HOW TO USE THIS MANUAL

IN00U-90

GENERAL INFORMATION

1. INDEX

An INDEX is provided on the first page of each section to guide you to the item to be repaired. To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page.

2. GENERAL DESCRIPTION

At the beginning of each section, a General Description is given that pertains to all repair operations contained in that section.

Read these precautions before starting any repair task.

3. TROUBLESHOOTING

TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause. The fundamentals of how to proceed with troubleshooting are described on page IN-22 .

Be sure to read this before performing troubleshooting.

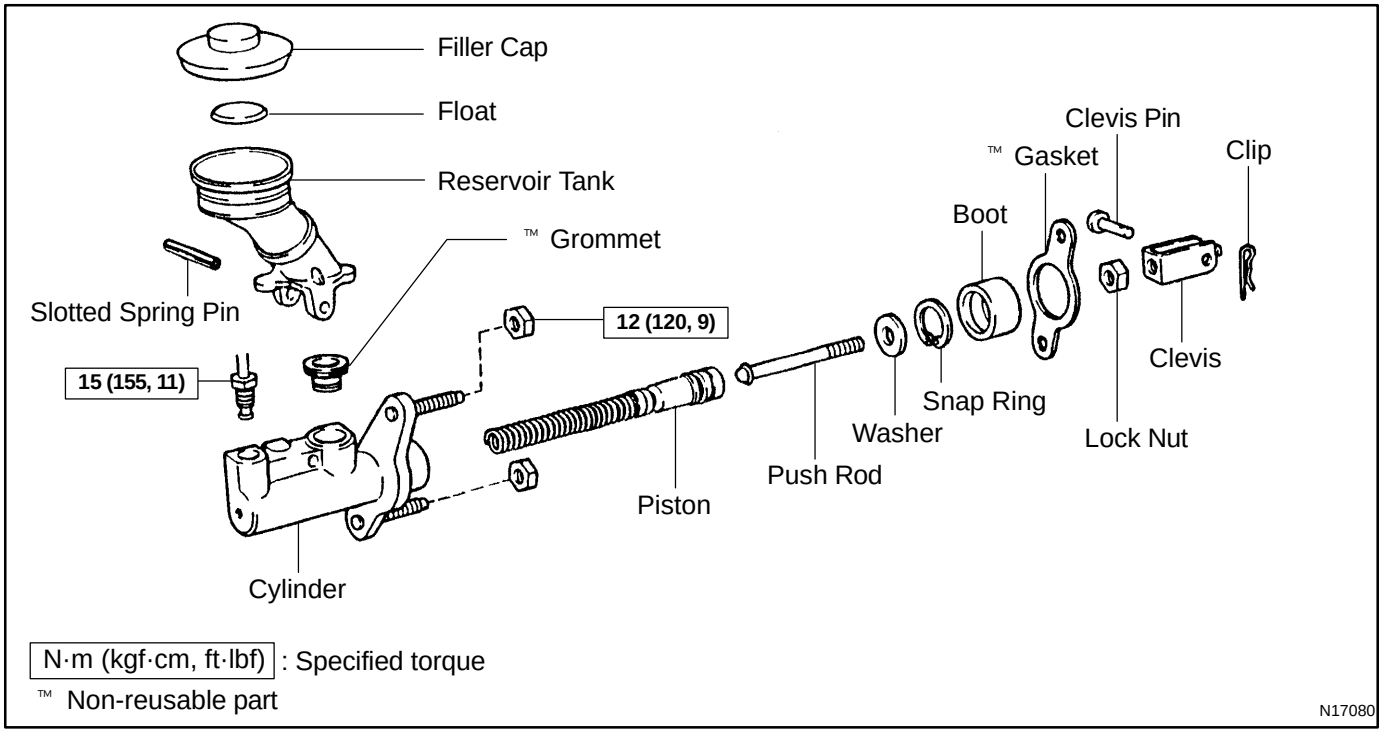
4. PREPARATION

Preparation lists the SST (Special Service Tools), recommended tools, equipment, lubricant and SSM (Special Service Materials) which should be prepared before beginning the operation and explains the purpose of each one.

5. REPAIR PROCEDURES

Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.

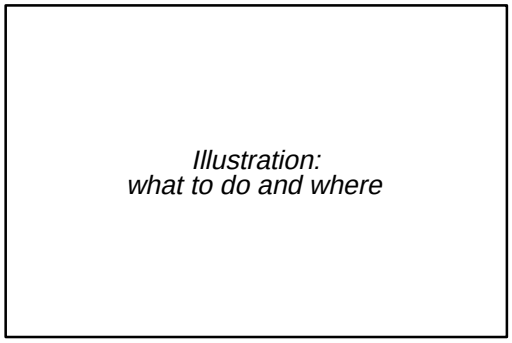
Example:



The procedures are presented in a step-by-step format:

- The illustration shows what to do and where to do it.
- The task heading tells what to do.
- The detailed text tells how to perform the task and gives other information such as specifications and warnings.

Example:



Task heading : what to do

21. CHECK PISTON STROKE OF OVERDRIVE BRAKE

(a) Place SST and a dial indicator onto the overdrive brake piston as shown in the illustration.

SST 09350-30020 (09350-06120)

Set part No. *Component part No.*

Detailed text : how to do task

(b) Measure the stroke applying and releasing the compressed air (392 — 785 kPa, 4 — 8 kgf/cm^2 or 57 — 114 psi) as shown in the illustration.

Piston stroke: 1.40 — 1.70 mm (0.0551 — 0.0669 in.)

Specification

This format provides the experienced technician with a FAST TRACK to the information needed. The upper case task heading can be read at a glance when necessary, and the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

6. REFERENCES

References have been kept to a minimum. However, when they are required you are given the page to refer to.

7. SPECIFICATIONS

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found in Service Specifications section for quick reference.

8. CAUTIONS, NOTICES, HINTS:

- CAUTIONS are presented presented in bold type, and indicate there is a possibility of injury to you or other people.
- NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- HINTS are separated from the text but do not appear in bold. They provide additional information to help you perform the repair efficiently.

9. SI UNIT

The UNITS given in this manual are primarily expressed according to the SI UNIT (International System of Unit), and alternately expressed in the metric system and in the English System.

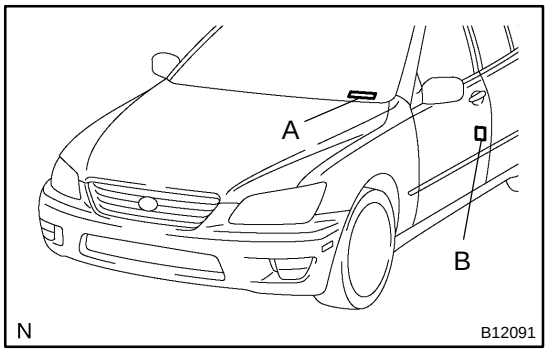
Example:

Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

IDENTIFICATION INFORMATION

IN04P-27

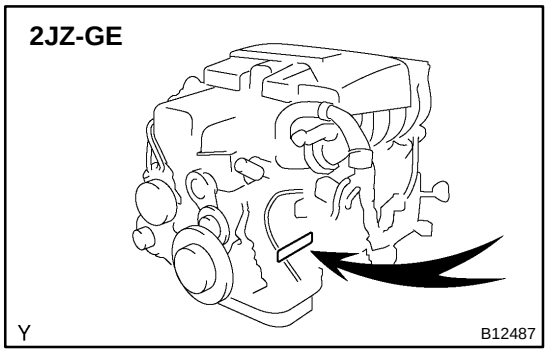
VEHICLE IDENTIFICATION AND ENGINE SERIAL NUMBER



1. VEHICLE IDENTIFICATION NUMBER

The vehicle identification number is stamped on the vehicle identification number plate and the certification label, as shown in the illustration.

A: Vehicle Identification Number Plate
B: Certification Label



2. ENGINE SERIAL NUMBER

The engine serial number is stamped on the engine block, as shown in the illustration.

REPAIR INSTRUCTIONS

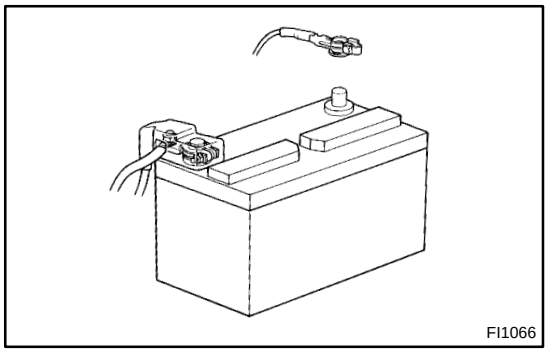
IN0DC-15

GENERAL INFORMATION

BASIC REPAIR HINT

(a) Prevent damage and maintain vehicle cleanliness by protective covering on the fender, seat and floor.

(b) During disassembly, line up parts in the order they were removed to facilitate reassembly.


FI1066

(c) Installation and removal of battery terminal:

(1) Before performing electrical work, disconnect the negative (-) terminal cable from the battery.

(2) If it is necessary to disconnect the battery for inspection or repair, first disconnect the negative (-) terminal cable.

(3) To prevent damage to the battery terminal when disconnecting the terminal cable, loosen the cable nut and raise the cable straight up. Do not twist or pry the cable off.

(4) Clean the battery terminals and cable ends with a clean shop rag. Do not scrape them with a file or other abrasive objects.

(5) Install the cable ends to the battery terminals after loosening the nut, and tighten the nut after installation. Do not use a hammer to tap the cable ends onto the terminals.

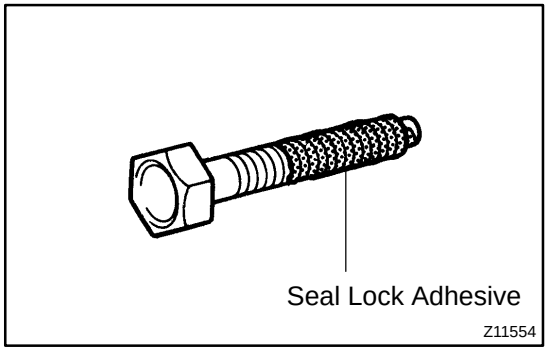
(6) Be sure the cover for the positive (+) terminal is properly in place.

(d) Check hose and wiring connectors to make sure that they are connected securely and correctly.

(e) Non-reusable parts:

(1) Always replace cotter pins, gaskets, O-rings, oil seals, etc. with new ones.

(2) Non-reusable parts are indicated in component illustrations by the " " symbols.



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(f) Precoated parts

Precoated parts are bolts, nuts, etc. that are coated with a seal lock adhesive at the factory.

(1) If a precoated part is retightened, loosened or move caused to in any way, it must be recoated with the specified adhesive.

(2) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply new seal lock adhesive to the bolt, nut or threads.

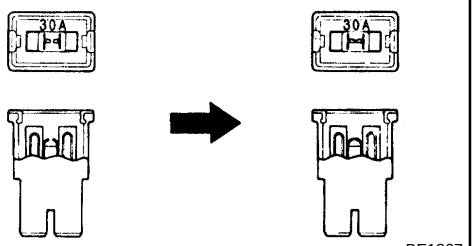
(3) Precoated parts are indicated in component illustrations by the "✓" symbols.

(g) When necessary, use a sealer on gaskets to prevent leaks.

(h) Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.

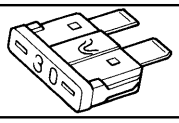
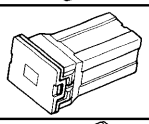
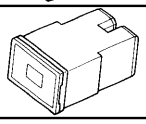
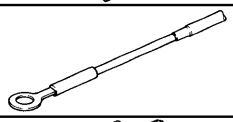
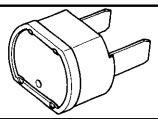
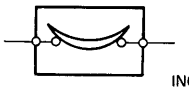
(i) Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found in the Preparation section in this manual.

Medium Current Fuse and High Current Fuse Equal Amperage Rating



BE1367

(j) When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.

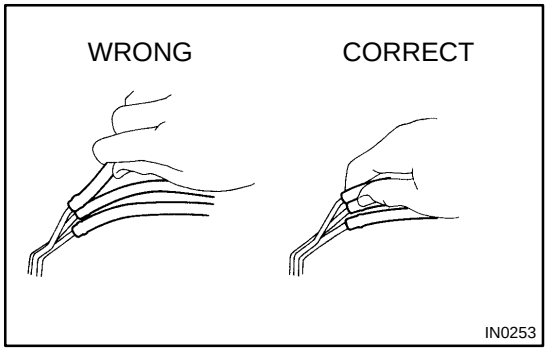
Illustration	Symbol	Part Name	Abbreviation
 BE5594	 IN0365	FUSE	FUSE
 BE5595	 IN0366	MEDIUM CURRENT FUSE	M-FUSE
 BE5596	 IN0367	HIGH CURRENT FUSE	H-FUSE
 BE5597	 IN0367	FUSIBLE LINK	FL
 BE5598	 IN0368	CIRCUIT BREAKER	CB

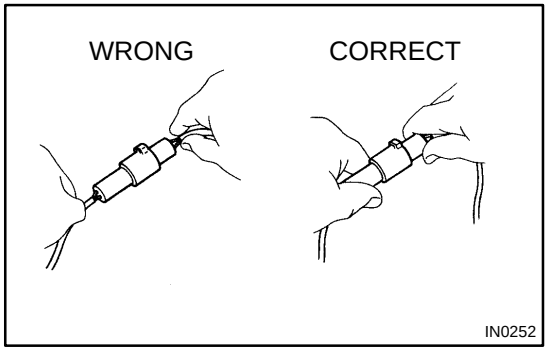
V00076

(k) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (see page IN-8).
- Release the parking brake on a level surface and shift to in Neutral or N range.
- When jacking up the front wheels of the vehicle, at first place chocks behind the rear wheels.
- When jacking up the rear wheels of the vehicle, place chocks in front of the front wheels.
- When jacking up only the front or rear wheels, set rigid racks and place chocks on front and behind the wheels in contact with the ground.
- After the vehicle is jacked up, be sure to support it on rigid racks. It is extremely dangerous to do any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.

(l) Observe the following precautions to avoid damage to the following parts:

(1) Do not open the cover or case of the ECU unless absolutely necessary. (Static electricity transmitted through human touch may destroy the IC.)





(2) To disconnect vacuum hoses, pull off the end of the hose, not the middle.

(3) To pull apart electrical connectors, pull on the connector itself, not the wires.

(4) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.

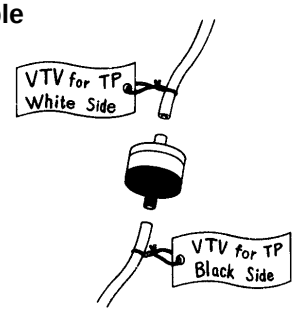
(5) When steam cleaning an engine, protect the electronic components, air filter and emission-related components from water.

(6) Never use an impact wrench to remove or install temperature switches or temperature sensors.

(7) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.

(8) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step-down adapter for adjustment. Once the hose has been stretched, it may leak air.

Example



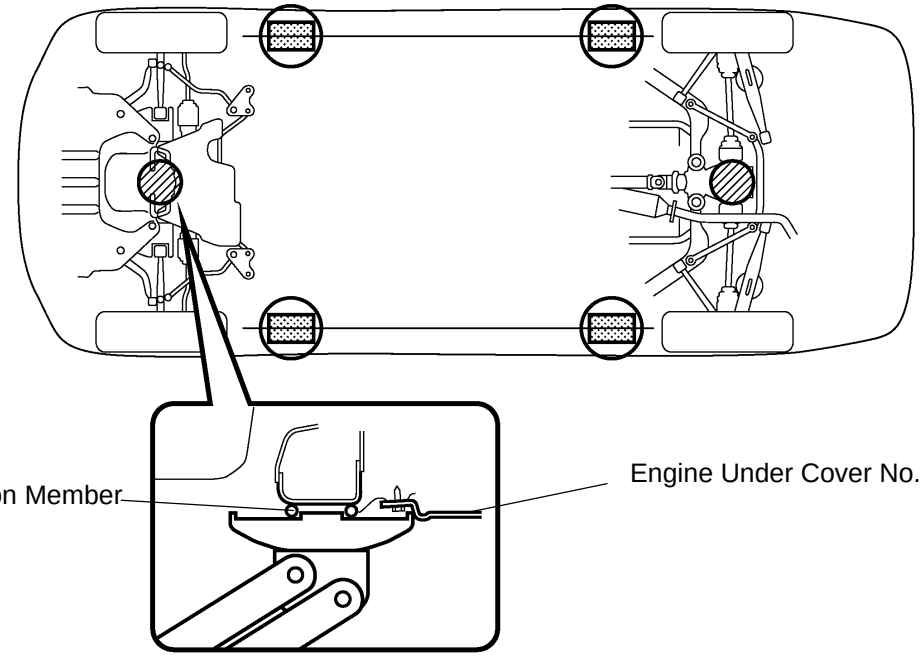
IN0002

(m) Installation and removal of vacuum hose:
  (1) When disconnecting vacuum hoses, use tags to identify where they should be reconnected to.
  (2) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

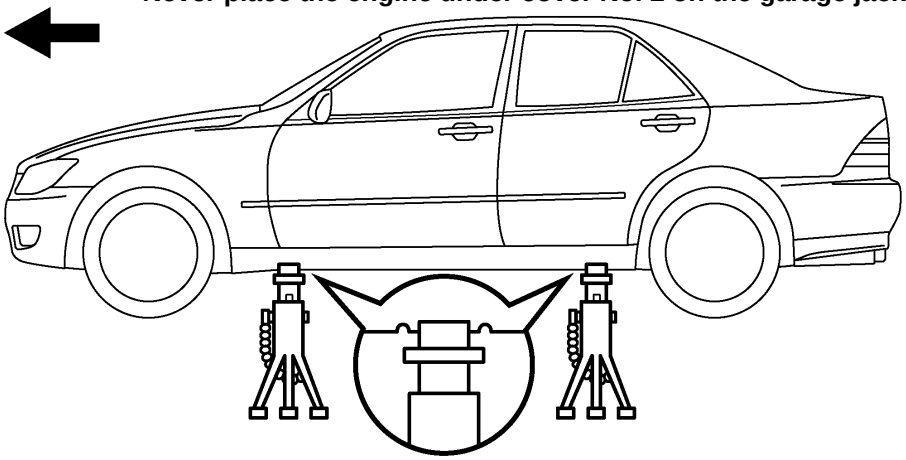
(n) Unless otherwise stated, all resistance should be measured at an ambient temperature of 20˚C (68˚F). Measurement should be made after the engine has cooled down. If measured at high temperatures immediately after the vehicle has been running, resistance may be outside specifications.

IN04O-16

VEHICLE LIFT AND SUPPORT LOCATIONS



NOTICE:
Never place the engine under cover No. 2 on the garage jack.



JACK POSITION

Front - - - - - - - - - - Front suspension member
Rear - - - - - - - - - - Differential carrier

CAUTION : **When jacking-up the front and rear, make sure the vehicle is not carrying any extra weight.**

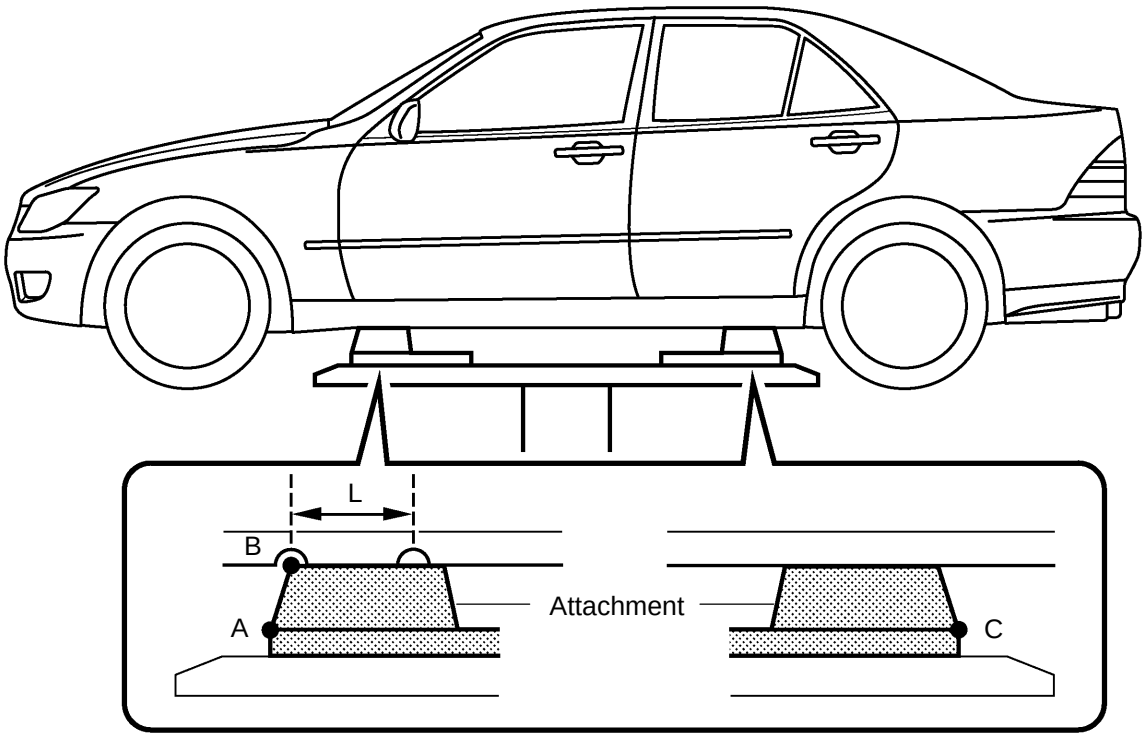
PANTOGRAPH JACK POSITION

SUPPORT POSITION

Safety stand and swing arm type lift -

I19098

Plate type lift



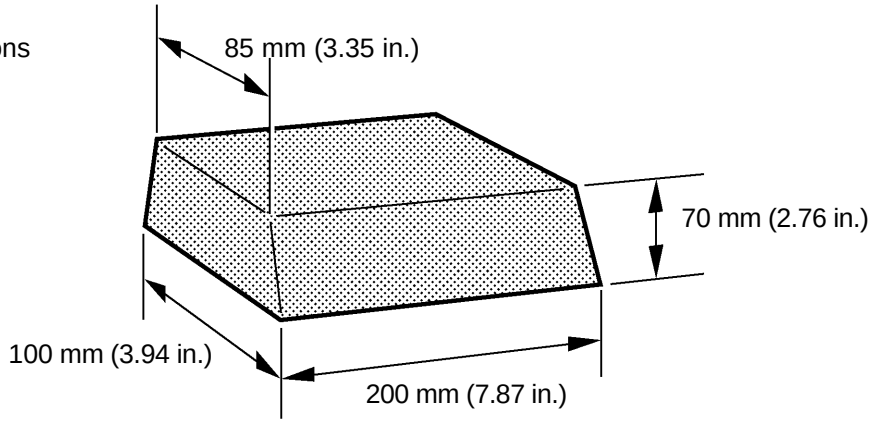
HINT :

Right and left set position	Place the vehicle over the center of the lift.
Front and rear set position	✓When using attachments, place the one for front side vertically and the one for rear side horizontally to the vehicle. ✓Align the cushion gum ends of the plate with the attachment lower ends (A, C). ✓Align the attachment upper end (B) with the rocker flange front side notch.

NOTICE :

Check the interference of the attachment with the front floor cover when placing the attachment on the plate.

Attachment dimensions



I19099

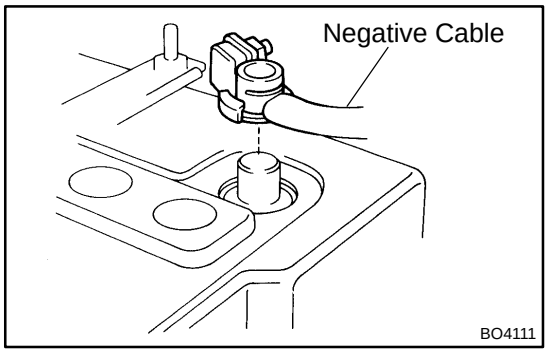
FOR ALL OF VEHICLES

IN0KE-01

PRECAUTION

1. FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

(a) The LEXUS IS300 is equipped with an Supplemental Restraint System (SRS), such as the driver airbag, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly and seat belt pretensioners.
Failure to carry out service operations in the correct sequence could cause the supplemental restraint system to unexpectedly deploy during servicing, possibly leading to a serious accident.
Further, if a mistake is made in servicing the supplemental restraint system, it is possible the SRS may fail to operate when required. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedure described in this manual.



(b) GENERAL NOTICE

(1) Malfunction symptoms of the SRS are difficult to confirm, so the diagnostic trouble codes become the most important source of information when troubleshooting. When troubleshooting the supplemental restraint system, always check the diagnostic trouble codes before disconnecting the battery (see page DI-597).

(2) Work must be started after 90 seconds from the time the ignition switch is turned to the LOCK position and the negative (-) terminal cable is disconnected from the battery.
(The supplemental restraint system is equipped with a back-up power source so that if work is started within 90 seconds of disconnecting the negative (-) terminal cable from the battery, the SRS may deploy.)
When the negative (-) terminal cable is disconnected from the battery, memory of the clock and audio systems will be cancelled. So before starting work, make a record of the contents memorized by the each memory system. Then when work is finished, reset the clock and audio systems as before.
To avoid erasing the memory of each memory system, never use a back-up power supply from another battery.

(3) Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad (see page RS- 17), front passenger airbag assembly (see page RS- 31), side airbag assembly (see page RS-44), curtain shield airbag assembly (see page RS-58), front airbag sensor (see page RS-74), side and curtain shield airbag sensor assembly (see page RS-79) and seat belt pretensioner (see page BO-220) should be inspected.

(4) Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.

(5) Before repairs, remove the airbag sensor if shocks are likely to be applied to the sensor during repairs.

(6) Never disassemble and repair the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, front air-bag sensor, side and curtain shied airbag sensor assembly or seat belt pretensioner.

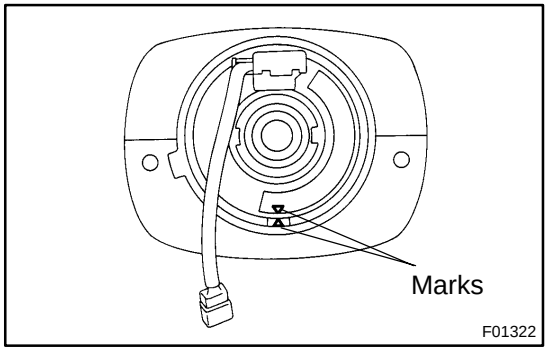
(7) Replace if the airbag sensor, steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, front airbag sensor assembly or seat belt pretensioner if it has been dropped, or if there are cracks, dents or other defects in its case, bracket or connector.

(8) Do not directly expose the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, front airbag sensor, side and curtain shied airbag sensor assembly or seat belt pretensioner to hot air or flames.

(9) Use a voltmeter/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting of the electrical circuit.

(10) Information labels are attached to the periphery of the SRS components. Follow the instructions on the labels.

(11) After work on the SRS is completed, check the SRS warning light (see page DI-597).



(c) SPIRAL CABLE (in Combination Switch)
The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, otherwise cable disconnection and other troubles may result. Refer to SR-25 of this manual concerning correct steering wheel installation.

(d) STEERING WHEEL PAD (with Airbag)

(1) When removing the steering wheel pad or handling a new steering wheel pad, it should be placed with the pad top surface facing up see illustration below. Storing the pad with its metallic surface facing upward may lead to a serious accident if the airbag inflates. In addition, do not store a steering wheel pad on top of one another.

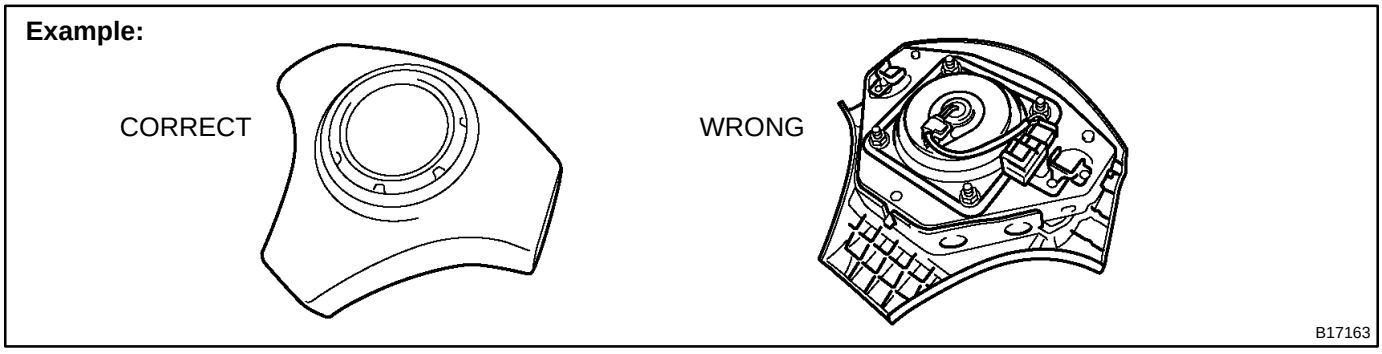
(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which is could cause serious injury.

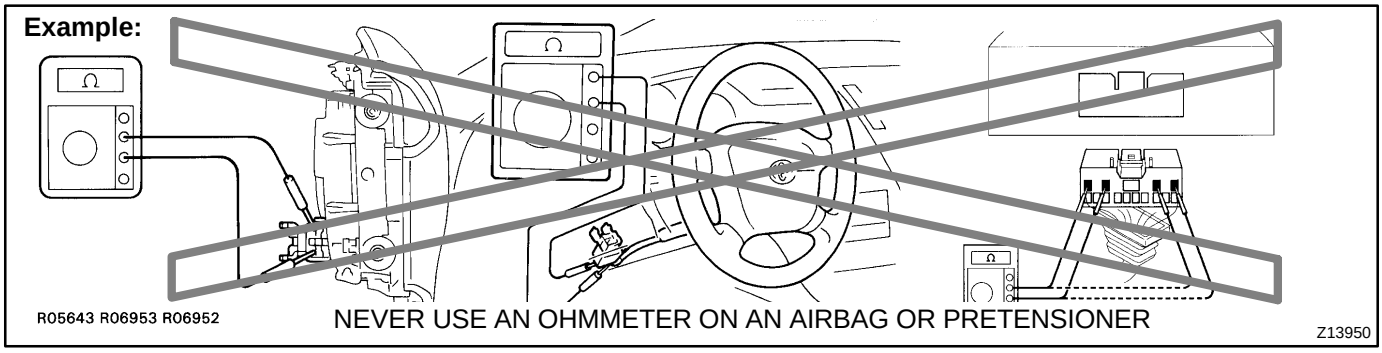
(3) Grease or detergents of any kind should not be applied to the steering wheel pad.

(4) Store the steering wheel pad where the ambient temperature remains below 93˚C (200˚F), has low humidity and is away from electrical noise.

(5) Before using an electric welder, first disconnect the airbag connector (the connector is yellow and has 4 pins) under the steering column near the combination switch connector.

(6) As a safety measure, always deploy airbags using an SST before disposal (see page RS-17). Deploy airbags in a safe place away from electrical noise.





(e) FRONT PASSENGER AIRBAG ASSEMBLY

(1) Always store a removed or new front passenger airbag assembly with the airbag deployment direction facing up.
Storing the airbag assembly with the airbag deployment direction facing down could cause a serious accident if the airbag inflate.

(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which is could cause serious injury.

(3) Grease or detergents of any kind should not be applied to the steering wheel pad.

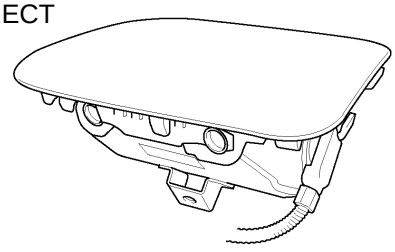
(4) Store the steering wheel pad where the ambient temperature remains below 93˚C (200˚F), has low humidity and is away from electrical noise.

(5) Before using an electric welder, first disconnect the airbag connector (the connector is yellow and has 4 pins) under the steering column near the combination switch connector.

(6) As a safety measure, always deploy airbags using an SST before disposal (see page RS-31).
Deploy airbags in a safe place away from electrical noise.

Example:

CORRECT



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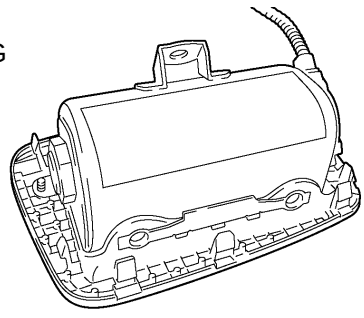
WRONG



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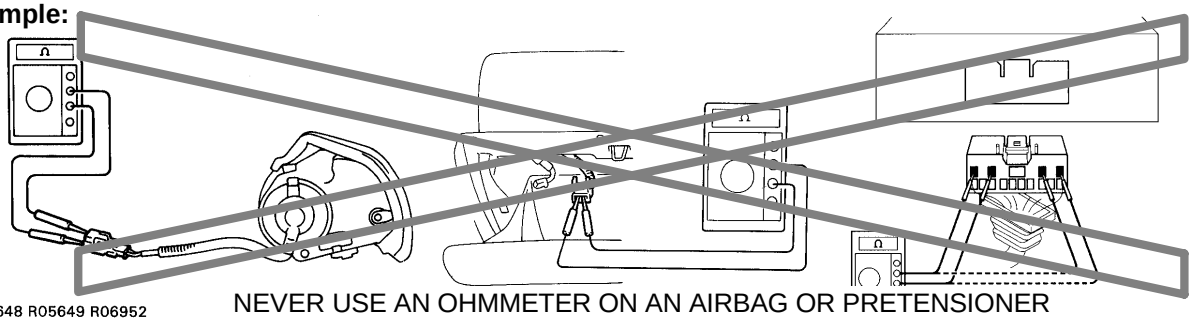
Example:



R05648 R05649 R06952

NEVER USE AN OHMMETER ON AN AIRBAG OR PRETENSIONER

Z13951

(f) SIDE AIRBAG ASSEMBLY

(1) Always store a removed or new side airbag assembly with the airbag deployment direction facing up. Storing the airbag assembly with the airbag deployment direction facing down could cause a serious accident if the airbag inflates.

(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which could cause serious injury.

(3) Grease or detergents of any kind should not be applied to the steering wheel pad.

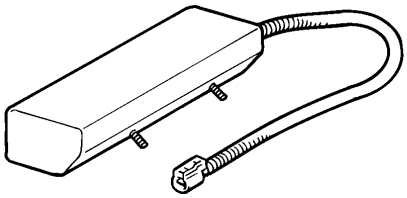
(4) Store the steering wheel pad where the ambient temperature remains below 93˚C (200˚F), has low humidity and is away from electrical noise.

(5) Before using an electric welder, first disconnect the airbag connector (the connector is yellow and has 2 pins) under the steering column near the combination switch connector.

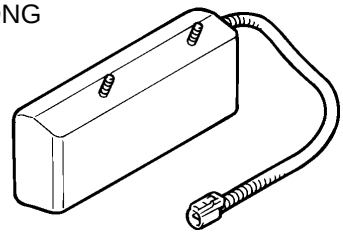
(6) As a safety measure, always deploy airbags using an SST before disposal (see page RS-44). Deploy airbags in safe place away from electrical noise.

Example:

CORRECT

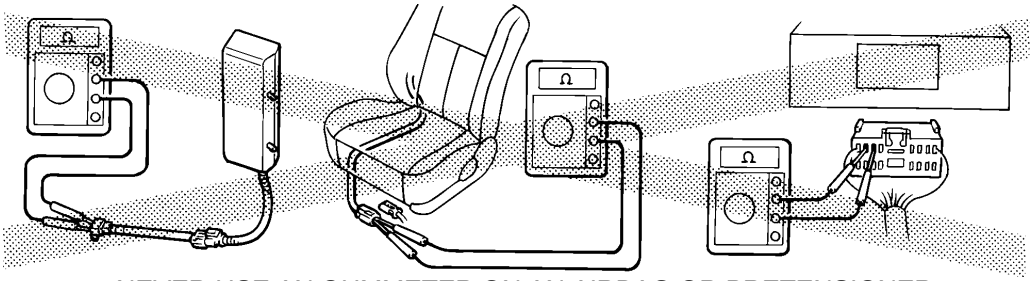


WRONG



B17197

Example:



NEVER USE AN OHMMETER ON AN AIRBAG OR PRETENSIONER

B01546

(g) CURTAIN SHIELD AIRBAG ASSEMBLY

(1) Always store a removed or new side airbag assembly with the airbag deployment direction facing up. Storing the airbag assembly with the airbag deployment direction facing down could cause a serious accident if the airbag inflates.

NOTICE:

Plastic bag is not re-useable.

CAUTION:

Never disassemble the curtain shield airbag assembly.

(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which could cause serious injury.

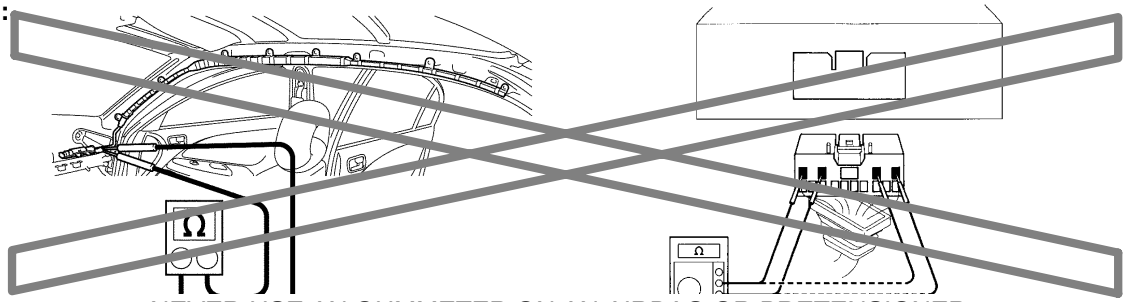
(3) Grease or detergents of any kind should not be applied to the curtain shield airbag assembly.

(4) Store the steering wheel pad where the ambient temperature remains below 93˚C (200˚F), has low humidity and is away from electrical noise.

(5) Before using an electric welder, first disconnect the airbag connector (the connector is yellow and has 2 pins) under the steering column near the combination switch connector.

(6) As a safety measure, always deploy airbags using an SST before disposal (see page RS-59). Deploy airbags in a safe place away from electrical noise.

Example:



H12059R06952 P NEVER USE AN OHMMETER ON AN AIRBAG OR PRETENSIONER B08605

(h) SEAT BELT PRETENSIONER

(1) Never measure the resistance of the seat belt pretensioner. This may cause the seat belt pretensioner to activate, which could cause serious injury.

(2) Never disassemble the seat belt pretensioner.

(3) Never install the seat belt pretensioner in another vehicle.

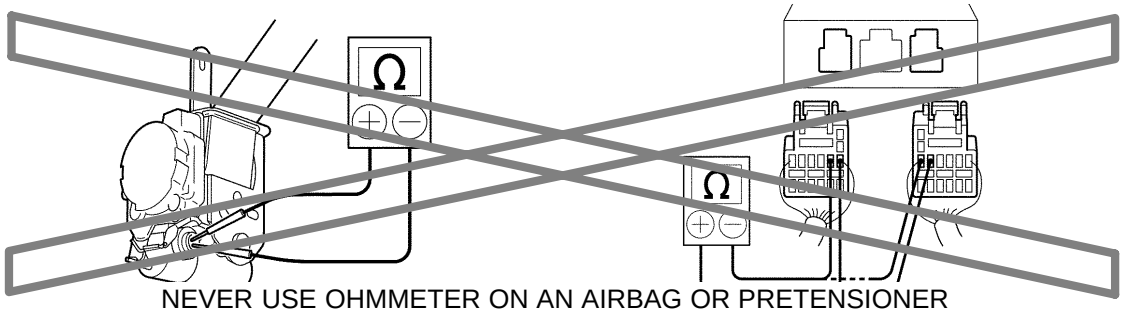
(4) Store the seat belt pretensioner where the ambient temperature remains below 80˚C (176˚F), has low humidity and is away from electrical noise.

(5) Before using an electric welder, first disconnect the connector (the connector is yellow and has 2 pins).

(6) As a safety measure, always activate the seat belt pretensioner before disposal (see page BO-220). Activate the pretensioner in safe place away from electrical noise.

(7) The seat belt pretensioner becomes hot after activation. Allow it to cool before disposing. Never use water to cool seat belt pretensioner.

Example:



NEVER USE OHMMETER ON AN AIRBAG OR PRETENSIONER

B02121

(i) AIRBAG SENSOR ASSEMBLY

(1) If an airbag sensor assembly has been involved in a collision where its SRS has deployed, do not re-use it.

(2) The connectors to the airbag sensor assembly should be connected or disconnected with the sensor mounted on the floor. Failure to do so could cause undesired deployment of the SRS.

(3) To avoid serious injury, servicing the SRS must be started 90 seconds after:

- The ignition switch is turned to the LOCK position.
- The negative (-) terminal cable is disconnected from the battery.

Even if only loosening the set bolts of the airbag sensor assembly, you must follow the above guidelines.

(j) WIRE HARNESS AND CONNECTOR

The SRS wire harness is integrated with the instrument panel wire harness assembly. All the connectors in the system are a standard yellow color. If the SRS wire harness becomes disconnected or the connector becomes broken, etc., repair or replace it as shown on page RS-82 .

2. FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER

CAUTION:

If large amount of unburned gasoline flows into the converter, it may overheat and create a fire hazard. To prevent this, observe the following precautions and explain them to your customer.

(a) Use only unleaded gasoline.

(b) Avoid prolonged idling.
Avoid running the engine at idle speed for more than 20 minutes.

(c) Avoid spark jump test.
(1) Perform spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
(2) While testing, never race the engine.

(d) Avoid prolonged engine compression measurement.
Engine compression tests must be done as rapidly as possible.

(e) Do not run engine when fuel tank is nearly empty.
This may cause the engine to misfire and create an extra load on the converter.

(f) Avoid coasting with ignition turned off.

(g) Do not dispose of used catalyst along with parts contaminated with gasoline or oil.

3. IF VEHICLE IS EQUIPPED WITH MOBILE COMMUNICATION SYSTEM

For vehicles with mobile communication systems such as two-way radios and cellular telephones, observe the following precautions.

(1) Install the antenna as far as possible away from the ECU and sensors of the vehicle's electronic system.

(2) Install the antenna feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle's electronic systems. For details about ECU and sensors locations, refer to the section on the applicable component.

(3) Avoid winding the antenna feeder together with other wiring as much as possible, and also avoid running the antenna feeder parallel with other wire harnesses.

(4) Check that the antenna and feeder are correctly adjusted.

(5) Do not install powerful mobile communications system.

4. FOR USING OBD II SCAN TOOL OR HAND-HELD TESTER

CAUTION:

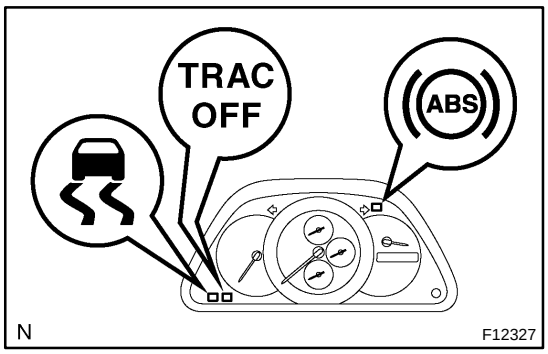
Observe the following items for safety reasons:

- **Before using the OBD II scan tool or hand-held tester, the OBD II scan tool's instruction book or hand-held tester's operator manual should be read thoroughly.**
- **Be sure to route all cables securely when driving with the OBD II scan tool or hand-held tester connected to the vehicle. (i.e. Keep cables away from feet, pedals, steering wheel and shift lever.)**
- **Two persons are required when test driving with the OBD II scan tool or hand-held tester, one person to drive the vehicle and the other person to operate the OBD II scan tool or hand-held tester.**

5. FOR VEHICLES EQUIPPED WITH TRACTION CONTROL (TRAC) SYSTEM

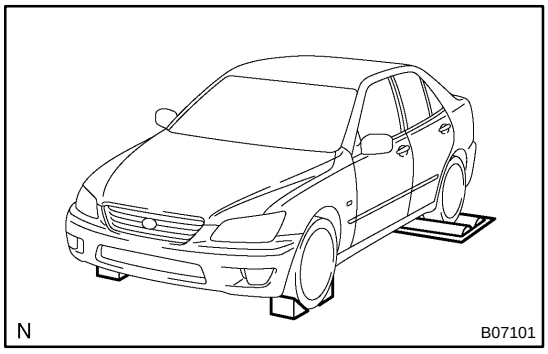
NOTICE:

When using a 2-wheel drum tester such as a speedometer tester or chassis dynamometer, etc., or jacking up the rear wheels and driving the wheels, always push in the TRAC cut switch and turn the TRAC system OFF.



(a) Press the TRAC cut switch.
(b) Check that the TRAC system is turned OFF by the TRAC cut switch.

HINT:
The SLIP indicator light should be always ON immediately after the engine is restarted.

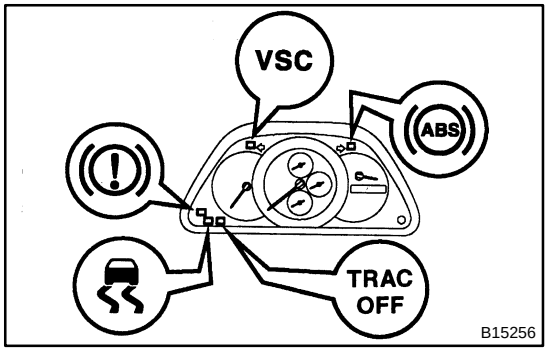


(c) Begin measurements.
(d) Press the TRAC cut switch to turn the TRAC to the operative mode and check that the TRAC OFF indicator light goes off.

HINT:
The SLIP indicator light blinks when the TRAC system is operational.

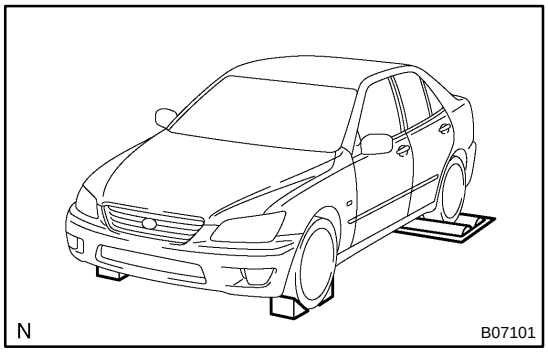
6. FOR VEHICLES EQUIPPED WITH VEHICLE SKID CONTROL (VSC) SYSTEM

NOTICE:
When using 2-wheel drum tester such as a speedometer tester or chassis dynamometer, etc., or jacking up the front wheels and driving the wheels, always push in the VSC OFF switch to turn the VSC system OFF.



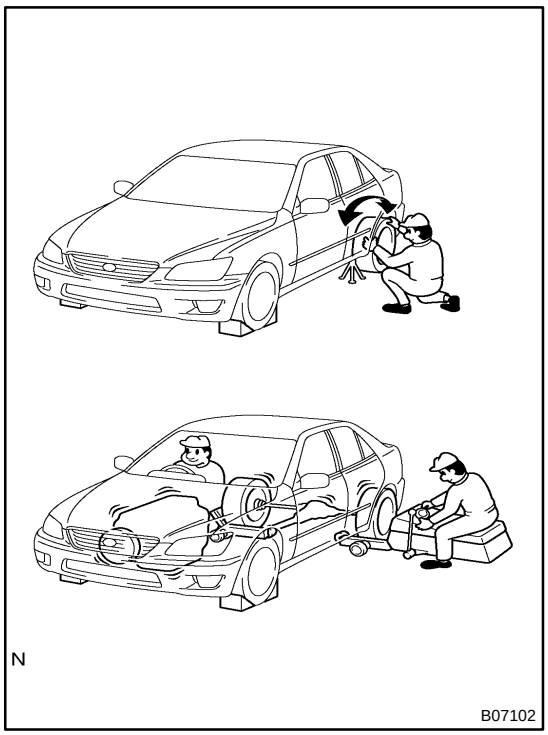
(a) Press the VSC OFF switch.
(b) Check that the VSC OFF indicator light comes ON.

HINT:
The VSC OFF indicator light should be always OFF when the engine is restarted.



(c) Begin measurements.
(d) Press the VSC OFF switch again to change the VSC system to operational condition and check that the VSC OFF indicator light goes off.

HINT:
The SLIP indicator light blinks and the VSC buzzer sounds when the VSC system is operational.



7. FOR VEHICLES EQUIPPED WITH LIMITED SLIP DIFFERENTIAL

(a) Never apply driving force when RH or LH rear wheel only is touching the ground.

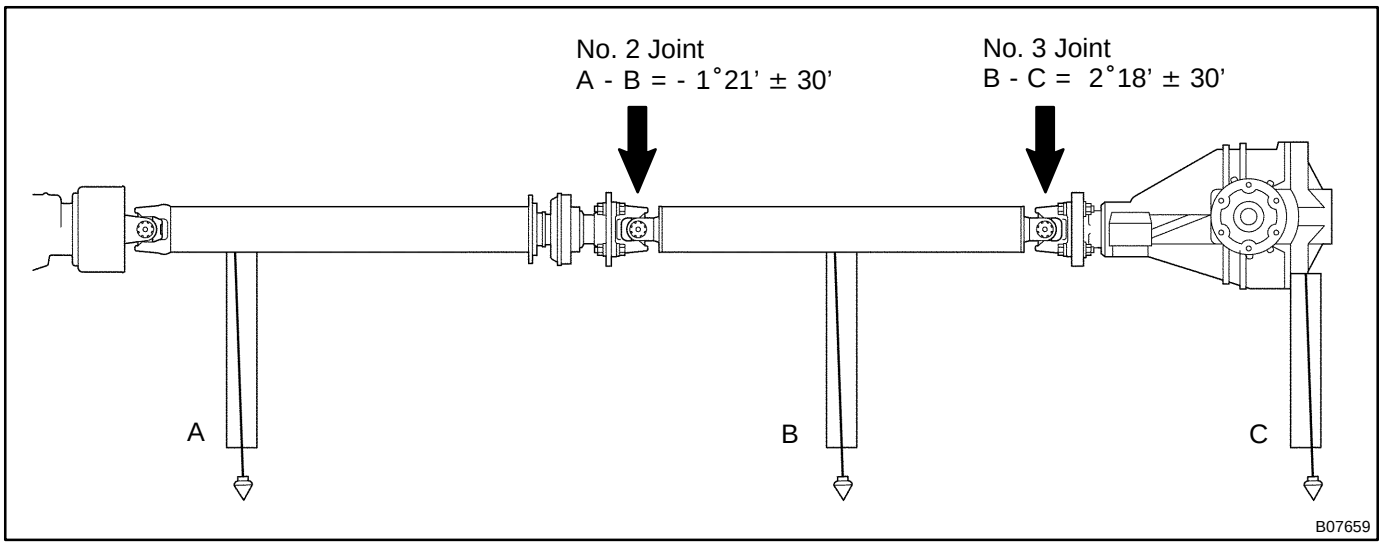
(b) During service/rectification work never spin (race) the RH or LH rear wheel only such as with ON-The-Car type wheel balancer, both rear wheels must be off the ground.

HINT:

- In case of the above, due to the construction of the LSD the driving force is transmitted to the opposite wheel and therefore it is possible for the vehicle to start suddenly if only one rear wheel is off the ground. Furthermore it could result in component damage to the LSD due to the loads acting on it.
- Always raise both rear wheels off the ground and support the vehicle on suitable safety stand.

8. INSPECTION AND ADJUSTMENT OF JOINT ANGLE DURING REMOVAL AND INSTALLATION OF PROPELLER SHAFT

When performing operations which involve the removal and installation of the propeller shaft, always check the joint angle. Make adjustments if necessary (see page PR-1 1).



HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

IN04S-45

GENERAL INFORMATION

A large number of ECU controlled systems are used in the LEXUS IS300. In general, ECU controlled systems are considered to be a very intricate, requiring a high level of technical knowledge to troubleshoot. However, following the problem checking procedures of the ECU controlled system's circuits carefully is not complex. If you have an adequate understanding of the system and a basic knowledge of electricity, accurate diagnosis and necessary repair can be performed.

This manual emphasizes the above standpoint to help service technicians perform accurate and effective troubleshooting. Detailed information on major ECU controlled systems in this vehicle are outlined below:

System	Page
1. Engine	DI-1
2. Automatic Transmission	DI-325
3. ABS with EBD & BA & TRAC System	DI-425
4. ABS with EBD & BA & TRAC & VSC System	DI-495
5. Supplemental Restraint System	DI-595
6. Theft Deterrent System	DI-766
7. Cruise Control System	DI-808
8. Engine Immobiliser System	DI-839
9. Combination Meter System	DI-860
10.Body Control System	DI-883
11.Multiplex Communication System	DI-939
12.LEXUS Navigation System	DI-969
13.Air Conditioning System	DI-999

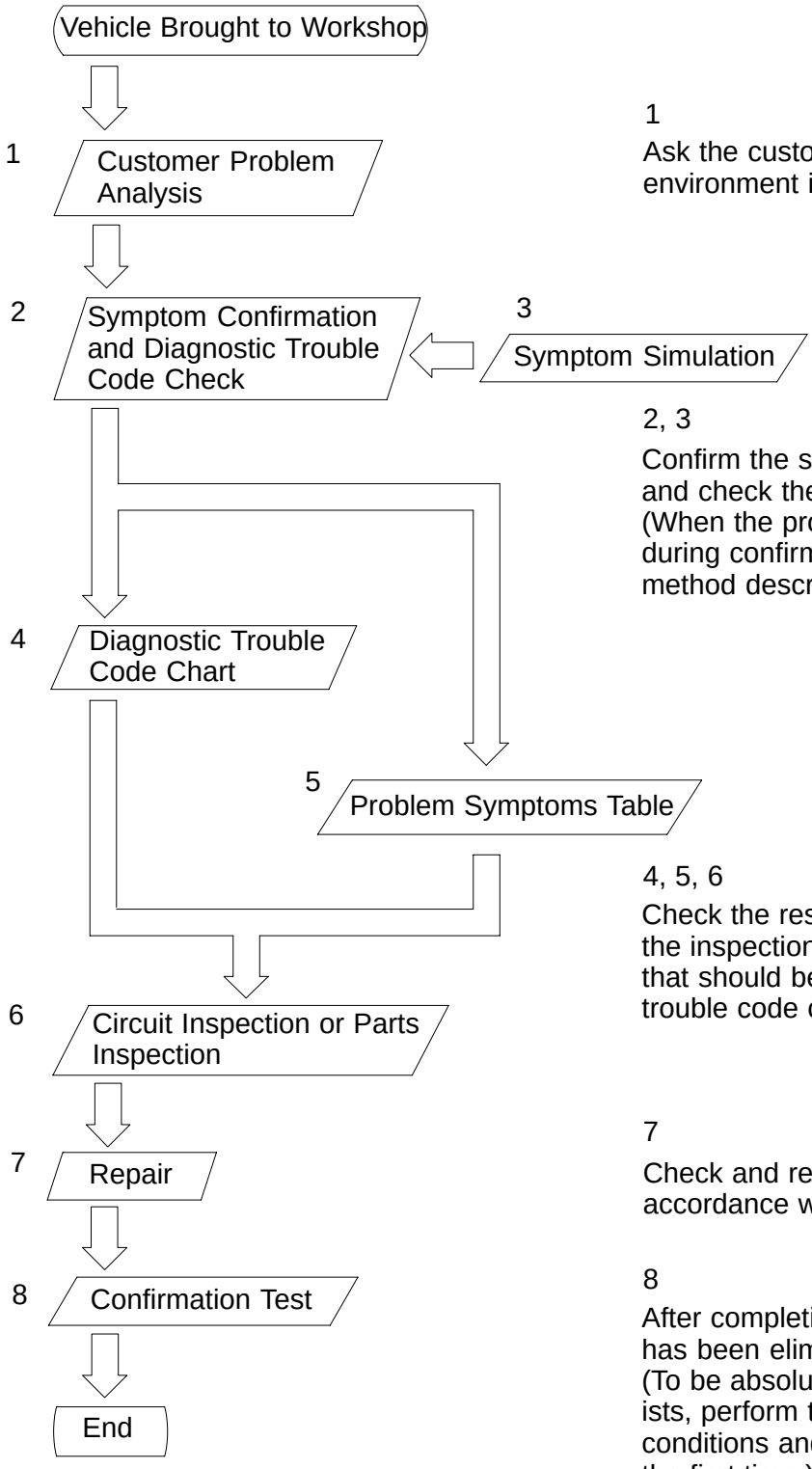
FOR USING OBDII SCAN TOOL OR HAND-HELD TESTER

- Before using the scan tool or tester, the scan tool's instruction book or tester's operator manual should be read thoroughly.
- If the scan tool or tester cannot communicate with ECU controlled systems when you have connected the cable of the scan tool or tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.
  (1) If communication is normal when the tool is connected to another vehicle, inspect the diagnosis data link line (Bus ± line) or ECU power circuit of the vehicle.
  (2) If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so perform the Self Test procedures outlined in the Tester Operator's Manual.

IN04T-22

HOW TO PROCEED WITH TROUBLESHOOTING

Carry out troubleshooting in accordance with the procedure below. Only a basic procedure is shown. Details in the Diagnostics section show the most effective methods for each circuit. Confirm troubleshooting procedures first for the relevant circuit before beginning troubleshooting of that circuit.



1

Ask the customer about the conditions and the environment in which the problem occurred.

2, 3

Confirm the symptoms and the problem conditions, and check the diagnostic trouble codes.
(When the problem symptoms do not appear during confirmation, use the symptom simulation method described later on.)

4, 5, 6

Check the results obtained in Step 2. Confirm the inspection procedure for the system or the part that should be checked using the diagnostic trouble code chart or the problem symptoms table.

7

Check and repair the affected system or part in accordance with the instructions in Step 6.

8

After completing repairs, confirm that the problem has been eliminated.
(To be absolutely sure the problem no longer exists, perform the confirmation test under the same conditions and environment as when it occurred the first time.)

1. CUSTOMER PROBLEM ANALYSIS

™ The 5 items in the table below are important points in the problem analysis:

™ In troubleshooting, the problem symptoms must be confirmed accurately. Preconceptions should be discarded in order to give an accurate judgement. To ascertain what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time it occurred.

Important Points in the Customer Problem Analysis

- What ----- Vehicle model, system name
- When ----- Date, time, occurrence frequency
- Where ----- Road conditions
- Under what conditions? ----- Running conditions, driving conditions, weather conditions
- How did it happen? ----- Problem symptoms

(Sample) Supplemental restraint system check sheet.

CUSTOMER PROBLEM ANALYSIS CHECK

SUPPLEMENTAL RESTRAINT SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		**VIN**	
		Production Date	/ /
		Licence No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other
Temperature	Approx.

Vehicle Operation	☐ Starting ☐ Idling ☐ Driving [☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ Other]

2. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE CHECK

The diagnostic system in the LEXUS IS300 fulfills various functions.

™ The first function is the Diagnostic Trouble Code (DTC) Check. In a DTC Check,a previous malfunction's DTC can be checked by a technician during troubleshooting. (A DTC is a code stored in the ECU memory whenever a malfunction in the signal circuits to the ECU occurs.)

™ Another function is the Input Signal Check, which checks if the signals from various switches are sent to the ECU correctly. By using these check functions, the problem areas can be narrowed down and troubleshooting is more effective. Diagnostic functions are incorporated in the following systems in the LEXUS IS300.

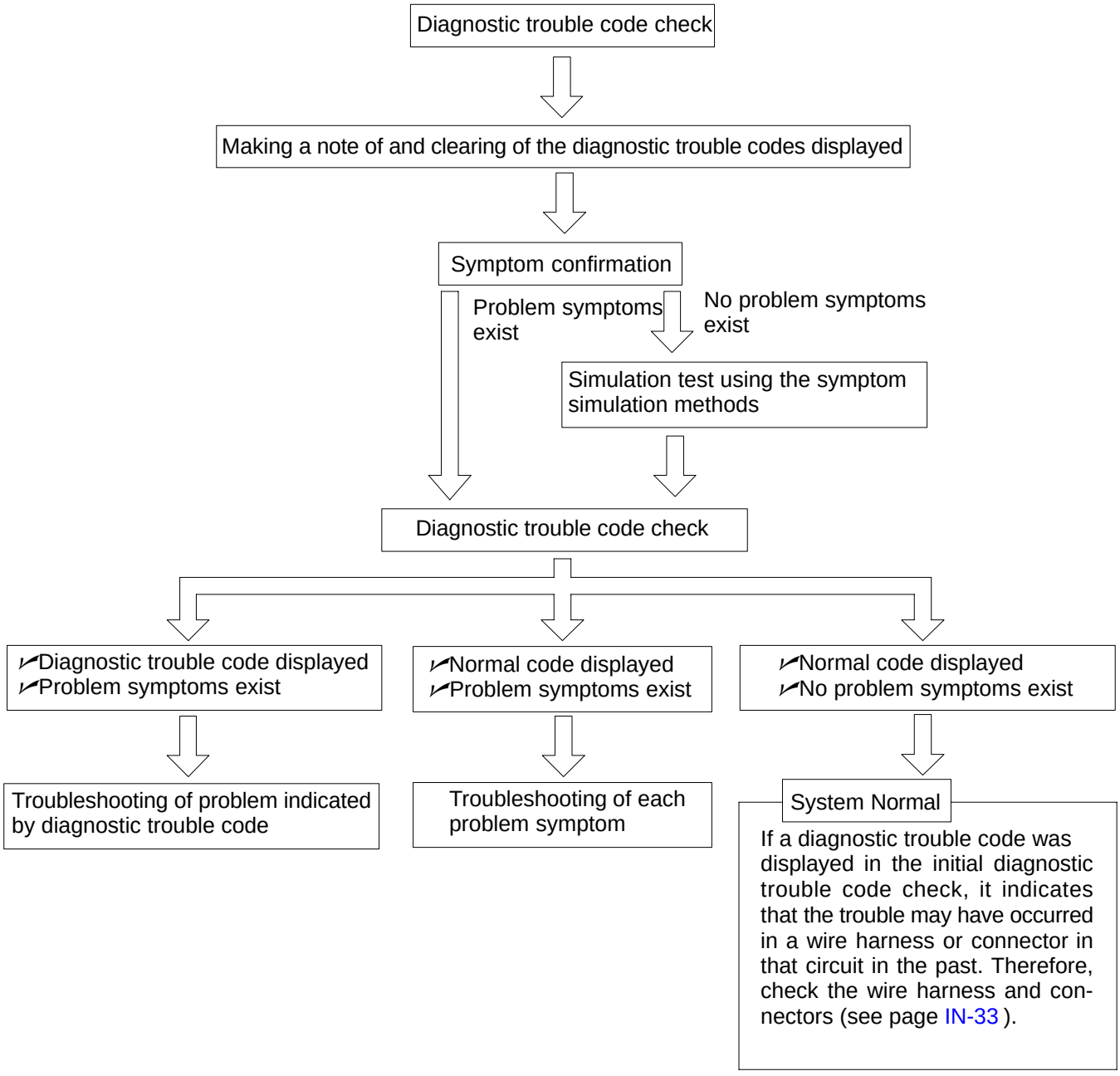
System	Diagnostic Trouble Code Check	Input Signal Check (Sensor Check)	Diagnostic Test Mode (Active Test)
Engine	¿ (with Check Mode)	¿	¿
Automatic Transmission	¿ (with Check Mode)	¿	
ABS with EBD & BA & TRAC System	¿	¿	¿
ABS with EBD & BA & TRAC & VSC System	¿	¿	¿
Supplemental Restraint System	¿		
Theft Deterent System			¿
Cruise Control System	¿	¿	
Engine Immobiliser System	¿		
Combination Meter System			¿
Body Control System			¿
Multiplex Communication System	¿		¿
LEXUS Navigation System			¿
Air Conditioning System	¿		¿

In diagnostic trouble code check, it is very important to determine whether the problem indicated by the diagnostic trouble code is still occurring or occurred in the past but returned to normal at present. In addition, it must be checked in the problem symptom check whether the malfunction indicated by the diagnostic trouble code is directly related to the problem symptom or not. For this reason, the diagnostic trouble codes should be checked before and after the symptom confirmation to determine the current conditions, as shown in the table below. If this is not done, it may, depending on the case, result in unnecessary troubleshooting for normally operating systems, thus making it more difficult to locate the problem, or in repairs not pertinent to the problem. Therefore, always follow the procedure in correct order and perform the diagnostic trouble code check.

DIAGNOSTIC TROUBLE CODE CHECK PROCEDURE

Diagnostic Trouble Code Check (Make a note of and then clear)	Confirmation of Symptoms	Diagnostic Trouble Code Check	Problem Condition
Diagnostic Trouble Code Display	Problem symptoms exist	Same diagnostic trouble code is displayed	Problem is still occurring in the diagnostic circuit
		Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit (The diagnostic trouble code displayed first is either for a past problem or it is a secondary problem)
	No problem symptoms exist		The problem occurred in the diagnostic circuit in the past
Normal Code Display	Problem symptoms exist	Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit
	No problem symptoms exist	Normal code is displayed	The problem occurred in a place other than in the diagnostic circuit in the past

Taking into account the points on the previous page, a flow chart showing how to proceed with troubleshooting using the diagnostic trouble code check is shown below. This flow chart shows how to utilize the diagnostic trouble code check effectively, then by carefully checking the results, indicates how to proceed either to diagnostic trouble code troubleshooting or to troubleshooting of problem symptoms table.



3. SYMPTOM SIMULATION

The most difficult case in troubleshooting is when no problem symptoms occurring. In such cases, a thorough customer problem analysis must be carried out. Then simulate a simulation of the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be carried out. No matter how much skill or experience a technician has, troubleshooting without confirming the problem symptoms will lead to something important in the repair operation being overlooked and lead to mistakes or delays in repairs.

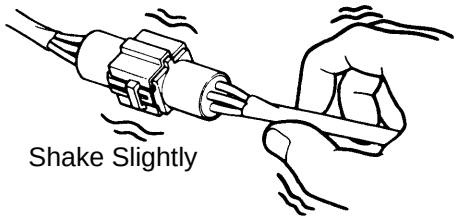
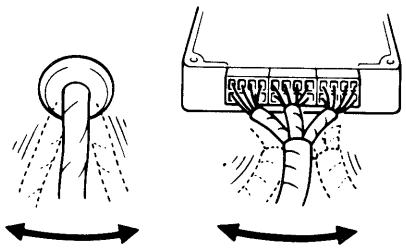
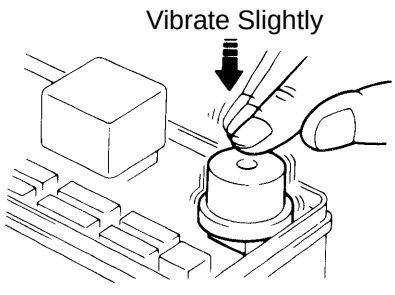
For example:

With a problem that only occurs when the engine is cold, or occurs as result of vibration caused by road during driving, the problem can never be determined as long as the symptoms are being checked on stationary vehicle or a vehicle with a warmed-up engine.

Vibration, heat or water penetration (moisture) is difficult to reproduce. The symptom simulation tests below are effected substitutes for the conditions and can be applied on a stationary vehicle.

Important Points in the Symptom Simulation Test:

In the symptom simulation test, the problem symptoms as well as problem area or parts must be confirmed. First, narrow down the possible problem circuits according to the symptoms. Then, connect the tester and carry out the symptom simulation test, judging whether the circuit being tested is defective or normal, and also confirming the problem symptoms at the same time. Refer to the problem symptoms table for each system to narrow down the possible causes of the symptom.

1	**VIBRATION METHOD: When vibration seems to be the major cause.**
CONNECTORS Slightly shake the connector vertically and horizontally. **WIRE HARNESS** Slightly shake the wire harness vertically and horizontally. The connector joint, fulcrum of the vibration, and body through portion are the major areas that should be checked thoroughly.	  FI2331 FI2332
PARTS AND SENSOR Apply slight vibration with a finger to the part of the sensor considered to be the cause of the problem and check whether or not the malfunction occurs. HINT: Applying strong vibration to relays may result in open relays.	 FI2330

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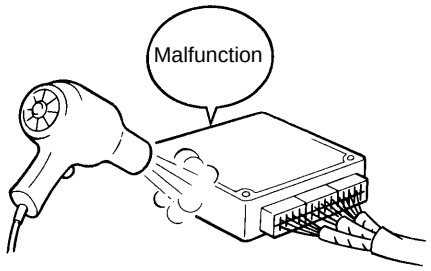
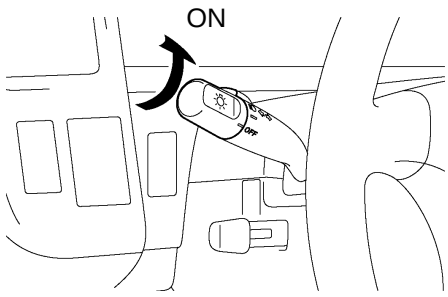
2	**HEAT METHOD: When the problem seems to occur when the suspect area is heated.**
Heat the component that is the likely cause of the malfunction with a hair dryer or similar device. Check whether or not if the malfunction occurs. **NOTICE:** **(1) Do not heat to more than 60˚C (140˚F). (Exceeding this temperature may damage components.)** **(2) Do not apply heat directly to parts in the ECU.**	 FI2334
3	**WATER SPRINKLING METHOD: When the malfunction seems to occur on a rainy day or in a high-humidity condition.**
Sprinkle water onto the vehicle and check whether or not if the malfunction occurs. **NOTICE:** **(1) Never sprinkle water directly into the engine compartment. Indirectly change the temperature and humidity by applying water spray onto the front of the radiator.** **(2) Never apply water directly onto electronic components.** HINT: If a vehicle is subject to water leakage, the leaked water may damage the ECU. When testing a vehicle with a water leakage problem, special caution must be taken.	 FI6649
4	**OTHER: When a malfunction seems to occur when electrical load is excessive.**
Turn on all electrical loads including the heater blower, head lights, rear window defogger, etc. and check to see if the malfunction occurs.	 B02389

B02390

4. DIAGNOSTIC TROUBLE CODE CHART

Use Diagnostic Trouble Codes (DTCs) (from the DTC checks) in the table below to determine the trouble area and proper inspection procedure. The engine diagnostic trouble code chart is shown below as an example.

- DTC No.
  Indicates the diagnostic trouble code.
- Page or Instructions
  Indicates the page where the inspection procedure for each circuit is to be found, or gives instructions for checking and repairs.
- Detection Item
  Indicates the system of the problem or contents of the problem.
- Trouble Area
  Indicates the suspect area of the problem.

DTC CHART (SAE Controlled)

HINT:
Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check mode, check the circuit for that code listed in the table below. For details of each code, refer to the ”See page” under the ”DTC No.” in the DTC chart.

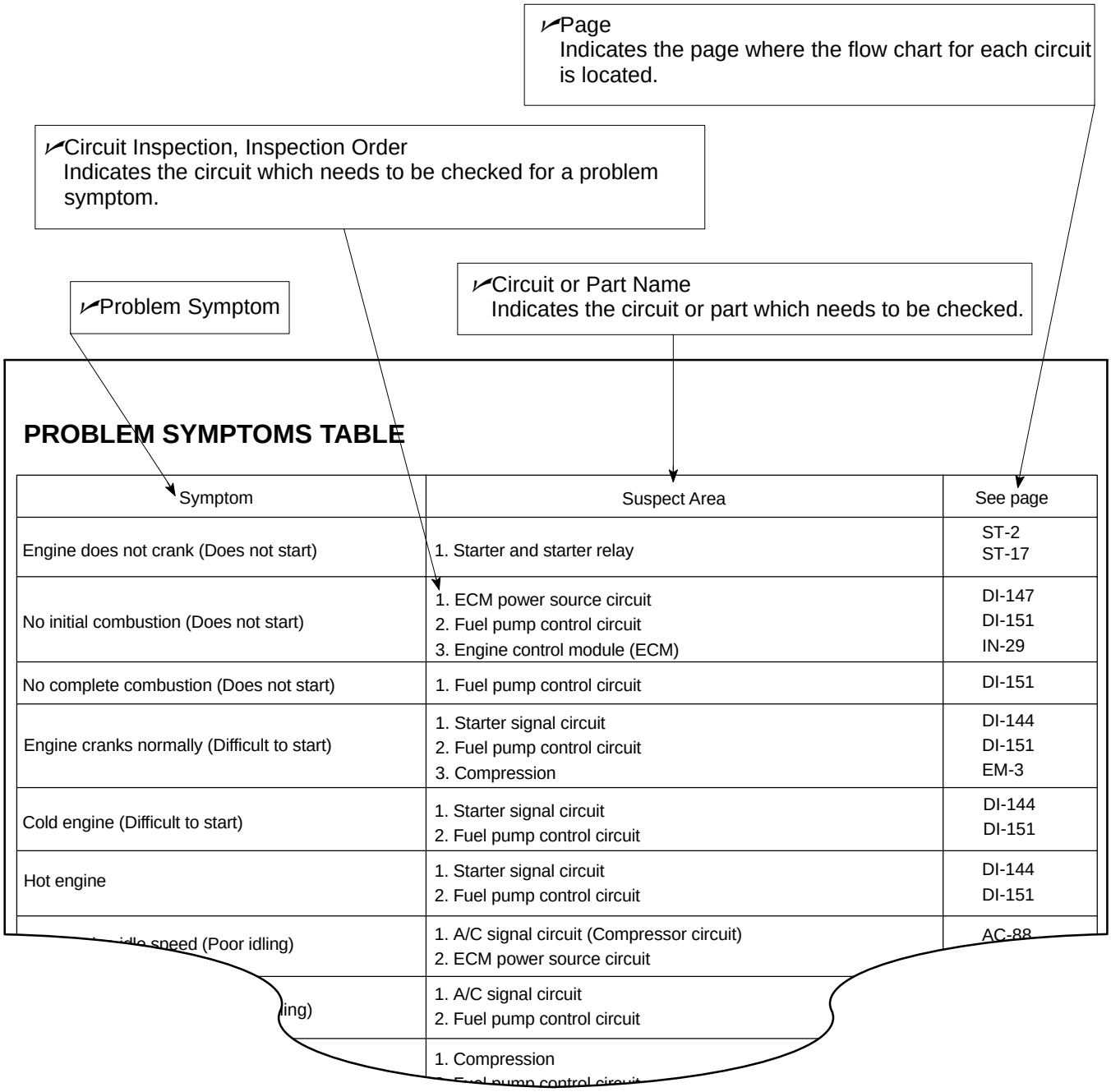
DTC No. (See page)	Detection Item	Trouble Area	MIL*	Memory
P0100 (DI-24)	Mass Air Flow Circuit Malfunction	✓Open or short in mass air flow meter circuit ✓Mass air flow meter ✓ECM	○	○
P0101 (DI-28)	Mass Air Flow Circuit Range/ Performance Problem	✓Mass air flow meter	○	○
P0110 (DI-29)	Intake Air Temp. Circuit Malfunction	✓Open or short in intake air temp. sensor circuit ✓Intake air temp. sensor ✓ECM	○	○
P0115 (DI-33)	Engine Coolant Temp. Circuit Malfunction	✓Open or short in engine coolant temp. sensor circuit ✓Engine coolant temp. sensor ✓ECM	○	○
P0116 (DI-37)	Engine Coolant Temp. Circuit Range/ Performance Problem	✓Engine coolant temp. sensor ✓Cooling system	○	○
	/ Pedal Position Sensor/Switch nction	✓Open or short in throttle position sensor circuit ✓Throttle position sensor ✓ECM		
	osition Sensor/ Switch rformance Prob-	✓Throttle position sensor		

5. PROBLEM SYMPTOMS TABLE

The suspected circuits or parts for each problem symptom are shown in the table below. Use this table to troubleshoot when, during a DTC check, a ”Normal” code is displayed in the diagnostic trouble code check but the problem is still occurring. Numbers in the table show the inspection order in which the circuits or parts should be checked.

HINT:

In some cases, a problem is not detected by the diagnostic system even though a problem symptom is present. It is possible that the problem is occurring outside the detection range of the diagnostic system, or that the problem is occurring in a completely different system.

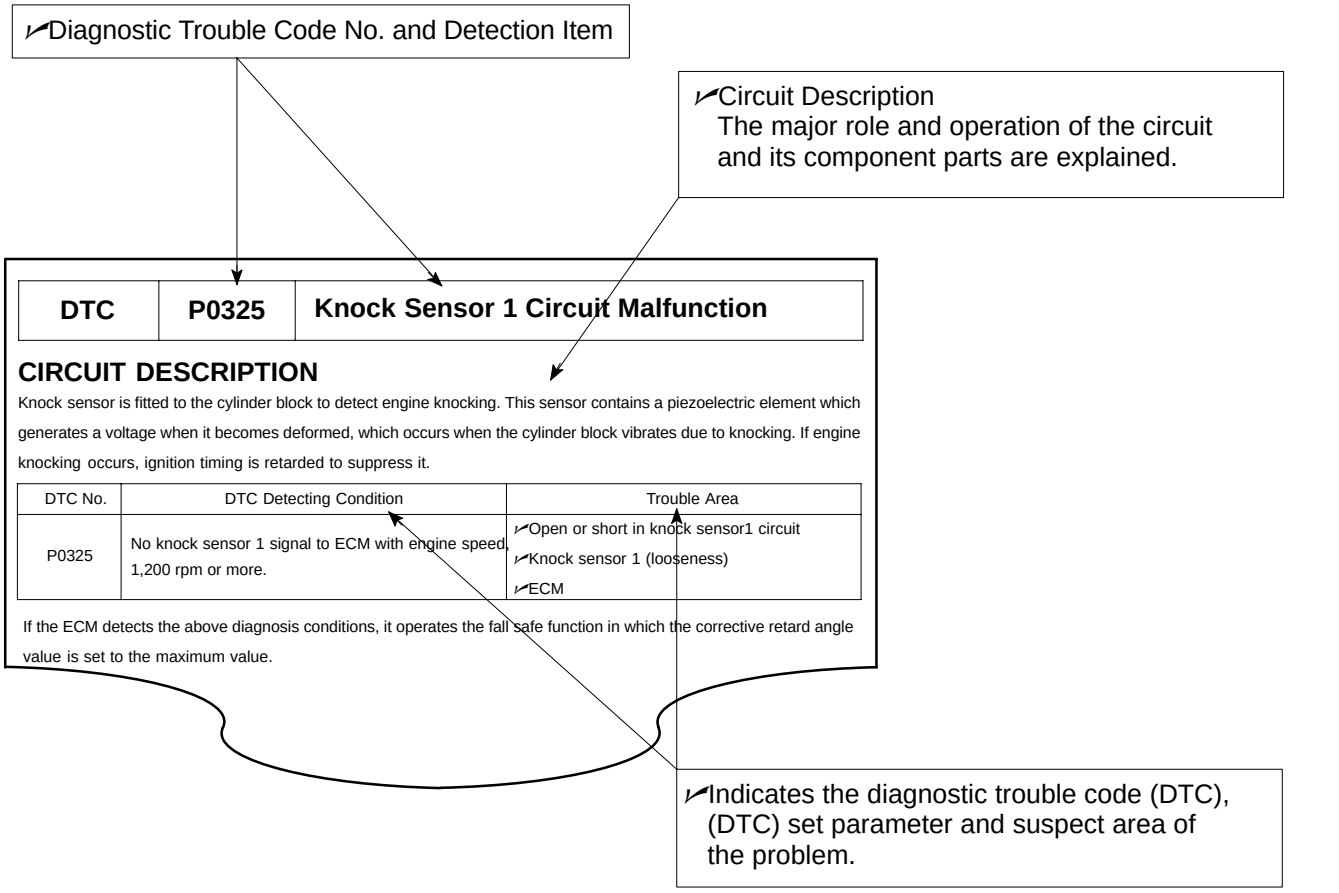


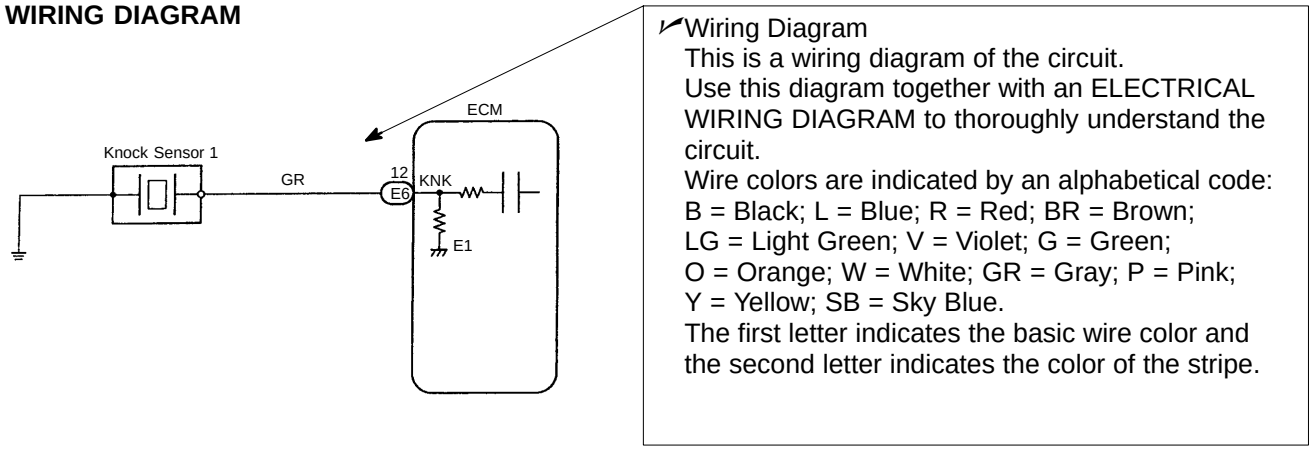
PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	1. Starter and starter relay	ST-2 ST-17
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. Engine control module (ECM)	DI-147 DI-151 IN-29
No complete combustion (Does not start)	1. Fuel pump control circuit	DI-151
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI-144 DI-151 EM-3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-144 DI-151
Hot engine	1. Starter signal circuit 2. Fuel pump control circuit	DI-144 DI-151
idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	AC-88
ling)	1. A/C signal circuit 2. Fuel pump control circuit	
	1. Compression 2. Fuel pump control circuit	

6. CIRCUIT INSPECTION

How to read and use each page is shown below.





V08423

Indicates the position of the ignition switch during the check.

LOCK
Ignition Switch LOCK (OFF)

ON
Ignition Switch ON

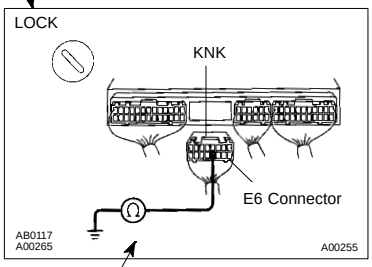
START
Ignition Switch START

ACC
Ignition Switch ACC

Inspection Procedure
Use the inspection procedure to determine if the circuit is normal or abnormal. If it is abnormal, use it to determine whether the problem is located in the sensors, actuators, wire harness or ECU.

INSPECTION PROCEDURE

1	**Check continuity between terminal KNK of ECM connector and body ground.**



PREPARATION:
(a) Remove the glove compartment (See page SF-68).
(b) Disconnect the E6 connector of ECM.

CHECK:
Measure resistance between terminal KNK of ECM connector and body ground.

OK:
Resistance: 1 MΩ or higher

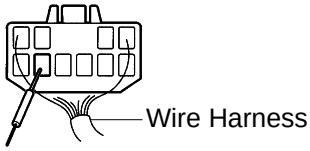
OK	**Go to step 3.**

NG

2	**Check knock sensor (See page SF-61).**

OK	**Replace knock sensor.**

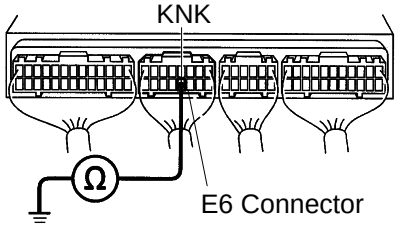
Indicates the place to check the voltage or resistance.
Indicates the connector position to checked (from the front or back side).



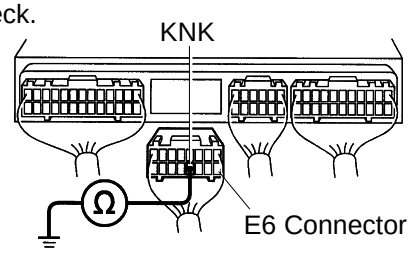
Check from the connector back side (with harness).

Check from the connector front side (without harness). In this case, care must be taken not to bend the terminals.

Indicates the condition of the connector of ECU during the check.



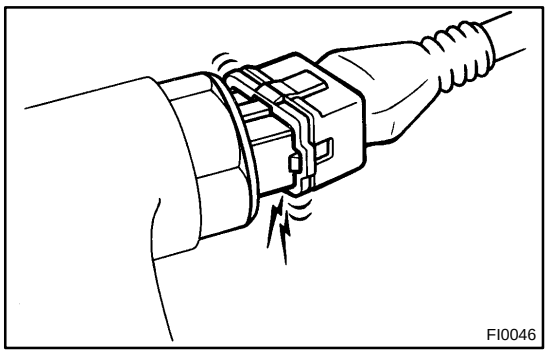
Connector being checked is connected.

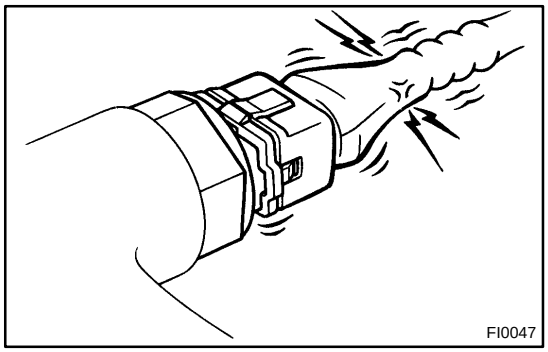


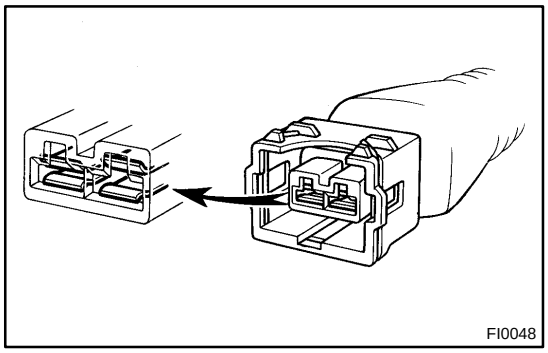
Connector being checked is disconnected.

V08425

IN011-56


FI0046


FI0047


FI0048

HOW TO USE THE DIAGNOSTIC CHART AND INSPECTION PROCEDURE

1. CONNECTOR CONNECTION AND TERMINAL INSPECTION

- For troubleshooting, diagnostic trouble code (DTC) charts or problem symptom table are provided for each circuit with detailed inspection procedures in this manual.
- When component parts, wire harnesses and connectors of each circuit are found to be normal in troubleshooting, the problem is most likely in the ECU. Accordingly, if diagnosis is performed without the problem symptoms occurring, refer to Step 8 to replace the ECU. Always confirm that the problem symptoms are occurring, or proceed with inspection while using the symptom simulation method.
- The instructions ”Check wire harness and connector” and ”Check and replace ECU” which appear in the inspection procedure are common and applicable to all DTCs. Follow the procedure outlined below whenever these instructions appear.

OPEN CIRCUIT:

An open circuit the result of a disconnected wire harness, a faulty contact in the connector, a connector terminal pulled out, etc.

HINT:

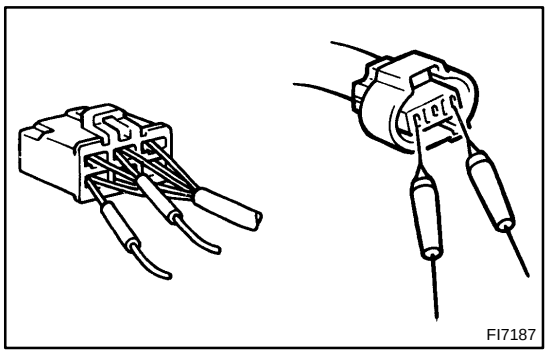
- A wire is rarely broken in its middle. Most problem occur at the wire ends. Carefully check the connectors of sensors and actuators.
- Faulty contacts could be due to the rusting, contamination, and/or deformation of connector terminals. In some cases: 1) simply disconnecting and reconnecting the connectors will fix the problem, or 2) even though no abnormality is found in the wire harness or connector, the problem disappears after the check (meaning the cause was most likely in the wire harness or connectors).

SHORT CIRCUIT:

A short circuit could be the result of contact between the wire harness and the body ground or a short circuiting switch.

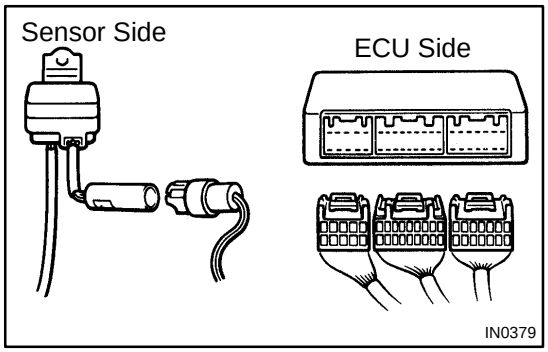
HINT:

When there is a short circuit between the wire harness and body ground, check thoroughly it wire harness is caught in the body or is clamped properly.



2. CONNECTOR HANDLING

When inserting tester probes into a connector, insert them from the rear of the connector. When necessary, use mini test leads. For water resistant connectors which cannot be accessed from behind, take good care not to deform the connector terminals.



3. CONTINUITY CHECK (OPEN CIRCUIT CHECK)

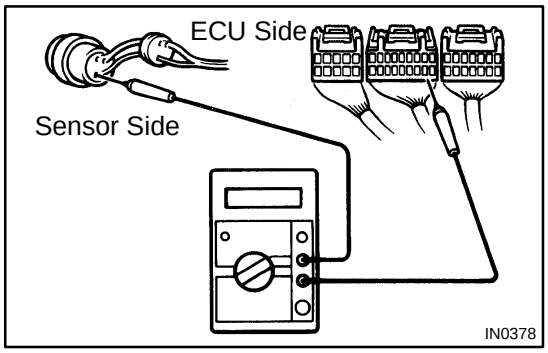
(a) Disconnect the connectors at both ECU and sensor sides.

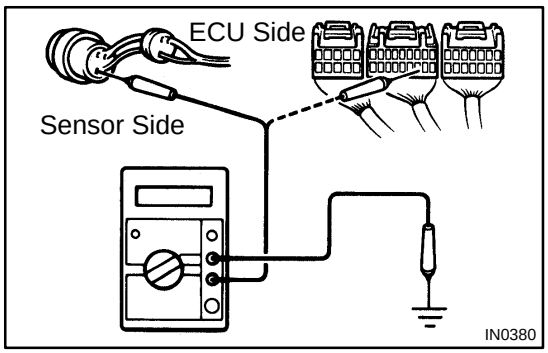
(b) Measure the resistance between the applicable terminals of the connectors.

Resistance: Below 1 Ω

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.





4. RESISTANCE CHECK (SHORT CIRCUIT CHECK)

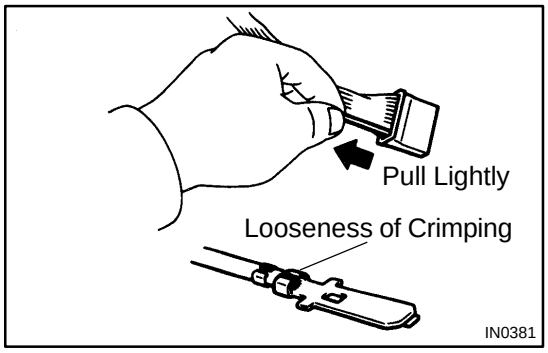
(a) Disconnect the connectors on both ends.

(b) Measure the resistance between the applicable terminals of the connectors and body ground. Be sure to carry out this check on the connectors on both ends.

Resistance: 10 kΩ or higher

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.



5. VISUAL CHECK AND CONTACT PRESSURE CHECK

(a) Disconnect the connectors at both ends.

(b) Check for rust or foreign material, etc. in the terminals of the connectors.

(c) Check crimped portions for looseness or damage and check that the terminals are secured in the lock portion.

HINT:

The terminals should not come out when pulled lightly from the back.

(d) Prepare a test male terminal and insert it in the female terminal, then pull it out.

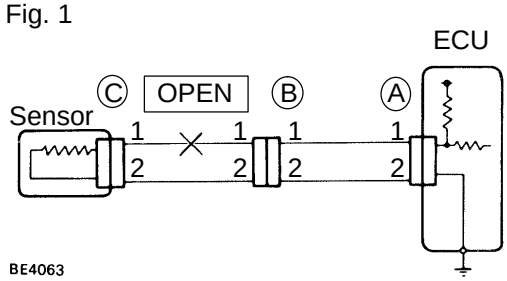
NOTICE:

When testing a gold-plated female terminal, always use a gold-plated male terminal.

HINT:

If a test terminal is easier to pulled out than others, there may be poor contact in that section.

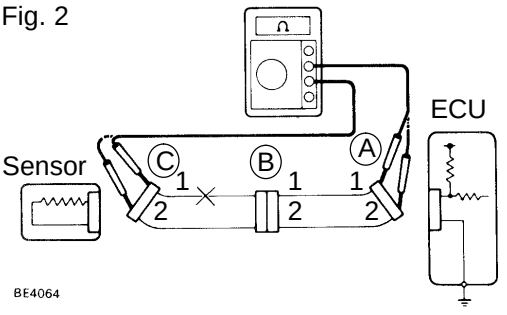
Fig. 1



6. CHECK OPEN CIRCUIT

For the open circuit in the wire harness in Fig. 1, perform a continuity check (step (a) below) or a voltage check (step (b) below).

Fig. 2



(a) Check the continuity.

(1) Disconnect connectors A and C and measure the resistance between them.

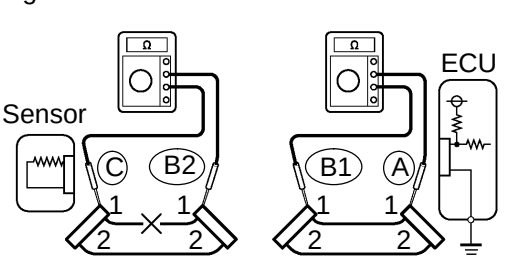
In the case of Fig. 2:

Between terminal 1 of connector A and terminal 1 of connector C → 10 kΩ or higher (open)

Between terminal 2 of connector A and terminal 2 of connector C → Below 1 Ω

An open circuit exists in the wire harness between terminal 1 of A and terminal 1 of C.

Fig. 3



(2) Disconnect connector B and measure the resistance between the connectors.

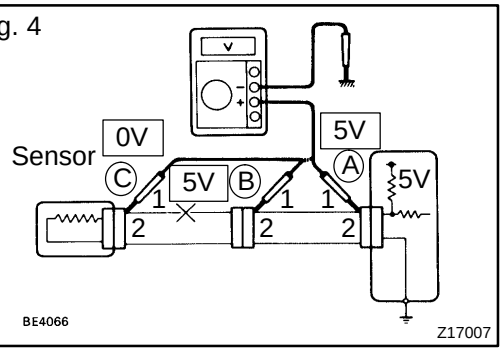
In the case of Fig. 3:

Between terminal 1 of connector A and terminal 1 of connector B1 → Below 1 Ω

Between terminal 1 of connector B2 and terminal 1 of connector C → 10 kΩ or higher (open)

An open circuit exists in the wire harness between terminal 1 of B2 and terminal 1 of C.

Fig. 4



(b) Check the voltage.

In a circuit in which voltage is applied to the ECU connector terminal, an open circuit can be checked for by conducting a voltage check.

As shown in Fig. 4, with each connector still connected, measure the voltage between body ground and terminal 1 of connector A at the ECU 5V output terminal, terminal 1 of connector B, and terminal 1 of connector C (in that order).

Example results:

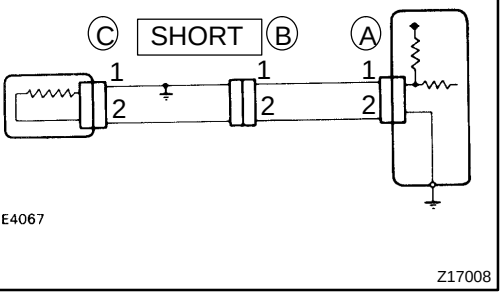
5V: Between Terminal 1 of connector A and Body Ground

5V: Between Terminal 1 of connector B and Body Ground

0V: Between Terminal 1 of connector C and Body Ground

In the above example, an open circuit is in the wire harness between terminal 1 of B and terminal 1 of C.

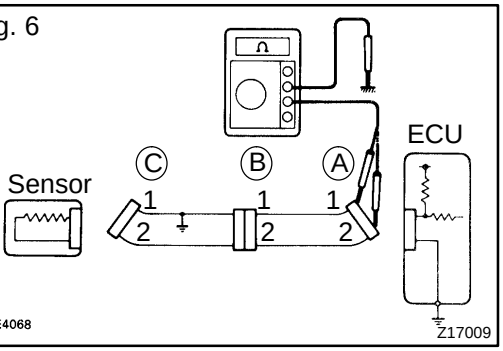
Fig. 5



7. CHECK SHORT CIRCUIT

If the wire harness is ground shorted (Fig. 5), locate the section by conducting a resistance check with ground below.

Fig. 6



Check the resistance with ground.

(1) Disconnect connectors A and C and measure the resistance between terminal 1 and 2 of connector A and body ground.

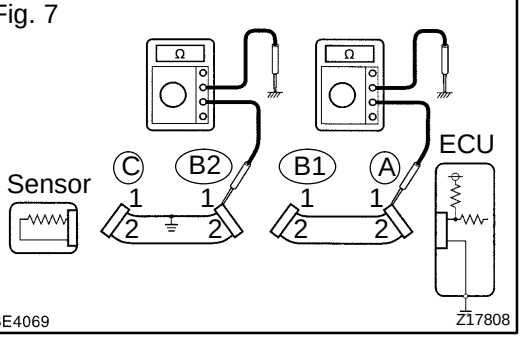
In the case of Fig. 6:

Between terminal 1 of connector A and body ground $\rightarrow$ Below 1 Ω (short)

Between terminal 2 of connector A and body ground $\rightarrow$ 10 kΩ or higher

A short circuit is between terminal 1 of connector A and terminal 1 of connector C.

Fig. 7



(2) Disconnect connector B and measure the resistance between terminal 1 of connector A and body ground, and terminal 1 of connector B2 and body ground.

In the case of Fig. 7:

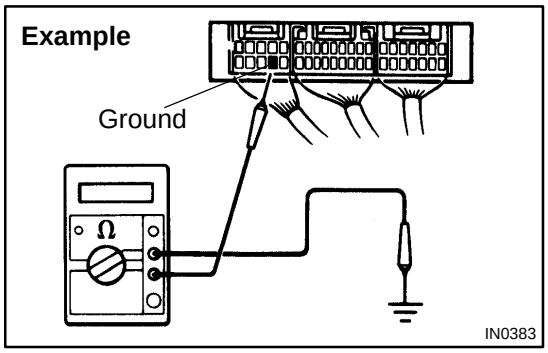
Between terminal 1 of connector A and body ground → 10 kΩ or higher

Between terminal 1 of connector B2 and body ground → Below 1 Ω (short)

A short circuit is between terminal 1 of connector B2 and terminal 1 of connector C.

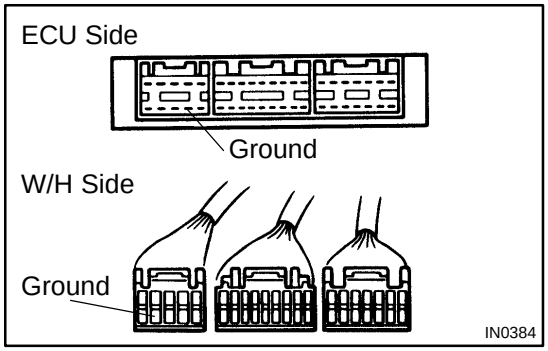
8. CHECK AND REPLACE ECU

First check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty. Replace the ECU with a and check if the symptoms appear.



(1) Measure the resistance between the ECU ground terminal and the body ground.

Resistance: Below 1 Ω



(2) Disconnect the ECU connector. Check for bent ground terminals (on the ECU side and the wire harness side). Lastly, check the contact pressure.

TERMS

ABBREVIATIONS USED IN THIS MANUAL

IN04Q-24

Abbreviations	Meaning
ABS	Anti-Lock Brake System
AC	Alternating Current
ACC	Accessory
ACIS	Acoustic Control Induction System
ACSD	Automatic Cold Start Device
A.D.D.	Automatic Disconnecting Differential
A/F	Air-Fuel Ratio
AHC	Active Height Control Suspension
ALR	Automatic Locking Retractor
ALT	Alternator
AMP	Amplifier
ANT	Antenna
APPROX.	Approximately
A/T	Automatic Transmission (Transaxle)
ATDC	After Top Dead Center
ATF	Automatic Transmission Fluid
AUTO	Automatic
AUX	Auxiliary
AVG	Average
AVS	Adaptive Variable Suspension
BA	Brake Assist
BACS	Boost Altitude Compensation System
BAT	Battery
BDC	Bottom Dead Center
B/L	Bi-Level
B/S	Bore-Stroke Ratio
BTDC	Before Top Dead Center
BVSV	Bimetallic Vacuum Switching Valve
Calif.	California
CB	Circuit Breaker
CCo	Catalytic Converter For Oxidation
CD	Compact Disc
CF	Cornering Force
CG	Center Of Gravity
CH	Channel
COMB.	Combination
CPE	Coupe
CPS	Combustion Pressure Sensor
CPU	Central Processing Unit
CRS	Child Restraint System
CTR	Center
C/V	Check Valve

CV	Control Valve
CW	Curb Weight
DC	Direct Current
DEF	Defogger
DFL	Deflector
DIFF.	Differential
DIFF. LOCK	Differential Lock
D/INJ	Direct Injection
DLI	Distributorless Ignition
DOHC	Double Overhead Camshaft
DP	Dash Pot
DS	Dead Soak
DSP	Digital Signal Processor
ECAM	Engine Control And Measurement System
ECD	Electronic Controlled Diesel
ECDY	Eddy Current Dynamometer
ECU	Electronic Control Unit
ED	Electro-Deposited Coating
EDU	Electronic Driving Unit
EDIC	Electric Diesel Injection Control
EFI	Electronic Fuel Injection
E/G	Engine
EGR-VM	EGR-V acuum Modulator
ELR	Emergency Locking Retractor
ENG	Engine
ESA	Electronic Spark Advance
ETCS	Electronic Throttle Control System
EVAP	Evaporator
E-VR V	Electric Vacuum Regulating Valve
EXH	Exhaust
FE	Fuel Economy
FF	Front-Engine Front-Wheel-Drive
F/G	Fuel Gauge
FIPG	Formed In Place Gasket
FL	Fusible Link
F/P	Fuel Pump
FPU	Fuel Pressure Up
Fr	Front
FR	Front-Engine Rear-Wheel-Drive
F/W	Flywheel
FW/D	Flywheel Damper
FWD	Front-Wheel-Drive
GAS	Gasoline
GND	Ground
HAC	High Altitude Compensator
H/B	Hatchback

H-FUSE	High Current Fuse
HI	High
HID	High Intensity Discharge (Head Lamp)
HSG	Housing
HT	Hard Top
HWS	Heated Windshield System
IAC	Idle Air Control
IC	Integrated circuit
IDI	Indirect Diesel Injection
IFS	Independent Front Suspension
IG	Ignition
IIA	Integrated Ignition Assembly
IN	Intake (Manifold, Valve)
INT	Intermittent
I/P	Instrument Panel
IRS	Independent Rear Suspension
J/B	Junction Block
J/C	Junction Connector
KD	Kick-Down
LAN	Local Area Network
LB	Liftback
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LH	Left-Hand
LHD	Left-Hand Drive
L/H/W	Length, Height, Width
LLC	Long-Life Coolant
LNG	Liquified Natural Gas
LO	Low
LPG	Liquified Petroleum Gas
LSD	Limited Slip Differential
LSP & PV	Load Sensing Proportioning And Bypass Valve
LSPV	Load Sensing Proportioning Valve
MAX.	Maximum
MIC	Microphone
MIL	Malfunction Indicator Lamp
MIN.	Minimum
MP	Multipurpose
MPX	Multiplex Communication System
M/T	Manual Transmission (Transaxle)
MT	Mount
MTG	Mounting
N	Neutral
NA	Natural Aspiration
No.	Number
O/D	Overdrive

OEM	Original Equipment Manufacturing
OHC	Overhead Camshaft
OHV	Overhead Valve
OPT	Option
O/S	Oversize
P & BV	Proportioning And Bypass Valve
PCS	Power Control System
PCV	Positive Crankcase Ventilation
PKB	Parking Brake
PPS	Progressive Power Steering
PS	Power Steering
PTO	Power Take-Off
R & P	Rack And Pinion
R/B	Relay Block
RBS	Recirculating Ball Type Steering
R/F	Reinforcement
RFS	Rigid Front Suspension
RRS	Rigid Rear Suspension
RH	Right-Hand
RHD	Right-Hand Drive
RLY	Relay
ROM	Read Only Memory
Rr	Rear
RR	Rear-Engine Rear-Wheel Drive
RWD	Rear-Wheel Drive
SDN	Sedan
SEN	Sensor
SICS	Starting Injection Control System
SOC	State Of Charge
SOHC	Single Overhead Camshaft
SPEC	Specification
SPI	Single Point Injection
SRS	Supplemental Restraint System
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
STJ	Cold-Start Fuel Injection
SW	Switch
SYS	System
T/A	Transaxle
TACH	Tachometer
TBI	Throttle Body Electronic Fuel Injection
TC	Turbocharger
TCCS	TOYOTA Computer-Controlled System
TCV	Timing Control Valve
TDC	Top Dead Center

TEMP.	Temperature
TEMS	TOYOTA Electronic Modulated Suspension
TIS	Total Information System For Vehicle Development
T/M	Transmission
TMC	TOYOTA Motor Corporation
TMMK	TOYOTA Motor Manufacturing Kentucky, Inc.
TRAC	Traction Control System
TURBO	Turbocharger
U/D	Underdrive
U/S	Undersize
VCV	Vacuum Control Valve
VENT	Ventilator
VIN	Vehicle Identification Number
VPS	Variable Power Steering
VSC	Vehicle Skid Control
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
w/	With
WGN	Wagon
W/H	Wire Harness
w/o	Without
1st	First
2nd	Second
2WD	Two Wheel Drive Vehicle (4x2)
4WD	Four Wheel Drive Vehicle (4x4)

IN03Q-04

GLOSSARY OF SAE AND LEXUS TERMS

This glossary lists all SAE-J1930 terms and abbreviations used in this manual in compliance with SAE recommendations, as well as their LEXUS equivalents.

SAE ABBREVIATIONS	SAE TERMS	LEXUS TERMS ( )--ABBREVIATIONS
A/C	Air Conditioning	Air Conditioner
ACL	Air Cleaner	Air Cleaner, A/CL
AIR	Secondary Air Injection	Air Injection (AI)
AP	Accelerator Pedal	-
B+	Battery Positive Voltage	+B, Battery Voltage
BARO	Barometric Pressure	HAC
CAC	Charge Air Cooler	Intercooler
CARB	Carburetor	Carburetor
CFI	Continuous Fuel Injection	-
CKP	Crankshaft Position	Crank Angle
CL	Closed Loop	Closed Loop
CMP	Camshaft Position	Cam Angle
CPP	Clutch Pedal Position	-
CTOX	Continuous Trap Oxidizer	-
CTP	Closed Throttle Position	LL ON, Idle ON
DFI	Direct Fuel Injection	Direct Injection (DI)
DI	Distributor Ignition	-
DLC1 DLC2 DLC3	Data Link Connector 1 Data Link Connector 2 Data Link Connector 3	1: Check Connector 2: Total Diagnosis Comunication Link (TDCL) 3: OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Code
DTM	Diagnostic Test Mode	-
ECL	Engine Coolant Level	-
ECM	Engine Control Module	Engine ECU (Electronic Control Unit)
ECT	Engine Coolant Temperature	Coolant Temperature, Water Temperature (THW)
EEPROM	Electrically Erasable Programmable Read Only Memory	Electrically Erasable Programmable Read Only Memory (EEPROM), Erasable Programmable Read Only Memory (EPROM)
EFE	Early Fuel Evaporation	Cold Mixture Heater (CMH), Heat Control Valve (HCV)
EGR	Exhaust Gas Recirculation	Exhaust Gas Recirculation (EGR)
EI	Electronic Ignition	TOYOTA Distributor-less Ignition (TDI)
EM	Engine Modification	Engine Modification (EM)
EPROM	Erasable Programmable Read Only Memory	Programmable Read Only Memory (PROM)
EVAP	Evaporative Emission	Evaporative Emission Control (EVAP)
FC	Fan Control	-
FEEPROM	Flash Electrically Erasable Programmable Read Only Memory	-
FEPROM	Flash Erasable Programmable Read Only Memory	-
FF	Flexible Fuel	-
FP	Fuel Pump	Fuel Pump
GEN	Generator	Alternator
GND	Ground	Ground (GND)

HO2S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO_2S)
IAC	Idle Air Control	Idle Speed Control (ISC)
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	-
IFI	Indirect Fuel Injection	Indirect Injection (IDL)
IFS	Inertia Fuel-Shutoff	-
ISC	Idle Speed Control	-
KS	Knock Sensor	Knock Sensor
MAF	Mass Airflow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	-
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Lamp	Check Engine Lamp
MST	Manifold Surface Temperature	-
MVZ	Manifold Vacuum Zone	-
NVRAM	Non-Volatile Random Access Memory	-
O2S	Oxygen Sensor	Oxygen Sensor, O_2 Sensor (O_2S)
OBD	On-Board Diagnostic	On-Board Diagnostic System (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalyst Convert (OC), CCo
OL	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	-
PNP	Park/Neutral Position	-
PROM	Programmable Read Only Memory	-
PSP	Power Steering Pressure	-
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	-
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	E-ABV
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	-
SRI	Service Reminder Indicator	-
SRT	System Readiness Test	-
ST	Scan Tool	-
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (Ci)
TC	Turbocharger	Turbocharger
TCC	Torque Converter Clutch	Torque Converter

TCM	Transmission Control Module	Transmission ECU, ECT ECU
TP	Throttle Position	Throttle Position
TR	Transmission Range	-
TVV	Thermal Vacuum Valve	Bimetallic Vacuum Switching Valve (BVSV) Thermostatic Vacuum Switching Valve (TVSV)
TWC	Three-Way Catalytic Converter	Three-Way Catalytic (TWC) Manifold Converter CC_{RO}
TWC+OC	Three-Way + Oxidation Catalytic Converter	CC_R + CCo
VAF	Volume Airflow	Air Flow Meter
VR	Voltage Regulator	Voltage Regulator
VSS	Vehicle Speed Sensor	Vehicle Speed Sensor
WOT	Wide Open Throttle	Full Throttle
WU-OC	Warm Up Oxidation Catalytic Converter	-
WU-TWC	Warm Up Three-Way Catalytic Converter	-
3GR	Third Gear	-
4GR	Fourth Gear	-

OUTSIDE VEHICLE

MA001-34

GENERAL MAINTENANCE

Performing these maintenance checks on the vehicle in the owner's responsibility. The owner may perform the maintenance or take the vehicle to a service center.
Check the parts of the vehicle described below on a daily basis. In most cases, special tool are not required. It i recommended that the owner perform these check.
The procedures for general maintenance are as follows.

1. GENERAL NOTES

- Maintenance requirements vary depending on the country.
- Check the maintenance schedule in the owner's manual supplement.
- Following the maintenance schedule is mandatory.
- Determine the appropriate time to service the vehicle using either miles driven or time (month) elapsed, whichever reaches the specification first.
- Maintain similar intervals between periodic maintenance unless noted.
- Failing to check each vehicle part could lead to poor engine performance and increase exhaust emissions.

2. TIRES

(a) Check the tire pressure with a gauge. Make adjustment if necessary.
(b) Check the surfaces of tires for cuts, damage or excessive wear.

3. WHEEL NUTS

Check for nuts that are loose or missing. Tighten them if necessary.

4. TIRE ROTATION

Check the maintenance schedule in the owner's manual supplement.

5. WINDSHIELD WIPER BLADES

Check the blades for wear or cracks whenever they are unable to wipe the windshield clean. Replace them if necessary.

6. FLUID LEAKS

(a) Check under the vehicle for leaking fuel, oil, water and other fluid.
(b) If you smell gasoline fumes or notice any leak, locate the cause found and correct it.

7. DOORS AND ENGINE HOOD

(a) Check that all of the doors and the trunk lid operate smoothly, and that all the latches lock securely.
(b) When the primary latch is released, check that the engine hood secondary latch prevents the hood from opening.

INSIDE VEHICLE

MA002-43

GENERAL MAINTENANCE

Performing these maintenance checks on the vehicle in the owner's responsibility. The owner may perform the maintenance or take the vehicle to a service center.
Check the parts of the vehicle described below on a daily basis. In most cases, special tool are not required. It i recommended that the owner perform these check.
The procedures for general maintenance are as follows.

1. GENERAL NOTES

- Maintenance requirements vary depending on the country.
- Check the maintenance schedule in the owner's manual supplement.
- Following the maintenance schedule is mandatory.
- Determine the appropriate time to service the vehicle using either miles driven or time (month) elapsed, whichever reaches the specification first.
- Maintain similar intervals between periodic maintenance unless noted.
- Failing to check each vehicle part could lead to poor engine performance and increase exhaust emissions.

2. LIGHTS

(a) Check that the headlights, stop lights, taillights, turn signal lights, and other lights are all working.
(b) Check that the headlights are aimed properly.

3. WARNING LIGHTS AND BUZZERS

Check that all the warning lights and buzzers are working.

4. HORN

Check that the horn is working.

5. WINDSHIELD GLASS

Check for scratches, pits or abrasions.

6. WINDSHIELD WIPER AND WASHER

(a) Check if the wind washers are aimed properly. Also, check if the washer fluid hits the center of the operating range of each wiper on the windshield.
(b) Check that the wipers do not streak.

7. WINDSHIELD DEFROSTER

When the heater or air conditioner is on the defroster setting, check that air comes out of the defroster outlet.

8. REAR VIEW MIRROR

Check that the rear view mirror is securely mounted.

9. SUN VISORS

Check that the sun visors move freely and are securely mounted.

10. STEERING WHEEL

Check that the steering wheel has the proper freeplay. Also check for steering difficulty, freeplay in the steering wheel and unusual noises.

11. SEATS

(a) Check that the seat adjusters operate smoothly.
(b) Check that all the latches lock securely in all positions.
(c) Check that the head restraints move up and down smoothly and that the locks hold securely in all latched positions.
(d) When the rear seatbacks are folded down, check if the latches lock securely.

12. SEAT BELTS

(a) Check that the seat belt system such as the buckles, retractors and anchors operate properly and smoothly.
(b) Check that the belt webbing is not cut, frayed, worn or damaged.

13. ACCELERATOR PEDAL

Check the pedal for smooth operation and uneven pedal effort and catching.

14. BRAKE PEDAL (See page BR-6)

(a) Check the pedal for smooth operation.

(b) Check that the pedal has the proper reserve distance and freeplay.

(c) Check the brake booster function.

15. BRAKES

In a safe place, check that the vehicle remains straight when applying the brakes.

16. PARKING BRAKE (See page BR-9)

(a) Check that the parking brake pedal has the proper range of motion.

(b) On a low incline, check that the parking brake alone can stabilize the vehicle.

17. AUTOMATIC TRANSMISSION ”PARK” MECHANISM

(a) Check the lock release mechanism of the selector lever for proper and smooth operation.

(b) When the selector lever is in the ”P” position and all brakes are released on a low incline, check that the vehicle is stabilized.

UNDER HOOD

MA003-42

GENERAL MAINTENANCE

1. GENERAL NOTES

- Maintenance requirements vary depending on the country.
- Check the maintenance schedule in the owner's manual supplement.
- Following the maintenance schedule is mandatory.
- Determine the appropriate time to service the vehicle using either miles driven or time (month) elapsed, whichever reaches the specification first.
- Maintain similar intervals between periodic maintenance unless noted.
- Failing to check each vehicle part could lead to poor engine performance and increase exhaust emissions.

2. WINDSHIELD WASHER FLUID

Check that there is sufficient fluid in the tank.

3. ENGINE COOLANT LEVEL

Check that the coolant level is between the "FULL" and "LOW" lines on the see-through reservoir.

4. RADIATOR AND HOSES

(a) Check that the front of the radiator is clean and free of leaves, dirt and bugs.
(see page CO-14)

(b) Check the hoses for cracks, kinks, rotting and loose connections.

5. BATTERY ELECTROLYTE LEVEL

Check that the electrolyte level of all the battery cells is between the upper and lower lines on the case.

6. BRAKE FLUID LEVEL

Check that the brake fluid levels are near the upper level line on the see-through reservoirs.

7. ENGINE DRIVE BELT

Check the drive belt for fraying, cracks, wear or oiliness.

8. ENGINE OIL LEVEL

Check if the level of engine oil is between "F" and "L" on the dipstick with the engine turned off.

9. POWER STEERING FLUID LEVEL

- Check the level on the dipstick.
- The level should be in the "HOT" or "COLD"range depending on the fluid temperature.

10. AUTOMATIC TRANSMISSION FLUID LEVEL

(a) Park the vehicle on a level surface.

(b) With the engine idling and the parking brake applied, shift the selector into all the positions from "P" to "L". Then shift the "P" position.

(c) Pull out the dipstick and wipe off the fluid with a clean shop rag. Re-insert the dipstick and check that the fluid level is in the "HOT" range.

(d) Perform this check with the fluid at the normal driving temperature: 70 to 80˚C (158 to 176˚F).

HINT:

After extended driving under harsh conditions (high speeds, hot weather, heavy traffic or pulling a trailer), let the engine cool own for approximately 30 minutes before checking the fluid level.

11. EXHAUST SYSTEM

Check for unusual exhaust sounds or abnormal exhaust fumes. Locate the cause and correct it.

ENGINE

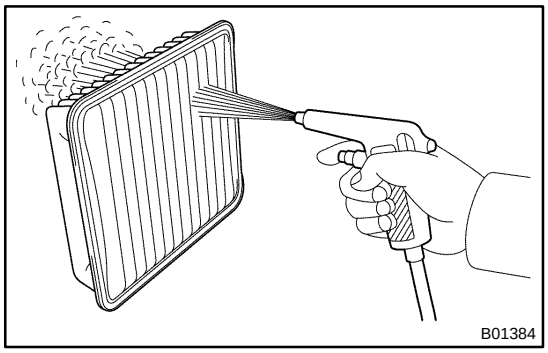
INSPECTION

MA004-16

HINT:

Inspect these items on a cooled down engine.

1. **REPLACE TIMING BELT**
   (See page EM-17)
2. **INSPECT DRIVE BELT**
   (See page CH-1)
3. **REPLACE SPARK PLUGS**
   (See page IG-1)



4. **INSPECT AIR FILTER**

(a) Remove the air filter.

(b) Visually check that the air filter is not excessively damaged or oily.

If necessary, replace the air filter.

(c) Clean the filter with compressed air.
First blow from the inside of the filter thoroughly then repeat from the outside.

(d) Reinstall the air filter.

5. **REPLACE AIR FILTER**

Replace the air filter with a new one.

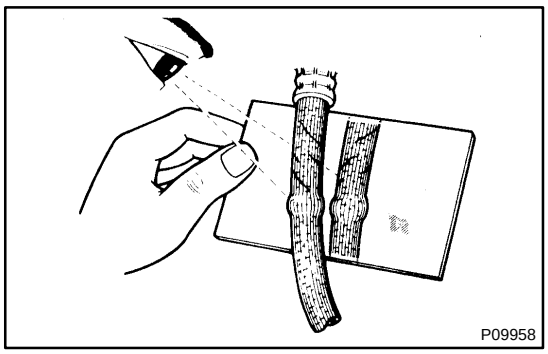
6. **REPLACE ENGINE OIL AND OIL FILTER**
   (See page LU-2)
7. **REPLACE ENGINE COOLANT**
   (See page CO-2)
8. **INSPECT GASKET IN FUEL TANK CAP**
   (See page EC-7)
9. **INSPECT FUEL LINES AND CONNECTIONS, FUEL TANK VAPOR VENT SYSTEM HOSES AND FUEL TANK BAND**

Visually check the fuel lines for cracks, leakage, loose connections, deformation or tank band looseness.

10. **INSPECT EXHAUST PIPES AND MOUNTINGS**

Visually check the pipes, hangers and connections for severe corrosion, leaks or damage.

11. **INSPECT VALVE CLEARANCE**
    (See page EM-5)



BRAKE

MA01R-11

INSPECTION

1. INSPECT BRAKE LINE PIPES AND HOSES

HINT:

Work in a well-lighted area. Check the entire circumference and length of the brake hoses using a mirror if neccessary. Turn the front wheels fully to the right or left before beginning.

(a) Check all brake lines and hoses for.
- Damage
- Wear
- Deformation
- Cracks
- Corrosion
- Leaks
- Bends
- Twists

(b) Check all the clamps for tightness and connections for leakage.

(c) Check that the hoses and lines are not near sharp edges, moving parts and the exhaust system.

(d) Check that the lines are installed pass through the center of the grommets.

2. INSPECT FRONT AND REAR BRAKE PADS AND DISCS

(FRONT PADS: See page BR-24)
(REAR PADS: See page BR-33)
(FRONT DISCS: See page BR-29)
(REAR DISCS: See page BR-38)

3. INSPECT OR CHANGE BRAKE FLUID

(See page BR-4)
Fluid: SAE J1703 or FMVSS No.116 DOT3

CHASSIS

MA01S-05

INSPECTION

1. INSPECT STEERING LINKAGE

(a) Check the steering wheel freeplay.
(see page SR-8)

(b) Check the steering linkage for looseness or damage.
Check that:

- Check that the tie rod ends do not have excessive play.
- Check that the dust seals and boots are not damaged.
- Check that the boot clamps are not loose.

2. INSPECT STEERING GEAR HOUSING OIL

Check the steering gear housing for oil leakage.

3. INSPECT DRIVE SHAFT BOOTS

Check the drive shaft boots for loose clamps, leakage or damage.

4. INSPECT LOWER BALL JOINTS AND DUST COVERS

(a) Jack up the front of the vehicle and support it with stands.

(b) Make sure the front wheels are in a straight-ahead position, and depress the brake pedal.

(c) Jack up the lower suspension arm until there is about half a load on the front coil spring.

(d) Inspect the dust cover for damage.

5. CHECK AUTOMATIC TRANSMISSION AND DIFFERENTIAL

Visually check the automatic transmission and differential for oil leakage.

6. CHECK MANUAL TRANSMISSION AND DIFFERENTIAL

Visually check the manual transmission and differential for oil leakage.

If leakage is found, check for the cause and repair it.

7. LSD torque sensing type:
REPLACE DIFFERENTIAL OIL (See page SA-73)

8. Except wagon model:
ROTATE TIRES (See page SA-3)

BODY

MA01T-05

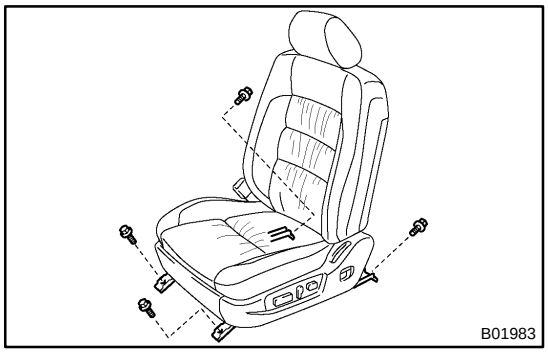
INSPECTION

1. CANADA:

TIGHTEN BOLTS AND NUTS ON CHASSIS AND BODY

(a) Where necessary, tighten all parts of the chassis.

- Front axle and suspension
- Rear axle and suspension
- Drive train
- Brake system
- Engine mounting, etc.

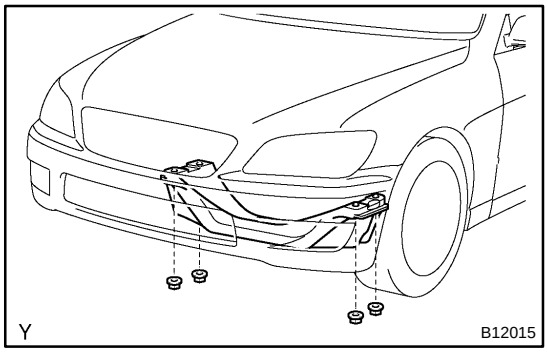


(b) Where necessary, tighten all parts of the body.

- Front seat mount bolts

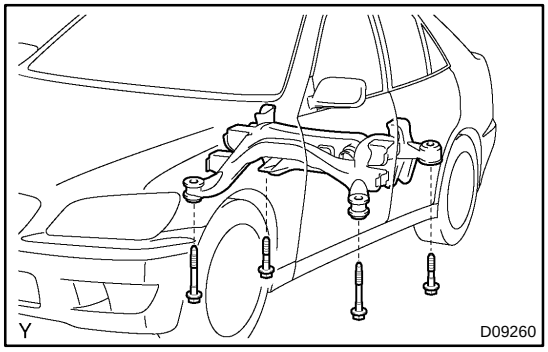
Torque: 37 N·m (375 kgf·cm, 27 ft·lbf)

- Seat belt system
- Doors and hood
- Body mountings
- Fuel tank
- Exhaust pipe system, etc.



- Front suspension member-to-body mounting bolts

Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)



- Rear axle beam assembly-to-body mounting nuts

Torque: 127 N·m (1,300 kgf·cm, 94 ft·lbf)

2. REPLACE AIR REFINER FILTER (See page AC-93)

3. BODY INSPECTION

(a) Check the body exterior for dents, scratches and rust.

(b) Check the underbody for rust and damage.

If necessary, replace or repair.

4. ROAD TEST

(a) Check the engine and chassis for abnormal noises.

(b) Check that the vehicle does not wander or pull to one side.

(c) Check that the brakes work properly and do not drag.

(d) Do setting of the parking brake shoes and drum.

MAINTENANCE

EQUIPMENT

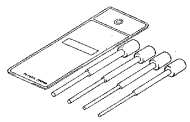
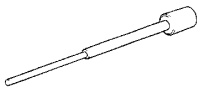
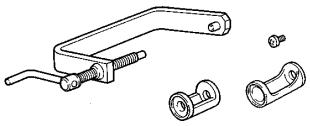
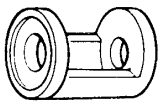
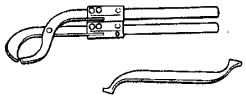
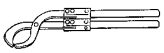
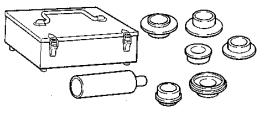
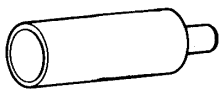
PP0Q1-05

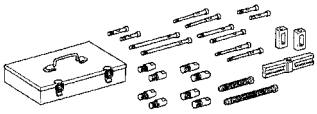
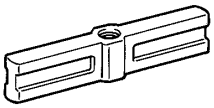
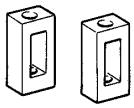
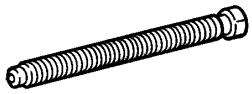
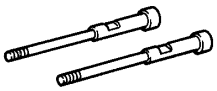
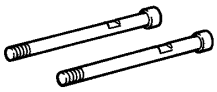
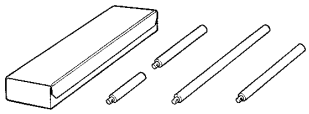
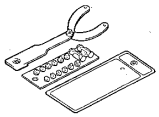
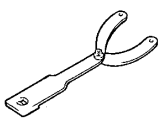
Mirror	Brake hose
Torque wrench	

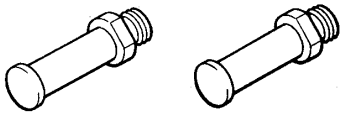
ENGINE MECHANICAL

PP3R8-01

SST (Special Service Tools)

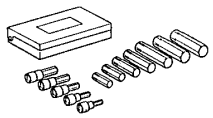
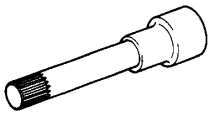
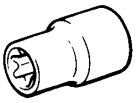
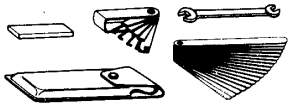
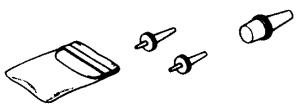
	09201-10000	Valve Guide Bushing Remover & Replacer Set	
	(09201-01060)	Valve Guide Bushing Remover & Replacer 6	
	09202-70020	Valve Spring Compressor	
	(09202-00010)	Attachment	
	09213-7001 1	Crankshaft Pully Holding Tool	
	09222-30010	Connecting Rod Bushing Remover & Replacer	
	09223-15030	Oil Seal & Bearing Replacer	Crankshaft rear oil seal
	09248-55040	Valve Clearance Adjust Tool Set	
	(09248-05410)	Valve Lifter Press	
	(09248-05420)	Valve Lifter Stopper	
	09316-6001 1	Transmission & Transfer Bearing Replacer	
	(09316-0001 1)	Replacer Pipe	Crankshaft front oil seal Camshaft oil seal

	(09316-00051)	Replacer ”D”	Camshaft oil seal
	09330-00021	Companion Flange Holding Tool	Crankshaft pulley
	09843-18040	Diagnosis Check Wire No.2	
	09950-50013	Puller C Set	
	(09951-05010)	Hanger 150	Crankshaft pulley Crankshaft timing pulley
	(09952-05010)	Slide Arm	Crankshaft pulley Crankshaft timing pulley
	(09953-05020)	Center Bolt 150	Crankshaft pulley Crankshaft timing pulley
	(09954-0501 1)	Claw No.1	Crankshaft timing pulley
	(09954-05031)	Claw No.3	Crankshaft pulley
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	Valve guide bushing Crankshaft rear oil seal
	09960-10010	Variable Pin Wrench Set	
	(09962-01000)	Variable Pin Wrench Arm Assy	Camshaft timing pulley

	(09963-01000) Pin 10	Camshaft timing pulley

PP0TE-05

RECOMMENDED TOOLS

	09040-0001 1	Hexagon Wrench Set .	
	09043-50100	Bi-hexagon Wrench 10 mm .	Cylinder head bolt
	09044-00020	Torx Socket E10 .	A/C compressor stud bolt
	09090-04020	Engine Sling Device	For suspending engine
	09200-00010	Engine Adjust Kit .	
	09258-00030	Hose Plug Set .	

PP0TF-01

EQUIPMENT

Abrasive compound	Valve
Bolt (Part No. 90105-10345)	For suspending engine
Bolt (Part No. 90119-18001)	Crankshaft pulley Crankshaft timing pulley
Caliper gauge	
CO/HC meter	
Compression gauge	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine tune-up tester	
Heater	
Magnetic finger	
Micrometer	
Mirror	
No. 1 engine hanger (Part No. 12281-46050)	For suspending engine
OBD II scan tool	
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Press	
Ridge reamer	Cylinder
Soft brash	
Solvent	
Spring tester	Valve spring
Steel square	Valve spring
Thermometer	
Torque wrench	
Valve seat cutter	
Vernier calipers	
V-block	
Wire brush	

PP1XM-01

SSM (Special Service Materials)

08826-00080	Seal Packing Black or equivalent (FIPG)	No. 1 camshaft bearing cap No. 3 camshaft bearing cap Cylinder head cover Rear oil seal retainer
08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	Drive plate bolt Heater union Torque converter clutch bolt
08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Idler pulley pivot bolt

EMISSION CONTROL

EQUIPMENT

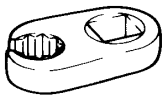
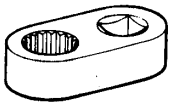
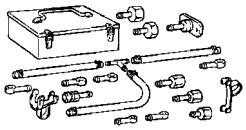
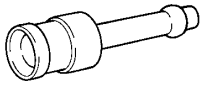
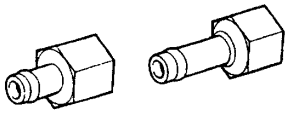
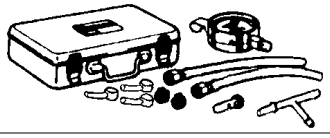
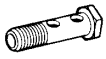
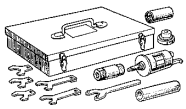
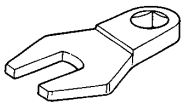
PP109-02

Hose clipper	
MITYVAC (Hand-held vacuum pump)	
Torque wrench	

SFI

SST (Special Service Tools)

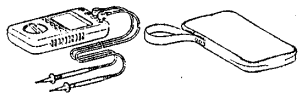
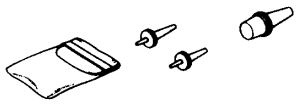
PP0UD-03

	09023-12700	Union Nut Wrench 17mm	Fuel line fare nut
	09205-76030	Cylinder Head Setting Bolt Tightening Adaptor	ECT sensor
	09268-41047	Injection Measuring Tool Set	
	(09268-41 110)	Adaptor	
	(09268-41300)	Clamp	
	(09268-5201 1)	Injection Measuring Attachment	
	09268-45014	EFI Fuel Pressure Gauge	
	(09268-41 190)	Adaptor	
	(90405-06167)	I Union	
	09612-24014	Steering Gear Housing Overhaul Tool Set	
	(09617-2401 1)	Steering Rack Wrench	Fuel pressure pulsation damper
	09816-30010	Oil Pressure Switch Socket	Knock sensor

09842-30070 Wiring "F" EFI Inspection 	

PP0TI-05

RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	
	09258-00030 Hose Plug Set .	

PP0TJ-07

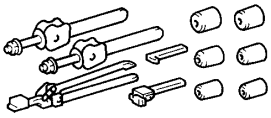
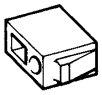
EQUIPMENT

Graduated cylinder	Injector
Heater	ECT sensor
OBD II scan tool	
Sound scope	Injector
Thermometer	ECT sensor
Torque wrench	
Vacuum gauge	

COOLING

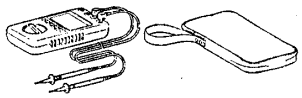
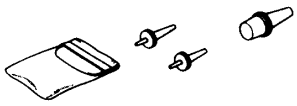
PP3C9-01

SST (Special Service Tools)

	09216-00041	V-Ribbed Belt Tensioner Wrench	
	09230-01010	Radiator Service Tool Set	
	09231-14010	Punch	

PP3CA-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	
	09258-00030	Hose Plug Set .	

PP0TM-08

EQUIPMENT

Heater	Thermostat ECT switch
Radiator cap tester	
Rubber hose (Inside diameter 6 - 8 mm)	
Thermometer	Thermostat ECT switch
Torque wrench	
Vernier calipers	

PP1IA-04

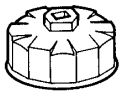
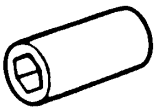
COOLANT

Item	Capacity	Classification
Engine coolant (w/ Heater)	7.5 liters (7.9 US qts, 6.6 Imp. qts)	”TOYOTA Long Life Coolant” or equivalent

LUBRICATION

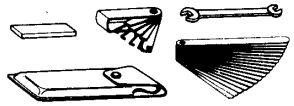
PP3CB-02

SST (Special Service Tools)

	09032-00100	Oil Pan Seal Cutter	No. 2 oil pan
	09228-07501	Oil Filter Wrench	
	09268-46021	Nozzle Holder Retaining Nut Wrench	Oil pressure switch

PP23F-02

RECOMMENDED TOOLS

	09200-00010 Engine Adjust Kit .	

PP1IE-03

EQUIPMENT

Oil pressure gauge	
Precision straight edge	Oil pump
Torque wrench	

PP1IF-05

LUBRICANT

Item		Capacity	Classification
Engine oil			
Drain and refill	w/ Oil filter change	5.4 liters (5.7 US qts, 4.8 Imp. qts)	API grade SL Energy-Conserving or ILSAC multigrade engine oil.
	w/o Oil filter change	5.1 liters (5.4 US qts, 4.5 Imp. qts)	
Dry fill		6.5 liters (6.9 US qts, 5.7 Imp. qts)	

PP1IG-03

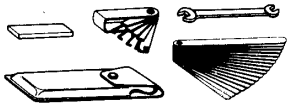
SSM (Special Service Materials)

08826-00080	Seal Packing Black or equivalent (FIPG)	Oil pump No. 1 oil pan No. 2 oil pan
08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Oil pressure switch

IGNITION

RECOMMENDED TOOLS

PP3CC-01

	09082-00040	TOYOTA Electrical Tester.	
	09200-00010	Engine Adjust Kit .	

PP0TU-09

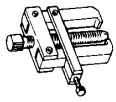
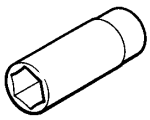
EQUIPMENT

Megger insulation resistance meter	Spark plug
Spark plug cleaner	
Torque wrench	

STARTING

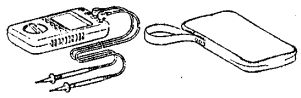
PP3CD-02

SST (Special Service Tools)

	09286-4601 1	Injection Pump Spline Shaft Puller	Armature bearing
	09810-38140	Starter Magnet Switch Nut Wrench 14	Terminal nut
	09820-00031	Alternator Rear Bearing Replacer	Armature front bearing

PP3CE-01

RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	

PP0TX-09

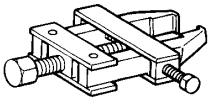
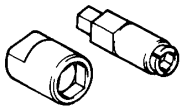
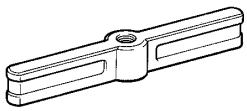
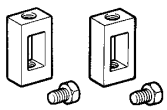
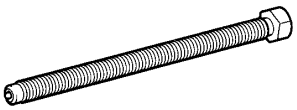
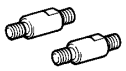
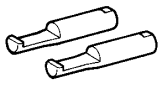
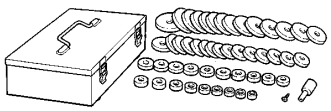
EQUIPMENT

Dial indicator	Commutator runout
Magnetic finger	Steel ball
Press	Magnetic switch terminal kit
Pull scale	Brush spring
Sandpaper	Commutator
Torque wrench	
V-block	Commutator
Vernier calipers	Commutator Brush

CHARGING

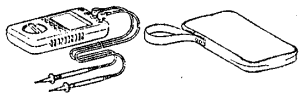
PP3CF-02

SST (Special Service Tools)

	09285-76010	Injection Pump Camshaft Bearing Cone Replacer	Rotor rear bearing cover
	09820-00021	Alternator Rear Bearing Puller	
	09820-00031	Alternator Rear Bearing Replacer	
	09820-6301 1	Alternator Pulley Set Nut Wrench Set	
	09950-4001 1	Puller B Set	
	(09951-04020)	Hanger 200	Rectifier end frame
	(09952-04010)	Slide Arm	Rectifier end frame
	(09953-04030)	Center Bolt 200	Rectifier end frame
	(09954-04010)	Arm 25	Rectifier end frame
	(09955-04041)	Claw No.4	Rectifier end frame
	09950-60010	Replacer Set	
	(09951-00500)	Replacer 50	Rotor front bearing

PP0TZ-05

RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	

PP0U0-07

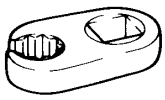
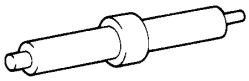
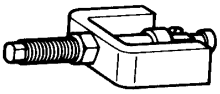
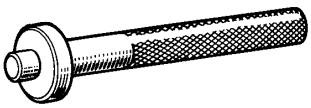
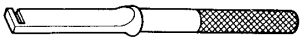
EQUIPMENT

Battery specific gravity gauge	Except maintenance-free battery
Battery tension gauge	
Torque wrench	
Vernier calipers	Rotor (Slip ring) Brush

CLUTCH

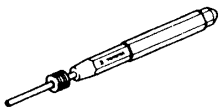
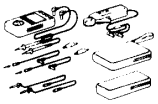
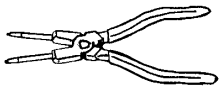
SST (Special Service Tools)

PP3RA-01

	09023-00100	Union Nut Wrench 10 mm	Clutch line
	09301-001 10	Clutch Guide Tool	
	09303-3501 1	Input Shaft Front Bearing Puller	
	09304-12012	Input Shaft Front Bearing Replacer	
	09333-00013	Clutch Diaphragm Spring Aligner	

PP3RB-01

RECOMMENDED TOOLS

	09031-00030	Pin Punch .	Reservoir tank
	09082-00050	TOYOTA Electrical Tester Set.	
	09905-00013	Snap Ring Pliers .	

PP3RC-01

EQUIPMENT

Vernier calipers	
Torque wrench	
Dial indicator with magnetic base	

PP3RD-01

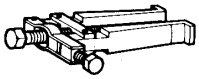
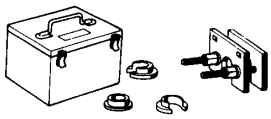
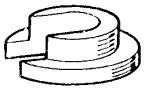
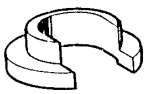
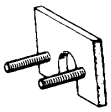
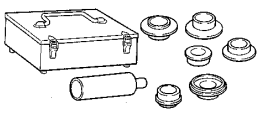
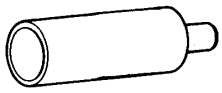
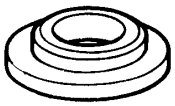
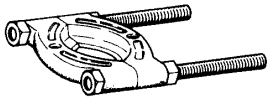
LUBRICANT

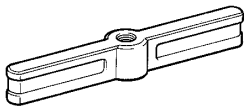
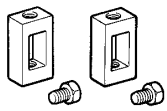
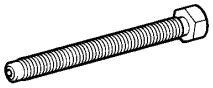
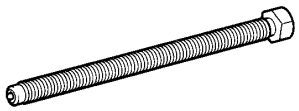
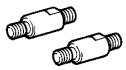
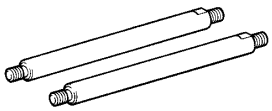
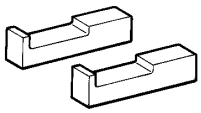
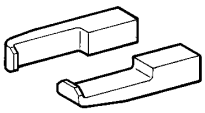
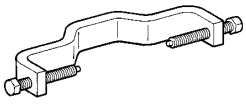
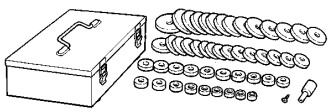
Item	Capacity	Classification
Brake fluid	-	SAEJ1703 or FMVSS No.116, DOT 3

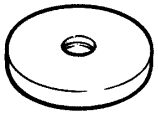
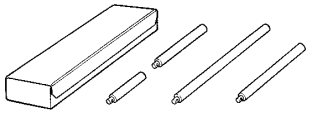
MANUAL TRANSMISSION

PP3R9-02

SST (Special Service Tools)

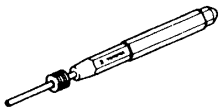
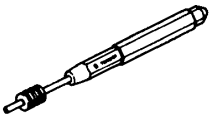
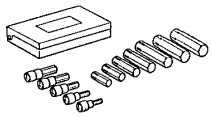
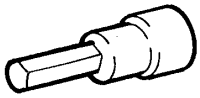
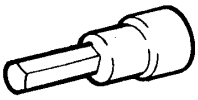
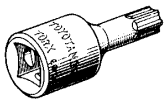
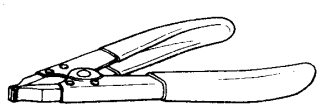
	09308-00010	Oil Seal Puller	Output shaft rear bearing outer race
	09308-10010	Oil Seal Puller	Extension housing oil seal
	09312-2001 1	Transmission Gear Remover & Replacer	5th gear Output shaft rear bearing Reverse gear
	(09313-00010)	Reverse Gear Remover	
	(09313-00030)	Rear Bearing Replacer	
	(09313-00040)	Plate "A"	
	(09313-00050)	Plate "B"	
	09316-6001 1	Transmission & Transfer Bearing Replacer	No. 3 clutch hob Counter gear center bearing outer race
	(09316-0001 1)	Replacer Pipe	
	(09316-00071)	Replacer "F"	
	09506-35010	Differential Drive Pinion Rear Bearing Replacer	Input shaft bearing Outer shaft center bearing
	09950-00020	Bearing Remover	Counter gear front bearing

	09950-4001 1	Puller B Set	Rear bearing, counter 5th gear rear bearing No. 3 clutch hub Reverse gear
	(09951-04020)	Hanger 200	
	(09952-04010)	Slide Arm	
	(09953-04020)	Center Bolt 150	
	(09953-04030)	Center Bolt 200	
	(09954-04010)	Arm 25	
	(09954-04040)	Arm 200	
	(09955-04051)	Claw No.5	
	(09955-04071)	Claw No.7	
	(09957-04010)	Attachment	
	(09958-0401 1)	Holder	
	09950-60010	Replacer Set	
	(09951-00200)	Replacer 20	No. 3 clutch hub

	(09951-00440)	Replacer 44	Front bearing retainer oil seal
	(09951-00510)	Replacer 51	Counter gear center bearing outer race
	(09951-00560)	Replacer 56	Output shaft rear bearing outer race Extension housing oil seal
	09950-70010	Handle Set	
	(09951-07150)	Handle 150	

PP3RE-01

RECOMMENDED TOOLS

	09031-00030	Pin Punch .	
	09031-00040	Pin Punch .	
	09040-0001 1	Hexagon Wrench Set .	
	(09043-20060)	Socket Hexagon Wrench 6.	
	(09043-20100)	Socket Hexagon Wrench 10.	
	09042-00020	Torx Socket T40 .	
	09905-00012	Snap Ring No.1 Expander	

PP3RF-01

EQUIPMENT

Dial indicator with magnetic base	
Feeler gauge	
Micrometer	
Torque wrench	
Calipers	
Magnetic finger	

PP3RG-01

LUBRICANT

Item	Capacity	Classification
Manual transmission oil	2.6 liters (2.7 US qts, 2.3 Imp. qts)	API GL-4 or GL-5 SAE 75W-90

PP3RH-01

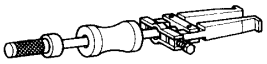
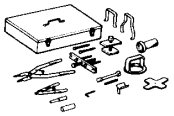
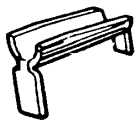
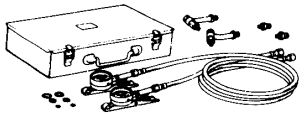
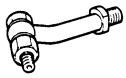
SSM (Special Service Materials)

	08826-00090 Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	
	08833-00080 Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	

AUTOMATIC TRANSMISSION

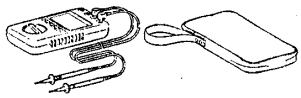
PP3BP-01

SST (Special Service Tools)

	09032-00100	Oil Pan Seal Cutter	Oil pan
	09308-00010	Oil Seal Puller	Extension housing rear oil seal
	09325-20010	Transmission Oil Plug	Extension housing rear oil seal
	09350-30020	TOYOTA Automatic Transmission Tool Set	
	(09351-32020)	Stator Stopper	
	09992-00095	Automatic Transmission Oil Pressure Gauge Set	
	(09992-00231)	Adaptor C	
	(09992-00271)	Gauge Assy	

PP3BQ-01

RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	

PP0N6-08

EQUIPMENT

OBD II scan tool	
Dial indicator or dial indicator with magnetic base	
Straight edge	
Torque wrench	

PP0N7-10

LUBRICANT

Item	Capacity	Classification
Automatic transmission fluid		
Dry fill	8.0 liters (8.5 US qts, 7.0 Imp. qts)	ATF TYPE T-IV
Drain and refill	2.4 liters (2.5 US qts, 2.1 Imp. qts)	

PP3BR-01

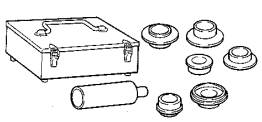
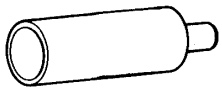
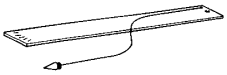
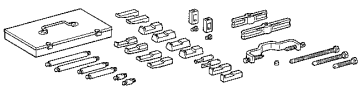
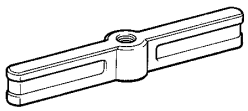
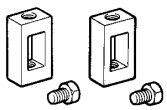
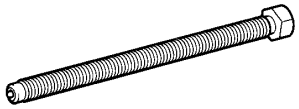
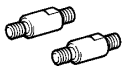
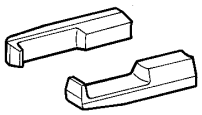
SSM (Special Service Materials)

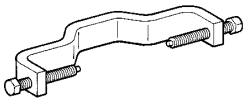
08826-00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	Transmission case x Oil pan
08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	Extension housing set bolt
08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Transmission case x Extension housing

PROPELLER SHAFT

SST (Special Service Tools)

PP23J-01

	09316-6001 1	Transmission & Transfer Bearing Replacer	
	(09316-0001 1)	Replacer Pipe	Dust cover
	09325-20010	Transmission Oil Plug	Oil leakage prevention
	09330-00021	Companion Flange Holding Tool	Universal joint flange
	09370-50010	Drive Line Angle Gauge	Joint angle
	09950-4001 1	Puller B Set	
	(09951-04020)	Hanger 200	Universal joint flange
	(09952-04010)	Slide Arm	Universal joint flange
	(09953-04030)	Center Bolt 200	Universal joint flange
	(09954-04010)	Arm 25	Universal joint flange
	(09955-04061)	Claw No.6	Universal joint flange
	(09957-04010)	Attachment	Universal joint flange

	(09958-0401 1) Holder	Universal joint flange

PP23K-01

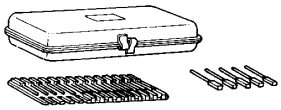
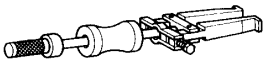
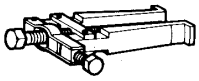
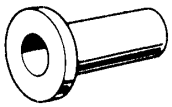
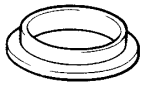
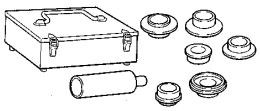
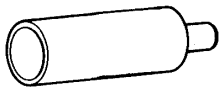
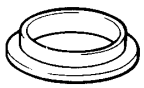
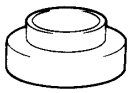
EQUIPMENT

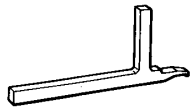
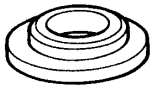
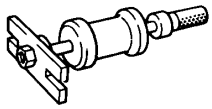
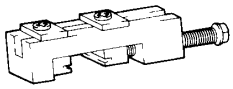
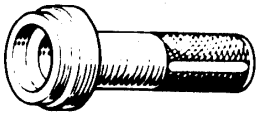
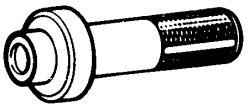
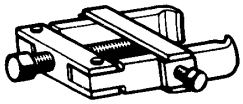
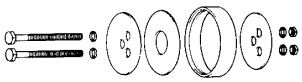
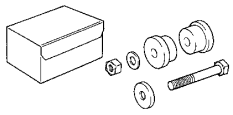
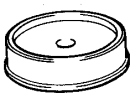
Torque wrench	
Dial indicator	

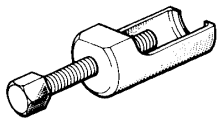
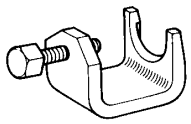
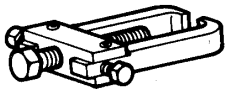
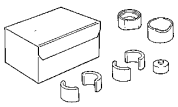
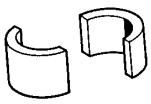
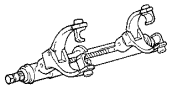
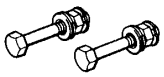
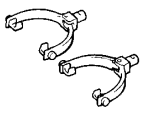
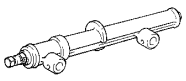
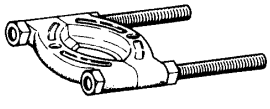
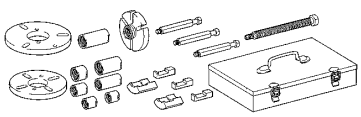
SUSPENSION AND AXLE

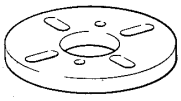
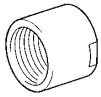
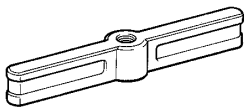
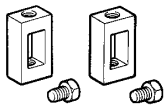
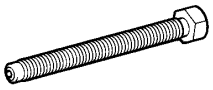
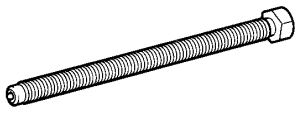
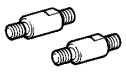
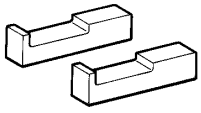
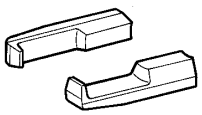
PP3C2-02

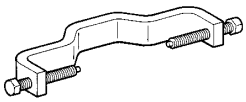
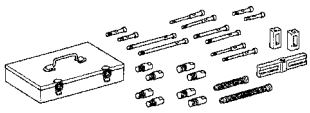
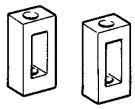
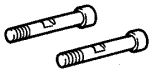
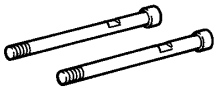
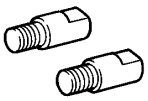
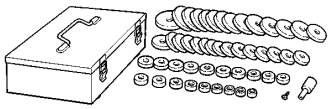
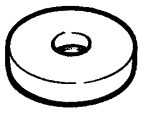
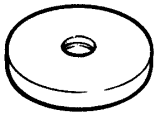
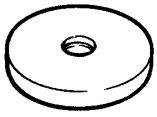
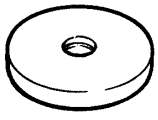
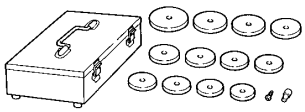
SST (Special Service Tools)

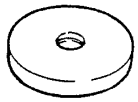
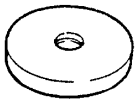
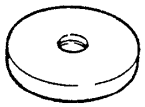
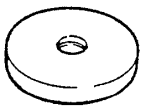
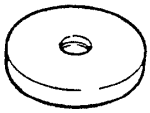
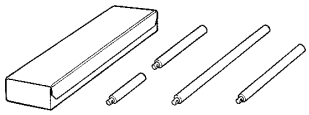
	09223-15020	Oil Seal & Bearing Replacer	Rear axle
	09240-00020	Wire Gauge Set	Rear drive shaft
	09308-00010	Oil Seal Puller	Front axle Rear differential
	09308-10010	Oil Seal Puller	Rear differential
	09309-36010	Transmission Rear Bearing Replacer	Rear drive shaft
	09316-12010	Transfer Bearing Replacer	Rear differential
	09316-6001 1	Transmission & Transfer Bearing Replacer	Front axle
	(09316-0001 1)	Replacer Pipe	
	(09316-00071)	Replacer "F"	
	09330-00021	Companion Flange Holding Tool	Rear differential
	09502-12010	Differential Bearing Replacer	Rear drive shaft
	09502-24010	Bearing Replacer	Front axle Rear differential

	09504-22012	Differential Side Bearing Replacer	Rear differential
	09506-30012	Differential Drive Pinion Rear Bearing Cone Replacer	Rear differential
	09520-24010	Differential Side Gear Shaft Puller	Rear differential
	09521-24010	Drive Shaft Boot Clamping Tool	Rear drive shaft
	09527-1701 1	Rear Axle Shaft Bearing Remover	Rear axle
	09554-22010	Differential Oil Seal Replacer	Rear differential
	09554-3001 1	Differential Oil Seal Replacer	Rear differential
	09556-22010	Drive Pinion Front Bearing Remover	Rear differential
	09570-24010	Differential Mounting Cushion Remover & Replacer	Rear differential
	09608-16042	Front Hub Bearing Adjusting Tool	Rear drive shaft
	(09608-02021)	Bolt & Nut	
	(09608-02041)	Retainer	
	09608-32010	Steering Knuckle Oil Seal Replacer	Front axle

	09610-20012	Pitman Arm Puller	Front axle Front suspension Rear axle Rear suspension
	09628-1001 1	Ball Joint Puller	Front axle Rear axle
	09628-6201 1	Ball Joint Puller	Front suspension Rear axle Rear suspension
	09710-04061	Base	Rear differential
	09710-04081	Base	Rear differential
	09726-12023	Lower Suspension Arm Bushing Remover & Replacer	Rear drive shaft
	(09726-01031)	Spacer	
	09727-30021	Coil Spring Compressor	Front suspension Rear suspension
	(09727-00010)	Bolt Set	
	(09727-00021)	Arm Set	
	(09727-00031)	Compressor	
	09950-00020	Bearing Remover	Front axle Rear axle Rear differential
	09950-30012	Puller A Set	Rear differential

	(09951-03010)	Upper Plate	
	(09953-03010)	Center Bolt	
	(09954-03010)	Arm	
	(09955-03030)	Lower Plate 130	
	(09956-03020)	Adapter 18	
	09950-4001 1	Puller B Set	
	(09951-04020)	Hanger 200	Front axle Rear axle Rear differential
	(09952-04010)	Slide Arm	Front axle Rear axle Rear differential
	(09953-04020)	Center Bolt 150	Front axle
	(09953-04030)	Center Bolt 200	Front axle Rear axle Rear differential
	(09954-04010)	Arm 25	Front axle Rear axle Rear differential
	(09955-04051)	Claw No.5	Front axle Rear axle
	(09955-04061)	Claw No.6	Rear differential

	(09957-04010)	Attachment	Front axle Rear axle Rear differential
	(09958-0401 1)	Holder	Front axle Rear axle Rear differential
	09950-50013	Puller C Set	
	(09952-05010)	Slide Arm	Front axle Rear axle Rear differential
	(09954-05021)	Claw No.2	Rear axle
	(09954-05031)	Claw No.3	Front axle Rear differential
	(09955-05040)	Adapter No.4	Front axle Rear axle Rear differential
	09950-60010	Replacer Set	
	(09951-00480)	Replacer 48	Rear axle Rear differential
	(09951-00560)	Replacer 56	Front axle
	(09951-00600)	Replacer 60	Rear differential
	(09951-00650)	Replacer 65	Rear axle
	09950-60020	Replacer Set No.2	

	(09951-00710) Replacer 71	Front axle Rear differential
	(09951-00750) Replacer 75	Rear axle
	(09951-00780) Replacer 78	Rear differential
	(09951-00790) Replacer 79	Rear differential
	(09951-01030) Replacer 103	Rear axle
	09950-70010 Handle Set	
	(09951-07100) Handle 100	Rear axle Rear differential
	(09951-07150) Handle 150	Front axle Rear differential
	(09951-07200) Handle 200	Rear differential

PP0T3-05

EQUIPMENT

Dial indicator with magnetic base	
Micrometer	
Torque wrench	
Vernier caliper	

PP0T4-07

LUBRICANT

REAR DRIVE SHAFT		
Item	Capacity	Classification
Outboard joint grease	170 - 180 g (0.37 - 0.40 lb, 6.0 - 6.3 oz.)	
Inboard joint grease	144 - 154 g (0.32 - 0.34 lb, 5.1 - 5.4 oz.)	
REAR DIFFERENTIAL		
Item	Capacity	Classification
Differential oil	-	Hypoid gear oil API GL-5 Above -18˚C (0˚F) SAE 90 Below -18˚C (0˚F) SAE 80W-90 or 80W

PP241-03

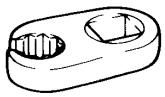
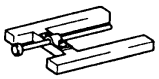
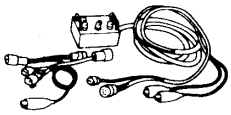
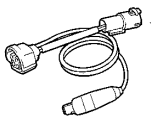
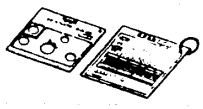
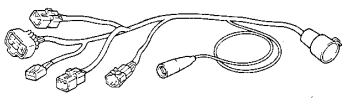
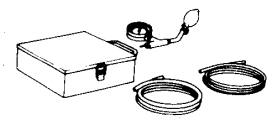
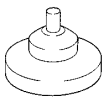
SSM (Special Service Materials)

	08826-00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)

BRAKE

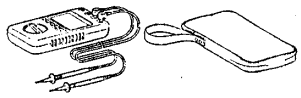
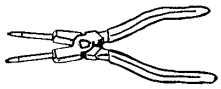
PP3C1-02

SST (Special Service Tools)

	09023-00100	Union Nut Wrench 10 mm	
	09737-0001 1	Brake Booster Push Rod Gauge	
	09843-18020	Diagnosis Check Wire	
	09843-18040	Diagnosis Check Wire No.2	
	09990-00150	ABS Actuator Checker and Sub-harness	
	09990-00250	ABS Actuator Checker Sub-harness ”G”	
	09990-00360	ABS Actuator Checker Sub-harness ”L”	
	09990-00410	ABS Actuator Checker Sheet ”N”	
	09990-00450	ABS Actuator Checker Sub-harness ”P”	
	09992-00242	Turbocharger Pressure Gauge	
	09992-00350	Brake Reservoir Pressure Adapter	

PP0P2-08

RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	
	09905-00013 Snap Ring Pliers .	

PP0P3-03

EQUIPMENT

Torque wrench	
Micrometer	Brake disc
Dial indicator	Brake disc
Brake drum gauge	Brake disc

PP0P4-02

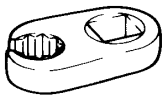
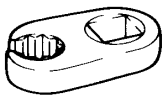
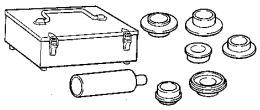
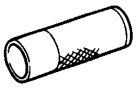
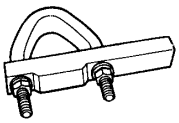
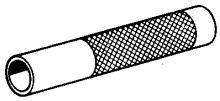
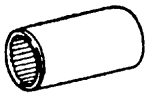
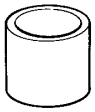
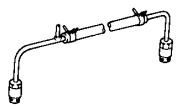
LUBRICANT

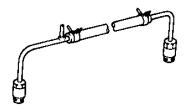
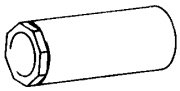
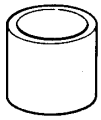
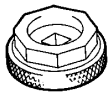
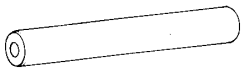
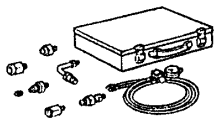
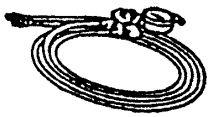
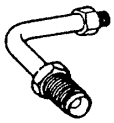
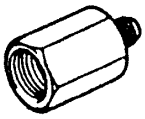
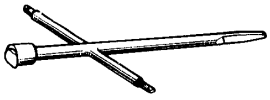
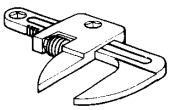
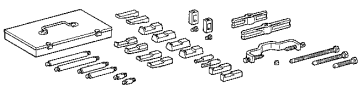
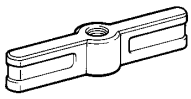
Item	Capacity	Classification
Brake fluid	-	SAE J1703 or FMVSS No. 116, DOT 3

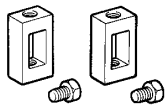
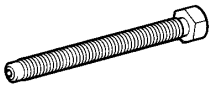
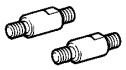
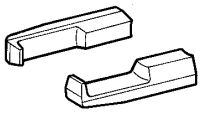
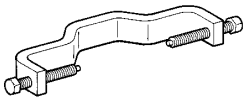
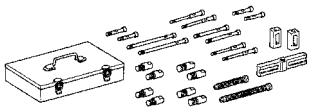
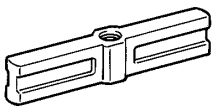
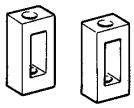
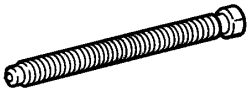
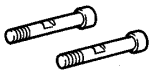
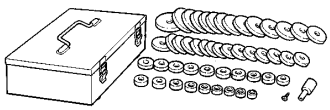
STEERING

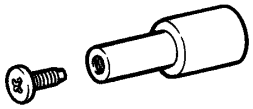
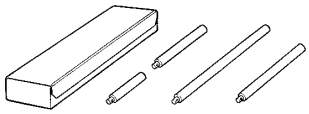
PP3R7-01

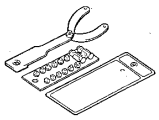
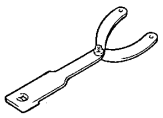
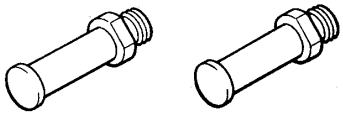
SST (Special Service Tools)

	09023-38200	Union Nut Wrench 12mm	PS gear
	09023-38400	Union Nut Wrench 14mm	PS gear
	09216-00041	V-Ribbed Belt Tensioner Wrench	PS vane pump
	09316-6001 1	Transmission & Transfer Bearing Replacer	Tilt steering column
	(09316-00051)	Replacer ”D”	
	09608-04031	Front Hub Inner Bearing Cone Replacer	PS vane pump
	09612-00012	Rack & Pinion Steering Rack Housing Stand	PS gear
	09612-2201 1	Tilt Handle Bearing Replacer	Tilt steering column
	09616-0001 1	Steering Worm Bearing Adjusting Socket	PS gear
	09630-24014	Steering Rack Oil Seal Tool Set	PS gear
	(09620-24051)	Seal Ring Tool	
	09631-12071	Steering Rack Oil Seal Test Tool	PS nane pump

	09631-12071	Steering Rack Oil Seal Test Tool	PS gear
	09631-20060	Bearing Guide Nut Wrench	PS gear
	09631-20081	Seal Ring Tool	PS gear
	09631-20090	Cylinder End Stopper Nut Wrench	PS gear
	09631-33010	Steering Rack Cover "I"	PS gear
	09640-10010	Power Steering Pressure Gauge Set	Power steering fluid
	(09641-01010)	Gauge Assy	
	(09641-01030)	Attachment B	
	(09641-01060)	Attachment E	
	09703-30010	Brake Shoe Return Spring Tool	Tilt steering column
	09922-10010	Variable Open Wrench	PS gear
	09950-4001 1	Puller B Set	Tilt steering column
	(09951-04010)	Hanger 150	

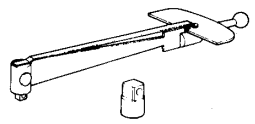
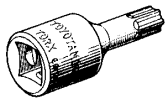
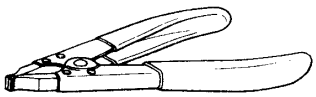
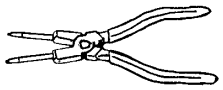
	(09952-04010)	Slide Arm	
	(09953-04020)	Center Bolt 150	
	(09954-04010)	Arm 25	
	(09955-04061)	Claw No.6	
	(09958-0401 1)	Holder	
	09950-50013	Puller C Set	Tilt steering column
	(09951-05010)	Hanger 150	
	(09952-05010)	Slide Arm	
	(09953-05020)	Center Bolt 150	
	(09954-05021)	Claw No.2	
	09950-60010	Replacer Set	
	(09951-00180)	Replacer 18	PS gear
	(09951-00240)	Replacer 24	PS gear

	(09951-00250) Replacer 25	PS gear
	(09951-00280) Replacer 28	PS gear
	(09951-00310) Replacer 31	PS gear
	(09951-00320) Replacer 32	PS vane pump PS gear
	(09951-00330) Replacer 33	
	(09951-00340) Replacer 34	PS gear
	(09951-00360) Replacer 36	PS gear
	(09951-00430) Replacer 43	PS gear
	(09952-06010) Adapter	PS gear
	09950-70010 Handle Set	
	(09951-07100) Handle 100	PS vane pump PS gear
	(09951-07150) Handle 150	PS gear
	(09951-07200) Handle 200	PS gear

	(09951-07360)	Handle 360	PS gear
	09960-10010	Variable Pin Wrench Set	PS vane pump
	(09962-01000)	Variable Pin Wrench Arm Assy	
	(09963-01000)	Pin 10	

PP23U-01

RECOMMENDED TOOLS

	09025-00010	Torque Wrench (30 kgf-cm)	PS vane pump PS gear
	09042-00010	Torx Socket T30 .	Tilt steering column
	09905-00012	Snap Ring No.1 Expander .	
	09905-00013	Snap Ring Pliers .	

PP18L-05

EQUIPMENT

Belt tension gauge	Drive belt
Caliper gauge	PS vane pump
Vernier calipers	PS vane pump
Dial indicator	PS gear
Feeler gauge	PS vane pump
Micrometer	PS vane pump
Torque wrench	

PP18M-04

LUBRICANT

Item	Capacity	Classification
Power steering fluid (Total)	0.9 liters (1.0 US qts, 0.8 Imp.qts)	ATF DEXRON® II or III

PP18N-04

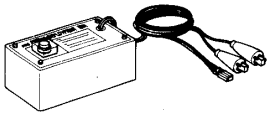
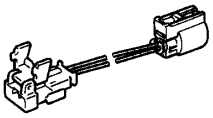
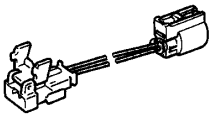
SSM (Special Service Materials)

08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	PS gear

SUPPLEMENTAL RESTRAINT SYSTEM

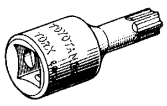
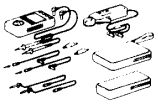
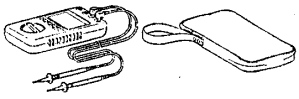
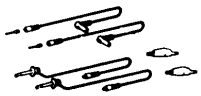
PP0MQ-10

SST (Special Service Tools)

	09082-00700	SRS Airbag Deployment Tool	
	09082-00750	Airbag Deployment Wire Sub-harness No.3	
	09082-00760	Airbag Deployment Wire Sub-harness No.4	
	09843-18040	Diagnosis Check Wire No.2	

PP1XL-06

RECOMMENDED TOOLS

	09042-00020	Torx Socket T40 .	Airbag sensor assembly
	09082-00050	TOYOTA Electrical Tester Set.	
	(09082-00040)	TOYOTA Electrical Tester.	
	(09083-00150)	Test Lead Set	Seat belt pretensioner connector

PP0MS-11

EQUIPMENT

Bolt Length: 35.0 mm (1.387 in.) Pitch: 1.0 mm (0.039 in.) Diam.: 6.0 mm (0.236 in.)	Airbag disposal
Tire Width: 185 mm (7.28 in.) Inner diam.: 360 mm (14.17 in.)	Airbag disposal
Tire with disc wheel Width: 185 mm (7.28 in.) Inner diam.: 360 mm (14.17 in.)	Airbag disposal
Torque wrench	
Vinyl bag	Airbag disposal

BODY ELECTRICAL

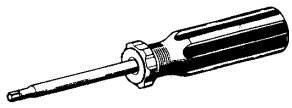
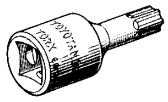
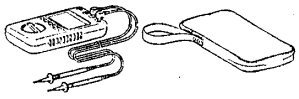
PP0O0-15

SST (Special Service Tools)

	09843-18040 Diagnosis Check Wire No.2	

PP0O1-11

RECOMMENDED TOOLS

	09041-00030	Torx Driver T30 .	For removing and installing steering wheel pad
	09042-00010	Torx Socket T30 .	For removing and installing steering wheel pad
	09082-00040	TOYOTA Electrical Tester.	

PP0O2-10

EQUIPMENT

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Thermometer	Engine oil level warning switch, Seat heater
Syphon	Brake fluid level warning switch
Oil bath	Engine oil level warning switch
Dry cell battery	Fuel sender gauge
Heat light	Seat heater
Hexagon wrench (6 mm)	Power seat
Torque wrench	
Clip remover	For removing cowl louver
Masking tape	Rear window defogger wire
Tin foil	Rear window defogger wire

PP0T6-08

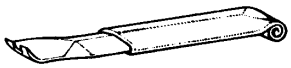
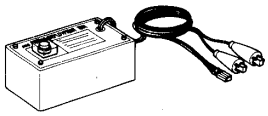
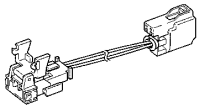
SSM (Special Service Materials)

	08888-88888	DuPont Paste No. 4817 or equivalent	Rear window defogger

BODY

PP0T8-08

SST (Special Service Tools)

	09812-00010	Door Hinge Set Bolt Wrench	
	09806-30010	Windshield Moulding Remover	
	09082-00700	SRS Airbag Deployment Tool	
	09082-00730	Airbag Deployment Wire Sub-Harness No.1	

PP1EI-05

RECOMMENDED TOOLS

	09070-20010 Moulding Remover .	

PP0TA-02

EQUIPMENT

Clip remover	
Torque wrench	
Torx driver	
Hog ring pliers	
Hand riveter	
Tape	To avoid surface damage
Adhesive tape	To avoid surface damage
Double-stick tape	
Adhesive	
Cleaner	
Shop rag	
Knife	
Sealer gun	
Brush	
Putty spatula	
Wooden block or similar object	For tying both piano wire ends
Plastic sheet	To avoid surface damage
Rope (no projections, difficult to break)	Seat belt pretensioner disposal
Tire Width: 185 mm (7.28 in.) Inner diam: 360 mm (14.17 in.)	Seat belt pretensioner disposal
Tire with disc wheel Width: 185mm (7.28 in.) Inner diam 360 mm (14.17 in.)	Seat belt pretensioner disposal
Vinyl bag	Seat belt pretensioner disposal

PP0TB-01

LUBRICANT

Item	Capacity	Classification
MP grease	-	-

PP0TC-09

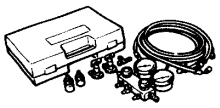
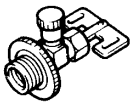
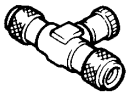
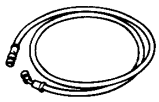
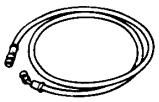
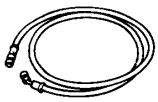
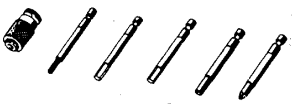
SSM (Special Service Materials)

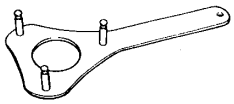
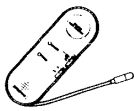
08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	
08833-00030	Three cement black or equivalent	
08850-00801	Windshield Glass Adhesive Set or equivalent	

AIR CONDITIONING

PP3BY-01

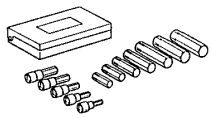
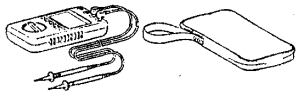
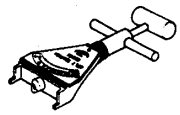
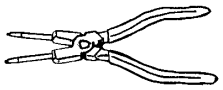
SST (Special Service Tools)

	07110-58060	Air Conditioner Service Tool Set	
	(07117-58060)	Refrigerant Drain Service Valve	
	(07117-58070)	T-Joint	
	(07117-58080)	Quick Disconnect Adapter	High pressure side
	(07117-58090)	Quick Disconnect Adapter	Low pressure side
	(07117-88060)	Refrigerant Charging Hose	High pressure side (Color: Red)
	(07117-88070)	Refrigerant Charging Hose	Low pressure side (Color: Blue)
	(07117-88080)	Refrigerant Charging Hose	Utility (Color: Green)
	07110-61050	Wrench Set	Expansion valve
	(07111-21020)	Holder	
	(07111-32020)	Hexagon Wrench	5 mm (0.20 in.)
	07112-66040	Magnetic Clutch Remover	

	07112-76060	Magnetic Clutch Stopper	
	07116-38360	Gas Leak Detector Assembly	
	09216-00041	V-Ribbed Belt Tensioner Wrench	

PP3BZ-01

RECOMMENDED TOOLS

	09040-0001 1	Hexagon Wrench Set .	
	09082-00040	TOYOTA Electrical Tester.	
	09216-00021	Belt Tension Gauge .	
	09905-00013	Snap Ring Pliers .	

PP0SP-01

EQUIPMENT

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Thermometer	Sernsor
Torque wrench	
Dial indicator	Magnetic clutch
Plastic hammer	Magnetic clutch

PP0SQ-01

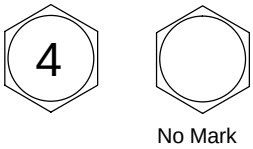
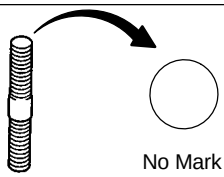
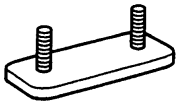
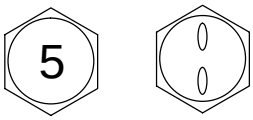
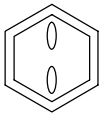
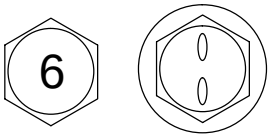
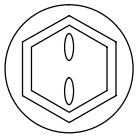
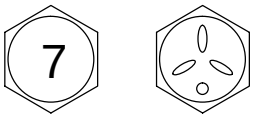
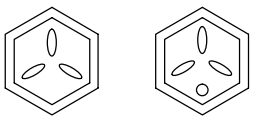
LUBRICANT

Item	Capacity	Classification
Compressor oil	-	ND-OIL 8 or equivalent
When replacing condenser	40 cc (1.4 fl. oz.)	
When replacing evaporator	40 cc (1.4 fl. oz.)	

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

SS0ZS-01

Bolt Type				Class
Hexagon Head Bolt		Stud Bolt	Weld Bolt	
Normal Recess Bolt	Deep Recess Bolt			
 No Mark	 No Mark	 No Mark		4T
				5T
 w/ Washer	 w/ Washer			6T
				7T
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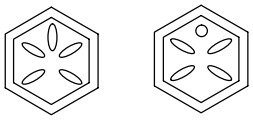
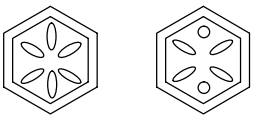
				10T
				11T

B06431

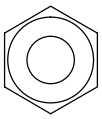
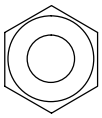
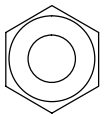
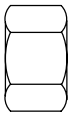
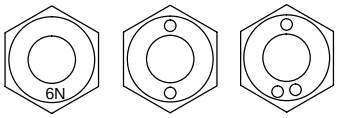
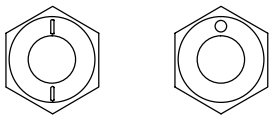
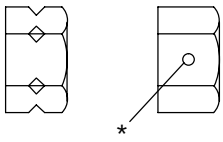
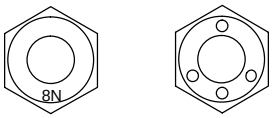
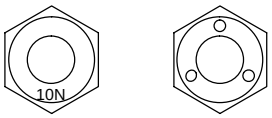
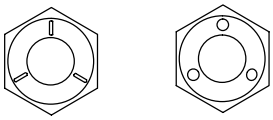
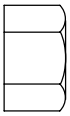
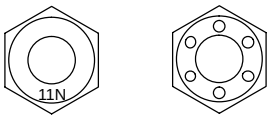
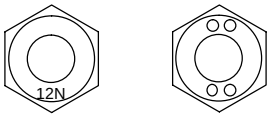
SS0ZT-01

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N·m	kgf·cm	ft·lbf	N·m	kgf·cm	ft·lbf
4T	6	1	5	55	48 in.·lbf	6	60	52 in.·lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	-	-	-
5T	6	1	6.5	65	56 in.·lbf	7.5	75	65 in.·lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	-	-	-
6T	6	1	8	80	69 in.·lbf	9	90	78 in.·lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	-	-	-
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	-	-	-
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

SS0ZU-01

HOW TO DETERMINE NUT STRENGTH

Nut Type			Class
Present Standard Hexagon Nut	Old Standard Hexagon Nut		
	Cold Forging Nut	Cutting Processed Nut	
 No Mark			4N
 No Mark (w/ Washer)	 No Mark (w/ Washer)	 No Mark	5N (4T)
 6N			6N
		 *	7N (5T)
 8N			8N
 10N		 No Mark	10N (7T)
 11N			11N
 12N			12N

*: Nut with 1 or more marks on one side surface of the nut.

B06432

HINT:

Use the nut with the same number of the nut strength classification or the greater than the bolt strength classification number when tightening parts with a bolt and nut.

Example: Bolt = 4T

Nut = 4N or more

MAINTENANCE

TORQUE SPECIFICATION

SS1JW-02

Part tightened	N·m	kgf·cm	ft·lbf
Front seat mount bolts	37	375	27
Front suspension member x Body	98	1,000	72
Rear suspension member x Body	127	1,300	94

ENGINE MECHANICAL

SS0FH-11

SERVICE DATA

Compression pressure		at 250 rpm STD	1,324 kPa (13.5 kgf/cm^2, 192 psi) or more
		Minimum	1,079 kPa (11.0 kgf/cm^2, 156 psi)
		Difference of pressure between each cylinder	98 kPa (1.0 kgf/cm^2, 14 psi) or less
Valve clearance		at cold Intake	0.15 - 0.25 mm (0.006 - 0.010 in.)
		Exhaust	0.25 - 0.35 mm (0.010 - 0.014 in.)
	Adjusting shim (for repair part)	Mark 2.500	2.500 mm (0.0984 in.)
		2.550	2.550 mm (0.1004 in.)
		2.600	2.600 mm (0.1024 in.)
		2.650	2.650 mm (0.1043 in.)
		2.700	2.700 mm (0.1063 in.)
		2.750	2.750 mm (0.1083 in.)
		2.800	2.800 mm (0.1102 in.)
		2.850	2.850 mm (0.1122 in.)
		2.900	2.900 mm (0.1142 in.)
		2.950	2.950 mm (0.1161 in.)
		3.000	3.000 mm (0.1181 in.)
		3.050	3.050 mm (0.1201 in.)
		3.100	3.100 mm (0.1220 in.)
		3.150	3.150 mm (0.1240 in.)
		3.200	3.200 mm (0.1260 in.)
		3.250	3.250 mm (0.1280 in.)
		3.300	3.300 mm (0.1299 in.)
Ignition timing	w/ Terminals TE and E1 connected of DLC1		10˚ ± 2˚ BTDC @ idle
Idle speed	-		700 ± 50 rpm
Timing belt tensioner	Protrusion (from housing side)		8.0 - 8.8 mm (0.315 - 0.346 in.)
Cylinder head	Warpage		
	Cylinder block side	Maximum	0.10 mm (0.0039 in.)
	Intake manifold side	Maximum	0.10 mm (0.0039 in.)
	Exhaust manifold side	Maximum	0.10 mm (0.0039 in.)
	Valve guide bore diameter	STD	10.985 - 11.006 mm (0.4325 - 0.4333 in.)
		O/S 0.05	11.035 - 11.056 mm (0.4344 - 0.4353 in.)
	Valve seat		
	Refacing angle		15˚, 45˚, 75˚
	Contacting angle		45˚
	Contacting width	Intake	1.0 - 1.4 mm (0.039 - 0.055 in.)
		Exhaust	1.2 - 1.6 mm (0.047 - 0.063 in.)
	Cylinder head bolt diameter	STD	10.8 - 11.0 mm (0.425 - 0.433 in.)
		Minimum	10.7 mm (0.421 in.)
Valve guide bushing	Inside diameter		6.010 - 6.030 mm (0.2366 - 0.2374 in.)
	Outside diameter (for repair part)	STD	11.033 - 11.044 mm (0.4344 - 0.4348 in.)
		O/S 0.05	11.083 - 11.094 mm (0.4363 - 0.4368 in.)
Valve	Valve overall length	STD Intake	98.29 - 98.79 mm (3.8697 - 3.8894 in.)
		Exhaust	98.84 - 99.34 mm (3.8913 - 3.9110 in.)
		Minimum Intake	98.19 mm (3.8657 in.)
		Exhaust	98.74 mm (3.8874 in.)
	Valve face angle		44.5˚
	Stem diameter	Intake	5.970 - 5.985 mm (0.2350 - 0.2356 in.)
		Exhaust	5.965 - 5.980 mm (0.2348 - 0.2354 in.)

Valve (cont'd)	Stem oil clearance	STD Intake	0.025 - 0.060 mm (0.0010 - 0.0024 in.)
		Exhaust	0.030 - 0.065 mm (0.0012 - 0.0026 in.)
		Maximum Intake	0.08 mm (0.0031 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Margin thickness	STD	0.8 - 1.2 mm (0.031 - 0.047 in.)
		Minimum	0.5 mm (0.020 in.)
Valve spring	Deviation	Maximum	2.0 mm (0.079 in.)
	Free length	Pink painted mark	43.71 mm (1.7209 in.)
		Yellow painted mark	44.10 mm (1.7362 in.)
	Installed tension at 34.5 mm (1.358 in.)		186.2 - 205.8 N (19.0 - 21.0 kgf, 41.9 - 46.3 lbf)
Valve lifter	Lifter diameter		30.966 - 30.976 mm (1.2191 - 1.2195 in.)
	Lifter bore diameter		31.000 - 31.016 mm (1.2205 - 1.2211 in.)
	Oil clearance	STD	0.024 - 0.050 mm (0.0009 - 0.0020 in.)
		Maximum	0.07 mm (0.0028 in.)
Camshaft	Thrust clearance	STD	0.080 - 0.190 mm (0.0031 - 0.0075 in.)
		Maximum	0.30 mm (0.0118 in.)
	Cam lobe height	STD Intake	44.310 - 44.360 mm (1.7445 - 1.7465 in.)
		Exhaust	44.250 - 44.350 mm (1.7421 - 1.7461 in.)
		Maximum Intake	44.16 mm (1.7386 in.)
		Exhaust	44.10 mm (1.7362 in.)
	Journal diameter		28.949 - 28.965 mm (1.1397 - 1.1404 in.)
	Journal oil clearance	STD	0.035 - 0.072 mm (0.0014 - 0.0028 in.)
		Maximum	0.10 mm (0.0039 in.)
	Circle runout	Maximum	0.08 mm (0.0031 in.)
Air intake chamber	Warpage	Maximum	0.15 mm (0.0059 in.)
Manifold	Warpage	Maximum Intake	0.15 mm (0.0059 in.)
		Exhaust	0.50 mm (0.0196 in.)
Cylinder block	Cylinder head surface warpage	Maximum	0.07 mm (0.0028 in.)
	Cylinder bore diameter	STD	86.000 - 86.013 mm (3.3858 - 3.3863 in.)
		Maximum	86.02 mm (3.3866 in.)
	Main bearing bolt diameter	STD	9.96 - 9.97 mm (0.3921 - 0.3925 in.)
		Minimum	9.7 mm (0.382 in.)
Connecting rod	Thrust clearance	STD	0.250 - 0.402 mm (0.0098 - 0.0158 in.)
		Maximum	0.50 mm (0.0197 in.)
	Connecting bolt diameter	STD	8.1 - 8.3 mm (0.319 - 0.327 in.)
		Minimum	8.0 mm (0.315 in.)
	Connecting rod oil clearance	STD STD	0.023 - 0.041 mm (0.0009 - 0.0016 in.)
		U/S 0.25	0.028 - 0.066 mm (0.0011 - 0.0026 in.)
		Maximum STD	0.07 mm (0.0027 in.)
		U/S 0.25	0.08 mm (0.0031 in.)
	Connecting rod bearing center wall thickness (Reference)		
		STD Mark 1	1.498 - 1.501 mm (0.0590 - 0.0591 in.)
		2	1.501 - 1.504 mm (0.0591 - 0.0592 in.)
		3	1.504 - 1.507 mm (0.0592 - 0.0593 in.)
		4	1.507 - 1.510 mm (0.0593 - 0.0594 in.)
		5	1.510 - 1.513 mm (0.0594 - 0.0596 in.)
	Bushing inside diameter		22.005 - 22.014 mm (0.8663 - 0.8667 in.)
	Piston pin diameter		21.997 - 22.006 mm (0.8660 - 0.8664 in.)
	Piston pin oil clearance	STD	0.005 - 0.011 mm (0.0002 - 0.0004 in.)
		Maximum	0.05 mm (0.0020 in.)
	Rod out-of alignment	Maximum per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist	Maximum per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)

Piston and Piston ring	Piston diameter		85.935 - 85.945 mm (3.3833 - 3.3837 in.)
	Piston oil clearance	STD	0.055 - 0.078 mm (0.0022 - 0.0031 in.)
		Maximum	0.10 mm (0.0039 in.)
	Piston ring groove clearance	No. 1	0.011 - 0.070 mm (0.0004 - 0.0028 in.)
		No. 2	0.030 - 0.070 mm (0.0012 - 0.0028 in.)
	Piston ring end gap	STD No. 1	0.300 - 0.470 mm (0.0118 - 0.0185 in.)
		No. 2	0.350 - 0.520 mm (0.0138 - 0.0205 in.)
		Oil	0.130 - 0.450 mm (0.0051 - 0.0177 in.)
		Maximum No. 1	1.07 mm (0.0421 in.)
		No. 2	1.12 mm (0.0441 in.)
		Oil	1.05 mm (0.0413 in.)
Crankshaft	Thrust clearance	STD	0.020 - 0.220 mm (0.0008 - 0.0087 in.)
		Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness	STD	1.940 - 1.990 mm (0.0764 - 0.0783 in.)
	Main journal oil clearance	STD STD	0.026 - 0.040 mm (0.0010 - 0.0016 in.)
		U/S 0.25	0.025 - 0.061 mm (0.0010 - 0.0024 in.)
		Maximum STD	0.06 mm (0.0024 in.)
		U/S 0.25	0.08 mm (0.0031 in.)
	Main journal diameter	STD	61.984 - 62.000 mm (2.4403 - 2.4409 in.)
		U/S 0.25	61.745 - 61.755 mm (2.4309 - 2.4313 in.)
	Main bearing center wall thickness (Reference)	Mark 1	1.994 - 1.997 mm (0.0785 - 0.0786 in.)
		2	1.997 - 2.000 mm (0.0786 - 0.0787 in.)
		3	2.000 - 2.003 mm (0.0787 - 0.0789 in.)
		4	2.003 - 2.006 mm (0.0789 - 0.0790 in.)
		5	2.006 - 2.009 mm (0.0790 - 0.0791 in.)
	Crank pin diameter	STD	51.982 - 52.000 mm (2.0465 - 2.0472 in.)
		U/S 0.25	51.745 - 51.755 mm (2.0372 - 2.0376 in.)
	Circle runout	Maximum	0.06 mm (0.0024 in.)
	Main journal taper and out-of-round	Maximum	0.02 mm (0.0008 in.)
	Crank pin taper and out-of-round	Maximum	0.02 mm (0.0008 in.)

SS0FI-11

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Timing belt plate x Oil pump		8.0	80	71 in.·lbf
Idler pulley x Oil pump		35	350	26
No. 1 timing belt cover x Oil pump		8.0	80	71 in.·lbf
Camshaft timing pulley x Camshaft		81	810	60
Straight screw plug x Camshaft timing pulley		15	150	11
No. 1 oil pipe x No. 3 camshaft bearing cap		55	550	41
Cylinder head cover x Cylinder head		8.5	85	75 in.·lbf
High-tension cord x Cylinder head cover		8.0	80	71 in.·lbf
Timing belt tensioner x Oil pump		27	270	20
Crankshaft pulley x Crankshaft		330	3,300	243
Drive belt tensioner x Cylinder head		21	210	15
No. 2 timing belt cover x Cylinder head		8.0	80	71 in.·lbf
No. 3 timing belt cover x Cylinder head		8.0	80	71 in.·lbf
PS pump front bracket x PS vane pump		58	590	43
PS pump front bracket x Cylinder block		52	530	38
Drive belt tensioner absorber x Drive belt tensioner arm		20	200	14
Drive belt tensioner absorber x Drive belt tensioner bracket		20	200	14
Drive belt tensioner Arm x Drive belt tensioner		21	210	15
Drive belt tensioner bracket x Oil pump		28	280	21
ECT sensor x Cylinder head		19.6	200	14
Engine hanger x Cylinder head		40	400	30
Water outlet x Cylinder head		28	280	21
Cylinder head x Cylinder head	1st 2nd 3rd	35 Turn 90° Turn 90°	350 Turn 90° Turn 90°	26 Turn 90° Turn 90°
Camshaft bearing cap x Cylinder head		20	200	14
No. 3 camshaft bearing cap x Cylinder head	Hexagon bolt	5.0	50	44 in.·lbf
No. 4 timing belt cover x Cylinder head		8.0	80	71 in.·lbf
Intake manifold x Cylinder head		28	280	21
Manifold stay x Intake manifold		40	400	30
Manifold stay x Cylinder block		40	400	30
Vacuum control valve set x Intake manifold		21	210	15
Exhaust manifold x Cylinder head		40	410	30
Front exhaust pipe x Exhaust manifold		43	438	32
PS vane pump x Cylinder block		58	590	43
PS vane pump x A/C compressor		58	590	43
PS pump rear stay x PS pump bracket		39.2	400	29
PS pump rear stay x Manifold stay		39.2	400	29
Drive plate x Torque converter clutch		48	490	35
Engine hanger x Cylinder head		40	400	30
Rear support member x Body		25.5	260	19
Drive plate x Crankshaft		83	850	61
Transmission x Cylinder block		72	730	53
Starter x Transmission		37	380	27

No. 1 oil pan x Transmission		37	380	27
Torque converter clutch x Drive plate		48	490	35
Suspension member x Body		70	714	52
Engine rear mounting member x Transmission		13.5	135	10
Engine rear mounting member x Body		25.5	260	19
Lower arm x Steering knuckle		245	2,500	181
Shock absorber x Steering knuckle		64	650	47
Stabilizer bar x Body	Bolt	18	180	13
	Nut	49	500	30
Sliding yoke x Steering intermediate shaft		35	360	26
Transmission control rod x Shift lever		13	130	9
Transmission control rod x Transmission		13	130	9
A/C compressor x Cylinder block	Stud bolt	26	265	19
	Bolt and nut	52	530	38
Fuel inlet hose x Fuel pipe support		29	300	22
Front suspension member brace x Front suspension member		119	1,120	88
Front suspension member brace x Body		58	590	43
Main bearing cap x Cylinder block	1st	45	450	33
	2nd	Turn 90°	Turn 90°	Turn 90°
Connecting rod cap x Connecting rod	1st	30	300	22
	2nd	Turn 90°	Turn 90°	Turn 90°
Rear oil seal retainer x Cylinder block		6.0	60	53
Engine mounting bracket x Cylinder block		59	590	44
Fuel inlet pipe x Cylinder block		29	290	21
No. 1 oil pipe x Cylinder block		55	550	41
Oil filter bracket x Cylinder block		90	900	66
No. 2 water bypass pipe x Water pump		21	210	15
No. 2 water bypass pipe x Cylinder block		21	210	15
Generator x Water pump		40	400	30
Generator x Cylinder block		40	400	30
Front exhaust pipe x Exhaust manifold		43	438	32
Front exhaust pipe x Center exhaust pipe		43	438	32
Center exhaust pipe x Tailpipe		43	438	32
Tailpipe bracket x Body		13	133	10

EMISSION CONTROL

TORQUE SPECIFICATION

SS0FJ-12

Part tightened	N·m	kgf·cm	ft·lbf
Protector for charcoal canister x Body	5.5	56	49 in.·lbf
Charcoal canister x Protector	5.0	51	44 in.·lbf
RH rear drive shaft x Differential	83	850	61
Heated oxygen sensor x Exhaust manifold	45	450	33
Exhaust manifold x Cylinder head	40	408	30
Front exhaust pipe (with rear TWC) x Exhaust manifold	44	440	32
Front exhaust pipe (with rear TWC) x Center exhaust pipe	44	440	32
Pipe support bracket x Transmission	44	440	32

SFI

SS0FK-14

SERVICE DATA

Fuel pump	Resistance	at 20˚C (68˚F)	0.2 - 3.0 Ω
Fuel pressure regulator	Fuel pressure		304 - 343 kPa (3.1 - 3.5 kgf/cm^2, 44 - 50 psi)
Injector	Resistance Injection volume Difference between each cylinder Fuel leakage	at 20˚C (68˚F)	13.4 - 14.2 Ω 60 - 73 cm^3 (3.7 - 4.5 cu in.) per 15 sec. 13 cm^3 (0.8 cu in.) or less 1 drop or less per 12 min.
MAF meter	Resistance (THA - E2)	at -20˚C (-4˚F) at 20˚C (68˚F) at 60˚C (140˚F)	13.6 - 18.4kΩ 2.21 - 2.69 kΩ 0.493 - 0.667 kΩ
Throttle body	Throttle body fully closed angle		3.5˚
Throttle control motor	Motor (M+ - M-) Clutch (CL+ - CL-)	at 20˚C (68˚F) at 20˚C (68˚F)	0.3 - 100 Ω 4.2 - 5.2 Ω
Throttle position sensor	Resistance (VC - E2) Throttle valve opening percentage	at 20˚C (68˚F) STD	1.2 - 3.2 kΩ 14.8 ± 0.8 %
Accelerator pedal position sensor	Resistance (VC - E2) Accelerator pedal position voltage	at 20˚C (68˚F) STD	1.2 - 3.2 kΩ 0.3 - 0.9 V
Camshaft timing oil control valve	Resistance	at 20˚C (68˚F)	5.5 - 12 Ω
Fuel pump resister	Resistance	at 20˚C (68˚F)	0.30 - 0.35 Ω
VSV for EVAP	Resistance	at 20˚C (68˚F)	27 - 33 Ω
VSV for ACIS	Resistance	at 20˚C (68˚F)	38.5 - 44.5 Ω
VSV for CCV	Resistance	at 20˚C (68˚F)	24 - 30 Ω
VSV for pressure switching valve	Resistance	at 20˚C (68˚F) at 120˚C (248˚F)	37 - 44 Ω 51 - 62 Ω
ECT sensor	Resistance	at -20˚C (-4˚F) 0˚C (32˚F) 20˚C (68˚F) 40˚C (104˚F) 60˚C (140˚F) 80˚C (176˚F)	10 - 20 kΩ 4 - 7 kΩ 2 - 3 kΩ 0.9 - 1.3 kΩ 0.4 - 0.7 kΩ 0.2 - 0.4 kΩ
Vapor pressure sensor	Power sorce voltage		4.5 - 5.5 V
Heated oxygen sensor	Heater coil resistance	at 20˚C (68˚F) at 800˚C (1,472˚F)	11 - 16 Ω 23 - 32 Ω
Fuel cut rpm		Fuel return rpm	1,000 rpm

SS0FL-12

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Fuel line Union bolt	29	300	22
Flare nut for use with SST	30	310	22
for use without SST	38	387	28
Fuel tank vent tube set plate x Fuel tank	3.5	36	31 in.·lbf
Fuel inlet hose x Body	9.0	90	80 in.·lbf
Delivery pipe x Intake manifold	21	210	15
Fuel pressure pulsation damper x Fuel pipe support	32.5	325	24
Fuel inlet pipe x Intake manifold	9.0	90	80 in.·lbf
No. 2 vacuum pipe x Intake manifold	21	210	15
Fuel sender gauge x Fuel tank	1.5	15	13 in.·lbf
Fuel tank band x Body	39	400	29
MAF meter x Air cleaner	10.7	109	8
Throttle body bracket x Throttle body	21	210	15
Throttle body bracket x Cylinder head	21	210	15
Throttle position sensor x Throttle body	1.7	17.5	15 in.·lbf
Throttle control motor x Throttle body	3.7	37.5	33 in.·lbf
Throttle control motor cover x Throttle body	1.7	17.5	15 in.·lbf
Accelerator pedal position sensor x Throttle body	3.7	37.5	33 in.·lbf
Camshaft timing oil control valve x No. 3 camshaft bearing cap	8.0	80	71 in.·lbf
No. 3 timing belt cover x Cylinder head cover	8.0	80	71 in.·lbf
Intake air connector x Air intake chamber	28	280	21
Air intake chamber x Intake manifold	28	280	21
Vacuum control valve set x Intake manifold	21	210	15
ECT sensor x Cylinder head	19.6	200	14
Knock sensor x Cylinder block	44	450	33
PS pump rear stay x Manifold stay	39.2	400	29
PS pump rear stay x PS pump bracket	39.2	400	29
Heated oxygen sensor x Exhaust manifold	45	450	33
Heated oxygen sensor x Front exhaust pipe	45	450	33

COOLING

SERVICE DATA

SS0SD-03

Thermostat	Valve opening temperature Valve lift	 at 95˚C (203˚F)	80 - 84˚C (176 - 183˚F) 8.5 mm (0.335 in.) or more
Radiator cap	Relief valve opening pressure	STD Minimum	93 - 123 kPa (0.95 - 1.25 kgf/cm^2, 13.5 - 17.8 psi) 78 kPa (0.8 kgf/cm^2, 11.4 psi)
Electric cooling fan	Rotating amperage	at 20˚C (68˚F)	8.5 - 11.5 A

SS0SE-04

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Engine drain plug x Cylinder block	30	300	22
Water pump x Cylinder block	21	210	15
Water pump x No. 2 water bypass pipe	21	210	15
Generator x Water pump	40	400	30
Generator x Cylinder block	40	400	30
Water bypass outlet x Cylinder head	9.0	90	80 in.·lbf
Water pump pulley x Water pump	14	140	10
Drive belt tensioner absorber x Drive belt tensioner arm	20	200	14
Drive belt tensioner absorber x Drive belt tensioner bracket	20	200	14
Water inlet x Water pump	9.0	90	80 in.·lbf
Oil cooler x Radiator lower tank	8.3	85	74 in.·lbf
Oil cooler x Oil cooler pipe	14.7	150	11
Electric cooling fan x Radiator	5.0	50	44 in.·lbf
Upper radiator support x Body	13.5	135	10

LUBRICATION

SS0SF-03

SERVICE DATA

Oil pressure		at idle speed	49 kPa (0.5 kgf/cm^2, 7.3 psi) or more
		at 3,000 rpm	324 kPa (3.3 kgf/cm^2, 47 psi) or more
Oil pump	Tip clearance	STD	0.060 - 0.240 mm (0.0024 - 0.0094 in.)
		Maximum	0.30 mm (0.0118 in.)
	Body clearance	STD	0.100 - 0.175 mm (0.0039 - 0.0069 in.)
		Maximum	0.20 mm (0.0079 in.)
	Side clearance	STD	0.030 - 0.090 mm (0.0012 - 0.0035 in.)
		Maximum	0.12 mm (0.0047 in.)

SS0SG-03

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Union bolt x Cylinder block		90	900	66
Oil pressure switch x Union bolt		15	150	11
Oil drain plug x No. 2 oil pan		38	380	28
Oil pump body cover x Oil pump body		10	105	8
Plug x Oil pump body		49	500	36
Oil pump x Cylinder block		21	210	15
No. 1 oil pan x Cylinder block	12 mm head 14 mm head	21 40	210 400	15 30
Oil pan baffle plate x No. 1 oil pan		9.0	90	80 in.·lbf
Oil strainer x No. 1 oil pan		9.0	90	80 in.·lbf
No. 2 oil pan x No. 1 oil pan		9.0	90	80 in.·lbf
Oil level sensor x No. 1 oil pan		5.4	55	48 in.·lbf
Crankshaft position sensor x Oil pump		9.0	90	80 in.·lbf

IGNITION

SS0IM-03

SERVICE DATA

High-tension cord	Resistance	Maximum	25 kΩ per cord
Spark plug	Recommended spark plug	DENSO made	SK16R-P11
	Correct electrode gap for new plug		1.1 mm (0.043 in.)
	Maximum electrode gap for used plug		1.2 mm (0.047 in.)
Ignition coil	Primary coil resistance	at cold	0.33 - 0.52 Ω
		at hot	0.42 - 0.61 Ω
	Secondary coil resistance	at cold	8.5 - 14.7 kΩ
		at hot	10.8 - 17.2 kΩ
Camshaft position sensor	Resistance	at cold	835 - 1,400 Ω
		at hot	1,060 - 1,645 Ω
Crankshaft position sensor	Resistance	at cold	1,630 - 2,740 Ω
		at hot	2,065 - 3,225 Ω

SS0IN-03

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head	18	180	13
Throttle body x Intake air connector	21	210	15
Throttle body bracket x Cylinder head	21	210	15
Throttle body bracket x Throttle body	21	210	15
Throttle body gasket x Intake air connector	21	210	15
Ignition coils and high-tension cord set assembly x Cylinder head	8.0	80	71 in.·lbf
PS pump rear stay x Manifold stay	39.2	400	29
PS pump rear stay x PS pump bracket	39.2	400	29
Camshaft position sensor x Cylinder head	9.0	90	80 in.·lbf
Crankshaft position sensor x Oil pump	9.0	90	80 in.·lbf

STARTING

SERVICE DATA

SS0FQ-11

Starter	Rated voltage and output power		12 V 1.4 kW
	No-load characteristics	Current	90 A or less at 11.5 V
		rpm	3,000 rpm or more
	Brush length	STD	15.5 mm (0.610 in.)
		Minimum	10.0 mm (0.394 in.)
	Spring installed load	STD	17.6 - 23.5 N (1.8 - 2.4 kgf, 3.9 - 5.3 lbf)
		Minimum	11.8 N (1.2 kgf, 2.6 lbf)
	Commutator		
	Diameter	STD	30.0 mm (1.181 in.)
		Minimum	29.0 mm (1.412 in.)
	Undercut depth	STD	0.6 mm (0.024 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Magnetic switch		
	Contact plate for wear	Maximum	0.9 mm (0.035 in.)

SS0FR-11

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Starter x Transmission	37	380	27
Lead wire x Terminal C of starter	5.9	60	52 in.·lbf
Field frame x Armature assembly	5.9	60	52 in.·lbf
Starter housing x Magnetic switch	5.9	60	52 in.·lbf
End cover x Field frame	1.5	15	13 in.·lbf
Terminal nut x Terminal 30 of starter	17	173	13
Terminal nut x Terminal C of starter	17	173	13
Magnetic switch end cover x Magnetic switch	2.5	26	22 in.·lbf

CHARGING

SS0E6-10

SERVICE DATA

Battery	Voltage (Maintenance-free battery)	at 20˚C (68˚F)	12.5 - 12.9 V
	Specific gravity (Except maintenance-free battery)	at 20˚C (68˚F)	1.25 - 1.29
Alternator	Rated output		12 V 80 A
	Rotor coil resistance	at 20˚C (68˚C)	2.1 - 2.5 Ω
	Slip ring diameter	STD	14.2 - 14.4 mm (0.559 - 0.567 in.)
		Minimum	12.8 mm (0.504 in.)
	Brush exposed length	STD	9.5 -11.5 mm (0.374 -0.453 in.)
		Minimum	1.5 mm (0.059 in.)
Voltage regulator	Regulating voltage		13.2 - 14.8 V

SS0E7-14

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Drive belt tensioner absorber x Drive belt tensioner arm		20	200	14
Drive belt tensioner absorber x Drive belt tensioner bracket		20	200	14
Generator x Water pump		40	400	30
Generator x Cylinder block		40	400	30
Bearing retainer x Drive end frame		3.0	31	27 in.·lbf
Rectifier end frame x Drive end frame		4.5	46	40 in.·lbf
Rectifier end frame with wire clip x Rectifier end frame		5.4	55	48 in.·lbf
Generator pully x Rotor		110.5	1,125	81
Rectifier holder x Coil lesd on rectifier end frame		2.9	30	26 in.·lbf
Voltage regulator x Rectifier end frame		2.0	20	18 in.·lbf
Voltage regulator x Rectifier holder		2.0	20	18 in.·lbf
Brush holder x Rectifier holder		2.0	20	18 in.·lbf
Brush holder x Voltage regulator		2.0	20	18 in.·lbf
Rear end cover x Rectifier holder		4.4	45	39 in.·lbf
Plate terminal x Rectifier holder	Nut	4.4	45	39 in.·lbf
	Bolt	3.9	40	35 in.·lbf
Terminal insulator x Rectifier holder		6.5	67	58 in.·lbf

CLUTCH

SERVICE DATA

SS1JS-01

Pedal height from asphalt sheet		162 - 172 mm (6.38 - 6.77 in.)
Pedal free play		5.0 - 15.0 mm (0.197 - 0.591 in.)
Push rod play at pedal top		1.0 - 5.0 mm (0.039 - 0.197 in.)
Full pedal stroke		142.0 - 147.5 mm (5.591 - 5.807 in.) or more
Clutch release point from pedal full stroke end position		25 mm (0.98 in.) or more
Clutch start switch ON-OFF Stroke		8.0 ± 0.5 mm (0.315 ± 0.020 in.)
Slotted spring pin protrusion		1.5 - 3.5 mm (0.059 - 0.138 in.)
Disc rivet head depth	Minimum	0.3 mm (0.012 in.)
Disc runout	Maximum	0.8 mm (0.031 in.)
Flywheel runout	Maximum	0.1 mm (0.004 in.)
Diaphragm spring finger wear	Maximum depth	0.6 mm (0.024 in.)
Diaphragm spring finger wear	Maximum width	5.0 mm (0.197 in.)
Diaphragm spring tip non-alignment	Maximum	0.5 mm (0.020 in.)

SS1JT-01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Pedal hight lock nut	15.7	160	12
Push rod lock nut	12	120	9
Clutch line union	15.2	155	11
Master cylinder installation nut	12	120	9
Release cylinder installation bolt	12	120	9
Bleeder plug	10.7	109	8
Clutch cover x Flywheel	19.1	195	14
Release fork suppor	39.2	400	29

MANUAL TRANSMISSION

SS1JU-01

SERVICE DATA

Output shaft 2nd gear journal diameter	Minimum	42.975 mm (1.6919 in.)
Output shaft 3rd gear journal diameter	Minimum	31.969 mm (1.2586 in.)
Output shaft flange thickness	Minimum	5.70 mm (0.2244 in.)
Output shaft runout	Maximum	0.03 mm (0.0012 in.)
1st gear inner race flange thickness	Minimum	4.78 mm (0.1881 in.)
1st gear inner race outer diameter	Minimum	42.975 mm (1.6919 in.)
Counter gear bearing journal diameter	Minimum	29.950 mm (1.1791 in.)
Counter 5th gear journal diameter	Minimum	26.975 mm (1.0620 in.)
1st, 2nd and 3rd gear thrust clearance	Standard	0.10 - 0.25 mm (0.0039 - 0.0098 in.)
	Maximum	0.25 mm (0.0098 in.)
Counter 5th gear thrust clearance	Standard	0.10 - 0.41 mm (0.0039 - 0.0161 in.)
	Maximum	0.41 mm (0.0161 in.)
1st, 2nd and counter 5th gear radial clearance	Standard	0.009 - 0.060 mm (0.0004 - 0.0024 in.)
	Maximum	0.060 mm (0.0024 in.)
3rd gear radial clearance	Standard	0.015 - 0.066 mm (0.0006 - 0.0026 in.)
	Maximum	0.066 mm (0.0026 in.)
Reverse idler gear radial clearance	Standard	0.041 - 0.074 mm (0.0016 - 0.0029 in.)
	Maximum	0.074 mm (0.0029 in.)
No. 1 and No. 2 shift fork to hub sleeve clearance	Maximum	0.5 mm (0.020 in.)
No. 3 shift fork to hub sleeve clearance	Maximum	0.84 mm (0.0331 in.)
Synchronizer ring to 1st, 3rd and 4th gear clearance	Minimum	0.70 mm (0.0276 in.)
Synchronizer ring to 2nd and 3rd gear clearance	Minimum	0.74 mm (0.0291 in.)
Input shaft snap ring thickness		
	Mark 1	2.05 - 2.10 mm (0.0807 - 0.0827 in.)
	Mark 2	2.10 - 2.15 mm (0.0827 - 0.0846 in.)
	Mark 3	2.15 - 2.20 mm (0.0846 - 0.0866 in.)
	Mark 4	2.20 - 2.25 mm (0.0866 - 0.0886 in.)
	Mark 5	2.25 - 2.30 mm (0.0886 - 0.0906 in.)
	Mark 11	2.30 - 2.35 mm (0.0906 - 0.0925 in.)
	Mark 12	2.35 - 2.40 mm (0.0925 - 0.0945 in.)
Output shaft snap ring thickness		
No.2 clutch hub	Mark C-1	1.75 - 1.80 mm (0.0689 - 0.0709 in.)
	Mark D	1.80 - 1.85 mm (0.0709 - 0.0728 in.)
	Mark 11	1.86 - 1.91 mm (0.0732 - 0.0752 in.)
	Mark 12	1.92 - 1.97 mm (0.0756 - 0.0776 in.)
	Mark 13	1.98 - 2.03 mm (0.0780 - 0.0799 in.)
	Mark 14	2.04 - 2.09 mm (0.0803 - 0.0823 in.)
	Mark 15	2.10 - 2.15 mm (0.0827 - 0.0846 in.)
Output shaft snap ring thickness		
Rear bearing	Mark 8	2.31 - 2.36 mm (0.0909 - 0.0929 in.)
	Mark 9	2.37 - 2.42 mm (0.0933 - 0.0953 in.)
	Mark 10	2.43 - 2.48 mm (0.0957 - 0.0976 in.)
	Mark 11	2.49 - 2.54 mm (0.0980 - 0.1000 in.)
	Mark 12	2.55 - 2.60 mm (0.1004 - 0.1024 in.)
	Mark 13	2.61 - 2.66 mm (0.1028 - 0.1047 in.)
	Mark 14	2.68 - 2.73 mm (0.1055 - 0.1075 in.)
	Mark 15	2.74 - 2.79 mm (0.1079 - 0.1098 in.)

Output shaft snap ring thickness		
Reverse gear	Mark 5	2.25 - 2.30 mm (0.0886 - 0.0906 in.)
	Mark 11	2.30 - 2.35 mm (0.0906 - 0.0925 in.)
	Mark 12	2.35 - 2.40 mm (0.0925 - 0.0945 in.)
	Mark 13	2.40 - 2.45 mm (0.0945 - 0.0965 in.)
	Mark 14	2.45 - 2.50 mm (0.0965 - 0.0984 in.)
	Mark 15	2.50 - 2.55 mm (0.0984 - 0.1004 in.)
	Mark 16	2.55 - 2.60 mm (0.1004 - 0.1024 in.)
	Mark 17	2.61 - 2.66 mm (0.1028 - 0.1047 in.)
	Mark 18	2.67 - 2.72 mm (0.1051 - 0.1071 in.)
	Mark 19	2.73 - 2.78 mm (0.1075 - 0.1094 in.)
	Mark 20	2.79 - 2.84 mm (0.1098 - 0.1118 in.)
	Mark 21	2.85 - 2.90 mm (0.1122 - 0.1142 in.)
	Mark 22	2.91 - 2.96 mm (0.1146 - 0.1165 in.)
	Mark 23	2.97 - 3.02 mm (0.1169 - 0.1189 in.)
Coutner gear snap ring thickness		
Front bearing	Mark A	2.05 - 2.10 mm (0.0807 - 0.0827 in.)
	Mark B	2.10 - 2.15 mm (0.0827 - 0.0846 in.)
	Mark C	2.15 - 2.20 mm (0.0846 - 0.0866 in.)
	Mark D	2.20 - 2.25 mm (0.0866 - 0.0886 in.)
	Mark E	2.25 - 2.30 mm (0.0886 - 0.0906 in.)
	Mark F	2.30 - 2.35 mm (0.0906 - 0.0925 in.)
Counter gear snap ring thickness		
No.3 clutch hub	Mark 2	2.06 - 2.11 mm (0.0811 - 0.0831 in.)
	Mark 3	2.12 - 2.17 mm (0.0835 - 0.0854 in.)
	Mark 4	2.18 - 2.23 mm (0.0858 - 0.0878 in.)
	Mark 5	2.24 - 2.29 mm (0.0882 - 0.0902 in.)
Counter gear snap ring thickness		
Rear bearing	Mark 1	1.90 - 1.95 mm (0.0748 - 0.0768 in.)
	Mark 2	1.96 - 2.01 mm (0.0772 - 0.0791 in.)
	Mark 3	2.02 - 2.07 mm (0.0795 - 0.0815 in.)
	Mark 4	2.08 - 2.13 mm (0.0819 - 0.0839 in.)
	Mark 5	2.14 - 2.19 mm (0.0843 - 0.0862 in.)
	Mark 6	2.20 - 2.25 mm (0.0866 - 0.0886 in.)
	Mark 7	2.26 - 2.31 mm (0.0890 - 0.0909 in.)
Oil seal drive in depth		
Front bearing retainer (from retainer end)		12.2 ± 0.5 mm (0.480 ± 0.020 in.)
Extension housing		0 ± 0.5 mm (0 ± 0.020 in.)
Reverse restrict pin drive in depth		16 - 17 mm (0.63 - 0.67 in.)

SS1JV-02

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Transmission x Engine	12 mm bolt	71.6	730	53
	10 mm bolt	37.3	380	27
Engine rear mounting x Transmission		25.5	260	19
Rear engine mounting member	Nut	13.5	138	10
	Bolt	25	255	18
Transmission x Starter		37.3	380	28
Starter wire set nut		9.8	10	7
Clutch release cylinder set bolt		11.7	119	9
Propeller shaft x Differential		74	750	54
Propeller shaft center bearing		49	500	36
Exhaust manifold x Front exhaust pipe		62	630	46
Front exhaust pipe x Pipe support bracket		43	438	32
Center exhaust pipe x Tailpipe		43	438	32
Drain and filler plugs		38	387	28
Exhaust manifold x Engine		40	408	29
Engine cover No. 1 set nut		5.0	51	44 in.·lbf
Shift lever x Control shift lever arm		8.0	82	71 in.·lbf
Back-up light switch clamp set bolt		5.8	59	51 in.·lbf
Back-up light switch		41	410	30
Vehicle speed sensor drain gear set bolt		13	130	9
Clutch housing x Transmission case		38	387	28
Control shift lever retainer x Extension housing		18.5	189	14
Straight screw plug x Control shift lever retainer		24.5	250	18
Restrict pin		41	418	30
Inner lever x Shift and select lever		33	337	24
Extension housing x Intermediate plate		38	387	28
Front bearing retainer x Transmission case		25	255	18
Oil separator x Intermediate plate		18.5	189	14
Straight screw plug x Intermediate plate		25	255	18
No. 1 and No. 2 shift fork set bolt		20	203	15
Reverse idler gear shaft stopper set bolt		25	255	18
Straight screw plug x Reverse shift head		25	255	18
Rear bearing retainer x Intermediate plate		18.5	189	14
Straight screw plug x Extension housing		25	25.5	18

AUTOMATIC TRANSMISSION

SS0C5-13

SERVICE DATA

Line pressure (Wheel locked)		
	Idling	
	D position	390 - 460 kPa (4.0 - 4.7 kgf·cm^2, 57 - 67 psi)
	R position	0
	Stall	
	D position	1,200 - 1,360 kPa (12.2 - 13.8 kgf·cm^2, 174 - 196 psi)
	R position	1,640 - 1,960 kPa (16.7 - 19.8 kgf·cm^2, 238 - 282 psi)
Engine stall revolution (D position)		2,700 ± 150 rpm
Time lag	N → D position	Less than 1.2 seconds
	N → R position	Less than 1.5 seconds
Engine idle speed (N position and A/C OFF)		700 ± 50 rpm
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Torque converter clutch sleeve runout	Max.	0.30 mm (0.0118 in.)
Torque converter clutch installation (Correct distance)		More than 0.1 mm (0.004 in.)
Shift schedule (NORM and PWR mode)		
Differential gear ratio 3.909		
D, 4 position		
(Throttle valve fully opened)	1 → 2	47 - 59 km/h (29 - 37 mph)
	2 → 3	77 - 88 km/h (48 - 55 mph)
	3 → 4	118 - 133 km/h (73 - 83 mph)
	4 → 5	168 - 185 km/h (104 - 115 mph)
	5 → 4	163 - 176 km/h (101 - 109 mph)
	4 → 3	107 - 118 km/h (66 - 73 mph)
	3 → 2	60 - 66 km/h (37 - 41 mph)
	2 → 1	32 - 38 km/h (20 - 24 mph)
(Throttle valve fully closed)	4 → 5	37 - 43 km/h (23 - 27 mph)
	5 → 4	21 - 26 km/h (13 - 16 mph)
3 position		
(Throttle valve fully opened)	1 → 2	47 - 59 km/h (29 - 37 mph)
	2 → 3	77 - 87 km/h (48 - 54 mph)
	4 → 3	123 - 134 km/h (76 - 83 mph)
	3 → 2	60 - 66 km/h (37 - 41 mph)
	2 → 1	32 - 38 km/h (20 - 24 mph)
2 position		
(Throttle valve fully opened)	1 → 2	47 - 59 km/h (29 - 37 mph)
	3 → 2	82 - 90 km/h (51 - 56 mph)
	2 → 1	32 - 38 km/h (20 - 24 mph)
L position		
(Throttle valve fully opened)	2 → 1	17 - 22 km/h (11 - 14 mph)

Shift schedule (SNOW mode)		
Differential gear ratio 3.916		
D, 4 position		
(Throttle valve fully opened)	1 → 2	35 - 49 km/h (22 - 30 mph)
	2 → 3	55 - 73 km/h (34 - 45 mph)
	3 → 4	84 - 109 km/h (52 - 68 mph)
	4 → 5	121 - 151 km/h (75 - 94 mph)
	5 → 4	64 - 88 km/h (40 - 55 mph)
	4 → 3	38 - 54 km/h (24 - 34 mph)
	3 → 2	17 - 31 km/h (11- 19 mph)
(Throttle valve fully closed)	4 → 5	37 - 43 km/h (23 - 27 mph)
	5 → 4	21 - 26 km/h (13 - 16 mph)
3 position		
(Throttle valve fully opened)	1 → 2	35 - 49 km/h (22 - 30 mph)
	2 → 3	55 - 73 km/h (34 - 45 mph)
	4 → 3	123 - 134 km/h (76 - 83 mph)
	3 → 2	17 - 31 km/h (11 - 19 mph)
2 position		
(Throttle valve fully opened)	1 → 2	47 - 59 km/h (29 - 37 mph)
	3 → 2	82 - 90 km/h (51 - 56 mph)
L position		
(Throttle valve fully opened)	2 → 1	17 - 22 km/h (11 - 14 mph)
Lock-up point	(Throttle valve opening 5 %)	
5th gear (D position)	Lock-up ON	53 - 59 km/h (33 - 37 mph)
	Lock-up OFF	52 - 58 km/h (32 - 36 mph)
4th gear (4 position)	Lock-up ON	53 - 59 km/h (33 - 37 mph)
	Lock-up OFF	52 - 58 km/h (32 - 36 mph)
Flex lock-up point		
(Throttle valve opening 3 %)		
D position (When accelerating)		
5th gear	Lock-up ON	37 - 43 km/h (23 - 27 mph)
	Lock-up OFF	36 - 41 km/h (22 - 25 mph)
4th gear	Lock-up ON	28 - 33 km/h (17 - 32 mph)
	Lock-up OFF	27 - 32 km/h (18 - 20 mph)

SS139-04

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Extension housing x Transmission case		34	345	25
Transmission mounting bracket x Extension housing		12	120	9
Engine rear support member x Frame		25	260	19
Engine rear support member x Transmission mounting bracket		12	120	9
Vehicle speed sensor set bolt		5.4	55	48 in.·lbf
O/D direct clutch speed sensor set bolt		5.4	55	48 in.·lbf
AFT temperature sensor connector set bolt		5.4	55	48 in.·lbf
Drain plug		20	205	15
Shift solenoid valve SLU and SLT set bolt		6.4	65	56 in.·lbf
Shift solenoid valve SLN and No. 4 set bolt		10	100	7
Shift solenoid valve clamp set bolt		6.4	65	56 in.·lbf
Shift solenoid valve No. 1 and No. 3		6.4	65	56
Shift solenoid valve No. 2		10	100	7
Shift control rod set nut		13	130	9
Valve body x Transmission case		10	100	7
Oil pan x Transmission case		7.4	75	65 in.·lbf
Oil strainer x Valve body		10	100	7
Parking lock pawl bracket x Transmission case		7.4	75	65 in.·lbf
Control shaft lever set nut		13	130	9
Shift lever guide housing assembly x Shift lever plate		4.9	50	43 in.·lbf
Floor shift lever assembly set bolt		8.3	85	73 in.·lbf
Oil cooler pipe clamp bolt		5.4	55	48 in.·lbf
Oil cooler pipe union nut		44	450	33
Transmission x Engine	14 mm head	37	380	27
	17 mm head	72	730	53
Starter x Transmission		37	380	27
Exhaust pipe assembly x Exhaust manifold		62	632	46
Exhaust manifold with TWC x Engine		39	400	29
Pipe support bracket x Transmission		43	438	32
Torque converter clutch x Drive plate		48	490	35
Propeller shaft x Differential		74	750	54
Propeller shaft x Body		49	500	36
Drive plate x Crankshaft		83	850	61

PROPELLER SHAFT

SS132-01

SERVICE DATA

Shaft runout Max.	0.8 mm (0.031 in.)
Joint angle (No. 2 joint)	- 1° 21' ± 30'
Joint angle (No. 3 joint)	2° 18' ± 30'
Center support bearing adjusting washer thickness	2.0 mm (0.079 in.) 4.5 mm (0.177 in.) 6.5 mm (0.256 in.) 9.0 mm (0.354 in.) 11.0 mm (0.433 in.) 13.5 mm (0.531 in.)

SS133-03

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Propeller shaft x Differential		74	750	54
Propeller shaft x Intermediate shaft		74	750	54
Intermediate shaft x Center support bearing x Universal joint flange	1st	181	1,850	134
	2nd	Loosen nut		
	3rd	69	700	51
Center support bearing x Body		49	500	36
Exhaust pipe assembly x Exhaust manifold		62	632	46
Heated oxygen sensor x Exhaust pipe assembly		44	450	33
Pipe support bracket x Transmission		43	438	32

SUSPENSION AND AXLE

SS0FD-11

SERVICE DATA

Cold tire inflation pressure (SEDAN)	Tire size: 215/45ZR17 or P205/55R16 89V	
	Front*1	230 kPa (2.3 kgf/cm^2, 33 psi)
	Rear*1	230 kPa (2.3 kgf/cm^2, 33 psi)
	Front*2	300 kPa (3.0 kgf/cm^2, 44 psi)
	Rear*2	300 kPa (3.0 kgf/cm^2, 44 psi)
Cold tire inflation pressure (WAGON)	Tire size: 215/45ZR17	
	Front*1	230 kPa (2.3 kgf/cm^2, 33 psi)
	Front*2	300 kPa (3.0 kgf/cm^2, 44 psi)
	Tire size: 225/45ZR17	
	Rear*1	240 kPa (2.4 kgf/cm^2, 35 psi)
	Rear*2	310 kPa (3.1 kgf/cm^2, 45 psi)
	Tire size: P205/55R16 89V	
	Front*1	230 kPa (2.3 kgf/cm^2, 33 psi)
	Rear*1	230 kPa (2.3 kgf/cm^2, 33 psi)
	Front*2	300 kPa (3.0 kgf/cm^2, 44 psi)
	Rear*2	320 kPa (3.2 kgf/cm^2, 46 psi)
Front wheel alignment (SEDAN, Canada)	Vehicle height: Front: B*4 - A*3	66 mm (2.60 in.)
	Rear: C*5 - D*6	66 mm (2.60 in.)
	Camber	-0°21' ± 30' (-0.35° ± 0.5°)
	Right-left error	30' (0.5°) or less
	Caster	5°46' ± 30' (5.77° ± 0.5°)
	Right-left error	30' (0.5°) or less
	Steering axis inclination	9°16' ± 30' (9.27° ± 0.5°)
	Right-left error	30' (0.5°) or less
	Toe-in (total)	0°06' ± 12' (0.1° ± 0.2°, 1 ± 2 mm, 0.04 ± 0.08 in.)
	Rack end length difference	1.5 mm (0.059 in.) or less
	Wheel angle: Inside wheel	41°02' (39°02' – 42°02')
		41.03° (39.03° – 42.03°)
	Outside wheel: Reference	33°30'
		33.5°
Front wheel alignment (SEDAN, Except Canada)	Vehicle height: Front: B*4 - A*3	72 mm (2.83 in.)
	Rear: C*5 - D*6	85 mm (3.35 in.)
	Camber	-0°30' ± 30' (-0.5° ± 0.5°)
	Right-left error	30' (0.5°) or less
	Caster	6°07' ± 30' (6.12° ± 0.5°)
	Right-left error	30' (0.5°) or less
	Steering axis inclination	9°25' ± 30' (9.42° ± 0.5°)
	Right-left error	30' (0.5°) or less
	Toe-in (total)	0°06' ± 12' (0.1° ± 0.2°, 1 ± 2 mm, 0.04 ± 0.08 in.)
	Rack end length difference	1.5 mm (0.059 in.) or less
	Wheel angle: Inside wheel	41°01' (39°01' – 42°01')
		41.02° (39.02° – 42.02°)
	Outside wheel: Reference	33°23'
		33.38°

Front wheel alignment (WAGON, Canada)	Vehicle height Front: B*4 - A*3 Rear: C*5 - D*6	56 mm (2.20 in.) 58 mm (2.28 in.)
	Camber Right-left error	-0°05' ± 30' (-0.08° ± 0.5°) 30' (0.5°) or less
	Caster Right-left error	5°31' ± 30' (5.52° ± 0.5°) 30' (0.5°) or less
	Steering axis inclination Right-left error	8°59' ± 30' (8.98° ± 0.5°) 30' (0.5°) or less
	Toe-in (total) Rack end length difference	0°06' ± 12' (0.1° ± 0.2°, 1 ± 2 mm, 0.04 ± 0.08 in.) 1.5 mm (0.059 in.) or less
	Wheel angle Inside wheel Outside wheel: Reference	41°03' (39°03' – 42°03') 41.05° (39.05° – 42.05°) 33°40' 33.6°
Front wheel alignment (WAGON, Except Canada)	Vehicle height Front: B*4 - A*3 Rear: C*5 - D*6	66 mm (2.60 in.) 66 mm (2.60 in.)
	Camber Right-left error	-0°21' ± 30' (-0.35° ± 0.5°) 30' (0.5°) or less
	Caster Right-left error	5°46' ± 30' (5.77° ± 0.5°) 30' (0.5°) or less
	Steering axis inclination Right-left error	9°16' ± 30' (9.27° ± 0.5°) 30' (0.5°) or less
	Toe-in (total) Rack end length difference	0°06' ± 12' (0.1° ± 0.2°, 1 ± 2 mm, 0.04 ± 0.08 in.) 1.5 mm (0.059 in.) or less
	Wheel angle Inside wheel Outside wheel: Reference	41°02' (39°02' – 42°02') 41.03° (39.03° – 42.03°) 33°30' 33.5°
Rear wheel alignment (SEDAN, Canada)	Camber Right-left error	-0°23' ± 30' (-0.38° ± 0.5°) 30' (0.5°) or less
	Toe-in (total) Right and left length difference	0°12' ± 12' (0.2° ± 0.2°, 2 ± 2 mm, 0.08 ± 0.08 in.) 4.0 mm (0.157 in.) or less
Rear wheel alignment (SEDAN, Except Canada)	Camber Right-left error	-0°55' ± 30' (-0.92° ± 0.5°) 30' (0.5°) or less
	Toe-in (total) Right and left length difference	0°12' ± 12' (0.2° ± 0.2°, 2 ± 2 mm, 0.08 ± 0.08 in.) 4.0 mm (0.157 in.) or less
Rear wheel alignment (WAGON, Canada)	Camber Right-left error	-0°04' ± 30' (-0.07° ± 0.5°) 30' (0.5°) or less
	Toe-in (total) Right and left length difference	0°12' ± 12' (0.2° ± 0.2°, 2 ± 2 mm, 0.08 ± 0.08 in.) 4.0 mm (0.157 in.) or less
Rear wheel alignment (WAGON, Except Canada)	Camber Right-left error	-0°23' ± 30' (-0.38° ± 0.5°) 30' (0.5°) or less
	Toe-in (total) Right and left length difference	0°12' ± 12' (0.2° ± 0.2°, 2 ± 2 mm, 0.08 ± 0.08 in.) 4.0 mm (0.157 in.) or less

*1: For driving under 160 km/h (100 mph)
*2: For driving at 160 km/h (100 mph) or over
*3: Ground clearance of the front No .1 lower suspension arm mounting bolt center.
*4: Ground clearance of the front wheel center.
*5: Ground clearance of the rear wheel center.
*6: Ground clearance of the No. 2 lower suspension arm mounting bolt (Suspension member side) tail center.

Front axle	Wheel bearing backlash	Maximum	0.05 mm (0.0020 in.)
	Axle hub deviation	Maximum	0.05 mm (0.0020 in.)
Front suspension	Upper ball joint turning torque		1.0 - 3.4 N·m (10 - 35 kgf·cm, 9 - 30 in.·lbf)
	Lower ball joint excessive play	Maximum	0.9 mm (0.035 in.)
	Lower ball joint turning torque		0.5 - 3.0 N·m (5 - 30 kgf·cm, 0.4 - 26 in.·lbf)
	Stabilizer bar link ball joint turning torque		0.05 - 1.9 N·m (0.5 - 20 kgf·cm, 0.4 - 16 in.·lbf)
Rear axle	Wheel bearing backlash	Maximum	0.05 mm (0.0020 in.)
	Axle hub deviation	Maximum	0.07 mm (0.0028 in.)
Rear drive shaft	Drive shaft standard length		RH: 585.4 ± 5.0 mm (23.047 ± 0.197 in.) LH: 539.8 ± 5.0 mm (21.252 ± 0.197 in.)
Rear suspension	Upper ball joint turning torque		1.0 - 2.9 N·m (10 - 30 kgf·cm, 9 - 26 in.·lbf)
	Toe control link ball joint turning torque		1.0 - 2.5 N·m (10 - 25 kgf·cm, 9 - 22 in.·lbf)
	Stabilizer bar link ball joint turning torque		0.05 - 1.0 N·m (0.5 - 10 kgf·cm, 0.4 - 9.0 in.·lbf)
Rear differential	Companion flange vertical runout	Maximum	0.09 mm (0.0035 in.)
	Companion flange lateral runout	Maximum	0.09 mm (0.0035 in.)
	Ring gear runout	Maximum	0.07 mm (0.0028 in.)
	Ring gear backlash	Maximum	0.13 - 0.18 mm (0.0051 - 0.0071 in.)
	Drive pinion bearing (at starting)	New bearing Reused bearing	0.98 - 1.57 N·m (10 - 16 kgf·cm, 8.7 - 13.9 in.·lbf) 0.49 - 0.78 N·m (5 - 8 kgf·cm, 4.3 - 6.9 in.·lbf)
	Total preload (at starting)		Drive pinion preload plus 0.39 - 0.59 N·m (4 - 6 kgf·cm, 3.5 - 5.2 in.·lbf)
	Side gear backlash (2 pinion differential)		0.05 - 0.20 mm (0.0020 - 0.0079 in.)
	Differential case runout	Maximum	0.07 mm (0.0028 in.)
	Side gear shaft oil seal drive in depth		0 ± 0.50 mm (0 ± 0.0197 in.)
	Front oil seal drive in depth		2.00 ± 0.45 mm (0.0787 ± 0.0177 in.)
	Right and left side gear shafts standard distance		279.7 mm (11.012 in.) or less
	Pinion gear backlash adjusting thrust washer		1.6 mm (0.062 in.) 1.7 mm (0.067 in.) 1.8 mm (0.071 in.)
Rear differential	Drive pinion bearing adjusting washer thickness		1.70 mm (0.0669 in.) 1.73 mm (0.0681 in.) 1.76 mm (0.0693 in.) 1.79 mm (0.0704 in.) 1.82 mm (0.0717 in.) 1.85 mm (0.0729 in.) 1.88 mm (0.0740 in.) 1.91 mm (0.0752 in.) 1.94 mm (0.0764 in.) 1.97 mm (0.0776 in.) 2.00 mm (0.0787 in.) 2.03 mm (0.0799 in.) 2.06 mm (0.0811 in.) 2.09 mm (0.0822 in.) 2.12 mm (0.0835 in.) 2.15 mm (0.0847 in.) 2.18 mm (0.0858 in.) 2.21 mm (0.0870 in.) 2.24 mm (0.0882 in.) 2.27 mm (0.0894 in.) 2.30 mm (0.0906 in.) 2.33 mm (0.0918 in.)

Rear differential	Side bearing adjusting washer thickness	2.58 mm (0.1016 in.) 2.60 mm (0.1024 in.) 2.62 mm (0.1031 in.) 2.64 mm (0.1039 in.) 2.66 mm (0.1047 in.) 2.68 mm (0.1055 in.) 2.70 mm (0.1063 in.) 2.72 mm (0.1071 in.) 2.74 mm (0.1079 in.) 2.76 mm (0.1087 in.) 2.78 mm (0.1094 in.) 2.80 mm (0.1102 in.) 2.82 mm (0.1110 in.) 2.84 mm (0.1118 in.) 2.86 mm (0.1126 in.) 2.88 mm (0.1134 in.) 2.90 mm (0.1142 in.) 2.92 mm (0.1150 in.) 2.94 mm (0.1157 in.) 2.96 mm (0.1165 in.) 2.98 mm (0.1173 in.) 3.00 mm (0.1181 in.) 3.02 mm (0.1189 in.) 3.04 mm (0.1197 in.) 3.06 mm (0.1205 in.) 3.08 mm (0.1213 in.) 3.10 mm (0.1220 in.) 3.12 mm (0.1228 in.) 3.14 mm (0.1236 in.) 3.16 mm (0.1244 in.) 3.18 mm (0.1252 in.) 3.20 mm (0.1260 in.) 3.22 mm (0.1268 in.) 3.24 mm (0.1276 in.) 3.26 mm (0.1283 in.) 3.28 mm (0.1291 in.) 3.30 mm (0.1299 in.) 3.32 mm (0.1307 in.) 3.34 mm (0.1315 in.) 3.36 mm (0.1323 in.) 3.38 mm (0.1331 in.) 3.40 mm (0.1339 in.) 3.42 mm (0.1346 in.) 3.44 mm (0.1354 in.) 3.46 mm (0.1362 in.) 3.48 mm (0.1370 in.)

SS0FE-12

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
FRONT AXLE			
Hub nut	103	1,050	76
Brake caliper x Steering knuckle	118	1,200	87
ABS speed sensor x Steering knuckle	8.0	82	71 in.·lbf
Steering knuckle x Upper suspension arm	65	660	50
Steering knuckle x Lower ball joint	113	1,150	83
Brake dust cover x Steering knuckle	8.3	85	74 in.·lbf
Tie rod end lock nut	56	570	41
Axle hub lock nut	147	1,500	108
FRONT SUSPENSION			
Height control sensor link x Lower arm bracket	5.4	55	48 in.·lbf
ABS speed sensor wire harness x Shock absorber	5.0	51	44 in.·lbf
Stabilizer bar x Stabilizer bar link	74	755	55
Shock absorber x Shock absorber bracket	64	650	47
Piston rod x Suspension support	34	350	25
Suspension support x Body	35	360	26
Upper suspension arm x Body	59	600	44
No. 1 lower suspension arm x Front suspension member	184	1,880	136
Steering gear housing bracket x Front suspension member	74	755	55
Front suspension member brace x No. 2 lower suspension arm x Body	119	1,210	88
Front suspension member brace x Body	58	590	43
Front suspension member brace x Front suspension member	58	590	43
Stabilizer bar link x Shock absorber bracket	95	970	70
No. 1 lower suspension arm x No. 2 lower suspension arm	245	2,500	180
No. 1 lower suspension arm x Lower ball joint	123	1,250	91
Shock absorber bracket x No. 1 lower suspension arm	25	250	18
Tie rod end x Lower ball joint	54	550	40
Stabilizer bar bracket x Body	23	235	17
REAR AXLE			
Hub nut	103	1,050	76
Brake caliper x Axle carrier	104	1,065	77
Axle carrier x Upper suspension arm	108	1,100	80
Backing plate x Axle carrier	59	600	43
No.2 lower suspension arm x Axle carrier	110	1,120	81
No.1 lower suspension arm x Axle carrier	75	765	55
Toe control link x Axle carrier	49	500	36
ABS speed sensor x Axle carrier	8.0	82	71 in.·lbf
Parking brake cable x Backing plate	7.8	80	69 in.·lbf
REAR DRIVE SHAFT			
Drive shaft x Axle hub	289	2,950	213
Drive shaft x Differential side gear shaft	68	695	50
REAR DIFFERENTIAL			
Differential drain plug	49	500	36

Differential filler plug		49	500	36
Differential mounting bolt	Front	95	970	71
	Rear	142	1,450	105
Ring gear set bolt		97	985	71
Companion flange lock nut		See page SA-88		
Differential carrier cover set bolt		47	475	34
Breather plug		21	210	15
Rear suspension member brace set bolt		50	510	37
Center exhaust pipe x Tailpipe		43	440	32
Front exhaust pipe x Exhaust pipe assembly		62	632	46
Heated oxygen sensor		44	450	33
Propeller shaft center support bearing set bolt		49	500	36
Propeller shaft assembly x Rear differential		74	750	54
Differential carrier x Bearing cap		85	870	63
Oil deflector x Differential carrier cover		8.0	82	71 in.·lbf
Rear suspension member x Body		127	1,300	94
Rear suspension member stopper x Body		19	195	14
Rear suspension member lower brace x Body		19	195	14
Parking brake cable x Body		7.8	80	69 in.·lbf
REAR SUSPENSION				
Height control sensor link x Lower arm bracket		5.4	55	48 in.·lbf
Rear seat belt assembly outer x Body		42	430	31
Rear seatback assembly x Body		18	185	13
Suspension support x Body	Upper side	64	650	47
	Lower side	18	185	13
Piston rod x Suspension support		18	185	13
Upper suspension arm x Body	Front side	88	900	65
	Rear side	74	755	55
No. 1 lower suspension arm x Body		75	765	55
No. 2 lower suspension arm x Stabilizer bar link		30	305	22
No. 2 lower suspension arm x Shock absorber		110	1,120	81
No. 2 lower suspension arm x Rear suspension member		110	1,120	81
ABS speed sensor wire harness x Toe control link		5.0	51	44 in.·lbf
Toe control link x Rear suspension member		49	500	36
Stabilizer bar x Stabilizer bar link		65	663	48
Stabilizer bar bracket x Suspension member		18	185	13

BRAKE

SS062-22

SERVICE DATA

Brake pedal height (from asphalt sheet)		154.0 - 164.0 mm (6.063 - 6.457 in.)
Brake pedal freeplay		1.0 - 6.0 mm (0.04 - 0.24 in.)
Stop light switch crearance		1.5 - 2.5 mm (0.059 - 0.098 in.)
Brake pedal reserve distance at 490 N (50 kgf, 110.2 lbf)		More than 99 mm (3.90 in.)
Brake booster push rod to piston clearance (w/ SST)		0 mm (0 in.)
Front brake pad thickness	STD	11.0 mm (0.433 in.)
Front brake pad thickness	Minimum	1.0 mm (0.039 in.)
Front brake disc thickness	STD	32.0 mm (1.260 in.)
Front brake disc thickness	Minimum	30.0 mm (1.181 in.)
Front brake disc runout	Maximum	0.05 mm (0.0020 in.)
Rear brake pad thickness	STD	10.5 mm (0.413 in.)
Rear brake pad thickness	Minimum	1.0 mm (0.039 in.)
Rear brake disc thickness	STD	12.0 mm (0.472 in.)
Rear brake disc thickness	Minimum	10.5 mm (0.413 in.)
Rear brake disc runout	Maximum	0.05 mm (0.0020 in.)
Rear brake disc inside diameter	STD	190 mm (7.48 in.)
Rear brake disc inside diameter	Maximum	191 mm (7.52 in.)
Parking brake shoe lining thickness for rear disc brake	STD	2.5 mm (0.098 in.)
Parking brake shoe lining thickness for rear disc brake	Minimum	1.0 mm (0.039 in.)
Parking brake pedal lever at 196 N (20 kgf, 44.1 lbf)		5 - 8 clicks
Parking brake clearance between rear shoe and lever		Less than 0.35 mm (0.0138 in.)
Parking brake adjusting shim thickness for rear disc brake		0.3 mm (0.012 in.) 0.6 mm (0.024 in.) 0.9 mm (0.035 in.)

SS063-24

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Master cylinder x Brake booster	13	130	9
Master cylinder x Piston stopper bolt	10	102	7
Brake line union nut	15	155	11
Brake booster clevis lock nut	25	260	19
Brake booster x Pedal bracket	13	130	9
Bleeder plug (Brake caliper)	11	110	8
Bleeder plug (ABS & TRAC / VSC actuator)	8.3	85	74 in.·lbf
Brake pedal x pedal bracket	37	377	27
Reservoir set screw	1.8	18	16 in.·lbf
Front brake caliper installation bolt	34	350	25
Front disc brake caliper x Flexible hose	30	310	22
Front disc brake torque plate x Steering knuckle	118	1,200	87
Rear disc brake caliper x Flexible hose	30	310	22
Rear disc brake caliper x Rear axle carrier	104	1,065	77
ABS & TRC Actuator x Actuator Bracket	5.4	55	48 in.·lbf
ABS & TRC Actuator Assembly x Body	19	195	14
Front speed sensor installation bolt	8.0	82	71 in.·lbf
Front speed sensor harness clamp bolt	5.0	51	44 in.·lbf
Rear speed sensor installation bolt	8.0	82	71 in.·lbf
Rear speed sensor harness x Body	5.0	51	44 in.·lbf
Rear speed sensor harness x Toe control link	5.0	51	44 in.·lbf

STEERING

SERVICE DATA

SS0MY-18

POWER STEERING FLUID		
Fluid level rise	Maximum	5 mm (0.20 in.)
Fluid pressure at idle speed with valve closed	Minimum	6,900 kPa (70 kgf/cm^2, 996 psi)
STEERING WHEEL		
Steering wheel freeplay	Maximum	30 mm (1.18 in.)
Steering effort at idle speed		4.2 - 5.4 N·m (43 - 55 kgf·cm, 37 - 48 in.lbf)
POWER STEERING VANE PUMP		
Vane pump rotating torque		0.25 N·m (2.5 kgf·cm, 2.2 in.·lbf) or less
Vane pump shaft and front housing bushing oil clearance	STD Maximum	0.03 - 0.05 mm (0.0012 - 0.0020 in.) 0.07 mm (0.0028 in.)
Vane plate height	Minimum	8.6 mm (0.339 in.)
Vane plate thickness	Minimum	1.40 mm (0.0551 in.)
Vane plate length	Minimum	14.99 mm (0.5902 in.)
Vane plate and vane pump rotor groove clearance	Maximum	0.033 mm (0.0013 in.)
Vane plate length	Pump rotor and cam ring mark	
	None	14.999 - 15.001 mm (0.59051 - 0.59059 in.)
	1	14.997 - 14.999 mm (0.59043 - 0.59051 in.)
	2	14.995 - 14.997 mm (0.59035 - 0.59043 in.)
	3	14.993 - 14.995 mm (0.59027 - 0.59035 in.)
	4	14.991 - 14.993 mm (0.59020 - 0.59027 in.)
Spring free length	Minimum	33.2 mm (1.307 in.)
POWER STEERING GEAR		
Steering rack runout	Maximum	0.15 mm (0.0059 in.)
Total preload	Turning	1.2 - 1.7 N·m (12.2 - 17.3 kgf·cm, 10.6 - 15.0 in.·lbf)

SS136-04

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
TILT STEERING COLUMN				
Tilt steering shaft		20	210	15
Turn signal bracket set bolt		2.9	30	26 in.·lbf
Column protector set bolt		6.1	60	52 in.·lbf
Column tube support x Column tube		15	150	11
No. 2 intermediate shaft assembly x Main shaft assembly		35	360	26
Steering column assembly set nut		26	270	19
Sliding yoke x No. 2 intermediate shaft assembly		35	360	26
Sliding yoke x Control valve shaft		35	360	26
Steering wheel set nut		50	510	37
Steering wheel pad set screw (Torx screw)		8.8	90	78 in.·lbf
POWER STEERING VANE PUMP				
Rear housing		24	240	17
Pressure port union		83	850	61
Oil reservoir	Front side	13	130	9
	Rear side	24	240	17
Vane pump pulley set nut		44	450	33
Vane pump assembly set bolt		58	590	43
Pressure feed tube x PS vane pump assembly		49	500	36
POWER STEERING GEAR				
Cylinder end stopper		59	600	44
Bearing guide nut		25	250	18
Control valve housing x Rack housing		18	180	13
Rack guide spring cap lock nut		50 (69)	510 (700)	37 (51)
Rack x Rack end		76 (103)	780 (1,050)	56 (76)
Tie rod end lock nut		56	570	41
Turn pressure tube union nut		22 (25)	220 (250)	16 (18)
PS gear assembly set bolt		74	750	54
Return tube x PS gear assembly		40 (44)	410 (450)	30 (33)
Pressure feed tube x PS gear assembly		42	430	31
Front suspension member brace	Bolt A	119	1,210	88
	Bolt B	58	590	43
Sliding yoke x Control valve shaft		35	360	26
Tie rod end x Steering knuckle		54	550	40
Front brake caliper x Steering knuckle		118	1,200	87
Steering wheel set nut		50	510	37

( ): For use without SST

SUPPLEMENTAL RESTRAINT SYSTEM

SS061-63

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Steering wheel	50	510	37
Steering wheel pad	8.8	90	78 in.·lbf
Front passenger airbag assembly x Instrument panel	5.4	55	48 in.·lbf
Front passenger airbag assembly x Instrument panel reinforcement	20	205	15
Front seat installation bolt	37	375	27
Seatback assembly x Seat cushion assembly	43	440	32
Front seat airbag door x Seat back assembly	4.7	48	42 in.·lbf
Airbag sensor assembly	20	205	15
Front airbag sensor	8.5	86.7	75 in.·lbf
Side and curtain shield airbag sensor assembly	20	205	15
Curtain shield airbag assembly x Body	9.8	100	86 in.·lbf

BODY ELECTRICAL

SS0CN-27

SERVICE DATA

AUTOMATIC LIGHT CONTROL SENSOR	
1 - Ground (Ignition switch LOCK or ACC)	No voltage
1 - Ground (Ignition switch ON)	9.5 V or more
SPEEDOMETER (ON-VEHICLE)	
Standard indication (mph) USA Models	Allowable range (mph)
20	18.5 - 21.5
40	38 - 41.5
60	58 - 62
80	77.5 - 82
100	97 - 102
120	116.5 - 122
140	136 - 142
Standard indication (km/h) CANADA Models	Allowable range (km/h)
20	18 - 23
40	40 - 44
60	60 - 64.5
80	80 - 85
100	100 - 105
120	120 - 125.5
140	140 - 146
160	160 - 169
180	180 - 188
200	200 - 209
220	220 - 230
240	240 - 251
Speedometer	Resistance (Ω)
A - B	160 Ω
C - D	160 Ω
TACHOMETER (ON-VEHICLE)/ DC 13.5 V 25 ˚C at (77 ˚F)	
Standard indication	Allowable range
700	630 - 770
1,000	900 - 1,100
2,000	1,850 - 2,150
3,000	2,800 - 3,200
4,000	3,800 - 4,200
5,000	4,800 - 5,200
6,000	5,750 - 6,250
7,000	6,700 - 7,300
8,000	7,700 - 8,300
Tachometer	Resistance (Ω)
A - B	160 Ω
C - D	160 Ω

FUEL RECEIVER GAUGE	Resistance (Ω)
A - B	160 Ω
C - D	160 Ω
FUEL MAIN SENDER GAUGE	
Float position mm (in.)	Resistance (Ω)
F: Approx. 22.9 (0.90) ± 3 (0.12)	Approx. 2.0 ± 1.0
1/2: Approx. 58.3 (2.30) ± 3 (0.12)	Approx. 30.3 ± 3.0
E: Approx. 133.6 (5.26) ± 3 (0.12)	Approx. 55.0 ± 1.0
FUEL SUB SENDER GAUGE	
Float position mm (in.)	Resistance (Ω)
F: Approx. 29.1 (1.15) ± 3 (0.12)	Approx. 2.0 ± 1.0
1/2: Approx. 65.8 (2.59) ± 3 (0.12)	Approx. 29.7 ± 3.0
E: Approx. 169.5 (6.67) ± 3 (0.12)	Approx. 55 ± 1.0
ENGINE COOLANT TEMPERATURE RECEIVER GAUGE (Resistance)	Resistance (Ω)
A - B	160 Ω
C - D	160 Ω
VOLTAGE GAUGE (Resistance)	Resistance (Ω)
A - B	160
C - D	160
SPECIFIC FUEL CONSUMPTION GAUGE (Resistance)	Resistance (Ω)
A - B	160
C - D	160

BODY

TORQUE SPECIFICATION

SS137-07

Part tightened	N·m	kgf·cm	ft·lbf
FRONT BUMPER			
Front bumper cover x Front fender panel	5.4	55	48 in.·lbf
REAR BUMPER (Sedan)			
Rear bumper cover x Side mounting bracket	5.4	55	48 in.·lbf
Rear bumper cover x Rear fender panel	5.4	55	48 in.·lbf
Rear bumper cover x Body Nut	8.3	85	74 in.·lbf
Rear bumper reinforcement x Body	6.0	61	53 in.·lbf
HOOD			
Hood x Hood hinge	13	133	10
Hood lock x Body	8.0	82	71 in.·lbf
FRONT DOOR			
Outside handle x Key cylinder	5.5	56	49 in.·lbf
Outside handle x Door panel	5.5	56	49 in.·lbf
Door lock x Door panel	5.5	56	49 in.·lbf
Window regulator x Door panel	8.0	82	71 in.·lbf
Door glass x Window regulator	5.5	56	49 in.·lbf
Outside rear view mirror x Door panel	8.0	82	71 in.·lbf
Front No.2 speaker x Body	8.0	82	71 in.·lbf
Door hinge x Body	30	306	22
Door hinge x Door panel	30	306	22
Door check x Door panel	5.5	56	49 in.·lbf
Door lock striker x Body	23	235	17
REAR DOOR			
Outside handle x Door panel	5.5	56	49 in.·lbf
Door lock x Door panel	5.5	56	49 in.·lbf
Window regulator x Door panel	8.0	82	71 in.·lbf
Door hinge x Body	21	214	15
Door hinge x Door panel	30	306	22
Door check x Door panel	5.5	56	49 in.·lbf
Door lock striker x Body	23	235	17
BACK DOOR			
Back door lock x Body	12.5	128	9
Door hinge x Door panel	8.0	82	71 in.·lbf
Door hinge x Body	11.5	117	8
Door lock striker x Body	23	235	17
Back door outside handle x Back door outside garnish	4.0	40	35 in.·lbf
BACK DOOR STAY			
Back door stay x Door panel	22	224	16
Back door stay x Body	19.5	199	14
LUGGAGE COMPARTMENT DOOR AND HINGE			
Door lock striker x Body	5.5	56	49 in.·lbf
Luggage compartment door x Hinge	8.0	82	71 in.·lbf

Luggage compartment door lock x Body	5.5	56	49 in.·lbf
Luggage compartment door hinge x Body	5.5	56	49 in.·lbf
FRONT WIPER AND WASHER			
Wiper motor x Wiper link	5.4	55	48 in.·lbf
Wiper link assembly x Body	5.5	56	49 in.·lbf
Wiper arm x Wiper link assembly	26	265	19
REAR WIPER AND WASHER (Wagon)			
Wiper arm x Rear wiper motor	5.5	56	49 in.·lbf
Nut x Rear wiper motor	12	122	9
Rear wiper motor x Rear wiper motor	5.5	56	49 in.·lbf
SLIDING ROOF			
Sliding roof housing x Body	5.5	56	49 in.·lbf
Sliding roof bracket x Body	8.0	82	71 in.·lbf
Sliding roof bracket x Sliding roof housing	5.5	56	49 in.·lbf
INSTRUMENT PANEL			
Front passenger airbag assembly x Reinforcement	20	205	15
Front passenger airbag assembly x Instrument panel	5.5	56	49 in.·lbf
ROOF HEADLINING			
Inner rear view mirror x Body	5.5	56	49 in.·lbf
FRONT SEAT			
Seatback assembly x Seat track	43	440	32
Seat cushion assembly x Seat track	21	210	15
Seat track x Body	38	387	28
REAR SEAT (Sedan)			
Seatback assembly x Body	7.8	80	69 in.·lbf
REAR SEAT (Wagon)			
Seatback x Body	21	214	15
SEAT BELT			
Front seat outer belt:			
Shoulder anchor x Adjuster anchor	41	420	30
Floor anchor x Body	41	420	30
Retractor x Body Upper bolt	7.8	80	69 in.·lbf
Adjustable anchor x Body	41	420	30
Inner belt x Seat track	41	420	30
Rear seat belt (Sedan):			
Shoulder anchor x Body	41	420	30
Floor anchor x Body	41	420	30
Inner belt x Body	41	420	30
Shoulder anchor x Body	41	420	30
Floor anchor x Body	41	420	30
CRS anchor set bolt	21	210	15
Rear Seat Belt (Wagon):			
Floor anchor x Body	42	428	31
Inner belt x Body	42	428	31

Retractor x Body	Floor side: Roof Side:	42	428	31
CRS anchor set bolt		13.2	135	10

AIR CONDITIONING

SERVICE DATA

SS0F5-05

Refrigerant volume		600 ± 50 g (21.16 ± 1.76 oz.)
Idle Speed	Magnetic clutch not engaged	600 ± 50 rpm
	Magnetic clutch engaged	650 ± 50 rpm
Magnetic clutch clearance		0.5 ± 0.15 mm (0.020 ± 0.0059 in.)

SS0F6-04

TORQUE SPECIFICATION

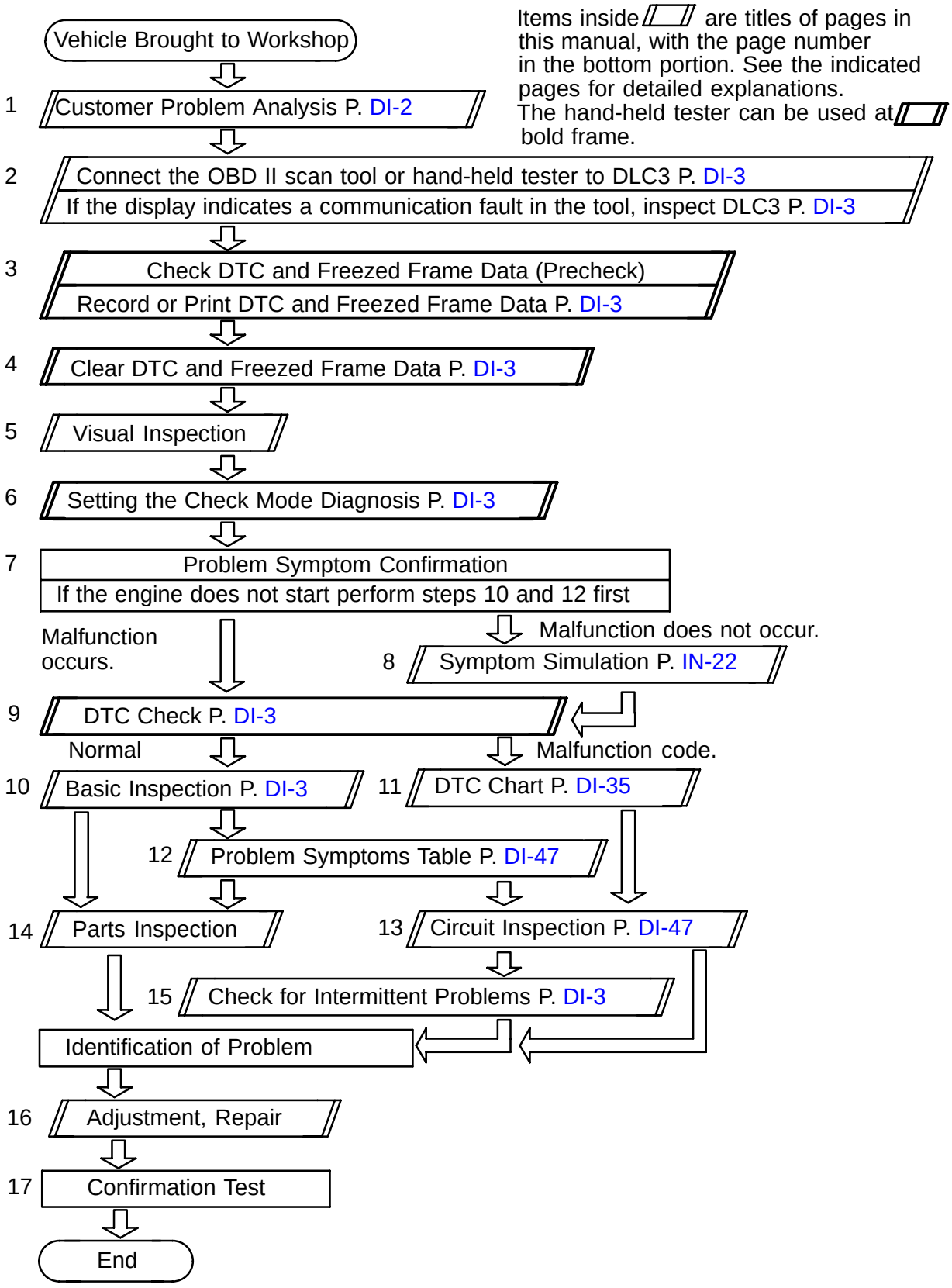
Part tightened	N·m	kgf·cm	ft·lbf
REFRIGERANT LINE			
Condenser x Discharge hose	10	100	7
Condenser x Liquid tube	10	100	7
Compressor x Discharge hose	10	100	7
Compressor x Suction hose	10	100	7
Suction line (Block joint)	10	100	7
A/C unit x Liquid and suction tubes	10	100	7
AIR CONDITIONER UNIT			
Tube connector x Expansion valve x Tube and accessory	4.1	42	36 in.·lbf
Tube and accessory x Evaporator	4.1	42	36 in.·lbf
COMPRESSOR AND MAGNETIC CLUTCH			
Compressor x Engine (Bolt)	52	530	38
Compressor x Engine (Nut)	52	530	38
Compressor x Engine (Stud bolt)	26	265	19
PS pump bracket x Compressor x Engine	52	530	38
PS pump bracket x Compressor bracket Engine	58	590	43
Compressor bracket x Engine	39	400	29
Pump stay x Compressor bracket	39	400	29
Compressor bracket x Compressor	58	590	43
Pressure plate x Compressor	13.2	135	9
CONDENSER			
Cap x Condenser	12.3	125	9
CONDENSER FAN			
Radiator x Cooling fan assembly	5	50	44 in.·lbf
PRESSURE SWITCH			
Pressure switch x Liquid tube	10	100	7
ENGINE COOLANT TEMPERATURE (ECT) SWITCH			
Engine coolant temperature (ECT) switch x Radiator	7.4	75	65 in.·lbf

ENGINE

DI2DE-11

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.



Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the indicated pages for detailed explanations.
The hand-held tester can be used at ▱ bold frame.

DI2DF-07

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		VIN	
Driver's Name		Production Date	
Data Vehicle Brought in		Licence Plate No.	
Engine model		Odometer Reading	km miles

Problem Symptoms	☐ Engine does not Start	☐ Engine does not crank ☐ No initial combustion ☐ No complete combustion
	☐ Difficult to Start	☐ Engine cranks slowly ☐ Other _____
	☐ Poor Idling	☐ Incorrect first idle ☐ Idling rpm is abnormal ☐ High (rpm) ☐ Low (rpm) ☐ Rough idling ☐ Other _____
	☐ Poor Driveability	☐ Hesitation ☐ Back fire ☐ Muffler explosion (after-fire) ☐ Surging ☐ Knocking ☐ Other _____
	☐ Engine Stall	☐ Soon after starting ☐ After accelerator pedal depressed ☐ After accelerator pedal released ☐ During A/C operation ☐ Shifting from N to D ☐ Other _____
	☐ Others	

Dates Problem Occurred		
Problem Frequency		☐ Constant ☐ Sometimes (times per day/month) ☐ Once only ☐ Other _____
Condition When Problem Occurs	Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Other _____
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (approx. ____˚C/____˚F)
	Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Downhill ☐ Rough road ☐ Other _____
	Engine Temp.	☐ Cold ☐ Warming up ☐ After warming up ☐ Any temp. ☐ Other _____
	Engine Operation	☐ Starting ☐ Just after starting (min.) ☐ Idling ☐ Racing ☐ Driving ☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ A/C switch ON/OFF ☐ Other _____

Condition of malfunction indicator light (MIL)		☐ Remains on	☐ Sometimes light up ☐ Does not light up
DTC Inspection	Normal Mode (Pre-check)	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )
	Check Mode	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )

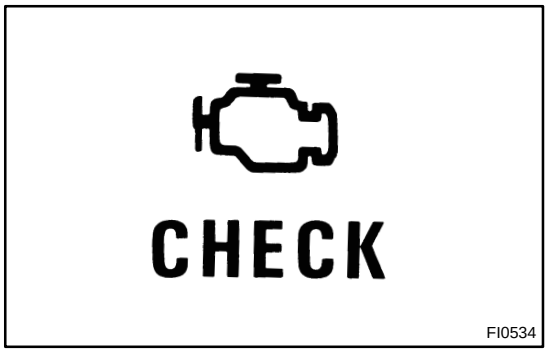
DIC3Z-01

PRE-CHECK

1. DIAGNOSIS SYSTEM

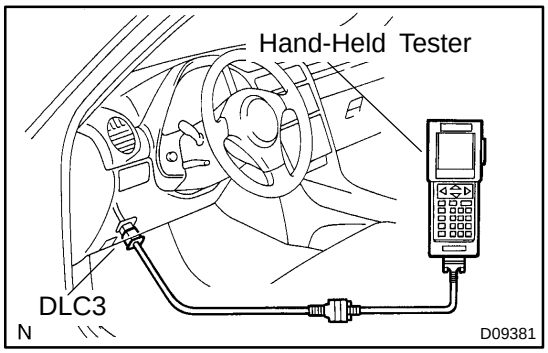
(a) Description

- When troubleshooting On-Board Diagnostic (OBD ll) vehicles, the vehicle must be connected to the OBD ll scan tool (in compliance with SAE J1978) or the hand-held tester. Various data output from the vehicle's ECM can then be read.



- OBD ll regulations require that the vehicle's on-board computer illuminates the Malfunction Indicator Light (MIL) on the instrument panel when the computer detects a malfunction in: 1) the emission control system/components, or 2) the powertrain control components (which affect vehicle emissions), or 3) The computer. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory (See page DI-35).

If the malfunction does not reoccur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain recorded in the ECM memory.



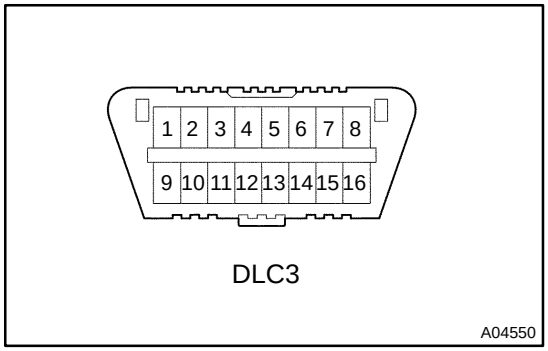
- To check the DTC, connect the hand-held tester or OBD II scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The hand-held tester or OBD II scan tool also enables you to erase the DTC and check the freeze frame data and various forms of engine data (See the instruction manual for the OBD ll scan tool or the hand-held tester). The DTC includes SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set according to the SAE, while manufacturer controlled codes can be set by a manufacturer with certain restrictions (See the DTC chart on page DI-35).
- The diagnosis system operates in "normal mode" during normal vehicle use. In "normal mode", 2 trip detection logic* is used to ensure accurate detection of malfunctions. A "check mode" is also available to technicians as an option. In "check mode", 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent malfunctions (hand-held tester only) (See step 3).

- *2 trip detection logic:
  When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. This is known as 1st trip detection. If the ignition switch is turned OFF and then ON again, and the same malfunction is detected again, the MIL will illuminate. This is known as 2nd trip detection.
- Freeze frame data:
  The freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determining if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Priorities for troubleshooting:

When multiple DTCs occur, find out the order in which the DTCs should be inspected by checking the component's DTC chart. If no instructions are written in the DTC chart, check DTCs in the following order of priority:

(1) DTCs other than fuel trim malfunction DTCs (P0171 and P0172) and misfire DTCs (P0300 to P0306).
(2) Fuel trim malfunction DTCs (P0171 and P0172).
(3) Misfire DTCs (P0300 to P0306).



DLC3

(b) Check the DLC3.
The vehicle's ECM uses the ISO 9141-2 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Tester Connection	Condition	Specified Condition
7 (Bus + line) - 5 (Signal ground)	During communication	pulse generation
4 (Chassis ground) - Body ground	Constant	Below 1 Ω
5 (Signal ground) - Body ground	Constant	
16 (B+) - Body ground	Constant	9 to 14 V

HINT:
Connect the cable of the hand-held tester to the DLC3, turn the ignition switch ON and attempt to use the hand-held tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

- If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

(c) Inspect the battery voltage.
Battery Voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

(d) Check the MIL.
(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

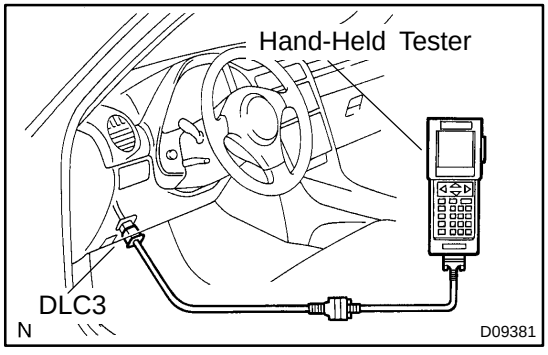
HINT:
If the MIL is not illuminated, troubleshoot the MIL circuit (See page DI-320).

(2) When the engine is started, the MIL should not illuminate. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

2. DTC CHECK (Normal Mode)

NOTICE:

- **If no DTC appears in normal mode:**
  On the OBD II scan tool or the hand-held tester check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979).
- **When the diagnosis system is changed from normal mode to check mode or vice-versa, all DTCs and freeze frame data recorded in normal mode will be erased. Before changing modes, always check and make a note of DTCs and freeze frame data.**



(a) Checking DTCs using the OBD II scan tool or hand-held tester.
(1) Connect the OBD II scan tool or the hand-held tester to DLC3.
(2) Turn the ignition switch ON.

(3) Use the OBD II scan tool or the hand-held tester to check the DTCs and freeze frame data and then write them down.
For the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES. For the OBD II scan tool, see its instruction manual.

(4) See page DI-35 to confirm the details of the DTCs.

NOTICE:

When simulating a symptom with the OBD II scan tool (excluding hand-held tester) to check the DTCs, use the normal mode. For DTCs chart subject to "2 trip detection logic", perform either of the following actions.

- **Check the pending fault code:**
  For the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
- **Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL come on and the DTCs are recorded in the ECM.**
- **Check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979) on the OBD II scan tool.**

(b) Clearing the DTCs using the OBD II scan tool or the hand-held tester.

(1) Connect the OBD II scan tool or the hand-held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester.
For the hand-held tester:
1) enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES.
For the OBD II scan tool, see its instruction manual.

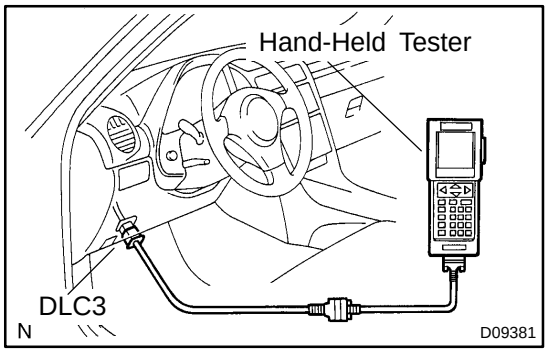
(c) Clearing the DTCs not using the OBD II scan tool or the hand-held tester.
Remove the EFI and ETCS fuses from the engine room J/B for more than 60 seconds, or disconnect the battery terminal for more than 60 seconds.
After disconnecting the battery terminal, perform the "INITIALIZE" procedure (See page DI-328).

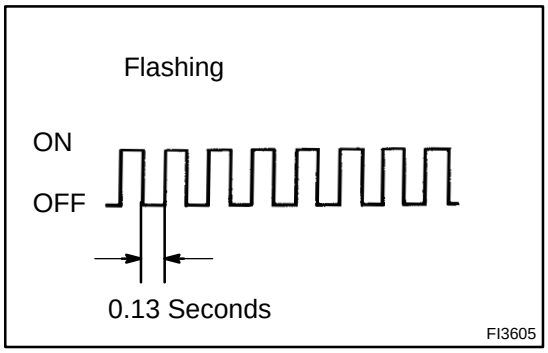
3. DTC CHECK (Check Mode)

HINT:

Hand-held tester only:

Check mode has a higher sensitivity to detect malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect.





(a) Follow these steps when preparing to use the hand-held tester check mode.
  (1) Make sure that the items below are true:
    - Battery positive voltage 11 V or more
    - Throttle valve fully closed
    - Transmission in the P or N position
    - A/C switched OFF
  (2) Turn the ignition switch OFF.
  (3) Connect the hand-held tester to the DLC3.
  (4) Turn the ignition switch ON.
  (5) Change the ECM to check mode with the hand-held tester. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE. Make sure the MIL flashes as shown in the illustration.

NOTICE:

All DTCs and freeze frame data recorded will be erased if: 1) the hand-held tester is used to change the ECM from normal mode to check mode or vice-versa; or 2) during check mode, the ignition switch is turned from ON to ACC or OFF.

  (6) Start the engine. The MIL should turn off after the engine starts.
  (7) Simulate the conditions of the malfunction described by the customer.
  (8) After simulating the malfunction conditions, use the hand-held tester diagnosis selector to check the DTC, freeze frame data and other data.
  (9) After checking the DTC, inspect the applicable circuit.

(b) Clearing DTCs using the OBD ll scan tool or the hand-held tester.
  (1) Connect the OBD ll scan tool or the hand-held tester to the DLC3.
  (2) Turn the ignition switch ON.

(3) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester.
For the hand-held tester:
1) enter the following menus: DIAGNOSIS ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES.
For the OBD II scan tool, see its instruction manual.

(c) Clearing the DTCs without using the OBD ll scan tool or the hand-held tester.
Remove the EFI and ETCS fuse from the engine room J/B for more than 60 seconds, or disconnect the battery terminal for more than 60 seconds.
After disconnecting the battery terminal, perform the "INITIALIZE" procedure (See page DI-328).

4. FAIL-SAFE CHART

If any of the following codes is recorded, the ECM enters into the fail-safe mode.

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0100	Ignition timing is fixed at 5˚ BTDC	Returned to normal condition
P0110	Intake air temperature is fixed at 20˚C (68˚F)	Returned to normal condition
P0115	Engine coolant temperature is fixed at 80˚C (176˚F)	Returned to normal condition
P0031 P0032 P0037 P0038 P0051 P0052 P0057 P0058	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0325 P0330	Max. ignition timing retardation	Ignition switch OFF
P0351	Fuel cut	Returned to normal condition

5. CHECK FOR INTERMITTENT PROBLEMS

Hand-held tester only:
Inspect the vehicle's ECM using check mode. Intermittent problems are easier to detect when the ECM is in check mode with hand-held tester. In check mode, the ECM uses 1 trip detection logic, which has a higher sensitivity to malfunctions than normal mode (default), which uses 2 trip detection logic.

(a) Clear the DTCs. (See step 2)
(b) Set the check mode. (See step 3)
(c) Perform a simulation test (See page IN-22).
(d) Check the connector and terminal (See page IN-33).
(e) Wiggle the harness and connector (See page IN-33).

6. BASIC INSPECTION

When the malfunction is not confirmed in the DTC check, troubleshooting should be carried out in all the possible circuits considered as causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the location causing the problem can be found quickly and efficiently. Therefore, using this check is essential in the engine troubleshooting.

1	**Is battery positive voltage 11 V or more when engine is stopped?**

NO → **Charge or replace battery.**

YES

2	**Is engine cranked?**

NO → **Proceed to pages ST-15 and ST-17 , and continue to troubleshoot.**

YES

3	**Does engine start?**

NO → **Go to step 7.**

YES

4	**Check air filter.**

PREPARATION:

Remove the air filter.

CHECK:

Visual check that the air filter is not excessively dirty or oily.

NG → **Repair or replace.**

OK

5	**Check idle speed.**

PREPARATION:

(a) Warm up the engine to normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the A/C.
(d) Shift transmission into the N position.
(e) Connect the OBD II scan tool or the hand-held tester to the DLC3 on the vehicle.

CHECK:

Use the CURRENT DATA to check the idle speed.

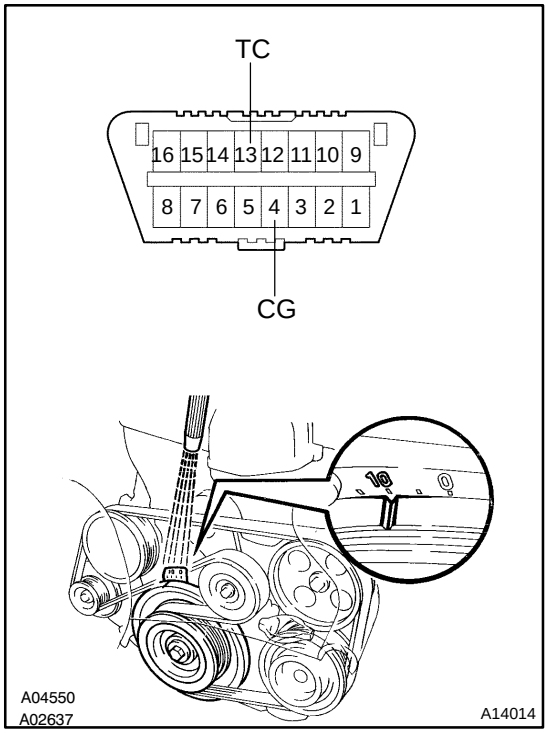
OK:

Idle speed: 650 to 750 rpm

NG → **Proceed to problem symptoms table on page DI-47 .**

OK

6	**Check ignition timing.**



PREPARATION:

(a) Warm up the engine to normal operating temperature.
(b) Shift the transmission into the N position.
(c) Keep the engine speed at idle.
(d) Using SST, connect terminals TC and E1 of the DLC3.
SST 09843-18020
(e) Using a timing light, connect the tester to the No.1 high-tension cord.

CHECK:

Check the ignition timing.

OK:

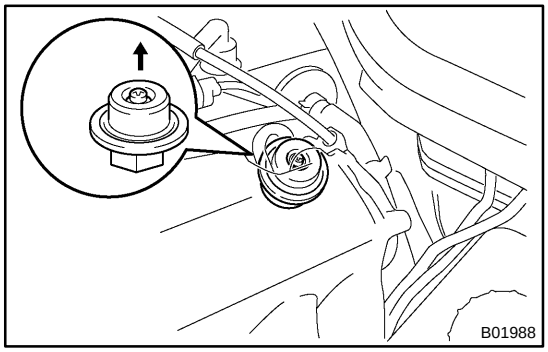
Ignition timing: 6 - 16˚ BTDC at idle

NG → **Proceed to page IG-1 , and continue to trouble-shoot.**

OK

Proceed to problem symptoms table on page DI-47 .

7	**Check fuel pressure.**



PREPARATION:

(a) Be sure that the enough fuel is in the tank.
(b) Remove the cover from the pulsation damper.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch ON and push the hand-held tester main switch ON.
(e) Use the ACTIVE TEST mode to operate the fuel pump.
(f) Please refer to the hand-held tester operator's manual for further details.
(g) If you have no hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page SF-6).

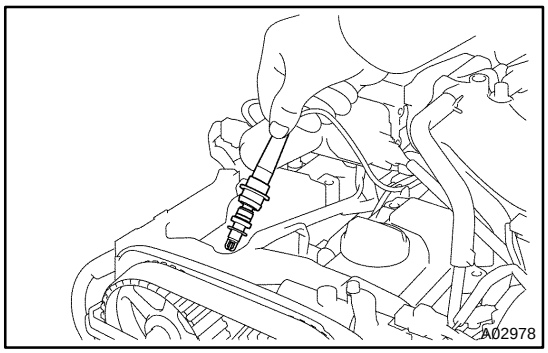
CHECK:

Check that the pulsation damper screw rises up when the fuel pump operates.
HINT:
At this time, you will hear a fuel flowing noise.

NG → **Proceed to page SF-6 , and continue to troubleshoot.**

OK

8	Check for spark.



PREPARATION:

(a) Remove the ignition coil from the spark plug.
(b) Remove the spark plug.
(c) Install the spark plug to the ignition coil.
(d) Disconnect the injector connector.
(e) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

NOTICE:

To prevent excess fuel from being injected from the injectors during this test, don't crank the engine for more than 5 - 10 seconds at a time.

NG → **Proceed to page IG-1 , and continue to troubleshoot.**

OK

Proceed to problem symptoms table on page DI-47 .

7. DATA LIST

HINT:

Using the hand-held tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of the hand-held tester.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(g) According to the display on tester, read the "DATA LIST".

hand-held tester display	Measurement Item	Normal Condition*	Diagnostic Note
INJECTOR	Injection period of the No.1 cylinder/ Min.: 0 ms, Max.: 32.64 ms	Idling: 2.0 - 2.8 ms	—
IGN ADVANCE	Ignition timing advance for No.1 cylinder/ Min.: -64 deg., Max.: 63.5 deg.	Idling: BTDC 6 - 16 deg.	—
CALC LOAD	Calculated load by ECM/ Min.: 0%, Max.: 100%	• Idling: 15.6 - 22.2 % • Racing without load (2,500 rpm): 16.6 - 23.9 %	—
MAF	Air flow rate from MAF sensor/ Min.: 0 gm/s, Max.: 655 gm/s	• Idling: 3.5 - 5.0 gm/sec. • Racing without load (2,500 rpm): 12.5 - 17.9 gm/sec.	If value is approximately 0.0 gm/s: • Mass air flow meter power source circuit open • VG circuit open or short If value is 160.0 gm/s or more: • E2G circuit open
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 16,383 rpm	Idling: 650 - 750 rpm	—
COOLANT TEMP	Coolant temperature/ Min.: -40˚C, Max.: 140˚C	After warming up: 80 - 95˚C (176 - 203˚F)	• If value is -40˚C (-40˚F): sensor circuit is open. • If value is 140˚C (284˚F) or more: sensor circuit is shorted.
INTAKE AIR	Intake air temperature/ Min.: -40 ˚C, Max.: 140 ˚C	Equivalent to ambient temp.	
THROTTLE POS	Absolute throttle position sensor/ Min.: 0%, Max.: 100%	• Throttle fully closed: 8 -20 % • Throttle fully open: 64 - 96 %	Read value with the ignition switch ON (Do not start engine).
SPD (SP2)	Vehicle speed/ Min.: 0 km/h, Max.: 255 km/h	Vehicle stopped: 0 km/h (0 mph)	Speed indicated from speed sensor (SP2) signal
O2S B1 S1	Oxygen sensor output voltage of the bank 1 sensor 1/ Min.: 0 V, Max.: 1.275 V	Idling: 0.1 - 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
O2S B1 S2	Oxygen sensor output voltage of the bank 1 sensor 2/ Min.: 0 V, Max.: 1.275 V	Driving 50 km/h (31 mph): 0.1 - 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
O2S B2 S1	Oxygen sensor output voltage of the bank 2 sensor 1/ Min.: 0 V, Max.: 1.275 V	Idling: 0.1 - 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.

O2S B2 S2	Oxygen sensor output voltage of the bank 2 sensor 2/ Min.: 0 V, Max.: 1.275 V	Driving 50 km/h (31 mph): 0.1 - 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
VAPOR PRESS	Vapor pressure Min: -4.125 kPa Max:: 2.25 kPa	Fuel tank cap removed: 0 kpa	Pressure inside of fuel tank as read by the vapor pressure sensor
SHORT FT #1	Short term fuel trim of bank 1/ Min.: -100%, Max.: 100%	0 ± 20%	This item is short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long term fuel trim of bank 1/ Min.: -100%, Max.: 100%	0 ± 20%	This item is overall, long-term fuel compensation that helps to maintain air-fuel ratio at stoichiometric air-fuel ratio (steadies long term deviations of short-term fuel trim from central value)
TOTAL FT #1	Total fuel trim of bank 1/ Min.: 0.5, Max.: 1.496	Idling: 0.5 - 1.4	—
SHORT FT #2	Short term fuel trim of bank 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
LONG FT #2	Long term fuel trim of bank 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as LONG FT #1
TOTAL FT #2	Total fuel trim of bank 2/ Min.: 0.5, Max.: 1.496	Idling: 0.5 - 1.4	—
O2FT B1 S1	Short term fuel trim associated with the bank 1, sensor 1/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
O2FT B1 S2	Short term fuel trim associated with the bank 1, sensor 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #2
O2FT B2 S1	Short term fuel trim associated with the bank 2, sensor 1/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
O2FT B2 S2	Short term fuel trim associated with the bank 2, sensor 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #2
O2 LR B1 S1	Response time of the O2 sensor lean to rich (bank 1, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 - 1,000 ms	—
O2 LR B2 S1	Response time of the O2 sensor lean to rich (bank 2, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 - 1,000 ms	—
O2 RL B1 S1	Response time of the O2 sensor rich to lean (bank 1, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 - 1,000 ms	—
O2 RL B2 S1	Response time of the O2 sensor rich to lean (bank 2, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms		—
IGNITION	Ignition counter/ Min.: 0, Max.: 400	0 - 400	—
CYL #1 - CYL #6	Misfire ratio of the cylinder/ Min.: 0%, Max.: 50%	0%	This item is displayed in only idling
CTP SW	Closed throttle position switch/ ON or OFF	↗Throttle fully closed: ON ↗Throttle open: OFF	—

FUEL SYS #1	Fuel system status (Bank1)/ OL or CL or OLDRIVE or OL-FAULT or CLFAULT	Idling after warming up: CL	⁄OL: Open Loop-has not yet satisfied conditions to go closed loop. ⁄CL: Closed Loop-using oxygen sensor (s) as feed back for fuel control. ⁄OL DRIVE: Open loop due to driving conditions (Power enrichment, deceleration enlargement). ⁄OL FAULT: Open loop due to detected system fault. ⁄CL FAULT: Closed loop, but fault with at least one oxygen sensor may be using single oxygen sensor for fuel control.
FUEL SYS #2	Fuel system status (Bank2)/ OL or CL or OLDRIVE or OL-FAULT or CLFAULT		
FC IDL	Idle fuel cut/ ON or OFF	Fuel cut operation: ON	FC IDL = ”ON” when throttle valve fully closed and engine speed is over 1,500 rpm.
MIL	MIL status/ ON or OFF	MIL ON: ON	—
STARTER SIG	Starter signal/ ON or OFF	Cranking: ON	—
A/C SIG	A/C signal/ ON or OFF	A/C ON: ON	—
PNP SW [NSW]	Park/neutral position switch signal/ ON or OFF	P or N range: ON	—
ELECT LOAD SIG	Electrical load signal/ ON or OFF	Defogger switch ON: ON	—
STOP LIGHT SW	Stop light switch/ ON or OFF	⁄Brake pedal depressed: ON ⁄Brake pedal released: OFF	—
PS OIL PRESS SW	Power steering signal/ ON or OFF	Steering position is; center: OFF Except center: ON	—
PS SIGNAL	Power steering signal/ ON or OFF	⁄After ingine start: OFF ⁄After steer the steering: ON	—
INTAKE CTL VSV1	VSV status for intake control (Bank 1)/ On or OFF	VSV operating: ON	—
FUEL PUMP SP CTL	Fuel pump speed control status/ ON or OFF	Idling: ON	—
FUEL PUMP/SPD	Fuel pump/speed status/ ON/H or OFF/M, L	Idling: ON	—
A/C MAG CLUTCH	A/C magnet clutch status/ ON or OFF	A/C magnet clutch ON: ON	—
EVAP VSV	VSV status for EVAP control/ ON or OFF	VSV operating: ON	VSV for EVAP is controlled by the ECM (ground side duty control)
VVT CTRL B1	VVT control status (Bank 1)/ ON or OFF	VVT system operation: ON	—

*:If no conditions are specifically stated for ”Idling”, it means the shift lever is at N or P range, the A/C switch is OFF and all accessory switches are OFF.

8. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester or the OBD II scan tool allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one method to shorten diagnostic time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of the hand-held tester or the OBD II scan tool.
(f) Enter the following menus: DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST.
(g) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
INJ VOL	[Test Details] Control the injection volume. Min.: -12.5%, Max.: 24.8% [Vehicle Condition] Engine speed: 3,000 rpm or less.	~~✓~~All injectors are tested at once. ~~✓~~Injection volume is gradually changed between -12.5 and 25%
FUEL PMP SP CTL	[Test Details] Activate the fuel pump speed control. ON or OFF	—
INTAKE CTL VSV1	[Test Details] Activate the VSV for intake control. ON or OFF	—
CAN CTRL VSV	[Test Details] Activate the VSV for canister control. ON or OFF	—
TANK BYPASS VSV	[Test Details] Activate the VSV for tank bypass. ON or OFF	—
EVAP VSV (ALONE)	[Test Details] Activate the VSV for EVAP control. ON or OFF	—
A/C MAG CLUTCH	[Test Details] Control the A/C magnet clutch. ON or OFF	—
FUEL PUMP / SPD	[Test Details] Control the fuel pump speed. ON or OFF	—
VVT CTRL B1	[Test Details] Activate the VVT system (Bank 1). ON or OFF	~~✓~~ON: Rough idle or engine stall ~~✓~~OFF: Normal engine speed
TC/TE1	[Test Details] Connect the TC and TE1. ON or OFF	Switch to the same state as the connection between terminal TC and TE1.
FC IDL PROHBT	[Test Details] Control the idle fuel cut prohibit. ON or OFF	—

9. DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	Diagnostic code
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. While another sensor is being monitored, the next sensor or component will not be monitored until the previous monitoring has concluded.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. ”Once per driving cycle” means that the ECM detects malfunction only one time during a single driving cycle. ”Continuous” means that the ECM detects malfunction every time when enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the ”typical enabling conditions” are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. ”Immediately” means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. ”2 driving cycle” means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.

10. TOYOTA/LEXUS PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

TOYOTA/LEXUS name	Definition
Toyota HCAC system, Hydro-carbon Adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve, OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor ”A”	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VSV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve

Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-board refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor ”A”, Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor ”A”	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor ”A”	Counter gear speed sensor
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor ”A”, Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobilizer system, Immobilizer system	Vehicle anti-theft system

11. The monitor will run whenever the following DTCs are not present (Monitor disablement List)

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the ”X” mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																												
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire			
P0010,P0020	P0010,P0020	VVT VSV1,2																			X					X					
P0011	P0011	VVT System1 - Advance				X		X														X					X					
P0012	P0012	VVT System1 - Retard				X		X														X					X					
P0016,P0018	P0016,P0018	VVT System - Misalignment																													
P0021	P0021	VVT System2 - Advance			X	X																X					X					
P0022	P0022	VVT System2 - Retard			X																	X					X					
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																				X	X	X	X	X	X					
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1																				X			X	X	X					
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2																							X	X						
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																								X						
P0100,P0101	P0100-P0103	MAF sensor		X	X		X	X											X		X	X	X	X	X	X	X	X	X			
P0105,P0106	P0105-P0108	MAP sensor		X	X		X	X											X		X	X	X	X	X	X	X	X	X			
P0110	P0110-P0113	IAT sensor																			X	X	X	X	X	X		X				
P0115,P0116	P0115-P0118	ECT sensor		X	X	X	X	X						X		X					X	X	X	X	X	X	X	X				
P0120,P0121	P0120-P0223,P2135	TP sensor												X		X							X	X	X	X	X	X				
P0125	P0125	Insufficient ECT for Closed Loop		X	X		X	X						X		X						X	X	X	X	X	X	X				
P0128	P0128	Thermostat																														
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																				X		X	X	X						
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1								X												X	X		X	X	X					
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2																														
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																														
P0171,P0172	P0171,P0172	Fuel system																				X	X	X	X	X						
P0300-P0308	P0300-P0308	Misfire							X													X	X	X	X	X						
P0325,P0330	P0325-P0333	Knock sensor																														
P0335	P0335	CKP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X				
P0340, P0341	P0340, P0341	CMP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X				
P0340-P0346	P0340-P0346	VVT sensor1,2																				X										
P0351-P0358	P0351-P0358	Ignitor		X	X		X	X														X										
P0385	P0385	CKP sensor 2												X		X						X	X	X	X	X	X	X				
P0401	P0401	EGR system (closed)																				X					X					
P0402	P0402	EGR system (open)																				X	X	X	X	X	X					
P0405,P0409	P0405-P0409	Lift sensor																									X					
P0420,P0430	P0420,P0430	Catalyst																														
P0442-P0456	P0442-P0456	EVAP system																					X	X	X	X						
P0450,P0451	P0450-P0453	EVAP press sensor																														

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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																											
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
			VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire
P0500	P0500	VSS																				X	X	X	X	X	X	X
P0511	P0511	IAC valve																					X					
P0510	P0510	Idle switch												X		X						X	X		X	X	X	X
P0560	P0560	System Voltage																										
P0617	P0617	Starter signal																										
P0705	P0705	Shift lever position switch																										
P0710	P0710-P0713	Trans fluid temp sensor																										
P0720-P0793	P0720-P0793	Output speed sensor																										
P0715-P0717	P0715-P0717	Input speed sensor																										
P0724	P0724	Stop lamp switch																										
P0741-P0796	P0741-P0796	Trans solenoid (function)																										
P0748-P0798	P0748-P0799	Trans solenoid (range)																										
P0850	P0850	PNP switch																										X
P1010,P1020	P1010,P1020	VVTL																				X					X	
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X					X	
P1126	P1126	Electronic magnet clutch																										
P1129	P1129	Electronic throttle system																										
P1430	P1430	HC adsorber ACT press sensor																										
P2004,6	P2004,6	Intake Manifold Runner Control																										
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
P2102,P2103	P2102,P2103	Throttle motor																										
P2120-P2138	P2120-P2138	Accel position sensor																										
P2196,P2198	P2196,P2198	A/F sensor (rationality)																				X			X	X		
P2226	P2226	BARO sensor																					X		X	X		
P2237,P2240	P2237,P2240	A/F sensor (open)																				X			X	X		
P2423,24	P2423,24	HC Adsorption Catalyst																										
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																										
P2431	P2431	AIR Pressure Sensor(Rationality)																										
P2440	P2440	AIR control valve stuck open																					X	X	X	X	X	
P2441	P2441	AIR control valve stuck close																					X	X	X	X	X	
P2444	P2444	AIP stuck On																					X	X	X	X	X	
P2445	P2445	AIP stuck Off																					X	X	X	X	X	
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																				X			X	X		

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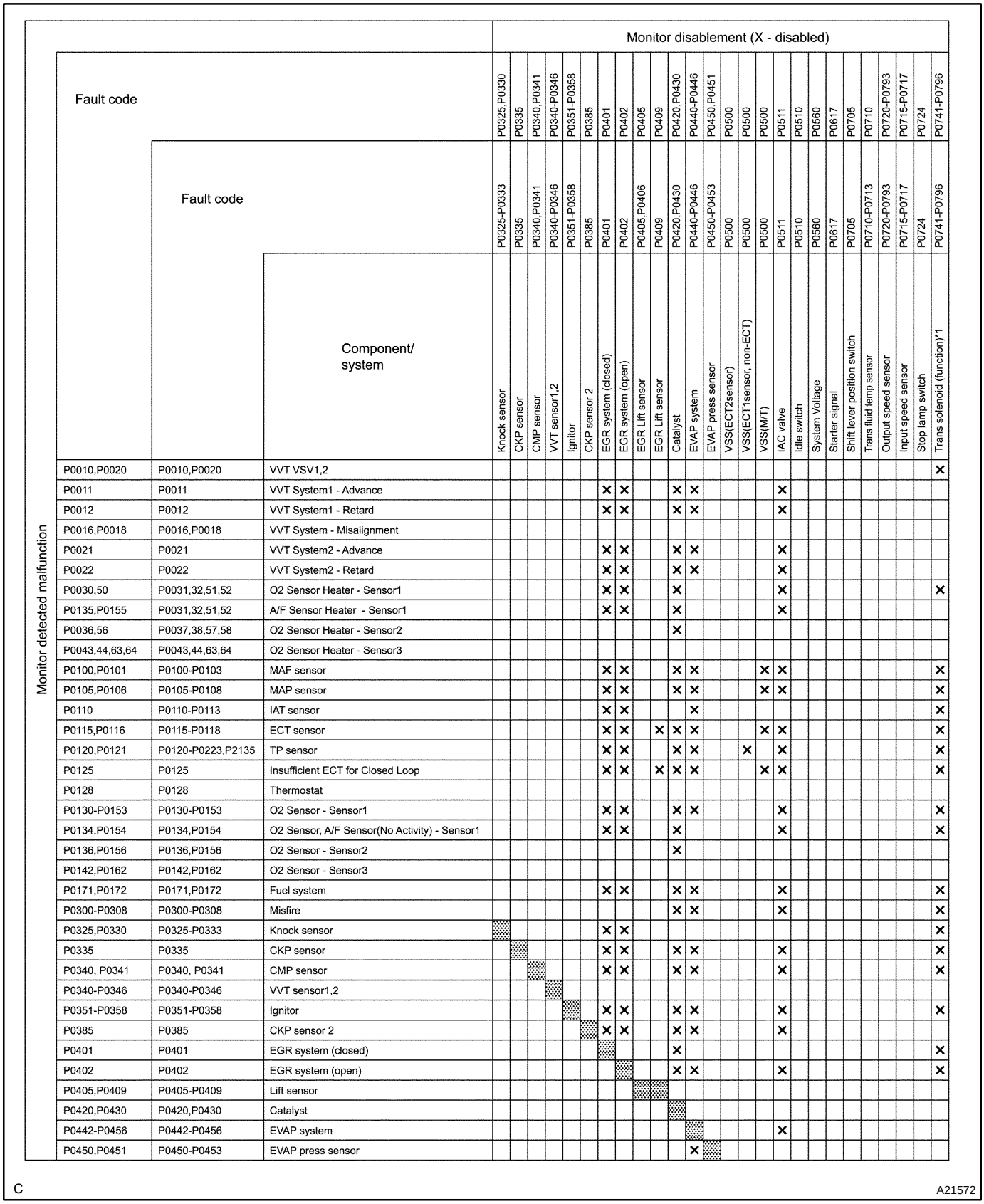

Monitor detected malfunction	Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																														
				P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
		P0325-P0333	Knock sensor																															
		P0335	CKP sensor																															
		P0340,P0341	CMP sensor																															
		P0340-P0346	VVT sensor1,2																															
		P0351-P0358	Ignitor																															
		P0385	CKP sensor 2																															
		P0401	EGR system (closed)																															
		P0402	EGR system (open)																															
		P0405,P0406	EGR Lift sensor																															
		P0409	EGR Lift sensor																															
		P0420,P0430	Catalyst																															
		P0440-P0446	EVAP system																															
		P0450,P0453	EVAP press sensor																															
		P0500	VSS(ECT2sensor)																															
		P0500	VSS(ECT1sensor, non-ECT)																															
		P0500	VSS(M/T)																															
		P0511	IAC valve																															
		P0510	Idle switch																															
		P0560	System Voltage																															
		P0617	Starter signal																															
		P0705	Shift lever position switch																															
		P0710-P0713	Trans fluid temp sensor																															
		P0720-P0793	Output speed sensor																															
		P0715-P0717	Input speed sensor																															
		P0724	Stop lamp switch																															
		P0741-P0796	Trans solenoid (function)*1																															
	P0010,P0020	P0010,P0020	VVT VSV1,2																															X
	P0011	P0011	VVT System1 - Advance							X	X			X	X					X														
	P0012	P0012	VVT System1 - Retard							X	X			X	X					X														
	P0016,P0018	P0016,P0018	VVT System - Misalignment																															
	P0021	P0021	VVT System2 - Advance							X	X			X	X					X														
	P0022	P0022	VVT System2 - Retard							X	X			X	X					X														
	P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1							X	X			X						X														X
	P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1							X	X			X						X														
	P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2											X																				
	P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																															
	P0100,P0101	P0100-P0103	MAF sensor							X	X			X	X				X	X														X
	P0105,P0106	P0105-P0108	MAP sensor							X	X			X	X				X	X														X
	P0110	P0110-P0113	IAT sensor							X	X				X																			X
	P0115,P0116	P0115-P0118	ECT sensor							X	X		X	X	X				X	X														X
	P0120,P0121	P0120-P0223,P2135	TP sensor							X	X			X	X			X		X														X
	P0125	P0125	Insufficient ECT for Closed Loop							X	X		X	X	X				X	X														X
	P0128	P0128	Thermostat																															
	P0130-P0153	P0130-P0153	O2 Sensor - Sensor1							X	X			X	X					X														X
	P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1							X	X			X						X														X
	P0136,P0156	P0136,P0156	O2 Sensor - Sensor2											X																				
	P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																															
	P0171,P0172	P0171,P0172	Fuel system							X	X			X	X					X														X
	P0300-P0308	P0300-P0308	Misfire											X	X					X														X
	P0325,P0330	P0325-P0333	Knock sensor							X	X																							X
	P0335	P0335	CKP sensor							X	X			X	X					X														X
	P0340, P0341	P0340, P0341	CMP sensor							X	X			X	X					X														X
	P0340-P0346	P0340-P0346	VVT sensor1,2																															
	P0351-P0358	P0351-P0358	Ignitor							X	X			X	X					X														X
	P0385	P0385	CKP sensor 2							X	X			X	X					X														
	P0401	P0401	EGR system (closed)											X																				X
	P0402	P0402	EGR system (open)											X	X					X														X
	P0405,P0409	P0405-P0409	Lift sensor																															
	P0420,P0430	P0420,P0430	Catalyst																															
	P0442-P0456	P0442-P0456	EVAP system																															
	P0450,P0451	P0450-P0453	EVAP press sensor												X																			

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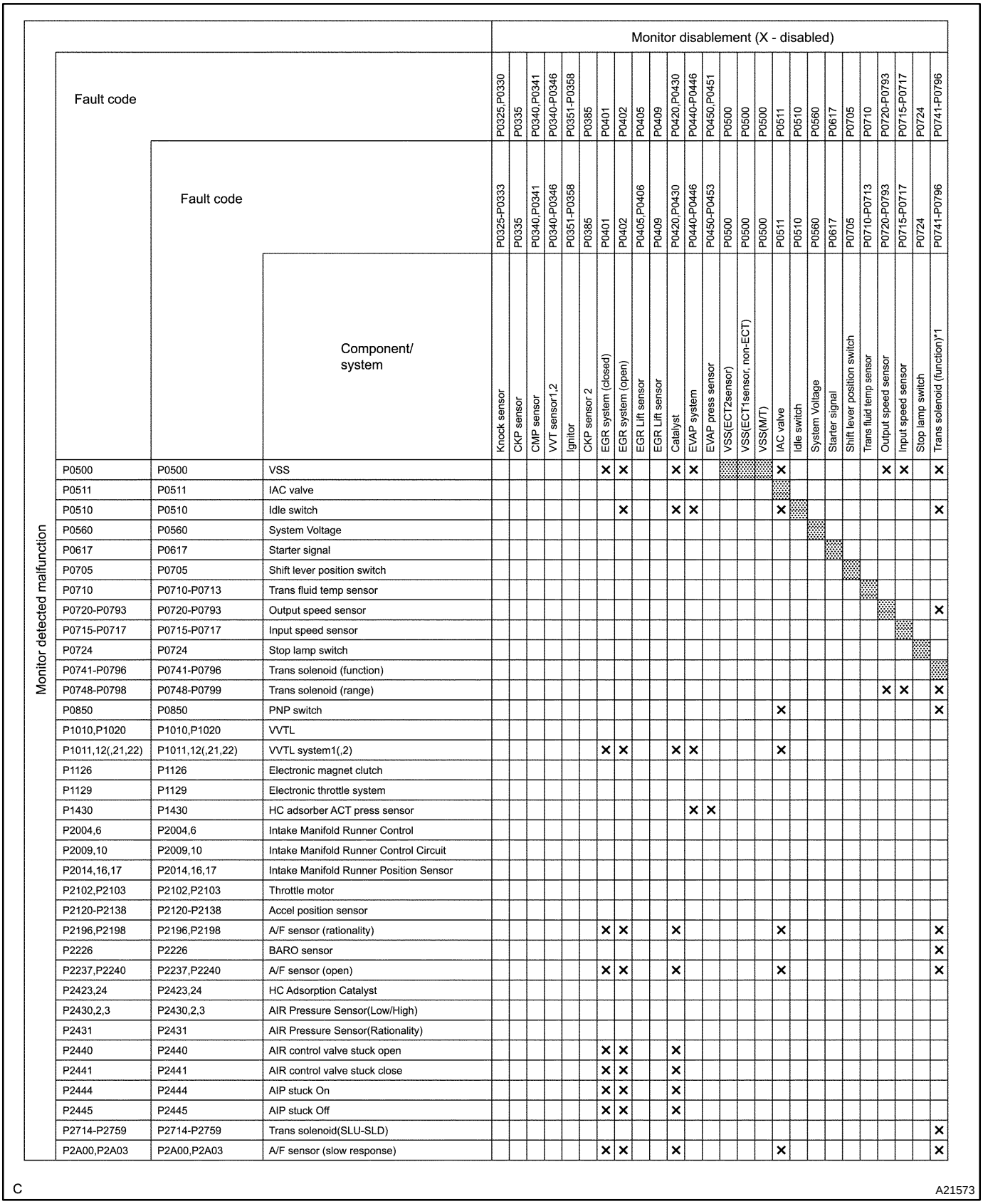
Note *1: Without input speed sensor



Monitor detected malfunction	Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																														
				P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
		P0325-P0333	Knock sensor																															
		P0335	CKP sensor																															
		P0340,P0341	CMP sensor																															
		P0340-P0346	VVT sensor1,2																															
		P0351-P0358	Ignitor																															
		P0385	CKP sensor 2																															
		P0401	EGR system (closed)																															
		P0402	EGR system (open)																															
		P0405,P0406	EGR Lift sensor																															
		P0409	EGR Lift sensor																															
		P0420,P0430	Catalyst																															
		P0440-P0446	EVAP system																															
		P0450-P0453	EVAP press sensor																															
		P0500	VSS(ECT2sensor)																															
		P0500	VSS(ECT1sensor, non-ECT)																															
		P0500	VSS(M/T)																															
		P0511	IAC valve																															
		P0510	Idle switch																															
		P0560	System Voltage																															
		P0617	Starter signal																															
		P0705	Shift lever position switch																															
		P0710-P0713	Trans fluid temp sensor																															
		P0720-P0793	Output speed sensor																															
		P0715-P0717	Input speed sensor																															
		P0724	Stop lamp switch																															
		P0741-P0796	Trans solenoid (function)																															
	P0500	P0500	VSS							X	X			X	X					X						X	X		X					
	P0511	P0511	IAC valve																															
	P0510	P0510	Idle switch								X			X	X					X									X					
	P0560	P0560	System Voltage																															
	P0617	P0617	Starter signal																															
	P0705	P0705	Shift lever position switch																															
	P0710	P0710-P0713	Trans fluid temp sensor																															
	P0720-P0793	P0720-P0793	Output speed sensor																															X
	P0715-P0717	P0715-P0717	Input speed sensor																															
	P0724	P0724	Stop lamp switch																															
	P0741-P0796	P0741-P0796	Trans solenoid (function)																															
	P0748-P0798	P0748-P0799	Trans solenoid (range)																													X	X	X
	P0850	P0850	PNP switch																	X														X
	P1010,P1020	P1010,P1020	VVTL																															
	P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)							X	X			X	X					X														
	P1126	P1126	Electronic magnet clutch																															
	P1129	P1129	Electronic throttle system																															
	P1430	P1430	HC adsorber ACT press sensor												X	X																		
	P2004,6	P2004,6	Intake Manifold Runner Control																															
	P2009,10	P2009,10	Intake Manifold Runner Control Circuit																															
	P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																															
	P2102,P2103	P2102,P2103	Throttle motor																															
	P2120-P2138	P2120-P2138	Accel position sensor																															
	P2196,P2198	P2196,P2198	A/F sensor (rationality)							X	X			X						X													X
	P2226	P2226	BARO sensor																														X	
	P2237,P2240	P2237,P2240	A/F sensor (open)							X	X			X						X													X	
	P2423,24	P2423,24	HC Adsorption Catalyst																															
	P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																															
	P2431	P2431	AIR Pressure Sensor(Rationality)																															
	P2440	P2440	AIR control valve stuck open							X	X			X																				
	P2441	P2441	AIR control valve stuck close							X	X			X																				
	P2444	P2444	AIP stuck On							X	X			X																				
	P2445	P2445	AIP stuck Off							X	X			X																				
	P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																															X
	P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)							X	X			X						X														X

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Note *1: Without input speed sensor

Monitor detected malfunction	Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																										
				P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
				P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
				Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Adsorption Catalyst	AIR Pressure Sensor(Low/High)	AIR Pressure Sensor(Rationality)	AIR control valve stuck open	AIR control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid(SLU-SLD)	A/F Sensor (Slow response) - Sensor1
	P0010,P0020	P0010,P0020	VVT VSV1,2																				X	X	X	X			
	P0011	P0011	VVT System1 - Advance																				X	X	X	X			
	P0012	P0012	VVT System1 - Retard																				X	X	X	X			
	P0016,P0018	P0016,P0018	VVT System - Misalignment																				X	X	X	X			
	P0021	P0021	VVT System2 - Advance																				X	X	X	X			
	P0022	P0022	VVT System2 - Retard																				X	X	X	X			
	P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																	X			X	X	X	X			
	P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1														X		X	X			X	X	X	X			X
	P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2														X			X									
	P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																	X									
	P0100,P0101	P0100-P0103	MAF sensor				X	X									X		X	X			X	X	X	X			X
	P0105,P0106	P0105-P0108	MAP sensor				X	X									X		X	X			X	X	X	X			X
	P0110	P0110-P0113	IAT sensor									X					X		X				X	X	X	X			X
	P0115,P0116	P0115-P0118	ECT sensor	X			X	X				X					X		X	X			X	X	X	X			X
	P0120,P0121	P0120-P0223,P2135	TP sensor														X		X	X			X	X	X	X			X
	P0125	P0125	Insufficient ECT for Closed Loop	X			X										X		X	X			X	X	X	X			X
	P0128	P0128	Thermostat																										
	P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																	X			X	X	X	X			
	P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1														X		X	X			X	X	X	X			X
	P0136,P0156	P0136,P0156	O2 Sensor - Sensor2														X			X									
	P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																	X									
	P0171,P0172	P0171,P0172	Fuel system														X		X	X			X	X	X	X			X
	P0300-P0308	P0300-P0308	Misfire														X		X	X			X	X	X	X			X
	P0325,P0330	P0325-P0333	Knock sensor																				X	X	X	X			
	P0335	P0335	CKP sensor				X	X									X		X	X			X	X	X	X			X
	P0340, P0341	P0340, P0341	CMP sensor				X	X									X		X	X			X	X	X	X			X
	P0340-P0346	P0340-P0346	VVT sensor1,2																				X	X	X	X			
	P0351-P0358	P0351-P0358	Ignitor																	X			X	X	X	X			
	P0385	P0385	CKP sensor 2				X	X									X		X	X			X	X	X	X			X
	P0401	P0401	EGR system (closed)																	X									
	P0402	P0402	EGR system (open)														X		X	X			X	X	X	X			X
	P0405,P0409	P0405-P0409	Lift sensor																										
	P0420,P0430	P0420,P0430	Catalyst																										
	P0442-P0456	P0442-P0456	EVAP system														X		X				X	X	X	X			X
	P0450,P0451	P0450-P0453	EVAP press sensor																				X	X	X	X			

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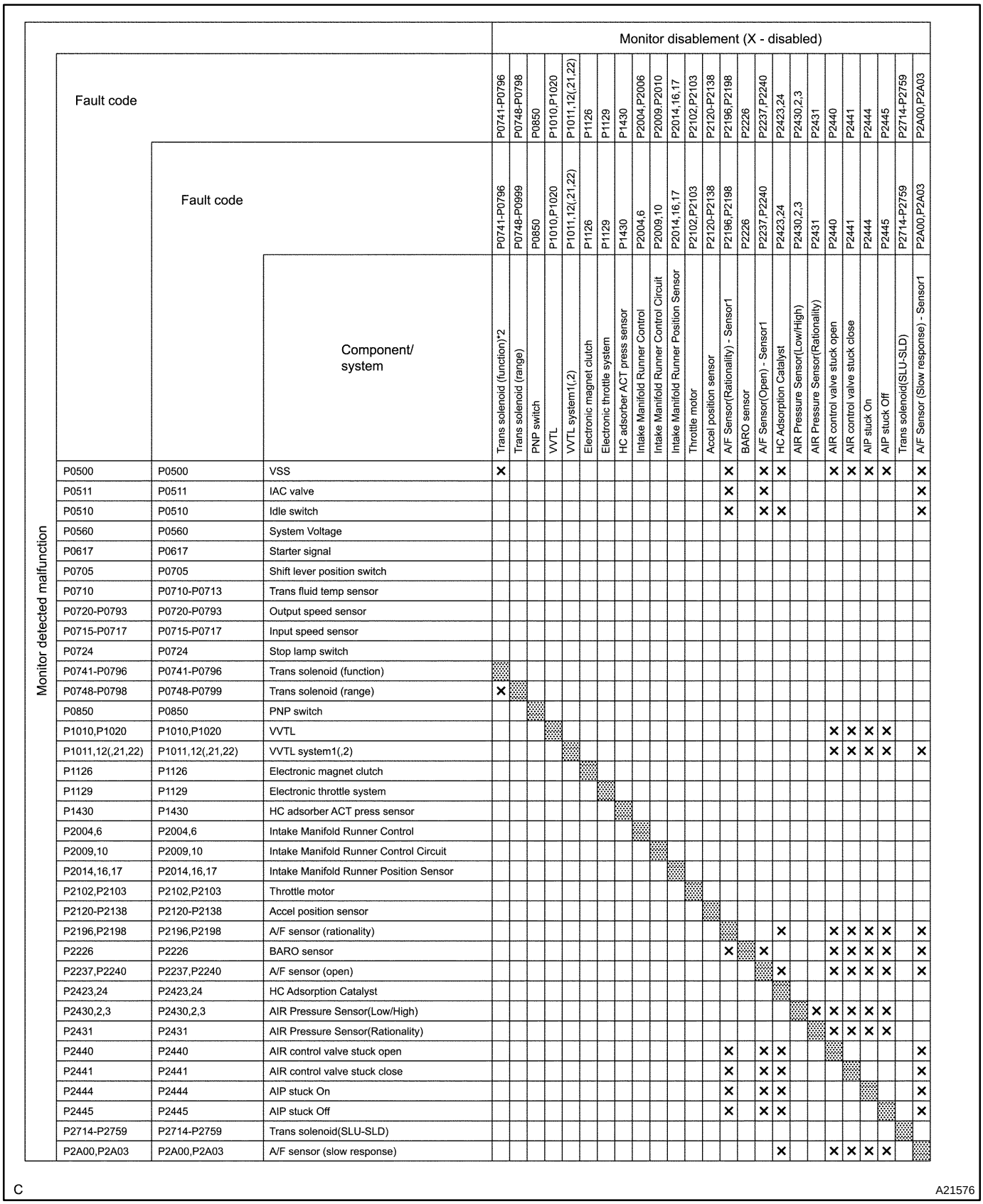
Note *2: With input speed sensor



Note *2: With input speed sensor

12. O2S TEST RESULT

INTRODUCTION

The O2S TEST RESULT refers to the results of the engine control module (ECM) when it monitors the oxygen sensor (O2S), and it can be read using the hand-held tester or the generic OBDII scantool. Based on this, you can find the O2S's conditions. The ECM monitors the O2S in the various items. You can read the monitor result (TEST DATA) of each monitor item using the O2S TEST RESULT. However, the output value of the TEST DATA is the latest "snapshot" value that is it taken after monitoring and therefore it is not dynamic.

In this repair manual, the description of the O2S TEST RESULT (for O2S related DTCs) are written in a table.

This table consists of 5 items:

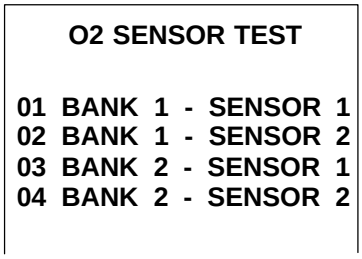
(1) TEST ID (a code applied to each TEST DATA)
(2) Description of TEST DATA
(3) Conversion Factor (When Conversion Factor has a value written in the table, multiply the TEST DATA value appearing on the scantool by the Conversion Factor value. The result will be the required value.)
(4) Unit
(5) Standard Value

If the TEST DATA value appearing on the scantool is out of the standard value, the O2S is malfunctioning. If it is within the standard value, the O2S is functioning normally. However, if the value is on the borderline of the standard value, the O2S may malfunction very soon.

HOW TO READ O2S TEST RESULT USING HAND-HELD TESTER

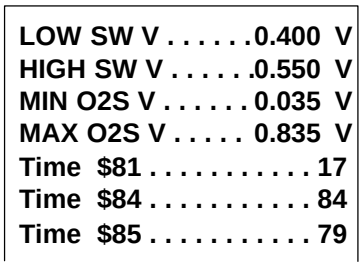
(a) Connect the hand-held tester to the DLC3.

O2S TEST RESULT Screen



(b) On the tester screen, select the following menus: DIAGNOSIS/CARB OBDII/O2S TEST RESULT. A list of the O2S equipped on the vehicle will be displayed.

TEST DATA Screen



(c) Select the desired O2S and press ENTER. The following screen will appear.

(d) Press HELP and ↓ simultaneously. More information will appear.

(e) Example:

(1) The hand-held tester displays ”17” as a value of the ”TIME $81” (see the illustration on the left).

(2) Find the Conversion Factor value of ”TIME $81” in the O2S TEST RESULT chart below. 0.3906 is specified for $81 in this chart.

(3) Multiply ”17” in step (1) by 0.3906 (Conversion Factor) in the step (2).
17 x 0.3906 = 6.6 %

(4) If the answer is within the standard value, the ”TIME $81” can be confirmed to be normal.

O2S TEST RESULT Chart

TEST ID	Description of TEST DATA	Conversion Factor	Unit	Standard Value
$81	Percentage of monitoring time when the HO2S voltage is less than 0.05V	Multiply 0.3906	%	Within 60 %

13. CHECKING MONITOR STATUS

NOTICE:

The Monitor Status is not applicable to the heated oxygen sensor (HO2S). The HO2S status can be checked with O2S TEST RESULT.

(a) INTRODUCTION

The purpose of the monitor result (mode 6) is to allow access to the results for on-board diagnostic monitoring tests of specific components/systems that are not continuously monitored. Examples are catalyst, EVAP and thermostat.

The monitor result allows the OBD scan tool to display the monitor status, test value and test limit. The monitor status indicates whether the component is functioning normally or not (PASS or FAIL). The test value is the value that was used to determine the monitor status. When the test value is inside the test limit, the ECM determines the component is functioning normally (PASS). If the test value is outside the test limit, the ECM determines the component is malfunctioning (FAIL).

A problem in these components/systems can be found by comparing the test value and test limit. The monitor result information is included under “MONITOR RESULT” in the DTC sections.

(b) PROCEDURE

NOTICE:

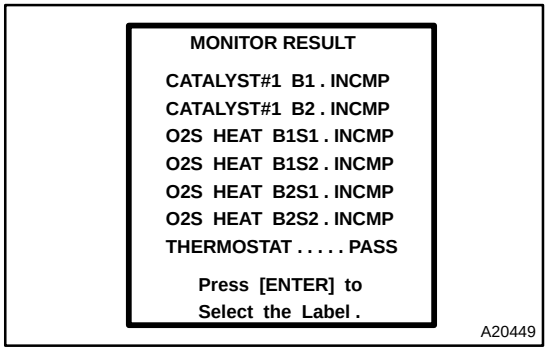
The monitor result and test value are cleared when the ignition switch is turned OFF.

(1) Connect the hand-held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) Clear the DTCs.

(4) Run the vehicle in accordance with the applicable drive pattern described in READINESS MONITOR DRIVE PATTERN (see page DI-29).



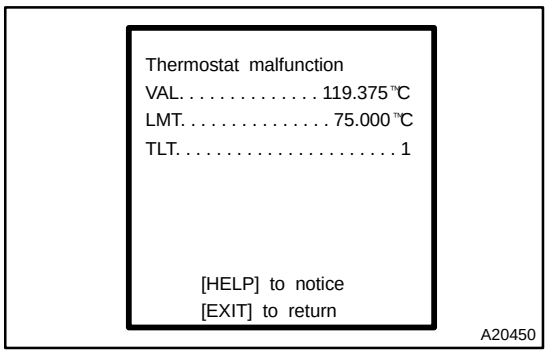
(5) Select from the tester menus: DIAGNOSIS, ENHANCED OBD II, MONITOR INFO and MONITOR RESULT. The monitor result appears after the component name.

INCMP: The component has not been monitored yet.

PASS: The component is functioning normally.

FAIL: The component is malfunctioning.

(6) Confirm that the component is set to either PASS or FAIL.



(7) Select the component (Label) and press ENTER. The accuracy test value appears when the monitor result is either PASS or FAIL.
VAL The test value
LMT: The test limit
TLT: The test limit type. Either 0 or 1 is displayed.

(8) If TLT is 0, the component is malfunctioning when the test value is higher than the test limit. If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.

(9) Compare the test value with the test limit. The test value is usually significantly higher or lower than the test limit. If the test value is on the borderline of the test limit, there is a potential malfunction in the component.

HINT:

The monitor result might on rare occasions be PASS even if the MIL is illuminated. This indicates the system malfunctioned on a previous driving cycle. This might be caused by an intermittent problem.

DIC40-01

READINESS MONITOR DRIVE PATTERN

1. PURPOSE OF THE READINESS TESTS

- The On-Board Diagnostic (OBD II) system is designed to monitor the performance of emission-related components and report any detected abnormalities in the form of Diagnostic Trouble Codes (DTCs). Since the various components need to be monitored during different driving conditions, the OBD II system is designed to run separate monitoring programs called Readiness Monitors. Many state Inspection and Maintenance (I/M) programs require that vehicles complete their Readiness Monitors prior to beginning an emissions test.
- The current status of the Readiness Monitors can be seen by using the hand-held tester with version 9.0 software (or newer), or a generic OBD II Scan tool.
- To view the Readiness Monitor status using the hand-held tester, select ”Monitor Status” from the Enhanced OBD II Menu.
- A status of ”complete” indicates that the necessary conditions have been met to run the performance tests for the related Readiness Monitor.
- The Readiness Monitor will be reset to ”incomplete” if:
  - ECM has lost power (battery or fuse).
  - DTCs have been cleared.
  - The conditions for running the Readiness Monitor have not been met.
- In the event that any Readiness Monitor shows ”incomplete,” follow the appropriate Readiness Monitor Drive Pattern to active the monitor and change the readiness status to ”complete.”

CAUTION:

Strictly observe of posted speed limits, traffic laws, and road conditions when performing these drive patterns.

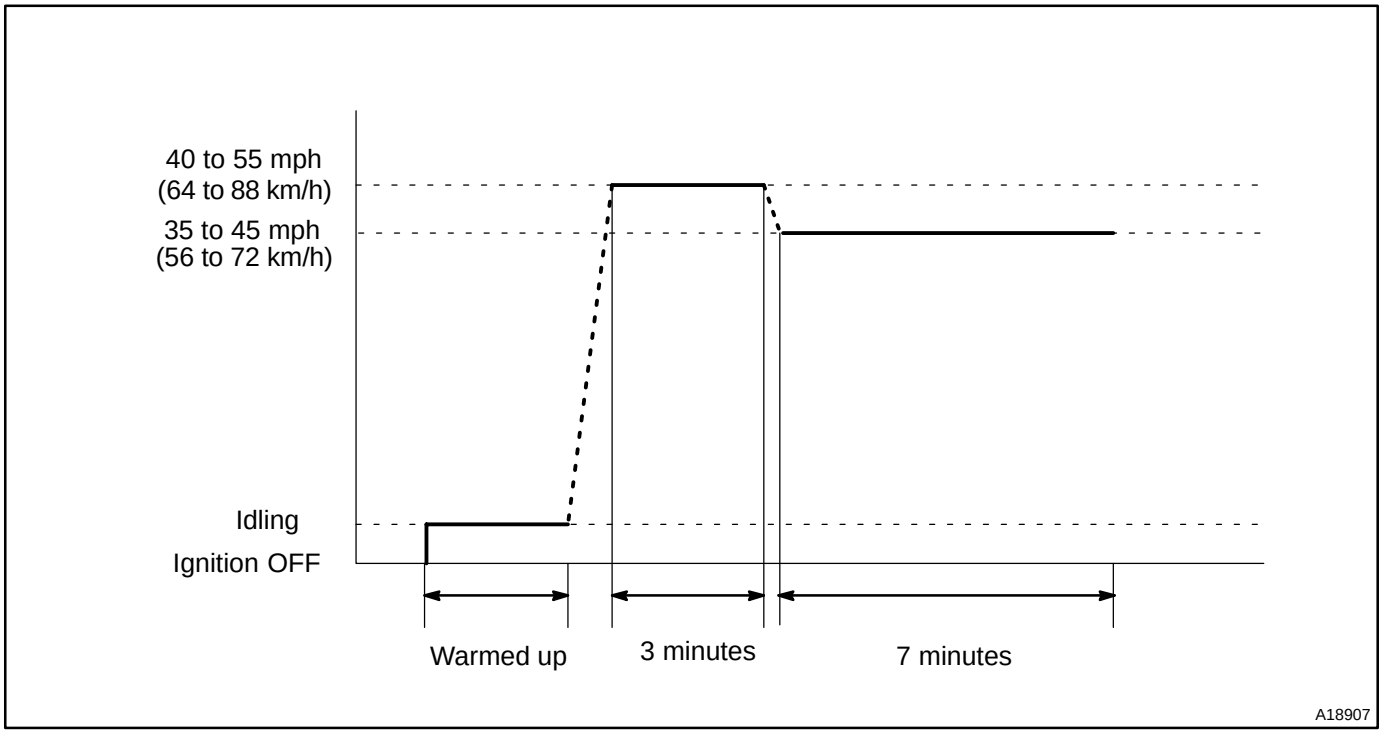
NOTICE:

These drive patterns represent the fastest method to satisfy all necessary conditions which allow the specific readiness monitor to complete.

In the event that the drive pattern must be interrupted (possibly due to traffic conditions or other factors) the drive pattern can be resumed, and in most cases, the readiness monitor will still set to ”complete”.

To ensure rapid completion of readiness monitors, avoid sudden changes in vehicle load and speed (driving up and down hills and/or sudden acceleration).

2. CATALYST MONITOR (O2S TYPE)



(a) Preconditions

The monitor will not run unless:

- MIL is OFF.
- Engine Coolant Temperature (ECT) is 75˚C (167˚F) or greater.
- Intake Air Temperature (IAT) is -10˚C (14˚F) or greater.

NOTICE:

The readiness test can be completed in cold ambient conditions (less than -10˚C / 14˚F), if the drive pattern is repeated a second time after cycling the ignition off.

(b) Drive Pattern

(1) Connect the OBD II scan tool to the DLC3 to check monitor status and preconditions.

(2) Drive the vehicle at 40 to 55 mph (64 to 88 km/h) for approximately for 3 minutes.

NOTICE:

Drive with smooth throttle operation and avoid sudden acceleration.

If IAT is less than 10˚C (50˚F) when engine was started, drive the vehicle at 40 to 55 mph (64 to 88 km/h) for additional 4 minutes.

(3) Drive the vehicle at 35 to 45 mph (56 to 72 km/h) for approximately 7 minutes.

NOTICE:

Drive with smooth throttle operation and avoid sudden deceleration as much as possible with the throttle fully closed.

(4) If readiness status dose not switch to complete, make sure that the preconditions are met and the ignition switch is turned OFF and then repeat steps (2) and (3).

(5) Release pressure in the fuel tank by removing and then reinstalling the fuel tank cap.

(6) Start the engine and immediately begin driving as directed.

3. EVAP MONITOR (VACUUM PRESSURE MONITOR)

NOTICE:

A cold soak must be performed prior to conducting the drive pattern to complete the Internal Pressure Readiness Monitor.

(a) Cold Soak Preconditions

The monitor will not run unless:

- MIL is OFF
- Fuel level is approximately 1/2 to 3/4
- Altitude is 7,800 feet (2,400 m) or less

(b) Cold Soak Procedure

Let the vehicle cold soak for 8 hours or until the difference between IAT and ECT becomes less than 7˚C (13˚F)

HINT:

Examples:

- Scenario 1

  ECT = 24˚C (75˚F)

  IAT = 16˚C (60˚F)

  Difference between ECT and IAT is 8˚C (15˚F)

  → The monitor will not run because difference between ECT and IAT is greater than 7˚C (13˚F)

- Scenario 2

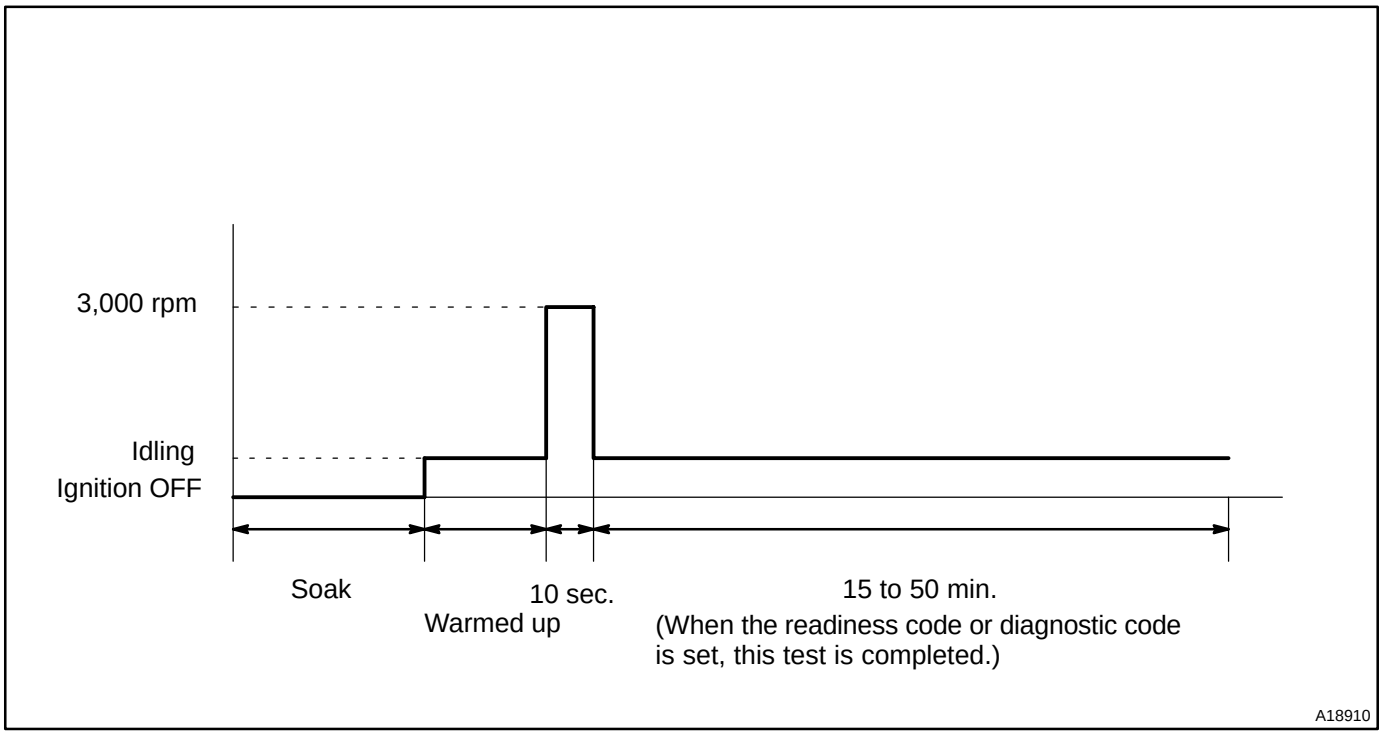
  ECT = 21˚C (70˚F)

  IAT = 20˚C (68˚F)

  Difference between ECT and IAT is 1˚C (2˚F)

  → The monitor will run because difference between ECT and IAT is less than 7˚C (13˚F)

4. EVAP MONITOR (VACUUM PRESSURE MONITOR) (CONTINUED)



(a) Preconditions

The monitor will not run unless:

- MIL is OFF
- Fuel level is approximately 1/2 to 3/4
- Altitude is 7,800 feet (2,400 m) or less
- Engine Coolant Temperature (ECT) is between 4.4˚C and 35˚C (40˚F and 95˚F)
- Intake Air Temperature (IAT) is between 4.4˚C and 35˚C (40˚F and 95 ˚F)
- Cold Soak Procedure has been completed
- Before starting the engine, the difference between ECT and IAT must be less than 7˚C (13˚F)

HINT:

Examples:

- Scenario 1

  ECT = 24˚C (75˚F)

  IAT = 16˚C (60˚F)

  Difference between ECT and IAT is 8˚C (15˚F)

  → The monitor will not run because difference between ECT and IAT is higher than 7˚C (13˚F)

- Scenario 2

  ECT = 21˚C (70˚F)

  IAT = 20˚C (68˚F)

  Difference between ECT and IAT is 1˚C (2˚F)

  → The monitor will run because difference between ECT and IAT is less than 7˚C (13˚F)

The readiness test can be completed in cold ambient conditions (less than 40˚F / 4.4˚C) and/or at high altitudes (more than 7,800 feet / 2,400 m) if the drive pattern is repeated a second time after cycling the ignition off.

(b) Drive Pattern

(1) Connect the OBDII scan tool to DLC3 to check monitor status and preconditions (refer to ”a”).

(2) Release pressure in fuel tank by removing the fuel tank cap and then reinstalling it.

(3) Start the engine and allow it to idle until ECT becomes 75˚C (167˚F) or higher.

(4) Run the engine at 3,000 rpm for about 10 seconds.

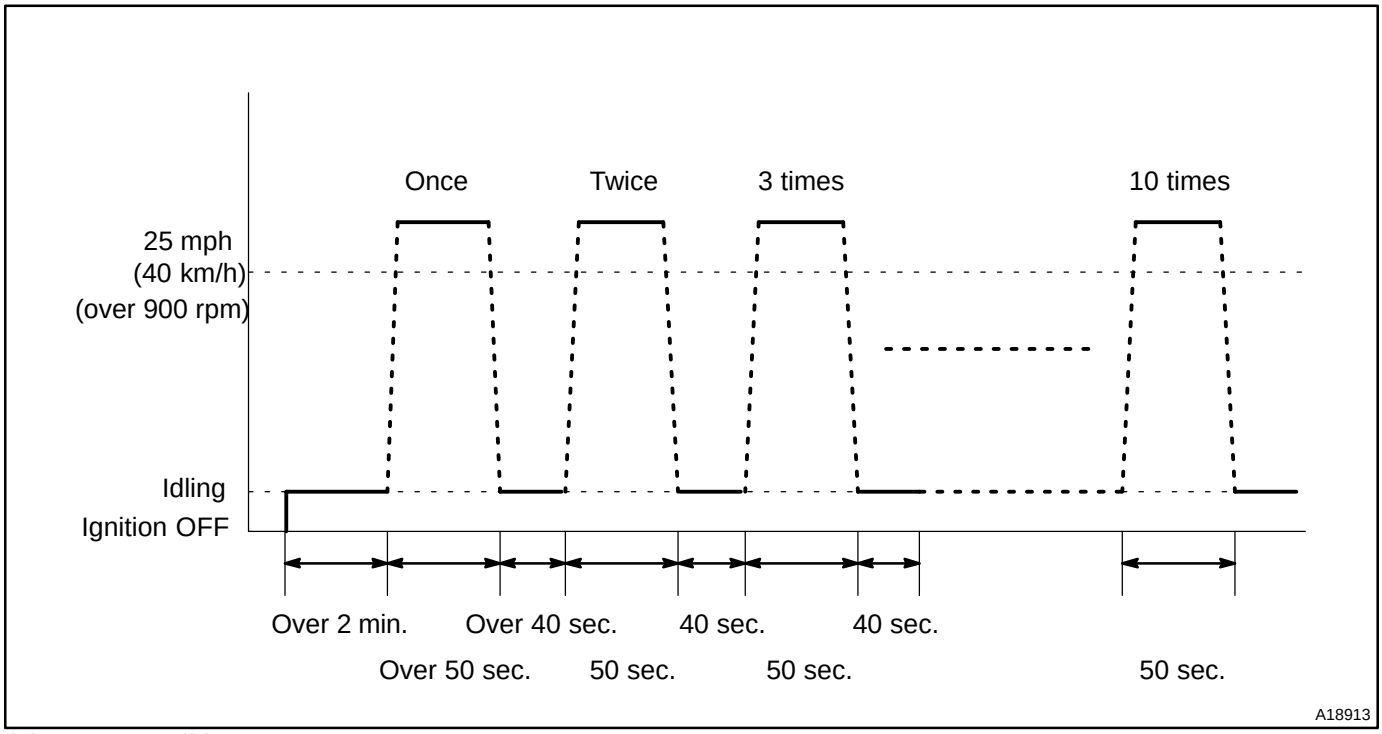
(5) Allow the engine to idle with the A/C ON (to create slight load) for 15 to 50 minutes.

NOTICE:

If the vehicle is not equipped with A/C put a slight load on the engine by doing the following :

- **Securely set the parking brake.**
- **Block the drive wheels with wheel chocks.**
- **Allow the vehicle to idle in drive for 15 to 50 minutes.**

5. OXYGEN SENSOR MONITOR (FRONT AND REAR O2S SYSTEM)



(a) Preconditions

The monitor will not run unless:

- MIL is OFF

(b) Drive Pattern

(1) Connect the OBDII scan tool to DLC3 to check monitor status and preconditions (refer to step "a").

(2) Start the engine and allow it to idle for 2 minutes or more.

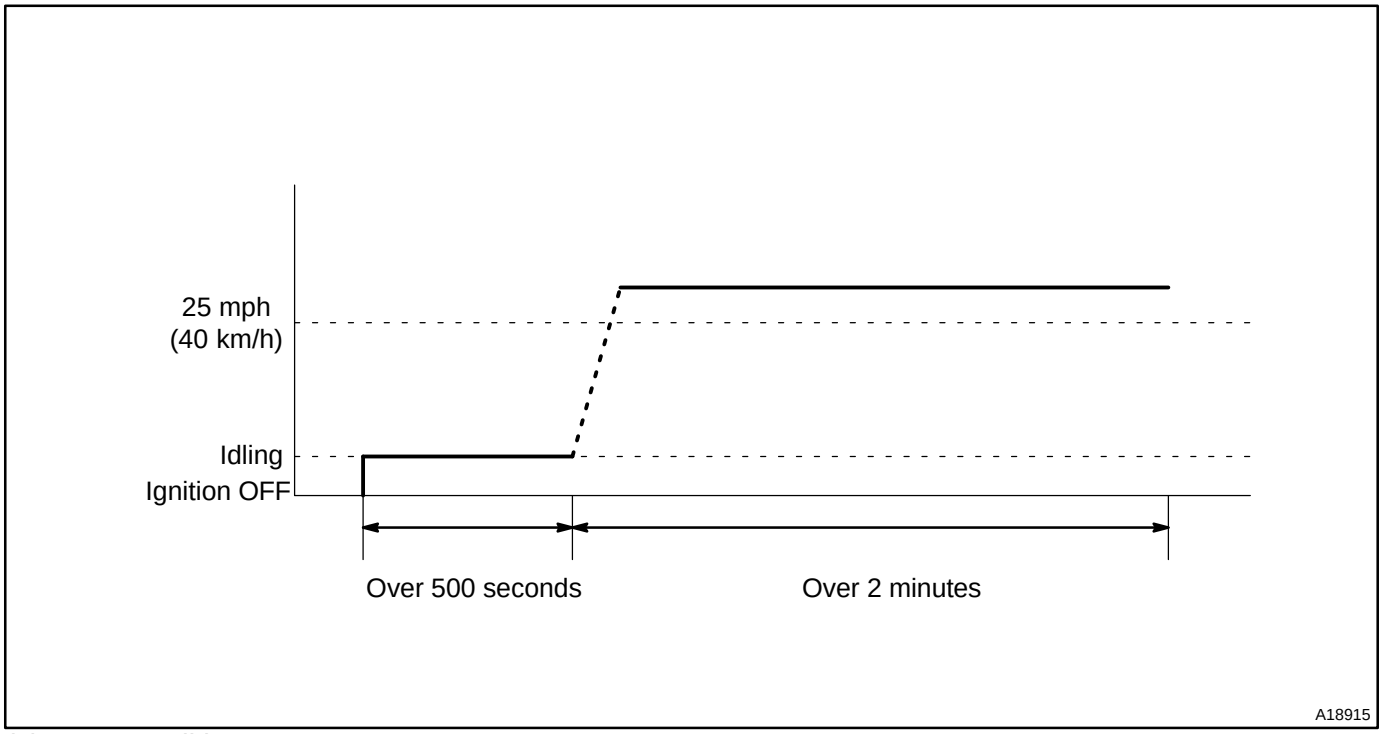
(3) Drive the vehicle at 25 mph (40 km/h) or more for at least 50 seconds.

(4) Stop the vehicle and allow the engine to idle for 40 seconds or more.

(5) Perform steps (3) and (4) ten times.

(6) Check the status of the readiness monitor on the scan tool display. If readiness status did not switch to complete, ensure preconditions are met, turn the ignition off and then repeat steps (1) and (5).

6. OXYGEN SENSOR HEATER MONITOR



(a) Preconditions

The monitor will not run unless:

- MIL is OFF

(b) Drive Pattern

(1) Connect the OBDII scan tool to the DLC3 to check monitor status and preconditions (refer to step "a").

(2) Start the engine and allow it to idle for 500 seconds or more.

(3) Drive the vehicle at 25 mph (40 km/h) or more at least 2 minutes.

(4) Check the status of the readiness monitor on the scan tool display. If readiness status did not switch to complete, ensure the preconditions are met, turn the ignition off and then repeat steps (2) and (3).

DI2DH-13

DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check in check mode, check the circuit for the codes listed in the table below. For details of each code, turn to the page referred to under the ''See page'' for the respective ''DTC No.'' in the DTC chart.

DTC No. (See page)	Detection Item	Trouble Area	MIL*1	Memory
P0010 (DI-48)	Camshaft Position ''A'' Actuator Circuit (Bank 1)	∕ Open or short in OCV circuit ∕ OCV ∕ ECM	™	™
P0011 (DI-53)	Camshaft Position ''A'' -Timing Over- Advanced or System Performance (Bank 1)	∕ Valve timing ∕ OCV ∕ VVT controller assembly ∕ ECM	™	™
P0012 (DI-53)	Camshaft Position ''A'' -Timing Over- Retarded (Bank 1)	∕ Valve timing ∕ OCV ∕ VVT controller assembly ∕ ECM	™	™
P0016 (DI-63)	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)	∕ Mechanical system (Jumping teeth of timing belt, belt stretched) ∕ ECM	™	™
P0031 (DI-65)	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 1)	∕ Open in heater circuit of heated oxygen sensor ∕ Heated oxygen sensor heater ∕ ECM	™	™
P0032 (DI-65)	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 1)	∕ Short in heater circuit of heated oxygen sensor ∕ Heated oxygen sensor heater ∕ ECM	™	™
P0037 (DI-65)	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)	∕ Open in heater circuit of heated oxygen sensor ∕ Heated oxygen sensor heater ∕ EFI relay ∕ ECM	™	™
P0038 (DI-65)	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)	∕ Short in heater circuit of heated oxygen sensor ∕ Heated oxygen sensor heater ∕ EFI relay ∕ ECM	™	™
P0051 (DI-65)	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 1)	∕ Open in heater circuit of heated oxygen sensor ∕ Heated oxygen sensor heater ∕ ECM	™	™
P0052 (DI-65)	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 1)	∕ Short in heater circuit of heated oxygen sensor ∕ Heated oxygen sensor heater ∕ ECM	™	™
P0057 (DI-65)	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)	∕ Open in heater circuit of heated oxygen sensor ∕ Heated oxygen sensor heater ∕ ECM	™	™
P0058 (DI-65)	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)	∕ Short in heater circuit of heated oxygen sensor ∕ Heated oxygen sensor heater ∕ ECM	™	™
P0100 (DI-70)	Mass or Volume Air Flow Circuit	∕ Open or short in mass air flow meter circuit ∕ Mass air flow meter ∕ ECM	™	™

P0101 (DI-76)	Mass or Volume Air Flow Circuit Range/Performance Problem	∕Mass air flow meter	™	™
P0102 (DI-70)	Mass or Volume Air Flow Circuit Low Input	∕Open in mass air flow meter circuit ∕Mass air flow meter ∕ECM	™	™
P0103 (DI-70)	Mass or Volume Air Flow Circuit High Input	∕Short in mass air flow meter circuit ∕Mass air flow meter ∕ECM	™	™
P0110 (DI-79)	Intake Air Temperature Circuit	∕Open or short in intake air temp. sensor circuit ∕Intake air temp. sensor (built in mass air flow meter) ∕ECM	™	™
P0112 (DI-79)	Intake Air Temperature Circuit Low Input	∕Short in intake air temp. sensor circuit ∕Intake air temp. sensor (built in mass air flow meter) ∕ECM	™	™
P0113 (DI-79)	Intake Air Temperature Circuit High Input	∕Open in intake air temp. sensor circuit ∕Intake air temp. sensor (built in mass air flow meter) ∕ECM	™	™
P0115 (DI-86)	Engine Coolant Temperature Circuit	∕Open or short in engine coolant temp. sensor circuit ∕Engine coolant temp. sensor ∕ECM	™	™
P0116 (DI-93)	Engine Coolant Temperature Circuit Range/Performance Problem	∕Cooling system ∕Engine coolant temp. sensor	™	™
P0117 (DI-86)	Engine Coolant Temperature Circuit Low Input	∕Short in engine coolant temp. sensor circuit ∕Engine coolant temp. sensor ∕ECM	™	™
P0118 (DI-86)	Engine Coolant Temperature Circuit High Input	∕Open in engine coolant temp. sensor circuit ∕Engine coolant temp. sensor ∕ECM	™	™
P0120 (DI-95)	Throttle Pedal Position Sensor/ Switch ”A” Circuit	∕Open or short in throttle position sensor circuit ∕Throttle position sensor ∕ECM	™	™
P0121 (DI-101)	Throttle/Pedal Position Sensor/ Switch ”A” Circuit Range/Performance Problem	∕Throttle position sensor	™	™
P0122 (DI-95)	Throttle/Pedal Position Sensor/ Switch ”A” Circuit Low Input	∕Open in throttle position sensor circuit ∕Throttle position sensor ∕ECM	™	™
P0123 (DI-95)	Throttle/Pedal Position Sensor/ Switch ”A” Circuit High Input	∕Short in throttle position sensor circuit ∕Throttle position sensor ∕ECM	™	™
P0125 (DI-93)	Insufficient Coolant Temperature for Closed Loop Fuel Control	∕Cooling system ∕Engine coolant temp. sensor	™	™
P0128 (DI-106)	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	∕Thermostat ∕Cooling system ∕Engine coolant temp. sensor ∕ECM	¿	¿
P0130 (DI-110)	Oxygen Sensor Circuit (Bank 1 Sensor 1)	∕Open or short in heated oxygen sensor circuit (Bank 1 Sensor 1) ∕Heated oxygen sensor (Bank 1 Sensor 1) ∕Air induction system ∕Fuel pressure ∕Injector ∕ECM	™	™

P0133 (DI-122)	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)	✓Open or short in heated oxygen sensor circuit (Bank 1 Sensor 1) ✓Heated oxygen sensor (Bank 1 Sensor 1) ✓Air induction system ✓Fuel pressure ✓Injector ✓ECM	™	™
P0134 (DI-131)	Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	✓Open or short in heated oxygen sensor circuit (Bank 1 Sensor 1) ✓Heated oxygen sensor (Bank 1 Sensor 1) ✓Air induction system ✓Fuel pressure ✓Injector ✓Gas leakage on exhaust system ✓PCV pipng ✓ECM	™	™
P0136 (DI-139)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	✓Open or short in heated oxygen sensor circuit (Bank 1 Sensor 2) ✓Heated oxygen sensor (Bank 1 Sensor 2) ✓Air induction system ✓Fuel pressure ✓Injector ✓ECM	™	™
P0150 (DI-110)	Oxygen Sensor Circuit (Bank 2 Sensor 1)	✓Open or short in heated oxygen sensor circuit (Bank 2 Sensor 1) ✓Heated oxygen sensor (Bank 2 Sensor 1) ✓Air induction system ✓Fuel pressure ✓Injector ✓ECM	™	™
P0153 (DI-122)	Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)	✓Open or short in heated oxygen sensor circuit (Bank 2 Sensor 1) ✓Heated oxygen sensor (Bank 2 Sensor 1) ✓Air induction system ✓Fuel pressure ✓Injector ✓ECM	™	™
P0154 (DI-131)	Oxygen Sensor Circuit No Activity Detected	✓Open or short in heated oxygen sensor circuit (Bank 2 Sensor 1) ✓Heated oxygen sensor (Bank 2 Sensor 1) ✓Air induction system ✓Fuel pressure ✓Injector ✓Gas leakage on exhaust system ✓PCV pipng ✓ECM	™	™
P0156 (DI-139)	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)	✓Open or short in heated oxygen sensor circuit (Bank 2 Sensor 2) ✓Heated oxygen sensor (Bank 2 Sensor 2) ✓Air induction system ✓Fuel pressure ✓Injector ✓ECM	™	™

P0171 (DI-148)	System too Lean (Bank 1)	✓Air induction system ✓Injector blockage ✓Mass air flow meter ✓Engine coolant temp. sensor ✓Fuel pressure ✓Gas leakage on exhaust system ✓Open or short in heated oxygen sensor (Bank 1 sensor 1) circuit ✓Heated oxygen sensor (Bank 1 sensor 1) ✓PCV pipng ✓ECM	™	™
P0172 (DI-148)	System too Rich (Bank 1)	✓Injector leak, blockage ✓Mass air flow meter ✓Engine coolant temp. sensor ✓Ignition system ✓Fuel pressure ✓Gas leakage in exhaust system ✓Open or short in heated oxygen sensor (Bank 1 sensor 1) circuit ✓Heated oxygen sensor (Bank 1 sensor 1) ✓ECM	™	™
P0174 (DI-148)	System too Lean (Bank 2)	✓Air induction system ✓Injector blockage ✓Mass air flow meter ✓Engine coolant temp. sensor ✓Fuel pressure ✓Gas leakage on exhaust system ✓Open or short in heated oxygen sensor (Bank 2 sensor 1) circuit ✓Heated oxygen sensor (Bank 2 sensor 1) ✓PCV pipng ✓ECM	™	™
P0175 (DI-148)	System too Rich (Bank 2)	✓Injector leak, blockage ✓Mass air flow meter ✓Engine coolant temp. sensor ✓Ignition system ✓Fuel pressure ✓Gas leakage in exhaust system ✓Open or short in heated oxygen sensor (Bank 2 sensor 1) circuit ✓Heated oxygen sensor (Bank 2 sensor 1) ✓ECM	™	™
P0230 (DI-161)	Fuel Pump Praimary Circuit	✓Open or short in fuel pump relay circuit ✓Fuel pump relay ✓ECM	™	™

P0300 (DI-164)	Random/Multiple Cylinder Misfire Detected	✓Open or short in engine wire ✓Connector connection ✓Vacuum hose connection ✓Ignition system ✓Injector ✓Fuel pressure ✓Mass air flow meter ✓Engine coolant temp. sensor ✓Compression pressure ✓Valve clearance ✓Valve timing ✓PCV piping ✓ECM	™ *2	™
P0301 (DI-164)	Cylinder 1 Misfire Detected		™ *2	™
P0302 (DI-164)	Cylinder 2 Misfire Detected		™ *2	™
P0303 (DI-164)	Cylinder 3 Misfire Detected		™ *2	™
P0304 (DI-164)	Cylinder 4 Misfire Detected		™ *2	™
P0305 (DI-164)	Cylinder 5 Misfire Detected		™ *2	™
P0306 (DI-164)	Cylinder 6 Misfire Detected		™ *2	™
P0325 (DI-179)	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)	✓Open or short in knock sensor 1 circuit ✓Knock sensor 1 (looseness) ✓ECM	™	™
P0330 (DI-179)	Knock Sensor 2 Circuit (Bank 2)	✓Open or short in knock sensor 2 circuit ✓Knock sensor 2 (looseness) ✓ECM	™	™
P0335 (DI-184)	Crankshaft Position Sensor ”A” Circuit	✓Open or short in crankshaft position sensor circuit ✓Crankshaft position sensor ✓Signal plate ✓ECM	™	™
P0339 (DI-184)	Crankshaft Position Sensor ”A” Circuit Intermittent	✓Open or short in crankshaft position sensor circuit ✓Crankshaft position sensor ✓Signal plate ✓ECM	-	™
P0340 (DI-189)	Camshaft Position Sensor ”A” Circuit (Bank 1 or Single Sensor)	✓Open or short in camshaft position sensor circuit ✓Camshaft position sensor ✓LH camshaft timing pulley ✓ECM	™	™
P0341 (DI-189)	Camshaft Position Sensor ”A” Circuit Range/Performance (Bank 1 or Single Sensor)		™	™
P0351 (DI-193)	Ignition Coil ”A” Primary/Secondary Circuit	✓Open or short in IGF and IGT1 circuit from No. 1 ignition coil with igniter to ECM ✓No. 1 ignition coil with igniter ✓Ignition system ✓ECM	™	™
P0420 (DI-200)	Catalyst System Efficiency Below Threshold (Bank 1)	✓Gas leakage on exhaust system ✓Heated oxygen sensor (bank 1 sensor 1, 2) ✓Three-way catalystic converter	™	™
P0430 (DI-200)	Catalyst System Efficiency Below Threshold (Bank 2)	✓Gas leakage on exhaust system ✓Heated oxygen sensor (bank 2 sensor 1, 2) ✓Three-way catalystic converter	™	™

P0441 (DI-207)	Evaporative Emission Control System Incorrect Purge Flow	∕Vacuum hose cracks, holed, blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6), (7), (8), (9), (10) and (11) in Fig. 1) ∕Fuel tank cap incorrectly installed ∕Fuel tank cap cracked or damaged ∕Open or short in vapor pressure sensor circuit ∕Vapor pressure sensor ∕Open or short in VSV circuit for EVAP ∕VSV for EVAP ∕Open or short in VSV circuit for CCV ∕VSV for CCV ∕Open or short in VSV circuit for pressure switching valve ∕VSV for pressure switching valve ∕Fuel tank cracked, holed or damaged ∕Charcoal canister cracked, holed or damaged ∕Fuel tank over fill check valve cracked or damaged ∕ECM	™	™
P0442 (DI-230)	Evaporative Emission Control System Leak Detected (Small Leak)	∕Hose or tube cracked, holed, damaged or loose seal ((3) or (9) in Fig. 1) ∕Fuel tank cap incorrectly installed ∕Fuel tank cap cracked or damaged ∕Vacuum hose cracked, holed, blocked, damaged or disconnected ((1), (2), (4), (5), (6), (7), (8), (10) and (11) in Fig. 1) ∕Fuel tank cracked, holed or damaged ∕Charcoal canister cracked, holed or damaged ∕Open or short in vapor pressure sensor circuit ∕Vapor pressure sensor ∕Fuel tank over fill check valve cracked or damaged ∕ECM	™	™
P0446 (DI-207)	Evaporative Emission Control System Vent Control Circuit	∕Same as DTC No. P0441	™	™
P0451 (DI-251)	Evaporative Emission Control System Pressure Sensor/Switch Range/Performance	∕Open or short in vapor pressure sensor circuit ∕Vapor pressure sensor ∕ECM	™	™
P0452 (DI-251)	Evaporative Emission Control System Pressure Sensor/Switch Low Input	∕Short in vapor pressure sensor circuit ∕Vapor pressure sensor ∕ECM	™	™
P0453 (DI-251)	Evaporative Emission Control System Pressure Sensor/Switch High Input	∕OpenShort in vapor pressure sensor circuit ∕Vapor pressure sensor ∕ECM	™	™
P0456 (DI-230)	Evaporative Emission Control System Leak Detected (Very Small Leak)	∕Same as DTC No. P0442	™	™
P0500 (DI-256)	Vehicle Speed Sensor ”A”	∕Combination meter ∕Open or short in vehicle speed sensor circuit ∕Vehicle speed sensor ∕ECM	™	™
P0503 (DI-256)	Vehicle Speed Sensor ”A” Intermittent/Erratic/High	∕Combination meter ∕Open or short in vehicle speed sensor circuit ∕Vehicle speed sensor ∕ECM	-	™
P0505 (DI-261)	Idle Air Control System	∕Air induction system ∕Electric throttle control system ∕Electric throttle control system circuit ∕PCV piping ∕ECM	™	™

P0550 (DI-265)	Power Steering Pressure Sensor/Switch Circuit Low Input	∕Open or short in power steering pressure sensor circuit ∕Power steering oil pressure sensor ∕ECM	™	™
P0552 (DI-265)	Power Steering Pressure Sensor/Switch Circuit High Input	∕Short in power steering pressure sensor circuit ∕Power steering oil pressure sensor ∕ECM	™	™
P0553 (DI-265)	Power Steering Pressure Sensor/Switch Circuit Intermittent	∕Open in power steering pressure sensor circuit ∕Power steering oil pressure sensor ∕ECM	™	™
P0560 (DI-267)	System Voltage	∕Back-up power source circuit ∕EFI fuse ∕ECM	™	™
P0604 (DI-270)	Internal Control Module Randam Access Memory (RAM) Error	∕ECM	™	™
P0606 (DI-270)	ECM/PCM Processor	∕ECM	™	™
P0607 (DI-270)	Control Module Performance	∕ECM	™	™
P0617 (DI-272)	Staerter Relay Circuit High	∕Park/neutral position switch ∕Starter relay circuit ∕Ignition switch ∕ECM	™	™
P0657 (DI-270)	Actuator Supply Voltage Circuit / Open	∕ECM	™	™
P1126 (DI-278)	Magnetic Clutch Circuit	∕Open or short in magnetic clutch circuit ∕Magnetic clutch ∕ECM	™	™
P2102 (DI-283)	Throttle Actuator Control Motor Circuit Low	∕Open in throttle control motor circuit ∕Throttle control motor ∕ECM	™	™
P2103 (DI-283)	Throttle Actuator Control Motor Circuit High	∕Short in throttle control motor circuit ∕Throttle control motor ∕ECM	™	™
P2111 (DI-287)	Throttle Actuator Control System - Stuck Open	∕Throttle control motor ∕Throttle body	™	™
P2112 (DI-287)	Throttle Actuator Control System - Stuck Closed	∕Throttle control motor ∕Throttle body	™	™
P2118 (DI-290)	Throttle Actuator Control Motor Current Range/Performance	∕Open in ETCS power source circuit ∕ECM	™	™
P2119 (DI-294)	Throttle Actuator Control Throttle Body Range/Performance	∕Electric throttle control system ∕ECM	™	™
P2120 (DI-297)	Throttle/Pedal Position Sensor/Switch ”D” Circuit	∕Open or short in accelerator pedal position sensor circuit ∕Accelerator pedal position sensor ∕ECM	™	™
P2121 (DI-305)	Throttle/Pedal Position Sensor/Switch ”D” Circuit Range/Performance	∕Accelerator pedal position sensor	™	™
P2122 (DI-297)	Trottle/Pedal Position Sensor/Switch ”D” Circuit Low Input	∕Open in accelerator pedal position sensor circuit ∕Accelerator pedal position sensor ∕ECM	™	™
P2123 (DI-297)	Trottle/Pedal Position Sensor/Switch ”D” Circuit High Input	∕Short in accelerator pedal position sensor circuit ∕Accelerator pedal position sensor ∕ECM	™	™

P2195 (DI-110)	Oxygen Sensor Signal Stauk Lean (Bank 1 Sensor 1)	✓Open or short in heated oxygen sensor circuit (Bank 1, 2 Sensor 1) ✓Heated oxygen sensor (Bank 1, 2 Sensor 1) ✓Air induction system ✓Fuel pressure ✓Injector ✓ECM	™	™
P2196 (DI-110)	Oxygen Sensor Signal Stauk Rich (Bank 1 Sensor 1)		™	™
P2197 (DI-110)	Oxygen Sensor Signal Stauk Lean (Bank 2 Sensor 1)		™	™
P2198 (DI-110)	Oxygen Sensor Signal Stauk Rich (Bank 2 Sensor 1)		™	™

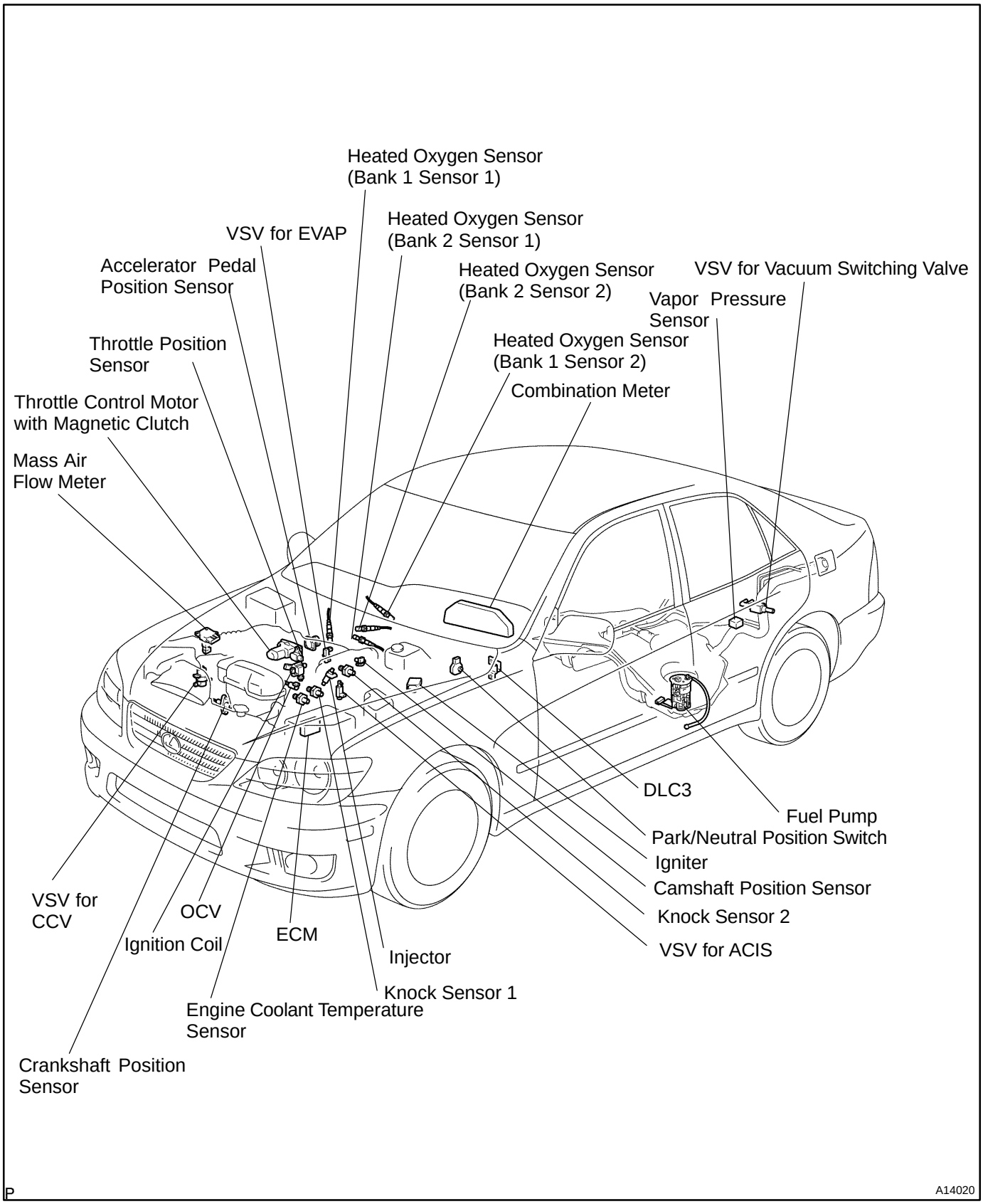
*1: MIL lights up.

*2: MIL lights up or blinks.

*: - .... MIL does not light up, ™ .... MIL lights up

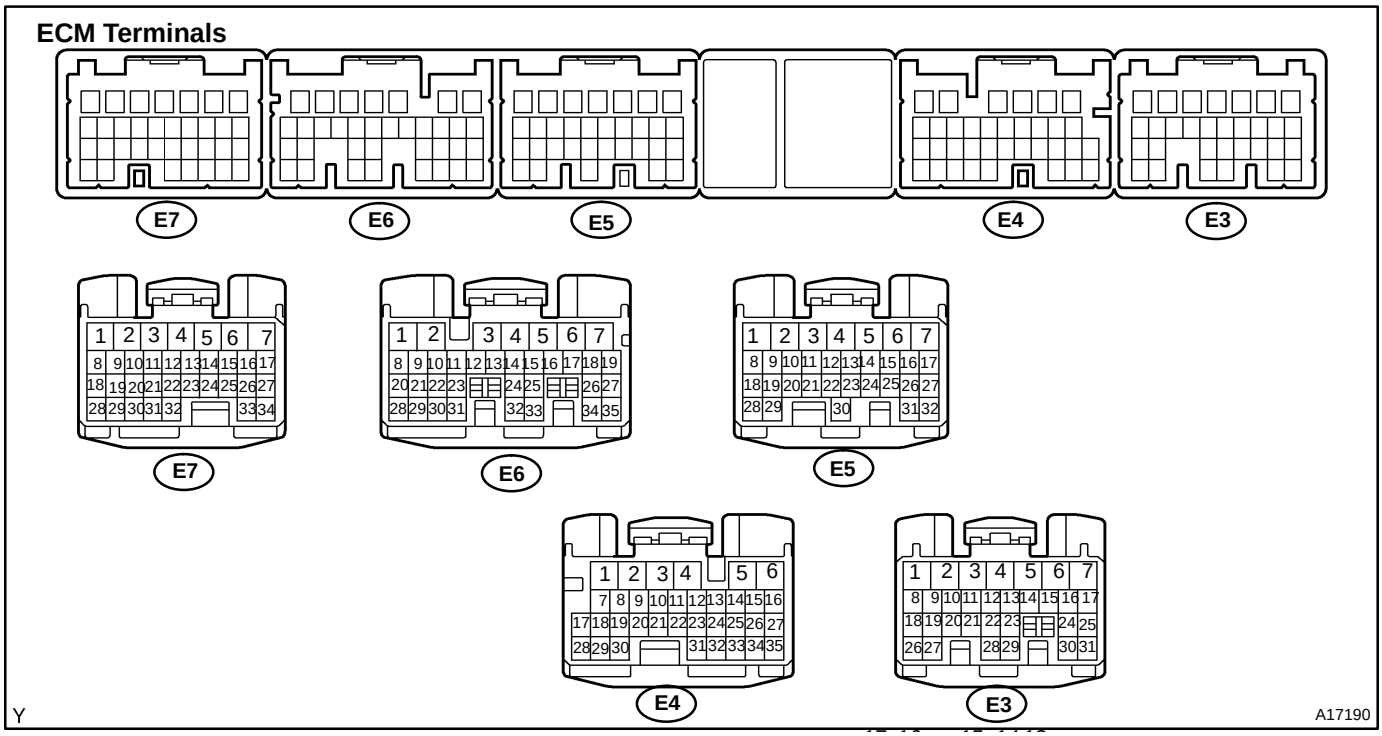
DI2DI-14

PARTS LOCATION



DI2DJ-13

TERMINALS OF ECM



Each ECM terminals standard normal voltage is shown in the table below. In the table, first follow the information under ”Condition”.
Look under ”Symbols (Terminals No.)” for the terminals to be inspected.
The standard normal voltage between the terminals is shown under ”STD Voltage”.
Use the illustration above as a reference for the ECM terminals.

Symbols (Terminal No.)	Wiring Color	Condition	STD Voltage
BATT (E3-4) - E1 (E6-7)	B-Y ↔ BR	Always	9 - 14 V
+BM (E3-7) - E1 (E6-7)	L-W ↔ BR		
IGSW (E3-17) - E1 (E6-7)	B -O ↔ BR	IG switch ON	9 - 14 V
+B (E3-6) - E1 (E6-7)	B-R ↔ BR		
+B2 (E3-5) - E1 (E6-7)	B-R ↔ BR		
VC (E4-35) - E2 (E4-34)	L-Y ↔ BR	IG switch ON	4.5 - 5.5 V
VTA (E7-25) - E2 (E4-34)	W-R ↔ BR	IG switch ON, Accelerator pedal released	0.4 - 1.0 V
		IG switch ON, Accelerator pedal depressed	3.2 - 4.8 V
VTA2 (E7-24) - E2 (E4-34)	G-Y ↔ BR	IG switch ON, Accelerator pedal released	2.0 - 2.9 V
		IG switch ON, Accelerator pedal depressed	4.6 - 5.1 V
VPA (E4-33) - E2 (E4-34)	P-L ↔ BR	IG switch ON, Accelerator pedal released	0.3 - 0.9 V
		IG switch ON, Accelerator pedal depressed	3.2 - 4.8 V
VPA2 (E4-32) - E2 (E4-34)	L-W ↔ BR	IG switch ON, Accelerator pedal released	1.8 - 2.7 V
		IG switch ON, Accelerator pedal depressed	4.7 - 5.1 V
VG (E5-27) - EVG (E5-26)	G-B ↔ L-W	Idling, P or N position, A/C switch OFF	1.1 - 1.5 V
THA (E5-32) - E2 (E4-34)	L-B ↔ BR	Idling, Intake air temp. 20˚C (68˚F)	0.5 - 3.4 V
THW (E5-24) - E2 (E4-34)	R ↔ BR	Idling, Engine coolant temp. 80˚C (176˚F)	0.2 - 1.0 V
STA (E3-12) - E1 (E6-7)	B ↔ BR	Shift lever position P or N position, ignition switch START	9 - 14 V

#10 (E7-15) - E01 (E5-2) #20 (E5-17) - E01 (E5-2) #30 (E7-14) - E01 (E5-2) #40 (E5-16) - E01 (E5-2) #50 (E7-13) - E01 (E5-2) #60 (E5-15) - E01 (E5-2)	R ↔ W-B L ↔ W-B V ↔ W-B R-W ↔ W-B L-R ↔ W-B B-W ↔ W-B	IG switch ON	9 - 14 V
		Idling	Pulse generation
IGT (E5-13) - E1 (E6-7) IGT2 (E7-27) - E1 (E6-7) IGT3 (E7-26) - E1 (E6-7)	GR-B ↔ BR B-R ↔ BR B-Y ↔ BR	Idling	Pulse generation (See page DI-193)
IGF (E5-7) - E1 (E6-7)	B-L ↔ BR	IG switch ON	4.5 - 5.5 V
		Idling	Pulse generation (See page DI-193)
G2 (E7-29) - NE- (E7-32)	G ↔ L	Idling	Pulse generation (See page DI-184)
NE (E7-31) - NE- (E7-32)	B-W ↔ L		
MREL (E3-13) - E1 (E6-7)	B-O ↔ BR	IG switch ON	9 - 14 V
FC (E3-14) - E1 (E6-7)	G-Y ↔ BR	IG switch ON	Below 1.5 V
		Idling	Pulse generation (0 and 4.5 - 5.5)
FPR (E3-15) - E1 (E6-7)	G-R ↔ BR	Idling	Below 1.5 V
STP (E4-4) - E1 (E6-7)	G-W ↔ BR	Brake pedal is depressed	7.5 - 14 V
		Brake pedal is released	Below 1.5 V
PRG (E7-11) - E01 (E5-2)	W-G ↔ W-B	IG switch ON	9 - 14 V
TBP (E4-10) - E01 (E5-2)	P ↔ W-B	IG switch ON	9 - 14 V
CCV (E5-22) - E01 (E5-2)	Y-R ↔ W-B	IG switch ON	9 - 14 V
PTNK (E4-25) - E2 (E4-34)	L-W ↔ BR	Ignition switch ON	2.9 - 3.7 V
		Apply vacuum 4.0 kPa (30 mmHg, 1.1 in.Hg)	Below 0.5 V
OX1A (E6-28) - E2 (E4-34) OX2A (E5-28) - E2 (E4-34)	W ↔ BR B ↔ BR	Maintain engine speed at 2,500 rpm for 90 sec. after warming up	Pulse generation
OX1B (E4-28) - E2 (E4-34) OX2B (E4-17) - E2 (E4-34)	W ↔ BR W ↔ BR	Maintain engine speed at 2,500 rpm for 3 min. after warming up	Pulse generation
HT1A (E6-9) - E01 (E5-2) HT2A (E5-30) - E01 (E5-2) HT1B (E4-7) - E01 (E5-2) HT2B (E4-8) - E01 (E5-2)	LG ↔ W-B P ↔ W-B G-B ↔ W-B R-W ↔ W-B	Idling	Below 3.0 V
		IG switch ON	9 - 14 V
KNK1 (E6-1) - E1 (E6-7)	B ↔ BR	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (See page DI-179)
KNK2 (E6-2) - E1 (E6-7)	W ↔ BR		
TC (E4-3) - E1 (E6-7)	R-W ↔ BR	IG switch ON	9 - 14 V
W (E4-2) - E01 (E5-2)	R-L ↔ W-B	Idling	9 - 14 V
		IG switch ON	Below 3.0 V
ACMG (E3-16) - E01 (E5-2)	L-W ↔ W-B	A/C switch ON (at idling)	Below 3.0 V
		A/C switch OFF	9 - 14 V
OCV+ (E7-6) - OCV- (E7-5)	R-Y ↔ Y-B	IG switch ON	Pulse generation (See page DI-48)
ACIS (E5-21) - E01 (E5-2)	Y-G ↔ W-B	IG switch ON	9 - 14 V
		Engine speed between 2,500 and 4,000 rpm	Below 3.0 V
CL+ (E7-10) - CL- (E7-9)	R-W ↔Y	Idling	Pulse generation (See page)
M+ (E7-3) - E1 (E6-7) M- (E7-2) - E1 (E6-7)	W ↔ BR R ↔ BR	Idling	Pulse generation (See page DI-283)

SIL (E3-26) - E1 (E6-7)	W ↔ BR	IG switch ON	9 - 14
SP2+ (E6-23) - SP2- (E6-22)	L-Y ↔ R-L	Vehicle is driving	Pulse generation (See page DI-256)

DI2DK-11

PROBLEM SYMPTOMS TABLE

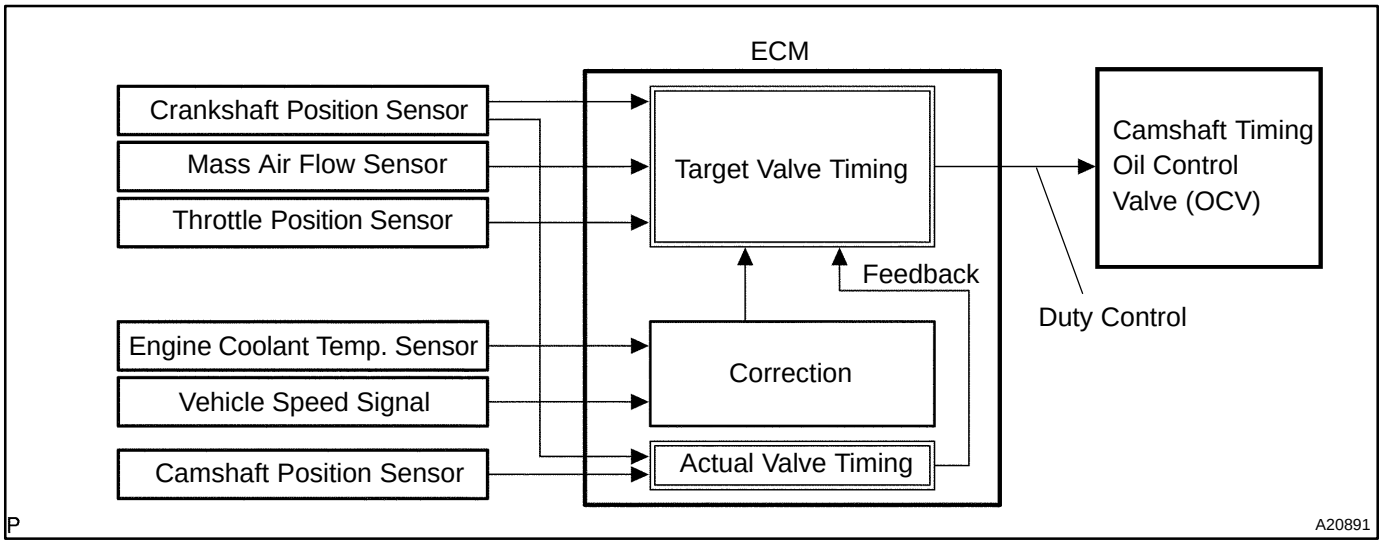
Symptom	Suspect Area	See page
Engine does not crank (Does not start)	14.Starter 15.Starter relay	ST-15 ST-17
No initial combustion (Does not start)	1. Engine immobiliser system 2. ECM power source circuit 3. Fuel pump control circuit	DI-847 DI-311 DI-161
No complete combustion (Does not start)	1. Fuel pump control circuit	DI-161
Under normal condition (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI-272 DI-161 EM-3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-272 DI-161
Hot engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-272 DI-161
High engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	- DI-311
Low engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. Fuel pump control circuit	- DI-161
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	EM-3 DI-161
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	DI-311 DI-161
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	DI-161 DI-356
Surging (Poor driveability)	1. Fuel pump control circuit	DI-161
Soon after starting (Engine stall)	1. Engine immobiliser system 2. Fuel pump control circuit	DI-847 DI-161
During A/C operation (Engine stall)	1. A/C signal circuit (Compressor circuit) 2. ECM	- IN-22

DIC41-01

DTC	P0010	Camshaft Position ”A” Actuator circuit (Bank 1)

CIRCUIT DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target ”duty-cycle” control signal to the OCV. This control signal, applied to the OCV, regulates the oil pressure supplied to the VVT controller. Camshaft timing control is performed based on engine operation conditions such as intake air volume, throttle position and engine coolant temperature.
The ECM controls the OCV, based on the signals output from the sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative position between the camshaft and the crankshaft is optimized, and the engine torque improves, fuel economy improves, and exhaust emissions decrease under overall driving conditions. Also, the ECM detects the actual valve timing using signals from the camshaft position sensor and the crankshaft position sensor, and performs feedback control. This is how target valve timing is verified by the ECM.



DTC No.	DTC Detecting Condition	Trouble Area
P0010	Open or short in OCV circuit (1 trip detection logic)	✓Open or short in OCV circuit ✓OCV ✓ECM

MONITOR DESCRIPTION

After the ECM sends the ”target” duty-cycle signal to the OCV (Oil Control Valve), the ECM monitors the OCV current to establish an ”actual” duty-cycle. When the actual duty-cycle ratio varies from the target duty-cycle, the ECM sets a DTC.

MONITOR STRATEGY

Related DTCs	P0010	VVT oil control valve bank 1 range check
Required sensors/components	OCV	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11 V	13 V
Target duty ratio	-	70%
Starter	OFF	
Current cut status	Not cut	

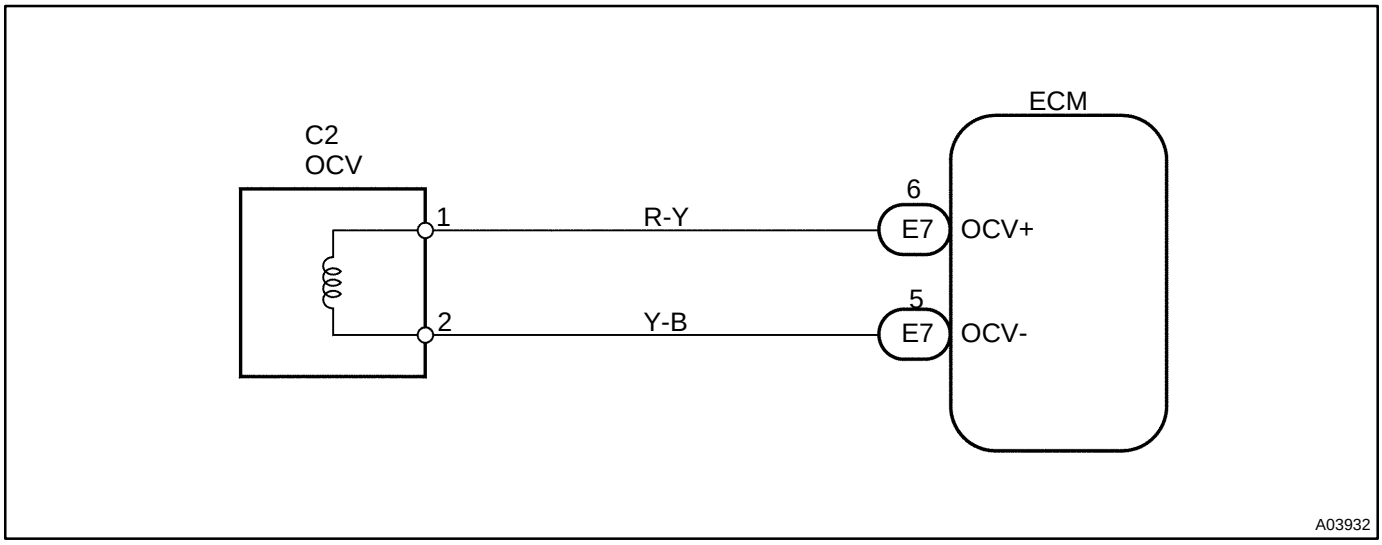
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Either of the following conditions is met:	A or B
A. Output signal duty for OCV	Output duty ratio is 100% (always ON) but target duty ratio is less than 70%
B. Output signal duty for OCV	Output duty is 3% or less despite the ECM supplying current to the OCV

COMPONENT OPERATING RANGE

Parameter	Standard Value
Output signal duty for OCV	"More than 3%" and "less than 100%"

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	**Check OCV circuit.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn the ignition switch On and push the hand-held tester main switch ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.

CHECK:

Check the engine speed when operate the OCV by the hand-held tester.

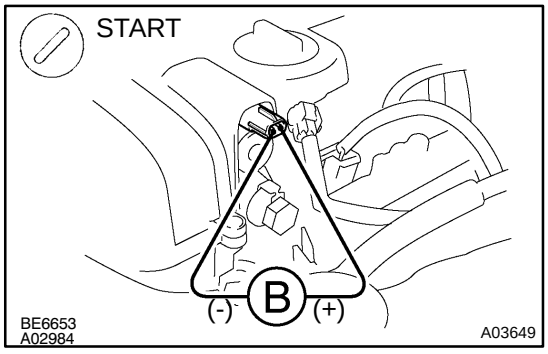
OK:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

OK → **Check for intermittent problems (See page DI-3).**

NG

2	**Check operation of OCV.**



PREPARATION:

(a) Start the engine and warm it up.
(b) Disconnect the OCV connector.
(c) Apply battery positive voltage between the terminals of the OCV.

CHECK:

Check the engine speed.

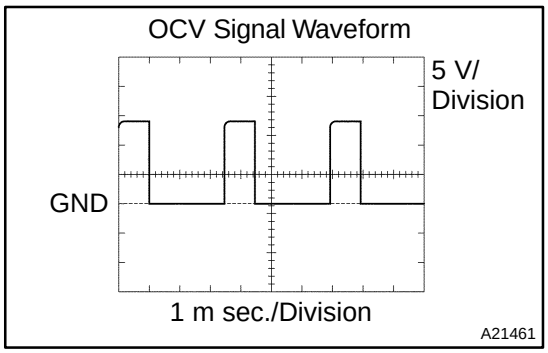
OK:

Rough idle or engine stalled.

NG → **Replace OCV.**

OK

3	**Check voltage between terminals OCV+ and OCV- of ECM connector.**



Reference: INSPECTION USING OSCILLOSCOPE
Turn the ignition switch ON, and check waveform between terminals OCV+ and OCV- of the ECM connector.
HINT:
The correct waveform is as shown.

NG → **Replace ECM (See page SF-74).**

OK

4	**Check for open and short in harness and connector between OCV and ECM (See page IN-33).**

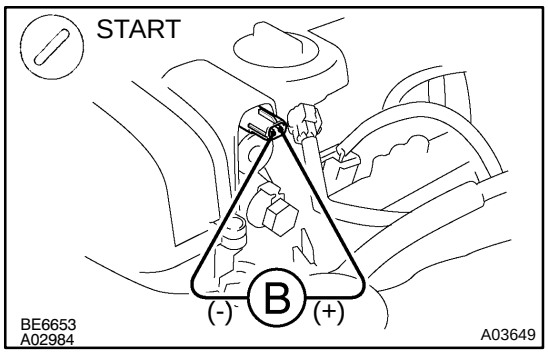
NG → **Repair or replace harness or connector.**

OK

Check for intermittent problems (See page DI-3).

OBD II scan tool (excluding hand-held tester):

1	**Check operation of OCV.**



PREPARATION:

(a) Start the engine and warm it up.
(b) Disconnect the OCV connector.
(c) Apply battery positive voltage between the terminals of the OCV.

CHECK:

Check the engine speed.

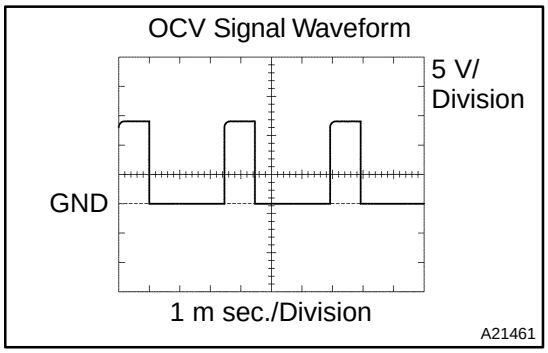
OK:

Rough idle or engine stalled.

NG → **Replace OCV.**

OK

2	**Check voltage between terminals OCV+ and OCV- of ECM connector.**



Reference: INSPECTION USING OSCILLOSCOPE

Turn the ignition switch ON, and check the waveform between terminals OCV+ and OCV- of the ECM connector.

HINT:

The correct waveform is as shown in the illustration.

NG → **Replace ECM (See page SF-74).**

OK

3	**Check for open and short in harness and connector between OCV and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Check for intermittent problems (See page DI-3).

DTC	P0011	Camshaft Position ”A” -Timing Over-Actuator or System Performance (Bank 1)

DTC	P0012	Camshaft Position ”A” -Timing Over-Retarded (Bank 1)

CIRCUIT DESCRIPTION

Refer to DTCs P0010 on page DI-48 .

DTC No.	DTC Detecting Condition	Trouble Area
P0011	Advanced cam timing: After engine is warmed up and engine speed is at 500 to 4,000 rpm condition (a) or (b) continues. (1 trip detection logic) (a) Valve timing does not change from current valve timing	✓Valve timing ✓OCV ✓Camshaft timing gear assy ✓ECM
P0012	Retarded cam timing: After engine is warmed up and engine speed is at 500 to 4,000 rpm condition (a) or (b) continues. (2 trip detection logic) (a) Valve timing does not change from current valve timing	

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the VVT (Variable Valve Timing) system to control the intake valve camshaft. The VVT system includes the ECM, the OCV (Oil Control Valve) and the VVT controller. The ECM sends a target ”duty-cycle” control signal to the OCV. This control signal, applied to the OCV, regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake valve camshaft.

Example:

A DTC will set if: 1) the difference between the target and actual valve timing is more than 5 degrees of the crankshaft angle (CA) and the condition continues for more than 4.5 sec.; or 2) the OCV is forcibly activated 63 times or more.

Advanced cam DTCs are subject to ”1 trip” detection logic.

Retarded cam DTCs are subject to ”2 trip” detection logic.

MONITOR STRATEGY

Related DTCs	P0011	VVT system advance (Bank 1)
	P0012	VVT system retard (Bank 1)
Required sensors/components	Main sensors/components	Camshaft position sensor
	Related sensors/components	Engine coolant temperature sensor, Crankshaft position sensor
Frequency of operation	Once per drive cycle	
Duration	10 sec.	
MIL operation	P0011: Immediate P0012: 2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11 V	-
Engine speed	500 rpm	4,000 rpm
Engine coolant temperature	75 °C (167 °F)	100 °C (212 °F)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Duration time of the following condition; A and B are met	4.5 sec. or more
A. Following conditions are met:	(a) and (b)
(a) VVT control status	Feedback
(b) Deviation of valve timing (Target valve timing - Actual valve timing)	More than 5 °CA
B. Response of valve timing	1 sec./ °CA or more

WIRING DIAGRAM

Refer to DTCs P0010 on page DI-48 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester or the OBD II scan tool. Because freeze frame records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

Hand-held tester:

1	**Check valve timing (Check for loose and jumped tooth of timing chain) (See page EM-24).**

NG → **Adjust valve timing.**

OK

2	Check operation of OCV.

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn the ignition switch ON and push the hand-held tester main switch ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.

CHECK:

Check the engine speed when operating the OCV by the hand-held tester.

OK:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

NG → **Go to step 4.**

OK

3	Check if DTC output reoccurs.

PREPARATION:

(a) Clear the DTCs.
    (1) Operating the hand-held tester to erase the codes, or disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.
(b) Start and warm up the engine.
(c) Drive the vehicle around for 10 minutes or more.

CHECK:

Read output DTCs using the hand-held tester.

OK:

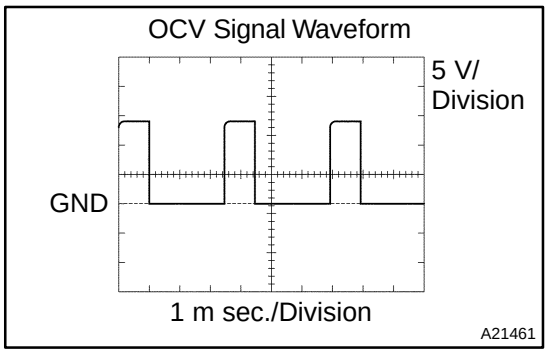
No DTC output.

OK → **VVT system is OK.***

*: DTCs P0011 and P0012 are output when a foreign object in the engine oil enters the system. These codes will stay even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

4	**Check voltage between terminals OCV+ and OCV- of ECM connector.**



Reference: INSPECTION USING OSCILLOSCOPE
Turn the ignition switch ON, check the waveform between terminals OCV+ and OCV- of the ECM connector.
HINT:
The correct waveform is as shown.

NG → **Replace ECM (See page SF-74).**

OK

5	**Check oil control valve filter.**

NG → **Replace oil control valve filter.**

OK

6	**Check oil control valve (See page SF-43).**

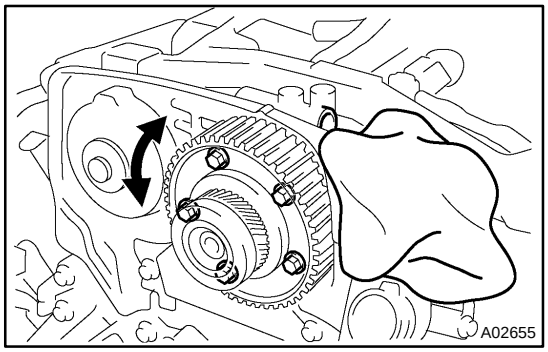
OK → **Go to step 8.**

NG

7	**Replace oil control valve.**

Go

8	**Check VVT controller assembly.**



PREPARATION:

(a) Remove the timing belt cover.
(b) Remove the ECM hood (See page SF-74).
(c) Remove the OCV.
(d) Drain the oil in the VVT controller assembly (See page EM-17).

CHECK:

Check whether the oil into the VVT controller assembly is drained or not.

OK:

Oil in VVT controller assembly is drained.

OK	**Go to step 10.**

NG

9	**Replace VVT controller assembly (See page EM-49).**

Go

10	**Check blockage of OCV, oil check valve and oil pipe No.1.**

NG	**Repair or replace.**

OK

11	**Check whether or not DTC P0011 or P0012 is stored.**

PREPARATION:

(a) Clear the DTCs.
Operate the hand-held tester to erase the codes, or disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.
(b) Start and warm up the engine.
(c) Drive the vehicle around for 10 minutes or more.

CHECK:

Read output DTC using the hand-held tester.

OK:

No DTC output.

OK → **VVT system is OK.***

*: DTCs P0011 and P0012 are output when a foreign object in the engine oil enters the system. These codes will stay even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

Replace ECM (See page SF-74).

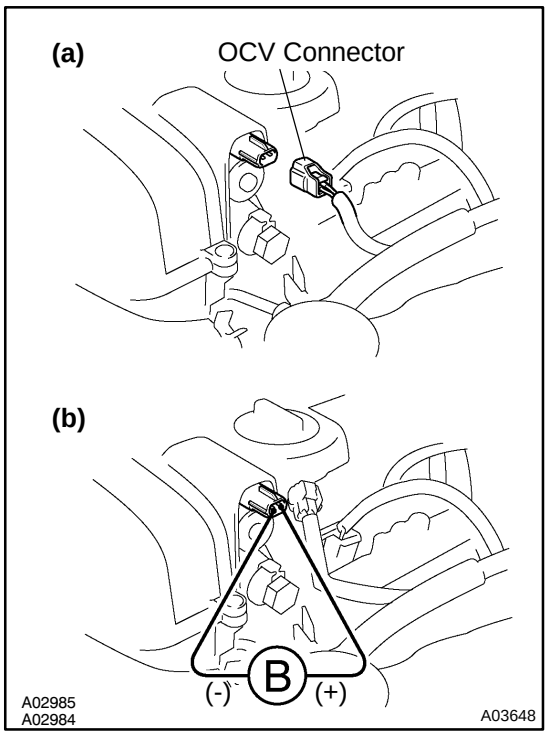
OBD II scan tool (excluding hand-held tester):

1	**Check valve timing (Check for loose and jumped tooth of timing chain) (See page EM-24).**

NG → **Adjust valve timing.**

OK

2	**Check operation of OCV.**



PREPARATION:

Start the engine.

CHECK:

(a) Check the engine speed when disconnecting the OCV connector.

(b) Check the engine speed when applying battery positive voltage between the terminals of the OCV.

RESULT:

Result	Check (a)	Check (b)
1	Normal engine speed	Rough idle or engine stall
2	Except 1	

2 → **Go to step 4.**

1

3	Check if DTC output reoccurs.

PREPARATION:

(a) Clear the DTCs.
Operate the OBD II scan tool to erase the codes, or disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.
(b) Start and warm up the engine.
(c) Drive the vehicle around for 10 minutes or more.

CHECK:

Read output DTCs using the OBD II scan tool.

OK:

No DTC output.

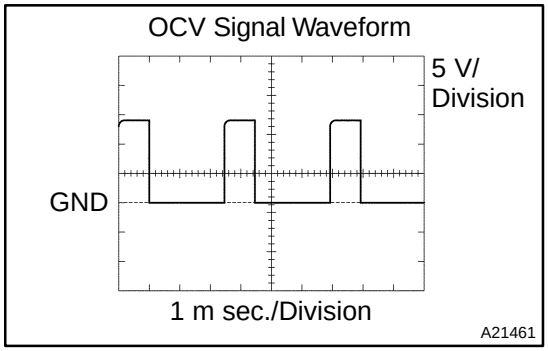
OK → **VVT system OK***

*: DTCs P0011 and P0012 are output when a foreign object in the engine oil enters the system. These codes will stay even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

Replace ECM (See page SF-74).

4	Check voltage between terminals OCV+ and OCV- of ECM connector.



Reference: INSPECTION USING OSCILLOSCOPE

Turn the ignition switch ON, and check waveform between terminals OCV+ and OCV- of the ECM connector.

HINT:

The correct waveform is as shown.

NG → **Replace ECM (See page SF-74).**

OK

5	Check oil control valve filter.

NG → Replace oil control valve filter.

OK

6	Check OCV (See page SF-43).

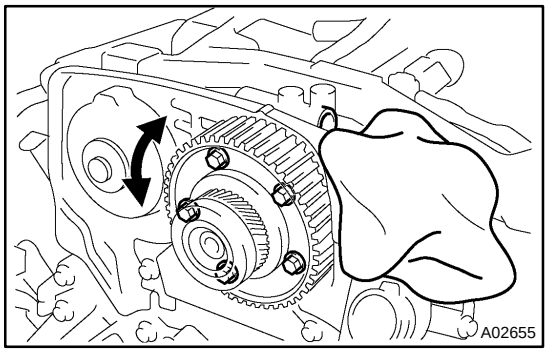
OK → Go to step 8.

OK

7	Replace OCV.

Go

8	Check VVT controller assembly.



PREPARATION:

(a) Remove the timing belt cover.
(b) Remove the ECM hood (See page SF-74).
(c) Remove the OCV.
(d) Drain the oil in the VVT controller assembly (See page EM-17).

CHECK:

Check whether the oil in the VVT controller assembly is drained or not.

OK:

Oil in VVT controller assembly is drained.

OK → Go to step 10.

OK

9	**Replace VVT controller assembly**

Go

10	**Check blockage of OCV, oil check valve and oil pipe No.1.**

NG → **Repair or replace.**

OK

11	**Check whether or not DTC P0011 or P0012 is stored.**

PREPARATION:

(a) Clear the DTCs.
Operate the OBD II scan tool to erase the codes, or disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.
(b) Start and warm up the engine.
(c) Drive the vehicle around for 10 minutes or more.

CHECK:

Read output DTC using the OBD II scan tool.

OK:

No DTC output.

OK → **VVT system is OK.***

*: DTCs P0011 and P0012 are output when a foreign object in the engine oil enters the system. These codes will stay even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

Replace ECM (See page SF-74).

DIC42-01

DTC	P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)

CIRCUIT DESCRIPTION

Refer to DTC P0335 on page DI-184 .

DTC No.	DTC Detecting Condition	Trouble Area
P0016	Deviation in crankshaft position sensor signal and camshaft position sensor signal (2 trip detection logic)	✓Mechanical system (Jumping teeth of timing belt, belt stretched) ✓ECM

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the VVT (Variable Valve Timing) system to control the intake valve camshaft. The VVT system includes the ECM, the OCV (Oil Control Valve) and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal, applied to the OCV, regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake valve camshaft. The ECM calibrates the valve timing of the VVT system by setting the camshaft to the maximum retard angle when the engine speed is idling. The ECM closes the OCV to retard the cam. The ECM stores this value as VVT learned value (When the difference between the target valve timing and the actual valve timing is 5 degrees or less, the ECM stores this in its memory.).

If the learned value meets both of the following conditions ((a) and (b)), the ECM interprets this as a defect in the VVT system and set a DTC.

(a) VVT learning value is less than 22˚CA (Crankshaft Angle) or more than 47˚CA.

(b) Above condition continues for more than 18 sec.

MONITOR STRATEGY

Related DTCs	P0016	Deviation in crankshaft position sensor signal and camshaft position sensor signal (Bank 1)
Required sensors/components	Crankshaft position sensor, Camshaft position sensor	
Frequency of operation	Once per drive cycle	
Duration	60 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)	
VVT feedback mode	ON	
Engine speed	500 rpm	1,400 rpm

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Either of the following conditions is met for 18 sec.:	A or B
A. "VVT learned" value	Less than 22 °CA
B. "VVT learned" value	More than 47 °CA

WIRING DIAGRAM

Refer to DTC P0335 on page DI-184 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check valve timing (Check for loose and jumping teeth of timing belt).**

NG → **Adjust valve timing (Repair or replace timing belt).**

OK

Replace ECM (See page SF-74).

DTC	P0031	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 1)

DTC	P0032	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 1)

DTC	P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)

DTC	P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)

DTC	P0051	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 1)

DTC	P0052	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 1)

DTC	P0057	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)

DTC	P0058	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)

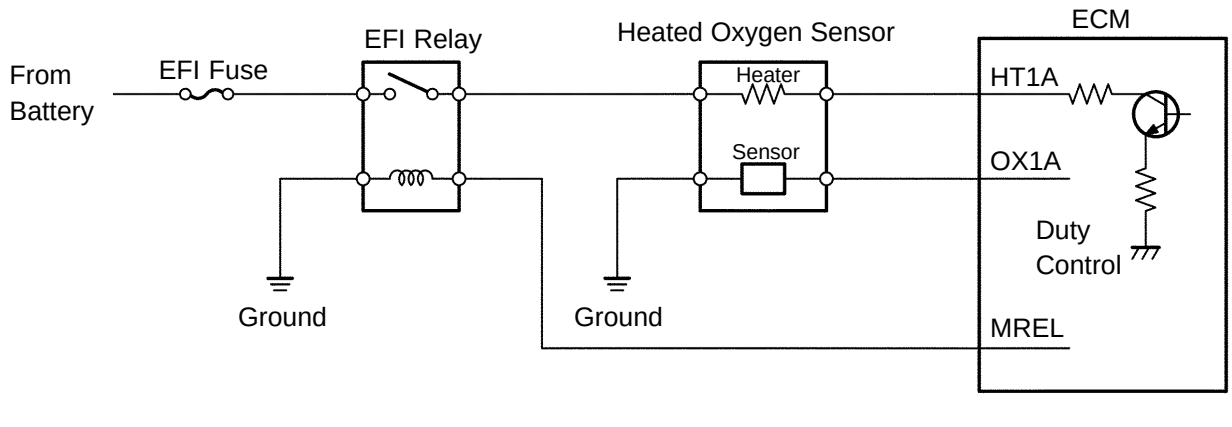
CIRCUIT DESCRIPTION

Refer to DTC P0130 on page DI-1 10.

HINT:

The ECM provides a pulse width modulated control circuit to adjust current through the heater. The heated oxygen sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (Bank 1 Sensor 1 System Drawing):



DTC No.	DTC Detecting Condition	Trouble Area
P0031 P0037	Heater current of 0.2 A or less when heater operates with +B > 10.5 V and < 11.5 V (1 trip detection logic)	✓Open in heater circuit of heated oxygen sensor ✓Heated oxygen sensor heater ✓EFI relay ✓ECM
P0051 P0058	Heater current of 0.25 A or less when heater operates with +B ± 11.5 V (1 trip detection logic)	
P0032 P0038 P0052 P0058	When heater operates, heater current exceeds 2 A (1 trip detection logic)	✓Short in heater circuit of heated oxygen sensor ✓Heated oxygen sensor heater ✓EFI relay ✓ECM

HINT:

- ✓ Bank 1 refers to bank that includes cylinder No.1.
- ✓ Bank 2 refers to bank that does not include cylinder No.1.
- ✓ Sensor 1 refers to the sensor closer to the engine body.
- ✓ Sensor 2 refers to the sensor farther away from the engine body.

MONITOR DESCRIPTION

The sensing portion of the heated oxygen sensor has a zirconia element which is used to detect oxygen concentration in the exhaust. If the zirconia element is at the proper temperature and difference of the oxygen concentration between the inside and outside surface of sensor is large, the zirconia element will generate voltage signals. In order to increase the oxygen concentration detecting capacity in the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor. When current in the sensor is out of the standard operating range, the ECM interprets this as a fault in the heated oxygen sensor and sets a DTC.

Example:

The ECM will set a high current DTC if the current in the sensor is more than 2 A when the heater is OFF. Similarly, the ECM will set a low current DTC if the current is less than 0.25 A when the heater is ON.

MONITOR STRATEGY

Related DTCs	P0031	Heated oxygen sensor heater current bank 1 sensor 1 (Low current)
	P0032	Heated oxygen sensor heater current bank 1 sensor 1 (High current)
	P0037	Heated oxygen sensor heater current bank 1 sensor 2 (Low current)
	P0038	Heated oxygen sensor heater current bank 1 sensor 2 (High current)
	P0051	Heated oxygen sensor heater current bank 2 sensor 1 (Low current)
	P0052	Heated oxygen sensor heater current bank 2 sensor 1 (High current)
	P0057	Heated oxygen sensor heater current bank 2 sensor 2 (Low current)
	P0058	Heated oxygen sensor heater current bank 2 sensor 2 (High current)
Required sensors/components	Main sensors/components	Heated oxygen sensor
	Related sensors/components	Vehicle speed sensor
Frequency of operation	Continuous	
Duration	0.3 sec.	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P0031, P0037, P0051, P0057 (Low current):		
Either of the following conditions is met:	A or B	
A. Following conditions are met:	1, 2, 3, 4 and 5	
1. Time after engine start	250 sec.	500 sec.
2. Battery voltage	10.5 V	-
3. Vehicle speed	-	90 km/h (56 mph)
4. Misfire	Not detected	
5. Pass/Fail detection in this driving cycle	Not detected	
B. Following conditions are met:	1, 2, 3, 4 and 5	
1. Time after engine start	500 sec.	-
2. Battery voltage	10.5 V	-
3. Vehicle speed	40 km/h (25 mph)	-
4. Misfire	Not detected	
5. Pass/Fail detection in this driving cycle	Not detected	
P0032, P0038, P0052, P0058 (High current):		
Intrusive heating is OFF		

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0031, P0037, P0051, P0057 (Low current):	
Heated oxygen sensor heater current	Less than 0.25 A (at 0.2 sec. after heater "ON")
P0032, P0038, P0052, P0058 (High current):	
Heated oxygen sensor heater current	More than 2 A (while intrusive heating is OFF)

COMPONENT OPERATING RANGE

Parameter	Standard Value
Heated oxygen sensor heater current under the following conditions: A. Engine has been warmed up B. Engine is idling C. Battery voltage is 11 to 14 V	0.4 to 1.0 A

MONITOR RESULT

The detailed information is described in "CHECKING MONITOR STATUS" (see page DI-3).

- TID (Test Identification) is assigned to each emission-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $04: HO2S Heater

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 1 sensor 1)	Malfunction criterion
1	$02	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 1 sensor 2)	Malfunction criterion
1	$10	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 2 sensor 1)	Malfunction criterion
1	$20	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 2 sensor 2)	Malfunction criterion

WIRING DIAGRAM

Refer to DTC P0130 on page DI-1 10.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check resistance of heated oxygen sensor heater (See page SF-73).**

NG → **Replace heated oxygen sensor.**

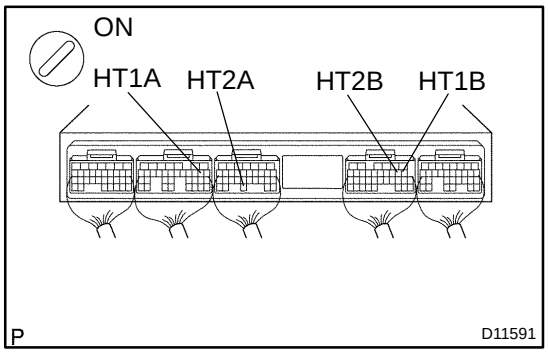
OK

2	**Check EFI relay (See page SF-50).**

NG → **Replace EFI relay.**

OK

3	**Check voltage between terminals HT1A, HT1B, HT2A, HT2B of ECM connectors and body ground.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals HT1A, HT1B, HT2A, HT2B and the body ground.

HINT:

- Connect terminal HT2A to bank 2 sensor 1.
- Connect terminal HT2B to bank 2 sensor 2.
- Connect terminal HT1A to bank 1 sensor 1.
- Connect terminal HT1B to bank 1 sensor 2.

OK:

Voltage: 9 to 14 V

OK → **Replace ECM (See page SF-74).**

NG

4	**Check for open and short in harness or connector between EFI main relay (Marking: EFI) and heated oxygen sensor, and heated oxygen sensor and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

DIAKL-02

DTC	P0100	Mass or Volume Air Flow Circuit

DTC	P0102	Mass or Volume Air Flow Circuit Low Input

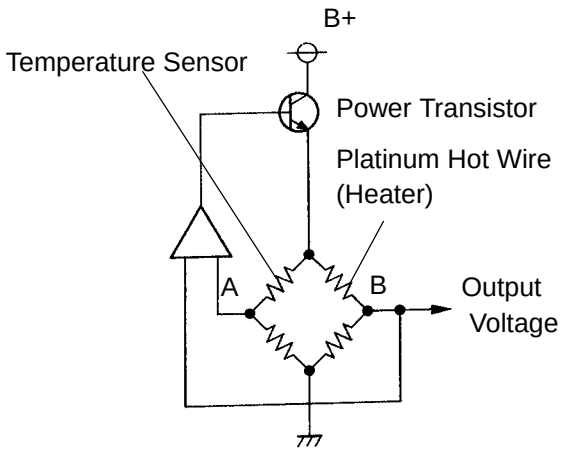
DTC	P0103	Mass or Volume Air Flow Circuit High Input

CIRCUIT DESCRIPTION

The MAF (Mass Air Flow) meter measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air-fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air.

By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermistor, changing their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the airflow through the sensor and the ECM interprets this voltage as the intake air amount.

The circuit is constructed so that the platinum hot wire and the temperature sensor provides a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.



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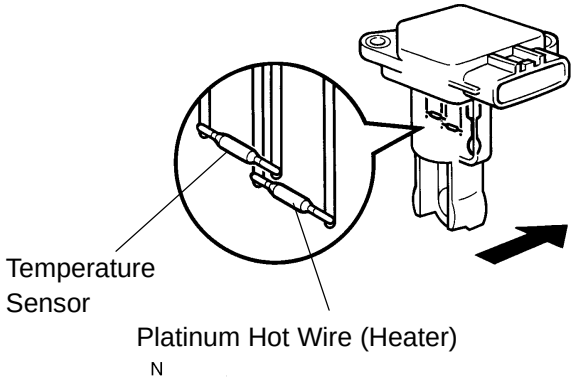

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DTC No.	DTC Detection Condition	Trouble Area
P0100	When the mass air flow meter circuit has an open or short for more than 3 seconds	✓Open or short in mass air flow meter circuit ✓Mass air flow meter ✓ECM
P0102	When the mass air flow meter circuit has an open for more than 3 seconds	
P0103	When the mass air flow meter circuit has a short for more than 3 seconds	

HINT:

After confirming DTC P0100, P0102 or P0103, confirm the mass air flow ratio in the ”DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL” using the hand-held tester or the OBD II scan tool.

Mass Air Flow Value (gm/sec.)	Malfunction
Approx. 0.0	●Mass air flow meter power source circuit open ●VG circuit open or short
271.0 or more	●EVG circuit open

MONITOR DESCRIPTION

If there is a defect in the MAF (Mass Air Flow) meter or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.
Example:
When the MAF meter voltage output is less than 0.2 V, or more than 4.9 V, and if either the condition continues for more than 3 sec.

MONITOR STRATEGY

Related DTCs	P0100	Mass air flow meter circuit range check (Fluttering)
	P0102	Mass air flow meter circuit range check (Low voltage)
	P0103	Mass air flow meter circuit range check (High voltage)
Required sensors/components	Mass air flow meter	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate (When engine speed is at less than 4,000 rpm) 2 driving cycles (When engine speed is at 4,000 rpm or more)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

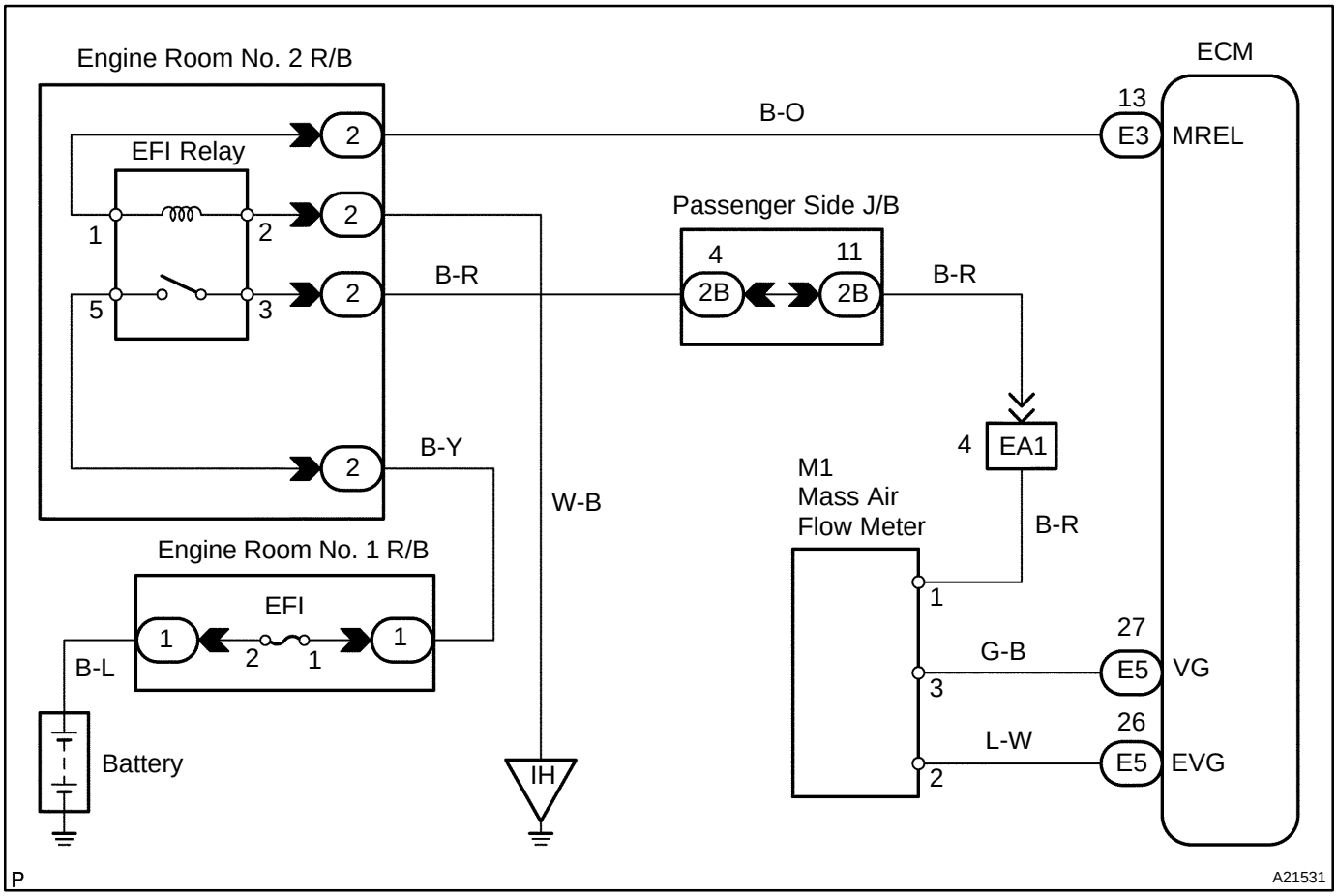
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0100:	
Mass air flow meter voltage	Less than 0.2 V or more than 4.9 V
P0102:	
Mass air flow meter voltage	Less than 0.2 V
P0103:	
Mass air flow meter voltage	More than 4.9 V

COMPONENT OPERATING RANGE

Parameter	Standard Value
Mass air flow meter voltage	0.4 to 2.2 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Connect OBD II scan tool or hand-held tester, and read value of mass air flow rate.**

PREPARATION:

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or hand-held tester main switch ON.
(c) Start the engine.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF.

CHECK:

Read the mass air flow rate on the OBD II scan tool or the hand-held tester.

RESULT:

Air Flow Rate (gm/s)	Proceed to
0.0	A
271.0 or more	B
Between 1.0 and 270.0 (*1)	C

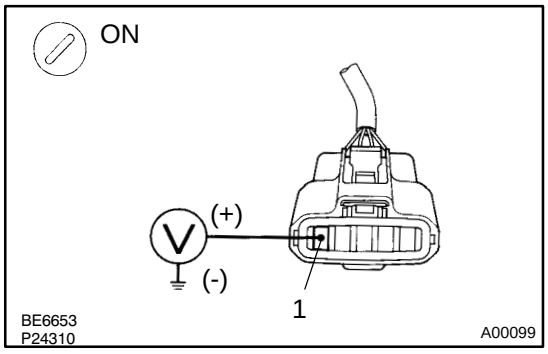
*1: The value must be changed when the throttle valve is opened or closed.

B → **Go to step 6.**

C → **Check for intermittent problems (See page DI-3).**

A

2	**Check voltage of mass air flow meter power source.**



PREPARATION:

(a) Disconnect the mass air flow meter connector.
(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal 3 of the mass air flow meter connector and body ground.

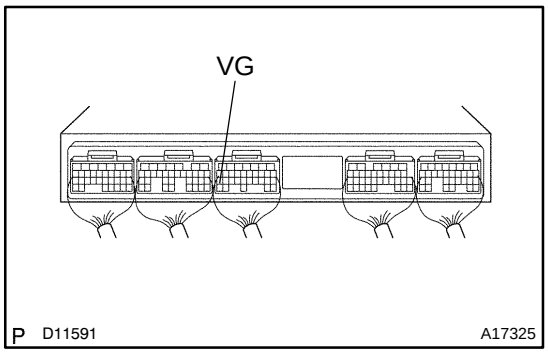
OK:

Voltage: 9 to 14 V

NG → **Go to step 5.**

OK

3	**Check voltage between terminal VG of ECM connector and body ground.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Start the engine.

CHECK:

Measure the voltage between terminal VG of the ECM connector and body ground while the engine is idling.

OK:

Voltage:

1.1 to 1.5 V (P or N position and A/C switch OFF)

OK → **Replace ECM (See page SF-74).**

NG

4	**Check for open and short in harness and connector between mass air flow meter and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace mass air flow meter.

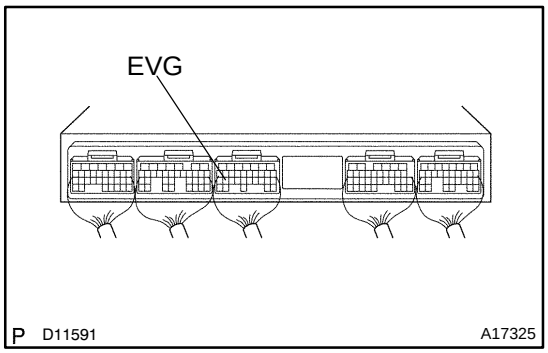
5	**Check for open in harness and connector between mass air flow meter and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Check ECM power source circuit (See page DI-31 1).

6	**Check continuity between terminal EVG of ECM connector and body ground.**



PREPARATION:
Remove the ECM hood (See page SF-74).
CHECK:
Check the continuity between terminal EVG of the ECM connector and body ground.
OK:
Continuity (1 Ω or less)

NG → **Replace ECM (See page SF-74).**

OK

7	**Check for open in harness and connector between mass air flow meter and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace mass air flow meter.

DIAKM-02

DTC	P0101	Mass or Volume Air Flow Circuit Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0100 on page DI-70 .

DTC No.	DTC Detecting Condition	Trouble Area
P0101	After engine is warmed up, conditions (a) and (b) continue for more than 10 seconds with engine speed less than 900 rpm: (2 trip detection logic) (a) Throttle valve fully closed (b) Mass air flow meter output ⊖ 2.2 V	●Mass air flow meter
	Conditions (a) and (b) continue for more than 6 seconds with engine speed 0 rpm or more: (2 trip detection logic) (a) VTA 0.1 V (b) Mass air flow meter output ± 0.4 V	
	Conditions (a) and (b) continue for more than 6 seconds with engine speed 1,500 rpm or more: (2 trip detection logic) (a) VTA 0.63 V (b) Mass air flow meter output ± 1.0 V	

MONITOR DESCRIPTION

The MAF (Mass Air Flow) meter helps the ECM calculate the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air. By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the air flow through the MAF meter. The ECM interprets this voltage as the intake air amount. If there is a defect in the MAF meter or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.

Example:

If the voltage is more than 2.2 V at idle or less than 0.4 V at idle OFF, the ECM interprets this as a defect in the MAF meter and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0101	Mass air flow meter rationality
Required sensors/components	Main sensors/components	Mass air flow meter
	Related sensors/components	Engine speed sensor, Engine coolant temperature sensor, Throttle position sensor
Frequency of operation	Continuous	
Duration	10 sec. (High voltage) 6 sec. (Low voltage)	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
High voltage:		
Engine speed	-	900 rpm
Idle	ON	
Engine coolant temperature	70°C (158°F)	-
Low voltage (Case 1):		
Engine speed	0 rpm	-
Throttle position	0.1 V	-
Low voltage (Case 2):		
Engine speed	1,500 rpm	-
Throttle position	0.63 V	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Mass air flow meter voltage (High voltage)	More than 2.2 V
Mass air flow meter voltage (Low voltage, Case 1)	Less than 0.4 V
Mass air flow meter voltage (Low voltage, Case 2)	Less than 1.0 V

WIRING DIAGRAM

Refer to DTC P0100 on page DI-70 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Are there any other codes (besides DTC P0101) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTCs.

RESULT:

Display (DTC output)	Proceed to
P0101 and other DTCs	A
Only P0101	B

HINT:

If any other codes besides P0101 are output, perform the troubleshooting for those DTCs first.

A → **Replace mass air flow meter.**

B

Go to relevant DTC chart (See page DI-35).

DIAKN-02

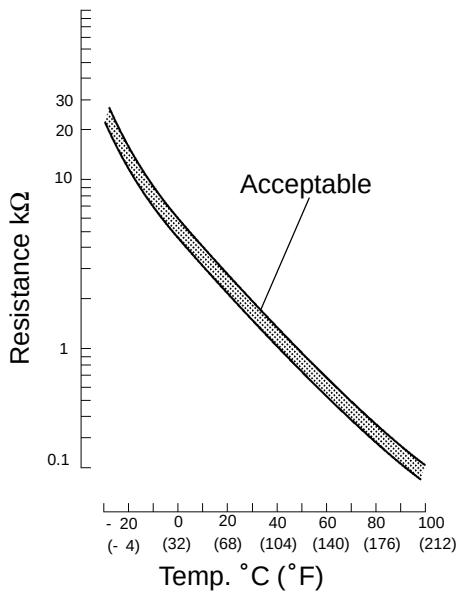
DTC	P0110	Intake Air Temperature Circuit

DTC	P0112	Intake Air Temperature Circuit Low Input

DTC	P0113	Intake Air Temperature Circuit High Input

CIRCUIT DESCRIPTION

Fig. 1



The intake air temperature (IAT) sensor, mounted on the mass air flow (MAF) meter, monitors the intake air temperature. The IAT sensor has a thermistor that varies its resistance depending on the temperature of the intake air. When the air temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected as voltage changes to the ECM terminal. (See Fig. 1).

The intake air temperature sensor is connected to the ECM. The 5 V power source voltage in the ECM is applied to the intake air temperature sensor from terminal THA (THAR) via resistor R.

That is, the resistor R and the intake air temperature sensor are connected in series. When the resistance value of the intake air temperature sensor changes in accordance with changes in the intake air temperature, the potential at terminal THA (THAR) also changes. Based on this signal, the ECM increases the fuel injection volume to improve the driveability during cold engine operation.

DTC No.	Procced to	DTC Detection Condition	Trouble Area
P0110	Step 1	Open or short in intake air temperature sensor circuit for 0.5 sec.	✓Open or short in intake air temperature sensor circuit ✓Intake air temperature sensor (built in mass air flow meter) ✓ECM
P0112	Step 4	Short in intake air temperature sensor circuit for 0.5 sec.	
P0113	Step 2	Open in intake air temperature sensor circuit for 0.5 sec.	

HINT:

After confirming DTC P0110, use the OBD II scan tool or hand-held tester to confirm the intake air temperature from the CURRENT DATA.

Displayed Temperature	Malfunction
-40 ˚C (-40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the intake air temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the IAT (Intake Air Temperature) sensor and sets a DTC.
Example:
When the sensor voltage output equal to -40 ℃ (-40 ℉), or more than 140 ℃ (284 ℉).

MONITOR STRATEGY

Related DTCs	P0110	Intake air temperature sensor range check (Fluttering)
	P0112	Intake air temperature sensor range check (Low resistance)
	P0113	Intake air temperature sensor range check (High resistance)
Required sensors/components	Intake air temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

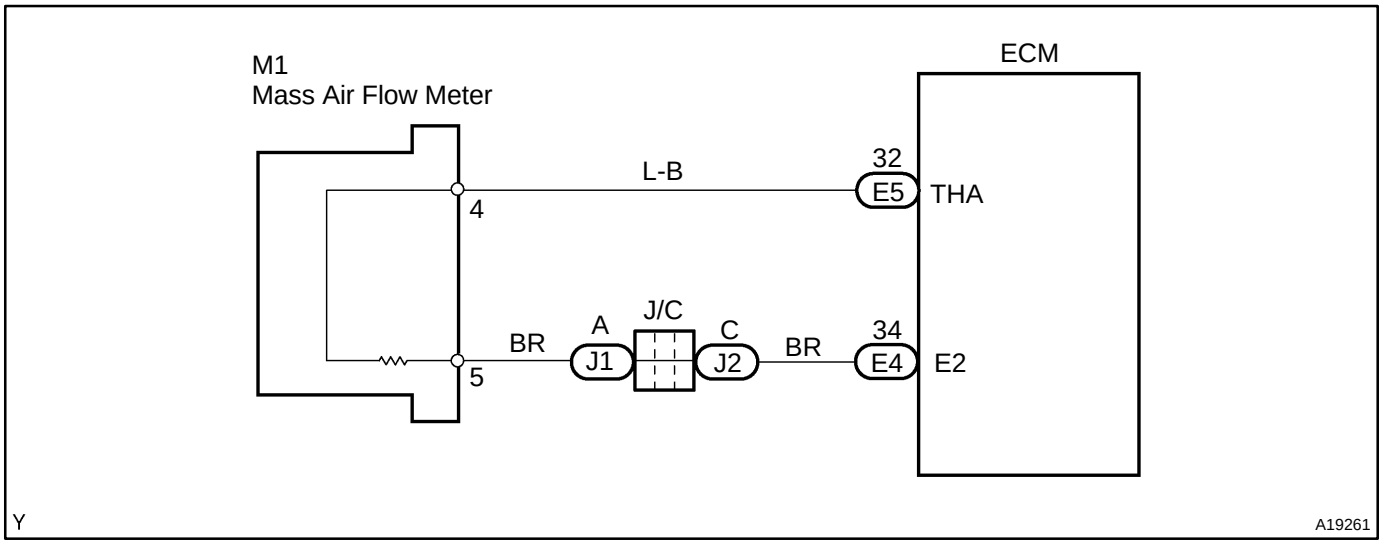
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0110:	
Intake air temperature sensor resistance (Intake air temperature)	Less than 98.5 Ω, or more than 156 kΩ (More than 140 ℃ (284 ℉), or less than -40 ℃ (-40 ℉)
P0112:	
Intake air temperature sensor resistance (Intake air temperature)	Less than 98.5 Ω (More than 140 ℃ (284 ℉))
P0113:	
Intake air temperature sensor resistance (Intake air temperature)	More than 156 kΩ (Less than -40 ℃ (-40 ℉))

COMPONENT OPERATING RANGE

Parameter	Standard Value
Intake air temperature sensor resistance	98.5 Ω (140 ℃ (281 ℉)) to 156 kΩ (-40 ℃ (-40 ℉))

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Connect OBD II scan tool or hand-held tester, and read value of intake air temperature.**

PREPARATION:

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or hand-held tester main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL DADA / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

OK:

Same as actual intake air temperature.

RESULT:

Temperature Displayed	Proceed to
-40 °C (-40°F)	A
140°C (284°F) or more	B
OK (Same as air temperature near to the intake)	C

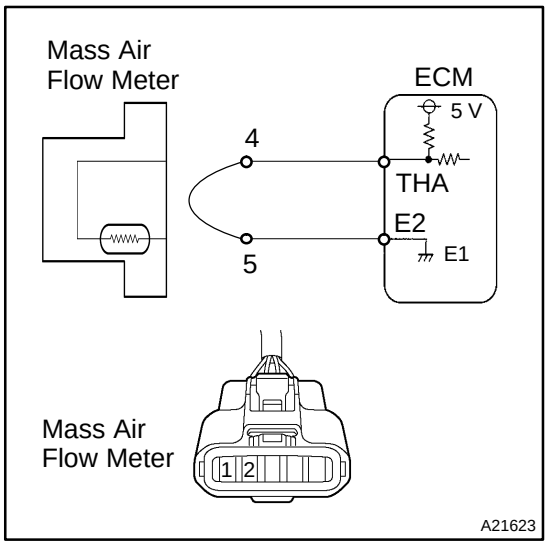
HINT:

- If there is open circuit, the OBD II scan tool or the hand-held tester indicates -40°C (-40 °F).
- If there is short circuit, the OBD II scan tool or the hand-held tester indicates 140°C (284°F) or more.

B	**Go to step 4.**
C	**Check for intermittent problems (See page DI-3).**

A

2	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the mass air flow meter connector.
(b) Connect the sensor and wire harness terminals together.
(c) Turn the ignition switch ON.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

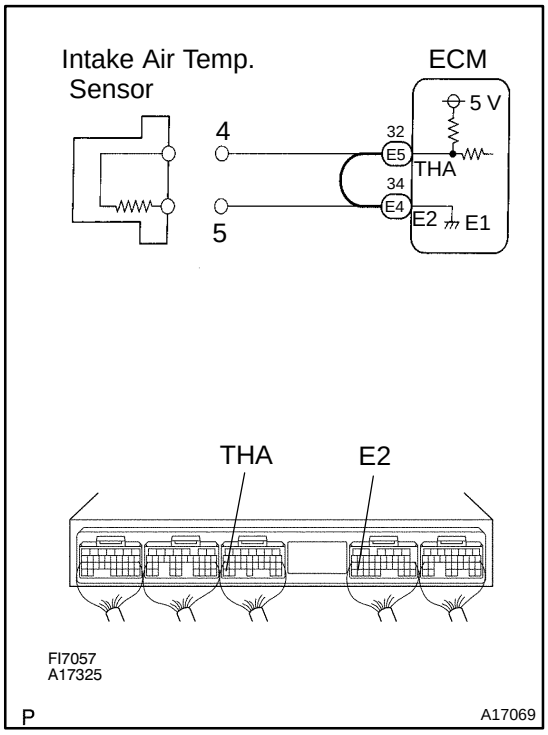
OK:

Temperature value: 140°C (284°F) or more

OK	Confirm good connection at sensor. If OK, replace mass air flow meter.

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).
(b) Connect terminals THA and E2 of the ECM connector together.

HINT:

The mass air flow meter connector is disconnected. Before checking, do a visual and contact pressure check for the ECM connector (See page IN-33).

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

OK:

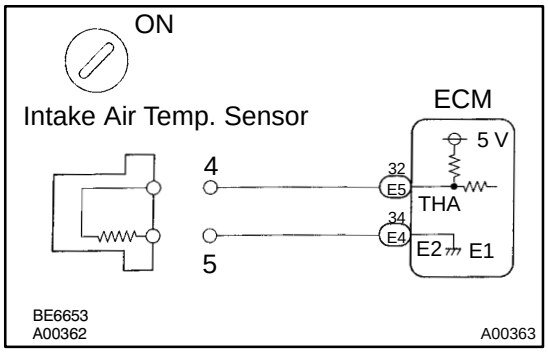
Temperature value: 140°C (284°F) or more

OK	Open in harness between terminal E2 or THA, repair or replace harness.

NG

Confirm good connection at ECM. If OK, replace ECM (See page SF-74).

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the mass air flow meter connector.
(b) Turn the ignition switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

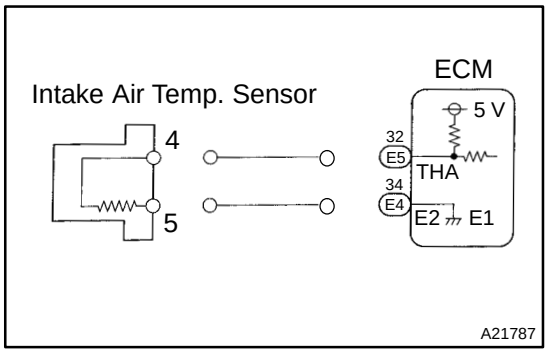
OK:

Temperature value: -40°C (-40°F)

OK	Replace mass air flow meter.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).
(b) Disconnect the E4 and E5 connectors from the ECM.

HINT:

The mass air flow meter connector is disconnected.

(c) Turn the ignition switch ON.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

OK:

Temperature value: -40°C (-40°F)

OK	Repair or replace harness or connector.

NG

Replace ECM (See page SF-74).

DIAKO-02

DTC	P0115	Engine Coolant Temperature Circuit

DTC	P0117	Engine Coolant Temperature Circuit Low Input

DTC	P0118	Engine Coolant Temperature Circuit High Input

CIRCUIT DESCRIPTION

A thermistor is built into the engine coolant temperature sensor and changes the resistance value according to the engine coolant temperature. The structure of the sensor and connection to the ECM is the same as those of intake air temperature sensor.

HINT:

If the ECM detects the DTC P0115, P0117 or P0118, it operates the fail-safe functions in which the engine coolant temperature is assumed to be 80 ™C (176 ™F).

DTC No.	Procced to	DTC Detection Condition	Trouble Area
P0115	Step 1	Open or short in engine coolant temperature sensor circuit for 0.5 sec.	✓Open or short in engine coolant temperature sensor circuit ✓Engine coolant temperature sensor ✓ECM
P0117	Step 4	Short in engine coolant temperature sensor circuit for 0.5 sec.	
P0118	Step 2	Open in engine coolant temperature sensor circuit for 0.5 sec.	

HINT:

After confirming DTC P0115, P0117 or P0118, confirm the engine coolant temperature in the ”DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL” using the hand-held tester or the OBD II scan tool.

Temperature Displayed	Malfunction
-40 ˚C (-40 ˚F)	Open circuit
140C˚ (284 ˚F) or more	Short circuit

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor.

The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Example:

When the ECM calculates that the ECT is less than -40 ™C (-40 ™F), or more than 140 ™C (284 ™F), and if either condition continues for 0.5 sec. or more, the ECM will set a DTC.

MONITOR STRATEGY

Related DTCs	P0115	Engine coolant temperature sensor range check (Fluttering)
	P0117	Engine coolant temperature sensor range check (Low resistance)
	P0118	Engine coolant temperature sensor range check (High resistance)
Required sensors/components	Engine coolant temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

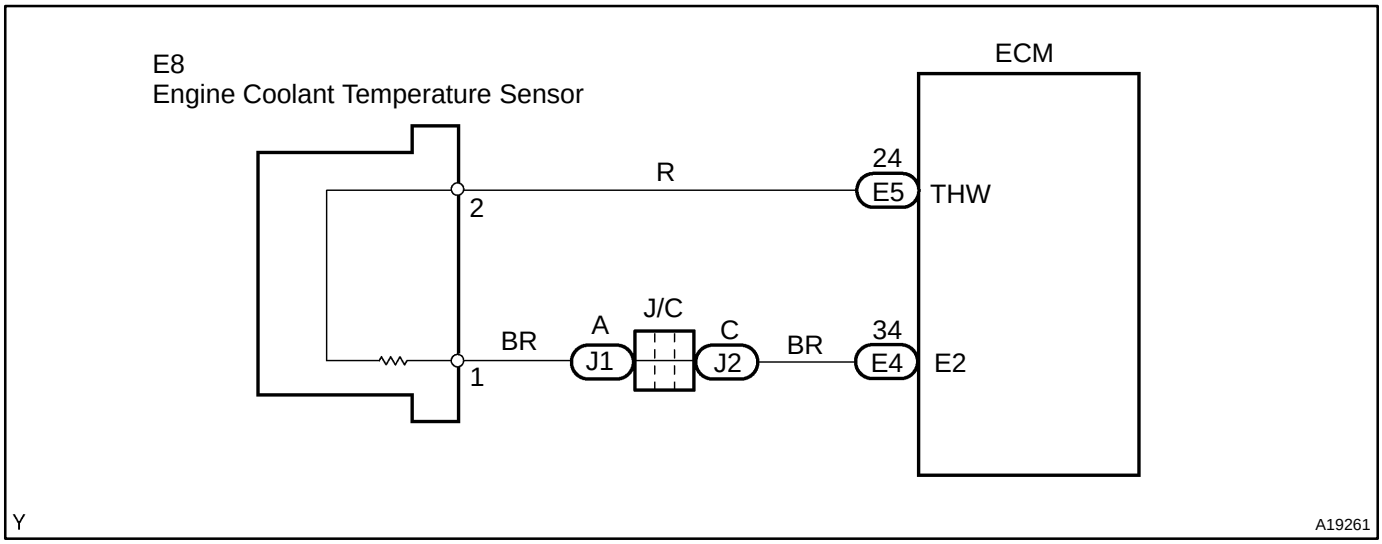
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0115:	
Engine coolant temperature sensor resistance (Coolant temperature)	Less than 79 Ω or more than 156 kΩ (More than 140 °C (284 °F) or less than -40 °C (-40 °F))
P0117:	
Engine coolant temperature sensor resistance (Coolant temperature)	Less than 79 Ω (More than 140 °C (284 °F))
P0118:	
Engine coolant temperature sensor resistance (Coolant temperature)	More than 156 kΩ (Less than -40 °C (-40 °F))

COMPONENT OPERATING RANGE

Parameter	Standard Value
Engine coolant temperature sensor resistance	79 Ω (140 °C (281 °F)) to 156 kΩ (-40 °C (-40 °F))

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If different DTCs that are related to different systems are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using hand-held tester or OBD II scan tool. Because freeze frame records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or hand-held tester, and read value of engine coolant temperature.**

PREPARATION:

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or hand-held tester main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL DATA / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

OK:

Same as actual engine coolant temperature.

RESULT:

Temperature Displayed	Proceed to
-40 °C (-40°F)	A
140°C (284°F) or more	B
OK (Same as air temperature near to the intake)	C

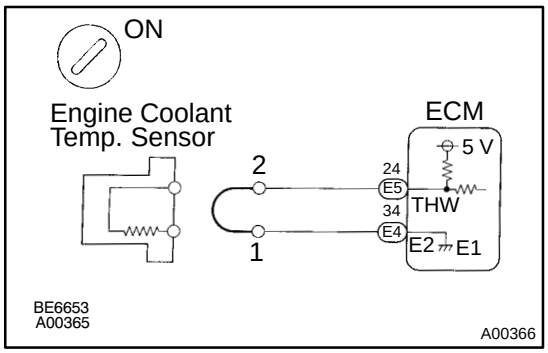
HINT:

- If there is open circuit, the OBD II scan tool or the hand-held tester indicates -40°C (-40°F).
- If there is short circuit, the OBD II scan tool or the hand-held tester indicates 140°C (284°F) or more.

B	**Go to step 4.**
C	**Check for intermittent problems (See page DI-3).**

A

2	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the engine coolant temperature sensor connector.
(b) Connect the sensor wire harness terminals together.
(c) Turn the ignition switch ON.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

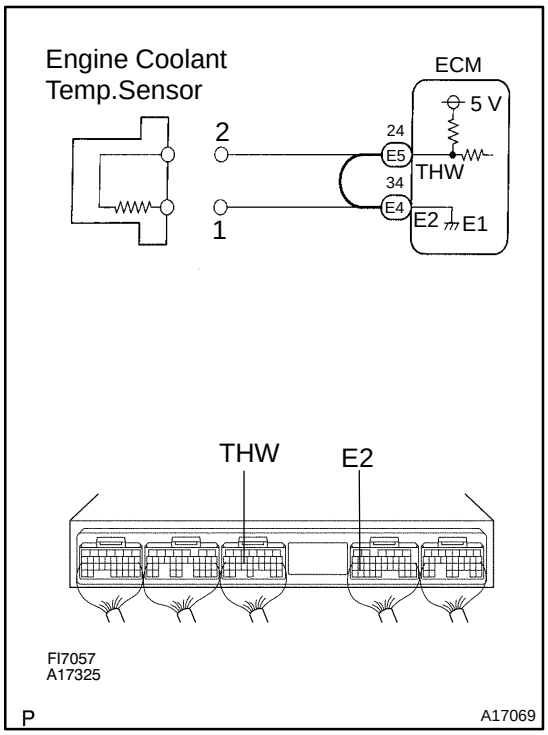
OK:

Temperature value: 140°C (284°F) or more

OK	**Confirm good connection at sensor. If OK, replace engine coolant temperature sensor.**

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Connect terminals THW and E2 of the ECM connector.

HINT:

The engine coolant temperature sensor connector is disconnected. Before checking, do a visual and contact pressure check for the ECM connector (See page IN-33).

(c) Turn the ignition switch ON.

(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

OK:

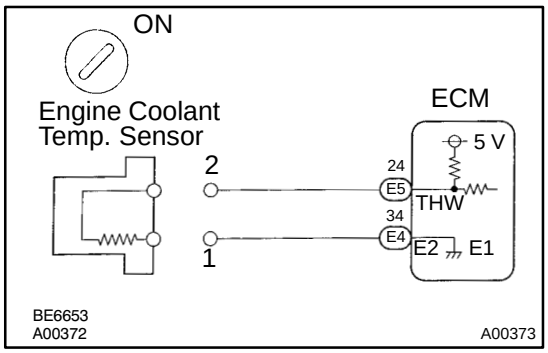
Temperature value: 140°C (284°F) or more

OK → **Open in harness between terminal E2 or THW, repair or replace harness.**

NG

Confirm good connection at ECM. If OK, replace ECM (See page SF-74).

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the engine coolant temperature sensor connector.

(b) Turn the ignition switch ON.

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

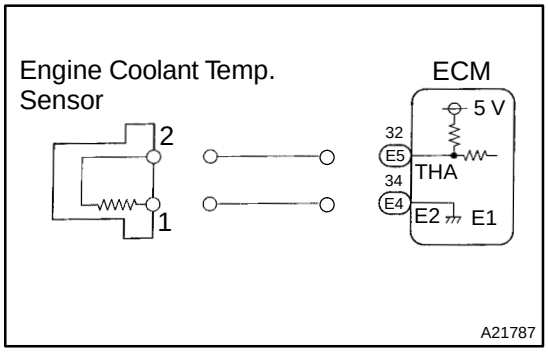
OK:

Temperature value: -40°C (-40°F)

OK	Replace engine coolant temperature sensor.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Disconnect the E4 and E5 connectors from the ECM.

HINT:

The engine coolant temperature sensor connector is disconnected.

(c) Turn the ignition switch ON.

(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

OK:

Temperature value: -40°C (-40°F)

OK	Repair or replace harness or connector.

NG

Replace ECM (See page SF-74).

DIC44-01

DTC	P0116	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI−86.

DTC No.	DTC Detection Condition	Trouble Area
P0116	When THW ⍁ 35˚C (95˚F) and less than 60˚C (140˚F), and THA ⊖ -6.7 ˚C (20˚F) when starting engine, conditions (a) and (b) continue: (2 trip detection logic) (a) Vehicle has accelerated and decelerated (b) Water temp. change is lower than 3˚C (5.4˚F) from water temp. since when starting engine	✓Engine coolant temp. sensor
	In case that reading value of water temp. sensor will not change more than 1˚C (1.8˚F) even after repeating 6 trips (detection logic) of adjusting speed pattern with THW more than 60˚C (140˚F) when starting engine	

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Examples:

(1) Upon starting the engine, the ECT is between 35˚C (95˚F) and 60˚C (140˚F). If after driving for 250 sec., the ECT still remains within 3˚C (5.4˚F) of the starting temperature, a DTC will be set (2 trip detection logic).

(2) Upon starting the engine, the ECT is over 60˚C (140˚F). If after driving for 250 sec., the ECT still remains within 1˚C (1.8˚F) of the starting temperature, a DTC will be set (6 trip detection logic).

MONITOR STRATEGY

Related DTCs	P0116	Engine coolant temperature sensor range check (Stuck)
Required sensors/components	Main sensors/components	Engine coolant temperature sensor
	Related sensors/components	Intake air temperature sensor, Crankshaft position sensor, Mass air flow meter
Frequency of operation	Continuous	
Duration	250 sec.	
MIL operation	2 driving cycles (When temperature is fixed between 35 ˚C (95 ˚F) and 60 ˚C (140 ˚F)) 6 driving cycles (When temperature is fixed at 60 ˚C (140 ˚F) or more)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1 (When temperature is fixed between 35°C (95°F) and 60°C (140°F)):		
Cumulative idle off period	250 sec.	-
Speed increase 30 km/h (19 mph) or more	10 times	-
Engine coolant temperature	35°C (95°F)	60°C (140°F)
Intake air temperature	-6.7°C (20°F)	-
Case 2 (When temperature is fixed at 60°C (140°F) or more):		
Engine coolant temperature	60°C (140°F)	-
Intake air temperature	-6.7°C (20°F)	-
Stop and go	Stop for 20 sec. or more and accelerate to more than 70 km/h (43 mph)	
70 km/h (43 mph) in less than 40 sec.	Decrease from 65 km/h (40 mph) to 3 km/h (2 mph) in 35 sec. and stop for 10 sec.	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case1 (When temperature is fixed between 35°C (95°F) and 60°C (140°F)):	
Change of engine coolant temperature value	Less than 3°C (5.4°F)
Case2 (When temperature is fixed at 60°C (140°F) or more):	
Change of engine coolant temperature value	1°C (1.8°F) or less

COMPONENT OPERATING RANGE

Standard Value
Engine coolant temperature changes with the actual engine coolant temperature

INSPECTION PROCEDURE

HINT:

- If DTCs P0115, P0116, P0117, P0118 and P0125 are output simultaneously, the engine coolant temperature sensor circuit may be open or short. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Replace engine coolant temperature sensor.

DIC45-01

DTC	P0120	Throttle Pedal Position Sensor/Switch ”A” Circuit

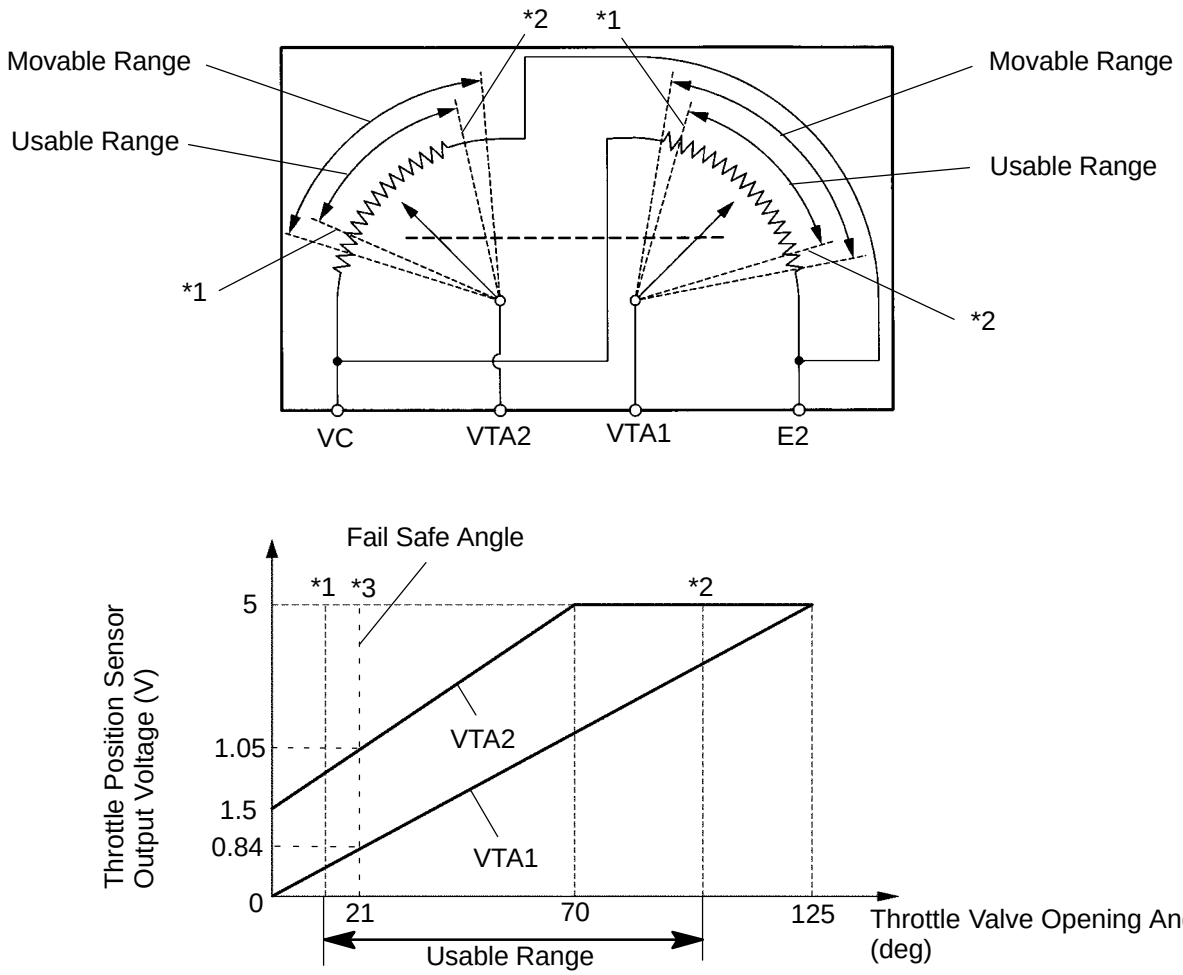
DTC	P0122	Throttle Pedal Position Sensor/Switch ”A” Circuit Low Input

DTC	P0123	Throttle Pedal Position Sensor/Switch ”A” Circuit High Input

HINT:
There are the purpose for the ”throttle position sensor”.

CIRCUIT DESCRIPTION

The throttle position sensor is mounted on the throttle body and it has 2 sensors to detect the throttle opening angle and a malfunction of the throttle position sensor.
The voltage applied to the terminals VTA1 and VTA2 of the ECM changes between 0 V to 5 V in proportion to the opening angle of the throttle valve. The VTA1 is a signal to indicate the actual throttle valve opening angle which is used for the engine control, and the VTA2 is a signal to indicate the information about the opening angle which is used for detecting a malfunction.
The ECM judges the current opening angle of the throttle valve from these signals input from terminals VTA1 and VTA2, and the ECM controls the throttle motor to make the throttle valve angle properly in response to the driving condition.
When a malfunction is detected, the throttle valve is locked at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled until the system returns to normal and the ignition switch is turned OFF.



*1: Throttle Valve Fully Closed 15˚
(Throttle Position Opening Position Expressed as Percentage (VAT1) 0 %)

*2: Throttle Valve Fully Opend 104˚
(Throttle Position Opening Position Expressed as Percentage (VAT1) about 100 %)

*3: Fail Safe Angle 21˚
(Throttle Position Opening Position Expressed as Percentage (VAT1) 8 %)

A02395 A02396 A19653

DTC No.	DTC Detection Condition	Trouble Area
Condition (a) of DTC P0120, P0122, P0123, P0220, P0222 or P0223 continues for 10 sec. when idle is ON, but for 2 seconds when idle is OFF		
P0120	Detection conditions for DTCs P0122 and P0123 are not satisfied but condition (a) is satisfied (a) VTA1 ± 0.2 V or VTA1 ⊖ 4.8 V	✓Open or short in throttle position sensor circuit ✓Throttle position sensor ✓ECM
P0122	(a) VTA1 ± 0.2 V	
P0123	(a) VTA1 ⊖ 4.8 V	

HINT:

DTC No.	Main Trouble Area
P0122	✓Throttle position sensor ✓VTA1 circuit open ✓VC circuit open (when the VC circuit is open, DTCs P0222 and P2135 are also output simultaneously)
P0123	✓Throttle position sensor ✓E2 circuit open

NOTICE:

When a malfunction is detected, the throttle valve is locked at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled until the system returns to normal and the ignition switch is turned OFF.

HINT:

- ✓ After confirming DTCs, use the hand-held tester or the OBD II scan tool to confirm the throttle valve opening percentage and closed throttle position switch condition.
- ✓ The THROTTLE POS means VTA1 signal as well as the THROTTLE POS #2 for the VTA2 signal.

Refference (Normal condition):

Tester display	Accelerator pedal released	Accelerator pedal depressed
THROTTLE POS	8 to 20 %	64 to 96 %
THROTTLE POS #2	2.0 to 2.9 V	4.5 to 5.5 V

MONITOR DESCRIPTION

The ECM uses throttle position sensor to monitor the throttle valve opening angle.

(a) There is a specific voltage difference expected between VTA1 and VTA2 for each throttle opening angle.

- ✓ If the difference between VTA1 and VTA2 is incorrect, the ECM interprets this as a fault and will set a DTC.

(b) VTA1 and VTA2 each have a specific voltage operating range.

- ✓ If VTA1 or VTA2 is out of the normal operating range, the ECM interprets this as a fault and will set a DTC.

(c) VTA1 and VTA2 should never be close to the same voltage levels.

- ✓ If VTA1 is within 0.02 V of VTA2, the ECM interprets this as a short circuit in the throttle position sensor system and will set a DTC.

MONITOR STRATEGY

Related DTCs	P0120	Throttle position sensor (sensor 1) range check (Fluttering)
	P0122	Throttle position sensor (sensor 1) range check (Low voltage)
	P0123	Throttle position sensor (sensor 1) range check (High voltage)
Required sensors/components	Throttle position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
Throttle control motor power	ON

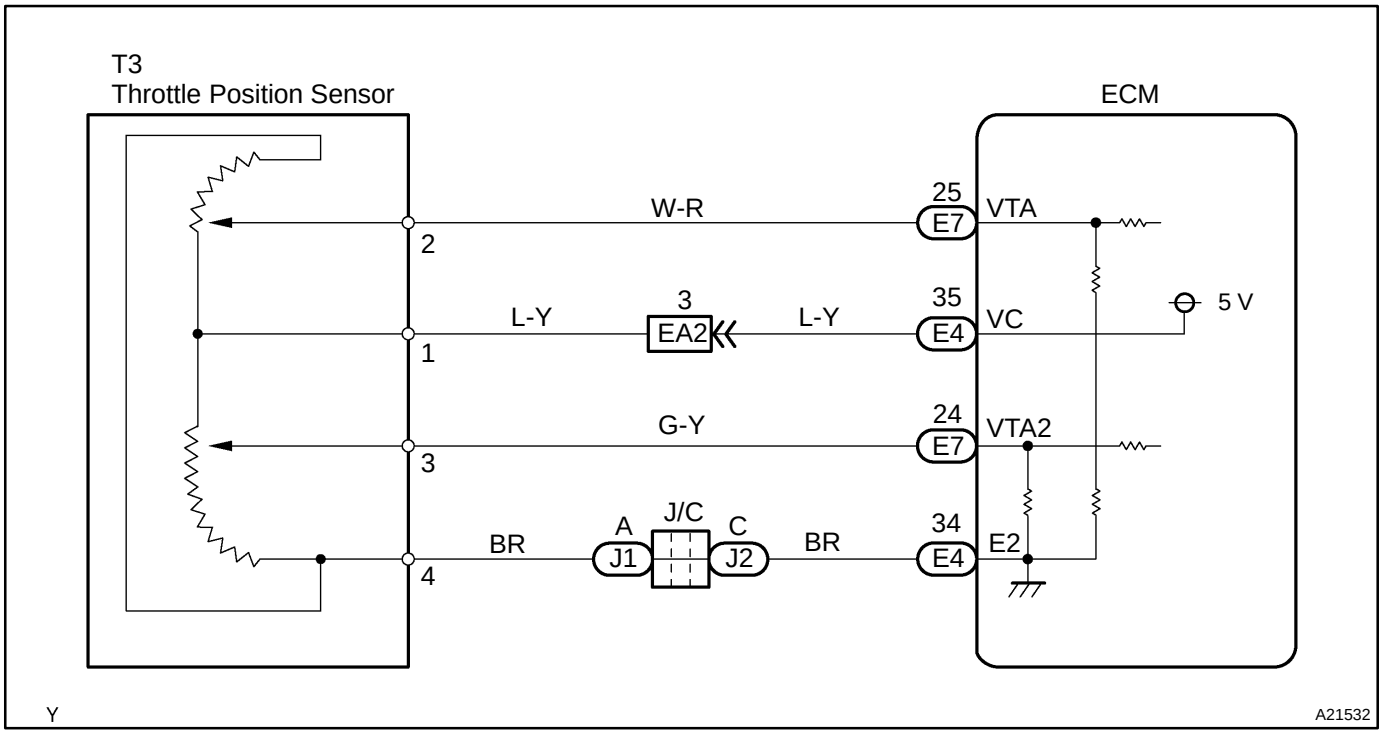
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0120:	
VTA1 voltage	0.2 V or less or 4.8 V or more (2 sec. or more)
P0122:	
VTA1 voltage	0.2 V or less (2 sec. or more)
P0123:	
VTA1 voltage	4.8 V or more (2 sec. or more)

COMPONENT OPERATING RANGE

Parameter	Standard Value
Throttle position sensor VTA1 voltage	0.6 to 3.96 V
Throttle position sensor VTA2 voltage	2.25 to 5.0 V

WIRING DIAGRAM

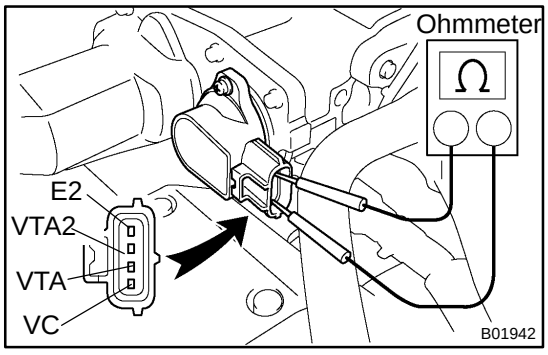


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check throttle position sensor.**



PREPARATION:

Disconnect the throttle position sensor connector.

CHECK:

(a) Measure the resistance between terminals VC and E2 of the throttle position sensor.

(b) Measure the resistance between terminals VTA and E2 of the throttle position sensor.

(c) Measure the resistance between terminals VTA2 and E2 of the throttle position sensor.

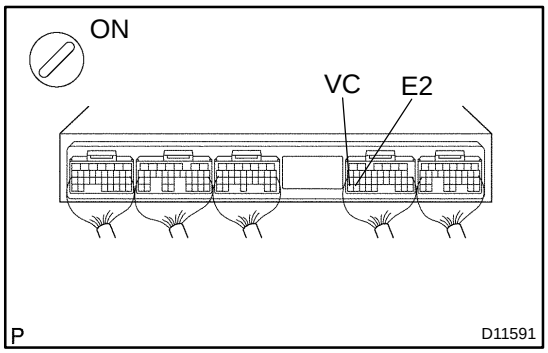
OK:

Throttle position sensor terminal	Resistance
VC (1) - E2 (4)	1.2 to 3.2 Ω at 20˚C (68˚F)
VTA (2) - E2 (4)	1.8 to 10.5 Ω at 20˚C (68˚F)
VTA2 (3) - E2 (4)	

NG	**Replace throttle position sensor.**

OK

2	**Check voltage between terminals VC and E2 of ECM connector.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

OK:

Voltage: 4.5 to 5.5 V

NG → **Replace ECM (See page SF-74).**

OK

3	**Check for open and short in harness and connector between throttle position sensor and ECM (See page SF-74).**

NG → **Repair or replace harness or connector.**

OK

Replace throttle position sensor.

DIAKR-02

DTC	P0121	Throttle/Pedal Position Sensor/Switch ”A” Circuit Range/Performance Problem

HINT:
This is the procedure of ”throttle position sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P0120 on page DI−95.

DTC No.	DTC Detecting Condition	Trouble Area
P0121	Condition (a) continues for 10 sec. when idle is ON, but for 2 sec. when idle is OFF : (a) Difference between VTA and VTA2 is out of threshold	●Throttle position sensor

MONITOR DESCRIPTION

The ECM uses throttle position sensor to monitor the throttle valve opening angle.
This sensor including two signals, VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. There are several checks that the ECM performs confirm proper operation of the throttle position sensor and VTA1.
(a) There is a specific voltage difference expected between VTA1 and VTA2 for each throttle opening angle.
(b) VTA1 and VTA2 each have a specific voltage operating range.
(c) VTA1 and VTA2 should never be close to the same voltage levels.
If the difference between VTA1 and VTA2 is incorrect (a), the ECM interprets this as a fault and will set a DTC.
If VTA1 or VTA2 is out of the normal operating range (b), the ECM interprets this as a fault and will set a DTC.
If VTA1 is within 0.02 V of VTA2 (c), the ECM interprets this as a short circuit in the throttle position sensor system and will set a DTC.
DTC P0121 relates to condition (a) above.
If the voltage output difference of the VTA1 and VTA2 deviates from the normal operating range, the ECM interprets this as a malfunction of the throttle position sensor. The ECM will turn on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0121	Throttle position sensor rationality
Required sensors/components	Throttle position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)	
VTA2 voltage	-	4.6 V

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Different between VTA1 and VTA2 |VTA1 - (VTA2 × 0.8 to 1.2)|* * Corrected by learning value	Less than 0.1 V and more than 0.4 V

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Replace throttle position sensor (See page SF-37).

DIC46-01

DTC	P0125	Insufficient coolant temperature for closed loop fuel control

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI-86 .

DTC No.	DTC Detection Condition	Trouble area
P0125	If THW or THA is less than -6.6˚C (20˚F) at engine start, 20 minutes or more after starting engine, ECT sensor value is less than "closed-loop enable temperature" (2 trip detection logic)	✓Cooling system ✓Engine coolant temperature sensor ✓Thermostat
	If THW and THA is between -6.6˚C (20˚F) and 10˚C (50˚F) at engine start; 5 minutes or more after starting engine, ECT sensor value is less than "closed-loop enable temperature" (2 trip detection logic)	
	If THW and THA greater than 10˚C (50˚F) at engine start; 2 minutes or more after starting engine, ECT sensor value is less than "closed-loop enable temperature" (2 trip detection logic)	

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the temperature of the engine coolant. The resistance of the sensor varies with the actual coolant temperature. The ECM applies a voltage to the sensor and the varying resistance of the sensor causes the signal voltage to vary. The ECM monitors the ECT signal voltage after engine start-up. If, after sufficient time has passed, the sensor still reports that the engine is not warmed up enough for closed-loop fuel control after sufficient time has passed, the ECM interprets this as a fault in the sensor or cooling system and sets a DTC.

Example:

The engine coolant temperature was 0 ™C (32 ™F) at engine start. After 5 min. running time, the ECT sensor still indicates that the engine is not warmed up enough to begin air fuel ratio feedback control of the air-fuel ratio. The ECM interprets this as a fault in the sensor or cooling system and will set a DTC.

MONITOR STRATEGY

Related DTCs	P0125	Insufficient coolant temperature for closed loop fuel control
Required sensors/components	Main sensors/components	Engine coolant temperature sensor, Cooling system, Thermostat
	Related sensors/components	Mass air flow meter
Frequency of operation	Continuous	
Duration	2 min. (at engine start, engine coolant or intake air temperature of 10˚C (50˚F) or more) 5 min. (at engine start, engine coolant or intake air temperature of -6.6˚C (20˚F) to 10˚C (50˚F)) 20 min. (at engine start, engine coolant or intake air temperature of less than -6.6˚C (20˚F))	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of Disable a Monitor" table (on page DI-3)	
Fuel cut	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Time until "engine coolant temperature" detection temperature reaches feedback start temperature	
When the temperature at the time of engine starting is 10˚C (50˚F) or more	Engine coolant temperature is less than "closed-loop enable temperature" when 2 min. or more after engine start
When the temperature at the time of engine starting is "-6.6 ˚C (20˚F)" to "10˚C (50˚F)"	Engine coolant temperature is less than "closed-loop enable temperature" when 5 min. or more after engine start
When the temperature at the time of engine starting is -6.6 ˚C (20˚F) or less	Engine coolant temperature is less than "closed-loop enable temperature" when 20 min. or more after engine start

INSPECTION PROCEDURE

HINT:

- If DTCs P0115, P0116, P0117, P0118 and P0125 are output simultaneously, the engine coolant temperature sensor circuit may be open or short. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Are there any other codes (besides DTC P0125) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P0125	A
"P0125" and other DTCs	B

HINT:

If any other codes besides "P0125" is output, perform the troubleshooting for those codes first.

B → **Go to relevant DTC chart (See page DI-35).**

A

2	**Check thermostat (See page CO-12).**

NG → **Replace thermostat (See page CO-11).**

OK

3	**Check cooling system.**

CHECK:

Check that there is defect cooling system which causes overcool, such as abnormal radiator fan operation, modified cooling system and so on.

NG → **Repair or replace cooling system.**

OK

Replace engine coolant temperature sensor.

DIC47-01

DTC	P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)

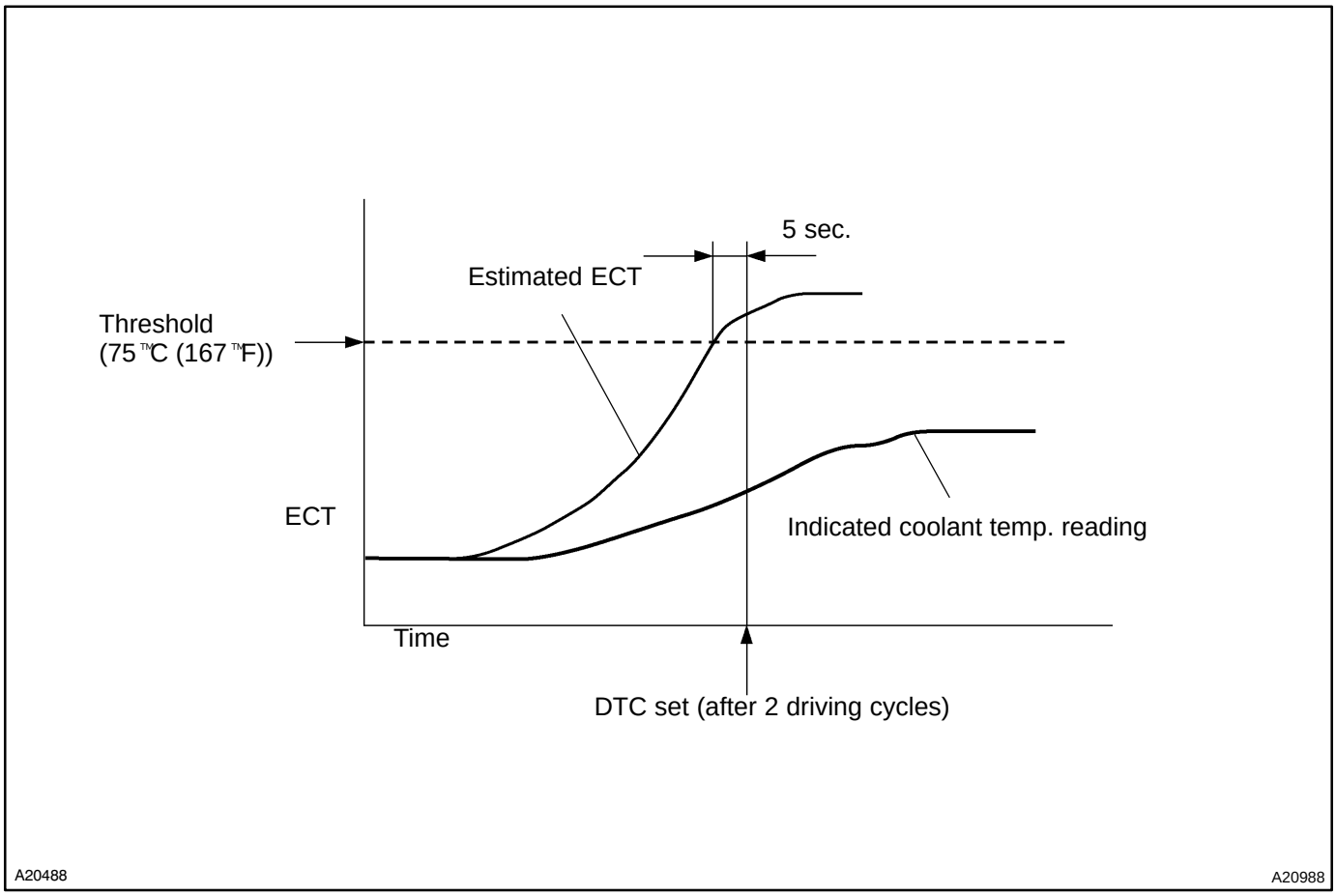
HINT:
This is the procedure of ”thermostat” malfunction detection.

CIRCUIT DESCRIPTION

If the engine coolant temperature (ECT) does not reach 75˚C (167˚F) despite sufficient warm - up time has elapsed.

DTC No.	DTC Detecting Condition	Trouble Area
P0128	Condition 1, 2 and 3: 1. Cold start 2. After engine is warmed up 3. THW<75 ˚C (167 ˚F)	✓Thermostat ✓Cooling system ✓Engine coolant temperature sensor ✓ECM

MONITOR DESCRIPTION



The ECM estimates the coolant temperature based on starting temperature, engine loads, and engine speeds. The ECM then compares the estimated temperature with the actual ECT (Engine Coolant Temperature). When the estimated coolant temperature reaches 75 ℃ (167 ℉), the ECM checks the actual ECT. If the actual ECT is less than 75 ℃ (167 ℉), the ECM will interpret this as a fault in the thermostat or engine cooling system and set a DTC.

MONITOR STRATEGY

Related DTCs	P0128	Thermostat
Required sensors/components	Main sensors/components	Engine coolant temperature sensor, Engine cooling system, Thermostat
	Related sensors/components	Intake air temperature sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	15 min.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11.0 V	-
Intake air temperature (at engine start)	-10 °C (14 °F)	35 °C (95 °F)
Engine coolant temperature (at engine start)	-10 °C (14 °F)	35 °C (95 °F)
Difference between engine coolant temperature and intake air temperature (at engine start)	-15 °C (-27 °F)	7 °C (12.6 °F)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Duration period of both A and B	5 sec. or more
A. Estimated engine coolant temperature	75 °C (167 °F) or more
B. Engine coolant temperature sensor output value	Less than 75 °C (167 °F)

MONITOR RESULT

The detailed information is described in "CHECKING MONITOR STATUS" (see page DI-3).

- TID (Test Identification) is assigned to each emission-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $08: Thermostat

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.625 and subtract 40 (°C)	ECT sensor output when estimated ECT reaches malfunction criterion	Malfunction criterion

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Are there any other codes (besides DTC P0128) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTCs.

RESULT:

Display (DTC output)	Proceed to
P0128	A
”P0128” and other DTCs	B

HINT:

If any other codes besides P0128 is output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI−35).**

A

2	**Check cooling system.**

CHECK:

Check that there is defect cooling system which causes overcool, such as abnormal radiator fan operation, modified cooling system and so on.

NG → **Repair or replace cooling system.**

OK

3	Inspect thermostat (See page CO-12).

NG → Replace thermostat (See page CO-11).

OK →

Replace ECM (See page SF-74).

DICDD-01

DTC	P0130	Oxygen Sensor Circuit (Bank 1 Sensor 1)

DTC	P0150	Oxygen Sensor Circuit (Bank 2 Sensor 1)

DTC	P2195	Oxygen Sensor Signal Stauk Lean (Bank 1 Sensor 1)

DTC	P2196	Oxygen Sensor Signal Stauk Rich (Bank 1 Sensor 1)

DTC	P2197	Oxygen Sensor Signal Stauk Lean (Bank 2 Sensor 1)

DTC	P2198	Oxygen Sensor Signal Stauk Rich (Bank 2 Sensor 1)

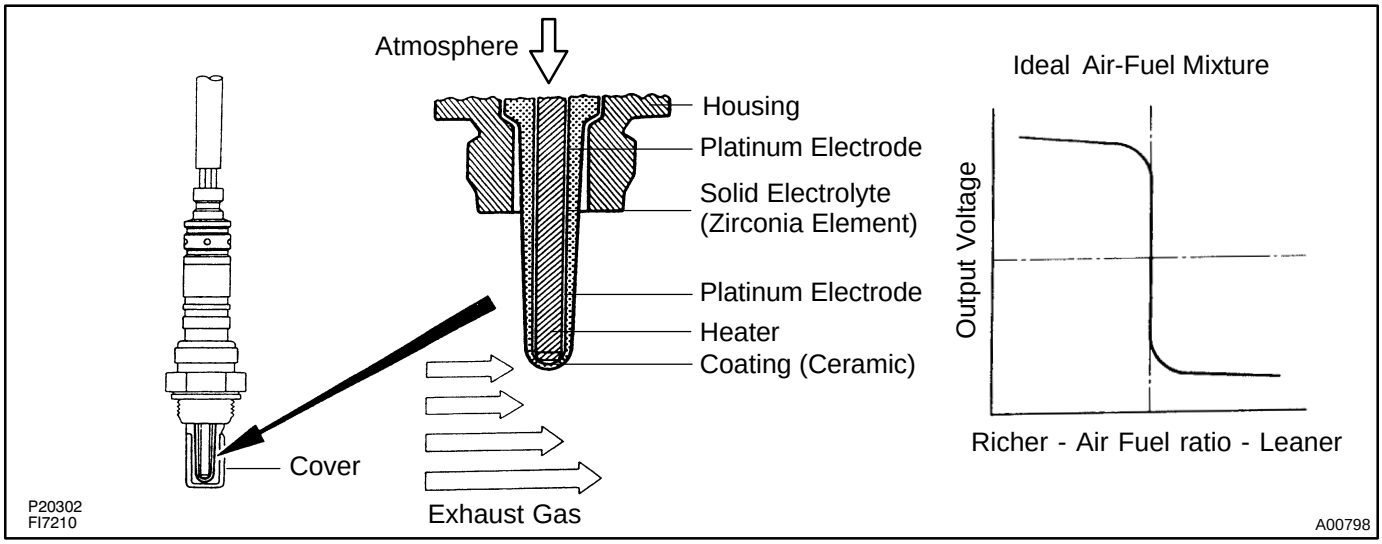
CIRCUIT DESCRIPTION

To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three-way catalytic converter is used, but for the most efficient use of the three-way catalytic converter, the air-fuel ratio must be precisely controlled so that it is always close to the stoichiometric air-fuel ratio.

The heated oxygen sensor has the characteristic which its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. This characteristic is used to detect the oxygen concentration in the exhaust gas and provide the ECM with feedback to control the air-fuel ratio.

When the air-fuel ratio becomes LEAN, the oxygen concentration in the exhaust increases and the heated oxygen sensor informs the ECM of the LEAN condition (low voltage, i.e. less than 0.45 V).

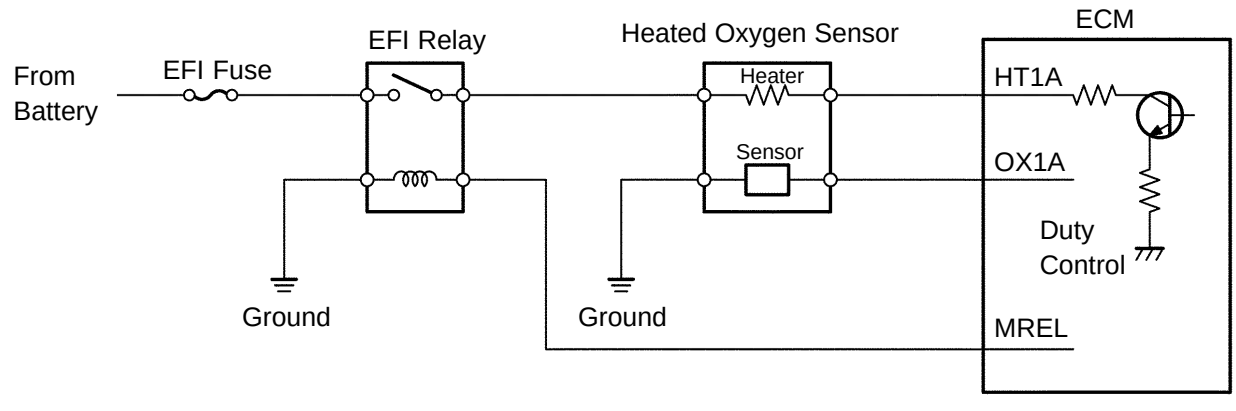
When the air-fuel ratio is RICHER than the stoichiometric air-fuel ratio, the oxygen concentration in the exhaust gas is reduced and the heated oxygen sensor informs the ECM of the RICH condition (high voltage, i.e. more than 0.45 V). The ECM judges by the voltage output from the heated oxygen sensor whether the air-fuel ratio is RICH or LEAN and controls the injection time accordingly. However, if malfunction of the heated oxygen sensor causes output of abnormal voltage, this disables the ECM for performing an accurate air-fuel ratio control. The heated oxygen sensors include a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low) current flows to the heater to heat the sensor for accurate oxygen concentration detection.



HINT:

The ECM provides a pulse width modulated control circuit to adjust current through the heater. The heated oxygen sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (Bank 1 Sensor 1 System Drawing):

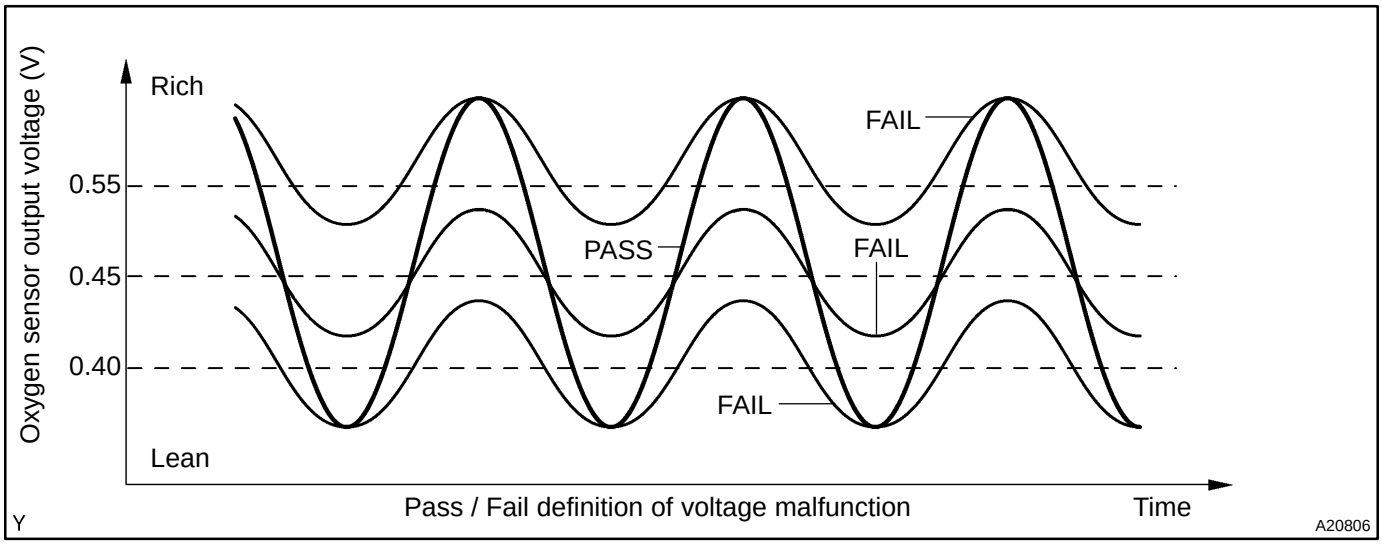


DTC No.	Detection Item	Trouble Area
P0130 P0150	Output voltage of heated oxygen sensor remains at 0.4 V or more, or 0.5 V or less, during idling after engine is warmed up (2 trip detection logic)	✓Open or short in heated oxygen sensor circuit ✓Heated oxygen sensor ✓EFI relay ✓Air induction system ✓Fuel pressure ✓Injector ✓ECM
P2195 P2197	Output voltage of heated oxygen sensor remains at 0.5 V or less, during idling after engine is warmed up (2 trip detection logic)	
P2196 P2198	Output voltage of heated oxygen sensor remains at 0.4 V or more, during idling after engine is warmed up (2 trip detection logic)	

HINT:

- ✓ Bank 1 refers to bank that includes cylinder No.1.
- ✓ Bank 2 refers to bank that does not include cylinder No.1.
- ✓ Sensor 1 refers to the sensor closer to the engine body.
- ✓ The heated oxygen sensor's output voltage and the short−term fuel trim value can be read using the OBD II scan tool or hand−held tester.

MONITOR DESCRIPTION



The ECM uses the heated oxygen sensor information to regulate the air-fuel ratio close to a stoichiometric ratio. This maximizes the catalytic converter's ability to purify the exhaust gas. The sensor detects oxygen levels in the exhaust gas and sends this signal to the ECM.

The inner surface of the sensor element is exposed to outside air. The outer surface of the sensor element is exposed to exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element. The heated oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. The heated oxygen sensor generates output voltage between 0 V and 1.0 V in response to the oxygen concentration in exhaust gas. When the output voltage of the heated oxygen sensor is 0.55 V or more, the ECM judges that the air-fuel ratio is RICH. When it is 0.4 V or less, the ECM judges that the air-fuel ratio is LEAN.

Under normal condition, the output voltage from the heated oxygen sensor alternates RICH and LEAN sides periodically. If the heated oxygen sensor outputs RICH signal (or LEAN signal) constantly, or if the heated oxygen sensor cannot output enough voltage to reach the minimum specification, the ECM interprets this as a malfunction in the heated oxygen sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0130	Front heated oxygen sensor voltage is constant at lean side or rich side (Bank 1)
	P0150	Front heated oxygen sensor voltage is constant at lean side or rich side (Bank 2)
	P2195	Front heated oxygen sensor voltage is constant at lean side (Bank 1)
	P2196	Front heated oxygen sensor voltage is constant at rich side (Bank 1)
	P2197	Front heated oxygen sensor voltage is constant at lean side (Bank 2)
	P2198	Front heated oxygen sensor voltage is constant at rich side (Bank 2)
Required sensors/components	Main sensors/components	Front heated oxygen senor
	Related sensors/components	Crank position sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	20 to 36 sec. x (3 times)	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
There is history that the following conditions were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Time after engine start	120 sec.	-
Idle	ON	
Fuel system status	Closed loop	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0130, P0150:	
Either of the following conditions A or B is met:	3 times or more
A. Front oxygen sensor voltage is 0.55 V or less	For 18 sec. or more
B. Front oxygen sensor voltage is 0.4 V or more	For 18 sec. or more
P2195, P2197:	
Front heated oxygen sensor voltage	Constant 0.55 V or less
P2196, P2198:	
Front heated oxygen sensor voltage	Constant 0.4 V or more

COMPONENT OPERATING RANGE

Parameter	Standard value
In the normal condition, the heated oxygen sensor voltage	0 to 1 V

O2S TEST RESULT

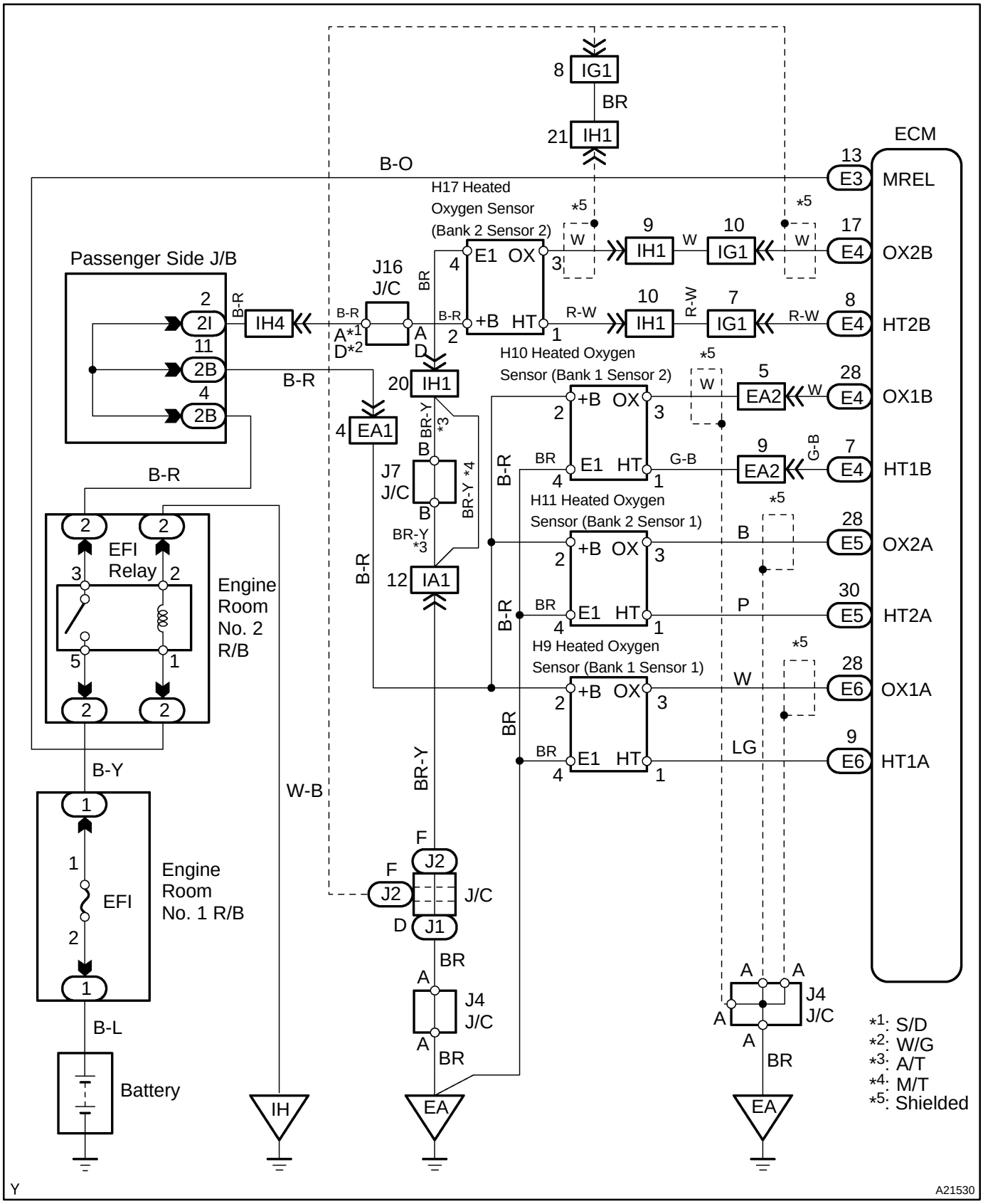
Refer to page DI-3 for detailed information.

Front HO2S voltage monitor

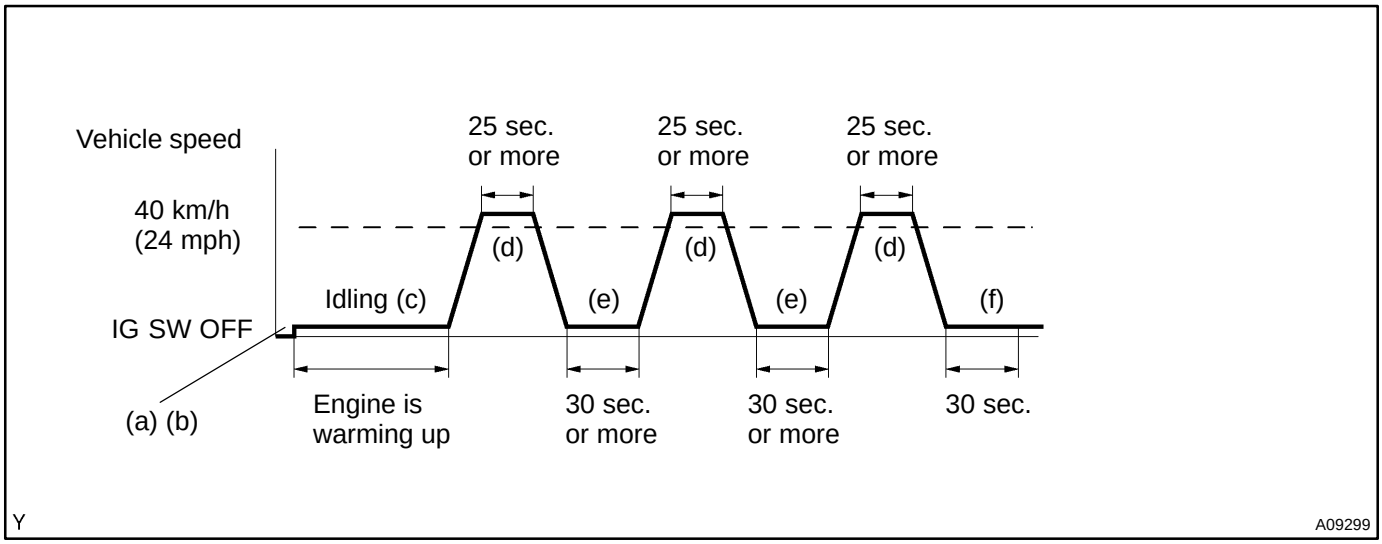
If the HO2S voltage is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$07	Minimum front HO2S voltage	N/A	V
$08	Maximum front HO2S voltage	N/A	V

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN



(a) Connect the hand-held tester to the DLC3.
(b) Switch the hand-held tester from ”normal mode” to ”check mode” (See page DI-3).
(c) Start the engine and let the engine idle for warming up (Engine coolant Temp. is 75˚C (167˚F) or greater).
(d) Drive the vehicle at 40 km/h (24 mph) or more for 25 sec. or more.
(e) Let the engine idle for 25 sec. or more.
(f) Let the engine idle for 30 sec.

HINT:

If a malfunction exists, the MIL will light up during step (f).

NOTICE:

If the conditions in this test are not strictly followed, detection of the malfunction will not be possible. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps (c) to (f), then perform steps (c) to (f) again.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is an ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

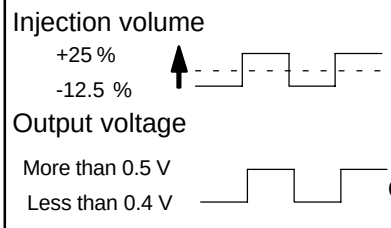
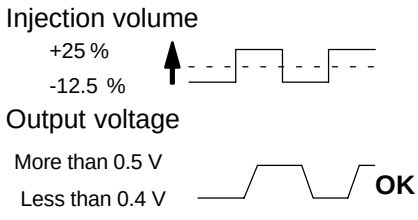
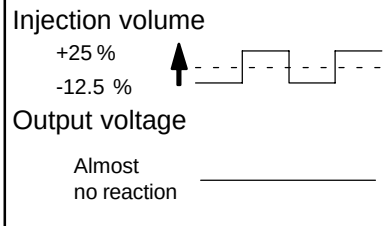
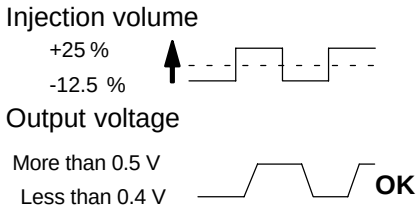
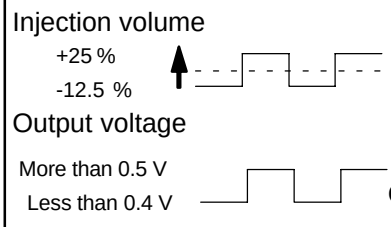
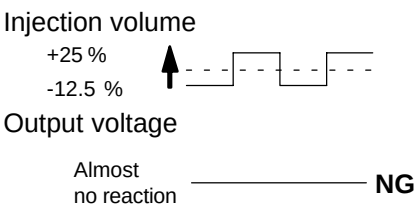
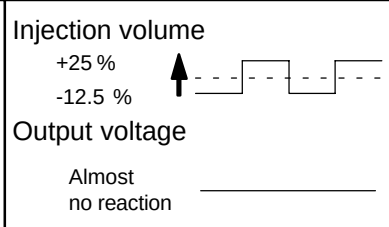
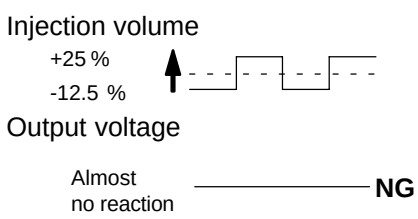
(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25% → rich output: More than 0.5 V
-12.5% → lean output: Less than 0.4 V

NOTICE:

However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1			—
Case 2			Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3			Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4			Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).

For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL/USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.

NOTICE:

If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and heated oxygen sensor DTCs will be recorded, and the MIL then comes on.

HINT:

- If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1	**Are there any other codes (besides DTC P0130, P0150, P2195, P2196, P2197 or P2198) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0130, P0150, P2195, P2196, P2197 and/or P2198”	A
”P0130, P0150 P2195, P2196, P2197 or P2198” and other DTCs	B

HINT:

If any other codes besides ”P0130, P0150, P2195, P2196, P2197 and/or P2198” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-35).**

A

2	**Check output voltage of heated oxygen sensor during idling.**

PREPARATION:

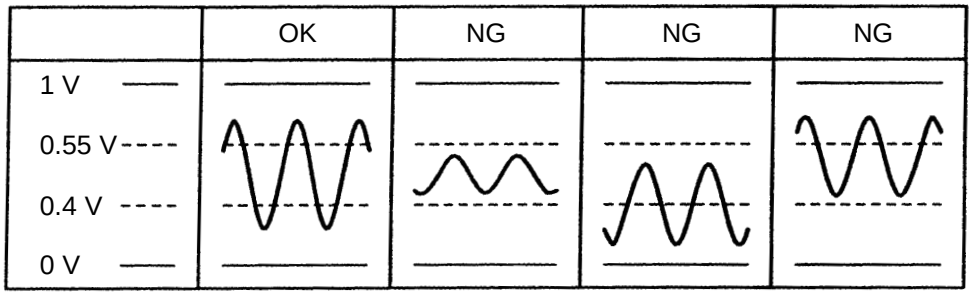
(a) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 90 seconds.
(b) Connect the hand-held tester or OBD II scan tool to the DLC3.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Use the OBD II scan tool or hand-held tester to read an output voltage of the heated oxygen sensor during idling.

OK:

Heated oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



A00292

OK → **Go to step 9.**

NG

3	**Check resistance of heated oxygen sensor heater (See page SF-73).**

NG → **Replace heated oxygen sensor.**

OK

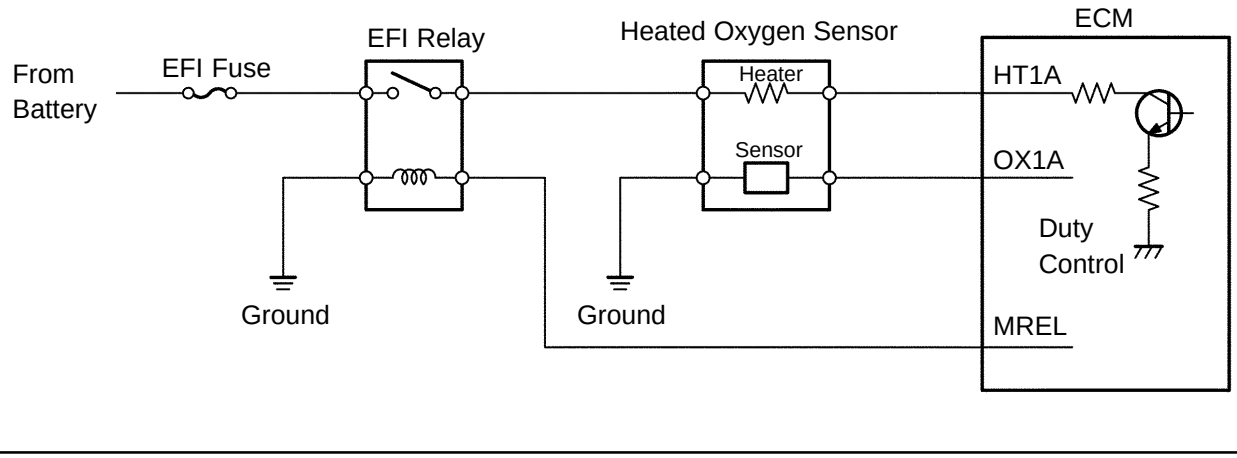
4	**Check EFI relay (See page SF-50).**

NG → **Replace EFI relay.**

OK

5	**Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN-33).**

Reference (Bank 1 Sensor 1 System Drawing):



NG → **Repair or replace harness or connector.**

OK

6	**Check air induction system (See page SF-1).**

CHECK:

Check the air induction system for vacuum leaks.

NG → **Repair or replace air induction system.**

OK

7	**Check fuel pressure (See page SF-6).**

CHECK:

Check the fuel pressure (high or low pressure).

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

8	**Check injector injection (See page SF-22).**

NG → **Replace injector.**

OK

Replace heated oxygen sensor.

9	**Perform confirmation driving pattern.**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

10	**Is there DTC P0130, P0150, P2195, P2196, P2197 or P2198 being output again?**

NO → **Check for intermittent problems (See page DI-427).**

YES

Replace heated oxygen sensor.

DIC49-01

DTC	P0133	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)

DTC	P0153	Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

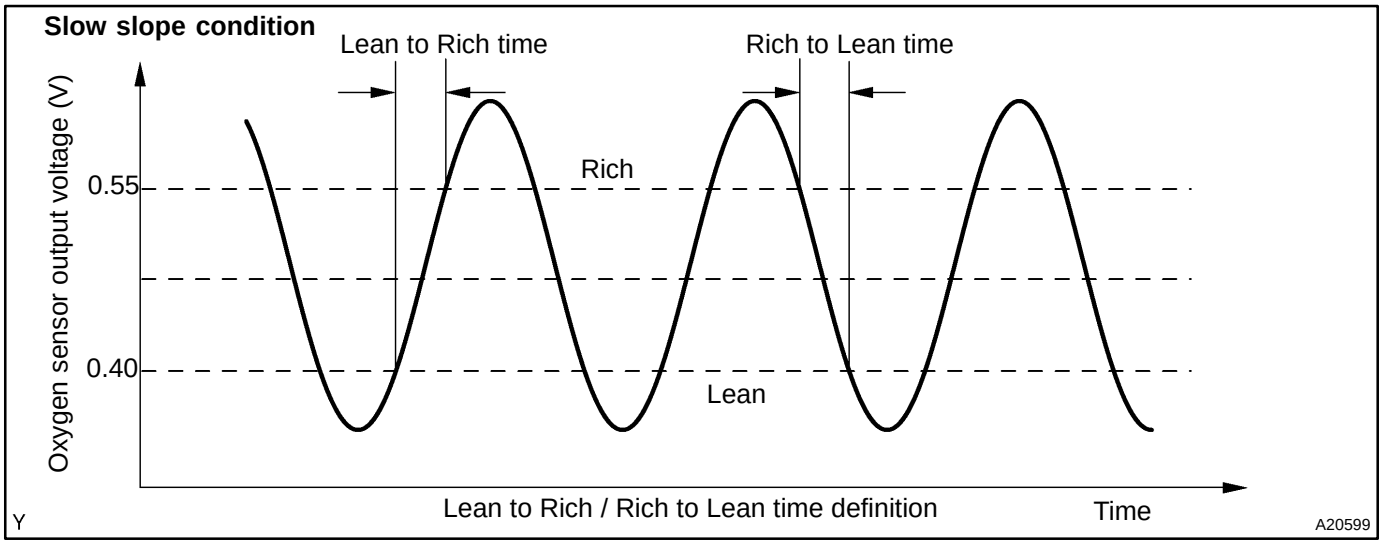
Refer to DTC P0130 on page DI-1 10.

DTC No.	DTC Detecting Condition	Trouble Area
P0133 P0153	After engine has been warmed up, if response time that heated oxygen sensor's output voltage reaches from RICH to LEAN. or from LEAN to RICH, is 0.6 second or more during idling. (2 trip detection logic)	✓Open or short in heated oxygen sensor circuit ✓Heated oxygen sensor ✓Air induction system ✓Fuel pressure ✓Injector ✓ECM
	If response time of heated oxygen sensor's output voltage in one RICH-LEAN cycle is 6 seconds or more during idling. (2 trip detection logic)	

HINT:

- ✓ Bank 1 refers to bank that includes cylinder No.1.
- ✓ Bank 2 refers to bank that does not include cylinder No.1.
- ✓ Sensor 1 refers to the sensor closer to the engine body.

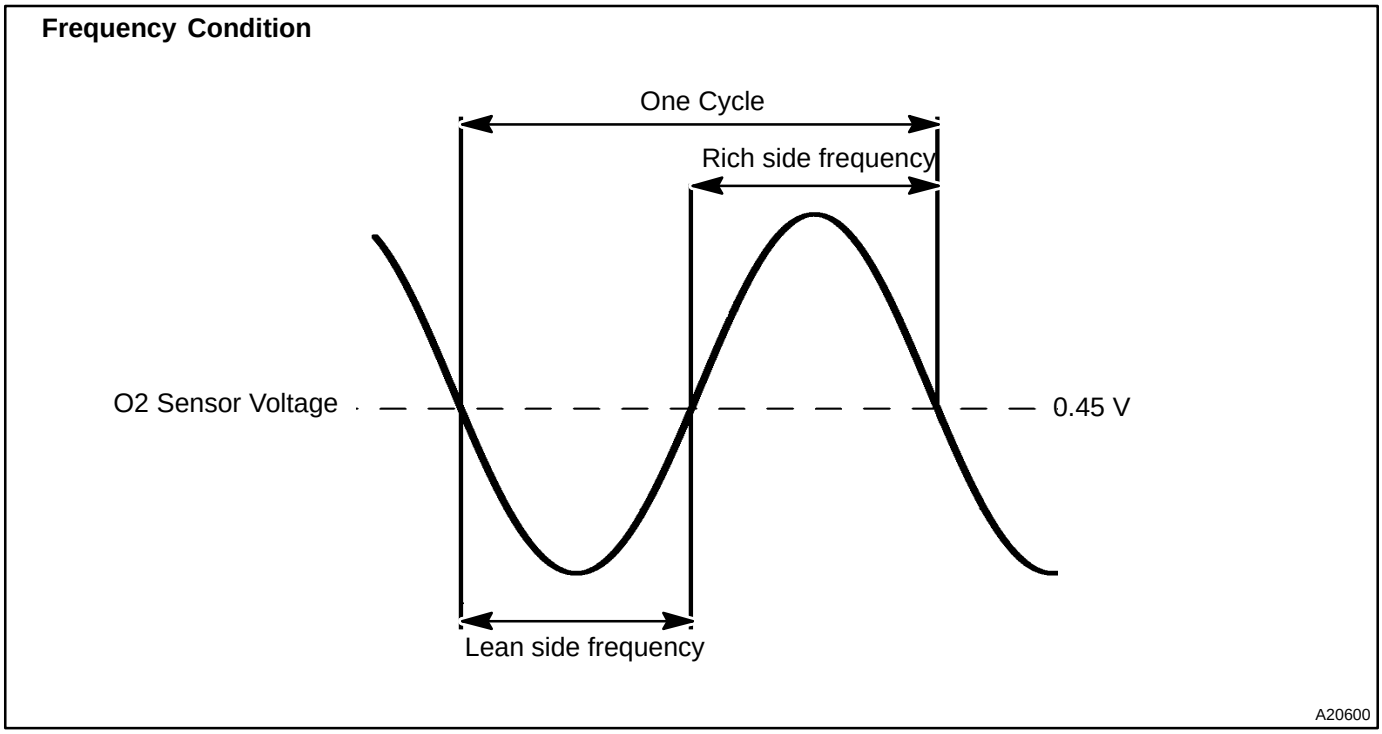
MONITOR DESCRIPTION



The ECM uses the heated oxygen sensor information to regulate the air-fuel ratio close to a stoichiometric ratio. This maximizes the catalytic converter's ability to purify the exhaust gas. The sensor detects oxygen levels in the exhaust gas and sends this signal to the ECM.

The inner surface of the sensor element is exposed to outside air. The outer surface of the sensor element is exposed to exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element. The heated oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. The heated oxygen sensor generates waveforms of a voltage between 0 V and 1 V in response to the oxygen concentration in exhaust gas. When the output voltage of the heated oxygen sensor is 0.55 V or more, the ECM judges that the air-fuel ratio is RICH. When it is 0.40 V or less, the ECM judges that the air-fuel ratio is LEAN.

The ECM monitors the response feature of the heated oxygen sensor. If the response time of the heated oxygen sensor output status change from RICH to LEAN or vice versa becomes longer, the ECM interprets this as a malfunction in the heated oxygen sensor and sets a DTC.



MONITOR STRATEGY

Related DTCs	P0133	Front heated oxygen sensor response monitor (Bank 1)
	P0153	Front heated oxygen sensor response monitor (Bank 2)
Required sensors/components	Main sensors/components	Front heated oxygen sensor
	Related sensors/components	Crank position sensor, Vehicle speed sensor, Mass air flow meter
Frequency of operation	Once per drive cycle	
Duration	Within 60 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)	
Frequency idle condition:		
There is history that the following conditions were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Idle	ON	
Vehicle speed	-	5 km/h (3 mph)
Fuel system status	Closed loop	
Time after engine start	120 sec.	-
Engine coolant temperature	75˚C (167˚F)	-
Frequency cruise condition:		
There is history that the following conditions were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Intake air amount	3 g/sec.	13 g/sec.
Time after engine start	120 sec.	-
Idle	OFF	
Fuel system status	Closed loop	
Engine speed	1,000 rpm	3,500 rpm
Engine coolant temperature	70˚C (158˚F)	-
Slow slope condition:		
There is history that the following conditions were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Time after engine start	120 sec.	-
Idle	ON	
Vehicle speed	-	5 km/h (3 mph)

Fuel system status	Closed loop	
Engine coolant temperature	40˚C (104˚F)	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Frequency idle condition	
Time required by the sensor's output voltage to change in one RICH-LEAN cycle	P0133 (Bank 1): 6.9 sec. or more P0153 (Bank 2): 7.4 sec. or more
Frequency cruise condition	
Time required by the sensor's output voltage to change in one RICH-LEAN cycle	a specific time or more
Slow slope condition	
Time that sensor's output voltage changes from 0.4 V to 0.55 V, or from 0.55 V to 0.4 V	0.9 sec. or more

COMPONENT OPERATING RANGE

Parameter	Standard value
Voltage output from heated oxygen sensor	Quickly fluctuates between 0.4 V and 0.55 V

O2S TEST RESULT

Refer to page DI-3 for detailed information.

Front HO2S slow slope monitor

If the HO2S sensor voltage is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$03	Low sensor voltage for response time calculation	N/A	V
$04	High sensor voltage for response time calculation	N/A	V

If the time required to change is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$31	Time to change from Lean (±0.4 V) to Rich (⊖0.55 V)	N/A	sec.
$32	Time to change from Rich (⊖0.55 V) to Lean (±0.4 V)	N/A	sec.

Front HO2S frequency monitor (idling)

If the $38 is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$38	Average of switching frequency at idle	N/A	sec.

Front HO2S frequency monitor (cruse)

If the $90 is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$90	Remained value of that average of switching frequency is subtracted from average of switching frequency threshold	Multiply by 0.04096 plus 5.2	sec.

WIRING DIAGRAM

Refer to DTC P0130 on page DI-1 10.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following "A/F CONTROL" (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

"A/F CONTROL" is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL".
(5) Perform "A/F CONTROL" with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few second delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.

NOTICE:

If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and DTCs P0133 and/or P0153 will be recorded, and the MIL then comes on.

- If different DTCs related to different systems while terminal E2 as ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1	**Are there any other codes (besides DTC P0133 or P0153) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0133 and/or P0153”	A
”P0133 or P0153” and other DTCs	B

HINT:
If any other codes besides ”P0133 and/or P0153” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-35).**

A

2	**Check output voltage of heated oxygen sensor during idling.**

PREPARATION:

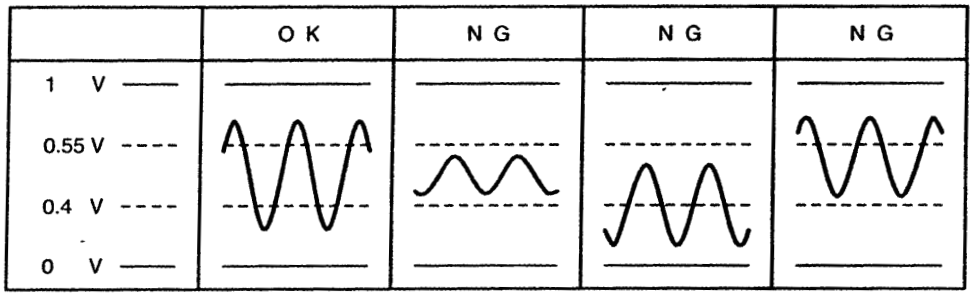
(a) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 90 seconds.
(b) Connect the hand-held tester or OBD II scan tool to the DLC3.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Use the OBD II scan tool or hand-held tester to read the output voltage of the heated oxygen sensor during idling.

OK:

Heated oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



P18349

OK → **Go to step 9**

NG

3	**Check resistance of heated oxygen sensor heater (See page SF-73).**

NG → **Replace heated oxygen sensor.**

OK

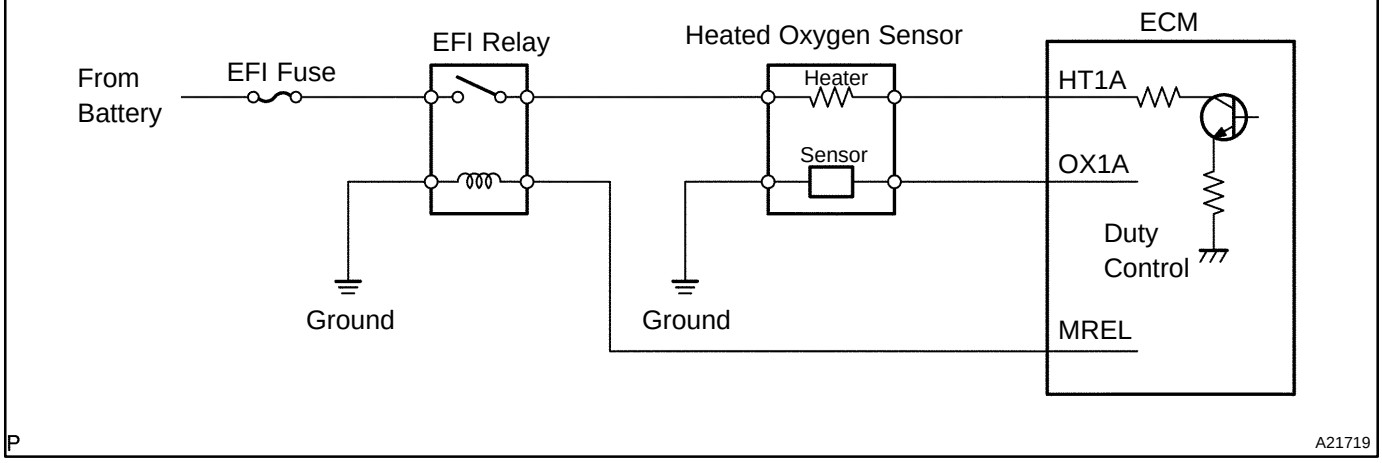
4	**Check EFI relay (see page SF-50).**

NG → **Replace EFI relay.**

OK

5	**Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN-33)**

Reference (Bank 1 Sensor 1 System Drawing):



NG → **Repair or replace harness or connector.**

OK

6	**Check air induction system (See page SF-1).**

CHECK:

Check the air induction system for vacuum leaks.

NG → **Repair or replace air induction system.**

OK

7	**Check fuel pressure (See page SF-6).**

CHECK:

Check the fuel pressure (high or low pressure).

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

8	Check injector injection (See page SF-22).

NG → Replace injector.

OK →

Replace heated oxygen sensor.

9	Perform confirmation driving pattern (See page DI-1 10).

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO →

10	Is there DTC P0133 or P0153 being output again?

NO → Check for intermittent problems (See page DI-3).

YES →

Replace heated oxygen sensor.

DIC4A-01

DTC	P0134	Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 1)

DTC	P0154	Oxygen Sensor Circuit No Activity Detected (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0130 on page DI-1 10.

DTC No.	DTC Detecting Condition	Trouble Area
P0134 P0154	After engine is warmed up, heated oxygen sensor (bank 1, 2 sensor 1) output does not indicate RICH (±0.45 V) even once when conditions (a), (b), (c) and (d) continue for at least 65 sec.: (a) Engine speed: 1,400 rpm or more (b) Vehicle speed: 40 km/h (25 mph) or more (c) Throttle valve does not fully closed (d) 180 sec. or more after starting engine	✓ Open or short in heated oxygen sensor (bank 1, 2 sensor 1) circuit ✓ Heated oxygen sensor (bank 1, 2 sensor 1) ✓ Air induction system ✓ Fuel pressure ✓ Injector ✓ Gas leakage on exhaust system ✓ ECM ✓ PCV piping

HINT:

- ✓ Bank 1 refers to bank that includes cylinder No. 1.
- ✓ Bank 2 refers to bank that does not includes cylinder No. 1.
- ✓ Sensor 1 refers to the sensor closer to the engine assembly.
- ✓ After confirming DTC P0134 and P0154, check the output voltage of the heated oxygen sensor in the ”DIAGNOSIS / ENHANCE OBD II / DATA LIST / ALL” using the OBD II scan tool or the hand−held tester. If output voltage of the heated oxygen sensor is always less than 0.1 V, heated oxygen sensor circuit may be open or short.

MONITOR DESCRIPTION

The ECM uses the heated oxygen sensor to optimize the air-fuel mixture in closed-loop fuel control. This control helps decrease exhaust emissions by providing the catalyst with a nearly stoichiometric mixture. The sensor detects the oxygen level in the exhaust gas and the ECM uses this data to control the air-fuel ratio. The sensor output voltage ranges from 0 V to 1 V. If the signal voltage is less than 0.4 V, the air-fuel ratio is LEAN. If the signal voltage is more than 0.55 V, the air-fuel ratio is RICH. If the conditions for the closed-loop fuel control are met and after a specified time-period, the sensor’s output signal never indicates RICH, the ECM will conclude that the closed-loop fuel control is malfunctioning. The ECM will illuminate the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0134	Excessive time to enter closed loop (Bank 1)
	P0154	Excessive time to enter closed loop (Bank 2)
Required sensors/components	Main sensors/components	Front heated oxygen sensor
	Related sensors/components	Crank position sensor, Engine coolant temperature sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	65 sec.	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Time after following conditions met:	50 sec.	-
Engine coolant temperature	40℃ (104°F)	-
Engine speed	1,400 rpm	-
Vehicle speed	40 km/h (25 mph)	-
Idle	OFF	
Time after engine start	180 sec.	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Front heated oxygen sensor voltage	Less than 0.45 V

COMPONENT OPERATING RANGE

Parameter	Standard value
In the normal condition, the front heated oxygen sensor voltage	0 to 1 V

WIRING DIAGRAM

Refer to DTC P0130 on page DI-1 10.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following "A/F CONTROL" (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

"A/F CONTROL" is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL".
(5) Perform "A/F CONTROL" with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % / -12.5 % → Output voltage: More than 0.5 V / Less than 0.4 V **OK**	Injection volume +25 % / -12.5 % → Output voltage: More than 0.5 V / Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % / -12.5 % → Output voltage: Almost no reaction **NG**	Injection volume +25 % / -12.5 % → Output voltage: More than 0.5 V / Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % / -12.5 % → Output voltage: More than 0.5 V / Less than 0.4 V **OK**	Injection volume +25 % / -12.5 % → Output voltage: Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % / -12.5 % → Output voltage: Almost no reaction **NG**	Injection volume +25 % / -12.5 % → Output voltage: Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.
HINT:

- If different DTCs related to different systems terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1	**Are there any other codes (besides DTC P0134 and P0154) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0134 and/or P0154”	A
”P0134 or P0154” and other DTCs	B

HINT:
If any other codes besides P0134 and/or P0154 are output, perform the troubleshooting for those codes first.

A → **Go to relevant DTC chart (See page DI-35).**

B

2	**Connect the OBD II scan tool or hand-held tester, and read value for voltage output of heated oxygen sensors (bank 1, 2 sensor 1).**

PREPARATION:

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Warm up the engine to normal operating temperature (above 75˚C (169˚F)).
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Read the voltage output of the heated oxygen sensors when the engine is suddenly raced.
HINT:
Perform quick racing to 4,000 rpm 3 times using the accelerator pedal.

OK:

Heated oxygen sensor output a RICH signal (0.45 V or more) at least once.

OK → **Go to step 12.**

NG

3	**Check connection of PCV piping.**

NG → **Repair or replace PCV piping.**

OK

4	**Check resistance of heated oxygen sensor heater (See page SF-73).**

NG → **Replace heated oxygen sensor.**

OK

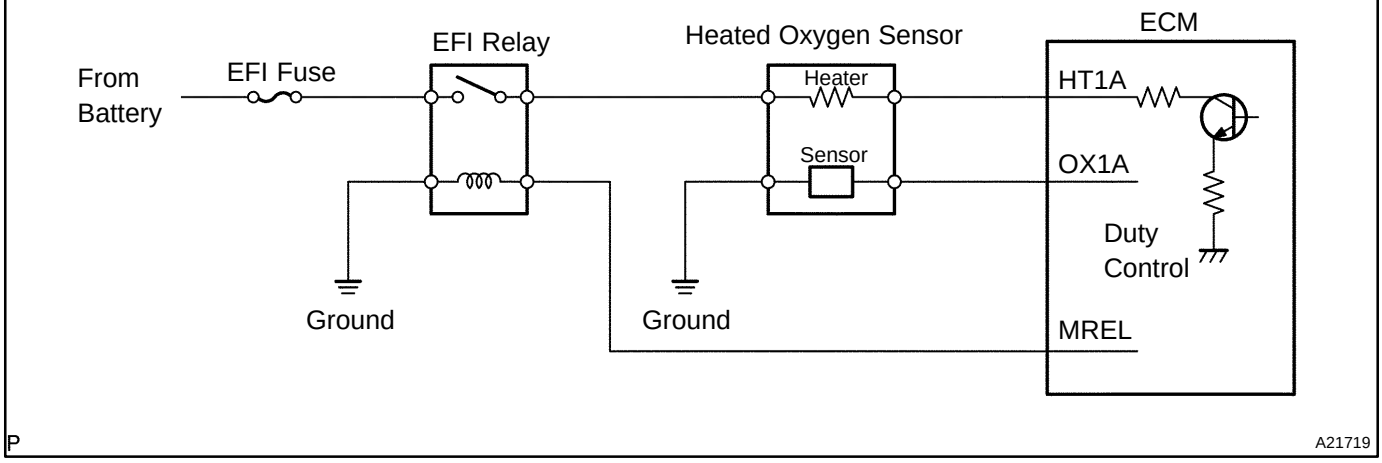
5	**Check EFI relay (See page SF-50).**

NG → **Replace EFI relay.**

OK

6	**Check for open and short in harness and connector between ECM and heated oxygen sensors (bank 1, 2 sensor 1) (See page IN-33).**

Reference (Bank 1 Sensor 1 System Drawing):



NG → **Repair or replace harness or connector.**

OK

7	**Check whether misfire is occurred or not by monitoring DTC and data list.**

NG → **Perform troubleshooting for misfire (See page DI-164).**

OK

8	**Check air induction system (See page SF-1).**

CHECK:

Check the air induction system for vacuum leaks.

NG → **Repair or replace air induction system.**

OK

9	**Check fuel pressure (See page SF-6).**

CHECK:

Check the fuel pressure (high or low pressure).

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK ↓

10	**Check injector injection (See page SF-22).**

NG → **Replace injector.**

OK ↓

11	**Check gas leakage on exhaust system.**

NG → **Repair or replace exhaust gas leakage point.**

OK ↓

Replace heated oxygen sensor (bank 1, 2 sensor 1).

12	**Perform confirmation driving pattern (See page DI-1 10).**

HINT:

Clear all DTCs prior to performing the confirmation driving pattern.

GO ↓

13	Is there DTC P0134 and P0154 being output again?

YES → Replace ECM (See page SF-74).

NO

14	Did vehicle runs out of fuel in past?

NO → Check for intermittent problems (See page DI-3).

YES

DTCs P0134 and P0154 are caused by running out of fuel.

DIC4B-01

DTC	P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

DTC	P0156	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0130 on page DI-1 10.

DTC No.	Detection Item	Trouble Area
P0136 P0156	Voltage output of heated oxygen sensor remains at 0.4 V or more or 0.5 V or less after engine is warmed up (2 trip detection logic)	™Open or short in heated oxygen sensor circuit ™Heated oxygen sensor ™Air induction system ™Fuel pressure ™Injector ™ECM

HINT:

- ™ Bank 1 refers to bank that includes cylinder No.1.
- ™ Bank 2 refers to bank that does not include cylinder No.1.
- ™ Sensor 2 refers to the farther sensor away from the engine body.

MONITOR DESCRIPTION

The ECM monitors the rear heated oxygen sensor in the following 3 items:

(1) If the rear heated oxygen sensor voltage changes between Rich and Lean while the vehicle is running (repeating acceleration and deceleration). If not, the ECM interprets this as a malfunction, illuminates the MIL, and then sets DTC.

(2) If the rear heated oxygen sensor voltage does not remain at less than 0.05 V for a long time while the vehicle is running. If not, the ECM interprets this as a malfunction, illuminates the MIL, and then sets DTC.

(3) If the sensor's voltage drops to below 0.2 V (extremely Lean status) immediately when the vehicle decelerates and the fuel cut is working. if not, the ECM interprets this to mean the sensor's response feature has deteriorated, illuminates the MIL, and then sets DTC.

MONITOR STRATEGY

Related DTCs	P0136	Heated rear oxygen sensor output voltage (Crack) (Bank 1)
		Heated rear oxygen sensor output voltage (Bank 1)
		Heated rear oxygen sensor slow response (Bank 1)
	P0156	Heated rear oxygen sensor output voltage (Crack) (Bank 2)
		Heated rear oxygen sensor output voltage (Bank 2)
		Heated rear oxygen sensor slow response (Bank 2)
Required sensors/components	Main sensors/components	Heated rear oxygen sensor
	Related sensors/components	Mass air flow meter, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	300 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1 (Output voltage (Crack)):		
Vehicle speed	3 km/h (2 mph)	-
Idle	OFF	
Fuel cut	OFF	
Time after fuel cut ON to OFF	14.5 sec.	-
Intake air amount per revolution	™AT: 0.38 g/rev ™MT: 0.32 g/rev	-
Case 2 (Output voltage):		
All of the following conditions are met:	A, B, C and D	
A. Pass/fail detection in this driving cycle	Not detected	
B. Engine	Running	
C. Time after engine start	0 sec.	-
D. Either of the following conditions is met:	(a) or (b)	
(a) Cumulative time while heated oxygen sensor hearter is ON	22 sec.	-
(b) At once more heated oxygen sensor voltage	0.2 V	-
Case 3 (Slow response):		
Rear oxygen sensor voltage before the fuel cut	0.2 V	-
Catalyst condition	Warmed up	

Engine coolant temperature	75˚C (167˚F)	-
Fuel cut	Continues	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1 (Output voltage (Crack)):	
Following conditions are met:	1, 2 and 3
1. Cumulative heated oxygen sensor monitor time	™AT: 230 sec. or more ™MT: 200 sec.
2. Time while heated oxygen sensor voltage is less than 0.05V	™AT: 138 sec. or more ™MT: 120
3. Maximum heated oxygen sensor rich time (0.45V or more)	Less than 20 sec.
Case 2 (Output voltage):	
Number of heated oxygen sensor voltage ”switching”	0 times or less
”Switching” is counted when the sensor signal crosses the minimum or maximum voltage	
Minimum voltage	0.4 V or less
Maximum voltage	0.5 V or more
Case 3 (Slow response):	
Time until the rear oxygen sensor voltage drops to 0.2 V after fuel cut starts operating	™AT: 6 sec. or more ™MT: 10 sec. or more

COMPONENT OPERATING RANGE

Parameter	Standard Value
Heated oxygen sensor voltage	0 to 1 V

O2S TEST RESULT

Refer to page DI-3 for detailed information.

Rear HO2S voltage monitor

If the HO2S sensor voltage is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$07	Minimum rear HO2S voltage	N/A	V
$08	Maximum rear HO2S voltage	N/A	V

If the time required to change is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$31	Time to change from Lean (<0.4 V) to Rich (±0.5 V)	N/A	sec.
$32	Time to change from Rich (±0.5 V) to Lean (<0.4 V)	N/A	sec.

Rear HO2S slow response monitor

If the elapsed time is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$37	Until rear HO2S voltage drops to 0.2 V after fuel-cut starting	N/A	sec.

Rear HO2S element monitor

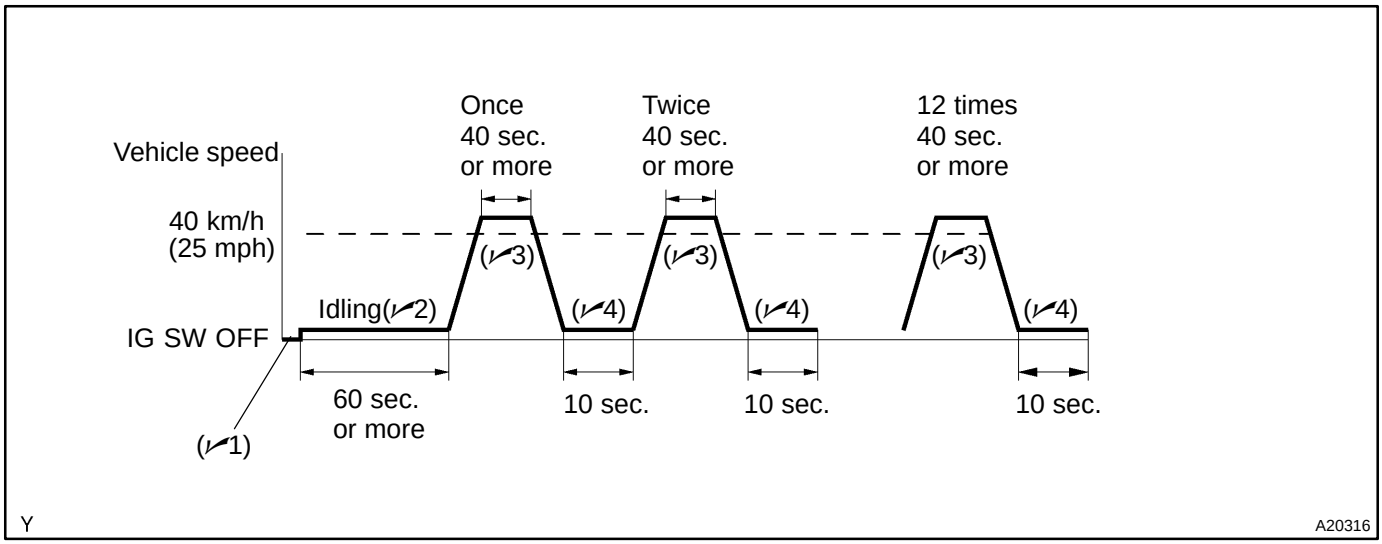
If all the values ($81, $84, $85 and $87) are out of the standard values, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$81	Percentage of monitoring time when the HO2S voltage is less than 0.05 V	Multiply 0.3906	%
$84	Percentage of monitoring time when the HO2S voltage is more than 0.7 V	Multiply 0.3906	%
$85	Time when the HO2S voltage is 0.45 V or more	Multiply 0.2621	sec.
$87	Percentage of monitoring time when the HO2S voltage is more than 0.45 V	Multiply 0.3906	%

WIRING DIAGRAM

Refer to DTC P0130 on page DI-1 10.

CONFIRMATION DRIVING PATTERN



1. **Connect the hand-held tester to the DLC3. (✓1)**
2. **Switch the hand-held tester from the normal mode to the check mode (See page DI-3). (✓1)**
3. **Start the engine and let the engine idle for 60 seconds or more. (✓2)**
4. **Drive the vehicle at 40 km/h (25 mph) or more for 40 seconds or more. (✓3)**
5. **Let the engine idle for 10 seconds or more. (✓4)**
6. **Perform steps 4. and 5. for 12 times.**

HINT:

If a malfunction exists, the MIL will light up on the multi-information display during step 6.

NOTICE:

If the conditions in this test are not strictly followed, a malfunction detection will not occur. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps from 3 to 6, then perform steps from 3 to 6 again.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

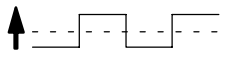
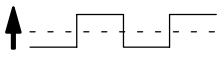
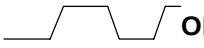
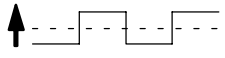
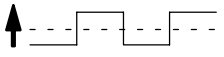
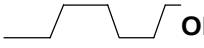
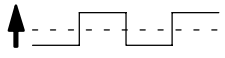
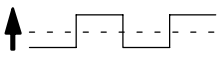
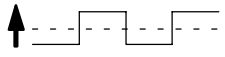
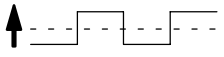
”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:
However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors.
For displaying the graph indication, first enter ”ACTIVE TEST / A/F CONTROL / USER DATA,” then select ”02S B1S1and O2S B1S2” by pressing ”YES” button, and push ”ENTER” button before pressing ”F4” button.
HINT:

- If different DTCs that are related to different system are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0136 or P0156) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD ll scan tool.

RESULT:

Display (DTC Output)	Proceed to
P0136 or P0156	A
”P0136 or P0156” and other DTCs	B

HINT:

If any other codes besides P0136 or P0156 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-35).**

A

2	**Check output voltage of heated oxygen sensor.**

PREPARATION:

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) After warming up the engine, race the engine speed at 2,500 rpm for 3 minntes.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S2 or B2 S2.

CHECK:

Read the output voltage of the heated oxygen sensor when the engine is suddenly raced.

HINT:

Perform a quick racing to 4,000 rpm 3 minntes. using the accelerator pedal.

OK:

Heated oxygen sensor output voltage: Alternates from 0.4 V or less to 0.5 V or more

OK → **Go to step 6.**

NG

3	Check resistance of heated oxygen sensor heater (See page SF-73).

NG → Replace heated oxygen sensor.

OK

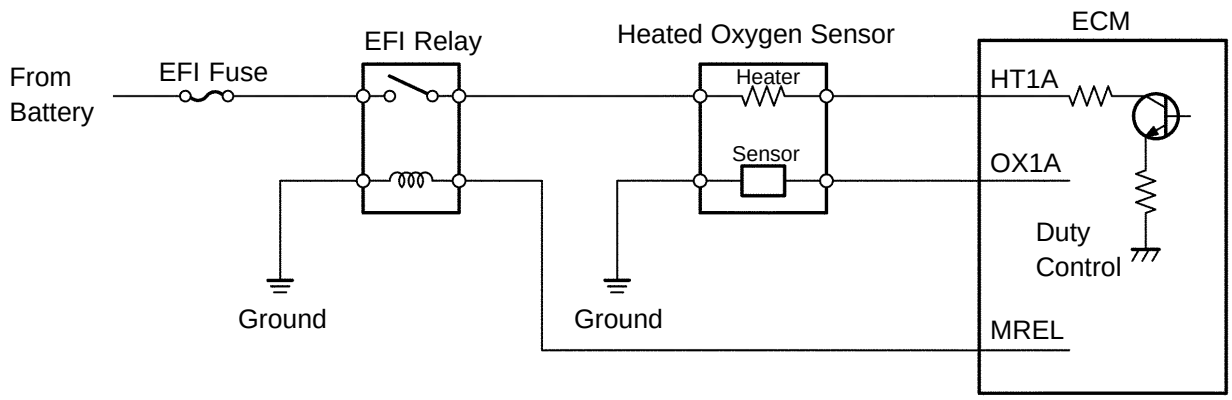
4	Check EFI relay (See page SF-50).

NG → Replace EFI relay.

OK

5	Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN-33).

Reference (Bank 1 Sensor 2 System Drawing):



NG → Repair or replace harness or connector.

OK

Replace heated oxygen sensor.

6	**Perform confirmation driving pattern (See page DI-148).**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

Go

7	**Is the DTC P0136 or P0156 being output again?**

NO → **Check for intermittent problems (See page DI-3).**

YES

Replace heated oxygen sensor.

DIC4C-01

DTC	P0171	System too Lean (Bank 1)

DTC	P0172	System too Rich (Bank 1)

DTC	P0174	System too Lean (Bank 2)

DTC	P0175	System too Rich (Bank 2)

CIRCUIT DESCRIPTION

The fuel trim is related to the feedback compensation value, not to the basic injection time. The fuel trim includes the short-term fuel trim and the long-term fuel trim.

The short-term fuel trim is the short-term fuel compensation used to maintain the air-fuel ratio at stoichiometric air-fuel ratio. The signal from the heated oxygen sensor indicates whether the air-fuel ratio is RICH or LEAN compared to the stoichiometric air-fuel ratio. This variance triggers a reduction in the fuel volume if the air-fuel ratio is RICH, and an increase in the fuel volume if it is LEAN.

The long-term fuel trim is the overall fuel compensation carried out in long-term to compensate for a continual deviation of the short-term fuel trim from the central value, due to individual engine differences, wear overtime and changes in the operating environment.

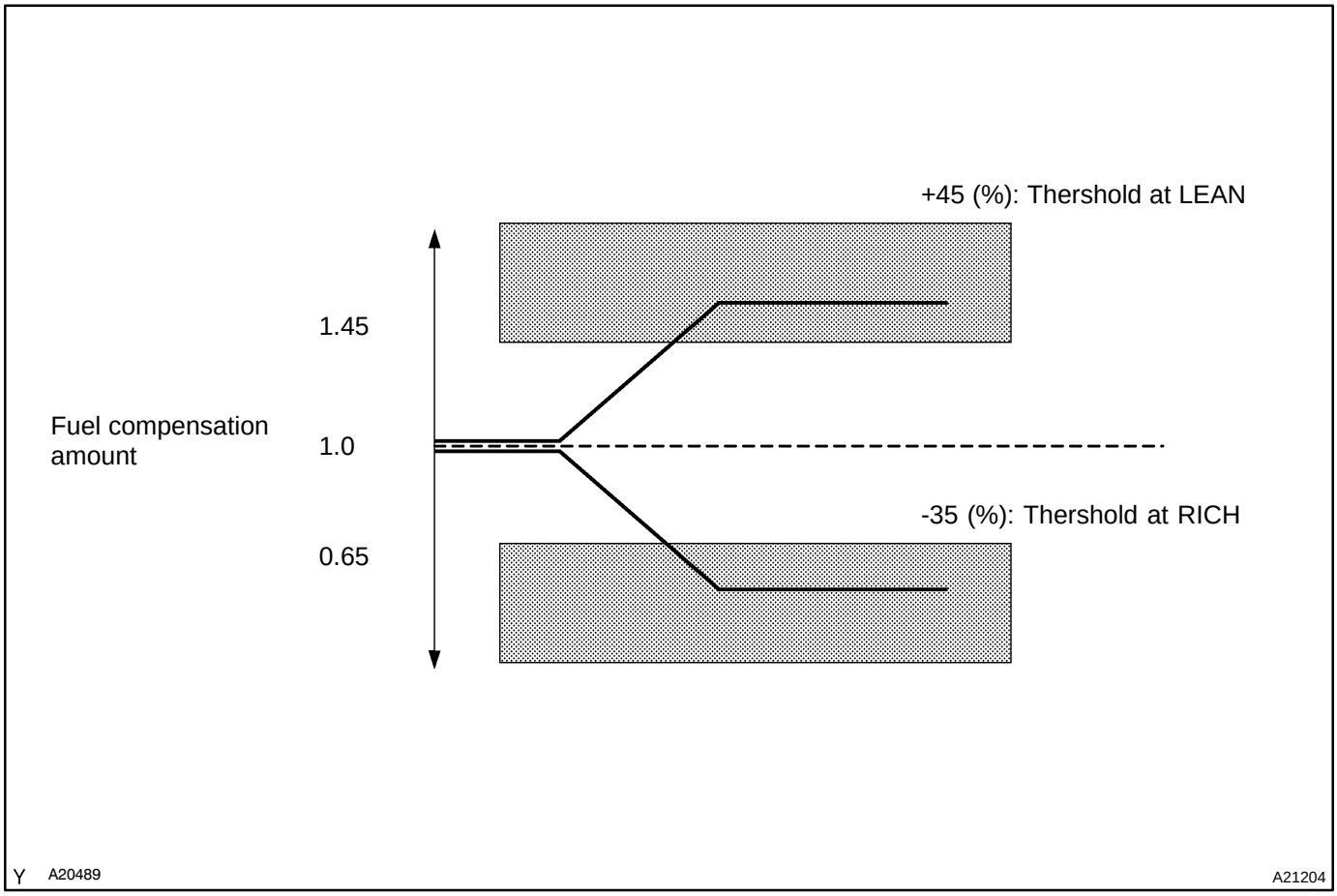
If both the short-term fuel trim and the long-term fuel trim are LEAN or RICH beyond a certain value, it is detected as a malfunction and the MIL is illuminated and a DTC is set.

DTC No.	DTC Detecting Condition	Trouble Area
P0171 P0174	When air fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on LEAN side (2 trip detection logic)	™Air induction system ™Injector blockage ™Mass air flow meter ™Engine coolant temp. sensor ™Fuel pressure ™Gas leakage on exhaust system ™Open or short in heated oxygen sensor circuit (bank 1, 2 sensor 1) ™Heated oxygen sensor (bank 1, 2 sensor 1) ™ECM ™PCV piping
P0172 P0175	When air fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on RICH side (2 trip detection logic)	™Injector leak, blockage ™Mass air flow meter ™Engine coolant temp. sensor ™Ignition system ™Fuel pressure ™Gas leakage on exhaust system ™Open or short in heated oxygen sensor circuit (bank 1, 2 sensor 1) ™Heated oxygen sensor (bank 1, 2 sensor 1) ™ECM

HINT:

- When DTC P0171 or P0174 is recorded, the actual air-fuel ratio is on the LEAN side. When DTC P0172 or P0175 is recorded, the actual air-fuel ratio is on the RICH side.
- If the vehicle runs out of fuel, the air-fuel ratio is LEAN and DTC P0171 or P0174 may be recorded. The MIL then comes on.
- If the total of the short-term fuel trim value and long-term fuel trim value is within ± 35 % (engine coolant temperature is more than 75 C (167 F)), the system is functioning normally.

MONITOR DESCRIPTION



Under closed-loop fuel control, fuel injection amounts that deviate from the ECM's estimated fuel amount will cause a change in the long-term fuel trim compensation value. This long-term fuel trim is adjusted when there are persistent deviations in the short-term fuel trim values. And the deviation from a simulated fuel injection amount by the ECM affects a smoothed fuel trim learning value. The smoothed fuel trim learning value is the combination of smoothed short term fuel trim (fuel feedback compensation value) and smoothed long term fuel trim (learning value of the air-fuel ratio). When the smoothed fuel trim learning value exceeds the DTC threshold, the ECM interprets this as a fault in the fuel system and sets a DTC.

Example:

If the smoothed fuel trim leaning value is more than +45% or less than -35%. The ECM interprets this as a malfunction in the fuel system.

MONITOR STRATEGY

Related DTCs	P0171	Fuel system lean (Bank 1)
	P0172	Fuel system rich (Bank 1)
	P0174	Fuel system lean (Bank 2)
	P0175	Fuel system rich (Bank 2)
Required sensors/components	Main sensors/components	Front oxygen sensor
	Related sensors/components	Engine coolant temperature sensor, Mass air flow meter, Crankshaft position sensor
Frequency of operation	Continuous	
Duration	10 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11 V	-
Fuel system: Closed loop	13 sec.	-
One of the following conditions is met:	A or B	
A. Engine speed	-	1,100 rpm
B. Intake air amount per revolution	0.22 g/sec.	-
Warm up condition to enable air fuel ratio learning control	Condition are met	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Either following condition continues for 3 sec.	A or B
A. Smoothed fuel trim learning value (Lean)	45% or more
B. Smoothed fuel trim learning value (Rich)	-35% or less

WIRING DIAGRAM

Refer to DTC P0130 on page DI-1 10.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following "A/F CONTROL" (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

"A/F CONTROL" is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL".
(5) Perform "A/F CONTROL" with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.
HINT:

- If different DTCs related to different systems that have terminal E2 as the ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1	**Check air induction system (See page SF-1).**

CHECK:
Check the air induction system for vacuum leaks.

NG → **Repair or replace air induction system.**

OK

2	**Check connection of PCV piping.**

NG → **Repair or replace PCV valve and hose.**

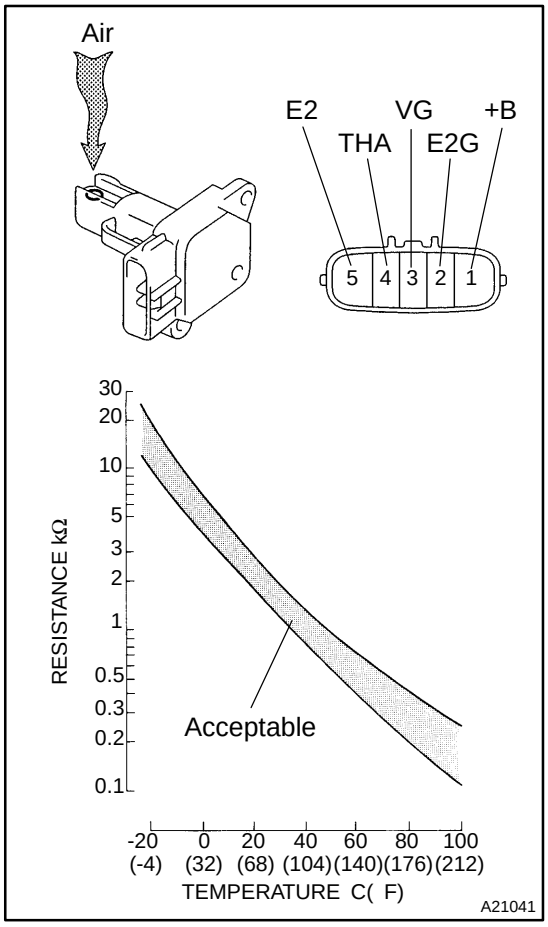
OK

3	**Check injector injection (See page SF-22).**

NG → **Replace injector.**

OK

4	Check mass air flow sensor.



PREPARATION:

Remove the mass air flow meter.

CHECK:

(a) Inspect output voltage.
  (1) Apply battery voltage across terminals +B and E2G.
  (2) Connect the positive (+) tester prove to terminal VG, and negative (-) tester prove to terminal E2G.
  (3) Blow air into the mass air flow sensor, and check that the voltage fluctuates.

(b) Inspect resistance.
  (1) Measure the resistance between terminals of the intake air temperature sensor.

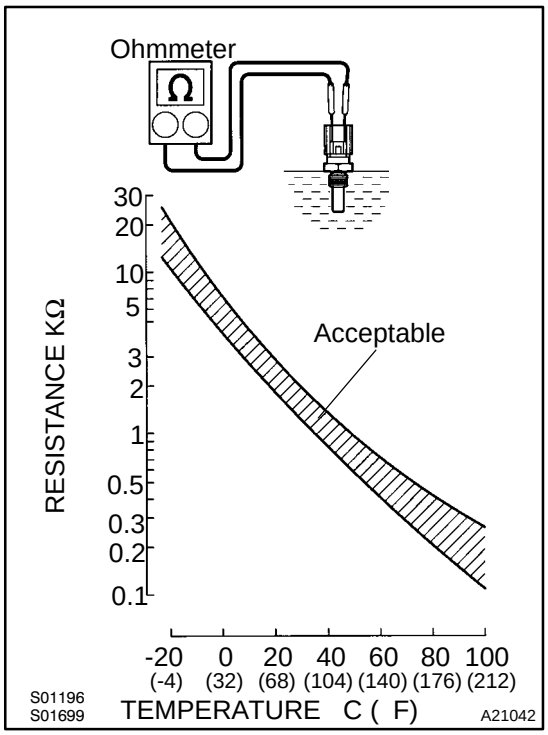
Resistance:

Tester Connection	Temperature	Specified Condition
THA (4) - E2 (5)	-20 C (-4 F)	13.6 to 18.4 kΩ
	20 C (68 F)	2.21 to 2.69 kΩ
	60 C (140 F)	0.49 to 0.67 kΩ

NG → **Repair or replace mass air flow meter.**

OK

5	Check engine coolant temperature sensor.



PREPARATION:

Remove the engine coolant temperature sensor.

CHECK:

(a) Measure the resistance between the terminals of the engine coolant temperature sensor.

Resistance:

Tester Connection	Specified Condition
1 - 2	2.32 to 2.59 kΩ (20 C (68 F))
	0.310 to 0.326 kΩ (80 C (176 F))

NOTICE:

In case of checking the engine coolant temperature sensor in the water, be careful not to allow water to go into the terminals. After checking, dry the sensor.

HINT:

Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

(b) Reinstall the engine coolant temperature sensor.

NG → **Repair or replace engine coolant temperature sensor.**

OK

6	Check for spark and ignition (See page IG-1).

NG → **Repair or replace.**

OK

7	**Check fuel pressure (See page SF-6).**

CHECK:

Check the fuel pressure (high or low pressure).

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

8	**Check gas leakage on exhaust system.**

NG → **Repair or replace exhaust gas leakage point.**

OK

9	**Check output voltage of heated oxygen sensor (bank 1, 2 sensor 1) during idling.**

PREPARATION:

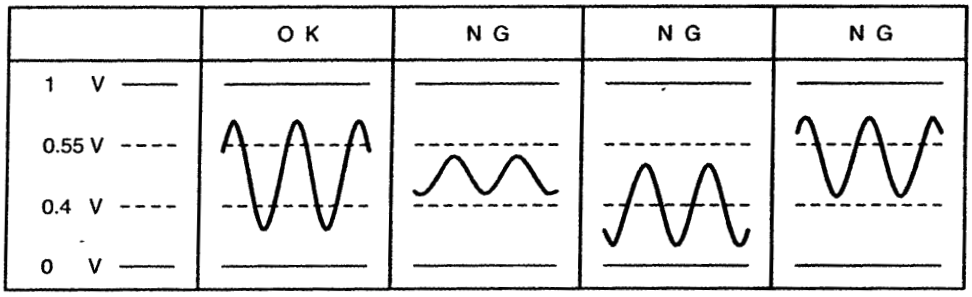
(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Warm up the engine to normal operating temperature (above 75˚C (169˚F)).
(c) Enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Use the OBD II scan tool or hand-held tester to read an output voltage of the heated oxygen sensor during idling.

OK:

Heated oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



P18349

OK	**Go to step 17.**

NG

10	**Check resistance of heated oxygen sensor heater (See page SF-73).**

NG	**Replace heated oxygen sensor.**

OK

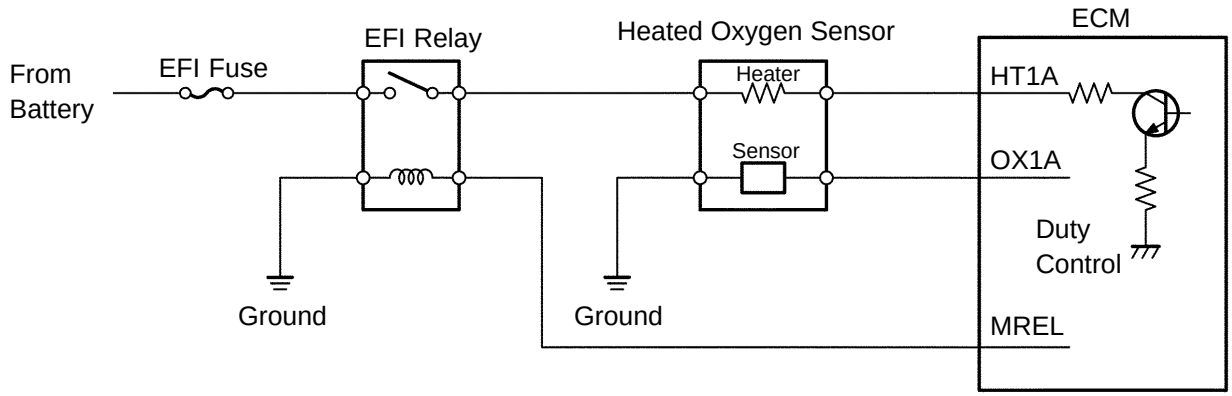
11	**Check EFI relay (See page SF-50).**

NG	**Replace EFI relay.**

OK

12	**Check for open and short in harness and connector between ECM and heated oxygen sensor (bank 1, 2 sensor 1) (See page IN-33).**

Reference (Bank 1 Sensor 1 System Drawing):



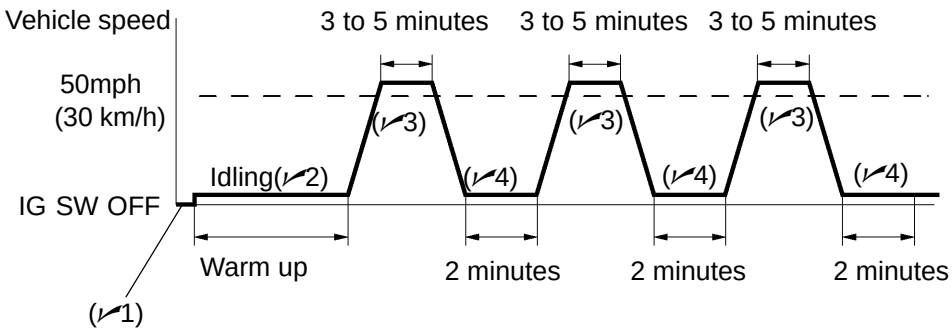
NG → **Repair or replace harness or connector.**

OK

13	**Replace heated oxygen sensor.**

Go

14	Preform confirmation driving pattern.



(a) Disconnect the battery terminal and wait for a minute (clear learning value of the air fuel ratio). (1)
(b) Connect the hand-held tester to the DLC3. (1)
(c) Switch the hand-held tester from the normal mode to the check mode (See page DI-3). (1)
(d) Start the engine and let it idle until engine coolant temperature is 75 ˚C (167 ˚F) or more. (2)
(e) Drive the vehicle at 50 mph (30 km/h) or more for 3 minutes or more. (3)
(f) Let the engine idle for approx. 2 minutes. (4)
(g) Perform steps (e) and (g) at least 3 times.

HINT:

If a malfunction exists, the MIL will be illuminated during step (f).

NOTICE:

If the conditions in this test are not strictly followed, detecting a malfunction may be difficult. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps (e) to (f), and then do step (f) again.

GO

15	Is there DTC P0171, P0172, P0174 or P0175 being output again?

YES → **Replace ECM (see page SF-74) and perform confirmation driving pattern (Refer to step 14).**

NO

16	**Did vehicle run out of fuel in past?**

NO → **Check for intermittent problems (See page DI-3).**

YES

DTC P0171, P0172, P0174 or P0175 is caused by running out of fuel.

17	**Perform confirmation driving pattern.**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (Refer to step 14).

Go

18	**Is there DTC P0171, P0172 P0174 and/or P0175 being output again?**

NO → **Go to step 22.**

YES

19	**Replace heated oxygen sensor.**

Go

20	**Perform confirmation driving pattern.**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (Refer to step 14).

Go

21	Is the DTC P0171, P0172, P0174 and/or P0175 being output again?

YES → Replace ECM (see page SF-74) and perform confirmation driving pattern (Refer to step 14).

No

22	Confirm if vehicle has run out of fuel in past.

NO → Check for intermittent problems. (See page DI-3).

YES

DTC is caused by running out of fuel (DTCs P0171, P0172 P0174 and/or P0175).

DI5YL-06

DTC	P0230	Fuel Pump Primary Circuit

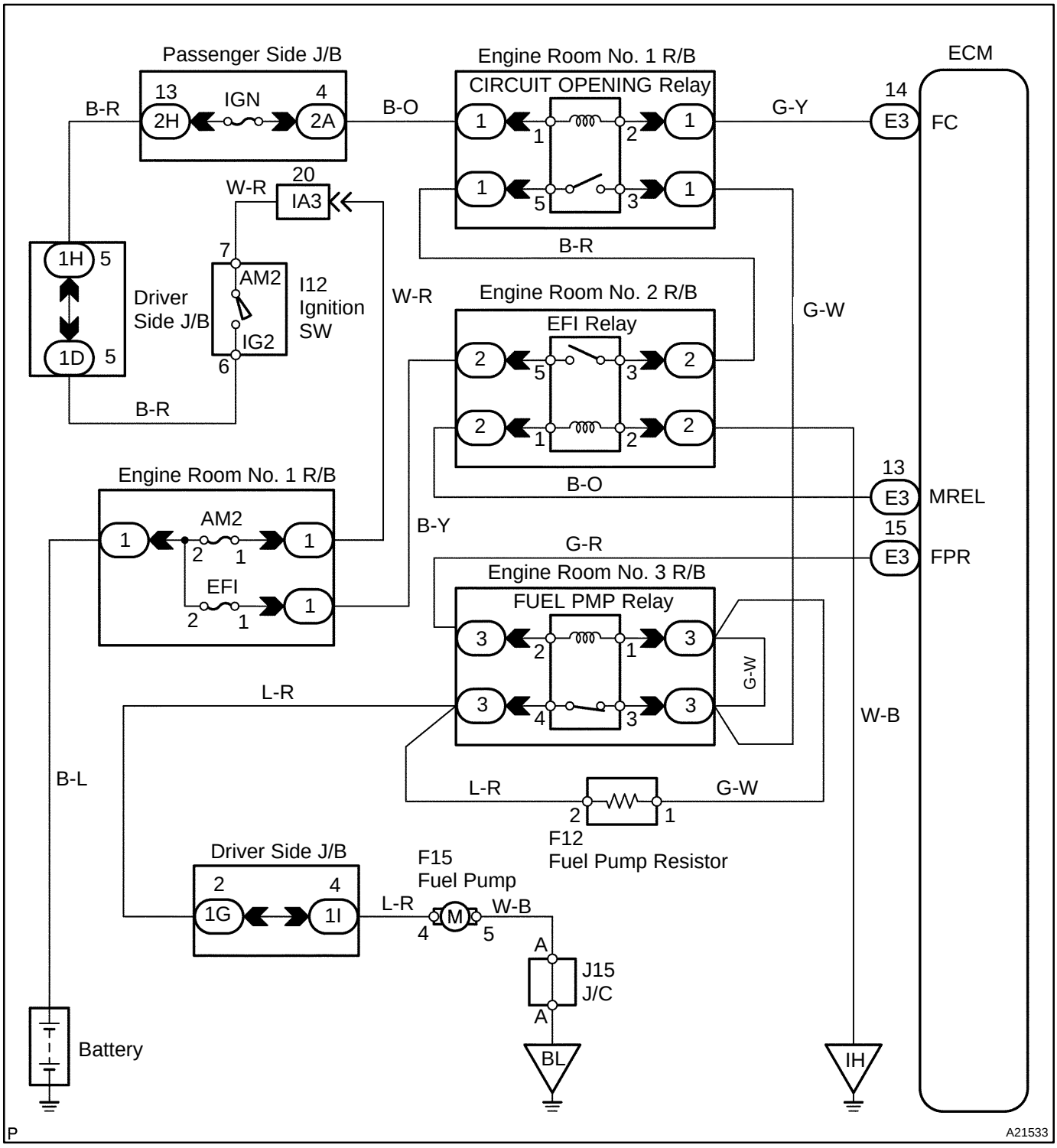
CIRCUIT DESCRIPTION

The fuel pump speed is controlled at 2 steps (high speed, low speed) according to the condition of the engine (starting, light load, heavy load).
When the engine starts, the ECM turns the fuel pump relay OFF to operate the fuel pump at high speed. After the engine has started, during idling or when the load is light, the ECM turns the fuel pump relay ON to operate the fuel pump at low speed. When the intake air increases (heavy load), the ECM turns the fuel pump relay OFF to operate the fuel pump at high speed. There are two fuel pumps. The ECM switches from main to sub or sub to main every time the ignition switch is turned ON and OFF.

DTC No.	DTC Detecting Condition	Trouble Area
P0230	When open or short is detected in the fuel pump relay circuit for 0.5 sec. or more during cranking.	✓Open or short in fuel pump relay circuit ✓Fuel pump relay ✓ECM

HINT:
This diagnostic chart is based on premise that engine is started. If the engine is not started, proceed to problem symptoms table on DI-47 .

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using hand-held tester. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check fuel pump relay (See page SF-52).**

NG → **Replace fuel pump relay.**

OK

2	**Check fuel pump resister (See page SF-54).**

NG → **Replace fuel pump resister.**

OK

3	**Check for open and short in harness and connector between terminal FPR ECM and fuel pump relay (See page IN-33).**

NG → **Repair or replace harness and connector.**

OK

Check and replace ECM (See page SF-74).

DIC4D-01

DTC	P0300	Random/Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

DTC	P0305	Cylinder 5 Misfire Detected

DTC	P0306	Cylinder 6 Misfire Detected

CIRCUIT DESCRIPTION

When a misfire occurs in the engine, hydrocarbons (HC) enter the exhaust in high concentrations. If this HC concentration is high enough, there could be an increase in exhaust emissions levels. High concentrations of HC can also cause to temperature of the catalyst to increase, possibly damaging the catalyst. To prevent this increase in emissions and limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the catalyst reaches a point of thermal degradation, the ECM will blink the MIL. For monitoring misfire, the ECM uses both the camshaft position sensor and the crankshaft position sensor. The camshaft position sensor is used to identify misfiring cylinders and the crankshaft position sensor is used to measure variations in the crankshaft rotation speed. The misfire counter increments when crankshaft rotation speed variations exceed threshold values.

If the misfiring rate exceeds the threshold value and could cause emissions deterioration, the ECM illuminates the MIL.

DTC No.	DTC Detecting Condition	Trouble Area
P0300	Misfiring of random cylinders is detected	✓Open or short in engine wire ✓Connector connection ✓Vacuum hose connection ✓Ignition system ✓Injector ✓Fuel pressure ✓Mass air flow meter ✓Engine coolant temperature sensor ✓Compression pressure ✓Valve clearance ✓Valve timing ✓PCV piping ✓ECM
P0301 P0302 P0303 P0304 P0305 P0306	Misfiring of each cylinder is detected	

HINT:

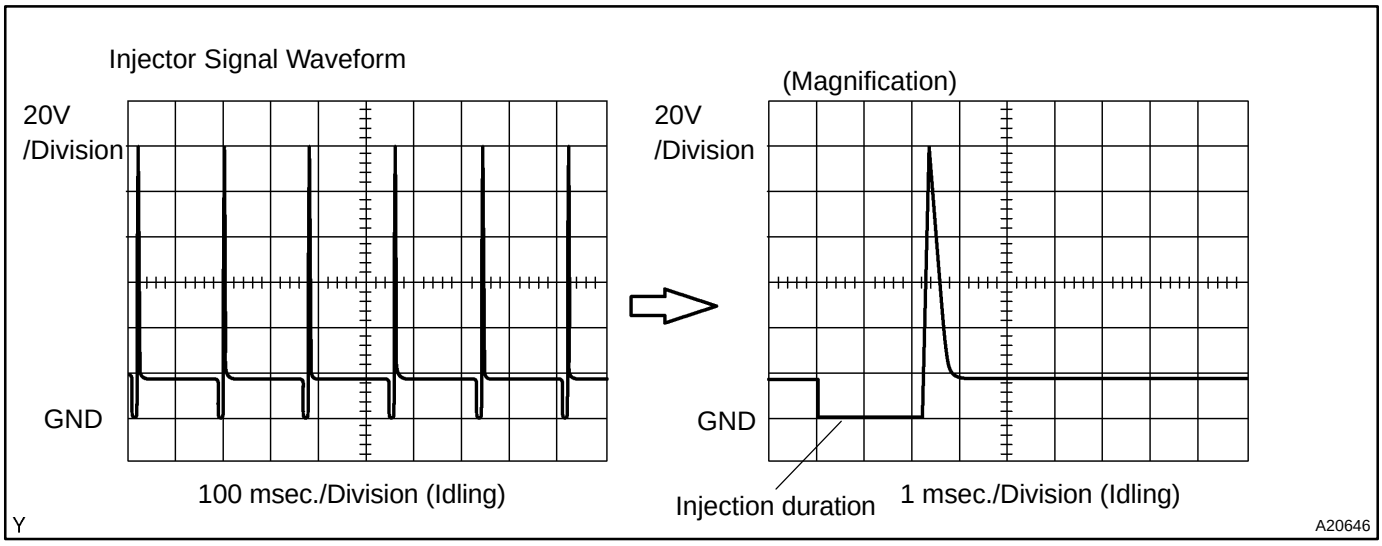
When several codes for a misfiring cylinder are recorded repeatedly but no random misfire code is recorded, it indicates that the misfires have been detected and recorded at different times.

Reference: Inspection using the oscilloscope.

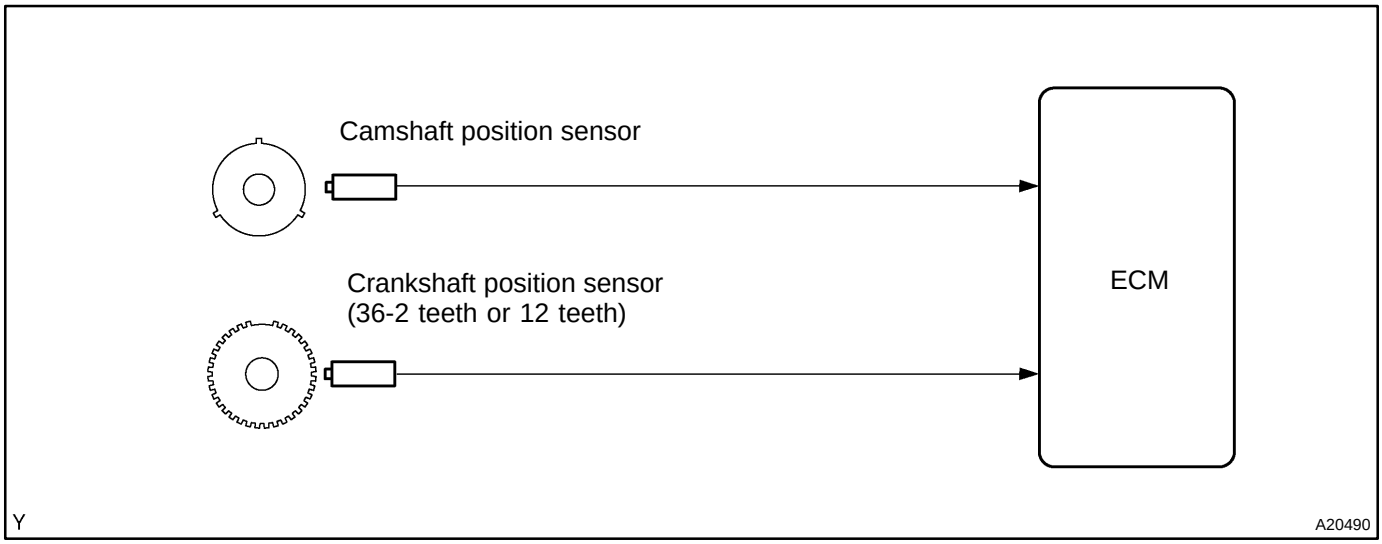
With the engine idling, check the waveform between terminals #10 to #60 and E01 of the ECM connectors.

HINT:

The correct waveform is as shown.



MONITOR DESCRIPTION



The ECM illuminates the MIL (2 trip detection logic) if:
The ECM will illuminate the MIL when the percent misfire exceeds the specified limit per 1,000 engine revolutions. One occurrence of excessive misfire during engine start will set the MIL. Four occurrences are required to set the MIL 1,000 revolutions after engine start.
The ECM blinks the MIL (MIL blinks immediately) if:

- Within 200 engine revolutions at a high rpm, the threshold for ”percent of misfire causing catalyst damage” is reached 1 time.
- Within 200 engine revolutions at a normal rpm, the threshold for ”percent of misfire causing catalyst damage” is reached 3 times.

MONITOR STRATEGY

Related DTCs	P0300	Random/Multiple cylinder misfire detected
	P0301	Cylinder 1 misfire detected
	P0302	Cylinder 2 misfire detected
	P0303	Cylinder 3 misfire detected
	P0304	Cylinder 4 misfire detected
	P0305	Cylinder 5 misfire detected
	P0306	Cylinder 6 misfire detected
Required sensors/components	Main sensors/components	Camshaft position sensor, Crankshaft position sensor
	Related sensors/components	Engine coolant temperature sensor, Intake air temperature sensor, Throttle position sensor
Frequency of operation	Continuous	
Duration	Every 1,000 revolutions (soon after engine is started: 1 time, other 4 times) (emission related misfire) Every 200 revolutions (1 or 3 times) (catalyst deteriorating misfire)	
MIL operation	2 driving cycles MIL ON Immediate MIL blinking (Catalyst deteriorating misfire)	
Sequence of operation	None	

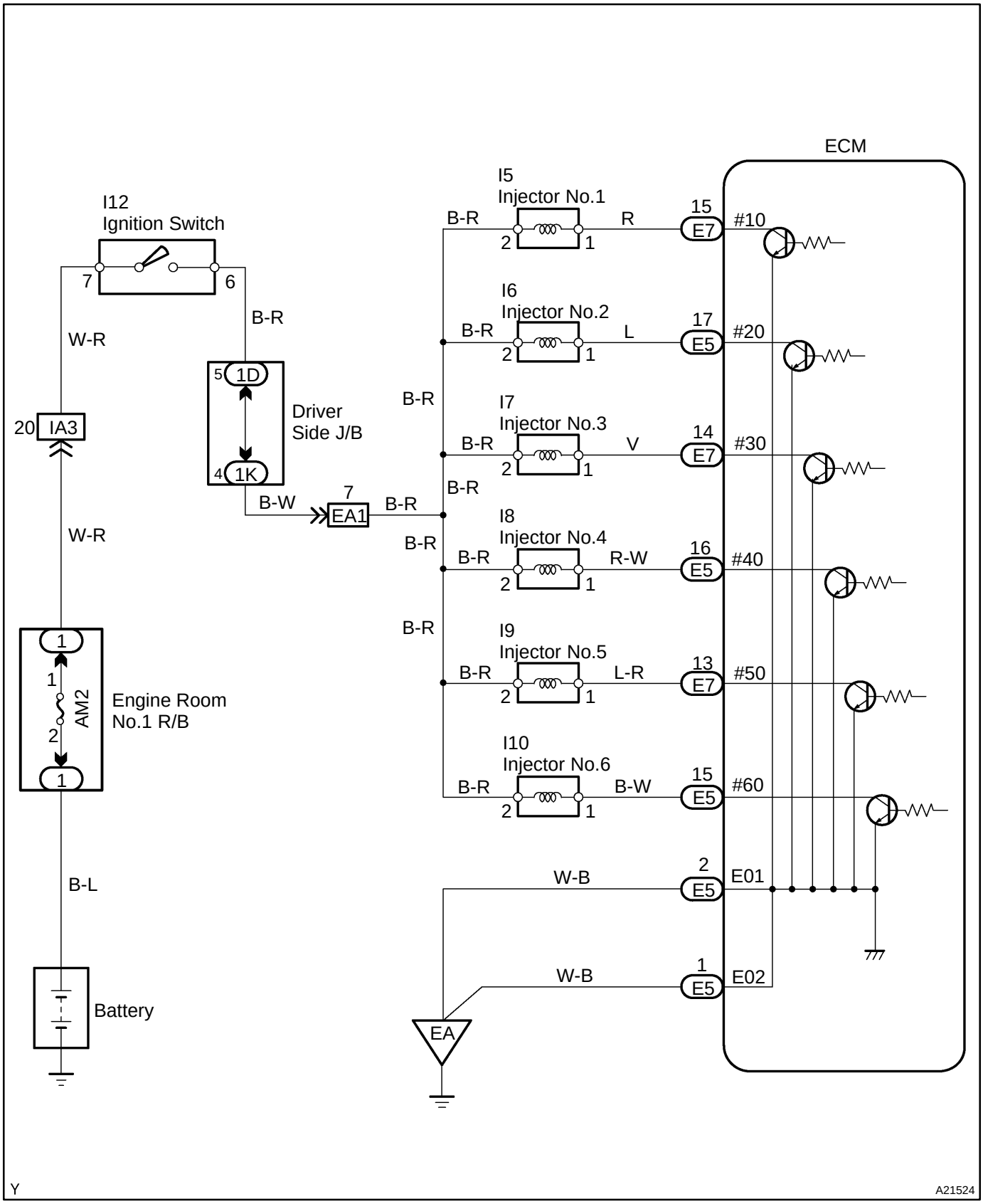
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	8 V	-
VVT	Normal operation (i. e. not under scan-tool control)	
Engine speed fluctuation	Engine speed should not have changed rapidly	
Engine speed (Two full revolutions (2 rev.) after engine has started)	450 rpm	6,400 rpm
All of the following conditions are met:	A, B and C	
A. Engine coolant temperature	-10 °C (14 °F)	-
B. Either of the following conditions is met:	(a) and (b)	
(a) Intake air temperature	-10 °C (14 °F)	-
(b) Engine coolant temperature	75 °C (167 °F)	-
C. Either of the following conditions is met:	(a) and (b)	
(a) Engine coolant temperature at engine start	-7 °C (19 °F)	-
(b) Engine coolant temperature	20 °C (68 °F)	-
Intake air amount per revolution (varies with engine speed)	✓AT: 0.23 g/rev ✓MT: 0.25 g/rev	-
Throttle position learning	Completed	
Throttle position	Rapid throttle opening or closing operation has not occurred	
	-	Changing value of throttle position Less than 3 ° per 0.008 sec.
Transient spark retard (The spark timing delay control in a short time for preventing surge at the time of a sudden acceleration.)	Not commanded	
Rough road counter	-	20 times/1,000 revolutions (Not running on rough road)
For paired cylinder misfire (6 cylinders):		
All of the following conditions are met:	A, B and C	
A. Engine speed	-	1,050 rpm
B. Vehicle speed	-	5 km/h (3 mph)
C. Idle	ON	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Emission related misfire rate: 1. During the first 1,000 revolutions after engine start (MIL is set when misfire is detected 1 time) 2. After the first 1,000 revolutions have occurred (MIL is set when misfire is detected 4 times)	1.0%/1,000 revolutions
Catalyst damage misfire count: 1. Low engine rpm area (ex. less than 3,000 rpm): 200 revolutions (MIL is set when misfire is detected 3 times) 2. High engine rpm area: Every 200 revolutions	85 count/200 revolutions (Threshold varies with engine speed and intake air amount per revolution)
For paired cylinder misfire (6 cylinders):	
Paired cylinders out per 170 rev. (MIL blink)	50 times or more

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

(a) Connect the hand-held tester to the DLC3.
(b) Record DTC and the freeze frame data.
(c) Use the hand-held tester to set to the check mode (See page DI-3).
(d) Read the value on the misfire counter for each cylinder when idling. If the value is displayed on the misfire counter, skip the following procedure of confirmation driving.
(e) Drive the vehicle several times with the engine speed, load and its surrounding range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the DATA LIST.

If you have no hand-held tester, turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again.

HINT:

In order to memorize the DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the DATA LIST for the following period of time. Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from check mode to normal mode. So all DTCs, etc., are erased.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1,000 rpm	3 minutes or more
2,000 rpm	1 minute 30 seconds or more
3,000 rpm	1 minute or more

(f) Check if there is misfire and DTC and the freeze frame data. Record the DTC's, freeze frame date and misfire counter date.
(g) Turn the ignition switch OFF and wait at least 5 seconds.

INSPECTION PROCEDURE

HINT:

- If DTCs besides misfire DTCs are memorized simultaneously, troubleshoot the non-misfire DTCs first.
- If the misfire does not occur when the vehicle is brought to the workshop, the misfire can be confirmed by reproducing the condition of the freeze frame data. Also, after finishing the repair, confirm that there is no misfire (See confirmation driving pattern).
- On 6 and 8 cylinder engines, misfiring cylinder identification is disabled at high engine speed and only a general misfire fault code P0300 is stored instead of a cylinder specific misfire fault code (P0301 to P0308).

  If the misfire starts in a high engine speed area or the misfire occurs only in a high engine speed area, only code P0300 may be stored.

  When only a general misfire fault code like P0300 is stored:
- Erase the general misfire fault code from the hand-held tester or OBD II scan tool.
- Start the engine and drive the confirmation patten (See confirmation driving pattern).
- Read the value of the misfire ratio for each cylinder. Or read the DTC.
- Perform repairs on the cylinder that has a high misfire ratio. Or repair the cylinder indicated by the DTC.
- After finishing repairs, drive the confirmation pattern again and confirm that no misfire occurs.
- When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is over the range of ±20 %, there is a possibility that the air-fuel ratio is becoming RICH (-20 % or less) or LEAN (+20 % or more).
- When COOLANT TEMP in the freeze frame data is less than 80˚C (176˚F), there is a possibility of misfire only during engine warm-up.
- If the misfire cannot be reproduced, the following reasons may apply: 1) the vehicle has low fuel, 2) improper fuel is being used, and 3) the ignition plug is contaminated.
- Be sure to check the value on the misfire counter after the repair.

1	**Are there any other codes (besides DTC P0300, P0301, P0302, P0303, P0304, P0305 or P0306) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0300, P0301, P0302, P0303, P0304, P0305 and/or P0306”	A
”P0300, P0301, P0302, P0303, P0304, P0305 and/or P0306” and other DTCs	B

HINT:

If any other codes besides ”P0300, P0301, P0302, P0303, P0304, P0305 or P0306” are output, perform the troubleshooting for those DTC.

B → **Go to relevant DTC chart (See page DI-35).**

A

2	**Check wire harness, connector and vacuum hose in engine room.**

CHECK:

(a) Check the connection conditions of wire harness and connector.
(b) Check the disconnection, piping and break of vacuum hose.

NG → **Repair or replace, then confirm that there is no misfire (See confirmation driving pattern).**

OK

3	**Check connection of PCV piping.**

NG → **Repair or replace PCV piping.**

OK

4	**Connect hand-held tester, and read the number of misfire.**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Start the engine.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / CYL#1 to CYL#6.

CHECK:

Read the number of misfire on the hand-held tester or the OBD II scan tool.
HINT:
When a misfire is not reproduced, be sure to branch below based on the stored DTC.

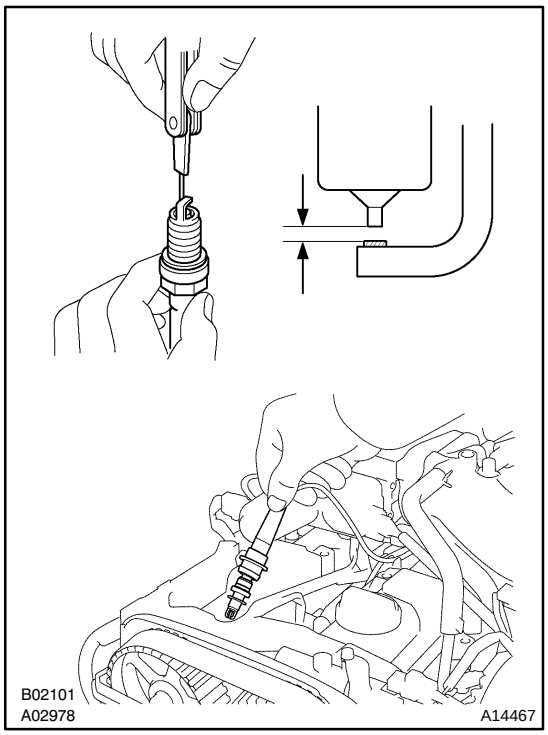
RESULT:

High Misfire Rate Cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → **Go to step 15.**

A

5	**Check spark plug and spark of misfiring cylinder.**



PREPARATION:

Remove the spark plug.

CHECK:

(a) Check the spark plug type (See page IG-1).

(b) Check the electrade for carbon deposits.

(c) Check the electrode gap.

OK:

(a) Twin ground electrodes type
Recommended spark plug:
DENSO made SK16R-P11
(b) No large carbon deposit present
Not wet with gasoline or oil
(c) Electrode gap: 1.0 to 1.2 mm (0.039 to 0.047 in.)

NOTICE:

If adjusting the gap of a new spark plug, bend only "the base / ground" electrode. Do not touch the tip. Never attempt to adjust the gap on a used plug.

PREPARATION:

(a) Install the spark plug to the high-tension cord or ignition coil.

(b) Disconnect the injector connector.

(c) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

CAUTION:

Always disconnect each injector connector.

NOTICE:

Do not crank the engine for more than 2 seconds.

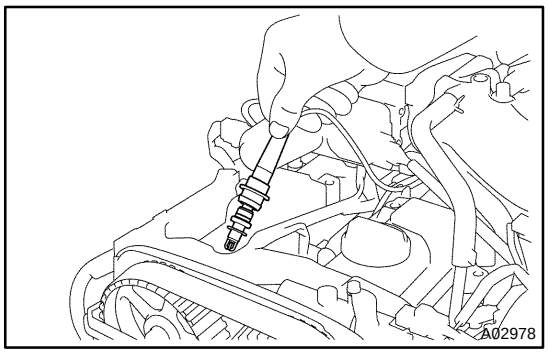
OK:

Spark jumps across electrode gap.

OK	**Go to step 8.**

NG

6	**Change normal spark plug and check spark of misfiring cylinder.**



PREPARATION:

(a) Change to the normal spark plug.
  (1) Remove the spark plug that may be faulty from the ignition coil assembly.
  (2) Install the spark plug to the high-tension cord or ignition coil.
(b) Disconnect the injector connector.
(c) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

CAUTION:

Always disconnect each injector connector.

NOTICE:

Do not crank the engine for more than 2 seconds.

OK:

Spark jumps across electrode gap.

OK → **Replace spark plug.**

NG

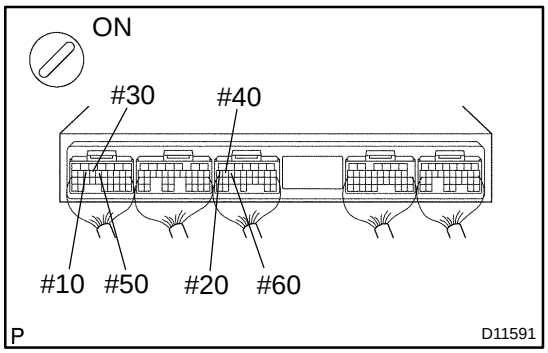
7	**Check for open and short in harness and connector between igniter and ECM (See page IN-33).**

OK → **Replace igniter, then confirm that there is no misfire.**

NG

Repair or replace harness or connector.

8	**Check voltage of ECM terminals for injector of failed cylinder.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between applicable terminals #10 - #60 of the ECM connectors and body ground.

OK:

Voltage: 9 to 14 V

OK	**Go to step 11**

NG

9	**Check resistance of injector of misfiring cylinder (See page SF-19).**

NG	**Replace injector.**

OK

10	**Check for open and short in harness and connector between ignition switch and injector, injector and ECM of misfiring cylinder (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

11	**Check injector injection of misfiring cylinder (See page SF-22).**

NG	**Replace injector.**

OK

12	Check compression pressure of misfiring cylinder (See page EM-3).

NG → Repair or replace.

OK

13	Check valve clearance of misfiring cylinder (See page EM-5).

NG → Adjust valve clearance.

OK

14	Check result of step 4 switch step by number of misfire cylinder.

High misfire rate cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → Check for intermittent problems (See page DI-3).

A

15	Check valve timing (Check for looseness or a jumped tooth of timing belt) (See page EM-22).

NG → Adjust valve timing (Repair or replace timing belt).

OK

16	**Check fuel pressure (See page SF-6).**

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

17	**Check mass air flow meter.**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

Check the intake air temperature.

(1) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

(2) Read its value displayed on the hand-held tester or the OBD II scan tool.

OK:

Equivalent to ambient temperature

CHECK:

Check the air flow rate.

(1) When using hand-held tester, enter the following menus: DIAGNOSIS/ENHANCED OBD II/ DATA LIST/ALL/MAF.

(2) Read its value displayed on the hand-held tester or the OBD II scan tool.

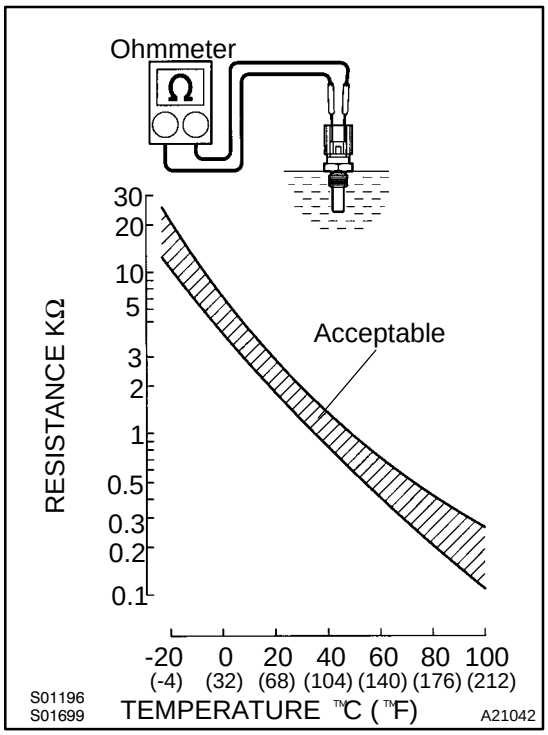
OK:

Condition	Air Flow Rate (gm/s)
Ignition switch ON (do not start engine)	0
Idling	4 to 6
Running without load (2,500 rpm)	13 to 20
Idling to quickly accelerating	Air flow rate fluctuates

NG → **Repair mass air flow meter.**

OK

18	Check engine coolant temp. sensor (See page SF-65).



PREPARATION:

Remove the engine coolant temperature sensor.

CHECK:

Measure the resistance between the terminals of the engine coolant temperature sensor.

Resistance:

Tester Connection	Specified Condition
1 - 2	2.32 to 2.59 kΩ (20°C (68°F))
	0.310 to 0.326 kΩ (80°C (176°F))

NOTICE:

In case of checking the engine coolant temperature sensor in the water, be careful not to allow water to go into the terminals. After checking, dry the sensor.

HINT:

Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

NG → **Replace engine coolant temperature sensor**

OK

19	Switch step by number of misfire cylinder (Refer result of step 4).

High misfire rate cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → **Go to step 5.**

A

Check intermittent problems (See page DI-3).

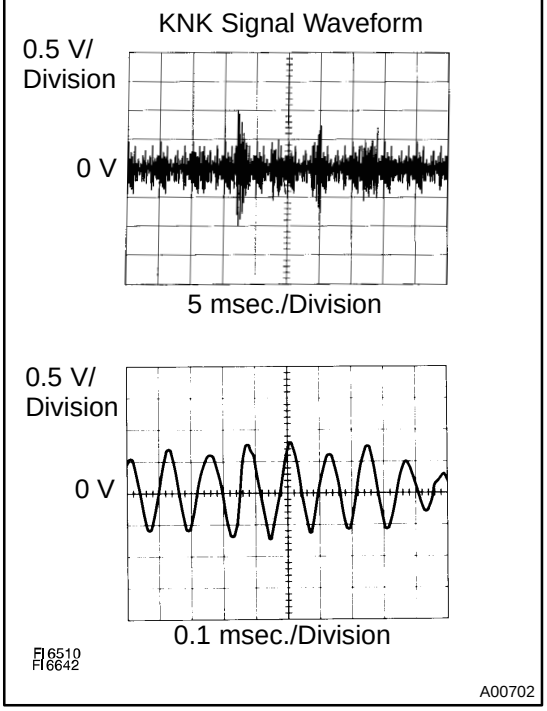
DTC	P0325	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)

DTC	P0330	Knock Sensor 2 Circuit Malfunction (Bank 2)

CIRCUIT DESCRIPTION

Each knock sensor is fitted to the right bank and left bank of the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed. The piezoelectric element sends a signal to the ECM, when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed between 1,600 rpm and 5,200 rpm	✓Open or short in knock sensor 1 circuit ✓Knock sensor 1 (looseness) ✓ECM
P0330	No knock sensor 2 signal to ECM with engine speed between 1,600 rpm and 5,200 rpm	✓Open or short in knock sensor 2 circuit ✓Knock sensor 2 (looseness) ✓ECM



Reference: INSPECTION USING OSCILLOSCOPE

✓ With the engine racing (4,000 rpm), check the waveform between terminals KNK1, KNK2 of the ECM connector and the body ground.

HINT:

The correct waveform is as shown in the illustration.

✓ Spread the time on the horizontal axis, and confirm that a period of the wave is 0.141 msec. (Normal mode vibration frequency of knock sensor: 7.1 kHz).

HINT:

If the normal mode vibration frequency is not 7.1 kHz, the sensor is malfunctioning.

MONITOR DESCRIPTION

The knock sensor located on the cylinder block, detects spark knock.
When spark knock occurs the sensor pick-up vibrates in a specific frequency range. When the ECM detects the voltage in this frequency range, it retards the ignition timing to suppress the spark knock.
The ECM also senses background engine noise with the knock sensor and uses this noise to check for faults in the sensor. If the knock sensor signal level is too low for more than 10 sec., and if the knock sensor output voltage is out of normal range,the ECM interprets this as a fault in the knock sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0325	Knock sensor (Bank 1) range check or rationality
	P0330	Knock sensor (Bank 2) range check or rationality
Required sensors/components	Main sensors/components	Knock sensor
	Related sensors/components	Crankshaft position sensor, Camshaft position sensor, Engine coolant temperature sensor, Mass air flow meter
Frequency of operation	Continuous	
Duration	10 sec.	
MIL operation	Immediate	
Sequence of operation	None	

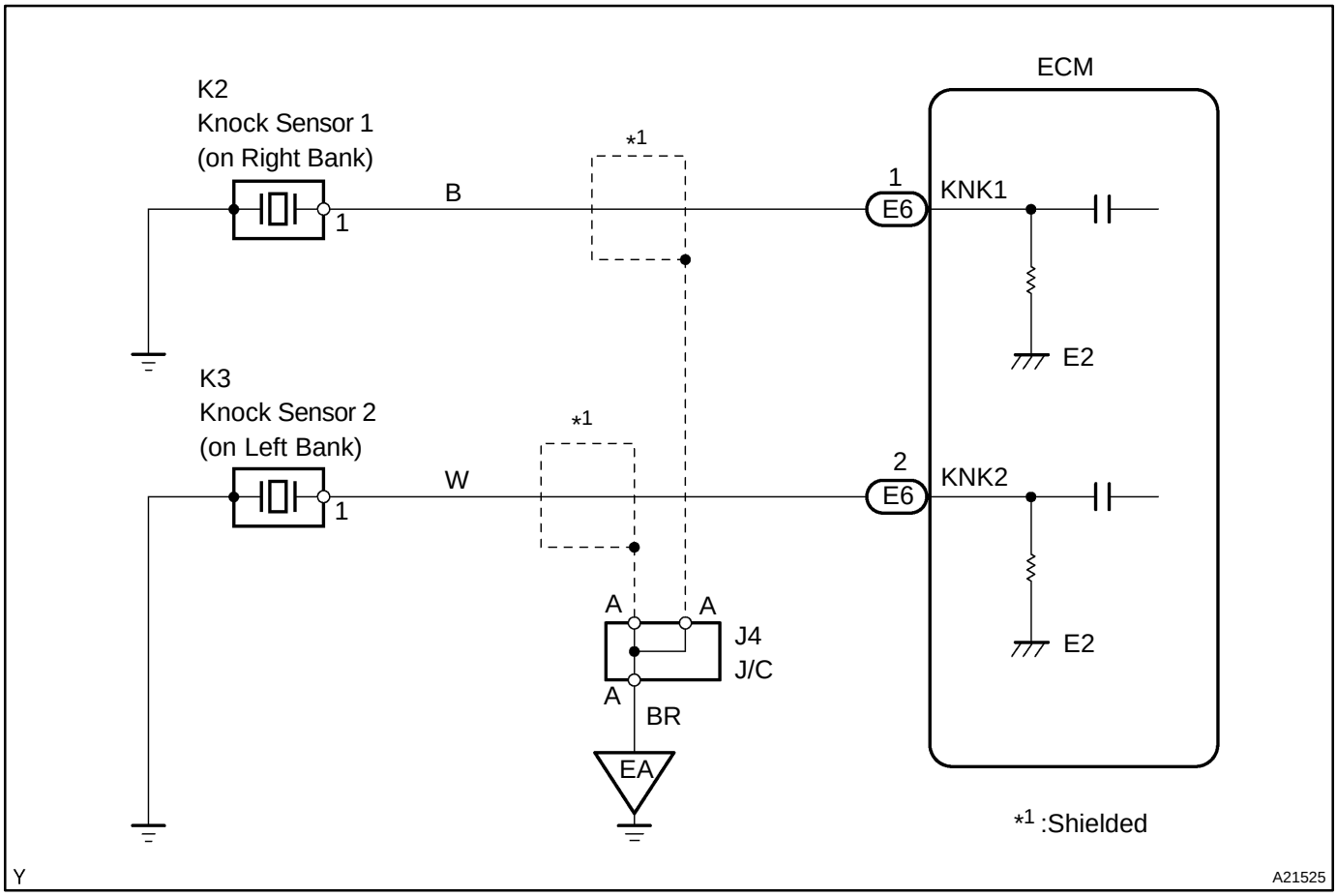
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	10 V	-
Idle	OFF	
Time after engine start	5 sec.	-
Engine coolant temperature	60°C (140°F)	-
Intake air amount per revolution	1 g/rev	-
Engine speed	1,600 rpm	5,200 rpm

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Sensor failure is indicated when the knock sensor output level is below the specific threshold for:	10 sec.

WIRING DIAGRAM

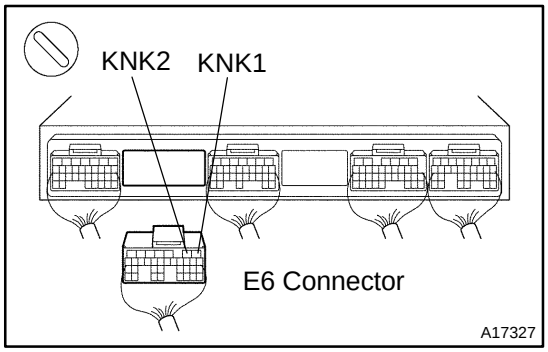


INSPECTION PROCEDURE

HINT:

- DTC P0325 is for the front side knock sensor circuit.
- DTC P0330 is for the rear side knock sensor circuit.
- Read freeze frame data using hand-held tester or OBD II scan tool. Because freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Check continuity between terminals KNK1, KNK2 of ECM connector and body ground.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Disconnect the E2 connector from the ECM.

CHECK:

Measure the resistance between terminals KNK1, KNK2 of the ECM connector and the body ground.

HINT:

- Connect terminal KNK1 to the knock sensor 1.
- Connect terminal KNK2 to the knock sensor 2.

OK:

Resistance: 1 MΩ or higher

OK	**Go to step 3.**

NG

2	**Check knock sensor (See page SF-69).**

NG	**Replace knock sensor.**

OK

3	**Check for open and short in harness and connector between ECM and knock sensor (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

4	Does malfunction disappear when normal knock sensor is installed?

YES → Replace knock sensor.

NO → Replace ECM (See page SF-74).

DIC4E-01

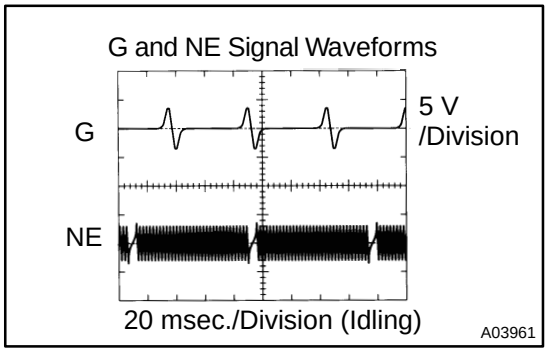
DTC	P0335	Crankshaft Position Sensor ”A” Circuit

DTC	P0339	Crankshaft Position Sensor ”A” Circuit Intermittent

CIRCUIT DESCRIPTION

The crankshaft position sensor system consists of a crankshaft position sensor plate and a pick-up coil. The sensor plate has 34 teeth and is installed on the crankshaft. The pick-up coil is made of an iron core and magnet. The sensor plate rotates and as each tooth passes through the pick-up coil, a pulse signal is created. The pick-up coil generates 34 signals for each engine revolution. Based on these signals, the ECM calculates the crankshaft position and engine RPM. Using these calculations, the fuel injection time and ignition timing are controlled.

DTC No.	DTC Detecting Condition	Trouble Area
P0335	No crankshaft position sensor signal to ECM during cranking (2 trip detection logic)	✓Open or short in crankshaft position sensor circuit ✓Crankshaft position sensor ✓Signal plate ✓ECM
	No crankshaft position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	
P0339	No crankshaft position sensor signal to ECM with engine speed 1,000 rpm or more	



Reference: INSPECTION USING OSCILLOSCOPE

During cranking or idling, check the waveforms between terminals G2 and NE-, and NE and NE- of the ECM connector.

HINT:

The correct waveforms are as shown in the illustration.

MONITOR DESCRIPTION

If there is no signal from the crankshaft sensor even though the engine is revolving, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0335	Crankshaft position sensor range check or rationality
Required sensors/components	Main sensors/components	Crankshaft position sensor
	Related sensors/components	Engine speed sensor
Frequency of operation	Continuous	
Duration	Case 1: 4.7 sec. Case 2: 0.5 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

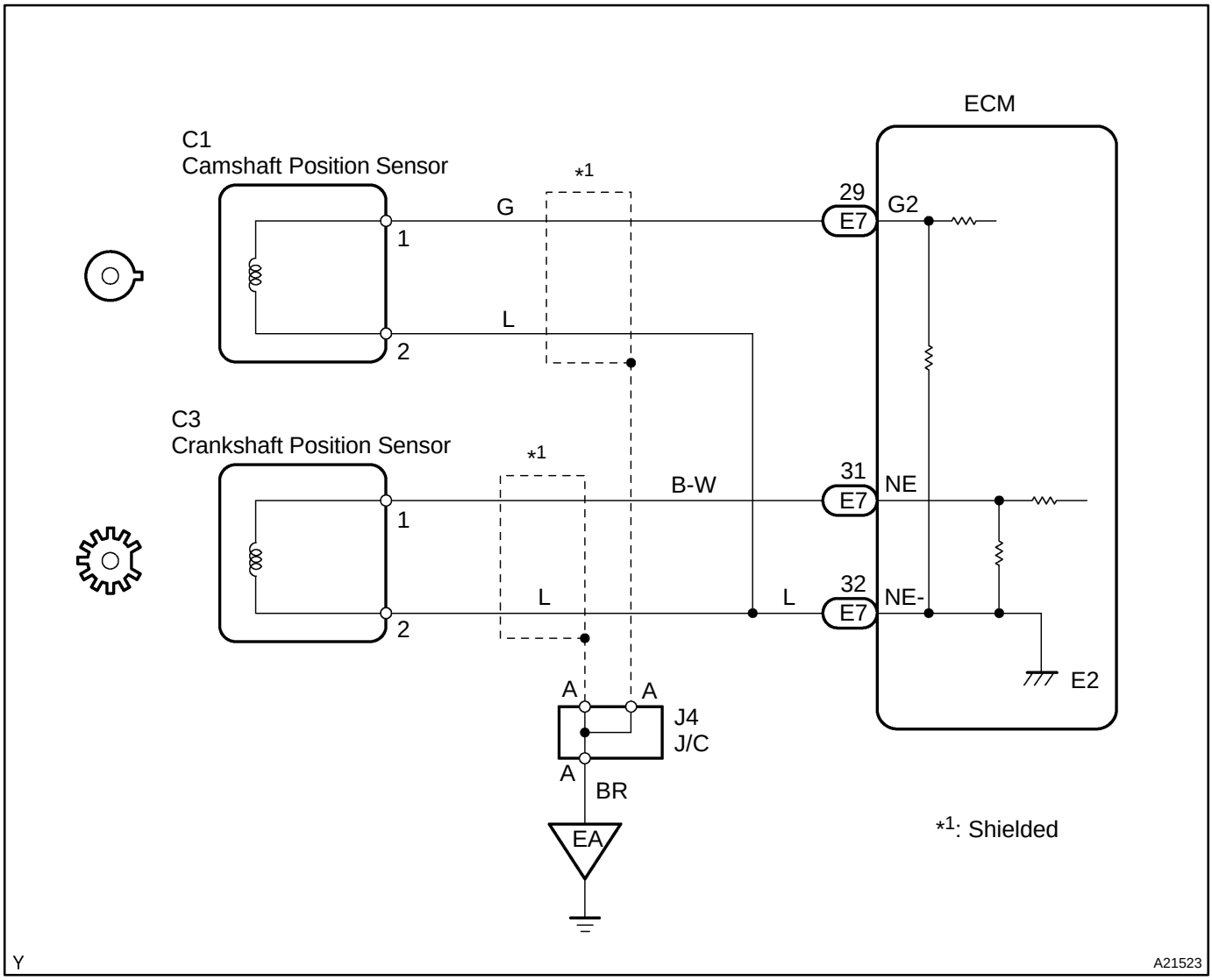
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1:		
Starter	ON	
Minimum battery voltage while starter ON	-	11 V
Case 2:		
Engine speed	600 rpm	-
Starter	OFF	
Time after starter ON to OFF	3 sec.	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1:	
Engine speed signal	No signal for 4.7 sec.
Case 2:	
Engine speed signal	No signal for 0.5 sec.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

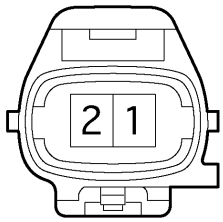
- Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame records the engine conditions when a malfunction is detected. When troubleshooting it is useful for determining whether the vehicle was running or stopped. the engine was warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.
- READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Start the engine and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ENGINE SPD.

- The engine speed can be confirmed in DATA LIST using the hand-held tester or OBD II scan tool. If there is no NE signals from the crankshaft position sensor despite the engine revolving, the engine speed will be indicated as zero. If voltage output of the crankshaft position sensor is insufficient, the engine speed will be indicated as lower PRM (than the actual RPM).

1	Check resistance of crankshaft position sensor.

Component Side



Crankshaft Position Sensor

A21026

PREPARATION:

Disconnect the crankshaft position sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2.

OK:

Tester Connection	Specified Condition
1 - 2	1,630 to 2,740 Ω at cold
	2,065 to 3,225 Ω at hot

NOTICE:

" Cold" and "Hot" shown above mean the temperature of the coils themselves. "Cold" is form -10˚C (14˚F) to 50˚C (122˚F) and "Hot" is from 50˚C (122˚F) to 100˚C (212˚F).

NG → **Replace crankshaft position sensor.**

OK

2	Check for open and short in harness and connector between ECM and crankshaft position sensor (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

3	Check sensor installation (crankshaft position sensor).

CHECK:

Check the crankshaft position sensor installation.

NG → **Tighten sensor.**

OK

4	**Inspect teeth of sensor plate.**

PREPARATION:
Remove the crankshaft angle sensor plate (See page EM-17).
CHECK:
Check the teeth of sensor plate.

NG → **Replace sensor plate.**

OK

Replace ECM (See page SF-74).

DIC4F-01

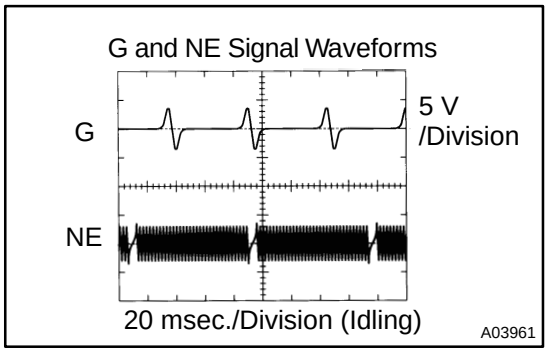
DTC	P0340	Camshaft Position Sensor ”A” Circuit (Bank 1 or Single Sensor)

DTC	P0341	Camshaft Position Sensor ”A” Circuit Range/Performance (Single Sensor)

CIRCUIT DESCRIPTION

The camshaft position sensor (G2 signal) consists of a magnet iron core and pickup coil.
The G signal plate has 3 teeth on its outer circumference and is installed on the camshaft timing pulley. When the camshafts rotate, protrusion on the signal plate and air gap on the pickup coil change, causing fluctuations in the magnetic field and generating a voltage in the pickup coil.
The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the crankshaft angle and the engine revolution based on the NE+ signals, and the cylinder and the angle of the VVT based on the combination of the G2 and NE signals.

DTC No.	DTC Detecting Condition	Trouble Area
P0340 P0341	No camshaft position sensor signal to ECM during cranking (2 trip detection logic)	✓Open or short in camshaft position sensor circuit ✓Camshaft position sensor ✓Camshaft timing pulley ✓Jumping teeth of timing belt ✓ECM
	No camshaft position sensor signal to ECM with engine speed 600 rpm or more	



Reference: INSPECTION USING OSCILLOSCOPE
During cranking or idling, check the waveforms between terminals G2 and NE-, and NE and NE- of the ECM connector.
HINT:
The correct waveforms are as shown in the illustration.

MONITOR DESCRIPTION

If there is no signal from the camshaft position sensor even though the engine is turning, or if the rotation of the camshaft and the crankshaft is not synchronized, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0340	Camshaft position sensor (Bank 1) range check or rationality
	P0341	Camshaft position sensor (Bank 1) range check or rationality
Required sensors/components	Main sensors/components	Camshaft position sensor
	Related sensors/components	Crankshaft position sensor, Engine speed sensor
Frequency of operation	Continuous	
Duration	5 sec.	
MIL operation	P0340 case 1 (no signal): 2 driving cycles P0340 case 2 (mis-aligned), P0341: Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P0340 Case 1 (No signal):		
Starter	ON	
Minimum battery voltage while starter ON	-	11 V
P0340 Case 2 (Mis-aligned):		
Engine speed	600 rpm	-
Starter	OFF	
P0341:		
Starter	After OFF to ON timing	
Engine revolution angle	720°CA	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0340 Case 1 (No signal):	
Camshaft position sensor signal	No signal
P0340 Case 2 (Mis-aligned):	
Crankshaft/camshaft alignment is mis-aligned (judged by comparing the crankshaft position to the camshaft position)	
Camshaft position sensor signal: No input in appropriate timing.	
P0341:	
Crankshaft/Camshaft alignment	Mis-aligned
Camshaft position sensor count	12 or more / 720°CA (= Engine 2 revolutions)

COMPONENT OPERATING RANGE

Parameter	Standard Value
Camshaft position sensor signal input during every 720°CA	3

WIRING DIAGRAM

Refer to DTC P0335 on page DI-184 .

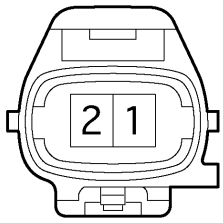
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check resistance of camshaft position sensor.**

Component Side



Camshaft Position Sensor

A21026

PREPARATION:

Disconnect the camshaft position sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2.

OK:

Tester Connection	Specified Condition
1 - 2	835 to 1,400 Ω at cold
	1,060 to 1,645 Ω at hot

NOTICE:

" Cold" and "Hot" shown above mean the temperature of the coils themselves. "Cold" is from -10˚C (14˚F) to 50˚C (122˚F) and "Hot" is form 50˚C (122˚F) to 100˚C (212˚F).

NG → **Replace camshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and camshaft position sensor (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

3	**Check sensor installation (Camshaft position sensor).**

CHECK:

Check the camshaft position sensor installation.

NG → **Tighten sensor.**

OK

4	**Inspect teeth of camshaft timing belt pulley.**

PREPARATION:
Remove the camshaft timing belt pulley (See page EM-17).
CHECK:
Check the camshaft timing belt pulley.

NG → **Replace camshaft timing pulley.**

OK

Replace ECM (See page SF-74).

DIC4G-01

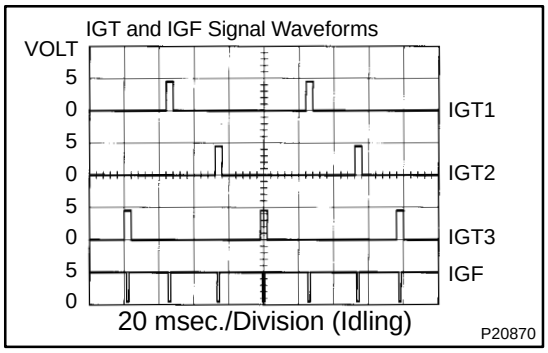
DTC	P0351	Igniter Coil ”A” Primary/Secondary Circuit

CIRCUIT DESCRIPTION

A Direct Ignition System (DIS) has been adopted. The DIS improves the ignition timing accuracy, reduces high-voltage loss, and enhances the overall reliability of the ignition system by eliminating the distributor. The DIS is a 2-cylinder simultaneous ignition system which ignites 2 cylinders simultaneously with 1 ignition coil. In the 2-cylinder simultaneous ignition system, each of the 2 spark plugs is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plugs. The sparks generated by the 2 spark plugs pass simultaneously from the center electrode to the ground electrode.

The ECM determines ignition timing and outputs the ignition signals (IGT) for each cylinder. Based on IGT signals, the igniter controls the primary ignition signals (IGC) for all ignition coils. At the same time, the igniter also sends an ignition confirmation signal (IGF) as a fail-safe measure to the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P0351	No IGF signal to ECM while engine is running (1trip detection logic)	✓ Open or short in IGF and IGT1 - IGT3 circuit from igniter to ECM ✓ Igniter ✓ Ignition system ✓ ECM



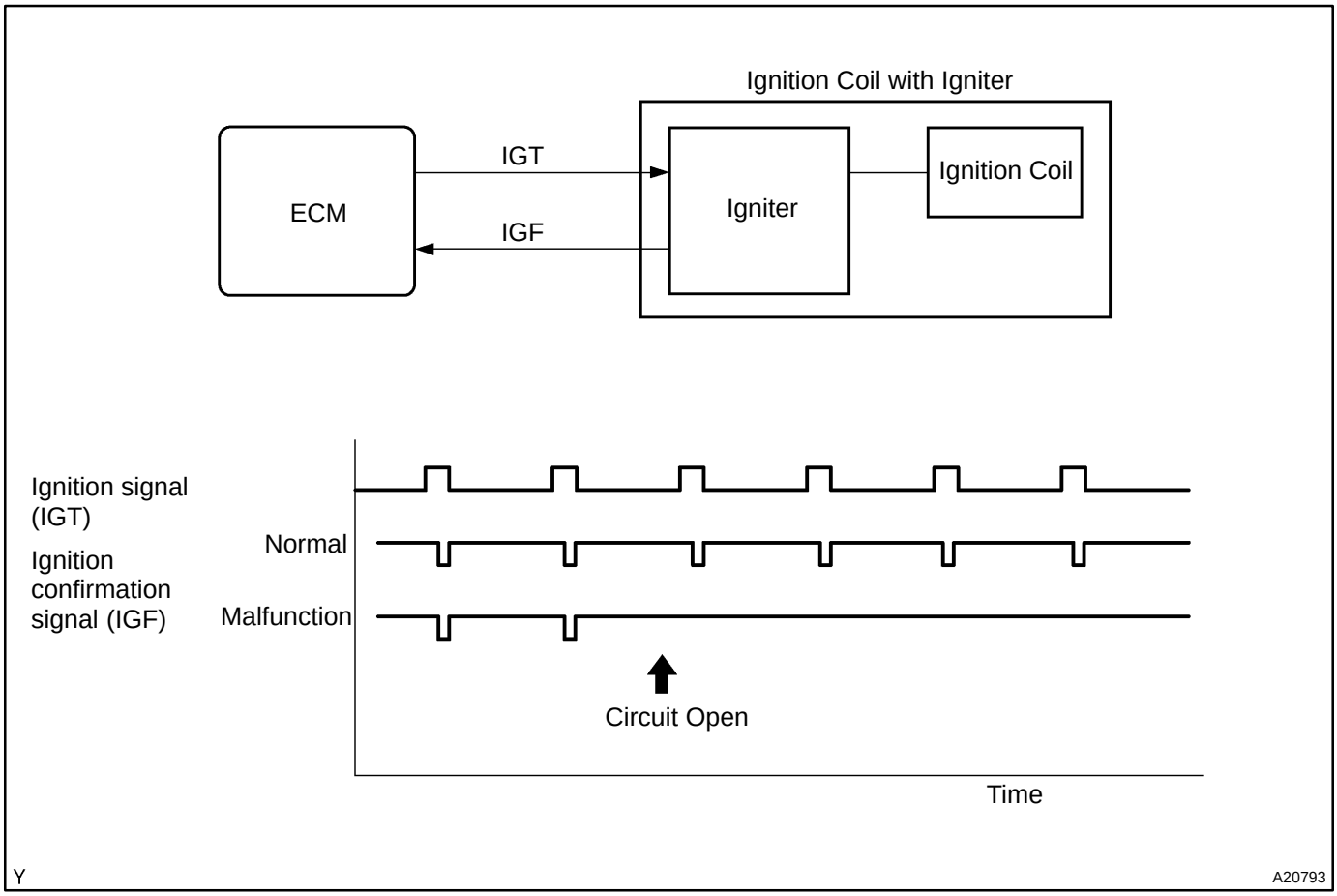
Reference: INSPECTION USING OSCILLOSCOPE

During idling, check the waveform between terminals IGT and E1, IGT2 and E1, IGT3 and E1, and IGF and E1 of the ECM connectors.

HINT:

The correct waveforms are as shown in the illustration.

MONITOR DESCRIPTION



If the ECM does not receive the IGF after sending the IGT it interprets this as a fault in the igniter and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0351	Ignition coil with igniter circuit malfunction
Required sensors/components	Igniter	
Frequency of operation	Continuous	
Duration	0.256 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Following conditions is met:	A or B	
A. Following conditions are met:	(a) and (b)	
(a) Engine speed	-	500 rpm
(b) Battery voltage	6 V	-
B. Following conditions are met:	(a) and (b)	
(a) Engine speed	500 rpm	-
(b) Battery voltage	10 V	-

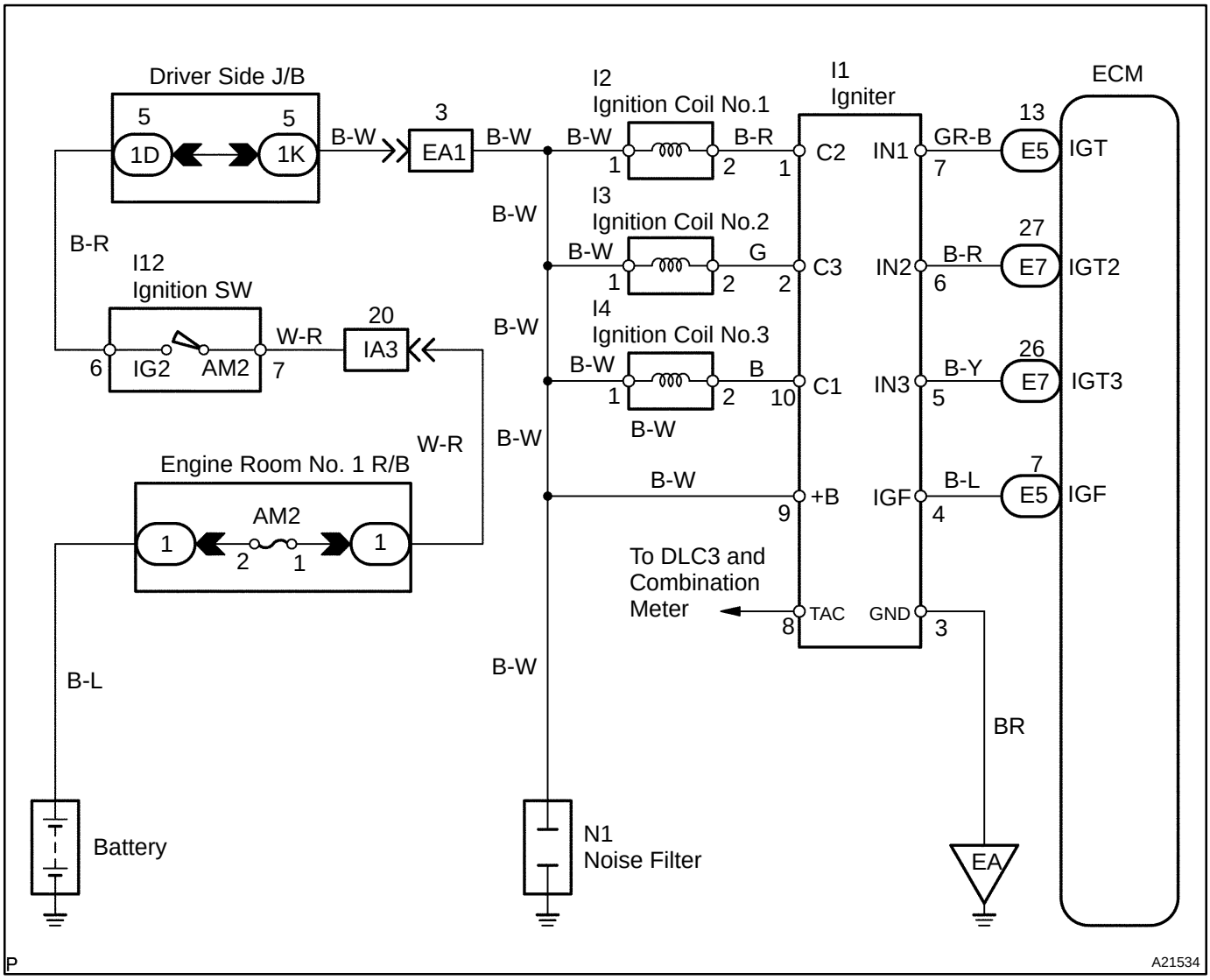
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
"Ignition signal fail count"	More than 2
"Ignition signal fail count" is as follows:	When IGF should have returned despite sending IGT.

COMPONENT OPERATING RANGE

Standard Value
Confirmed signal number = ignition signal number

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check spark plug and spark (See page IG-1).**

NG → **Go to step 4.**

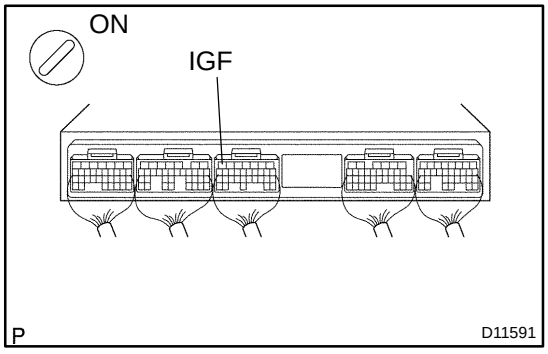
OK

2	**Check for open and short in harness and connector in IGF signal circuit between ECM and igniter (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

3	**Disconnect igniter connector, and check voltage between terminal IGF of ECM connector and body ground.**



PREPARATION:

(a) Disconnect the igniter connector.
(b) Remove the ECM hood (See page SF-74).
(c) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal IGF of the ECM connector and the body ground.

OK:

Voltage: 4.5 to 5.5 V

NG → **Replace ECM (See page SF-74).**

OK

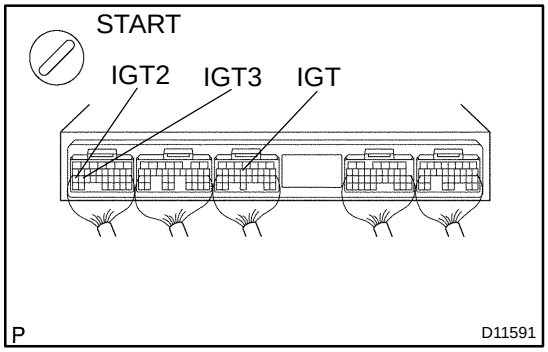
Replace igniter.

4	**Check for open and short in harness and connector in IGT signal circuit between ECM and igniter (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

5	**Check voltage between terminals IGT, IGT2, IGT3 of ECM connector and body ground.**

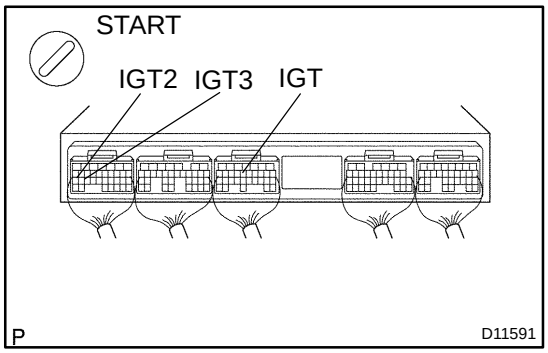


PREPARATION:
Remove the ECM hood (See page SF-74).
CHECK:
Measure the voltage between terminals IGT, IGT2, IGT3 of the ECM connector and the body ground when the engine is cranked.
OK:
Voltage: More than 0.1 V and less than 4.5 V

NG → **Replace ECM (See page SF-74).**

OK

6	**Disconnect igniter connector, and check voltage between terminals IGT, IGT2, IGT3 of ECM connector and body ground.**

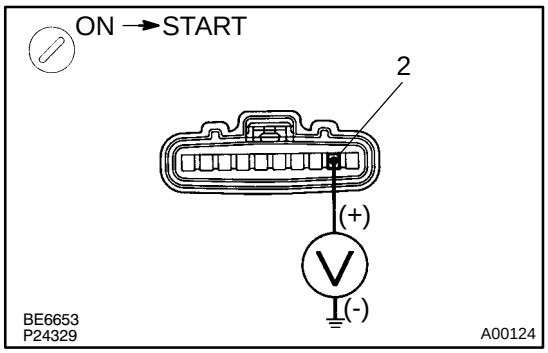


PREPARATION:
(a) Disconnect the igniter connector.
(b) Remove the ECM hood (See page SF-74).
CHECK:
Measure the voltage between terminals IGT, IGT2, IGT3 of the ECM connector and the body ground when the engine is cranked.
OK:
Voltage: 4.5 V or more

NG → **Replace ECM (See page SF-74).**

OK

7	**Check voltage between terminal 2 of igniter connector and body ground.**



PREPARATION:
Disconnect the igniter connector.
CHECK:
Measure the voltage between terminal 2 of the igniter connector and the body ground when the ignition switch is turned to ON and START positions.
OK:
Voltage: 9 to 14 V

OK	**Repair igniter.**

OK

8	**Check for open and short in harness and connector between ignition switch and ignition coil, and ignition coil and igniter (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

9	**Check ignition coil (See page IG-1).**

NG	**Replace ignition coil.**

OK

Replace igniter.

DIC4H-01

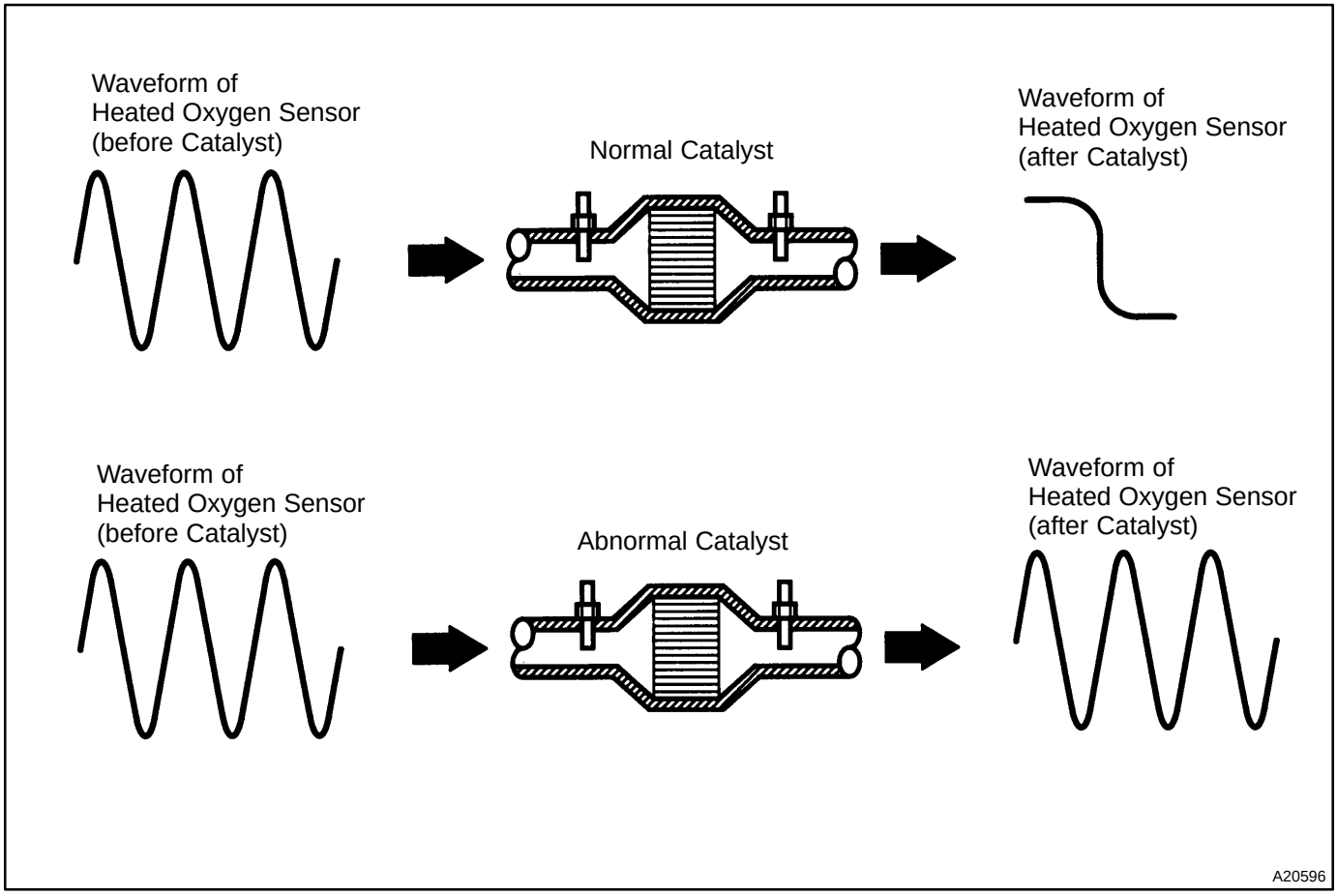
DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

DTC	P0430	Catalyst System Efficiency Below Threshold (Bank 2)

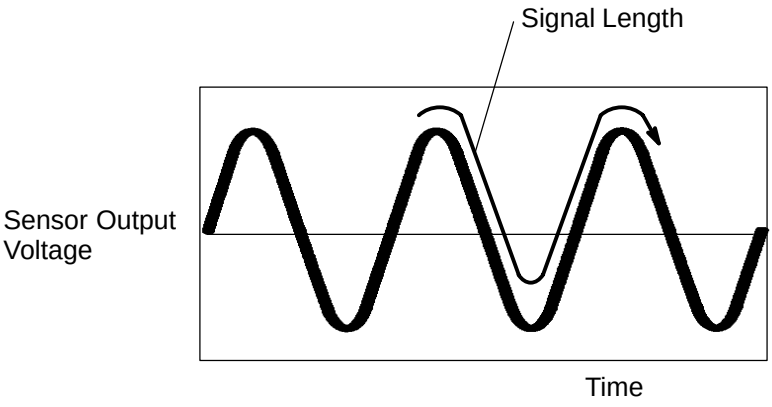
MONITOR DESCRIPTION

The vehicle is equipped with two heated oxygen sensors. One is mounted upstream from the TWC (Three-Way Catalytic) converter (Front Oxygen Sensor, "sensor 1"), the second is mounted downstream (Rear Oxygen Sensor "sensor 2"). The catalyst efficiency monitor compares the sensor 1 and sensor 2 signals in order to calculate TWC ability to store the oxygen.

During normal operation, the TWC stores and releases oxygen as needed. This results in low oxygen variations in the post TWC exhaust stream as shown below.



Heated Oxygen Sensor Signal Length



A20598

DTC No.	DTC Detecting Condition	Trouble Area
P0420 P0430	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveform of heated oxygen sensors have same amplitude (2 trip detection logic)	✓Gas leakage on exhaust system ✓Heated oxygen sensor ✓Three-way catalytic converter

MONITOR STRATEGY

Related DTCs	P0420	Bank 1 catalyst is deteriorated
	P0430	Bank 2 catalyst is deteriorated
Required sensors/components	Main sensors/components	Front and rear heated oxygen sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor, Engine speed sensor, Intake air temperature sensor
Frequency of operation	Once per driving cycle	
Duration	90 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11 V	-
Intake air temperature	-10 ℃ (14 ℉)	-
Idle	OFF	
Intake air amount	8 g/sec.	25 g/sec.
Engine speed	-	3,000 rpm
Engine coolant temperature	75˚C (167˚F)	
Estimated catalyst temperature conditions are met:	A and B	
A. Estimated temperature of up stream catalyst	450 ℃ (842 ℉)	800 ℃ (1,472 ℉)
B. Estimated temperature of down stream catalyst	450 ℃ (842 ℉)	800 ℃ (1,472 ℉)
Fuel system status	Closed loop	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Catalyst deterioration level (Heated oxygen sensor locus length ratio)	P0420 (Bank 1): 0.5 or more P0430 (Bank 2): 0.4 or more
Number of times detection	8 times

MONITOR RESULT

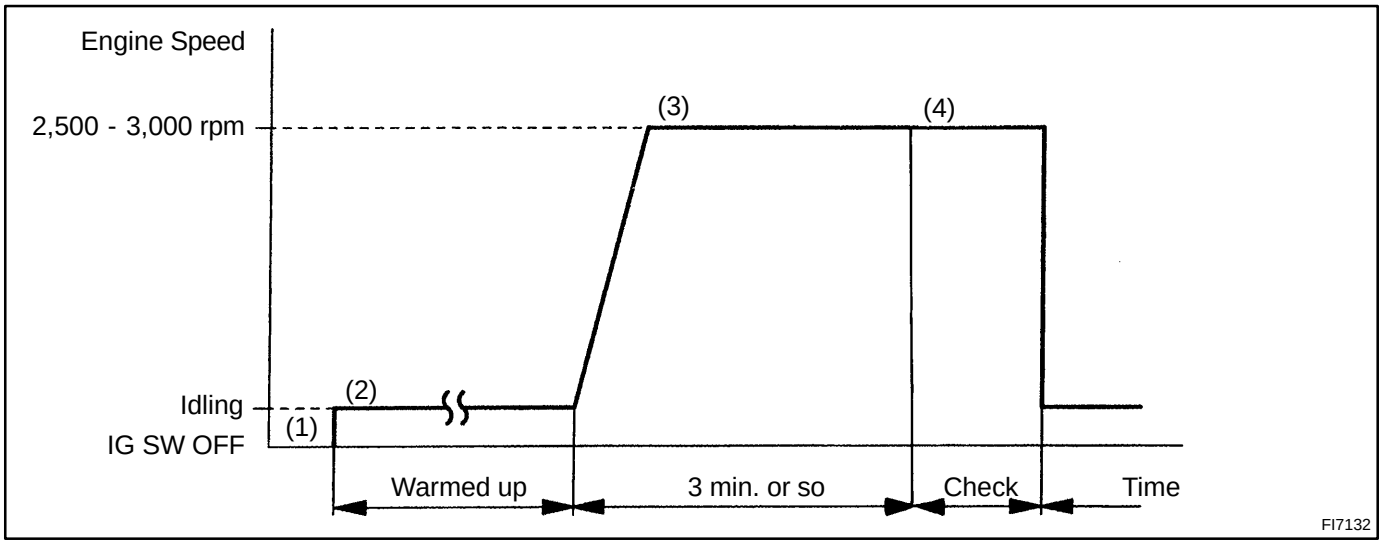
The detailed information is described in “CHECKING MONITOR STATUS” (see page DI-3).

- TID (Test Identification) is assigned to each emission-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

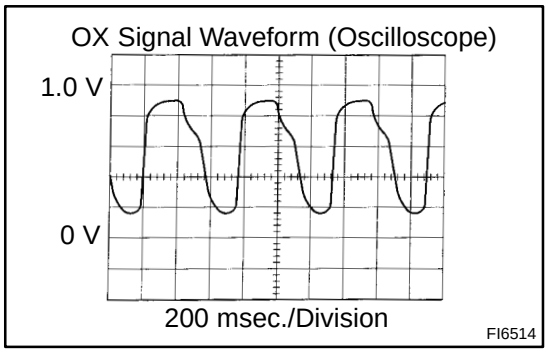
TID $01: Catalyst- Using Front HO2S and Rear HO2S

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
0	$01	Multiply by 0.0078 (no dimension)	Catalyst deterioration level bank 1: Determined by waveform of front HO2S and rear HO2S	Malfunction criterion
0	$02	Multiply by 0.0078 (no dimension)	Catalyst deterioration level bank 2: Determined by waveform of front HO2S and rear HO2S	Malfunction criterion

CONFIRMATION ENGINE RACING PATTERN



(1) Connect the hand-held tester to the DLC3, or connect the probe of the oscilloscope between terminals OX1A, OX1B, OX2A, OX2B and E1 of ECM connectors.
(2) Start the engine and warm it up with all the accessories switched OFF until engine coolant temperature is stable.
(3) Race the engine at 2,500 - 3,000 rpm for about 3 min.
(4) After confirming that the waveform of the heated oxygen sensor (bank 1, 2 sensor 1 (OX1A, OX2A)), oscillate around 0.5 V during feedback to the ECM, check the waveform of the heated oxygen sensor (bank 1, 2 sensor 2 (OX1B, OX2B)).



HINT:
If there is a malfunction in the system, the waveform of the heated oxygen sensor (bank 1, 2 sensor 2 (OX1B, OX2B)) is almost the same as that of the heated oxygen sensor (bank 1, 2 sensor 1 (OX1A, OX2A)) on the left.
There are some cases where, even though a malfunction exists, the MIL may either light up or not light up.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Are there any other codes (besides DTC P0420 or P0430) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0420 and/or P0430”	A
”P0420 or P0430” and other DTCs	B

HINT:

If any other codes besides ”P0420 and/or P0430” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-35).**

A

2	**Check gas leakage on exhaust system.**

NG → **Repair or replace exhaust gas leakage point.**

OK

3	**Check heated oxygen sensor (bank 1, 2 sensor 1) (See page SF-73).**

HINT:

Reter to the hint following the end of this flowchart.

NG → **Replace heated oxygen sensor.**

OK

4	**Check heated oxygen sensor (bank 1, 2 sensor 2) (See page SF-73).**

HINT:
Reter to the hint following the end of this flowchart.

NG → **Replace heated oxygen sensor.**

OK

Replace front and rear three-way catalytic converter.

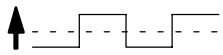
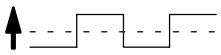
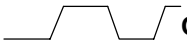
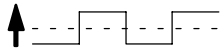
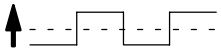
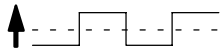
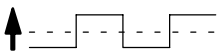
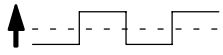
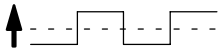
HINT:
Hand-held tester only:
The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).
(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).
HINT:
”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.
(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few second delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).

For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.

NOTICE:

If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and DTCs P0133 and/or P0153 will be recorded, and the MIL then comes on.

- If different DTCs related to different systems while terminal E2 as ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

DIC4I-01

DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC	P0446	Evaporative Emission Control System Vent Control Circuit

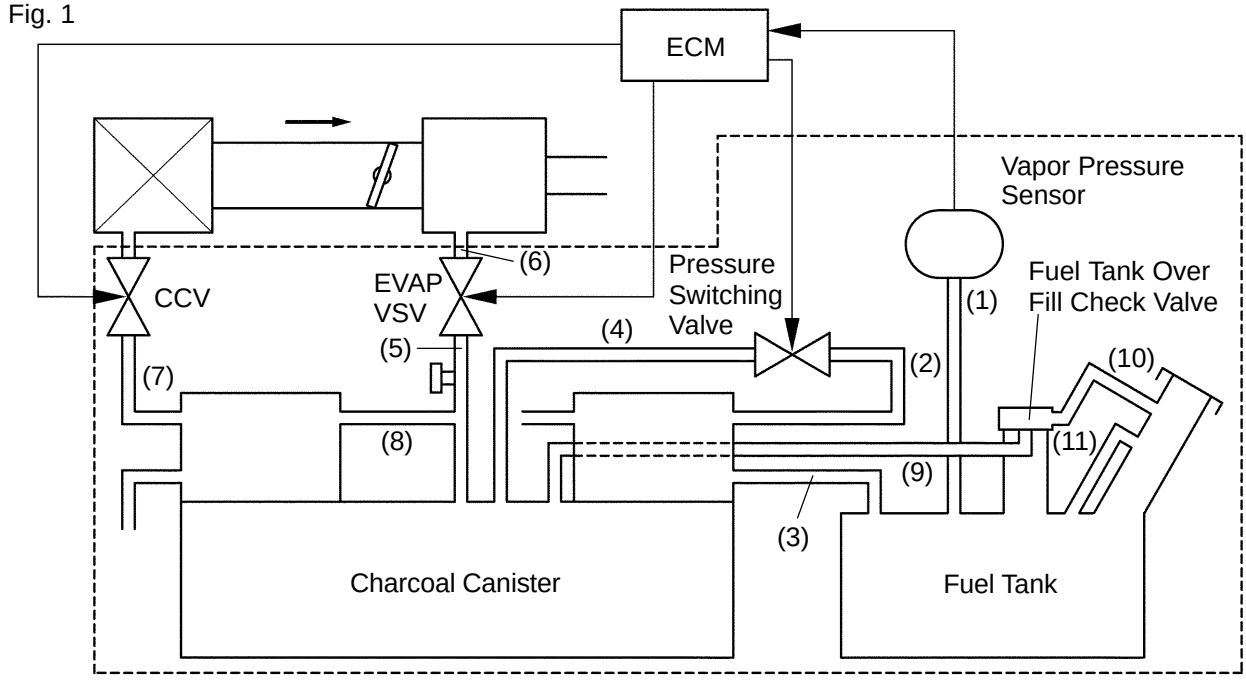
CIRCUIT DESCRIPTION

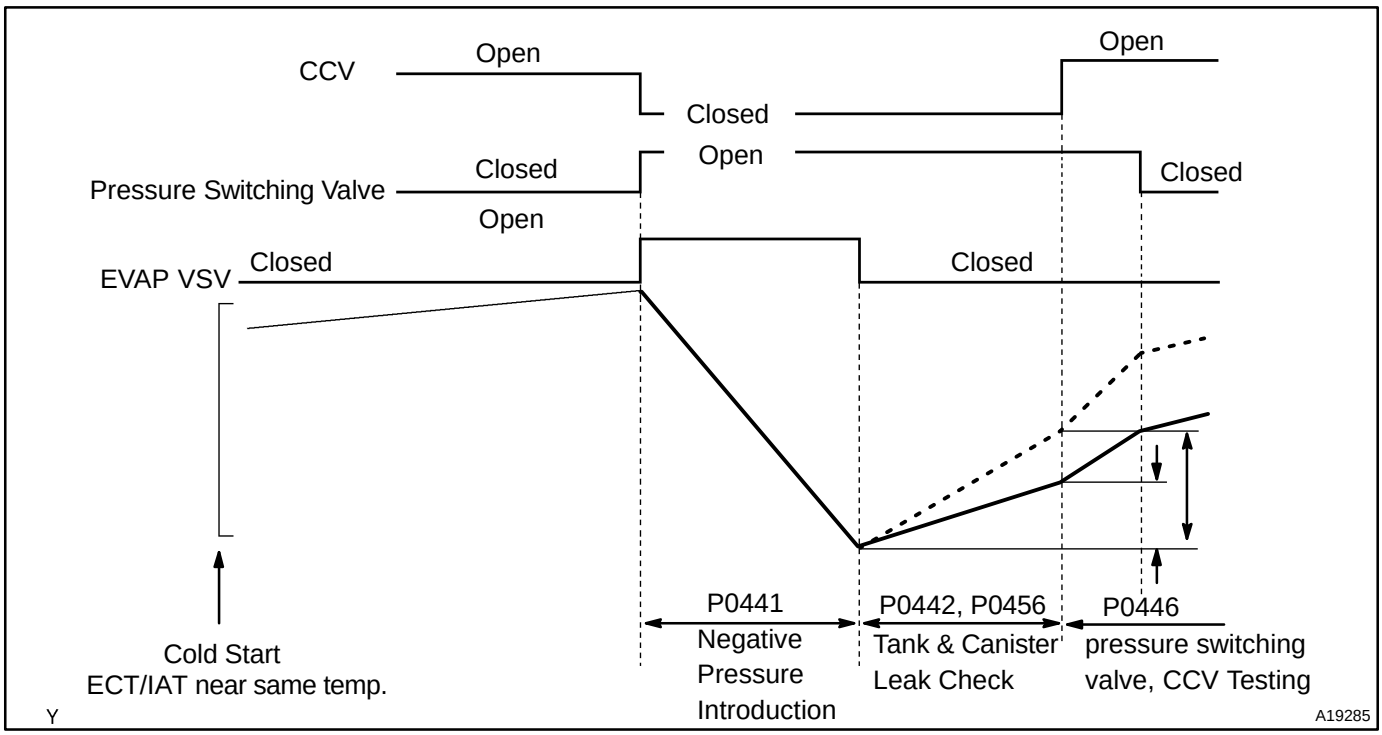
The vapor pressure sensor, canister closed valve (CCV), pressure switching valve are used to detect abnormalities in the evaporative emission control system.

The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.

DTCs P0441 and P0446 are recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or when there is a malfunction in either the EVAP VSV, the pressure switching valve, or in the vapor pressure sensor itself.

Fig. 1





DTC No.	DTC Detecting Condition	Trouble Area
P0441	Pressure in charcoal canister and fuel tank does not drop during purge control (2 trip detection logic)	✓Vacuum hose cracks, holed, blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6), (7), (8), (9), (10) and (11) in Fig. 1) ✓Fuel tank cap incorrectly installed ✓Fuel tank cap cracked or damaged ✓Open or short in vapor pressure sensor circuit ✓Vapor pressure sensor ✓Open or short in circuit for EVAP VSV ✓EVAP VSV ✓Open or short in circuit for CCV ✓CCV ✓Open or short in circuit for pressure switching valve ✓Pressure switching valve ✓Fuel tank cracked, holed or damaged ✓Charcoal canister cracked, holed or damaged ✓Fuel tank over fill check valve cracked damaged ✓ECM
	During purge cut-off, negative pressure incoming in the charcoal canister and fuel tank will not stop. (2 trip detection logic)	
P0446	No rising the fuel tank pressure when commanding the CCV open after an EVAP leak test	
	No changing the fuel tank pressure when commanding the pressure switching valve for the check after the EVAP leak test	
	A high negative pressure (vacuum) does not occurs in the system when commanding the EVAP VSV open with the CCV closed	

HINT:

Typical DTC output of each trouble part

Trouble part		Typical DTC output (*1)
Small Leak		”P0442” and/or ”P0456” (*2)
Medium Leak (ex: Vacuum hose loose)		P0442
Large Leak (ex: Fuel tank cap loose)		P0442 and P0441 and P0446
EVAP VSV	Open Malfunction	P0441
	Close Malfunction	P0442 and P0441 and P0446
CCV	Open Malfunction	P0442 and P0441 and P0446
	Close Malfunction	P0446
Pressure Switching Valve	Open Malfunction	P0446
	Close Malfunction	P0442 and P0441 and P0446

*1: ECM may output some other DTC combination.

MONITOR DESCRIPTION

P0441

The ECM checks for a stuck closed malfunction in the EVAP VSV by commanding it to open with the CCV closed. If a high negative pressure does not develop in the fuel tank, the ECM determines that the VSV for EVAP remains closed. The ECM turns on the MIL and a DTC is set.

The ECM checks for EVAP VSV ”stuck open” fault by commanding both valves (EVAP VSV and CCV) to close at a time when the fuel tank is at atmospheric pressure. If the fuel tank develops a high negative pressure at this early stage of the test, the ECM determines that the EVAP VSV is stuck OPEN.

The ECM will turn on the MIL and a DTC is set.

P0446

If there is a malfunction detected in the evaporative emission (EVAP) VSV, the canister closed valve (CCV) and the VSV for bypass valve; the ECM will illuminate the MIL and set a DTC.

This portion of the EVAP diagnosis checks the following EVAP system functions:

(a) CCV stuck closed.
The ECM checks for a CCV ”stuck closed” malfunction by commanding the CCV to open after an EVAP leak test. If the fuel tank pressure does not rise (lose vacuum), the ECM determines that the CCV is stuck closed. The ECM will turn on the MIL and a DTC is set.

(b) Pressure switching valve stuck closed.
The ECM checks for a pressure switching valve ”stuck closed” malfunction by commanding the pressure switching valve to close after an EVAP leak test. If the fuel tank pressure does not change, the ECM determines that the pressure switching valve is malfunctioning. The ECM will turn on the MIL and a DTC is set.

(c) EVAP VSV (Purge line to intake manifold) stuck closed.
The ECM checks for a stuck closed malfunction in the EVAP VSV by commanding it to open with the CCV closed. If a high negative pressure does not develop in the fuel tank, the ECM determines that the EVAP VSV remains closed. The ECM turns on the MIL and a DTC is set.

MONITOR STRATEGY

DTCs	P0441	VSV for EVAP malfunction
	P0446	Canister close valve stuck closed Pressure switching valve malfunction EVAP VSV malfunction
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Engine coolant temperature sensor, Intake air temperature sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	P0441 : 90 sec. P0446 : 10 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Criteria	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
The same as that for DTC P0442		

TYPICAL MALFUNCTION THRESHOLDS

P0441

Detection Criteria	Threshold
Either of the following condition is met:	A or B
A. Following conditions are met:	(a) and (b)
(a) Fuel tank pressure at the vacuum introduction start	-1.6 kPa (-12 mmHg, -0.47 in.Hg) or more
(b) Difference between the fuel tank pressure at the vacuum introduction start and completion	Less than 0.9 kPa (7 mmHg, 2.7 in.Hg)
B. Following conditions are met:	(a) and (b)
(a) Difference between "minimum" fuel tank pressure before the leak check and the fuel tank pressure at 14 sec. after the leak check	0.5 kPa or more (3.5 mmHg, 0.15 in.Hg)
(b) Fuel tank pressure at 14 sec. after the leak check	Less than -3.7 kPa (-28 mmHg, -1.1 in.Hg)

P0446

Detection Criteria	Threshold
Case 1: CCV stuck closed	
Fuel tank pressure when the CCV is opened after an EVAP leak check	Not changing
Case 2: Pressure switching valve malfunction	
Fuel tank pressure when the pressure switching valve is closed after an EVAP leak check	Not changing
Case 3: EVAP VSV stuck closed	
Fuel tank pressure after the EVAP VSV is opened and manifold vacuum is introduced to the fuel tank	Not changing

MONITOR RESULT

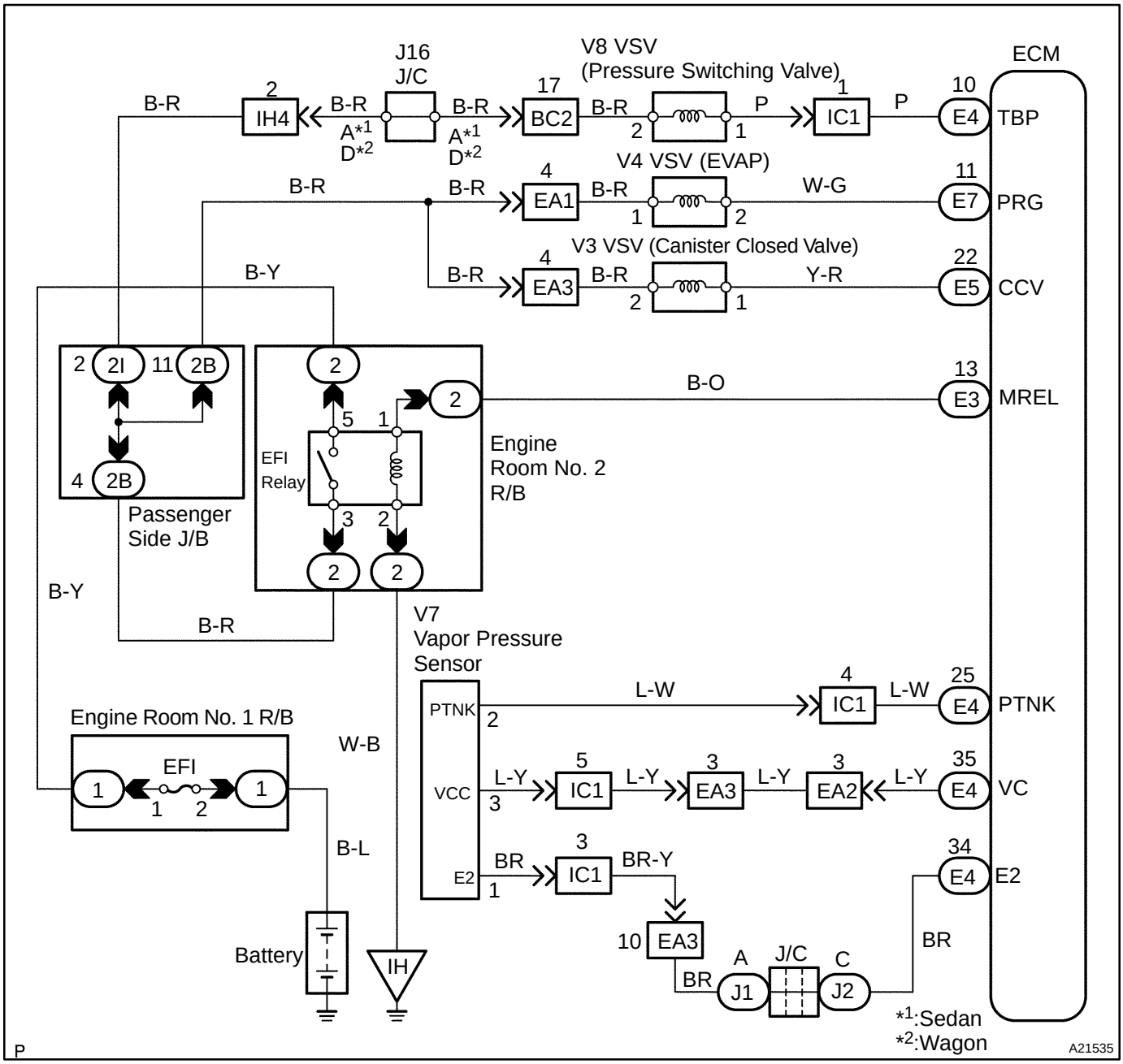
The detailed information is described in “CHECKING MONITOR STATUS” (see page DI-3).

- TID (Test Identification) is assigned to each emission-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $02: EVAP - Vacuum Monitor

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.0916 (mmHg)	Test value of EVAP VSV: Determined by fuel tank pressure change during vacuum introduction	Malfunction criterion
1	$02	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of bypass VSV (pressure switching valve) and CCV: Determined by fuel tank pressure change at switching over bypass VSV and CCV	Malfunction criterion
0	$03	Multiply by 0.0458 (mmHg)	Test value of 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criterion
0	$04	Multiply by 0.0458 (mmHg)	Test value of 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criterion

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P0441 (Purge Flow), P0446 (CCV) or pressure switching valve or P0451 (Evaporative Pressure Sensor) is output with DTC P0442, P0455 or P0456, first troubleshoot DTC P0441, P0446 or P0451. If no malfunction is detected, troubleshoot DTC P0442, P0455 or P0456 next.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the vapor pressure sensor.

Hand-held tester:

1	**Check that fuel tank cap meets OEM specifications.**

NG → **Replace with a cap that meets OEM specifications.**

OK

2	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK

3	**Check fuel tank cap (See page EC-7).**

NG → **Replace fuel tank cap.**

OK

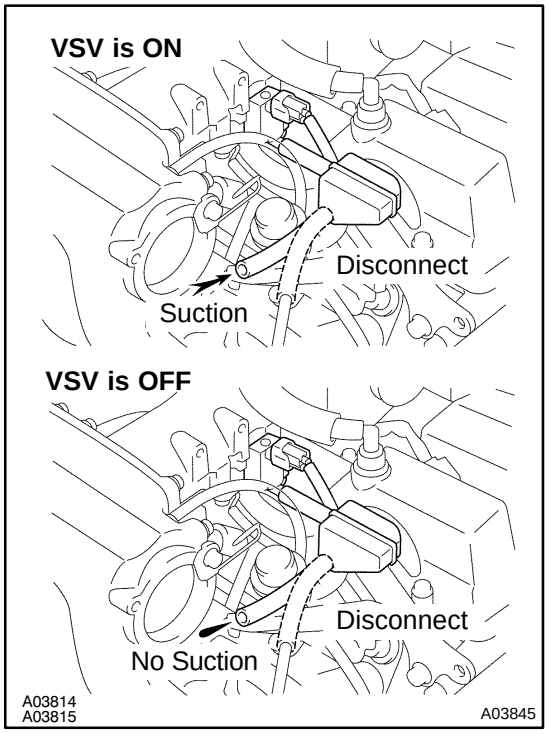
4	**Check filler neck for damage.**

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK

5	**Check purge flow.**



PREPARATION:
(a) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
(b) Disconnect the vacuum hose for the EVAP VSV from the charcoal canister.
(c) Start the engine.
(d) Select the item "EVAP VSV (ALON) / ALL" in the ACTIVE TEST and operate EVAP VSV (Press the right or left button).

CHECK:
When the EVAP VSV is operated by the hand-held tester, check whether the disconnected hose applies suction to your finger.

OK:
VSV is ON:
Disconnected hose applies suction to your finger.
VSV is OFF:
Disconnected hose applies no suction to your finger.

OK → **Go to step 9.**

NG

6	**Check vacuum hose between intake manifold and EVAP VSV, and EVAP VSV and charcoal canister.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace vacuum hose.**

OK

7	**Check operation of EVAP VSV (See page SF-56).**

NG → **Replace EVAP VSV.**

OK

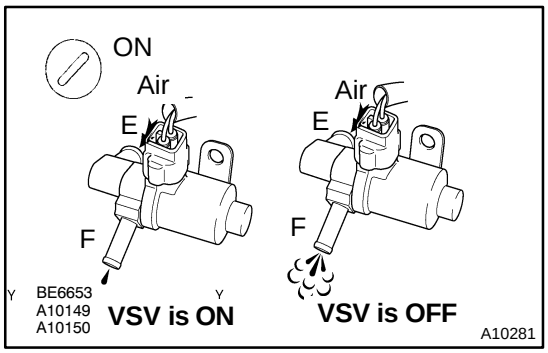
8	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and EVAP VSV, and EVAP VSV and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

9	Check CCV.



PREPARATION:

(a) Disconnect the vacuum hose for the VSV for the CCV from the charcoal canister.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
(d) Select the item "CAN CTRL VSV / ALL" in the ACTIVE TEST and operate CAN CTRL VSV (Press the right or left button).

CHECK:

Check the CCV operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air does not flow from port E to port F.
VSV is OFF:
Air from port E flows out through port F.

OK	Go to step 13.

NG

10	Check vacuum hose between CCV and charcoal canister.

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage and blockage.

NG	Repair or replace vacuum hose.

OK

11	**Check operation of CCV (See page SF-61).**

NG → **Replace CCV.**

OK

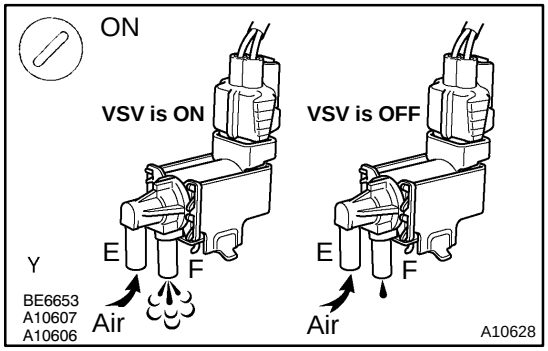
12	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and CCV, and CCV and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

13	**Check pressure switching valve.**



PREPARATION:

(a) Turn the ignition switch ON and push the hand-held tester main switch ON.

(b) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.

(c) Select the item "TANK BYPASS VSV / ALL" in the ACTIVE TEST and operate TANK BYPASS VSV (Press the right or left button).

CHECK:

Check the pressure switching valve operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 16.**

NG

14	**Check operation of pressure switching valve (See page SF-63).**

NG → **Replace pressure switching valve.**

OK

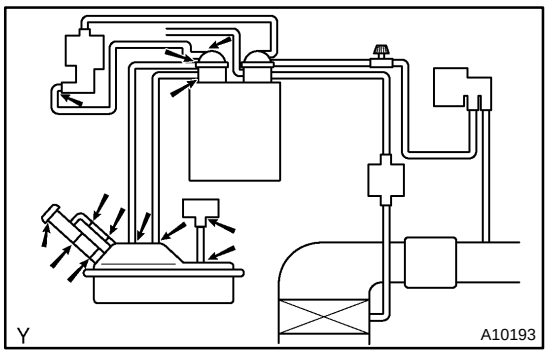
15	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and pressure switching valve, and pressure switching valve and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

16	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Fuel tank filler pipe
- Hoses and tubes around fuel tank

NG → **Repair or replace evaporative emission leak part.**

OK

17	Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve.

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace vacuum hose.**

OK

18	Check hose and tube between fuel tank and charcoal canister.

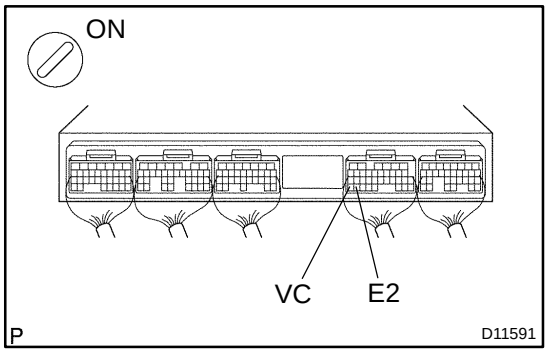
CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-7), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

19	Check voltage between terminals VC and E2 of ECM connector.



CHECK:

(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

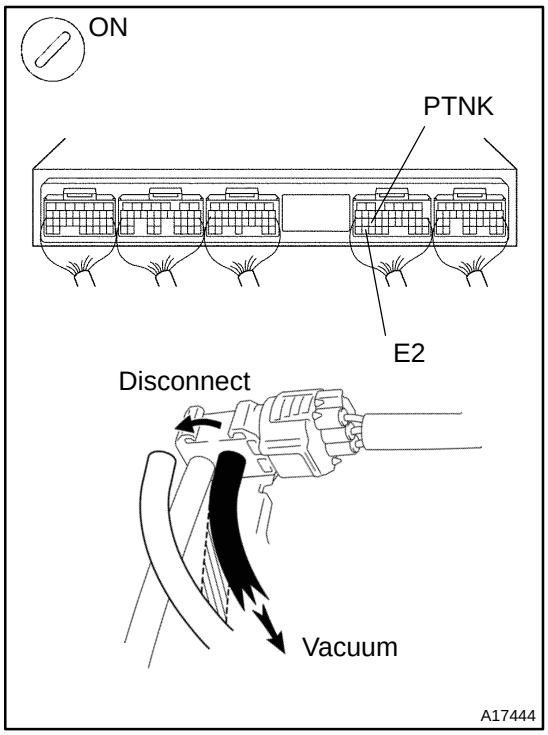
OK:

Voltage: 4.5 to 5.5 V

NG → **Replace ECM (See page SF-74).**

OK

20	**Check voltage between terminals PTNK and E2 of ECM connectors.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(1) Disconnect the vacuum hose from the vapor pressure sensor.

(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:

Vacuum applied to vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:

Condition (1) Voltage: 2.9 to 3.7 V

Condition (2) Voltage: 0.5 V or less

OK	**Go to step 22.**

NG

21	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

22	**Check fuel tank over fill check valve.**

NG	**Replace fuel tank over fill check valve.**

OK

23	Check fuel tank.

NG → Replace fuel tank.

OK

24	Check charcoal canister for cranks, hole and damage.

NG → Replace charcoal canister.

OK

Replace ECM (See page SF-74).

OBD II scan tool (excluding hand-held tester):

1	Check that fuel tank cap meets OEM specifications.

NG → Replace with a cap that meets OEM specifications.

OK ↓

2	Check that fuel tank cap is correctly installed.

NG → Correctly install fuel tank cap.

OK ↓

3	Check fuel tank cap (See page EC-7).

NG → Replace fuel tank cap.

OK ↓

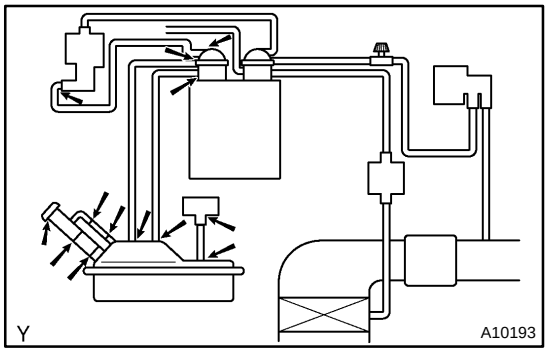
4	Check filler neck for damage.

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → Replace filler pipe.

OK ↓

5	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around fuel tank and charcoal canister

NG → **Repair or replace evaporative emissions leak part.**

OK

6	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace vacuum hose.**

OK

7	**Check hose and tube between fuel tank and charcoal canister.**

CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-7), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

8	**Check vacuum hoses ((8) and (9) in Fig. 1 in circuit description).**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage, and blockage.

NG → **Repair or replace vacuum hose.**

OK

9	**Check VSV connector for EVAP, VSV connector for CCV, VSV connector for pressure switching valve and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect VSV or sensor connector.**

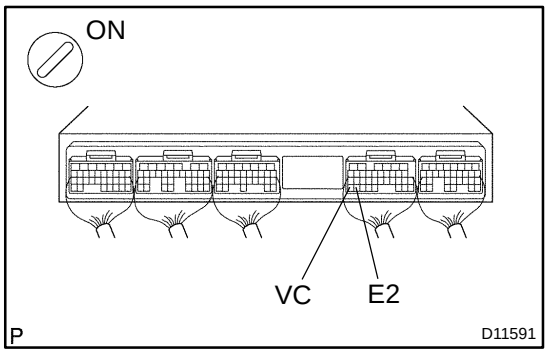
OK

10	**Check charcoal canister for cracks, hole and damage.**

NG → **Replace charcoal canister.**

OK

11	Check voltage between terminals VC and E2 of ECM connector.



CHECK:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

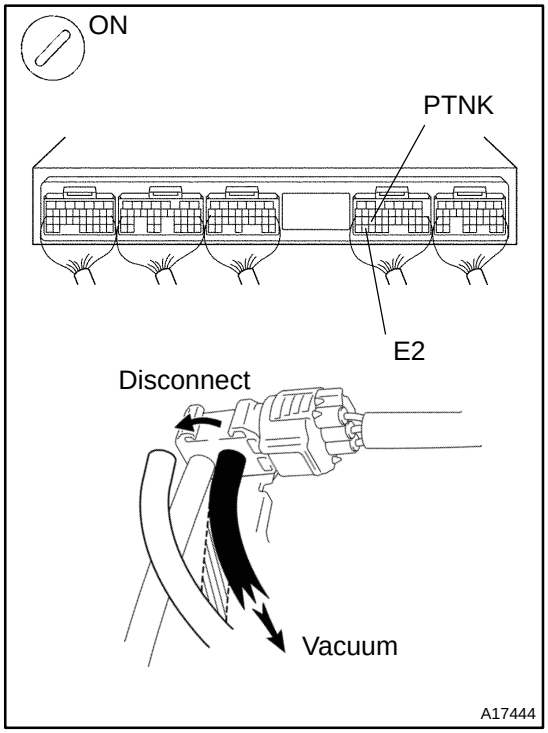
OK:

Voltage: 4.5 to 5.5 V

NG	Replace ECM (See page SF-74).

OK

12	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(1) Disconnect the vacuum hose from the vapor pressure sensor.

(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:

Vacuum applied to vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:

Condition (1) Voltage: 2.9 to 3.7 V

Condition (2) Voltage: 0.5 V or less

OK	Go to step 14.

NG

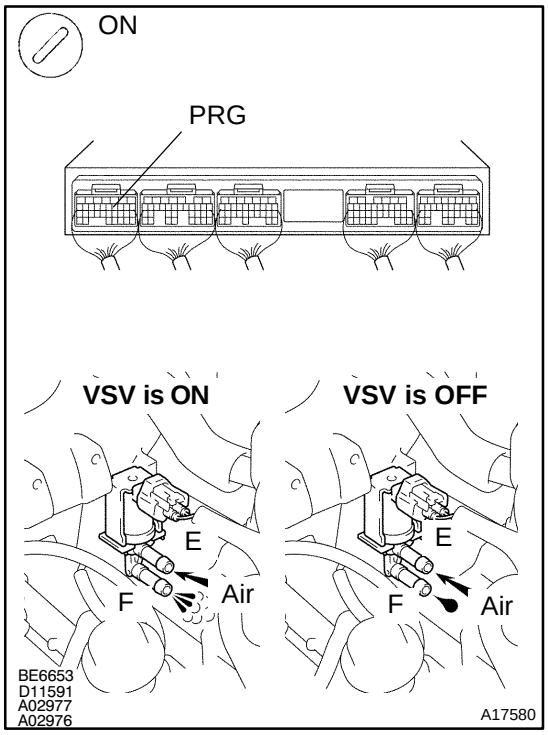
13	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

14	**Check EVAP VSV.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal PRG of the ECM connector and body ground (ON).

(2) Disconnect between terminal PRG of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E frows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 17.**

NG

15	**Check operation of EVAP VSV (See page SF-56).**

NG → **Replace EVAP VSV.**

OK

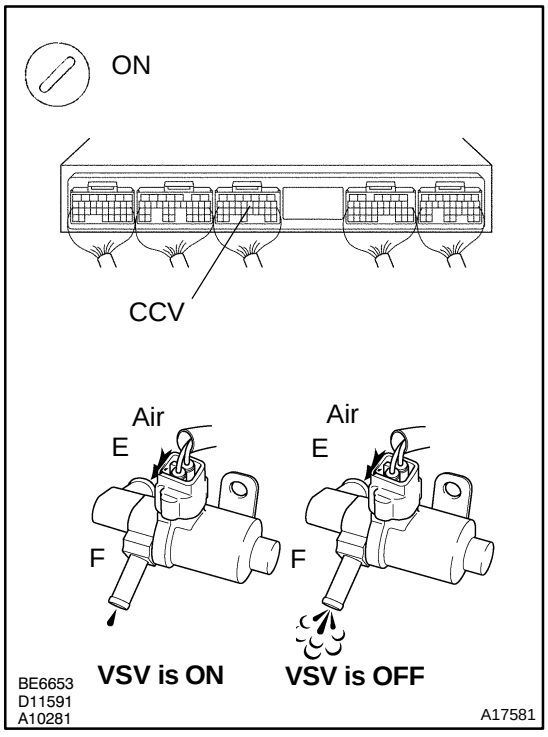
16	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and EVAP VSV, and EVAP VSV and ECM (See page IN-33)**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

17	**Check CCV.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal CCV of the ECM connector and body ground (ON).

(2) Disconnect between terminal CCV of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air does not flow from port E to port F.
(2) VSV is OFF:
Air from port E flows out through port F.

OK → **Go to step 20.**

NG

18	**Check operation of CCV (See page SF-61).**

NG → **Replace CCV.**

OK

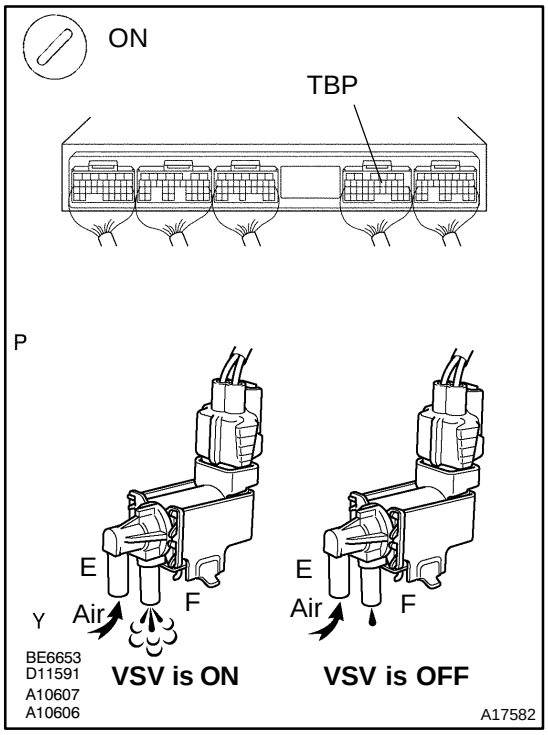
19	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and CCV, and CCV and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

20	**Check pressure switching valve.**



PREPARATION:

(a) Remove the ECM cover (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal TBP of the ECM connector and body ground (ON).

(2) Disconnect between terminal TBP of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 23**

NG

21	**Check operation of pressure switching valve (See page SF-63).**

NG → **Replace pressure switching valve.**

OK

22	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and pressure switching valve, and pressure switching valve and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-74).

23	Check fuel tank over fill check valve.

NG → Replace fuel tank over fill check valve.

OK

24	Check fuel tank.

NG → Replace fuel tank.

OK

It is likely that vehicle user did not properly close fuel tank cap.

DIC4J-01

DTC	P0442	Evaporative Emission Control System Leak Detected (Small Leak)

DTC	P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)

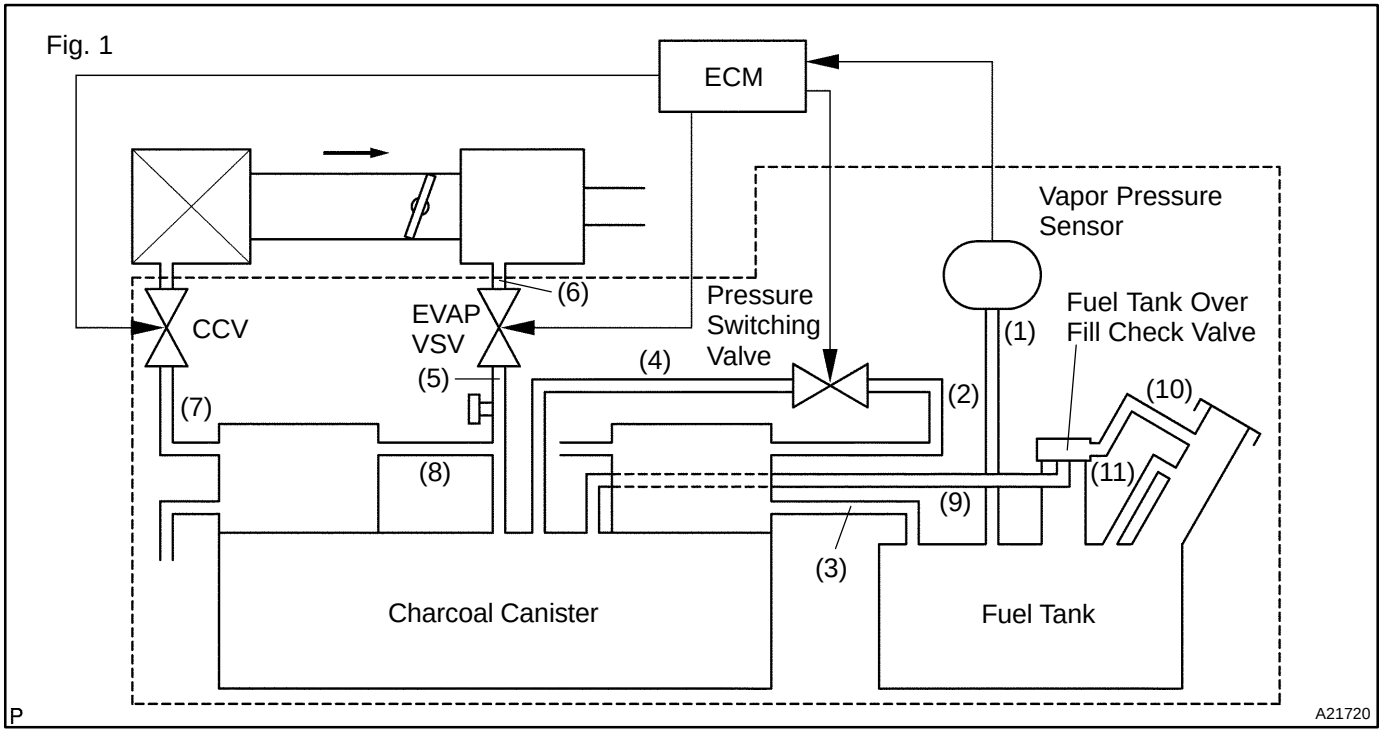
CIRCUIT DESCRIPTION

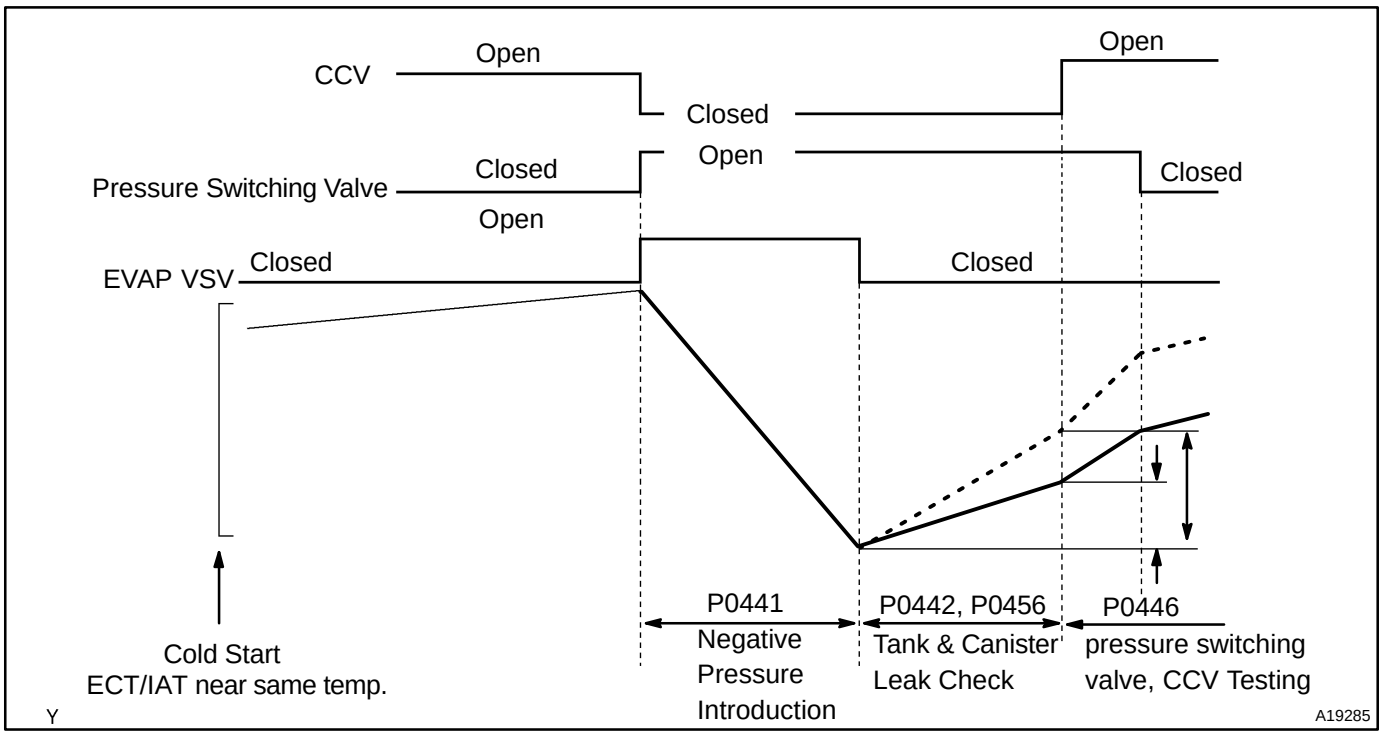
The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.

The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.

DTC P0440 is recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or when the vapor pressure sensor malfunctions.

Fig. 1





DTC No.	DTC Detecting Condition	Trouble Area
P0442 P0456	After a cold engine start. After EVAP VSV operation, the EVAP VSV is turned off, Sealing the vacuum in the system and the ECM begins to monitor the pressure increase. Some increase is expected and will not set a DTC. (2 trip detection logic) - A rapid, sharp increase in pressure indicates a leak in the EVAP system and DTC P0442 sets. - An increase in pressure (above the expected amount) indicates a very small leak in the EVAP system and DTC P0456 sets.	- Hose or tube cracked, holed, damaged or loose seal ((3) in Fig. 1) - Fuel tank cap incorrectly installed - Fuel tank cap cracked or damaged - Vacuum hose cracked, holed, blocked, damaged or disconnected ((1), (2), (4), (5), (6), (7), (8) and (9) in Fig. 1) - Fuel tank cracked, holed or damaged - Charcoal canister cracked, holed or damaged - Open or short in vapor pressure sensor circuit - Vapor pressure sensor - ECM

HINT:

Typical DTC output of each trouble part

Trouble part		Typical DTC output (*1)
Small Leak		"P0442" or "P0456" or "P0442 and P0456"
Medium Leak (ex: Vacuum hose loose)		P0442
Large Leak (ex: Fuel tank cap loose)		P0442 and P0441 and P0446
EVAP VSV	Open Malfunction	P0441
	Close Malfunction	P0442 and P0441 and P0446
CCV	Open Malfunction	P0442 and P0441 and P0446
	Close Malfunction	P0446
Pressure Switching Valve	Open Malfunction	P0446
	Close Malfunction	P0442 and P0441 and P0446

*1: ECM may output some other DTC combination.

MONITOR DESCRIPTION

The evaporative emission system consists of the vapor pressure sensor, the CCV (Canister Close Valve), the pressure switching valve and the EVAP VSV (Purge VSV), those are used to detect malfunction in the system by ECM.

This test will run once per driving cycle when the ECM detects stable vapor pressure in the fuel tank. While the vehicle is being driven on rough or winding roads, the movement of the fuel in the tank will cause unstable fuel tank vapor pressure and the diagnostic test will not executed.

The ECM perform the following steps:

(a) The CCV is closed. (shuts the system)

(b) Checks the stability of the fuel tank pressure. If the variation in the pressure is greater than the specified value, disables the diagnosis.

(c) Opens the EVAP VSV to introduce a negative pressure (vacuum) from the intake manifold into the fuel tank.

(d) Closes the EVAP VSV to seal the fuel tank for storing the negative pressure.

(e) Monitors the negative pressure in the fuel tank for:

(1) Rapid decrease, i.e. a large leak, 0.040 inch or more

(2) Decrease greater than the normal value

If the ECM detects either of above conditions, the ECM interprets this as a leak in the EVAP system. The ECM will illuminate the MIL (2-trip detection logic) and set a DTC.

MONITOR STRATEGY

DTCs	P0442	Small leak (0.040 inch or more large hole) is detected
	P0456	Vary small leak (0.020 inch hole) is detected
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow sensor, Engine coolant temperature sensor EVAP VSV (purge VSV), CCV
Frequency of operation	Once per drive cycles	
Duration	60 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Criteria	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Common pre-conditions for 0.020 and 0.040 inch:		
Altitude	-	2,400 m (7,872 ft.)
Throttle position learning	Completed	
Vapor pressure sensor	No malfunction	
Difference between intake air temperature and engine coolant temperature at engine start	-7 ℃ (-13 ℉)	11.1 ℃ (20 ℉)
Vehicle speed condition	A or B	
A. Time after vehicle stopped (Less than 10 km/h (6 mph))	90 sec.	-

B. Time after vehicle started (7 km/h (4 mph) or more)	20 sec.	-
0.020 inch malfunction detection:		
Engine coolant temperature at engine start	10 to 32°C (50 to 89.6°F)	
Intake air temperature at engine start	10 to 32°C (50 to 89.6°F)	
Intake air temperature	10°C (50°F)	-
Fuel level condition in fuel tank during leak check	Fuel slosh is small (must not drive on road in bad conditions)	
Time after engine start	-	50 min.
Fuel tank pressure condition before leak check (Fuel tank condition before closed negative pressure introduction)	Tank inside pressure change is small before negative pressure introduction. (Reference: If fuel in tank is high temperature, vapor volume increase and tank inside pressure changes also increase)	
Vehicle speed and intake air amount condition before and after negative pressure introduction	Steady speed and not change greatly of intake air amount	
Fuel level	-	90%
0.020 inch leak detection	Not completed	
0.040 inch leak detection	Not detected	
CCV malfunction, bypass VSV malfunction	Not detected	
Vehicle speed	-	130 km/h (81 mph)
EVAP VSV (Evap purge VSV) malfunction	Not detected	
0.040 inch malfunction:		
Engine coolant temperature at engine start	10°C (50°F)	35°C (95°F)
Intake air temperature at engine start	10°C (50°F)	35°C (95°F)
Intake air temperature	10°C (50°F)	-
Fuel level condition in fuel tank during leak check	Fuel slosh is small (must not drive on road in bad conditions)	
Time after engine start	-	50 min.
Fuel tank pressure condition before leak check (Fuel tank condition before closed negative pressure introduction)	Tank inside pressure change is small before negative pressure introduction. (Reference: If fuel in tank is high temperature, vapor volume increase and tank inside pressure changes also increase)	
Vehicle speed and intake air amount condition before and after negative pressure introduction	Steady speed and not change greatly of intake air amount	
Fuel level	-	90%
0.040 inch leak detection	Not completed	
Fuel tank pressure at vacuum introduction completed	-2.4 kPa (-18 mmHg, -0.71 in.Hg)	-
P0446 VSV check	Not executed	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
0.020 inch malfunction detection:	
Fuel tank pressure changing value for 5 sec. from -2.0 kPa (-15 mmHg, -0.59 in.Hg) point	Increase more than 0.067 kPa (0.5 mmHg, 0.02 in.Hg)
Fuel tank pressure changing value for 5 sec. from -2.7 kPa (-20 mmHg, -0.79 in.Hg) point	Increase more than 0.067 kPa (0.5 mmHg, 0.02 in.Hg)
0.040 inch malfunction detection:	
Fuel tank pressure changing value for 5 sec. from -2.0 kPa (-15 mmHg, -0.59 in.Hg) point	Increase more than 0.2 kPa (1.5 mmHg, 0.06 in.Hg)
Fuel tank pressure changing value for 5 sec. from -2.7 kPa (-20 mmHg, -0.79 in Hg) point	Increase more than 0.2 kPa (1.5 mmHg, 0.06 in.Hg)

MONITOR RESULT

The detailed information is described in “CHECKING MONITOR STATUS” (see page DI-3).

- TID (Test Identification) is assigned to each emission-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $02: EVAP - Vacuum Monitor

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.0916 (mmHg)	Test value of EVAP VSV: Determined by fuel tank pressure change during vacuum introduction	Malfunction criterion
1	$02	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of bypass VSV (pressure switching valve) and CCV: Determined by fuel tank pressure change at switching over bypass VSV and CCV	Malfunction criterion
0	$03	Multiply by 0.0458 (mmHg)	Test value of 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criterion
0	$04	Multiply by 0.0458 (mmHg)	Test value of 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criterion

WIRING DIAGRAM

Refer to DTC P0441 on page DI-207 .

INSPECTION PROCEDURE

Hand-held tester:

1	Check that fuel tank cap meets OEM specifications.

NG → Replace with a cap that meets OEM specifications.

OK

2	Check that fuel tank cap is correctly installed.

NG → Correctly install fuel tank cap.

OK

3	Check fuel tank cap (See page EC-7).

NG → Replace fuel tank cap.

OK

4	Check filler neck for damage.

PREPARATION:

Remove the fuel tank cap.

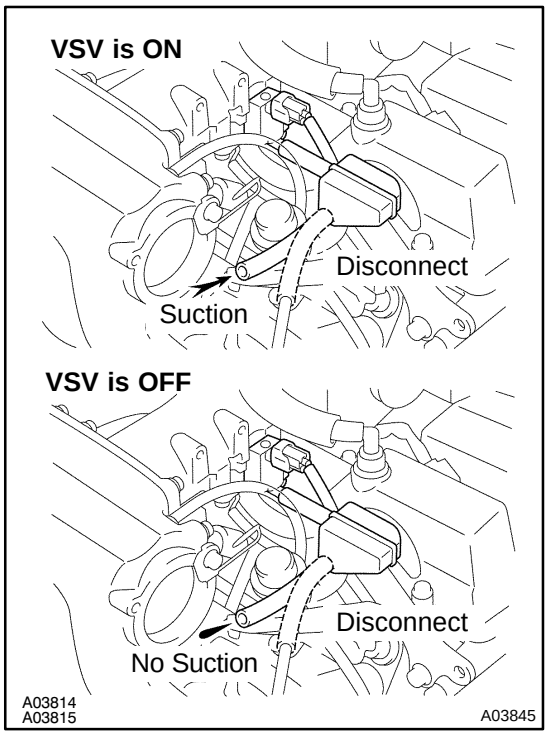
CHECK:

Visually inspect the filler neck for damage.

NG → Replace filler pipe.

OK

5	Check purge flow.



PREPARATION:

(a) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
(b) Disconnect the vacuum hose for the EVAP VSV from the charcoal canister.
(c) Start the engine.
(d) Select the item "EVAP VSV (ALON) / ALL" in the ACTIVE TEST and operate EVAP VSV (Press the right or left button).

CHECK:

When the EVAP VSV is operated by the hand-held tester, check whether the disconnected hose applies suction to your finger.

OK:

VSV is ON:
Disconnected hose applies suction to your finger.
VSV is OFF:
Disconnected hose applies no suction to your finger.

OK	Go to step 9.

NG

6	Check vacuum hose between intake manifold and EVAP VSV, and EVAP VSV and charcoal canister.

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG	Repair or replace vacuum hose.

OK

7	**Check operation of EVAP VSV (See page SF-55).**

NG → **Replace EVAP VSV.**

OK

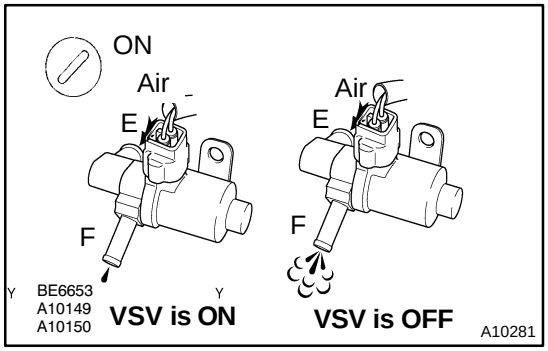
8	**Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

9	**Check CCV.**



PREPARATION:

(a) Disconnect the vacuum hose for the CCV from the charcoal canister.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the item ”DIAGNOSIS / ENHANCED OBD II/ACTIVE TEST” mode on the hand-held tester.

(d) Select the item ”CAN CTRL VSV / ALL” in the ACTIVE TEST and operate CAN CTRL VSV (Press the right or left button).

CHECK:

Check the CCV operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air does not flow from port E to port F.
VSV is OFF:
Air from port E flows out through port F.

OK → **Go to step 13.**

NG

10	**Check vacuum hose between CCV and charcoal canister.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage and blockage.

NG → **Repair or replace vacuum hose.**

OK

11	**Check operation of CCV (See page SF-61).**

NG → **Replace CCV.**

OK

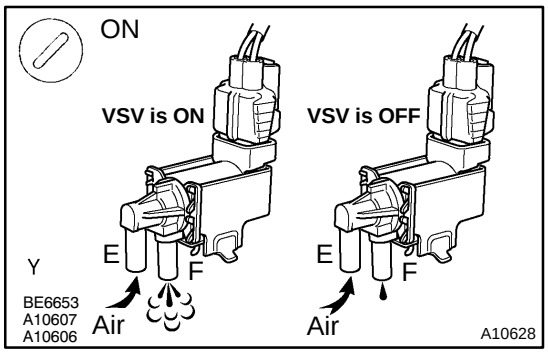
12	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and CCV, and CCV and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

13	**Check pressure switching valve.**



PREPARATION:

(a) Turn the ignition switch ON and push the hand-held tester main switch ON.

(b) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.

(c) Select the item "TANK BYPASS VSV / ALL" in the ACTIVE TEST and operate TANK BYPASS VSV (Press the right or left button).

CHECK:

Check the pressure switching valve operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air does not flow from port E to port F.

OK	**Go to step 16.**

NG

14	**Check operation of pressure switching valve (See page SF-63).**

NG	**Replace pressure switching valve.**

OK

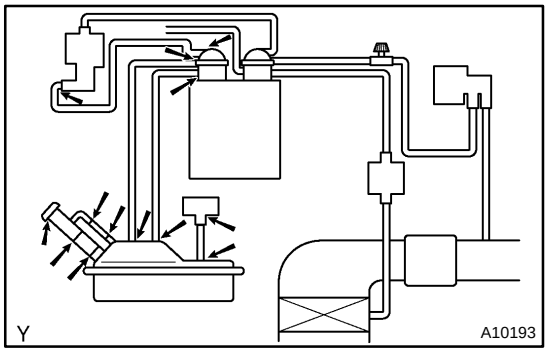
15	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and pressure switching valve, and pressure switching valve and ECM (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

16	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Fuel tank filler pipe
- Hoses and tubes around fuel tan

NG → **Repair or replace evaporative emissions leak part.**

OK

17	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace vacuum hose and tube.**

OK

18	**Check hose and tube between fuel tank and charcoal canister.**

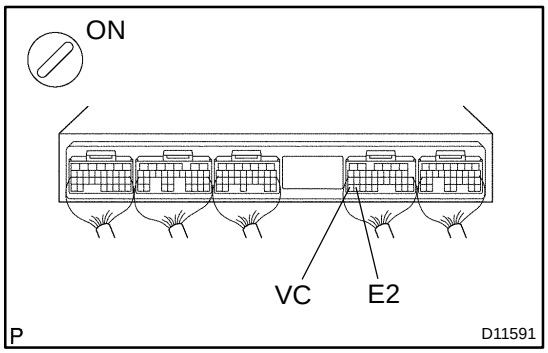
CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-7), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

19	Check voltage between terminals VC and E2 of ECM connector.



CHECK:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

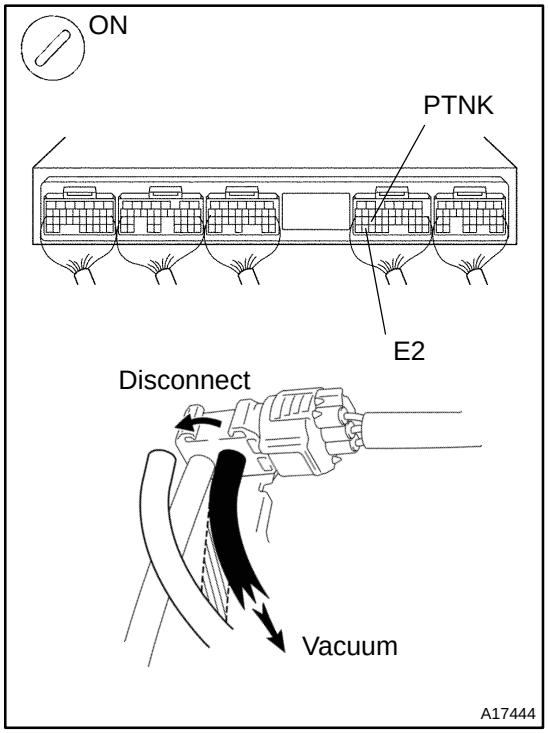
OK:

Voltage: 4.5 to 5.5 V

NG	Replace ECM (See page SF-74).

OK

20	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(1) Disconnect the vacuum hose from the vapor pressure sensor.

(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:

Vacuum applied to vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:

Condition (1) Voltage: 2.9 to 3.7 V

Condition (2) Voltage: 0.5 V or less

OK	Go to step 22.

NG

21	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-74).

22	Check fuel tank over fill check valve.

NG → Replace fuel tank over fill check valve.

OK

23	Check fuel tank.

NG → Replace fuel tank.

OK

24	Check charcoal canister for cranks, hole and damage.

NG → Replace charcoal canister.

OK

Replace ECM (See page SF-74).

OBD II scan tool (excluding hand-held tester):

1	Check that fuel tank cap meets OEM specifications.

NG → Replace with a cap that meets OEM specifications.

OK ↓

2	Check that fuel tank cap is correctly installed.

NG → Correctly install fuel tank cap.

OK ↓

3	Check fuel tank cap (See page EC-7).

NG → Replace fuel tank cap.

OK ↓

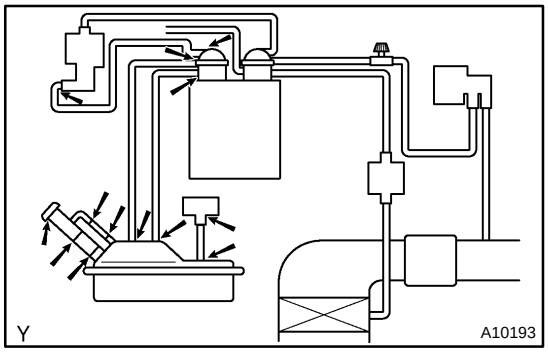
4	Check filler neck for damage.

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → Replace filler pipe.

OK ↓

5	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around fuel tank and charcoal canister

NG → **Repair or replace evaporative emission leak part.**

OK

6	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve, and pressure switching valve and charcoal canister.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace vacuum hose.**

OK

7	**Check hose and tube between fuel tank and charcoal canister.**

CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-7), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

8	**Check vacuum hoses ((5), (6), (7), (8) and (9) in Fig. 1 in circuit description).**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage, and blockage.

NG → **Repair or replace vacuum hose.**

OK

9	**Check VSV connector for EVAP, VSV connector for CCV, VSV connector for pressure switching valve and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect VSV or sensor connector.**

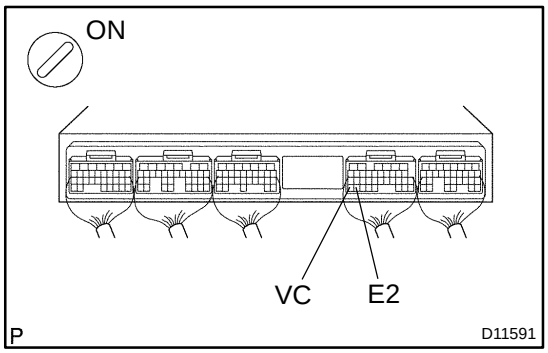
OK

10	**Check charcoal canister for cracks, hole and damage.**

NG → **Replace charcoal canister.**

OK

11	Check voltage between terminals VC and E2 of ECM connector.



CHECK:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

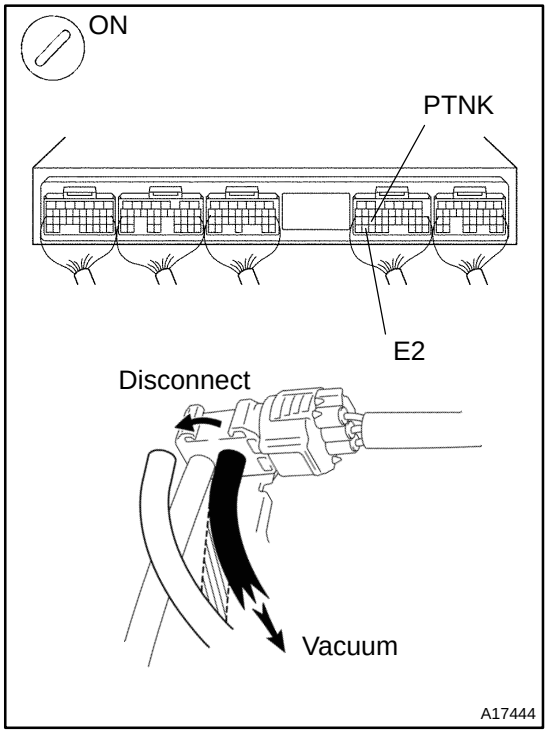
OK:

Voltage: 4.5 to 5.5 V

NG	Replace ECM (See page SF-74).

OK

12	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(1) Disconnect the vacuum hose from the vapor pressure sensor.

(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:

Vacuum applied to vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:

Condition (1) Voltage: 2.9 to 3.7 V

Condition (2) Voltage: 0.5 V or less

OK	Go to step 14.

NG

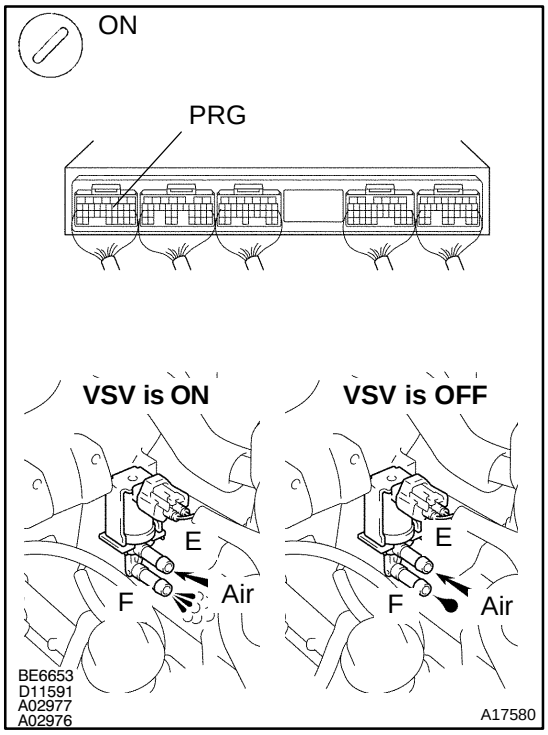
13	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

14	**Check EVAP VSV.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal PRG of the ECM connector and body ground (ON).

(2) Disconnect between terminal PRG of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E frows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 17.**

NG

15	**Check operation of EVAP VSV (See page SF-56).**

NG → **Replace EVAP VSV.**

OK

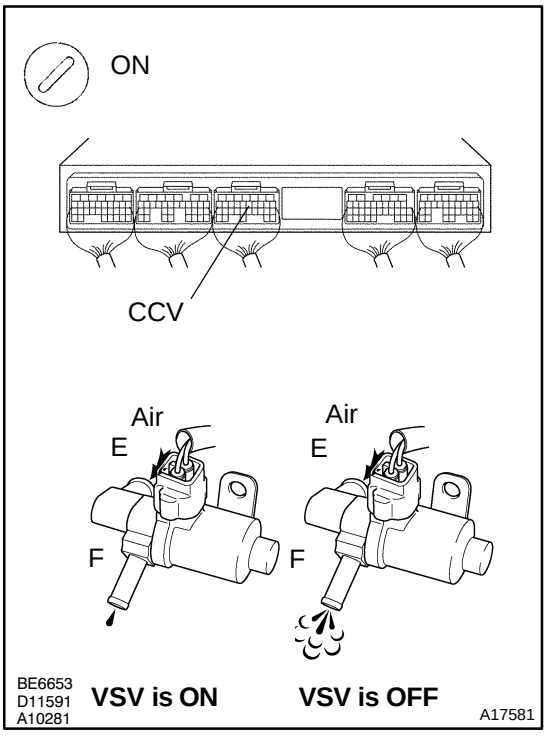
16	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and EVAP VSV, and EVAP VSV and ECM (See page IN-33)**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

17	**Check CCV.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal CCV of the ECM connector and body ground (ON).

(2) Disconnect between terminal CCV of the ECM connector and body ground (OFF).

OK:

VSV is ON:
Air does not flow from port E to port F.
VSV is OFF:
Air from port E flows out through port F.

OK → **Go to step 20.**

NG

18	**Check operation of CCV (See page SF-61).**

NG → **Replace CCV.**

OK

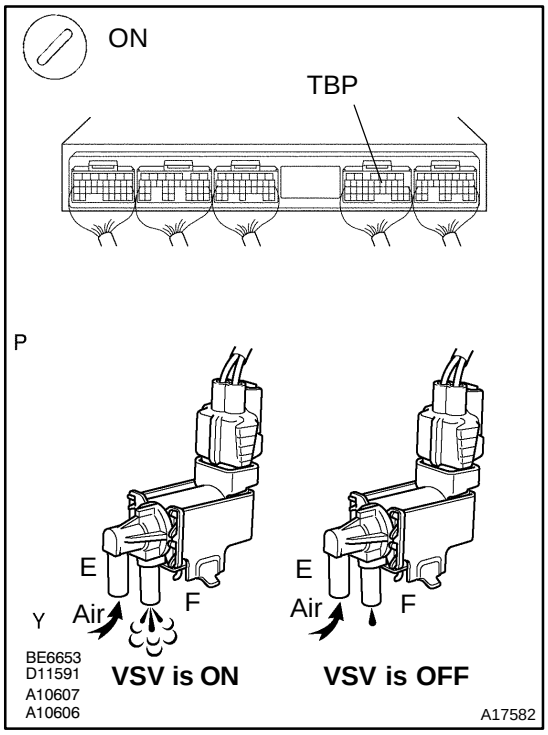
19	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and CCV, and CCV and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

20	**Check pressure switching valve.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal TBP of the ECM connector and body ground (ON).

(2) Disconnect between terminal TBP of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 23.**

NG

21	Check operation of pressure switching valve (See page SF-63).

NG → Replace pressure switching valve.

OK

22	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and pressure switching valve, and pressure switching valve and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-74).

23	Check fuel tank over fill check valve.

NG → Replace fuel tank over fill check valve.

OK

24	Check fuel tank.

NG → Replace fuel tank.

OK

It is likely that vehicle user did not properly close fuel tank cap.

DIC4K-01

DTC	P0451	Evaporative Emission Control System Pressure Sensor/Switch Range/Performance

DTC	P0452	Evaporative Emission Control System Pressure Sensor/Switch Low Input

DTC	P0453	Evaporative Emission Control System Pressure Sensor/Switch High Input

MONITOR DESCRIPTION

DTC ”P0451, P0452 or P0453” is recorded by the ECM when the vapor pressure sensor malfunctions.

DTC No.	DTC Detecting Condition	Trouble Area
P0451	Vapor pressure sensor output extremely changes under conditions of (a) and (b): (2 trip detection logic) (a) Vehicle speed: 0 km/h (0mph), Engine speed: Idling and VSV for pressure switching valve is OFF (b) Vapor pressure sensor value ⊖ opening pressure valve of charcoal canister	✓Open or short in vapor pressure sensor circuit ✓Vapor pressure sensor ✓ECM
P0452	10 seconds or less after engine starting condition vapor pressure sensor fixed value continues for fixed value or less: (2 trip detection logic)	
P0453	10 seconds or less after engine starting condition vapor pressure sensor fixed value continues for fixed value or more: (2 trip detection logic)	

P0451

The ECM sensor pressure in the fuel tank using the vapor pressure sensor. The ECM supplies the sensor with a regulated 5 V reference voltage and the sensor returns a signal voltage between 0.5 V and 4.5 V according to the pressure level in the fuel tank.

When the pressure in the fuel tank is low, the output voltage of the vapor pressure sensor is low. When it is high, the output voltage is high.

For this DTC P0451, the ECM checks for a ”noisy” sensor or a ”stuck” sensor.

The ECM checks for a ”noisy” sensor by monitoring the fuel tank pressures when the vehicle is stationary and there should be little variation in the tank pressure. If the indicated pressure varies beyond specified limits, the ECM will illuminate the MIL (2-trip detection logic) and a DTC is set.

The ECM checks for a ”stuck” sensor by monitoring the fuel tank pressure for an extended time period. If the indicated pressure does not change over this period, the ECM will conclude that the fuel tank pressure sensor is malfunctioning, The ECM will illuminate the MIL and a DTC is set.

P0452 and P0453

The ECM sensor pressure in the fuel tank using the vapor pressure sensor. The ECM supplies the sensor with a regulated 5 V reference voltage and the sensor returns a signal voltage between 0.5 V and 4.5 V according to the pressure level in the fuel tank.
If the output voltage of the vapor pressure sensor is out of normal range, the ECM will determine that there is a malfunction in the sensor or sensor circuit.
When pressure indicated by the vapor pressure sensor deviates below -3.999 kpa (-30 mmHg, -1.18 in.Hg) or above 1.999 kpa (15 mmHg, 0.59 in.Hg), the ECM interprets this as a malfunction in the vapor pressure sensor. The ECM will turn on the MIL and a DTC will be set.

MONITOR STRATEGY

P0451

Related DTCs	P0451	Evaporative emission control system pressure sensor range/performance
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor
Frequency of operation	Once per driving cycle	
Duration	Signal fluctuation (noise) monitoring: 10 sec. No signal change (stuck) monitoring: 20 min.	
MIL operation	2 driving cycles	
Sequence of operation	None	

P0452 and P0453

Related DTCs	P0452	Evaporative emission control system pressure sensor/switch low input
	P0453	Evaporative emission control system pressure sensor/switch high input
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor
Frequency of operation	Once per driving cycle	
Duration	17 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

P0451

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)	
Signal fluctuation (noise) monitoring:		
Altitude	-	2,400 m (7,872 ft)

Difference between intake air temperature and engine coolant temperature at engine start	-7 °C (-13 °F)	11.1 °C (20 °F)
Engine coolant temperature at engine start	4.4 °C (40 °F)	35 °C (95 °F)
Intake temperature at engine start	4.4 °C (40 °F)	35 °C (95 °F)
Vehicle stop and idling	5 sec.	15 sec.
Stuck monitoring:		
Altitude	-	2,400 m (7,872 ft)
Vapor pressure sensor	No malfunction	
Difference between intake air temperature and engine coolant temperature at engine start	-7 °C (-13 °F)	11.1 °C (20 °F)
Engine coolant temperature at engine start	4.4 °C (40 °F)	35 °C (95 °F)
Intake air temperature at engine start	4.4 °C (40 °F)	35 °C (95 °F)
Time after engine start	5 sec.	-

P0452 and P0453

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Difference between intake air temperature and engine coolant temperature at engine start	-	12 °C (21.6 °F)
Engine coolant temperature at engine start	10 °C (50 °F)	35 °C (95 °F)
Intake air temperature at engine start	10 °C (50 °F)	35 °C (95 °F)
Engine	Running	

TYPICAL MALFUNCTION THRESHOLDS

P0451

Detection Criteria	Threshold
Signal fluctuation (noise) monitoring:	
The number of times the output changed ±0.667 kpa (±5 mmHg, ±0.02 in.Hg) or more during 5 to 15 sec. after idling and vehicle stop	7 times or more
No signal change (stuck) monitoring:	
Fuel tank pressure "no change" time (less than 0.18 kpa (1.35 mmHg, 0.05 in.Hg) change since engine start)	20 min. or more

P0452 and P0453

Detection Criteria	Threshold
P0452:	
Fuel tank pressure	Less than -3.999 kPa (-30 mmHg, -1.18 in.Hg) / when engine running

P0453:	
Fuel tank pressure	1.999 kPa (15 mmHg, 0.59 in.Hg) or more / when engine running

WIRING DIAGRAM

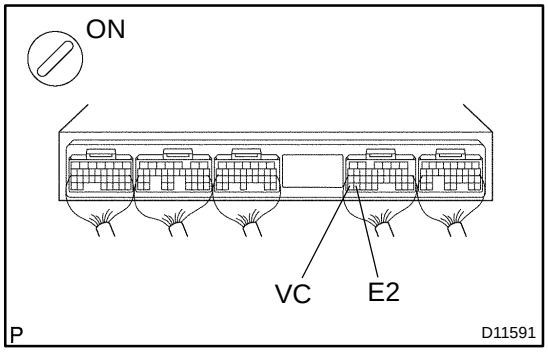
Refer to DTC P0441 on page DI-207 .

INSPECTION PROCEDURE

HINT:

- If different DTCs related to differemt system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- If DTC P0441 (Purge Flow), P0446 (VSV for CCV), P0451, P0452 or P0453 (Evaporative Pressure Sensor) is output with DTC P0442 or P0456, troubleshoot DTC P0441, P0446, P0451, P0452 or P0453 first. If no malfunction is detected, troubleshoot DTC P0442 or P0456 next.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the vapor pressure sensor.

1	**Check voltage between terminals VC and E2 of ECM connector.**



CHECK:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

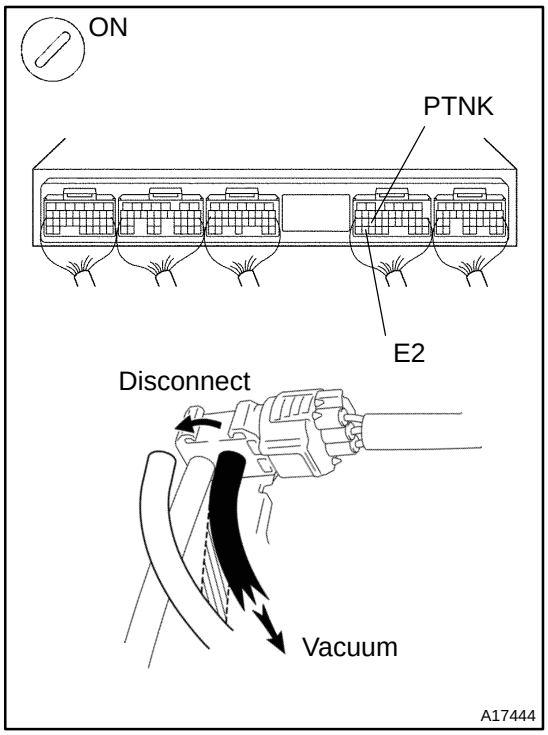
OK:

Voltage: 4.5 to 5.5 V

NG → **Replace ECM (See page SF-74).**

OK

2	**Check voltage between terminals PTNK and E2 of ECM connectors.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(1) Disconnect the vacuum hose from the vapor pressure sensor.

(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:

Vacuum applied to vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:

Condition (1) Voltage: 2.9 to 3.7 V

Condition (2) Voltage: 0.5 V or less

OK	**Replace ECM (See page SF-74).**

NG

3	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

Replace vapor pressure sensor.

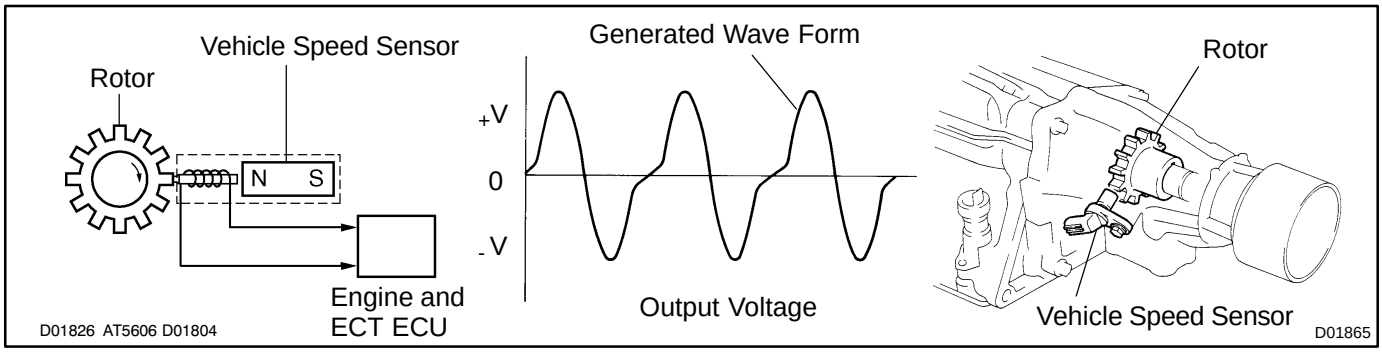
DIC4L-01

DTC	P0500	Vehicle Speed Sensor ”A”

DTC	P0503	Vehicle Speed Sensor ”A” Intermittent/ Erratic/High

CIRCUIT DESCRIPTION

The vehicle speed sensor detects the rotation speed of the transmission output shaft and sends signals to the ECM. The ECM determines the vehicle speed based on these signals. An AC voltage is generated in the vehicle speed sensor coil when the rotor mounted on the output shaft rotates, and then this voltage is sent to the ECM.



DTC No.	Procced to	DTC Detection Condition	Trouble Area
P0500	Step 1	No vehicle speed sensor signal to ECM under following conditions (a) and (b): (1 trip detection logic) (a) Park/neutral position switch is OFF (b) Vehicle is being driven	✓Open or short in vehicle speed sensor circuit ✓Vehicle speed sensor ✓ECM
P0503	DI-3	Intermittent problem in the vehicle speed sensor circuit	

MONITOR DESCRIPTION

The ECM assumes that the vehicle is driven when the RPM of the transmission counter gear indicates more than 300 rpm and it has been over 30 sec. since the park/neutral position switch was turned OFF. If there is no signal from the vehicle speed sensor with these conditions satisfied, the ECM concludes that there is a fault in the vehicle speed sensor. The ECM will turn on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0500	Vehicle speed sensor "A" pulse input error
Required sensors/components	Main sensors/components	Vehicle speed sensor
	Related sensors/components	Park/Neutral position switch, Engine coolant temperature sensor, Combination meter
Frequency of operation	Continuous	
Duration	8 sec.	
MIL operation	Case 1: 2 driving cycles Case 2: Immediate	
Sequence of operation	None	

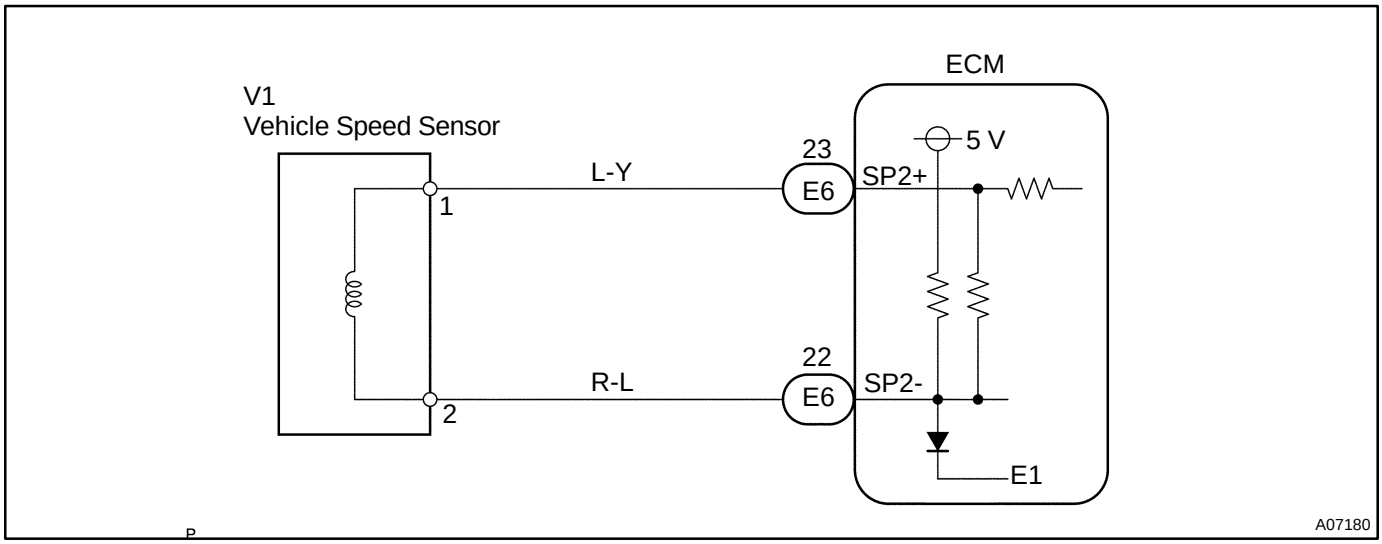
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1:		
Engine coolant temperature	70˚C (158˚F)	-
Engine speed	2,000 rpm	5,000 rpm
Calculated load	33%	-
Fuel cut at high engine speed	Not executing	
Case 2:		
Either the following conditions is met:	A or B	
A. Following conditions are met:	1 and 2	
1. Time after park/neutral position switch ON to OFF	10 sec.	-
2. Engine coolant temperature	20℃ (68℉)	-
B. Following conditions are met:	1 and 2	
1. Time after park/neutral position switch ON to OFF	30 sec.	-
2. Engine coolant temperature	-	20℃ (68℉)
Engine speed	Vary with throttle opening angle	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Sensor signal	No pulse input

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Connect OBD II scan tool or hand-held tester, and read value of vehicle speed.**

PREPARATION:

(a) Connect the OBD II scan tool or hand-held tester.
(b) Start the engine.
(c) Turn the iginition switch ON and push the OBD II scan tool or hand-held tester main switch ON.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / SPD (SP2).

CHECK:

Drive the vehicle and read the vehicle speed SPD (SP2) on the OBD II scan tool or hand-held tester.

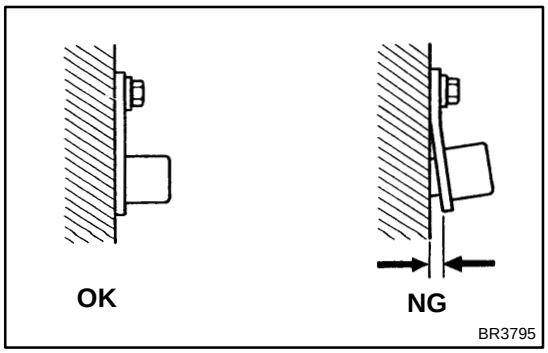
OK:

The actual vehicle speed should be almost equal to the vehicle speed displayed on the tester.

NG → **Check for intermittent problems (See page DI-3).**

OK

2	Check vehicle speed sensor installation.



CHECK:

Check the speed sensor installation.

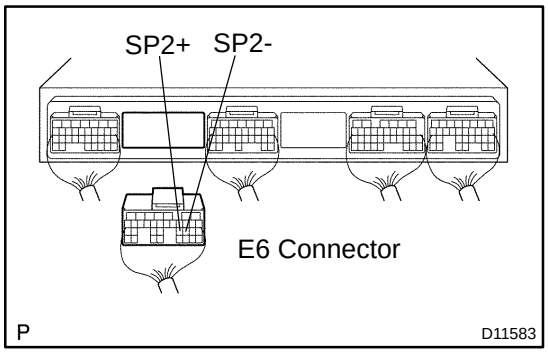
OK:

Sensor is installation properly. There is no clearance between the sensor and transmission.

NG	Properly install the vehicle speed sensor.

OK

3	Check resistance between terminals SP2+ and SP2- of ECM connector.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Disconnect the E6 connector from the ECM.

CHECK:

Check the resistance between terminals SP2+ and SP2- of the ECM connector.

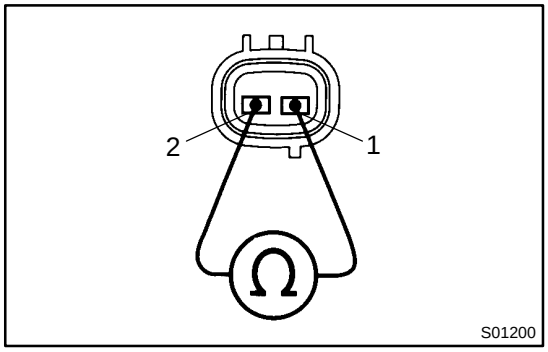
OK:

Resistance: 560 to 680 Ω

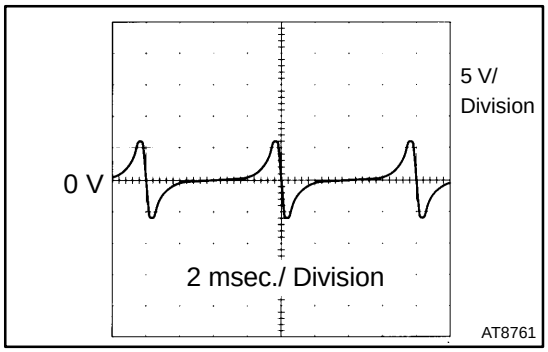
OK	Replace ECM (See page SF-74).

NG

4	Check vehicle speed sensor.



PREPARATION:
Remove the vehicle speed sensor from the transmission.
CHECK:
Measure the resistance between terminals 1 and 2 of the speed sensor.
OK:
Resistance: 560 to 680 Ω



Reference: INSPECTION USING OSCILLOSCOPE
Check the waveform between terminals SP2+ and SP2- when the vehicle speed is approximately. 60 km/h (37 mph).

NG → **Replace vehicle speed sensor.**

OK

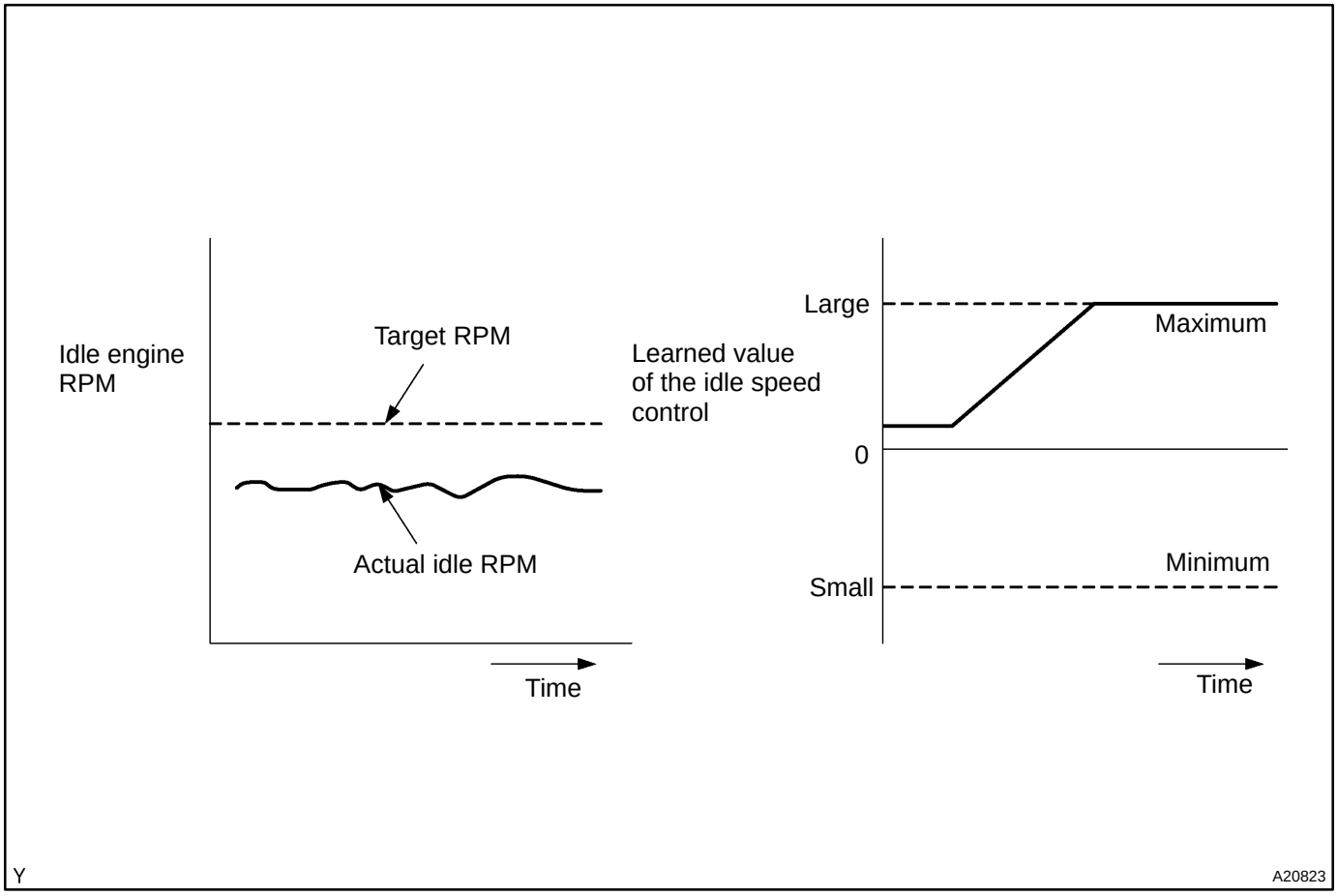
Check and repair harness and connector between ECM and vehicle speed sensor (See page IN-33).

DIC4M-01

DTC	P0505	Idle Air Control System

MONITOR DESCRIPTION

The idle speed is controlled by the ETCS (Electronic Throttle Control System).
The ETCS is composed of the throttle motor which operates the throttle valve, and the throttle position sensor, which detects the opening angle of the throttle valve.
The ECM controls the throttle motor to provide the proper throttle valve opening angle to obtain the target idle speed.
The ECM regulates the idle speed by opening and closing the throttle valve using the ETCS. The ECM concludes that the idle speed control ECM function is malfunctioning if: 1) the actual idle RPM varies more than the specified amount, or 2) a learned value of the idle speed control remains at the maximum or minimum five times or more during a drive cycle. The ECM will turn on the MIL and set a DTC.
Example:
If the actual idle RPM varies from the target idle RPM by more than 200 (*1) rpm five times during a drive cycle, or if the learned value angle of the IAC remains at its maximum or minimum angle for 5 sec., the ECM will turn on the MIL and a DTC is set.
HINT:
*1: RPM threshold varies with engine load.



DTC No.	DTC Detecting Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed (2 trip detection logic)	✓Air induction system ✓PCV piping ✓ECM

MONITOR STRATEGY

Related DTCs	P0505	Idle air control malfunction
Required sensors/components	Main sensors/components	Crankshaft position sensor
	Related sensors/components	Vehicle speed sensor, Engine coolant temperature sensor
Frequency of operation	Functional check: Once per trip Range check: Continuous	
Duration	Functional check: 10 min. Range check: 10 sec.	
MIL operation	Functional check: 2 driving cycles Range check: Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Functional check:		
Precondition is met when both of the following are met	A and B	
A. Intake air flow rate learnings is enabled	3 sec.	-
B. Engine	Running (400 rpm or more)	
Range check:		
Output signal duty	10%	90%
Battery voltage	10 V	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Functional check:	
Case 1:	
All of the following conditions are met:	A, B and C
A. Engine RPM - target engine RPM (History that vehicle had run for 10 km/h (6 mph) or more)	Less than -100 rpm or more than 200 rpm (A/C ON or park/neutral position switch ON) or Less than -100 rpm or more than 150 rpm (A/C OFF and park/neutral position switch OFF)
B. Number of fallowing conditions is met	5 times or more
C. IAC flow rate learning value	Value when fail is judged first + 1.55 L/sec. or more Value when fail is judged first - 1.55 L/sec. or less
Case 2:	
Both or the following condition is met:	A and B
A. Engine RPM - target engine RPM (History that vehicle had run for 10 km/h (6 mph) or more)	Less than -100 rpm or more than 200 rpm (A/C ON or park/neutral position switch ON) or Less than -100 rpm or more than 150 rpm (A/C OFF and park/neutral position switch OFF)
B. IAC flow rate learning value	5.8 L/sec. or more or 1.49 L/sec. or less

Range check:
Missing output duty change

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides P0505) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P0505	A
”P0505” and other DTCs	B

HINT:

If any other codes besides P0505 are output, perform the troubleshooting for those DTCs first.

YES → **Go to relevant DTC chart (See page DI-35).**

NO

2	**Check connection of PCV piping.**

NG → **Repair or replace PCV piping.**

OK

3	**Check air induction system (See page SF-1).**

CHECK:

Check for vacuum leaks in air induction system.

NG → **Repair or replace air induction system.**

OK

Check electric throttle control system (See page SF-32).

DIC4N-01

DTC	P0550	Power Steering Pressure Sensor/Switch Circuit

DTC	P0552	Power Steering Pressure Sensor/Switch Circuit Low Input

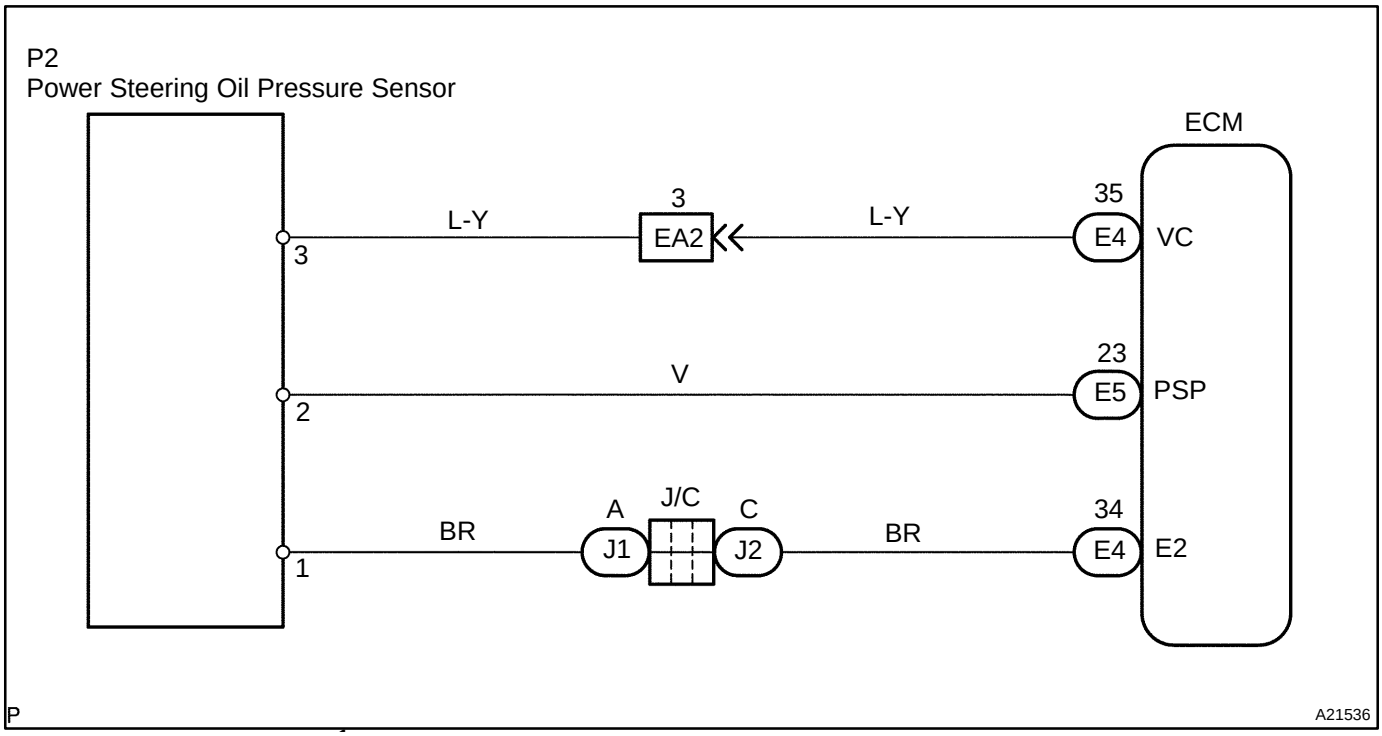
DTC	P0553	Power Steering Pressure Sensor/Switch Circuit High Input

CIRCUIT DESCRIPTION

ECM controls idle speed most appropriately according to a signal from the power steering pressure sensor.

DTC No.	DTC Detecting Condition	Trouble Area
P0550	Condition (a) or (b) continues with more than 0.5 secs.:	✓Open or short in power steering pressure sensor circuit
P0552	(a) PNP < 0.28 V	✓Power steering oil pressure sensor
P0553	(b) PNP > 4.9 V	✓ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check power steering oil pressure sensor.**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Start the engine.
(c) Push the hand-held tester or the OBD II scan tool main switch ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / PS SIGNAL.

CHECK:

Read signal displayed on the hand-held tester or the OBD II scan tool.

RESULT:

Condition	Power steering oil pressure sensor
Turning the steering wheel until it is locked	ON
In an idle	OFF

OK → **Check for intermittent problems (See page DI-3).**

NG

2	**Check for open in harness and connector between engine ECU and power steering oil pressure sensor (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace power steering oil pressure sensor (See page SR-29).

DIALB-02

DTC	P0560	System Voltage

MONITOR DESCRIPTION

The battery supplies electricity to the ECM even when the ignition switch is OFF. This electricity allows the ECM store data such as DTC history, freeze frame data, fuel time values, and other data.
If the battery voltage falls below a minimum level, the ECM will conclude that there is a fault in the power supply circuit. The next engine starts, the ECM will turn on the MIL and a DTC will be set.

DTC No.	DTC Detecting Condition	Trouble Area
P0560	Open in back up power source circuit	✓ Back-up power source circuit ✓ EFI No.1 fuse ✓ Engine room No. 1 R/B ✓ ECM

HINT:
If DTC P0560 present, the ECM will not store another DTC.

MONITOR STRATEGY

Related DTCs	P0560	System voltage malfunction
Required sensors/components	ECM	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate (*1)	
Sequence of operation	None	

*1: The DTC is set immediate. The MIL will be illuminated after the next engine start.

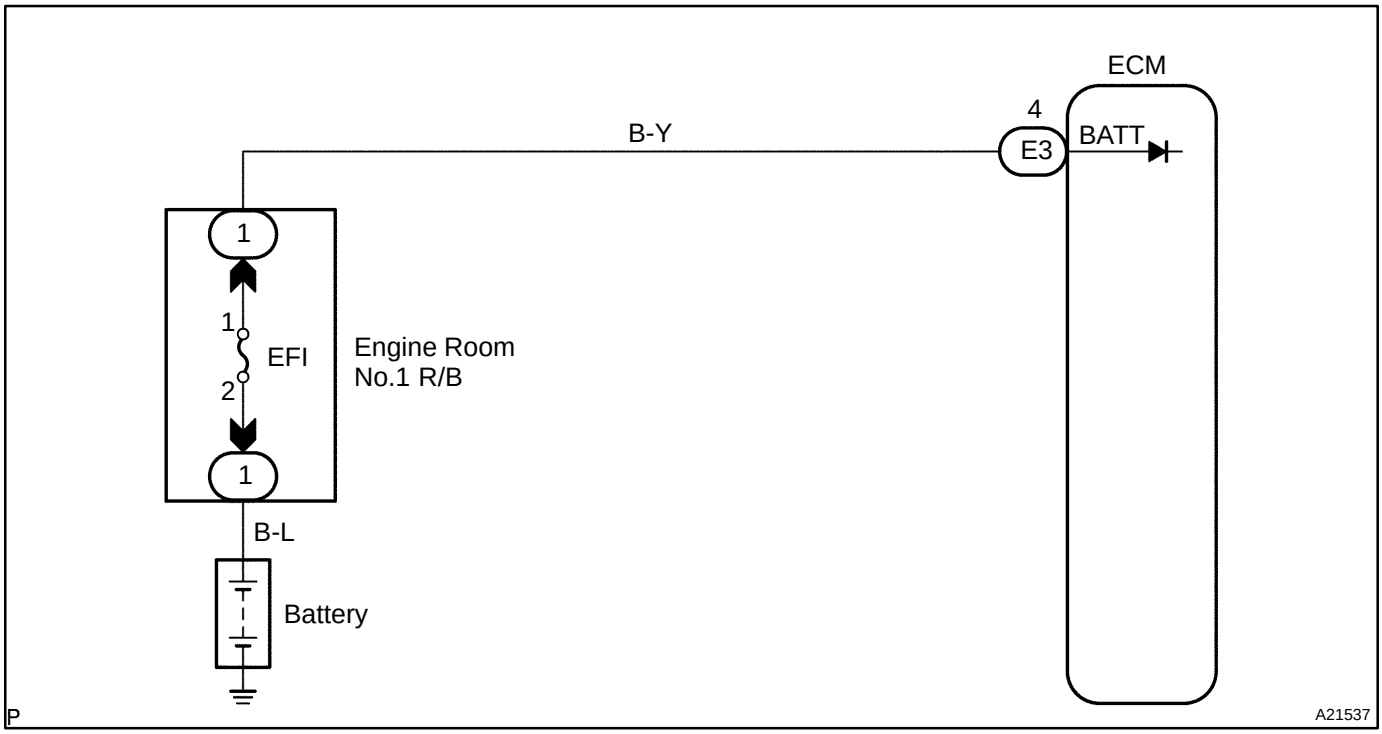
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Stand-by RAM	Initialized	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Battery voltage	Less than 3.5 V

WIRING DIAGRAM

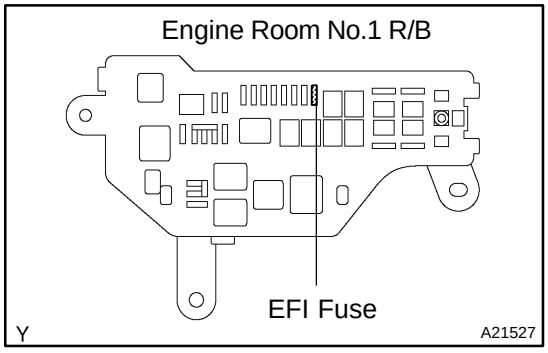


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check EFI fuse of engine rooom No.1 R/B.**



PREPARATION:

Remove the EFI fuse from the engine room No.1 R/B.

CHECK:

Check the continuity of the EFI fuse.

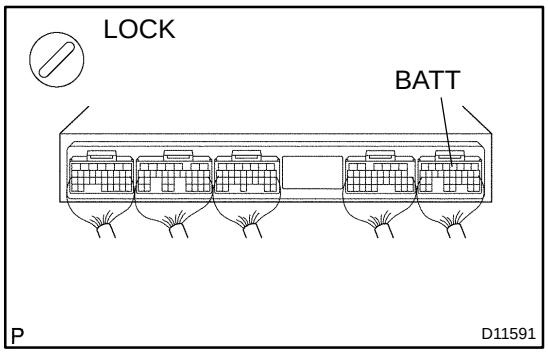
OK:

Continuity

NG → **Check for short in all harness and components connected to EFI fuse.**

OK

2	**Check voltage between terminal BATT of ECM connector and body ground.**



PREPARATION:
Remove the ECM hood (See page SF-74).
CHECK:
Measure the voltage between terminal BATT of the ECM connector and body ground.
OK:
Voltage: 9 to 14 V

OK	**Check for intermitten problems (See page DI-3).**

NG

3	**Check for open and short in harness and connector between ECM and EFI fuse, EFI fuse and battery.**

NG	**Repair or replace harness or connector.**

OK

Check and replace engine room No.1 R/B.

DIALC-02

DTC	P0604	Internal Control Module Random Access Memory (RAM) Error

DTC	P0606	ECM/PCM Processor

DTC	P0607	Control Module Performance

DTC	P0657	Actuator Supply Voltage Circuit / Open

MONITOR DESCRIPTION

The ECM continuously monitors it's internal memory status, internal circuits, and output signals to the throttle actuator. This self-check insures that the ECM is functioning properly. If any malfunction is detected, the ECM will set the appropriate DTC and illuminate the MIL.

The ECM memory status is diagnosed by internal "mirroring" of the main CPU and the sub CPU to detect RAM (Random Access Memory) errors. The two CPUs also perform continuous mutual monitoring.

The ECM sets a DTC if: 1) outputs from the 2 CPUs are different and deviate from the standards, 2) the signals to the throttle actuator deviate from the standards, 3) a malfunction is found in the throttle actuator supply voltage, and 4) any other ECM malfunction is found.

DTC No.	DTC Detecting Condition	Trouble Area
P0604 P0606 P0607 P0657	ECM malfunction	ECM

MONITOR STRATEGY

Related DTCs	P0604	Random access memory (RAM) error range check
	P0606	ECM range check/description
	P0657	Actuator supply voltage circuit range check
Required sensors/components	ECM	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0604:	
RAM mirror check failure	
P0606:	
Either of the following condition is met	(a) and (b)
(a) Difference between TP of main CPU and TP of sub CPU	0.3 V or more
(b) Difference between APP of main CPU and APP of sub CPU	0.3 V or more
P0657:	
ETCS power supply when electronic throttle actuator power OFF	4 V or more

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Replace ECM (See page SF-74).

DIC4Q-01

DTC	P0617	Starter Relay Circuit High

MONITOR DESCRIPTION

While the engine is being cranked, the battery positive voltage is applied to terminal STA of the ECM. If the vehicle is being driven and the ECM detects the starter control signal (STA), the ECM concludes that the starter control circuit is malfunction. The ECM will turn on the MIL and a DTC is set.

DTC No.	DTC Detection Condition	Trouble Area
P0617	When all conditions (a), (b) and (c) are satisfied for 20 seconds with battery (+B) voltage 10.5 V or more (a) Vehicle speed ± 20 km/h (b) Engine revolution ± 1,000 rpm (c) STA signal ON	✓Park/neutral position switch ✓Starter relay circuit ✓Ignition switch ✓ECM

MONITOR STRATEGY

Related DTCs	P0617	Starter signal error
Required sensors/components	Main sensors/components	Starter signal
	Related sensors/components	Vehicle speed sensor, Engine speed sensor
Frequency of operation	Continuous	
Duration	20 sec.	
MIL operation	Immediate	
Sequence of operation	None	

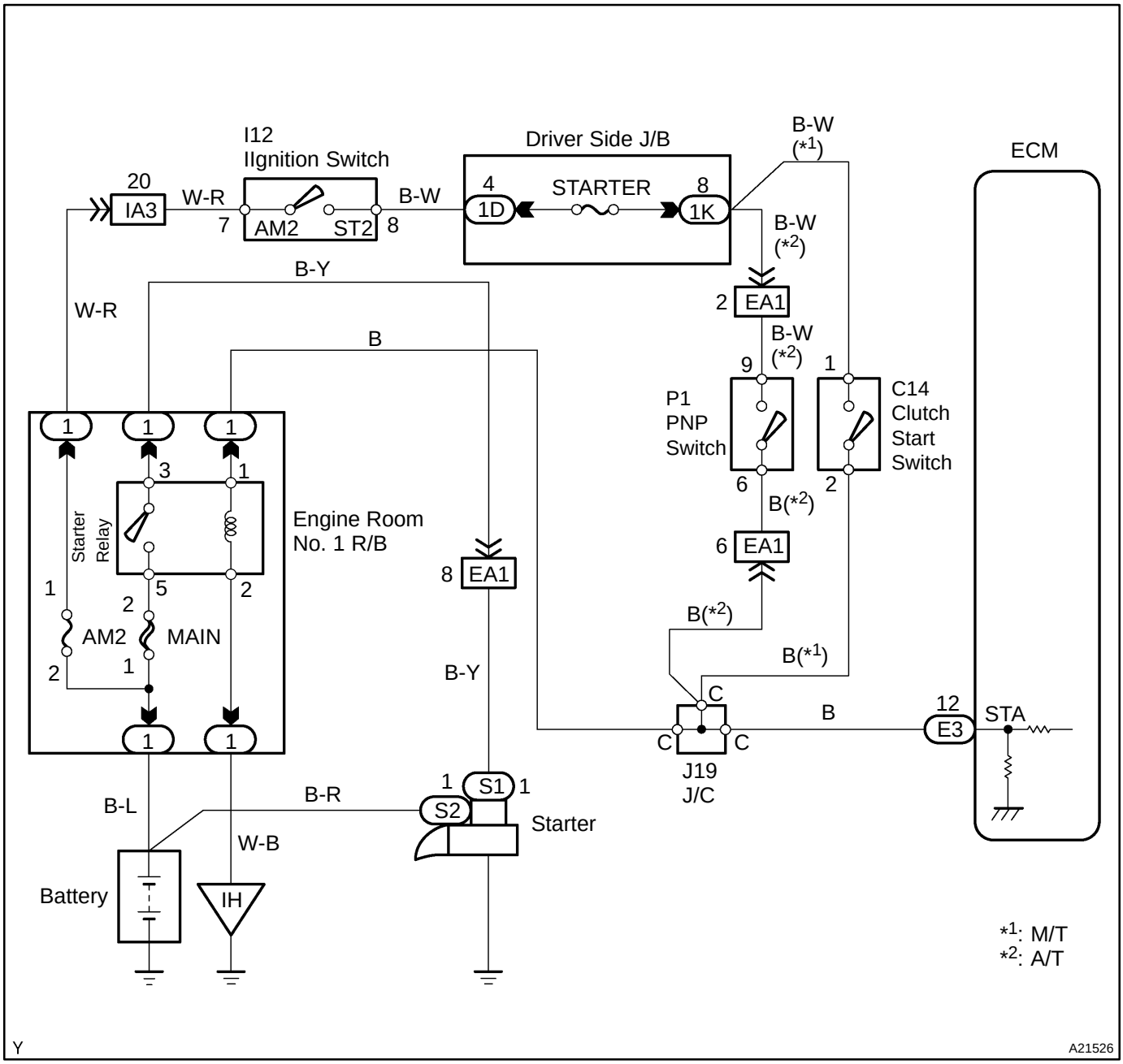
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	10.5 V	-
Vehicle speed	20 km/h (12.4 mph)	-
Engine speed	1,000 rpm	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Starter signal	ON (at "more than 20 km/h (12.4 mph) and more than 1,000 rpm")

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	**Connect hand-held tester, and check STA signal.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

CHECK:

Read the STA signal on the hand-held tester while the starter is operating.

OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

OK → **Go to step 5.**

NG

2	**Check park/neutral position switch (See page DI-361).**

NG → **Replace park/neutral position switch.**
Go to next step 3 after the replacement.

OK

3	**Check ignition switch (See page BE-21).**

NG → **Replace ignition switch.**
Go to next step 5 after the replacement.

OK

4	**Connect hand-held tester, and check STA signal.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

CHECK:

Read the STA signal on the hand-held tester while the starter is operating.

OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

NG → **Repair or replace harness and connector.**

OK

5	**Check DTC reoccur**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Clear DTC (See page DI-3)
Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODE and press YES.
(d) Drive the vehicle more than 40 km/h (25 mph) for 20 seconds or more.

CHECK:

Check DTC reoccur.

RESULT:

Display (DTC Output)	Proceed to
P0617	A
No DTC output	B

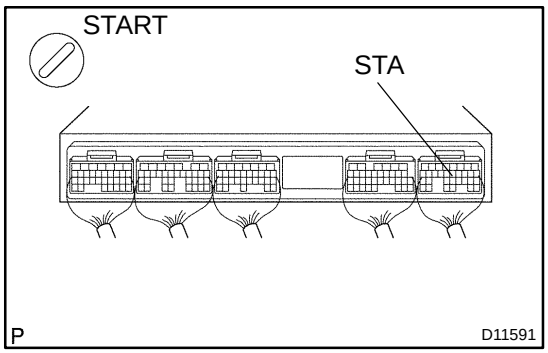
A → **Replace ECM (See page SF-74).**

B

Check for intermittent problems (See page DI-3).

OBD II scan tool (excluding hand-held tester):

1	**Check voltage between terminal STA of ECM connector and body ground.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal STA of the ECM connector and body ground, during the engine cranking.

OK:

Voltage:

6 V or more (ignition switch START position)

0 V (ignition switch ON position)

OK	**Go to step 5.**

NG

2	**Check park/neutral position switch (See page DI-361).**

NG	**Replace park/neutral position switch. And go to next step 4 after the replacement.**

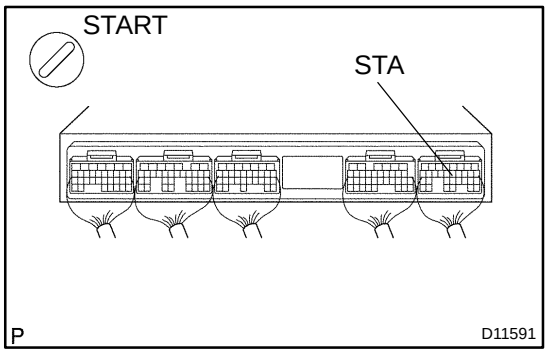
OK

3	**Check ignition switch (See page BE-21).**

NG	**Replace ignition switch. And go to step 4 after the replacement.**

OK

4	Check voltage between terminal STA of ECM connector and body ground.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal STA of the ECM connector and body ground, during the engine cranking.

OK:

Voltage:

6 V or more (ignition switch START position)

0 V (ignition switch ON position)

NG → **Repair or replace harness or connector.**

OK

5	Check DTC reoccur

PREPARATION:

(a) Connect the OBD II scan tool.

(b) Turn the ignition switch ON and OBD II scan tool main switch ON.

(c) Clear DTC (See page DI-3)

(d) Drive the vehicle more than 40 km/h (25 mph) for 20 seconds or more.

CHECK:

Check DTC reoccur.

RESULT:

Display (DTC Output)	Proceed to
P0617	A
No DTC output	B

A → **Replace ECM (See page SF-74).**

B

Check for intermittent problems (See page DI-3).

DIC4R-01

DTC	P1126	Magnetic Clutch Circuit

CIRCUIT DESCRIPTION

Magnetic clutch is mounted between the throttle motor and the valve, and it connects the throttle motor with the throttle valve.Therefore, the throttle motor opens and closes the throttle valve through the magnetic clutch.
If the electric throttle control system has a malfunction, the magnetic clutch separates the throttle motor from the throttle valve so that the throttle valve cannot be operated by the throttle motor.
If this DTC is stored, the ECM shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

DTC No.	DTC Detecting Condition	Trouble Area
P1126	Condition (a) continues for 0.8 seconds: (a) Magnetic clutch current ⊖ 1.4 A or ± 0.4 A	✓Open or short in magnetic clutch cirucit ✓Magnetic clutch ✓ECM
	Condition (a) continues for 1.5 seconds: (a) Magnetic clutch current ⊖ 1.0 A or ± 0.8 A	

MONITOR DESCRIPTION

The ECM monitors both the magnetic clutch current and the throttle position sensor to confirm proper operation of the throttle motor and magnetic clutch. If the clutch current is out of range, the ECM will interpret this as malfunction of the magnetic clutch. If the throttle position sensor value does not change when the throttle motor is operated, the ECM will conclude that the magnetic clutch is “stuck”.
If the ECM detects a malfunction in the magnetic clutch, it will:

- ✓ Illuminate the MIL and set a DTC.
- ✓ Disconnect the electrical supply to the throttle motor.
- ✓ Disengage the magnetic clutch (With the magnetic clutch disengaged, the throttle motor is disconnected from the throttle valve).

MONITOR STRATEGY

Related DTCs	P1126	Magnetic clutch range check
Required sensors/components	Main sensors/components	Magnetic clutch
	Related sensor/components	Accelerator pedal position sensor
Frequency of operation	Continuous	
Duration	Within 1.5 sec.	
MIL operation	1 drive cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 3: Magnetic clutch circuit range check		
When following conditions are met for 0.5 sec., start judgment for temporary fail and start intrusive throttle operation	A, B and C	
A. Ignition switch	ON to OFF	
B. Magnetic clutch	ON to OFF	
C. Actuator power	ON	
Stop the judgment if following conditions are met:	A, B, C and D	
A. Ignition switch	ON	
B. Pedal position	20°	-
C. Throttle control system down	Requested	
D. Engine coolant temperature	-	0°C (0°F)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1: Magnetic clutch circuit range check	
Clutch current when engagement motor clutch is ON	Less than 0.4 A (for 0.8 sec. or more)
	More than 1.4 A (for 0.8 sec. or more)
	Less than 0.8 A (for 1.5 sec. or more)
	More than 1.0 A (for 1.5 sec. or more)
Case 2: Magnetic clutch fail count (Magnetic clutch circuit is open/shorted)	25 times (x 0.004 sec.) or more
Case 3: Magnetic clutch circuit range check	
Throttle sensor valtage change	0.05 V or more

WIRING DIAGRAM

Refer to DTC P2102 on page DI-283 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check magnetic clutch circuit.**

When using hand-held tester:

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

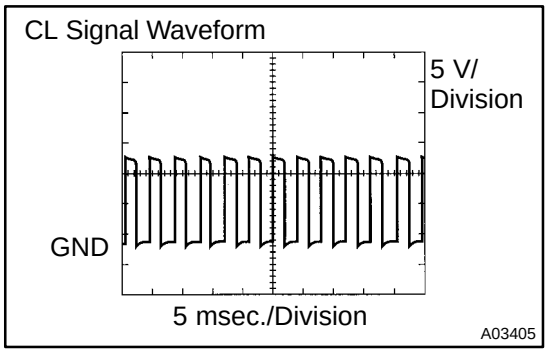
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

CHECK:

Read the magnetic clutch current value on the hand-held tester.

OK:

Current: 0.8 to 1.0 A



When not using hand-held tester:

PREPARATION:

(a) Connect an oscilloscope between terminals CL+ and CL- of the ECM connector.

(b) Start the engine.

CHECK:

Check the waveform between terminals CL+ and CL- of the ECM connector while the engine is idling.

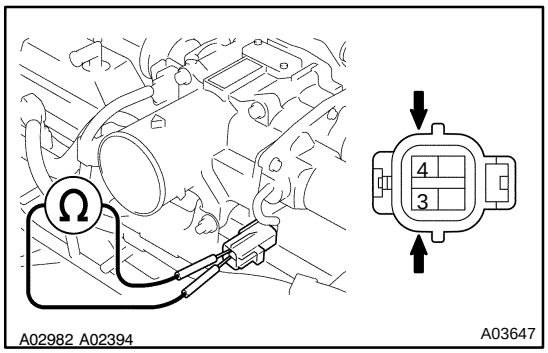
OK:

The correct waveform is as shown.

NG → **Go to step 4.**

OK

2	**Check magnetic clutch.**



PREPARATION:

Disconnect the throttle control motor together with the magnetic clutch connector.

CHECK:

Measure the resistance between terminals 3 and 4 of the throttle control motor with the magnetic clutch.

OK:

Resistance: 4.2 to 5.2 Ω at 20˚C (68˚F)

NG → **Replace throttle control motor with magnetic clutch (See page SF-37).**

OK

3	**Check for open and short in harness and connector between magnetic clutch and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

4	**Check operation of magnetic clutch.**

CHECK:

(a) Clear the DTC.

(b) Perform the following steps and check the DTC.

(1) Turn the ignition switch ON.

(2) Start the engine.

(3) Turn the ignition switch OFF and wait 3 seconds.

(4) Turn the ignition switch ON.

OK:

DTC P1126 is not stored.

NG → **Replace throttle control motor with magnetic clutch (See page SF-37).**

OK

Replace ECM (See page SF-74).

DIALE-02

DTC	P2102	Throttle Actuator Control Motor Circuit Low

DTC	P2103	Throttle Actuator Control Motor Circuit High

CIRCUIT DESCRIPTION

Throttle motor is operated by the ECM and it opens and closes the throttle valve.
The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body and it provides feedback to the ECM to control the throttle motor in order to the throttle valve opening angle properly in response to driving condition.
If this DTC is stored, the throttle valve is locked at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled until the system returns to normal and the ignition switch is turned OFF.

DTC No.	DTC Detection Condition	Trouble Area
P2102 P2103	Conditions (a) and (b) continue for 2 sec.: (a) Throttle control motor output duty ± 80 % (b) Throttle control motor current < 0.5 A	✓Open or short in throttle control motor circuit ✓Throttle control motor ✓ECM

MONITOR DESCRIPTION

The ECM monitors the current flows through the electronic throttle motor and detects malfunctions or an open circuit in the throttle motor based on the current value. When the current deviates from standard range, the ECM concludes that there is a fault in the throttle motor ECM turns on MIL and a DTC is set.
Example:
The current is less than 0.5 A when the motor driving duty ratio is exceeding 80%. The ECM concludes that the current is out of range, turns on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P2102	Throttle actuator control motor current (Low current)
	P2103	Throttle actuator control motor current (High current)
Required sensors/components	Throttle actuator motor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	P2102: Immediate P2103: 1 driving cycle	
Sequence of operation	None	

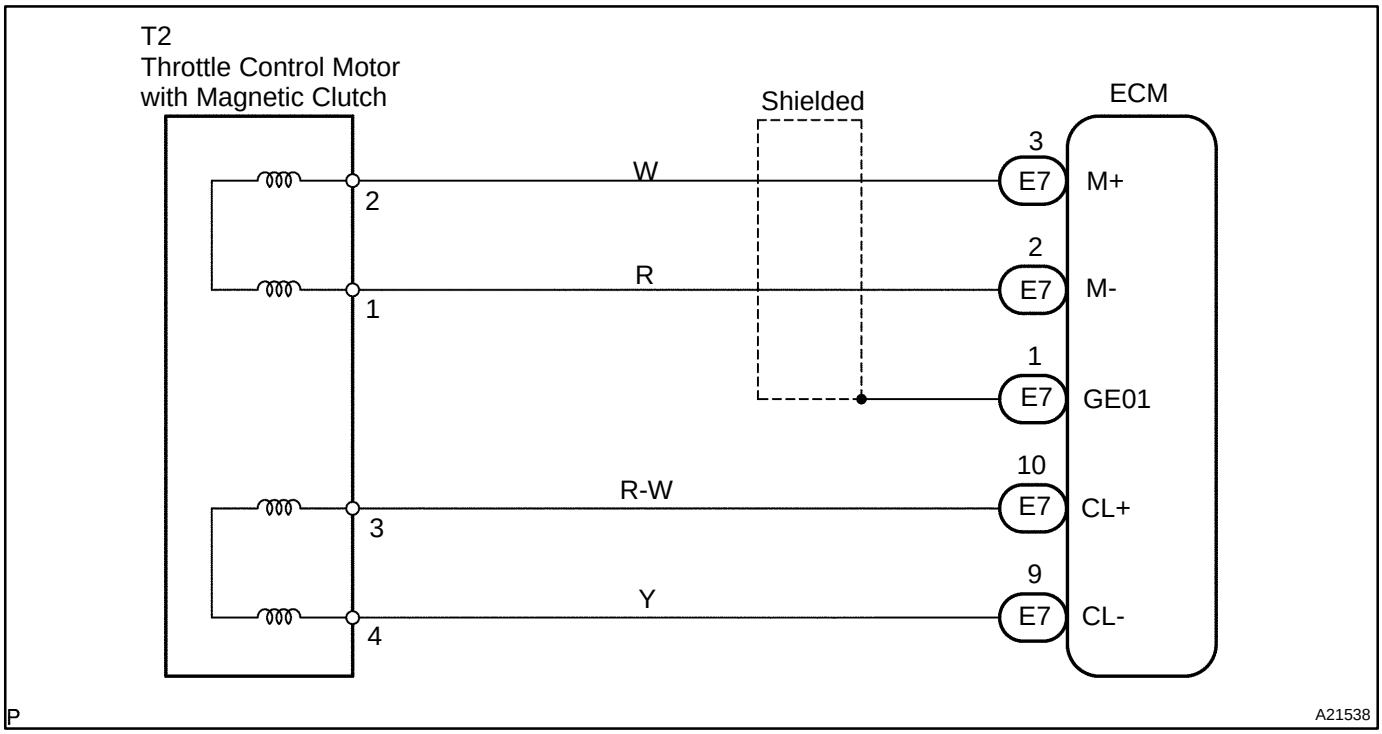
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P2102:		
Throttle control motor	ON	
Duty-cycle ratio to open throttle actuator	80%	-
Throttle actuator power supply	8 V	-
Current motor current - Motor current at 0.016 sec. before	-	0.2 A
Actuator power supply voltage	8 V	-
P2103:		
Throttle control motor	ON	
Either of the following conditions is met:	A or B	
A. Throttle actuator power supply	8 V	-
B. Throttle actuator power	ON	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2102:	
Throttle control motor current	Less than 0.5 A (when motor drive duty 80% or more)
P2103:	
Hybrid IC	Fail

WIRING DIAGRAM

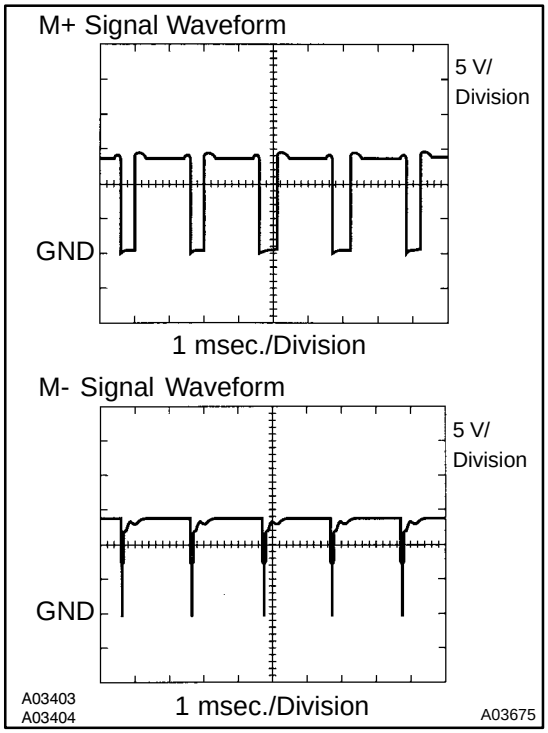


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check throttle control motor circuit.**



PREPARATION:

(a) Connect an oscilloscope between terminals M+ or M- and E1 of the ECM connectors.

(b) Start the engine.

CHECK:

Check the waveform between terminals M+ or M- and E1 of the ECM connectors when the engine is idling.

OK:

Correct waveforms are as shown.

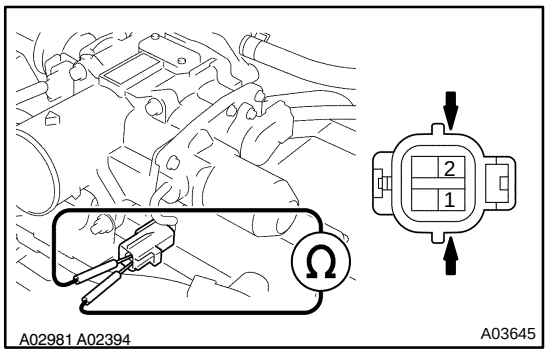
HINT:

The waveform frequency varies depending on the throttle opening.

NG

OK → **Replace ECM (See page SF-74).**

2	**Check throttle control motor.**



PREPARATION:
Disconnect the throttle control motor with the magnetic clutch connector.
CHECK:
Measure the resistance between terminals 1 and 2 of the throttle control motor with the magnetic clutch.
OK:
Resistance: 0.3 to 100 Ω at 20˚C (68˚F)

NG → **Replace throttle control motor with magnetic clutch (See page SF-37).**

OK

3	**Check for open and short in harness and connector between throttle control motor and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

4	**Visually check throttle valve.**

CHECK:
Check between the throttle valve and the housing for foreign objects.
Also, check if the valve can open and close smoothly.

NG → **Remove foreign object and clean throttle body.**

OK

Replace ECM (See page SF-74).

DTC	P2111	Throttle Actuator Control System -Stuck Open

DTC	P2112	Throttle Actuator Control System -Stuck Closed

CIRCUIT DESCRIPTION

The throttle motor is operated by the ECM and it opens and closes the throttle valve. The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body. And, it provides feedback to the ECM to control the throttle motor in order to make the throttle valve opening angle properly in response to the driving condition. If this malfunction is detected, the ECM shuts down the power for the throttle motor, and the throttle valve is fully closed by the return spring. And the throttle valve is locked at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled until the system returns to normal and the ignition switch is turned OFF.

DTC No.	DTC Detection Condition	Trouble Area
P2111 P2112	Lock throttle control motor during control of throttle control motor	✓Throttle control motor ✓Throttle body

MONITOR DESCRIPTION

The ECM concludes that there is a malfunction of the ETCS (Electronic Throttle Control System) when the throttle valve remains at a fixed angle despite high drive current from the ECM. The ECM will turn on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P2111	Throttle motor actuator lock (Open)
	P2112	Throttle motor actuator lock (Closed)
Required sensors/components	Main sensors/components	Throttle actuator motor
	Related sensors/components	Throttle position sensor
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P2111:		
Throttle motor current	2 A	-
Throttle motor duty to close side	80%	-
P2112:		
Throttle motor current	2 A	-
Throttle motor duty to open side	80%	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
|Current throttle position sensor voltage at this time - throttle position sensor voltage 0.016 sec. earlier|	Less than 0.1 V when throttle motor open (or close) duty 80% or more

WIRING DIAGRAM

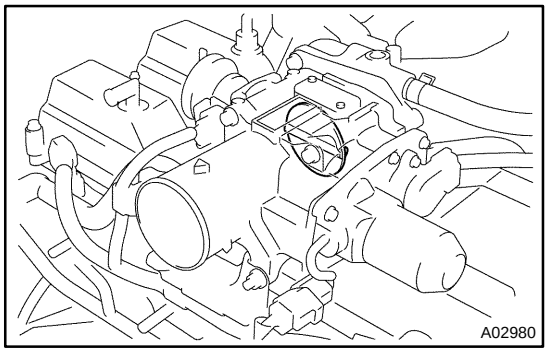
Refer to DTC P2102 DI-283 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Visually check throttle valve.**



PREPARATION:

Remove the intake air resonator.

CHECK:

Check whether or not a foreign body exists between the throttle valve and housing. Also, check if the valve can open and close smoothly.

NG → **Remove foreign body and clean throttle body.**

OK

2	Check throttle control motor (See page SF-32).

NG → Replace throttle control motor with magnetic clutch (See page SF-37).

OK

3	Check for open and short in harness and connector between ECM and throttle control motor (See page IN-33).

NG → Repair or replace harness or connector.

OK

Check for intermittent problems (See page DI-3).

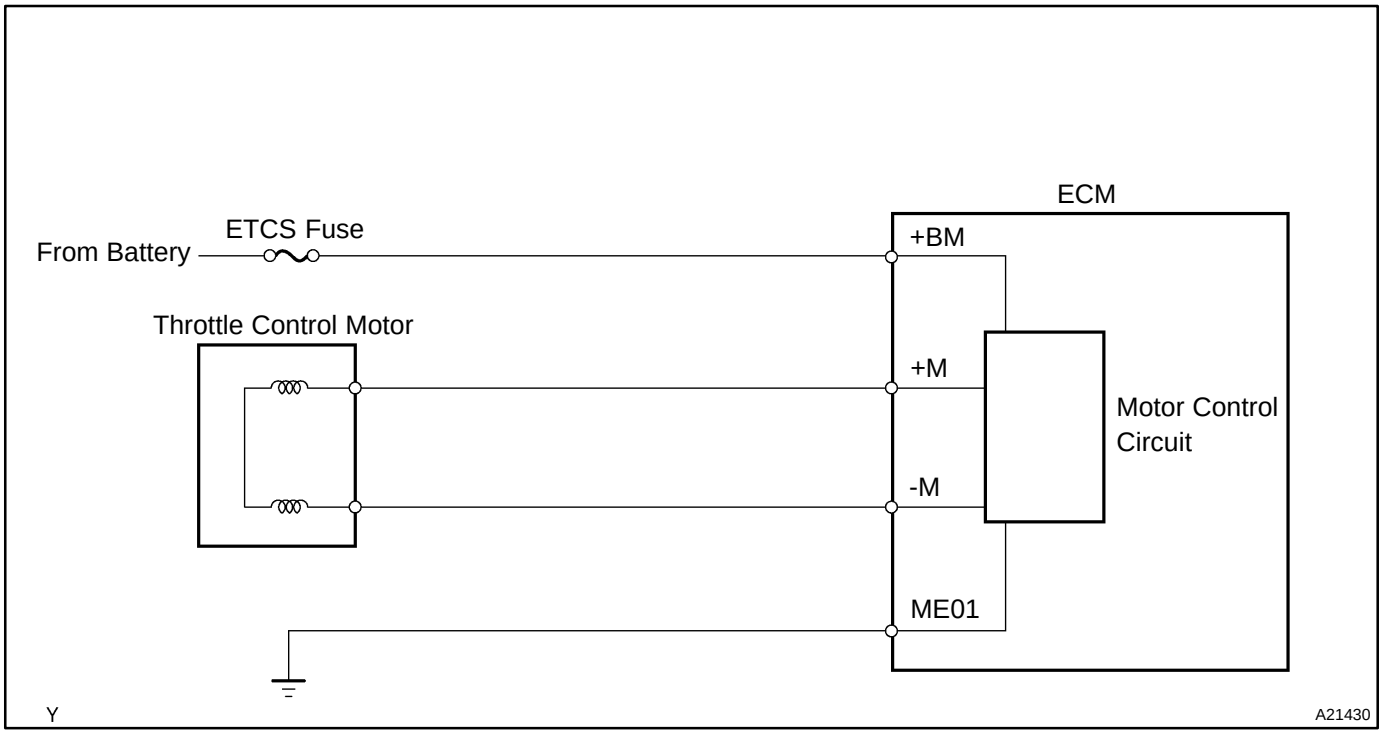
DIC4O-01

DTC	P2118	Throttle Actuator Control Motor Current Range/Performance

CIRCUIT DESCRIPTION

The Electronic Throttle Control System (ETCS) has a dedicated power supply circuit. The voltage (+BM) is monitored and when the voltage is low (less than 4V), the ECM concludes that the ETCS has a fault and current to the throttle control motor is cut.

When the voltage becomes unstable, the ETCS itself becomes unstable. For this reason, when the voltage is low, the current to the motor is cut. If repairs are made and the system has returned to normal, turn the ignition switch to OFF. The ECM then allows current to flow to the motor and the motor can be restarted.



DTC No.	DTC Detecting Condition	Trouble Area
P2118	Open in ETCS power source circuit	✓Open in ETCS power source circuit ✓ETCS fuse ✓ECM

MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the electronic throttle motor. When the power supply voltage drops below the threshold, the ECM concludes that the power supply has an open circuit. A DTC is set and the MIL is turned on.

MONITOR STRATEGY

Related DTCs	P2118	Throttle actuator motor power supply line range check (Low voltage)
Required sensors/components	Throttle actuator motor	
Frequency of operation	Continuous	
Duration	0.8 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Actuator power	ON	
Battery voltage	8 V	-

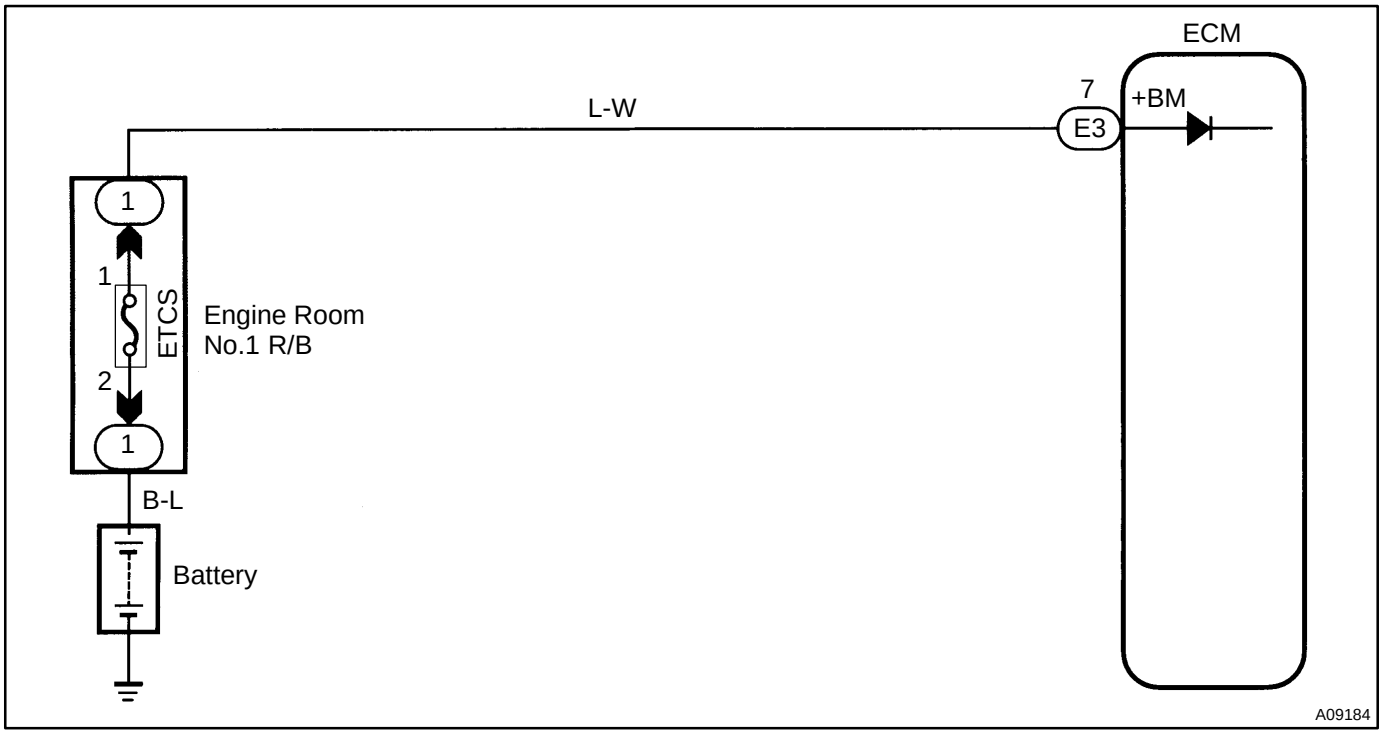
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Throttle actuator motor power supply voltage	Less than 4 V

COMPONENT OPERATING RANGE

Parameter	Standard Value
Throttle actuator motor power supply voltage	9 to 14 V

WIRING DIAGRAM

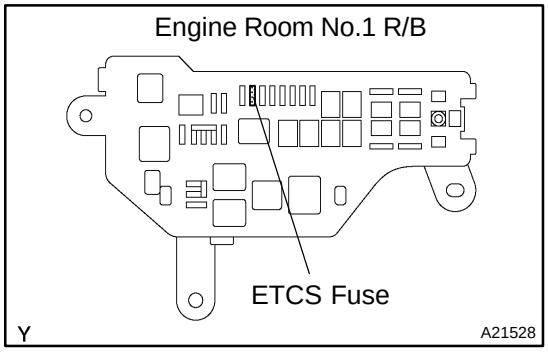


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check ETCS fuse of engine room No.1 R/B.**



PREPARATION:

Remove the ETCS fuse from the engine room No.1 R/B.

CHECK:

Check the countinuity of the ETCS fuse.

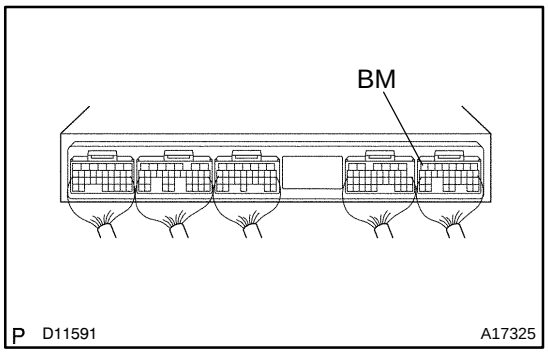
OK:

Continuity

NG → **Check for short in all harness and components connected to ETCS fuse.**

OK

2	Check voltage between terminal BM of ECM connector and body ground.



PREPARATION:
Remove the ECM hood (See page SF-74).
CHECK:
Measure the voltage between terminal BM of the ECM connector and the body ground.
OK:
Voltage: 9 to 14 V

OK	Check for intermittent problems (See page DI-3).

NG

3	Check for open or short in harness or connector between battery and ETCS fuse, ETCS fuse and ECM.

NG	Repair or replace harness or connector.

OK

Check engine room No.1 R/B.

DTC	P2119	Throttle Actuator Control Throttle Body Range/Performance

CIRCUIT DESCRIPTION

The Electric Throttle Control System (ETCS) is composed of the throttle motor to operate the throttle valve, the throttle position sensor to detect the opening angle of the throttle valve, the accelerator pedal position sensor to detect the accelerator pedal position, the ECM to control the ETCS, and the one valve type throttle body.
The ECM controls the throttle motor to make the throttle valve opening angle properly in response to the driving condition.
The throttle position sensor which is mounted on the throttle body detects the opening angle of the throttle valve, and it provides feedback to the ECM to control the throttle motor.
If the ETCS has a malfunction, the throttle valve is locket at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled until the system returns to normal and the ignition switch is turned OFF.

DTC No.	DTC Detecting Condition	Trouble Area
P2119	Throttle opening angle continues to vary greatly from target throttle opening angle	✓Electric throttle control system ✓ECM

MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the electronic throttle motor. When the power supply voltage drops below the threshold, the ECM concludes that the power supply has an open circuit. A DTC is set and the MIL is turned on.

MONITOR STRATEGY

Related DTCs	P2118	Throttle actuator motor power supply line range check (Low voltage)
Required sensors/components	Throttle actuator motor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Actuator power supply voltage	4 V	-
Throttle motor	ON	
Electric system down operation	Not executing	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Difference between ”target throttle position” and ”actual throttle position”	0.3 V or more

COMPONENT OPERATING RANGE

Parameter	Standard Value
Throttle actuator motor power supply voltage	9 to 14 V

WIRING DIAGRAM

Refer to DTC P2102 on page DI-283 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Are there any other codes (besides DTC P2119) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P2119	A
”P2119” and other DTC	B

HINT:

If any other codes besides P2119 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-35).**

A

2	**Check throttle control motor (See page SF-32).**

NG → **Replace throttle control motor with magnetic clutch (See page SF-37).**

OK

3	**Replace ECM and clear DTC (Check if DTC outputs reoccur).**

PREPARATION:

(a) Replace ECM.
(b) Clear the DTC (See page DI-3).
(c) Start and warm up the engine.
(d) Run the engine at idle for 15 seconds or more.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool (See page DI-3).

OK:

No DTC output.

OK → **System is normal.**

NG

Replace throttle body.

DTC	P2120	Throttle/Pedal Position Sensor/Switch ”D” Circuit

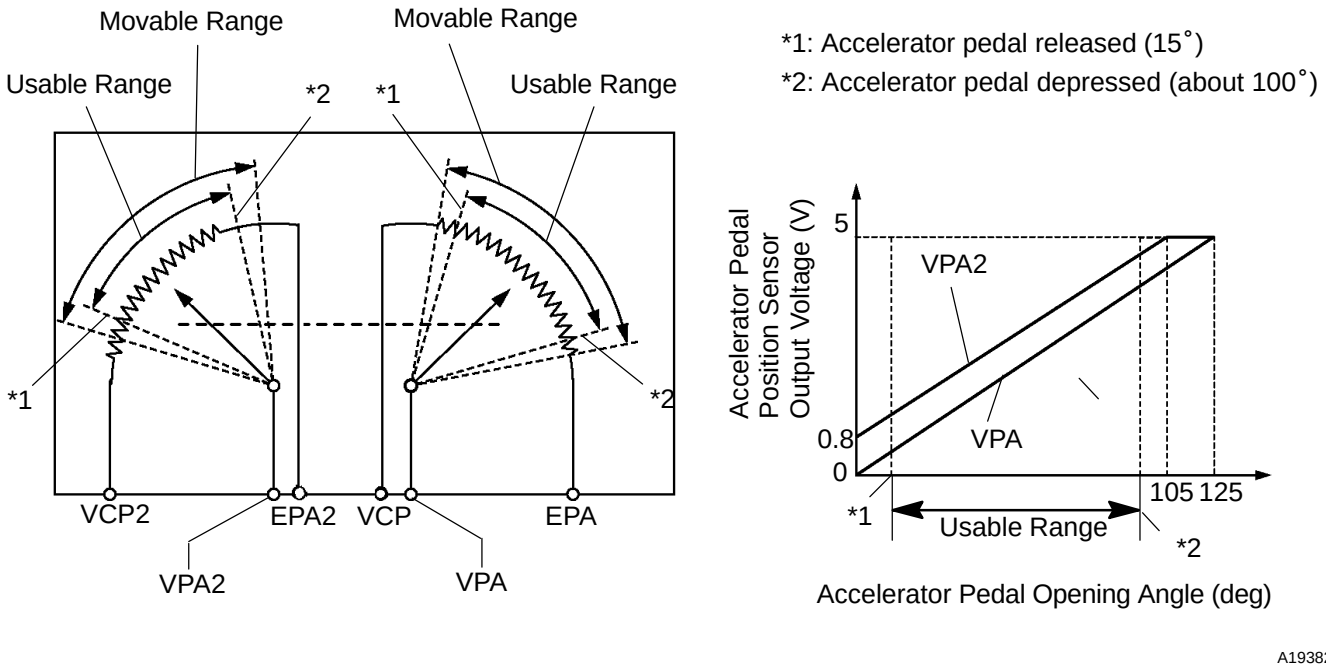
DTC	P2122	Throttle/Pedal Position Sensor/Switch ”D” Circuit Low Input

DTC	P2123	Throttle/Pedal Position Sensor/Switch ”D” Circuit High Input

HINT:
There are the repair procedure for the ”accelerator pedal position sensor”.

CIRCUIT DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket and it has the 2 sensors to detect the accelerator position and a malfunction of the accelerator position sensor.
In the accelerator pedal position sensor, the voltage applied to the pedal terminals VPA and VPA2 of the ECM changes between 0 V to 5 V, in proportion to the opening angle of the accelerator pedal. The VPA is a signal to indicate the actual accelerator pedal opening angle which is used for the engine control, and the VPA2 is a signal to indicate the information about the opening angle which is used for detecting a malfunciton.
The ECM judges the current opening angle of the accelerator pedal from these signals input from terminals VPA and VPA2 and, the ECM controls the throttle motor based on these signals.
If this DTCs is stored, the throttle valve is locked at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled untill the system returns to normal and the ignition switch is turned OFF.



DTC No.	Detection Item	Trouble Area
P2120	Condition (a) continues for 0.5 sec. or more: (a) VPA1 ± 0.2 V and VPA2 ⊖ 0.97 deg, or VPA1 ⊖ 4.7 V	✓Open or short in accelerator pedal position sensor circuit ✓Accelerator pedal position sensor ✓ECM
P2122	Condition (a) and (b) continues for 0.5 sec. or more: (a) VPA1 ± 0.2 V (b) VPA2 ⊖ 0.97 deg	
P2123	Condition (a) continues for 2.0 sec. or more: (a) VPA1 ⊖ 4.7 V	

HINT:
After confirming DTC P2120, P2122, P2123, P2125, P2127, P2128 and P2138 use the OBD II scan tool or the hand-held tester to confirm the throttle valve opening percentage.

Trouble area	Accelerator pedal position expressed as voltage			
	Accelerator pedal released		Accelerator pedal depressed	
	ACCEL POS #1	ACCEL POS #2	ACCEL POS #1	ACCEL POS #2
VC circuit open	0 V	0 V	0 V	0 V
VPA circuit open or ground short	0 V	0.9 to 2.3 V	0 V	3.4 to 5.0 V
VPA2 circuit open or ground short	0.5 to 1.1 V	0 V	3.0 to 4.6 V	0 V
E2 circuit open	5 V	5 V	5 V	5 V

MONITOR DESCRIPTION

When either voltage output VPA or VPA2, deviates from the standard ranges, or difference between the voltage outputs of the two sensors is less than threshold, the ECM concludes that there is a defect in the accelerator pedal position sensor. The ECM turns on the MIL and a DTC is set.
Example:
When the voltage output of the VPA below 0.2 V or exceeds 4.7 V.

MONITOR STRATEGY

Related DTCs	P2120	Accelerator position sensor 1 (VPA) range check (Fluttering)
	P2122	Accelerator position sensor 1 (VPA) range check (Low voltage)
	P2123	Accelerator position sensor 1 (VPA) range check (High voltage)
Required sensors/components	Accelerator position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)
Throttle control motor power	ON

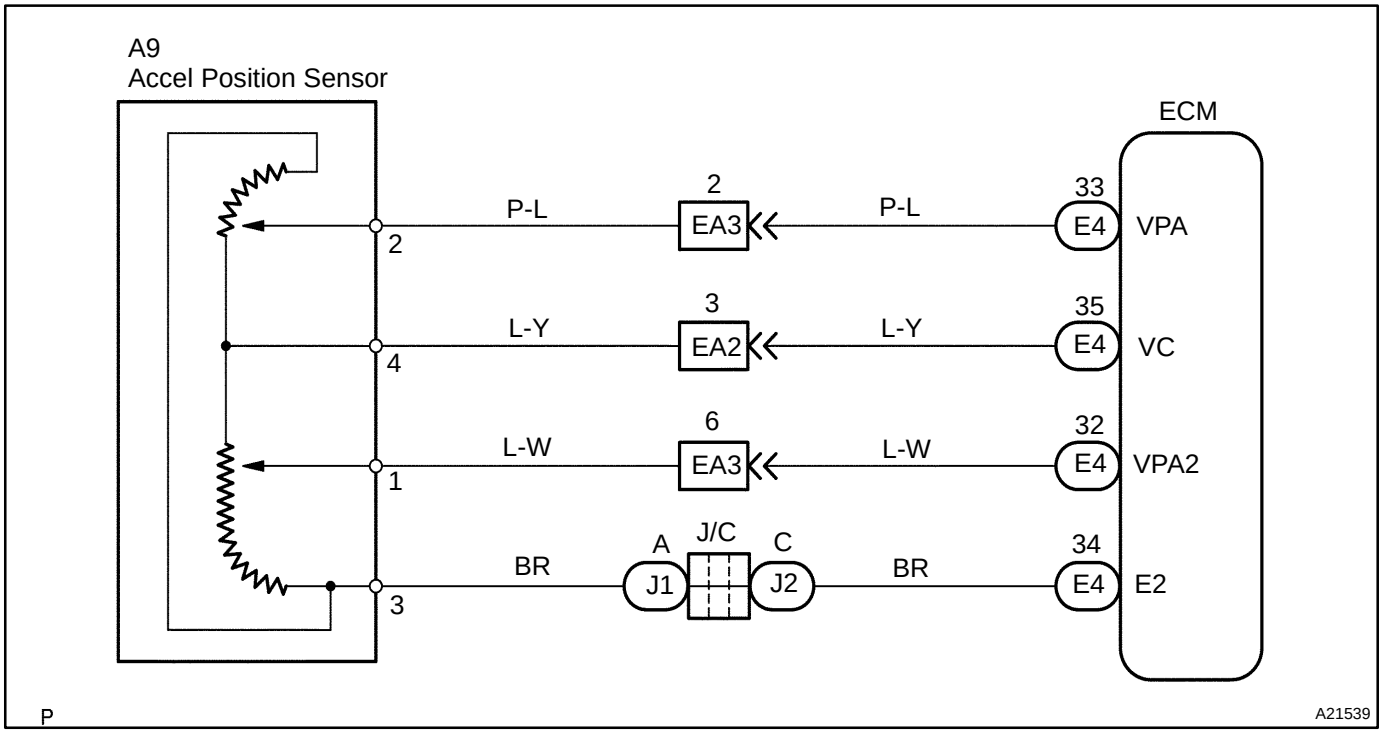
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2120:	
VPA voltage	0.2 V or less or 4.7 V or more fluttering
P2122:	
VPA voltage	0.2 V or less (When VPA2 angle 1 deg or more)
P2123:	
VPA voltage	4.7 V or more

COMPONENT OPERATING RANGE

Parameter	Standard Value
VPA voltage	More than 0.2 V and less than 4.7 V
VPA2 voltage	More than 0.5 V and Less than 4.97 V
Difference between VPA and VPA2 voltages	More than 0.02 V

WIRING DIAGRAM



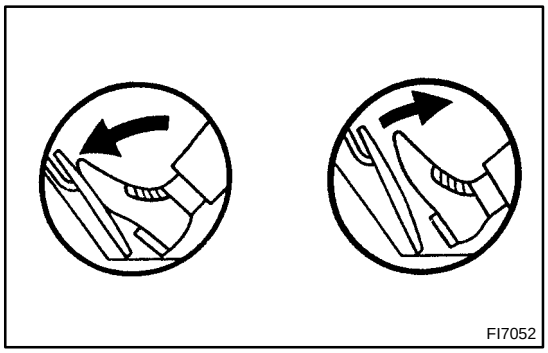
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	**Connect hand-held tester, and read voltage for accelerator pedal position sensor data.**



PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

CHECK:

Read the voltage for the accelerator pedal position sensor data.

OK:

Accelerator pedal	VPA	VPA2
Released	0.3 to 0.9 V	1.8 to 2.7 V
Depressed	3.2 to 4.8 V	4.7 to 5.1 V

OK	**Go to step 6.**

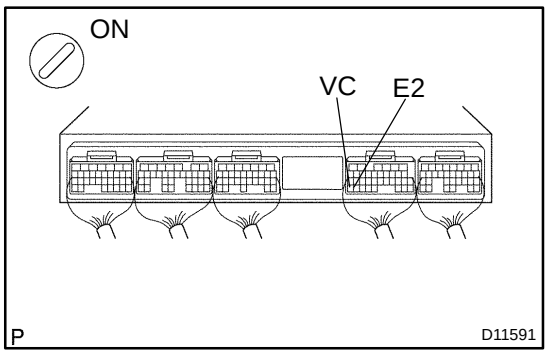
NG

2	**Check accelerator pedal position sensor (See page SF-32).**

NG	**Replace accelerator pedal position sensor.**

NG

3	**Check voltage between terminals VC and E2 of ECM connector.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

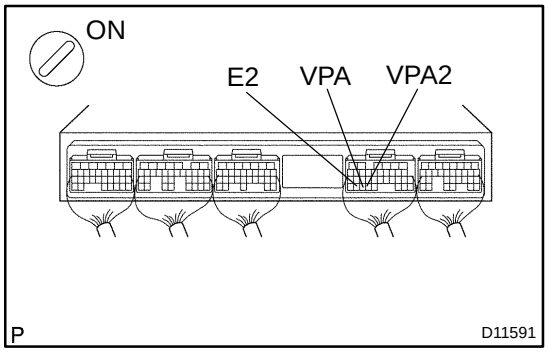
OK:

Voltage: 4.5 to 5.5 V

NG	**Replace ECM (See page SF-74).**

OK

4	**Check voltage between terminals VPA and E2, and VPA2 and E2 of ECM connector.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VPA and E2, and VPA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VPA - E2	VPA2 - E2
Released	0.3 to 0.9 V	1.8 to 2.7 V
Depressed	3.2 to 4.8 V	4.7 to 5.1 V

OK → **Replace ECM (See page SF-74).**

NG

5	**Check for open and short in harness and connector between accelerator pedal position sensor and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

6	**Is the DTC P2120, P2122 or P2123 being output again?**

PREPARATION:

(a) Clear the DTC (See page DI-3).

(b) Start the engine.

(c) Run the engine at idle for 15 seconds or more.

CHECK:

(a) Read the DTC (See page DI-3).

Result:

Display (DTC Output)	Proceed to
P2120, P2122 and/or P2123 are output again	A
No DTC output	B

B → **System OK**

A

Replace ECM (See page SF-74).

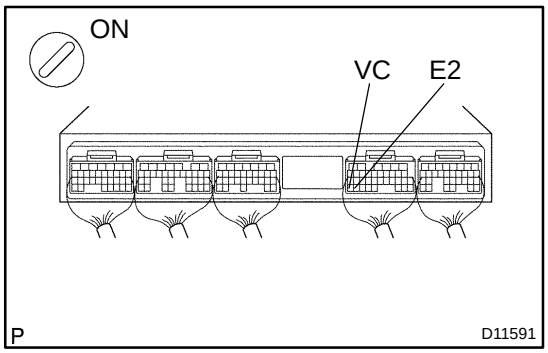
OBD II scan tool (excluding hand-held tester):

1	**Check accelerator pedal position sensor (See page SF-32).**

NG → **Replace accelerator pedal position sensor (See page SF-37).**

OK

2	Check voltage between terminals VC and E2 of ECM connector.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

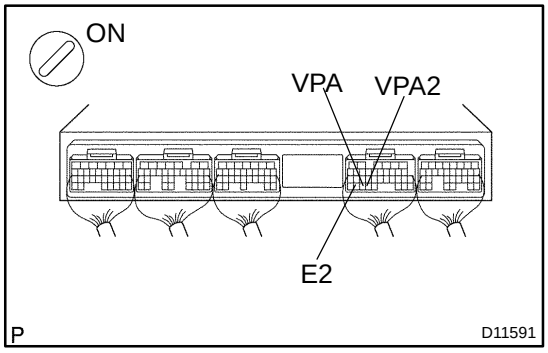
OK:

Voltage: 4.5 to 5.5 V

NG	Replace ECM (See page SF-74).

OK

3	Check voltage between terminals VPA and E2, and VPA2 and E2 of ECM connector.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VPA and E2, and VPA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VPA - E2	VPA2 - E2
Released	0.3 to 0.9 V	1.8 to 2.7 V
Depressed	3.2 to 4.8 V	4.7 to 5.1 V

OK	Replace ECM (See page SF-74).

NG

4	Check for open and short in harness and connector between accelerator pedal position sensor and ECM (See page IN-33).

NG	Repair or replace harness or connector.

OK

5	**Is the DTC P2120, P2122 or P2123 being output again?**

PREPARATION:

(a) Clear the DTC (See page DI-3).

(b) Start the engine.

(c) Run the engine at idle for 15 seconds or more.

CHECK:

(a) Read the DTC (See page DI-3).

Result:

Display (DTC Output)	Proceed to
P2120, P2122 and/or P2123 are output again	A
No DTC output	B

B → **System OK**

A → **Replace ECM (See page SF-74).**

DTC	P2121	Throttle/Pedal Position Sensor/Switch ”D” Circuit Range/Performance

CIRCUIT DESCRIPTION

Refer to DTC P2120 on page DI-297 .

DTC No.	DTC Detecting Condition	Trouble Area
P2121	Condition (a) continues for 0.5 seconds: (a) Difference between VPA and VPA2 is out of threshold	Accelerator pedal position sensor

MONITOR DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket and consists of two sensors VPA and VPA2. The VPA is used to detect accelerator pedal position, and the VPA2 is used to monitor the VPA and detect faults in the sensor itself. When difference between voltage outputs, of the VPA or VPA2 deviates from the standard range, the ECM concludes that there is a defect in the accelerator pedal position sensor. The ECM turns on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P2121	Accelerator position sensor (rationality)
Required sensors/components	Accelerator position sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)	
Ignition switch	ON	
Throttle control motor power	ON	
System is not under limp home mode due to accelerator pedal position sensor malfunction		

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
|VPA - (VPA2 - 0.8)|* *Corrected by learning value	More than 0.4 V

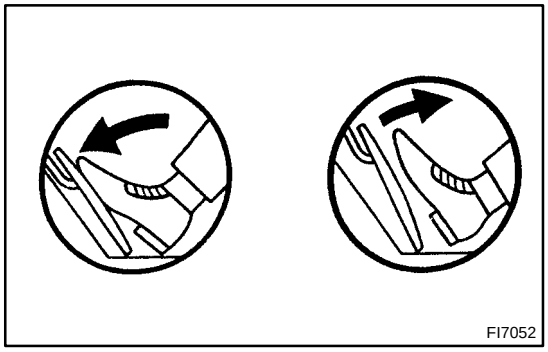
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	**Connect hand-held tester, and read voltage for accelerator pedal position sensor data.**



PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

CHECK:

Read the voltage for the accelerator pedal position sensor data.

OK:

Accelerator pedal	VPA	VPA2
Released	0.3 to 0.9 V	1.8 to 2.7 V
Depressed	3.2 to 4.8 V	4.7 to 5.1 V

OK	**Go to step 5.**

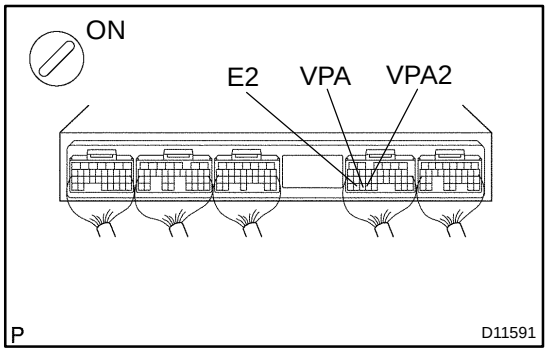
NG

2	**Check accelerator pedal position sensor (See page SF-32).**

NG	**Replace accelerator pedal position sensor.**

OK

3	**Check voltage between terminals VPA and E2, and VPA2 and E2 of ECM connector.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VPA and E2, and VPA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VPA - E2	VPA2 - E2
Released	0.3 to 0.9 V	1.8 to 2.7 V
Depressed	3.2 to 4.8 V	4.7 to 5.1 V

OK → **Go to step 5.**

NG

4	**Check for open and short in harness and connector between accelerator pedal position sensor and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace accelerator pedal position sensor (See page SF-37).

5	**Is the DTC P2121 being output again?**

PREPARATION:

(a) Clear the DTC (See page DI-3).

(b) Start the engine.

(c) Run the engine at idle for 15 seconds or more.

CHECK:

(a) Read the DTC (See page DI-3).

Result:

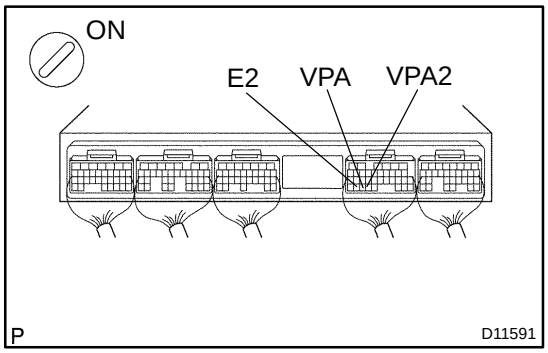
Display (DTC Output)	Proceed to
P2121 is output again	A
No DTC output	B

B → **System OK**

A → **Replace ECM (See page SF-74).**

OBD II scan tool (excluding hand-held tester):

1	**Check voltage between terminals VPA and E2, and VPA2 and E2 of ECM connector.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VPA and E2, and VPA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VPA - E2	VPA2 - E2
Released	0.3 to 0.9 V	1.8 to 2.7 V
Depressed	3.2 to 4.8 V	4.7 to 5.1 V

OK → **Go to step 3.**

NG

2	**Check for open and short in harness and connector between accelerator pedal position sensor and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace accelerator pedal position sensor (See page SF-37).

3	**Is the DTC P2121 being output again?**

PREPARATION:

(a) Clear the DTC (See page DI-3).

(b) Start the engine.

(c) Run the engine at idle for 15 seconds or more.

CHECK:

(a) Read the DTC (See page DI-3).

Result:

Display (DTC Output)	Proceed to
P2121 is output again	A
No DTC output	B

B → **System OK**

A

Replace ECM (See page SF-74).

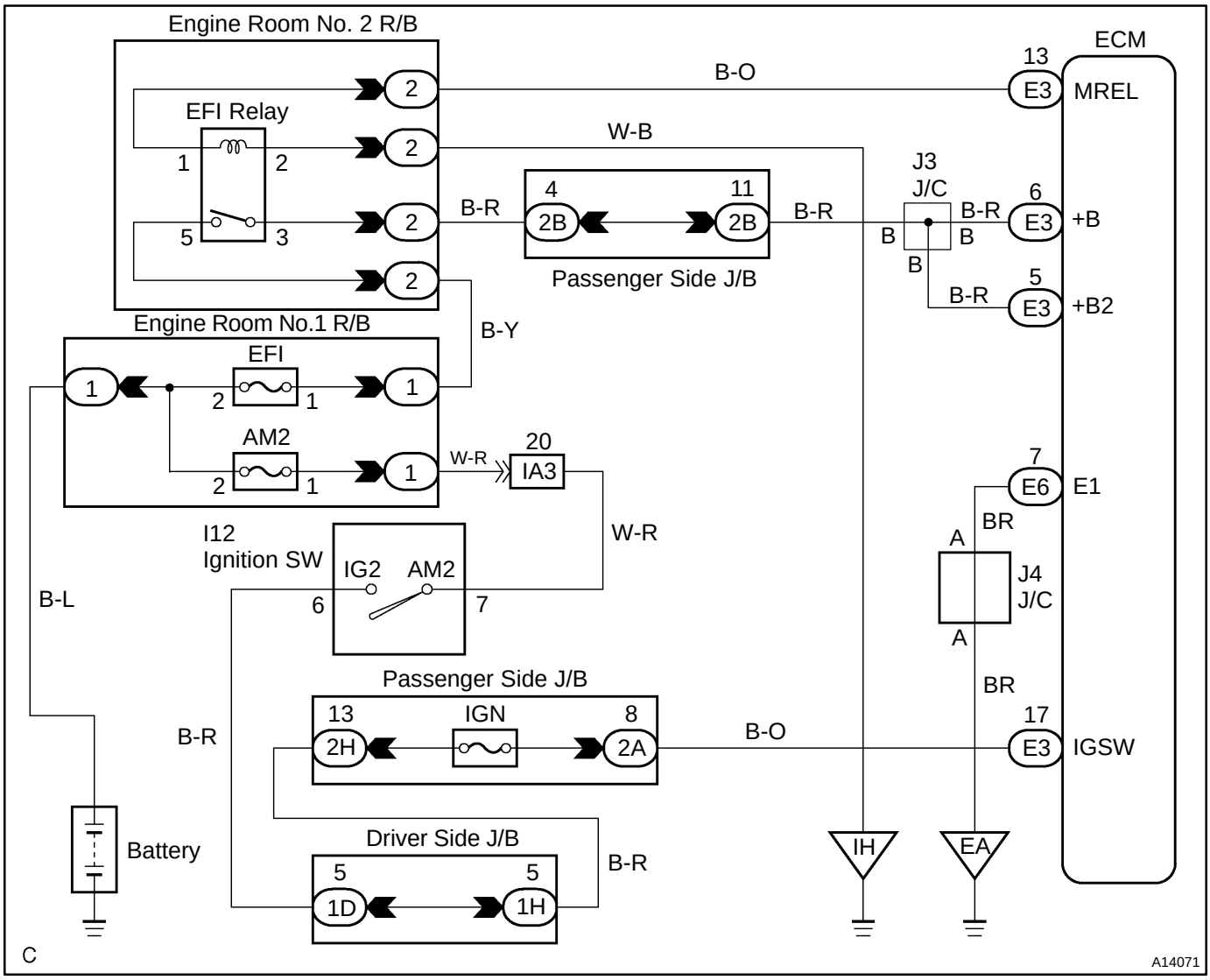
DI2EP-12

ECM Power Source Circuit

CIRCUIT DESCRIPTION

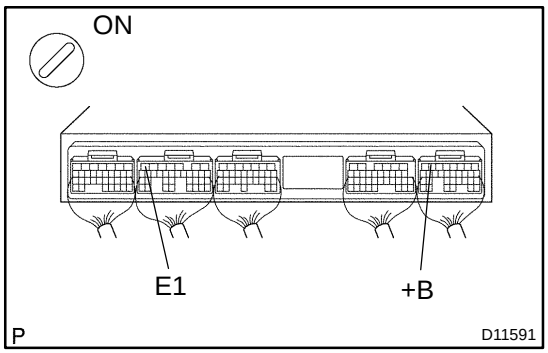
When the ignition switch is turned ON, battery positive voltage is applied to terminal IGSW of the ECM and the EFI main relay (Marking: EFI) control circuit in the ECM sends a signal to terminal MREL of the ECM, switching on the EFI main relay.
This signal causes current to flow to the coil, closing the contacts of the EFI main relay and supplying power to terminals +B and B2 of the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals + B and E1 of ECM connectors.**



PREPARATION:

(a) Remove the ECM cover (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals +B and E1 of the ECM connectors.

OK:

Voltage: 9 to 14 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI-47).**

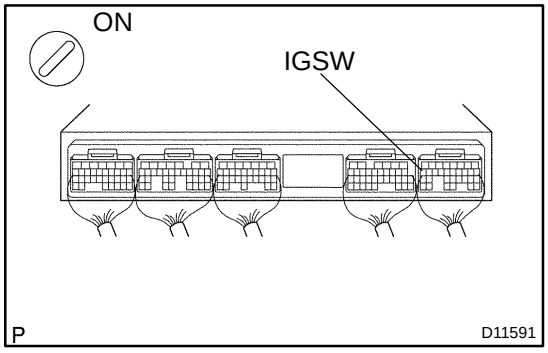
NG

2	**Check for open in harness and connector between terminal E1 of ECM connector and body ground (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

3	**Check voltage between terminal IGSW of ECM connector and body ground.**



PREPARATION:

(a) Remove the ECM cover (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal IGSW of the ECM connector and the body ground.

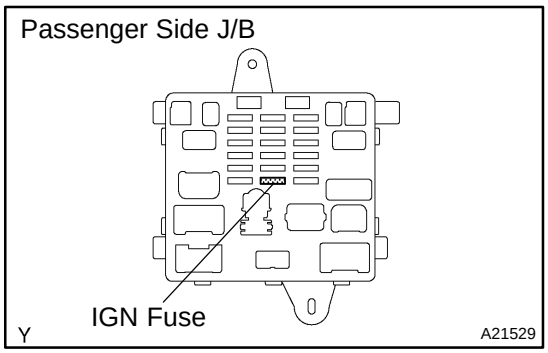
OK:

Voltage: 9 to 14 V

OK	**Go to step 6.**

NG

4	**Check IGN fuse.**



PREPARATION:
Remove the IGN fuse from the passenger side J/B.
CHECK:
Check the continuity of the IGN fuse.
OK:
Continuity

NG → **Check for short in all harness and components connected to IGN fuse.**

OK

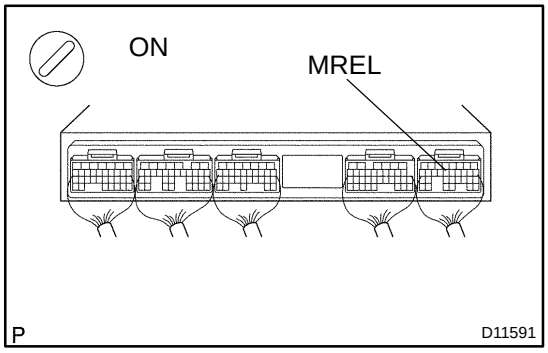
5	**Check ignition switch (See page BE-21).**

NG → **Replace ignition switch.**

OK

Check and repair harness and connector between battery and ignition switch, and ignition switch and ECM.

6	**Check voltage between terminal MREL of ECM connector and body ground.**



PREPARATION:
(a) Remove the ECM cover (See page SF-74).
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal MREL of the ECM connector and the body ground.
OK:
Voltage: 9 to 14 V

NG → **Replace ECM (See page SF-74).**

OK

7	Check EFI fuse.

NG → Check for short in all harness and components connected to EFI fuse.

OK

8	Check EFI main relay (Marking: EFI) (See page SF-50).

NG → Replace EFI main relay.

OK

9	Check for open and short in harness and connector between terminal MREL of ECM and body ground (See page IN-33).

NG → Repair and replace harness or connector.

OK

Check and repair harness or connector between EFI fuse and battery.

DI2ER-13

IACV Control Circuit

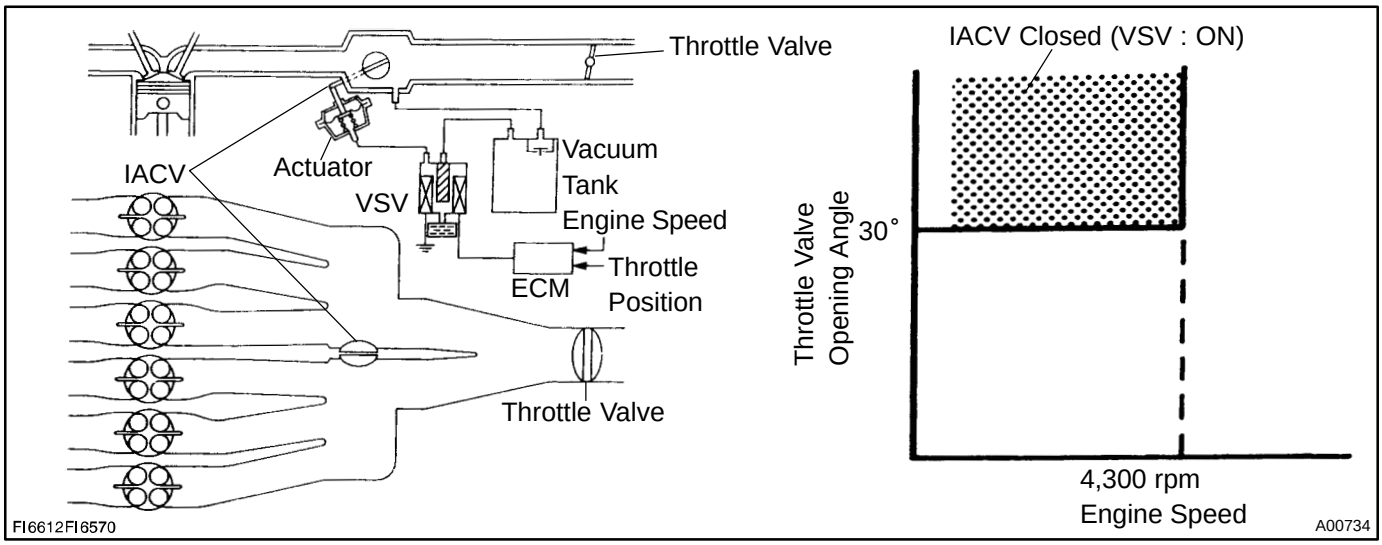
CIRCUIT DESCRIPTION

This circuit opens and closes the Intake Air Control Valve (IACV) in response to the engine load in order to increase the intake efficiency.

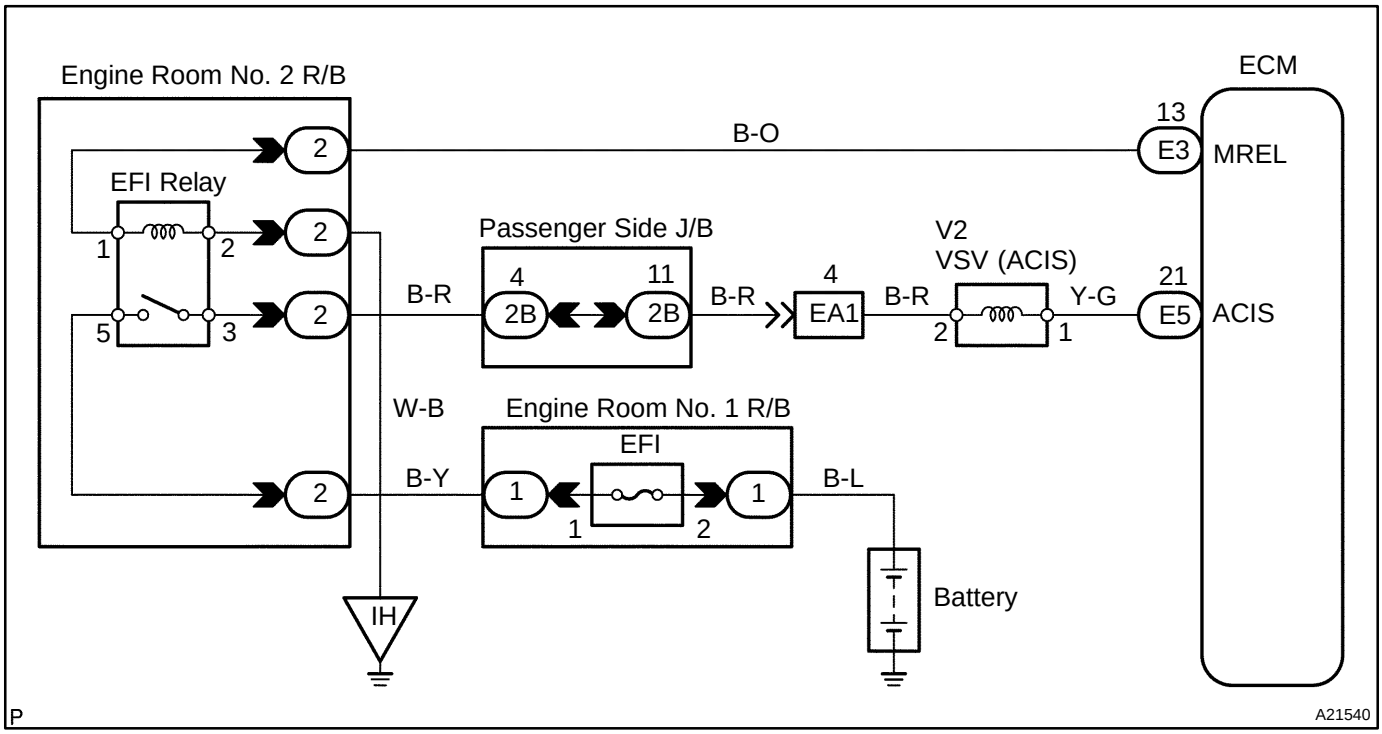
When the engine speed is 4,300 rpm or less and the throttle valve opening angle is 30° or more, the ECM turns the VSV ON and closes the IACV. At all other times, the VSV is OFF, so the IACV is open.

HINT:

IACV stands for "Acoustic Control Induction System".



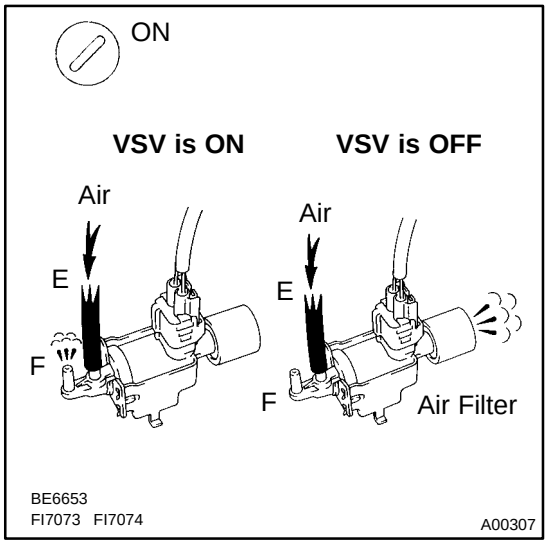
WIRING DIAGRAM



INSPECTION PROCEDURE

Hand-held tester:

1	**Connect hand-held tester, and check operation of VSV for ACIS.**



PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check the operation of the the VSV when the VSV is operated by the hand-held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air from port E flows out through air filter.

OK	**Check for vacuum tank (See page SF-48).**

NG

2	**Check VSV for ACIS (See page SF-58).**

NG	**Replace VSV for ACIS.**

OK

3	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and ECM (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

4	**Check vacuum hose.**

CHECK:

(a) Check that the vacuum hoses are connected correctly.
(b) Check that the vacuum hoses are not loose or disconnected.
(c) Check the vacuum hoses for cracks, holes or damage.

NG → **Repair or replace vacuum hose.**

OK

5	**Check intake air control valve (See page SF-44).**

NG → **Replace intake air control system.**

OK

Replace ECM (See page SF-74).

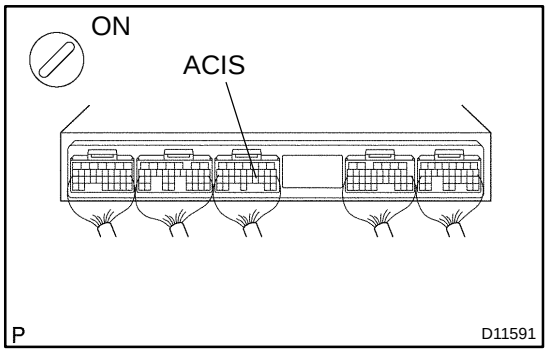
OBD II scan tool (excluding hand-held tester):

1	**Check VSV for ACIS (See page SF-58).**

NG → **Replace VSV for ACIS.**

OK

2	**Check voltage between terminal ACIS of ECM connector and body ground.**



PREPARATION:

(a) Remove the engine room ECM cover.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal ACIS of the ECM connector and body ground.

OK:

Voltage: 9 to 14 V

NG → **Go to step 4.**

OK

3	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

4	**Check vacuum hose.**

CHECK:

(a) Check that the vacuum hoses are connected correctly.
(b) Check that the vacuum hoses are not loose or disconnected.
(c) Check the vacuum hoses for cracks, holes or damage.

NG → **Repair or replace vacuum hose.**

OK

5	**Check intake air control valve (See page SF-44).**

NG → **Replace intake air control system.**

OK

Replace ECM (See page SF-74).

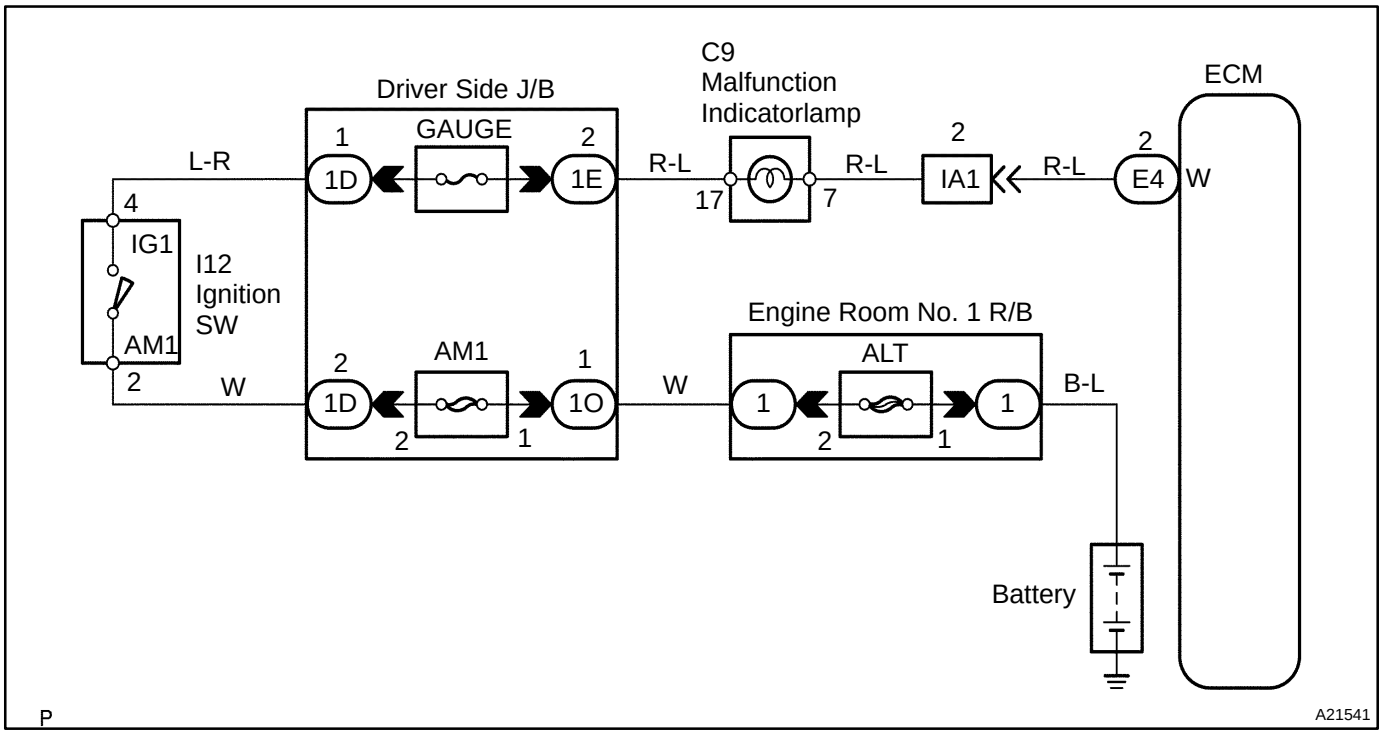
DI6MN-25

MIL Circuit Malfunction

CIRCUIT DESCRIPTION

If the ECM detects a trouble, the MIL lights up. At this time, the ECM records a DTC in the memory.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Troubleshoot in accordance with the chart below for each trouble symptom.

MIL does not light up	Start inspection from step 1 with hand-held tester and start from step 2 without hand-held tester
MIL remains on	After inspection of step 3, start inspection from step 4 with hand-held tester and start from step 5 without hand-held tester

1	Inspect diagnosis (normal mode, check mode) (See page DI-3).

OK → Check and replace ECM (See page SF-74).

NG

2	Check MIL.

See the combination meter troubleshooting on page BE-2 .

NG → Repair or replace bulb or combination meter assembly.

OK

3	Check that ECM connectors are securely connected to ECM.

NO → Connect connector to ECM.

YES

Check for open circuit in harness and connector between combination meter and ECM (See page IN-33).

4	Check operation of MIL (See step 1).

OK → Check and replace ECM (See page SF-74).

NG

5	**Is any DTC output?**

Check DTC on page DI-35 .

YES → **Repair circuit indicated by output code.**

NO

6	**Check IG1 relay (Marking: IG1) (See page BE-20).**

NG → **Replace IG1 relay.**

OK

Check for short circuit in harness and connector between DLC3 and ECM (See page IN-33).

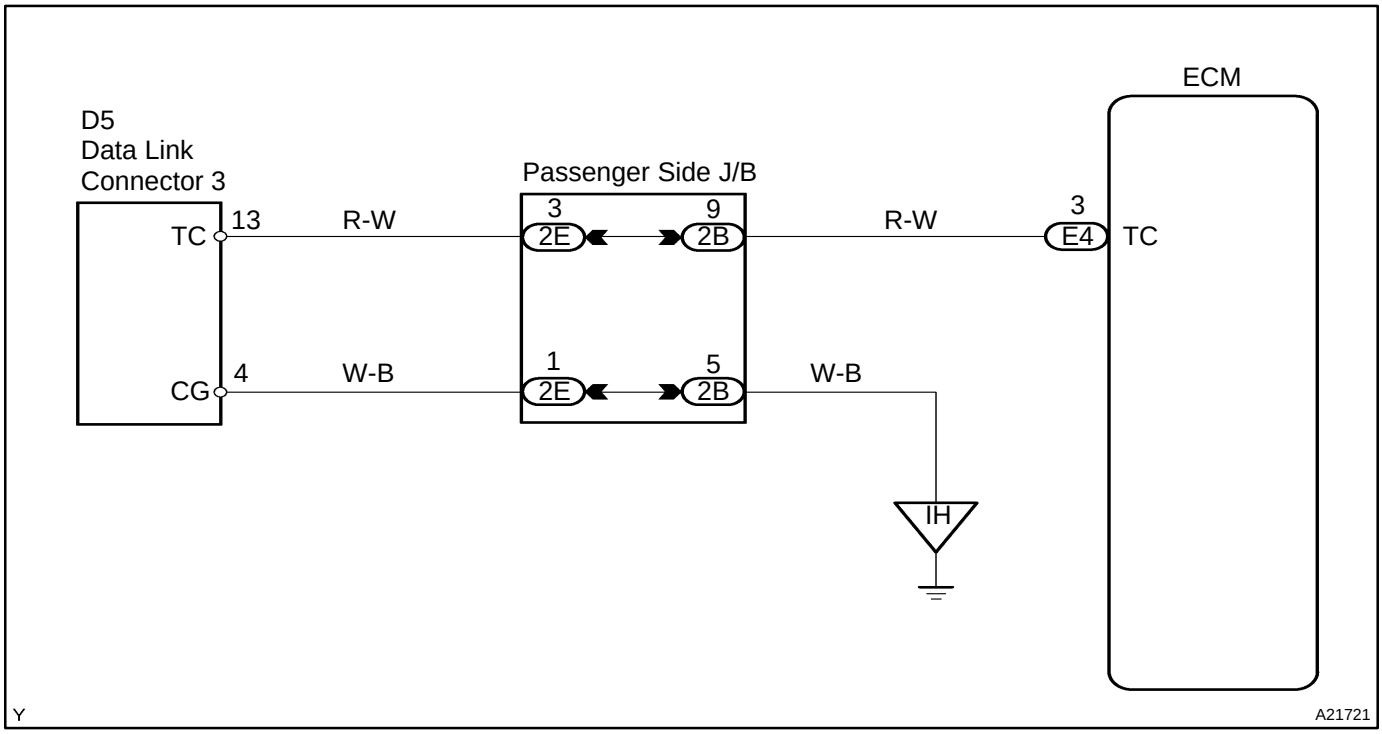
DI7DL-18

TC Terminal Circuit

CIRCUIT DESCRIPTION

Terminal TC and CG are located in the DLC3. When connecting these terminals, DTCs in the normal mode or the test mode can be read through the MIL flashing in the combination meter.

WIRING DIAGRAM

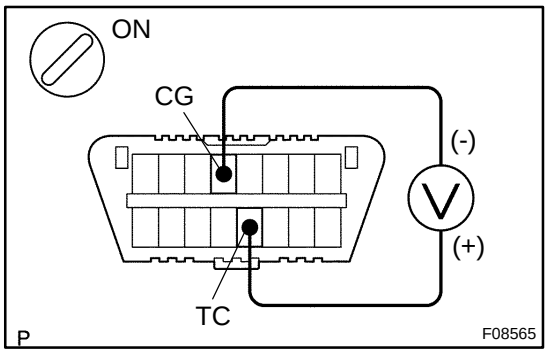


INSPECTION PROCEDURE

HINT:

- Even though terminal TC is not connected with terminal CG, the MIL blinks.
- For the above phenomenon,an open or short in the wire harness, or a malfunction inside the ECM is a likely cause.

1	**Check voltage between terminals TC and CG of DLC3.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals TC and CG of the DLC3.
OK:
Voltage: 9 - 14 V

OK	**Check and replace ECM (See page SF-74).**

NG

2	**Check continuity between terminal CG of DLC3 and body ground.**

NG	**Repair or replace harness or connector.**

OK

3	**Check for open and short circuit in harness and connector between ECM and DLC3, and DLC3 and body ground (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

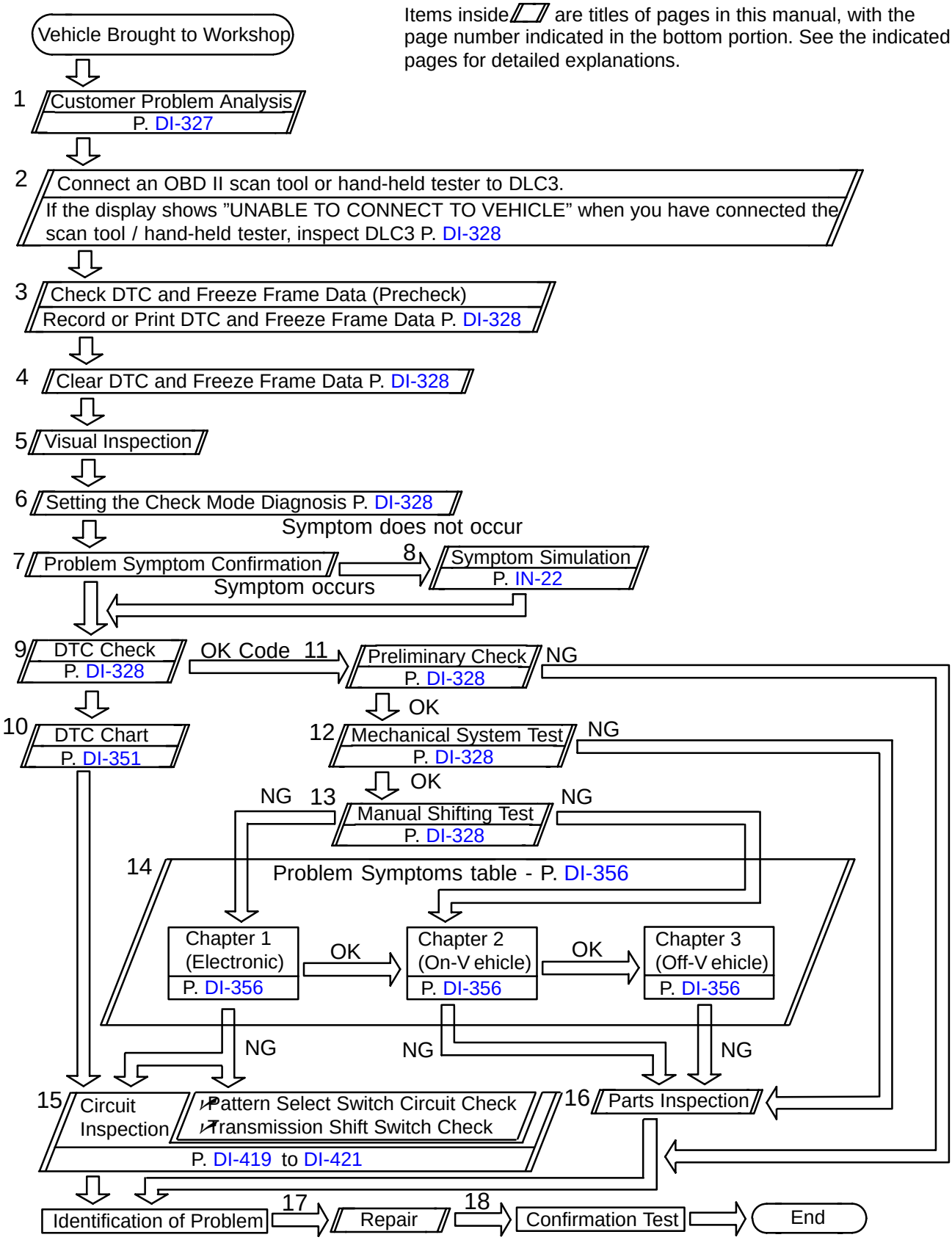
Check and replace ECM (See page SF-74).

AUTOMATIC TRANSMISSION

DI25G-05

HOW TO PROCEED WITH TROUBLESHOOTING

Items inside ▱ are titles of pages in this manual, with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.



DIBZW-02

PRECAUTION

NOTICE:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assy, engine assy or the ECM (See page DI-328).

HINT:

Initialization can not be completed by only disconnecting the battery terminal.

DI25H-04

CUSTOMER PROBLEM ANALYSIS CHECK

Automatic Transmission System Check Sheet	Inspector's Name :

Customer's Name		VIN	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	Odometer Reading	km mile

Date Problem Occurred	/ /
How Often Does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Vehicle does not move (☐ Any position ☐ particular position)
	☐ No up-shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → 4th ☐ 4th → 5th)
	☐ No down-shift (☐ 5th → 4th ☐ 4th → 3rd ☐ 3rd → 2nd ☐ 2nd → 1st)
	☐ Lock-up malfunction
	☐ Shift point too high or too low
	☐ Harsh engagement (☐ N → D ☐ Lock-up ☐ Any drive position)
	☐ Slip or shudder
	☐ No kick-down
	☐ Others ( )

Check Item	Check Engine Warning Light	☐ Normal ☐ Remains ON

DTC Check	1st Time	☐ Normal code ☐ Malfunction code (DTC)
	2nd Time	☐ Normal code ☐ Malfunction code (DTC)

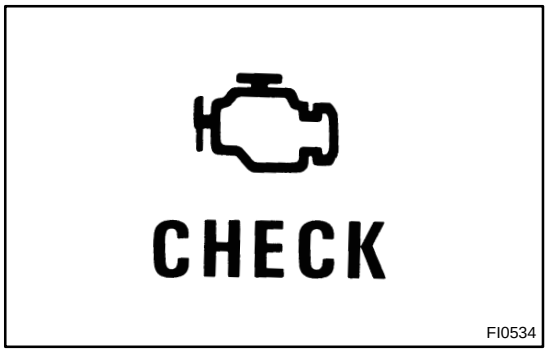
DIC66-01

PRE-CHECK

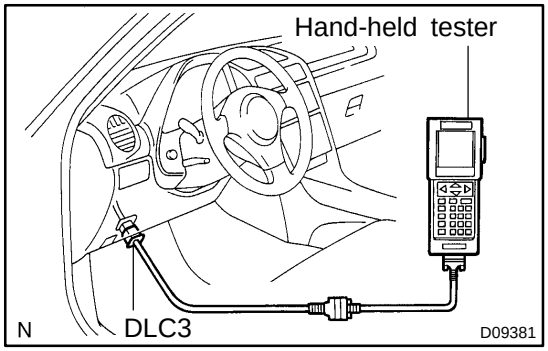
1. DIAGNOSIS SYSTEM

(a) Description

- When troubleshooting vehicles with OBD II, the only difference from the usual troubleshooting procedure is that you connect an OBD II scan tool complying with SAE J1987 or hand-held tester to the vehicle, and read off various data output from the vehicle's ECM.

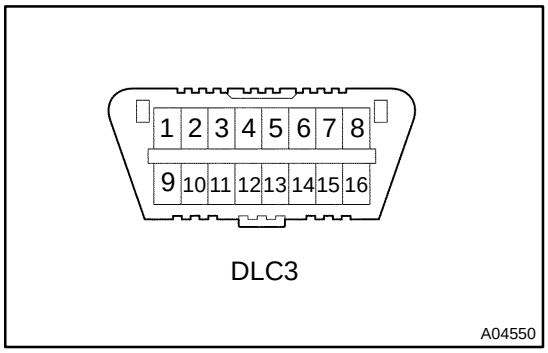


- OBD II regulations require that the vehicle's on-board computer lights up the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components which affect vehicle emissions. In addition to the MIL lighting up when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (See page DI-47).
  If the malfunction does not occur in 3 consecutive trips, the MIL goes off but the DTCs remain recorded in the ECM memory.



- To check the DTCs, connect an OBD II scan tool or hand-held tester to DLC3 on the vehicle. The OBD II scan tool or hand-held tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For operating instructions, see the instruction book).
- DTCs include SAE controlled codes and Manufacturer controlled codes.
  SAE controlled codes must be set as the codes prescribed by the SAE, while Manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits (See DTC chart on page DI-351).

- The diagnosis system operates in normal mode during normal vehicle use, and also has a check mode for technicians to simulate malfunction symptoms and perform troubleshooting. Most DTCs use 2- trip detection logic (*) to prevent erroneous detection. By switching the ECM to check mode when troubleshooting, the technician can cause the MIL to light up for a malfunction that is only detected once or momentarily.
  (Hand-held tester) (See page DI-328)
- *2-trip detection logic:
  When a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the 2nd test drive, this 2nd detection causes the MIL to light up. The 2-trip repeats the same mode 2nd time (However, the IG switch must be turned OFF between the 1st trip and 2nd trip.).

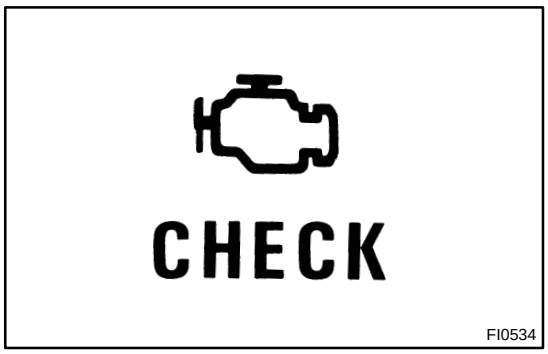


(b) Inspect the DLC3.
The vehicle's ECM uses the ISO 9141-2 communication protocol. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Terminal No.	Connection / Voltage or Resistance	Condition
7	Bus ± Line / Pulse generation	During communication
4	Chassis Ground ↔ Body / 1 Ω or less	Always
5	Signal Ground ↔ Body / 1 Ω or less	Always
16	Battery Positive ↔ Body / 9 to 14 V	Always

HINT:
If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of OBD II scan tool or hand-held tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

- If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.



2. INSPECT DIAGNOSIS (NORMAL MODE)

(a) Check the MIL.

(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

HINT:

If the MIL does not light up, troubleshoot the combination meter (See page BE-2).

(2) When the engine is started, the MIL should go off. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

(b) Check the DTC.

NOTICE:

Hand-held tester only: When the diagnostic system is switched from normal mode to check mode, it erases all DTCs and freeze frame data recorded in normal mode. So before switching modes, always check the DTCs and freeze frame data, and note them down.

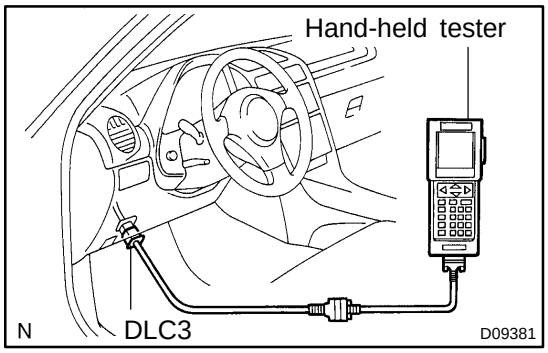
(1) Prepare an OBD II scan tool (complying with SAE J1978) or hand-held tester.

(2) Connect the OBD II scan tool or hand-held tester to DLC3 at the lower of the instrument panel.

(3) Turn the ignition switch ON and turn the OBD II scan tool or hand-held tester switch ON.

(4) Use the OBD II scan tool or hand-held tester to check the DTCs and freeze frame data and note them down (For operating instructions, see the OBD II scan tool's instruction book).

(5) See page DI-351 to confirm the details of the DTCs.



NOTICE:

When simulating symptoms with an OBD II scan tool (excluding hand-held tester) to check the DTCs, use normal mode. For codes on the DTCs chart subject to "2-trip detection logic", turn the ignition switch off after the symptoms have been simulated the 1st time. Then repeat the simulation process again. When the problem has been simulated twice, the MIL comes on on the instrument panel and the DTCs are recorded in the ECM.

(c) When using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
(1) Connect the OBD II scan tool or hand-held tester to the DLC3.
(2) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch on.
(3) When you use hand-held tester:
Select the item ”DIAGNOSIS/ENHANCED OBD II/ DTC INFO/CLEAR CODES [YES] button”.

HINT:
When operating the OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool’s instruction book for operating instructions.)

(d) When not using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
Disconnect the battery terminal or remove the EFI and ETCS fuses from the engine room J/B for 60 seconds or more. But if you disconnect the battery terminal, you should do the ”INITIALIZE” procedure.

3. INSPECT DIAGNOSIS (CHECK MODE)

HINT:

Hand-held tester only: Compared to the normal mode, the check mode has high sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in Normal mode can also be detected in Check mode.

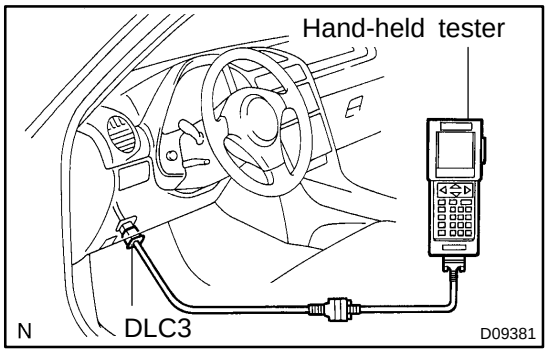
(a) Check the DTC.

(1) Check the initial conditions.

- Battery voltage 11 V or more
- Throttle valve fully closed
- Transmission in P position
- Air conditioning switched off

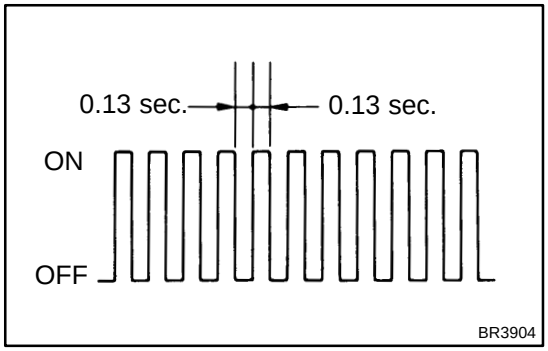
(2) Turn the ignition switch off.

(3) Prepare a hand-held tester.



(4) Connect the hand-held tester to DLC3 at the lower side of the instrument panel.

(5) Turn the ignition switch ON and switch the hand-held tester ON.



(6) Switch the hand-held tester from Normal mode to Check mode (Check that the MIL flashes).

(7) Start the engine (MIL goes out after the engine starts).

(8) Simulate the conditions of the malfunction described by the customer.

NOTICE:

Leave the ignition switch ON until you have checked the DTCs, etc.

(9) After simulating the malfunction conditions, use the hand-held tester diagnosis selector to check the DTCs and freeze frame data, etc.

HINT:

Be sure not to turn the ignition switch off as turning it off switches the diagnosis system from Check mode to Normal mode, which erases all DTCs, etc.

(10) After checking the DTC, inspect the applicable circuit.

(b) When using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
(1) Connect the OBD II scan tool or hand-held tester to the DLC3.
(2) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch on.
(3) When you use hand-held tester:
Select the item "DIAGNOSIS/ENHANCED OBD II/ DTC INFO/CLEAR CODES [YES] button".

HINT:
When operating the OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool's instruction book for operating instructions.)

(c) When not using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
Disconnect the battery terminal or remove the EFI and ETCS fuses from the engine room J/B for 60 seconds or more. But if you disconnect the battery terminal, you should do the "INITIALIZE" procedure.

4. DATA LIST

HINT:
According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one of the methods to shorten the labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the OBD II scan tool or the hand-held tester.
(f) Select the item "DIAGNOSIS/ENHANCED OBD II/DATA LIST".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light SW Status/ ON or OFF	∕ Brake Pedal is depressed: ON ∕ Brake Pedal is released: OFF	-
SHIFT	Actual Gear Position/ 1st, 2nd, 3rd, 4th, 5th	Shift Lever Position is; ∕ L: 1st ∕ 2: 1st or 2nd ∕ 3: 1st, 2nd or 3rd ∕ 4: 1st, 2nd, 3rd or 4th ∕ D: 1st, 2nd, 3rd, 4th or 5th	-
LOCK UP SOL	Lock Up Solenoid Status/ ON or OFF	∕ Lock Up: ON ∕ Except Lock Up: OFF	-
PATTERN SW (M)	Pattern Switch Status/ ON or OFF	Pattern Select Switch is; POWER: ON Except POWER: OFF	-
SNOW SW	Snow Switch Status/ ON or OFF	Pattern Select Switch is; SNOW: ON Except SNOW: OFF	-

PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P or N: ON Except P or N: OFF	When the shift lever position displayed on the hand-held tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page DI-361 .
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	
DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; D: ON Except D: OFF	
3RD	PNP SW Status/ ON or OFF	Shift lever position is; 2: ON Except 2: OFF	
2ND	PNP SW Status/ ON or OFF	Shift lever position is; 2: ON Except 2: OFF	
LOW	PNP SW Status/ ON or OFF	Shift lever position is; L: ON Except L: OFF	
SOLENOID (SLT)	Shift Solenoid SLT Status/ ON or OFF	・Accelerator pedal is depressed: OFF ・Accelerator pedal is released: ON	-
SOLENOID (SLU)	Shift Solenoid SLU Status/ ON or OFF	・Lock Up: ON ・Except Lock Up: OFF	-
SOLENOID (SLN)	Shift Solenoid SLN Status/ ON or OFF	Gear is changed: OFF → ON → OFF	-
AT FLUID TEMP	ATF Temp. Sensor Value/ min.: -40 °C (-40 °F) max.: 225 °C (437 °F)	Approx. 80 °C (176 °F) (After Stall Test)	If the value is "-40 °C (-40 °F)" or "225 °C (437 °F)", ATF temp. sensor circuit is opened or shorted.

5. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one of the methods to shorten the labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the the hand-held tester.
(f) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST".
(g) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] ・Press → button: Shift up ・Press ← button: Shift down	Possible to check the operation of the shift solenoid valves.

LOCK UP	[Test Details] Control the shift solenoid DSL to set the ATM to the lock-up condition. [Vehicle Condition] Vehicle Speed: 58 km/h (36 mph) or more	Possible to check the DSL operation.
LINE PRESS UP	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] •Vehicle Stopped. •IDL: ON [Others] ON: Line pressure up. OFF: No action (normal operation)	-

6. DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	Diagnostic code
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. When a sensor is being monitored, the next sensor or component will not be monitored until the sensor monitoring is finished.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. "Once per driving cycle" means that the ECM detects the malfunction only one time during a single driving cycle. "Continuous" means that the ECM detects malfunction every time an enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the "typical enabling conditions" are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. "Immediately" means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. "2 driving cycle" means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.

7. TOYOTA/LEXUS PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

TOYOTA/LEXUS name	Definition
Toyota HCAC system, Hydro-carbon Adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve, OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor "A"	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit

Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VSV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-board refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor ”A”, Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor ”A”	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor ”A”	Counter gear speed sensor
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor ”A”, Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobiliser system, Immobiliser system	Vehicle anti-theft system

8. The monitor will run whenever the following DTCs are not present (Monitor disablement List)

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the ”X” mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																												
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire			
P0010,P0020	P0010,P0020	VVT VSV1,2																			X					X					
P0011	P0011	VVT System1 - Advance				X		X														X					X					
P0012	P0012	VVT System1 - Retard				X		X														X					X					
P0016,P0018	P0016,P0018	VVT System - Misalignment																													
P0021	P0021	VVT System2 - Advance			X	X																X					X					
P0022	P0022	VVT System2 - Retard			X																	X					X					
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																				X	X	X	X	X	X					
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1																				X			X	X	X					
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2																							X	X						
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																								X						
P0100,P0101	P0100-P0103	MAF sensor		X	X		X	X											X		X	X	X	X	X	X	X	X	X			
P0105,P0106	P0105-P0108	MAP sensor		X	X		X	X											X		X	X	X	X	X	X	X	X	X			
P0110	P0110-P0113	IAT sensor																			X	X	X	X	X	X		X				
P0115,P0116	P0115-P0118	ECT sensor		X	X	X	X	X						X		X					X	X	X	X	X	X	X	X				
P0120,P0121	P0120-P0223,P2135	TP sensor												X		X							X	X	X	X	X	X				
P0125	P0125	Insufficient ECT for Closed Loop		X	X		X	X						X		X						X	X	X	X	X	X	X				
P0128	P0128	Thermostat																														
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																				X		X	X	X						
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1								X												X	X		X	X	X					
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2																														
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																														
P0171,P0172	P0171,P0172	Fuel system																				X	X	X	X	X						
P0300-P0308	P0300-P0308	Misfire							X													X	X	X	X	X						
P0325,P0330	P0325-P0333	Knock sensor																														
P0335	P0335	CKP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X				
P0340, P0341	P0340, P0341	CMP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X				
P0340-P0346	P0340-P0346	VVT sensor1,2																				X										
P0351-P0358	P0351-P0358	Ignitor		X	X		X	X														X										
P0385	P0385	CKP sensor 2												X		X						X	X	X	X	X	X	X				
P0401	P0401	EGR system (closed)																				X					X					
P0402	P0402	EGR system (open)																				X	X	X	X	X	X					
P0405,P0409	P0405-P0409	Lift sensor																									X					
P0420,P0430	P0420,P0430	Catalyst																														
P0442-P0456	P0442-P0456	EVAP system																					X	X	X	X						
P0450,P0451	P0450-P0453	EVAP press sensor																														

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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																												
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire			
P0500	P0500	VSS																				X	X	X	X	X	X	X			
P0511	P0511	IAC valve																					X								
P0510	P0510	Idle switch												X		X						X	X		X	X	X	X			
P0560	P0560	System Voltage																													
P0617	P0617	Starter signal																													
P0705	P0705	Shift lever position switch																													
P0710	P0710-P0713	Trans fluid temp sensor																													
P0720-P0793	P0720-P0793	Output speed sensor																													
P0715-P0717	P0715-P0717	Input speed sensor																													
P0724	P0724	Stop lamp switch																													
P0741-P0796	P0741-P0796	Trans solenoid (function)																													
P0748-P0798	P0748-P0799	Trans solenoid (range)																													
P0850	P0850	PNP switch																										X			
P1010,P1020	P1010,P1020	VVTL																				X					X				
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X					X				
P1126	P1126	Electronic magnet clutch																													
P1129	P1129	Electronic throttle system																													
P1430	P1430	HC adsorber ACT press sensor																													
P2004,6	P2004,6	Intake Manifold Runner Control																													
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																													
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																													
P2102,P2103	P2102,P2103	Throttle motor																													
P2120-P2138	P2120-P2138	Accel position sensor																													
P2196,P2198	P2196,P2198	A/F sensor (rationality)																				X			X	X					
P2226	P2226	BARO sensor																					X		X	X					
P2237,P2240	P2237,P2240	A/F sensor (open)																				X			X	X					
P2423,24	P2423,24	HC Adsorption Catalyst																													
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																													
P2431	P2431	AIR Pressure Sensor(Rationality)																													
P2440	P2440	AIR control valve stuck open																					X	X	X	X	X				
P2441	P2441	AIR control valve stuck close																					X	X	X	X	X				
P2444	P2444	AIP stuck On																					X	X	X	X	X				
P2445	P2445	AIP stuck Off																					X	X	X	X	X				
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																													
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																				X			X	X					

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Monitor disablement (X - disabled)

Fault code (Monitor detected malfunction)	Fault code	Component/system	Knock sensor	CKP sensor	CMP sensor	VVT sensor1,2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor	VSS(ECT2sensor)	VSS(ECT1sensor, non-ECT)	VSS(M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1
Fault code			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
	Fault code		P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796
P0010,P0020	P0010,P0020	VVT VSV1,2																										X
P0011	P0011	VVT System1 - Advance							X	X			X	X					X									
P0012	P0012	VVT System1 - Retard							X	X			X	X					X									
P0016,P0018	P0016,P0018	VVT System - Misalignment																										
P0021	P0021	VVT System2 - Advance							X	X			X	X					X									
P0022	P0022	VVT System2 - Retard							X	X			X	X					X									
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1							X	X			X						X									X
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1							X	X			X						X									
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2											X															
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																										
P0100,P0101	P0100-P0103	MAF sensor							X	X			X	X				X	X									X
P0105,P0106	P0105-P0108	MAP sensor							X	X			X	X				X	X									X
P0110	P0110-P0113	IAT sensor							X	X				X														X
P0115,P0116	P0115-P0118	ECT sensor							X	X		X	X	X				X	X									X
P0120,P0121	P0120-P0223,P2135	TP sensor							X	X			X	X			X		X									X
P0125	P0125	Insufficient ECT for Closed Loop							X	X		X	X	X				X	X									X
P0128	P0128	Thermostat																										
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1							X	X			X	X					X									X
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1							X	X			X						X									X
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2											X															
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																										
P0171,P0172	P0171,P0172	Fuel system							X	X			X	X					X									X
P0300-P0308	P0300-P0308	Misfire											X	X					X									X
P0325,P0330	P0325-P0333	Knock sensor							X	X																		X
P0335	P0335	CKP sensor							X	X			X	X					X									X
P0340, P0341	P0340, P0341	CMP sensor							X	X			X	X					X									X
P0340-P0346	P0340-P0346	VVT sensor1,2																										
P0351-P0358	P0351-P0358	Ignitor							X	X			X	X					X									X
P0385	P0385	CKP sensor 2							X	X			X	X					X									
P0401	P0401	EGR system (closed)											X															X
P0402	P0402	EGR system (open)											X	X					X									X
P0405,P0409	P0405-P0409	Lift sensor																										
P0420,P0430	P0420,P0430	Catalyst																										
P0442-P0456	P0442-P0456	EVAP system																	X									
P0450,P0451	P0450-P0453	EVAP press sensor												X														

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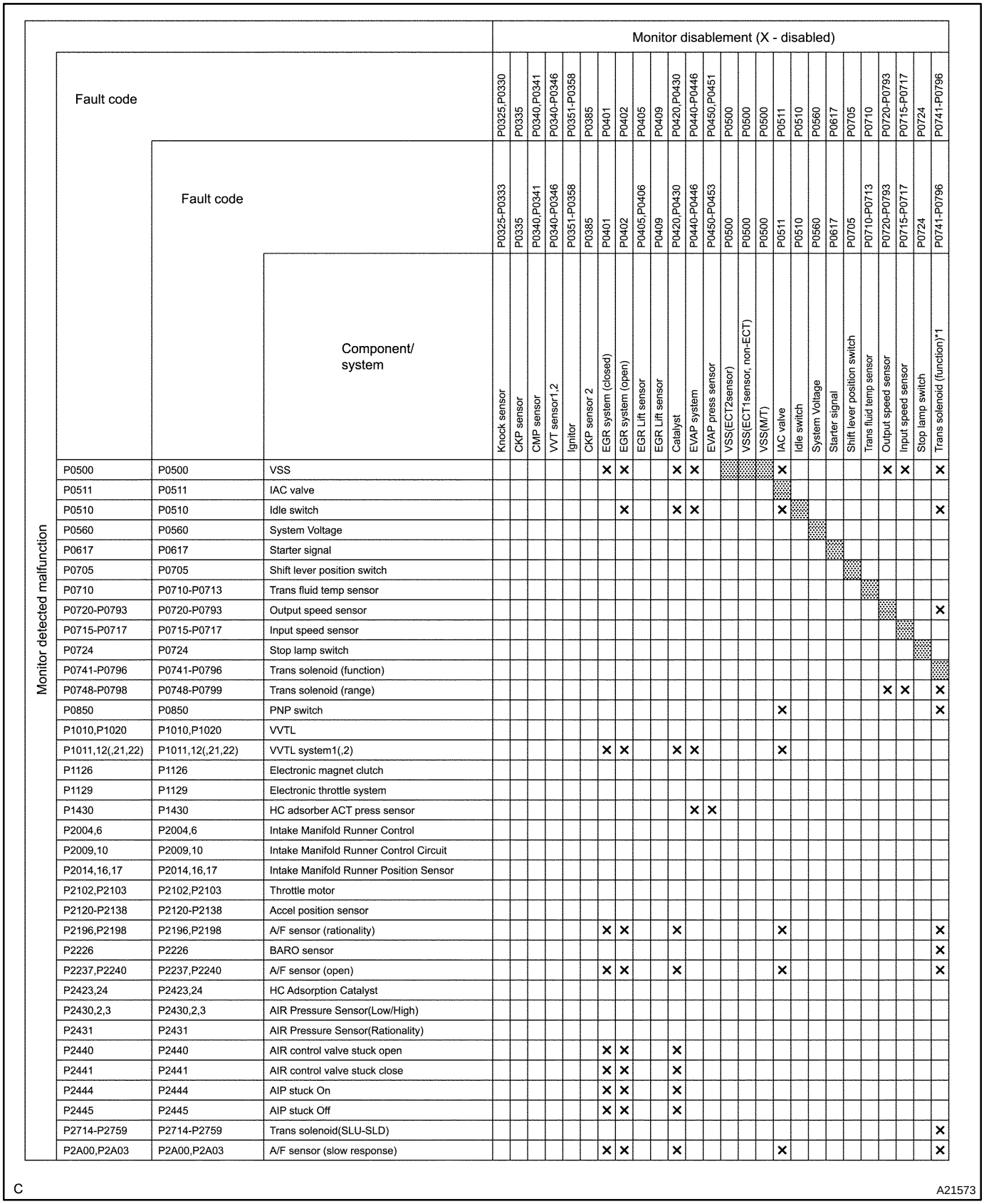

Monitor detected malfunction	Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																														
				P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
				P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796
				Knock sensor	CKP sensor	CMP sensor	VVT sensor1,2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor	VSS(ECT2sensor)	VSS(ECT1sensor, non-ECT)	VSS(M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1
	P0500	P0500	VSS							X	X			X	X					X						X	X		X
	P0511	P0511	IAC valve																															
	P0510	P0510	Idle switch								X			X	X					X										X
	P0560	P0560	System Voltage																															
	P0617	P0617	Starter signal																															
	P0705	P0705	Shift lever position switch																															
	P0710	P0710-P0713	Trans fluid temp sensor																															
	P0720-P0793	P0720-P0793	Output speed sensor																															X
	P0715-P0717	P0715-P0717	Input speed sensor																															
	P0724	P0724	Stop lamp switch																															
	P0741-P0796	P0741-P0796	Trans solenoid (function)																															
	P0748-P0798	P0748-P0799	Trans solenoid (range)																							X	X			X
	P0850	P0850	PNP switch																	X										X
	P1010,P1020	P1010,P1020	VVTL																															
	P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)							X	X			X	X					X										
	P1126	P1126	Electronic magnet clutch																															
	P1129	P1129	Electronic throttle system																															
	P1430	P1430	HC adsorber ACT press sensor												X	X																		
	P2004,6	P2004,6	Intake Manifold Runner Control																															
	P2009,10	P2009,10	Intake Manifold Runner Control Circuit																															
	P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																															
	P2102,P2103	P2102,P2103	Throttle motor																															
	P2120-P2138	P2120-P2138	Accel position sensor																															
	P2196,P2198	P2196,P2198	A/F sensor (rationality)							X	X			X						X										X
	P2226	P2226	BARO sensor																															X
	P2237,P2240	P2237,P2240	A/F sensor (open)							X	X			X						X										X
	P2423,24	P2423,24	HC Adsorption Catalyst																															
	P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																															
	P2431	P2431	AIR Pressure Sensor(Rationality)																															
	P2440	P2440	AIR control valve stuck open							X	X			X																
	P2441	P2441	AIR control valve stuck close							X	X			X																
	P2444	P2444	AIP stuck On							X	X			X																
	P2445	P2445	AIP stuck Off							X	X			X																
	P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																															X
	P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)							X	X			X						X										X

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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																												
			P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
	P0741-P0796	Trans solenoid (function)*2																													
	P0748-P0999	Trans solenoid (range)																													
	P0850	PNP switch																													
	P1010,P1020	VVTL																													
	P1011,12(,21,22)	VVTL system1(,2)																													
	P1126	Electronic magnet clutch																													
	P1129	Electronic throttle system																													
	P1430	HC adsorber ACT press sensor																													
	P2004,6	Intake Manifold Runner Control																													
	P2009,10	Intake Manifold Runner Control Circuit																													
	P2014,16,17	Intake Manifold Runner Position Sensor																													
	P2102,P2103	Throttle motor																													
	P2120-P2138	Accel position sensor																													
	P2196,P2198	A/F Sensor(Rationality) - Sensor1																													
	P2226	BARO sensor																													
	P2237,P2240	A/F Sensor(Open) - Sensor1																													
	P2423,24	HC Adsorption Catalyst																													
	P2430,2,3	AIR Pressure Sensor(Low/High)																													
	P2431	AIR Pressure Sensor(Rationality)																													
	P2440	AIR control valve stuck open																													
	P2441	AIR control valve stuck close																													
	P2444	AIP stuck On																													
	P2445	AIP stuck Off																													
	P2714-P2759	Trans solenoid(SLU-SLD)																													
	P2A00,P2A03	A/F Sensor (Slow response) - Sensor1																													
P0010,P0020	P0010,P0020	VVT VSV1,2																				X	X	X	X		
P0011	P0011	VVT System1 - Advance																				X	X	X	X		
P0012	P0012	VVT System1 - Retard																				X	X	X	X		
P0016,P0018	P0016,P0018	VVT System - Misalignment																				X	X	X	X		
P0021	P0021	VVT System2 - Advance																				X	X	X	X		
P0022	P0022	VVT System2 - Retard																				X	X	X	X		
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																	X			X	X	X	X		
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1														X		X	X			X	X	X	X		X
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2														X			X								
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																	X								
P0100,P0101	P0100-P0103	MAF sensor				X	X									X		X	X			X	X	X	X		X
P0105,P0106	P0105-P0108	MAP sensor				X	X									X		X	X			X	X	X	X		X
P0110	P0110-P0113	IAT sensor									X					X		X				X	X	X	X		X
P0115,P0116	P0115-P0118	ECT sensor	X			X	X				X					X		X	X			X	X	X	X		X
P0120,P0121	P0120-P0223,P2135	TP sensor														X		X	X			X	X	X	X		X
P0125	P0125	Insufficient ECT for Closed Loop	X			X										X		X	X			X	X	X	X		X
P0128	P0128	Thermostat																									
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																	X			X	X	X	X		
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1														X		X	X			X	X	X	X		X
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2														X			X								
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																	X								
P0171,P0172	P0171,P0172	Fuel system														X		X	X			X	X	X	X		X
P0300-P0308	P0300-P0308	Misfire														X		X	X			X	X	X	X		X
P0325,P0330	P0325-P0333	Knock sensor																				X	X	X	X		
P0335	P0335	CKP sensor				X	X									X		X	X			X	X	X	X		X
P0340, P0341	P0340, P0341	CMP sensor				X	X									X		X	X			X	X	X	X		X
P0340-P0346	P0340-P0346	VVT sensor1,2																				X	X	X	X		
P0351-P0358	P0351-P0358	Ignitor																	X			X	X	X	X		
P0385	P0385	CKP sensor 2				X	X									X		X	X			X	X	X	X		X
P0401	P0401	EGR system (closed)																	X								
P0402	P0402	EGR system (open)														X		X	X			X	X	X	X		X
P0405,P0409	P0405-P0409	Lift sensor																									
P0420,P0430	P0420,P0430	Catalyst																									
P0442-P0456	P0442-P0456	EVAP system														X		X				X	X	X	X		X
P0450,P0451	P0450-P0453	EVAP press sensor																				X	X	X	X		

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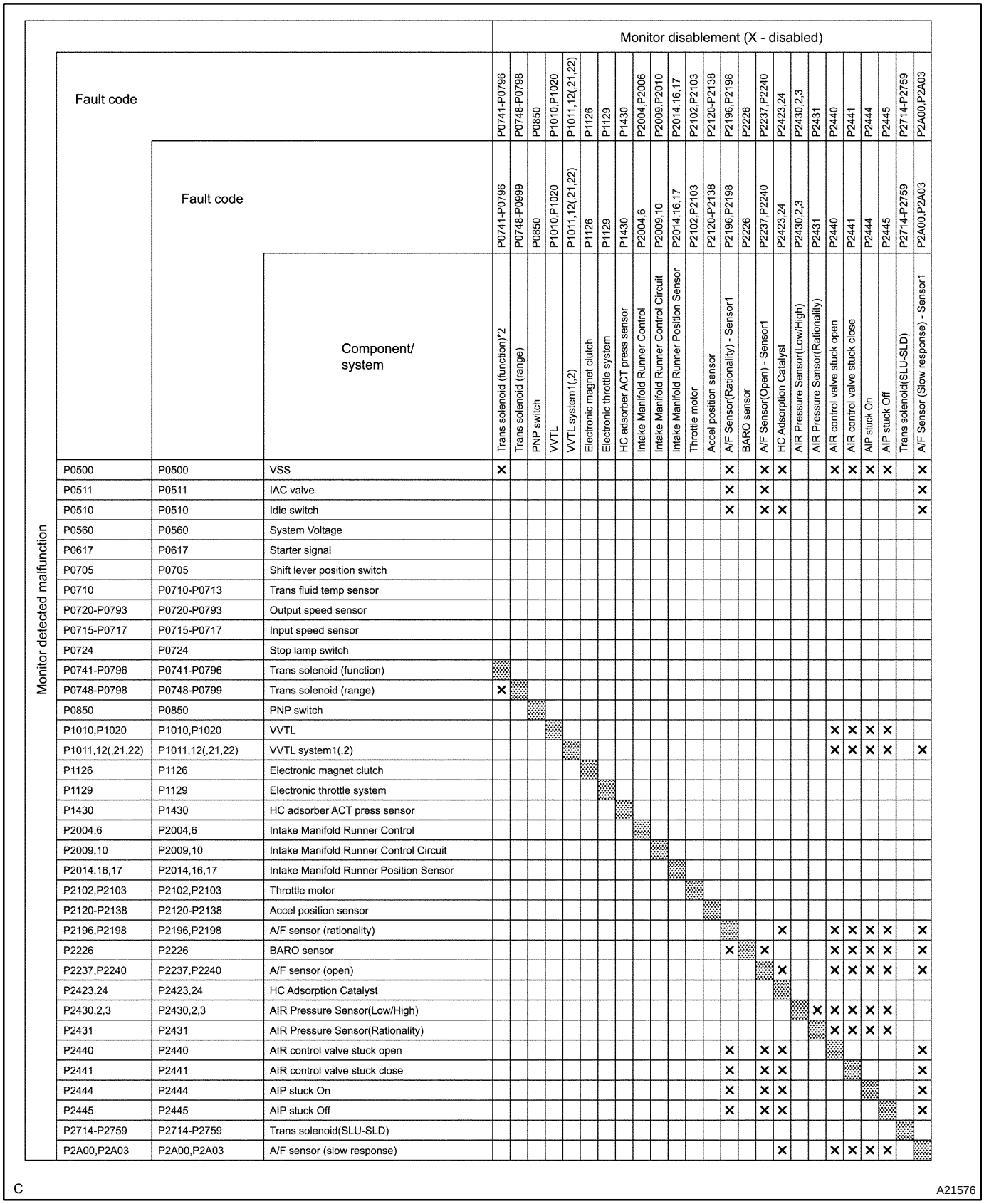

Monitor detected malfunction	Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																										
				P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
				P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
				Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Adsorption Catalyst	AIR Pressure Sensor(Low/High)	AIR Pressure Sensor(Rationality)	AIR control valve stuck open	AIR control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid(SLU-SLD)	A/F Sensor (Slow response) - Sensor1
	P0500	P0500	VSS	X													X		X	X			X	X	X	X		X
	P0511	P0511	IAC valve														X		X									X
	P0510	P0510	Idle switch														X		X	X								X
	P0560	P0560	System Voltage																										
	P0617	P0617	Starter signal																										
	P0705	P0705	Shift lever position switch																										
	P0710	P0710-P0713	Trans fluid temp sensor																										
	P0720-P0793	P0720-P0793	Output speed sensor																										
	P0715-P0717	P0715-P0717	Input speed sensor																										
	P0724	P0724	Stop lamp switch																										
	P0741-P0796	P0741-P0796	Trans solenoid (function)																										
	P0748-P0798	P0748-P0799	Trans solenoid (range)	X																									
	P0850	P0850	PNP switch																										
	P1010,P1020	P1010,P1020	VVTL																				X	X	X	X			
	P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X	X	X	X			X
	P1126	P1126	Electronic magnet clutch																										
	P1129	P1129	Electronic throttle system																										
	P1430	P1430	HC adsorber ACT press sensor																										
	P2004,6	P2004,6	Intake Manifold Runner Control																										
	P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
	P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
	P2102,P2103	P2102,P2103	Throttle motor																										
	P2120-P2138	P2120-P2138	Accel position sensor																										
	P2196,P2198	P2196,P2198	A/F sensor (rationality)																	X			X	X	X	X			X
	P2226	P2226	BARO sensor														X		X				X	X	X	X			X
	P2237,P2240	P2237,P2240	A/F sensor (open)																	X			X	X	X	X			X
	P2423,24	P2423,24	HC Adsorption Catalyst																										
	P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																			X	X	X	X	X			
	P2431	P2431	AIR Pressure Sensor(Rationality)																				X	X	X	X			
	P2440	P2440	AIR control valve stuck open														X		X	X									X
	P2441	P2441	AIR control valve stuck close														X		X	X									X
	P2444	P2444	AIP stuck On														X		X	X									X
	P2445	P2445	AIP stuck Off														X		X	X									X
	P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										
	P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																	X			X	X	X	X			

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9. PROBLEM SYMPTOM CONFIRMATION

Taking into consideration the results of the customer problem analysis, try to reproduce the symptoms of the trouble. If the problem is that the transaxle does not up-shift, down-shift, or the shift point is too high or too low, conduct the following road test to confirm the automatic shift schedule and simulate the problem symptoms.

10. ROAD TEST

NOTICE:

Perform the test at normal operating ATF temperature 50 to 80 °C (122 to 176 °F).

(a) D position test (NORM and PWR pattern):

Shift into the D position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.

Check that 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up-shifts take place, and that the shift points conform to the automatic shift schedule (See page SS-28).

HINT:

- 5th Gear Up-shift Prohibition Control (1. Coolant temp. is 60 °C (140 °F) or less. 2. If there is a 10 km/h (6 mph) difference between the set cruise control speed and vehicle speed.)
- 5th Gear Lock-up Prohibition Control (1. Brake pedal is depressed. 2. Coolant temp. is 60 °C (140 °F) or less.)

(2) Check for shift shock and slip.

Check for shock and slip at the 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up-shifts.

(3) Check for abnormal noises and vibration.

Drive in the D position lock-up or 5th gear and check for abnormal noises and vibration.

HINT:

The check for the cause of abnormal noises and vibration must be done very thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

(4) Check kick-down operation.

While driving in the D position, 2nd, 3rd, 4th and 5th gears, check that the possible kick-down vehicle speed limits for 2 → 1, 3 → 2, 4 → 3 and 5 → 4th kick-downs conform to those indicated on the automatic shift schedule (See page SS-28).

(5) Check abnormal shock and slip at kick-down.

(6) Check the lock-up mechanism.

- Drive in D position 5th gear, at a steady speed (lock-up ON) of about 70 km/h (43 mph).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine speed, there is no lock-up.

(b) 4 position test:

With the shift lever in ”M”, press the shift down switch once and check that the gear position indicator show ”4”. Fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.

Check that the 1 → 4 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-28).

HINT:

There is no 5th up-shift in the 4 position.

(2) Check engine braking.

While driving in the 4 position and 4th gear, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

(c) 3 position test:

Shift into the 3 position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.
Check that the 1 → 3 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-28).

(2) Check engine braking.
While driving in the 3 position and 3rd gear, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

(d) 2 position test:
Shift into the 2 position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.
Check that the 1 → 2 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-28).

(2) Check engine braking.
While driving in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

(e) L position test:
Shift into the L position and fully depress the accelerator pedal and check the following points.

(1) Check no up-shift.
While driving in the L position, check that there is no up-shift to 2nd gear.

(2) Check engine braking.
While driving in the L position, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration.

(f) R position test
Shift into the R position, lightly depress the accelerator pedal, and check that the vehicle moves backward without any abnormal noise or vibration.

CAUTION:
Before conducting this test ensure that the test area is free from people and obstruction.

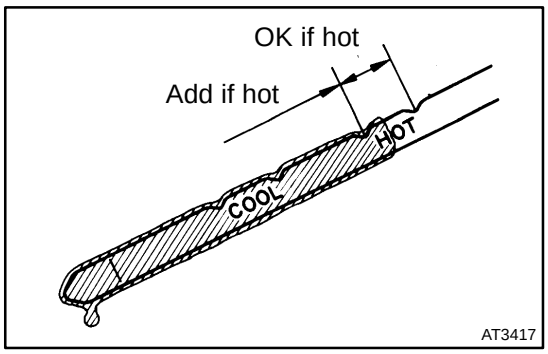
(g) P position test:
Stop the vehicle on a grade (more than 5°) and after shifting into the P position, release the parking brake. Then, check that the parking lock pawl holds the vehicle in place.

11. BASIC INSPECTION

(a) Check the fluid level.

HINT:

- Drive the vehicle so that the engine and transmission are at normal operating temperature.
  Fluid temp.: 70 to 80 °C (158 to 176 °F)
- Only use the COOL range on the dipstick as a rough reference when the fluid is changed or the engine does not run.



(1) Park the vehicle on a level surface and set the parking brake.
(2) With the engine idling and the brake pedal depressed, shift the shift lever into all positions from P to L position and return to P position.
(3) Pull out the dipstick and wipe it clean.
(4) Push it back fully into the pipe.
(5) Pull it out and check that the fluid level is in the HOT range.

If the level is not within the range, add new fluid.

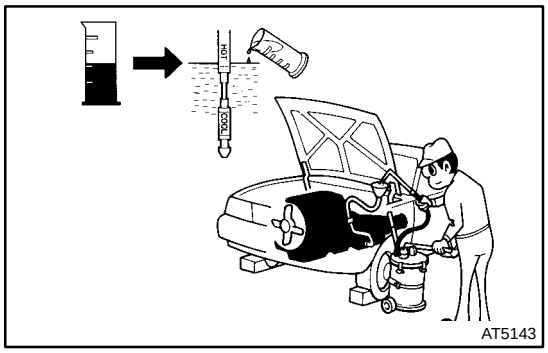
Fluid type: ATF T-IV

NOTICE:

Do not overfill.

(b) Check the fluid condition.

If the fluid smells burnt or is black, change it.



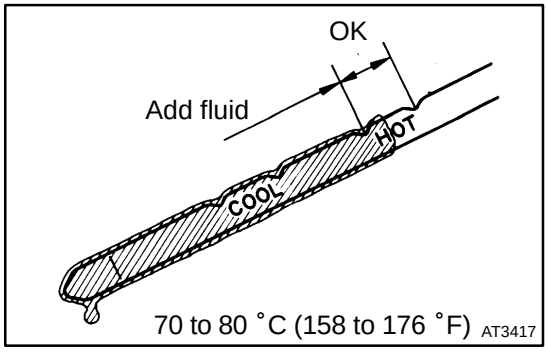
(c) Replace the ATF.
(1) Remove the drain plug and drain the fluid.
(2) Reinstall the drain plug securely.
(3) With the engine OFF add new fluid through the oil filler pipe.

Fluid type: ATF T-IV

Capacity:

2.0 liters (2.1 US qts, 1.8 Imp. qts)

(4) Start the engine and shift the shift lever into all positions from P to L position and then shift into P position.
(5) With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.



(6) Check the fluid level is at the normal operating temperature, 70 to 80 ˚C (158 to 176 ˚F), and add as necessary.

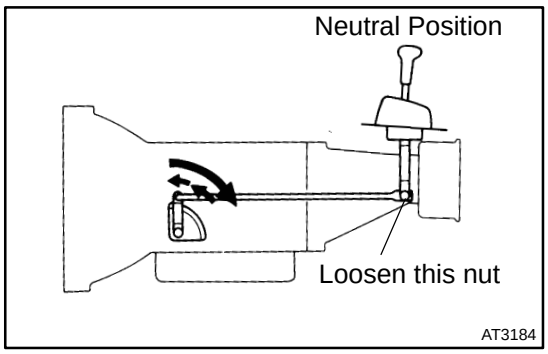
NOTICE:

Do not overfill.

(d) Check the fluid leaks.

Check for leaks in the transmission.

If there are leaks, it is necessary to repair or replace O-rings, FIPGs, oil seals, plugs or other parts.



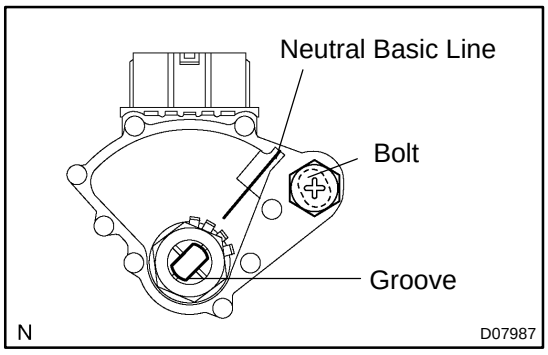
(e) Inspect and adjust the shift lever position.
When shifting the shift lever from the N position to other positions, check that the lever can be shifted smoothly and accurately to each position and that the position indicator is aligned with the correct position.

If the indicator is not aligned with the correct position, carry out the following adjustment procedures.

- Loosen the nut on the shift lever.
- Push the control shaft fully rearward.
- Return the control shaft lever 2 notches to N position.
- Set the shift lever to N position.
- While holding the shift lever lightly toward the R position side, tighten the shift lever nut.

Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)

- Start the engine and make sure that the vehicle moves forward when shifting the lever from the N to D position and reverses when shifting it to the R position.



(f) Inspect and adjust the park/neutral position switch.

- Check that the engine can be started with the shift lever only in the N or P position, but not in other positions.

If it is not as stated above, carry out the following adjustment procedures.

- Loosen the park/neutral position switch bolt and set the shift lever to the N position.
- Align the groove and neutral basic line.
- Hold the switch in position and tighten the bolt.

Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)

- For continuity inspection of the park/neutral position switch, see page DI-361 .

(g) Check the idle speed.
Idle speed (In N position and air conditioner OFF): 700 ± 50 rpm

12. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transmission and engine by measuring the stall speeds in the D position.

NOTICE:

- **Do the test at normal operating fluid temperature 50 to 80 °C (122 to 176 °F).**
- **Do not continuously run this test for longer than 5 seconds.**
- **To ensure safety, conduct this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**
  - Chock the 4 wheels.
  - Connect an OBD II scan tool or hand-held tester to DLC3.
  - Fully apply the parking brake.
  - Keep your left foot depressing firmly on the brake pedal.
  - Start the engine.
  - Shift into the D position. Press all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

Stall speed:

2,700 ± 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall engine speed is low in D position	Engine output may be insufficient Stator one-way clutch is operating properly HINT: If the value is larger or smaller than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Stall engine speed is high in D position	Line pressure too low Forward clutch slipping No. 2 one-way clutch not operating properly O/D one-way clutch not operating properly

(b) Measure the time lag.

When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the O/D direct clutch, forward clutch, and 1st & reverse brake.

NOTICE:

- **Do the test at normal operating fluid temperature 50 to 80 °C (122 to 176 °F).**
- **Be sure to allow 1 minute interval between tests.**
- **Take 3 measurements and take the average value.**
  - Fully apply the parking brake.
  - Start the engine and check idle speed.

Idle speed (In N position and air conditioner OFF):

700 ± 50 rpm

  - Shift the shift lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

Time lag: N → D Less than 1.2 seconds

  - In the same manner, measure the time lag for N → R.

Time lag: N → R Less than 1.5 seconds

Evaluation (If N → D or N → R time lag is longer than the specified):

Problem	Possible cause
N → D time lag is longer	✓Line pressure too low ✓Forward clutch worn ✓O/D one-way clutch not operating properly
N → R time lag is longer	✓Line pressure too low ✓Direct clutch worn ✓1st & reverse brake worn ✓O/D one-way clutch not operating properly

13. HYDRAULIC TEST

Measure the line pressure.

NOTICE:

- **Do the test at normal operation fluid temperature 50 to 80 °C (122 to 176 °F).**
- **The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**
- **Be careful to prevent SST's hose from interfering with the exhaust pipe.**

(1) Warm up the ATF.

(2) Remove the test plug on the front left side of the transmission case and connect SST (See page AT-29 for the location to connect SST).

SST 09992-00095 (09992-00231, 09992-00271)

(3) Fully apply the parking brake and chock the 4 wheels.

(4) Start the engine and check idling speed.

(5) Keep your left foot pressing firmly on the brake pedal and shift into D position.

(6) Measure the line pressure when the engine is idling.

(7) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.

(8) In the same manner, do the test in R position.

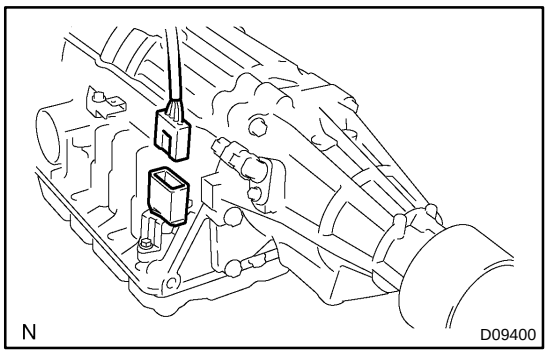
Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)	R position kPa (kgf/cm^2, psi)
Idling	390 to 460 (4.0 to 4.7, 57 to 67)	0
Stall	1,200 to 1,360 (12.2 to 13.8, 174 to 196)	1,640 to 1,960 (16.7 to 19.8, 238 to 282)

If the measured pressures are not up to the specified values, recheck the throttle cable adjustment and re-test.

Evaluation

Problem	Possible cause
If the measured values at all positions are higher	✓Shift solenoid valve SLT defective ✓Regulator valve defective
If the measured values at all positions are lower	✓Shift solenoid valve SLT defective ✓Regulator valve defective ✓Oil pump defective ✓O/D direct clutch defective
If pressure is low in the D position only	✓D position circuit fluid leakage ✓Forward clutch defective
If pressure is low in the R position only	✓R position circuit fluid leakage ✓Direct clutch defective ✓1st & reverse brake defective



14. MANUAL SHIFTING TEST

HINT:

By this test, it can be determined whether the trouble is within the electrical circuit or is a mechanical problem in the transmission.

(a) Disconnect the solenoid wire.

(b) Inspect the manual driving operation.

Check that the shift and gear positions correspond to the table below.

While driving, shift through the L, 2, 3, M and D positions.

Check that the gear change corresponds to the shift position.

Shift Position	Gear Position
D	5th
M	5th
3	4th
2	3rd
L	3rd
R	Reverse
P	Pawl Lock

HINT:

If the gear positions of the L, 2, 3, M and D are difficult to distinguish, do the road test.

If any abnormality is found in the above manual shifting test, the problem is in the transmission itself.

(c) Connect the solenoid wire.

(d) Clear out the DTC.

15. RESET MEMORY

CAUTION:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transaxle assy, engine assy or the ECM.

NOTICE:

Hand-held tester only

HINT:

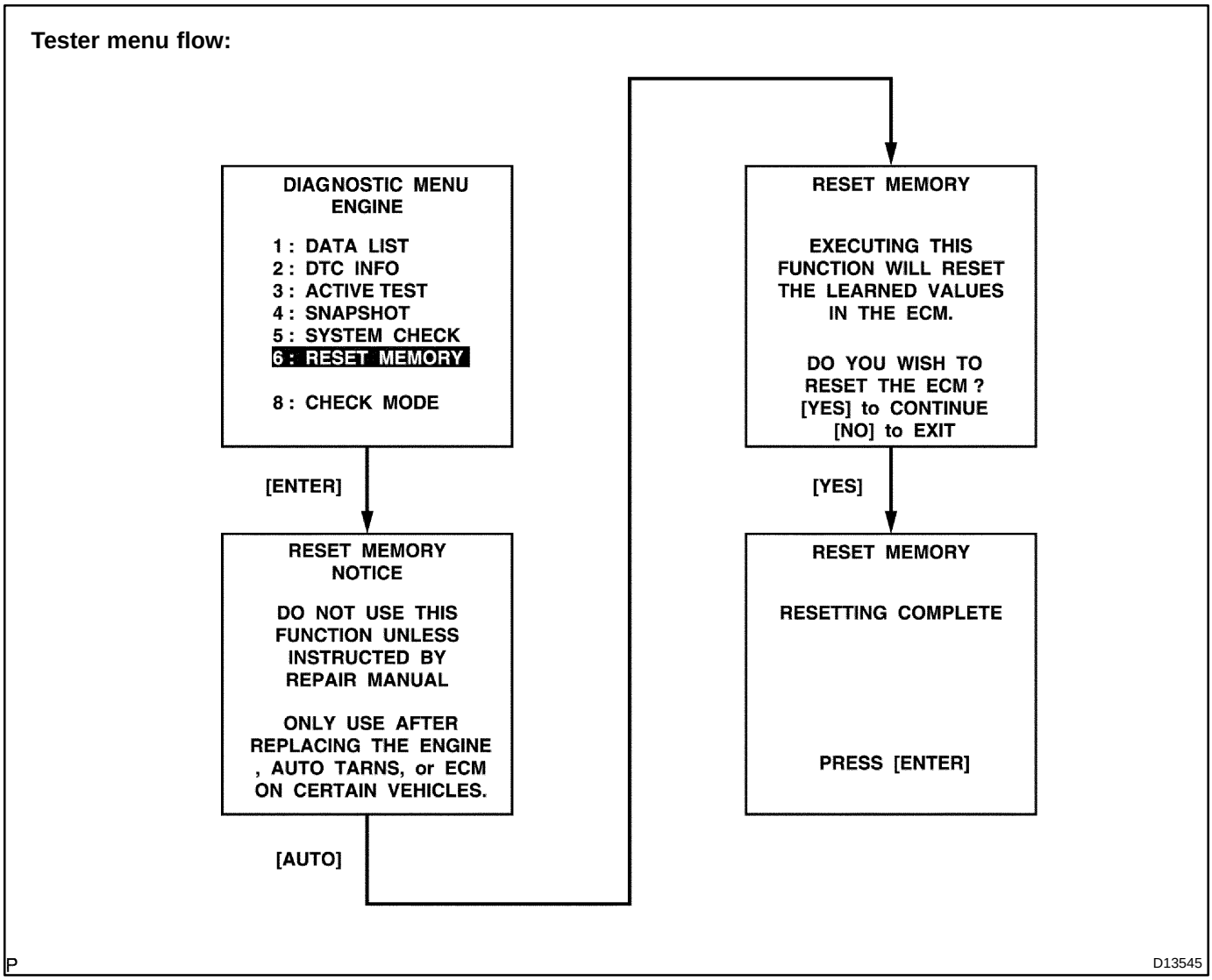
The ECM memorizes the condition that the ECT controls the automatic transaxle assy and engine assy according to those characteristics. Therefore, when the automatic transaxle assy, engine assy, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information. Reset procedure is as follows.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(d) Select the item "DIAGNOSIS/ENHANCED OBD II".
(e) Perform the reset memory procedure from the ENGINE menu.

CAUTION:

After performing the RESET MEMORY, be sure to perform the ROAD TEST described earlier.

Tester menu flow:



DI25J-08

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the circuit listed in the table below and proceed to the page given.

* : ✓...MIL lights up

DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P0500 (DI-256)	Vehicle Speed Sensor "A"	™Open or short in vehicle speed sensor circuit ™Speed sensor (SP2) ™ECM ™Automatic transmission assembly	✓	
P0705 (DI-361)	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	™Short in park/neutral position switch circuit ™Park/neutral position switch ™ECM	✓	
P0710 (DI-367)	Transmission Fluid Temperature Sensor "A" Circuit	™Open or short in ATF temperature sensor circuit ™ATF temperature sensor ™ECM	✓	
P0711 (DI-371)	Transmission Fluid Temperature Sensor "A" Performance	™Transmission fluid level ™ATF temperature sensor	✓	
P0712 (DI-367)	Transmission Fluid Temperature Sensor "A" Circuit Low Input	™Open or short in ATF temperature sensor circuit ™ATF temperature sensor ™ECM	✓	
P0713 (DI-367)	Transmission Fluid Temperature Sensor "A" Circuit High Input		✓	
P0717 (DI-374)	Input Speed Sensor Circuit No Signal	™Open or short in O/D direct clutch speed sensor circuit ™O/D direct clutch speed sensor ™ECM ™Automatic transmission assembly	✓	
P0724 (DI-378)	Brake Switch "B" Circuit High	™Open or short in stop light switch signal circuit ™Stop light switch ™ECM	✓	
P0751 (DI-380)	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)	™Shift solenoid valve No. 1 is stuck open or closed ™Valve body is blocked up or stuck ™Automatic transmission assembly	✓	
P0756 (DI-380)	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)	™Shift solenoid valve No. 2 is stuck open or closed ™Valve body is blocked up or stuck ™Automatic transmission assembly	✓	
P0761 (DI-380)	Shift Solenoid "C" Performance (Shift Solenoid Valve S3)	™Shift solenoid valve No. 3 is stuck open or closed ™Valve body is blocked up or stuck ™Automatic transmission assembly	✓	
P0973 (DI-390)	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)	™Open or short in shift solenoid valve No. 1 circuit ™Shift solenoid valve No. 1 ™ECM	✓	
P0974 (DI-390)	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)		✓	
P0976 (DI-390)	Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)	™Open or short in shift solenoid valve No. 2 circuit ™Shift solenoid valve No. 2 ™ECM	✓	
P0977 (DI-390)	Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)		✓	
P0979 (DI-390)	Shift Solenoid "C" Control Circuit Low (Shift Solenoid Valve S3)	™Open or short in shift solenoid valve No. 3 circuit ™Shift solenoid valve No. 3 ™ECM	✓	
P0980 (DI-390)	Shift Solenoid "C" Control Circuit High (Shift Solenoid Valve S3)		✓	

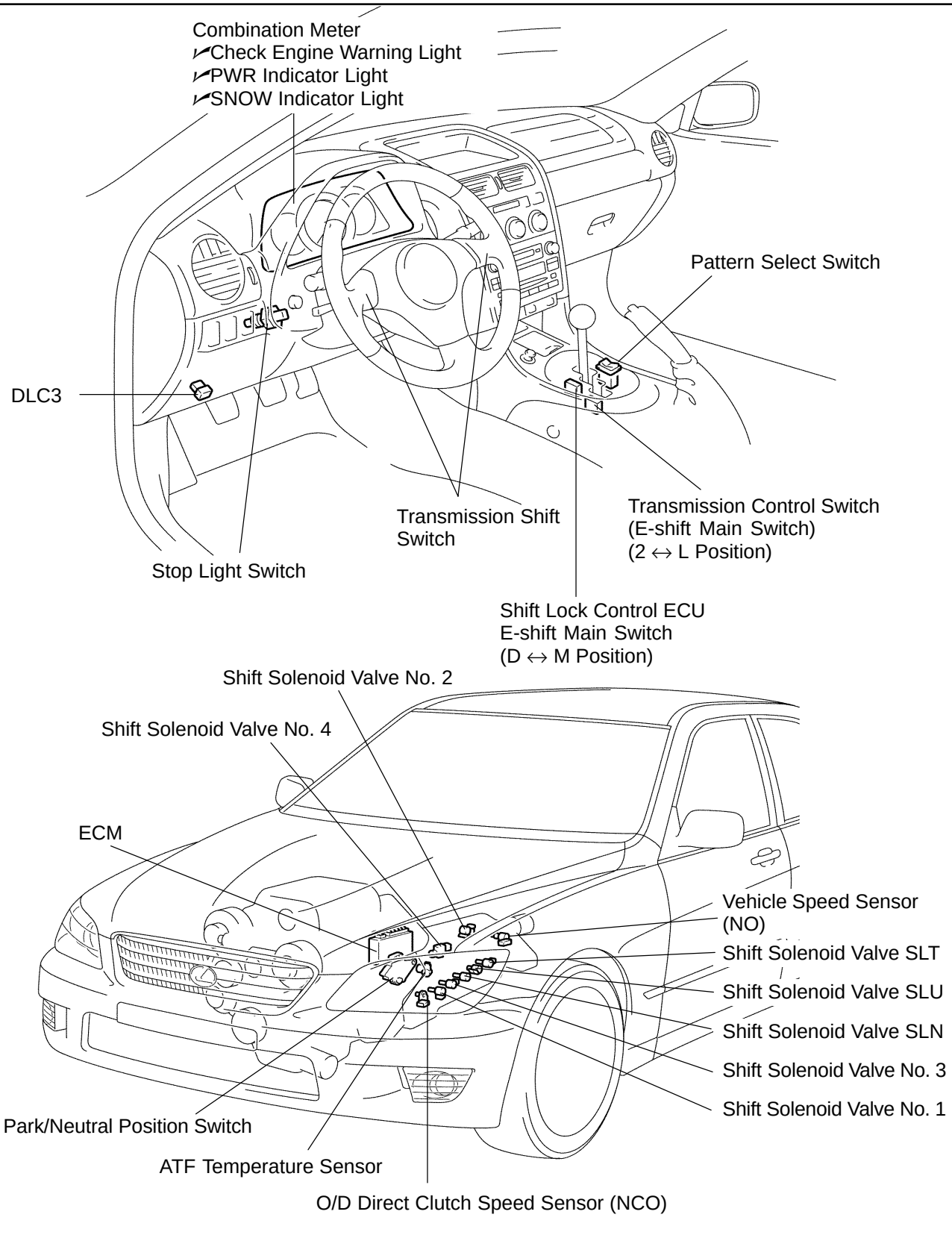
P0982 (DI-397)	Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)	™Open or short in shift solenoid valve No. 4 circuit ™Shift solenoid valve No. 4 ™ECM	✓	
P0983 (DI-397)	Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)		✓	
P2716 (DI-401)	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	™Open or short in shift solenoid valve SLT circuit ™Shift solenoid valve SLT ™ECM	✓	
P2725 (DI-406)	Pressure Control Solenoid "E" Electrical (Shift Solenoid Valve SLN)	™Open or short in shift solenoid valve SLN circuit ™Shift solenoid valve SLN ™ECM	✓	
P2757 (DI-411)	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	™Shift solenoid valve SLU is stuck open or closed ™Valve body is blocked up or stuck ™Lock-up clutch ™Automatic transmission assembly	✓	
P2759 (DI-415)	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)	™Open or short in shift solenoid valve SLU circuit ™Shift solenoid valve SLU ™ECM	✓	

HINT:

This DTC may be output when the clutch, brake and gear components etc. inside the automatic transmission are damaged.

DI25K-06

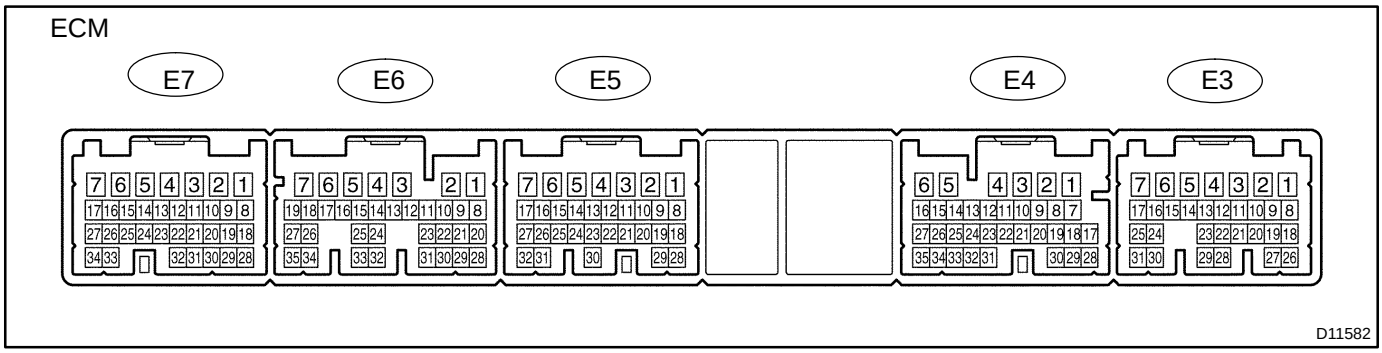
PARTS LOCATION



P D09382

DI260-06

TERMINALS OF ECM



Each ECM terminals standard normal voltage is shown in the table below. In the table, first follow the information under ”Condition”.
Look under ”Symbols (Terminals No.)” for the terminals to be inspected.
The standard normal voltage between the terminals is shown under ”STD Voltage”.
Use the illustration above as a reference for the ECM terminals.

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage
STP ↔ E1 (E4-4 ↔ E6-7)	G-W ↔ BR	IG ON and brake pedal depressed	7.5 to 14 V
		IG ON and brake pedal released	Below 1.5 V
SFTD ↔ E1 (E4-5 ↔ E6-7)	GR-R ↔ BR	IG ON and ”Down” transmission shift switch pressed	Below 3 V
		IG ON and ”Down” transmission shift switch released	7 to 12 V
SFTU ↔ E1 (E4-6 ↔ E6-7)	GR-G ↔ BR	IG ON and ”Up” transmission shift switch pressed	Below 3 V
		IG ON and ”Up” transmission shift switch released	7 to 12 V
2 ↔ E1 (E4-12 ↔ E6-7)	Y-G ↔ BR	IG ON and shift lever 2 or L position	7.5 to 14 V
		IG ON and shift lever other than 2 and L position	Below 1.5 V
D ↔ E1 (E4-13 ↔ E6-7)	GR-B ↔ BR	IG ON and shift lever D or M position	7.5 to 14 V
		IG ON and shift lever other than D and M position	Below 1.5 V
4 ↔ E1 (E4-14 ↔ E6-7)	LG-B ↔ BR	IG ON and shift lever M position	7.5 to 14 V
		IG ON and shift lever other than M position	Below 1.5 V
L ↔ E1 (E4-15 ↔ E6-7)	G-Y ↔ BR	IG ON and shift lever L position	7.5 to 14 V
		IG ON and shift lever other than L position	Below 1.5 V
N ↔ E1 (E6-3 ↔ E6-7)	G-R ↔ BR	IG ON and shift lever N position	7.5 to 14 V
		IG ON and shift lever other than N position	Below 1.5 V
3 ↔ E1 (E6-4 ↔ E6-7)	G-W ↔ BR	IG ON and shift lever 3 position	7.5 to 14 V
		IG ON and shift lever other than 3 position	Below 1.5 V
R ↔ E1 (E6-5 ↔ E6-7)	R-B ↔ BR	IG ON and shift lever R position	7.5 to 14 V
		IG ON and shift lever other than R position	Below 1.5 V
P ↔ E1 (E6-6 ↔ E6-7)	G ↔ BR	IG ON and shift lever P position	7.5 to 14 V
		IG ON and shift lever other than P position	Below 1.5 V
SLU^+ ↔ SLU^- (E6-11 ↔ E6-10)	G-W ↔ LG-B	IG ON	Below 3 V
		Engine is idling	Pulse signal is output below 1.5 V ↔ 9 to 14 V
SLN^+ ↔ SLN^- (E6-13 ↔ E6-12)	Y-R ↔ R-W	IG ON	Below 3 V
		Engine is idling	Pulse signal is output below 1.5 V ↔ 9 to 14 V

S4 ↔ E1 (E6-16 ↔ E6-7)	B-R ↔ BR	IG ON	Below 1.5 V
		1st, 2nd, 3rd or 4th gear	Below 1.5 V
		5th gear	9 to 14 V
S3 ↔ E1 (E6-17 ↔ E6-7)	W-L ↔ BR	IG ON	Below 1.5 V
		1st, 2nd, 3rd or 5th gear	Below 1.5 V
		4th gear	9 to 14 V
S2 ↔ E1 (E6-18 ↔ E6-7)	G-Y ↔ BR	IG ON	Below 1.5 V
		1st, 4th or 5th gear	Below 1.5 V
		2nd or 3rd gear	9 to 14 V
S1 ↔ E1 (E6-19 ↔ E6-7)	Y ↔ BR	IG ON	Below 1.5 V
		3rd, 4th or 5th gear	Below 1.5 V
		1st or 2nd gear	9 to 14 V
NCO^+ ↔ NCO^- (E6-21 ↔ E6-20)	R ↔ G	Engine is idling	Pulse signal is output below 1.5 V ↔ 4 to 6 V
$SP2^+$ ↔ $SP2^-$ (E6-23 ↔ E6-22)	L-Y ↔ R-L	Engine is idling	Pulse signal is output below 1.5 V ↔ 4 to 6 V
OIL ↔ E2 (E6-27 ↔ E4-34)	GR ↔ BR	IG ON and ATF temperature 110 ˚C (176 ˚F)	Below 1 V
SLT^+ ↔ SLT^- (E6-35 ↔ E6-34)	B-Y ↔ R-B	IG ON	Below 3 V
		Engine is idling	Pulse signal is output below 1.5 V ↔ 9 to 14 V

DI25L-05

PROBLEM SYMPTOMS TABLE

HINT:

If a normal code is displayed during the DTC check but the trouble still occurs, check the circuits for each symptom in the order given in the charts on the following pages and proceed to the page given for trouble-shooting.

The Matrix Chart is divided into 3 chapters.

™ If the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.

™ If the trouble still occurs even though there are no abnormalities in any of the other circuits, then check and replace the ECM.

1. CHAPTER 1: ELECTRONIC CIRCUIT MATRIX CHART

Symptom	Suspected Area	See page
No up-shift (A particular gear, from 1st to 4th gear, is not up-shifted)	ECM	IN-33
No up-shift (4th → 5th)	1. E-shift main switch circuit 2. ECM	DI-361 IN-33
No down-shift (5th → 4th)	1. E-shift main switch circuit 2. ECM	DI-361 IN-33
No down-shift (A particular gear, from 1st to 4th gear, is not up-shifted)	ECM	IN-33
No lock-up	ECM	IN-33
No lock-up off	ECM	IN-33
Shift point too high or too low	1. Pattern select switch circuit 2. ECM	DI-419 IN-33
Up-shift to 5th from 4th while shift lever is M position	1. E-shift main switch circuit 2. ECM	DI-361 IN-33
Up-shift to 5th from 4th while engine is cold	ECM	IN-33
No pattern select	1. Pattern select switch circuit 2. ECM	DI-419 IN-33
Engine stalls when starting off or stopping	ECM	IN-33
No 2nd start	1. Pattern select switch circuit 2. ECM	DI-419 IN-33
No E-shift system	1. E-shift main switch circuit. 2. Transmission shift switch circuit 3. Pattern select switch circuit 4. ECM	DI-361 DI-421 DI-419 IN-33

2. CHAPTER 2: ON-VEHICLE REPAIR (✓: A650E AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM780U)

Symptom	Suspected Area	See page
Vehicle does not move in any forward positions and reverse position	1. Transmission control rod 2. Manual valve 3. Parking lock pawl 4. Off-vehicle repair matrix chart	DI-328 ✓ ✓ -
Vehicle does not move in R position	1. Reverse control valve 2. Off-vehicle repair matrix chart	✓ -
Vehicle does not move in particular position or positions (except R position)	Off-vehicle repair matrix chart	-
No up-shift (1st → 2nd)	1. 1-2 shift valve 2. Off-vehicle repair matrix chart	✓ -
No up-shift (2nd → 3rd)	1. 2-3 shift valve 2. Off-vehicle repair matrix chart	✓ -
No up-shift (3rd → 4th)	1. 3-4 shift valve 2. Off-vehicle repair matrix chart	✓ -
No up-shift (4th → 5th)	1. 4-5 shift valve 2. Off-vehicle repair matrix chart	✓ -
No down-shift (5th → 4th)	1. 4-5 shift valve 2. Off-vehicle repair matrix chart	✓ -
No down-shift (4th → 3rd)	1. 3-4 shift valve 2. Off-vehicle repair matrix chart	✓ -
No down-shift (3rd → 2nd)	1. 2-3 shift valve 2. Off-vehicle repair matrix chart	✓ -
No down-shift (2nd → 1st)	1. 1-2 shift valve 2. Off-vehicle repair matrix chart	✓ -
No lock-up or No lock-up off	1. Lock-up control valve 2. Lock-up relay valve 3. Off-vehicle repair matrix chart	✓ ✓ -
Harsh engagement (N → D)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_1 accumulator 4. Orifice control valve 5. Off-vehicle repair matrix chart	✓ ✓ ✓ ✓ -
Harsh engagement (Lock-up)	1. Lock-up control valve 2. Lock-up relay valve 3. Solenoid relay valve 4. Off-vehicle repair matrix chart	✓ ✓ ✓ -
Harsh engagement (N → R)	1. Accumulator control valve 2. C_2 accumulator 3. Solenoid modulator valve 4. Off-vehicle repair matrix chart	✓ ✓ ✓ -
Harsh engagement (2 → L)	Coast brake control valve	✓
Harsh engagement (2nd → 3rd → 4th → 5th)	1. Accumulator control valve 2. Solenoid modulator valve	✓ ✓
Harsh engagement (1st → 2nd)	1. Solenoid modulator valve 2. B_3 control valve 3. B_2 release control valve 4. Solenoid relay valve 5. Off-vehicle repair matrix chart	✓ ✓ ✓ ✓ -

Harsh engagement (2nd → 3rd)	1. Accumulator control valve 2. Solenoid modulator valve 3. B_2 accumulator 4. B_3 control valve 5. B_2 release control valve 6. Solenoid relay valve 7. Off-vehicle repair matrix chart	✓ ✓ ✓ ✓ ✓ ✓ -
Harsh engagement (3rd → 4th)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_2 accumulator 4. Off-vehicle repair matrix chart	✓ ✓ ✓ -
Harsh engagement (4th → 5th)	1. Accumulator control valve 2. Solenoid modulator valve 3. B_0 accumulator 4. Off-vehicle repair matrix chart	✓ ✓ ✓ -
Harsh engagement (5th → 4th)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_0 accumulator 4. Off-vehicle repair matrix chart	✓ ✓ ✓ -
Slip or shudder (Forward and reverse)	1. Transmission control rod 2. Oil strainer 3. Pressure relief valve 4. Off-vehicle repair matrix chart	DI-328 ✓ ✓ -
Slip or shudder (Particular position)	1. Transmission control rod 2. Off-vehicle repair matrix chart	DI-328 -
No engine braking (1st: L position)	1. Coast brake control valve 2. Off-vehicle repair matrix chart	✓ -
No engine braking (2nd: 2 position)	1. Coast brake control valve 2. Off-vehicle repair matrix chart	✓ -

3. CHAPTER 3: OFF-VEHICLE REPAIR (↙: A650E AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM780U)

Symptom	Suspected Area	See page
Vehicle does not move in any forward positions and reverse position	1. O/D one-way clutch (F_0) 2. O/D direct clutch (C_0) 3. O/D planetary gear unit 4. Torque converter clutch	↙ ↙ ↙ AT-35
Vehicle does not move in R position	1. Center and rear planetary gear unit 2. Direct clutch (C_2) 3. 1st & reverse brake (B_4) 4. O/D brake (B_0)	↙ ↙ ↙ ↙
No up-shift (1st → 2nd)	2nd brake (B_3)	↙
No up-shift (2nd → 3rd)	1. 3rd brake (B_2) 2. One-way clutch No.1 (F_1)	↙ ↙
No up-shift (3rd → 4th)	Direct clutch	↙
No up-shift (4th → 5th)	O/D brake (B_0)	↙
No lock-up or No lock-up off	Torque converter clutch	AT-35
Harsh engagement (N → D)	1. Forward clutch (C_1) 2. O/D one-way clutch (F_0) 3. One-way clutch No.2 (F_2)	↙ ↙ ↙
Harsh engagement (N → R)	1. Direct clutch (C_2) 2. O/D brake (B_0) 3. 1st & reverse brake (B_4)	↙ ↙ ↙
Harsh engagement (1st → 2nd)	2nd brake (B_3)	↙
Harsh engagement (2nd → 3rd)	1. 3rd brake (B_2) 2. 2nd brake (B_3) 3. One-way clutch No.1 (F_1)	↙ ↙ ↙
Harsh engagement (3rd → 4th)	Direct clutch (C_2)	↙
Harsh engagement (4th → 5th)	1. O/D brake (B_0) 2. O/D direct clutch (C_0)	↙ ↙
Harsh engagement (Lock-up)	Torque converter clutch	AT-35
Slip or shudder (Forward and reverse: After warm-up)	1. O/D one-way clutch (F_0) 2. O/D direct clutch (C_0) 3. Torque converter clutch	↙ ↙ AT-35
Slip or shudder (Particular position: Just after engine starts)	Torque converter clutch	AT-35
Slip or shudder (R position)	1. Direct clutch (C_2) 2. O/D brake (B_0) 2. 1st & reverse brake (B_4)	↙ ↙ ↙
Slip or shudder (1st)	1. Forward clutch (C_1) 2. No. 2 one-way clutch (F_2)	↙ ↙
Slip or shudder (2nd)	2nd brake (B_3)	↙
Slip or shudder (3rd)	1. 3rd coast brake (B_1) 2. 3rd brake (B_2) 3. One-way clutch No.1 (F_1)	↙ ↙ ↙
Slip or shudder (4th)	Direct clutch	↙
Slip or shudder (5th)	O/D brake (B_0)	↙
No engine braking (1st ~ 4th: D position)	O/D direct clutch (C_0)	↙
No engine braking (1st: L position)	1st & reverse brake (B_4)	↙
No engine braking (2nd: 2 position)	2nd brake (B_3)	↙
No engine braking (3rd: 3 position)	3rd coast brake (B_1)	↙

Poor acceleration (All positions)	Torque converter clutch	AT-35
Poor acceleration (5th)	1. O/D brake (B_0) 2. O/D planetary gear unit	✓ ✓
Engine stalls when starting off or stopping	Torque converter clutch	AT-35

DIALK-02

DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)

CIRCUIT DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.
The ECM receives signals (P, R, N, D, 4, 3, 2 and L) from the park/neutral position switch. When the signal is not sent to the ECM from the park/neutral position switch, the ECM judges that the shift lever is in D position.
When the shift lever is in the M position (with E-shift main switch for D and M pressed), "M" in the shift position indicator light will come on and when the shift lever is in the D position (with E-shift main switch for D and M released), "D" in the shift position indicator light will come on.
When the shift lever is in the L position (with E-shift main switch for 2 and L pressed), "L" in the shift position indicator light will come on and when the shift lever is in the 2 position (with E-shift main switch for 2 and L released), "2" in the shift position indicator light will come on.
When the shift lever is in M position, the ECM prohibits shifting to 5th.

DTC No.	DTC Detection Condition	Trouble Area
P0705	(2-trip detection logic) • All switches are OFF simultaneously for P, R, N, D, 3 and 2 positions. • 2 or more switches are ON simultaneously for P, R, N, D, 3 and 2 positions.	• Open or short in park/neutral position switch circuit • Park/neutral position switch • ECM

MONITOR DESCRIPTION

The park/neutral position switch detects the shift lever position and sends a signal to the ECM.
For security, the park/neutral position switch detects the shift lever position so that engine can be started only when the vehicle is in P or N shift position.
When the park/neutral position switch sends more than one signal at a time from switch positions P, R, N or D, the ECM interprets this as a fault in the switch. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0705	Park/neutral position switch/Verify switch input
Required sensors/Components	Park/neutral position switch	
Frequency of operation	Continuous	
Duration	Condition (A)	0.5 sec.
	Condition (B)	60 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
The typical enabling condition is not available.	-	

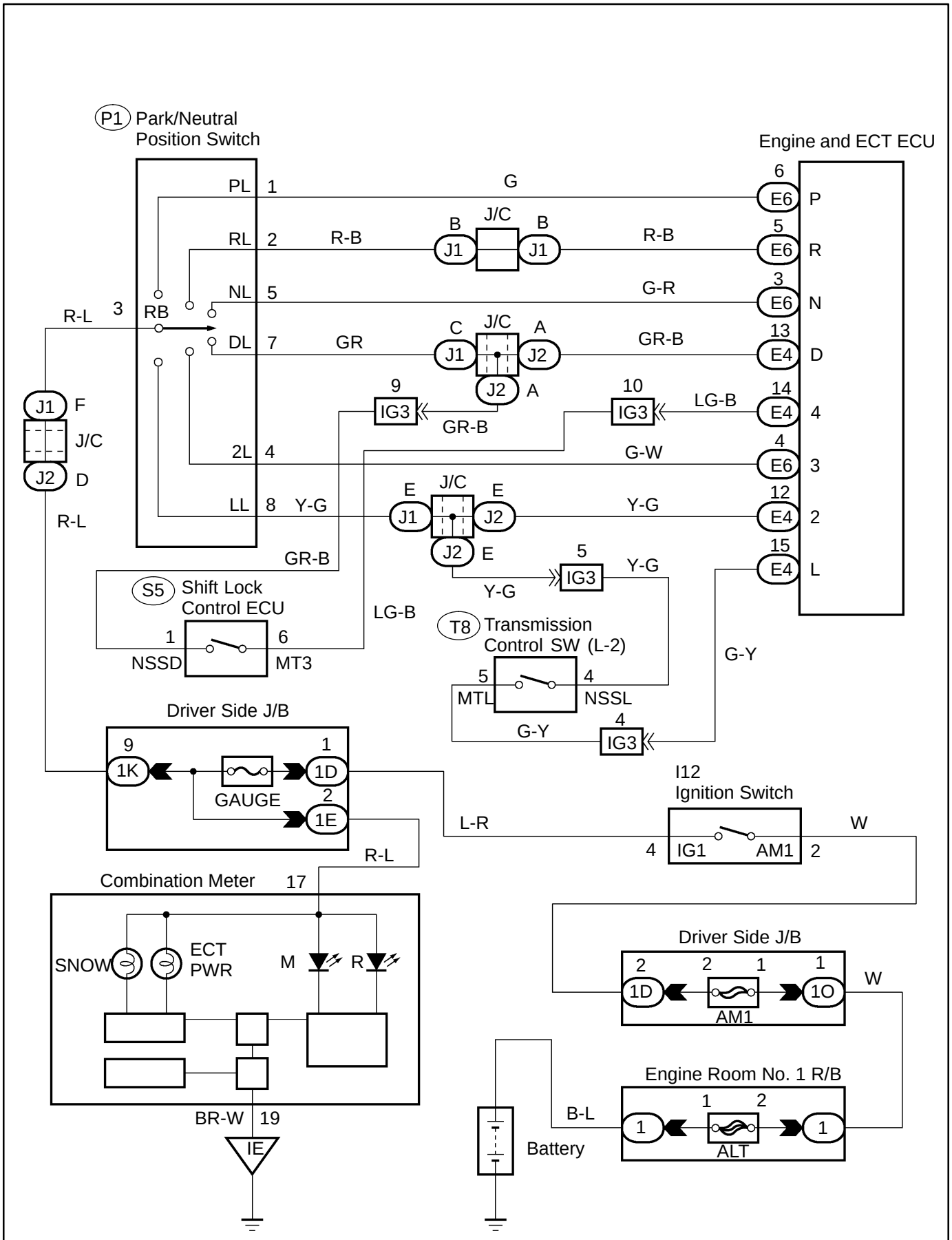
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Either of the following conditions is met: Condition (A) or (B)	
Condition (A)	
Number of the following signal input at the same time.	2 or more
P switch	ON
R switch	
N switch	
D switch	
3 switch	
2 switch	
Condition (B)	
All of the followings are met	
P switch	OFF
R switch	
N switch	
D switch	
3 switch	
2 switch	

COMPONENT OPERATING RANGE

Parameter	Standard value
Park/neutral position switch	The park/neutral position switch sends only one signal to the ECM.

WIRING DIAGRAM

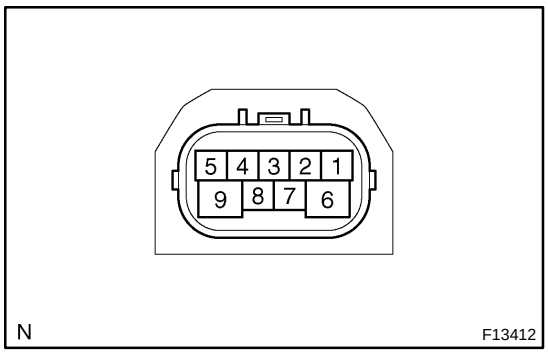


C
2004 LEXUS IS300 (RM1054U)

D13647

INSPECTION PROCEDURE

1	Check park/neutral position switch.



PREPARATION:

(a) Jack up the vehicle.

(b) Disconnect the park/neutral position switch connector.

CHECK:

Check continuity between each terminal shown below when the shift lever is moved to each position.

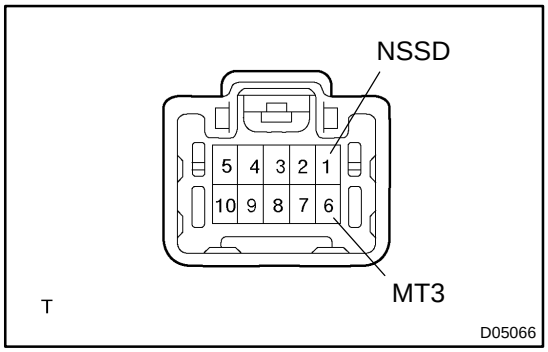
OK:

Shift position	Terminal No. to continuity	Terminal No. to continuity
P	1 - 3	6 - 9
R	2 - 3	-
N	3 - 5	6 - 9
D, M	3 - 7	-
3	3 - 4	-
2, L	3 - 8	-

NG → **Replace the park/neutral position switch.**

OK

2	Check shift lock control ECU (E-shift main switch).



PREPARATION:

(a) Connect the park/neutral position switch connector.

(b) Disconnect the shift lock control ECU connector.

CHECK:

Check continuity between each terminal of shift lock control ECU connector.

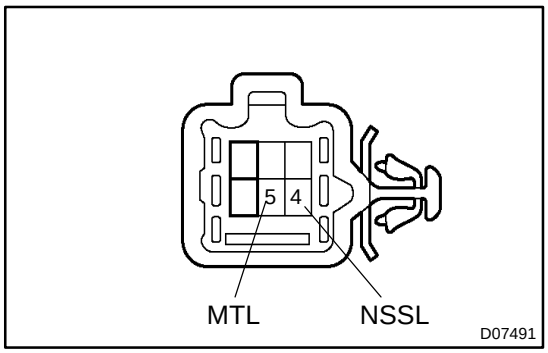
OK:

Shift position	Tester connection	Specified valve
D	1 - 6 (NSSD - MT3)	No continuity
M		Continuity

NG → **Replace the shift lock control ECU (E-shift main switch) (See page AT-20).**

OK

3	Check transmission control switch (E-shift main switch).



PREPARATION:

(a) Connect the shift lock control ECU connector.

(b) Disconnect the transmission control switch connector.

CHECK:

Check continuity between each terminal of transmission control switch connector.

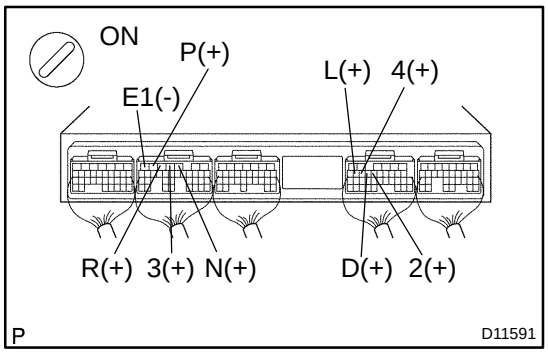
OK:

Shift position	Tester connection	Specified valve
2	4 - 5 (NSSL - MTL)	No continuity
L		Continuity

NG → **Replace the transmission control switch (E-shift main switch) (See page AT-20).**

OK

4	Measure voltage between each terminal of P, R, N, D, 4, 3, 2, L and E1 of ECM.



PREPARATION:

(a) Connect the shift lock control computer connector and E-shift main switch connector.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between each terminal of P, R, N, D, 4, 3, 2 and L, and E1 of ECM when the shift lever is shifted to the following positions.

OK:

Tester connection	Condition	Specified condition
P- E1	Shift lever position: P	Battery voltage
R - E1	Shift lever position: R	Battery voltage*
N - E1	Shift lever position: N	Battery voltage
D - E1	Shift lever position: D and M	Battery voltage
4 - E1	Shift lever position: M	Battery voltage
3 - E1	Shift lever position: 3	Battery voltage
2 - E1	Shift lever position: 2 and L	Battery voltage
L - E1	Shift lever position: L	Battery voltage

HINT:

*: The voltage will drop slightly due to lighting up of the back up light.

NG → **Repair or replace the harness or connector.**

OK →

Check and replace the ECM (See page IN-33).

DIALL-02

DTC	P0710	Transmission Fluid Temperature Sensor ”A” Circuit

DTC	P0712	Transmission Fluid Temperature Sensor ”A” Circuit Low Input

DTC	P0713	Transmission Fluid Temperature Sensor ”A” Circuit High Input

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input into the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P0710	(a) and (b) is detected momentarily within 0.5 sec. when neither P0712 or P0713 is not detected (1-trip detection logic) (a) ATF temperature sensor resistance is less than 79 Ω. (b) ATF temperature sensor resistance is more than 156 kΩ. HINT: Within 0.5 sec. the malfunction switches from (a) to (b) or from (b) to (a)	✓Open or short in ATF temperature sensor circuit ✓ATF temperature sensor ✓ECM
P0712	ATF temperature sensor resistance is less than 79 Ω for 0.5 sec. or more (1-trip detection logic).	
P0713	DTC is detected for 0.5 sec. or more (1-trip detection logic). ATF temperature sensor resistance is more than 156 kΩ after started engine for 15 minutes or more.	

MONITOR DESCRIPTION

The automatic transmission fluid (ATF) temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an opens or shorts in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω*1 or more than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

*1: 150 ™C (302 ™F) or more is indicated regardless of the actual ATF temperature.

*2: -40 ™C (-40 ™F) is indicated regardless of the actual ATF temperature.

HINT:

The ATF temperature can be checked on the OBD II scan tool or hand-held tester display.

MONITOR STRATEGY

Related DTCs	P0710	ATF temperature sensor/Range check (Chattering)
	P0712	ATF temperature sensor/Range check (Low resistance)
	P0713	ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Range check (Fluttering, Low resistance)		
The typical enabling condition is not available.	-	
Range check (High resistance)		
Time after engine start	15 min. or more	-

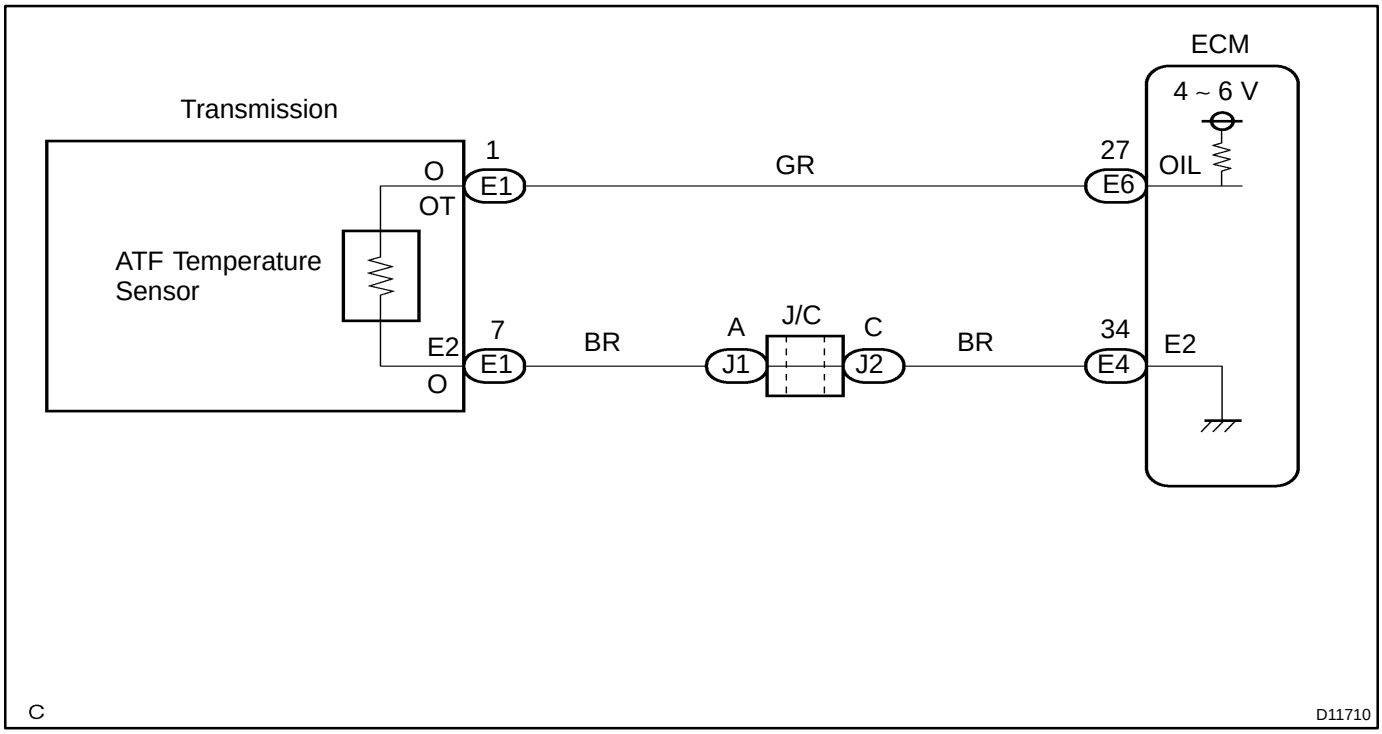
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Fluttering)	
ATF temperature sensor resistance	Less than 79 Ω or More than 156 kΩ
Range check (Low resistance)	
ATF temperature sensor resistance	Less than 79 Ω
Range check (High resistance)	
ATF temperature sensor resistance	More than 156 kΩ

COMPONENT OPERATING RANGE

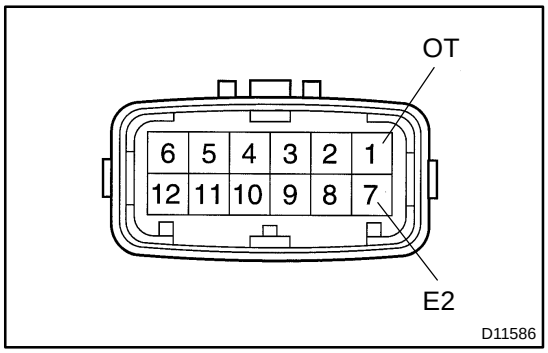
Parameter	Standard value
ATF temperature sensor	Atmospheric temperature to approx. 130˚C (266˚F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ATF temperature sensor.**



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure resistance between terminals 1 and 7of transmission wire connector.

OK:

79 Ω to 156 kΩ

CHECK:

Measure resistance between terminals 1 and 7 of the transmission wire connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG → **Replace the ATF temperature sensor (transmission wire) (See page AT-9).**

OK

2	**Check harness and connector between ATF temperature sensor and ECM (See page IN-33).**

NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM (See page IN-33).

DIC67-01

DTC P0711 Transmission Fluid Temperature Sensor "A" Performance

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input into the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P0711	Both (a) and (b) are detected: (2-trip detection logic) (a) After 12 sec. of engine start, temp. of atmosphere and that of engine coolant is more than -10°C (14°F) (b) After normal driving for over 18 min. and 20 sec. and 9 km (6 miles), ATF temp. is less than -4°C (25°F)	●Transmission fluid level ●ATF temperature sensor

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects an opens or shorts in the ATF temperature circuit or a fault of the ATF temperature sensor.

After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below -4℃ (25℉) after running the vehicle for a certain period, the ECM interprets this as a fault, and turns on the MIL.

When the ATF temperature is 110℃ (230℉) or more after 18 minutes of engine cold start, the ECM also determines this as a fault, turns on the MIL, and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0711	ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
ATF temperature sensor "A" circuit	There is no malfunction in the circuit shown on the left.	
ECT (Engine coolant temperature) sensor circuit		
IAT (Intake air temperature) sensor circuit		
Duration time from engine start	18 min. and 20 sec. or more	-
Driving distance after engine start	9 km (6 mile) or more	-
IAT (12 sec after engine start)	-10°C or more	-
ECT (12 sec after engine start)	-10°C or more	-

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
ATF temperature	Less than -4˚C

COMPONENT OPERATING RANGE

Parameter	Standard value
ATF temperature sensor	Atmospheric temperature to approx. 130˚C (266˚F)

WIRING DIAGRAM

See page DI-367 .

INSPECTION PROCEDURE

1	**Check other DTCs output (in addition to DTC P0711)**

PREPARATION:

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand-held tester.
(f) Select the item ”DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES”.

CHECK:

Read the DTCs using the OBD II scan tool or the hand-held tester.

RESULT:

Display (DTC output)	Proceed to
Only ”P0711” is output	A
”P0711” and other DTCs	B

HINT:

If any other codes besides ”P0711” is output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-328).**

A

2	**Check transaxle fluid level (See page DI-328).**

NG → **Add fluid (See page DI-328).**

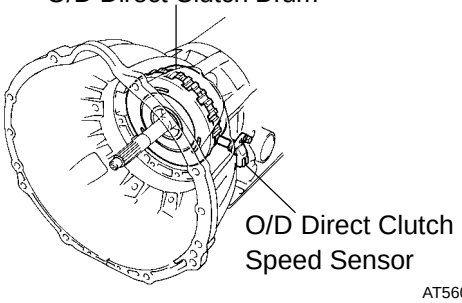
OK

Replace the transmission wire (ATF temperature sensor) (See page AT-9).

DIC68-01

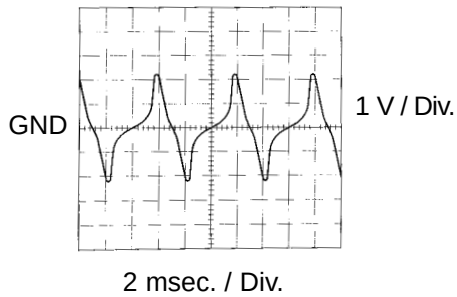
DTC	P0717	Input Speed Sensor Circuit No Signal

CIRCUIT DESCRIPTION



This sensor detects the rotation speed of the O/D input shaft from the rotation of the O/D direct clutch drum.
Its mechanism is the same as that of the vehicle speed sensor (See page DI-256).
By comparing the O/D direct clutch speed signal with vehicle speed sensor signal, the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure in response to various conditions, thus doing smooth gear shift.

DTC No.	DTC Detection Condition	Trouble Area
P0717	All conditions below are detected for 5 secs. or more (1-trip detection logic) (a) Gear change not being performed (b) Gear position: 1st, 2nd, 3rd or 4th (c) T/M input shaft rpm: 300 rpm or less (d) T/M output shaft rpm: 500 rpm or more (e) Park/neutral position switch: OFF (f) R switch: OFF (g) Shift solenoid valves, park/neutral position switch and vehicle speed sensor are in normal operation	✓Open or short in O/D direct clutch speed sensor circuit ✓O/D direct clutch speed sensor ✓ECM ✓Automatic transmission assembly



Refer to the chart for the waveform between terminals $NC0^{+}$ and $NC0^{-}$ during engine idling.

MONITOR DESCRIPTION

The NT terminal of the ECM detects the revolving signal from speed sensor (NCO) (input RPM). The ECM outputs a gearshift signal comparing the speed sensor (NCO) with the speed sensor (NO).
While the vehicle is operating in the 2nd, 3rd, 4th or 5th gear position in the shift position of D, if the input shaft revolution is less than 300 rpm*1 although the output shaft revolution is more than 1,000 rpm*2, the ECM detects the trouble, illuminates the MIL and stores the DTC.
*1: Pulse is not output or is irregularly output.
*2: The vehicle speed is 50 km/h (31 mph) or more.

MONITOR STRATEGY

Related DTCs	P0717	Speed sensor (NT)/Verify pulse input
Required sensors/Components	Speed sensor (NCO), Speed sensor (NO)	
Frequency of operation	Continuous	
Duration	5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Output shaft revolution	500 rpm or more	-
ECM selected gear	1st, 2nd, 3rd and 4th	
NSW switch	OFF	
R switch	OFF	
Engine	Running	

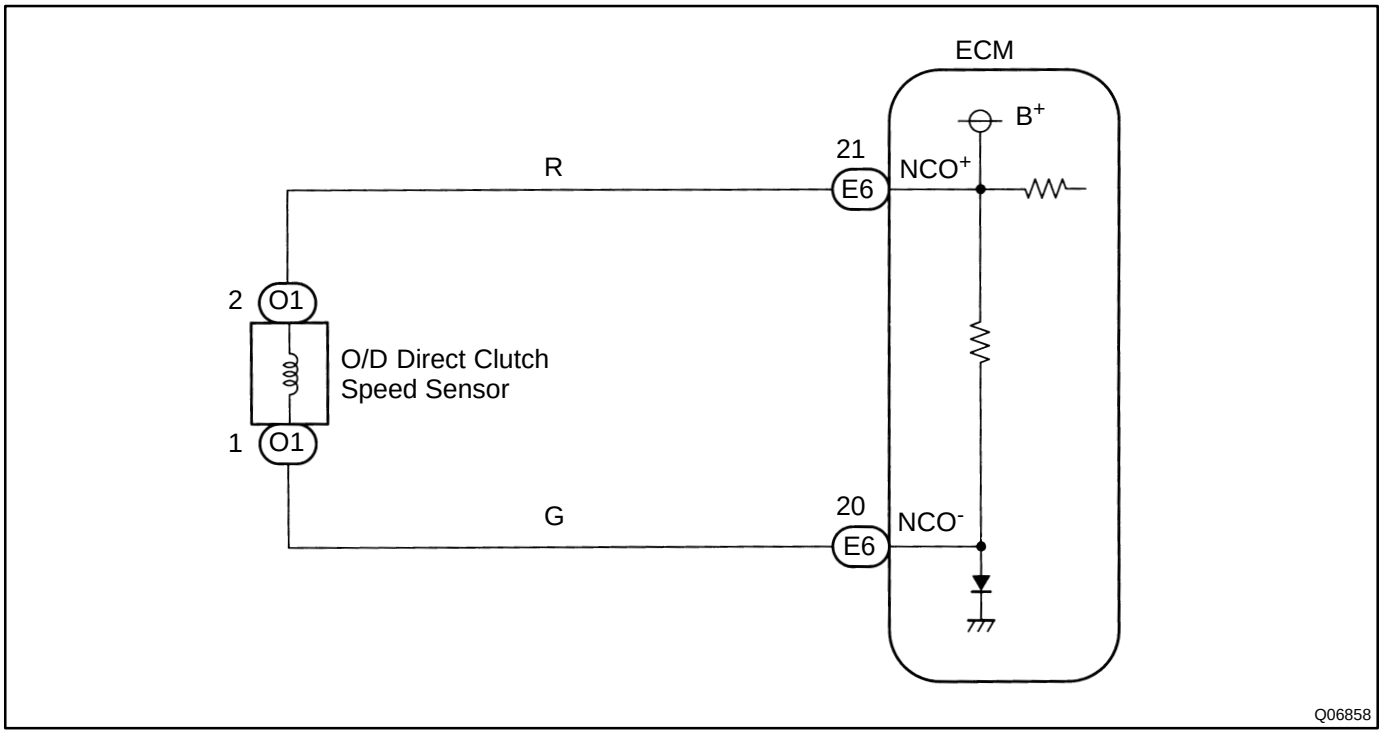
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

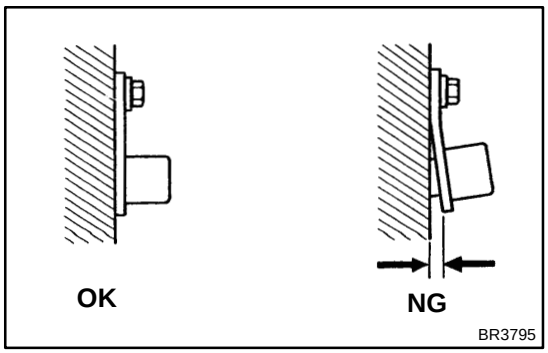
Parameter	Standard value
Speed sensor (NT)	Input speed is equal to engine speed when lock-up is ON.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check O/D direct clutch speed sensor (NCO) installation.**

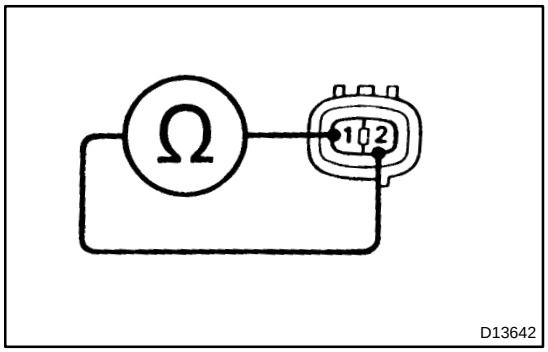


CHECK:
Check the speed sensor installation.
OK:
The installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG → **Tighten the speed sensor (NCO) properly.**

OK

2	**Check O/D direct clutch speed sensor (NCO) .**



PREPARATION:
Remove the speed sensor (NCO) from transaxle.
CHECK:
Measure resistance between terminals 1 and 2 of speed sensor.
OK:
Resistance: 620 ± 60 Ω at 20 ˚C (68 ˚F)

NG → **Replace the O/D direct clutch speed sensor (See page AT-8).**

OK

3	**Check harness and connector between ECM and O/D direct clutch speed sensor (See page IN-33).**

NG → **Repair or replace harness and connector.**

OK

Check and replace the ECM (See page IN-33).

DI25S-07

DTC	P0724	Brake Switch ”B” Circuit High

CIRCUIT DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling, while driving in lock-up condition, when brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signal to ECM. Then the ECM cancels operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detecting Condition	Trouble Area
P0724	The stop light switch does not turn off even once the vehicle is driven. (2-trip detection logic)	✓Short in stop light switch signal circuit ✓Stop light switch ✓ECM

MONITOR DESCRIPTION

When the stop light switch remains ON during ”stop and go” driving, the ECM interprets this as a fault in the stop light switch and the MIL comes on and the ECM stores the DTC. The vehicle must stop and go (3 km/h (2 mph) to 30 km/h (19 mph)) ten times for two driving cycles in order to detect malfunction.

MONITOR STRATEGY

Related DTCs	P0724	Stop light switch/Range check/Rationality
Required sensors/Components	Stop light switch, Vehicle speed sensor	
Frequency of operation	Continuous	
Duration	GO and STOP 10 times	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
The stop light switch remains on during GO and STOP 10 times. GO and STOP is defined as follows:		
GO: Vehicle speed	30 km/h (19 mph) or more	-
STOP: Vehicle speed	-	Less than 3 km/h (2 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Brake switch status	ON stuck

WIRING DIAGRAM

See page DI-821 .

INSPECTION PROCEDURE

1	Check stop light switch (See page BE-68).

NG → Replace stop light switch.

OK ↓

2	Check harness and connector between ECM and stop light switch (See page IN-33).

NG → Repair or replace harness or connector.

OK ↓

Check and replace ECM (See page IN-33).

DI25O-07

DTC	P0751	Shift Solenoid ”A” Performance (Shift Solenoid Valve S1)

DTC	P0756	Shift Solenoid ”B” Performance (Shift Solenoid Valve S2)

DTC	P0761	Shift Solenoid ”C” Performance (Shift Solenoid Valve S3)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor and input turbine speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear). The ECM then compares the actual gear with the shift schedule in the ECM memory to detect mechanical trouble of the shift solenoid valves, valve body and automatic transmission (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0751	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	●Shift solenoid valve No.1 is stuck open or closed ●Valve body is blocked up or stuck ●Automatic transmission (clutch, brake or gear etc.)
P0756		●Shift solenoid valve No.2 is stuck open or closed ●Valve body is blocked up or stuck ●Automatic transmission (clutch, brake or gear etc.)
P0756		●Shift solenoid valve No.3 is stuck open or closed ●Valve body is blocked up or stuck ●Automatic transmission (clutch, brake or gear etc.)

MONITOR DESCRIPTION

P0751, P0756

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th, 5th, or 6th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL.

P0761

The ECM commands transmission gearshifts by turning the shift-solenoid valve ”ON/OFF”. Using the signals from the Input Speed sensor (Input shaft speed) and the Output Speed sensor (Output shaft speed or Counter shaft speed), the ECM calculates the actual gear position (1st, 2nd, 3rd, 4th, 5th, or 6th gear position). When the gear position indicated by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

P0751

Related DTCs	P0751	Shift solenoid valve S1/Rationality check
		Shift solenoid valve S1/OFF malfunction
		Shift solenoid valve S1/ON malfunction
Required sensors/Components	Main	Shift solenoid valve S1
Required sensors/Components	Sub	ECT sensor, Vehicle speed sensor (NO), MAF meter, Throttle position sensor, Input speed sensor (NCO)
Frequency of operation	Continuous	
Duration	0.4 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

P0756

Related DTCs	P0756	Shift solenoid valve S2/OFF malfunction
		Shift solenoid valve S2/ON malfunction
Required sensors/Components	Main	Shift solenoid valve S2
Required sensors/Components	Sub	ECT sensor, Vehicle speed sensor (NO), MAF meter, Throttle position sensor, Input speed sensor (NCO)
Frequency of operation	Continuous	
Duration	OFF malfunction (A), (B), (C) and (D) 0.4 sec. OFF malfunction (E) and (F) 1.2 sec. ON malfunction (A), (B) and (C) 0.4 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

P0761

Related DTCs	P0761	Shift solenoid valve S3/OFF malfunction
		Shift solenoid valve S3/ON malfunction
Required sensors/Components	Main	Shift solenoid valve S3
Required sensors/Components	Sub	ECT sensor, Vehicle speed sensor (NO), MAF meter, Throttle position sensor, Input speed sensor (NCO)
Frequency of operation	Continuous	
Duration	0.4 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

P0751

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
The following items are common to all conditions below		
Transmission shift position	”D”	
Spark advance from Max. retard timing by KCS control	0˚ CA or more	-
ECT (Engine Coolant Temperature)	40˚C (104˚F) or more	-
Neutral start switch circuit Shift solenoid ”A” (S1) circuit Shift solenoid ”B” (S2) circuit Shift solenoid ”C” (S3) circuit Shift solenoid ”D” (S4) circuit ECT sensor circuit	There is no malfunction in the circuits shown on the left.	
OFF malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	8% or more and 6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
OFF malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Continuous time for ECM selecting 4th gear	2 sec. or more	-
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
ON malfunction (B)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-

P0756

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
The following items are common to all conditions below		
Transmission shift position	"D"	
ECT (Engine Coolant Temperature)	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Neutral Start Switch circuit Shift Solenoid "A" (S1) circuit Shift Solenoid "B" (S2) circuit Shift Solenoid "C" (S3) circuit Shift Solenoid "D" (S4) circuit ECT Sensor circuit	There is no malfunction in the circuits shown on the left.	
OFF malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
OFF malfunction (B)		
ECM selected gear	2nd	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Continuous time for ECM selecting 4th gear	2 sec. or more	-
OFF malfunction (D)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
OFF malfunction (E)		
Torque converter clutch pressure control solenoid circuit	There is no malfunction in the circuits shown on the left.	
ECM selected gear	4th or 5th	
Vehicle speed	25 km/h (16 mph) or more	Less than 100 km/h (62 mph)
Input speed/Output speed (NC0/NO)	0.93 or more	Less than 1.07
ECM lock-up command	ON (SLU pressure: 513 kPa or more)	
Throttle valve opening angle	10% or more	-
OFF malfunction (F)		
Torque converter clutch pressure control solenoid circuit	There is no malfunction in the circuits shown on the left.	
ECM selected gear	4th or 5th	
Vehicle speed	25 km/h (16 mph) or more	Less than 100 km/h (62 mph)

Input speed/Output speed (NC0/NO)	0.00 or more	Less than 0.20
ECM lock-up command	ON (SLU pressure: 513 kPa or more)	
Throttle valve opening angle	10% or more	-
ON malfunction (A)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
ON malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Continuous time for ECM selecting 4th gear	2 sec. or more	-
ON malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	

P0761

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
The following items are common to all conditions below		
Transmission shift position	”D”	
ECT (Engine Coolant Temperature)	40˚C (104˚F) or more	-
Spark advance from Max. retard timing by KCS control.	0˚ CA or more	-
Neutral start switch circuit Shift solenoid ”A” (S1) circuit Shift solenoid ”B” (S2) circuit Shift solenoid ”C” (S3) circuit Shift solenoid ”D” (S4) circuit ECT sensor circuit	There is no malfunction in the circuits shown on the left.	
OFF malfunction (A)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
OFF malfunction (B)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-

Continuous time for ECM selecting 4th gear	2 sec. or more	-
OFF malfunction (D)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction (A)		
ECM selected gear	5th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
ON malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Continuous time for ECM selecting 4th gear	2 sec. or more	-
ON malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	

TYPICAL MALFUNCTION THRESHOLDS

P0751

Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: OFF malfunction (A), (B) and (C)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
OFF malfunction (A)	
Input speed/Output speed (NC0/NO)	0.00 or more and 0.20 or less
OFF malfunction (B)	
Input speed/Output speed (NC0/NO)	0.00 or more and 0.20 or less
OFF malfunction (C)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
Both of the following conditions are met: ON malfunction (A) and (B)	
ON malfunction (A)	
Input speed/Output speed (NC0/NO)	3.14 or more and 7.34 or less
ON malfunction (B)	
Input speed/Output speed (NC0/NO)	3.14 or more and 7.34 or less

P0756

Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: OFF malfunction (A), (B), (C), (D), (E) and (F)	
OFF malfunction (A)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Input speed/Output speed (NC0/NO)	3.14 or more and 7.34 or less
OFF malfunction (B)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Input speed/Output speed (NC0/NO)	3.14 or more and 7.34 or less
OFF malfunction (C)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Input speed/Output speed (NC0/NO)	0.00 or more and 0.20 or less
OFF malfunction (D)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Output record from ECM for 4th → 5th upshifting	Recorded
OFF malfunction (E)	
|Engine speed - Input speed| (|NE - NC0|)	Less than 35 rpm
OFF malfunction (F)	
|Engine speed - Output speed x 5th gear ratio| (|NE - NO x 5th gear ratio|)	Less than 35 rpm
[ON malfunction]	
All of the following conditions are met: ON malfunction (A), (B), (C) and (D)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
ON malfunction (A)	
Input speed/Output speed (NC0/NO)	1.30 or more and 1.55 or less
ON malfunction (B)	
Input speed/Output speed (NC0/NO)	Not change as follows 0.93 or more and 1.07 or less ↓ 0.00 or more and 0.20 or less
ON malfunction (C)	
Output record from ECM for 4th → 5th upshifting	Recorded

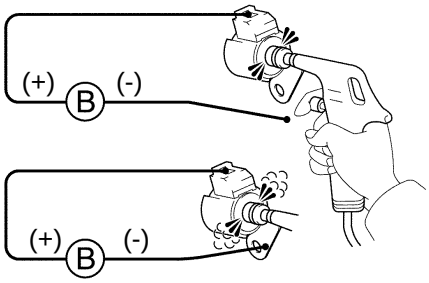
P0761

Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: OFF malfunction (A), (B), (C) and (D)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
OFF malfunction (A)	
Input speed/Output speed (NC0/NO)	0.00 or more and 0.20 or less
OFF malfunction (B)	
Input speed/Output speed (NC0/NO)	3.14 or more and 7.34 or less
OFF malfunction (C)	
Input speed/Output speed (NC0/NO)	Not change as follows 0.93 or more and 1.07 or less ↓ 0.00 or more and 0.20 or less
OFF malfunction (D)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
All of the following conditions are met: ON malfunction (A), (B) and (C)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
ON malfunction (A)	
Input speed/Output speed (NC0/NO)	0.93 or more and 1.07 or less
ON malfunction (B)	
Input speed/Output speed (NC0/NO)	Not change as follows 0.93 or more and 1.07 or less ↓ 0.00 or more and 0.20 or less
ON malfunction (C)	
Output record from ECM for 4th → 5th upshifting	Recorded

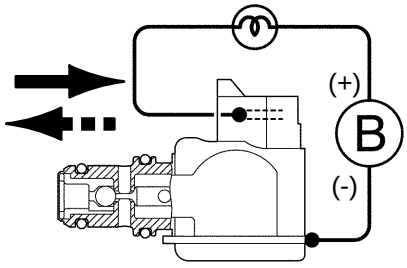
INSPECTION PROCEDURE

1	Check shift solenoid valve No. 1, No. 2 or No. 3 operation.

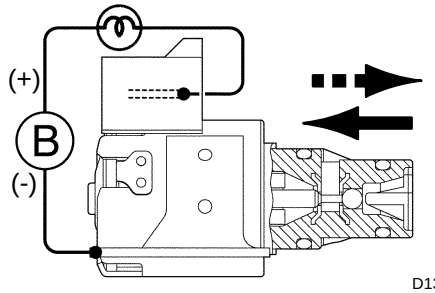
Shift Solenoid Valve No. 2



Shift Solenoid Valve No. 1



Shift Solenoid Valve No. 3



PREPARATION:

(a) Remove the oil pan.

(b) Remove the shift solenoid valve No. 1, No. 2 or No. 3 (See page AT-13).

CHECK:

Shift solenoid valve No. 2:

(a) Applying 490 kPa (5 kgf/cm^2, 71 psi) of compressed air, check that the solenoid valves do not leak air.

(b) When battery voltage is supplied to the shift solenoid valves, check that the solenoid valves are open.

Shift solenoid valve No. 1 and No. 3:

Connect the positive (+) lead with 8 to 10 W bulb to terminal 2 and the negative (-) lead to terminal 1, then check the movement of the valve.

OK:

When B^+ is applied.	Valve moves in ← direction in illustration on the left.
When B^+ is cut off.	Valve moves in ■■■→ direction in illustration on the left.

NG → **Replace the shift solenoid valve No. 1, No. 2 or No. 3 (See page AT-13).**

OK

2	Check valve body (See page DI-356).

NG → Repair or replace the valve body (See page AT-13).

OK →

Replace the transmission (See page AT-31).

DI25P-05

DTC	P0973	Shift Solenoid ”A” Control Circuit Low (Shift Solenoid Valve S1)

DTC	P0974	Shift Solenoid ”A” Control Circuit High (Shift Solenoid Valve S1)

DTC	P0976	Shift Solenoid ”B” Control Circuit Low (Shift Solenoid Valve S2)

DTC	P0977	Shift Solenoid ”B” Control Circuit High (Shift Solenoid Valve S2)

DTC	P0979	Shift Solenoid ”C” Control Circuit Low (Shift Solenoid Valve S3)

DTC	P0980	Shift Solenoid ”C” Control Circuit High (Shift Solenoid Valve S3)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ON and OFF of the shift solenoid valves No. 1, No. 2 and No. 3 controlled by ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

HINT:

Check the shift solenoid valve No. 1 when DTCs P0973 and P0974 are output, check the shift solenoid valve No. 2 when DTCs P0976 and P0977 are output and check the shift solenoid valve No. 3 when DTCs P0979 and P0980 are output.

DTC No.	DTC Detection Condition	Trouble Area
P0973	ECM detects short in solenoid valve No. 1 circuit 2 times when solenoid valve No. 1 is operated (1-trip detection logic)	・Short in shift solenoid valve No. 1 circuit ・Shift solenoid valve No. 1 ・ECM
P0974	ECM detects open in solenoid valve No. 1 circuit 2 times when solenoid valve No. 1 is not operated (1-trip detection logic)	・Open in shift solenoid valve No. 1 circuit ・Shift solenoid valve No. 1 ・ECM
P0976	ECM detects short in solenoid valve No. 2 circuit 2 times when solenoid valve No. 2 is operated (1-trip detection logic)	・Short in shift solenoid valve No. 2 circuit ・Shift solenoid valve No. 2 ・ECM
P0977	ECM detects open in solenoid valve No. 2 circuit 2 times when solenoid valve No. 2 is not operated (1-trip detection logic)	・Open in shift solenoid valve No. 2 circuit ・Shift solenoid valve No. 2 ・ECM
P0979	ECM detects short in solenoid valve No. 3 circuit 2 times when solenoid valve No. 3 is operated (1-trip detection logic)	・Short in shift solenoid valve No. 3 circuit ・Shift solenoid valve No. 3 ・ECM
P0980	ECM detects open in solenoid valve No. 3 circuit 2 times when solenoid valve No. 3 is not operated (1-trip detection logic)	・Open in shift solenoid valve No. 3 circuit ・Shift solenoid valve No. 3 ・ECM

Fail Safe Function:
If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid ON and OFF to shift to the gear positions shown in the table below. The ECM also turns the shift solenoid valve SL OFF at the same time. If both solenoids are malfunctioning, hydraulic control cannot be performed electronically and must be done manually.
Manual shifting as shown in the following table must be done (In the case of a short circuit, the ECM stops sending current to the short circuited solenoid).

Position	Normal				Shift Solenoid No. 1 Malfunction				Shift Solenoid No. 2 Malfunction				Shift Solenoid No. 3 Malfunction			
	Shift Solenoid			Gear	Shift Solenoid			Gear	Shift Solenoid			Gear	Shift Solenoid			Gear
	No. 1	No. 2	No. 3		No. 1	No. 2	No. 3		No. 1	No. 2	No. 3		No. 1	No. 2	No. 3	
D	ON	OFF	OFF	1	X	OFF→ON	OFF	5→3	ON	X	OFF	1	ON	OFF	X	1
	OFF	ON	OFF	3	X	ON	OFF	3	OFF	X	OFF→ON	5→4	OFF	ON	X	3
	OFF	OFF	ON	4	X	OFF	ON	4	OFF	X	ON	4	OFF	OFF	X	5
	OFF	OFF	OFF	5	X	OFF	OFF	5	OFF	X	OFF	5	OFF	OFF	X	5
4	ON	OFF	OFF	1	X	OFF→ON	OFF	5→3	ON	X	OFF	1	ON	OFF	X	1
	OFF	ON	OFF	3	X	ON	OFF	3	OFF	X	OFF→ON	5→4	OFF	ON	X	3
	OFF	OFF	ON	4	X	OFF	ON	4	OFF	X	ON	4	OFF	OFF	X	5
3	ON	OFF	OFF	1	X	OFF→ON	OFF→ON	4→3	ON	X	OFF	1	ON	OFF	X	1
	OFF	ON	ON	3	X	ON	ON	3	OFF	X	ON	4	OFF	ON	X	3
	OFF	OFF	ON	4	X	OFF	ON	4	OFF	X	ON	4	OFF	OFF	X	4
2	ON	OFF	ON	1	X	OFF→ON	ON	3	ON	X	ON	1	ON	OFF	X	1
	OFF	ON	ON	3	X	ON	ON	3	OFF	X	ON	3	OFF	ON	X	3
L	ON	OFF	OFF	1	X	OFF→ON	OFF→ON	3	ON	X	OFF	1	ON	OFF	X	1

Position	Shift Solenoid No. 1 and No. 2 Malfunction				Shift Solenoid No. 1 and No. 3 Malfunction				Shift Solenoid No. 2 and No. 3 Malfunction				Shift Solenoid No. 1, No. 2 and No. 3 Malfunction			
	Shift Solenoid			Gear	Shift Solenoid			Gear	Shift Solenoid			Gear	Shift Solenoid			Gear
	No. 1	No. 2	No. 3		No. 1	No. 2	No. 3		No. 1	No. 2	No. 3		No. 1	No. 2	No. 3	
D	X	X	OFF→ON	5→4	X	OFF→ON	X	5→3	ON	X	X	1	X	X	X	5
	X	X	OFF→ON	5→4	X	ON	X	3	OFF	X	X	5	X	X	X	5
	X	X	ON	4	X	OFF	X	5	OFF	X	X	5	X	X	X	5
	X	X	OFF	5	X	OFF	X	5	OFF	X	X	5	X	X	X	5
4	X	X	OFF→ON	5→4	X	OFF→ON	X	5→3	ON	X	X	1	X	X	X	5
	X	X	OFF→ON	5→4	X	ON	X	3	OFF	X	X	5	X	X	X	5
	X	X	ON	4	X	OFF	X	5	OFF	X	X	5	X	X	X	5
3	X	X	OFF→ON	4	X	OFF→ON	X	4 → 3	ON	X	X	1	X	X	X	4
	X	X	ON	4	X	ON	X	3	OFF	X	X	4	X	X	X	4
	X	X	ON	4	X	OFF	X	4	OFF	X	X	4	X	X	X	4
2	X	X	OFF→ON	3	X	OFF→ON	X	3	ON	X	X	1	X	X	X	3
	X	X	ON	3	X	ON	X	3	OFF	X	X	3	X	X	X	3
L	X	X	OFF→ON	3	X	OFF→ON	X	3	ON	X	X	1	X	X	X	3

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves ”ON/OFF.”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF.” (In case of an open or short circuit, the ECM stops sending current to the circuit.)

MONITOR STRATEGY

Related DTCs	P0973	Shift solenoid valve S1/Range check (Low resistance)
	P0974	Shift solenoid valve S1/Range check (High resistance)
	P0976	Shift solenoid valve S2/Range check (Low resistance)
	P0977	Shift solenoid valve S2/Range check (High resistance)
	P0979	Shift solenoid valve S3/Range check (Low resistance)
	P0980	Shift solenoid valve S3/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S1 (P0973/P0974), Shift solenoid valve S2 (P0976/P0977), Shift solenoid valve S3 (P0979/P0980)	
Frequency of operation	Continuous	
Duration	0.1 sec. x 2 (times) or more	
MIL operation	1 driving cycle	
Sequence of operation	None	

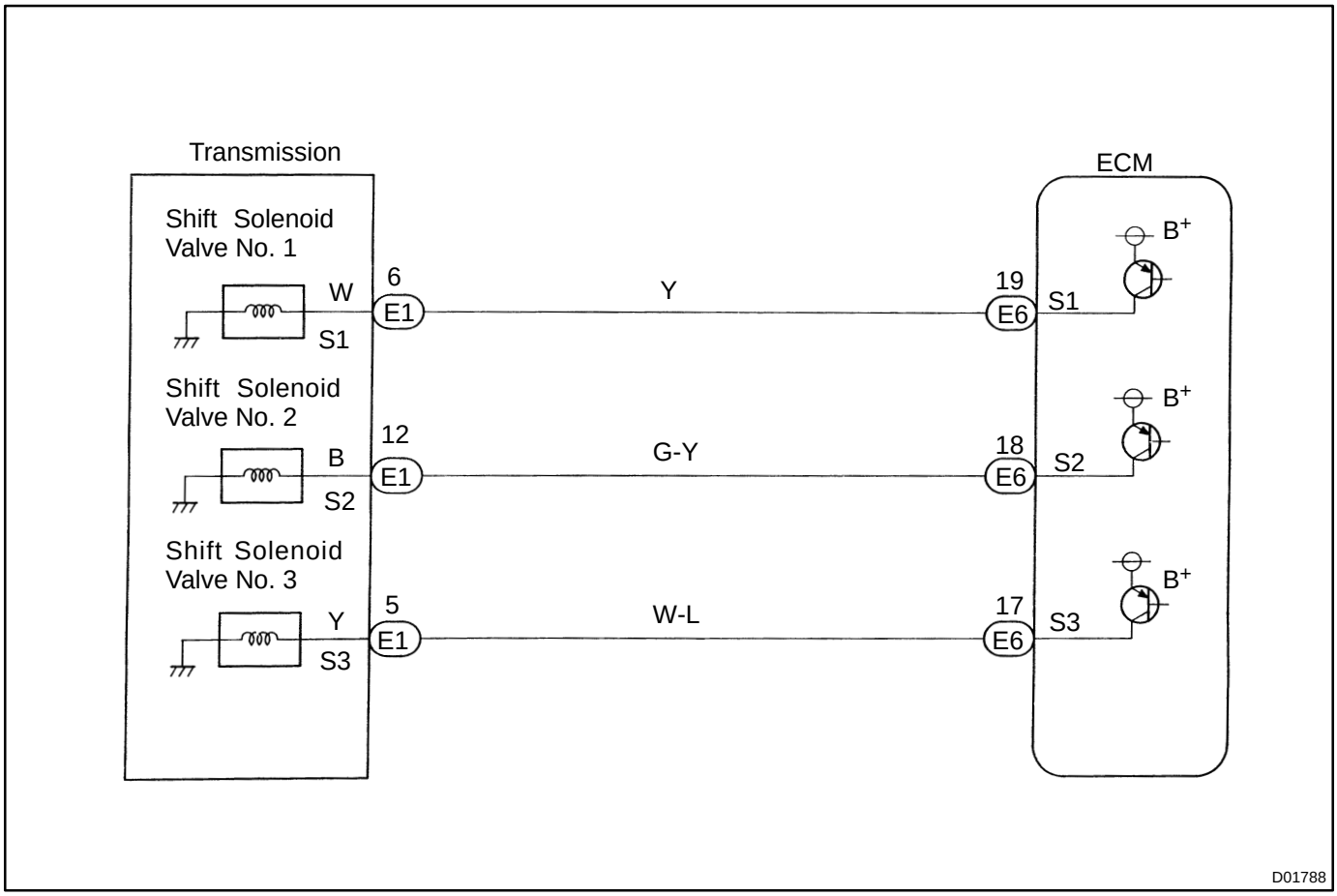
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Range check (Low resistance)		
Solenoid	ON	
Range check (High resistance)		
Solenoid	OFF	

TYPICAL MALFUNCTION THRESHOLDS

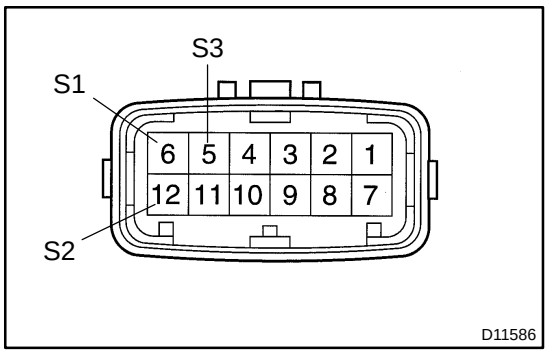
Detection criteria	Threshold
Range check (Low resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is operating	Fail at solenoid resistance: 8 Ω or less
Range check (High resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is not operating	Fail at solenoid resistance: 100 kΩ or more

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

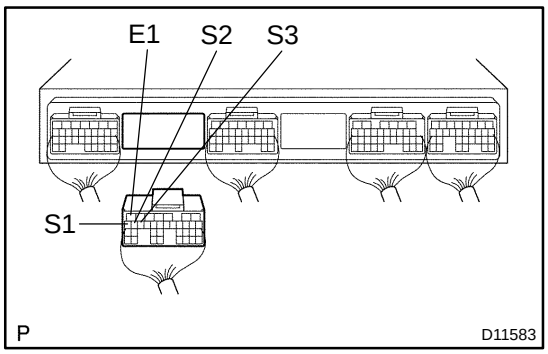


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between S1, S2 or S 3 of transmission wire and body ground.
OK:
Resistance: 11 to 15 Ω at 20 ˚C (68 ˚F)

NG → **Go to step 3.**

OK

2	Measure resistance between terminal S1, S2 or S 3 of ECM and body ground.



PREPARATION:
(a) Connect the transmission wire connector.
(b) Remove the ECM hood.
(c) Disconnect the connector from ECM.
CHECK:
Measure resistance between terminal S1, S2 or S 3 and E1 of ECM.
OK:
Resistance: 11 to 15 Ω at 20 ˚C (68 ˚F)

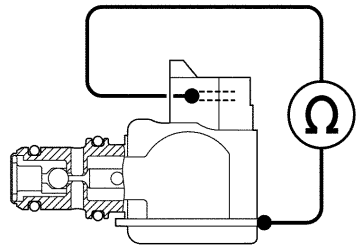
OK → **Check and replace the ECM (See page IN-33).**

NG

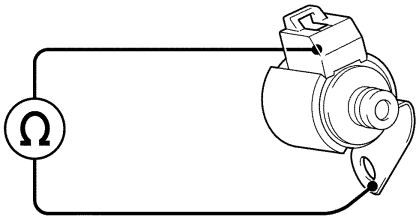
Repair or replace the harness or connector (See page IN-33).

3	Check shift solenoid valve No. 1, No. 2 or No. 3.

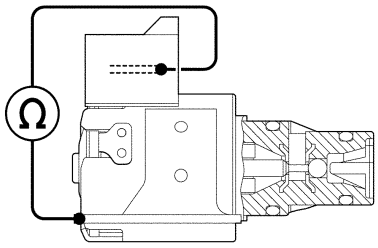
Shift Solenoid Valve No. 1



Shift Solenoid Valve No. 2



Shift Solenoid Valve No. 3



D01882
D01890
D01884

D02236

PREPARATION:

Remove the shift solenoid valve No. 1, No. 2 or No. 3 (See page AT-13).

CHECK:

(a) Measure resistance between solenoid connector and body ground.

(b) Connect positive ± lead to terminal of solenoid connector, negative ⊖ lead to solenoid body.

OK:

(a) Resistance: 11 to 15 Ω at 20 ˚C (68 ˚F)

(b) The solenoid makes an operating noise.

NG → **Replace the shift solenoid valve (See page AT-13).**

OK

Repair or replace the transmission wire (See page AT-9).

DI25Q-05

DTC	P0982	Shift Solenoid ”D” Control Circuit Low (Shift Solenoid Valve S4)

DTC	P0983	Shift Solenoid ”D” Control Circuit High (Shift Solenoid Valve S4)

CIRCUIT DESCRIPTION

Shift solenoid valve No. 4 is controlled by ECM and it switches ON and OFF of the O/D direct switch.

DTC No.	DTC Detection Condition	Trouble Area
P0982	ECM detects short in solenoid valve S4 circuit 2 times when solenoid valve SR is operated (1-trip detection logic)	∕ Short in shift solenoid valve S4 circuit ∕ Shift solenoid valve S4 ∕ ECM
P0983	ECM detects open in solenoid valve S4 circuit 2 times when solenoid valve SR is not operated (1-trip detection logic)	∕ Open in shift solenoid valve S4 circuit ∕ Shift solenoid valve S4 ∕ ECM

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.).

MONITOR STRATEGY

Related DTCs	P0982	Shift solenoid valve S4/Range check (Low resistance)
	P0983	Shift solenoid valve S4/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S4	
Frequency of operation	Continuous	
Duration	0.1 sec x 2 (times) or more	
MIL operation	1 driving cycle	
Sequence of operation	None	

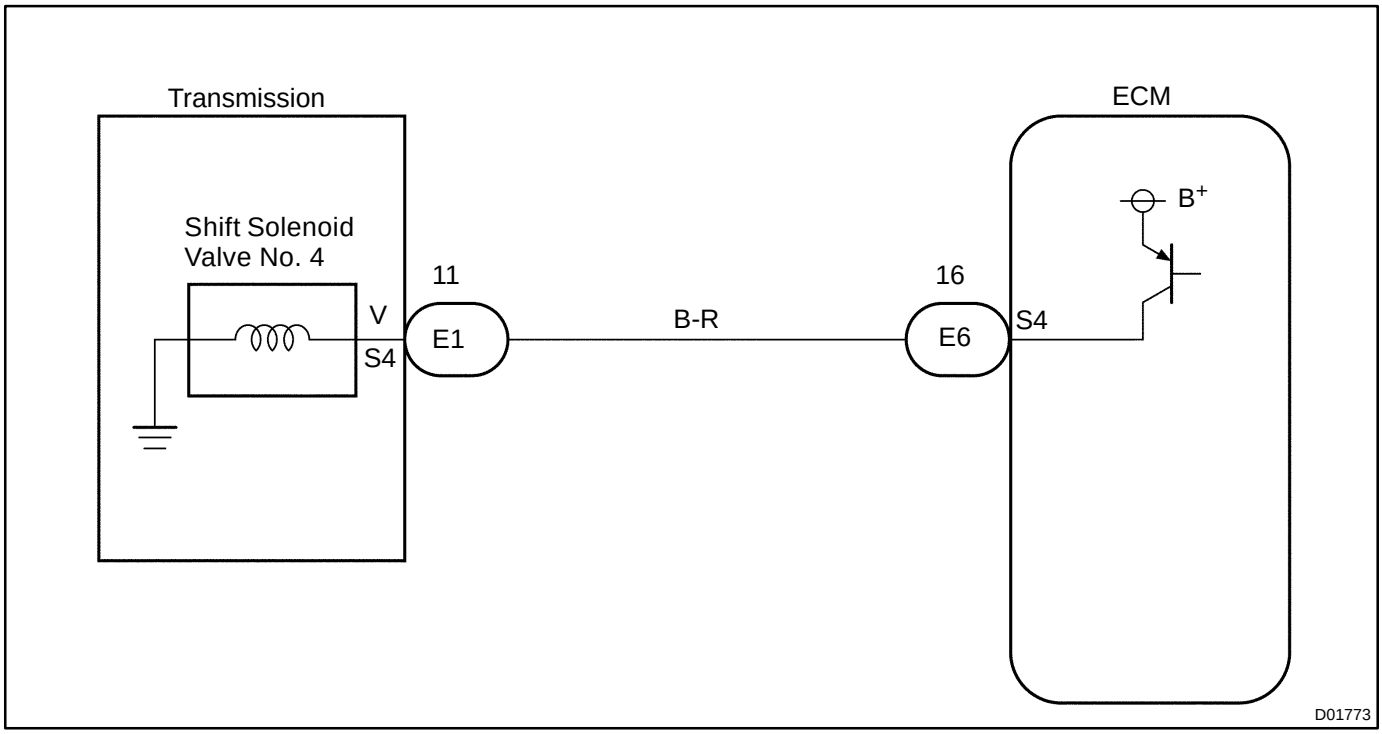
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Low resistance		
Solenoid	ON	
High resistance		
Solenoid	OFF	

TYPICAL MALFUNCTION THRESHOLDS

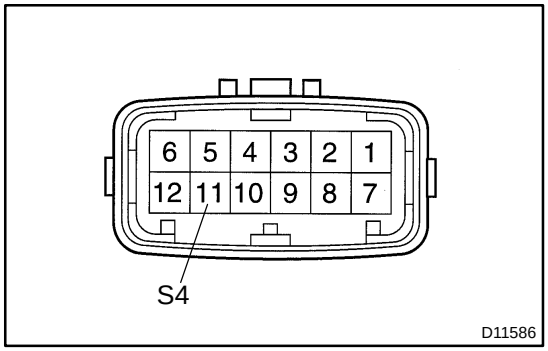
Detection criteria	Threshold
Range check (Low resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is operating.	Fail at solenoid resistance: 8 Ω or less
Range check (High resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is not operating.	Fail at solenoid resistance: 100 kΩ or more

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

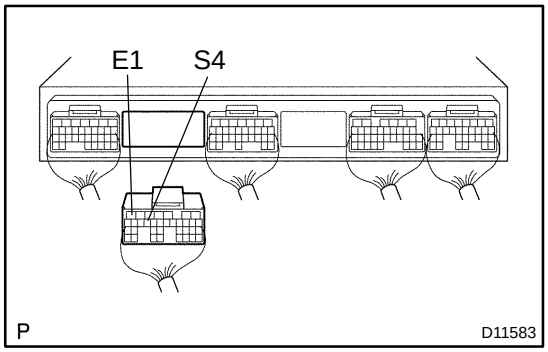


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between S4 of transmission wire and body ground.
OK:
Resistance: 11 to 15 Ω at 20 ˚C (68 ˚F)

NG	Go to step 3.

OK

2	Measure resistance between terminals S4 of ECM and body ground.



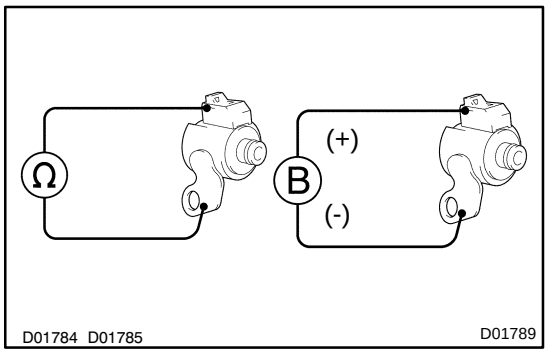
PREPARATION:
(a) Connect the transmission wire connector.
(b) Remove the ECM hood.
(c) Disconnect the connector from ECM.
CHECK:
Measure resistance between terminals S4 and E1 of ECM.
OK:
Resistance: 11 to 15 Ω at 20 ˚C (68 ˚F)

NG	Repair or replace the harness or connector (See page IN-33).

OK

Check and replace the ECM (See page IN-33).

3	Check shift solenoid valve No. 4.



PREPARATION:

Remove the shift solenoid valve No. 4 (See page AT-13).

CHECK:

(a) Measure resistance between terminal and solenoid body.

(b) Connect positive (+) lead to terminal of solenoid connector and negative (-) lead to solenoid body.

OK:

(a) Resistance: 11 to 15 Ω at 20 ˚C (68 ˚F)

(b) The solenoid makes an operating noise.

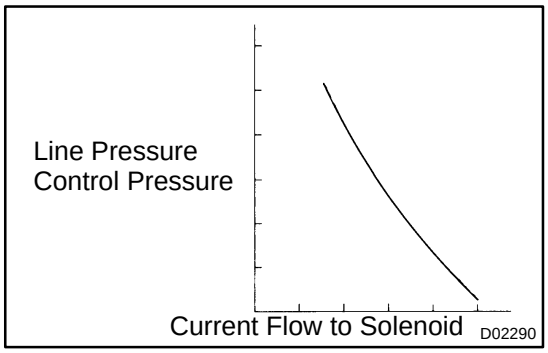
NG → **Replace the shift solenoid valve No. 4 (See page AT-13).**

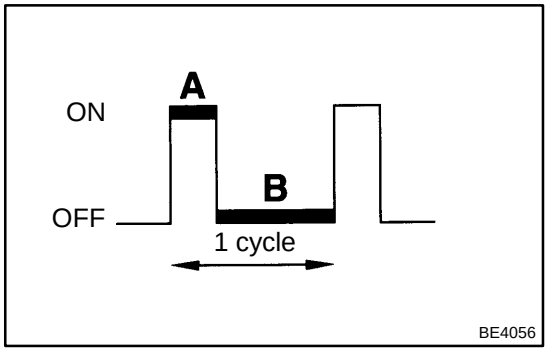
OK

Repair or replace the transmission wire (See page AT-9).

DI9IZ-03

DTC	P2716	Pressure Control Solenoid ”D” Electrical (Shift Solenoid Valve SLT)





CIRCUIT DESCRIPTION

The throttle pressure that is applied to the primary regulator valve (which modulates line pressure) causes the solenoid valve SLT, under electronic control, to precisely and minutely modulate and generate line pressure according to the accelerator pedal effort, or engine power output detected.

This controls the line pressure and provides smooth shifting characteristics.

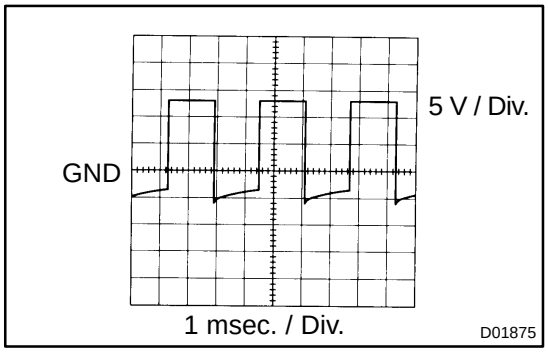
Upon receiving the throttle valve opening angle signal, ECM controls the line pressure by sending a predetermined (*) duty ratio to the solenoid valve, modulating the line pressure, and generating throttle pressure.

(*) Duty Ratio:

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then

$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

DTC No.	DTC Detection Condition	Trouble Area
P2716	ECM detects solenoid SLT circuit malfunction for 1 sec. or more (1-trip detection logic)	✓Open or short in shift solenoid valve SLT circuit ✓Shift solenoid valve SLT ✓ECM



Reference:

Refer to the chart for the waveform between terminals SLT^+ and SLT^- during engine idling.

MONITOR DESCRIPTION

When an open or short in the linear solenoid valve (SLT) circuit is detected, the ECM interprets this as a fault. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2716	Shift solenoid valve SLT/Range check
Required sensors/Components	Shift solenoid valve SLT	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Solenoid current cut status	Not cut	
Battery voltage	11 V or more	-
Target current	0.1 A or more	-

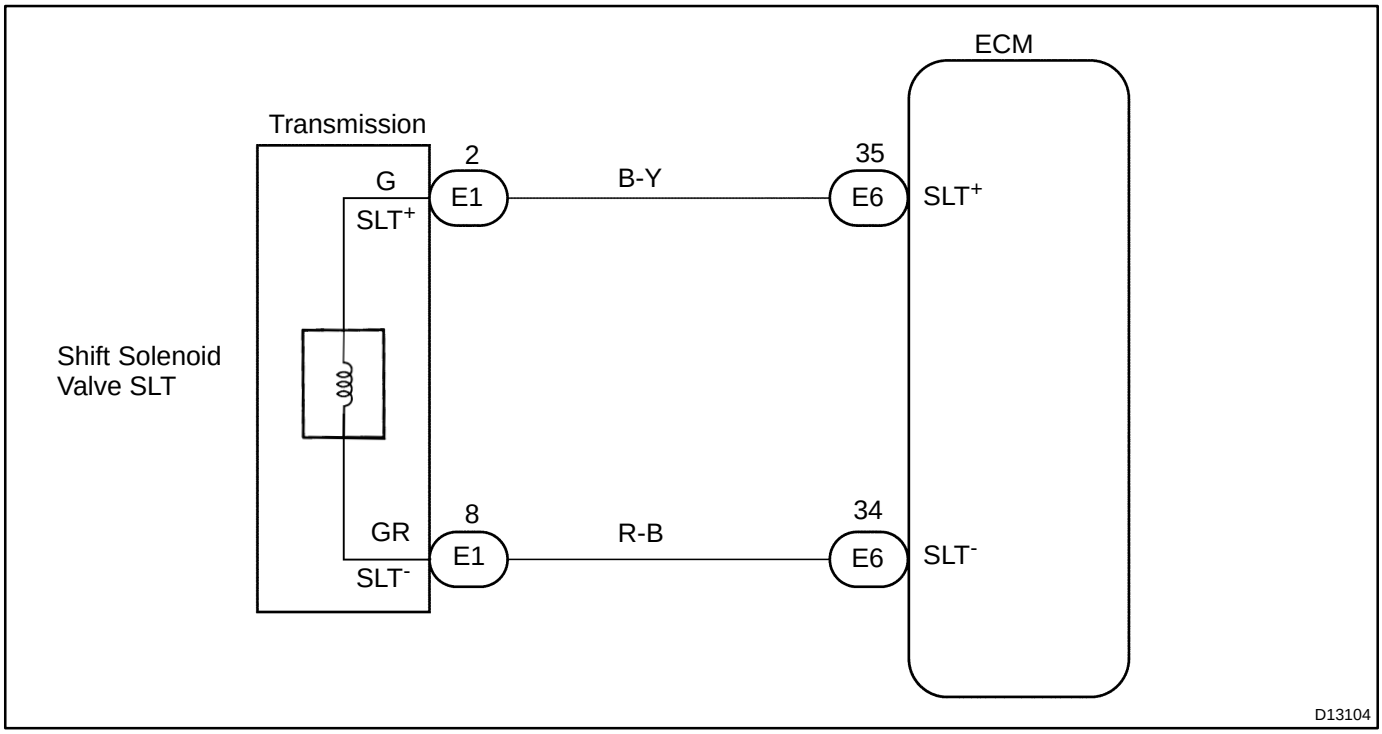
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

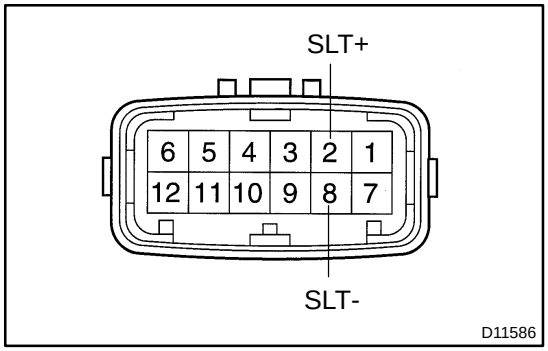
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

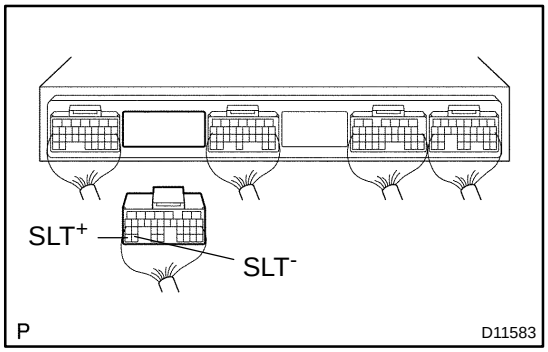


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between SLT+ and SLT- of transmission wire.
OK:
Resistance: 5.0 to 5.6 Ω at 20 ˚C (68˚F)
CHECK:
Measure resistance between terminals SLT^+ and SLT^- of the transmission wire connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG	Go to step 3.

OK

2	Measure resistance between terminals SLT^+ and SLT^- of ECM connector.



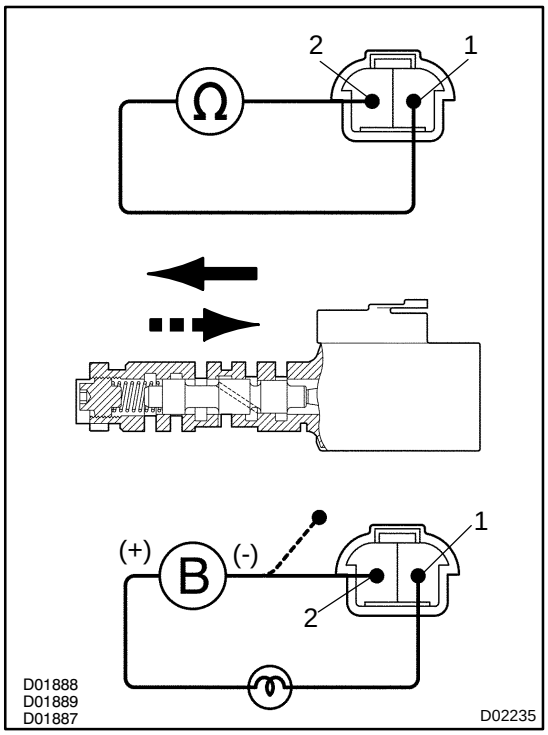
PREPARATION:
(a) Connect the transmission wire connector.
(b) Remove the ECM hood.
(c) Disconnect the connector of the ECM.
CHECK:
Measure resistance between terminals SLT^+ and SLT^- of ECM connector.
OK:
Resistance: 5.0 to 5.6 Ω at 20 ˚C (68˚F)
Measure resistance between terminals SLT^+ and SLT^- of the ECM connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG	Repair or replace the harness or connector (See page IN-33).

OK

Check and replace the ECM (See page IN-33).

3	Check shift solenoid valve SLT.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Disconnect the solenoid connector.

Check solenoid resistance:

CHECK:

Measure resistance between terminals 1 and 2 of solenoid connector.

OK:

Resistance: 5.0 to 5.6 Ω at 20 ˚C (68˚F)

Check solenoid operation:

CHECK:

Connect positive (+) lead with an 8 to 10 W bulb to terminal 1 of solenoid connector and negative (-) lead to terminal 2, then check the movement of the valve.

OK:

When battery positive voltage is applied.	Valve moves in ◄ direction in the illustration on the left.
When battery positive voltage is cut off.	Valve moves in ■■► direction in the illustration on the left.

NG → **Replace the shift solenoid valve SLT (See page AT-13).**

OK →

Repair or replace the transmission wire (See page AT-9).

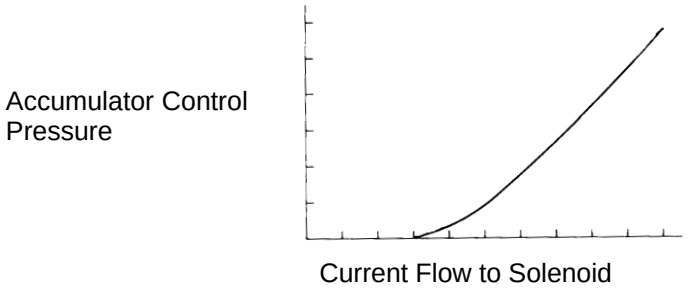
DI9J0-03

DTC	P2725	Pressure Control Solenoid ”E” Electrical (Shift Solenoid Valve SLN)

CIRCUIT DESCRIPTION

The shift solenoid valve SLN controls the hydraulic pressure acting on the accumulator control valve when gears are shifted and performs smooth gear shifting. The ECM determines optimum operating pressure according to the signals from the throttle position sensor, vehicle speed sensor and direct clutch speed sensor and controls the volume of current flow to the solenoid valve. The amount of current to the solenoid is controlled by the (*) duty ratio of ECM output signals, causing a momentary charge to the hydraulic pressure acting on the clutches during gear shifting .

When the duty ratio is high, the hydraulic pressure acting on the clutches is low.

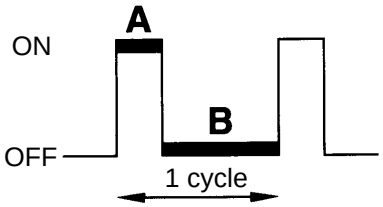


D02291

(*) Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle.

For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then

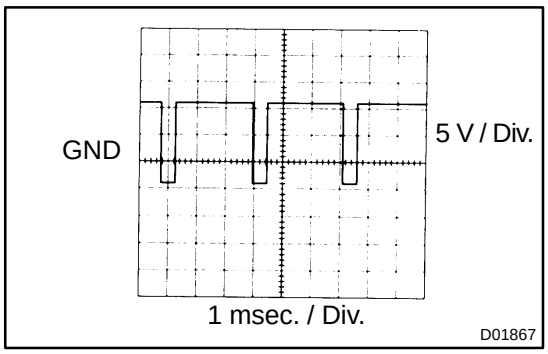


$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

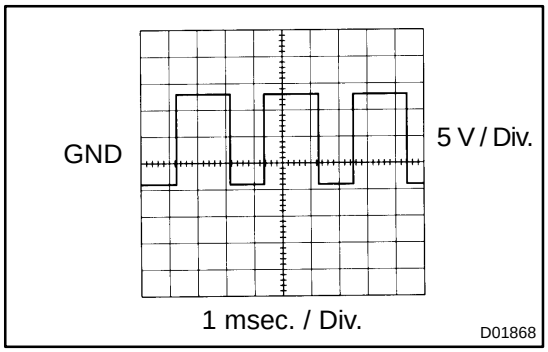
BE4056

D02292

DTC No	DTC Detecting Condition	Trouble Area
P2725	ECM detects solenoid valve SLU circuit malfunction for 1 sec. or more	✓Open or short in shift solenoid valve SLN circuit ✓Shift solenoid valve SLN ✓ECM



Reference:
Refer to the chart for the waveform between terminals SLN- and E1 when engine is idling.



Refer to the chart for the waveform between terminals SLN- and E1 during shift change.

MONITOR DESCRIPTION

The shift solenoid valve SLN controls the oil pressure to the accumulator control valve to reduce transmission gearshift shock.
The ECM judges the appropriate oil pressure based on the signals from the throttle position sensor, the output speed sensor and the input speed sensor, and adjusts the oil pressure by sending a duty-ratio signal to the shift solenoid valve SLN.
The ECM illuminates the MIL and stores the DTC when it detects an open or a short circuit malfunction in the shift solenoid valve SLN.

MONITOR STRATEGY

Related DTCs	P2725	Shift solenoid valve SLN/Range check
Required sensors/Components	Shift solenoid valve SLN	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Solenoid current cut status	Not cut	
Battery voltage	11 V or more	-
Target current	0.1 A or more	-

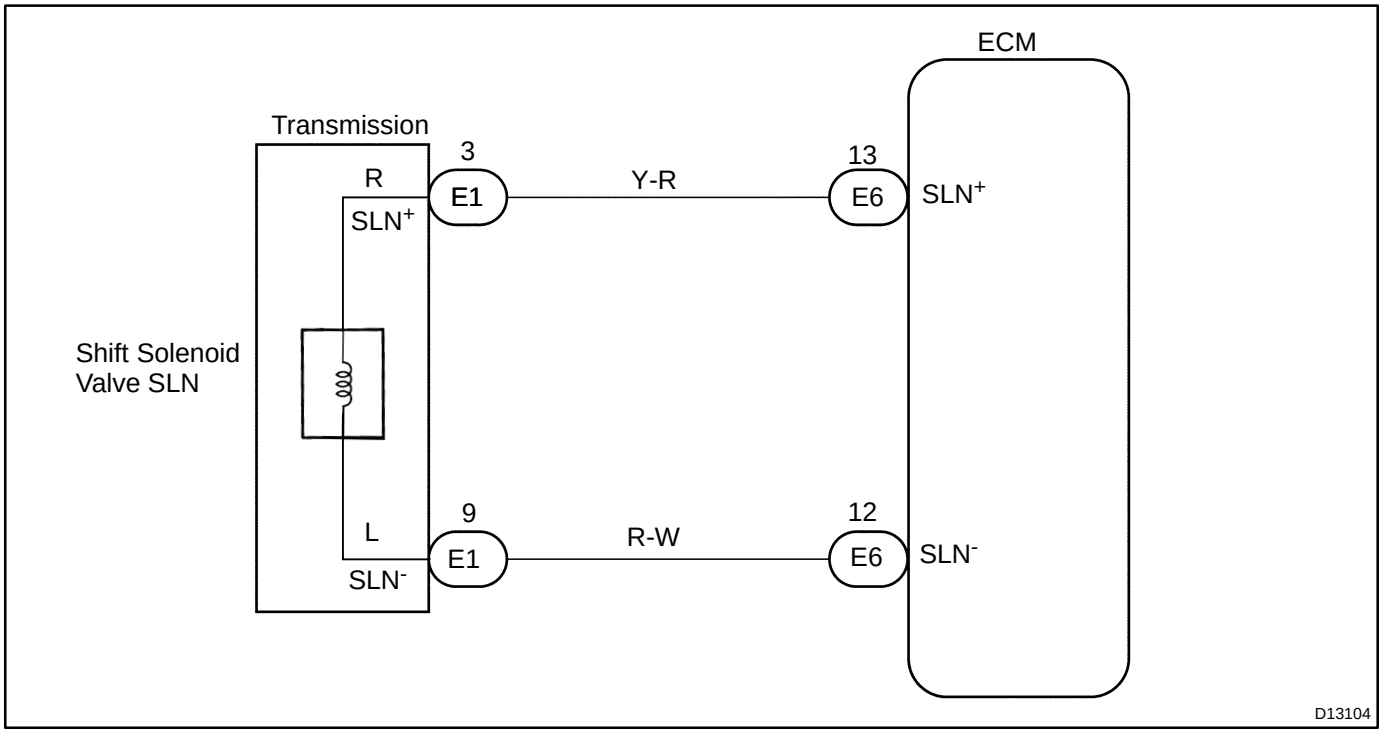
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

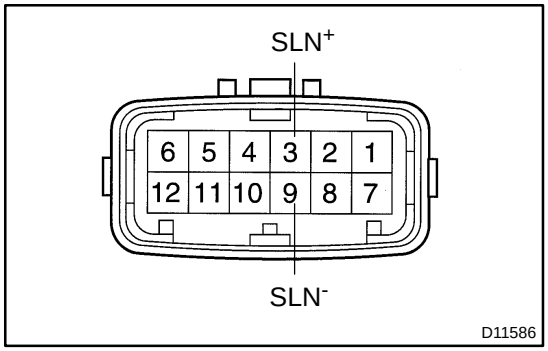
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

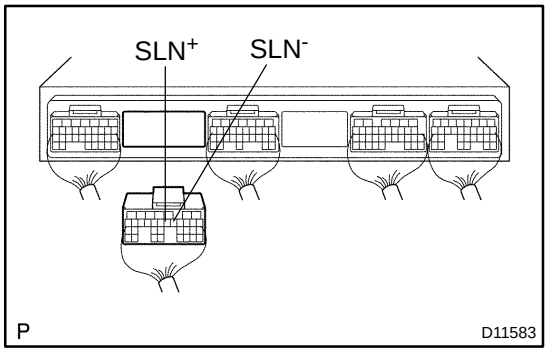


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between SLN+ and SLN- of transmission wire.
OK:
Resistance: 5.0 to 5.6 Ω at 20 ˚C (68˚F)
CHECK:
Measure resistance between terminals SLN^+ and SLN^- of the transmission wire connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG → **Go to step 3.**

OK

2	Measure resistance between terminals SLN^+ and SLN^- of ECM connector.



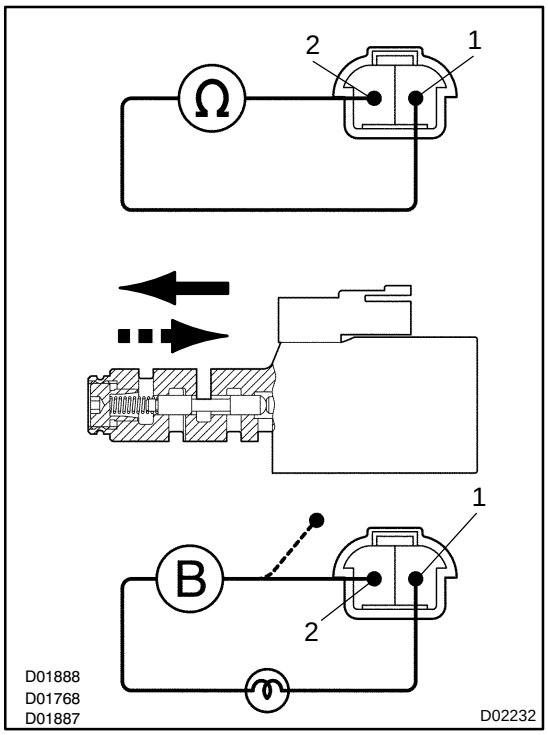
PREPARATION:
(a) Connect the transmission wire connector.
(b) Remove the ECM hood.
(c) Disconnect the connector of the ECM.
CHECK:
Measure resistance between terminals SLN^+ and SLN^- of ECM connector.
OK:
Resistance: 5.0 to 5.6 Ω at 20 ˚C (68˚F)
CHECK:
Measure resistance between terminals SLN^+ and SLN^- of the ECM connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG → **Repair or replace the harness or connector (See page IN-33).**

OK

Check and replace the ECM (See page IN-33).

3	Check shift solenoid valve SLN.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Disconnect the solenoid connector.

Check solenoid resistance:

CHECK:

Measure resistance between terminals 1 and 2 of solenoid connector.

OK:

Resistance: 5.0 to 5.6 Ω at 20 ˚C (68 ˚F)

Check solenoid operation:

CHECK:

Connect positive (+) lead with an 8 to 10 W bulb to terminal 1 of solenoid connector and negative (-) lead to terminal 2, then check the movement of the valve.

OK:

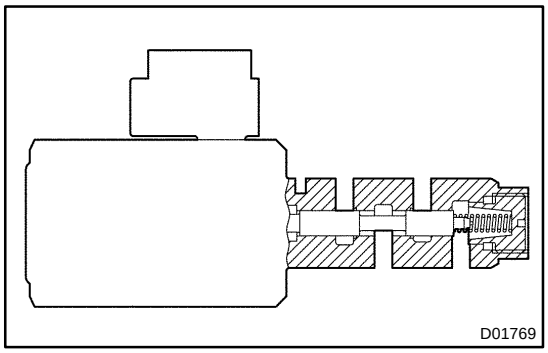
When battery positive voltage is applied.	Valve moves in ◄ direction in the illustration on the left.
When battery positive voltage is cut off.	Valve moves in ■■► direction in the illustration on the left.

NG → **Replace the shift solenoid valve SLN (See page AT-13).**

OK →

Repair or replace the transmission wire (See page AT-9).

DTC	P2757	Torque Converter Clutch Pressure Control Solenoid Performance(Shift Solenoid Valve SLU)



SYSTEM DESCRIPTION

The ECM uses the signals from the Throttle Position Sensor and Air-flow Meter to monitor the engagement condition of the lock-up clutch.

Then the ECM compares the engagement condition of the lock-up clutch with the lock-up schedule in the ECM memory to detect mechanical trouble of the shift solenoid valve SLU, valve body, torque converter clutch and automatic transmission assembly (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P2757	Lock-up does not occur when driving in the lock-up range (normal driving at 80 km/h [50 mph]), or lock-up remains ON in the lock-up OFF range. (2-trip detection logic)	✓Shift solenoid valve SLU is stuck open or closed ✓Valve body blocked up or stuck ✓Lock-up clutch ✓Automatic transmission assembly

MONITOR DESCRIPTION

The ECM controls the oil pressure to the lock-up clutch based on engine-load information from the throttle position sensor, crankshaft position sensor, input speed sensor, and the oil pressure sensor for shift-solenoid SLU. The ECM commands the shift-solenoid SLU using a duty-cycle control signal. In turn, the shift solenoid operates the lock-up control valve and causes lock-up or flexible lock-up of the torque converter clutch.

To monitor the condition of the lock up clutch, the ECM monitors the signals from the input speed sensor, crank position sensor, the throttle position sensor, and air flow meter. The ECM uses this information to determine when the vehicle's torque converter clutch should be locked-up. The ECM can detect many mechanical problems in the shift solenoids, valve body, and the transmission clutches, brakes, and gears. If the ECM detects that the torque converter clutch locked below the minimum lock-up speed, it will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2757	Shift solenoid valve SLU/OFF malfunction
		Shift solenoid valve SLU/OFF malfunction
Require sensors/Components	Main	Shift solenoid valve SLU, valve body
Require sensors/Components	Sub	ECT sensor, MAF meter, Vehicle speed sensor (NO), Throttle position sensor, Input speed sensor (NCO)
Frequency of operation	Continuous	
Duration	OFF malfunction (A)	2 sec.
	OFF malfunction (B)	0.5 sec.
	ON malfunction	1.8 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following items are common to all conditions below:		
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Transmission shift position	”D”	
ECT (Engine coolant temperature)	40˚C or more	-
Spark advance from Max. retard timing by KCS control	0˚ CA or more	-
Neutral Start Switch circuit	There is no malfunction in the circuit shown on the left.	
Shift Solenoid ”A” (S1) circuit		
Shift Solenoid ”B” (S2) circuit		
Shift Solenoid ”C” (S3) circuit		
Shift Solenoid ”D” (S4) circuit		
ECT Sensor circuit		
Torque Converter Clutch Pressure Control Solenoid circuit		
ECM selected gear	4th or 5th	
Vehicle speed	25 km/h (16 mph) or more	-
OFF malfunction (A)		
ECM lock-up command	ON (SLU duty: 90% or more)	
Intake air amount per revolution	0.4 g/rev or more (A/C OFF) 0.6 g/rev or more (A/C ON)	-
Vehicle speed	-	Less than 100 km/h (62 mph)
OFF malfunction (B)		
ECM selected gear	3rd	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions varies with engine speed)	-
Intake air amount per revolution	0.2 g/rev or more	-
ON malfunction		

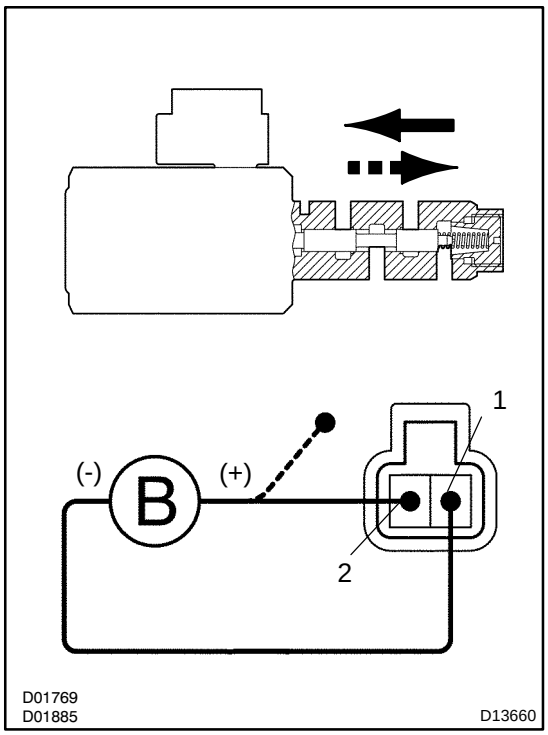
ECM lock-up command	OFF (SLU duty: Less than 10%)	
Throttle valve opening angle	8% or more	-
Vehicle speed	-	Less than 60 km/h (37 mph)
Intake air amount per revolution	0.4 g/rev or more (A/C OFF) 0.6 g/rev or more (A/C ON)	-

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
[OFF malfunction]	
Both of the following conditions are met: OFF malfunction (A) and (B)	
OFF malfunction (A)	
Engine speed - Output speed x 5th gear ratio (NE-NO x 5th gear ratio)	150 rpm or more
OFF malfunction (B)	
Input speed/Output speed (NC0/NO)	not 3.14 or more and 7.34 or less
[ON malfunction]	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Vehicle speed must be under 10 km/h (6 mph) once before 2nd detection	
|Engine speed - Input speed| (|NE-NC0|)	Less than 35 rpm

INSPECTION PROCEDURE

1	**Check shift solenoid valve SLU operation.**



PREPARATION:

(a) Remove the oil pan.

(b) Remove the shift solenoid valve SLU.

CHECK:

Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1.

OK:

When B^+ is applied.	Valve moves in ➡ direction in illustration on the left.
When B^+ is cut off.	Valve moves in ⬅ direction in illustration on the left.

NG → **Replace the shift solenoid valve SLU (See page AT-13).**

OK

2	**Check valve body (See page DI-356).**

NG → **Replace the valve body (See page AT-13).**

OK

3	**Check torque converter clutch (See page AT-35).**

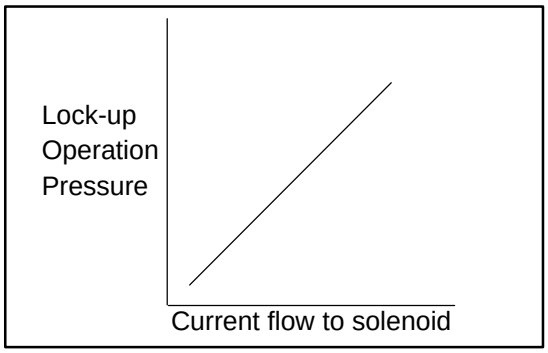
OK → **Repair or replace transmission (See page AT-31).**

NG

Replace the torque converter clutch.

DI9IY-03

DTC	P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical(Shift Solenoid Valve SLU)

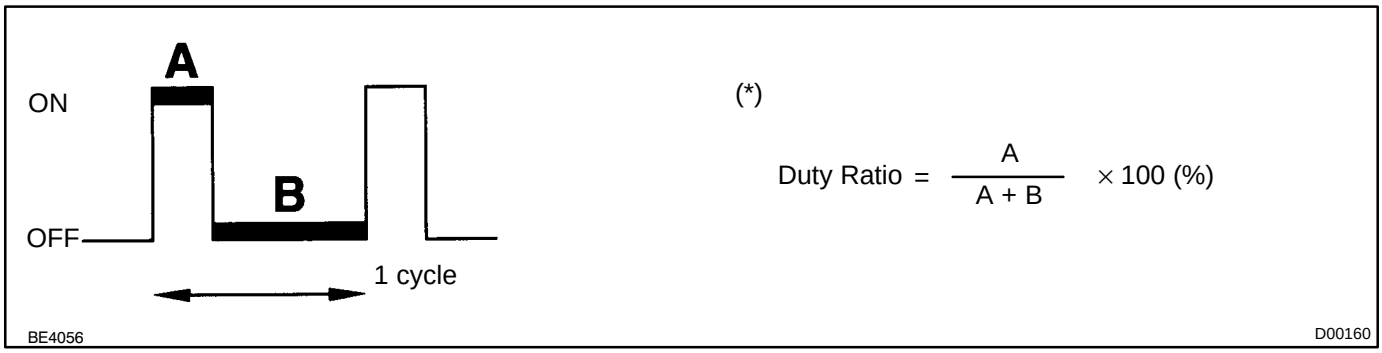


CIRCUIT DESCRIPTION

The amount of current flow to the solenoid is controlled by the (*) duty ratio of the ECM output signal. The higher the duty ratio becomes, the higher the lock-up hydraulic pressure becomes during the lock-up operation.

(*) Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then



DTC No.	DTC detection condition	Trouble Area
P2759	ECM detects solenoid valve SLU circuit malfunction for 1 sec. or more	✓Open or short in shift solenoid valve SLU circuit ✓Shift solenoid valve SLU ✓ECM

MONITOR DESCRIPTION

The ECM controls the oil pressure to the lock-up clutch based on engine-load information from the throttle position sensor, crankshaft position sensor, input speed sensor, and the oil pressure sensor for shift-solenoid SLU. The ECM commands the shift-solenoid SLU using a duty-cycle control signal. In turn, the shift solenoid operates the lock-up control valve and cause lock-up or flexible lock-up of the torque converter clutch. The ECM illuminates the MIL and stores the DTC when ECM detects an open or a short circuit malfunction in the shift solenoid valve SLU.

MONITOR STRATEGY

Related DTCs	P2759	Shift solenoid valve SLU/Range check
Required sensors/Components	Shift solenoid valve SLU	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Solenoid current cut status	Not cut	
Battery voltage	11 V or more	-
Target current	0.1 A or more	-

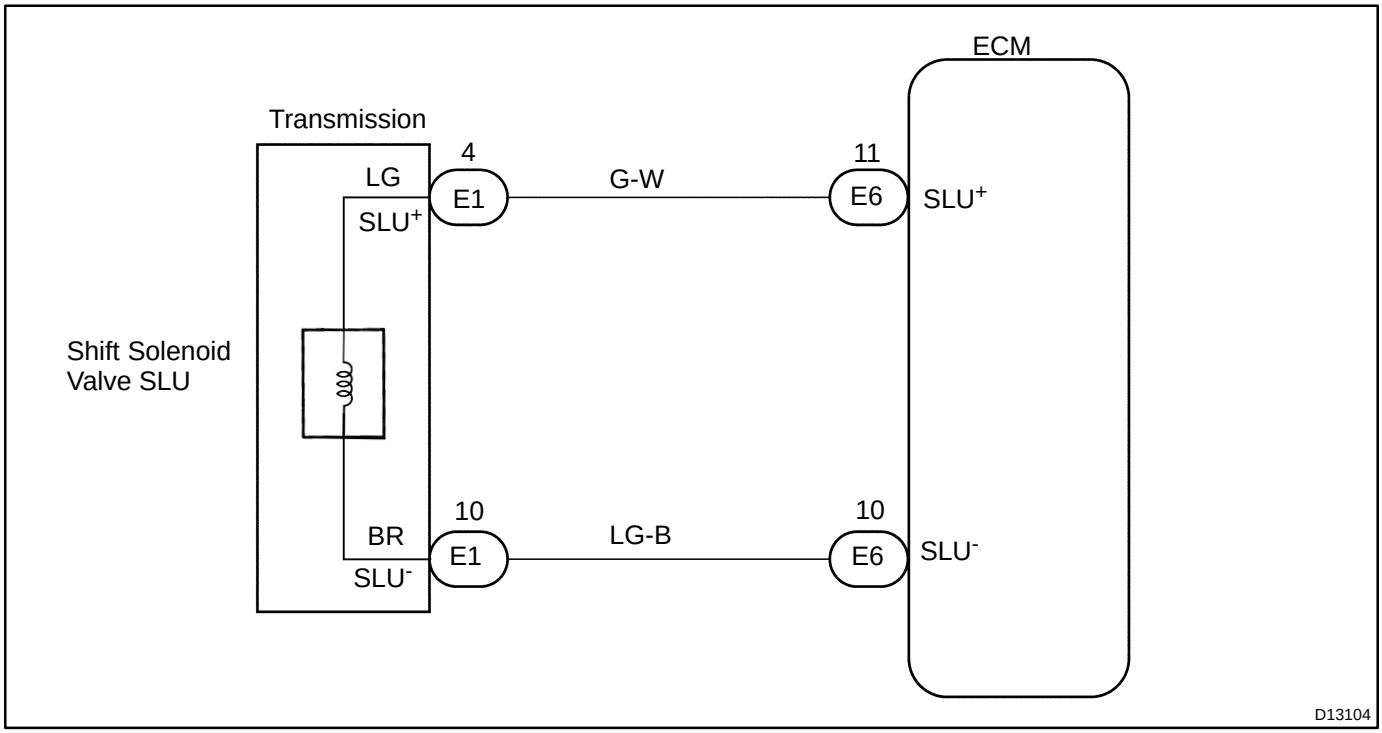
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

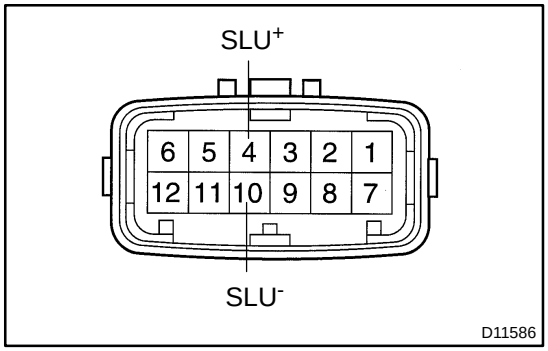
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transmission wire.**



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure resistance between SLU^+ and SLU^- of transmission wire.

OK:

Resistance: 5.0 to 5.6 Ω at 20 ˚C (68 ˚F)

CHECK:

Measure resistance between terminals SLU^+ and SLU^- of the transmission wire connector and body ground.

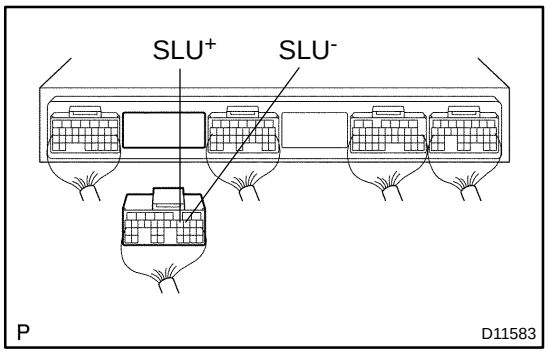
OK:

Resistance: 1 MΩ or higher

NG → **Go to step 3.**

OK

2	Measure resistance between terminal SLU+ and SLU- of ECM connector.



PREPARATION:

(a) Connect the transmission wire connector.
(b) Remove the ECM hood.
(c) Disconnect the connector of the ECM.

CHECK:

Measure resistance between terminals SLU+ and SLU- of ECM connector.

OK:

Resistance: 5.0 to 5.6 Ω at 20 °C (68 °F)

CHECK:

Measure resistance between terminals SLU+ and SLU- of the ECM connector and body ground.

OK:

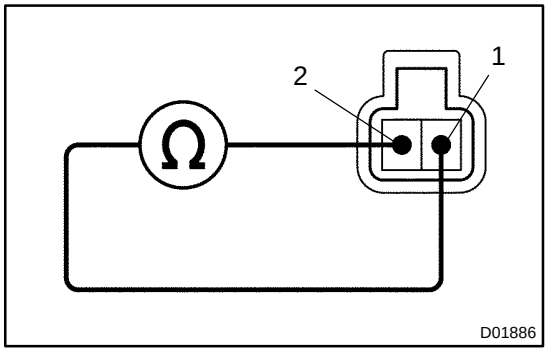
Resistance: 1 MΩ or higher

NG → **Repair or replace the harness or connector (See page IN-33).**

OK

Check and replace the ECM (See page IN-33).

3	Check shift solenoid valve SLU.



PREPARATION:

(a) Remove the oil pan.
(b) Disconnect the solenoid valve connector.

CHECK:

Measure the resistance between terminals 1 and 2.

OK:

Resistance: 5.0 to 5.6 Ω at 20 °C (68 °F)

NG → **Replace the shift solenoid valve SLU (See page AT-13).**

OK

Repair or replace the transmission wire (See page AT-9).

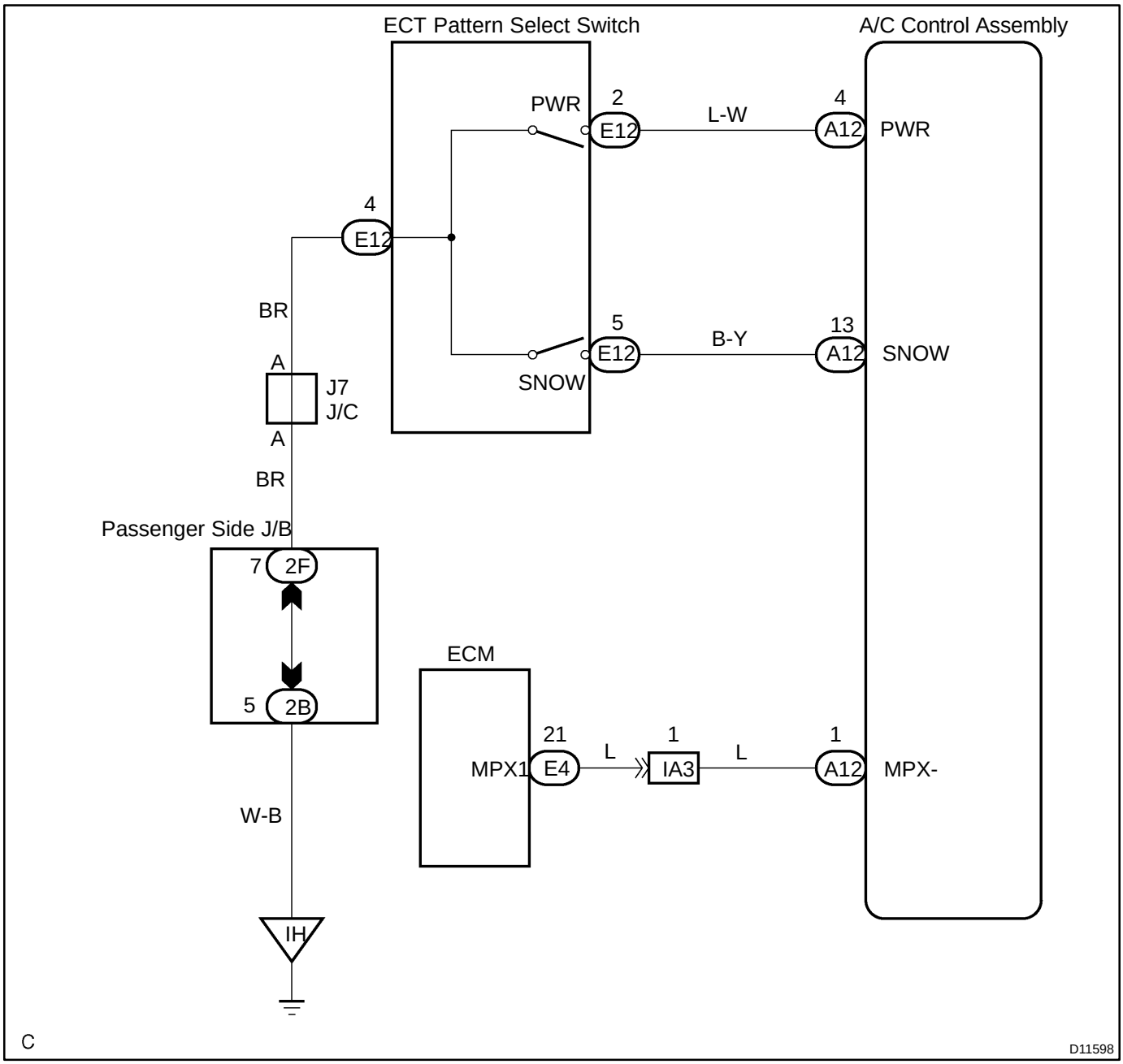
DI7W1-04

Pattern Select Switch Circuit

CIRCUIT DESCRIPTION

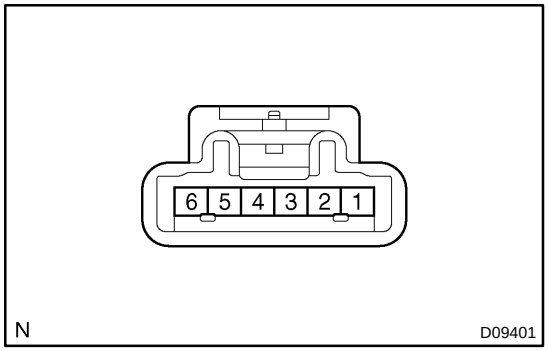
The ECM memory contains the shift programs for the NORMAL, POWER and SNOW patterns, 2 position, L position and the lock-up patterns. By following the programs corresponding to the signals from the pattern select switch, the park/neutral position and other various sensors, the ECM switches the solenoid valves ON and OFF, and controls the transmission gear change and the lock-up clutch operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check pattern select switch.**



PREPARATION:
Disconnect the pattern select switch connector.
CHECK:
Check continuity between each terminal of pattern select switch connector when the select switch is set to PWR, NORM and SNOW positions.
OK:

Switch condition	Tester connection	Specified condition
PWR	2 - 4	Continuity
NORM	2 - 4, 4 - 5	No continuity
SNOW	4 - 5	Continuity

NG → **Replace pattern select switch.**

OK

2	**Check harness and connector between A/C control assembly and pattern select switch, pattern select switch and body ground (See page IN-33).**

NG → **Repair or replace the harness or connector.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-356).

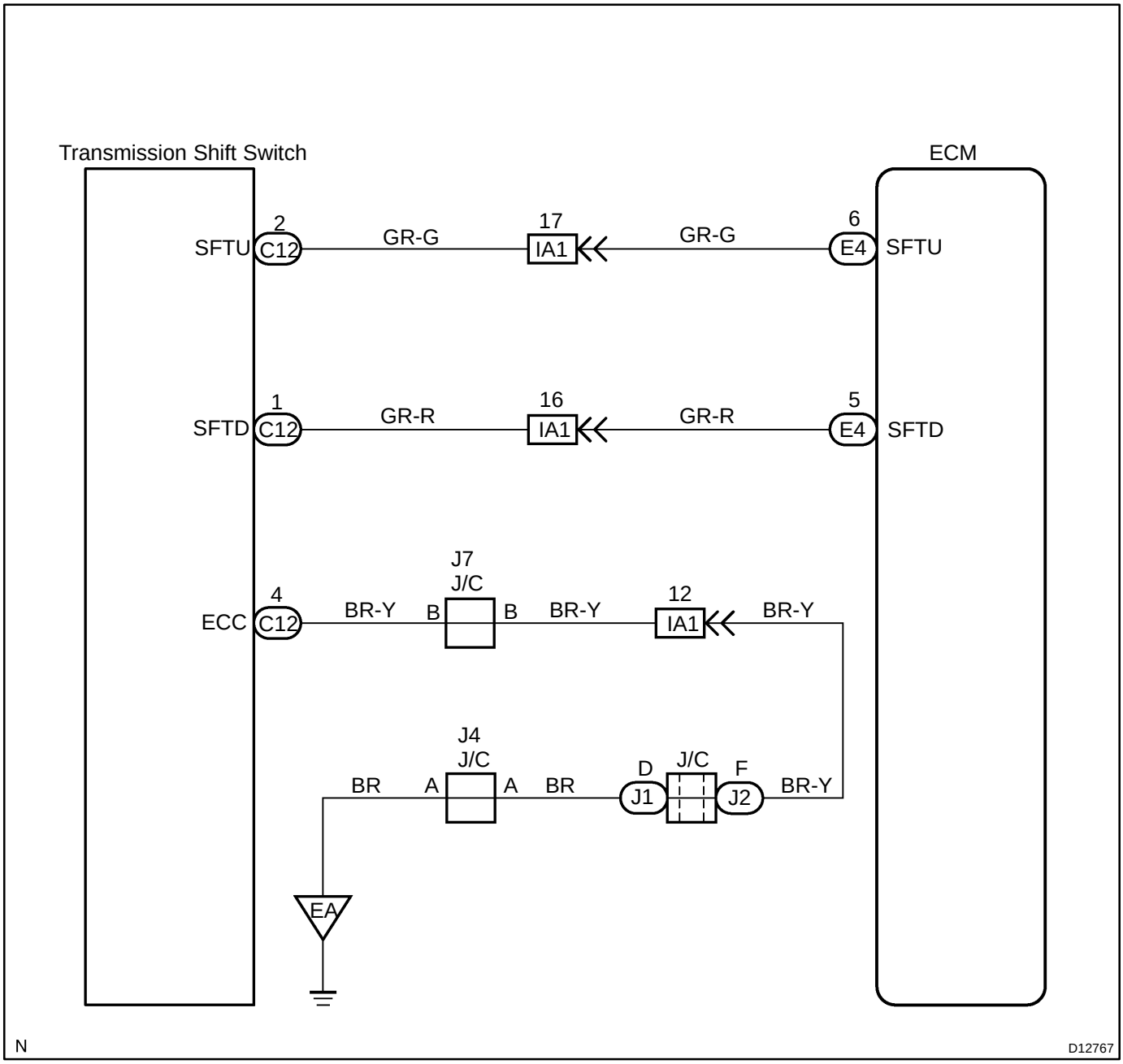
DI25Z-11

Transmission Shift Switch Circuit

CIRCUIT DESCRIPTION

When shifting the shift lever to the M position, using the transmission shift switch, it is possible to shift to the 2 to 5 positions.
Pressing ”Up switch” once shifts up 1 position, and pressing ”Down switch” once shifts down 1 position respectively.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check shift lock control ECU (E-shift main switch) (See page DI-361).**

NG → **Replace the shift lock control ECU (E-shift main switch) (See page AT-20).**

OK

2	**Check operation of transmission shift switch.**

PREPARATION:

(a) Turn the ignition switch ON.

(b) Shift the shift lever into the M position.

CHECK:

Check the odo trip display panel when the transmission shift switch is pressed.

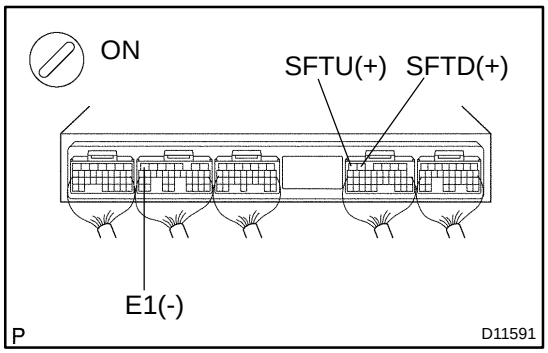
OK:

Switch condition	Odo trip display panel
”Up” switch press	Shift up
”Down” switch press	Shift down

OK → **Check and replace the ECM (See page IN-33).**

NG

3	Check voltage between each of terminals SFTU, SFTD and E1 of ECM.



PREPARATION:

(a) Turn ignition switch ON.

(b) Remove the ECM with connectors still connected.

CHECK:

Check voltage between each terminal of SFTU or SFTD and E1 of ECM.

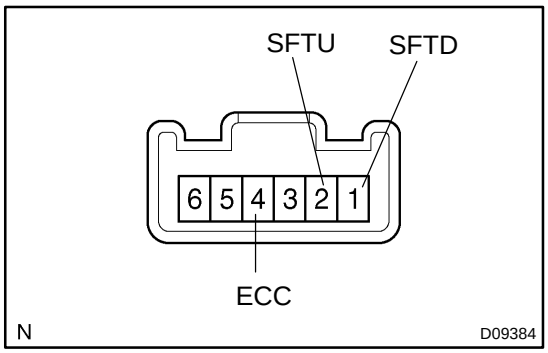
OK:

Switch condition	Tester connection	Specified condition
"Up" switch held pressed	SFTU - E1	7 to 14 V
"Up" switch released		Below 1.5 V
"Down" switch held pressed	SFTD - E1	7 to 14 V
"Down" switch released		Below 1.5 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI-356).**

NG

4	Check transmission shift switch.



PREPARATION:

(a) Remove the steering wheel pad.

(b) Disconnect the transmission shift switch connector.

CHECK:

Check continuity between each terminal of transmission shift switch connector.

OK:

Switch condition	Tester connection	Specified value
"Up" switch pressed	4 - 2	No continuity
"Up" switch released		Continuity
"Down" switch pressed	4 - 1	No continuity
"Down" switch released		Continuity

NG → **Replace the steering wheel (See page SR-11).**

OK →

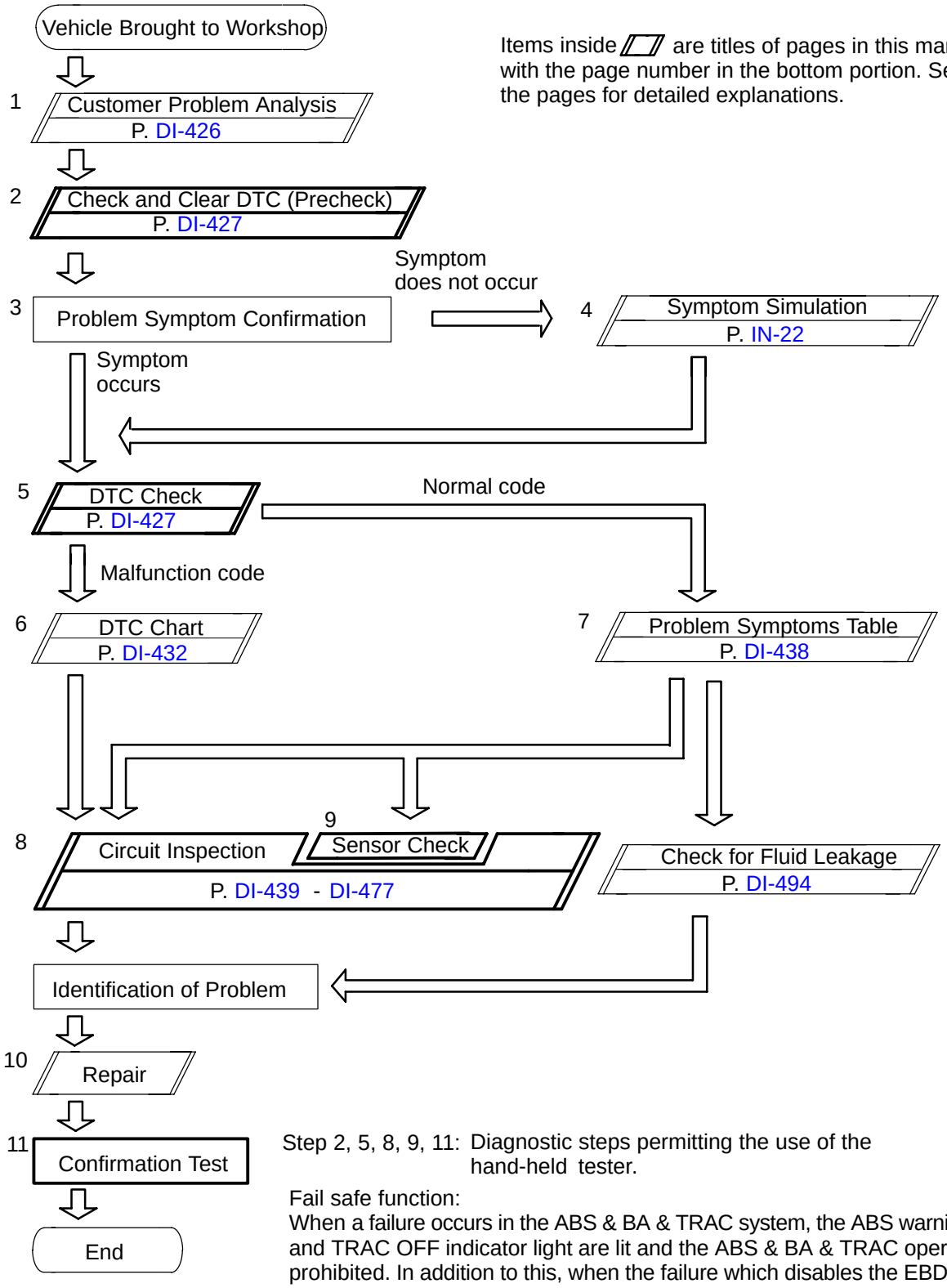
Repair or replace harness or connector (See page IN-33).

ABS WITH EBD & BA & TRAC SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI7UD-03

Troubleshoot in accordance with the procedure on the following pages.



Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Step 2, 5, 8, 9, 11: Diagnostic steps permitting the use of the hand-held tester.

Fail safe function:
When a failure occurs in the ABS & BA & TRAC system, the ABS warning light and TRAC OFF indicator light are lit and the ABS & BA & TRAC operation is prohibited. In addition to this, when the failure which disables the EBD operation occurs, the brake warning light is lit as well and the EBD operation is prohibited.

DI7UE-01

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & TRAC Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

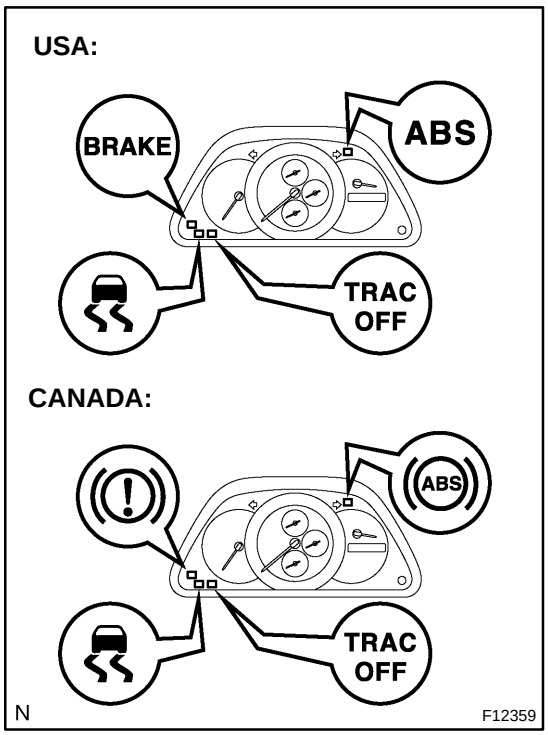
Date Problem First Occurred	/ /
Frequency the Problem Occurs	☐ Continuously ☐ Intermittently (times a day)

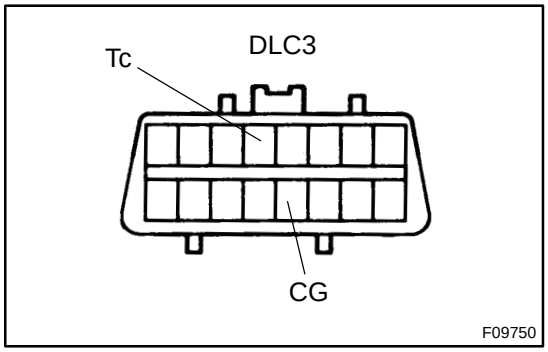
Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ TRAC does not operate. (Wheels spin when starting rapidly.)	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	TRAC OFF Indicator Light Abnormal	☐ Remains ON ☐ Blinks ☐ Does not Light Up
	SLIP Indicator Light Abnormal	☐ Remains ON ☐ Does not Light Up
	BRAKE Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

Check Item	**ABS Warning Light**	☐ Normal ☐ Malfunction Code (Code)
	Malfunction Indicator Light	☐ Normal ☐ Malfunction Code (Code)

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI9J7-01





PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Release the parking brake lever.

(b) Check the indicator.

When the ignition switch is turned ON, check that the ABS warning light, BRAKE warning light, TRAC OFF indicator light and SLIP indicator light go on for 3 seconds.

HINT:

- When the parking brake is applied or the lever of the brake fluid is low, the BRAKE warning light is lit.
- If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit, BRAKE warning light circuit, TRAC OFF indicator light circuit and SLIP indicator light circuit.

Trouble Area	See page
ABS warning light circuit	DI-482
BRAKE warning light circuit	DI-490
TRAC OFF indicator light circuit	DI-485
SLIP indicator light circuit	DI-488

(c) In case of not using hand-held tester:

Check the DTC.

(1) Using SST, connect terminals Tc and CG of DLC3.

SST 09843-18040

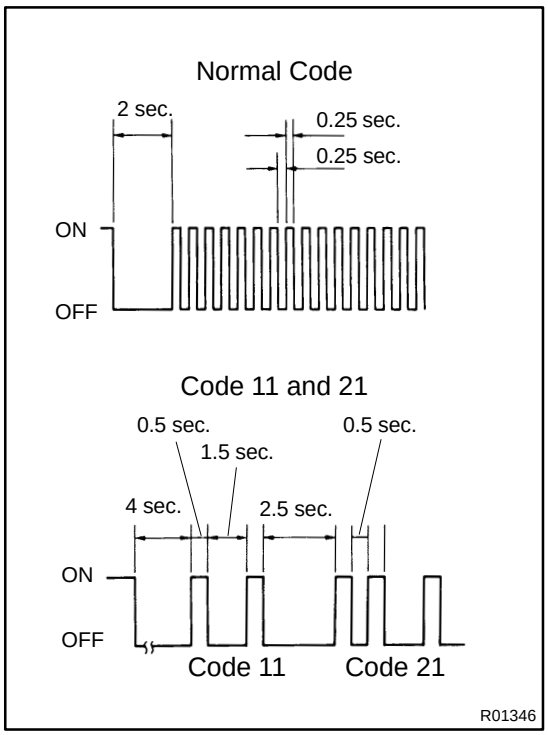
(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light and TRAC OFF indicator light on the combination meter.

HINT:

- If no code appears, inspect the ABS warning light circuit or TRAC OFF indicator light circuit.

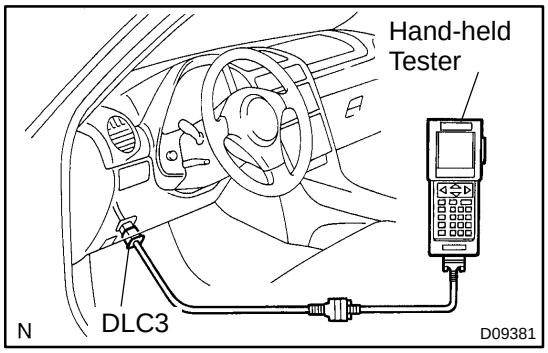
Trouble Area	See page
ABS warning light circuit	DI-482
TRAC OFF indicator light circuit	DI-485



As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

(4) Codes are explained in the code table on page DI-432 .

(5) After completing the check, disconnect terminals Tc and CG of DLC3 and turn off the display.
If 2 or more malfunctions are indicated at the same time the lowest numbered DTC will be displayed 1st.



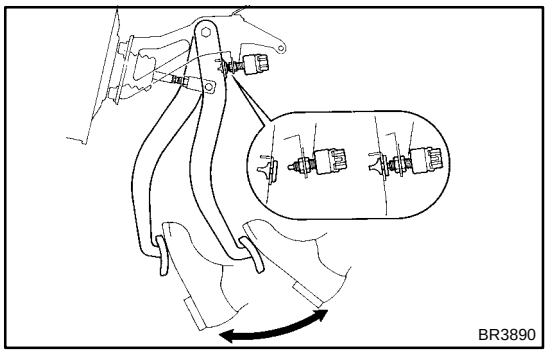
(d) In case of using hand-held tester:
Check the DTC.

(1) Hook up the hand-held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the hand-held tester operator's manual for further details.



(e) In case of not using hand-held tester:
Clear the DTC.

(1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040

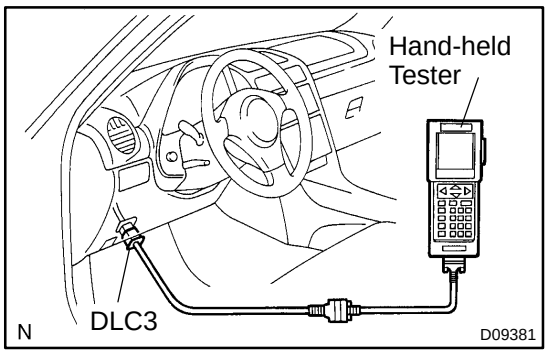
(2) Turn the ignition switch ON.

(3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 5 seconds.

(4) Check that the warning light shows the normal code.

(5) Remove the SST from the terminals of DLC3.
SST 09843-18040

HINT:
The DTC stored in the ECU will be erased when the battery terminal is disconnected for the troubleshooting.



(f) In case of using hand-held tester:
Clear the DTC.
(1) Hook up the hand-held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Operate the hand-held tester to erase the codes. (See hand-held tester operator's manual.)

2. FREEZE FRAME DATA

(a) The vehicle (sensor) status at the occurrence of abnormality of the diagnosis code and during the ABS operating can be memorized and displayed using the hand-held tester.

(b) Only one record of freeze frame data is stored, however, freeze frame data during the ABS operating is always up-dated. After the storage of freeze frame data, up to 31 ignition "ON" operations are stored and displayed.

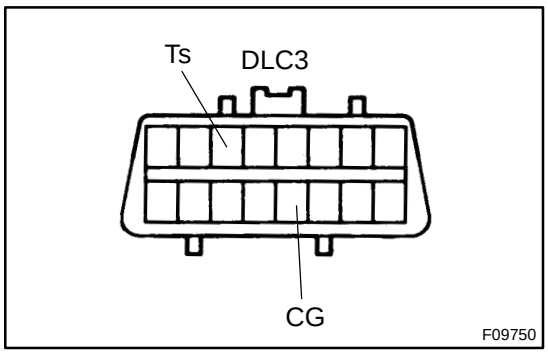
HINT:

If the ignition switch "ON" operation exceeds 31 times, "31" appears on the display.

(c) If the diagnosis code abnormality occurs, the freeze frame data at the occurrence of the abnormality is stored but the ABS actuation data is deleted.

Hand-held tester display	Measurement Item	Reference Value*
VEHICLE SPD	Vehicle speed	Speed indication of a meter
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Numbers of operations of ignition switch ON after memorizing freeze frame data	0 - 31
MAS CYL PRESS	Master cylinder pressure sensor output voltage	Release brake pedal: 0.3 - 0.9 V Depress brake pedal: 3.2 - 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor changing declivity	-30 - 200 MPa/s
SYSTEM	Operate system	ABS operate: ABS BA operate: BA
YAW RATE	Yaw rate angle sensor output value	-70 - 70
STEERING ANG	Steering angle sensor output value	Left turn: Increase Right turn: Drop
G (RIGHT & LEFT)	Right and left G	-1.5 - 1.5
G (BACK & FORTH)	Back and forth G	-1.5 - 1.5
VSC / TRC OFF SW	TRAC OFF switch signal	TRAC OFF SW ON: ON OFF: OFF
SHIFT POSITION	Shift lever position	P: P R: R N: N D: D 2: 2 L: L

If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.



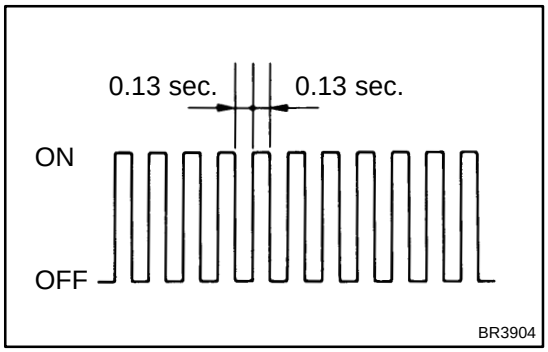
3. SPEED SENSOR SIGNAL CHECK

(a) In case of not using hand-held tester:
Check the speed sensor signal.

(1) Turn the ignition switch OFF.

(2) Using SST, connect terminals Ts and CG of DLC3.
SST 09843-18040

(3) Start the engine.



(4) Check that the ABS warning light blinks.

HINT:
If the ABS warning light does not blink, inspect the ABS warning light circuit (See page DI-482).

(5) Drive vehicle straight forward.
Drive vehicle faster than 45 km/h (28 mph) for several seconds.

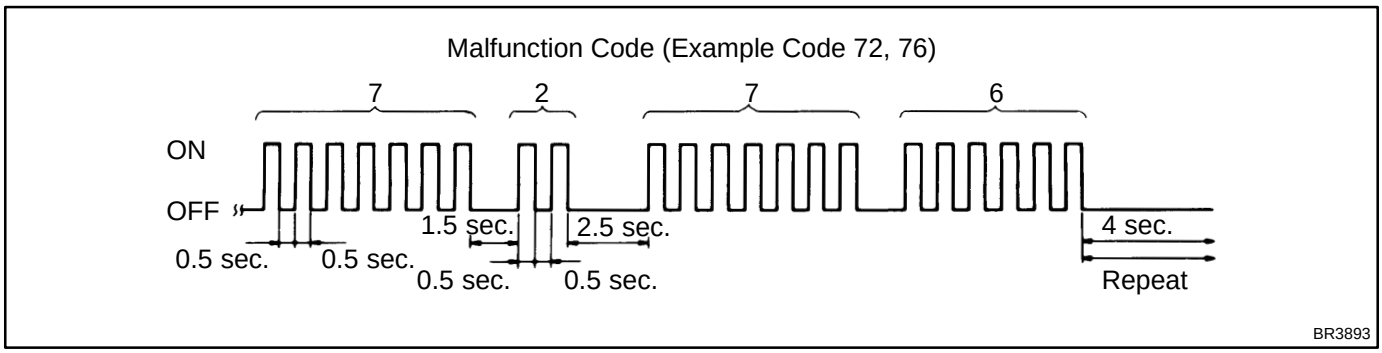
(6) Stop the vehicle.

(7) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040

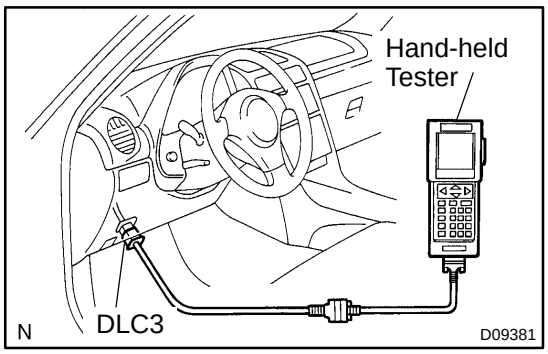
(8) Read the number of blinks of the ABS warning light.

HINT:

- See the list of DTC shown on the next page.
- If every sensor is normal, a normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).
- If 2 or more malfunctions are indicated at the same time, the lowest numbered code will be displayed 1st.



(9) After doing the check, disconnect the SST from terminals Ts and CG, Tc and CG of DLC3, and turn ignition switch OFF.
SST 09843-18040



(b) In case of using hand-held tester:
Check the speed sensor signal.
(1) Hook up the hand-held tester to the DLC3.
(2) Do step (3) to (6) on the previous page and this page.
(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the hand-held tester operator's manual for further details.

DTC of speed sensor check function:

Code No.	Diagnosis	Trouble Area
C1271/71	Low output voltage of right front speed sensor	✓Right front speed sensor ✓Sensor installation ✓Right front speed sensor rotor ✓Right front speed sensor circuit
C1272/72	Low output voltage of left front speed sensor	✓Left front speed sensor ✓Sensor installation ✓Left front speed sensor rotor ✓Left front speed sensor circuit
C1273/73	Low output voltage of right rear speed sensor	✓Right rear speed sensor ✓Sensor installation ✓Right rear speed sensor rotor ✓Right rear speed sensor circuit
C1274/74	Low output voltage of left rear speed sensor	✓Left rear speed sensor ✓Sensor installation ✓Left rear speed sensor rotor ✓Left rear speed sensor circuit
C1275/75	Abnormal change in output voltage of right front speed sensor	✓Right front speed sensor rotor ✓Right front speed sensor
C1276/76	Abnormal change in output voltage of left front speed sensor	✓Left front speed sensor rotor ✓Left front speed sensor
C1277/77	Abnormal change in output voltage of right rear speed sensor	✓Right rear speed sensor rotor ✓Right rear speed sensor
C1278/78	Abnormal change in output voltage of left rear speed sensor	✓Left rear speed sensor rotor ✓Left rear speed sensor
C1281/81	✓Master cylinder pressure sensor output signal is faulty ✓The problem symptoms in the brake cannot be confirmed	✓Master cylinder pressure sensor ✓Brake booster

DI7UG-03

DIAGNOSTIC TROUBLE CODE CHART

HINT:

- Using SST 09843-18040, connect the terminals Tc and CG of DLC3.
- If any abnormality is not found when inspecting parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit listed for the code. For details of each code, turn to the page referred to under the "See page" for respective "DTC No." in the DTC chart.

DTC chart of anti-lock brake system:

DTC No. (See Page)	Detection Item	Trouble Area
C0278/11 (DI-451)	Open circuit of ABS solenoid relay circuit	ABS solenoid relay ABS solenoid relay circuit
C0279/12 (DI-451)	Short circuit of ABS solenoid relay circuit	
C0273/13*1 (DI-447)	Open circuit of ABS motor relay circuit	ABS motor relay ABS motor relay circuit
C0274/14 (DI-447)	Short circuit of ABS motor relay circuit	
C0226/21 (DI-445)	Open or short circuit of right front solenoid circuit	Brake actuator SFRR or SFRH circuit
C0236/22 (DI-445)	Open or short circuit of left front solenoid circuit	Brake actuator SFLR or SFLH circuit
C0246/23 (DI-445)	Open or short circuit of right rear solenoid circuit	Brake actuator SRRR or SRRH circuit
C0256/24 (DI-445)	Open or short circuit of left rear solenoid circuit	Brake actuator SRLR or SRLH circuit
C1225/25 (DI-463)	Open or short circuit of SM circuit	Brake actuator SM1 or SM2 circuit
C1226/26 (DI-463)	Open or short circuit of SRM circuit	Brake actuator SRM1 or SRM2 circuit
C1227/27 (DI-463)	Open or short circuit of SRC circuit	Brake actuator SRC1 or SRC2 circuit
C0200/31*1 (DI-439)	Right front wheel speed sensor signal malfunction	Right front, left front, right rear, left rear speed sensor Each speed sensor circuit Speed sensor rotor
C0205/32*1 (DI-439)	Left front wheel speed sensor signal malfunction	
C0210/33*1 (DI-439)	Right rear wheel speed sensor signal malfunction	
C0215/34*1 (DI-439)	Left rear wheel speed sensor signal malfunction	
C1235/35 (DI-439)	Foreign matter is attached on the tip of the right front sensor	Right front, left front, right rear, left rear speed sensor Speed sensor rotor
C1236/36 (DI-439)	Foreign matter is attached on the tip of the left front sensor	
C1238/38 (DI-439)	Foreign matter is attached on the tip of the right rear sensor	
C1239/39 (DI-439)	Foreign matter is attached on the tip of the left rear sensor	

C1241/41 (DI-465)	Low battery positive voltage	✓Battery ✓Charging system ✓Power source circuit
C1249/49*3 (DI-472)	Open circuit of stop light switch circuit	✓Stop light switch ✓Stop light switch circuit
C1246/46*2 (DI-469)	Malfunction in master ccylinder pressure sensor	✓Master cylinder pressure sensor ✓Master cylinder pressure sensor circuit
C1251/51*1 (DI-475)	Pump motor is locked	✓ABS & TRAC Actuator ✓ABS & TRAC Actuator circuit
C1267/67*4 (DI-477)	Malfunction in brake pedal load sensing switch	✓Brake pedal load sensing switch ✓Brake pedal load sensing switch circuit
Always ON (DI-480)	Malfunction in ECU	✓Combination meter ✓Combination meter circuit ✓Battery ✓ABS & TRAC ECU

*1, *2, *3, *4:

Even after the troubled areas are repaired, ABS warning light will not go OFF unless the following operations are performed.

✓ *1:

(1) Drive the vehicle at 20 km/h (12 mph) for 30 seconds or more and check that the ABS warning light goes off.

(2) Clear the DTC (See page DI-427).

✓ *2:

(1) Keep the vehicle in the stationary condition for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.

(2) Drive the vehicle at the vehicle speed 50 km/h (31 mph) and keep depressing the brake pedal strongly for about 3 seconds.

(3) Repeat the above operation 3 times or more and check that the ABS warning light goes off.

(4) Clear the DTC (See page DI-427).

✓ *3: Depress the brake pedal for 1 sec.

✓ *4: Depress the brake pedal strongly for 1 sec., then release the brake pedal for 1 sec.

HINT:

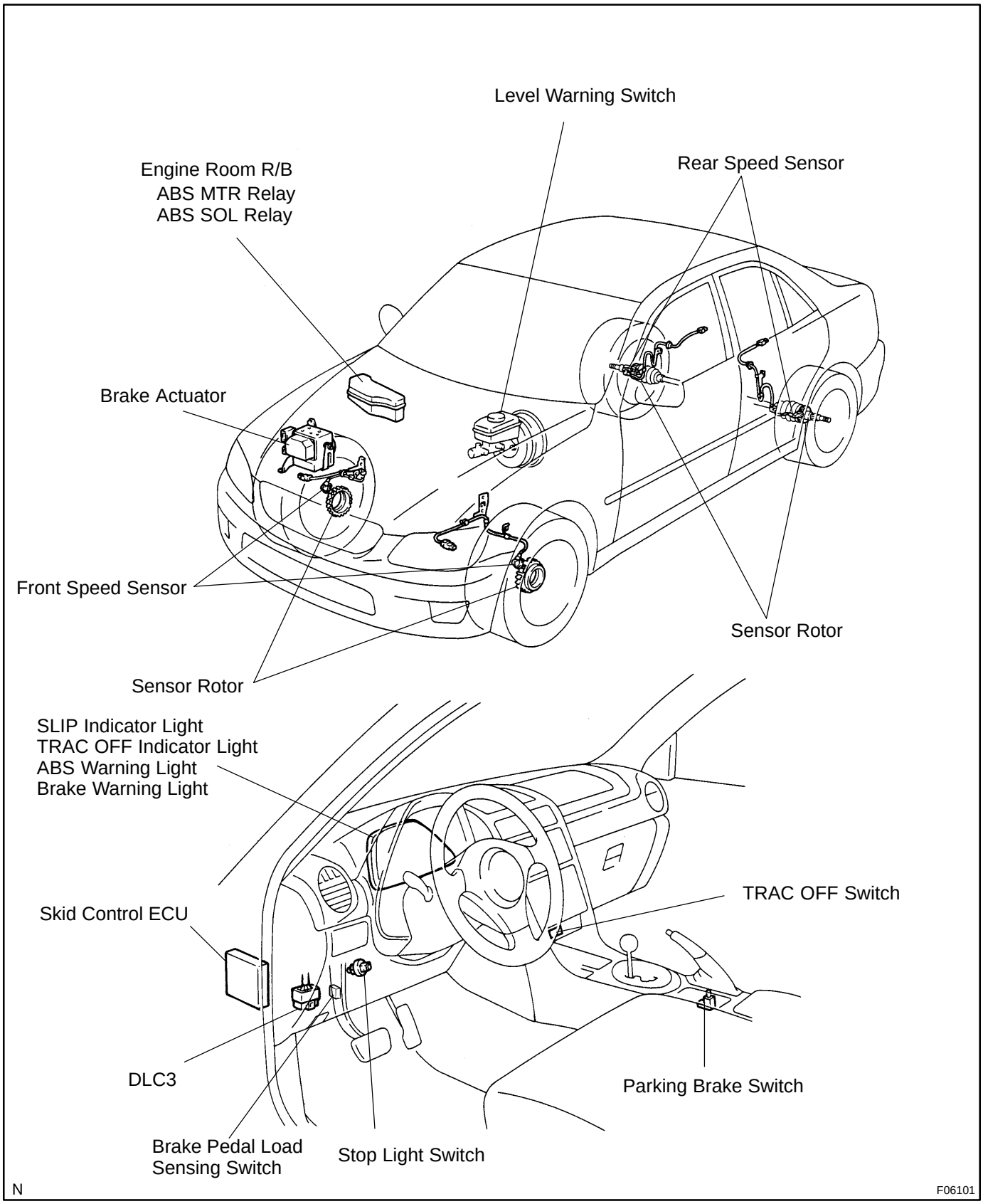
There is a case that hand-held tester cannot be used when ABS warning light is always on.

DTC chart of traction control system:

DTC No. (See Page)	Detection Item	Trouble Area
C1223/43 (DI-460)	Malfunction in ABS control system	ABS control system
C1224/44 (DI-461)	Open or short circuit of NE signal circuit	✓NEO circuit ✓ECM
C1201/51 (DI-455)	Malfunction in engine control system	Engine control system
C1202/52 (DI-456)	Brake fluid level low Open circuit in brake fluid level warning switch circuit	✓Brake fluid level ✓Brake fluid warning switch ✓Brake fluid level warning switch circuit
C1203/53 (DI-458)	Malfunction in ECM communication circuit	✓TRC+ or TRC - circuit ✓ENG+ or ENG- circuit ✓ECM

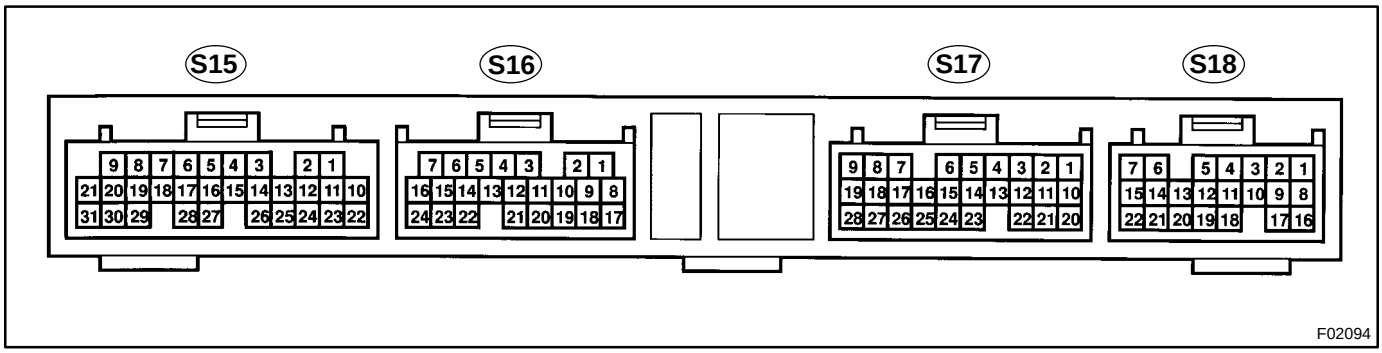
DI7UH-03

PARTS LOCATION



DI7UI-03

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
SRLR (S18 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	B ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SM1- (S18 - 2) - GND (S18 - 15, 22, S15 - 2, 3)	B-L ↔ W-B	IG switch OFF	Continuity
SM1+ (S18 - 3) - GND (S18 - 15, 22, S15 - 2, 3)	B-R ↔ W-B	IG switch ON, ABS warning light OFF	Below 1.0
SM2- (S18 - 4) - GND (S18 - 15, 22, S15 - 2, 3)	L-B ↔ W-B	IG switch OFF	Continuity
SM2+ (S18 - 5) - GND (S18 - 15, 22, S15 - 2, 3)	G-B ↔ W-B	IG switch ON, ABS warning light OFF	Below 1.0
AST (S18 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	Y-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRLH (S18 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	G-W ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SFRR (S18 - 8) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
E3 (S18 - 12) - GND (S18 - 15, 22, S15 - 2, 3)	Y ↔ W-B	IG switch OFF	Continuity
FSS (S18 - 13) - GND (S18 - 15, 22, S15 - 2, 3)	Shielded ↔ W-B	IG switch OFF	Continuity
MT (S18 - 14) - GND (S18 - 15, 22, S15 - 2, 3)	L-Y ↔ W-B	IG switch ON (Motor relay is OFF)	Below 1.5
SFRH (S18 - 16) - GND (S18 - 15, 22, S15 - 2, 3)	B-W ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
PMC2 (S18 - 18) - E3 (S18 - 12)	L ↔ Y	IG switch ON, stop light switch OFF	0.3 - 0.8
VCM2 (S18 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	IG switch ON	4.5 - 5.5
CSW (S17 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	LG-R ↔ W-B	IG switch ON, CSW is OFF	10 - 14
FSW+ (S17 - 5) - FSW- (S17 - 4)	W-G ↔ R-B	IG switch ON, ABS warning light OFF	10 - 14
NEO (S17 - 26) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	Engine idling	Pulse generation
D/G (S17 - 28) - GND (S18 - 15, 22, S15 - 2, 3)	W-R ↔ W-B	IG switch ON	10 - 14
WA (S16 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON, ABS warning light ON	10 - 14
		IG switch ON, ABS warning light OFF	Below 2.0

SP1 (S16 - 2) - GND (S18 - 15, 22, S15 - 2, 3)	R-Y ↔ W-B	Vehicle drives at about 20 km/h (12 mph)	Pulse generation
STP (S16 - 3) - GND (S18 - 15, 22, S15 - 2, 3)	G-R ↔ W-B	Stop light switch OFF	Below 1.5
		Stop light switch ON	8 - 14
WT (S16 - 4) - GND (S18 - 15, 22, S15 - 2, 3)	LG ↔ W-B	IG switch ON, TRC OFF indicator light ON	Below 2.0
		IG switch ON, TRC OFF indicator light OFF	10 - 14
IND (S16 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	L-Y ↔ W-B	IG switch ON, SLIP indicator light ON	Below 2.0
		IG switch ON, SLIP indicator light OFF	10 - 14
IG1 (S16 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	B-R ↔ W-B	IG switch ON	10 - 14
BRL (S16 - 8) - GND (S18 - 15, 22, S15 - 2, 3)	Y-G ↔ W-B	IG switch ON, fluid in master cylinder reservoir above MIN level and parking brake switch is OFF (Brake warning light is OFF)	Below 2.0
		IG switch ON, fluid in master cylinder reservoir below MIN level or parking brake switch is ON (Brake warning light ON)	10 - 14
ENG+ (S16 - 9) - ENG- (S16 - 18)	L-B ↔ P	IG switch ON	Pulse generation
Ts (S16 - 10) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON	10 - 14
TRC+ (S16 - 11) - TRC- (S16 - 20)	R-Y ↔ W-G	IG switch ON, ABS warning light OFF	Pulse generation
FRO (S16 - 13) - GND (S18 - 15, 22, S15 - 2, 3)	W-R ↔ W-B	Vehicle drives at about 20 km/h (12 mph)	Pulse generation
RR+ (S16 - 16) - RR- (S16 - 15)	GR ↔ B	IG switch ON, slowly turn right rear wheel	Pulse generation
PKB (S16 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	Y-R ↔ W-B	IG switch ON, parking brake switch ON	Below 1.5
		IG switch ON, parking brake switch OFF	10 - 14
RL+ (S16 - 22) - RL- (S16 - 23)	R ↔ L	IG switch ON, slowly turn left rear wheel	Pulse generation
R+ (S15 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	L-B ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRM1 (S15 - 4) - GND (S18 - 15, 22, S15 - 2, 3)	B-Y ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRC2 (S15 - 5) - GND (S18 - 15, 22, S15 - 2, 3)	G-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SFLH (S15 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	L-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SFLR (S15 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	L-Y ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRRH (S15 - 8) - GND (S18 - 15, 22, S15 - 2, 3)	L-O ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRRR (S15 - 9) - GND (S18 - 15, 22, S15 - 2, 3)	G-Y ↔ W-B	IG switch ON, ABS warning light OFF	10 -14
SR (S15 - 10) - R+ (S15 - 1)	L-R ↔ L-B	IG switch ON, ABS warning light OFF	10 - 14
FR+ (S15 - 13) - FR- (S15 - 12)	O ↔ B	IG switch ON, slowly turn right front wheel	Pulse generation
SRM2 (S15 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	B-O ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
MR (S15 - 23) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON, ABS motor stops	10 - 14

MRF (S15 - 24) - GND (S18 - 15, 22, S15 - 2, 3)	R-Y ↔ W-B	IG switch ON, ABS warning light OFF	Below 2.0
LBL (S15 - 25) - GND (S18 - 15, 22, S15 - 2, 3)	Y-R ↔ W-B	IG switch ON, fluid in master cylinder reservoir above MIN level	4 - 10
FL+ (S15 - 28) - FL- (S15 - 27)	LG ↔ V	IG switch ON, slowly turn left front wheel	Pulse generation
SRC1 (S15 - 31) - GND (S18 - 15, 22, S15 - 2, 3)	G-O ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14

DI7UJ-03

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

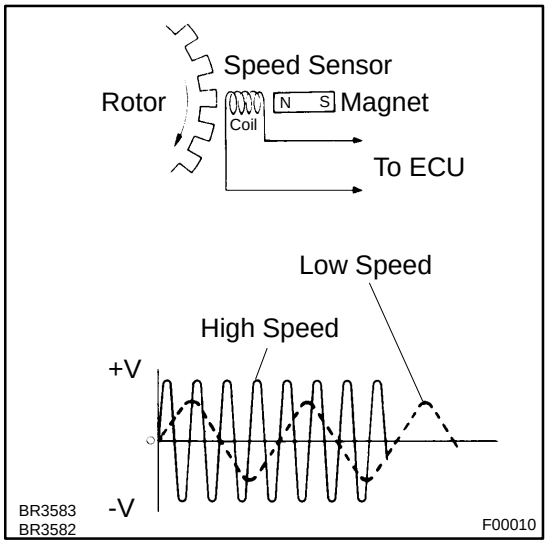
Symptom	Suspect Area	See page
ABS does not operate	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 3. Check the DTC reconfirming that the normal code is output. 4. IG power source circuit 5. Speed sensor circuit 6. Check the brake actuator with a hand-held tester. If abnormal, check the hydraulic circuit for leakage (See page DI-494).	 DI-427 DI-465 DI-439
ABS does not operate efficiently	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 1. Check the DTC reconfirming that the normal code is output 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the brake actuator with a hand-held tester. If abnormal, check the hydraulic circuit for leakage (See page DI-494).	 DI-427 DI-439 DI-472
ABS warning light abnormal	1. ABS warning light circuit 2. Skid control ECU	 IN-33
BRAKE warning light abnormal	1. BRAKE warning light circuit 2. Skid control ECU	 IN-33
DTC check cannot be done	Only when 1. and 2. are all normal and the problem is still occurring, replace the skid control ECU. 1. ABS warning light circuit 2. TRAC OFF indicator light circuit	 DI-482 DI-485
Speed sensor signal check cannot be done	1. Ts terminal circuit 2. Skid control ECU	DI-492 IN-33
TRAC does not operate	Only when inspection circuits for each problem symptom are all normal and the problem is still occurring, replace the skid control ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit	 DI-427 DI-465 DI-494 DI-439
SLIP indicator light abnormal	SLIP indicator light circuit	
TRAC OFF indicator light abnormal	Only when inspection circuits for each problem symptom are all normal and the problem is still occurring, replace the skid control ECU. 1. TRAC OFF indicator light circuit 2. TRAC cut switch circuit	 DI-485 DI-485

DI9J8-01

CIRCUIT INSPECTION

DTC	C0200 / 31 - C1239 / 39	Speed Sensor Circuit

CIRCUIT DESCRIPTION



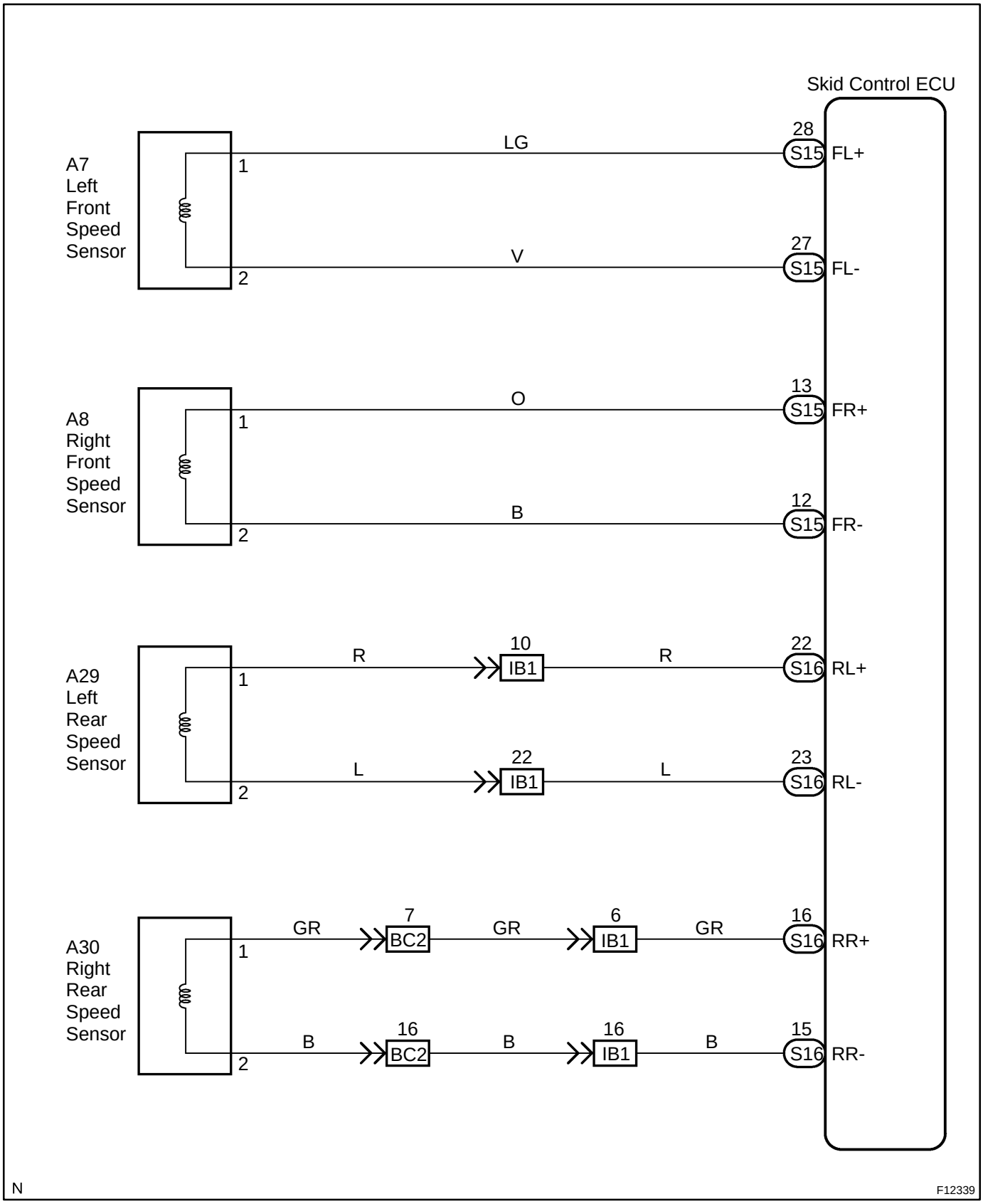
The speed sensor measures wheel speed and sends the corresponding signals to the ECU. These signals are used for control of both the ABS & TRAC control system. Both the front and rear rotors have 48 serrations.
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to measure the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
C0200 / 31 C0205 / 32 C0210 / 33 C0215 / 34	Detection of any of conditions 1. through 3.: 1. At vehicle speed of 10 km/h (6 mph) or more, open or short circuit of the speed sensor signal circuit continues for 15 sec. 2. Momentary interruption of the speed sensor signal occurs 7 times or more. 3. Open circuit of the speed sensor signal circuit continues for 0.5 sec. or more.	✓ Right front, left front, right rear, left rear speed sensor ✓ Each speed sensor circuit ✓ Sensor rotor
C1235 / 35 C1236 / 36 C1238 / 38 C1239 / 39	At the vehicle speed of 20 km/h (12mph) or more, the condition that noise is included in the speed sensor signal continues for 5 sec. or more.	✓ Right front, left front, right rear, left rear speed sensor ✓ Sensor rotor

HINT:

- ✓ DTC No. C0200 / 31 and C1235 / 35 are for the right front speed sensor.
- ✓ DTC No. C0205 / 32 and C1236 / 36 are for the left front speed sensor.
- ✓ DTC No. C0210 / 33 and C1238 / 38 are for the right rear speed sensor.
- ✓ DTC No. C0215 / 34 and C1239 / 39 are for the left rear speed sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of speed sensor.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and turn the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that there is no difference between the speed value output from the speed sensor observed in the hand-held tester and the speed value displayed by the speedometer when the vehicle is in motion.

OK:

There is almost no difference in the displayed speed values.

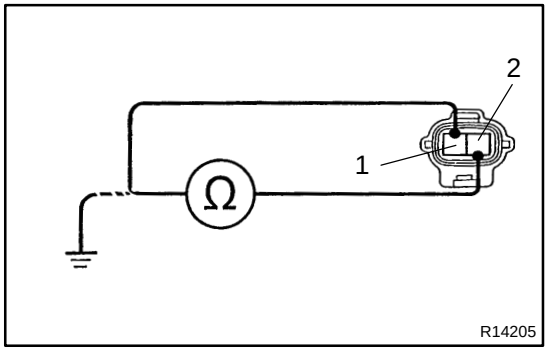
HINT:

There is tolerance of ± 10 % in the speedometer indication.

OK → **Go to step 4.**

NG

2	**Check speed sensor.**



Front:

PREPARATION:

(a) Make sure that the speed sensor connector and the wire harness side connector are securely connected.
(b) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:

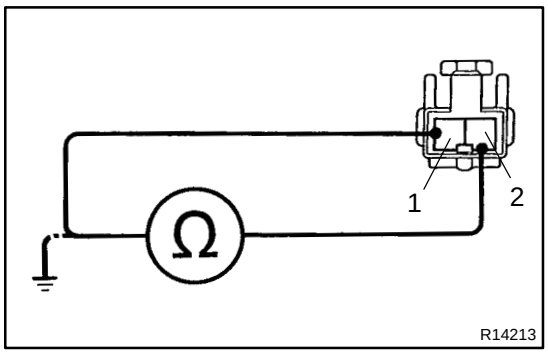
Resistance: 1.4 - 1.8 kΩ at 20˚C

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Remove the rear seat cushion and the seatback.

(b) Make sure that the speed sensor connector and the wire harness side connector are securely connected.

(c) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:

Resistance: 0.9 - 1.3 kΩ at 25 ± 5˚C

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG	**Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI-427).

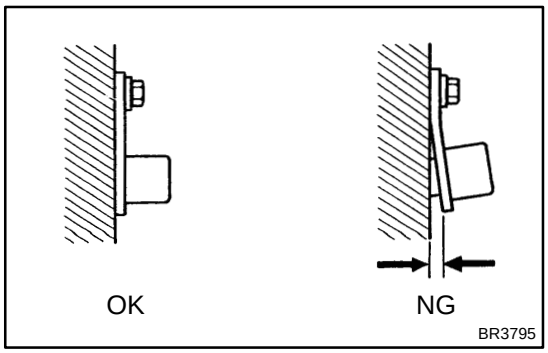
OK

3	**Check for open and short circuit in harness and connector between each speed sensor and skid control ECU (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

4	Check sensor installation.



CHECK:

Check the speed sensor installation.

OK:

The installation bolt is tightened properly and there is no clearance between the sensor and front steering knuckle or rear axle carrier.

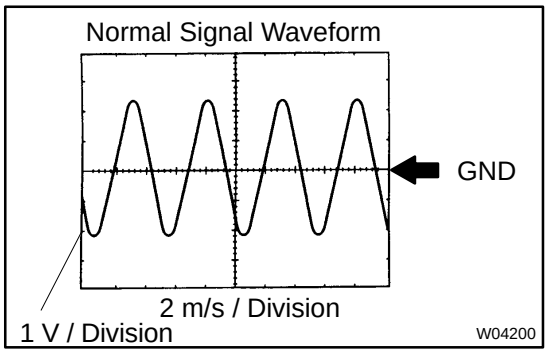
NG	Replace speed sensor.

NOTICE:

Check the speed sensor signal last (See page DI-427).

OK

5	Check speed sensor and sensor rotor serrations.



(REFERENCE) INSPECTION USING OSCILLOSCOPE

PREPARATION:

(a) Remove the skid control ECU with the connector still connected.

(b) Connect the oscilloscope to the terminals FR+ - FR-, FL+ - FL-, RR+ - RR- and RL+ - RL- of the skid control ECU.

CHECK:

Drive the vehicle at the speed of about 20 km/h (12 mph), and check the signal waveform.

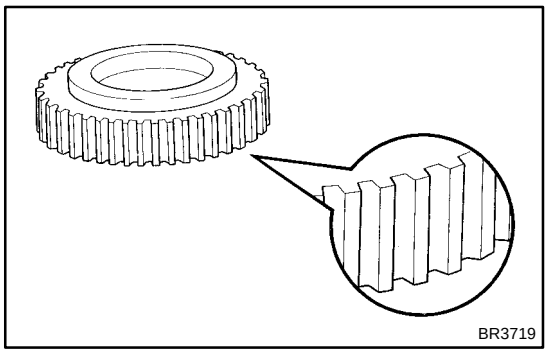
HINT:

- As the vehicle speed (rpm of the wheels) increases, a cycle of the waveform becomes shorter and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter deposited on it.

OK	Check and replace skid control ECU (See page IN-33).

NG

6	Check sensor rotor and sensor tip.



Front:

PREPARATION:

Remove the front axle hub and the speed sensor (See page BR-51).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects on the sensor rotor.

CHECK:

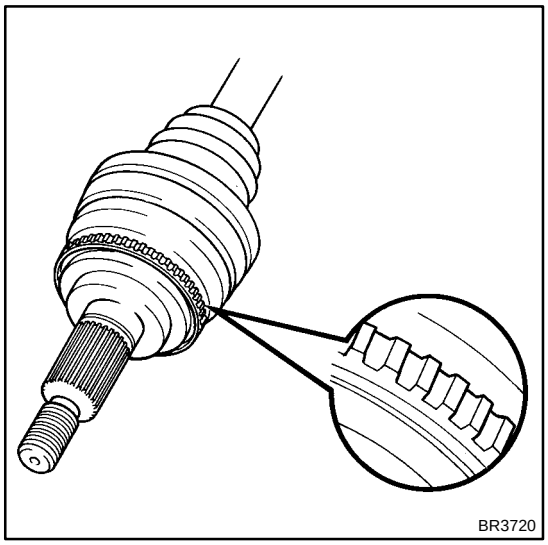
Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.



Rear:

PREPARATION:

Remove the drive shaft (See page SA-57).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See page BR-54).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.

NG	Replace speed sensor or rotor.

NOTICE:

Check the speed sensor signal last (See page DI-427).

OK

Check and replace skid control ECU (See page IN-33).

DI1GI-11

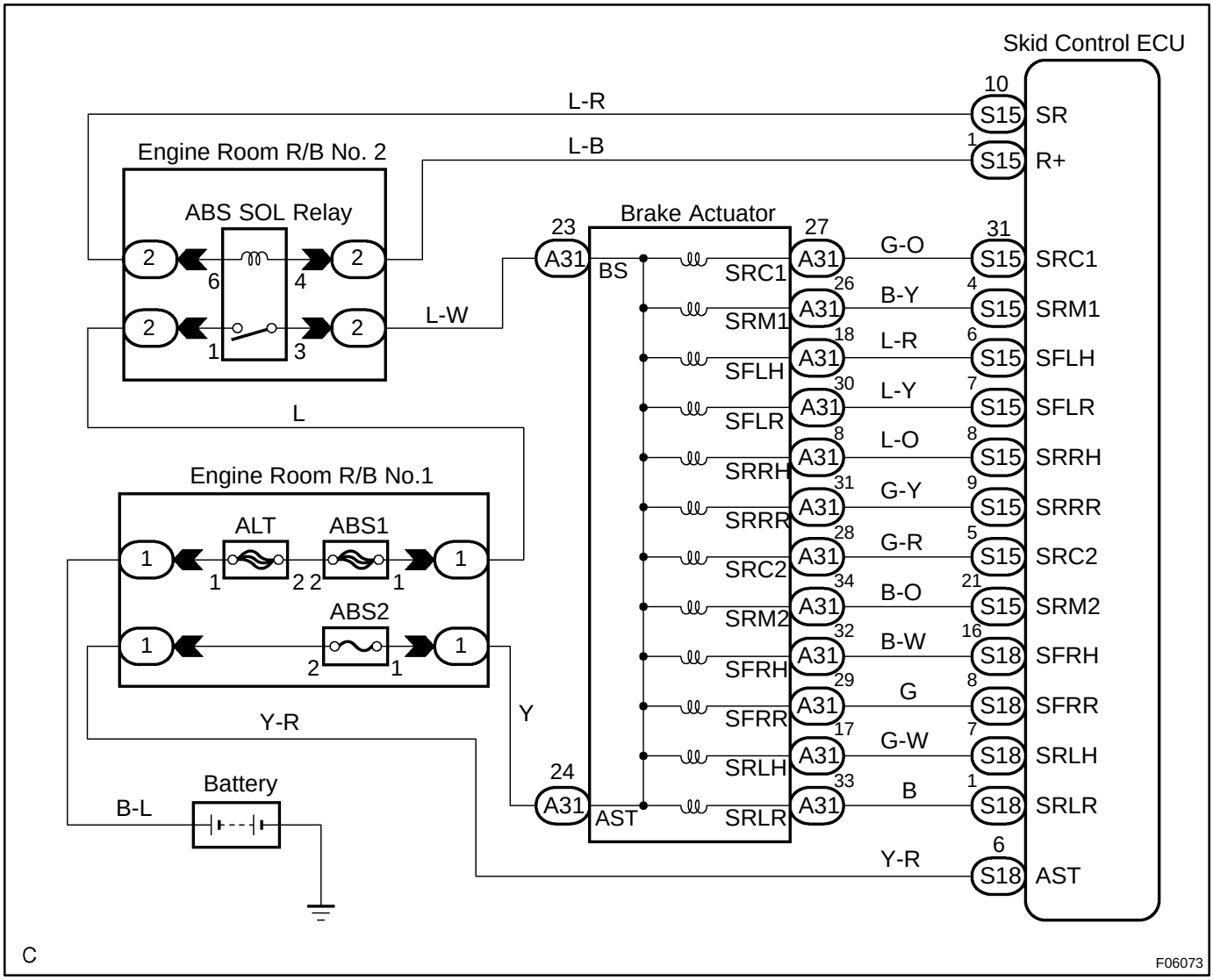
DTC	C0226 / 21 - C0256 / 24	ABS-Related Solenoid Circuits

CIRCUIT DESCRIPTION

ABS-related solenoids operate when signals are received from the ECU, and control the pressure acting on the wheel cylinders thus controlling the braking force.

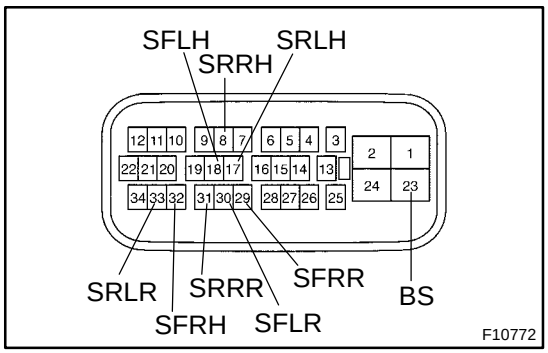
DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	Open or short circuit for SFRH or SFRR circuit continues for 0.05 sec. or more.	✓Brake actuator ✓SFRH or SFRR circuit
C0236 / 22	Open or short circuit for SFLH or SFLR circuit continues for 0.05 sec. or more.	✓Brake actuator ✓SFLH or SFLR circuit
C0246 / 23	Open or short circuit for SRRH or SRRR circuit continues for 0.05 sec. or more.	✓Brake actuator ✓SRRH or SRRR circuit
C0256 / 24	Open or short circuit for SRLH or SRLR circuit continues for 0.05 sec. or more.	✓Brake actuator ✓SRLH or SRLR circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake actuator solenoid.**



PREPARATION:

Disconnect the brake actuator connector.

CHECK:

Check continuity between terminal BS and terminals SFRH, SFLH, SRRH, SRLH, SFRR, SFLR, SRRR and SRLR of brake actuator.

OK:

Continuity

HINT:

Resistance of each solenoid at 25˚C

SFRH, SFLH, SRRH, SRLH: 8.1 - 9.1 Ω

SFRR, SFLR, SRRR, SRLR: 4.0 - 4.6 Ω

NG → **Replace brake actuator.**

OK ↓

2	**Check for open and short circuit in harness and connector between skid control ECU and brake actuator (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK ↓

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI7UM-02

DTC	C0273/13, C0274/14	ABS Motor Relay Circuit

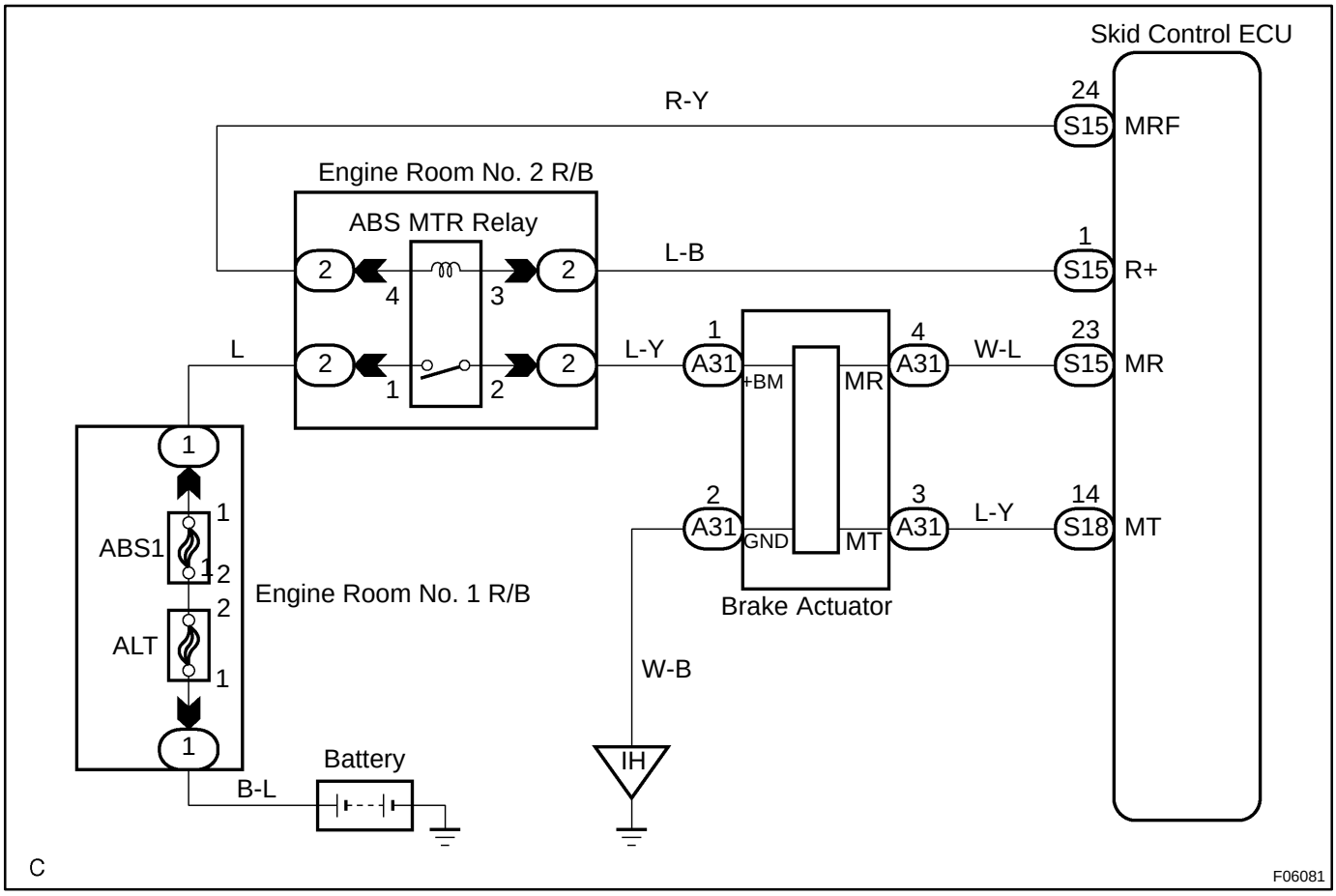
CIRCUIT DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. While the ABS & TRAC are activated, the ECU switches the motor relay ON and operates the ABS pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
C0273/13	Condition 1. or 2. continues for 0.2 sec. or more: 1. Skid control ECU terminal IG1 voltage is 9.5 V to 18.5 V, and when motor relay is ON in the midst of initial check or in operation of ABS control.*1 2. Motor relay is ON driving in the midst of initial check or in operation of ABS control, skid control ECU terminal IG1 voltage becomes 9.5 V or less.*2	ABS motor relay ABS motor relay circuit
C0274/14	Condition below continues for 4 sec. or more: When the motor relay is OFF, there is open circuit in MT terminal of skid control ECU.	

*1 Relay contact OFF condition: MT terminal voltage is below 3.6 V.
*2 Relay contact ON condition: MT terminal voltage is 3.6 V or above.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using hand-held tester.

1	**Check ABS motor relay operation.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check the operation sound of the ABS motor relay when operating it with the hand-held tester.

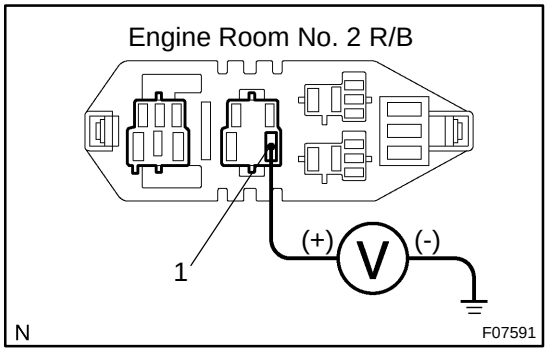
OK:

The operation sound of the ABS motor relay should be heard.

OK → **Go to step 4.**

NG

2	**Check voltage between terminal 1 of engine room No. 2 R/B (for ABS motor relay) and body ground.**



PREPARATION:

Remove the ABS motor relay from the engine room No. 2 R/B.

CHECK:

Measure voltage between terminal 1 of engine room No. 2 R/B (for ABS motor relay) and body ground.

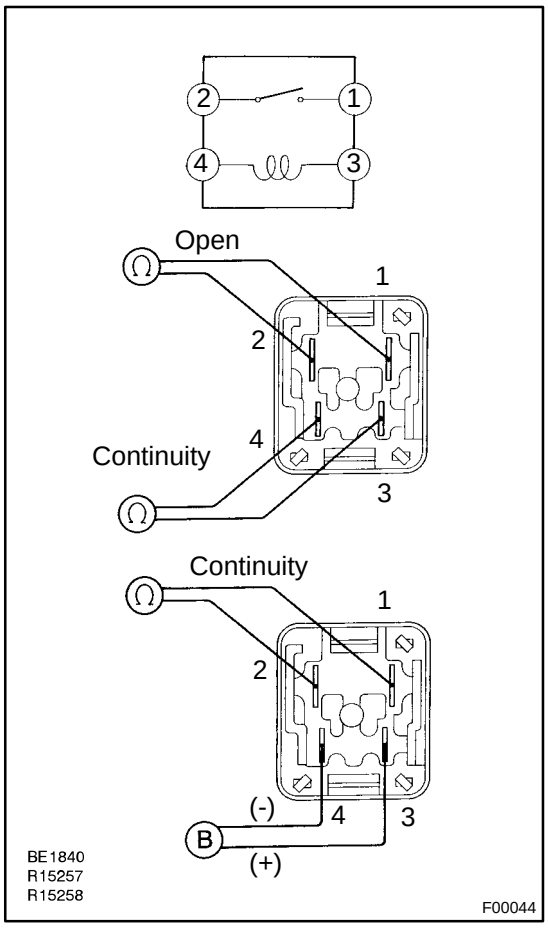
OK:

Voltage: 10 - 14 V

NG → **Check and repair harness or connector.**

OK

3	Check ABS motor relay.



CHECK:

Check continuity between each pair of terminal of motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value 62 Ω)
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

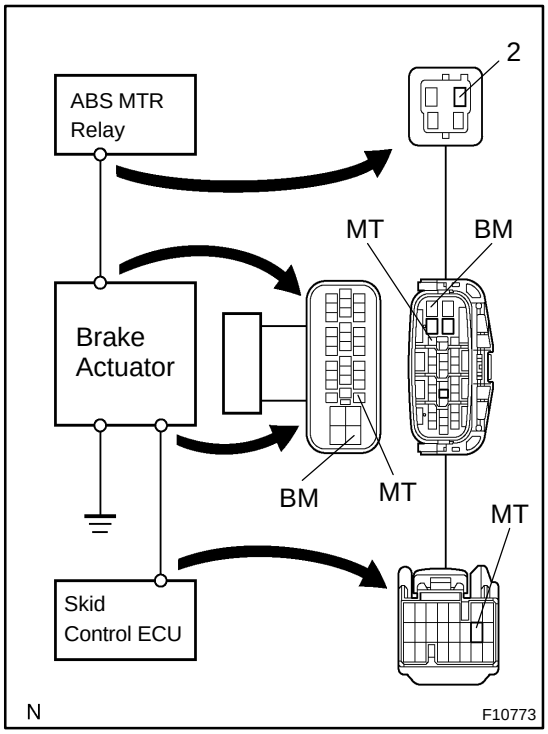
OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS motor relay.**

OK

4	**Check continuity between terminals 2 of engine room No. 2 R/B (for ABS motor relay) and terminal MT of skid control ECU.**



PREPARATION:

(a) Remove the ABS motor relay from the engine room No. 2 R/B.

(b) Disconnect the connector from the skid control ECU.

CHECK:

Check continuity between terminals 2 of engine room No. 2 R/B (for ABS motor relay) and terminal MT of skid control ECU harness side connector.

OK:

Continuity

HINT:

There is a no continuity between terminals BM and MT of brake actuator.

NG → **Repair or replace harness or brake actuator.**

OK

5	**Check for open and short circuit in harness and connector between ABS motor relay and skid control ECU (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI7UN-02

DTC	C0278/11, C0279/12	ABS Solenoid Relay Circuit

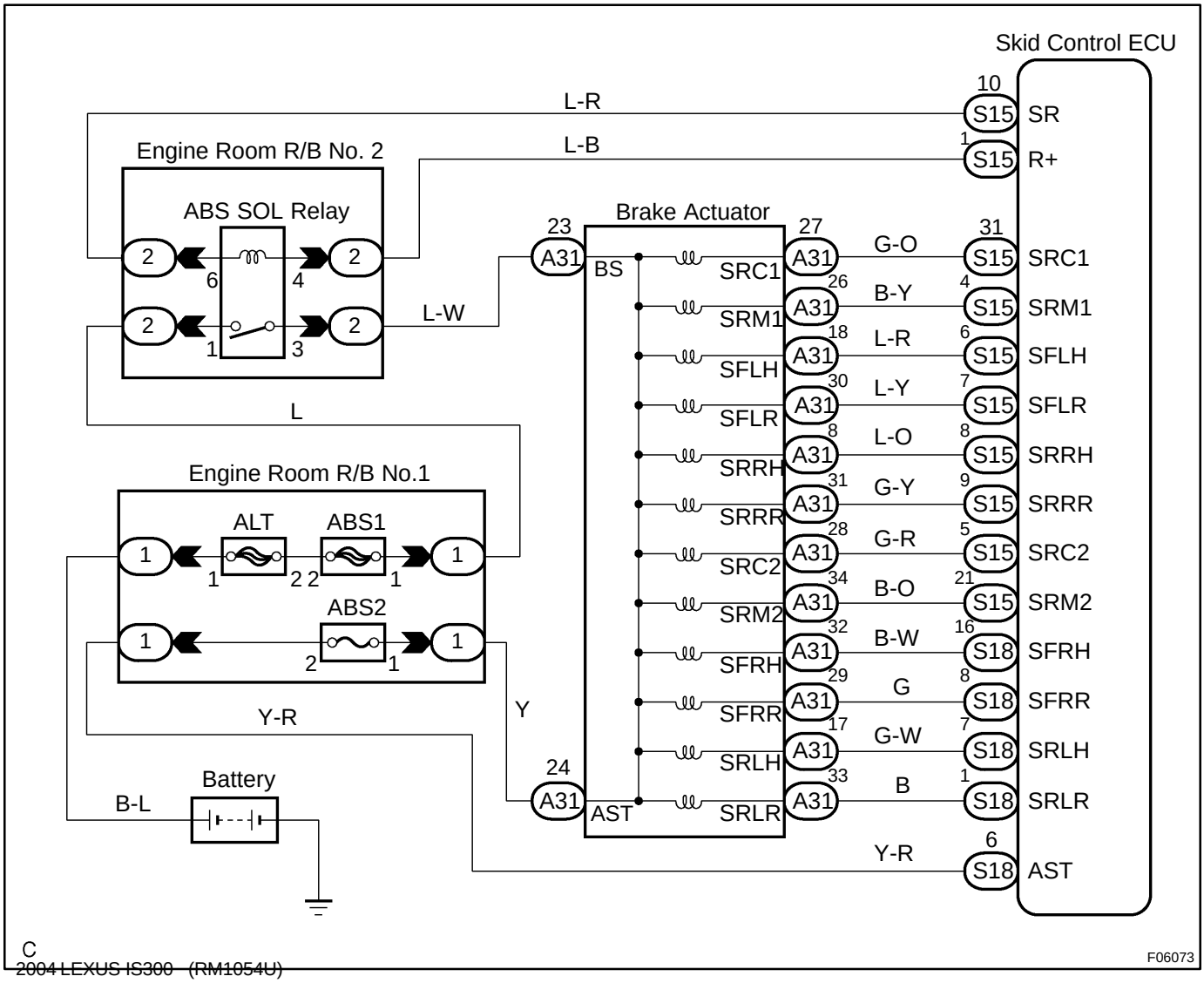
CIRCUIT DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
C0278/11	Condition 1. or 2. continues for 0.2 sec. or more: 1. IG1 terminal voltage of skid control ECU is 9.5 - 18.5 V, and when the solenoid relay is ON.*1 2. With solenoid relay ON driving, when IG1 terminal of skid control ECU is less than 9.5 V.*1	✓ABS solenoid relay ✓ABS solenoid relay circuit
C0279/12	Immediately after IG switch has been turned ON, when the solenoid relay is OFF.*2	

*1 Solenoid relay contact OFF condition:
All of solenoid terminal voltage is half of IG1 terminal voltage or less than.
*2 Solenoid relay contact ON condition:
All of solenoid terminal voltage is half of IG 1 terminal voltage or more.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check ABS solenoid relay operation.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check the operation sound of the ABS solenoid relay when operating it with the hand-held tester.

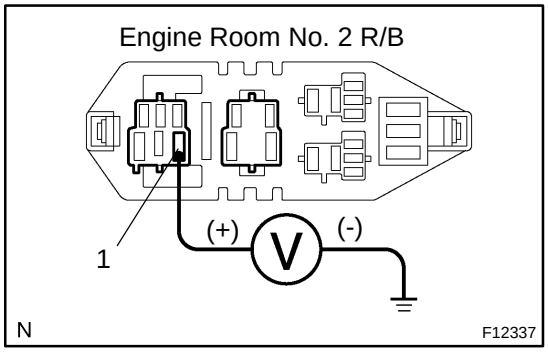
OK:

The operation sound of the ABS solenoid relay should be heard.

OK → **Go to step 4.**

NG

2	**Check voltage between terminals 1 of engine room No. 2 R/B (for ABS solenoid relay) and body ground.**



PREPARATION:

Remove the ABS solenoid relay from the engine room No. 2 R/B.

CHECK:

Measure the voltage between terminals 1 of engine room No. 2 R/B (for ABS solenoid relay) and body ground.

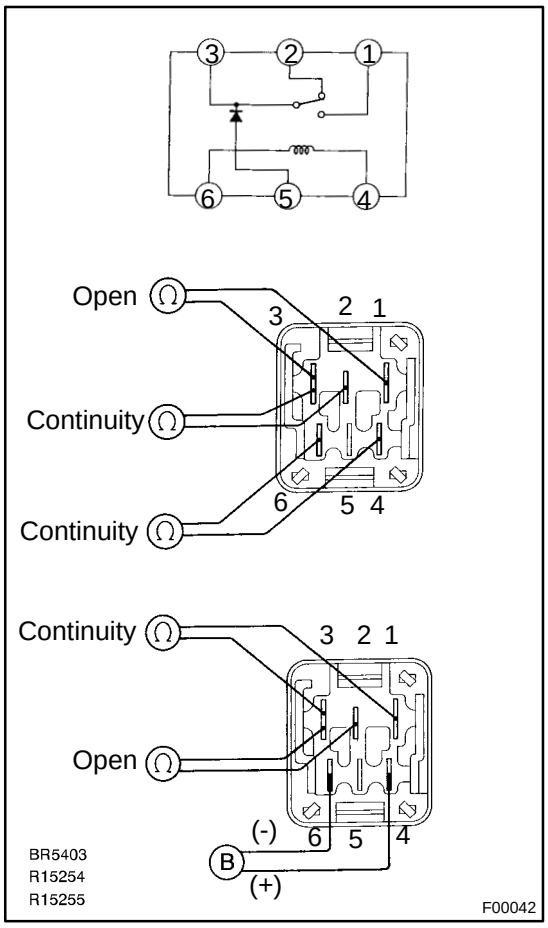
OK:

Voltage: 10 - 14 V

NG → **Check and repair harness or connector.**

OK

3	Check ABS solenoid relay.



CHECK:

Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

CHECK:

(a) Apply battery positive voltage between terminals 4 and 6.

(b) Check continuity between each terminal of ABS solenoid relay.

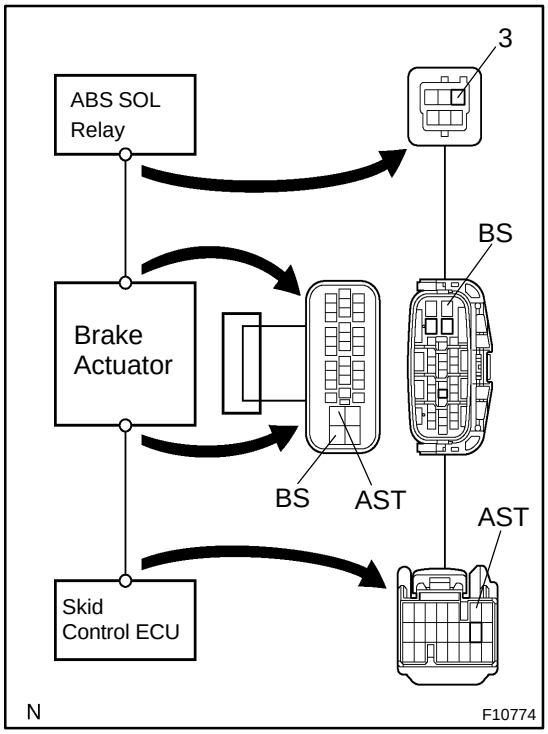
OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG → **Replace ABS solenoid relay.**

OK

4	Check continuity between terminals 3 of engine room No. 2 R/B (for ABS solenoid relay) and terminal AST of skid control ECU.



PREPARATION:

(a) Remove the ABS solenoid relay from the engine room No. 2 R/B.

(b) Disconnect the connector from the skid control ECU.

CHECK:

Check continuity between terminals 3 of engine room No. 2 R/B (for ABS solenoid relay) and terminal AST of skid control ECU harness side connector.

OK:

Continuity

NG → **Repair or replace harness or brake actuator.**

OK

5	Check for open and short circuit in harness and connector between ABS solenoid relay and skid control ECU (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI7UO-01

DTC	C1201/51	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If any trouble occurs in the engine control system, the ECU prohibits TRAC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1201/51	Low fluid level condition in the brake master cylinder reservoir tank continues for 10 sec. or more	Engine control system

INSPECTION PROCEDURE

1	**Check the DTC for the engine (See page DI-3).**

***1** → **Repair engine control system according to the code output.**

***2**

Check for ECM connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON

DI7UP-02

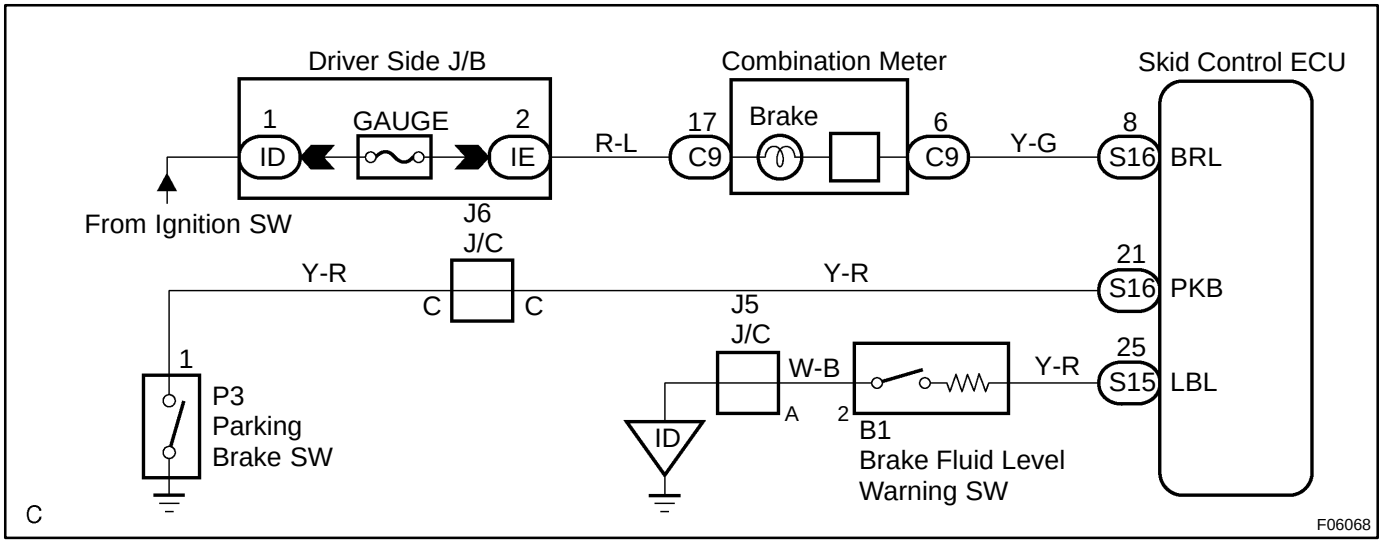
DTC	C1202/52	Brake Fluid Warning Switch Circuit

CIRCUIT DESCRIPTION

The brake fluid level warning switch sends the appropriate signal to the ECU when the brake fluid level drops.
HINT:
Pull the parking brake lever also turns on the brake warning light but does not diagnose DTC No. C1202 / 52.

DTC No.	DTC Detecting Condition	Trouble Area
C1202/52	Low master reservoir fluid level condition continues for 30 sec. or more when vehicle stops, or for 60 sec. or more when driving.	✓Brake fluid level ✓Brake fluid level warning switch ✓Brake fluid level warning switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake fluid level.**

CHECK:
Check the amount of fluid in the brake reservoir.

NG → **Check and repair brake fluid leakage and add fluid.**

OK

2	Check brake fluid level warning switch (See page BE-89).

NG → Replace brake fluid level warning switch.

OK

3	Check for open circuit in all the harness and components connected to BRAKE fluid level warning light (See page IN-33).

NG → Repair or replace harness or connector.

OK

Check and replace skid control ECU (See page IN-33).

DI7UQ-02

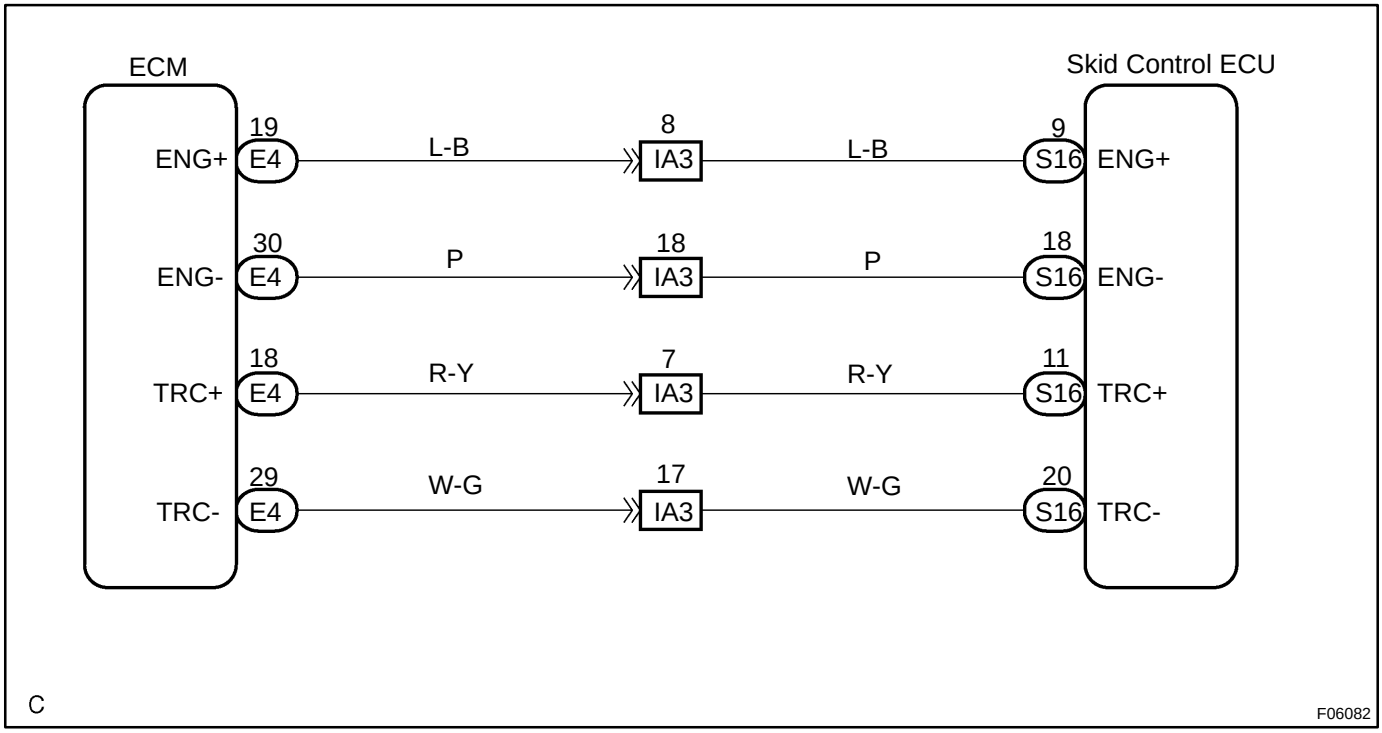
DTC	C1203/53	ECM Communication Circuit Malfunction

CIRCUIT DESCRIPTION

The circuit is used to send TRAC control information from the skid control ECU to the ECM (TRC+, TRC-), and engine control information from the ECM to the skid control ECU (ENG+, ENG-).

DTC No.	DTC Detecting Condition	Trouble Area
C1203/53	Either of the following 1., 2. or 3. continues for 5 sec.: 1. When ECU terminal IG1 voltage is 9.5 V or more, the condition that the data is not transmitted to ECM continues for more than 5 sec. 2. When ECU terminal IG1 voltage is 9.5 V or more, engine speed is 500 rpm or more and data receipt from ECM is impossible. 3. The condition that the data sent from ECM becomes repeatedly normal and abnormal occurs 10 times or more for 60 sec.	✓TRC+ or TRC- circuit ✓ENG+ or ENG- circuit ✓ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between terminals ENG+, ENG-, TRC+, TRC- of skid control ECU and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK ↓

Check and replace ECM or skid control ECU (See page IN-33).

DI7UR-02

DTC	C1223/43	ABS Control System Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1223/43	ABS control system is abnormal.	ABS control system

INSPECTION PROCEDURE

1	**Check the DTC for the ABS (See page DI-427).**

***1** → **Repair ABS control system according to the code output.**

***2**

Check for ECU connected to malfunction indicator lamp.

*1: Output NG code
*2: Malfunction indicator lamp remains ON

DI7US-02

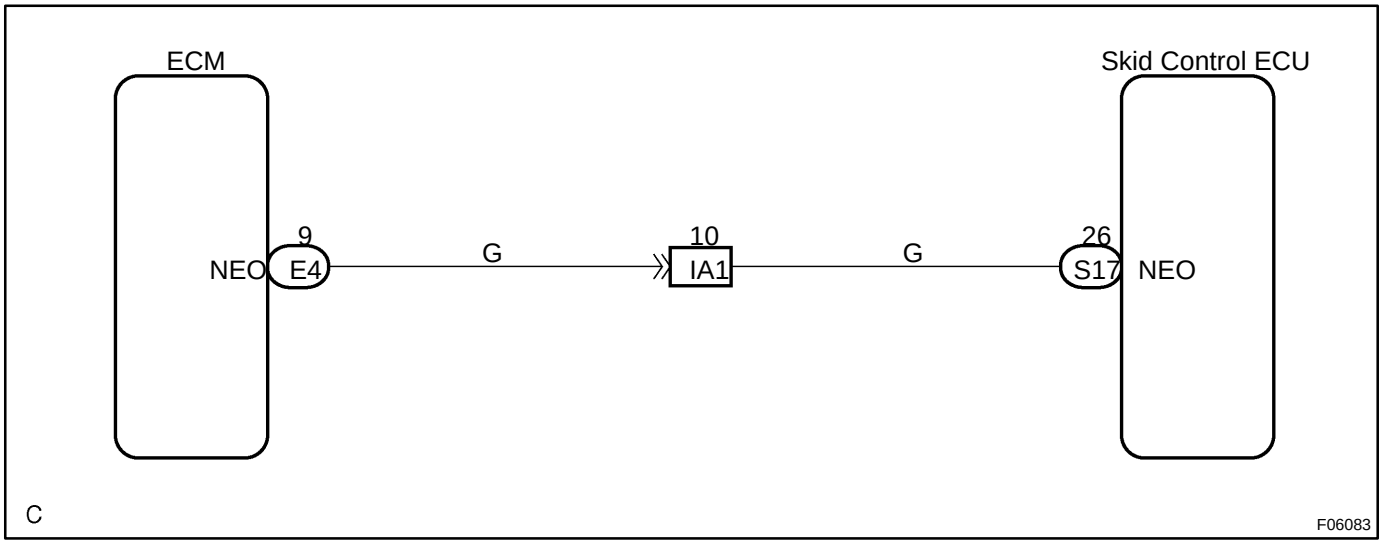
DTC	C1224/44	NE Signal Circuit

CIRCUIT DESCRIPTION

The skid control ECU receives engine revolution speed signals (NE signals) from the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
C1224/44	When any of the following 1. through 2. is detected: 1. At vehicle speed of 30 km/h (19 mph) or more, and when data receiving from the ECM is in normal condition, and open or short circuit for engine revolution signal circuit continues for 10 sec. or more. 2. While TRAC is operating and when open or short circuit for engine revolution signal circuit continues for 0.24 sec. or more.	~~NEO circuit ~~ECM

WIRING DIAGRAM



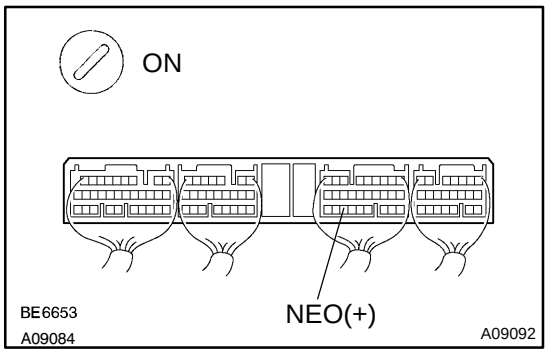
INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between terminals NEO of skid control ECU and terminal NEO of ECM (See page IN-33).**

NG → **Repair or replace harness and connector.**

OK

2	Check voltage between terminals NEO of skid control ECU and body ground.



PREPARATION:

(a) Remove the skid control ECU with connectors still connected.

(b) Turn the ignition switch ON.

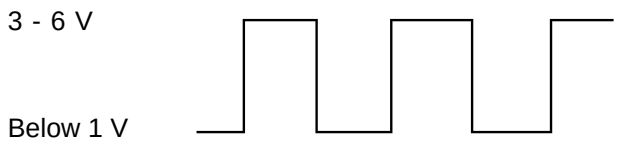
CHECK:

Measure voltage between terminal NEO of skid control ECU and body ground for the engine conditions below.

OK:

Engine condition	Voltage
OFF (IG ON)	3 - 6 V or below 1 V
ON (Idling)	3 - 6 V ↔ below 1 V (Pulse)

(Reference)



NG → **Check and replace skid control ECU or ECM (See page IN-33).**

OK

If the same codes is still output after the DTC is deleted, check the contact condition of each connection.

DI9J9-01

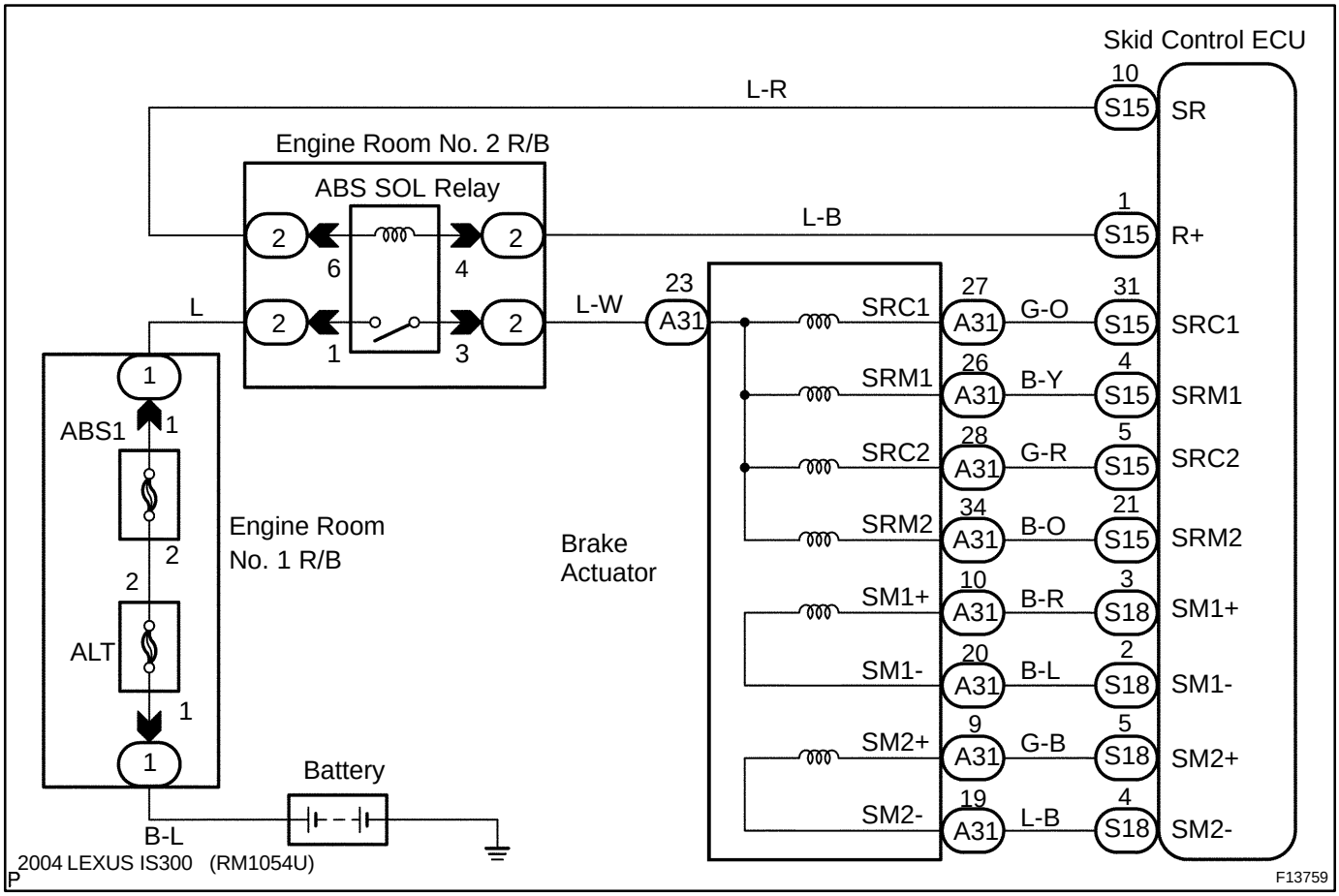
DTC	C1225 / 25 - C1227 / 27	TRAC & VSC-Related Solenoid Circuits

CIRCUIT DESCRIPTION

The TRAC & VSC solenoids operate in accordance with signals from the ECU and raise the fluid pressure in and release it from the brake cylinders.

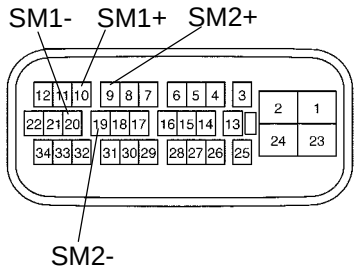
DTC No.	DTC Detecting Condition	Trouble Area
C1225 / 25	Detection of any of conditions 1. through 6.: 1. When SMF or SMR is ON, excessive electric current on SMF or SMR continues for 0.05 sec. or more. 2. When SMF or SMR is OFF, open circuit of SMF or SMR continues for 0.05 sec. or more. 3. When SMF or SMR is ON, open circuit of SMF or SMR continues for 0.1 sec. or more. 4. When SMF or SMR is OFF, electric current application on SMF or SMR continues for 0.1 sec. or more. 5. GND short circuit if SMF or SMR continues for 0.1 sec. or more. 6. Short circuit of SMF or SMR continues for 0.1 sec. or more.	⁄ Brake actuator ⁄ SMF or SMR circuit
C1226 / 26	Open or short circuit of SRMF or SRMR continues for 0.05 sec. or more.	⁄ Brake actuator ⁄ SRMF or SRMR circuit
C1227 / 27	Open or short circuit of SRCF or SRCR continues for 0.05 sec. or more.	⁄ Brake actuator ⁄ SRCF or SRCR circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake actuator solenoid.**



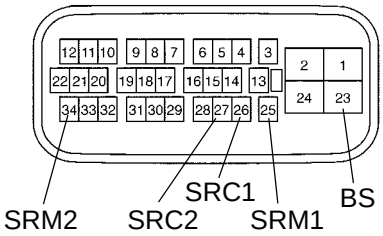
PREPARATION:
Disconnect the brake actuator connector.
CHECK:
Check continuity between terminals SM1+ - SM1-, and terminals SM2+ - SM2- of brake actuator.
OK:

Continuity

HINT:
Resistance of each solenoid: 8.1 - 9.1 Ω at 25 °C
CHECK:
Check continuity between terminal BS and terminals SRC1, SRC2, SRM1 and SRM2 of brake actuator.
OK:

Continuity

HINT:
Resistance of each solenoid at 25 °C
SRC1, SRC2: 8.1 - 9.1 Ω
SRM1, SRM2: 4.9 - 5.5 Ω



NG → **Replace brake actuator.**

OK ↓

2	**Check for open and short circuit in harness and connector between skid control ECU and brake actuator (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK ↓

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

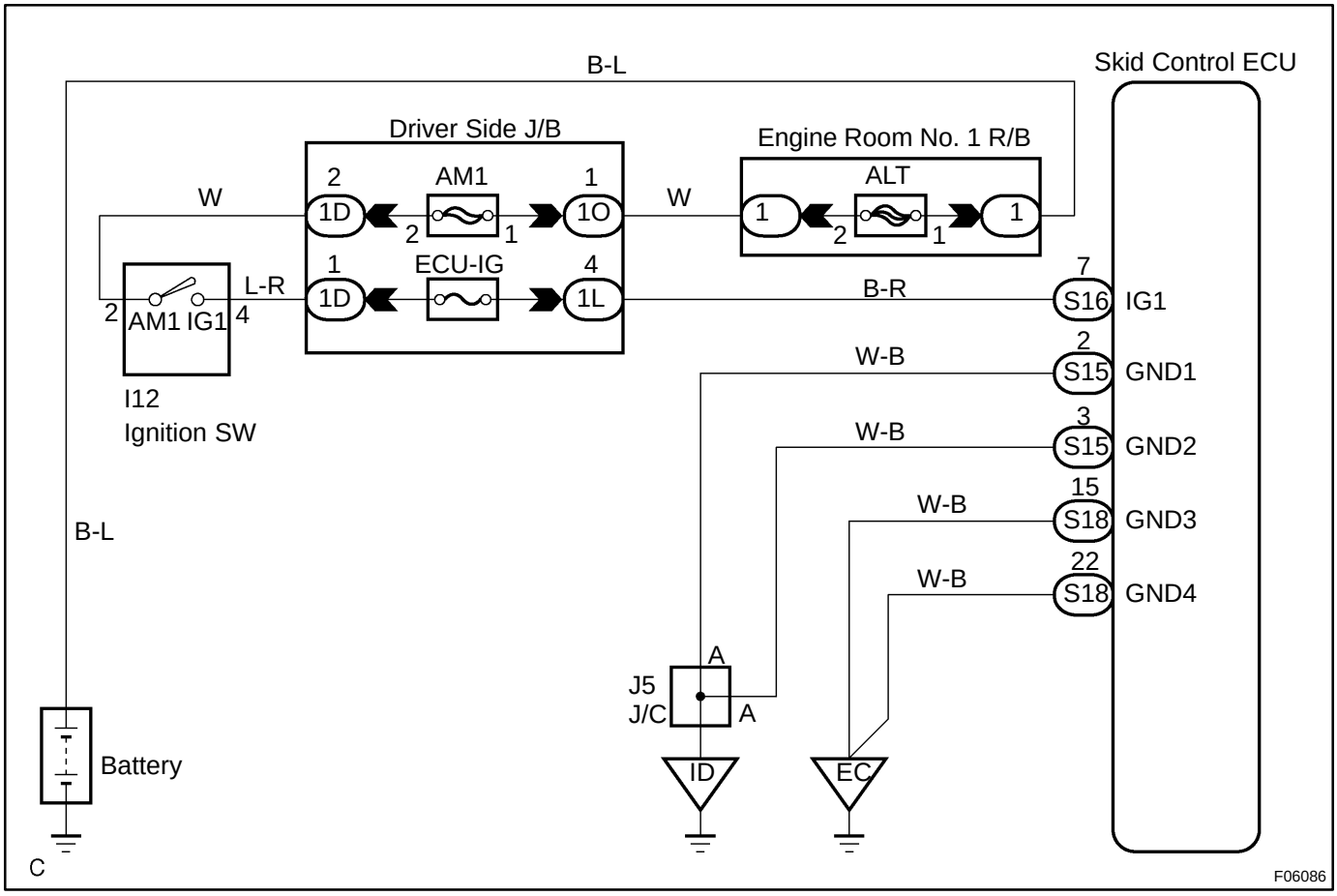
DI7UT-02

DTC	C1241/41	IG Power Source Circuit

CIRCUIT DESCRIPTION

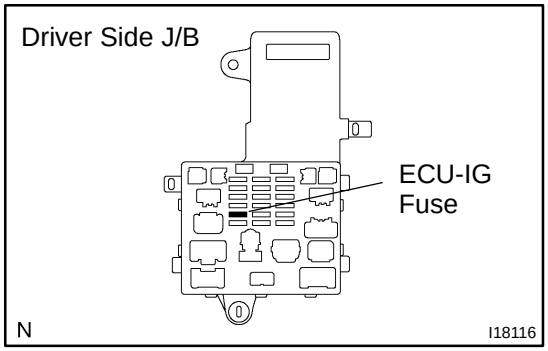
DTC No.	DTC Detecting Condition	Trouble Area
C1241/41	Condition 1. or 2. is detected: 1. Vehicle speed is at 3 km/h (1.9 mph) or more and ECU terminal IG1 voltage is 9.5 V or less , which continues for 10 sec. or more. 2. When IG1 terminal voltage is less than 9.5 V, there is open circuit in the motor relay or in the solenoid relay, or the solenoid circuit malfunction.	∕ Battery ∕ Charging system ∕ Power source circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ECU-IG fuse.**



PREPARATION:
Remove ECU-IG fuse from driver side J/B.
CHECK:
Check continuity of ECU-IG fuse.
OK:
Continuity

NG → **Check for short circuit in all the harness and components connected to ECU-IG fuse (See attached wiring diagram).**

OK

2	**Check battery positive voltage.**

OK:
Voltage: 10 - 14 V

NG → **Check and repair the charging system (See page CH-1).**

OK

3	**Check voltage of the ECU IG power souce.**

In case of using the hand-held tester.

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

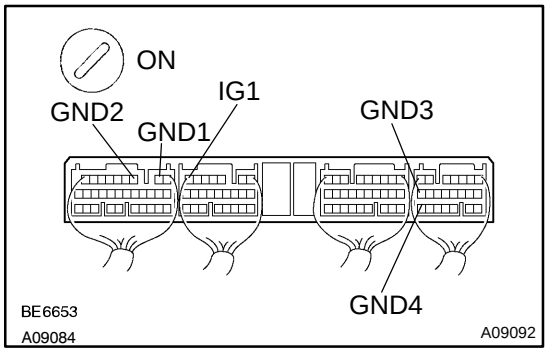
CHECK:

Check the voltage condition output from the ECU displayed by the hand-held tester.

OK:

"Normal" is displayed.

In case of not using the hand-held tester.



PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG1 and GND of skid control ECU.

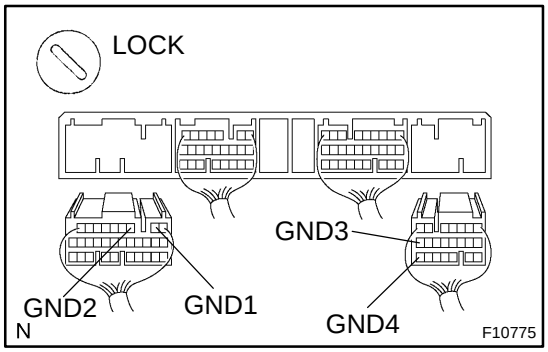
OK:

Voltage: 10 - 14 V

OK	**Ignition switch OFF, check and replace skid control ECU.**

NG

4	**Check continuity between terminal GND of skid control ECU connector and body ground.**



CHECK:

(a) Disconnect the 2 connector from the skid control ECU.

(b) Measure resistance between terminal GND of skid control ECU connector and body ground.

OK:

Resistance: 1 Ω or less

NG → **Repair or replace harness or connector.**

OK

Check for open circuit in harness and connector between skid control ECU and battery (See page IN-33).

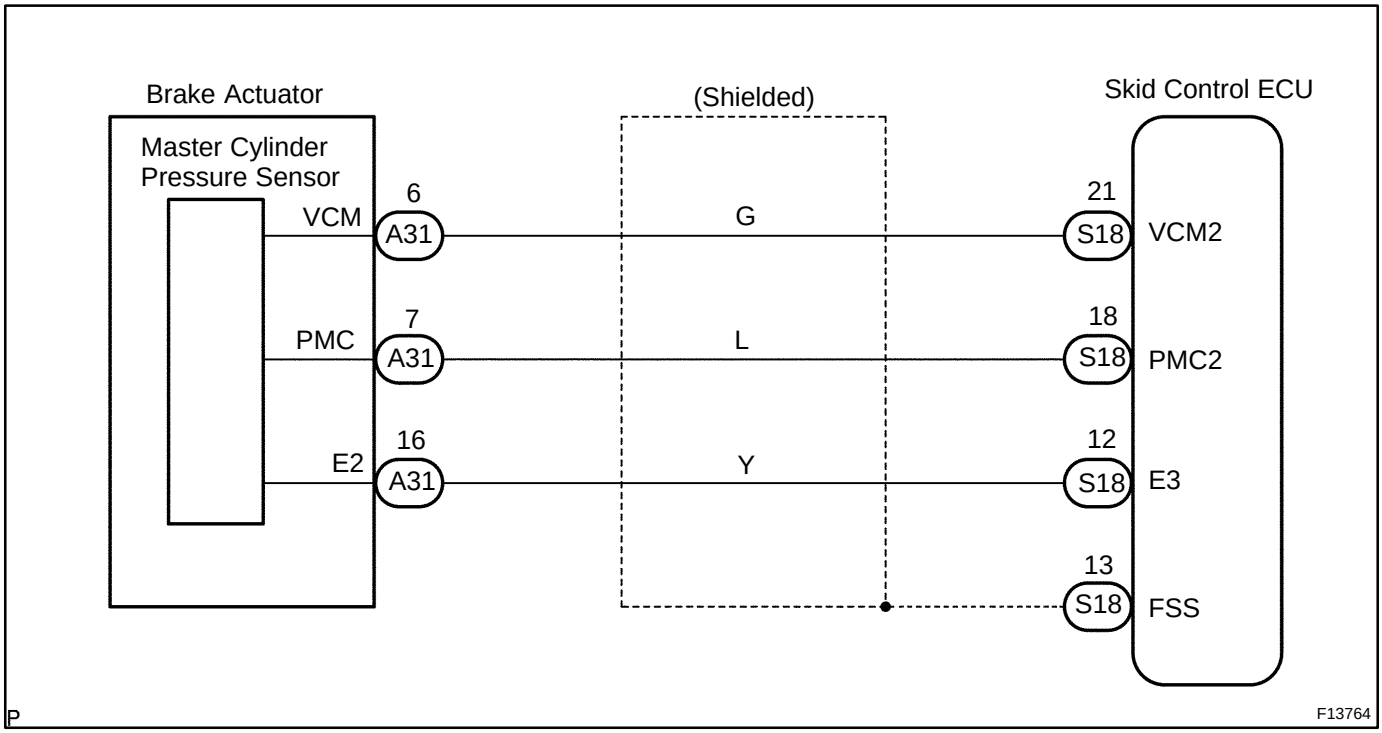
DI1GN-13

DTC	C1246 / 46	Master Cylinder Pressure Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1246 / 46	Detection of any of conditions 1. through 5.: 1. When the vehicle speed is 7 km/h (4 mph) or more and ECU PMC terminal voltage exceeds 0.86 V, the condition that the voltage does not change 0.005 V or more continues for 30 sec. 2. Noise in ECU PMC terminal occurs 7 times or more in 5 sec. 3. When the ECU STP terminal is OFF, the condition that ECU PMC terminal voltage is 0.86 V or more, or less than 0.3 V continues for 5 sec. or more. 4. When IG1 terminal voltage is 9.5 to 17.2 V, the condition that ECU VCM terminal voltage is out of the range from 4.4 to 5.6 V continues for 1.2 sec. or more. 5. When ECU VCM terminal voltage is 4.4 to 5.6 V, the condition that the ECU PMC terminal voltage is out of the range from 0.14 to 4.85 V continues for 1.2 sec. or more.	✓Master cylinder pressure sensor ✓Master cylinder pressure sensor circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of the master cylinder pressure sensor.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and turn the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that the brake fluid pressure value of the master cylinder pressure sensor observed in the hand-held tester is changing when the brake pedal is being depressed.

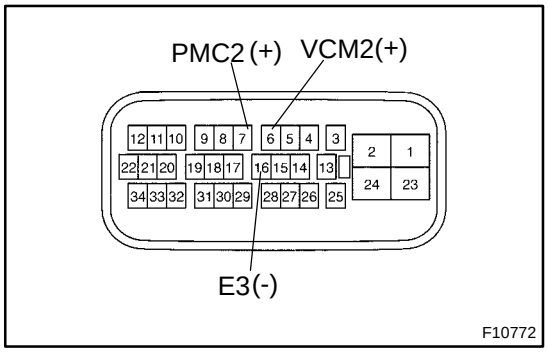
OK:

Brake fluid pressure value must be changing.

OK → **Go to step 4.**

NG

2	**Check master cylinder pressure sensor.**



PREPARATION:

Install LSPV gauge to the front caliper bleeder plug portion, and bleed air from LSPV gauge.

SST 09709-29018

CHECK:

Start the engine and depress the brake pedal, then check how the fluid pressure affects voltage of PMC2 and E3 terminals of the master cylinder pressure sensor with the connector still connected to it.

OK:

Front brake caliper fluid pressure	Voltage
0 kPa (0 kgf/cm^2, 0 psi)	0.37 - 0.63 V
5,883 kPa (60 kgf/cm^2, 853 psi)	1.57 - 1.83 V
11,768 kPa (120 kgf/cm^2, 1,706 psi)	2.77 - 3.03 V

HINT:

Voltage of between terminals VCM2 and E3: 4.7 - 5.3 V

NG → **Replace brake actuator.**

OK

3	Check for open and short circuit in harness and connector between master cylinder pressure sensor and skid control ECU (See page IN-33).

NG → Repair or replace harness or connector.

OK

4	Check whether or not the ECU terminal STP input voltage is changes when the stop light switch is turned on and off.

NO → Check stop light switch circuit (See page BE-2).

YES

Check and replace skid control ECU (See page IN-33).

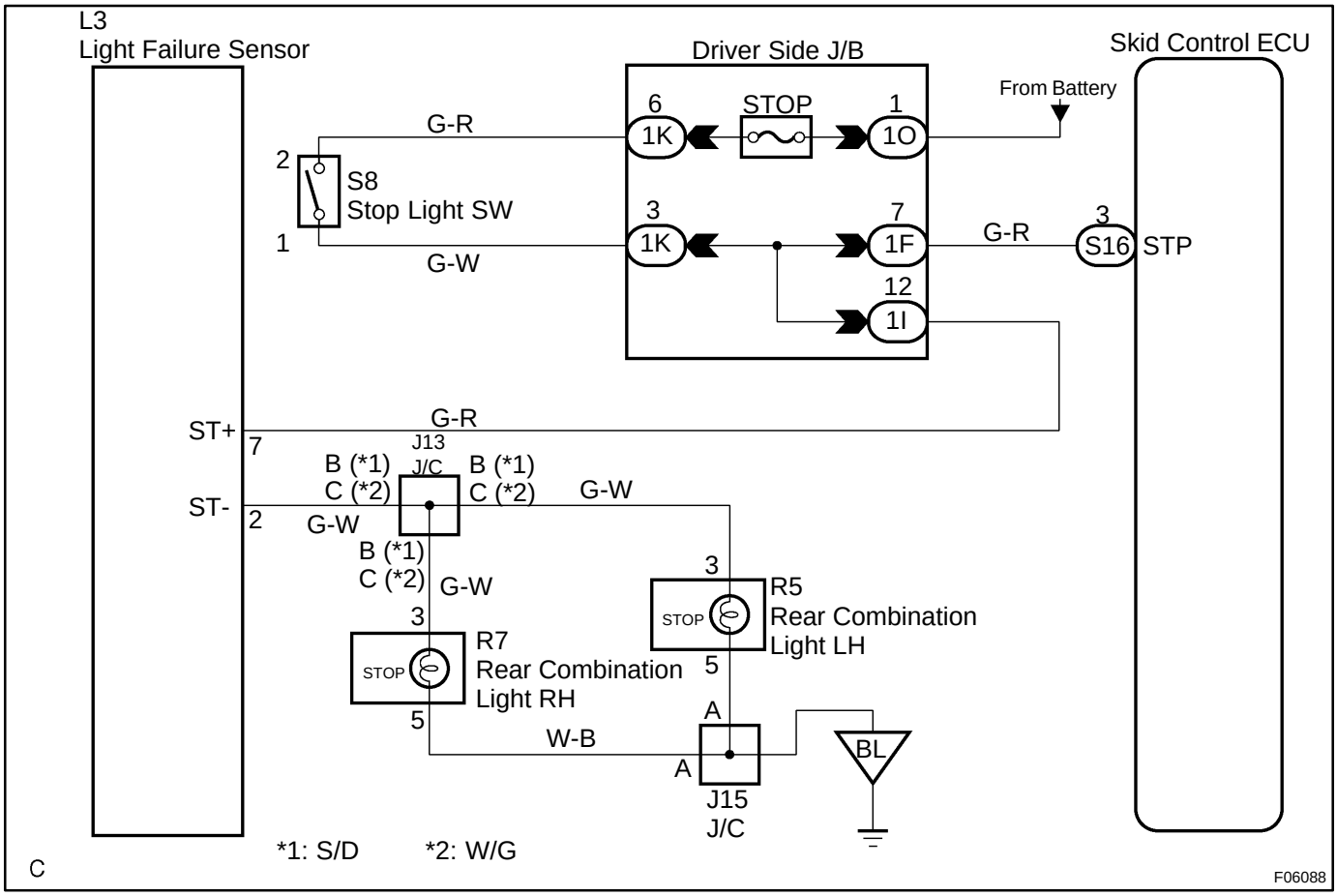
DI7UU-02

DTC	C1249/49	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1249/49	1. ECU terminal IG1 voltage is 9.5 to 17.2 V and ABS is in non-operation, the open circuit of stop light switch circuit continues for 0.3 sec. or more. 2. When the following (a) to (d) continue for 2 sec. or more: (a) Brake pedal load sensing switch is ON. (b) Master cylinder pressure is 2 MPa or more. (c) The presumed gravity on the vehicle is 0.2 G or more. (d) Stop light switch is OFF.	✓Stop light switch ✓Stop light switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of the stop light switch.**

CHECK:

Check that the stop light lights up when brake pedal is depressed and turns off when the brake pedal is released.

OK → **Go to step 3.**

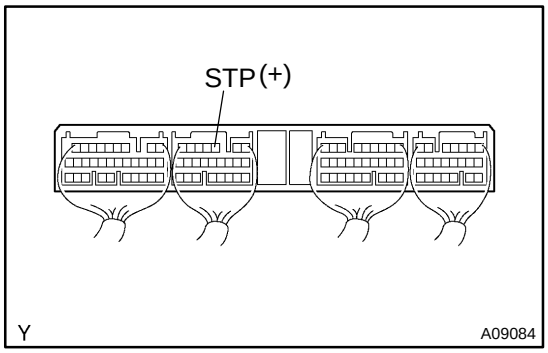
NG

2	**Check stop light circuit (See page BE-68).**

NG → **Repair or replace stop light circuit.**

OK

3	**Check voltage between terminal STP of skid control ECU and body ground.**



PREPARATION:

Remove skid control ECU with connectors still connected.

CHECK:

Measure voltage between terminal STP of skid control ECU and body ground when brake pedal is depressed.

OK:

Voltage: 10 - 14 V

OK → **Check and replace skid control ECU (See page IN-33).**

NG

4	**Check for open circuit in harness and connector between skid control ECU and stop light switch (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-438).

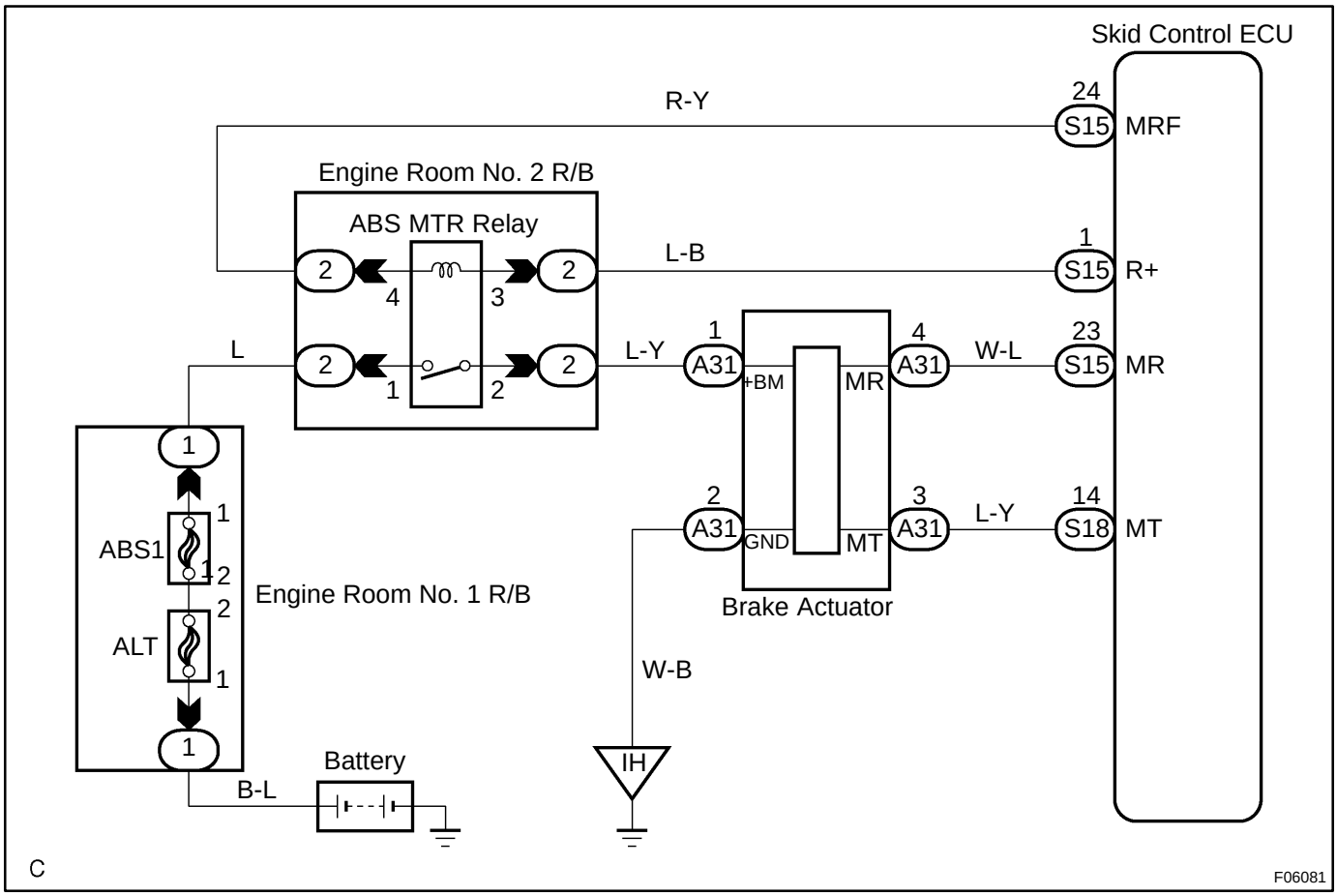
DI7UV-02

DTC	C1251/51	ABS Pump Motor Lock

CIRCUIT DESCRIPTION

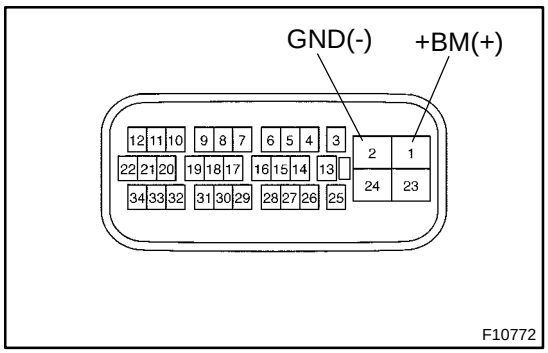
DTC No.	DTC Detecting Condition	Trouble Area
C1251/51	Either of the following 1. or 2. is detected: 1. Actuator drive motor is not operating normally. 2. Open circuit condition of actuator drive motor continues for 2 sec. or more.	✓Brake actuator ✓Brake actuator Circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of pump motor.**



PREPARATION:

Disconnect the connector from the brake actuator.

CHECK:

Connect positive ± lead to BM terminal and negative ⊖ lead to GND terminal of the brake actuator, check that the pump motor is operated.

OK:

The running sound of the pump motor should be heard.

OK

Check for open circuit in harness and connector between motor relay, brake actuator and skid control ECU (See page IN-33).

NG

Replace brake actuator.

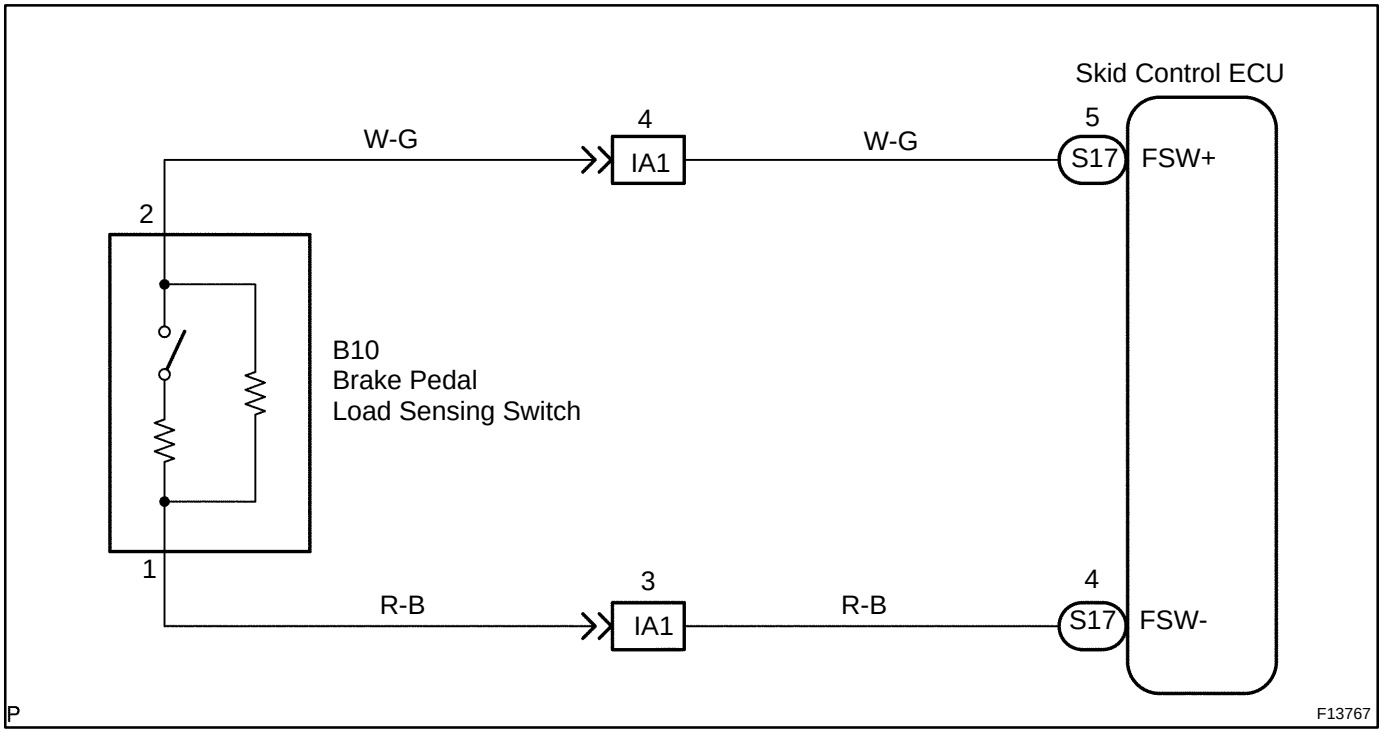
DI7AR-04

DTC	C1267 / 67	Brake Pedal Load Sensing Switch

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1267 / 67	Detection of any of conditions 1. through 4: 1. Open or short circuit of the brake pedal load sensing switch continues for 0.3 sec. or more. 2. Immediately after the ignition switch is turned ON, the condition that the brake load sensing switch is ON and the stop light switch is OFF continues for 10 sec. or more. 3. While the vehicle speed becomes 30 km/h (18 mph) or more from 0 km/h (0 mph), the condition that the brake pedal load sensing switch remains ON occurs 5 times continuously. 4. The condition that the stop light switch is ON, the brake pedal load sensing switch is OFF, the master cylinder pressure is 5 Mpa or more and deceleration is 0.4 G or more continues for 1 sec. or more.	✓Brake pedal load sensing switch ✓Brake pedal load sensing switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of the brake pedal load sensing switch.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and turn the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that the brake pedal load sensing switch value observed in the hand-held tester is changing when the brake pedal is being depressed.

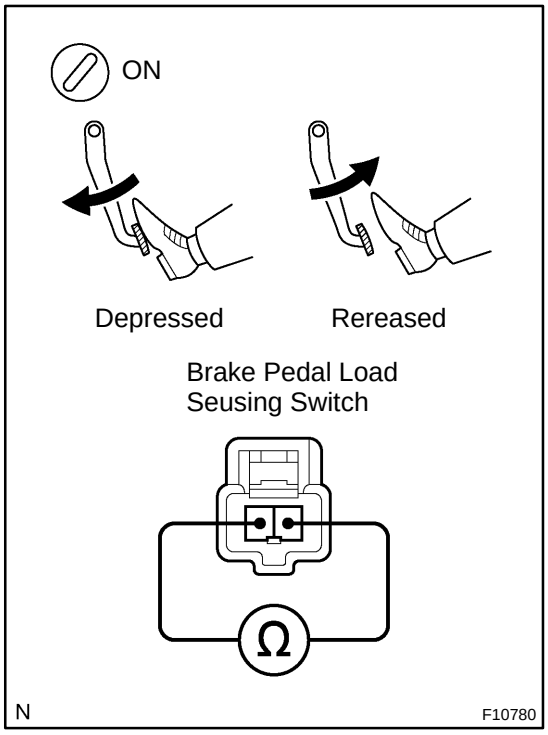
OK:

Brake pedal load sensing switch value must be changing.

OK → **Go to step 4.**

NG

2	**Check brake pedal load sensing switch.**



PREPARATION:

Disconnect the brake pedal load sensing switch connector.

CHECK:

Measure resistance between each terminal of brake pedal load sensing switch when brake pedal is depressed.

OK:

Brake pedal depressed	Resistance (about 1 kΩ)
Brake pedal released	Resistance (about 213 Ω)

NG → **Replace brake pedal assembly.**

OK

3	**Check for open and short circuit in harness and connector between brake pedal load sensing switch and skid control ECU.**

NG → **Repair or replace harness or connector.**

OK

4	**Check whether or not the ECU terminal STP input voltage changes when the stop light switch is turned on and off.**

NO → **Check the stop light switch circuit (See page BE-2).**

YES

Check and replace skid control ECU.

DI9JA-01

DTC	Always ON	Skid Control ECU Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	Skid control ECU internal malfunction is detected.	✓Combination meter ✓Combination meter circuit ✓Battery ✓Skid control ECU

INSPECTION PROCEDURE

1	**Is DTC output?**

Check DTC on page DI-497 .

YES → **Repair circuit indicated by the code output.**

NO

2	**Is normal code displayed?**

YES → **Check solenoid relay. Check for short circuit in harness and connector between solenoid relay and check connector (See page IN-33).**

NO

3	**Does ABS warning light go off?**

YES → **Check for open or short circuit in harness and connector between ECU-IG fuse and skid control ECU (See page IN-33).**

NO

4	**Check battery positive voltage.**

CHECK:

Check the battery positive voltage.

OK:

10 - 14 V

NG → **Check and repair the charging system (See page CH-1).**

OK

5	**Check ABS warning light.**

PREPARATION:

(a) Turn the ignition switch OFF.

(b) Disconnect the connector from the skid control ECU.

(c) Turn the ignition switch ON.

CHECK:

Check the ABS warning light goes off.

OK → **Check and replace skid control ECU (See page IN-33).**

NG

Check for short circuit in harness and connector between ABS warning light, DLC3 and skid control ECU (See page IN-33).

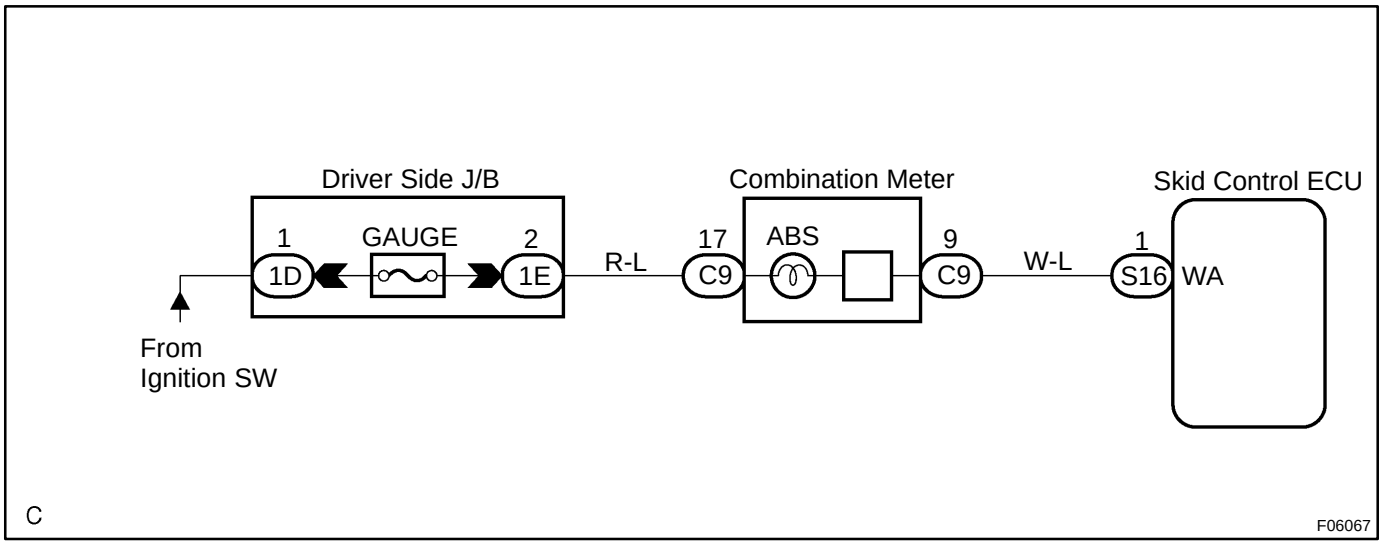
DI7UX-02

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects a trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a DTC in memory.
Connect terminals Tc and CG of the DLC3 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Troubleshooting in accordance with the chart below for each trouble symptom.

ABS warning light does not light up	*1
ABS warning light remains on	*2

*1: Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using hand-held tester.
*2: After inspection with step 3, start the inspection from step 4 in case of using the hand-held tester and start from step 5 in case of not using hand-held tester.

1	**Check operation of the ABS warning light.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check that ”ON” and ”OFF” of the ABS warning light can be shown on the combination meter by the hand-held tester.

HINT:

ABS warning light turns ”OFF” automatically 2 seconds after is turned ”ON”.

OK → **Check and replace skid control ECU.**

NG

2	**Check ABS warning light.**

See combination meter troubleshooting (See page BE-2).

NG → **Repair bulb or combination meter assembly (See page BE-86).**

OK

3	**Check that the skid control ECU connectors are securely connected to the skid control ECU.**

NO → **Connect the connector to the skid control ECU.**

YES

4	**Check for open circuit in harness and connector between combination meter and skid control ECU (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

5	**Check operation of the ABS warning light (See step 1).**

OK → **Check and replace skid control ECU (See page IN-33).**

NG

6	**Is DTC output?**

Check DTC on page DI-497 .

YES → **Repair circuit indicated by the output code.**

NO

Check for short circuit in harness and connector between DLC3 and skid control ECU (See page IN-33).

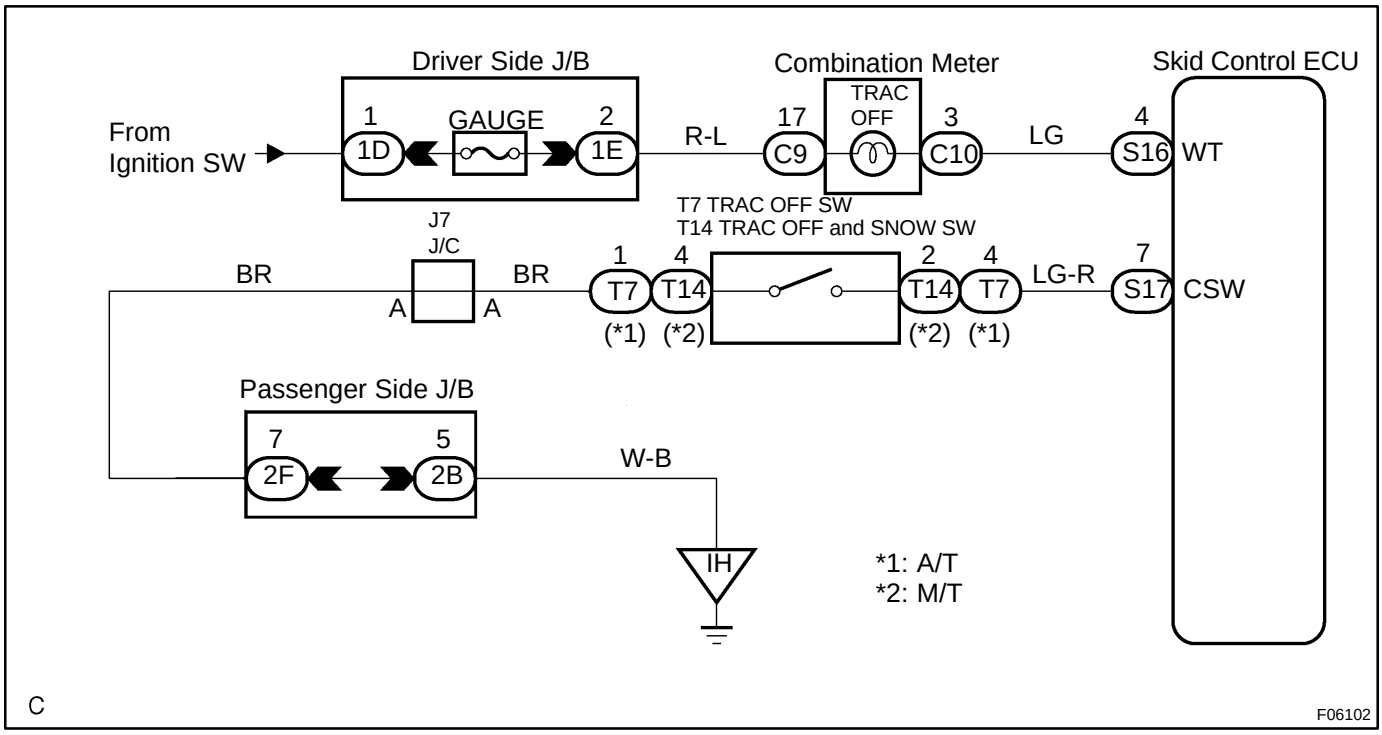
DI7UY-02

TRAC OFF Indicator, TRAC Cut Switch Circuit

CIRCUIT DESCRIPTION

This is the TRAC control main switch. When the TRAC cut switch is pushed on, TRAC control goes off and the TRAC OFF indicator lights up. This indicator blinks for warnings when the trouble occurs and for displaying DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check operation of the TRAC OFF indicator light.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

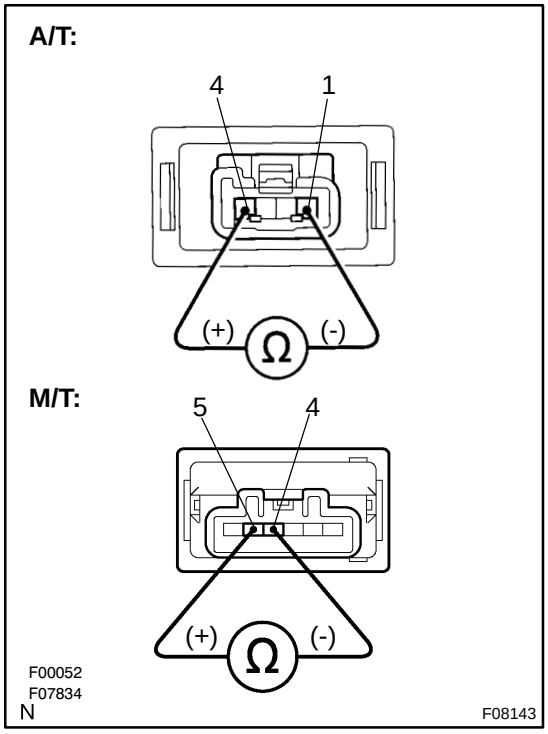
CHECK:

Check that "ON" and "OFF" of the TRAC OFF indicator light can be shown on the combination meter by the hand-held tester.

NG → **Go to step 4.**

OK

2	**Check TRAC OFF switch.**



PREPARATION:

Remove the TRAC OFF switch and disconnect the connector from the TRAC OFF switch.

CHECK:

Measure resistance between terminals 1 and 4 (A/T) or 4 and 5 (M/T) of TRAC OFF switch when TRAC OFF switch is on and off.

OK:

TRAC OFF switch	Resistance
Pushed in	Continuity
Released	1 MΩ or higher

NG → **Replace TRAC OFF switch.**

OK

3	**Check for open and short circuit in harness and connector between terminal CSW of skid control ECU and TRAC OFF switch and body ground (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

4	**Check TRAC OFF indicator light.**

See combination meter troubleshooting on page BE-2 .

NG → **Repair bulb or combination meter assembly (See page BE-86).**

OK

5	**Check for open and short circuit in harness and connector between terminal WT of skid control ECU and TRAC OFF indicator light (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU (See page IN-33).

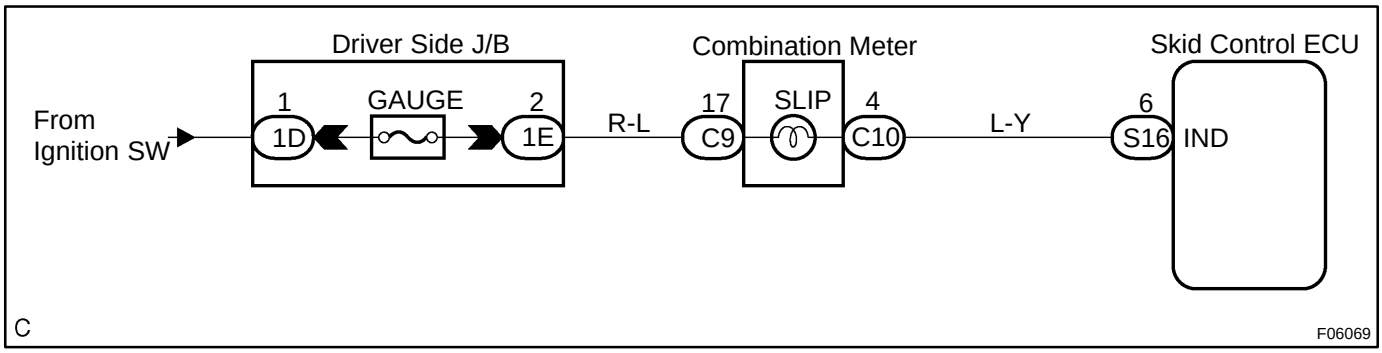
DI7UZ-02

SLIP Indicator Light Circuit

CIRCUIT DESCRIPTION

The SLIP indicator blinks during TRAC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check operation of the SLIP indicator light.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check that ”ON” and ”OFF” of the SLIP indicator light can be shown on the combination meter by the hand-held tester.

OK → **Go to step 4.**

NG

2	**Check that the SLIP indicator light is ON for 3 seconds soon after ignition switch is turned ON.**

OK → **Check and replace skid control ECU.**

NG

3	**Check SLIP indicator light.**

See combination meter troubleshooting on page BE-2 .

NG → **Repair bulb or combination meter assembly (See page BE-86).**

OK ↓

4	**Check for open and short circuit in harness and connector between skid control ECU and SLIP indicator light (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace skid control ECU (See page IN-33).

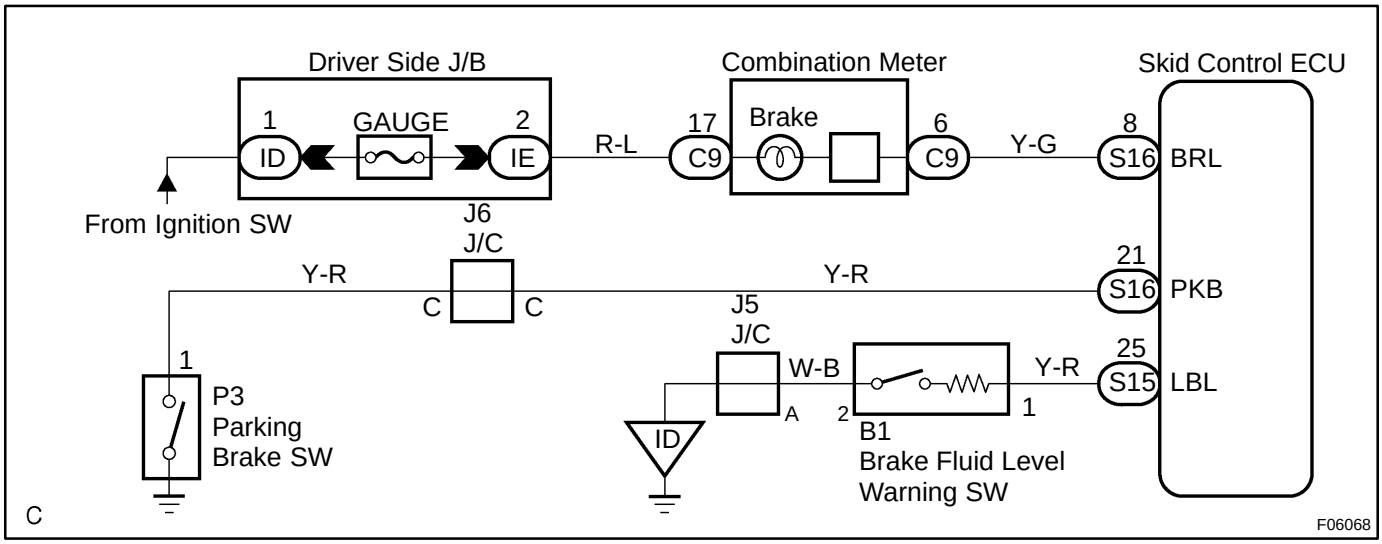
DI6QP-11

BRAKE Warning Light Circuit

CIRCUIT DESCRIPTION

The BRAKE warning light lights up when the brake fluid is insufficient, the parking brake is applied or the EBD is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check parking brake switch circuit (See page BE-2).**

NG → **Repair or replace parking brake switch circuit.**

OK

2	**Check brake fluid level warning switch circuit (See page BE-2).**

NG → **Repair or replace brake fluid level warning switch circuit.**

OK

3	**Is DTC output for ABS?**

Check DTC on page DI-427 .

Yes → **Repair circuit indicated by the output code.**

No

4	**Check BRAKE warning light.**

See combination meter troubleshooting on page BE-2 .

NG → **Repair or replace combination meter.**

OK

Check and replace skid control ECU (See page IN-33).

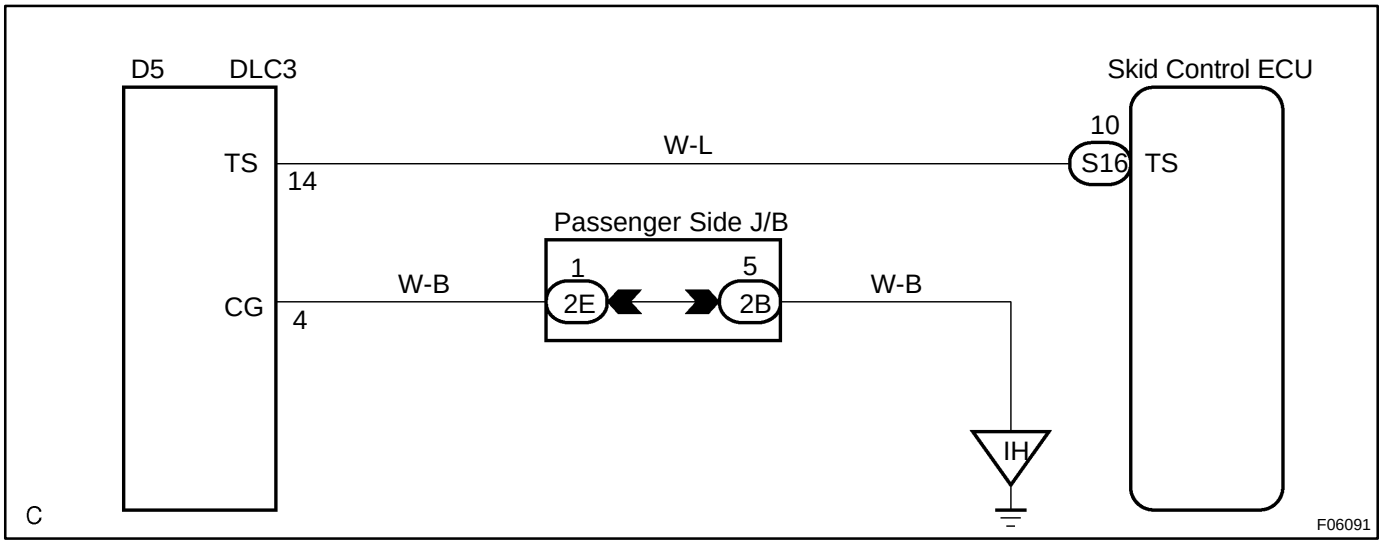
DI7V1-02

Ts Terminal Circuit

CIRCUIT DESCRIPTION

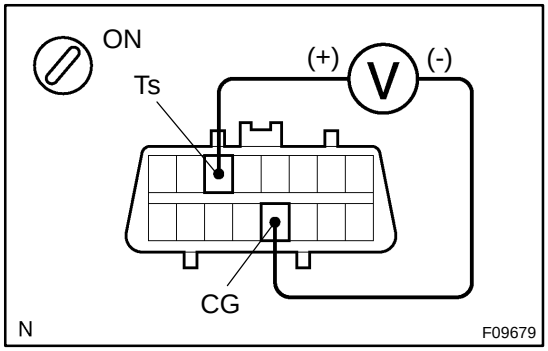
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the DTC check. Connecting terminals Ts and CG of the DLC3 starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and CG of DLC3.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Ts and CG of DLC3.

OK:

Voltage: 10 - 14 V

OK

If ABS warning light does not blink even after Ts and E_1 or Ts and CG have been connected, the ECU may be defective.

NG

2	**Check for open and short circuit in harness and connector between skid control ECU and DLC3, DLC3 and body ground (See page IN-33).**

NG → **Repair or replace harness or connector.**

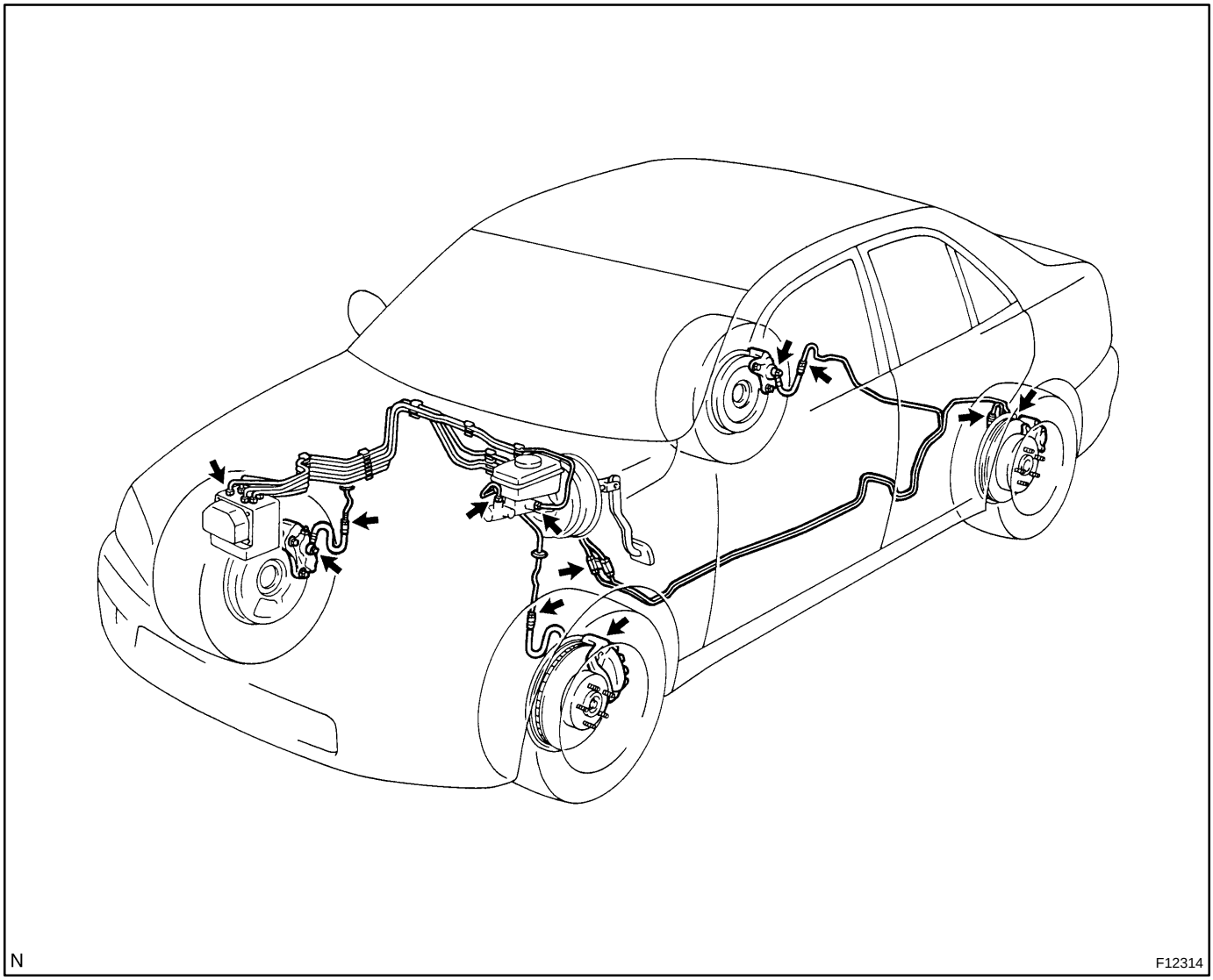
OK

Check and replace skid control ECU (See page IN-33).

DI7V2-04

Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.



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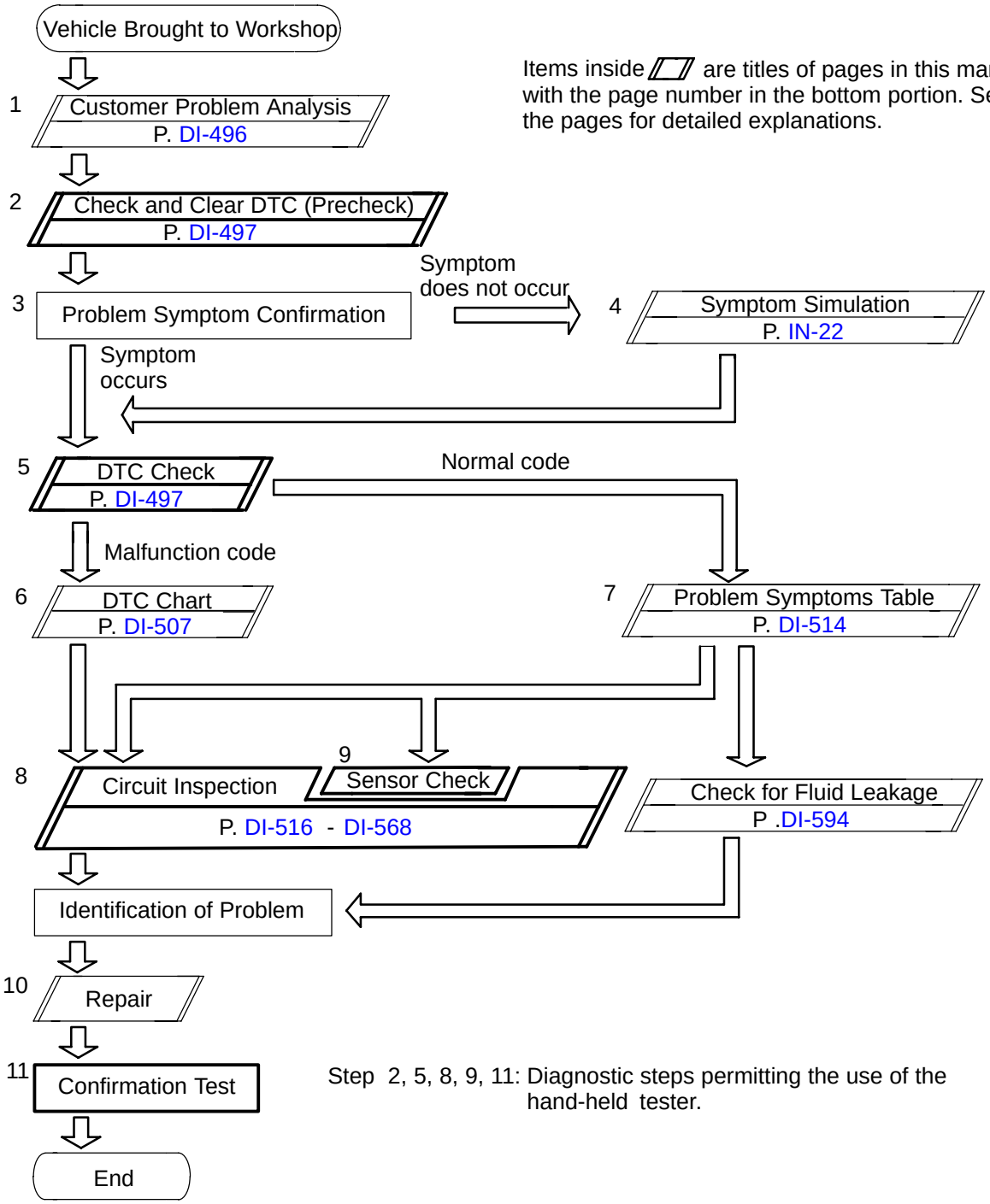
F12314

ABS WITH EBD & BA & TRAC & VSC SYSTEM

DI1GR-09

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshooting in accordance with the procedure on the following pages.



Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Step 2, 5, 8, 9, 11: Diagnostic steps permitting the use of the hand-held tester.

Fail safe function:
ABS WITH EBD & BA & TRAC & VSC SYSTEM:
When a failure occurs in the ABS & BA & TRAC & VSC systems, the ABS warning light and VSC and TRAC OFF indicator light are lit and the ABS & BA & TRAC & VSC operations are prohibited. In addition to this, when the failure that disables the EBD operation occurs, the brake warning light is lit as well and the EBD operation is prohibited.

DI0W4-09

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & BA & TRAC & VSC Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Data	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

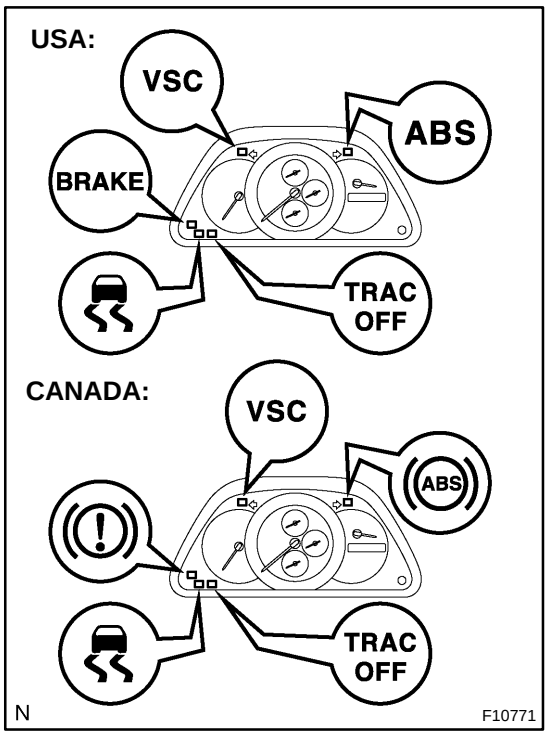
Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ TRAC does not operate.	
	☐ VSC does not operate. (Wheels spin when starting rapidly.)	
	☐ BA does not operate.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	TRAC OFF Indicator Light Abnormal	☐ Remains ON ☐ Does not Light Up
	VSC Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	SLIP Indicator Light Abnormal	☐ Remains ON ☐ Does not Light Up
	BRAKE Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

Check Item	**Malfunction Indicator Light**	☐ Normal ☐ Does not Light Up

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI9JB-01



PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Inspect the battery positive voltage.

Battery positive voltage: 10 - 14 V

(b) Check the warning lights and indicator lights.

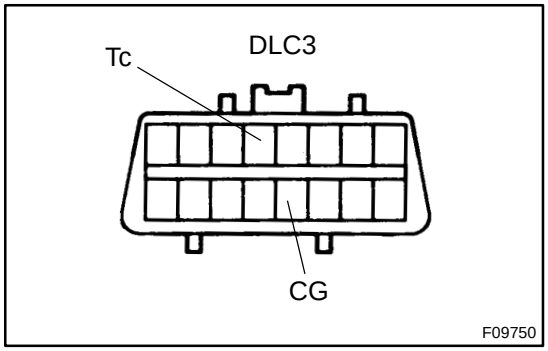
(1) Release the parking brake lever.

(2) When the ignition switch is ON, check that the ABS warning light, BRAKE warning light, TRAC OFF indicator light and SLIP indicator light go on for 3 sec.

HINT:

- If the ECU stores DTC, VSC warning light, ABS warning light and TRAC OFF indicator light BRAKE warning light, are ON.
- If the check result is not normal, proceed to troubleshooting for the light circuit.

Trouble Area	See Page
ABS warning light circuit	DI-578
BRAKE warning light circuit	DI-586
VSC warning light circuit	DI-588
TRAC OFF indicator light circuit	DI-581
SLIP indicator light circuit	DI-584



(c) In case of not using the hand-held tester:
Check the DTC of ABS system.

(1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040

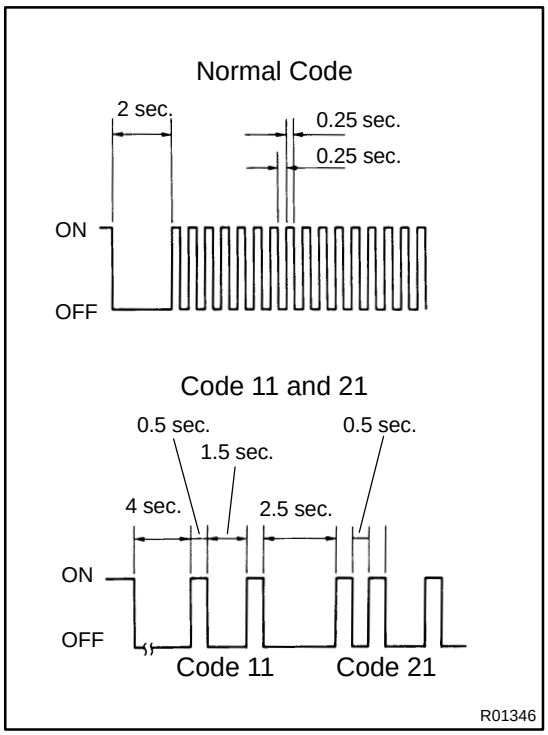
(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light and VSC warning light on the combination meter.

HINT:

- If no code appears, inspect the ABS warning light circuit and VSC warning light circuit.

Trouble Area	See Page
ABS warning light circuit	DI-578
VSC warning light circuit	DI-588

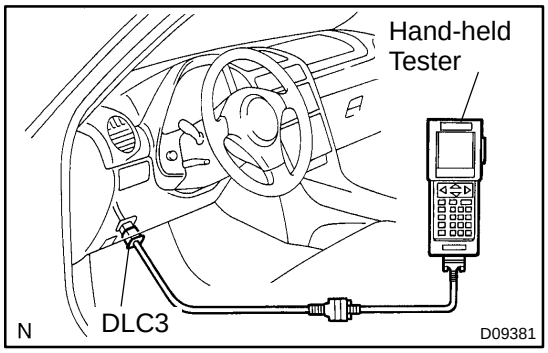


As an example, the blinking patterns for the normal code and codes 11 and 21 are shown on the left.

(4) Codes are examples in the code table on page DI-507 .

(5) After completing the check, disconnect terminal Tc and CG of DLC3, and turn off the display.

If 2 or more malfunctions are detected at the same time, the lowest numbered DTC will be displayed 1st.



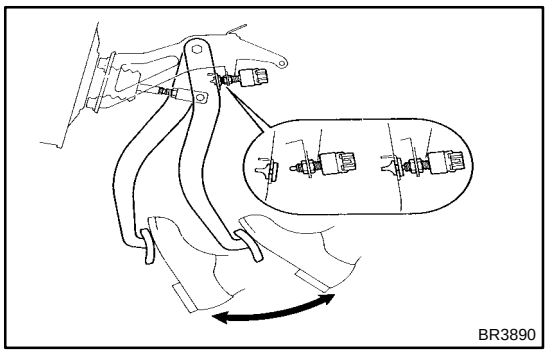
(d) In case of using the hand-held tester:
Check the DTC.

(1) Hook up the hand-held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the hand-held tester operator's manual for further details.



(e) In case of not using the hand-held tester:
Clear the DTC.

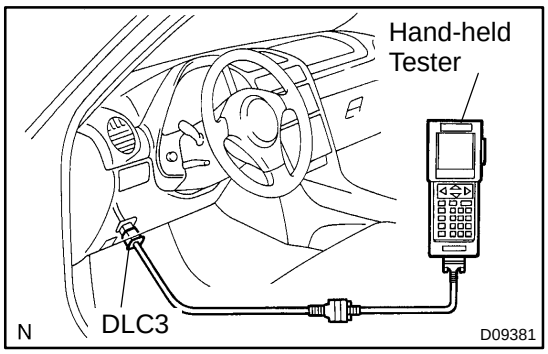
(1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040

(2) Turn the ignition switch ON.

(3) Clear the DTC stored in ECU by depressing the brake pedal 8 times or more within 5 sec.

(4) Check that the warning light show the normal code.

(5) Remove the SST from the terminals of DLC3.
SST 09843-18040



(f) In case of using the hand-held tester:
Clear the DTC.
(1) Hook up the hand-held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Operate the hand-held tester to erase the codes.

HINT:
Please refer to the hand-held tester operator's manual for further details.

2. FREEZE FRAME DATA

(a) The vehicle (sensor) status at the occurrence of abnormality of the diagnosis code and during the ABS operating can be memorized and displayed using the hand-held tester.
(b) Only one record of freeze frame data is stored, however, freeze frame data during the ABS operating is always up-dated. After the storage of freeze frame data, up to 31 ignition "ON" operations are stored and displayed.

HINT:
If the ignition switch "ON" operation exceeds 31 times, "31" appears on the display.

(c) If the diagnosis code abnormality occurs, the freeze frame data at the occurrence of the abnormality is stored but the ABS actuation data is deleted.

Hand-held tester display	Measurement Item	Reference Value*
VEHICLE SPD	Vehicle speed	Speed indication of a meter
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Numbers of operations of ignition switch ON after memorizing freeze frame data	0 - 31
MAS CYL PRESS	Master cylinder pressure sensor output voltage	Release brake pedal: 0.3 - 0.9 V Depress brake pedal: 3.2 - 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor changing declivity	-30 - 200 MPa/s
SYSTEM	Operate system	ABS operate: ABS BA operate: BA
YAW RATE	Yaw rate angle sensor output value	-70 - 70
STEERING ANG	Steering angle sensor output value	Left turn: Increase Right turn: Drop
G (RIGHT & LEFT)	Right and left G	-1.5 - 1.5
G (BACK & FORTH)	Back and forth G	-1.5 - 1.5
VSC / TRC OFF SW	TRAC OFF switch signal	TRAC OFF SW ON: ON OFF: OFF
SHIFT POSITION	Shift lever position	P: P R: R N: N D: D 2: 2 L: L

If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

3. In case of not using the hand-held tester:
ABS SENSOR SIGNAL CHECK (TEST MODE)

NOTICE:

When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.).

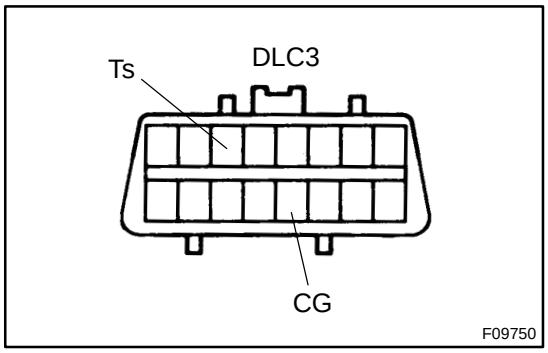
HINT:

If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.

(a) Procedures for test mode:

(1) Turn the ignition switch OFF.

(2) Set the shift lever to P position.



(3) Using SST, connect terminals Ts and CG of DLC3.
SST 09846-18040

(4) Check that the steering wheel is in the straight-ahead position.

(5) Turn the ignition switch ON.

(6) Check that the ABS warning light blinks.

HINT:

If the ABS warning light does not blink, inspect the ABS warning light circuit or Ts terminal circuit.

Trouble Area	See page
Ts terminal circuit	DI-592
ABS warning light circuit	DI-578

(b) Check the brake pedal load sensing switch.

(1) By pumping the brake pedal, replease the booster vacuum.

(2) Turn the ignition switch to ON (do not start the engine) and keep depressing the brake pedal for 1 sec. or more with a force of approx. 59 N (6 kgf, 14 lbf) or more.

(3) Check that the brake warning light is lit and the operating sound of the ABS motor is heard.

(4) Start the engine and depress the brake pedal with a force of approx. 59 N (6 kgf, 14 lbf) or more.

(5) Check that the brake warning light goes out.

HINT:

When rechecking, once exit the test mode and then activate the test mode again.

(c) Check the deceleration sensor.
Keep the vehicle in a stationary condition on a level place for 1 sec. or more.

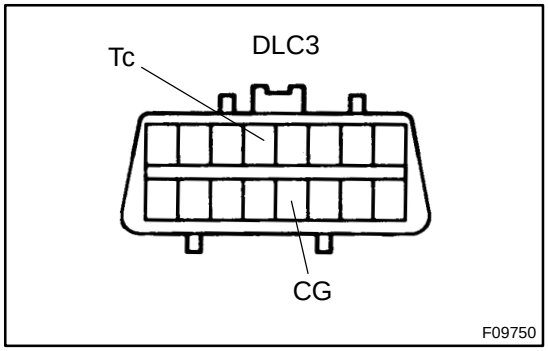
(d) Check the master cylinder pressure sensor.
(1) Leaving the vehicle in a stationary condition and the brake pedal in free condition for 1 sec. or more, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 sec. or more.
(2) While the vehicle is stopped, release the brake pedal.
(3) While the vehicle is stopped, quickly depress the brake pedal once or more and check the ABS warning light is lit for 3 sec.

HINT:
Repeat the operation until the ABS warning light is lit.

(e) Check the speed sensor signal.
Drive the vehicle straightforward.
Drive the vehicle with the speed faster than 45 km/h (28 mph) for several seconds and check that the ABS warning light comes off.

HINT:
The sensor check may not be completed if the wheels spin or the steering wheel is steered during this check.

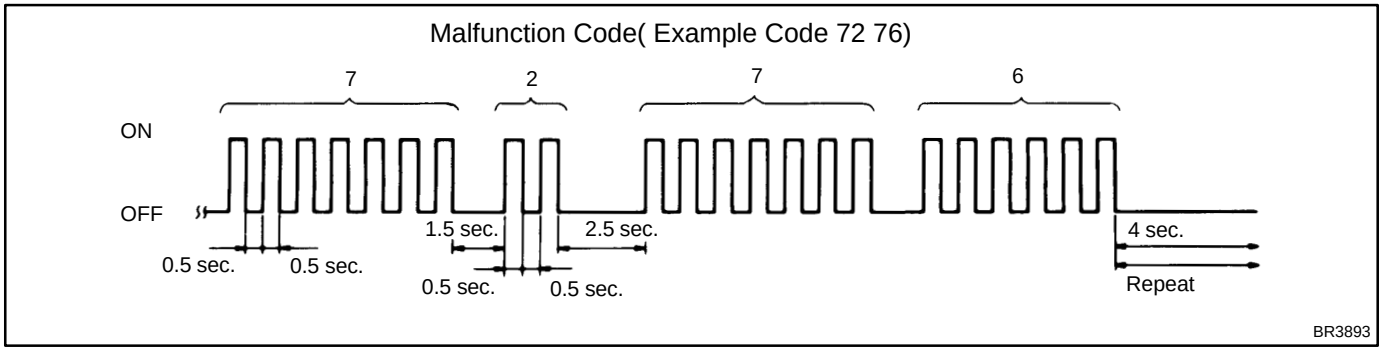
(f) Stop the vehicle.



(g) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040

(h) Read the number of blinks of the ABS warning light.

HINT:
- See the list of DTC on the next page.
- If every sensor is normal, the normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).
- If 2 or more malfunctions are detected at the same time, the lowest numbered will be displayed 1st.



(i) After doing the check, disconnect the SST from terminals Ts and CG, Tc and CG of DLC3 and turn the ignition switch OFF.
SST 09843-18040

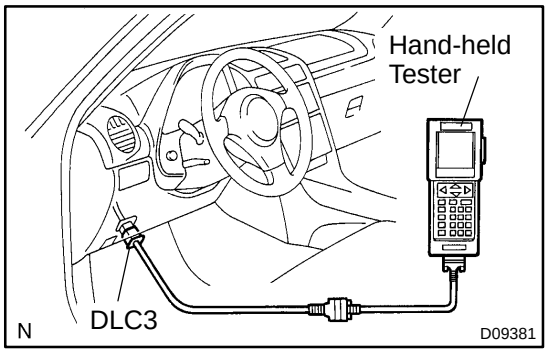
4. In case of using the hand-held tester:
ABS SENSOR SIGNAL CHECK (TEST MODE)

NOTICE:

When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.). Make sure that this operation should be done before starting the following.

HINT:

If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.



(a) Hook up the hand-held tester to the DLC3.
(b) Do steps 3.-(a)-(2), (4) and from (b) to (f) on the previous pages.
(c) Read the DTC by following the prompts on the tester screen.

HINT:

Please refer to the hand-held tester operator's manual for further details.

DTC of ABS sensor check function:

Code No.	Diagnosis	Trouble Area
C1271 / 71	Low output voltage of right front speed sensor	✓Right front speed sensor ✓Sensor installation ✓Sensor rotor
C1272 / 72	Low output voltage of left front speed sensor	✓Left front speed sensor ✓Sensor installation ✓Sensor rotor
C1273 / 73	Low output voltage of right rear speed sensor	✓Right rear speed sensor ✓Sensor installation ✓Sensor rotor
C1274 / 74	Low output voltage of left rear speed sensor	✓Left rear speed sensor ✓Sensor installation ✓Sensor rotor
C1275 / 75	Abnormal change in output voltage of right front speed sensor	Right front speed sensor rotor
C1276 / 76	Abnormal change in output voltage of Left front speed sensor	Left front speed sensor rotor
C1277 / 77	Abnormal change in output voltage of right rear speed sensor	Right rear speed sensor rotor

C1278 / 78	Abnormal change in output voltage of Left rear speed sensor	Left rear speed sensor rotor
C1279 / 79	Deceleration sensor is faulty	✓Deceleration sensor ✓Sensor installation
C1281/81	✓Master cylinder pressure sensor output signal is faulty ✓The problem symptoms in the brake cannot be confirmed	✓Master cylinder pressure sensor ✓Brake booster

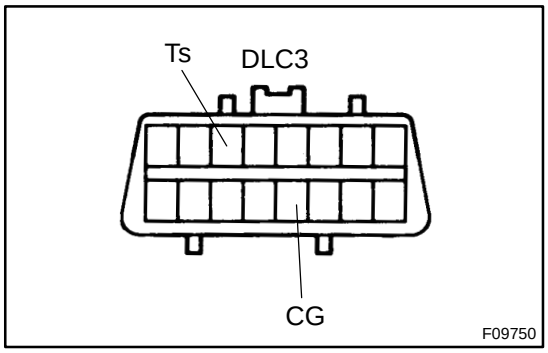
5. In case of not using the hand-held tester:
VSC SENSOR SIGNAL CHECK (TEST MODE)

NOTICE:

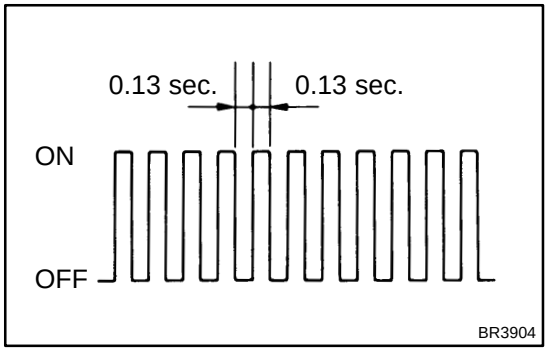
When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.).

HINT:

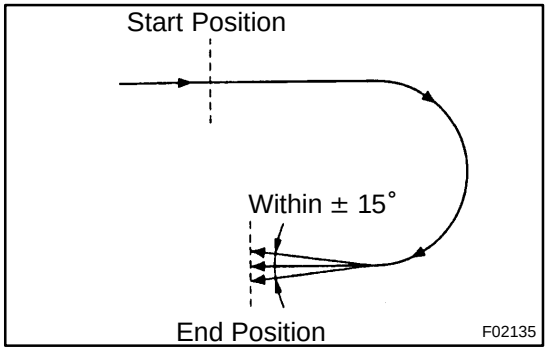
If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.



(a) Procedures for test mode:
(1) Turn the ignition switch OFF.
(2) Check that the shift lever position is at P range. Turn the steering wheel to the straight-ahead position.
(3) Using SST, connect terminals Ts and CG of DLC3.
SST 09843-18040
(4) Start the engine.



(5) Check that the VSC warning light blinks.



(b) Check the yaw rate sensor.
Shift the shift lever to the D range and drive the vehicle at the vehicle speed of approx. 5 km/h (3 mph). Turn the steering wheel either to left or right for 90° or more, and maintain 180° circular drive for the vehicle.
Stop the vehicle and shift the shift lever to the P range. Check that the VSC warning buzzer sounds for 3 sec.

If the VSC warning buzzer sounds, the sensor check is in normal completion.

If the VSC warning buzzer does not sound, check the VSC warning buzzer circuit, then do the sensor check again.

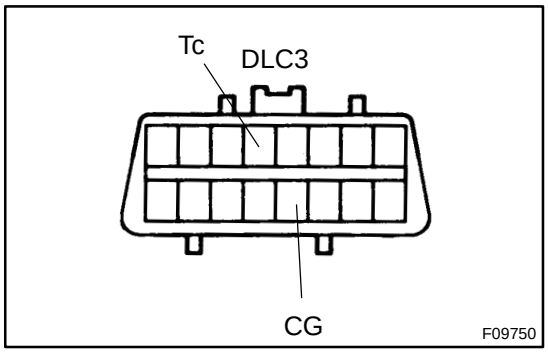
Trouble Area	See page
VSC warning buzzer circuit	DI-590

If the VSC warning buzzer still does not sound, there is malfunction in the VSC sensor, so check the DTC.

HINT:

- Drive the vehicle circularly by 180°. At the end of the turn, the direction of the vehicle should be within 180° ± 5° from its start position.
- Do not spin the wheels.

(1) Check the steering angle sensor.
Turn the steering wheel to either left or right to the full lock position, from the vehicle stationary condition, and turn back the steering wheel to the neutral position.



(c) Read the DTC.
(1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040
(2) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040
(3) Read the number of blinks of the VSC warning light.

HINT:

- See the list of DTC shown in the next page.
- If every sensor is normal, a normal code is output. (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated.)

(4) After doing the check, disconnect the SST from terminals Ts and CG ,Tc and CG of DLC3 and turn the ignition switch OFF.
SST 09843-18040

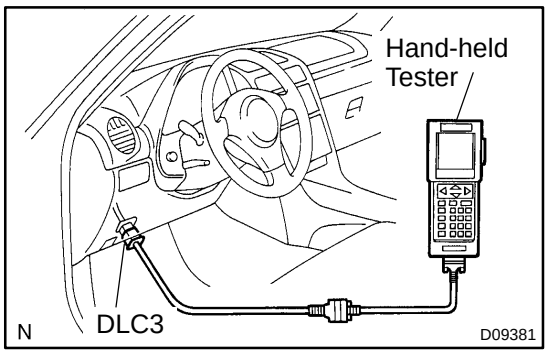
6. In case of using the hand-held tester:
VSC SENSOR SIGNAL CHECK (TEST MODE)

NOTICE:

When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.). Make sure that this operation should be done before starting the following.

HINT:

If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.



(a) Hook up the hand-held tester to the DLC3.
(b) Do steps 5.-(a)-(2), (a)-(4) and (b) on the previous pages.
(c) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the hand-held tester operator's manual for further details.

DTC of VSC sensor check function:

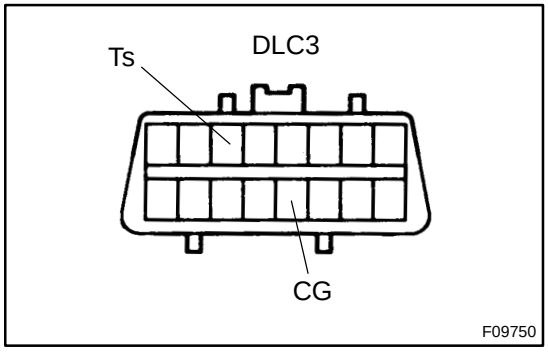
Code No.	Diagnosis	Trouble Area
C0371 / 71	Yaw rate sensor output signal malfunction	✓Yaw rate sensor ✓Yaw rate sensor circuit

7. IF NECESSARY, PERFORM ZERO POINT CALIBRATION OF YAW RATE AND DECELERATION SENSORS

HINT:
- ✓ When having replaced the yaw rate sensor, deceleration sensor or the ECU, make sure to perform yaw rate and deceleration sensors' zero point calibration. Be sure to complete this step 7. once it is started.
- ✓ During step 7., a not-replaced sensor also requires zero point calibration.

NOTICE:
- ✓ **While obtaining the zero point, do not give any vibration to the vehicle by tilting, moving or shaking it and keep it in a stationary condition. (Do not start the engine.)**
- ✓ **Be sure to do this on a level surface (within an inclination of 1 %).**

(a) Clear the zero points of the yaw rate and deceleration sensors.
  (1) Shift the shift lever to P range.
  (2) Turn the ignition switch ON in a stationary condition.



  (3) With the lit switch ON, using SST, repeat a cycle of short and open between terminals Ts and CG of DLC3 4 times or more within 8 sec. Check that the TRAC OFFand VSC indicator light is lit indicating the recorded zero point is erased.
  SST 09843-18040
  (4) Turn the ignition switch OFFand VSC with in 15 sec.
(b) Obtain zero point of the yaw rate sensor.
  (1) Make the terminals Ts and CG of DLC3 disconnected.

(2) Turn the ignition switch ON.

HINT:

The vehicle should be in a stationary condition with the shift lever in P range.

(3) Check that the lit TRAC OFFand VSC indicator light goes off about 15 sec. after the ignition switch is turned ON.

HINT:

Even if the ignition is not turned OFF in step (a)-(4) and remains ON, the yaw rate sensor zero point calibration can be completed. In this case, the TRAC OFF and VSC indicator light is lit for about 15 sec. and then VSC warning light starts blinking. (Normal code)

(4) After ensuring that the TRAC OFF and VSC indicator light remains OFF for 2 sec., turn the ignition switch OFF.

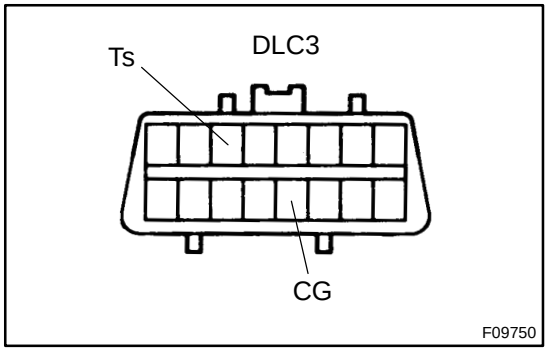
HINT:

If the ignition switch is not turned OFF in step (a)-(4), make sure that the TRAC OFF and VSC indicator light blinks for 2 sec. Then turn the ignition switch OFF.

(c) Perform deceleration sensor zero point calibration.

NOTICE:

After step (b) (the yaw rate sensor zero point calibration), the VSC warning light goes off. At this time, if the vehicle is driven without performing step (c) (deceleration sensor zero point calibration), deceleration sensor zero point calibration malfunction will be detected and the TRAC OFF indecator light and VSC warning light will light up. Therefore, perform step (c) right after step (b).



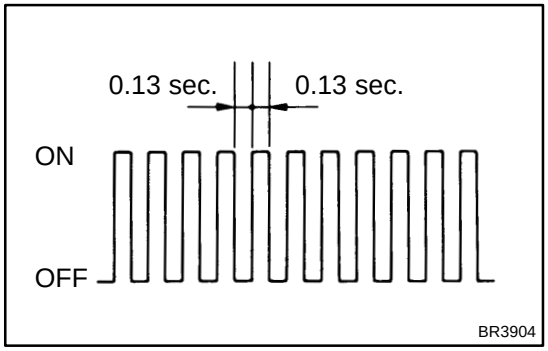
(1) Using SST, connect the terminals Ts and CG of DLC3.

SST 09843-18040

(2) Turn the ignition switch ON.

HINT:

Place the vehicle in a stationary condition with the shift lever in P range.



(3) After turning the ignition switch ON, check that the VSC warning light is lit for about 4 sec. and then starts quick blinking at 0.13 sec. intervals.

(4) After ensuring the blinking of the VSC warning light for 2 sec., turn the ignition switch OFF.

(5) Remove the SST and make the terminals Ts and CG of DLC3 disconnected.

SST 09843-18040

DI0WA-16

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

Before replacing or removing the part, turn the ignition switch OFF.

HINT:

- Using SST 09843-18040, connect the terminals Tc and CG of DLC3.
- If any abnormality is not found on inspected parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit indicated by DTC. For details of each code, turn to the pages in the "See page" for respective "DTC No." in the DTC chart.

DTC chart of ABS:

DTC No. (See Page)	Detection Item	Trouble Area
C0200 / 31*1 (DI-516)	Right front wheel speed sensor signal malfunction	・Right front, left front, right rear, left rear speed sensor ・Each speed sensor circuit ・Sensor rotor
C0205 / 32*1 (DI-516)	Left front wheel speed sensor signal malfunction	
C0210 / 33*1 (DI-516)	Right rear wheel speed sensor signal malfunction	
C0215 / 34*1 (DI-516)	Left rear wheel speed sensor signal malfunction	
C0226 / 21 (DI-522)	Open or short circuit in brake actuator solenoid circuit (SFR circuit)	・Brake actuator ・SFRH or SFRR circuit
C0236 / 22 (DI-522)	Open or short circuit in brake actuator solenoid circuit (SFL circuit)	・Brake actuator ・SFLH or SFLR circuit
C0246 / 23 (DI-522)	Open or short circuit in brake actuator solenoid circuit (SRR circuit)	・Brake actuator ・SRRH or SRRR circuit
C0256 / 24 (DI-522)	Open or short circuit in brake actuator solenoid circuit (SRL circuit)	・Brake actuator ・SRLH or SRLR circuit
C0273 / 13*1 (DI-524)	Open circuit in ABS MTR relay circuit	・ABS MTR relay ・ABS MTR relay circuit
C0274 / 14 (DI-524)	Short circuit in ABS MTR relay circuit	
C0278 / 11 (DI-528)	Open circuit in ABS SOL relay circuit	・ABS SOL relay ・ABS SOL relay circuit
C0279 / 12 (DI-528)	Short circuit in ABS SOL relay circuit	
C1225 / 25 (DI-541)	Open or short circuit in brake actuator solenoid circuit (SM circuit)	・Brake actuator ・SMF or SMR circuit
C1226 / 26 (DI-541)	Open or short circuit in brake actuator solenoid circuit (SRM circuit)	・Brake actuator ・SRMF or SRMR circuit
C1227 / 27 (DI-541)	Open or short circuit in brake actuator solenoid circuit (SRC circuit)	・Brake actuator ・SRCF or SRCR circuit
C1235 / 35 (DI-516)	Foreign matter is attached on the tip of the right front sensor	・Right front, left front, right rear, left rear speed sensor ・Sensor rotor
C1236 / 36 (DI-516)	Foreign matter is attached on the tip of the left front sensor	
C1238 / 38 (DI-516)	Foreign matter is attached on the tip of the right rear sensor	
C1239 / 39 (DI-516)	Foreign matter is attached on the tip of the left rear sensor	

C1241 / 41 (DI-550)	Low battery positive voltage	✓Battery ✓Charging system ✓Power source circuit
C1243 / 43*1 (DI-554)	Malfunction in deceleration sensor (constant output)	✓Deceleration sensor ✓Wire harness for deceleration sensor system
C1244 / 44 (DI-554)	Open or short circuit in deceleration sensor circuit	✓Deceleration sensor ✓Deceleration sensor circuit
C1245 / 45*1 (DI-554)	Malfunction in deceleration sensor (Output error)	✓Deceleration sensor ✓Wire harness for deceleration sensor system
C1246 / 46*2 (DI-559)	Malfunction in master cylinder pressure sensor	✓Master cylinder pressure sensor ✓Master cylinder pressure sensor circuit
C1249 / 49*3 (DI-563)	Open circuit in stop light switch circuit	✓Stop light bulb ✓Stop light switch circuit
C1251 / 51*1 (DI-566)	ABS pump motor is locked Open circuit in pump motor circuit	ABS pump motor
C1267 / 67*4 (DI-568)	Malfunction in brake pedal load sensing switch	✓Brake pedal load sensing switch ✓Brake pedal load sensing switch circuit
Always ON (DI-571)	Malfunction in skid control ECU	✓Power source circuit ✓ABS warning light circuit ✓Multiplex communication circuit ✓Skid control ECU

*1, *2, *3, *4:

Even after the troubled areas are repaired, ABS warning light will not go OFF unless the following operations are performed.

✓ *1:

(1) Drive the vehicle at 20 km/h (12 mph) for 30 seconds or more and check that the ABS warning light goes off.

(2) Clear the DTC (See page DI-497).

✓ *2:

(1) Keep the vehicle in the stationary condition for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.

(2) Drive the vehicle at the vehicle speed 50 km/h (31 mph) and keep depressing the brake pedal strongly for about 3 seconds.

(3) Repeat the above operation 3 times or more and check that the ABS warning light goes off.

(4) Clear the DTC (See page DI-497).

✓ *3: Depress the brake pedal for 1 sec.

✓ *4: Depress the brake pedal strongly for 1 sec. then release the brake pedal for 1 sec.

HINT:

There is a case that hand-held tester cannot be used when ABS warning light is always on.

DTC chart of VSC:

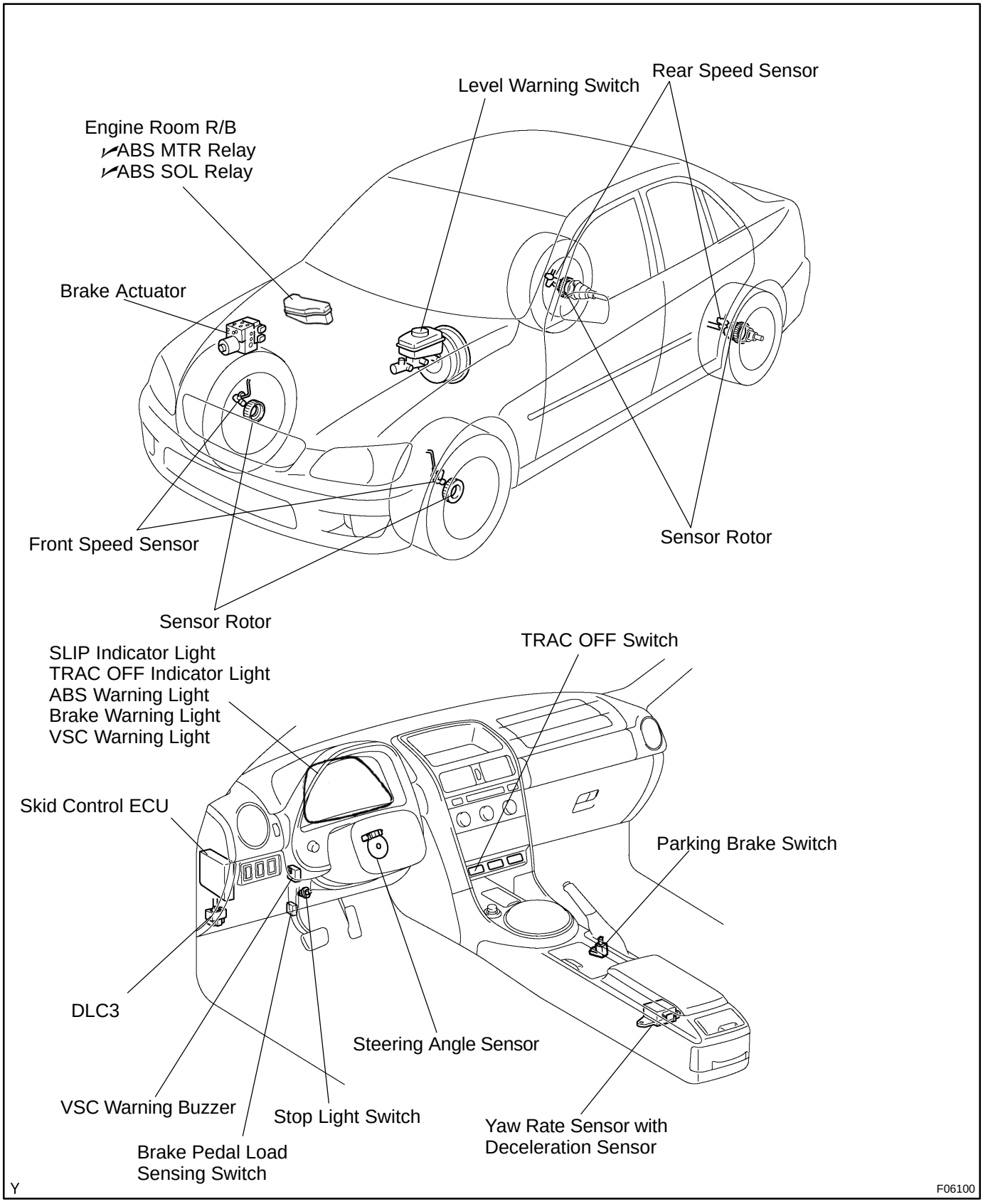
DTC No. (See Page)	Detection Item	Trouble Area
C1201 / 51 (DI-533)	Malfunction in ECM	Engine control system
C1202 / 52 (DI-534)	Brake fluid level low Open circuit in brake fluid level warning switch circuit	✓Brake fluid level ✓Brake fluid level warning switch ✓Brake fluid level warning switch circuit
C1203 / 53 (DI-536)	Malfunction in ECM communication circuit	✓TRC+ or TRC- circuit ✓ENG+ or ENG- circuit ✓ECM
C1223/43 (DI-538)	Malfunction in ABS control system	ABS control system
C1224 / 44 (DI-539)	Open or short circuit in NEO signal circuit	✓NEO circuit ✓ECM
C1231 / 31 (DI-543)	Malfunction in steering angle sensor	✓Steering angle sensor ✓Steering angle sensor circuit
C1233 / 33 (DI-547)	Open or short circuit in yaw rate sensor circuit	✓Yaw rate sensor ✓Yaw rate sensor circuit
C1234 / 34 (DI-547)	Malfunction in yaw rate sensor	
C1335 / 35 (DI-543)	Open circuit in steering angle sensor	✓Steering angle sensor ✓Steering angle sensor circuit
C1360/61 (DI-559)	Malfunction in comparative master cylinder pressure sensor	✓Master cylinder pressure sensor ✓Master cylinder pressure sensor circuit
Always ON (DI-575)	Malfunction in skid control ECU Open circuit in VSC warning indicator circuit	✓Power source circuit ✓Skid control ECU

HINT:

In some cases hand-held tester cannot be used when VSC warning light is always on.

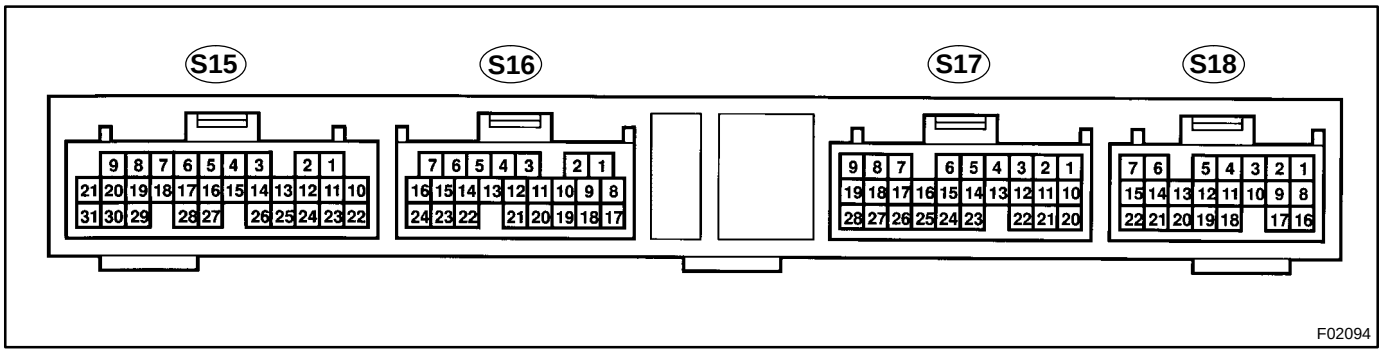
DI8IY-02

PARTS LOCATION



DI1GG-11

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
SRLR (S18 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	B ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SM1- (S18 - 2) - GND (S18 - 15, 22, S15 - 2, 3)	B-L ↔ W-B	IG switch OFF	Continuity
SM1+ (S18 - 3) - GND (S18 - 15, 22, S15 - 2, 3)	B-R ↔ W-B	IG switch ON, ABS warning light OFF	Below 1.0
SM2- (S18 - 4) - GND (S18 - 15, 22, S15 - 2, 3)	L-B ↔ W-B	IG switch OFF	Continuity
SM2+ (S18 - 5) - GND (S18 - 15, 22, S15 - 2, 3)	G-B ↔ W-B	IG switch ON, ABS warning light OFF	Below 1.0
AST (S18 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	Y-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRLH (S18 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	G-W ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SFRR (S18 - 8) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
PMC (S18 - 10) - E2 (S18 - 19)	R ↔ W	IG switch ON, stop light switch OFF	0.3 - 0.8
E3 (S18 - 12) - GND (S18 - 15, 22, S15 - 2, 3)	Y ↔ W-B	IG switch OFF	Continuity
FSS (S18 - 13) - GND (S18 - 15, 22, S15 - 2, 3)	Shielded ↔ W-B	IG switch OFF	Continuity
MT (S18 - 14) - GND (S18 - 15, 22, S15 - 2, 3)	L-Y ↔ W-B	IG switch ON (Motor relay is OFF)	Below 1.5
SFRH (S18 - 16) - GND (S18 - 15, 22, S15 - 2, 3)	B-W ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
PMC2 (S18 - 18) - E3 (S18 - 12)	L ↔ Y	IG switch ON, stop light switch OFF	0.3 - 0.8
E2 (S18 - 19) - GND (S18 - 15, 22, S15 - 2, 3)	W ↔ W-B	IG switch OFF	Continuity
VCM (S18 - 20) - GND (S18 - 15, 22, S15 - 2, 3)	B ↔ W-B	IG switch ON	4.5 - 5.5
VCM2 (S18 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	IG switch ON	4.5 - 5.5
VYS (S17 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	L ↔ W-B	IG switch ON	4.5 - 5.5
YSS (S17 - 3) - GND (S18 - 15, 22, S15 - 2, 3)	Shielded ↔ W-B	IG switch OFF	Continuity

FSW+ (S17 - 5) - FSW- (S17 - 4)	W-G ↔ R-B	IG switch ON, brake pedal depressed	2 - 4
TRIG (S17 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON	Above 3.5
CSW (S17 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	LG-R ↔ W-B	ITRAC OFF switch OFF	10 - 14
YAW2 (S17 - 10) - GND (S18 - 15, 22, S15 - 2, 3)	R ↔ W-B	IG switch ON, yaw rate sensor is stationary	2 - 3
GSS (S17 - 12) - GND (S18 - 15, 22, S15 - 2, 3)	BR-W ↔ W-B	IG switch OFF	Continuity
YD (S17 - 16) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	IG switch ON, VSC warning light OFF	Above 4.5
SS1+ (S17 - 18) - SS1- (S17 - 27)	LG-B ↔ LG	Engine idling, slowly tun steering wheel	Pulse generation
GYAW (S17 - 20) - GND (S18 - 15, 22, S15 - 2, 3)	Y ↔ W-B	IG switch OFF	Continuity
GL1 (S17 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	W ↔ W-B	IG switch ON, vehicle is stopped	0.5 - 4.5
GL2 (S17 - 22) - GND (S18 - 15, 22, S15 - 2, 3)	BR ↔ W-B	IG switch ON, vehicle is stopped	0.5 - 4.5
NEO (S17 - 26) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	Engine idling	Pulse generation
D/G (S17 - 28) - GND (S18 - 15, 22, S15 - 2, 3)	W-R ↔ W-B	IG switch ON	10 - 14
WA (S16 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON, ABS warning light ON	4 - 8
		IG switch ON, ABS warning light OFF	Below 2.0
SP1 (S16 - 2) - GND (S18 - 15, 22, S15 - 2, 3)	R-Y ↔ W-B	Vehicle drives at about 20 km/h (12 mph)	Pulse generation
STP (S16 - 3) - GND (S18 - 15, 22, S15 - 2, 3)	G-R ↔ W-B	Stop light switch OFF	Below 1.5
		Stop light switch ON	8 - 14
WT (S16 - 4) - GND (S18 - 15, 22, S15 - 2, 3)	LG ↔ W-B	IG switch ON, TRAC OFF indicator light ON	Below 2.0
		IG switch ON, TRAC OFF indicator light OFF	10 - 14
BZ (S16 - 5) - GND (S18 - 15, 22, S15 - 2, 3)	L-R ↔ W-B	IG switch ON, VSC buzzer is sounded	Below 1.0 ↔ 10 - 14
		IG switch ON, VSC buzzer is not sounded	10 - 14
IND (S16 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	L-Y ↔ W-B	IG switch ON, SLIP indicator light ON	Below 2.0
		IG switch ON, SLIP indicator light OFF	10 - 14
IG1 (S16 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	B-R ↔ W-B	IG switch ON	10 - 14
BRL (S16 - 8) - GND (S18 - 15, 22, S15 - 2, 3)	Y-G ↔ W-B	IG switch ON, fluid in master cylinder reservoir above MIN level and parking brake switch is OFF (Brake warning light is OFF)	Below 2.0
ENG+ (S16 - 9) - ENG- (S16 - 18)	L-B ↔ P	IG switch ON	Pulse generation
Ts (S16 - 10) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON	10 - 14
TRC+ (S16 - 11) - TRC- (S16 - 20)	R-Y ↔ W-G	IG switch ON	Pulse deneration
FRO (S16 - 13) - GND (S18 - 15, 22, S15 - 2, 3)	W-R ↔ W-B	Vehicle drives at about 20 km/h (12 mph)	Pulse generation

VSCW (S16 - 14) - GND (S18 - 15, 22, S15 - 2, 3)	Y-B ↔ W-B	IG switch ON, VSC warning light ON	Below 2.0
		IG switch ON, VSC warning light OFF	10 - 14
RR+ (S16 - 16) - RR- (S16 - 15)	GR ↔ B	IG switch ON, slowly turn right rear wheel	Pulse generation
PKB (S16 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	Y-R ↔ W-B	IG switch ON, parking brake switch ON	Below 1.5
		IG switch ON, parking brake switch OFF	10 - 14
RL+ (S16 - 22) - RL- (S16 - 23)	R ↔ L	IG switch ON, slowly turn left rear wheel	Pulse generation
+BO (S16 - 24) - GND (S18 - 15, 22, S15 - 2, 3)	W ↔ W-B	Always	10 - 14
R+ (S15 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	L-B ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRM1 (S15 - 4) - GND (S18 - 15, 22, S15 - 2, 3)	B-Y ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRC2 (S15 - 5) - GND (S18 - 15, 22, S15 - 2, 3)	G-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SFLH (S15 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	L-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SFLR (S15 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	L-Y ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRRH (S15 - 8) - GND (S18 - 15, 22, S15 - 2, 3)	L-O ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRRR (S15 - 9) - GND (S18 - 15, 22, S15 - 2, 3)	G-Y ↔ W-B	IG switch ON, ABS warning light OFF	10 -14
SR (S15 - 10) - R+ (S15 - 1)	L-R ↔ L-B	IG switch ON, ABS warning light OFF	Below 1.0
FR+ (S15 - 13) - FR- (S15 - 12)	O ↔ B	IG switch ON, slowly turn right front wheel	Pulse generation
SRM2 (S15 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	B-O ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
+BI (S15 - 22) - GND (S18 - 15, 22, S15 - 2, 3)	W-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
MR (S15 - 23) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON, ABS motor stops	10 - 14
MRF (S15 - 24) - GND (S18 - 15, 22, S15 - 2, 3)	R-Y ↔ W-B	IG switch ON	10 - 14
LBL (S15 - 25) - GND (S18 - 15, 22, S15 - 2, 3)	Y-R ↔ W-B	IGnswitch ON, fluid in master cylinder reservoir above MIN level	4 - 8
		IG switch ON, fluid in master cylinder reservoir below MIN level	Below 1.0
FL+ (S15 - 28) - FL- (S15 - 27)	LG ↔ V	IG switch ON, slowly turn right front wheel	Pulse generation
SRC1 (S15 - 31) - GND (S18 - 15, 22, S15 - 2, 3)	G-O ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14

DI0WG-16

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

When replacing skid control ECU, sensor or etc., turn the ignition switch OFF.

Symptom	Suspect Area	See page
ABS does not operate BA does not operate	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. IG power source circuit 3. Speed sensor circuit 4. Check the brake actuator with a hand-held tester. If abnormal, check the hydraulic circuit for leakage (See page DI-594).	 DI-497 DI-550 DI-516 BR-46
ABS does not operate efficiently BA does not operate efficiently	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the brake actuator with a hand-held tester. If abnormal, check the hydraulic circuit for leakage (See page DI-594).	 DI-497 DI-516 DI-563 BR-46
ABS warning light abnormal	1. ABS warning light circuit 2. Skid control ECU	DI-578 IN-33
DTC of ABS check cannot be done	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output.	 DI-497
Sensor signal check cannot be done	1. Ts terminal circuit 2. Skid control ECU	DI-592 IN-33
TRAC does not operate	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit	 DI-497 DI-550 DI-594 DI-516
VSC does not operate	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit 5. Deceleration sensor circuit 6. Yaw rate sensor circuit 7. Steering angle sensor circuit	 DI-497 DI-550 DI-594 DI-516 DI-554 DI-547 DI-543

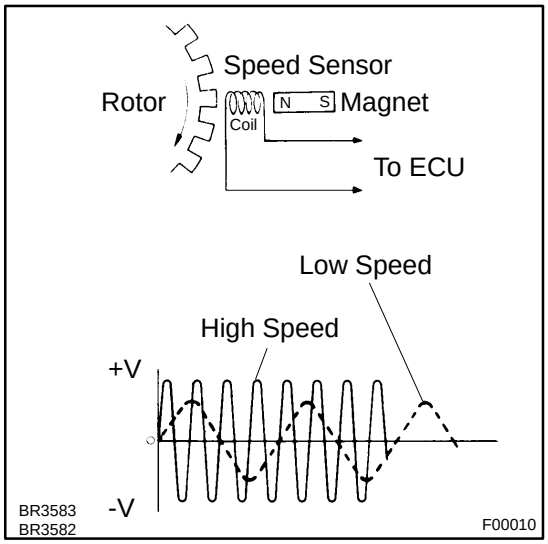
SLIP indicator light abnormal	1. SLIP indicator light circuit 2. Skid control ECU	DI-584 IN-33
TRAC OFF indicator abnormal	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. TRAC OFF switch circuit	 DI-497 DI-581
DTC of VSC check cannot be done	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output.	 DI-497
VSC warning indicator abnormal	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. VSC warning indicator circuit	 DI-497 DI-588

DI9JC-01

CIRCUIT INSPECTION

DTC	C0200 / 31 - C1239 / 39	Speed Sensor Circuit

CIRCUIT DESCRIPTION



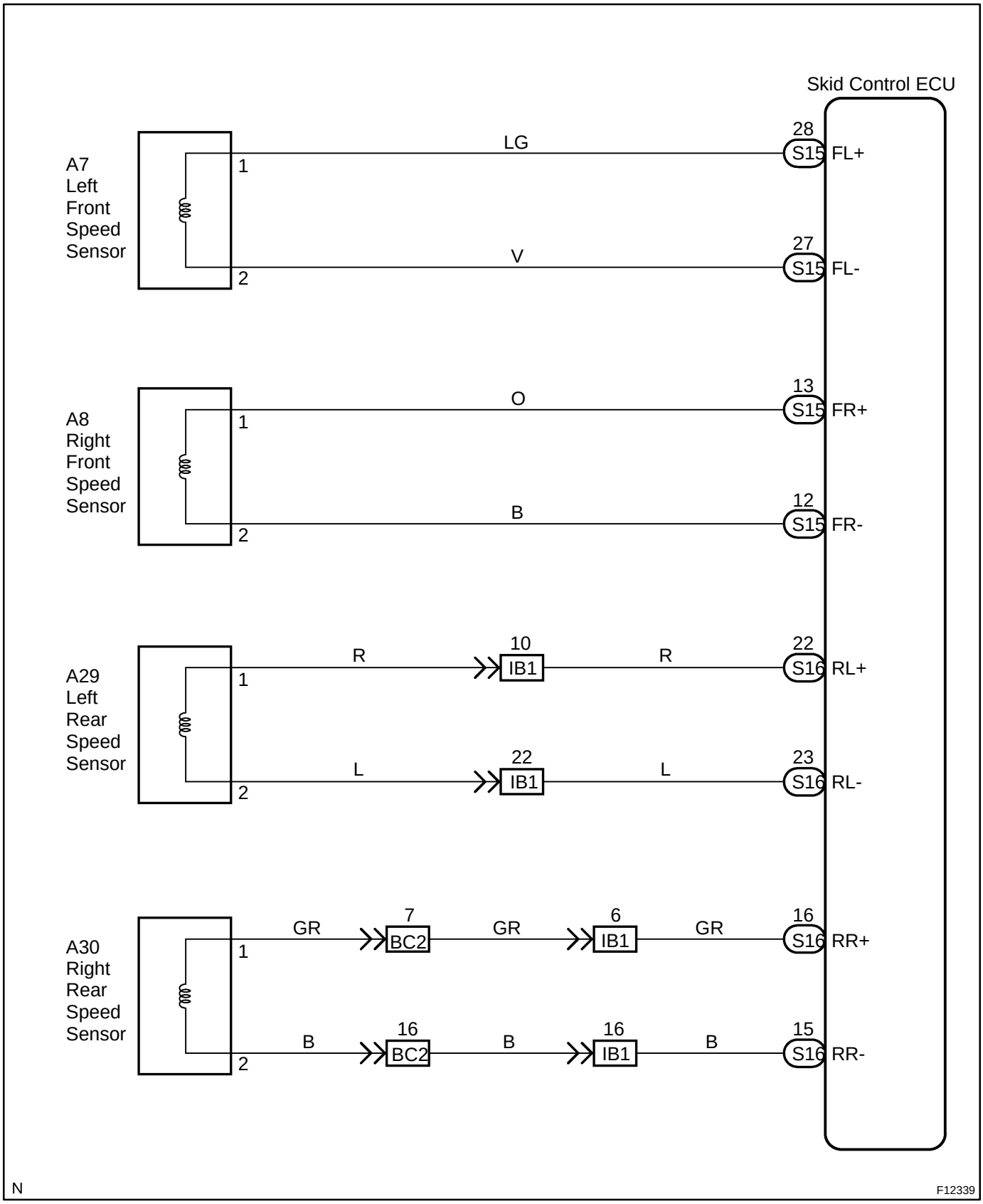
The speed sensor measures wheel speed and sends the corresponding signals to the ECU. These signals are used for control of both the ABS & TRAC & VSC control system. Both the front and rear rotors have 48 serrations.
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to measure the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
C0200 / 31 C0205 / 32 C0210 / 33 C0215 / 34	Detection of any of conditions 1. through 3.: 1. At vehicle speed of 10 km/h (6 mph) or more, open or short circuit of the speed sensor signal circuit continues for 15 sec. 2. Momentary interruption of the speed sensor signal occurs 7 times or more. 3. Open circuit of the speed sensor signal circuit continues for 0.5 sec. or more.	✓ Right front, left front, right rear, left rear speed sensor ✓ Each speed sensor circuit ✓ Sensor rotor
C1235 / 35 C1236 / 36 C1238 / 38 C1239 / 39	Nose have been counted 75 times in 5 sec.	✓ Right front, left front, right rear, left rear speed sensor ✓ Sensor rotor

HINT:

- ✓ DTC No. C0200 / 31 and C1235 / 35 are for the right front speed sensor.
- ✓ DTC No. C0205 / 32 and C1236 / 36 are for the left front speed sensor.
- ✓ DTC No. C0210 / 33 and C1238 / 38 are for the right rear speed sensor.
- ✓ DTC No. C0215 / 34 and C1239 / 39 are for the left rear speed sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of speed sensor.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and turn the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that there is no difference between the speed value output from the speed sensor observed in the hand-held tester and the speed value displayed by the speedometer when the vehicle is in motion.

OK:

There is almost no difference in the displayed speed values.

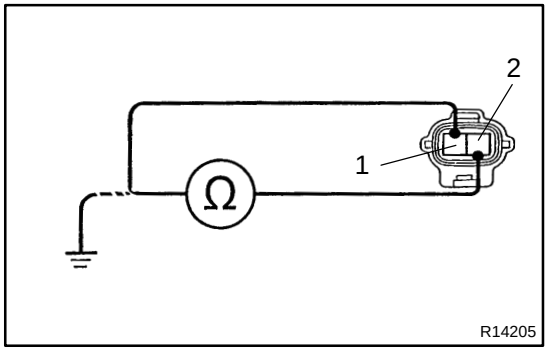
HINT:

There is tolerance of ± 10 % in the speedometer indication.

OK → **Go to step 4.**

NG

2	**Check speed sensor.**



Front:

PREPARATION:

(a) Make sure that the speed sensor connector and the wire harness side connector are securely connected.
(b) Disconnect the speed sensor connector.
(c) Turn the ignition switch OFF.

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:

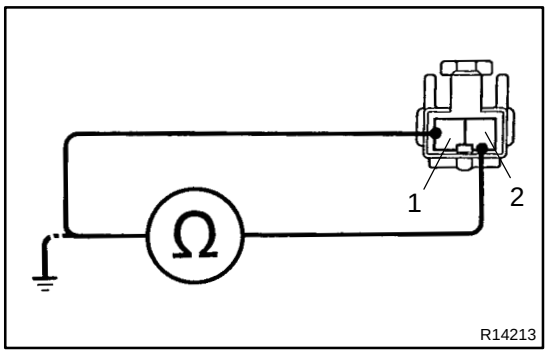
Resistance: 1.6 - 1.8 kΩ at 20˚C

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Remove the rear seat cushion and the seatback.
(b) Make sure that the speed sensor connector and the wire harness side connector are securely connected.
(c) Disconnect the speed sensor connector.
(d) Turn the ignition switch OFF.

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:

Resistance: 0.9 - 1.3 kΩ at 25 ± 5˚C

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG	**Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI-497).

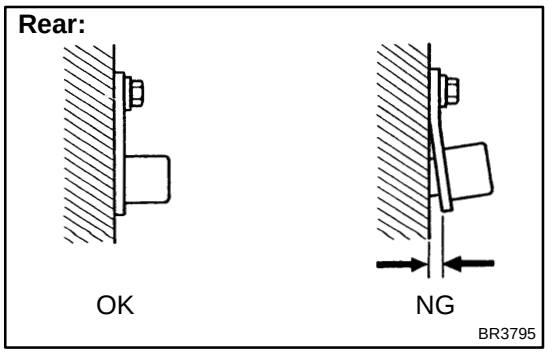
OK

3	**Check for open and short circuit in harness and connector between each speed sensor and skid control ECU (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

4	Check sensor installation.



CHECK:

Check the speed sensor installation.

OK:

The installation bolt is tightened properly and there is no clearance between the sensor and front steering knuckle or rear axle carrier.

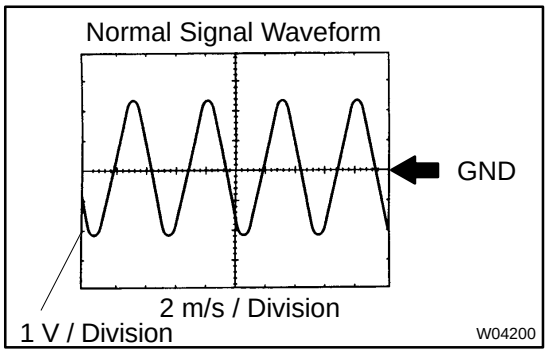
NG	Replace speed sensor.

NOTICE:

Check the speed sensor signal last (See page DI-497).

OK

5	Check speed sensor and sensor rotor serrations.



(REFERENCE) INSPECTION USING OSCILLOSCOPE

PREPARATION:

(a) Remove the skid control ECU with the connector still connected.

(b) Connect the oscilloscope to the terminals FR+ - FR-, FL+ - FL-, RR+ - RR- and RL+ - RL- of the skid control ECU.

CHECK:

Drive the vehicle at the speed of about 20 km/h (12 mph), and check the signal waveform.

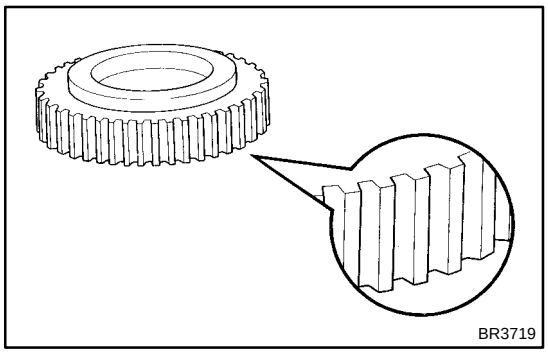
HINT:

- As the vehicle speed (rpm of the wheels) increases, a cycle of the waveform becomes shorter and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter deposited on it.

OK	Check and replace skid control ECU (See page IN-33).

NG

6	Check sensor rotor and sensor tip.



Front:

PREPARATION:

Remove the front axle hub and the speed sensor (See page BR-51).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects on the sensor rotor.

CHECK:

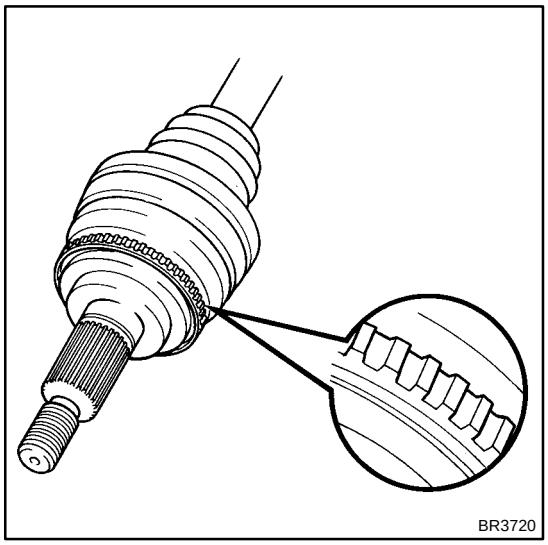
Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.



Rear:

PREPARATION:

Remove the drive shaft (See page SA-57).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See page BR-54).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.

NG → **Replace speed sensor or rotor.**

NOTICE:

Check the speed sensor signal last (See page DI-497).

OK

Check and replace skid control ECU (See page IN-33).

DI1GI-12

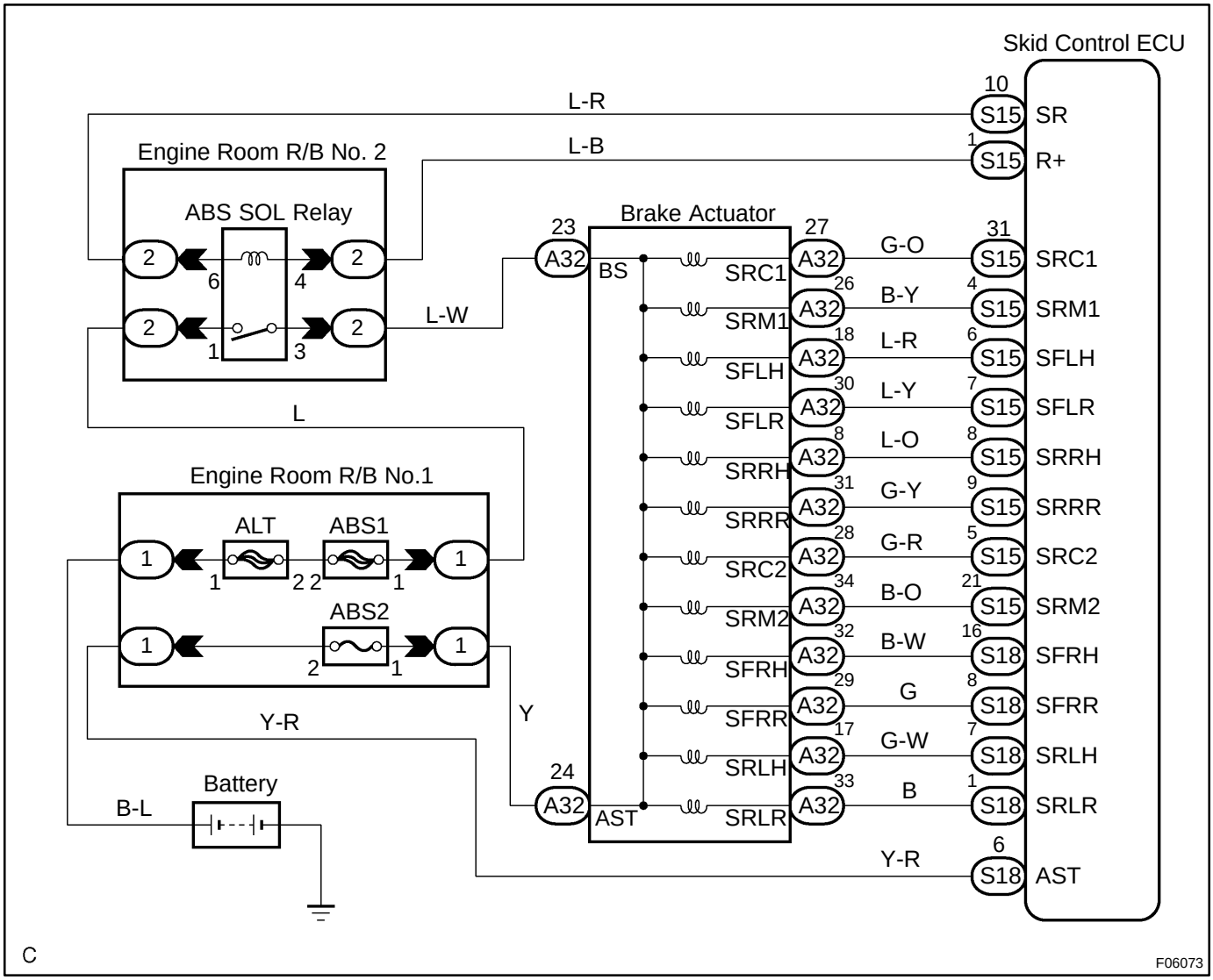
DTC	C0226 / 21 - C0256 / 24	ABS-Related Solenoid Circuits

CIRCUIT DESCRIPTION

ABS-related solenoids operate when signals are received from the ECU, and control the pressure acting on the wheel cylinders thus controlling the braking force.

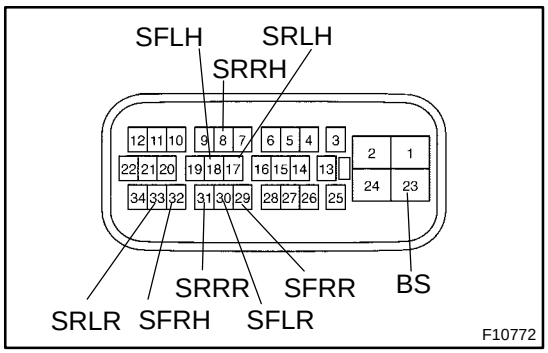
DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	Open or short circuit for SFRH or SFRR circuit continues for 0.05 sec. or more.	✓Brake actuator ✓SFRH or SFRR circuit
C0236 / 22	Open or short circuit for SFLH or SFLR circuit continues for 0.05 sec. or more.	✓Brake actuator ✓SFLH or SFLR circuit
C0246 / 23	Open or short circuit for SRRH or SRRR circuit continues for 0.05 sec. or more.	✓Brake actuator ✓SRRH or SRRR circuit
C0256 / 24	Open or short circuit for SRLH or SRLR circuit continues for 0.05 sec. or more.	✓Brake actuator ✓SRLH or SRLR circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check brake actuator solenoid.



PREPARATION:

(a) Turn the ignition switch OFF.

(b) Disconnect the brake actuator connector.

CHECK:

Check continuity between terminal BS and terminals SFRH, SFLH, SRRH, SRLH, SFRR, SFLR, SRRR and SRLR of brake actuator.

OK:

Continuity

HINT:

Resistance of each solenoid at 25°C

SFRH, SFLH, SRRH, SRLH: 8.1 - 9.1 Ω

SFRR, SFLR, SRRR, SRLR: 4.0 - 4.6 Ω

NG → **Replace brake actuator.**

OK ↓

2	Check for open and short circuit in harness and connector between skid control ECU and brake actuator (See page IN-33).

NG → **Repair or replace harness or connector.**

OK ↓

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI7UM-03

DTC	C0273/13, C0274/14	ABS Motor Relay Circuit

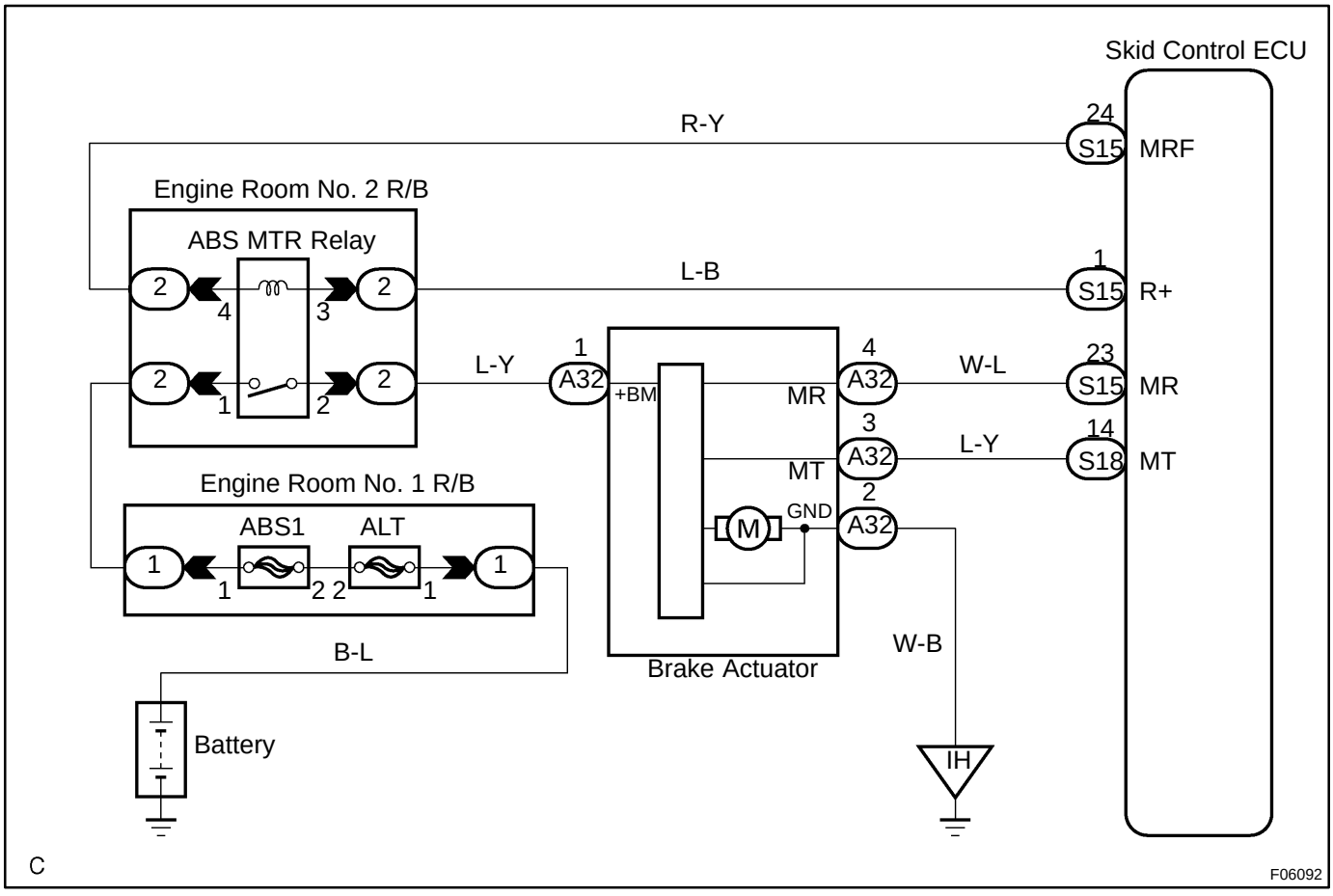
CIRCUIT DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. While the ABS & TRAC & VSC are activated, the ECU switches the motor relay ON and operates the ABS pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
C0273 / 13	Conditions 1. and 2. continued for 0.12 sec. or more: 1. ECU terminal IG1 voltage is 9.5 V to 17.2 V in the initial check or ABS, TRC are in operation, and when the motor relay is ON, however, the contact point of the motor relay is OFF.*1 2. ECU terminal IG1 is 9.5 V or less, and when the motor relay is ON, but the contact point of the motor relay does not become ON.*2	ABS motor relay ABS motor relay circuit Skid control ECU
C0274 / 14	When the motor relay is OFF, the condition that the contact point of motor relay is ON continues for 4 sec. or more.	

*1 Relay contact OFF condition: MT terminal voltage is below 3.6 V.
*2 Relay contact ON condition: MT terminal voltage is 3.6 V or above.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using hand-held tester.

1	**Check ABS motor relay operation.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check the operation sound of the ABS motor relay when operating it with the hand-held tester.

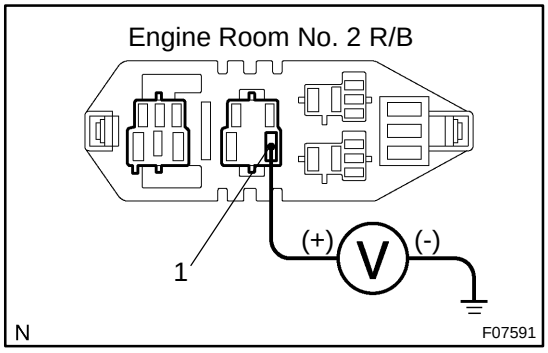
OK:

The operation sound of the ABS motor relay should be heard.

OK → **Go to step 4.**

NG

2	**Check voltage between terminal 1 of engine room No. 2 R/B (for ABS motor relay) and body ground.**



PREPARATION:

Remove the ABS motor relay from the engine room No. 2 R/B.

CHECK:

Measure voltage between terminal 1 of engine room No. 2 R/B (for ABS motor relay) and body ground.

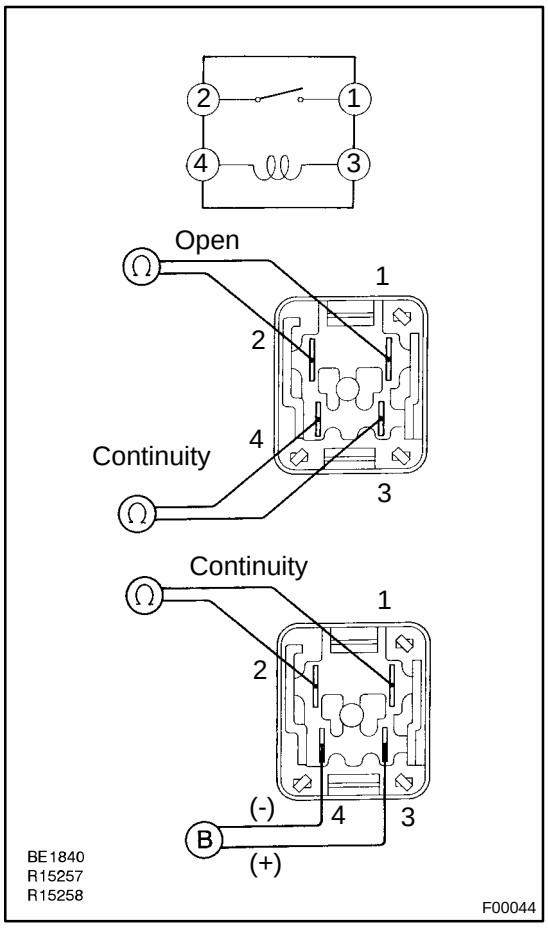
OK:

Voltage: 10 - 14 V

NG → **Check and repair harness or connector.**

OK

3	Check ABS motor relay.



CHECK:

Check continuity between each pair of terminal of motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value 62 Ω)
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

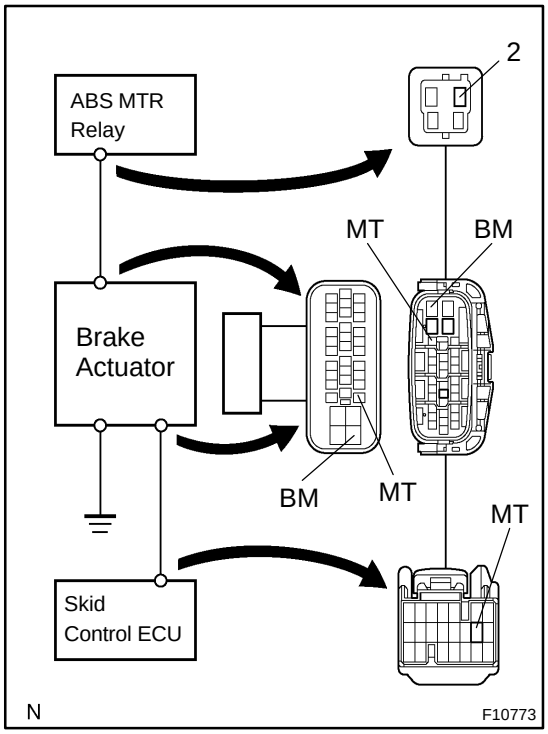
OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS motor relay.**

OK

4	**Check continuity between terminals 2 of engine room No. 2 R/B (for ABS motor relay) and terminal MT of skid control ECU.**



PREPARATION:

(a) Remove the ABS motor relay from the engine room No. 2 R/B.

(b) Disconnect the connector from the skid control ECU.

CHECK:

Check continuity between terminals 2 of engine room No. 2 R/B (for ABS motor relay) and terminal MT of skid control ECU harness side connector.

OK:

Continuity

HINT:

There is no continuity between terminals BM and MT of brake actuator.

NG → **Repair or replace harness or brake actuator.**

OK

5	**Check for open and short circuit in harness and connector between ABS motor relay and skid control ECU (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI7UN-03

DTC	C0278/11, C0279/12	ABS Solenoid Relay Circuit

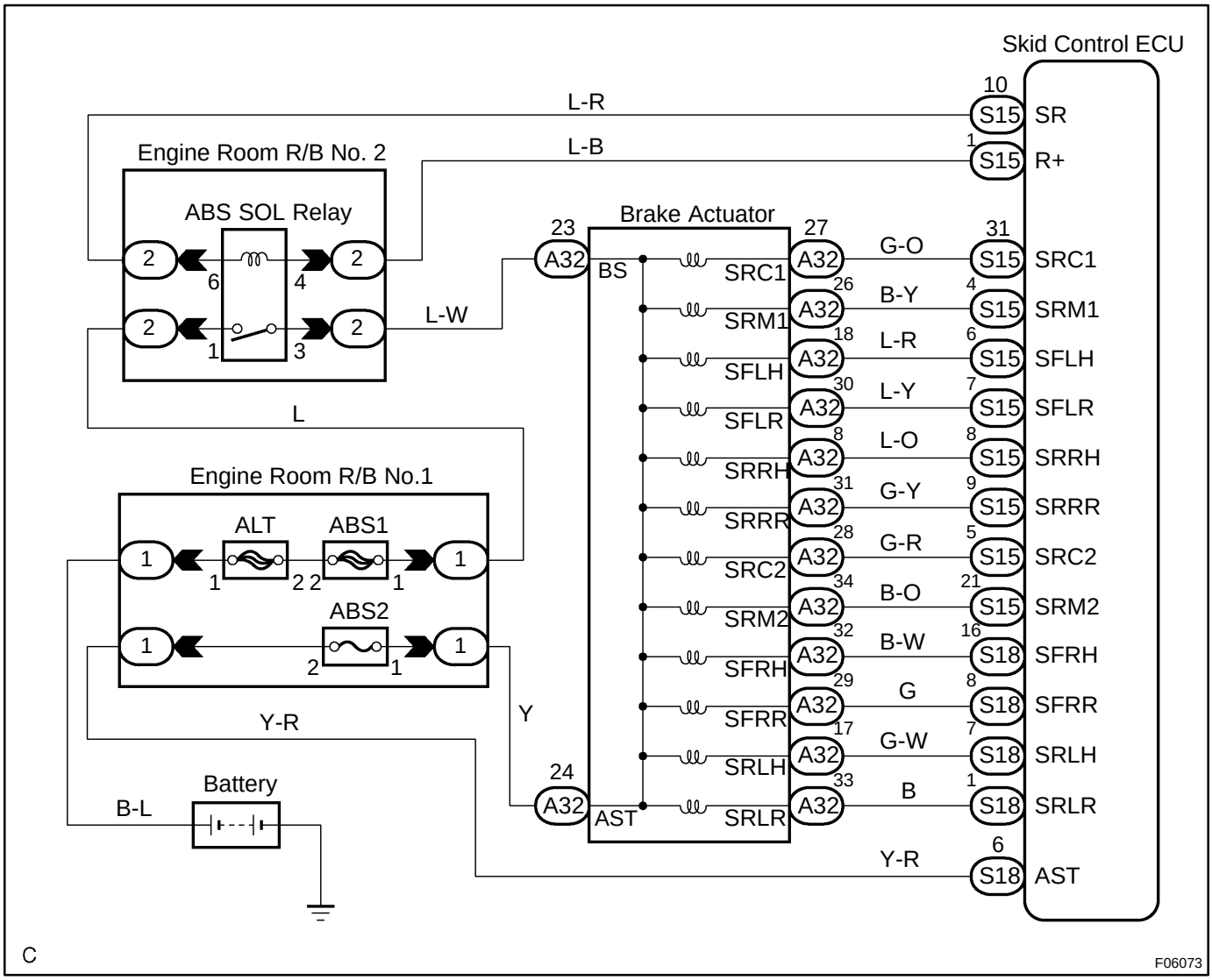
CIRCUIT DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
C0278 / 11	Conditions 1. and 2. continue for 0.2 sec. or more: 1. ECU terminal IG1 voltage is 9.5 V to 17.2 V and the solenoid relay is ON, however, the contact point of the solenoid relay is OFF.*1 2. With solenoid relay ON driving, ECU terminal IG1 voltage becomes 9.5 V or less and the contact point of the solenoid relay does not become ON.*2	ABS solenoid relay ABS solenoid relay circuit Skid control ECU
C0279 / 12	Immediately after ECU terminal IG1 becomes ON, and solenoid relay is OFF, however, when the condition that the contact point of the solenoid relay is ON continues for 0.2 sec. or more.	ABS solenoid relay ABS solenoid relay circuit Skid control ECU

*1 Solenoid relay contact OFF condition:
All of solenoid terminal voltage is half of IG1 terminal voltage or less than.
*2 Solenoid relay contact ON condition:
All of solenoid terminal voltage is half of IG 1 terminal voltage or more.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check ABS solenoid relay operation.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check the operation sound of the ABS solenoid relay when operating it with the hand-held tester.

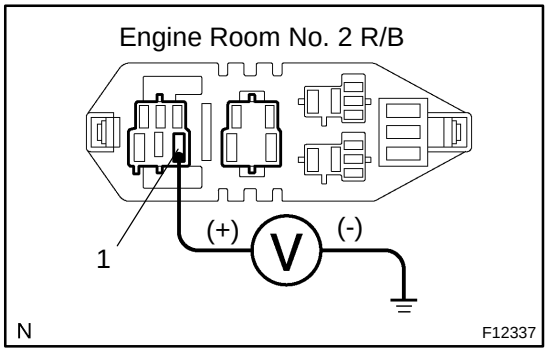
OK:

The operation sound of the ABS solenoid relay should be heard.

OK	Go to step 4.

NG

2	**Check voltage between terminals 1 of engine room No. 2 R/B (for ABS solenoid relay) and body ground.**



PREPARATION:

Remove the ABS solenoid relay from the engine room No. 2 R/B.

CHECK:

Measure the voltage between terminals 1 of engine room No. 2 R/B (for ABS solenoid relay) and body ground.

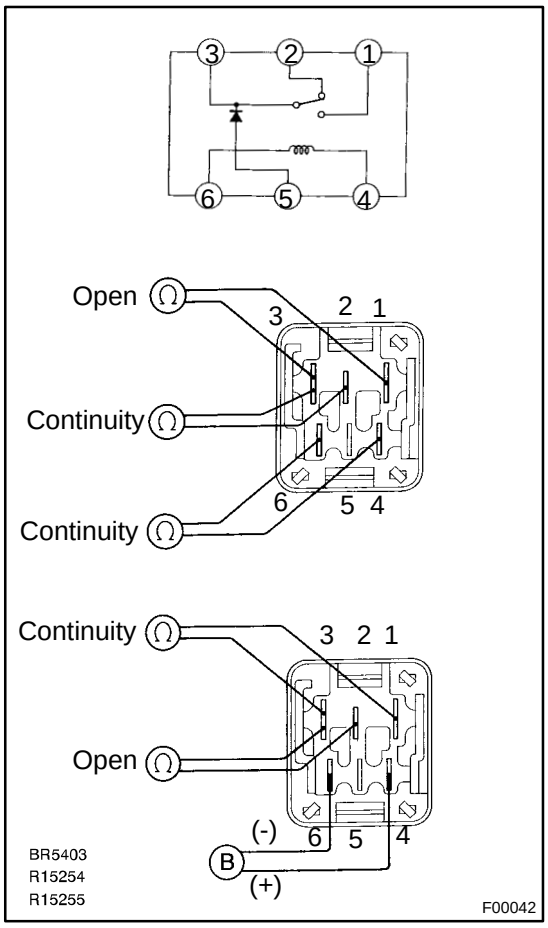
OK:

Voltage: 10 - 14 V

NG	Check and repair harness or connector.

OK

3	Check ABS solenoid relay.



CHECK:

Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

CHECK:

(a) Apply battery positive voltage between terminals 4 and 6.

(b) Check continuity between each terminal of ABS solenoid relay.

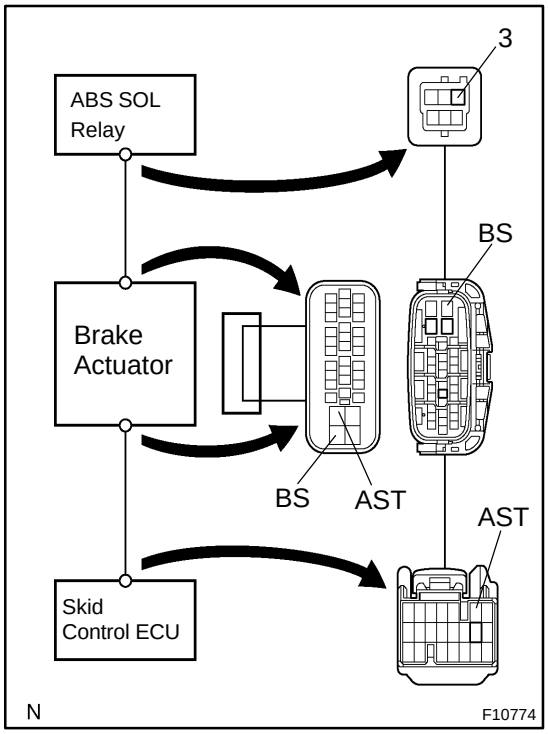
OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG → **Replace ABS solenoid relay.**

OK

4	Check continuity between terminals 3 of engine room No. 2 R/B (for ABS solenoid relay) and terminal AST of skid control ECU.



PREPARATION:

(a) Remove the ABS solenoid relay from the engine room No. 2 R/B.

(b) Disconnect the connector from the skid control ECU.

CHECK:

Check continuity between terminals 3 of engine room No. 2 R/B (for ABS solenoid relay) and terminal AST of skid control ECU harness side connector.

OK:

Continuity

NG → **Repair or replace harness or brake actuator.**

OK

5	Check for open and short circuit in harness and connector between ABS solenoid relay and skid control ECU (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI7UO-02

DTC	C1201/51	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If any trouble occurs in the engine control system, the ECU prohibits TRAC and VSC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1201 / 51	Conditions 1. and 2. continue for 5 sec.: 1. Engine speed: 500 rpm or more. 2. A trouble signal in the engine control system is input.	✓Engine control system

INSPECTION PROCEDURE

1	**Check the DTC for the engine (See page DI-3).**

***1** → **Repair engine control system according to the code output.**

***2**

Check for ECM connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON

DI7UP-03

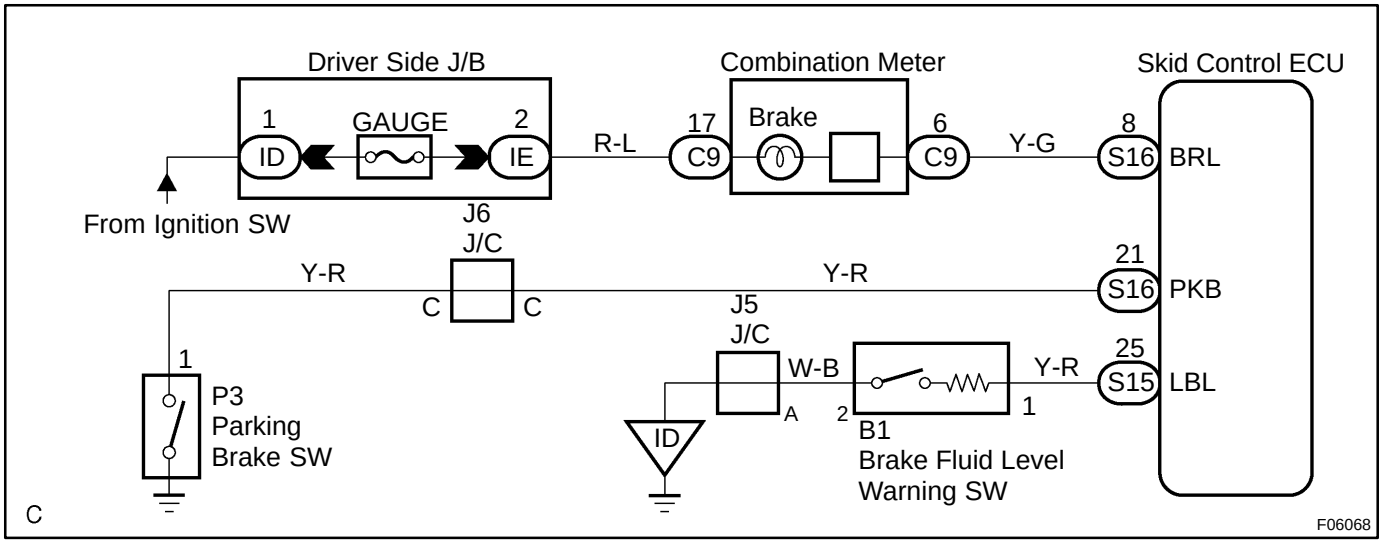
DTC	C1202/52	Brake Fluid Warning Switch Circuit

CIRCUIT DESCRIPTION

The brake fluid level warning switch sends the appropriate signal to the ECU when the brake fluid level drops.
HINT:
Pull the parking brake lever also turns on the brake warning light but does not diagnose DTC No. C1202 / 52.

DTC No.	DTC Detecting Condition	Trouble Area
C1202/52	Low master reservoir fluid level condition continues for 30 sec. or more when vehicle stops, or for 60 sec. or more when driving.	✓Brake fluid level ✓Brake fluid level warning switch ✓Brake fluid level warning switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake fluid level.**

CHECK:
Check the amount of fluid in the brake reservoir.

NG → **Check and repair brake fluid leakage and add fluid.**

OK

2	Check brake fluid level warning switch (See page BE-89).

NG → Replace brake fluid level warning switch.

OK

3	Check for open circuit in all the harness and components connected to BRAKE fluid level warning light (See page IN-33).

NG → Repair or replace harness or connector.

OK

Check and replace skid control ECU (See page IN-33).

DI7UQ-03

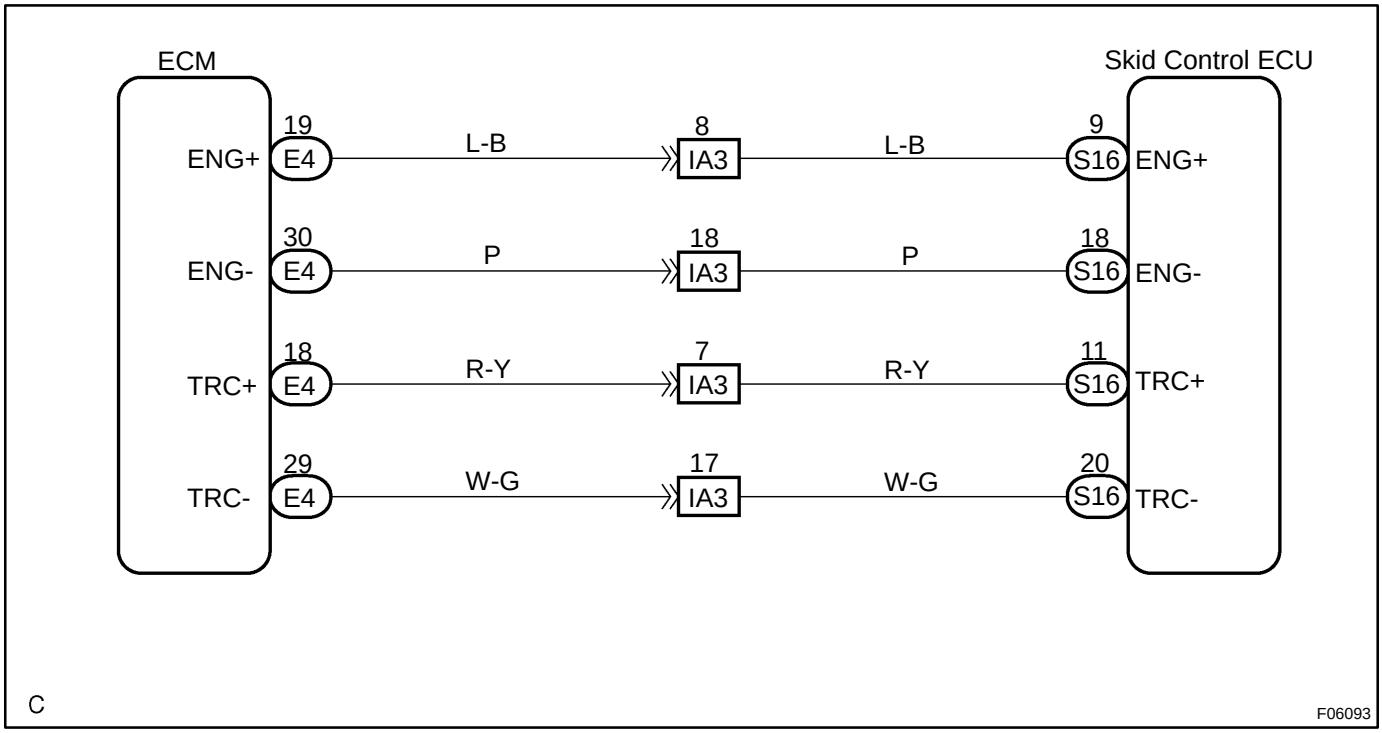
DTC	C1203/53	ECM Communication Circuit Malfunction

CIRCUIT DESCRIPTION

The circuit is used to send TRAC and VSC control information from the skid control ECU to the ECM (TRC+, TRC-), and engine control information from the ECM to the skid control ECU (ENG+, ENG-).

DTC No.	DTC Detecting Condition	Trouble Area
C1203 / 53	1. Either of the following (a),or (b) continues for 5 sec.: (a) When ECU terminal IG1 voltage is 9.5 V or more, the condition that the data is not transmitted to engine ECU continues for more than 5 sec. (b) When ECU terminal IG1 voltage is 9.5 V or more, engine speed is 500 rpm or more and data receipt from engine ECU is impossible. 2. The condition that the data sent from engine ECU becomes repeatedly normal and abnormal occurs 10 times or more for 60 sec. 3. The condition that TRC ± communication is normal ↔ abnormal has been repeated more than 10 times in 60 sec.	✓TRC+ or TRC- circuit ✓ENG+ or ENG- circuit ✓Engine ECU ✓Skid control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between terminals ENG+, ENG-, TRC+, TRC- of skid control ECU and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK ↓

Check and replace ECM or skid control ECU (See page IN-33).

DI7UR-03

DTC	C1223/43	ABS Control System Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1223/43	ABS control system is abnormal.	ABS control system

INSPECTION PROCEDURE

1	**Check the DTC for the ABS (See page DI-497).**

***1** → **Repair ABS control system according to the code output.**

***2**

Check for ECU connected to malfunction indicator lamp.

*1: Output NG code
*2: Malfunction indicator lamp remains ON

DI7US-03

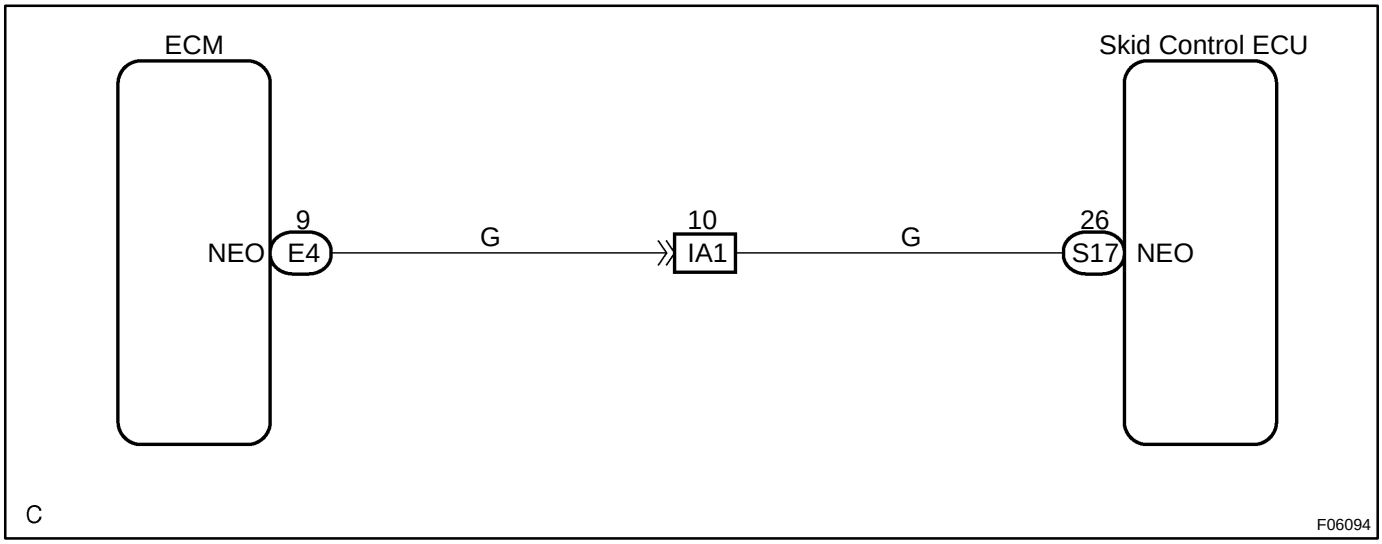
DTC	C1224/44	NE Signal Circuit

CIRCUIT DESCRIPTION

The skid control ECU receives engine revolution speed signals (NE signals) from the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
C1224/44	When any of the following 1. through 2. is detected: 1. At vehicle speed of 30 km/h (19 mph) or more, and when data receiving from the ECM is in normal condition, and open or short circuit for engine revolution signal circuit continues for 10 sec. or more. 2. While TRAC is operating and when open or short circuit for engine revolution signal circuit continues for 0.24 sec. or more.	~NEO circuit ~ECM

WIRING DIAGRAM



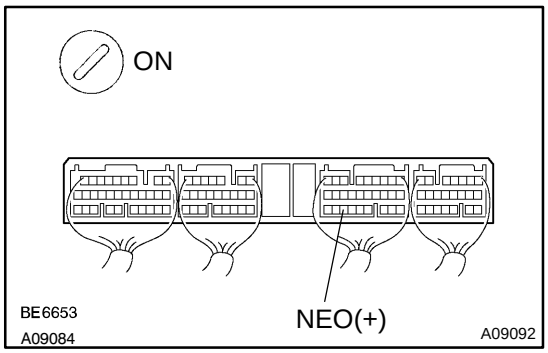
INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between terminals NEO of skid control ECU and terminal NEO of ECM (See page IN-33).**

NG → **Repair or replace harness and connector.**

OK

2	Check voltage between terminals NEO of skid control ECU and body ground.



PREPARATION:

(a) Remove the skid control ECU with connectors still connected.

(b) Turn the ignition switch ON.

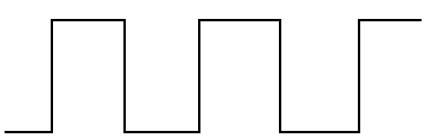
CHECK:

Measure voltage between terminal NEO of skid control ECU and body ground for the engine conditions below.

OK:

Engine condition	Voltage
OFF (IG ON)	3 - 6 V or below 1 V
ON (Idling)	3 - 6 V ↔ below 1 V (Pulse)

(Reference)



NG → **Check and replace skid control ECU or ECM (See page IN-33).**

OK

If the same codes is still output after the DTC is deleted, check the contact condition of each connection.

DI9JD-01

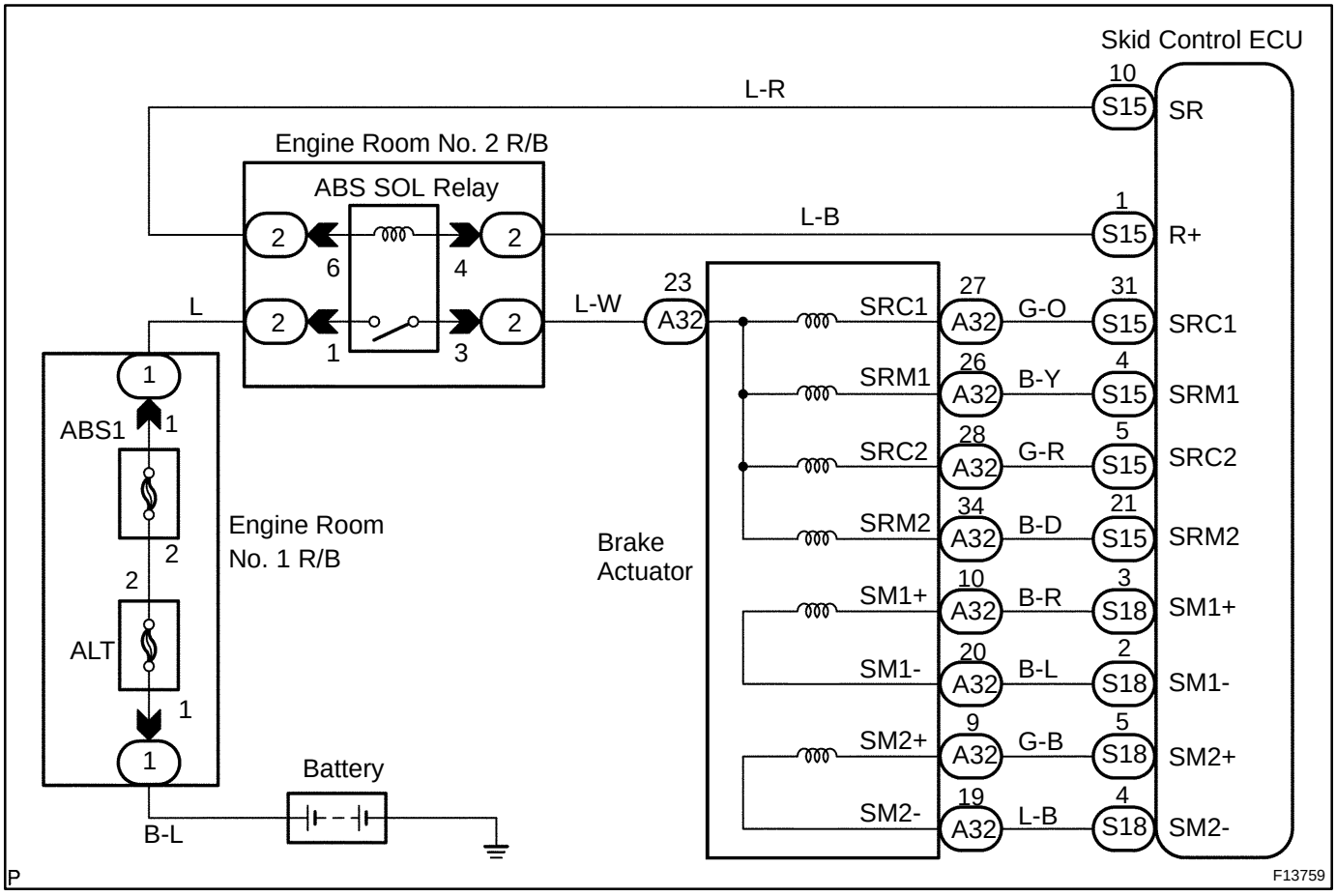
DTC	C1225 / 25 - C1227 / 27	TRAC & VSC-Related Solenoid Circuits

CIRCUIT DESCRIPTION

The TRAC & VSC solenoids operate in accordance with signals from the ECU and raise the fluid pressure in and release it from the brake cylinders.

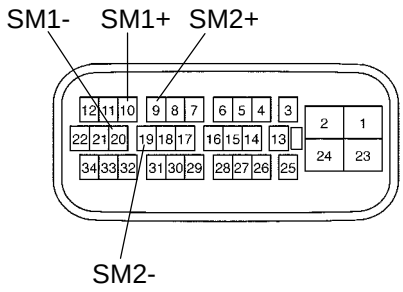
DTC No.	DTC Detecting Condition	Trouble Area
C1225 / 25	Detection of any of conditions 1. through 4.: 1. When SM1 or SM2 is ON, excessive electric current on SM1 or SM2 continues for 0.05 sec. or more. 2. When SM1 or SM2 is OFF, open circuit of SM1 or SM2 continues for 0.05 sec. or more. 3. When SM1 or SM2 is ON, open circuit of SM1 or SM2 continues for 0.1 sec. or more. 4. When SM1 or SM2 is OFF, electric current application on SM1 or SM2 continues for 0.1 sec. or more.	✓Brake actuator ✓SM1 or SM2 circuit
C1226 / 26	Open or short circuit of SRM1 or SRM2 continues for 0.05 sec. or more.	✓Brake actuator ✓SRM1 or SRM2 circuit
C1227 / 27	Open or short circuit of SRC1 or SRC2 continues for 0.05 sec. or more.	✓Brake actuator ✓SRC1 or SRC2 circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake actuator solenoid.**



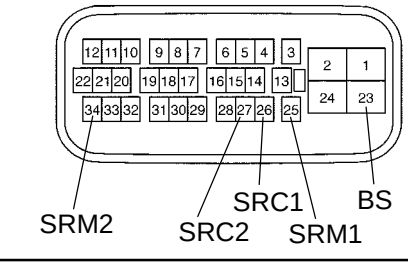
PREPARATION:
Disconnect the brake actuator connector.
CHECK:
Check continuity between terminals SM1+ - SM1-, and terminals SM2+ - SM2- of brake actuator.
OK:

Continuity

HINT:
Resistance of each solenoid: 8.1 - 9.1 Ω at 25 °C
CHECK:
Check continuity between terminal BS and terminals SRC1, SRC2, SRM1 and SRM2 of brake actuator.
OK:

Continuity

HINT:
Resistance of each solenoid at 25 °C
SRC1, SRC2: 8.1 - 9.1 Ω
SRM1, SRM2: 4.9 - 5.5 Ω



NG → **Replace brake actuator.**

OK

2	**Check for open and short circuit in harness and connector between skid control ECU and brake actuator (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

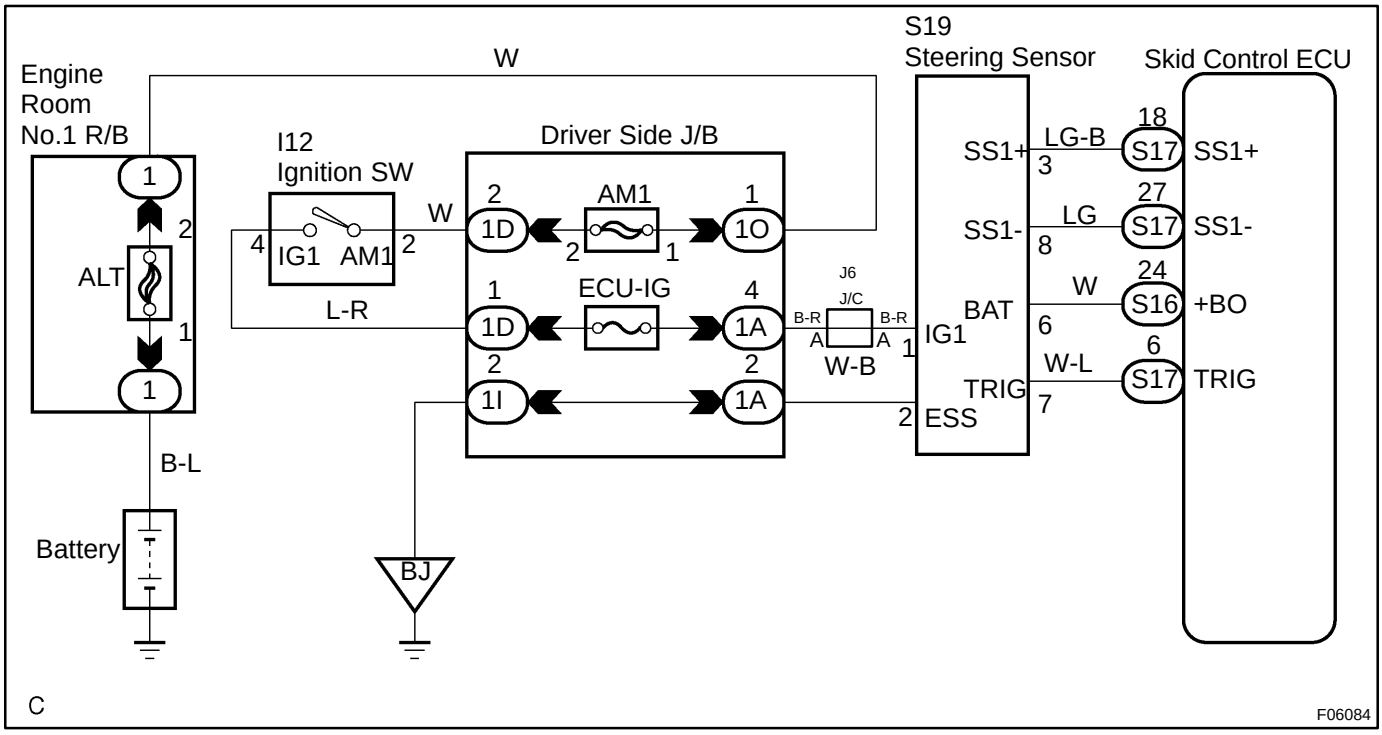
DI1H5-12

DTC	C1231 / 31, C1335 / 35	Steering Angle Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1231 / 31	When detecting the abnormality.	✓Steering angle sensor ✓Steering angle sensor circuit ✓BI circuit
C1335 / 35	Detection of either condition 1. or 2.: 1. When the ECU IG1 terminal voltage is 9.5 V or more, data transmission from the steering angle sensor is impossible for 1 sec. or more. 2. Immediately after the terminal BAT is connected and when IG1 terminal voltage is 9.5 V or more, open circuit of terminal TRIG continues for 15 sec. or more.	

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of the steering angle sensor.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and turn the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that the steering wheel turning angle value of the steering angle sensor observed in the hand-held tester is changing as the steering wheel is turned.

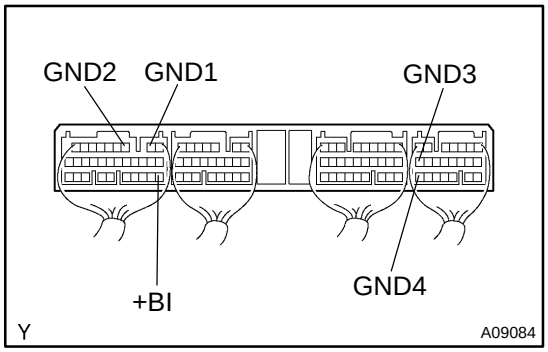
OK:

Steering wheel turning angle value must be changing.

OK	**Go to step 5.**

NG

2	**Check voltage between terminals +BI and GND of skid control ECU.**



PREPARATION:

(a) Remove the skid control ECU with the connector still connected.
(b) Turn the ignition switch ON.
(c) Measure voltage between terminal +BI and GND of skid control ECU.

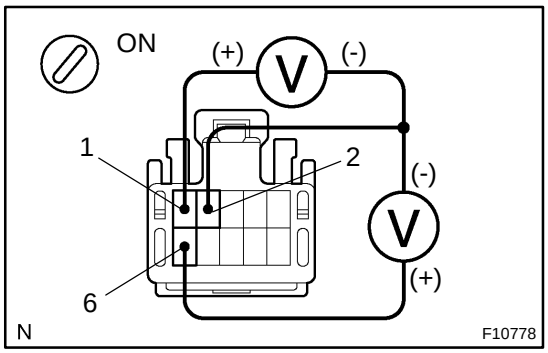
OK:

Voltage: 10 - 14 V

NG	**Check and replace harness and connector.**

OK

3	Check input voltage of the steering angle sensor.



PREPARATION:

(a) Remove the steering wheel and column lower cover (See page RS-13).

(b) Disconnect the steering angle sensor connector.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals 1 and 2, 2 and 6 of the steering angle sensor harness side connector.

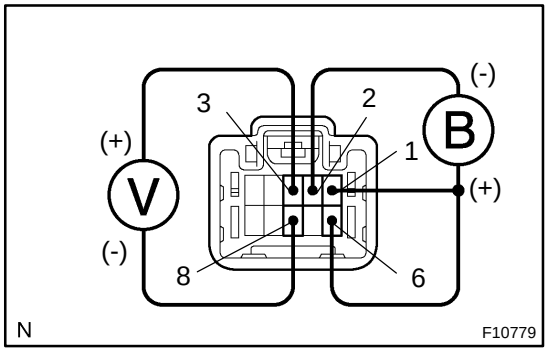
OK:

Voltage: 10 - 14 V

NG	Check and replace harness and connector.

OK

4	Check steering angle sensor.



PREPARATION:

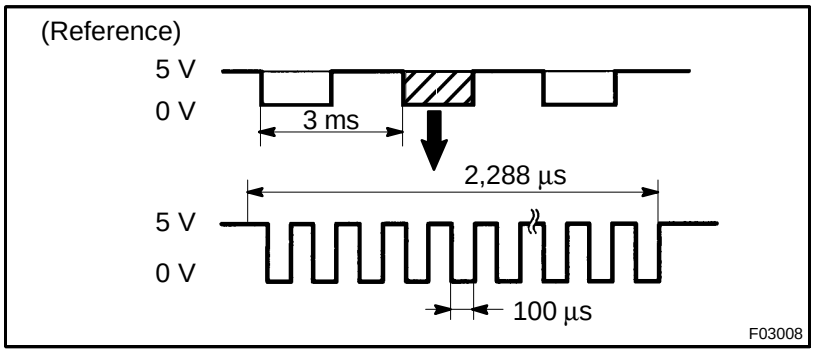
(a) Apply battery positive voltage between terminals 1 and 2, 2 and 6 of the steering angle sensor.

(b) Connect the oscilloscope to the terminals 3 and 8 of the steering angle sensor.

CHECK:

Turn the steering wheel slowly and check the signal waveform.

OK:



HINT:

The above signal wave form does not repeat ON and OFF regularly and this ON-OFF interval changes case by case according to the data.

NG	Replace steering angle sensor.

OK

Check and replace skid control ECU (See page IN-33).

5	Check DTC for ABS (See page DI-497).

OK	Check and replace skid control ECU (See page IN-33).

OK

End.

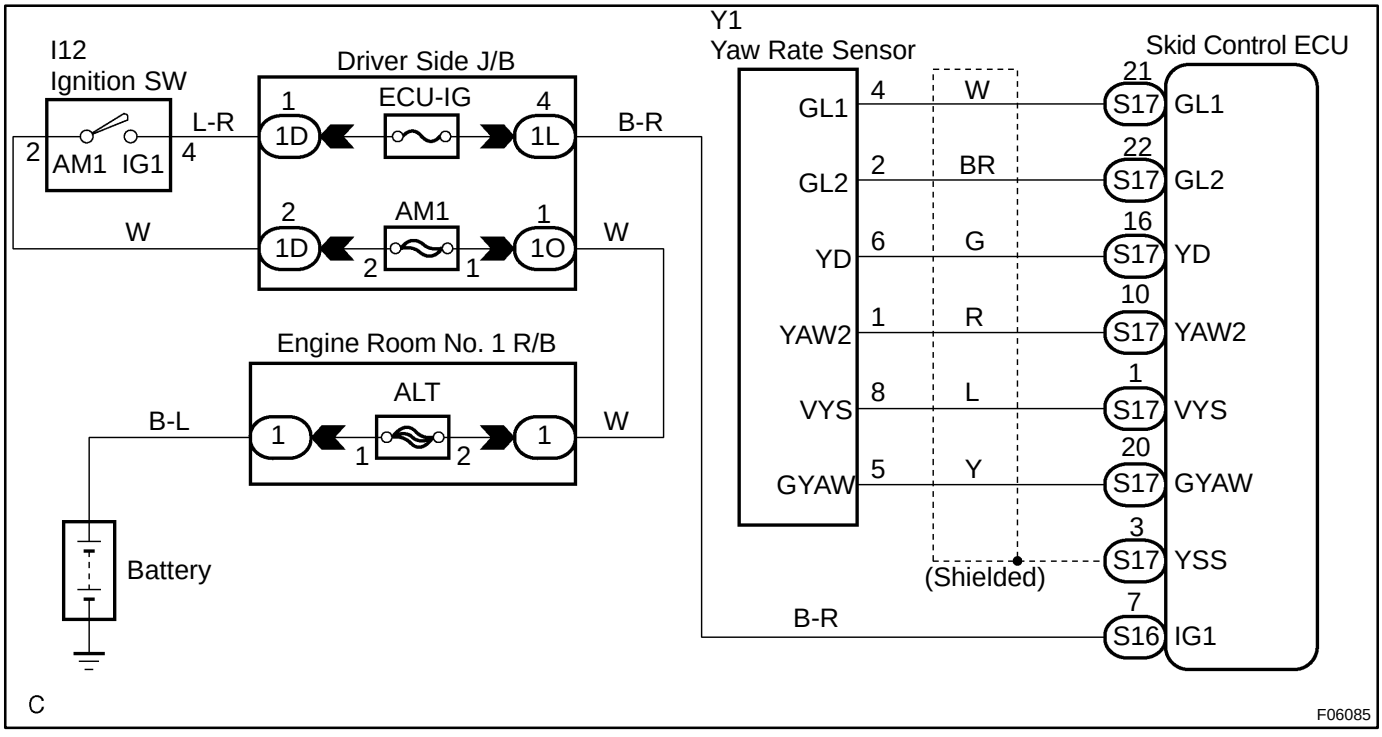
DI8DW-04

DTC	C1233 / 33, C1234 / 34	Yaw Rate Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1233 / 33	Detection of any of conditions 1. through 4.: 1. When the ECU IG1 terminal voltage is 9.5 to 17.2 V, the yaw rate sensor voltage is out of the range from 0.25 to 4.75 V for 1 sec. or more. 2. The yaw rate sensor open circuit detect signal is ON for 1 sec. or more. 3. The yaw rate sensor power source voltage is out of the range from 4.4 to 5.6 V for 1 sec. or more. 4. Momentary open circuit of the yaw rate sensor signal occurs 10 times or more.	✓Yaw rate sensor ✓Yaw rate sensor circuit
C1234 / 34	When the yaw rate sensor VYS terminal voltage is 4.4 to 5.6 V, YD malfunction signal of the yaw rate sensor is ON for 5 sec. or more.	

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Perform zero point calibration of the yaw rate sensor (See page DI-497).**

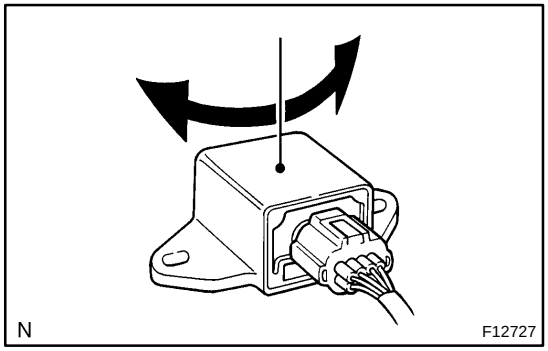
2	Is DTC still output?

Check DTC on page DI-497 .

NO → End.

YES

3	Check output value of the yaw rate sensor.



In case of using the hand-held tester:

PREPARATION:

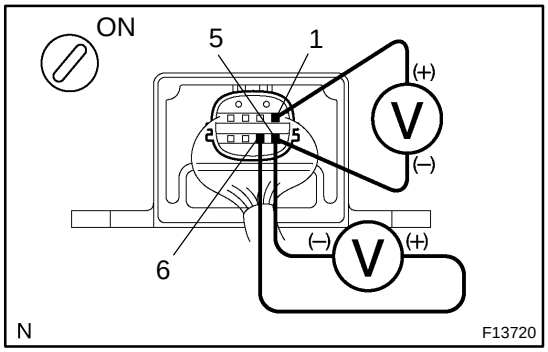
(a) Remove the consol box.
(b) Remove the 2 nuts and the yaw rate sensor with the connector still connected to it.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch ON and push the hand-held tester main switch ON.
(e) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that the yaw rate value of the yaw rate sensor observed in the hand-held tester is changing: Place the yaw rate sensor vertically to the ground and turn the sensor pivoted on its center.

OK:

Yaw rate value must be changing.
(Reference)
When the yaw rate sensor is stationary
output value: ± 4 deg/s



In case of not using the hand-held tester:

PREPARATION:

(a) Remove the consol box then remove the yaw rate sensor with the connector still connected to it.
(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals YAW (1) - GYAW (5), and terminals YD (6) - GYAW (5) of the yaw rate sensor.

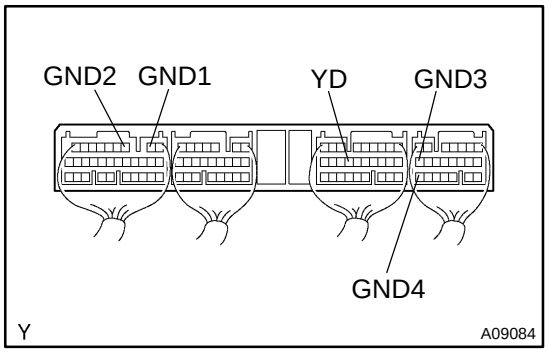
OK:

Terminals 1 and 5 (YAW - GYAW)	About 2.42 - 2.58 V
Terminals 6 and 5 (YD - GYAW)	About 4.5 V - 5.3 V

NG → **Replace yaw rate sensor.**

OK

4	**Check voltage between terminals YD and GND of skid control ECU.**



PREPARATION:

Remove the skid control ECU with the connector still connected to it.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals YD and GND of skid control ECU.

OK:

Voltage: 4.5 - 5.3 V

OK	**Check and replace skid control ECU (See page IN-33).**

NG

5	**Check for open and short circuit in harness and connector between yaw rate sensor and skid contorl ECU (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

Check and replace skid control ECU (See page IN-33).

CO/HC

INSPECTION

EM0D0-09

HINT:

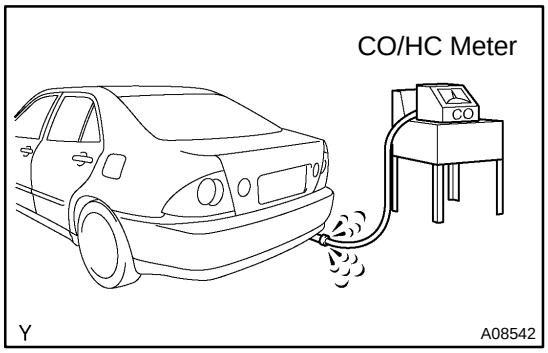
This check is used only to determine whether or not the idle CO/HC complies with regulations.

1. INITIAL CONDITIONS

(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected
(f) SFI system wiring connectors fully plugged
(g) Ignition timing checked correctly
(h) Transmission in neutral position
(i) Tachometer and CO/HC meter calibrated by hand

2. START ENGINE

3. RACE ENGINE AT 2,500 RPM FOR APPROX. 180 SECONDS



4. INSERT CO/HC METER TESTING PROBE AT LEAST 40 cm (1.3 ft) INTO TAILPIPE DURING IDLING

5. IMMEDIATELY CHECK CO/HC CONCENTRATION AT IDLE AND/OR 2,500 RPM

HINT:

When doing the 2 mode (2,500 rpm and idle) test, follow the measurement order prescribed by the applicable local regulations.

If the CO/HC concentration does not comply with regulations, troubleshoot in the order given below.

(a) Check heated oxygen sensors operation (See page SF-73).

(b) See the table below for possible causes, and then inspect and correct the applicable causes if necessary.

HC	CO	Phenomenon	Causes
High	Normal	Rough idle	4. Faulty ignitions: • Incorrect timing • Fouled, shorted or improperly gapped plugs • Open or crossed high-tension cords 5. Incorrect valve clearance 6. Leaky intake and exhaust valves 7. Leaky cylinder
High	Low	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: • PCV hose • Intake manifold • Throttle body • Cylinder head gasket 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty SFI system: • Faulty fuel pressure regulator • Faulty ECM • Faulty injector • Faulty throttle position sensor • Faulty MAF meter

COMPRESSION

EM0D1-09

INSPECTION

HINT:

If there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

1. WARM UP AND STOP ENGINE

Allow the engine to warm up to normal operating temperature.

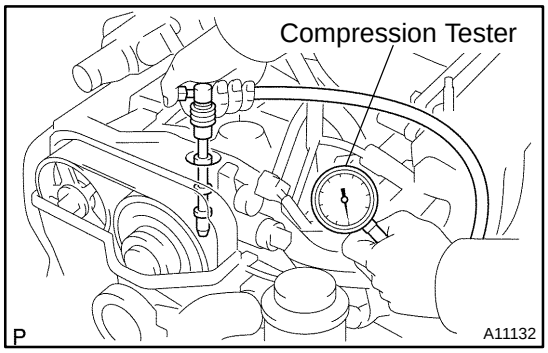
2. REMOVE ENGINE COVER

Remove the 4 nuts and engine cover.

3. DISCONNECT IGNITION COILS AND HIGH-TENSION CORD SET ASSEMBLY (See page IG-7)

4. REMOVE SPARK PLUGS

5. DISCONNECT INJECTOR CONNECTORS



6. CHECK CYLINDER COMPRESSION

(a) Insert a compression tester into the spark plug hole.

(b) While cranking the engine, measure the compression pressure.

HINT:

Always use a fully charged battery to obtain engine revolutions of 250 rpm or more.

(c) Repeat steps (a) through (b) for each cylinder.

NOTICE:

This measurement must be done in as short a time as possible.

Compression:
1,324 kPa (13.5 kgf/cm^2, 192 psi) or more
Minimum pressure: 1,079 kPa (11.0 kgf/cm^2, 156 psi)
Difference between each cylinder:
98 kPa (1.0 kgf/cm^2, 14 psi) or less

(d) If the cylinder compression in 1 or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (b) for the cylinder with low compression.

- If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are probably worn or damaged.
- If pressure stays low, a valve may be sticking or seating improper, or there may be leakage past the gasket.

7. RECONNECT INJECTOR CONNECTORS

HINT:

The Nos. 1, 3, 5 injector connectors and dark gray, and the Nos. 2, 4, 6 injector connectors are brown.

8. REINSTALL SPARK PLUGS

9. RECONNECT IGNITION COILS AND HIGH-TENSION CORD SET ASSEMBLY (See page IG-9)

10. INSTALL ENGINE COVER

Install the engine cover with the 4 nuts.

VALVE CLEARANCE

ADJUSTMENT

EM0D2-07

HINT:

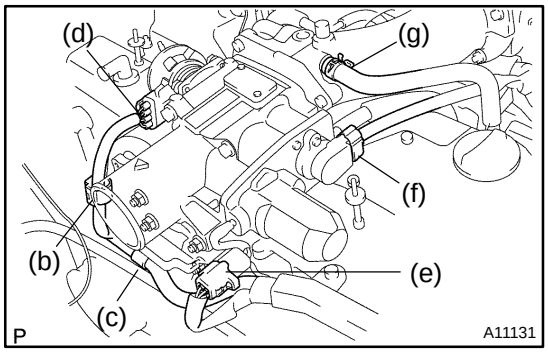
Inspect and adjust the valve clearance when the engine is cold.

1. REMOVE ENGINE COVER

Remove the 4 nuts and engine cover.

2. DRAIN ENGINE COOLANT

3. REMOVE INTAKE AIR RESONATOR



4. REMOVE THROTTLE BODY AND INTAKE AIR CONNECTOR ASSEMBLY

(a) Disconnect the accelerator cable from the throttle body.

(b) Disconnect the engine wire clamp from the clamp bracket of the throttle body.

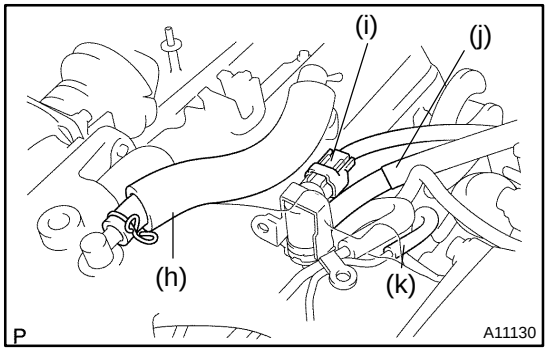
(c) Disconnect the engine wire from the clamp on the throttle body bracket.

(d) Disconnect the accelerator pedal position sensor connector.

(e) Disconnect the throttle control motor connector.

(f) Disconnect the throttle position sensor connector.

(g) Disconnect the air assist hose from the intake air connector.

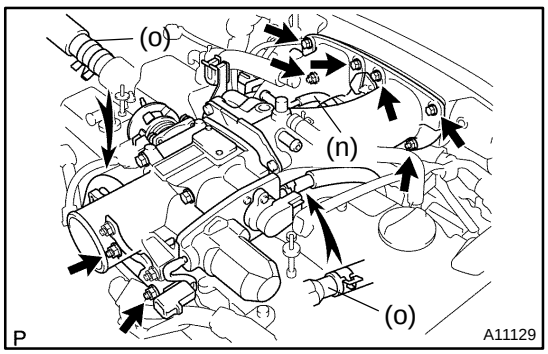


(h) Disconnect the PCV hose from the intake air connector.

(i) Disconnect the VSV connector for EVAP.

(j) Disconnect the EVAP hose (from charcoal canister) from the VSV for EVAP.

(k) Disconnect the vacuum hose (from No. 2 vacuum pipe) from the No. 1 vacuum pipe.



(l) Remove the 2 nuts holding the throttle body bracket to the cylinder head.

(m) Remove the 4 bolts and 2 nuts holding the intake air connector to the air intake chamber.

(n) Disconnect the vacuum hose (from actuator for ACIS) from the No. 1 vacuum pipe.

(o) Disconnect the 2 water bypass hoses from the throttle body, and remove the throttle body together with the intake air connector and gasket.

5. REMOVE NO. 3 TIMING BELT COVER

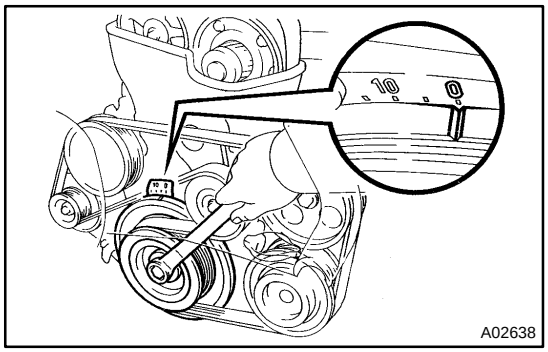
Using a 5 mm hexagon wrench, remove the 4 bolts, oil filler cap, timing belt cover and gasket.

6. REMOVE IGNITION COILS AND HIGH- TENSION CORD SET ASSEMBLY (See page IG-7)

7. REMOVE SPARK PLUGS

8. DISCONNECT ENGINE WIRE FROM CYLINDER HEAD COVERS

9. REMOVE CYLINDER HEAD COVERS (See page EM-34)

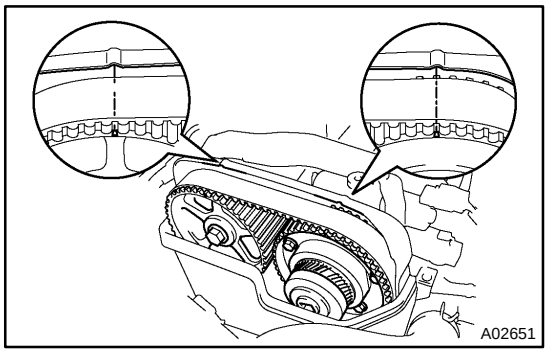


10. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley and align its groove with the timing mark ”0” of the No. 1 timing belt cover.

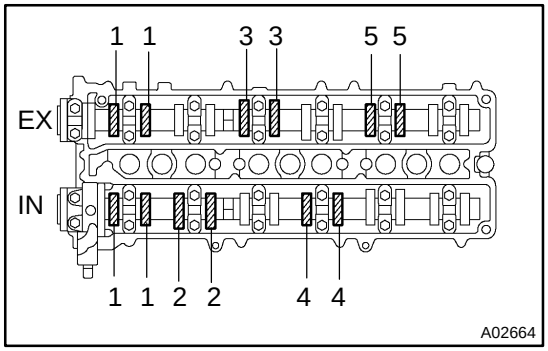
NOTICE:

Always turn the crankshaft clockwise.



(b) Check that the timing marks of the camshaft timing pulleys are aligned with the timing marks of the No. 4 timing belt cover.

If not, turn the crankshaft 1 revolution (360˚).



11. INSPECT VALVE CLEARANCE

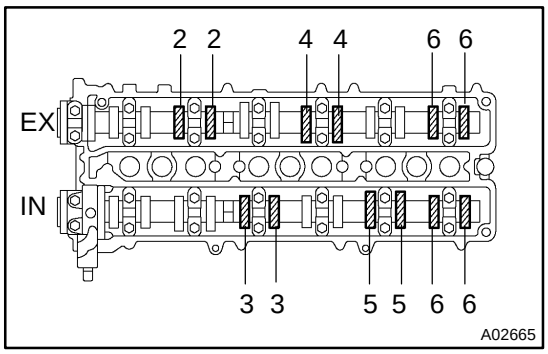
(a) Check only those valves indicated in the illustration.

- Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
- Record the valve clearance measurements of those that are out of specification. They will be used later to determine the required replacement adjusting shim.

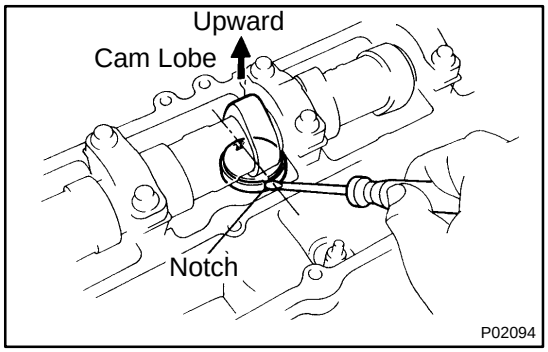
Valve clearance (Cold):

Intake	0.15 - 0.25 mm(0.006 - 0.010 in.)
Exhaust	0.25 - 0.35 mm (0.010 - 0.014 in.)

(b) Turn the crankshaft pulley 1 revolution (360˚), and align the groove with the timing mark ”0” of the No. 1 timing belt cover.



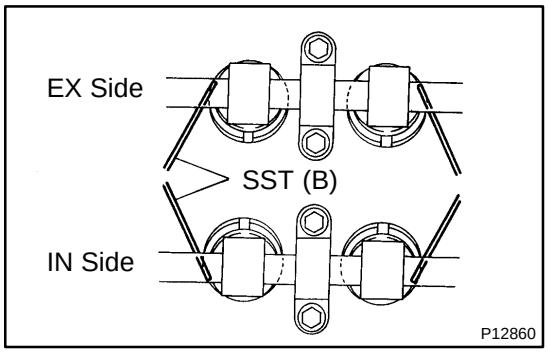
(c) Check only the valves indicated as shown. Measure the valve clearance. (See procedure in step (a))



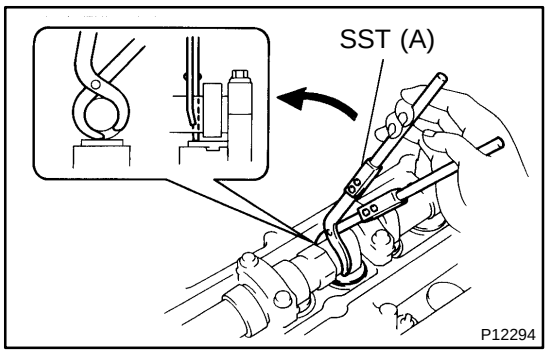
12. ADJUST VALVE CLEARANCE

(a) Remove the adjusting shim.

- Turn the camshaft so that the cam lobe for the valve to be adjusted faces up.
- Turn the valve lifter with a screwdriver so that the notches are perpendicular to the camshaft.

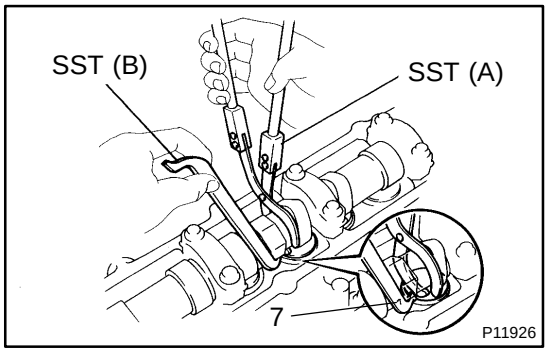


- Insert SST (B) gently from the inside as shown in the illustration.



- Using SST (A), hold the camshaft as shown in the illustration.

SST 09248-55040 (09248-05410)

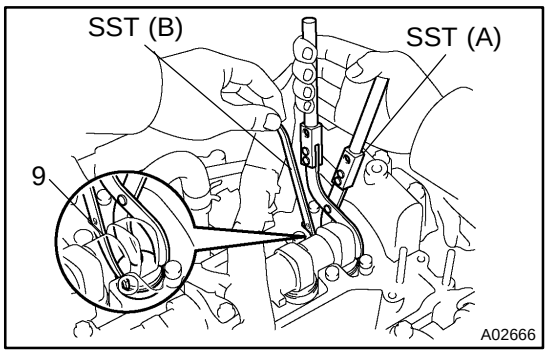


- Using SST (A), press down the valve lifter and place SST (B) between the camshaft and valve lifter. Remove SST (A).

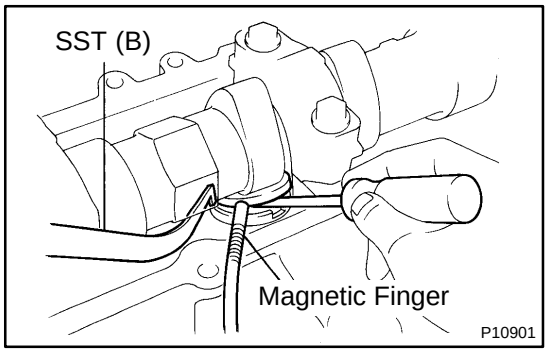
SST 09248-55040 (09248-05410, 09248-05420)

HINT:

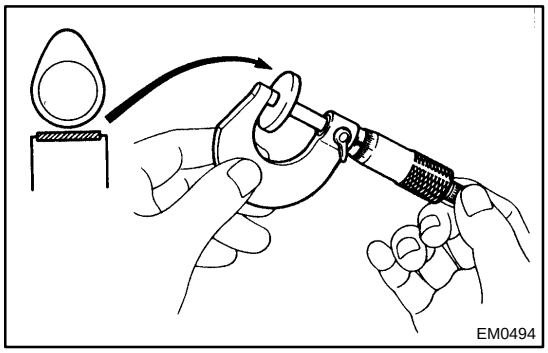
- Apply SST (B) at slight angle on the side marked with ”7” or ”9”, at the position shown in the illustration.



- When the adjusting shim of the No. 1 intake side replace, remove the No. 2 or No. 3 camshaft bearing cap, and insert SST as shown in the illustration.



- Using a small screwdriver and a magnetic finger, remove the adjusting shim.



(b) Determine the replacement adjusting shim size according to the following Formula or Charts:

- Using a micrometer, measure the thickness of the removed shim.
- Calculate the thickness of a new shim so the valve clearance comes within specified value.

T ..... Thickness of used shim
A ..... Measured valve clearance
N ..... Thickness of new shim

Intake: N = T + (A - 0.20 mm (0.008 in.))

Exhaust: N = T + (A - 0.30 mm (0.012 in.))

- Select a new shim with a thickness as close as possible to the calculated values.

HINT:

Shims are available in 17 sizes in increments of 0.050 mm (0.0020 in.), from 2.500 mm (0.0984 in.) to 3.300 mm (0.1299 in.).

Adjusting Shim Selection Chart (Intake)

Measured Clearance mm (in.) / Installed Shim Thickness mm (in.)	2.500 (0.0984)	2.520 (0.0992)	2.540 (0.1000)	2.550 (0.1004)	2.560 (0.1008)	2.580 (0.1016)	2.600 (0.1024)	2.620 (0.1031)	2.640 (0.1039)	2.650 (0.1043)	2.660 (0.1047)	2.670 (0.1051)	2.680 (0.1055)	2.690 (0.1059)	2.700 (0.1063)	2.710 (0.1067)	2.720 (0.1071)	2.730 (0.1075)	2.740 (0.1079)	2.750 (0.1083)	2.760 (0.1087)	2.770 (0.1091)	2.780 (0.1094)	2.790 (0.1098)	2.800 (0.1102)	2.810 (0.1106)	2.820 (0.1110)	2.830 (0.1114)	2.840 (0.1118)	2.850 (0.1122)	2.860 (0.1126)	2.870 (0.1130)	2.880 (0.1134)	2.890 (0.1138)	2.900 (0.1142)	2.910 (0.1146)	2.920 (0.1150)	2.930 (0.1154)	2.940 (0.1157)	2.950 (0.1161)	2.960 (0.1165)	2.970 (0.1169)	2.980 (0.1173)	2.990 (0.1177)	3.000 (0.1181)	3.010 (0.1185)	3.020 (0.1189)	3.030 (0.1193)	3.040 (0.1197)	3.050 (0.1201)	3.060 (0.1205)	3.080 (0.1213)	3.100 (0.1220)	3.120 (0.1228)	3.140 (0.1236)	3.150 (0.1240)	3.160 (0.1244)	3.180 (0.1252)	3.200 (0.1260)	3.220 (0.1268)	3.240 (0.1276)	3.250 (0.1280)	3.260 (0.1283)	3.280 (0.1291)	3.300 (0.1299)
0.000 – 0.020 (0.0000 – 0.0008)									1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	10	10	10	10	11	11	12	12	12	12	13	13
0.021 – 0.040 (0.0008 – 0.0016)								1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	10	10	10	11	11	11	12	12	12	13	13	13	14
0.041 – 0.060 (0.0016 – 0.0024)							1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	10	10	10	11	11	11	12	12	12	13	13	13	14	14
0.061 – 0.080 (0.0024 – 0.0031)						1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	11	11	11	12	12	12	13	13	13	14	14	14
0.081 – 0.100 (0.0032 – 0.0039)				1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	11	11	12	12	12	12	13	13	14	14	14	14	15
0.101 – 0.120 (0.0040 – 0.0047)			1	1	1	1	1	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	12	12	12	12	13	13	14	14	14	14	15	15
0.121 – 0.140 (0.0048 – 0.0055)		1	1	1	1	1	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	12	12	12	13	13	13	14	14	14	15	15	15	16
0.141 – 0.149 (0.0056 – 0.0059)		1	1	1	1	2	2	2	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	12	12	12	13	13	13	14	14	14	15	15	15	16	16
0.150 – 0.250 (0.0059 – 0.0098)																																																																	
0.251 – 0.260 (0.0099 – 0.0102)	2	3	3	3	3	4	4	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	15	15	15	15	16	16	17	17	17	17	17	
0.261 – 0.280 (0.0103 – 0.0110)	2	3	3	3	4	4	4	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	15	15	15	16	16	16	17	17	17	17	17	
0.281 – 0.300 (0.0111 – 0.0118)	3	3	4	4	4	4	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	15	15	16	16	16	16	17	17	17	17	17		
0.301 – 0.320 (0.0119 – 0.0126)	3	4	4	4	4	5	5	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	16	16	16	16	17	17	17	17				
0.321 – 0.340 (0.0126 – 0.0134)	4	4	4	5	5	5	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	16	16	16	17	17	17	17	17					
0.341 – 0.360 (0.0134 – 0.0142)	4	4	5	5	5	6	6	6	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	16	16	16	17	17	17	17	17						
0.361 – 0.380 (0.0142 – 0.0150)	4	5	5	5	6	6	6	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	17	17	17	17	17							
0.381 – 0.400 (0.0150 – 0.0157)	5	5	6	6	6	6	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	16	16	16	16	16	17	17	17	17	17								
0.401 – 0.420 (0.0158 – 0.0165)	5	6	6	6	6	7	7	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17										
0.421 – 0.440 (0.0166 – 0.0173)	6	6	6	7	7	7	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17											
0.441 – 0.460 (0.0174 – 0.0181)	6	6	7	7	7	8	8	8	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17												
0.461 – 0.480 (0.0181 – 0.0189)	6	7	7	7	8	8	8	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17													
0.481 – 0.500 (0.0189 – 0.0197)	7	7	8	8	8	8	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17														
0.501 – 0.520 (0.0197 – 0.0205)	7	8	8	8	8	9	9	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																
0.521 – 0.540 (0.0205 – 0.0213)	8	8	8	9	9	9	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																		
0.541 – 0.560 (0.0213 – 0.0220)	8	8	9	9	9	10	10	10	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																				
0.561 – 0.580 (0.0221 – 0.0228)	8	9	9	9	10	10	10	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																						
0.581 – 0.600 (0.0229 – 0.0236)	9	9	10	10	10	10	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																								
0.601 – 0.620 (0.0237 – 0.0244)	9	10	10	10	10	11	11	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																										
0.621 – 0.640 (0.0244 – 0.0252)	10	10	10	11	11	11	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																												
0.641 – 0.660 (0.0252 – 0.0260)	10	10	11	11	11	12	12	12	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																														
0.661 – 0.680 (0.0260 – 0.0268)	10	11	11	11	12	12	12	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																
0.681 – 0.700 (0.0268 – 0.0276)	11	11	12	12	12	12	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																		
0.701 – 0.720 (0.0276 – 0.0283)	11	12	12	12	12	13	13	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																				
0.721 – 0.740 (0.0284 – 0.0291)	12	12	12	13	13	13	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																						
0.741 – 0.760 (0.0292 – 0.0299)	12	12	13	13	13	14	14	14	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																								
0.761 – 0.780 (0.0300 – 0.0307)	12	13	13	13	14	14	14	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																										
0.781 – 0.800 (0.0307 – 0.0315)	13	13	14	14	14	14	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																												
0.801 – 0.820 (0.0315 – 0.0323)	13	14	14	14	14	15	15	16	16	16	16	17	17	17	17	17	17	17	17																																														
0.821 – 0.840 (0.0323 – 0.0331)	14	14	14	15	15	15	16	16	16	17	17	17	17	17	17	17	17																																																
0.841 – 0.860 (0.0331 – 0.0339)	14	14	15	15	15	16	16	16	17	17	17	17	17	17	17																																																		
0.861 – 0.880 (0.0339 – 0.0346)	14	15	15	15	16	16	16	17	17	17	17	17	17																																																				
0.881 – 0.900 (0.0347 – 0.0354)	15	15	16	16	16	16	17	17	17	17	17																																																						
0.901 – 0.920 (0.0355 – 0.0362)	15	16	16	16	16	17	17	17	17																																																								
0.921 – 0.940 (0.0363 – 0.0370)	16	16	16	17	17	17	17	17																																																									
0.941 – 0.960 (0.0370 – 0.0378)	16	16	17	17	17	17	17																																																										
0.961 – 0.980 (0.0378 – 0.0386)	16	17	17	17	17	17																																																											
0.981 – 1.000 (0.0386 – 0.0394)	17	17	17	17	17																																																												
1.001 – 1.020 (0.0394 – 0.0402)	17	17	17																																																														
1.021 – 1.040 (0.0402 – 0.0409)	17	17																																																															
1.041 – 1.050 (0.0410 – 0.0413)	17																																																																

V00719

Intake valve clearance (Cold):
0.15 - 0.25 mm (0.006 - 0.010 in.)

EXAMPLE:
The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No. 12 shim.

New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
1	2.500 (0.0984)	10	2.950 (0.1161)
2	2.550 (0.1004)	11	3.000 (0.1181)
3	2.600 (0.1024)	12	3.050 (0.1201)
4	2.650 (0.1043)	13	3.100 (0.1220)
5	2.700 (0.1063)	14	3.150 (0.1240)
6	2.750 (0.1083)	15	3.200 (0.1260)
7	2.800 (0.1102)	16	3.250 (0.1280)
8	2.850 (0.1122)	17	3.300 (0.1299)
9	2.900 (0.1142)		

HINT:
New shims have the thickness in millimeters imprinted on the face.

Author :

Date :

Adjusting Shim Selection Chart (Exhaust)

Measured Clearance mm (in.) \ Installed Shim Thickness mm (in.)	2.500 (0.0984)	2.520 (0.0992)	2.540 (0.1000)	2.550 (0.1004)	2.560 (0.1008)	2.580 (0.1016)	2.600 (0.1024)	2.620 (0.1031)	2.640 (0.1039)	2.650 (0.1043)	2.660 (0.1047)	2.670 (0.1051)	2.680 (0.1055)	2.690 (0.1059)	2.700 (0.1063)	2.710 (0.1067)	2.720 (0.1071)	2.730 (0.1075)	2.740 (0.1079)	2.750 (0.1083)	2.760 (0.1087)	2.770 (0.1091)	2.780 (0.1094)	2.790 (0.1098)	2.800 (0.1102)	2.810 (0.1106)	2.820 (0.1110)	2.830 (0.1114)	2.840 (0.1118)	2.850 (0.1122)	2.860 (0.1126)	2.870 (0.1130)	2.880 (0.1134)	2.890 (0.1138)	2.900 (0.1142)	2.910 (0.1146)	2.920 (0.1150)	2.930 (0.1154)	2.940 (0.1157)	2.950 (0.1161)	2.960 (0.1165)	2.970 (0.1169)	2.980 (0.1173)	2.990 (0.1177)	3.000 (0.1181)	3.010 (0.1185)	3.020 (0.1189)	3.030 (0.1193)	3.040 (0.1197)	3.050 (0.1201)	3.060 (0.1205)	3.080 (0.1213)	3.100 (0.1220)	3.120 (0.1228)	3.140 (0.1236)	3.150 (0.1240)	3.160 (0.1244)	3.180 (0.1252)	3.200 (0.1260)	3.220 (0.1268)	3.240 (0.1276)	3.250 (0.1280)	3.260 (0.1283)	3.280 (0.1291)	3.300 (0.1299)
0.000 – 0.020 (0.0000 – 0.0008)																	1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	8	8	8	8	9	9	10	10	10	10	11	11
0.021 – 0.040 (0.0008 – 0.0016)															1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	8	8	8	9	9	9	10	10	10	11	11	11	12
0.041 – 0.060 (0.0016 – 0.0024)													1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	8	8	8	9	9	9	10	10	10	11	11	11	12	12
0.061 – 0.080 (0.0024 – 0.0031)											1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	9	9	9	10	10	10	11	11	11	12	12	12
0.081 – 0.100 (0.0032 – 0.0039)									1	1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	9	9	10	10	10	10	11	11	12	12	12	12	13
0.101 – 0.120 (0.0040 – 0.0047)								1	1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	10	10	10	10	11	11	12	12	12	12	13	13
0.121 – 0.140 (0.0048 – 0.0055)							1	1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	10	10	10	11	11	11	12	12	12	13	13	13	14
0.141 – 0.160 (0.0056 – 0.0063)						1	1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	10	10	10	11	11	11	12	12	12	13	13	13	14	14
0.161 – 0.180 (0.0063 – 0.0071)					1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	11	11	11	12	12	12	13	13	13	14	14	14
0.181 – 0.200 (0.0071 – 0.0079)			1	1	1	1	1	2	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	11	11	12	12	12	12	13	13	14	14	14	14	15
0.201 – 0.220 (0.0079 – 0.0087)			1	1	1	1	1	2	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	12	12	12	12	13	13	14	14	14	14	15	15
0.221 – 0.240 (0.0087 – 0.0094)		1	1	1	1	1	2	2	2	3	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	12	12	12	13	13	13	14	14	14	15	15	15	16
0.241 – 0.249 (0.0095 – 0.0098)		1	1	1	1	2	2	2	3	3	3	3	4	4	4	4	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	12	12	12	13	13	13	14	14	14	15	15	15	16	16
0.250 – 0.350 (0.0098 – 0.0138)																																																																	
0.351 – 0.360 (0.0138 – 0.0142)	2	3	3	3	3	4	4	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	15	15	15	15	16	16	17	17	17	17	17	
0.361 – 0.380 (0.0142 – 0.0150)	2	3	3	3	4	4	4	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	15	15	15	16	16	16	17	17	17	17	17	
0.381 – 0.400 (0.0150 – 0.0157)	3	3	4	4	4	4	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	15	15	16	16	16	16	17	17	17	17	17		
0.401 – 0.420 (0.0158 – 0.0165)	3	4	4	4	4	5	5	6	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	16	16	16	16	17	17	17	17				
0.421 – 0.440 (0.0166 – 0.0173)	4	4	4	5	5	5	6	6	6	7	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	16	16	16	17	17	17	17	17					
0.441 – 0.460 (0.0174 – 0.0181)	4	4	5	5	5	6	6	6	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	16	16	16	17	17	17	17	17						
0.461 – 0.480 (0.0181 – 0.0189)	4	5	5	5	6	6	6	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	17	17	17	17	17							
0.481 – 0.500 (0.0189 – 0.0197)	5	5	6	6	6	6	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	17	17	17	17	17								
0.501 – 0.520 (0.0197 – 0.0205)	5	6	6	6	6	7	7	8	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17										
0.521 – 0.540 (0.0205 – 0.0213)	6	6	6	7	7	7	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17											
0.541 – 0.560 (0.0213 – 0.0220)	6	6	7	7	7	8	8	8	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17												
0.561 – 0.580 (0.0221 – 0.0228)	6	7	7	7	8	8	8	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17													
0.581 – 0.600 (0.0229 – 0.0236)	7	7	8	8	8	8	9	9	10	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17														
0.601 – 0.620 (0.0237 – 0.0244)	7	8	8	8	8	9	9	10	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																
0.621 – 0.640 (0.0244 – 0.0252)	8	8	8	9	9	9	10	10	10	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																		
0.641 – 0.660 (0.0252 – 0.0260)	8	8	9	9	9	10	10	10	11	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																				
0.661 – 0.680 (0.0260 – 0.0268)	8	9	9	9	10	10	10	11	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																						
0.681 – 0.700 (0.0268 – 0.0276)	9	9	10	10	10	10	11	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																								
0.701 – 0.720 (0.0276 – 0.0283)	9	10	10	10	10	11	11	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																										
0.721 – 0.740 (0.0284 – 0.0291)	10	10	10	11	11	11	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																												
0.741 – 0.760 (0.0292 – 0.0299)	10	10	11	11	11	12	12	12	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																														
0.761 – 0.780 (0.0300 – 0.0307)	10	11	11	11	12	12	12	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																
0.781 – 0.800 (0.0307 – 0.0315)	11	11	12	12	12	12	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																		
0.801 – 0.820 (0.0315 – 0.0323)	11	12	12	12	12	13	13	14	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																				
0.821 – 0.840 (0.0323 – 0.0331)	12	12	12	13	13	13	14	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																						
0.841 – 0.860 (0.0331 – 0.0339)	12	12	13	13	13	14	14	14	15	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																								
0.861 – 0.880 (0.0339 – 0.0346)	12	13	13	13	14	14	14	15	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																										
0.881 – 0.900 (0.0347 – 0.0354)	13	13	14	14	14	14	15	15	16	16	16	16	16	17	17	17	17	17	17	17	17																																												
0.901 – 0.920 (0.0355 – 0.0362)	13	14	14	14	14	15	15	16	16	16	16	17	17	17	17	17	17	17	17																																														
0.921 – 0.940 (0.0363 – 0.0370)	14	14	14	15	15	15	16	16	16	17	17	17	17	17	17	17	17																																																
0.941 – 0.960 (0.0370 – 0.0378)	14	14	15	15	15	16	16	16	17	17	17	17	17	17	17																																																		
0.961 – 0.980 (0.0378 – 0.0386)	14	15	15	15	16	16	16	17	17	17	17	17	17																																																				
0.981 – 1.000 (0.0386 – 0.0394)	15	15	16	16	16	16	17	17	17	17	17																																																						
1.001 – 1.020 (0.0394 – 0.0402)	15	16	16	16	16	17	17	17	17																																																								
1.021 – 1.040 (0.0402 – 0.0409)	16	16	16	17	17	17	17	17																																																									
1.041 – 1.060 (0.0410 – 0.0417)	16	16	17	17	17	17	17																																																										
1.061 – 1.080 (0.0418 – 0.0425)	16	17	17	17	17	17																																																											
1.081 – 1.100 (0.0426 – 0.0433)	17	17	17	17	17																																																												
1.101 – 1.120 (0.0433 – 0.0441)	17	17	17																																																														
1.121 – 1.140 (0.0441 – 0.0449)	17	17																																																															
1.141 – 1.150 (0.0449 – 0.0453)	17																																																																

Exhaust valve clearance (Cold):
0.25 - 0.35 mm (0.010 - 0.014 in.)

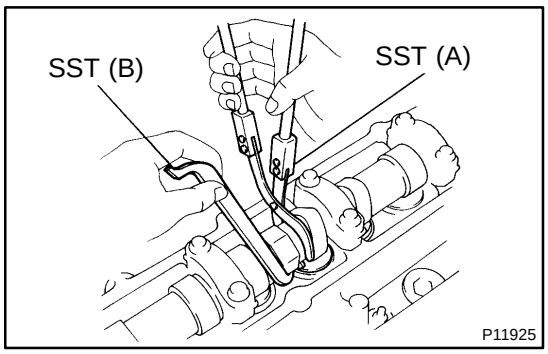
EXAMPLE:
The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No. 10 shim.

New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
1	2.500 (0.0984)	10	2.950 (0.1161)
2	2.550 (0.1004)	11	3.000 (0.1181)
3	2.600 (0.1024)	12	3.050 (0.1201)
4	2.650 (0.1043)	13	3.100 (0.1220)
5	2.700 (0.1063)	14	3.150 (0.1240)
6	2.750 (0.1083)	15	3.200 (0.1260)
7	2.800 (0.1102)	16	3.250 (0.1280)
8	2.850 (0.1122)	17	3.300 (0.1299)
9	2.900 (0.1142)		

HINT:
New shims have the thickness in millimeters imprinted on the face.

V00720



(c) Install a new adjusting shim.
- Place a new adjusting shim on the valve lifter, with imprinted numbers facing down.
- Press down the valve lifter with SST (A), and remove SST (B).

SST 09248-55040

(d) Recheck the valve clearance.

13. REINSTALL CYLINDER HEAD COVERS (See page EM-53)

14. RECONNECT ENGINE WIRE TO CYLINDER HEAD COVERS

15. REINSTALL SPARK PLUGS

16. REINSTALL IGNITION COILS AND HIGH-TENSION CORD SET ASSEMBLY (See page IG-9)

17. REINSTALL NO. 3 TIMING BELT COVER

(a) Install the gasket to the timing belt cover.

(b) Using a 5 mm hexagon wrench, install the timing belt cover with the 4 bolts.

Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)

(c) Install the oil filler cap.

18. REINSTALL THROTTLE BODY AND INTAKE AIR CONNECTOR ASSEMBLY

(a) Install a new gasket to the air intake chamber.

(b) Place the throttle body together with the intake air connector on the cylinder head.

(c) Connect the vacuum hose (from actuator for ACIS) to the No. 1 vacuum pipe.

(d) Connect the 2 water bypass hoses to the throttle body.

(e) Install the 4 bolts and 2 nuts holding the intake air connector to the air intake chamber.

Torque: 28 N·m (280 kgf·cm, 21 ft·lbf)

(f) Install the 2 nuts holding the throttle body bracket to the cylinder head.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(g) Connect the air assist hose to the intake air connector.

(h) Install the PCV hose to the intake air connector.

(i) Install the EVAP hose (from charcoal canister) to the VSV for EVAP.

(j) Install the vacuum hose (from No. 2 vacuum pipe) to the No. 1 vacuum pipe.

(k) Install the throttle position sensor connector.

(l) Install the accelerator pedal position sensor connector.

(m) Install the throttle control motor connector.

(n) Install the VSV connector for EVAP.

(o) Secure the engine wire with the clamp on the throttle body bracket.

(p) Install the engine wire clamp with the clamp bracket of the throttle body.

(q) Connect the accelerator cable to the throttle body.

19. REINSTALL INTAKE AIR RESONATOR

20. REINSTALL ENGINE COVER

Install the engine cover with the 4 nuts.

21. REFILL WITH ENGINE COOLANT

22. START ENGINE AND CHECK FOR LEAKS

IGNITION TIMING

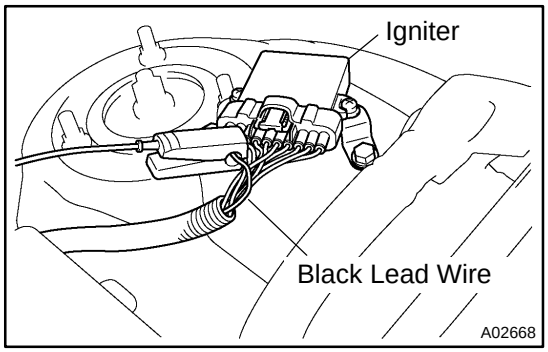
EM1SC-02

INSPECTION

1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

2. CHECK IDLE SPEED (See page EM-14)

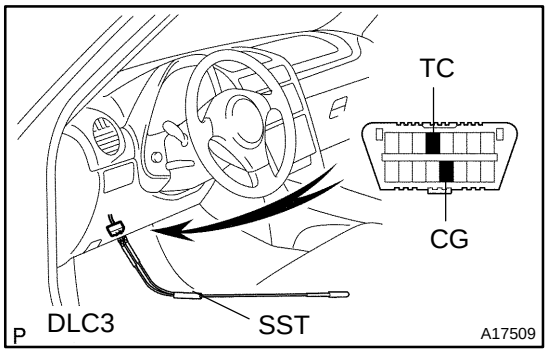


3. CONNECT TIMING LIGHT TO ENGINE

Connect the timing light clip to the black lead wire.

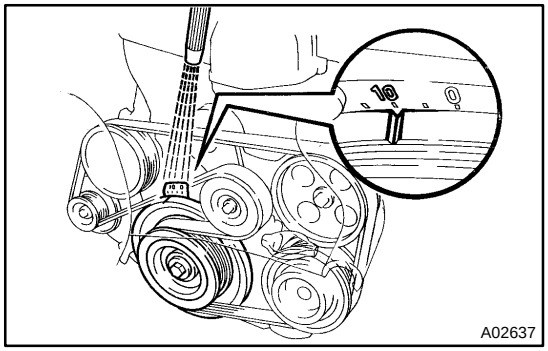
NOTICE:

Use a timing light that can detect the primary signal.



4. INSPECT IGNITION TIMING

(a) Using SST, connect terminals TC and CG of the DLC3.
SST 09843-18040



(b) Using a timing light, check the ignition timing.
Ignition timing:
10 ± 2˚ BTDC @ idle
(Transmission in neutral position)

(c) Remove the SST from the DLC1.

5. FURTHER CHECK IGNITION TIMING
Ignition timing: 6 - 16˚ BTDC @ idle
(Transmission in neutral position)

HINT:

The timing mark moves in a range between 6˚ and 16˚.

6. DISCONNECT TIMING LIGHT FROM ENGINE

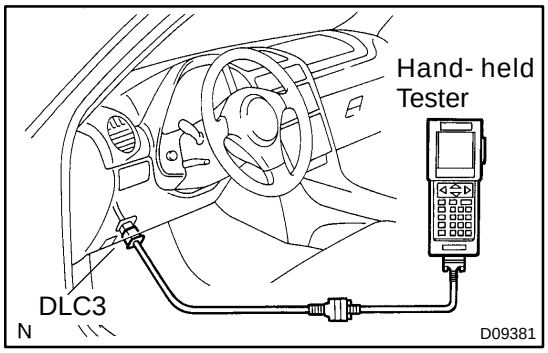
IDLE SPEED

EM1S9-02

INSPECTION

1. INITIAL CONDITIONS

(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected
(f) SFI system wiring connectors fully plugged
(g) Ignition timing checked correctly
(h) Transmission in neutral position



2. CONNECT HAND-HELD TESTER OR OBD II SCAN TOOL

(a) Connect the hand-held tester or OBD II scan tool to the DLC3.
(b) Please refer to the hand-held tester or OBD II scan tool operator's manual for further details.

3. INSPECT IDLE SPEED

(a) Race the engine speed at 2,500 rpm for approx. 90 seconds.
(b) Check the idle speed.

Idle speed: 700 ± 50 rpm

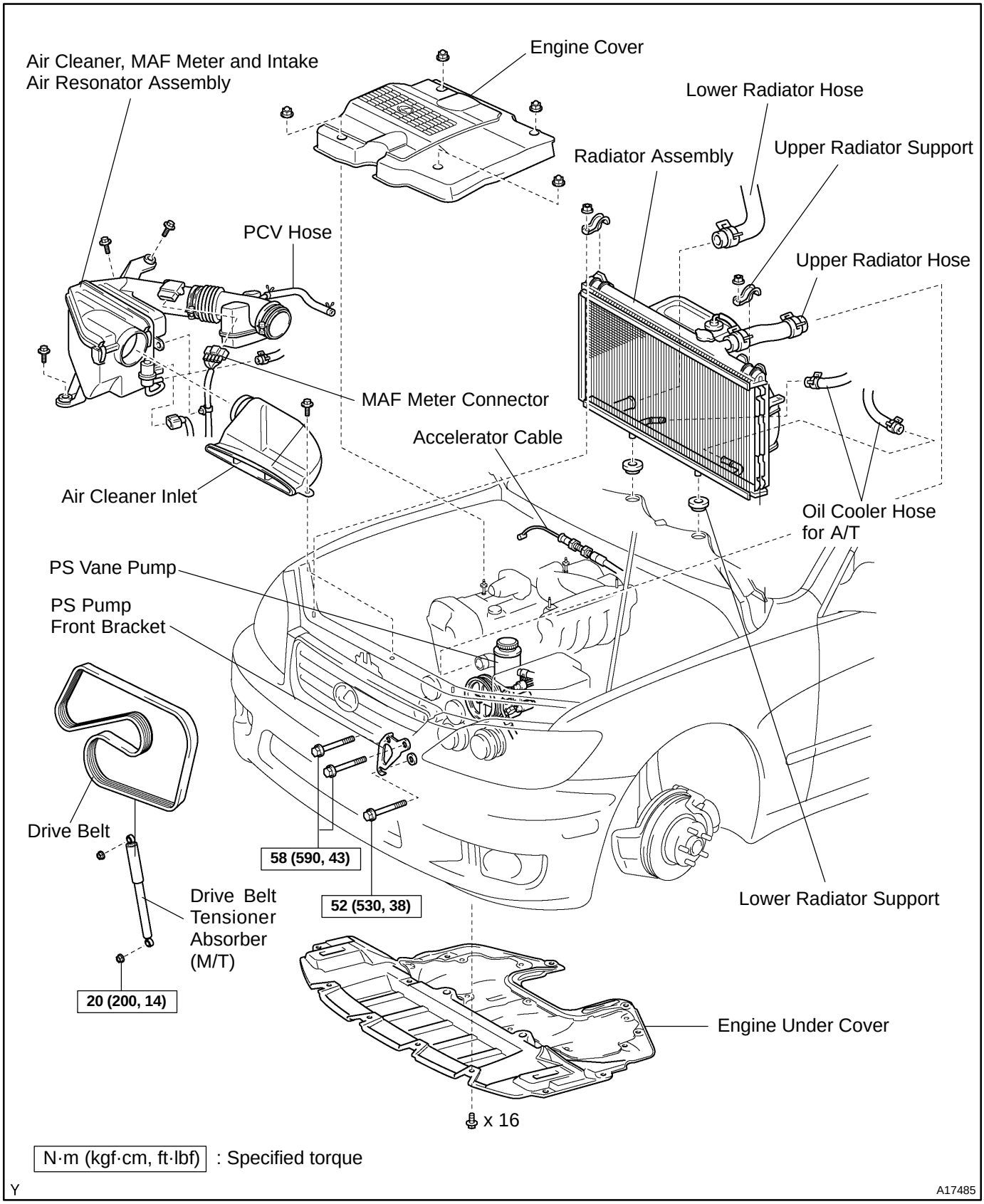
If the idle speed is not as specified, check the throttle body.

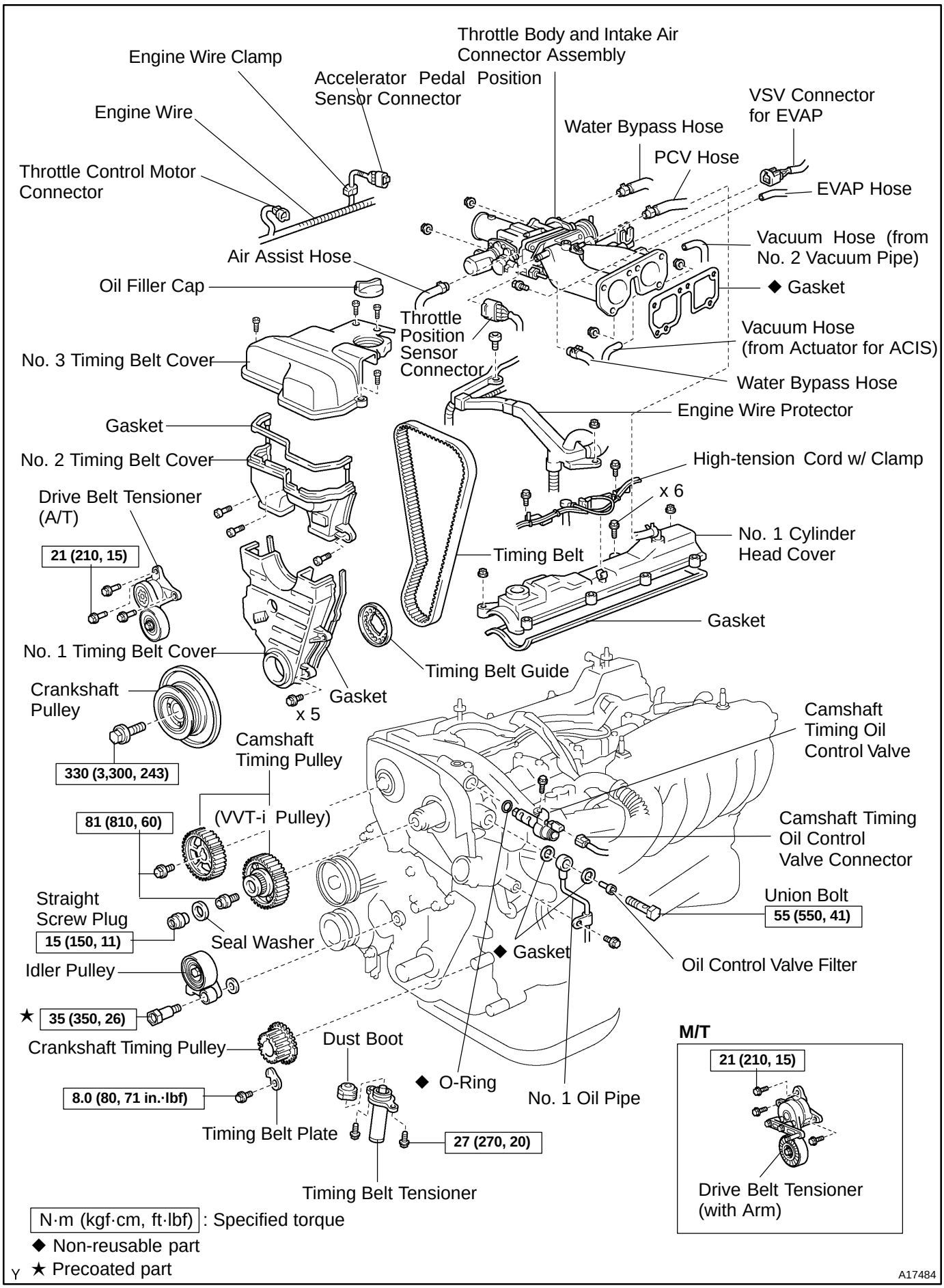
4. DISCONNECT HAND-HELD TESTER OR OBD II SCAN TOOL

TIMING BELT

COMPONENTS

EM0D5-09




Throttle Body and Intake Air Connector Assembly
Engine Wire Clamp
Accelerator Pedal Position Sensor Connector
VSV Connector for EVAP
Engine Wire
Water Bypass Hose
PCV Hose
Throttle Control Motor Connector
EVAP Hose
Vacuum Hose (from No. 2 Vacuum Pipe)
Air Assist Hose
Oil Filler Cap
◆ Gasket
Throttle Position Sensor Connector
Vacuum Hose (from Actuator for ACIS)
No. 3 Timing Belt Cover
Water Bypass Hose
Engine Wire Protector
Gasket
No. 2 Timing Belt Cover
High-tension Cord w/ Clamp
x 6
Drive Belt Tensioner (A/T)
No. 1 Cylinder Head Cover
21 (210, 15)
Timing Belt
Gasket
No. 1 Timing Belt Cover
Timing Belt Guide
Crankshaft Pulley
Gasket
x 5
Camshaft Timing Oil Control Valve
330 (3,300, 243)
Camshaft Timing Pulley
(VVT-i Pulley)
81 (810, 60)
Camshaft Timing Oil Control Valve Connector
Straight Screw Plug
Union Bolt
55 (550, 41)
15 (150, 11)
Seal Washer
◆ Gasket
Oil Control Valve Filter
Idler Pulley
★ 35 (350, 26)
Crankshaft Timing Pulley
Dust Boot
◆ O-Ring
No. 1 Oil Pipe
8.0 (80, 71 in.·lbf)
Timing Belt Plate
27 (270, 20)
Timing Belt Tensioner
M/T
21 (210, 15)
Drive Belt Tensioner (with Arm)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
A17484

EM1J7-03

REMOVAL

1. REMOVE ENGINE UNDER COVER

2. DRAIN ENGINE COOLANT

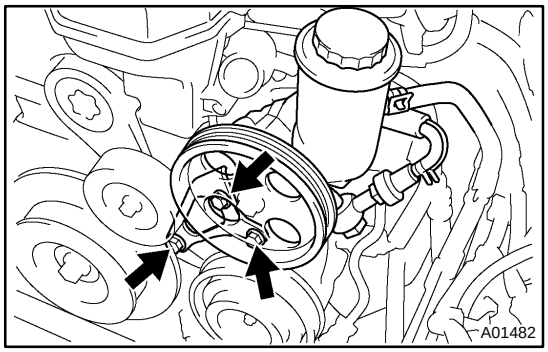
3. REMOVE RADIATOR ASSEMBLY (See page CO-19)

4. M/T:

REMOVE DRIVE BELT TENSIONER ABSORBER

Remove the 2 nuts and absorber.

5. REMOVE DRIVE BELT (See page CH-1)



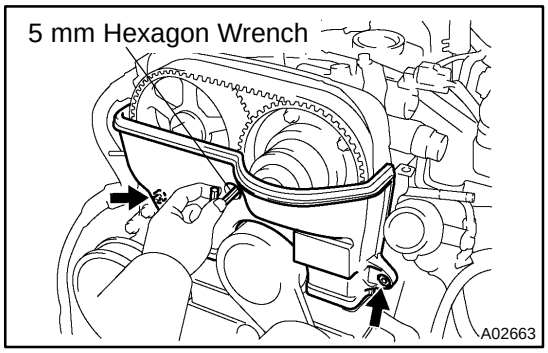
6. REMOVE PS PUMP AND FRONT BRACKET

(a) Remove the 3 bolts, plate washer and pump front bracket.

(b) Disconnect the vane pump from the bracket.

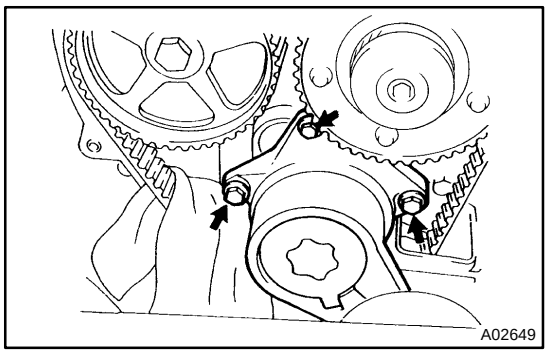
7. REMOVE NO. 3 TIMING BELT COVER

Using a 5 mm hexagon wrench, remove the 4 bolts, oil filler cap, timing belt cover and gasket.



8. REMOVE NO. 2 TIMING BELT COVER

Using a 5 mm hexagon wrench, remove the 3 bolts, timing belt cover and gasket.

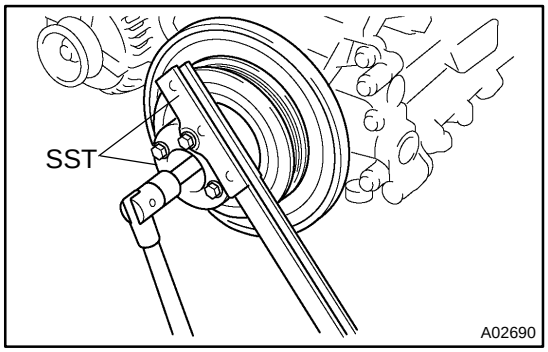


9. REMOVE DRIVE BELT TENSIONER

Remove the 3 bolts and tensioner.

NOTICE:

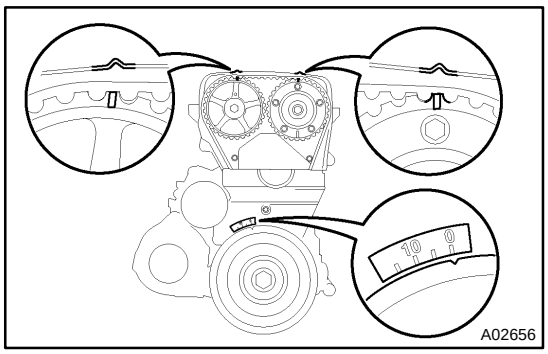
Be careful not to drop the bolts inside the timing belt cover.



10. LOOSEN CRANKSHAFT PULLEY BOLT

Using SST, loosen the pulley bolt.

SST 09213-7001 1, 09330-00021



11. SET NO. 1 CYLINDER TO APPROX. 60˚/ BTDC COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark ”0” of the No. 1 timing belt cover.

NOTICE:

Always turn the crankshaft clockwise.

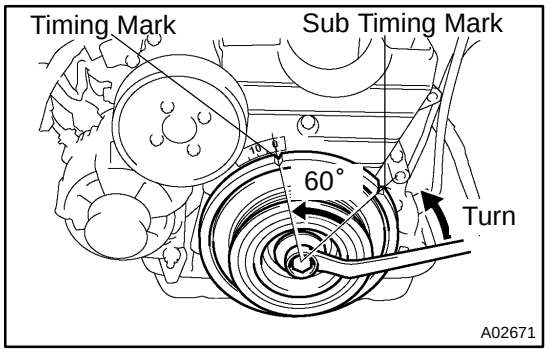
(b) Check that the timing marks (TDC mark) of the camshaft timing pulleys are aligned with the timing marks of the No. 4 timing belt cover.

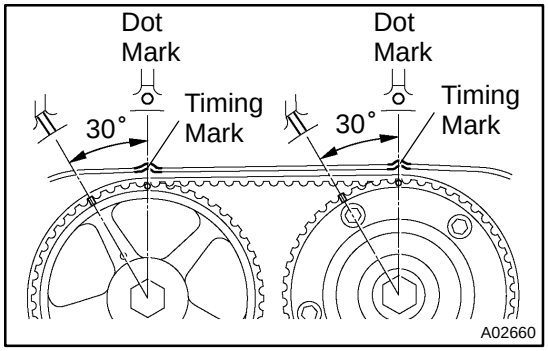
If not, turn the crankshaft 1 revolution (360˚).

(c) Turn the crankshaft pulley 60˚ counterclockwise to place the sub timing mark (60˚ mark BTDC) on the crankshaft pulley at the timing mark ”0” position of the No. 1 timing belt cover.

NOTICE:

If the timing belt is disengaged, having the crankshaft pulley at the wrong angle can cause the piston head and valve head to come into contact with each other when you remove the camshaft timing pulleys (steps 13 and 19), thus resulting damage. So, always set the crankshaft pulley at the correct angle.



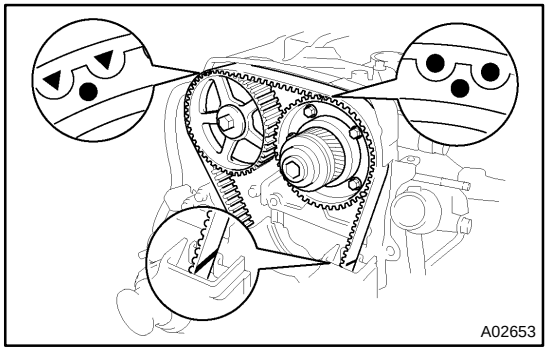


(d) Check that the dot marks (60˚ mark BTDC) of the camshaft timing pulleys are aligned with the timing marks of the No. 4 timing belt cover.

(e) Remove the crankshaft pulley bolt.

NOTICE:

Do not turn the crankshaft pulley.

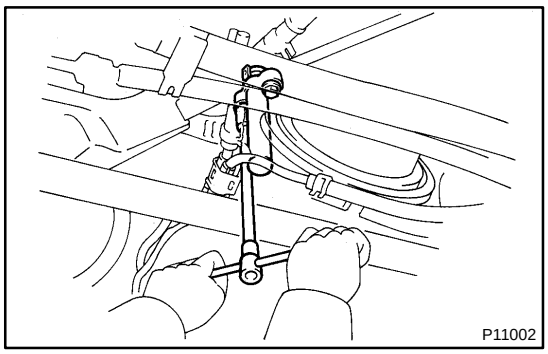


12. REMOVE TIMING BELT FROM CAMSHAFT TIMING PULLEYS

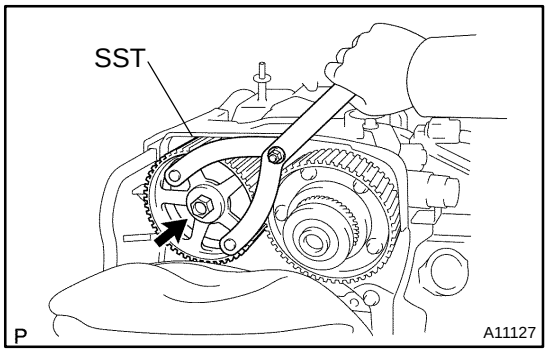
HINT:

Re-using timing belt:

Place matchmarks on the timing belt and camshaft timing pulleys as shown in the illustration.



(a) Alternately loosen the 2 bolts, and remove them, the tensioner and dust boot.
(b) Disconnect the timing belt from the camshaft timing pulleys.



13. REMOVE EXHAUST CAMSHAFT TIMING PULLEY

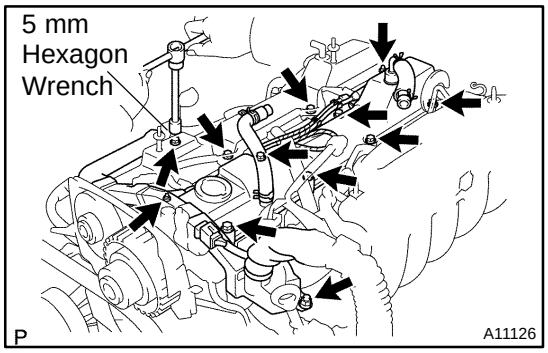
Using SST, remove the bolt and timing pulley.

SST 09960-10010 (09962-01000, 09963-01000)

14. REMOVE ENGINE COVER

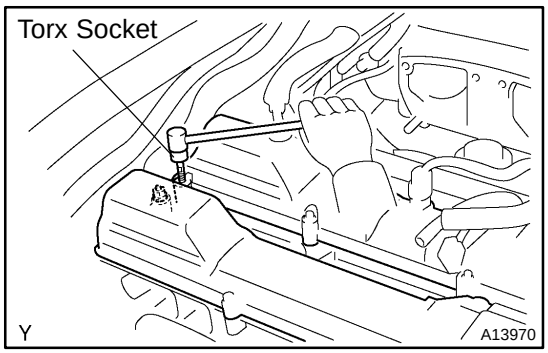
Remove the 4 nuts and engine cover.

15. REMOVE THROTTLE BODY AND INTAKE AIR CONNECTOR ASSEMBLY (See page EM-5)



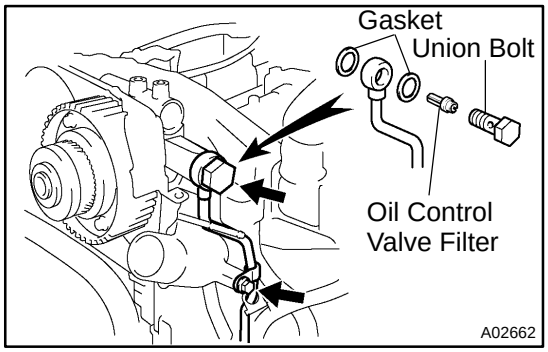
16. REMOVE NO. 1 CYLINDER HEAD COVER

(a) Using a 5 mm hexagon wrench, remove the bolts, and disconnect the engine wire protector from the No. 2 cylinder head cover.
(b) Remove the nut, and disconnect the engine wire protector from the intake manifold.
(c) Remove the 2 bolts, and disconnect the high-tension cords with the clamp from the No. 2 cylinder head.



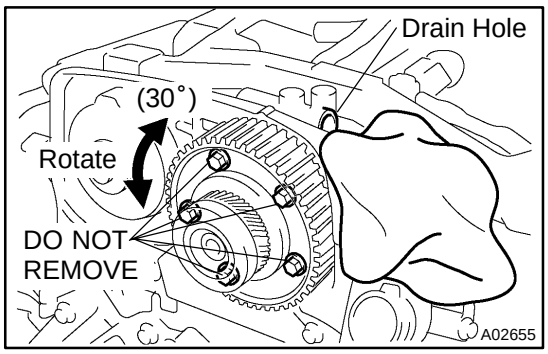
(d) Remove the 2 nuts from the No. 1 cylinder head cover.
(e) Using a torx socket (E5), remove the 2 stud bolts.
(f) Remove the 6 bolts, No. 1 cylinder head cover and gasket.

17. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE (See page SF-43)



18. DISCONNECT NO. 1 OIL PIPE

Remove the bolt, union bolt, oil control valve filter and 2 gaskets, and disconnect the No. 1 oil pipe from the No. 3 camshaft bearing cap.



19. REMOVE VVT-i (INTAKE CAMSHAFT TIMING) PULLEY

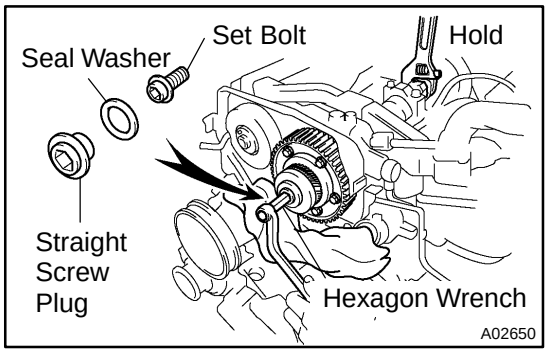
NOTICE:

- **The 5 bolts shown in the illustration determine the backlash of the gear in the timing pulley, so do not remove them.**
  If any of the 5 bolts are removed, install a new camshaft timing pulley assembly.
- **When removing the straight screw plug, follow the prescribed procedure in order to avoid spilling oil on the timing system parts.**

(a) Rotate the VVT-i pulley from left to right 2 to 3 times within its range of movement (30˚) and use a waste cloth to collect the oil from the camshaft timing oil control valve installation hole.

NOTICE:

Approximately 20 cc (1.2 cu in.) of oil will be ejected, so take care not to spill it.



(b) Holding the hexagon portion of camshaft with a wrench.

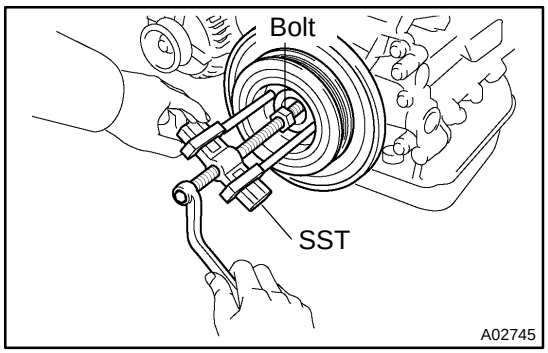
(c) Using a 14 mm hexagon wrench, remove the straight screw plug and seal washer.

NOTICE:

Some oil may spill, so put a waster cloth below the plug white doing the operation.

(d) Using a 10 mm hexagon wrench, and remove the set bolt and VVT-i pulley.

(e) Remove the wrench.



20. REMOVE CRANKSHAFT PULLEY

Using SST and bolt (diameter: 8 mm, pitch: 1.5 mm), remove the crankshaft pulley.

SST 09950-50013 (09951-05010, 09552-05010, 09553-05020, 09554-05031)

Bolt: Part No. 90119-18001

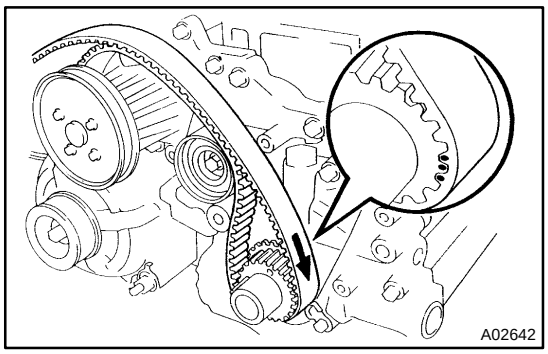
NOTICE:

Do not turn the crankshaft pulley.

21. REMOVE NO. 1 TIMING BELT COVER

Remove the 5 bolts, timing belt cover and gasket.

22. REMOVE TIMING BELT GUIDE

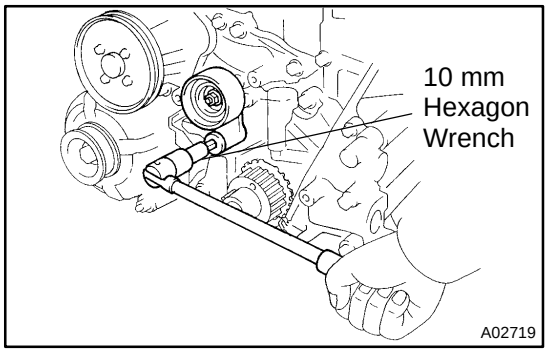


23. REMOVE TIMING BELT

HINT:

When re-using timing belt:

Draw an arrow on the timing belt in the direction of engine revolution, and place matchmarks on the timing belt and crankshaft timing pulley.

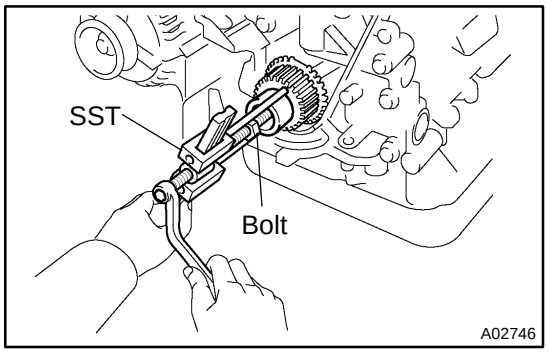


24. REMOVE IDLER PULLEY

Using a 10 mm hexagon wrench, remove the pivot bolt, plate washer and idler pulley.

25. REMOVE CRANKSHAFT TIMING PULLEY

(a) Remove the bolt and timing belt plate.



(b) Remove the crankshaft timing pulley.

If the pulley cannot be removed by hand, use SST and bolt (diameter: 8 mm, pitch: 1.5 mm) to remove the crankshaft timing pulley.

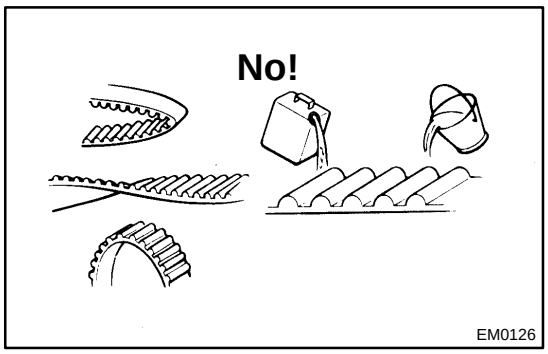
SST 09950- 50013 (09951- 05010, 09952- 05010, 09953-05020, 09954-05011)

Bolt: Part No. 90119-18001

NOTICE:

- **Do not scratch the sensor part the crankshaft timing pulley.**
- **Do not turn the timing pulley.**

EM1SB-02



INSPECTION

1. INSPECT TIMING BELT

NOTICE:

- **Do not bend, twist or turn the timing belt inside out. Do not allow the timing belt to come into contact with oil, water or steam.**
- **Do not utilize timing belt tension when installing or removing the mount bolt of the camshaft timing pulley.**

If there are any defects, as shown in the illustrations, check the following points.

(a) Premature parting
- Check for proper installation.
- Check the timing cover gasket for damage and proper installation.

(b) If the belt teeth are cracked or damaged, check to see if either camshaft is locked.

(c) If there is noticeable wear or cracks on the belt face, check to see if there are nicks on the side of the idler pulley lock.

(d) If there is wear or damage on only one side of the belt, check the belt guide and the alignment of each pulley.

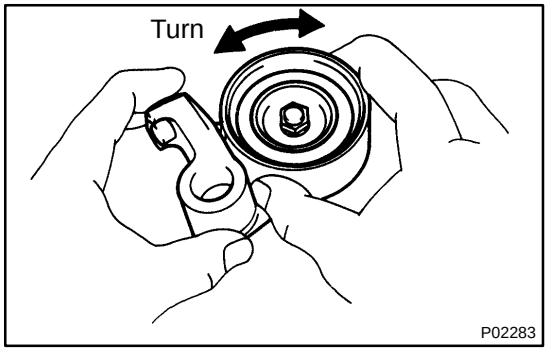
(e) If there is noticeable wear on the belt teeth, check timing cover for damage and check gasket has been installed correctly and for foreign material on the pulley teeth.

If necessary, replace the timing belt.

2. INSPECT DRIVE BELT TENSIONER

Check the turning smoothness of the tensioner.

If necessary, replace the tensioner.



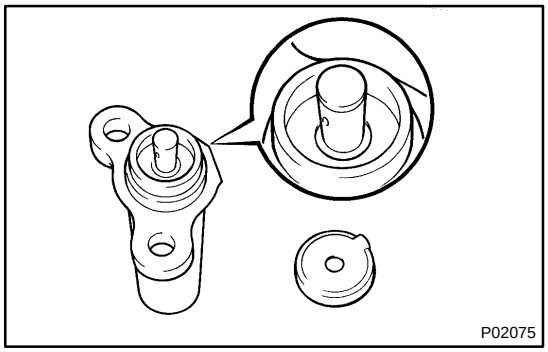
3. INSPECT IDLER PULLEY

(a) Visually check the seal portion of the idler pulley for oil leakage.

If leakage is found, replace the idler pulley.

(b) Check the turning smoothness of the idler pulley.

If necessary, replace the idler pulley.



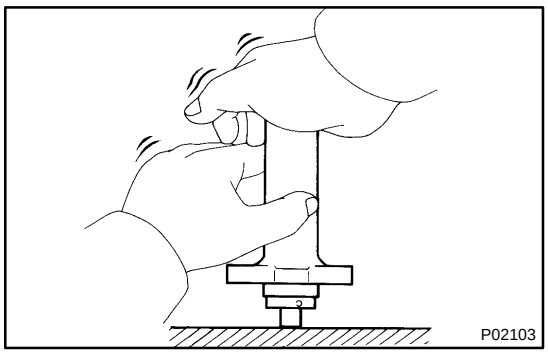
4. INSPECT TIMING BELT TENSIONER

(a) Visually check tensioner for oil leakage.

HINT:

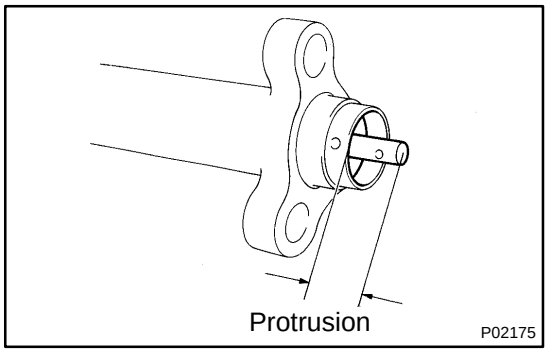
If there is only the faintest trace of oil on the seal on the push rod side, the tensioner is all right.

If leakage is found, replace tensioner.



(b) Hold the tensioner with both hands and push the push rod strongly against the floor or wall to check that it doesn't move.

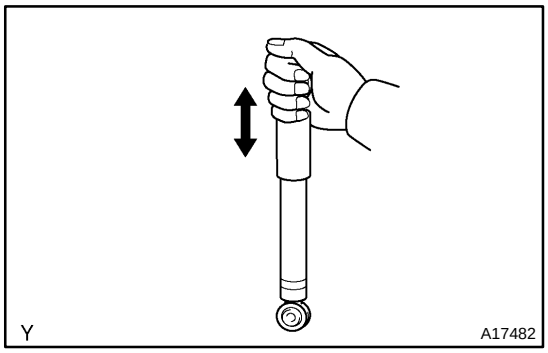
If the push rod moves, replace the tensioner.



(c) Measure the protrusion of the push rod from the housing end.

Protrusion: 8.0 - 8.8 mm (0.315 - 0.346 in.)

If the protrusion is not as specified, replace the tensioner.

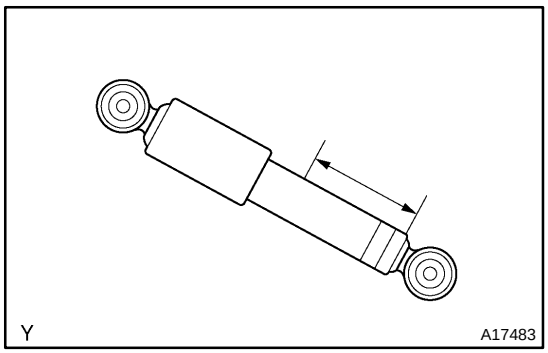


5. M/T:

INSPECT DRIVE BELT TENSIONER ABSORBER

Compress and extend the absorber rod and check that there is no abnormal resistance or unusual operation sounds.

If there is any abnormality, replace the absorber.



NOTICE:

When discarding the absorber, use the these procedure.

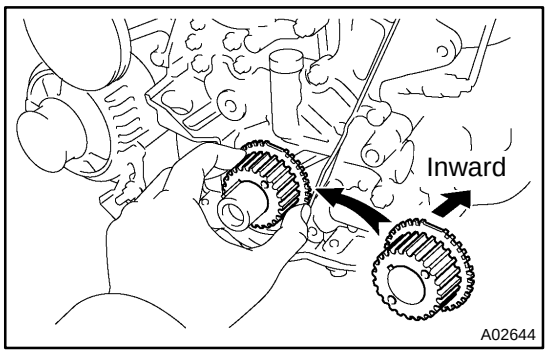
- **Fully extend the absorber rod.**
- **Using a drill, make a hole in the cylinder as shown to release the gas inside.**

CAUTION:

The gas coming out is harmless, but the careful of the chips which may fly up when drilling.

EM1J8-03

INSTALLATION



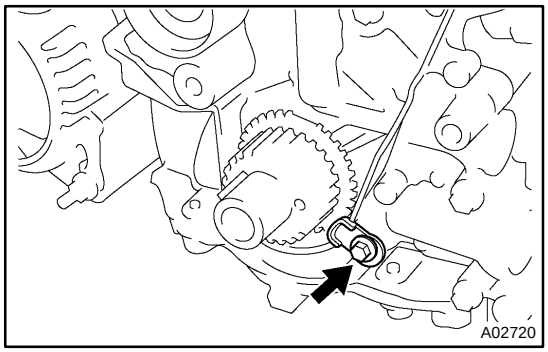
1. INSTALL CRANKSHAFT TIMING PULLEY

(a) Align the pulley set key with the key groove of the pulley.

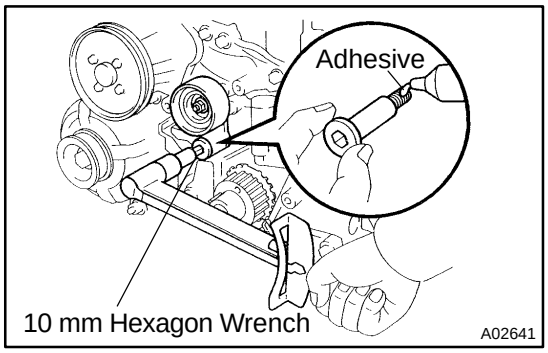
(b) Slide on the timing pulley facing the flange side inward.

NOTICE:

Do not scratch the sensor part of the crankshaft timing pulley.



(c) Install the timing belt plate with the bolt.
Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)

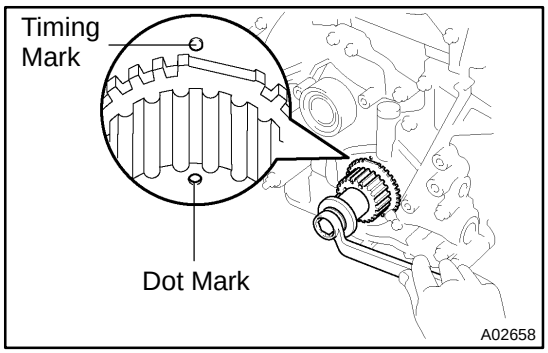


2. INSTALL IDLER PULLEY

(a) Apply adhesive to 2 or 3 threads of the pivot bolt.
Adhesive:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Using a 10 mm hexagon wrench, install the plate washer and pulley with the pivot bolt.
Torque: 35 N·m (350 kgf·cm, 26 ft·lbf)

(c) Check that the pulley bracket moves smoothly.



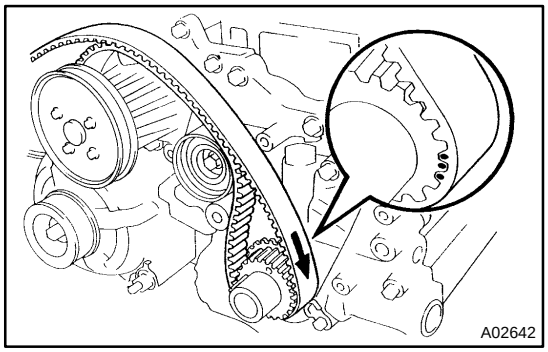
3. TEMPORARILY INSTALL TIMING BELT

NOTICE:

The engine should be cold.

(a) Use the crankshaft pulley bolt to turn the crankshaft, and align the dot mark on the crankshaft timing pulley and the timing mark on the oil pump body.

(b) Remove any oil or water on the crankshaft timing pulley and idler pulley, and keep them clean.

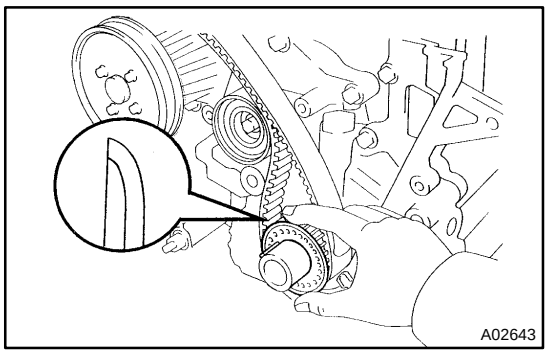


(c) Install the timing belt on the crankshaft timing pulley and idler pulley.

HINT:

When re-using timing belt:

Align the matchmarks of the crankshaft timing pulley and timing belt, and install the belt with the arrow pointing in the direction of engine revolution.



4. INSTALL TIMING BELT GUIDE

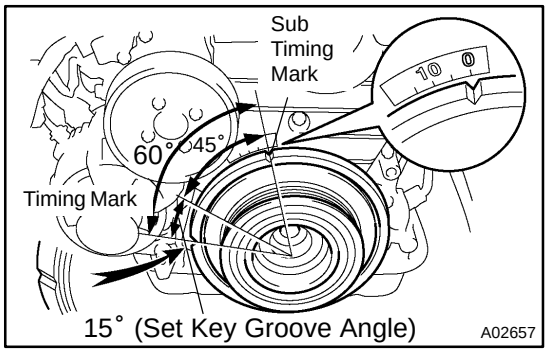
Install the guide, facing the cup side outward.

5. INSTALL NO. 1 TIMING BELT COVER

(a) Install the gasket to the timing belt cover.

(b) Install the timing belt cover with the 5 bolts.

Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)



6. INSTALL CRANKSHAFT PULLEY

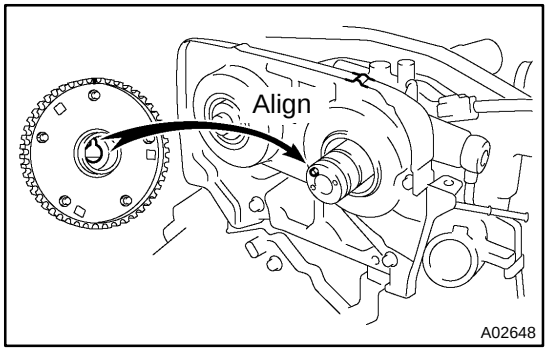
(a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.

(b) Check that the sub timing mark (60° mark BTDC) of the crankshaft pulley is aligned with the timing mark "0" of the No.1 timing belt cover.

HINT:

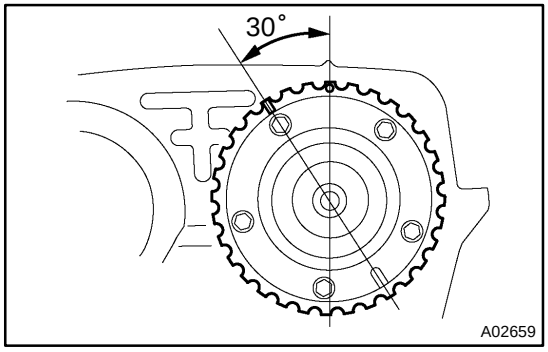
At this time, the crankshaft pulley set key groove and the timing mark (TDC mark) of the crankshaft pulley are as shown the illustration.

(c) Temporarily install the pulley bolt.

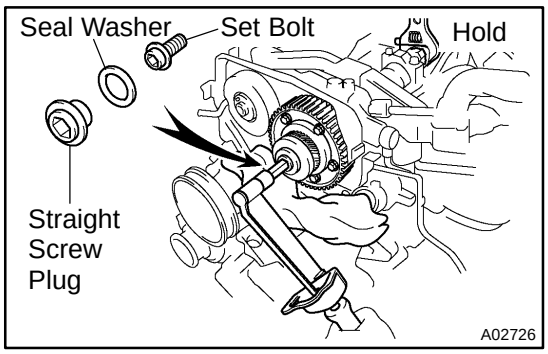


7. INSTALL VVT-i (INTAKE CAMSHAFT TIMING) PULLEY

(a) Align the camshaft knock pin with the VVT-i pulley, and push the VVT-i pulley by hand until you feel it touch the bottom.



(b) Check that the outer circumference of the VVT-i pulley easily rotates through 30°.

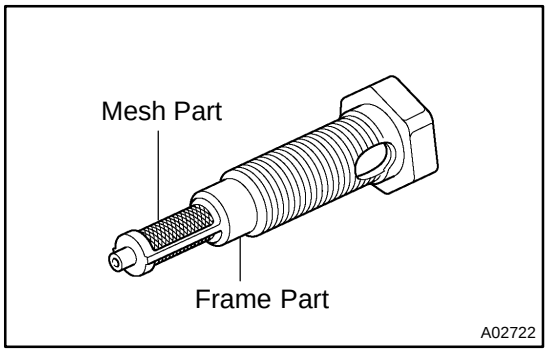


(c) Holding the hexagon portion of the camshaft with a wrench.
(d) Using a 10 mm hexagon wrench, and the set bolt.
Torque: 81 N·m (810 kgf·cm, 60 ft·lbf)
(e) Using a 14 mm hexagon wrench, install the straight screw plug with the seal washer to the set bolt.
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)
(f) Align the dot mark on the camshaft timing pulley with the timing mark of the No. 4 timing belt cover.
(g) Remove the wrench.

8. CONNECT NO. 1 OIL PIPE

(a) Install the union bolt to the oil control valve filter.

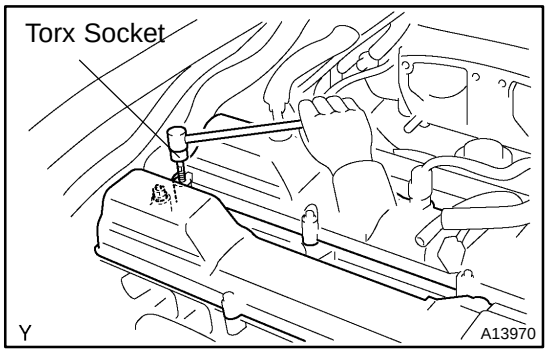
NOTICE:
In case of touching the filter, avoid holding the mesh part and holding the frame part.



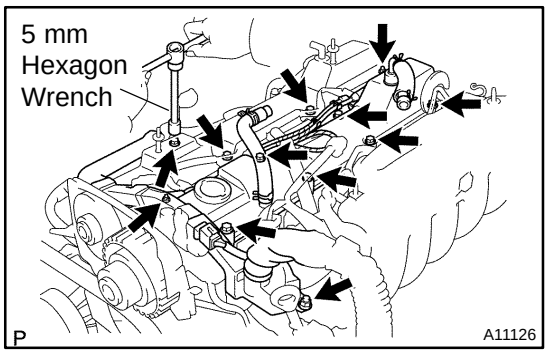
(b) Install the oil pipe with 2 new gasket and the union bolt to the No.3 camshaft bearing cap.
Torque: 55 N·m (550 kgf·cm, 41 ft·lbf)

9. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE (See page SF-43)

10. INSTALL NO. 1 CYLINDER HEAD COVER



(a) Install the cylinder head and gasket with the 6 bolts.
Torque: 8.5 N·m (85 kgf·cm, 75 in.·lbf)
(b) Using a torx socket (E5), install the 2 stud bolts.
Torque: 8.5 N·m (85 kgf·cm, 75 in.·lbf)
(c) Install the 2 nuts to the 2 stud bolts.
Torque: 8.5 N·m (85 kgf·cm, 75 in.·lbf)
(d) Install the high-tension cords and clamps with the 2 bolts.
Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)

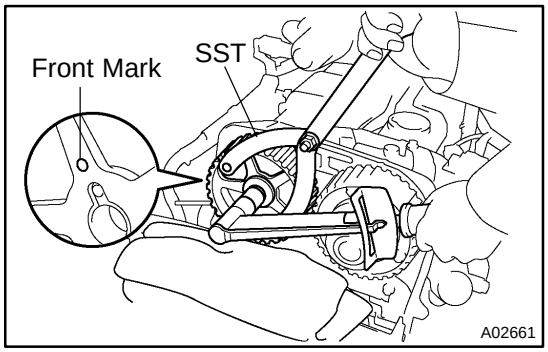


(e) Using a 5 mm hexagon wrench, install the engine wire protector with the bolt and nut.

11. INSTALL THROTTLE BODY AND INTAKE AIR CONNECTOR ASSEMBLY (See page EM-5)

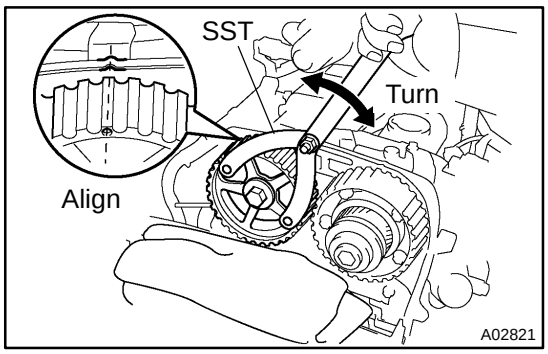
12. INSTALL ENGINE COVER

Install the engine cover with the 4 nuts.

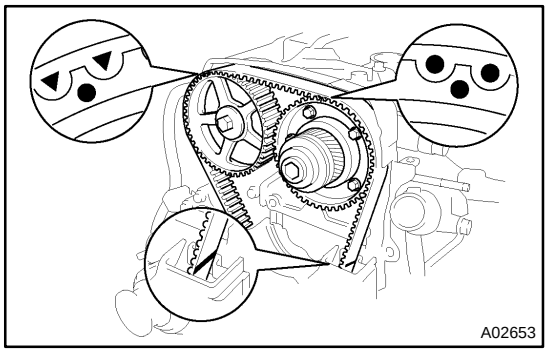


13. INSTALL EXHAUST CAMSHAFT TIMING PULLEY

(a) Align the camshaft knock pin with the groove on the pulley, and slide on the timing pulley.
(b) Slide the timing pulley on the camshaft, facing the front mark forward.
(c) Using SST, install the pulley bolt.
SST 09960-10010 (09962-01000, 09963-01000)
Torque: 81 N·m (810 kgf·cm, 60 ft·lbf)

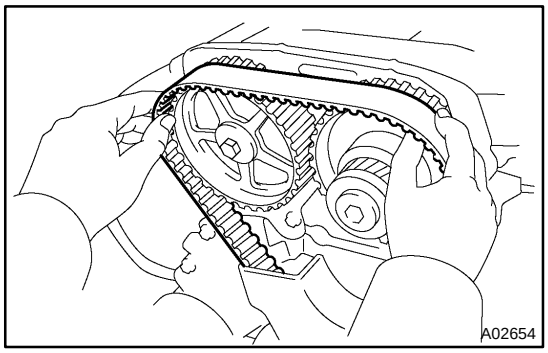


(d) Using SST, align the dot mark on the camshaft timing timing pulley with the timing mark of the No. 4 timing belt cover.
SST 09960-10010 (09962-01000, 09963-01000)

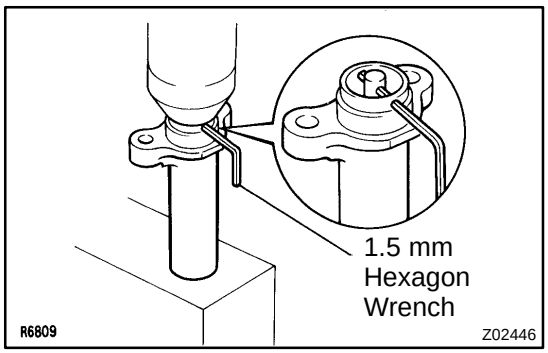


14. CONNECT TIMING BELT TO CAMSHAFT TIMING PULLEYS

HINT:
When re-using timing belt:
- Check that the matchmark on the timing belt matches the end of the No. 1 timing belt cover.
  If the matchmark does not align, shift the meshing of the timing belt and crankshaft timing pulley until they align.
- Align the matchmarks of the timing belt and camshaft timing pulleys.

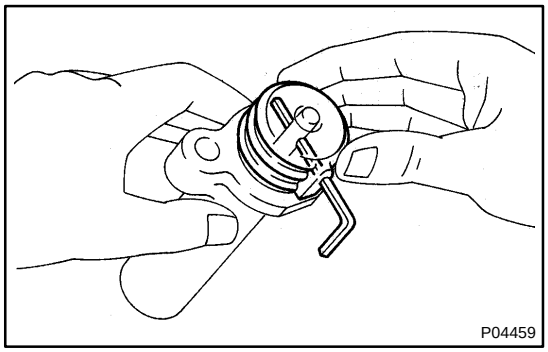


(a) Remove any oil or water on the camshaft timing pulley, and keep it clean.
(b) Install the timing belt, checking the tension between the crankshaft timing pulley and intake camshaft timing pulley.

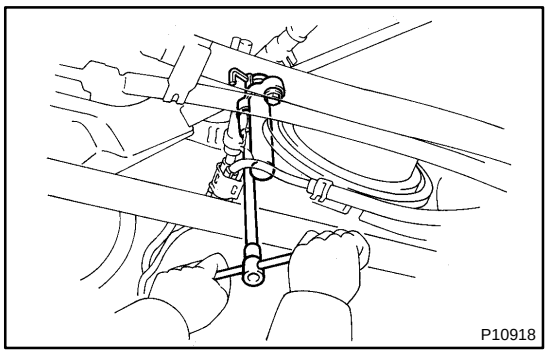


15. SET TIMING BELT TENSIONER

(a) Using a press, slowly press in the push rod using 981 - 9,807 N (100 - 1,000 kgf, 220 - 2,205 lbf) of force.
(b) Align the holes of the push rod and housing, pass a 1.5 mm hexagon wrench through the holes to keep the push rod retracted.
(c) Release the press.



(d) Install the dust boot onto the tensioner.

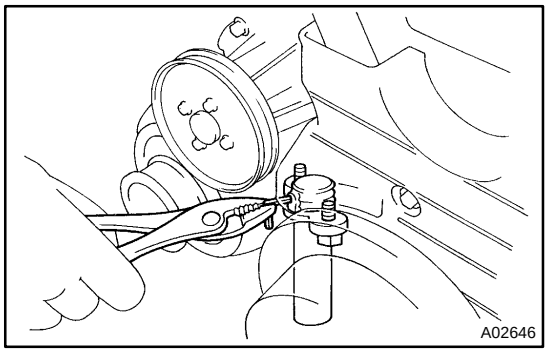


16. INSTALL TIMING BELT TENSIONER

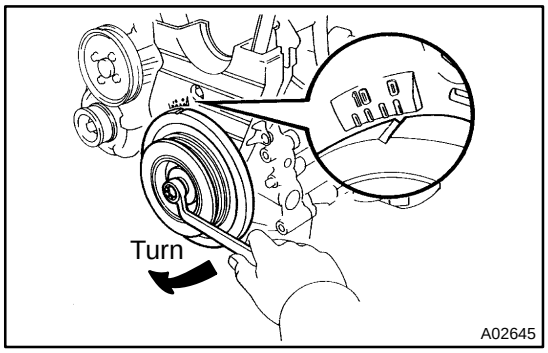
(a) Temporarily install the tensioner with the 2 bolts.

(b) Alternately tighten the 2 bolts.

Torque: 27 N·m (270 kgf·cm, 20 ft·lbf)



(c) Remove the 1.5 mm hexagon wrench from the tensioner with pliers.

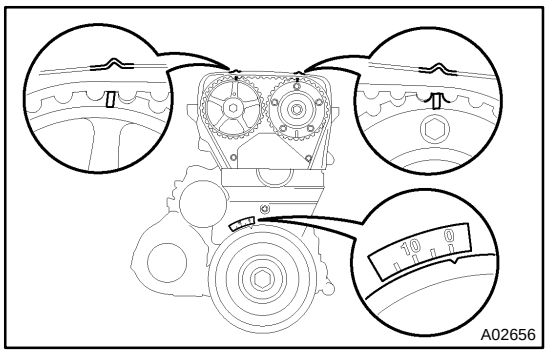


17. CHECK VALVE TIMING

(a) Slowly turn the crankshaft pulley 2 revolutions from TDC to TDC.

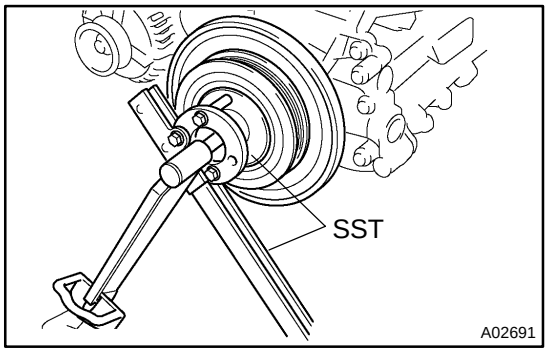
NOTICE:

Always turn the crankshaft clockwise.



(b) Check that each pulley aligns with the timing marks as shown in the illustration.

If the marks do not align, remove the timing belt and reinstall it.



18. TIGHTEN CRANKSHAFT PULLEY BOLT

Using SST, install the pulley bolt.

SST 09213-7001 1, 09330-00021

Torque: 330 N·m (3,300 kgf·cm, 243 ft·lbf)

19. INSTALL DRIVE BELT TENSIONER

Install the tensioner with the 3 bolts.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

NOTICE:

Be careful not to drop the bolts inside the timing belt cover.

20. INSTALL NO. 2 TIMING BELT COVER

(a) Install the gasket on the timing belt cover.

(b) Using a 5 mm hexagon wrench, install the timing belt cover with the 3 bolts.

Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)

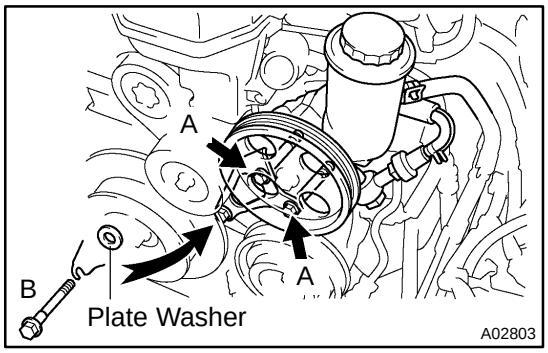
21. INSTALL NO. 3 TIMING BELT COVER

(a) Install the gasket on the timing belt cover.

(b) Using a 5 mm hexagon wrench, install the timing belt cover with the 4 bolts.

Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)

(c) Install the oil filler cap.



22. INSTALL PS PUMP AND FRONT BRACKET

(a) Temporarily install the vane pump to the bracket.

(b) Install the plate washer and front bracket with the 3 bolts.

Torque:
58 N·m (590 kgf·cm, 43 ft·lbf) for bolt A
52 N·m (530 kgf·cm, 38 ft·lbf) for bolt B

23. INSTALL DRIVE BELT (See page CH-1)

24. M/T:

INSTALL DRIVE BELT TENSIONER ABSORBER

Install the absorber with the 2 nuts.

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

25. INSTALL RADIATOR ASSEMBLY (See page CO-24)

26. FILL ENGINE WITH COOLANT

27. START ENGINE CHECK FOR LEAKS

28. INSTALL ENGINE UNDER COVER

29. ROAD TEST

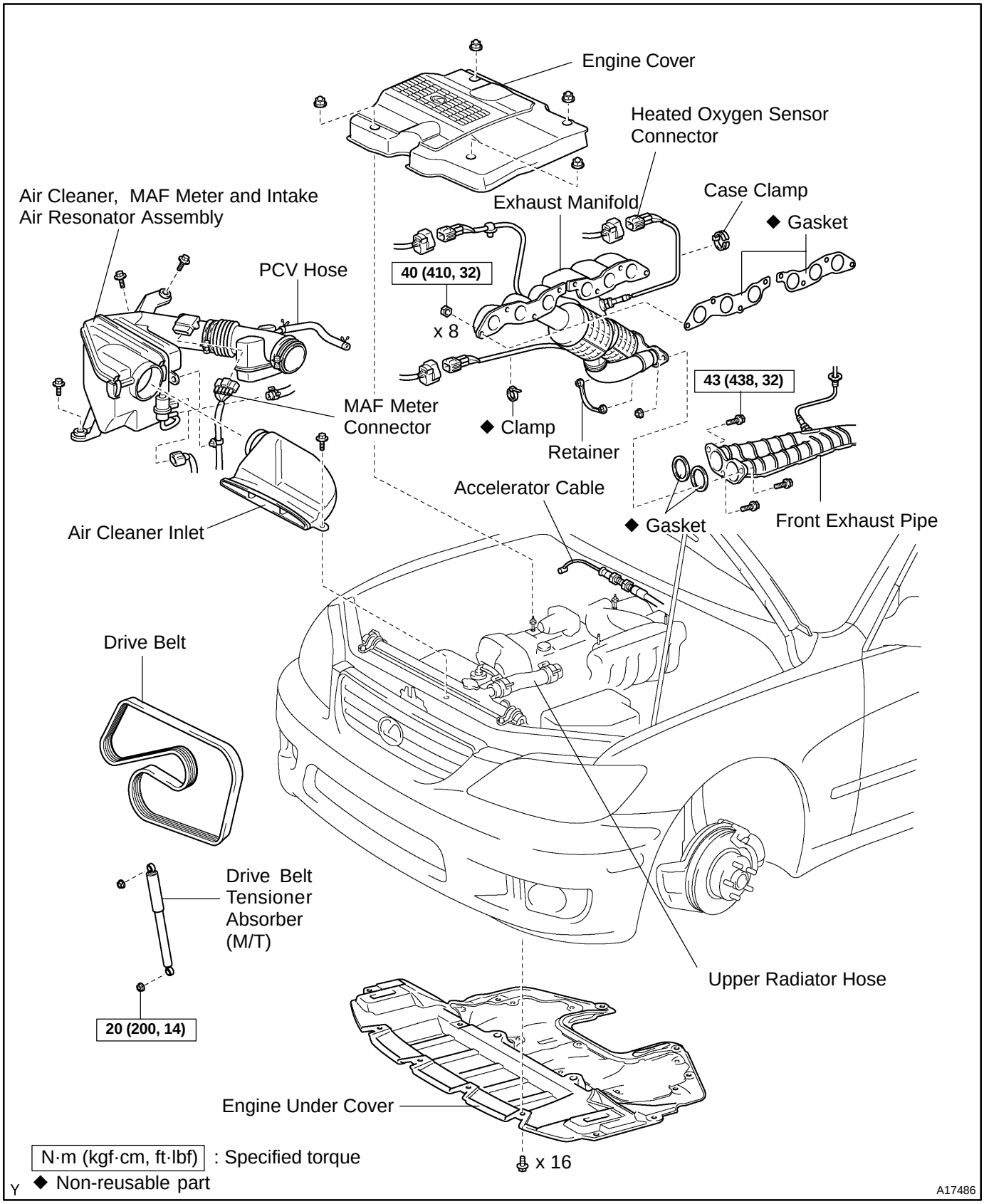
Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

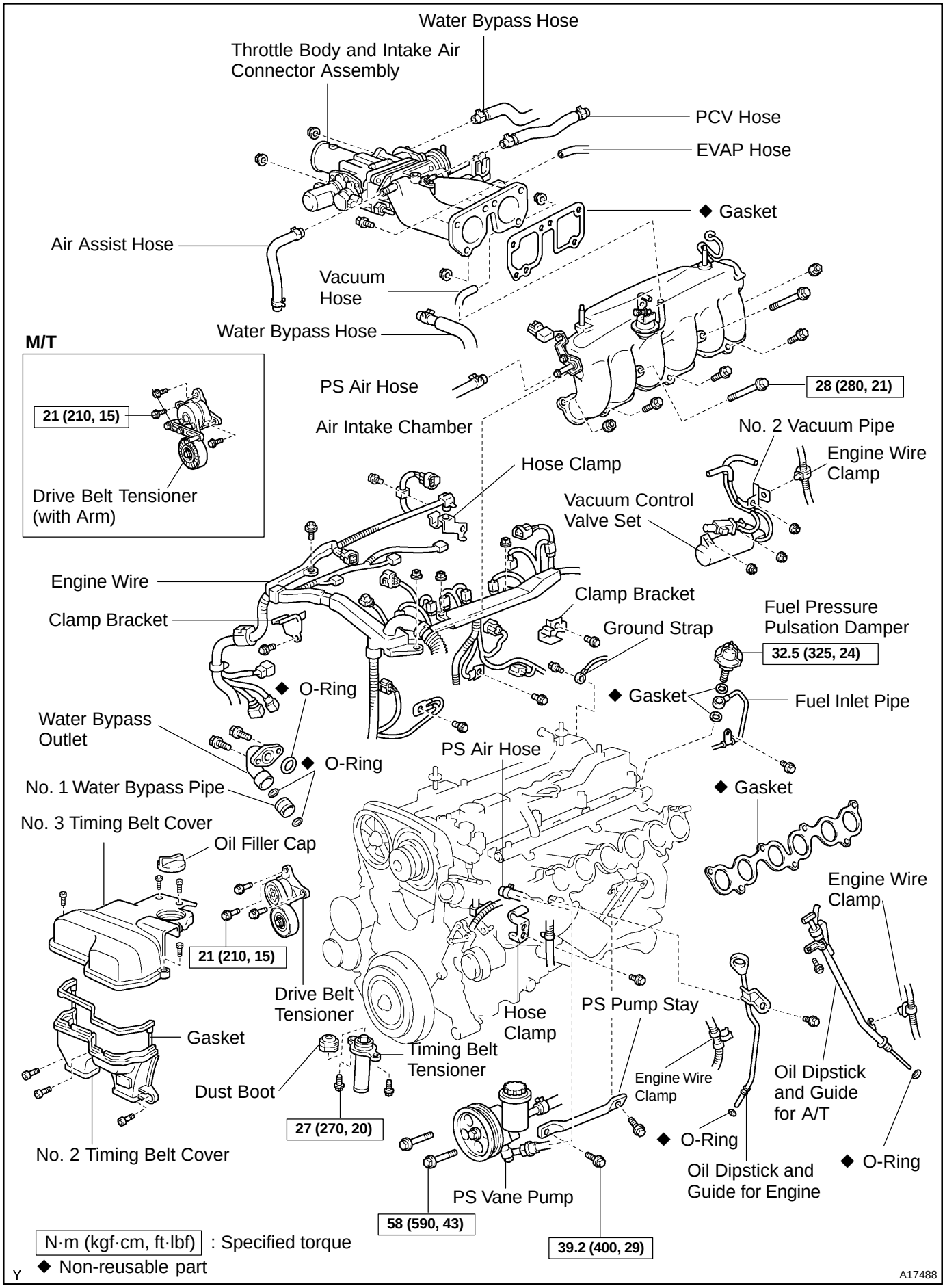
30. RECHECK ENGINE COOLANT LEVEL

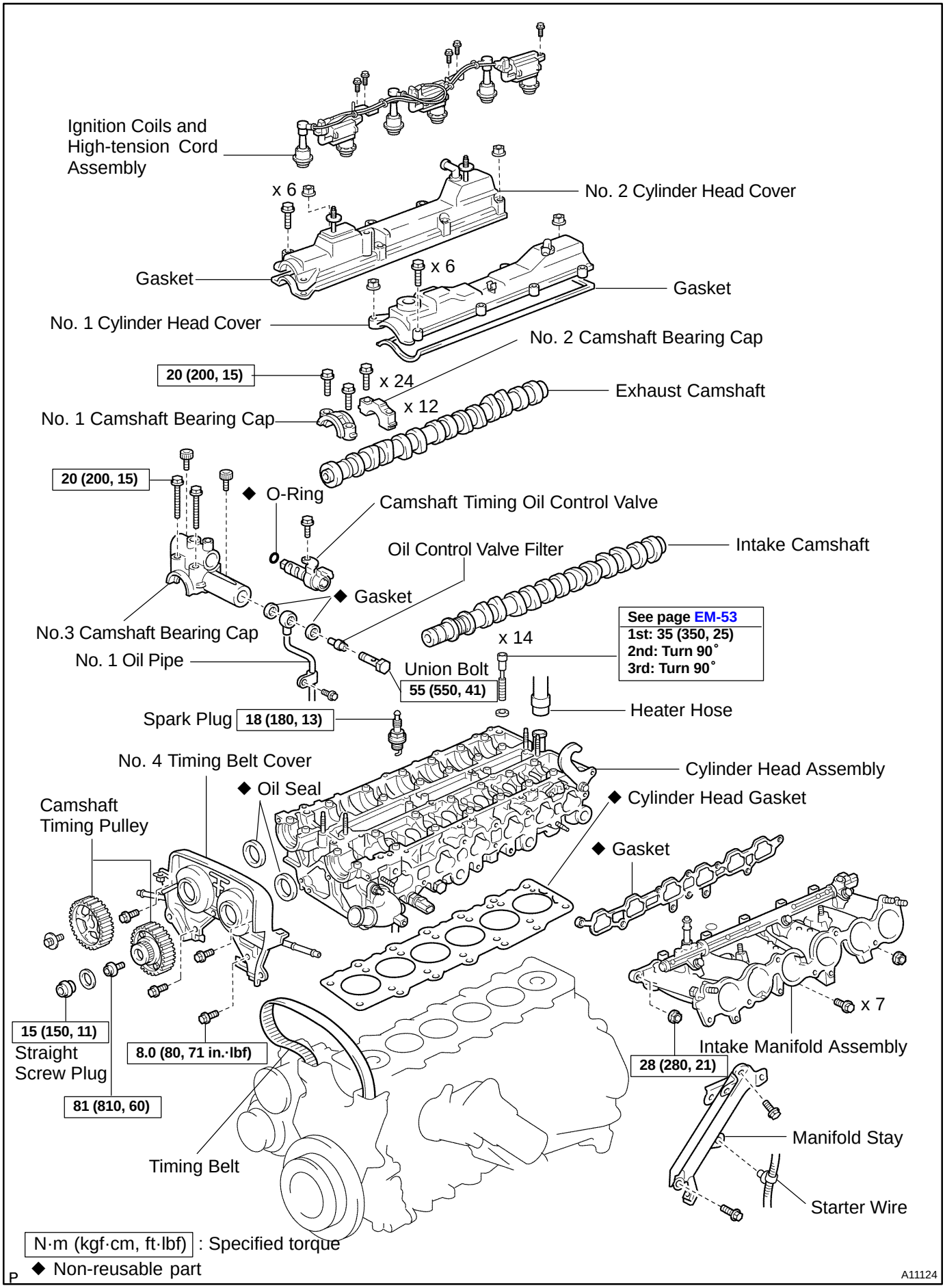
CYLINDER HEAD

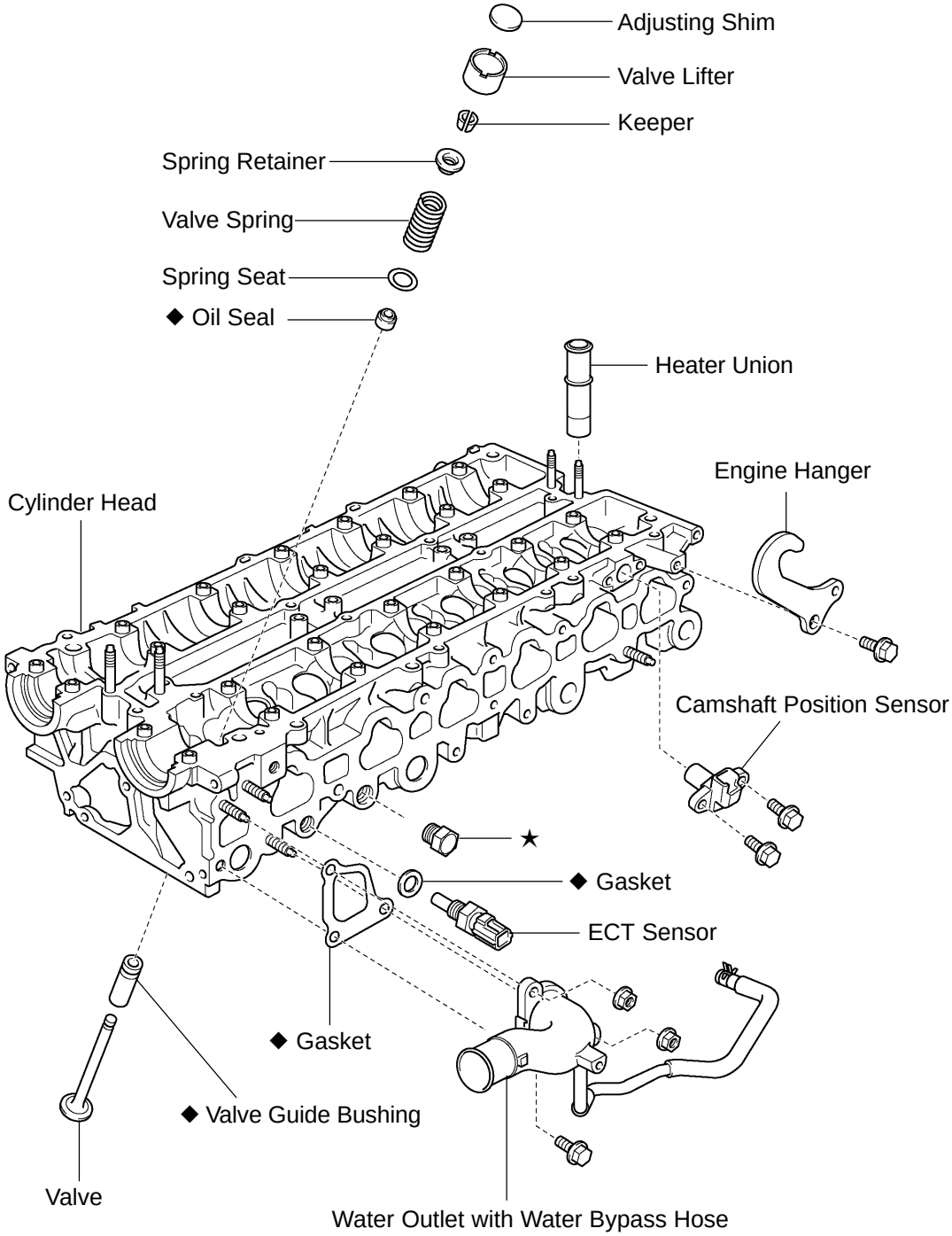
COMPONENTS

EM0D9-09




Water Bypass Hose
Throttle Body and Intake Air Connector Assembly
PCV Hose
EVAP Hose
◆ Gasket
Air Assist Hose
Vacuum Hose
Water Bypass Hose
M/T
21 (210, 15)
Drive Belt Tensioner (with Arm)
PS Air Hose
28 (280, 21)
Air Intake Chamber
No. 2 Vacuum Pipe
Engine Wire Clamp
Hose Clamp
Vacuum Control Valve Set
Engine Wire
Clamp Bracket
Clamp Bracket
Ground Strap
Fuel Pressure Pulsation Damper
32.5 (325, 24)
◆ O-Ring
◆ Gasket
Fuel Inlet Pipe
Water Bypass Outlet
PS Air Hose
◆ O-Ring
No. 1 Water Bypass Pipe
◆ Gasket
No. 3 Timing Belt Cover
Oil Filler Cap
Engine Wire Clamp
21 (210, 15)
Drive Belt Tensioner
Hose Clamp
PS Pump Stay
Gasket
Timing Belt Tensioner
Engine Wire Clamp
Oil Dipstick and Guide for A/T
Dust Boot
27 (270, 20)
◆ O-Ring
◆ O-Ring
No. 2 Timing Belt Cover
Oil Dipstick and Guide for Engine
PS Vane Pump
58 (590, 43)
39.2 (400, 29)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
Y
A17488


Ignition Coils and High-tension Cord Assembly
x 6
No. 2 Cylinder Head Cover
Gasket
x 6
Gasket
No. 1 Cylinder Head Cover
No. 2 Camshaft Bearing Cap
20 (200, 15)
x 24
x 12
Exhaust Camshaft
No. 1 Camshaft Bearing Cap
20 (200, 15)
◆ O-Ring
Camshaft Timing Oil Control Valve
Oil Control Valve Filter
Intake Camshaft
◆ Gasket
No.3 Camshaft Bearing Cap
See page EM-53
1st: 35 (350, 25)
2nd: Turn 90°
3rd: Turn 90°
x 14
No. 1 Oil Pipe
Union Bolt
55 (550, 41)
Heater Hose
Spark Plug 18 (180, 13)
No. 4 Timing Belt Cover
◆ Oil Seal
Cylinder Head Assembly
◆ Cylinder Head Gasket
Camshaft Timing Pulley
◆ Gasket
x 7
15 (150, 11)
Straight Screw Plug
8.0 (80, 71 in.·lbf)
Intake Manifold Assembly
28 (280, 21)
81 (810, 60)
Manifold Stay
Timing Belt
Starter Wire
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
A11124



◆ Non-reusable part
Y ★ Precoated part

A14344

EM1J9-03

REMOVAL

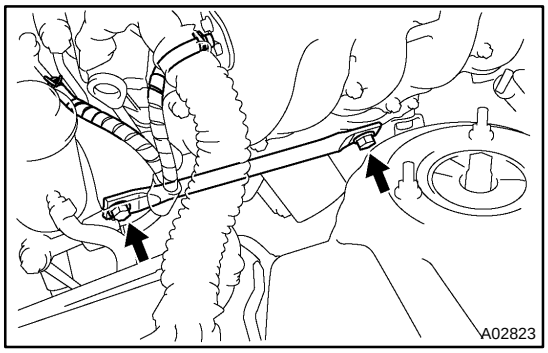
1. **REMOVE ENGINE UNDER COVER**
2. **DRAIN ENGINE COOLANT**
3. **DISCONNECT UPPER RADIATOR HOSE FROM WATER OUTLET**
4. **REMOVE ENGINE COVER**

Remove the 4 nuts and engine cover.

5. **REMOVE AIR CLEANER INLET**
6. **REMOVE AIR CLEANER, MAF METER AND INTAKE AIR RESONATOR ASSEMBLY (See page EM-65)**
7. **M/T:**
   REMOVE DRIVE BELT TENSIONER ABSORBER

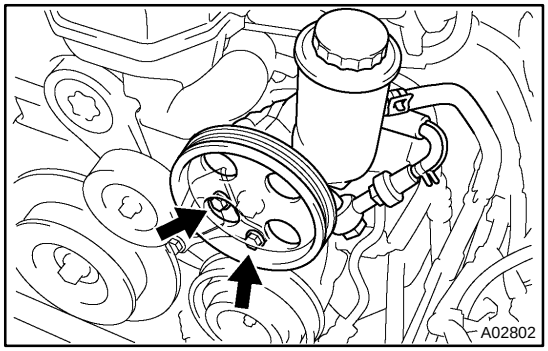
Remove the 2 nuts and absorber.

8. **REMOVE DRIVE BELT (See page CH-1)**



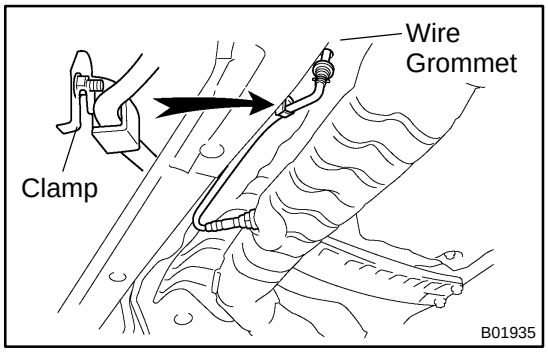
9. **DISCONNECT PS PUMP WITHOUT DISCONNECTING HOSES**

(a) Disconnect the PS air hose from the No. 4 timing belt cover.
(b) Disconnect the PS air hose from the air intake chamber.
(c) Remove the 2 bolts and pump rear stay.



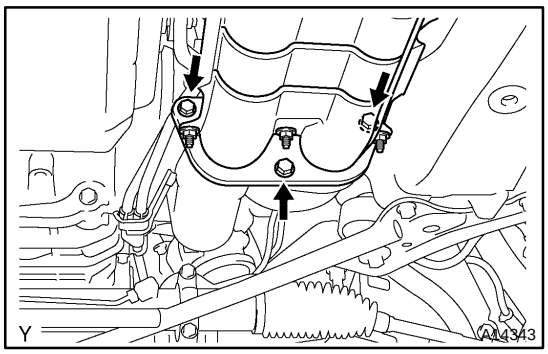
(d) Remove the 2 bolts, and disconnect the vane pump from the pump bracket.

HINT:
Put aside the vane pump, and suspend it.

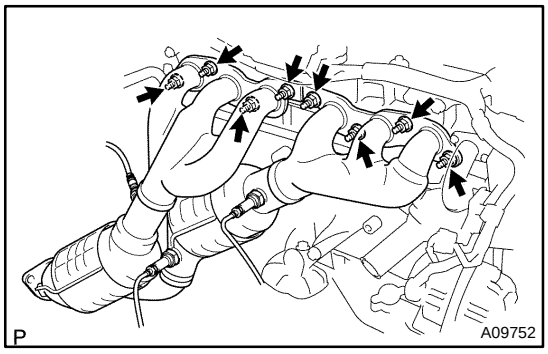


10. **DISCONNECT FRONT EXHAUST PIPE FROM EXHAUST MANIFOLD**

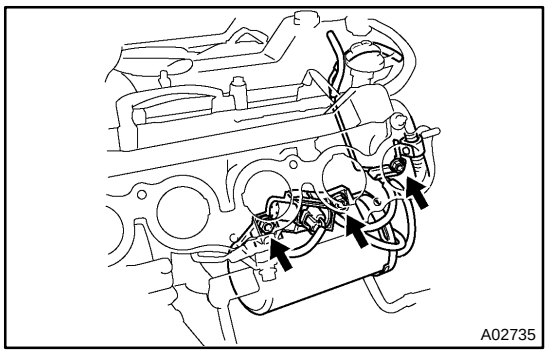
(a) Disconnect the wire grommet and sensor wire of the heated oxygen sensor (bank 2 sensor 2) from the hole and clamp on the floor.



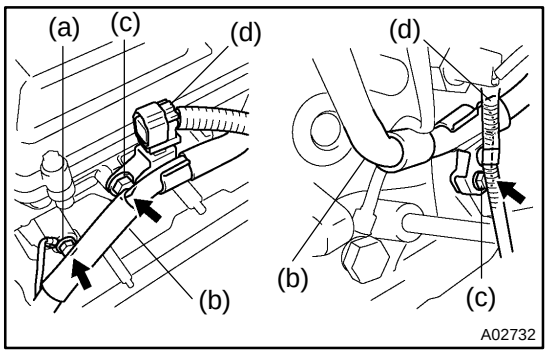
(b) Remove the 3 bolts, nuts and retainer holding the front exhaust pipe to the exhaust manifold.
(c) Disconnect the front exhaust pipe from the exhaust manifold, and remove the 2 gaskets.



11. REMOVE EXHAUST MANIFOLD
(a) Disconnect the 3 heated oxygen sensor connectors and clamp.
(b) Remove the clamp and case clamp.
(c) Using a 14 mm deep socket wrench, remove the 8 nuts, exhaust manifold and 2 gaskets.
12. REMOVE WATER BYPASS OUTLET AND NO. 1 WATER BYPASS PIPE (See page CO-12)
13. REMOVE THROTTLE BODY AND INTAKE AIR CONNECTOR ASSEMBLY (See page EM-5)
14. REMOVE OIL DIPSTICK AND GUIDE FOR ENGINE (See page LU-6)
15. REMOVE OIL DIPSTICK AND GUIDE FOR A/T (See page EM-65)
16. REMOVE AIR INTAKE CHAMBER (See page SF-46)

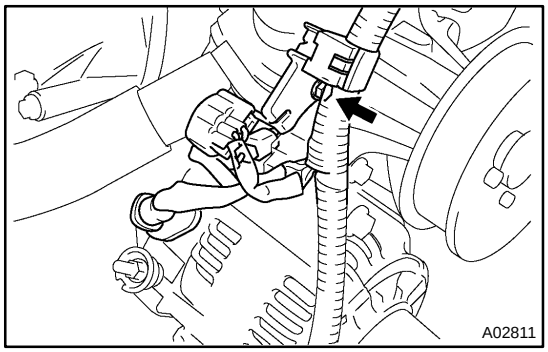


17. REMOVE VACUUM CONTROL VALVE SET AND NO. 2 VACUUM PIPE
(a) Disconnect the VSV connector for the ACIS.
(b) Remove the 3 nuts, vacuum control valve set and No. 2 vacuum pipe.
(c) Disconnect the engine wire clamp from the clamp bracket of the No. 2 vacuum pipe.
18. REMOVE NO. 3 TIMING BELT COVER
19. REMOVE IGNITION COILS AND HIGH- TENSION CORD SET ASSEMBLY (See page IG-7)
20. REMOVE SPARK PLUGS

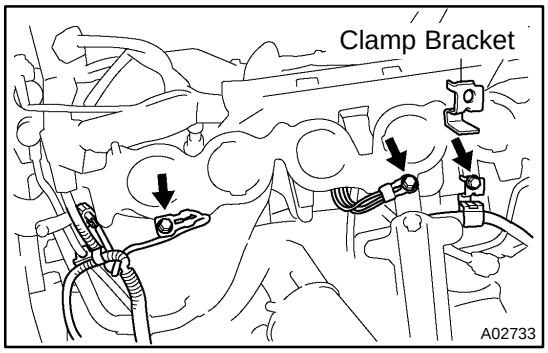


21. DISCONNECT ENGINE WIRE FROM CYLINDER HEAD

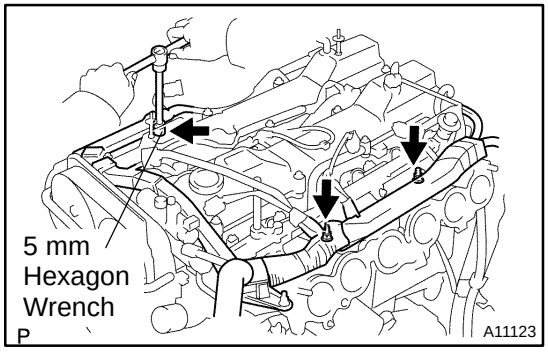
(a) Disconnect the ground strap from the cylinder head.
(b) Disconnect the 2 water bypass hoses from the hose clamps on the cylinder head and oil filter bracket.
(c) Remove the 2 bolts and hose clamps.
(d) Disconnect the heated oxygen sensor (bank 2 sensor 1) connector and engine wire clamp from the hose clamps.



(e) Disconnect the heated oxygen sensor (bank 1 sensor 1) connector.
(f) Disconnect the crankshaft position sensor connector.
(g) Disconnect the generator connector.
(h) Remove the bolt and clamp bracket, and disconnect the engine wire from the water pump.

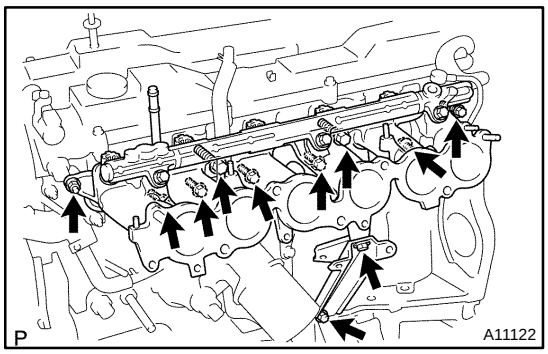


(i) Disconnect the 2 ground terminals from the intake manifold.
(j) Disconnect the 2 engine wire clamps from the No. 1 oil pipe and clamp bracket on the intake manifold.
(k) Remove the bolt and clamp bracket.
(l) Disconnect the ECT sensor connector.
(m) Remove the 2 knock sensor connectors.
(n) Remove the oil pressure switch connector.
(o) Remove the oil level sensor connector.
(p) Remove the starter connector.
(q) Remove the 6 injector connectors.
(r) Remove the camshaft timing oil control valve connector.
(s) Remove the camshaft position sensor connector.



(t) Using a 5 mm hexagon wrench, remove the bolt holding the engine wire protector to the No. 2 cylinder head cover.
(u) Remove the 3 nuts, and disconnect the engine wire protector from the intake manifold.

22. REMOVE FUEL PRESSURE PULSATION DAMPER (See page SF-26)

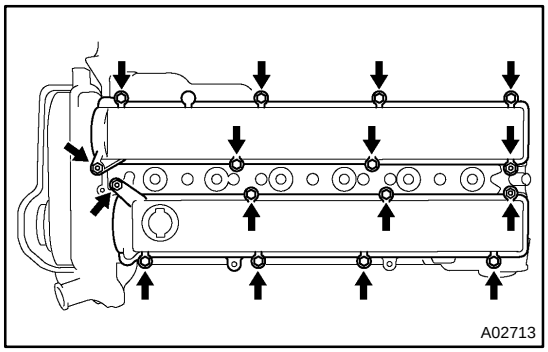


23. REMOVE INTAKE MANIFOLD ASSEMBLY

(a) Disconnect the starter wire from the manifold stay.

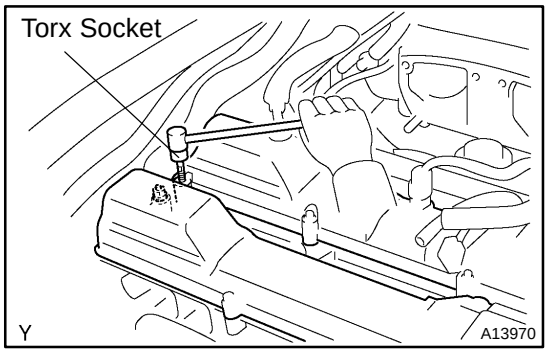
(b) Remove the 2 bolts and manifold stay.

(c) Remove the 7 bolts, 2 nuts, the intake manifold and delivery pipe assembly and gasket.



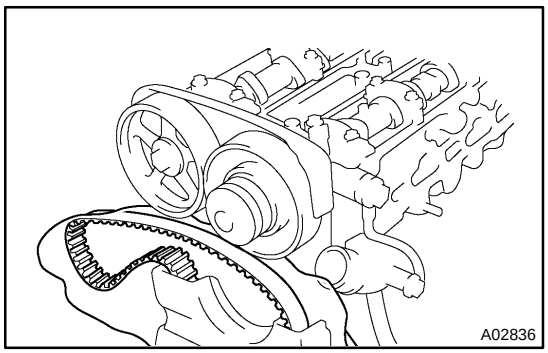
24. REMOVE NO. 1 AND NO. 2 CYLINDER HEAD COVERS

(a) Remove the 12 bolts and 4 nuts.



(b) Using a torx socket (E5), remove the 4 stud bolts.

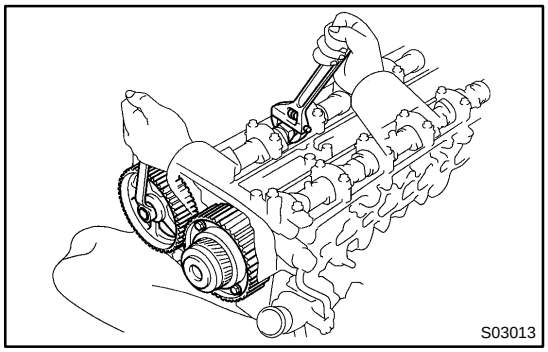
(c) Remove the cylinder head covers and gaskets.



25. DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEYS (See page EM-17)

NOTICE:

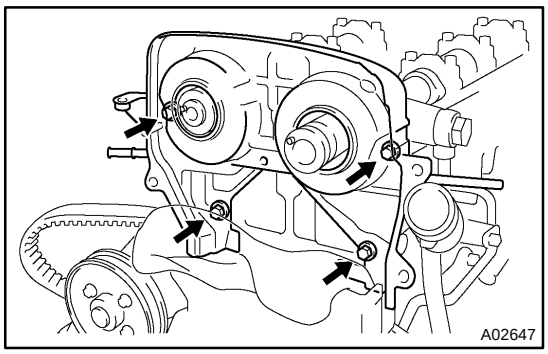
- **Support the timing belt, so that the measuring of the crankshaft timing pulley and timing belt does not shift.**
- **Be careful not to drop anything inside the timing belt cover.**
- **Do not allow the timing belt to come into contact with oil, water or dust.**



26. REMOVE CAMSHAFT TIMING PULLEYS

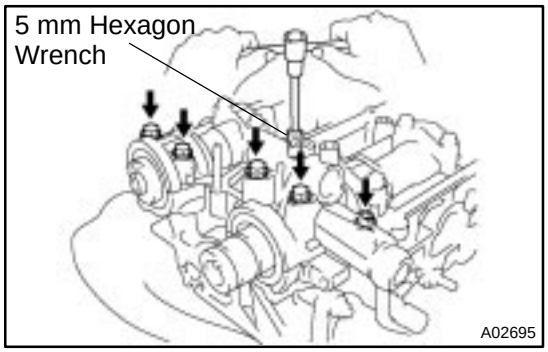
(a) Remove the exhaust camshaft timing pulley.
Hold the hexagon portion of the camshaft with a wrench, and remove the pulley bolt and camshaft pulley.

(b) Remove the VVT-i (intake camshaft timing) pulley (See page EM-17).



27. REMOVE NO. 4 TIMING BELT COVER

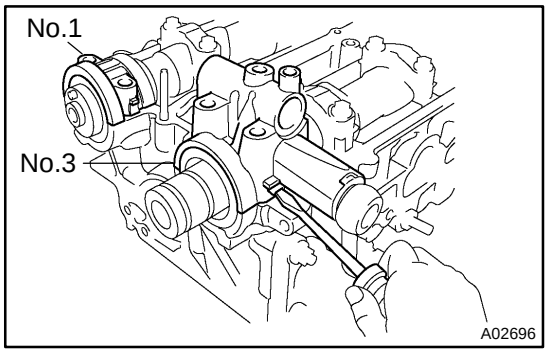
Remove the 4 bolts and timing belt cover.



28. REMOVE CAMSHAFTS

(a) Using a 5 mm hexagon wrench, the 2 No. 3 camshaft bearing cap bolts.

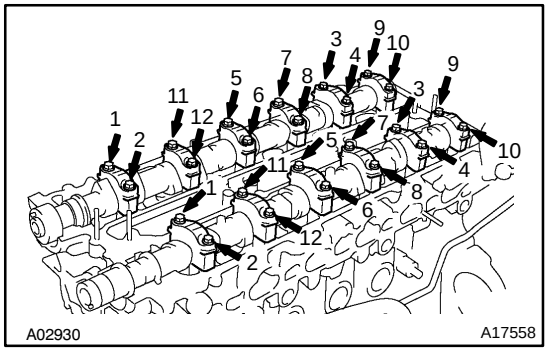
(b) Uniformly loosen and remove the 4 camshaft bearing cap bolts.



(c) Using a screwdriver, pry out the Nos. 1, 3 camshaft bearing caps and oil seals.

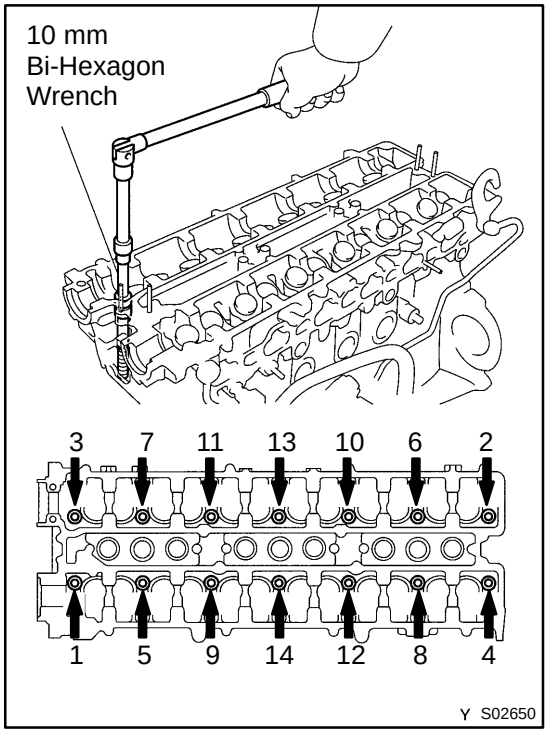
NOTICE:

Be careful not to damage the cap. Tape the screwdriver tip.



(d) Uniformly loosen and remove the 12 camshaft bearing cap bolts, in several passes, in the sequence shown.

(e) Remove the 6 No. 2 camshaft bearing caps and camshaft. Remove the intake and exhaust camshafts.



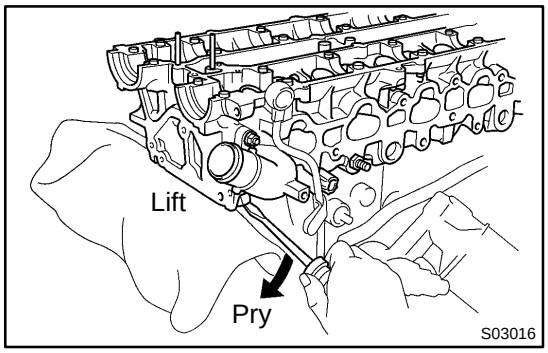
29. REMOVE CYLINDER HEAD ASSEMBLY

(a) Using a 10 mm bi-hexagon wrench, uniformly loosen and remove the 14 cylinder head bolts, in several passes, in the sequence shown.

NOTICE:

Cylinder head warpage or cranking could result from removing in incorrect order.

(b) Remove the 14 plate washers.



(c) Lift the cylinder head from the dowels on the cylinder block.

(d) Disconnect the heater hose from the heater union.

(e) Place the head on wooden blocks on a bench.

If the cylinder head is difficult to lift off, pry with a screwdriver between the cylinder head and block projection.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

EM0DB-05

DISASSEMBLY

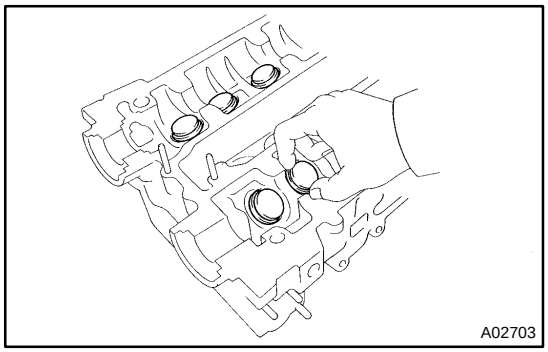
1. REMOVE WATER OUTLET WITH WATER BYPASS HOSE

Remove the 2 nuts, bolt, water outlet and gasket.

2. REMOVE ENGINE HANGER

3. REMOVE CAMSHAFT POSITION SENSOR

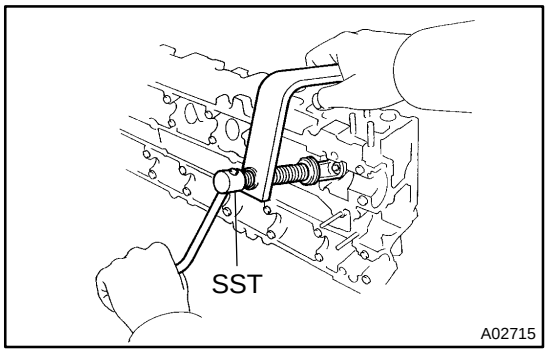
4. REMOVE ECT SENSOR



5. REMOVE VALVE LIFTERS AND SHIMS

HINT:

Store the valve lifters and shims in correct order.



6. REMOVE VALVES

(a) Using SST, compress the valve spring and remove the 2 keepers.

SST 09202-70020 (09202-00010)

(b) Remove the spring retainer, valve spring, valve and spring seat.

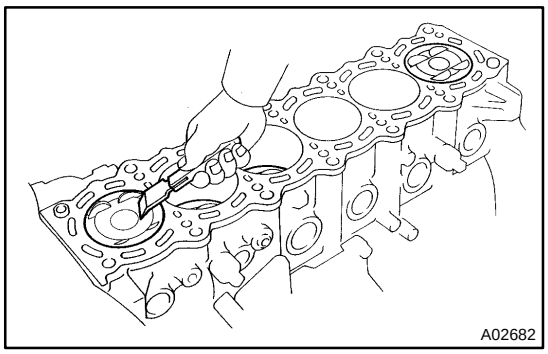
HINT:

Store the valves, valve springs, spring seats and spring retainers in correct order.

(c) Using needle-nose pliers, remove the oil seal.

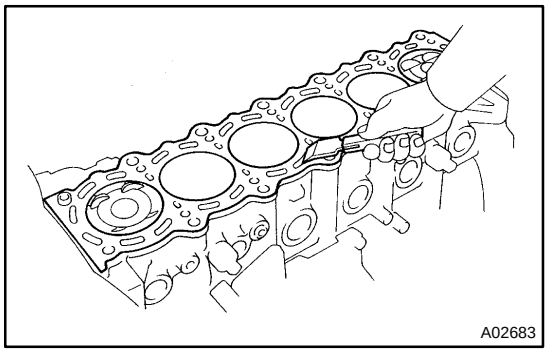
EM0DC-06

INSPECTION



1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK

(a) Turn the crankshaft, and bring each piston to top dead center (TDC). Using a gasket scraper, remove all the carbon from the piston top surface.



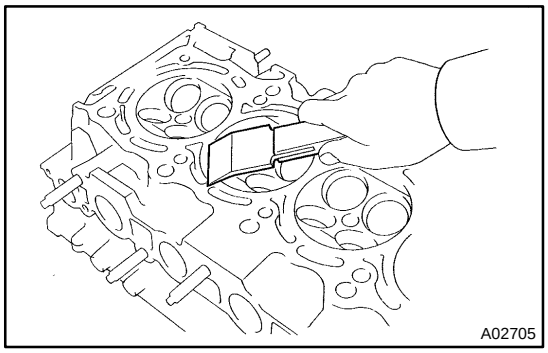
(b) Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.

(c) Using compressed air, blow carbon and oil from the bolt holes.

CAUTION:

Protect your eyes when using high - pressure compressed air.

2. INSPECT CYLINDER BLOCK FOR FLATNESS (See page EM-87)



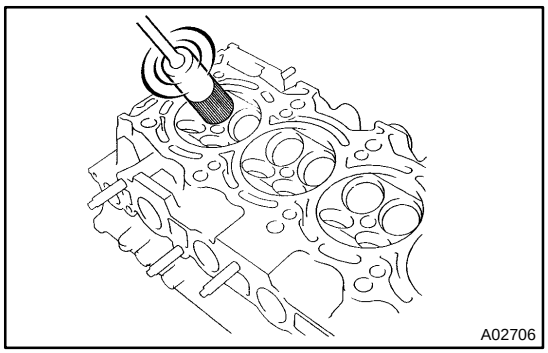
3. CLEAN CYLINDER HEAD

(a) Remove the gasket material.

Using a gasket scraper, remove all the gasket material from the cylinder block surface.

NOTICE:

Be careful not to scratch the cylinder block contact surface.

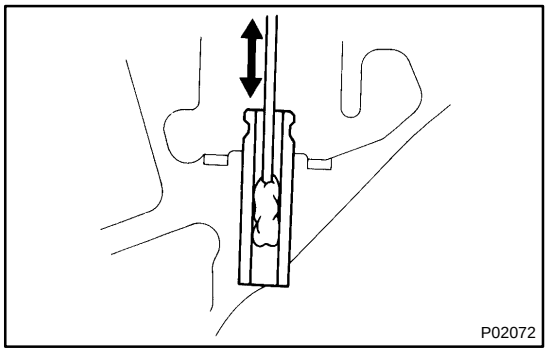


(b) Clean the combustion chambers.

Using a wire brush, remove all the carbon from the combustion chambers.

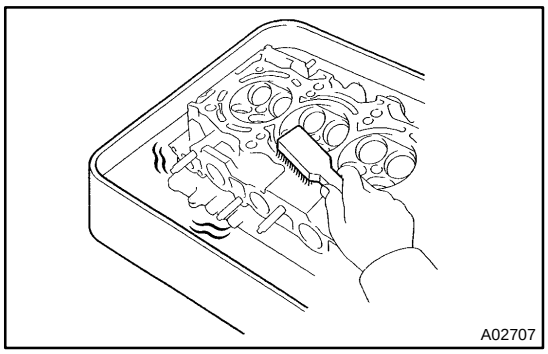
NOTICE:

Be careful not to scratch the cylinder block contact surface.

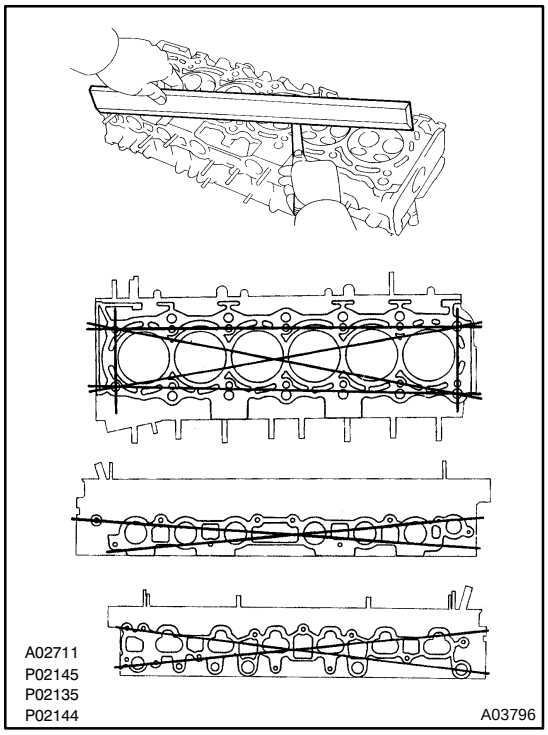


(c) Clean the valve guide bushings.

Using a valve guide bushing brush and solvent, clean all the guide bushings.



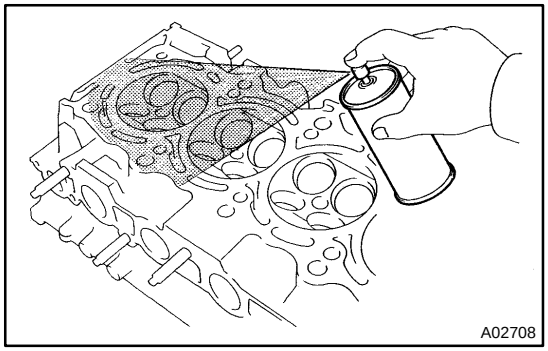
(d) Clean the cylinder head.
Using a soft brush and solvent, thoroughly clean the cylinder head.



4. INSPECT CYLINDER HEAD

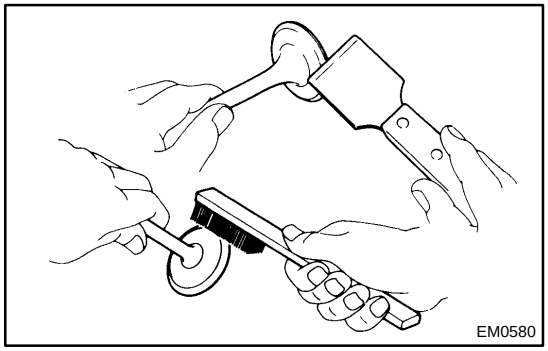
(a) Inspect for the flatness.
Using precision straight edge and feeler gauge, measure the surfaces contacting the cylinder block, intake and exhaust manifolds for warpage.
Maximum warpage: 0.10 mm (0.0039 in.)

If warpage is greater than maximum, replace the cylinder head.



(b) Inspect for the cranks.
Using a dye penetrant, check the combustion chamber, intake ports, exhaust ports and cylinder block surface for cracks.

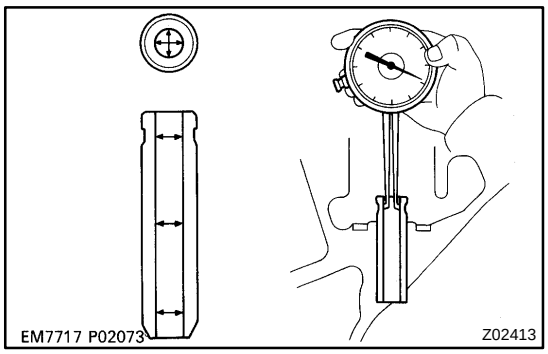
If cracked, replace the cylinder head.



5. CLEAN VALVES

(a) Using a gasket scraper, chip off any carbon from the valve head.

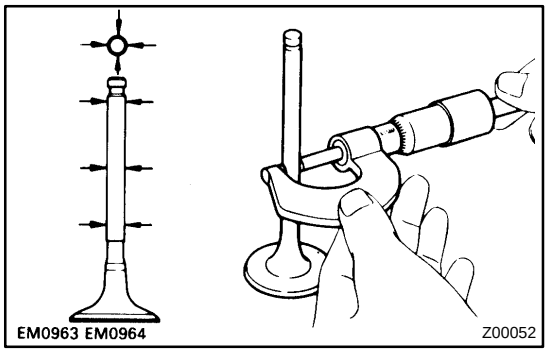
(b) Using a wire brush, thoroughly clean the valve.



6. INSPECT VALVE STEMS AND GUIDE BUSHINGS

(a) Using a caliper gauge, measure the inside diameter of the guide bushing.

Bushing inside diameter:
6.010 - 6.030 mm (0.2366 - 0.2374 in.)



(b) Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter:

Intake	5.970 - 5.985 mm (0.2350 - 0.2356 in.)
Exhaust	5.965 - 5.980 mm (0.2348 - 0.2354 in.)

(c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

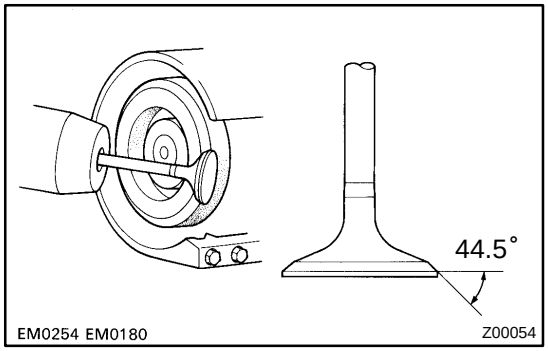
Standard oil clearance:

Intake	0.025 - 0.060 mm (0.0010 - 0.0024 in.)
Exhaust	0.030 - 0.065 mm (0.0012 - 0.0026 in.)

Maximum oil clearance:

Intake	0.08 mm (0.0031 in.)
Exhaust	0.10 mm (0.0039 in.)

If the clearance is greater than maximum, replace the valve and guide bushing (See page EM-49).

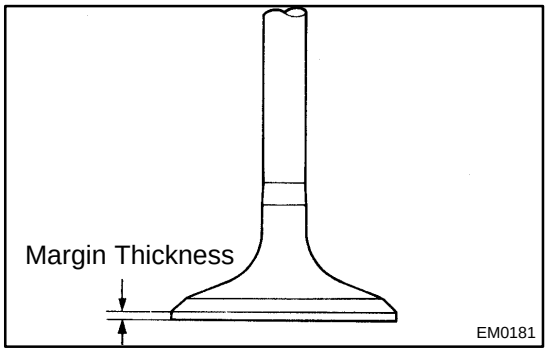


7. INSPECT AND GRIND VALVES

(a) Grind the valve enough to remove pits and carbon.

(b) Check that the valve is ground to the correct valve face angle.

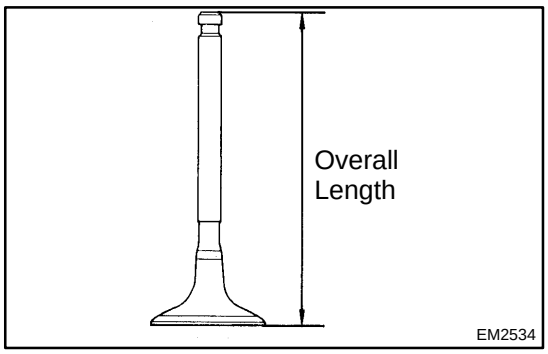
Valve face angle: 44.5°



(c) Check the valve head margin thickness.

Standard margin thickness:
0.8 - 1.2 mm (0.031 - 0.047 in.)
Minimum margin thickness: 0.5 mm (0.020 in.)

If the margin thickness is less than minimum, replace the valve.



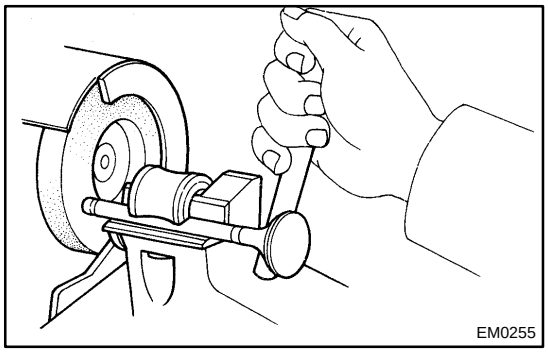
(d) Check the valve overall length.

Standard overall length:

Intake	98.29 - 98.79 mm (3.8697 - 3.8894 in.)
Exhaust	98.84 - 99.34 mm (3.8913 - 3.9110 in.)

Minimum overall length:

Intake	98.19 mm (3.8657 in.)
Exhaust	98.74 mm (3.8874 in.)



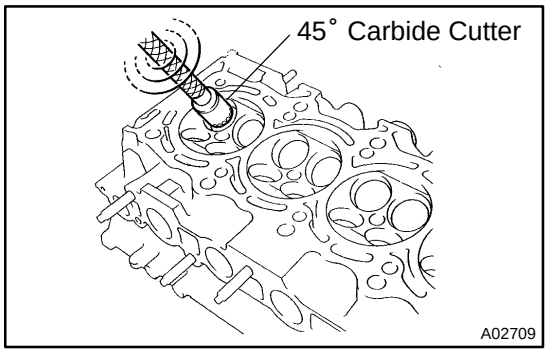
If the overall length is less than minimum, replace the valve.

(e) Check the surface of the valve stem tip for wear.

If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.

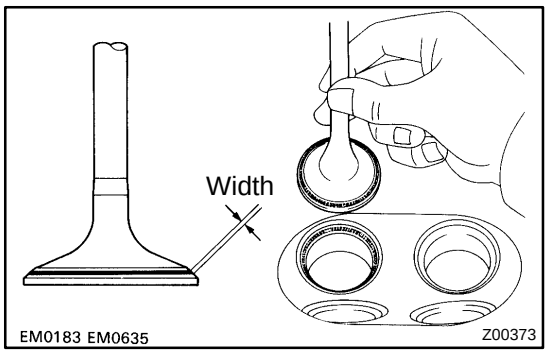
NOTICE:

Do not grind off more than the minimum overall length.



8. INSPECT AND CLEAN VALVE SEATS

(a) Using a 45˚ carbide cutter, resurface the valve seats. Remove only enough metal to clean the seats.



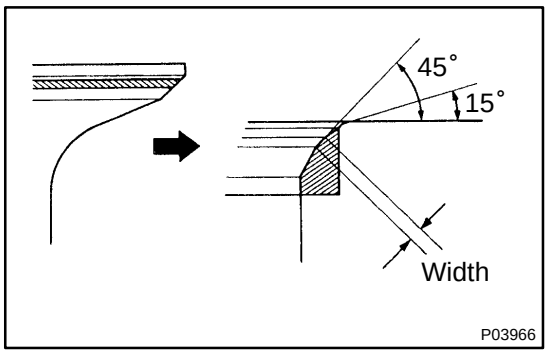
(b) Check the valve seating position.

Apply a thin coat of Prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate the valve.

(c) Check the valve face and seat for the following:

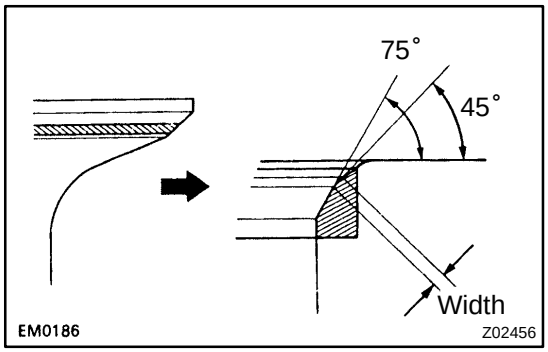
- If blue appears 360˚ around the face, the valve is concentric. If not, replace the valve.
- If blue appears 360˚ around the valve seat, the guide and face are concentric. If not, resurface the seat.
- Check that the seat contact is in the middle of the valve face with the following width:

Intake	1.0 - 1.4 mm (0.039 - 0.055 in.)
Exhaust	1.2 - 1.6 mm (0.047 - 0.063 in.)

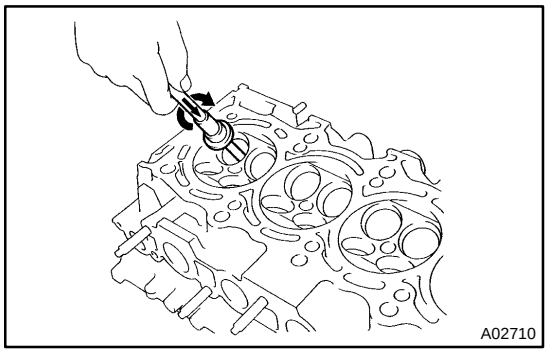


If not, correct the valve seats as follows:

(1) If the seating is too high on the valve face, use 15˚ and 45˚ cutters to correct the seat.

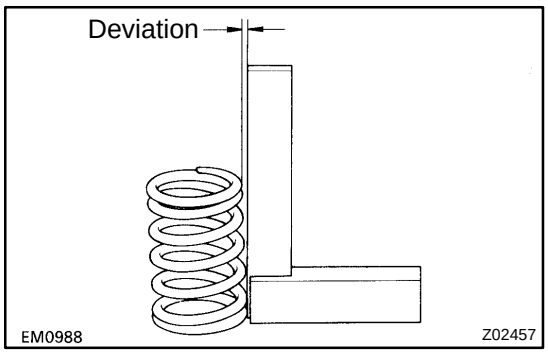


(2) If the seating is too low on the valve face, use 75˚ and 45˚ cutters to correct the seat.



(d) Hand-lap the valve and valve seat with an abrasive compound.

(e) After hand-lapping, clean the valve and valve seat.

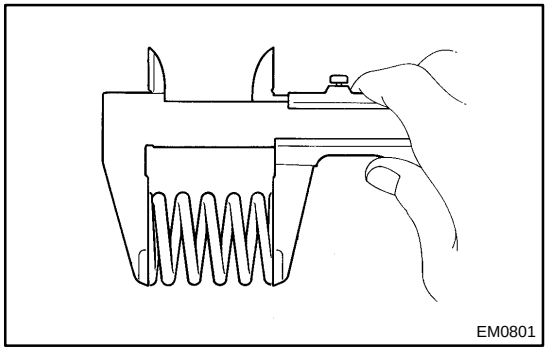


9. INSPECT VALVE SPRINGS

(a) Using a steel square, measure the deviation of the valve spring.

Maximum deviation: 2.0 mm (0.079 in.)

If deviation is greater than maximum, replace the valve spring.

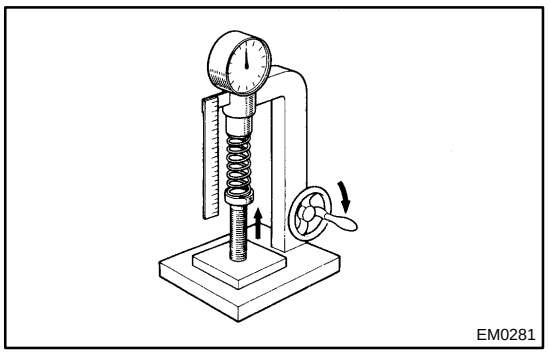


(b) Using vernier calipers, measure the free length of the valve spring.

Free length:

Pink painted mark	43.71 mm (1.7209 in.)
Yellow painted mark	44.10 mm (1.7362 in.)

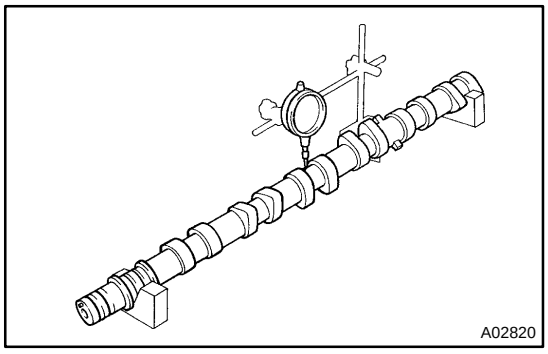
If the free length is not as specified, replace the valve spring.


EM0281

(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Installed tension:
186.2 - 205.8 N (19.0 - 21.0 kgf, 41.9 - 46.3 lbf)
at 34.5 mm (1.358 in.)

If the installed tension is not as specified, replace the valve spring.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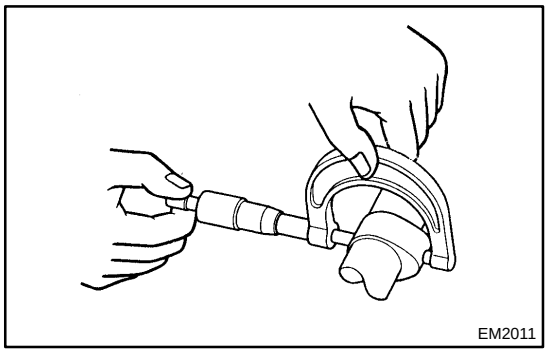
10. INSPECT CAMSHAFTS FOR RUNOUT

(a) Place the camshaft on V-blocks.

(b) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.08 mm (0.0031 in.)

If the circle runout is greater than maximum, replace the camshaft.


EM2011

11. INSPECT CAM LOBES

Using a micrometer, measure the cam lobe height.

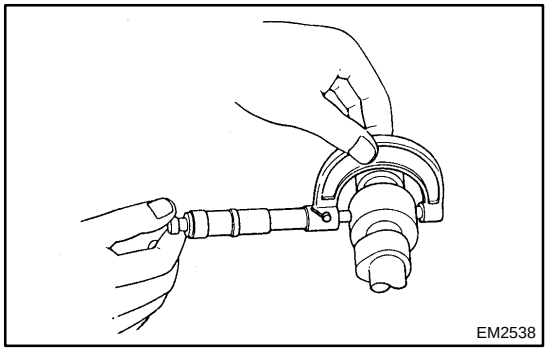
Standard cam lobe height:

Intake	44.310 - 44.360 mm (1.7445 - 1.7465 in.)
Exhaust	44.250 - 44.350 mm (1.7421 - 1.7461 in.)

Minimum cam lobe height:

Intake	44.16 mm (1.7386 in.)
Exhaust	44.10 mm (1.7362 in.)

If the lobe height is less than minimum, replace the camshaft.


EM2538

12. INSPECT CAMSHAFT JOURNALS

Using a micrometer, measure the journal diameter.

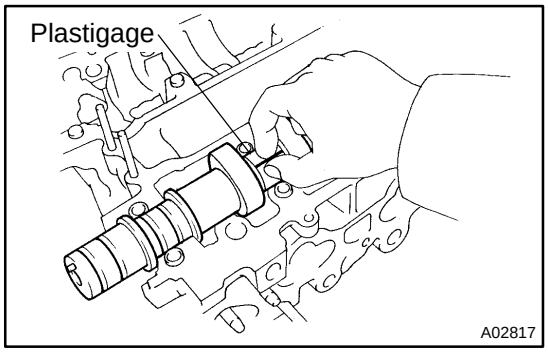
Journal diameter:
28.949 - 28.965 mm (1.1397 - 1.1404 in.)

If the journal diameter is not as specified, check the oil clearance.

13. INSPECT CAMSHAFT BEARING

Check the bearings for flaking and scoring.

If the bearings are damaged, replace the bearing caps and cylinder head as a set.



A02817

14. INSPECT CAMSHAFT JOURNAL OIL CLEARANCE

(a) Clean the bearing caps and camshaft journals.

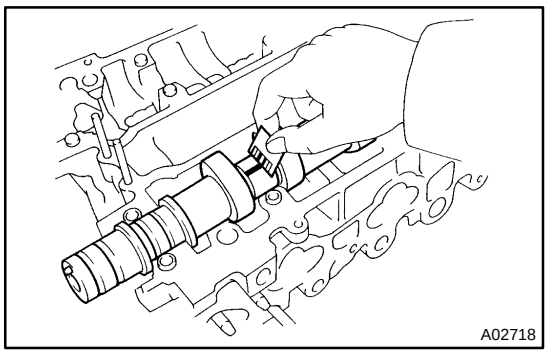
(b) Place the camshafts on the cylinder head.

(c) Lay a strip of Plastigage across each of the camshaft journals.

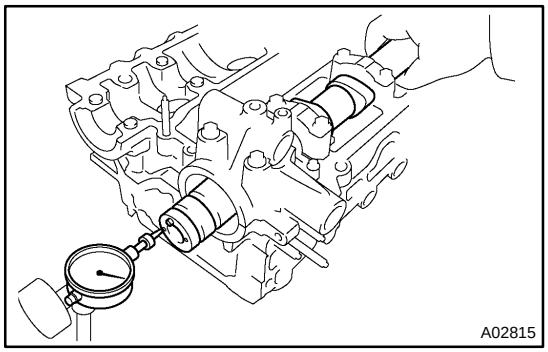
(d) Install the bearing caps (See page EM-53).

NOTICE:
Do not turn the camshaft.

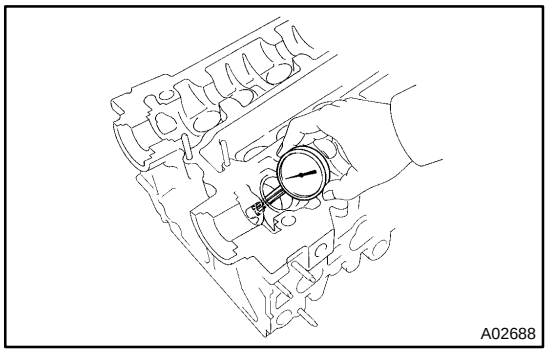
(e) Remove the bearing caps.


A02718

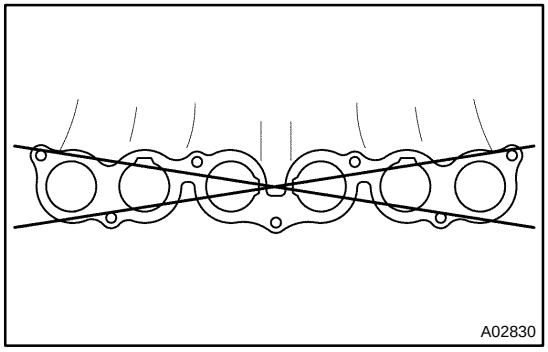
(f) Measure the Plastigage at its widest point.
Standard oil clearance:
0.035 - 0.072 mm (0.0014 - 0.0028 in.)
Maximum oil clearance: 0.10 mm (0.0039 in.)
If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.
(g) Completely remove the Plastigage.


A02815

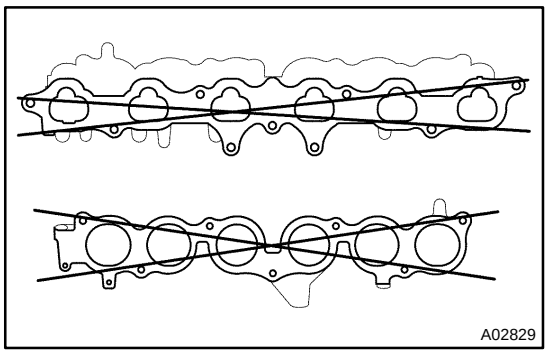
15. INSPECT CAMSHAFT THRUST CLEARANCE
(a) Install the camshafts (See page EM-53).
(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
Standard thrust clearance:
0.080 - 0.190 mm (0.0031 - 0.0075 in.)
Maximum thrust clearance: 0.30 mm (0.0118 in.)
If the thrust clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.


A02688

16. INSPECT VALVE LIFTERS AND LIFTER BORES
(a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.
Lifter bore diameter:
31.000 - 31.016 mm (1.2205 - 1.2211 in.)
(b) Using a micrometer, measure the lifter diameter.
Lifter diameter:
30.966 - 30.976 mm (1.2191 - 1.2195 in.)
(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.
Standard oil clearance:
0.024 - 0.050 mm (0.0009 - 0.0020 in.)
Maximum oil clearance: 0.07 mm (0.0028 in.)
If the oil clearance is greater than maximum, replace the lifter. If necessary, replace the cylinder head.


A02830

17. INSPECT AIR INTAKE CHAMBER
Using a precision straight edge and feeler gauge, measure the surfaces contacting the intake manifold for warpage.
Maximum warpage: 0.15 mm (0.0059 in.)
If warpage is greater than maximum, replace the chamber.

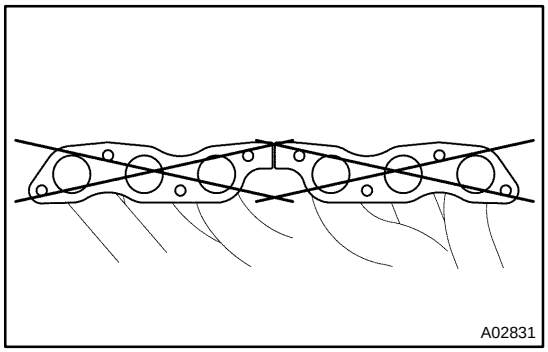


18. INSPECT INTAKE MANIFOLD

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head and air intake chamber for warpage.

Maximum warpage: 0.15 mm (0.0059 in.)

If warpage is greater than maximum, replace the manifold.

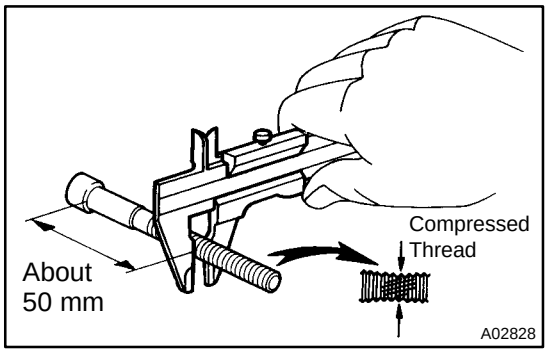


19. INSPECT EXHAUST MANIFOLD

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head for warpage.

Maximum warpage: 0.50 mm (0.0196 in.)

If warpage is greater than maximum, replace the manifold.



20. INSPECT CYLINDER HEAD BOLTS

Using a vernier caliper, measure the thread outside diameter of the bolt.

Standard outside diameter:

10.8 - 11.0 mm (0.425 - 0.433 in.)

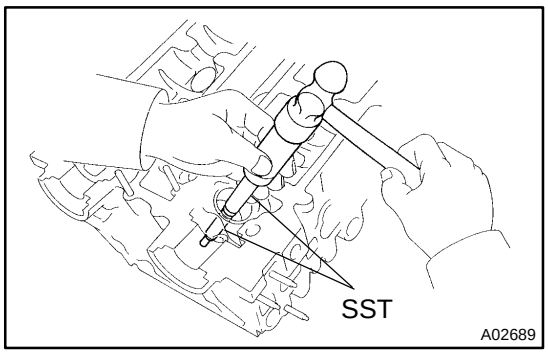
Minimum outside diameter: 10.7 mm (0.421 in.)

If the diameter is less than minimum, replace the bolt.

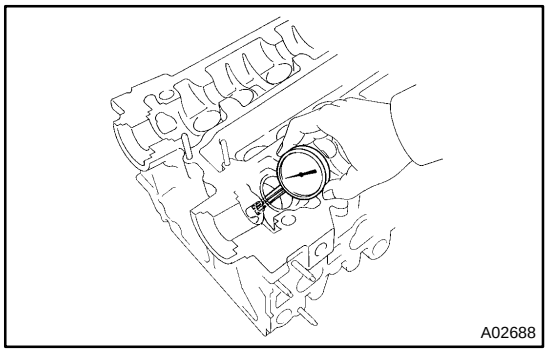
EM0DD-06

REPLACEMENT

REPLACE VALVE GUIDE BUSHINGS



(a) Using SST and a hammer, tap out the guide bushing.
SST 09201- 10000 (09201- 01060), 09950- 70010 (09951-07100)



(b) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

Both intake and exhaust

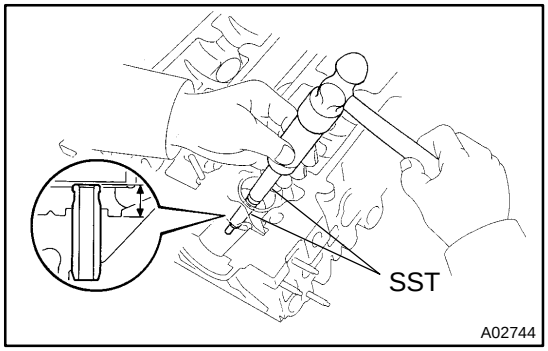
Bushing bore diameter mm (in.)	Bushing size
10.985 - 11.006 mm (0.4325 - 0.4333 in.)	Use STD
11.035 - 11.056 mm (0.4344 - 0.4353 in.)	Use O/S 0.05

(c) Select a new guide bushing (STD or O/S 0.05).

If the bushing bore diameter of the cylinder head is greater than 11.006 mm (0.4333 in.), machine the bushing bore to the following dimension:

11.035 - 11.056 mm (0.4344 - 0.4353 in.)

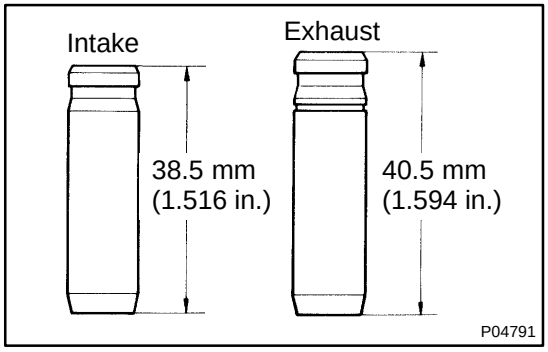
If the bushing bore diameter of the cylinder head is greater than 11.056 mm (0.4353 in.), replace the cylinder head.



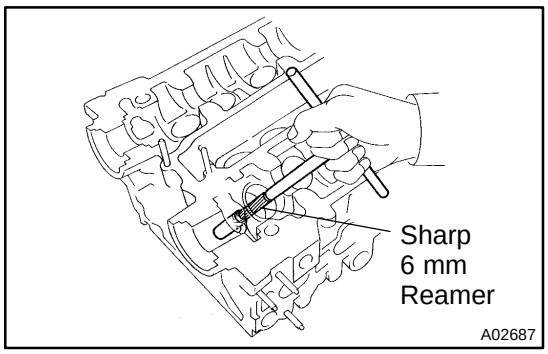
(d) Using SST and a hammer, tap in a new guide bushing to the specified protrusion height.
SST 09201- 10000 (09201- 01060), 09950- 70010 (09951-07100)

Protrusion height:

Intake	12.3 - 12.7 mm (0.484 - 0.500 in.)
Exhaust	11.4 - 11.8 mm (0.449 - 0.465 in.)



HINT:
Different bushings are used for the intake and exhaust.



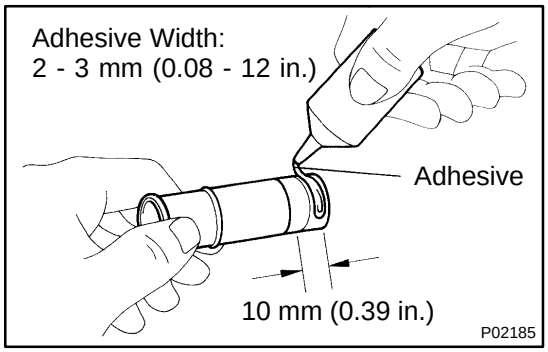
(e) Using a sharp 6 mm reamer, ream the guide bushing to obtain the standard specified clearance (See page EM-41) between the guide bushing and valve stem.

EM0DE-06

REASSEMBLY

HINT:

- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply fresh engine oil to all sliding and rotating surfaces.
- Replace all gaskets and oil seals with new ones.



1. INSTALL HEATER UNION

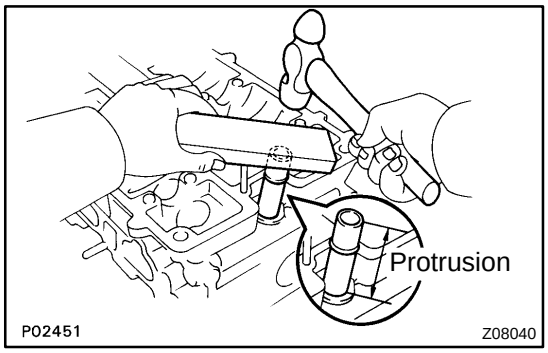
HINT:

When using a new cylinder head, a new heater union must be installed.

(a) Apply adhesive to the end of the heater union as shown in the illustration.

Adhesive:

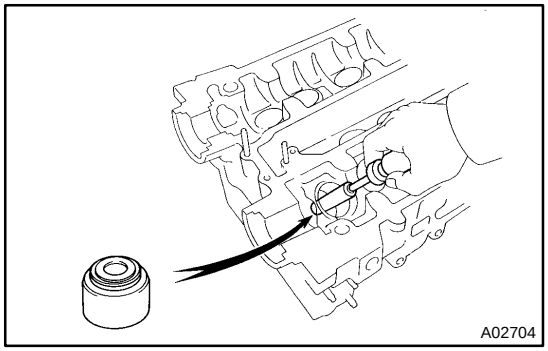
Part No.08833-00070, THREE BOND 1324 or equivalent



(b) Using a wooden block and hammer, tap in a new heater union, leaving 48 mm (1.89 in.) protruding from the cylinder head.

NOTICE:

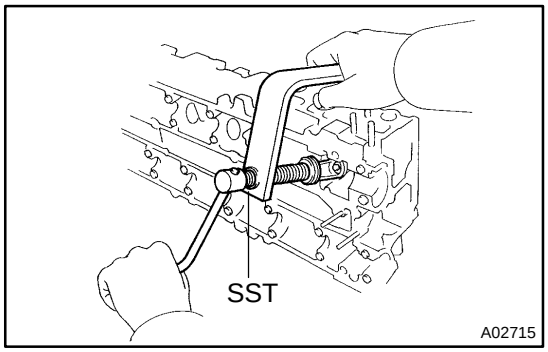
Do not tap it in too far.



2. INSTALL VALVES

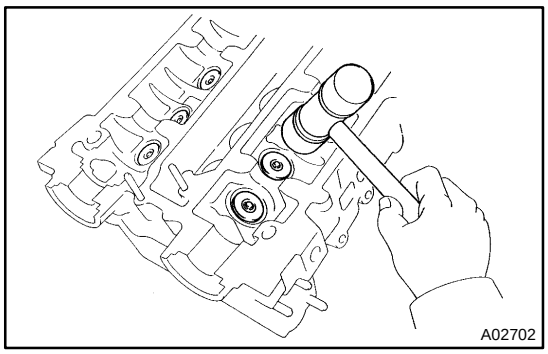
(a) Install a new oil seal on the valve guide bushing.

(b) Install the valve, spring seat, valve spring and spring retainer.



(c) Using SST, compress the valve spring and place the 2 keepers around the valve stem.

SST 09202-70020 (09202-00010)



(d) Using a plastic-faced hammer, lightly tap the valve stem tip to assure proper fit.

3. INSTALL VALVE LIFTERS AND SHIMS

(a) Install the valve lifter and shim.

(b) Check that the valve lifter rotates smoothly by hand.

4. INSTALL ECT SENSOR

Torque: 19.6 N·m (200 kgf·cm, 14 ft·lbf)

5. INSTALL CAMSHAFT POSITION SENSOR

6. INSTALL ENGINE HANGER

Torque: 40 N·m (400 kgf·cm, 30 ft·lbf)

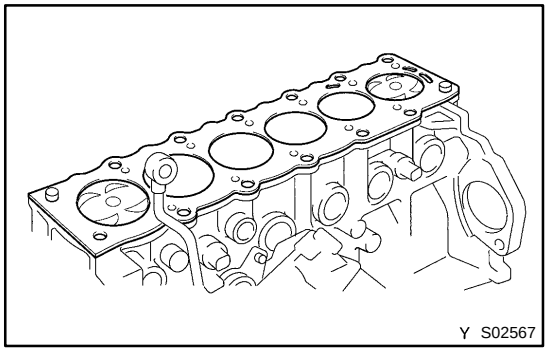
7. INSTALL WATER OUTLET WITH WATER BYPASS HOSE

Install a new gasket and the water outlet with the bolt and 2 nuts.

Torque: 28 N·m (280 kgf·cm, 21 ft·lbf)

EM1JA-03

INSTALLATION



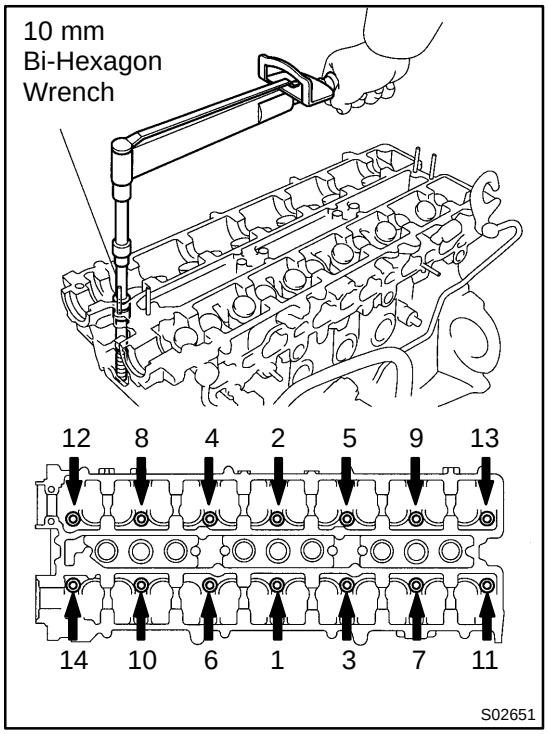
1. PLACE CYLINDER HEAD ON CYLINDER BLOCK

(a) Place a new cylinder head gasket in position on the cylinder block.

NOTICE:

Be sure to install it correctly.

(b) Place the cylinder head in position on the cylinder head gasket.



2. INSTALL CYLINDER HEAD BOLTS

HINT:

- The cylinder head bolts are tightened in 2 progressive steps (steps (c) and (f)).
- If any of bolts break or deform, replace them.

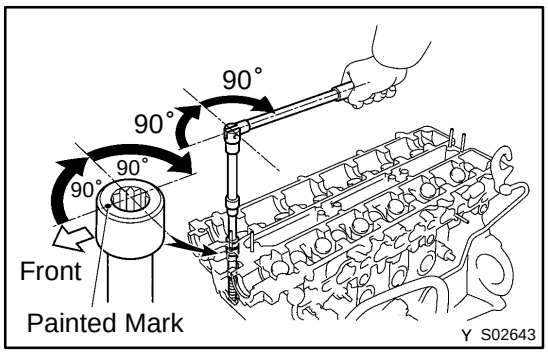
(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) Install the 14 plate washers to each cylinder head bolt.

(c) Using a 10 mm bi-hexagon wrench, uniformly tighten the cylinder head bolts, in several passes, in the sequence shown.

Torque: 35 N·m (350 kgf·cm, 26 ft·lbf)

If any of the bolts do not meet the torque specification, replace the bolt.

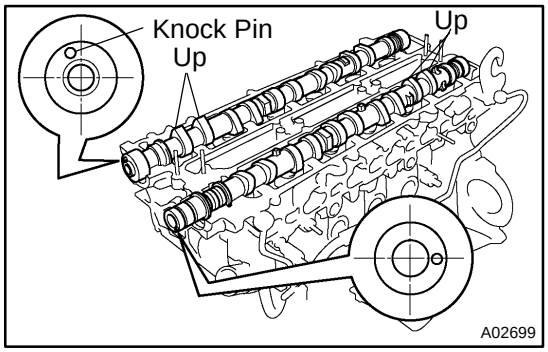


(d) Mark the front of the cylinder head bolt head with paint.

(e) Retighten the cylinder head bolts 90° in the numerical order shown.

(f) Retighten cylinder head bolts by an additional 90° shown.

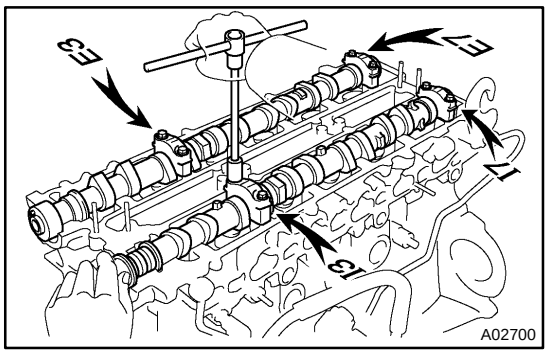
(g) Check that the painted mark is now turned to the rear.



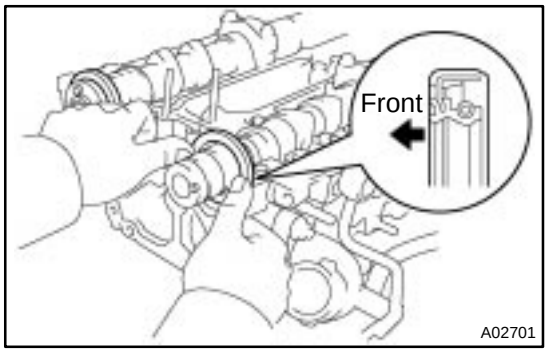
3. INSTALL CAMSHAFTS

(a) Apply engine oil to the thrust portion of the camshaft.

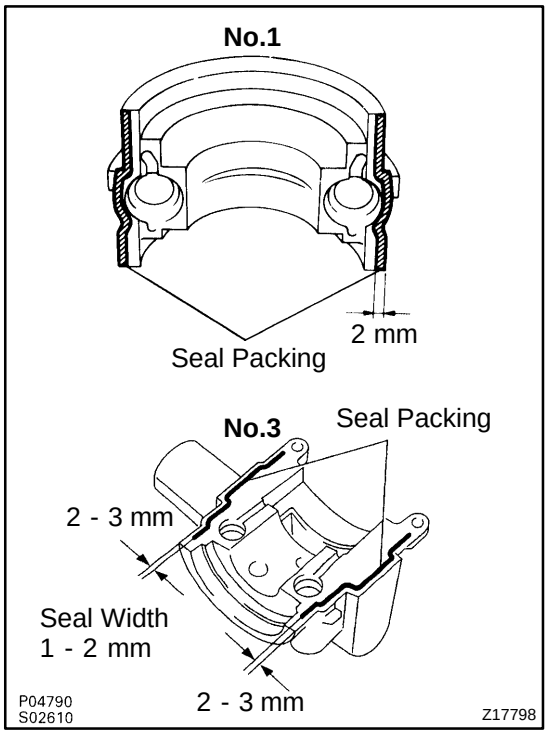
(b) Place the camshaft on the cylinder head with the cam lobe facing up as shown.



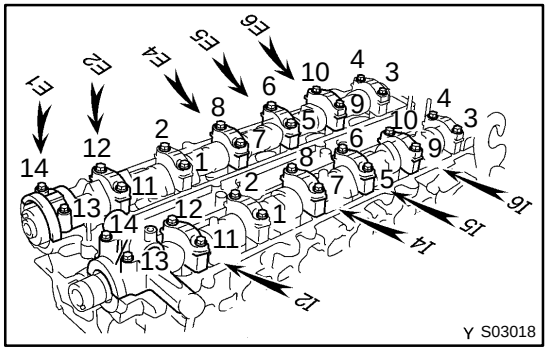
(c) Place the (Nos. 3, 7 journal) camshaft bearing caps in their proper location.
(d) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(e) Temporarily tighten these bearing cap bolts uniformly and alternately, in several passes, until the bearing caps are snug with the cylinder head.



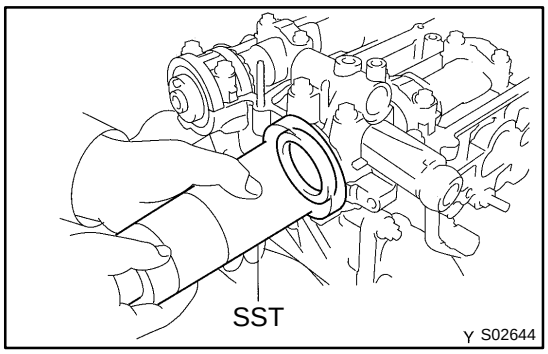
(f) Apply MP grease to a new camshaft oil seal lip.
(g) Install the 2 oil seals to the camshafts.



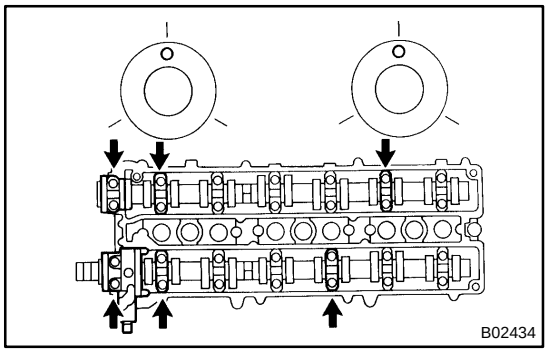
(h) Clean the installed surfaces of the Nos. 1, 3 camshaft bearing cap and cylinder head with cleaner.
(i) Apply seal packing to the bearing caps as shown.
Seal packing: Part No. 08826-00080 or equivalent



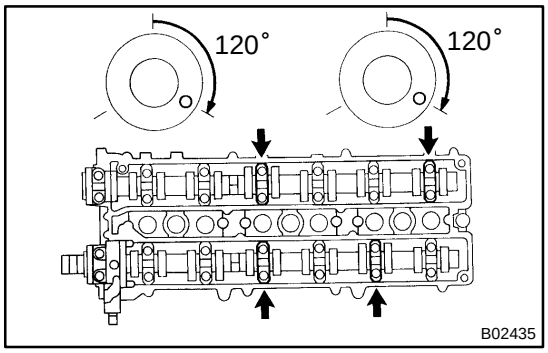
(j) Install the other bearing caps in their proper locations.
(k) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(l) Install and uniformly tighten the 14 bearing cap bolts on one side, in several passes, in the sequence shown.
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)
(m) Using a 5 mm hexagon wrench, the 2 No. 3 camshaft bearing cap bolts.
Torque: 5.0 N·m (50 kgf·cm, 44 in.·lbf)



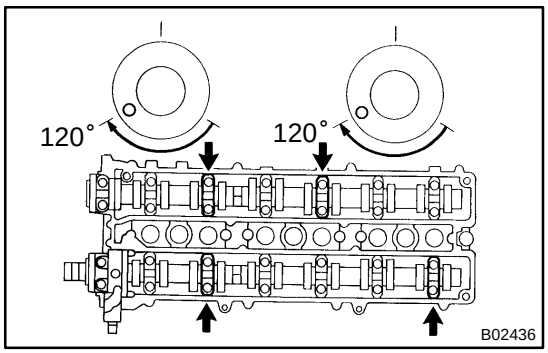
(n) Using SST, push the 2 oil seals in as far as they can go.
SST 09316-6001 1 (09316-00011, 09316-00051)



(o) Rotate the camshaft with a wrench at the hexagon position, bring the forward straight pin up.
(p) Loosen the 12 bearing cap bolts as shown, until they can be turned by hand; retighten in several passes.
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)



(q) Turn the camshaft 1/3 of a revolution.
(r) Loosen the 8 bearing cap bolts as shown, until they can be turned by hand; retighten in several passes.
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)

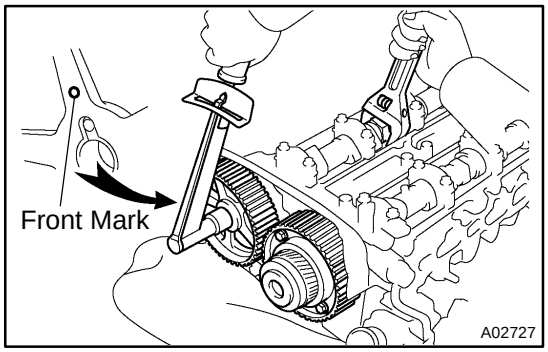


(s) Turn the camshaft a further 1/3 of a revolution.
(t) Loosen the 8 bearing cap bolts as shown, until they can be turned by hand; retighten in several passes.
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)

4. CHECK AND ADJUST VALVE CLEARANCE (See page EM-5)

5. INSTALL NO. 4 TIMING BELT COVER

Install the timing belt cover with 4 bolts.
Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)

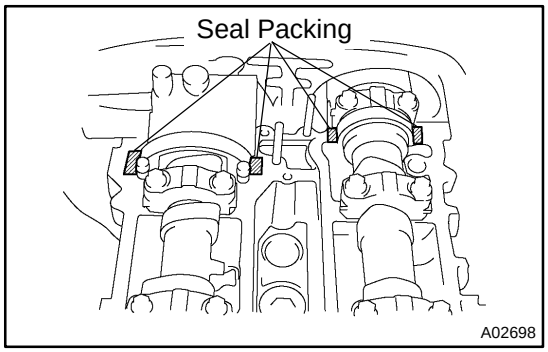


6. INSTALL CAMSHAFT TIMING PULLEYS

(a) Install the exhaust camshaft timing pulley.
(1) Align the camshaft knock pin with the groove in the pulley, and slide on the pulley.
(2) Slide the timing pulley on the camshaft, facing the front mark forward.
(3) Hold the hexagon portion of the camshaft with a wrench, and tighten the timing pulley bolt.
Torque: 81 N·m (810 kgf·cm, 60 ft·lbf)

(b) Install the VV-i (intake camshaft timing) pulley (See page EM-24).

7. CONNECT TIMING BELT TO CAMSHAFT TIMING PULLEYS (See page EM-24)



8. INSTALL NO. 1 AND NO. 2 CYLINDER HEAD COVERS

(a) Remove the any old packing (FIPG) material.

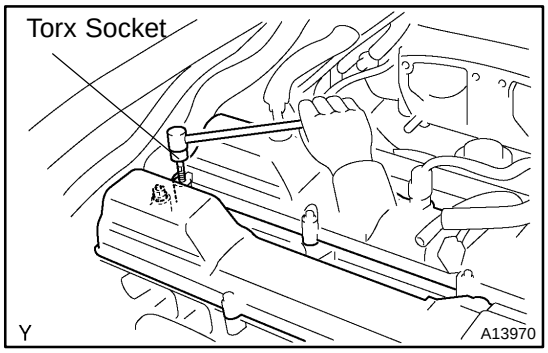
(b) Apply seal packing to the cylinder head as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

(c) Install the gaskets to the cylinder head covers.

(d) Install the cylinder head covers with the 12 bolts.

Torque: 8.5 N·m (85 kgf·cm, 75 in.·lbf)

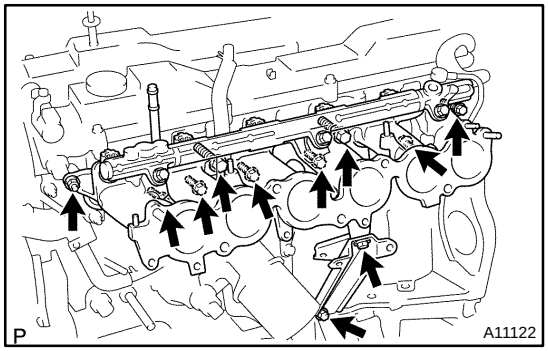


(e) Using a torx socket (E5), install the 4 stud bolts.

Torque: 8.5 N·m (85 kgf·cm, 75 in.·lbf)

(f) Install the 4 nuts to the stud bolts.

Torque: 8.5 N·m (85 kgf·cm, 75 in.·lbf)



9. INSTALL INTAKE MANIFOLD ASSEMBLY

(a) Install a new gasket and the intake manifold and delivery pipe assembly with the 7 bolts and 2 nuts.

Torque: 28 N·m (280 kgf·cm, 21 ft·lbf)

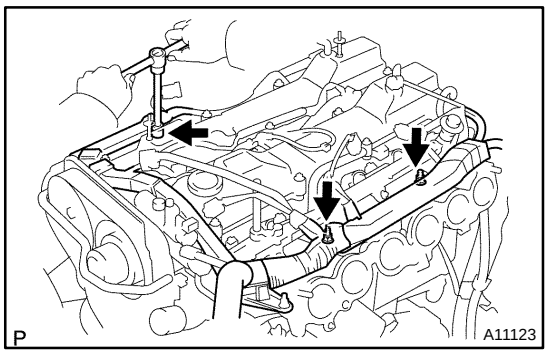
(b) Pass the water bypass hose between the No. 2, No. 3 intake ports of the manifold and delivery pipe.

(c) Install the manifold stay with the 2 bolts.

Torque: 40 N·m (400 kgf·cm, 30 ft·lbf)

(d) Install the starter wire to the manifold stay.

10. INSTALL FUEL PRESSURE PULSATION DAMPER (See page SF-27)



11. CONNECT ENGINE WIRE TO CYLINDER HEAD

(a) Install the engine wire protector with the 3 nuts.

(b) Using a 5 mm hexagon wrench, install the bolt holding the engine wire protector to the No. 2 cylinder head cover.

(c) Connect the 6 injector connectors.

HINT:

The Nos. 1, 3, 5 injector connectors and dark gray, and the Nos. 2, 4, 6 injector connectors are brown.

(d) Connect the camshaft timing oil control valve connector.

(e) Connect the camshaft position sensor connector.

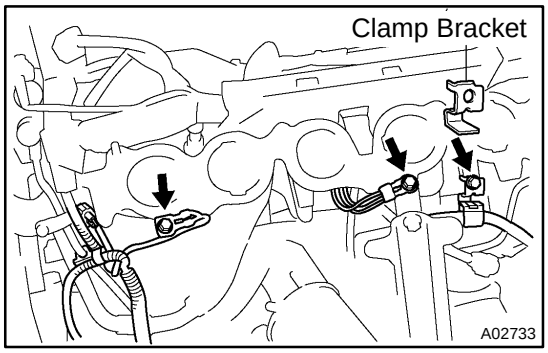
(f) Connect the ECT sensor connector.

(g) Connect the 2 knock sensor connector.

(h) Connect the starter connector.

(i) Connect the oil pressure switch connector.

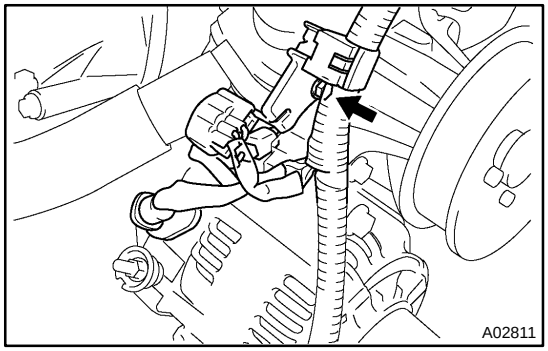
(j) Connect the oil level sensor connector.



(k) Install the clamp bracket to the intake manifold.

(l) Connect the 2 wire clamps to the No. 1 oil pipe and clamp bracket on the intake manifold.

(m) Install the 2 ground terminals to the intake manifold. Tighten so that each calking part should face inside.



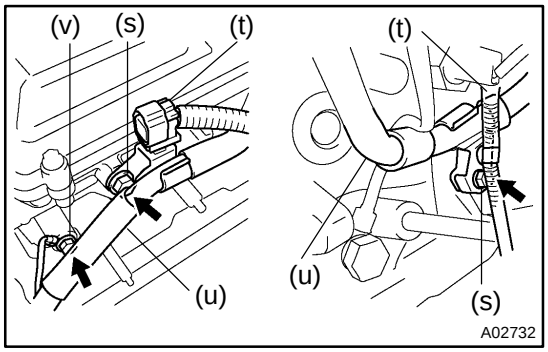
(n) Install the clamp bracket to the water pump.

(o) Connect the generator connector.

(p) Connect the crankshaft position sensor connector.

(q) Connect the heated oxygen sensor (bank 1 sensor 1) connector.

(r) Secure the engine wire with the clamp.



(s) Install the 2 hose clamps to the cylinder head and oil filter bracket.

(t) Install the heated oxygen sensor (bank 2 sensor 1) connector and engine wire clamp to the hose clamps.

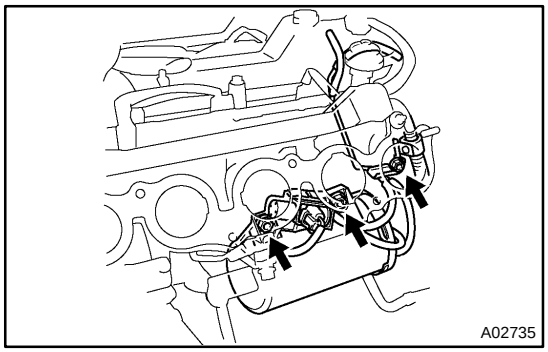
(u) Install the 2 water bypass hoses to the hose clamps on the cylinder head and oil filter bracket.

(v) Install the ground strap to the cylinder head.

12. INSTALL SPARK PLUGS

13. INSTALL IGNITION COILS AND HIGH-TENSION CORD SET ASSEMBLY (See page IG-9)

14. INSTALL NO. 3 TIMING BELT COVER
Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)



15. INSTALL VACUUM CONTROL VALVE SET AND NO. 2 VACUUM PIPE

(a) Install the vacuum control valve set and No. 2 vacuum pipe with the 3 nuts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(b) Install the engine wire clamp to the clamp bracket of the No. 2 vacuum pipe.

(c) Connect the VSV connector for the ACIS.

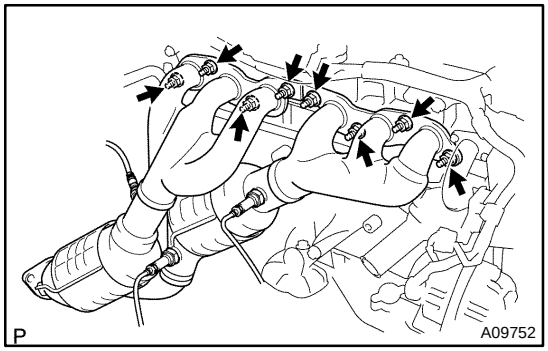
16. INSTALL AIR INTAKE CHAMBER (See page SF-49)

17. INSTALL OIL DIPSTICK AND GUIDE FOR A/T (See page EM-71)

18. INSTALL OIL DIPSTICK AND GUIDE FOR ENGINE (See page LU-12)

19. INSTALL THROTTLE BODY AND INTAKE AIR CONNECTOR ASSEMBLY (See page EM-5)

20. INSTALL WATER BYPASS OUTLET AND NO. 1 WATER BYPASS PIPE (See page CO-14)

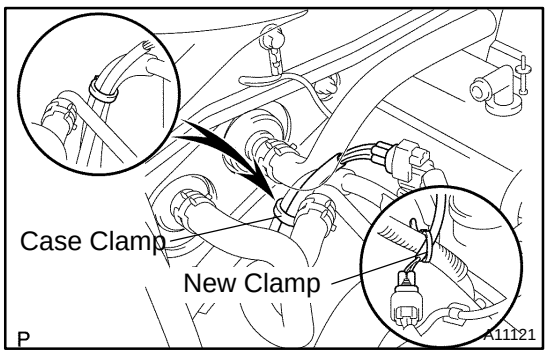


21. INSTALL EXHAUST MANIFOLD

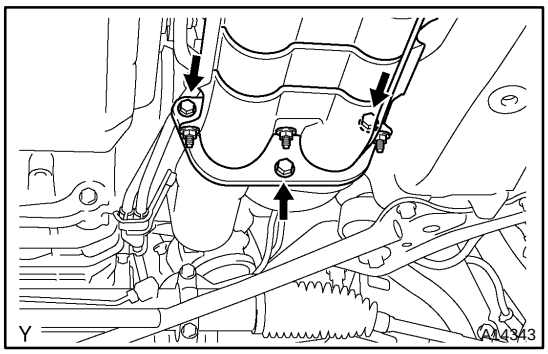
(a) Install 2 new gaskets to the cylinder head.

(b) Using a 14 mm deep socket wrench, install the exhaust manifold with the 8 nuts. Uniformly tighten the nuts in several passes.
Torque: 40 N·m (410 kgf·cm, 30 ft·lbf)

(c) Connect the 3 heated oxygen sensor connectors and clamp.



(d) Install a new clamp and the case clamp as shown in the illustration.

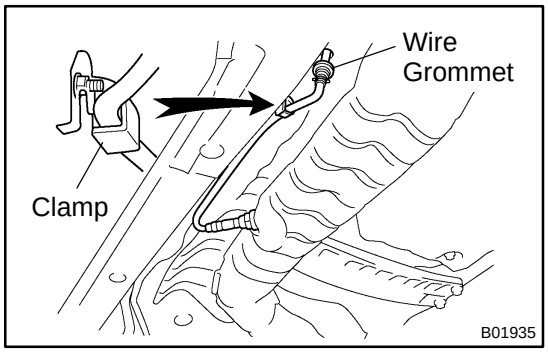


22. CONNECT FRONT EXHAUST PIPE TO EXHAUST MANIFOLD

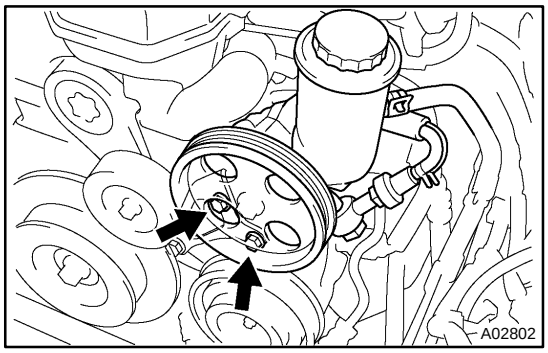
(a) Temporarily install the pipe support bracket to the transmission with the 2 bolts.

(b) Install 2 new gaskets to front end of the front exhaust pipe, and connect the front exhaust pipe to the exhaust manifold with the 3 bolts nuts and retainer.

Torque: 43 N·m (438 kgf·cm, 32 ft·lbf)



(c) Connect the wire grommet and sensor wire of the the heated oxygen sensor (bank 2 sensor 2) to the hole and clamp on the floor.



23. INSTALL PS PUMP

(a) Install the vane pump with the 2 bolts.

Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)

(b) Install the pump rear stay with the 2 bolts.

Torque: 39.2 N·m (400 kgf·cm, 29 ft·lbf)

(c) Connect the PS air hose to the No.4 timing belt cover.

(d) Connect the PS air hose to the air intake chamber.

24. INSTALL DRIVE BELT (See page CH-1)

25. M/T:

INSTALL DRIVE BELT TENSIONER ABSORBER

Install the absorber with the 2 nuts.

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

26. INSTALL AIR CLEANER, MAF METER AND INTAKE AIR RESONATOR ASSEMBLY (See page EM-71)

27. INSTALL AIR CLEANER INLET

28. CONNECT UPPER RADIATOR HOSE TO WATER OUTLET

29. INSTALL ENGINE COVER

Install the engine cover with the 4 nuts.

30. FILL WITH ENGINE COOLANT

31. START ENGINE AND CHECK FOR LEAKS

32. INSTALL ENGINE UNDER COVER

33. ROAD TEST

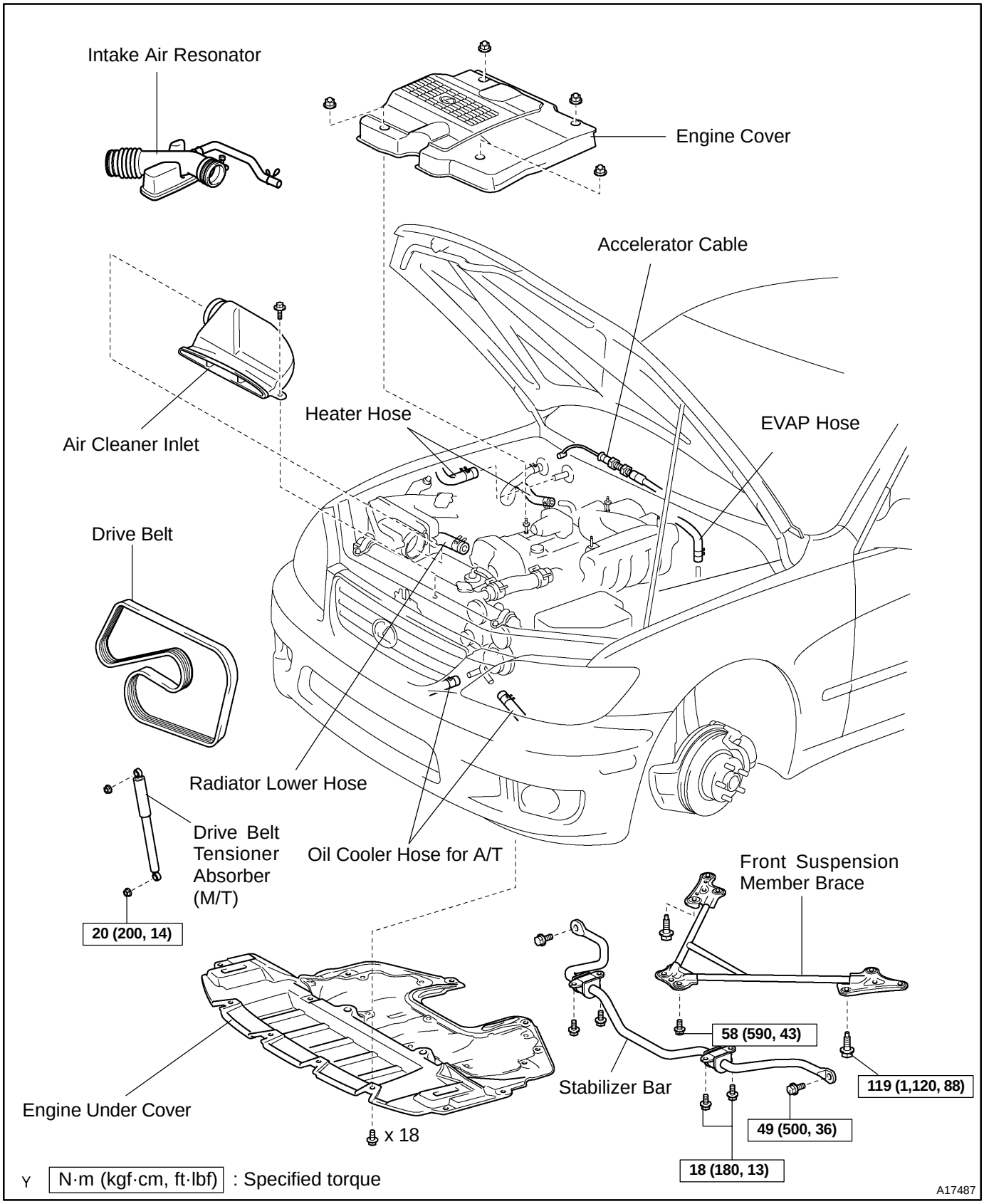
Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

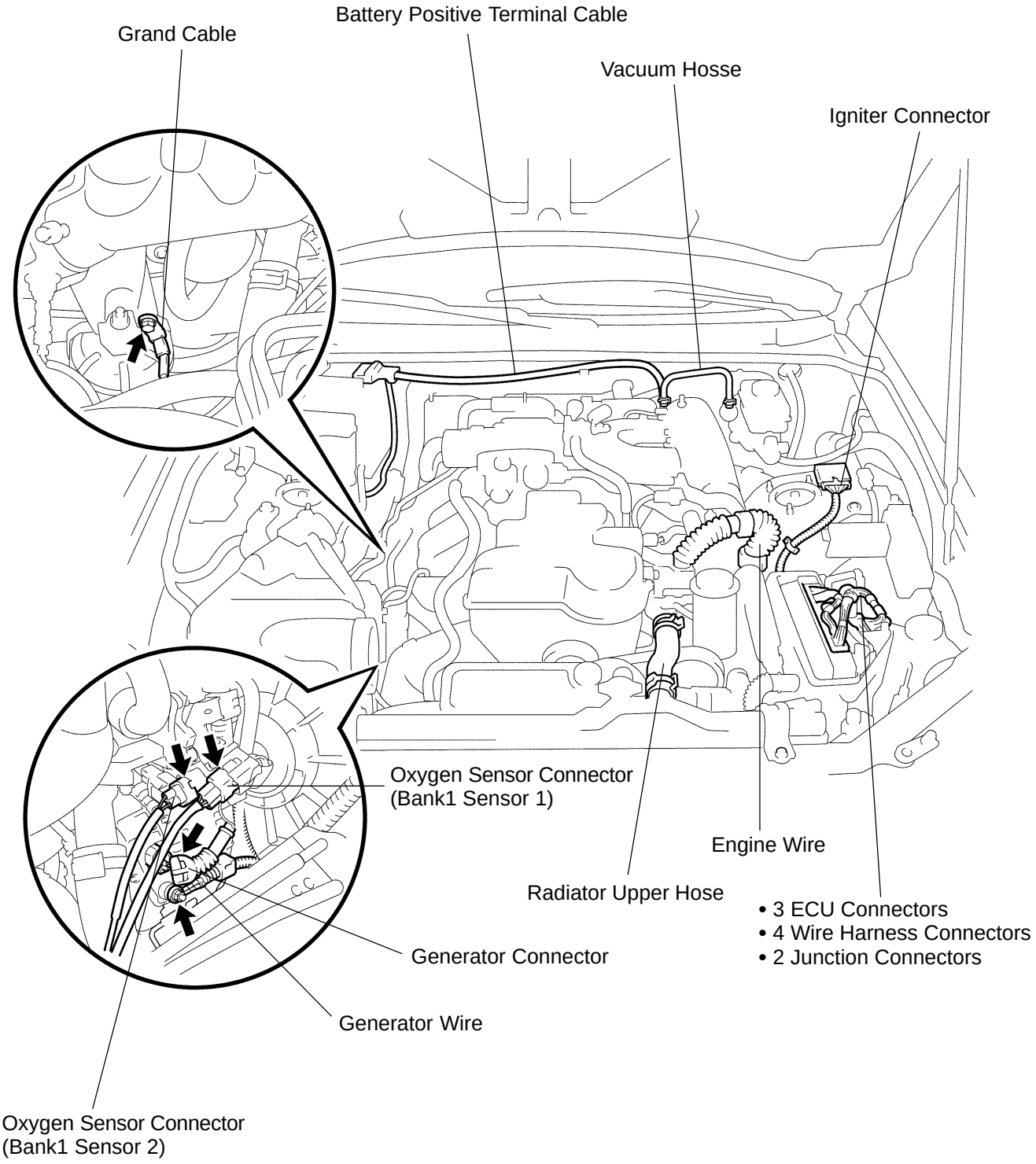
34. RECHECK ENGINE COOLANT LEVEL

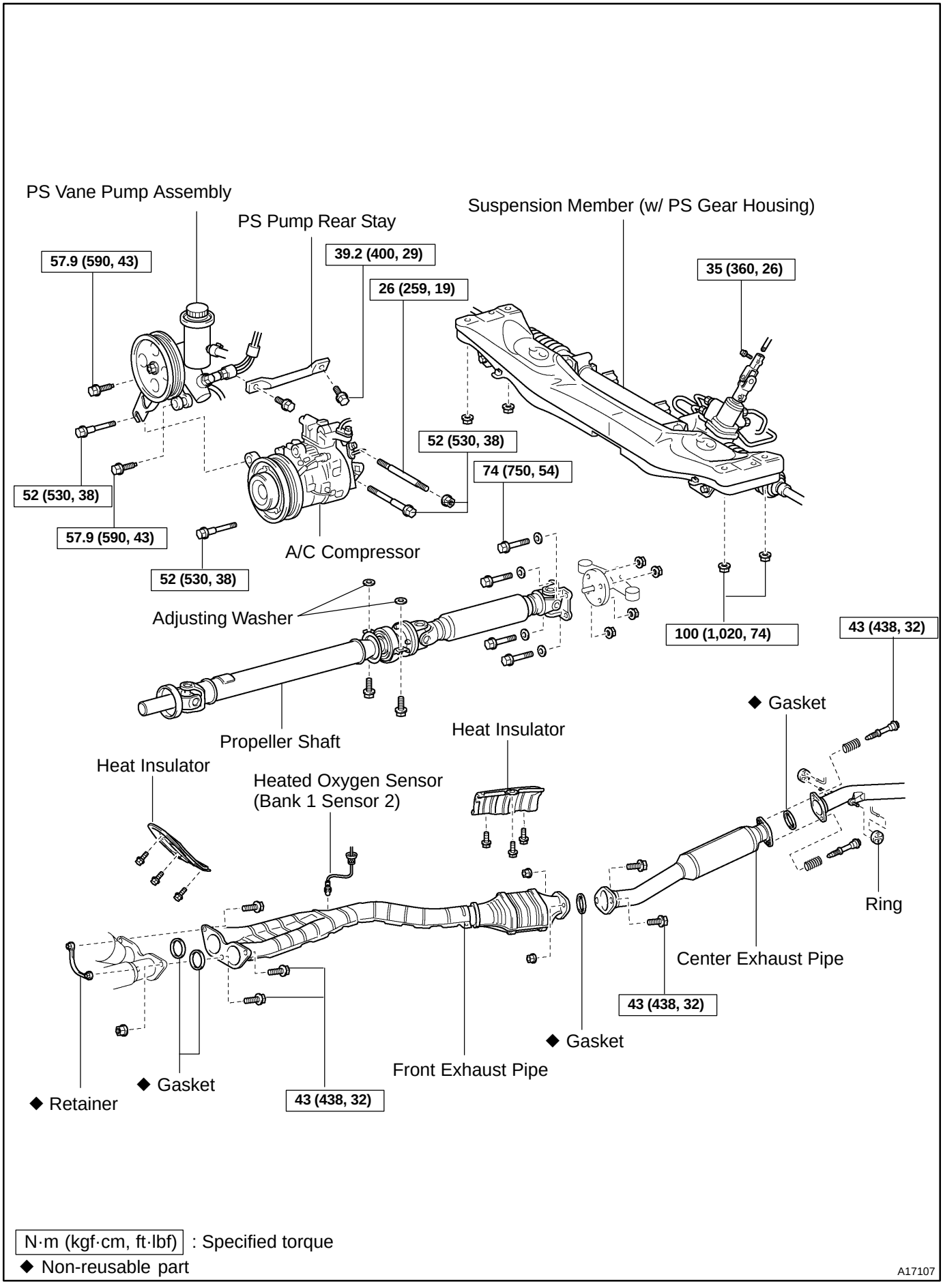
ENGINE UNIT

COMPONENTS

EM1SA-02



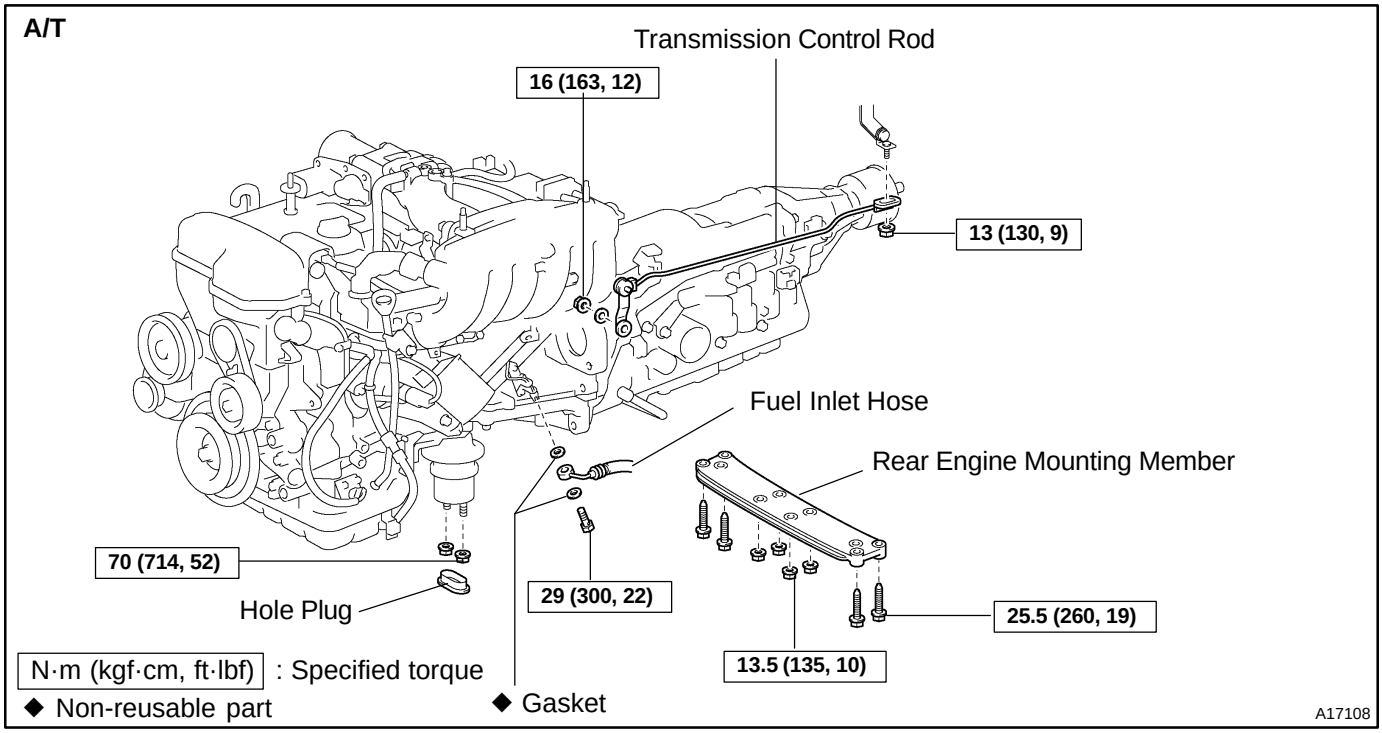

Grand Cable
Battery Positive Terminal Cable
Vacuum Hosse
Igniter Connector
Oxygen Sensor Connector
(Bank1 Sensor 1)
Engine Wire
Radiator Upper Hose
• 3 ECU Connectors
• 4 Wire Harness Connectors
• 2 Junction Connectors
Generator Connector
Generator Wire
Oxygen Sensor Connector
(Bank1 Sensor 2)
P
A17494

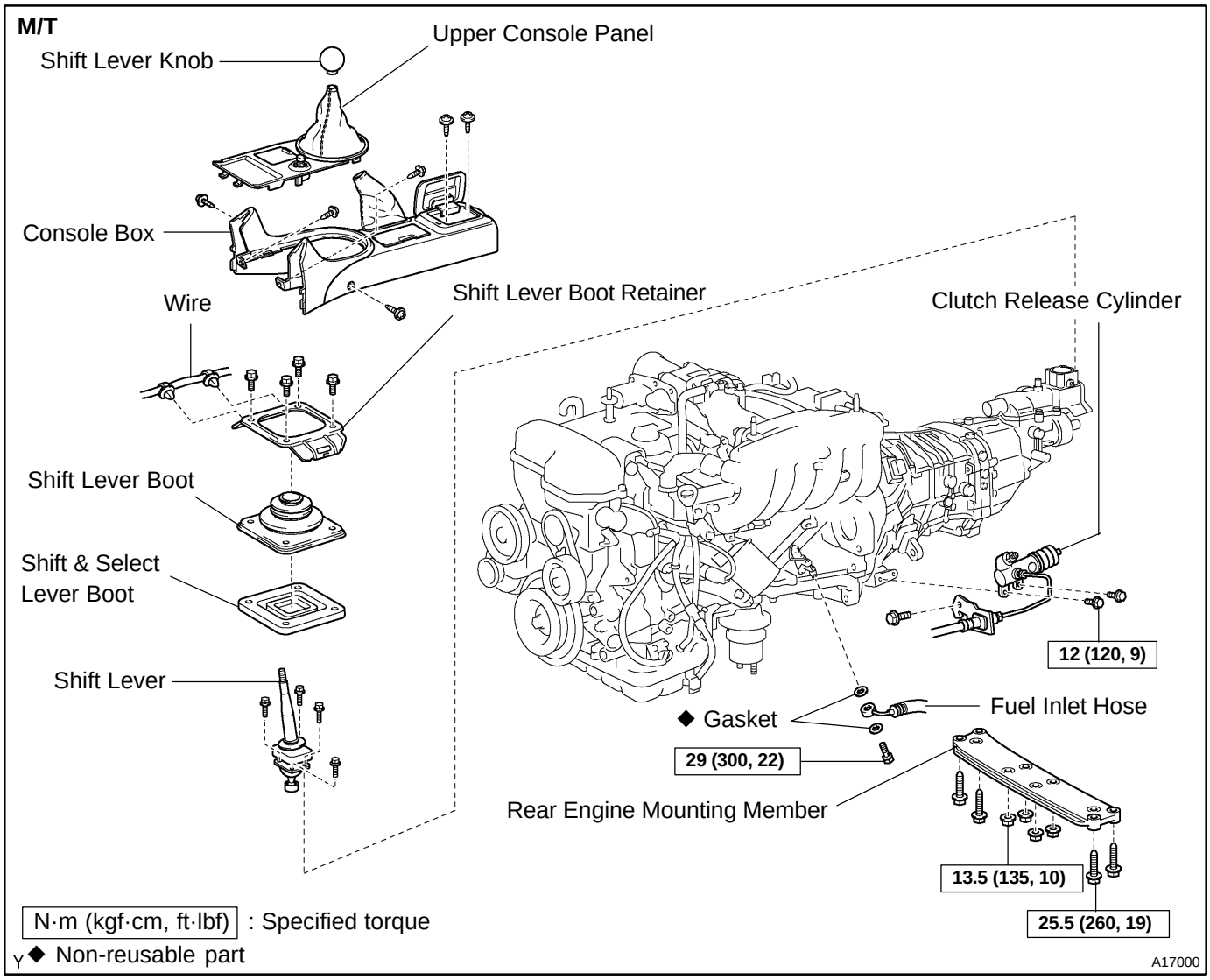


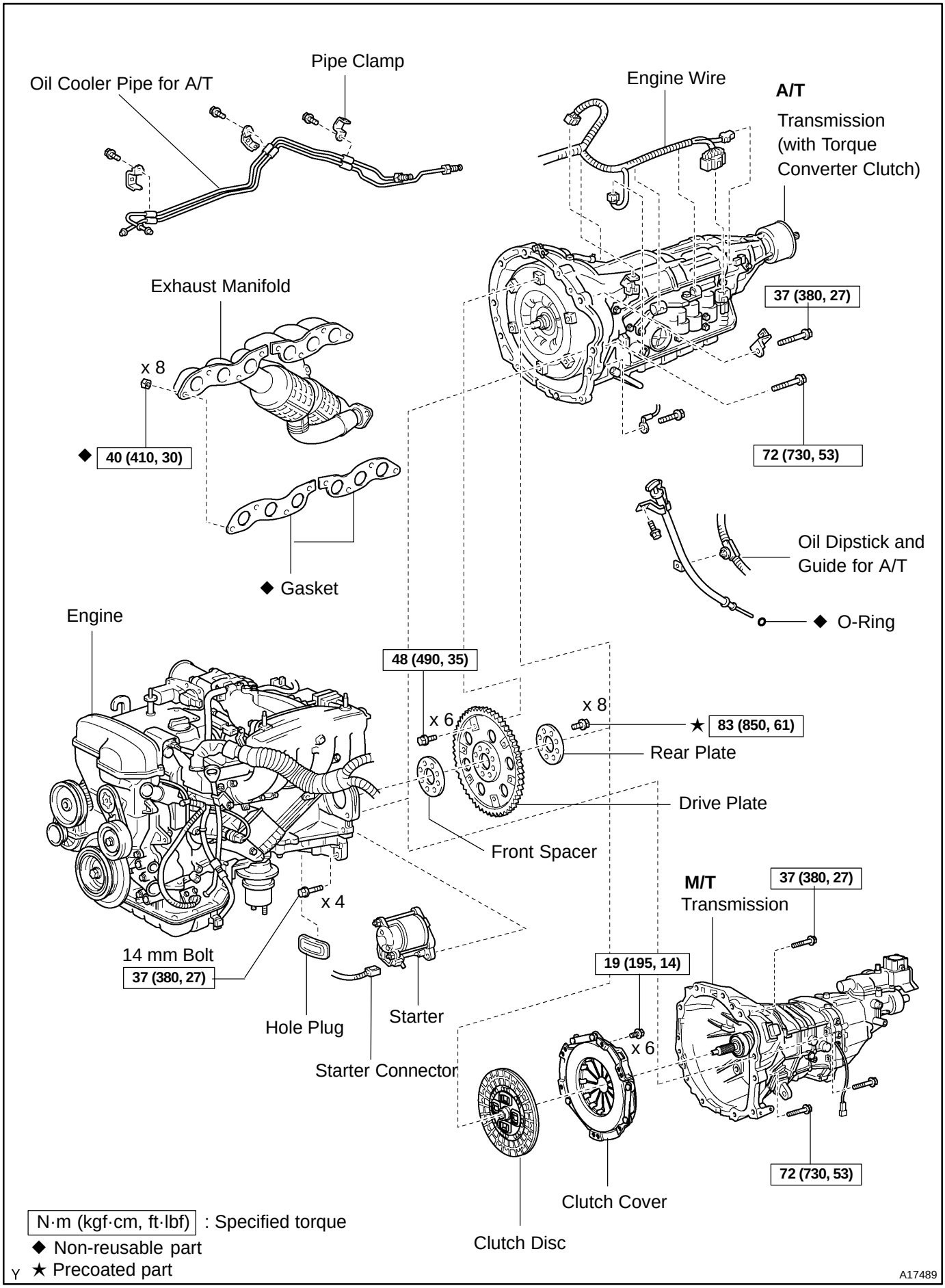
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

A17107


A/T
Transmission Control Rod
16 (163, 12)
13 (130, 9)
Fuel Inlet Hose
Rear Engine Mounting Member
70 (714, 52)
29 (300, 22)
25.5 (260, 19)
Hole Plug
13.5 (135, 10)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
◆ Gasket
A17108


M/T
Upper Console Panel
Shift Lever Knob
Console Box
Wire
Shift Lever Boot Retainer
Clutch Release Cylinder
Shift Lever Boot
Shift & Select Lever Boot
Shift Lever
12 (120, 9)
◆ Gasket
Fuel Inlet Hose
29 (300, 22)
Rear Engine Mounting Member
13.5 (135, 10)
25.5 (260, 19)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
A17000


Pipe Clamp
Oil Cooler Pipe for A/T
Engine Wire
A/T
Transmission
(with Torque
Converter Clutch)
Exhaust Manifold
x 8
37 (380, 27)
◆ 40 (410, 30)
72 (730, 53)
◆ Gasket
Oil Dipstick and
Guide for A/T
◆ O-Ring
Engine
48 (490, 35)
x 6
x 8
★ 83 (850, 61)
Rear Plate
Drive Plate
Front Spacer
M/T
Transmission
37 (380, 27)
x 4
14 mm Bolt
37 (380, 27)
19 (195, 14)
Hole Plug
Starter
Starter Connector
x 6
72 (730, 53)
Clutch Cover
Clutch Disc
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
A17489

EM1JB-03

REMOVAL

1. REMOVE ENGINE UNDER COVER

2. DRAIN ENGINE COOLANT

3. DRAIN ENGINE OIL

4. REMOVE ENGINE COVER

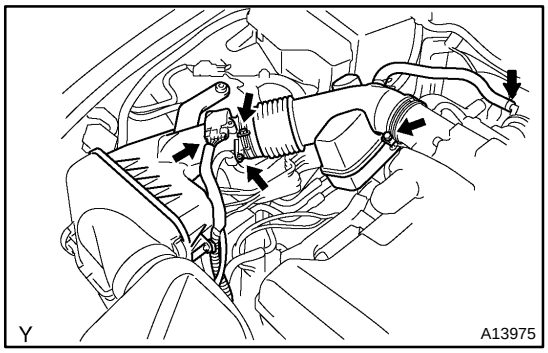
Remove the 4 nuts and engine cover.

5. REMOVE AIR CLEANER INLET

6. DISCONNECT BRAKE BOOSTER VACUUM HOSE

7. DISCONNECT RADIATOR UPPER AND LOWER HOSES FROM ENGINE

8. DISCONNECT ACCELERATOR CABLE FROM ENGINE



9. REMOVE INTAKE AIR RESONATOR

(a) Disconnect the MAF meter connector.

(b) Disconnect the engine wire clamp from the air cleaner case.

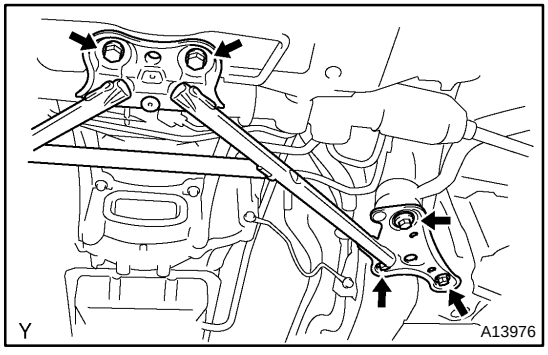
(c) Disconnect the PCV hose from the No. 2 cylinder head cover.

(d) Loosen the 2 hose clamp bolts, remove the intake air resonator from the throttle body.

10. M/T:
REMOVE DRIVE BELT TENSIONER ABSORBER

Remove the 2 nuts and absorber.

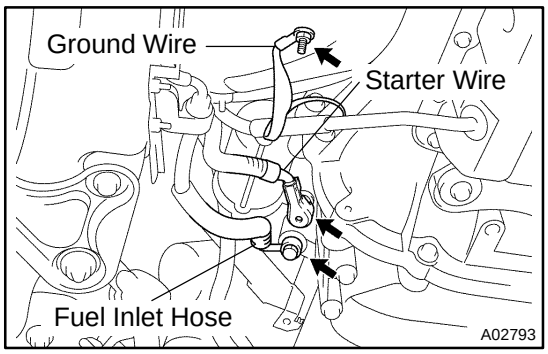
11. REMOVE DRIVE BELT (See page CH-1)



12. REMOVE FRONT SUSPENSION MEMBER BRACE

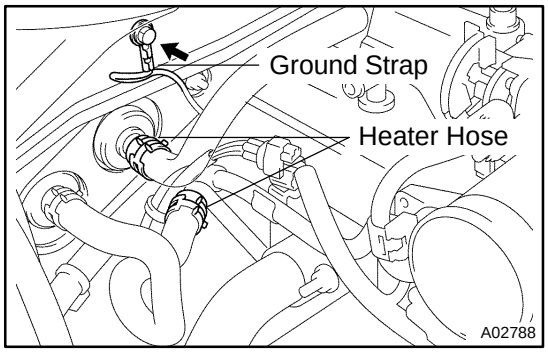
Remove the 8 bolts and brace.

13. M/T:
REMOVE TRANSMISSION SHIFT LEVER

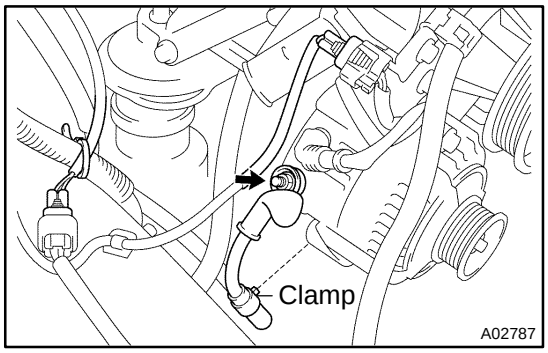


14. DISCONNECT WIRES, CABLE, STRAP, CONNECTORS, HOSES AND CLAMPS

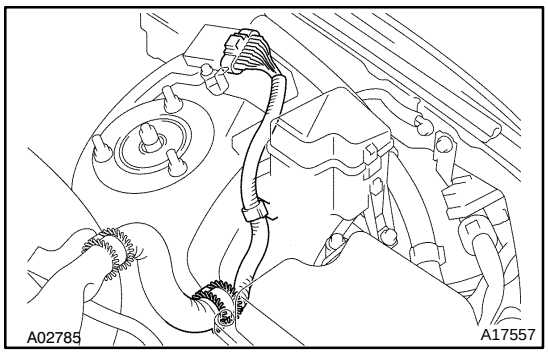
(a) Disconnect the ground wire from the floor.
(b) Disconnect the starter wire from the terminal and manifold stay.
(c) Disconnect the fuel inlet hose from the fuel pipe support.



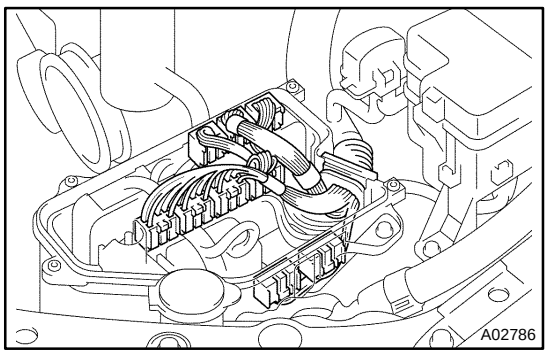
(d) Disconnect the ground strap from the dash panel.
(e) Disconnect the heater hose from the heater pipe.
(f) Disconnect the heater hose from the water bypass pipe.
(g) Disconnect the EVAP hose from the pipe (from charcoal canister).



(h) Disconnect the heater oxygen sensor (bank 1 sensor 1) connector.
(i) Disconnect the heater oxygen sensor (bank 1 sensor 2) connector.
(j) Disconnect the generator wire.
(k) Disconnect the engine wire clamp from the wire clip of generator.
(l) Disconnect the ground cable from the bracket on the cylinder block.

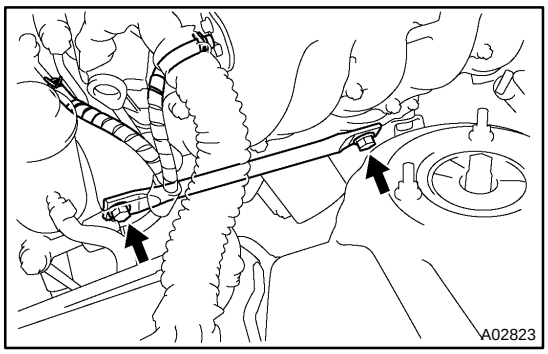


(m) Disconnect the igniter connector.
(n) Disconnect the 2 engine wire clamps from the clamp brackets.



15. DISCONNECT ENGINE WIRE FROM ECM BOX

(a) Remove the ECM hood and ECM cover.
(b) Disconnect the 3 ECM connectors.
(c) Disconnect the 4 wire harness connectors.
(d) Disconnect the 2 junction connectors.
(e) Disconnect the grommet and engine wire from the ECM box.

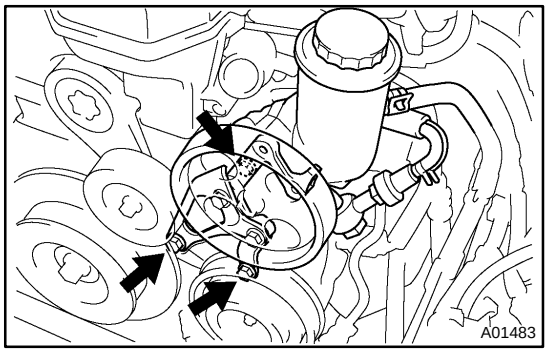


16. DISCONNECT PS PUMP AND A/C COMPRESSOR WITHOUT DISCONNECTING HOSES

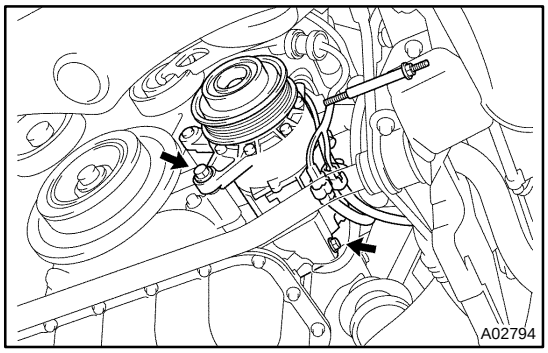
(a) Disconnect the PS air hose from the No. 4 timing belt cover.

(b) Disconnect the PS air hose from the air intake chamber

(c) Remove the 2 bolts and pump rear stay.



(d) Remove the 3 bolts and plate washer, and disconnect the vane pump assembly from the engine.



(e) Loosen the nut.

(f) Using a torx socket (E10), remove the stud bolt and nut.

(g) Disconnect the PPS solenoid valve connector.

(h) Disconnect the A/C compressor connector.

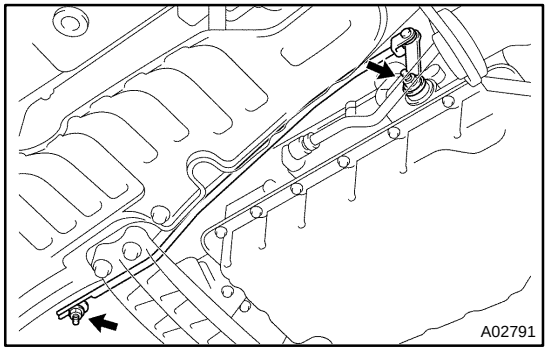
(i) Remove the 2 bolts, and disconnect the compressor from the engine.

HINT:

Put aside the vane pump and compressor, and suspend it securely.

17. M/T:
DISCONNECT CLUTCH RELEASE CYLINDER FROM TRANSMISSION

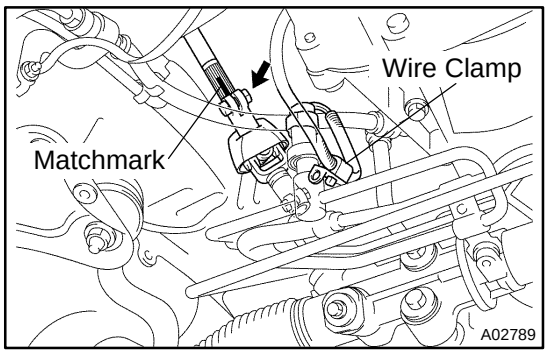
18. REMOVE PROPELLER SHAFT (See page PR-4)



19. A/T:
REMOVE TRANSMISSION CONTROL ROD

Remove the 2 nuts and control rod.

20. REMOVE FRONT AND CENTER EXHAUST PIPES

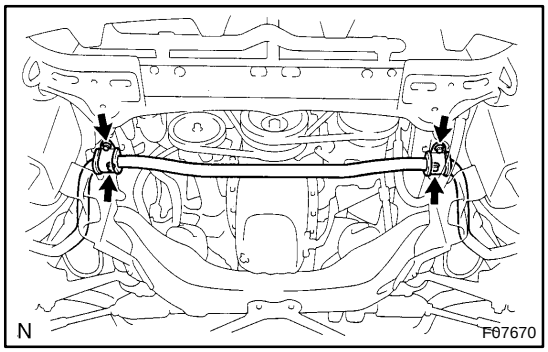


21. DISCONNECT SLIDING YOKE

(a) Check the steering wheel at the straight-ahead position, and place matchmarks on the sliding yoke and intermediate shaft.

(b) Remove the bolt, and disconnect the sliding yoke from the steering intermediate shaft.

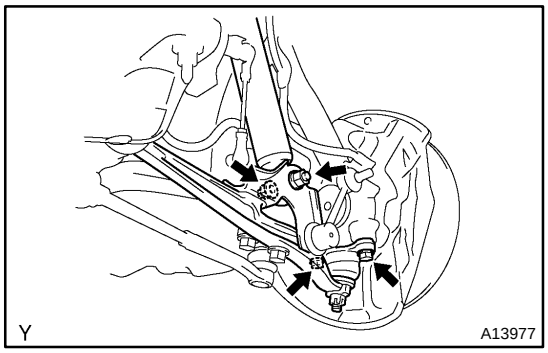
(c) Disconnect the PS pressure switch connector and wire clamp.



22. REMOVE STABILIZER BAR

(a) Remove the 2 nuts from the stabilizer bar links.

(b) Remove the 4 bolts, 2 stabilizer bar brackets and 2 bushings.



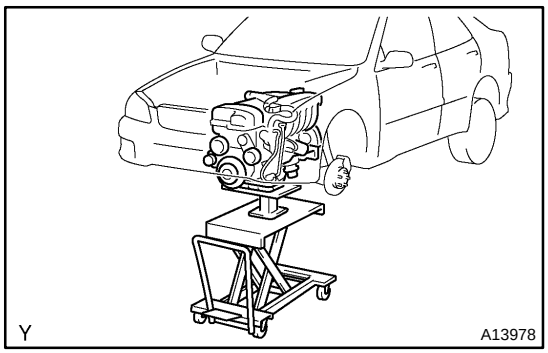
23. DISCONNECT SHOCK ABSORBER

Remove the bolt and nut, and disconnect the shock absorber from the shock absorber bracket.

24. DISCONNECT LOWER ARM

(a) Remove the nut, and disconnect the height level sensor from the lower arm.

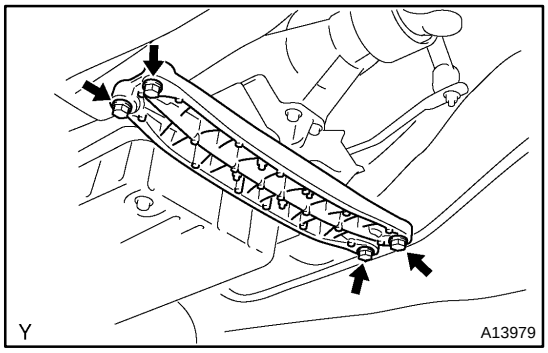
(b) Remove the 2 bolts, and disconnect the lower arm from the steering knuckle.



25. SET ENGINE JACK

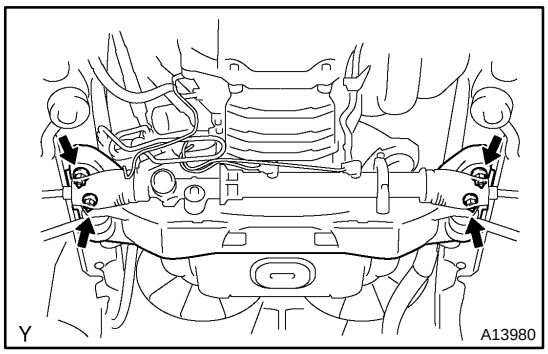
NOTICE:

Using chain, hold the engine tightly.



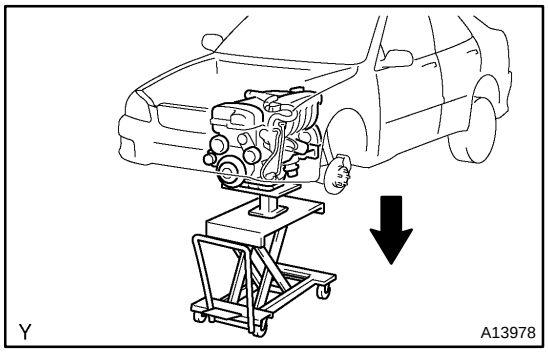
26. DISCONNECT REAR ENGINE MOUNTING MEMBER

Remove the 4 bolts and rear engine mounting member.



27. DISCONNECT SUSPENSION MEMBER

Remove the 4 bolts, and disconnect the suspension member from the body.



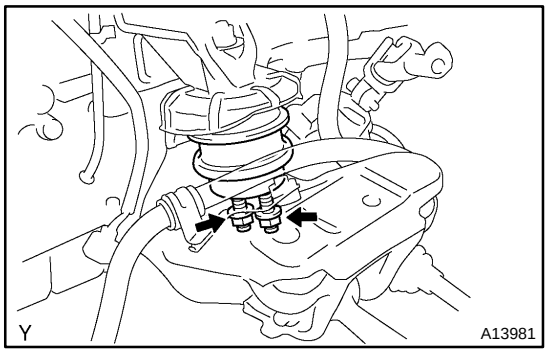
28. REMOVE ENGINE AND TRANSMISSION ASSEMBLY

(a) Remove the engine out of vehicle slowly and carefully.

NOTICE:

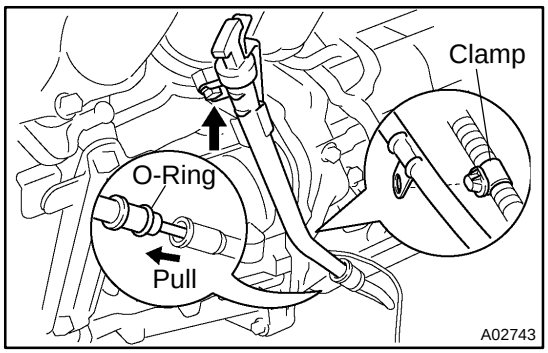
Make sure the engine is clear of all wiring, hoses and cables.

(b) Using a engine sliding device, and place the engine and transaxle assembly onto the stand.



29. REMOVE SUSPENSION MEMBER FROM ENGINE

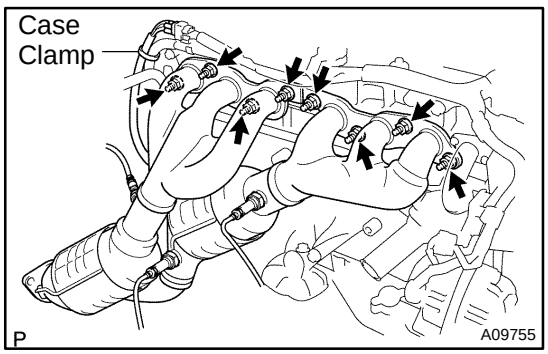
Remove the 4 nuts and suspension member with the steering gear housing from the engine.



30. A/T:

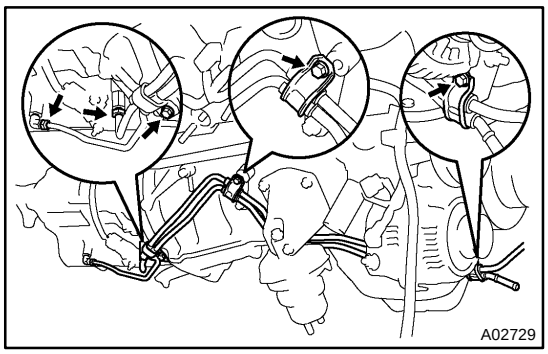
REMOVE OIL DIPSTICK AND GUIDE

(a) Disconnect the engine wire clamp from the dipstick guide.
(b) Remove the bolt.
(c) Pull out the dipstick guide and dipstick from the dipstick tube.
(d) Remove the O-ring from the dipstick guide.



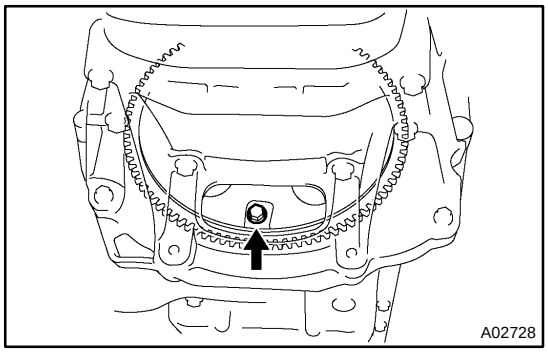
31. REMOVE EXHAUST MANIFOLD

(a) Remove the case clamp.
(b) Disconnect the heated oxygen sensor (bank 2 sensor 1) connector.
(c) Remove the 8 nuts, exhaust manifold and 2 gaskets.



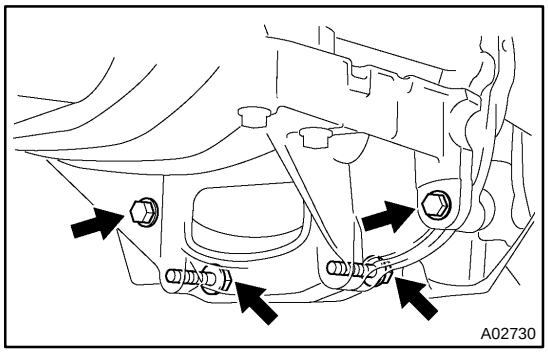
32. A/T:
REMOVE OIL COOLER PIPES

(a) Remove the 3 bolts and pipe clamps.
(b) Loosen the 2 union nuts, and remove the 2 oil cooler pipes.



33. A/T:
REMOVE TORQUE CONVERTER CLUTCH BOLTS

(a) Remove the hole plug.
(b) Turn the crankshaft pulley bolt to gain access to each bolt.
(c) Hold the crankshaft pulley bolt with a wrench, and remove the 6 bolts.



34. REMOVE 4 BOLTS HOLDING NO. 1 OIL PAN TO TRANSMISSION

35. REMOVE STARTER

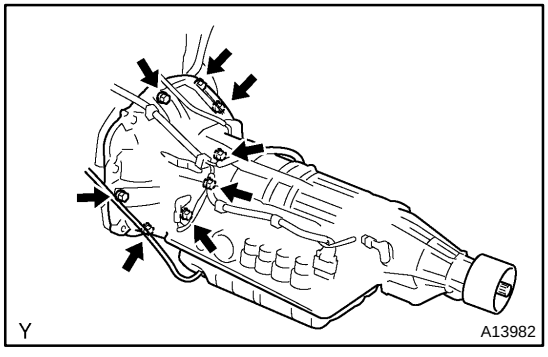
(a) Disconnect the starter connector.
(b) Remove the 2 bolts, clamp bracket and starter.

36. DISCONNECT ENGINE WIRE FROM TRANSMISSION

(a) Disconnect the VSS connector.
(b) Disconnect the PNP switch connector.
(c) Disconnect the solenoid connector.
(d) Disconnect the direct clutch speed sensor connector.
(e) Disconnect the engine wire from the 3 wire clamps.

37. M/T:
DISCONNECT ENGINE WIRE FROM TRANSMISSION

(a) Disconnect the VSS connector.
(b) Disconnect the back-up light switch connector.



38. REMOVE TRANSMISSION FROM ENGINE

(a) Remove the 5 bolts and ground wire.
(b) Remove the transmission together with the torque converter clutch from the engine.

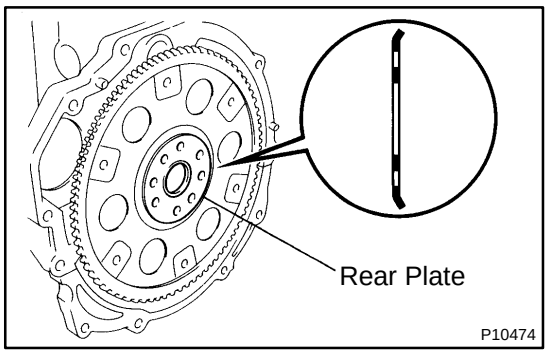
39. A/T:
REMOVE DRIVE PLATE

Remove the 8 bolts, rear plate, drive plate and front spacer.

40. M/T:
REMOVE CLUTCH COVER AND DISC

EM1JC-03

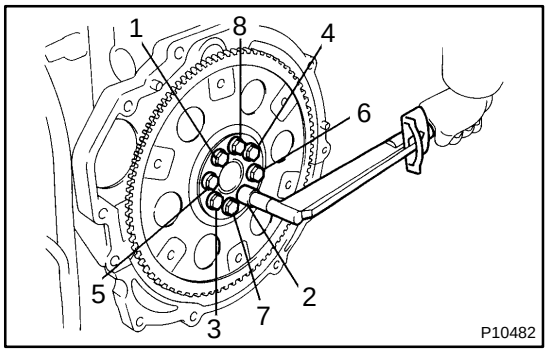
INSTALLATION



1. A/T:

INSTALL DRIVE PLATE

(a) Install the front spacer, drive plate and rear plate on the crankshaft.



(b) Apply adhesive to 2 or 3 threads of the mounting bolt end.

Adhesive:

Part No. 08833-00070, THREE BOND 1324 or equivalent

(c) Install the uniformly tighten the 8 mounting bolts in several passes, in the sequence shown.

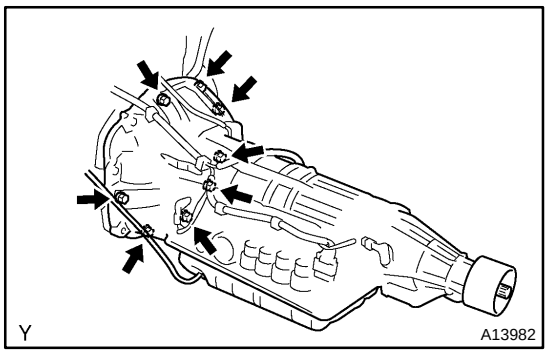
Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)

2. M/T:

INSTALL CLUTCH DISC AND COVER (See page CL-18)

3. A/T:

INSTALL TORQUE CONVERTER CLUTCH INSTALLATION (See page AT-35)



4. INSTALL TRANSMISSION TO ENGINE

(a) Attach the transmission to the engine.

(b) Install the ground wire and 5 bolts.

Torque: 72 N·m (730 kgf·cm, 53 ft·lbf)

5. A/T:

CONNECT ENGINE WIRE TO TRANSMISSION

(a) Connect the VSS connector.

(b) Connect the PNP switch connector.

(c) Connect the solenoid connector.

(d) Connect the direct clutch speed sensor connector.

(e) Connect the engine wire to the 3 wire clamps.

6. M/T:

CONNECT ENGINE WIRE TO TRANSMISSION

(a) Connect the VSS connector.

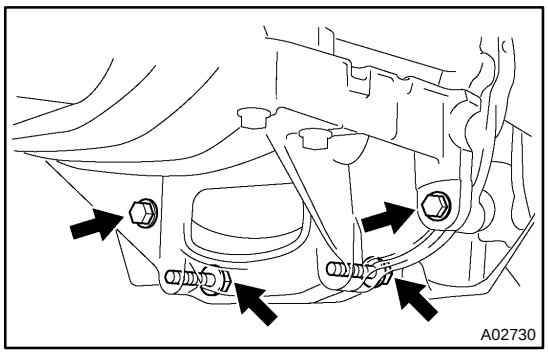
(b) Connect the back-up light switch connector.

7. INSTALL STARTER

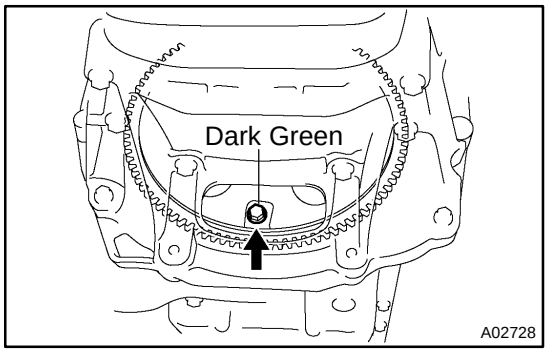
(a) Install the starter and clamp bracket with the 2 bolts.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

(b) Connect the starter connector.

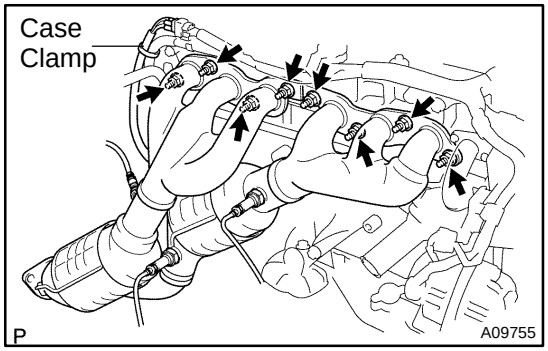


8. INSTALL 4 BOLTS HOLDING NO. 1 OIL PAN TO TRANSMISSION
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

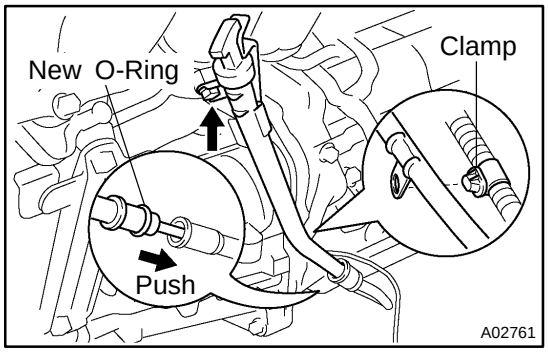


9. A/T:
INSTALL TORQUE CONVERTER CLUTCH BOLTS
(a) Apply adhesive to 2 or 3 threads of the bolt end.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent
(b) Hold the crankshaft pulley bolt with a wrench, and install the 6 bolts evenly.
Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)
HINT:
First install the dark green colored bolt, install the other bolts.
(c) Install the hole plug.

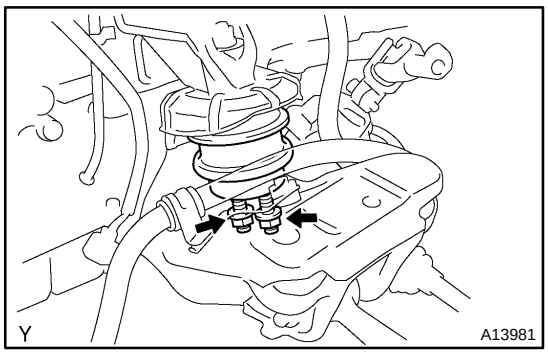
10. A/T:
INSTALL OIL COOLER PIPE



11. INSTALL EXHAUST MANIFOLD
(a) Install 2 new gaskets to the cylinder head.
(b) Using a 14 mm deep socket wrench, install the exhaust manifold with the 8 nuts. Uniformly tighten the nuts in several passes.
Torque: 40 N·m (408 kgf·cm, 30 ft·lbf)
(c) Connect the heated oxygen sensor (bank 2 sensor 1) connector.
(d) Install the case clamp.



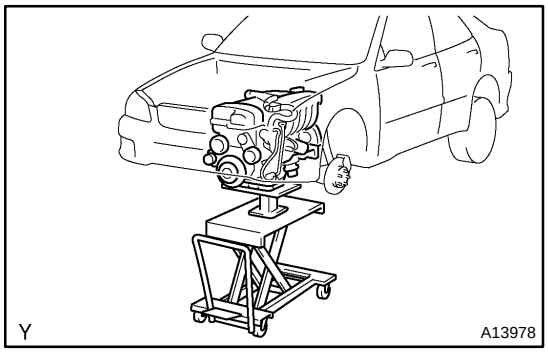
12. A/T:
INSTALL OIL DIPSTICK GUIDE AND DIPSTICK
(a) Install a new O-ring to the dipstick guide.
(b) Push in the dipstick guide end to the dipstick tube of the oil pan.
(c) Install the dipstick guide with the bolt.
(d) Connect the engine wire clamp to the dipstick guide.
(e) Install the dipstick.



13. INSTALL SUSPENSION MEMBER TO ENGINE

Install the suspension member and to the engine with the 4 nuts.

Torque: 70 N·m (714 kgf·cm, 52 ft·lbf)



14. SET ENGINE JACK

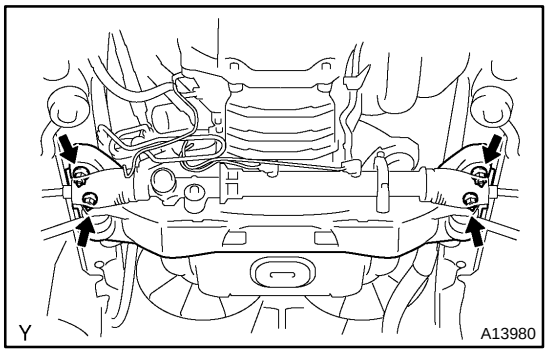
NOTICE:

Using a chain, hold the engine tightly.

15. INSTALL ENGINE AND TRANSMISSION ASSEMBLY IN VEHICLE

(a) Raise the engine into the engine compartment.

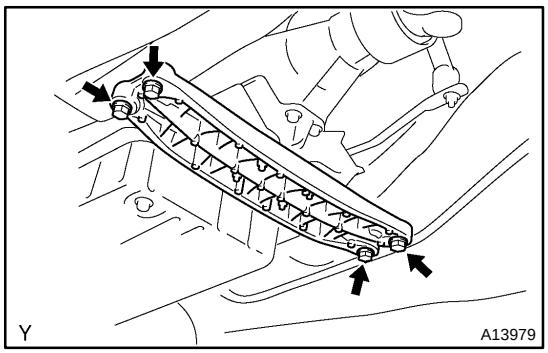
(b) Keep the engine level, and align RH and LH mountings with the insulator.



16. CONNECT SUSPENSION MEMBER

Connect the suspension member with the 4 bolts to the body.

Torque: 70 N·m (714 kgf·cm, 52 ft·lbf)



17. CONNECT REAR ENGINE MOUNTING MEMBER

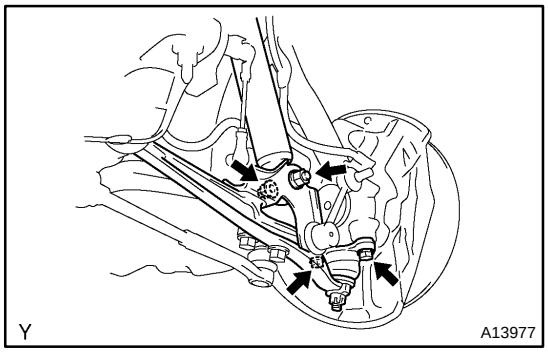
Install the rear engine mounting member with the 4 bolts.

Torque:

25.5 N·m (260 kgf·cm, 19 ft·lbf) for bolt

13.5 N·m (135 kgf·cm 10 ft·lbf) for nut

18. REMOVE ENGINE JACK



19. CONNECT LOWER ARM

(a) Connect the lower arm with the 2 bolts to the steering knuckle.

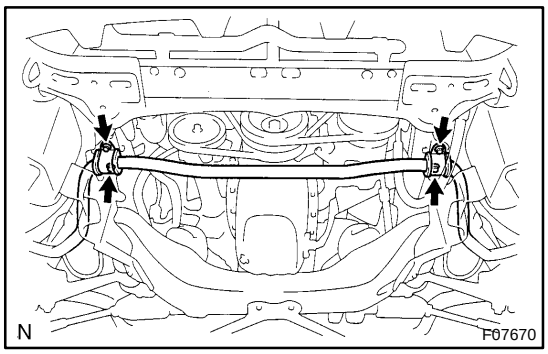
Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)

(b) Connect the height level sensor to the lower arm.

20. CONNECT SHOCK ABSORBER

Connect the shock absorber with the bolt and nut.

Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

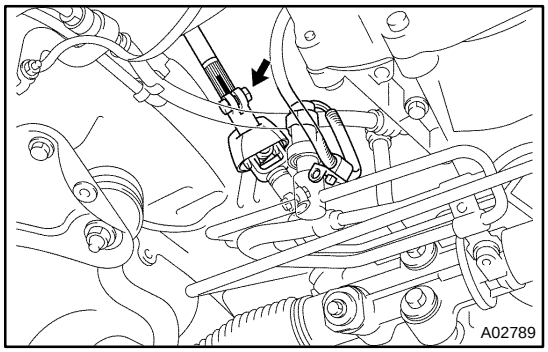


21. INSTALL STABILIZER BAR

(a) Install the 2 bushings and 2 stabilizer bar brackets to the stabilizer bar.

(b) Install the stabilizer bar with the 4 bolts and 2 nuts.

Torque:
18 N·m (180 kgf·cm, 13 ft·lbf) for bolt
49 N·m (500 kgf·cm, 36 ft·lbf) for nut



22. CONNECT SLIDING YOKE

(a) Align the matchmarks and connect the sliding yoke to the steering intermediate shaft.

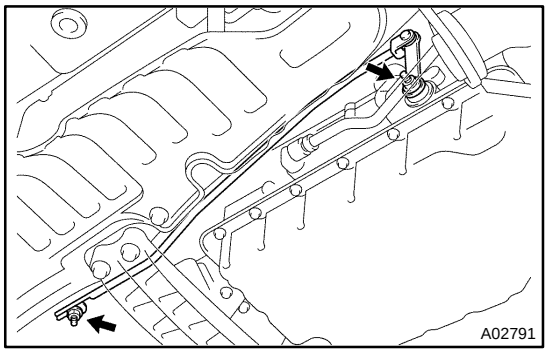
(b) Install the bolt holding the sliding yoke to the steering intermediate shaft.

Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)

(c) Connect the PS pressure switch and wire clamp.

23. INSTALL FRONT AND CENTER EXHAUST PIPE

Torque: 43 N·m (438 kgf·cm, 32 ft·lbf)

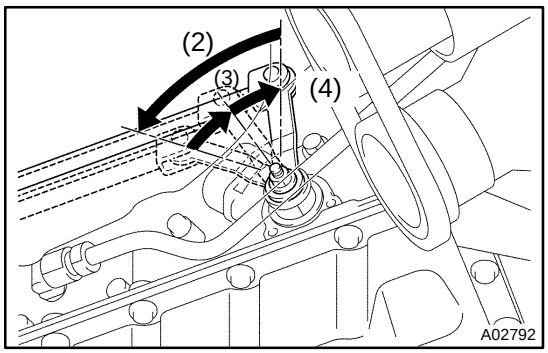


24. A/T:

INSTALL TRANSMISSION CONTROL ROD

Install the control rod with the 2 nuts.

Torque: 16 N·m (163 kgf·cm, 12 ft·lbf)



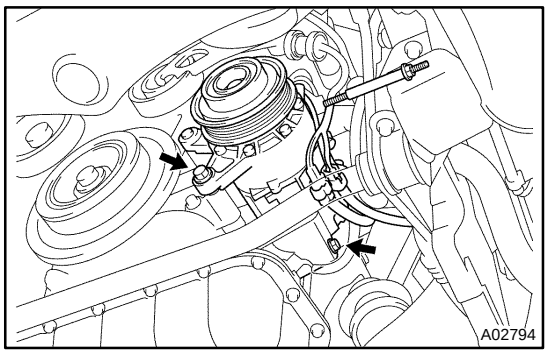
If the indicator is not aligned with the correct position, carry out the following adjustment procedures.

(1) Loosen the nut on the shift lever.
(2) Push the control shaft lever fully rearward.
(3) Return the control shaft lever 2 notches to the N position.
(4) Set the shift lever to the N position.
(5) While holding the shift lever lightly toward the R position side, tighten the nut.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

25. M/T:

INSTALL CLUTCH RELEASE CYLINDER TO TRANSMISSION



26. INSTALL A/C COMPRESSOR AND PS PUMP

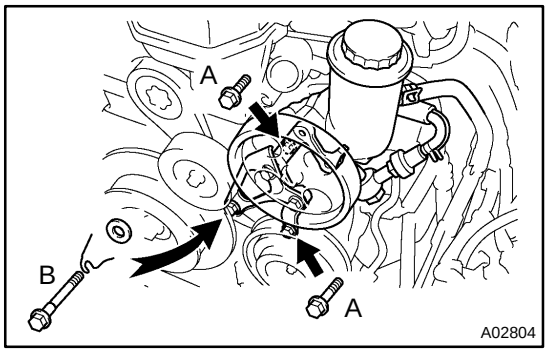
(a) Temporarily install the compressor with the 2 bolts.

(b) Using a torx socket (E10), install the stud bolt.
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

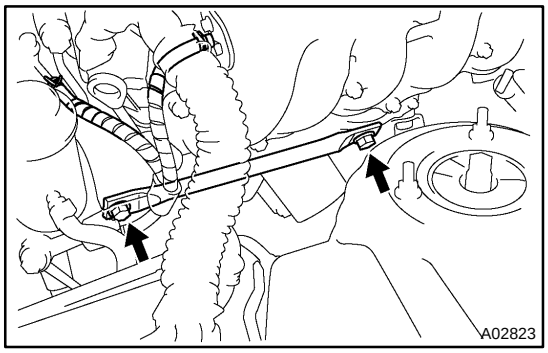
(c) Tighten the nut and 2 bolts.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

(d) Connect the compressor connector.

(e) Connect the PPS solenoid valve connector.



(f) Install the vane pump assembly with the 3 bolts and plate washer.
Torque:
58 N·m (590 kgf·cm, 43 ft·lbf) for bolt A
52 N·m (530 kgf·cm, 38 ft·lbf) for bolt B



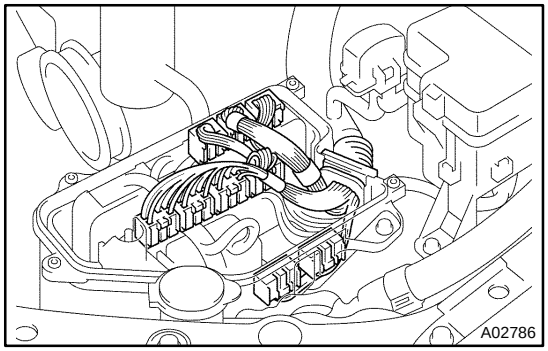
(g) Install the pump rear stay with the 2 bolts.
Torque: 39.2 N·m (400 kgf·cm, 29 ft·lbf)

(h) Connect the PS air hose to the No. 4 timing belt cover.

(i) Connect the PS air hose to the air intake chamber.

27. M/T:
INSTALL TRANSMISSION SHIFT LEVER

(a) Install the shift lever with the 4 bolts.
Torque: 8 N·m (82 kgf·cm, 71 in.·lbf)



28. CONNECT ENGINE WIRE TO ECM BOX

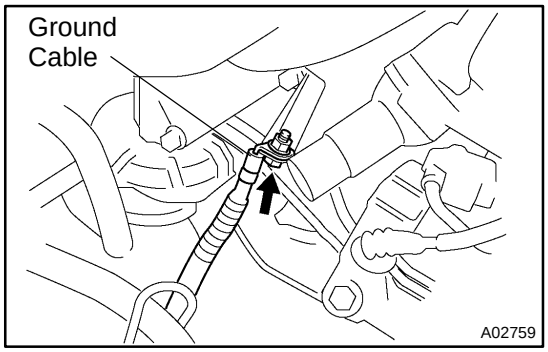
(a) Install the engine wire grommet to the ECM box.

(b) Connect the 3 ECM connectors.

(c) Connect the 4 wire harness connectors.

(d) Connect the 2 junction connectors.

(e) Install the ECM cover and hood.



29. CONNECT CLAMPS, WIRES, CONNECTORS, HOSES, CABLE AND STRAP

(a) Connect the 2 engine wire clamps to the clamp brackets.

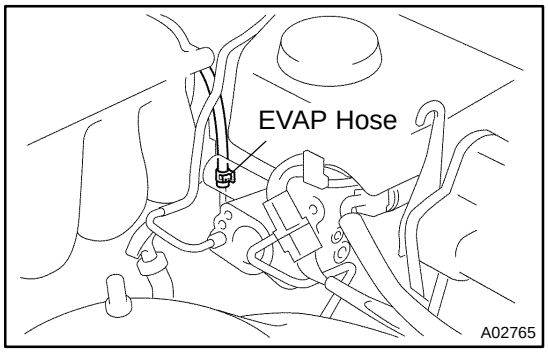
(b) Connect the igniter connector.

(c) Connect the ground cable to the bracket on the cylinder block.

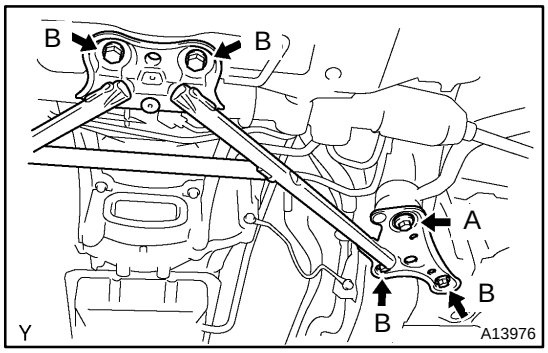
(d) Connect the engine wire clamp to the wire clip of the generator.

(e) Connect the generator wire.

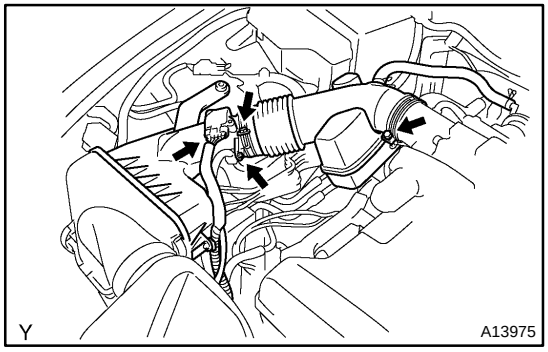
(f) Connect the heated oxygen sensor (bank 1 sensor 1) connector.
(g) Connect the heated oxygen sensor (bank 1 sensor 2) connector.



(h) Connect the EVAP hose to the pipe (from charcoal canister).
(i) Connect the heater hose to the heater pipe.
(j) Connect the heater hose to the water bypass pipe.
(k) Connect the ground strap to the dash panel.
(l) Connect the fuel inlet hose to the fuel pipe support.
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)
(m) Connect the starter wire to the terminal and manifold stay.
(n) Connect the ground wire to the floor.



30. INSTALL FRONT SUSPENSION MEMBER BRACE
Install the brace with the 8 bolts.
Torque:
Bolt A: 119 N·m (1,210 kgf·cm, 88 ft·lbf)
Bolt B: 58 N·m (590 kgf·cm, 43 ft·lbf)
31. INSTALL DRIVE BELT (See page CH-1)
32. M/T:
INSTALL DRIVE BELT TENSIONER ABSORBER
Install the absorber with the 2 nuts.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)
33. CONNECT ACCELERATOR CABLE TO ENGINE



34. INSTALL INTAKE AIR RESONATOR
(a) Connect the intake air resonator to the throttle body.
(b) Tighten the hose clamp bolt holding the intake air resonator to the throttle body.
(c) Connect the MAF meter connector.
(d) Connect the engine wire clamp to the air cleaner case.
(e) Connect the PCV hose to the No.2 cylinder head cover.
35. CONNECT RADIATOR UPPER AND LOWER HOSES
36. CONNECT BRAKE BOOSTER VACUUM HOSE
37. INSTALL AIR CLEANER INLET

38. INSTALL ENGINE COVER

Install the engine cover with the 4 nuts.

39. FILL WITH ENGINE COOLANT

40. FILL WITH ENGINE OIL

41. START ENGINE AND CHECK FOR LEAKS

42. INSTALL ENGINE UNDER COVER

NOTICE:

Be careful not to damage the body or glass with the hood end.

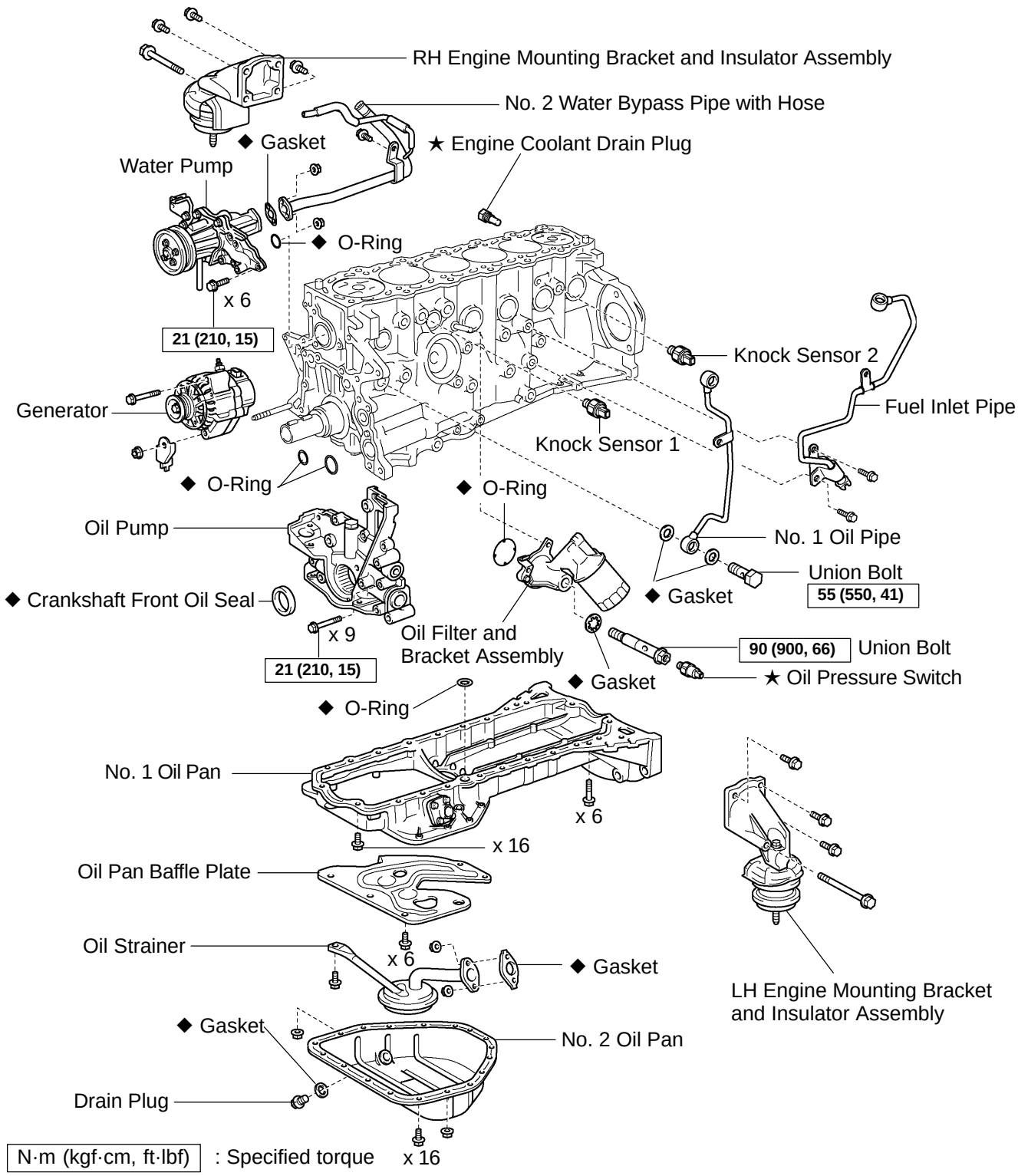
43. PERFORM ROAD TEST

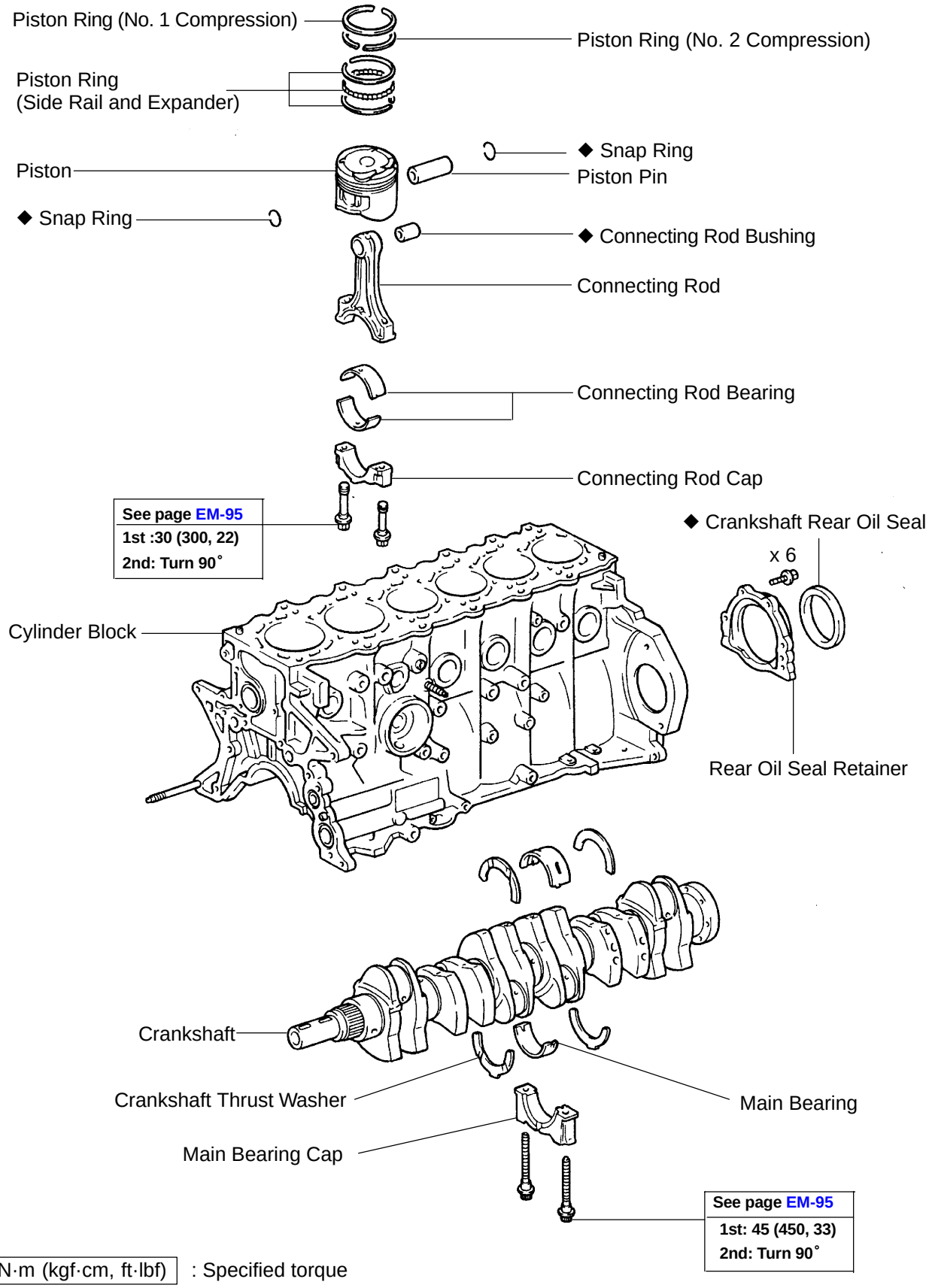
Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

44. RECHECK ENGINE COOLANT AND OIL LEVELS

CYLINDER BLOCK COMPONENTS

EM0DJ-06





N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

A02806

EM0DK-06

DISASSEMBLY

1. INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY

2. REMOVE GENERATOR

Remove the bolt, nut, pipe bracket and generator.

3. REMOVE TIMING BELT AND PULLEYS (See page EM-17)

4. REMOVE NO. 2 WATER BYPASS PIPE WITH HOSE

Remove the bolt, 2 nuts, water bypass pipe and gasket.

5. REMOVE WATER PUMP

Remove the 6 bolts, water pump and O-ring.

6. REMOVE CYLINDER HEAD (See page EM-34)

7. REMOVE OIL PRESSURE SWITCH (See page LU-1) AND KNOCK SENSORS (See page SF-69)

8. REMOVE OIL FILTER AND BRACKET ASSEMBLY

(a) Remove the union bolt and oil filter bracket.

(b) Remove the gasket from the union bolt.

(c) Remove the O-ring from the oil filter bracket.

9. REMOVE NO. 1 OIL PIPE

Remove the union bolt, oil pipe and 2 gaskets.

10. REMOVE FUEL INLET PIPE

Remove the 2 bolts and fuel inlet pipe.

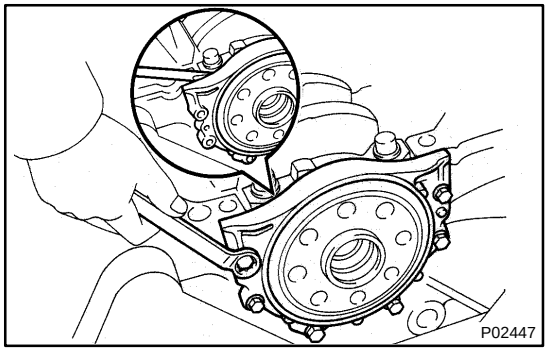
11. REMOVE LH ENGINE MOUNTING BRACKET AND INSULATOR ASSEMBLY

Remove the 4 bolts and mounting bracket.

12. REMOVE RH ENGINE MOUNTING BRACKET AND INSULATOR ASSEMBLY

Remove the 4 bolts and mounting bracket.

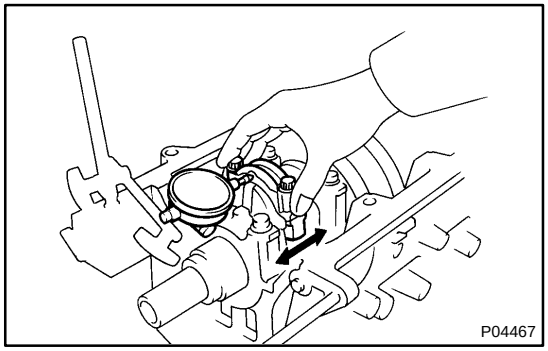
13. REMOVE OIL PUMP (See page LU-6)



14. REMOVE REAR OIL SEAL RETAINER

(a) Remove the 6 bolts of the retainer.

(b) Remove the oil seal retainer by prying the area between the oil seal retainer and main bearing cap with a screwdriver.



15. CHECK CONNECTING ROD THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while moving the connecting rods back and forth.

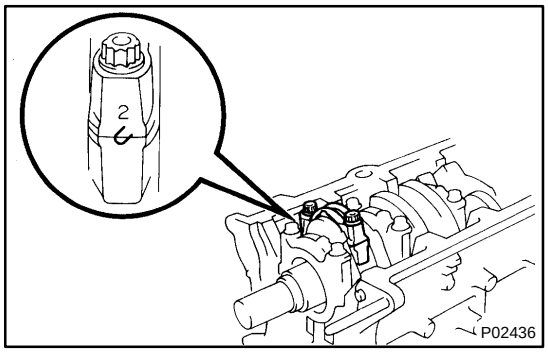
Standard thrust clearance:

0.250 - 0.402 mm (0.0098 - 0.0158 in.)

Maximum thrust clearance: 0.50 mm (0.0197 in.)

If the thrust clearance is greater than maximum, replace the connecting rod assembly(s). If necessary, replace the crankshaft.

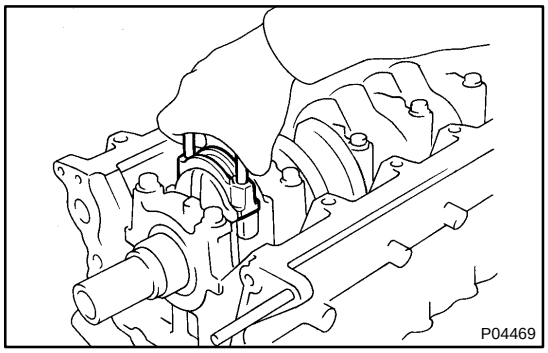
Connecting rod thickness:
25.898 - 25.950 mm (1.0196 - 1.0217 in.)



16. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

(a) Check the matchmarks on the connecting rod and cap to ensure correct reassembly.

(b) Remove the connecting rod cap bolts.

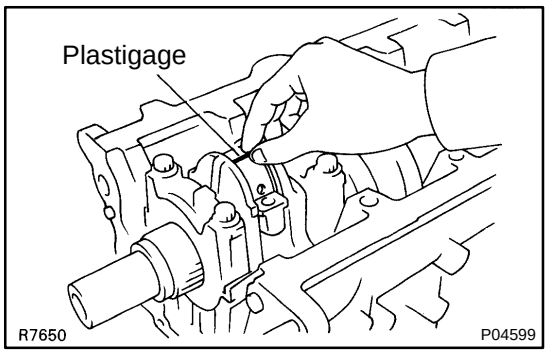


(c) Using the 2 removed connecting rod bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.

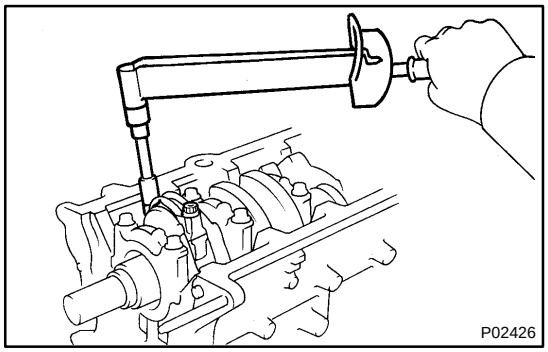
HINT:
Keep the lower bearing inserted with the connecting rod cap.

(d) Clean the crank pin and bearings.

(e) Check the crank pin and bearing for pitting and scratches.
If the crank pin or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.



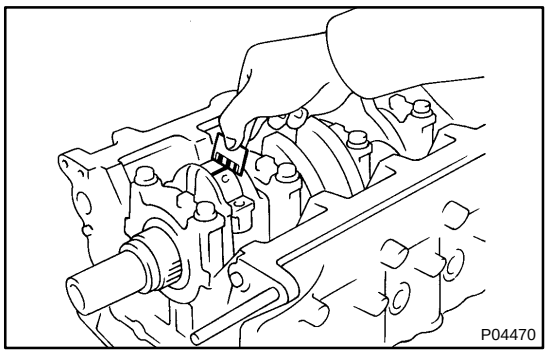
(f) Lay a strip of Plastigage across the crank pin.

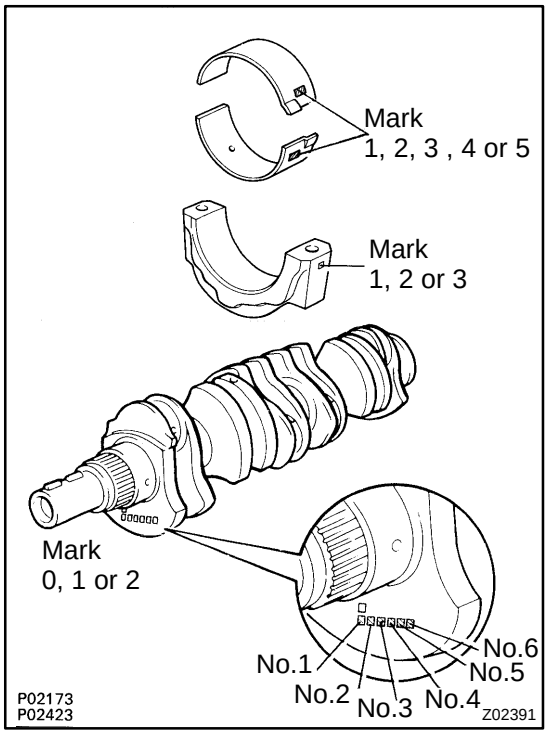


(g) Install the connecting rod cap with the 2 bolts (See page EM-95).

NOTICE:
Do not turn the crankshaft.

(h) Remove the 2 bolts, connecting rod cap and lower bearing (See procedure (b) and (c) above).





(i) Measure the Plastigage at its widest point.

Standard oil clearance:

STD	0.023 - 0.041 mm (0.0009 - 0.0016 in.)
U/S 0.25	0.028 - 0.066 mm (0.0011 - 0.0026 in.)

Maximum oil clearance:

STD	0.07 mm (0.0027 in.)
U/S 0.25	0.08 mm (0.0031 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.

HINT:

If using a standard bearing, replace with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the connecting rod cap and crankshaft, then selecting the bearing with the same number as the total. There are 5 sizes of standard bearings, marked ”1”, ”2”, ”3”, ”4” and ”5” accordingly.

	Number mark								
Connecting rod cap	1			2			3		
Crankshaft	0	1	2	0	1	2	0	1	2
Use bearing	1	2	3	2	3	4	3	4	5

EXAMPLE:
Connecting rod cap ”3” + Crankshaft ”1”
= Total number 4 (Use bearing ”4”)

Reference

Connecting rod big end inside diameter:

Mark ”1”	55.025 - 55.031 mm (2.1663 - 2.1666 in.)
Mark ”2”	55.031 - 55.037 mm (2.1666 - 2.1668 in.)
Mark ”3”	55.037 - 55.043 mm (2.1668 - 2.1670 in.)

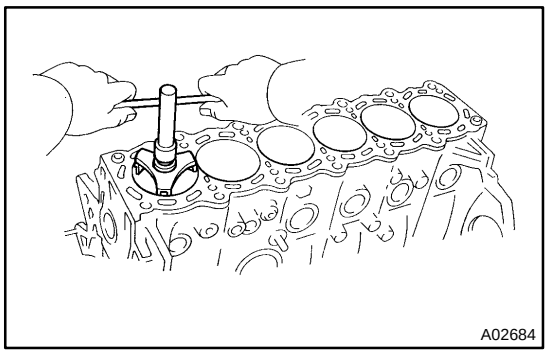
Crankshaft crank pin diameter:

Mark ”0”	51.994 - 52.000 mm (2.0470 - 2.0472 in.)
Mark ”1”	51.988 - 51.994 mm (2.0468 - 2.0470 in.)
Mark ”2”	51.982 - 51.988 mm (2.0465 - 2.0468 in.)

Standard sized bearing center wall thickness:

Mark ”1”	1.498 - 1.501 mm (0.0590 - 0.0591 in.)
Mark ”2”	1.501 - 1.504 mm (0.0591 - 0.0592 in.)
Mark ”3”	1.504 - 1.507 mm (0.0592 - 0.0593 in.)
Mark ”4”	1.507 - 1.510 mm (0.0593 - 0.0594 in.)
Mark ”5”	1.510 - 1.513 mm (0.0594 - 0.0596 in.)

(j) Completely remove the Plastigage.

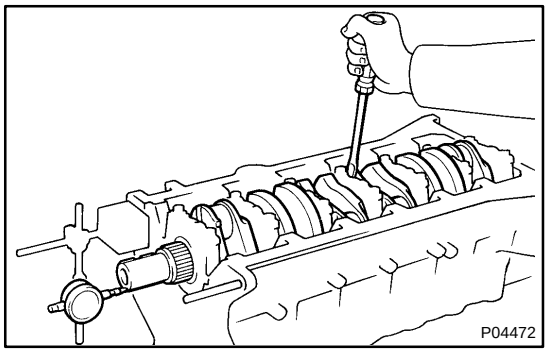


17. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.

(b) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

- Keep the bearings, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in correct order.



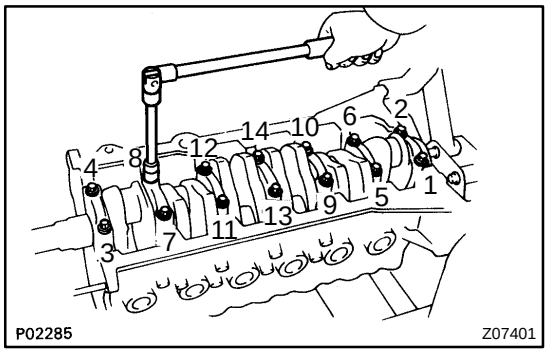
18. CHECK CRANKSHAFT THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:
0.020 - 0.220 mm (0.0008 - 0.0087 in.)
Maximum thrust clearance: 0.30 mm (0.0118 in.)

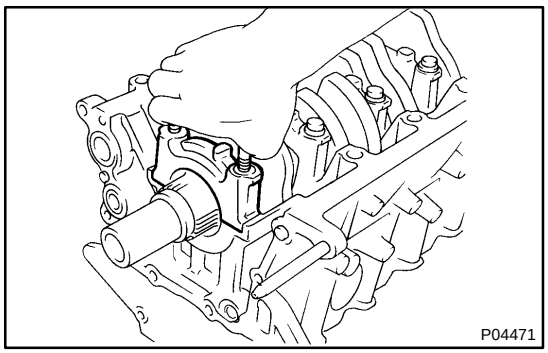
If the thrust clearance is greater than maximum, replace the thrust washers as a set.

Thrust washer thickness:
1.940 - 1.990 mm (0.0764 - 0.0783 in.)



19. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

(a) Uniformly loosen and remove the 14 main bearing cap bolts, in several passes, in the sequence shown.



(b) Using the removed main bearing cap bolts, pry the main bearing cap back and forth, and remove the main bearing caps, lower bearings and lower thrust washers (No.4 main bearing cap only).

HINT:

- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps and lower thrust washers in correct order.

(c) Lift out the crankshaft.

HINT:

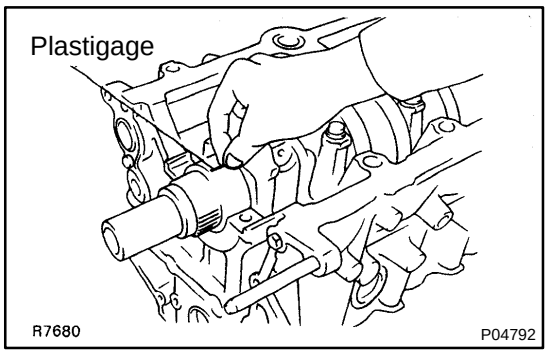
Keep the upper bearing and upper thrust washers together with the cylinder block.

(d) Clean each main journal and bearing.

(e) Check each main journal and bearing for pitting and scratches.

If the journal or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.

(f) Place the crankshaft on the cylinder block.

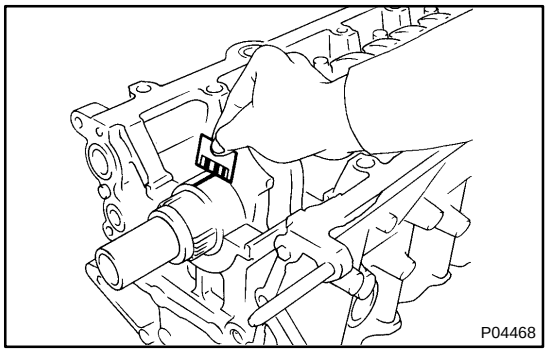


(g) Lay a strip of Plastigage across each journal.
(h) Install the main bearing caps (See page EM-95).

NOTICE:

Do not turn the crankshaft.

(i) Remove the main bearing caps (See procedures (a) and (b) above).



(j) Measure the Plastigage at its widest point.

Standard clearance:

STD	0.026 - 0.040 mm (0.0010 - 0.0016 in.)
U/S 0.25	0.025 - 0.061 mm (0.0010 - 0.0024 in.)

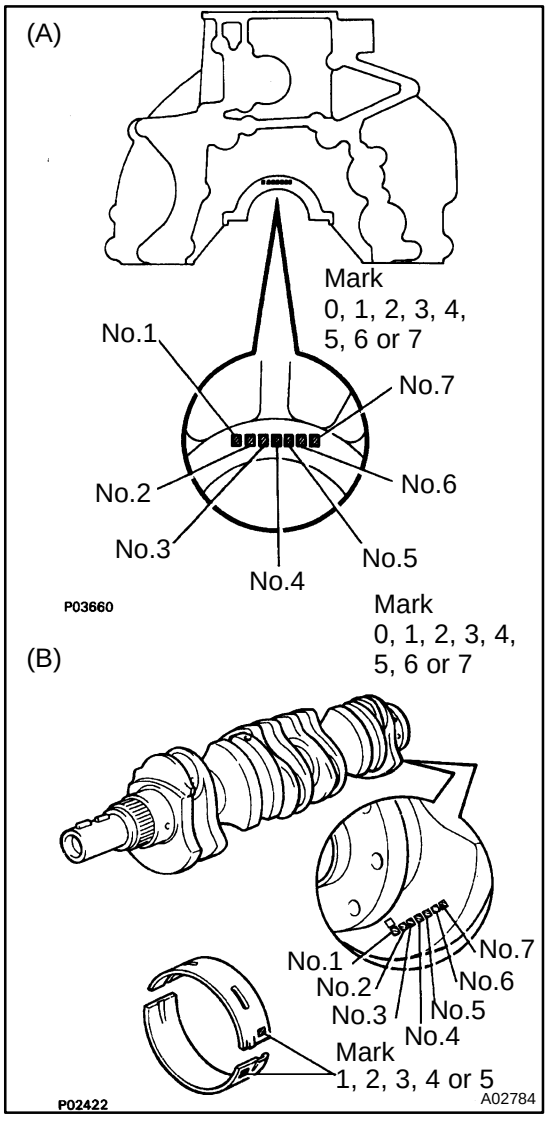
Maximum clearance:

STD	0.06 mm (0.0024 in.)
U/S 0.25	0.08 mm (0.0031 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.

HINT:

If using a standard bearing, replace with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then refer to the table below for the appropriate bearing number. There are 5 sizes of standard bearings, marked ”1”, ”2”, ”3”, ”4” and ”5” accordingly.



	Total number ” ” : Number mark				
Cylinder block (A) + Crankshaft (B) =	0 - 2	3 - 5	6 - 8	9 - 11	12 - 14
Use bearing	”1”	”2”	”3”	”4”	”5”

EXAMPLE:
Cylinder block ”3” (A) + Crankshaft ”4” (B)
= Total number 7 (Use bearing ”3”)

Standard sized bearing selection chart:

Crankshaft number mark	Cylinder block number mark							
	0	1	2	3	4	5	6	7
0	1	1	1	2	2	2	3	3
1	1	1	2	2	2	3	3	3
2	1	2	2	2	3	3	3	4
3	2	2	2	3	3	3	4	4
4	2	2	3	3	3	4	4	4
5	2	3	3	3	4	4	4	4
6	3	3	3	4	4	5	5	5
7	3	3	4	4	5	5	5	5

EXAMPLE:
Cylinder block "3", Crankshaft "4" = Use bearing "3"

Reference

Cylinder block main journal bore diameter (A):

Mark "0"	66.020 - 66.022 mm (2.59922 - 2.59929 in.)
Mark "1"	66.022 - 66.024 mm (2.59929 - 2.59936 in.)
Mark "2"	66.024 - 66.026 mm (2.59936 - 2.59944 in.)
Mark "3"	66.026 - 66.028 mm (2.59944 - 2.59952 in.)
Mark "4"	66.028 - 66.030 mm (2.59952 - 2.59960 in.)
Mark "5"	66.030 - 66.032 mm (2.59960 - 2.59968 in.)
Mark "6"	66.032 - 66.034 mm (2.59968 - 2.59976 in.)
Mark "7"	66.034 - 66.036 mm (2.59976 - 2.59984 in.)

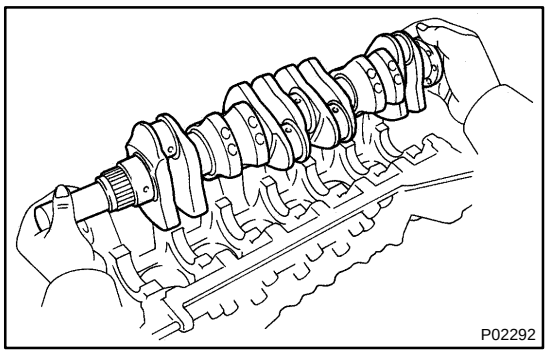
Crankshaft main journal diameter (B):

Mark "0"	61.998 - 62.000 mm (2.44086 - 2.44094 in.)
Mark "1"	61.996 - 61.998 mm (2.44078 - 2.44086 in.)
Mark "2"	61.994 - 61.996 mm (2.44070 - 2.44078 in.)
Mark "3"	61.992 - 61.994 mm (2.44063 - 2.44070 in.)
Mark "4"	61.990 - 61.992 mm (2.44055 - 2.44063 in.)
Mark "5"	61.988 - 61.990 mm (2.44047 - 2.44055 in.)
Mark "6"	61.986 - 61.988 mm (2.44039 - 2.44047 in.)
Mark "7"	61.984 - 61.986 mm (2.44031 - 2.44039 in.)

Standard bearing center wall thickness:

Mark "1"	1.994 - 1.997 mm (0.0785 - 0.0786 in.)
Mark "2"	1.997 - 2.000 mm (0.0786 - 0.0787 in.)
Mark "3"	2.000 - 2.003 mm (0.0787 - 0.0789 in.)
Mark "4"	2.003 - 2.006 mm (0.0789 - 0.0790 in.)
Mark "5"	2.006 - 2.009 mm (0.0790 - 0.0791 in.)

(k) Completely remove the Plastigage.



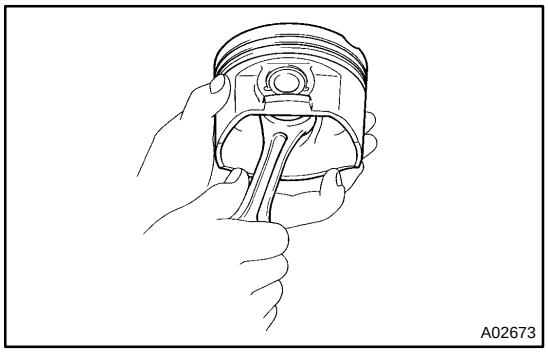
20. REMOVE CRANKSHAFT

(a) Lift out the crankshaft

(b) Remove the upper bearings and upper thrust washers from the cylinder block.

HINT:

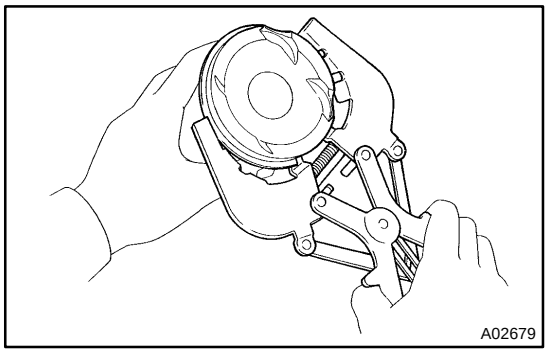
Arrange the main bearing caps, bearings and thrust washers in the correct order.



21. CHECK FIT BETWEEN PISTON AND PISTON PIN

Try to move the piston back and forth on the piston pin.

If any movement is felt, replace the piston and pin as a set.



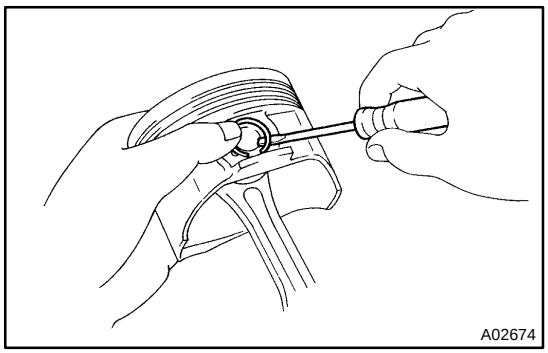
22. REMOVE PISTON RINGS

(a) Using a piston ring expander, remove the 2 compression rings.

(b) Remove the 2 side rails and oil ring expander by hand.

HINT:

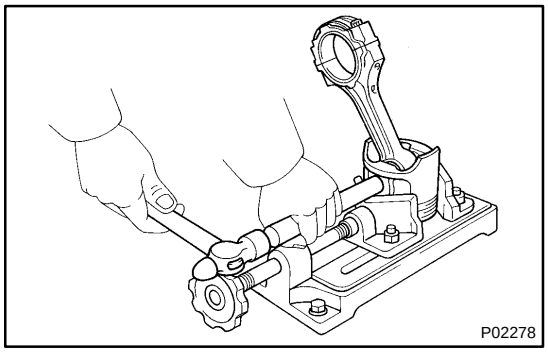
Arrange the piston rings in correct order only.



23. DISCONNECT CONNECTING ROD FROM PISTON

(a) Using a small screwdriver, remove the 2 snap rings.

(b) Gradually heat the piston to about 80˚C (176˚F).



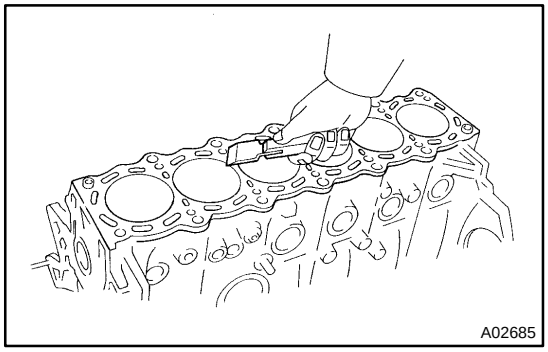
(c) Using a plastic-faced hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.

HINT:

- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in the correct order.

EM0DL-08

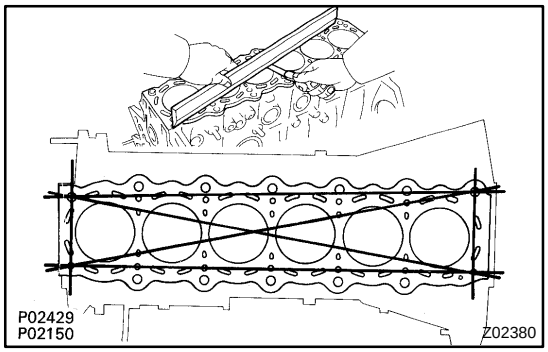
INSPECTION



1. CLEAN CYLINDER BLOCK

(a) Remove the gasket material.
Using a gasket scraper, remove all the gasket material from the cylinder block surface.

(b) Clean the cylinder block.
Using a soft brush and solvent, thoroughly clean the cylinder block.

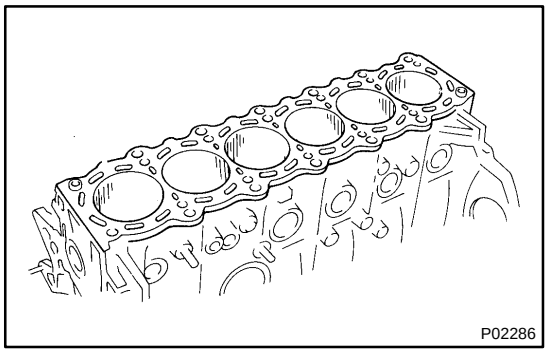


2. INSPECT CYLINDER BLOCK SURFACE FOR FLATNESS

Using precision straight edge and feeler gauge, measure the top surfaces of the cylinder block for warpage.

Maximum warpage: 0.07 mm (0.0028 in.)

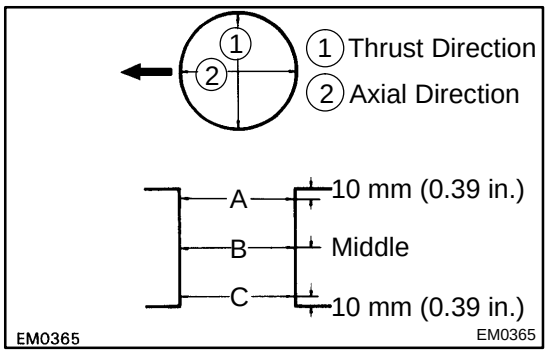
If warpage is greater than maximum, replace the cylinder block.



3. INSPECT CYLINDER FOR VERTICAL SCRATCHES

Visually check the cylinder for vertical scratches.

If deep scratches are present, replace the cylinder block.



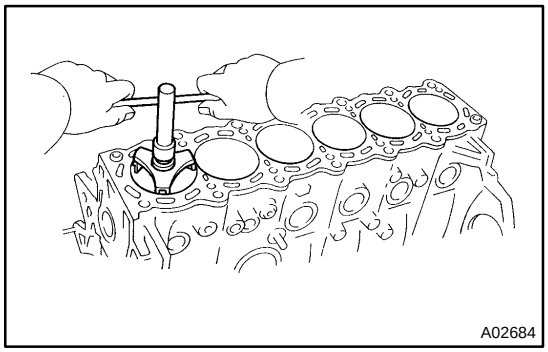
4. INSPECT CYLINDER BORE DIAMETER

Using a cylinder gauge, measure the cylinder bore diameter at positions A, B and C in the thrust and axial directions.

Standard diameter:
86.000 - 86.013 mm (3.3858 - 3.3863 in.)

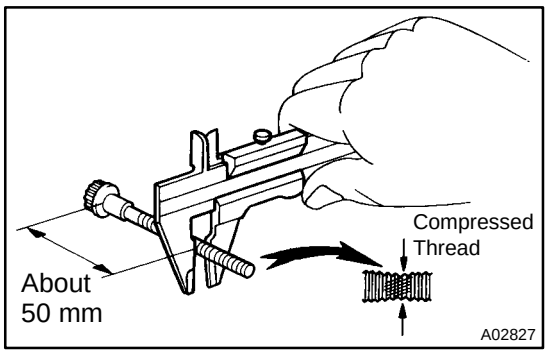
Maximum diameter: 86.02 mm (3.3866 in.)

If the diameter is greater than maximum, replace the cylinder block.



5. REMOVE CYLINDER RIDGE

If the wear is less than 0.2 mm (0.008 in.), using a ridge reamer, grind the top of the cylinder.

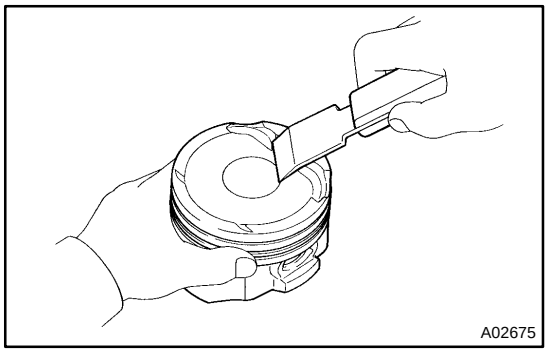


6. INSPECT MAIN BEARING CAP BOLTS

Using vernier calipers, measure the minimum diameter of the compressed thread at the measuring point.

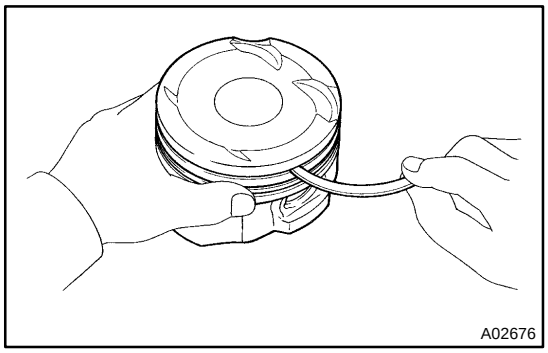
Standard diameter:
9.96 - 9.97 mm (0.3921 - 0.3925 in.)
Minimum diameter: 9.7 mm (0.382 in.)

If the diameter is less than minimum, replace the bolt.



7. CLEAN PISTON

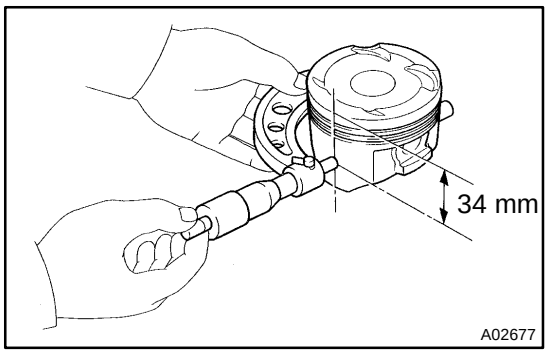
(a) Using a gasket scraper, remove the carbon from the piston top.



(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.

(c) Using solvent and a brush, thoroughly clean the piston.

NOTICE:
Do not use a wire brush.



8. INSPECT PISTON OIL CLEARANCE

(a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 34 mm (1.34 in.) from the piston head.

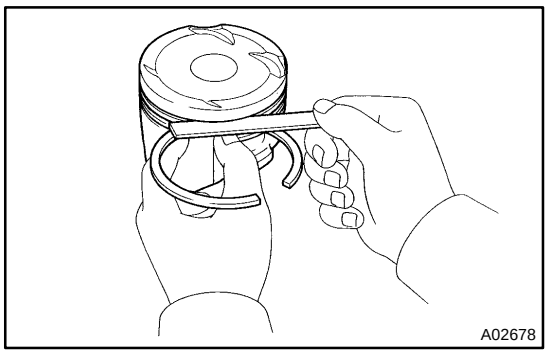
Piston diameter:
85.945 - 85.965 mm (3.3837 - 3.3844 in.)

(b) Measure the cylinder bore diameter in the thrust directions (See step 4).

(c) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance:
0.035 - 0.068 mm (0.0014 - 0.0027 in.)
Maximum oil clearance: 0.10 mm (0.0039 in.)

If the oil clearance is greater than maximum, replace all the 6 pistons. If necessary, replace the cylinder block.



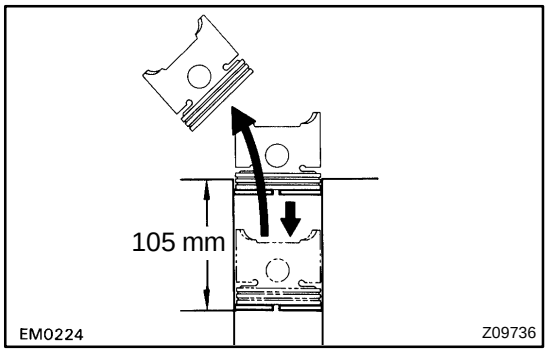
9. INSPECT PISTON RING GROOVE CLEARANCE

Using a feeler gauge, measure the clearance between new piston ring and the wall of the piston ring groove.

Ring groove clearance:

No.1	0.011 - 0.070 mm (0.0004 - 0.0028 in.)
No.2	0.030 - 0.070 mm (0.0012 - 0.0028 in.)

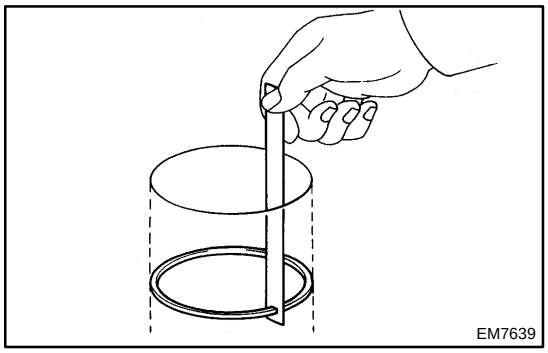
If the clearance is not as specified, replace the piston.



10. INSPECT PISTON RING END GAP

(a) Insert the piston ring into the cylinder bore.

(b) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 105 mm (4.13 in.) from the top of the cylinder block.



(c) Using a feeler gauge, measure the ring end gap.

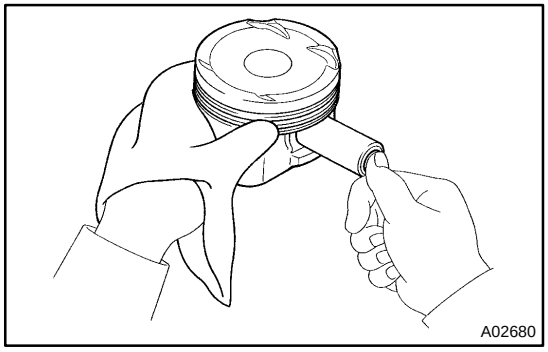
Standard ring end gap:

No.1	0.300 - 0.470 mm (0.0118 - 0.0185 in.)
No.2	0.350 - 0.520 mm (0.0138 - 0.0205 in.)
Oil (Side rail)	0.130 - 0.450 mm (0.0051 - 0.0177 in.)

Maximum ring end gap:

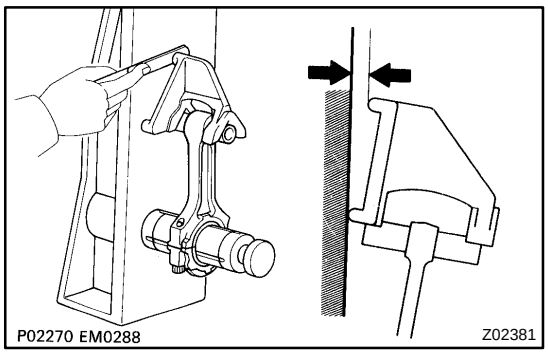
No.1	1.07 mm (0.0421 in.)
No.2	1.12 mm (0.0441 in.)
Oil (Side rail)	1.05 mm (0.0413 in.)

If the end gap is greater than maximum, replace the piston ring.
If the end gap is greater than maximum, even with a new piston ring, replace the cylinder block.



11. INSPECT PISTON PIN FIT

At 80°C (176°F), you should be able to push the piston pin into the piston pin hole with your thumb.



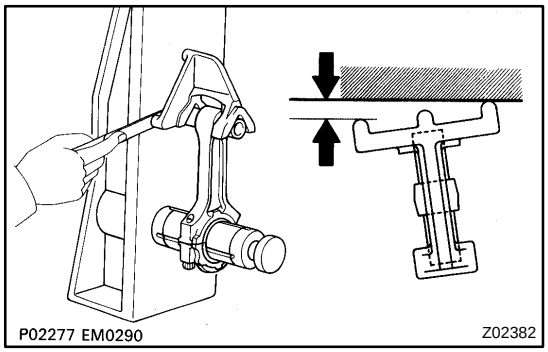
12. INSPECT CONNECTING ROD ALIGNMENT

Using a feeler gauge and rod aligner, check the connecting rod alignment.

- Check for out-of-alignment.

Maximum out-of-alignment:
0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

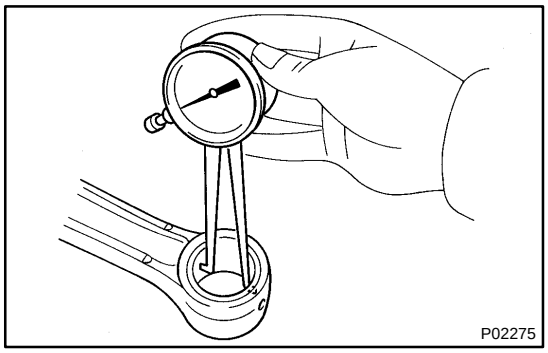
If out-of-alignment is greater than maximum, replace the connecting rod assembly.



- Check for twist.

Maximum twist:
0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

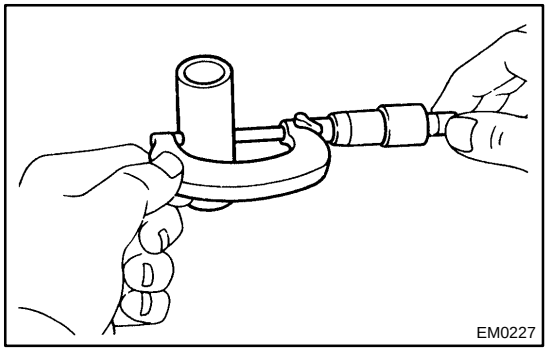
If twist is greater than maximum, replace the connecting rod assembly.



13. INSPECT PISTON PIN OIL CLEARANCE

(a) Using a caliper gauge, measure the inside diameter of the connecting rod bushing.

Bushing inside diameter:
22.005 - 22.014 mm (0.8663 - 0.8667 in.)



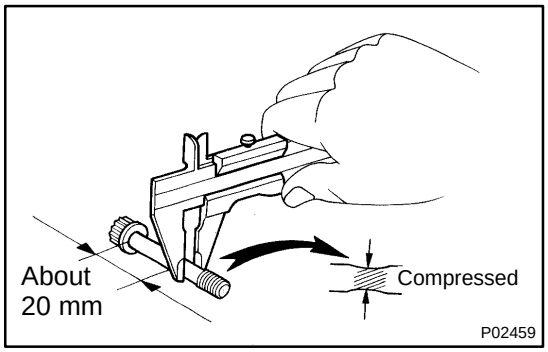
(b) Using a micrometer, measure the piston pin diameter.

Piston pin diameter:
21.997 - 22.006 mm (0.8660 - 0.8664 in.)

(c) Subtract the piston pin diameter measurement from the bushing in side diameter measurement.

Standard oil clearance:
0.005 - 0.011 mm (0.0002 - 0.0004 in.)
Maximum oil clearance: 0.05 mm (0.0020 in.)

If the oil clearance is greater than maximum, replace the bushing. If necessary, replace the piston and piston pin as a set.

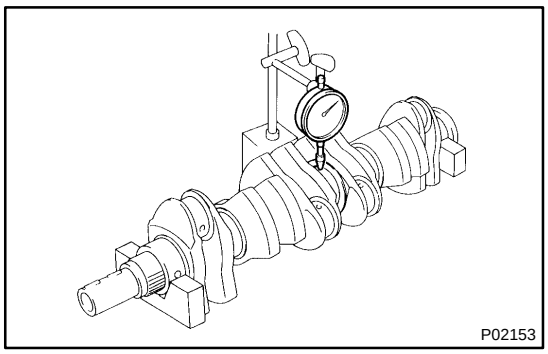


14. INSPECT CONNECTING ROD BOLTS

Using vernier calipers, measure the minimum diameter of the compressed bolt at the measuring point.

Standard diameter: 8.1 - 8.3 mm (0.319 - 0.327 in.)
Minimum diameter: 8.0 mm (0.315 in.)

If the diameter is less than minimum, replace the connecting rod bolt.



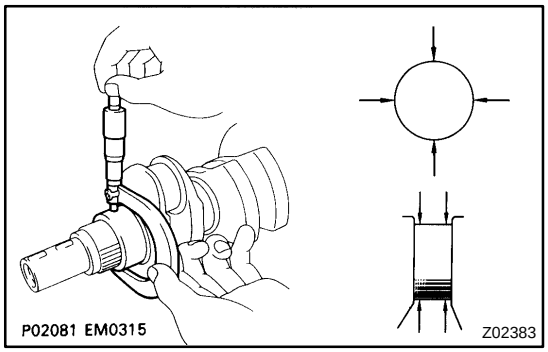
15. INSPECT CRANKSHAFT FOR RUNOUT

(a) Place the crankshaft on V-blocks.

(b) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.06 mm (0.0024 in.)

If the circle runout is greater than maximum, replace the crankshaft.



16. INSPECT MAIN JOURNALS AND CRANK PINS

(a) Using a micrometer, measure the diameter of each main journal and crank pin.

Main journal diameter:

STD	61.984 - 62.000 mm (2.4403 - 2.4409 in.)
U/S 0.25	61.745 - 61.755 mm (2.4309 - 2.4313 in.)

Crank pin diameter:

STD	51.982 - 52.000 mm (2.0465 - 2.0472 in.)
U/S 0.25	51.745 - 51.755 mm (2.0372 - 2.0376 in.)

If the diameter is not as specified, check the oil clearance (See page EM-80).

(b) Check each main journal and crank pin for taper and out-of-round as shown.

Maximum taper and out-of round:
0.02 mm (0.0008 in.)

If the taper or out-of-round is greater than maximum, grind or replace the crankshaft.

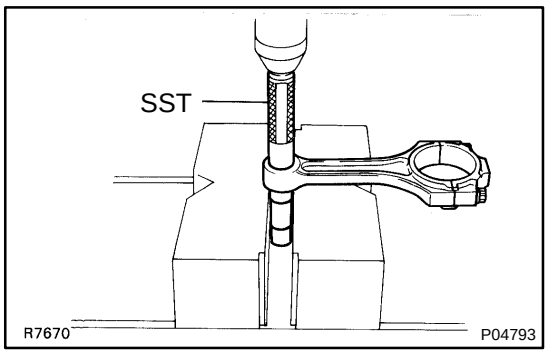
17. IF NECESSARY, GRIND AND HONE MAIN JOURNALS AND/OR CRANK PINS

- Grind and hone the main journals and/or crank pins to the finished undersized diameter (See procedure step 16).
- Install new main journal and/or crank pin undersized bearings.

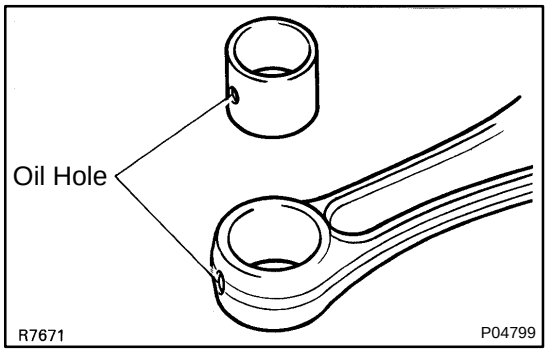
EM0DM-07

REPLACEMENT

1. REPLACE CONNECTING ROD BUSHING

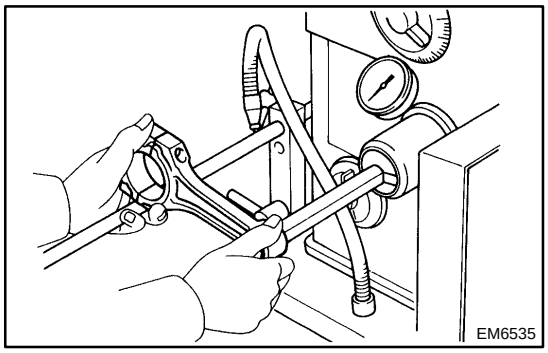


(a) Using SST and a press, press out the bushing.
SST 09222-30010

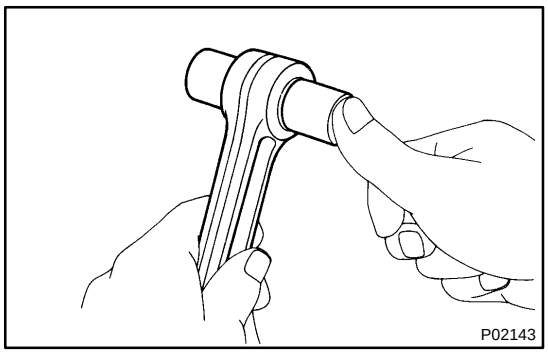


(b) Align the oil holes of a new bushing and the connecting rod.

(c) Using SST and a press, press in the bushing.
SST 09222-30010

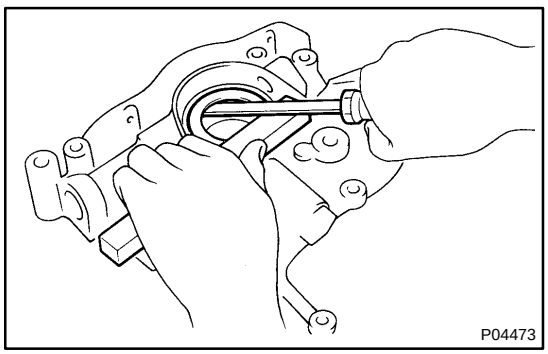


(d) Using a pin hole grinder, bore the bushing to obtain the standard specified clearance (See page EM-87) between the bushing and piston pin.



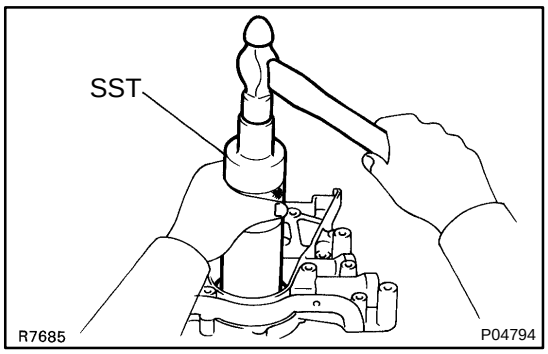
(e) Check the piston pin fit at room temperature.
Coat the piston pin with engine oil and push it into the connecting rod with your thumb.

2. REPLACE CRANKSHAFT FRONT OIL SEAL

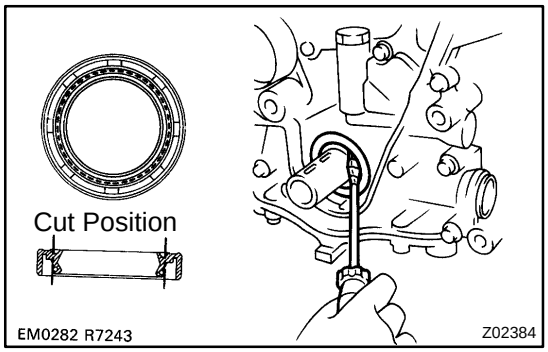


HINT:
There are 2 methods ((a) and (b)) to replace the oil seal.

(a) If the oil pump is removed form the cylinder block.
(1) Using a screwdriver, pry out the oil seal.



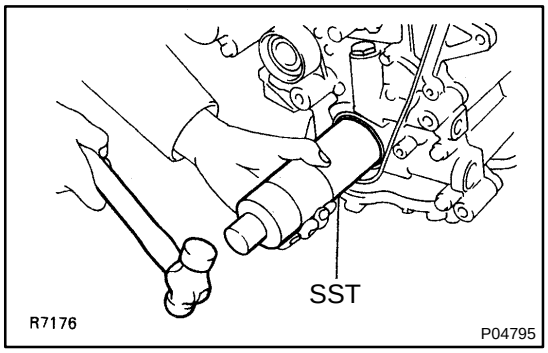
(2) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.
SST 09316-6001 1 (09316-00011)
(3) Apply MP grease to the oil seal lip.



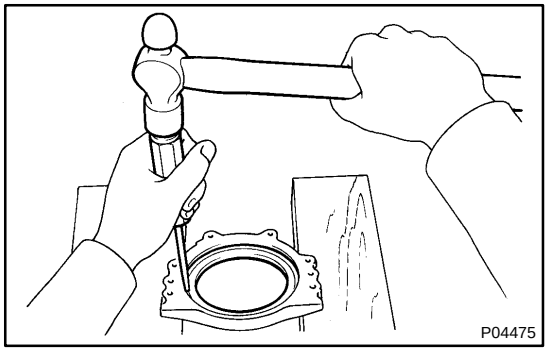
(b) If the pump is installed on the cylinder block.
(1) Using a knife, cut off the oil seal lip.
(2) Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the crankshaft. Tape the screwdriver tip.



(3) Apply MP grease to a new oil seal lip.
(4) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump body edge.
SST 09316-6001 1 (09316-00011)

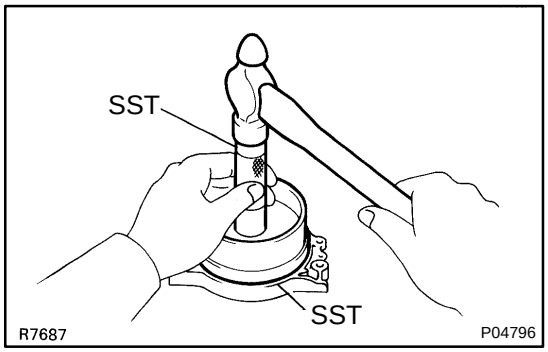


3. REPLACE CRANKSHAFT REAR OIL SEAL

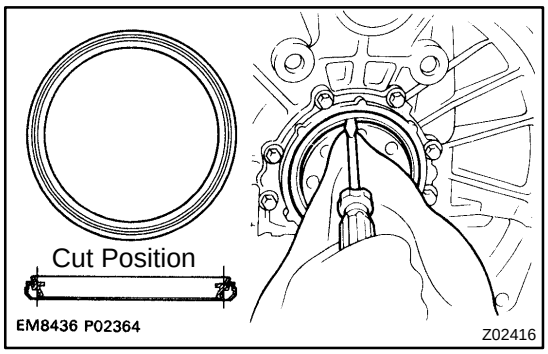
HINT:

There are 2 methods ((a) and (b)) to replace the oil seal.

(a) If the rear oil seal retainer is removed from the cylinder block.
(1) Using a screwdriver and hammer, tap out the oil seal.



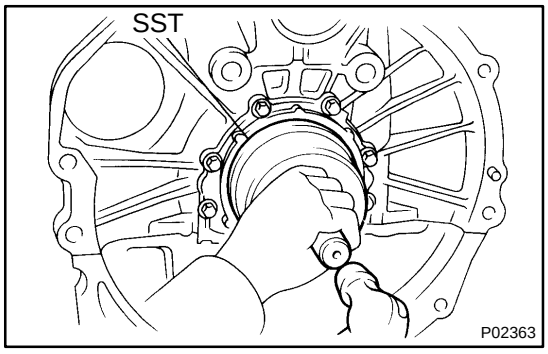
(2) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223-15030, 09950-70010 (09951-07100)
(3) Apply MP grease to the oil seal lip.



(b) If the rear seal retainer is installed on the cylinder block.
(1) Using a knife, cut off the oil seal lip.
(2) Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the crankshaft. Tape the screwdriver tip.



(3) Apply MP grease to a new oil seal lip.
(4) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.

SST 09223-15030, 09950-70010 (09951-07100)

EM0DN-06

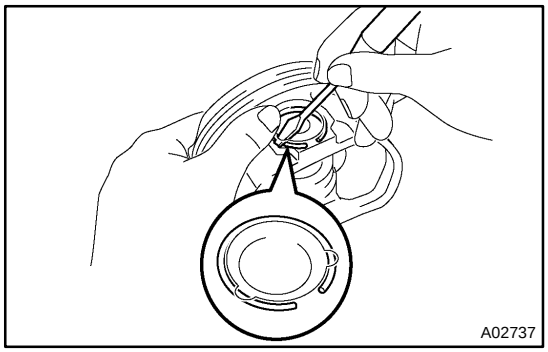
REASSEMBLY

HINT:

- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply fresh engine oil to all sliding and rotating surfaces.
- Replace all gaskets, O-rings and oil seals with new parts.

NOTICE:

Apply a generous amount of oil on the sliding surface of the bearing, and not on the back of it or on the surface to which it is installed.



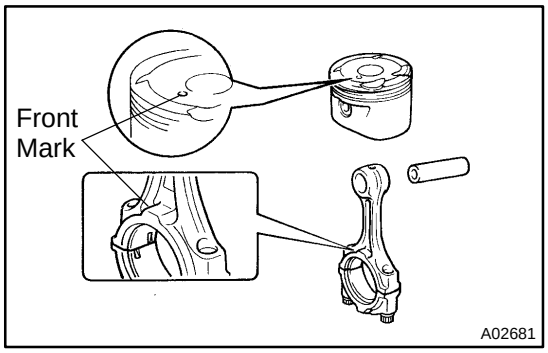
1. ASSEMBLE PISTON AND CONNECTING ROD

(a) Using a small screwdriver, install a new snap ring on one side of the piston pin hole.

HINT:

Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.

(b) Gradually heat the piston to about 80˚C (176˚F).



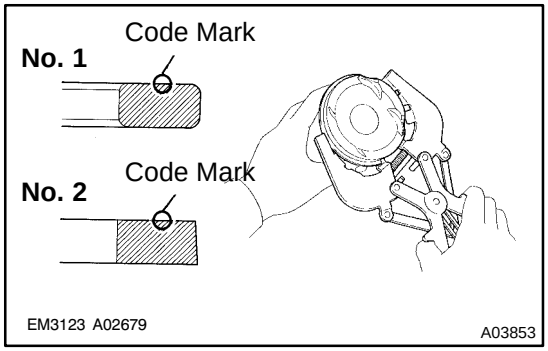
(c) Coat the piston pin with engine oil.

(d) Align the front marks of the piston and connecting rod, and push in the piston pin with your thumb.

(e) Install a new snap ring at the other end of the piston pin hole.

HINT:

Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



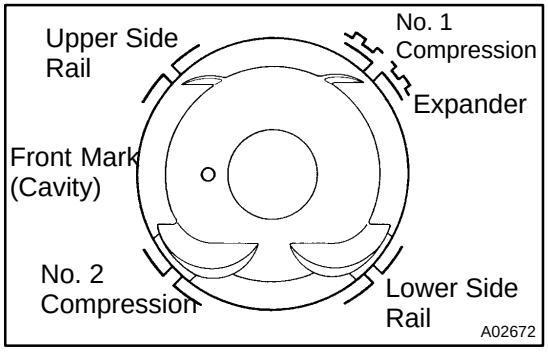
2. INSTALL PISTON RINGS

(a) Install the oil ring expander and 2 side rails by hand.

(b) Using a piston ring expander, install the 2 compression rings with the code mark facing up.

Code mark:

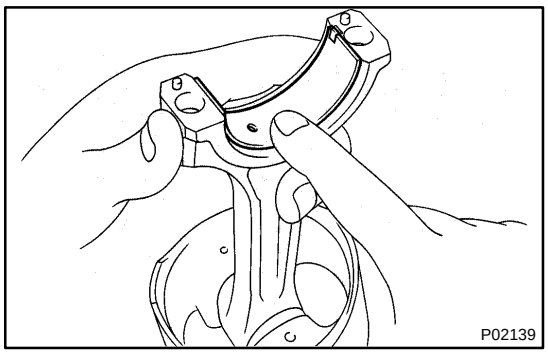
No. 1	1T
No. 2	2T



(c) Position the piston rings so that the ring ends are as shown.

NOTICE:

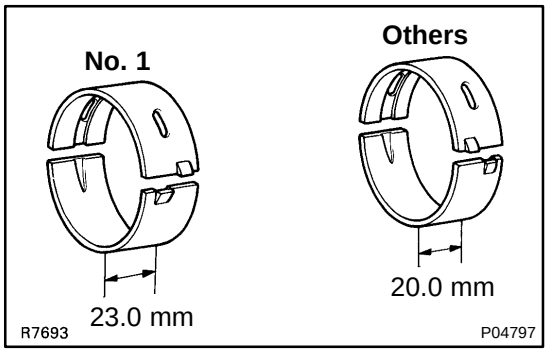
Do not align the piston ring ends.



3. INSTALL BEARINGS

(a) Align the bearing claw with the groove of the connecting rod and connecting cap.

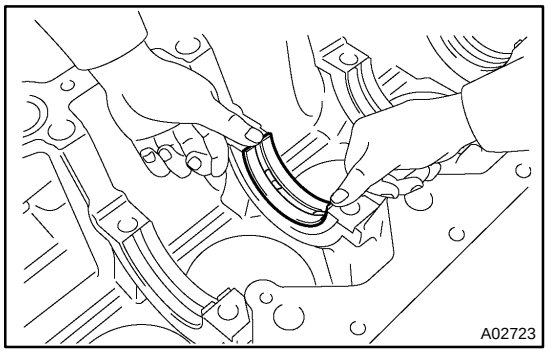
(b) Install the bearings in the connecting rod and connecting rod cap.



4. INSTALL MAIN BEARINGS

HINT:

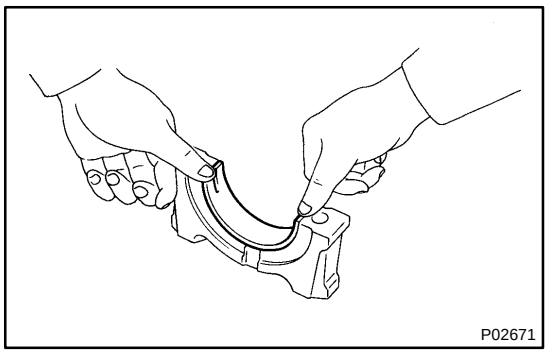
- Main bearings come in widths of 20.0 mm (0.787 in.) and 23.0 mm (0.906 in.). Install the 23.0 mm bearings in the No.1 cylinder block journal position with the main bearing cap. Install the 20.0 mm bearings in the other positions.
- Upper bearings have an oil groove and oil holes; lower bearings do not.



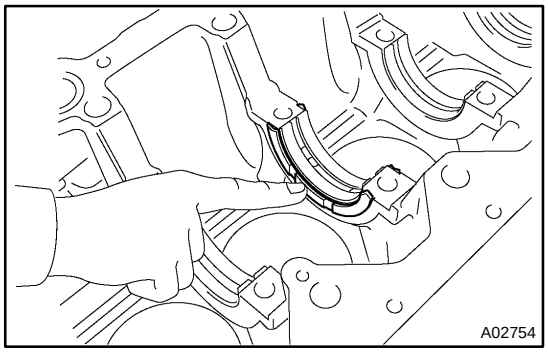
(a) Align the bearing claw with the claw groove of the main bearing cap or cylinder block.

NOTICE:

Install the bearing with the oil hole in the cylinder block.



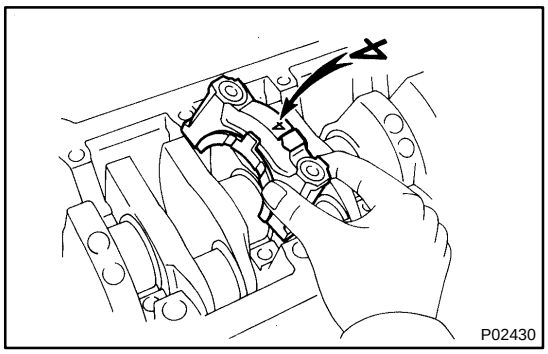
(b) Install the bearings in the cylinder block and main bearing caps.



5. INSTALL UPPER THRUST WASHERS

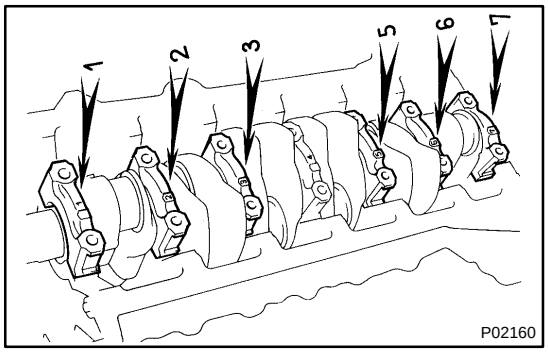
Install the 2 thrust washers under the No.4 main journal position of the cylinder block with the oil grooves facing outward.

6. PLACE CRANKSHAFT ON CYLINDER BLOCK



7. PLACE MAIN BEARING CAP AND LOWER THRUST WASHERS ON CYLINDER BLOCK

(a) Install the lower thrust washers on the No.4 main bearing with the grooves facing outward.

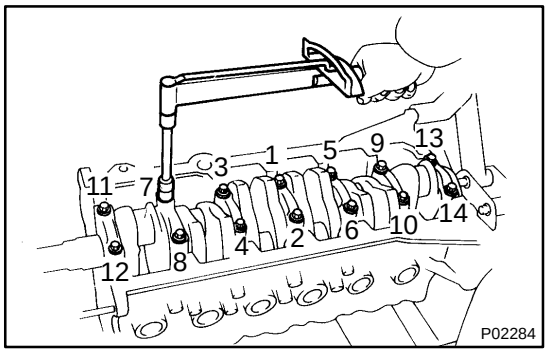


(b) Install the main bearing caps in numerical order with the arrows facing forward.

8. INSTALL MAIN BEARING CAP BOLTS

HINT:

- The main bearing cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any of the main bearing bolts break or deform, replace them.

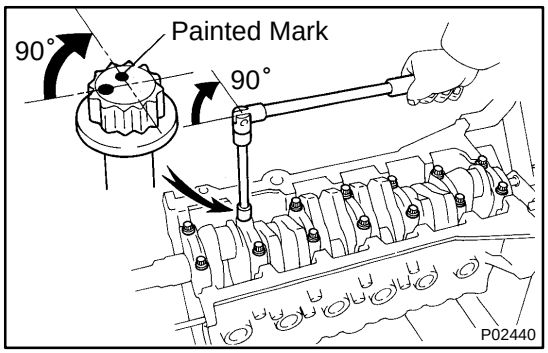


(a) Apply a light coat of engine oil on the threads and under the heads of the main bearing cap bolts.

(b) Install and uniformly tighten the 14 main bearing cap bolts, in several passes, in the sequence shown.

Torque: 45 N·m (450 kgf·cm, 33 ft·lbf)

If any one of the main bearing cap bolts does not meet the torque specification, replace the main bearing cap bolt.



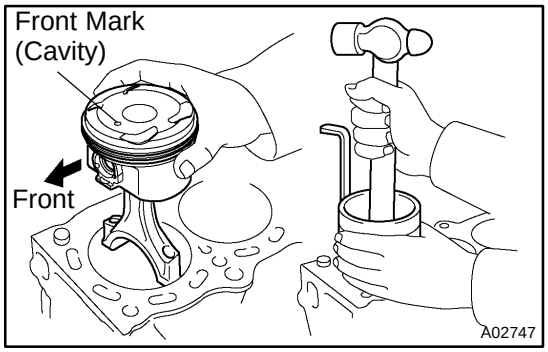
(c) Mark the front of the main bearing cap bolt head with paint.

(d) Retighten the main bearing cap bolts 90° in the numerical order shown above.

(e) Check that the painted mark is now at a 90° angle to the front.

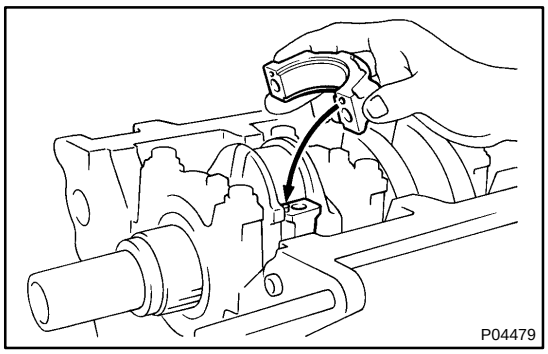
(f) Check that the crankshaft turns smoothly.

9. CHECK CRANKSHAFT THRUST CLEARANCE (See page EM-80)



10. INSTALL PISTON AND CONNECTING ROD ASSEMBLIES

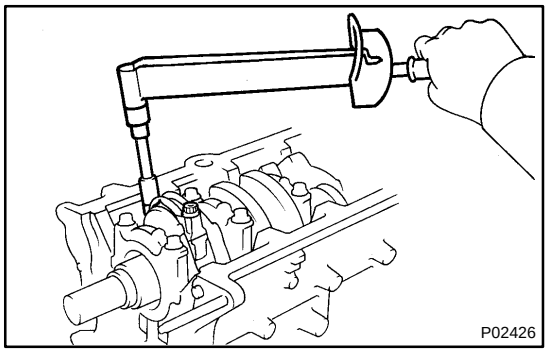
Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.



11. PLACE CONNECTING ROD CAP ON CONNECTING ROD

(a) Match the numbered connecting rod cap with the connecting rod.

(b) Install the connecting rod cap with by aligning the dowel pin to the corresponding hole.



12. INSTALL CONNECTING ROD CAP BOLTS

HINT:

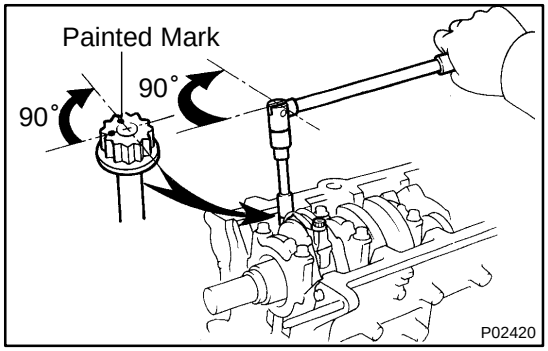
- The connecting rod cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any of the connecting rod bolts break or deform, replace them.

(a) Apply a light coat of engine oil on the threads and under the heads of the connecting rod cap bolts.

(b) Install and alternately tighten the bolts of the connecting rod cap in several passes.

Torque: 30 N·m (300 kgf·cm, 22 ft·lbf)

If any one of the connecting rod cap bolts does not meet the torque specification, replace the cap bolt.



(c) Mark the front of the connecting rod cap bolt with paint.

(d) Retighten the connecting rod cap bolts 90° in the numerical order shown.

(e) Check that the painted mark is now at a 90° angle to the front.

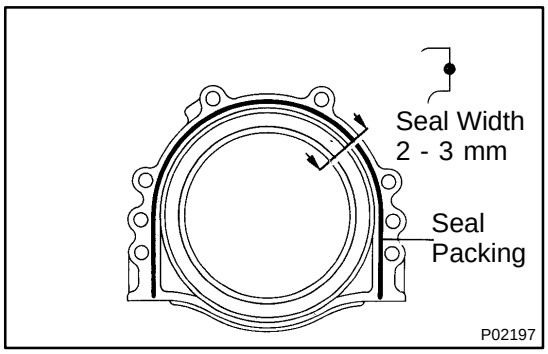
(f) Check that the crankshaft turns smoothly.

13. CHECK CONNECTING ROD THRUST CLEARANCE (See page EM-80)

14. INSTALL REAR OIL SEAL RETAINER

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the retainer and cylinder block.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all debris.
- Using a non-residue solvent, clean both sealing surfaces.



(b) Apply seal packing to the retainer as shown in the illustration.

Seal packing: Part No.08826-00080 or equivalent

- Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.
- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Install the retainer with the 6 bolts.

Torque: 6.0 N·m (60 kgf·cm, 53 in.·lbf)

15. INSTALL OIL PUMP (See page LU-12)

16. INSTALL RH ENGINE MOUNTING BRACKET AND INSULATOR ASSEMBLY

Install the mounting bracket with the 4 bolts.

Torque: 59 N·m (590 kgf·cm, 44 ft·lbf)

17. INSTALL LH ENGINE MOUNTING BRACKET AND INSULATOR ASSEMBLY

Install the mounting bracket with the 4 bolts.

Torque: 59 N·m (590 kgf·cm, 44 ft·lbf)

18. INSTALL FUEL INLET PIPE

Install the fuel inlet pipe with the 2 bolts.

Torque: 29 N·m (290 kgf·cm, 21 ft·lbf)

19. INSTALL NO. 1 OIL PIPE

Install the oil pipe with 2 new gaskets and the union bolt.

Torque: 55 N·m (550 kgf·cm, 41 ft·lbf)

20. INSTALL OIL FILTER AND BRACKET ASSEMBLY

(a) Install a new O-ring to the oil filter bracket.

(b) Install a new gasket to the union bolt.

(c) Install the oil filter bracket with the union bolt.

Torque: 90 N·m (900 kgf·cm, 65 ft·lbf)

21. INSTALL OIL PRESSURE SWITCH (See page LU-1) AND KNOCK SENSORS (See page SF-69)

22. INSTALL CYLINDER HEAD (See page EM-53)

23. INSTALL WATER PUMP (See page CO-9)

24. INSTALL NO. 2 WATER BYPASS PIPE WITH HOSE

(a) Install the water bypass pipe with the bolt and 2 nuts.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(b) Connect the water bypass hose to the hose clamp.

25. INSTALL TIMING PULLEYS AND BELT (See page EM-24)

26. INSTALL GENERATOR

Install the generator and pipe bracket with the bolt and nut.

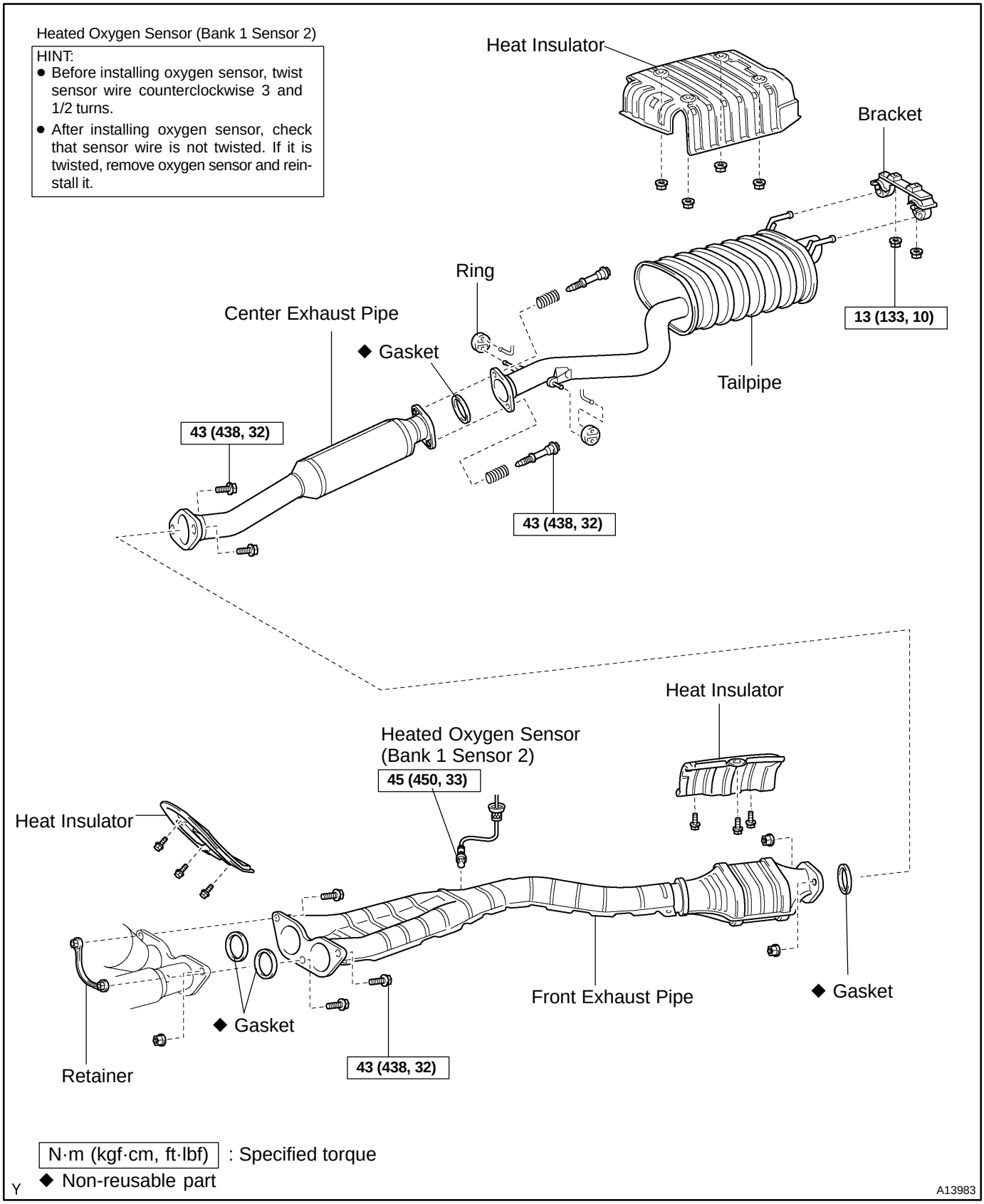
Torque: 40 N·m (400 kgf·cm, 30 ft·lbf)

27. REMOVE ENGINE STAND FROM ENGINE

EXHAUST SYSTEM

COMPONENTS

EM0DO-08



EMISSION CONTROL SYSTEM

EC00B-05

PURPOSE

The emission control systems are installed to reduce the amount of CO, HC and NOx exhausted from the engine (3) and (4)), to prevent the atmospheric release of blow-by gas-containing HC (1) and evaporated fuel containing HC being released from the fuel tank (2).
The function of each system is shown in these table.

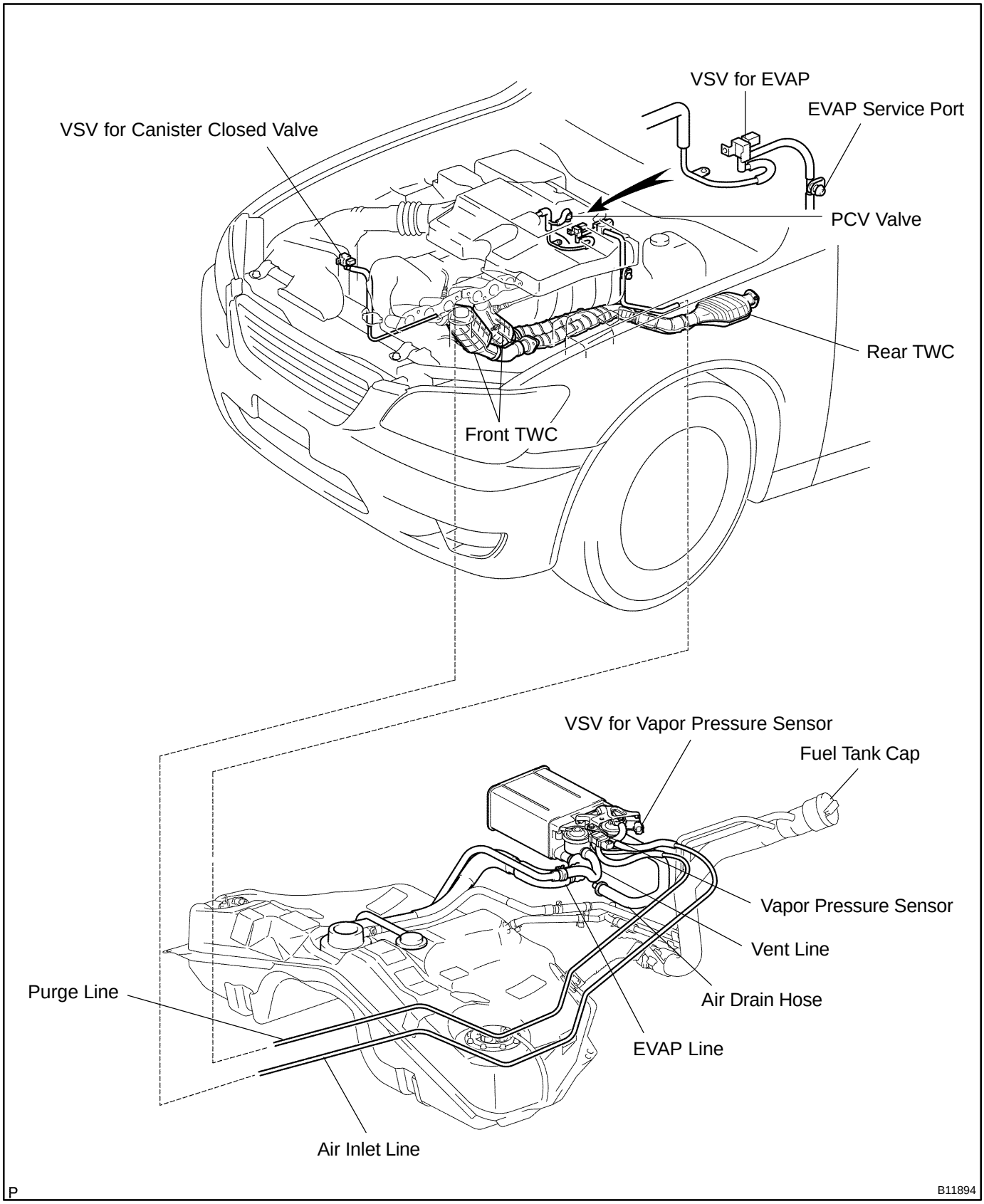
System	Abbreviation	Function
(1) Positive Crankcase Ventilation	PCV	Reduces blow-by gas (HC)
(2) Evaporative Emission Control	EVAP	Reduces evaporated HC
(3) Three-Way Catalytic Converter	TWC	Reduces CO, HC and NOx
(4) Sequential Multiport Fuel Injection *	SFI	Injects a precisely timed, optimum amount of fuel for reduced exhaust emissions

Remark: *For inspection and repair of the SFI system, refer to the SF section this manual.

PARTS LAYOUT AND SCHEMATIC DRAWING

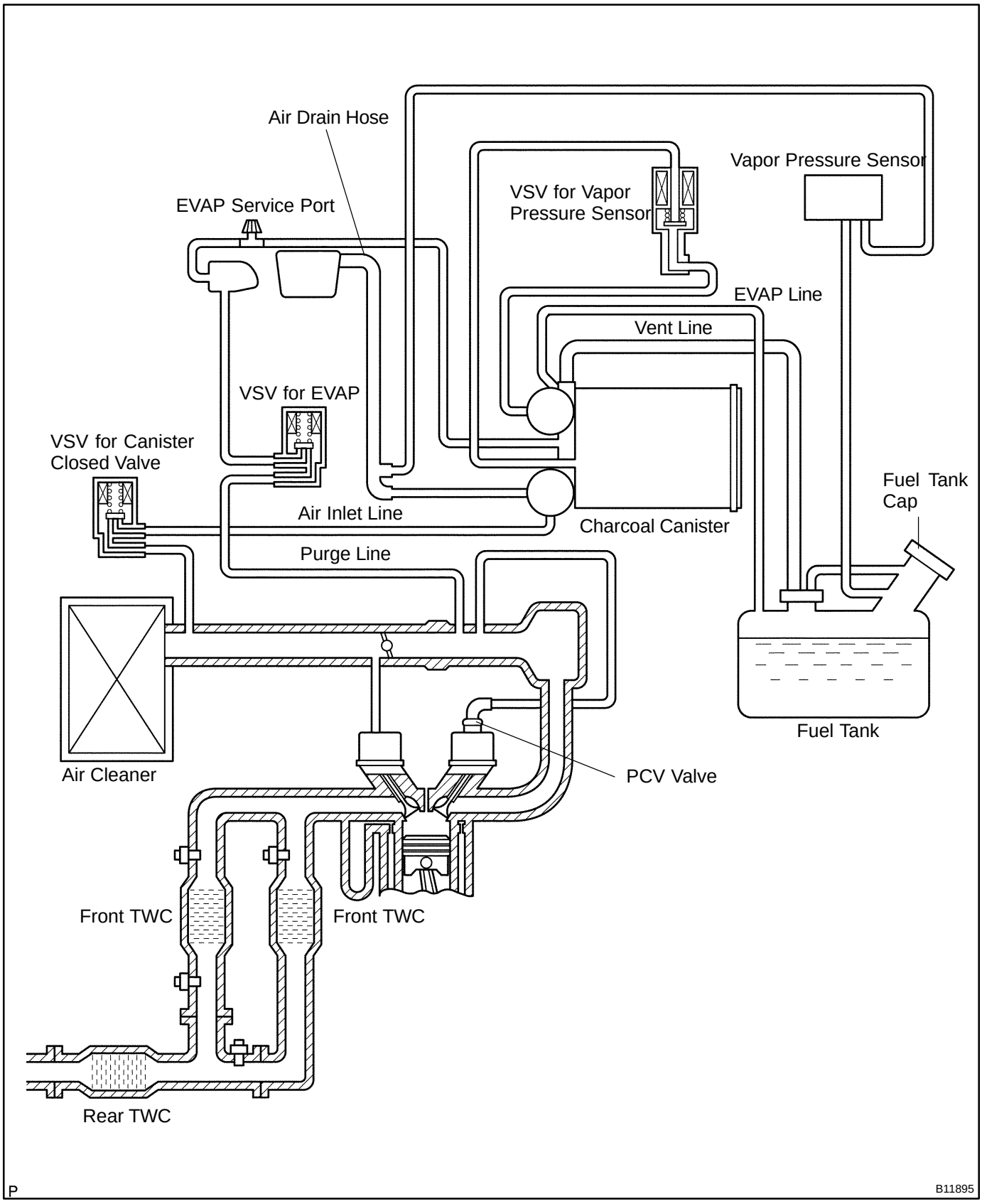
EC04V-10

LOCATION



EC04W-14

DRAWING



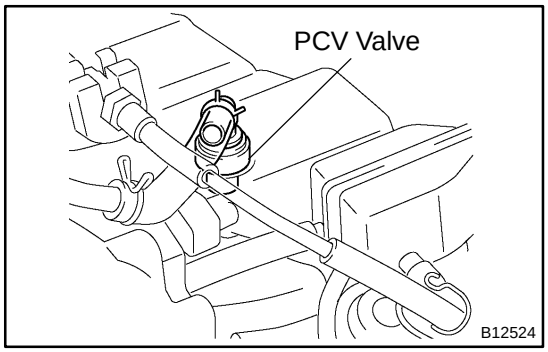
POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

EC04X-09

INSPECTION

1. REMOVE ENGINE COVER

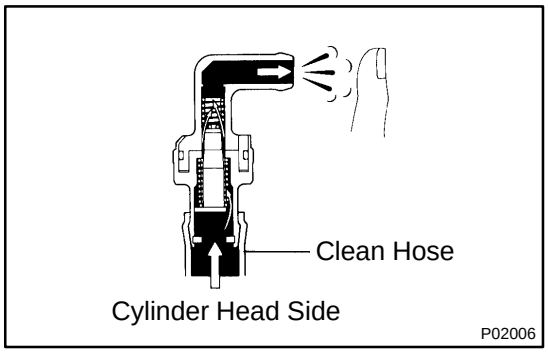
Remove 4 nuts and engine cover.



2. REMOVE PCV VALVE

(a) Disconnect the PCV hose from the PCV valve.

(b) Remove the PCV valve.



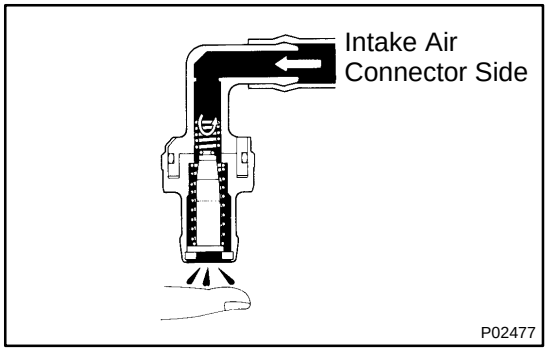
3. INSTALL CLEAN HOSE TO PCV VALVE

4. INSPECT PCV VALVE OPERATION

(a) Blow air into the cylinder head side, and check that air passes through easily.

CAUTION:

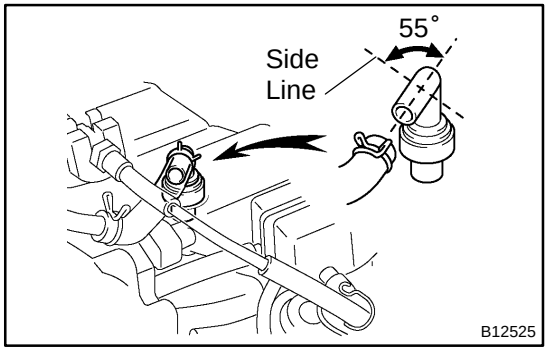
- **Do not suck air through the valve.**
- **Petroleum substances inside the valve are harmful.**



(b) Blow air into the intake air connector side, and check that air passes through with difficulty.

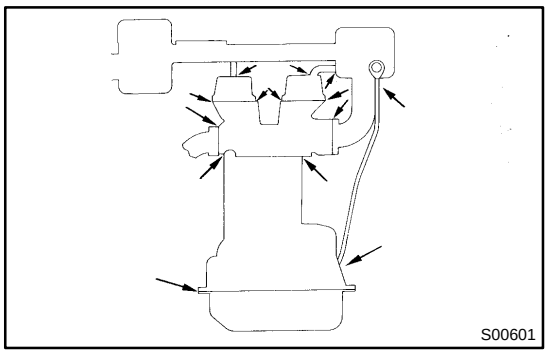
If operation is not as specified, replace the PCV valve.

5. REMOVE CLEAN HOSE FROM PCV VALVE



6. REINSTALL PCV VALVE

The port faces in the direction indicated in the illustration.



7. VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS

Check for cracks, leaks or damage.

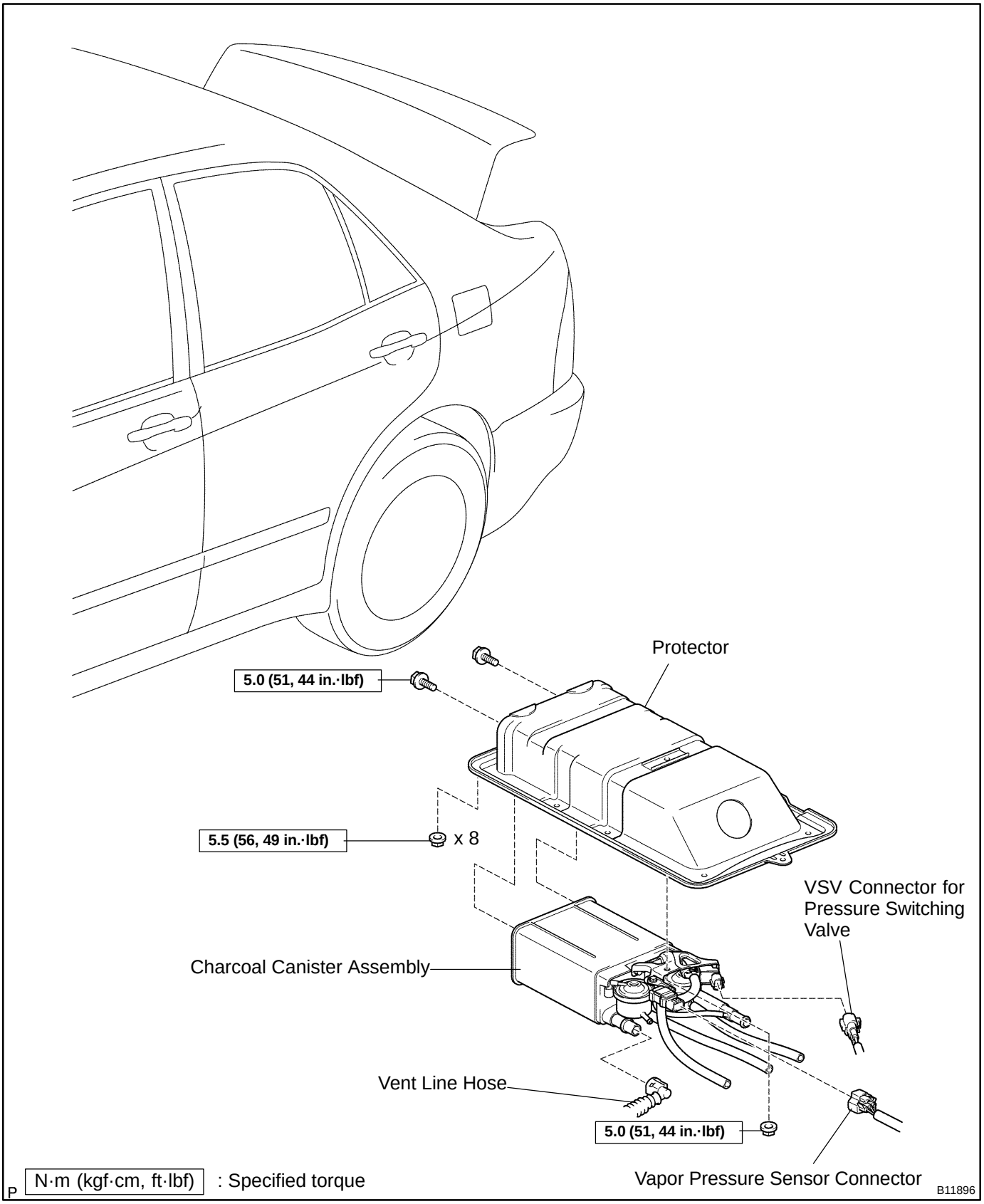
8. REINSTALL ENGINE COVER

Install the engine cover with the 4 nuts.

EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM

EC053-08

COMPONENTS



EC0BD-05

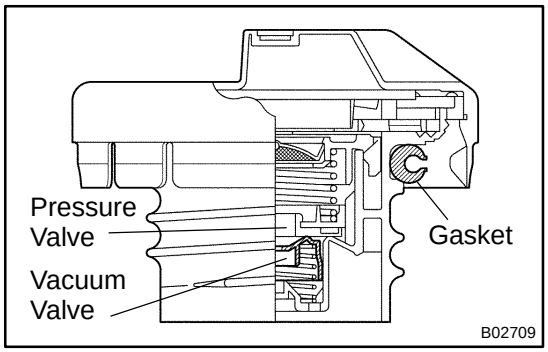
INSPECTION

1. INSPECT LINES AND CONNECTORS

Visually check for loose connections, sharp bends or damage.

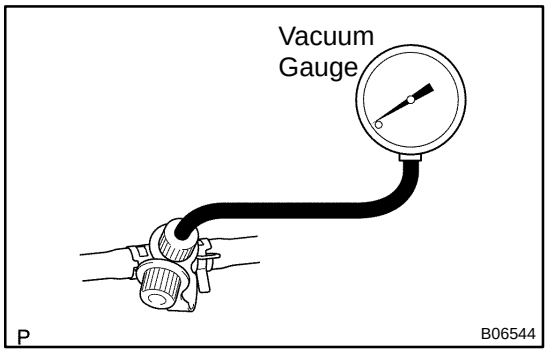
2. INSPECT FUEL TANK FILLER PIPE

Visually check for deformation, cracks or fuel leakage.



3. VISUALLY INSPECT FUEL TANK CAP

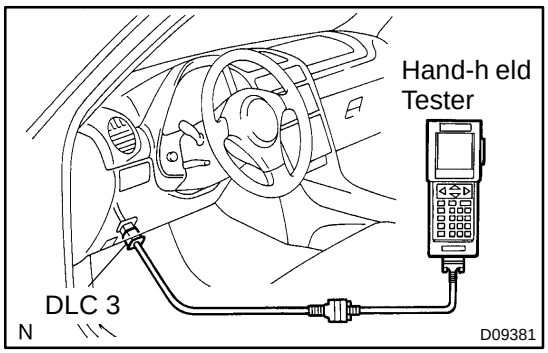
Check if the cap and/or gasket are deformed or damaged.
If necessary, repair or replace the cap.



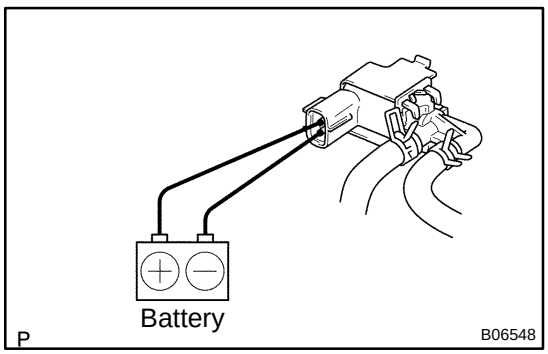
4. INSPECT EVAP SYSTEM LINE

(a) Warm up the engine and stop the engine.
Allow the engine to warm up to normal operating temperature.

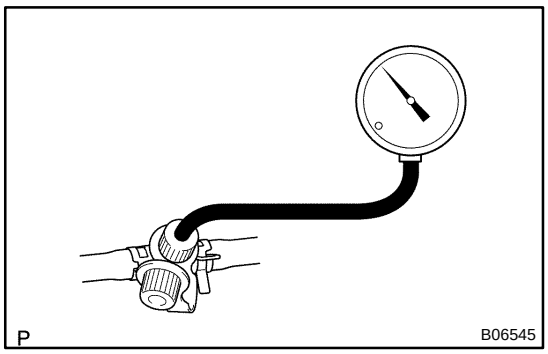
(b) Install a vacuum gauge (EVAP control system test equipment vacuum gauge) to the EVAP service port on the purge line.



(c) Hand-held Tester:
Forced driving of the VSV for the EVAP.
(1) Connect a hand-held tester to the DLC3.
(2) Start the engine.
(3) Push the hand-held tester main switch ON.
(4) Select the following menu items: DIAGNOSIS/ENHANCED OBDII / ACTIVE TEST / EVAP VSV (ALONE).



(d) If you have no Hand-held Tester:
Forced driving of the VSV for the EVAP.
(1) Disconnect the VSV connector for the EVAP.
(2) Connect the positive (+) and negative (-) leads from the battery to the VSV terminals for the EVAP.
(3) Start the engine.



(e) Check the vacuum at idle.
Vacuum:
Maintain at 0.368 - 19.713 in.Hg (5 - 268 in.Aq) for over 5 seconds

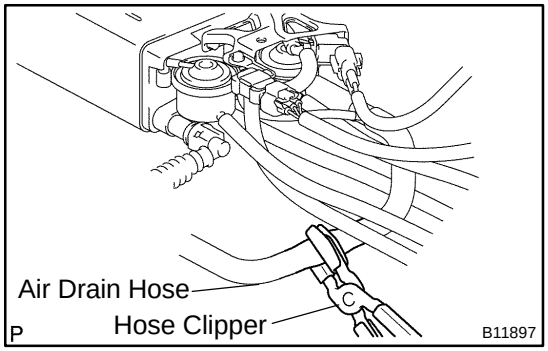
HINT:
If the vacuum does not change, you can conclude that the hose connecting the VSV to the service port has come loose or is blocked, or the VSV is malfunctioning.

(f) Hand-held Tester:
Conclude forced driving of the VSV for the EVAP.
(1) Stop the engine.
(2) Disconnect the hand-held tester from the DLC3.

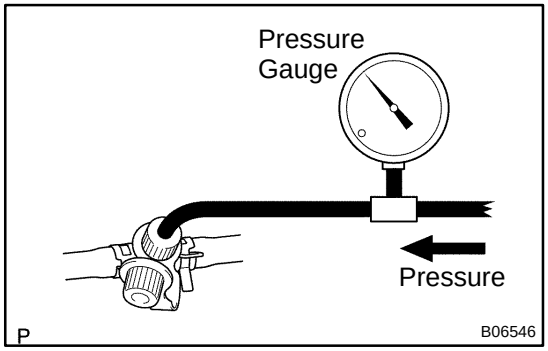
(g) If you have no Hand-held Tester:
Conclude forced driving of the VSV for the EVAP.
(1) Stop the engine.
(2) Disconnect the positive (+) and negative (-) leads from the battery from the VSV terminals for the EVAP.
(3) Connect the VSV connector for the EVAP.

(h) Disconnect the vacuum gauge from the EVAP service port on the purge line.

(i) Connect a pressure gauge to the EVAP service port on the purge line.

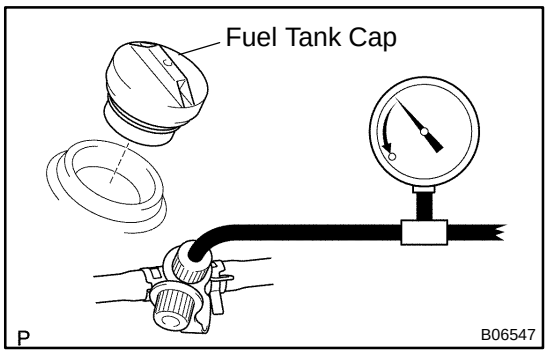


(j) Check the pressure.
(1) Close off the air drain hose at the marked position of the canister with a hose clipper or similar instrument.



(2) Add the pressure (13.5 - 15.5 in.Aq) from the EVAP service port.
Pressure:
2 minutes after the pressure is added, the gauge should be over 7.7 - 8.8 in.Aq.

HINT:
If you can't add pressure, you can conclude that the hose connecting the VSV - canister - fuel tank has slipped off or the VSV is open.

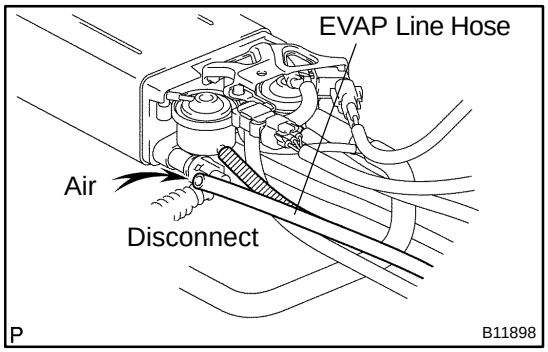


(3) Check if the pressure decreases when the fuel tank cap is removed while adding pressure.

HINT:

If the pressure does not decrease when the filler cap is removed, then you can conclude that the hose connecting the service port to the fuel tank is blocked, etc.

(k) Disconnect the pressure gauge from the EVAP service port on the purge line.



5. CHECK AIRTIGHTNESS IN FUEL TANK AND FILLER PIPE

(a) Disconnect the EVAP line hose from the charcoal canister side and then pressurize and make the internal pressure in the fuel tank 4 kPa (41 gf/cm^2, 0.58 psi).

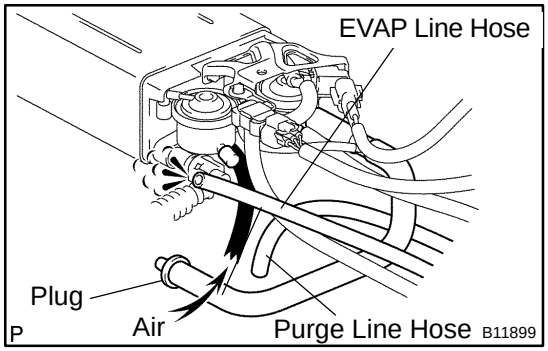
(b) Check that the internal pressure of the fuel tank can be hold for 1 minute.

(c) Check the connected portions of each hose and pipe.

(d) Check the installed parts on the fuel tank.

If there is no abnormality, replace the fuel tank and filler pipe.

(e) Reconnect the EVAP line hose to the charcoal canister.



6. INSPECT FUEL CUTOFF VALVE AND FILL CHECK VALVE

(a) Disconnect the purge line hose and EVAP line hose from the charcoal canister.

(b) Plug the EVAP port with a cap.

(c) Disconnect the air drain hose from the canister tank, and plug its.

(d) Pressurize 4 kPa (41 gf/cm^2, 0.58 psi) to the purge port and check that there is ventilation through the EVAP line hose.

HINT:

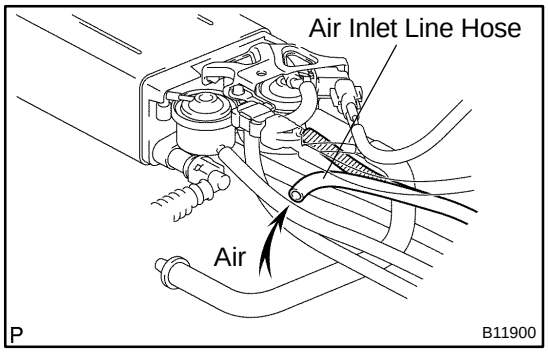
In the condition that the fuel fuel is full, as the float value of the fill check valve is closed and has no ventilation, it is necessary to check the fuel amount (volume).

(e) Check if there is any stuck in the vent line hose and EVAP line hose.

If there is no stuck in hoses, replace the fuel cutoff valve and fill check valve.

(f) Reconnect the purge line hose and EVAP line hose to the charcoal canister.

(g) Reconnect the air drain hose to the canister tank.



7. CHECK AIR INLET LINE

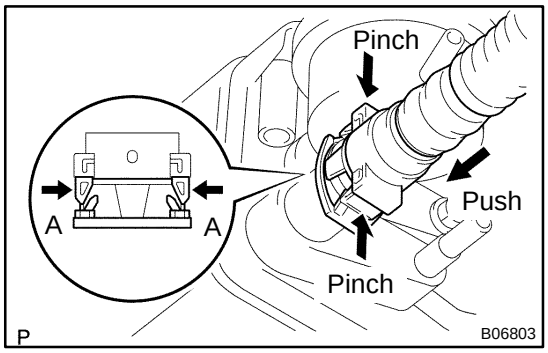
(a) Disconnect the air inlet line hose from the charcoal canister.

(b) Check that there is ventilation in the air inlet line.

(c) Reconnect the air inlet line hose to the charcoal canister.

8. REMOVE CHARCOAL CANISTER ASSEMBLY

(a) Remove the luggage trim from body.



(b) Remove the charcoal canister assembly.

(1) Disconnect the purge line hose, EVAP line hose and air inlet line from the charcoal canister.

(2) Disconnect the vent line hose from the charcoal canister.

Push the connector deep inside, pinch portion A, and pull out the connector.

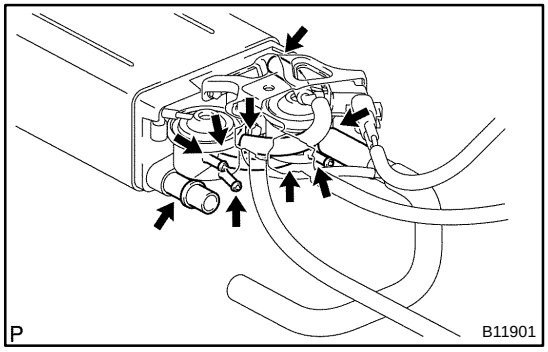
(3) Disconnect the air drain hose from the canister tank.

(4) Remove the 8 nuts and the charcoal canister assembly with protector.

(5) Disconnect the vapor pressure sensor connector.

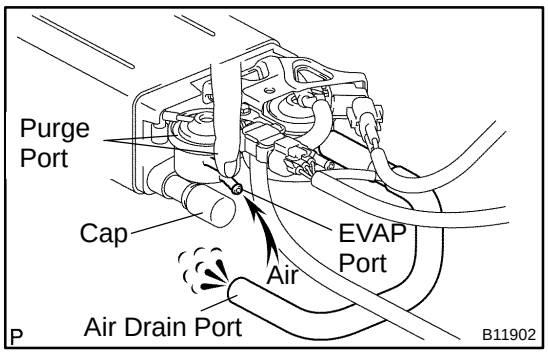
(6) Disconnect the VSV connector for vapor pressure sensor.

(7) Remove the 2 bolts, nut and the charcoal canister assembly from the protector.



9. INSPECT CHARCOAL CANISTER

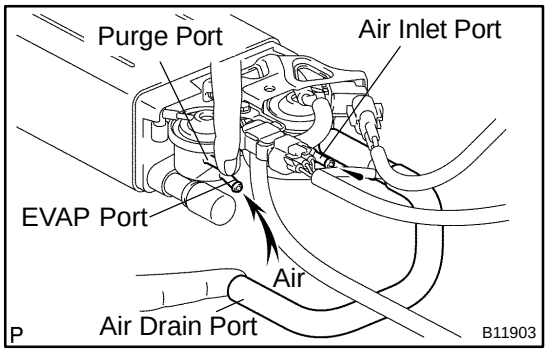
(a) Visually check the charcoal canister for cracks or damage.



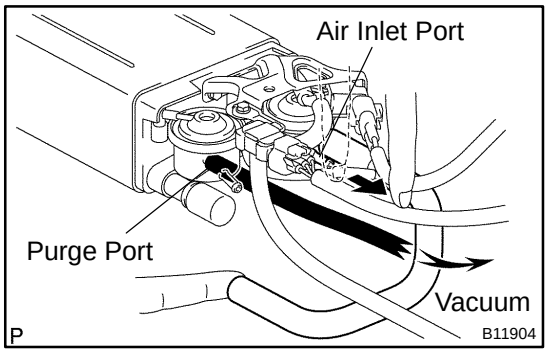
(b) Inspect the charcoal canister operation.

(1) Plug the vent port with a cap.

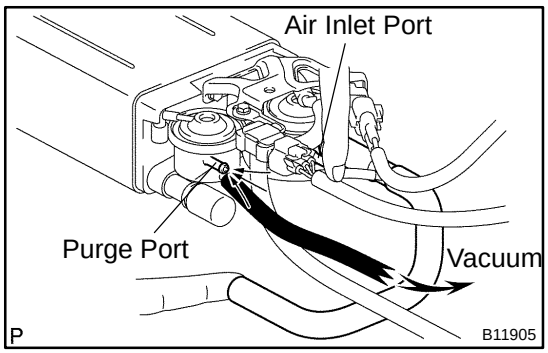
(2) While holding the purge port closed, blow air (1.76 kPa, 18 gf/cm^2, 0.26 psi) into the EVAP port and check that air flows from the air drain port.



(3) While holding the purge port and the air drain port closed, blow air (1.76 kPa, 18 gf/cm^2, 0.26 psi) into the EVAP port and check that air does not flow from the air inlet port.



(4) Apply vacuum (3.43 kPa, 25.7 mmHg, 1.01 in.Hg) to the purge port, check that the vacuum does not decrease when the air inlet port is closed, and check that the vacuum decreases when the air inlet port is released.



(5) While holding the air inlet port closed, apply vacuum (3.43 kPa, 25.7 mmHg, 1.01 in.Hg) to the EVAP port and check that air flows into the purge port.

If operation is not as specified, replace the charcoal canister.

10. INSPECT VSV FOR EVAP (See page SF-56)

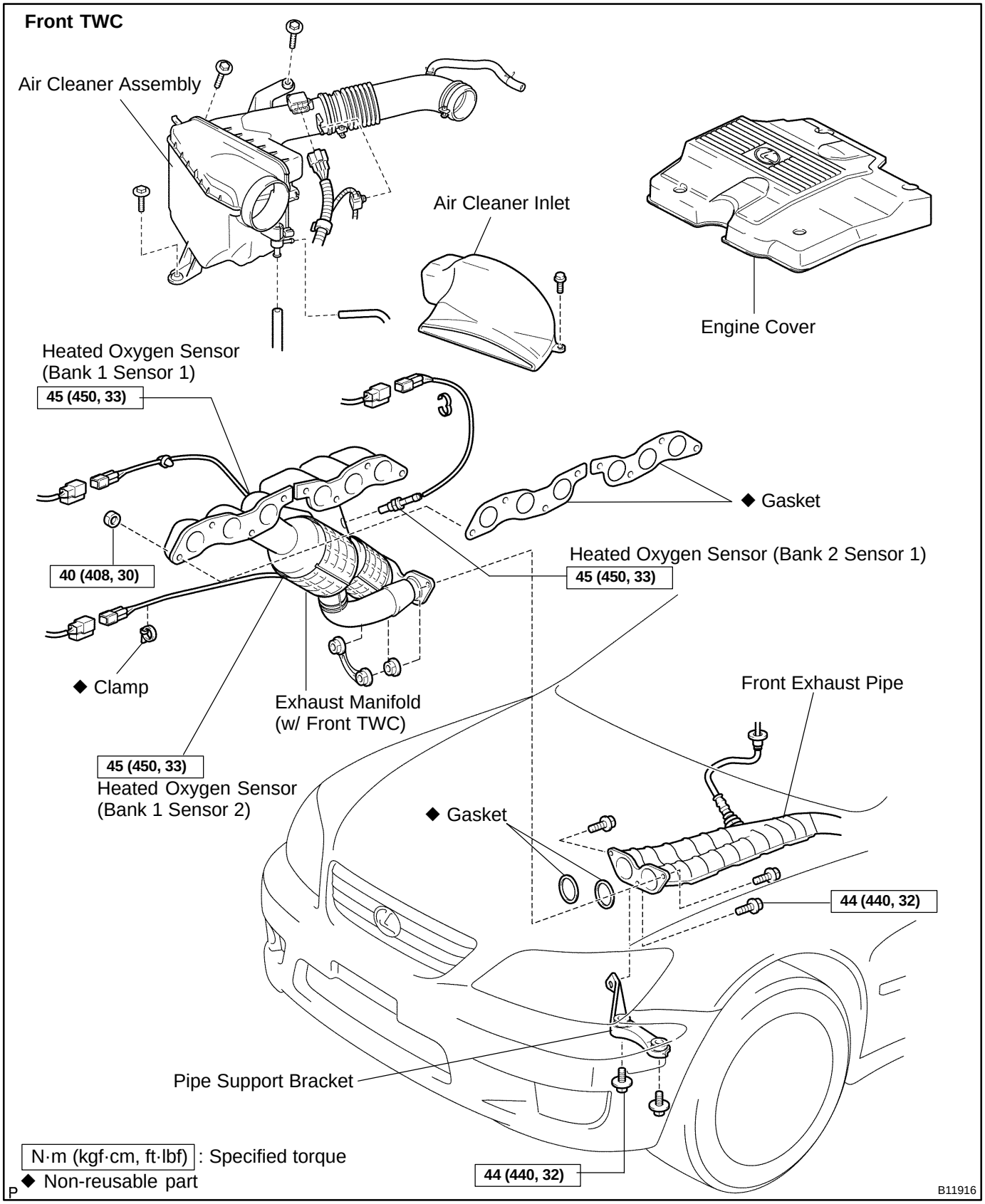
11. INSPECT VAPOR PRESSURE SENSOR (See page SF-67)

12. REINSTALL CHARCOAL CANISTER ASSEMBLY

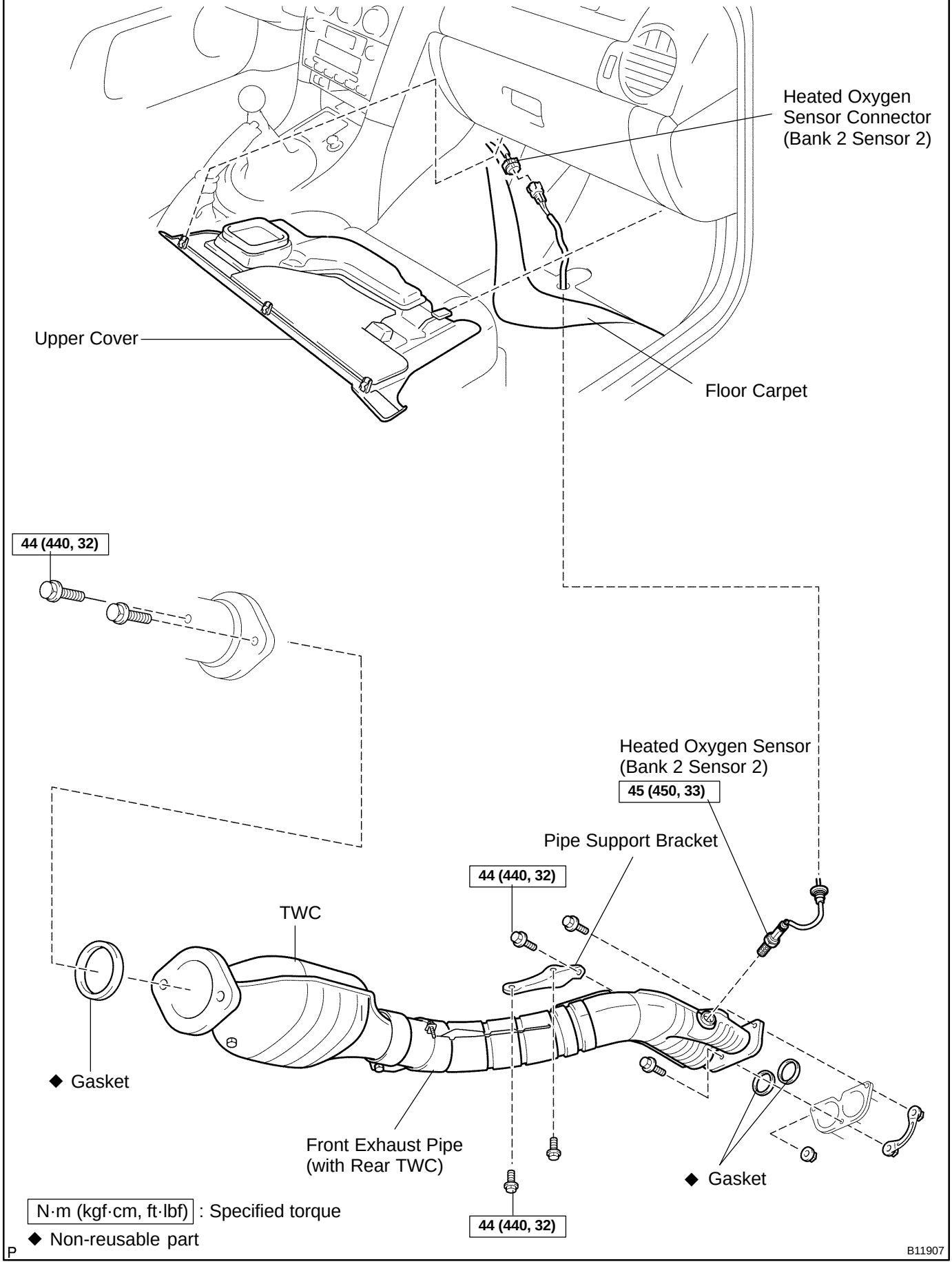
THREE-WAY CATALYTIC CONVERTER (TWC) SYSTEM

COMPONENTS

EC0DF-07



Rear TWC


Heated Oxygen Sensor Connector (Bank 2 Sensor 2)
Upper Cover
Floor Carpet
44 (440, 32)
Heated Oxygen Sensor (Bank 2 Sensor 2)
45 (450, 33)
Pipe Support Bracket
44 (440, 32)
TWC
◆ Gasket
Front Exhaust Pipe (with Rear TWC)
◆ Gasket
44 (440, 32)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P
B11907

EC04Z-01

INSPECTION

1. INSPECT EXHAUST PIPE ASSEMBLY

(a) Check the connections for looseness or damage.

(b) Check the clamps for weakness, cracks or damage.

2. INSPECT TWC

Check for dents or damage.

If any part of the protector is damaged or dented to the extent that it contacts the TWC, repair or replace it.

3. INSPECT TWC HEAT INSULATOR

(a) Check the heat insulator for damage.

(b) Check for adequate clearance between the catalytic converter and heat insulator.

EC050-07

REPLACEMENT

1. **REMOVE ENGINE COVER**
2. **REMOVE AIR CLEANER INLET**
3. **REMOVE AIR CLEANER ASSEMBLY AND MAF METER (See page EM-65)**
4. **DISCONNECT HEATED OXYGEN SENSORS (BANK 1 SENSOR 1, 2) FROM EXHAUST MANIFOLD**

(a) Disconnect the 3 oxygen sensor connectors.

(b) Disconnect the 2 oxygen sensors from the exhaust manifold.

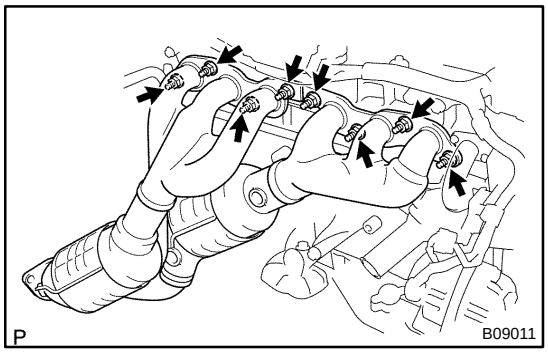
5. **REMOVE FRONT EXHAUST PIPE (WITH REAR TWC)**

(a) Take out the front side of the floor carpet.

(b) Disconnect the heated oxygen sensor (bank 2 sensor 2) connector.

(c) Remove the 2 bolts and pipe support bracket.

(d) Remove the 5 bolts, front exhaust pipe and 3 gaskets.



6. **REMOVE EXHAUST MANIFOLD (WITH FRONT TWC)**

(a) Using a 14 mm deep socket wrench, remove the 8 nuts, exhaust manifold and 2 gaskets.

(b) Remove the heated oxygen sensor (bank 2 sensor 1) form the exhaust manifold.

7. **REINSTALL EXHAUST MANIFOLD (WITH FRONT TWC)**

(a) Install the heated oxygen sensor (bank 2 sensor 1) to the exhaust manifold.

Torque: 45 N·m (450 kgf·cm, 33 ft·lbf)

(b) Install 2 new gaskets to the cylinder head.

(c) Using a 14 mm deep socket wrench, install a new exhaust manifold with 8 new nuts. Uniformly tighten the nuts in several passes.

Torque: 40 N·m (408 kgf·cm, 30 ft·lbf)

8. **REINSTALL FRONT EXHAUST PIPE (WITH REAR TWC)**

(a) Reinstall new 3 gaskets and front exhaust pipe with 5 bolts and support bracket.

Torque: 44 N·m (440 kgf·cm, 32 ft·lbf)

(b) Reinstall the pipe support bracket with the 2 bolts.

Torque: 44 N·m (440 kgf·cm, 32 ft·lbf)

9. **RECONNECT HEATED OXYGEN SENSORS (BANK 1 SENSOR 1, 2) TO EXHAUST MANIFOLD**

(a) Install the 2 oxygen sensors to the exhaust manifold.

Torque: 45 N·m (450 kgf·cm, 33 ft·lbf)

(b) Connect the 3 oxygen sensor connectors.

10. **REINSTALL AIR CLEANER ASSEMBLY AND MAF MATER (See page EM-71)**
11. **REINSTALL AIR CLEANER INLET**

12. REINSTALL ENGINE COVER

SFI SYSTEM

PRECAUTION

SF0N1-08

HINT:

Any diagnostic trouble code retained by the ECM will be erased when the battery negative (-) terminal cable is removed from the battery. Therefore, if necessary, read the diagnostic trouble code(s) before removing the negative (-) terminal cable from the battery.

1. BEFORE WORKING ON FUEL SYSTEM, DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY

2. DO NOT SMOKE OR WORK NEAR AN OPEN FLAME WHEN WORKING ON FUEL SYSTEM

3. KEEP GASOLINE AWAY FROM RUBBER OR LEATHER PARTS

4. MAINTENANCE PRECAUTIONS

(a) Precaution when the connecting gauge.
Use battery as the power source for the timing light, etc.

(b) In the event of engine misfire, these precautions should be taken.
  (1) Check proper connection of battery terminals, etc.
  (2) Handle high-tension cords carefully.
  (3) After repair work, check that the ignition coil terminals and all other ignition system lines are reconnected securely.
  (4) When cleaning the engine compartment, be especially careful to protect the electrical system from water.

(c) Precautions when the handling heated oxygen sensors.
  (1) Do not allow oxygen sensor to drop or hit against an object.
  (2) Do not allow the sensor to come into contact with water.

5. IF VEHICLE IS EQUIPPED WITH MOBILE RADIO SYSTEM (HAM, CB, ETC.)

If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.

6. AIR INDUCTION SYSTEM

(a) Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine to run out of tune.

(b) Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will cause air suction and cause the engine to run out of tune.

7. ELECTRONIC CONTROL SYSTEM

(a) Before removing SFI wiring connectors, terminals, etc., first disconnect the power by either turning the ignition switch OFF or disconnecting the negative (-) terminal cable from the battery.

HINT:

Always check the diagnostic trouble code before disconnecting the negative (-) terminal cable from the battery.

(b) When installing the battery, be especially careful not to incorrectly connect the positive (+) and negative (-) cable terminals.

(c) Do not permit parts to receive a severe impact during removal or installation. Handle all SFI parts carefully, especially the ECM.

(d) Do not be careless during troubleshooting as there are numerous transistor circuits and even slight terminal contact can further troubles.

(e) Do not open the ECM cover.

(f) When inspecting during rainy weather, take care to prevent entry of water. Also, when washing the engine compartment, prevent water from getting on the SFI parts and wiring connectors.

(g) Parts should be replaced as an assembly.

(h) Care is required when pulling out and inserting wiring connectors.

(1) Release the lock and pull out the connector, pulling on the connectors.

(2) Fully insert the connector and check that it is locked.

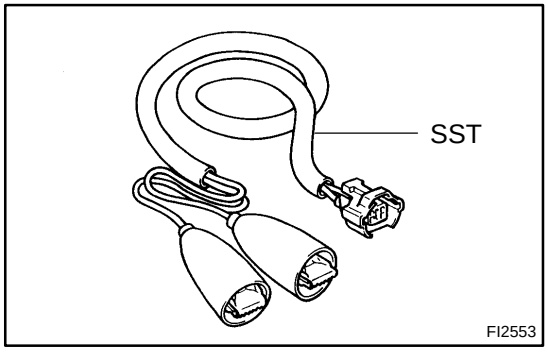
(i) When inspecting a connector with a volt/ohmmeter.

(1) Carefully take out the water-proofing rubber if it is a water-proof type connector.

(2) Insert the test probe into the connector from wiring side when checking the continuity, amperage or voltage.

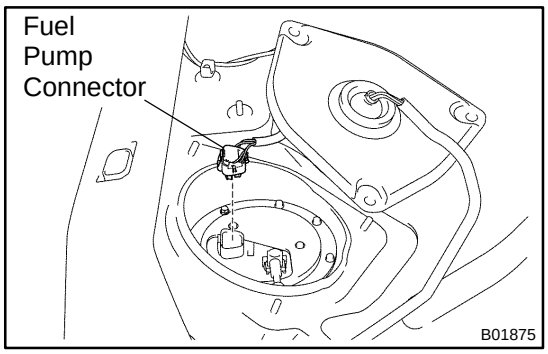
(3) Do not apply unnecessary force to the terminal.

(4) After checking, install the water-proofing rubber on the connector securely.



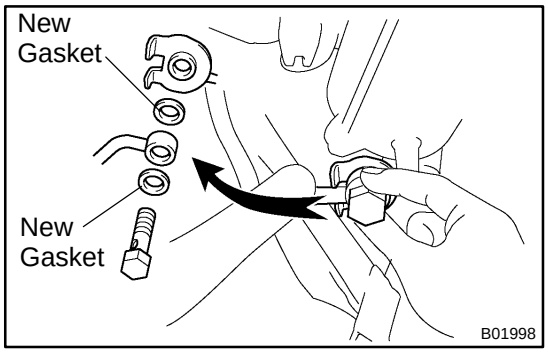
(5) Use SST for inspection or test of the injector or its wiring connector.

SST 09842-30070

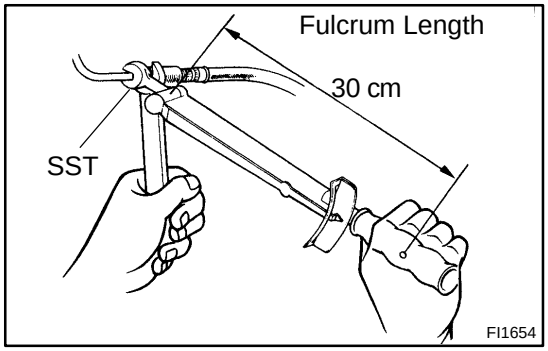


8. FUEL SYSTEM

(a) When disconnecting the high pressure fuel line, a large amount of gasoline will spill out, so observe these procedures:
   (1) Disconnect the fuel pump connector.
   (2) Start the engine. After the engine has stopped on its own, turn the ignition switch OFF.
   (3) Put a container under the connection.
   (4) Slowly loosen the connection.
   (5) Disconnect the connection.
   (6) Plug the connection with a rubber plug.
   (7) Reconnect the fuel pump connector.



(b) When connecting the flare nut or union bolt on the high pressure pipe union, observe these procedures:
   (1) Union Bolt Type:
   Always use a new gasket.
   (2) Union Bolt Type:
   Tighten the union bolt by hand.
   (3) Union Bolt Type:
   Tighten the union bolt to the specified torque.
   Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)



   (4) Flare Nut Type:
   Apply a light coat of engine oil to the flare and tighten the flare nut by hand.
   (5) Flare Nut Type:
   Using SST, tighten the flare nut to the specified torque.
   SST 09023-12701

NOTICE:

Do not rotate the fuel pipe, when tightening the flare nut.

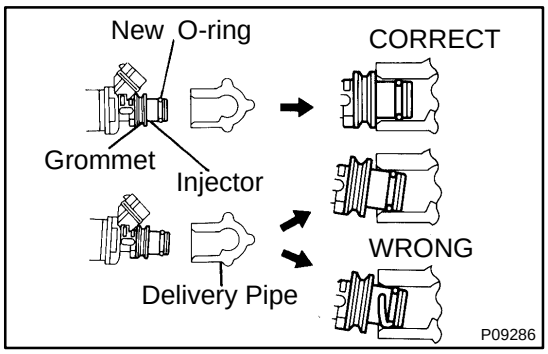
Torque:

30 N·m (310 kgf·cm, 22 ft·lbf) for using SST

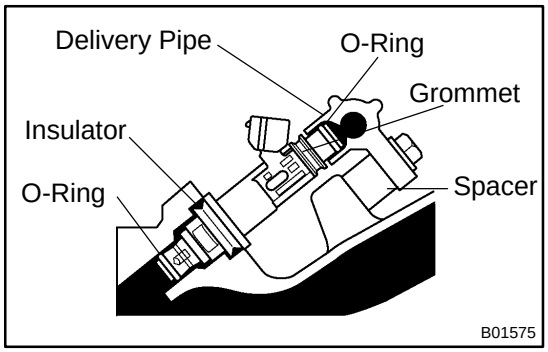
38 N·m (387 kgf·cm, 28 ft·lbf)

HINT:

Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

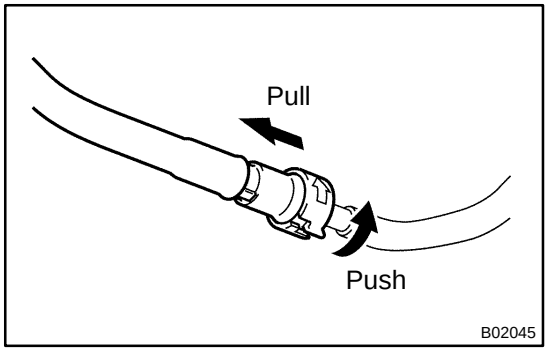


(c) Observe these precautions when removing and installing the injectors.
(1) Never reuse the O-ring.
(2) When placing a new O-ring on the injector, take care not to damage it in any way.
(3) Coat a new O-ring with spindle oil or gasoline before installing-never use engine, gear or brake oil.

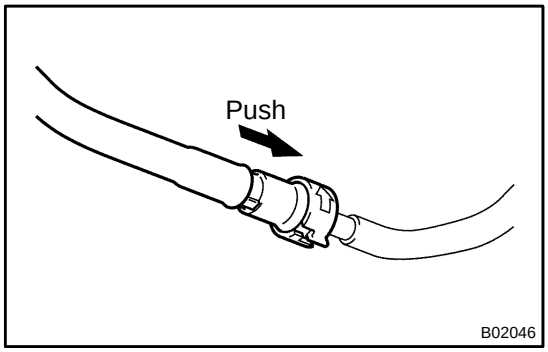


(d) Install the injector to the delivery pipe and intake manifold as shown in the illustration.
Before installing the injector, must apply spindle oil or gasoline on the place where a delivery pipe or an intake manifold touches an O-ring of the injector.

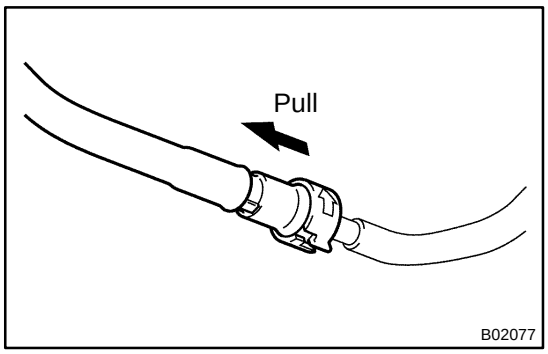
(e) Quick Type:
Observe these precautions when disconnecting the fuel tube connector:
(1) Check if there is any dirt like mud on the pipe and around the connector before disconnecting them and clean the dirt away.
(2) Be sure to disconnect with hands.



(3) When the connector and the pipe are stuck, push and pull the connector to free to disconnect and pull it out. Do not use any tool at this time.
(4) Inspect if there is any dirt or the likes on the seal surface of the disconnected pipe and clean it away.
(5) Prevent the disconnected pipe and connector from damaging and mixing foreign objects by covering them with a vinyl bag.

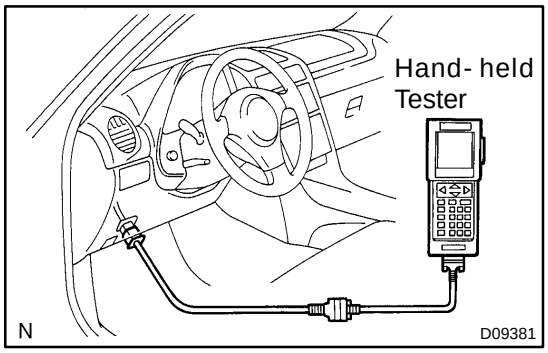


(f) Quick Type:
Observe these precautions when connecting the fuel tube connector:
(1) Check if there is any damage or foreign objects on the connected part of the pipe.
(2) Match the axis of the connector with axis of the pipe, and push in the connector until the connector makes a ”click” sound. In case the connections is tight, apply little amount of new engine oil on the tip of the pipe.



(3) After having finished the connection, check if the pipe and the connector are securely connected by pulling them.
(4) Check if there is any fuel leakage.

(g) Observe these precautions when handling nylon tube.
(1) Pay attention not to turn the connected part of the nylon tube and quick connector with force when connecting them.
(2) Pay attention not to kink the nylon tube.
(3) Do not remove the EPDM protector on the outside of the nylon tube.
(4) Must not close the piping with the nylon tube by bending it.



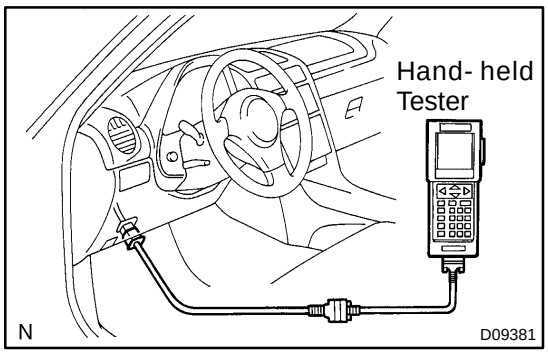
(h) Check that there are no fuel leaks after doing maintenance anywhere on the fuel system.
(1) Connect a hand-held tester to the DLC3.
(2) Connect the hand-held tester to the DLC3.
(3) Select the following menu items: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.

NOTICE:
Do not start the engine.

(4) Please refer to the hand-held tester operator's manual for further details.
(5) If you have no hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page SF-6).
(6) Check that there are no leaks from any part of the fuel system.
(7) Turn the ignition switch OFF.
(8) Disconnect the hand-held tester from the DLC3.
(9) Start the engine.

NOTICE:
Keep cranking the engine until the air is removed from the fuel line.

(10) After the engine starts, check again that there are no fuel leaks.



FUEL PUMP

SF0N2-10

ON-VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION

(a) Connect a hand-held tester to the DLC3.

(b) Turn the ignition switch ON and hand-held tester main switch ON.

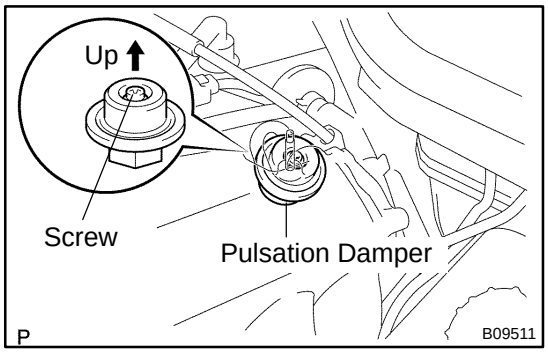
NOTICE:

Do not start the engine.

(c) Select the following menu items: DIAGNOSIS/ENHANCED OBD ll / ACTIVE TEST / FUEL PUMP / SPD.

(d) Please refer to the hand-held tester operator's manual for further details.

(e) If you have no hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See step 3).

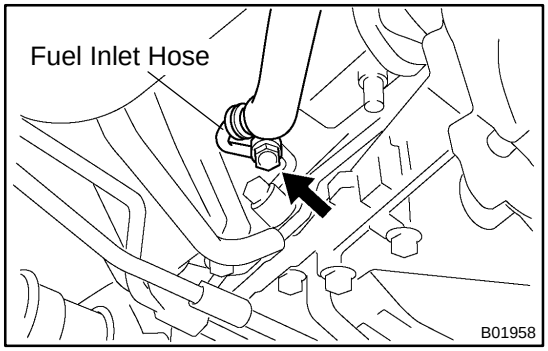


(f) Check that the pulsation damper screw rises up when the fuel pump operates.

If there is no pressure, check the fusible link, fuses, EFI main relay, fuel pump ECU, fuel pump, ECM and wiring connections.

(g) Turn the ignition switch OFF.

(h) Disconnect the hand-held tester from the DLC3.



2. CHECK FUEL PRESSURE

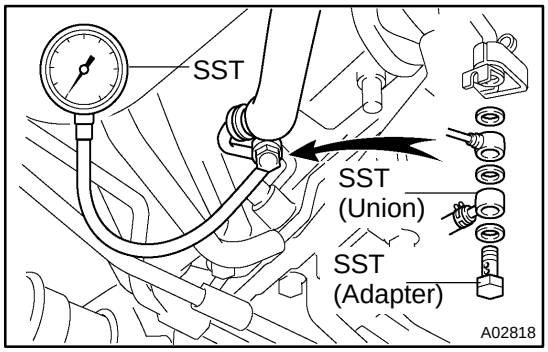
(a) Check the battery positive voltage is above 12 V.

(b) Disconnect the negative (-) terminal cable from the battery.

(c) Remove the union bolt and 2 gaskets, and disconnect the fuel inlet hose from the fuel pipe support.

NOTICE:

- **Put a shop towel under the fuel pipe support.**
- **Slowly loosen the union bolt.**

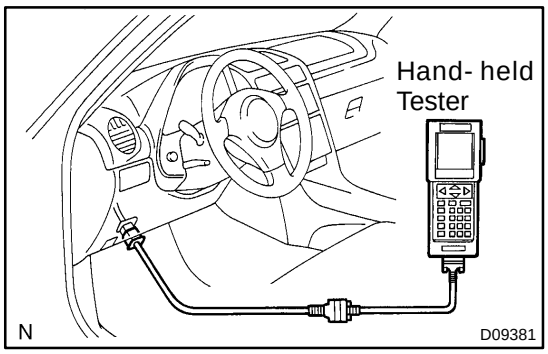


(d) Install the fuel inlet hose and SST (pressure gauge) to the fuel pipe support with the 3 gaskets and SST (union and adapter).

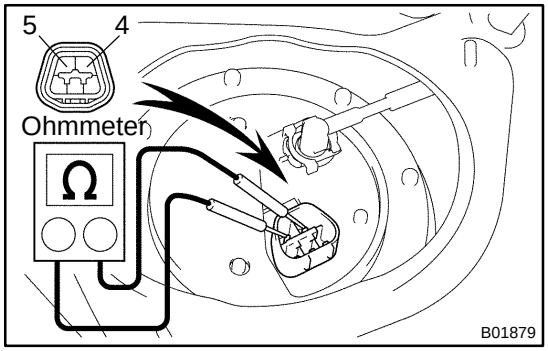
SST 09268-45014 (09268-41190, 90405-06167)

Torque: 29 N·m (300 kgf·cm, 21 ft·lbf)

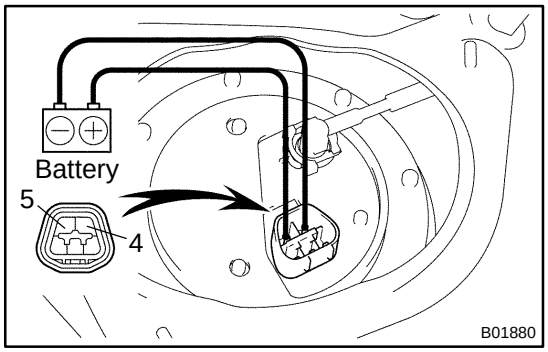
(e) Wipe off any splattered gasoline.



(f) Connect a hand-held tester to the DLC3 (See step 1 in check fuel pump operation (a) to (e)).
(g) Measure the fuel pressure.
Fuel pressure:
304 - 343 kPa (3.1 - 3.5 kgf/cm^2, 44 - 50 psi)
If pressure is high, replace the fuel pressure regulator.
If pressure is low, check the fuel hoses and connections, fuel pump, fuel filter and fuel pressure regulator.
(h) Disconnect the hand-held tester from the DLC3.
(i) Start the engine.
(j) Measure the fuel pressure at idle.
Fuel pressure:
304 - 343 kPa (3.1 - 3.5 kgf/cm^2, 44 - 50 psi)
(k) Stop the engine.
(l) Check that the fuel pressure remains as specified for 5 minutes after the engine has stopped.
Fuel pressure: 147 kPa (1.5 kgf/cm^2, 21 psi) or more
If pressure is not as specified, check the fuel pump, pressure regulator and/or injectors.
(m) After checking fuel pressure, disconnect the negative (-) terminal cable from the battery and carefully remove SST to prevent gasoline from splashing.
SST 09268-45014
(n) Reconnect the fuel inlet hose to the fuel pipe support with 2 new gaskets and the union bolt.
Torque: 29 N·m (300 kgf·cm, 21 ft·lbf)
(o) Reconnect the negative (-) terminal cable to the battery.
(p) Check for fuel leaks.



3. INSPECT FUEL PUMP
(a) Remove the rear seat cushion.
(b) Remove the 3 cap nuts and floor service hole cover.
(c) Disconnect the fuel pump & sender gauge connector.
(d) Using an ohmmeter, measure the resistance between terminals 4 and 5.
Resistance: 0.2 - 3.0 Ω at 20˚C (68˚F)
If the resistance is not as specified, replace the fuel pump.



(e) Inspect the fuel pump operation.
Connect the positive (+) lead from the battery to terminal 4 of the connector, and the negative (-) lead to terminal 5. Check that the fuel pump operates.

NOTICE:
- **These tests must be done quickly (within 10 seconds) to prevent the coil burning out.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always do the switching at the battery side.**

If operation is not as specified, replace the fuel pump.

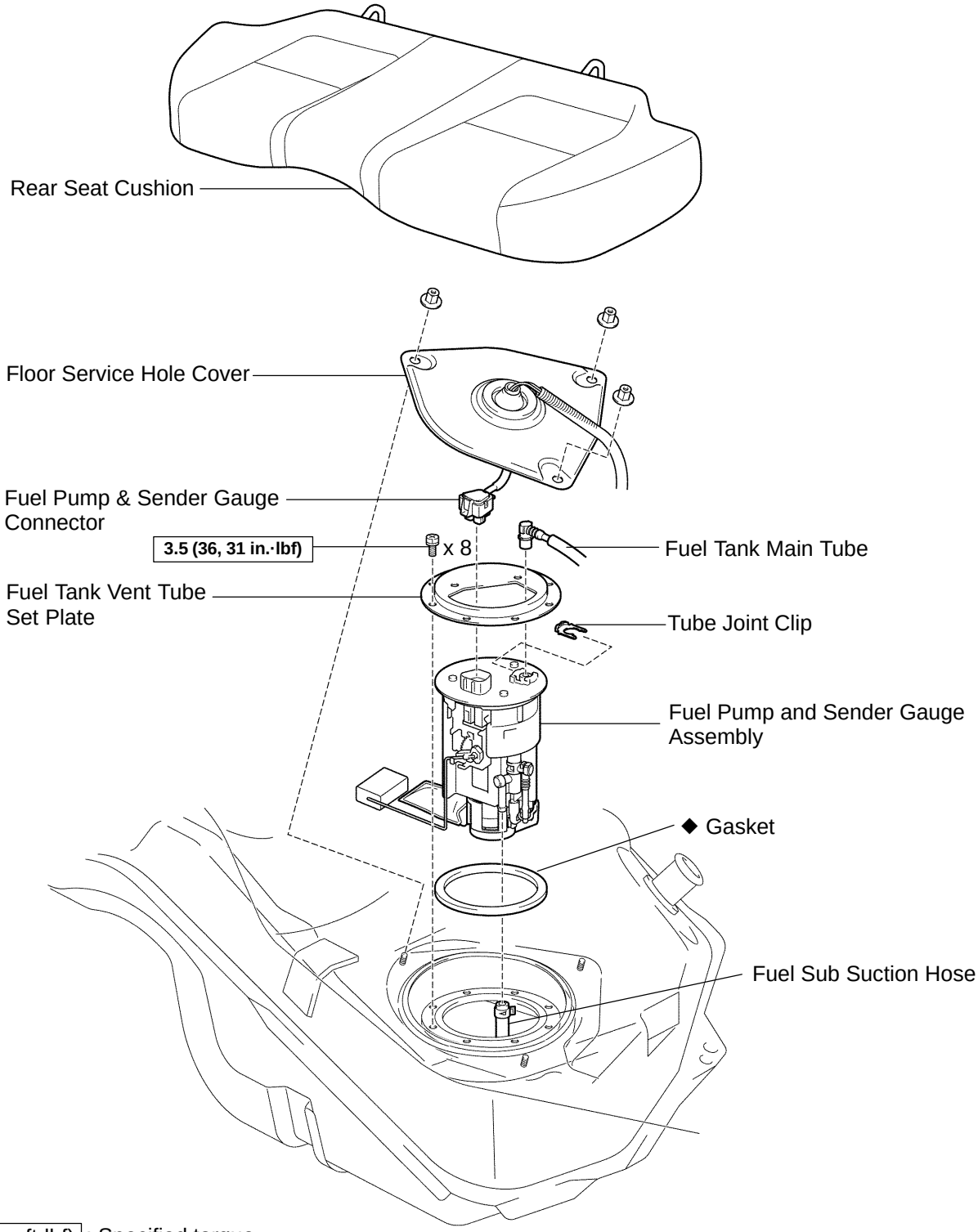
(f) Reconnect the fuel pump & sender gauge connector.

(g) Reinstall the floor service hole cover with the cap nuts.

(h) Reinstall the rear seat cushion.

SF0N3-10

COMPONENTS

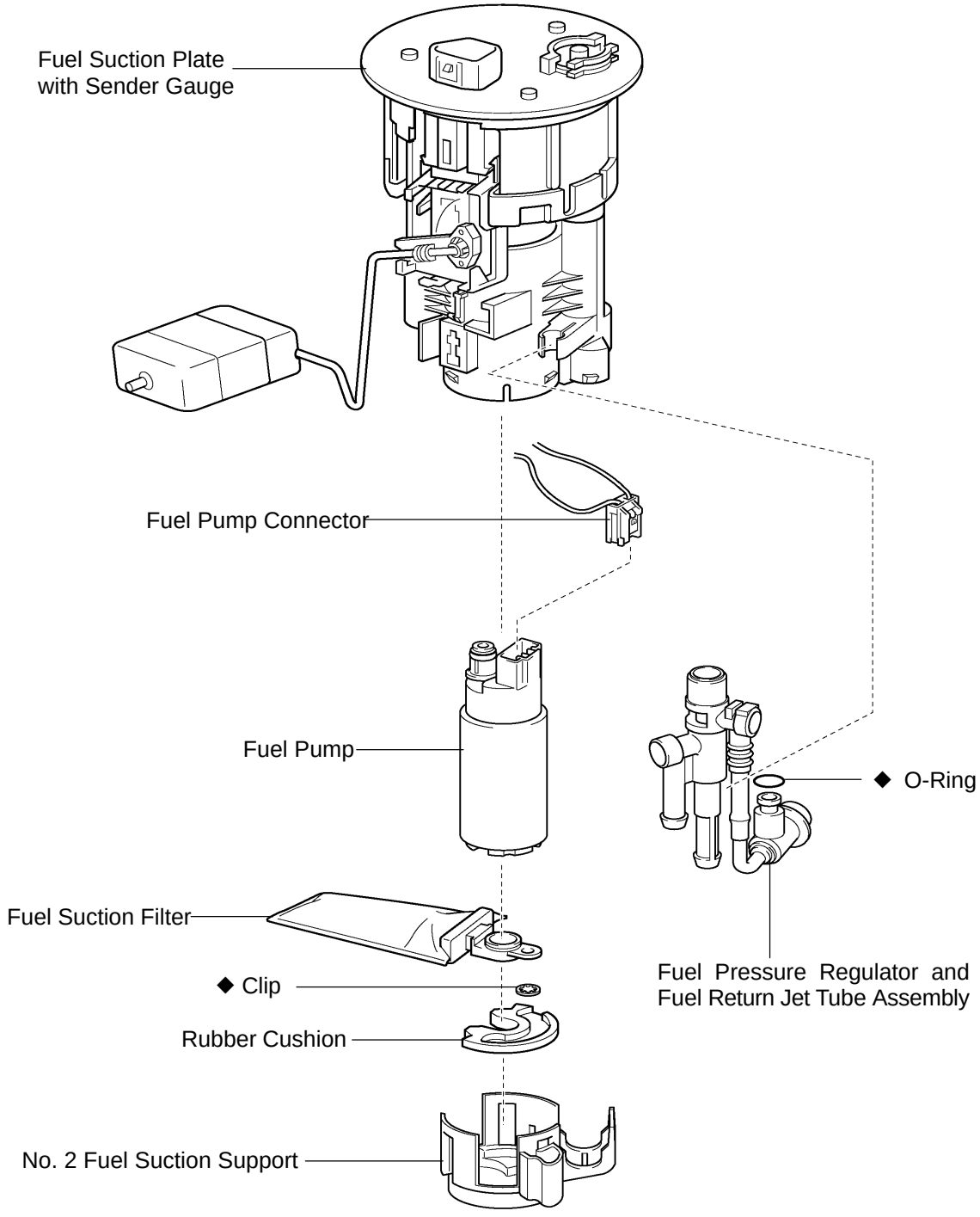


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

P

B11928



Y

◆ Non-reusable part

B10328

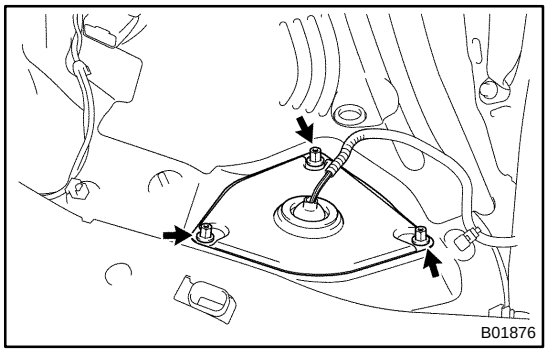
SF1LB-02

REMOVAL

CAUTION:

Do not smoke or work near an open frame when working the fuel pump.

1. REMOVE REAR SEAT CUSHION



2. REMOVE FLOOR SERVICE HOLE COVER

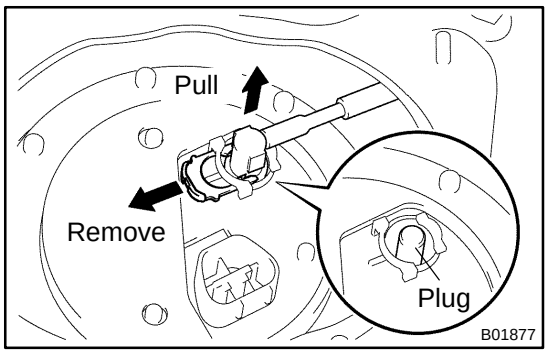
Remove the 3 cap nuts and service hole cover.

3. DISCONNECT FUEL PUMP & SENDER GAUGE CONNECTOR

4. DISCONNECT FUEL TANK MAIN TUBE (FUEL TUBE CONNECTOR) FROM FUEL SECTION PLATE

CAUTION:

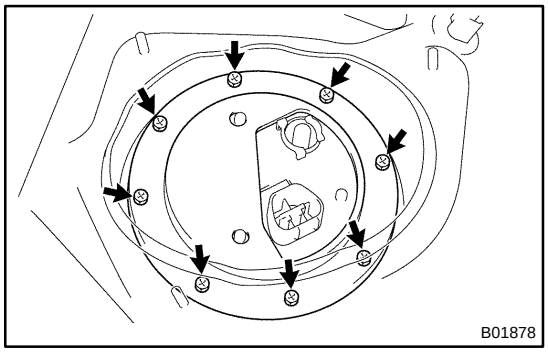
- **Perform disconnecting operation of the fuel tube connector (quick type) after observing precaution (See page SF-1).**
- **As there is retained pressure in the fuel line, prevent it from splashing inside the vehicle compartment.**



(a) Remove the tube joint clip.

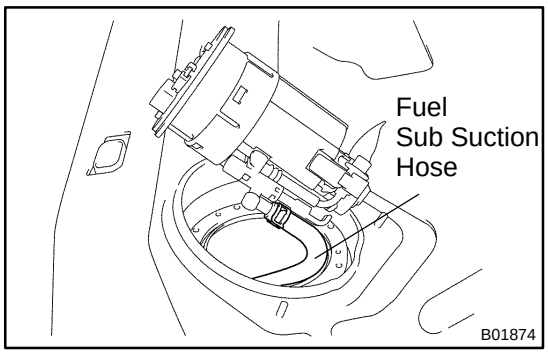
(b) Pull out the fuel main tube.

(c) Plug the port of the fuel suction plate with a clean rubber cap.



5. REMOVE FUEL PUMP AND SENDER GAUGE ASSEMBLY FROM FUEL TANK

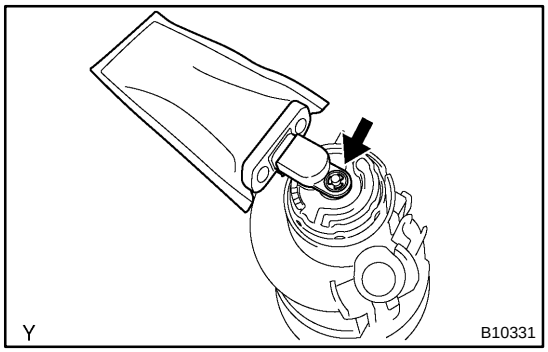
(a) Remove the 8 bolts and fuel tank vent tube set plate.



(b) Lift up the fuel pump and sender gauge assembly, and disconnect the fuel sub suction hose from the fuel return jet tube and remove the fuel pump, sender gauge assembly and gasket.

6. REMOVE NO. 2 FUEL SUCTION SUPPORT (See page SF-17)

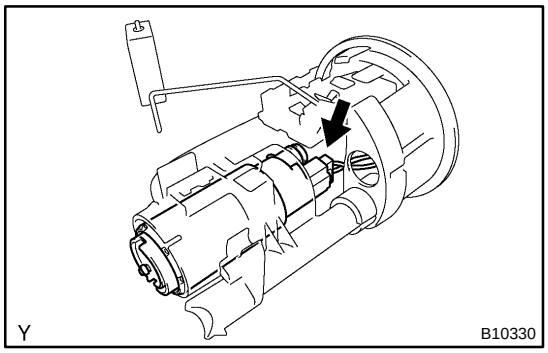
7. REMOVE FUEL PRESSURE REGULATOR AND FUEL RETURN JET TUBE ASSEMBLY (See page SF-17)



8. REMOVE FUEL SUCTION FILTER

(a) Remove the clip.

(b) Pull out the suction filter.



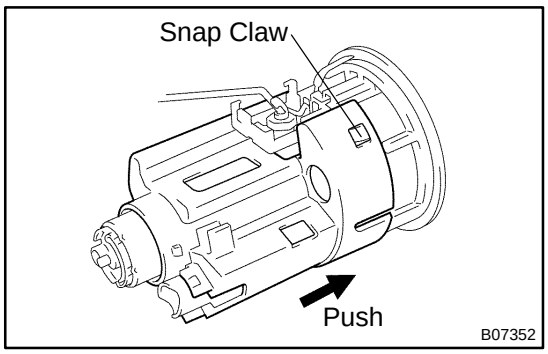
9. REMOVE FUEL PUMP

(a) Disconnect the fuel pump connector from the fuel pump.

(b) Pull out the fuel pump.

SF1LC-03

INSTALLATION

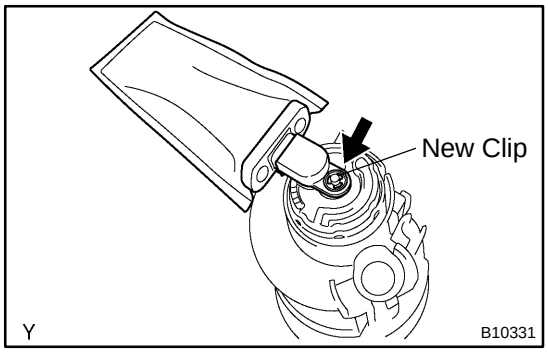


1. INSTALL FUEL PUMP

(a) Apply a light coat of gasoline to the O-ring.

(b) Push in the fuel pump.

(c) Connect the fuel pump connector.

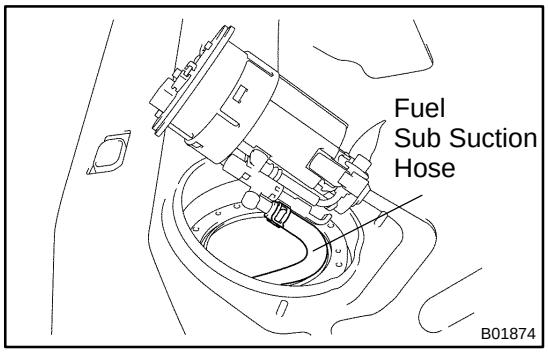


2. INSTALL FUEL SUCTION FILTER

Install the suction filter with a new clip.

3. INSTALL FUEL PRESSURE REGULATOR AND FUEL RETURN JET TUBE ASSEMBLY (See page SF-18)

4. INSTALL NO. 2 FUEL SUCTION SUPPORT (See page SF-18)

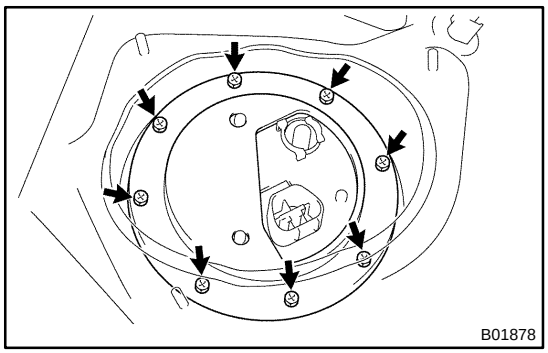


5. INSTALL FUEL PUMP AND SENDER GAUGE ASSEMBLY TO FUEL TANK

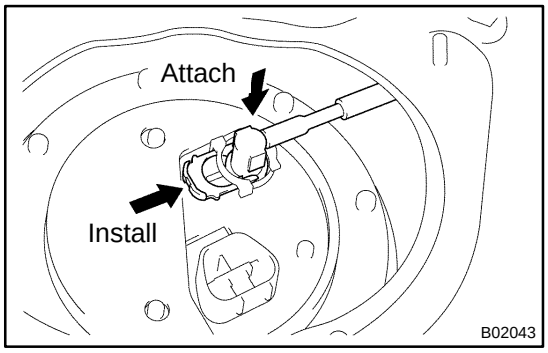
(a) Install a new gasket to the fuel suction plate.

(b) Connect the fuel sub suction hose to the fuel return jet tube.

(c) Attach the fuel pump and sender gauge assembly to the fuel tank.



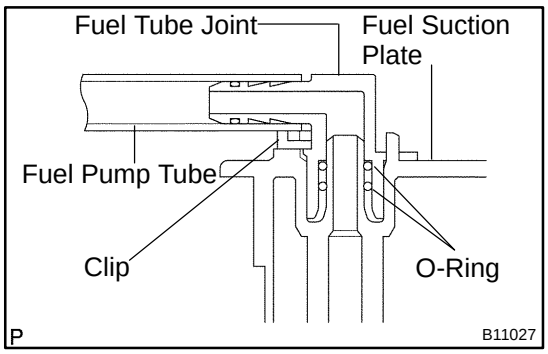
(d) Install the fuel tank vent tube set plate with the 8 bolts.
Torque: 3.5 N·m (36 kgf·cm, 31 in.·lbf)

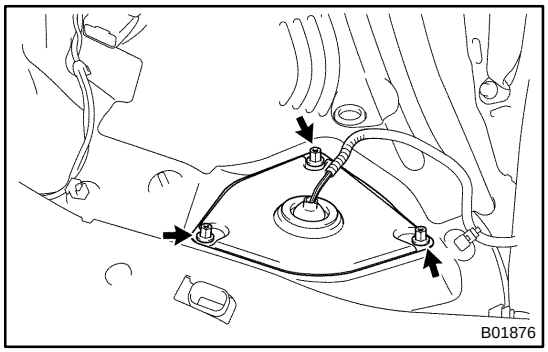


6. CONNECT FUEL TANK MAIN TUBE (FUEL TUBE CONNECTOR) TO FUEL SUCTION PLATE

(a) Attach the fuel tube connector to the port of the fuel suction plate.

(b) Install the tube joint clip.





NOTICE:

- **Check that the connector is inserted fully and securely.**
- **Check that the clip of the tube joint is on the collar of the connector.**
- **After installing the clip of the tube joint, check that the connector is not pulled off.**

7. CONNECT FUEL PUMP & SENDER GAUGE CONNECTOR

8. CHECK FOR FUEL LEAKS (See page SF-1)

9. INSTALL FLOOR SERVICE HOLE COVER

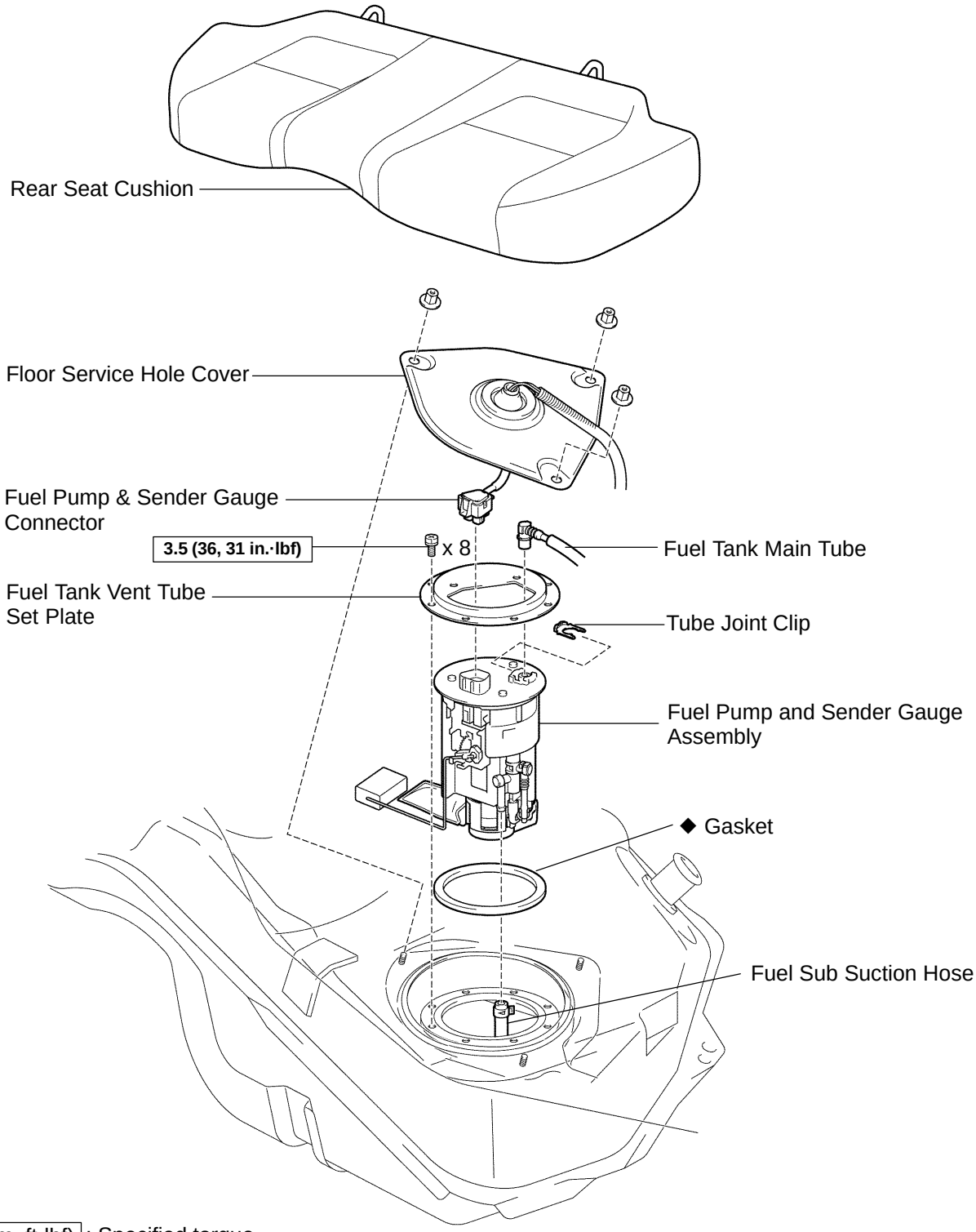
Install the service hole cover with the 3 cap nuts.

10. INSTALL REAR SEAT CUSHION

FUEL PRESSURE REGULATOR

SF0N6-07

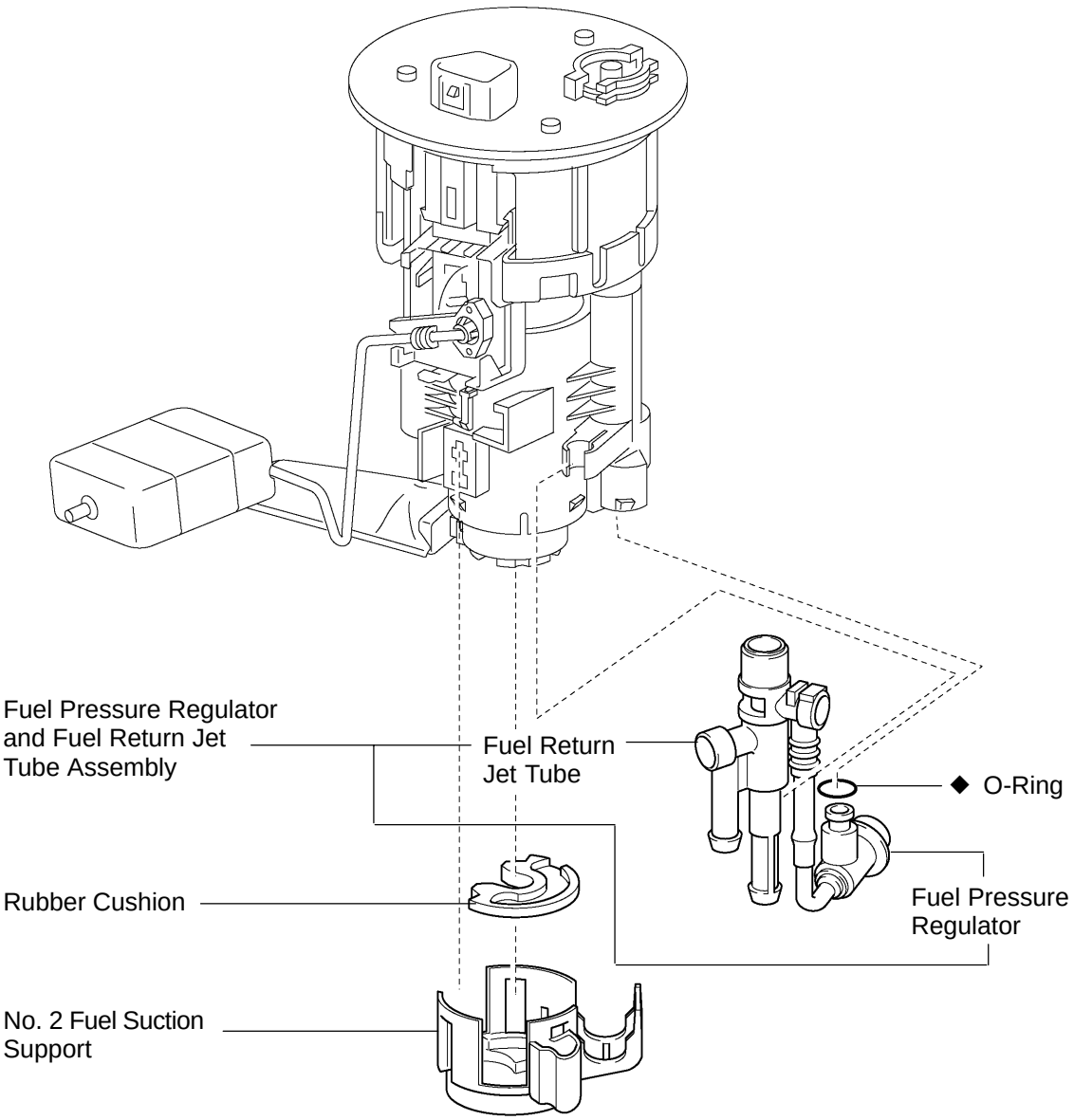
COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

B11928



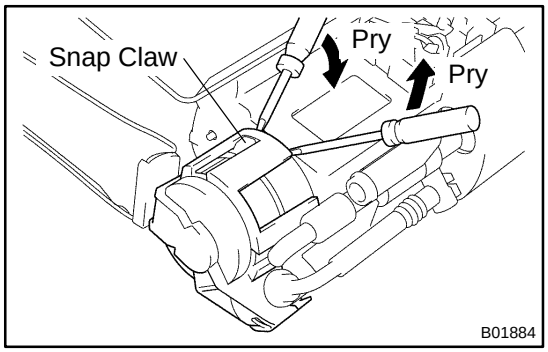
Y ◆ Non-reusable part

B10327

SF0N7-09

REMOVAL

1. REMOVE FUEL PUMP AND SENDER GAUGE ASSEMBLY FROM FUEL TANK (See page SF-11)



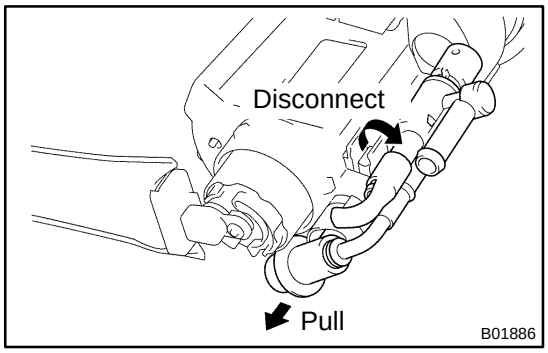
2. REMOVE NO. 2 FUEL SUCTION SUPPORT

(a) Using 2 screwdrivers, disconnect the 4 snap claws from the claw holes and remove the fuel suction support.

NOTICE:

Be careful not to damage the suction supports.

(b) Remove the rubber cushion.



3. REMOVE FUEL PRESSURE REGULATOR AND FUEL RETURN JET TUBE ASSEMBLY

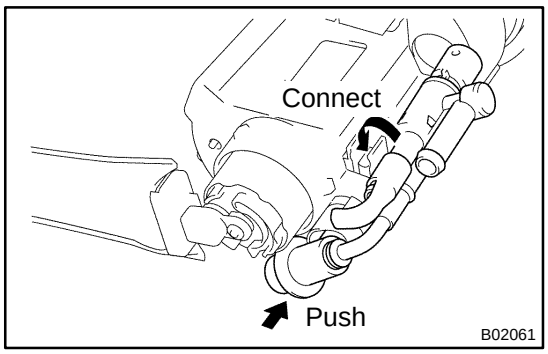
(a) Disconnect the fuel return jet tube from the clamp of the No.2 fuel suction support.

(b) Pull out the fuel pressure regulator from the fuel filter, and remove the fuel pressure regulator and fuel return jet tube assembly.

(c) Remove the O-ring from the fuel pressure regulator.

SF0N8-09

INSTALLATION



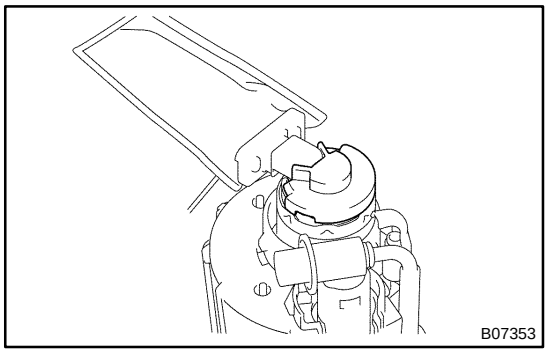
1. INSTALL FUEL PRESSURE REGULATOR AND FUEL RETURN JET TUBE ASSEMBLY

(a) Apply a light coat of gasoline to a new O-ring, and install it to the fuel pressure regulator.

(b) Push in the fuel pressure regulator to the fuel filter.

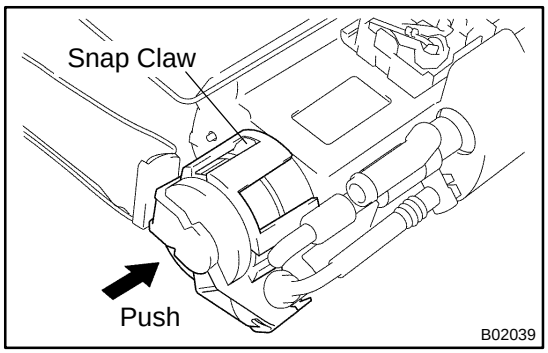
(c) Check that the fuel pressure regulator rotates smoothly. If it does not rotates smoothly, the O-ring may be pinched, so remove the fuel pressure regulator and perform again steps (b) and (c) above.

(d) Connect the fuel return jet tube to the clamp of the No. 2 fuel suction support.



2. INSTALL NO. 2 FUEL SUCTION SUPPORT

(a) Install the rubber cushion to the fuel pump.



(b) Push the fuel suction support, and attach the 4 snap claws to the claw holes.

3. INSTALL FUEL PUMP AND SENDER GAUGE ASSEMBLY TO FUEL TANK (See page SF-13)

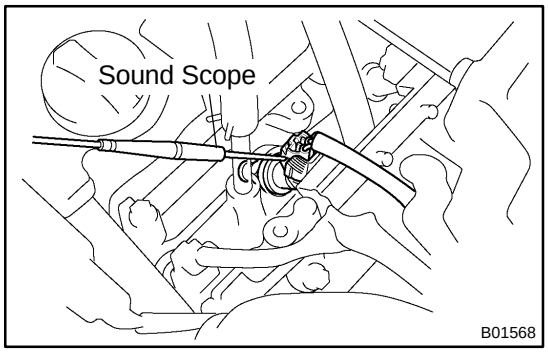
INJECTOR

SF0N9-10

ON-VEHICLE INSPECTION

1. REMOVE ENGINE COVER

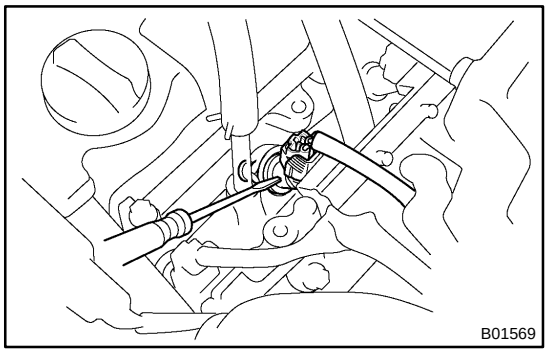
Remove 4 nuts and engine cover.



2. INSPECT INJECTOR OPERATION

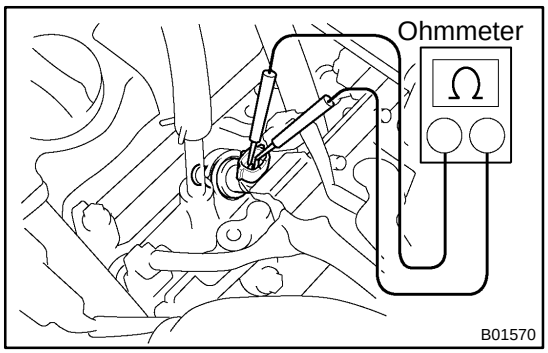
Check operation sound from each injector.

(1) With the engine running or cranking, use a sound scope to check that there is normal operating noise in proportion to engine speed.



(2) If you have no sound scope, you can check the injector transmission operation with a screwdriver.

If no sound or an unusual sound is heard, check the wiring connector, injector or injection signal from the ECM.



3. INSPECT INJECTOR RESISTANCE

(a) Disconnect the injector connectors.

(b) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 13.4 - 14.2 Ω at 20°C (68°F)

If the resistance is not as specified, replace the injector.

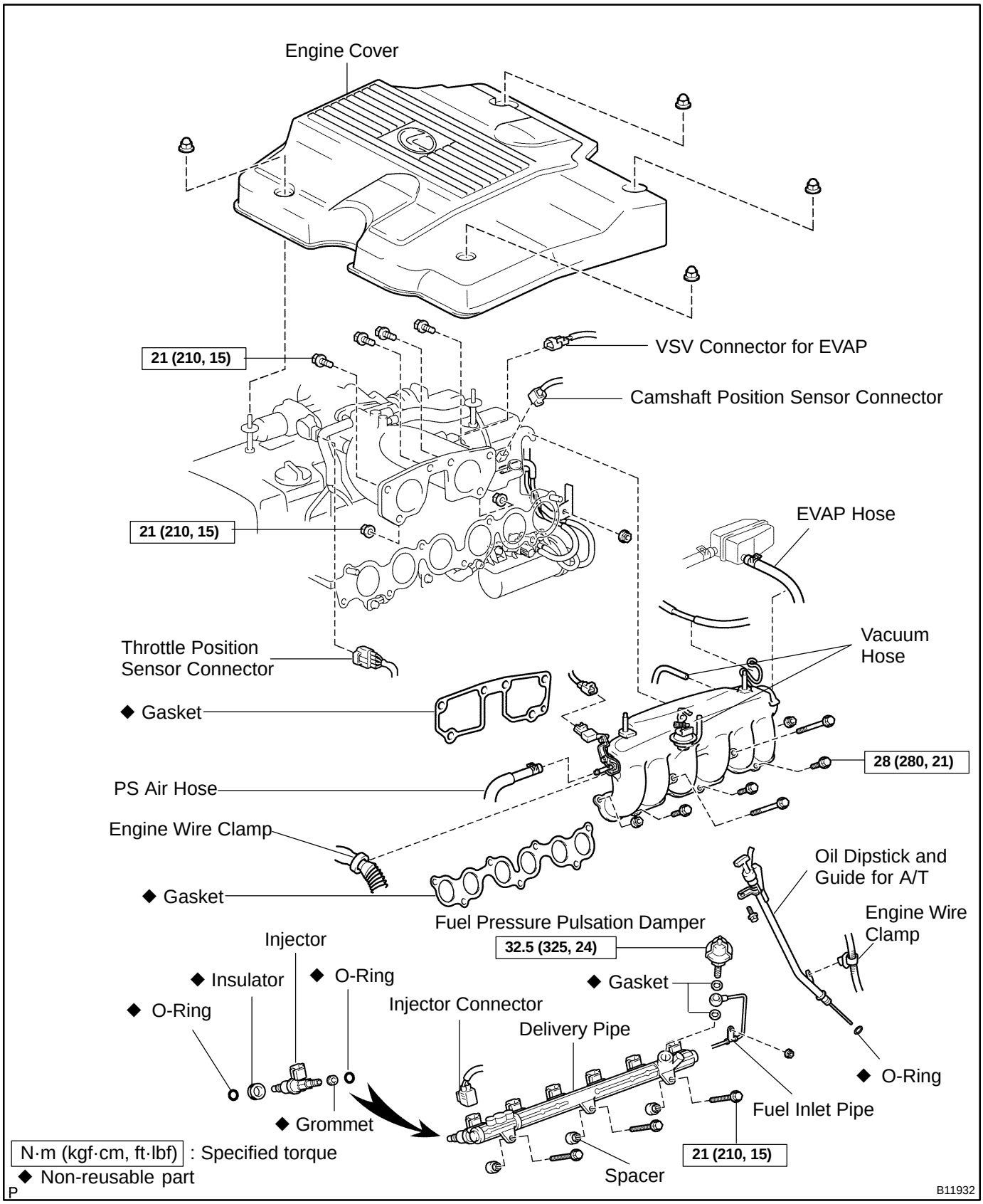
(c) Reconnect the injector connectors.

4. REINSTALL ENGINE COVER

Install the engine cover with the 4 nuts.

SF151-05

COMPONENTS



SF0NB-08

REMOVAL

1. REMOVE ENGINE COVER

Remove the 4 nuts and engine cover.

2. REMOVE AIR INTAKE CHAMBER (See page SF-46)

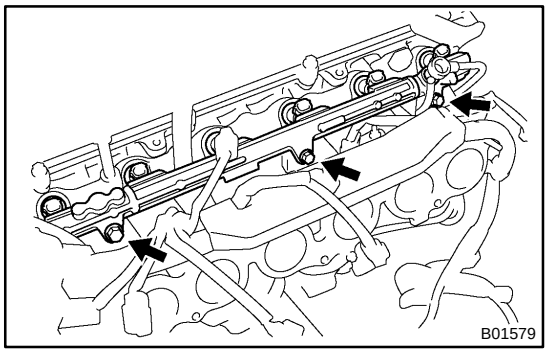
3. REMOVE FUEL PRESSURE PULSATION DAMPER (See page SF-26)

4. REMOVE DELIVERY PIPE AND INJECTORS

NOTICE:

- **Be careful not to drop the injectors when removing the delivery pipe.**
- **Pay attention to put any hung load on the injector to and from the side direction.**

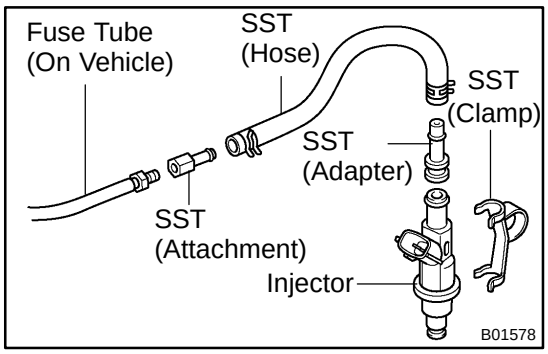
(a) Disconnect the 6 injector connectors.
(b) Disconnect the camshaft position sensor connector.
(c) Disconnect the throttle position sensor connector.
(d) Disconnect the VSV connector for EVAP.



(e) Remove the 3 bolts and delivery pipe together with the 6 injectors.
(f) Pull out the 6 injectors from the delivery pipe.
(g) Remove the 2 O-rings, grommet and insulator from each injector.
(h) Remove the 3 spacers from the intake manifold.

SF0NC-09

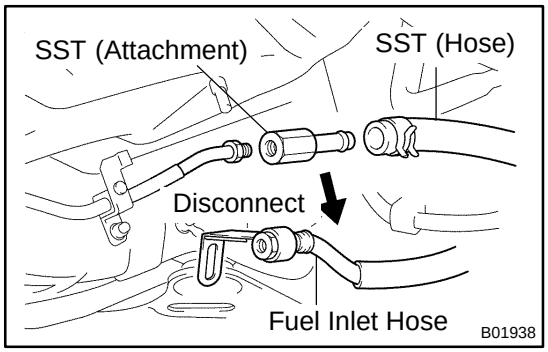
INSPECTION



1. INSPECT INJECTOR INJECTION

CAUTION:

Keep injector clear of sparks during the test.

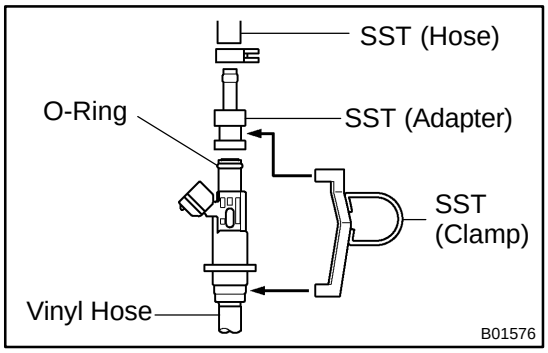


(a) Remove the nut, and disconnect the fuel inlet hose from the fuel main tube.

(b) Temporarily install SST (attachment) to the fuel main tube.
SST 09268-41047 (09268-52011)

(c) Tighten the flare nut on the fuel main tube (See page SF-1).

(d) Connect SST (hose) to the SST (attachment).
SST 09268-41047



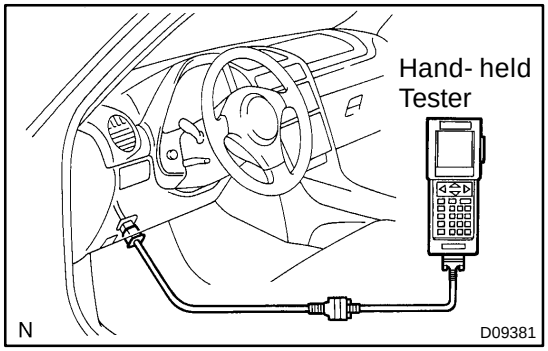
(e) Install the O-ring to the injector.

(f) Connect SST (hose) to the injector with SST (adapter), and hold the injector and adapter with SST (clamp).
SST 09268-41047 (09268-41110, 09268-41300)

(g) Put the injector into the graduated cylinder.

CAUTION:

Install a suitable vinyl hose onto the injector to prevent gasoline from splashing out.



(h) Connect the hand-held tester to the DLC3.

(i) Connect the battery negative (-) terminal cable to the battery.

(j) Turn the ignition switch ON and hand-held tester main switch ON.

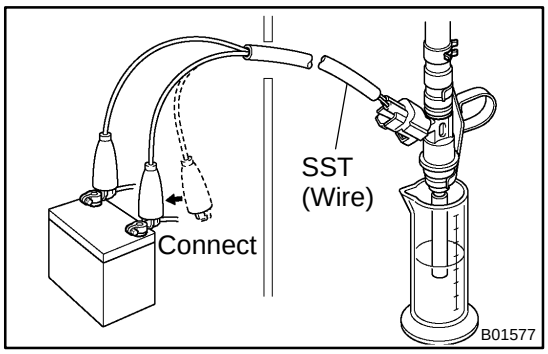
NOTICE:

Do not start the engine.

(k) Select the ACTIVE TEST mode on the hand-held tester.

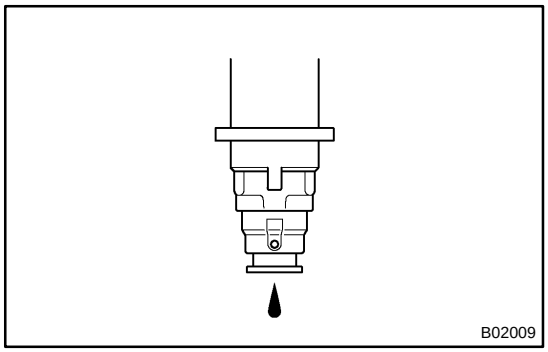
(l) Please refer to the hand-held tester operator's manual for further details.

(m) If you have no hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page SF-6).



(n) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector 2 or 3 times.
SST 09842-30070
Injection volume:
60 - 73 cm^3 (3.7 - 4.5 cu in.) per 15 sec.
Difference between each injector:
13 cm^3 (0.8 cu in.) or less

If the injection volume is not as specified, replace the injector.



2. INSPECT LEAKAGE

(a) In the condition above, disconnect the test probes of SST (wire) from the battery and check the fuel leakage from the injector.
SST 09842-30070
Fuel drop: 1 drop or less per 12 min.

(b) Turn the ignition switch OFF.

(c) Disconnect the negative (-) terminal cable from the battery.

(d) Remove the SST.
SST 09268-41047, 09842-30070

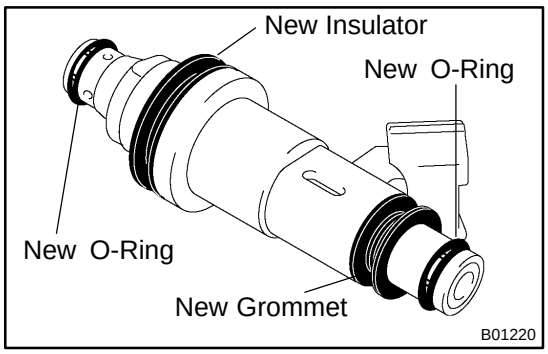
(e) Reconnect the fuel inlet hose to the fuel main tube (See page SF-1).

(f) Install the fuel inlet hose with the nut.
Torque: 9 N·m (90 kgf·cm, 80 in.·lbf)

(g) Disconnect the hand-held tester from the DLC3.

SF0ND-08

INSTALLATION

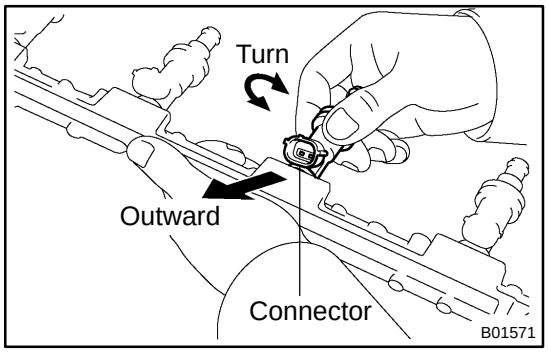


1. INSTALL INJECTORS AND DELIVERY PIPE

(a) Install new insulator and grommet to each injector.

(b) Apply a light coat of spindle oil or gasoline to 2 new O-rings and install them to each injector.

(c) Apply a light coat of spindle oil or gasoline on the place where a delivery pipe touches an O-ring of the injector.



(d) While turning the injector clockwise and counterclockwise, push it to the delivery pipe. Install the 6 injectors.

(e) Position the injector connector outward.

(f) Place the 3 spacers in position on the intake manifold.

(g) Apply a light coat of spindle oil or gasoline on the place where a intake manifold touches an O-ring of the injector.

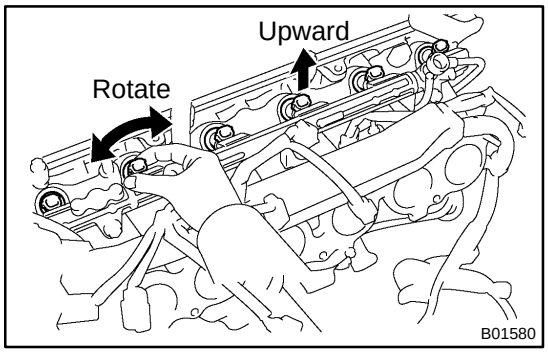
(h) Place the 6 injectors together with the delivery pipe and 3 bolts in position on the intake manifold.

(i) Temporarily install the 3 bolts holding the delivery pipe to the intake manifold.

(j) Check that the injectors rotate smoothly.

HINT:

If injectors do not rotate smoothly, the probable cause is incorrect installation of O-rings. Replace the O-rings.



(k) Position the injector connector upward.

(l) Connect the 6 injector connectors.

HINT:

The Nos.1, 3, 5 injector connectors and dark gray, and the Nos. 2, 4, 6 injector connectors are brown.

(m) Tighten the 3 bolts holding the delivery pipe to the intake manifold.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(n) Connect the camshaft position sensor connector.

(o) Connect the throttle position sensor connector.

(p) Connect the VSV connector for EVAP.

2. INSTALL FUEL PRESSURE PULSATION DAMPER (See page SF-27)

3. INSTALL AIR INTAKE CHAMBER (See page SF-49)

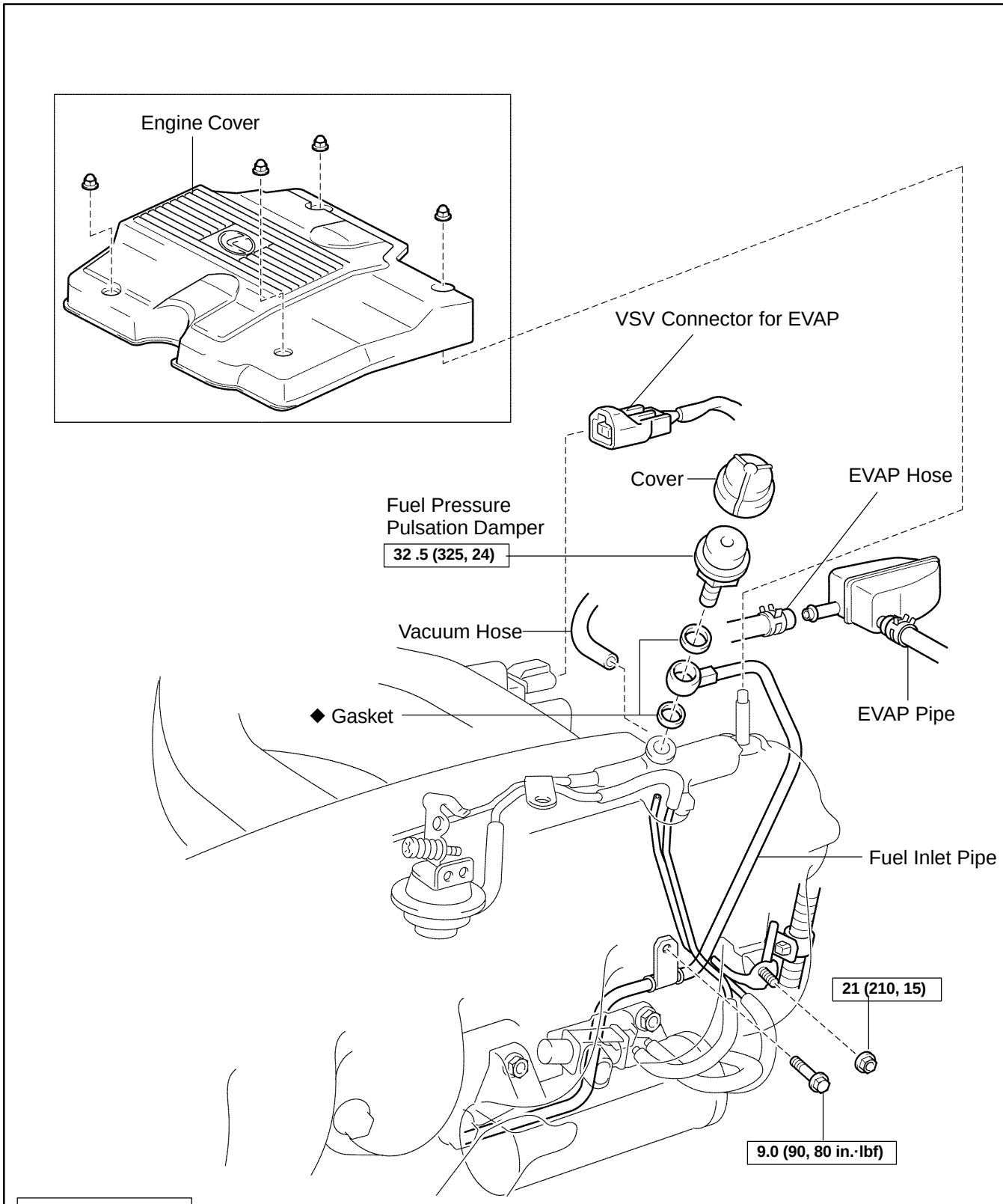
4. INSTALL ENGINE COVER

Install the engine cover with the 4 nuts.

FUEL PRESSURE PULSATION DAMPER

COMPONENTS

SF0NE-10

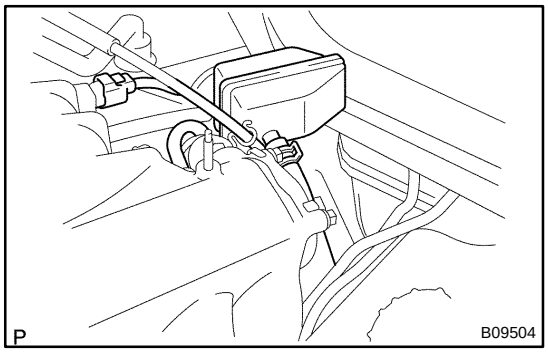


SF0NF-07

REMOVAL

1. REMOVE ENGINE COVER

Remove the 4 nuts and engine cover.

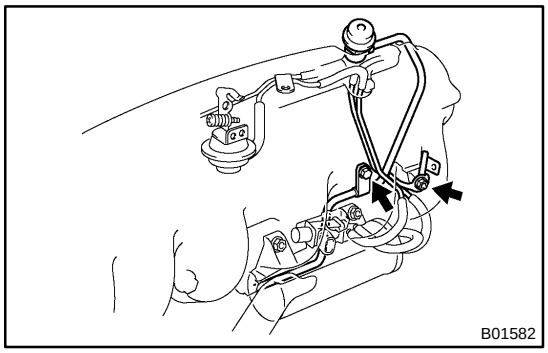


2. DISCONNECT CONNECTOR AND HOSES

(a) Disconnect the VSV connector for the EVAP.

(b) Disconnect the EVAP hose from the EVAP pipe.

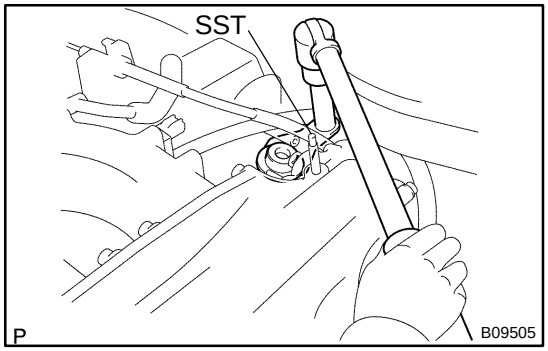
(c) Disconnect the vacuum hose (from No. 2 vacuum pipe) from the air intake chamber.



3. REMOVE FUEL PRESSURE PULSATION DAMPER

(a) Remove the nut holding the No. 2 vacuum pipe to the intake manifold.

(b) Remove the bolt holding the fuel inlet pipe to the intake manifold.



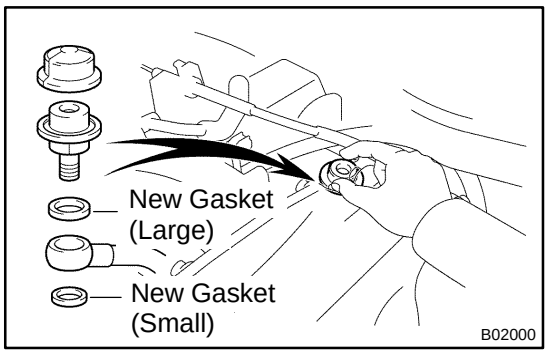
(c) Using SST, remove the pulsation damper and 2 gaskets.
SST 09612-24014 (09617-24011)

CAUTION:

- **Put a shop towel under the delivery pipe.**
- **Slowly loosen the pulsation damper.**

SF0NG-08

INSTALLATION

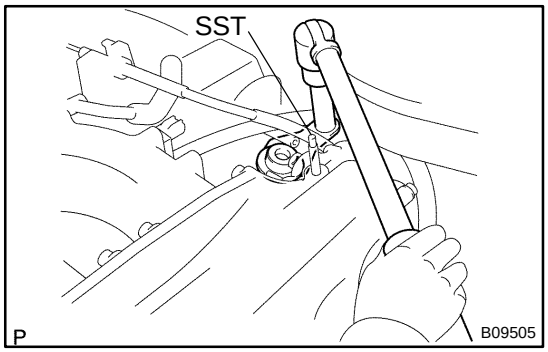


1. INSTALL FUEL PRESSURE PULSATION DAMPER

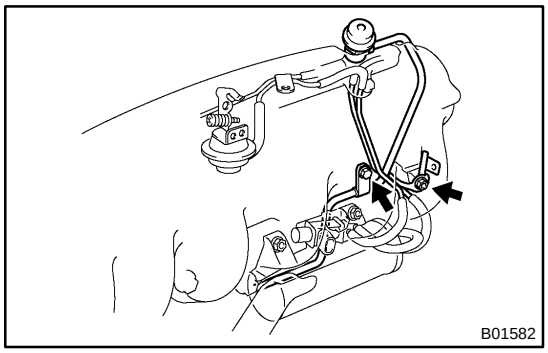
(a) Install the fuel inlet pipe and pulsation damper with 2 new gaskets.

HINT:

Different the gaskets are used for the upper (large side) and lower (small side).

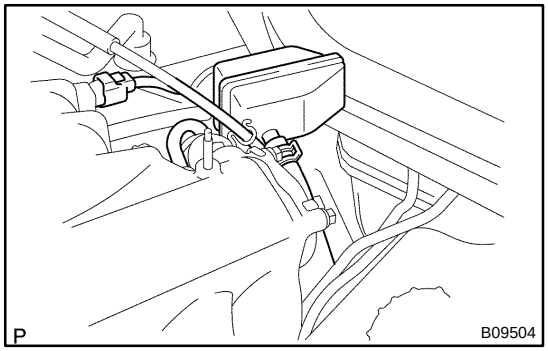


(b) Using SST, tighten the pulsation damper.
SST 09612-24014 (09617-24011)
Torque: 32.5 N·m (325 kgf·cm, 24 ft·lbf)



(c) Install the bolt holding the fuel inlet pipe to the intake manifold.
Torque: 9.0 N·m (90 kgf·cm, 80 in.·lbf)

(d) Install the nut holding the No. 2 vacuum pipe to the intake manifold.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)



2. CONNECT CONNECTOR AND HOSES

(a) Connect the vacuum hose (from No. 2 vacuum pipe) to the air intake chamber.

(b) Connect the EVAP hose to the EVAP pipe.

(c) Connect the VSV connector for the EVAP.

3. INSTALL ENGINE COVER

Install the engine cover with the 4 nuts.

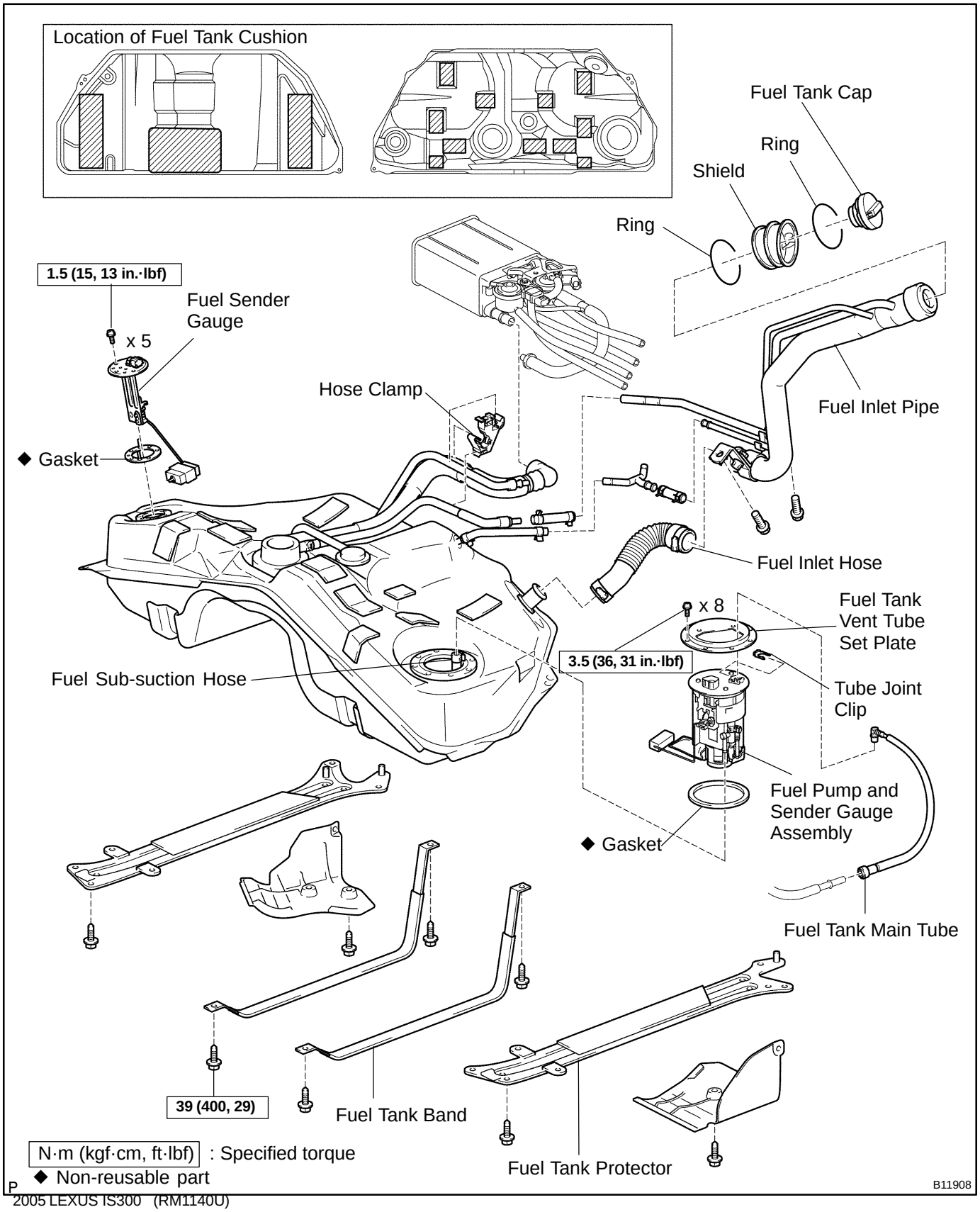
FUEL TANK AND LINE

SF0NH-07

COMPONENTS

CAUTION:

- **Always use new gaskets when replacing the fuel tank or component parts.**
- **Apply the proper torque to all parts tightened**



SF0NI-10

INSPECTION

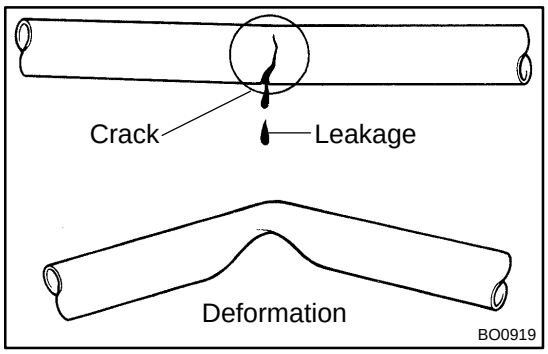
INSPECT FUEL TANK AND LINE

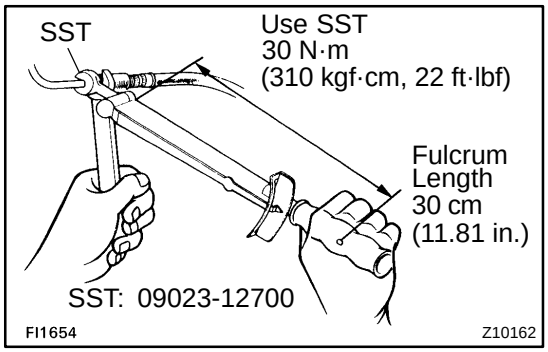
(a) Check the fuel lines for cracks or leakage, and all connections for deformation.

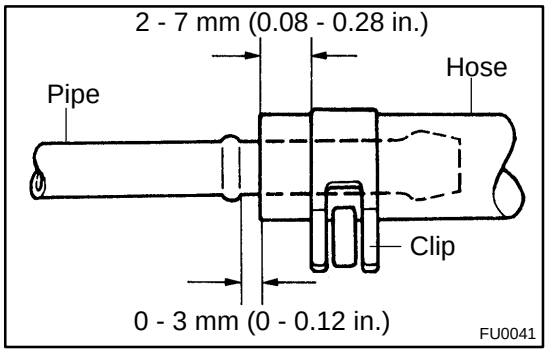
(b) Check the fuel tank vapor vent system hoses and connections for looseness, sharp bends or damage.

(c) Check the fuel tank for deformation, cracks, fuel leakage or tank band looseness.

(d) Check the filler neck for damage or fuel leakage.







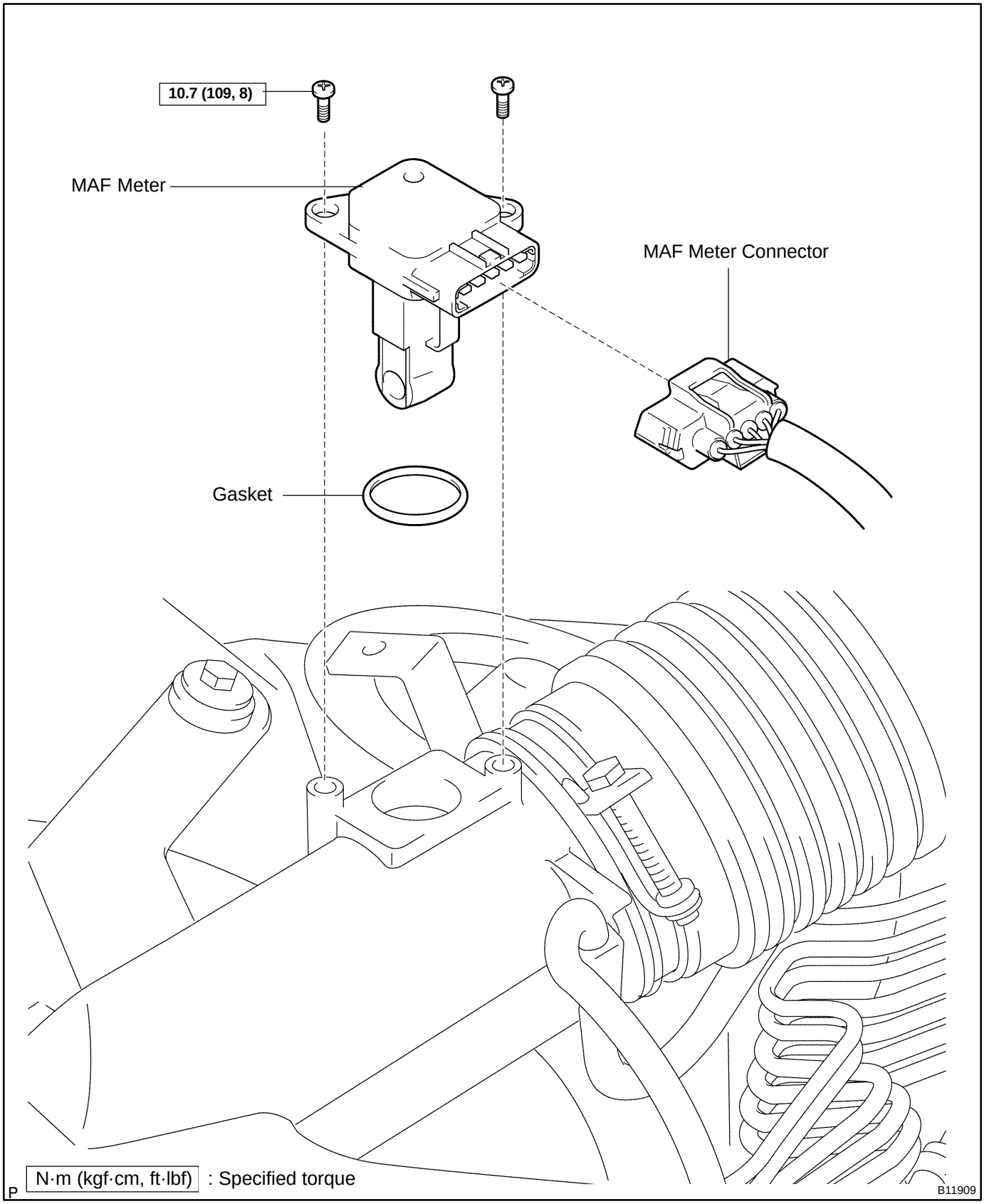
(e) Hose and pipe connections are as shown in the illustration.

If a problem is found, repair or replace the parts as necessary.

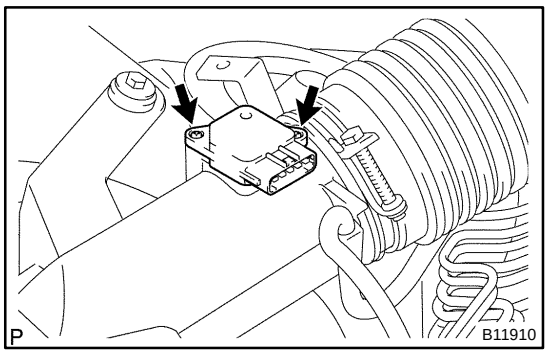
MASS AIR FLOW (MAF) METER

COMPONENTS

SF0NJ-11



SF0NK-07

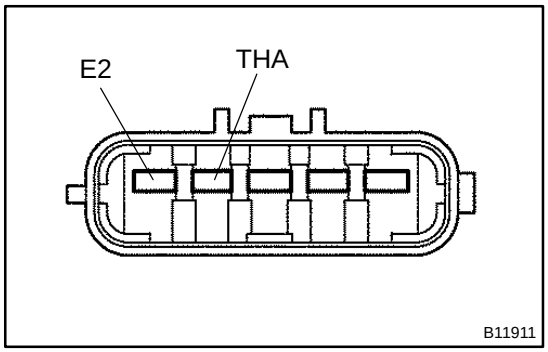


INSPECTION

1. REMOVE MAF METER

(a) Disconnect the MAF meter connector.

(b) Remove the 2 screws, MAF meter and gasket.

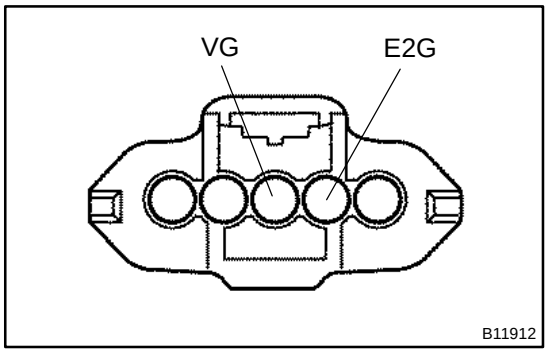


2. INSPECT MAF METER RESISTANCE

Using an ohmmeter, measure the resistance between terminals THA and E2.

Resistance	Temperature
13.6 - 18.4 kΩ	-20˚C (-4˚F)
2.21 - 2.69 kΩ	20˚C (68˚F)
0.493 - 0.667 kΩ	60˚C (140˚F)

If the resistance is not as specified, replace the MAF meter.



3. INSPECT MAF METER OPERATION

(a) Connect the MAF meter connector.

(b) Connect the negative (-) terminal cable to the battery.

(c) Turn the ignition switch ON.

(d) Using a voltmeter, connect the positive (+) tester probe to terminal VG, and negative (-) tester probe to terminal E2G.

(e) Blow air into the MAF meter, and check that the voltage fluctuates.

If operation is not as specified, replace the MAF meter.

(f) Turn the ignition switch OFF.

(g) Disconnect the negative (-) terminal cable from the battery.

(h) Disconnect the MAF meter connector.

4. REINSTALL MAF METER

(a) Install the gasket to the MAF meter.

(b) Install the MAF meter with the 2 screws.

Torque: 10.7 N·m (109 kgf·cm 8 ft·lbf)

(c) Connect the MAF meter connector.

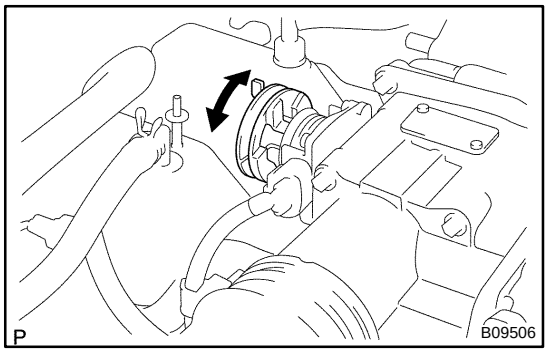
THROTTLE BODY

SF0NL-10

ON-VEHICLE INSPECTION

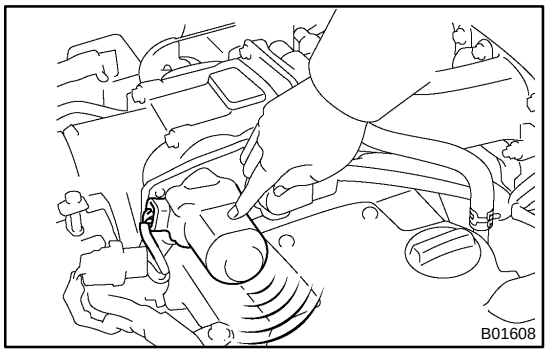
1. REMOVE ENGINE COVER

Remove the 4 nuts and engine cover.



2. INSPECT SYSTEM OPERATION

(a) Check that the throttle linkage moves smoothly.

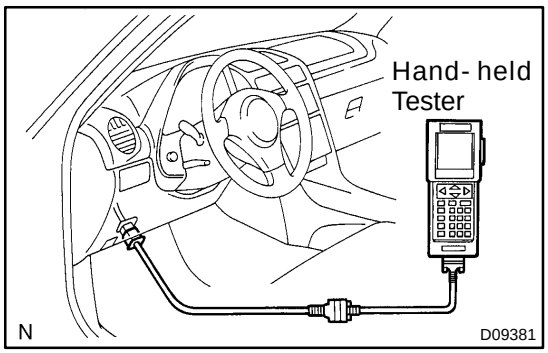


(b) Inspect the throttle control motor for operating sound.

(1) Turn the ignition switch ON.

(2) When turning the accelerator pedal position sensor lever, check the running sound of the motor. Also, check that there is no friction sound.

If operation is not as specified, check the throttle control motor, wiring and ECM.



(c) Inspect the throttle position sensor and accelerator pedal position sensor function.

(1) Connect the hand-held tester to the DLC3.

(2) When turning the accelerator pedal position sensor lever to the full-open position.

(3) Select the following menu, DIAGNOSIS / ENHANCED OBD ll / DATA LIST / THROTTLE POS.

Throttle valve opening percentage: 60 % or more

If operation is not as specified, check that the throttle position sensor, accelerator pedal position sensor, wiring and ECM.

(d) Start the engine, and check that the Malfunction Indicator Lamp (MIL) does not light up.

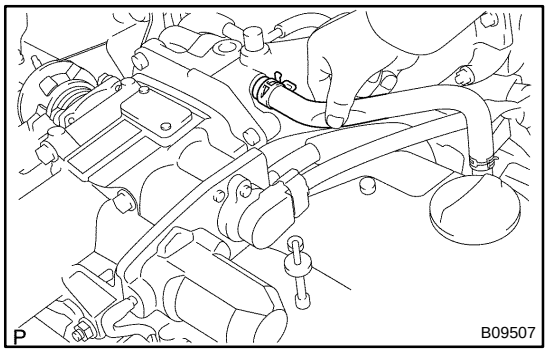
(e) Inspect the air assist system.

(1) Allow the engine to warm up to normal operating temperature.

(2) Turn the A/C switch ON and OFF, and check the idle speed.

Idle speed (Transmission in neutral):
700 ± 50 rpm (A/C OFF)
750 ± 50 rpm (A/C ON)

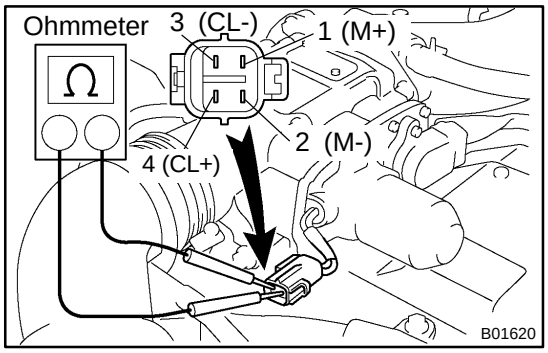
NOTICE:
Perform inspection under condition without electrical load.



(3) With engine idling, pinch the air assist hose and check that engine speed drops, and then returns back up to idle speed.

If operation is not as specified, check the throttle body, wiring and ECM.

(f) After checking the above (b) to (e), perform the diving test and check that there is no sense of incongruity.



3. INSPECT THROTTLE CONTROL MOTOR

(a) Disconnect the throttle control motor connector.

(b) Using an ohmmeter, measure the resistance between terminal 3 (CL-) and 4 (CL+).

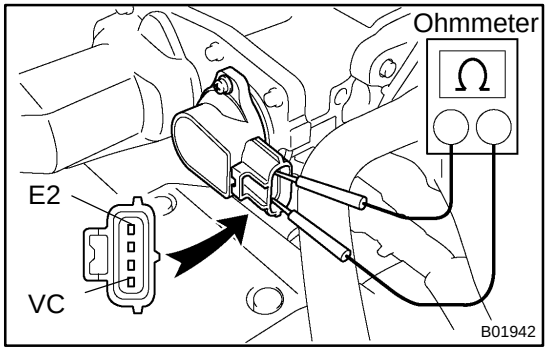
Resistance: 4.2 - 5.2 Ω at 20˚C (68˚F)

(c) Using an ohmmeter, measure the resistance between terminal 1 (M+) and 2 (M-).

Resistance: 0.3 - 100 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the throttle control motor (See page SF-37).

(d) Reconnect the throttle control motor connector.



4. INSPECT THROTTLE POSITION SENSOR

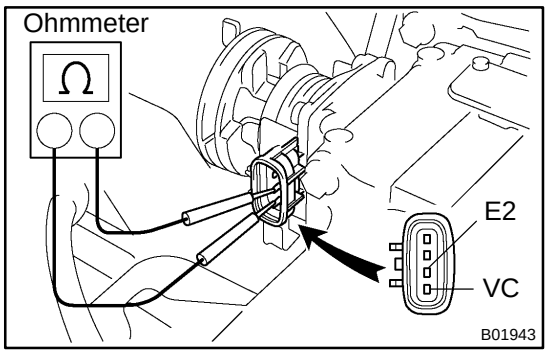
(a) Disconnect the throttle position sensor connector.

(b) Using an ohmmeter, measure the resistance between terminals VC and E2.

Resistance: 1.2 - 3.2 kΩ at 20˚C (68˚F)

If the resistance is not as specified, replace the throttle position sensor (See page SF-37).

(c) Reconnect the throttle position sensor connector.



5. INSPECT ACCELERATOR PEDAL POSITION SENSOR

(a) Disconnect the accelerator pedal position sensor connector.

(b) Using an ohmmeter, measure the resistance between terminals VC and E2.

Resistance: 1.2 - 3.2 kΩ at 20˚C (68˚F)

If the resistance is not as specified, replace the accelerator pedal position sensor (See page SF-37).

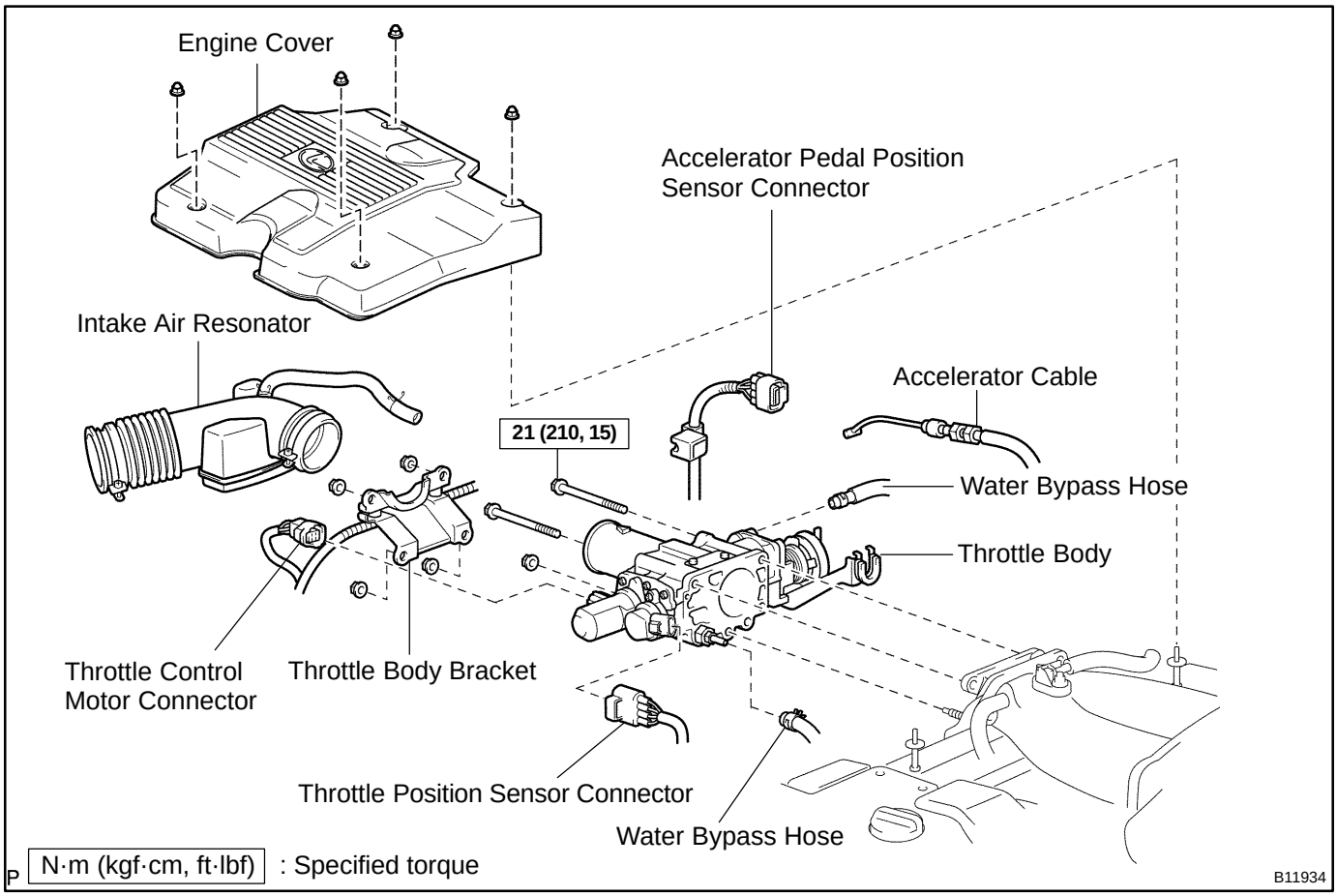
(c) Reconnect the accelerator pedal position sensor connector.

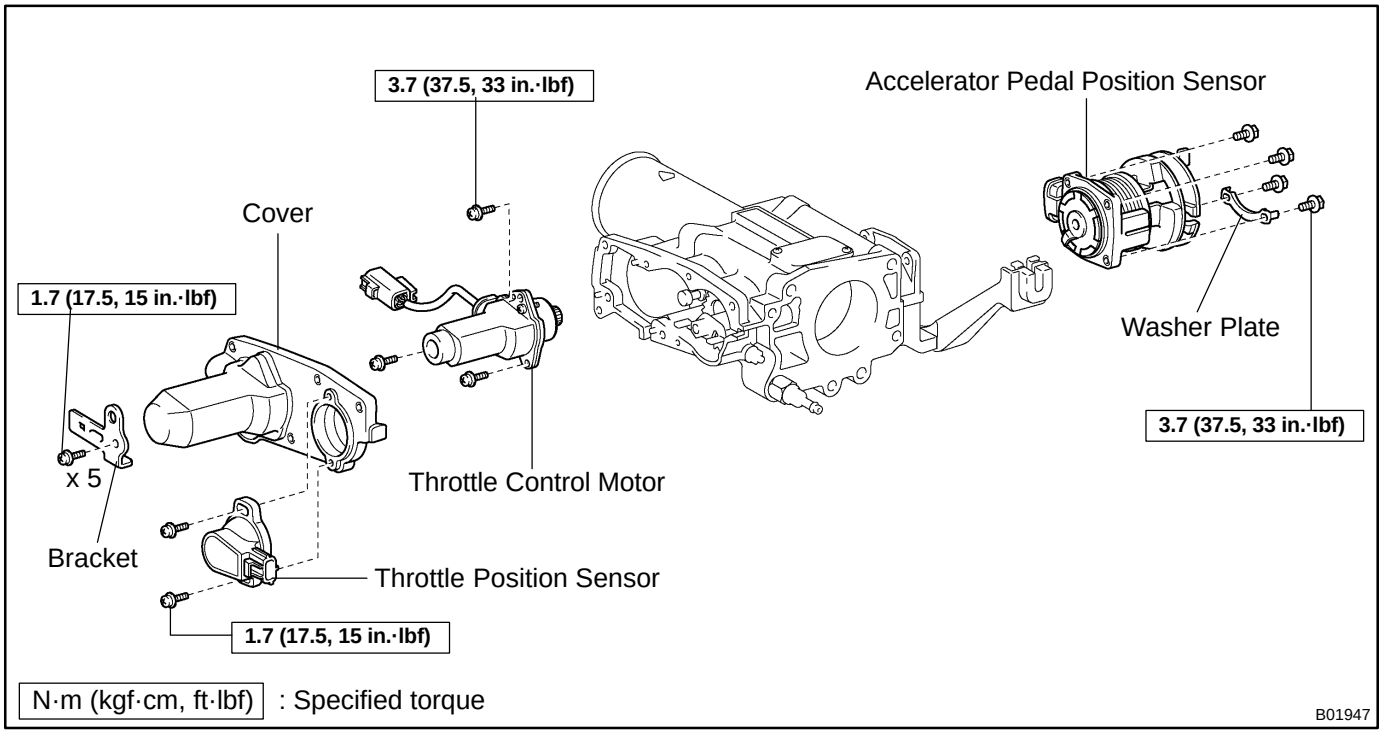
6. REINSTALL ENGINE COVER

Install the engine cover with the 4 nuts.

SF0NM-13

COMPONENTS





SF0NN-08

REMOVAL

1. DRAIN ENGINE COOLANT

2. REMOVE ENGINE COVER

Remove the 4 nuts and engine cover.

3. REMOVE INTAKE AIR RESONATOR

4. REMOVE THROTTLE BODY BRACKET AND THROTTLE BODY

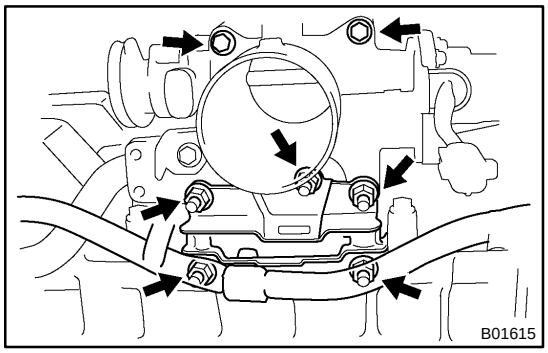
(a) Disconnect the accelerator cable.

(b) Disconnect the throttle position sensor connector.

(c) Disconnect the throttle control motor connector.

(d) Disconnect the accelerator pedal position sensor connector.

(e) Disconnect the engine wire clamp from the clamp bracket of throttle body.



(f) Remove the 2 bolts and nut holding the throttle body to the intake air connector.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

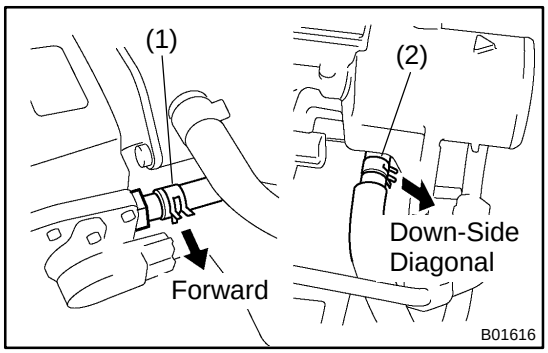
(g) Remove the 4 nuts and throttle body bracket.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(h) Slightly slide the throttle body away from the intake air connector.

NOTICE:

When putting up the throttle body, do not hold the motor part.



(i) Disconnect the 2 water bypass hoses from the throttle body, and remove the throttle body.

HINT:

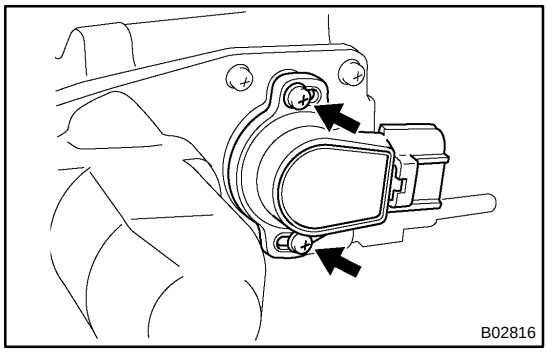
- At the time of installation, please refer to the following items.
- Connect the water bypass hose with its discrimination mark downward.
- Install the with its craw direction for (1) forward and down-side diagonal (engine side about 45˚) for (2).

SF0NO-09

REPLACEMENT

NOTICE:

- **To prevent deterioration, do not shock the throttle position sensor and accelerator pedal position sensor.**
- **Mixing of the foreign objects may cause the gear locking, so thoroughly check that there is no stuck of any foreign objects and clean up if any.**

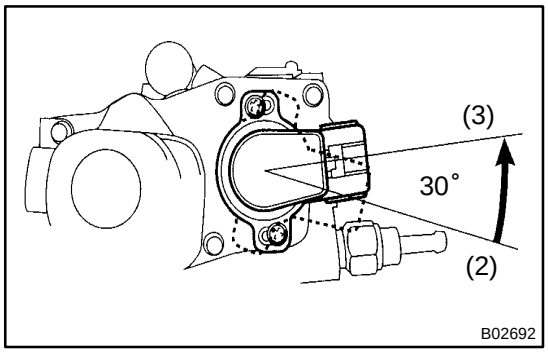


1. REPLACE THROTTLE POSITION SENSOR

(a) Remove the 2 set screws and throttle position sensor.

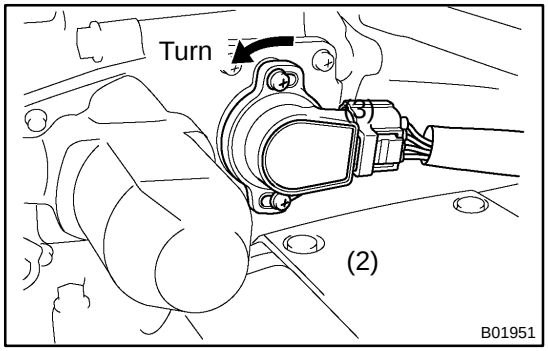
(b) Reinstall the throttle position sensor.

(1) Check that the throttle valve is under the condition of the opener opening angle (about 3.5˚).



(2) Install the sensor to the place where is at 30˚ rotated to the right from the specified installation position.

(3) Gradually turn sensor counterclockwise until it touches the throttle valve shaft and temporarily torque the 2 set screws.



(c) Adjust the throttle position sensor.

(1) Connect the throttle position sensor connector.

NOTICE:

At this time, do not connect the throttle control motor connector.

(2) Connect the hand-held tester or OBD II scan tool to the DLC3.

(3) Turn the ignition switch ON.

NOTICE:

After turning the ignition switch ON, do not depress the accelerator pedal.

(4) While reading the value of the throttle valve opening percentage (THROTTLE POS) of the CURRENT DATA, turn the throttle position sensor slowly to left and set the sensor at the center value of the standard value, and then torque the screws.

Torque: 1.7 N·m (17.5 kgf·cm, 15 in.·lbf)

Standard throttle valve opening percentage:

14.8 ± 0.8 %

NOTICE:

At the time of tightening the screw, as the sensor itself tends to turn causing to slanting, check that it is within the standard value after having finished the torque.

(5) Fully close the throttle valve with a screwdriver and check that the value of the throttle valve opening percentage (THROTTLE POS) of the CURRENT DATA stays with the standard value.

Standard throttle valve opening percentage:

10 - 14 %

If the throttle valve opening percentage is not as specified, repeat steps (4) through (5).

(6) Paint the sensor set screws.

(7) Turn the ignition switch OFF.

(8) Disconnect the hand-held tester or OBD II scan tool from the DLC3.

(9) Disconnect the throttle position sensor connector.

2. REPLACE THROTTLE CONTROL MOTOR

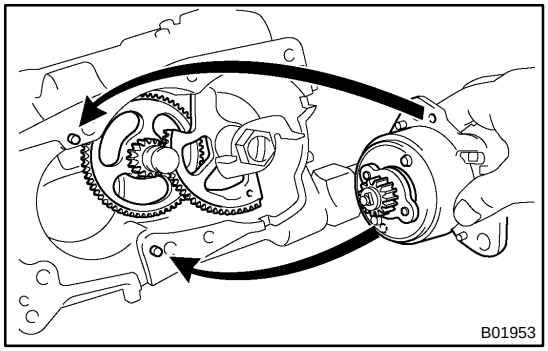
(a) Remove the throttle position sensor.

(b) Remove the throttle control motor.

(1) Disconnect the connector from the bracket.

(2) Remove the 5 screws, bracket and cover.

(3) Remove the 3 screws and throttle control motor.



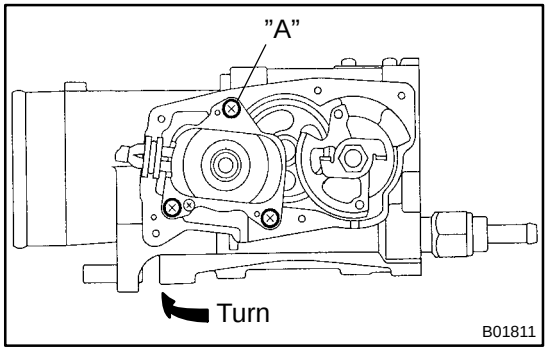
(c) Reinstall the throttle control motor.

(1) Apply the grease thinly on the whole surface of the gear teeth.

NOTICE:

Do not apply the grease other than specified because grease has been already applied to the component to be replaced.

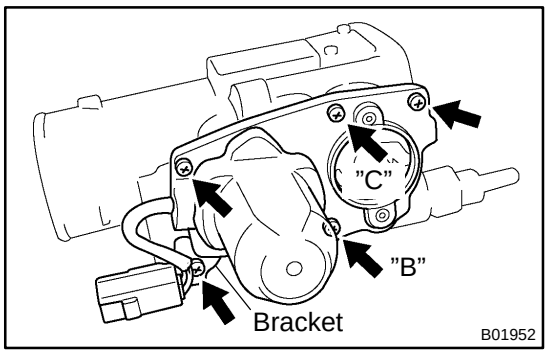
(2) Align the protrusions of the motor with the positioning pin holes of the throttle body.



(3) Rotate the motor to the direction marked with an arrow and temporarily install the set screw "A" under the condition that there is no wobbles in the motor and the positioning pin.

(4) Tighten the 3 set screws.

Torque: 3.7 N·m (37.5 kgf·cm, 33 in.·lbf)



(5) Temporarily install the cover with the 2 screws "B" and "C".

NOTICE:

The grommet of motor not be caught.

(6) Tighten the 5 screws.

Torque: 1.7 N·m (17.5 kgf·cm, 15 in.·lbf)

(7) Connect the connector to the bracket.

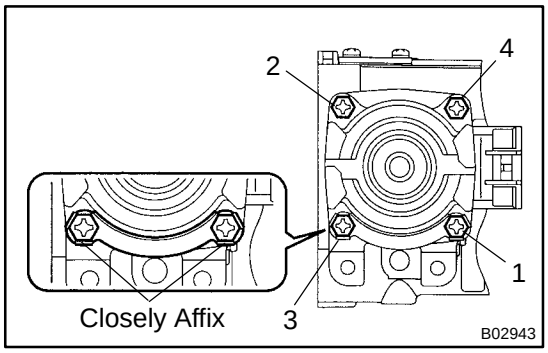
(d) Reinstall and adjust the throttle position sensor (See step 1).

3. REPLACE ACCELERATOR PEDAL POSITION SENSOR

(a) Remove the accelerator pedal position sensor.

(1) Using a small screwdriver, pry the 4 stoppers of the washer plate.

(2) Remove the 4 set bolts, washer plate and accelerator pedal position sensor.



(b) Reinstall the accelerator pedal position sensor.

(1) Install the accelerator pedal position sensor to the throttle body.

(2) Torque the 4 bolts in the order shown in the illustration through the washer plate.

Torque: 3.7 N·m (37.5 kgf·cm, 33 in.·lbf)

(3) Bend the stopper of the washer plate and closely affix to the bolts.

(c) Inspect the accelerator pedal position sensor.

(1) Connect the accelerator pedal position sensor connector.

(2) Connect the hand-held tester or OBD II scan tool to the DLC3.

(3) Turn the ignition switch ON.

NOTICE:

After turning the ignition switch ON, do not depress the accelerator pedal.

(4) Check that the ACCEL POS #1 (VPA) voltage of the CURRENT DATA shows the standard value.

Standard accelerator pedal position voltage:

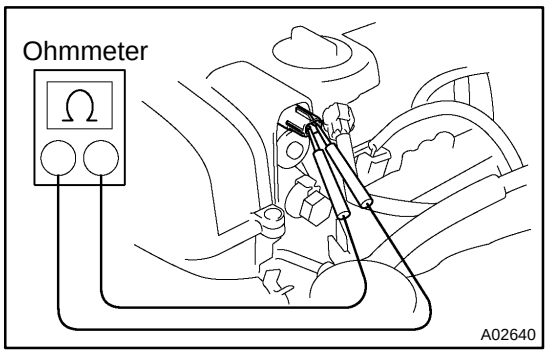
0.3 - 0.9 V

4. AFTER INSTALL THROTTLE BODY, INSPECT SYSTEM OPERATION (See page SF-32)

SF0NP-09

INSTALLATION

Installation is in the reverse order of removal (See page SF-36).



CAMSHAFT TIMING OIL CONTROL VALVE

SF0NR-10

ON-VEHICLE INSPECTION

1. INSPECT OIL CONTROL VALVE RESISTANCE

(a) Disconnect the oil control valve connector.

(b) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 5.5 - 12 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the valve.

(c) Reconnect the oil control valve connector.

2. INSPECT VVT-i OPERATION

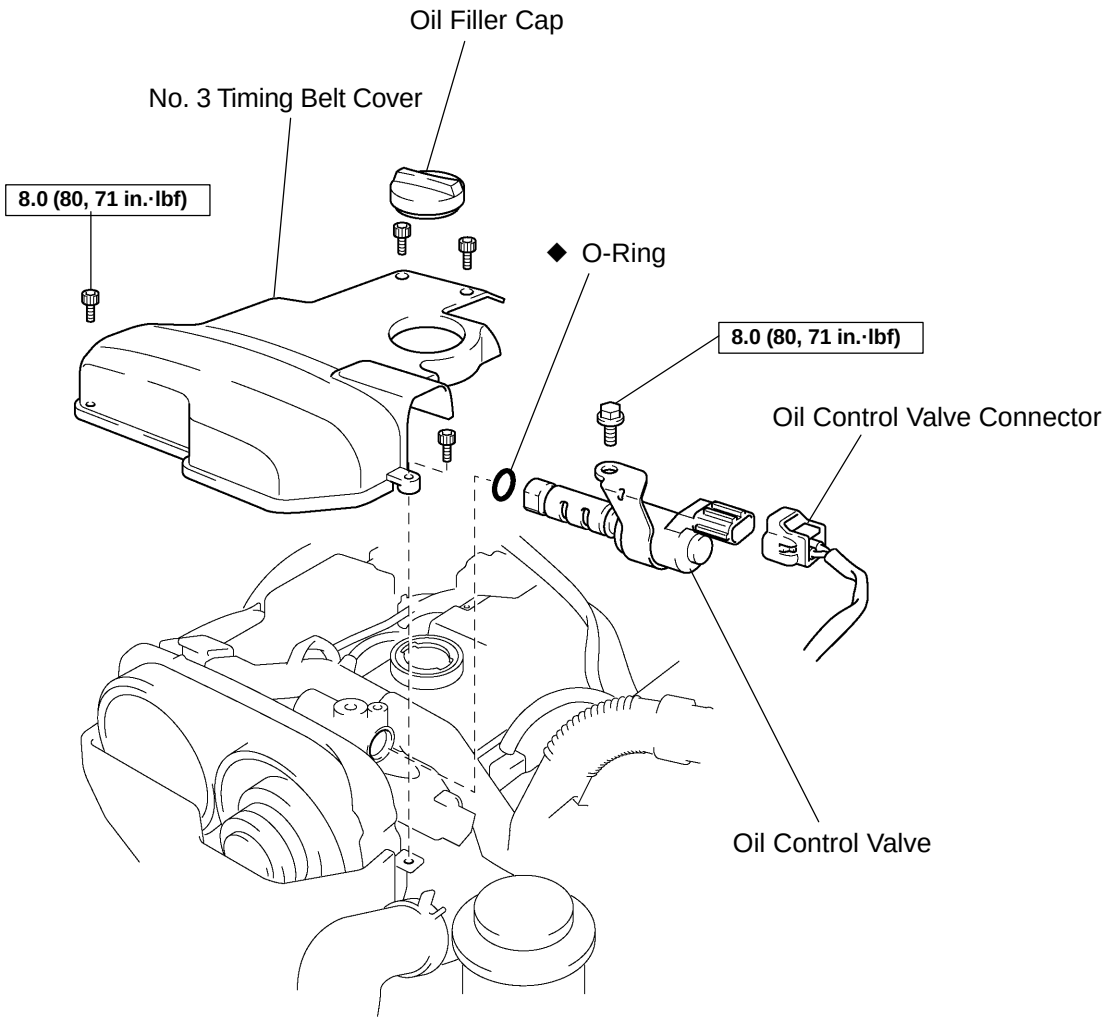
(a) Allow the engine to warm up to normal operating temperature.

(b) Check that the engine stalls or becomes in rough-idling state when the battery positive voltage is applied to the oil control valve with the engine idling.

If operation is not as specified, check the oil control valve (see page SF-43), VVT-i pulley, intake camshaft, wiring and ECM.

SF0NQ-10

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

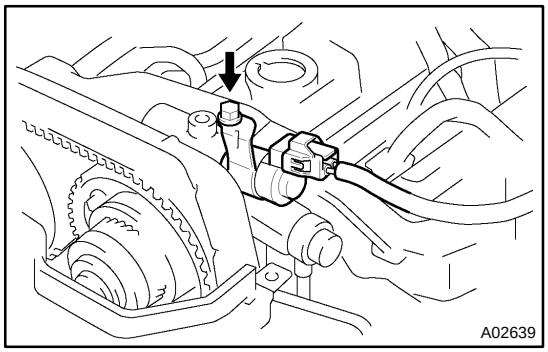
◆ Non-reusable part

B11945

SF0NS-05

INSPECTION

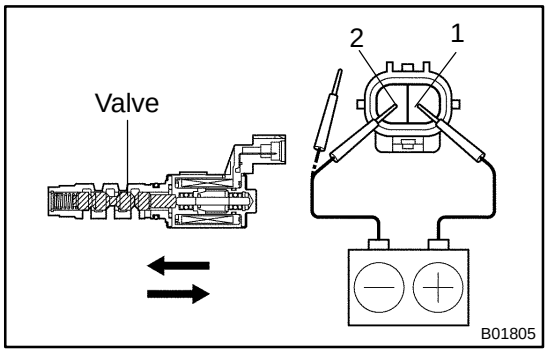
1. REMOVE NO. 3 TIMING BELT COVER



2. REMOVE OIL CONTROL VALVE

(a) Disconnect the oil control valve connector.

(b) Remove the bolt, oil control valve and O-ring.



3. INSPECT OIL CONTROL VALVE OPERATION

Connect positive (+) lead from the battery to terminal 1 and negative (-) lead to terminal 2, and check the movement of the valve.

Battery positive voltage is applied	Valve moves in ← direction
Battery positive voltage is cut off	Valve moves in → direction

If operation is not as specified, replace the valve.

4. REINSTALL OIL CONTROL VALVE

(a) Install a new O-ring to the oil control valve.

(b) Install the oil control valve with the bolt.

Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)

(c) Connect the oil control valve connector.

5. REINSTALL NO. 3 TIMING BELT COVER

Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)

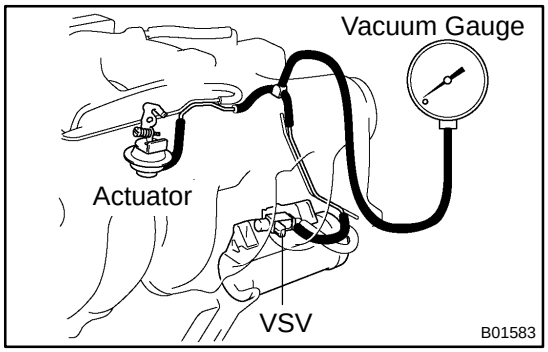
ACOUSTIC CONTROL INDUCTION SYSTEM (ACIS)

SF0NT-07

ON-VEHICLE INSPECTION

1. REMOVE ENGINE COVER

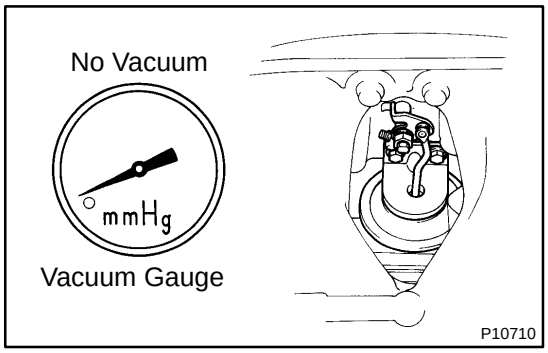
Remove the 4 nuts and engine cover.



2. CONNECT VACUUM GAUGE

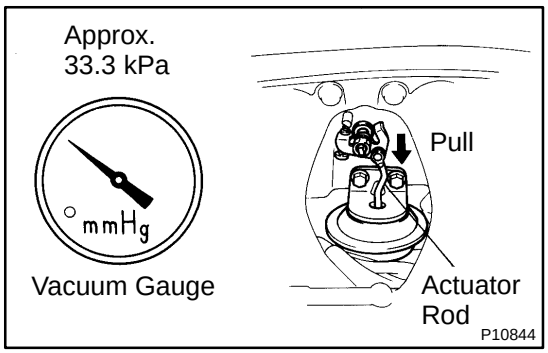
Using a 3-way connector, connect vacuum gauge to the hose between the actuator and VSV.

3. START ENGINE



4. INSPECT INTAKE AIR CONTROL VALVE

(a) While the engine is idling, check that the vacuum gauge needle does not move.



(b) Rapidly depress the accelerator pedal to fully open position and check that the vacuum gauge needle momentarily fluctuates approx. 33.3 kPa (250 mmHg, 9.84 in.Hg) or more. (The actuator rod is pulled down.)

5. REMOVE VACUUM GAUGE

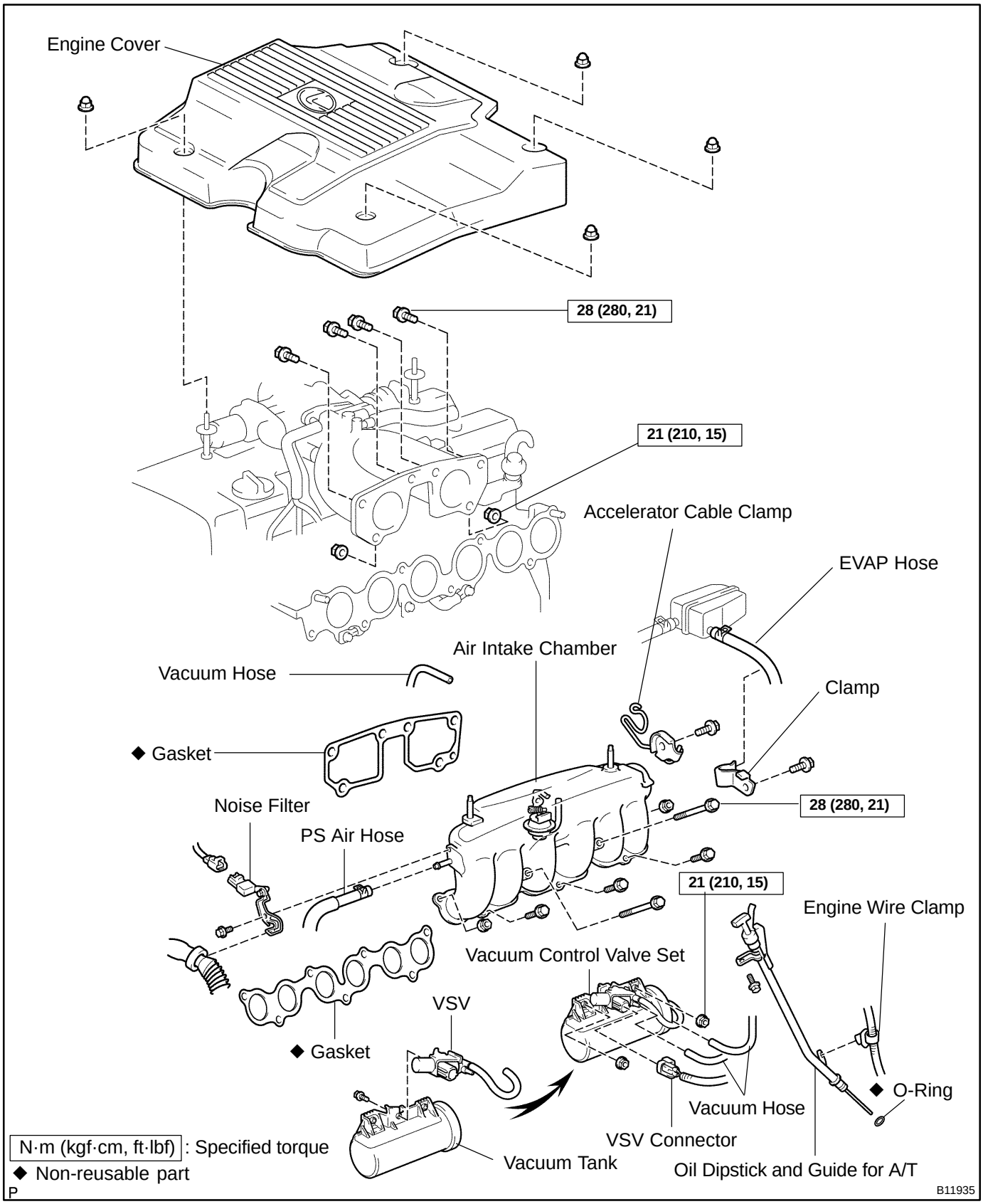
Remove the vacuum gauge, and reconnect the vacuum hoses to their proper locations.

6. REINSTALL ENGINE COVER

Reinstall the engine cover with the 4 nuts.

SF0NU-07

COMPONENTS

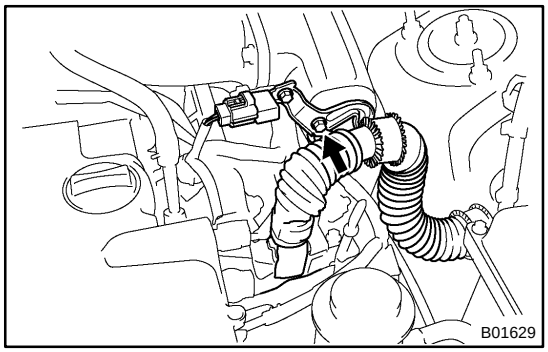


SF0NV-07

REMOVAL

1. REMOVE ENGINE COVER

Remove the 4 nuts and engine cover.



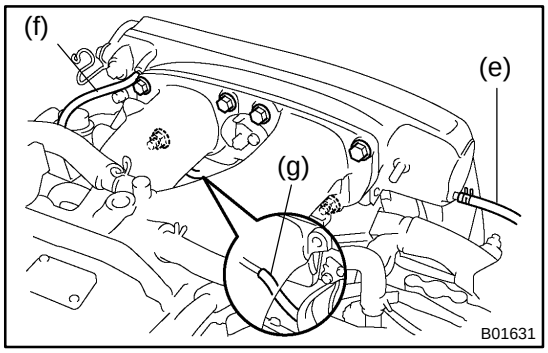
2. REMOVE OIL DIPSTICK AND GUIDE FOR A/T (See page EM-65)

3. REMOVE AIR INTAKE CHAMBER (WITH INTAKE AIR CONTROL VALVE)

(a) Disconnect the noise filter connector.

(b) Disconnect the engine wire clamp from the bracket.

(c) Remove the bolt, bracket and noise filter.



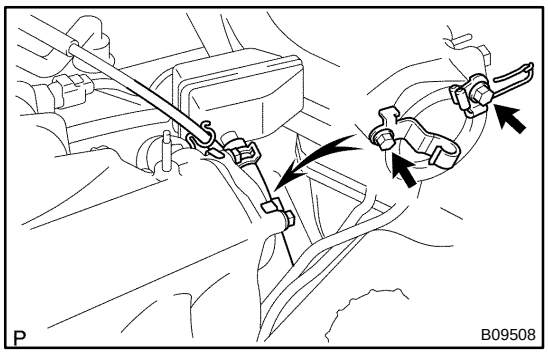
(d) Remove the 4 bolts and 2 nuts holding the intake air connector to the air intake chamber,

Torque: 28 N·m (280 kgf·cm, 21 ft·lbf)

(e) Disconnect the PS air hose from the air intake chamber.

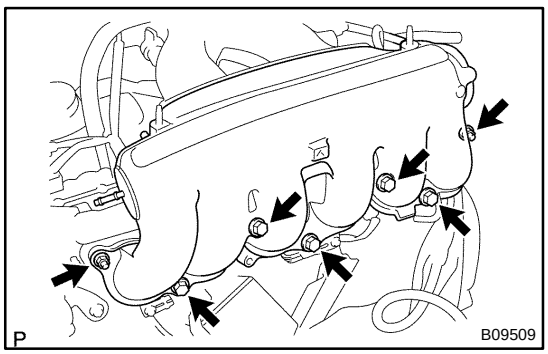
(f) Disconnect the vacuum hose (from No.2 vacuum pipe) from the air intake chamber.

(g) Disconnect the vacuum hose (from actuator for ACIS) from the No. 1 vacuum pipe.



(h) Disconnect the accelerator cable, and remove the bolt and accelerator cable clamp.

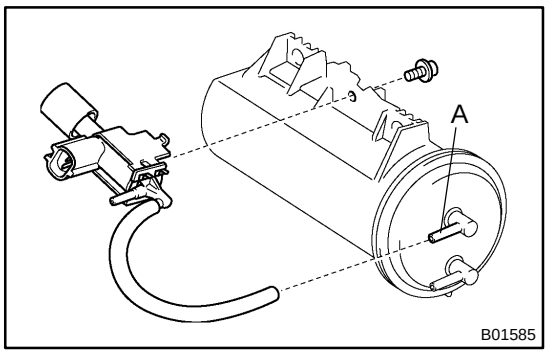
(i) Disconnect the EVAP hose, and remove the bolt and clamp.



(j) Remove the 5 bolts, 2 nuts, air intake chamber and 2 gaskets.

Torque: 28 N·m (280 kgf·cm, 21 ft·lbf)

4. REMOVE VACUUM CONTROL VALVE SET (See page SF-48)



5. REMOVE VSV FROM VACUUM TANK

(a) Disconnect the vacuum hose from port A of the vacuum tank.

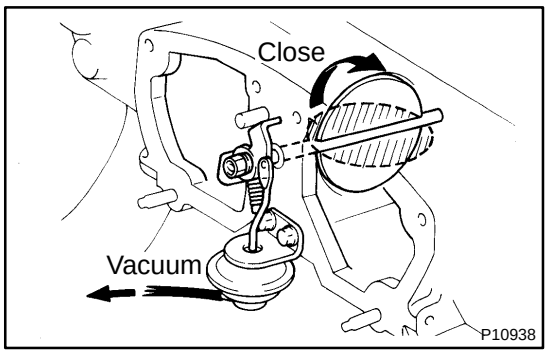
(b) Remove the screw and VSV.

SF0NW-06

INSPECTION

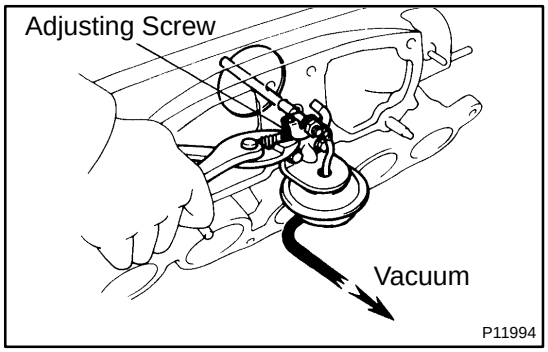
1. INSPECT INTAKE AIR CONTROL VALVE

(a) With 53.3 kPa (400 mmHg, 15.75 in.Hg) of vacuum applied to the actuator, check that the actuator rod moves.



If operation is not as specified, turn the adjusting screw.

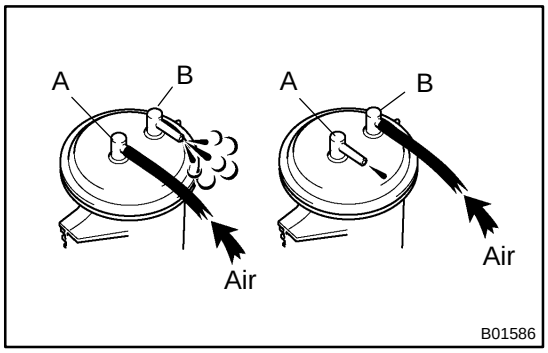
(b) 1 minute after applying the vacuum in (a), check that the actuator rod does not return.



2. INSPECT VACUUM TANK

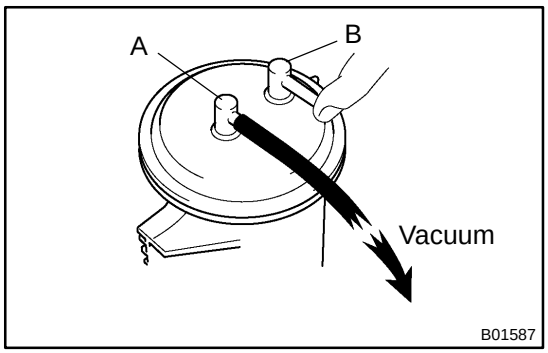
(a) Check that air flows from ports A to B.

(b) Check that air does not flow ports B to A.



(c) Plug port B with your finger, and apply 53.3 kPa (400 mmHg, 15.75 in.Hg) of vacuum to port A, and check that there is no change in vacuum after 1 minute.

If operation is not as specified, replace the vacuum tank.

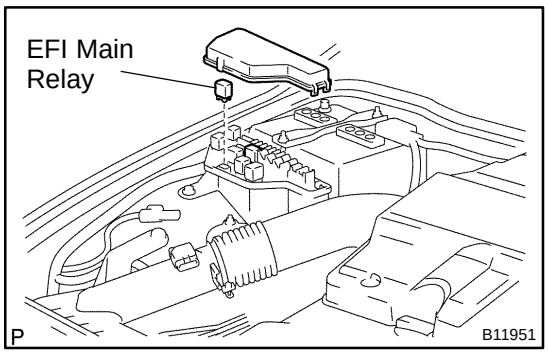


3. INSPECT VSV (See page SF-48)

SF0NX-04

INSTALLATION

Installation is in the reverse order of removal (See page SF-46).

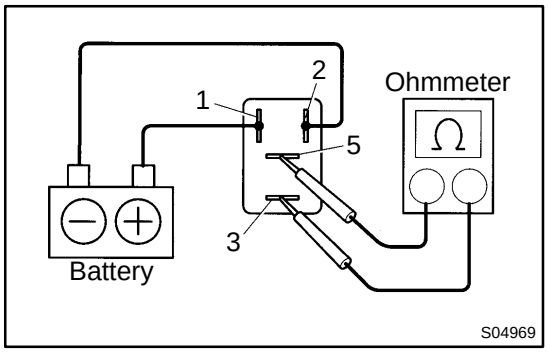


EFI MAIN RELAY

SF1ZJ-01

INSPECTION

1. **REMOVE RELAY BOX COVER**
2. **REMOVE EFI MAIN RELAY (Marking: EFI)**



3. **INSPECT EFI MAIN RELAY**

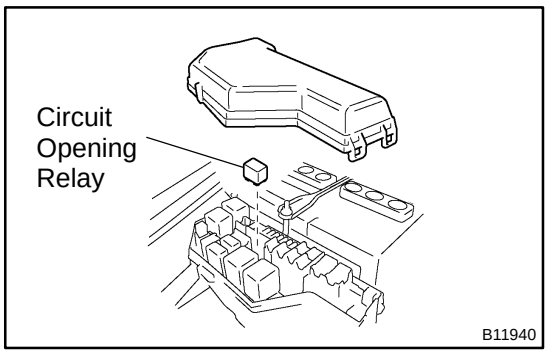
(1) Using an ohmmeter, measure the resistance between the terminals.

Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

If the resistance is not as specified, replace the relay.

4. **REINSTALL EFI MAIN RELAY**
5. **REINSTALL RELAY BOX COVER**



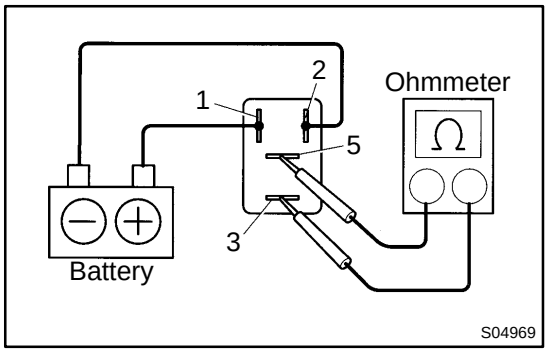
CIRCUIT OPENING RELAY

SF1ZK-01

INSPECTION

1. REMOVE RELAY BOX COVER

2. REMOVE CIRCUIT OPENING RELAY



3. INSPECT CIRCUIT OPENING RELAY

(2) Using an ohmmeter, measure the resistance between the terminals.

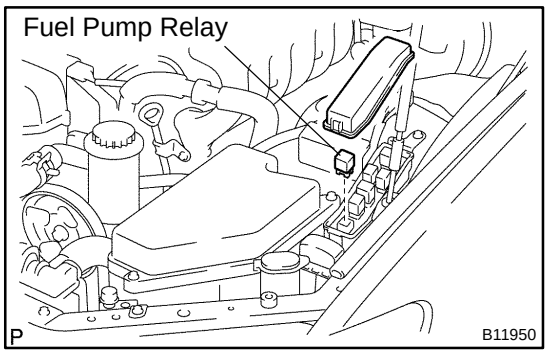
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

If the resistance is not as specified, replace the relay.

4. REINSTALL CIRCUIT OPENING RELAY

5. REINSTALL RELAY BOX COVER



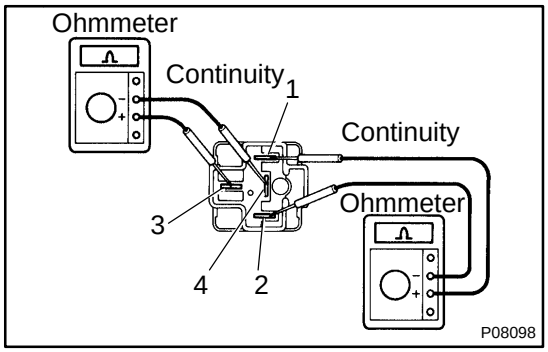
FUEL PUMP RELAY

SF1LG-04

INSPECTION

1. REMOVE RELAY BOX COVER

2. REMOVE FUEL PUMP RELAY (Marking: FUEL PMP)



3. INSPECT FUEL PUMP RELAY

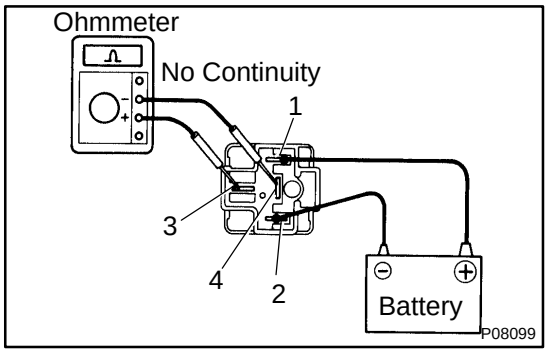
(a) Inspect the relay continuity.

(1) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

(2) Check that there is continuity between terminals 3 and 4.

If there is no continuity, replace the relay.



(b) Inspect the relay operation.

(1) Apply battery positive voltage across terminals 1 and 2.

(2) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.

If there is continuity, replace the relay.

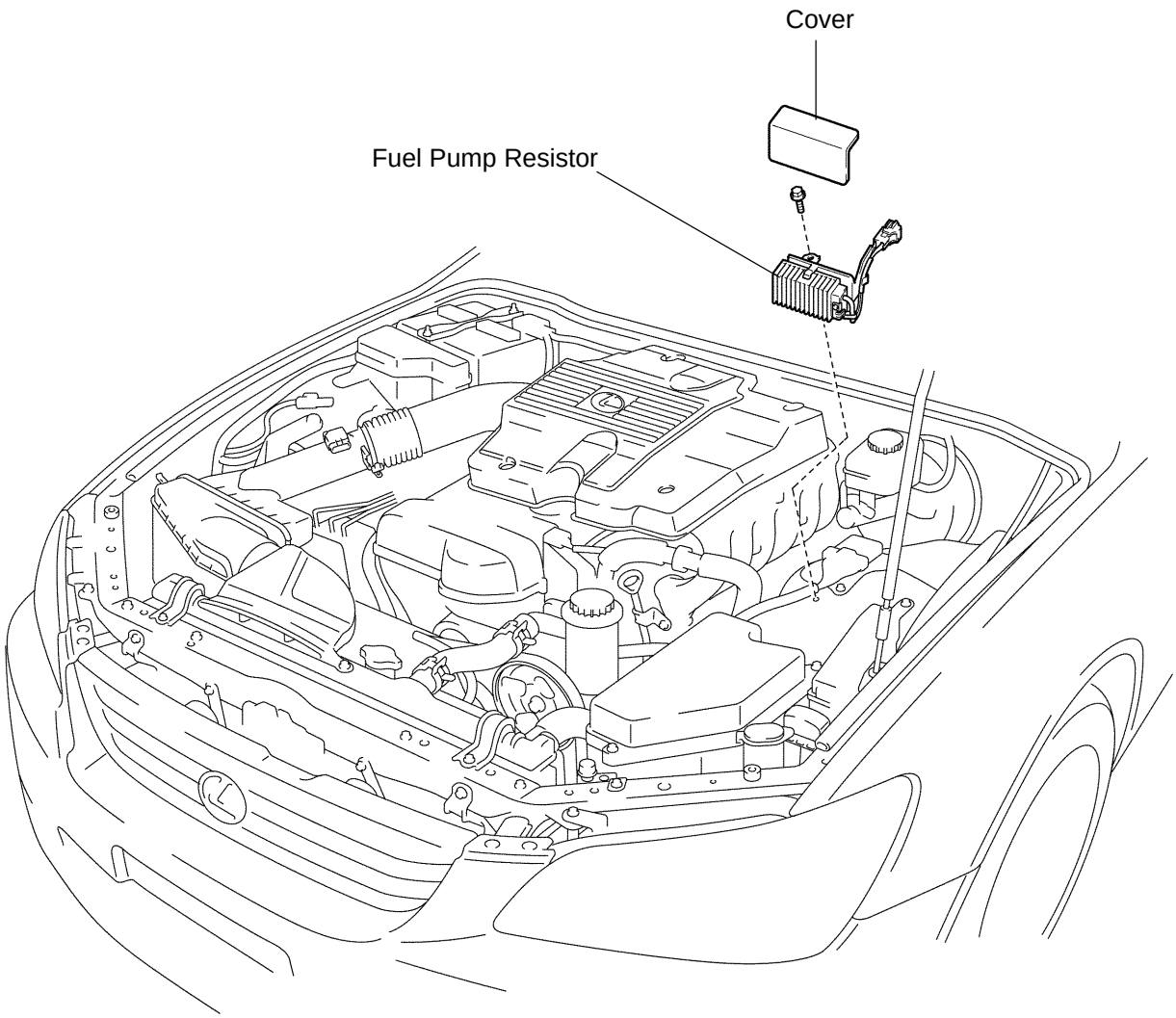
4. REINSTALL FUEL PUMP RELAY

5. REINSTALL RELAY BOX COVER

FUEL PUMP RESISTOR

COMPONENTS

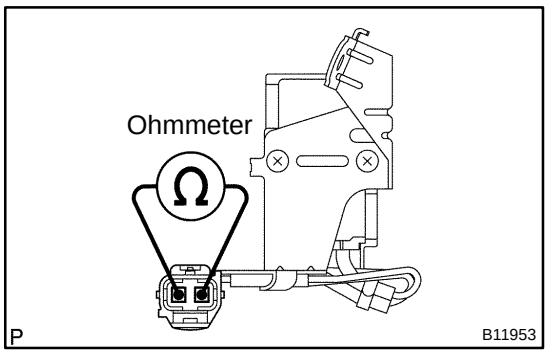
SF1LF-03



P

B11952

SF0FX-09



INSPECTION

INSPECT FUEL PUMP RESISTOR

Using an ohmmeter, measure the resistance between the terminals.

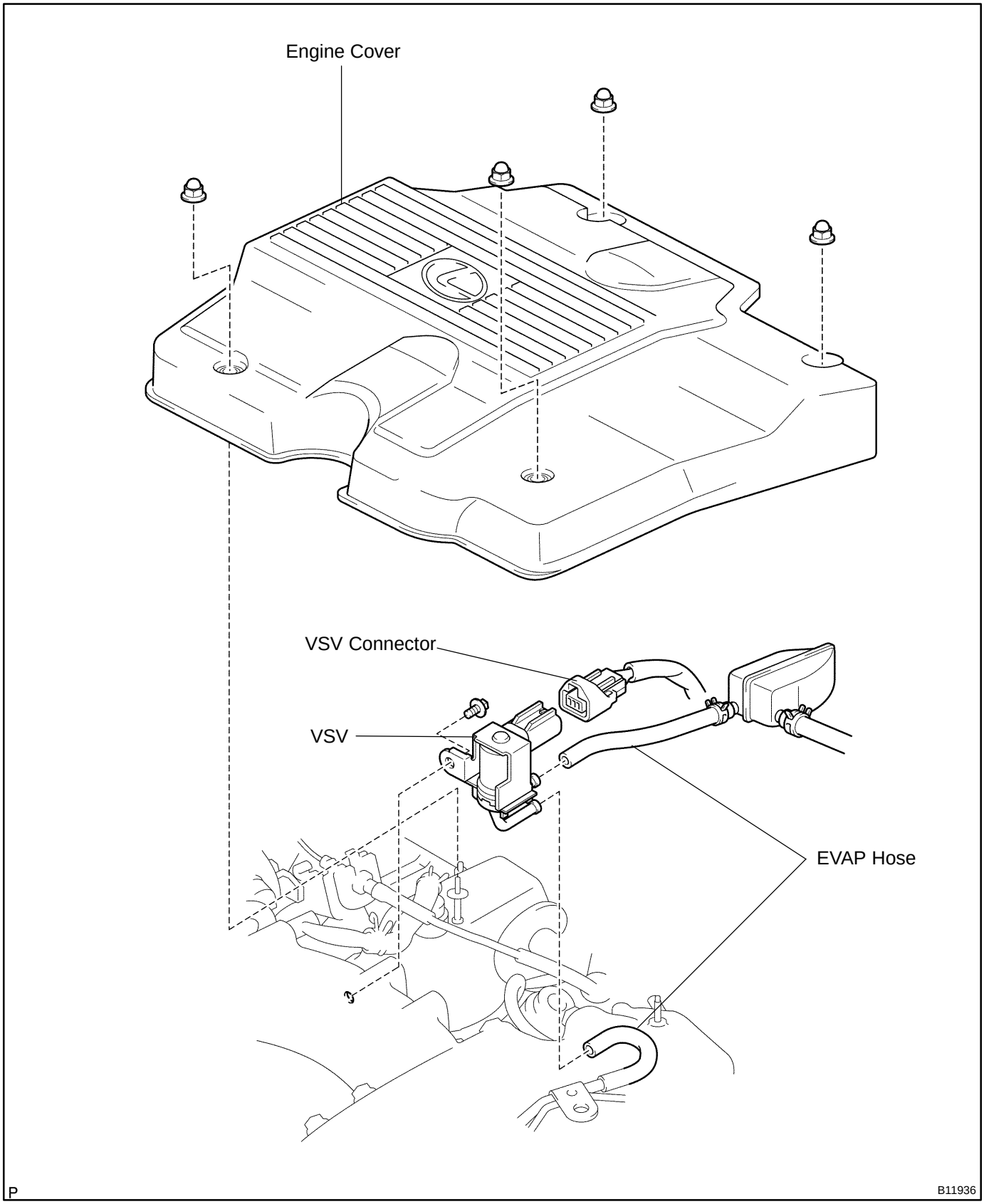
Resistance: 0.30 - 0.35 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the resistor.

VSV FOR EVAPORATIVE EMISSION (EVAP)

SF0NZ-07

COMPONENTS



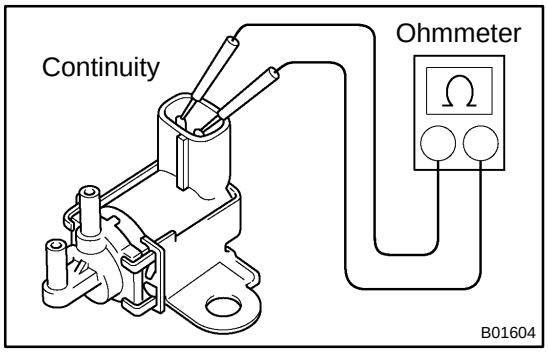
SF0O0-08

INSPECTION

1. REMOVE ENGINE COVER

Remove the 4 nuts and engine cover.

2. REMOVE VSV



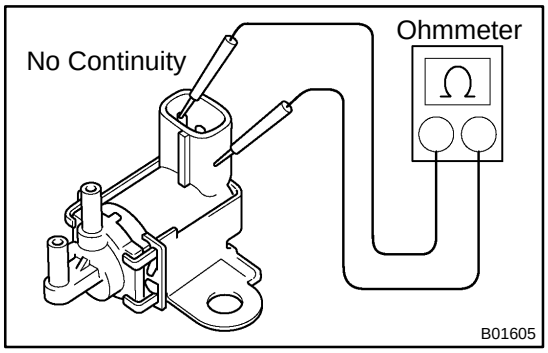
3. INSPECT VSV

(a) Inspect the VSV for open circuit.

Using an ohmmeter, check that there is continuity between the terminals.

Resistance: 27 - 33 Ω at 20˚C (68˚F)

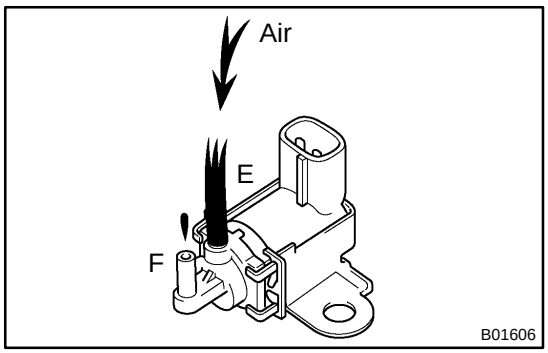
If there is no continuity, replace the VSV.



(b) Inspect the VSV for ground.

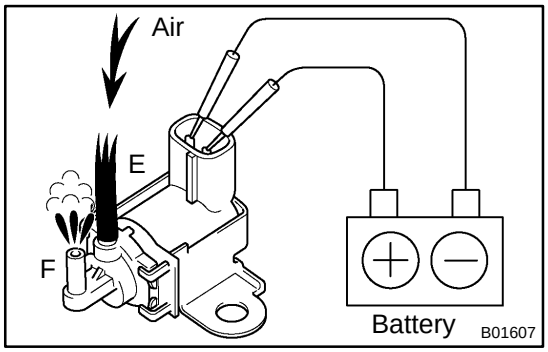
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.

(1) Check that air does not flows from port E to F.



(2) Apply battery positive voltage across the terminals.

(3) Check that air flows from port E to F.

If operation is not specified, replace the VSV.

4. REINSTALL VSV

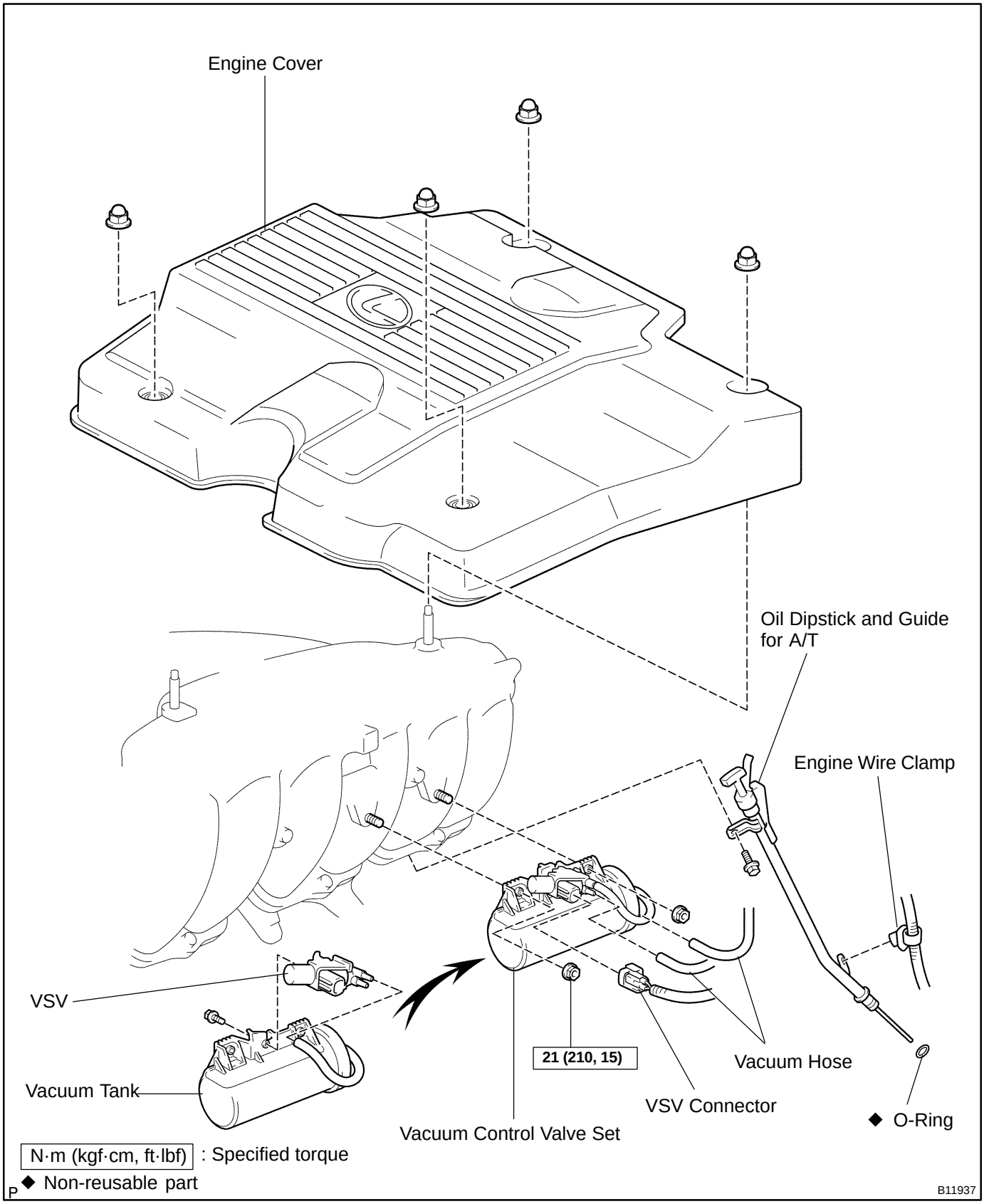
5. REINSTALL ENGINE COVER

Install the engine cover with the 4 nuts.

VSV FOR ACOUSTIC CONTROL INDUCTION SYSTEM (ACIS)

SF0O1-06

COMPONENTS



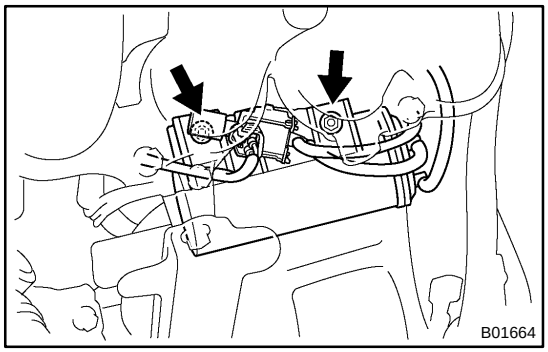
SF0O2-08

INSPECTION

1. REMOVE ENGINE COVER

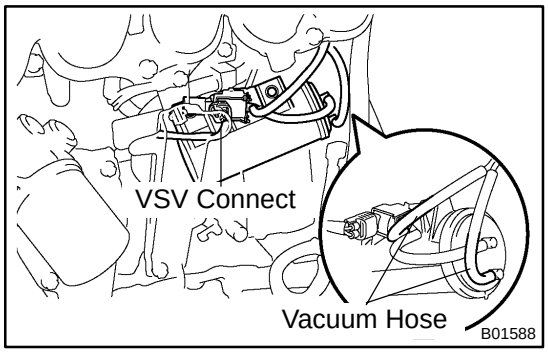
Remove the 4 nuts and engine cover.

2. REMOVE OIL DIPSTICK AND GUIDE FOR A/T (See page EM-65)



3. REMOVE VACUUM CONTROL VALVE SET

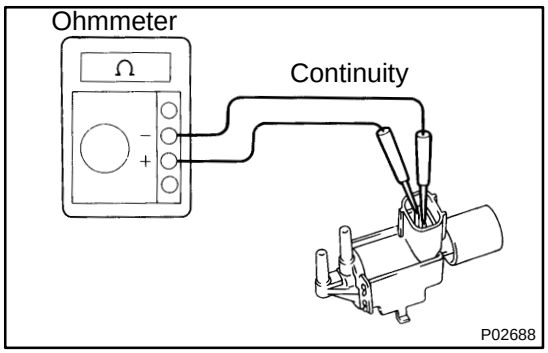
(a) Remove the 2 nuts, and disconnect the vacuum tank from the intake manifold.



(b) Disconnect VSV connector and vacuum hoses, and remove the vacuum control valve set.

4. REMOVE VSV

Remove the screw, vacuum hose and VSV.



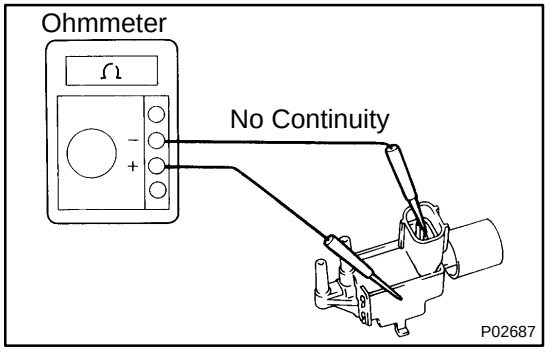
5. INSPECT VSV

(a) Inspect the VSV for open circuit.

Using an ohmmeter, check that there is continuity between the terminals.

Resistance: 38.5 - 44.5 Ω at 20˚C (68˚F)

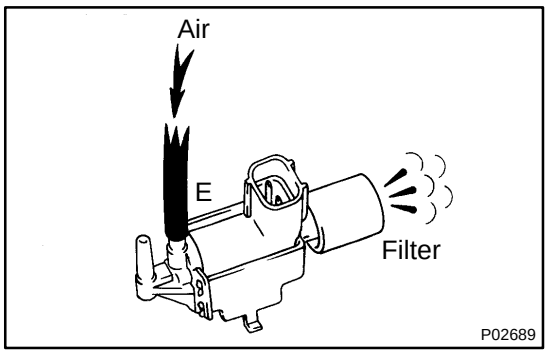
If there is no continuity, replace the VSV.



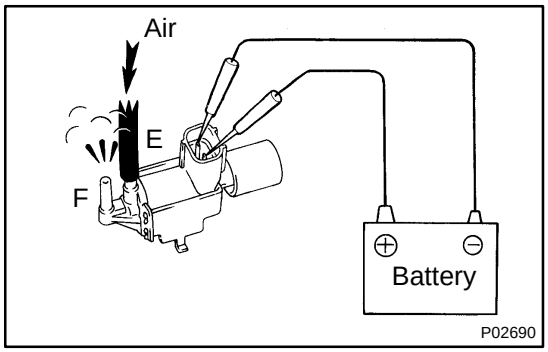
(b) Inspect the VSV for ground.

Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.
(1) Check that air flows from port E to the filter.



(2) Apply battery positive voltage across the terminals.
(3) Check that air flows from port E to F.

6. REINSTALL VSV

(a) Install the VSV with the screw to the vacuum tank.
(b) Install the vacuum hose.

7. REINSTALL VACUUM CONTROL VALVE SET

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

8. REINSTALL OIL DIPSTICK AND GUIDE FOR A/T

HINT:
Using a new O-ring.

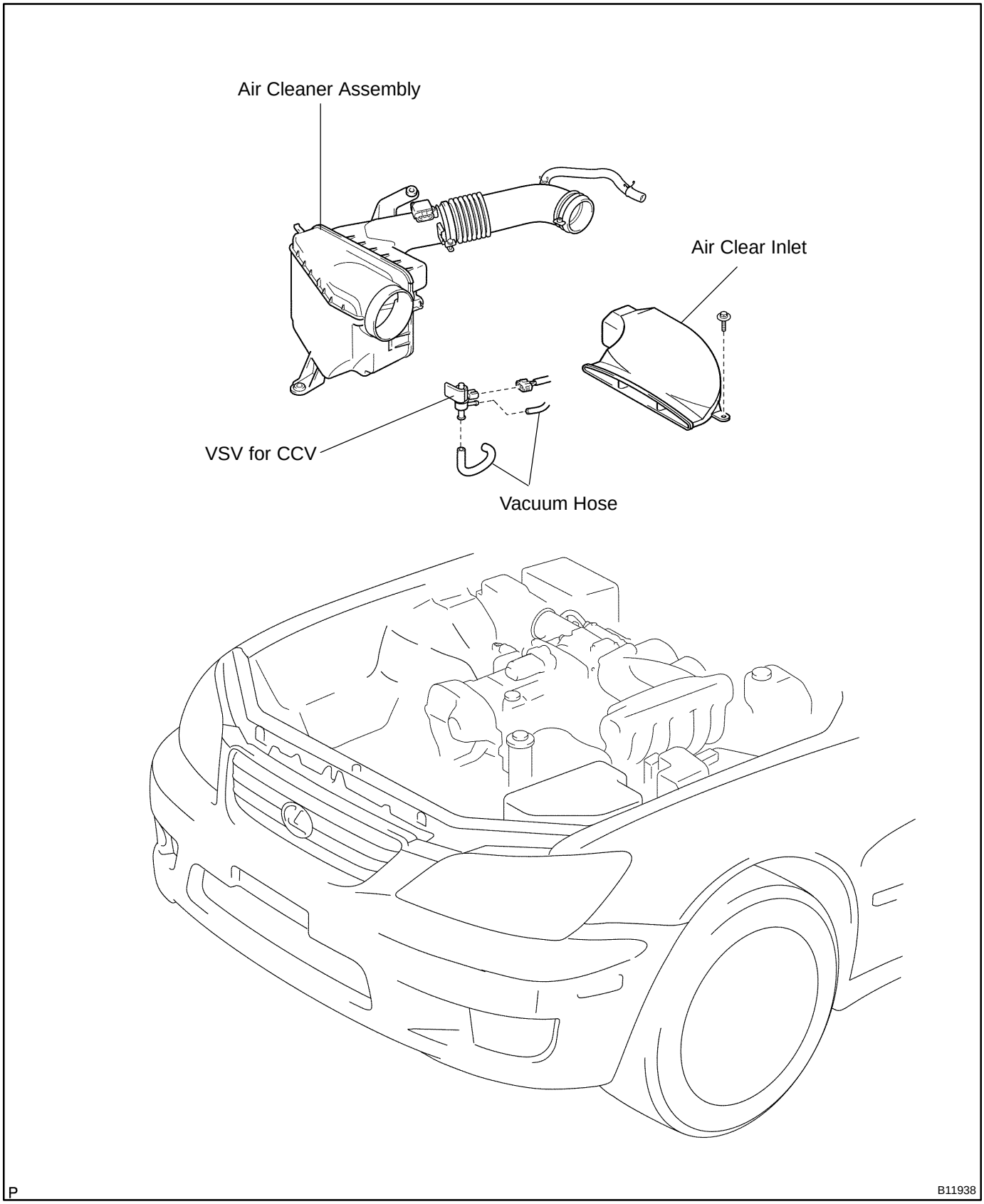
9. REINSTALL ENGINE COVER

Reinstall the engine cover with the 4 nuts.

VSV FOR CANISTER CLOSED VALVE (CCV)

COMPONENTS

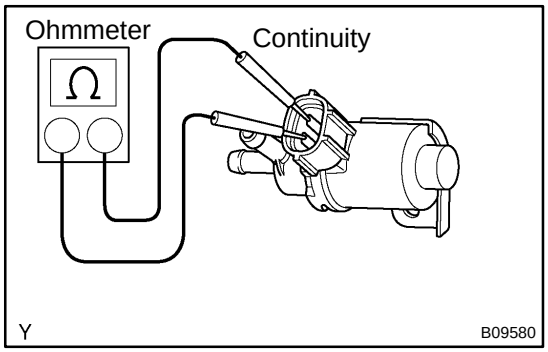
SF1LD-03



SF1LE-03

INSPECTION

1. REMOVE VSV



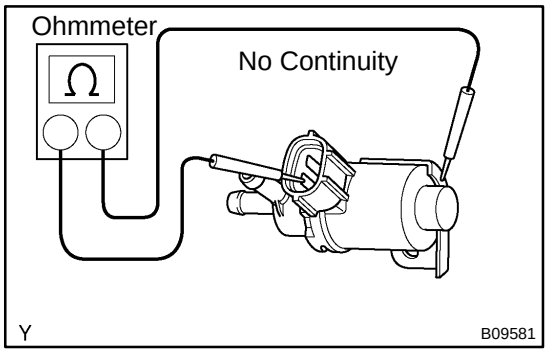
2. INSPECT VSV

(a) Inspect the VSV for open circuit.

Using an ohmmeter, check that there is continuity between terminals.

Resistance: 24 - 30 Ω at 20˚C (68˚F)

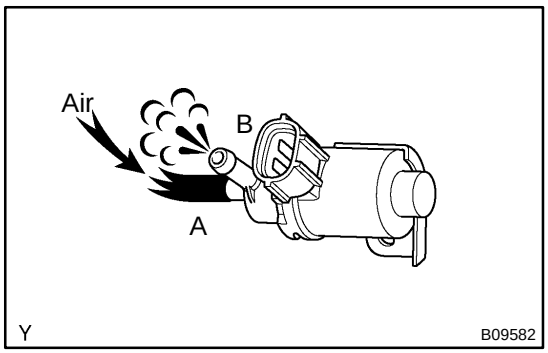
If there is no continuity, replace the VSV.



(b) Inspect the VSV for ground.

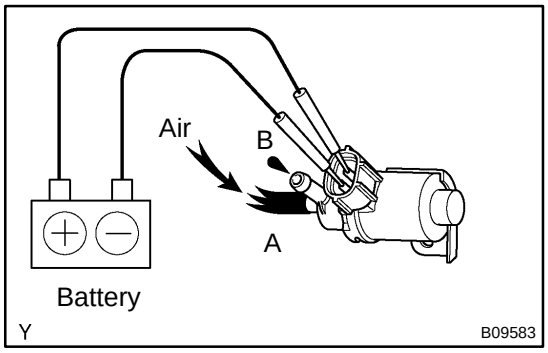
Check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.

(1) Check that air flows from port B to A.



(2) Apply battery positive voltage across the terminals.

(3) Check that air flows with difficulty from port B to A.

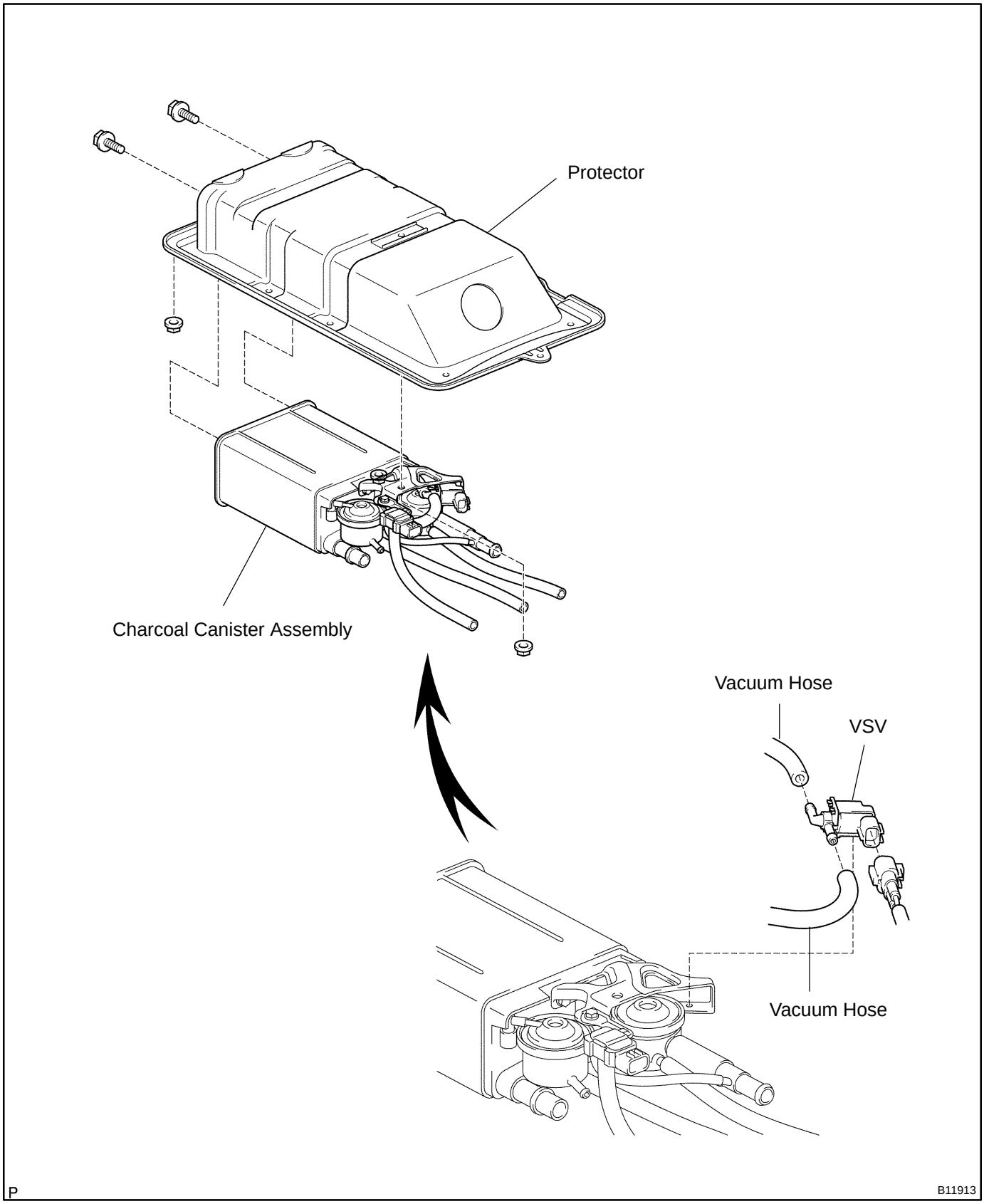
If operation is not as specified, replace the VSV.

3. REINSTALL VSV

VSV FOR PRESSURE SWITCHING VALVE

SF0O3-06

COMPONENTS

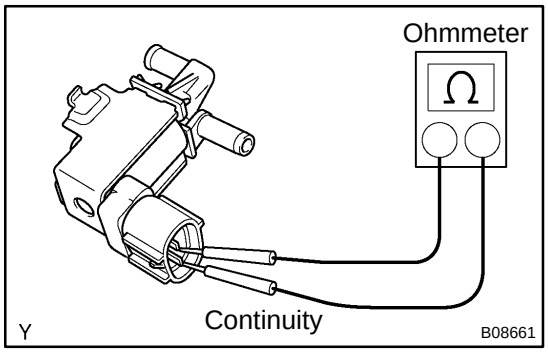


SF0O4-03

INSPECTION

1. REMOVE CHARCOAL CANISTER ASSEMBLY

2. REMOVE VSV FROM CHARCOAL CANISTER



3. INSPECT VSV

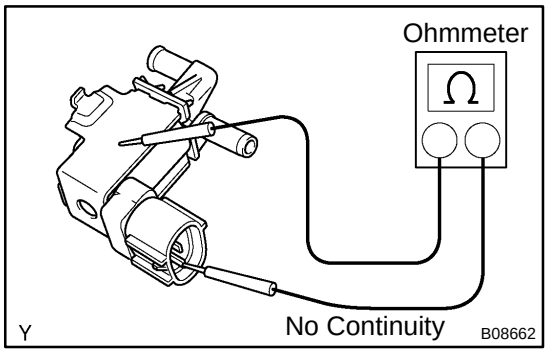
(a) Inspect the VSV for open circuit.

Using an ohmmeter, check that there is continuity between the terminals.

Resistance:

20˚C (68˚F)	37 - 44 Ω
120˚C (248˚F)	51 - 62 Ω

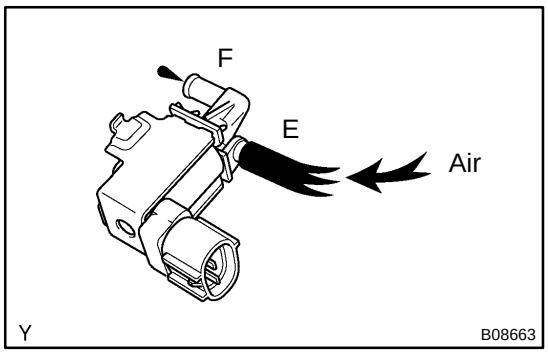
If there is no continuity, replace the VSV.



(b) Inspect the VSV for ground.

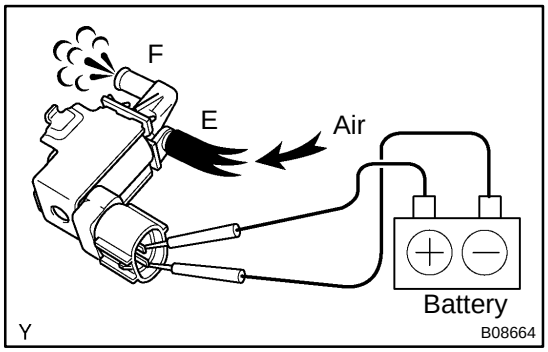
Check that there is no continuity between each terminals and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.

(1) Check that the air does not from port E to F.



(2) Apply battery positive voltage across the terminals.

(3) Check that the air flows from port E to F.

If operation is not specified, replace the VSV.

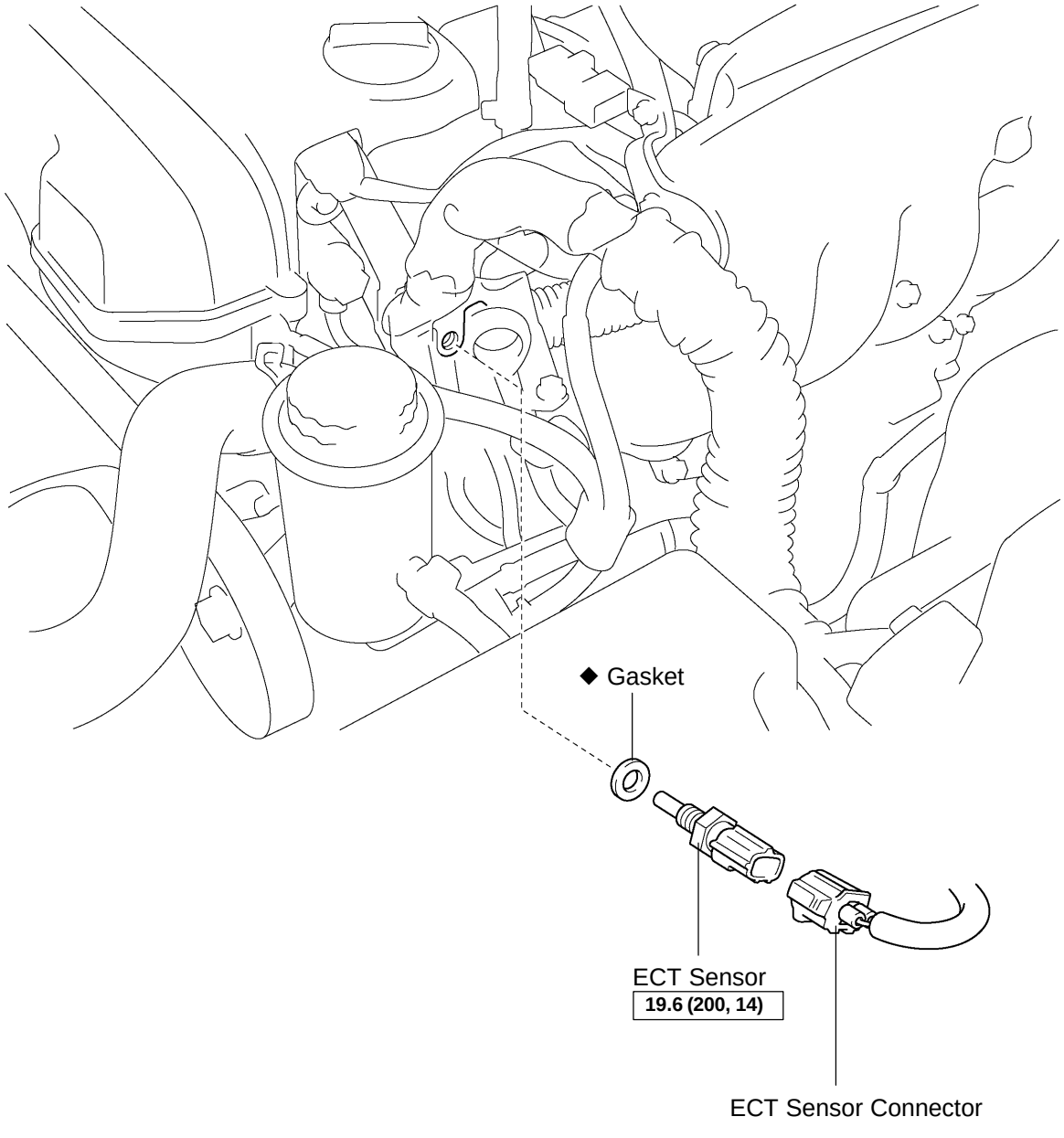
4. REINSTALL VSV TO CHARCOAL CANISTER

5. REINSTALL CHARCOAL CANISTER ASSEMBLY

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

SF0O5-08

COMPONENTS

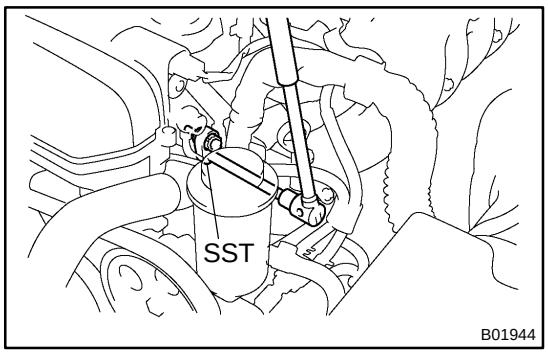


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

B02006

SF0O6-06



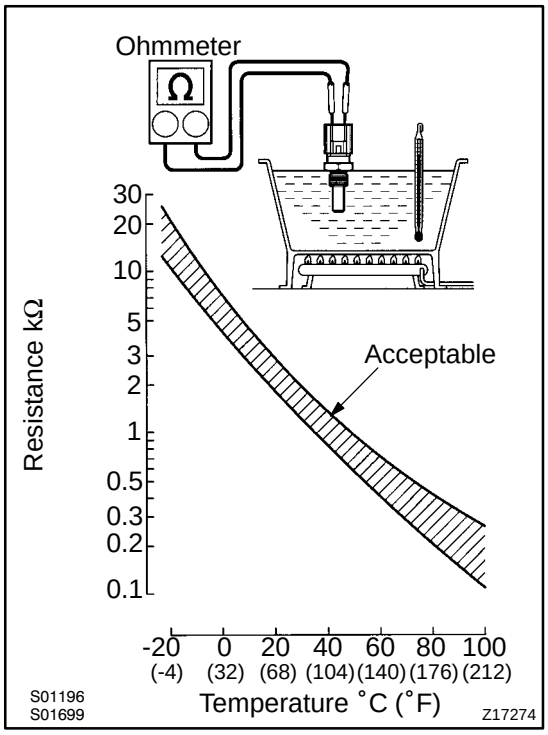
INSPECTION

1. DRAIN ENGINE COOLANT

2. REMOVE ECT SENSOR

(a) Disconnect the ECT sensor connector.

(b) Using SST, remove the ECT sensor and gasket.
SST 09205-76030



3. INSPECT ECT SENSOR

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to the graph

If the resistance is not as specified, replace the ECT sensor.

4. REINSTALL ECT SENSOR

(a) Install a new gasket to the ECT sensor.

(b) Using SST, install the ECT sensor.
SST 09205-76030
Torque: 19.6 N·m (200 kgf·cm, 14 ft·lbf)

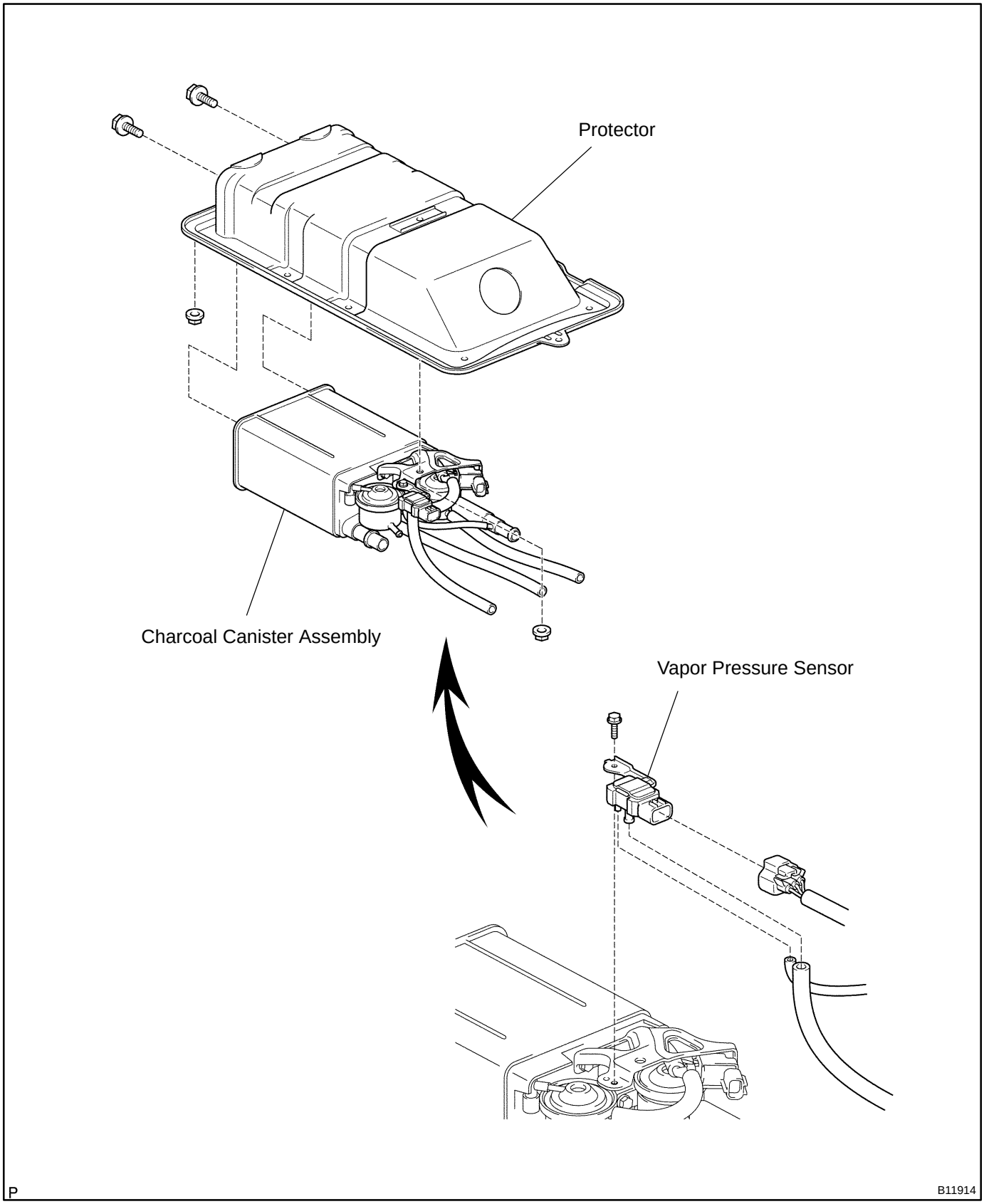
(c) Connect the ECT sensor connector.

5. REFILL WITH ENGINE COOLANT

VAPOR PRESSURE SENSOR

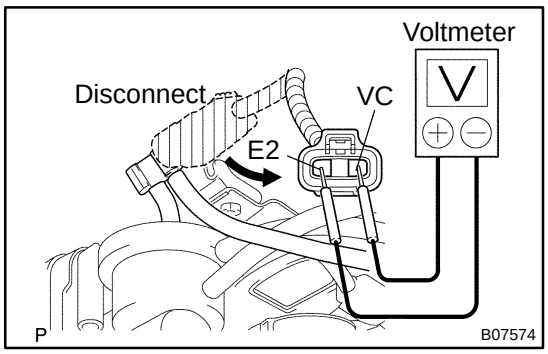
COMPONENTS

SF0ZQ-05



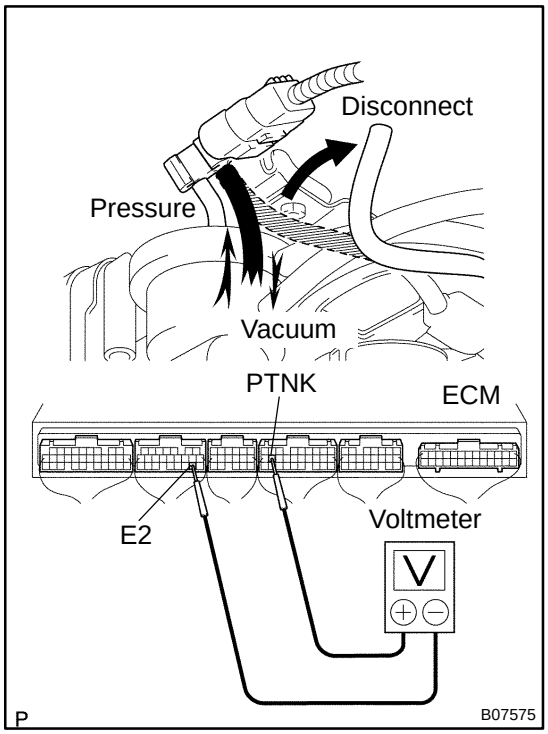
SF0O8-03

INSPECTION



1. INSPECT POWER SOURCE VOLTAGE OF VAPOR PRESSURE SENSOR

(a) Disconnect the vapor pressure sensor connector.
(b) Turn the ignition switch ON.
(c) Using a voltmeter, measure the voltage between connector terminals VC and E2 of the wiring harness side.
Voltage: 4.5 - 5.5 V
(d) Turn the ignition switch OFF.
(e) Reconnect the vapor pressure sensor connector.



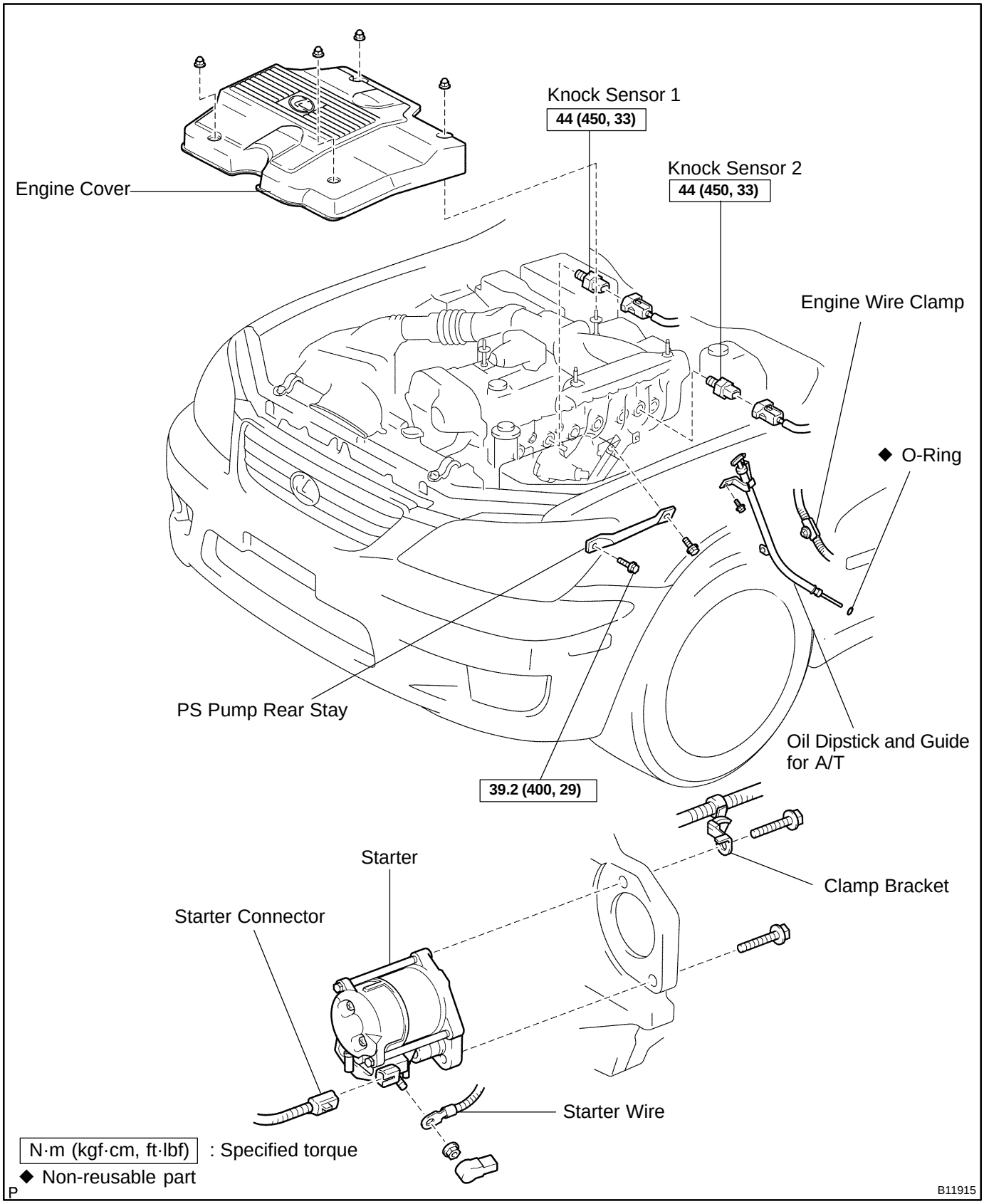
2. INSPECT POWER OUTPUT OF VAPOR PRESSURE SENSOR

(a) Turn the ignition switch ON.
(b) Disconnect the vacuum hose from the vapor pressure sensor.
(c) Connect a voltmeter to terminals PTNK and E2 of the ECM, and measure the output voltage under these conditions:
(1) Apply vacuum (2.0 kPa (15 mmHg, 0.59 in.Hg)) to the vapor pressure sensor.
Voltage: 1.3 - 2.1 V
(2) Release the vacuum from the vapor pressure sensor.
Voltage: 3.0 - 3.6 V
(3) Apply pressure (1.5 kPa (15 gf/cm^2, 0.22 psi)) to the vapor pressure sensor.
Voltage: 4.2 - 4.8 V
(d) Turn the ignition switch OFF.
(e) Reconnect the vacuum hose to the vapor pressure sensor.

KNOCK SENSOR

COMPONENTS

SF0O9-08

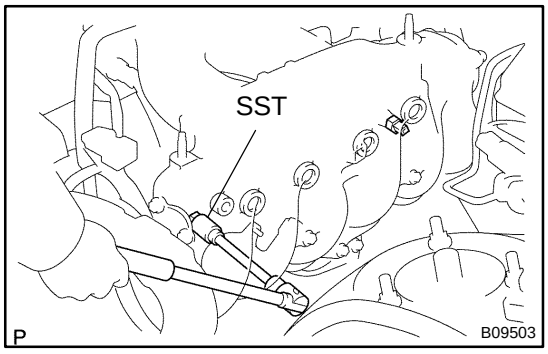


SF0OA-07

INSPECTION

1. REMOVE ENGINE COVER

Remove the 4 nuts and engine cover.



2. REMOVE PS PUMP REAR STAY

3. REMOVE KNOCK SENSOR 1

(a) Disconnect the knock sensor connector.

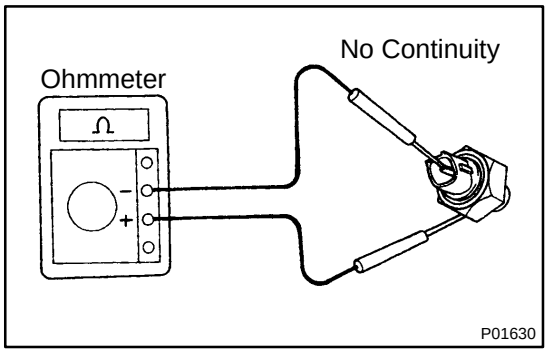
(b) Using SST, remove the knock sensor.

SST 09816-30010

4. REMOVE OIL DIPSTICK AND GUIDE FOR A/T (See page EM-65)

5. REMOVE STARTER (See page ST-4)

6. REMOVE KNOCK SENSOR 2 (See step 2)



7. INSPECT KNOCK SENSORS

Using an ohmmeter, check that there is no continuity between the terminal and body.

If there is continuity, replace the sensor.

8. REINSTALL KNOCK SENSORS

(a) Using SST, install the knock sensor.

SST 09816-30010

Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)

(b) Connect the knock sensor connector.

9. REINSTALL STARTER (See page ST-16)

10. REINSTALL OIL DIPSTICK AND GUIDE FOR A/T

HINT:

Use a new O-ring.

11. REINSTALL PS PUMP REAR STAY

Torque: 39.2 N·m (400 kgf·cm, 29 ft·lbf)

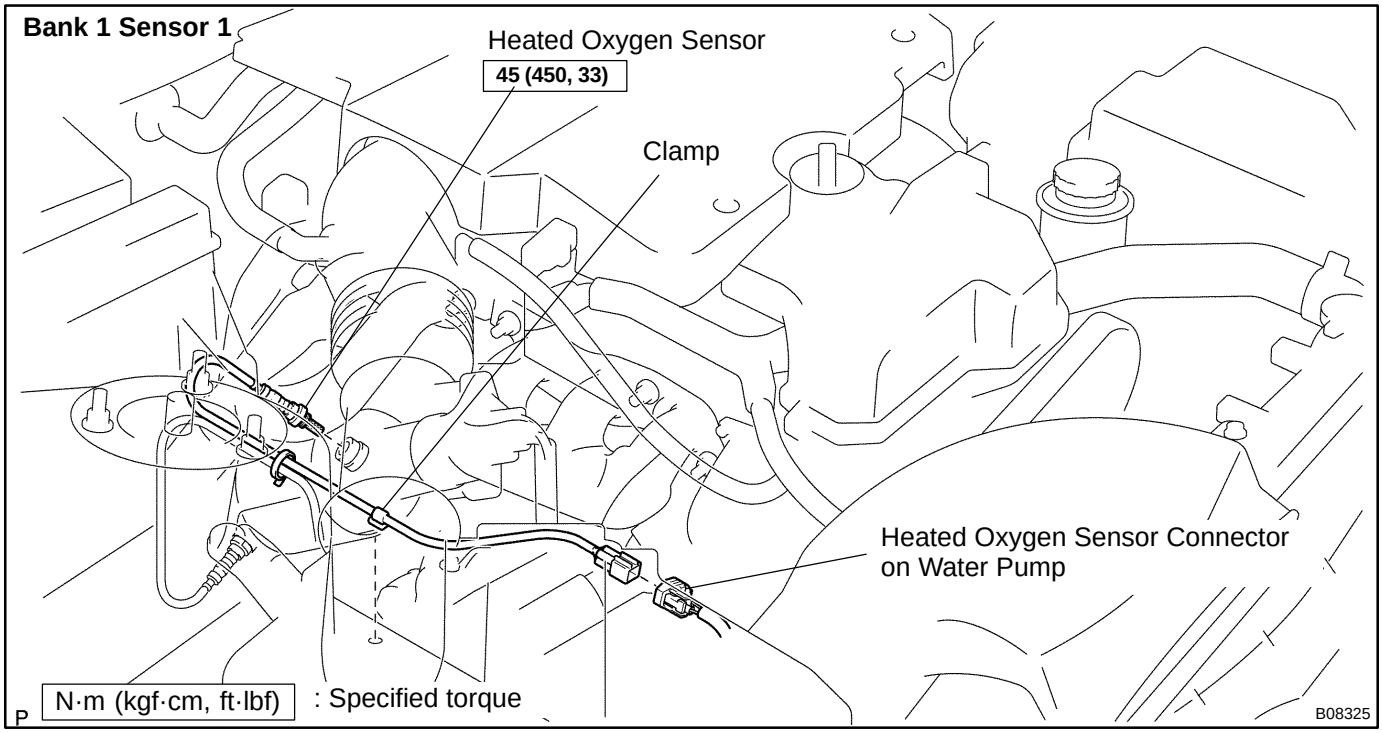
12. REINSTALL ENGINE COVER

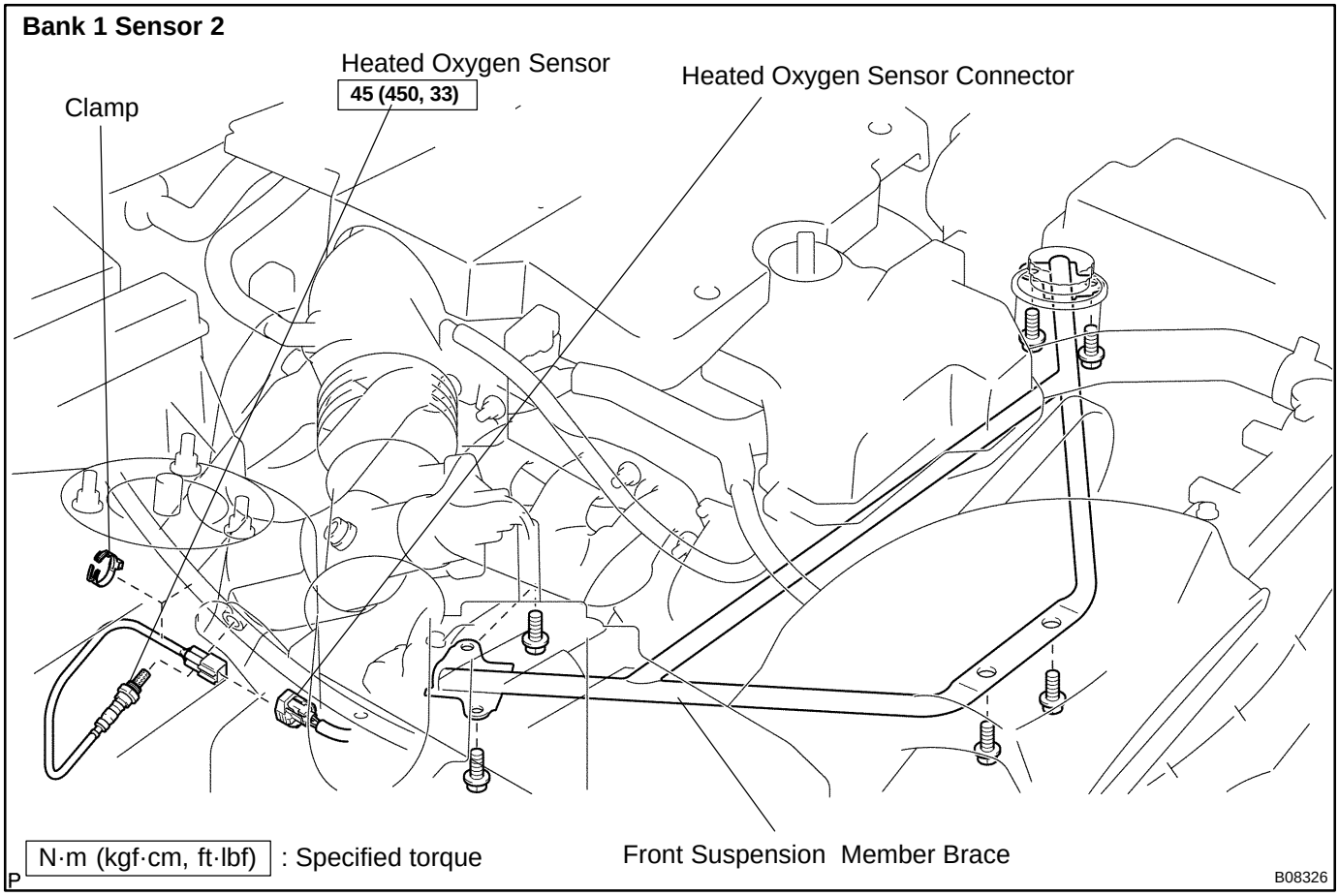
Reinstall the engine cover with the 4 nuts.

HEATED OXYGEN SENSOR

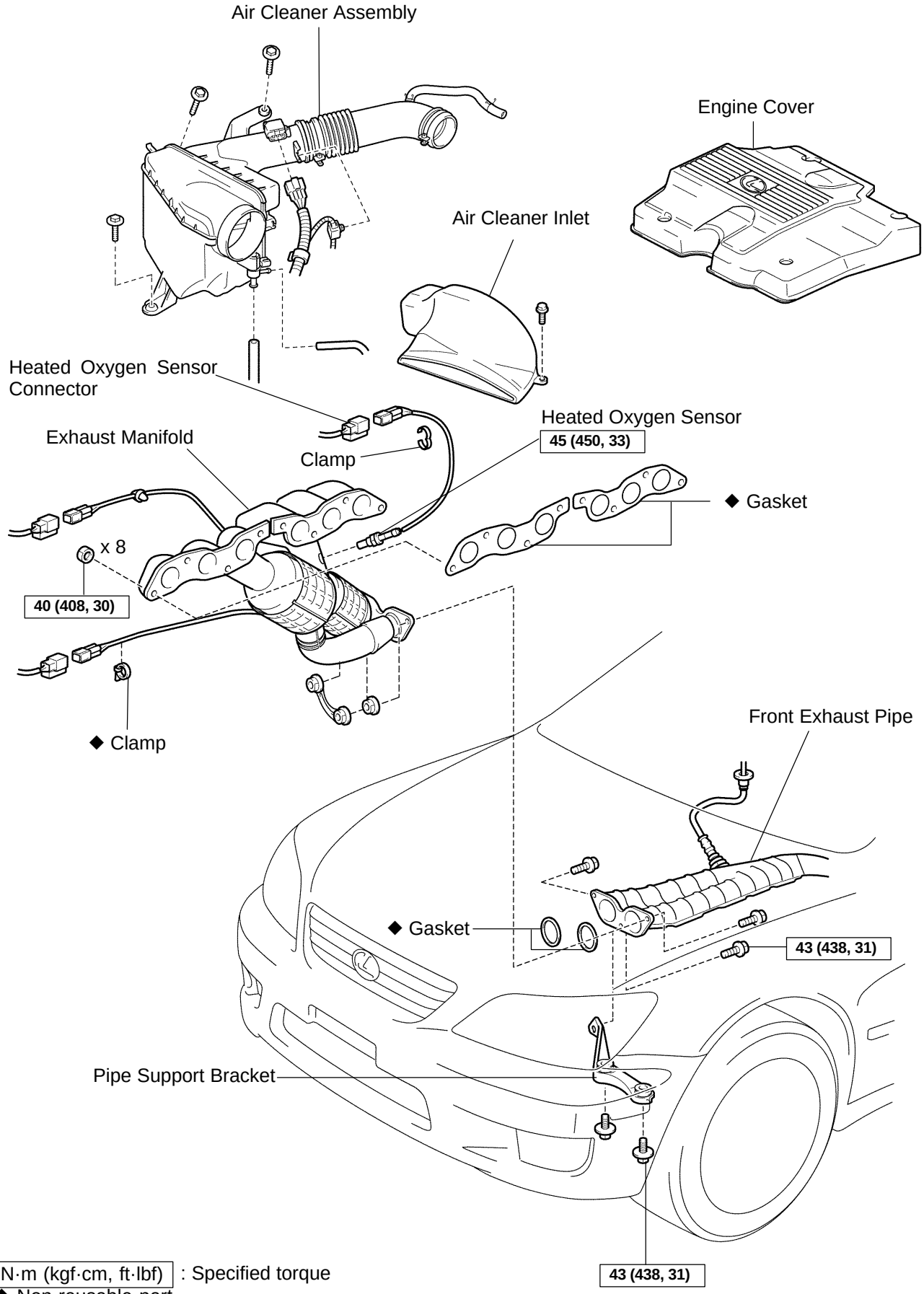
SF0OB-07

COMPONENTS





Bank 2 Sensor 1

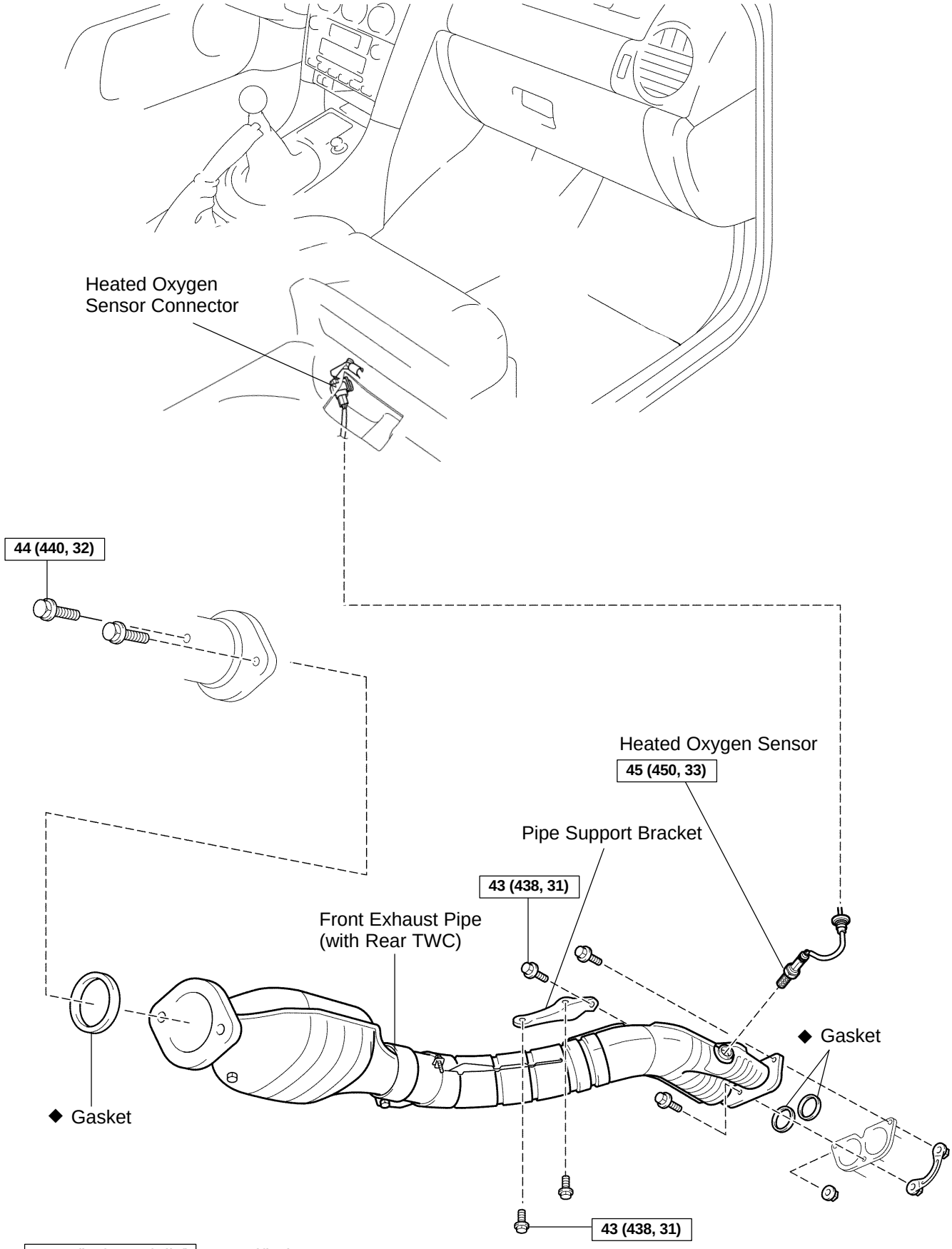


P

N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

B11916

Bank 2 Sensor 2



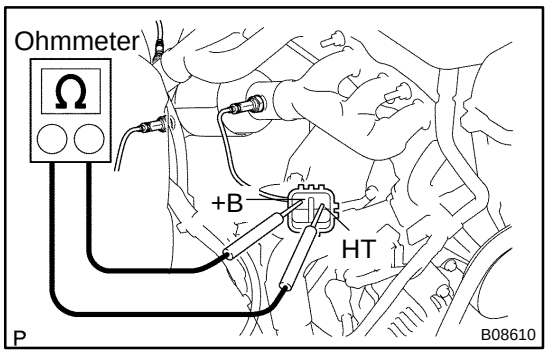
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

P

F20085

SF0OC-11



INSPECTION

1. Bank 1, 2 Sensor 1, and Bank 1 Sensor 2:
INSPECT HEATER RESISTANCE OF HEATED OXYGEN SENSORS

(a) Disconnect the oxygen sensor connectors.

(b) Using an ohmmeter, measure the resistance between the terminals +B and HT.

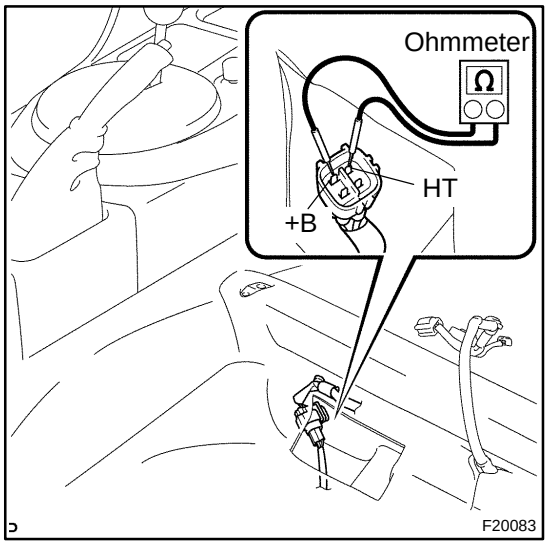
Resistance:

20˚C (68˚F)	11 - 16 Ω
800˚C (1,472˚F)	23 - 32 Ω

If the resistance is not as specified, replace the sensor.

Torque: 45 N·m (450 kgf·cm, 33 ft·lbf)

(c) Reconnect the oxygen sensor connectors.



2. Bank 2 Sensor 2:
INSPECT HEATER RESISTANCE OF HEATED OXYGEN SENSOR

(a) Remove the front seat assembly RH.

(b) Remove the air duct guide rear RH.

(c) Disconnect the oxygen sensor connector.

(d) Using an ohmmeter, measure the resistance between the terminals +B and HT.

Resistance:

20˚C (68˚F)	11 - 16 Ω
800˚C (1,472˚F)	23 - 32 Ω

If the resistance is not as specified, replace the sensor.

Torque: 45 N·m (450 kgf·cm, 33 ft·lbf)

(e) Reconnect the oxygen sensor connector.

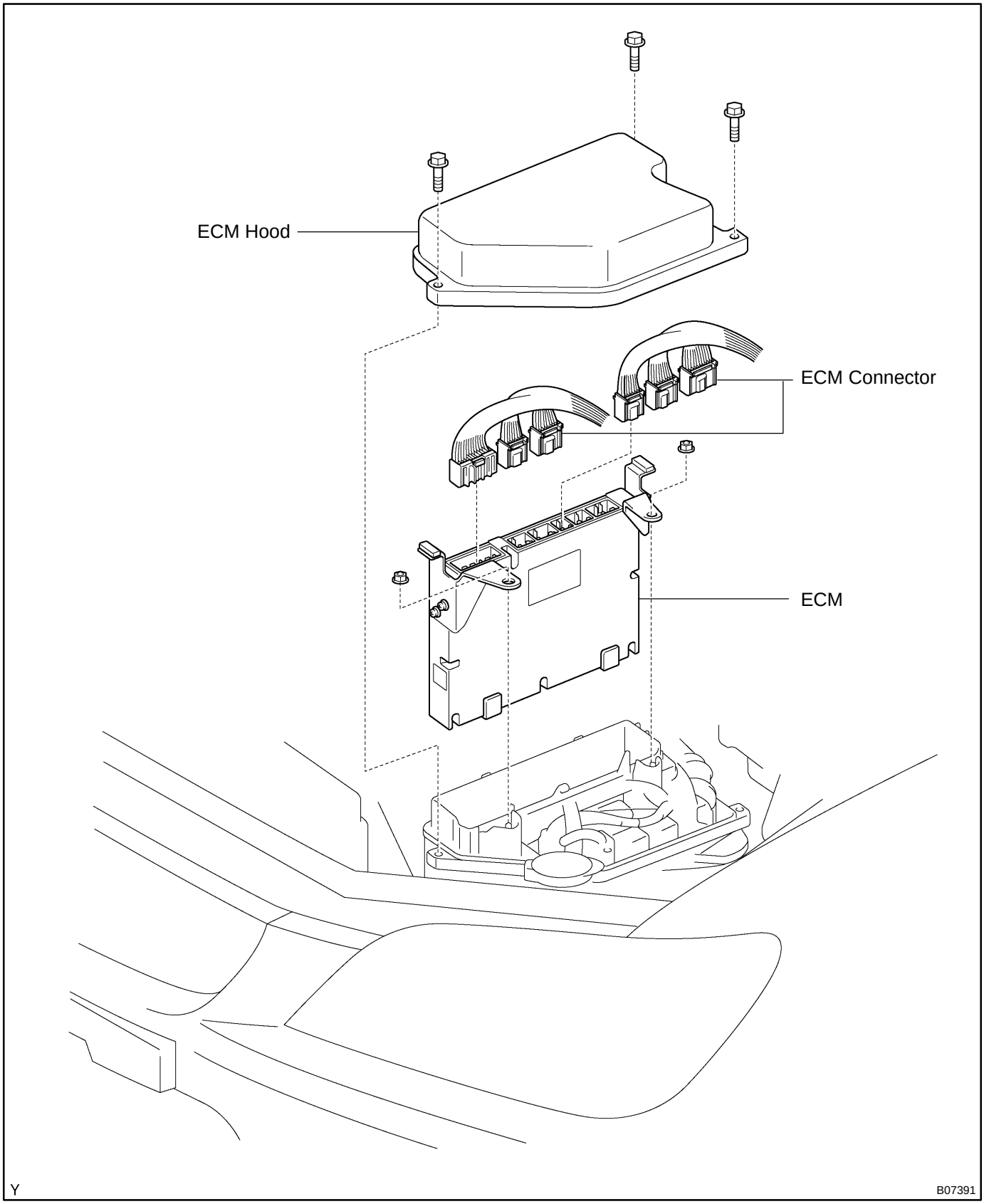
(f) Install the air duct guide rear RH.

(g) Install the front seat assembly RH.

ENGINE CONTROL MODULE (ECM)

SF0OF-14

COMPONENTS



SF0OG-04

INSPECTION

1. REMOVE ECM
2. INSPECT ECM (See page DI-41)
3. REINSTALL ECM

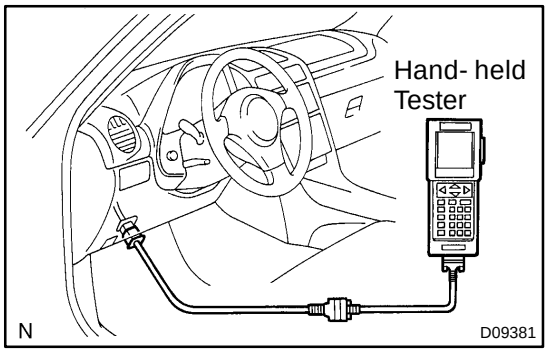
FUEL CUT RPM

SF0OH-09

INSPECTION

1. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

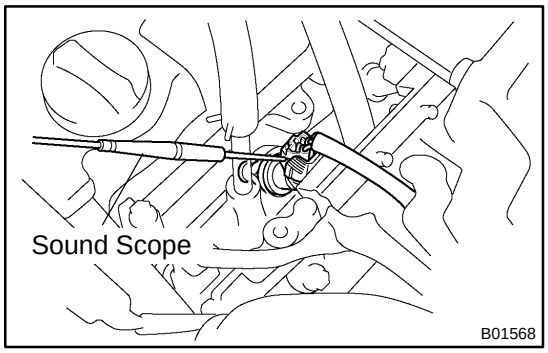


2. CONNECT HAND-HELD TESTER OR OBD II SCAN TOOL

(a) Connect the hand-held tester or OBD II scan tool to the DLC3.

(b) Select the following menu items: DIAGNOSIS / ENHANCED OBD ll / DATA LIST / ENGINE SPD.

(c) Please refer to the hand-held tester or OBD II scan tool operator's manual for further details.



3. INSPECT FUEL CUT-OFF OPERATION

(a) Increase the engine speed to at least 3,000 rpm.

(b) Check for injector operating noise.

(c) Check that when the throttle lever is released, injector operation noise stops momentarily and then resumes.

HINT:

Measure with the A/C OFF.

Fuel return rpm: 1,000 rpm

4. DISCONNECT HAND-HELD TESTER OR OBD II SCAN TOOL

COOLANT

CO09W-05

INSPECTION

HINT:

Check the coolant level when the engine is cold.

1. CHECK ENGINE COOLANT LEVEL AT RESERVOIR

The engine coolant should be between the LOW and FULL lines when the engine is cold.

If low, check for leakge and add Toyota Super Long Life Coolant or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate coolant with long-life hybrid organic acid technology up to the FULL line.

2. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

CAUTION:

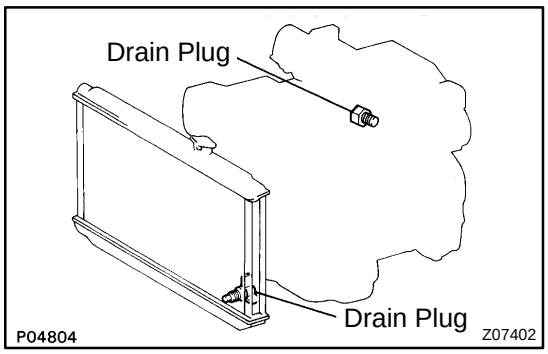
To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(b) Check for any excessive deposits of rust or scale around the radiator cap and radiator filler hole; the coolant should be free of oil.

If excessively dirty, replace the coolant.

(c) Reinstall the radiator cap.

CO09X-08



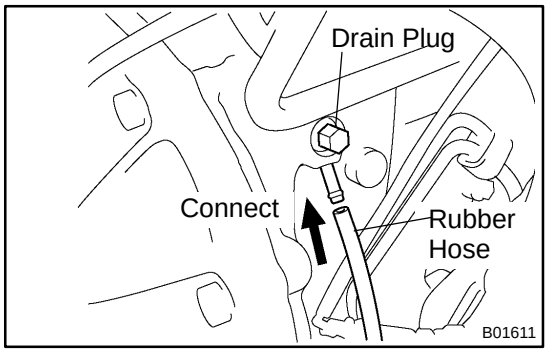
REPLACEMENT

1. DRAIN ENGINE COOLANT

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator.

(a) Loosen the 2 drain plugs (for the engine and radiator).



HINT:

To prevent the coolant from spraying over the cylinder block, connect the rubber hose (inside diameter 6 - 8 mm (0.24 - 0.31 in.)) in the market to the union pipe under the drain plug.

(b) Remove the radiator cap and drain the coolant.

(c) Close the 2 drain plugs.

Torque: 30 N·m (300 kgf·cm, 22 ft·lbf) for engine

2. ADD ENGINE COOLANT

(a) Pour coolant into the radiator until it overflows.

Capacity (w/ Heater):

7.5 liters (7.9 US qts, 6.6 lmp. qts)

HINT:

- Use of improper coolants may damage the engine cooling system.
- Only use Toyota Super Long Life Coolant or similar high quality ethlene glycol based non-silicate, non-amine, non-nitrite, and non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).
- New Toyota vehicles are filled with Toyota Super Long Life Coolant. When replacing the coolant, Toyota Super Long Life Coolant (color is pink, premixed ethyleneglycol concentration is approximately 50 % and freezing temperature is -35˚C (-31˚F)) is recommended.

NOTICE:

Do not substitute plain water for engine coolant.

(b) Check the coolant level inside the radiator by squeezing the inlet and outlet radiator hoses several times by hand. If the coolant level goes down, add coolant.

(c) Install the radiator cap securely.

(d) Slowly pour coolant into the radiator reservoir until it reaches the FULL line.

(e) Warm up the engine until the cooling fan operates.

- Set the air conditioning as follows while warming up the engine.

	Automatic air conditioning system
Set control as follows	Fan speed - Any setting except OFF Temperature - To the highest temperature Air condition switch OFF AUTO switch OFF

- Maintain the engine speed at 2,000 to 2,500 rpm and warm up the engine until the cooling fan operates.

(f) Squeeze the inlet and outlet radiator hoses several times by hand while warning up the engine.

(g) Stop the engine and wait until the coolant cools down.

(h) Remove the radiator cap and check the coolant level inside the radiator.
(i) If the coolant level is below the full level, perform the steps from (a) through (h) and repeat the operation until the coolant level remains the full level.
(j) Recheck the coolant level inside the radiator reservoir tank. If it is below the full level, add coolant.

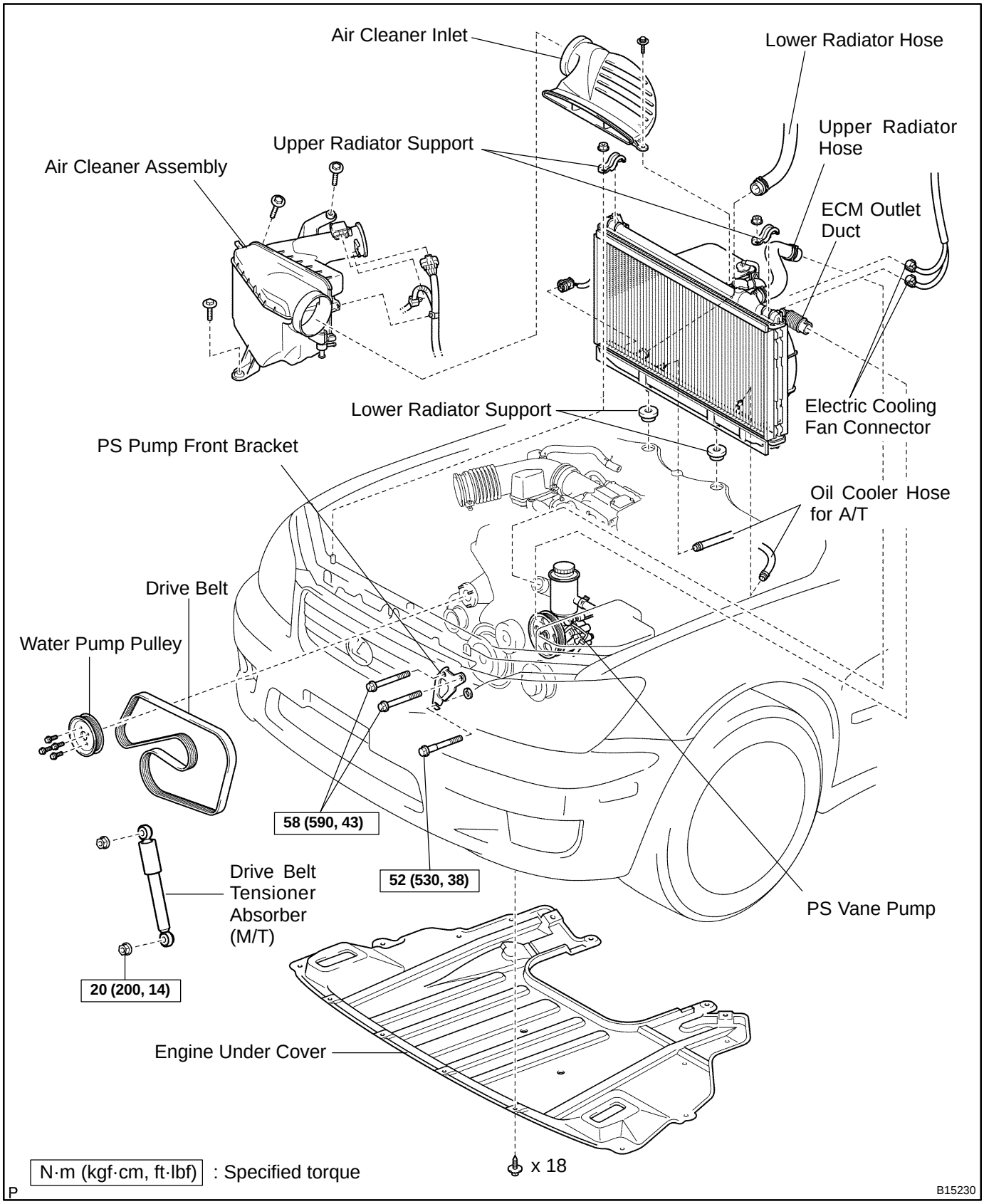
3. CHECK FOR ENGINE COOLANT LEAKS

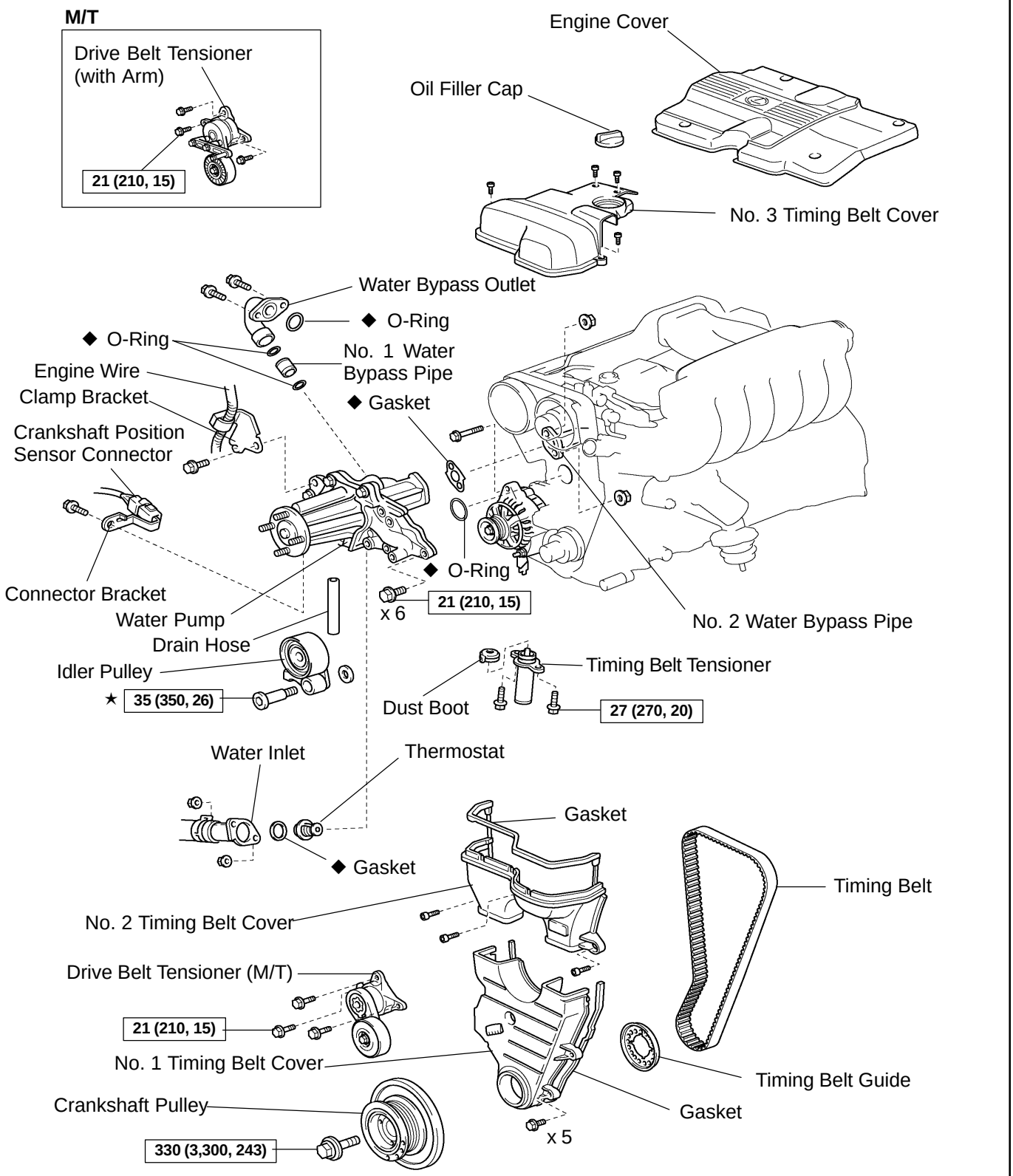
(a) Fill the radiator with engine coolant and attach a radiator cap tester.
(b) Pump it to 177 kPa (1.8 kgf/cm^2, 26 psi) and check for leakage.

WATER PUMP

COMPONENTS

CO09Y-08





Y N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part

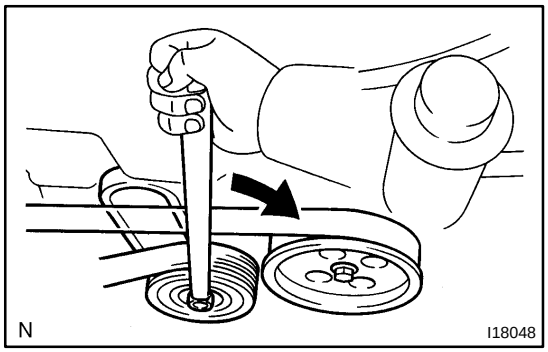
B15232

CO09Z-07

REMOVAL

1. **REMOVE RADIATOR ASSEMBLY (See page CO-19)**
2. **M/T:**
   REMOVE DRIVE BELT TENSIONER ABSORBER

Remove the 2 nuts and absorber.



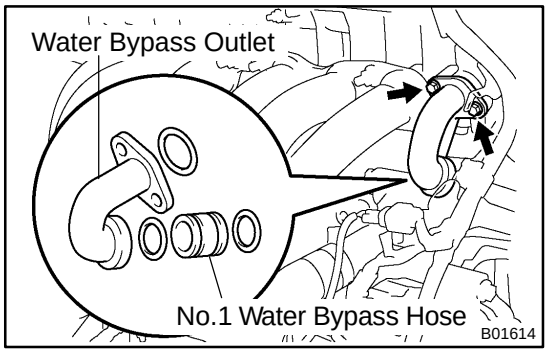
3. **REMOVE DRIVE BELT AND WATER PUMP PULLEY**

(a) Loosen the 4 nuts holding the water pump pulley to the water pump.

(b) Using SST, loosen the drive belt tension by turning the drive belt tensioner clockwise, and remove the drive belt.
SST 09216-00041

(c) Remove the 4 nuts and water pump pulley.

4. **REMOVE TIMING BELT AND IDLER PULLEY (See page EM-17)**

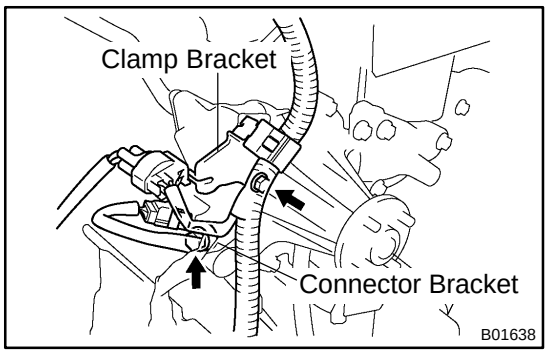


5. **REMOVE WATER BYPASS OUTLET AND NO. 1 WATER BYPASS PIPE**

(a) Remove the 2 bolts, water bypass outlet and No. 1 water bypass pipe.

(b) Remove the 3 O-rings from the water bypass outlet and No. 1 water bypass pipe.

6. **REMOVE WATER INLET AND THERMOSTAT (See page CO-12)**

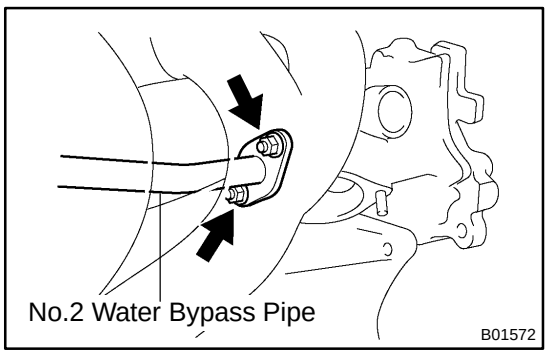


7. **REMOVE WATER PUMP**

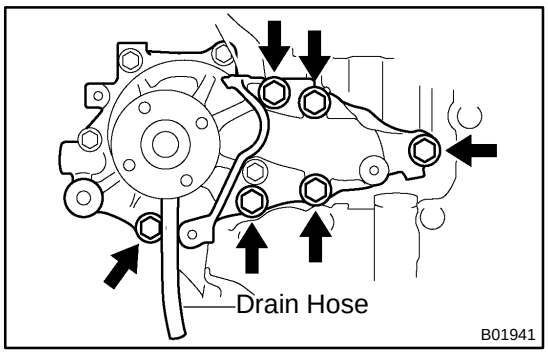
(a) Loosen the nut and remove the bolt, slide the generator away from the water pump.

(b) Remove the bolt, and disconnect the clamp bracket (for engine wire).

(c) Remove the bolt, and disconnect the connector bracket (for crankshaft position sensor connector).

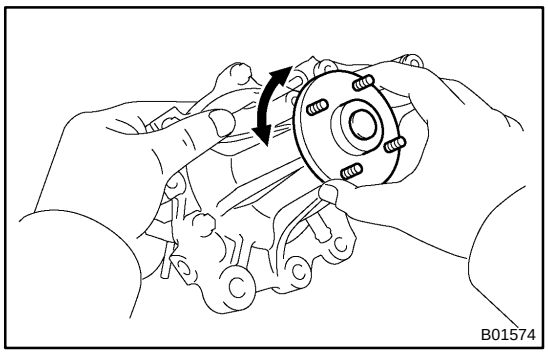


(d) Remove the 2 nuts, and disconnect the No. 2 water bypass pipe from the water pump.



(e) Remove the 6 bolts, water pump and gasket.
(f) Remove the drain hose.
(g) Remove the O-ring from the cylinder block.

CO0A0-06



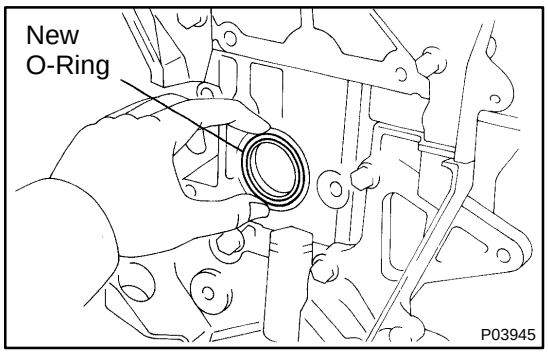
INSPECTION

INSPECT WATER PUMP

Turn the pulley seat, and check that the water pump bearing is not rough or noisy.

If necessary, replace the water pump.

CO0A1-06

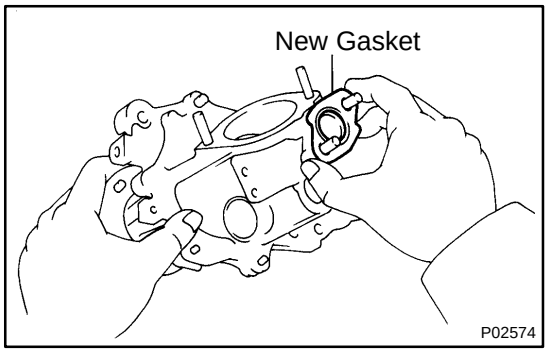


INSTALLATION

1. INSTALL WATER PUMP

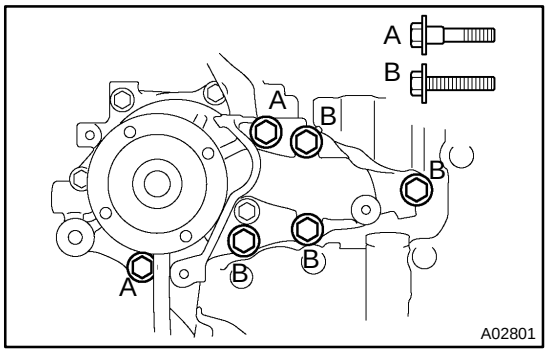
(a) Install a new O-ring to the cylinder block.

(b) Install the drain hose.



(c) Install a new gasket to the water pump.

(d) Connect the water pump to the water bypass pipe. Do not install the nut yet.



(e) Install the water pump with the 2 bolts (A) and 4 bolts (B).
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

HINT:

Hand tighten the (A) bolts first.

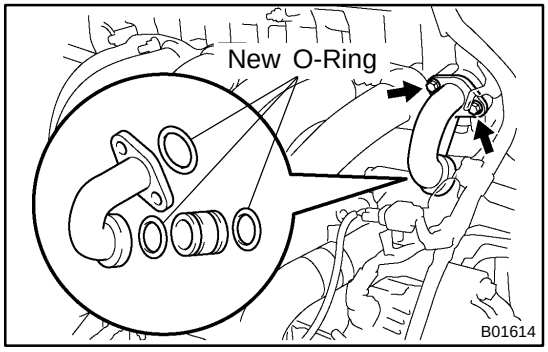
(f) Install the 2 nuts holding the No. 2 water bypass pipe to the water pump.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(g) Install the connector bracket (for crankshaft position sensor connector) with the bolt.

(h) Install the clamp bracket (for engine wire) with the bolt.

(i) Install the generator with the bolt and nut.
Torque: 40 N·m (400 kgf·cm, 30 ft·lbf)

2. INSTALL THERMOSTAT AND WATER INLET (See page CO-14)



3. INSTALL NO. 1 WATER BYPASS PIPE AND WATER BYPASS OUTLET

(a) Install 2 new O-rings to the No. 1 water bypass pipe.

(b) Install a new O-ring and the water bypass outlet with the 2 bolts.
Torque: 9.0 N·m (90 kgf·cm, 80 in.·lbf)

4. INSTALL IDLER PULLEY AND TIMING BELT (See page EM-24)

5. INSTALL WATER PUMP PULLEY AND DRIVE BELT
Torque: 14 N·m (140 kgf·cm, 10 ft·lbf)

6. **M/T:**
   INSTALL DRIVE BELT TENSIONER ABSORBER

Install the absorber with the 2 nuts.

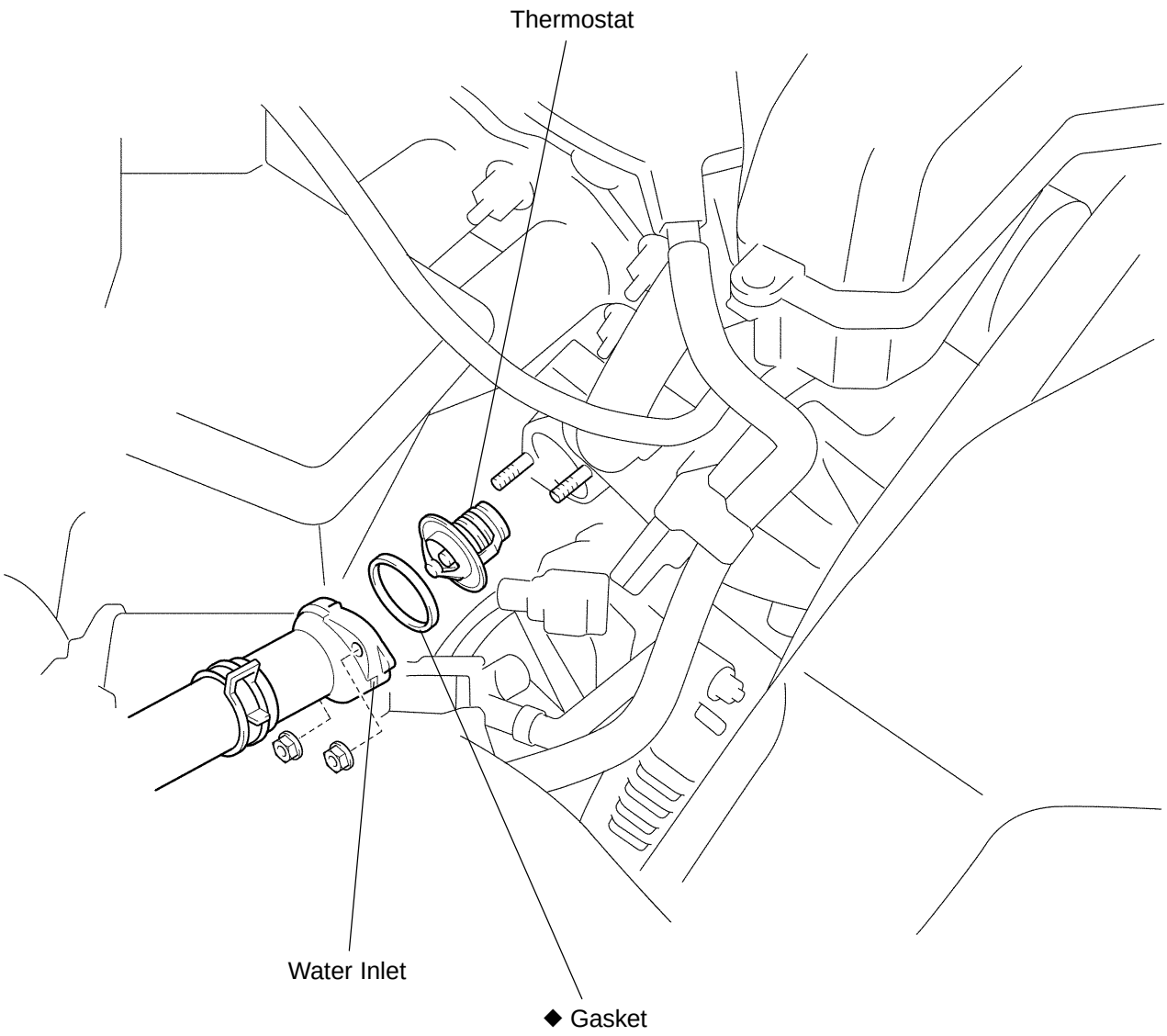
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

7. **INSTALL RADIATOR ASSEMBLY (See page CO-24)**

THERMOSTAT

COMPONENTS

CO0A2-05



P ◆ Non-reusable part

B11922

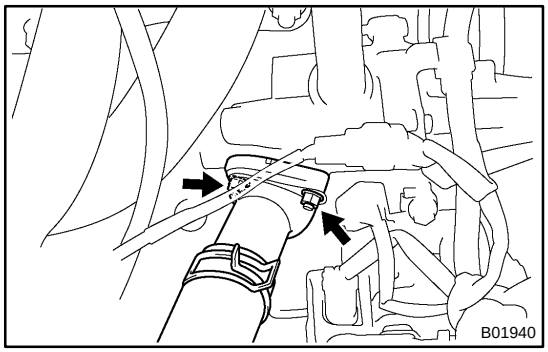
CO0A3-07

REMOVAL

HINT:

Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. DRAIN ENGINE COOLANT



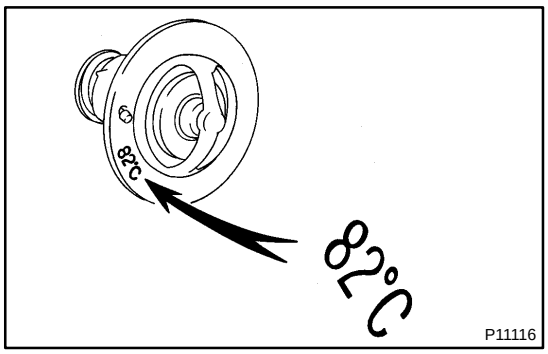
2. REMOVE THERMOSTAT

(a) Remove the 2 nuts holding the water inlet to the water pump, and disconnect the water inlet from the water pump.

(b) Remove the thermostat.

(c) Remove the gasket from the thermostat.

CO0A4-07

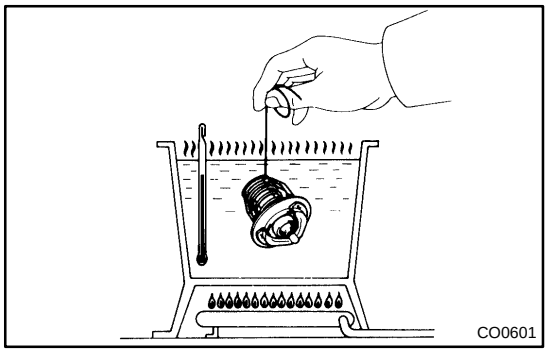


INSPECTION

INSPECT THERMOSTAT

HINT:

The thermostat is numbered with the valve opening temperature.

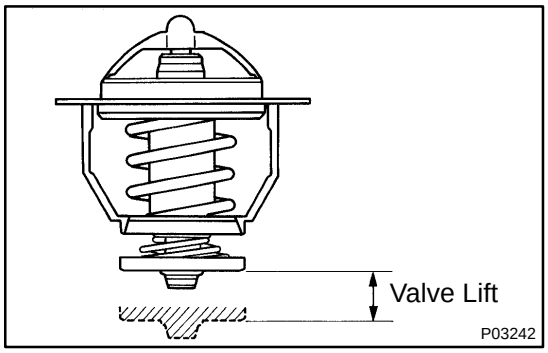


(a) Immerse the thermostat in water and gradually heat the water.

(b) Check the valve opening temperature.

Valve opening temperature: 80 - 84˚C (176 - 183˚F)

If the valve lift is not as specified, replace the thermostat.



(c) Check the valve lift.

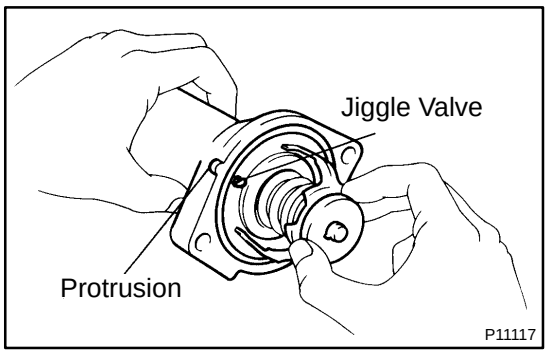
Valve lift: 8.5 mm (0.335 in.) or more at 95˚C (203˚F)

If the valve lift is not as specified, replace the thermostat.

(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 40˚C (104˚F)).

If not closed, replace the thermostat.

CO0A5-06



INSTALLATION

1. PLACE THERMOSTAT IN WATER INLET

(a) Install a new gasket to the thermostat.

(b) Align the jiggle valve of the thermostat with the protrusion of the water inlet.

2. INSTALL WATER INLET

Install the water inlet with the 2 nuts.

Torque: 9.0 N·m (90 kgf·cm, 80 in.·lbf)

3. FILL WITH ENGINE COOLANT

4. START ENGINE AND CHECK FOR COOLANT LEAKS

RADIATOR

CO0A6-01

ON-VEHICLE CLEANING

CLEAN RADIATOR

Using water or a steam cleaner, remove any mud or dirt from the radiator core.

NOTICE:

If using a high pressure type cleaner, be careful not to deform the fins of the radiator core. (i.e. Maintain a distance between the cleaner nozzle and radiator core.)

CO0A7-06

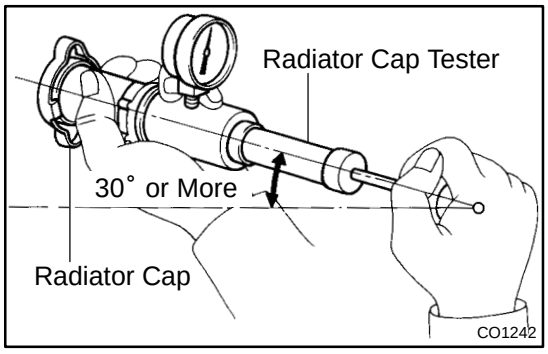
ON-VEHICLE INSPECTION

1. REMOVE RADIATOR CAP

Remove the radiator cap from the radiator.

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



2. INSPECT RADIATOR CAP

NOTICE:

- **If the radiator cap has contaminations, always rinse it with water.**
- **Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.**
- **When performing steps (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.**

(a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push/(3 seconds or more)

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

(b) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

This pump speed is for the first pump only (in order to close the vacuum valve). After this, the pump speed can be reduced.

Standard opening pressure:

93 - 123 kPa (0.95 - 1.25 kgf/cm^2, 13.5 - 17.8 psi)

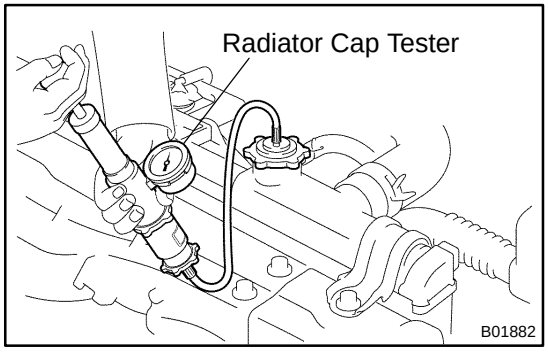
Minimum opening pressure:

78 kPa (0.8 kgf/cm^2, 11.4 psi)

HINT:

Use the tester's maximum reading as the opening pressure.

If the opening pressure is less than minimum, replace the radiator cap.



3. INSPECT COOLING SYSTEM FOR LEAKS

(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Warm up the engine.

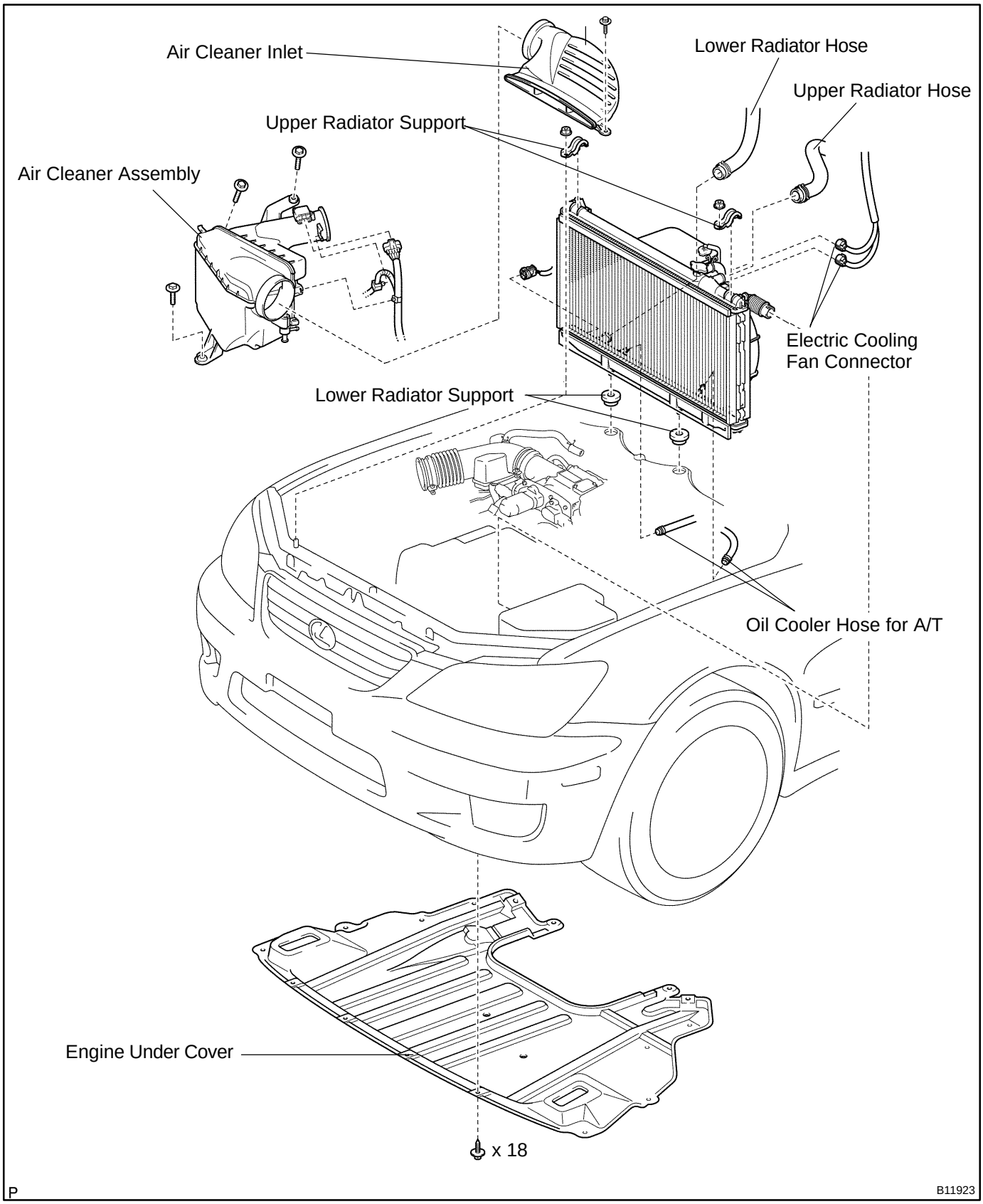
(c) Pump it to 118 kPa (1.2 kgf/cm^2, 17.1 psi), and check that the pressure does not drop.

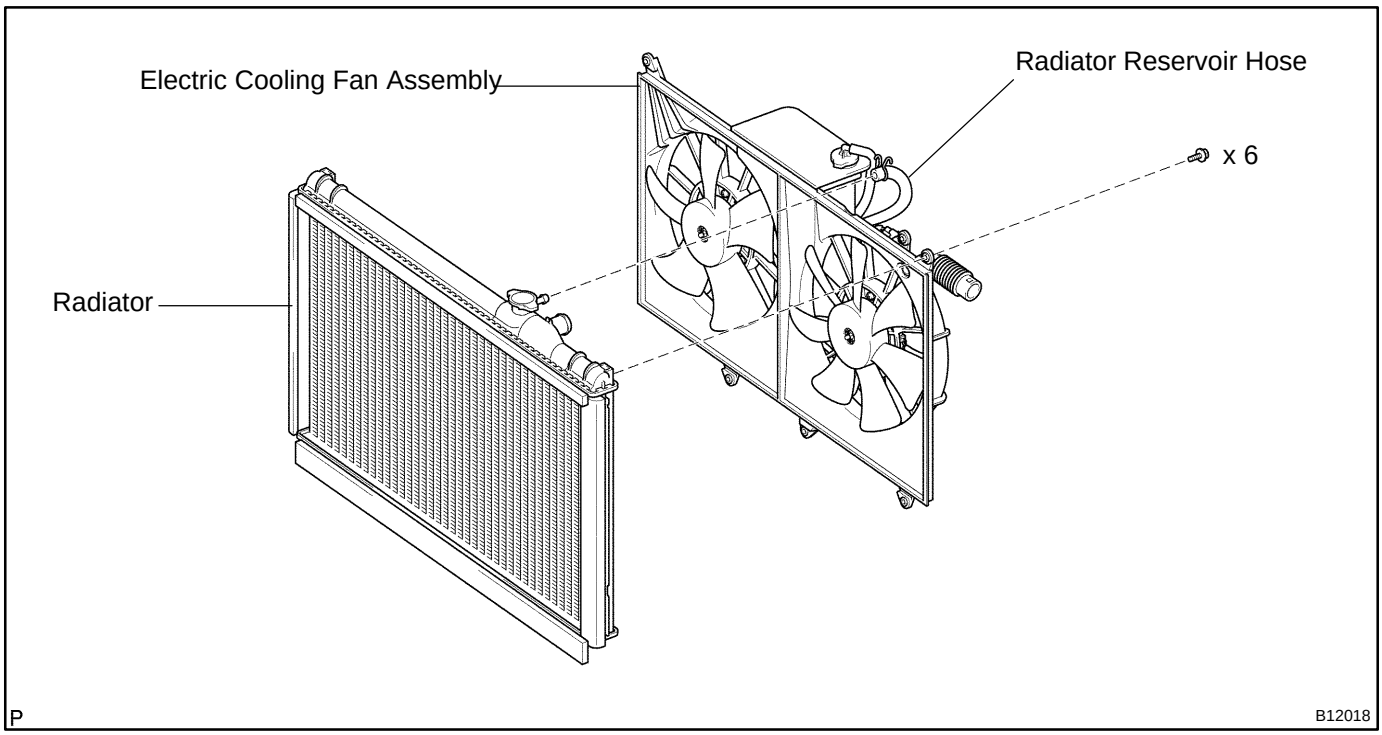
If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

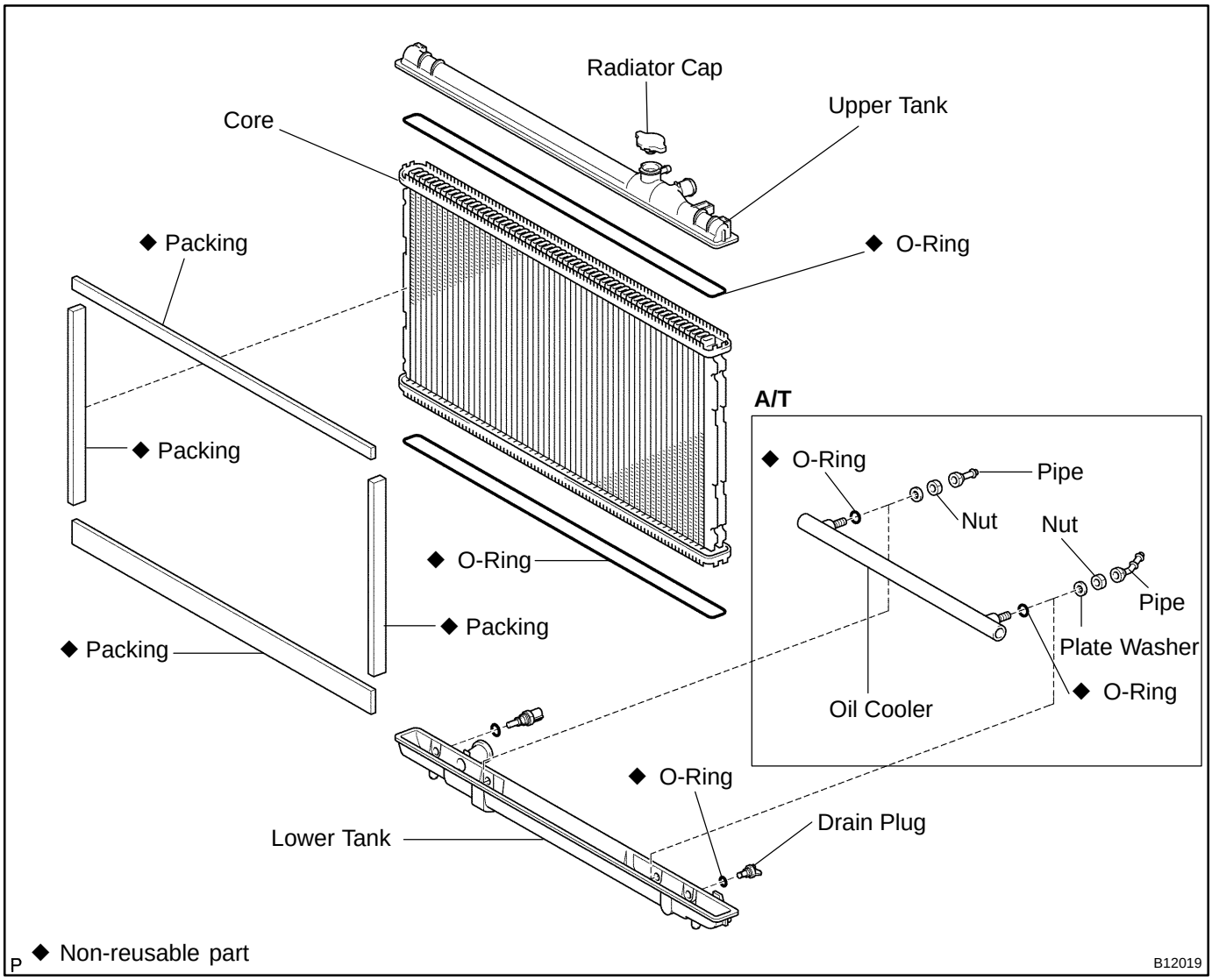
4. REINSTALL RADIATOR CAP

CO0A8-07

COMPONENTS




Electric Cooling Fan Assembly
Radiator Reservoir Hose
x 6
Radiator
P
B12018


Radiator Cap
Upper Tank
Core
◆ Packing
◆ O-Ring
A/T
◆ O-Ring
Pipe
Nut
Nut
Pipe
Plate Washer
◆ O-Ring
Oil Cooler
◆ Packing
◆ O-Ring
◆ Packing
◆ Packing
◆ O-Ring
Drain Plug
Lower Tank
P
◆ Non-reusable part
B12019

CO0A9-07

REMOVAL

1. REMOVE ENGINE UNDER COVER

2. DRAIN ENGINE COOLANT

3. REMOVE AIR CLEANER INLET

4. REMOVE AIR CLEANER AND MAF METER ASSEMBLY

5. REMOVE RADIATOR AND ELECTRIC COOLING FAN ASSEMBLY

(a) Disconnect the upper radiator hose from the radiator.

(b) Disconnect the lower radiator hose from the radiator.

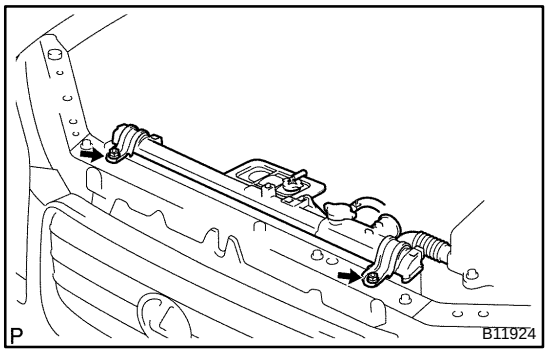
(c) Disconnect the ECM outlet duct from the ECM box.

(d) Disconnect the wire for electric cooling fan from the clamp on the electric cooling fan.

(e) Disconnect the 2 electric cooling fan connectors.

(f) Disconnect the ECT switch connector for electric cooling fan.

(g) A/T:
Disconnect the 2 oil cooler hoses for A/T from the radiator.



(h) Remove the 2 nuts and 2 upper radiator supports.

(i) Lift out the radiator and cooling fan assembly.

(j) Remove the 2 lower radiator supports.

6. REMOVE ELECTRIC COOLING FAN FROM RADIATOR

(a) Disconnect the radiator reservoir hose from the radiator.

(b) Remove the 6 bolts and electric cooling fan.

CO0AA-08

DISASSEMBLY

1. REMOVE PACKINGS

2. REMOVE RADIATOR CAP

3. REMOVE DRAIN PLUG

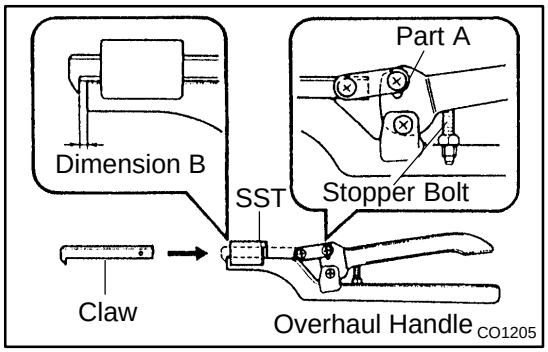
(a) Remove the drain plug.

(b) Remove the O-ring.

4. REMOVE ECT SWITCH

(a) Remove the ECT switch.

(b) Remove the O-ring.



5. ASSEMBLE SST

SST 09230-01010

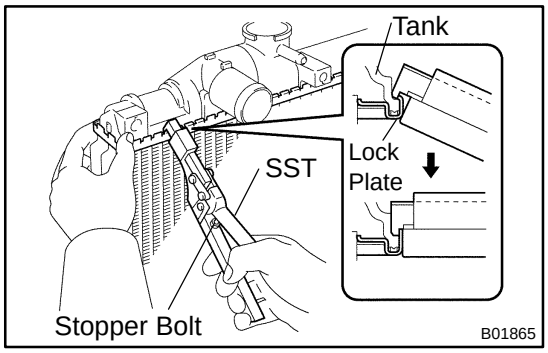
(a) Install the claw to the overhaul handle, inserting it in the hole in part A as shown in the diagram.

(b) While gripping the handle, adjust the stopper bolt so that dimension B is as shown in the illustration.

Dimension B: 0.2 - 0.3 mm (0.008 - 0.012 in.)

NOTICE:

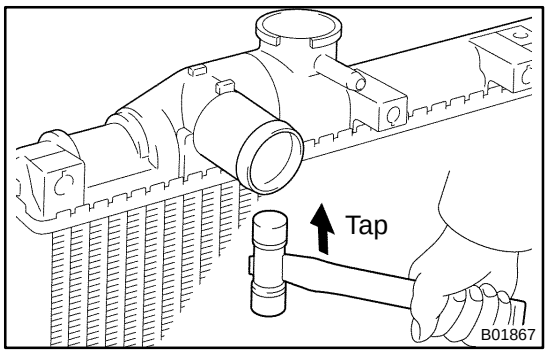
If this adjustment is not done the claw may be damaged.



6. UNCAULK LOCK PLATES

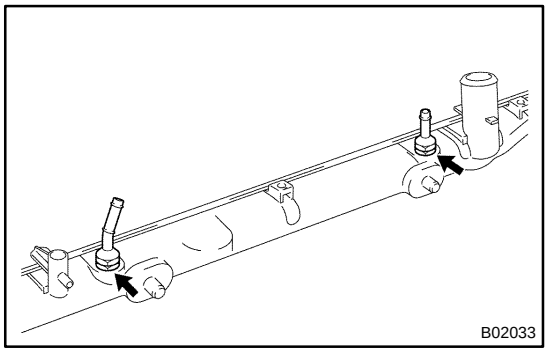
Using SST to release the caulking, squeeze the handle until stopped by the stopper bolt.

SST 09230-01010



7. REMOVE TANKS AND O-RINGS

Lightly tap the bracket of the radiator (or radiator inlet or outlet) with a soft-faced hammer, and remove the tank and the O-ring.



8. A/T:

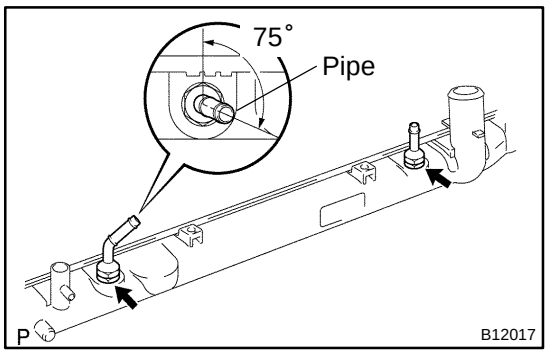
REMOVE OIL COOLER FROM LOWER TANK

(a) Loosen the nut, and remove the cooler pipe. Remove the 2 cooler pipes.

(b) Remove the 2 nuts and 2 plate washers.

(c) Remove the oil cooler and 2 O-rings.

CO0AB-06



REASSEMBLY

1. A/T:

INSTALL OIL COOLER TO LOWER TANK

(a) Install 2 new O-rings to the oil cooler.

(b) Install the oil cooler to the lower tank with the 2 plate washers and 2 nuts.

Torque: 8.3 N·m (85 kgf·cm, 74 in.·lbf)

(c) Install the cooler pipes in the direction indicated in the illustration.

Torque: 14.7 N·m (150 kgf·cm, 11 ft·lbf)

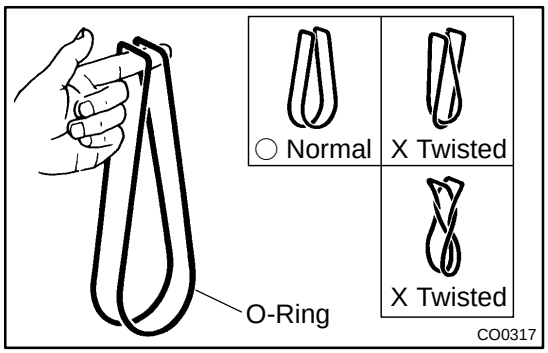
2. INSPECT LOCK PLATE FOR DAMAGE

HINT:

- If the sides of the lock plate groove are deformed, reassembly of the tank will be impossible.
- Therefore, first correct any deformation with pliers or similar object. Water leakage will result if the bottom of the lock plate groove is damaged or dented.

NOTICE:

The radiator can only be recaulked 2 times. After the 2nd time, the radiator core must be replaced.

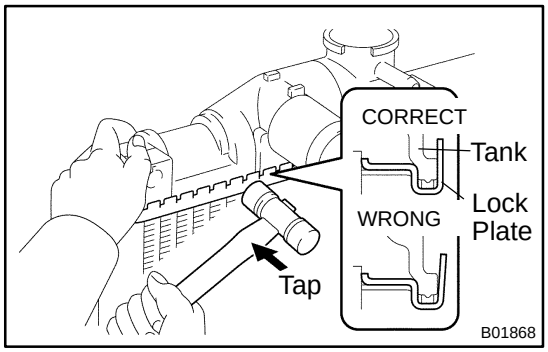


3. INSTALL NEW O-RINGS AND TANKS

(a) After checking that there are no foreign objects in the lock plate groove, install a new O-ring without twisting it.

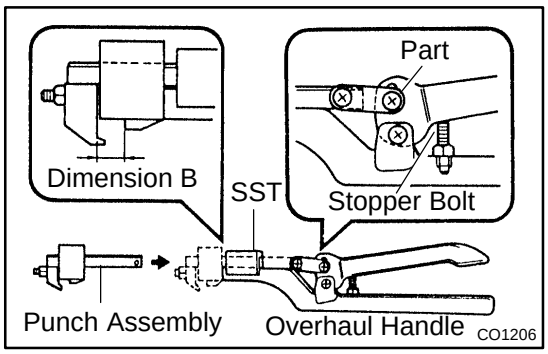
HINT:

When cleaning the lock plate groove, lightly rub it with sand paper without scratching it.



(b) Install the tank without damaging the O-ring.

(c) Tap the lock plate with a soft-faced hammer so that there is no gap between it and the tank.



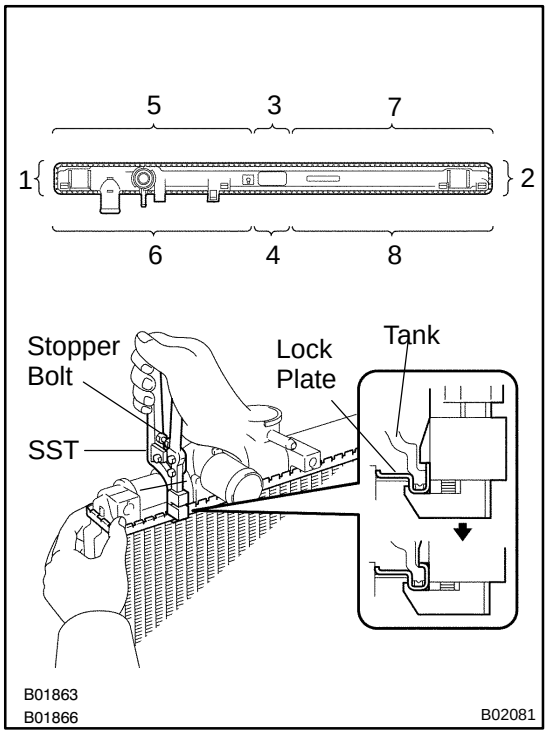
4. ASSEMBLE SST

SST 09230-01010, 09231-14010

(a) Install the punch assembly to the overhaul handle, inserting it in the hole in part A as shown in the illustration.

(b) While gripping the handle, adjust the stopper bolt so that dimension B is as shown in the illustration.

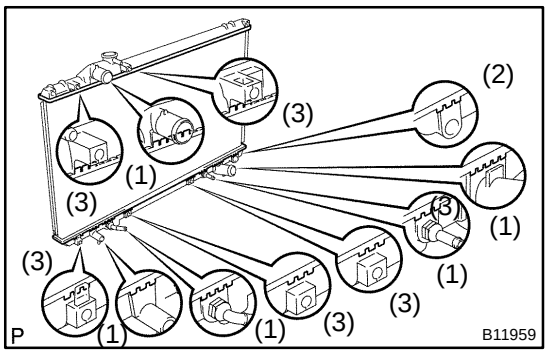
Dimension B: 8.4 mm (0.331 in.)



5. CAULK LOCK PLATE

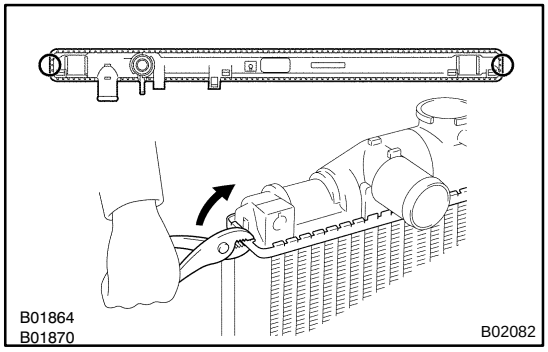
(a) Lightly press SST against the lock plate in the order shown in the illustration. After repeating this a few times, fully caulk the lock plate by squeezing the handle until stopped by the stopper plate.

SST 09230-01010

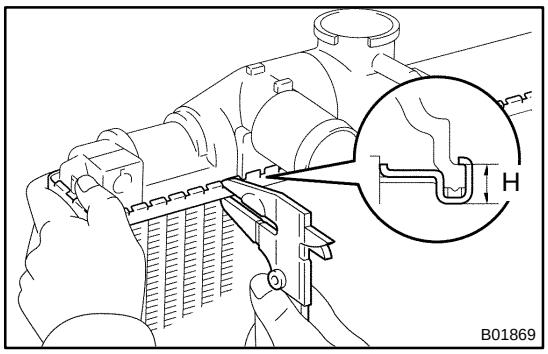


HINT:

- Do not stake the areas protruding around the ports (1), flange (2) and bracket (3).



- The points shown in the illustration cannot be staked with the SST. Use pliers or similar object and be careful not to damage the core plates.



(b) Check the lock plate height (H) after completing the caulking.

Plate height (H): 7.40 - 7.80 mm (0.2913 - 0.3071 in.)

If not within the specified height, adjust the stopper bolt of the handle again and caulk again.

6. INSTALL ECT SWITCH

(a) Install a new O-ring to the ECT switch.

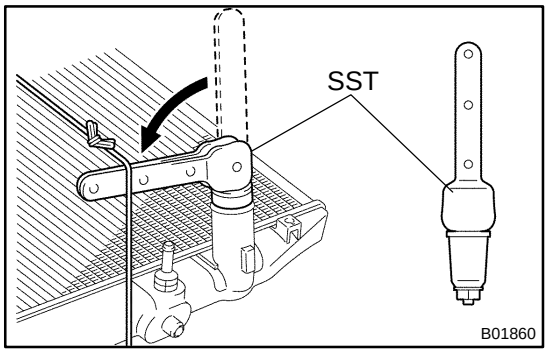
(b) Install the ECT switch.

7. INSTALL DRAIN PLUG

(a) Install a new O-ring to the drain plug.

(b) Install the drain plug.

8. INSTALL RADIATOR CAP



9. INSPECT FOR WATER LEAKS

(a) Tighten the drain plug.

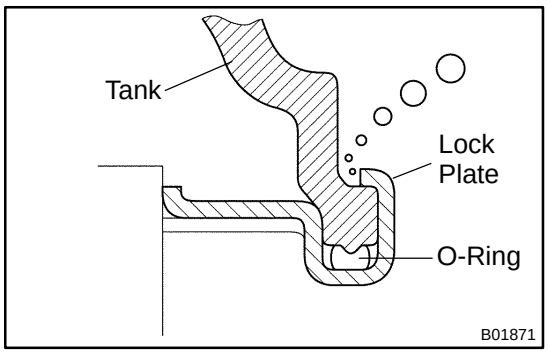
(b) Plug the inlet pipes of the radiator with SST.

SST 09230-01010

(c) Using a radiator cap tester, apply pressure to the radiator.

Test pressure: 177 kPa (1.8 kgf/cm^2, 26 psi)

(d) Submerge the radiator in water.



(e) Inspect for leaks.

HINT:

On radiators with resin tanks, there is a clearance between the tank and lock plate where a minute amount of air will remain, giving the appearance of an air leak when the radiator is submerged in water. Therefore, before doing the water leak test, first swish the radiator around in the water until all air bubbles disappear.

10. INSTALL NEW PACKINGS

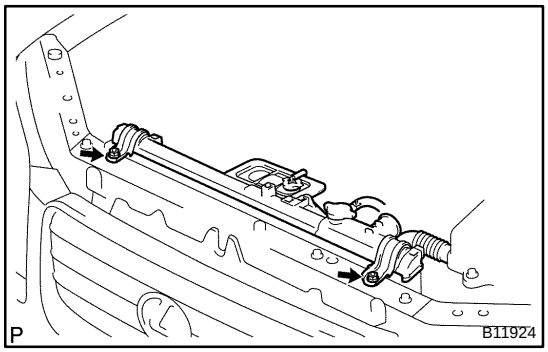
CO0AC-06

INSTALLATION

1. INSTALL ELECTRIC COOLING FAN TO RADIATOR

(a) Install the electric cooling fan with the 6 bolts.
Torque: 5.0 N·m (50 kgf·cm, 44 in.·lbf)

(b) Connect the radiator reservoir hose to the radiator.



2. INSTALL RADIATOR AND ELECTRIC COOLING FAN ASSEMBLY

(a) Install the 2 lower radiator supports to the radiator.

(b) Attach the 2 lower radiator supports on the radiator to the body bracket.

(c) Install the radiator and electric cooling fan assembly with the 2 upper radiator supports and 2 nuts.
Torque: 13.5 N·m (135 kgf·cm, 10 ft·lbf)

(d) Connect the upper radiator hose to the radiator.

(e) Connect the lower radiator hose to the radiator.

(f) Connect the ECM outlet duct to the ECM box.

(g) Connect the wire for electric cooling fan to the clamp on the electric cooling fan.

(h) Connect the 2 electric cooling fan connectors.

(i) Connect the ECT switch connector for electric cooling fan.

(j) A/T:
Connect the 2 oil cooler hoses for A/T to the radiator.

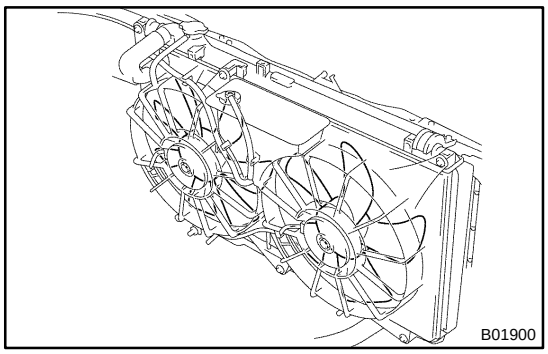
3. INSTALL AIR CLEANER AND MAF METER ASSEMBLY

4. INSTALL AIR CLEANER INLET

5. FILL WITH ENGINE COOLANT

6. START ENGINE AND CHECK FOR ENGINE COOLANT AND A/T FLUID LEAKS

7. INSTALL ENGINE UNDER COVER



ELECTRIC COOLING FAN

CO0AD-09

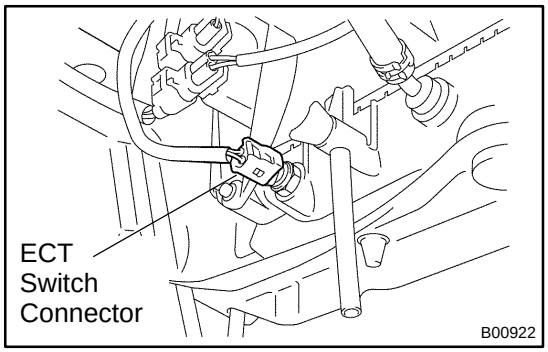
ON-VEHICLE INSPECTION

1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 83˚C (181˚F))

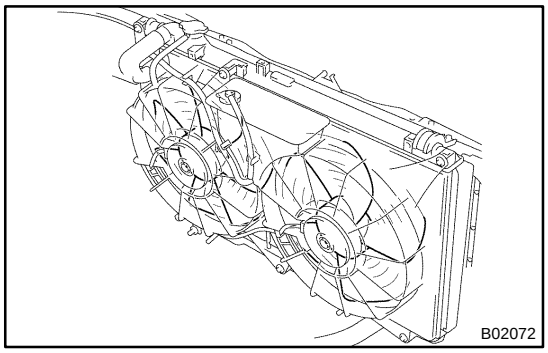
(a) Turn the ignition switch ON.

(b) Check that the cooling fan stops.

If not, check the cooling fan relay and ECT switch, and check for a separated connector or severed wire between the cooling fan relay and ECT switch.



(c) Disconnect the ECT switch connector.



(d) Check that the cooling fan rotates.

If not, check the fuses, radiator fan main relay, cooling fan relay, cooling fan, and check for a short circuit between the cooling fan relay and ECT switch.

(e) Reconnect the ECT switch connector.

2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 93˚C (199˚F))

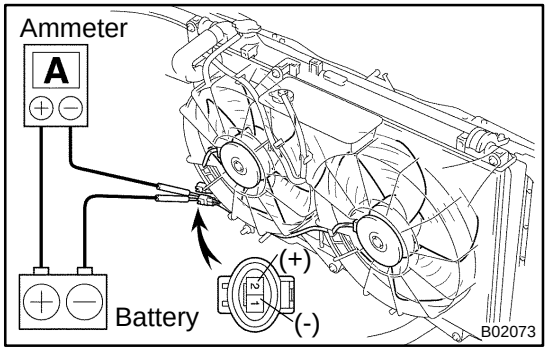
(a) Start the engine, and raise coolant temperature to above 93˚C (199˚F).

HINT:

Coolant temperature is the detected value by the ECT switch on the radiator lower tank.

(b) Check that the cooling fan rotates.

If not, replace the ECT switch.



3. INSPECT COOLING FANS

(a) Disconnect the cooling fan connector.

(b) Connect battery and ammeter to the cooling fan connector.

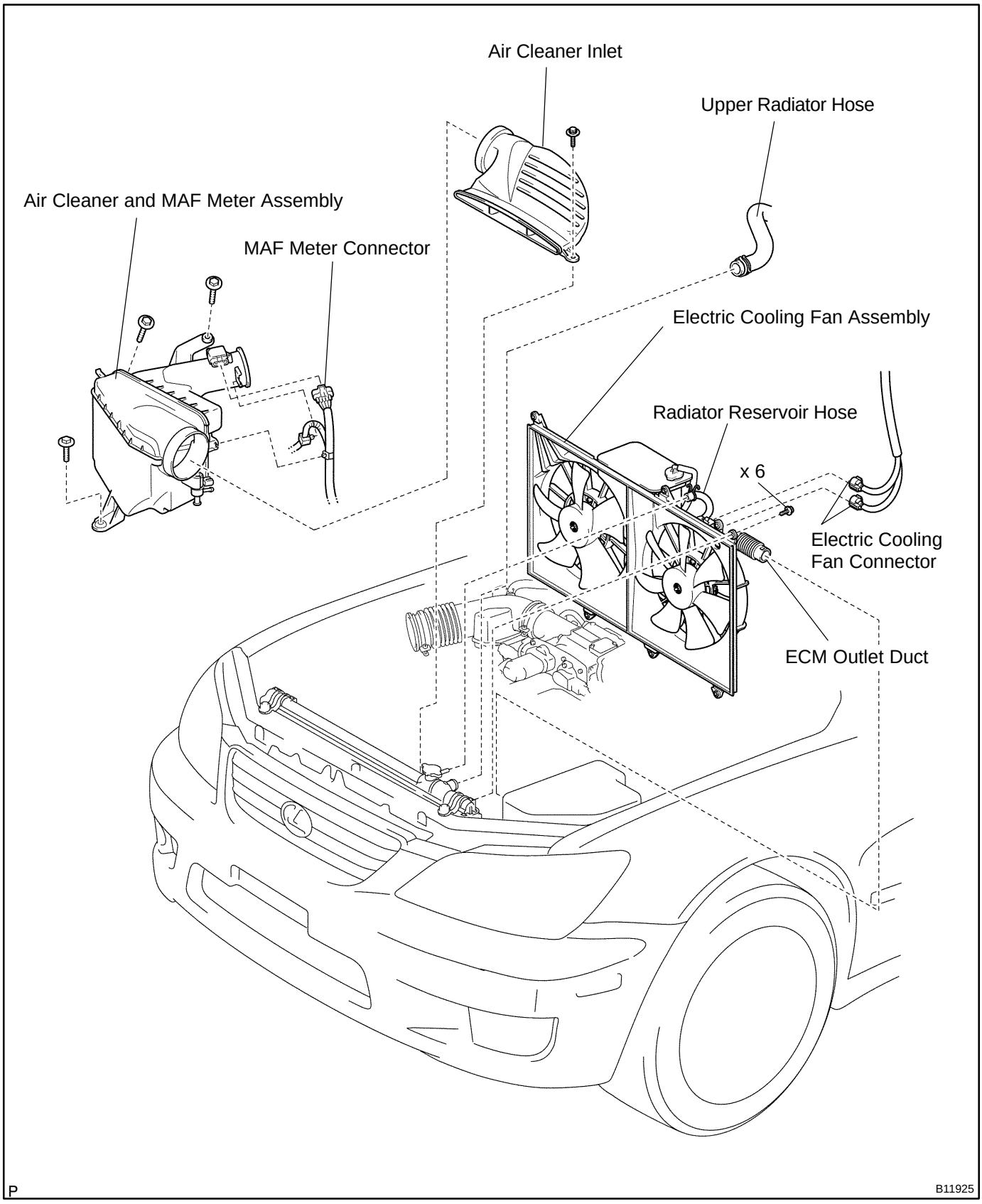
(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

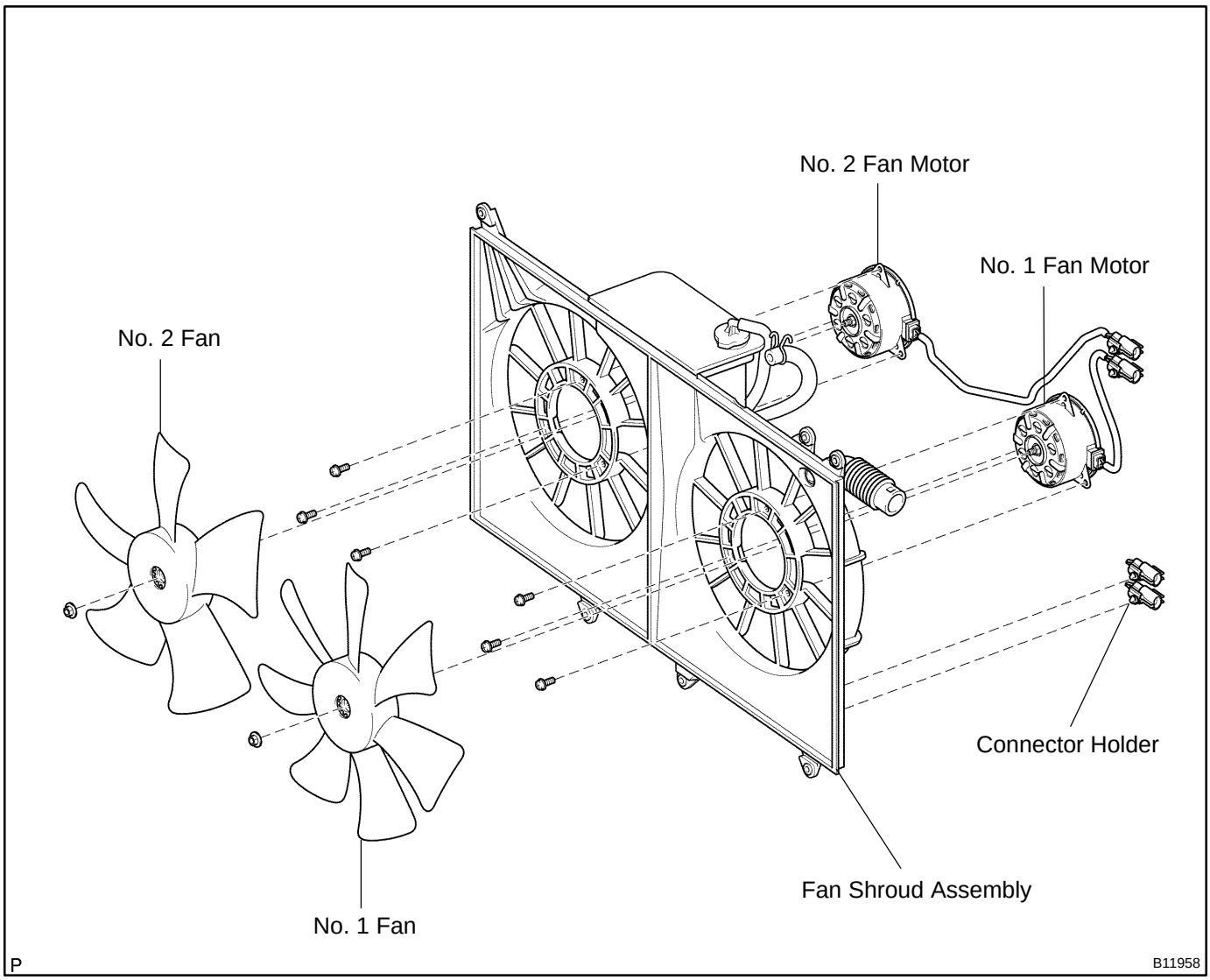
Standard amperage: 8.5 - 11.5 A at 20˚C (68˚F)

(d) Reconnect the cooling fan connector.

CO0AE-10

COMPONENTS




No. 2 Fan Motor
No. 1 Fan Motor
No. 2 Fan
Connector Holder
Fan Shroud Assembly
No. 1 Fan
P
B11958

CO0AF-10

REMOVAL

1. DRAIN ENGINE COOLANT

2. REMOVE AIR CLEANER INLET

3. REMOVE AIR CLEANER AND MAF METER ASSEMBLY

4. REMOVE ELECTRIC COOLING FAN

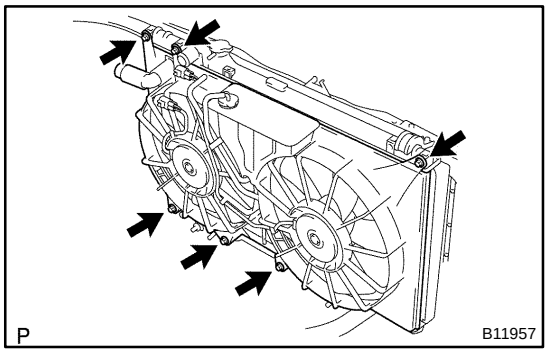
(a) Disconnect the upper radiator hose from the radiator.

(b) Disconnect the ECM outlet duct from the ECM box.

(c) Disconnect the wire for electric cooling fan from the clamp on the electric cooling fan.

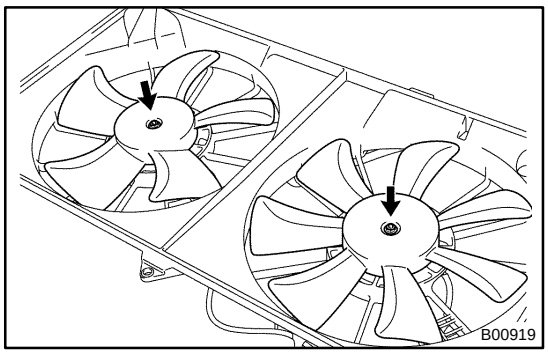
(d) Disconnect the 2 electric cooling fan connectors.

(e) Disconnect the radiator reservoir hose from the radiator.



(f) Remove the 6 bolts and electric cooling fan.

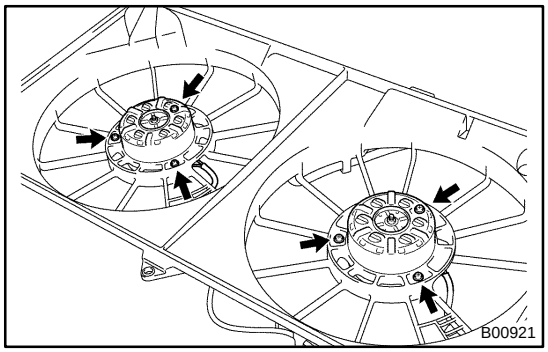
CO0AG-07



DISASSEMBLY

1. REMOVE FANS

Remove the nut and fan. Remove the 2 fans.



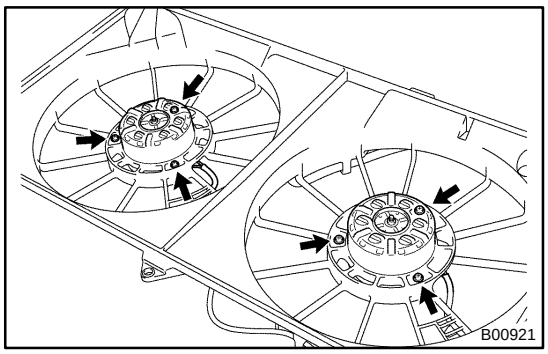
2. REMOVE FAN MOTORS

(a) Disconnect the wires and connector holders from the fan shroud.

(b) Remove the 3 screws and fan motor. Remove the 2 fan motors.

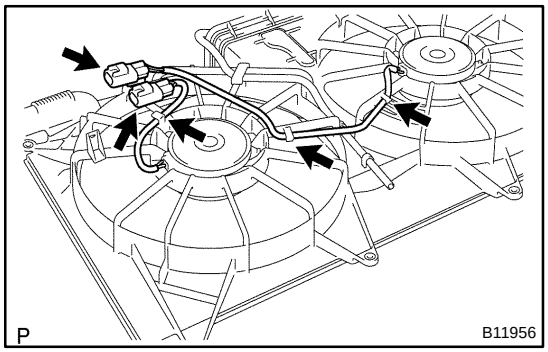
CO0AH-06

REASSEMBLY

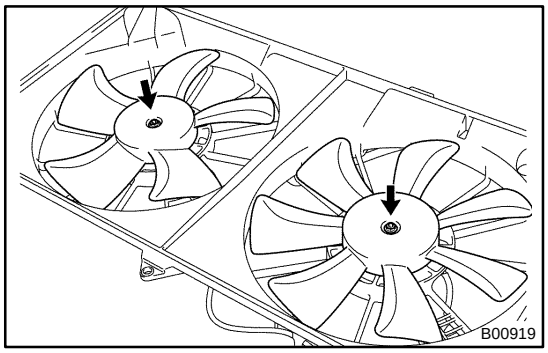


1. INSTALL FAN MOTORS

(a) Install the fan motor with the 3 screws. Install the 2 fan motors.



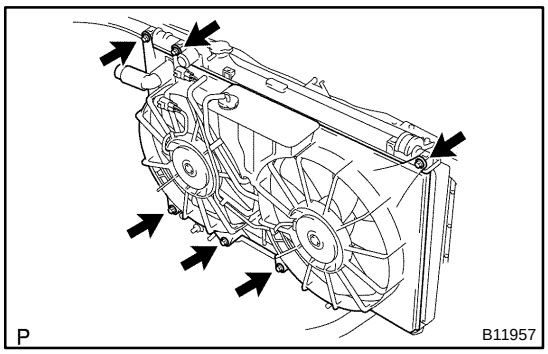
(b) Install the wires and connector holders to the fan shroud as shown in the illustration.



2. INSTALL FANS

Install the fan with the nut. Install the 2 fans.

CO0AI-08



INSTALLATION

1. INSTALL ELECTRIC COOLING FAN

(a) Install the electric cooling fan with the 6 bolts.
Torque: 5.0 N·m (50 kgf·cm, 44 in.·lbf)

(b) Connect the upper radiator hose to the radiator.

(c) Connect the ECM outlet duct to the ECM box.

(d) Connect the wire for electric cooling fan to clamp on the electric cooling fan.

(e) Connect the 2 electric cooling fan connectors.

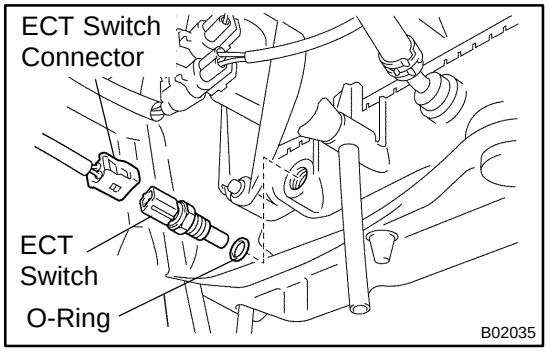
(f) Connect the radiator reservoir hose to the radiator.

2. INSTALL AIR CLEANER AND MAF METER ASSEMBLY

3. INSTALL AIR CLEANER INLET

4. FILL WITH ENGINE COOLANT

5. START ENGINE AND CHECK FOR COOLANT LEAKS



ENGINE COOLANT TEMPERATURE (ECT) SWITCH

CO0AJ-10

INSPECTION

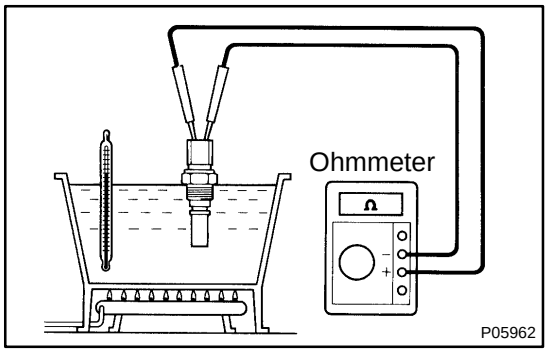
1. DRAIN ENGINE COOLANT

2. REMOVE ECT SWITCH

(a) Disconnect the connector.

(b) Remove the ECT switch.

(c) Remove the O-ring from the ECT switch.



3. INSPECT ECT SWITCH

(a) Using an ohmmeter, check that there is no continuity between the terminals when the coolant temperature is above 93˚C (199˚F).

If there is continuity, replace the switch.

(b) Using an ohmmeter, check that there is continuity between the terminals when the coolant temperature is below 83˚C (181˚F).

If there is no continuity, replace the switch.

4. REINSTALL ECT SWITCH

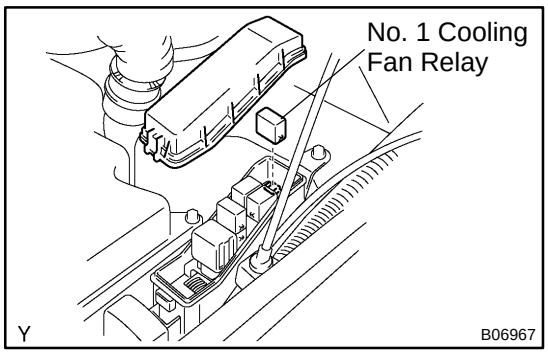
(a) Install a new O-ring to the ECT switch.

(b) Install the ECT switch.

(c) Connect the connector.

5. REFILL WITH ENGINE COOLANT

6. START ENGINE AND CHECK FOR COOLANT LEAKS



COOLING FAN RELAY

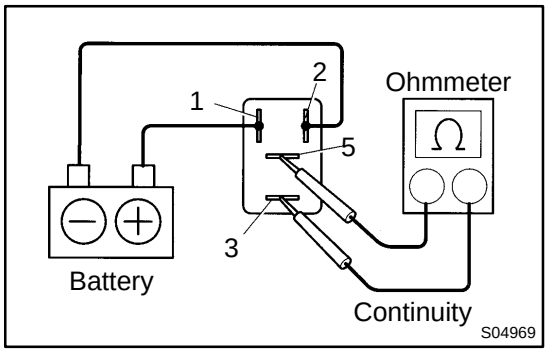
CO1DJ-01

INSPECTION

1. INSPECT NO. 1 COOLING FAN RELAY

(a) Remove the relay box cover.

(b) Remove the No. 1 cooling fan relay (Marking: FAN NO.1).



(c) Inspect the resistance.

(1) Using an ohmmeter, measure the resistance between the terminals.

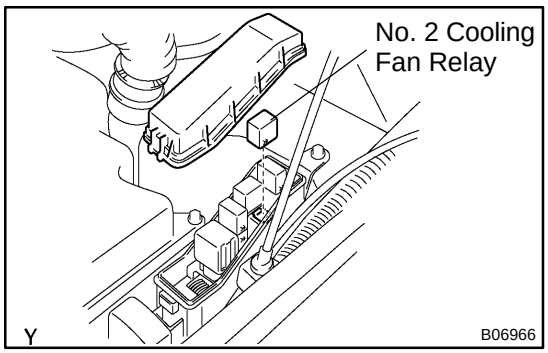
Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

If the resistance is not as specified, replace the relay.

(d) Reinstall the No. 1 cooling fan relay.

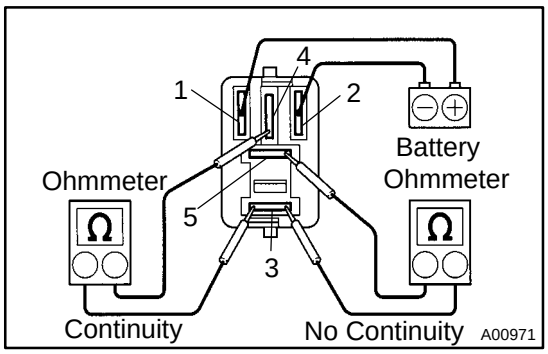
(e) Reinstall the relay box cover.



2. INSPECT NO. 2 COOLING FAN RELAY

(a) Remove the relay box cover.

(b) Remove the No. 2 cooling fan relay (Marking: FAN NO.2).



(c) Inspect the resistance.

(1) Using an ohmmeter, measure the resistance between the terminals.

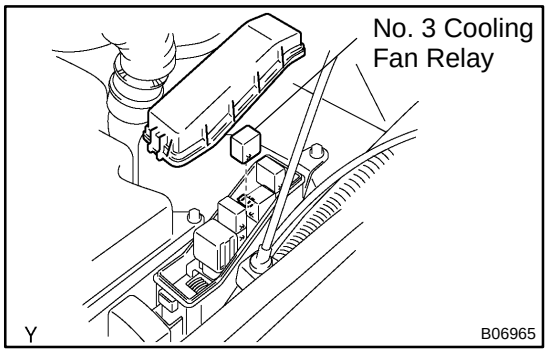
Standard:

Tester Connection	Specified Condition
3 - 4	Below 1 Ω
3 - 4	10 kΩ or higher (Apply battery voltage to terminals 1 and 2)
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

If the resistance is not as specified, replace the relay.

(d) Reinstall the No. 2 cooling fan relay.

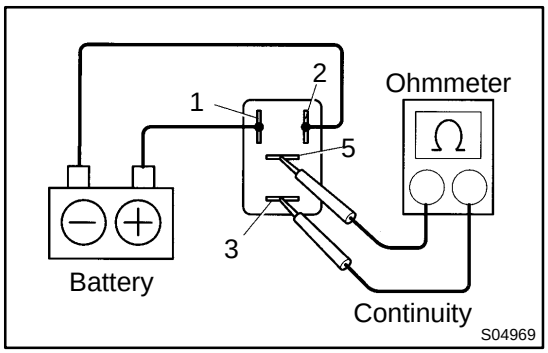
(e) Reinstall the relay box cover.



3. INSPECT NO. 3 COOLING FAN RELAY

(a) Remove the relay box cover.

(b) Remove the No. 3 cooling fan relay (Marking: FAN NO.3).



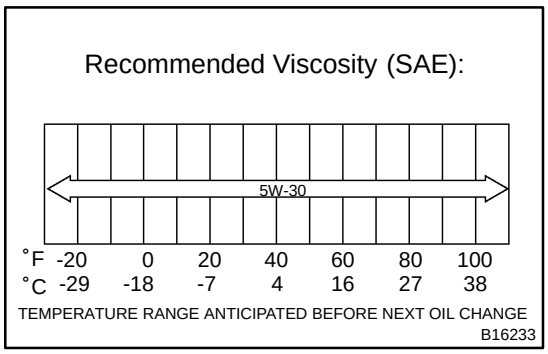
(c) Inspect the resistance.

(1) Using an ohmmeter, measure the resistance between the terminals.

If the resistance is not as specified, replace the relay.

(d) Reinstall the No. 3 cooling fan relay.

(e) Reinstall the relay box cover.



OIL AND FILTER

INSPECTION

LU05G-11

1. CHECK OIL QUALITY

Check the oil for deterioration, entry of water, discoloring or thinning.

If oil quality is visibly poor, replace the oil.

Oil grade:

API grade SL Energy-Conserving or ILSAC multi-grade engine oil.

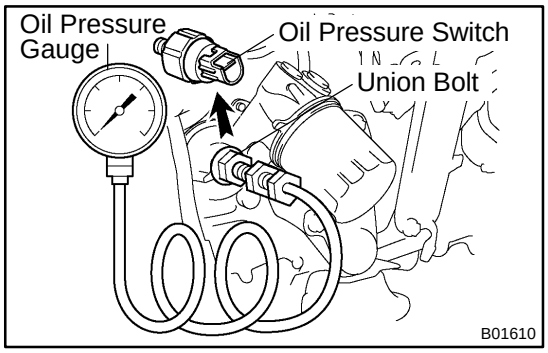
2. CHECK ENGINE OIL LEVEL

After warming up the engine and then 5 minutes after the engine stop, oil level should be between the low level and full level marks of the dipstick.

If low, check for leakage and add oil up to the full level mark.

NOTICE:

Do not fill with engine oil above the full level mark.



3. REMOVE OIL PRESSURE SWITCH AND INSTALL OIL PRESSURE GAUGE

(a) Disconnect the oil pressure switch connector.

(b) Using SST, remove the oil pressure switch.

SST 09268-46021

(c) Install an oil pressure gauge.

4. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

5. CHECK OIL PRESSURE

Oil pressure:

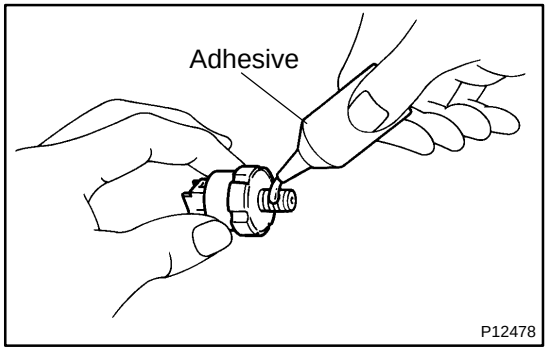
Idle	49 kPa (0.5 kgf/cm^2, 7 psi) or more
3,000 rpm	324 kPa (3.3 kgf/cm^2, 47 psi) or more

6. REMOVE OIL PRESSURE GAUGE AND REINSTALL OIL PRESSURE SWITCH

(a) Remove the oil pressure gauge.

(b) Tighten the union bolt.

Torque: 90 N·m (900 kgf·cm, 66 ft·lbf)



(c) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(d) Using SST, install the oil pressure switch.

SST 09268-46021

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

(e) Connect the oil pressure switch connector.

7. START ENGINE AND CHECK FOR LEAKS

LU05H-11

REPLACEMENT

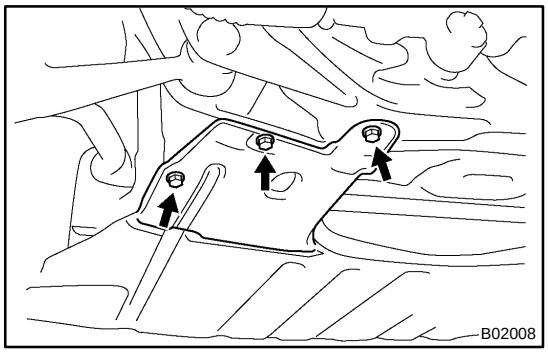
CAUTION:

- **Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.**
- **Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use water-less hand cleaner, to remove any used engine oil. Do not use gasoline, thinners, or solvents.**
- **In order to preserve the environment, used oil and used oil filters must be disposed of only at designated disposal sites.**

1. DRAIN ENGINE OIL

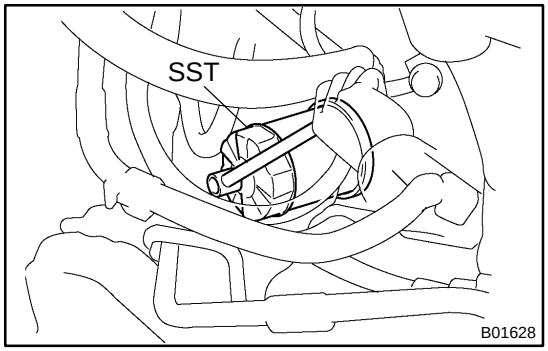
(a) Remove the oil filler cap.

(b) Remove the oil drain plug, and drain the oil into a container.



2. REPLACE OIL FILTER

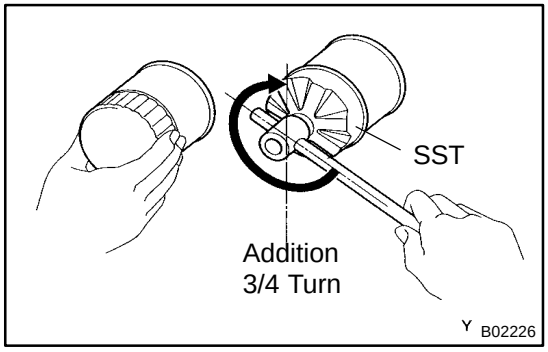
(a) Remove the 3 screws, and bend the engine under cover.



(b) Using SST, remove the oil filter.
SST 09228-07501

(c) Clean the oil filter contact surface on the oil filter mounting.

(d) Lubricate the filter rubber gasket with clean engine oil.



(e) Tighten the oil filter by hand until the rubber gasket contacts the seat of the filter mounting.

(f) Using SST, tighten it an additional 3/4 turn to seat the filter.
SST 09228-07501

(g) Reinstall the engine under cover with the 3 screws.

3. FILL WITH ENGINE OIL

(a) Clean and install the oil drain plug with a new gasket.
Torque: 38 N·m (380 kgf·cm, 28 ft·lbf)

(b) Fill with fresh engine oil.

Capacity:

Drain and refill	w/ Oil filter change	5.4 liters (5.7 US qts, 4.8 Imp. qts)
	w/o Oil filter change	5.1 liters (5.4 US qts, 4.5 Imp. qts)
Dry fill		6.5 liters (6.9 US qts, 5.7 Imp. qts)

(c) Reinstall the oil filler cap.

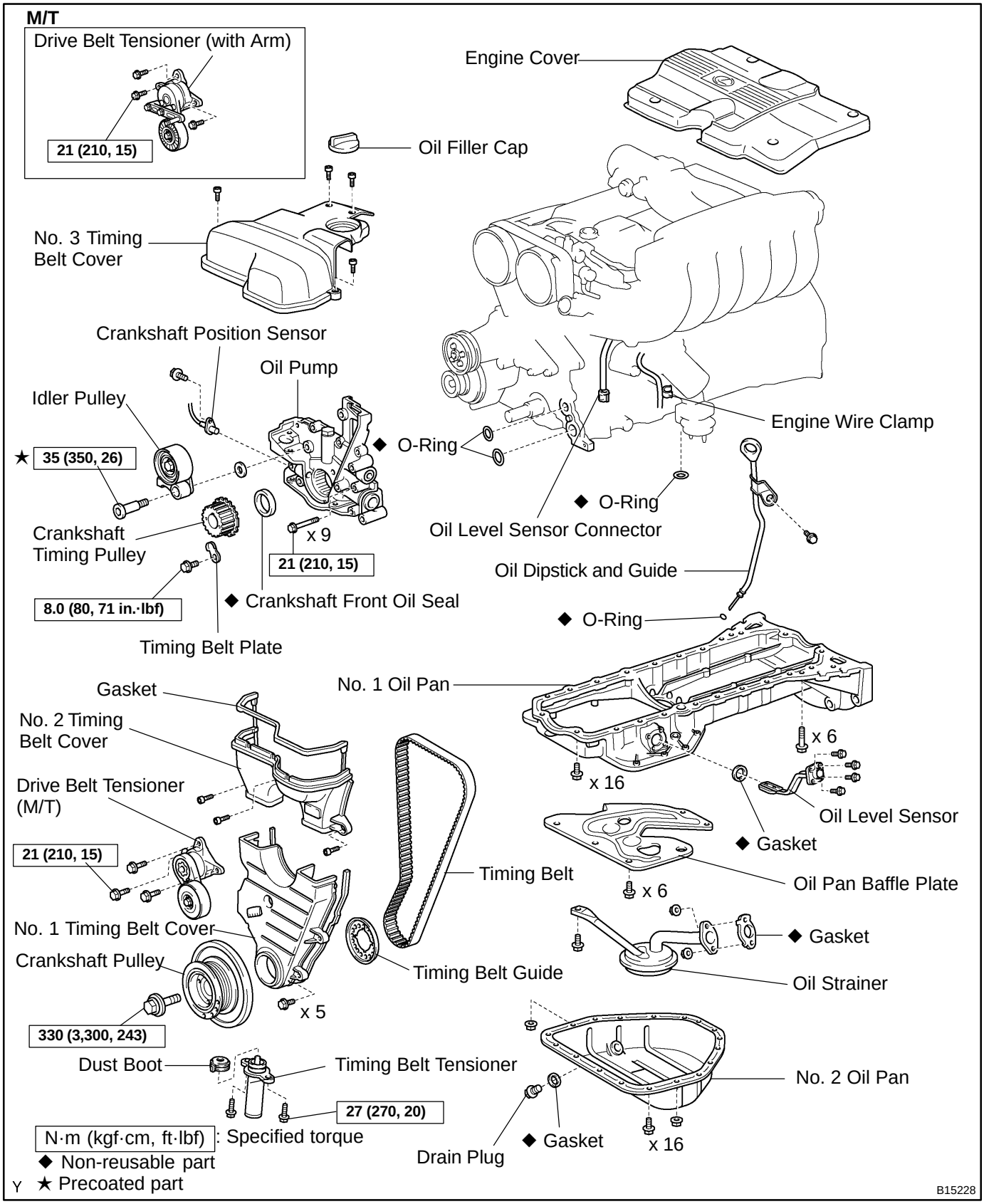
4. START ENGINE AND CHECK FOR OIL LEAKS

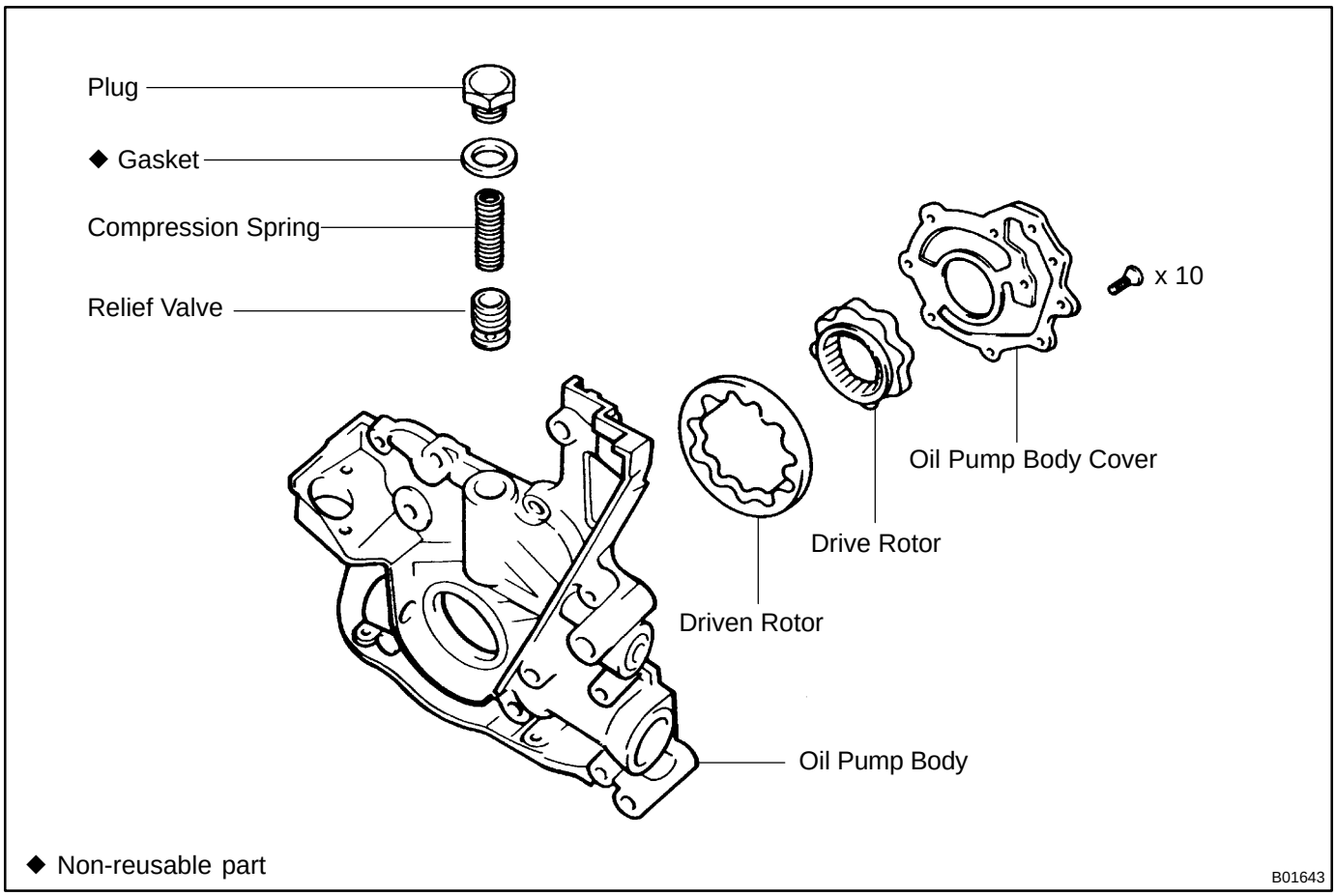
5. RECHECK ENGINE OIL LEVEL

OIL PUMP

COMPONENTS

LU05I-09




Plug
◆ Gasket
Compression Spring
Relief Valve
x 10
Oil Pump Body Cover
Drive Rotor
Driven Rotor
Oil Pump Body
◆ Non-reusable part
B01643

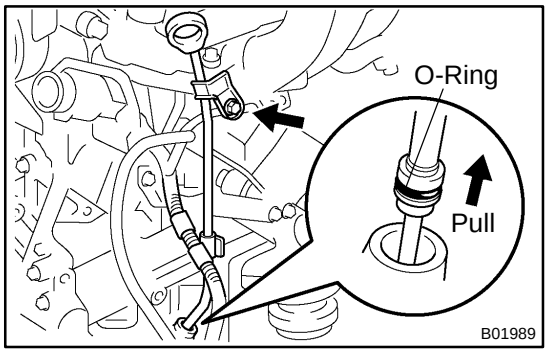
LU05J-07

REMOVAL

HINT:

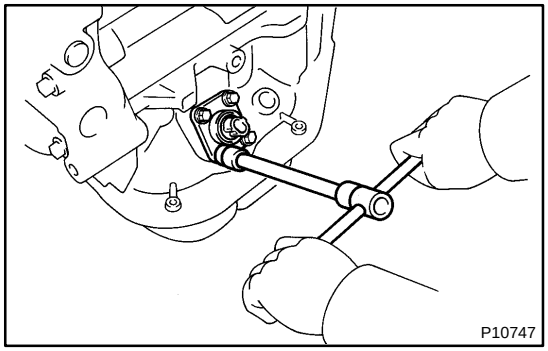
When repairing the oil pump, the oil pan and strainer should be removed and cleaned.

1. **REMOVE ENGINE WITH TRANSMISSION (See page EM-65)**
2. **SEPARATE ENGINE AND TRANSMISSION (See page EM-65)**
3. **INSTALL ENGINE TO ENGINE STAND FOR REMOVAL**
4. **REMOVE CRANKSHAFT POSITION SENSOR**
5. **REMOVE TIMING BELT, IDLER PULLEY AND CRANKSHAFT TIMING PULLEY (See page EM-17)**



6. **REMOVE OIL DIPSTICK AND GUIDE**

(a) Disconnect the engine wire clamp from the dipstick guide.
(b) Remove the bolt.
(c) Pull out the dipstick guide together with the dipstick.
(d) Remove the O-ring from the dipstick guide.

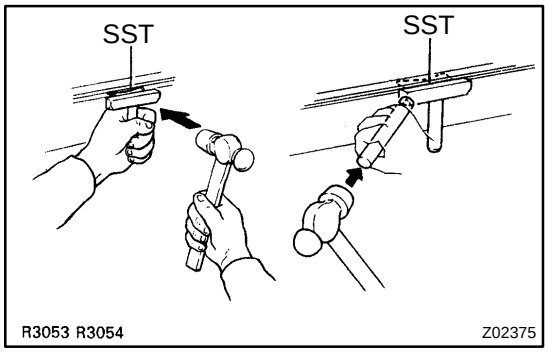


7. **REMOVE OIL LEVEL SENSOR**

(a) Disconnect the level sensor connector.
(b) Remove the 4 bolts and level sensor.
(c) Remove the gasket from the level sensor.

NOTICE:

Be careful not to drop the oil level sensor when removing it.

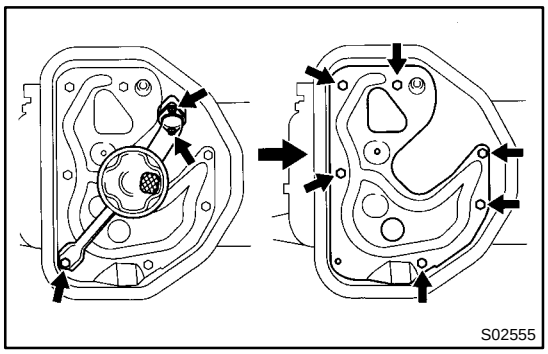


8. **REMOVE NO. 2 OIL PAN**

(a) Remove the 16 bolts and 2 nuts.
(b) Insert the blade of SST between the No. 1 and No. 2 oil pan, break the seal of the applied sealer and remove the No. 2 oil pan.
SST 09032-00100

NOTICE:

Be careful not to damage the No. 2 oil pan contact surface of the No.1 oil pan. Be careful not to damage the oil pan flange.

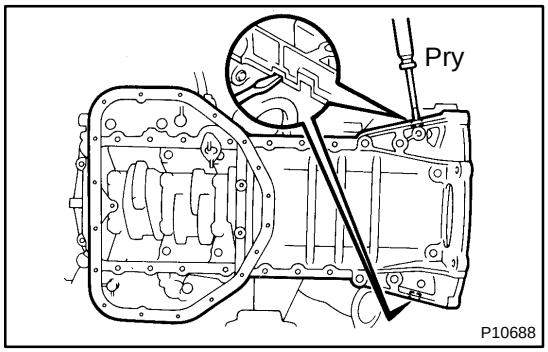


9. REMOVE OIL STRAINER

Remove the bolt, 2 nuts, oil strainer and gasket.

10. REMOVE OIL PAN BAFFLE PLATE

Remove the 6 bolts and baffle plate.



11. REMOVE NO. 1 OIL PAN

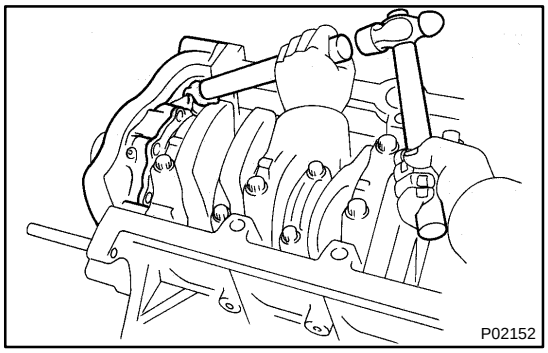
(a) Remove the 22 bolts.

(b) Remove the No. 1 oil pan by prying the portions between the cylinder block and No. 1 oil pan with a screwdriver.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder block and No. 1 oil pan.

(c) Remove the O-ring from the cylinder block.



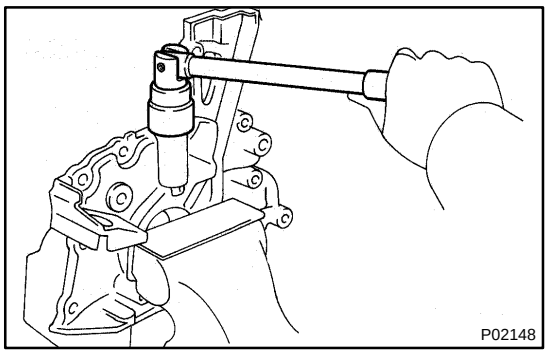
12. REMOVE OIL PUMP

(a) Remove the 9 bolts.

(b) Using a hammer and a brass bar, remove the oil pump by carefully tapping the oil pump body.

(c) Remove the 2 O-rings from the cylinder block.

LU05K-08



DISASSEMBLY

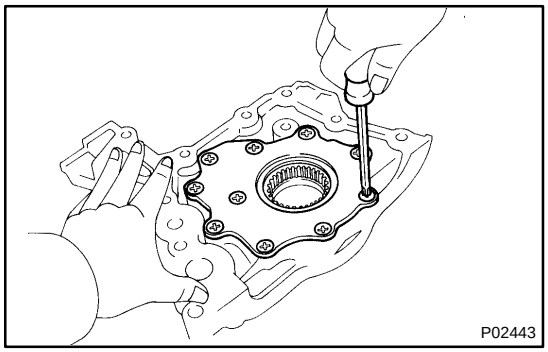
1. REMOVE RELIEF VALVE

(a) Carefully mount the pump body in a soft jaw vise.

(b) Remove the plug, gasket, compression spring and relief valve.

NOTICE:

Be careful not to damage the pump body.

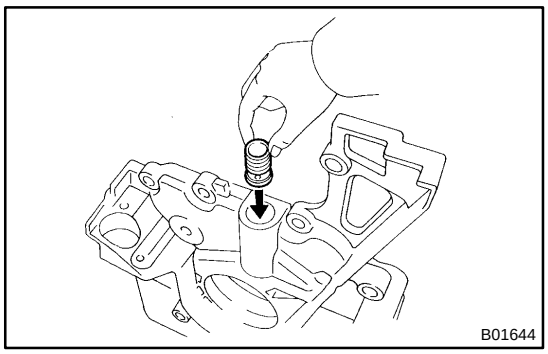


2. REMOVE DRIVE AND DRIVEN ROTORS

Remove the 10 screws, pump body cover, the drive and driven rotors.

LU05L-09

INSPECTION



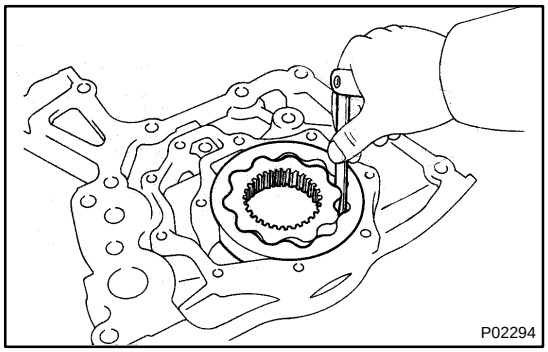
1. INSPECT RELIEF VALVE

Coat the valve with engine oil and check that it falls smoothly into the valve hole under its own weight.

If it doesn't, replace the relief valve. If necessary, replace the oil pump assembly.

2. INSPECT ROTORS

(a) Place the rotors into the oil pump body (See page LU-1 1).



(b) Inspect the rotors for the tip clearance.

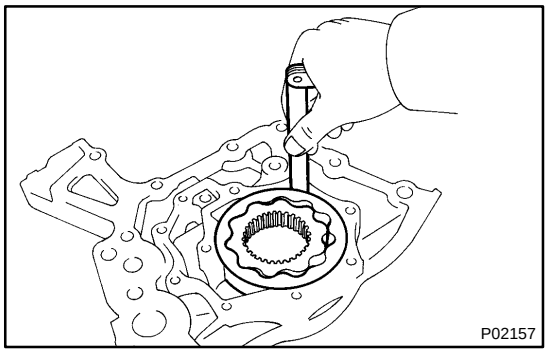
Using a feeler gauge, measure the clearance between the drive and driven rotors.

Standard tip clearance:

0.060 - 0.240 mm (0.0024 - 0.0094 in.)

Maximum tip clearance: 0.30 mm (0.0118 in.)

If the tip clearance is greater than maximum, replace the rotors as a set.



(c) Inspect the rotor for the body clearance.

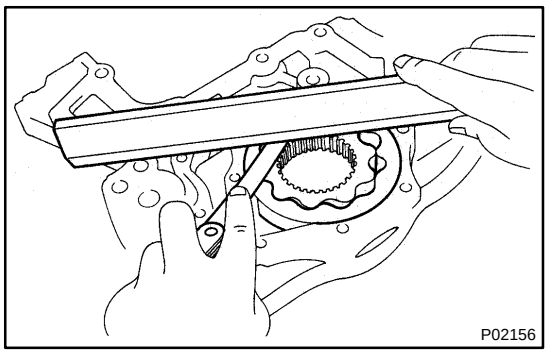
Using a feeler gauge, measure the clearance between the driven rotor and pump body.

Standard body clearance:

0.100 - 0.175 mm (0.0039 - 0.0069 in.)

Maximum body clearance: 0.20 mm (0.0079 in.)

If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.



(d) Inspect the rotors for the side clearance.

Using a feeler gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.

Standard side clearance:

0.030 - 0.090 mm (0.0012 - 0.0035 in.)

Maximum side clearance: 0.12 mm (0.0047 in.)

If the side clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.

(e) Remove the rotors.

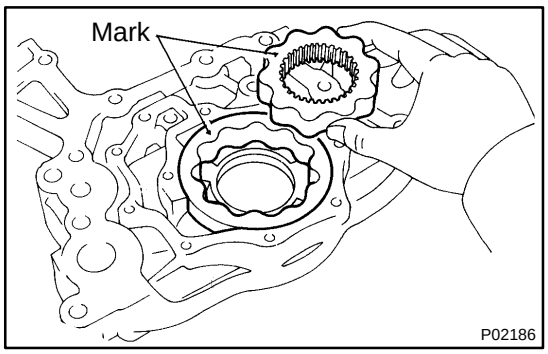
LU05M-04

REPLACEMENT

REPLACE FRONT CRANKSHAFT OIL SEAL (See page EM-92)

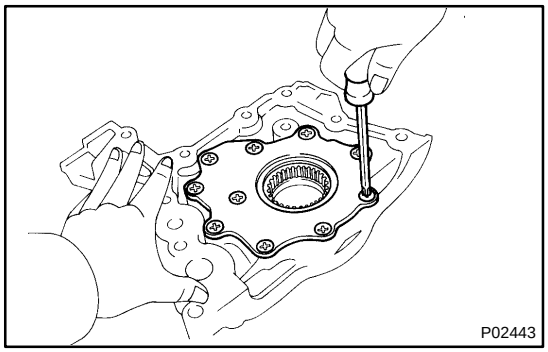
LU05N-08

REASSEMBLY

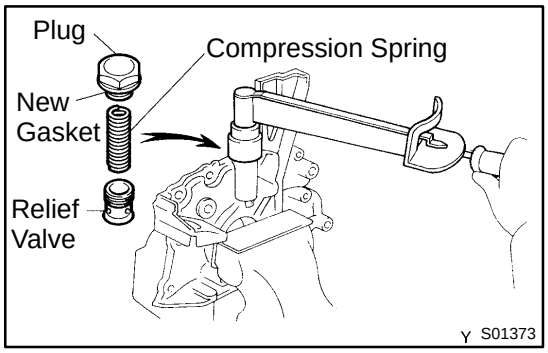


1. INSTALL DRIVE AND DRIVEN ROTORS

(a) Place the drive and driven rotors into oil pump body with the mark facing upward.



(b) Install the pump body cover with the 10 screws.
Torque: 10 N·m (105 kgf·cm, 8 ft·lbf)



2. INSTALL RELIEF VALVE

(a) Carefully mount the pump body in a soft jaw vise.

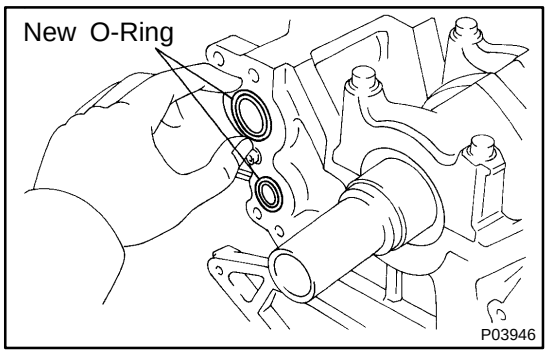
NOTICE:

Be careful not to damage the pump body.

(b) Insert the relief valve and compression spring into the oil pump body hole.

(c) Install the plug with a new gasket.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

LU05O-08



INSTALLATION

1. INSTALL OIL PUMP

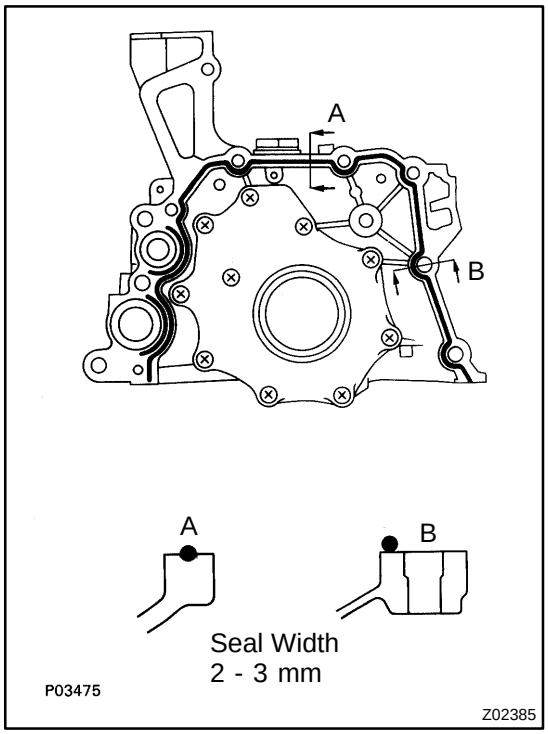
(a) Place 2 new O-rings in position on the cylinder block.

(b) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil pump and cylinder block.

- Using a razor blade gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the debris.
- Using a non-residue solvent, clean both sealing surfaces.

NOTICE:

Do not use a solvent which will affect the painted surfaces.



(c) Apply seal packing to the oil pump as shown in the illustration.

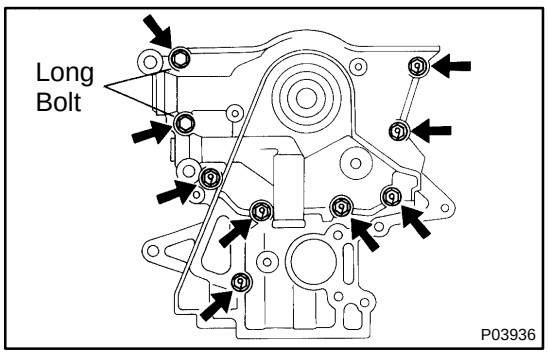
Seal packing: Part No.08826-00080 or equivalent

- Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.

HINT:

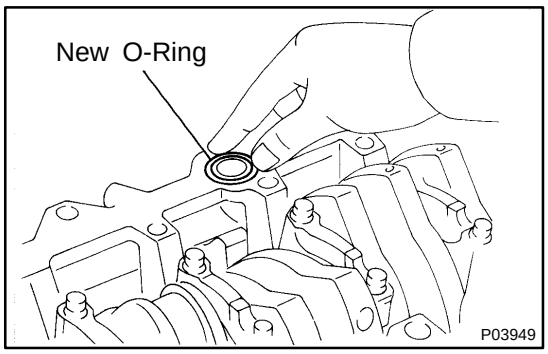
Avoid applying an excessive amount to the surface. Be particularly careful near oil passages.

- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



(d) Install the oil pump with the 9 bolts.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)



2. INSTALL NO. 1 OIL PAN

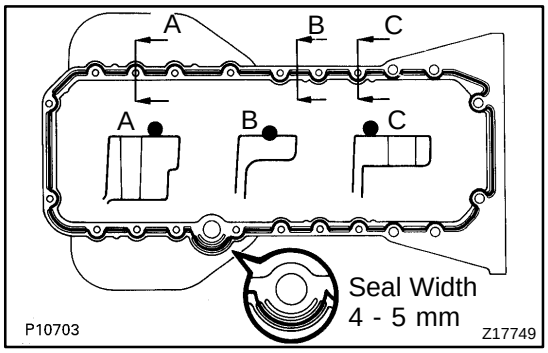
(a) Place a new O-ring in the position on the cylinder block.

(b) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the No. 1 oil pan and cylinder block.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the debris.
- Using a non-residue solvent, clean both sealing surfaces.

NOTICE:

Do not use a solvent which will affect the painted surfaces.



(c) Apply seal packing to the No. 1 oil pan as shown in the illustration.

Seal packing: Part No.08826-00080 or equivalent

- Install a nozzle that has been cut to a 4 - 5 mm (0.16 - 0.20 in.) opening.

HINT:

Avoid applying an excessive amount to the surface.

- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(d) Install the No.1 oil pan with the 22 bolts.

Torque:

21 N·m (210 kgf·cm, 15 ft·lbf) for 12 mm head

40 N·m (400 kgf·cm, 30 ft·lbf) for 14 mm head

3. INSTALL OIL PAN BAFFLE PLATE

Torque: 9.0 N·m (90 kgf·cm, 80 in.·lbf)

4. INSTALL OIL STRAINER

Install a new gasket and the oil strainer with the bolt and 2 nuts.

Torque: 9.0 N·m (90 kgf·cm, 80 in.·lbf)

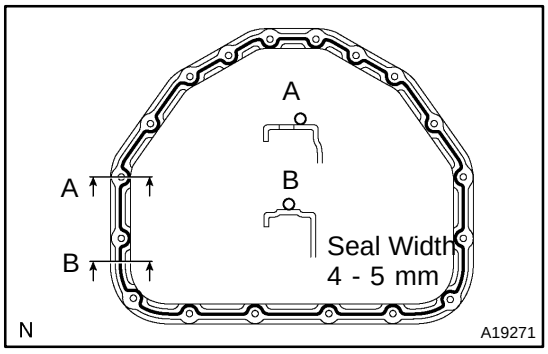
5. INSTALL NO. 2 OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the No. 1 and No. 2 oil pans.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the debris.

- Using a non-residue solvent, clean both sealing surfaces.

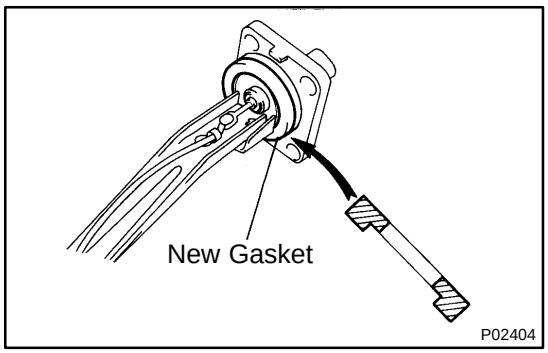
NOTICE:
Do not use a solvent which will affect the painted surfaces.



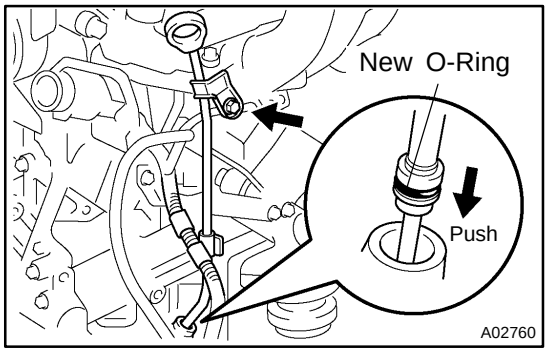
(b) Apply seal packing to the No. 2 oil pan as shown in the illustration.
Seal packing: Part No.08826-00080 or equivalent
Install a nozzle that has been cut to a 4 - 5 mm (0.16 - 0.20 in.) opening.

HINT:
Avoid applying an excessive amount to the surface.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Install the No. 2 oil pan with the 16 bolts and 2 nuts.
Torque: 9.0 N·m (90 kgf·cm, 80 in.·lbf)



6. INSTALL OIL LEVEL SENSOR
(a) Install a new gasket to the level sensor.
(b) Install the level sensor with the 4 bolts.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)
(c) Connect the level sensor connector.



7. INSTALL OIL DIPSTICK GUIDE AND DIPSTICK
(a) Install a new O-ring on the dipstick guide.
(b) Apply soapy water on the O-ring.
(c) Push in the dipstick guide into the guide hole of the No. 1 oil pan.
(d) Install the dipstick guide with the bolt.
(e) Install the dipstick.
(f) Connect the engine wire clamp to the dipstick guide.

8. INSTALL CRANKSHAFT TIMING PULLEY, IDLER PULLEY AND TIMING BELT (See page EM-24)

9. **INSTALL CRANKSHAFT POSITION SENSOR**
   Torque: 9.0 N·m (90 kgf·cm, 80 in.·lbf)
10. **REMOVE ENGINE STAND FROM ENGINE**
11. **ASSEMBLY ENGINE AND TRANSMISSION (See page EM-71)**
12. **INSTALL ENGINE WITH TRANSMISSION (See page EM-71)**

IGNITION SYSTEM

IG0K5-04

ON-VEHICLE INSPECTION

NOTICE:

"Cold" and "Hot" in these sentences express the temperature of the coils themselves. "Cold" is from -10 °C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

1. INSPECT IGNITER AND SPARK TEST

Check that the spark occurs.

(1) Remove the ignition coil (See page IG-7).
(2) Using a 16 mm plug wrench, remove the spark plug.
(3) Install the spark plug to the ignition coil, and connect the ignition coil connector.
(4) Ground the spark plug.
(5) Check if spark occurs while engine is being cranked.

NOTICE:

To prevent excess fuel being injected from the injectors during this test, do not crank the engine for more 5 - 10 seconds at a time.

If the spark does not occur, do the test as follows:

SPARK TEST

NO

CHECK CONNECTION OF IGNITION COIL CONNECTOR → BAD → Connect securely.

OK

CHANGE IT TO NORMAL IGNITION COIL (WITH IGNITER) AND PERFORM SPARK TEST AGAIN → OK → Replace the ignition coil (with igniter).

NO

CHECK POWER SUPPLY TO IGNITION COIL (WITH IGNITER)
1. Turn ignition switch to ON.
2. Check that there is battery voltage at ignition coil positive (+) terminal.

→ BAD → Check wiring between ignition switch to ignition coil (with igniter).

OK

CHECK RESISTANCE OF CAMSHAFT POSITION SENSOR (See step 3)

	Cold	Hot
Resistance:	1,630 - 2,740 Ω	2,065 - 3.225 Ω

→ BAD → Replace the camshaft position sensor.

OK

CHECK RESISTANCE OF CRANKSHAFT POSITION SENSOR (See step 4)

	Cold	Hot
Resistance:	985 - 1,600 Ω	1,265 - 1,890 Ω

→ BAD → Replace the crankshaft position sensor.

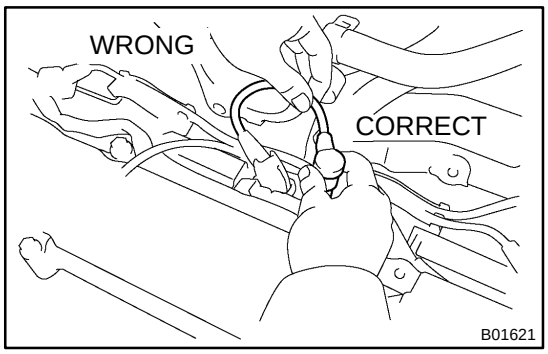
OK

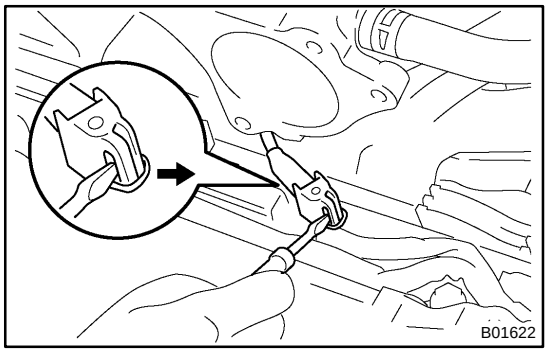
CHECK IGT SIGNAL FROM ECM (See page DI-201) → BAD → Check ECM (See page IN-33)

OK

REPAIR WIRING BETWEEN IGNITION COIL AND ECM

(6) Using a 16 mm plug wrench, reinstall the spark plug.
Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)
(7) Reinstall the ignition coil (See page IG-9).





2. INSPECT HIGH-TENSION CORDS

(a) Remove the No.3 timing belt cover.

(b) Remove the throttle body gasket (See page IG-7).

(c) Disconnect the high-tension cord set from the spark plugs.

Disconnect the high-tension cords at the rubber boot. DO NOT pull on the cords.

NOTICE:

Pulling on or bending the cords may damage the conductor inside.

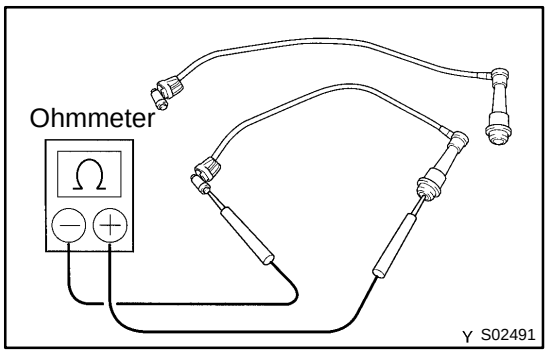
(d) Disconnect the high-tension cord set from the ignition coils.

(1) Using a screwdriver, lift up the lock claw and disconnect the holder from the ignition coils.

(2) Disconnect the high-tension cord at the grommet. DO NOT pull on the cord.

NOTICE:

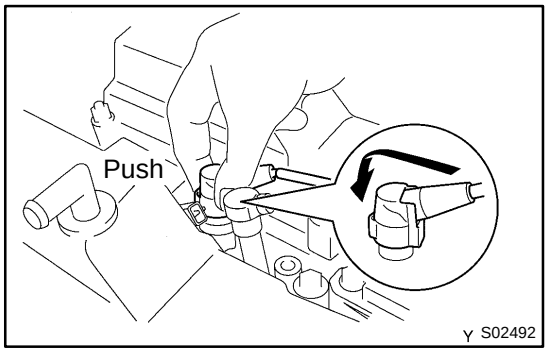
- **Pulling on or bending the cords may damage the conductor inside.**
- **Do not wipe any of the oil from the grommet after the high-tension cord is disconnected.**



(e) Using an ohmmeter, measure the resistance.

Maximum resistance: 25 kΩ per cord

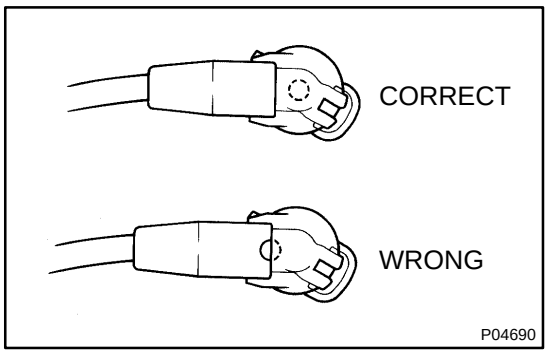
If the resistance is greater than the maximum, check the terminals. If necessary, replace the high-tension cord.



(f) Reconnect the high-tension cord set to the ignition coils.

(1) Assemble the holder and grommet.

(2) Align the spline of the ignition coil with the spline of the holder, and push in the cord.



NOTICE:

Check that the holder is correctly installed to the grommet as shown in the illustration.

(3) Check that the lock claw of the holder is engaged by lightly pulling the holder.

(g) Reconnect the high-tension cord set to the spark plugs.

(h) Reinstall the throttle body gasket (See page IG-9).

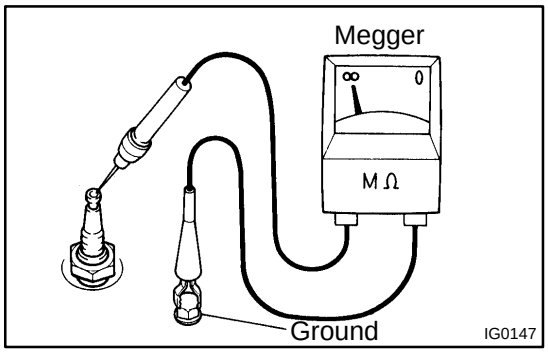
(i) Reinstall the No.3 timing belt cover.

3. INSPECT SPARK PLUGS

NOTICE:

- **Never use a wire brush for cleaning.**
- **Never attempt to adjust the electrode gap on used a spark plug.**

(a) Remove the ignition coils and high-tension cord set assembly (See page IG-7).



(b) Inspect the electrode.

- Using a megger (insulation resistance meter), measure the insulation resistance.

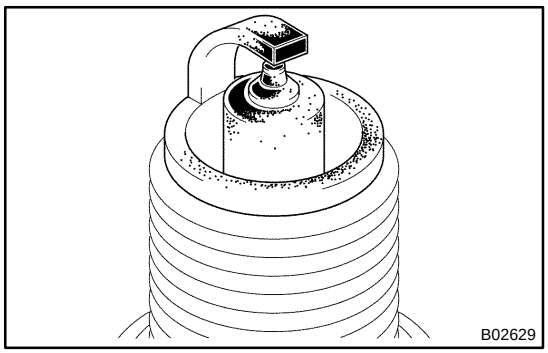
Standard correct insulation resistance:

10 MΩ or more

If the resistance is less than specified, proceed to step (d).

HINT:

If a megger is not available, the following simple method of inspection provides fairly accurate results.



- Simple Method:
  - Quickly race the engine 5 times to 4,000 rpm.
  - Remove the spark plug (See step c).
  - Visually check the spark plug.
    If the electrode is dry ... OK
    If the electrode is wet ... Proceed to step (d)
  - Reinstall the spark plug (See step g).

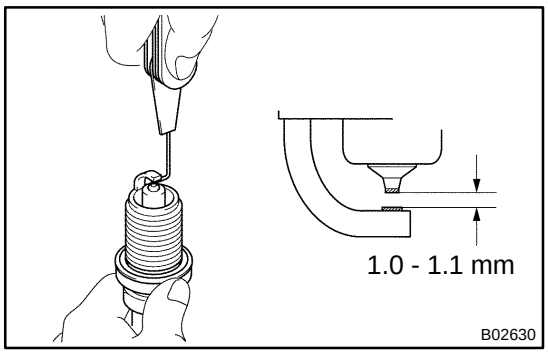
(c) Using a 16 mm plug wrench, remove the 6 spark plugs.

(d) Visually check the spark plug for thread damage and insulator damage.

If abnormal, replace the spark plug.

Recommended spark plug:

DENSO made	SK16R-P11



(e) Inspect the electrode gap.

Maximum electrode gap for used spark plug:
1.2 mm (0.047 in.)

If the gap is greater than maximum, replace the spark plug.

Correct electrode gap for new spark plug:
1.1 mm (0.043 in.)

NOTICE:

If adjusting the gap of a new spark plug, bend only the base of the ground electrode. Do not touch the tip. Never attempt to adjust the gap on the used plug.

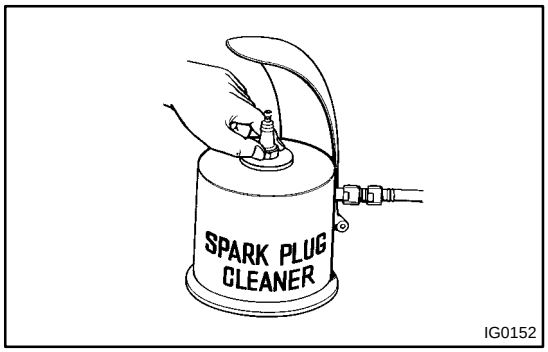
(f) Clean the spark plugs.

If the electrode has traces of wet carbon, allow it to dry and then clean with a spark plug cleaner.

Air pressure: Below 588 kPa (6 kgf/cm^2, 85 psi)
Duration: 20 seconds or less

HINT:

If there are traces of oil, remove it with gasoline before using the spark plug cleaner.



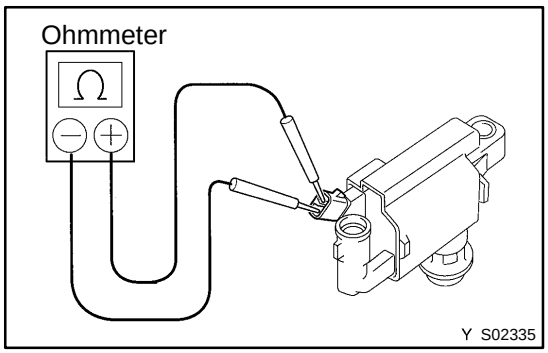
(g) Using a 16 mm plug wrench, reinstall the 6 spark plugs.

Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

(h) Reinstall the ignition coils and high-tension cord set assembly (See page IG-9).

4. INSPECT IGNITION COILS

(a) Remove the ignition coil assembly (See page IG-7).

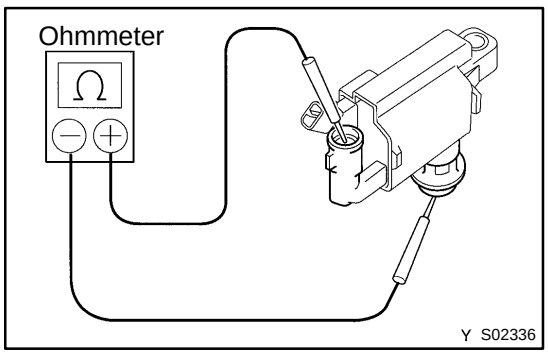


(b) Using an ohmmeter, measure the resistance between the positive (+) and negative (-) terminals.

Primary coil resistance:

Cold	0.33 - 0.52 Ω
Hot	0.42 - 0.61 Ω

If the resistance is not as specified, replace the ignition coil.



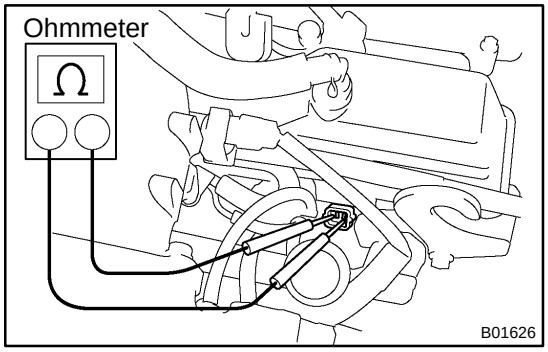
(c) Using an ohmmeter, measure the resistance between the positive (+) and high-tension terminal.

Secondary coil resistance:

Cold	8.5 - 14.7 kΩ
Hot	10.8 - 17.2 kΩ

If the resistance is not as specified, replace the ignition coil.

(d) Reinstall the ignition coil assembly (See page IG-9).



5. INSPECT CAMSHAFT POSITION SENSOR

(a) Disconnect the sensor connector.

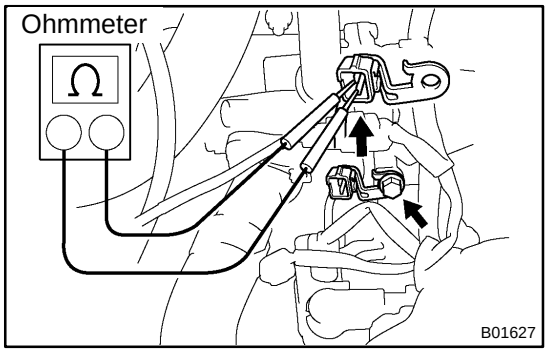
(b) Using an ohmmeter, measure the resistance between terminals.

Resistance:

Cold	835 - 1,400 Ω
Hot	1,060 - 1,645 Ω

If the resistance is not as specified, replace the sensor.

(c) Reconnect the camshaft position sensor connector.



6. INSPECT CRANKSHAFT POSITION SENSOR

(a) Disconnect the sensor connector.

(b) Remove the bolt holding the connector bracket to the water pump.

(c) Using an ohmmeter, measure the resistance between terminals.

Resistance:

Cold	1,630 - 2,740 Ω
Hot	2,065 - 3,225 Ω

If the resistance is not as specified, replace the sensor.

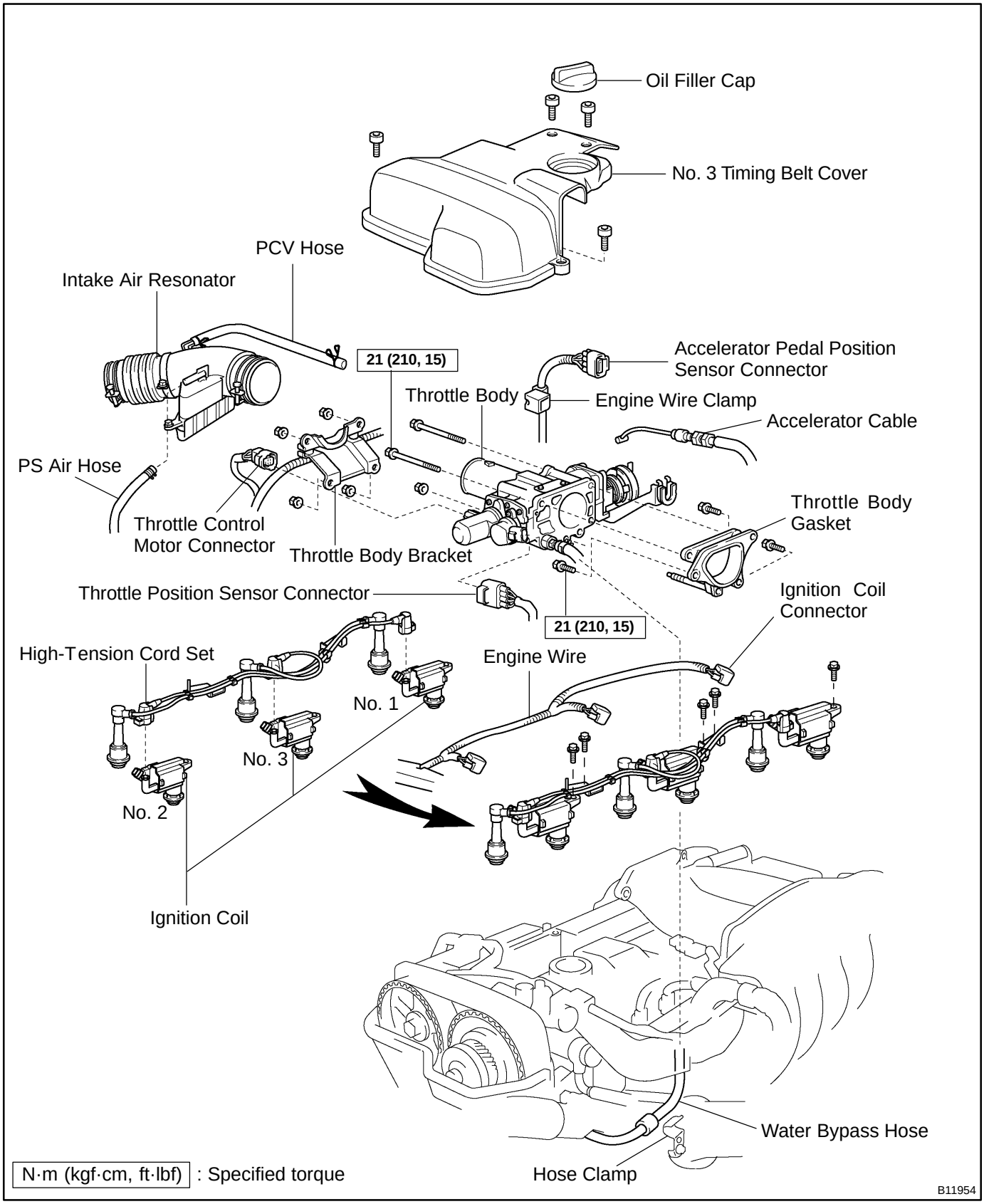
(d) Reinstall the bolt holding the connector bracket to the water pump.

(e) Reconnect the sensor connector.

IGNITION COIL

COMPONENTS

IG05T-08



IG05U-06

REMOVAL

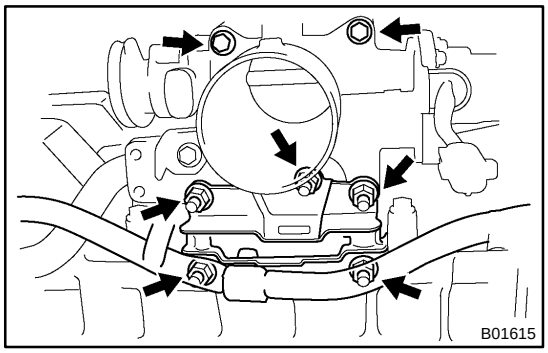
1. REMOVE INTAKE AIR RESONATOR

2. REMOVE NO. 3 TIMING BELT COVER

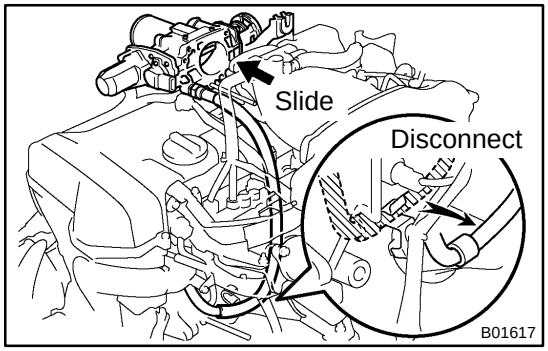
Using a 5 mm hexagon wrench, remove the 4 bolts, oil filler cap and No.3 timing belt cover.

3. DISCONNECT THROTTLE BODY FROM INTAKE AIR CONNECTOR WITHOUT DISCONNECTING WATER BYPASS HOSES

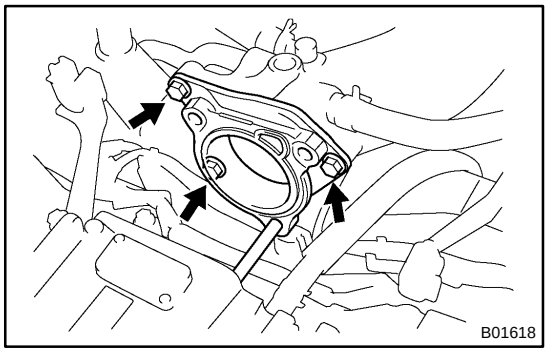
(a) Disconnect the accelerator cable.
(b) Disconnect the throttle position sensor connector.
(c) Disconnect the throttle control motor connector.
(d) Disconnect the accelerator pedal position sensor connector.
(e) Disconnect the engine wire clamp from the clamp bracket of the throttle body.



(f) Remove the 2 bolts and nut holding the throttle body to the intake air connector.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)
(g) Remove the 4 nuts and the throttle body bracket.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

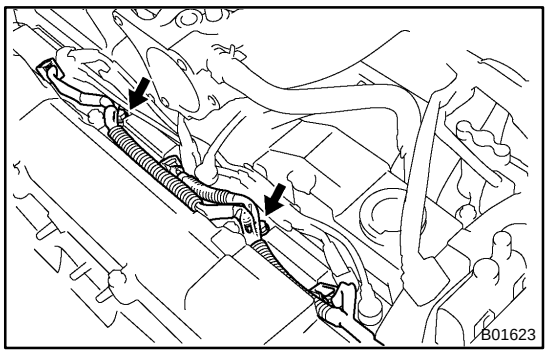


(h) Disconnect the water bypass hose from the hose clamp on the oil filter bracket.
(i) Slightly slide the throttle body away from the intake air connector.



4. REMOVE THROTTLE BODY GASKET

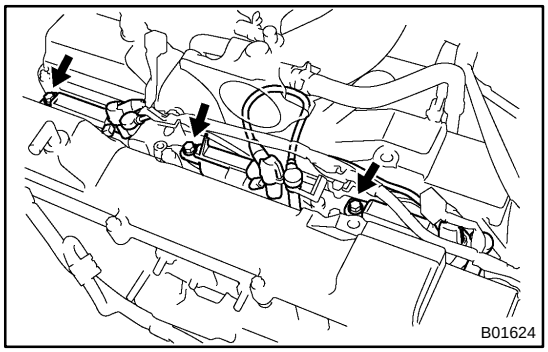
Remove the 3 bolts and throttle body gasket.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)



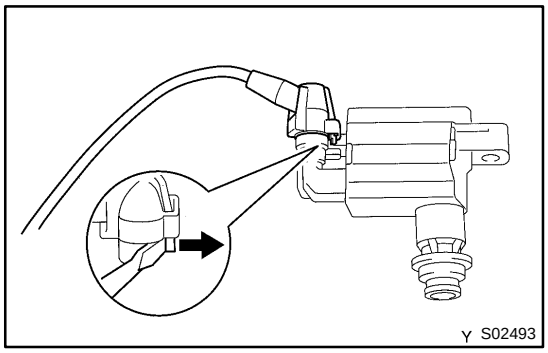
5. REMOVE IGNITION COILS AND HIGH- TENSION CORDS SET ASSEMBLY

(a) Disconnect the 3 connectors from the ignition coils.

(b) Remove the 2 bolts, and disconnect the clamps from the engine wire.



(c) Remove the 3 bolts, the ignition coils and high-tension cord set assembly.
Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)



6. REMOVE IGNITION COILS FROM HIGH- TENSION CORD SET

IG00X-04

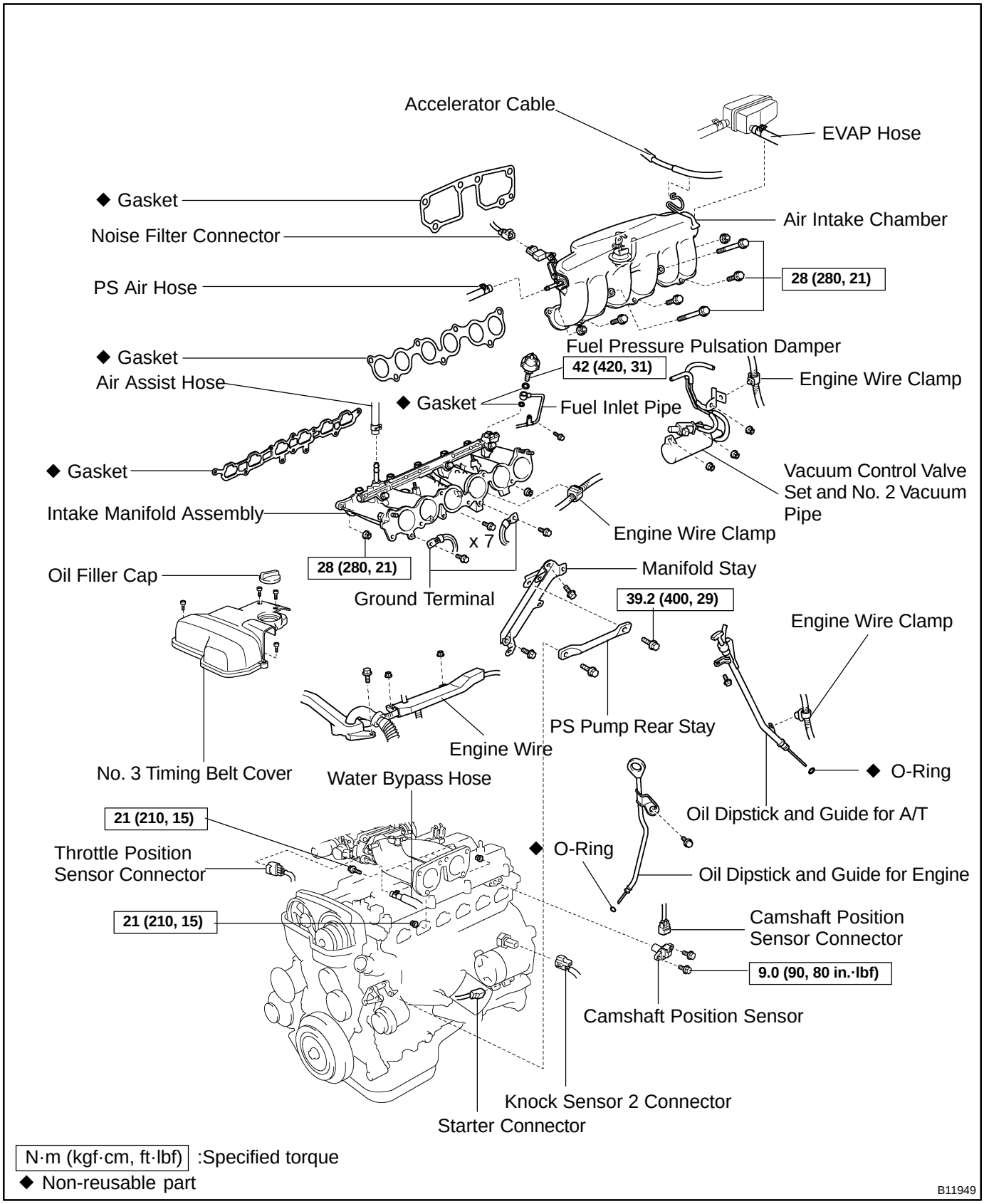
INSTALLATION

Installation is in the reverse order of removal (See page IG-7).

CAMSHAFT POSITION SENSOR

IG05V-08

COMPONENTS



N·m (kgf·cm, ft·lbf) :Specified torque

◆ Non-reusable part

B11949

IG05W-06

REMOVAL

1. DRAIN ENGINE COOLANT

2. REMOVE OIL DIPSTICK AND GUIDE FOR ENGINE (See page LU-6)

3. REMOVE OIL DIPSTICK AND GUIDE FOR A/T (See page EM-65)

4. REMOVE AIR INTAKE CHAMBER (See page SF-46)

5. REMOVE VACUUM CONTROL VALVE SET AND NO. 2 VACUUM PIPE (See page EM-34)

6. REMOVE NO. 3 TIMING BELT COVER

7. DISCONNECT HOSES AND ENGINE WIRE

(a) Disconnect the air assist hose from the intake manifold.

(b) Disconnect the water bypass hose (from the water outlet) from the throttle body.

(c) Disconnect the 2 ground terminals from the intake manifold.

HINT:

At time of the installation, tighten so that each calking part should inside.

(d) Disconnect the throttle position sensor connector.

(e) Disconnect the 6 injector connectors.

(f) Disconnect the camshaft position sensor connector.

(g) Disconnect the knock sensor 2 connector.

(h) Disconnect the starter connector.

(i) Disconnect the engine wire clamp from the clamp bracket on the intake manifold.

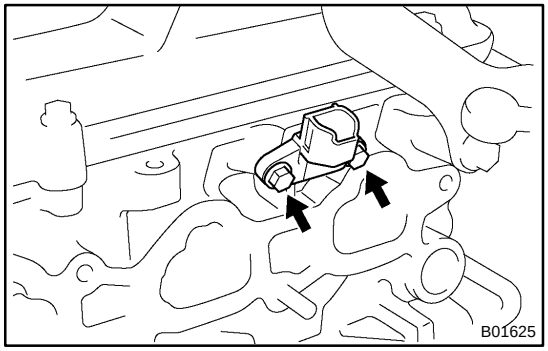
(j) Remove the 3 nuts, and disconnect the engine wire protector from the intake manifold.

8. REMOVE FUEL PRESSURE PULSATION DAMPER (See page SF-26)

9. REMOVE PS PUMP REAR STAY

Torque: 39.2 N·m (400 kgf·cm, 29 ft·lbf)

10. REMOVE INTAKE MANIFOLD ASSEMBLY (See page EM-34)



11. REMOVE CAMSHAFT POSITION SENSOR

Remove the 2 bolts and sensor.

Torque: 9.0 N·m (90 kgf·cm, 80 in.·lbf)

IG05X-03

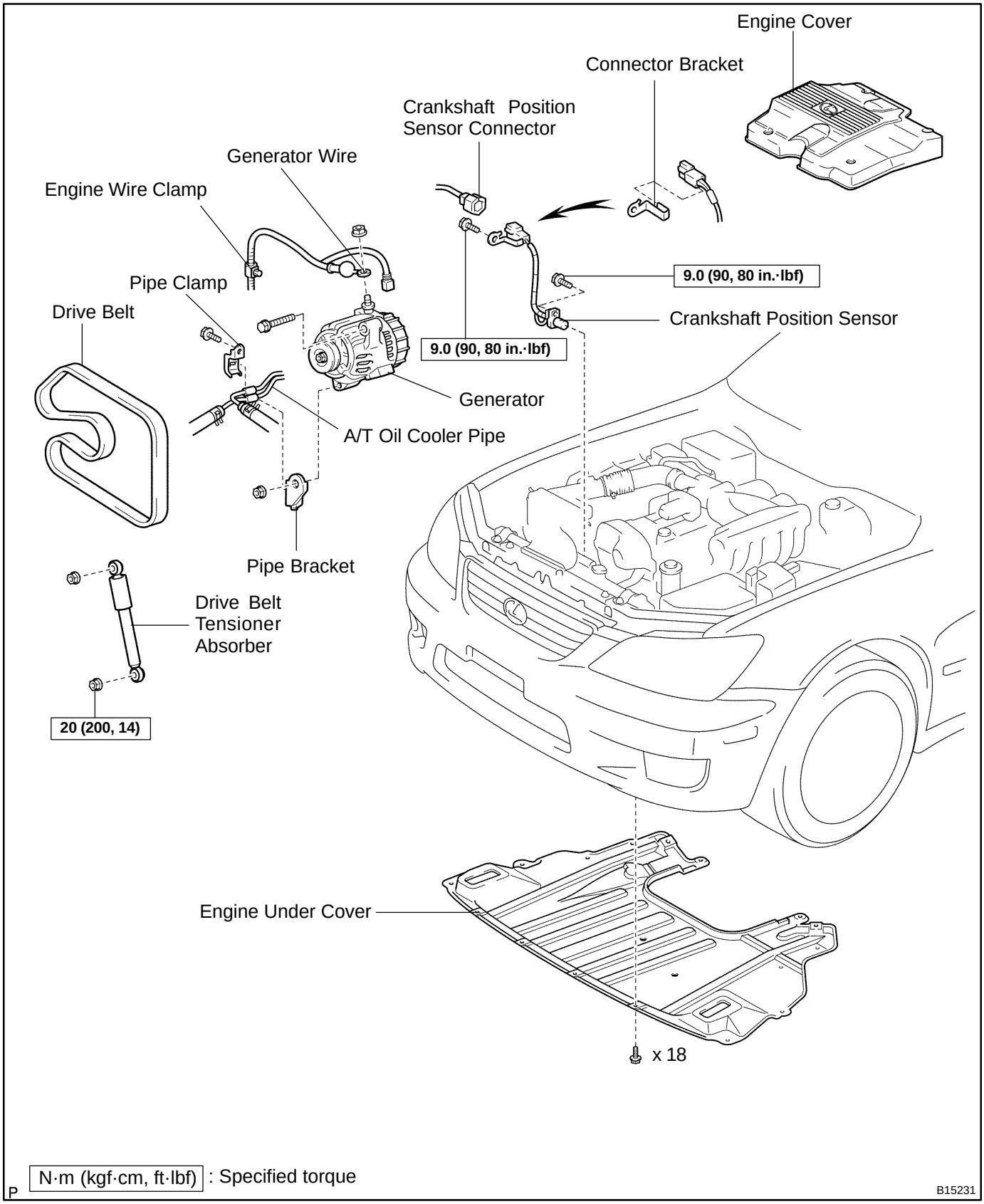
INSTALLATION

Installation is in the reverse order of removal (See page IG-1 1).

CRANKSHAFT POSITION SENSOR

IG060-09

COMPONENTS



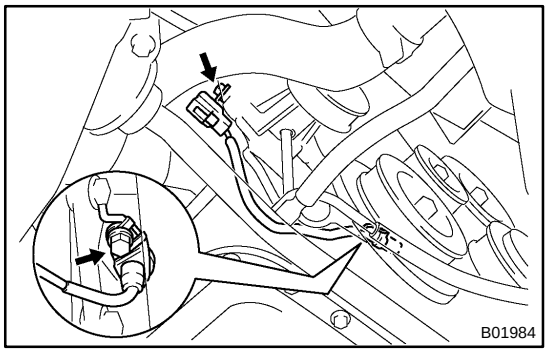
IG05Y-08

REMOVAL

1. REMOVE GENERATOR (See page CH-6)

2. DISCONNECT CRANKSHAFT POSITION SENSOR CONNECTOR

(a) Disconnect the sensor connector.



(b) Remove the bolt holding the connector bracket to the water pump.

3. REMOVE CRANKSHAFT POSITION SENSOR

(a) Remove the bolt and sensor.

Torque: 9.0 N·m (90 kgf·cm, 80 in.·lbf)

(b) Remove the connector bracket from the connector.

IG05Z-04

INSTALLATION

Installation is in the reverse order of removal (See page IG-14).

STARTING SYSTEM

ST04X-01

ON-VEHICLE INSPECTION

NOTICE:

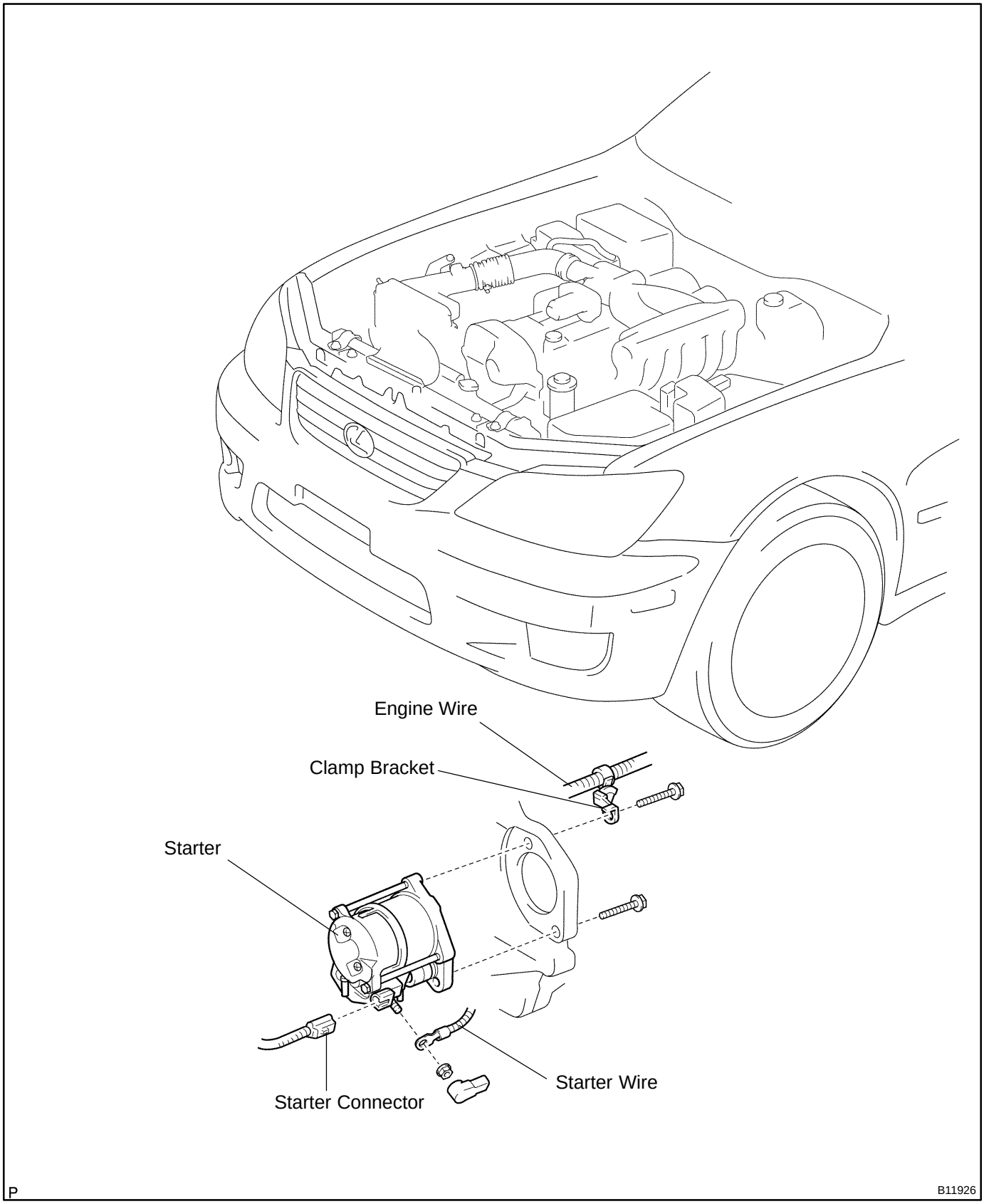
Before changing the starter, check the following items again:

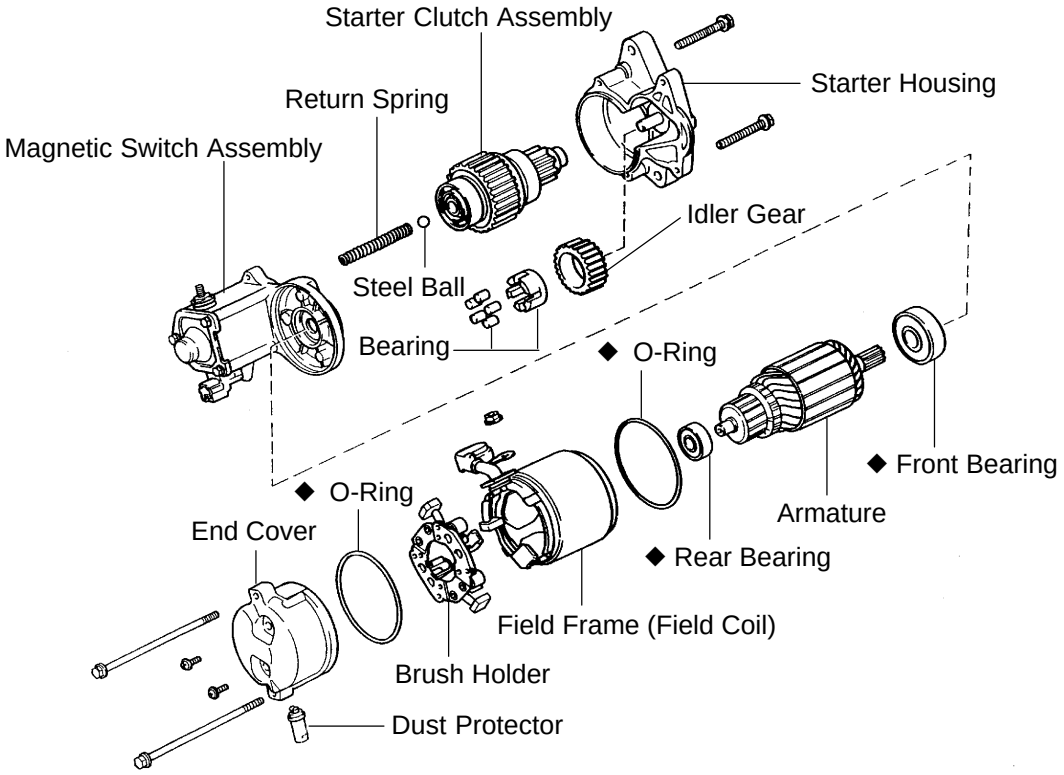
- **Connector connection**
- **Accessory installation, e.g.: theft deterrent system**

STARTER

COMPONENTS

ST04Y-04

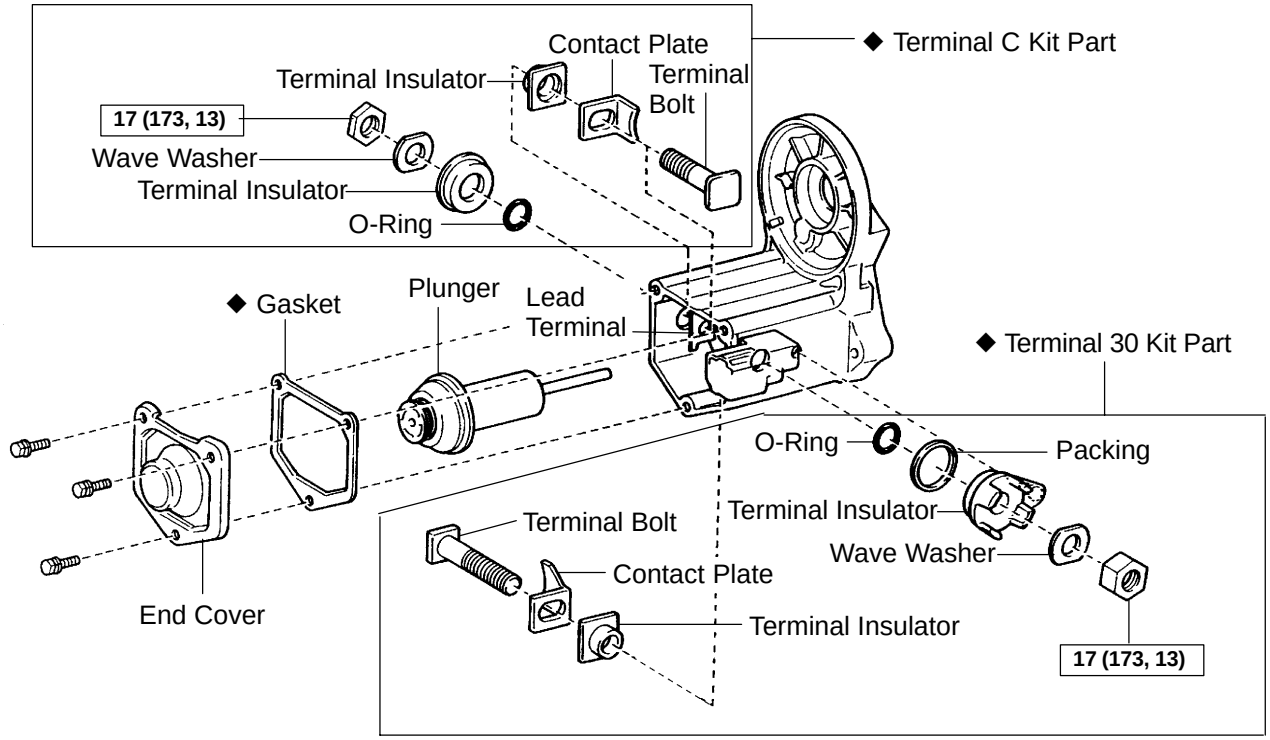




◆ Non-reusable part

B01640

Magnetic Switch Assembly

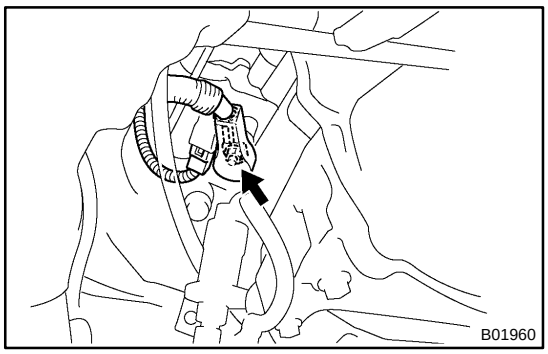


N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

B11947

ST04Z-04

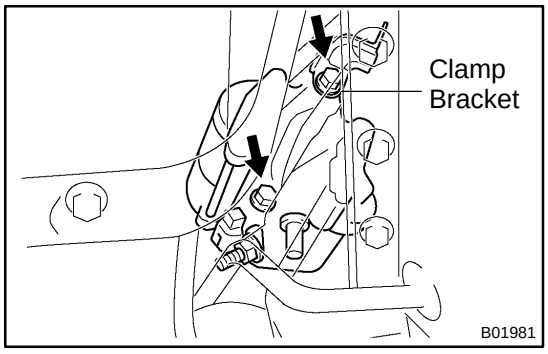


REMOVAL

REMOVE STARTER

(a) Remove the rubber cap and nut, and disconnect the starter wire.

(b) Disconnect the starter connector.



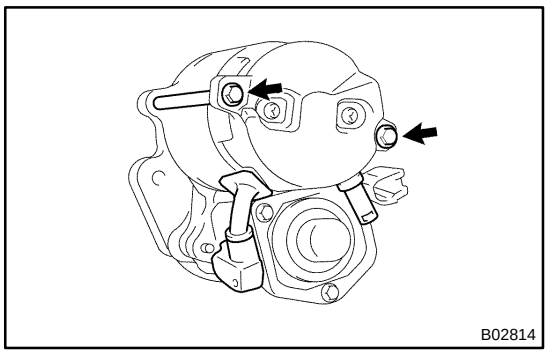
(c) Remove the 2 bolts and starter.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

HINT:

At time of the installation, when installing the upper bolt, tighten it together with the clamp bracket.

ST050-05

DISASSEMBLY

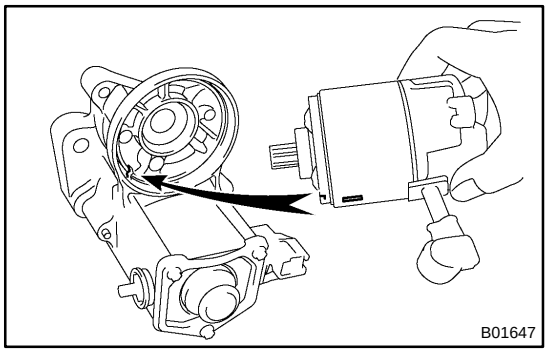

B02814

1. REMOVE DUST PROTECTOR

2. REMOVE FIELD FRAME AND ARMATURE

(a) Remove the nut, and disconnect the lead wire from the magnetic switch terminal.
Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)

(b) Remove the 2 through bolts.
Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)


B01647

(c) Pull out the field frame together with the armature.

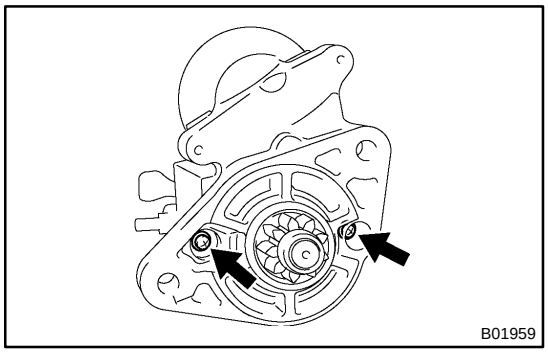
HINT:

At the time of reassembly, align the protrusion of the field frame with the cutout of the magnetic switch.

(d) Remove the O-ring from the field frame.

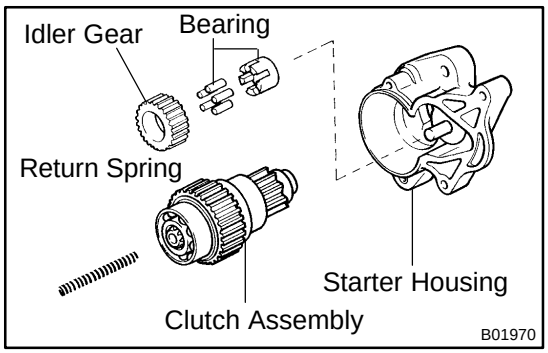
HINT:

At the time of reassembly, use a new O-ring.


B01959

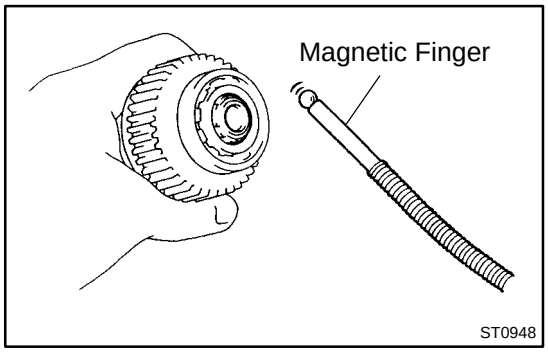
3. REMOVE STARTER HOUSING, CLUTCH ASSEMBLY AND GEAR

(a) Remove the 2 bolts.
Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)



B01970

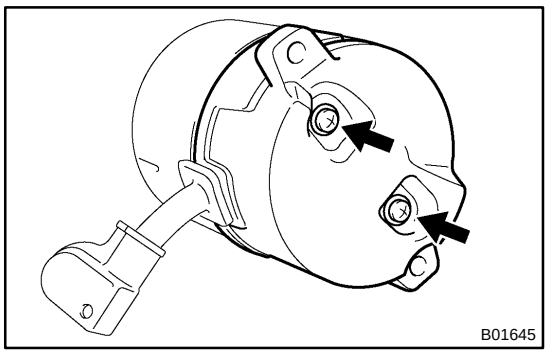
(b) Remove the starter housing, idler gear, bearing, clutch assembly and return spring from the magnetic switch.



ST0948

4. REMOVE STEEL BALL

Using a magnetic finger, remove the steel ball from the clutch shaft hole.



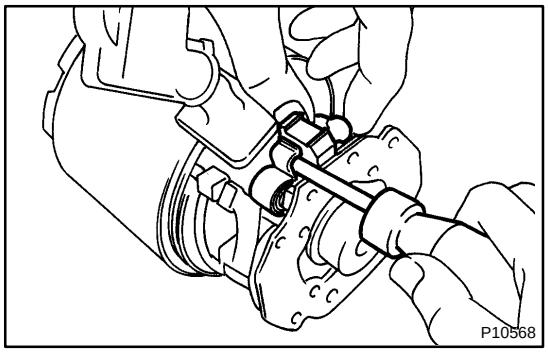
5. REMOVE BRUSH HOLDER

(a) Remove the 2 screws and end cover from the field frame.
Torque: 1.5 N·m (15 kgf·cm, 13 in.·lbf)

(b) Remove the O-ring from the field frame.

HINT:

At the time of reassembly, use a new O-ring.



(c) Using a screwdriver, hold the spring back and disconnect the brush from the brush holder. Disconnect the 4 brushes, and remove the brush holder.

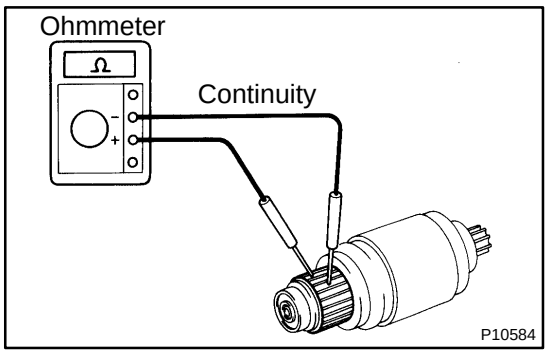
NOTICE:

At the time of reassembly, check that the positive (+) lead wires are not grounded.

6. REMOVE ARMATURE FROM FIELD FRAME

ST051-06

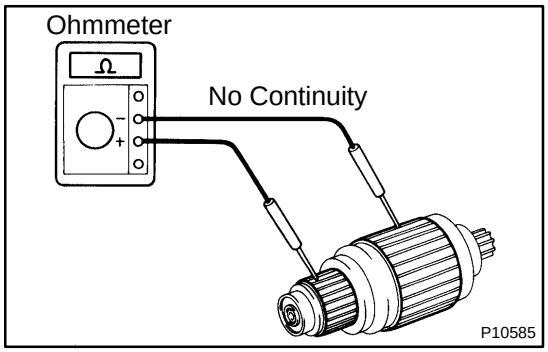
INSPECTION



1. INSPECT ARMATURE COIL

(a) Check the commutator for open circuit.
Using an ohmmeter, check that there is continuity between the segments of the commutator.

If there is no continuity between any segment, replace the armature.



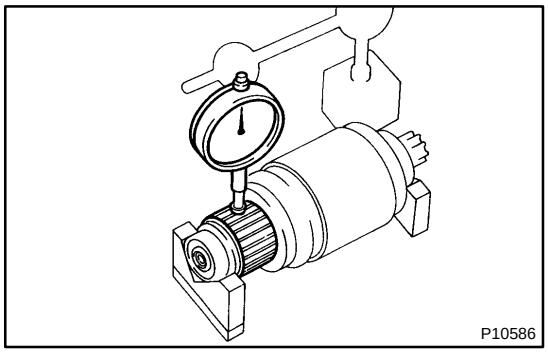
(b) Check the commutator for ground.
Using an ohmmeter, check that there is no continuity between the commutator and armature coil core.

If there is no continuity, replace the armature.

2. INSPECT COMMUTATOR

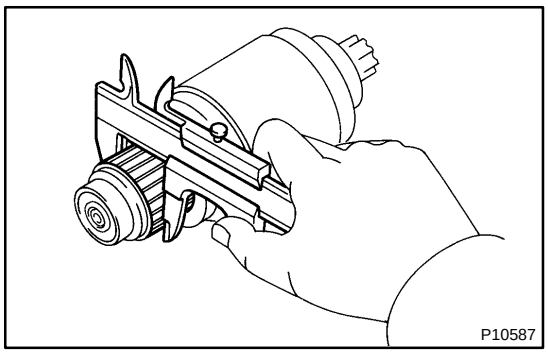
(a) Check the commutator for the dirty and burnt surfaces.

If the surface is dirty or burnt, correct it with sandpaper (No.400) or on a table.



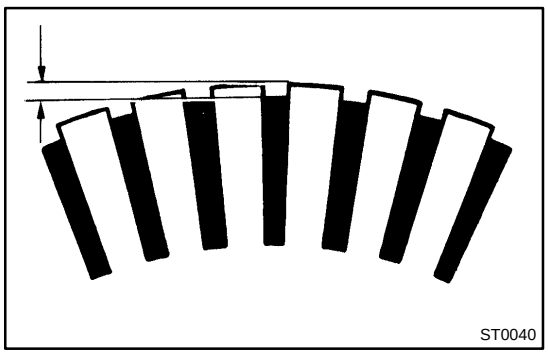
(b) Check for the commutator circle runout.
(1) Place the commutator on V-blocks.
(2) Using a dial gauge, measure the circle runout.
Maximum circle runout: 0.05 mm (0.0020 in.)

If the circle runout is greater than maximum, correct it on a lathe.



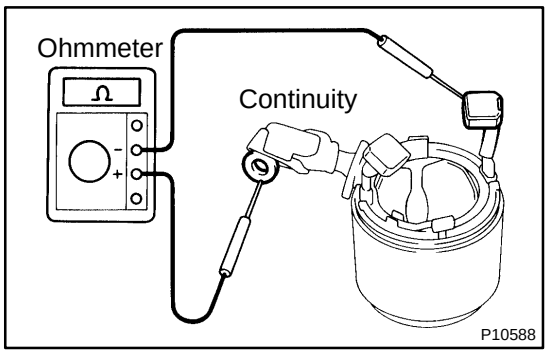
(c) Using a vernier caliper, measure the commutator diameter.
Standard diameter: 30.0 mm (1.181 in.)
Minimum diameter: 29.0 mm (1.412 in.)

If the diameter is less than minimum, replace the armature.



(d) Check that the undercut depth is clean and free of foreign materials. Smooth out the edge.
Standard undercut depth: 0.6 mm (0.024 in.)
Minimum undercut depth: 0.2 mm (0.008 in.)

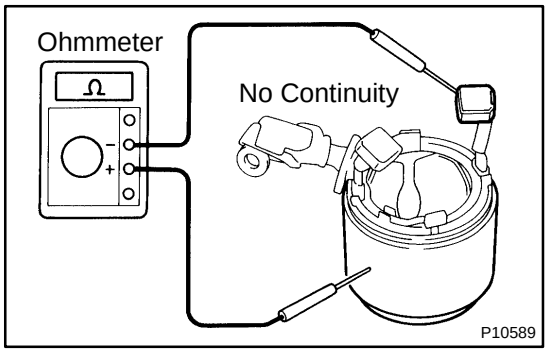
If the undercut depth is less than minimum, correct it with a hacksaw blade.



3. INSPECT FIELD COIL

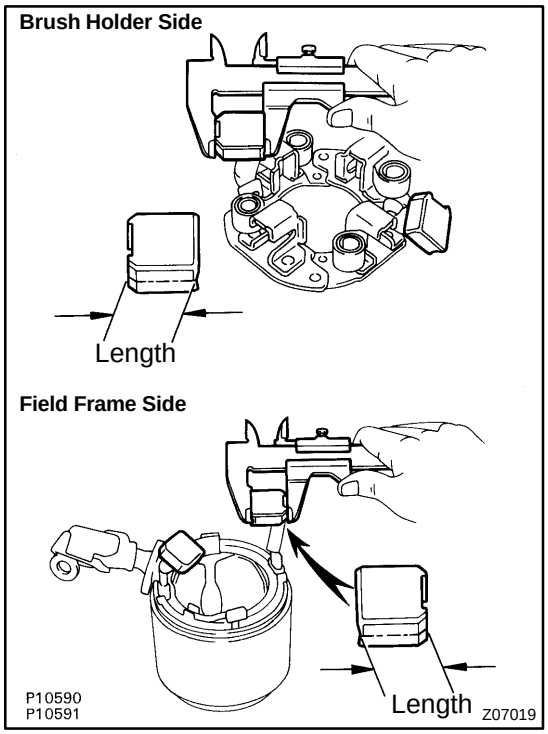
(a) Check the field coil for open circuit.
Using an ohmmeter, check that there is continuity between the lead wire and field coil brush lead.

If there is no continuity, replace the field frame.



(b) Check the field coil for ground.
Using an ohmmeter, check that there is no continuity between the field coil end and field frame.

If there is continuity, replace the field frame.

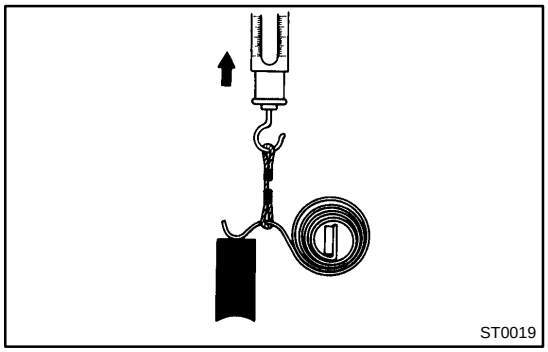


4. INSPECT BRUSHES

Using a vernier caliper, measure the brush length.

Standard length: 15.5 mm (0.610 in.)
Minimum length: 10.0 mm (0.394 in.)

If the length is less than minimum, replace the brush holder and field frame.

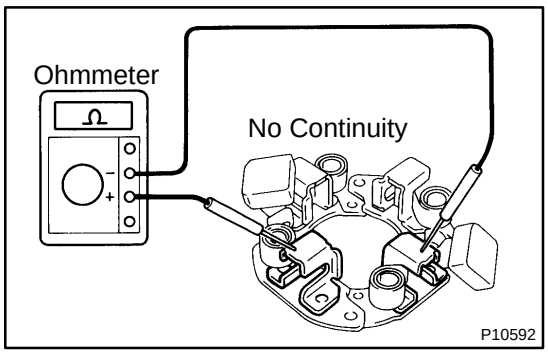


5. INSPECT BRUSH SPRINGS

Check the brush spring load. Take the pull scale reading the instant the brush spring separates from the brush.

Standard spring installed load:
17.6 - 23.5 N (1.8 - 2.4 kgf, 3.9 - 5.3 lbf)
Minimum spring installed load:
11.8 N (1.2 kgf, 2.6 lbf)

If the installed load is less than minimum, replace the brush springs.



6. INSPECT BRUSH HOLDER

Check the brush holder insulator. Using an ohmmeter, check that there is no continuity between the positive (+) and negative (-) brush holders.

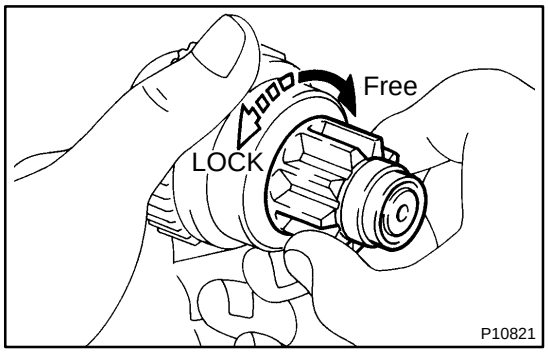
If there is continuity, repair or replace the brush holder.

7. INSPECT CLUTCH AND GEAR

(a) Check the gear teeth on the pinion gear, idle gear and the clutch assembly for wear or damage.

If damaged, replace the gear or clutch assembly.

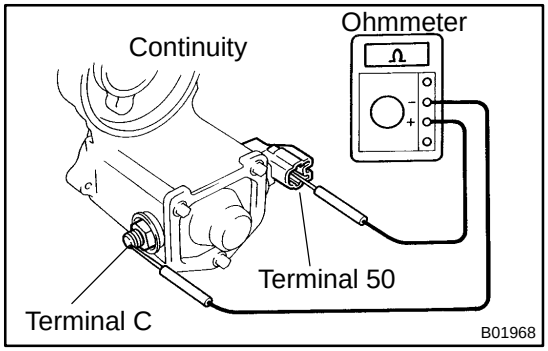
If damaged, also check the drive plate ring gear for wear or damage.



(b) Check the clutch pinion gear.

Rotate the pinion gear counterclockwise, and check that it turns freely. Try to rotate the pinion gear clockwise and check that it locks.

If necessary, replace the clutch assembly.

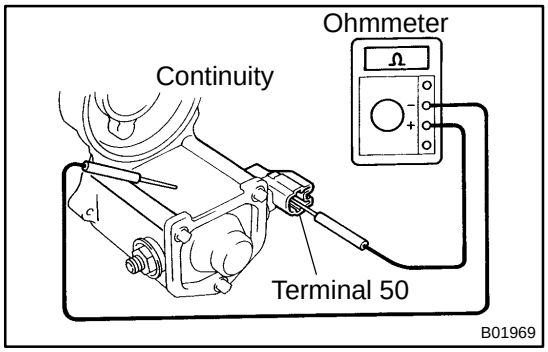


8. INSPECT MAGNETIC SWITCH

(a) Check the pull -in coil for open circuit.

Using an ohmmeter, check that there is continuity between terminals 50 and C.

If there is no continuity, check and replace the magnetic switch.



(b) Check the hold-in coil for open circuit.

Using an ohmmeter, check that there is continuity between terminal 50 and the switch body.

If there is no continuity, replace the magnetic switch.

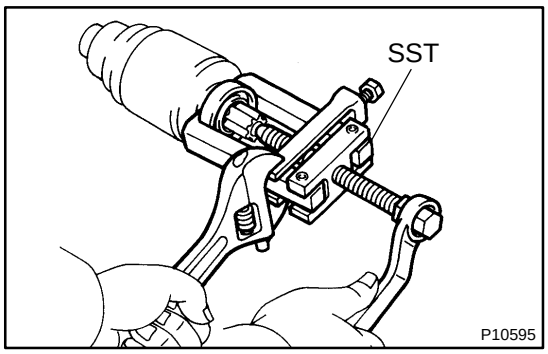
9. INSPECT BEARING

Turn the bearing by hand and while apply inward force.

If resistance is felt or bearing sticks, replace the bearing (See page ST-10).

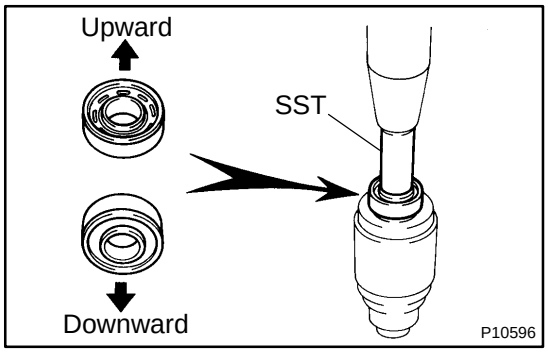
ST052-08

REPLACEMENT



1. REPLACE FRONT BEARING

(a) Using SST, remove the bearing.
SST 09286-4601 1

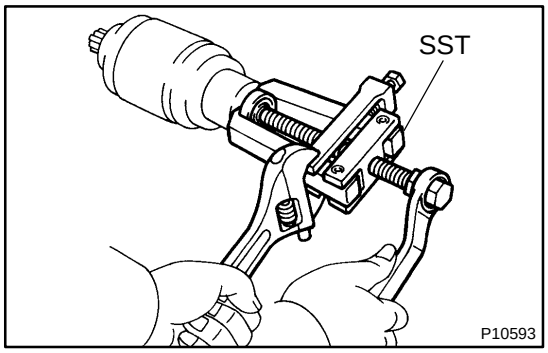


(b) Using SST and a press, press in a new bearing.

NOTICE:

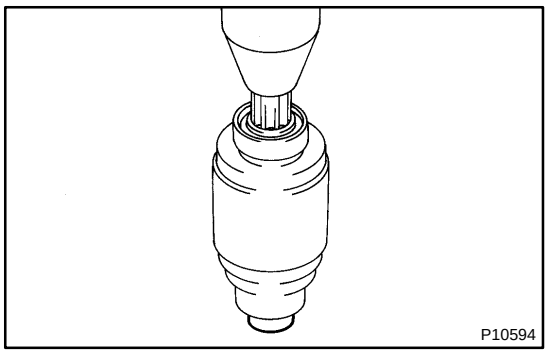
Be careful of the bearing installation direction.

SST 09820-00031

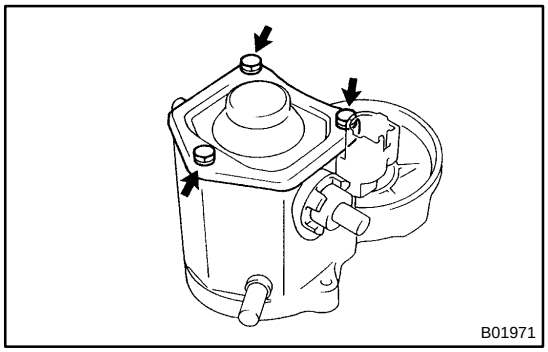


2. REPLACE REAR BEARING

(a) Using SST, remove the bearing.
SST 09286-4601 1

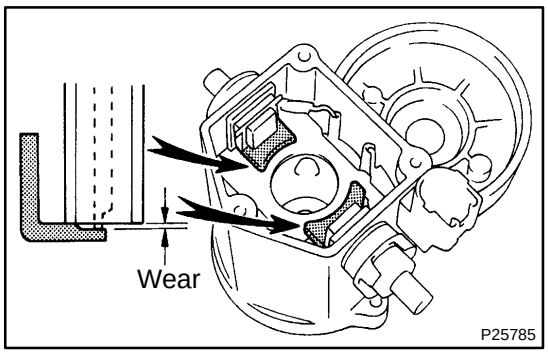


(b) Using a press, press in a new rear bearing.



3. REPLACE MAGNETIC SWITCH TERMINAL PARTS

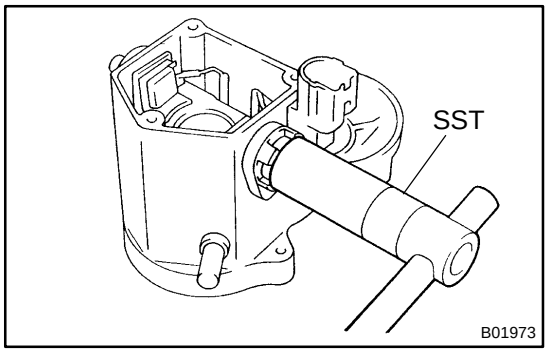
(a) Remove the 3 bolts, end cover, gasket and plunger.



(b) Using vernier calipers, measure the contact plate for depth of wear.

Maximum wear: 0.9 mm (0.035 in.)

If the depth of wear is greater than the maximum, replace the contact plate.



(c) Remove the terminal kit parts.

(1) Using SST, loosen the terminal nuts.

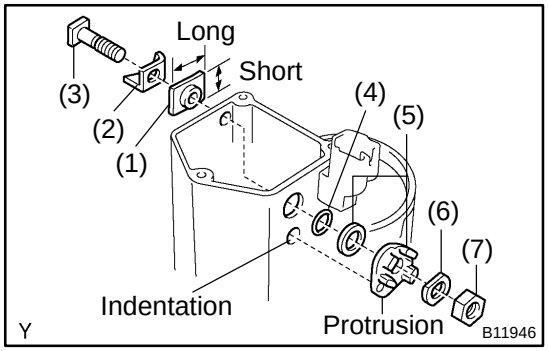
SST 09810-38140

(2) Terminal C:

Remove the terminal nut, wave washer, terminal insulator (outside), O- ring, terminal bolt, contact plate and terminal insulator (inside).

(3) Terminal 30:

Remove the terminal nut, wave washer, terminal insulator (outside), packing, O-ring, terminal bolt, contact plate and terminal insulator (inside).



(d) Temporarily install new terminal 30 kit parts:

(1) Install a new terminal insulator (inside).

(2) Install a new contact plate.

(3) Install a new terminal bolt.

(4) Install a new O-ring.

(5) Install a new packing and terminal insulator (outside).

Install the packing to the terminal insulator, and install them.

HINT:

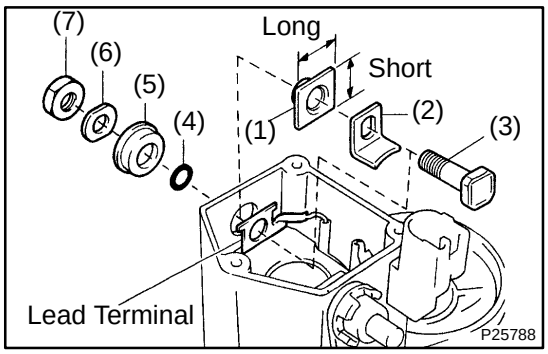
Match the protrusion of the insulator with the indentation of the housing.

(6) Install a new wave washer.

(7) Install a new terminal nut.

NOTICE:

Be careful to install the terminal insulators in the correct direction.

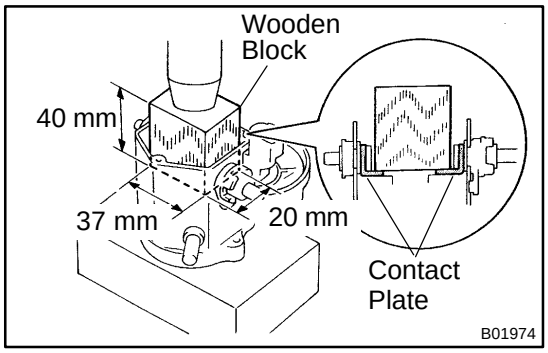


(e) Temporarily install new terminal C kit parts:
(1) Install a new terminal insulator (inside).
(2) Install a new contact plate.
(3) Install a new terminal bolt.
(4) Install a new O-ring.
(5) Install a new terminal insulator (outside).
(6) Install a new wave washer.
(7) Install a new terminal nut.

NOTICE:

Be careful to install the terminal insulators in the correct direction.

(f) Temporarily tighten the terminal nuts.



(g) Tighten the terminal nut
(1) Put a wooden block on the contact plate and press it down with a hand press.

Dimensions of wooden block:
20 x 37 x 40 mm (0.79 x 1.46 x 1.57 in.)
Press force:
981 N (100 kgf, 221 lbf)

NOTICE:

- **Check the diameter of the hand press ram. Then calculate the gauge pressure of the press when 981 N (100 kgf, 221 lbf) of force is applied.**
  Gauge pressure:

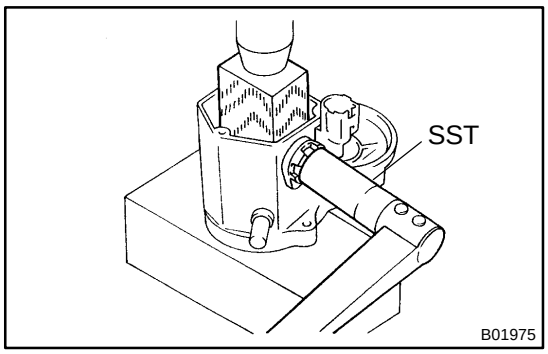
$$(\text{kgf/cm}^2) = \frac{100\ \text{kgf}}{\left(\frac{\text{Ram diameter (cm)}}{2}\right)^2 \times 3.14\ (\pi)}$$

$$(\text{psi}) = \frac{221\ \text{lbf}}{\left(\frac{\text{Ram diameter (in.)}}{2}\right)^2 \times 3.14\ (\pi)}$$

$$(\text{kPa}) = (\text{kgf/cm}^2) \times 98.1$$

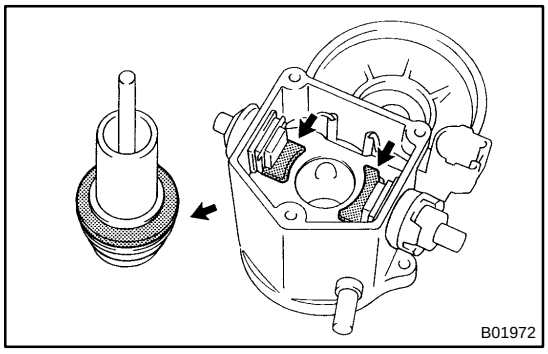
$$(\text{kPa}) = (\text{psi}) \times 6.9$$

- **If the contact plate is not pressed down with the specified pressure, the contact plate may tilt due to coil deformation or the tightening of the nut.**



(2) Using SST, tighten the nuts to the specified torque.
SST 09810-38140
Torque: 17 N·m (173 kgf·cm, 13 ft·lbf)

NOTICE:
If the nut is over tightened, it may cause cracks on the inside of the insulator.



(h) Clean the contact surfaces of the remaining contact plate and plunger with a dry shop rag.

(i) Reinstall the plunger, new gasket, end cover and lead clamp with the 3 bolts.
Torque: 2.5 N·m (26 kgf·cm, 22 in.·lbf)

ST053-03

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page ST-5).

HINT:

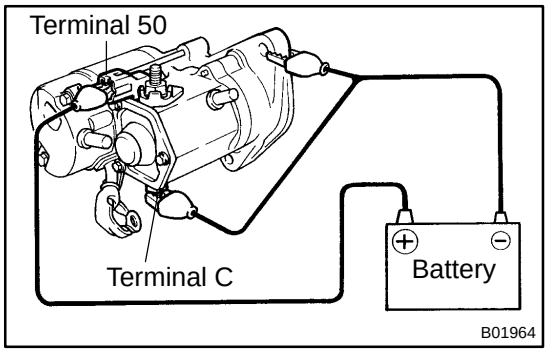
Before reassembly, use high-temperature grease to lubricate the bearings and gears.

ST054-06

TEST

NOTICE:

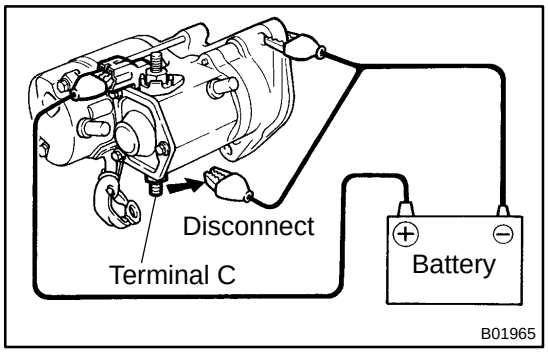
These tests must be done within 3 to 5 seconds to avoid burning out the coil.



1. DO PULL-IN TEST

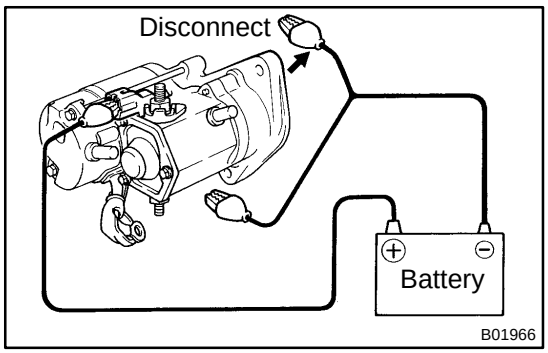
(a) Disconnect the field coil lead wire from terminal C.

(b) Connect the battery to the magnetic switch as shown. Check that the pinion gear moves outward.



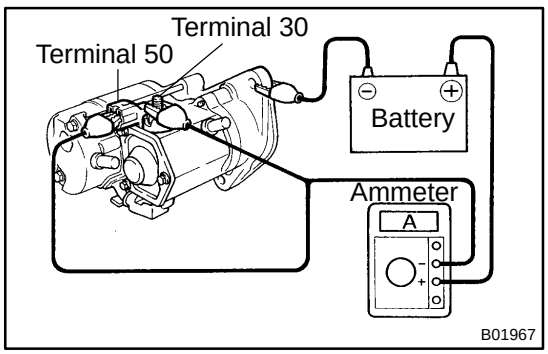
2. DO HOLD-IN TEST

While connected as above with the pinion gear out, disconnect the negative (-) lead from terminal C. Check that the pinion gear remains out.



3. INSPECT CLUTCH PINION GEAR RETURN

Disconnect the negative (-) lead from the starter body. Check that the pinion gear returns inward.



4. DO NO-LOAD PERFORMANCE TEST

(a) Connect the battery and ammeter to the starter as shown.

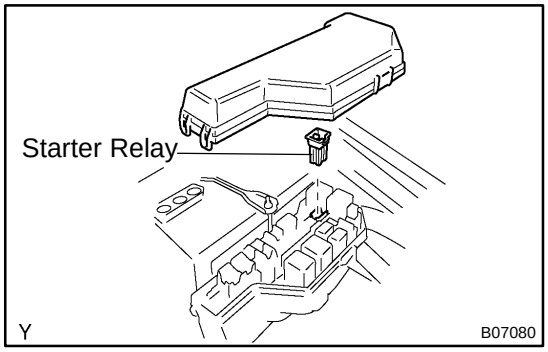
(b) Check that the starter rotates smoothly and steadily with the pinion gear moving out. Check that the ammeter shows the specified current.

Specified current: 90 A or less at 11.5 V

ST055-03

INSTALLATION

Installation is in the reverse order of removal (See page ST-4).



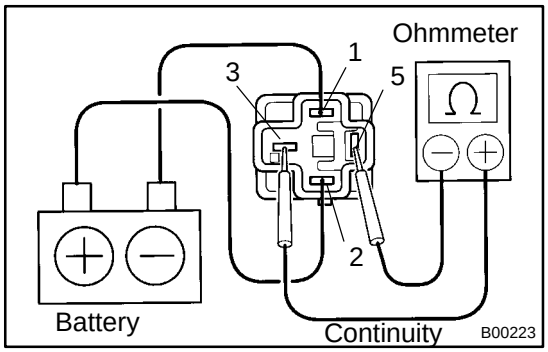
STARTER RELAY

ST0Q3-01

INSPECTION

1. REMOVE RELAY BOX COVER

2. REMOVE STARTER RELAY



3. INSPECT STARTER RELAY

(1) Using an ohmmeter, measure the resistance between the terminals.

Standard:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

If the resistance is not as specified, replace the relay.

4. REINSTALL STARTER RELAY

5. REINSTALL RELAY BOX COVER

CHARGING SYSTEM

CH043-05

ON-VEHICLE INSPECTION

CAUTION:

- **Check that the battery cables are connected to the correct terminals.**
- **Disconnect the battery cables when the battery is given a quick charge.**
- **Do not do tests with a high voltage insulation resistance tester.**
- **Never disconnect the battery while the engine is running.**

1. CHECK BATTERY ELECTROLYTE LEVEL

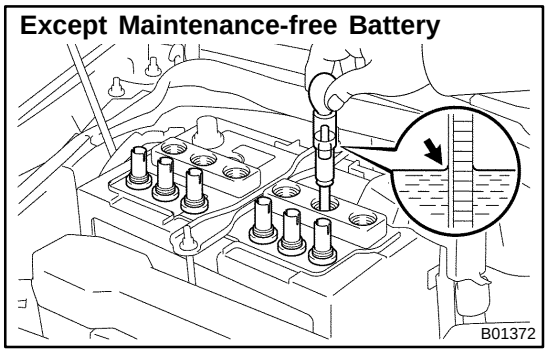
Check the electrolyte quantity of each cell.

Maintenance-free Battery:

If under the lower level, replace the battery (or add distilled water if possible). Check the charging system.

Except Maintenance-free Battery:

If under the lower level, add distilled water.

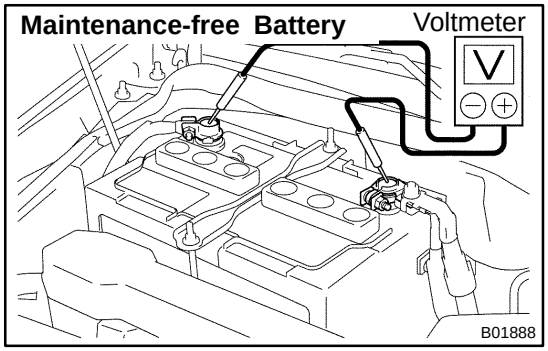


2. Except Maintenance-free Battery: CHECK BATTERY SPECIFIC GRAVITY

Check the specific gravity of each cell.

Standard specific gravity: 1.25 - 1.29 at 20˚C (68˚F)

If the specific gravity is less than specification, charge the battery.



3. Maintenance-free Battery: CHECK BATTERY POSITIVE VOLTAGE

(a) After having driven the vehicle and in the case that 20 minutes have not passed after having stopped the engine, turn the ignition switch ON and turn on the electrical system (headlight, blower motor, rear defogger etc.) for 60 seconds to remove the surface charge.

(b) Turn the ignition switch OFF and turn off the electrical systems.

(c) Measure the battery positive voltage between the negative (-) and positive (+) terminals of the battery.

Standard voltage: 12.5 - 12.9 V at 20˚C (68˚F)

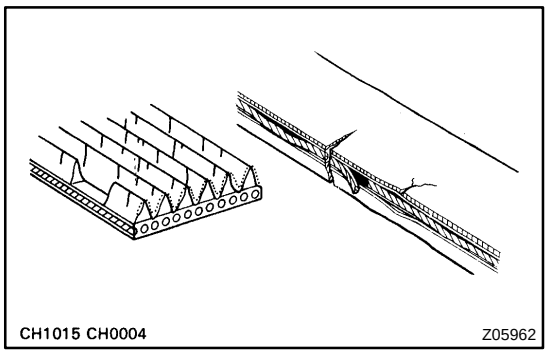
If the voltage is less than specification, charge the battery.

4. CHECK BATTERY TERMINALS AND FUSES

(a) Check that the battery terminals are not loose or corroded.

If the terminals are corroded, clean the terminals.

(b) Check the fusible link and fuses for continuity.



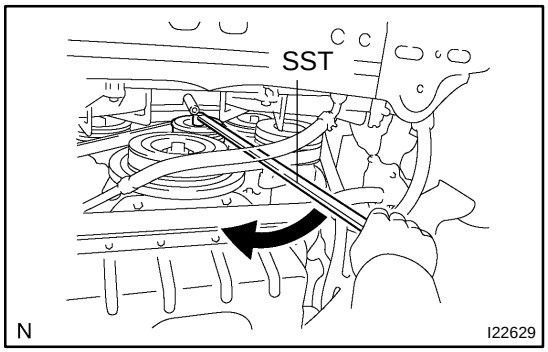
5. INSPECT DRIVE BELT

(a) Visually check the drive belt for excessive wear, frayed cords, etc.

If necessary, replace the drive belt.

HINT:

- Cracks on the rib side of a drive belt are considered acceptable. If the drive belt has chunks missing from the ribs, it should be replaced.



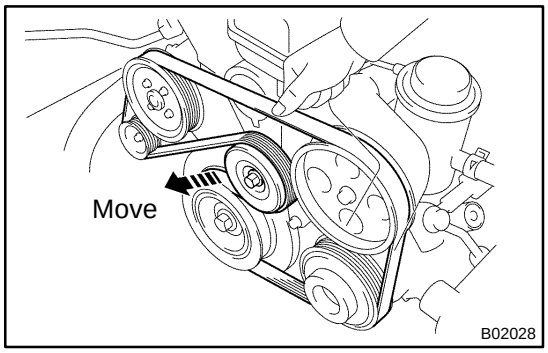
(b) Check the belt tensioner operation.

(1) Remove the engine under cover.

(2) Using SST, the drive belt tension can be released by turning the belt tensioner clockwise from the bottom side.

SST 09216-00041

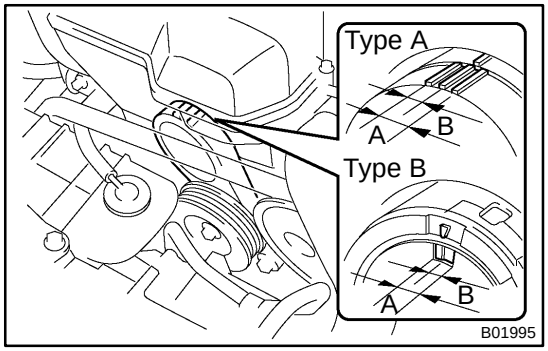
(3) Install the engine under cover.



(4) Check that the belt tensioner moves downward when the drive belt is pressed down at the points indicated in the illustration with approx. 98 N (10 kgf, 22.0 lbf) of force.

(5) Check the alignment of the belt tensioner pulley to make sure the drive belt will not slip off the pulley.

If necessary, replace the belt tensioner.

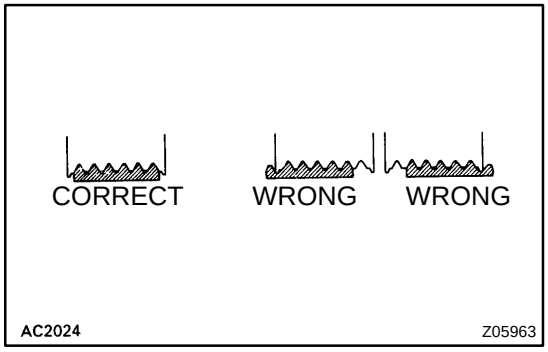


(6) Check that the arrow mark on the belt tensioner falls within area A of the scale.

If it is outside area A, replace the drive belt.

HINT:

- When a new belt is installed, it should lie within area B. If not, the drive belt is not correct.



- After installing a drive belt, check that it fits properly in the ribbed grooves.
- Check by hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.

6. VISUALLY CHECK GENERATOR WIRING AND LISTEN FOR ABNORMAL NOISES

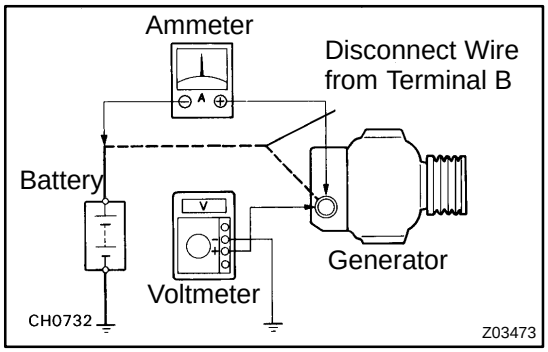
(a) Check that the wiring is in good condition.

(b) Check that there is no abnormal noise from the generator while the engine is running.

7. CHECK CHARGE WARNING LIGHT CIRCUIT

(a) Warm up the engine and then turn it off.
(b) Turn off all accessories.
(c) Turn the ignition switch ”ON”. Check that the charge warning light is lit.
(d) Start the engine. Check that the light goes off.

If the light does not go off as specified, troubleshoot the charge light circuit.



8. INSPECT CHARGING CIRCUIT WITHOUT LOAD

HINT:
If a battery/generator tester is available, connect the tester to the charging circuit as per manufacturer’s instructions.

(a) If a tester is not available, connect a voltmeter and ammeter to the charging circuit as follows:
- Disconnect the wire from terminal B of the generator, and connect it to the negative (-) probe of the ammeter.
- Connect the positive (+) probe of the ammeter to terminal B of the generator.
- Connect the positive (+) probe of the voltmeter to terminal B of the generator.
- Ground the negative (-) probe of the voltmeter.

(b) Check the charging circuit as follows:
With the engine running from idling to 2,000 rpm, check the reading on the ammeter and voltmeter.
Standard amperage: 10 A or less
Standard voltage: 13.2 - 14.8 V

If the voltmeter reading is more than standard voltage, replace the voltage regulator.
If the voltmeter reading is less than standard voltage, check the voltage regulator (See page CH-9).

9. INSPECT CHARGING CIRCUIT WITH LOAD

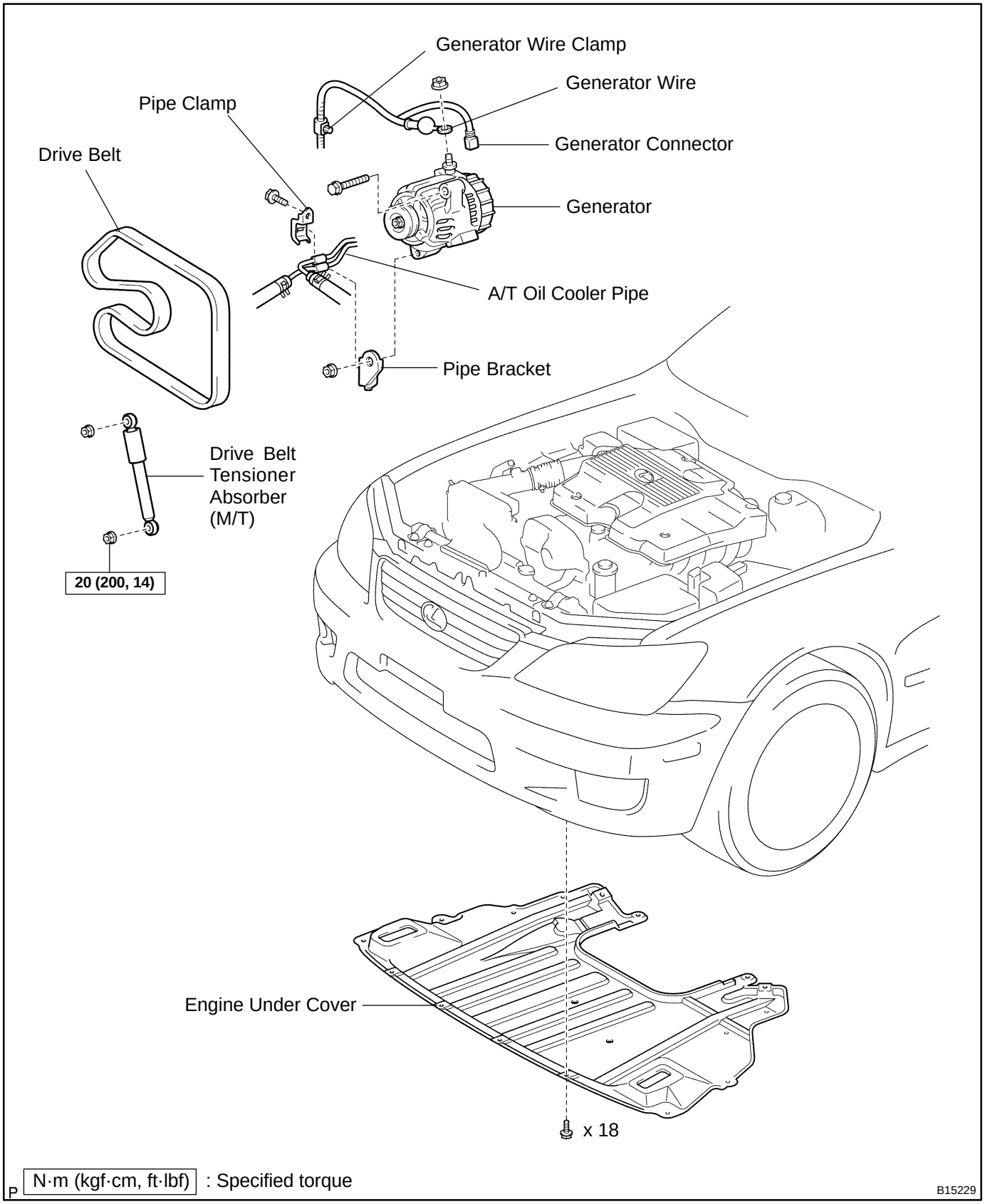
(a) With the engine running at 2,000 rpm, turn on the high beam headlights and place the heater blower switch at ”HI”.
(b) Check the reading on the ammeter.
Standard amperage: 30 A or more

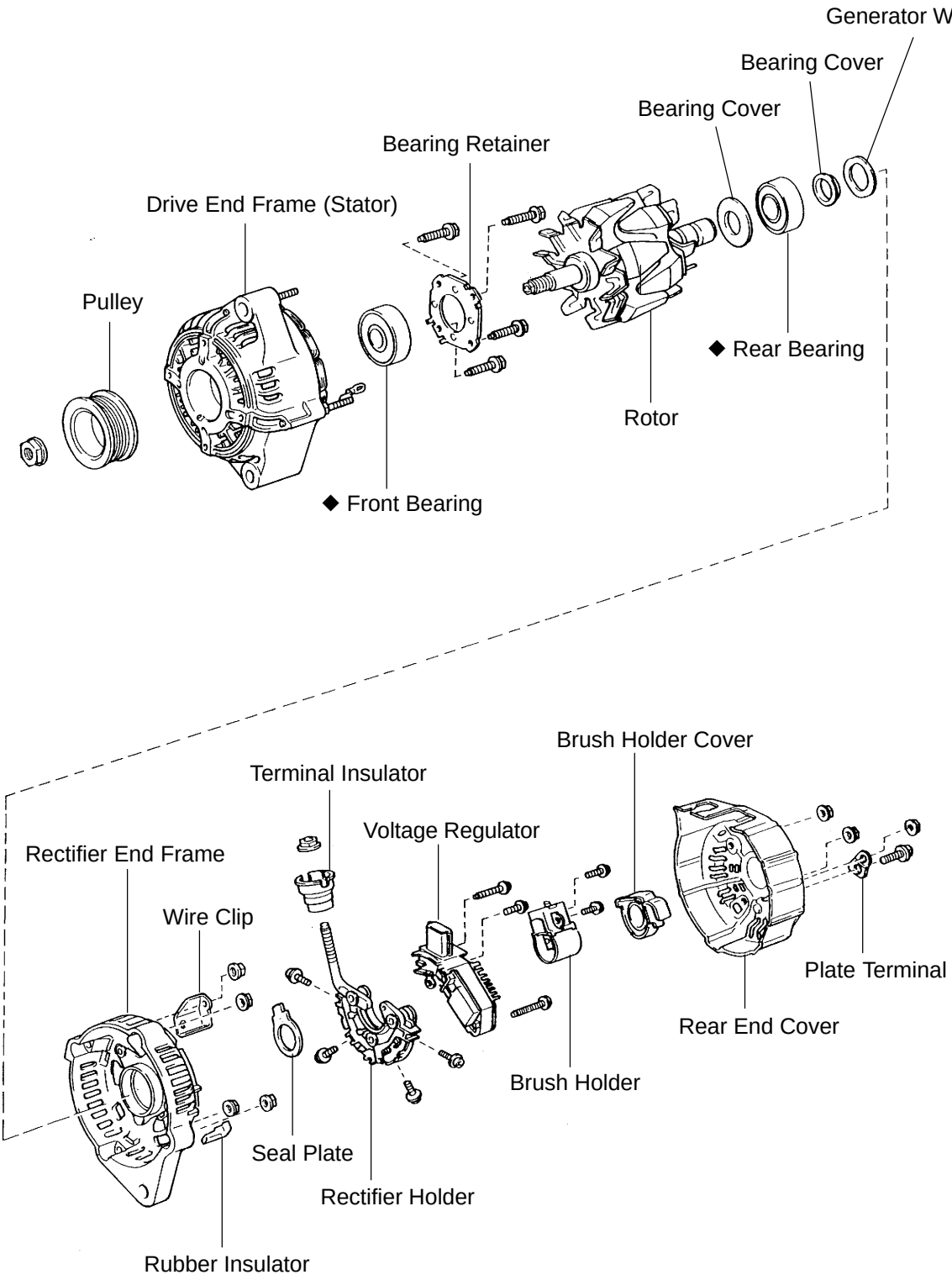
If the ammeter reading is less than the standard amperage, repair the generator.
HINT:
If the battery is fully charged, the indication will sometimes be less than standard amperage.

GENERATOR

COMPONENTS

CH044-09





◆ Non-reusable part

B01642

CH045-08

REMOVAL

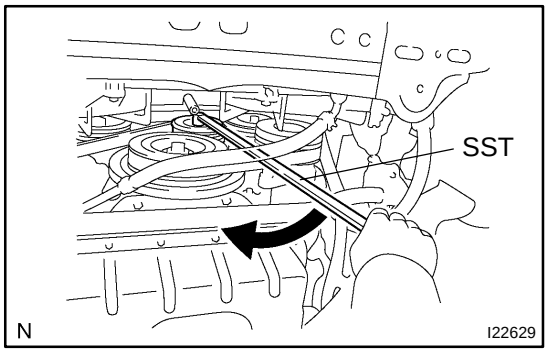
1. REMOVE ENGINE UNDER COVER

2. M/T:

REMOVE DRIVE BELT TENSIONER ABSORBER

Remove the 2 nuts and absorber.

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)



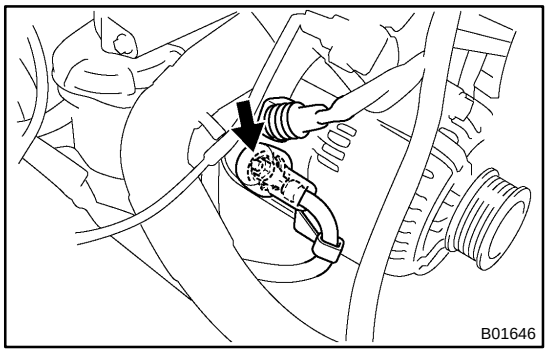
3. REMOVE DRIVE BELT

Using SST, loosen the belt tension by turning the belt tensioner clockwise from the bottom side, and remove the drive belt.

SST 09216-00041

NOTICE:

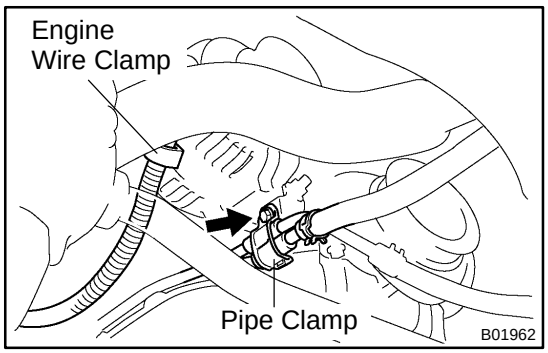
At the time of installation, do an on-vehicle inspection (See page CH-1).



4. REMOVE GENERATOR

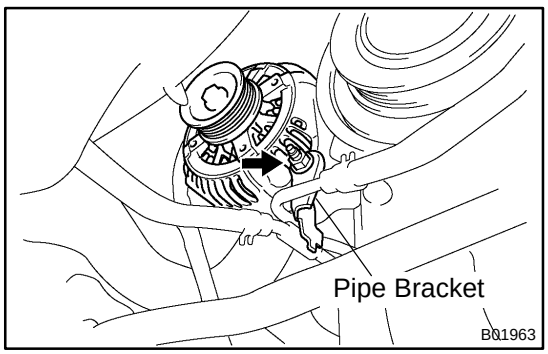
(a) Disconnect the generator connector.

(b) Remove the rubber cap and nut, and disconnect the generator wire.



(c) Disconnect the engine wire clamp from the wire clip on the generator.

(d) Remove the bolt and pipe clamp, and disconnect the 2 A/T oil cooler pipes from the generator.

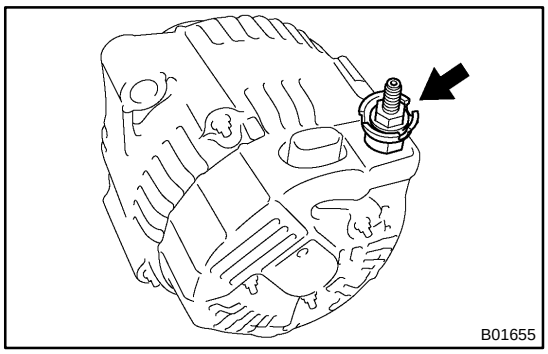


(e) Remove the bolt, nut, pipe bracket and generator.

Torque: 40 N·m (400 kgf·cm, 30 ft·lbf)

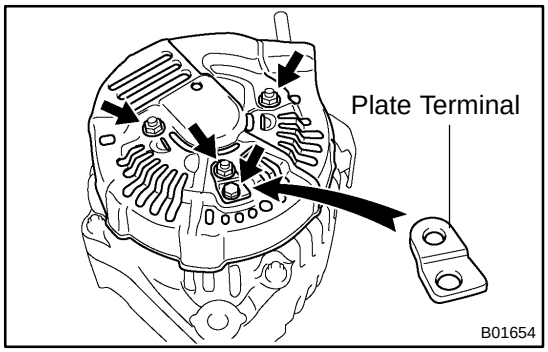
CH046-10

DISASSEMBLY

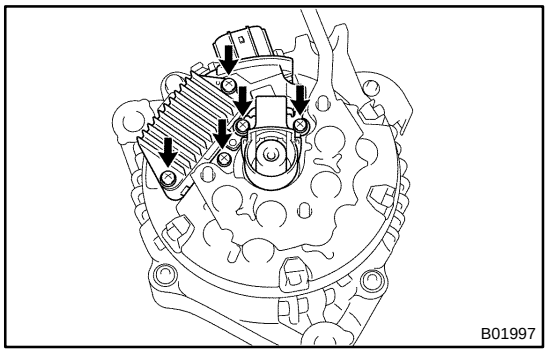


1. REMOVE REAR END COVER

(a) Remove the nut and terminal insulator.



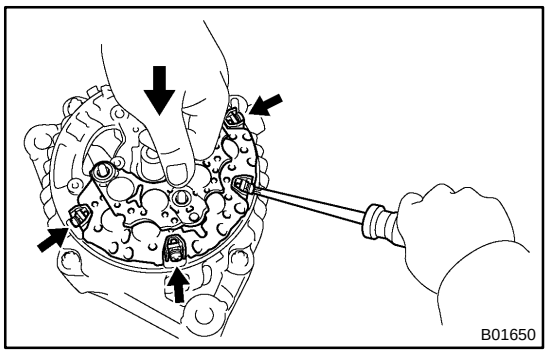
(b) Remove the bolt, 3 nuts, plate terminal, end cover and brush holder cover.



2. REMOVE BRUSH HOLDER AND VOLTAGE REGULATOR

(a) Remove the 5 screws, brush holder and voltage regulator.

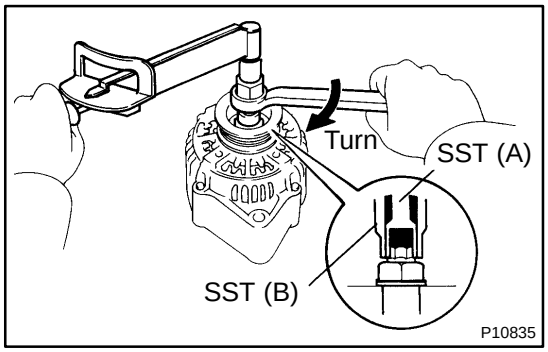
(b) Remove the seal plate from the rectifier end frame.



3. REMOVE RECTIFIER HOLDER

(a) Remove the 4 screws and rectifier holder.

(b) Remove the 4 rubber insulators.



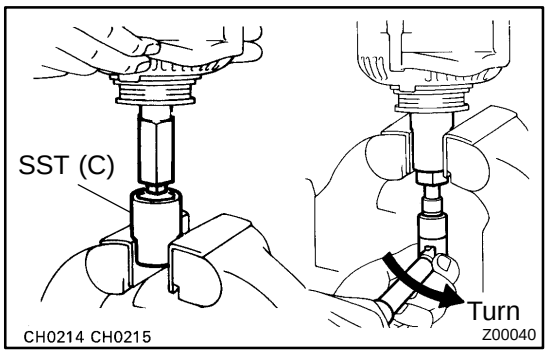
4. REMOVE PULLEY

(a) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.

SST 09820-6301 1

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

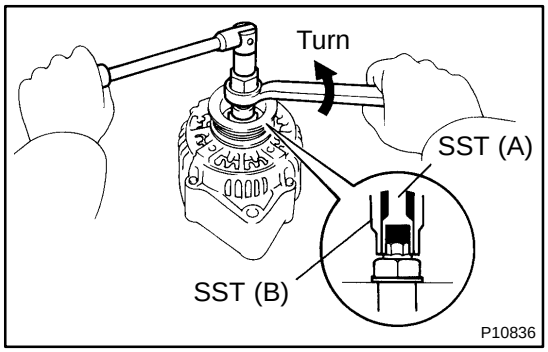
(b) Check that SST (A) is secured to the rotor shaft.



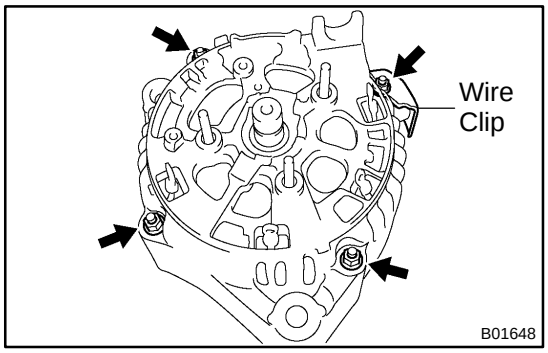
(c) Mount SST (C) in a vise.
(d) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).
(e) To loosen the pulley nut, turn SST (A) in the direction shown in the illustration.

NOTICE:
To prevent damage to the rotor shaft, do not loosen the pulley nut more than one-half of a turn.

(f) Remove the generator from SST (C).

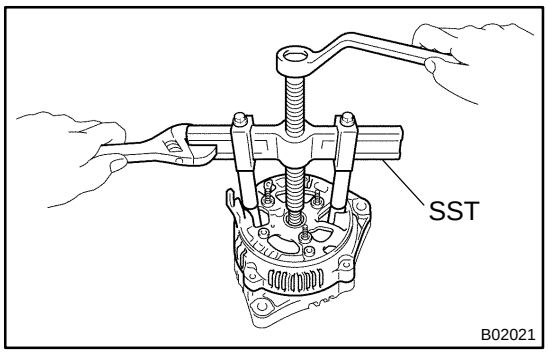


(g) Turn SST (B), and remove SST (A and B).
(h) Remove the pulley nut and pulley.



5. REMOVE RECTIFIER END FRAME

(a) Remove the 4 nuts and wire clip.

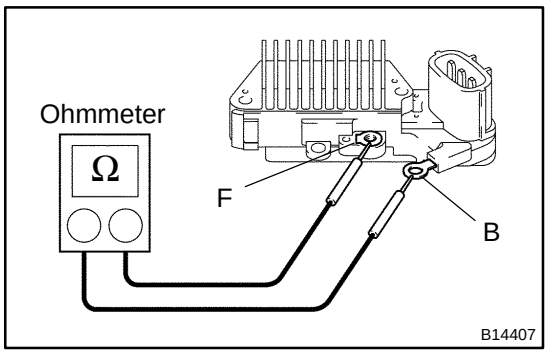


(b) Using SST, remove the rectifier end frame.
SST 09950- 40011 (09951- 04020, 09952- 04010, 09953-04030, 09954-04010, 09955-04041)
(c) Remove the generator washer.

6. REMOVE ROTOR FROM DRIVE END FRAME

CH047-07

INSPECTION



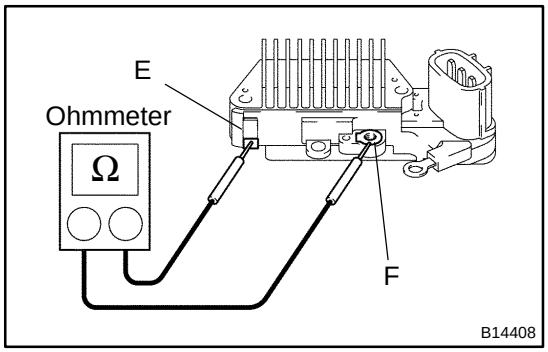
1. INSPECT VOLTAGE REGULATOR

(a) Using an ohmmeter, check the continuity between terminals F and B.

Standard:

When the positive and negative poles between terminals F and B are exchanged, there is continuity in one way but no continuity in another way.

If the continuity is not as specified, replace the regulator.

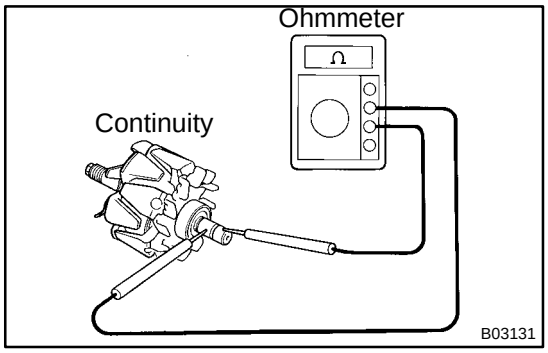


(b) Using an ohmmeter, check the continuity between terminals F and E.

Standard:

When the positive and negative poles between terminals F and E are exchanged, there is continuity in one way but no continuity in another way.

If the continuity is not as specified, replace the regulator.



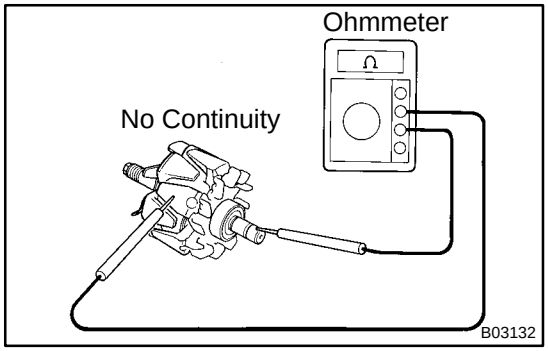
2. INSPECT ROTOR

(a) Check rotor for open circuit.

Using an ohmmeter, check that there is continuity between the slip rings.

Standard resistance: 2.1 - 2.5 Ω at 20˚C (68˚F)

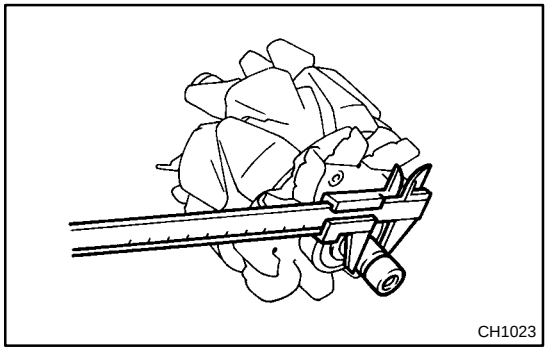
If there is no continuity, replace the rotor.



(b) Check the rotor for ground.

Using an ohmmeter, check that there is no continuity between the slip ring and rotor.

If there is continuity, replace the rotor.



(c) Check that the slip rings are not rough or scored.

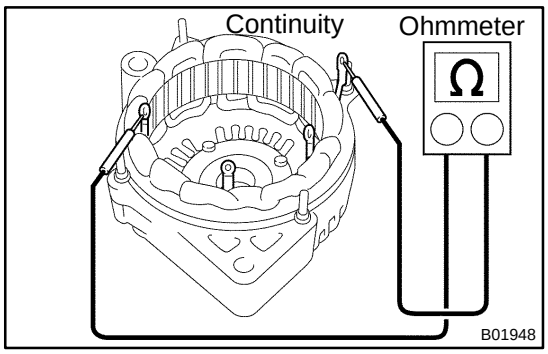
If rough or scored, replace the rotor.

(d) Using vernier calipers, measure the slip ring diameter.

Standard diameter: 14.2 - 14.4 mm (0.559 - 0.567 in.)

Minimum diameter: 12.8 mm (0.504 in.)

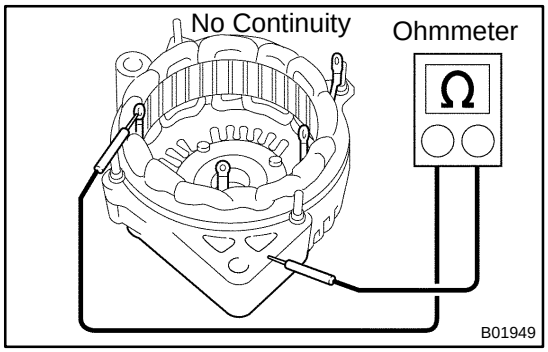
If the diameter is less than minimum, replace the rotor.



3. INSPECT STATOR (DRIVE END FRAME)

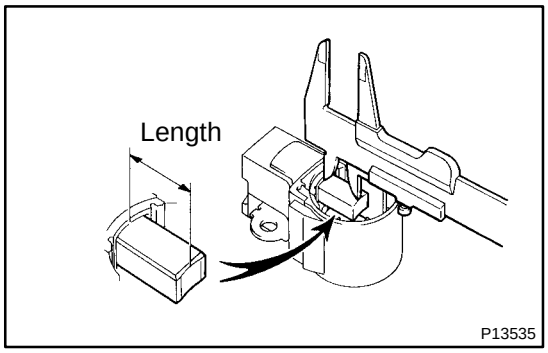
(a) Check the stator for open circuit.
Using an ohmmeter, check that there is continuity between the coil leads.

If there is no continuity, replace the drive end frame assembly.



(b) Check the stator for ground.
Using an ohmmeter, check that there is no continuity between the coil lead and drive end frame.

If there is continuity, replace the drive end frame assembly.

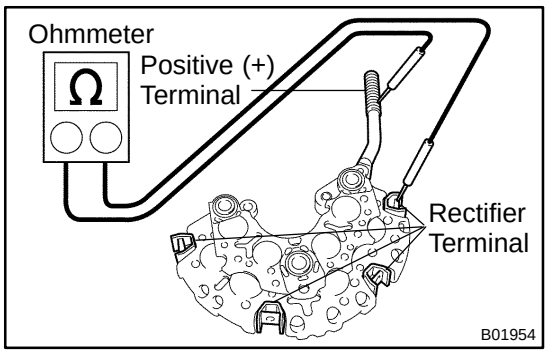


4. INSPECT BRUSHES

Using vernier calipers, measure the exposed brush length.

Standard exposed length:
9.5 - 11.5 mm (0.374 - 0.453 in.)
Minimum exposed length: 1.5 mm (0.059 in.)

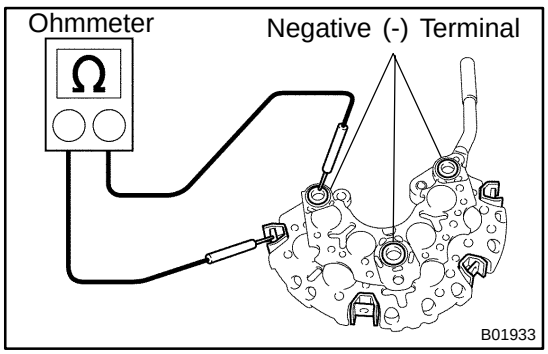
If the exposed length is less than minimum, replace the brush holder assembly.



5. INSPECT RECTIFIERS (RECTIFIER HOLDER)

(a) Check the positive (+) rectifier.
(1) Using an ohmmeter, connect one tester prob to the positive (+) terminal and the other to each rectifier terminal.
(2) Reverse the polarity of the tester probes and repeat step (a).
(3) Check that one shows continuity and the other shows no continuity.

If continuity is not as specified, replace the rectifier holder.



(b) Check the negative (-) rectifier.
(1) Using an ohmmeter, connect one tester probe to each negative (-) terminal and the other to each rectifier terminal.
(2) Reverse the polarity of the tester probes and repeat step (a).
(3) Check that one shows continuity and the other shows no continuity.

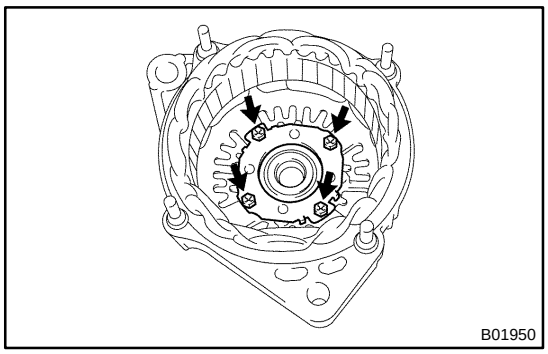
If continuity is not as specified, replace the rectifier holder.

6. INSPECT BEARING

Check the bearing is not rough or worn.

If necessary, replace the bearing (See page CH-12).

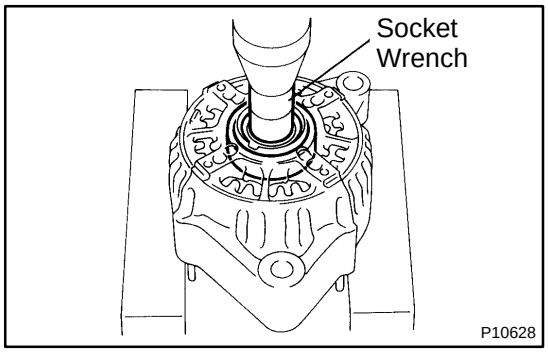
CH048-08


B01950

REPLACEMENT

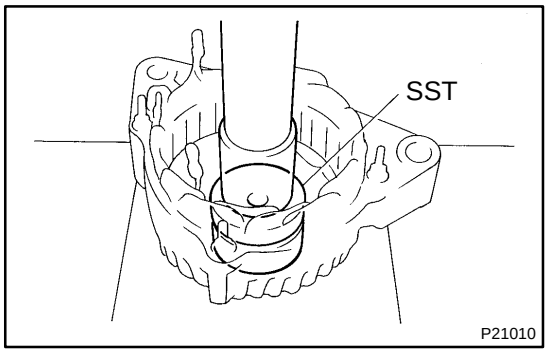
1. REPLACE FRONT BEARING

(a) Remove the 4 screws and bearing retainer.



P10628

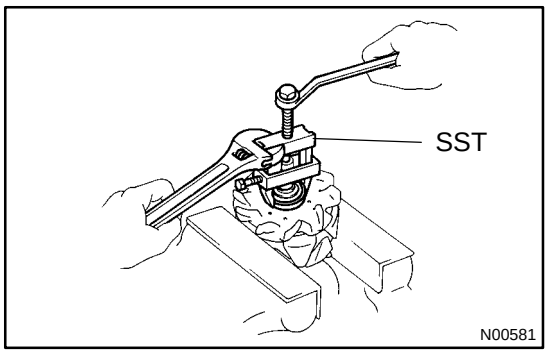
(b) Using a socket wrench and press, press out the bearing.



P21010

(c) Using SST and a press, press in a new bearing.
SST 09950-60010 (09951-00500)

(d) Install the bearing retainer with the 4 screws.
Torque: 3.0 N·m (31 kgf·cm 27 in.·lbf)

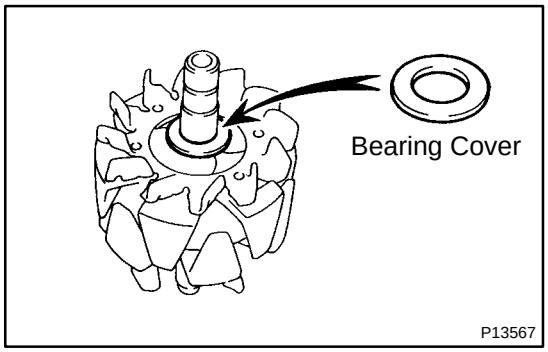


N00581

2. REPLACE REAR BEARING

(a) Using SST, remove the bearing cover (outside) and bearing.
SST 09820-00021

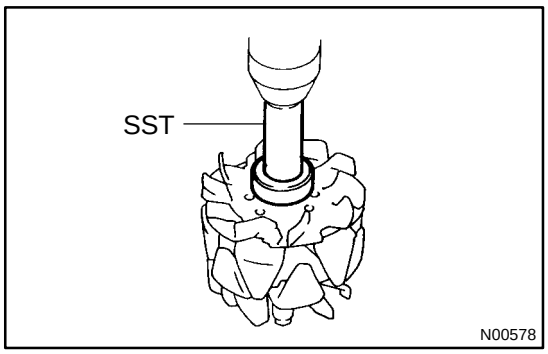
NOTICE:
Be careful not to damage the fan.



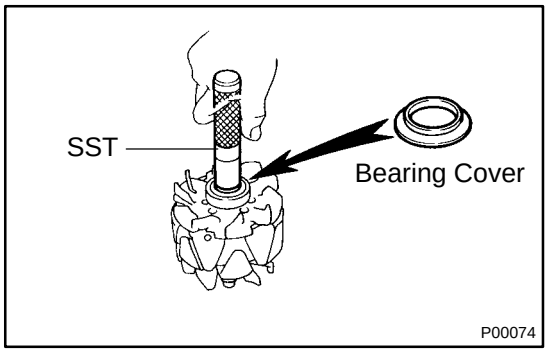
P13567

(b) Remove the bearing cover (inside).

(c) Place the bearing cover (inside) on the rotor.



(d) Using SST and a press, press in a new bearing.
SST 09820-00031



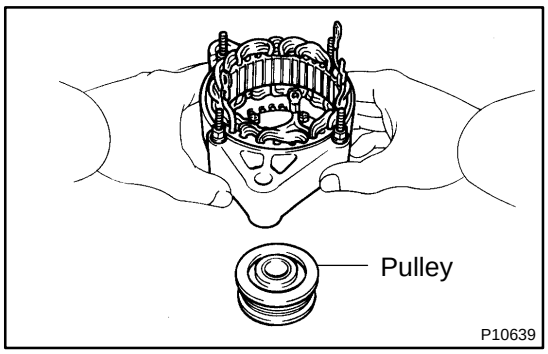
(e) Using SST, push in the bearing cover (outside).
SST 09285-76010

CH049-07

REASSEMBLY

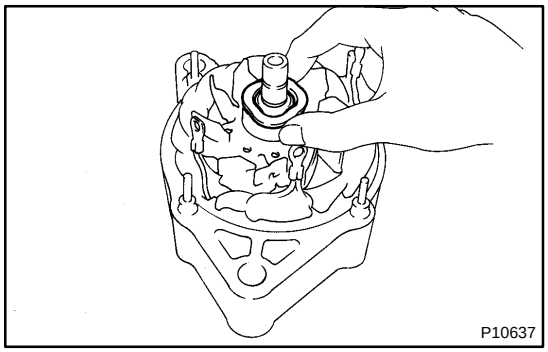
1. PLACE DRIVE END FRAME ON PULLEY

2. INSTALL ROTOR TO DRIVE END FRAME

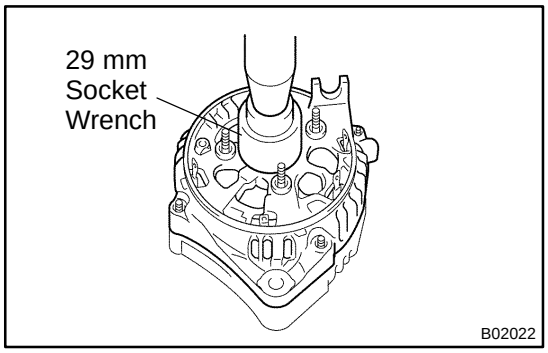


3. INSTALL RECTIFIER END FRAME

(a) Place the generator washer on the rotor.

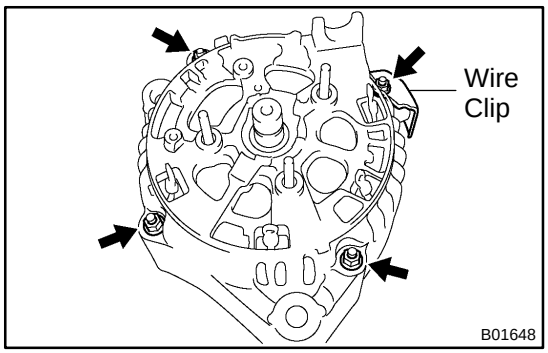


(b) Using a 29 mm socket wrench and press, slowly press in the rectifier end frame.



(c) Install the 3 nuts.
Torque: 4.5 N·m (46 kgf·cm, 40 in.·lbf)

(d) Install the wire clip with the nut.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

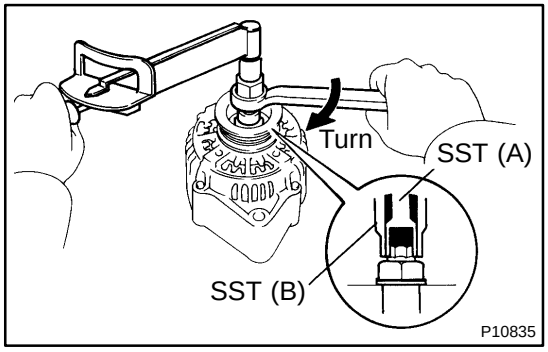


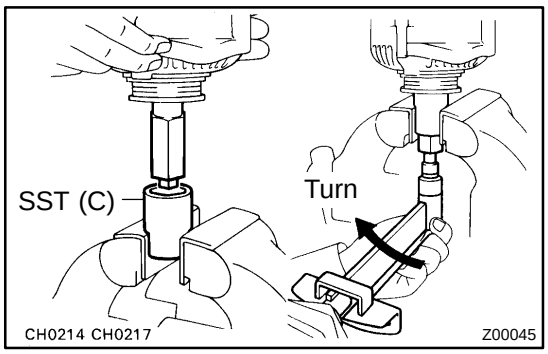
4. INSTALL PULLEY

(a) Install the pulley to the rotor shaft by tightening the pulley nut by hand.

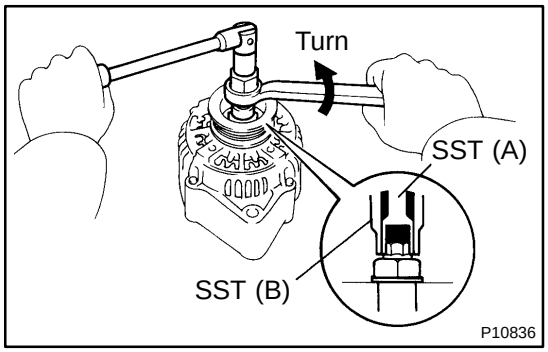
(b) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.
SST 09820-6301 1
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(c) Check that SST (A) is secured to the pulley shaft.

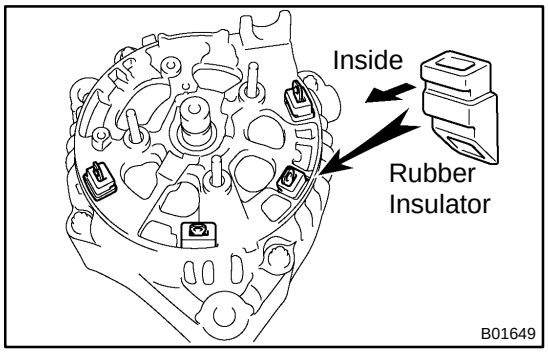




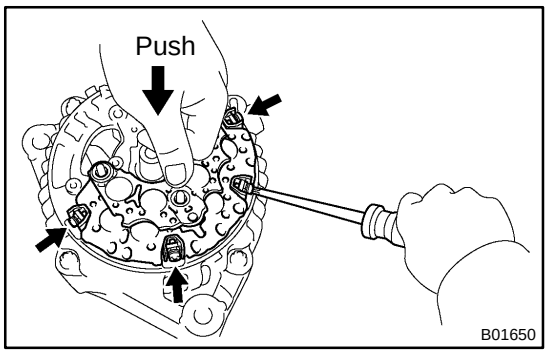
(d) Mount SST (C) in a vise.
(e) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).
(f) To torque the pulley nut, turn SST (A) in the direction shown in the illustration.
Torque: 110.5 N·m (1,125 kgf·cm, 81 ft·lbf)
(g) Remove the generator from SST (C).



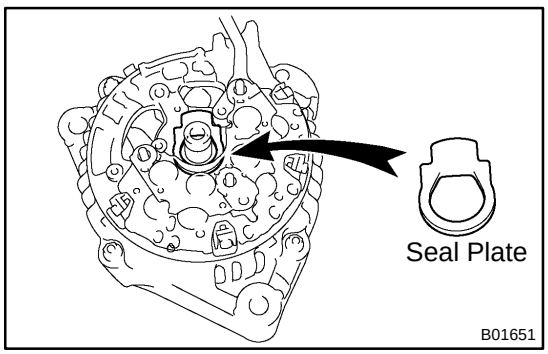
(h) Turn SST (B), and remove SST (A and B).



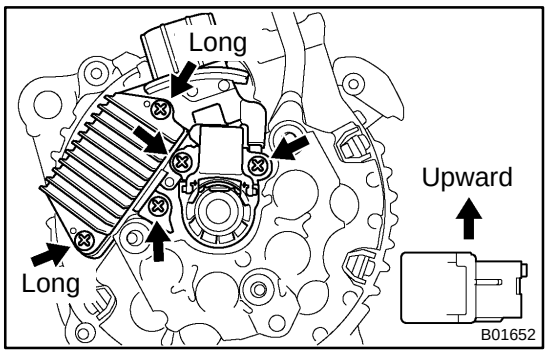
5. INSTALL RECTIFIER HOLDER
(a) Install the 4 rubber insulators on the lead wires.



(b) Install the rectifier holder while pushing it with the 4 screws.
Torque: 2.9 N·m (30 kgf·cm, 26 in.·lbf)



6. INSTALL VOLTAGE REGULATOR AND BRUSH HOLDER
(a) Place the seal plate on the rectifier end frame.



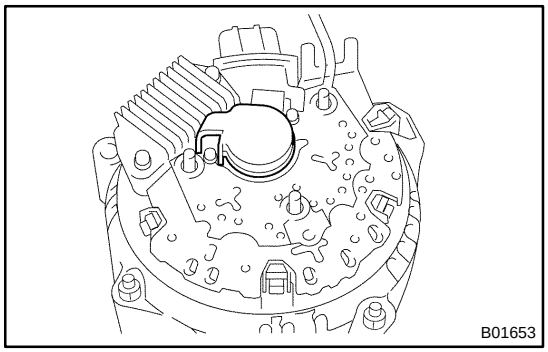
(b) Place the voltage regulator and brush holder on the rectifier end frame.

NOTICE:

Be careful of the holder installation direction.

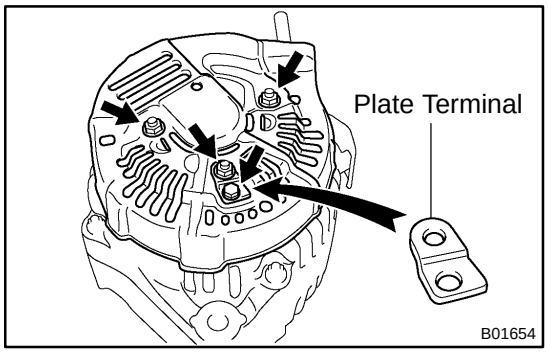
(c) Install the 5 screws.

Torque: 2.0 N·m (20 kgf·cm, 18 in.·lbf)



7. INSTALL REAR END COVER

(a) Place the brush holder cover on the brush holder.



(b) Install the end cover and plate terminal with the bolt and 3 nuts.

Torque:

4.4 N·m (45 kgf·cm, 39 in.·lbf) for nut

3.9 N·m (39 kgf·cm, 35 in.·lbf) for bolt

(c) Install the terminal insulator with the nut.

Torque: 6.5 N·m (67 kgf·cm, 58 in.·lbf)

8. CHECK THAT ROTOR ROTATES SMOOTHLY

CH04A-04

INSTALLATION

Installation is in the reverse order of removal (See page CH-6).

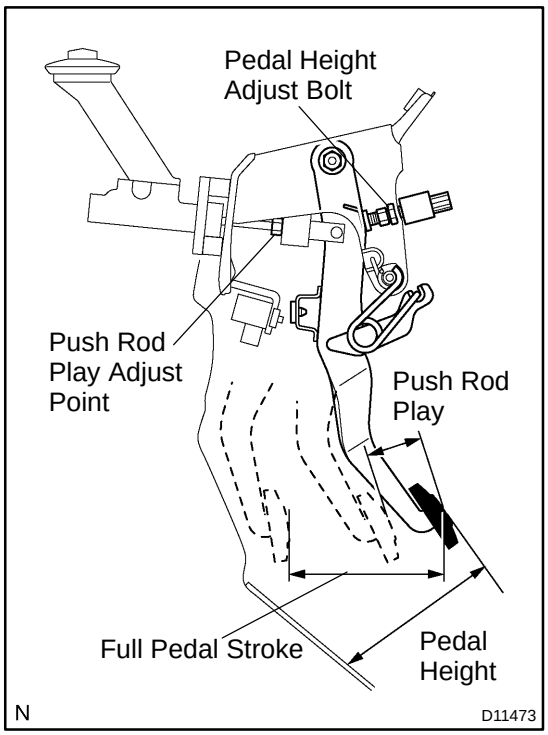
TROUBLESHOOTING

CL0CY-01

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspect Area	See page
Clutch grabs/chatters	1. Engine mounting (Loosen)	-
	2. Clutch disc (Runout is excessive)	CL-14
	3. Clutch disc (Oily)	CL-14
	4. Clutch disc (Worn out)	CL-14
	5. Clutch disc (Damaged torsion rubber)	CL-14
	6. Clutch disc (Glazed)	CL-14
	7. Diaphragm spring (Out of tip alignment)	CL-18
Clutch pedal spongy	1. Clutch line (Air in line)	-
	2. Master cylinder cup (Damaged)	CL-4
	3. Release cylinder cup (Damaged)	CL-9
Clutch noisy	1. Release bearing (Worn, dirty or damaged)	CL-14
	2. Pilot bearing (Worn or damaged)	CL-14
	3. Input shaft bearing (Worn, dirty or damaged)	-
	4. Clutch disc torsion rubber (Damaged)	CL-14
Clutch slips	1. Clutch pedal (Free play out of adjustment)	CL-2
	2. Clutch disc (Oily)	CL-14
	3. Clutch disc (Worn out)	CL-14
	4. Diaphragm spring (Damaged)	CL-14
	5. Pressure plate (Distortion)	CL-14
	6. Flywheel (Distortion)	-
Clutch does not disengage	1. Clutch pedal (Free play out of adjustment)	CL-2
	2. Clutch line (Air in line)	-
	3. Master cylinder cup (Damaged)	CL-4
	4. Release cylinder cup (Damaged)	CL-9
	5. Input shaft bearing (Worn, dirty or damaged)	-
	6. Pilot bearing (Worn or damaged)	CL-14
	7. Clutch disc (Out of true)	CL-14
	8. Clutch disc (Runout is excessive)	CL-14
	9. Clutch disc (Lining broken)	CL-14
	10. Clutch disc (Dirty or burred)	CL-14
	11. Clutch disc (Oily)	CL-14
	12. Clutch disc (Lack of spline grease)	CL-18
	13. Diaphragm spring (Damaged)	CL-14
	14. Diaphragm spring (Out of tip alignment)	CL-18
	15. Pressure plate (Distortion)	CL-14



CLUTCH PEDAL

INSPECTION

CL0CZ-01

1. CHECK PEDAL HEIGHT

Pedal height from asphalt sheet:
162 - 172 mm (6.38 - 6.77 in.)

2. IF NECESSARY, ADJUST PEDAL HEIGHT

(a) Remove the lower finish panel (See page BO-135).

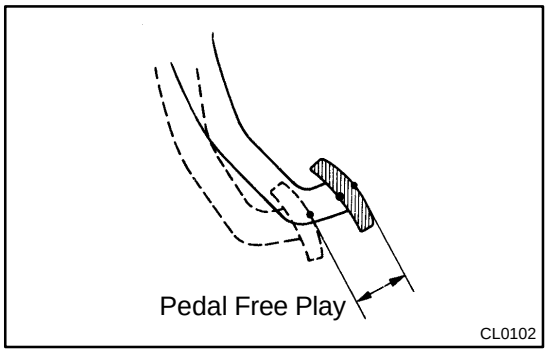
(b) Loosen the lock nut and clutch switch until the height is correct. Tighten the lock nut.

Torque: 15.7 N·m (160 kgf·cm, 12 ft·lbf)

HINT:

Before rotating the clutch switch for pedal height adjustment, disconnect the clutch switch connector.

(c) Install the lower finish panel (See page BO-135).



3. CHECK THAT PEDAL FREE PLAY AND PUSH ROD PLAY ARE CORRECT

(a) Depress the pedal until the clutch resistance begins to felt.

Pedal free play: 5.0 - 15.0 mm (0.197 - 0.591 in.)

(b) Gently push on the pedal until the resistance begins to increase a little.

Push rod play at pedal top:
1.0 - 5.0 mm (0.039 - 0.197 in.)

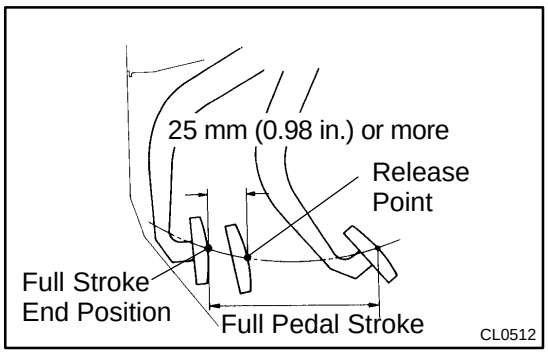
4. IF NECESSARY, ADJUST PEDAL FREE PLAY AND PUSH ROD PLAY

(a) Loosen the lock nut and turn the push rod until the free play and push rod play are correct.

(b) Tighten the lock nut.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

(c) After adjusting the pedal free play, check the pedal height.



5. INSPECT FULL PEDAL STROKE

Full pedal stroke: 142.0 - 147.5 mm (5.591 - 5.807 in.)

6. INSPECT CLUTCH RELEASE POINT

(a) Pull the parking brake lever and install wheel stopper.

(b) Start the engine and idle the engine.

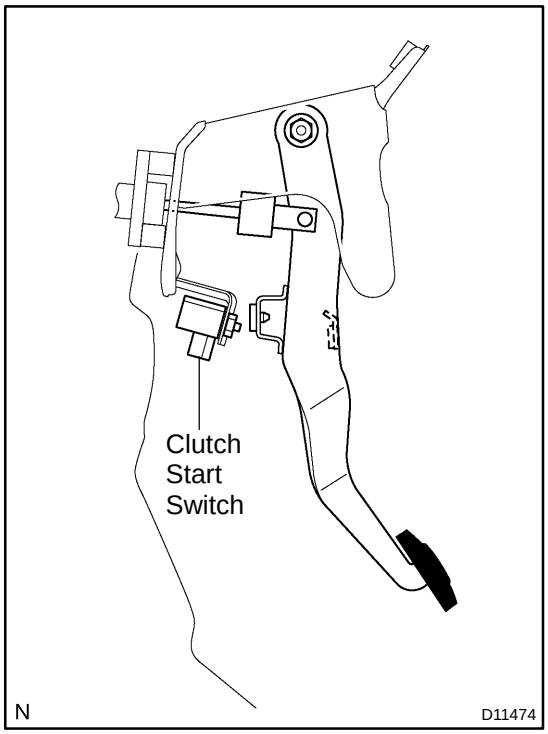
(c) Without depressing the clutch pedal, slowly shift the shift lever into the reverse position until the gears contact.

(d) Gradually depress the clutch pedal and measure the stroke distance from the point the gear noise stops (release point) up to the full stroke end position.

Standard distance: 25 mm (0.98 in.) or more
(From pedal stroke end position to release point)

If the distance is not as specified, do the following operation.

- Inspect pedal height.
- Inspect push rod play and pedal free play.
- Bleed the clutch line.
- Inspect the clutch cover and disc.

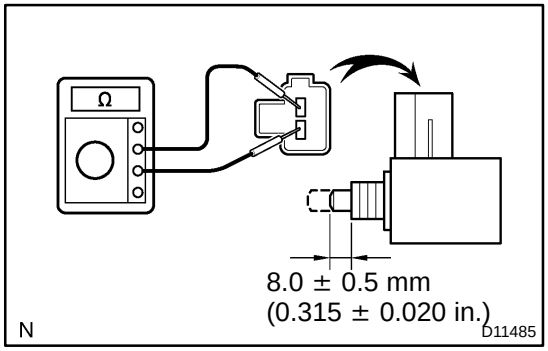


7. CHECK CLUTCH START SYSTEM

(a) Check that the engine does not start when the clutch pedal is released.

(b) Check that the engine starts when the clutch pedal is fully depressed.

If necessary, replace the clutch start switch.



8. INSPECT CONTINUITY OF CLUTCH START SWITCH

(a) Check that there is continuity between the terminals when the switch is ON (pushed).

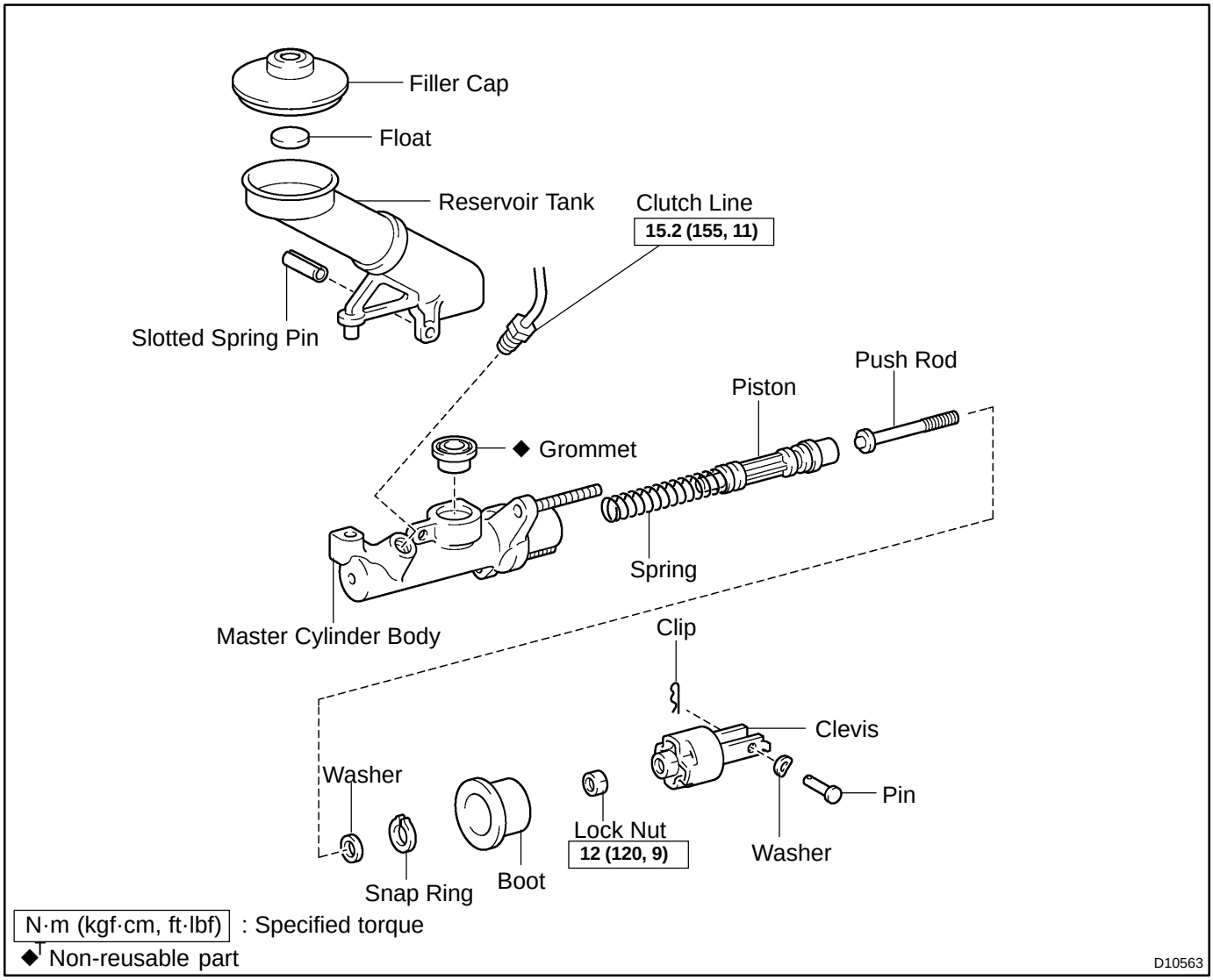
(b) Check that there is no continuity between the terminals when the switch is OFF (free).

If continuity is not as specified, replace the switch.

CLUTCH MASTER CYLINDER

COMPONENTS

CL0D0-01

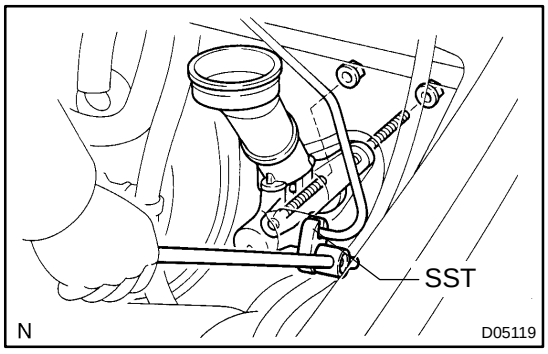


CL0D1-02

REMOVAL

1. DRAIN OUT FLUID WITH SYRINGE

2. REMOVE LOWER FINISH PANEL (See page BO-135)



3. DISCONNECT CLUTCH LINE UNION

Using SST, disconnect the clutch line. Use a container to catch the fluid.

SST 09023-00101

Torque: 15.2 N·m (155 kgf·cm, 11 ft·lbf)

4. REMOVE CLIP AND PIN

(a) Using needle nose pliers, remove the clip.

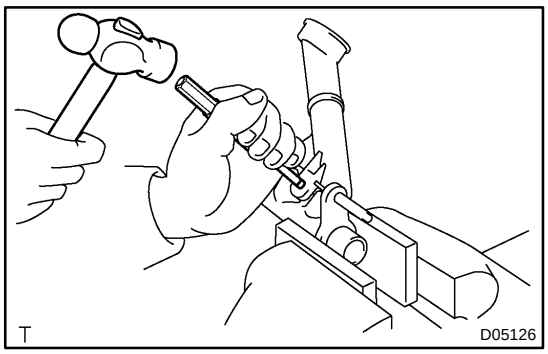
(b) Remove the pin and washer.

5. REMOVE 2 MOUNTING NUTS AND PULL OUT MASTER CYLINDER

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

CL0D2-01

DISASSEMBLY



1. REMOVE RESERVOIR TANK

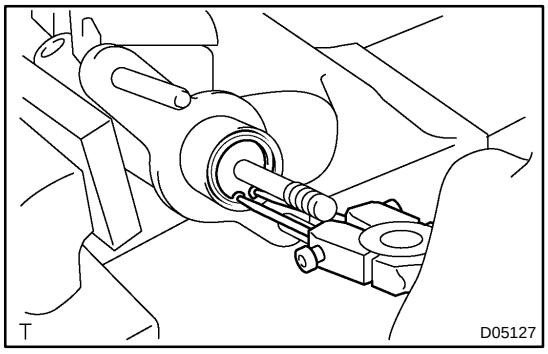
(a) Using a pin punch (5 mm) and a hammer, drive out the slotted spring pin.

(b) Remove the reservoir tank and grommet.

2. REMOVE CLEVIS AND BOOT

(a) Loosen the lock nut to remove the clevis and remove the lock nut.

(b) Remove the boot.



3. REMOVE PUSH ROD

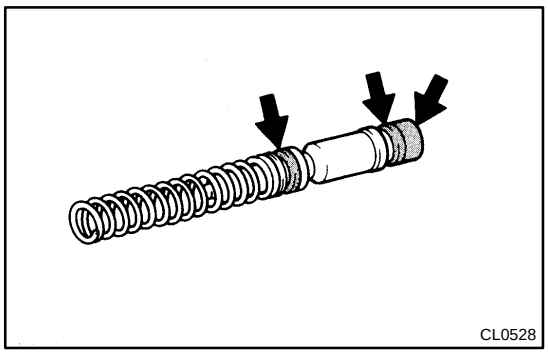
(a) While pushing the push rod, using snap ring pliers remove the snap ring.

(b) Remove the push rod and washer.

4. REMOVE PISTON AND SPRING

CL0D3-01

REASSEMBLY



1. COAT PARTS WITH LITHIUM SOAP BASE GLYCOL GREASE, AS SHOWN

2. INSERT PISTON AND SPRING INTO CYLINDER

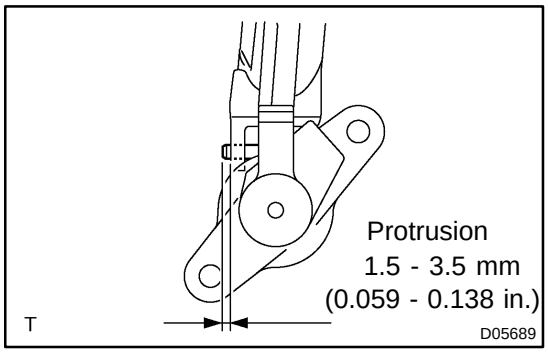
3. INSTALL PUSH ROD AND BOOT

(a) Install the washer to the push rod.

(b) Push the push rod to the piston, using snap ring pliers, install the snap ring.

(c) Install the boot.

4. TEMPORARILY INSTALL LOCK NUT AND CLEVIS



5. INSTALL RESERVOIR TANK

(a) Install the reservoir tank and a new grommet.

(b) Using a pin punch (5 mm) and a hammer, drive in the slotted spring pin.

CL0D4-01

INSTALLATION

Installation is in the reverse order of removal (See page CL-5).

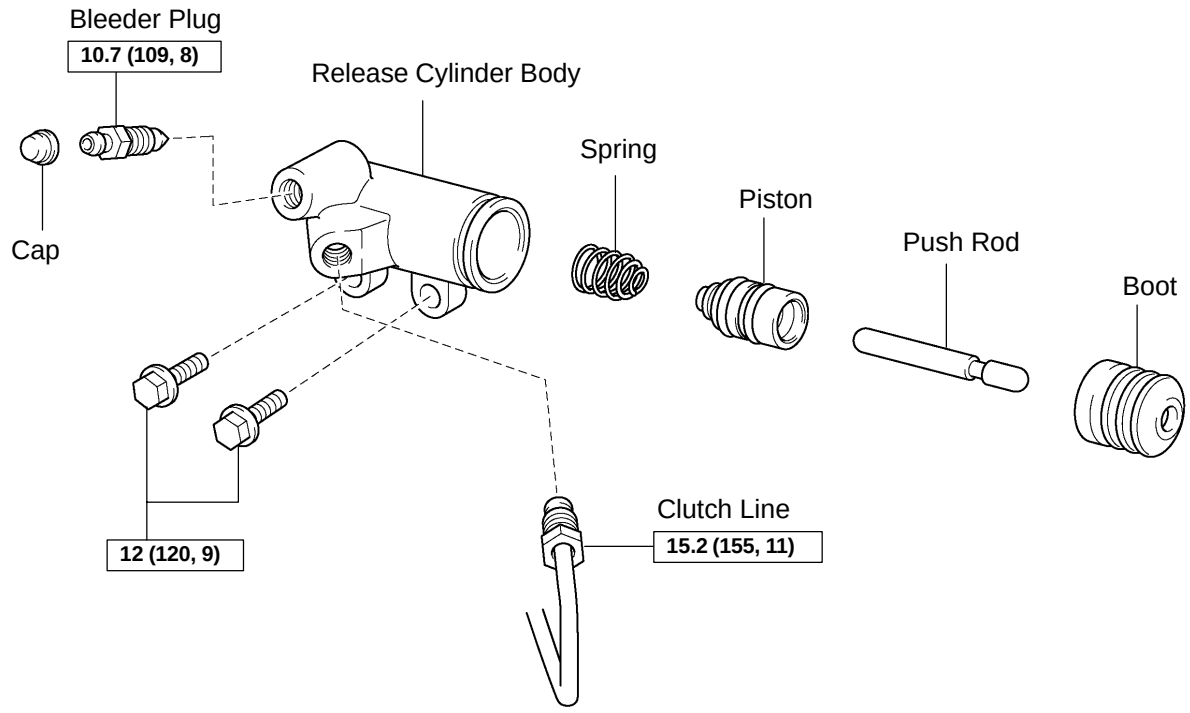
HINT:

After installation, adjust the clutch pedal and bleed the clutch system.

CLUTCH RELEASE CYLINDER

CL0D5-01

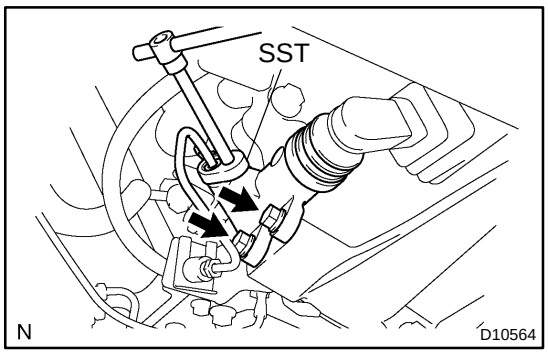
COMPONENTS



N N·m (kgf·cm, ft·lbf) : Specified torque

D11475

CL0D6-02



REMOVAL

1. DISCONNECT CLUTCH LINE

Using SST, disconnect the clutch line. Use a container to catch the fluid.

SST 09023-00101

Torque: 15.2 N·m (155 kgf·cm, 11 ft·lbf)

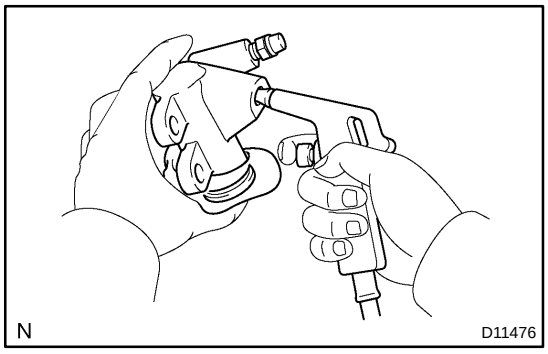
2. REMOVE 2 BOLTS AND PULL OUT RELEASE CYLINDER

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

CL0D7-01

DISASSEMBLY

1. PULL OUT PUSH ROD WITH BOOT



2. REMOVE PISTON WITH SPRING

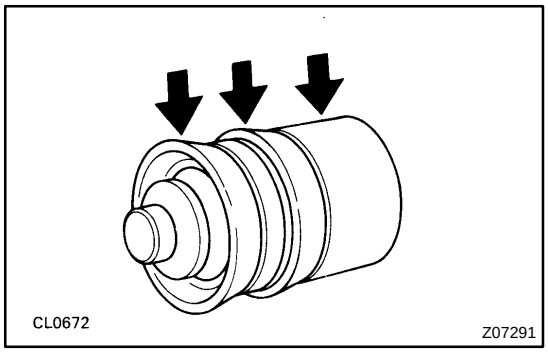
Using compressed air, remove the piston and spring from the cylinder.

3. REMOVE BLEEDER PLUG AND CAP

CL0D8-01

REASSEMBLY

1. **INSTALL BLEEDER PLUG AND CAP**
   Torque: 10.7 N·m (109 kgf·cm, 8 ft·lbf)



2. **COAT PISTON WITH LITHIUM SOAP BASE GLYCOL GREASE, AS SHOWN**
3. **INSTALL PISTON WITH SPRING INTO CYLINDER**
4. **INSTALL BOOT WITH PUSH ROD TO CYLINDER**

CL0D9-01

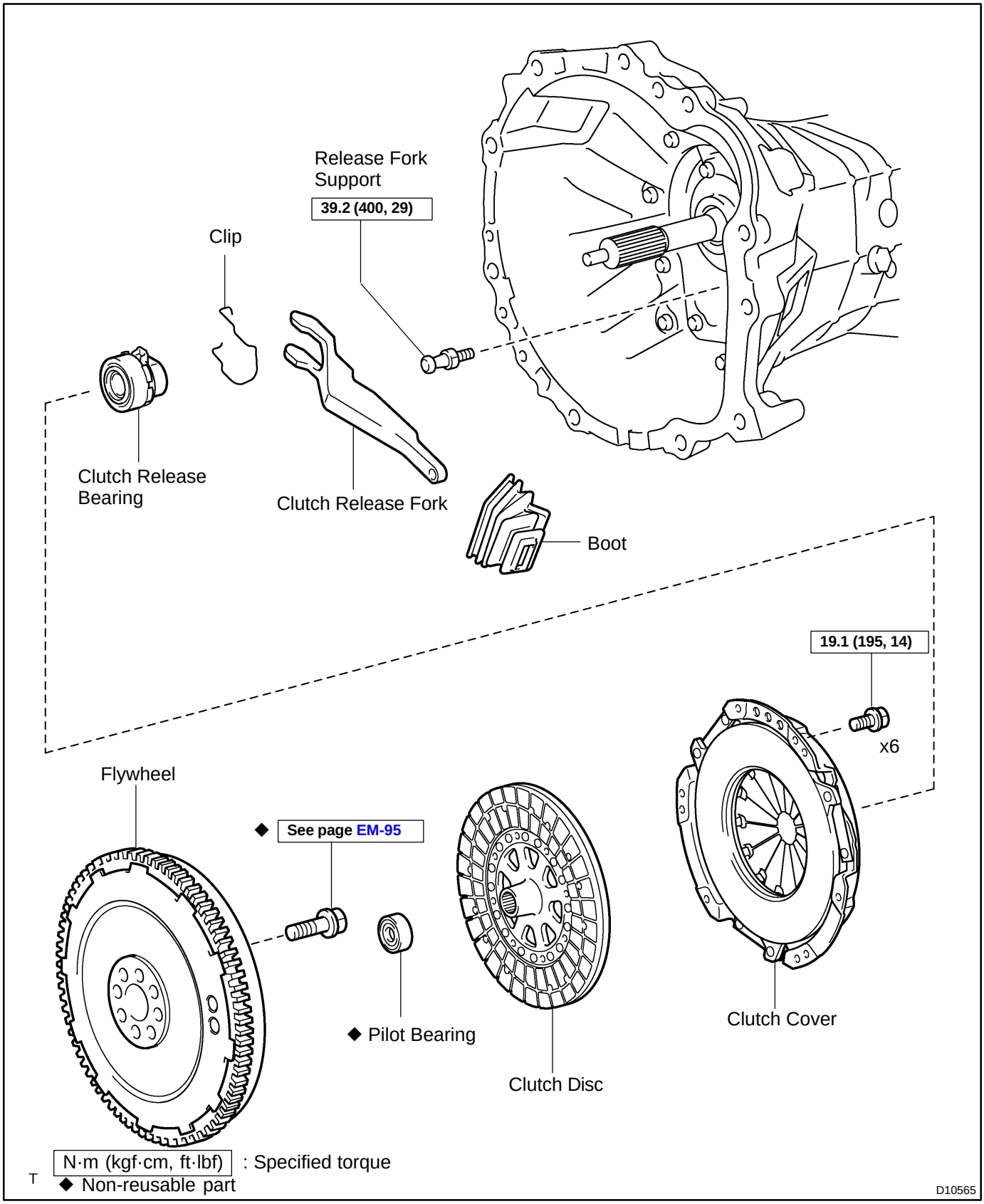
INSTALLATION

Installation is in the reverse order of removal (See page CL-10).

CLUTCH UNIT

COMPONENTS

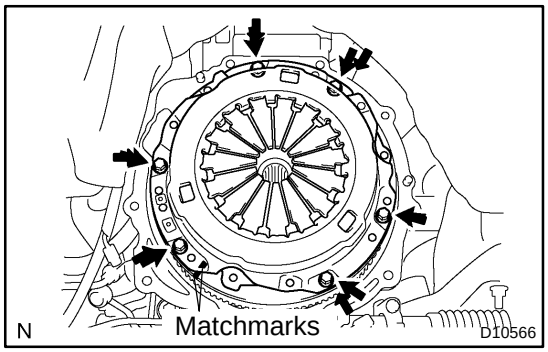
CL0DA-01



CL0DB-01

REMOVAL

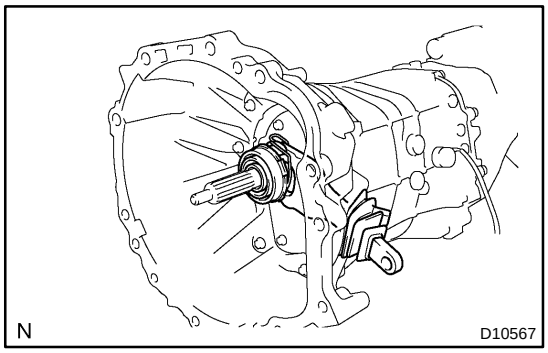
1. REMOVE TRANSMISSION FROM ENGINE
(See page MT-5)



2. REMOVE CLUTCH COVER AND DISC

(a) Place matchmarks on the flywheel and clutch cover.
(b) Loosen each set bolt one turn at a time until spring tension is released.
(c) Remove the set bolts, and pull off the clutch cover with the clutch disc.

NOTICE:
Do not drop the clutch disc.

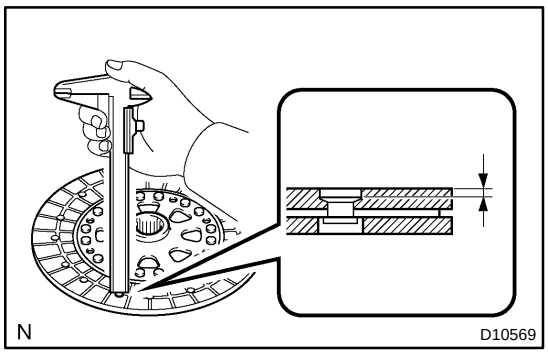


3. REMOVE BOOT, RELEASE BEARING AND FORK FROM TRANSMISSION

(a) Remove the boot from the transmission.
(b) Remove the release bearing together with the fork and then separate them.
(c) Remove the clip from the release bearing.

CL0DC-01

INSPECTION

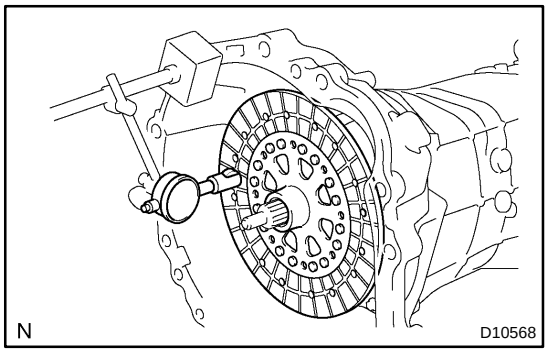


1. INSPECT CLUTCH DISC FOR WEAR OR DAMAGE

Using vernier calipers, measure the rivet head depth.

Minimum rivet depth: 0.3 mm (0.012 in.)

If it is not as specified, replace the clutch disc.

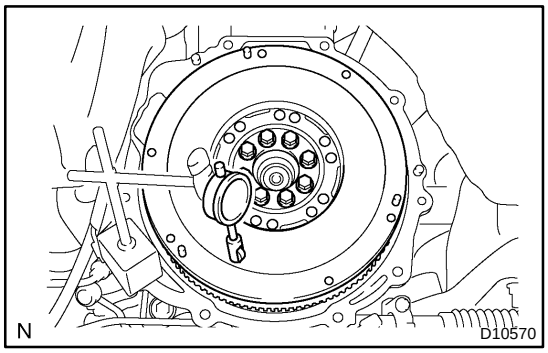


2. INSPECT CLUTCH DISC RUNOUT

Using a dial indicator with roller instrument, check the disc runout.

Maximum runout: 0.8 mm (0.031 in.)

If it is not as specified, replace the clutch disc.

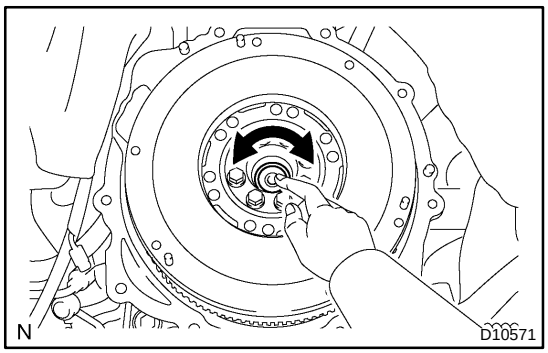


3. INSPECT FLYWHEEL RUNOUT

Using a dial indicator with roller instrument, check the flywheel runout.

Maximum runout: 0.1 mm (0.004 in.)

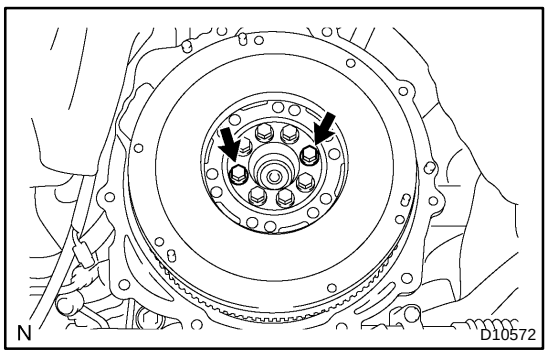
If it is not as specified, replace the flywheel.



4. INSPECT PILOT BEARING

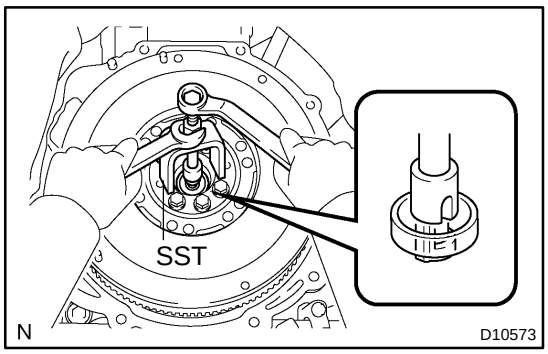
Turn the bearing by hand while applying force in the axial direction.

If the bearing sticks or has much resistance, replace the pilot bearing.

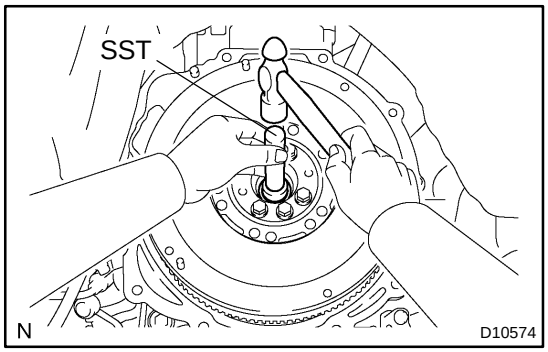


5. IF NECESSARY, REPLACE PILOT BEARING

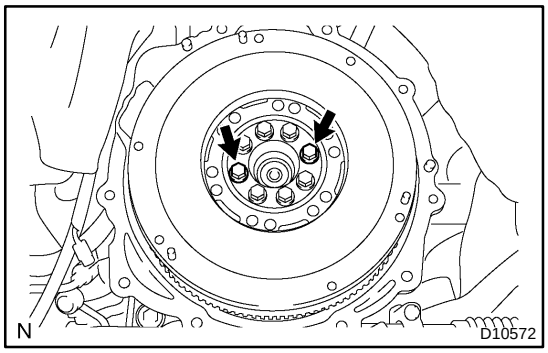
(a) Remove the 2 bolts at diametrically opposite points.



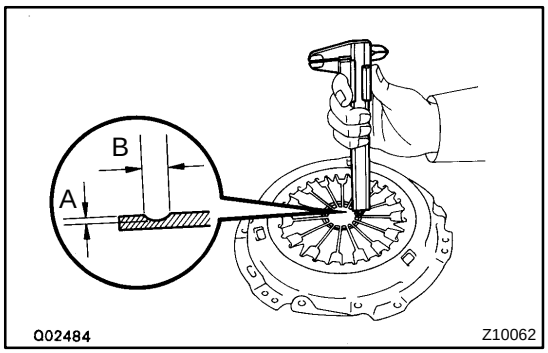
(b) Using SST, remove the pilot bearing.
SST 09303-3501 1



(c) Using SST and a hammer, drive in a new pilot bearing.
SST 09304-12012



(d) Install the 2 new bolts.
(e) First, torque the 2 bolts uniformly a little at a time.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)
(f) Then tighten the 2 bolts and additional 80 - 100°.

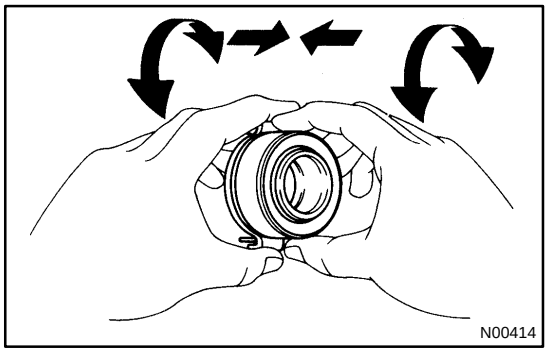


6. INSPECT DIAPHRAGM SPRING FOR WEAR

Using calipers, measure the diaphragm spring for depth and width of wear.

Maximum depth: A 0.6 mm (0.024 in.)
Maximum width: B 5.0 mm (0.197 in.)

If it is not as specified, replace the clutch cover.



7. INSPECT RELEASE BEARING

Turn the bearing by hand while applying force in the axial direction.

HINT:

The bearing is permanently lubricated and requires no cleaning or lubrication.

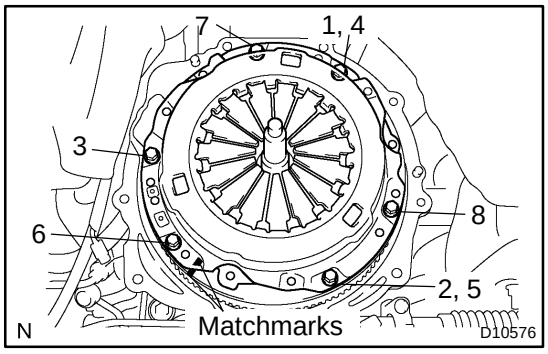
If necessary, replace the release bearing.

CL0DD-01

INSTALLATION

1. INSTALL CLUTCH DISC AND CLUTCH COVER ON FLYWHEEL

(a) Insert SST in the clutch disc, and then set them.
SST 09301-001 10



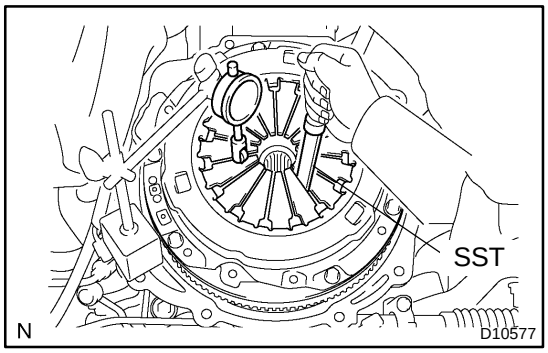
(b) Align the matchmarks on the clutch cover and flywheel.

(c) Following the procedures shown in the illustration, tighten the 6 bolts in the order starting the bolt locating near the knock pin on the top.

Torque: 19.1 N·m (195 kgf·cm, 14 ft·lbf)

HINT:

- Following the order in the illustration, tighten the bolts at a time evenly.
- Move SST up and down, right and left lightly, after checking that the disc is in the center, tighten the bolts.



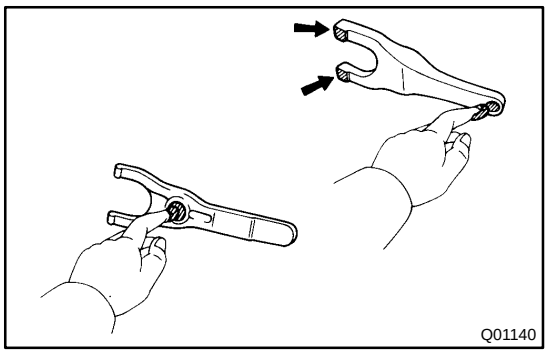
2. CHECK DIAPHRAGM SPRING TIP ALIGNMENT

Using a dial indicator with roller instrument, check the diaphragm spring tip alignment.

Maximum non-alignment: 0.5 mm (0.020 in.)

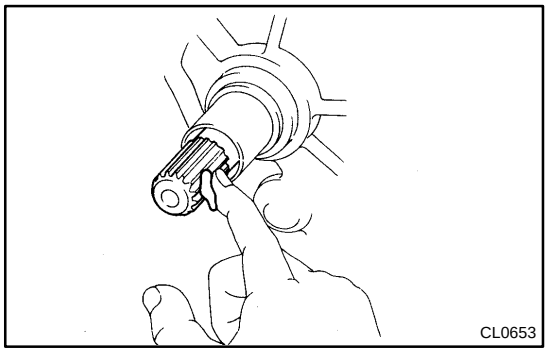
If the alignment is not as specified, with SST, adjust the diaphragm spring tip alignment.

SST 09333-00013



3. APPLY MOLYBDENUM DISULPHIDE LITHIUM BASE GREASE (NLGI NO.2)

(a) Apply release hub grease to the release fork and release bearing contact, release fork and push rod contact and release fork pivot points.



(b) Apply clutch spline grease to the clutch disc spline.

HINT:

Recommended grease part number 08887-01706 (100 g).

4. INSTALL BOOT, RELEASE BEARING AND FORK TO TRANSMISSION

(a) Install the clip to the release bearing.

(b) Install the release bearing to the release fork, and then install them to the transmission.

(c) Install the boot to the transmission.

5. INSTALL TRANSMISSION TO ENGINE
(See page MT-8)

MANUAL TRANSMISSION SYSTEM

MT0BW-02

PRECAUTION

When working with FIPG material, you must observe the following items.

- **Using a razor blade and gasket scraper, remove all the old FIPG material from the gasket surfaces.**
- **Thoroughly clean all components to remove all the loose material.**
- **Clean both sealing surfaces with a non-residue solvent.**
- **Apply FIPG in an approx. 1.2 mm (0.047 in.) wide bead along the sealing surface.**
- **Parts must be assembled within 10 minutes of application. Otherwise, the FIPG material must be removed and reapplied.**

TROUBLESHOOTING

MT0BX-02

PROBLEM SYMPTOMS TABLE

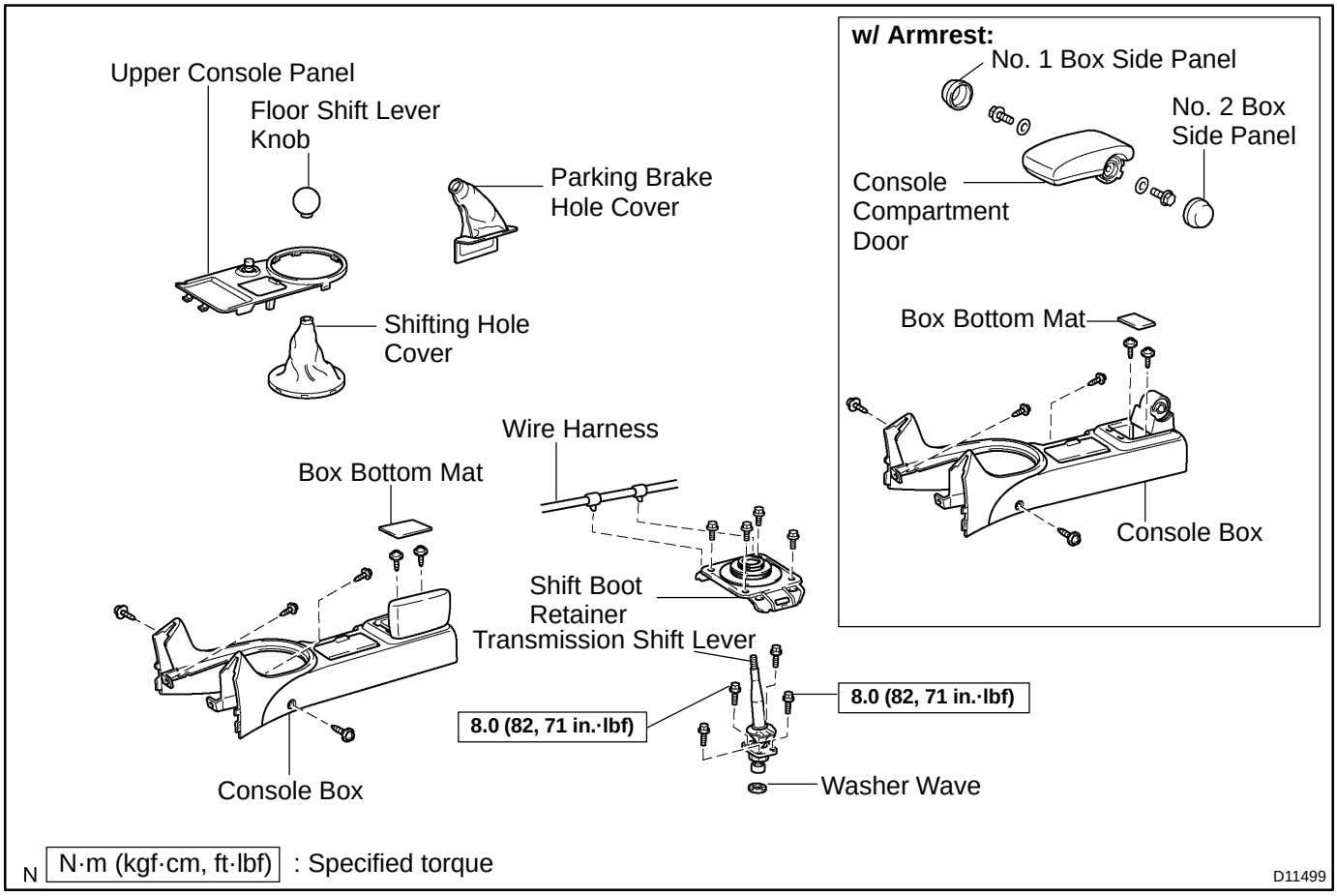
Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

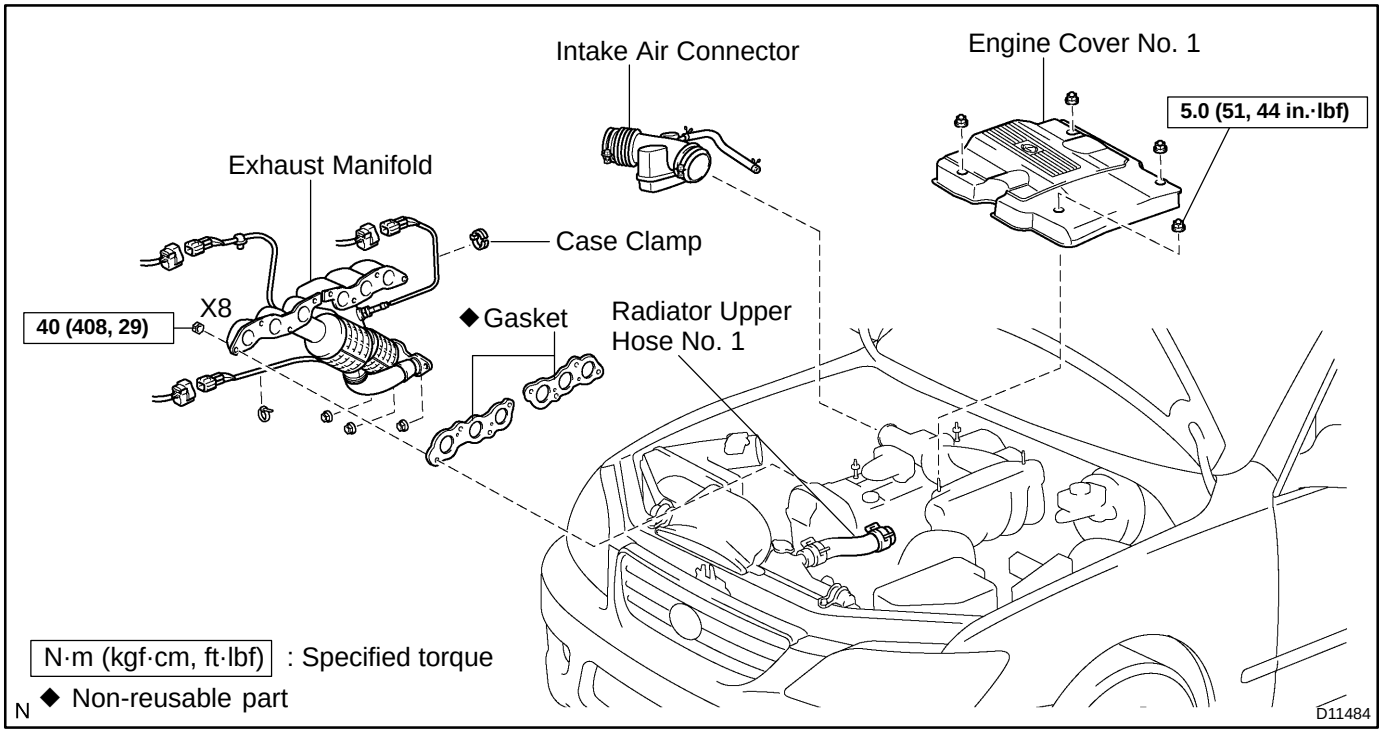
Symptom	Suspect Area	See page
Noise	1. Oil (Level low)	MT-8
	2. Oil (Wrong)	MT-8
	3. Gear (Worn or damaged)	MT-11
	4. Bearing (Worn or damaged)	MT-11
Oil leakage	1. Oil (Level too high)	MT-8
	2. Gasket (Damaged)	MT-11
	3. Oil seal (Worn or damaged)	MT-11
	4. O-Ring (Worn or damaged)	MT-11
Hard to shift or will not shift	1. Synchronizer ring (Worn or damaged)	MT-25 MT-30 MT-38
	2. Shift key spring (Damaged)	MT-30 MT-38
Jumps out of gear	1. Locking ball spring (Damaged)	MT-11
	2. Shift fork (Worn)	MT-11
	3. Gear (Worn or damaged)	MT-11
	4. Bearing (Worn or damaged)	MT-11

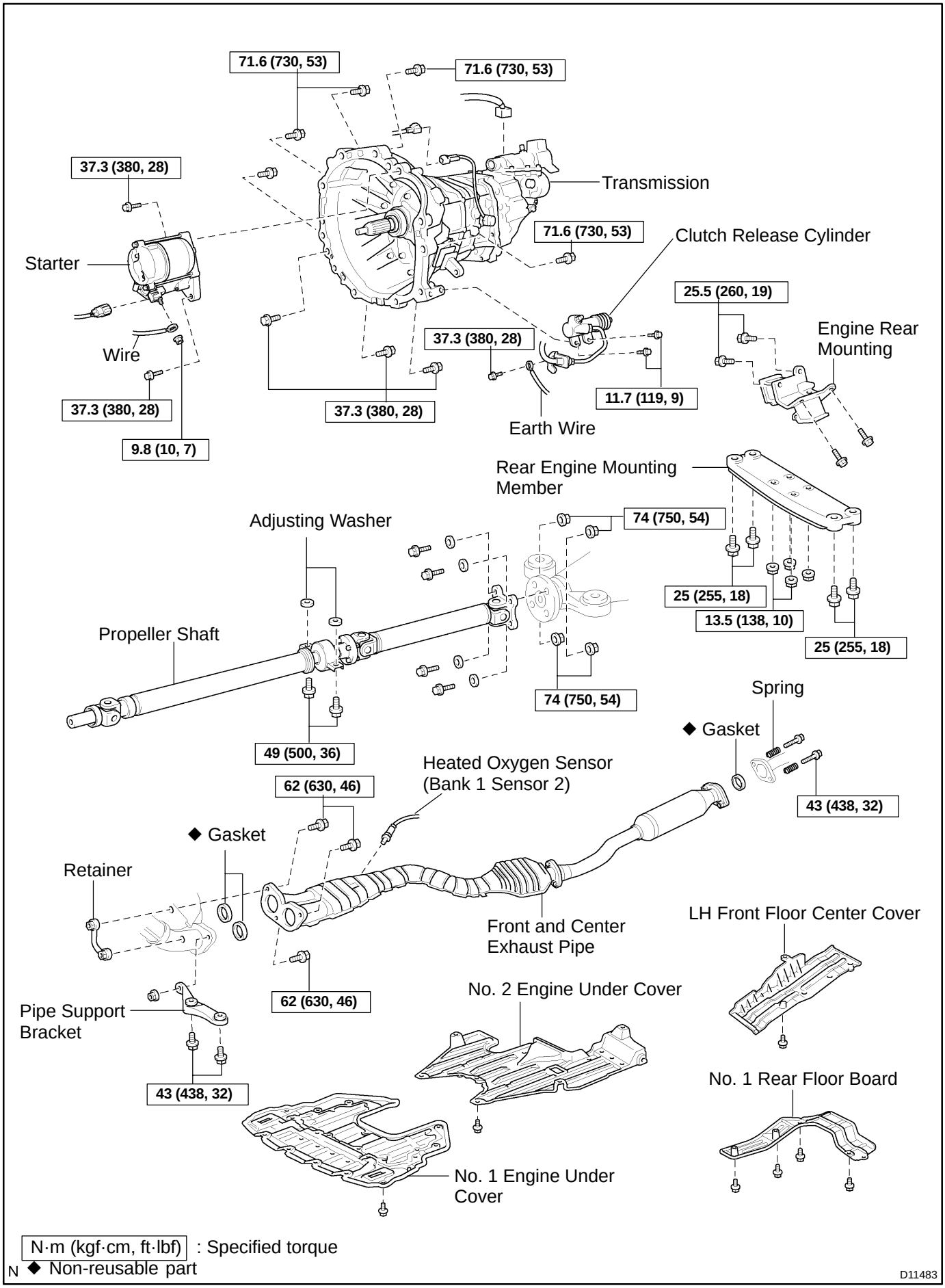
MANUAL TRANSMISSION UNIT

COMPONENTS

MT0FS-02



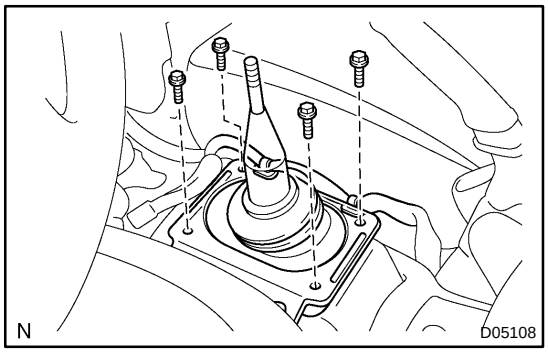



71.6 (730, 53)
71.6 (730, 53)
37.3 (380, 28)
Transmission
71.6 (730, 53)
Clutch Release Cylinder
Starter
25.5 (260, 19)
Engine Rear Mounting
Wire
37.3 (380, 28)
37.3 (380, 28)
11.7 (119, 9)
37.3 (380, 28)
Earth Wire
9.8 (10, 7)
Rear Engine Mounting Member
Adjusting Washer
74 (750, 54)
25 (255, 18)
13.5 (138, 10)
25 (255, 18)
Propeller Shaft
74 (750, 54)
Spring
◆ Gasket
49 (500, 36)
Heated Oxygen Sensor (Bank 1 Sensor 2)
62 (630, 46)
43 (438, 32)
◆ Gasket
Retainer
Front and Center Exhaust Pipe
LH Front Floor Center Cover
62 (630, 46)
No. 2 Engine Under Cover
Pipe Support Bracket
43 (438, 32)
No. 1 Rear Floor Board
No. 1 Engine Under Cover
N·m (kgf·cm, ft·lbf) : Specified torque
N ◆ Non-reusable part
D11483

MT0FT-01

REMOVAL

1. REMOVE UPPER CONSOLE PANEL AND CONSOLE BOX (See page BO-139)

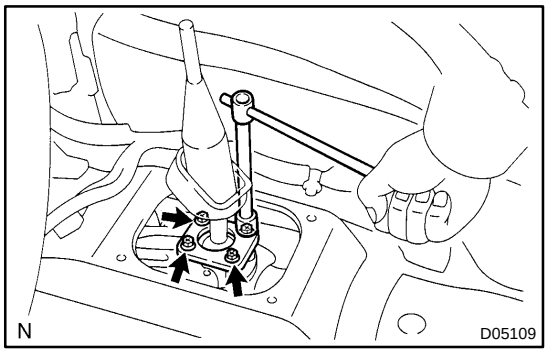


2. REMOVE SHIFT BOOT RETAINER

(a) Disconnect the 2 wire harness clamps.

(b) Remove the 4 bolts and shift boot retainer.

3. REMOVE SHIFT BOOT



4. REMOVE TRANSMISSION SHIFT LEVER

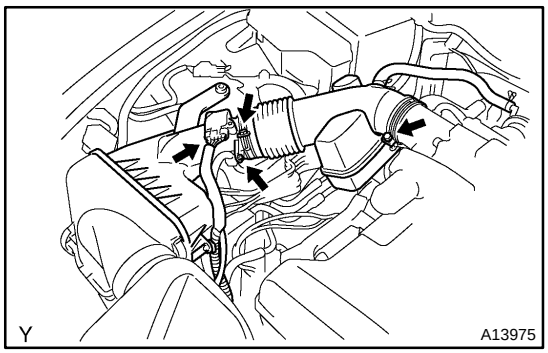
Remove the 4 bolts, transmission shift lever and washer washer.

5. REMOVE ENGINE COVER NO. 1

6. REMOVE NO. 1 AND NO. 2 ENGINE UNDER COVERS

7. DRAIN ENGINE COOLANT

8. DISCONNECT RADIATOR UPPER HOSE NO. 1 FROM ENGINE

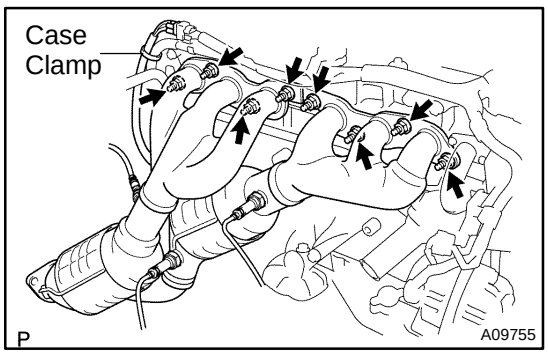


9. REMOVE INTAKE AIR CONNECTOR

(a) Disconnect the MAF meter connector.

(b) Disconnect the engine wire harness clamp from the air cleaner case.

(c) Loosen the 2 hose clamp bolts, remove the intake air connector from the throttle body.



10. REMOVE EXHAUST MANIFOLD

(a) Remove the case clamp.

(b) Disconnect the heated oxygen sensor (bank 2 sensor 1) connector.

(c) Remove the 8 nuts, exhaust manifold and 2 gaskets.

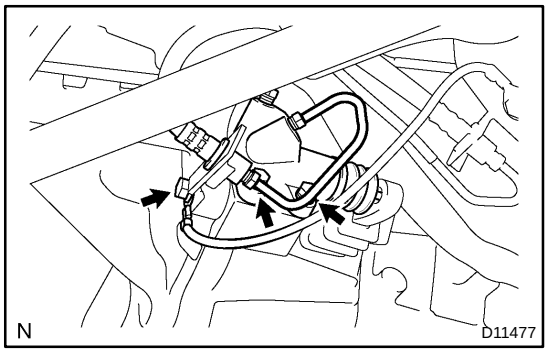
11. RAISE VEHICLE

NOTICE:

Make sure that the vehicle is securely supported.

12. DRAIN TRANSMISSION OIL

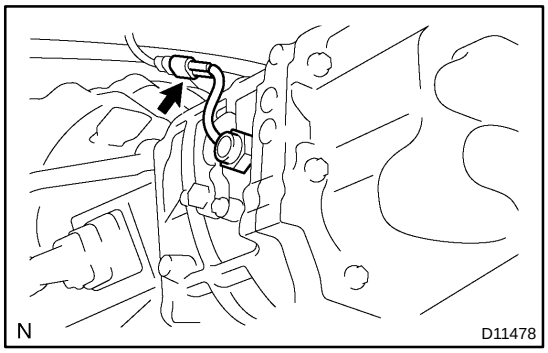
13. **REMOVE LH FRONT FLOOR CENTER COVER**
14. **REMOVE NO. 1 REAR FLOOR BOARD**
15. **REMOVE FRONT AND CENTER EXHAUST PIPES (See page EM-100)**
16. **REMOVE PROPELLER SHAFT (See page PR-4)**



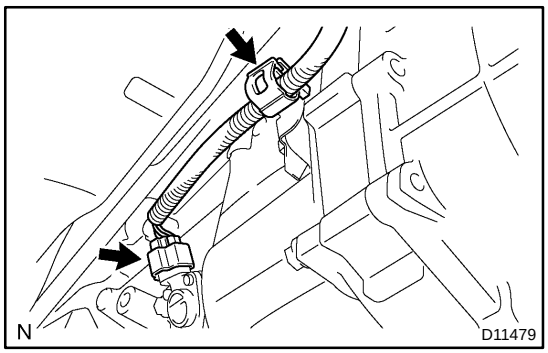
17. **DISCONNECT CLUTCH RELEASE CYLINDER, CLUTCH LINE BRACKET AND EARTH WIRE**

(a) Remove the 2 bolts and disconnect the clutch release cylinder.

(b) Remove the bolt and disconnect the clutch line bracket and earth wire.



18. **DISCONNECT BACK-UP LIGHT SWITCH CONNECTOR**



19. **DISCONNECT SPEED SENSOR CONNECTOR AND WIRE HARNESS**

(a) Disconnect the connector.

(b) Disconnect the wire harness from the clamp.

20. **REMOVE STARTER**

(a) Disconnect the connector.

(b) Remove the nut and wire.

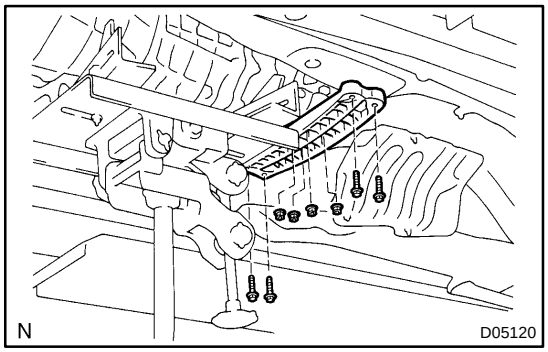
(c) Remove the 2 bolts and starter.

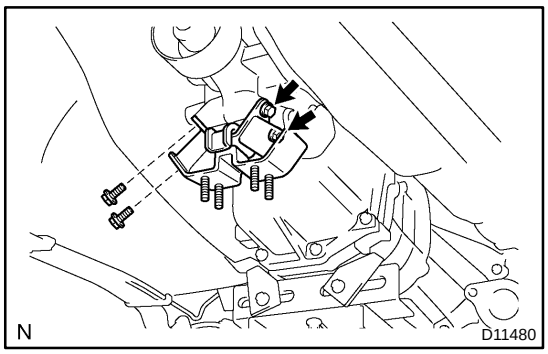
21. **JACK UP TRANSMISSION SLIGHTLY**

Using a transmission jack, support the transmission.

22. **REMOVE REAR ENGINE MOUNTING MEMBER**

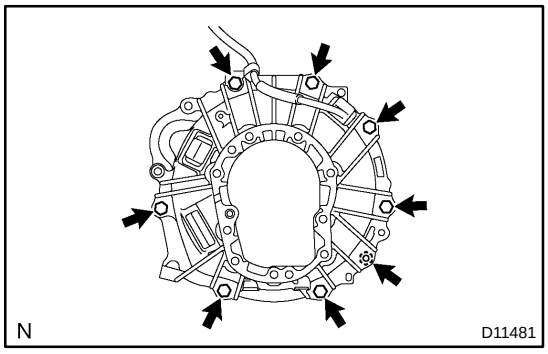
Remove the 4 bolts, 4 nuts and rear engine mounting member.





23. REMOVE ENGINE REAR MOUNTING

Remove the 4 bolts and engine rear mounting.



24. REMOVE TRANSMISSION

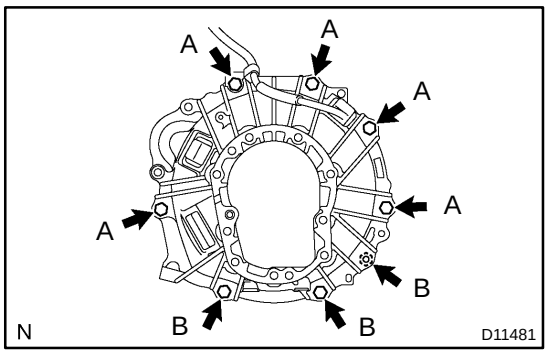
Remove the 8 bolts, wire harness clamp and transmission.

HINT:

After separating the transmission from the engine, turn the transmission a little in the clockwise. At the condition that the transmission housing does not contact the body, lower the jack.

MT0FU-02

INSTALLATION



1. INSTALL TRANSMISSION

(a) Raise the engine front side.

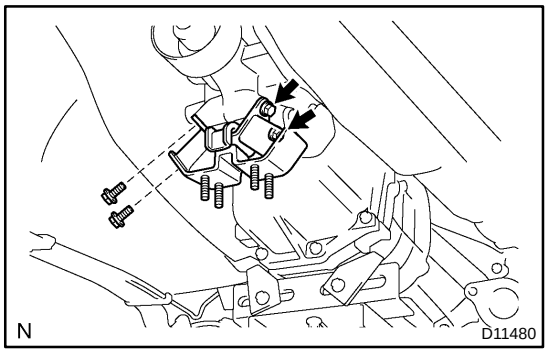
(b) Align the input spline with a clutch disc and install the transmission to the engine.

HINT:

Turn the transmission a little in the clockwise and jack up until just before the transmission housing touches the body.

(c) Install the transmission and wire harness clamp with the 8 bolts.

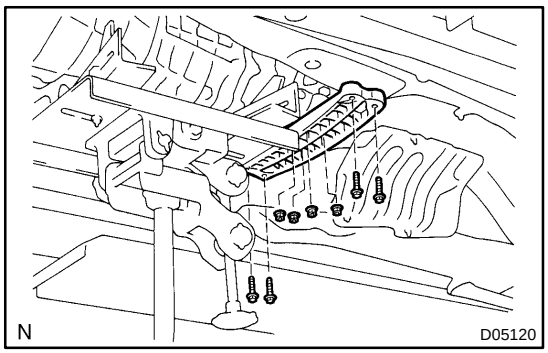
Torque:
Bolt A (12 mm head bolt):
71.6 N·m (730 kgf·cm, 53 ft·lbf)
Bolt B (10 mm head bolt):
37.3 N·m (380 kgf·cm, 28 ft·lbf)



2. INSTALL ENGINE REAR MOUNTING

Install the engine rear mounting with 4 the bolts.

Torque: 25.5 N·m (260 kgf·cm, 19 ft·lbf)



3. INSTALL REAR ENGINE MOUNTING MEMBER

Install the rear engine mounting member with the 4 bolts and 4 nuts.

Torque:
Bolt: 25 N·m (255 kgf·cm, 18 ft·lbf)
Nut: 13.5 N·m (138 kgf·cm, 10 ft·lbf)

4. INSTALL STARTER

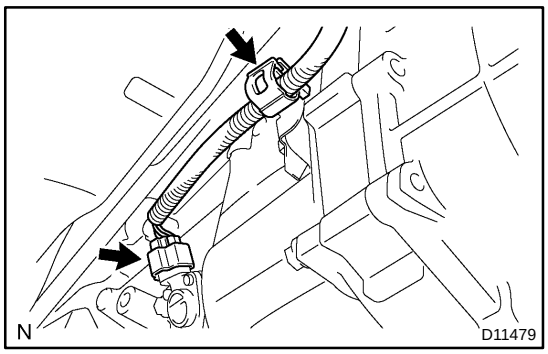
(a) Install the starter with the 2 bolts.

Torque: 37.3 N·m (380 kgf·cm, 28 ft·lbf)

(b) Install the wire with the nut.

Torque: 9.8 N·m (10 kgf·cm, 7 ft·lbf)

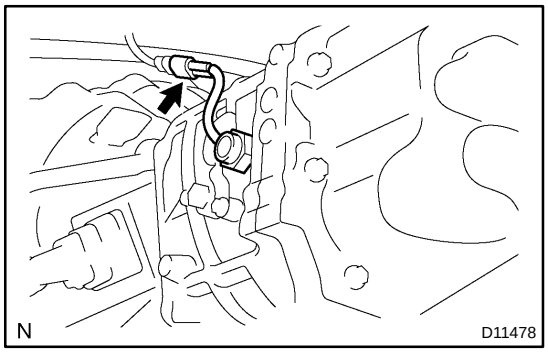
(c) Connect the connector.



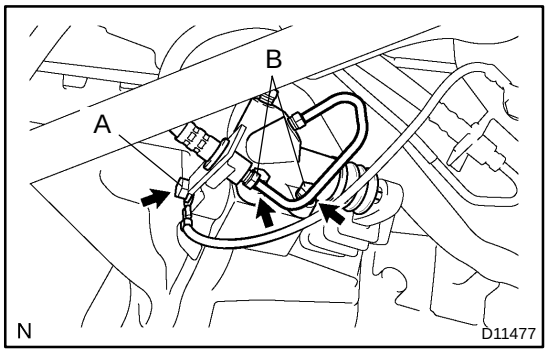
5. CONNECT SPEED SENSOR CONNECTOR AND WIRE HARNESS

(a) Connect the wire harness to the clamp.

(b) Connect the connector.



6. CONNECT BACK-UP LIGHT SWITCH CONNECTOR



7. CONNECT CLUTCH RELEASE CYLINDER, CLUTCH LINE BRACKET AND EARTH WIRE

(a) Connect the clutch line and earth wire with the bolt.

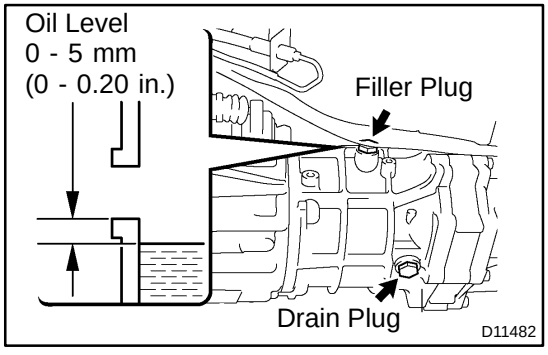
Torque:
Bolt A: 37.3 N·m (380 kgf·cm, 28 ft·lbf)

(b) Connect the clutch release cylinder with the 2 bolts.

Torque:
Bolt B: 11.7 N·m (119 kgf·cm, 9 ft·lbf)

8. INSTALL PROPELLER SHAFT (See page PR-10)

9. INSTALL FRONT AND CENTER EXHAUST PIPES (See page EM-100)



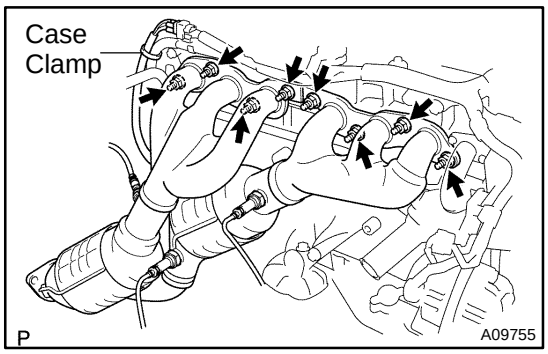
10. FILL WITH TRANSMISSION OIL

Torque:
Filler and Drain plug:
38 N·m (387 kgf·cm, 28 ft·lbf)
Oil grade: API GL-4 or GL-5
Viscosity: SAE 75W-90
Capacity: 2.6 litter (2.7 US qts, 2.3 Imp. qts)

11. INSTALL NO. 1 REAR FLOOR BOARD

12. INSTALL LH FRONT FLOOR CENTER COVER

13. LOWER VEHICLE



14. INSTALL EXHAUST MANIFOLD

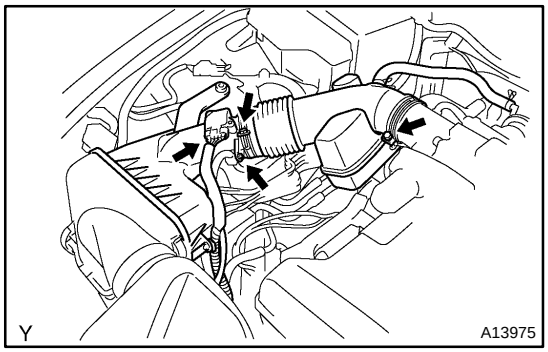
(a) Install 2 new gaskets to the cylinder head.

(b) Install the exhaust manifold with the 8 nuts. Uniformly tighten the nuts in several passes.

Torque: 40 N·m (408 kgf·cm, 29 ft·lbf)

(c) Connect the heated oxygen sensor (bank 2 sensor 1) connector.

(d) Install the case clamp.



15. INSTALL INTAKE AIR CONNECTOR

(a) Install the intake air resonator to the throttle body, tighten the 2 hose clamp bolts.

(b) Connect the PCV hose to the No. 2 cylinder head cover.

(c) Connect the engine wire harness clamp to the air cleaner case.

(d) Connect the MAF meter connector.

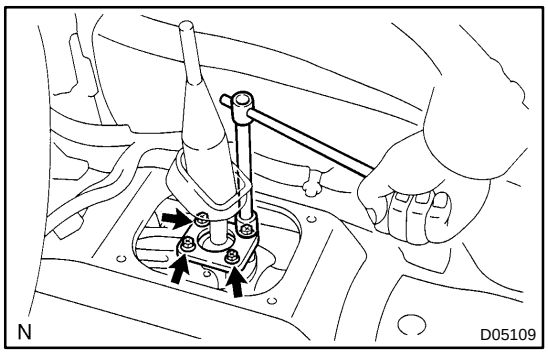
16. CONNECT RADIATOR UPPER HOSE NO. 1 FROM ENGINE

17. FILL WITH ENGINE COOLANT

18. INSTALL ENGINE COVER NO. 1

Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

19. INSTALL NO. 1 AND NO. 2 ENGINE UNDER COVERS



20. INSTALL TRANSMISSION SHIFT LEVER

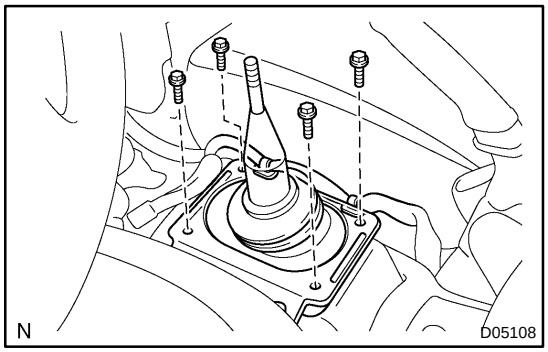
(a) Install the washer.

(b) Apply MP grease to the tip of shift lever.

(c) Install the shift lever with the 4 bolts.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

21. INSTALL SHIFT BOOT



22. INSTALL SHIFT BOOT RETAINER

(a) Install the shift boot retainer with the 4 bolts.

(b) Connect the 2 wire harness clamps.

23. INSTALL UPPER CONSOLE PANEL AND CONSOLE BOX (See page BO-149)

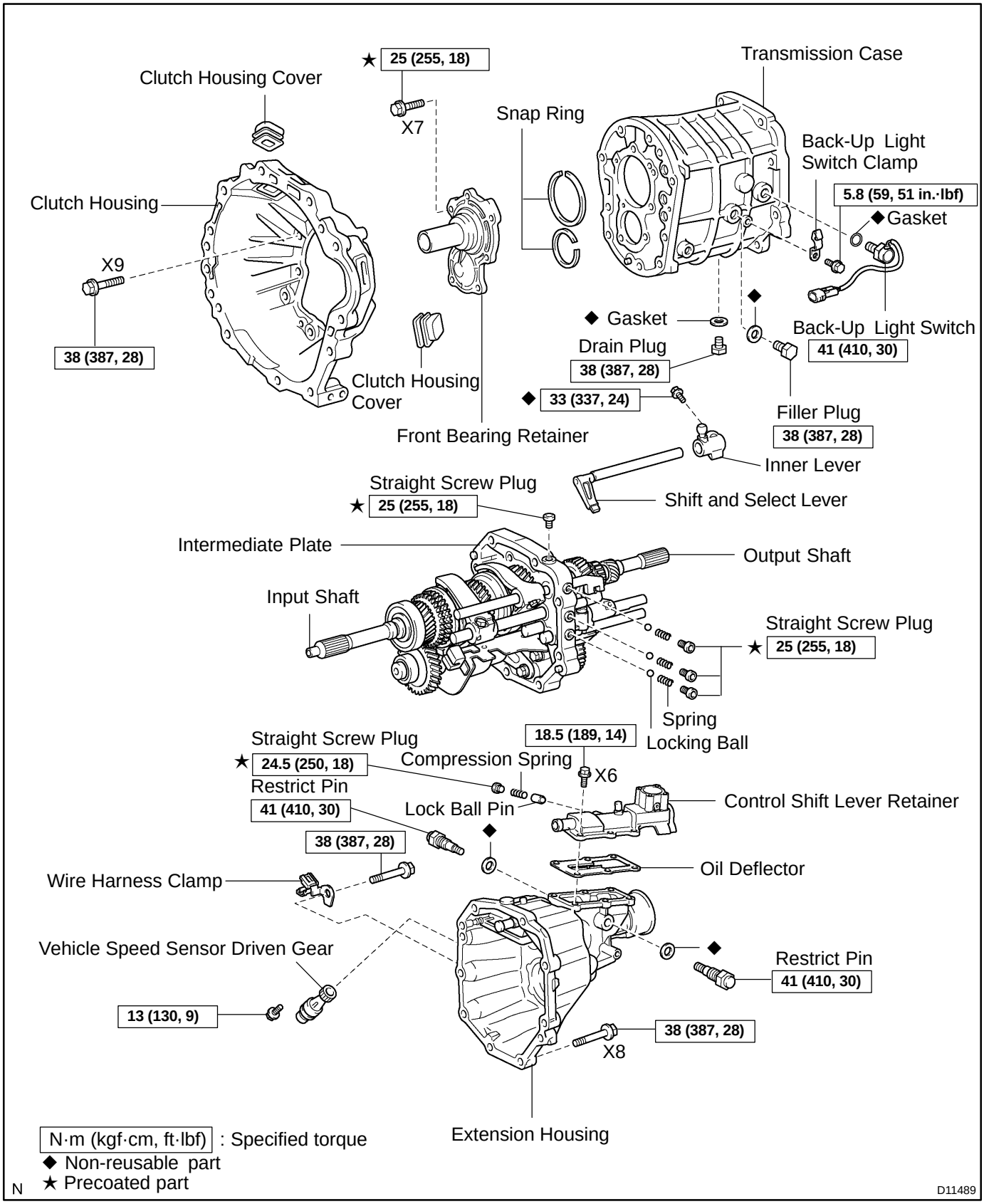
24. DO ROAD TEST

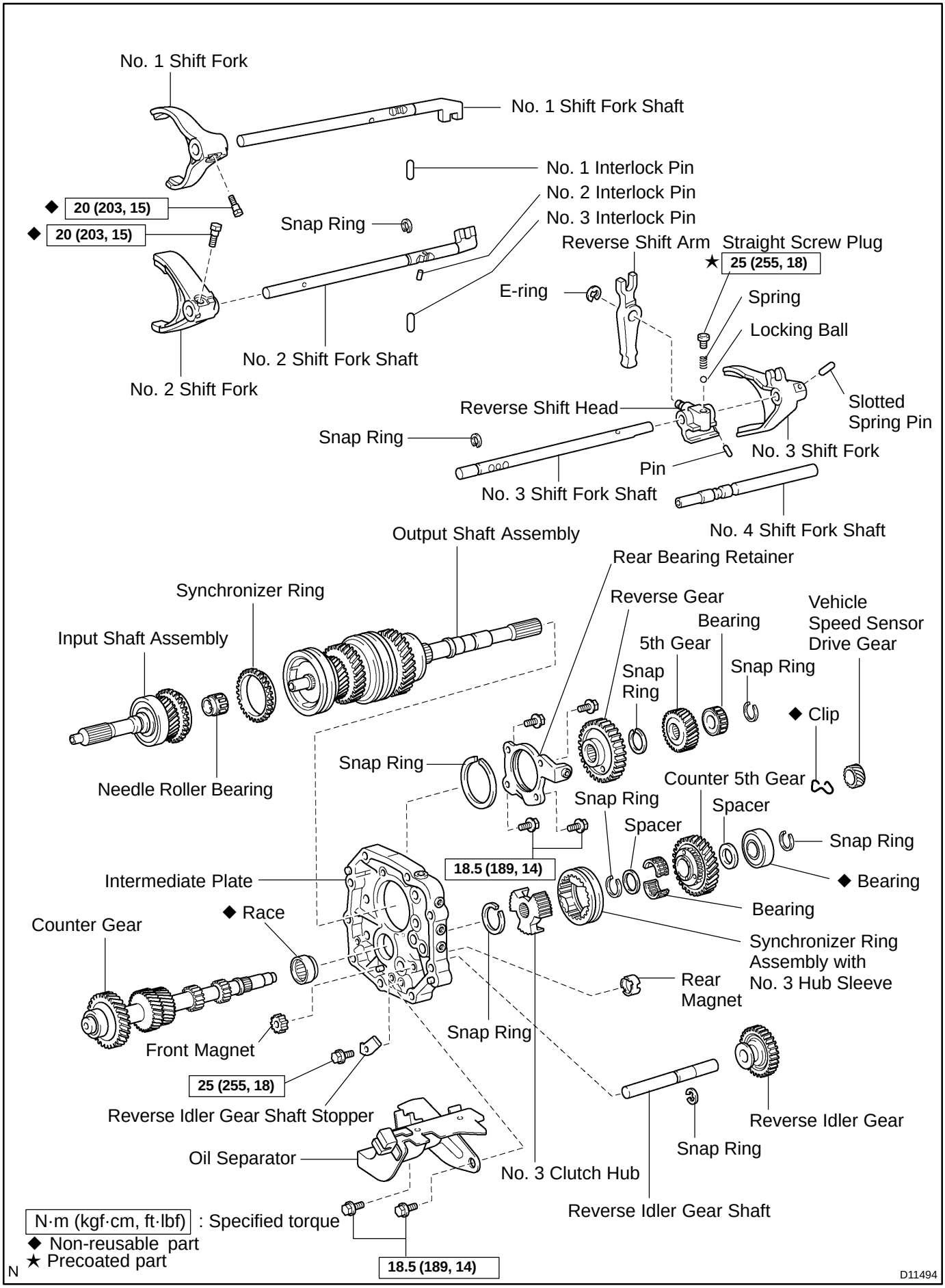
Check for abnormal noises and smooth shifting.

MANUAL TRANSMISSION ASSEMBLY

MT0C1-03

COMPONENTS




No. 1 Shift Fork
No. 1 Shift Fork Shaft
No. 1 Interlock Pin
No. 2 Interlock Pin
No. 3 Interlock Pin
◆ 20 (203, 15)
◆ 20 (203, 15)
Snap Ring
Reverse Shift Arm
Straight Screw Plug
★ 25 (255, 18)
E-ring
Spring
Locking Ball
No. 2 Shift Fork Shaft
No. 2 Shift Fork
Reverse Shift Head
Slotted Spring Pin
Snap Ring
No. 3 Shift Fork
Pin
No. 3 Shift Fork Shaft
No. 4 Shift Fork Shaft
Output Shaft Assembly
Rear Bearing Retainer
Synchronizer Ring
Reverse Gear
Bearing
Vehicle Speed Sensor Drive Gear
Input Shaft Assembly
5th Gear
Snap Ring
Snap Ring
◆ Clip
Snap Ring
Needle Roller Bearing
Counter 5th Gear
Snap Ring
Spacer
Spacer
Snap Ring
18.5 (189, 14)
◆ Bearing
Intermediate Plate
Bearing
◆ Race
Counter Gear
Synchronizer Ring Assembly with No. 3 Hub Sleeve
Rear Magnet
Snap Ring
Front Magnet
25 (255, 18)
Reverse Idler Gear
Reverse Idler Gear Shaft Stopper
Oil Separator
Snap Ring
No. 3 Clutch Hub
Reverse Idler Gear Shaft
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
18.5 (189, 14)
N
D11494

MT0FW-02

DISASSEMBLY

1. REMOVE BACK-UP LIGHT SWITCH WITH GASKET

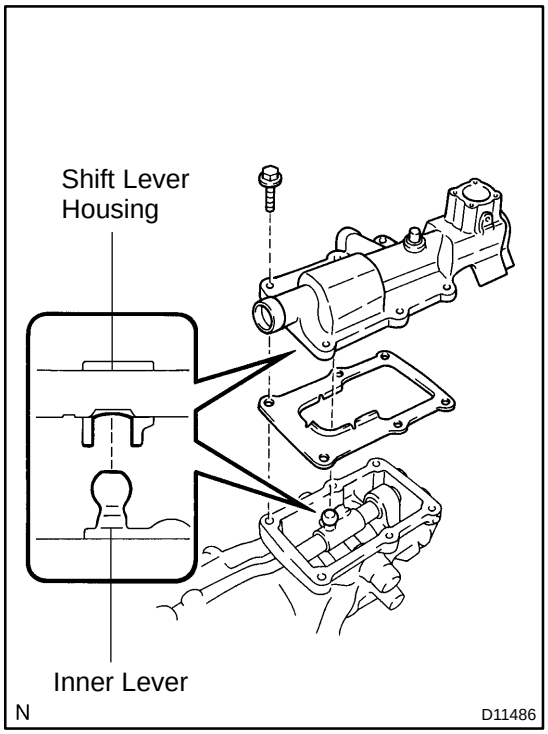
(a) Remove the bolt and disconnect the back-up light switch clamp.
Torque: 5.8 N·m (59 kgf·cm, 51 in.·lbf)

(b) Remove the back-up light switch with the gasket.
Torque: 41 N·m (410 kgf·cm, 30 ft·lbf)

2. REMOVE BOLT AND VEHICLE SPEED SENSOR DRIVEN GEAR
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

3. REMOVE CLUTCH HOUSING FROM TRANSMISSION CASE

Remove the 9 bolts and clutch housing.
Torque: 38 N·m (387 kgf·cm, 28 ft·lbf)

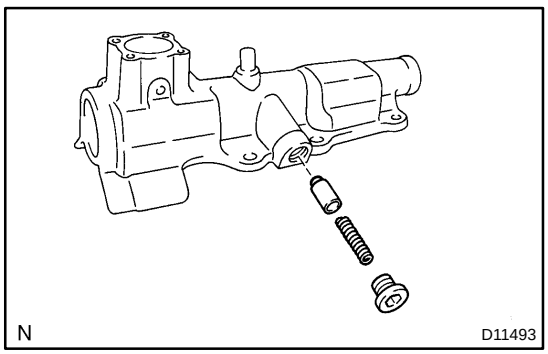


4. REMOVE CONTROL SHIFT LEVER RETAINER ASSEMBLY

(a) Remove the 6 bolts.
Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

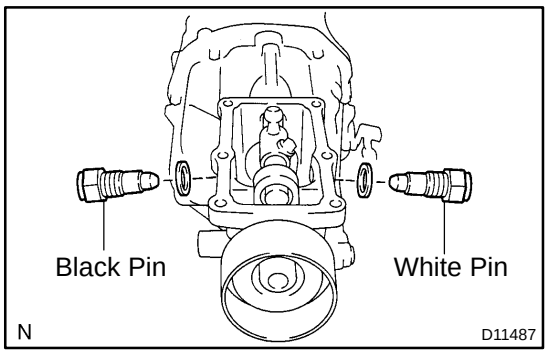
(b) Remove the control shift lever retainer assembly and oil deflector.

HINT:
At the time of installation, please refer to the following item.
Be sure to spline the small ball portion of inner lever into the shift lever housing.
(At this time, pay attention so that the retainer assy will not move to forth and back.)



(c) Using a hexagon wrench (10 mm), remove the straight screw plug.
Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

(d) Using a magnetic finger, remove the compression spring and lock ball pin.



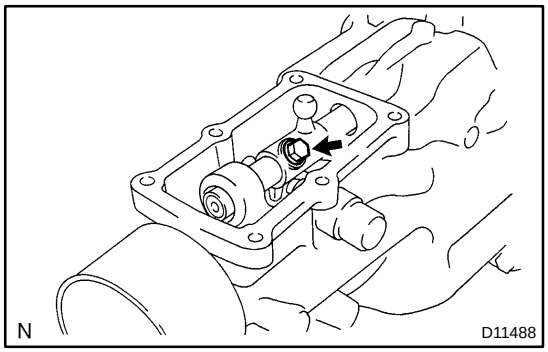
5. REMOVE 2 RESTRICT PINS AND GASKETS

(a) Remove the restrict pin (color: black) with the gasket.
Torque: 41 N·m (418 kgf·cm, 30 ft·lbf)

HINT:

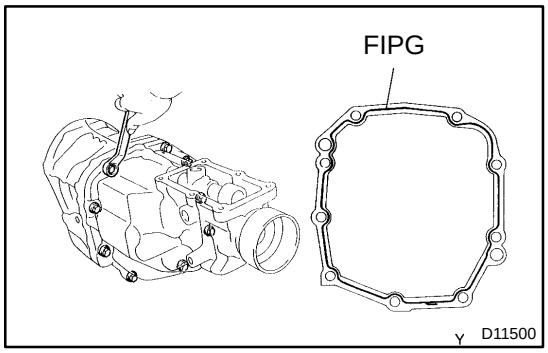
Install the black pin on the reverse gear/5th gear side.

(b) Remove the restrict pin (color: white) with the gasket.
Torque: 41 N·m (418 kgf·cm, 30 ft·lbf)



6. REMOVE EXTENSION HOUSING

(a) Remove the shift lever housing set bolt.
Torque: 33 N·m (337 kgf·cm, 24 ft·lbf)

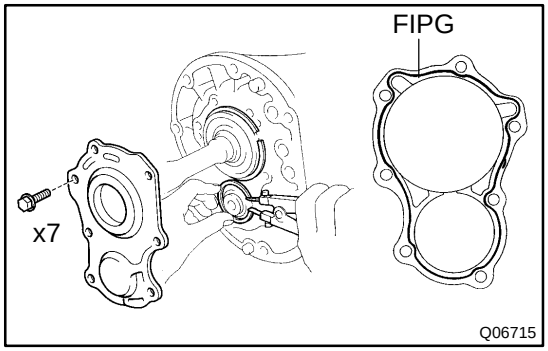


(b) Remove the 9 bolts and wire harness clamp from the extension housing.
Torque: 38 N·m (387 kgf·cm, 28 ft·lbf)

(c) Using a plastic hammer, carefully tap the extension housing.

(d) Pull out the extension housing and inner lever.
FIPG: Part No. 08826-00090, THREE BOND 1281 or equivalent

7. REMOVE SHIFT AND SELECT LEVER

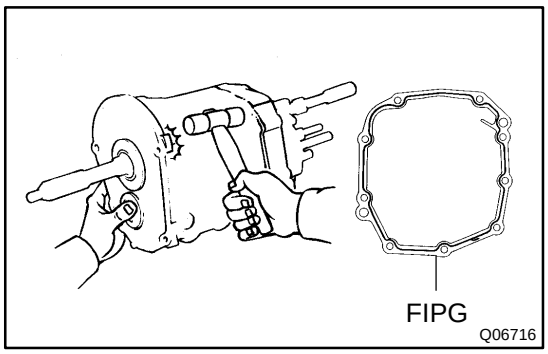


8. REMOVE FRONT BEARING RETAINER AND BEARING SNAP RING

(a) Remove the 7 bolts.
Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

(b) Remove the front bearing retainer.
FIPG: Part No. 08826-00090, THREE BOND 1281 or equivalent

(c) Using a snap ring expander, remove the 2 bearing snap rings.



9. SEPARATE INTERMEDIATE PLATE FROM TRANSMISSION CASE

(a) Using a plastic hammer, carefully tap the transmission case.

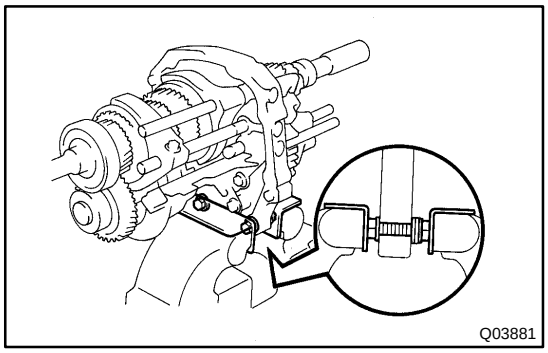
(b) Pull the transmission case from the intermediate plate.

HINT:

At the time of installation, please refer to the following item.

Align each bearing outer race and each shift fork shaft end with the case holes.

FIPG: Part No. 08826-00090, THREE BOND 1281 or equivalent



10. MOUNT INTERMEDIATE PLATE IN VISE

(a) Use the 2 long clutch housing bolts, plate washers and suitable nuts, as shown.

NOTICE:

Increase or decrease plate washers so that the bolt tip does not protrude from the nut.

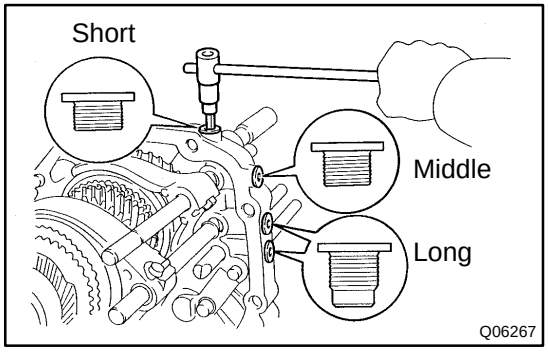
(b) Mount the intermediate plate in a vise.

11. REMOVE OIL SEPARATOR

Remove the 2 bolts and oil separator.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

12. REMOVE FRONT MAGNET



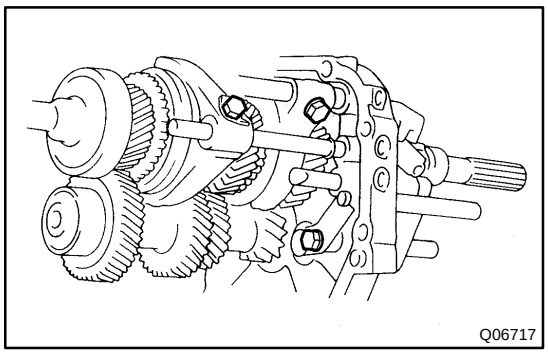
13. REMOVE LOCKING BALL AND SPRING

(a) Using a hexagon wrench (6 mm), remove the 4 straight screw plugs.

Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

(b) Using a magnetic finger, remove the 3 springs and balls.



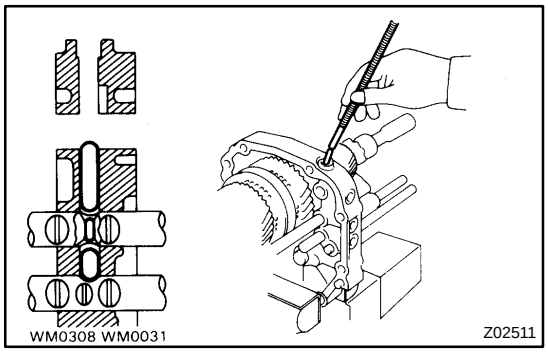
14. REMOVE SHIFT FORK, SHIFT FORK SHAFT AND REVERSE IDLER GEAR

(a) Remove the No. 1 and No. 2 shift forks set bolts.
Torque: 20 N·m (203 kgf·cm, 15 ft·lbf)

(b) Remove the bolt and reverse idler gear shaft stopper.
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

(c) Remove the reverse idler gear and shaft with the snap ring.

(d) Remove the No. 1 shift fork and shaft.

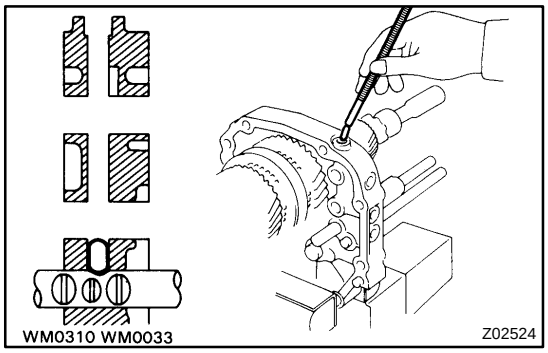


(e) Using a magnetic finger, remove the No. 1 and No. 2 interlock pins.

HINT:
At the time of installation, please refer to the following item.
Apply MP grease to the No. 1 and No. 2 interlock pins.

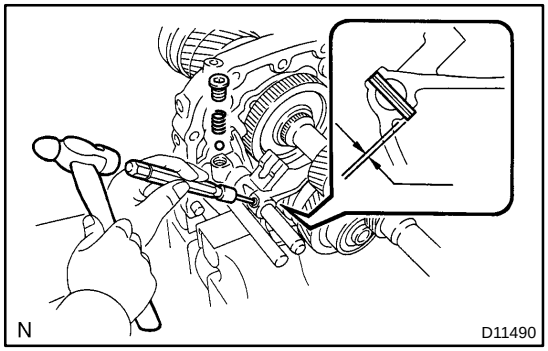
(f) Using 2 screwdrivers and a hammer, tap out the No. 2 shift fork shaft snap ring.

(g) Remove the No. 2 shift fork and shaft.



(h) Using a magnetic finger, remove the No. 3 interlock pin.

HINT:
At the time of installation, please refer to the following item.
Apply MP grease to the No. 3 interlock pin.

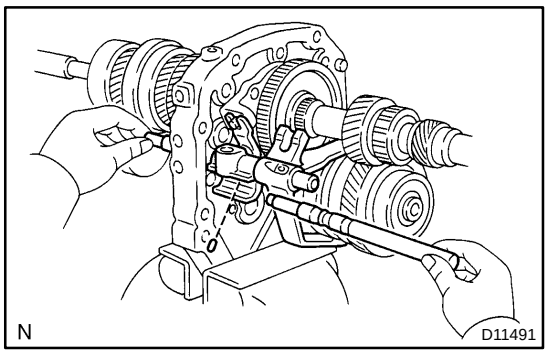


(i) Using a pin punch (5 mm) and hammer, drive out the No. 3 shift fork pin.

HINT:
At the time of installation, please refer to the following item.
Using a pin punch (5 mm) and a hammer, install the No. 3 shift fork pin.
Drive in depth: 0 - 0.5 mm (0 - 0.020 in.)

(j) Using a hexagon wrench (6 mm), remove the straight screw plug.
Sealant: Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

(k) Using a magnetic finger, remove the spring and ball.

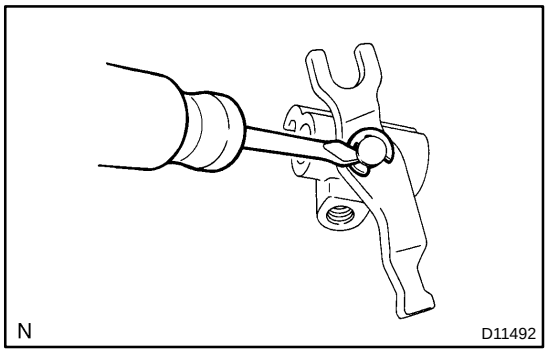


(l) Pull out the No. 4 shift fork shaft.
(m) Remove the pin from the reverse shift head.

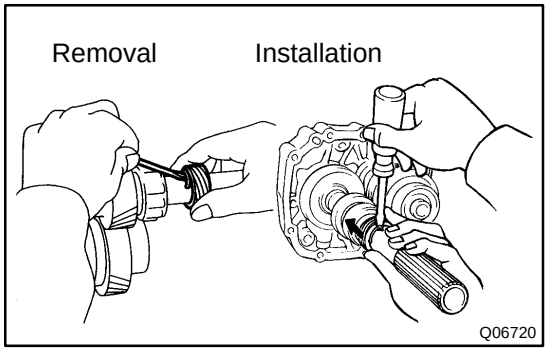
HINT:
At the time of installation, please refer to the following item.
Apply MP grease to the pin.

(n) Remove the No. 3 shift fork, fork shaft and reverse shift arm with the snap ring.

HINT:
At the time of installation, please refer to the following item.
Align the No. 3 shift fork with the No. 3 hub sleeve groove, put the reverse shift arm into the pivot of bearing retainer and align the reverse shift arm shoe with the reverse idler gear groove.

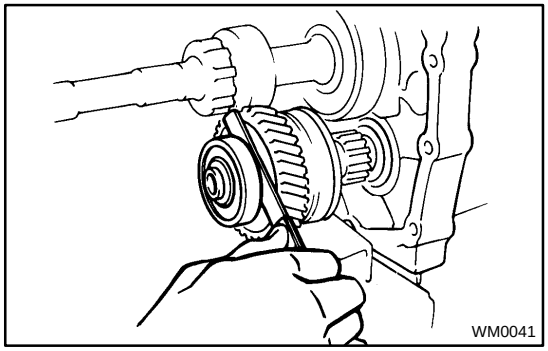


(o) Using a screwdriver, remove the E-ring, separate the reverse shift head and reverse shift arm.



15. REMOVE VEHICLE SPEED SENSOR DRIVE GEAR

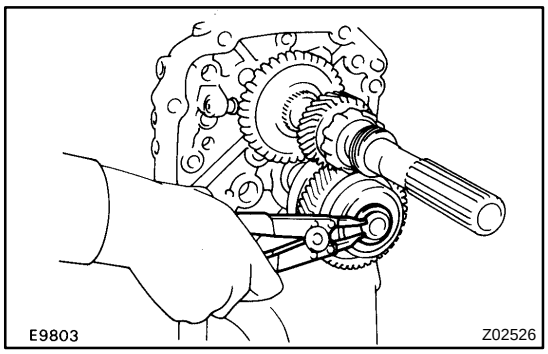
Pry out both ends of the clip and remove the drive gear.



16. INSPECT COUNTER 5TH GEAR THRUST CLEARANCE

Using a feeler gauge, measure the counter 5th gear thrust clearance.

Standard clearance:
0.10 - 0.41 mm (0.0039 - 0.0161 in.)
Maximum clearance:
0.41 mm (0.0161 in.)



17. REMOVE COUNTER REAR BEARING, SPACER, COUNTER 5TH GEAR AND NEEDLE ROLLER BEARING

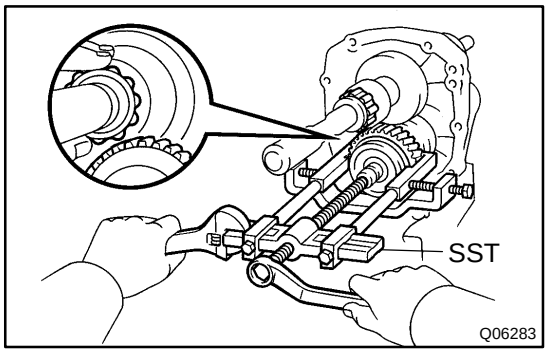
(a) Using a snap ring expander, remove the snap ring.

HINT:

At the time of installation, please refer to the following item.

Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
1	1.90 - 1.95 (0.0748 - 0.0768)
2	1.96 - 2.01 (0.0772 - 0.0791)
3	2.02 - 2.07 (0.0795 - 0.0815)
4	2.08 - 2.13 (0.0819 - 0.0839)
5	2.14 - 2.19 (0.0843 - 0.0862)
6	2.20 - 2.25 (0.0866 - 0.0886)
7	2.26 - 2.31 (0.0890 - 0.0909)

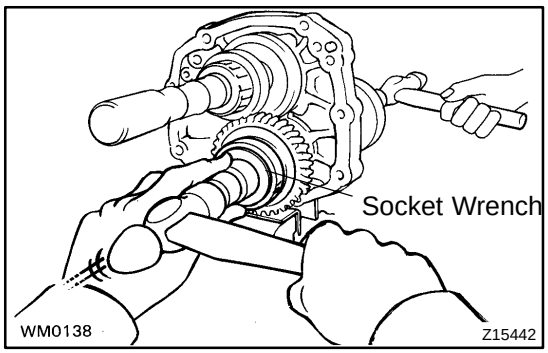


(b) Using SST, remove the rear bearing, spacer, counter 5th gear and bearing.

SST 09950- 40011 (09951- 04020,09953- 04030, 09954- 04010, 09955- 04051, 09957- 04010, 09958-0401 1)

NOTICE:

Be careful not to catch the output shaft rear bearing roller on the counter 5th gear.

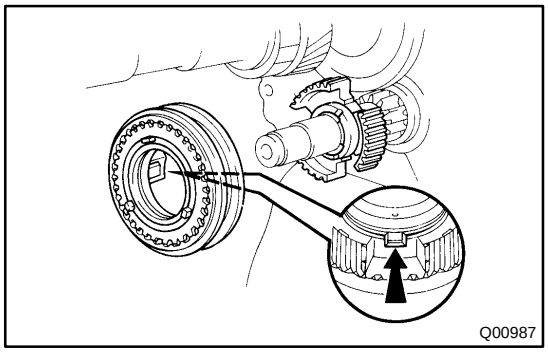


(c) Remove the spacer.

HINT:

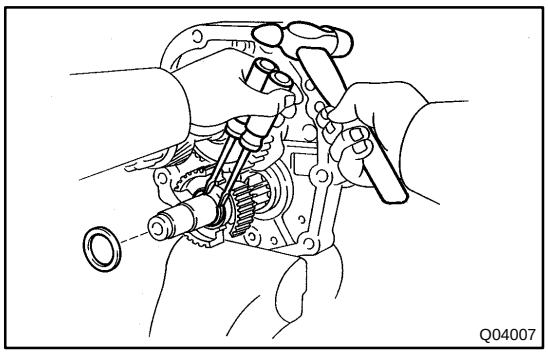
At the time of installation, please refer to the following items.

- Install the counter 5th gear with the 5th gear gaps aligned with the synchronizer cone ring pin.
- Using a socket wrench and hammer, drive in the bearing.
- When driving in the bearing support the counter shaft in front with a 1.4 - 2.3 kg (3 - 5 lb) hammer or equivalent.



18. REMOVE SYNCHRONIZER RING ASSEMBLY WITH NO. 3 HUB SLEEVE AND NO. 3 CLUTCH HUB

(a) Remove the synchronizer ring assembly with the No. 3 hub sleeve from the No. 3 clutch hub.



(b) Remove the spacer.

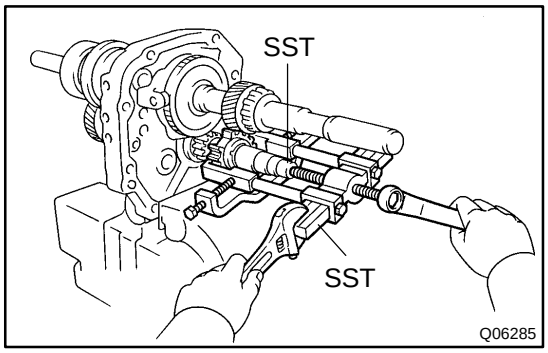
(c) Using 2 screwdrivers and a hammer, tap out the snap ring.

HINT:

At the time of installation, please refer to the following item.

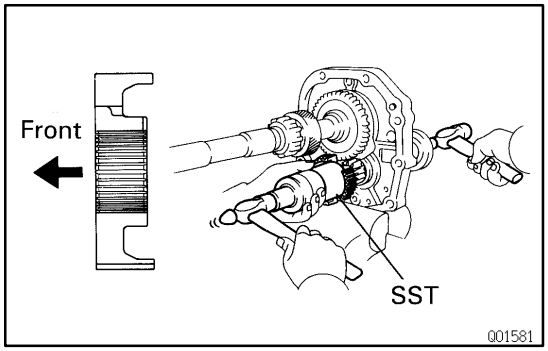
Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
2	2.06 - 2.11 (0.0811 - 0.0831)
3	2.12 - 2.17 (0.0835 - 0.0854)
4	2.18 - 2.23 (0.0858 - 0.0878)
5	2.24 - 2.29 (0.0882 - 0.0902)



(d) Using SST, remove the No. 3 clutch hub.

SST 09950- 40011 (09951- 04020, 09952- 04010, 09953- 04020, 09954- 04010, 09955- 04051, 09957-04010, 09958-04011)
09950-60010 (09951-00200)

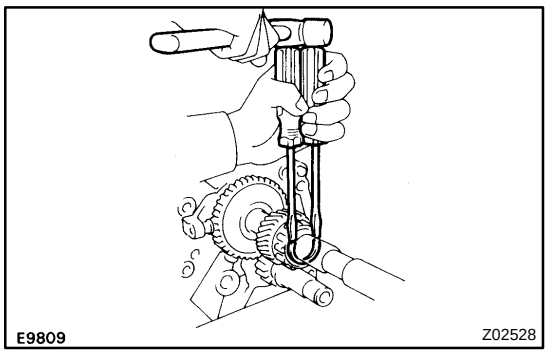


HINT:

At the time of installation, please refer to the following items.

- Using SST and a hammer, drive in the No. 3 clutch hub.
  SST 09316-6001 1 (09316-00011, 09316-00071)
- When installing the No. 3 clutch hub, support the counter shaft in front with a 1.4 - 2.3 kg (3 - 5 lb) hammer or equivalent.

19. REMOVE REAR MAGNET



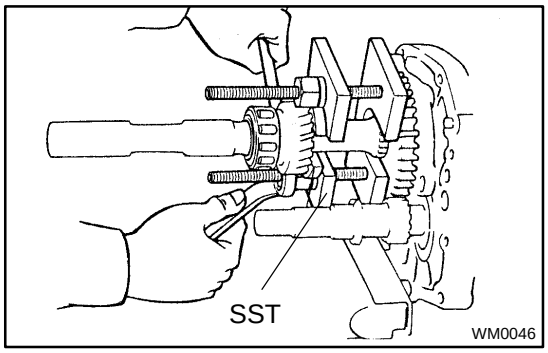
20. REMOVE OUTPUT SHAFT REAR BEARING AND 5TH GEAR

(a) Using 2 screwdrivers and a hammer, tap out the snap ring.

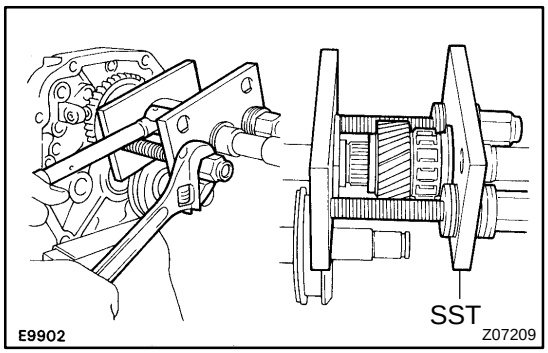
HINT:

At the time of installation, please refer to the following item.
Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
8	2.31 - 2.36 (0.0909 - 0.0929)
9	2.37 - 2.42 (0.0933 - 0.0953)
10	2.43 - 2.48 (0.0957 - 0.0976)
11	2.49 - 2.54 (0.0980 - 0.1000)
12	2.55 - 2.60 (0.1004 - 0.1024)
13	2.61 - 2.66 (0.1028 - 0.1047)
14	2.68 - 2.73 (0.1055 - 0.1075)
15	2.74 - 2.79 (0.1079 - 0.1098)

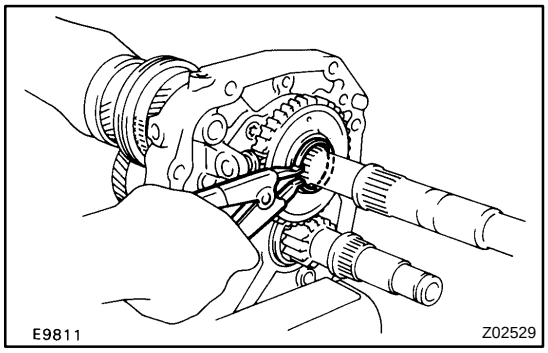


(b) Using SST, remove the rear bearing and 5th gear.
SST 09312-20012 (09313-00030, 09313-00040, 09313-00050)



HINT:

At the time of installation, please refer to the following item.
Using SST, install the 5th gear and rear bearing.
SST 09312-20012 (09313-00010, 09313-00030, 09313-00040, 09313-00050)

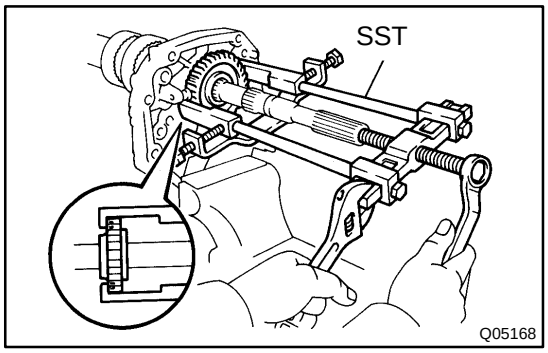


21. REMOVE REVERSE GEAR

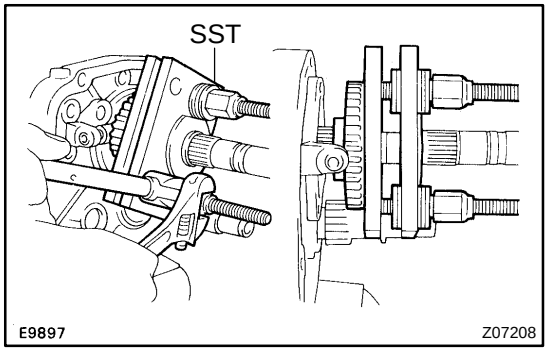
(a) Using a snap ring expander, remove the snap ring.

HINT:
At the time of installation, please refer to the following item.
Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
5	2.25 - 2.30 (0.0886 - 0.0906)
11	2.30 - 2.35 (0.0906 - 0.0925)
12	2.35 - 2.40 (0.0925 - 0.0945)
13	2.40 - 2.45 (0.0945 - 0.0965)
14	2.45 - 2.50 (0.0965 - 0.0984)
15	2.50 - 2.55 (0.0984 - 0.1004)
16	2.55 - 2.60 (0.1004 - 0.1024)
17	2.61 - 2.66 (0.1028 - 0.1047)
18	2.67 - 2.72 (0.1051 - 0.1071)
19	2.73 - 2.78 (0.1075 - 0.1094)
20	2.79 - 2.84 (0.1098 - 0.1118)
21	2.85 - 2.90 (0.1122 - 0.1142)
22	2.91 - 2.96 (0.1146 - 0.1165)
23	2.97 - 3.02 (0.1169 - 0.1189)



(b) Using SST, remove the reverse gear.
SST 09950- 40011 (09951- 04020, 09952- 04010, 09953- 04020, 09954- 04040, 09955- 04051, 09958-0401 1)



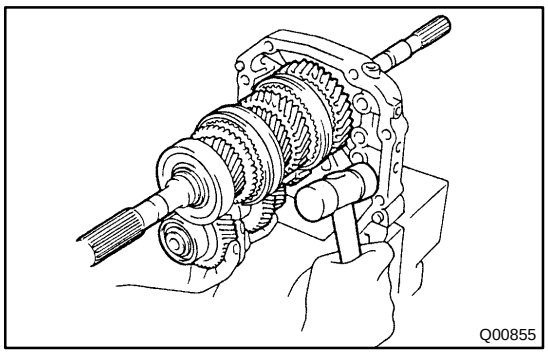
HINT:
At the time of installation, please refer to the following item.
Using SST, install the reverse gear.
SST 09312-20012 (09313-00030, 09313-00040, 09313-00050)

22. REMOVE REAR BEARING RETAINER

(a) Using a torx socket wrench (T40), unscrew the 4 torx screws and remove the rear bearing retainer.
Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

(b) Using a snap ring expander, remove the 2 snap rings.

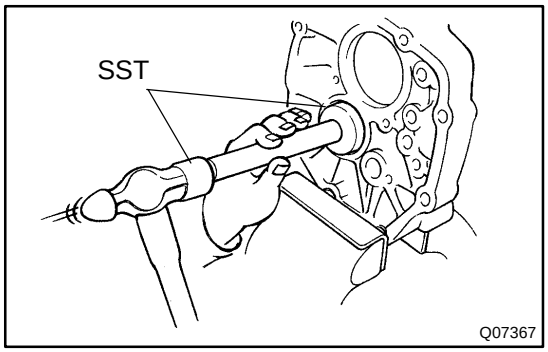
HINT:
At the time of installation, please refer to the following item.
Be sure the snap ring is flush with the intermediate plate surface.


Q00855

23. REMOVE OUTPUT SHAFT AND COUNTER GEAR FROM INTERMEDIATE PLATE

(a) Remove the output shaft, input shaft and counter gear as a unit from the intermediate plate by pulling on the counter gear and tapping on the intermediate plate with a plastic hammer.

(b) Remove the input shaft from the output shaft.

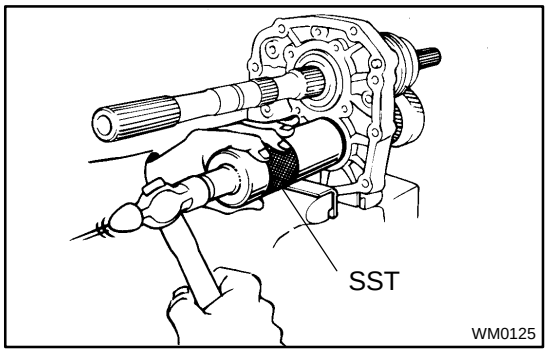


Q07367

HINT:

At the time of installation, please refer to the following items.

- Before installing the output shaft, use SST to remove the counter gear center bearing outer race.
  SST 09950-60010 (09951-00510), 09950-70010 (09951-07150)
- Install the outer race after installing the counter gear.
- Install the output shaft into the intermediate plate by pulling on the output shaft and tapping on the intermediate plate.



WM0125

HINT:

At the time of installation, please refer to the following items.

- Apply gear oil to the needle roller bearing.
- Install the needle roller bearing to the input shaft.
- Install the input shaft and counter gear together.
- Using SST and a hammer, install the counter gear center bearing outer race.
  SST 09316-6001 1 (09316-00011)
- Be careful not to damage the bearing rollers.

MT0C3-02

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page MT-23).

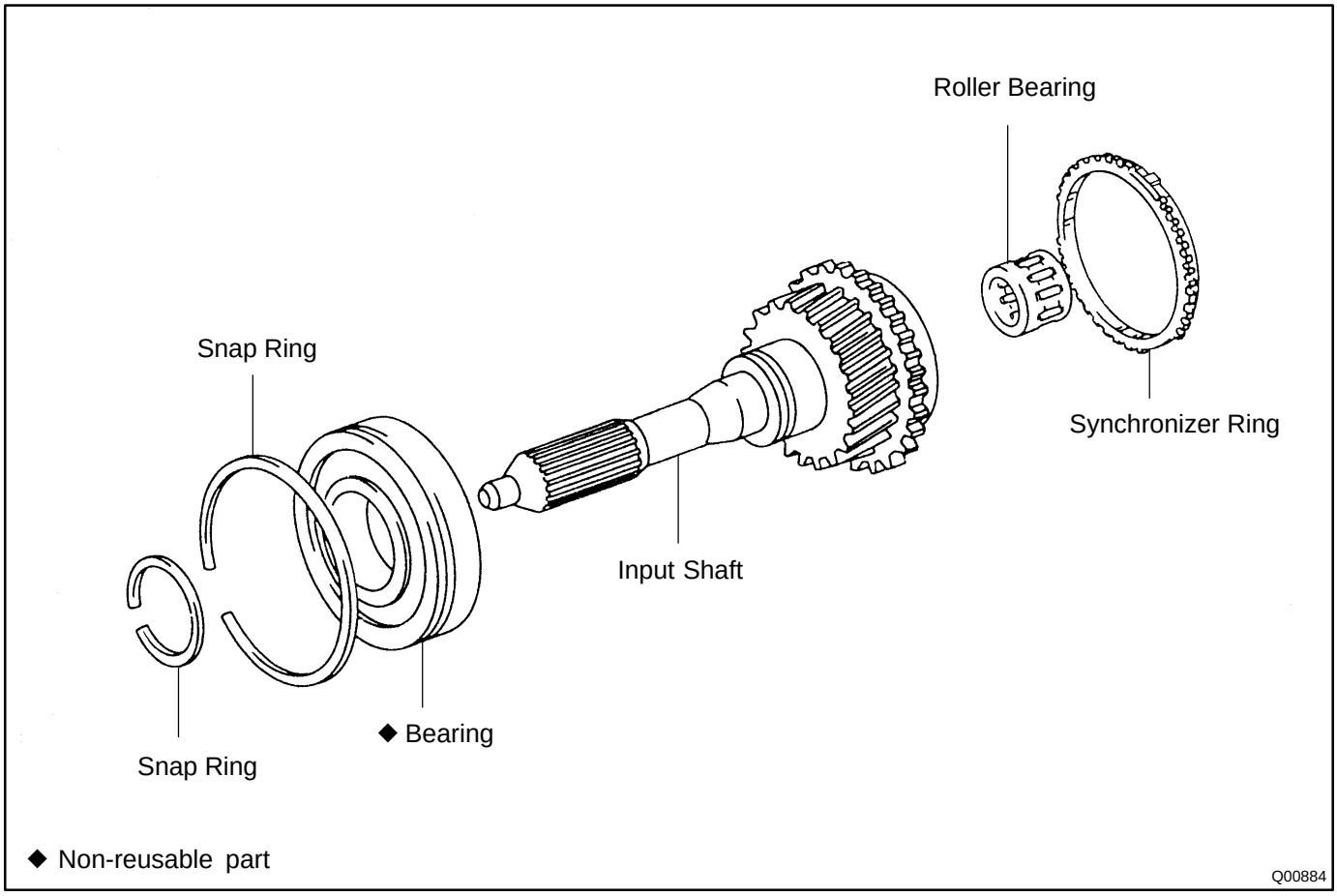
HINT:

Coat all of the sliding and rotating surfaces with gear oil before assembly.

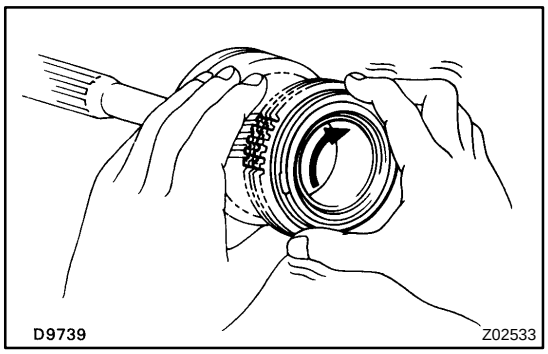
INPUT SHAFT

COMPONENTS

MT0C4-02



MT0C5-02



INSPECTION

INSPECT SYNCHRONIZER RING

(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer ring.

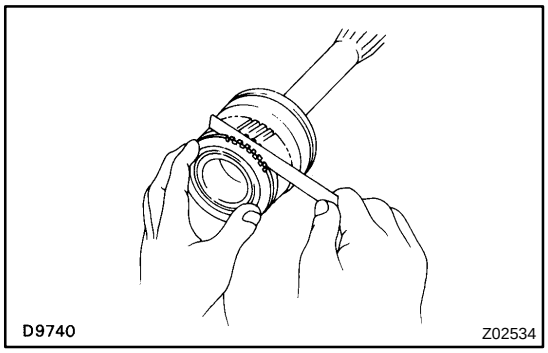
Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of fine lapping compound between the synchronizer ring and gear cone. Lightly rub the synchronizer ring and gear cone together.

NOTICE:

Ensure the fine lapping compound is completely washed off after rubbing.

(c) Check again the braking effect of the synchronizer ring.



(d) Using a feeler gauge, measure the clearance between the synchronizer ring back and gear spline end.

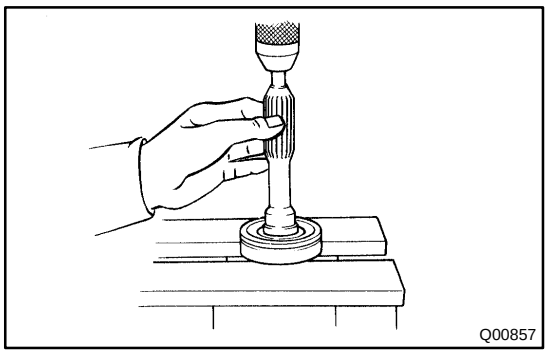
Minimum clearance: 0.7 mm (0.028 in.)

If the clearance is less than the minimum, replace the synchronizer ring and gear cone by applying a small amount of fine lapping compound.

NOTICE:

Ensure the fine lapping compound is completely washed off after rubbing.

MT0C6-02

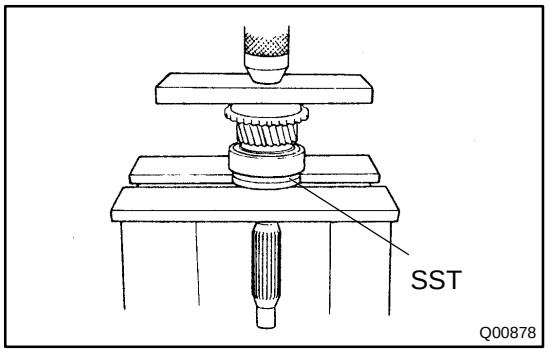

Q00857

REPLACEMENT

IF NECESSARY, REPLACE INPUT SHAFT BEARING

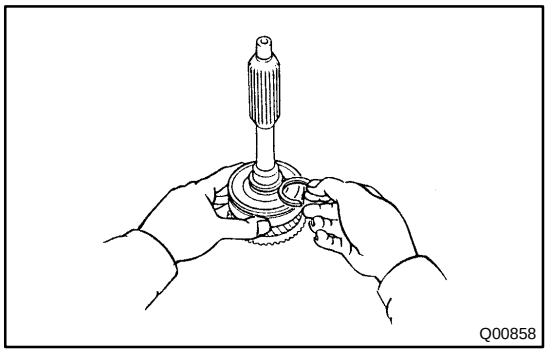
(a) Using a snap ring expander, remove the snap ring.

(b) Using a press, remove the bearing.



Q00878

(c) Using SST and a press, install a new bearing.
SST 09506-35010


Q00858

(d) Select a snap ring that will allow minimum axial play.

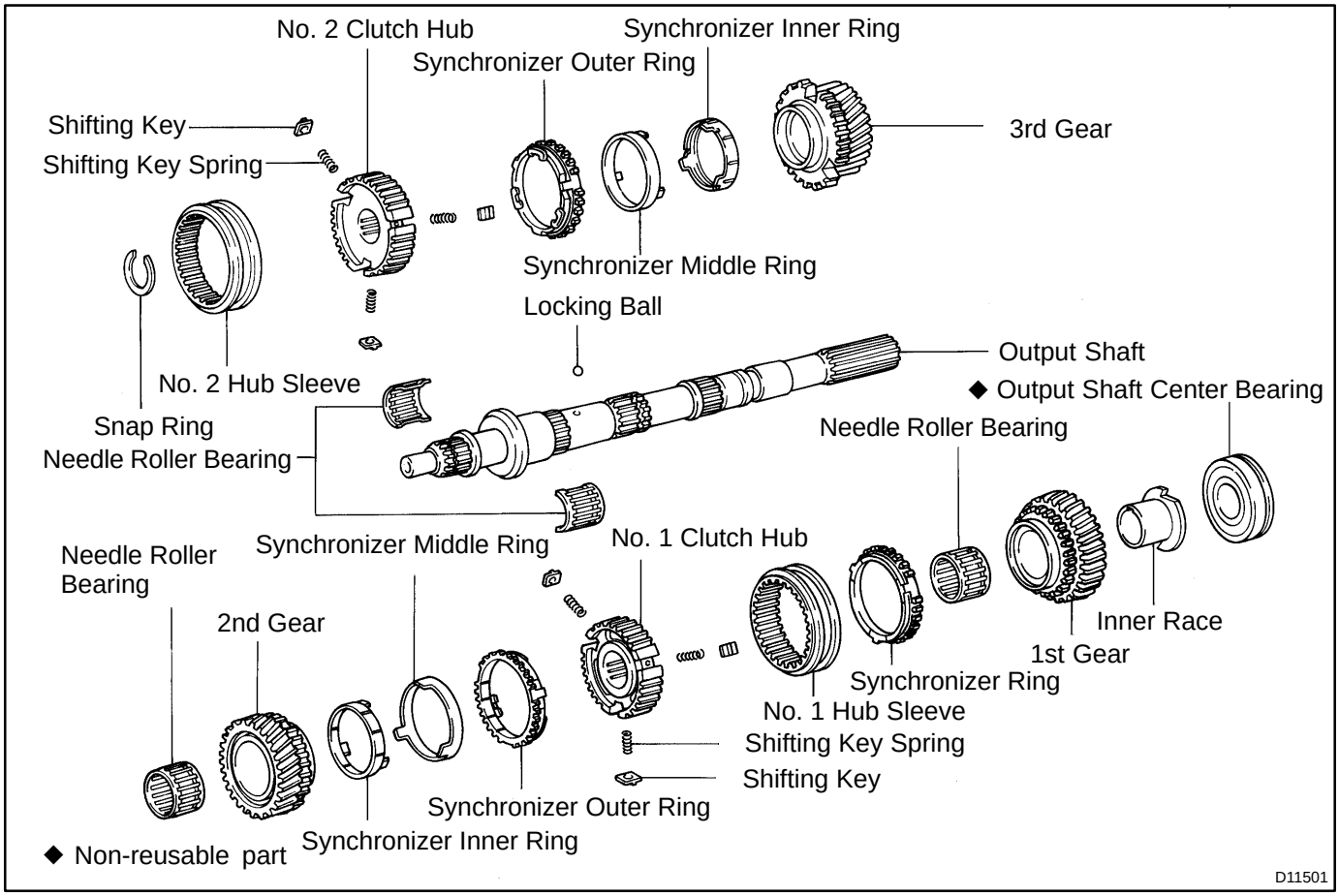
Mark	Thickness mm (in.)
1	2.05 - 2.10 (0.0807 - 0.0827)
2	2.10 - 2.15 (0.0827 - 0.0846)
3	2.15 - 2.20 (0.0846 - 0.0866)
4	2.20 - 2.25 (0.0866 - 0.0886)
5	2.25 - 2.30 (0.0886 - 0.0906)
11	2.30 - 2.35 (0.0906 - 0.0925)
12	2.35 - 2.40 (0.0925 - 0.0945)

(e) Using a snap ring expander, install the snap ring.

OUTPUT SHAFT

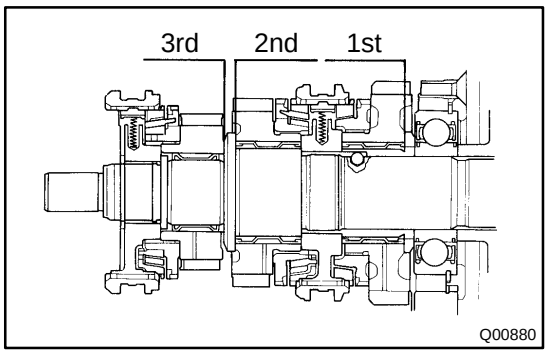
COMPONENTS

MT0C7-02



MT0C8-02

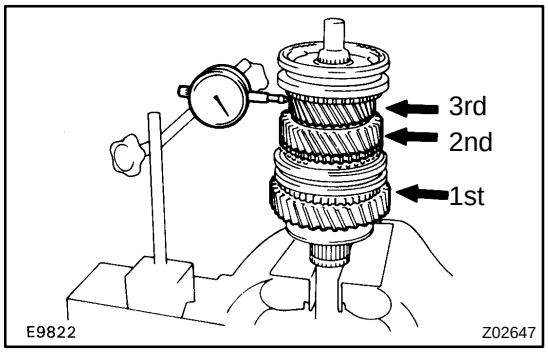
DISASSEMBLY



1. INSPECT EACH GEAR THRUST CLEARANCE

Using a feeler gauge, measure the thrust clearance of each gear.

Standard clearance:
0.10 - 0.25 mm (0.0039 - 0.0098 in.)
Maximum clearance:
0.25 mm (0.0098 in.)

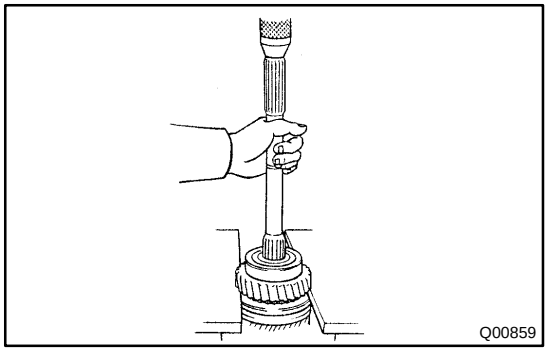


2. INSPECT EACH GEAR RADIAL CLEARANCE

Using a dial indicator, measure the radial clearance of each gear.

Standard clearance:
1st and 2nd gears:
0.009 - 0.060 mm (0.0004 - 0.0024 in.)
3rd gear: 0.015 - 0.066 mm (0.0006 - 0.0026 in.)
Maximum clearance:
1st and 2nd gears: 0.060 mm (0.0024 in.)
3rd gear: 0.066 mm (0.0026 in.)

If the clearance exceeds the maximum, replace the gear, shaft or needle roller bearing.

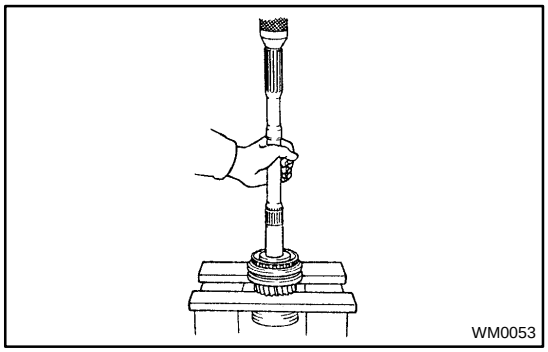


3. REMOVE OUTPUT SHAFT CENTER BEARING AND 1ST GEAR ASSEMBLY

(a) Shift the No. 1 hub sleeve onto the 2nd gear.
(b) Using a press, remove the center bearing, 1st gear, needle roller bearing, inner race and synchronizer ring.

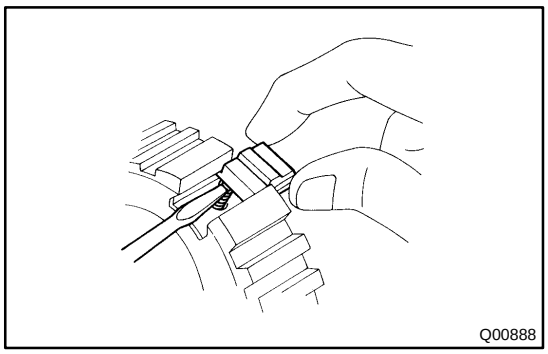
4. REMOVE LOCKING BALL ON OUTPUT SHAFT

Using a magnetic finger, remove the locking ball.



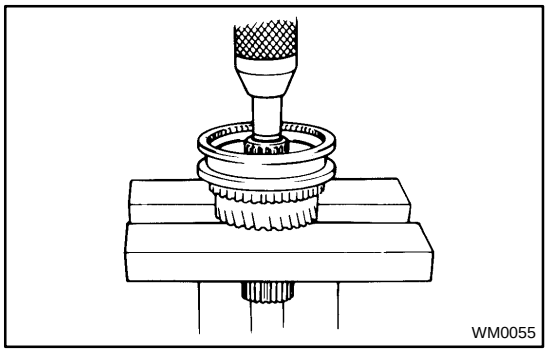
5. REMOVE NO. 1 HUB SLEEVE ASSEMBLY, 2ND GEAR AND NEEDLE ROLLER BEARING

Using a press, remove the parts from the shaft as an assembly.



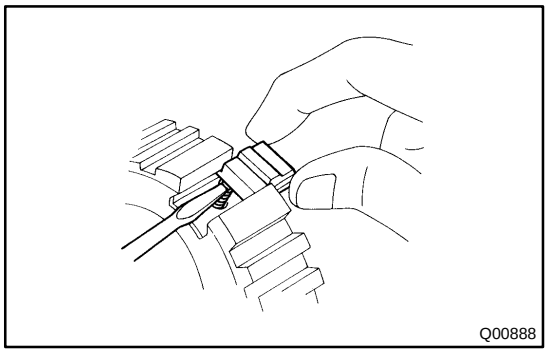
6. REMOVE NO. 1 HUB SLEEVE, SHIFTING KEY AND SPRING FROM NO. 1 CLUTCH HUB

(a) Remove the No. 1 hub sleeve from the No. 1 clutch hub.
(b) Push the shifting key spring with a screwdriver, remove the 3 shifting keys and key springs.



7. REMOVE NO. 2 HUB SLEEVE ASSEMBLY AND 3RD GEAR

(a) Using a snap ring expander, remove the snap ring.
(b) Using a press, remove the No. 2 hub sleeve, synchronizer ring and 3rd gear.

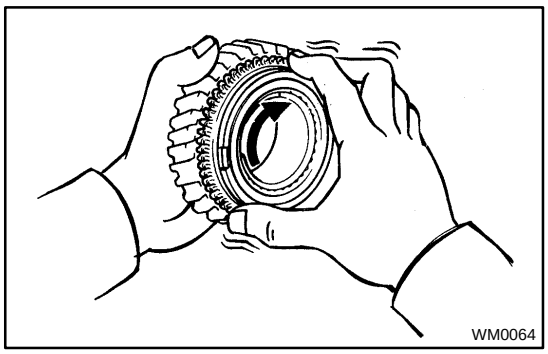


8. REMOVE NO. 2 HUB SLEEVE, SHIFTING KEY AND SPRING FROM NO. 2 CLUTCH HUB

(a) Remove the No. 2 hub sleeve from the No. 2 clutch hub.
(b) Push the shifting key spring with a screwdriver, remove the 3 shifting keys and key springs.

MT0C9-02

INSPECTION



1. INSPECT 1ST GEAR SYNCHRONIZER RING

(a) Check for wear or damage.

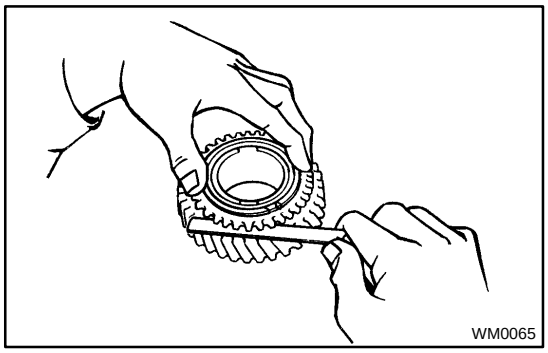
(b) Check the braking effect of the synchronizer ring.
Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of fine lapping compound between the synchronizer ring and gear cone. Lightly rub the synchronizer ring and gear cone together.

NOTICE:

Ensure the fine lapping compound is completely washed off after rubbing.

(c) Check again the braking effect of the synchronizer ring.

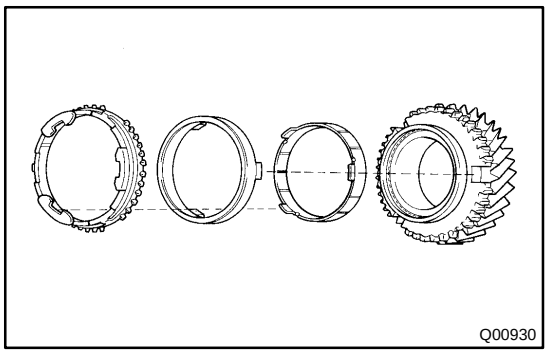


(d) Using a feeler gauge, measure the clearance between the synchronizer ring back and gear spline end.
Minimum clearance: 0.7 mm (0.028 in.)

If the clearance is less than the minimum, replace the synchronizer ring and gear cone by applying a small amount of fine lapping compound.

NOTICE:

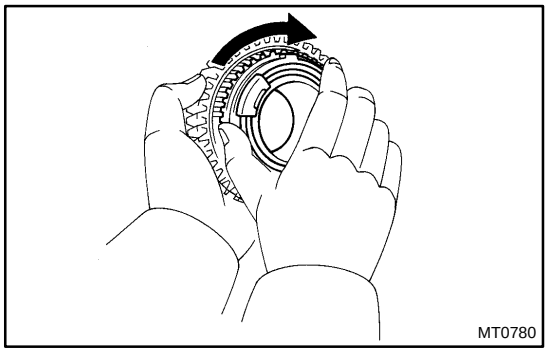
Ensure the fine lapping compound is completely washed off after rubbing.



2. INSPECT 2ND AND 3RD GEARS SYNCHRONIZER RING

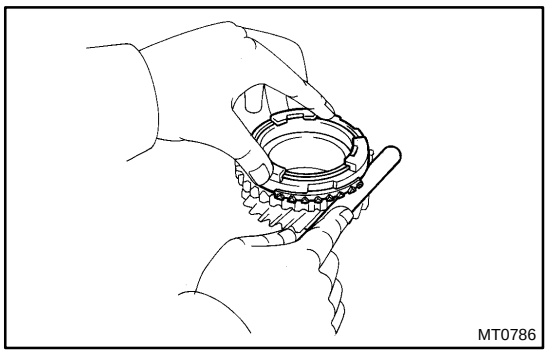
(a) Check for wear or damage.

(b) Install the synchronizer inner ring, middle ring and outer ring to each gear.

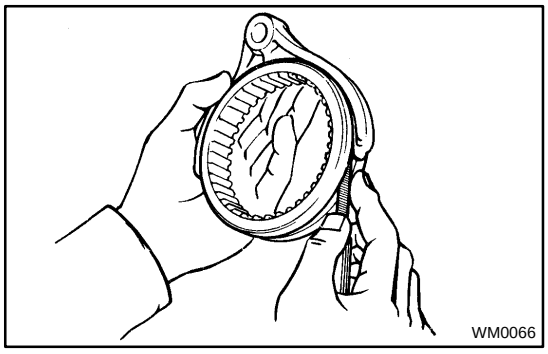


(c) Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

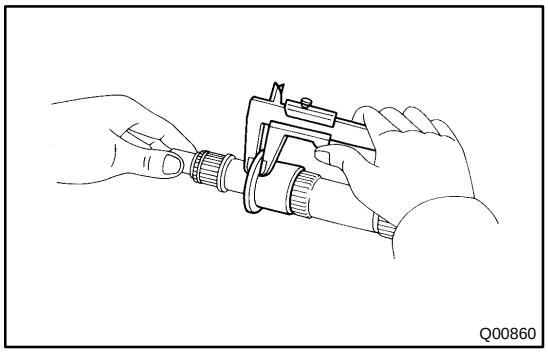
If it does not lock, replace the synchronizer ring.


MT0786

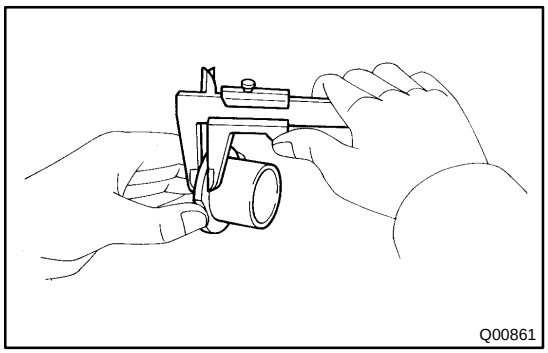
(d) Using a feeler gauge, measure the clearance between the synchronizer ring back and the gear spline end.
Minimum clearance:
2nd gear: 0.74 mm (0.0291 in.)
3rd gear : 0.70 mm (0.0276 in.)
If the clearance is less than the minimum, replace the synchronizer ring.


WM0066

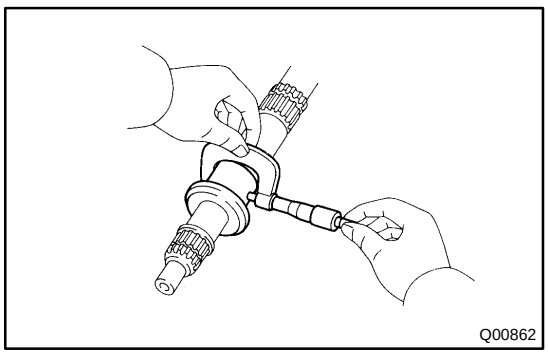
3. INSPECT SHIFT FORK AND HUB SLEEVE CLEARANCE
Using a feeler gauge, measure the clearance between the hub sleeves and shift forks.
Maximum clearance: 0.5 mm (0.020 in.)
If the clearance exceeds the maximum, replace the shift fork or hub sleeve.


Q00860

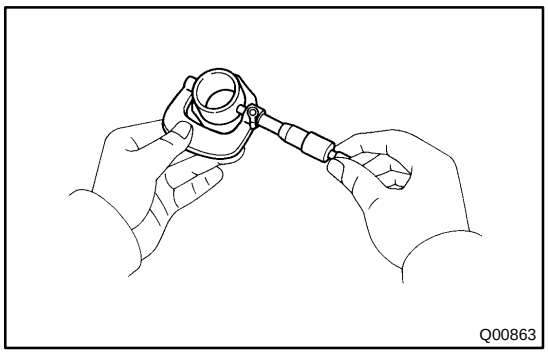
4. INSPECT OUTPUT SHAFT AND INNER RACE
(a) Using vernier calipers, measure the output shaft flange thickness.
Minimum thickness: 5.70 mm (0.2244 in.)
If the thickness is less than the minimum, replace the output shaft.


Q00861

(b) Using vernier calipers, measure the inner race flange thickness.
Minimum thickness: 4.78 mm (0.1881 in.)
If the thickness is less than the minimum, replace the inner race.

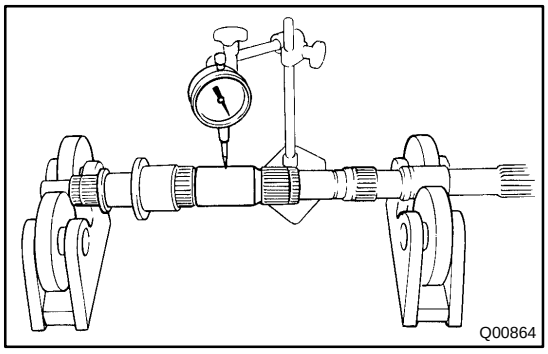

Q00862

(c) Using a micrometer, measure the outer diameter of the output shaft journal.
Minimum diameter:
2nd gear: 42.975 mm (1.6919 in.)
3rd gear: 31.969 mm (1.2586 in.)
If the outer diameter is less than the minimum, replace the output shaft.



(d) Using a micrometer, measure the outer diameter of the inner race.
Minimum diameter: 42.975 mm (1.6919 in.)

If the outer diameter is less than the minimum, replace the inner race.

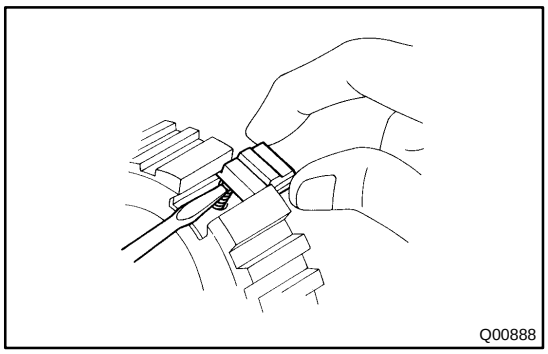


(e) Using a dial indicator, check the shaft runout.
Maximum runout: 0.03 mm (0.0012 in.)

If the runout exceeds the maximum, replace the output shaft.

MT0CA-02

REASSEMBLY


Q00888

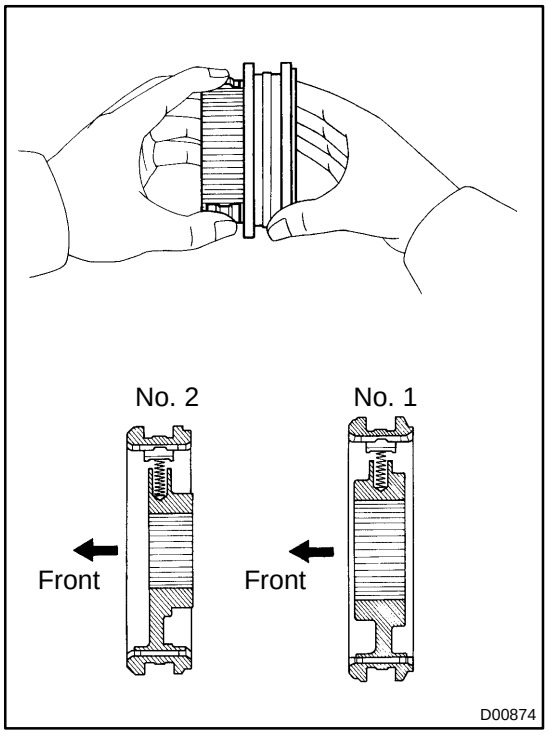
HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL NO. 1 AND NO. 2 CLUTCH HUBS INTO HUB SLEEVE

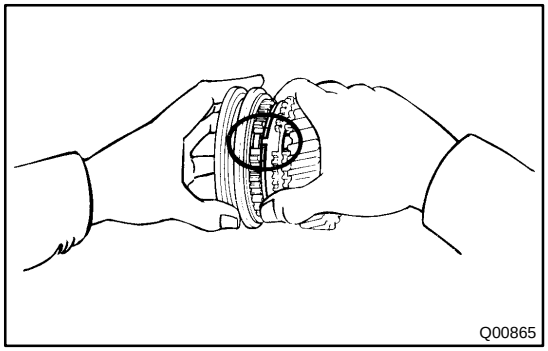
(a) Install the 3 shifting key springs to the clutch hub.

(b) While pushing the shifting key spring with a screwdriver, install the 3 shifting keys.



D00874

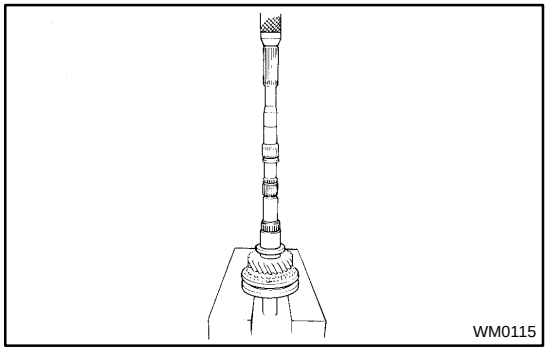
(c) While pushing the 3 shifting keys, install the clutch hub to the hub sleeve, as shown.


Q00865

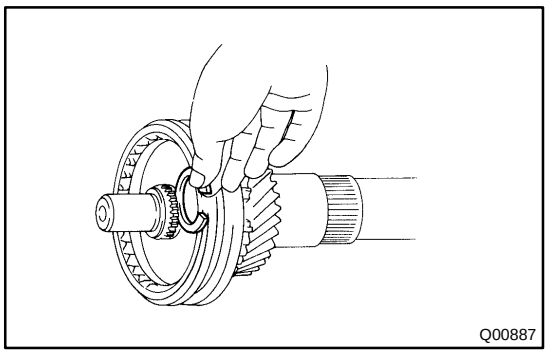
2. INSTALL 3RD GEAR AND NO. 2 CLUTCH HUB ON OUTPUT SHAFT

(a) Apply gear oil to the shaft.

(b) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.


WM0115

(c) Using a press, install the 3rd gear and No. 2 clutch hub.


Q00887

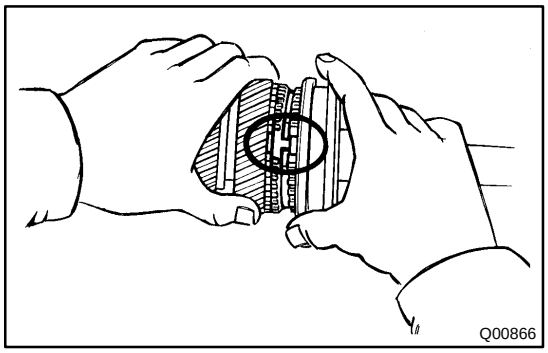
3. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
C-1	1.75 - 1.80 (0.0689 - 0.0709)
D	1.80 - 1.85 (0.0709 - 0.0728)
11	1.86 - 1.91 (0.0732 - 0.0752)
12	1.92 - 1.97 (0.0756 - 0.0776)
13	1.98 - 2.03 (0.0780 - 0.0799)
14	2.04 - 2.09 (0.0803 - 0.0823)
15	2.10 - 2.15 (0.0827 - 0.0846)

(b) Using a snap ring expander, install the snap ring.

4. INSPECT 3RD GEAR THRUST CLEARANCE
(See page MT-28)

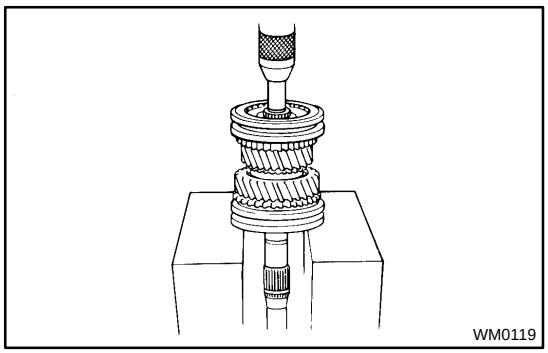

Q00866

5. INSTALL 2ND GEAR AND NO. 1 CLUTCH HUB

(a) Apply gear oil to the shaft and needle roller bearing.

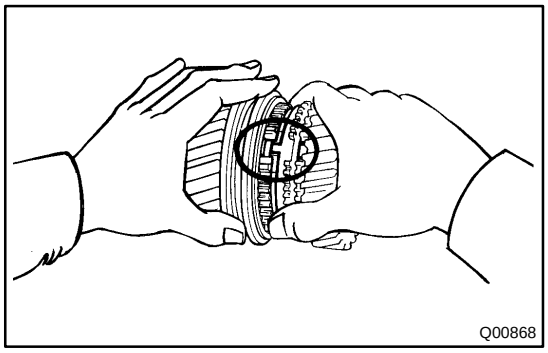
(b) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

(c) Install the needle roller bearing in the 2nd gear.


WM0119

(d) Using a press, install the 2nd gear and No. 1 clutch hub.

6. INSPECT 2ND GEAR THRUST CLEARANCE
(See page MT-28)


Q00868

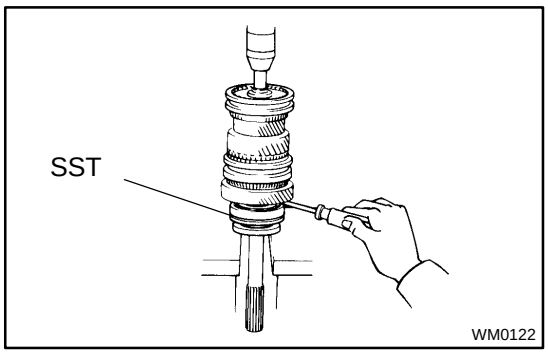
7. INSTALL LOCKING BALL AND 1ST GEAR ASSEMBLY

(a) Install the locking ball in the shaft.

(b) Apply gear oil to the bearing.

(c) Assemble the 1st gear, synchronizer ring, needle roller bearing and bearing inner race.

(d) Install the assembly on the output shaft with the synchronizer ring slots aligned with the shifting keys and turn the inner race to align it with the locking ball.



8. INSTALL OUTPUT SHAFT CENTER BEARING

Using SST and a press, install the center bearing on the output shaft with the outer race snap ring groove toward the rear.

HINT:

Hold the 1st gear inner race to prevent it from falling.

SST 09506-35010

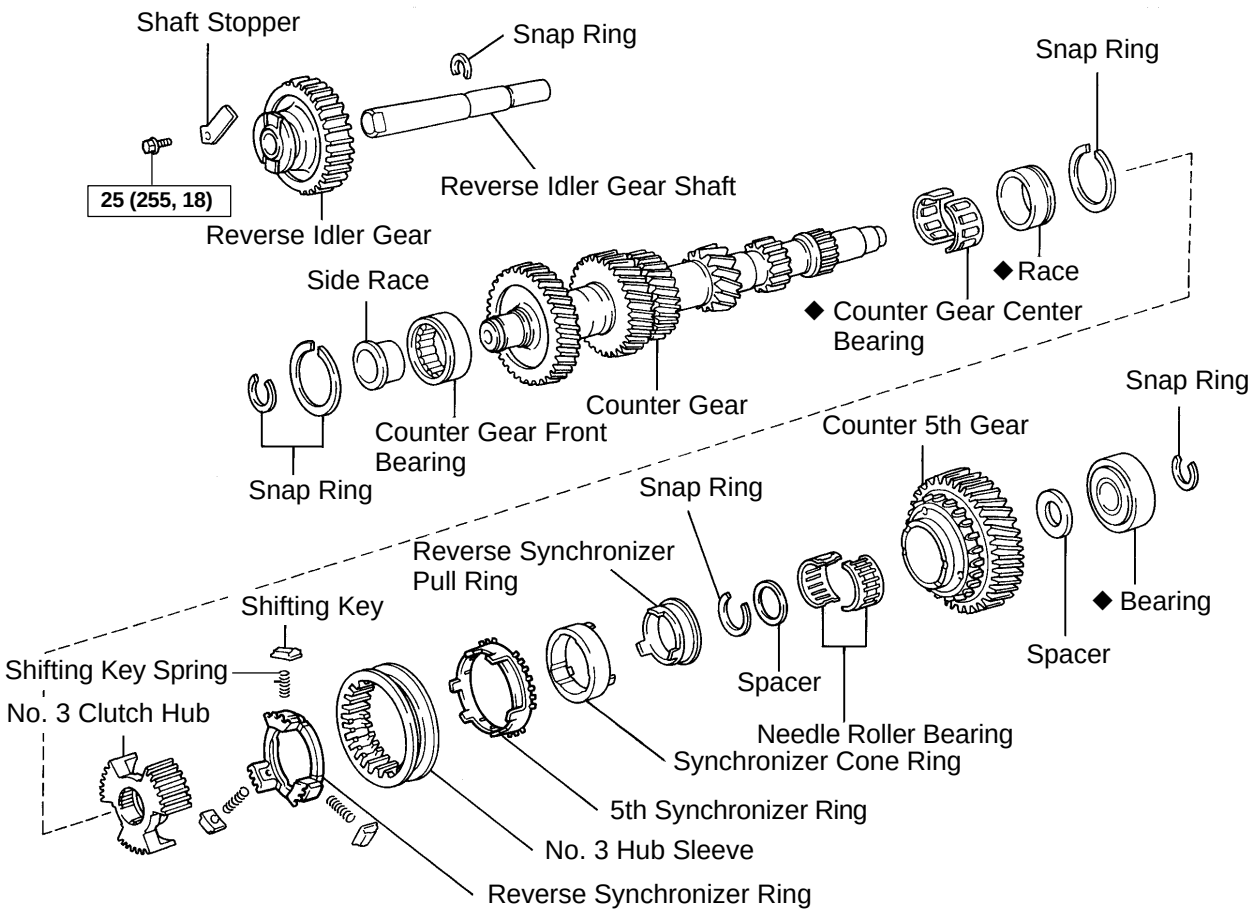
9. INSPECT 1ST GEAR THRUST CLEARANCE

(See page MT-28)

COUNTER GEAR AND REVERSE IDLER GEAR

COMPONENTS

MT0CB-02



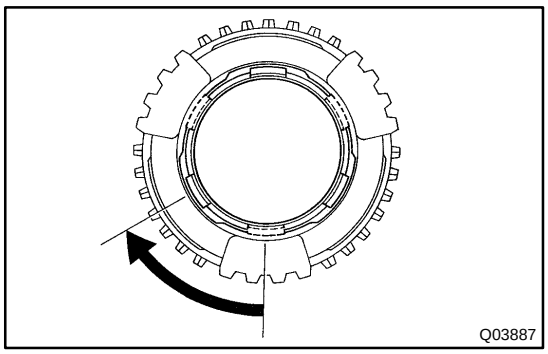
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

Z15652

MT0CC-02

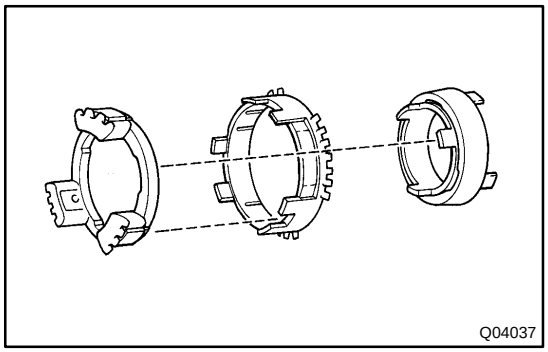
DISASSEMBLY

REMOVE NO. 3 HUB SLEEVE, SHIFTING KEY AND SPRING FROM SYNCHRONIZER RING

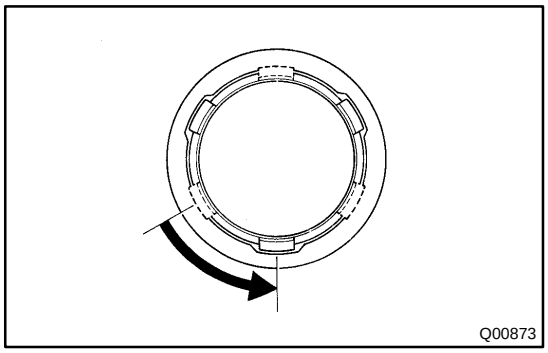


(a) Remove the synchronizer ring assembly from the No. 3 hub sleeve.

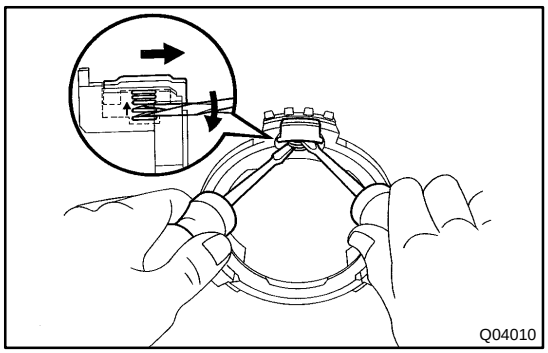
(b) Turn the reverse synchronizer pull ring.



(c) Remove the reverse synchronizer ring and 5th synchronizer ring from the synchronizer pull ring and cone ring.



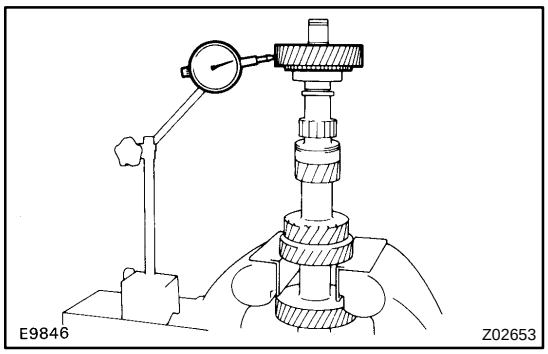
(d) Turn the reverse synchronizer pull ring and separate the pull ring and cone ring.



(e) Remove the 3 shifting keys and key springs by carefully levering up the shifting key spring with one screwdriver and levering the shifting key away from the reverse synchronizer ring with another screwdriver.

MT0FV-01

INSPECTION



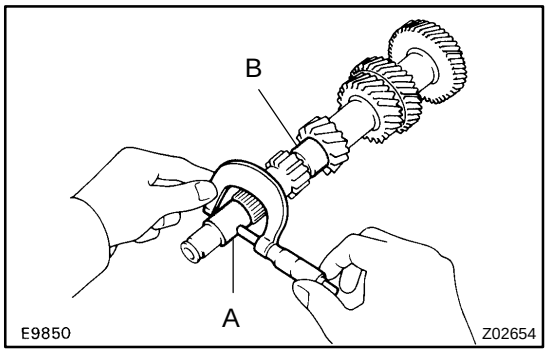
1. INSPECT COUNTER 5TH GEAR RADIAL CLEARANCE

(a) Install the spacer, counter 5th gear and needle roller bearing to the counter gear.

(b) Using a dial indicator, measure the counter 5th gear radial clearance.

Standard clearance:
0.009 - 0.060 mm (0.0004 - 0.0024 in.)
Maximum clearance:
0.060 mm (0.0024 in.)

If the clearance exceeds the maximum, replace the counter gear, needle roller bearing or counter 5th gear.

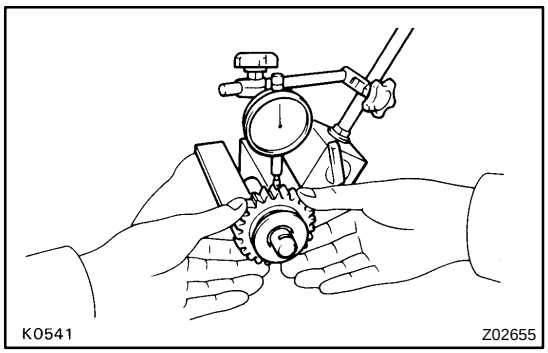


2. INSPECT COUNTER GEAR

Using a micrometer, measure the outer diameter of the counter shaft journal.

Minimum diameter:
Part A: 26.975 mm (1.0620 in.)
Part B: 29.950 mm (1.1791 in.)

If the outer race is less than the minimum, replace the counter gear.

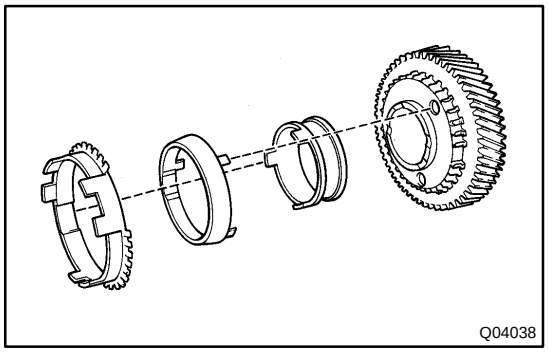


3. INSPECT REVERSE IDLER GEAR RADIAL CLEARANCE

Using a dial indicator, measure the reverse idler gear radial clearance.

Standard clearance:
0.041 - 0.074 mm (0.0016 - 0.0029 in.)
Maximum clearance:
0.074 mm (0.0029 in.)

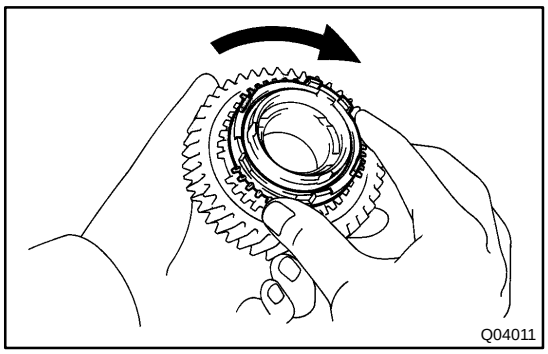
If the clearance exceeds the maximum, replace the gear or shaft.



4. INSPECT 5TH GEAR SYNCHRONIZER RING

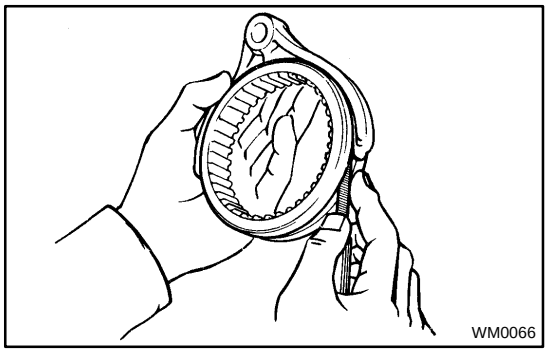
(a) Check for wear or damage.

(b) Install the synchronizer pull ring, cone ring and outer ring to the 5th gear.



(c) Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

If it does not lock, replace the synchronizer ring.



5. INSPECT SHIFT FORK AND HUB SLEEVE CLEARANCE

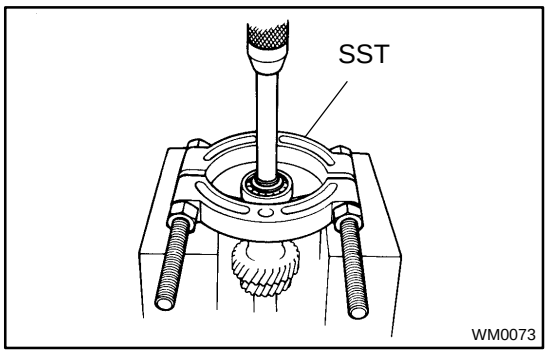
Using a feeler gauge, measure the clearance between the hub sleeves and shift forks.

Maximum clearance: 0.84 mm (0.0331 in.)

If the clearance exceeds the maximum, replace the shift fork or hub sleeve.

MT0CE-02

REPLACEMENT

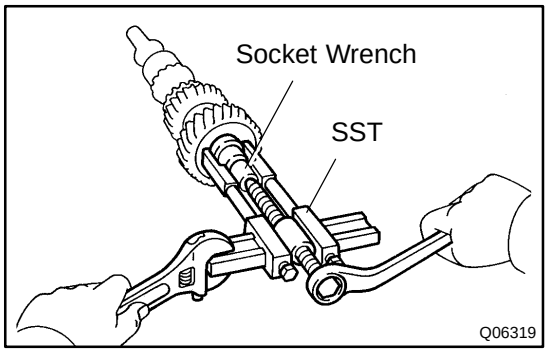


1. IF NECESSARY, REPLACE COUNTER GEAR FRONT BEARING AND SIDE RACE

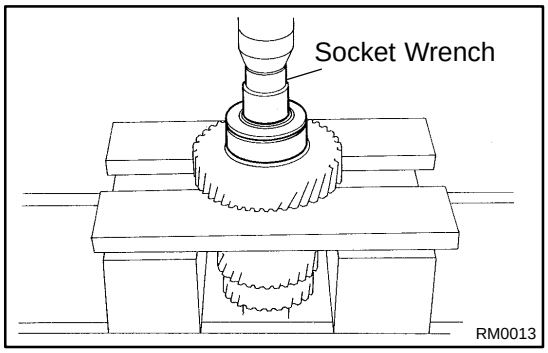
(a) Using a snap ring expander, remove the snap ring.

(b) Using SST and a press, press out the bearing.
SST 09950-00020

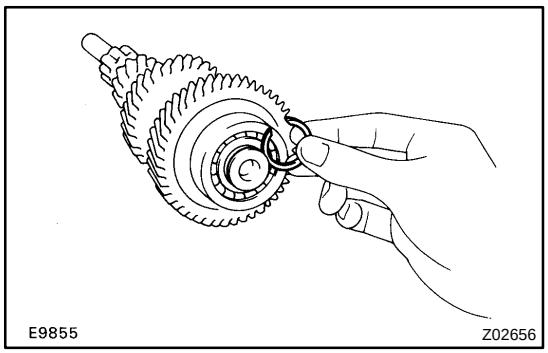
(c) Check the side race for wear or damage.



(d) If necessary, remove the side race.
Using SST and a socket wrench, remove the side race.
SST 09950- 40011 (09951- 04020, 09952- 04010, 09953-04020, 09954-04010, 09955-04071)



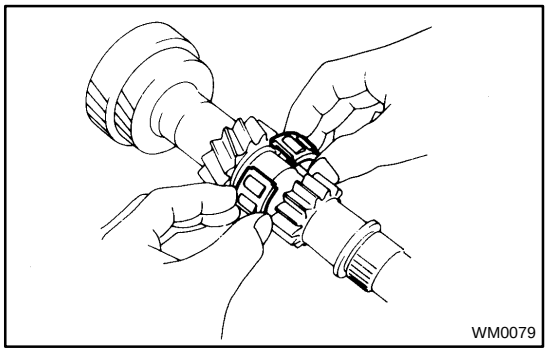
(e) Using a socket wrench and press, install a new bearing, side race and inner race.



(f) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
A	2.05 - 2.10 (0.0807 - 0.0827)
B	2.10 - 2.15 (0.0827 - 0.0846)
C	2.15 - 2.20 (0.0846 - 0.0866)
D	2.20 - 2.25 (0.0866 - 0.0886)
E	2.25 - 2.30 (0.0886 - 0.0906)
F	2.30 - 2.35 (0.0906 - 0.0925)

(g) Using a snap ring expander, install the snap ring.



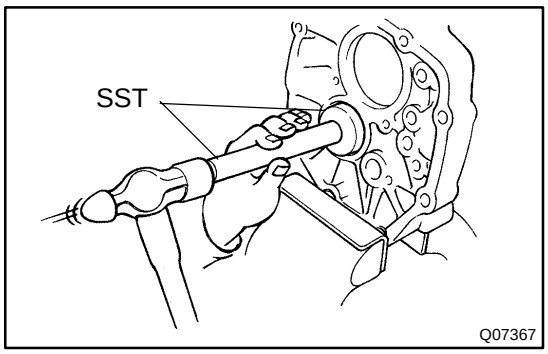
2. IF NECESSARY, REPLACE COUNTER GEAR CENTER BEARING

(a) Remove the bearing from the counter gear.

(b) Install a new bearing on the counter gear.

HINT:

Engage the roller cages.



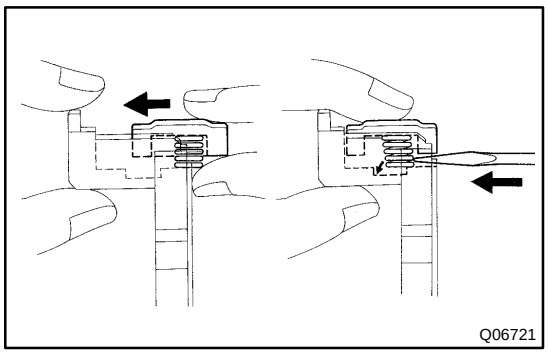
(c) Using SST and a hammer, tap out the bearing outer race.
SST 09950-60010 (09951-00510), 09950-70010 (09951-07150)

HINT:
The outer race will be installed later, as the transmission is assembled.

MT0CF-02

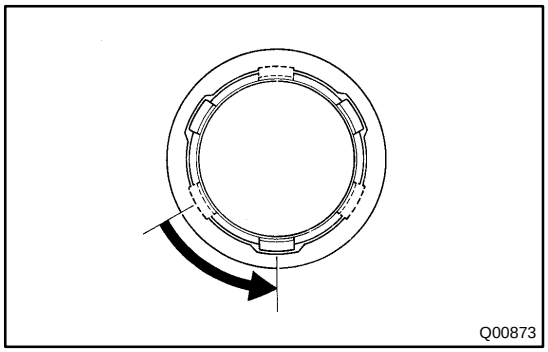
REASSEMBLY

INSTALL SYNCHRONIZER RING ASSEMBLY TO NO. 3 HUB SLEEVE

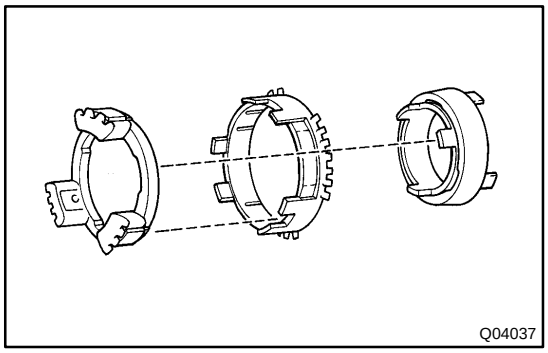


(a) Push the synchronizer key spring, install the shifting key and key spring to the reverse synchronizer ring.

(b) Using a screwdriver, push the 3 key springs into the synchronizer ring spring gaps.

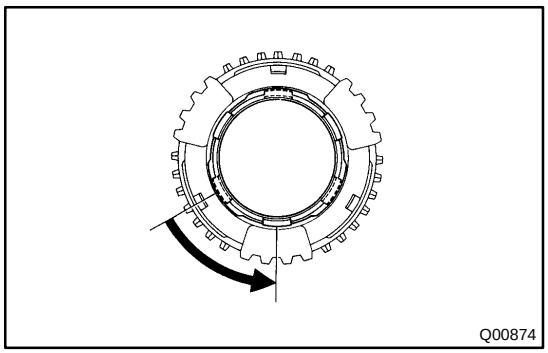


(c) Install the synchronizer cone ring to the reverse synchronizer pull ring and turn the pull ring.

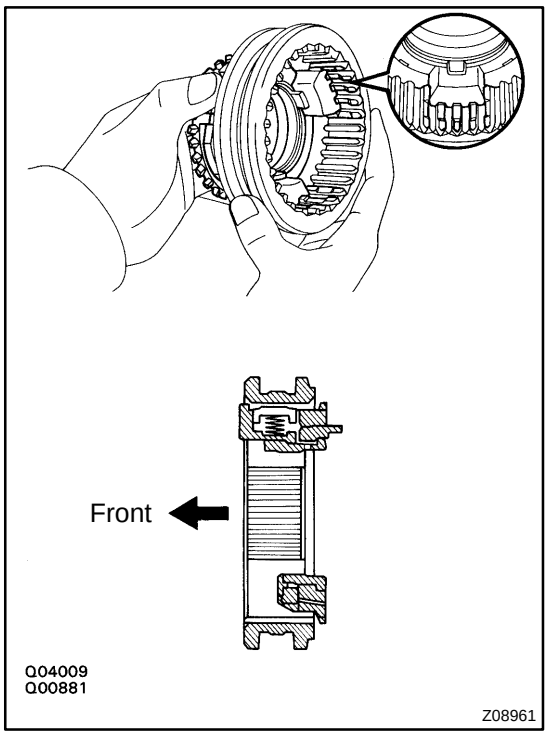


(d) Install the 5th synchronizer ring.

(e) Install the reverse synchronizer ring.



(f) Turn the reverse synchronizer pull ring.

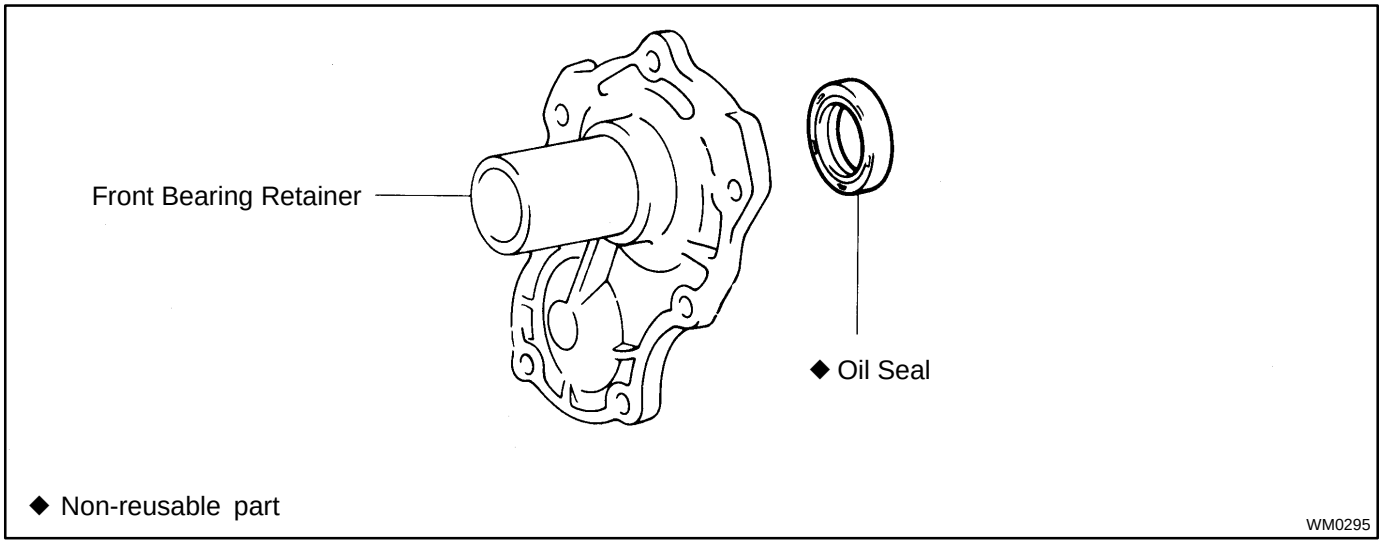


(g) While pushing 3 shifting keys, install the synchronizer ring assembly to the No. 3 hub sleeve.

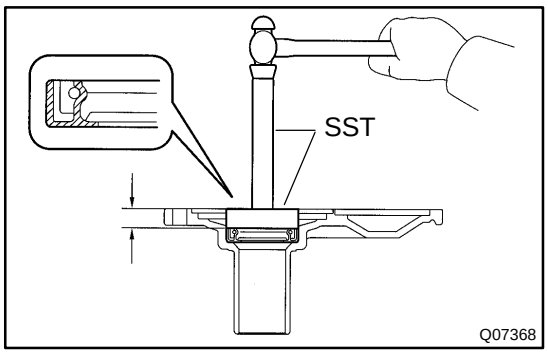
FRONT BEARING RETAINER OIL SEAL

MT0CG-02

COMPONENTS



MT0CH-02



REPLACEMENT

IF NECESSARY, REPLACE FRONT BEARING RETAINER OIL SEAL

(a) Using a screwdriver, pry out the oil seal.

(b) Using SST and a press, install a new oil seal.

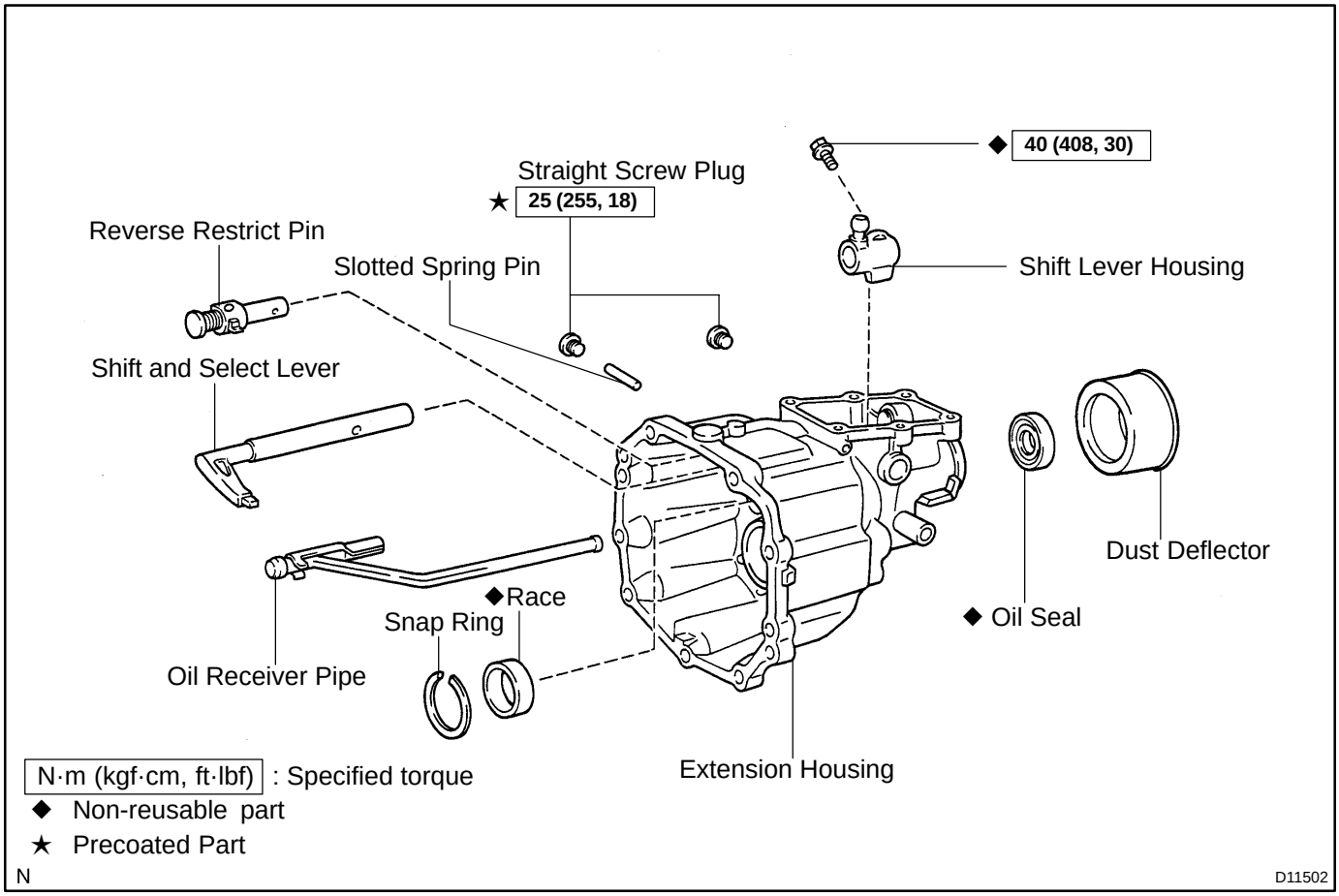
SST 09950-60010 (09951-00440), 09950-70010 (09951-07150)

Drive in depth: 12.2 ± 0.5 mm (0.480 ± 0.020 in.)

EXTENSION HOUSING

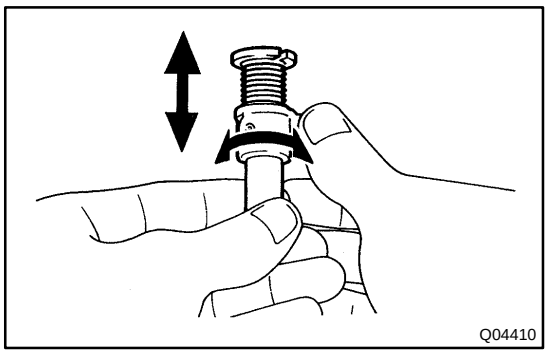
COMPONENTS

MT0CI-02



MT0CJ-02

REPLACEMENT


Q04410

1. REMOVE REVERSE RESTRICT PIN

(a) Using a hexagon wrench, remove the screw plug.

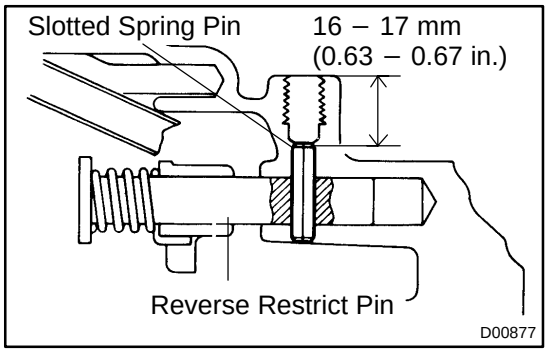
(b) Using a pin punch and hammer, drive out the slotted spring pin.

(c) Pull off the lever housing and slide out the shaft.

2. INSPECT REVERSE RESTRICT PIN

(a) Turn and push the reverse restrict pin by hand.

(b) Check for smooth operation.



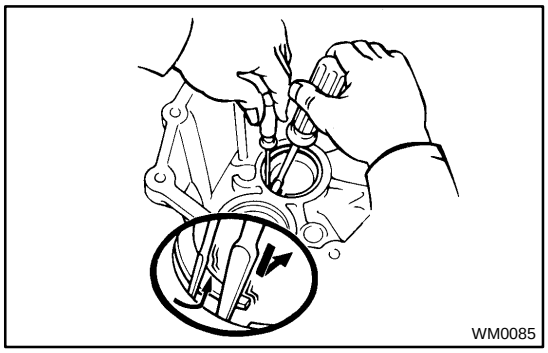
3. INSTALL REVERSE RESTRICT PIN

(a) Install the lever housing.

(b) Using a pin punch and hammer, drive in the slotted spring pin, as shown.
Drive in depth: 16 – 17 mm (0.63 – 0.67 in.)

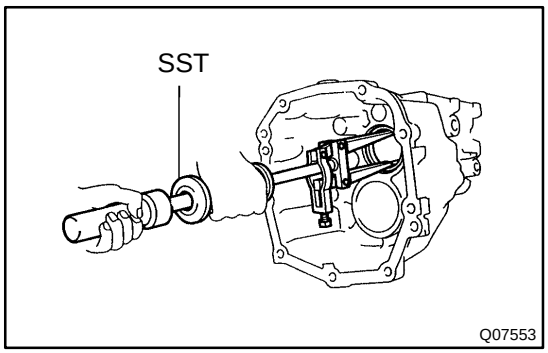
(c) Apply sealant to the plug.
Sealant: Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(d) Install and torque the screw plug.
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)


WM0085

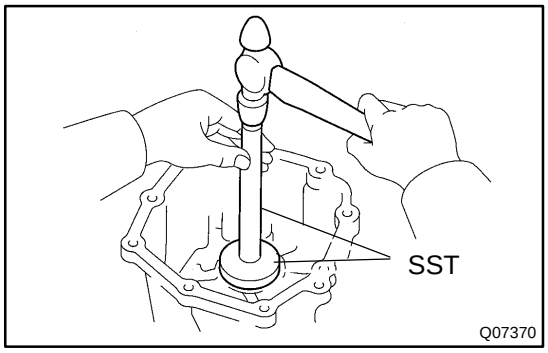
4. IF NECESSARY, REPLACE REAR BEARING OUTER RACE

(a) Using 2 screwdrivers, remove the snap ring.



Q07553

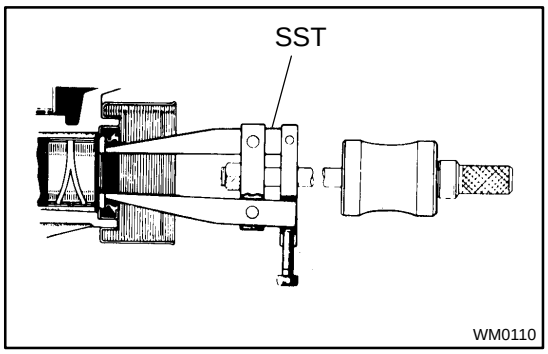
(b) Using SST, remove the outer race.
SST 09308-00010



Q07370

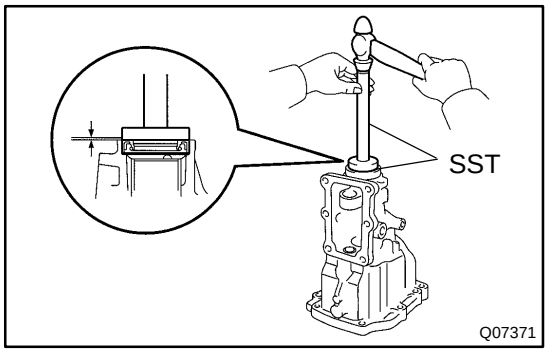
(c) Using SST, install a new outer race.
SST 09950- 60010 (09951- 00560), 09950- 70010 (09951-07150)

(d) Using a screwdriver, install the snap ring.



5. IF NECESSARY, REPLACE OIL SEAL

(a) Using SST, remove the oil seal.
SST 09308-00010 or
09308-10010 w/ output shaft installed



(b) Using SST and a hammer, drive in a new oil seal.
SST 09950- 60010 (09951- 00560), 09950- 70010 (09951-07150)
Drive in depth: 0 ± 0.5 mm (0 ± 0.020 in.)

AUTOMATIC TRANSMISSION SYSTEM

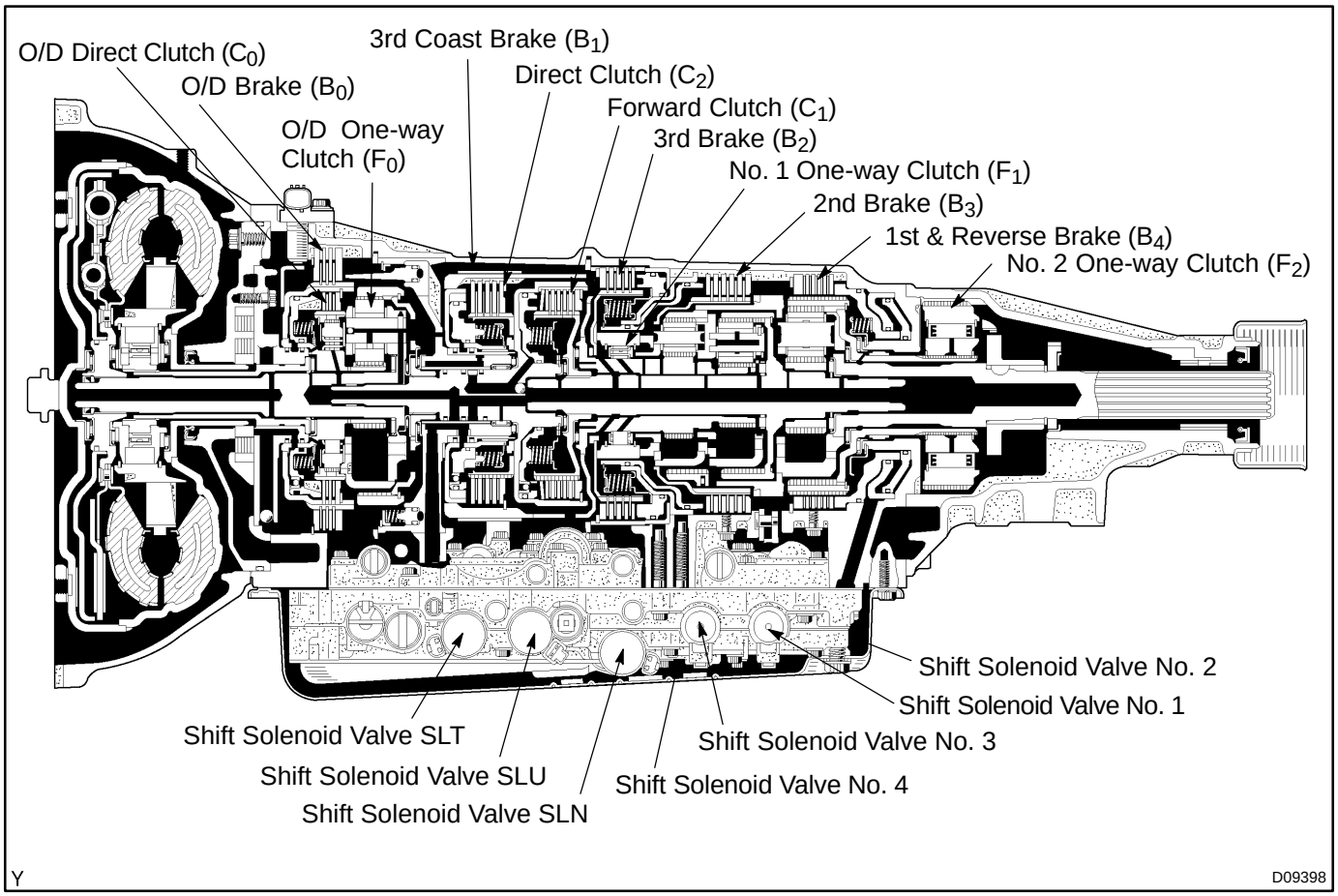
AT0HC-01

PRECAUTION

If the vehicle is equipped with a mobile communication system, refer to the precautions in the IN section.

AT05W-05

OPERATION



Shift Lever Position	Gear Position	S1	S2	S3	S4	C_0	C_1	C_2	B_0	B_1	B_2	B_3	B_4	F_0	F_1	F_2
P	Park	ON	OFF	ON	OFF	○										
R	Reverse	ON	OFF	OFF	OFF			○	○				○			
N	Neutral	ON	OFF	ON	OFF	○										
D M (5)*	1st	ON	OFF	OFF	OFF	○	○							○		○
	2nd	ON	ON	OFF	OFF	○	○					○		○		
	3rd	OFF	ON	OFF	OFF	○	○				○			○	○	
	4th	OFF	OFF	ON	OFF	○	○	○			○			○		
	5th	OFF	OFF	OFF	ON		○	○	○		○					
3	1st	ON	OFF	OFF	OFF	○	○							○		○
	2nd	ON	ON	OFF	OFF	○	○					○		○		
	3rd	OFF	ON	ON	OFF	○	○			○	○			○	○	
2	1st	ON	OFF	ON	OFF	○	○							○		○
	2nd	ON	ON	OFF	OFF	○	○					○		○		
L	1st	ON	OFF	OFF	OFF	○	○						○	○		○

○ : Operating

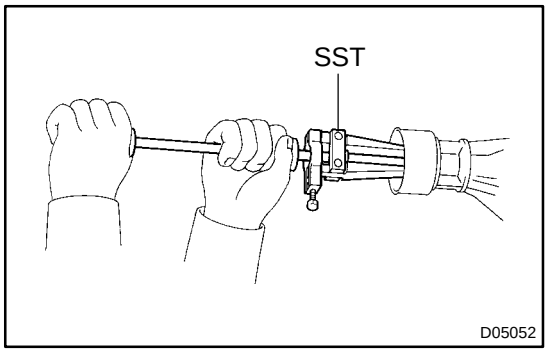
* : When the shift lever position is ”M” and the gear position indicator shows ”5”.

EXTENSION HOUSING OIL SEAL

AT0HE-02

ON-VEHICLE REPAIR

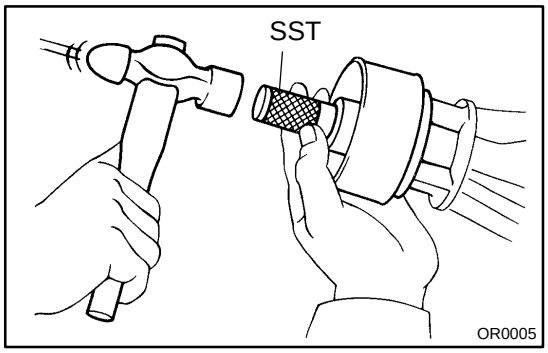
1. **REMOVE NO. 1 AND NO. 2 ENGINE UNDER COVERS**
2. **REMOVE LH FRONT FLOOR CENTER COVER**
3. **REMOVE NO. 1 REAR FLOOR BOARD**
4. **REMOVE EXHAUST PIPE ASSEMBLY**
   (See page EM-100)
5. **REMOVE PROPELLER SHAFT (See page PR-4)**



6. **REMOVE REAR OIL SEAL**

Using SST, remove the oil seal.

SST 09308-00010



7. **INSTALL NEW OIL SEAL**

(a) Using SST and a hammer, carefully drive a new oil seal in as far as it will go.

SST 09325-20010

NOTICE:

Clean the extension housing before removing the oil seal.

(b) Coat the lip of a new oil seal with MP grease.

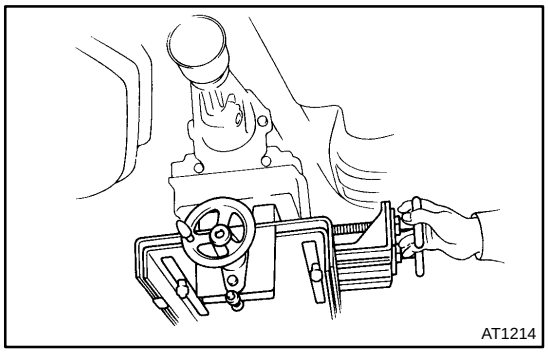
8. **INSTALL PROPELLER SHAFT (See page PR-10)**
9. **INSTALL EXHAUST PIPE ASSEMBLY**
   (See page EM-100)
10. **FILL ATF AND CHECK FLUID LEVEL**
    (See page DI-338)
11. **REMOVE NO. 1 REAR FLOOR BOARD**
12. **REMOVE LH FRONT FLOOR CENTER COVER**
13. **INSTALL NO. 1 AND NO. 2 ENGINE UNDER COVERS**

SENSOR ROTOR

AT0HF-02

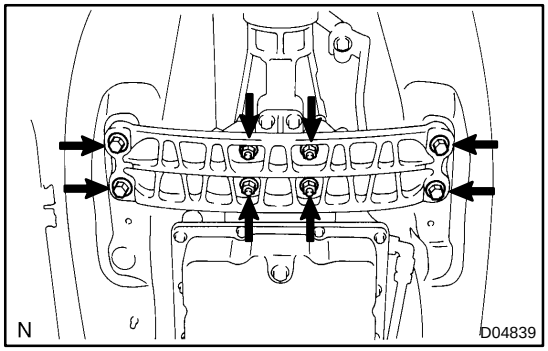
ON-VEHICLE REPAIR

1. **RAISE VEHICLE AND POSITION PAN TO CATCH ANY FLUID THAT MAY DRIP**
2. **REMOVE NO. 1 AND NO. 2 ENGINE UNDER COVERS**
3. **REMOVE LH FRONT FLOOR CENTER COVER**
4. **REMOVE NO. 1 REAR FLOOR BOARD**
5. **REMOVE EXHAUST PIPE (See page EM-100)**
6. **REMOVE PROPELLER SHAFT (See page PR-4)**
7. **REMOVE VEHICLE SPEED SENSOR (See page AT-7)**



8. JACK UP TRANSMISSION SLIGHTLY

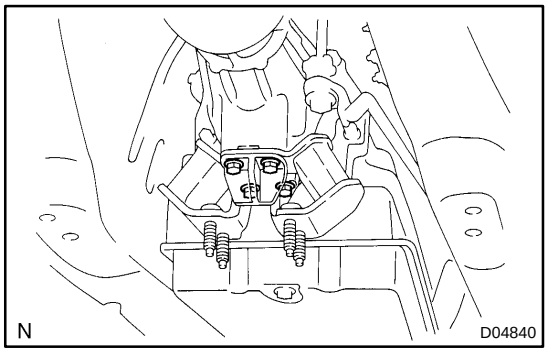
Securely support the transmission on a transmission jack. Lift the transmission slightly from the rear support member.



9. REMOVE ENGINE REAR SUPPORT MEMBER

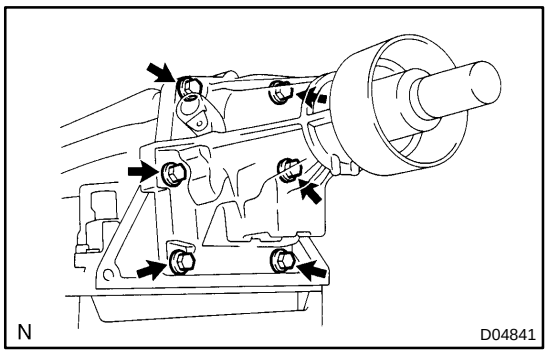
(a) Remove the 4 nuts.

(b) Remove the 4 bolts and rear support member.



10. REMOVE TRANSMISSION MOUNTING BRACKET

Remove the 4 bolts and the transmission mounting bracket from the transmission.



11. REMOVE EXTENSION HOUSING

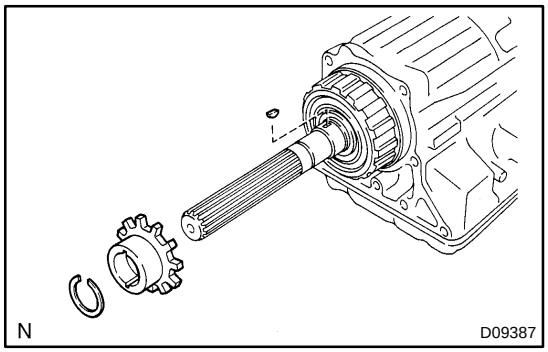
(a) Remove the 6 bolts.

(b) Remove the extension housing.

HINT:

If necessary, tap the extension housing with a plastic hammer.

(c) Remove the extension housing gasket.



12. REMOVE SENSOR ROTOR AND KEY

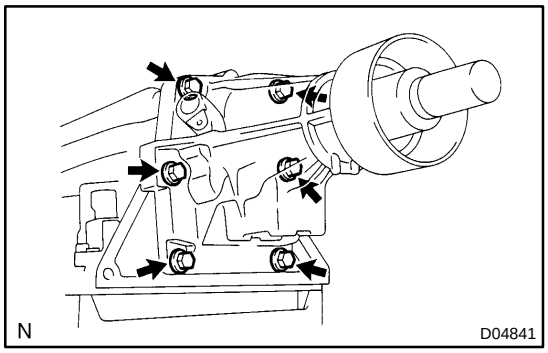
(a) Using a snap ring expander, remove the snap ring.

(b) Remove the sensor rotor and key.

13. INSTALL KEY AND SENSOR ROTOR

(a) Install the key and sensor rotor.

(b) Using a snap ring expander, install a new snap ring.



14. INSTALL EXTENSION HOUSING

(a) Install a new extension housing gasket.

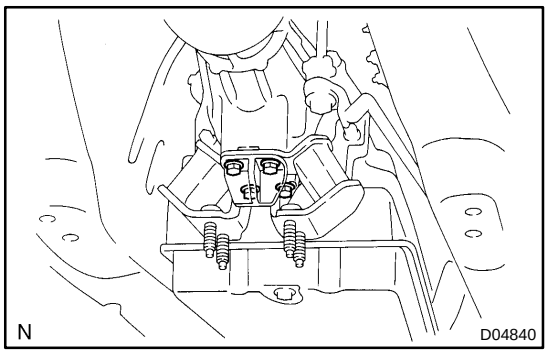
(b) Install the extension housing with the 6 bolts.

Torque: 34 N·m (345 kgf·cm, 25 ft·lbf)

HINT:

Coat the thread of the all bolts with sealant.

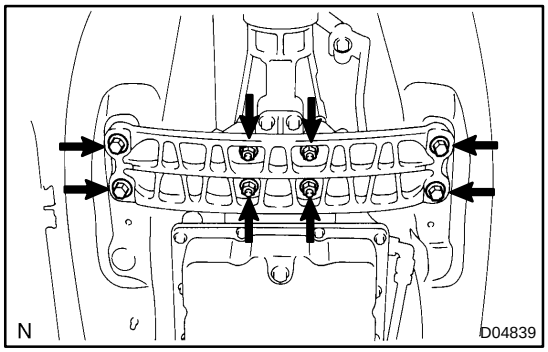
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent



15. INSTALL TRANSMISSION MOUNTING BRACKET

Install the transmission mounting bracket with the 4 bolts to the transmission.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)



16. INSTALL ENGINE REAR SUPPORT MEMBER

(a) Install the rear support member with the 4 bolts.

Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)

(b) Install the 4 nuts.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

17. REMOVE JACK

18. INSTALL VEHICLE SPEED SENSOR (See page AT-7)

19. INSTALL PROPELLER SHAFT (See page PR-10)

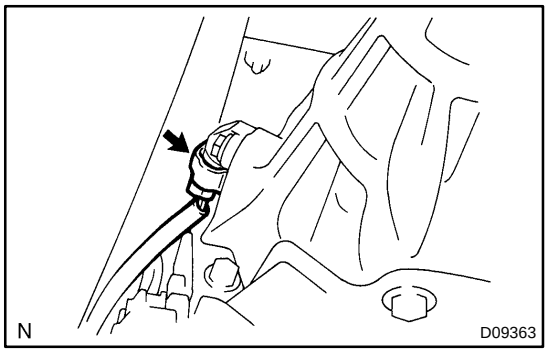
20. INSTALL EXHAUST PIPE (See page EM-100)
21. FILL ATF AND CHECK FLUID LEVEL (See page DI-338)
22. INSTALL NO. 1 REAR FLOOR BOARD
23. INSTALL LH FRONT FLOOR CENTER COVER
24. INSTALL NO. 1 AND NO. 2 ENGINE UNDER COVERS

VEHICLE SPEED SENSOR

AT0XV-01

ON-VEHICLE REPAIR

1. **REMOVE NO. 1 AND NO. 2 ENGINE UNDER COVERS**
2. **REMOVE LH FRONT FLOOR CENTER COVER**
3. **REMOVE NO. 1 REAR FLOOR BOARD**



4. **DISCONNECT VEHICLE SPEED SENSOR CONNECTOR**
5. **REMOVE VEHICLE SPEED SENSOR**

(a) Remove the bolt and vehicle speed sensor.

(b) Remove the O-ring from the vehicle speed sensor.

6. **INSTALL VEHICLE SPEED SENSOR**

(a) Coat a new O-ring with ATF and install it to the vehicle speed sensor.

(b) Install the vehicle speed sensor to the extension housing and torque the bolt.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

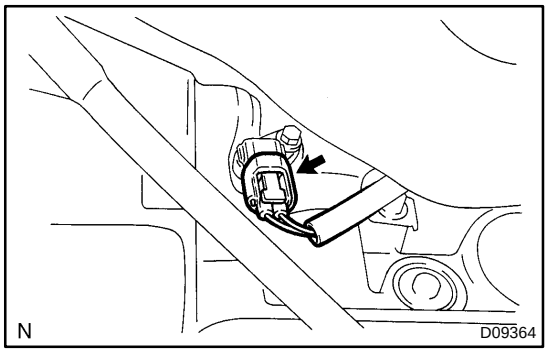
7. **INSTALL NO. 1 REAR FLOOR BOARD**
8. **INSTALL LH FRONT FLOOR CENTER COVER**
9. **INSTALL NO. 1 AND NO. 2 ENGINE UNDER COVERS**

O/D DIRECT CLUTCH SPEED SENSOR

AT0XW-01

ON-VEHICLE REPAIR

1. **REMOVE NO. 1 AND NO. 2 ENGINE UNDER COVERS**
2. **REMOVE LH FRONT FLOOR CENTER COVER**
3. **REMOVE NO. 1 REAR FLOOR BOARD**



4. **DISCONNECT O/D DIRECT CLUTCH SPEED SENSOR CONNECTOR**
5. **REMOVE O/D DIRECT CLUTCH SPEED SENSOR**

(a) Remove the bolt and O/D direct clutch speed sensor.

(b) Remove the O-ring from the O/D direct clutch speed sensor.

6. **INSTALL O/D DIRECT CLUTCH SPEED SENSOR**

(a) Coat a new O-ring with ATF and install it to the O/D direct clutch speed sensor.

(b) Install the O/D direct clutch speed sensor to the transmission case and torque the bolt.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

7. **INSTALL NO. 1 REAR FLOOR BOARD**
8. **INSTALL LH FRONT FLOOR CENTER COVER**
9. **INSTALL NO. 1 AND NO. 2 ENGINE UNDER COVERS**

ATF TEMPERATURE SENSOR

AT05Y-03

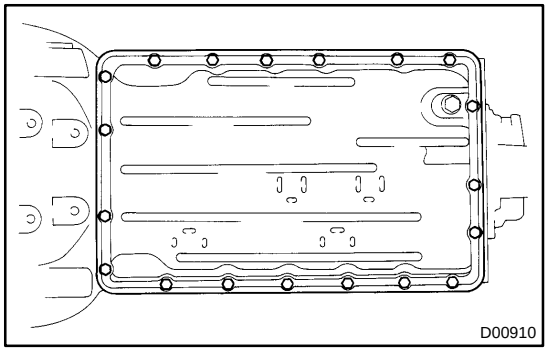
ON-VEHICLE REPAIR

CAUTION:

When working with FIPG material, you must observe the following items.

- **Using a razor blade and gasket scraper, remove all the old FIPG material from the gasket surfaces.**
- **Thoroughly clean all components to remove all the loose material.**
- **Clean both sealing surfaces with a non-residue solvent.**
- **Apply FIPG in an approx. 1 mm (0.04 in.) wide bead along the sealing surface.**
- **Parts must be assembled within 10 minutes of application. Otherwise, the FIPG material must be removed and reapplied.**

1. **REMOVE NO. 1 AND NO. 2 ENGINE UNDER COVERS**
2. **REMOVE LH FRONT FLOOR CENTER COVER**
3. **REMOVE NO. 1 REAR FLOOR BOARD**
4. **REMOVE DRAIN PLUG WITH GASKET AND DRAIN ATF**

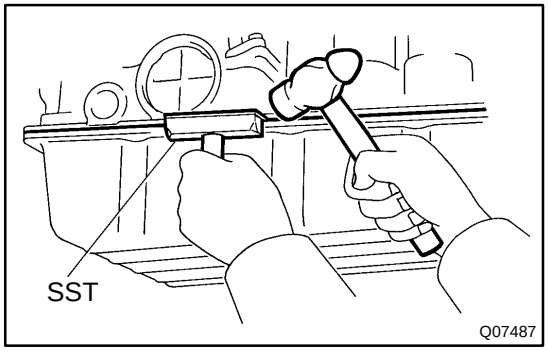


5. REMOVE OIL PAN

NOTICE:

Some fluid will remain in the oil pan.

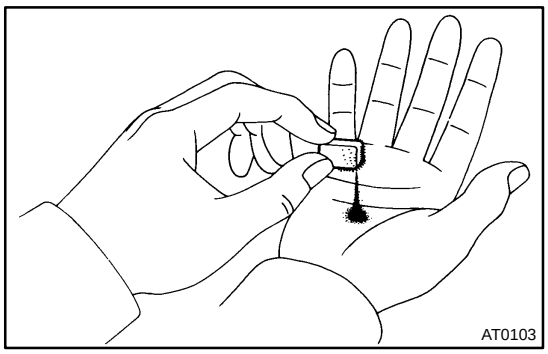
(a) Remove the 19 bolts.



(b) Install the blade of SST between the transmission case and oil pan, cut off applied sealer, and remove the oil pan.
SST 09032-00100

NOTICE:

When removing the oil pan, be careful not to damage the oil pan flange.

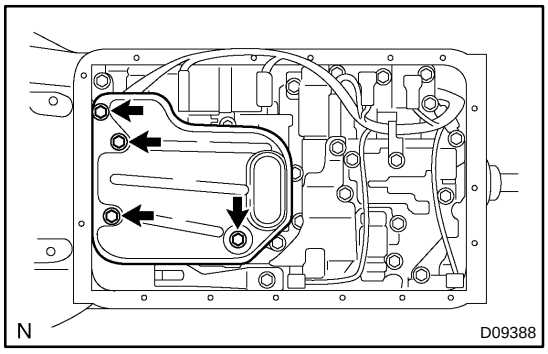


6. EXAMINE PARTICLES IN PAN

Remove the magnets and use them to collect steel particles. Carefully look at the foreign matter and particles in the pan and on the magnets to anticipate the type of wear you will find in the transmission.

Steel (magnetic) ... bearing, gear and clutch plate wear

Brass (non-magnetic) ... bushing wear

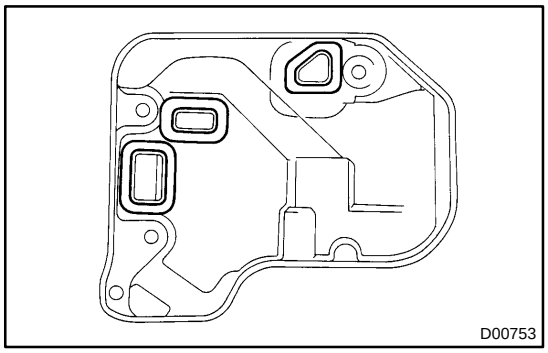


7. REMOVE OIL STRAINER

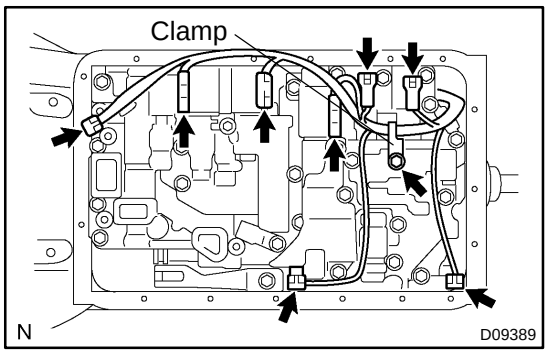
NOTICE:

Be careful as some fluid will come out of the oil strainer.

(a) Remove the 4 bolts and oil strainer.



(b) Remove the 3 gaskets from the oil strainer.

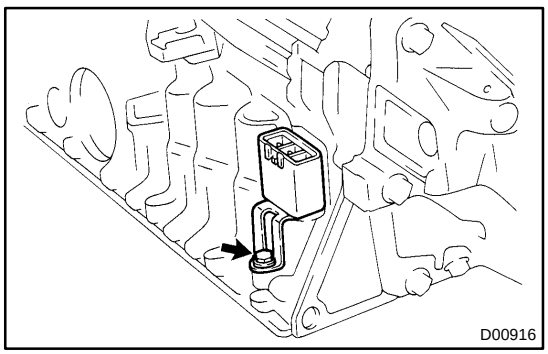


8. REMOVE SOLENOID WIRING WITH ATF TEMPERATURE SENSOR

(a) Disconnect the ATF temperature sensor and remove the O-ring.

(b) Remove the bolt and clamp.

(c) Disconnect the 7 connectors from the solenoid valves.

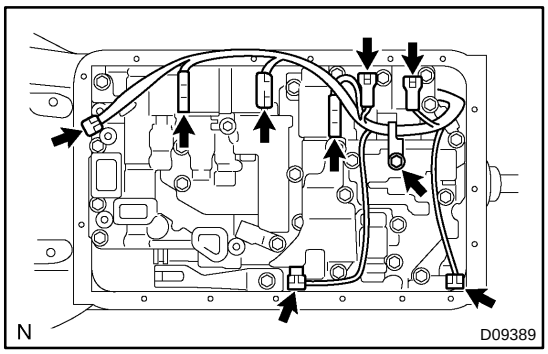


(d) Remove the bolt, solenoid connector and O-ring.

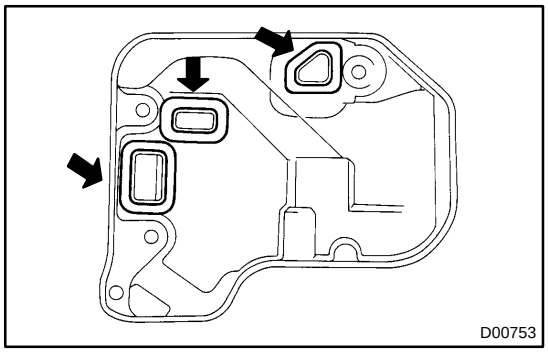
9. INSTALL SOLENOID WIRING WITH ATF TEMPERATURE SENSOR

(a) Install the solenoid connector and a new O-ring with the bolt.

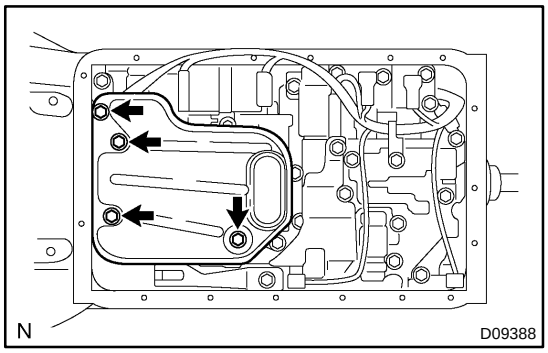
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



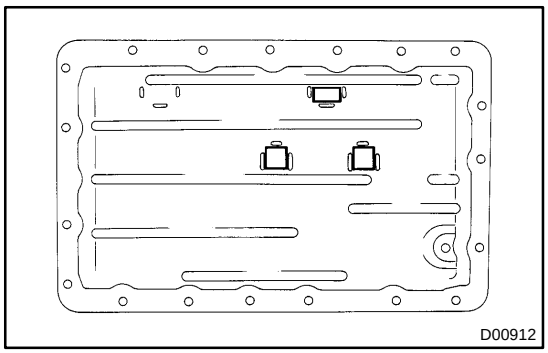
(b) Connect the 7 connectors to the solenoid valves.
(c) Install the clamp with the bolt.
Torque: 6.4 N·m (65 kgf·cm, 56 in.·lbf)
(d) Install a new O-ring and connect the ATF temperature sensor.



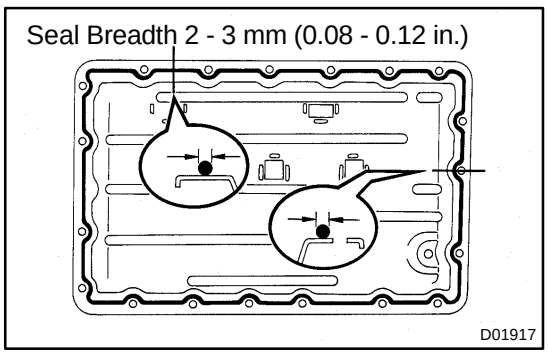
10. INSTALL OIL STRAINER
(a) Install 3 new gaskets.



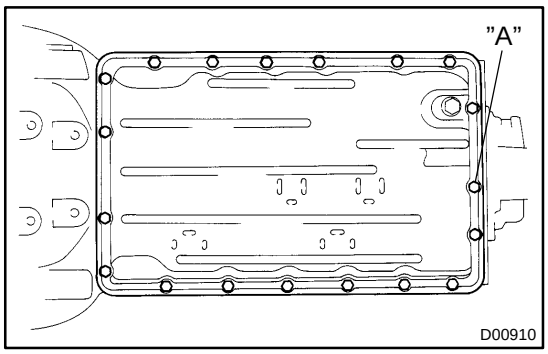
(b) Install the oil strainer with the 4 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)



11. INSTALL OIL PAN
(a) Install the 3 magnets in the indications of the oil pan.



(b) Remove any packing material and be careful not to drop oil on the contacting surfaces of the transmission case and oil pan.
(c) Apply FIPG to the oil pan.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent



(d) Install the oil pan with the 19 bolts.
Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

HINT:

Replace the only "A" bolt with a new one.

12. INSTALL DRAIN PLUG WITH NEW GASKET
Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

13. FILL FLUID AND CHECK FLUID (See page DI-338)

14. INSTALL NO. 1 REAR FLOOR BOARD

15. INSTALL LH FRONT FLOOR CENTER COVER

16. INSTALL NO. 1 AND NO. 2 ENGINE UNDER COVERS

VALVE BODY ASSEMBLY

AT05Z-03

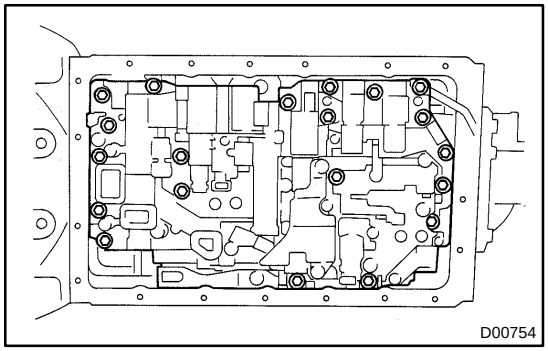
ON-VEHICLE REPAIR

CAUTION:

When working with FIPG material, you must observe the following items.

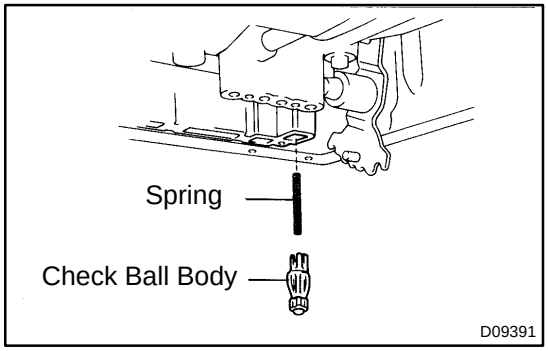
- **Using a razor blade and gasket scraper, remove all the old FIPG material from the gasket surfaces.**
- **Thoroughly clean all components to remove all the loose material.**
- **Clean both sealing surfaces with a non-residue solvent.**
- **Apply FIPG in an approx. 1 mm (0.04 in.) wide bead along the sealing surface.**
- **Parts must be assembled within 10 minutes of application. Otherwise, the FIPG material must be removed and reapplied.**

1. **REMOVE NO. 1 AND NO. 2 ENGINE UNDER COVERS**
2. **REMOVE LH FRONT FLOOR CENTER COVER**
3. **REMOVE NO. 1 REAR FLOOR BOARD**
4. **REMOVE DRAIN PLUG WITH GASKET AND DRAIN ATF**
5. **REMOVE OIL PAN (See page AT-9)**
6. **EXAMINE PARTICLES IN PAN (See page AT-9)**
7. **REMOVE OIL STRAINER (See page AT-9)**
8. **REMOVE SOLENOID WIRING WITH ATF TEMPERATURE SENSOR (See page AT-9)**



9. REMOVE VALVE BODY

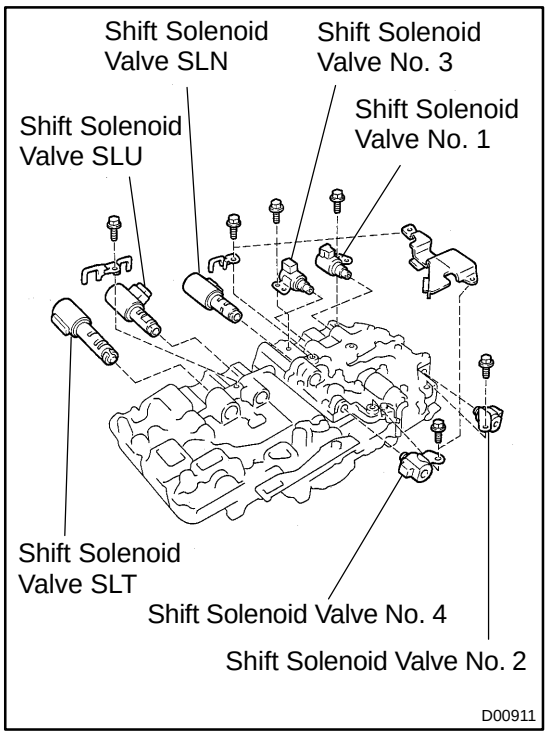
Remove the 20 bolts and valve body.



10. REMOVE CHECK BALL BODY AND SPRING

NOTICE:

Do not drop the check ball body and spring.



11. REMOVE SOLENOID VALVE

(a) Remove the 3 bolts and shift solenoid valve No. 1, No. 2 and No. 3.

(b) Remove the 2 bolts, oil guide plate, lock plate, shift solenoid valve SLN and No. 4.

(c) Remove the 6 O-rings from each shift solenoid valve.

(d) Remove the bolt, lock plate and shift solenoid valve SLU and SLT.

12. INSTALL SOLENOID VALVE

(a) Install the shift solenoid valve SLU and SLT and the lock plate with the bolt.

Torque: 6.4 N·m (65 kgf·cm, 56 in.·lbf)

(b) Coat 6 new O-rings with ATF.

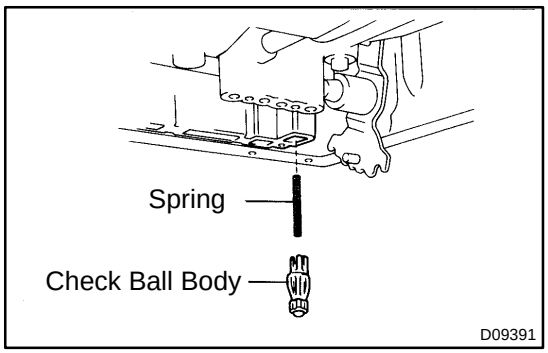
(c) Install the 6 O-rings to the each solenoid valve.

(d) Install the shift solenoid valve SLN, No. 4, lock plate and oil guide plate with the 2 bolts.

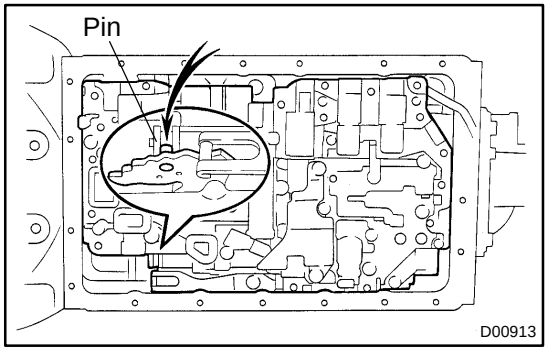
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

(e) Install the shift solenoid valve No. 1, No. 2 and No. 3 with the 3 bolts.

Torque:
Shift solenoid valve No. 1 and No. 3:
6.4 N·m (65 kgf·cm, 56 in.·lbf)
Shift solenoid valve No. 2:
10 N·m (100 kgf·cm, 7 ft·lbf)

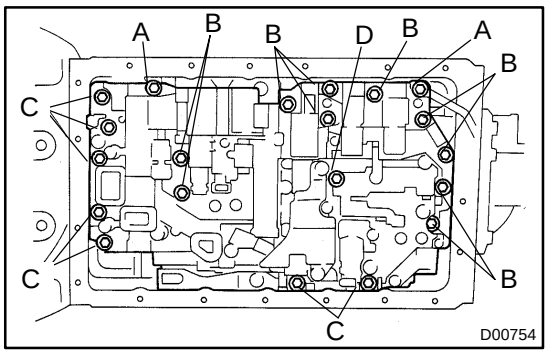


13. INSTALL CHECK BALL BODY AND SPRING



14. INSTALL VALVE BODY

(a) Align the groove of the manual valve to pin of the lever.



(b) Install the 20 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)
Bolt length:
Bolt A: 23 mm (0.91 in.)
Bolt B: 28 mm (1.10 in.)
Bolt C: 36 mm (1.42 in.)
Bolt D: 55 mm (2.17 in.)

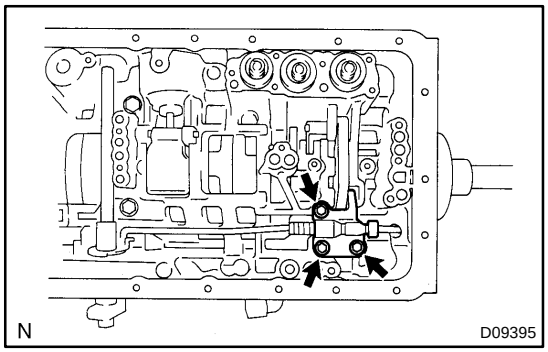
15. **INSTALL SOLENOID WIRING WITH ATF TEMPERATURE SENSOR (See page AT-9)**
16. **INSTALL OIL STRAINER (See page AT-9)**
17. **INSTALL OIL PAN (See page AT-9)**
18. **INSTALL DRAIN PLUG WITH NEW GASKET**
Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)
19. **FILL FLUID AND CHECK FLUID (See page DI-338)**
20. **INSTALL NO. 1 REAR FLOOR BOARD**
21. **INSTALL LH FRONT FLOOR CENTER COVER**
22. **INSTALL NO. 1 AND NO. 2 ENGINE UNDER COVERS**

PARKING LOCK PAWL

AT0HL-02

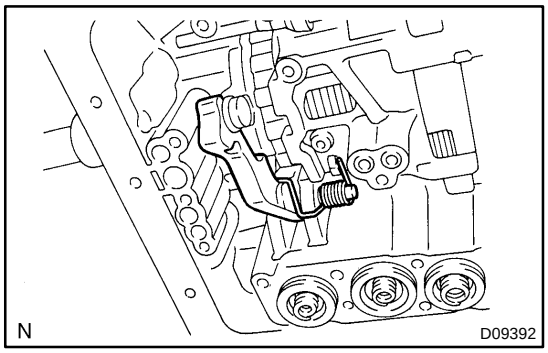
ON-VEHICLE REPAIR

1. **REMOVE NO. 1 AND NO. 2 ENGINE UNDER COVERS**
2. **REMOVE LH FRONT FLOOR CENTER COVER**
3. **REMOVE NO. 1 REAR FLOOR BOARD**
4. **REMOVE VALVE BODY (See page AT-13)**



5. **REMOVE PARKING LOCK PAWL BRACKET**

Remove the 3 bolts and parking lock pawl bracket.



6. **REMOVE SPRING FROM PARKING LOCK PAWL SHAFT**
7. **REMOVE PARKING LOCK PAWL SHAFT AND PARKING LOCK PAWL**
8. **INSTALL PARKING LOCK PAWL AND PARKING LOCK PAWL SHAFT**
9. **INSTALL SPRING TO PARKING LOCK PAWL SHAFT**
10. **INSTALL PARKING LOCK PAWL BRACKET**

Install the parking lock pawl bracket with the 3 bolts.

Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

HINT:

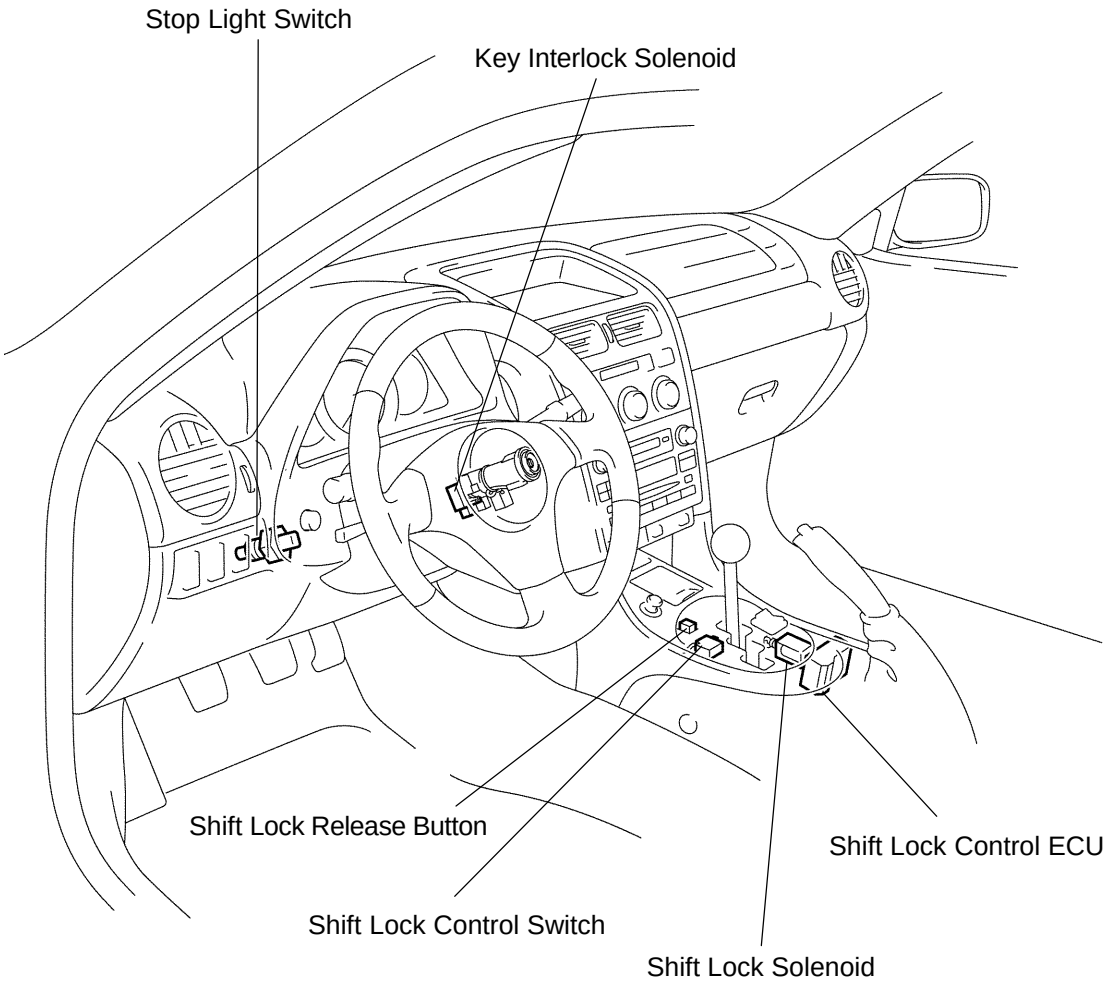
- Push the lock rod fully forward.
- Check that the parking lock pawl operates smoothly.

11. **INSTALL VALVE BODY (See page AT-13)**
12. **INSTALL NO. 1 REAR FLOOR BOARD**
13. **INSTALL LH FRONT FLOOR CENTER COVER**
14. **INSTALL NO. 1 AND NO. 2 ENGINE UNDER COVERS**

SHIFT LOCK SYSTEM

AT0HM-02

LOCATION



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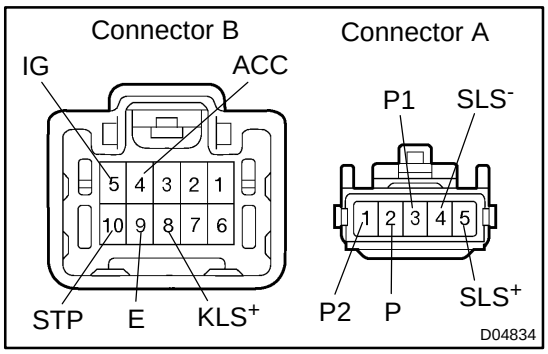


INSPECTION

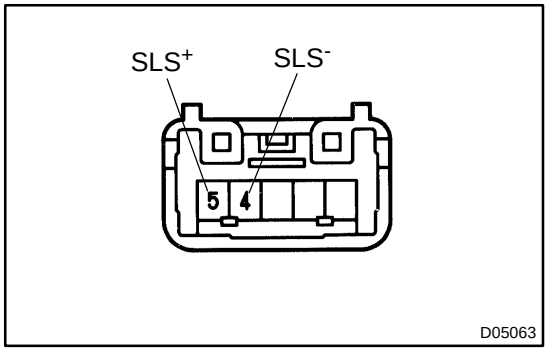
1. INSPECT SHIFT LOCK CONTROL ECU

Using a voltmeter, measure the voltage at each terminal.

HINT:

Do not disconnect the shift lock control ECU connector.

Terminal	Measuring condition	Voltage (V)
B4 - B9 (ACC - E)	Ignition switch ACC	10 - 14
B5 - B9 (IG - E)	Ignition switch ON	10 - 14
B8 - B9 (KLS^+ - E)	4. Ignition switch ACC and P position 5. Ignition switch ACC and except P position 6. Ignition switch ACC and except P position (After approx. 1 second)	0 7.5 - 11.5 6 - 9
B10 - B9 (STP - E)	Depressing brake pedal	10 - 14
A5 - A4 (SLS^+ - SLS^-)	1. Ignition switch ON and P position 2. Depress brake pedal 3. Depress brake pedal (After approx. 1 second) 4. Shift between P and N position under conditions above 5. Shift D position under conditions above	0 8 - 15 6 - 11 6 - 11 0
A3 - A2 (P1 - P)	1. Ignition switch ON, P position and depress brake pedal 2. Shift except P position under condition above	0 12
A1 - A2 (P2 - P)	1. Ignition switch ON, P position and depress brake pedal 2. Shift except P position under conditions above	12 0



2. INSPECT SHIFT LOCK SOLENOID

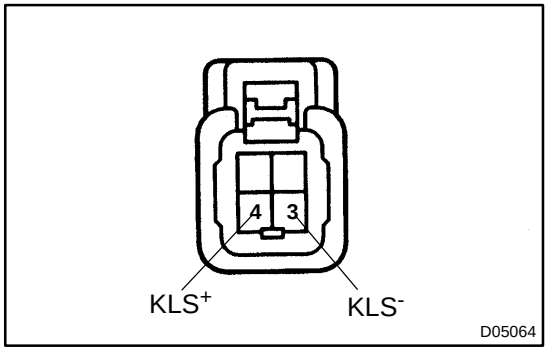
(a) Disconnect the solenoid connector.

(b) Using an ohmmeter, measure resistance between terminals.

If resistance value is not as specified, replace the solenoid.

(c) Check the solenoid operating sound when connecting the battery positive terminal to 5 (SLS^+) and battery negative terminal to 4 (SLS^-).

If the solenoid does not operate, replace the solenoid.



3. INSPECT KEY INTERLOCK SOLENOID

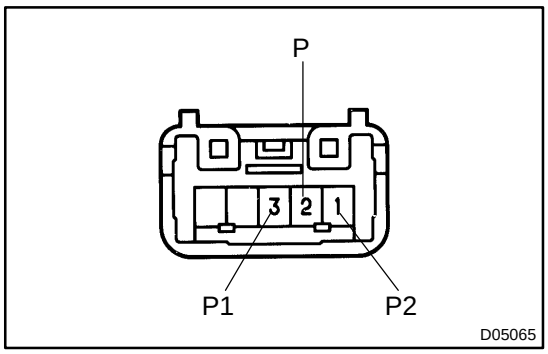
(a) Disconnect the solenoid connector.

(b) Using an ohmmeter, measure resistance between terminals.

If resistance valve is not as specified, replace the solenoid.

(c) Check the solenoid operating sound when connecting the battery positive terminal to 4 (KLS^+) and battery negative terminal to 3 (KLS^-).

If the solenoid does not operate, replace the solenoid.



4. INSPECT SHIFT LOCK CONTROL SWITCH

(a) Disconnect the shift lock control switch.

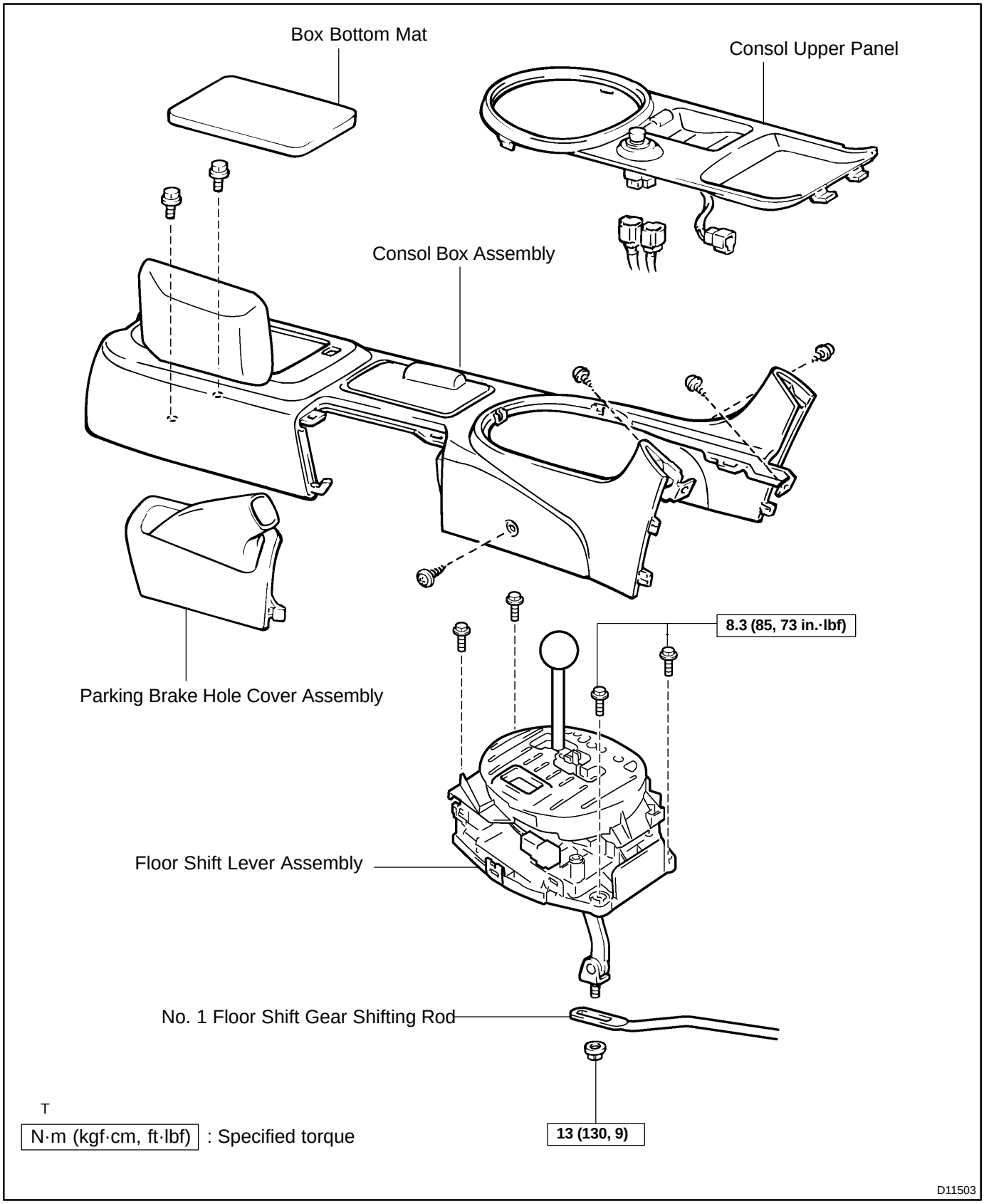
(b) Inspect that continuity exists between each terminal.

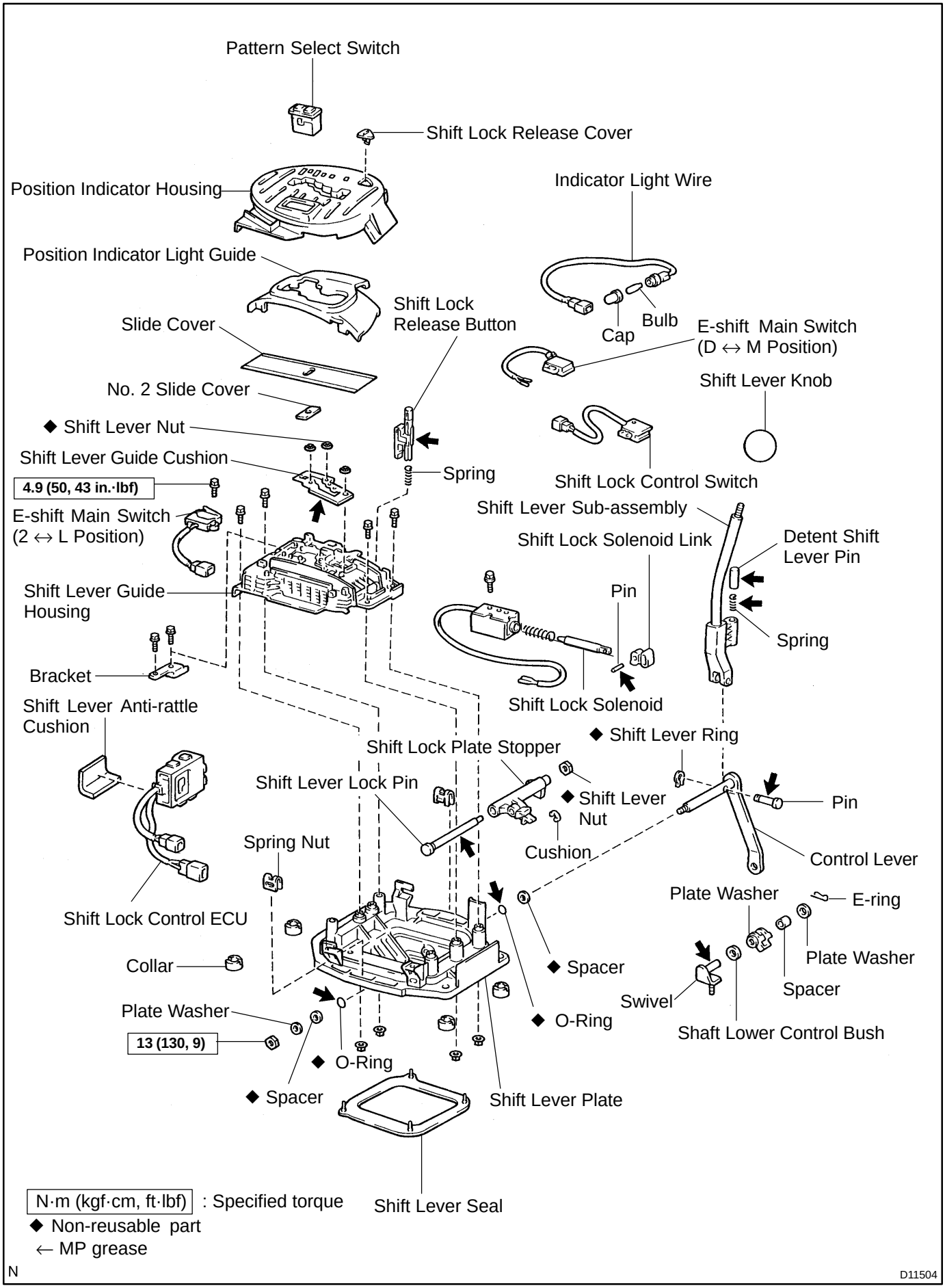
Shift position	Terminal condition to terminal number	Specified value
P position (Release button is not pushed)	P - P1	Continuity
P position (Release button is pushed)	P - P1 P - P2	Continuity
Except P position	P - P2	Continuity

FLOOR SHIFT ASSEMBLY

COMPONENTS

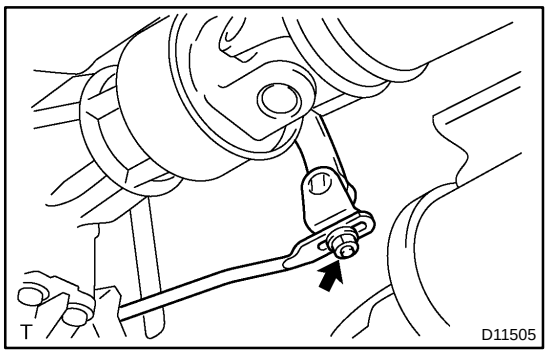
AT0HO-02




Pattern Select Switch
Shift Lock Release Cover
Position Indicator Housing
Indicator Light Wire
Position Indicator Light Guide
Shift Lock Release Button
Slide Cover
Cap
Bulb
E-shift Main Switch (D ↔ M Position)
No. 2 Slide Cover
Shift Lever Knob
◆ Shift Lever Nut
Shift Lever Guide Cushion
Spring
Shift Lock Control Switch
4.9 (50, 43 in.·lbf)
Shift Lever Sub-assembly
E-shift Main Switch (2 ↔ L Position)
Shift Lock Solenoid Link
Detent Shift Lever Pin
Shift Lever Guide Housing
Pin
Spring
Bracket
Shift Lock Solenoid
Shift Lever Anti-rattle Cushion
◆ Shift Lever Ring
Shift Lock Plate Stopper
Shift Lever Lock Pin
◆ Shift Lever Nut
Pin
Spring Nut
Cushion
Control Lever
Plate Washer
E-ring
Shift Lock Control ECU
Collar
◆ Spacer
Plate Washer
Swivel
Spacer
Plate Washer
13 (130, 9)
◆ O-Ring
Shaft Lower Control Bush
◆ O-Ring
◆ Spacer
Shift Lever Plate
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
← MP grease
Shift Lever Seal
N
D11504

AT0HP-02

REMOVAL



1. SEPARATE NO. 1 FLOOR SHIFT GEAR SHIFTING ROD

(a) Shift into the N position.

(b) Remove the nut and separate the No. 1 floor shift gear shifting rod from the connecting rod swivel.

2. REMOVE CONSOLE BOX ASSEMBLY

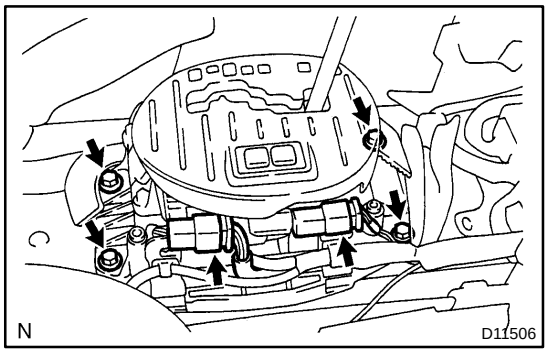
(See page BO-139)

(a) Remove the console upper panel.

(b) Remove the box bottom mat.

(c) Remove the parking brake hole cover assembly.

(d) Remove the console box assembly.



3. REMOVE FLOOR SHIFT LEVER ASSEMBLY

(a) Remove the 4 bolts.

(b) Disconnect the 2 connectors.

(c) Remove the floor shift lever assembly.

AT0HQ-02

DISASSEMBLY

1. REMOVE SHIFT LEVER KNOB

2. REMOVE POSITION INDICATOR HOUSING

(a) Using a small screwdriver, remove the shift lock release cover from the position indicator housing.

(b) Disconnect the pattern select switch connector.

(c) Remove the position indicator housing assembly.

(d) Remove the pattern select switch from the position indicator housing assembly.

3. REMOVE POSITION INDICATOR LIGHT GUIDE

(a) Disconnect the indicator light wire from the position indicator light guide.

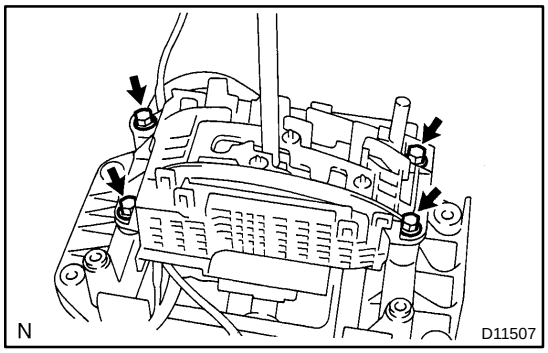
(b) Remove the position indicator light guide.

4. REMOVE SLIDE COVER AND NO. 2 SLIDE COVER

5. REMOVE SHIFT LEVER GUIDE HOUSING

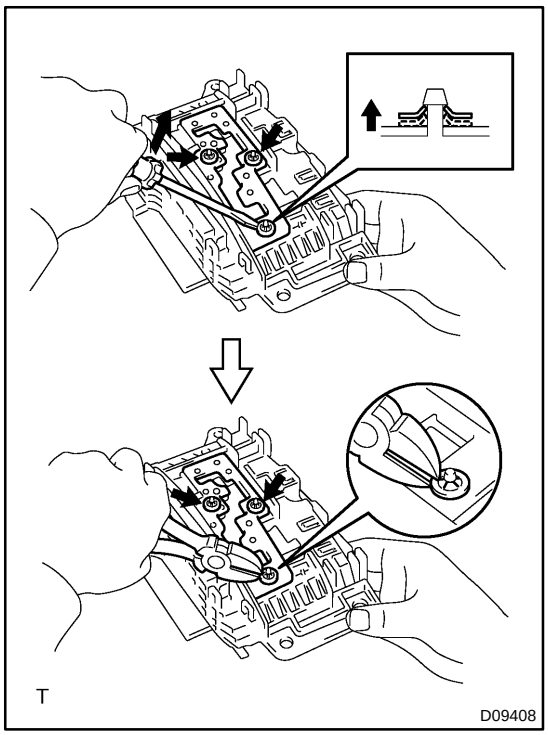
(a) Disconnect the shift lock control ECU connector and indicator light wire from the shift lever plate.

(b) Remove the 2 E-shift main switches and shift lock control switch from the shift lever guide housing.



(c) Remove the 4 bolts, nuts and shift lever guide housing assembly.

(d) Remove the bulb and cap and from the indicator light wire.



6. DISASSEMBLE SHIFT LEVER GUIDE HOUSING

(a) Using a screwdriver, ply and push up 3 shift lever nuts.

(b) Using nippers, cut the 3 shift lever nuts off then.

HINT:

Remove the shift lever lock pin of shift lever nut in the same way.

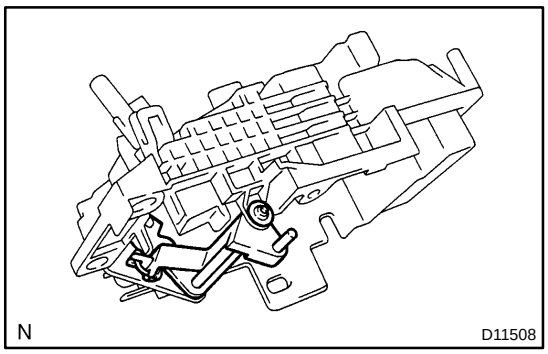
(c) Remove the shift lever guide cushion.

(d) Remove the 3 screws, shift lock control ECU and shift lock solenoid.

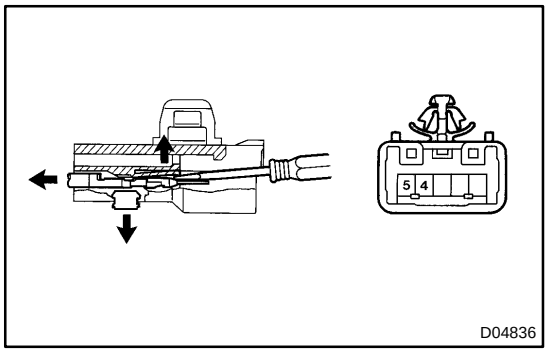
(e) Remove the shift lock control ECU bracket and shift lever anti-rattle cushion from the shift lock control ECU.

(f) Disconnect the E-shift main switch connector from the shift lever guide housing.

(g) Remove the shift lock release button and spring.



(h) Remove the shift lever lock pin, shift lock plate stopper and cushion.



7. DISCONNECT SHIFT LOCK CONTROL ECU, SHIFT LOCK SOLENOID, SHIFT LOCK CONTROL SWITCH AND E-SHIFT MAIN SWITCH

(a) Disengage the secondary locking device of shift lock solenoid.

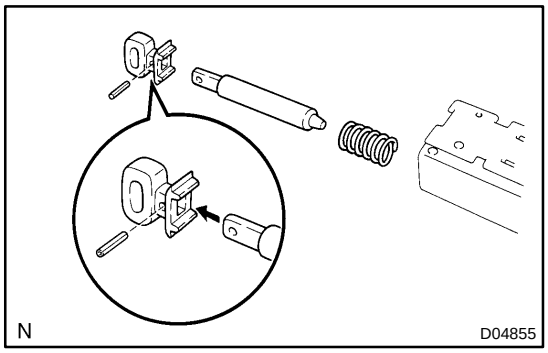
(b) Release the locking lug of the terminals 4 and 5, and pull the terminals out from the rear.

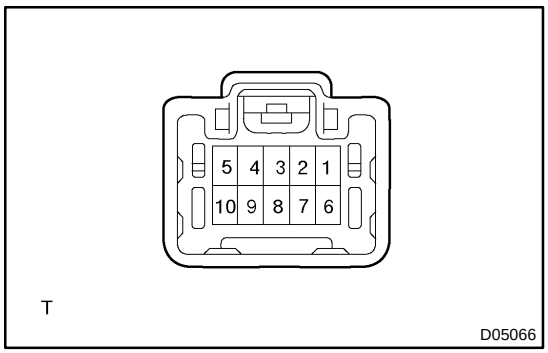
HINT:

Remove the E-shift main switch in the same way.

(c) Remove the shift lock solenoid.

(d) Using 2 mm dia. steel wire, remove the pin the remove the shift lock solenoid link from the shift lock solenoid plunger.

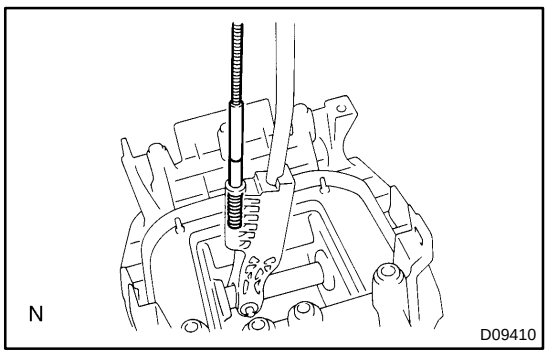




(e) Disengage the secondary locking device of shift lock solenoid.

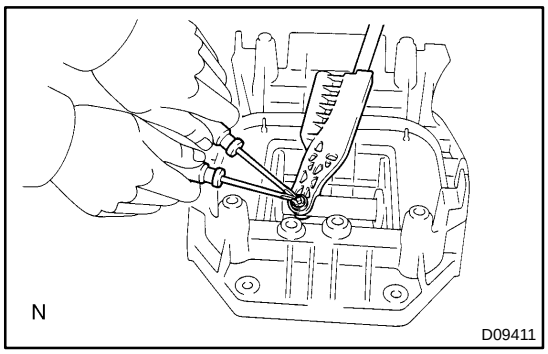
(f) Release the locking lag of the terminals 1 and 6, and pull the terminals out from the rear.

(g) Remove the E-shift main switch.

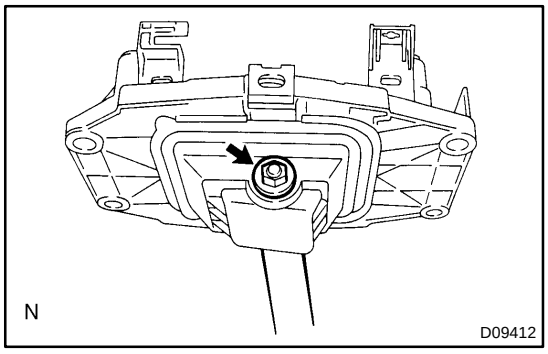


8. REMOVE SHIFT LEVER SUB-ASSEMBLY

(a) Using a magnetic finger, remove the detent shift lever pin and spring.

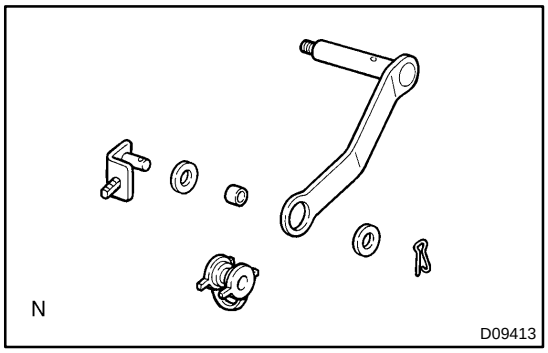


(b) Using 2 screwdrivers, remove the shift lever ring.
(c) Remove the pin and shift lever sub-assembly.



9. DISASSEMBLE SHIFT LEVER PLATE

(a) Remove the nut, control lever, plate washer, 2 spacers and 2 O-ring.



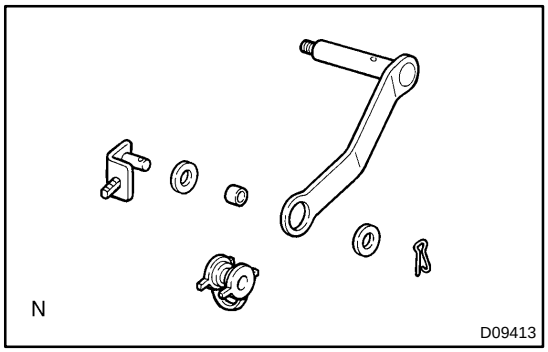
(b) Using pliers, remove the E-ring.
(c) Remove the swivel, 2 plate washer, shaft lower control bush and spacer.
(d) Remove the shift lever seal.
(e) Remove the 4 collars.
(f) Remove the 2 spring nuts.

AT0HR-02

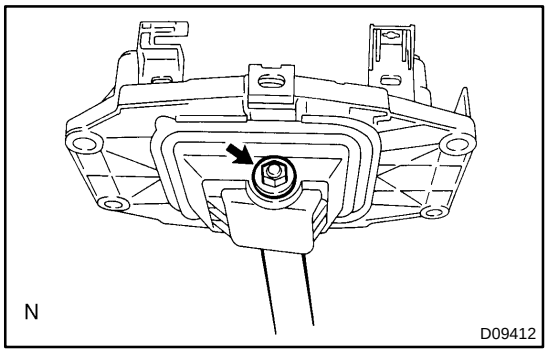
REASSEMBLY

1. REASSEMBLE SHIFT LEVER PLATE

(a) Install the 2 spring nuts.
(b) Install the 4 collars.
(c) Install the shift lever seal.



(d) Install the shaft lower control bush, spacer, 2 plate washers and swivel.
(e) Using pliers, install the E-ring.

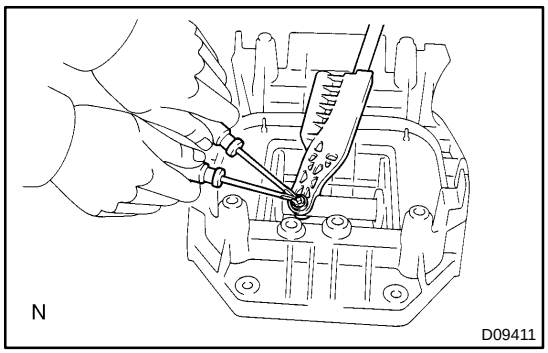


(f) Apply MP grease to the new 2 O-rings.
(g) Install the 2 O-rings, 2 new spacers, plate washer, control lever and nut.

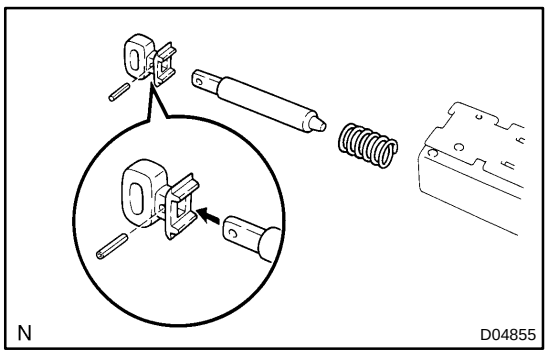
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

2. INSTALL SHIFT LEVER SUB-ASSEMBLY

(a) Apply MP grease to the pin.
(b) Install the shift lever sub-assembly and pin.



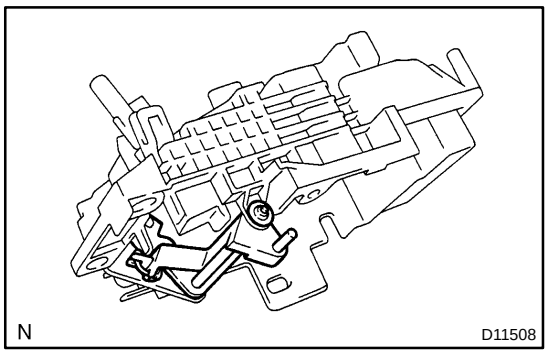
(c) Using 2 screwdriver, install the shift lever ring.
(d) Apply MP grease to the detent shift lever pin and spring.
(e) Install the detent shift lever pin and spring.



3. REASSEMBLE SHIFT LOCK SOLENOID

(a) Apply MP grease to the shift lock solenoid link.
(b) Install the shift lock solenoid link and pin to the shift lock solenoid plunger.
(c) Install the shift lock solenoid link with shift lock solenoid plunger and spring to the shift lock solenoid.

4. CONNECT SHIFT LOCK CONTROL ECU, SHIFT LOCK SOLENOID, SHIFT LOCK CONTROL SWITCH AND E-SHIFT MAIN SWITCH



5. REASSEMBLE SHIFT LEVER GUIDE HOUSING

(a) Apply MP grease to the shift lever lock pin.

(b) Install the shift lever lock pin, shift lock plate stopper and cushion to the shift lever guide housing.

(c) Install the new shift lever nut to the shift lever lock pin by knocking them lightly via the 10 mm seated nut.

HINT:

Install the shift lever guide cushion of the shift lever nut in the same way.

(d) Apply MP grease to the shift lock release button.

(e) Install the spring and shift lock release button.

(f) Connect the E-shift main switch connector to the shift lever guide housing.

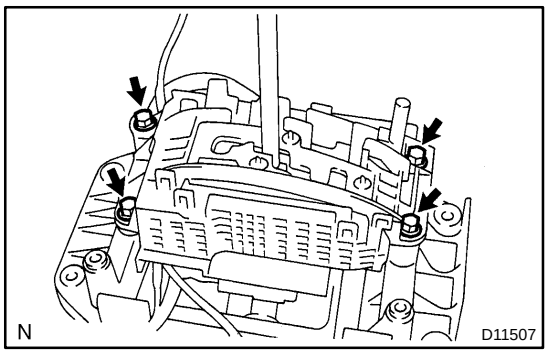
(g) Install the shift lock control ECU bracket and shift lever anti-rattle cushion to the shift lock control ECU.

(h) Install the shift lock control ECU and shift lock solenoid with the 3 screws to the shift lever guide housing.

(i) Install the shift lever guide cushion with new 3 shift lever nuts.

6. INSTALL SHIFT LEVER GUIDE HOUSING

(a) Install the bulb and cap to the indicator light wire.



(b) Install the shift lever guide housing assembly with the 4 bolts and nuts to the shift lever plate.

Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)

(c) Install the 2 E-shift main switches and shift lock control switch to the shift lever guide housing.

(d) Connect the shift lock control ECU and indicator light wire connector to the shift lever plate.

7. INSTALL SLIDE COVER AND NO. 2 SLIDE COVER

8. INSTALL POSITION INDICATOR LIGHT GUIDE

(a) Install the position indicator light guide.

(b) Connect the indicator light wire to the position indicator light guide.

9. INSTALL POSITION INDICATOR HOUSING

(a) Install the pattern select switch to the position indicator housing.

(b) Install the position indicator housing.

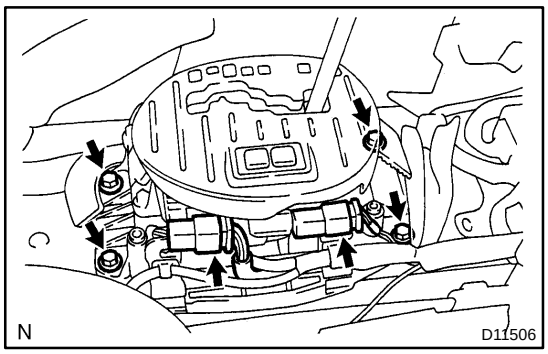
(c) Connect the pattern select switch connector.

(d) Install the shift lock release cover to the position indicator housing.

10. INSTALL SHIFT LEVER KNOB

AT0HS-02

INSTALLATION



1. INSTALL FLOOR SHIFT LEVER ASSEMBLY

(a) Connect the 2 connectors to the floor shift lever assembly.

(b) Install the floor shift lever assembly with the 4 bolts.

Torque: 8.3 N·m (85 kgf·cm, 73 in.·lbf)

2. INSTALL CONSOLE BOX ASSEMBLY

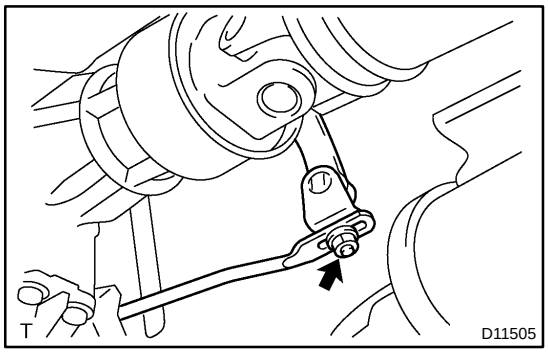
(See page BO-149)

(a) Install the console box assembly.

(b) Install the parking brake hole cover assembly.

(c) Install the box bottom mat.

(d) Install the console upper panel.



3. INSTALL NO. 1 FLOOR SHIFT GEAR SHIFTING ROD

(a) Shift into the N position.

(b) Connect the No. 1 floor shift gear shifting rod and connecting rod swivel with the nut.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

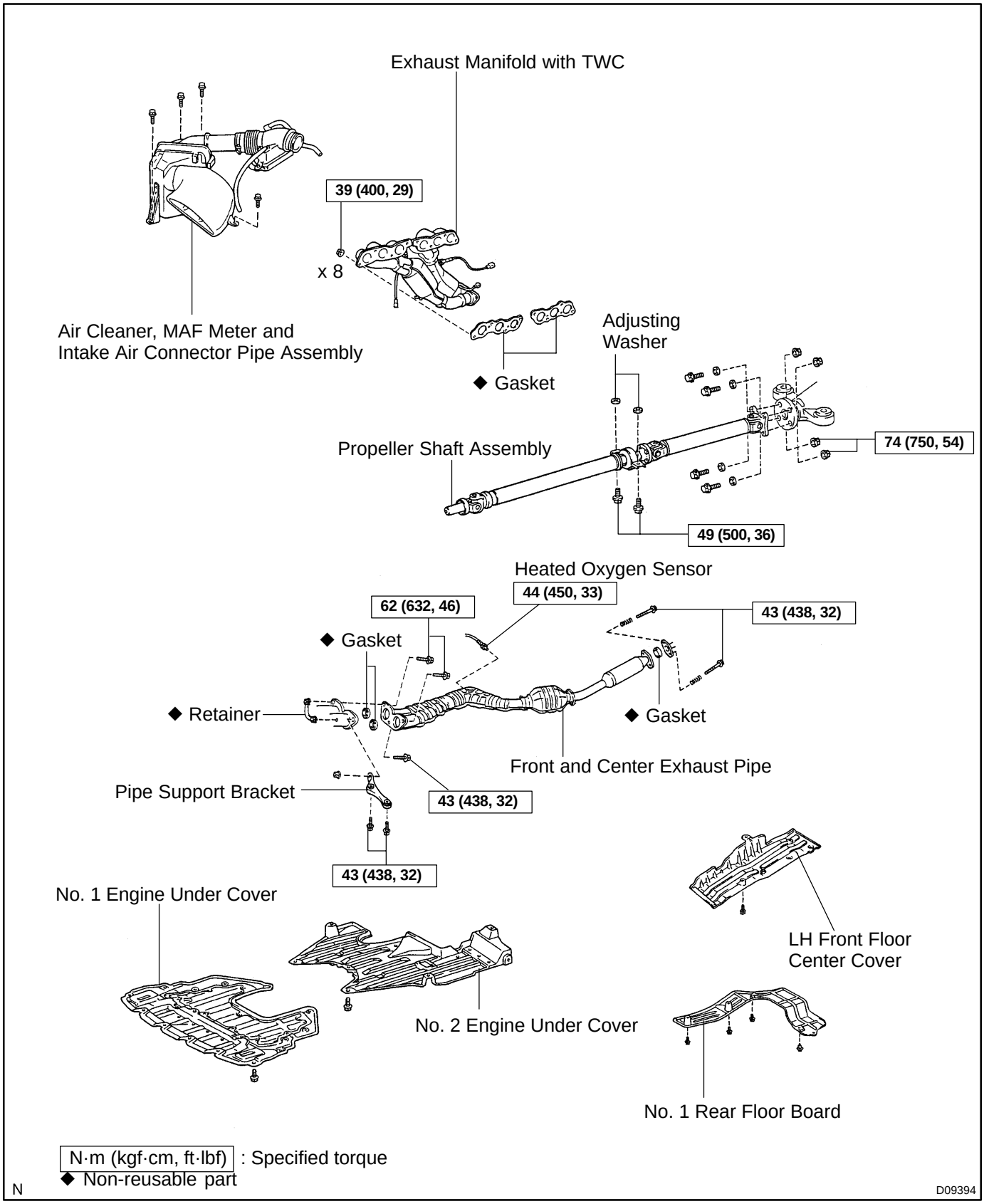
4. CHECK SHIFTING LEVER POSITION

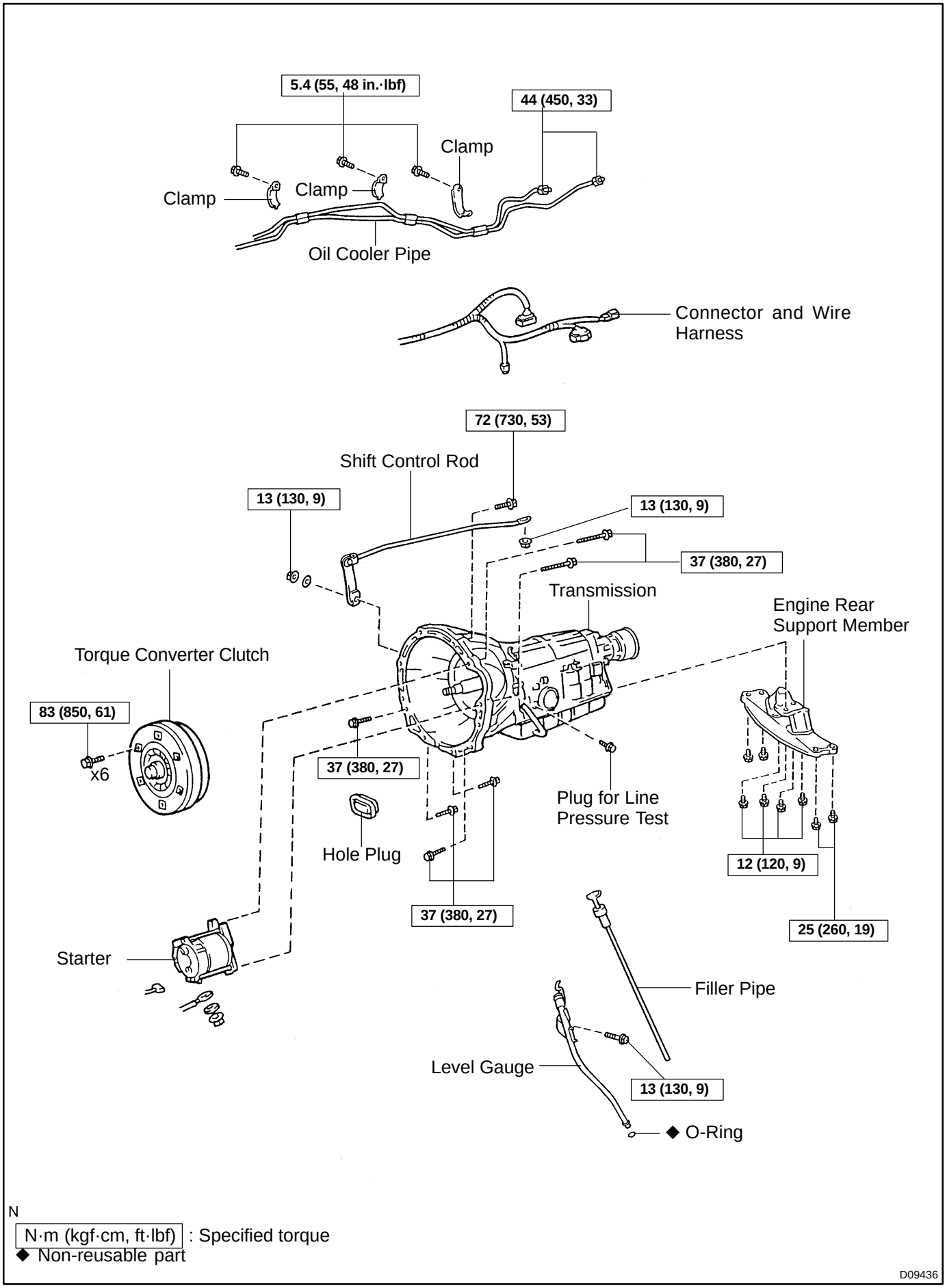
(See page DI-338)

AUTOMATIC TRANSMISSION UNIT

AT0XX-03

COMPONENTS




5.4 (55, 48 in.·lbf)
44 (450, 33)
Clamp
Clamp
Clamp
Oil Cooler Pipe
Connector and Wire Harness
72 (730, 53)
Shift Control Rod
13 (130, 9)
13 (130, 9)
37 (380, 27)
Transmission
Engine Rear Support Member
Torque Converter Clutch
83 (850, 61)
x6
37 (380, 27)
Plug for Line Pressure Test
Hole Plug
12 (120, 9)
37 (380, 27)
25 (260, 19)
Starter
Filler Pipe
Level Gauge
13 (130, 9)
◆ O-Ring
N
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
D09436

AT0XY-01

REMOVAL

1. REMOVE LEVEL GAUGE

2. REMOVE FILLER PIPE

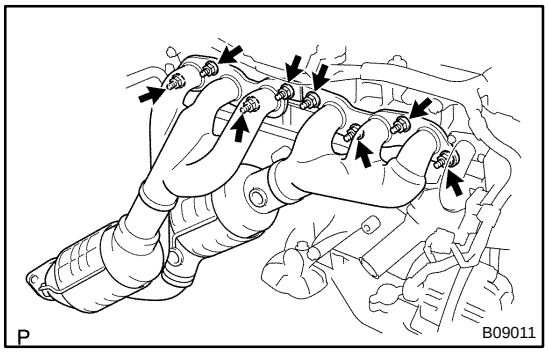
Remove the bolt and filler pipe with the O-ring.

HINT:

At the time of installation, please refer to the following item.

Replace the used O-ring with a new one.

3. REMOVE AIR CLEANER, MAF METER AND INTAKE AIR CONNECTOR PIPE ASSEMBLY



4. REMOVE EXHAUST MANIFOLD WITH TWC

(a) Disconnect the 3 connectors.

(b) Remove the 8 nuts, 2 gaskets and exhaust manifold with the TWC.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

HINT:

At the time of installation, please refer to the following item.

Replace the used gaskets with new ones.

5. RAISE VEHICLE

NOTICE:

Make sure that the vehicle is securely supported.

6. REMOVE NO. 1 AND NO. 2 ENGINE UNDER COVERS

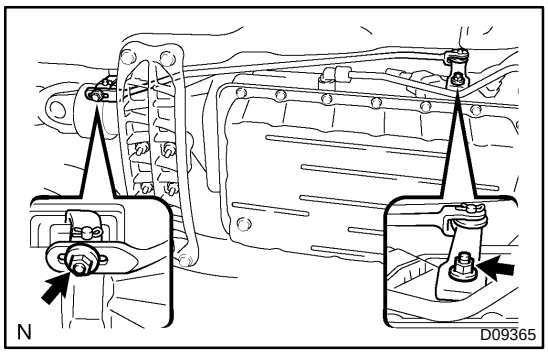
7. REMOVE LH FRONT FLOOR CENTER COVER

8. REMOVE NO. 1 REAR FLOOR BOARD

9. DRAIN ENGINE COOLANT

10. REMOVE UPPER RADIATOR HOSE FROM RADIATOR

11. REMOVE FRONT AND CENTER EXHAUST PIPES (See page EM-100)



12. REMOVE SHIFT CONTROL ROD

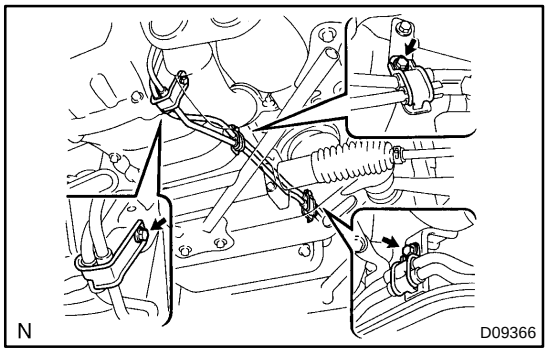
(a) Remove the nut and washer, and disconnect the rod.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(b) Remove the nut and shift control rod.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

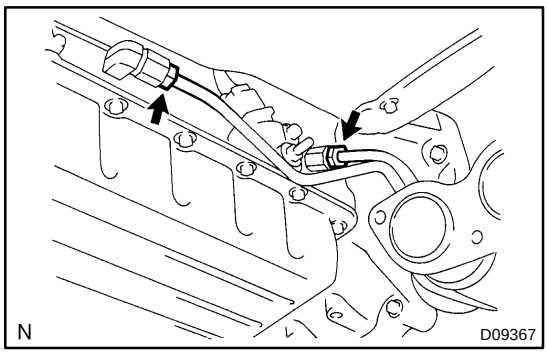
13. REMOVE PROPELLER SHAFT (See page PR-4)



14. DISCONNECT OIL COOLER PIPE

(a) Remove the 3 bolts and 3 clamps.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

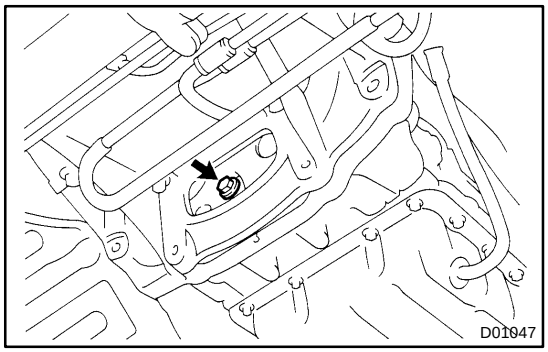


(b) Loosen the 2 union nuts from the transmission.
Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)

NOTICE:

Be careful not to damage the oil cooler pipe.

(c) Disconnect the 2 oil cooler pipes from the transmission.



15. REMOVE TORQUE CONVERTER CLUTCH MOUNTING BOLT

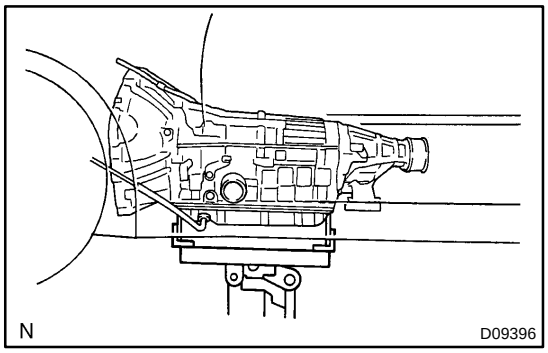
(a) Remove the hole plug.

(b) Turn the crankshaft to gain access to each bolt.

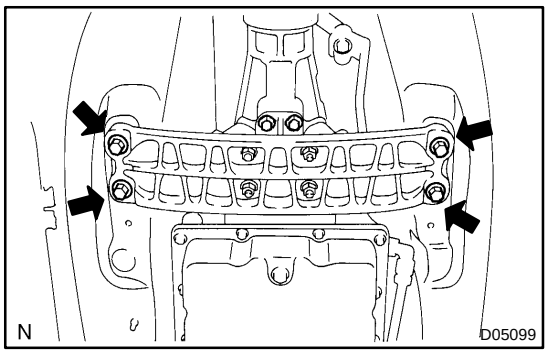
(c) Hold the crankshaft pulley nut with a wrench and remove the 6 bolts.
Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)

HINT:

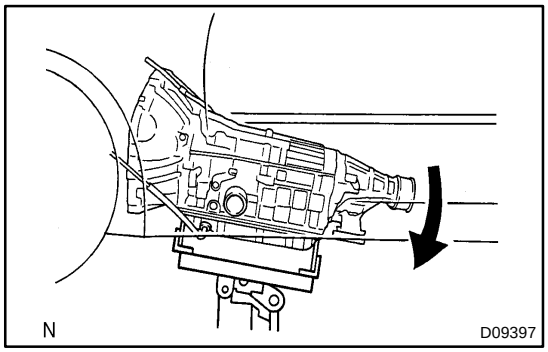
At the time of installation, please refer to the following item.
First install black colored bolt and then the 5 other bolts.



16. SUPPORT TRANSMISSION WITH JACK



17. REMOVE 4 ENGINE REAR SUPPORT MEMBER SET BOLTS
Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)



18. DISCONNECT CONNECTORS AND WIRE HARNESS

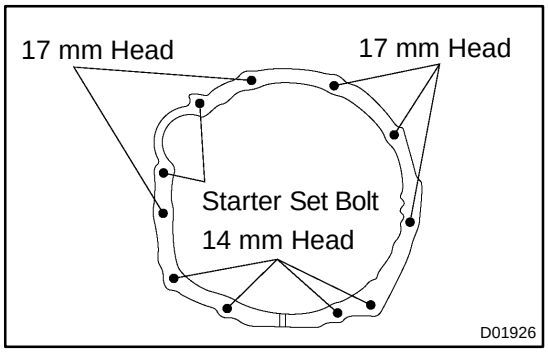
(a) Tilt down the transmission.

NOTICE:

Take care so that the cooling fan does not come in contact with the fan shroud.

(b) Disconnect the following connectors:
(1) O/D direct clutch speed sensor connector
(2) Vehicle speed sensor connector
(3) Park/neutral position switch connector
(4) Solenoid connector

(c) Disconnect the wire harness from the clamps on the transmission.



19. REMOVE STARTER

(a) Disconnect the connector and wire from the starter.

(b) Remove the 2 bolts and starter.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

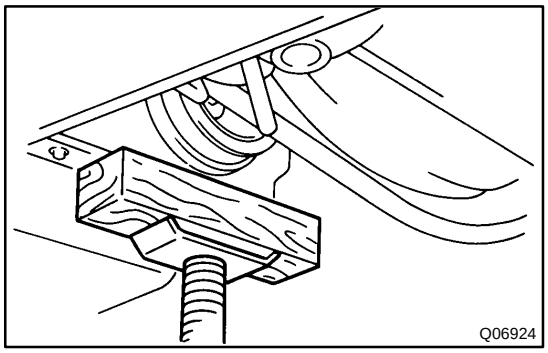
20. REMOVE TRANSMISSION

Remove the 9 bolts, ground cable and transmission.

Torque:

17 mm head: 72 N·m (730 kgf·cm, 53 ft·lbf)

14 mm head: 37 N·m (380 kgf·cm, 27 ft·lbf)



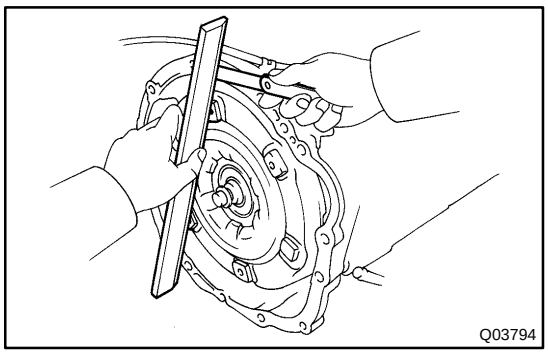
HINT:

At the time of installation, please refer to the following item.

Lift the front side of the engine.

AT0HV-02

INSTALLATION



1. CHECK TORQUE CONVERTER CLUTCH INSTALLATION

Using calipers and a straight edge, measure from the distance from the installed surface of the transmission housing to the installed surface of the torque converter clutch.

Correct distance: More than 0.1 mm (0.004 in.)

If the distance is less than the standard, check for an improper installation.

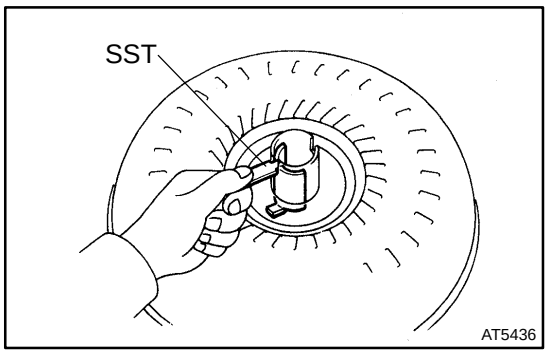
2. INSTALL TRANSMISSION

Installation is in the reverse order of removal (See page AT-31).

HINT:

After installation, check and inspect items as follows.

- Adjust the shift lever position (See page DI-338).
- Fill ATF and check fluid level (See page DI-338).
- Do the road test (See page DI-338).
- Fill with engine coolant (See page CO-2).



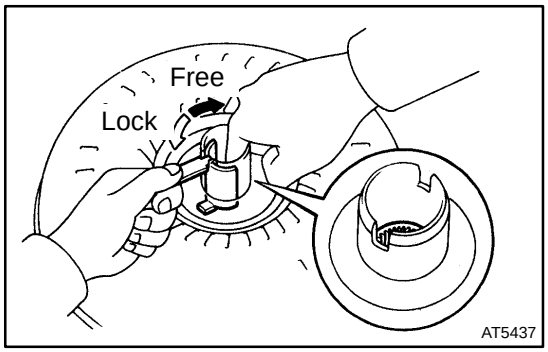
TORQUE CONVERTER CLUTCH AND DRIVE PLATE

AT06D-03

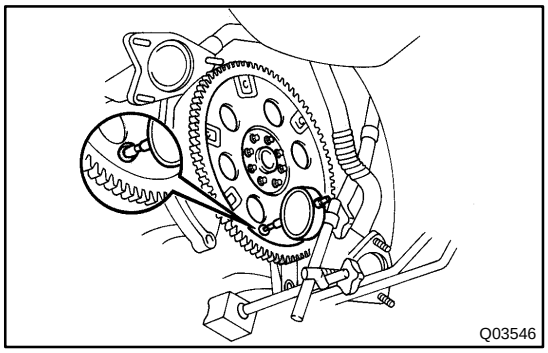
INSPECTION

1. INSPECT ONE-WAY CLUTCH

(a) Install SST so that it fits in the notch of the converter hub and outer race of the one-way clutch.
SST 09350-30020 (09351-32020)



(b) Press on the serrations of starter with a finger and rotate it.
Check if it rotates smoothly when turned clockwise and locks up when turned counterclockwise.



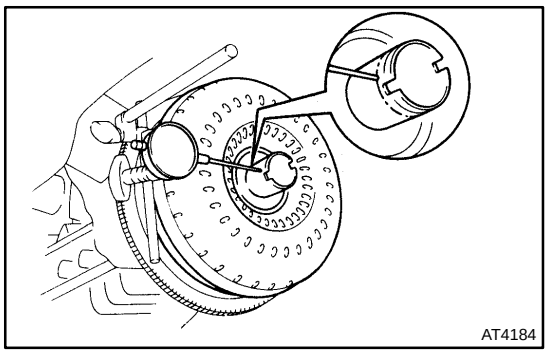
2. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR

Set up a dial indicator and measure the drive plate runout.

Maximum runout: 0.20 mm (0.0079 in.)

If runout exceeds 0.20 mm (0.0079 in.) or if the ring gear is damaged, replace the drive plate. If installing a new drive plate, note the orientation of spacers and tighten the bolts.

Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)



3. MEASURE TORQUE CONVERTER CLUTCH SLEEVE RUNOUT

(a) Temporarily mount the torque converter clutch to the drive plate. Set up a dial indictor.

Maximum runout: 0.30 mm (0.0118 in.)

If runout exceeds 0.30 mm (0.0118 in.), try to correct by reorienting the installation of the torque converter clutch.

If excessive runout cannot be corrected, replace the torque converter clutch.

HINT:

Mark the position of the torque converter clutch to ensure correct installation.

(b) Remove the torque converter clutch.

TROUBLESHOOTING

PR05A-02

PROBLEM SYMPTOMS TABLE

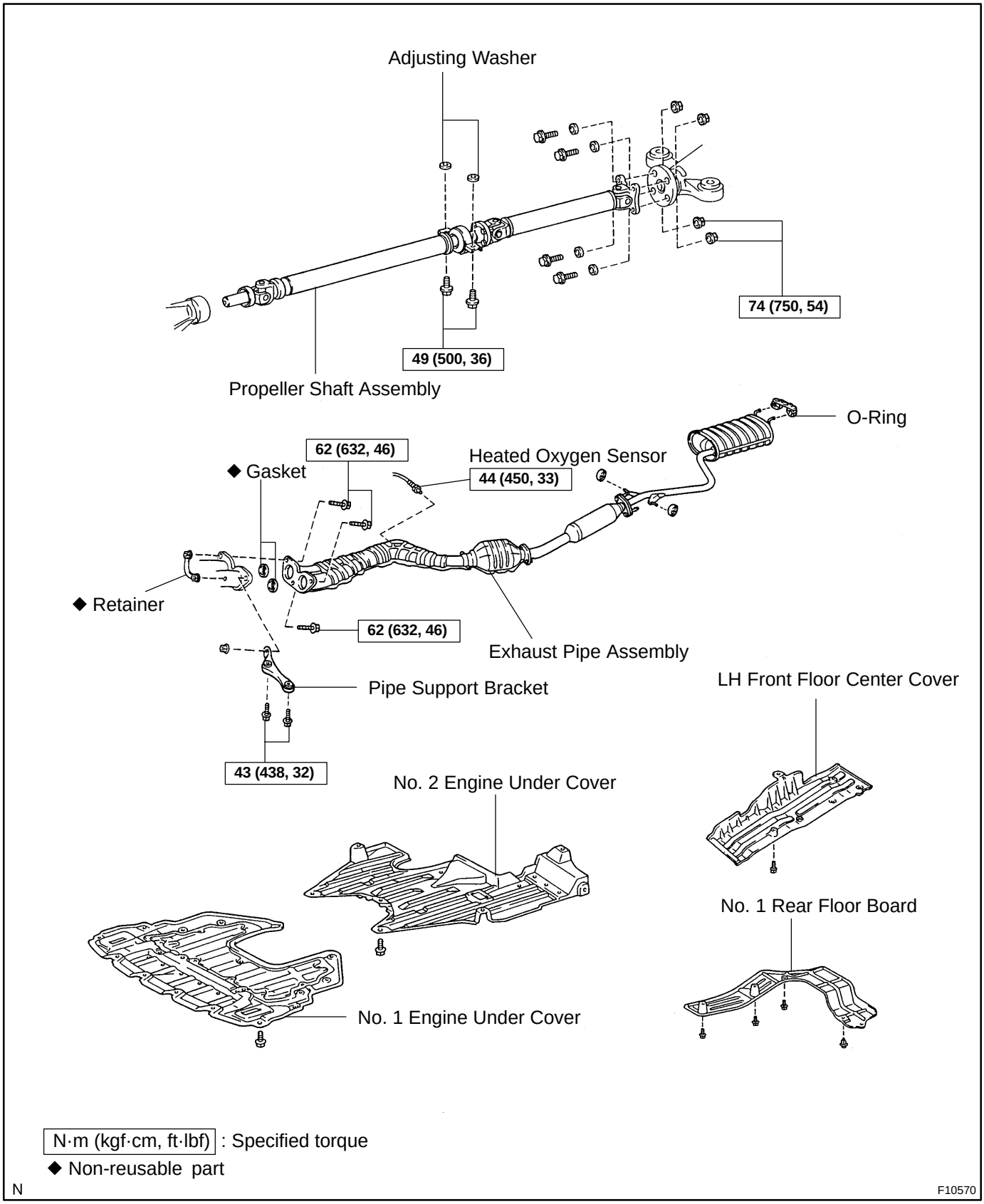
Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

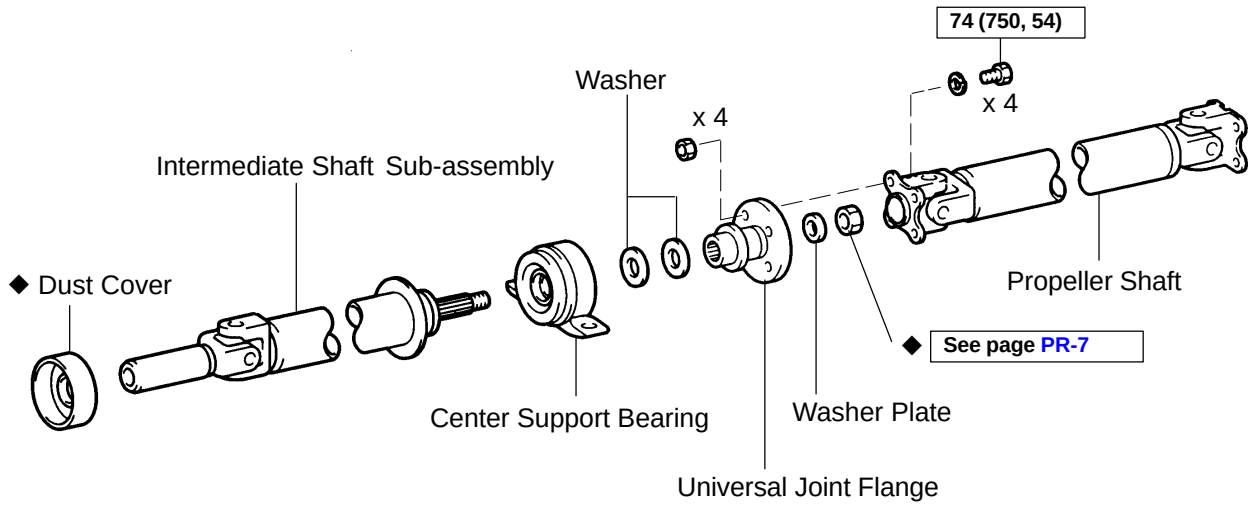
Symptom	Suspect Area	See page
Noise	1. Sleeve yoke spline (Worn) 2. Spider bearing (Worn or stuck)	- PR-6
Vibration	1. Sleeve yoke spline (Stuck) 2. Propeller shaft (Runout) 3. Propeller shaft (Imbalance)	- PR-6 -

PROPELLER SHAFT ASSEMBLY

COMPONENTS

PR05B-04





N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

F08147

PR05C-02

REMOVAL

1. REMOVE NO. 1 AND NO. 2 ENGINE UNDER COVERS

2. REMOVE LH FRONT FLOOR CENTER COVER

3. REMOVE NO. 1 REAR FLOOR BOARD

4. REMOVE EXHAUST PIPE ASSEMBLY

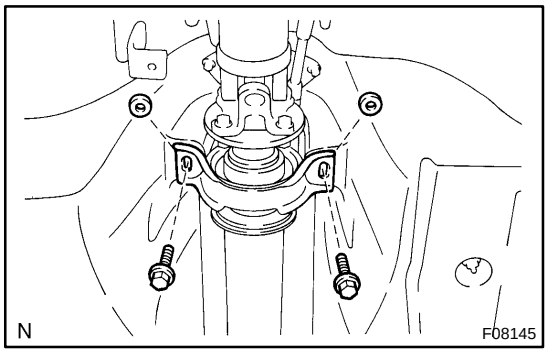
(a) Disconnect the heated oxygen sensor.

(b) Remove the 5 bolts, pipe support bracket, retainer and nut from the exhaust manifold.

(c) Disconnect the exhaust pipe assembly from the 4 O-rings.

(d) Remove the exhaust pipe assembly.

(e) Remove the 2 gaskets from exhaust pipe assembly.



5. REMOVE PROPELLER SHAFT

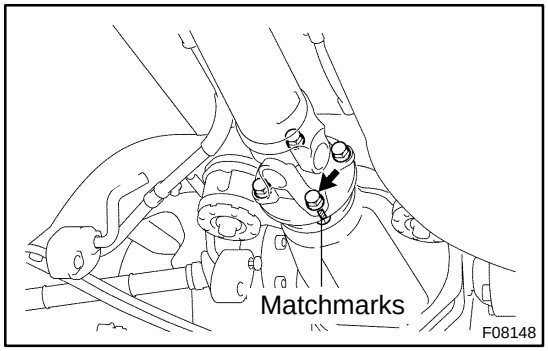
(a) Remove the 2 center support bearing set bolts and adjusting washers.

HINT:

Production vehicles are not equipped with adjusting washers.

NOTICE:

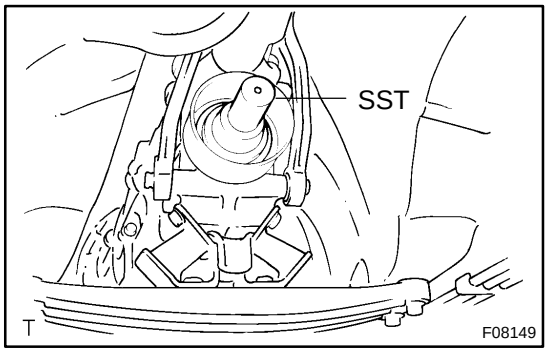
When removing the set bolts, support the center support bearing by hand so that the transmission and intermediate shaft, and propeller shaft and differential, remain in a straight line.



(b) Place matchmarks on the differential companion flange and propeller shaft.

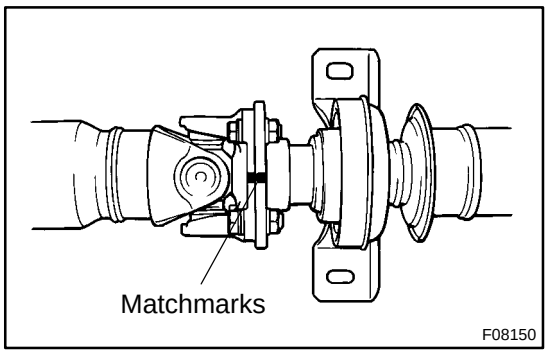
(c) Remove the 4 bolts, washers and nuts.

(d) Pull the yoke from the transmission.



(e) Install SST in the transmission to prevent oil leakage.
SST 09325-20010

PR05D-01



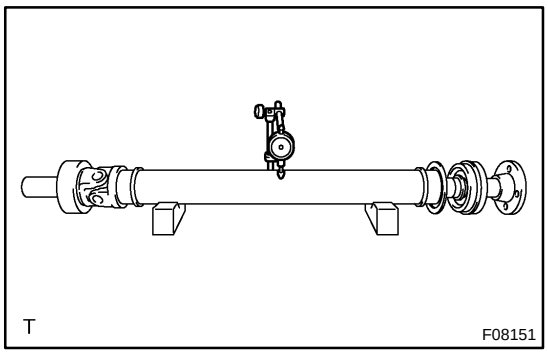
DISASSEMBLY

DISASSEMBLE PROPELLER SHAFT

(a) Place matchmarks on the universal joint flange and propeller shaft flange.
(b) Remove the 4 bolts, washers and nuts.
(c) Separate the intermediate shaft and propeller shaft.

PR05E-01

INSPECTION

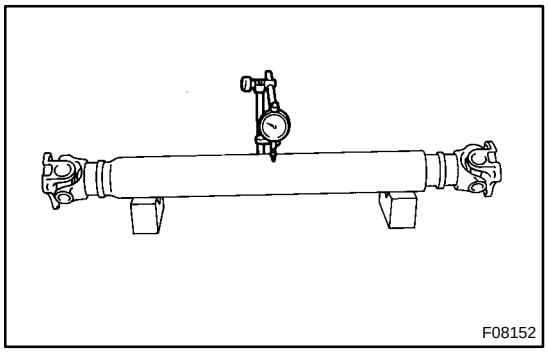


1. INSPECT RUNOUT OF INTERMEDIATE SHAFT

Using a dial indicator, inspect the intermediate shaft runout.

Maximum runout: 0.8 mm (0.031 in.)

If the runout is greater than the maximum, replace the intermediate shaft sub-assembly.

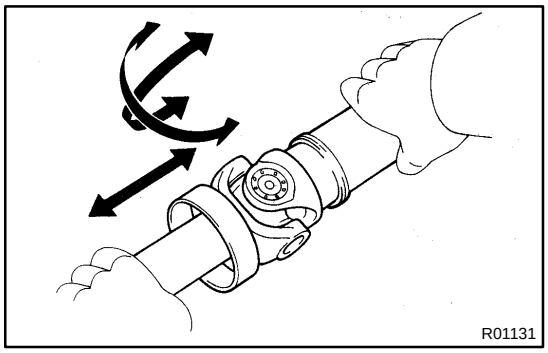


2. INSPECT RUNOUT OF PROPELLER SHAFT

Using a dial indicator, inspect the propeller shaft runout.

Maximum runout: 0.8 mm (0.031 in.)

If the runout is greater than the maximum, replace the propeller shaft assembly.

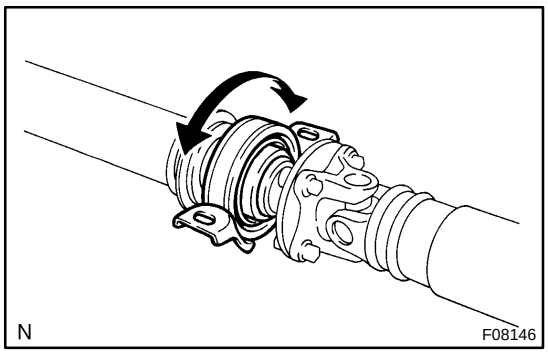


3. INSPECT SPIDER BEARING

(a) Check if the spider bearing rotates smoothly.

(b) Check if there any play in the spider bearing.

If necessary, replace the propeller shaft assembly or intermediate shaft sub-assembly.



4. INSPECT CENTER SUPPORT BEARING

(a) Check if the bearing turns smoothly.

(b) Check for crack in or damage to the cushion.

If the center support bearing is damaged, worn or does not turn smoothly, replace it.

PR05F-02

REPLACEMENT

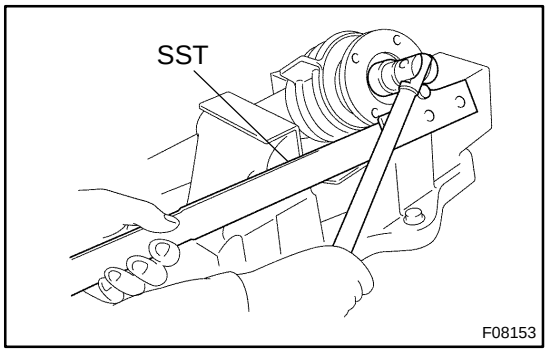
NOTICE:

Be careful not to grip the propeller shaft tube too tightly in the vise as will cause deformation.

1. REPLACE CENTER SUPPORT BEARING

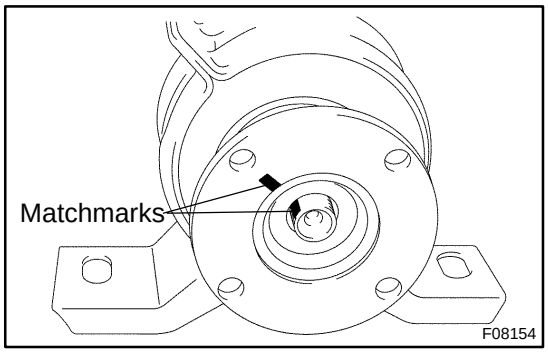
(a) Using a chisel and hammer, unstake the staked part of the nut.

(b) Mount the intermediate shaft sub-assembly in a vise.

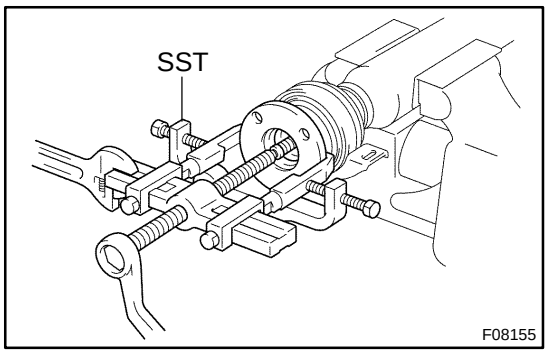


(c) Using SST to hold the universal joint flange, remove the nut.
SST 09930-00021

(d) Remove the washer plate.



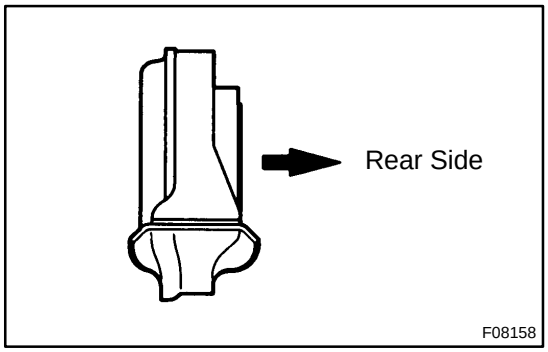
(e) Place matchmarks on the universal joint flange and intermediate shaft.



(f) Using SST, remove the universal joint flange.
SST 09950-4001 1 (09951-04020, 09952-04010, 09953-04030, 09954-04010, 09955-04061, 09957-04010, 09958-04011)

(g) Remove the 2 washers.

(h) Remove the center support bearing.

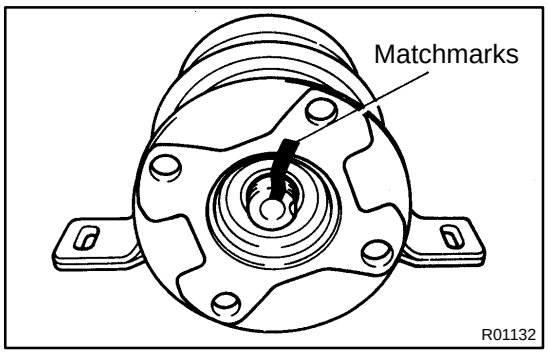


(i) Install a new center support bearing to intermediate shaft.

HINT:

Install the center support bearing in the direction, as shown.

(j) Install the 2 washers.

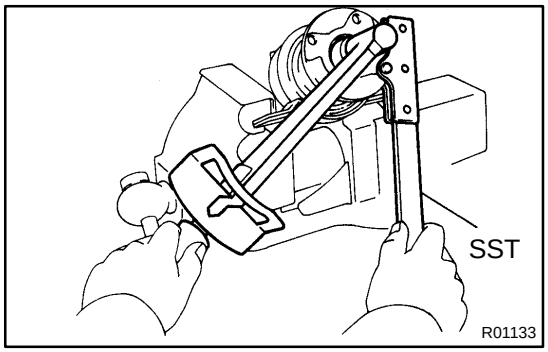


(k) Align the matchmarks on the universal joint flange and intermediate shaft, and install the universal joint flange.

HINT:

If replacing either the center flange or intermediate shaft, reassemble them so that the front yoke of the intermediate shaft and the rear yoke of the propeller shaft are facing in the same direction.

(l) Install the washer plate.

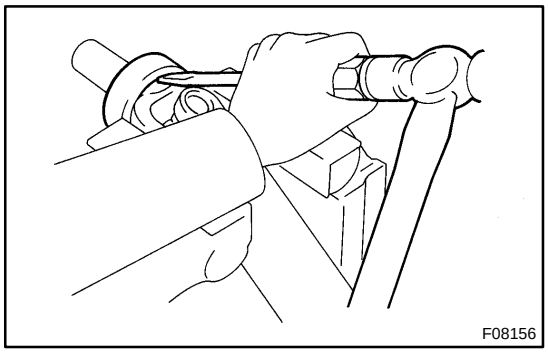


(m) Using SST to hold the flange, install a new nut.
SST 09330-00021
Torque: 181 N·m (1,850 kgf·cm, 134 ft·lbf)

(n) Loosen the nut.

(o) Torque the nut again.
Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

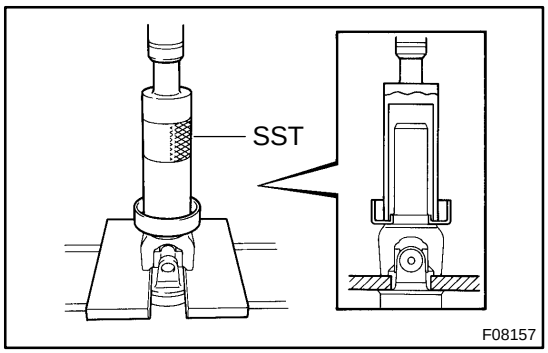
(p) Using a chisel and hammer, stake the nut.



2. REPLACE DUST COVER

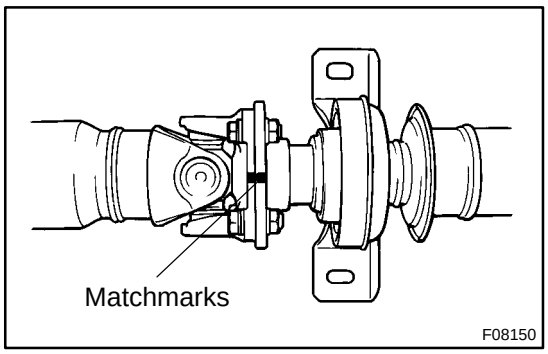
(a) Mount the intermediate shaft sub-assembly in a vise.

(b) Using a screwdriver and hammer, remove the dust cover.



(c) Using SST and press, install a new dust cover.
SST 09316-6001 1 (09316-00011)

PR05G-03



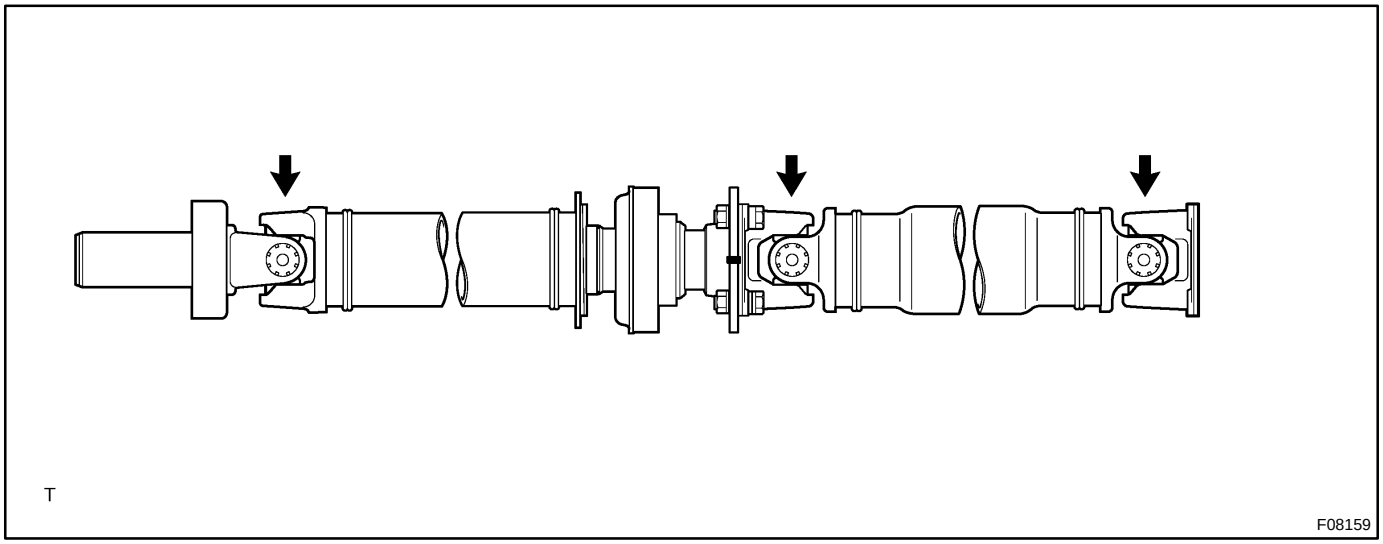
REASSEMBLY

REASSEMBLE PROPELLER SHAFT

(a) Assemble the propeller shaft, align the matchmarks on the universal joint flange and propeller shaft flange, and connect the flanges with the 4 bolts, washers and nuts.

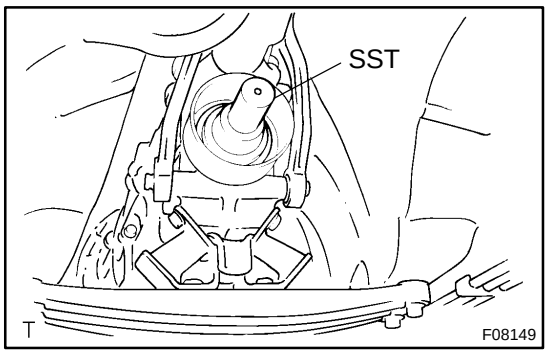
(b) Torque the 4 nuts.
Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)

HINT:
Assemble the propeller shaft so that each joint faces in the direction as shown in the illustration.



PR05H-04

INSTALLATION



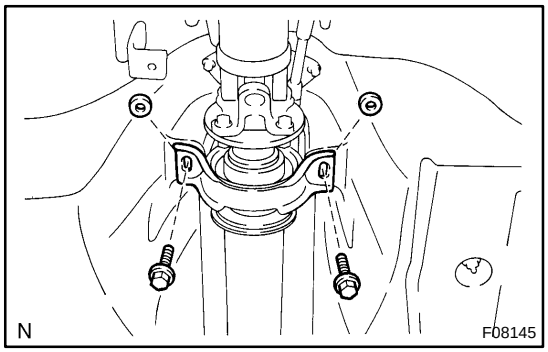
1. INSTALL PROPELLER SHAFT

(a) Remove the SST.
SST 09325-20010

(b) Insert the propeller shaft assembly to the transmission.

NOTICE:

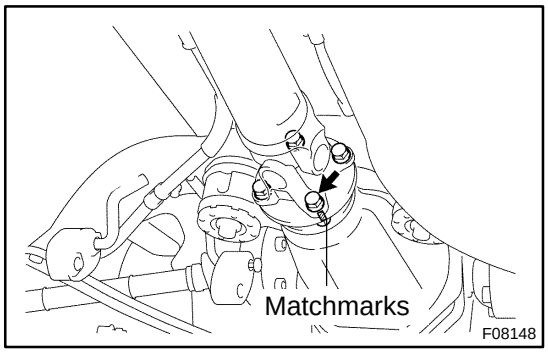
Support the center support bearing by hand so that the transmission and intermediate shaft, and propeller shaft and differential, remain in a straight line.



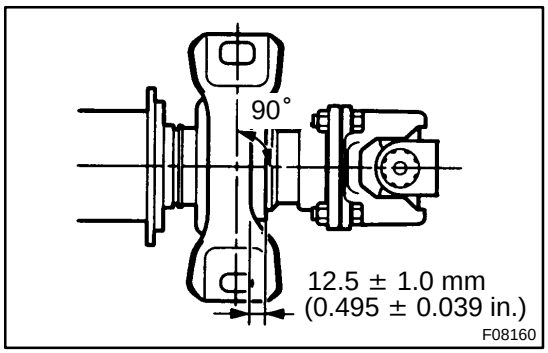
(c) Temporarily install the 2 center support bearing set bolts with the adjusting washers.

HINT:

Use the adjusting washers which were removed.



(d) Align the matchmarks on the differential companion flange and propeller shaft, and install the propeller shaft on the differential with the 4 bolts, washers and nuts.
Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)



(e) Torque the 2 center support bearing set bolts.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

HINT:

Adjust the center support bearing to keep the dimension, as shown with the vehicle in the unladen condition.

Under the same condition, check if the center line of the center support bearing is at right angles to the shaft axial direction.

2. INSTALL EXHAUST PIPE ASSEMBLY

(a) Connect the exhaust pipe assembly to the 4 O-rings.

(b) Install the exhaust pipe assembly with 2 new gaskets, 5 bolts, pipe support bracket, retainer and nut.
Torque: 62 N·m (632 kgf·cm, 46 ft·lbf)

(c) Connect the heated oxygen sensor.
Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)

3. INSTALL NO. 1 REAR FLOOR BOARD

4. INSTALL LH FRONT FLOOR CENTER COVER

5. INSTALL NO. 1 AND NO. 2 ENGINE UNDER COVERS

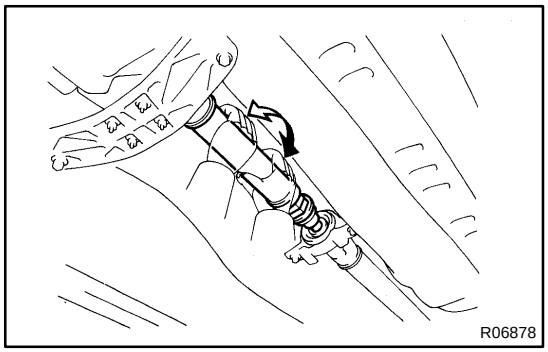
JOINT ANGLE

PR05I-01

ADJUSTMENT

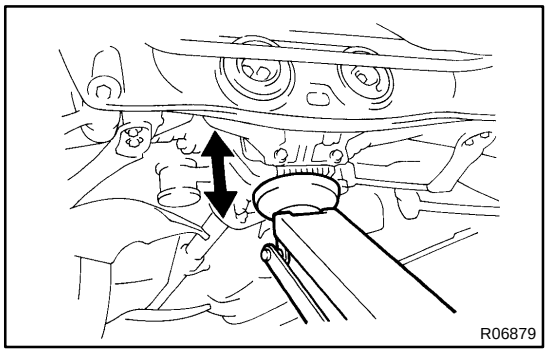
NOTICE:

When doing operations which involve the removal and installation of the propeller shaft, always check the joint. Make adjustments if necessary.

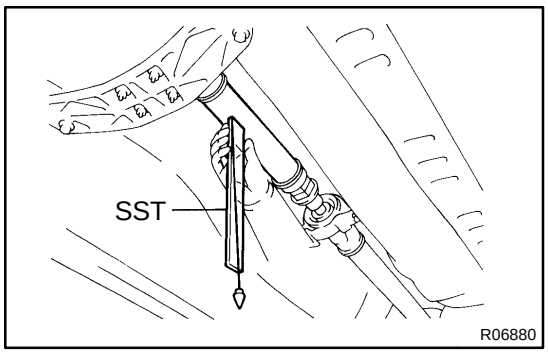


1. STABILIZE PROPELLER SHAFT AND DIFFERENTIAL

(a) Turn the propeller shaft several times by hand to stabilize the center support bearing.

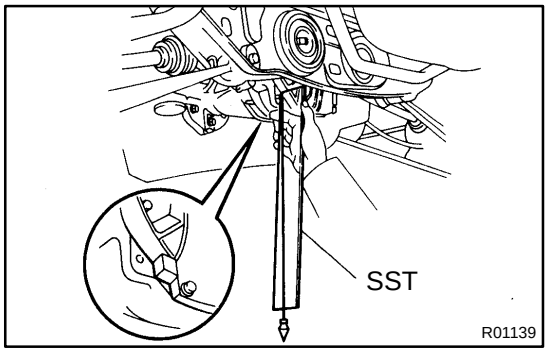


(b) Using a jack, raise and lower the differential to stabilize the differential mounting cushion.



2. CHECK JOINT ANGLE OF NO. 2 JOINT AND NO. 3 JOINT

(a) Using SST, measure the installation angle of the intermediate shaft and propeller shaft.
SST 09370-50010



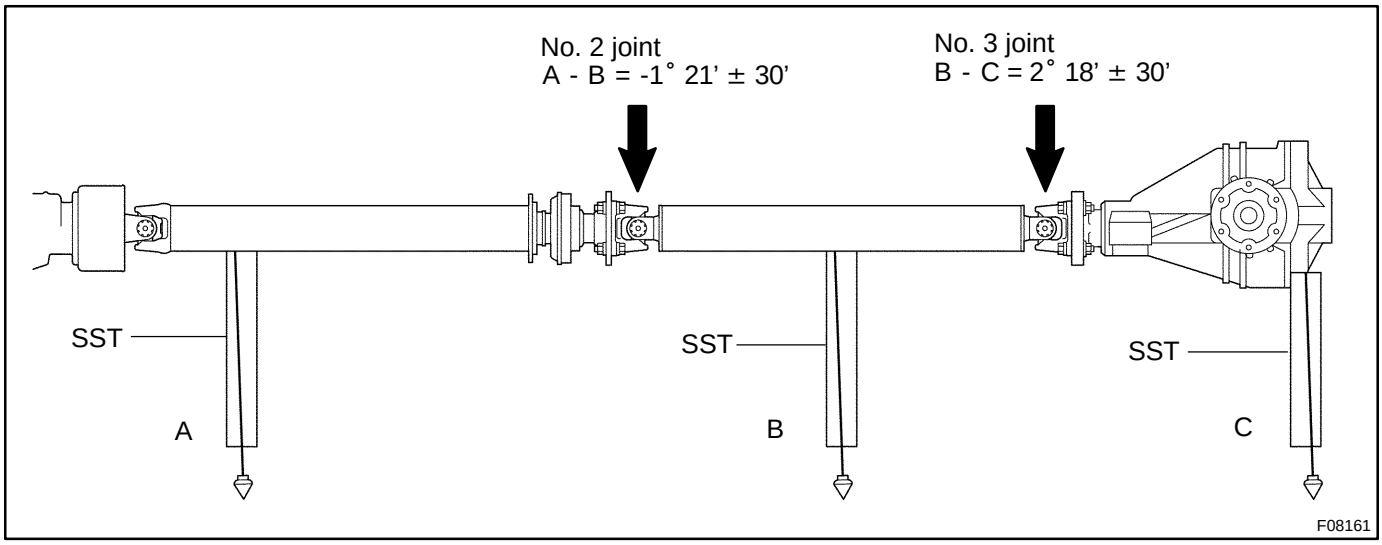
(b) Using SST, measure the installation angle of the differential.
SST 09370-50010

HINT:

Measure the installation angle by placing the SST in the position, as shown in the illustration.

(c) Calculate the No. 2 joint angle.
No. 2 joint angle:
A - B = -1° 21' ± 30'
A: Intermediate shaft installation angle
B: Propeller shaft installation angle

(d) Calculate the No. 3 joint angle.
No. 3 joint angle:
B - C = 2° 18' ± 30'
B: Propeller shaft installation angle
C: Differential installation angle



If the measured angle is not within the specification, adjust it with the center support bearing adjusting washer and differential adjusting shim.

Center support bearing adjusting washer thickness:

Thickness mm (in.)	Thickness mm (in.)
2.0 (0.079)	9.0 (0.354)
4.5 (0.177)	11.0 (0.433)
6.5 (0.256)	13.5 (0.531)

NOTICE:
- **Left and right washers should be the same thickness.**
- **2 washers should not be assembled together.**
- **Some vehicles are not assembled with washers.**

TROUBLESHOOTING

SA0R1-07

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

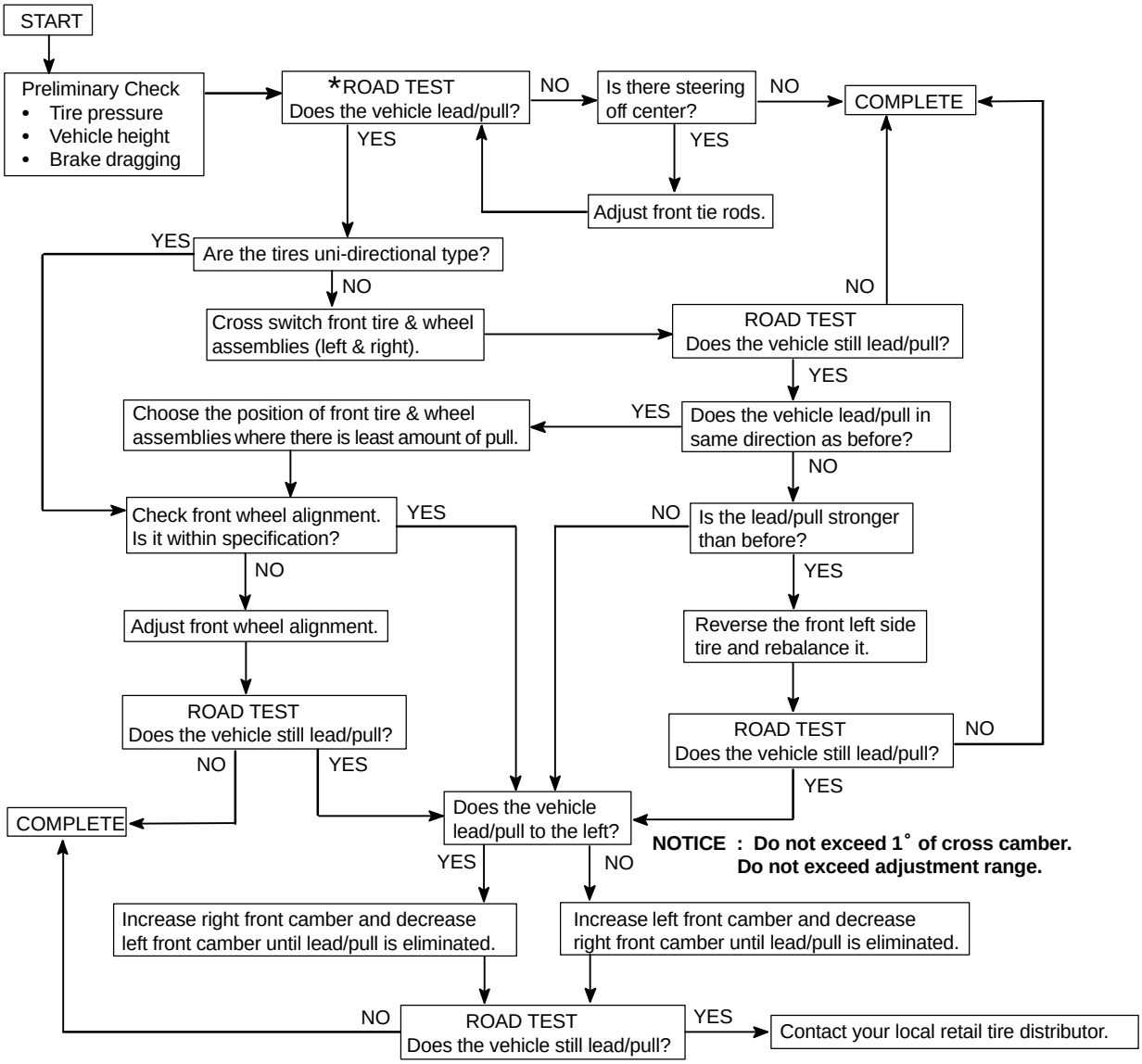
Symptom	Suspect Area	See page
Bottoming	1. Vehicle (Overloaded)	-
	2. Spring (Weak)	SA-19
		SA-109
	3. Shock absorber (Worn)	SA-23
		SA-114
Sways/pitches	1. Tire (Worn or improperly inflated)	SA-3
	2. Stabilizer bar (Bent or broken)	SA-44
		SA-130
	3. Shock absorber (Worn)	SA-23
		SA-114
Front wheel shimmy	1. Tire (Worn or improperly inflated)	SA-3
	2. Wheel (Out of balance)	SA-3
	3. Shock absorber (Worn)	SA-23
	4. Wheel alignment (Incorrect)	SA-5
	5. Ball joint (Worn)	SA-31
		SA-39
		SA-42
	6. Hub bearing (Loose or worn)	SA-12
	7. Steering linkage (Loose or worn)	-
	8. Steering gear (Out of adjustment or broken)	SR-46
Abnormal tire wear	1. Tire (Improperly inflated)	SA-3
	2. Wheel alignment (Incorrect)	SA-5
		SA-9
	3. Shock absorber (Worn)	SA-23
		SA-114
	4. Suspension parts (Worn)	-
Noise in rear differential	1. Oil level (Low or wrong grade)	SA-69
	2. Excessive backlash between pinion and ring gear	SA-76
	3. Ring, pinion or side gears (Worn or chipped)	SA-76
	4. Side bearing (Worn)	SA-76
Oil leak from rear differential	1. Oil level (Too high or wrong grade)	SA-69
	2. Drive pinion oil seal (Worn or damaged)	SA-67
	3. Side gear oil seal (Worn or damaged)	SA-72
	4. Companion flange (Loose or damaged)	SA-81
	5. Side gear shaft (Damaged)	SA-76

SA28F-01

REPAIR PROCEDURES

HINT:

This is a flow chart for vehicle pull.



* Select a flat road where the vehicle can be driven in a straight line for 100 meters at a constant speed of 35mph. Please confirm safety and set the steering wheel to its straight position. Drive the vehicle in a straight line for 100 meters at a constant speed of 35mph without holding the steering wheel.

(1) The vehicle can keep straight but the steering wheel has some angle.
→ STEERING OFF CENTER (See page SR-9)

(2) The vehicle cannot keep straight.
→ STEERING PULL

TIRE AND WHEEL

SA28G-01

INSPECTION

1. INSPECT TIRE

(a) Check the tires for wear and proper inflation pressure.

Cold tire inflation pressure:

(SEDAN):

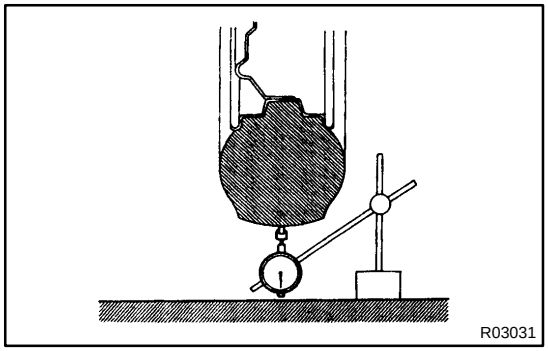
Tire size	Front kpa (kgf/cm^2,psi)	Rear kpa (kgf/cm^2,psi)
215/45ZR17	230 (2.3, 33) *1 300 (3.0, 44) *2	230 (2.3, 33) *1 300 (3.0, 44) *2
P205/55R16 89V	230 (2.3, 33) *1 300 (3.0, 44) *2	230 (2.3, 33) *1 300 (3.0, 44) *2

(WAGON):

Tire size	Front kpa (kgf/cm^2,psi)	Rear kpa (kgf/cm^2,psi)
215/45ZR17	230 (2.3, 33) *1 300 (3.0, 44) *2	-
225/45ZR17	-	240 (2.4, 35) *1 310 (3.1, 45) *2
P205/55R16 89V	230 (2.3, 33) *1 300 (3.0, 44) *2	230 (2.3, 33) *1 320 (3.2, 46) *2

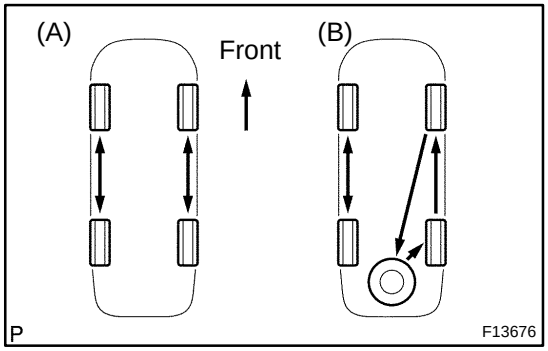
*1: For driving under 160 km/h (100 mph)

*2: For driving at 160 km/h (100 mph) or over



(b) Check the tire runout.

Tire runout: 1.4 mm (0.055 in.) or less



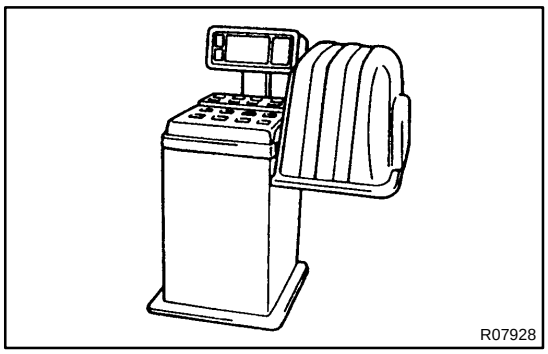
2. ROTATING TIRES

NOTICE:

Tires must not be rotated for wagon due to the difference in size between the front and rear tires.

HINT:

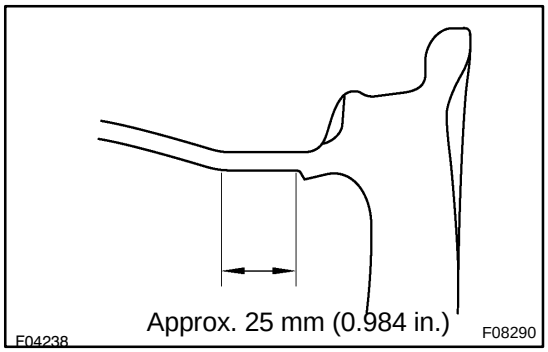
- Rotate tires as shown in the illustration as rotation.
- Rotate as shown in (B) if the spare tire is included in the rotation.



3. INSPECT WHEEL BALANCE

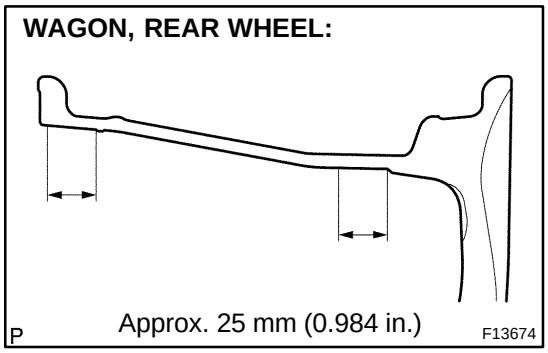
(a) Check and adjust the off-the-car balance.

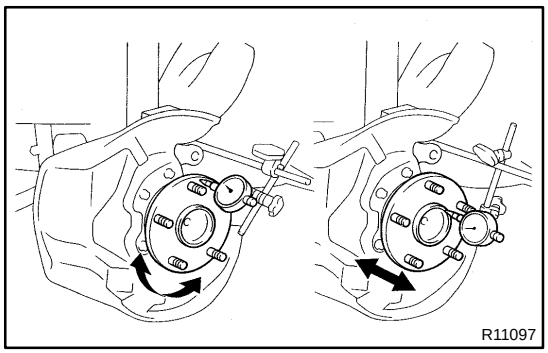
(b) If necessary, check and adjust the on-the-car balance.
Imbalance after adjustment: 8.0 g (0.018 lb) or less



NOTICE:

- **Adhere the sticking type balance weight to the flat position as shown in the illustration.**
- **Push the balance weight securely with a finger to adhere it to the position.**
  (Pushing force: 10 kgf/more than 2 secs.)
- **After cleaning the surface which the balance weight will be adhered to of dirt, oil and water with a cleaning detergent, adhere the balance weight to the surface.**
- **Do not touch the sticking surface of the tape.**
- **Do not use the once used balance weight.**
- **Please use the TOYOTA genuine sticking type balance weight.**





4. CHECK WHEEL BEARING LOOSENESS

(a) Check the backlash in the bearing shaft direction.
Maximum: 0.05 mm (0.0020 in.)

(b) Check the axle hub deviation.
Maximum: 0.05 mm (0.0020 in.)

5. CHECK FRONT SUSPENSION FOR LOOSENESS

6. CHECK STEERING LINKAGE FOR LOOSENESS

7. CHECK BALL JOINT FOR LOOSENESS AND EXCESSIVE PLAY (See page SA-39)

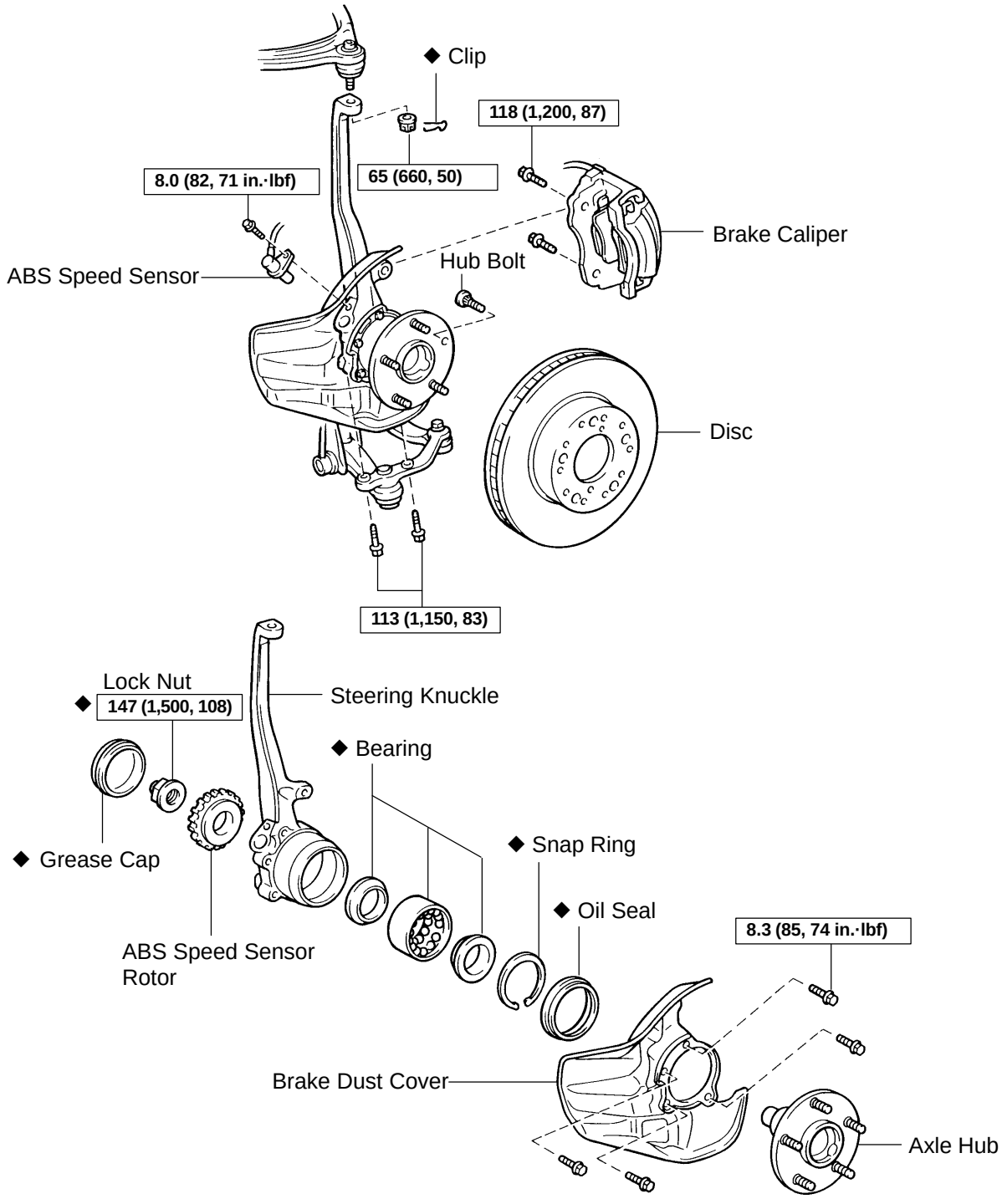
8. CHECK SHOCK ABSORBER WORKS PROPERLY

- Check if oil leaks
- Check mounting bushings for wear
- Bounce front and rear of the vehicle

FRONT AXLE HUB

COMPONENTS

SA0R5-08



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

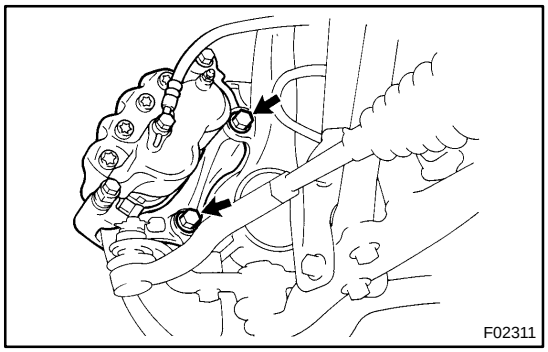
N

F07643

SA0R6-06

REMOVAL

1. REMOVE FRONT WHEEL

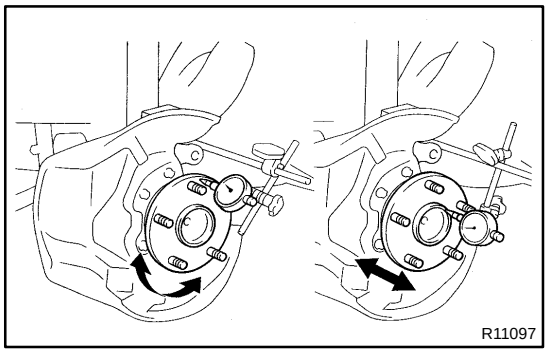


2. REMOVE FRONT BRAKE CALIPER AND DISC

(a) Remove the 2 bolts and brake caliper from the steering knuckle.

(b) Support the brake caliper securely.

(c) Remove the disc.



3. CHECK BEARING BACKLASH AND AXLE HUB DEVIATION

(a) Using a dial indicator near the center of the axle hub and check the backlash in the bearing shaft direction.

Maximum: 0.05 mm (0.0020 in.)

If the backlash exceeds the maximum, replace the bearing.

(b) Using a dial indicator, check the deviation at the surface of the axle hub outside the hub bolt.

Maximum: 0.05 mm (0.0020 in.)

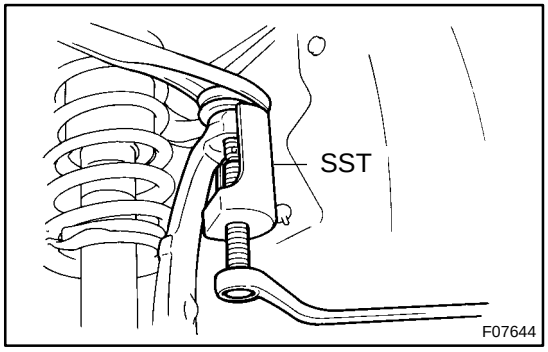
If the deviation exceeds the maximum, replace the axle hub.

4. REMOVE ABS SPEED SENSOR

Remove the bolt and disconnect the ABS speed sensor from the steering knuckle.

5. REMOVE STEERING KNUCKLE WITH AXLE HUB

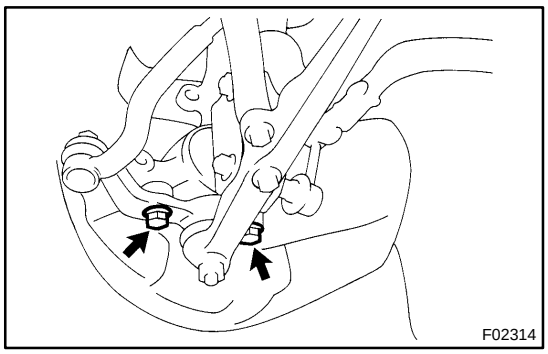
(a) Remove the clip and nut.



(b) Using SST, remove the steering knuckle from the upper suspension arm.

SST 09610-20012

(c) Temporarily install the steering knuckle to the upper suspension arm with the nut.



(d) Remove the 2 bolts and disconnect the lower ball joint from the steering knuckle.

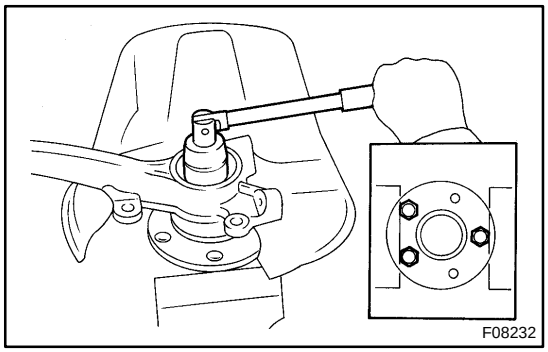
(e) Remove the nut and steering knuckle with the axle hub from the upper suspension arm.

SA0R7-09

DISASSEMBLY

1. REMOVE GREASE CAP

Using a screwdriver and hammer, remove the grease cap from the steering knuckle.



2. REMOVE LOCK NUT

(a) Mount the axle hub in a soft jaw vise.

HINT:

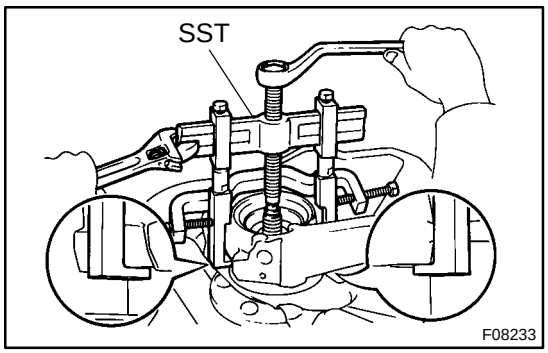
Close the vise until it holds hub bolts. Do not tighten further.

(b) Using a chisel and hammer, loosen the staked part of the lock nut.

(c) Using a socket wrench (32 mm), remove the lock nut.

3. REMOVE ABS SPEED SENSOR ROTOR AND AXLE HUB

(a) Remove the 4 bolts and shift the brake dust cover toward the outside.



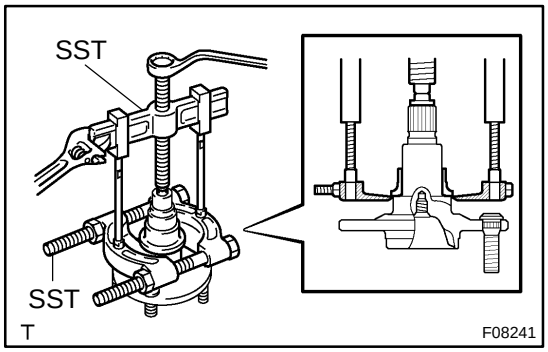
(b) Using SST, remove the ABS speed sensor rotor and axle hub from the steering knuckle.

SST 09950- 40011 (09951- 04020, 09952- 04010, 09953-04020, 09954-04010, 09955-04051, 09957-04010, 09958-04011)

NOTICE:

Take care not to scratch the serrations of the sensor rotor.

(c) Remove the brake dust cover.



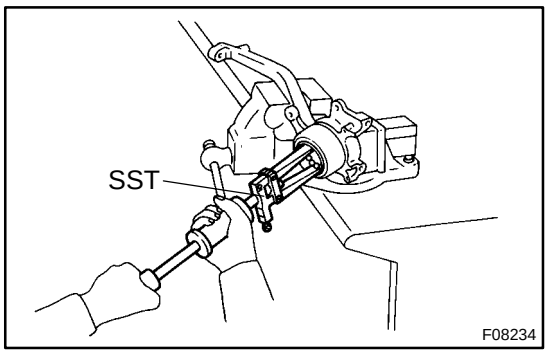
4. REMOVE INNER RACE (OUTSIDE)

Using SST, remove the inner race from the axle hub.

SST 09950- 00020, 09950- 40011 (09951- 04020, 09953- 04030, 09957- 04010), 09950- 50013 (09952-05010, 09954-05031, 09955-05040)

NOTICE:

Be careful not to damage the axle hub.



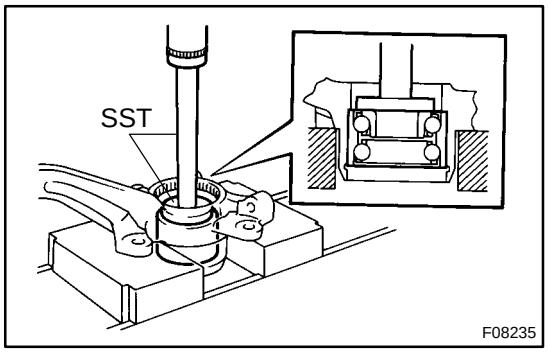
5. REMOVE OIL SEAL

Using SST, remove the oil seal from the steering knuckle.

SST 09308-00010

6. REMOVE BEARING

(a) Using snap ring pliers, remove the snap ring from the steering knuckle.

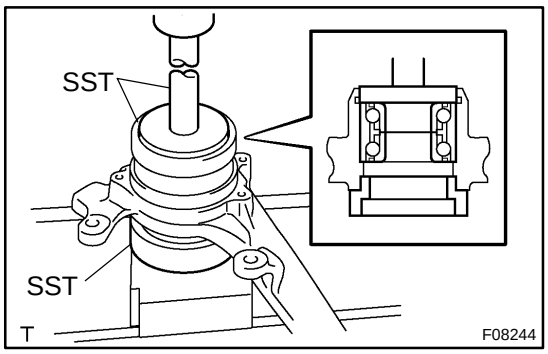


(b) Using SST and a press, remove the bearing from the steering knuckle.

SST 09950- 60010 (09951- 00560), 09950- 70010 (09951-07150)

SA0R8-07

REASSEMBLY



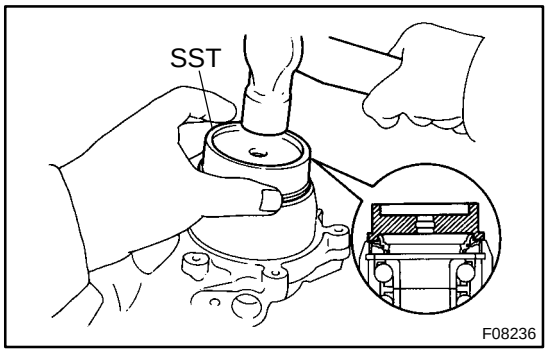
1. INSTALL BEARING

(a) Using SST and a press, install a new bearing to the steering knuckle.
SST 09502- 24010, 09950- 60020 (09951- 00710), 09950-70010 (09951-07150)

NOTICE:

If the inner race and balls come loose from the bearing outer race, make sure that they are installed on the same side as before.

(b) Using snap ring pliers, install a new snap ring to the steering knuckle.



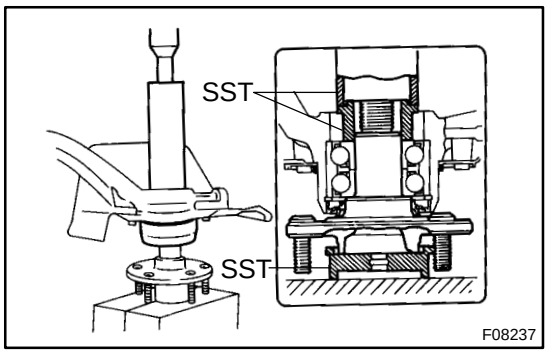
2. INSTALL OIL SEAL

(a) Using SST and a hammer, install a new oil seal until it is flush with the end surface of the steering knuckle.
SST 09608-32010

(b) Coat MP grease to the oil seal lip.

3. INSTALL AXLE HUB

(a) Install the brake dust cover to the steering knuckle with the 4 bolts.
Torque: 8.3 N·m (85 kgf·cm, 74 in.·lbf)



(b) Using SST and a press, install the axle hub to the steering knuckle.
SST 09316- 60011 (09316- 00011, 09316- 00071), 09608-32010

4. INSTALL ABS SPEED SENSOR ROTOR

Install the speed sensor rotor to the steering knuckle with its concave surface facing to the inner side.

NOTICE:

Do not scratch the serrations of the sensor rotor.

5. INSTALL LOCK NUT

(a) Using a socket wrench (32 mm), install a new lock nut.
Torque: 147 N·m (1,500 kgf·cm, 108 ft·lbf)

(b) Using a chisel and hammer, stake the lock nut.

6. INSTALL GREASE CAP

Using a screwdriver and hammer, install the grease cap to the steering knuckle.

SA0R9-06

INSTALLATION

1. INSTALL STEERING KNUCKLE WITH AXLE HUB

(a) Temporarily install the steering knuckle to the upper suspension arm with the nut.

(b) Connect the steering knuckle to the lower ball joint with the 2 bolts.

Torque: 113 N·m (1,150 kgf·cm, 83 ft·lbf)

(c) Torque the nut on the upper side of the steering knuckle.

Torque: 65 N·m (660 kgf·cm, 50 ft·lbf)

(d) Install a new clip.

If the holes for the clip are not aligned, tighten the nut further up to 60°.

2. CONNECT ABS SPEED SENSOR TO STEERING KNUCKLE

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

3. CHECK BEARING BACKLASH AND AXLE HUB DEVIATION (See page SA-12)

4. INSTALL DISC AND BRAKE CALIPER

Install the disc, brake caliper and 2 bolts.

Torque: 118 N·m (1,200 kgf·cm, 87 ft·lbf)

5. INSTALL FRONT WHEEL

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

6. DEPRESS BRAKE PEDAL SEVERAL TIMES

7. CHECK FRONT WHEEL ALIGNMENT (See page SA-5)

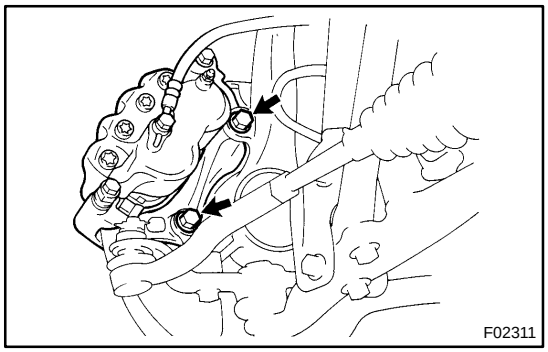
8. CHECK ABS SPEED SENSOR SIGNAL (See page DI-437 or DI-507)

FRONT WHEEL HUB BOLT

SA0RA-05

REPLACEMENT

1. REMOVE FRONT WHEEL

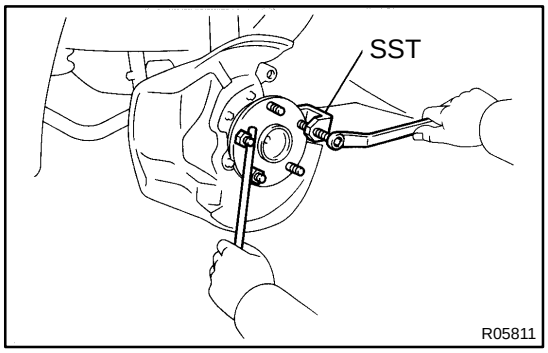


2. REMOVE BRAKE CALIPER AND DISC

(a) Remove the 2 bolts and brake caliper from the steering knuckle.

(b) Support the brake caliper securely.

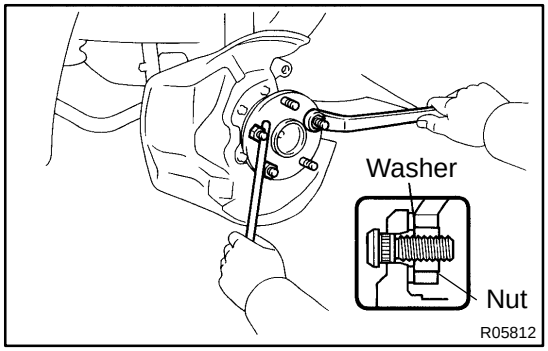
(c) Remove the disc.



3. REMOVE HUB BOLT

Using SST and a brass bar or an equivalent to hold, remove the hub bolt.

SST 09628-1001 1



4. INSTALL HUB BOLT

(a) Install a washer and nut to a new hub bolt, as shown in the illustration.

(b) Using a brass bar or an equivalent to hold, install the hub bolt by torquing the nut.

5. INSTALL DISC AND BRAKE CALIPER

(a) Install the disc.

(b) Install the brake caliper and 2 bolts to the steering knuckle.

Torque: 118 N·m (1,200 kgf·cm, 87 ft·lbf)

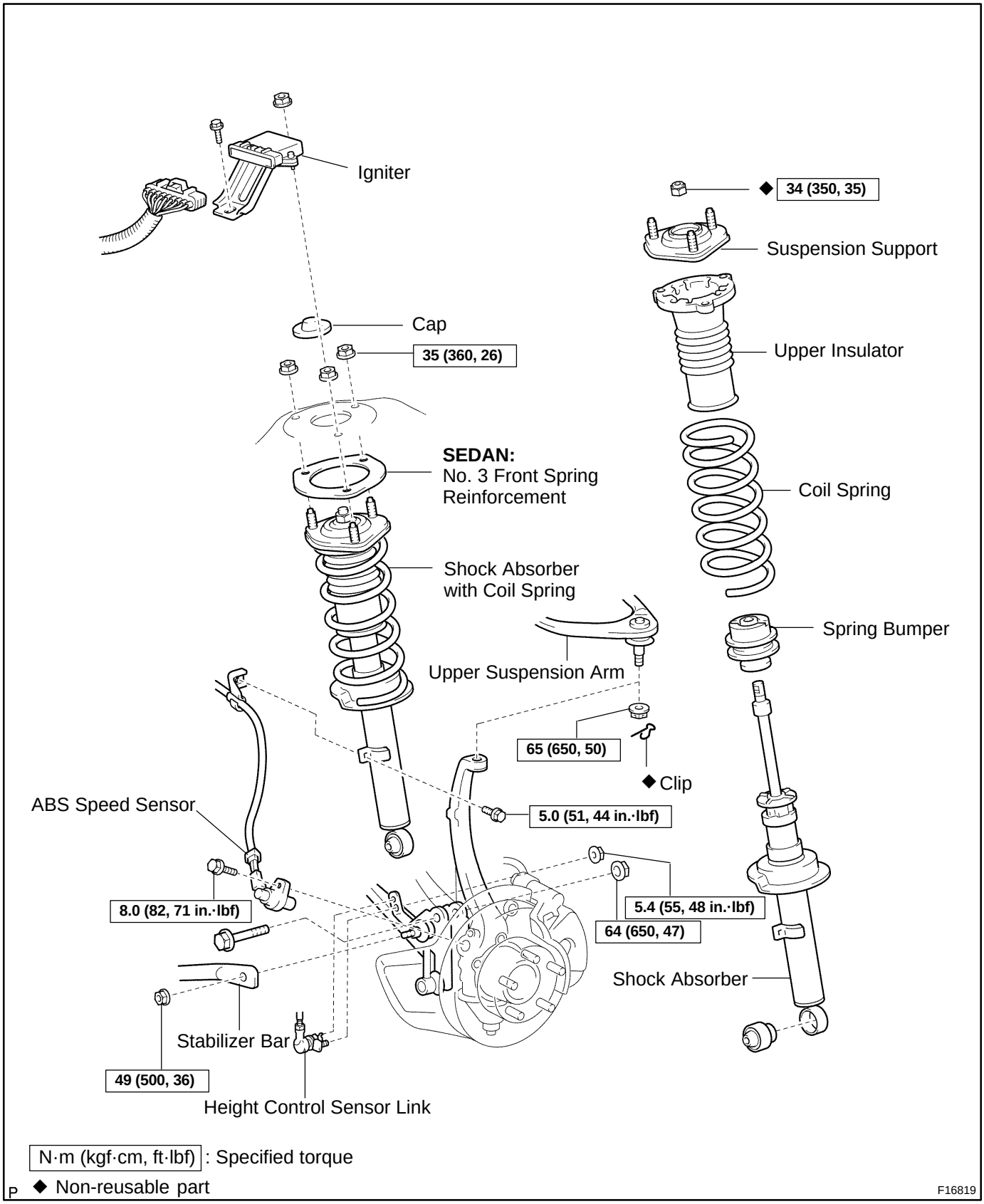
6. INSTALL FRONT WHEEL

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

FRONT SHOCK ABSORBER

SA0RB-11

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

F16819

SA20I-02

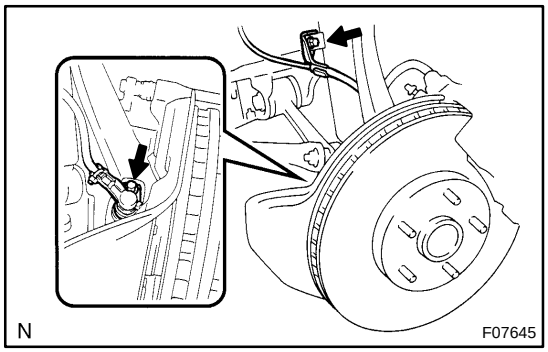
REMOVAL

1. REMOVE FRONT WHEEL

2. REMOVE IGNITER

(a) Disconnect the connector.

(b) Remove the bolt, nut and igniter.



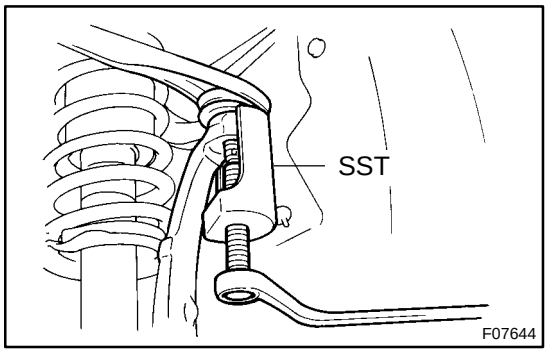
3. DISCONNECT ABS SPEED SENSOR AND WIRE HARNESS CLAMP

(a) Remove the bolt and disconnect the ABS speed sensor from the steering knuckle.

(b) Remove the bolt and disconnect the ABS speed sensor wire harness clamp from the shock absorber.

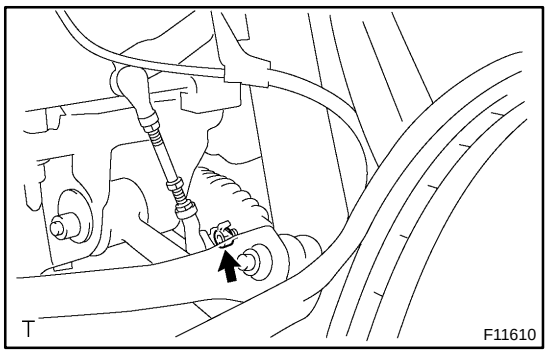
4. DISCONNECT UPPER SUSPENSION ARM FROM STEERING KNUCKLE

(a) Remove the clip and nut.



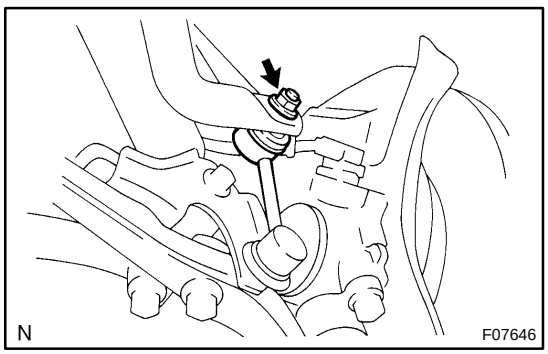
(b) Using SST, disconnect the upper suspension arm.
SST 09610-20012

(c) Support the steering knuckle securely.



5. DISCONNECT HEIGHT CONTROL SENSOR LINK

Remove the nut and disconnect the height control sensor link from lower arm.

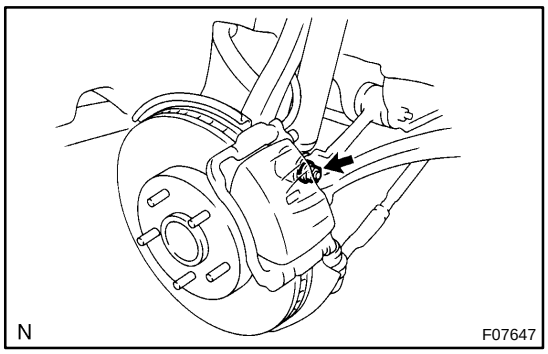


6. DISCONNECT STABILIZER BAR LINK FROM STABILIZER BAR

Remove the nut and disconnect the stabilizer bar link.

HINT:

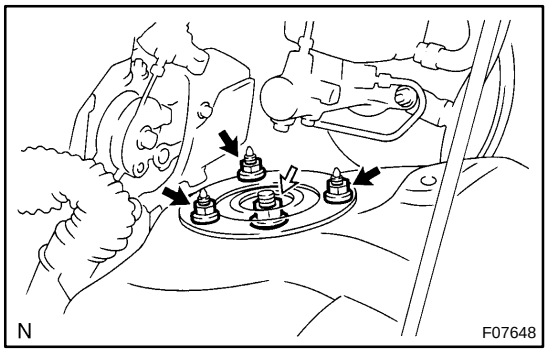
If the ball joint turns together with the nut, use a 5 mm hexagon wrench to hold the stud.



7. REMOVE FRONT SHOCK ABSORBER WITH COIL SPRING

(a) Remove the nut and bolt, and disconnect the shock absorber from the shock absorber bracket.

(b) Remove the cap from the suspension support.



(c) Loosen the nut in the center of the suspension support.

NOTICE:

Do not remove it.

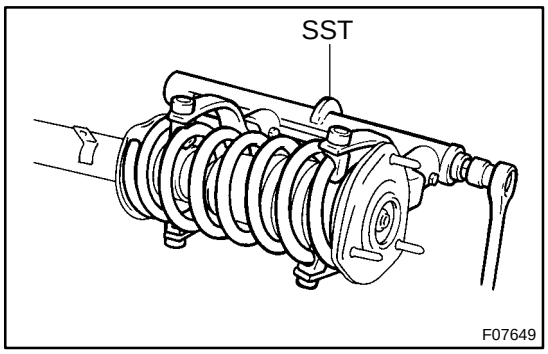
HINT:

If not disassembling the shock absorber, it is not necessary to loosen the nut.

(d) Remove the 3 nuts and shock absorber with coil spring from the body.

(e) SEDAN:
Remove the No. 3 front spring reinforcement from the shock absorber.

SA0RD-08



DISASSEMBLY

REMOVE SUSPENSION SUPPORT AND COIL SPRING

(a) Using SST, compress the coil spring.
SST 09727- 30021 (09727- 00010, 09727- 00021, 09727-00031)

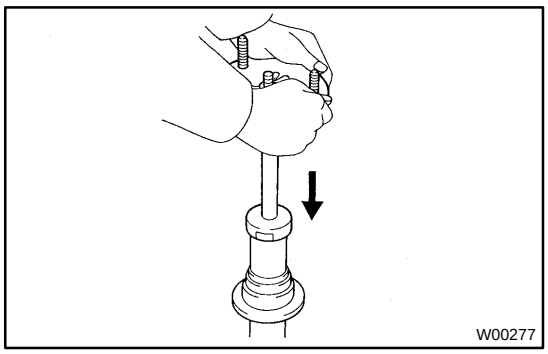
NOTICE:

Do not use an impact wrench. It will damage the SST.

(b) Remove the suspension support nut.

(c) Remove the suspension support, upper insulator, coil spring and spring bumper from the shock absorber.

SA0RE-07



INSPECTION

INSPECT SHOCK ABSORBER

Compress and extend the shock absorber rod and check that there is no abnormal resistance or unusual operation sounds. If there is any abnormality, replace the shock absorber with a new one.

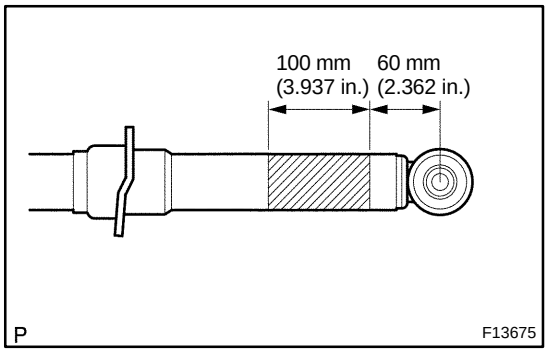
NOTICE:

When discarding the shock absorber, see DISPOSAL on page SA-24 .

SA0RF-07

DISPOSAL

1. FULLY EXTEND SHOCK ABSORBER PISTON ROD



2. DRILL HOLE TO DISCHARGE GAS FROM CYLINDER

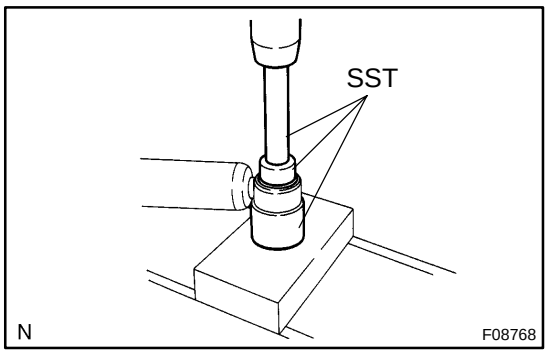
(a) Place the shock absorber horizontally to prevent the oil from coming out.

(b) Using a drill, make a hole on the top of the shell as shown to discharge the gas inside.

CAUTION:

- **When drilling, chips may fly out, work carefully.**
- **The gas is colorless, odorless and non-poisonous.**

SA28H-01

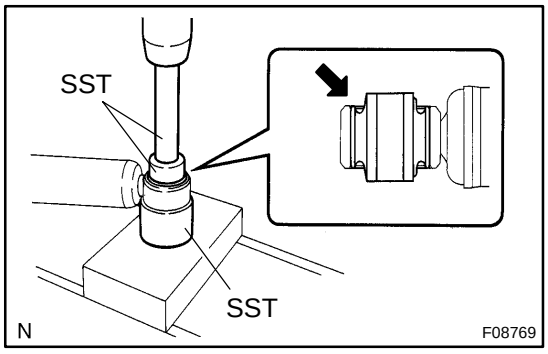


REPLACEMENT

1. REMOVE BUSHING

Using SST and a press, remove the bushing.

SST 09710-28021 (09710-08031),
09710-30021 (09710-03131),
09950-70010 (09951-07100)



2. INSTALL BUSHING

Using SST and a press, install a new bushing.

SST 09710-28021 (09710-08031),
09710-30021 (09710-03131),
09950-70010 (09951-07100)

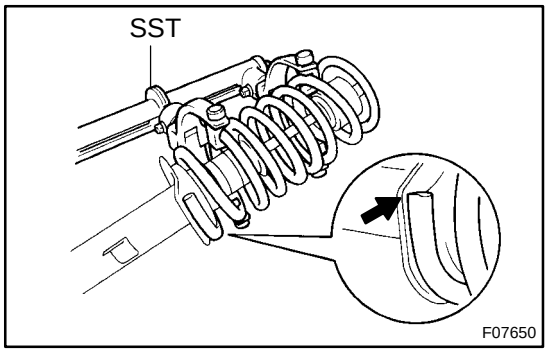
HINT:

Install the bushing until it is flush with the bushing bracket of the shock absorber.

SA0RG-08

REASSEMBLY

1. INSTALL SPRING BUMPER TO PISTON ROD



2. INSTALL COIL SPRING

(a) Using SST, compress the coil spring.

SST 09727- 30021 (09727- 00010, 09727- 00021, 09727-00031)

NOTICE:

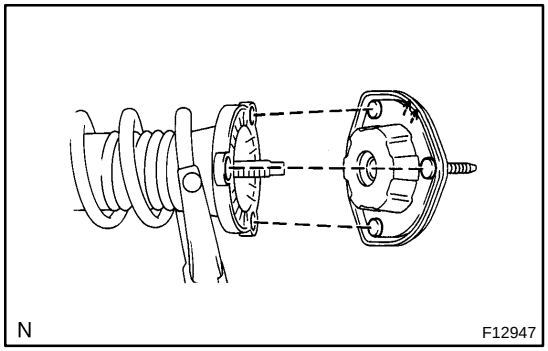
Do not use an impact wrench. It will damage the SST.

(b) Install the coil spring to the shock absorber.

HINT:

Fit the lower end of the coil spring into the gap of the spring seat of the shock absorber.

3. INSTALL UPPER INSULATOR TO SHOCK ABSORBER



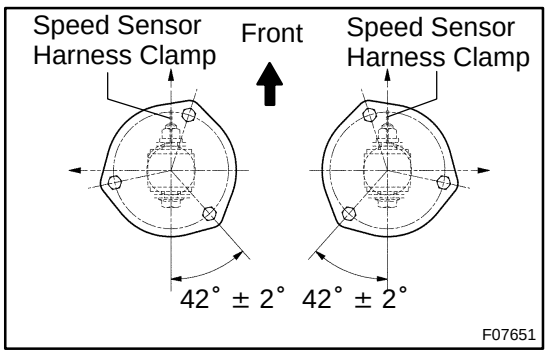
4. INSTALL SUSPENSION SUPPORT

(a) Install the suspension support to the shock absorber, as shown in the illustration.

HINT:

Align the bolt of the suspension support with the cut-out of the upper insulator.

(b) Temporarily tighten a new lock nut.



(c) Align the suspension support with the shock absorber lower bolt as shown in the illustration.

5. REMOVE SST

SST 09727- 30021 (09727- 00010, 09727- 00021, 09727-00031)

HINT:

After removing the SST, recheck the direction of the suspension support.

SA20J-02

INSTALLATION

1. INSTALL FRONT SHOCK ABSORBER WITH COIL SPRING

(a) SEDAN:
Install the No. 3 front spring reinforcement to the shock absorber.

(b) Install the shock absorber to the body with the 3 nuts.
Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)

(c) Connect the shock absorber to the shock absorber bracket with the bolt and nut.
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

HINT:
After stabilizing the suspension, torque the nut.

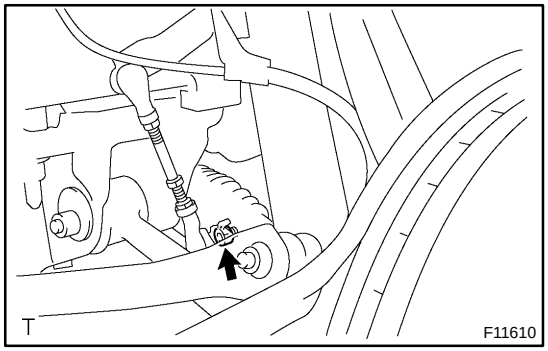
(d) Torque the nut in the center of the suspension support.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

HINT:
If the shock absorber has not been disassembled, it is not necessary to torque the nut.

(e) Install the cap to the suspension support.

2. CONNECT STABILIZER BAR LINK TO STABILIZER BAR
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

HINT:
If the ball joint turns together with the nut, use a 5 mm hexagon wrench to hold the stud.



3. CONNECT HEIGHT CONTROL SENSOR LINK

(a) Set the lower arm to the vehicle height.

(b) Install the sensor link to the lower arm bracket with a nut.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

NOTICE:

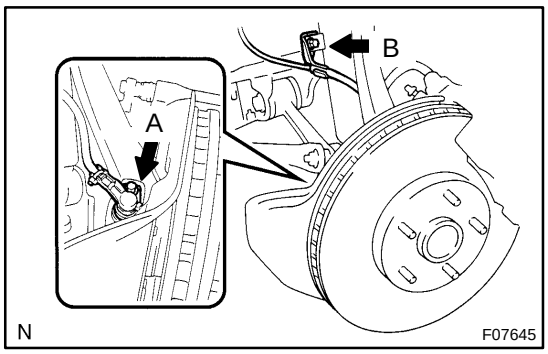
- **Be careful not to brake the link fixing pin until the above operation is completed.**
- **The pin can the broken after completion of the above, however, the sensor arm rotation angle shall not exceed the range of ±70° from the standard vehicle height.**

4. CONNECT UPPER SUSPENSION ARM TO STEERING KNUCKLE

(a) Connect the upper suspension arm with the nut.
Torque: 65 N·m (660 kgf·cm, 50 ft·lbf)

(b) Install a new clip.

If the holes for the clip are not aligned, tighten the nut further up to 60°.



5. CONNECT ABS SPEED SENSOR AND WIRE HARNESS CLAMP
Torque:
Bolt A: 8.0 N·m (82 kgf·cm, 71 in.·lbf)
Bolt B: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

6. INSTALL IGNITER

(a) Install the bolt, nut and igniter.

(b) Connect the connector.

7. INSTALL FRONT WHEEL
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

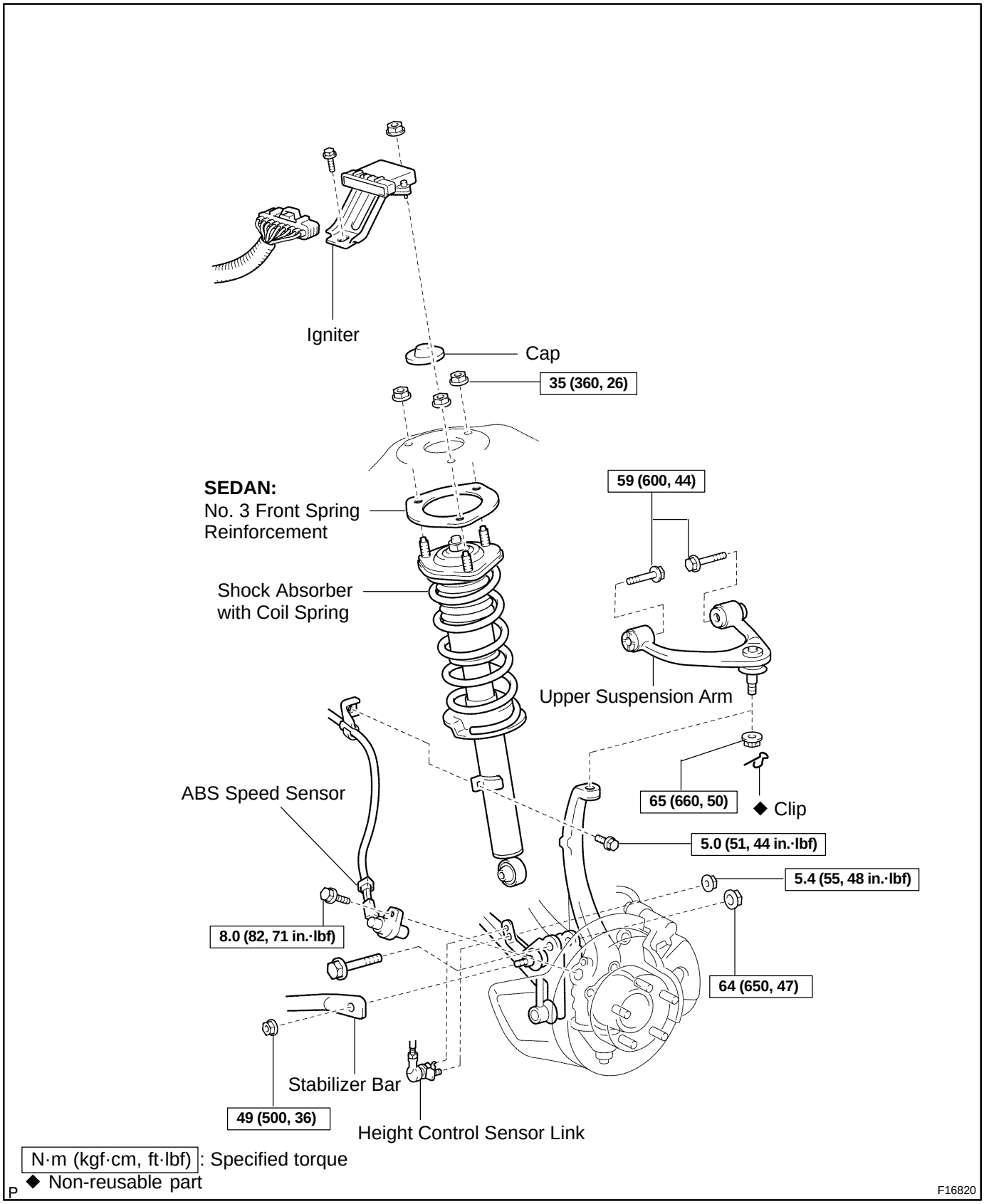
8. CHECK FRONT WHEEL ALIGNMENT
(See page SA-5)

9. CHECK ABS SPEED SENSOR SIGNAL
w/ VSC (See page DI-507)
w/o VSC (See page DI-437)

FRONT UPPER SUSPENSION ARM

SA0RI-09

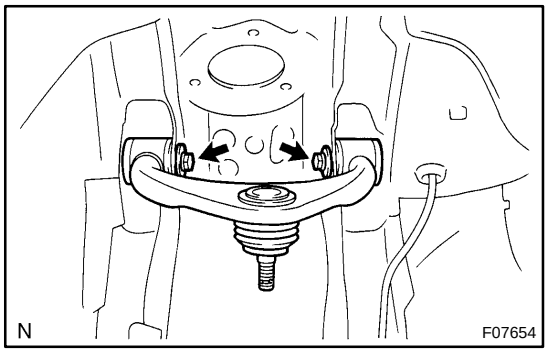
COMPONENTS



SA0RJ-06

REMOVAL

1. **REMOVE FRONT WHEEL**
2. **REMOVE FRONT SHOCK ABSORBER**
   (See page SA-20)



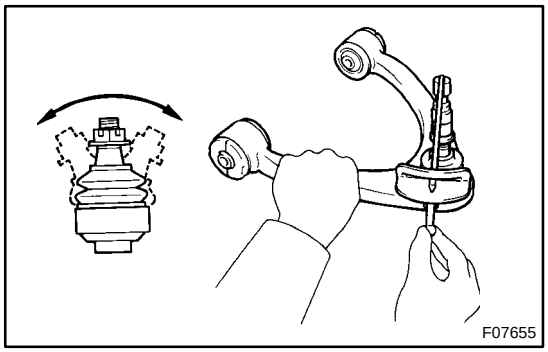
3. **REMOVE UPPER SUSPENSION ARM**

Remove the 2 bolts and upper suspension arm from the body.

SA0RK-07

INSPECTION

1. INSPECT UPPER SUSPENSION ARM BALL JOINT BOOT FOR DAMAGE



2. INSPECT UPPER SUSPENSION ARM BALL JOINT FOR ROTATION CONDITION

(a) As shown in the illustration, flip the ball joint stud back and forth 5 times, before installing the nut.

(b) Using a torque wrench, turn the nut continuously 1 turn per 2 - 4 seconds and take the torque reading on the 5th turn.

Turning torque:

1.0 - 3.4 N·m (10 - 35 kgf·cm, 9 - 30 in.·lbf)

SA0RL-08

INSTALLATION

1. INSTALL UPPER SUSPENSION ARM TO BODY
Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)

HINT:

After stabilizing the suspension, torque the bolt.

2. INSTALL FRONT SHOCK ABSORBER (See page SA-27)

3. INSTALL FRONT WHEEL
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

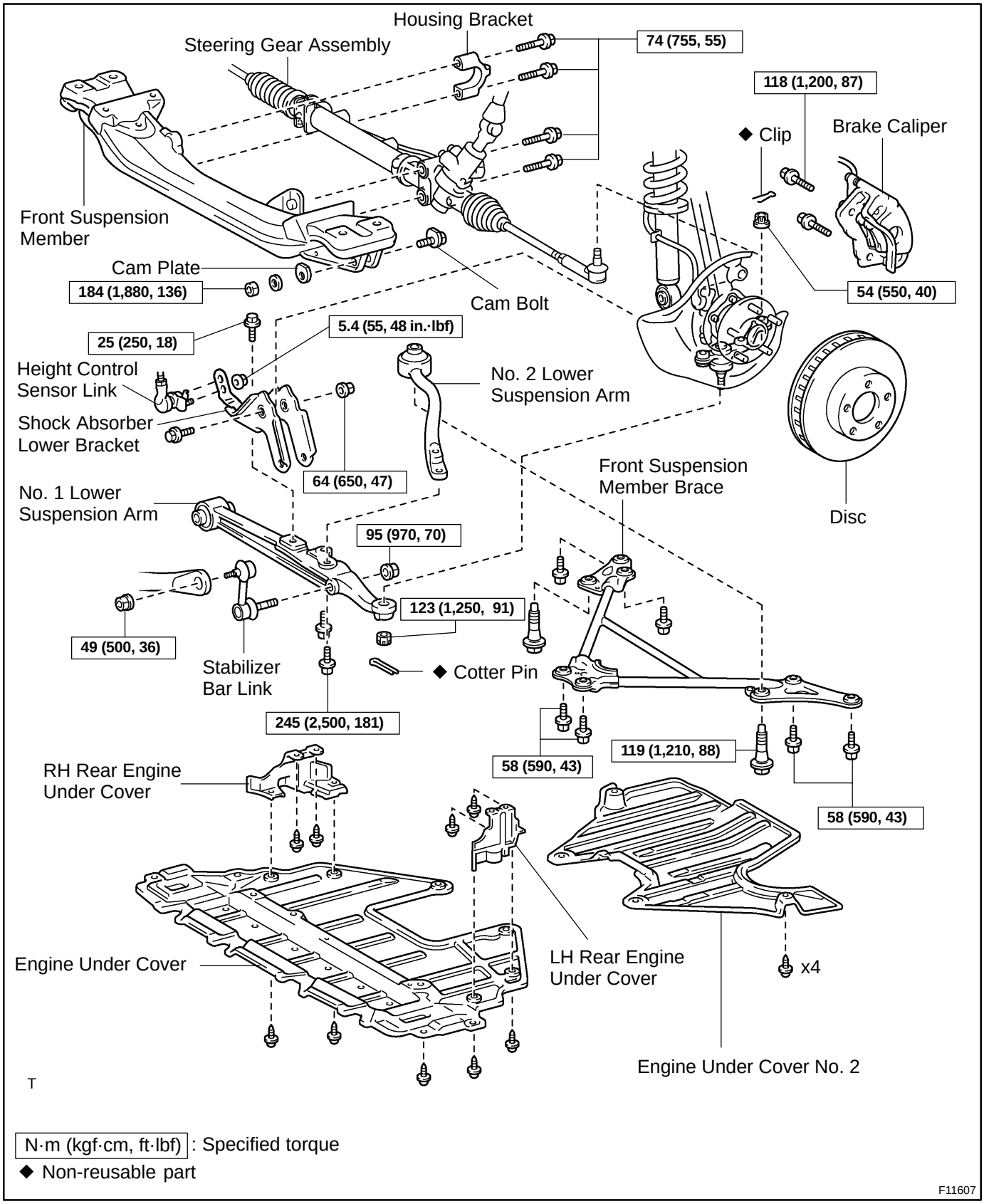
4. CHECK FRONT WHEEL ALIGNMENT (See page SA-5)

5. CHECK ABS SPEED SENSOR SIGNAL
w/ VSC (See page DI-507)
w/o VSC (See page DI-437)

FRONT LOWER SUSPENSION ARM

SA0RM-08

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

F11607

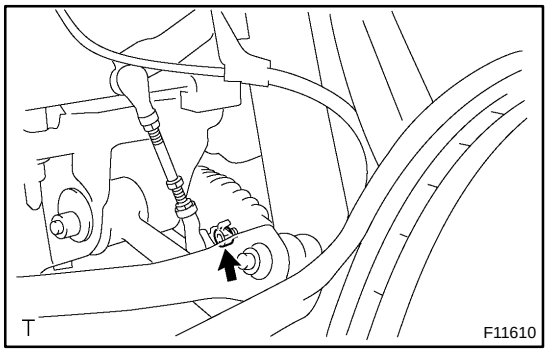
SA20K-02

REMOVAL

1. REMOVE FRONT WHEEL

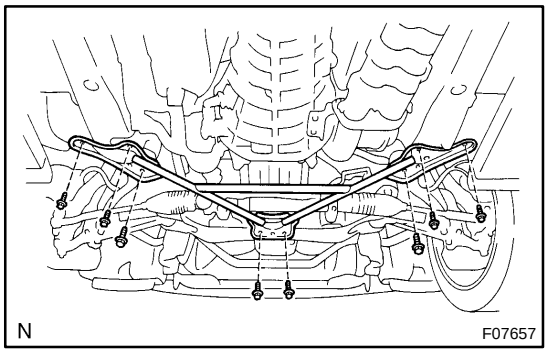
2. REMOVE ENGINE UNDER COVER AND ENGINE UNDER COVER NO. 2

3. REMOVE RH AND LH REAR ENGINE UNDER COVER



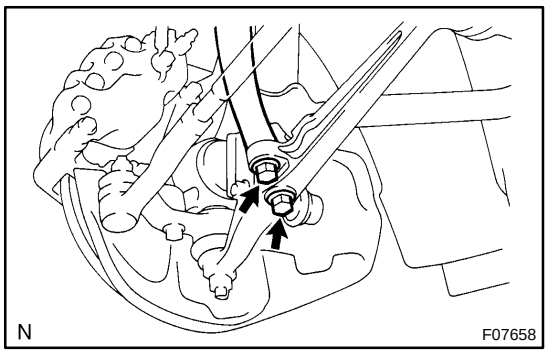
4. DISCONNECT HEIGHT CONTROL SENSOR LINK

Remove the nut and disconnect the height control sensor link from lower arm.



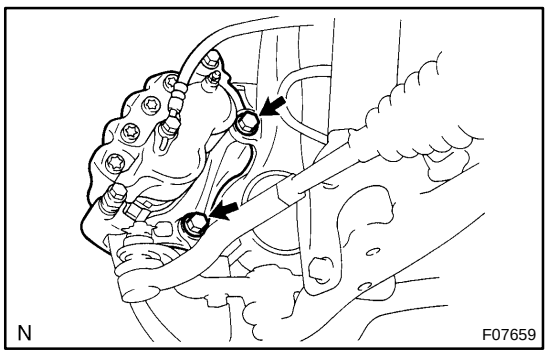
5. REMOVE FRONT SUSPENSION MEMBER BRACE

Remove the 8 bolts and suspension member brace.



6. REMOVE NO. 2 LOWER SUSPENSION ARM

Remove the 2 bolts and No. 2 lower suspension arm from the No. 1 lower suspension arm.



7. REMOVE BRAKE CALIPER AND DISC

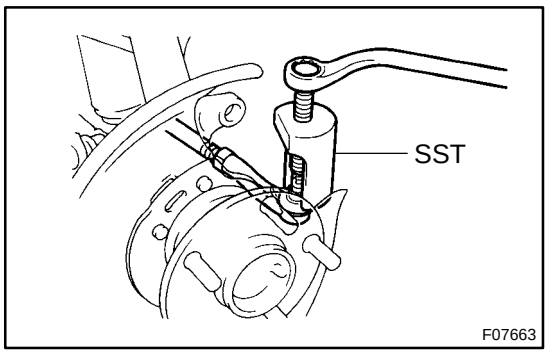
(a) Remove the 2 bolts and brake caliper from the steering knuckle.

(b) Support the brake caliper securely.

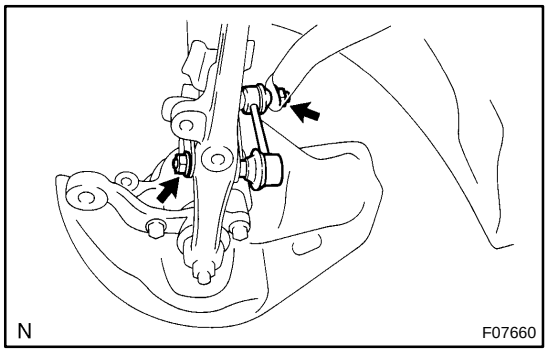
(c) Remove the disc.

8. DISCONNECT TIE ROD END FROM LOWER BALL JOINT

(a) Remove the clip and nut.



(b) Using SST, disconnect the tie rod end.
SST 09610-20012

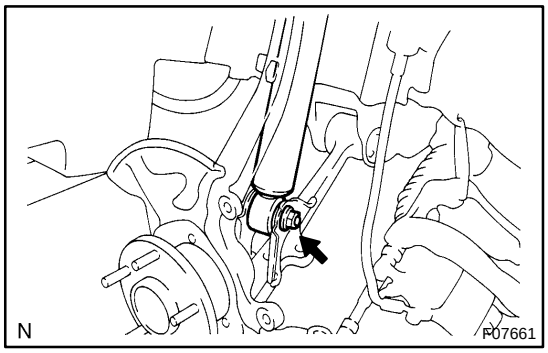


9. REMOVE STABILIZER BAR LINK

Remove the 2 nuts and stabilizer bar link.

HINT:

If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.

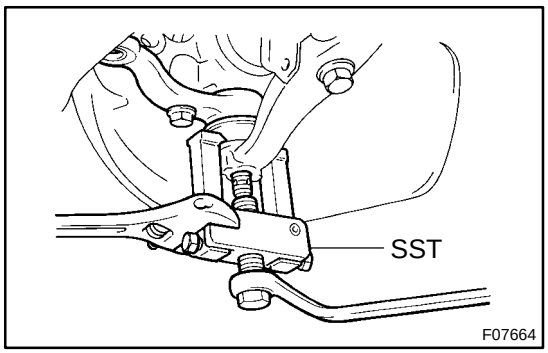


10. DISCONNECT SHOCK ABSORBER FROM SHOCK ABSORBER BRACKET

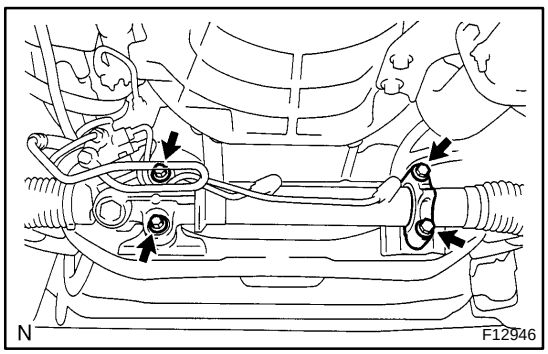
Remove the nut and bolt and disconnect the shock absorber.

11. DISCONNECT LOWER BALL JOINT FROM NO. 1 LOWER SUSPENSION ARM

(a) Remove the cotter pin and nut.



(b) Using SST, disconnect the lower ball joint.
SST 09628-6201 1



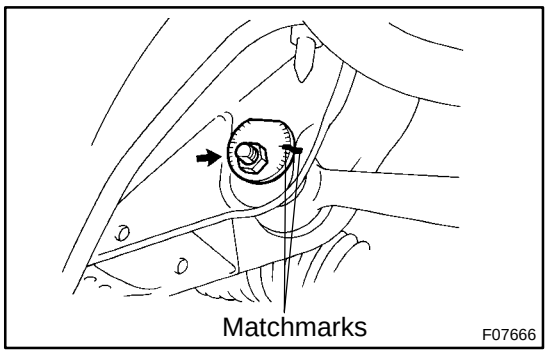
12. DISCONNECT STEERING GEAR ASSEMBLY

(a) Remove the 4 bolts, housing bracket and disconnect the steering gear assembly.

NOTICE:

Be careful not to damage the return tube and pressure feed tube.

(b) Support the steering gear assembly securely.



13. REMOVE NO. 1 LOWER SUSPENSION ARM

(a) Place matchmarks on the cam plate and suspension member.

(b) Remove the nut, washer, cam plate, cam bolt and No.1 lower suspension arm from the suspension member.

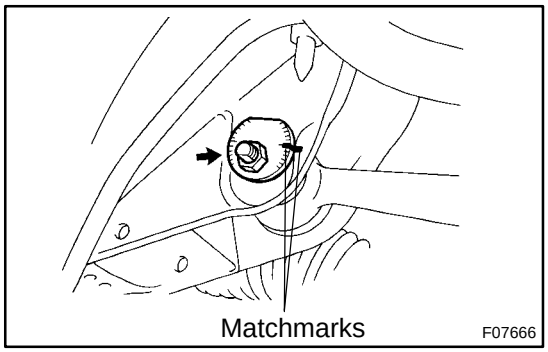
14. REMOVE SHOCK ABSORBER LOWER BRACKET

Remove the bolt and shock absorber lower bracket from the No. 1 lower suspension arm.

SA20L-02

INSTALLATION

1. INSTALL SHOCK ABSORBER LOWER BRACKET TO NO. 1 LOWER SUSPENSION ARM
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)



2. INSTALL NO. 1 LOWER SUSPENSION ARM

(a) Install the No. 1 lower suspension arm to the suspension member with the cam bolt, cam plate, washer and nut.
Torque: 184 N·m (1,880 kgf·cm, 136 ft·lbf)

HINT:

After stabilizing the suspension, align the matchmarks on the cam plate and suspension member, and torque the nut.

(b) Connect the lower ball joint to the No. 1 lower suspension arm with the nut.
Torque: 123 N·m (1,250 kgf·cm, 91 ft·lbf)

(c) Install a new cotter pin.

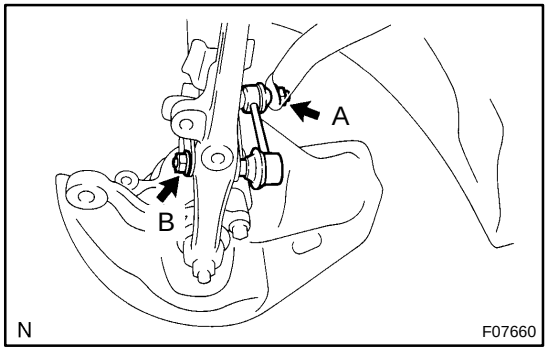
If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.

3. CONNECT STEERING GEAR ASSEMBLY
Torque: 74 N·m (755 kgf·cm, 55 ft·lbf)

NOTICE:

Be careful not to damage the return tube and pressure feed tube.

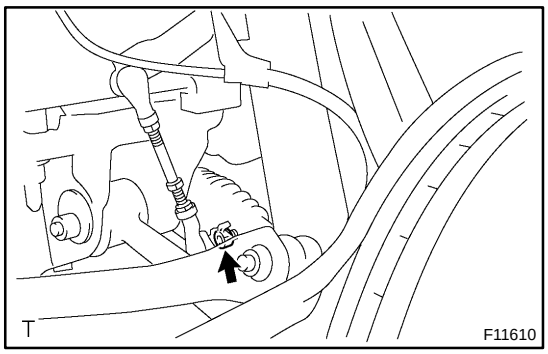
4. CONNECT SHOCK ABSORBER TO FRONT SHOCK ABSORBER BRACKET
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)



5. INSTALL STABILIZER BAR LINK
Torque:
Nut A: 49 N·m (500 kgf·cm, 36 ft·lbf)
Nut B: 95 N·m (970 kgf·cm, 70 ft·lbf)

HINT:

If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.



6. CONNECT HEIGHT CONTROL SENSOR LINK

(a) Set the lower arm to the vehicle height.

(b) Install the sensor link to the lower arm bracket with a nut.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

NOTICE:

- **Be careful not to brake the link fixing pin until the above operation is completed.**
- **The pin can the broken after completion of the above, however, the sensor arm rotation angle shall not exceed the range of ±70° from the standard vehicle height.**

7. CONNECT TIE ROD END TO LOWER BALL JOINT

(a) Connect the tie rod end to the lower ball joint with the nut.

Torque: 54 N·m (550 kgf·cm, 40 ft·lbf)

(b) Install a new clip.

HINT:

If the holes for the clip are not aligned, tighten the nut further up to 60°.

8. INSTALL DISC AND BRAKE CALIPER

Install the disc, brake caliper and 2 bolts.

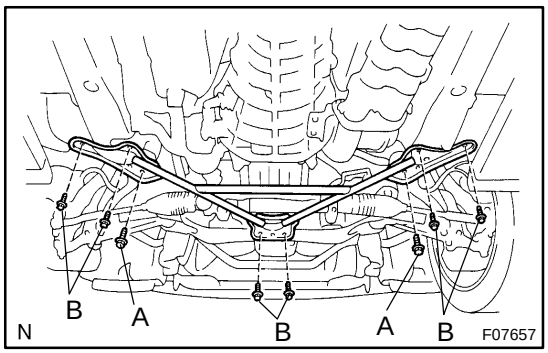
Torque: 118 N·m (1,200 kgf·cm, 87 ft·lbf)

9. CONNECT NO. 2 LOWER SUSPENSION ARM TO NO. 1 LOWER SUSPENSION ARM

Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)

HINT:

After stabilizing the suspension, torque the bolt.



10. INSTALL FRONT SUSPENSION MEMBER BRACE

Torque:

Bolt A: 119 N·m (1,210 kgf·cm, 88 ft·lbf)

Bolt B: 58 N·m (590 kgf·cm, 43 ft·lbf)

HINT:

- Install the bolt A through the No.2 lower suspension arm.
- After stabilizing the suspension, torque the bolt A.

11. INSTALL RH AND LH REAR ENGINE UNDER COVER

12. INSTALL ENGINE UNDER COVER AND ENGINE UNDER COVER NO. 2

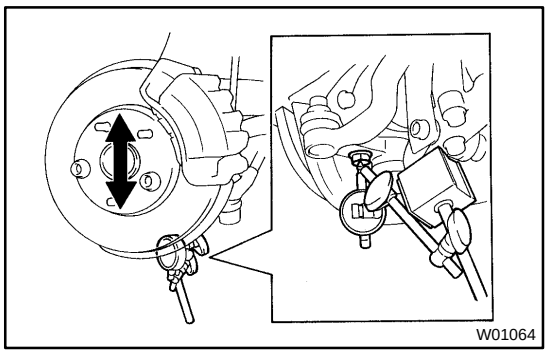
13. INSTALL FRONT WHEEL

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

14. DEPRESS BRAKE PEDAL SEVERAL TIMES

15. CHECK FRONT WHEEL ALIGNMENT

(See page SA-5)



FRONT LOWER BALL JOINT

SA0RP-06

ON-VEHICLE INSPECTION

INSPECT LOWER BALL JOINT EXCESSIVE PLAY ON-VEHICLE

(a) Remove the front wheel and install the hub nuts to the disc.

(b) Using a dial indicator, check the lower ball joint for excessive play when you push the hub nuts up and down with a force of 294 N (30 kgf, 66 lbf).

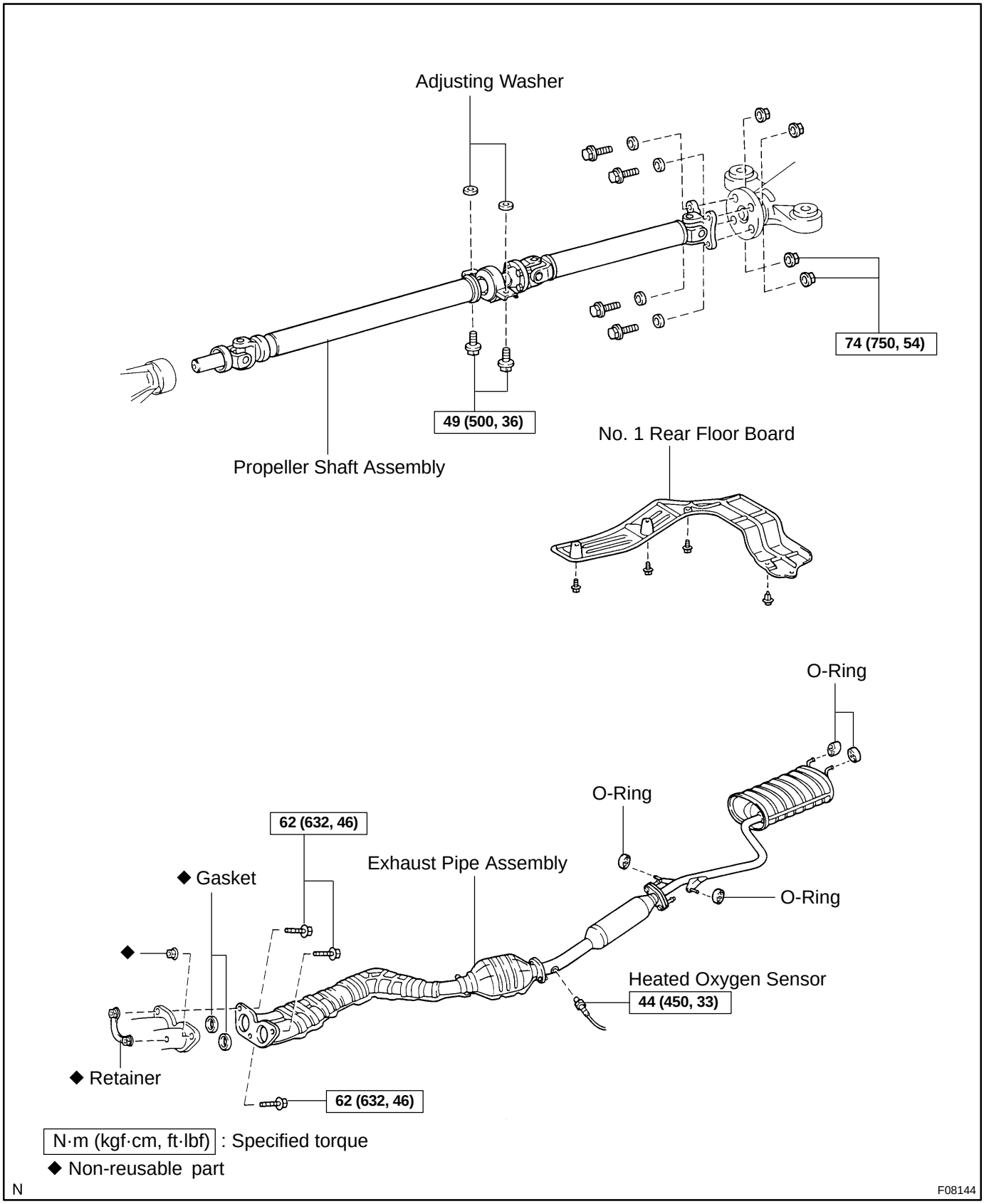
Maximum: 0.9 mm (0.035 in.)

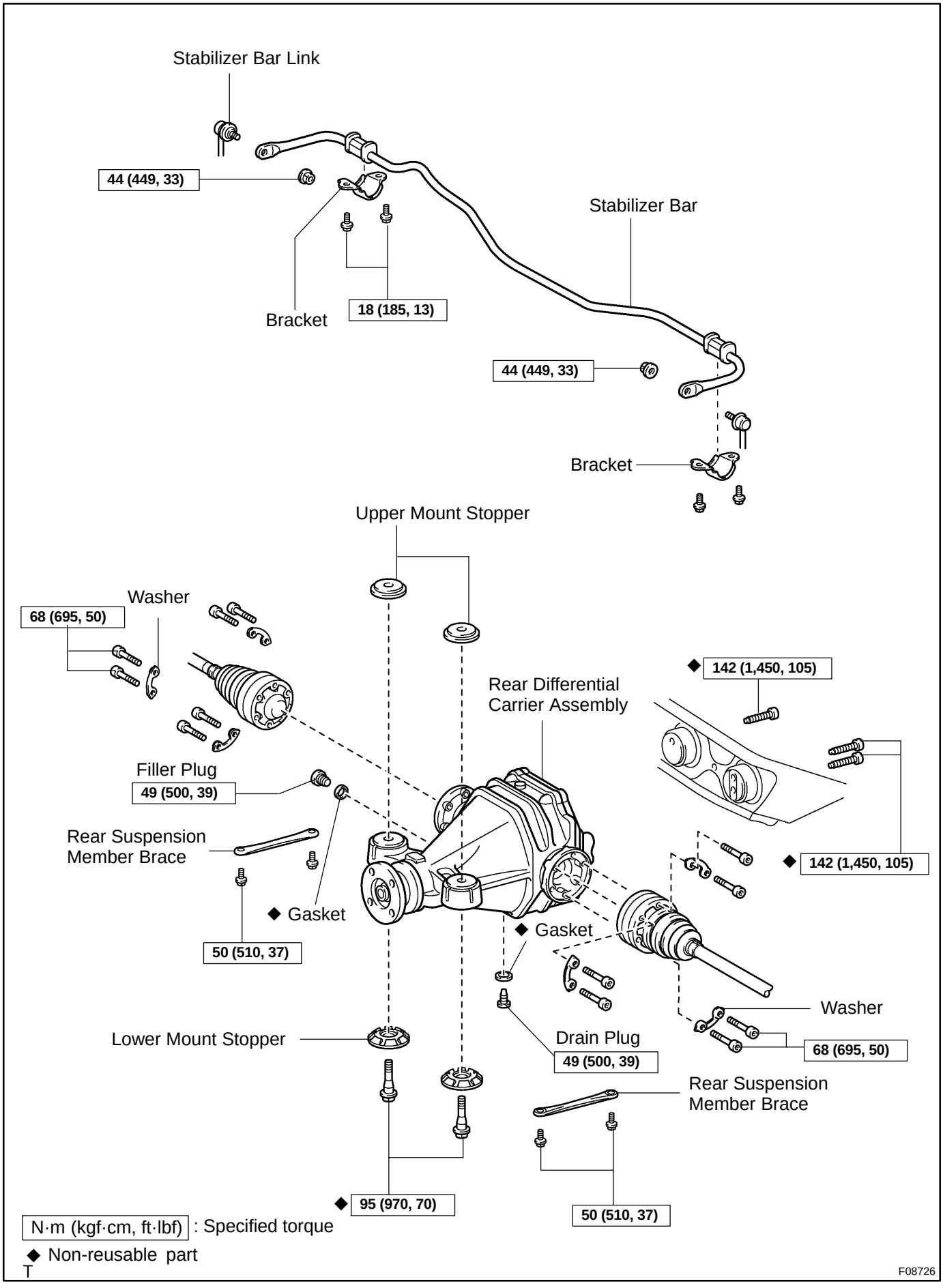
If it is not within the specified value, replace the lower ball joint.

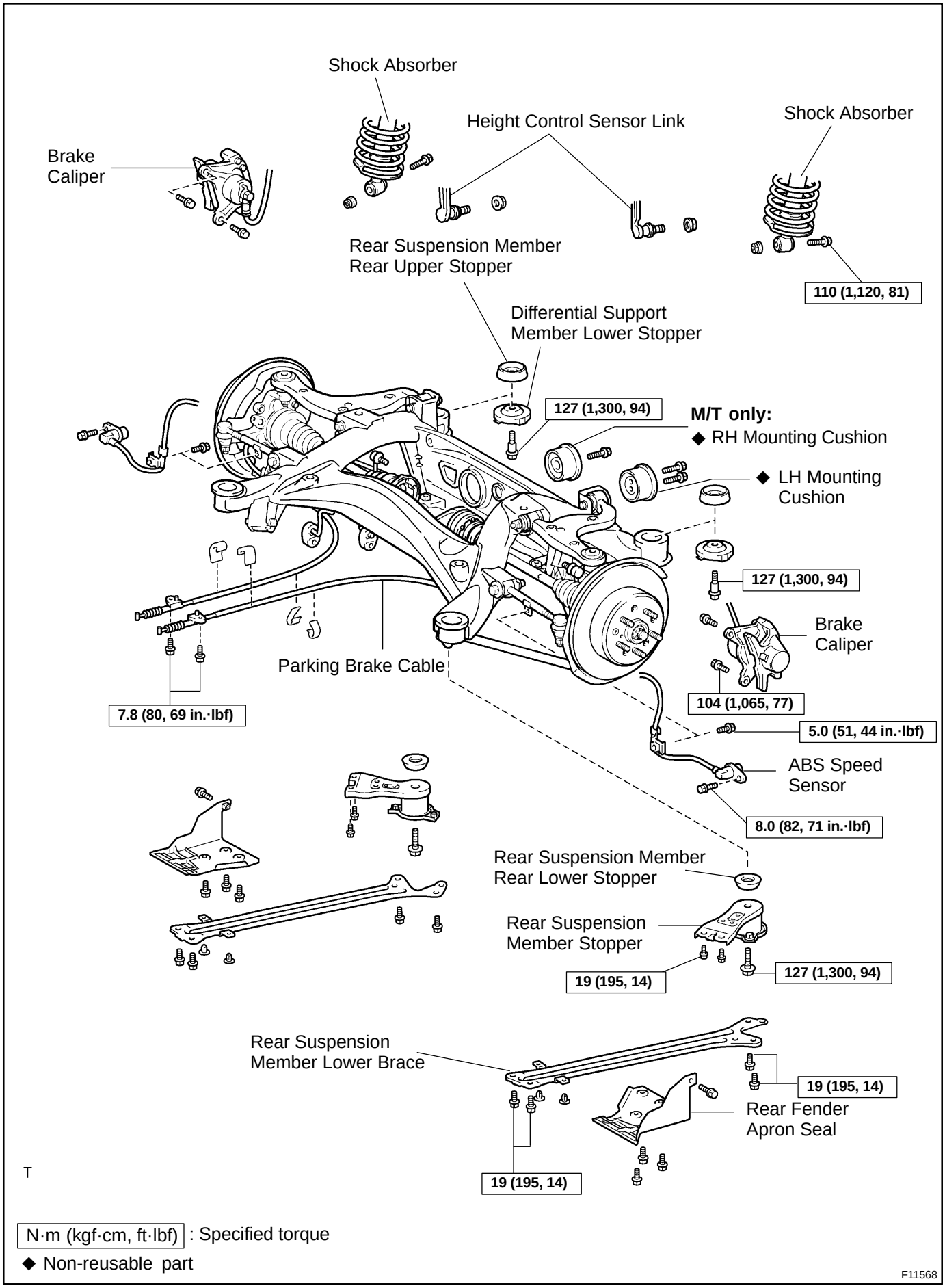
DIFFERENTIAL MOUNTING CUSHION

SA1JH-05

COMPONENTS



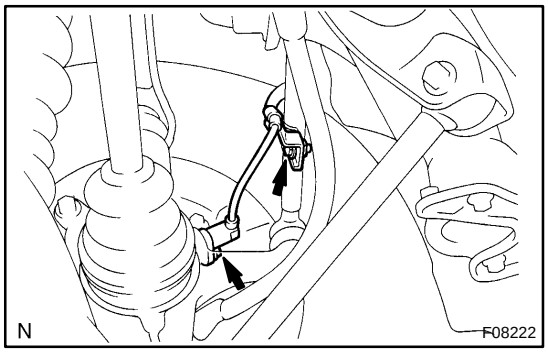

Stabilizer Bar Link
44 (449, 33)
Bracket
18 (185, 13)
Stabilizer Bar
44 (449, 33)
Bracket
Upper Mount Stopper
Washer
68 (695, 50)
Filler Plug
49 (500, 39)
Rear Suspension Member Brace
50 (510, 37)
◆ Gasket
Rear Differential Carrier Assembly
◆ 142 (1,450, 105)
◆ 142 (1,450, 105)
◆ Gasket
Lower Mount Stopper
Drain Plug
49 (500, 39)
Washer
68 (695, 50)
Rear Suspension Member Brace
◆ 95 (970, 70)
50 (510, 37)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
F08726


Shock Absorber
Height Control Sensor Link
Shock Absorber
Brake Caliper
Rear Suspension Member Rear Upper Stopper
110 (1,120, 81)
Differential Support Member Lower Stopper
127 (1,300, 94)
M/T only:
◆ RH Mounting Cushion
◆ LH Mounting Cushion
127 (1,300, 94)
Brake Caliper
Parking Brake Cable
104 (1,065, 77)
7.8 (80, 69 in.·lbf)
5.0 (51, 44 in.·lbf)
ABS Speed Sensor
8.0 (82, 71 in.·lbf)
Rear Suspension Member Rear Lower Stopper
Rear Suspension Member Stopper
19 (195, 14)
127 (1,300, 94)
Rear Suspension Member Lower Brace
19 (195, 14)
Rear Fender Apron Seal
19 (195, 14)
T
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
F11568

SA20M-02

REPLACEMENT

1. **REMOVE REAR WHEELS**
2. **REMOVE REAR DIFFERENTIAL CARRIER ASSEMBLY (See page SA-79)**



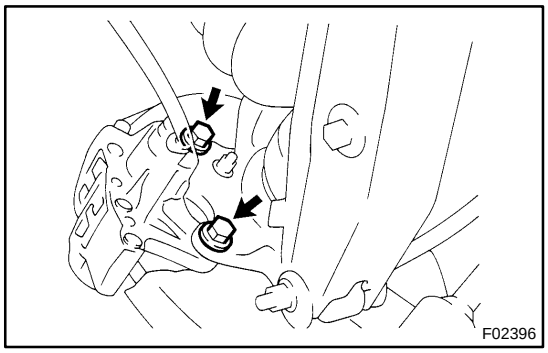
3. **DISCONNECT RH AND LH ABS SPEED SENSORS AND WIRE HARNESS**

(a) Remove the bolt and disconnect the ABS speed sensor from the rear axle carrier.

(b) Remove the bolt and disconnect the ABS speed sensor wire harness clamp from the toe control link.

(c) Employ the same manner described above to the other side.

4. **REMOVE RH AND LH REAR FENDER APRON SEALS**

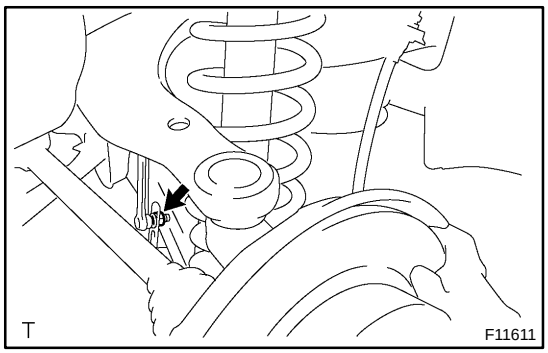


5. **REMOVE RH AND LH BRAKE CALIPERS**

(a) Remove the 2 bolts and brake caliper from the axle carrier.

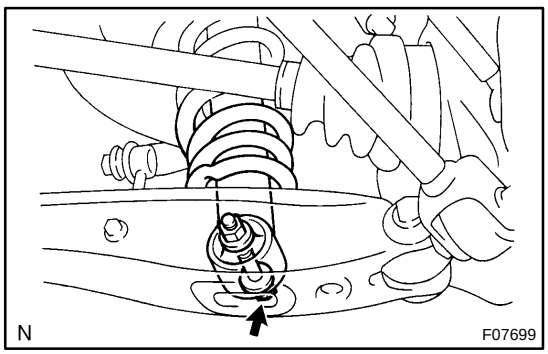
(b) Support the brake caliper securely.

(c) Employ the same manner described above to the other side.



6. **DISCONNECT HEIGHT CONTROL SENSOR LINK**

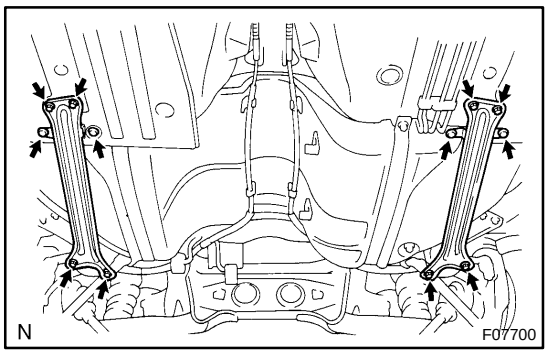
Remove the nut and disconnect the height control sensor link from lower arm bracket.



7. **DISCONNECT RH AND LH SHOCK ABSORBERS FROM NO. 2 LOWER SUSPENSION ARMS**

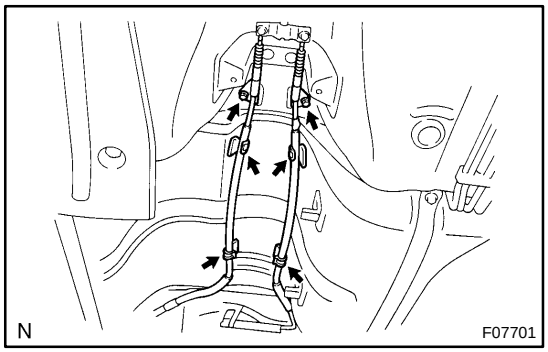
(a) Remove the nut and bolt, and disconnect the shock absorber.

(b) Employ the same manner described above to the other side.



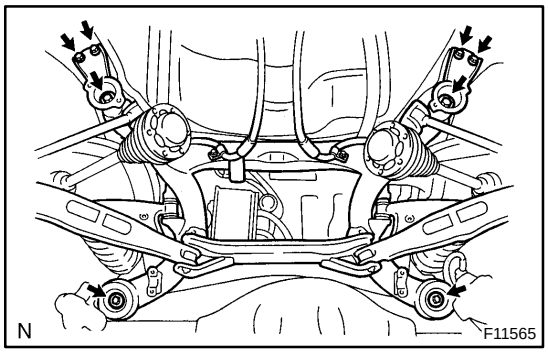
8. REMOVE RH AND LH REAR SUSPENSION MEMBER LOWER BRACES

Remove the 8 bolts, 4 clips and 2 lower braces.



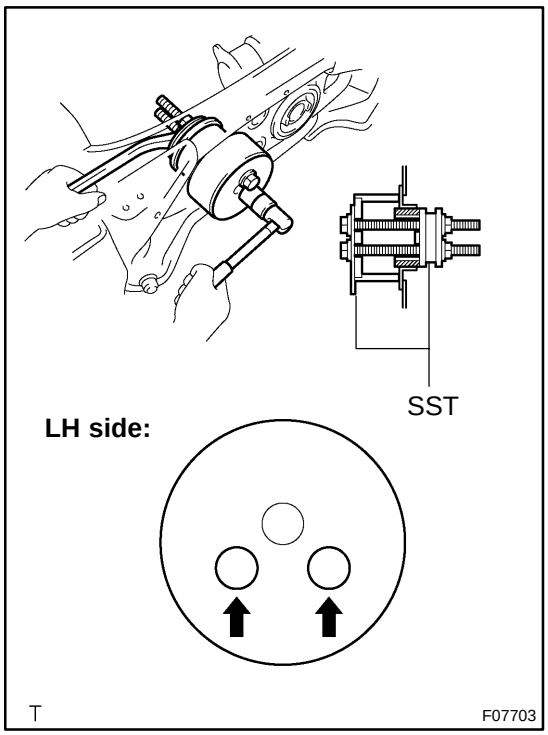
9. DISCONNECT PARKING BRAKE CABLE

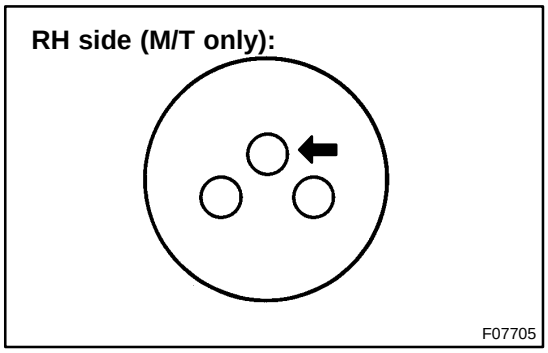
(a) Disconnect the parking brake cable from the 4 clamps.
(b) Remove the 2 bolts and disconnect the parking brake cable.



10. REMOVE REAR SUSPENSION MEMBER

(a) Support the rear suspension member with a jack.
(b) Remove the 8 bolts, 2 rear suspension member stoppers and 2 differential support member lower stoppers.
(c) Lower the rear suspension member.
(d) Remove the rear suspension member rear upper and lower stoppers from the rear suspension member.





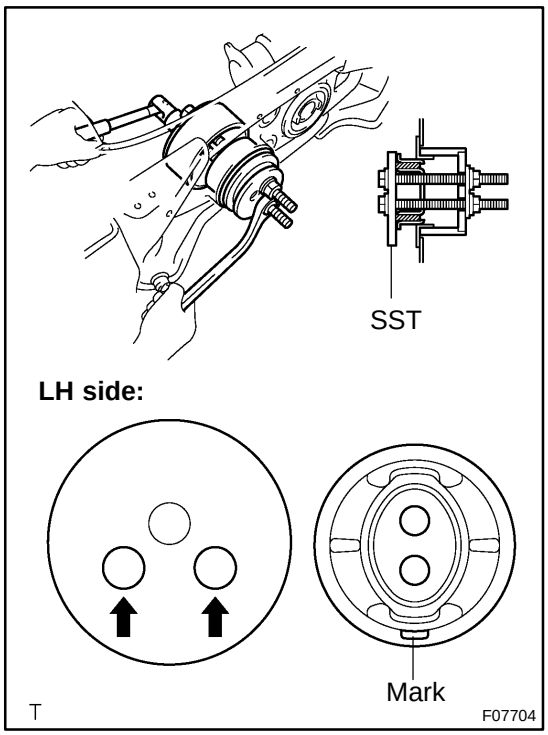
11. REMOVE DIFFERENTIAL MOUNTING CUSHION

Using SST, remove the differential mounting cushion.

SST 09316-12010, 09570-24010

NOTICE:

- **When driving out the mounting cushion, be careful not to touch the suspension member with the SST.**
- **Align the SST straight so that the bolt of the SST is parallel with the center line of the mounting cushion.**
- **When installing the bolts to the RH and LH differential mounting cushions, make sure that the bolts are passed through the correct holes in the SST, as shown in the illustration.**



12. INSTALL DIFFERENTIAL MOUNTING CUSHION

Using SST, install the cushion so that the marks are positioned, as shown in the illustration.

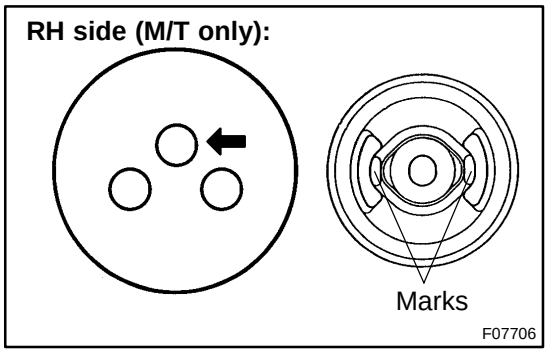
SST 09570-24010

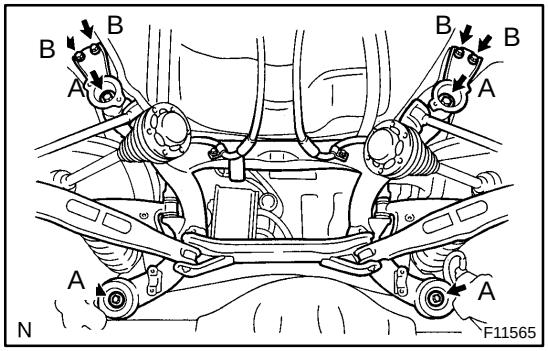
NOTICE:

- **Be careful not to confuse RH and LH sides, and its top and bottom.**
- **Set the SST after temporarily installing the differential mounting cushion into the member so as not to install at an angle.**
- **To confirm that the differential mounting cushion is aligned straight in relation to the member, check that the SST is fully in contact with all of the cushion.**

13. INSTALL REAR SUSPENSION MEMBER

(a) Install the rear suspension member rear upper and lower stoppers to the rear suspension member.





(b) Install the 2 differential support member lower stopper, rear suspension member stopper with the 8 bolts.

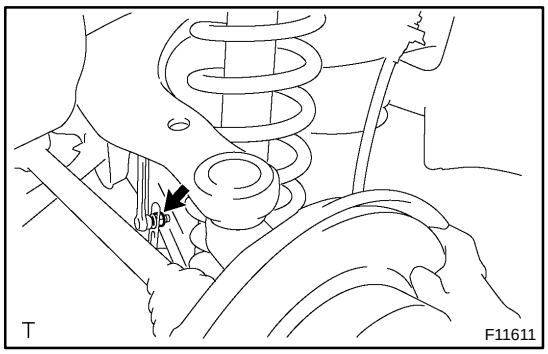
Torque:
A bolt: 127 N·m (1,300 kgf·cm, 94 ft·lbf)
B bolt: 19 N·m (195 kgf·cm, 14 ft·lbf)

(c) Lower the jack.

14. CONNECT PARKING BRAKE CABLE
Torque: 7.8 N·m (80 kgf·cm, 69 in.·lbf)

15. INSTALL RH AND LH REAR SUSPENSION MEMBER LOWER BRACES
Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

16. CONNECT RH AND LH SHOCK ABSORBERS TO NO. 2 LOWER SUSPENSION ARMS
Torque: 110 N·m (1,120 kgf·cm, 81 ft·lbf)



17. CONNECT HEIGHT CONTROL SENSOR LINK

(a) Set the lower arm to the vehicle height.

(b) Install the sensor link to the lower arm bracket with a nut.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

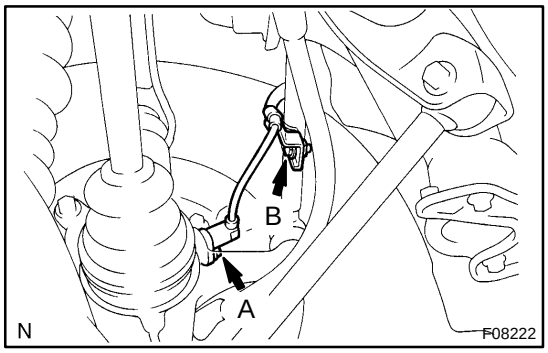
NOTICE:

- **Be careful not to brake the link fixing pin until the above operation is completed.**
- **The pin can be broken after completion of the above, however, the sensor arm rotation angle shall not exceed the range of ± 70° from the standard vehicle height.**

18. INSTALL RH AND LH BRAKE CALIPERS TO STEERING KNUCKLES

Torque: 104 N·m (1,065 kgf·cm, 77 ft·lbf)

19. INSTALL RH AND LH REAR FENDER APRON SEALS



20. CONNECT RH AND LH ABS SPEED SENSORS AND WIRE HARNESS

Torque:
Bolt A: 8.0 N·m (82 kgf·cm, 71 in.·lbf)
Bolt B: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

21. INSTALL REAR DIFFERENTIAL CARRIER ASSEMBLY (See page SA-99)

22. INSTALL REAR WHEELS

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

23. DEPRESS BRAKE PEDAL SEVERAL TIMES

24. CHECK REAR WHEEL ALIGNMENT

(See page SA-9)

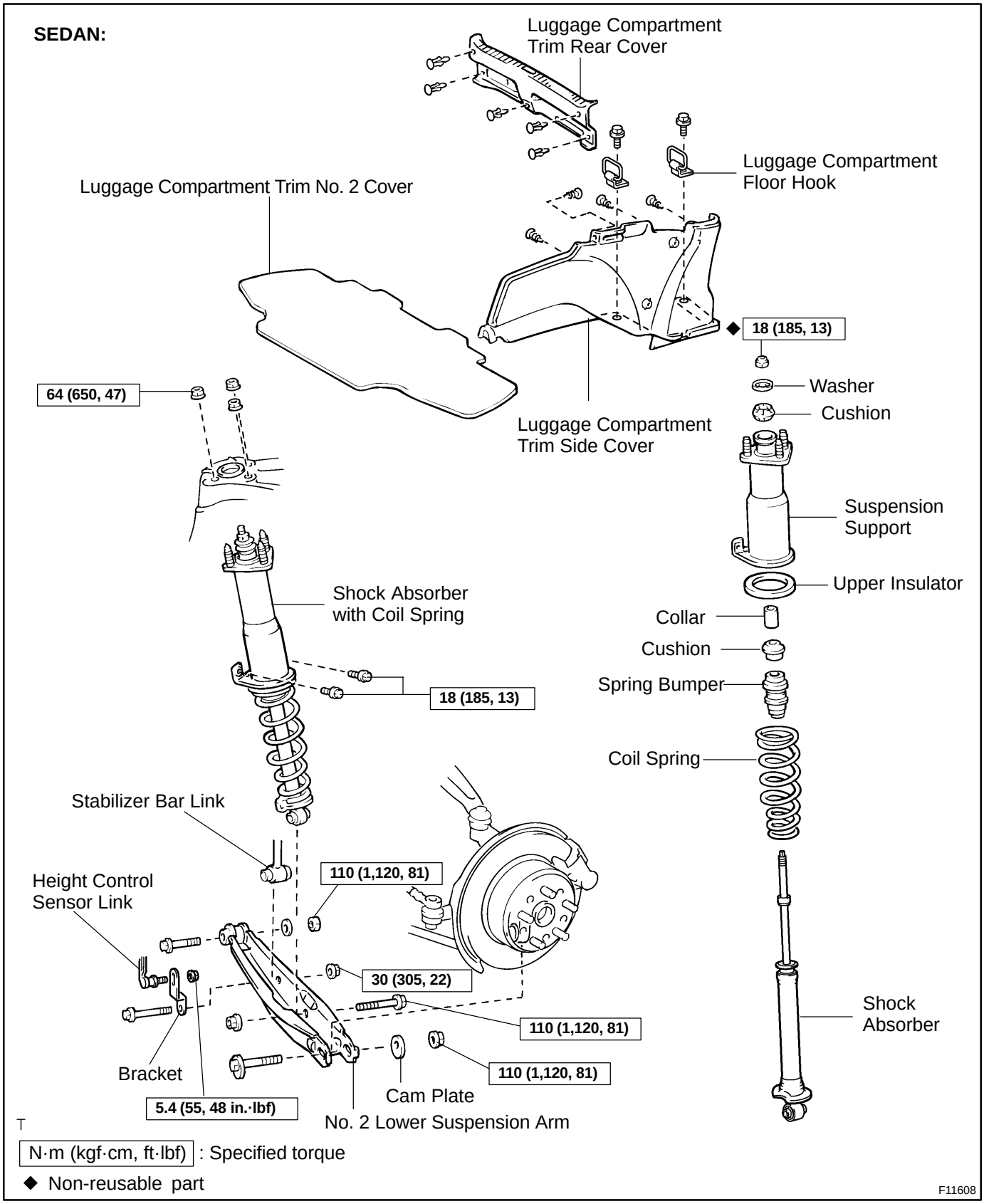
25. CHECK ABS SPEED SENSOR SIGNAL

w/o VSC (See page DI-437)
w/VSC (See page DI-507)

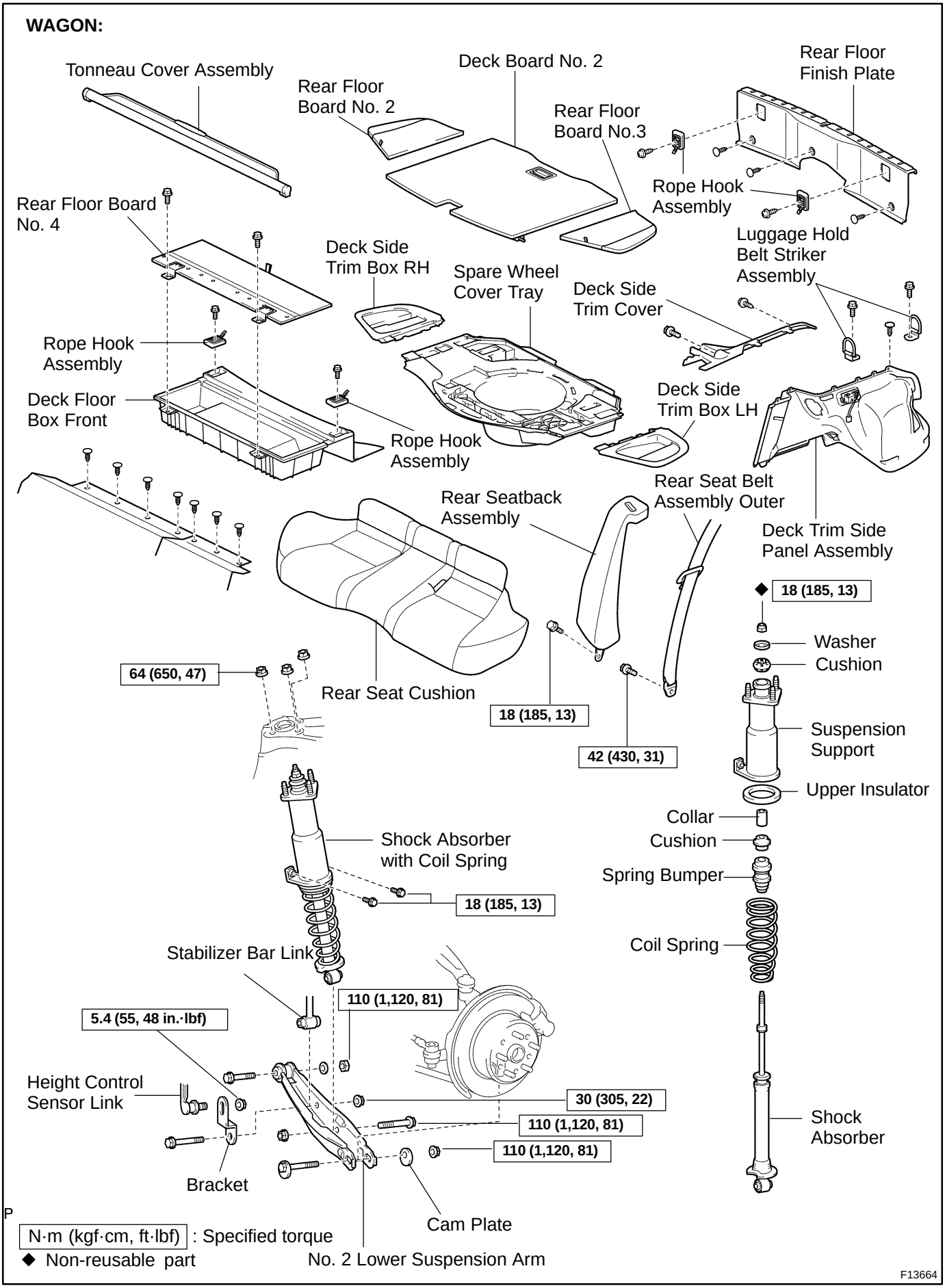
REAR SHOCK ABSORBER

COMPONENTS

SA28I-02



WAGON:


Tonneau Cover Assembly
Rear Floor Board No. 2
Deck Board No. 2
Rear Floor Board No.3
Rear Floor Finish Plate
Rope Hook Assembly
Rear Floor Board No. 4
Deck Side Trim Box RH
Spare Wheel Cover Tray
Deck Side Trim Cover
Luggage Hold Belt Striker Assembly
Rope Hook Assembly
Deck Floor Box Front
Rope Hook Assembly
Deck Side Trim Box LH
Rear Seatback Assembly
Rear Seat Belt Assembly Outer
Deck Trim Side Panel Assembly
◆ 18 (185, 13)
Washer
Cushion
64 (650, 47)
Rear Seat Cushion
18 (185, 13)
42 (430, 31)
Suspension Support
Upper Insulator
Collar
Cushion
Shock Absorber with Coil Spring
Spring Bumper
18 (185, 13)
Coil Spring
Stabilizer Bar Link
110 (1,120, 81)
5.4 (55, 48 in.·lbf)
Height Control Sensor Link
30 (305, 22)
110 (1,120, 81)
110 (1,120, 81)
Shock Absorber
Bracket
Cam Plate
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
No. 2 Lower Suspension Arm
F13664

SA28J-01

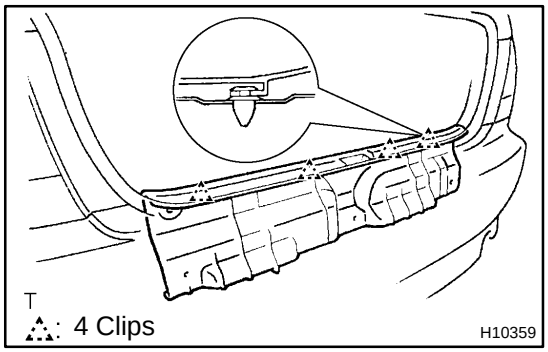
REMOVAL

1. REMOVE REAR WHEEL

2. SEDAN:

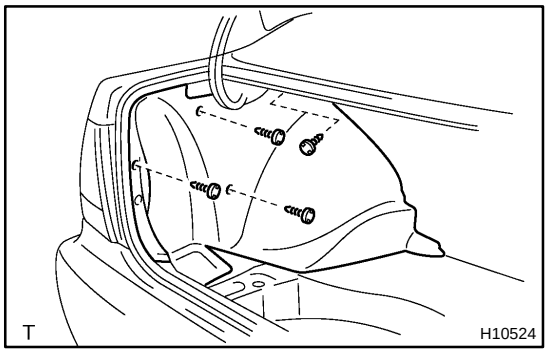
REMOVE LUGGAGE COMPARTMENT TRIM SIDE COVER

(a) Remove the luggage compartment trim No. 2 cover.



(b) Remove the luggage compartment trim rear cover.

(c) Remove the 2 bolts and 2 luggage compartment floor hooks.



(d) Remove the 4 screws and luggage compartment trim side cover.

3. WAGON:

REMOVE DECK TRIM SIDE PANEL ASSEMBLY

(a) Remove the rear seat cushion. (See page BO-204)

(b) Remove the tonneau cover assembly.

(c) Remove the bolt and rear seat belt assembly outer.

(d) Remove the side seatback assembly. (See page BO-204)

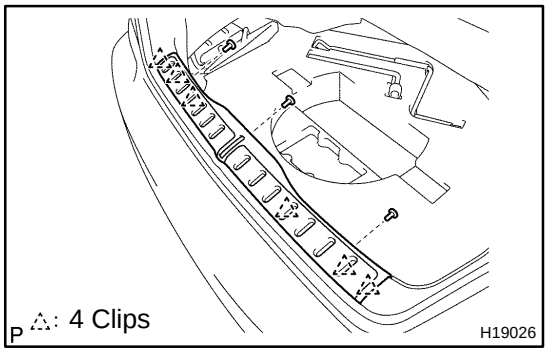
(e) Remove the seat board carpets.

(f) Remove the 2 bolts and rear floor board No. 4.

(g) Remove 2 bolts, 2 rope hook assemblies and deck floor box front.

(h) Remove the rear floor board No. 2, No. 3 and deck board No. 2.

(i) Remove the deck side trim box LH, RH and the spare wheel cover tray.



(j) Remove the 2 bolts and 2 rope hook assemblies.

(k) Remove the 3 clips.

(l) Using a screwdriver, remove the rear floor finish plate.

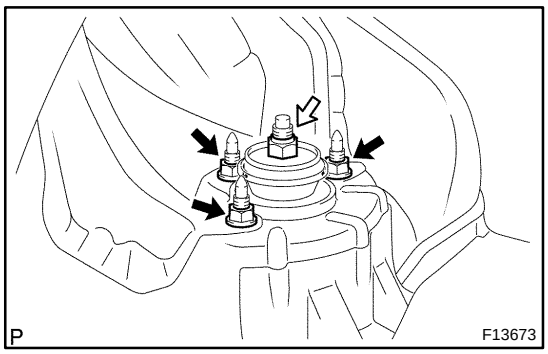
HINT:

Tape the screwdriver tip before use.

(m) Remove the deck trim side panel assembly. (See page BO-164)

4. REMOVE NO. 2 LOWER SUSPENSION ARM

(See page SA-34)



5. REMOVE REAR SHOCK ABSORBER WITH COIL SPRING

(a) Loosen the nut in the center of the suspension support.

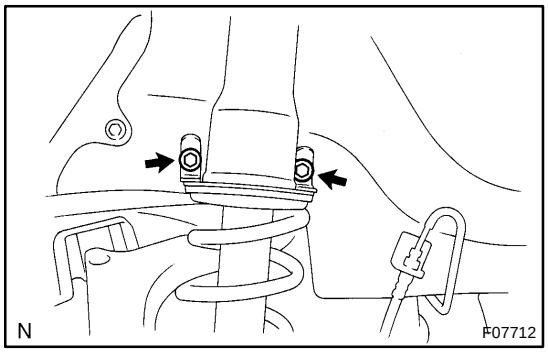
NOTICE:

Do not remove it.

HINT:

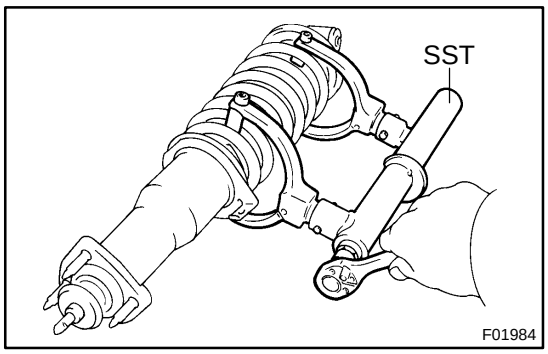
If not disassembling the shock absorber, it is not necessary to loosen the nut.

(b) Remove the 3 nuts from the body.



(c) Remove the 2 bolts and shock absorber with the coil spring from the body.

SA0SK-07



DISASSEMBLY

REMOVE SUSPENSION SUPPORT AND COIL SPRING

(a) Using SST, compress the coil spring.
SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)

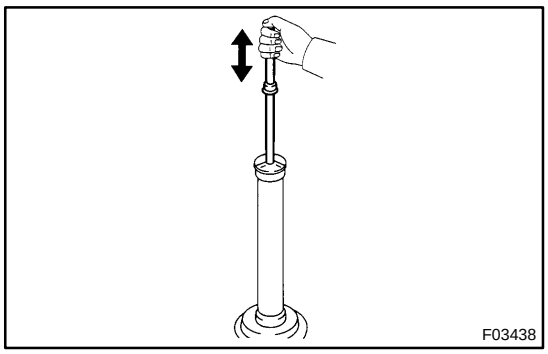
NOTICE:

Do not use an impact wrench. It will damage the SST.

(b) Remove the suspension support nut.

(c) Remove the washer, cushion, suspension support, upper insulator, coil spring, collar, cushion and spring bumper.

SA0SL-07



INSPECTION

INSPECT SHOCK ABSORBER

Compress and extend the shock absorber rod and check that there is no abnormal resistance or unusual sound during operation.

If there is any abnormality, replace the shock absorber with a new one.

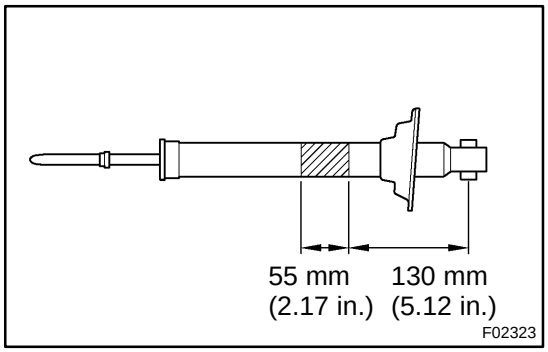
NOTICE:

When discarding the shock absorber, see DISPOSAL on page SA-1 15.

SA0SM-07

DISPOSAL

1. FULLY EXTEND SHOCK ABSORBER ROD



2. DRILL HOLE TO DISCHARGE GAS FROM CYLINDER

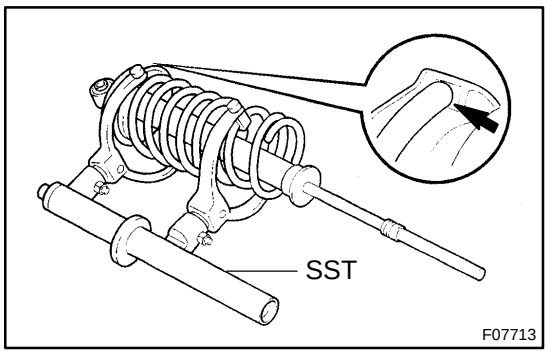
Using a drill, make a hole in the cylinder as shown to discharge the gas inside.

CAUTION:

- **When drilling, chips may fly out, work carefully.**
- **The gas is colorless, odorless and non-poisonous.**

SA0SN-08

REASSEMBLY



INSTALL SUSPENSION SUPPORT AND COIL SPRING

(a) Using SST, compress the coil spring.
SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)

NOTICE:

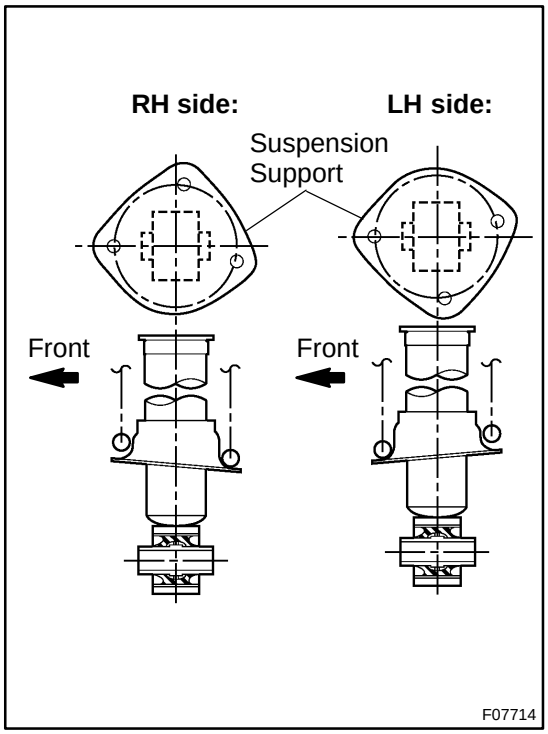
Do not use an impact wrench. It will damage the SST.

(b) Install the coil spring to the shock absorber.

HINT:

Fit the lower end of the coil spring into the gap of the spring seat of the shock absorber.

(c) Install the spring bumper, cushion, collar, upper insulator, suspension support, cushion and washer to the shock absorber and temporarily tighten a new nut.



(d) Rotate the suspension support, as shown in the illustration.

(e) Remove the SST.
SST 09727-30021 (09727-00010, 09727-00021, 09727-00031)

HINT:

After removing the SST, recheck the direction of the suspension support.

SA0SO-08

INSTALLATION

1. INSTALL REAR SHOCK ABSORBER WITH COIL SPRING

(a) Install the suspension support to the body with the 3 nuts.
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

(b) Connect the shock absorber with coil spring to the body with the 2 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(c) Torque the nut in the center of the suspension support.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

HINT:

If the shock absorber has not been disassembled, it is not necessary to torque the nut.

2. INSTALL NO. 2 LOWER SUSPENSION ARM (See page SA-125)

3. SEDAN:
INSTALL LUGGAGE COMPARTMENT TRIM SIDE COVER

(a) Install the 4 screws and luggage compartment trim side cover.

(b) Install the 2 bolts and 2 luggage compartment floor hooks.

(c) Install the luggage compartment trim rear cover and luggage compartment trim No. 2 cover.

4. WAGON:
INSTALL DECK TRIM SIDE PANEL ASSEMBLY

(a) Install the deck trim side panel assembly. (See page BO-169)

(b) Install the rear floor finish plate with 3 clips.

(c) Install the 2 rope hook assemblies and 2 bolts.

(d) Install the deck side trim box LH, RH and the spare wheel cover tray.

(e) Install the rear floor board No. 2, No. 3 and deck board No. 2.

(f) Install the 2 bolts, 2 rope hook assemblies and deck floor box front.

(g) Install the rear floor board No. 4 with 2 bolts.

(h) Install the seat board carpets.

(i) Install the side seatback assembly. (See page BO-210)

(j) Install the rear seat belt assembly outer with the bolt.

(k) Install the tonneau cover assembly.

(l) Install the rear seat cushion. (See page BO-210)

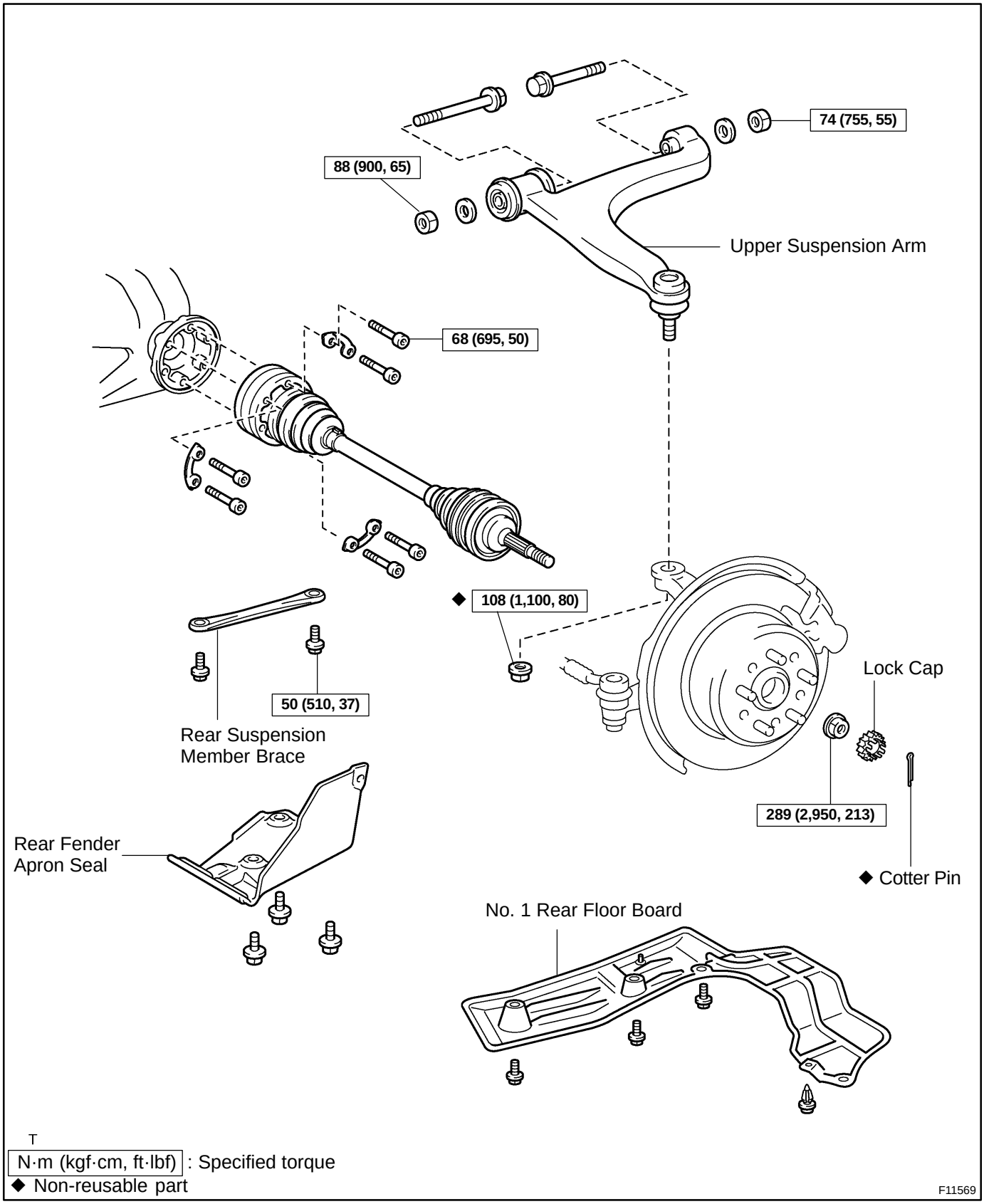
5. INSTALL REAR WHEEL
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

6. CHECK REAR WHEEL ALIGNMENT (See page SA-9)

REAR UPPER SUSPENSION ARM

COMPONENTS

SA0SP-08



T

N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

F11569

SA0SQ-08

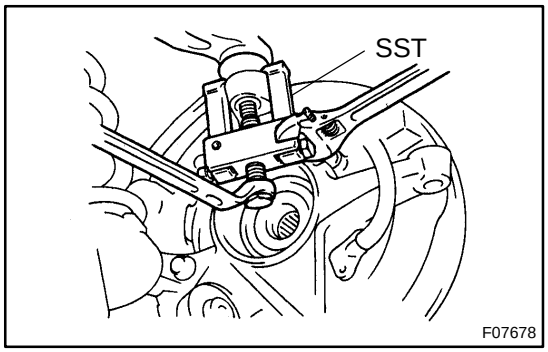
REMOVAL

1. REMOVE REAR WHEEL

2. REMOVE DRIVE SHAFT (See page SA-59)

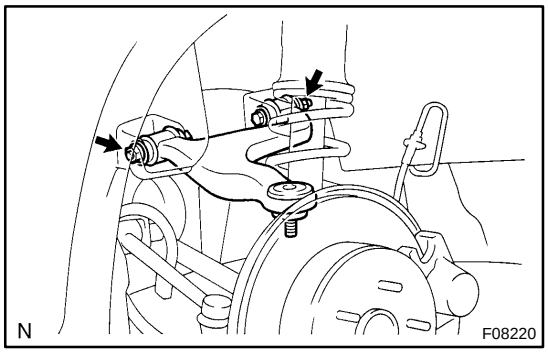
3. REMOVE UPPER SUSPENSION ARM

(a) Remove the nut.



(b) Using SST, disconnect the upper suspension arm from the axle carrier.
SST 09628-6201 1

(c) Support the axle carrier securely.

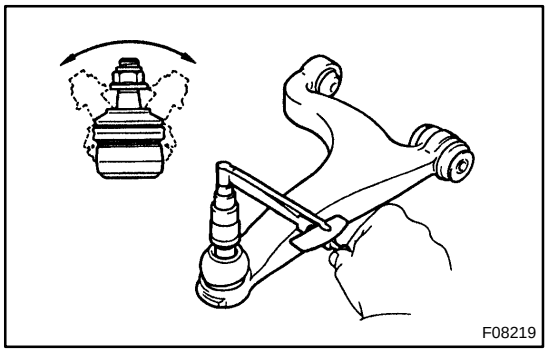


(d) Remove the 2 nuts, washers, bolts and upper suspension arm from the body.

SA0SR-08

INSPECTION

1. INSPECT UPPER SUSPENSION ARM BALL JOINT BOOT FOR DAMAGE



2. INSPECT UPPER SUSPENSION ARM BALL JOINT FOR ROTATION CONDITION

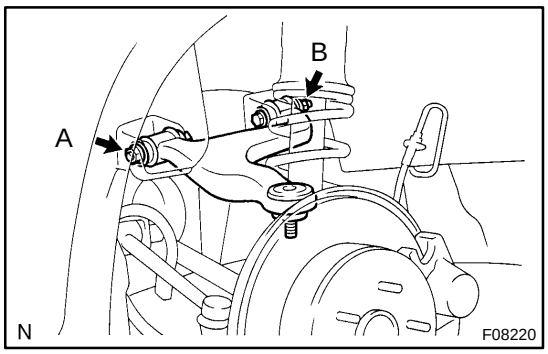
(a) As shown in the illustration, flip the ball joint stud back and forth 5 times, before installing the nut.

(b) Using torque wrench, turn the nut continuously 1 turn per 2 - 4 seconds and take the torque reading on the 5th turn.

Turning torque:

1.0 - 2.9 N·m (10 - 30 kgf·cm, 9 - 26 in.·lbf)

SA1JK-05



INSTALLATION

1. INSTALL UPPER SUSPENSION ARM

(a) Install the upper suspension arm to the body with the 2 bolts, washers and 2 nuts.

Torque:
Nut A: 88 N·m (900 kgf·cm, 65 ft·lbf)
Nut B: 74 N·m (755 kgf·cm, 55 ft·lbf)

HINT:

After stabilizing the suspension arm, torque the nut.

(b) Connect the upper suspension arm to the axle carrier with a new nut.

Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)

2. INSTALL DRIVE SHAFT (See page SA-66)

3. INSTALL REAR WHEEL
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

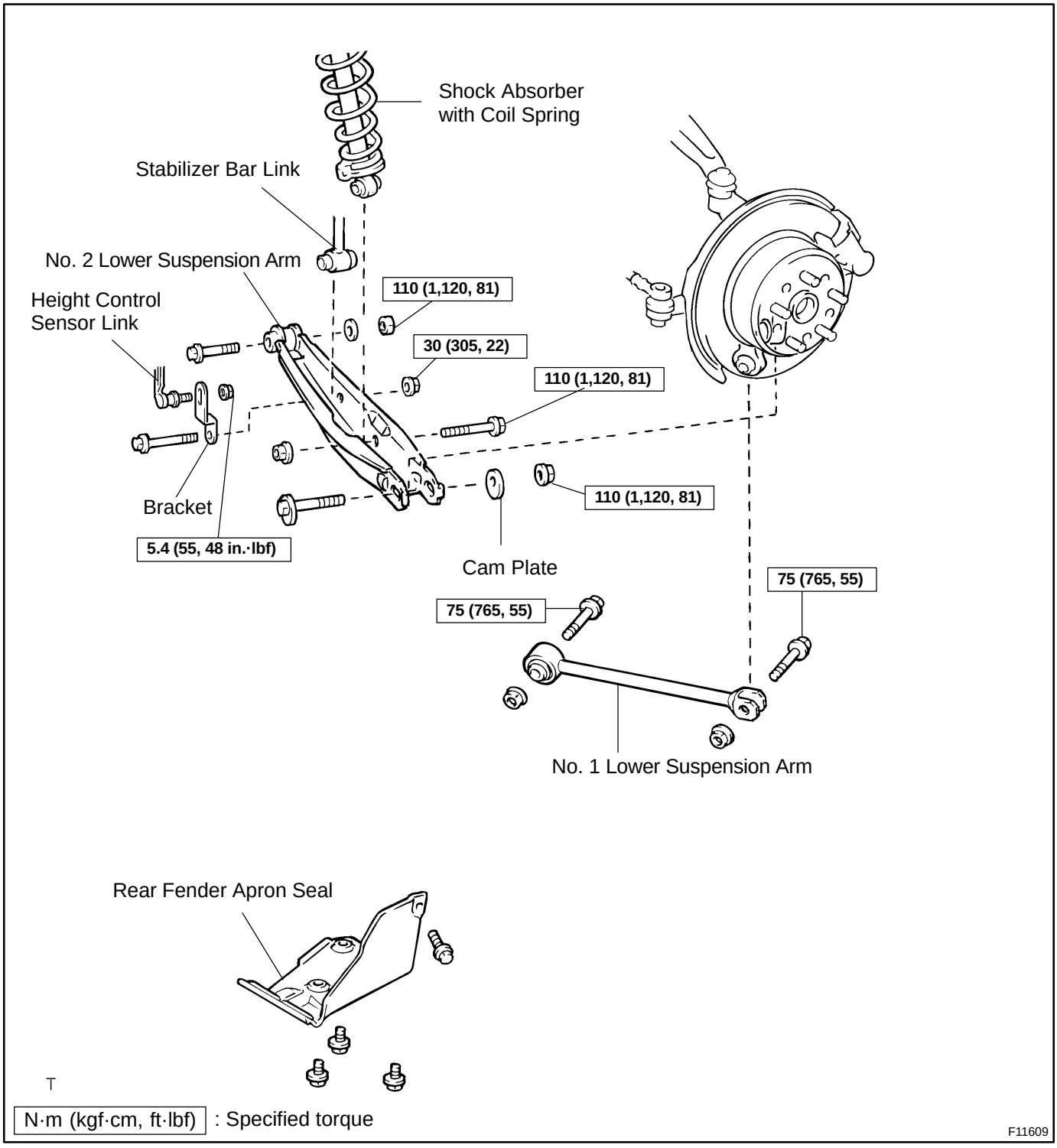
4. CHECK REAR WHEEL ALIGNMENT
(See page SA-9)

5. CHECK ABS SPEED SENSOR SIGNAL
w/ VSC (See page DI-507)
w/o VSC (See page DI-437)

REAR LOWER SUSPENSION ARM

SA0ST-08

COMPONENTS

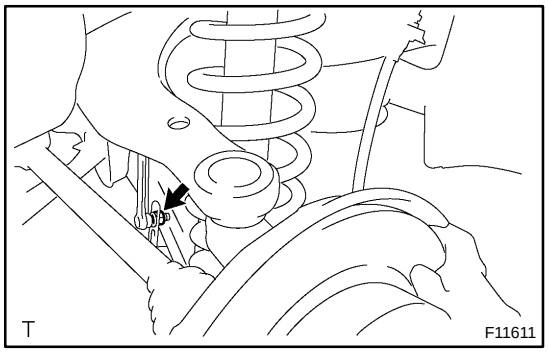


SA20N-03

REMOVAL

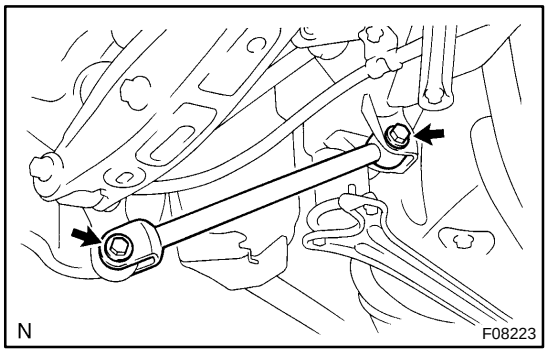
1. REMOVE REAR WHEEL

2. REMOVE REAR FENDER APRON SEAL



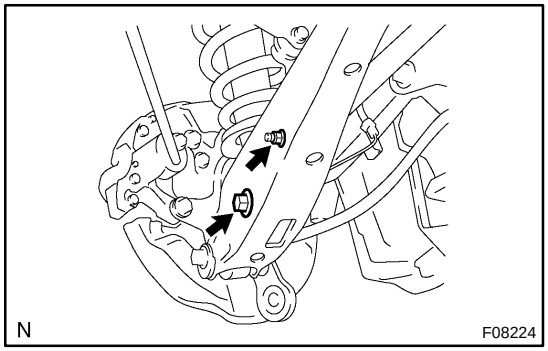
3. DISCONNECT HEIGHT CONTROL SENSOR LINK

Remove the nut and disconnect the height control sensor link from lower arm bracket.



4. REMOVE NO. 1 LOWER SUSPENSION ARM

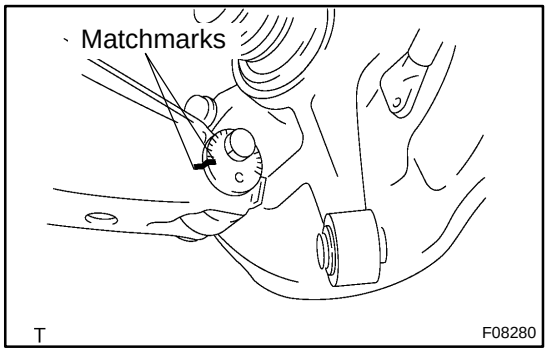
Remove the 2 bolts, nuts, and No. 1 lower suspension arm.



5. REMOVE NO. 2 LOWER SUSPENSION ARM

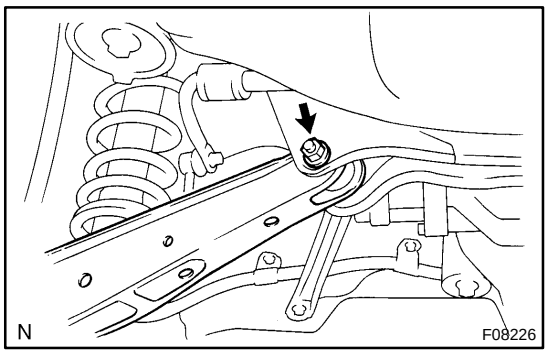
(a) Remove the nut, bolt and bracket, and disconnect the stabilizer bar link from the No. 2 lower suspension arm.

(b) Remove the bolt and nut, and disconnect the shock absorber from the No. 2 lower suspension arm.



(c) Place matchmarks on the cam bolt and No. 2 lower suspension arm.

(d) Remove the nut, cam plate and cam bolt, and disconnect the axle carrier.



(e) Remove the nut, washer, bolt and No. 2 lower suspension arm from the rear suspension member.

SA20O-03

INSTALLATION

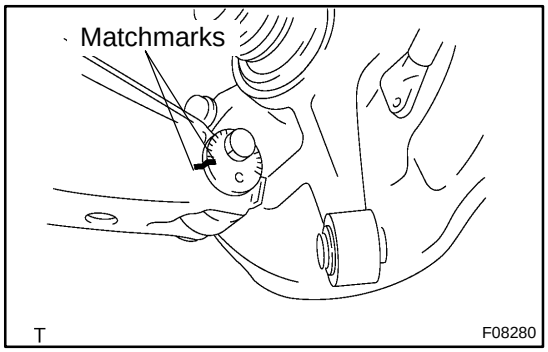
1. INSTALL NO. 2 LOWER SUSPENSION ARM

(a) Install the No. 2 lower suspension arm to the rear suspension member with bolt, washer and nut.

Torque: 110 N·m (1,120 kgf·cm, 81 ft·lbf)

HINT:

After stabilizing the suspension, torque the nut.



(b) Connect the No. 2 lower suspension arm to the axle carrier with the cam bolt, cam plate and nut.

Torque: 110 N·m (1,120 kgf·cm, 81 ft·lbf)

HINT:

After stabilizing the suspension, align the matchmarks on the cam bolt and No. 2 lower suspension arm, and torque the nut.

(c) Connect the shock absorber to the No. 2 lower suspension arm with the bolt and nut.

Torque: 110 N·m (1,120 kgf·cm, 81 ft·lbf)

HINT:

After stabilizing the suspension, torque the nut.

(d) Connect the stabilizer bar link to the No. 2 lower suspension arm with the bracket, bolt and nut.

Torque: 30 N·m (305 kgf·cm, 22 ft·lbf)

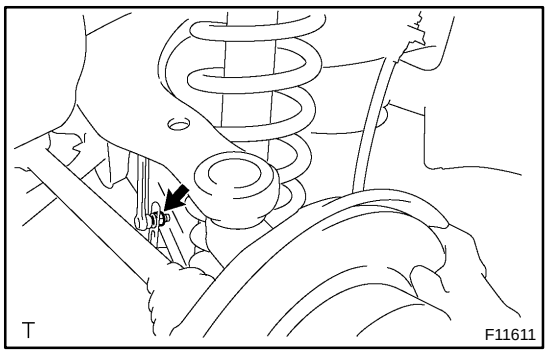
2. INSTALL NO. 1 LOWER SUSPENSION ARM

Install the No. 1 lower suspension arm with the 2 bolts and nuts.

Torque: 75 N·m (765 kgf·cm, 55 ft·lbf)

HINT:

After stabilizing the suspension, torque the bolt.



3. CONNECT HEIGHT CONTROL SENSOR LINK

(a) Set the lower arm to the vehicle height.

(b) Install the sensor link to the lower arm bracket with a nut.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

NOTICE:

- **Be careful not to brake the link fixing pin until the above operation is completed.**
- **The pin can be broken after completion of the above, however, the sensor arm rotation angle shall not exceed the range of ± 70° from the standard vehicle height.**

4. INSTALL REAR FENDER APRON SEAL

5. INSTALL REAR WHEEL

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

6. CHECK REAR WHEEL ALIGNMENT

(See page SA-9)

7. CHECK ABS SPEED SENSOR SIGNAL

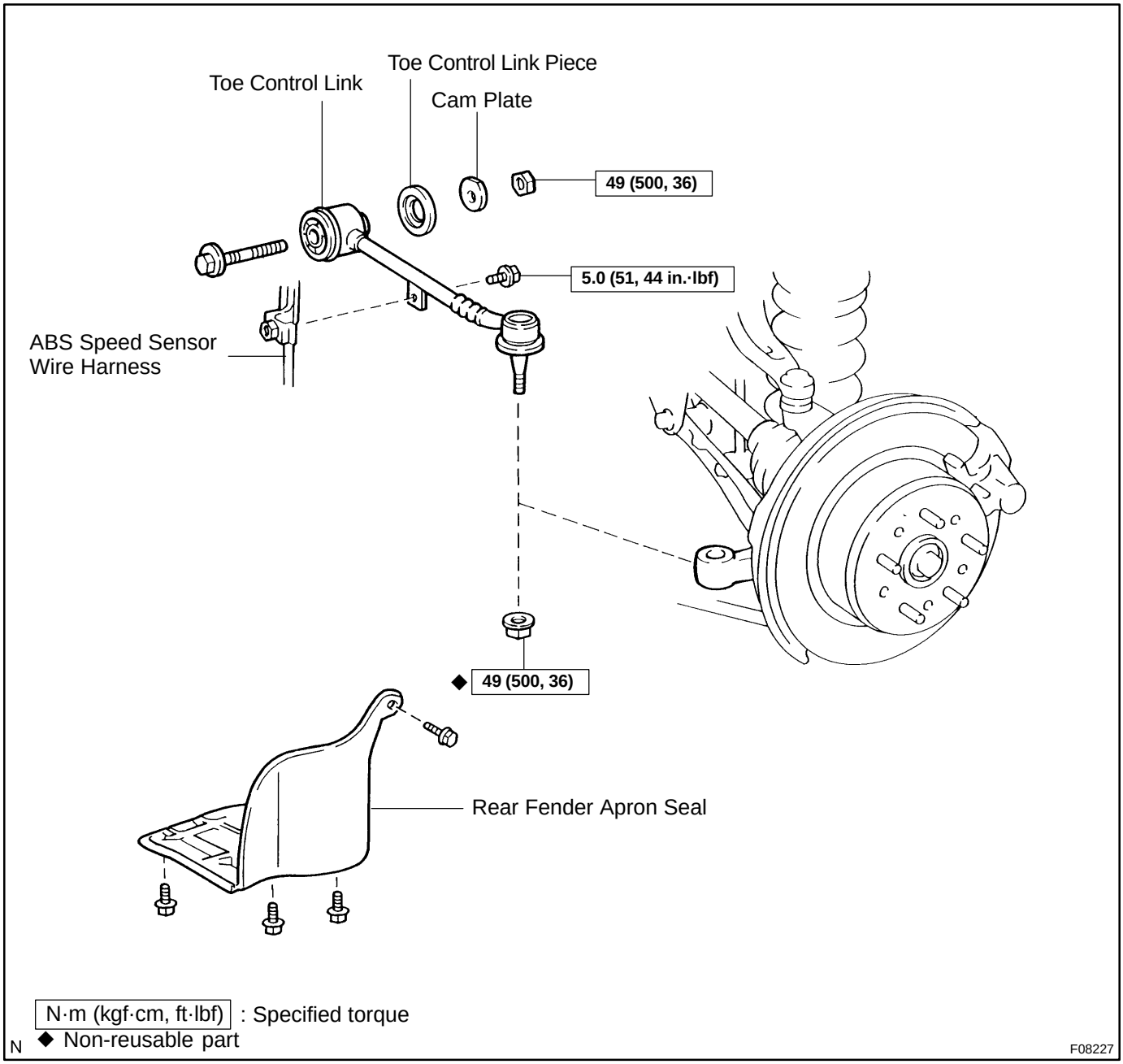
w/ VSC (See page DI-507)

w/o VSC (See page DI-437)

TOE CONTROL LINK

COMPONENTS

SA0SW-07



SA0SX-07

REMOVAL

1. REMOVE REAR WHEEL

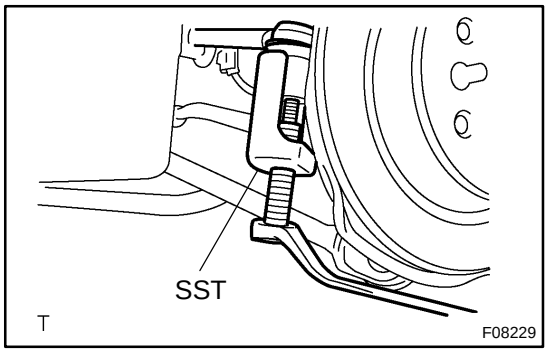
2. REMOVE REAR FENDER APRON SEAL

3. DISCONNECT ABS SPEED SENSOR WIRE HARNESS FROM TOE CONTROL LINK

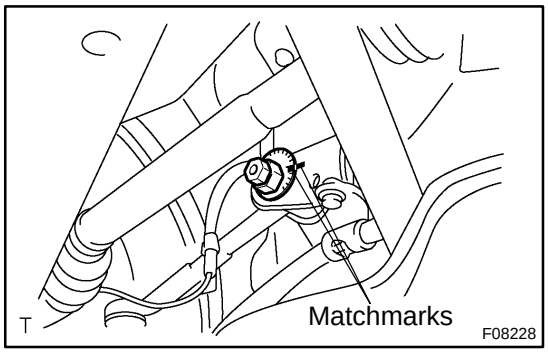
Remove the bolt and disconnect the ABS speed sensor wire harness.

4. REMOVE TOE CONTROL LINK

(a) Remove the nut.



(b) Using SST, disconnect the toe control link from the axle carrier.
SST 09610-20012



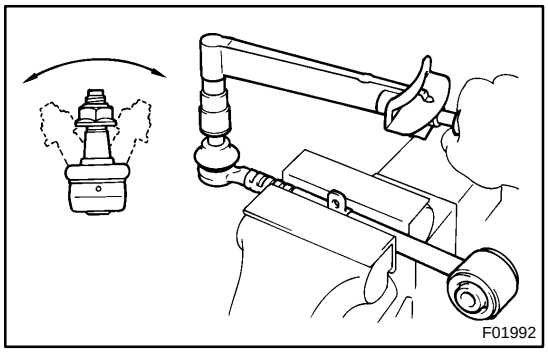
(c) Place matchmarks on the cam plate and rear suspension member.

(d) Remove the nut, cam plate, cam bolt, toe control link piece and toe control link from the axle carrier.

SA0SY-07

INSPECTION

1. INSPECT TOE CONTROL LINK BALL JOINT BOOT FOR DAMAGE



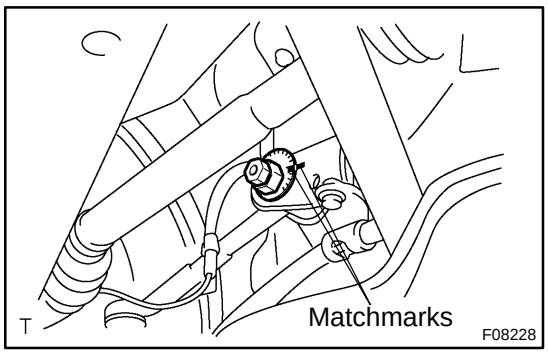
2. INSPECT TOE CONTROL LINK BALL JOINT FOR ROTATION CONDITION

(a) As shown in the illustration, flip the ball joint stud back and forth 5 times, before installing the nut.

(b) Using a torque wrench, turn the nut continuously 1 turn per 2 - 4 seconds and take the torque reading on the 5th turn.

Turning torque:
1.0 - 2.5 N·m (10 - 25 kgf·cm, 9 - 22 in.·lbf)

SA1JN-05



INSTALLATION

1. INSTALL TOE CONTROL LINK

(a) Install the toe control link, toe control link piece to the rear suspension member with the cam bolt, cam plate and nut.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

HINT:

After stabilizing the suspension arm, align the matchmarks on the cam plate and rear suspension member, and torque the nut.

(b) Connect the toe control link to the axle carrier with a new nut.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

2. CONNECT ABS SPEED SENSOR WIRE HARNESS TO TOE CONTROL LINK

Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

3. INSTALL REAR FENDER APRON SEAL

4. INSTALL REAR WHEEL

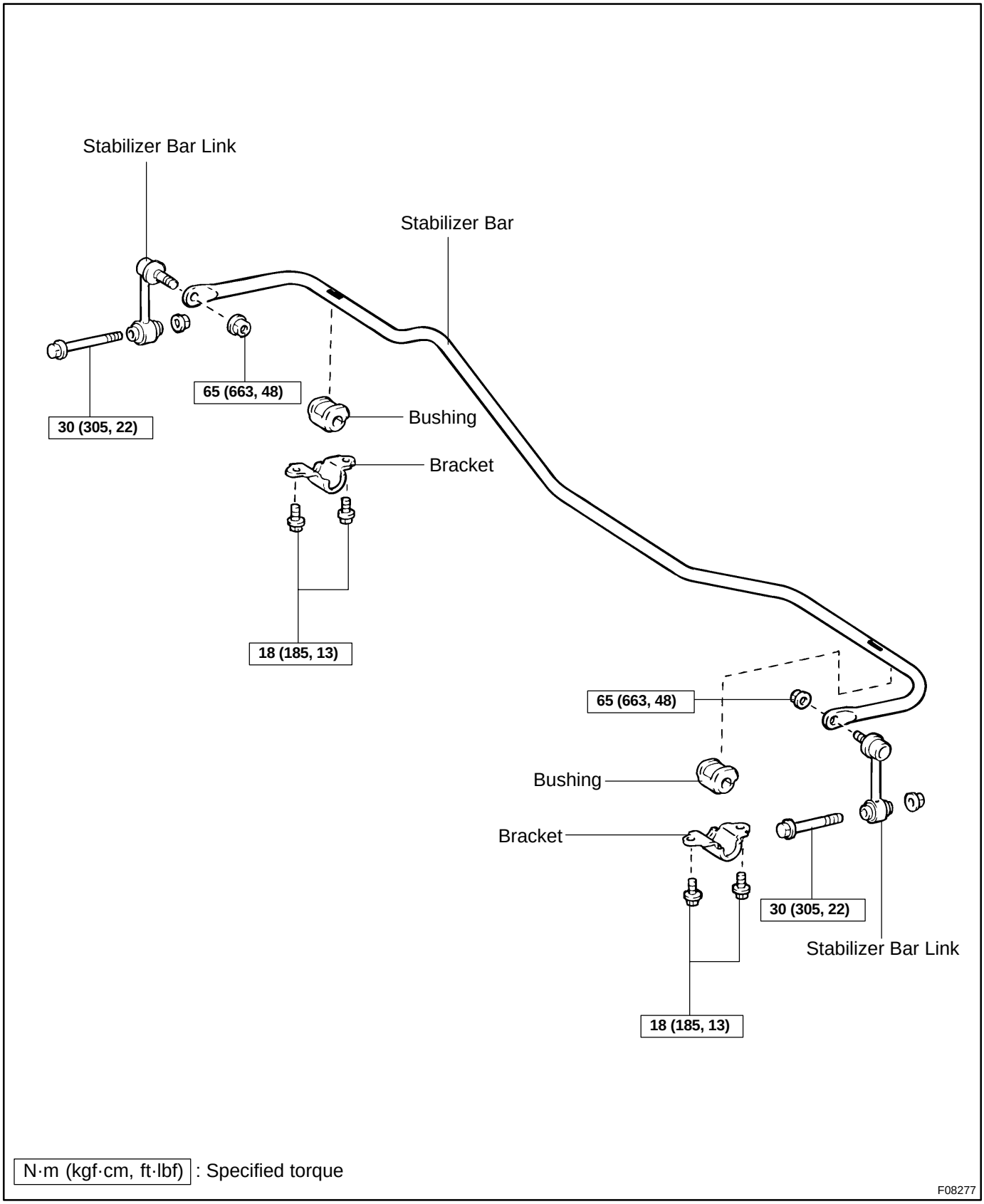
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

5. CHECK REAR WHEEL ALIGNMENT (See page SA-9)

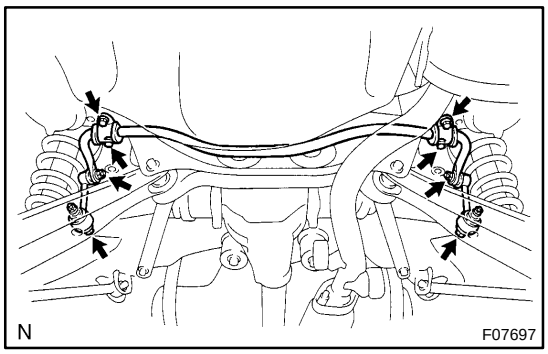
REAR STABILIZER BAR

SA0T0-08

COMPONENTS



SA1JO-04



REMOVAL

1. REMOVE STABILIZER BAR

(a) Remove the 4 nuts, 2 bolts and stabilizer bar links.

HINT:

If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.

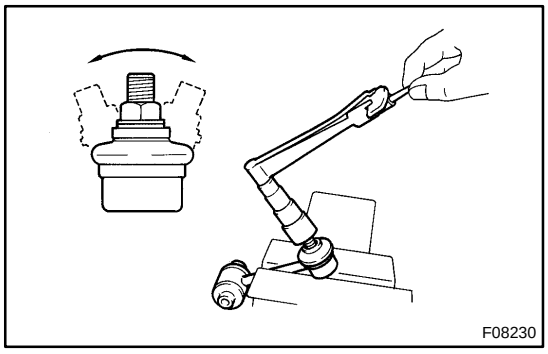
(b) Remove the 4 bolts and stabilizer bar.

2. REMOVE 2 BRACKETS AND BUSHINGS FROM STABILIZER BAR

SA0T2-07

INSPECTION

1. INSPECT STABILIZER BAR LINK BALL JOINT BOOT FOR DAMAGE



2. INSPECT STABILIZER BAR LINK BALL JOINT FOR ROTATION CONDITION

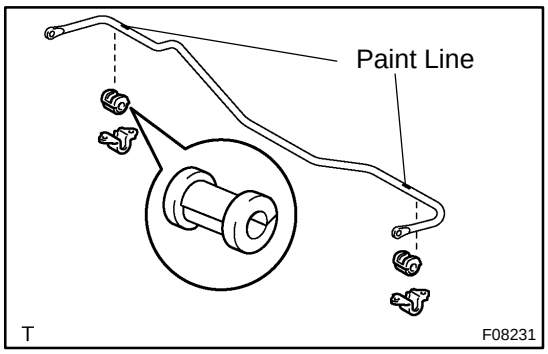
(a) As shown in the illustration, flip the ball joint stud back and forth 5 times, before installing the nut.

(b) Using a torque wrench, turn the nut continuously 1 turn per 2 - 4 seconds and take the torque reading on the 5th turn.

Turning torque:
0.05 - 1.0 N·m (0.5 - 10 kgf·cm, 0.4 - 9.0 in.·lbf)

SA1JP-05

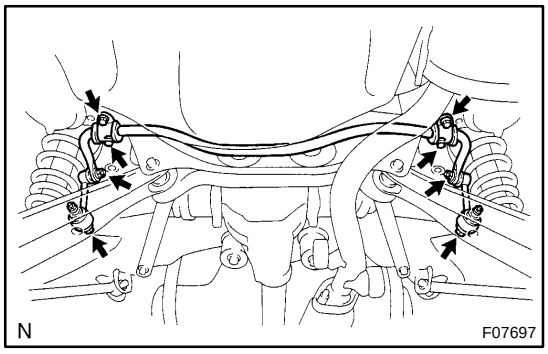
INSTALLATION



1. INSTALL 2 BUSHINGS AND BRACKETS TO STABILIZER BAR

HINT:

- Install the bushing to the outside of the paint line on the stabilizer bar.
- Install the bushing to the stabilizer bar so that the cutout of the bushing faces the rear of the vehicle, as shown in the illustration.



2. INSTALL STABILIZER BAR

(a) Install the stabilizer bar to the body with the 4 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(b) Install the 2 stabilizer bar links with the 2 bolts and 4 nuts.
Torque:
Bolt: 30 N·m (305 kgf·cm, 22 ft·lbf)
Nut: 65 N·m (663 kgf·cm, 48 ft·lbf)

HINT:

If the ball joint turns together with the nut, use a hexagon wrench (5 mm) to hold the stud.

BRAKE SYSTEM

BR0MH-01

PRECAUTION

- **Care must be taken to replace each part properly as it could affect the performance of the brake system and result in a driving hazard. Replace the parts with parts of the same part number or equivalent.**
- **It is very important to keep parts and the area clean when repairing the brake system.**
- **If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.**

TROUBLESHOOTING

BR0MI-08

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspect Area	See page
Lower pedal or spongy pedal	6. Brake system (Fluid leaks)	DI-504 DI-604
	7. Brake system (Air in)	BR-4
	8. Piston seals (Worn or damaged)	BR-26 BR-35
	9. Master cylinder (Faulty)	BR-10
	10. Booster push rod (Out of adjustment)	BR-21
Brake drag	1. Brake pedal freeplay (Minimal)	BR-6
	2. Parking brake lever travel (Out of adjustment)	BR-9
	3. Parking brake wire (Sticking)	-
	4. Parking brake shoe clearance (Out of adjustment)	BR-45
	5. Pad (Cracked or distorted)	BR-23 BR-32
	6. Piston (Stuck)	BR-26 BR-35
	7. Piston (Frozen)	BR-26 BR-35
	8. Tension or return spring (Faulty)	BR-41
	9. Booster push rod (Out of adjustment)	BR-21
	10. Booster system (Vacuum leaks)	BR-18
	11. Master cylinder (Faulty)	BR-10
Brake pull	1. Piston (Stuck)	BR-26 BR-35
	2. Pad (Oily)	BR-23 BR-32
	3. Piston (Frozen)	BR-26 BR-35
	4. Disc (Scored)	BR-29 BR-38
	5. Pad (Cracked or distorted)	BR-23 BR-32
Hard pedal but brake inefficient	1. Brake system (Fluid leaks)	DI-504 DI-604
	2. Brake system (Air in)	BR-4
	3. Pad (Worn)	BR-23 BR-32
	4. Pad (Cracked or distorted)	BR-23 BR-32
	5. Pad (Oily)	BR-23 BR-32
	6. Pad (Glazed)	BR-23 BR-32
	7. Disc (Scored)	BR-29 BR-38
	8. Booster push rod (Out of adjustment)	BR-21
	9. Booster system (Vacuum leaks)	BR-18

Symptom	Suspect Area	See page
Noise from brake	1. Pad (Cracked or distorted)	BR-23 BR-32
	2. Installation bolt (Loose)	BR-26 BR-35
	3. Disc (Scored)	BR-29 BR-38
	4. Pad support plate (Loose)	BR-26
	5. Sliding pin (Worn)	BR-26
	6. Pad (Dirty)	BR-23 BR-32
	7. Pad (Glazed)	BR-23 BR-32
	8. Tension or return spring (Faulty)	BR-41
	9. Anti-squeal shim (Damaged)	BR-23 BR-32
	10.Shoe hold-down spring (Damaged)	BR-41

BRAKE FLUID

BR0MJ-08

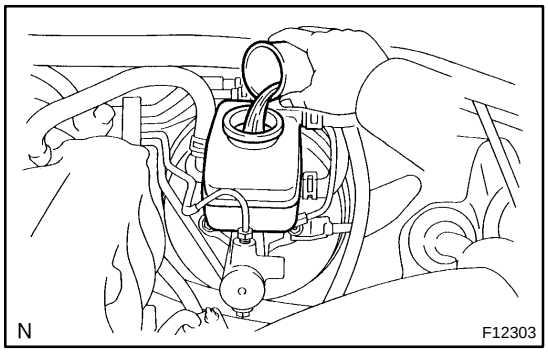
BLEEDING

HINT:

If any work is done on the brake system or if air in the brake lines is suspected, bleed the air from the system.

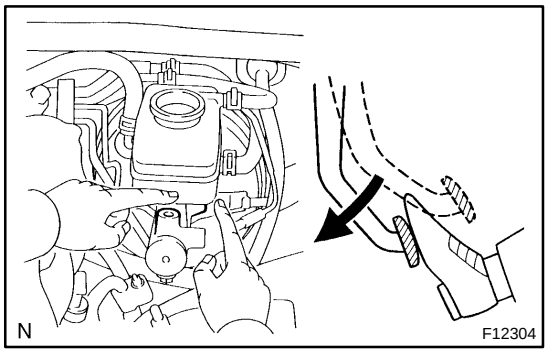
NOTICE:

Do not let brake fluid remain on painted surfaces. Wash it off immediately.



1. FILL RESERVOIR WITH BRAKE FLUID

Fluid: SAE J1703 or FMVSS NO. 116 DOT3



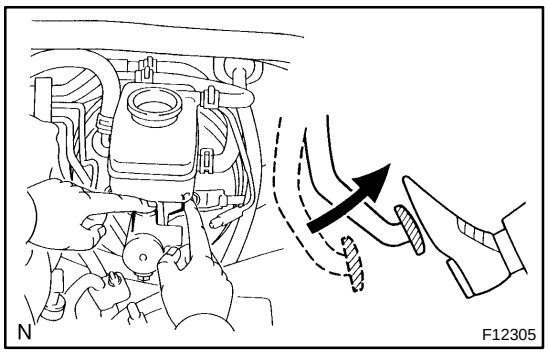
2. BLEED MASTER CYLINDER

HINT:

If the master cylinder has been disassembled or if the reservoir becomes empty, bleed the master cylinder of the air.

(a) Disconnect the brake lines from the master cylinder.
SST 09023-00100

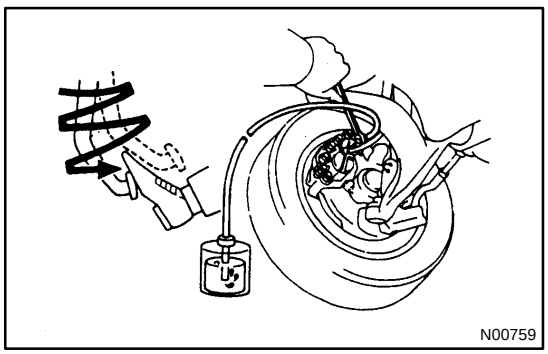
(b) Slowly depress the brake pedal and hold it.



(c) Block off the outer holes with your fingers, and release the brake pedal.

(d) Repeat (b) and (c) 3 or 4 times.

(e) Connect the brake lines to the master cylinder.
SST 09023-00100
Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)



3. BLEED BRAKE LINE

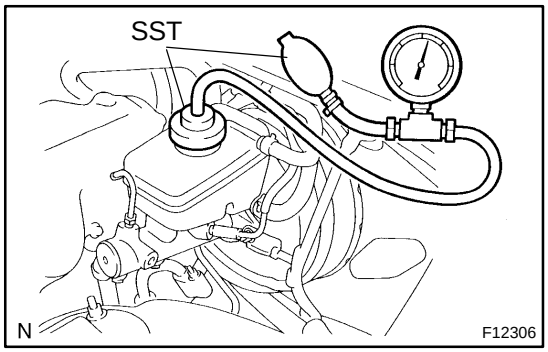
(a) Connect the vinyl tube to the caliper.

(b) Depress the brake pedal several times, then loosen the bleeder plug with the pedal held down.

(c) At the point when fluid stops coming out, tighten the bleeder plug, then release the brake pedal.

(d) Repeat (b) and (c) until all the air in the fluid has been bled out.

(e) Repeat the procedure on the previous page to bleed the brake line for each wheel.
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

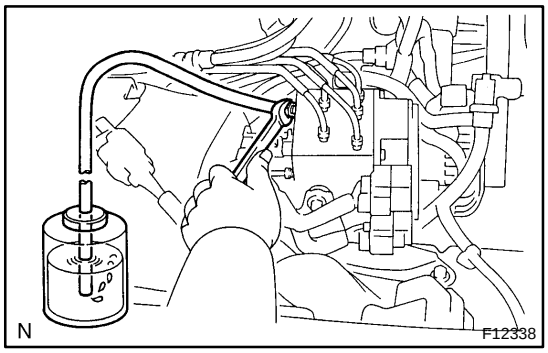


4. BLEED ABS & TRAC / VSC ACTUATOR

CAUTION:

When repairing the brake master cylinder or ABS & TRAC / VSC actuator, bleed the ABS & TRAC / VSC actuator of the air.

(a) Install the SST to the reservoir.
SST 09992-00242, 09992-00350



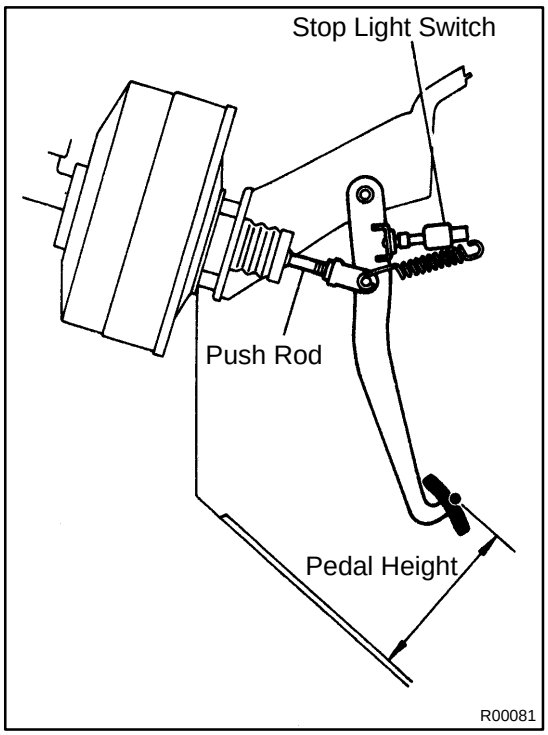
(b) Connect the vinyl tube to the ABS & TRAC / VSC actuator, and loosen the bleeder plug.

(c) Using SST, apply pressure to the reservoir.
Pressure: 98.1 kpa (1.0 kgf/cm^2, 14.2 psi)

(d) Bleed the ABS & TRAC / VSC actuator of the air, tighten the bleeder plug.
Torque: 8.3 N·m (85 kgf·cm, 74 in.·lbf)

5. CHECK FLUID LEVEL IN RESERVOIR

Check the fluid level and add fluid if necessary.
Fluid: SAE J1703 or FMVSS NO. 116 DOT3



BRAKE PEDAL

BR0MK-07

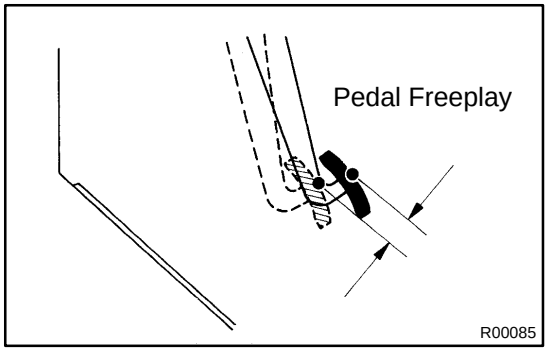
ON-VEHICLE INSPECTION

1. CHECK PEDAL HEIGHT

Pedal height from asphalt sheet:
154 - 164 mm (6.063 - 6.457 in.)

2. IF NECESSARY, ADJUST PEDAL HEIGHT

(a) Remove the lower finish panel (See page BO-135).
(b) Disconnect the connector from the stop light switch.
(c) Loosen the stop light switch lock nut and remove the stop light switch.
(d) Loosen the push rod lock nut.
(e) Adjust the pedal height by turning the pedal push rod.
(f) Tighten the push rod lock nut.
Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)
(g) Install the stop light switch and turn it until it slightly contacts the pedal stopper.
(h) Connect the connector to the stop light switch.
(i) Push in the brake pedal 5 - 10 mm (0.20 - 0.39 in.), turn the stop light switch to lock the nut in a position where the stop light goes off.
(j) After installation, push in the brake pedal 5 - 10 mm (0.20 - 0.39 in.), check that stop light lights up.
(k) After adjusting the pedal height, check the pedal free play.
(l) Install the lower finish panel (See page BO-135).

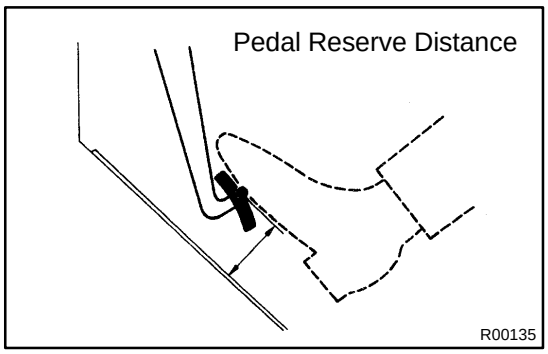


3. CHECK PEDAL FREE PLAY

(a) Stop the engine and depress the brake pedal several times until there is no more vacuum left in the booster.
(b) Push in the pedal by hand until the resistance begins to be felt, then measure the distance.
Pedal free play: 1 - 6 mm (0.04 - 0.24 in.)

HINT:
The freeplay to the 1st resistance is due to the play between the clevis and pin. This is magnified up to 2.0 - 4.5 mm (0.08 - 0.18 in.) at the pedal.
If incorrect, check the stop light switch clearance. If the clearance is OK, then troubleshoot the brake system.

Stop light switch clearance:
1.5 - 2.5 mm (0.059 - 0.098 in.)



4. CHECK PEDAL RESERVE DISTANCE

Release the parking brake lever.

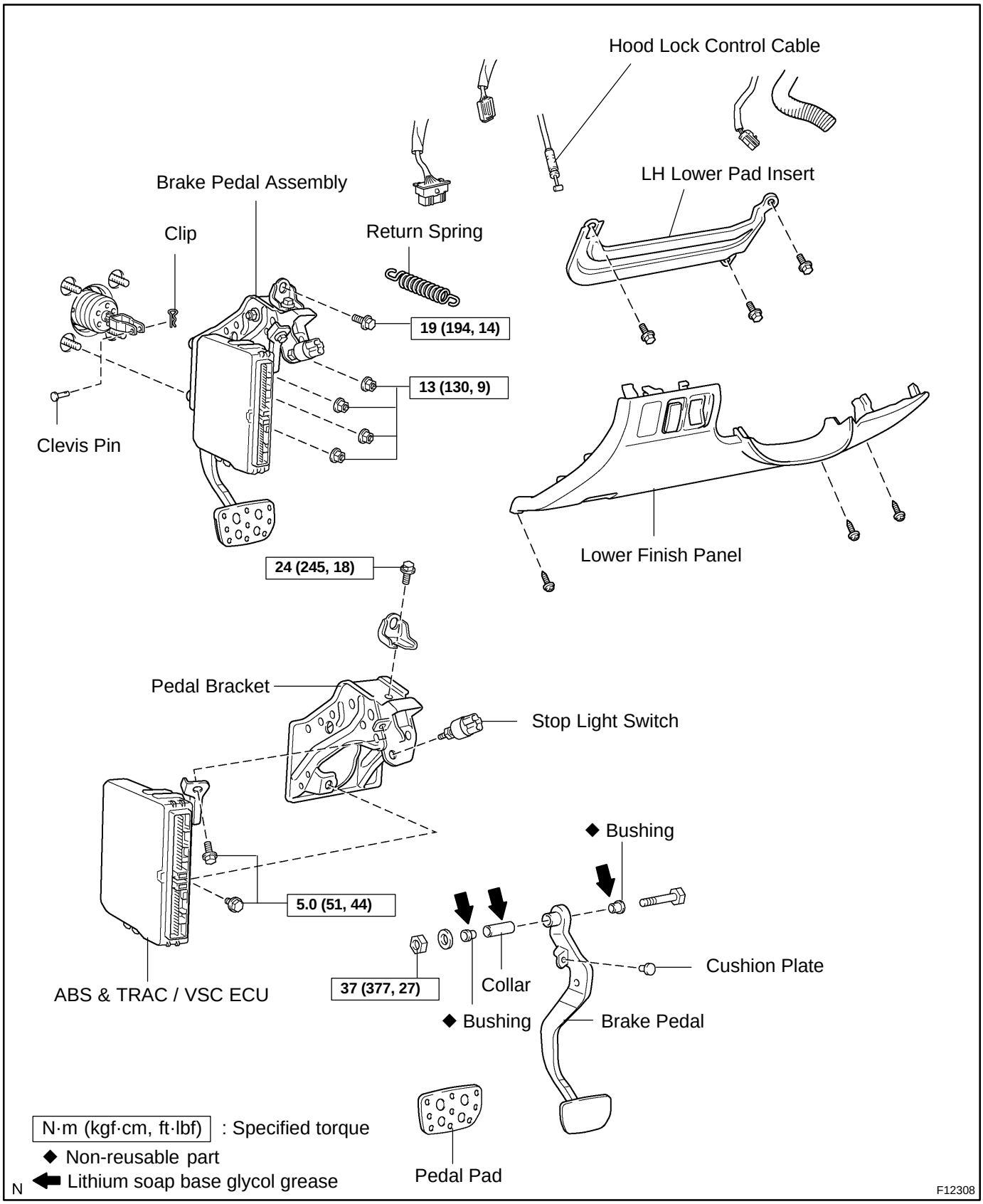
With the engine running, depress the pedal and measure the pedal reserve distance, as shown.

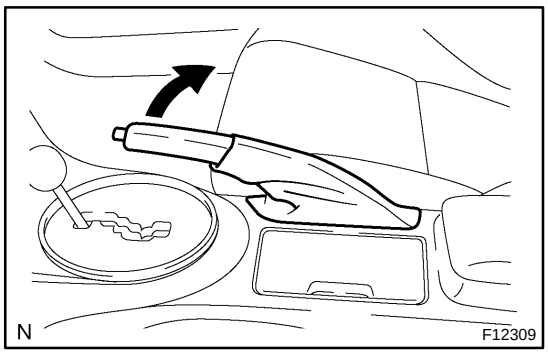
Pedal reserve distance from asphalt sheet at 490 N (50 Kgf, 110.2 lbf): More than 99 mm (3.90 in.)

If the reserve distance is incorrect, troubleshoot the brake system.

BR0YI-06

COMPONENTS





PARKING BRAKE LEVER

BR0ZV-02

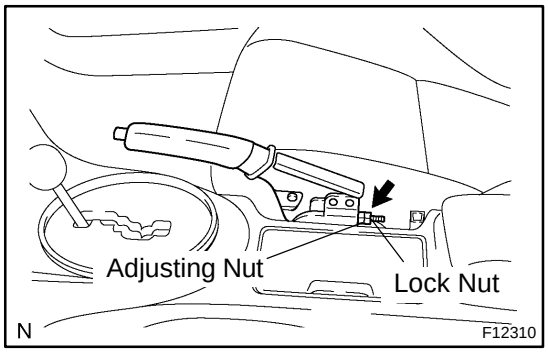
ON-VEHICLE INSPECTION

1. CHECK PARKING BRAKE LEVER TRAVEL

Pull the parking brake lever all the way up, and count the number of clicks.

Parking brake lever travel at 196 N (20 kgf, 44.1 lbf): 5 - 8 clicks

If incorrect, adjust the parking brake.



2. IF NECESSARY, ADJUST PARKING BRAKE

HINT:

Before adjusting the parking brake, make sure that the rear brake shoe clearance has been adjusted.

For shoe clearance adjustment (See page BR-45).

(a) Remove the parking brake lever hole cover.

(b) Loosen the lock nut and the turn adjusting nut until the lever travel is correct.

(c) Tighten the lock nut.

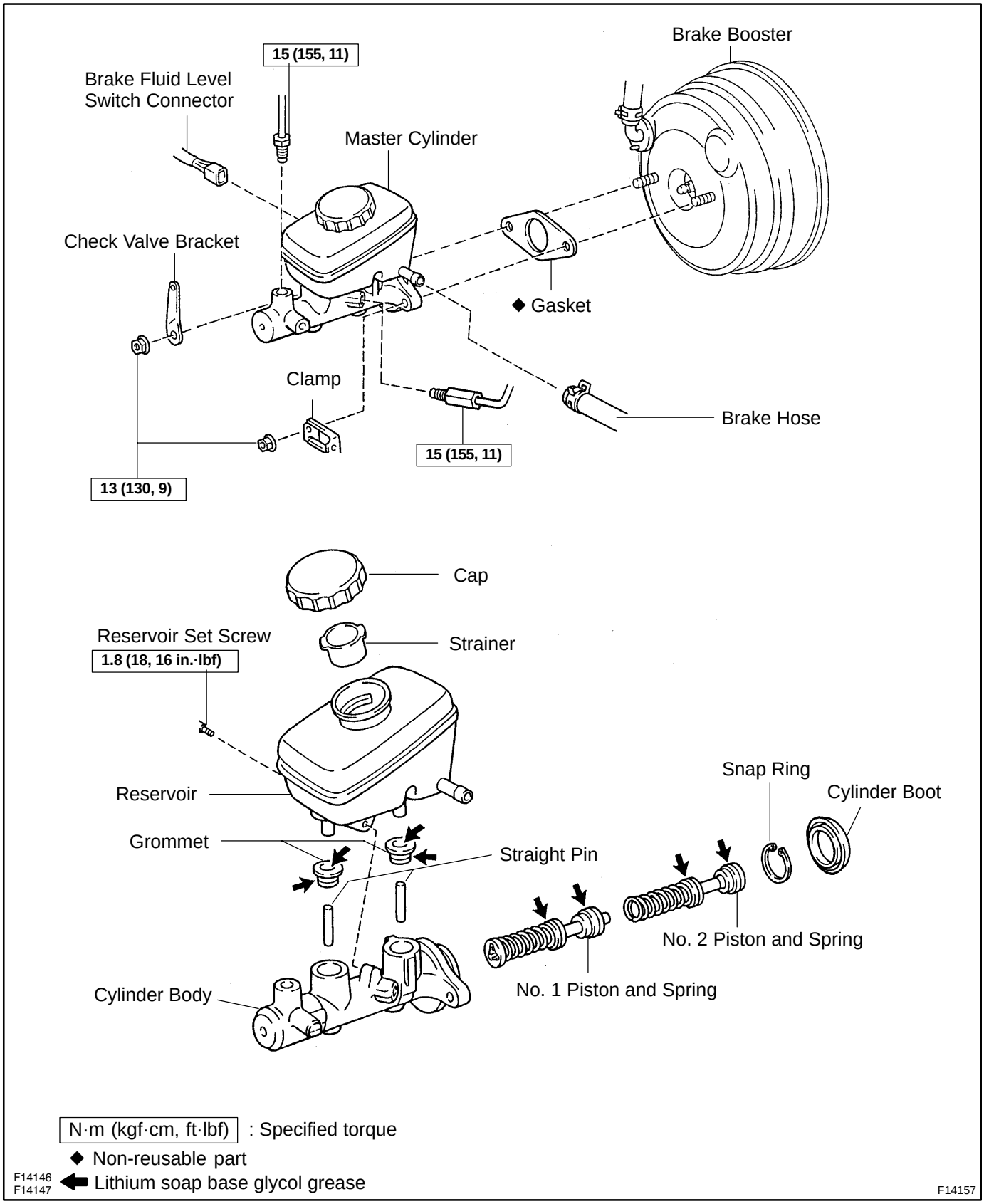
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(d) Install the parking brake lever hole cover.

BRAKE MASTER CYLINDER

COMPONENTS

BR1JU-02



BR0AF-12

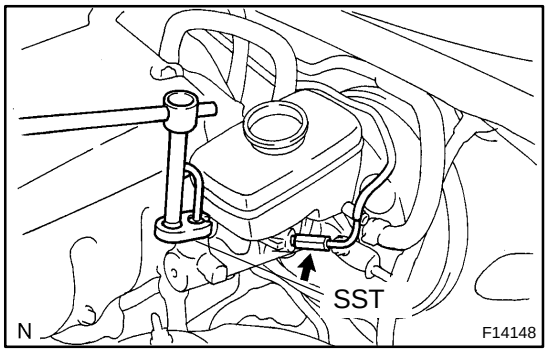
REMOVAL

1. TAKE OUT FLUID WITH SYRINGE

NOTICE:

Do not let brake fluid remain on a painted surface. Wash it off immediately.

2. DISCONNECT BRAKE FLUID LEVEL SWITCH CONNECTOR

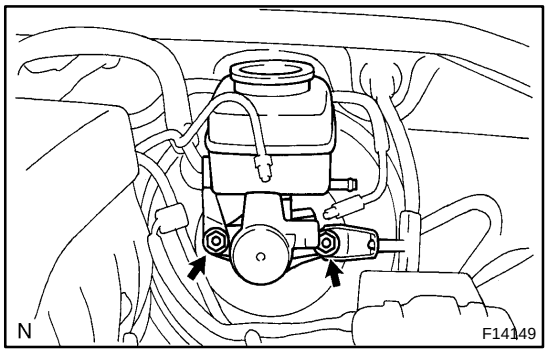


3. DISCONNECT BRAKE LINES

Using SST, disconnect the 2 brake lines.

SST 09023-00100

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)



4. REMOVE MASTER CYLINDER

(a) Disconnect the 2 brake hoses.

(b) Remove the 2 nuts, and pull out the check valve bracket, brake hose clamp, master cylinder and gasket.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

BR1R6-01

DISASSEMBLY

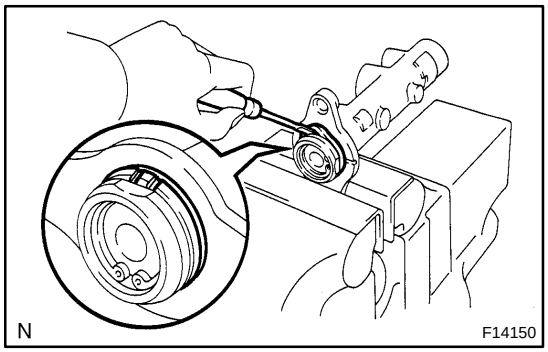
1. REMOVE RESERVOIR

Remove the set screw and pull out the reservoir.

Torque: 1.8 N·m (18 kgf·cm, 16 in.·lbf)

2. REMOVE 2 GROMMETS

3. PLACE CYLINDER IN VISE



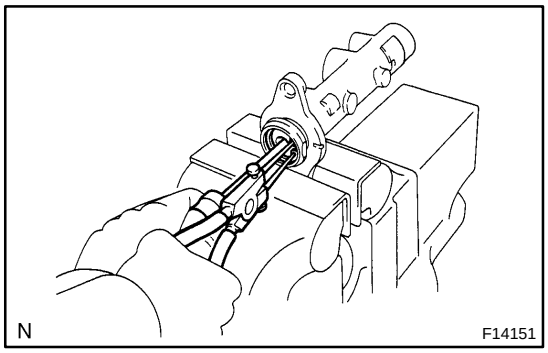
4. REMOVE MASTER CYLINDER BOOT

Using a screwdriver, remove the master cylinder boot.

HINT:

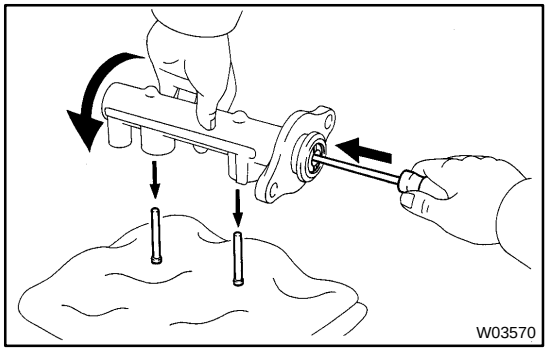
At the time of reassembly, please refer to the following item.

With the UP mark on the master cylinder boot facing upwards, install the cylinder boot on the master cylinder.



5. REMOVE 2 PISTONS AND SPRINGS

(a) Push in the piston with a screwdriver and remove the snap ring with snap ring pliers.

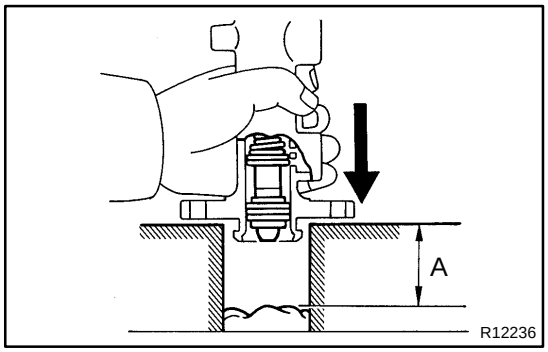


(b) Push in the piston with a screwdriver, and remove the 2 straight pins by turning over the cylinder body.

HINT:

Tape the screwdriver tip before use.

(c) Remove the 2 pistons and springs by hand, pulling straight out, not at angle.



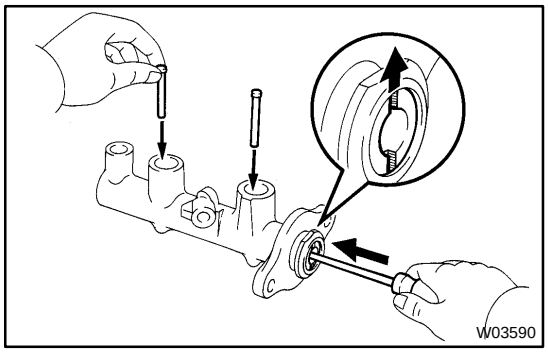
(d) Place a rag and 2 wooden blocks on the work table and lightly tap the cylinder flange against the block edges until the piston drops out of the cylinder.

HINT:

Make sure the distance (A) from the rag to the top of the blocks is at least 100 mm (3.94 in.).

NOTICE:

- **If pulled out and installed at an angle, there is a possibility that the cylinder bore could be damaged.**
- **At the time of reassembly, be careful not to damage the rubber lips on the pistons.**



HINT:
At the time of reassembly, insert the pistons with elliptic hole facing vertically.

BR0MP-01

INSPECTION

HINT:

Clean the disassembled parts with compressed air.

1. INSPECT CYLINDER BORE FOR RUST OR SCORING

2. INSPECT CYLINDER FOR WEAR OR DAMAGE

If necessary, clean or replace the cylinder.

BR0MQ-04

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR-12).

HINT:

Apply lithium soap base glycol grease to the rubber parts indicated by the arrows (See page BR-10).

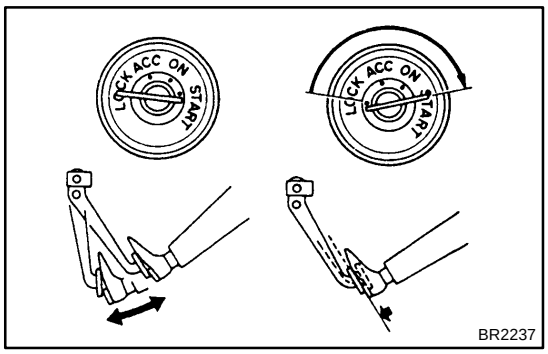
BR0MR-03

INSTALLATION

Installation is in the reverse order of removal (See page BR-11).

HINT:

- Before installation, adjust length of brake booster push rod (See page BR-21).
- After installation, fill the brake reservoir with brake fluid, bleed brake system (See page BR-4), and check for leaks.
- Check and adjust brake pedal (See page BR-6).



BRAKE BOOSTER ASSEMBLY

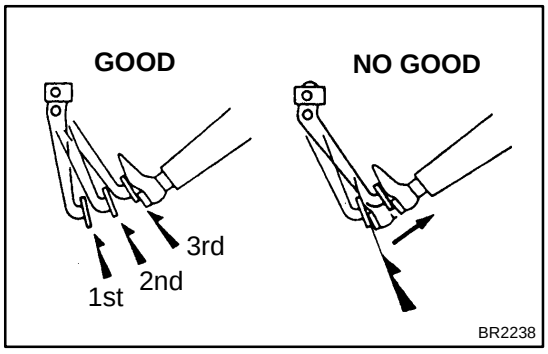
BR0NR-06

ON-VEHICLE INSPECTION

1. OPERATING CHECK

(a) Depress the bake pedal several times with the engine OFF and check that there is no change in the pedal reserve distance.

(b) Depress the brake pedal and start the engine. If the pedal goes down slightly, operation is normal.



2. AIR TIGHTNESS CHECK

(a) Start the engine and stop it after 1 or 2 minutes. Depress the brake pedal several times slowly.

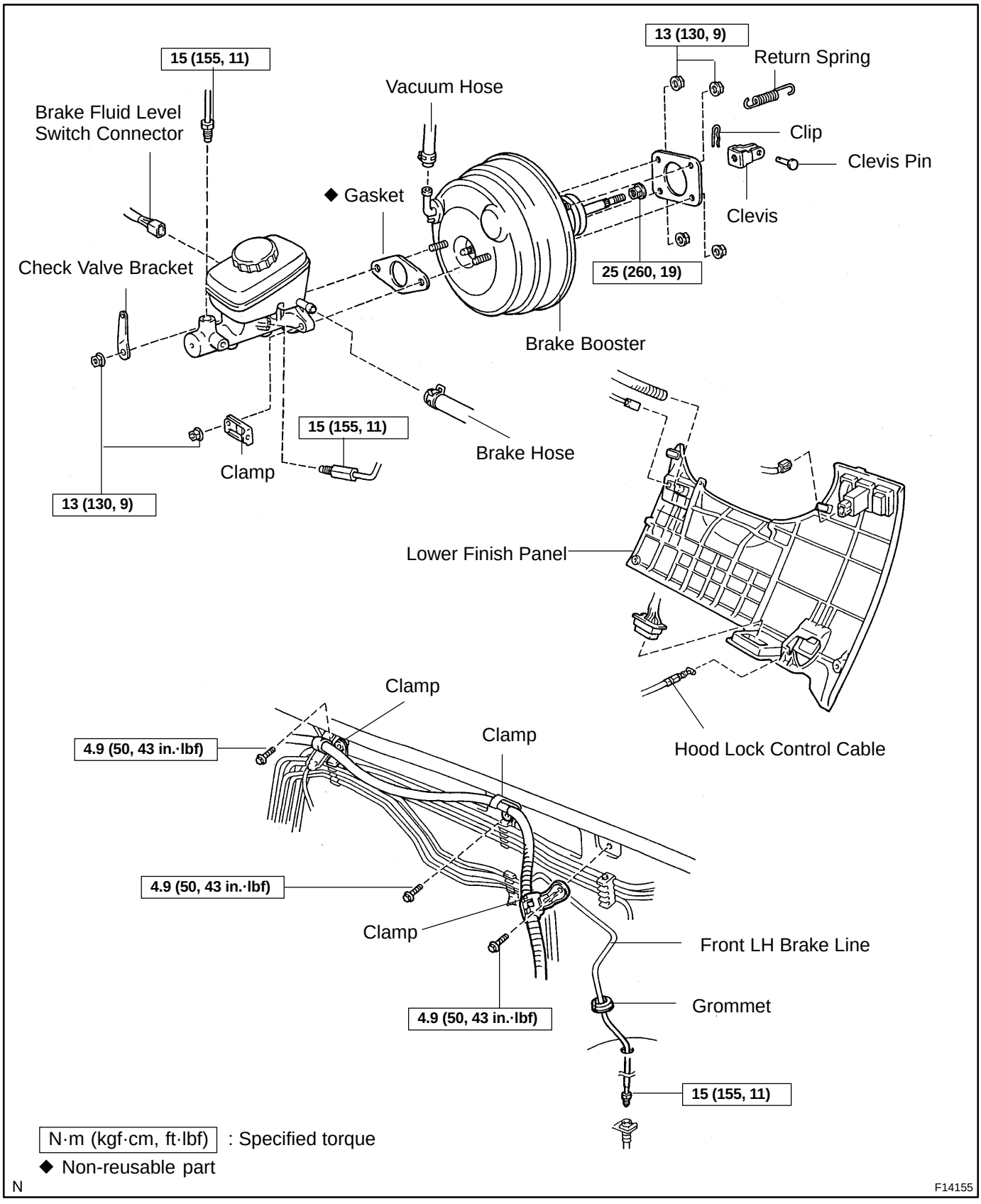
If the pedal goes down the farthest the 1st time, but gradually rises after the 2nd or 3rd time, the booster is air-tight.

(b) Depress the brake pedal while the engine is running, and stop the engine with the pedal depressed.

If there is no change in the pedal reserve travel after holding the pedal for 30 seconds, the booster is air-tight.

BR0NS-07

COMPONENTS



BR1JR-01

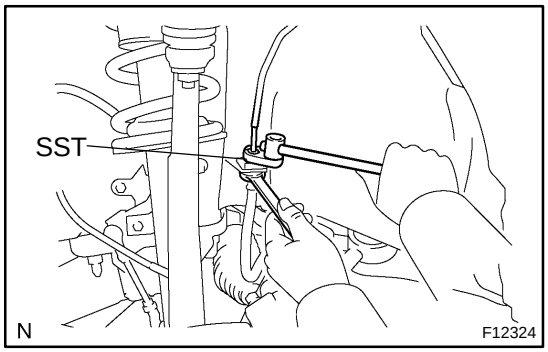
REMOVAL

1. REMOVE FRONT LH WHEEL

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

2. REMOVE MASTER CYLINDER (See page BR-11)

3. DISCONNECT VACUUM HOSE FROM BRAKE BOOSTER

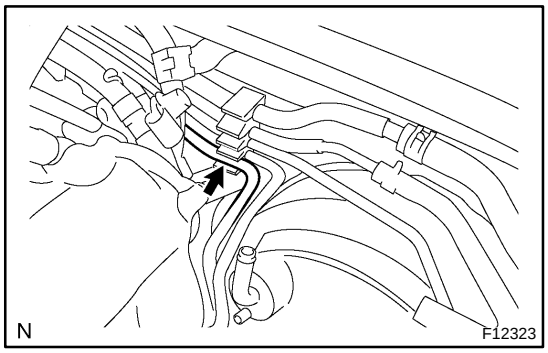


4. DISCONNECT FRONT LH BRAKE LINE

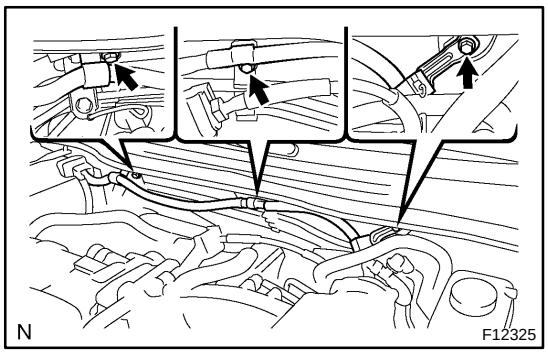
(a) Using SST and spanner, disconnect the brake line from the flexible hose of front LH brake.

SST 09023-00100

(b) Separate the grommet from body through the brake line.



(c) Disconnect the front LH brake line from the clamp.

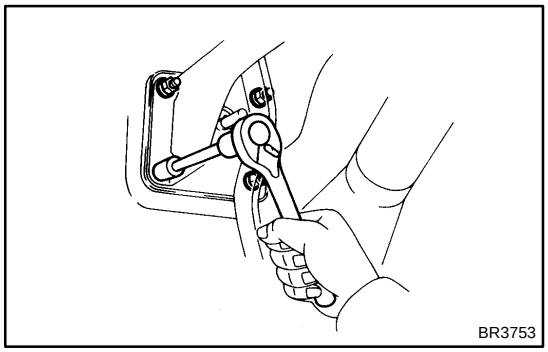


5. REMOVE BRAKE BOOSTER

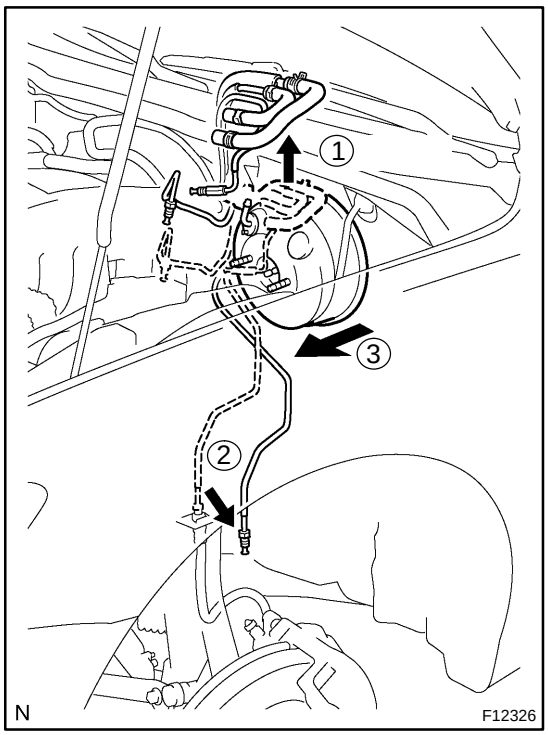
(a) Remove the 3 bolts and disconnect the 3 clamps.

(b) Remove the lower finish panel (See page BO-135).

(c) Remove the return spring, clip and clevis pin.



(d) Remove the clevis and 4 nuts.



(e) Move the brake line as illustrated and ensure sufficient space.

(f) Pull out the booster and gasket.

BR1JS-02

INSTALLATION

1. INSTALL BRAKE BOOSTER

(a) Install a new gasket to the booster.

(b) Install the booster.

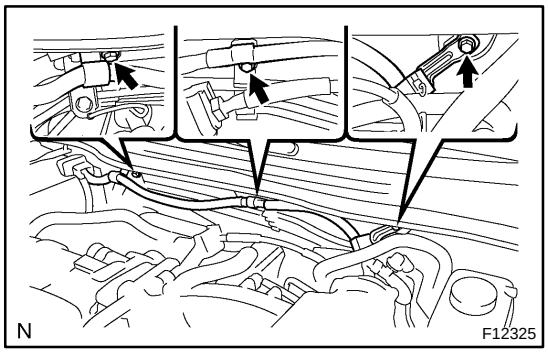
(c) Install and torque the booster installation nuts.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(d) Install the clevis to the operating rod.

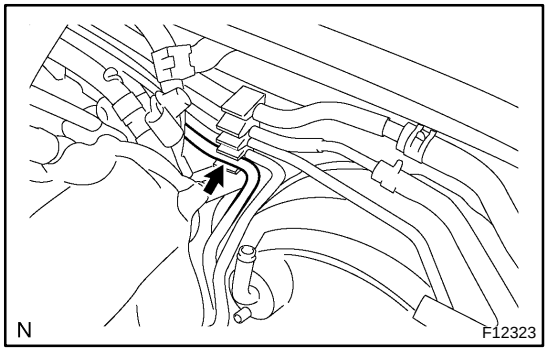
(e) Insert the clevis pin into the clevis and brake pedal, and install the clip to the clevis pin.

(f) Install the pedal return spring.

(g) Install the vacuum hose.



(h) Install the 3 clamps with 3 bolts.
Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)

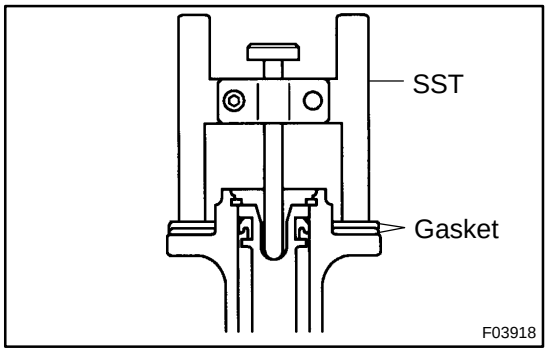


2. CONNECT FRONT LH BRAKE LINE

(a) Connect the front LH brake line to the clamp.

(b) Using SST and spanner, connect the brake line to the flexible hose of front LH brake.
SST 09023-00100
Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

(c) Attach the grommet to body through the brake line.



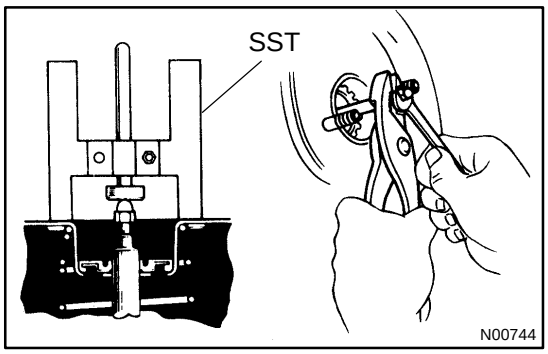
3. ADJUST LENGTH OF BOOSTER PUSH ROD

(a) Install 2 new gaskets on the master cylinder.

(b) Set the SST on the gasket, and lower the pin until its tip slightly touches the piston.
SST 09737-0001 1

(c) Turn the SST upside down, and set it on the booster.
SST 09737-0001 1

(d) Measure the clearance between the booster push rod and pin head (SST).
Clearance: 0 mm (0 in.)



(e) Adjust the booster push rod length until the push rod slightly touches the pin head.

HINT:

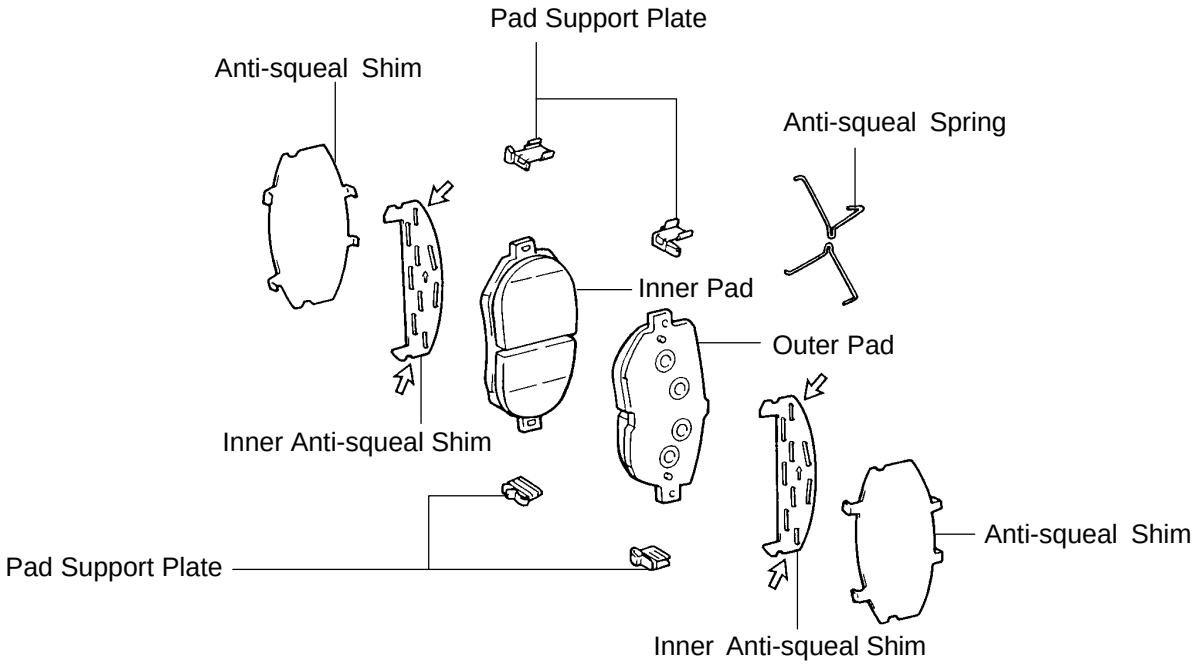
When adjusting the push rod, depress the brake pedal enough so that the push rod sticks out.

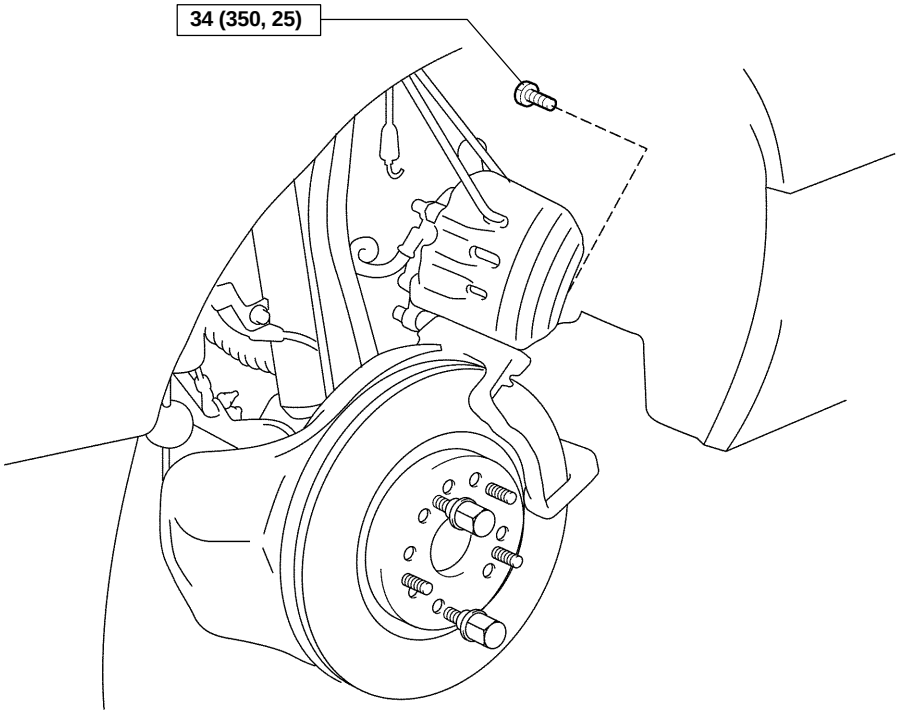
4. **INSTALL BRAKE MASTER CYLINDER (See page BR-16)**
5. **FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM (See page BR-4)**
6. **CHECK FOR FLUID LEAKAGE**
7. **CHECK AND ADJUST BRAKE PEDAL (See page BR-6)**
8. **INSTALL LOWER FINISH PANEL (See page BO-135)**
9. **DO OPERATIONAL CHECK (See page BR-17)**

FRONT BRAKE PAD

COMPONENTS

BR0JH-08





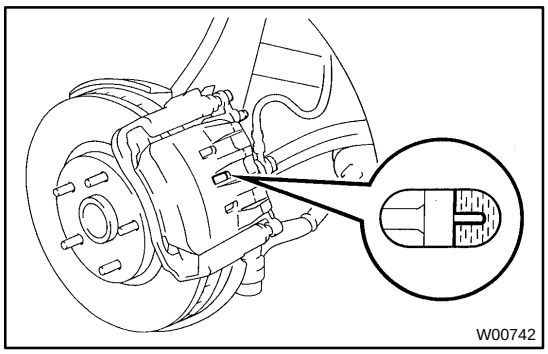
N·m (kgf·cm, ft·lbf) : Specified torque

⇨ Disc brake grease

F07909

BR1JT-01

REPLACEMENT

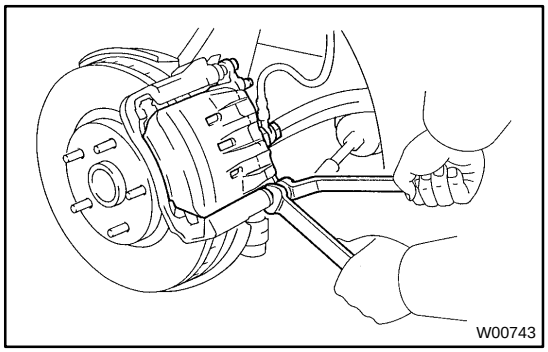


1. REMOVE FRONT WHEEL

2. INSPECT PAD LINING THICKNESS

Check the pad thickness through the caliper inspection hole and replace the pads if they are not within the specification.

Minimum thickness: 1.0 mm (0.039 in.)



3. LIFT UP CALIPER

(a) Hold the sliding pin on the bottom and loosen the installation bolt.

(b) Remove the installation bolt.

(c) Lift up the caliper and suspend it securely.

HINT:

Do not disconnect the flexible hose from the caliper.

4. REMOVE 2 ANTI- SQUEAL SPRINGS

5. REMOVE 2 BRAKE PADS WITH 4 ANTI- SQUEAL SHIMS

6. REMOVE 4 PAD SUPPORT PLATES

NOTICE:

The anti-squeal springs and support plates can be used again provided that they have sufficient rebound, no deformation, cracks or wear, and have had all rust, dirt and foreign particles cleaned off.

7. CHECK DISC THICKNESS AND RUNOUT

(See page BR-29)

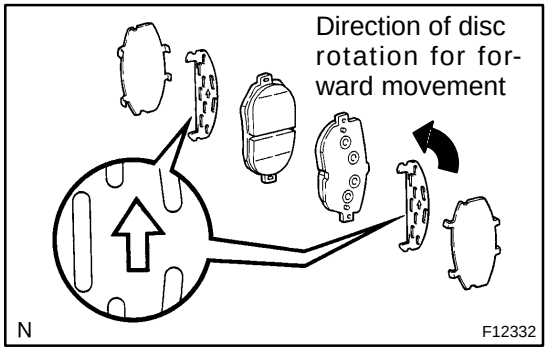
8. INSTALL 4 PAD SUPPORT PLATES

9. INSTALL NEW PADS

NOTICE:

When replacing worn pads, the anti-squeal shims must be replaced together with the pad.

(a) Apply disc brake grease to both sides of each inner anti-squeal shims (See page BR-23).



(b) Install the 2 anti-squeal shims to each pad.

HINT:

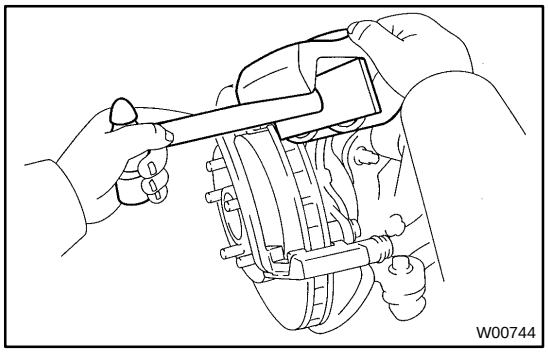
Make sure the arrows on the inner anti-squeal shims facing to the direction of disc rotation as shown in the illustration.

(c) Install the inner pad with the pad wear indicator plates facing downward.
(d) Install the outer pad.

NOTICE:

There should be no oil or grease adhering to the friction surfaces of the pads or the disc.

(e) Install the 2 anti-squeal springs.



10. INSTALL CALIPER

(a) Draw out a small amount of brake fluid from the reservoir.
(b) Press in the pistons with a hammer handle or similar implement.

HINT:

If the pistons are difficult to push in, loosen the bleeder plug and push in the pistons while letting some brake fluid escape.

(c) Install the caliper.
(d) Hold the sliding pin and torque the installation bolt.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

11. INSTALL FRONT WHEEL
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

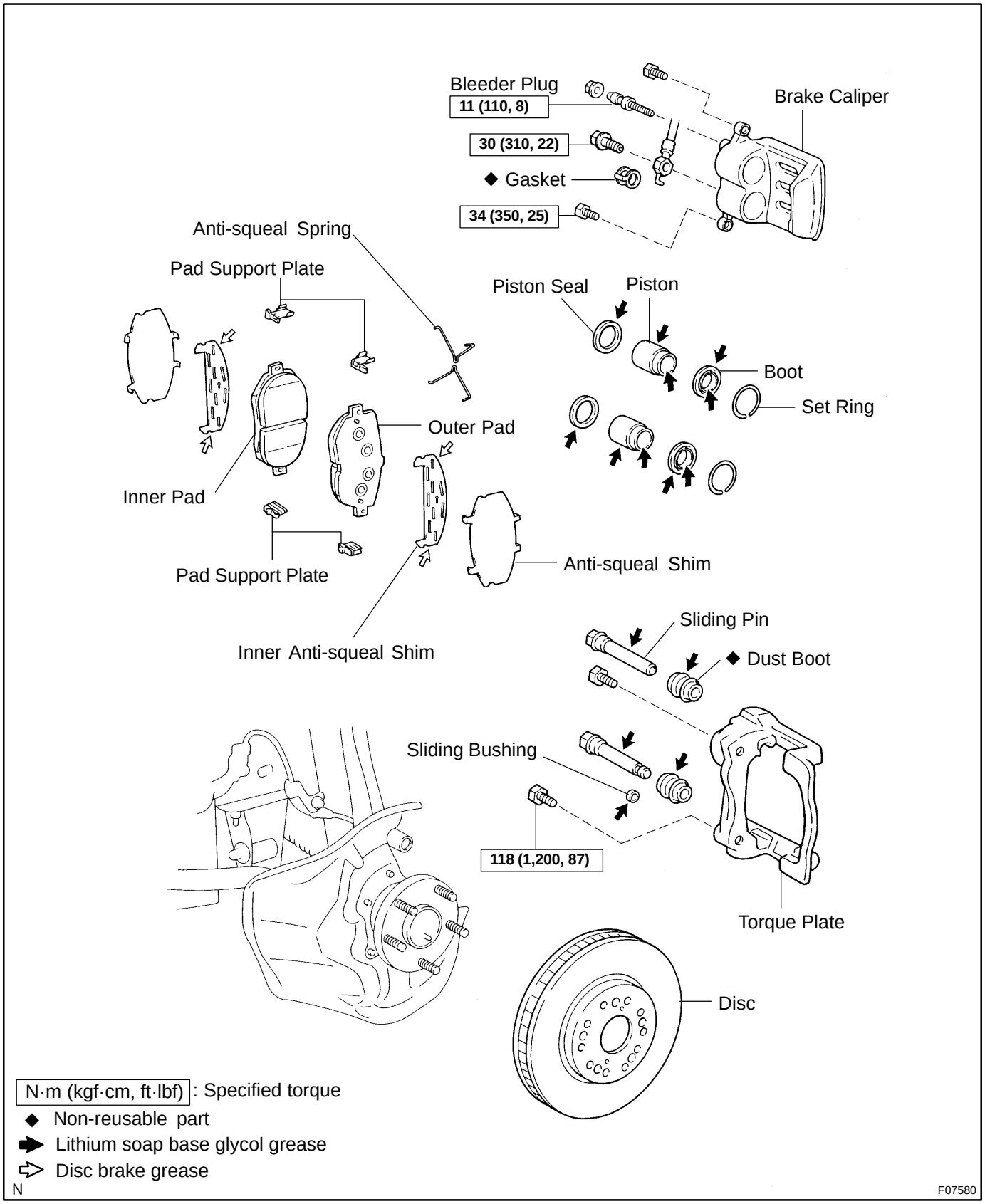
12. DEPRESS BRAKE PEDAL SEVERAL TIMES

13. CHECK THAT FLUID LEVEL IS AT MAX LINE

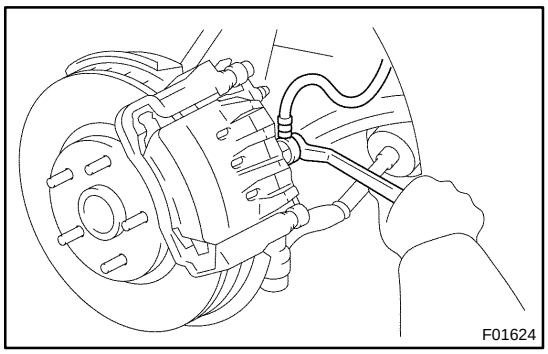
FRONT BRAKE CALIPER

COMPONENTS

BR0JJ-12



BR0JK-07



REMOVAL

1. DISCONNECT FLEXIBLE HOSE

Remove the union bolt and gasket from the caliper, then disconnect the flexible hose from the caliper. Use a container to catch brake fluid as it drains out.

Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

HINT:

At the time of installation, install the flexible hose lock securely in the lock hole in the caliper.

2. REMOVE CALIPER

(a) Hold the sliding pin and loosen the 2 installation bolts.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

(b) Remove the 2 installation bolts.

(c) Remove the caliper from the torque plate.

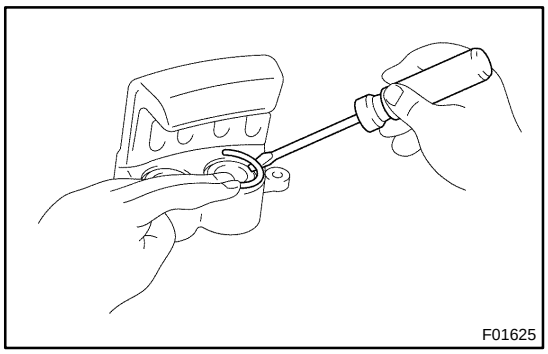
3. REMOVE 2 ANTI-SQUEAL SPRINGS

4. REMOVE 2 BRAKE PADS WITH 4 ANTI- SQUEAL SHIMS

5. REMOVE 4 PAD SUPPORT PLATES

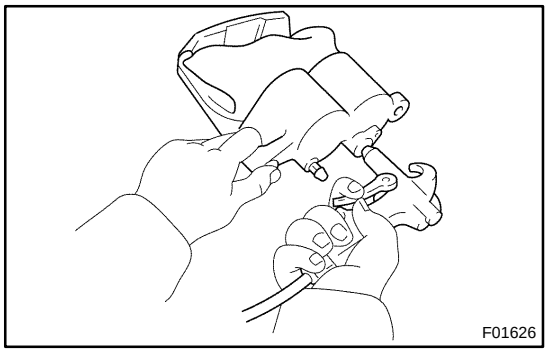
BR0JL-10

DISASSEMBLY



1. REMOVE SET RINGS AND CYLINDER BOOTS

Using a screwdriver, remove the 2 set rings and 2 cylinder boots.



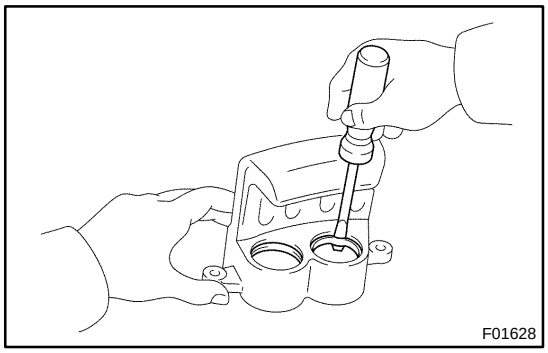
2. REMOVE PISTONS

(a) Put a piece of cloth or an equivalent between the piston and caliper.

(b) Use compressed air to remove the 2 pistons from the cylinder.

CAUTION:

Do not place your fingers in front of the piston when using compressed air.



3. REMOVE PISTON SEALS FROM BRAKE CYLINDER

Using a screwdriver, remove the 2 piston seals.

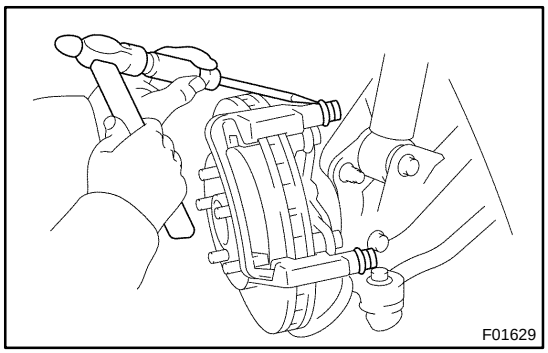
4. REMOVE SLIDING PINS AND DUST BOOTS

(a) Remove the 2 sliding pins from the torque plate.

NOTICE:

At the time of reassembly, please refer to the following item.

Insert the sliding pin with the sliding bushing into the bottom side.



(b) Using a screwdriver and hammer, tap out the 2 dust boots.

NOTICE:

At the time of reassembly, please refer to the following item.

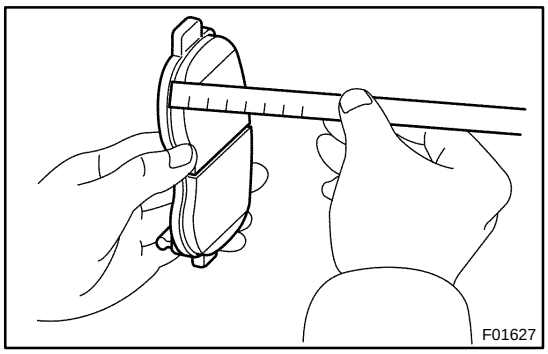
Confirm that the metal plate portion of the dust boot fits snugly in the torque plate.

HINT:

At the time of reassembly, use a 21 mm socket and tap in new dust boots into the torque plate.

BR0JM-11

INSPECTION



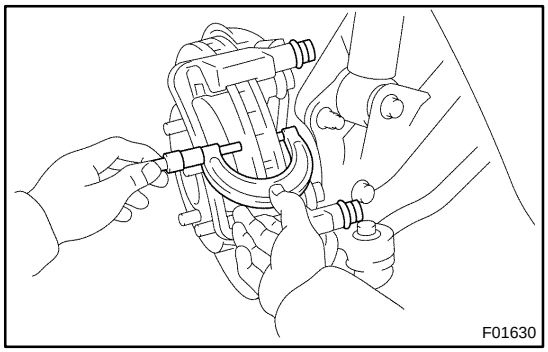
1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

Standard thickness: 11.0 mm (0.433 in.)

Minimum thickness: 1.0 mm (0.039 in.)

Replace the pad if the thickness is less than the minimum (the 1.0 mm slit is no longer visible), or if it shows signs of uneven wear.



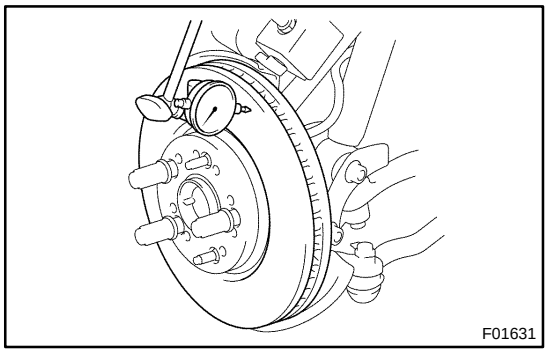
2. MEASURE DISC THICKNESS

Using a micrometer, measure the disc thickness.

Standard thickness: 32.0 mm (1.260 in.)

Minimum thickness: 30.0 mm (1.181 in.)

Replace the disc if the thickness of the disc is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is scored or is worn unevenly.



3. MEASURE DISC RUNOUT

(a) Temporarily fasten the disc with the 3 hub nuts.

(b) Using a dial indicator, measure the disc runout at a position 10 mm (0.39 in.) away from the out side edge.

Maximum disc runout: 0.050 mm (0.0020 in.)

If the disc's runout is maximum value or greater, check the bearing play in the axial direction and check the axle hub runout (See page SA-12). If the bearing play and axle hub runout are not abnormal, adjust the disc runout or grind it on a "On-Car" brake lathe.

4. IF NECESSARY, ADJUST DISC RUNOUT

(a) Remove the 2 bolts and torque plate.

(b) Remove the 3 hub nuts and disc. Turn the disc 1/5 turn and reinstall the disc. Install and torque the 3 hub nuts.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

(c) Remeasure the disc runout. Make a note of the runout and the disc's position on the hub.

(d) Repeat (b) until the disc has been installed on the 3 remaining hub positions.

- If the minimum runout recorded in (b) and (c) is less than 0.05 mm (0.0020 in.), install the disc in that position.
- If the minimum runout recorded in (b) and (c) is greater than 0.05 mm (0.0020 in.), replace the disc and repeat step 3.

(e) Install the torque plate and torque the 2 bolts.

Torque: 118 N·m (1,200 kgf·cm, 87 ft·lbf)

BR0JN-05

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR-28).

HINT:

Apply lithium soap base glycol grease to the parts indicated by the arrows (See page BR-26).

BR0JO-07

INSTALLATION

Installation is in the reverse order of removal (See page BR-27).

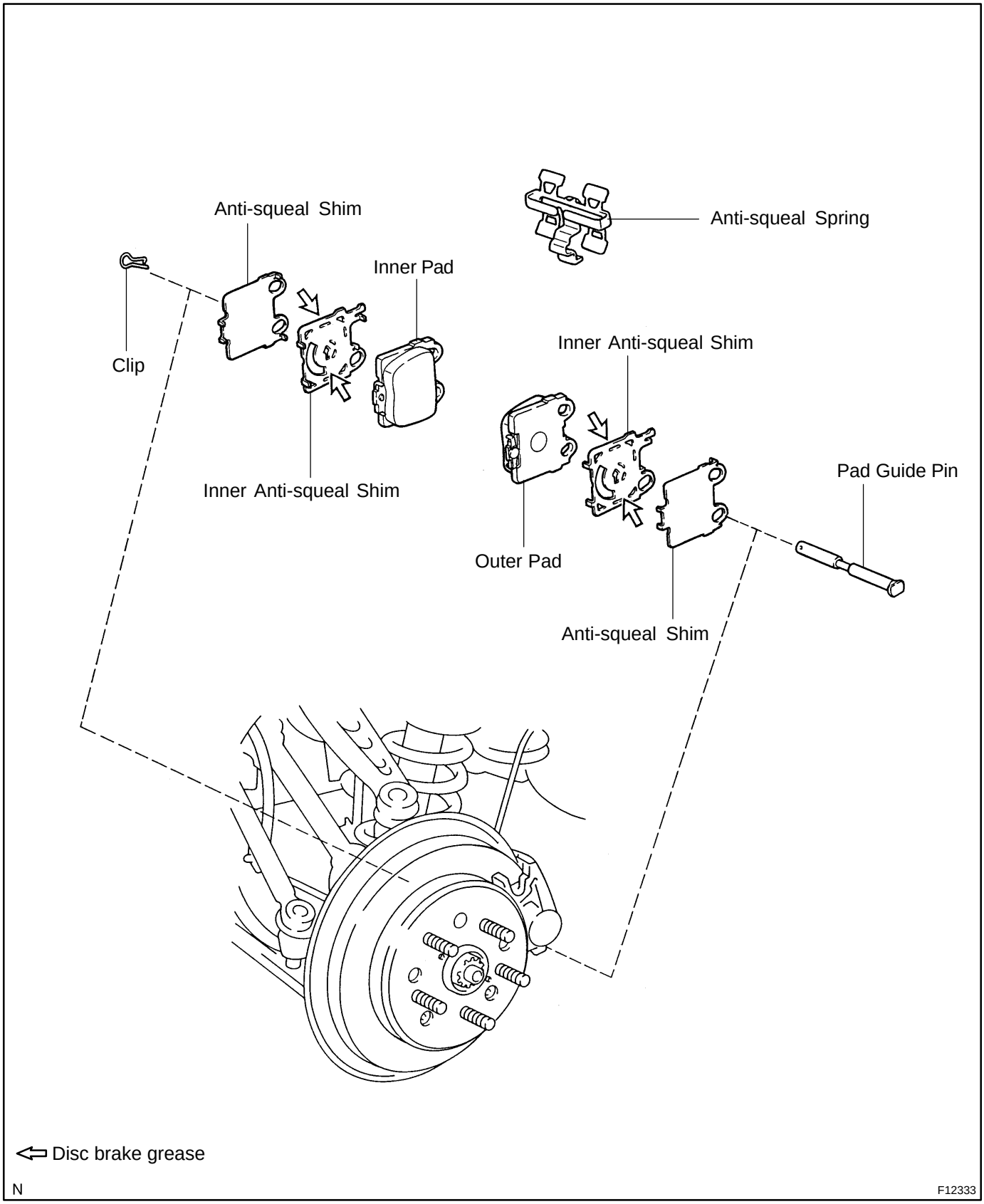
HINT:

- After installation, fill the brake reservoir with brake fluid and bleed brake system (See page BR-4).
- Check for leaks.

REAR BRAKE PAD

COMPONENTS

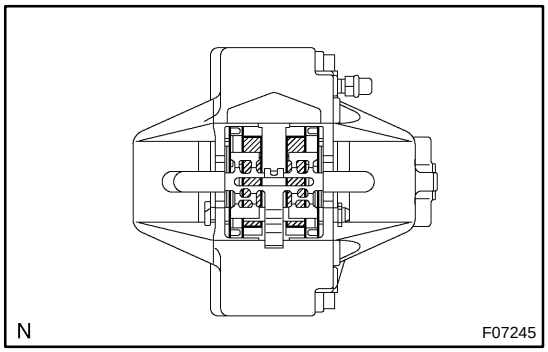
BR0JP-12



BR0ZX-03

REPLACEMENT

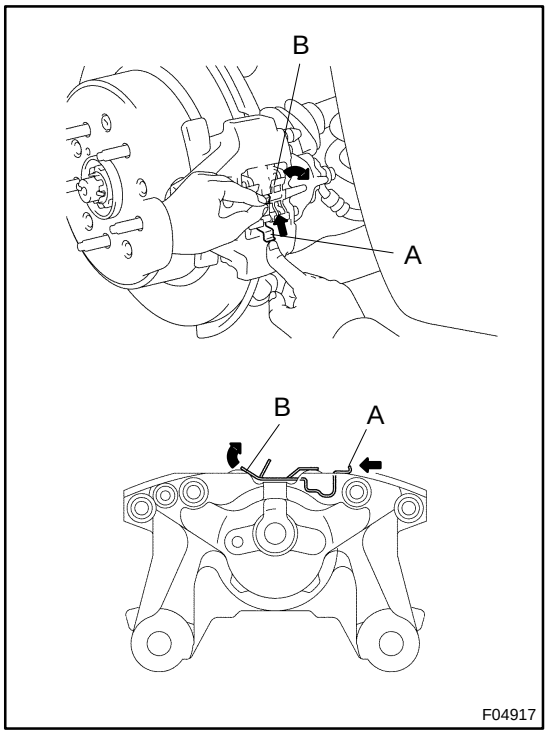
1. REMOVE REAR WHEEL



2. INSPECT PAD LINING THICKNESS

Check the pad thickness through the caliper inspection hole and replace pads if the thickness is not within the specification.

Minimum thickness: 1.0 mm (0.039 in.)



3. REMOVE ANTI-SQUEAL SPRING AND PAD GUIDE PIN

(a) Raise the "B" portion with hand, push up the "A" portion and unlatch the anti-squeal spring from brake caliper.

(b) Remove the anti-squeal spring.

NOTICE:

- **Do not deform the clip and anti-squeal spring.**
- **The clip and anti-squeal spring can be used again provided that they have sufficient rebound, no-deformation, cracks or wear, and have had all rust, dirt and foreign particles cleaned off.**

(c) Remove the clip and pad guide pin.

4. REMOVE PADS AND ANTI-SQUEAL SHIMS

(a) Remove the 2 pads.

(b) Remove the 4 anti-squeal shims from each pad.

5. CHECK DISC THICKNESS AND RUNOUT

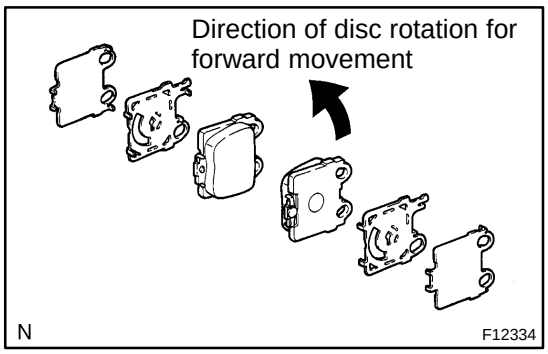
(See page BR-38)

6. INSTALL NEW PADS

NOTICE:

When replacing worn pads, the anti-squeal shims must be replaced together with the pads.

(a) Apply disc brake grease to both sides of inner anti-squeal shims (See page BR-32).

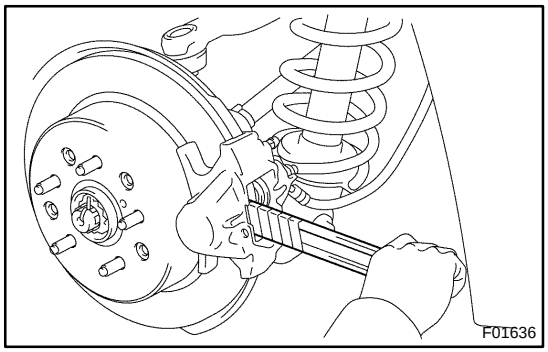


(b) Install the 2 anti-squeal shims on each pad.

HINT:

Make sure the arrows on the inner anti-squeal shims facing to the direction of disc rotation as shown in the illustration.

(c) Draw out a small amount of brake fluid from the reservoir.

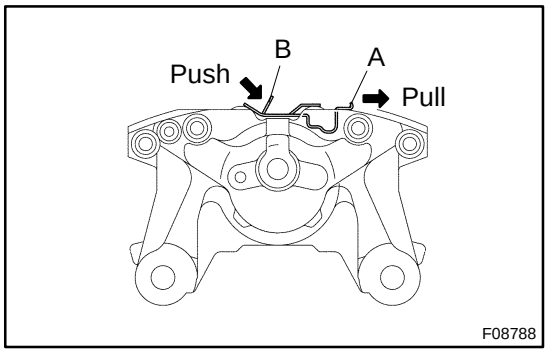


(d) Press in the pistons with a monkey wrench handle or equivalent.

HINT:

- Tape the monkey wrench handle before use.
- If the piston is difficult to push in, loosen the bleeder plug and push in the piston while letting some brake fluid escape.

(e) Install the 2 pads.

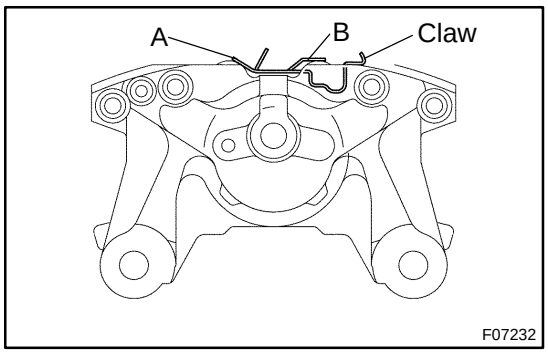


7. INSTALL PAD GUIDE PIN AND ANTI- SQUEAL SPRING

(a) Install the pad guide pin and clip.

(b) Install the anti-squeal spring.

(c) Push in the ”B” portion with hand, pull the ”A” portion and latch the anti-squeal spring to brake caliper.



HINT:

- Ensure that the claw of the anti-squeal spring is raised up on the caliper securely.
- Ensure that there is no gap between the pad guide pin and anti-squeal spring.
- Ensure that ”A” and ”B” portions of anti-squeal spring are attached to the pad.

8. INSTALL REAR WHEEL

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

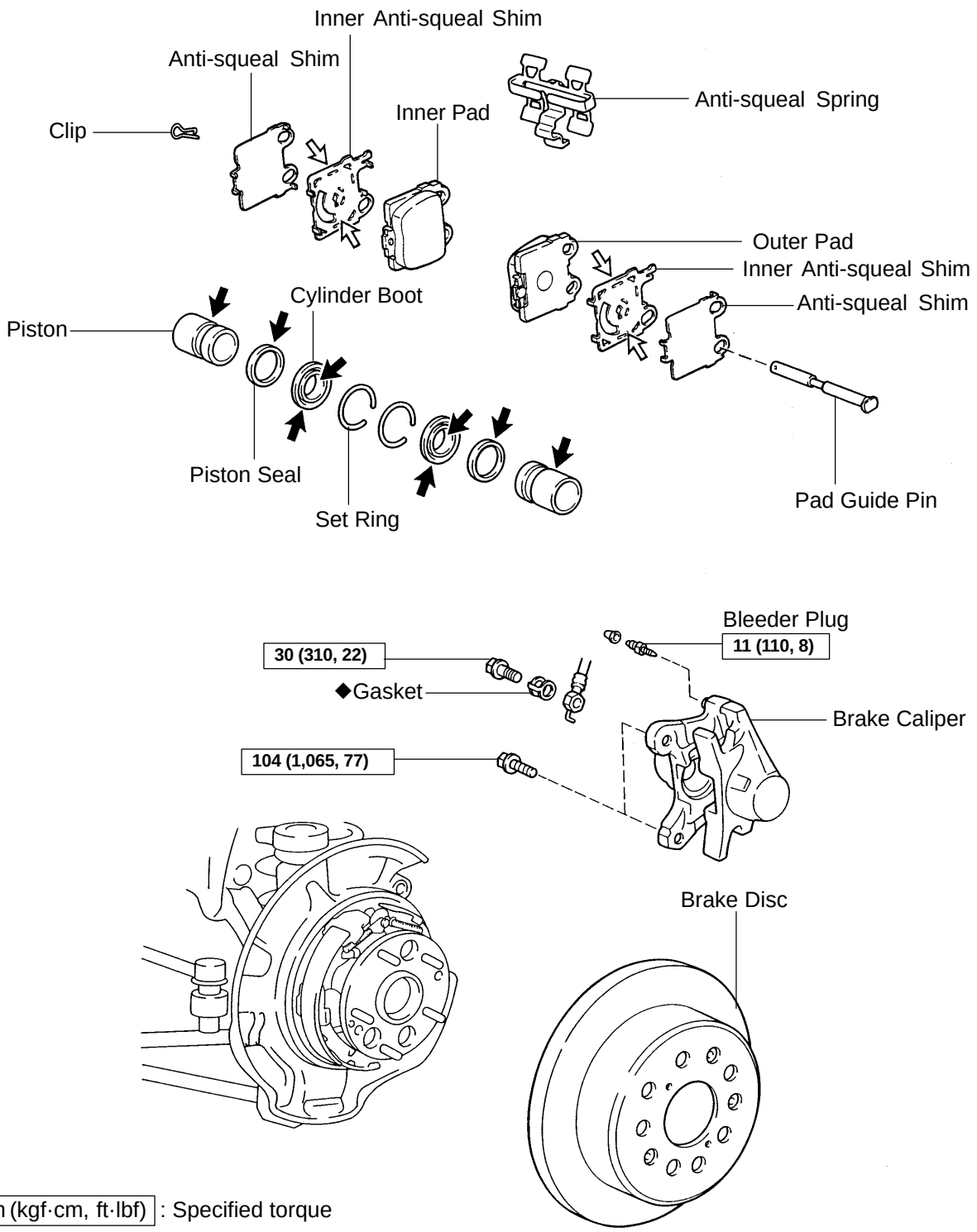
9. DEPRESS BRAKE PEDAL SEVERAL TIMES

10. CHECK THAT FLUID LEVEL IS AT MAX LINE

REAR BRAKE CALIPER

BR0JR-13

COMPONENTS



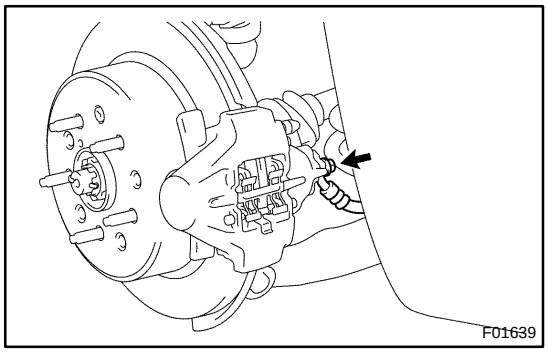
BR0JS-11

REMOVAL

1. REMOVE REAR WHEEL

Remove the rear wheel and temporarily fasten the disc with 3 hub nuts.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)



2. DISCONNECT FLEXIBLE HOSE

Remove the union bolt and gasket from the caliper, then disconnect the flexible hose from the caliper. Use a container to catch brake fluid as it drains out.

Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

HINT:

At the time of installation, please refer to the following item.

Install the flexible hose lock securely in the lock hole in the caliper.

3. REMOVE CALIPER

(a) Remove the 2 installation bolts.

Torque: 104 N·m (1,065 kgf·cm, 77 ft·lbf)

(b) Remove the caliper.

4. REMOVE BRAKE PADS (See page BR-33)

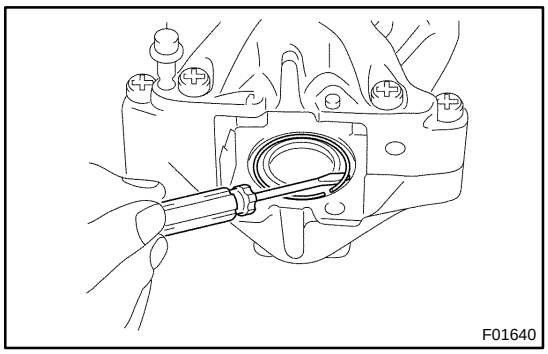
(a) Remove the anti-squeal spring.

(b) Remove the clip and pad guide pin.

(c) Remove the 2 pads with the 4 anti-squeal shims.

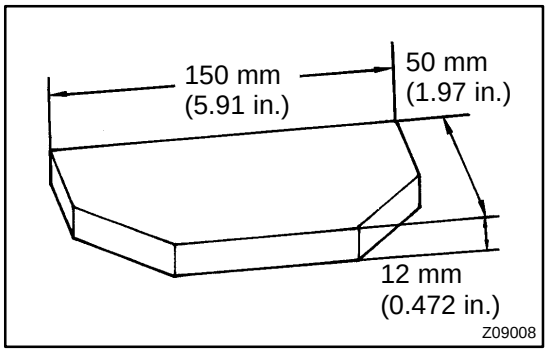
BR0JT-07

DISASSEMBLY



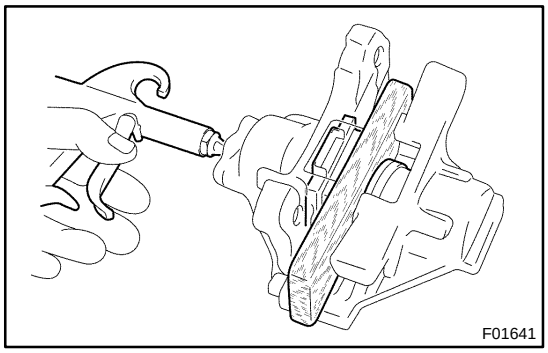
1. REMOVE SET RINGS AND BOOTS

Using a screwdriver, remove the 2 set rings and 2 boots.



2. REMOVE PISTONS FROM CYLINDER

(a) Prepare a wooden plate to hold the pistons.

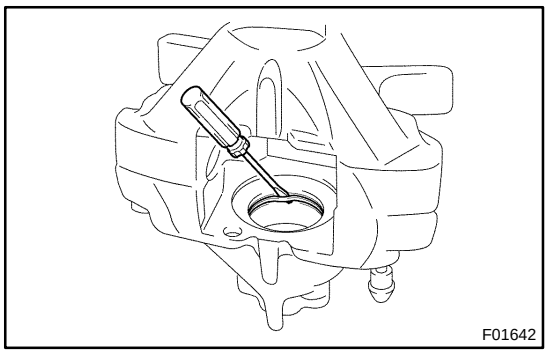


(b) Place the plate between the pistons and insert a pad on one side.

(c) Use compressed air to remove the pistons alternately from the caliper.

CAUTION:

Do not place your fingers in front of the piston when using compressed air.

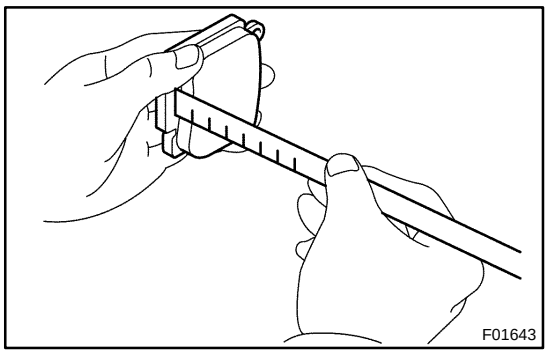


3. REMOVE PISTON SEALS

Using a screwdriver, remove the 2 piston seals from the caliper.

BR0JU-11

INSPECTION



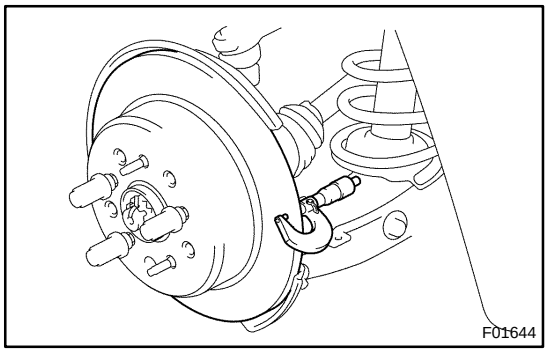
1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

Standard thickness: 10.5 mm (0.413 in.)

Minimum thickness: 1.0 mm (0.039 in.)

Replace the pads if the thickness is less than the minimum or if it shows signs of uneven wear.



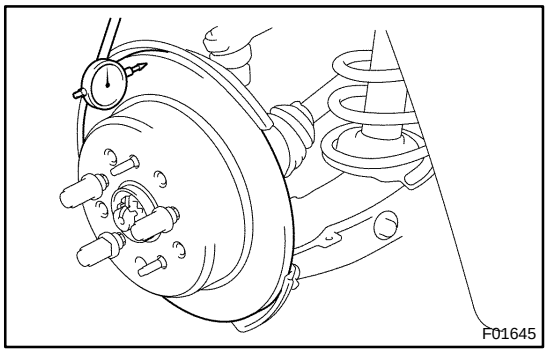
2. MEASURE DISC THICKNESS

Using a micrometer, measure the disc thickness.

Standard thickness: 12.0 mm (0.472 in.)

Minimum thickness: 10.5 mm (0.413 in.)

Replace the disc if the thickness of the disc is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is badly scored or worn unevenly.



3. MEASURE DISC RUNOUT

Using a dial indicator, measure the disc runout at a position 10 mm (0.394 in.) away from the out side edge.

Maximum disc runout: 0.05 mm (0.0020 in.)

If the disc's runout is maximum value or greater, check the bearing play in the axial direction and check the axle hub runout (See page SA-50). If the bearing play and axle hub runout are not abnormal, adjust the disc runout or grind it on a "On-Car" brake lathe.

4. IF NECESSARY, ADJUST DISC RUNOUT

(a) Remove the 3 hub nuts and disc. Turn the disc 1/5 and reinstall the disc. Install and torque the 3 hub nuts.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

(b) Remeasure the disc runout. Make a note of the runout and the disc's position on the hub.

(c) Repeat (b) until the disc has been installed on the 3 remaining hub positions.

- If the minimum runout recorded in (b) and (c) is less than 0.05 mm (0.0020 in.), install the disc in that position.
- If the minimum runout recorded in (b) and (c) is greater than 0.05 mm (0.0020 in.), replace the disc and repeat step 3.

BR0JV-04

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR-37).

HINT:

Apply lithium soap base glycol grease to the parts indicated by the arrows (See page BR-35).

BR0JW-04

INSTALLATION

Installation is in the reverse order of removal (See page BR-36).

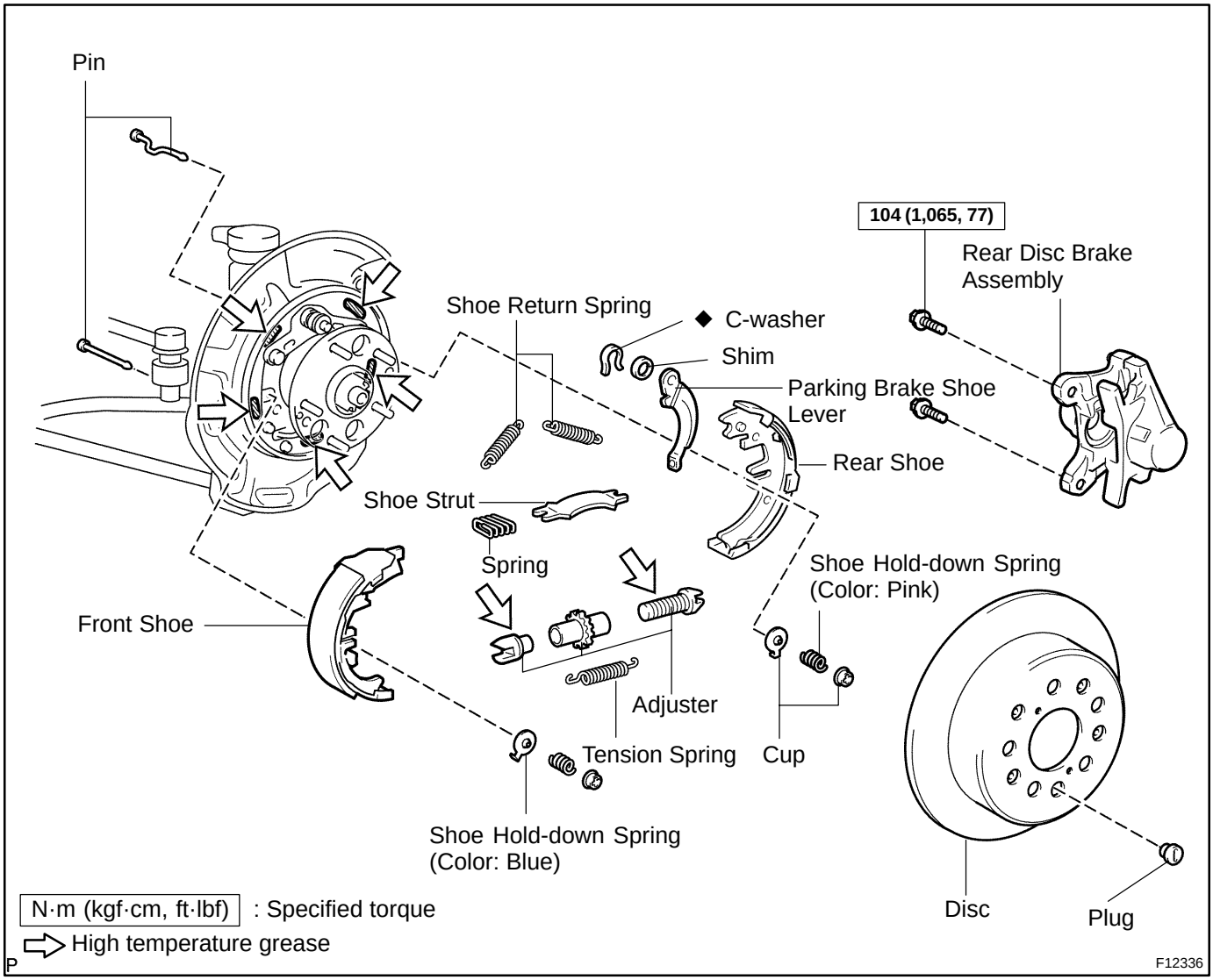
HINT:

- After installation, fill the brake reservoir with brake fluid and bleed brake system (See page BR-4).
- Check for leaks.

PARKING BRAKE

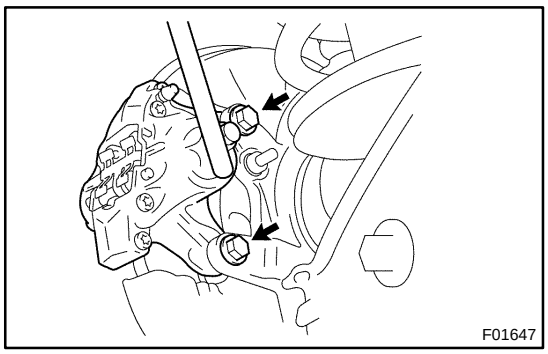
BR0JX-10

COMPONENTS



BR0JY-08

DISASSEMBLY


F01647

1. REMOVE REAR WHEEL

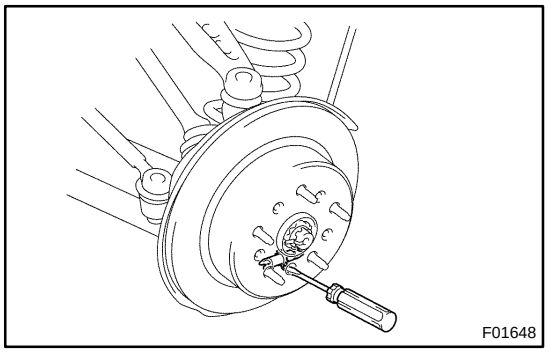
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

2. REMOVE REAR DISC BRAKE ASSEMBLY

(a) Remove the 2 mounting bolts and remove the disc brake assembly.

Torque: 104 N·m (1,065 kgf·cm, 77 ft·lbf)

(b) Suspend the disc brake securely and so the hose is not stretched.


F01648

3. REMOVE DISC

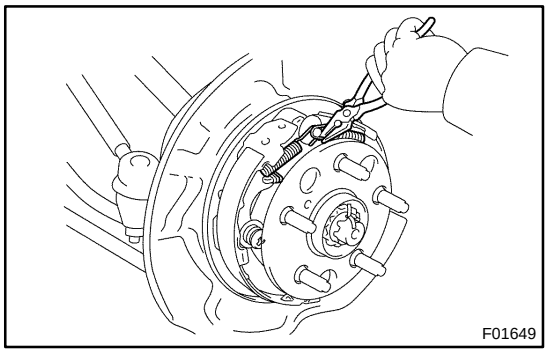
(a) Release the parking brake lever.

(b) Place matchmarks on the disc and rear axle hub.

(c) Remove the disc.

HINT:

- If the disc cannot be removed easily, turn the shoe adjuster until the wheel turns freely.
- If there are no matchmarks, temporarily install the disc, then measure the disc runout and install the disc in position (See page BR-38).


F01649

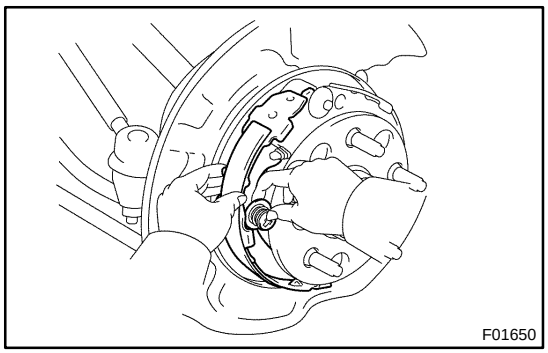
4. REMOVE SHOE RETURN SPRINGS

Using needle-nose pliers, remove the 2 shoe return springs.

5. REMOVE SHOE STRUT WITH SPRING

HINT:

At the time of reassembly, install the strut with the spring facing forward.


F01650

6. REMOVE FRONT SHOE AND ADJUSTER

(a) Slide out the front shoe and remove the shoe adjuster.

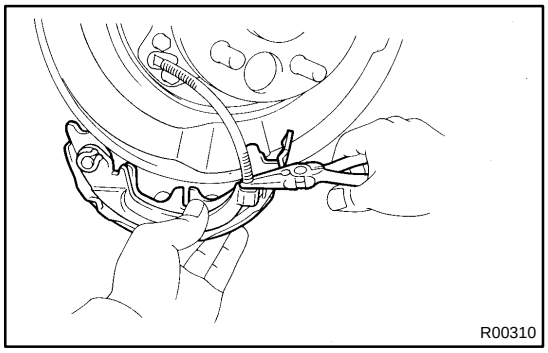
(b) Disconnect the tension spring and remove the front shoe.

(c) Remove the 2 cups and shoe hold-down spring.

7. REMOVE REAR SHOE AND TENSION SPRING

(a) Slide out the rear shoe.

(b) Remove the tension spring from the rear shoe.


R00310

(c) Disconnect the parking brake cable from the parking brake shoe lever.

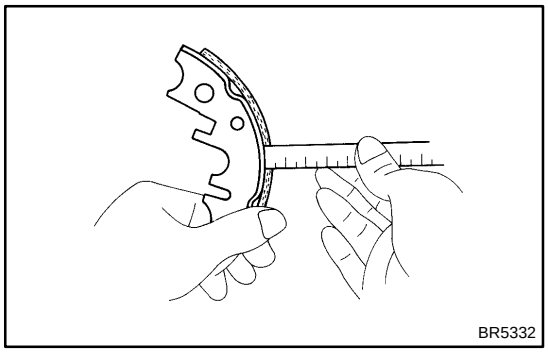
(d) Remove the 2 cups, shoe hold-down spring and pin.

BR0ZY-03

INSPECTION

1. INSPECT DISASSEMBLED PARTS

Inspect the disassembled parts for wear, rust or damage.



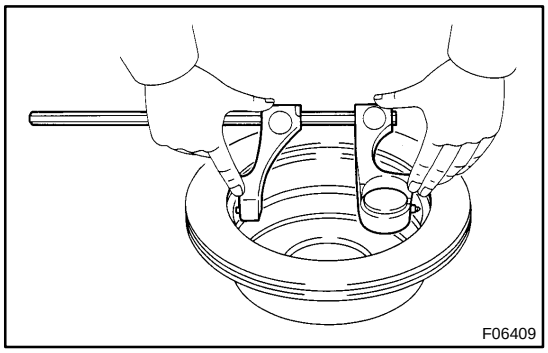
2. MEASURE BRAKE SHOE LINING THICKNESS

Using a ruler, measure the thickness of the shoe lining.

Standard thickness: 2.5 mm (0.098 in.)

Minimum thickness: 1.0 mm (0.039 in.)

If the lining thickness is at the minimum thickness or less, or if there is severe and uneven wear, replace the brake shoe.



3. MEASURE BRAKE DISC INSIDE DIAMETER

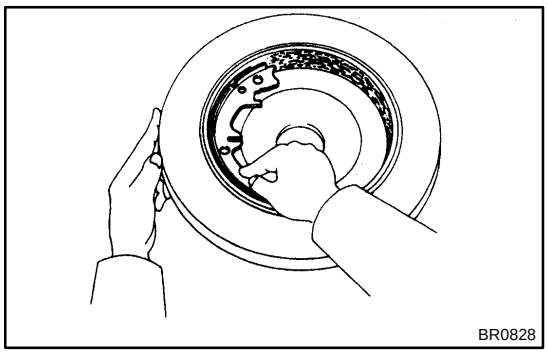
Using a brake drum gauge or equivalent, measure the inside diameter of the disc.

Standard inside diameter: 190 mm (7.48 in.)

Maximum inside diameter: 191 mm (7.52 in.)

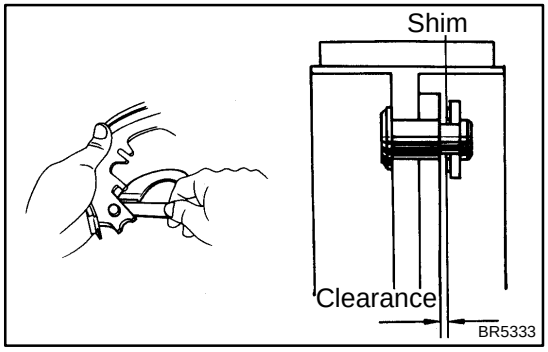
Replace the disc if the inside diameter is at the maximum value or more.

Replace the disc or grind it with a lathe if the disc is scored or worn unevenly.



4. INSPECT PARKING BRAKE SHOE LINING AND DISC FOR PROPER CONTACT

Apply chalk to the inside surface of the disc, then grind down the brake shoe lining to fit. If the contact between the disc and the brake shoe lining is improper, repair it using a brake shoe grinder or replace the brake shoe assembly.



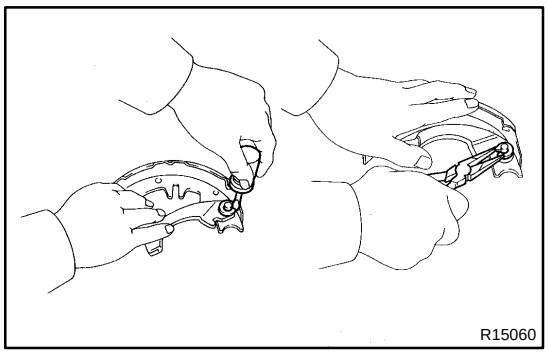
5. MEASURE CLEARANCE BETWEEN PARKING BRAKE SHOE AND LEVER

Using a feeler gauge, measure the clearance.

Standard clearance: Less than 0.35 mm (0.0138 in.)

If the clearance is not within the specification, replace the shim with one of the correct size.

Thickness mm (in.)	Thickness mm (in.)
0.3 (0.012)	0.9 (0.035)
0.6 (0.024)	-



6. IF NECESSARY, REPLACE SHIM

(a) Using a screwdriver, remove the C-washer and shim.

(b) Install the correct size shim with a new C-washer.

(c) Remeasure the clearance.

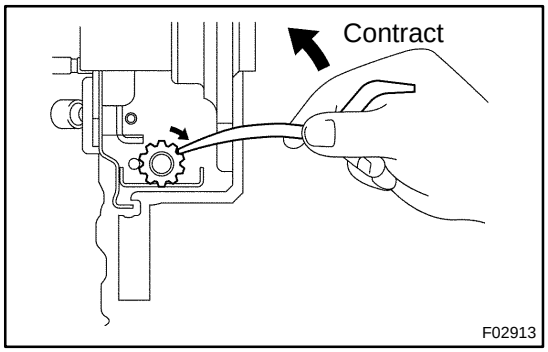
BR0K0-07

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR-42).

HINT:

Apply high temperature grease to the parts indicated by the arrows (See page BR-41).



1. ADJUST PARKING BRAKE SHOE CLEARANCE

(a) Temporarily install the 3 hub nuts.

(b) Remove the hole plug.

(c) Turn the adjuster and expand the shoes until the disc locks.

(d) Return the adjuster 8 notches.

(e) Install the hole plug.

2. SETTLING PARKING BRAKE SHOES AND DISC

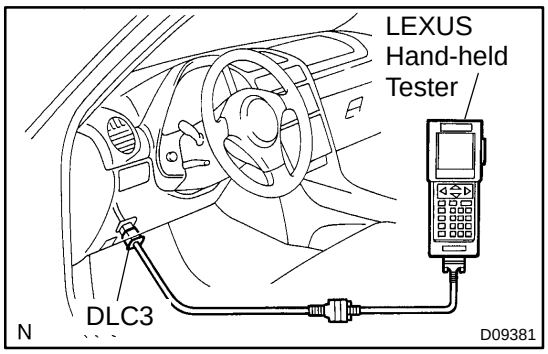
(a) Drive the vehicle at about 50 km/h (31 mph) on a safe, level and dry road.

(b) With the parking brake release button pushed in, pull on the parking brake lever with 88 N (9 kgf, 20 lbf) of force.

(c) Drive the vehicle for about 400 meters (0.25 mile) in this condition.

(d) Repeat this procedure 2 or 3 times.

3. CHECK AND ADJUST PARKING BRAKE LEVER TRAVEL (See page BR-9)



BRAKE ACTUATOR

BR1R7-01

ON-VEHICLE INSPECTION

1. INSPECT ABS & TRAC / VSC ACTUATOR OPERATION

(a) Connect the LEXUS hand-held tester.

(1) Connect the LEXUS hand-held tester to the DLC3.

(2) Start the engine and run it at idle.

(3) Select the ACTIVE TEST mode on the LEXUS hand-held tester.

HINT:

Please refer to the LEXUS hand-held tester operator's manual for further details.

(b) Inspect the actuator motor operation.

(1) With the motor relay ON, check the actuator motor operation noise.

(2) Turn the motor relay OFF.

(3) Depress the brake pedal and hold it for about 15 seconds. Check that the brake pedal cannot be depressed.

(4) With the motor relay ON, check that the pedal does not pulsate.

NOTICE:

Do not keep motor relay ON for more than 5 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

(5) Turn the motor relay OFF and release the brake pedal.

(c) Inspect the right front wheel operation.

NOTICE:

Never turn ON the solenoid which is not described below.

(1) With the brake pedal depressed, perform the following operations.

(2) Turn the SFRH and SFRR solenoid ON simultaneously, and check that the pedal cannot be depressed.

NOTICE:

Do not keep solenoid ON for more than 10 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

(3) Turn the SFRH and SFRR solenoid OFF simultaneously, and check that the pedal can be depressed.

(4) Turn the motor relay ON, and check that the pedal returns.

NOTICE:

Do not keep motor relay ON for more than 5 seconds continuously. When operating it continuously, set the interval of more than 20 seconds.

(5) Turn the motor relay OFF and release the brake pedal.

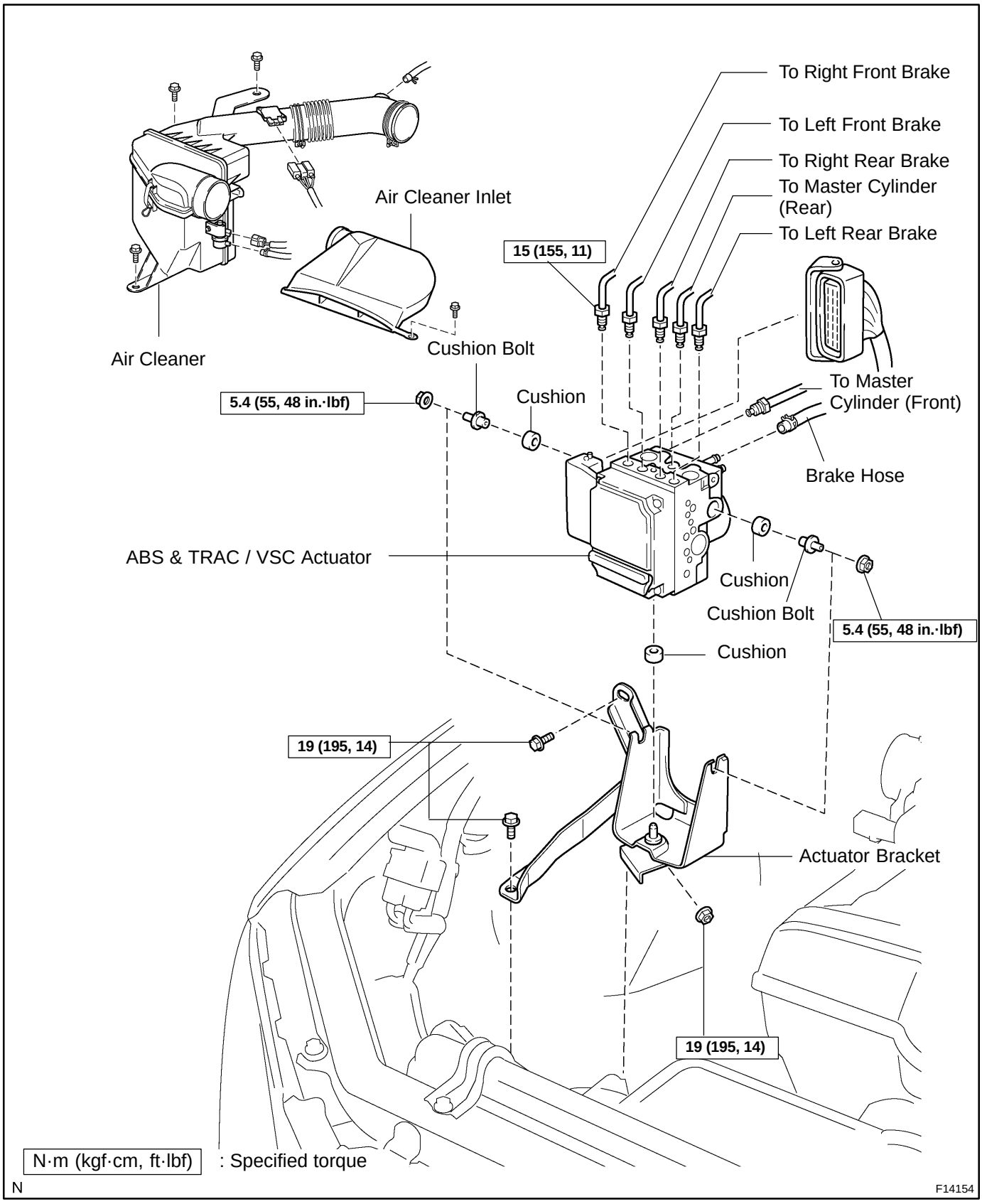
(d) Inspect other wheel operation.
As in the same procedure, check the solenoids of other wheels.

HINT:
Left front wheel: SFLH, SFLR
Right rear wheel: SRRH, SRRR
Left rear wheel: SRLH, SRLR

(e) Clear the DTC (See page DI-437 or DI-505).

BR1R8-01

COMPONENTS



BR1R9-01

REMOVAL

1. REMOVE AIR CLEANER INLET AND AIR CLEANER (See page EM-30)

2. DISCONNECT BRAKE LINES

Using SST, disconnect the 6 brake lines from the ABS & TRAC / VSC actuator.

SST 09023-00100

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

3. DISCONNECT BRAKE HOSE AND CONNECTOR

4. REMOVE ABS & TRAC / VSC ACTUATOR ASSEMBLY

Remove the nut, 2 bolts and ABS & TRAC / VSC actuator assembly.

Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

5. REMOVE ABS & TRAC & VSC ACTUATOR

(a) Remove the 2 nuts and ABS & TRAC / VSC actuator from the bracket.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(b) Remove the 2 cushion bolts and 3 cushions.

BR1RA-01

INSTALLATION

Installation is in the reverse order of removal (See page BR-49).

HINT:

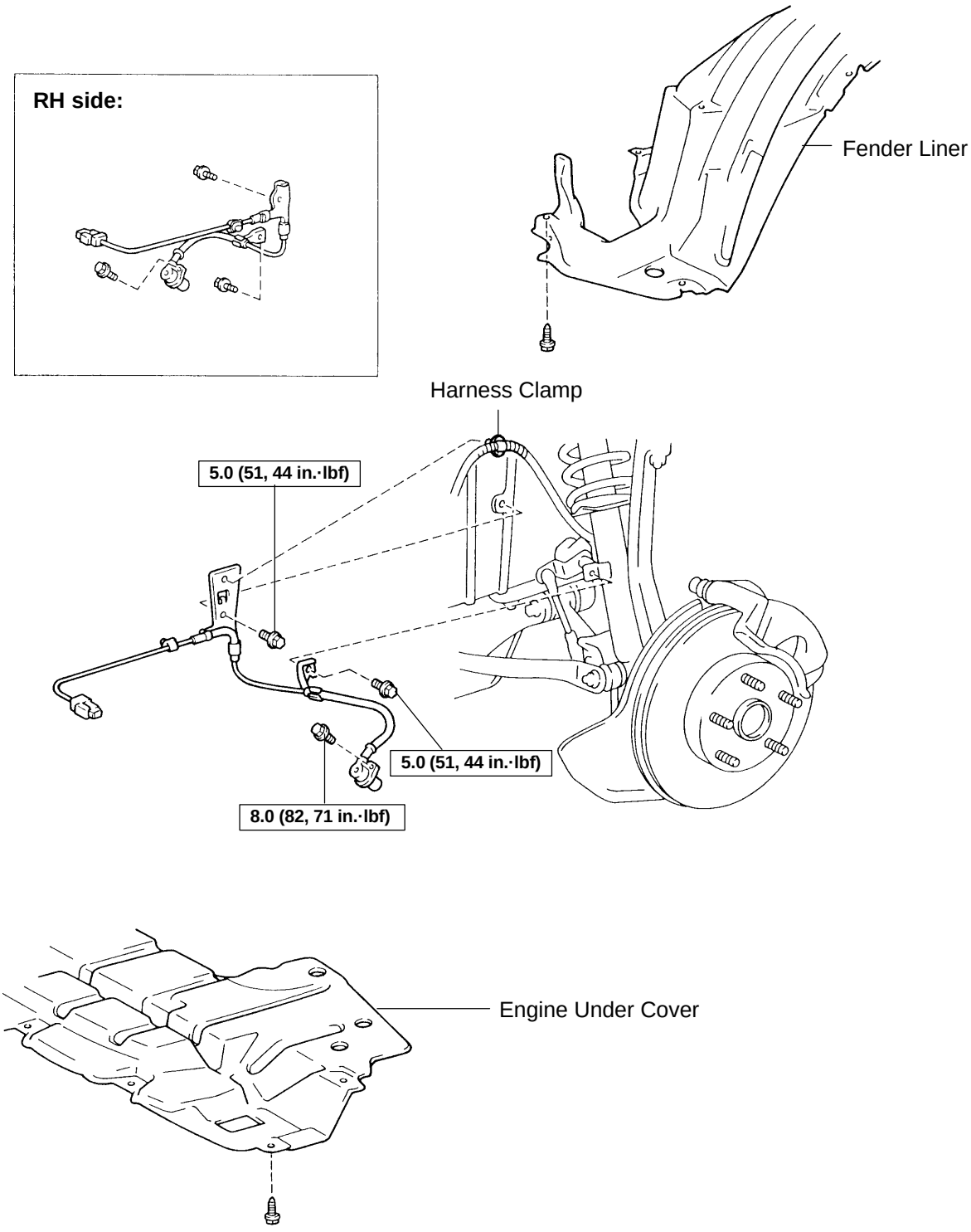
- After installation, fill the brake reservoir with brake fluid, bleed brake system (See page BR-4).
- Check for leaks.

FRONT SPEED SENSOR

COMPONENTS

BR0K1-11

LH side:



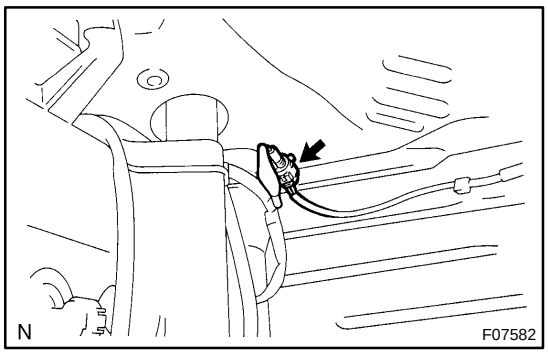
N·m (kgf·cm, ft·lbf) : Specified torque

N

F12321

BR0K2-10

REMOVAL



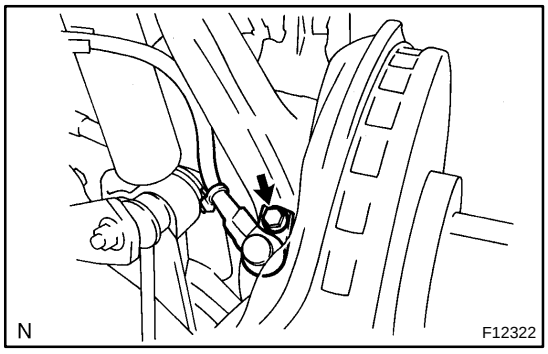
1. REMOVE FRONT WHEEL

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

2. DISCONNECT SPEED SENSOR CONNECTOR

(a) Remove the engine under cover and fender liner.

(b) Disconnect the speed sensor connector.



3. REMOVE SPEED SENSOR

(a) LH side:
Disconnect the harness clamp.

(b) Remove the resin clip and 2 clamp bolts holding the sensor harness to the body.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

(c) Remove the bolt and speed sensor from the steering knuckle.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

BR0K3-11

INSTALLATION

Installation is in the reverse order of removal (See page BR-52).

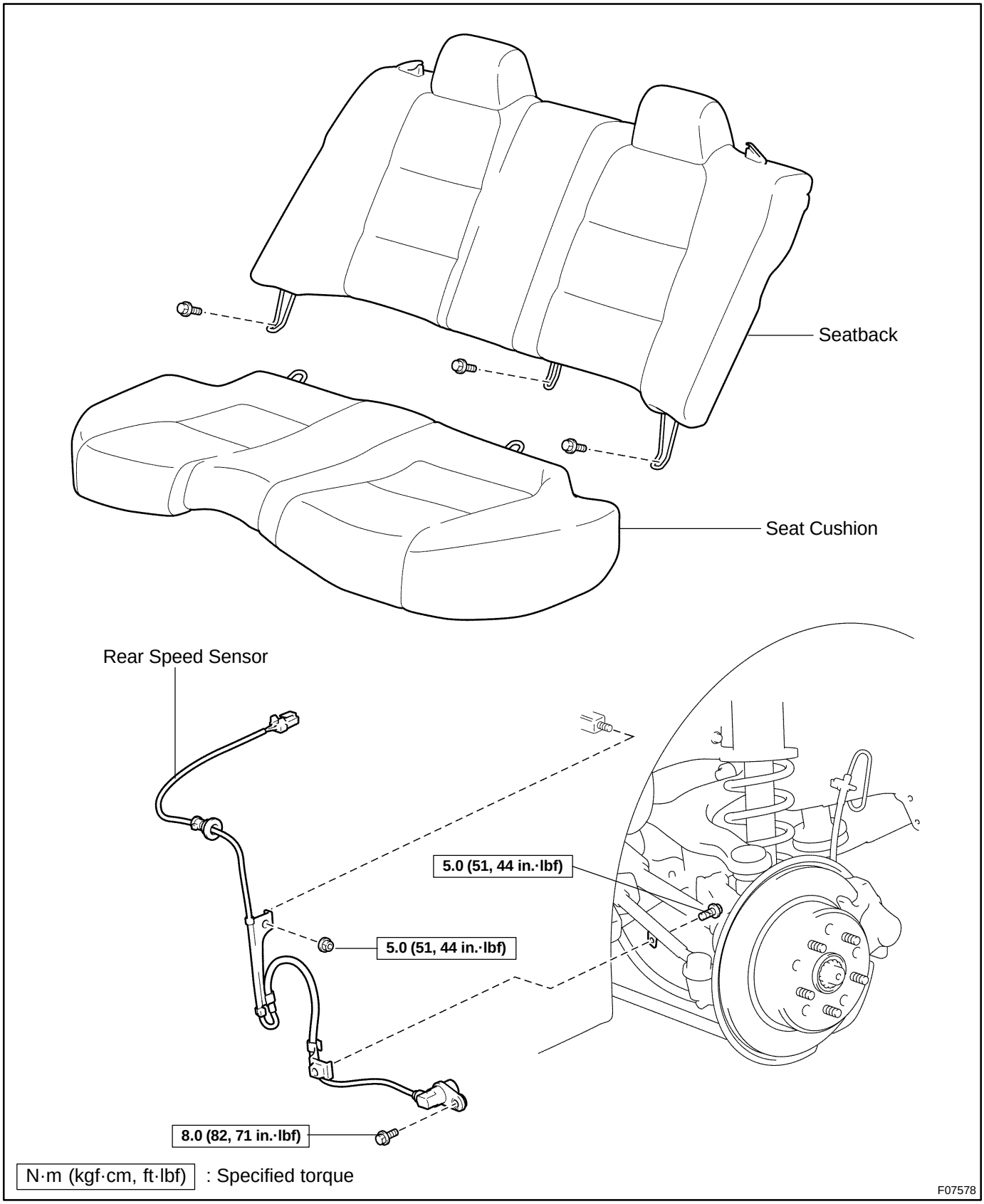
HINT:

After installation, check speed sensor signal (See page DI-437 or DI-507).

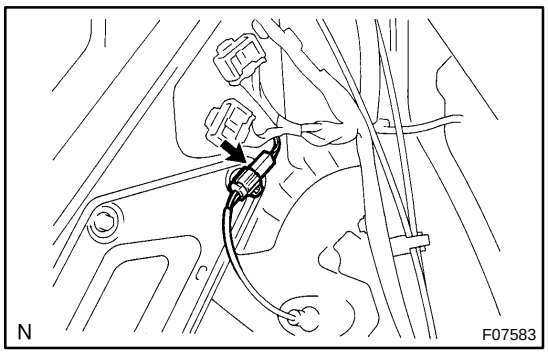
REAR SPEED SENSOR

COMPONENTS

BR0K4-11



BR0K5-11



REMOVAL

1. DISCONNECT SPEED SENSOR CONNECTOR

(a) Remove the seat cushion and seatback.

(b) Disconnect the speed sensor connector and pull out the sensor wire harness with the grommet.

2. REMOVE REAR WHEEL

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

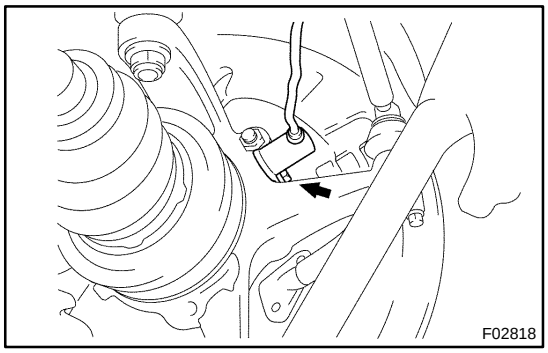
3. REMOVE SPEED SENSOR

(a) Remove the clamp bolt holding the sensor wire harness to the toe control link.

Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

(b) Remove the clamp nut holding the sensor wire harness to the body.

Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)



(c) Remove the sensor installation bolt and speed sensor from the axle carrier.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

BR0K6-11

INSTALLATION

Installation is in the reverse order of removal (See page BR-55).

HINT:

After installation, check speed sensor signal (See page DI-437 or DI-507).

STEERING SYSTEM

SR0L4-09

PRECAUTION

- **Care must be taken to replace parts properly because they could affect the performance of the steering system and result in a driving hazard.**
- **The LEXUS IS300 is equipped with SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.**

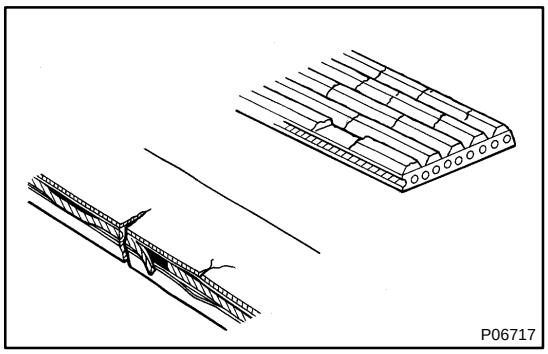
TROUBLESHOOTING

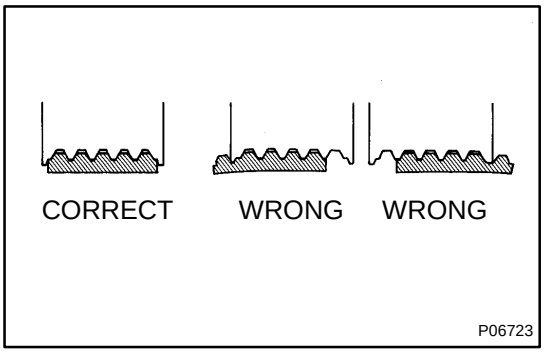
PROBLEM SYMPTOMS TABLE

SR0L5-15

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in the order shown. If necessary, repair or replace these parts.

Symptom	Suspect Area		See page
Hard steering	1. Tires (Improperly inflated)		SA-3
	2. Power steering fluid level (Low)		SR-5
	3. Drive belt (Loose)		-
	4. Front wheel alignment (Incorrect)		SA-5
	5. Steering system joints (Worn)		-
	6. Suspension arm ball joints (Worn)	Upper	SA-31
		Lower	SA-39
	7. Steering column (Binding)		-
	8. Power steering vane pump		SR-27
	9. Power steering gear		SR-38
Poor return	1. Tires (Improperly inflated)		SA-3
	2. Front wheel alignment (Incorrect)		SA-5
	3. Steering column (Binding)		-
	4. Power steering gear		SR-38
Excessive play	1. Steering system joints (Worn)		-
	2. Suspension arm ball joints (Worn)	Upper	SA-31
		Lower	SA-39
	3. Intermediate shaft (Worn)		-
	4. Front wheel bearing (Worn)		SA-12
	5. Power steering gear		SR-38
Abnormal noise	1. Power steering fluid level (Low)		SR-5
	2. Steering system joints (Worn)		-
	3. Power steering vane pump		SR-27
	4. Power steering gear		SR-38





DRIVE BELT

SR1BQ-02

INSPECTION

INSPECT DRIVE BELT

Visually check the belt for excessive wear, frayed cords etc.
If any defect has been found, replace the drive belt.
HINT:

- Cracks on the rib side of a belt are considered acceptable. If the missing chunks from the ribs are found on the belt, it should be replaced.
- After installing a belt, check that it fits properly in the ribbed grooves.
- Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.

POWER STEERING FLUID

SR05P-16

BLEEDING

1. CHECK FLUID LEVEL (See page SR-5)

2. JACK UP FRONT OF VEHICLE AND SUPPORT IT WITH STANDS

3. TURN STEERING WHEEL

With the engine stopped, turn the wheel slowly from lock to lock several times.

4. LOWER VEHICLE

5. START ENGINE

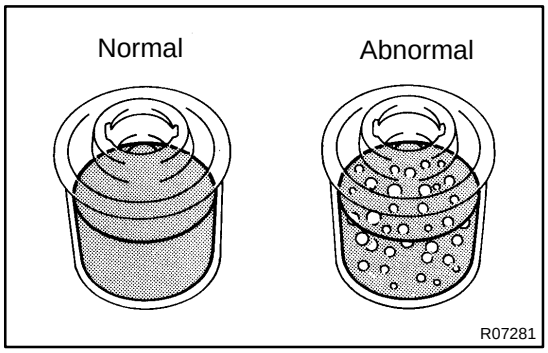
Run the engine at idle for a few minutes.

6. TURN STEERING WHEEL

(a) With the engine idling, turn the wheel to left or right full lock position and keep it there for 2 - 3 seconds, then turn the wheel to the opposite full lock position and keep it there for 2 - 3 seconds.

(b) Repeat (a) several times.

7. STOP ENGINE

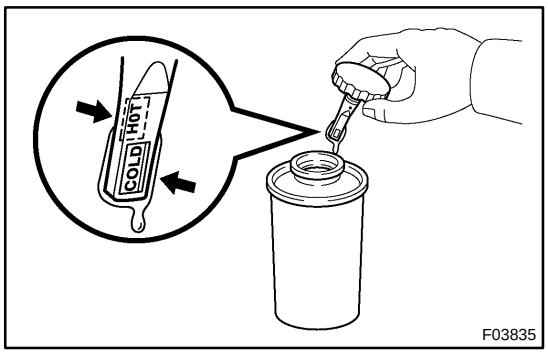


8. CHECK FOR FOAMING OR EMULSIFICATION

If the system has to be bled twice specifically because of foaming or emulsification, check for fluid leaks in the system.

9. CHECK FLUID LEVEL (See page SR-5)

SR05Q-18



INSPECTION

1. CHECK FLUID LEVEL

(a) Keep the vehicle level.

(b) With the engine stopped, check the fluid level in the oil reservoir.

If necessary, add fluid.

Fluid: ATF DEXRON® II or III

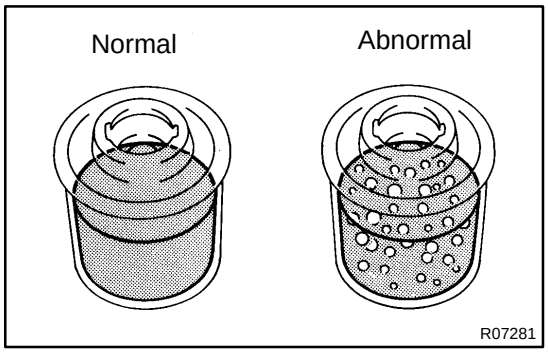
HINT:

Check that the fluid level is within the HOT LEVEL range on the reservoir. If the fluid is cold, check that it is within the COLD LEVEL range.

(c) Start the engine and run it at idle.

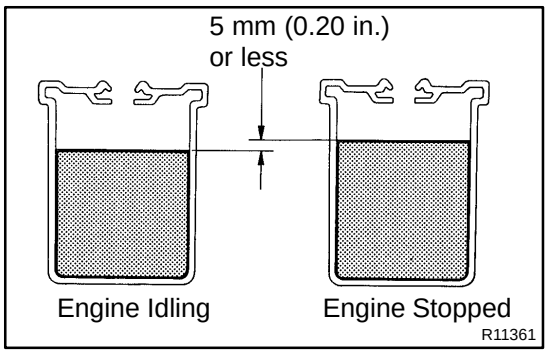
(d) Turn the steering wheel from lock to lock several times to boost fluid temperature.

Fluid temperature: 80˚C (176˚F)



(e) Check for foaming or emulsification.

If there is foaming or emulsification, bleed power steering system (See page SR-4).



(f) With the engine idling, measure the fluid level in the oil reservoir.

(g) Stop the engine.

(h) Wait a few minutes and remeasure the fluid level in the oil reservoir.

Maximum fluid level rise: 5 mm (0.20 in.)

If a problem is found, bleed power steering system (See page SR-4).

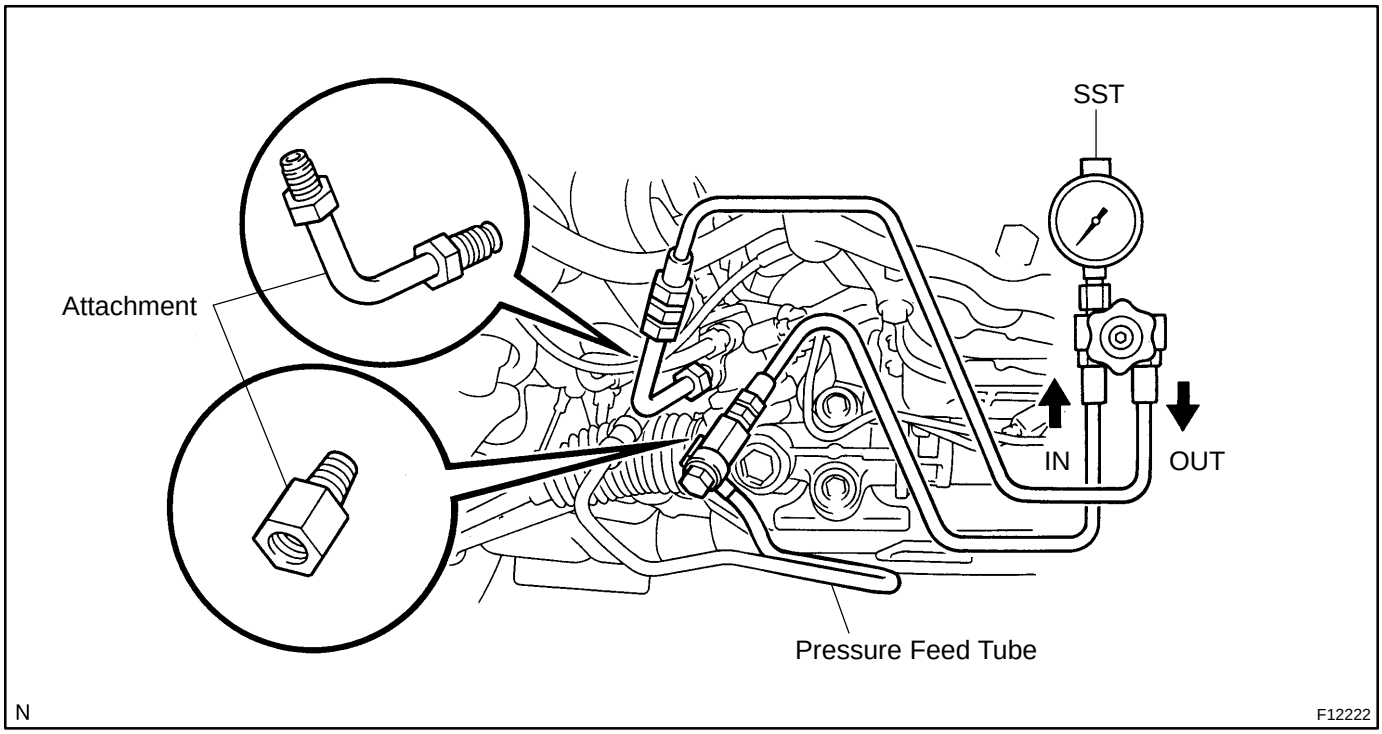
(i) Check the fluid level.

2. CHECK STEERING FLUID PRESSURE

(a) Disconnect the pressure feed tube from the PS gear (See page SR-41).

(b) Connect SST, as shown in the illustration below.
SST 09640-10010 (09641-01010, 09641-01030, 09641-01060)

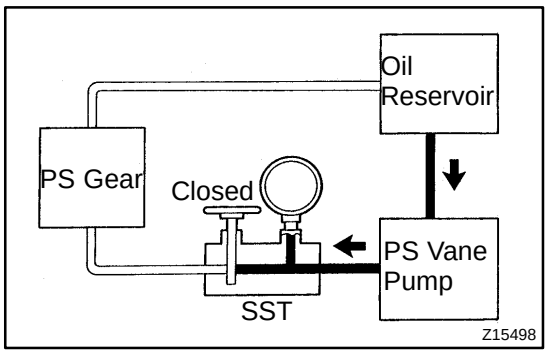
NOTICE:
Check that the valve of the SST is in the open position.



(c) Bleed the power steering system (See page SR-4).

(d) Start the engine and run it at idle.

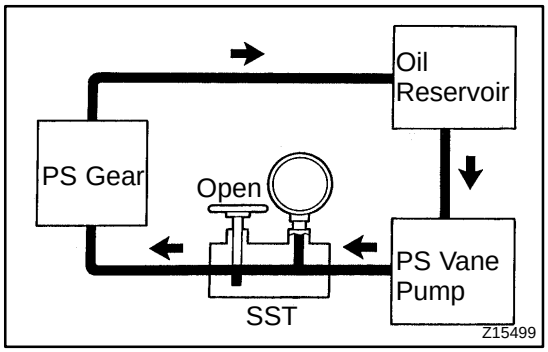
(e) Turn the steering wheel from lock to lock several times to boost fluid temperature.
Fluid temperature: 80 ˚C (176 ˚F)



(f) With the engine idling, close the valve of the SST and observe the reading on the SST.
Minimum fluid pressure:
6,900 kPa (70 kgf/cm^2, 996 psi)

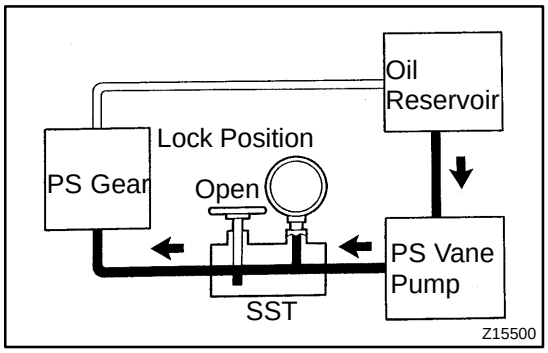
NOTICE:

- **Do not keep the valve closed for more than 10 seconds.**
- **Do not let the fluid temperature become too high.**



(g) With the engine idling, open the valve fully.
(h) Measure the fluid pressure at engine speeds of 1,000 rpm and 3,000 rpm.
Difference fluid pressure:
490 kPa (5 kgf/cm^2, 71 psi) or less

NOTICE:
Do not turn the steering wheel.

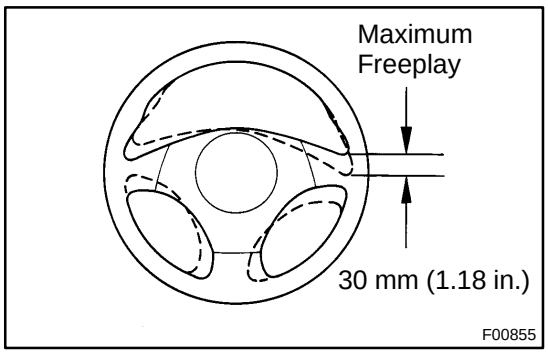


(i) With the engine idling and valve fully opened, turn the steering wheel to full lock position.
Minimum fluid pressure:
6,900 kPa (70 kgf/cm^2, 996 psi)

NOTICE:

- **Do not maintain lock position for more than 10 seconds.**
- **Do not let the fluid temperature become too high.**

(j) Disconnect the SST.
SST 09640-10010 (09641-01010, 09641-01030, 09641-01060)
(k) Connect the pressure feed tube to the PS gear (See page SR-57).
(l) Bleed the power steering system (See page SR-4).



STEERING WHEEL

SR05R-20

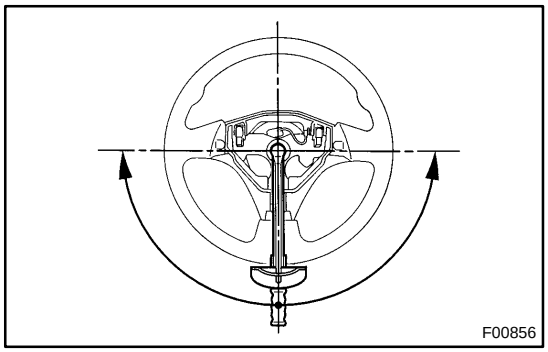
INSPECTION

1. CHECK STEERING WHEEL FREEPLAY

(a) Stop the vehicle and face the tires straight ahead.

(b) Rock the steering wheel gently up and down with a finger lightly, check the steering wheel freeplay.

Maximum freeplay: 30 mm (1.18 in.)



2. CHECK STEERING EFFORT

(a) Center the steering wheel.

(b) Remove the steering wheel pad (See page SR-13).

(c) Start the engine and run it at idle.

(d) Measure the steering effort in both directions.

Steering effort (Reference):

4.2 - 5.4 N·m (43 - 55 kgf·cm, 37 - 48 in.·lbf)

HINT:

Take the tire type, pressure and contact surface into consideration before making your diagnosis.

(e) Torque the steering wheel set nut.

Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

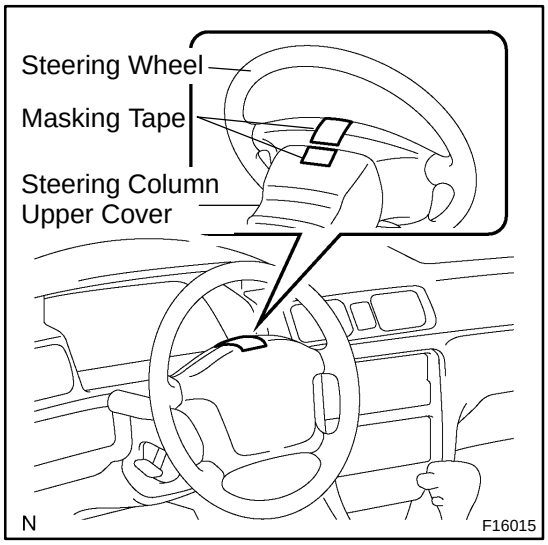
(f) Install the steering wheel pad (See page SR-25).

SR1HO-01

REPAIR PROCEDURES

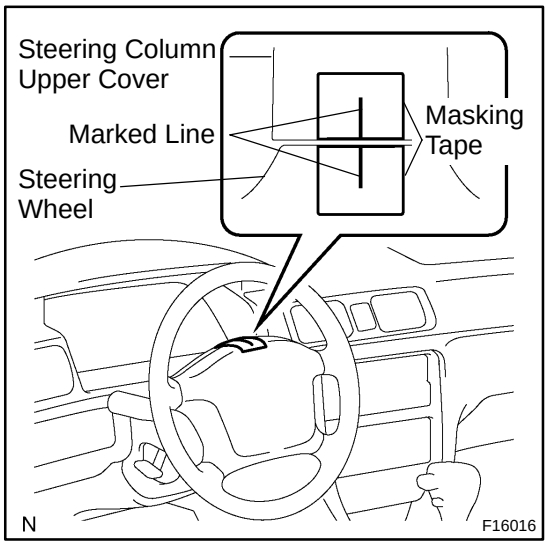
HINT:

This is the repair procedure for steering off center.



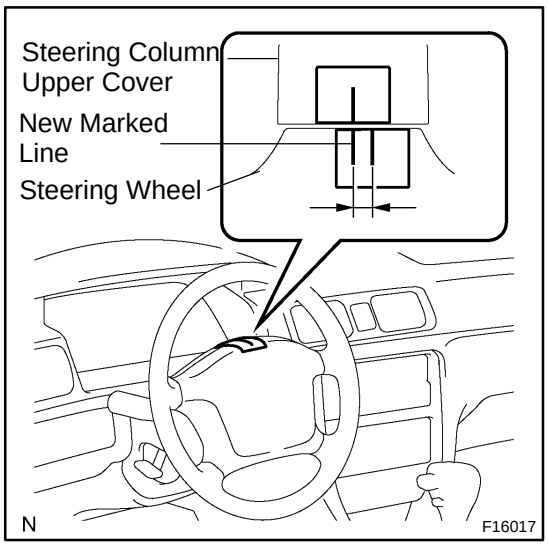
1. INSPECT STEERING WHEEL OFF CENTER

(a) Apply masking tape on the top center of the steering wheel and steering column upper cover.



(b) Drive the vehicle in a straight line for 100 meters at a constant speed of 35 mph (56 km/h), and hold the steering wheel to maintain the course.

(c) Draw a line on the masking tape as shown in the illustration.



(d) Turn the steering wheel to its straight position.

HINT:

Refer to the upper surface of the steering wheel, steering spoke and SRS airbag line for the straight position.

(e) Draw a new line on the masking tape of the steering wheel as shown in the illustration.

(f) Measure the distance between the 2 lines on the masking tape of the steering wheel.

(g) Convert the measured distance to steering angle.
Measured distance 1 mm (0.04 in.) = Steering angle approximately 1 deg.

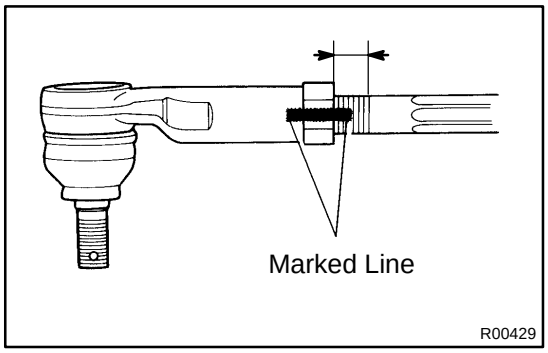
HINT:

Make a note of the steering angle.

2. ADJUST STEERING ANGLE

NOTICE:

The adjustment method for steering angle is different depending on the models. Check whether it is type A or B.

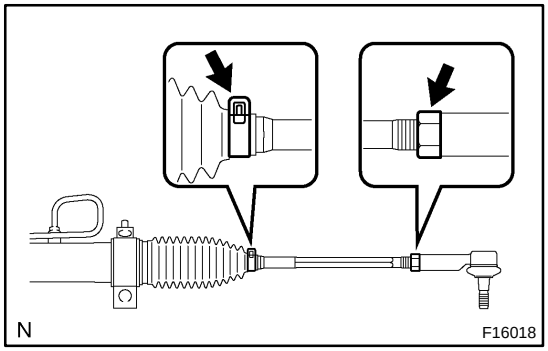


(a) Draw a line on the RH and LH tie rod and rack ends where it can easily be seen.

(b) Using a paper gauge, measure the distance from RH and LH tie rod ends to the rack end screws.

HINT:

- Measure the RH side and LH side.
- Make a note of the measured values.



(c) Remove the RH and LH boot clips from the rack boots.

(d) Loosen the RH and LH lock nuts.

(e) Turn the RH and LH rack end by the same amount (but in different directions) according to the steering angle.
1 turn 360 deg. of rack end (1.5 mm (0.059 in.) horizontal movement) = 12 deg. of steering angle

(f) Tighten the RH and LH lock nuts.
Torque: 56 N·m (570 kgf·cm, 41 ft·lbf)

NOTICE:

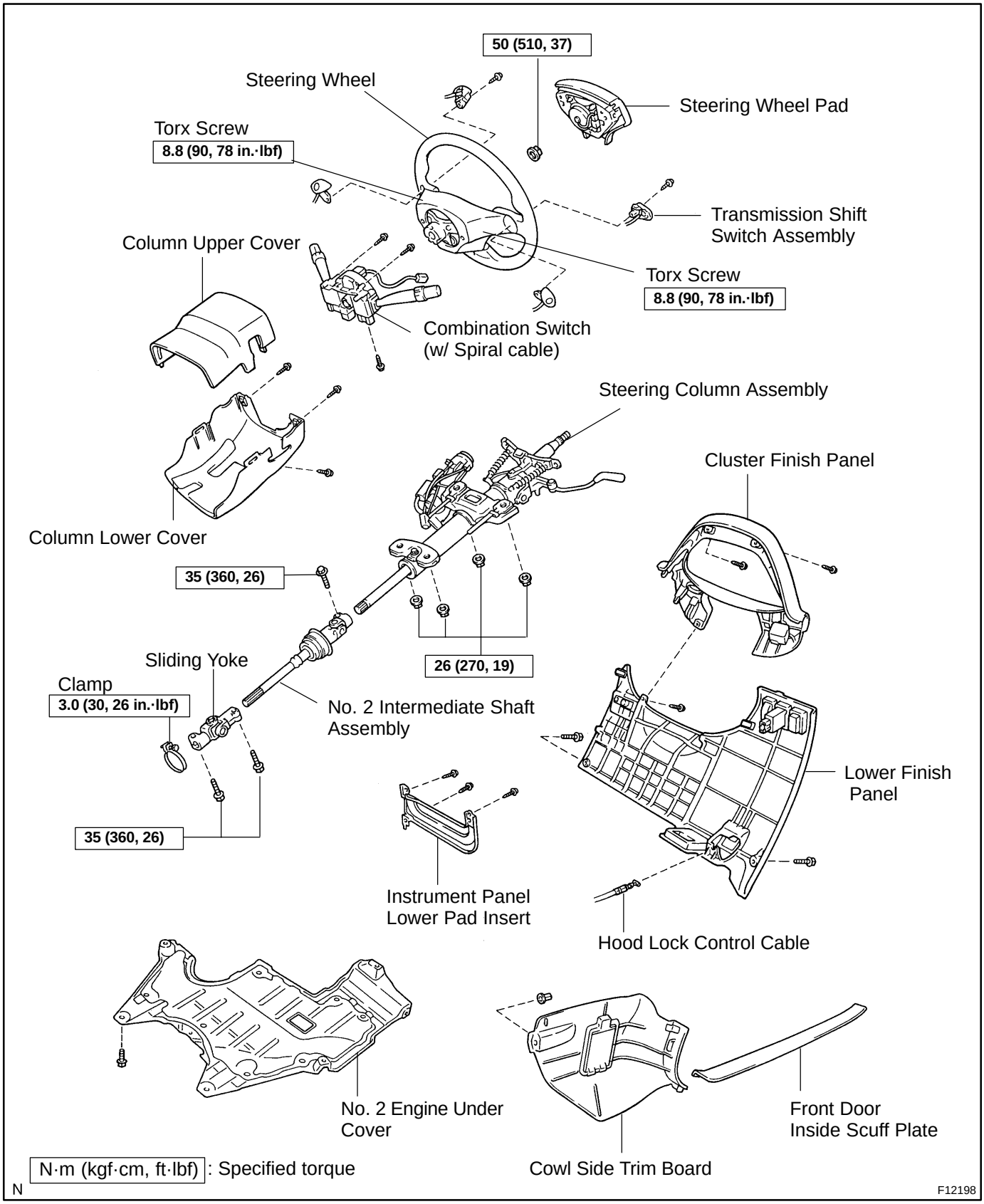
Make sure that the difference in length between RH and LH tie rod ends and rack end screws are within 1.5 mm (0.059 in.).

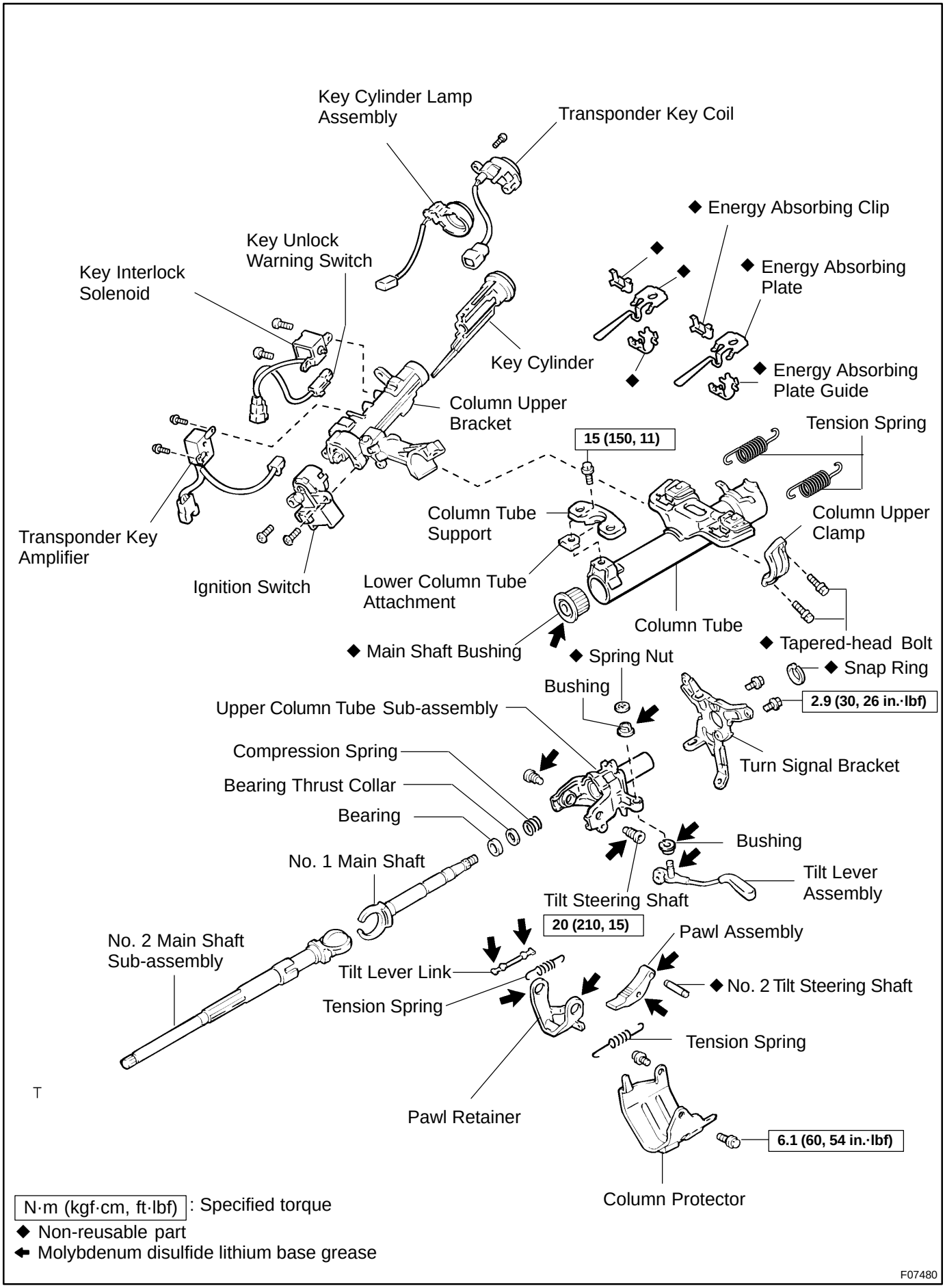
(g) Install the RH and LH boot clips.

TILT STEERING COLUMN

COMPONENTS

SR1BR-02




Key Cylinder Lamp Assembly
Transponder Key Coil
◆ Energy Absorbing Clip
Key Unlock Warning Switch
Key Interlock Solenoid
◆ Energy Absorbing Plate
Key Cylinder
◆ Energy Absorbing Plate Guide
Column Upper Bracket
15 (150, 11)
Tension Spring
Column Tube Support
Column Upper Clamp
Transponder Key Amplifier
Ignition Switch
Lower Column Tube Attachment
Column Tube
◆ Main Shaft Bushing
◆ Spring Nut
◆ Tapered-head Bolt
◆ Snap Ring
Bushing
2.9 (30, 26 in.·lbf)
Upper Column Tube Sub-assembly
Turn Signal Bracket
Compression Spring
Bearing Thrust Collar
Bearing
Bushing
No. 1 Main Shaft
Tilt Lever Assembly
Tilt Steering Shaft
20 (210, 15)
Pawl Assembly
No. 2 Main Shaft Sub-assembly
Tilt Lever Link
◆ No. 2 Tilt Steering Shaft
Tension Spring
Tension Spring
T
Pawl Retainer
6.1 (60, 54 in.·lbf)
Column Protector
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
Molybdenum disulfide lithium base grease
F07480

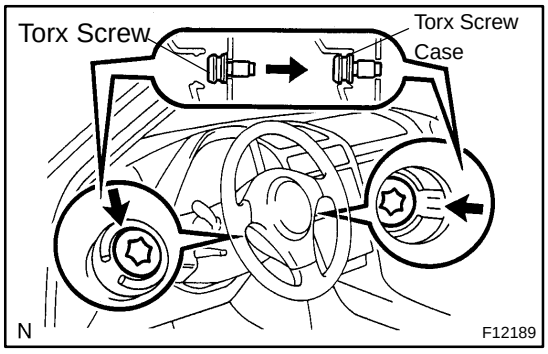
SR1BS-02

REMOVAL

1. REMOVE STEERING WHEEL PAD

NOTICE:

If the airbag connector is disconnected with the ignition switch at ON or ACC, DTCs will be recorded.



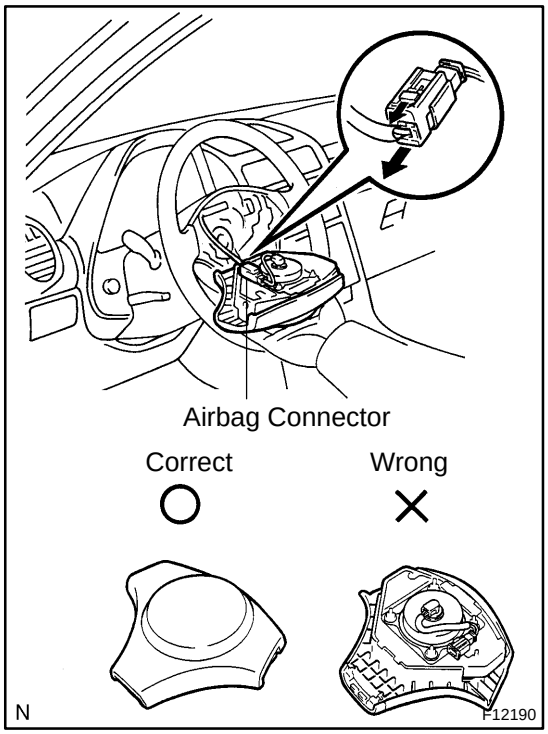
(a) Place the front wheels facing straight ahead.

(b) Remove the 2 steering wheel lower No. 2 covers.

(c) Using a torx socket wrench, loosen the 2 torx screws.

HINT:

Loosen the 2 screws until the groove along the screw circumference catches on the screw case.



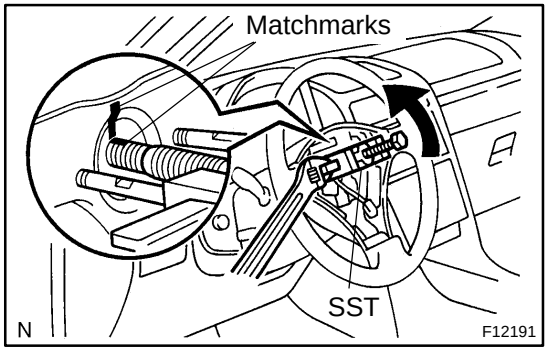
(d) Pull out the wheel pad from the steering wheel and disconnect the airbag connector.

CAUTION:

- **When storing the wheel pad, keep the upper surface of the pad facing upward.**
- **Never disassemble the wheel pad.**

NOTICE:

When removing the wheel pad, take care not to pull the airbag wire harness.



2. REMOVE STEERING WHEEL

(a) Disconnect the connector.

(b) Remove the steering wheel set nut.

(c) Place matchmarks on the steering wheel and main shaft assembly.

(d) Using SST, remove the wheel.

SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)

3. REMOVE FRONT DOOR INSIDE SCUFF PLATE AND COWL SIDE TRIM BOARD

(a) Remove the front door inside scuff plate.

(b) Remove the clip and cowl side trim board.

4. REMOVE LOWER FINISH PANEL

(a) Remove the 3 screws.

(b) Disconnect the connectors and remove the lower finish panel.

(c) Disconnect the hood lock control cable.

5. REMOVE CLUSTER FINISH PANEL

(a) Remove the 2 screws.

(b) Disconnect the connector and remove the cluster finish panel.

6. REMOVE COLUMN UPPER AND LOWER COVERS

(a) Remove the 3 screws and column lower cover.

(b) Remove the column upper cover.

7. REMOVE COMBINATION SWITCH WITH SPIRAL CABLE

(a) Disconnect the connectors.

(b) Disconnect the airbag connector.

(c) Remove the 3 screws and combination switch.

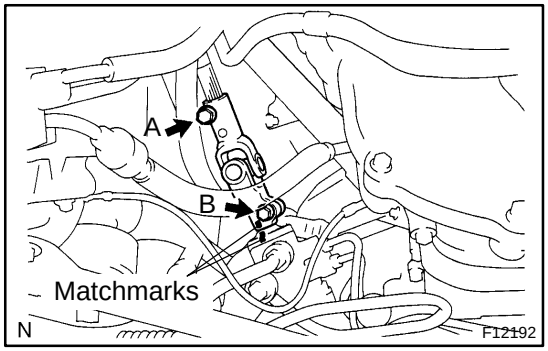
8. REMOVE SPIRAL CABLE

NOTICE:

Do not disassemble the cable or apply oil to it.

9. REMOVE UNDER COVER

Remove the 5 screws, 2 nuts and under cover.



10. DISCONNECT SLIDING YOKE

(a) Place matchmarks on the sliding yoke and control valve shaft.

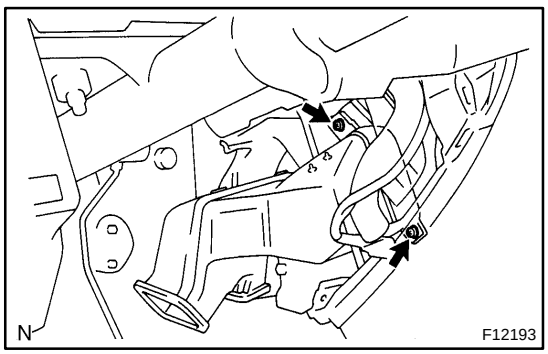
(b) Loosen the bolt ”A” and remove the bolt ”B”.

(c) Disconnect the sliding yoke.

11. DISCONNECT BRAKE PEDAL RETURN SPRING

12. REMOVE INSTRUMENT PANEL LOWER PAD INSERT

Remove the 3 bolts and instrument panel lower pad insert.



13. DISCONNECT HEATER TO REGISTER DUCT

Remove the 2 screws and disconnect heater to register duct.

14. REMOVE STEERING COLUMN ASSEMBLY

(a) Loosen the clamp.

(b) Disconnect the connectors.

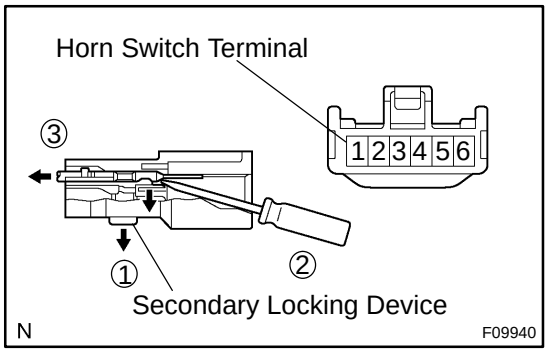
(c) Remove the 4 nuts and steering column assembly.

15. REMOVE SLIDING YOKE

Remove the bolt "A" and sliding yoke.

16. REMOVE NO. 2 INTERMEDIATE SHAFT ASSEMBLY

Remove the bolt and No. 2 intermediate shaft assembly.



17. REMOVE TRANSMISSION SHIFT SWITCH ASSEMBLY FROM STEERING WHEEL

(a) Remove the 2 screws.

(b) Disengage the secondary locking device of the connector.

(c) Release the locking lug of the terminal 1 (horn switch terminal), and pull the terminal out of the rear.

(d) Remove the transmission shift switch assembly.

SR0U8-03

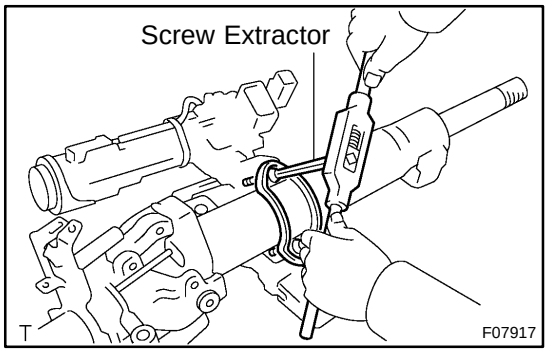
DISASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. REMOVE TRANSPONDER KEY COIL AND KEY CYLINDER LAMP ASSEMBLY

Remove the screw, transponder key coil and key cylinder lamp assembly.



2. REMOVE COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

(a) Using a centering punch, mark the center of the 2 tapered-head bolts.

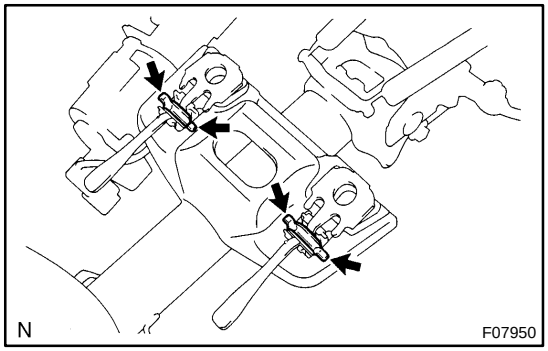
(b) Using a 3 - 4 mm (0.12 - 0.16 in.) drill, drill into the 2 bolts.

(c) Using a screw extractor, remove the 2 bolts, column upper bracket and column upper clamp.

3. REMOVE COLUMN TUBE SUPPORT

(a) Remove the bolt and column tube support with the lower column tube attachment.

(b) Remove the lower column tube attachment from the column tube support.



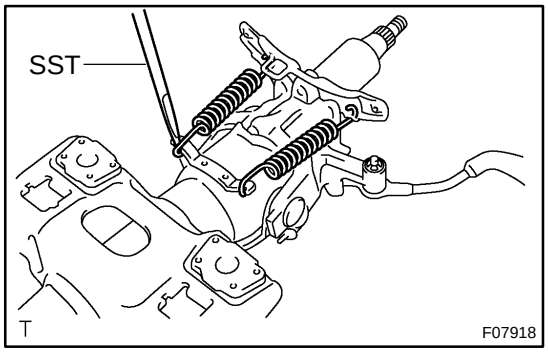
4. REMOVE 2 ENERGY ABSORBING PLATES

(a) Using pliers, remove the 2 energy absorbing clips.

(b) Remove the 2 energy absorbing plates and 2 energy absorbing plate guides.

5. REMOVE COLUMN PROTECTOR

Remove the 2 bolts and column protector.



6. REMOVE 2 TENSION SPRINGS

Using SST, remove the 2 tension springs.

SST 09703-30010

7. REMOVE TURN SIGNAL BRACKET

(a) Using pliers, remove the tension spring.

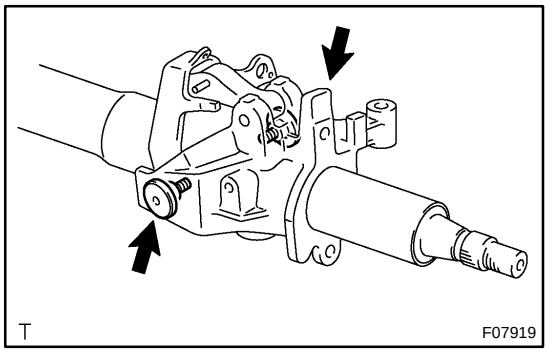
(b) Remove the 2 bolts and turn signal bracket.

8. REMOVE TILT LEVER ASSEMBLY

(a) Remove the tension spring.

(b) Remove the spring nut, tilt lever assembly and tilt lever link.

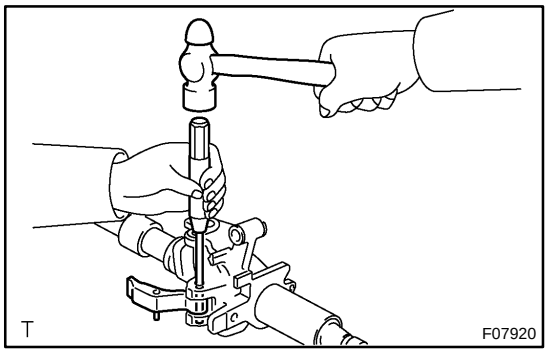
(c) Remove the 2 bushings from the upper column tube sub-assembly.



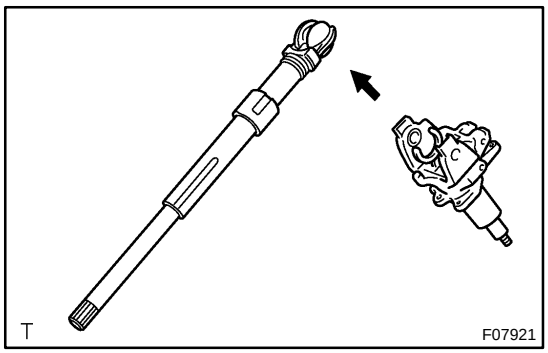
9. REMOVE MAIN SHAFT ASSEMBLY WITH UPPER COLUMN TUBE SUB-ASSEMBLY

(a) Using a hexagon wrench (6 mm), remove the 2 tilt steering shafts.

(b) Remove the pawl retainer and main shaft assembly with the upper column tube sub-assembly.

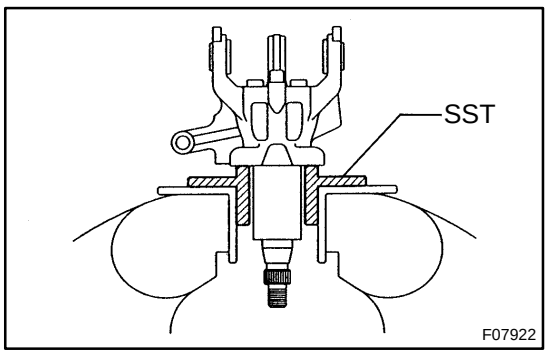


(c) Using a pin punch (5 mm) and a hammer, remove the No. 2 tilt steering shaft and pawl assembly.

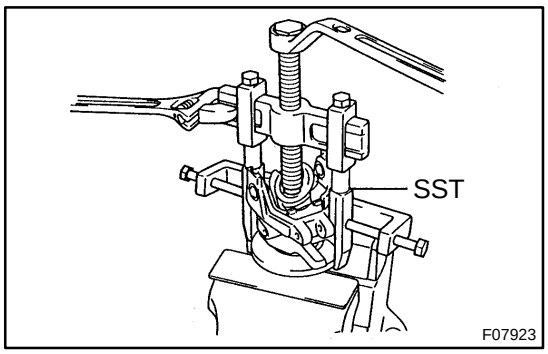


10. REMOVE UPPER COLUMN TUBE SUB-ASSEMBLY FROM MAIN SHAFT ASSEMBLY

(a) Bent the joint of the main shaft at right angles, leaving the cross ball in the No. 2 main shaft sub-assembly, separate the main shaft into the No. 1 main shaft with upper column tube sub-assembly and No. 2 main shaft sub-assembly.



(b) Secure the No. 1 main shaft with upper column tube sub-assembly and SST in a vise.
SST 09316-6001 1 (09316-00051)



(c) Using SST, compress the spring of the upper column tube sub-assembly .

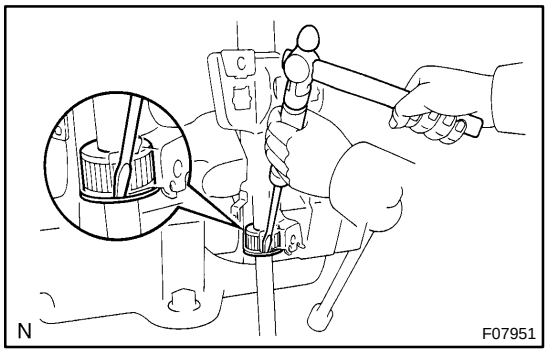
SST 09950-4001 1 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04061, 09958-0401 1)

NOTICE:

Do not overtighten the SST.

(d) Using snap ring expander, remove the snap ring and No. 1 main shaft.

11. REMOVE COMPRESSION SPRING, BEARING THRUST COLLAR AND BEARING

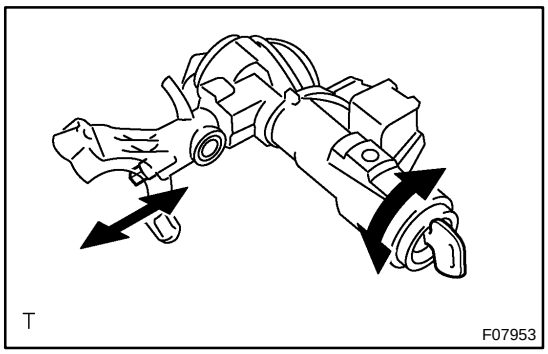


12. REMOVE MAIN SHAFT BUSHING

Using a screwdriver, tap out the main shaft bushing.

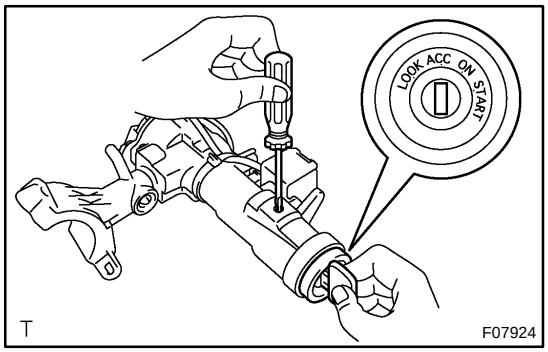
SR0LE-07

INSPECTION



1. INSPECT STEERING LOCK OPERATION

Check that the steering lock mechanism operates properly.



2. IF NECESSARY, REPLACE KEY CYLINDER

(a) Place the ignition key at the ACC position.

(b) Push down the stop pin with a screwdriver, and pull out the cylinder.

(c) Install a new cylinder.

HINT:

Make sure the key is at the ACC position.

3. INSPECT IGNITION SWITCH (See page BE-21)

4. IF NECESSARY, REPLACE IGNITION SWITCH

(a) Remove the 2 screws and ignition switch from the column upper bracket.

(b) Install a new ignition switch with the 2 screws.

5. INSPECT KEY UNLOCK WARNING SWITCH (See page BE-21)

6. IF NECESSARY, REPLACE KEY UNLOCK WARNING SWITCH

(a) Slide the key unlock waring switch out of the column upper bracket.

(b) Slide a new key unlock waring switch in the column upper bracket.

7. INSPECT KEY INTERLOCK SOLENOID (See page AT-18)

8. IF NECESSARY, REPLACE KEY INTERLOCK SOLENOID

(a) Remove the 2 screws and key interlock solenoid.

(b) Install a new key interlock solenoid with the 2 screws.

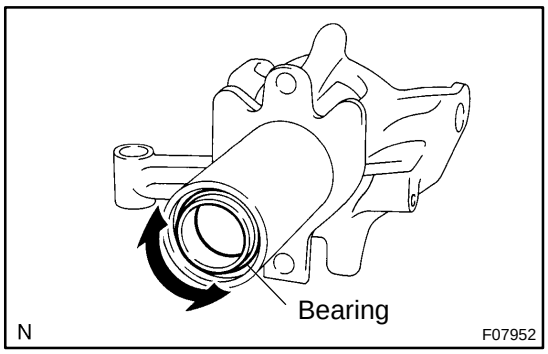
9. INSPECT TRANSPONDER KEY COIL (See page BE-230)

10. IF NECESSARY, REPLACE TRANSPONDER KEY COIL

11. IF NECESSARY, REPLACE TRANSPONDER KEY AMPLIFIER

(a) Remove the 2 screws and transponder key amplifier.

(b) Install a new transponder key amplifier with the 2 screws.



12. INSPECT BEARING

Check the bearing rotation condition and check for abnormal noise.

If the bearing is worn or damaged, replace the upper column tube sub-assembly.

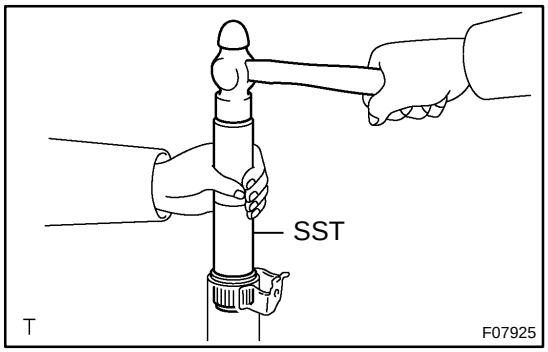
SR0U9-03

REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. COAT PARTS INDICATED BY ARROWS WITH MOLYBDENUM DISULFIDE LITHIUM BASE GREASE
(See page SR-1 1)



2. INSTALL MAIN SHAFT BUSHING

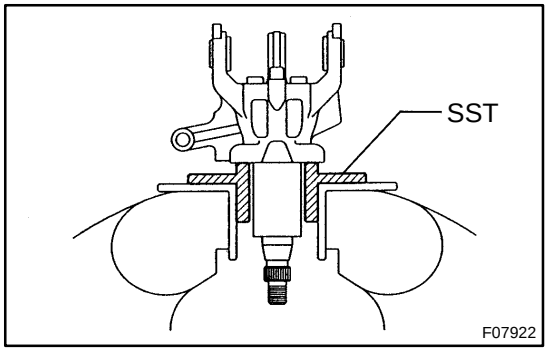
(a) Coat a new main shaft bushing with molybdenum disulfide lithium base grease.

(b) Using SST and a hammer, tap in the main shaft bushing.
SST 09612-2201 1

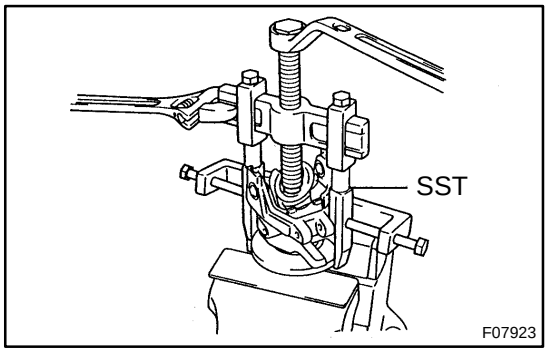
3. INSTALL COMPRESSION SPRING, BEARING THRUST COLLAR AND BEARING

4. INSTALL UPPER COLUMN TUBE SUB-ASSEMBLY TO MAIN SHAFT ASSEMBLY

(a) Temporarily install the upper column tube sub-assembly to the No. 1 main shaft.



(b) Secure the No. 1 main shaft with upper column tube sub-assembly and SST in a vise.
SST 09316-6001 1 (09316-00051)

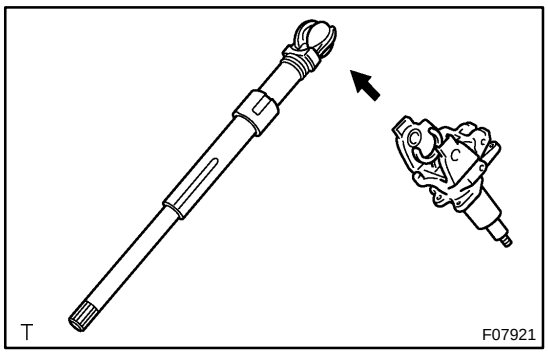


(c) Using SST, compress the spring of the upper column tube sub-assembly .
SST 09950-4001 1 (09951-04010, 09952-04010, 09953-04020, 09954-04010, 09955-04061, 09958-0401 1)

NOTICE:

Do not overtighten the SST.

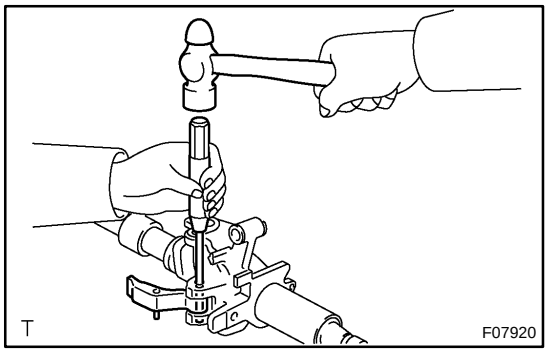
(d) Using a snap ring expander, install a new snap ring and No. 1 main shaft.



(e) Assemble the No. 1 main shaft with upper column tube sub-assembly and No. 2 main shaft sub-assembly.

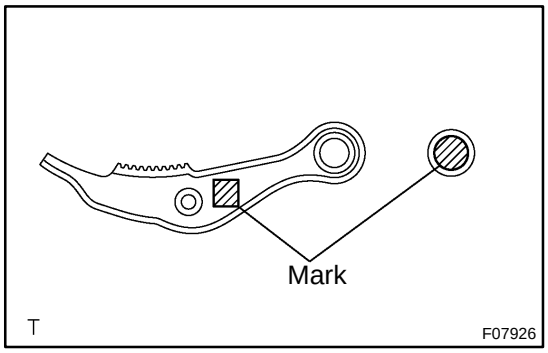
NOTICE:

Do not bend the universal joint of the shaft more than 20˚.



5. INSTALL MAIN SHAFT ASSEMBLY WITH UPPER COLUMN TUBE SUB-ASSEMBLY

(a) Using a pin punch (5 mm) and a hammer, install the pawl assembly with a new No. 2 tilt steering shaft.

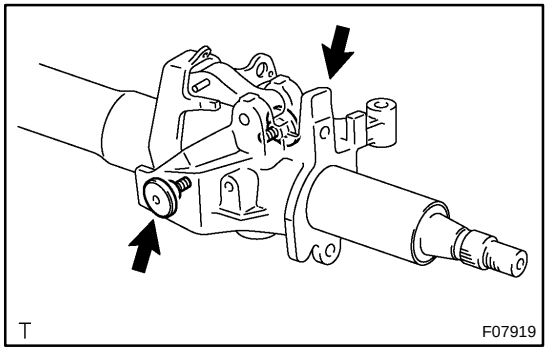


HINT:

Install a new No. 2 tilt steering shaft with the one having the mark corresponding to the mark stamped on the pawl assembly.

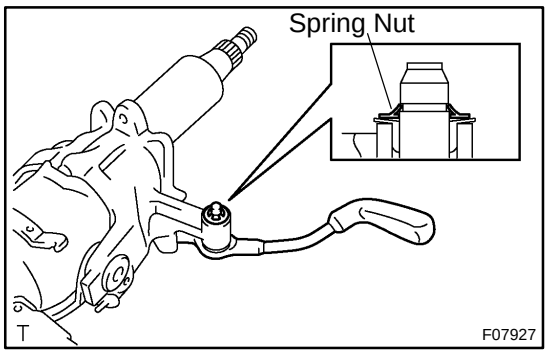
Pawl assembly mark	No. 2 tilt steering shaft color	No. 2 tilt steering shaft part number
1	White	45856-26010
2	Yellow	45856-26020
3	Black	45856-26030

(b) Install the main shaft assembly with the upper column tube sub-assembly and pawl retainer.



(c) Using a hexagon wrench (6 mm), install the 2 tilt steering shafts.

Torque: 20 N·m (210 kgf·cm, 15 ft·lbf)



6. INSTALL TILT LEVER ASSEMBLY

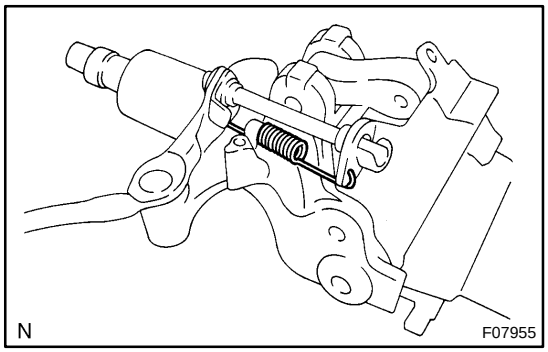
(a) Install the 2 bushings to the upper column tube sub-assembly.

(b) Install the tilt lever assembly with a new spring nut.

NOTICE:

Make sure that the spring nut is installed facing in the correct direction.

(c) Install the tilt lever link.



(d) Install the tension spring.

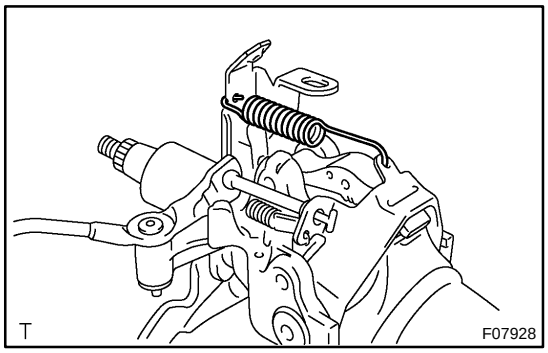
NOTICE:

Make sure that the tension spring is installed facing in the correct direction.

7. INSTALL TURN SIGNAL BRACKET

(a) Install the turn signal bracket with the 2 bolts.

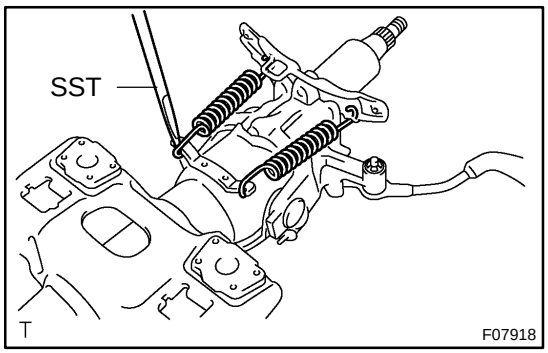
Torque: 2.9 N·m (30 kgf·cm, 26 in.·lbf)



(b) Using pliers, install the tension spring.

NOTICE:

Make sure that the tension spring is installed facing in the correct direction.



8. INSTALL 2 TENSION SPRINGS

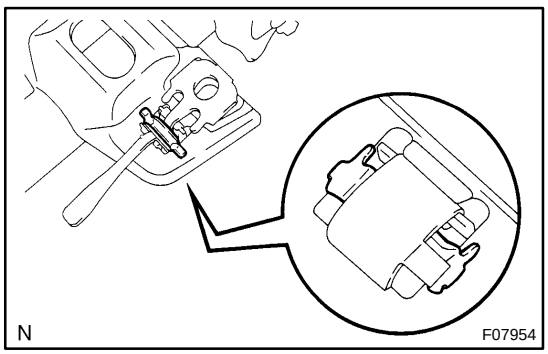
Using SST, install the 2 tension springs.

SST 09703-30010

9. INSTALL COLUMN PROTECTOR

Install the column protector with the 2 bolts.

Torque: 6.1 N·m (60 kgf·cm, 52 in.·lbf)



10. INSTALL 2 ENERGY ABSORBING PLATES

(a) Install the 2 new energy absorbing plate guides and energy absorbing plates.

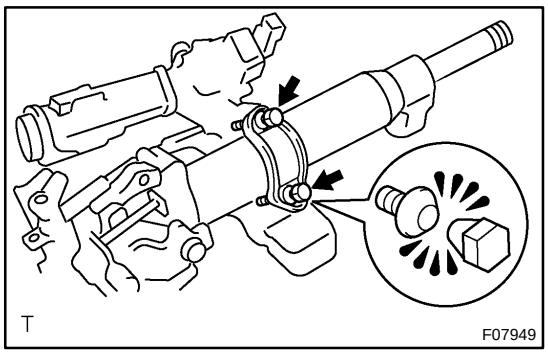
(b) Install the 2 new energy absorbing clips.

11. INSTALL COLUMN TUBE SUPPORT

(a) Install the lower column tube attachment to the column tube support.

(b) Install the column tube support with the lower column tube attachment with the bolt.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)



12. INSTALL COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

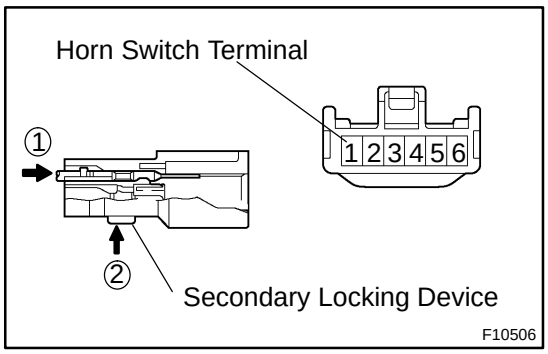
(a) Install the column upper bracket and column upper clamp with 2 new tapered-head bolts.

(b) Tighten the 2 tapered-head bolts until the bolt heads break off.

13. INSTALL TRANSPONDER KEY COIL AND KEY CYLINDER LAMP ASSEMBLY

Install the key cylinder lamp assembly and transponder key coil with the screw.

SR1BT-02



INSTALLATION

1. INSTALL TRANSMISSION SHIFT SWITCH ASSEMBLY TO STEERING WHEEL

(a) Install the transmission shift switch assembly.
(b) Push the terminal 1 (horn switch terminal) into the connector.
(c) Engage the secondary locking device of the connector.
(d) Install the 2 screws.

2. INSTALL NO. 2 INTERMEDIATE SHAFT ASSEMBLY

Install the No. 2 intermediate shaft assembly with the bolt.

Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)

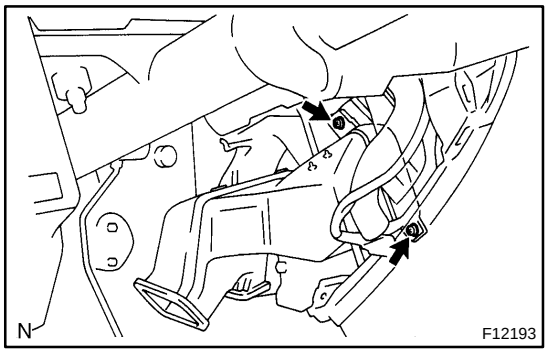
3. INSTALL SLIDING YOKE

Temporarily install sliding yoke with the bolt ”A”.

4. INSTALL STEERING COLUMN ASSEMBLY

Install the steering column assembly with the 4 nuts.

Torque: 26 N·m (270 kgf·cm, 19 ft·lbf)



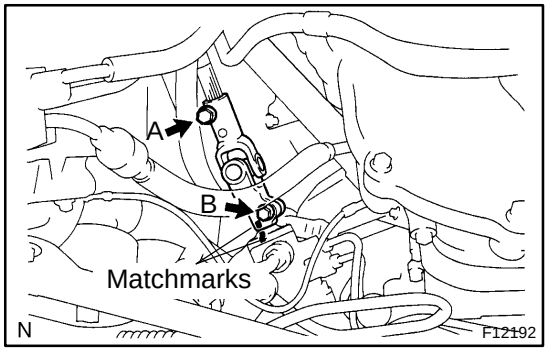
5. CONNECT HEATER TO REGISTER DUCT

Connect the heater to register duct with the 2 screws.

6. INSTALL INSTRUMENT PANEL LOWER PAD INSERT

Install the instrument panel lower pad insert with the 3 bolts.

7. CONNECT BRAKE PEDAL RETURN SPRING



8. CONNECT SLIDING YOKE

(a) Align the matchmarks on the sliding yoke and control valve shaft.
(b) Install the bolt ”A” and ”B”.

Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)

9. INSTALL NO. 2 ENGINE UNDER COVER

Install the No. 2 engine under cover with the 5 screws.

10. INSTALL SPIRAL CABLE

11. INSTALL COMBINATION SWITCH WITH SPIRAL CABLE

(a) Install the combination switch with the 3 screws.
(b) Connect the airbag connector.
(c) Connect the connectors.

12. INSTALL COLUMN UPPER AND LOWER COVERS

(a) Install the column upper cover.
(b) Install the column lower cover with the 3 screws.

13. INSTALL CLUSTER FINISH PANEL

(a) Connect the connector and install the cluster finish panel.
(b) Install the 2 screws.

14. INSTALL LOWER FINISH PANEL

(a) Connect the hood lock control cable to the lower finish panel.

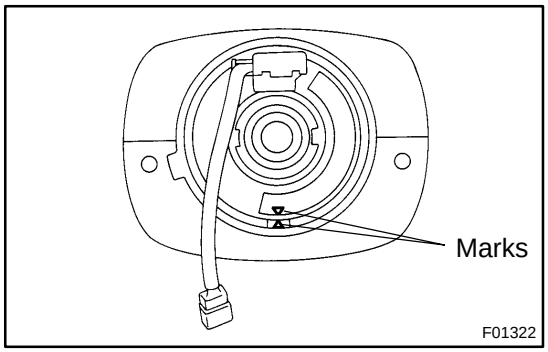
(b) Connect the connectors and install the lower finish panel.

(c) Install the 3 screws.

15. INSTALL FRONT DOOR INSIDE SCUFF PLATE AND COWL SIDE TRIM BOARD

(a) Install the cowl side trim board with the clip.

(b) Install the front door inside scuff plate.



16. CENTER SPIRAL CABLE

(a) Check that the front wheels are facing straight ahead.

(b) Turn the cable counterclockwise by hand until it becomes harder to turn.

(c) Then rotate the cable clockwise about 2.5 turns to align the marks.

HINT:

The cable will rotate about 2.5 turns to either left or right of the center.

17. INSTALL STEERING WHEEL

(a) Align the matchmarks on the steering wheel and main shaft assembly.

(b) Install the steering wheel set nut.

Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

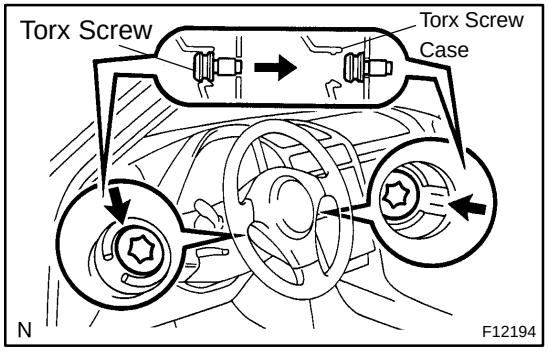
(c) Connect the connector.

18. INSTALL STEERING WHEEL PAD

NOTICE:

- **Never use airbag parts from another vehicle. When replacing parts, replace with new ones.**
- **Make sure the wheel pad is installed with the specified torque.**
- **If the wheel pad has been dropped, or there are cracks, dents or other defects on the case or connector, replace the wheel pad with a new one.**
- **When installing the wheel pad, take care that the wirings do not interfere with other parts and that they are not pinched between other parts.**

(a) Connect the airbag connector.



(b) Install the steering wheel pad after confirming that the circumference groove of the torx screws is caught on the screw case.

(c) Using a torx socket wrench, torque the 2 screws.

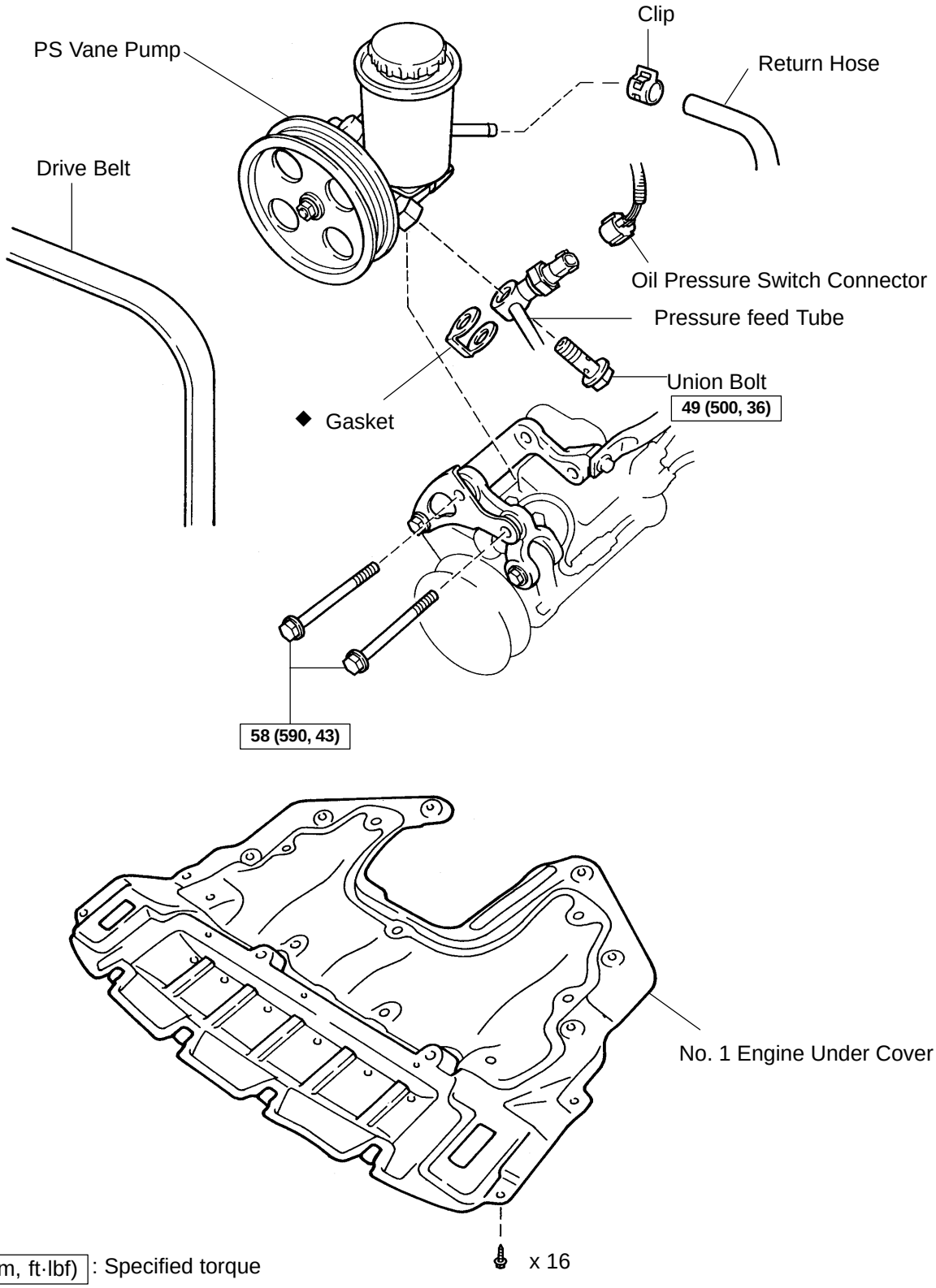
Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)

19. CHECK STEERING WHEEL CENTER POINT

POWER STEERING VANE PUMP

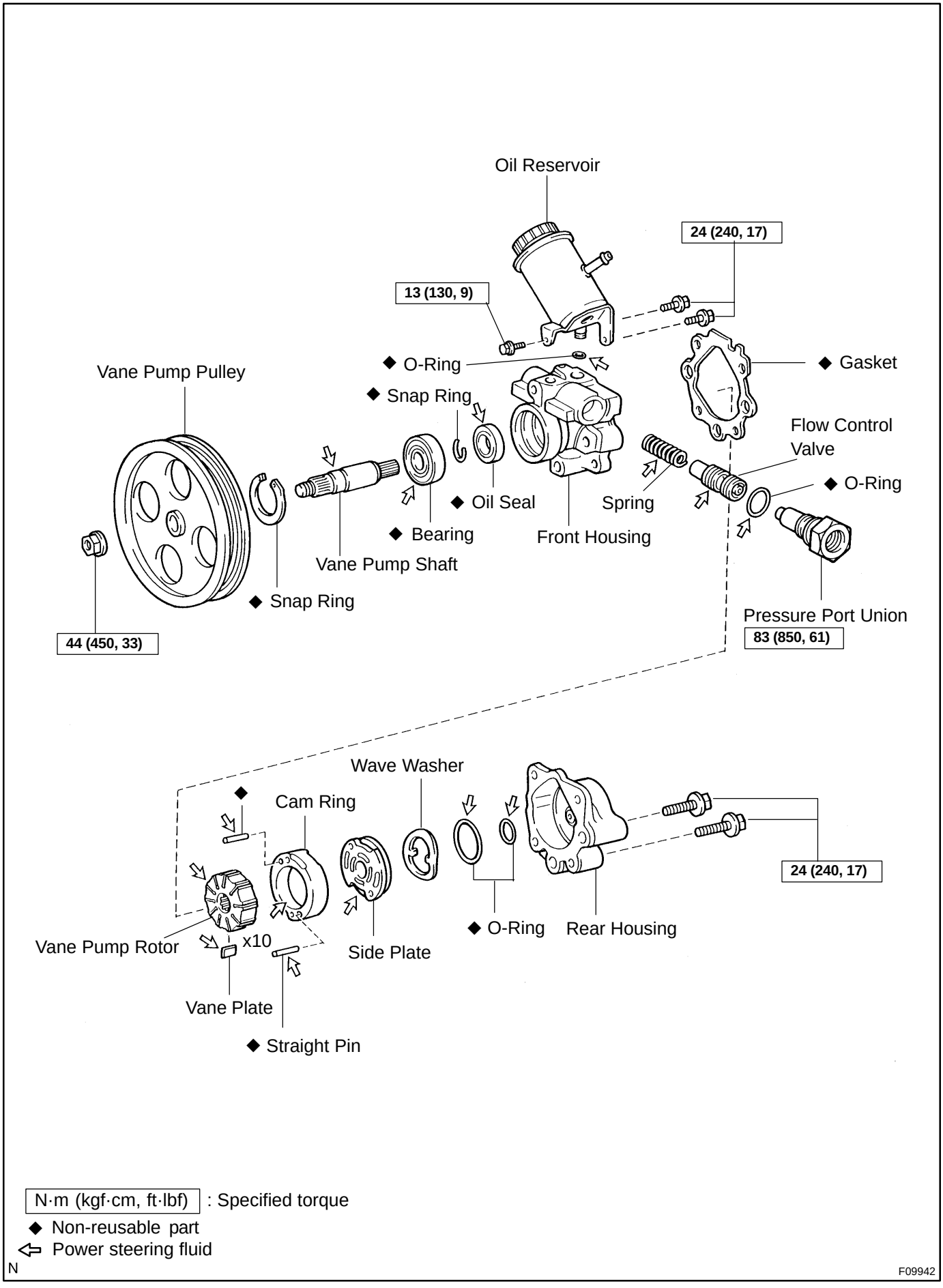
SR1BU-02

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

F12207

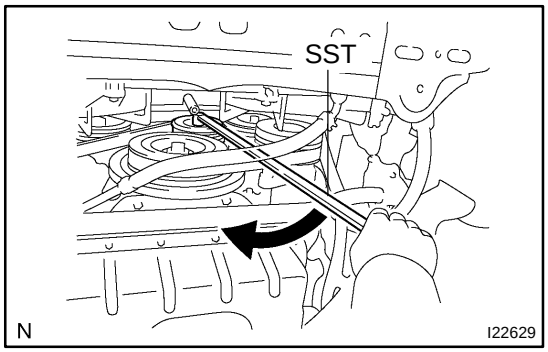

Oil Reservoir
24 (240, 17)
13 (130, 9)
◆ O-Ring
◆ Gasket
Vane Pump Pulley
◆ Snap Ring
Flow Control Valve
◆ O-Ring
◆ Oil Seal
Spring
◆ Bearing
Front Housing
Vane Pump Shaft
◆ Snap Ring
Pressure Port Union
83 (850, 61)
44 (450, 33)
Wave Washer
◆
Cam Ring
24 (240, 17)
◆ O-Ring
Rear Housing
Vane Pump Rotor
x10
Side Plate
Vane Plate
◆ Straight Pin
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
⇦ Power steering fluid
N
F09942

SR1BV-03

REMOVAL

1. REMOVE NO. 1 ENGINE UNDER COVER

Remove the 16 screws, clip and No. 1 engine under cover.



2. REMOVE DRIVE BELT

Using SST, loosen the drive belt tension by turning the drive belt tensioner clockwise from the bottom side, and remove the drive belt.

SST 09216-00041

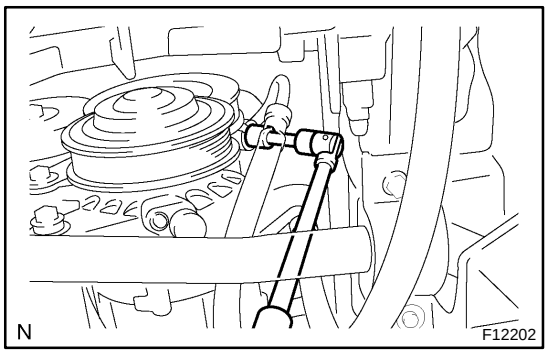
3. DISCONNECT OIL PRESSURE SWITCH CONNECTOR

4. DISCONNECT RETURN HOSE

Remove the clip and disconnect the return hose.

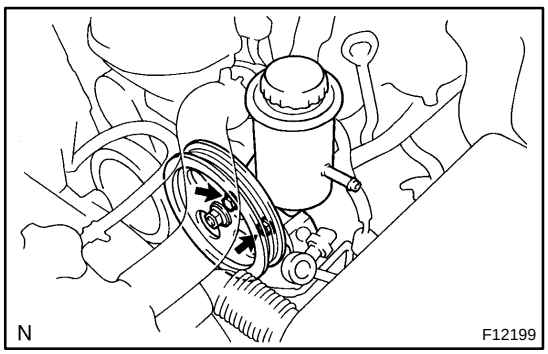
NOTICE:

Take care not to spill fluid on the drive belt and oil pressure switch connector.



5. DISCONNECT PRESSURE FEED TUBE

Remove the union bolt and gasket and disconnect the pressure feed tube.

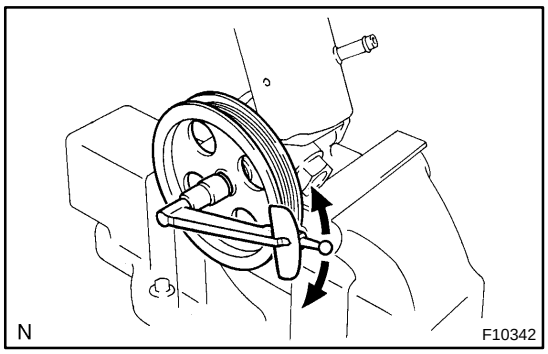


6. REMOVE PS VANE PUMP ASSEMBLY

Remove the 2 bolts and PS vane pump assembly.

SR1BW-02

DISASSEMBLY



NOTICE:

When using a vise, do not overtighten it.

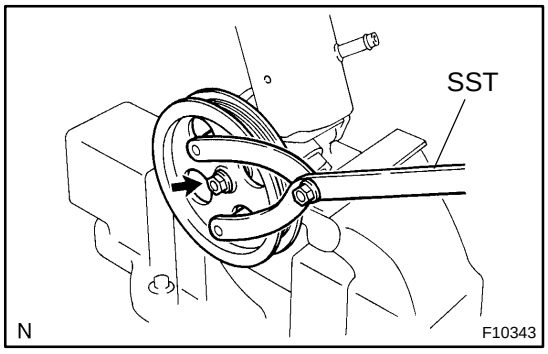
1. MEASURE PS VANE PUMP ROTATING TORQUE

(a) Check that the pump rotates smoothly without abnormal noise.

(b) Using a torque wrench, check the pump rotating torque.

Rotating torque:

0.25 N·m (2.5 kgf·cm, 2.2 in.·lbf) or less



2. REMOVE VANE PUMP PULLEY

Using SST, stop the pulley rotating and remove the pulley set nut.

SST 09960-10010 (09962-01000, 09963-01000)

3. REMOVE OIL RESERVOIR

(a) Remove the 3 bolts and oil reservoir.

(b) Remove the O-ring from the oil reservoir.

4. REMOVE PRESSURE PORT UNION, FLOW CONTROL VALVE AND SPRING

(a) Remove the pressure port union, flow control valve and spring.

(b) Remove the O-ring from the pressure port union.

5. REMOVE REAR HOUSING

(a) Remove the 2 bolts and rear housing.

(b) Remove the 2 O-rings from the rear housing.

6. REMOVE WAVE WASHER

7. REMOVE SIDE PLATE

8. REMOVE CAM RING, 10 VANE PLATES AND VANE PUMP ROTOR

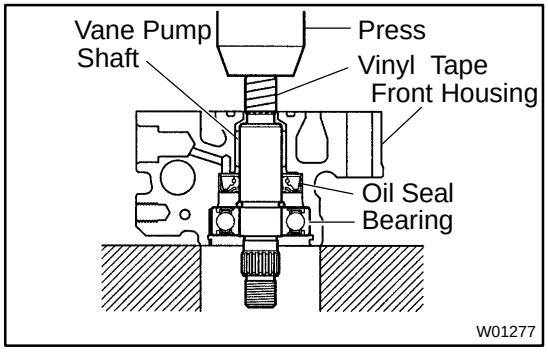
NOTICE:

Be careful not to drop the vane plate.

9. REMOVE 2 STRAIGHT PINS

Remove the 2 straight pins from the front housing.

10. REMOVE GASKET



11. REMOVE VANE PUMP SHAFT WITH BEARING

(a) Using snap ring pliers, remove the snap ring from the front housing.

(b) To prevent oil seal lip damage, wind vinyl tape on the serrated part of the vane pump shaft.

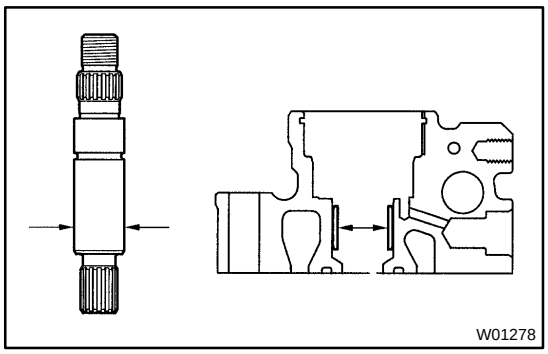
(c) Press out the vane pump shaft with the bearing.

NOTICE:

Be careful not to damage the oil seal lip.

SR1BX-02

INSPECTION



NOTICE:

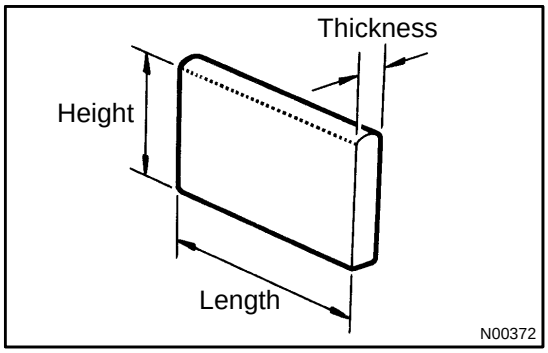
When using a vise, do not overtighten it.

1. CHECK OIL CLEARANCE BETWEEN VANE PUMP SHAFT AND BUSHING

Using a micrometer and caliper gauge, measure the oil clearance.

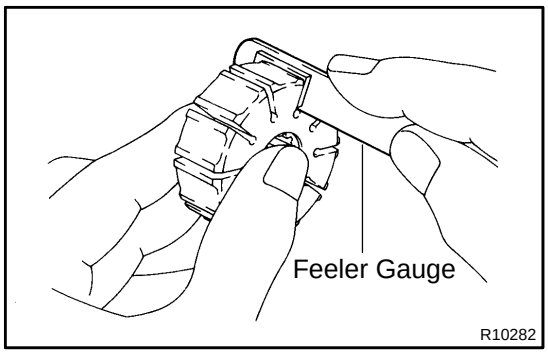
Standard clearance:
0.03 - 0.05 mm (0.0012 - 0.0020 in.)
Maximum clearance: 0.07 mm (0.0028 in.)

If it is more than the maximum, replace the vane pump shaft and front housing.

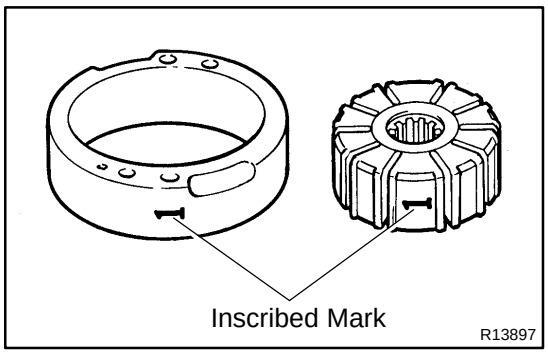


2. INSPECT VANE PUMP ROTOR AND VANE PLATES

(a) Using a micrometer, measure the height, thickness and length of the 10 vane plates.
Minimum height: 8.6 mm (0.339 in.)
Minimum thickness: 1.40 mm (0.0551 in.)
Minimum length: 14.99 mm (0.5902 in.)



(b) Using a feeler gauge, measure the clearance between the vane pump rotor groove and vane plate.
Maximum clearance: 0.033 mm (0.0013 in.)



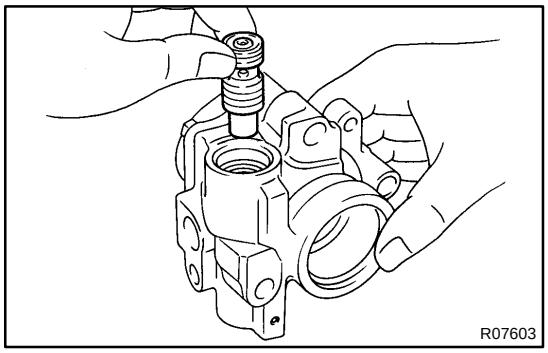
If it is more than the maximum, replace the vane plate and/or vane pump rotor with one having the same mark stamped on the cam ring.

Inscribed mark: 1, 2, 3, 4 or None

HINT:

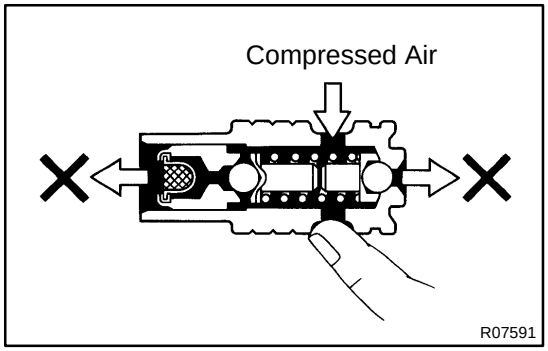
There are 5 vane plate lengths with the following rotor and cam ring marks:

Rotor and cam ring mark	Vane plate part number	Vane plate length mm (in.)
None	44345-26010	14.999-15.001 (0.59051-0.59059)
1	44345-26020	14.997-14.999 (0.59043-0.59051)
2	44345-26030	14.995-14.997 (0.59035-0.59043)
3	44345-26040	14.993-14.995 (0.59027-0.59035)
4	44345-26050	14.991-14.993 (0.59020-0.59027)

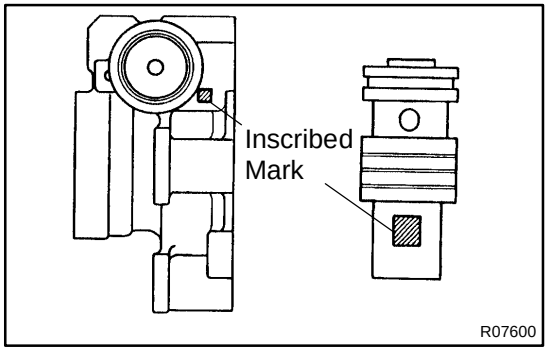


3. INSPECT FLOW CONTROL VALVE

(a) Coat the flow control valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.

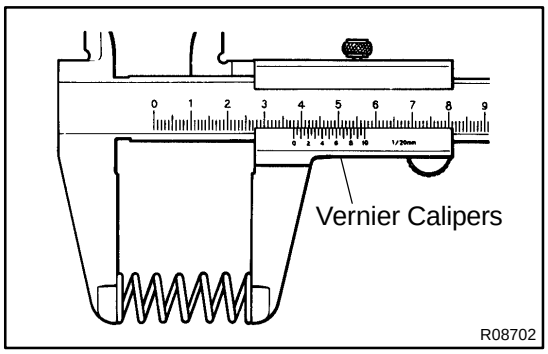


(b) Check the flow control valve for leakage.
Close one of the holes and apply compressed air 392 - 490 kPa (4 - 5 kgf/cm^2, 57 - 71 psi) into the opposite side, and confirm that air does not come out from the end holes.



If necessary, replace the flow control valve with one having the same letter as inscribed on the front housing.

Inscribed mark: A, B, C, D, E or F



4. INSPECT SPRING

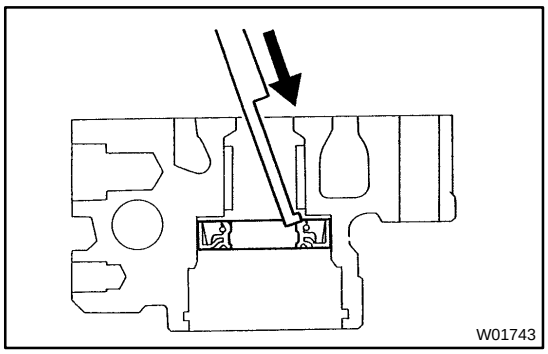
Using vernier calipers, measure the free length of the spring.

Minimum free length: 33.2 mm (1.307 in.)

If it is not within the specification, replace the spring.

SR1BY-02

REPLACEMENT



NOTICE:

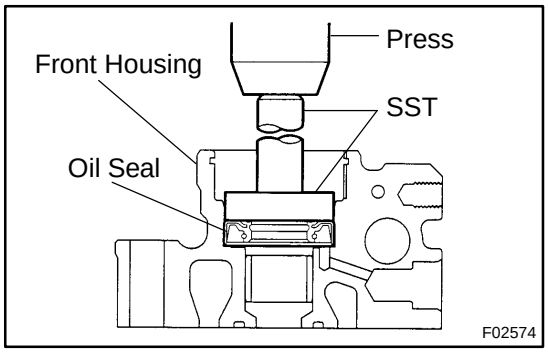
When using a vise, do not overtighten it.

1. IF NECESSARY, REPLACE OIL SEAL

(a) Using SST, tap out the oil seal from the front housing.
SST 09631-10030

NOTICE:

Be careful not to damage the bushing of the front housing.

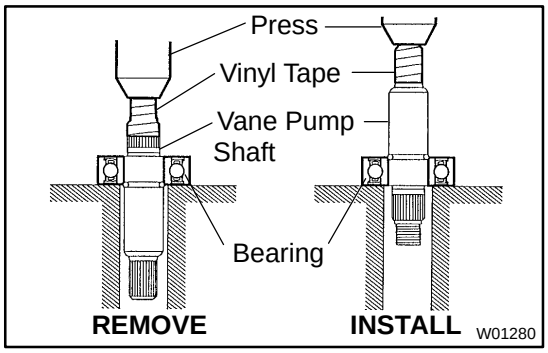


(b) Coat a new oil seal lip with power steering fluid.

(c) Using SST, press in the oil seal.
SST 09950-60010 (09951-00330),
09950-70010 (09951-07100)

NOTICE:

Make sure that the oil seal is installed facing in the correct direction.



2. IF NECESSARY, REPLACE BEARING

(a) Press out the bearing from the vane pump shaft.

(b) Using snap ring expander, replace the snap ring with new one.

NOTICE:

Be careful not to damage the shaft.

(c) Coat a new bearing with power steering fluid.

(d) Press in the bearing to the shaft.

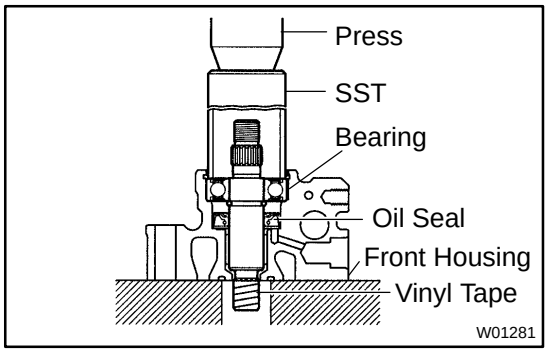
SR1BZ-02

REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. COAT PARTS INDICATED BY ARROWS WITH POWER STEERING FLUID (See page SR-27)



2. INSTALL VANE PUMP SHAFT WITH BEARING

(a) To prevent oil seal lip damage, wind vinyl tape on the serrated part of the vane pump shaft.

(b) Using SST, press in the vane pump shaft with the bearing.
SST 09608-04031

NOTICE:

Be careful not to damage the oil seal.

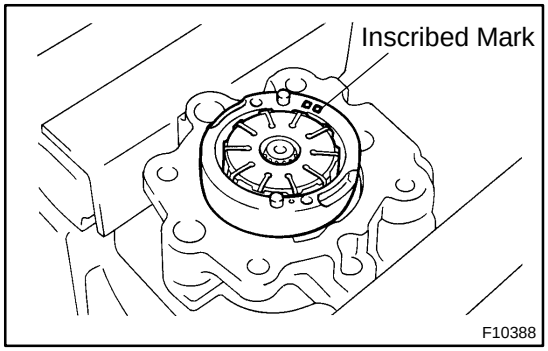
(c) Using snap ring pliers, install a new snap ring to the front housing.

3. INSTALL 2 STRAIGHT PINS

Using a plastic hammer, tap in 2 new straight pins to the front housing.

NOTICE:

Be careful not to damage the straight pins.



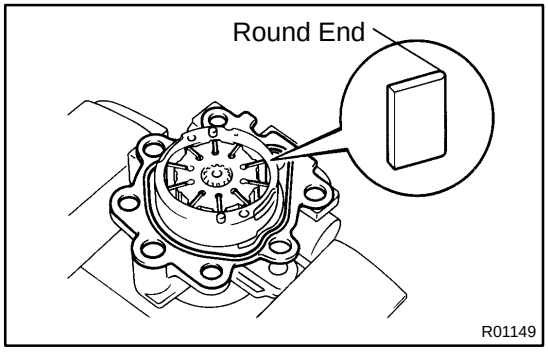
4. INSTALL CAM RING

Install the cam ring with the inscribed mark facing outward.

HINT:

Align the holes of the cam ring with the 2 straight pins.

5. INSTALL VANE PUMP ROTOR



6. INSTALL 10 VANE PLATES AND GASKET

(a) Install the 10 vane plates with the round end facing outward.

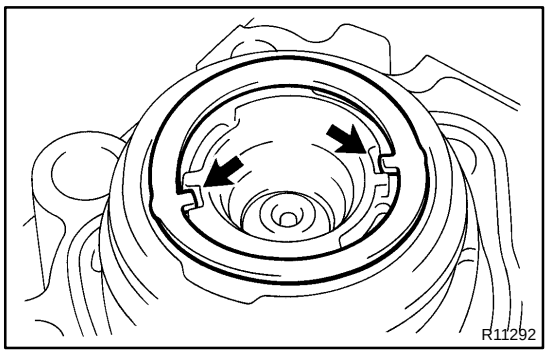
(b) Install a new gasket on the front housing.

NOTICE:

Be careful the direction of the gasket.

7. INSTALL SIDE PLATE

Align the holes of the side plate and 2 straight pins.



8. INSTALL WAVE WASHER

Install the wave washer so that its protrusions fit into the slots in the side plate.

9. INSTALL REAR HOUSING

(a) Coat 2 new O-rings with power steering fluid and install them to the rear housing.

(b) Install the rear housing with the 2 bolts.

Torque: 24 N·m (240 kgf·cm, 17 ft·lbf)

10. INSTALL SPRING, FLOW CONTROL VALVE AND PRESSURE PORT UNION

(a) Install the spring.

(b) Install the flow control valve facing in the correct direction (See page SR-27).

(c) Coat a new O-ring with power steering fluid, and install it to the pressure port union.

(d) Install the pressure port union.

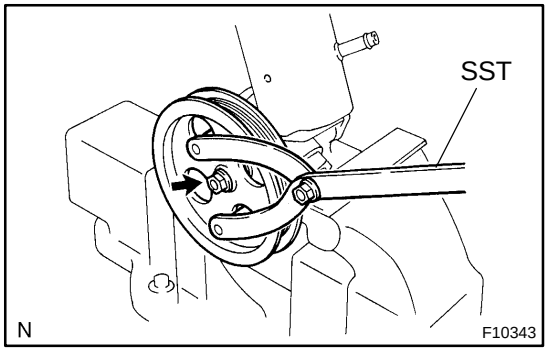
Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)

11. INSTALL OIL RESERVOIR

(a) Coat a new O-ring with power steering fluid and install it to the oil reservoir.

(b) Install the oil reservoir with the 3 bolts.

Torque:
Front side bolt: 13 N·m (130 kgf·cm, 9 ft·lbf)
Rear side bolts: 24 N·m (240 kgf·cm, 17 ft·lbf)



12. INSTALL VANE PUMP PULLEY

(a) Install the vane pump pulley and nut to the vane pump shaft.

(b) Using SST, stop the pulley rotating and torque the pulley set nut.

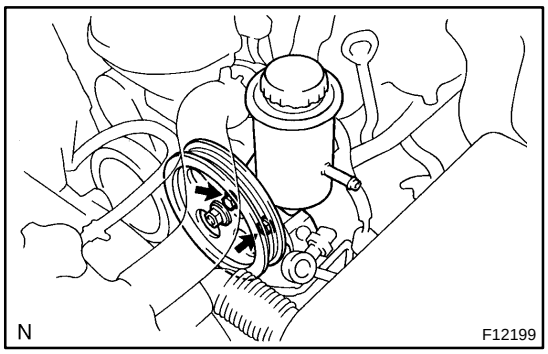
SST 09960-10010 (09962-01000, 09963-01000)

Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)

13. MEASURE PS VANE PUMP ROTATING TORQUE (See page SR-30)

SR1C0-03

INSTALLATION



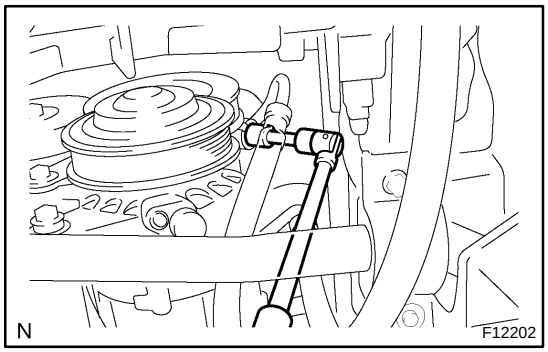
1. INSTALL PS VANE PUMP ASSEMBLY

Install the PS vane pump assembly with the 2 bolts.

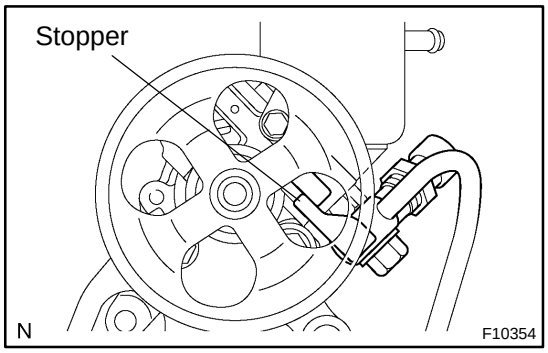
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)

2. CONNECT PRESSURE FEED TUBE

(a) Install a new gasket to the pressure feed tube.



(b) Connect the pressure feed tube with the union bolt.



HINT:

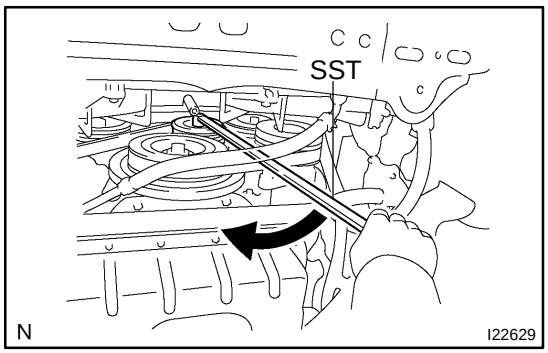
Make sure the stopper of the pressure feed tube touches the PS vane pump body as shown in the illustration, then install the union bolt.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

3. CONNECT RETURN HOSE

Connect the return hose with the clip.

4. CONNECT OIL PRESSURE SWITCH CONNECTOR



5. INSTALL DRIVE BELT

Using SST, loosen the drive belt tension by tuning the drive belt tensioner clockwise from the bottom side, and install the drive belt.

SST 09216-00041

6. INSTALL NO. 1 ENGINE UNDER COVER

Install the No. 1 engine under cover with the 16 screws and clip.

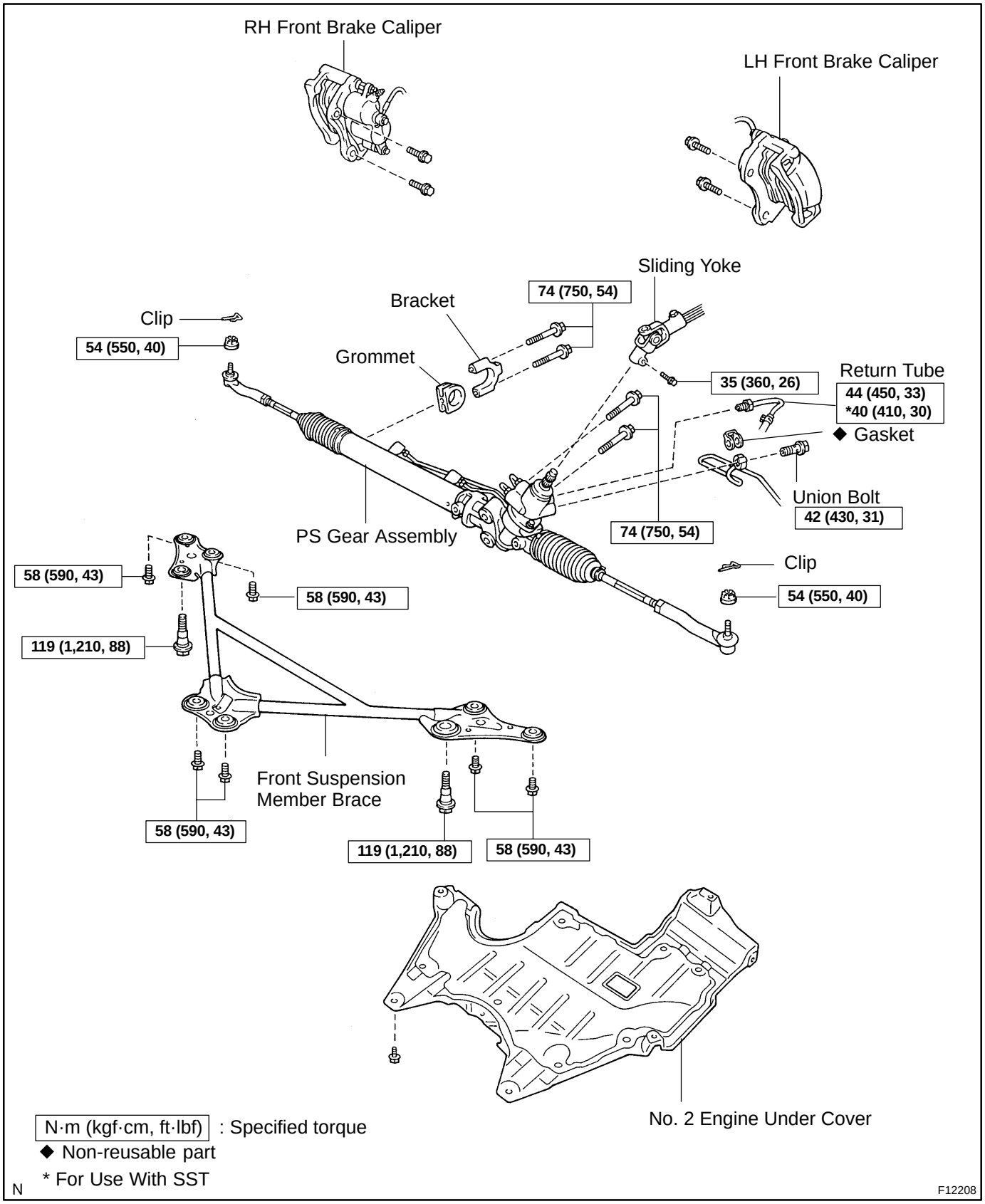
7. BLEED POWER STEERING SYSTEM

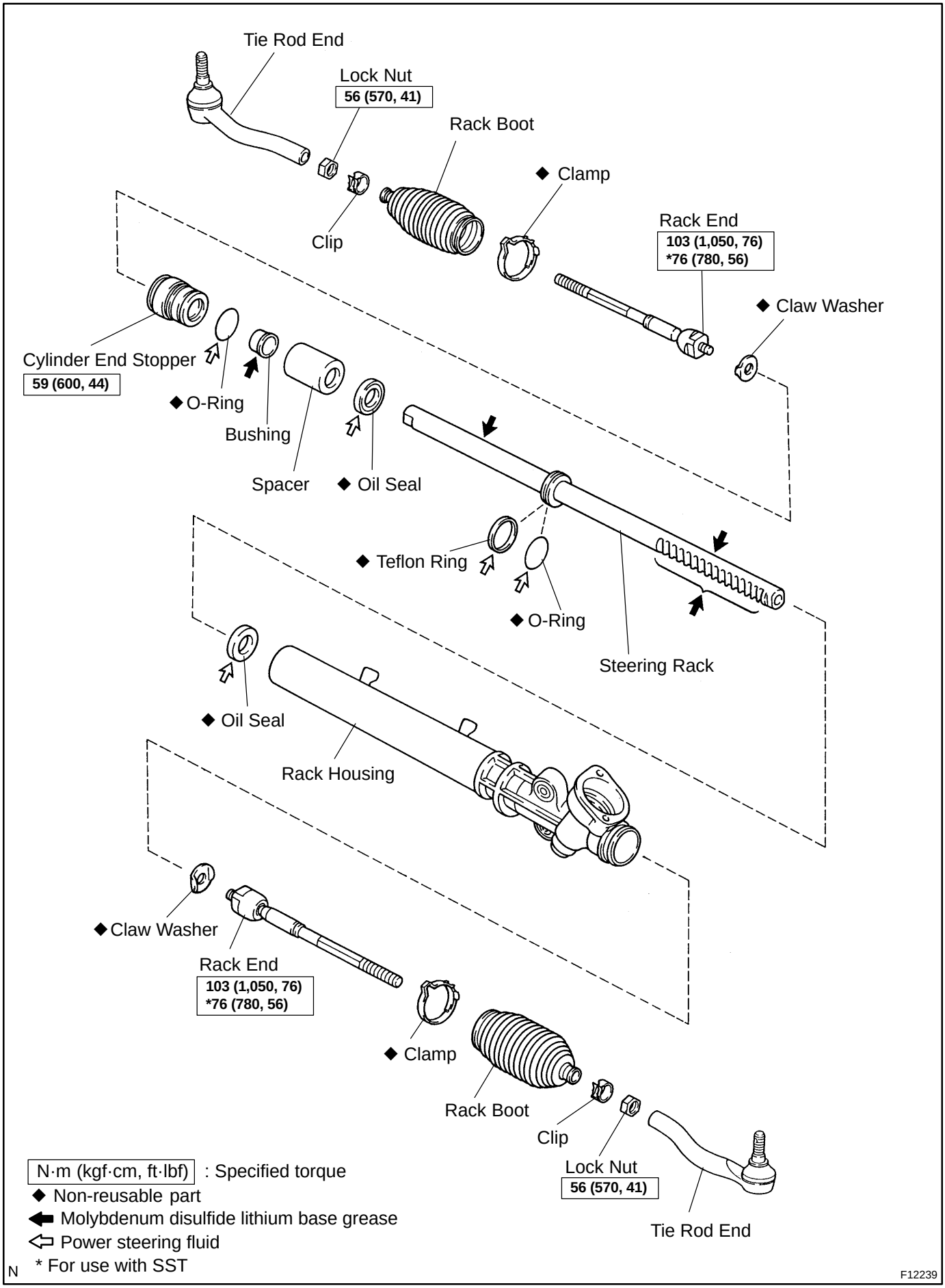
(See page SR-4)

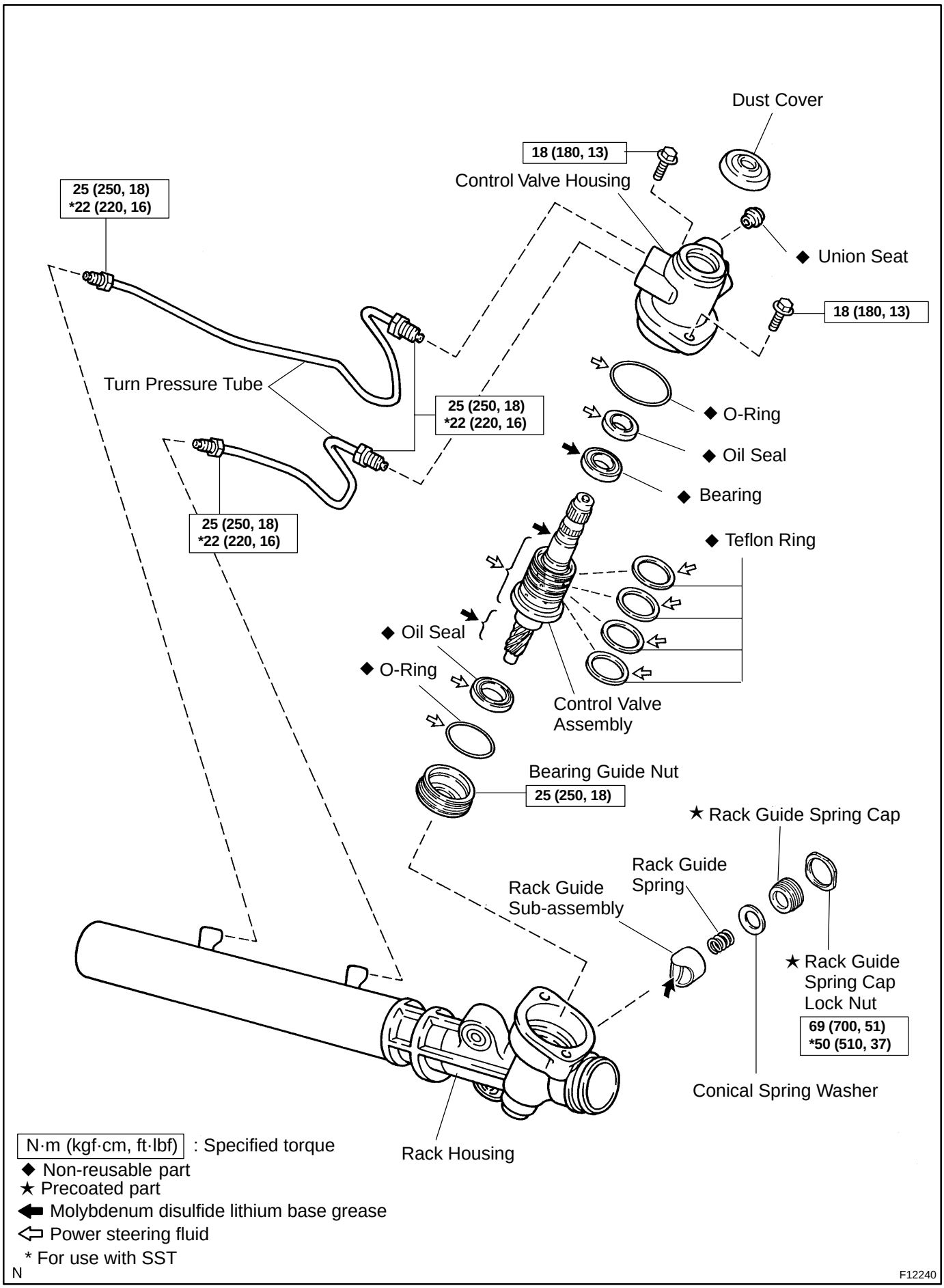
POWER STEERING GEAR

COMPONENTS

SR1C1-02



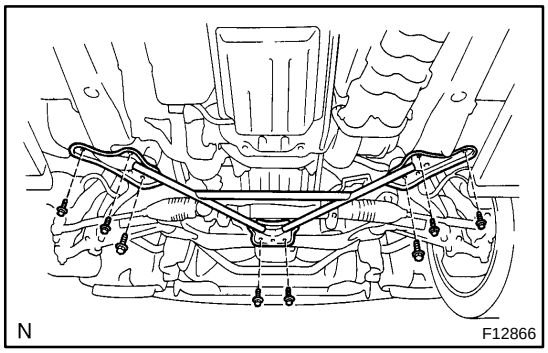

Tie Rod End
Lock Nut
56 (570, 41)
Rack Boot
◆ Clamp
Clip
Rack End
103 (1,050, 76)
*76 (780, 56)
◆ Claw Washer
Cylinder End Stopper
59 (600, 44)
◆ O-Ring
Bushing
Spacer
◆ Oil Seal
◆ Teflon Ring
◆ O-Ring
Steering Rack
◆ Oil Seal
Rack Housing
◆ Claw Washer
Rack End
103 (1,050, 76)
*76 (780, 56)
◆ Clamp
Rack Boot
Clip
Lock Nut
56 (570, 41)
Tie Rod End
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
Molybdenum disulfide lithium base grease
Power steering fluid
* For use with SST
N
F12239


Dust Cover
18 (180, 13)
Control Valve Housing
25 (250, 18)
*22 (220, 16)
◆ Union Seat
18 (180, 13)
Turn Pressure Tube
25 (250, 18)
*22 (220, 16)
◆ O-Ring
◆ Oil Seal
◆ Bearing
25 (250, 18)
*22 (220, 16)
◆ Teflon Ring
◆ Oil Seal
◆ O-Ring
Control Valve
Assembly
Bearing Guide Nut
25 (250, 18)
★ Rack Guide Spring Cap
Rack Guide
Spring
Rack Guide
Sub-assembly
★ Rack Guide
Spring Cap
Lock Nut
69 (700, 51)
*50 (510, 37)
Conical Spring Washer
Rack Housing
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
Molybdenum disulfide lithium base grease
Power steering fluid
* For use with SST
N
F12240

SR1C2-02

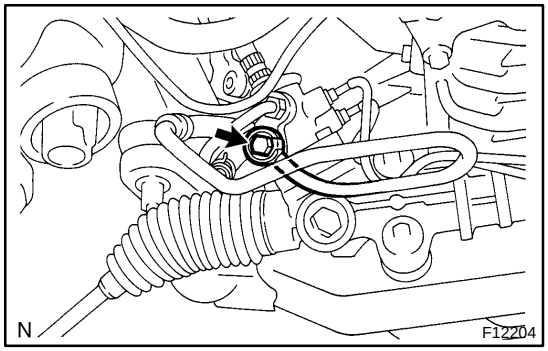
REMOVAL

1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD
2. REMOVE STEERING WHEEL PAD (See page SR-13)
3. REMOVE STEERING WHEEL (See page SR-13)
4. REMOVE RH AND LH FRONT BRAKE CALIPERS (See page BR-27)
5. DISCONNECT RH AND LH TIE ROD ENDS (See page SA-34)
6. REMOVE NO. 2 ENGINE UNDER COVER
7. DISCONNECT SLIDING YOKE (See page SR-13)



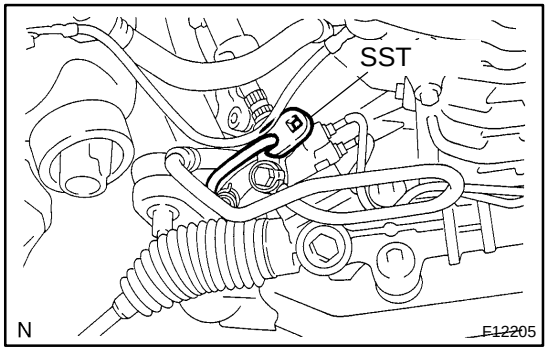
8. REMOVE FRONT SUSPENSION MEMBER BRACE

Remove the 8 bolts and front suspension member brace.



9. DISCONNECT PRESSURE FEED TUBE

Remove the union bolt and gasket, and disconnect the pressure feed tube.



10. DISCONNECT RETURN TUBE

Using SST, disconnect the return tube.

SST 09023-38400

11. REMOVE PS GEAR ASSEMBLY, BRACKET AND GROMMET

Remove the 4 bolts, PS gear assembly, bracket and grommet.

SR0UH-03

DISASSEMBLY

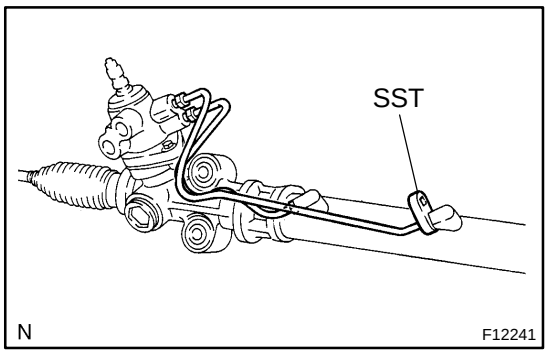
NOTICE:

When using a vise, do not overtighten it.

1. REMOVE 2 TURN PRESSURE TUBES

Using SST, remove the 2 turn pressure tubes.

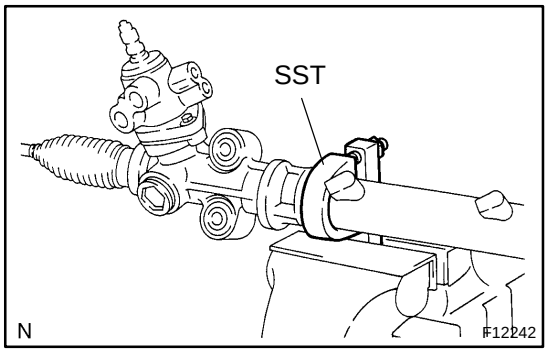
SST 09023-38200



2. SECURE PS GEAR ASSEMBLY IN VISE

Using SST, secure the PS gear assembly in a vise.

SST 09612-00012

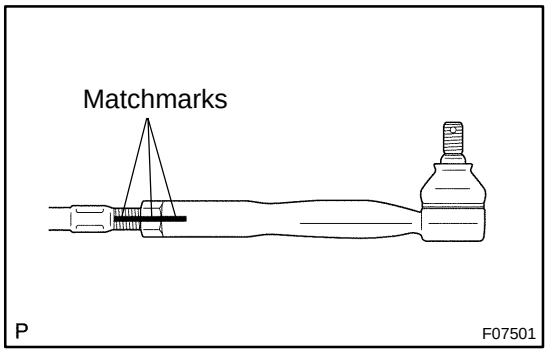


3. REMOVE RH AND LH TIE ROD ENDS AND LOCK NUTS

(a) Place matchmarks on the tie rod end, lock nut and rack end.

(b) Loosen the lock nut, and remove the tie rod end and lock nut.

(c) Employ the same manner described above to the other side.



4. REMOVE RH AND LH CLIPS, RACK BOOTS AND CLAMPS

(a) Using pliers, loosen the clamp as shown in the illustration.

(b) Remove the clamp, clip and rack boot.

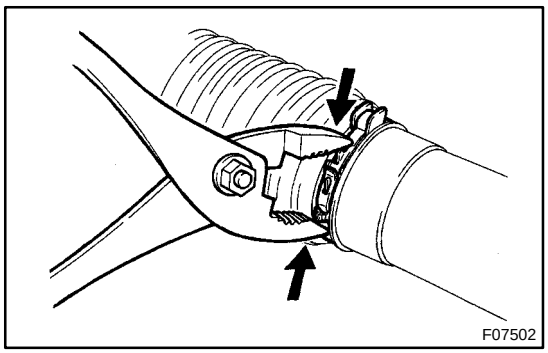
NOTICE:

Be careful not to damage the boot.

HINT:

Mark the RH and LH rack boots.

(c) Employ the same manner described above to the other side.

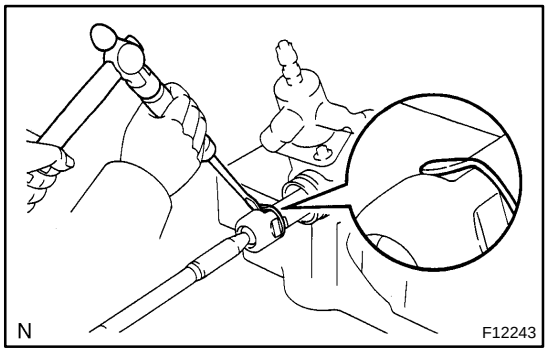


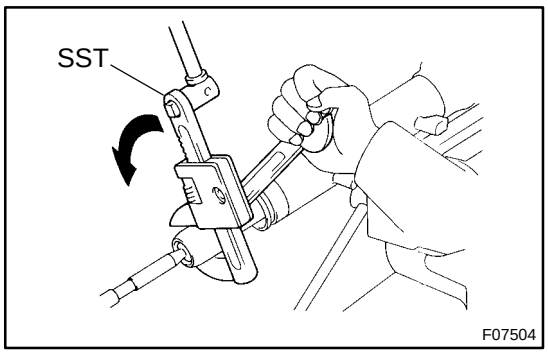
5. REMOVE RH AND LH RACK ENDS AND CLAW WASHERS

(a) Using a screwdriver and a hammer, unstake the washer.

NOTICE:

Avoid any impact on the steering rack.





(b) Using a spanner, hold the steering rack steadily and using SST, remove the rack end.
SST 09922-10010

NOTICE:

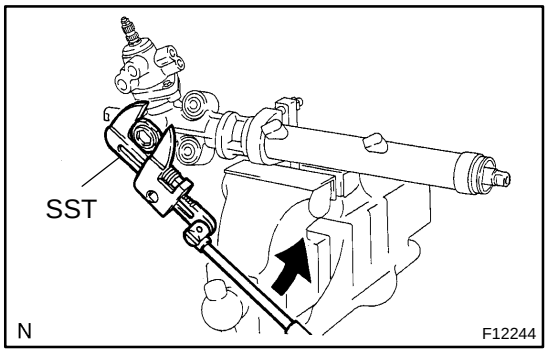
Use SST 09922-10010 in the direction shown in the illustration.

HINT:

Mark the RH and LH rack ends.

(c) Remove the claw washer.

(d) Employ the same manner described above to the other side.



6. REMOVE RACK GUIDE SPRING CAP LOCK NUT

Using SST, remove the rack guide spring cap lock nut.
SST 09922-10010

NOTICE:

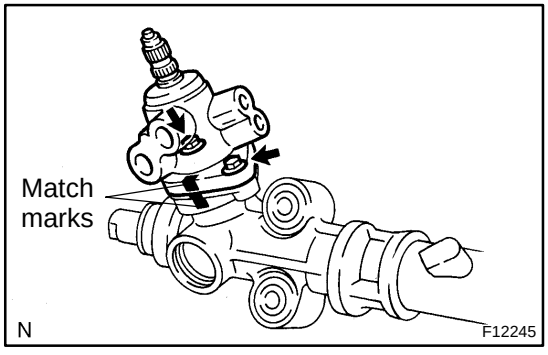
Use SST 09922-10010 in the direction shown in the illustration.

7. REMOVE RACK GUIDE SPRING CAP, CONICAL SPRING, RACK GUIDE SPRING AND RACK GUIDE SUB-ASSEMBL Y

(a) Using a hexagon wrench (24 mm), remove the rack guide spring cap.

(b) Remove the conical spring, rack guide spring and rack guide sub-assembly.

8. REMOVE DUST COVER

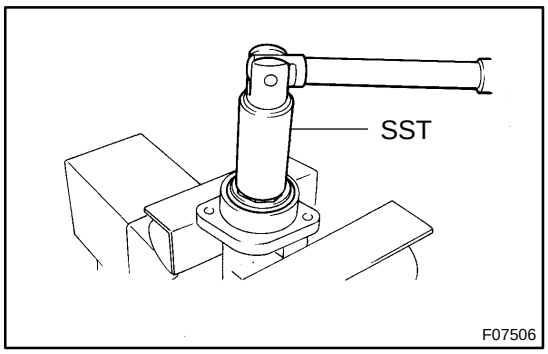


9. REMOVE CONTROL VALVE HOUSING WITH CONTROL VALVE ASSEMBLY

(a) Place matchmarks on the control valve housing and rack housing.

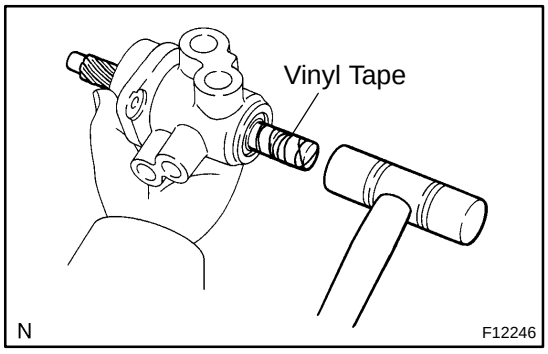
(b) Remove the 2 bolts and pull out the control valve housing with control valve assembly.

(c) Remove the O-ring from the control valve housing.



10. REMOVE BEARING GUIDE NUT AND CONTROL VALVE ASSEMBLY

(a) Using SST, loosen the bearing guide nut.
SST 09631-20060



(b) To prevent oil seal lip damage, wind vinyl tape on the serrated part of the control valve shaft.

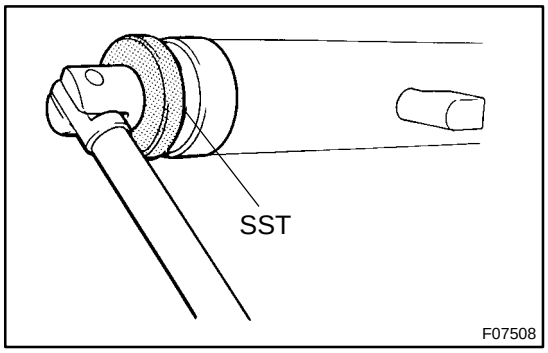
(c) Using a plastic hammer, tap out the control valve assembly with the bearing guide nut from the control valve housing.

NOTICE:

Be careful not to damage the oil seal lip

(d) Remove the bearing guide nut from the control valve assembly.

(e) Remove the O-ring from the bearing guide nut.

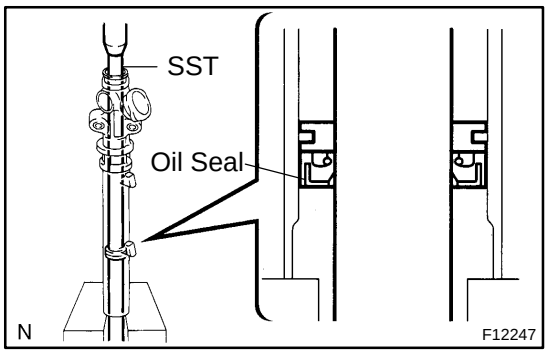


11. REMOVE CYLINDER END STOPPER AND SPACER

(a) Using SST, remove the cylinder end stopper.
SST 09631-20090

(b) Remove the O-ring from the cylinder end stopper.

(c) Remove the spacer.



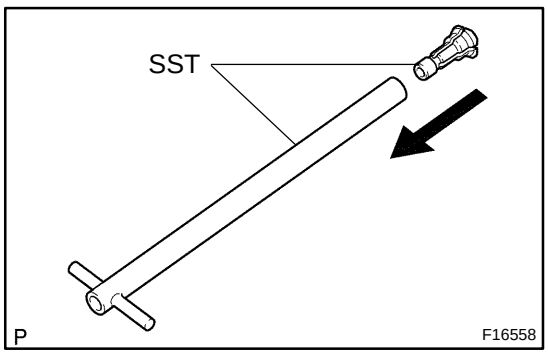
12. REMOVE STEERING RACK WITH OIL SEAL

(a) Using SST, press out the steering rack with the oil seal.
SST 09950-70010 (09951-07200)

NOTICE:

Take care not to drop the steering rack.

(b) Remove the oil seal from the steering rack.

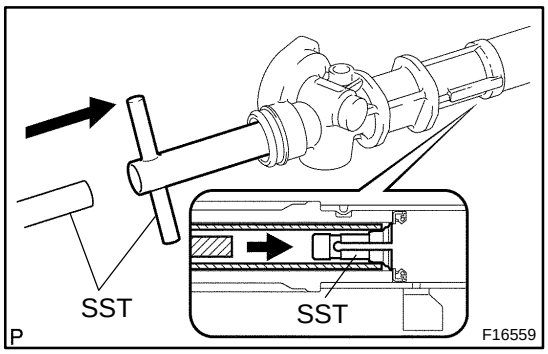


13. REMOVE OIL SEAL

(a) Install SST (09612-07130) on SST (09612-07210).
SST 09612-70100 (09612-07130, 09612-07210)

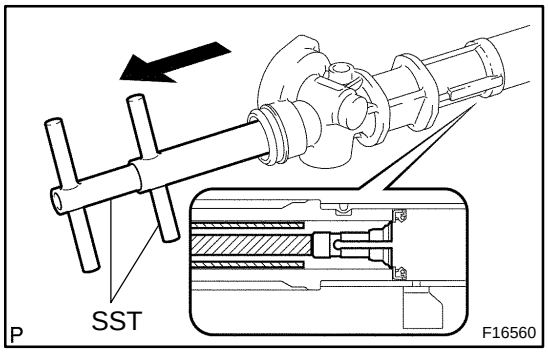
NOTICE:

- **Before using them, apply a small dab of grease to the inside wall of SST (09612-07210, 09612-07130).**
- **To prevent the inside of the housing from being damaged securely install SST 09612- 07130) on SST (09612-07210).**



(b) Diagonally insert SST (09612-07210) into the housing until it contacts with the oil seal, and then further insert the SST (09612-07210) until the tip of SST (09612-07220) contacts with SST (09612-07130).
SST 09612- 70100 (09612- 07130, 09612- 07210, 09612-07220)

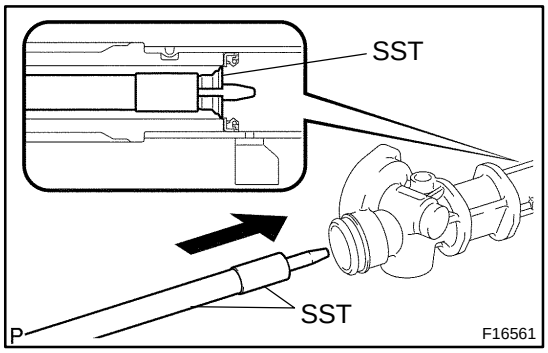
NOTICE:
Do not damage the inside of the housing.



(c) Secure SST (09612- 07220), and pull SST (09612-07210) to place SST (09612-07130) in the housing.
SST 09612- 70100 (09612- 07130, 09612- 07210, 09612-07220)

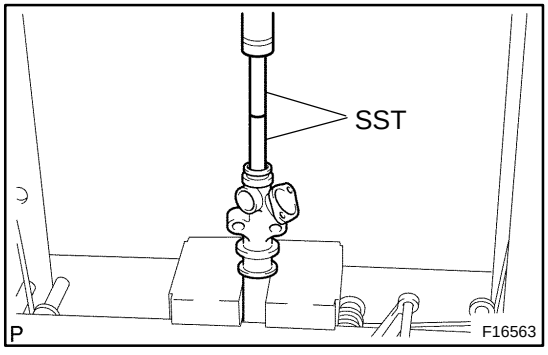
HINT:
Place SST on the chamfering position between the oil seal and rack housing.

(d) Remove the SST (09612-07210, 09612-07220).
SST 09612-70100 (09612-07210, 09612-07220)



(e) After installing SST (09612- 07240) on SST (09612-07210), insert the tip of SST (09612-07230) in the service hole of SST (09612-07130).
SST 09612- 70100 (09612- 07130, 09612- 07230, 09612-07240)

NOTICE:
- **Before using them, apply a small dab of grease to the tip of SST (09612-07230).**
- **To prevent SST (09612-07130) from being damaged, be sure to install SST (09612-07240).**
- **Do not damage the inside of the rack housing.**



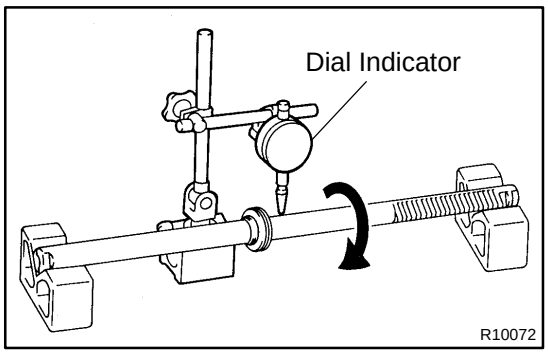
(f) Install SST (09951-07100) on SST (09612-07230) and remove the oil seal using a press.
SST 09612- 70100 (09612- 07130, 09612- 07230, 09612-07240), 09950-70010 (09951-07100)

NOTICE:
Do not damage the rack housing.

HINT:
Replace SST (09951-07100) with SST that is different in length in the set, if necessary.

SR0UI-03

INSPECTION

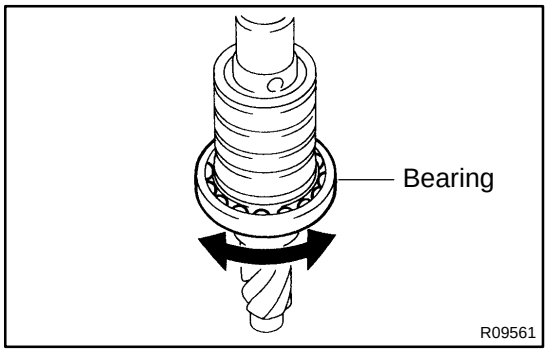


1. INSPECT STEERING RACK

(a) Using a dial indicator, check the steering rack for runout and for teeth wear and damage.

Maximum runout: 0.15 mm (0.0059 in.)

(b) Check the back surface for wear and damage.



2. INSPECT BEARING

(a) Check the bearing rotation condition and check for abnormal noise.

If the bearing is worn or damaged, replace the control valve assembly.

(b) Coat the bearing with molybdenum disulfide lithium base grease.

SR0UJ-03

REPLACEMENT

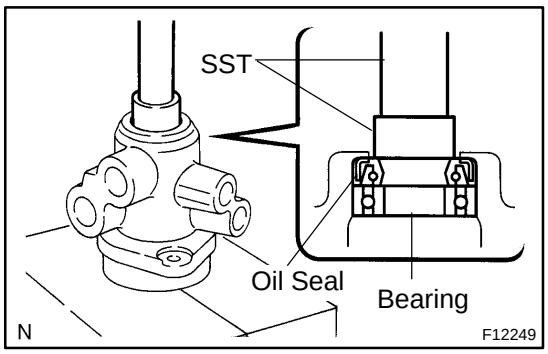
NOTICE:

When using a vise, do not overtighten it.

1. IF NECESSARY, REPLACE OIL SEAL AND BEARING

(a) Using SST, press out the bearing and oil seal from the control valve housing.

SST 09950-60010 (09951-00240), 09950-70010 (09951-07100)



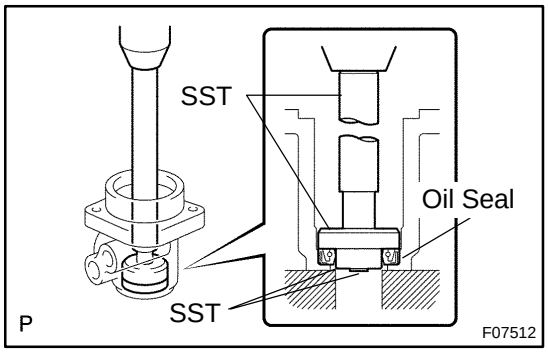
(b) Coat a new oil seal lip with power steering fluid.

(c) Using SST, press in the oil seal.

SST 09950- 60010 (09951- 00180, 09951- 00320, 09952-06010), 09950-70010 (09951-07150)

NOTICE:

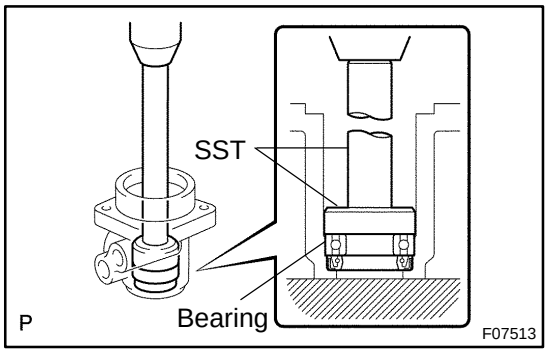
Make sure that the oil seal is installed facing in the correct direction.



(d) Coat a new bearing with molybdenum disulfide lithium base grease.

(e) Using SST, press in the bearing.

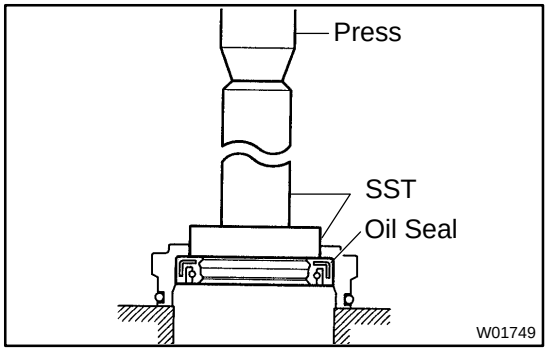
SST 09950-60010 (09951-00340), 09950-70010 (09951-07150)



2. IF NECESSARY, REPLACE OIL SEAL

(a) Using SST, press out the oil seal from the bearing guide nut.

SST 09950-60010 (09951-00310), 09950-70010 (09951-07100)



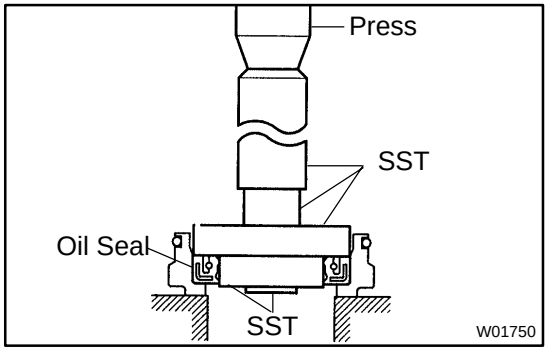
(b) Coat a new oil seal lip with power steering fluid.

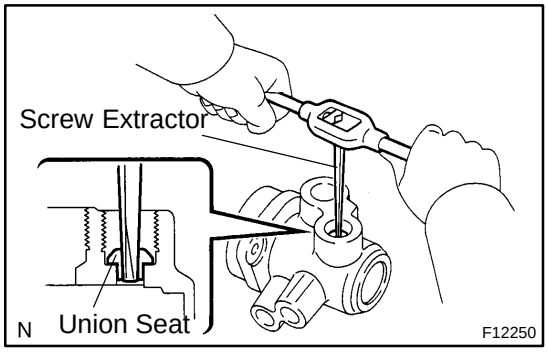
(c) Using SST, press in the oil seal.

SST 09950- 60010 (09951- 00250, 09951- 00360, 09952-06010), 09950-70010 (09951-07100)

NOTICE:

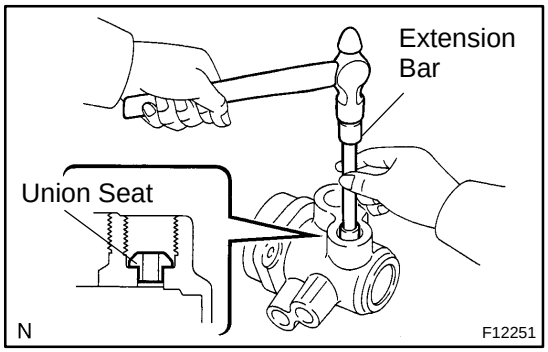
Make sure that the oil seal is installed facing in the correct direction.



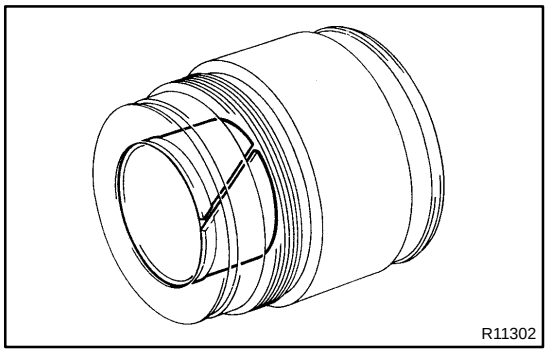


3. IF NECESSARY, REPLACE UNION SEAT

(a) Using a screw extractor, remove the union seat from the control valve housing.



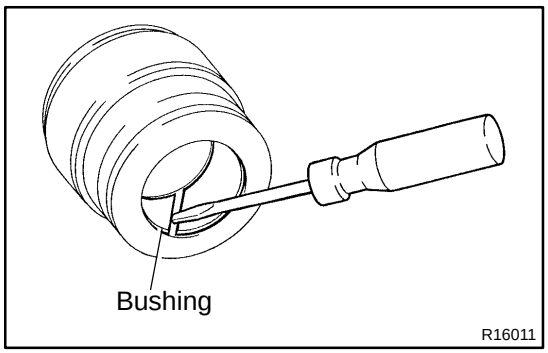
(b) Using a plastic hammer and extension bar, lightly tap in a new union seat.



4. INSPECT BUSHING

(a) Check the inside of the bushing of the cylinder end stopper for cracks. If faulty, replace the bushing.

(b) Apply molybdenum disulfide lithium base grease to the inside of the bushing.



5. IF NECESSARY, REPLACE BUSHING

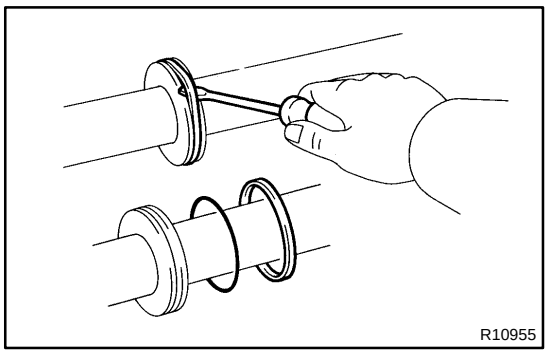
(a) Using a screwdriver, remove the bushing from the cylinder end stopper.

NOTICE:

Be careful not to damage the cylinder end stopper.

(b) Coat the inside of a new bushing with molybdenum disulfide lithium base grease.

(c) Install the bushing.



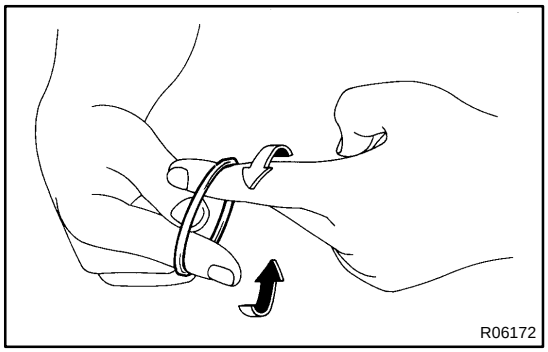
6. IF NECESSARY, REPLACE TEFLON RING AND O-RING

(a) Using a screwdriver, remove the teflon ring and O-ring from the steering rack.

NOTICE:

Be careful not to damage the groove for the teflon ring.

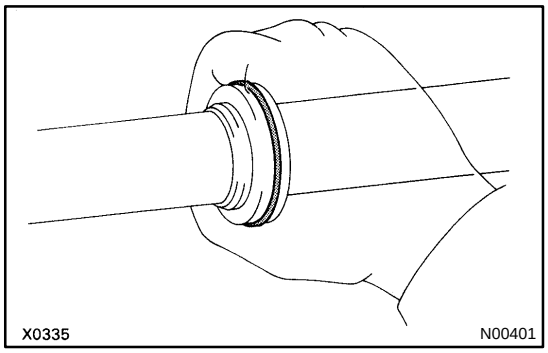
(b) Coat a new O-ring with power steering fluid and install it to the steering rack.



(c) Expand a new teflon ring with your fingers.

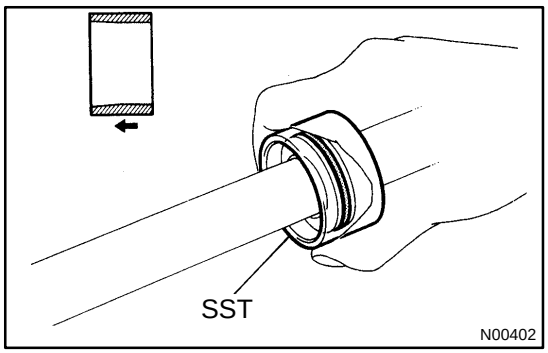
NOTICE:

Be careful not to overexpand the teflon ring.



(d) Coat the teflon ring with power steering fluid.

(e) Install the teflon ring to the steering rack and settle it down with your fingers.

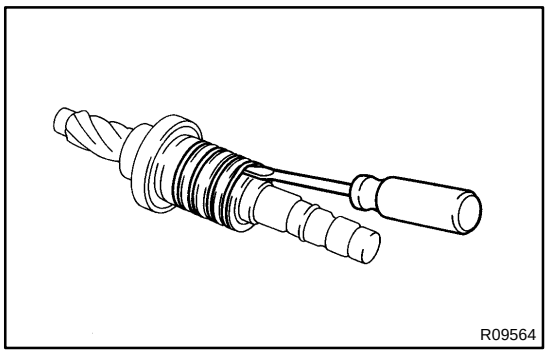


(f) Carefully slide the tapered end of SST over the teflon ring until it fits to the steering rack.

SST 09630-24014 (09620-24051)

NOTICE:

Be careful not to damage the teflon ring.



7. IF NECESSARY, REPLACE 4 TEFLON RINGS

(a) Using a screwdriver, remove the 4 teflon rings from the control valve assembly.

NOTICE:

Be careful not to damage the grooves for the teflon ring.

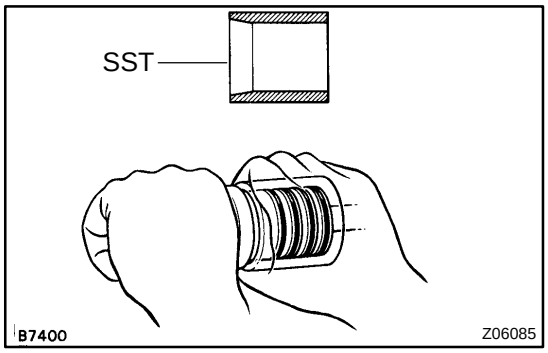
(b) Expand 4 new teflon rings with your fingers.

NOTICE:

Be careful not to overexpand the teflon ring.

(c) Coat the teflon rings with power steering fluid.

(d) Install the teflon rings to the control valve assembly, and settle them down with your fingers.



(e) Carefully slide the tapered end of SST over the teflon rings until they fit to the control valve assembly.

SST 09631-20081

NOTICE:

Be careful not to damage the teflon rings.

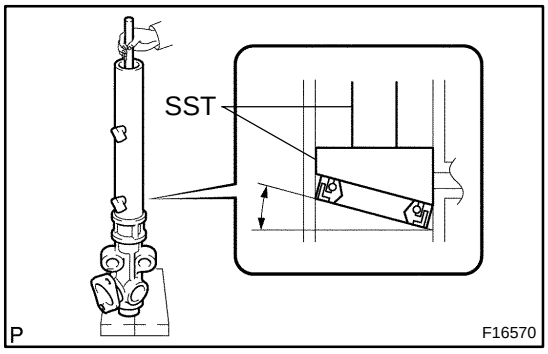
SR0UK-03

REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. COAT PARTS INDICATED BY ARROWS WITH POWER STEERING FLUID OR MOLYBDENUM DISULFIDE LITHIUM BASE GREASE (See page SR-38)



2. INSTALL OIL SEAL

(a) Apply power steering fluid to a new oil seal, and install the oil seal on the rack housing at an angle.

NOTICE:

Install the oil seal in the correct direction.

HINT:

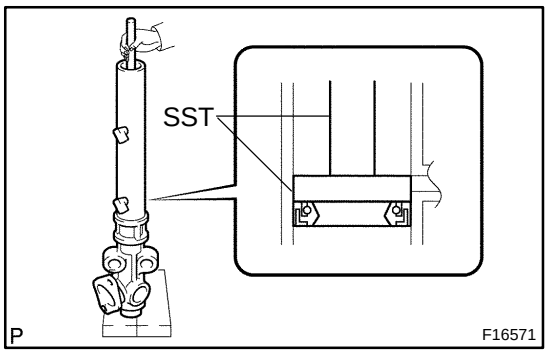
Install the oil seal so that the port faces downward with approx. 15 degrees.

(b) Using SST, push in the oil seal by hand until it passes through the 2 ports.

SST 09631-00180, 09950-70010 (09951-07360)

NOTICE:

Do not turn SST when inserting the oil seal.

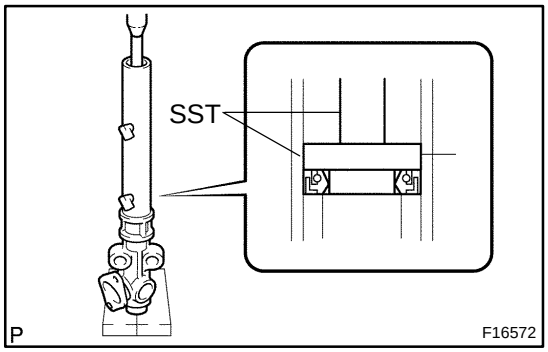


(c) After the oil seal has passed through the ports, push in the oil seal by hand until it becomes level, using SST.

SST 09950- 60010 (09951- 00430), 09950- 70010 (09951-07360)

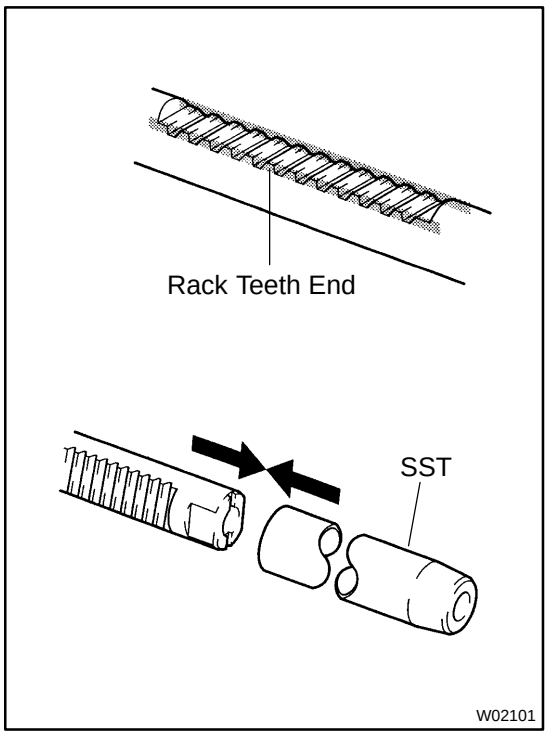
NOTICE:

When SST is set, do not damage the inside surface of the rack housing.



(d) After the oil seal has become level, using SST and press, install the oil seal.

SST 09950- 60010 (09951- 00430), 09950- 70010 (09951-07360)



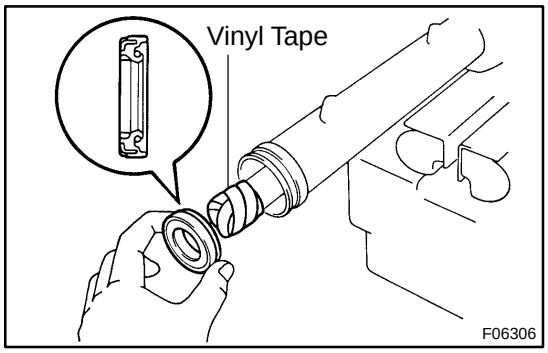
3. INSTALL STEERING RACK

(a) Install SST to the rack.
SST 09631-33010

HINT:

If necessary, scrape the burrs off the rack teeth end and burnish.

(b) Coat SST with power steering fluid.
(c) Install the steering rack into the rack housing.
(d) Remove the SST.
SST 09631-33010

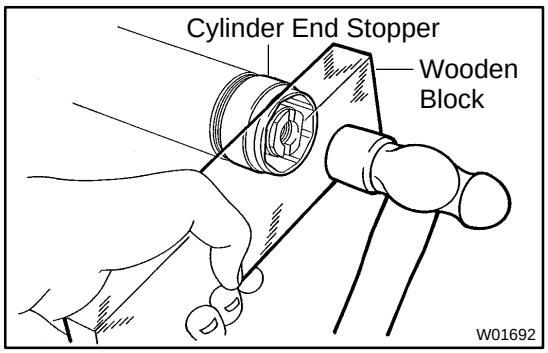


4. INSTALL OIL SEAL

(a) Coat a new oil seal lip with power steering fluid.
(b) To prevent oil seal lip damage, wind vinyl tape on the steering rack end, and apply power steering fluid.
(c) Install the oil seal by pushing it into the rack housing without tilting.

NOTICE:

Make sure that the oil seal is installed facing in the correct direction.

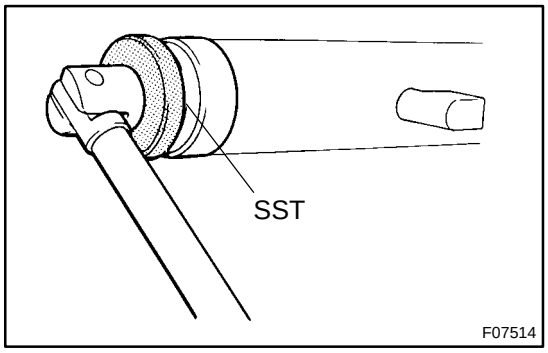


5. INSTALL CYLINDER END STOPPER AND SPACER

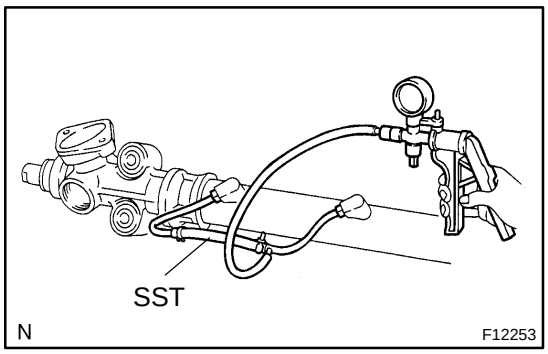
(a) Install the spacer.
(b) Coat a new O-ring with power steering fluid and install it to the cylinder end stopper.
(c) Using a wooden block and hammer, drive in the cylinder end stopper until it is tightly installed.

NOTICE:

Be careful not to damage the O-ring.



(d) Using SST, torque the cylinder end stopper.
SST 09631-20090
Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)



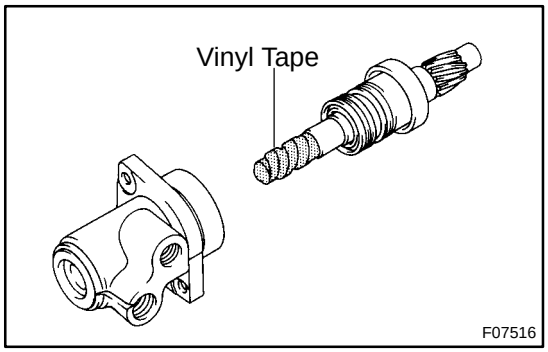
6. AIR TIGHTNESS TEST

(a) Install SST to the rack housing.
SST 09631-12071

(b) Apply 53 kPa (400 mmHg, 15.75 in.Hg) of vacuum for about 30 seconds.

(c) Check that there is no change in the vacuum.

If there is a change in the vacuum, check the installation of the oil seals.



7. INSTALL CONTROL VALVE ASSEMBLY

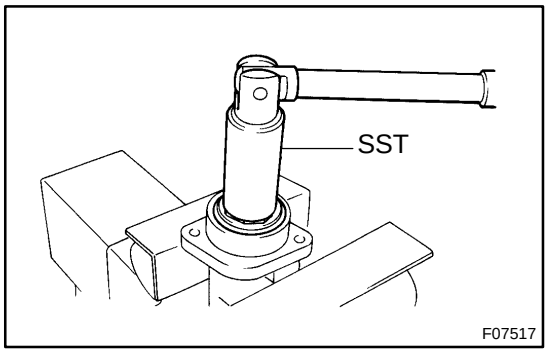
(a) Coat the teflon rings with power steering fluid.

(b) To prevent oil seal lip damage, wind vinyl tape on the serrated part of the control valve shaft.

(c) Push the control valve assembly into the control valve housing.

NOTICE:

Be careful not to damage the teflon rings and oil seal lip.



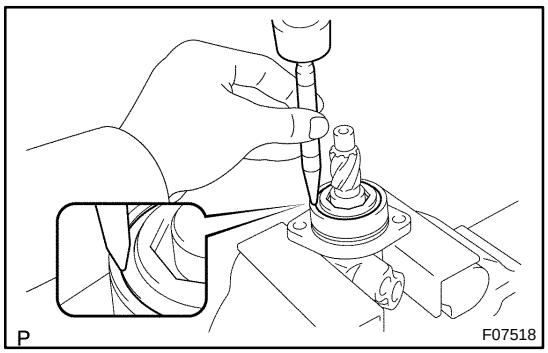
8. INSTALL BEARING GUIDE NUT

(a) Coat a new O-ring with power steering fluid, and install it to the bearing guide nut.

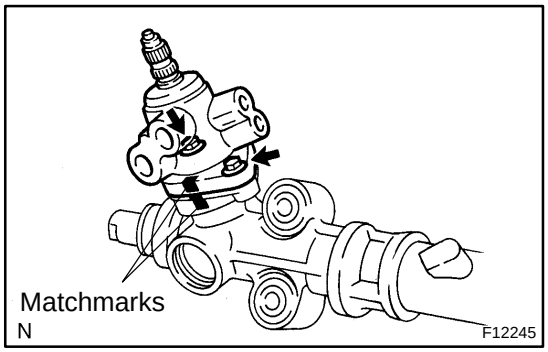
(b) Using SST, install the bearing guide nut.
SST 09631-20060
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

NOTICE:

Be careful not to damage the oil seal lip.



(c) Using a punch, stake the bearing guide nut.



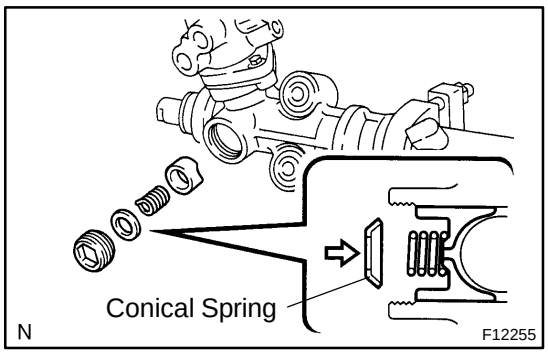
9. INSTALL CONTROL VALVE HOUSING WITH CONTROL VALVE ASSEMBLY

(a) Coat a new O-ring with power steering fluid, and install it to the control valve housing.

(b) Align the matchmarks on the valve housing and rack housing.

(c) Install the 2 bolts.
Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

10. INSTALL DUST COVER



11. INSTALL RACK GUIDE SUB- ASSEMBLY, RACK GUIDE SPRING, CONICAL SPRING AND RACK GUIDE SPRING CAP

(a) Install the rack guide sub-assembly, rack guide spring and conical spring.

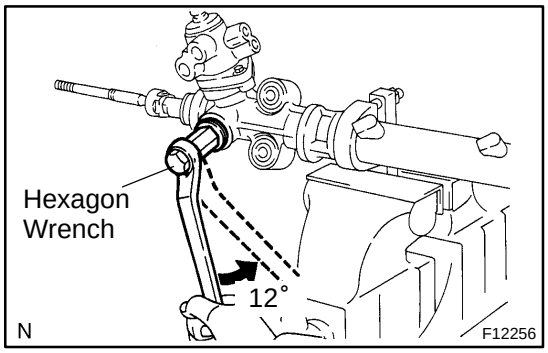
NOTICE:

Make sure that the conical spring is installed facing in the correct direction.

(b) Apply sealant to 2 or 3 threads of the rack guide spring cap.

Sealant:
Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(c) Temporarily install the rack guide spring cap.



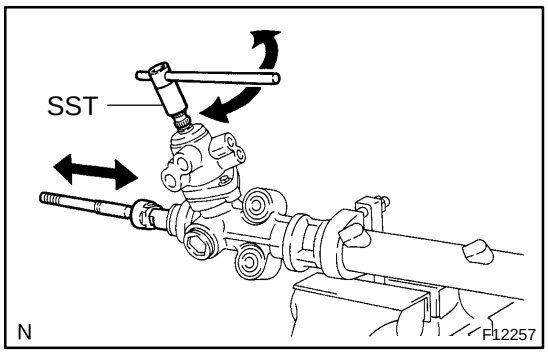
12. ADJUST TOTAL PRELOAD

(a) To prevent the steering rack teeth from damaging the oil seal lip, temporarily install the RH and LH rack ends.

(b) Using a hexagon wrench (24 mm), torque the rack guide spring cap.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

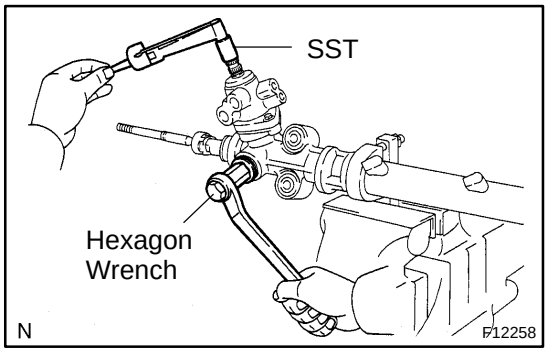
(c) Using a hexagon wrench (24 mm), return the rack guide spring cap 12°.



(d) Using SST, turn the control valve shaft right and left 1 or 2 times.

SST 09616-0001 1

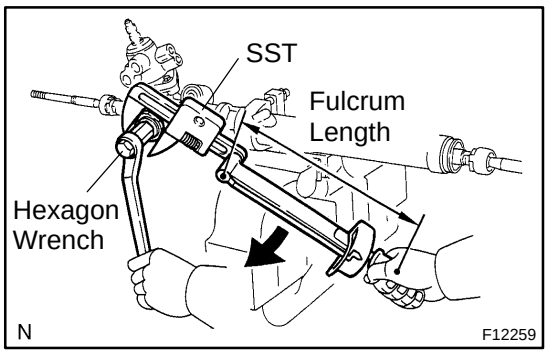
(e) Using a hexagon wrench (24 mm), loosen the rack guide spring cap until the rack guide spring is not functioning.



(f) Using SST, a torque wrench and hexagon wrench (24 mm), tighten the rack guide spring cap until the preload is within the specification.

SST 09616-0001 1

Preload (turning):
1.2 - 1.7 N·m (12.2 - 17.3 kgf·cm, 10.6 - 15.0 in.·lbf)



13. INSTALL RACK GUIDE SPRING CAP LOCK NUT

(a) Apply sealant to 2 or 3 threads of the rack guide spring cap lock nut.
Sealant:
Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Temporarily install the rack guide spring cap lock nut.

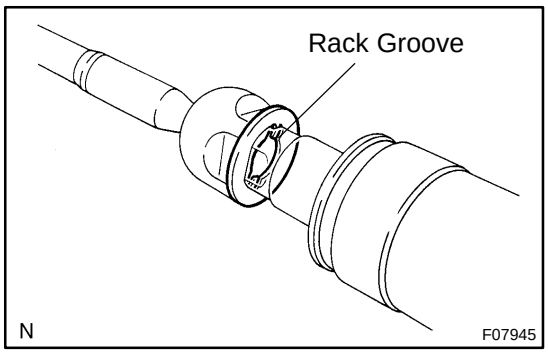
(c) Using a hexagon wrench (24 mm), hold the rack guide spring cap and using SST, torque the rack guide spring cap lock nut.
SST 09922-10010
Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

NOTICE:
Use SST 09922-10010 in the direction shown in the illustration.

HINT:
Use a torque wrench with a fulcrum length of 345 mm (13.58 in.).

(d) Recheck the total preload.
Preload (turning):
1.2 - 1.7 N·m (12.2 - 17.3 kgf·cm, 10.6 - 15.0 in.·lbf)

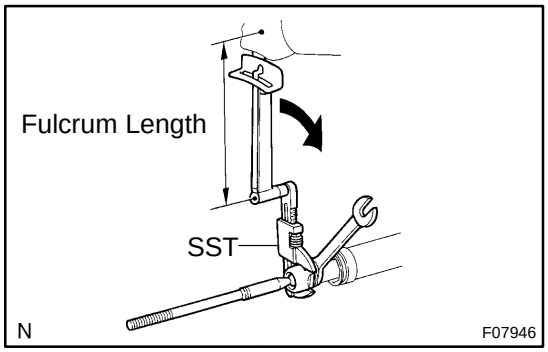
(e) Remove the RH and LH rack ends.



14. INSTALL RH AND LH CLAW WASHERS AND RACK ENDS

(a) Install a new claw washer, and temporarily install the rack end.

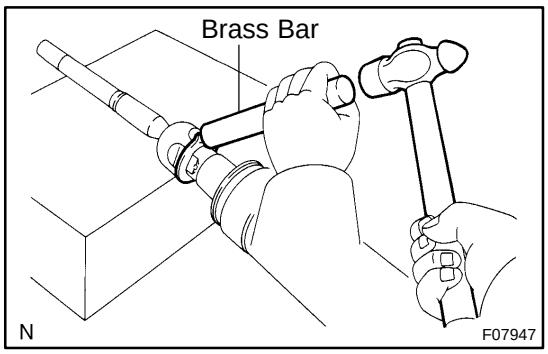
HINT:
Align the claws of the claw washer with the steering rack grooves.



(b) Using a spanner, hold the steering rack steadily and using SST, torque the rack end.
SST 09922-10010
Torque: 76 N·m (780 kgf·cm, 56 ft·lbf)

NOTICE:
Use SST 09922-10010 in the direction shown in the illustration.

HINT:
Use a torque wrench with a fulcrum length of 380 mm (14.96 in.).

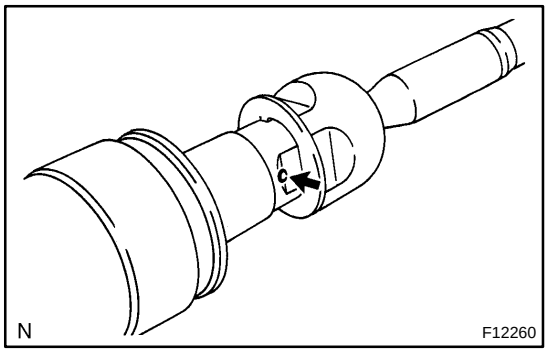


(c) Using a brass bar and a hammer, stake the washer.

NOTICE:

Avoid any impact on the steering rack.

(d) Employ the same manner described above to the other side.



15. INSTALL RH AND LH RACK BOOTS, CLAMPS AND CLIPS

(a) Ensure that the steering rack hole is not clogged with grease.

HINT:

If the hole is clogged, the pressure inside the boot will change after it is assembled and the steering wheel is turned.

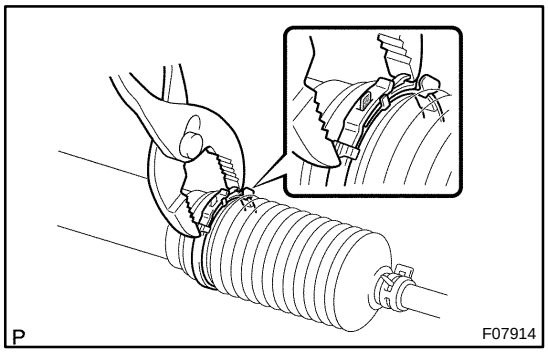
(b) Install the boot, clip and a new clamp.

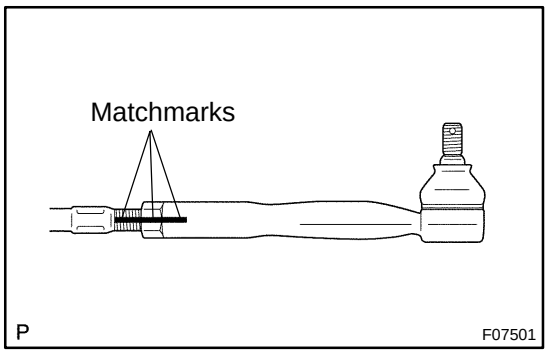
NOTICE:

Be careful not to damage or twist the boot.

(c) Tighten the clamp as shown in the illustration.

(d) Employ the same manner described above to the other side.



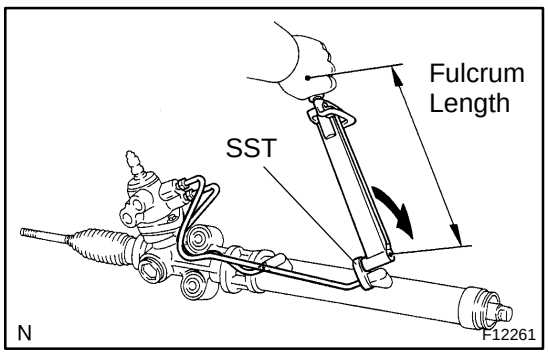


16. INSTALL RH AND LH TIE ROD ENDS AND LOCK NUTS

(a) Screw the lock nut and tie rod end onto the rack end until the matchmarks are aligned.

(b) After adjusting toe-in, torque the nut
(See page SA-5).
Torque: 56 N·m (570 kgf·cm, 41 ft·lbf)

(c) Employ the same manner described above to the other side.



17. INSTALL 2 TURN PRESSURE TUBES

Using SST, install the 2 turn pressure tubes.

SST 09023-38200

Torque: 22 N·m (220 kgf·cm, 16 ft·lbf)

HINT:

- Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).
- This torque value is effective in case that SST is parallel to a torque wrench.

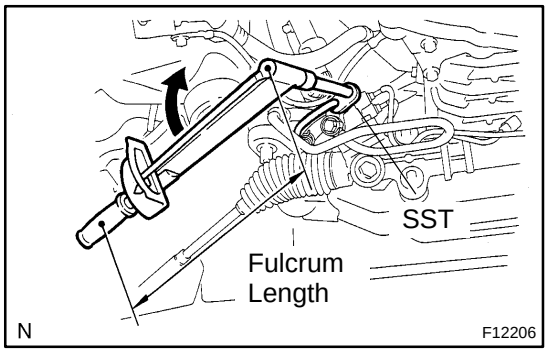
SR1C3-02

INSTALLATION

1. INSTALL GROMMET, BRACKET AND PS GEAR ASSEMBLY

Install the grommet, bracket and PS gear assembly with the 4 bolts.

Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)



2. CONNECT RETURN TUBE

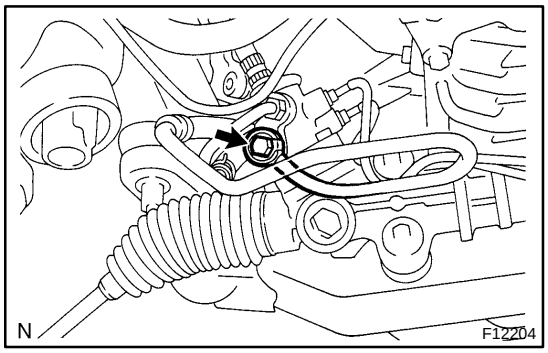
Using SST, connect the return tube.

SST 09023-38400

Torque: 40 N·m (410 kgf·cm, 30 ft·lbf)

HINT:

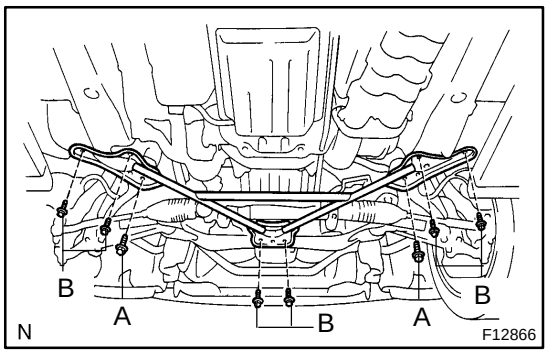
- Use a torque wrench with a fulcrum length of 345 mm (13.58 in).
- This torque value is effective in case that SST is parallel to a torque wrench.



3. CONNECT PRESSURE FEED TUBE

Install a new gasket, then connect the pressure feed tube with the union bolt.

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)



4. INSTALL FRONT SUSPENSION MEMBER BRACE

Install the front suspension member brace with the 8 bolts.

Torque:
Bolt A: 119 N·m (1,210 kgf·cm, 88 ft·lbf)
Bolt B: 58 N·m (590 kgf·cm, 43 ft·lbf)

5. CONNECT SLIDING YOKE (See page SR-25)

6. INSTALL NO. 2 ENGINE UNDER COVER

7. CONNECT RH AND LH TIE ROD ENDS (See page SA-37)

8. INSTALL RH AND LH FRONT BRAKE CALIPERS (See page BR-26)

9. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

HINT:

Do it with the front of the vehicle jacked up.

10. CENTER SPIRAL CABLE (See page SR-25)

11. INSTALL STEERING WHEEL

(a) Align the matchmarks on the steering wheel and steering column main shaft.

(b) Temporarily tighten the steering wheel set nut.

(c) Connect the connector.

12. **BLEED POWER STEERING SYSTEM**
    (See page SR-4)
13. **CHECK STEERING WHEEL CENTER POINT**
14. **TORQUE STEERING WHEEL SET NUT**
    Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)
15. **INSTALL STEERING WHEEL PAD (See page SR-25)**
16. **CHECK FRONT WHEEL ALIGNMENT**
    (See page SA-5)

SRS AIRBAG

RS01Y-54

PRECAUTION

CAUTION:

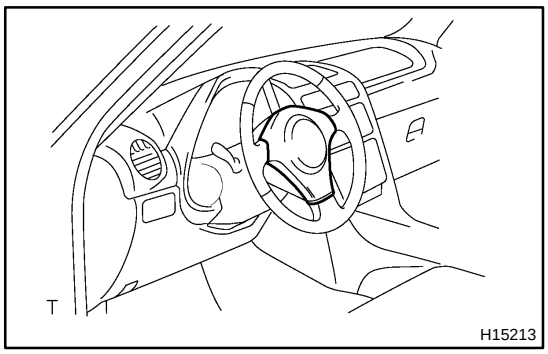
- **The LEXUS IS 300 is equipped with SRS, which comprises a driver airbag, front passenger airbag, side airbag and curtain shield airbag. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Further, if a mistake is made in servicing the SRS, it is possible that the SRS may fail to operate when required. Before performing servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedures described in the repair manual.**
- **Work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.**
  (The SRS is equipped with a back-up power source so that if work is started within 90 seconds from disconnecting the negative (-) terminal cable of the battery, the SRS may be deployed.)
- **Do not expose the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, airbag sensor assembly, front airbag sensor or side and curtain shield airbag sensor assembly directly to hot air or flames.**

NOTICE:

- **Malfunction symptoms of the SRS are difficult to confirm, so the DTCs become the most important source of information when troubleshooting. When troubleshooting the SRS, always inspect the DTCs before disconnecting the battery.**
- **Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad, front passenger airbag assembly, side airbag assembly, airbag sensor assembly, front airbag sensor, curtain shield airbag assembly and side and curtain shield airbag sensor assembly should be inspected (See page RS-15 , RS-29 , RS-43 , RS-43 , RS-58 , RS-69 , RS-74 and RS-79).**
- **Before repairs, remove the airbag sensor if shocks are likely to be applied to the sensor during repairs.**
- **Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.**
- **Never disassemble and repair the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, airbag sensor assembly, front airbag sensor or side and curtain shield airbag sensor assembly in order to reuse it.**
- **If the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, airbag sensor assembly, front airbag sensor or side and curtain shield airbag sensor assembly has been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace it with new one.**
- **Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting the system's electrical circuits.**
- **Information labels are attached to the periphery of the SRS components. Follow the instructions on the notices.**
- **After work on the SRS is completed, perform the SRS warning light check (See page DI-607).**
- **When the negative (-) terminal cable is disconnected from the battery, the memory of the clock and audio system will be canceled. So before starting work, make a record of the contents memorized in the audio memory system. When work is finished, reset the audio systems as they were before and adjust the clock. To avoid erasing the memory in each memory system, never use a back- up power supply from outside the vehicle.**
- **If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.**

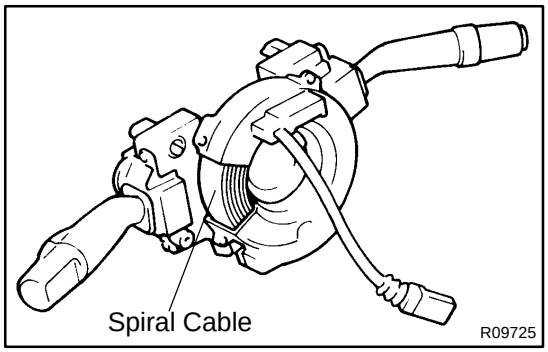
RS0UB-02

OPERATION



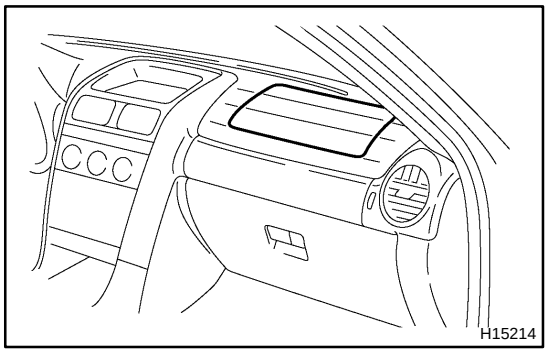
1. STEERING WHEEL PAD (with AIRBAG)

The inflater and bag of the SRS are stored in the steering wheel pad and cannot be disassembled. The inflater contains a squib, igniter charge, gas generator, etc., and inflates the bag when instructed by the airbag sensor assembly.



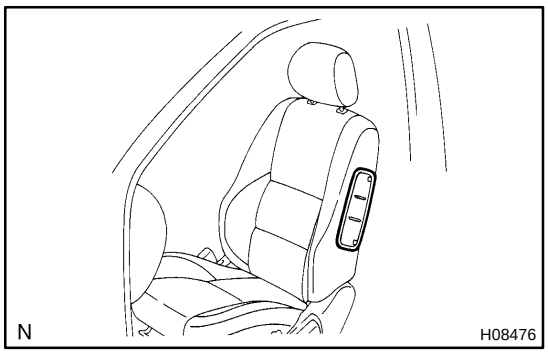
2. SPIRAL CABLE (in COMBINATION SWITCH)

A spiral cable is used as an electrical joint from the vehicle body side to the steering wheel.



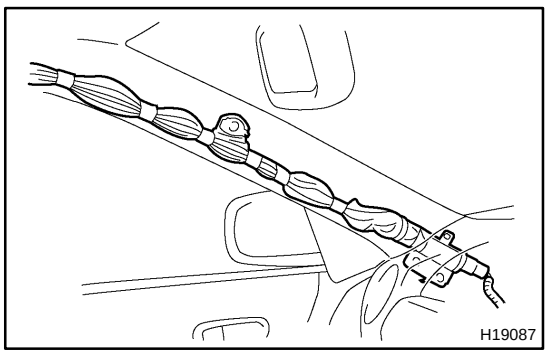
3. FRONT PASSENGER AIRBAG ASSEMBLY

The inflater and bag of the SRS are stored in the front passenger airbag assembly and cannot be disassembled. The inflater contains a squib, igniter charge, gas generator, etc., and inflates the bag when instructed by the airbag sensor assembly.



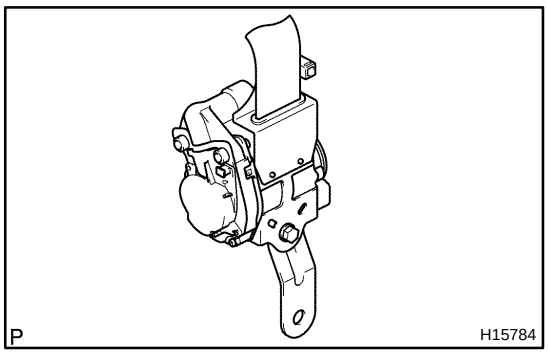
4. SIDE AIRBAG ASSEMBLY

The inflater and bag of the SRS side airbag are stored in the side airbag assembly and cannot be disassembled. The inflater contains a squib, igniter charge, gas generator, etc., and inflates the bag when instructed by the side and curtain shield airbag sensor assembly.



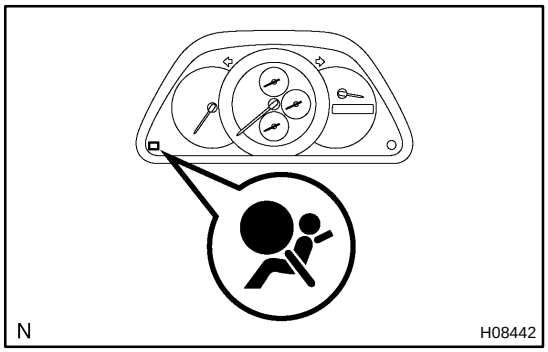
5. CURTAIN SHIELD AIRBAG ASSEMBLY

The inflater and bag of the SRS are stored in the curtain shield airbag assembly and cannot be disassembled. The inflater contains a squib, igniter charge, gas generator, etc., and inflates the bag when instructed by the airbag sensor assembly.



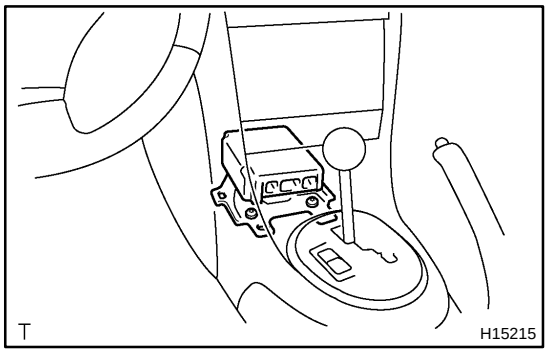
6. SEAT BELT PRETENSIONER

The seat belt pretensioner system is a component of the front seat outer belt. The pretensioner contains a squib, gas generator, wire, piston, etc., and operates in the event of a frontal collision. The seat belt pretensioner cannot be disassembled.



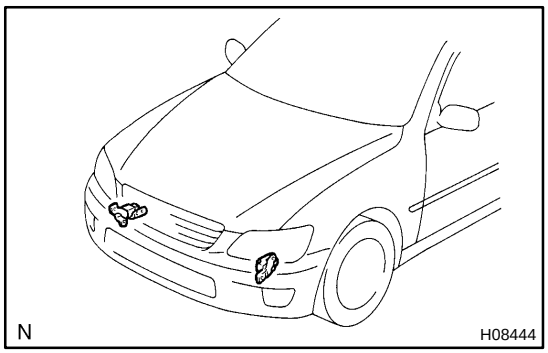
7. SRS WARNING LIGHT

The SRS warning light is located on the combination meter. It goes on to alert the driver of trouble in the system when a malfunction is detected in the airbag sensor assembly self-diagnosis. In normal operation conditions when the ignition switch is turned to the ON position, the light goes on for about 6 seconds and then goes off.



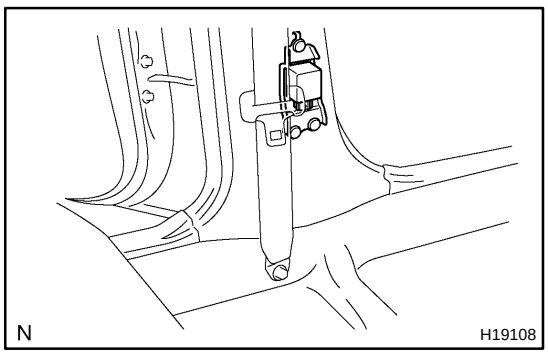
8. AIRBAG SENSOR ASSEMBLY

The airbag sensor assembly is mounted on the floor inside the console box. The airbag sensor assembly consists of an airbag sensor, safing sensor, diagnosis circuit, ignition control, drive circuit, etc. It receives signals from the airbag sensor, front airbag sensor, side and curtain shield airbag sensor assembly and door side airbag assembly and judges whether the SRS must be activated or not. The airbag sensor assembly cannot be disassembled.



9. FRONT AIRBAG SENSOR

The front airbag sensor is mounted inside each of the side members. The sensor unit is a mechanical type. When the sensor detects deceleration force above a predetermined limit, contact is made in the sensor, sending a signal to the airbag sensor assembly. The front airbag sensor cannot be disassembled.



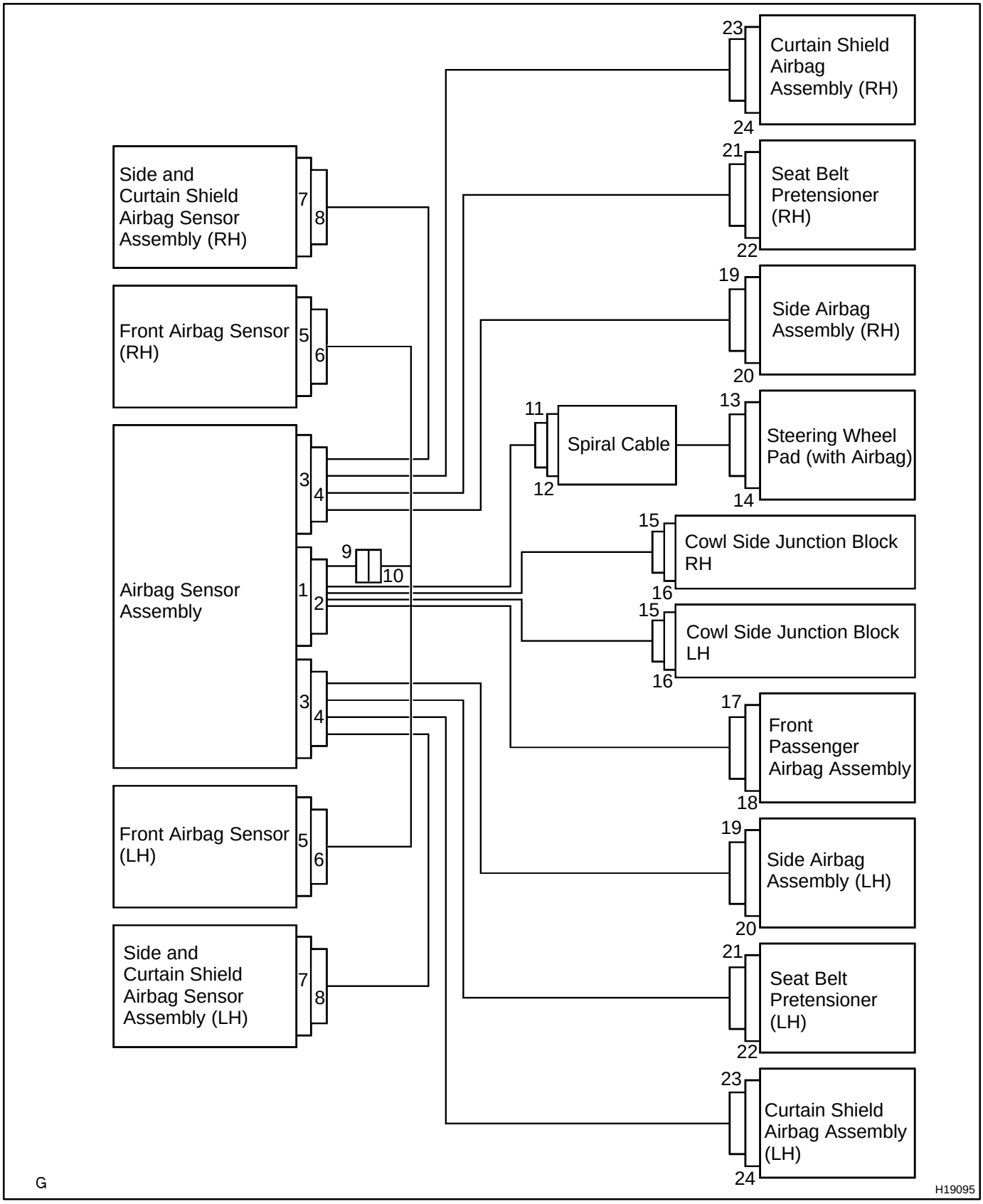
10. SIDE AND CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY

The side and curtain shield airbag sensor assembly is mounted in the LH and RH center pillars. The side and curtain shield airbag sensor assembly consists of a lateral deceleration sensor, safing sensor, diagnosis circuit, etc. It sends signals to the airbag sensor assembly to judge whether the SRS side and curtain shield airbag must be activated or not. The side and curtain shield airbag sensor assembly cannot be disassembled.

11. SRS CONNECTORS

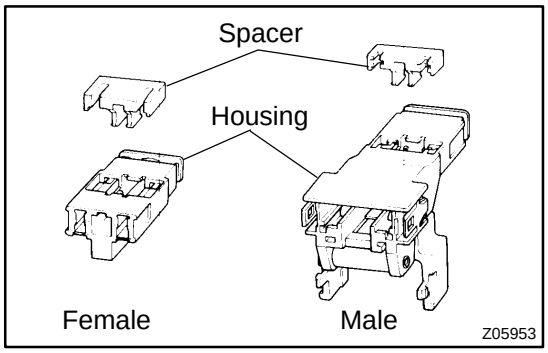
HINT:

SRS connectors are located as shown in the following illustration.



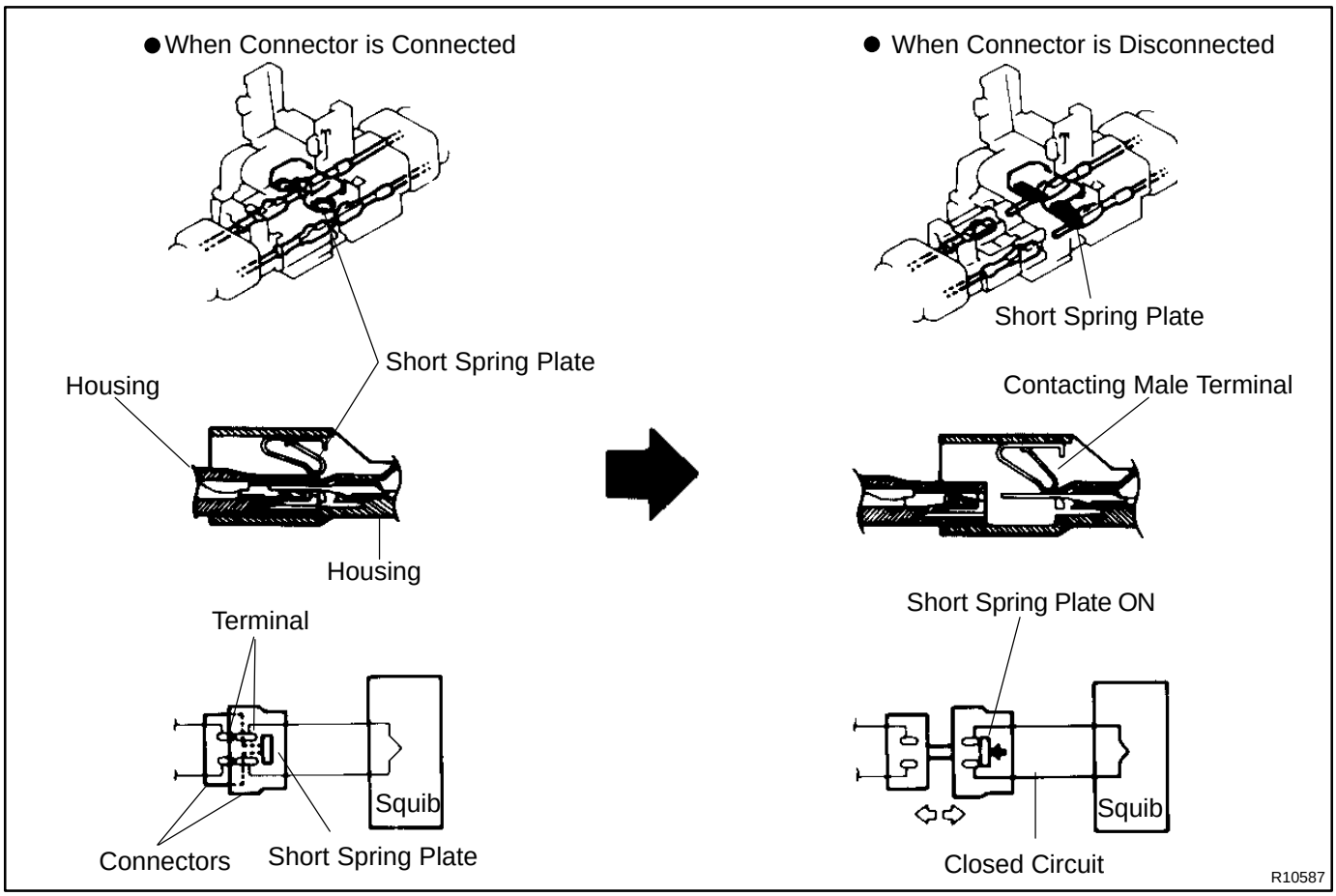
No.	Item	Application
(1)	Terminal Twin-Lock Mechanism	Connectors 2, 4, 6, 8, 9, 10, 11, 12, 13, 15, 16, 17, 19, 21, 23
(2)	Airbag Activation Prevention Mechanism	Connectors 2, 4, 12, 14, 18, 20, 22, 24
(3)	Electrical Connection Check Mechanism	Connectors 1, 2, 3, 4
(4)	Half Connection Prevention Mechanism	Connectors 6, 8, 9, 11, 13, 17, 19, 21, 23
(5)	Connector Twin-Lock Mechanism	Connectors 16

(a) All connectors in the SRS are colored in yellow to distinguish them from other connectors. Connectors having special functions and specifically designed for the SRS are used in the locations shown on the previous page to ensure high reliability. These connectors use durable gold-plated terminals.

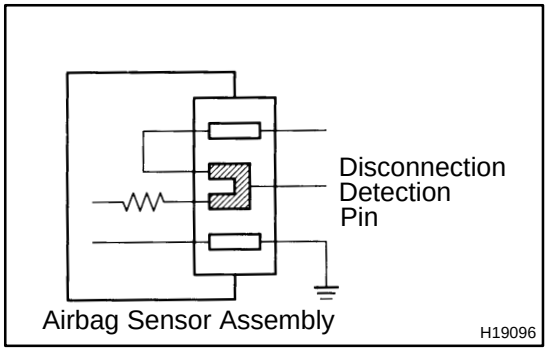


(1) Terminal twin-lock mechanism:
Each connector has a two-piece component consisting of a housing and a spacer. This design enables the terminal to be locked securely by two locking devices (the retainer and the lance) to prevent terminals from coming out.

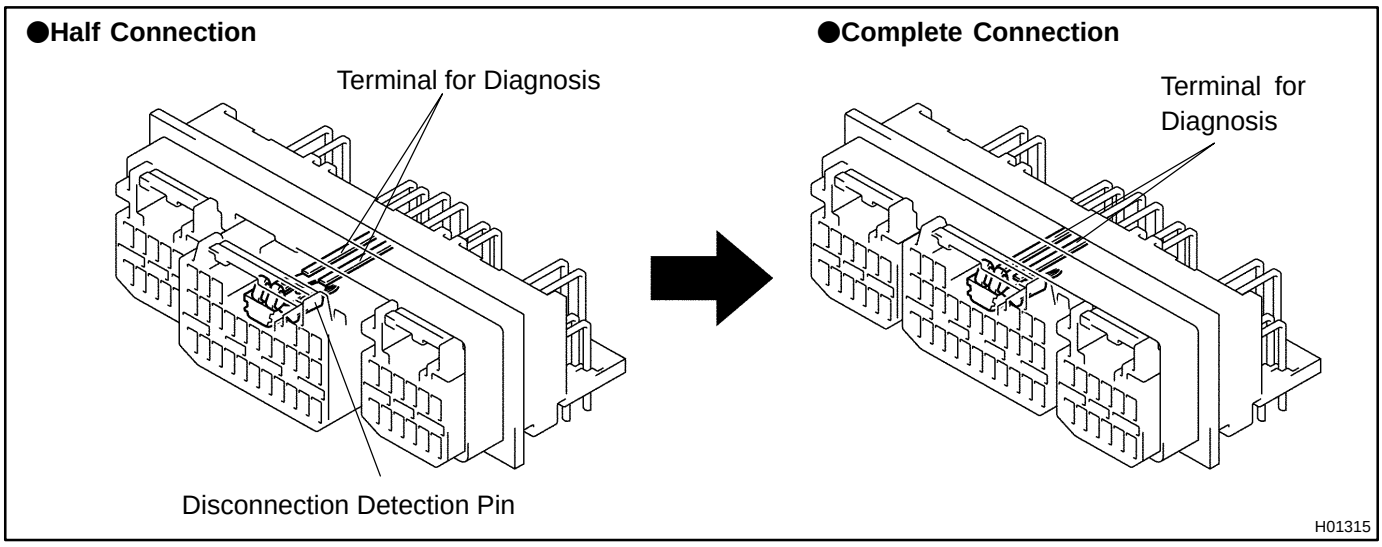
(2) Airbag activation prevention mechanism:
Each connector contains a short spring plate. When the connector is disconnected, the short spring plate automatically connects positive (+) terminal and negative (-) terminal of the squib.



HINT:
The type of connector is shown in the diagram on the previous page.

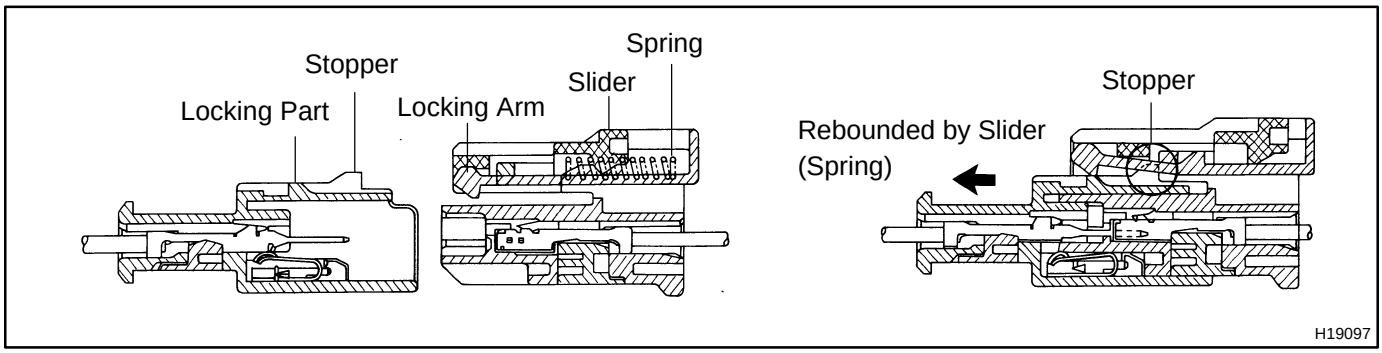


(3) Electrical connection check mechanism:
This mechanism electrically checks that connectors are connected correctly and completely. The electrical connection check mechanism is designed so that the disconnection detection pin connects with the diagnosis terminals when the connector housing lock is locked.

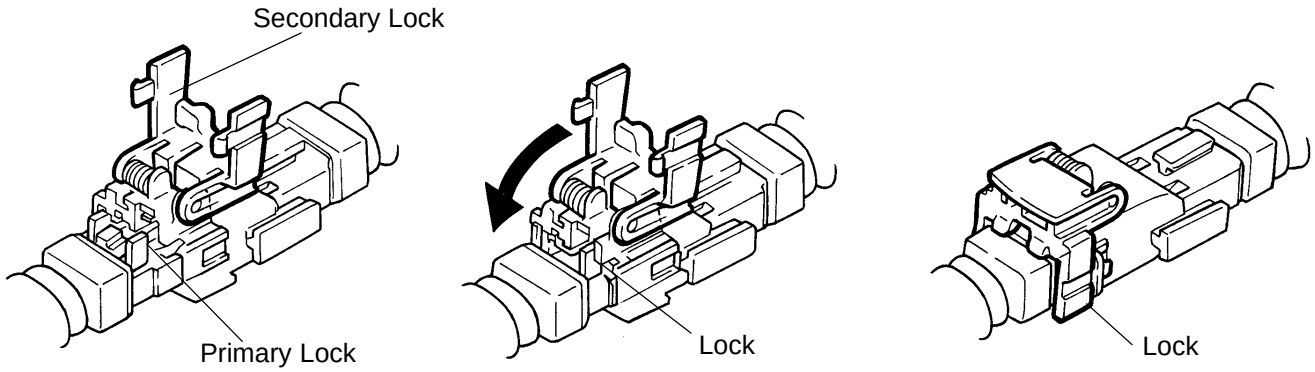


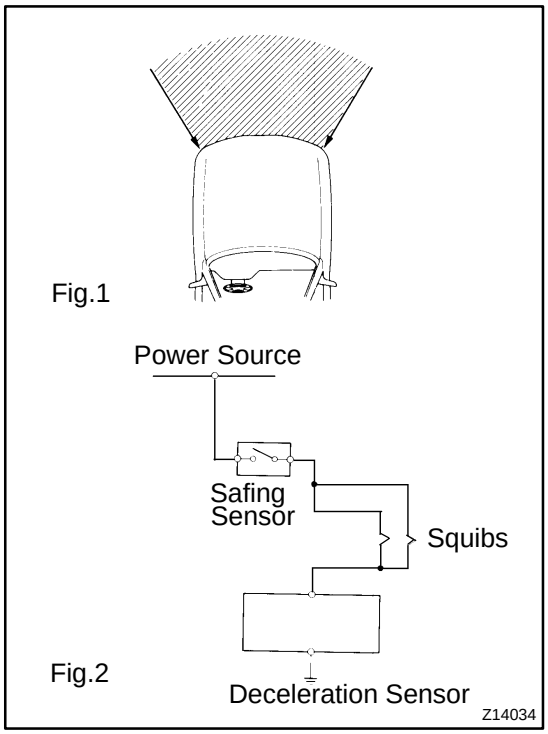
HINT:
The connectors shown in this illustration are connectors, "1", "2" and "3" in step 8.

(4) Half connection prevention mechanism:
If the connector is not completely connected, the connector is disconnected due to the spring operation to the extent that no continuity exists.

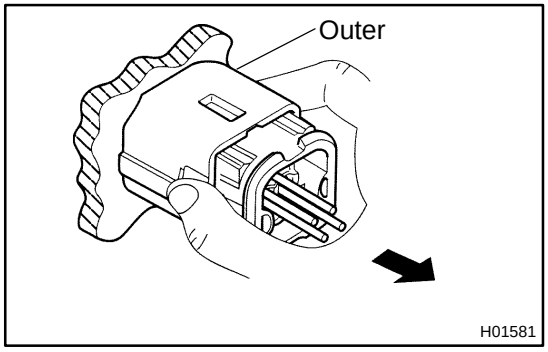


(5) Connector twin-lock mechanism:
With this mechanism connectors (male and female connectors) are locked by 2 locking devices to increase the connection reliability. If the primary lock is incomplete, ribs interfere and prevent the secondary lock.





(b) When the vehicle is involved in a frontal collision in the hatched area (Fig. 1) and the shock is larger than the predetermined level, the SRS is activated automatically. A safing sensor is designed to go on at a smaller deceleration rate than the airbag sensor. As illustrated in Fig. 2, ignition is caused when current flows to the squib, which happens when a safing sensor and the deceleration sensor go on simultaneously. When a deceleration force acts on the sensors, 2 squibs in the driver airbag and front passenger airbag ignite and generate gas. The gas discharging into the driver airbag and front passenger airbag rapidly increases the pressure inside the bags, breaking open the steering wheel pad and instrument panel.
Bag inflation then ends, and the bags deflate as the gas is discharged through discharge holes at the bag's rear or side.



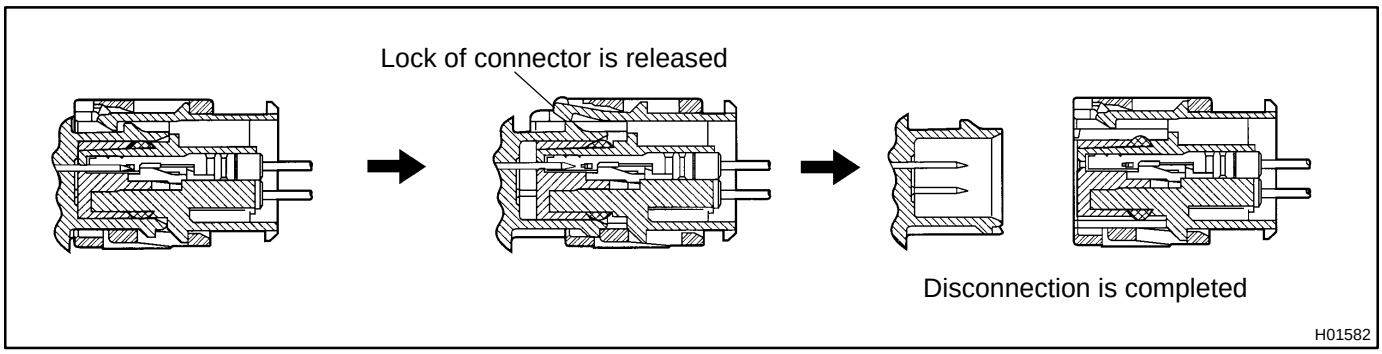
12. DISCONNECTION OF CONNECTORS FOR FRONT AIRBAG SENSOR AND SIDE AND CURTAIN SHIELD AIRBAG SENSOR

(a) While holding both flank sides of the outer, slide the outer to the direction shown by an arrow.

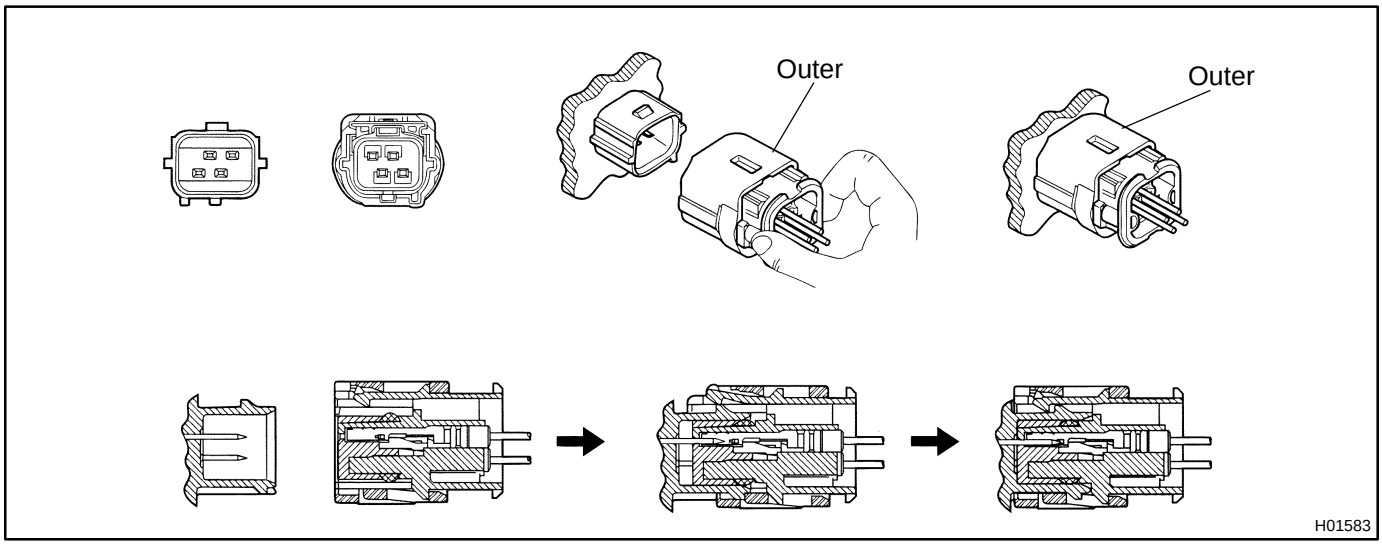
(b) Lock of the connectors is released, then disconnect the connectors.

HINT:

Be sure to hold both flank sides of the outer. If holding the top and bottom sides, it will obstruct disconnection.



13. CONNECTION OF CONNECTORS FOR FRONT AIRBAG SENSOR AND SIDE AND CURTAIN SHIELD AIRBAG SENSOR



(a) Align the male connector (of the side of sensor) and female connector in the same direction as shown in the illustration and fit in them without rubbing.

(b) As they are fitted in, the outer slides rearward. Press it until the outer returns to its original position again.

If fitting stops half way, connectors will separate.

(c) Be sure to insert until they are locked. After fitting in, pull them slightly to check that they are locked. (When locked, make sure that the outer returns to its original position and sound at the time of fitting in can be heard.)

HINT:

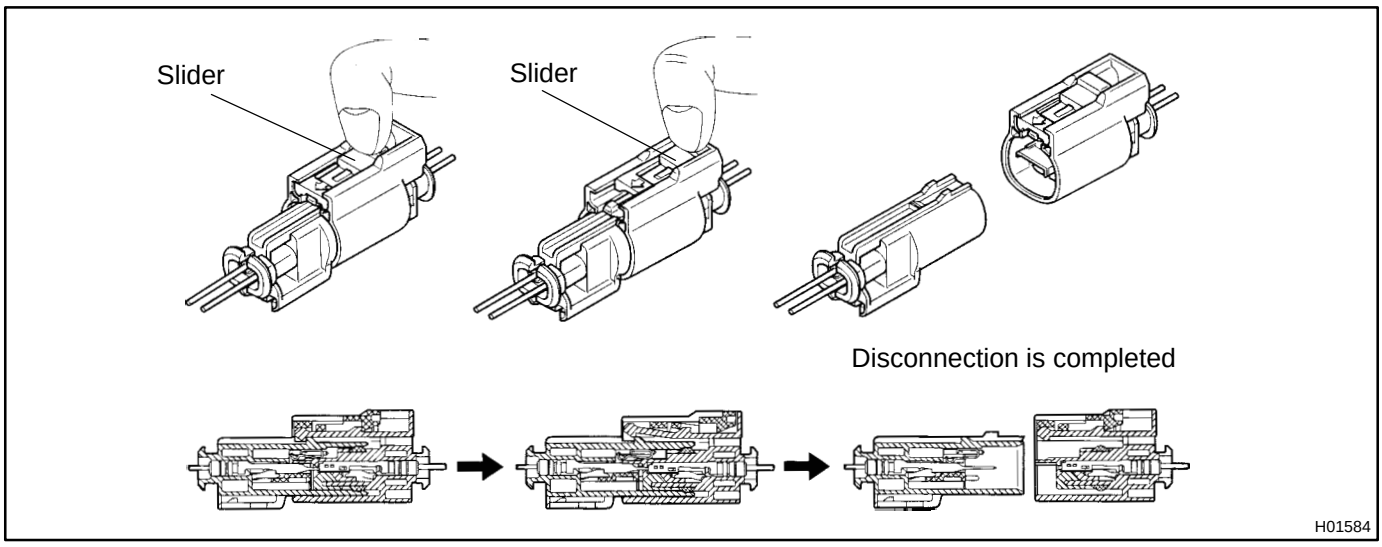
- Do not fit in while holding the outer.
- When fitting in, the outer slides. Do not touch it.

14. DISCONNECTION OF SIDE AIRBAG CONNECTOR

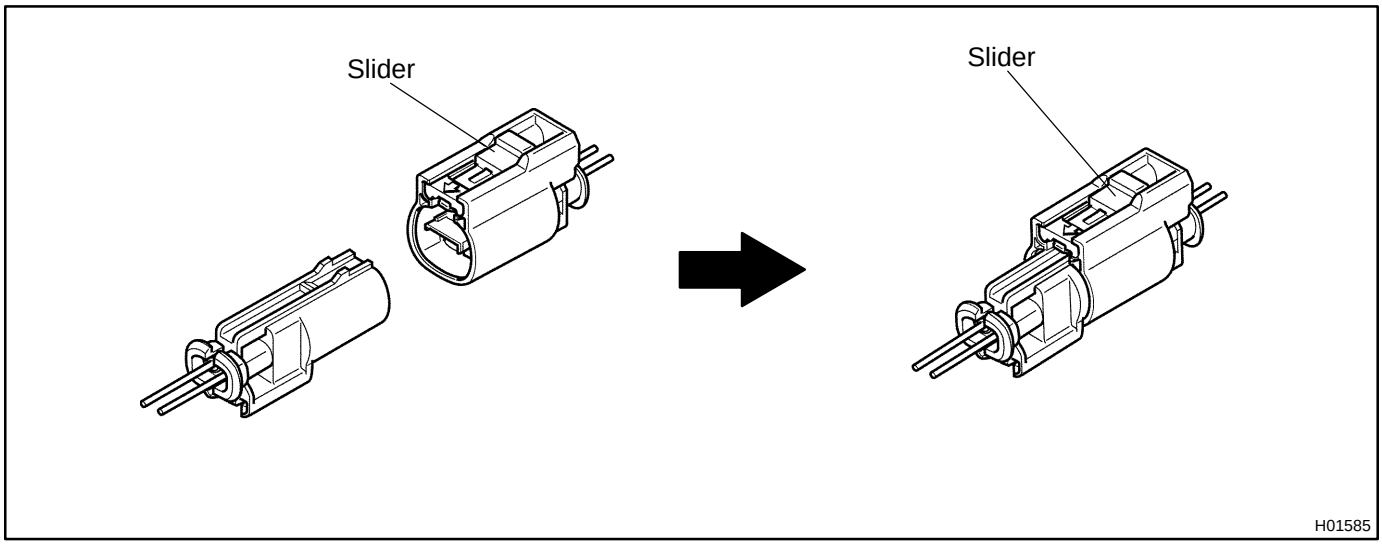
(a) Place a finger on the slider.

(b) Slide the slider to release lock.

(c) Disconnect the connector.



15. CONNECTION OF SIDE AIRBAG CONNECTOR



(a) Align a lock part of male connector and a slider of female connector in the same direction as shown in the illustration, fit in them without rubbing.

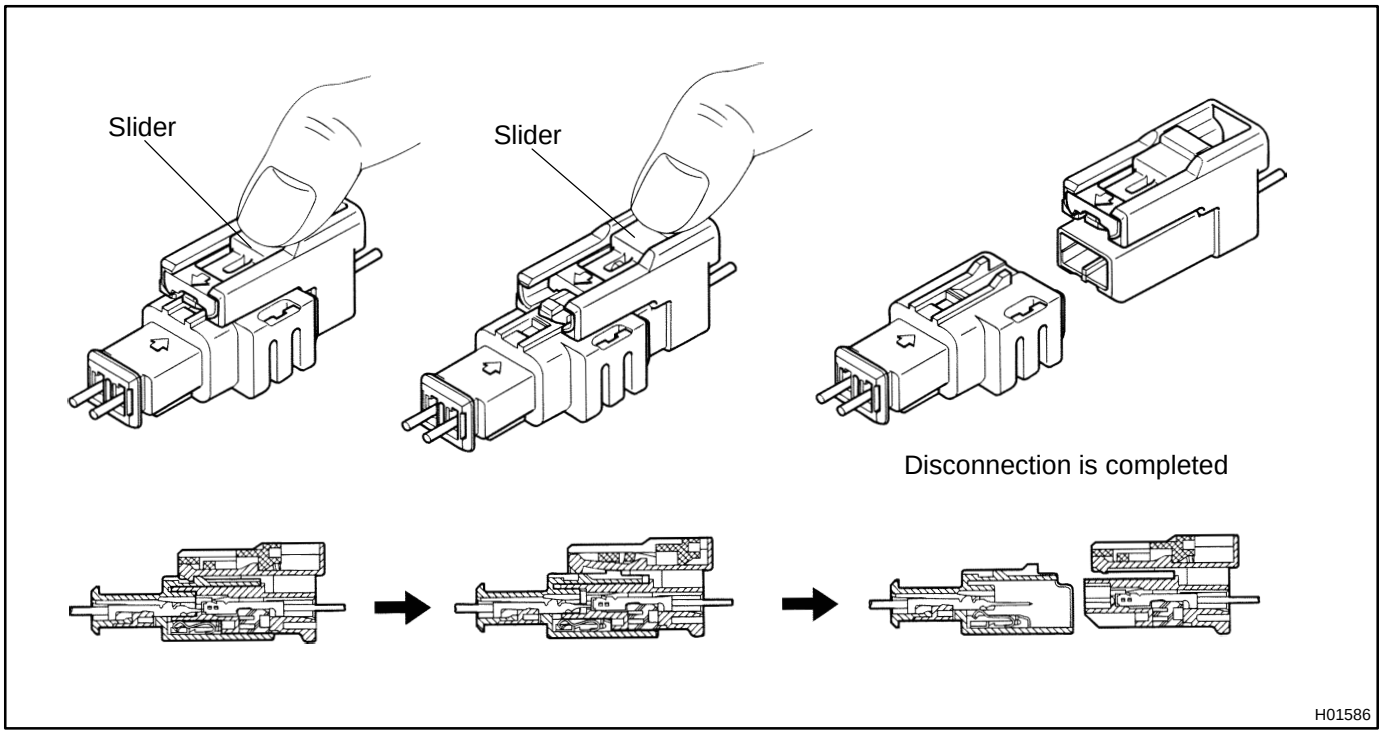
(b) Be sure to insert until they are locked. After fitting in pull them slightly to check that they are locked. (When locked, make sure that the outer returns to its original position and sound at the time of fitting in can be heard.)

HINT:

- As the slider slides, do not touch it.
- Be careful not to deform the release board. If the release board is deformed, replace it with a new one.

16. DISCONNECTION OF CONNECTORS FOR STEERING WHEEL PAD (with AIRBAG), CURTAIN SHIELD AIRBAG ASSEMBLY AND FRONT PASSENGER AIRBAG ASSEMBLY

(a) Place a finger on the slider.
(b) Slide the slider to release lock.
(c) Disconnect the connector.



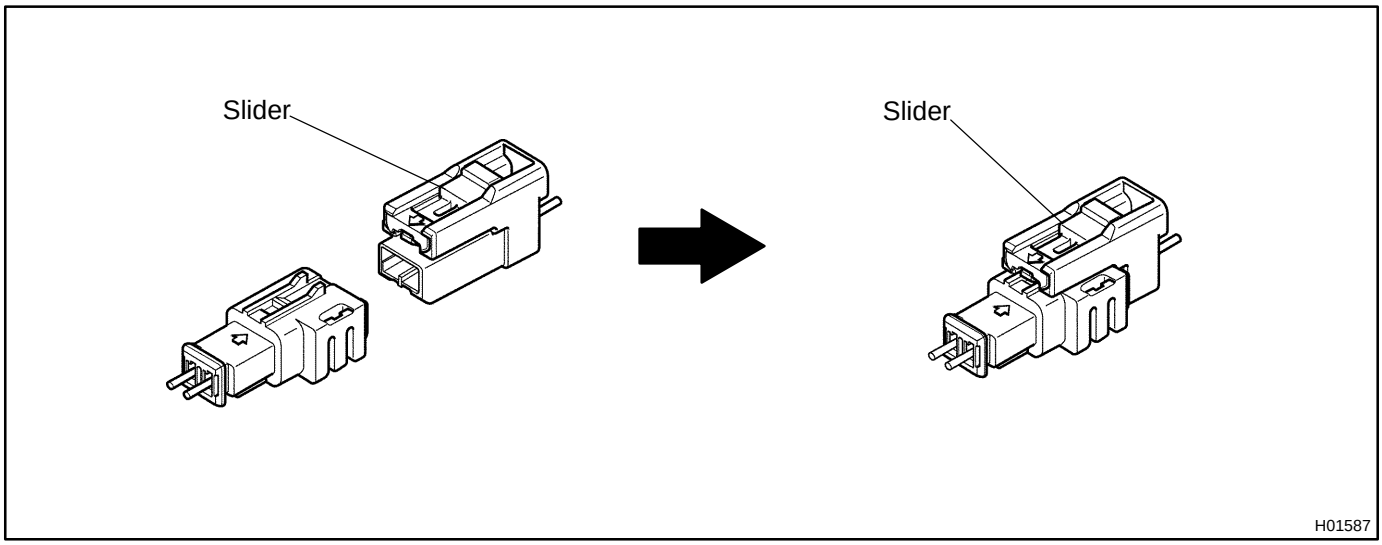
17. CONNECTION OF CONNECTORS FOR STEERING WHEEL PAD (with AIRBAG), CURTAIN SHIELD AIRBAG ASSEMBLY AND FRONT PASSENGER AIRBAG ASSEMBLY

(a) Align a lock part of male connector and a slider of female connector in the same direction as shown in the illustration, fit in them without rubbing.

(b) Be sure to insert until they are locked. After fitting in pull them slightly to check that they are locked. (When locked, make sure that the outer returns to its original position and sound at the time of fitting in can be heard.)

HINT:

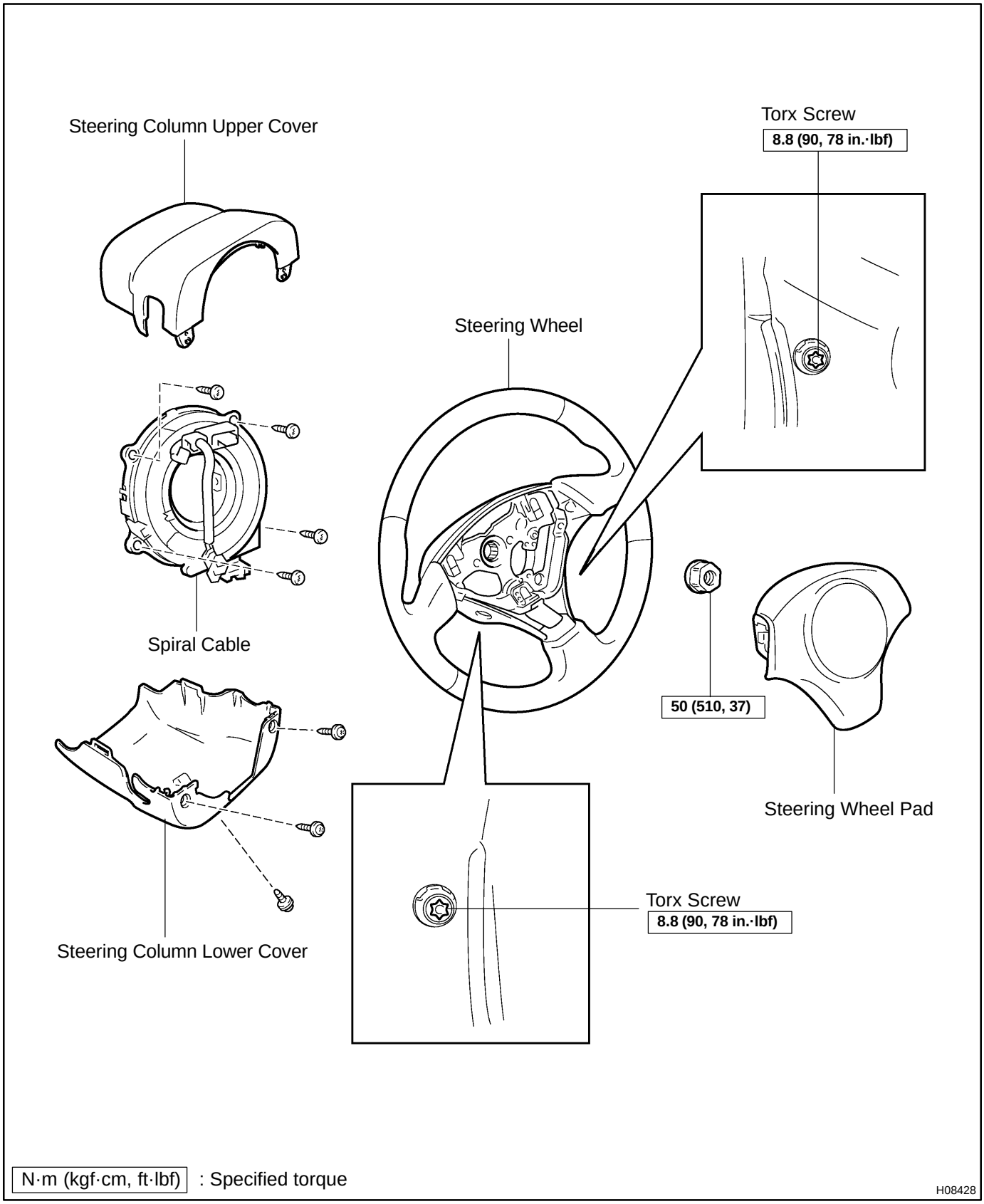
- As the slider slides, do not touch it.
- Be careful not to deform the release board. If the release board is deformed, replace it with a new one.



STEERING WHEEL PAD AND SPIRAL CABLE

COMPONENTS

RS00Y-52



RS00Z-18

REMOVAL

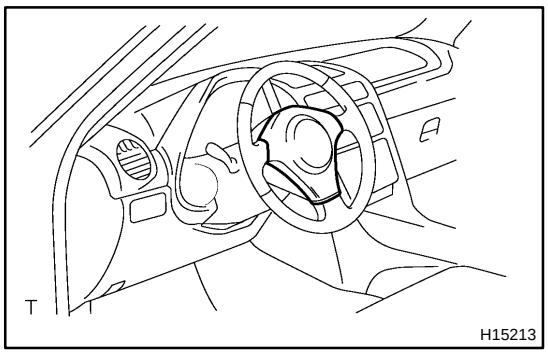
HINT:

For step 1 to 4, refer to page SR-13 .

1. **REMOVE STEERING WHEEL PAD**
2. **REMOVE STEERING WHEEL**
3. **REMOVE STEERING COLUMN UPPER AND LOWER COVERS**
4. **REMOVE SPIRAL CABLE**

RS0RF-02

INSPECTION



1. Vehicle not involved in collision:

INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-607).

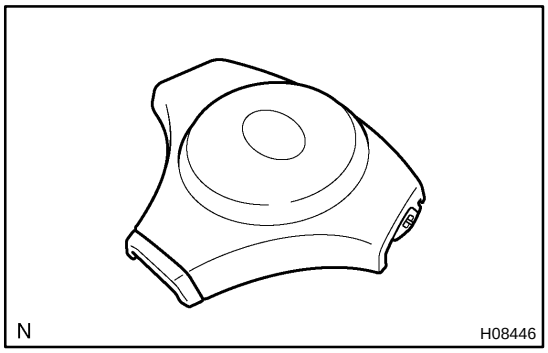
(b) Do a visual check which includes the following items with the steering wheel pad (with airbag) installed in the vehicle.

Check cuts, minute cracks or marked discoloration on the steering wheel pad top surface and in the grooved portion.

2. Vehicle involved in collision and airbag is not deployed:

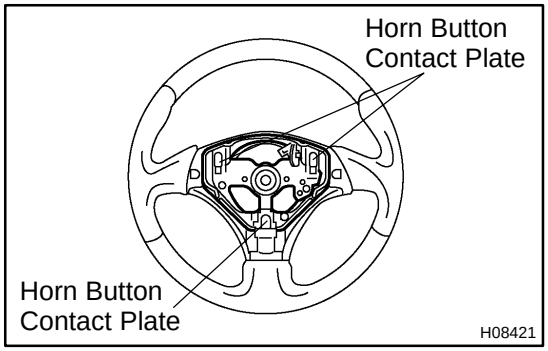
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-607).



(b) Do a visual check which includes the following items with the steering wheel pad (with airbag) removed from the vehicle.

- Check cuts, minute cracks or marked discoloration on the steering wheel pad top surface and in the grooved portion.
- Check cuts and cracks in the wire harness, and chipping in the connectors.



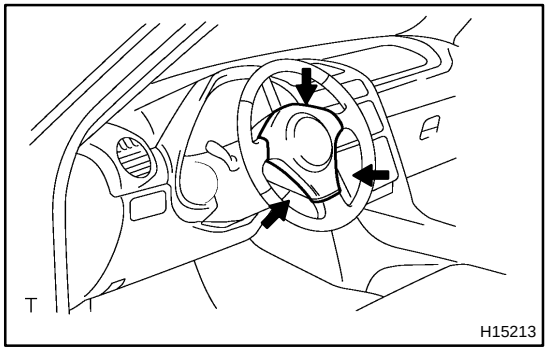
- Check the deformation of the horn button contact plate on the steering wheel.

CAUTION:

For removal and installation of the steering wheel pad, see page SR-13 and SR-25 , and be sure to follow the correct procedure.

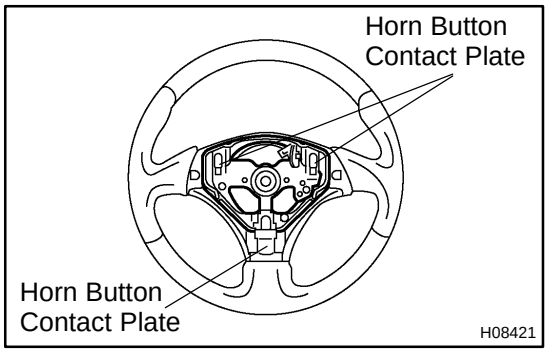
HINT:

- If the horn button contact plate of the steering wheel is deformed, never repair it. Always replace the steering wheel assembly with a new one.
- There should be no interference between the steering wheel pad and steering wheel, and the clearance should be uniform all the way around when a new steering wheel pad is installed on the steering wheel.



3. Vehicle involved in collision and airbag is deployed: INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-607).

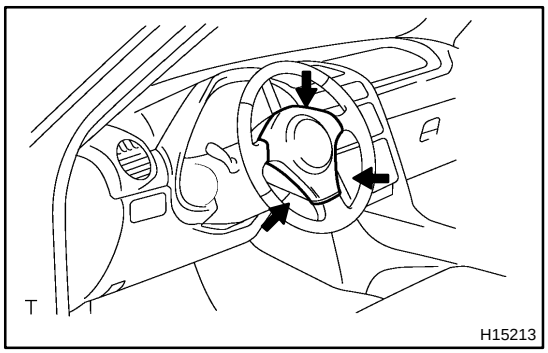


(b) Do a visual check which includes the following items with the steering wheel pad (with airbag) removed from the vehicle.

- Check the deformation on the horn button contact plate of the steering wheel.
- Check the damage on the spiral cable connector and wire harness.

HINT:

- If the horn button contact plate of the steering wheel is deformed, never repair it. Always replace the steering wheel assembly with a new one.



- There should be no interference between the steering wheel pad and steering wheel, and the clearance should be uniform all the way around when a new steering wheel pad is installed on the steering wheel.

RS0RG-03

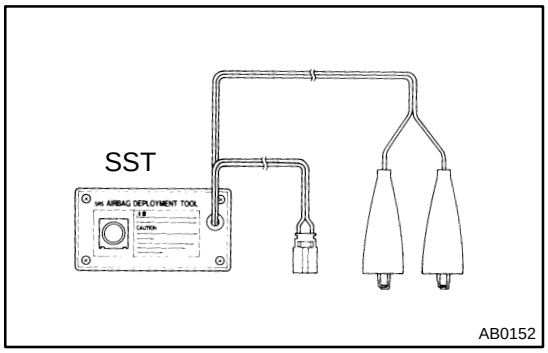
DISPOSAL

HINT:

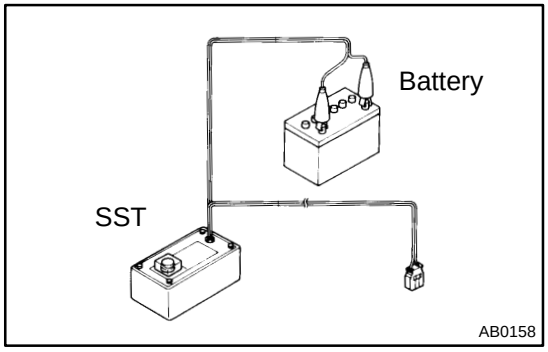
When scrapping vehicle equipped with an SRS or disposing of a steering wheel pad (with airbag), always first deploy the airbag in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Never dispose of a steering wheel pad which has an undeployed airbag.**
- **The airbag produces a sizeable exploding sound when it deploys, so perform the operation out-of-doors and where it will not create a nuisance to nearby residents.**



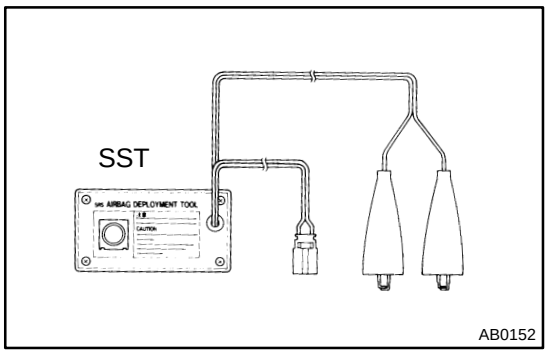
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
  SST 09082-00700
- **When deploying an airbag, perform the operation at least 10 m (33 ft) away from the steering wheel pad.**
- **The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering wheel pad with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a steering wheel pad with the deployed airbag.**



1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

Have a battery ready as the power source to deploy the airbag.

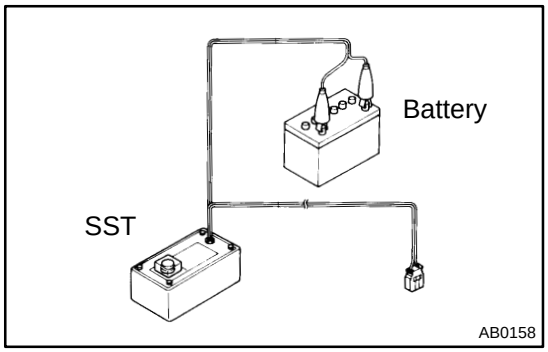


(a) Check functioning of the SST.

CAUTION:

When deploying the airbag, always use the specified SST: SRS Airbag Deployment Tool.

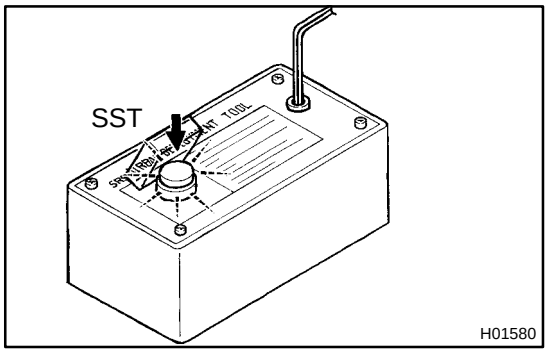
SST 09082-00700



(1) Connect the SST to the battery.
Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.

HINT:

Do not connect the yellow connector which will be connected with the supplemental restraint system.

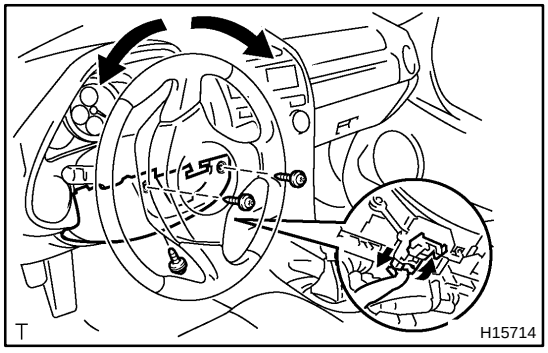


(2) Check functioning of the SST.
Press the SST activation switch, and check that the LED of the SST activation switch lights up.

CAUTION:

If the LED lights up when the activation switch is not being pressed, SST malfunction is probable, so definitely do not use the SST.

(3) Disconnect the SST from the battery.



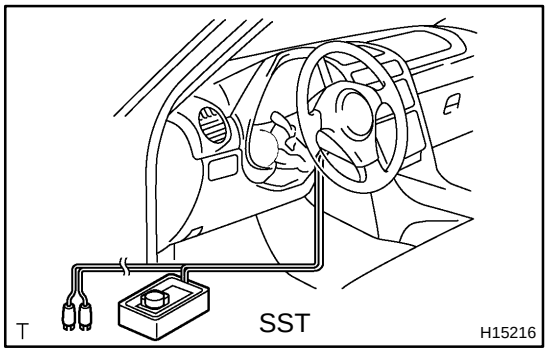
(b) Install the SST.

CAUTION:

Check that there is no looseness in the steering wheel and steering wheel pad.

(1) While turning the steering wheel right/left, remove the 3 screws and column lower cover.

(2) Disconnect the airbag connector of the spiral cable.

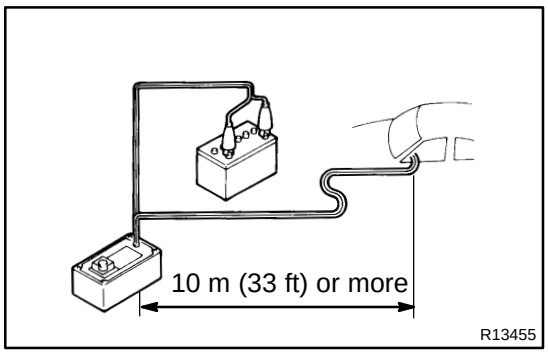


(3) Connect the SST connector to the airbag connector of the spiral cable.

SST 09082-00700

NOTICE:

To avoid damaging the connector of the SST and wire harness, do not lock the secondary lock of the twin lock.



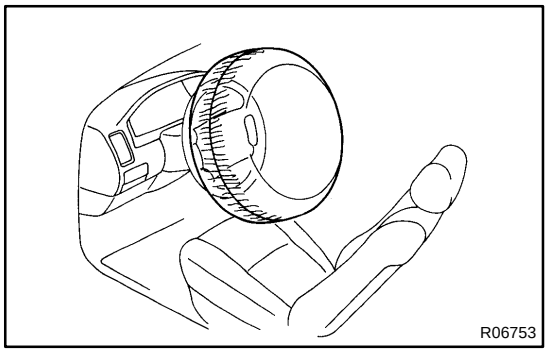
(4) Move the SST at least 10 m (33 ft) away from the front of the vehicle.

(5) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(6) Connect the SST red clip to the battery positive (+) terminal and the black clip to the negative (-) terminal.



(c) Deploy the airbag.

(1) Confirm that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering wheel pad with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a steering wheel pad with the deployed airbag.**
- **When scrapping a vehicle, deploy the airbag and scrap the vehicle with the steering wheel pad still installed.**
- **When moving a vehicle for scrapping which has a steering wheel pad with deployed airbag, use gloves and safety glasses.**

HINT:

The airbag deploys simultaneously as the LED of the SST activation switch lights up.

2. DEPLOYMENT WHEN DISPOSING OF STEERING WHEEL PAD ONLY

NOTICE:

- **When disposing of the steering wheel pad (with airbag) only, never use the customers vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

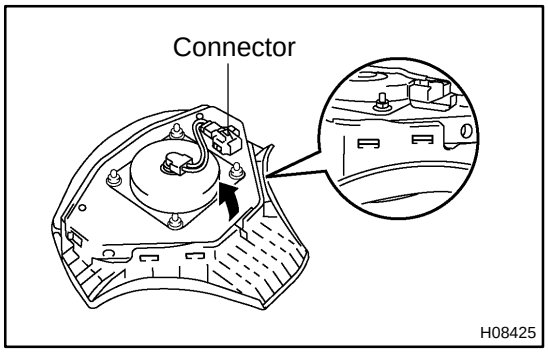
HINT:

Have a battery ready as the power source to deploy the airbag.

(a) Remove the steering wheel pad (See page SR-13).

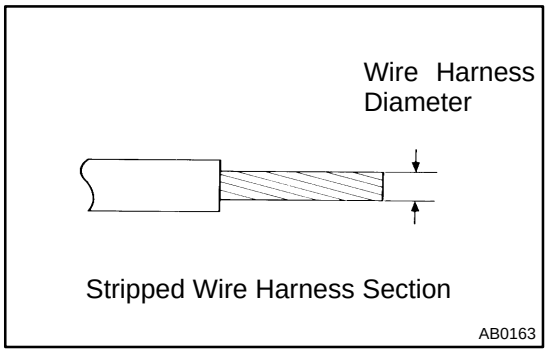
CAUTION:

- **When removing the steering wheel pad, work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.**
- **When storing the steering wheel pad, keep the upper surface of the pad facing upward.**



(b) Remove the connector on the rear surface of the steering wheel pad from the bracket.

(c) Disconnect the engagement of the claw and remove the steering wheel pad cover.



(d) Using a service-purpose wire harness, tie down the steering wheel pad to the disc wheel.

Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in^2. or more).

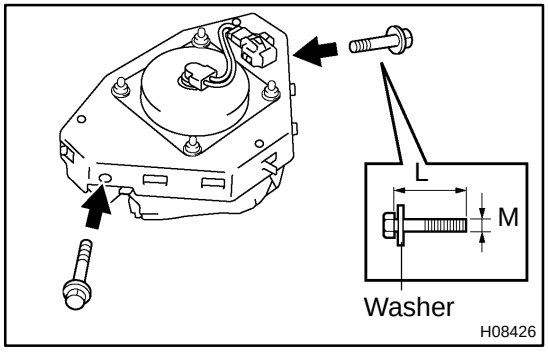
CAUTION:

If a wire harness which is too thin or some other thing is used to tie down the steering wheel pad, it may be snapped by the shock when the airbag is deployed. This is highly dangerous. Always use a wire harness for vehicle use which is at least 1.25 mm^2 (0.0019 in^2).

HINT:

To calculate the square of the stripped wire harness section:

Square = 3.14 x (Diameter)^2 divided by 4



(1) Install the 2 bolts with the washers in the 2 bolt holes in the steering wheel pad.

Bolt:

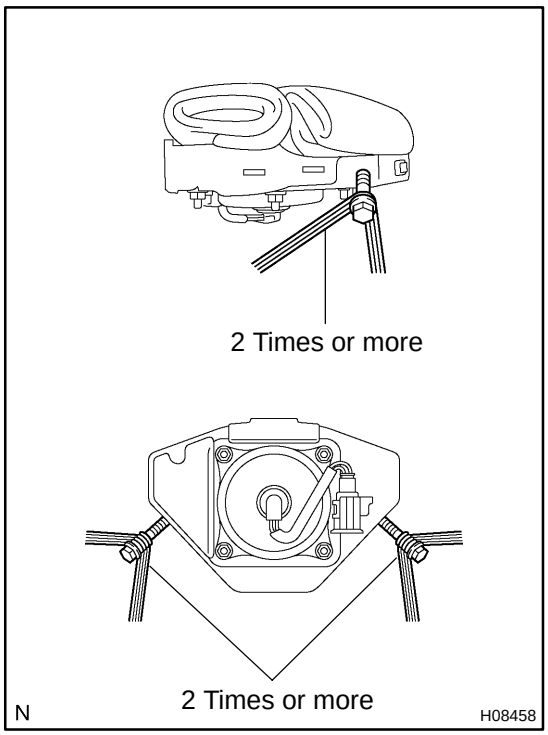
L: 35.0 mm (1.387 in.)

M: 6.0 mm (0.236 in.)

Pitch: 1.0 mm (0.039 in.)

NOTICE:

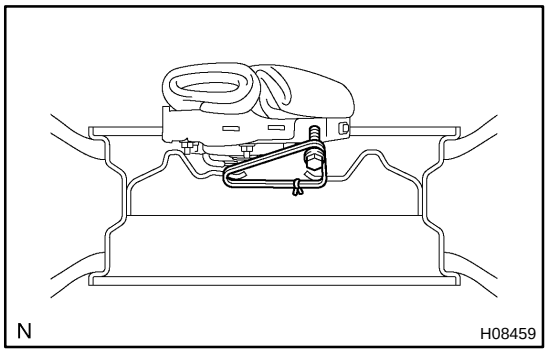
- **Tighten the bolts by hand until the bolts become difficult to turn.**
- **Do not tighten the bolts too much.**



(2) Using 3 wire harness, wind the wire harness at least 2 times each around the bolts installed on the left and right sides of the steering wheel pad.

CAUTION:

- **Tightly wind the wire harness around the bolts so that there is no slack.**
- **If there is slack in the wire harness, the steering wheel pad may come loose due to the shock when the airbag is deployed. This is highly dangerous.**



(3) Face the upper surface of the steering wheel pad upward. Separately tie the left and right sides of the steering wheel pad to the disc wheel through the hub nut holes. Position the steering wheel pad connector so that it hangs downward through a hub hole in the disc wheel.

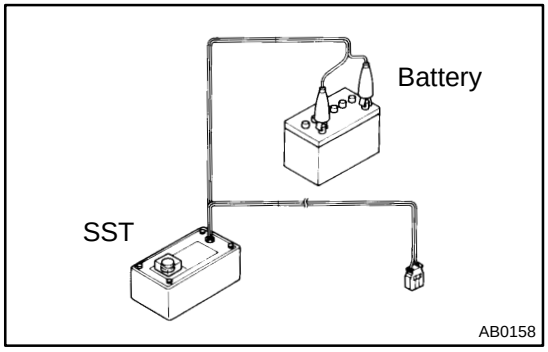
CAUTION:

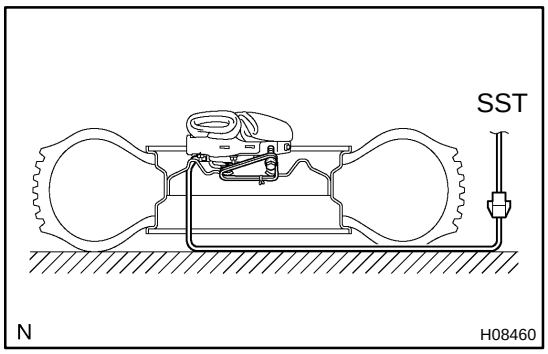
- **Make sure that the wire harness is tight. It is very dangerous when looseness in the wire harness results in the steering wheel pad coming free through the shock from the airbag deploying.**
- **Always tie down the steering wheel pad with the pad side facing upward. It is very dangerous if the steering wheel pad is tied down with the metal surface facing upward as the wire harness will be cut by the shock from the airbag deploying and the steering wheel pad will be thrown into the air.**

NOTICE:

The disc wheel will be marked by airbag deployment, so when disposing of the airbag use a redundant disc wheel.

(e) Check functioning of the SST (See step 1-(a)).
SST 09082-00700





(f) Install the SST.

CAUTION:

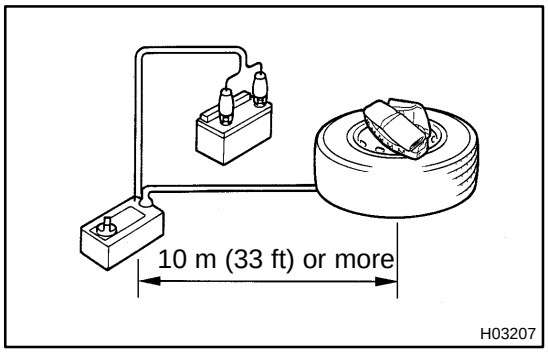
Place the disc wheel on the level ground.

(1) Connect the connector of 2 SST to the steering wheel pad connector.

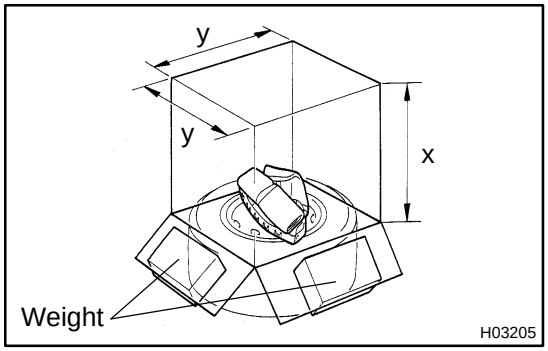
SST 09082-00700, 09082-00760

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the disc wheel.



(2) Move the SST to at least 10 m (33 ft) away from the steering wheel pad tied down on the disc wheel.



(g) Cover the steering wheel pad with a cardboard box or tires.

- Covering method using a cardboard box:
  Cover the steering wheel pad with the cardboard box and weight the cardboard box down in 4 places with at least 190 N (20 kg, 44 lb).

Size of cardboard box:

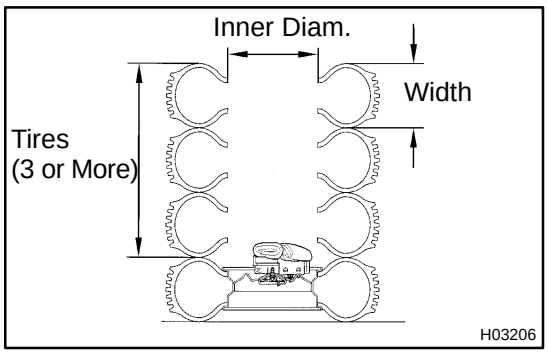
Must exceed the following dimensions:

X = 460 mm (18.11 in.)

Y = 650 mm (25.59 in.)

NOTICE:

- **When dimension Y of the cardboard box exceeds the diameter of the disc wheel with tire to which the steering wheel pad is tied, X should be the following size.**
  X = 460 mm (18.11 in.) + width of tire
- **If a cardboard box smaller than the specified size is used, the cardboard box will be broken by the shock from the airbag deployment.**



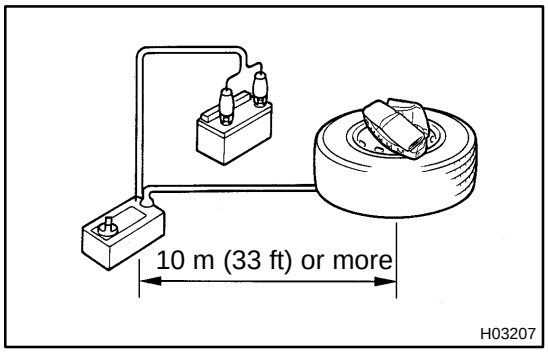
- Covering method using tires:
  Place at least 3 tires without disc wheel on top of the disc wheel with tire to which the steering wheel pad is tied.

Tire size: Must exceed the following dimensions-
Width: 185 mm (7.87 in.)
Inner diameter: 360 mm (14.17 in.)

CAUTION:
Do not use tires with disc wheels.

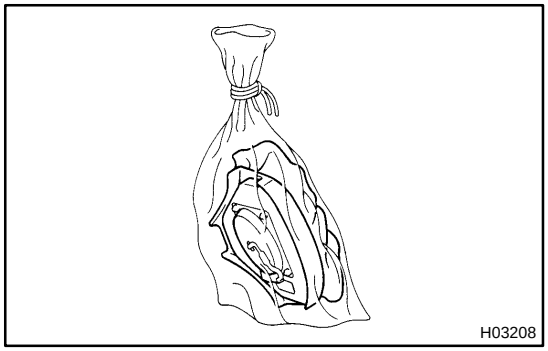
NOTICE:
The tires may be marked by the airbag deployment, so use the redundant tires.

(h) Deploy the airbag.
  (1) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.



  (2) Check that no one is within 10 m (33 ft) area around the disc wheel which the steering wheel pad is tied to.
  (3) Press the SST activation switch and deploy the airbag.

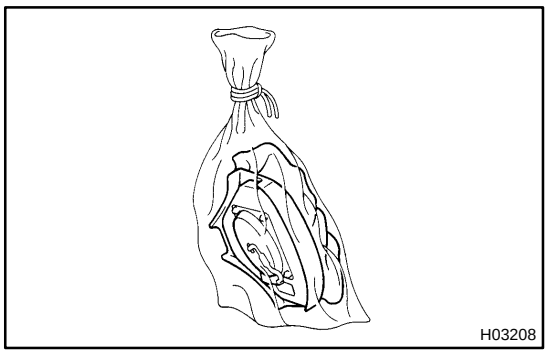
HINT:
The airbag deploys simultaneously as the LED of the SST activation switch lights up.



(i) Dispose of the steering wheel pad (with airbag).

CAUTION:
- **The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering wheel pad with deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a steering wheel pad with deployed airbag.**

  (1) Remove the steering wheel pad from the disc wheel.
  (2) Place the steering wheel pad in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts disposal.



3. DEPLOYMENT WHEN DISPOSING OF STEERING WHEEL PAD WITH AIRBAG DEPLOYED IN COLLISION

Dispose of the steering wheel pad (with airbag).

CAUTION:

- **The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **When moving a vehicle for scrapping which has a steering wheel pad with the deployed airbag, use gloves and safety glasses.**
- **Use gloves and safety glasses when handling a steering wheel pad with deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a steering wheel pad with the deployed airbag.**

(1) Remove the steering wheel pad from the steering wheel (See page SR-13).

(2) Place the steering wheel pad in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts disposal.

RS012-38

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the steering wheel pad, steering wheel or spiral cable.

Case	Replacing part
If the airbag has been deployed.	Steering wheel pad
If the steering wheel pad has been found to be faulty in troubleshooting.	Steering wheel pad
If the spiral cable has been found to be faulty in troubleshooting.	Spiral cable
If the steering wheel pad has been found to be faulty during checking items (See page RS-15).	Steering wheel pad
If the steering wheel has been found to be faulty during checking items (See page RS-15).	Steering wheel
If the spiral cable has been found to be faulty during checking items (See page RS-15).	Spiral cable
If the steering wheel pad has been dropped.	Steering wheel pad

CAUTION:

For removal and installation of the steering wheel pad, see page SR-13 and SR-25 . Be sure to follow the correct procedure.

RS013-19

INSTALLATION

HINT:

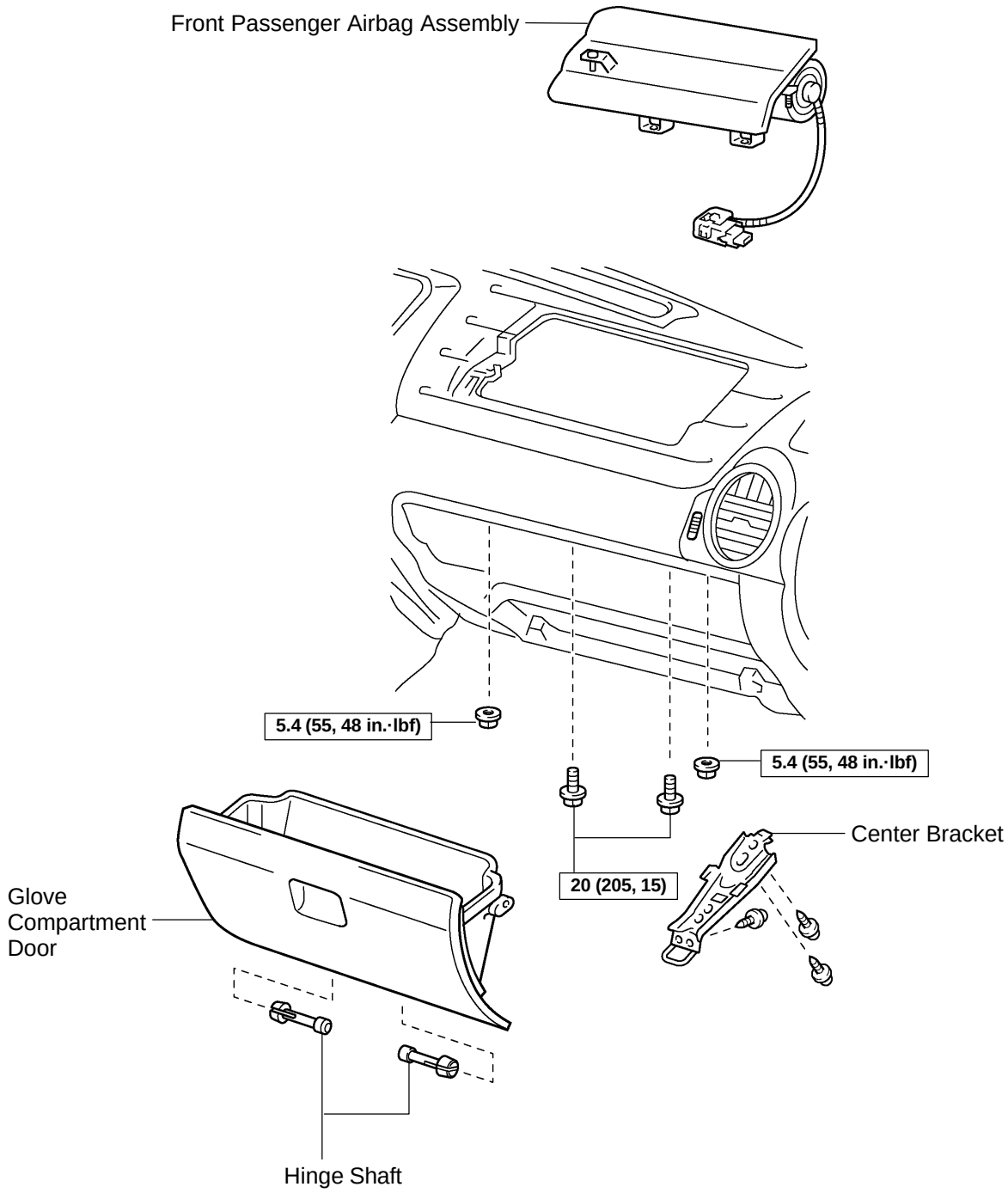
For step 1 to 4, refer to page SR-25 .

1. **INSTALL SPIRAL CABLE**
2. **INSTALL STEERING COLUMN UPPER AND LOWER COVERS**
3. **INSTALL STEERING WHEEL**
4. **INSTALL STEERING WHEEL PAD**

FRONT PASSENGER AIRBAG ASSEMBLY

RS014-40

COMPONENTS



T N·m (kgf·cm, ft·lbf) : Specified torque

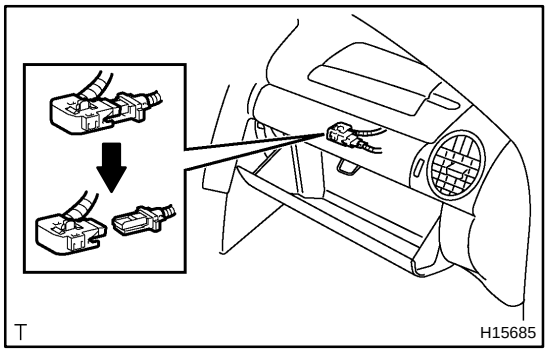
H15527

RS02P-08

REMOVAL

NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is in ON or ACC position, DTCs will be recorded.**
- **Never use the airbag parts from another vehicle. When replacing parts, replace them with new parts.**



1. DISCONNECT FRONT PASSENGER AIRBAG ASSEMBLY CONNECTOR

Open the glove compartment door and disconnect the front passenger airbag assembly connector.

NOTICE:

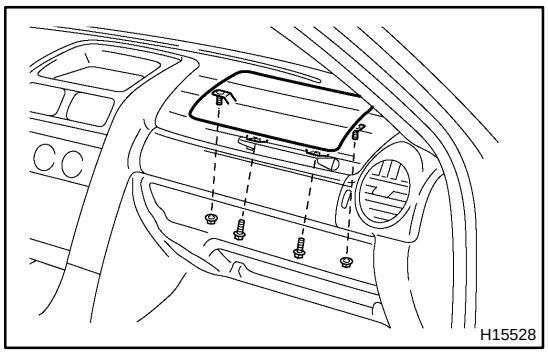
When handling the airbag connector, take care not to damage the airbag wire harness.

2. REMOVE GLOVE COMPARTMENT DOOR

(See page BO-135)

3. REMOVE CENTER BRACKET

Remove the 3 screws and center bracket.



4. REMOVE FRONT PASSENGER AIRBAG ASSEMBLY

(a) Remove the 2 bolts and nuts from the front passenger airbag assembly.

(b) Disconnect the engagement of the claw at 10 positions and remove the front passenger airbag assembly from the instrument panel.

CAUTION:

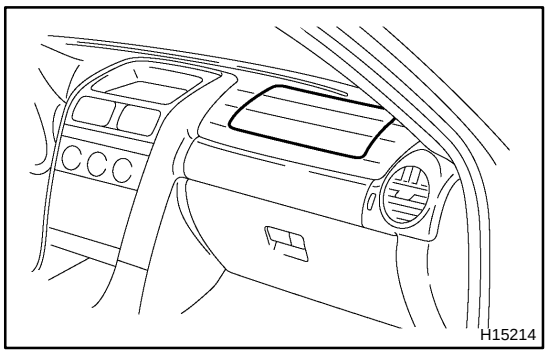
- **Do not store the front passenger airbag assembly with the airbag deployment side facing downward.**
- **Never disassemble the front passenger airbag assembly.**

NOTICE:

When removing the front passenger airbag assembly, take care not to damage the wire harness.

RS02Q-14

INSPECTION



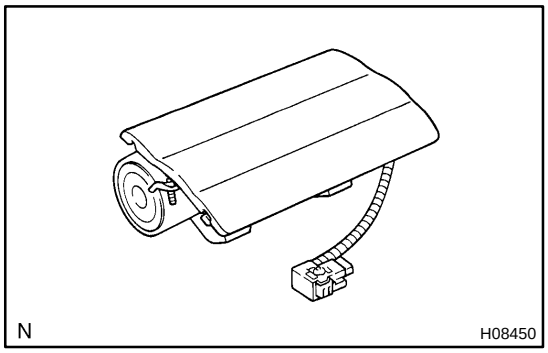
1. Vehicle not involved in collision :
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-607).

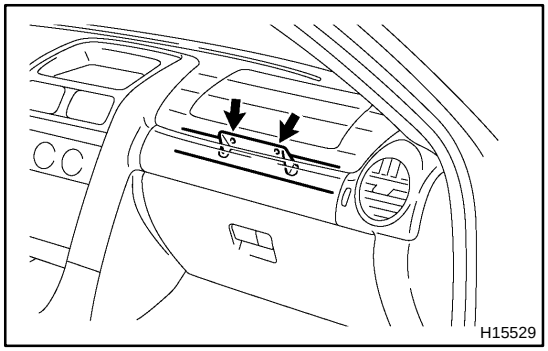
(b) Do a visual check which includes the following item with the front passenger airbag assembly installed in the vehicle.
Check cuts, minute cracks or marked discoloration on the front passenger airbag assembly and instrument panel.

2. Vehicle involved in collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-607).



(b) Do a visual check which includes the following items with the front passenger airbag assembly removed from the vehicle.
- Check cuts, minute cracks or marked discoloration on the front passenger airbag assembly.
- Check cuts and cracks in the wire harness, and for chipping in the connectors.



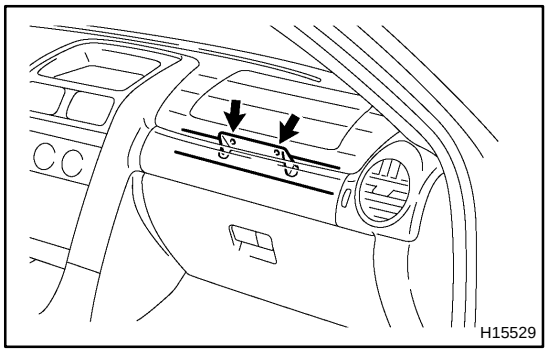
- Check the deformation or cracks on the instrument panel and instrument panel reinforcement.

CAUTION:
For removal and installation of the front passenger airbag assembly, see page RS-28 and RS-38 , and be sure to follow the correct procedure.

HINT:
If the instrument panel or instrument panel reinforcement is deformed or cracked, never repair it. Always replace it with a new one.

3. Vehicle involved in collision and airbag is deployed: INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-607).



(b) Do a visual check which includes the following items with the front passenger airbag assembly removed from the vehicle.

- Check the deformation or cracks on the instrument panel and instrument panel reinforcement.
- Check the damage on the connector and wire harness.

CAUTION:

For removal and installation of the front passenger airbag assembly, see page RS-28 and RS-38 , and be sure to follow the correct procedure.

HINT:

If the instrument panel or instrument panel reinforcement is deformed or cracked, never repair it. Always replace it with a new one.

RS0RH-01

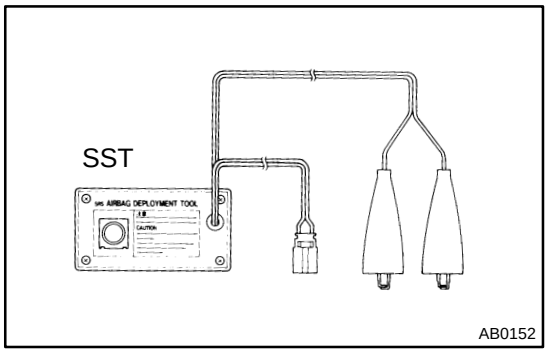
DISPOSAL

HINT:

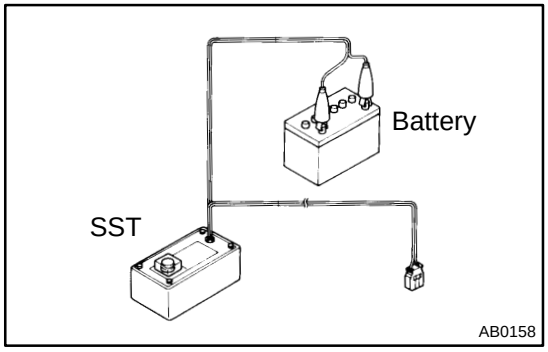
When scrapping vehicle equipped with an SRS or disposing of a front passenger airbag assembly, always first deploy the airbag in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Never dispose of a front passenger airbag assembly which has an undeployed airbag.**
- **The airbag produces a sizeable exploding sound when it deploys, so perform the operation out-of-doors and where it will not create a nuisance to nearby residents.**



- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
  SST 09082-00700
- **When deploying an airbag, perform the operation at least 10 m (33 ft) away from the front passenger airbag assembly.**
- **The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front passenger airbag assembly with the deployed airbag.**

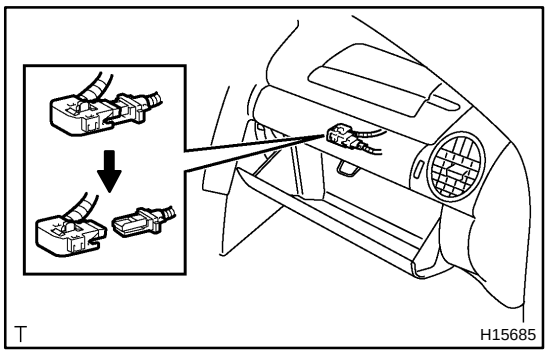


1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

Have a battery ready as the power source to deploy the airbag.

(a) Check functioning of the SST (See page RS-17).
SST 09082-00700

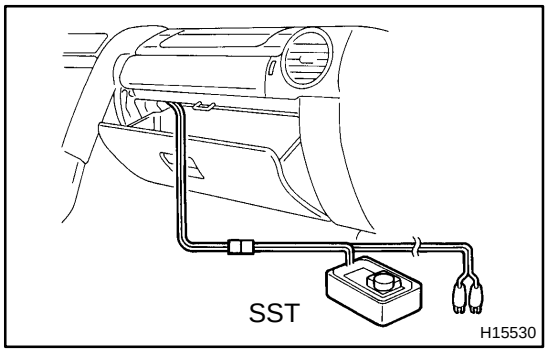


(b) Disconnect the front passenger airbag assembly connector.

Open the glove compartment door and disconnect the front passenger airbag assembly connector.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



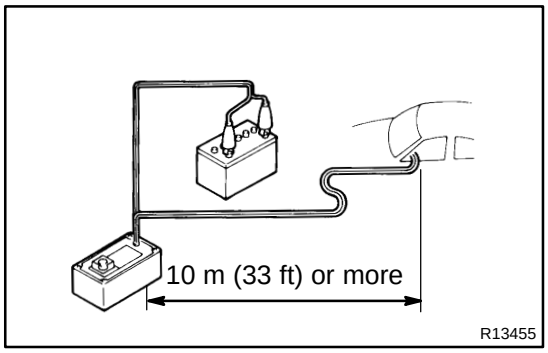
(c) Install the SST.

(1) Connect the connector of 2 SST to the front passenger airbag assembly connector.

SST 09082-00700, 09082-00760

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



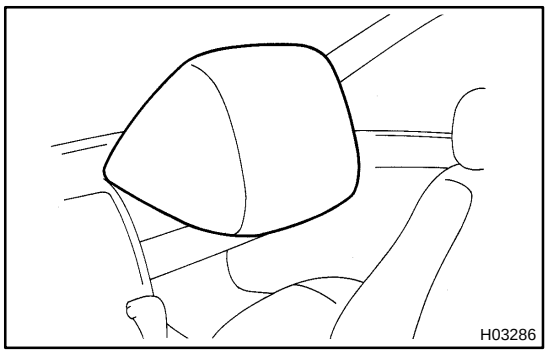
(2) Move the SST to at least 10 m (33 ft) away from the front of the vehicle.

(3) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the SST red clip to the battery positive (+) terminal and the black clip to the negative (-) terminal.



(d) Deploy the airbag.

(1) Check that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front passenger airbag assembly with deployed airbag.**
- **When moving a vehicle for scrapping which has a front passenger airbag assembly with deployed airbag, use gloves and safety glasses.**

HINT:

The airbag deploys simultaneously as the LED of the SST activation switch light up.

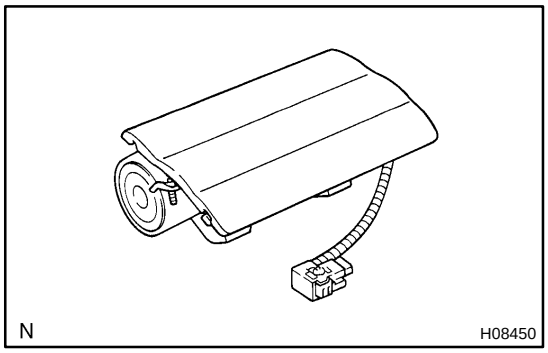
2. DEPLOYMENT WHEN DISPOSING OF FRONT PASSENGER AIRBAG ASSEMBLY ONLY

NOTICE:

- **When disposing of the front passenger airbag assembly only, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

HINT:

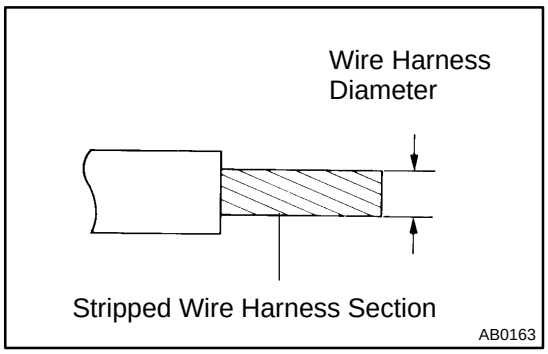
Have a battery ready as the power source to deploy the airbag.



(a) Remove the front passenger airbag assembly (See page RS-28).

CAUTION:

- **When removing the front passenger airbag assembly, work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.**
- **When storing the front passenger airbag assembly, keep the upper surface of the airbag deployment side facing upward.**



(b) Using a service-purpose wire harness for the vehicle, tie down the front passenger airbag assembly to the tire.

Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in.^{2} or more)

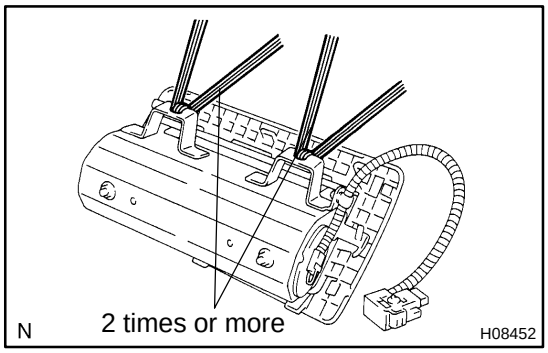
CAUTION:

If the front passenger airbag assembly is tied down with too thin wire harness, it may snap. This is highly dangerous. Always use a wire harness which is at least 1.25 mm^2 (0.0019 in.^{2}).

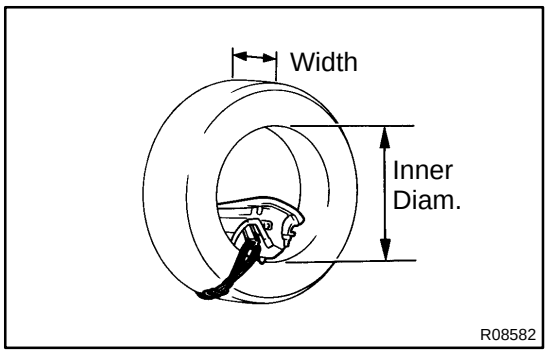
HINT:

To calculate the square of the stripped wire harness section:

Square = 3.14 X (Diameter)^2 divided by 4



(1) Pass the wire harness through the installation holes, as shown in the illustration.



(2) Position the front passenger airbag assembly inside the tire with the airbag deployment side facing inside. Tie the front passenger airbag assembly to the tire, as shown in the illustration.

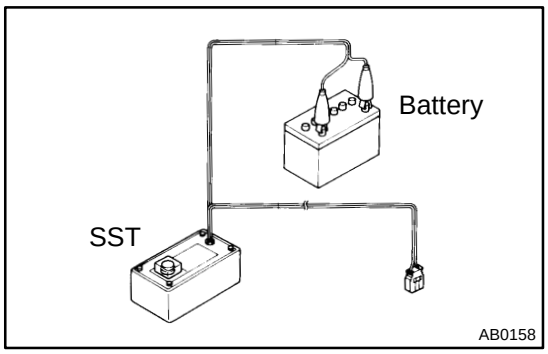
Tire size: Must exceed the following dimensions-
Width: 185 mm (7.28 in.)
Inner diameter: 360 mm (14.17 in.)

CAUTION:

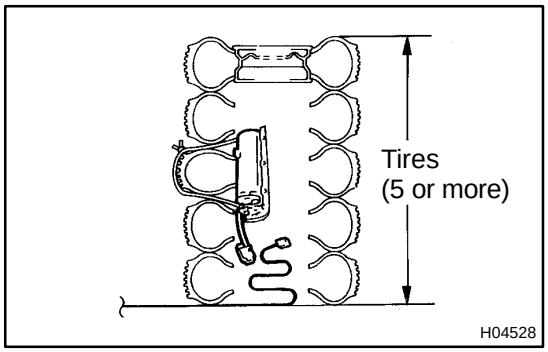
- **Make sure that the wire harness is tight. It is very dangerous if looseness in the wire harness results in the front passenger airbag assembly coming free due to the shock from the airbag deploying.**
- **Always tie down the front passenger airbag assembly with the airbag deployment side facing inside.**

NOTICE:

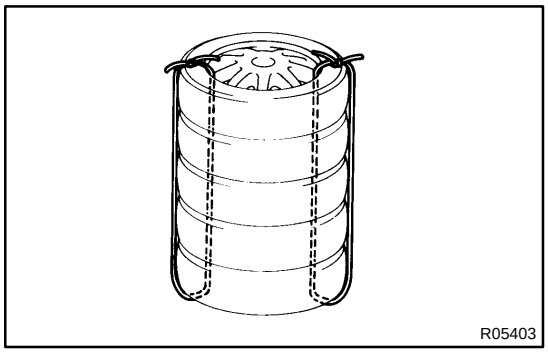
The tire will be marked by the airbag deployment, so use a redundant tire.



(c) Check functioning of the SST (See step 1-(a) on page RS-14).
SST 09082-00700



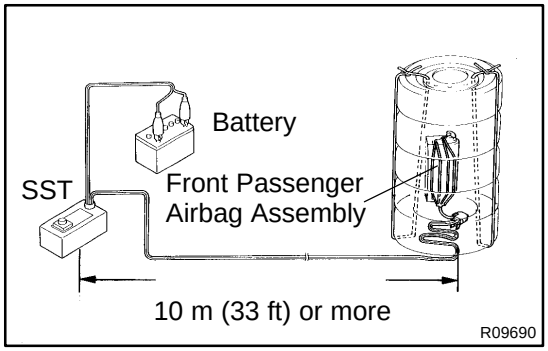
(d) Place the tires.
(1) Place at least 2 tires under the tire to which the front passenger airbag assembly is tied.
(2) Place at least 2 tires over the tire to which the front passenger airbag assembly is tied. The top tire should have the wheel installed.



(3) Tie the tires together with the 2 wire harness.

CAUTION:
Make sure that the wire harness is tight. It is very dangerous if loose wire harness result in the tires coming free due to the shock from the airbag deploying.

HINT:
Place the SST connector and wire harness inside tires. Provide at least 1 m (3 ft) of slack for the wire harness.

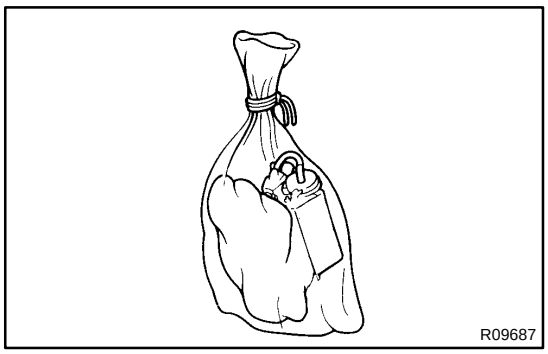


(e) Install the SST.
Connect the connector of 2 SST to the front passenger airbag assembly connector.
SST 09082-00700, 09082-00760

NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.

(f) Deploy the airbag.
(1) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.
(2) Check that no one is within 10 m (33 ft) area around the tire which the front passenger airbag assembly is tied to.
(3) Press the SST activation switch and deploy the airbag.

HINT:
The airbag deploys simultaneously as the LED of the SST activation switch lights up.



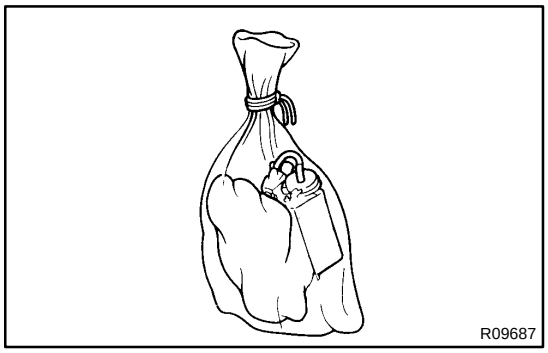
(g) Dispose of the front passenger airbag assembly.

CAUTION:

- **The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front passenger airbag assembly with deployed airbag.**

(1) Remove the front passenger airbag assembly from the tire.

(2) Place the front passenger airbag assembly in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts.



3. DEPLOYMENT WHEN DISPOSING OF FRONT PASSENGER AIRBAG ASSEMBLY WITH AIRBAG DEPLOYED IN COLLISION

Dispose of the front passenger airbag assembly.

CAUTION:

- **The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Using gloves and safety glasses when handling a front passenger airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front passenger airbag assembly with the deployed airbag.**

(1) Remove the front passenger airbag assembly from the instrument panel (See page BO-139).

(2) Place the front passenger airbag assembly in a vinyl bag, tie the end tightly and dispose of it in the same way so as other general parts disposal.

RS018-30

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the front passenger airbag assembly, instrument panel or instrument panel reinforcement.

Case	Replacing part
If the airbag has been deployed.	Front passenger airbag assembly
If the front passenger airbag assembly has been found to be faulty in trouble-shooting.	Front passenger airbag assembly
If the front passenger airbag assembly has been found to be faulty during checking items (See page RS-29).	Front passenger airbag assembly
If the instrument panel has been found to be faulty during checking items (See page RS-29).	Instrument panel
If the instrument panel reinforcement has been found to be faulty during checking items (See page RS-29).	Instrument panel reinforcement
If the front passenger airbag assembly has been dropped.	Front passenger airbag assembly

CAUTION:

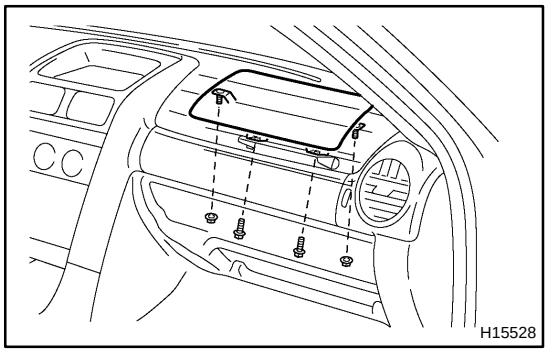
For replacement of the front passenger airbag assembly, see page RS-28 and RS-38 . Be sure to follow the correct procedure.

RS019-11

INSTALLATION

NOTICE:

Never use airbag parts from another vehicle. When replacing parts, replace them with new parts.



1. INSTALL FRONT PASSENGER AIRBAG ASSEMBLY

Connect the engagement of the claw at 10 positions and install the front passenger airbag assembly to the instrument panel with the 2 bolts and nuts.

Torque:
Bolt: 20 N·m (205 kgf·cm, 15 ft·lbf)
Nut: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

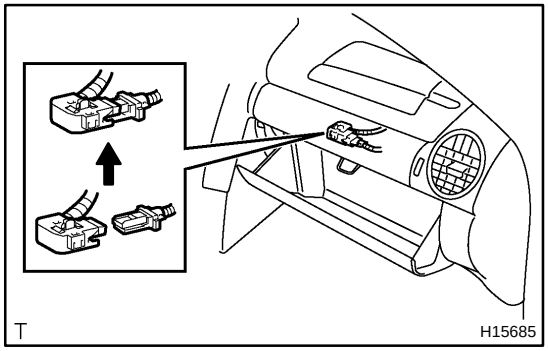
NOTICE:

- **Make sure that the front passenger airbag assembly is installed with the specified torque.**
- **When installing the front passenger airbag assembly, take care that the wiring does not interfere with other parts and is not pinched between other parts.**
- **If the front passenger airbag assembly has been dropped, or there are cracks, dents or other defects in the case or connector, replace the front passenger airbag assembly with a new one.**

2. INSTALL CENTER BRACKET

Install the center bracket with the 3 screws.

3. INSTALL GLOVE COMPARTMENT DOOR
(See page BO-149)

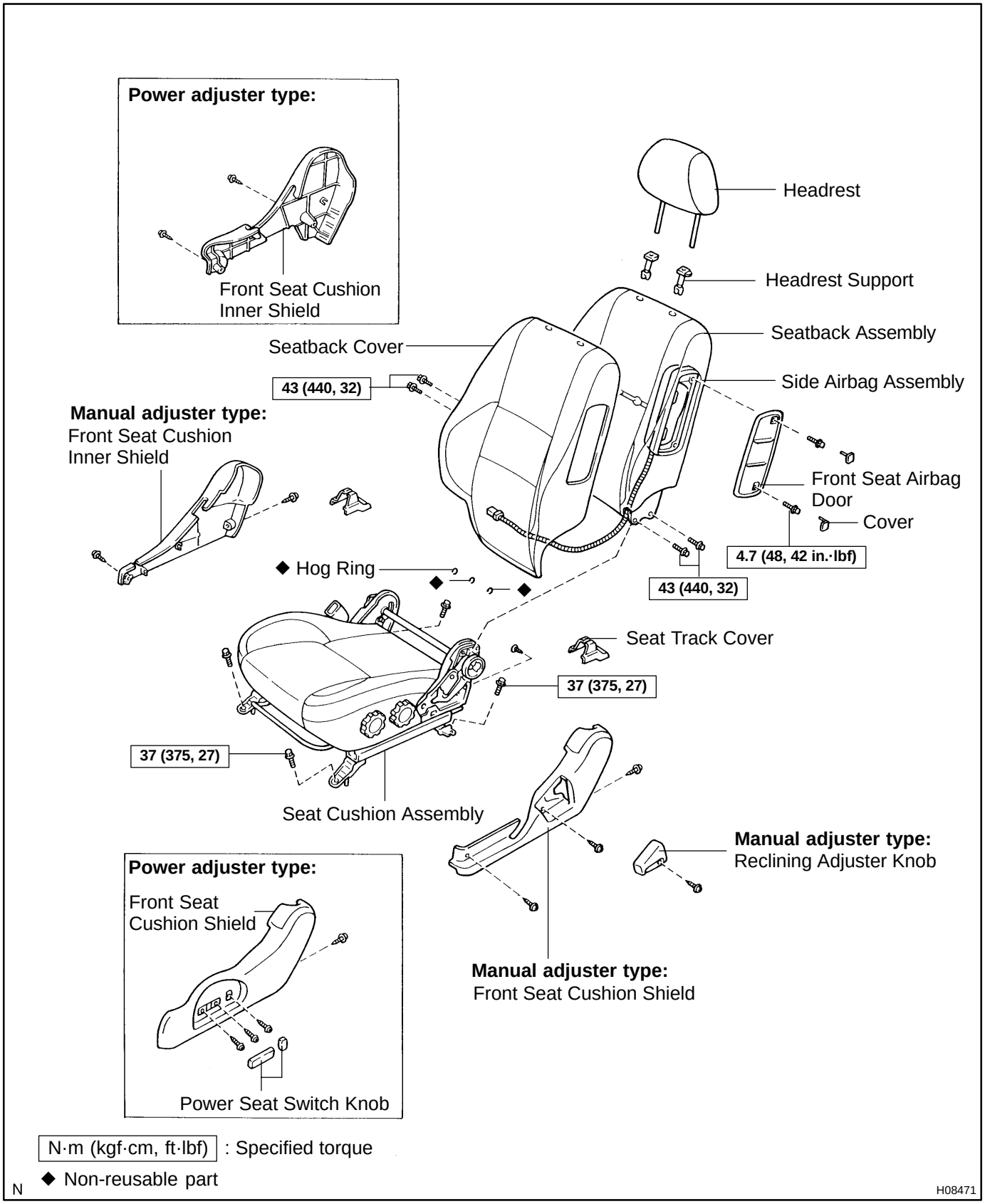


4. CONNECT FRONT PASSENGER AIRBAG ASSEMBLY CONNECTOR

SIDE AIRBAG ASSEMBLY

COMPONENTS

RS0HK-02

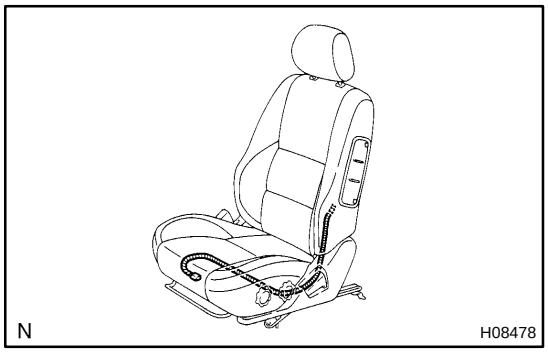


RS0HL-01

REMOVAL

NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is at ON or ACC position, DTCs will be recorded.**
- **Never use the airbag parts from another vehicle. When replacing parts, replace them with new parts.**



1. REMOVE FRONT SEAT

(a) Remove the 2 seat track covers and 4 bolts.

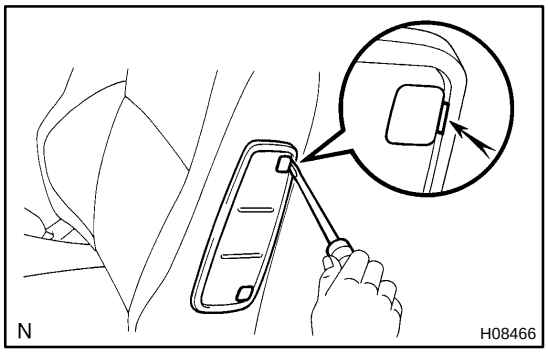
(b) Disconnect the connectors under the front seat.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

(c) Remove the front seat.

2. REMOVE HEADREST

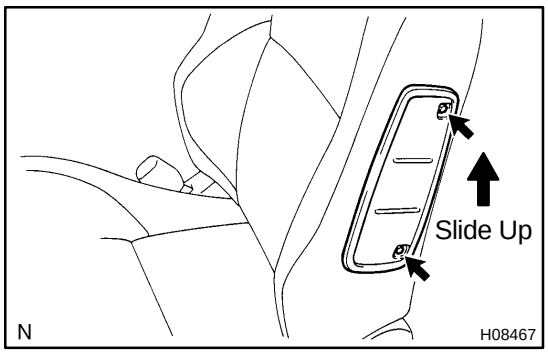


3. REMOVE FRONT SEAT AIRBAG DOOR

(a) Using a screwdriver, remove the 2 covers.

HINT:

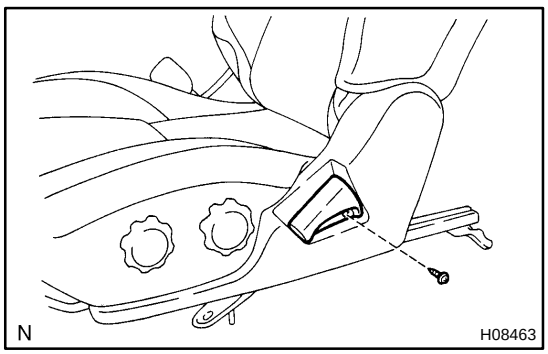
Tape the screwdriver tip before use.



(b) Remove the 2 bolts.

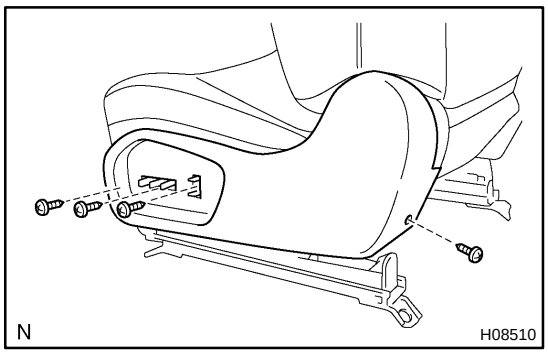
(c) Slide up the front seat airbag door and remove it.

4. Power adjuster type:
REMOVE POWER SEAT SWITCH KNOBS



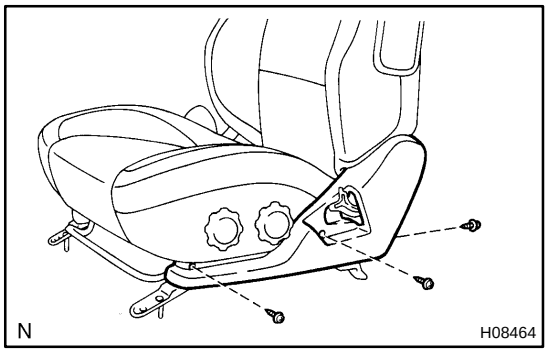
5. Manual adjuster type:
REMOVE RECLINING ADJUSTER KNOB

Remove the screw and reclining adjuster knob.



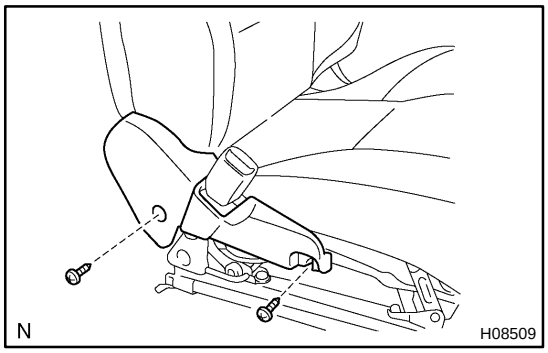
6. Power adjuster type:
REMOVE FRONT SEAT CUSHION SHIELD

Remove the 4 screws and front seat cushion shield.



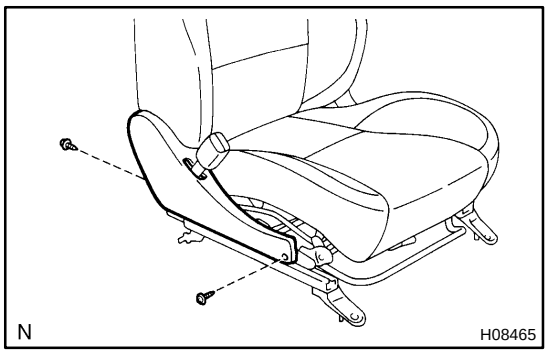
7. Manual adjuster type:
REMOVE FRONT SEAT CUSHION SHIELD

Remove the 3 screws and front seat cushion shield.



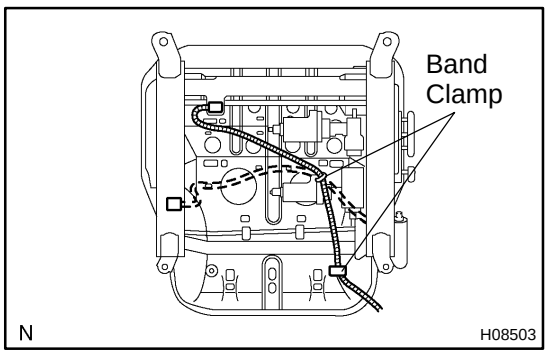
8. Power adjuster type:
REMOVE FRONT SEAT CUSHION INNER SHIELD

Remove the 2 screws and front seat cushion inner shield.



9. Manual adjuster type:
REMOVE FRONT SEAT CUSHION INNER SHIELD

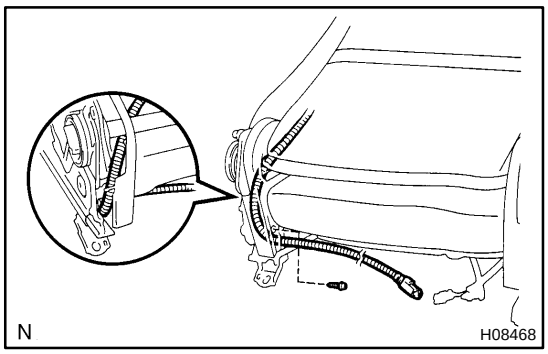
Remove the 2 screws and front seat cushion inner shield.



10. DISCONNECT WIRE HARNESS FOR SIDE AIRBAG ASSEMBLY FROM SEAT CUSHION ASSEMBLY

(a) Remove the band clamps.

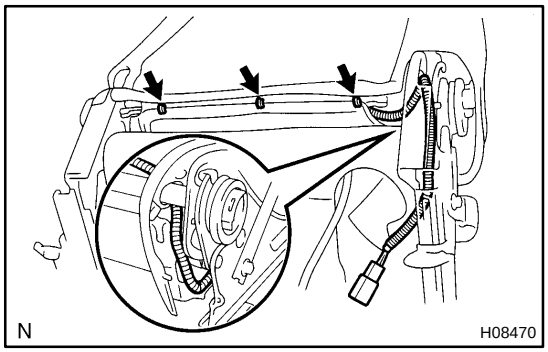
(b) Pull out the wire harness of the side airbag assembly and seat heater (w/ seat heater).



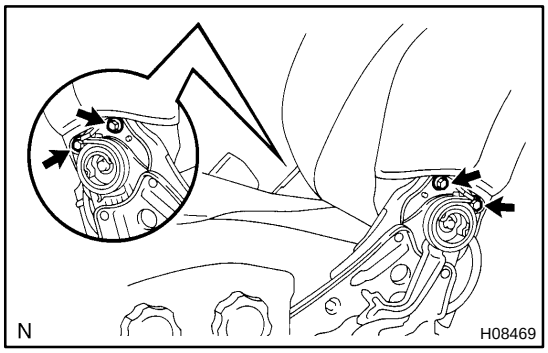
11. REMOVE SEATBACK ASSEMBLY

(a) Remove the LH reclining adjuster inside cover set screw.

(b) Disconnect the wire harness of the side airbag assembly from the LH reclining adjuster inside cover.



(c) Remove the 3 hog rings.



(d) Remove the 4 bolts and move the seatback assembly a little upward.

NOTICE:

Do not apply unnatural force to the airbag wire harness.

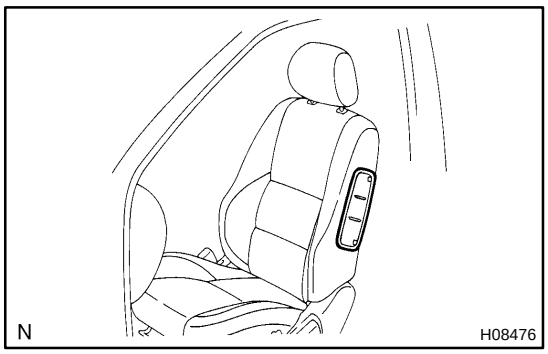
(e) Remove the seatback assembly.

NOTICE:

Take care not to let the airbag wire harness catch on the seat adjuster assembly, as this can damage the airbag wire harness.

RS05I-07

INSPECTION



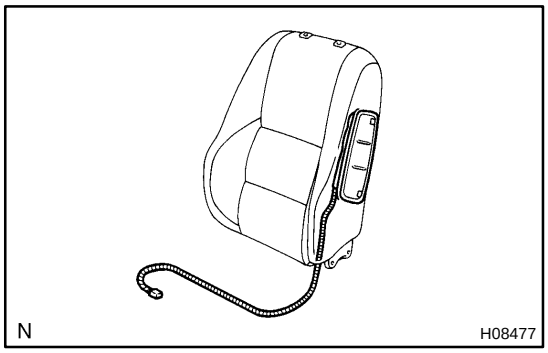
1. Vehicle not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-607).

(b) Do a visual check which includes the following item with the seatback assembly installed in the vehicle.
Check for cuts, minute cracks or marked discoloration of the front seat airbag door.

2. Vehicle involved in collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-607).



(b) Do a visual check which includes the following items with the seatback assembly removed from the vehicle.
- Check cuts and cracks of the side airbag assembly.
- Check for cuts, minute cracks or marked discoloration of the front seat airbag door.
- Check cuts and cracks in the wire harness, and chipping in the connectors.

CAUTION:
For removal and installation of the seatback assembly, see page RS-40 and RS-52 . Be sure to follow the correct procedure.

3. Vehicle involved in collision and airbag is deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-607).

(b) Do a visual check which includes the following items with the seatback assembly removed from the vehicle.
- Check the seatback installation part of the seat adjuster.
- Check the damage to the connector and wire harness.

CAUTION:
For removal and installation of the seatback assembly, see page RS-40 and RS-52 . Be sure to follow the correct procedure.

HINT:
If the seat adjuster is deformed, never repair it. Always replace it with a new one.

RS0RI-01

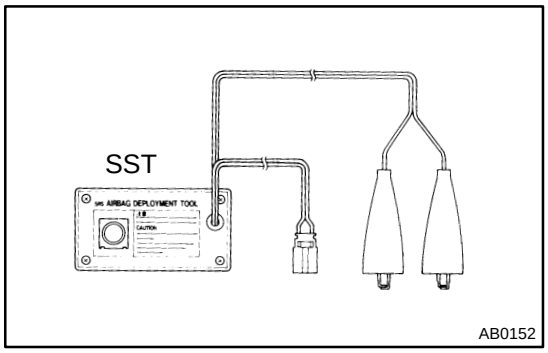
DISPOSAL

HINT:

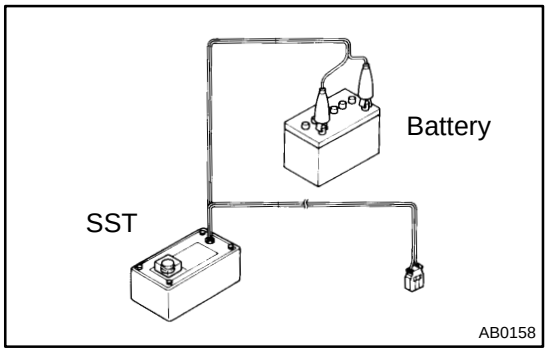
When scrapping vehicles equipped with an SRS or disposing of the side airbag assembly always first deploy the airbag in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Never dispose of a side airbag assembly which has an undeployed airbag.**
- **The airbag produces a sizeable exploding sound when it deploys, so perform the operation out of doors and where it will not create a nuisance to nearby residents.**



- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool), perform the operation in a place away from electrical noise.**
  SST 09082-00700
- **When deploying an airbag, perform the operation at least 10 m (33 ft) away from the airbag assembly.**
- **The side airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling side airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a side airbag assembly with the deployed airbag.**

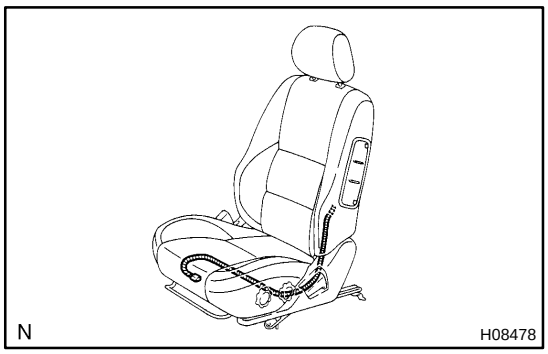


1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

Have a battery ready as the power source to deploy the airbag.

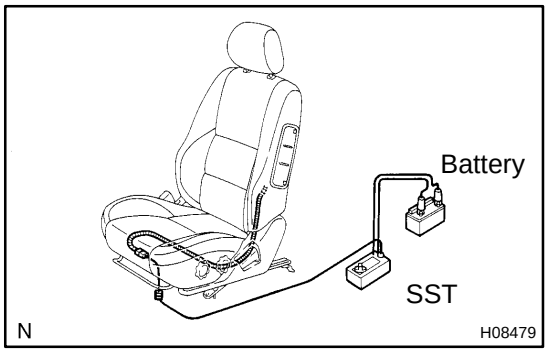
(a) Check functioning of the SST (See step 1 - (a) on page RS-17).
SST 09082-00700



(b) Disconnect the side airbag assembly connector.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



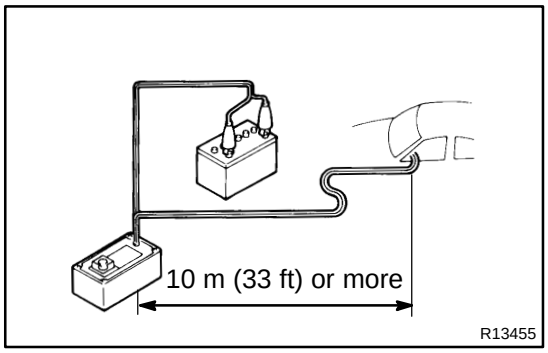
(c) Install the SST.

(1) Connect the connector of 2 SST to the side airbag assembly connector.

SST 09082-00700, 09082-00750

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



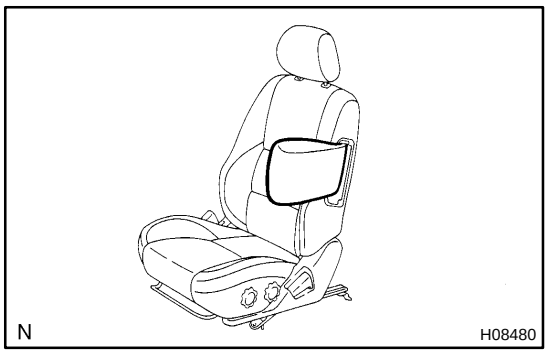
(2) Move the SST at least 10 m (33 ft) away from the front of the vehicle.

(3) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.



(d) Deploy the airbag.

(1) Check that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **The side airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a side airbag assembly with the deployed airbag.**
- **Do not apply water, etc. to a side airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **When scrapping a vehicle, deploy the airbag and scrap the vehicle with the side airbag assembly still installed.**

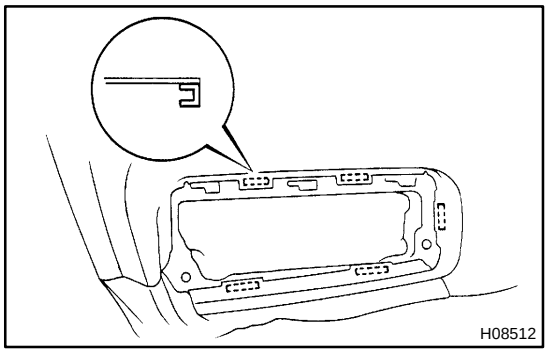
HINT:
The airbag deploys simultaneously as the LED of SST activation switch lights up.

2. DEPLOYMENT WHEN DISPOSING OF SIDE AIRBAG ASSEMBLY

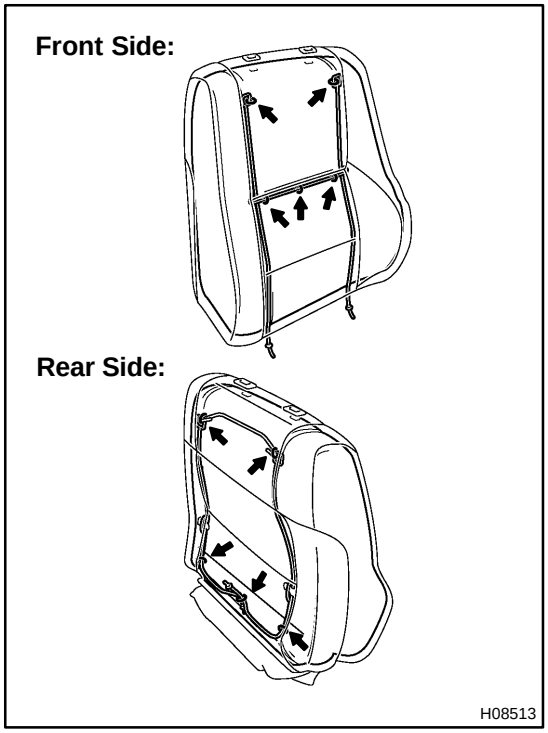
NOTICE:

- **When disposing of the side airbag assembly only, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

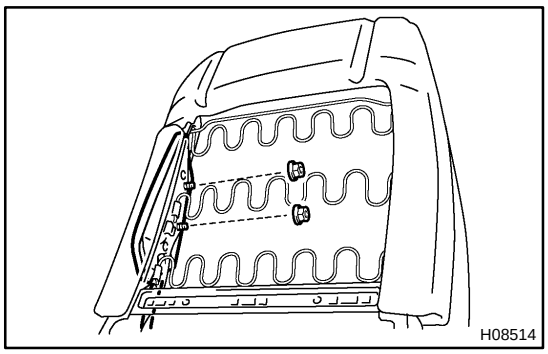
HINT:
Have a battery ready as the power source to deploy the airbag.



(a) Remove the side airbag assembly.
(1) Disengage the seatback cover hooks circumference of the side airbag assembly.



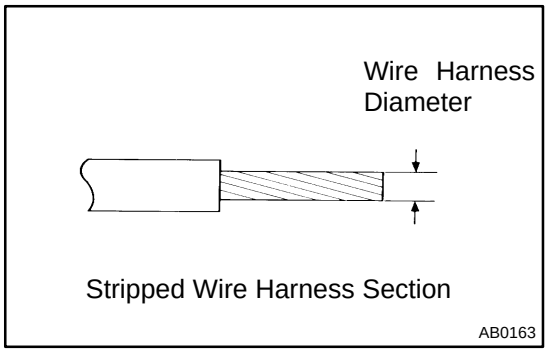
(2) Remove the 10 hog rings, headrest supports and seat back cover, as shown in the illustration.



(3) Remove the 2 nuts and side airbag assembly.

CAUTION:

When storing the side airbag assembly, keep the upper surface of the airbag deployment side facing upward.



(b) Using a service-purpose wire harness, tie down the side airbag assembly.

Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in^2 or more)

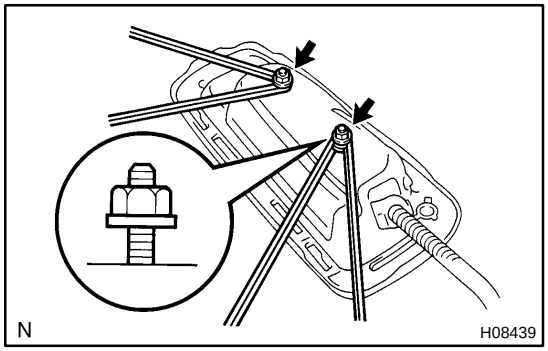
CAUTION:

If a wire harness which is too thin or some other thing is used to tie down the side airbag assembly, it may be snapped by the shock when the airbag is deployed. This is highly dangerous. Always use a wire harness for vehicle use which is at least 1.25 mm^2 (0.0019 in^2).

HINT:

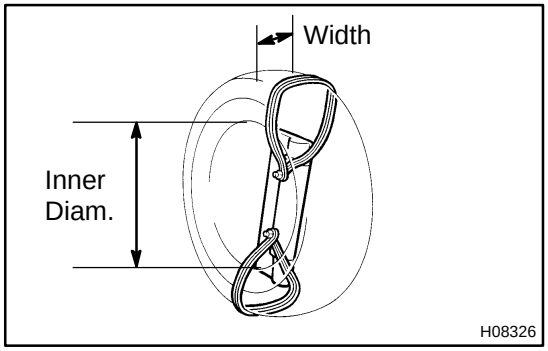
To calculate the square of the stripped wire harness section:

Square = 3.14 x (Diameter)^2 divided by 4



(1) Install the 2 nuts to the side airbag assembly.

(2) Wind the wire harness around the stud bolts of the side airbag assembly, as shown in the illustration.



(3) Position the side airbag assembly inside the tire with the airbag deployment direction facing inside. Tie the side airbag assembly to the tire, as shown in the illustration.

Tire size: Must exceed the following dimensions:-

Width: 185 mm (7.28 in.)

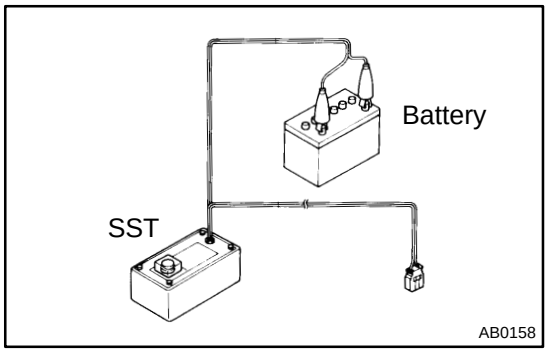
Inner diameter: 360 mm (14.17 in.)

CAUTION:

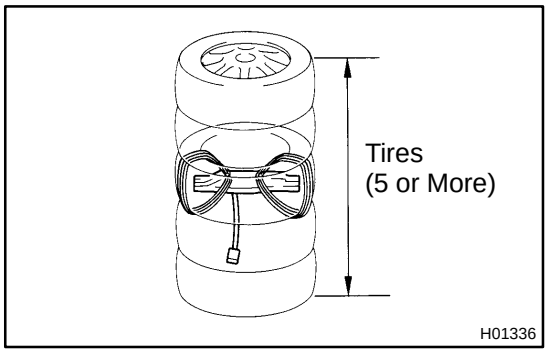
- **Make sure the wire harness is tight. It is very dangerous when a loose wire harness results in the side airbag assembly coming free due to the shock from the airbag deploying.**
- **Always tie down the side airbag assembly with the airbag deployment side facing inside.**

NOTICE:

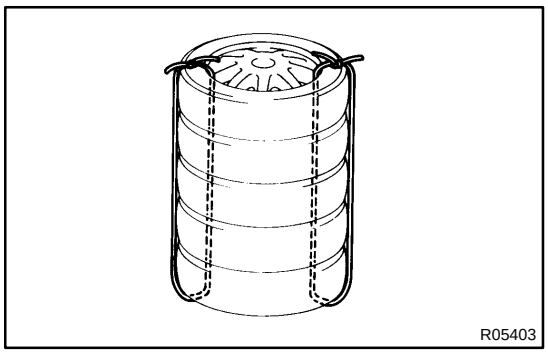
The tire will be marked by the airbag deployment, so when disposing of the airbag use a redundant tire.



(c) Check functioning of the SST
(See step 1 - (a) on page RS-17).
SST 09082-00700



(d) Place the tires.
(1) Place at least 2 tires under the tire to which the side airbag assembly is tied.
(2) Place at least 2 tires over the tire to which the side airbag assembly is tied. The top tire should have the wheel installed.



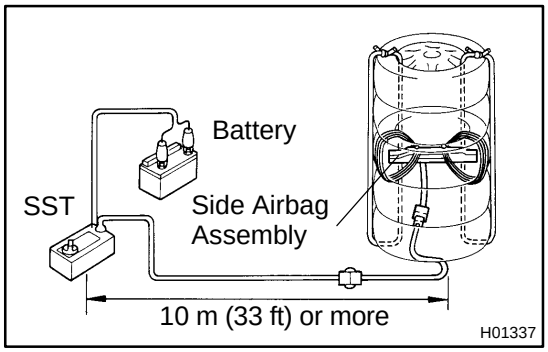
(3) Tie the tires together with the 2 wire harness.

CAUTION:

Make sure that the wire harness is tight. It is very dangerous when loose wire harness results in the tires coming free due to the shock from the airbag deploying.

HINT:

Place the SST connector and wire harness inside tires. Secure at least 1 m (3 ft) of slack for the wire harness.



(e) Install the SST.
Connect the connector of 2 SST to the side airbag assembly connector.
SST 09082-00700, 09082-00750

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.

(f) Deploy the airbag.

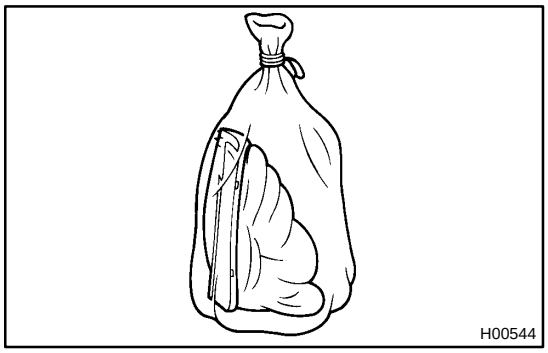
(1) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.

(2) Check that no one is within 10 m (33 ft) area around the tire which the side airbag assembly is tied to.

(3) Press the SST activation switch and deploy the airbag.

HINT:

The airbag deploys simultaneously as the LED of the SST activation switch lights up.



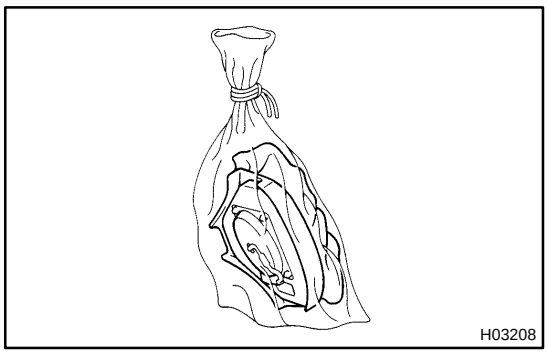
(g) Dispose of the side airbag assembly.

CAUTION:

- **The side airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a side airbag assembly with the deployed airbag.**
- **Do not apply water etc. to a side airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the side airbag assembly from the tire.

(2) Place the side airbag assembly in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts disposal.


H03208

3. DEPLOYMENT WHEN DISPOSING OF SIDE AIRBAG ASSEMBLY WITH AIRBAG DEPLOYED IN COLLISION

Dispose of the side airbag assembly.

CAUTION:

- **The side airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a side airbag assembly with deployed airbag.**
- **Do not apply water, etc. to a side airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the side airbag assembly from the seat (See step 2).

(2) Place the side airbag assembly in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts disposal.

RS05K-07

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the seatback assembly or front seat airbag door.

Case	Replacing part
If the side airbag has been deployed.	Seatback assembly
If the side airbag assembly has been found to be faulty in troubleshooting.	Seatback assembly
If the side airbag assembly has been found to be faulty during checking items (See page RS-43).	Seatback assembly
If the front seat airbag door has been found to be faulty during checking items (See page RS-43).	Front seat airbag door
If the seatback assembly has been dropped.	Seatback assembly

CAUTION:

For removal and installation of the seatback assembly, see page RS-40 and RS-52 . Be sure to follow the correct procedure.

RS0E5-03

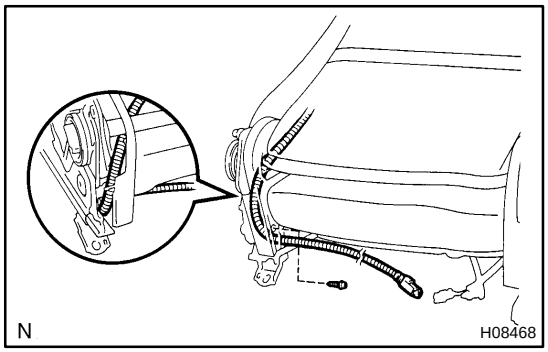
INSTALLATION

NOTICE:

Never use airbag parts from another vehicle. When replacing parts, replace them with new parts.

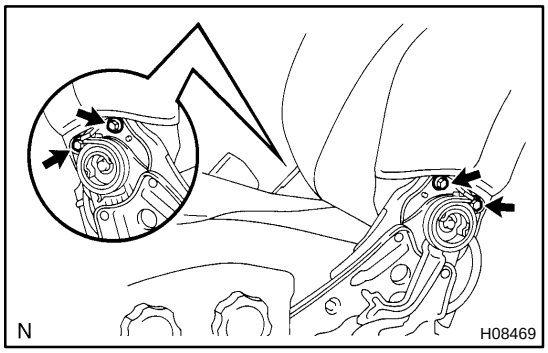
1. INSTALL SEATBACK ASSEMBLY

(a) Temporarily install the seatback assembly.



(b) Set the wire harness of the side airbag assembly to the LH reclining adjuster inside cover, as shown.

(c) Install the LH reclining adjuster inside cover set screw.

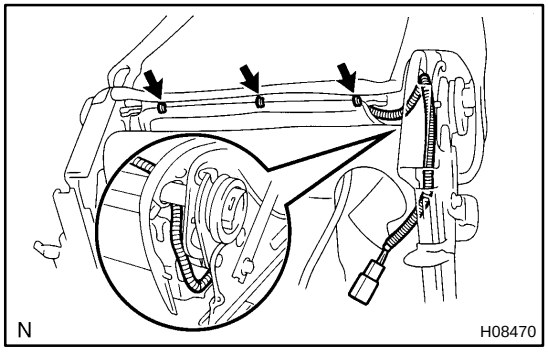


(d) Install the 4 bolts.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

NOTICE:

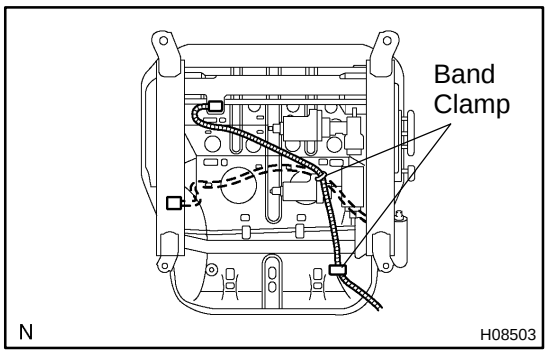
- **Make sure that the seatback assembly is installed with the specified torque.**
- **If the seatback assembly has been dropped, or there are cracks, dents or other defects in the case or connector, replace the seatback assembly with a new one.**
- **When installing the seatback assembly, take care it is not pinched between other parts.**



(e) Install 3 new hog rings, as shown in the illustration.

HINT:

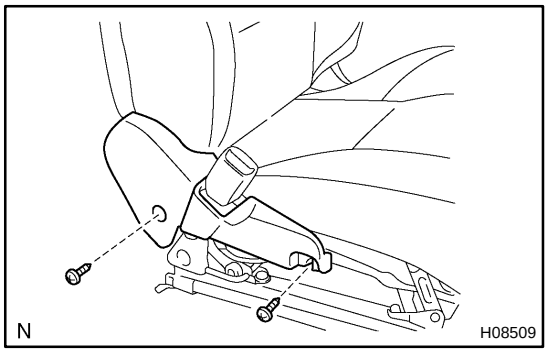
When installing the hog rings, take care to prevent wrinkles as much as possible.



2. SET WIRE HARNESS FOR SIDE AIRBAG ASSEMBLY TO SEAT CUSHION ASSEMBLY

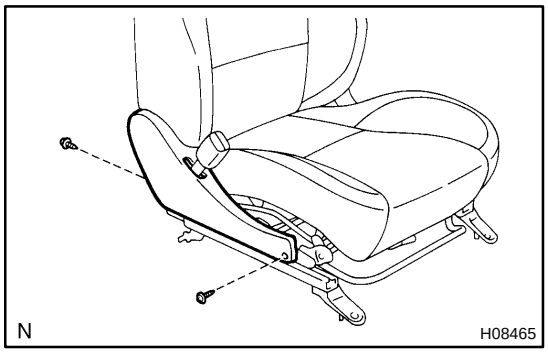
(a) Set the wire harness of the side airbag assembly and seat heater (w/ seat heater).

(b) Install the band clamps, as shown in the illustration.



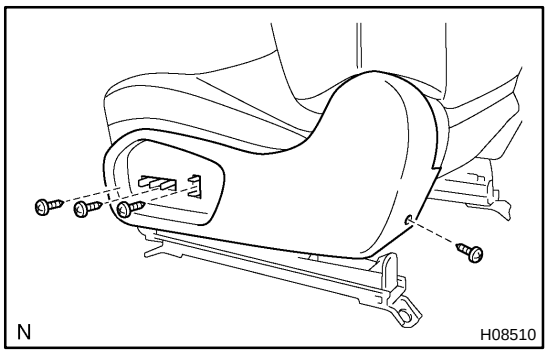
3. Power adjuster type:
INSTALL FRONT SEAT CUSHION INNER SHIELD

Install the front seat cushion inner shield with the 2 screws.



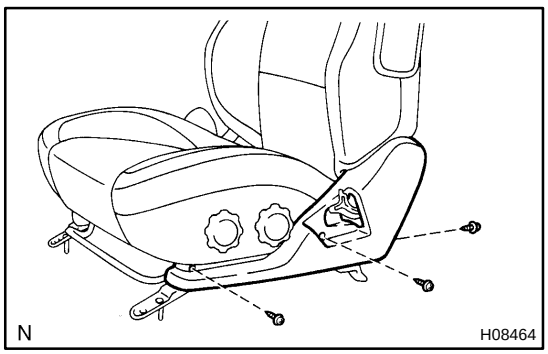
4. Manual adjuster type:
INSTALL FRONT SEAT CUSHION INNER SHIELD

Install the front seat cushion inner shield with the 2 screws.



5. Power adjuster type:
INSTALL FRONT SEAT CUSHION SHIELD

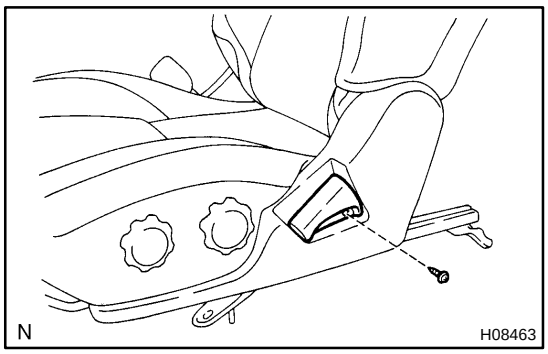
Install the front seat cushion shield with the 4 screws.



6. Manual adjuster type:
INSTALL FRONT SEAT CUSHION SHIELD

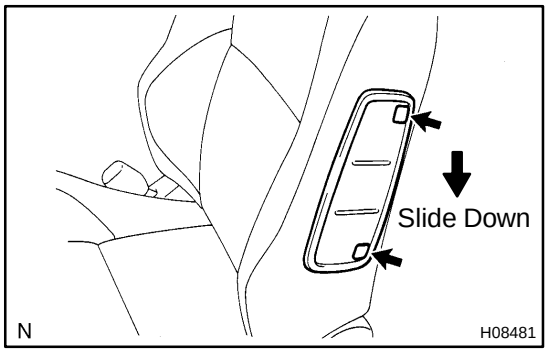
Install the front seat cushion shield with the 3 screws.

7. Power adjuster type:
INSTALL POWER SEAT SWITCH KNOBS



8. Manual adjuster type:
INSTALL RECLINING ADJUSTER KNOB

Install the reclining adjuster knob with the screw.



9. INSTALL FRONT SEAT AIRBAG DOOR

(a) Slide down the front seat airbag door and install it.

(b) Install the front seat airbag door with the 2 screws.
Torque: 4.7 N·m (48 kgf·cm, 42 in.·lbf)

10. INSTALL HEADREST

11. INSTALL FRONT SEAT

(a) Mount the front seat to the vehicle.

NOTICE:

When mounting the seat to the vehicle, take care not to damage the airbag wire harness.

(b) Connect the connectors under the front seat.

(c) Slide the front seat to the front most position.

NOTICE:

Make sure that seat adjuster locks.

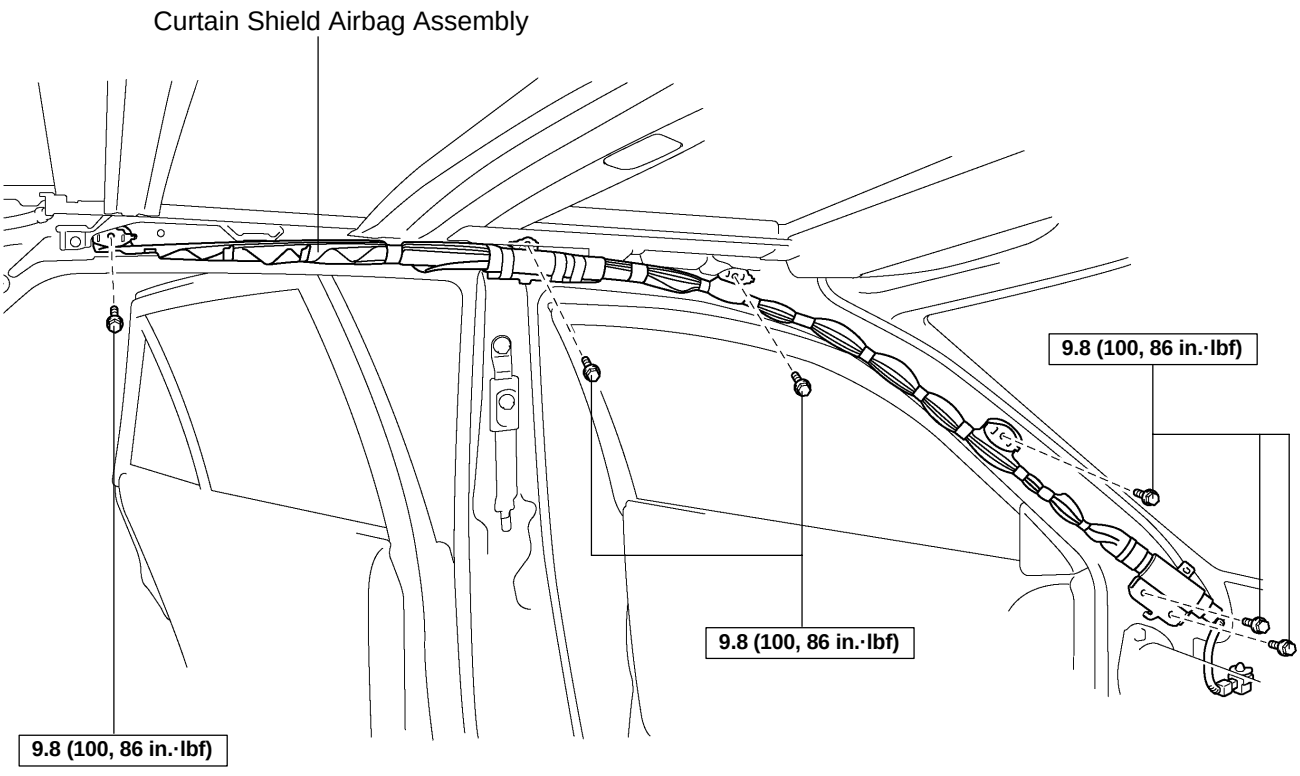
(d) Tighten the bolts on the rear side temporarily, starting from the bolt on the inner side tighten them completely.
Torque: 37 N·m (375 kgf·cm, 27 ft·lbf)

(e) Slide the seat to the rearmost position to install the bolts on the front side.
Torque: 37 N·m (375 kgf·cm, 27 ft·lbf)

CURTAIN SHIELD AIRBAG ASSEMBLY

RS0N2-07

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

H19085

RS0UC-02

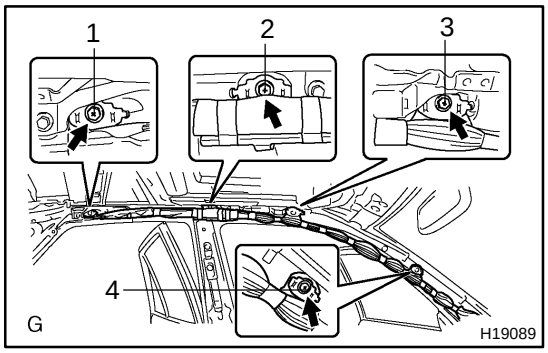
REMOVAL

NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is at ON position, DTCs will be recorded.**
- **Never use any airbag parts removed from another vehicle. When replacing parts, replace them with new ones.**

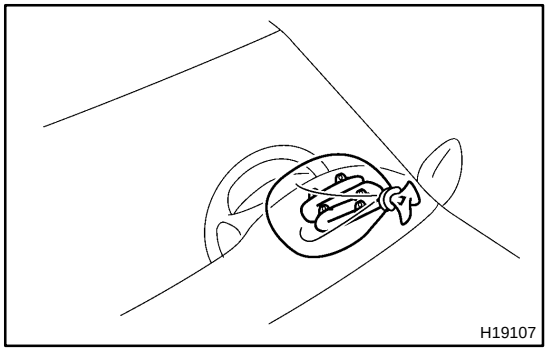
1. REMOVE ROOF HEADLINING

Pages for reference	See page
Sedan	BO-156
Wagon	BO-164



2. In case without removing inflater:
REMOVE CURTAIN SHIELD AIRBAG ASSEMBLY

(a) In the order shown in the illustration, remove the bolts and deployment section of the curtain shield airbag assembly.



(b) Put the removed curtain shield airbag assembly into a clear plastic bag and put it on the instrument panel.

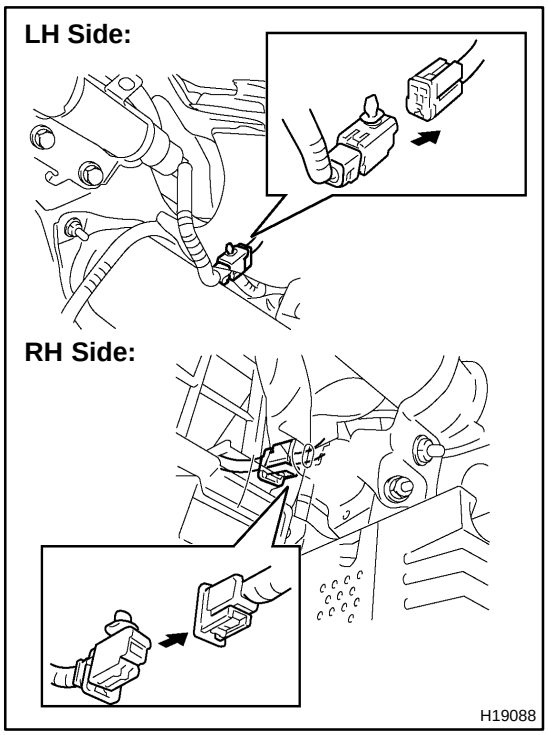
CAUTION:

Never disassemble the curtain shield airbag assembly.

NOTICE:

The clear plastic bag is not reusable.

3. REMOVE INSTRUMENT PANEL (See page BO-139)

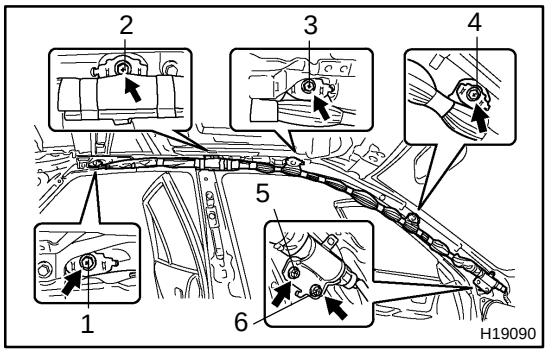


4. REMOVE CURTAIN SHIELD AIRBAG ASSEMBLY

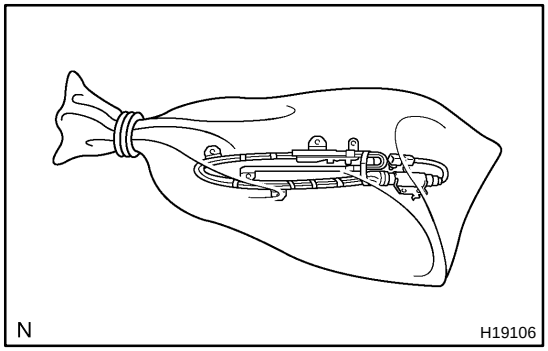
(a) Disengage the clamp and remove the curtain shield airbag assembly connector.

(b) Disconnect the connector for curtain sealed airbag assembly.

(c) Disengage the claw and disconnect the vehicle wire harness from the bracket of the curtain shield airbag assembly.



(d) In the order shown in the illustration, remove the bolts and curtain shield airbag assembly.



(e) Put the removed curtain shield airbag assembly into a clear plastic bag and keep it in a safe place.

CAUTION:

Never disassemble the curtain shield airbag assembly.

NOTICE:

The protection bag is not reusable.

RS0UD-02

INSPECTION

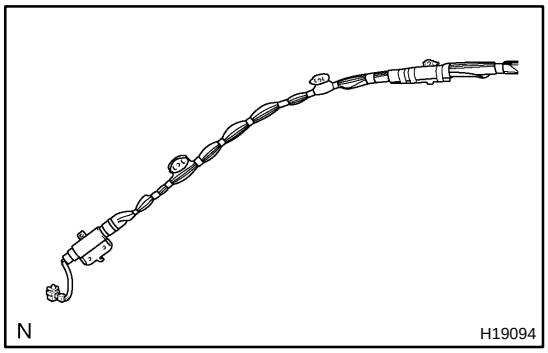
1. Vehicles not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Perform a diagnostic system check (See page DI-607).

(b) Perform a visual check which includes the following item with the curtain shield airbag assembly installed in the vehicle.
Check for cuts, minute cracks or marked discoloration on the front pillar garnish and roof headlining.

2. Vehicle involved in a collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Perform a diagnostic system check (See page DI-607).



(b) Perform a visual check which includes the following items with the curtain shield airbag assembly removed from the vehicle.
- Check for cuts, tears and cracks, or marked discoloration of the curtain shield airbag assembly.
- Check for cuts and cracks in wire harness, and chipping in connectors.

CAUTION:
For removal and installation of the curtain shield airbag assembly, see page RS-56 and RS-66 . Be sure to follow the correct procedure.

3. Vehicle involved in a collision and airbag is deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Perform a diagnostic system check (See page DI-607).

(b) Perform a visual check which includes the following items with the curtain shield airbag assembly removed from the vehicle.
- Check for deformation or cracks on the body part to where the curtain shield airbag installed.
- Check for damage of the connector and wire harness.

HINT:
If the body part is deformed or cracked, replace it.

RS0N5-08

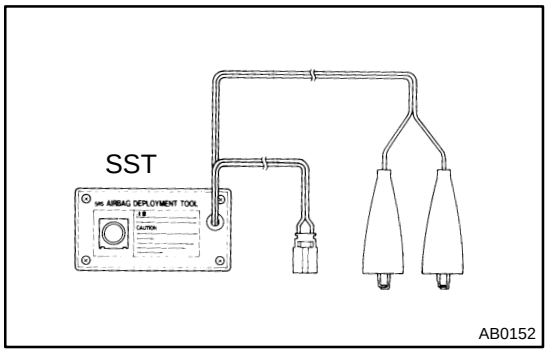
DISPOSAL

HINT:

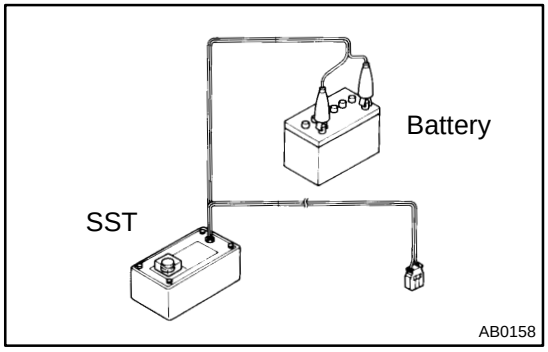
When scrapping vehicles equipped with an SRS or disposing of the curtain shield airbag assembly always first deploy the airbag in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Never dispose of a curtain shield airbag assembly which has an undeployed airbag.**
- **The airbag produces a sizeable exploding sound when it deploys, so perform the operation out-of-doors and where it will not create a nuisance to nearby residents.**



- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool), perform the operation in a place away from electrical noise.**
  SST 09082-00700
- **When deploying an airbag, perform the operation at least 10 m (33 ft) away from the airbag assembly.**
- **The side airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling side airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a side airbag assembly with the deployed airbag.**



1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

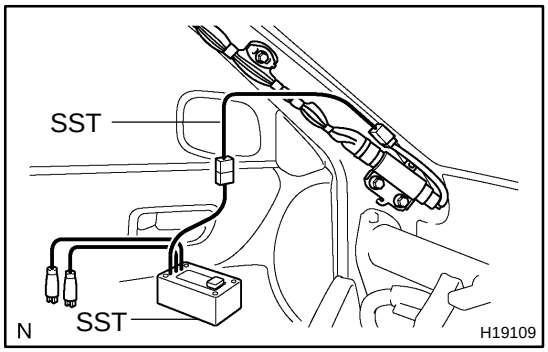
Have a battery ready as the power source to deploy the airbag.

(a) Check functioning of the SST (See step 1-(a) on page RS-17).
SST 09082-00700

(b) Disconnect the curtain shield airbag connector.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



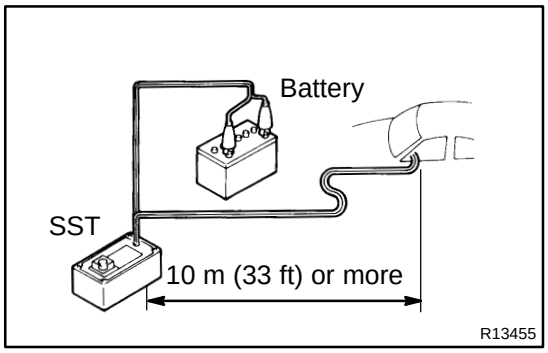
(c) Install the SST.

(1) Connect the connectors of the 2 SST to the airbag connector.

SST 09082-00700, 09082-00760

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



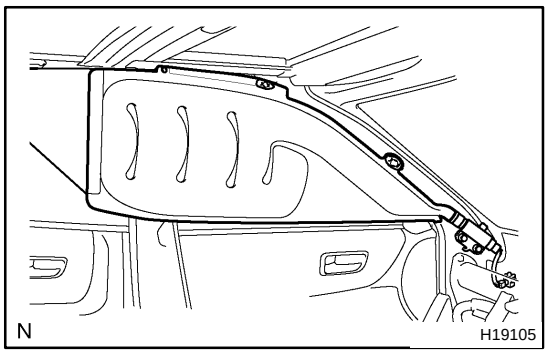
(2) Move the SST at least 10 m (33 ft) away from the front of the vehicle.

(3) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.



(d) Deploy the airbag.

(1) Check that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **The curtain shield airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling the curtain shield airbag assembly with the deployed airbag.**
- **Do not apply water, etc. to the curtain shield airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **When scrapping a vehicle, deploy the airbag and scrap the vehicle with the curtain shield airbag assembly still installed.**

2. DEPLOYMENT WHEN DISPOSING OF CURTAIN SHIELD AIRBAG ASSEMBLY

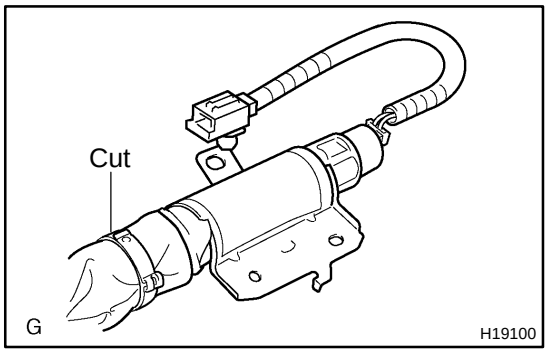
NOTICE:

- **When disposing of the curtain shield airbag assembly only, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

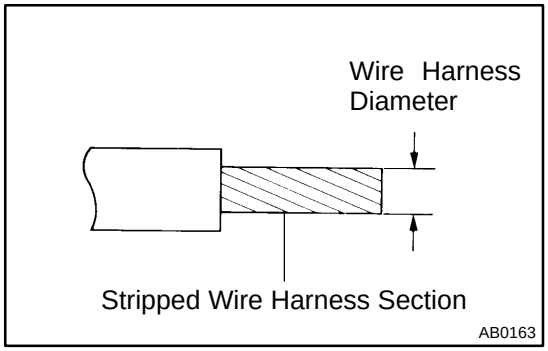
HINT:

Have a battery ready as the power source to deploy the airbag.

(a) Remove the curtain shield airbag assembly (See page RS-56).



(b) Cut off the deployment section in airbag from inflator.



(c) Using a service-purpose wire harness, tie down the curtain shield airbag assembly to the tire.

Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in^2. or more)

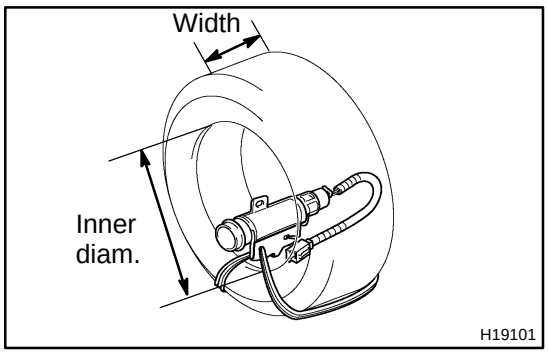
CAUTION:

If a wire harness which is too thin or some other thing is used to tie down the side airbag assembly, it may be snapped by the shock when the airbag is deployed. This is highly dangerous. Always use a wire harness for vehicle use which is at least 1.25 mm^2 (0.0019 in^2.).

HINT:

To calculate the square of the stripped wire harness section-

Square = 3.14 x $(Diameter)^2$ divided by 4

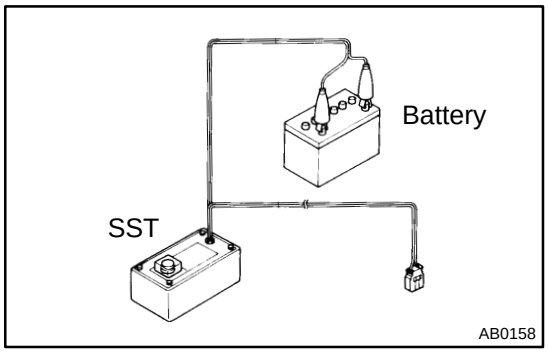


Position the curtain shield airbag assembly inside the tire with the airbag deployment direction facing inside.

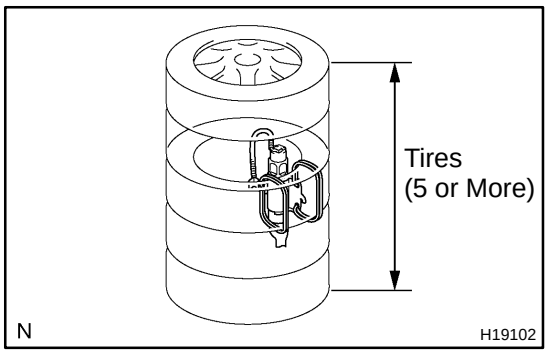
Tire size: Must exceed the following dimensions-
Width: 185 mm (7.28 in.)
Inner diameter: 360 mm (14.17 in.)

CAUTION:
Make sure the wire harness is tight. It is very dangerous when a loose wire harness results in the curtain shield airbag assembly coming free due to the shock from the airbag deploying.

NOTICE:
The tire will be marked by the airbag deployment, so when disposing of the airbag use a redundant tire.



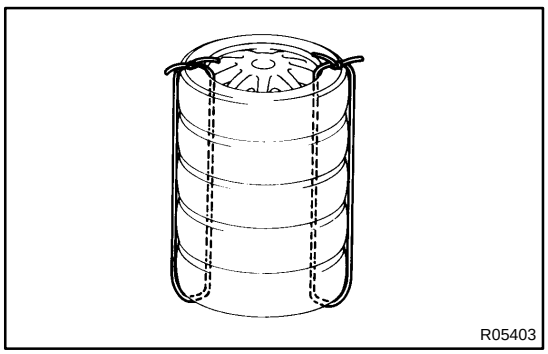
(d) Check functioning of the SST (See step 1-(a) on page RS-17).
SST 09082-00700



(e) Place the tires.

CAUTION:
Place the tire so that the deployment direction of the curtain shield airbag will be downward.

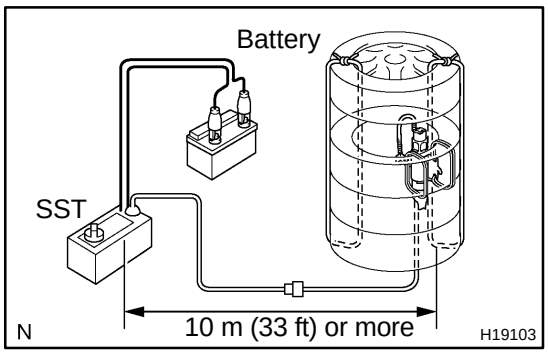
(1) Place at least 2 tires under the tire to which the side airbag assembly is tied.
(2) Place at least 2 tires over the tire to which the side airbag assembly is tied. The top tire should have the wheel installed.



(3) Tie the tires together with 2 wire harness.

CAUTION:
Make sure that the wire harness are tight. It is very dangerous when loose wire harness results in the tires coming free due to the shock from the airbag deploying.

HINT:
Place the SST connector and wire harness inside tires. Secure at least 1 m (3 ft) of slack for the wire harness.



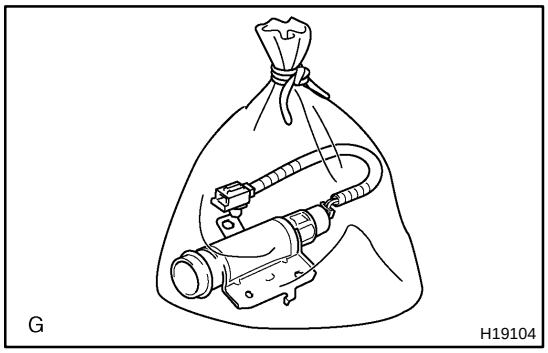
(f) Install the SST.
Connect the connectors of the 2 SST to the curtain shield airbag assembly connector.
SST 09082-00700, 09082-00760

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.

(g) Deploy the airbag.
(1) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.
(2) Check that no one is within 10 m (33 ft) area around the tire which the side airbag assembly is tied to.
(3) Press the SST activation switch and deploy the airbag.

HINT:
The airbag deploys simultaneously as the LED of the SST activation switch lights up.

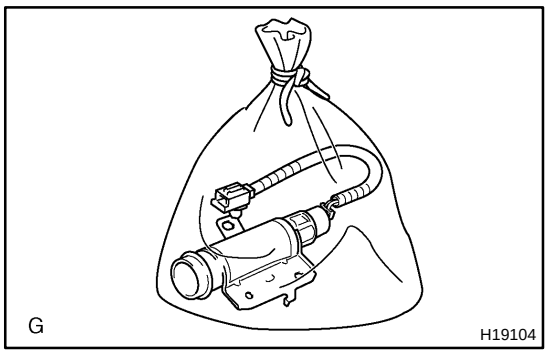


(h) Dispose of the curtain shield airbag assembly.

CAUTION:

- **The curtain shield airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with the deployed airbag.**
- **Do not apply water etc. to a curtain shield airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the curtain shield airbag assembly from the tire.
(2) Place the curtain shield airbag assembly in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts disposal.



3. DEPLOYMENT WHEN DISPOSING OF SIDE AIRBAG ASSEMBLY WITH AIRBAG DEPLOYED IN COLLISION

Dispose of the curtain shield airbag assembly.

CAUTION:

- **The curtain shield airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with the deployed airbag.**
- **Do not apply water etc. to a curtain shield airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the curtain shield airbag assembly (See page RS-56).

(2) Place the curtain shield airbag assembly in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts disposal.

RS0N6-04

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the curtain shield airbag assembly, front pillar garnish and/or roof headlining.

Case	Part to be replaced
If the curtain shield airbag has been deployed.	Curtain shield airbag assembly
If the curtain shield airbag assembly has been found to be faulty in trouble-shooting.	Curtain shield airbag assembly
If the curtain shield airbag assembly has been found to be faulty during checking items (See page RS-58).	Curtain shield airbag assembly
If the front pillar garnish has been found to be faulty during the check (See page RS-58).	Front pillar garnish
If the roof headlining has been found to be faulty during the check (See page RS-58).	Roof headlining
If the curtain shield airbag assembly has been dropped.	Curtain shield airbag assembly

CAUTION:

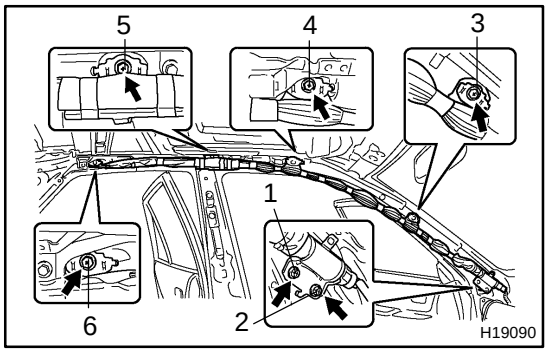
For removal and installation of the curtain shield airbag assembly, see page RS-56 and RS-66 . Be sure to follow the correct procedure.

RS0N7-05

INSTALLATION

NOTICE:

Never use airbag parts removed from another vehicle. When replacing parts, replace them with new parts.



1. INSTALL CURTAIN SHIELD AIRBAG ASSEMBLY

(a) In order shown in the illustration, install the curtain shield airbag assembly with the 6 bolts.

Torque: 9.8 N·m (100 kgf·cm, 86 in.·lbf)

CAUTION:

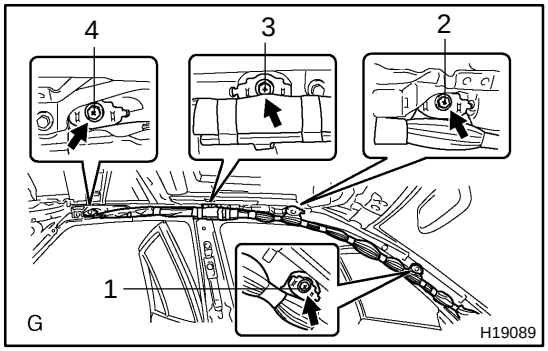
Pay attention not to twist the deployment section of the curtain shield airbag assembly.

NOTICE:

- **Make sure that the curtain shield airbag assembly is installed with the specified torque.**
- **If the curtain shield airbag assembly has been dropped, or any cracks, dents or other defects in the case or connector, replace the curtain shield airbag assembly with a new one.**
- **When installing the curtain shield airbag assembly, be careful to prevent it from being pinched between other parts.**

(b) Connect the connector of the curtain shield airbag assembly.

2. INSTALL INSTRUMENT PANEL (See page BO-149)



3. When inflator is installed:

INSTALL CURTAIN SHIELD AIRBAG ASSEMBLY

In order shown in the illustration, install the deployment section of the curtain shield airbag assembly with the 4 bolts.

Torque: 9.8 N·m (100 kgf·cm, 86 in.·lbf)

CAUTION:

Pay attention not to twist it.

NOTICE:

- **Make sure that the curtain shield airbag assembly is installed with the specified torque.**
- **When installing the curtain shield airbag assembly, be careful to prevent it from being pinched between other parts.**

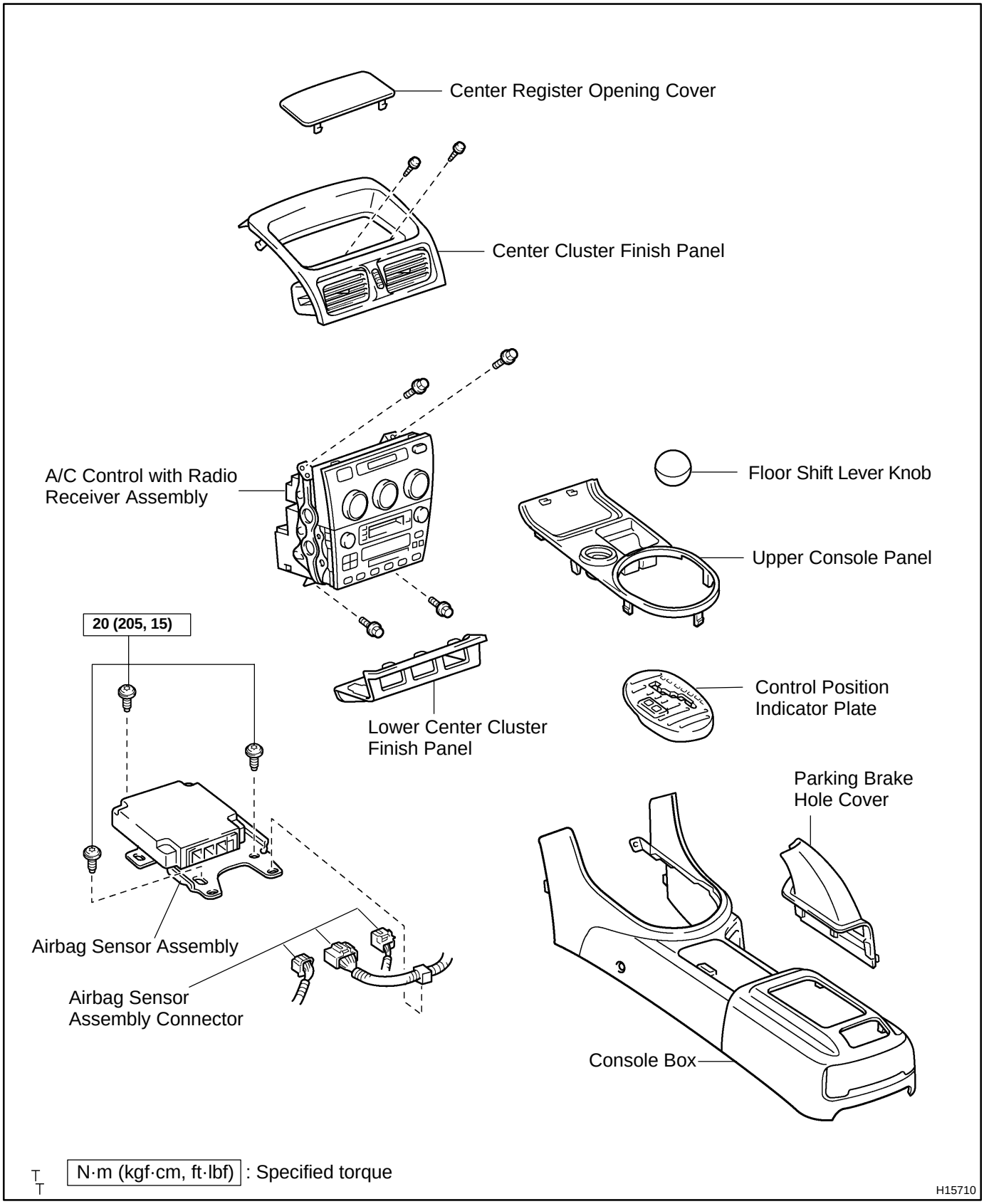
4. INSTALL ROOF HEADLINING

Pages for reference	See page
Sedan	BO-160
Wagon	BO-169

AIRBAG SENSOR ASSEMBLY

RS01G-31

COMPONENTS



RS0EY-13

REMOVAL

NOTICE:

Do not open the cover or the case of the ECU and various electrical devices unless absolutely necessary.

(If the IC terminals are touched, the IC may be destroyed by static electricity.)

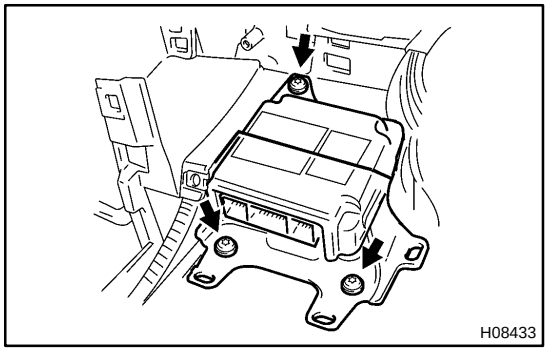
HINT:

For step 1 to 8, refer to page BO-139 .

1. **REMOVE FLOOR SHIFT LEVER KNOB**
2. **REMOVE UPPER CONSOLE PANEL**
3. **REMOVE CENTER REGISTER OPENING COVER**
4. **REMOVE CENTER CLUSTER FINISH PANEL**
5. **REMOVE LOWER CENTER CLUSTER FINISH PANEL**
6. **REMOVE A/C CONTROL WITH RADIO RECEIVER ASSEMBLY**
7. **REMOVE PARKING BRAKE HOLE COVER**
8. **REMOVE CONSOLE BOX**
9. **REMOVE CONTROL POSITION INDICATOR PLATE**

(a) Disconnect the connector.

(b) Disconnect the engagement of the claw at 4 positions and remove the control position indicator plate.



10. **REMOVE AIRBAG SENSOR ASSEMBLY**

(a) Disconnect the 3 airbag sensor assembly connectors.

NOTICE:

Disconnect the connectors with the sensor assembly installed.

(b) Using a torx wrench, remove the 3 screws and airbag sensor assembly.

Torx wrench: T40 (Part No.09042-00020 or locally manufactured tool)

RS05T-04

INSPECTION

1. Vehicle not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-607).

2. Vehicle involved in collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-607).

3. Vehicle involved in collision and airbag is deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Replace the airbag sensor assembly (See page RS-68).

RS01J-13

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the airbag sensor assembly.

- If the SRS has been deployed in a collision.
- If the airbag sensor assembly has been found to be faulty in troubleshooting.
- If the airbag sensor assembly has been dropped.

CAUTION:

For removal and installation of the airbag sensor assembly, see page RS-68 and RS-71 . Be sure to follow the correct procedure.

RS0EZ-13

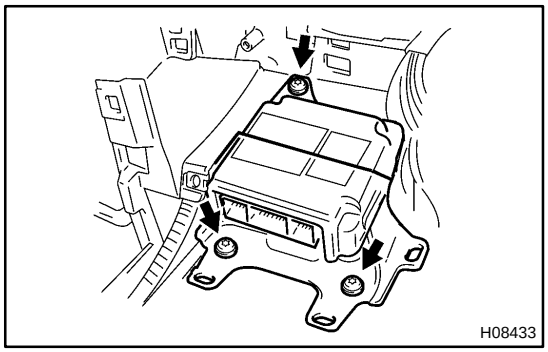
INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.**
- **Never reuse the airbag sensor assembly involved in a collision when the airbag has deployed.**
- **Never repair a sensor in order to reuse it.**

HINT:

For step 3 to 10, refer to page BO-149 .



1. INSTALL AIRBAG SENSOR ASSEMBLY

(a) Using a torx wrench, install the airbag sensor assembly with the 3 screws.

Torx wrench: T40 (Part No.09042-00020 or locally manufactured tool)

Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

(b) Connect the 3 airbag sensor assembly connectors.

NOTICE:

- **Connection of the connector is done after the sensor assembly has been installed.**
- **Make sure the sensor assembly is installed with the specified torque.**
- **If the sensor assembly has been dropped, or there are cracks, dents or other defects in the case, bracket or connector, replace the sensor assembly with a new one.**
- **When installing the sensor assembly, take care that the SRS wiring does not interfere with other parts and is not pinched between other parts.**
- **After installing, shake the sensor assembly to check that there is no looseness.**

2. INSTALL CONTROL POSITION INDICATOR PLATE

(a) Connect the engagement of the claw at 4 positions and install the control position indicator plate.

(b) Connect the connector.

3. INSTALL CONSOLE BOX

4. INSTALL PARKING BRAKE HOLE COVER

5. INSTALL A/C CONTROL WITH RADIO RECEIVER ASSEMBLY

6. INSTALL LOWER CENTER CLUSTER FINISH PANEL

7. INSTALL CENTER CLUSTER FINISH PANEL

8. INSTALL CENTER REGISTER OPENING COVER

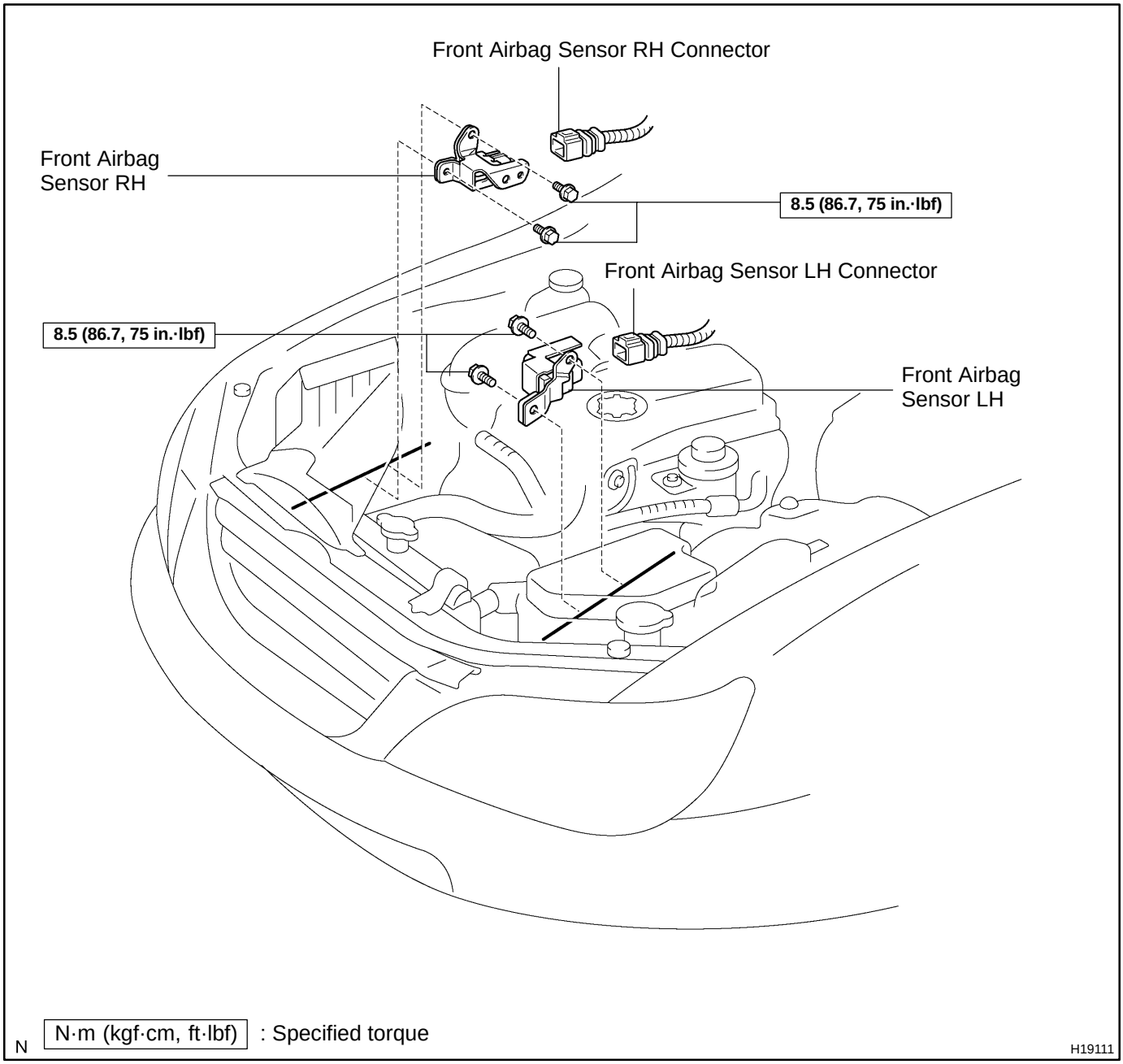
9. INSTALL UPPER CONSOLE PANEL

10. INSTALL FLOOR SHIFT LEVER KNOB

FRONT AIRBAG SENSOR

RS07U-06

COMPONENTS

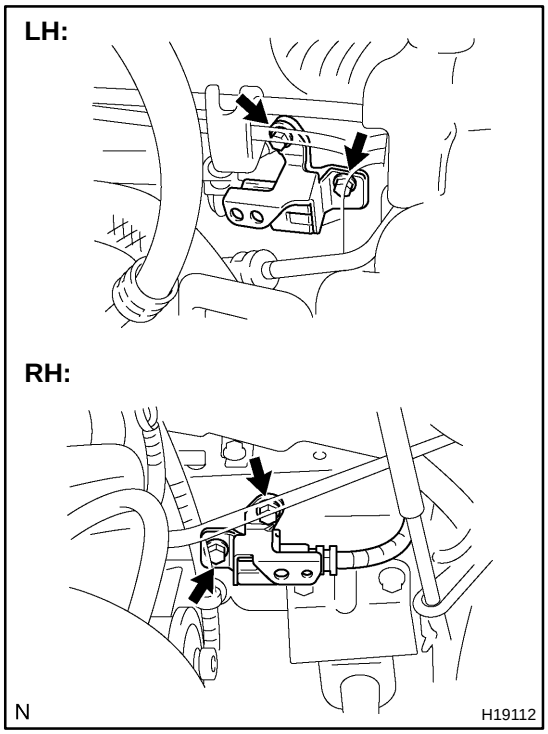


RS0UJ-02

REMOVAL

NOTICE:

- **If the wiring connector of the SRS is disconnected with the ignition switch in ON or ACC position, DTCs will be recorded.**
- **Never use any SRS parts removed from another vehicle. When replacing parts, replace them with new one.**
- **Never reuse the sensor involved in a collision when the SRS has deployed.**
- **Never repair a sensor in order to reuse it.**



REMOVE FRONT AIRBAG SENSOR

(a) Disconnect the front airbag sensor connector.

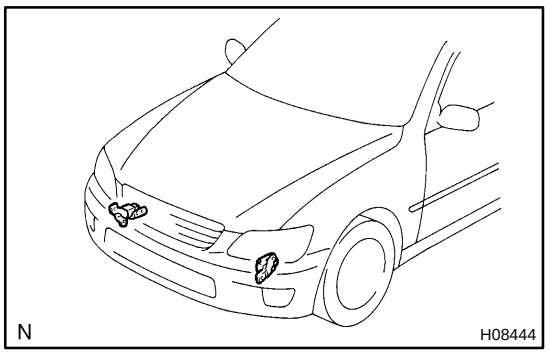
NOTICE:

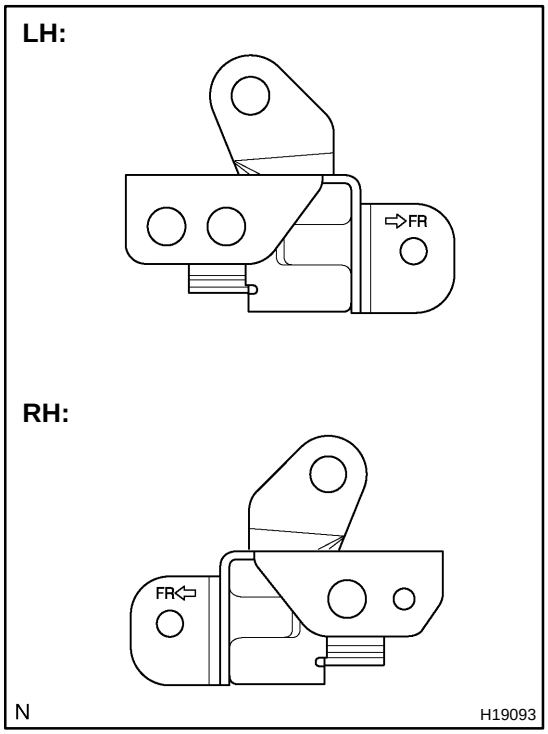
Disconnect the connector with the sensor assembly installed.

(b) Remove the 2 bolts and front airbag sensor.

(c) Employ the same manner described above to the other side.

RS07W-05





INSPECTION

1. VEHICLES NOT INVOLVED IN COLLISION

Perform a diagnostic system check (See page DI-607).

2. VEHICLES INVOLVED IN COLLISION

(a) Perform a diagnostic system check (See page DI-607).

(b) If the front fender of the car or its periphery is damaged, do a visual check for damage to the front airbag sensor, which includes the following items even if the airbag was not deployed:

- Bracket deformation
- Paint peeling off the bracket
- Cracks, dents or chips in the case
- Cracks, dents, chipping and scratches in the connector
- Peeling of the label or damage to the serial number

RS07X-04

REPLACEMENT

REPLACEMENT REQUIREMENTS

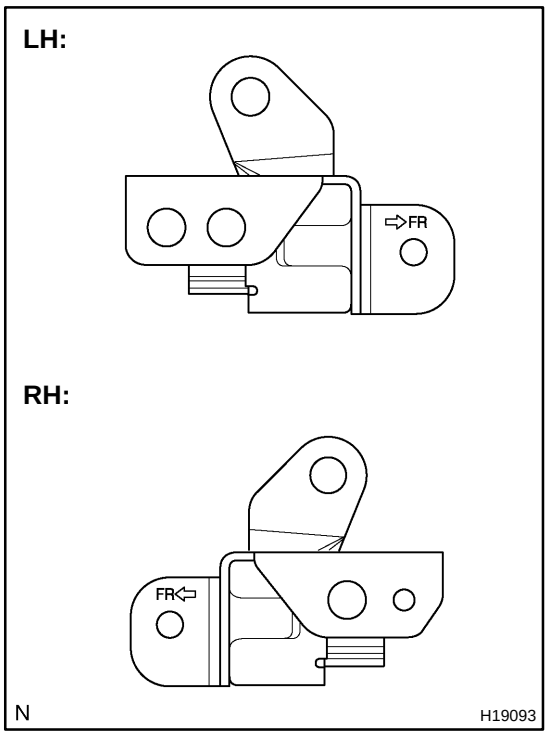
In the following cases, replace the front airbag sensor.

- If the SRS has been deployed in a collision (Replace both the left and right airbag sensors.).
- If the front airbag sensor has been found to be faulty in troubleshooting.
- If the front airbag sensor has been found to be faulty during the check in item (See page RS-74).
- If the front airbag sensor has been dropped.

CAUTION:

For removal and installation of the front airbag sensor, see page RS-73 and RS-76 . Be sure to follow the correct procedure.

RS0UK-02



INSTALLATION

INSTALL FRONT AIRBAG SENSOR

(a) Install the front airbag sensor with the arrow on the sensor facing toward the front of the vehicle.

Torque: 8.5 N·m (86.7 kgf·cm, 75 in.·lbf)

NOTICE:

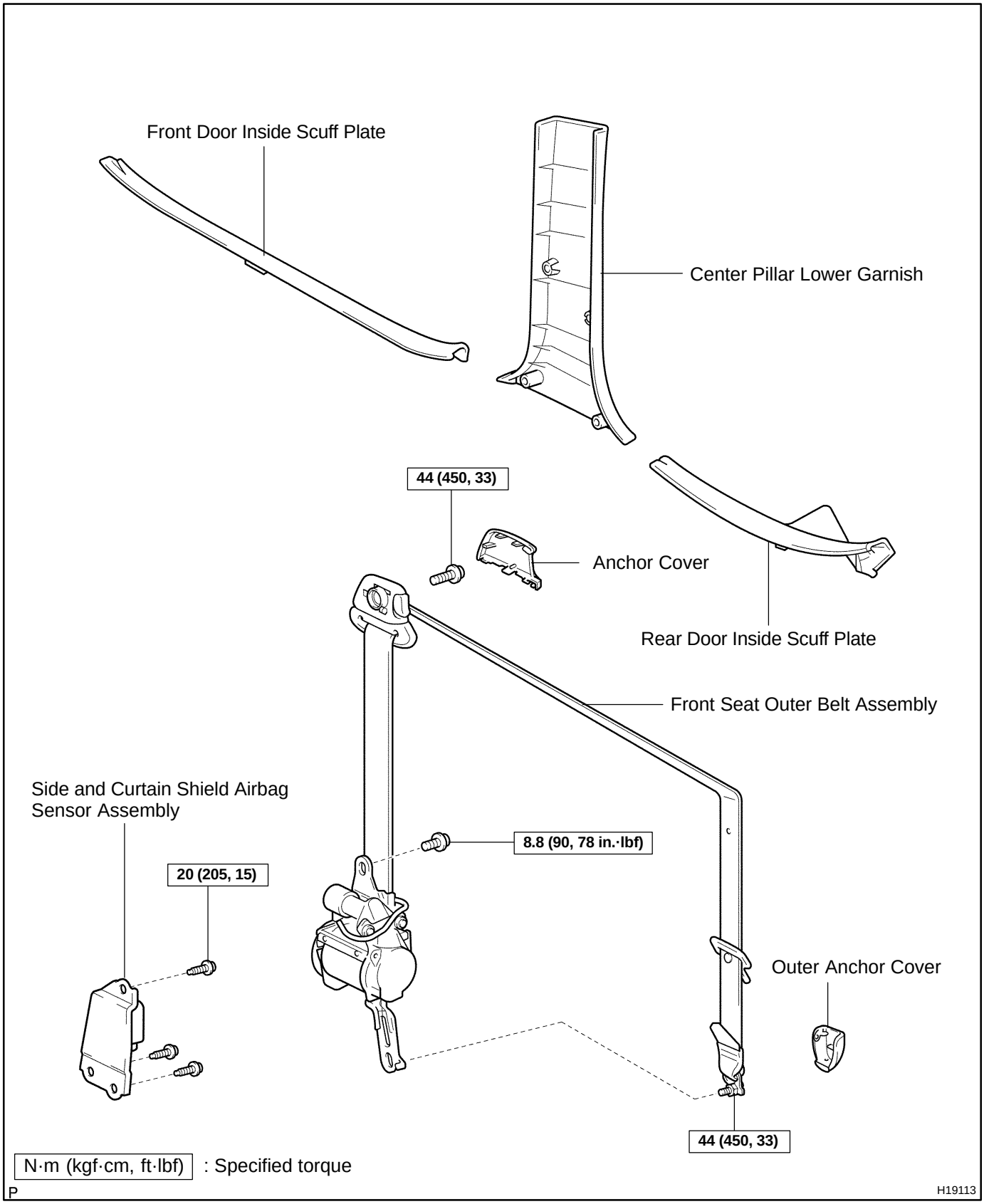
- **Connection of the connector is done after the sensor has been installed.**
- **Make sure the sensor is installed with the specified torque.**
- **If the sensor has been dropped, or there are cracks, dents or other defects in the case, brackets or connector, replace the removed sensor with a new one.**
- **The front sensor is equipped with an electrical connection check mechanism. Be sure to lock this mechanism securely when connecting the connector. If the connector is not securely locked, a malfunction code will be detected by the diagnostic system.**

(b) Connect the front airbag sensor connector.

SIDE AND CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY

RS0UE-03

COMPONENTS



RS0UF-03

REMOVAL

NOTICE:

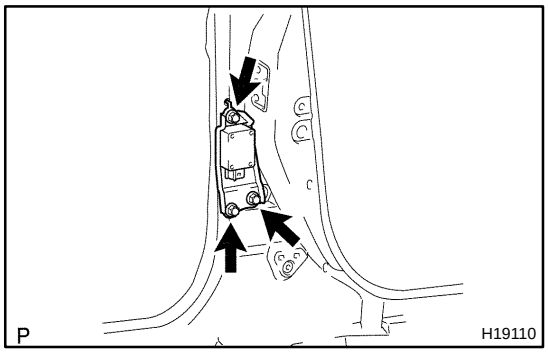
- **If the wiring connector of the SRS is disconnected with the ignition switch at ON position, DTC will be recorded.**
- **Do not open the cover or the case of the ECU and various electrical devices unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)**

1. REMOVE FRONT AND REAR DOOR INSIDE SCUFF PLATES

2. REMOVE CENTER PILLAR LOWER GARNISH

3. REMOVE FRONT SEAT OUTER BELT ASSEMBLY

Pages for reference	See page
Sedan	BO-211
Wagon	BO-214



4. REMOVE SIDE AND CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY

(a) Disconnect the side and curtain shield airbag sensor assembly connector.

NOTICE:

Disconnect the connector with the sensor assembly installed.

(b) Remove the 3 bolts and side and curtain shield airbag sensor assembly.

RS0UG-01

INSPECTION

1. Vehicle not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-607).

2. Vehicle involved in collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-607).

3. Vehicle involved in collision and airbag is deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Replace the side airbag sensor assembly (See page RS-78).

RS0UH-01

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the side and curtain shield airbag sensor assembly.

- If the side and curtain shield airbag sensor assembly has been deployed in a collision.
- If the side and curtain shield airbag sensor assembly has been found to be faulty in troubleshooting.
- If the side and curtain shield airbag sensor assembly has been dropped.

CAUTION:

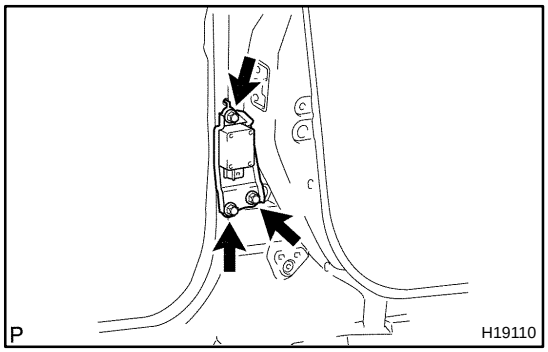
For removal and installation of the side and curtain shield airbag sensor assembly, see page RS-78 and RS-81 . Be sure to follow the correct procedure.

RS0UI-02

INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the side and curtain shield airbag sensor assembly involved in a collision when the airbag has deployed.**
- **Never repair a sensor in order to reuse it.**



1. INSTALL SIDE AND CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY

(a) Install the side and curtain shield airbag sensor assembly with the 3 bolts.

Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

(b) Connect the side and curtain shield airbag sensor assembly connector.

NOTICE:

- **Connection of the connector is done after the sensor assembly has been installed. Make sure the sensor assembly is installed with the specified torque.**
- **If the sensor assembly has been dropped, or there are cracks, dents or other defects in the case, bracket or connector, replace the sensor assembly with a new one.**
- **When installing the sensor assembly, take care that the SRS wiring does not interfere with other parts and is not pinched between other parts.**
- **After installation, shake the sensor assembly to check that there is no looseness.**

2. INSTALL FRONT SEAT OUTER BELT ASSEMBLY

Pages for reference	See page
Sedan	BO-211
Wagon	BO-214

3. INSTALL CENTER PILLAR LOWER GARNISH

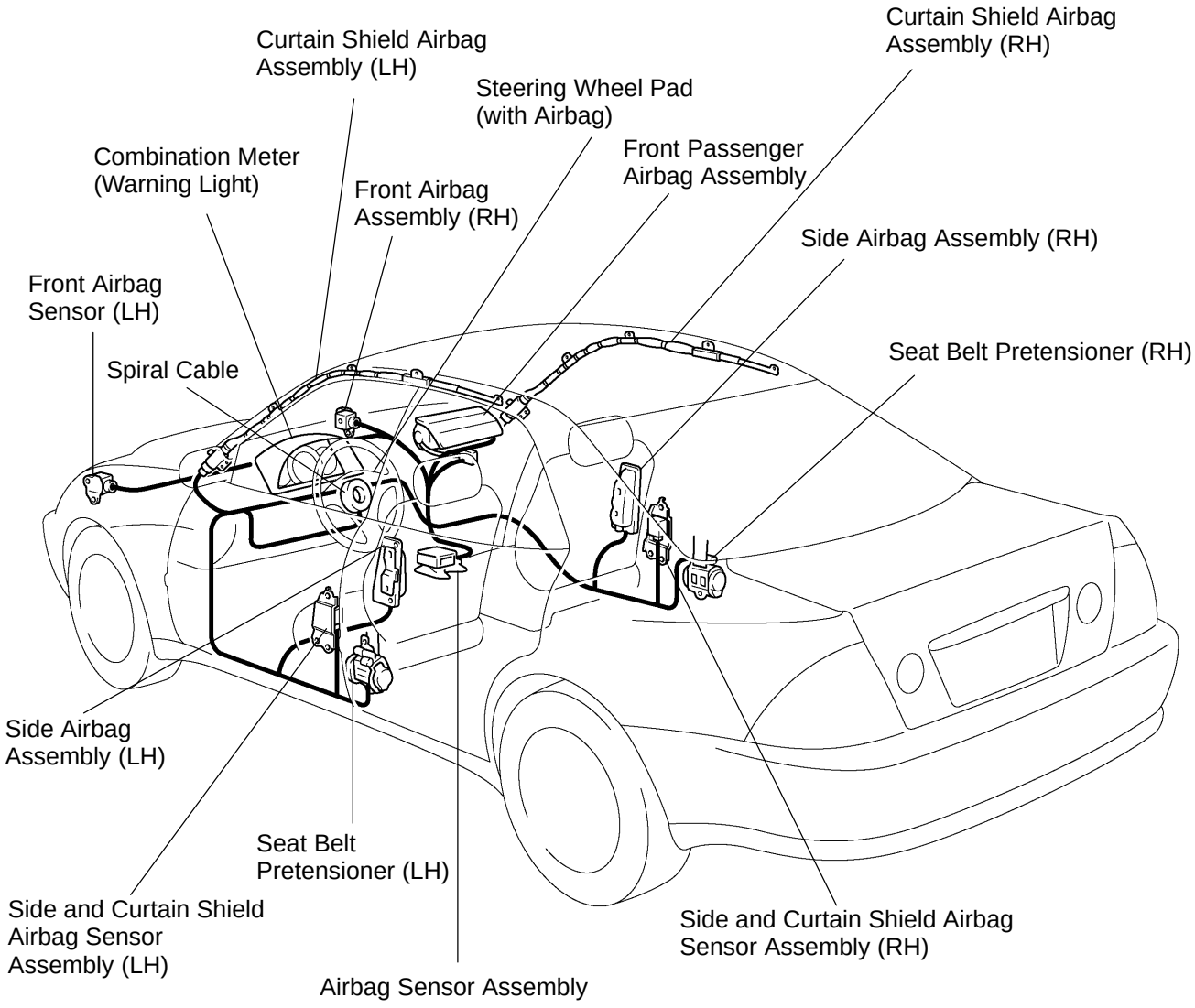
4. INSTALL FRONT AND REAR DOOR INSIDE SCUFF PLATES

WIRE HARNESS AND CONNECTOR

RS0UL-02

LOCATION

Sedan:



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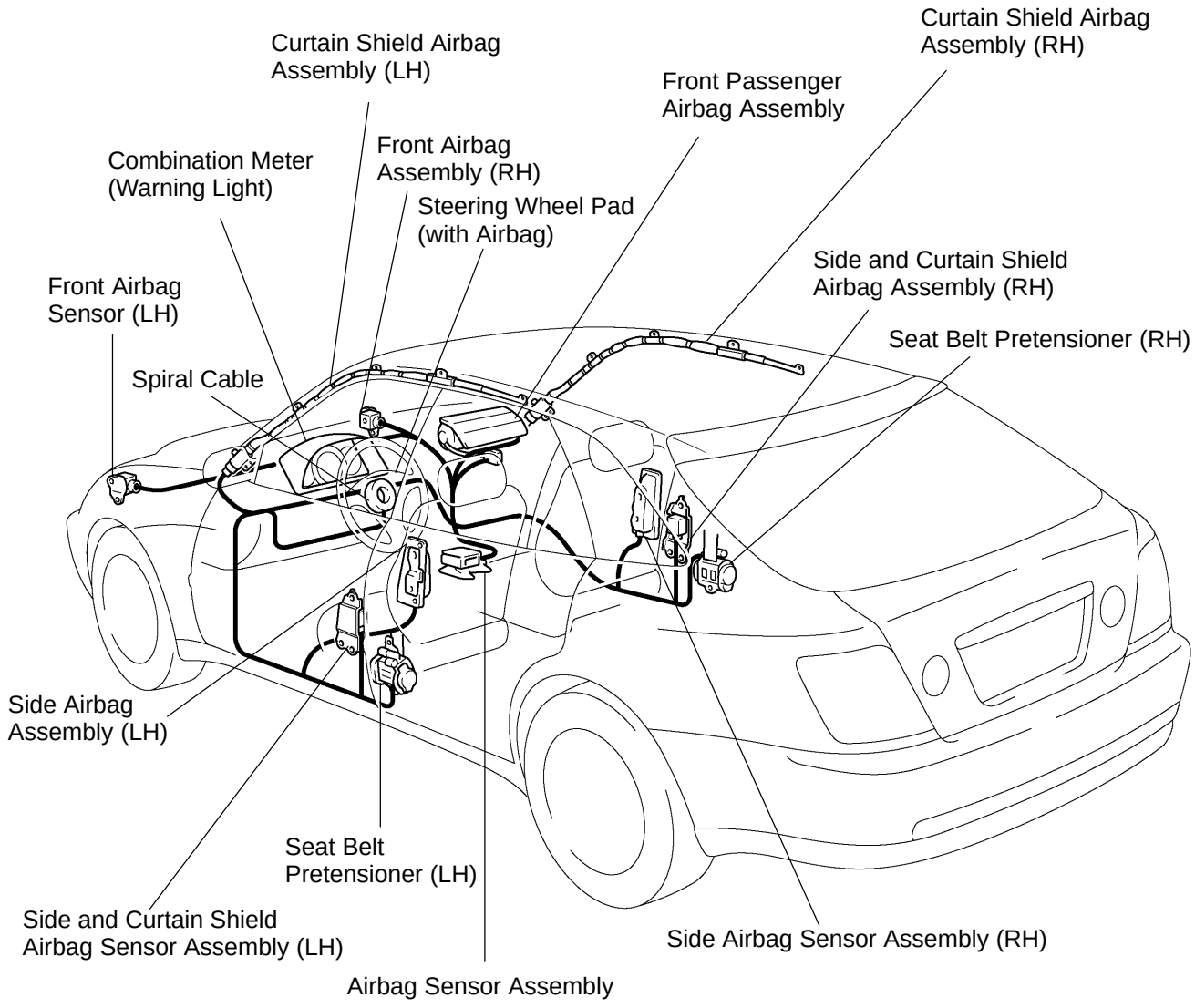
H19272

Wagon:



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H19086

RS085-04

INSPECTION

HINT:

The SRS wire harness is integrated with the instrument panel wire harness assembly. All the connectors in the system are a standard yellow color.

1. Vehicles not involved in collision:

INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Perform a diagnostic system check (See page DI-607).

2. Vehicles involved in collision:

INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Perform a diagnostic system check (See page DI-607).

(b) Check breaks in all wires of the SRS wire harness, and exposed conductors.

(c) Check to see if the SRS wire harness connectors are cracked or chipped.

RS086-04

REPLACEMENT

In the following cases,replace the wire harness or connector.

- If any part of the SRS wire harness or any connector has been found to be faulty in troubleshooting.
- If any part of the SRS wire harness or any connector has been found to be faulty during checking items (See page RS-84).

CAUTION:

If the wire harness used in the SRS is damaged, replace the whole wire harness assembly.

BODY ELECTRICAL SYSTEM

BE01I-15

PRECAUTION

HINT:

Take care to observe the following precautions when performing inspections or removal and replacement of body electrical related parts.

1. HEADLIGHT SYSTEM

- Halogen bulbs have pressurized gas inside and require special handling. They can burst if scratched or dropped. Hold a bulb only by its plastic or metal case. Don't touch the glass part of a bulb with bare hands.
- When high voltage socket of discharge headlight is touched with the light control switch HEAD, high voltage of 20,000 V is momentarily generated. This might lead to a serious accident.
- Never connect the tester to the high voltage socket of discharge headlight for measurement, as this leads to a serious accident because of high voltage.
- When performing operation related to the discharge headlight, make sure to do it in the place with no water of rain to prevent electric shock, with light control switch OFF, battery terminal removed, connector of light control ECU disconnected.
- When performing operation related to the discharge headlight, make sure to do it after assembling has been completely over and never light up without a bulb installed.
- Do not light up the discharge headlight using another power source except vehicle's.
- When there is a defect on the discharge headlight or any shock has been applied to it, replace the light with a new one.
  Even if the light operates normally, there is a possibility that the fail-safe function works.

2. SRS (SUPPLEMENTAL RESTRAINT SYSTEM)

The LEXUS IS300 is equipped with an SRS (Supplemental Restraint System) such as the driver airbag, front passenger airbag, side airbag, curtain shield airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.

3. AUDIO SYSTEM

If the negative (-) terminal cable is disconnected from the battery, the preset AM, FM 1 and FM 2 stations stored in memory are erased, so make sure to note the stations and reset them after the negative (-) terminal cable is reconnected to the battery.

4. MOBILE COMMUNICATION SYSTEM

If the vehicle is equipped with a mobile communication system, refer to precautions in the IN section.

TROUBLESHOOTING

BE16S-06

PROBLEM SYMPTOMS TABLE

IGNITION SWITCH AND

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Ignition switch is not set to each position.	11. Ignition switch 12. Power source circuit	BE-21 -

KEY UNLOCK WARNING SWITCH

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Key unlock warning system does not operate. (The buzzer sounds when the ignition key is ACC or ON)	1. Ignition Switch 2. Key Unlock Warning Switch 3. Body ECU 4. Combination Meter 5. Wire Harness	BE-21 BE-21 DI-893 BE-90 -

w/o Daytime running light system:

HEADLIGHT AND TAILLIGHT SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

HINT:

To inspect the bulb and light control ECU, replace them with the ones working normally and judge whether they work normally or not.

Symptom	Suspect Area	See page
”Automatic light control system” does not operate.	1. Automatic Light Control Sensor 2. Light Control Switch 3. Door Courtesy Switch 4. Wire Harness 5. Theft Deterrent ECU 6. Body ECU	BE-31 BE-31 BE-58 - DI-776 DI-893
Auto turn-off system does not operate when the driver’s door is opened.	1. Drivers Door Courtesy Switch 2. Body ECU	BE-58 DI-893
Auto turn-off system: Headlight and taillight do not come on.	1. Body ECU 2. Wire Harness	DI-893 -
Auto turn-off system: Headlight and taillight stay on.	1. Body ECU 2. Wire Harness	DI-893 -
Only one headlight comes on.	1. Bulb 2. Light Control Sensor 3. Wire Harness	- BE-31 -
”LO-Beam” does not light (All).	1. Headlight Control Relay 2. Light Control Sensor 3. Wire Harness	BE-31 BE-31 -
”LO-Beam” does not light (One side).	1. Bulb 2. H-LP L-LWR Fuse 3. H-LP R-LWR Fuse 4. Wire Harness	- BE-15 BE-15 -
”HI-Beam” does not light (All).	1. Headlight Dimmer Switch 2. Wire Harness	BE-31 -

”HI-Beam” does not light (One side).	1. Bulb 2. H-LP L-UPR Fuse 3. H-LP R-UPR Fuse 4. Wire Harness	- BE-15 BE-15 -
”Flash” does not light.	1. H-LP L-UPR Fuse 2. H-LP R-UPR Fuse 3. Headlight Dimmer Switch 4. Light Control ECU 5. Wire Harness	BE-15 BE-15 BE-31 - -
”Flash” does not light.	1. Bulb 2. Light Control ECU 3. Wire Harness	- - -
Headlight does not come on.	1. Headlight Control Relay 2. Light Control Switch 3. Light Control ECU 4. Wire Harness	BE-31 BE-31 - -
Headlight does not come on.	1. Bulb 2. Light Control ECU 3. Wire Harness	- - -
Headlight flickers.	1. Bulb 2. Light Control ECU 3. Wire Harness	- - -
Headlight is dark.	1. Bulb 2. Light Control ECU 3. Wire Harness	- - -
Only one taillight comes on.	1. Bulb 2. Wire Harness	- -
Taillight does not come on. (Headlight is normal)	1. TAIL Fuse 2. GAUGE Fuse 3. Taillight Control Relay 4. Light Failure Relay 5. Light Control Switch 6. Wire Harness	BE-15 BE-15 BE-31 BE-31 BE-31 -
Taillight does not come on. (Headlight does not light)	1. Light Control Switch 2. Wire Harness	BE-31 -
Rear combination light does not come on.	1. Light Failure Relay 2. Wire Harness 3. Bulb	BE-31 - -

w/ Daytime running light system:

HEADLIGHT AND TAILLIGHT SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

HINT:

To inspect the bulb and light control ECU, replace them with the ones working normally and judge whether they work normally or not.

Symptom	Suspect Area	See page
”Automatic light control system” does not operate.	1. Automatic Light Control Sensor 2. Light Control Switch 3. Door Courtesy Switch 4. Wire Harness 5. Theft Deterrent ECU 6. Body ECU	BE-31 BE-31 BE-58 - DI-776 DI-893
Auto turn-off system does not operate when the driver’s door is opened.	1. Drivers Door Courtesy Switch 2. Body ECU	BE-58 DI-893
Auto turn-off system: Headlight and taillight do not come on.	1. Body ECU 2. Wire Harness	DI-893 -
Auto turn-off system: Headlight and taillight stay on.	1. Body ECU 2. Wire Harness	DI-893 -
Only one headlight comes on.	1. Daytime Running Light No. 2 Relay 2. Daytime Running Light Main Relay 3. Bulb 4. Light Control ECU 5. Wire Harness 6. Combination Meter	BE-31 BE-31 - - - BE-90
”LO-Beam” does not light (All).	1. Headlight Control Relay 2. Light Control ECU 3. Wire Harness	BE-31 - -
”LO-Beam” does not light (One side).	1. Bulb 2. H-LP L-LWR Fuse 3. H-LP R-LWR Fuse 4. Light Control ECU 5. Wire Harness	- BE-15 BE-15 - -
”HI-Beam” does not light (All).	1. Headlight Dimmer Switch 2. Daytime Running Light Main Relay 3. Wire Harness 4. Combination Meter	BE-31 BE-31 - BE-90
”HI-Beam” does not light (One side).	1. Bulb 2. H-LP L-UPR Fuse 3. H-LP R-UPR Fuse 4. Daytime Running Light No. 2 Relay 5. Wire Harness	- BE-15 BE-15 BE-31 -
”Flash” does not light.	1. Headlight Dimmer Switch 2. Daytime Running Light Main Relay 3. Wire Harness 4. Combination Meter	BE-31 BE-31 - BE-90

Headlight does not come on.	1. Headlight Control Relay 2. Daytime Running Light Main Relay 3. Daytime Running Light No.2 Relay 4. Headlight Dimmer Switch 5. Light Control Switch 6. Wire Harness 7. Light Control ECU 8. Bulb 9. Combination Meter	BE-31 BE-31 BE-31 BE-31 BE-31 - - - BE-90
Headlight does not come on with light control switch in HEAD.	1. Light Control Switch 2. Light Control ECU 3. Wire Harness	BE-31 - -
Headlight does not go out with light control switch in OFF.	1. Headlight Control Relay 2. Light Control ECU 3. Wire Harness	BE-31 - -
Headlight flickers.	1. Bulb 2. Light Control ECU 3. Wire Harness	- - -
Headlight is dark.	1. Bulb 2. Light Control ECU 3. Wire Harness	- - -
Taillight does not come on with light control switch in TAIL.	1. Taillight Control Relay 2. Light Control Switch 3. Wire Harness	BE-31 BE-31 -
Taillight does not go out with light control switch in OFF.	1. Taillight Control Relay 2. Light Control Switch 3. Wire Harness	BE-31 BE-31 -
Headlight does not come on with engine running and light control switch in OFF.	1. ECU-B Fuse 2. GAUGE Fuse 3. Daytime Running Light Main Relay 4. Daytime Running Light No.2 Relay 5. Generator L Terminal 6. Parking Brake Switch 7. Wire Harness 8. Combination Meter	BE-15 BE-15 BE-31 BE-31 BE-90 BE-90 - -

HID type headlight:
HEADLIGHT BEAM LEVEL CONTROL SYSTEM

Symptom	Suspect Area	See page
Beam axis is not controlled. (It is not initialized.) Headlight Beam Level Control System does not operate.	1. ECU-IG Fuse 2. Headlight Beam Level Control Actuator 3. Headlight Beam Level Control ECU 4. Wire Harness Side	BE-15 BE-31 BE-31 -
Beam axis is not controlled. (It is initialized.) Headlight Beam Level Control System does not operate.	1. Height Control Sensor 2. Headlight Beam Level Control ECU 3. Wire Harness Side	- BE-31 -
Controlled angle of head light is unusual. (The angle is controlled.)	1. Height Control Sensor 2. Headlight Beam Level Control ECU 3. Headlights 4. Wire Harness Side	- BE-31 BE-31 -
Beam axis position is not stable during driving.	1. ABS System 2. Headlights 3. Wire Harness	- BE-31 -

FOG LIGHT SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Front fog light does not light up with light control SW TAIL or HEAD (LO-beam only). (Headlight is normal.)	1. Bulbs 2. FR FOG Fuse 3. Front Fog Light Relay 4. Front Fog Light Switch 5. Wire Harness	- BE-15 BE-48 BE-48 -
Only one light does not light.	1. Bulbs 2. Wire Harness	- -
Rear fog light does not light with light control SW HEAD. (Headlight is normal.)	1. Bulbs 2. ECU-B2 Fuse 3. Rear Fog Light Switch 4. Wire Harness	- BE-15 BE-48 -
Rear fog light does not light with light control SW HEAD. (Headlight does not light.)	1. Inspect Headlight and Taillight System 2. Wire Harness	BE-2 -
Only one light does not light.	1. Bulbs 2. Wire Harness	- -

TURN SIGNAL AND HAZARD WARNING SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
”Hazard” and ”Turn” do not light up.	1. GAUGE Fuse 2. TURN HAZ Fuse 3. Ignition Switch 4. Turn Signal Flasher Relay 5. Wire Harness	BE-15 BE-15 BE-21 BE-53 -
Hazard warning light does not light up. (Turn is normal)	1. A/C Control Panel 2. Wire Harness	AC-79 -
Turn signal does not light up. (Hazard is normal)	1. Turn Signal Switch 2. Wire Harness	BE-53 -
Turn signal does not light up in one direction.	1. Turn Signal Switch 2. Wire Harness	BE-53 -
Only one bulb does not light up.	1. Bulb 2. Wire Harness	- -

INTERIOR LIGHT SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
All the lights do not come ON.	DOME Fuse	BE-15
The driver door courtesy light does not come ON when the driver's door is opened.	1. Driver's Door Courtesy Switch 2. Wire Harness 3. Body ECU	BE-58 - DI-893
The passenger door courtesy light does not come ON when the passenger's door is opened.	1. Passenger's Door Courtesy Switch 2. Wire Harness 3. Body ECU	BE-58 - DI-893
The room light does not come on when the rear-right door is opened.	1. Rear-Right Door Courtesy Switch 2. Wire Harness 3. Body ECU 4. Room Light	BE-58 - DI-893 BE-58

The room light does not come on when the rear-left door is opened.	1. Rear-Left Door Courtesy Switch 2. Wire Harness 3. Body ECU 4. Room Light	BE-58 - DI-893 BE-58
Only one of the bulbs comes ON.	Bulb	-
The illumination does not fade out when all the doors are closed.	1. Courtesy Switch 2. Wire Harness 3. Body ECU	BE-58 - DI-893
The illumination does not fade out immediately when the ignition switch is turned to ACC or ON within 15 seconds after all the doors are closed.	1. Ignition Switch 2. RADIO NO.2 Fuse 3. GAUGE Fuse 4. Wire Harness 5. Body ECU	BE-21 BE-15 BE-15 - DI-893
The illumination does not fade out immediately when all the doors are locked within 15 seconds after they are closed.	1. Door Unlock Detection Switch 2. Wire Harness 3. Body ECU	BE-121 - DI-893
Interior light does not light up. (in front personal light)	1. Bulb 2. Front Personal Light 3. Wire Harness	- BE-58 -
Front personal light does not light up.	1. Bulb 2. Front Personal Light 3. Wire Harness	- BE-58 -
Rear personal light does not light up.	1. Bulb 2. Rear Personal Light 3. Wire Harness	- BE-58 -
Vanity light does not light up.	1. Bulb 2. Vanity Light 3. Wire Harness	- BE-58 -
Luggage compartment light does not light up.	1. Bulb 2. Luggage Compartment Door Courtesy Switch 3. Wire Harness	- BE-58 -
Courtesy light does not light up.	1. Bulb 2. Door Courtesy Switch 3. Wire Harness 4. Body ECU	- BE-58 - DI-893

BACK-UP LIGHT SYSTEM

Symptom	Suspect Area	See page
Back-Up Light does not light up.	1. GAUGE Fuse 2. Ignition Switch 3. Wire Harness 4. Bulb	BE-15 BE-21 - -
Back-Up Light remains always on.	1. Park/Neutral Position Switch (A/T) Back-up Light Switch (M/T) 2. Wire Harness	DI-371 BE-65 -
Only one light does not light up.	1. Bulb 2. Wire Harness	- -

STOP LIGHT SYSTEM

Symptom	Suspect Area	See page
Stop light does not light up.	1. STOP Fuse 2. Stop Light Switch 3. Light Failure Relay 4. Wire Harness	BE-15 BE-68 BE-31 -
Stop light always lights up.	1. Stop Light Switch 2. Wire Harness	BE-68 -
Only one light always lights up.	Wire Harness	-
Only one light does not light up.	1. Bulb 2. Wire Harness	- -

HEADLIGHT CLEANER SYSTEM

Symptom	Suspect Area	See page
”Headlight Cleaner System” does not operate (All)	1. H-LP CLN Fuse 2. WASHER Fuse 3. Ignition Switch 4. Headlight Cleaner Switch 5. Headlight Cleaner Relay 6. Headlight Cleaner Motor 7. Headlight Cleaner Nozzle and Hose 8. Wire Harness	BE-15 BE-15 BE-21 BE-70 BE-70 BE-70 - -
Washer fluid does not spray.	Headlight Cleaner Nozzle and Hose	-

WIPER AND WASHER SYSTEM

Symptom	Suspect Area	See page
Wipers and washer do not operate.	1. WIP Fuse 2. Wiper Switch 3. Wiper Motor 4. Wire Harness	BE-15 BE-75 BE-75 -
Wipers do not operate in LO, HI or MIST.	1. Wiper Switch 2. Wiper Motor 3. Wire Harness	BE-75 BE-75 -
Wipers do not operate in INT.	1. Wiper Switch 2. Wiper Motor 3. Wire Harness	BE-75 BE-75 -
Washer motor does not operate.	1. WASHER Fuse 2. Washer Switch 3. Washer Motor 4. Wire Harness	BE-15 BE-75 BE-75 -
Wipers do not operate when washer switch ON.	1. WASHER Fuse 2. Washer Switch 3. Wiper Motor 4. Wire Harness	BE-15 BE-75 BE-75 -
Washer fluid does not operate.	Washer Hose and Nozzle	-
● When wiper switch is in HI position, the wiper blade is in contact with the body. ● When the wiper switch is OFF, the wiper blade does not retract or the retract position is wrong.	1. Wiper Motor *1 2. Wire harness *1	BE-75 -
Rear wiper does not operate.	1. WIPER Fuse 2. Rear Wiper Motor 3. Rear Wiper Switch 4. Wire Harness	- BE-75 BE-75 -

Rear wiper does not operate in INT or ON position.	1. Rear Wiper Switch 2. Wire Harness	BE-75 -
Rear wiper does not return to OFF position.	1. Rear Wiper Motor 2. Wire Harness	BE-75 -
Rear Washer Motor does not operate.	1. Rear Washer Motor 2. Rear Washer Switch 3. Wire Harness	BE-75 BE-75 -

*1: Inspect wiper arm and blade set positions.

COMBINATION METER

- This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.
- Refer to DI section for warning light or indicator light not described in the table below.

Symptom	Suspect Area	See page
Driver seat belt warning light does not light up.	1. Bulb 2. Driver Buckle Switch CIrcuit 3. Meter Circuit Plate 4. Wire Harness 5. Body ECU	- BE-90 BE-90 - DI-893
Passenger seat belt warning light does not light up. (in A/C control panel)	1. Passenger Buckle Switch CIrcuit 2. Occupant Detection Sensor 3. A/C Control Panel 4. Wire Harness 5. A/C ECU	BE-90 BE-90 DI-1009 - DI-1009
SRS warning light does not light up.	1. MPX-B Fuse 2. SRS-B Fuse 3. Bulb 4. Meter Circuit Plate 5. Wire Harness 6. Airbag Sensor Assembly	BE-15 BE-15 - BE-90 - DI-605
Hi-beam indicator light does not light up.	1. Bulb 2. Meter Circuit Plate 3. Wire Harness 4. Headlight System	- BE-90 - BE-31
Turn indicator light does not light up.	1. Bulb 2. Meter Circuit Plate 3. Wire Harness 4. Turn Signal and Hazard Warning System	- BE-90 - BE-53
ABS warning light does not light up.	1. GAUGE Fuse 2. Bulb 3. Meter Circuit Plate 4. Wire Harness 5. ABS ECU	BE-15 - BE-90 - DI-435
TRAC warning light does not light up.	1. GAUGE Fuse 2. Bulb 3. Meter Circuit Plate 4. Wire Harness 5. ABS ECU	BE-15 - BE-90 - DI-435

Check engine warning light does not light up.	1. Bulb 2. Meter Circuit Plate 3. Wire Harness 4. ECM	- BE-90 - DI-1
Fuel level warning light does not light up.	1. Bulb 2. Fuel Level Warning Switch 3. Meter Circuit Plate 4. Wire Harness	- BE-90 BE-90 -

DEFOGGER SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Rear window defogger does not operate.	1. HTR Fuse 2. DEF M-Fuse 3. Defogger Relay Circuit 4. Defogger Switch (in A/C Panel Switch) 5. Defogger Wire 6. Wire Harness 7. Body ECU 8. Noise Filter 9. A/C ECU	BE-15 BE-15 DI-940 DI-1009 BE-102 - DI-893 - DI-1009
Mirror heater does not operate.	1. MIR-HTR Fuse (Passenger Side J/B) 2. Mirror Heater Relay 3. Mirror Heater 4. Wire Harness	BE-15 BE-102 BE-102 -

POWER WINDOW CONTROL SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
All the power windows do not operate. (Power Door Lock System is normal.)	1. Power Window Master Switch 2. Wire Harness 3. Body ECU	BE-115 - DI-893
Only the driver's window does not operate.	1. Power Window Master Switch 2. Power Window Switch 3. Power Window Motor 4. Wire Harness	BE-115 BE-115 BE-115 -
"Window lock function" does not operate.	Power Window Master Switch	BE-115
Power window control system abnormal operation.	TROUBLESHOOTING	BE-104

POWER DOOR LOCK CONTROL SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
All the doors cannot be locked or unlocked. (Power Window Control System is normal.)	1. Door Lock Control Switch 2. Wire Harness 3. Body ECU	BE-121 - DI-893
Only one side door lock control does not operate.	1. Door Lock Motor 2. Wire Harness	BE-121 -
Door key related function does not operate.	1. Door Key Lock and Unlock Switch 2. Wire Harness 3. Body ECU	BE-121 - DI-893

Key confinement prevention function does not operate.	1. Key Unlock Warning Switch 2. Door Courtesy Switch 3. Wire Harness 4. Body ECU	BE-21 BE-58 - DI-893
Luggage compartment door opener function does not operate.	1. Luggage Compartment Door Opener Switch 2. Luggage Compartment Door Opener Motor 3. Wire Harness 4. Body ECU	BE-121 BE-121 - DI-893

THEFT DETERRENT SYSTEM

- This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.
- Refer to DI section for warning light or indicator light not described in the table below.

Symptom	Suspect Area	See page
The system cannot be set.	1. Indicator Light 2. Key Unlock Warning Switch 3. Door Unlock Detection Switch 4. Engine Hood Courtesy Switch 5. Luggage Compartment Door Courtesy Switch 6. Wire Harness 7. Theft Deterrent ECU	BE-127 BE-21 BE-121 BE-58 BE-58 - DI-776
The system cannot be canceled when the ignition switch is turned to ON with key.	1. Key Unlock Warning Switch 2. Ignition Switch 3. RAD NO. 2 Fuse 4. Wire Harness 5. Theft Deterrent ECU	BE-21 BE-21 BE-15 - DI-776
The system cannot be canceled when the luggage compartment door is unlocked with key.	1. Luggage Compartment Door Courtesy Switch 2. Wire Harness 3. Theft Deterrent ECU	BE-58 - DI-776
The system does not operate when the engine hood is opened.	1. Engine Hood Courtesy Switch 2. Wire Harness 3. Theft Deterrent ECU	BE-58 - DI-776
The system does not operate when the ignition switch is turned to ACC without using a key or transmitter.	1. Ignition Switch 2. Key Unlock Warning Switch 3. Transmitter 4. Wire Harness 5. Theft Deterrent ECU	BE-21 BE-21 BE-136 - DI-776
Some of the system does not operate. (Headlight does not light up.)	1. Headlight System 2. Wire Harness 3. Theft Deterrent ECU	BE-31 - DI-776
Some of the system does not operate. (Taillight does not light up.)	1. Taillight System 2. Wire Harness 3. Theft Deterrent ECU	BE-31 - DI-776
Some of the system does not operate. (Self power siren or Horn does not sound.)	1. HORN Fuse 2. Self Power Siren 3. Horn 4. Horn Relay 5. Wire Harness 6. Theft Deterrent ECU	BE-15 BE-127 BE-233 BE-233 - DI-776
While the warning is given, the system cannot be canceled by unlocking the door with key or transmitter.	1. Door Key Lock and Unlock Switch 2. Wire Harness 3. Theft Deterrent ECU	BE-121 - DI-776

While the warning is given, the system cannot be canceled by turning the ignition switch to ACC or ON with key.	1. Ignition Switch 2. Key Unlock Warning Switch 3. RAD NO. 2 Fuse 4. ECU-IG Fuse 5. Wire Harness 6. Theft Deterrent ECU	BE-21 BE-21 BE-15 BE-15 - DI-776
The system operates for more than 30 seconds.	Theft Deterrent ECU	DI-776

WIRELESS DOOR LOCK CONTROL SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

HINT:

- Troubleshooting of the wireless door lock control system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the wireless door lock control system, first make certain that the door lock control system is operating normally.
- If the trouble still reappears even though there are no abnormalities in any of the other circuits, then check and replace the Wireless Door Lock Control Receiver as the last step.

Symptom	Suspect Area	See page
All functions of wireless door lock control system do not operate.	1. Transmitter 2. Wireless Door Lock Control Receiver 3. Wire Harness 4. Body ECU	BE-136 BE-136 - DI-893

SLIDING ROOF SYSTEM:

HINT:

The sliding roof system must be initialized after any of the following is done:

- The battery is disconnected.
- The S/ROOF fuse is replaced.
- The sliding roof assembly (sliding roof ECU) is replaced.
- The sliding roof is removed and reinstalled or replaced.

Initialize the sliding roof system as follows:

- Using the tilt switch, tilt the roof fully upward, and then fully downward.
- Using the slide switch, fully open the roof, and then fully close it.

Symptom	Suspect Area	See page
Sliding roof system does not operate.	1. S/ROOF Fuse 2. ECU-IG Fuse 3. Front Personal Light (Sliding Roof Switch) 4. Sliding Roof Control Assembly 5. Wire Harness	BE-15 BE-15 BE-145 BE-145 -
Sliding roof system stops operation halfway. (Sliding roof reverses during close (down) operation.)	1. Foreign object between sliding roof rail and glass 2. Incorrect sliding roof adjustment 3. Sliding Roof Control Assembly	- BO-126 BE-145
Only "Key-off Sliding Roof Operation*" does not operate.	1. Drivers Door Courtesy Switch 2. Sliding Roof Control Assembly 3. Body ECU 4. Wire Harness	BE-58 BE-145 DI-893 -

*: The sliding roof can be operated for approximately 45 seconds, after the ignition switch is turned from ON to OFF with all doors closed. However, if the driver side door is opened during this time, the operation is canceled.

POWER SEAT CONTROL SYSTEM

Symptom	Suspect Area	See page
Driver's seat does not operate.	1. P/SEAT Fuse 2. Power Seat Switch 3. Wire Harness	BE-15 BE-151 -
"Slide operation" does not operate.	1. Power Seat Switch 2. Wire Harness 3. Slide Motor	BE-151 - BE-151
"Front Vertical Operation" does not operate.	1. Power Seat Switch 2. Wire Harness 3. Front Vertical Motor	BE-151 - BE-151
"Lifter Operation" does not operate.	1. Power Seat Switch 2. Wire Harness 3. Lifter Motor	BE-151 - BE-151
"Reclining Operation" does not operate.	1. Power Seat Switch 2. Wire Harness 3. Reclining Motor	BE-151 - BE-151

(D): Driver's Seat
(P): Passenger's Seat

POWER MIRROR CONTROL SYSTEM

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
Both right and left mirrors do not operate.	1. Mirror Switch 2. Wire Harness	BE-159 -
Only one side of mirror does not operate.	1. Mirror Motor 2. Wire Harness	BE-159 -

SEAT HEATER SYSTEM

Symptom	Suspect Area	See page
Driver's seat heater does not operate.	1. SEAT HTR Fuse 2. Seat Heater Switch (D, P) 3. Seat Heater 4. Wire Harness	BE-15 BE-165 BE-165 -
Passenger's seat heater does not operate.	1. SEAT HTR Fuse 2. Seat Heater Switch (D, P) 3. Seat Heater 4. Wire Harness	BE-15 BE-165 BE-165 -
Seat heater temperature is too hot.	Seat Heater	BE-165

AUDIO SYSTEM

Symptom	Suspect Area	See page
Audio system abnormal operation.	TROUBLESHOOTING	BE-179

CLOCK SYSTEM (in A/C Control Panel)

Symptom	Suspect Area	See page
Passenger seat belt warning system does not light up.	TROUBLESHOOTING NO. 1	BE-210
Clock will not operate.	TROUBLESHOOTING NO. 1	BE-210
Clock loses or gains time.	TROUBLESHOOTING NO. 2	BE-210

ENGINE IMMOBILIZER SYSTEM

Symptom	Suspect Area	See page
Engine immobilizer system does not operate.	See DIAGNOSIS SYSTEM	DI-849

HORN SYSTEM

Symptom	Suspect Area	See page
Horn system does not operate.	1. HORN Fuse 2. Horn Relay 3. Horn Switch 4. Horn 5. Wire Harness	BE-15 BE-233 BE-233 BE-233 -
Horns blow all the time.	1. Horn Relay 2. Horn Switch 3. Wire Harness	BE-233 BE-233 -
One horn operates but the other horn does not operate.	1. Horn 2. Wire Harness	BE-233 -
Horns operate abnormally.	1. Horn Relay 2. Horn 3. Wire Harness	BE-233 BE-233 -

GARAGE DOOR OPENER SYSTEM

Symptom	Suspect Area	See page
The equipment of which code has been registered does not operate.	1. Garage Door Opener 2. Wire Harness 3. *	BE-219 - -
LED does not light up. (Even though either switch is pressed.)	1. Garage Door Opener 2. Wire Harness	BE-219 -
LED does not light up. (Only one switch is pressed.)	Garage Door Opener	BE-219

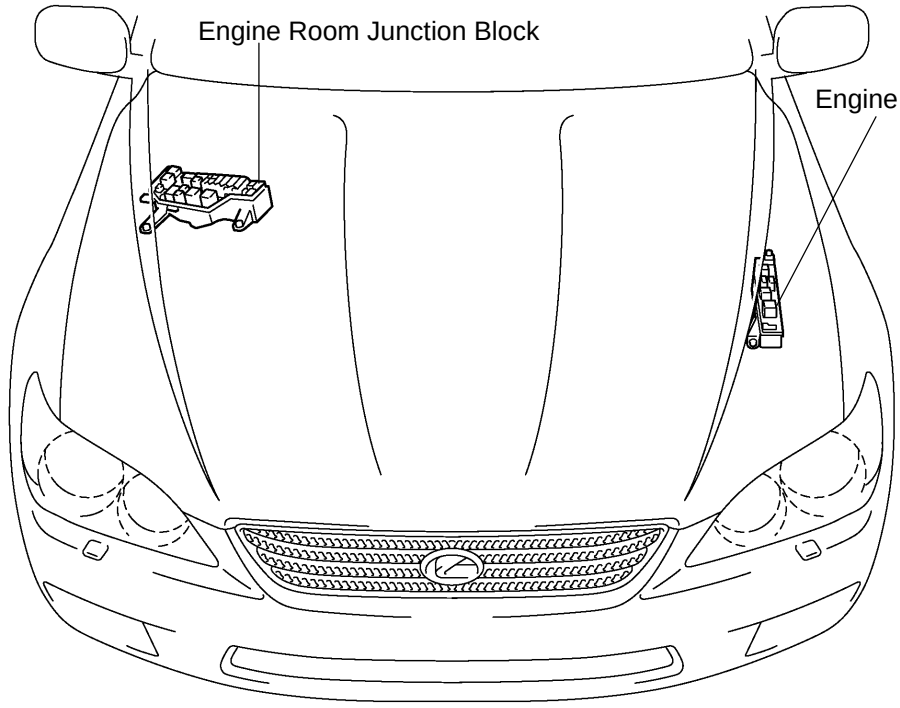
* As the GARAGE DOOR OPENER on the vehicle side seems to be normal, check the OPENER on the equipment side, of which code has been registered.

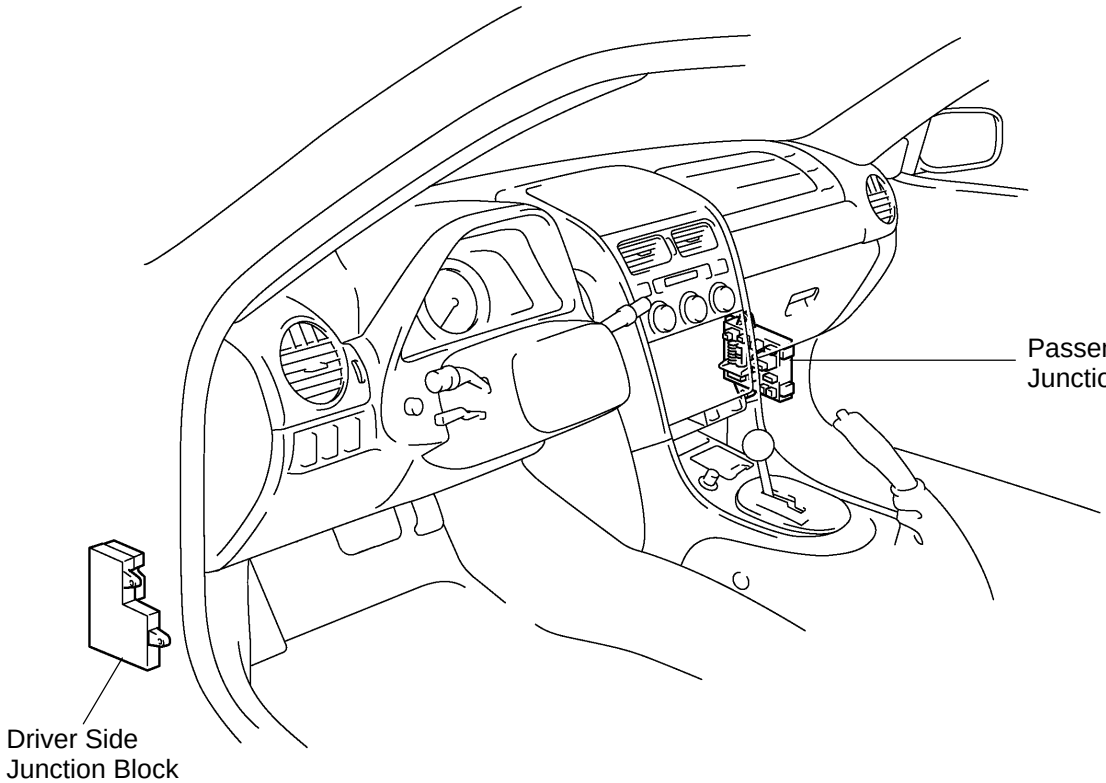
POWER SOURCE

LOCATION

BE1WP-04

Power Source

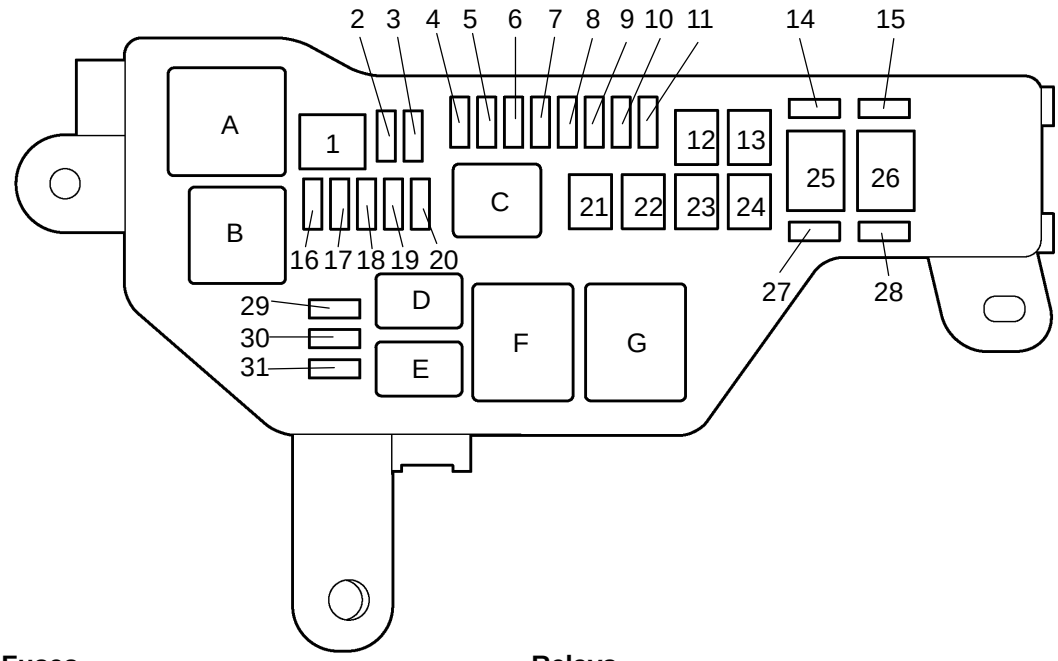




C

I27323

● **Engine Room Junction Block**



Fuses

1. MAIN FL 40A
2. ECU-B1 20A
3. -
4. ALT-S 7.5A
5. ETCS 15A
6. AM2 20A
7. HORN 10A
8. -
9. RADIO NO. 1 20A
10. TURN-HAZ 15A
11. EFI 25A
12. P/SEAT 30A
13. H-LP CLN 30A
14. SPARE
15. SPARE
16. DRL NO. 2 7.5A
17. DRL NO. 1 7.5A
18. H-LP L LWR 15A
19. H-LP R LWR 15A
20. ABS2 7.5A
21. -
22. -
23. CDS FAN 30A
24. RDI FAN 30A
25. ALT 120A
26. ABS1 60A
27. SPARE
28. SPARE
29. H-LP L UPR 10A
30. H-LP R UPR 10A
31. -

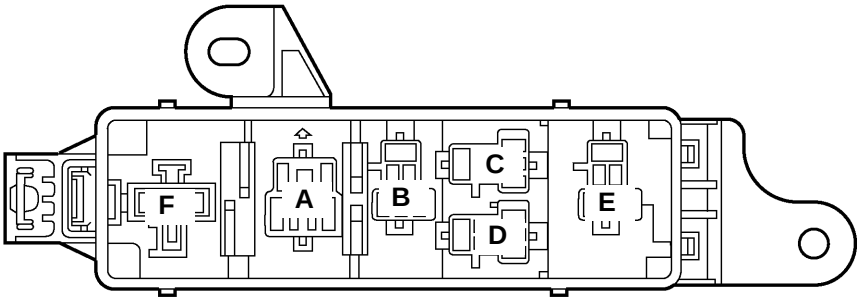
Relays

A. HEAD LP Relay
B. Starter relay
C. Circuit Opening Relay
D. Horn Relay
E. EFI Relay
F. ABS MTR Relay
G. ABS SOL Relay

N

I11570

● **Engine Room Relay Block**



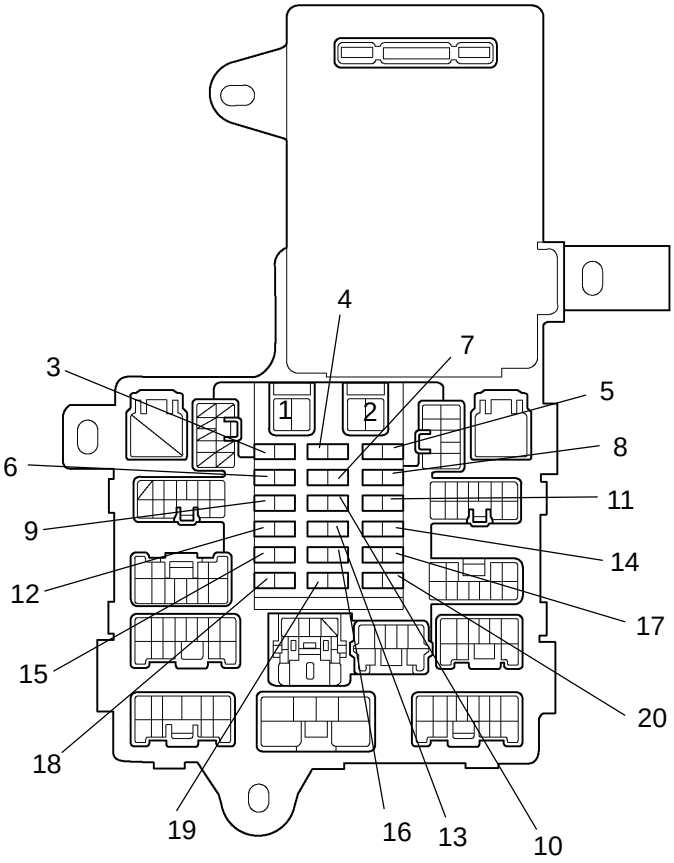
Relays

A. DIMMER Relay
B. A/C COMP Relay
C. FAN NO.3 Relay
D. FAN NO.2 Relay
E. FAN NO.1 Relay
F. FUEL PMP Relay

C

I23236

● **Driver Side Junction Block**

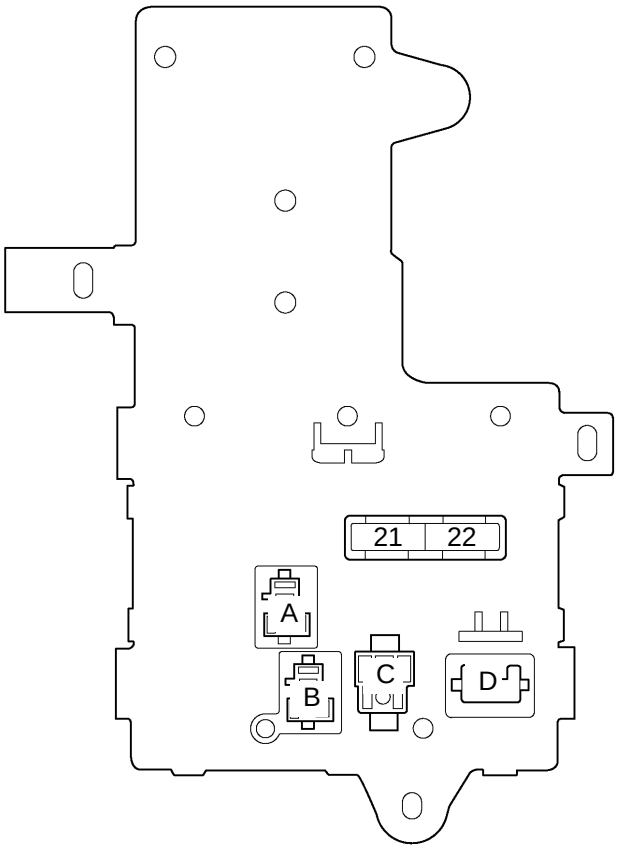


Fuses

1. RR DEF 40A
2. AM1 40A
3. D FR P/W 20A
4. TAIL 10A
5. GAUGE 10A
6. DOOR 20A
7. PANEL 7.5A
8. WASHER 15A
9. STARTER 7.5A
10. FR DEF 20A
11. A/C 10A
12. SEAT HTR 15A
13. CIG 15A
14. S/ROOF 30A
15. ECU-IG 10A
16. SRS-ACC 10A
17. STOP 15A
18. WIPER 25A
19. RADIO NO.2 10A
20. -

Condenser

21. DEF CDS
22. DEF CDS



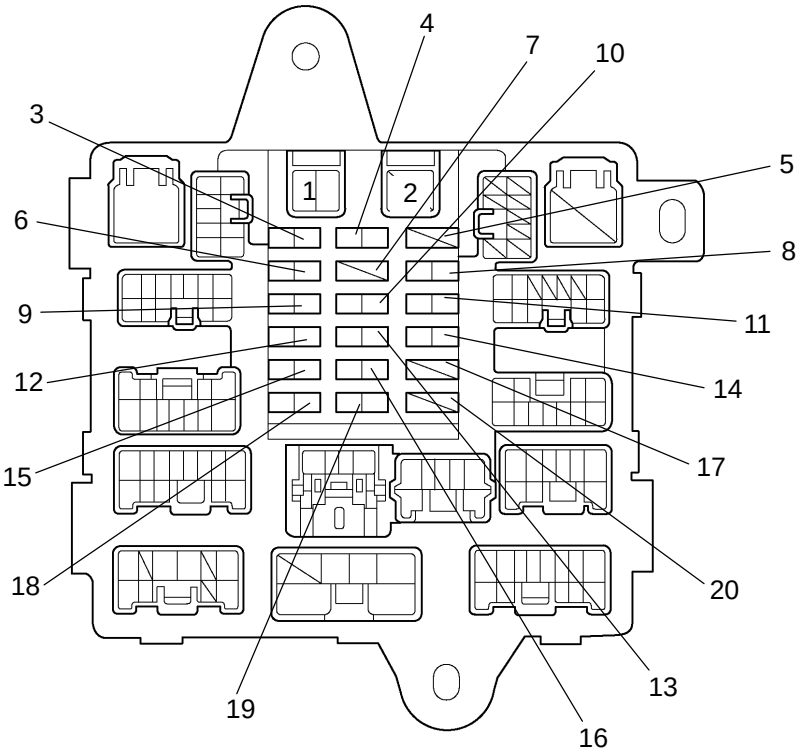
Relays

A. Deicer Relay
B. TAIL Relay
C. RR DEF Relay
D. FLSH Relay

N

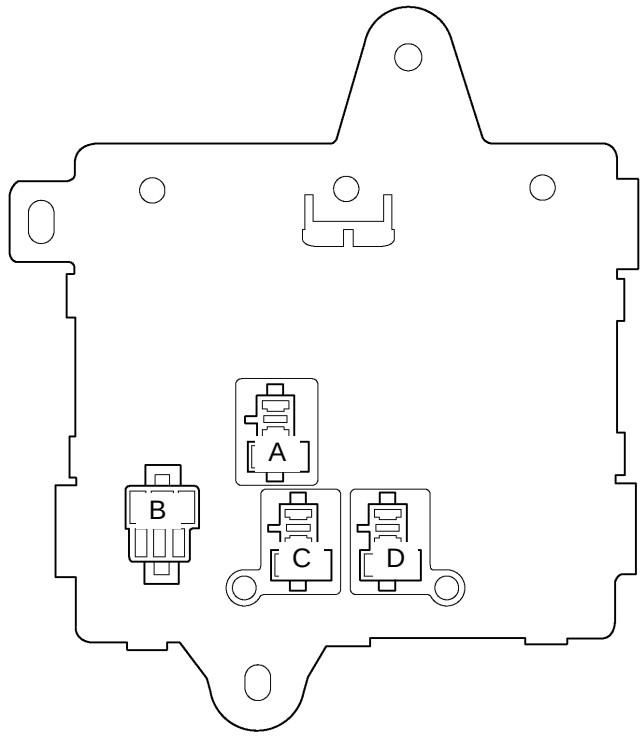
I11547

● **Passenger Side Junction Block**



Fuses

1. HEATER 40A
2. -
3. DOOR DL 15A
4. DOME 7.5A
5. -
6. FR FOG 15A
7. -
8. P FR P/W 20A
9. PWR OUTLET 15A
10. ECU-B2 7.5A
11. D RR P/W 20A
12. MIR HIR 15A
13. MPX-B 10A
14. P RR P/W 20A
15. SRS-B 7.5A
16. TV 7.5A
17. -
18. OBD 7.5A
19. IGN 7.5A
20.-



Relays

A. FR FOG Relay
B. HTR Relay
C. MIR HTR Relay
D. P/W Relay

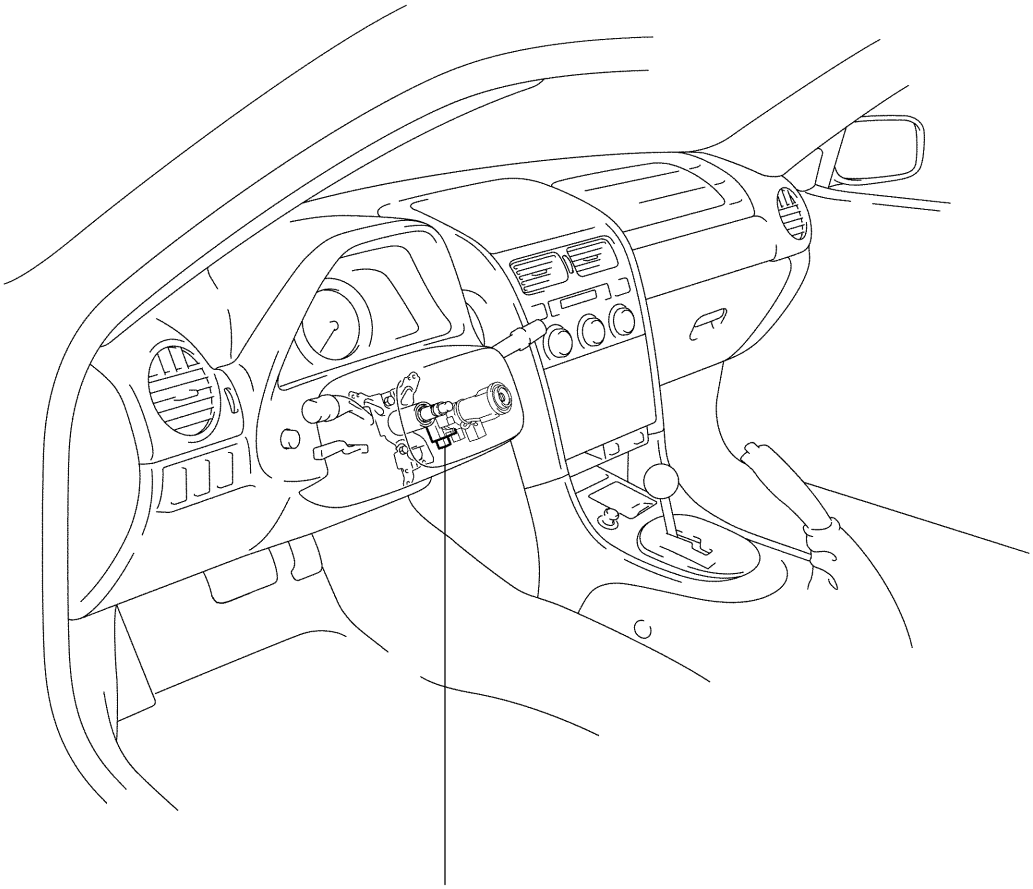
N

I11548

IGNITION SWITCH AND KEY UNLOCK WARNING SWITCH

BE01L-18

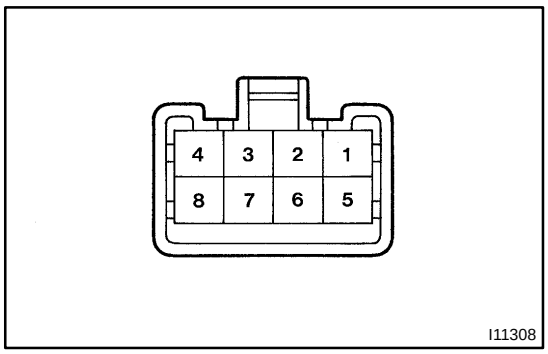
LOCATION



Ignition Switch and
Key Unlock Warning Switch

I27324

BE15W-04

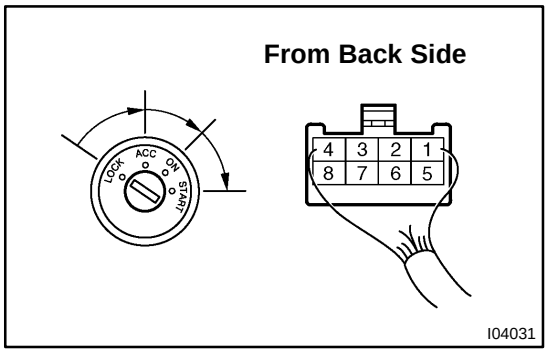


INSPECTION

1. INSPECT IGNITION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	-	No continuity
ACC	2 - 3	Continuity
ON	2 - 3 - 4 6 - 7	Continuity
START	1 - 2 - 4 6 - 7 - 8	Continuity

If continuity is not as specified, replace the switch.

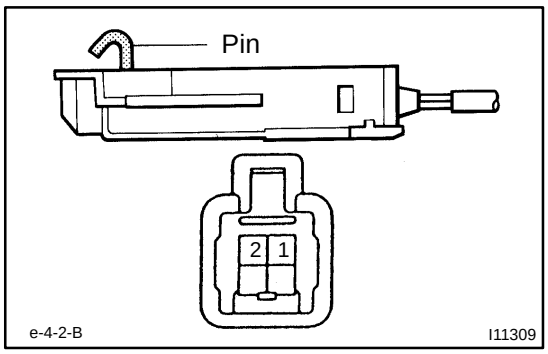


2. INSPECT IGNITION SWITCH CIRCUIT

Connect the switch connector and inspect the connector on wire harness side from the back side, as shown.

Tester connection	Condition	Specified condition
2 - Ground	Always	Battery Positive Voltage
3 - Ground	Ignition switch ACC or ON	Battery Positive Voltage
4 - Ground	Ignition switch ON	Battery Positive Voltage
6 - Ground	Ignition switch ON or START	Battery Positive Voltage
7 - Ground	Always	Battery Positive Voltage
8 - Ground	Ignition switch START	Battery Positive Voltage

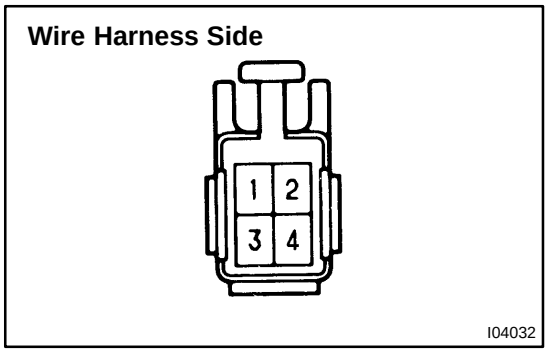
If circuit is not as specified, inspect the circuits connected to other parts.



3. INSPECT KEY UNLOCK WARNING SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Key removed)	1 - 2	No continuity
ON (Key set)	1 - 2	Continuity

If continuity is not as specified, replace the switch.



4. INSPECT KEY UNLOCK WARNING SWITCH CIRCUIT (See page DI-915)

Connect the switch connector and inspect the connector on wire harness side from the back side, as shown.

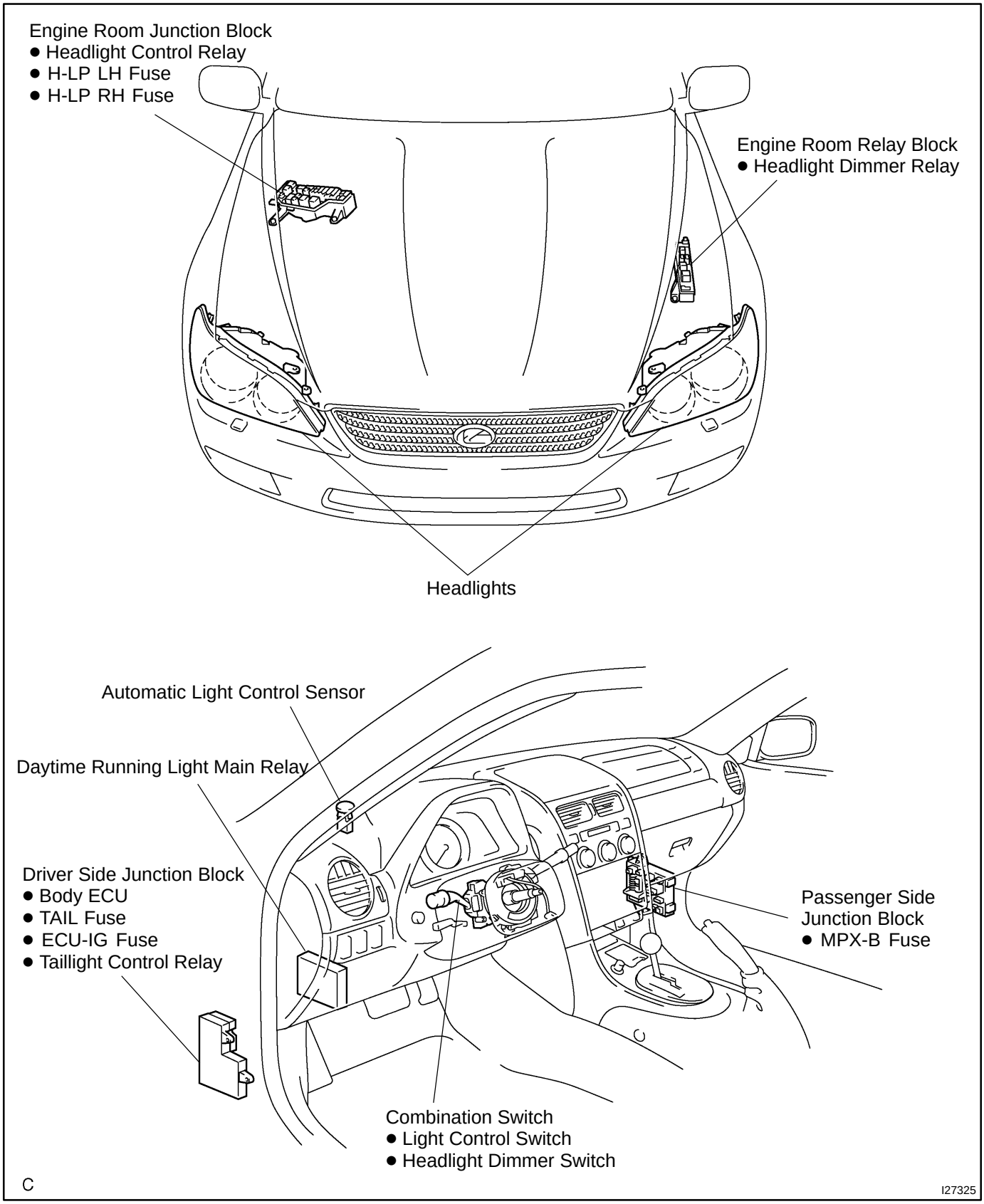
Tester connection	Condition	Specified condition
1 - Ground	Always	Continuity

If circuit is not as specified, inspect the circuits connected to other parts.

HEADLIGHT AND TAILLIGHT SYSTEM

BE29M-02

LOCATION



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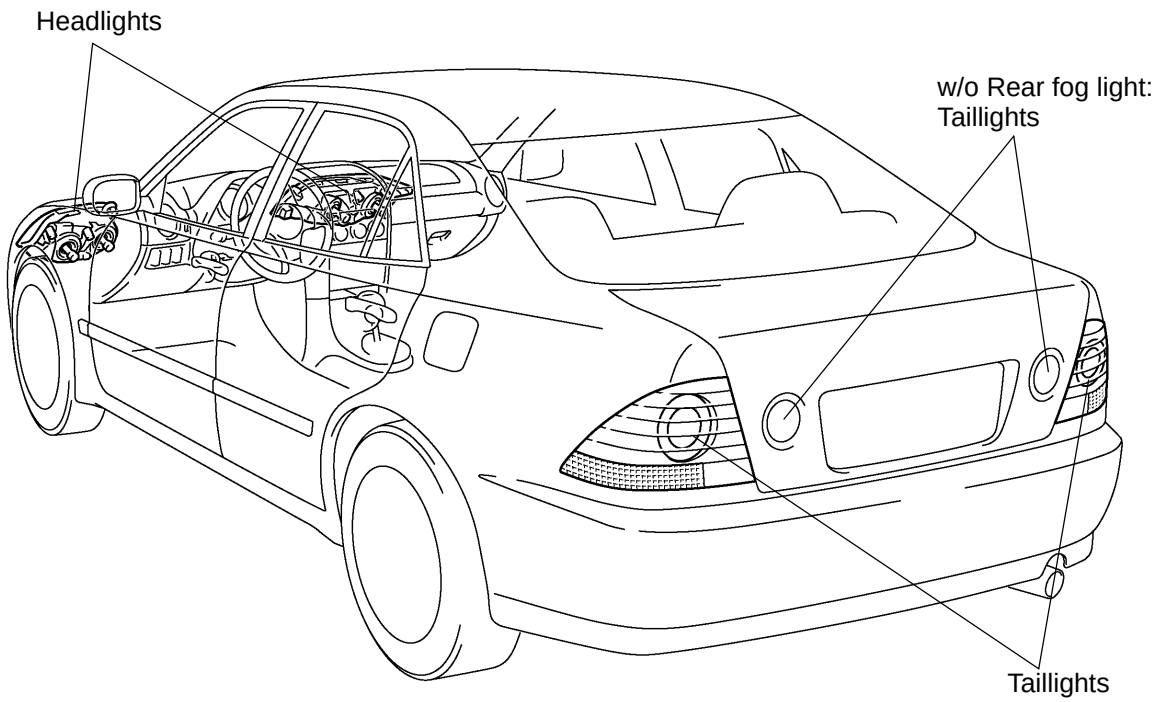
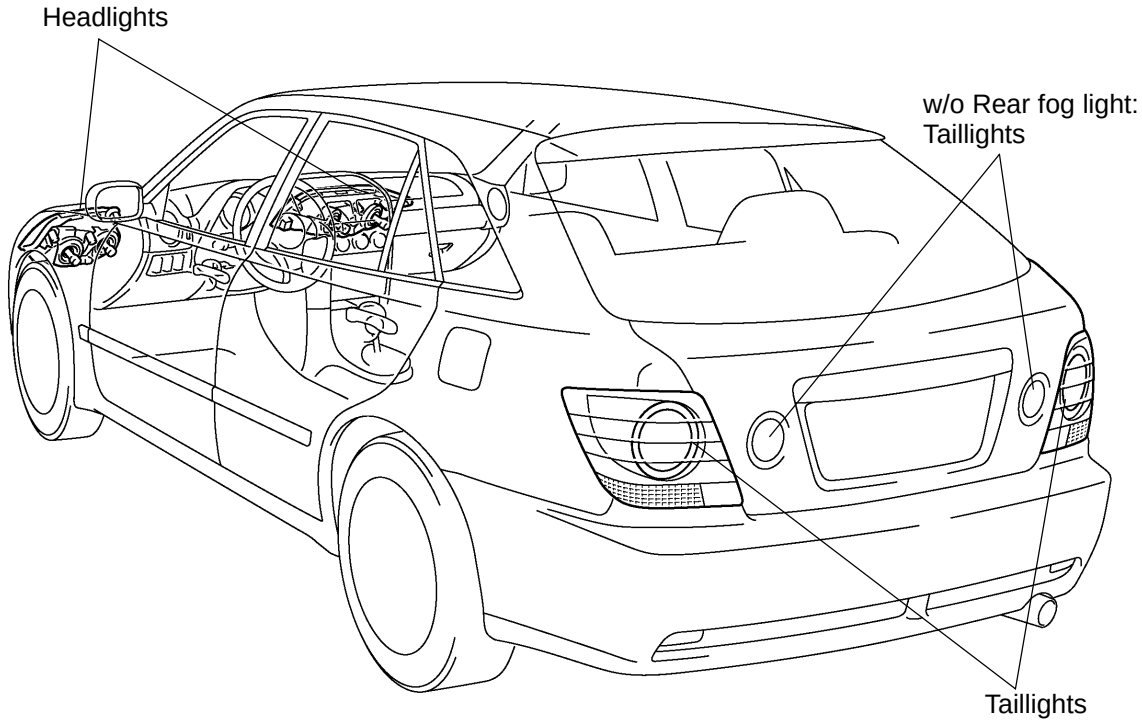


Wagon:



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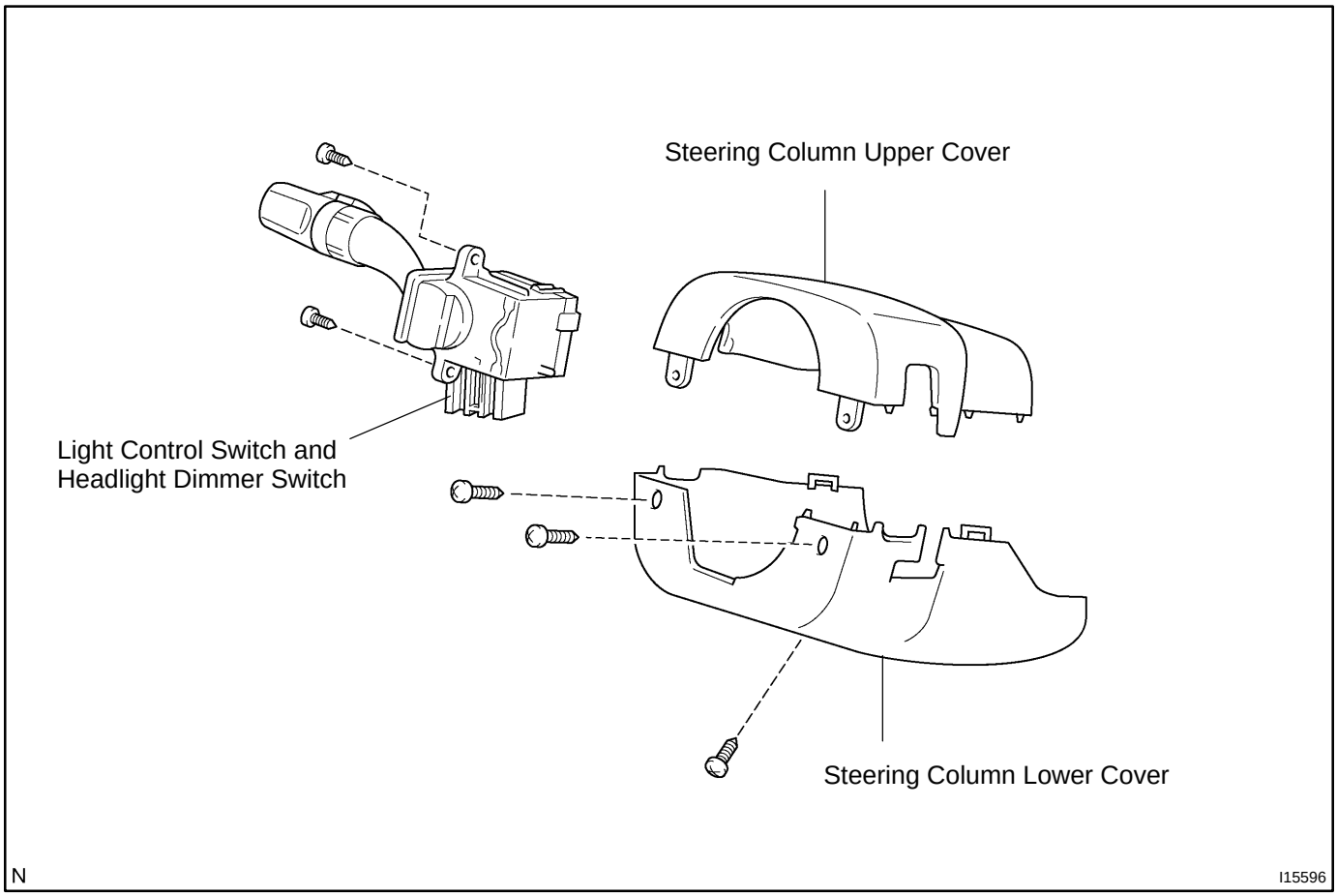
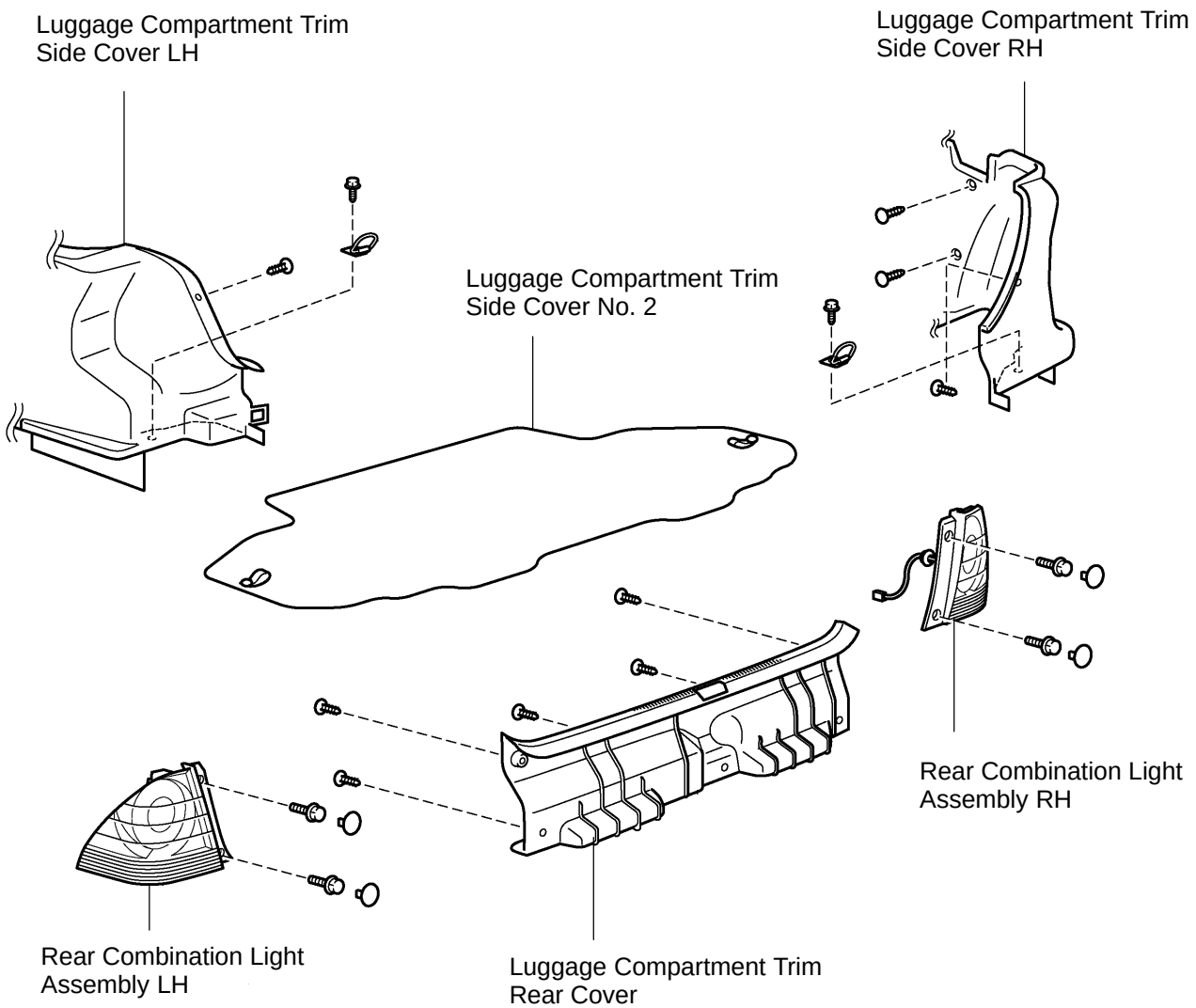
I23132

BE29N-02

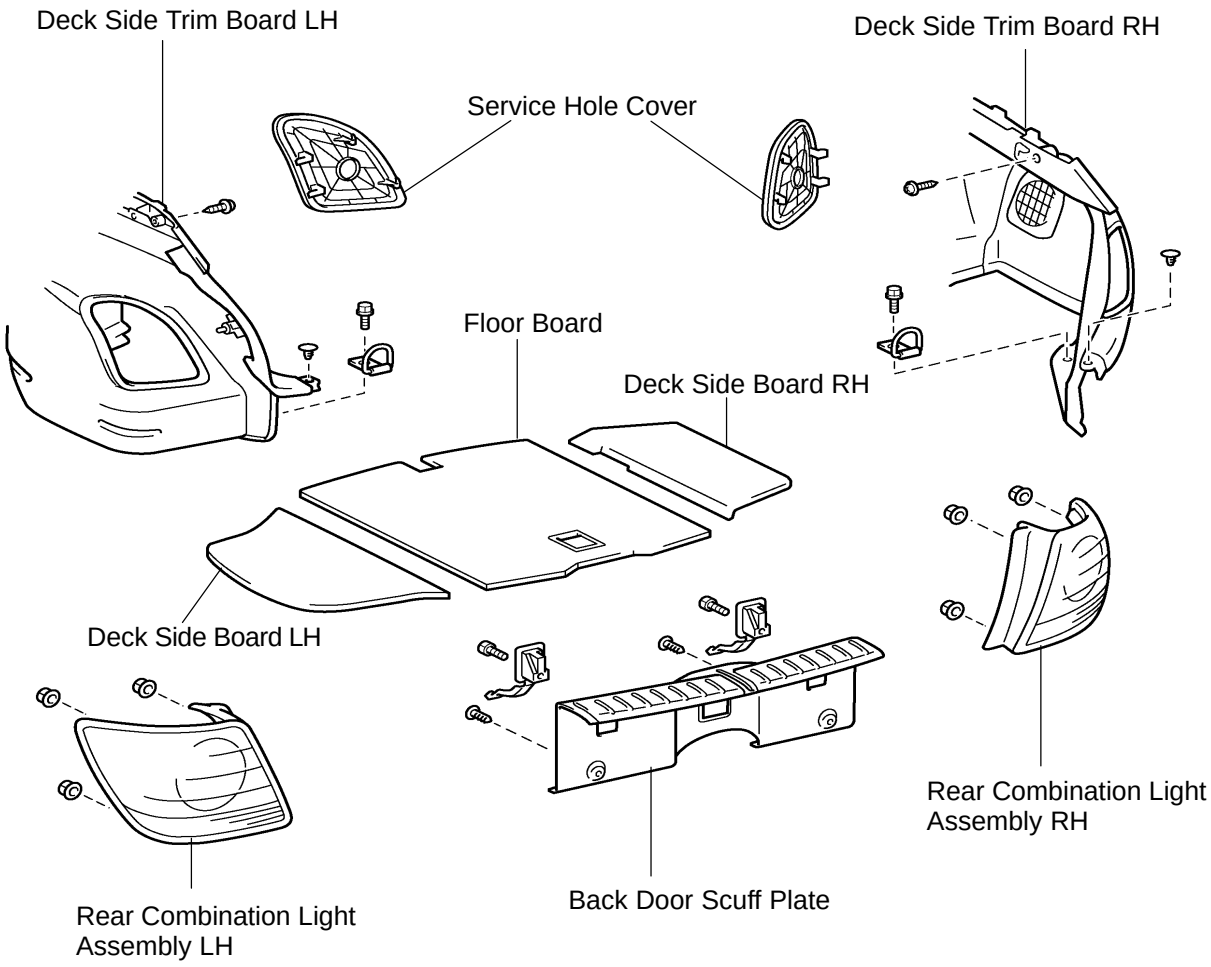
COMPONENTS



Sedan:


Luggage Compartment Trim Side Cover LH
Luggage Compartment Trim Side Cover RH
Luggage Compartment Trim Side Cover No. 2
Rear Combination Light Assembly RH
Rear Combination Light Assembly LH
Luggage Compartment Trim Rear Cover
H
I11324

Wagon:



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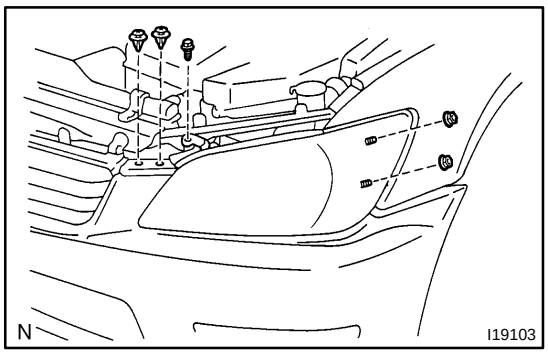
I23133

BE29O-02

REMOVAL

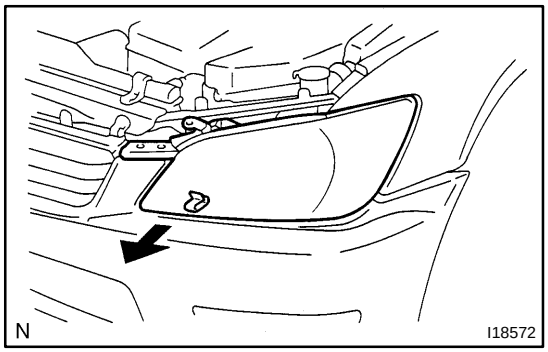


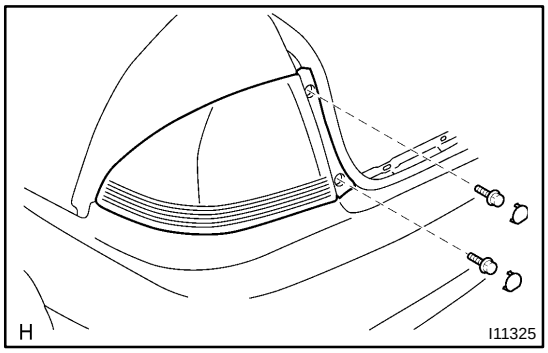
1. REMOVE HEADLIGHT

HINT:

Follow the same procedure for RH as for LH.

(a) Remove a part of LH front fender liner.
(b) Remove a part of front bumper cover.
(c) Remove the bolt, 2 nuts and 2 clips.
(d) Lift up the front bumper and pull the headlight assembly towards the front of the vehicle, and disconnect the engagement of the headlight assembly.
(e) Install LH headlight assembly.
(f) Install a part of front bumper cover.
(g) Install a part of front fender liner.
(h) Inspect and adjust optical axis of headlight (See page BE-38).



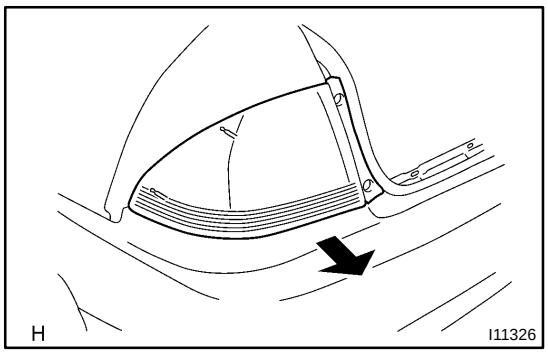


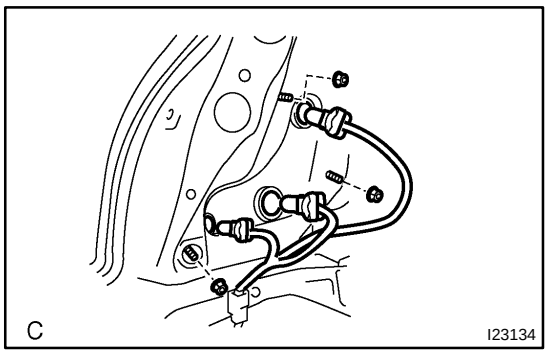
2. Sedan: REMOVE REAR COMBINATION LIGHT

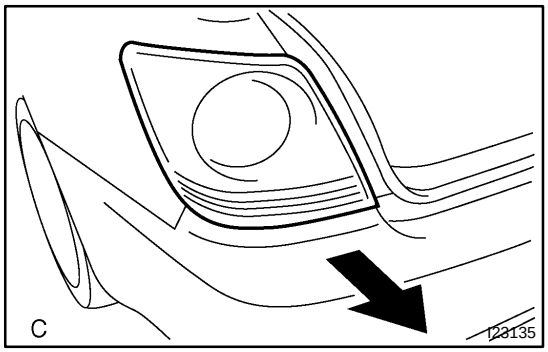
HINT:

- Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.
- Follow the same procedure for RH as for LH.

(a) Remove luggage compartment trim side cover No. 2.
(b) Remove luggage compartment trim rear cover.
(c) Remove a part of LH luggage compartment trim side cover.
(d) Remove the 2 rear light covers and 2 bolts.
(e) Pull the pin toward the rear of the vehicle, and disconnect the engagement of 2 pins.
(f) From the inside of the luggage room, separate the connector and disconnect the LH rear combination light assembly.





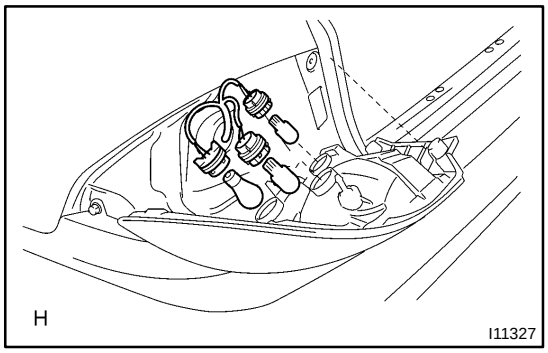


3. Wagon:
REMOVE REAR COMBINATION LIGHT

HINT:

- Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.
- Follow the same procedure for RH as for LH.

(a) Remove floor board and deck side board LH.
(b) Remove back door scuff plate.
(c) Remove a part of deck side trim board LH.
(d) Disconnect the bulb sockets and 3 nuts.
(e) Remove the combination light assembly.



4. Sedan:
REMOVE REAR COMBINATION BULB

HINT:

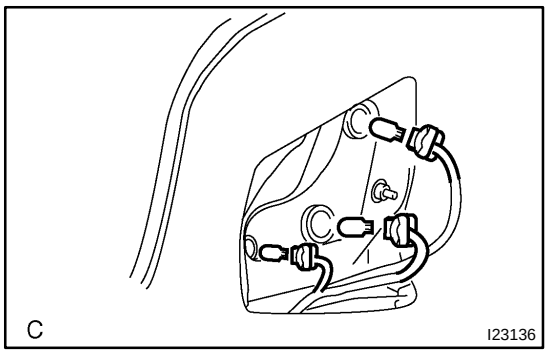
- Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.
- Follow the same procedure for RH as for LH.

(a) Remove a part of LH combination light assembly.

HINT:

Remove the light unit from only the outside of the vehicle.

(b) Remove the bulb sockets and remove the bulbs.

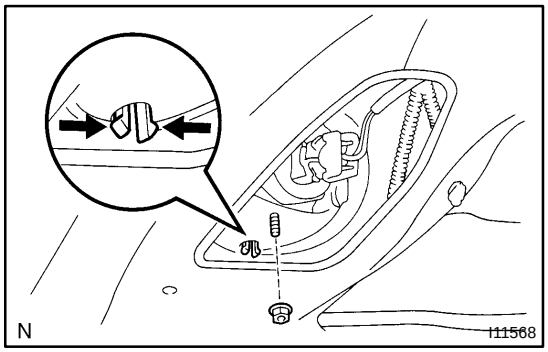


5. Wagon:
REMOVE REAR COMBINATION BULB

HINT:

- Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.
- Follow the same procedure for RH as for LH.

(a) Remove a service hole cover.
(b) Remove the bulb sockets and remove the bulbs.



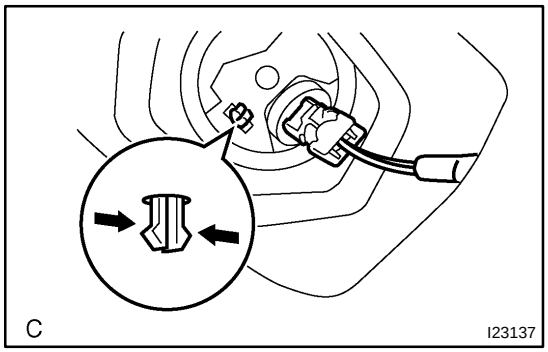
6. Sedan:
REMOVE REAR LAMP ASSEMBLY

HINT:

- Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.
- Follow the same procedure for RH as for LH.

(a) Remove a part of luggage compartment door trim.
(b) Remove the nut.
(c) Compress the claw to disconnect the engagement as shown in the illustration.

(d) Separate the connector and remove the rear light assembly.

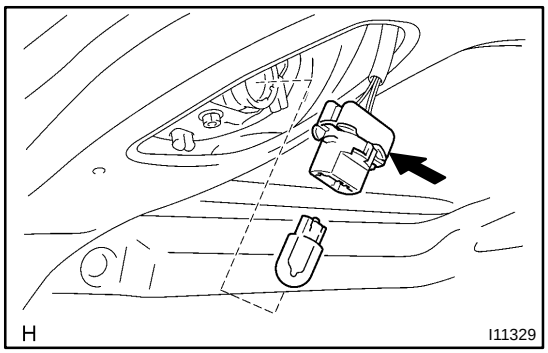


7. Wagon:
REMOVE REAR LAMP ASSEMBLY

HINT:

- Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.
- Follow the same procedure for RH as for LH.

(a) Remove the back door trim service hole cover.
(b) Compress the claw to disconnect the engagement as shown in the illustration.
(c) Separate the connector and remove the rear light assembly.

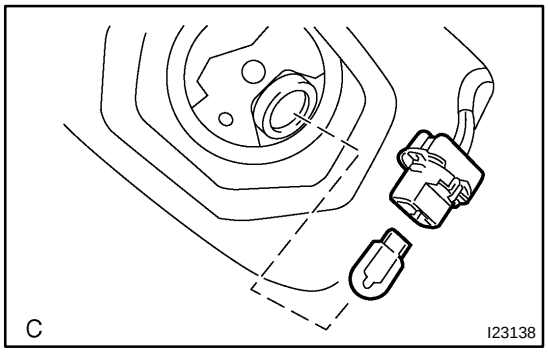


8. Sedan:
REMOVE REAR LAMP BULB

HINT:

Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.

(a) Remove a part of luggage compartment door trim.
(b) Remove the bulb socket and bulb.



9. Wagon:
REMOVE REAR LAMP BULB

HINT:

Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.

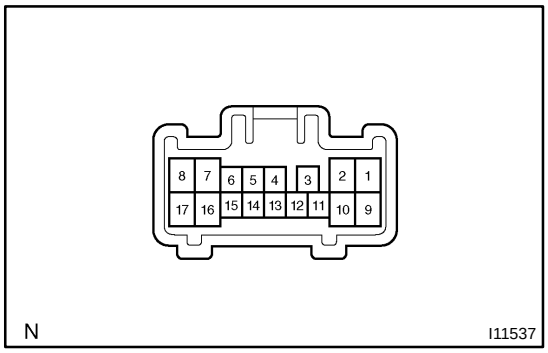
(a) Remove the back door trim service hole cover.
(b) Remove the bulb socket and bulb.

BE1WQ-04

INSPECTION

1. FAIL-SAFE FUNCTION (Light Control ECU)

When input error is inspected.	When input voltage is not within the range of operation voltage (9 to 16 V), lighting of the headlight stops. As soon as the voltage comes within the range, it lights up again. However if the input voltage becomes low after lighting up, sufficient voltage is maintained until light of bulb completely goes off.
When output error is inspected (Open or short). When light flushing is inspected.	When an error occurs in the output voltage (open or short) or flushing symptom occurs on the bulb, lighting of the headlight stops, the condition is maintained until power is turned ON again (headlight dimmer switch OFF → ON). In this case, it can not be judged whether lighting malfunction is caused by an output error or other reasons (fuse blown out, etc.). Check that there is no error in fuse and wiring (including power source) and replace the bulb in the first place, when the error still appears, replace the light control ECU.



2. INSPECT LIGHT CONTROL SWITCH CONTINUITY

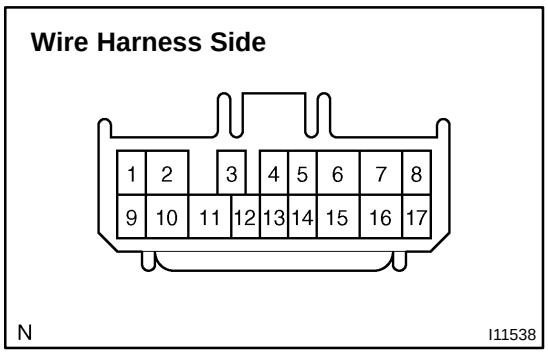
Switch position	Tester connection	Specified condition
OFF	-	No continuity
TAIL	14 - 16	Continuity
HEAD	13 - 14 - 16	Continuity
AUTO	13 - 16	Continuity

If continuity is not as specified, replace the switch.

3. INSPECT HEADLIGHT DIMMER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Low beam	16 - 17	Continuity
High beam	7 - 16	Continuity
Flash	7 - 8 - 16	Continuity

If continuity is not as specified, replace the switch.

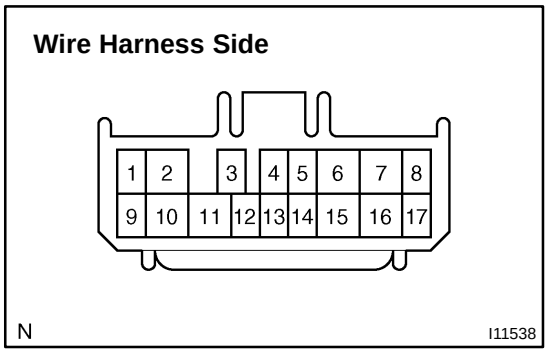


4. Connector disconnected:
INSPECT LIGHT CONTROL SWITCH CIRCUIT(See page DI-802)

Disconnect the connector from the switch and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
16 - Ground	Always	Continuity

If circuit is not as specified, inspect the wire harness.

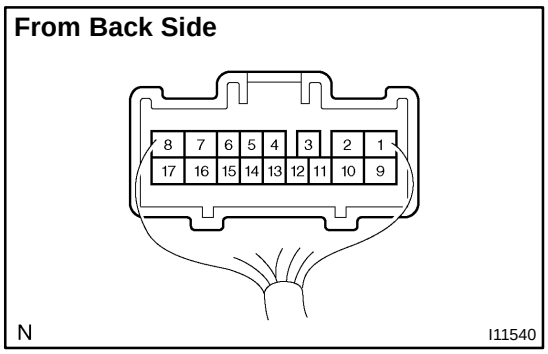


5. Connector disconnected:
INSPECT HEADLIGHT DIMMER SWITCH CIRCUIT (See page DI-802)

Disconnect the connector from the switch and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
16 - Ground	Always	Continuity
13 - Ground	Light control switch HEAD	Battery Positive Voltage

If circuit is not as specified, inspect the wire harness.

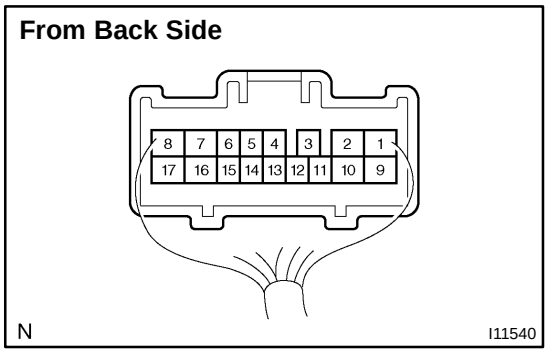


6. Connector connected:
INSPECT LIGHT CONTROL SWITCH CIRCUIT

Connect the wire harness side connector to the light control and dimmer switch and inspect the connector from the back side, as shown.

Tester connection	Condition	Specified condition
12 - Ground	Light control switch OFF, TAIL or HEAD	Battery Positive Voltage
12 - Ground	Light control switch AUTO	No voltage
13 - Ground	Light control switch OFF or TAIL	Battery Positive Voltage
13 - Ground	Light control switch HEAD	No voltage
14 - Ground	Light control switch OFF	Battery Positive Voltage
14 - Ground	Light control switch TAIL or HEAD	No voltage

If circuit is not as specified, inspect the wire harness.

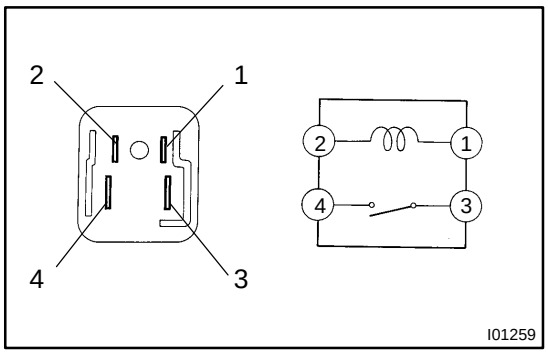


7. Connector connected:
INSPECT HEADLIGHT DIMMER SWITCH CIRCUIT

Connect the wire harness side connector to the light control and dimmer switch and inspect the connector from the back side, as shown.

Tester connection	Condition	Specified condition
7 - Ground	Headlight dimmer switch FLASH Light control switch HEAD and dimmer switch HIGH	No voltage
7 - Ground	Light control switch HEAD and dimmer switch LOW	Battery Positive Voltage
17 - Ground	Light control switch HEAD and dimmer switch LOW and fog light switch ON	No voltage
17 - Ground	Light control switch HEAD and dimmer switch HIGH or FLASH and fog light switch ON	Battery Positive Voltage

If circuit is not as specified, inspect the wire harness.

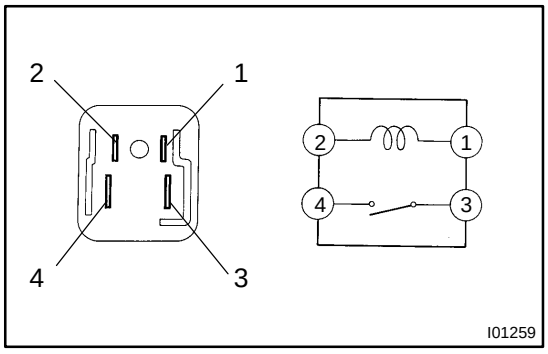


8. INSPECT HEADLIGHT CONTROL RELAY CONTINUITY

Condition	Tester connection	Specified condition
Always	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 4	Continuity

If continuity is not as specified, replace the relay.

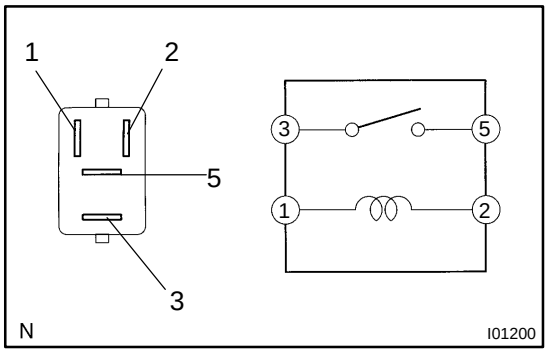
9. INSPECT HEADLIGHT CONTROL RELAY CIRCUIT (See page DI-805)



10. INSPECT HEADLIGHT DIMMER (DAYTIME RUNNING LIGHT NO. 2) RELAY CONTINUITY

Condition	Tester connection	Specified condition
Always	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 4	Continuity

If continuity is not as specified, replace the relay.

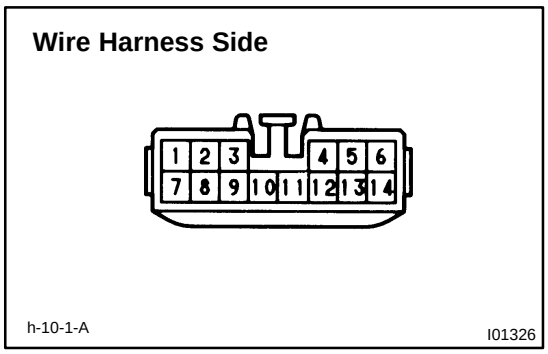


11. INSPECT TAILLIGHT CONTROL RELAY CONTINUITY

Condition	Tester connection	Specified condition
Always	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

If continuity is not as specified, replace the relay.

12. INSPECT TAILLIGHT CONTROL RELAY CIRCUIT (See page DI-913)

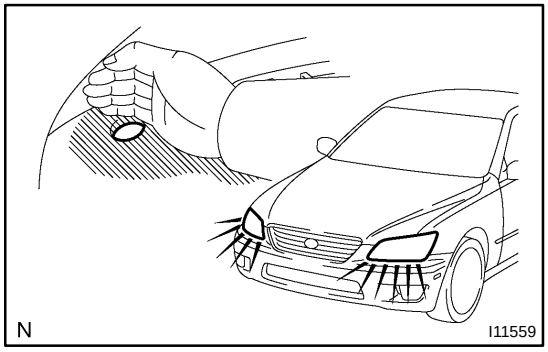


13. INSPECT DAYTIME RUNNING LIGHT MAIN RELAY CIRCUIT

Disconnect the connector from the relay and inspect the connector on the wire harness side.

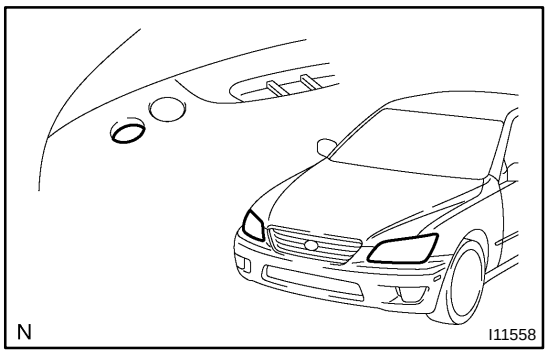
Tester connection	Condition	Specified condition
2 - Ground	Light control switch OFF	No continuity
2 - Ground	Light control switch TAIL or HEAD	Continuity
4 - Ground	Light control switch OFF or TAIL	No continuity
4 - Ground	Light control switch HEAD	Continuity
6 - Ground	Headlight dimmer switch FLASH	Continuity
8 - Ground	Engine running	Battery Positive Voltage
7 - Ground	Always	Continuity
10 - Ground	Always	Continuity
13 - Ground	Headlight dimmer switch FLASH or HI	Continuity
12 - Ground	Always	Battery Positive Voltage
1 - Ground	Ignition switch OFF	No voltage
1 - Ground	Ignition switch ON	Battery Positive Voltage
9 - Ground	Terminal 3 ground	Battery Positive Voltage
11 - Ground	Rear fog light switch ON, terminal 3 ground	Battery Positive Voltage
5 - Ground	Always	Battery Positive Voltage
14 - Ground	Terminal 5 ground	Battery Positive Voltage

If circuit is specified, try replacing the relay with a new one.
If circuit is not as specified, inspect the circuits connected to other parts.



14. Auto on function:
INSPECT AUTOMATIC LIGHT CONTROL SYSTEM

(a) Turn the ignition switch ON.
(b) Turn the light control switch to AUTO.
(c) Gradually cover the top of the sensor.
(d) Check the accessory lights and the headlights should turn ON.



15. Auto off function:
INSPECT AUTOMATIC LIGHT CONTROL SYSTEM

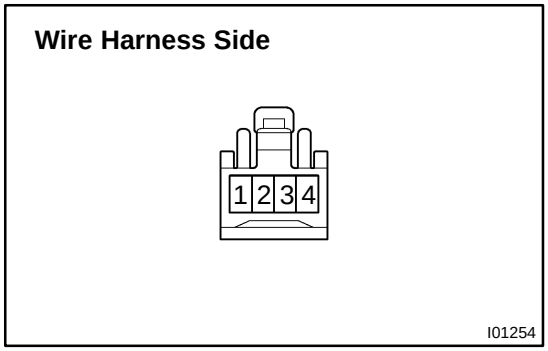
(a) Gradually expose the sensor.
(b) Check the headlights and the accessory lights should turn OFF.

16. INSPECT LIGHT-OFF CONDITION

(a) Turn the ignition switch ON.
(b) Gradually cover the top of the sensor.
Lights auto ON:
(c) Check that the lights go off under the following conditions.
(1) Light control switch is OFF.
(2) The area surrounding the sensor gets bright.
(3) The driver's door is opened with the ignition switch OFF.

17. INSPECT LIGHTS-ON CONDITION

(a) Open the driver's door while the ignition switch is OFF.
(b) Turn the light control switch to AUTO leaving the door open and cover the top of the sensor, and verify that the lights go on when the ignition switch is turned ON.



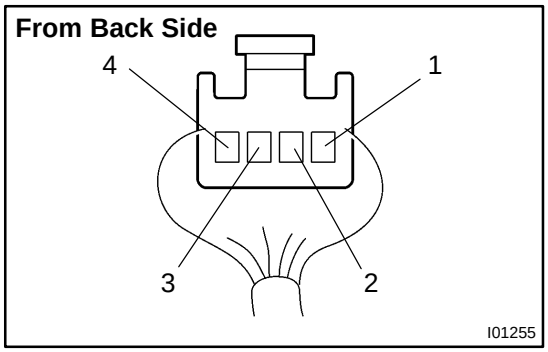
18. Connector disconnected:
INSPECT AUTOMATIC LIGHT CONTROL SENSOR CIRCUIT

Disconnect the connector from the sensor and inspect the connector on the wire harness side, as shown in the table.

Tester connection	Condition	Specified condition
3 - Ground	Always	Continuity
1 - Ground	Ignition switch LOCK or ACC	No voltage
1 - Ground	Ignition switch ON	Battery Positive Voltage
4 - Ground	Ignition switch LOCK or ACC	No voltage
4 - Ground	Ignition switch ON	5.2 - 9.0 V

If circuit is as specified, perform the inspection on the following page.

If the circuit is not as specified, inspect the circuit connected to other parts.



19. Connector connected:
INSPECT AUTOMATIC LIGHT CONTROL SENSOR CIRCUIT

Connect the wire harness side connector to the sensor and inspect wire harness side connector from the back side, as shown.

HINT:

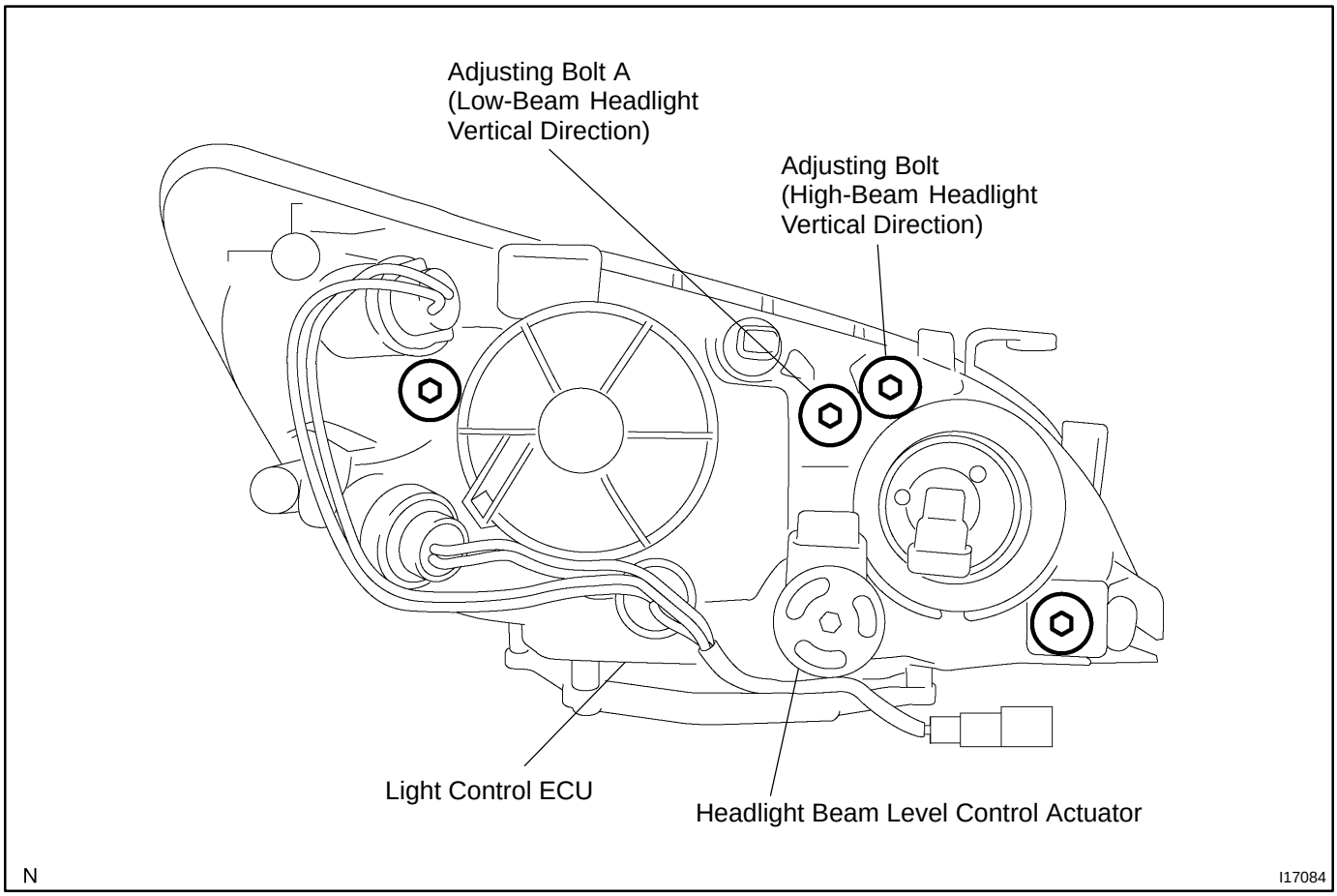
- Ignition switch ON.
- Light control switch AUTO.
- Vehicle's surroundings are bright.

Tester connection	Condition	Specified condition
3 - Ground	Always	Continuity
1 - Ground	Ignition switch LOCK or ACC	No voltage
1 - Ground	Ignition switch ON	9.5 V or more
Vehicle is under the direct sun light. (Sensor is not covered)		Taillight and Headlight are ON.

If circuit is as specified, try replacing the sensor with a new one.
If the circuit is not as specified, inspect the circuit connected to other parts.

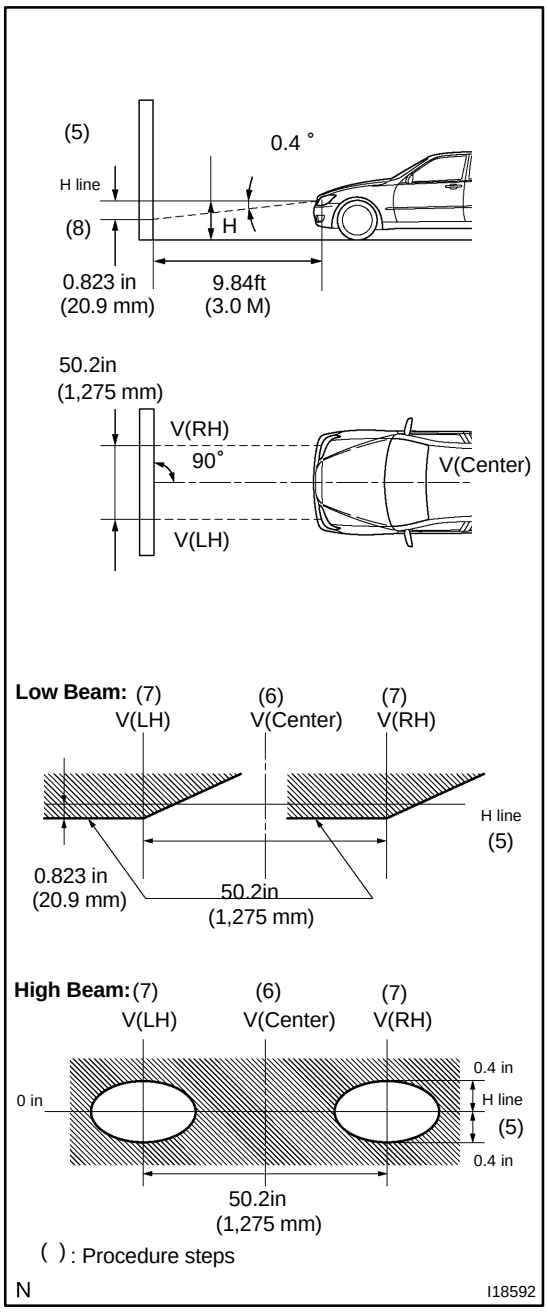
BE160-04

ADJUSTMENT



NOTICE:

- **Disconnect the connector of the other light to avoid heat affection from the light because the outer lens of the head light assembly is made of synthetic resin. When connecting the connector again take care not to wake the aiming out of adjustment.**
- **When covering the headlight, finish it within 3 minutes.**



ADJUSTING HEADLIGHT AIM

(a) Put the vehicle in below conditions.
- Make sure the body around the headlight is not deformed.
- Park the vehicle on a level spot.
- Tire inflation pressure is the specified value.
- Height control operation completes.
- Tire inflation pressure is the specified value.
- The driver gets into the driver's seat and puts the vehicle in a state ready for driving (with a full tank).
- Bounce the vehicle several times.

(b) Check the headlight aiming.
(1) Prepare the thick white colored paper.
(2) Stand the paper perpendicularly and ensure the distance from it to the head lights is 9.84 ft.
(3) Ensure that the center line of vehicle and the paper are at a 90 degree angle as shown in the illustration.
(4) Engine running.
(5) Draw a horizontal line (H line) on the paper where the head lights of the vehicle are to be.
(6) Draw a vertical line on the paper where the center line of the vehicle is to be. (V line)
(7) Draw the vertical lines on the paper where the headlights (low-beam and high-beam center marks) of the vehicle are to be (V RH and V LH lines).
(8) Draw the vertical lines on the paper where the headlights (low beam center marks) of the vehicle are to be. (V RH and LH lines)
(9) Turn the head lights ON.
(10) Check that the head lights light up the paper as shown in the illustration.
(11) When the paper is not lighted up properly, adjust the lights in the vertical direction.

HINT:

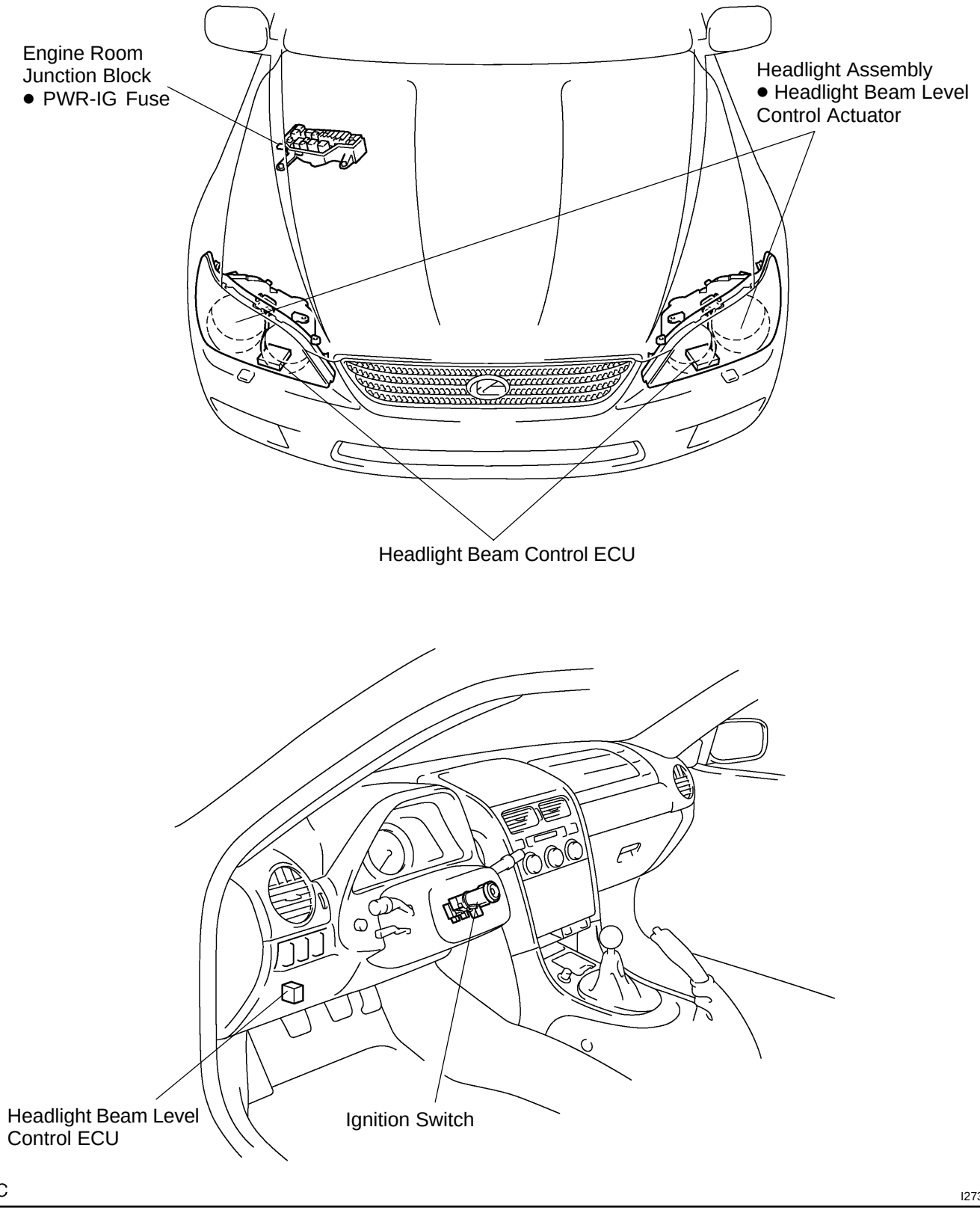
As shown in the illustration, adjust aiming of the LH and RH lights respectively.

(c) Adjust the headlight in vertical direction.
Using adjusting bolt A, adjust the headlight aim to within the specifications.

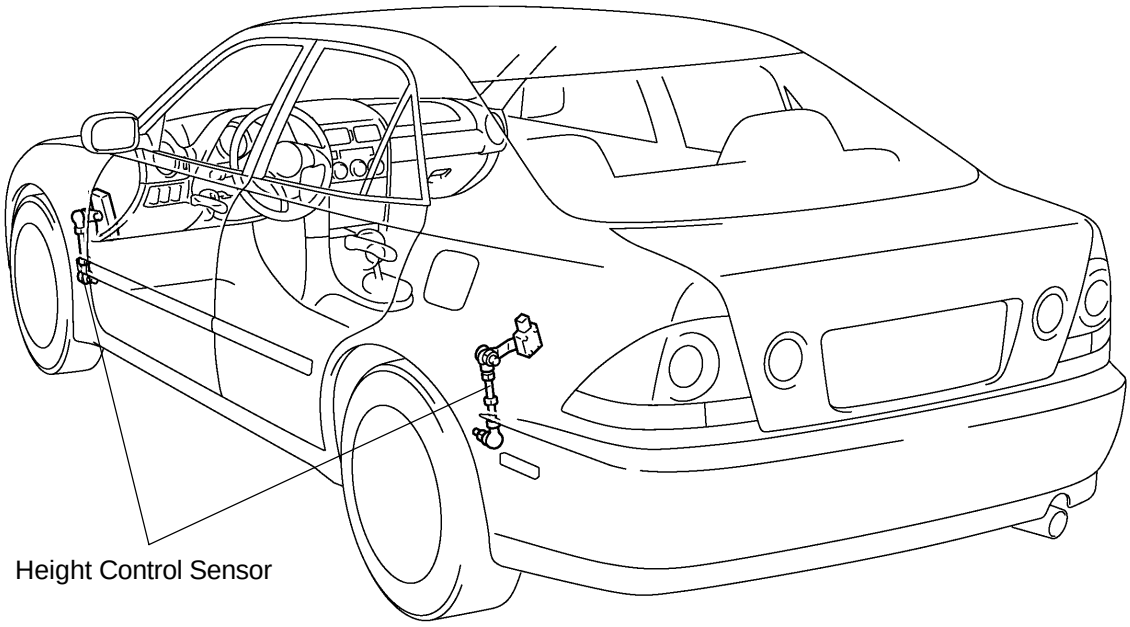
HEADLIGHT BEAM LEVEL CONTROL SYSTEM

LOCATION

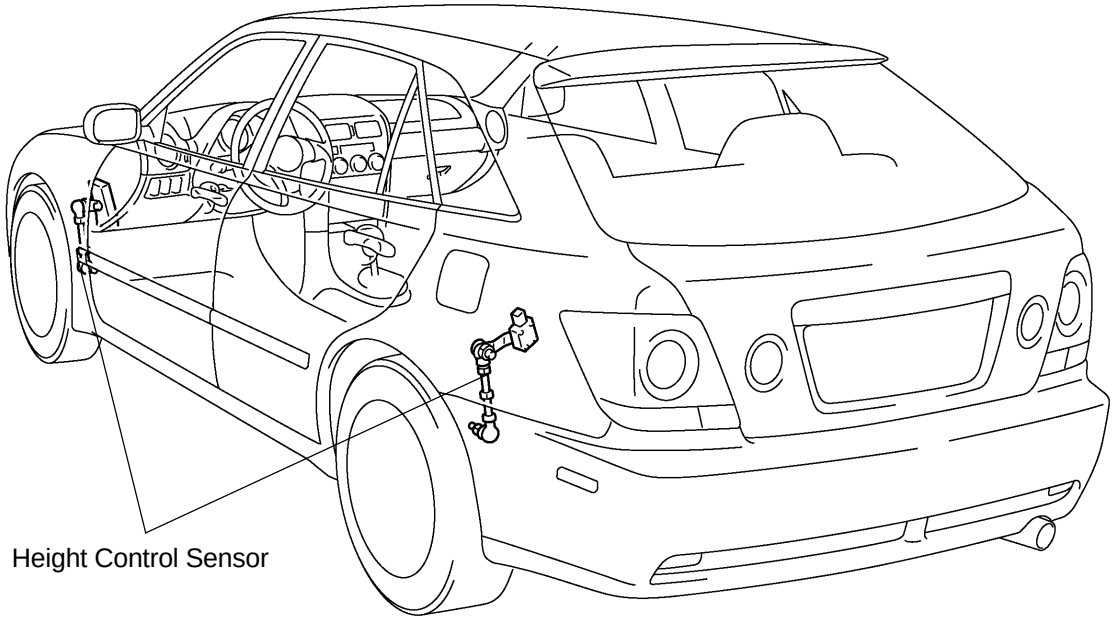
BE29P-02



Sedan:



Wagon:



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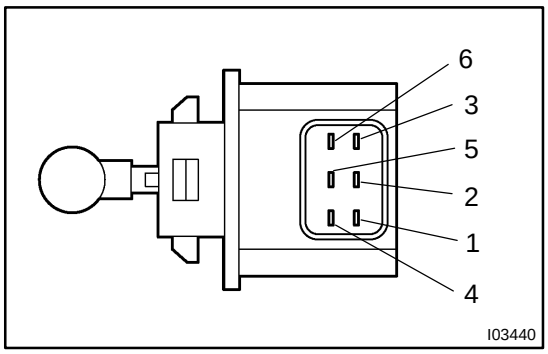
BE0BI-04

INSPECTION



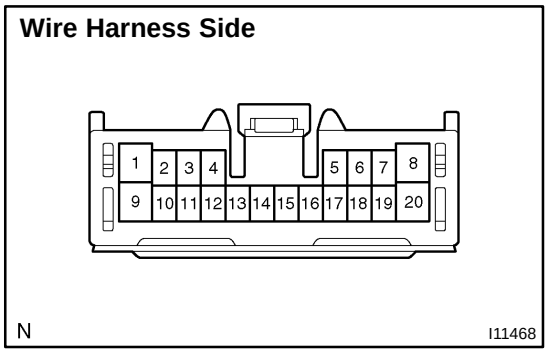
1. INSPECT HEADLIGHT BEAM LEVEL CONTROL ACTUATOR RESISTANCE

(a) Check that continuity exists between terminal 2 and 5.

(b) Check that resistance exists between terminal, as shown in the chart.

Terminal	Resistance (Ω)
2 - 1	26 - 30
2 - 3	26 - 30
2 - 4	26 - 30
2 - 6	26 - 30
5 - 1	26 - 30
5 - 3	26 - 30
5 - 4	26 - 30
5 - 6	26 - 30

If resistance value is not as specified, replace the actuator.

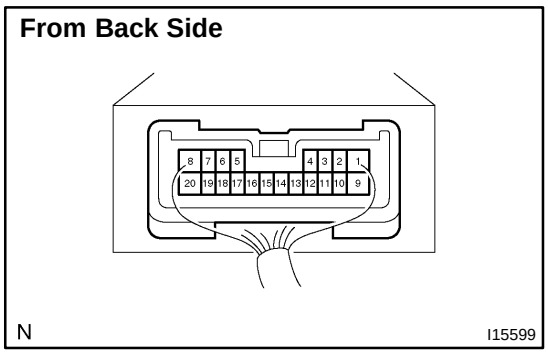


2. Connector disconnected:
INSPECT HEADLIGHT BEAM LEVEL CONTROL ECU CIRCUIT

Disconnect the connector from the ECU and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
1 - 13	Ignition switch OFF	26 - 30 Ω
1 - 15	Ignition switch OFF	26 - 30 Ω
1 - 14	Ignition switch OFF	26 - 30 Ω
1 - 16	Ignition switch OFF	26 - 30 Ω
1 - 4	Ignition switch OFF	26 - 30 Ω
1 - 2	Ignition switch OFF	26 - 30 Ω
1 - 12	Ignition switch OFF	26 - 30 Ω
1 - 3	Ignition switch OFF	26 - 30 Ω
6 - 10	Ignition switch OFF	Continuity
7 - 11	Ignition switch OFF	Continuity
10 - 17	Ignition switch OFF	Continuity
5 - 11	Ignition switch OFF	Continuity
20 - Ground	Ignition switch OFF	Continuity

If circuit is not as specified, perform the inspection on the following page.



3. Connector connected:
INSPECT HEADLIGHT BEAM LEVEL CONTROL ECU CIRCUIT

Connect the connector from the ECU and inspect the connector on the back side, as shown in the chart.

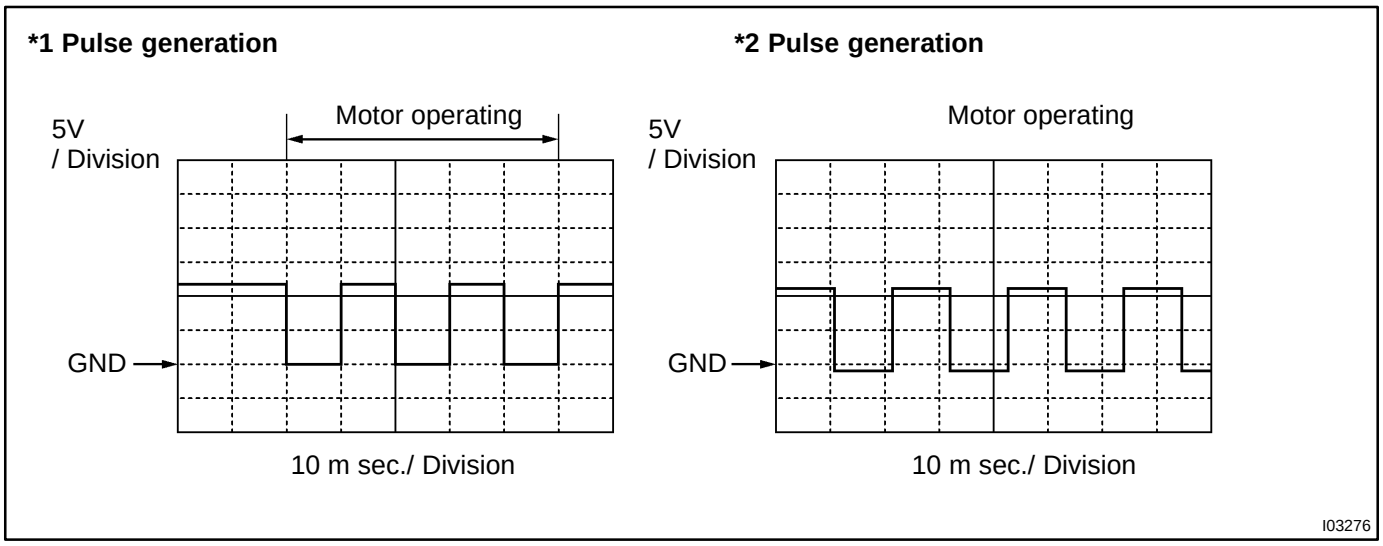
Tester connection	Condition	Specified condition
1 - 20	Ignition switch ON	Battery positive voltage
13 - 20	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
15 - 20	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
14 - 20	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
16 - 20	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
10 - 17	Ignition switch ON	Approx. 2.5 V
18 - 20	Ignition switch ON	No continuity
4 - 20	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
2 - 20	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
12 - 20	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
3 - 20	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
5 - 11	Ignition switch ON	Approx. 2.5 V
11 - 20	Ignition switch OFF	Continuity
10 - 17	Ignition switch OFF	Continuity
6 - 10	Ignition switch ON	5 V
7 - 11	Ignition switch ON	5 V
10 - 20	Ignition switch OFF	Continuity
20 - Body ground	Ignition switch OFF	Continuity

If the circuit is not as specified, replace the ECU.

Reference INSPECTION USING OSCILLOSCOPE

HINT:

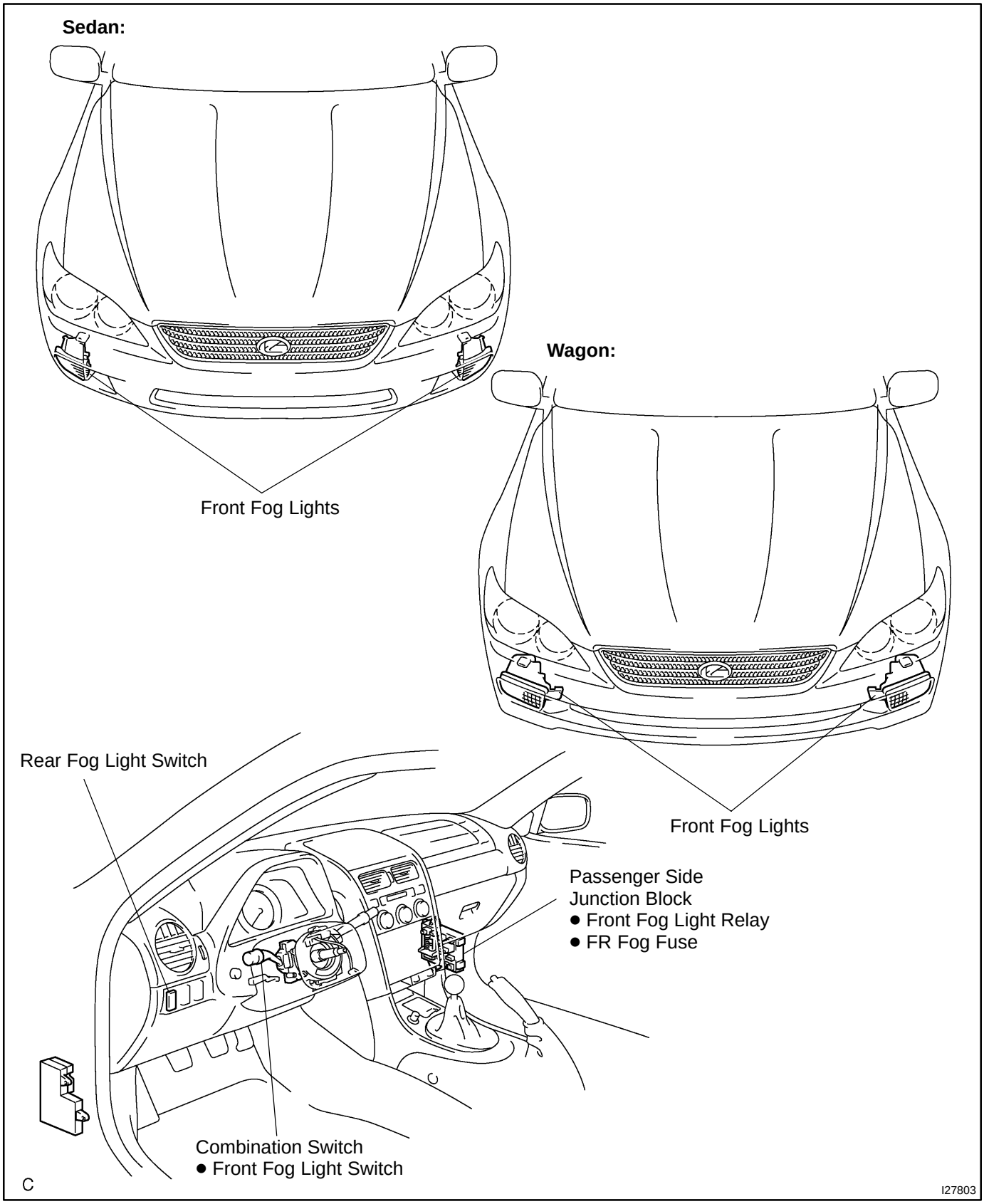
The correct waveform is as shown in the illustration.



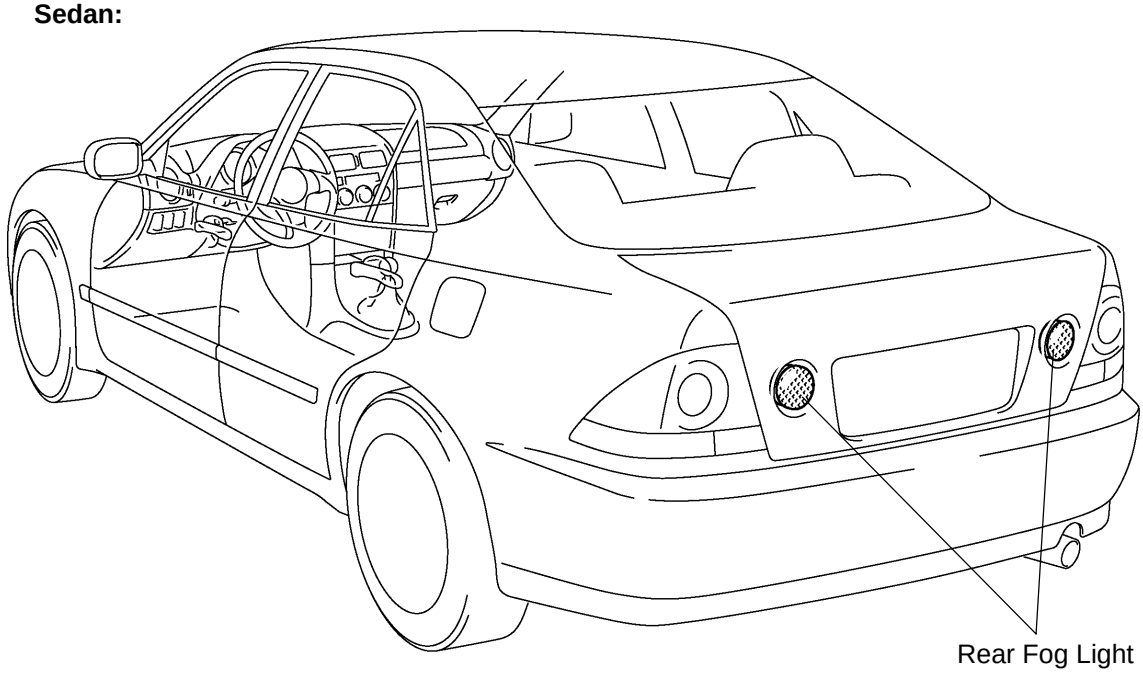
FOG LIGHT SYSTEM

LOCATION

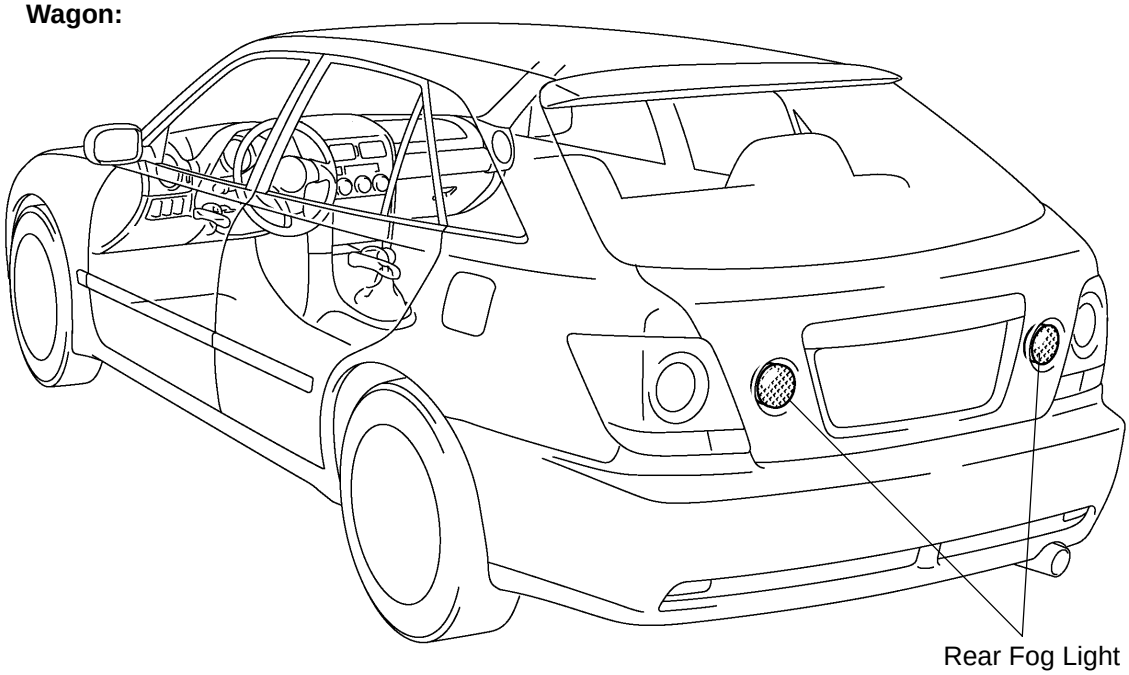
BE29Q-02



Sedan:



Wagon:

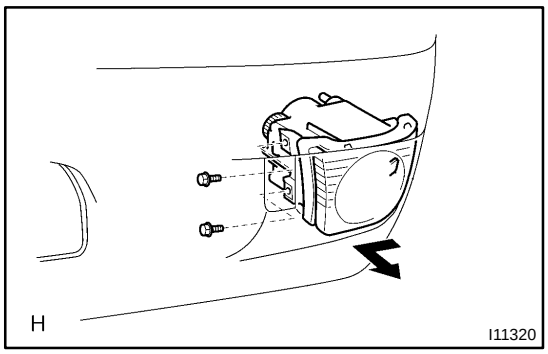


C

I27804

BE29R-02

REMOVAL

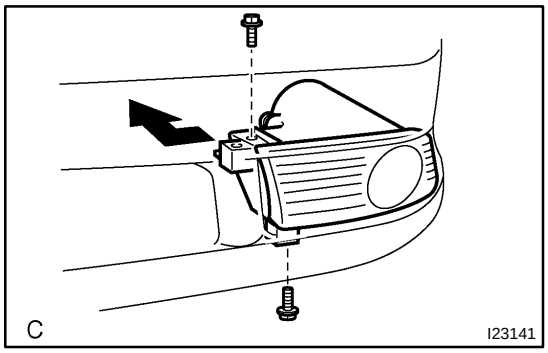


1. Sedan:
REMOVE FRONT FOG LIGHT ASSEMBLY

HINT:

- Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.
- Follow the same procedure for RH as for LH.

(a) Remove the front portion of fender liner.
(b) Disconnect the connecter.
(c) Remove the 2 bolts.
(d) Remove the front fog light assembly, as shown in the illustration.
(e) Install front fog light assembly.
(f) Adjust optical axis of fog light (See page BE-50).

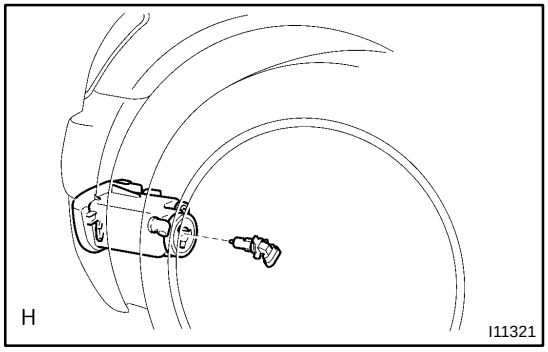


2. Wagon:
REMOVE FRONT FOG LIGHT ASSEMBLY

HINT:

- Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.
- Follow the same procedure for RH as for LH.

(a) Remove the front portion of fender liner.
(b) Disconnect the connecter.
(c) Remove the 2 bolts.
(d) Remove the front fog light assembly, as shown in the illustration.
(e) Install front fog light assembly.
(f) Adjust optical axis of fog light (See page BE-50).



3. REMOVE FRONT FOG LIGHT BULB

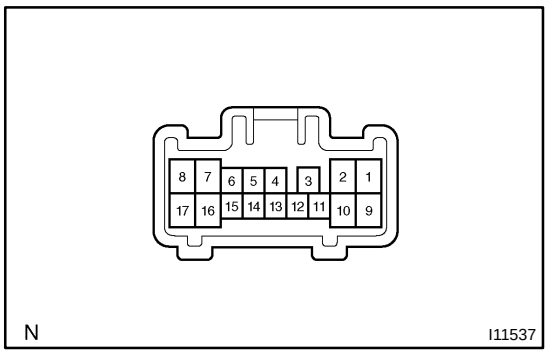
HINT:

Follow the same procedure for RH as for LH.

(a) Remove a part of LH front fender liner.
(b) Separate the connector and remove the bulb.

BE29S-03

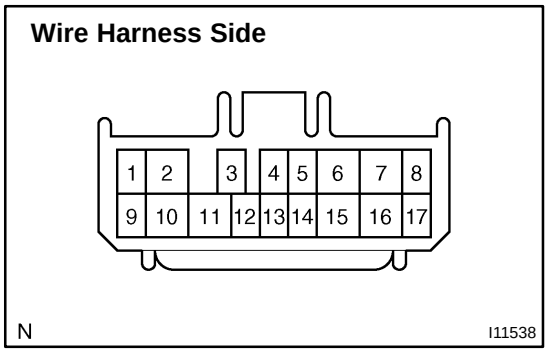
INSPECTION



1. INSPECT FRONT FOG LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	-	No continuity
ON	10 - 11	Continuity

If continuity is not as specified, replace the switch.

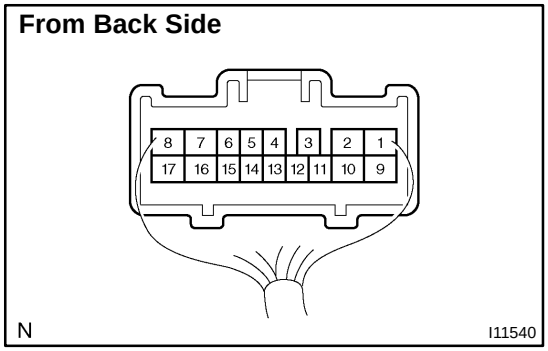


2. Connector disconnected: INSPECT FRONT FOG LIGHT SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
10 - 17	Always	Continuity

If circuit is not as specified, inspect the wire harness.



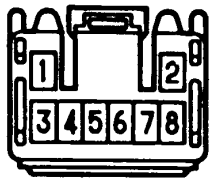
3. Connector connected: INSPECT FRONT FOG LIGHT SWITCH CIRCUIT

Connect the wire harness side connector to the light control and dimmer switch and inspect the connector from the back side, as shown.

Tester connection	Condition	Specified condition
11 - Ground	Light control switch HEAD and headlight dimmer switch LO and fog light switch ON	No voltage
11 - Ground	Light control switch HEAD and headlight dimmer switch LO and fog light switch OFF	Battery Positive Voltage

If circuit is not as specified, inspect the wire harness.

Wire Harness Side



I11315

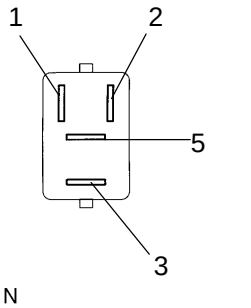
4. INSPECT REAR FOG LIGHT SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
1 - Ground	Always	* Continuity
2 - Ground	Light control switch TAIL or HEAD	Continuity
3 - Ground	Always	Battery voltage
5 - Ground	Light control switch HEAD	Continuity
7 - Ground	Always	Continuity
8 - Ground	Always	Continuity

*: There is resistance because this circuit is ground through the bulb.

If the circuit is not as specified, replace the wire harness.



N

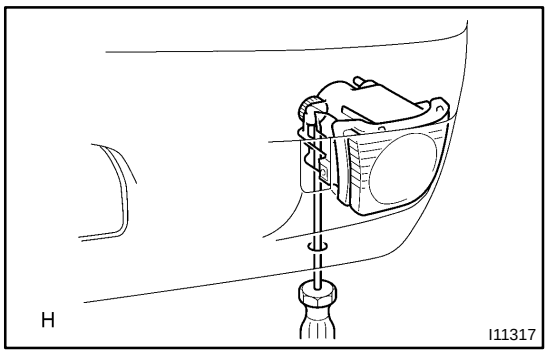
I01200

5. INSPECT FRONT FOG LIGHT RELAY CONTINUITY

Condition	Tester connection	Specified condition
Always	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

If continuity is not as specified, replace the relay.

BE164-05



ADJUSTMENT

ADJUST FRONT FOG LIGHT AIM

A-bolt: Vertical Direction

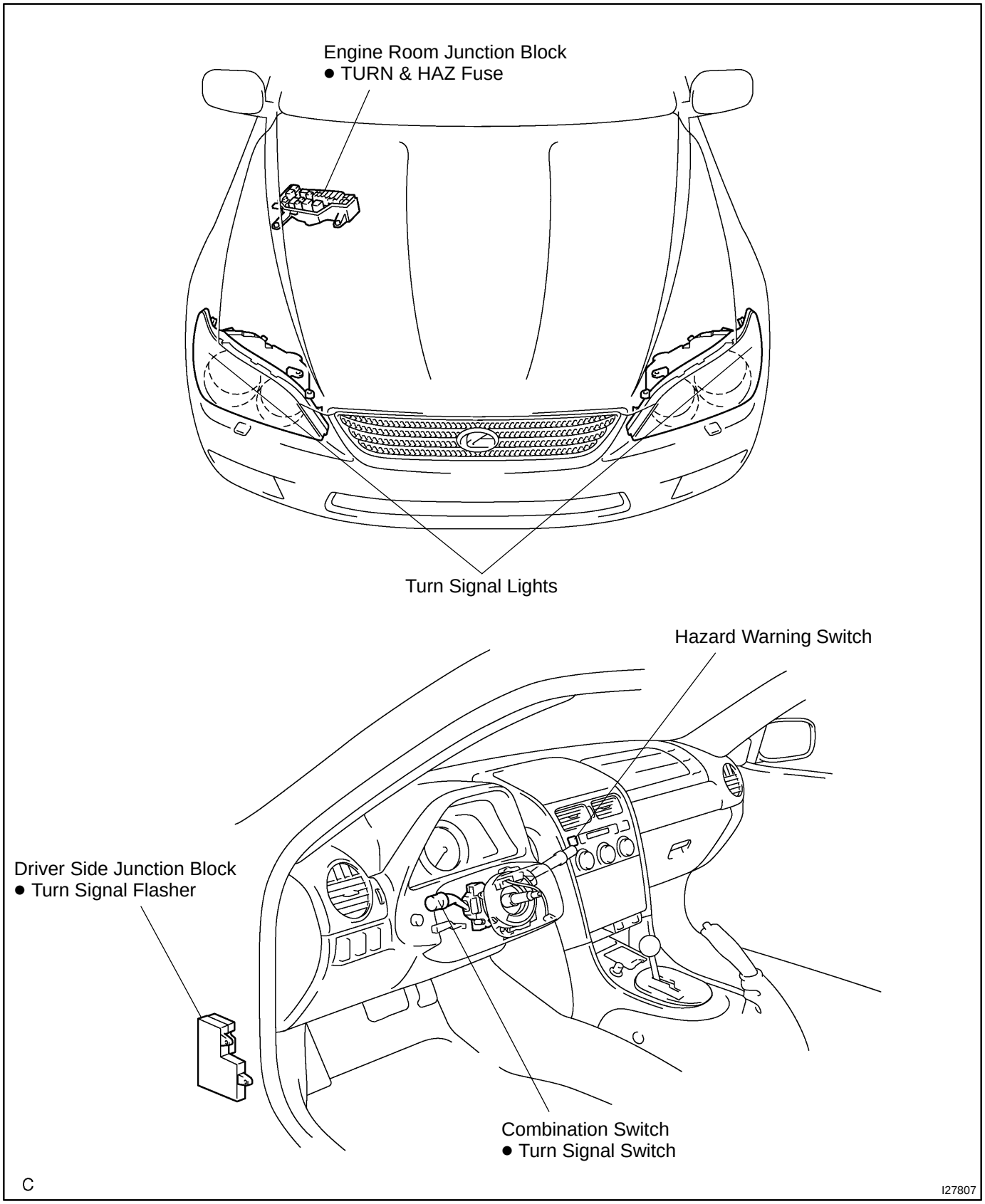
HINT:

Insert a driver into the hole for aiming in the fender liner to perform aiming.

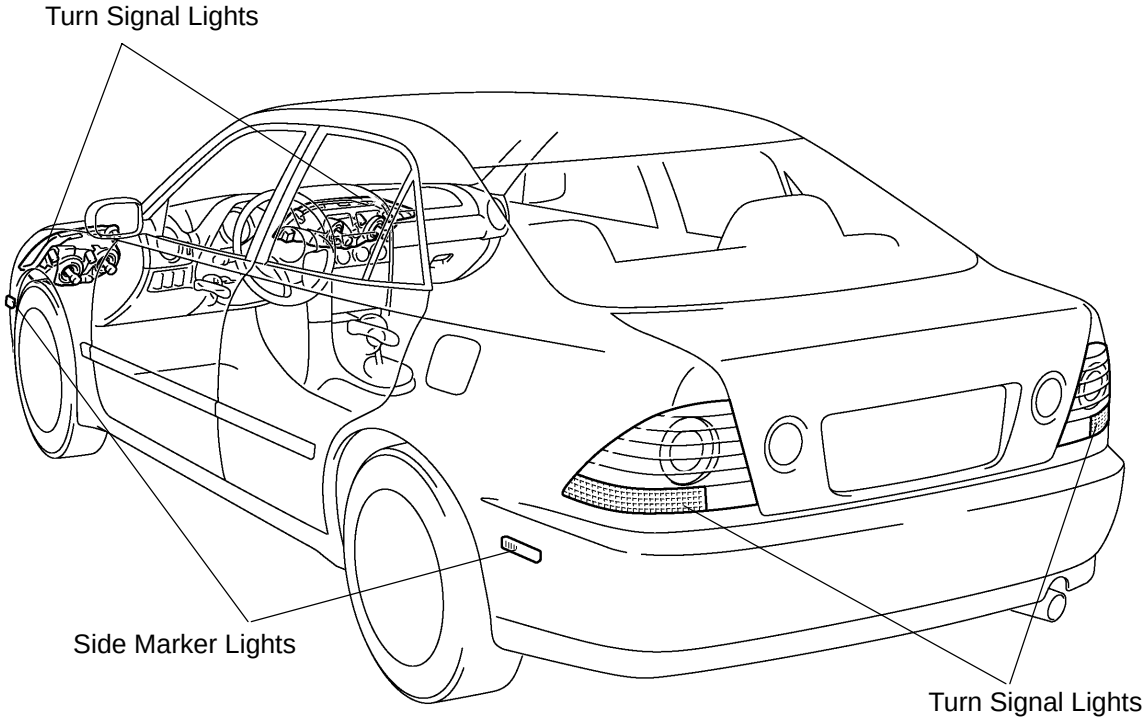
TURN SIGNAL AND HAZARD WARNING SYSTEM

BE29T-02

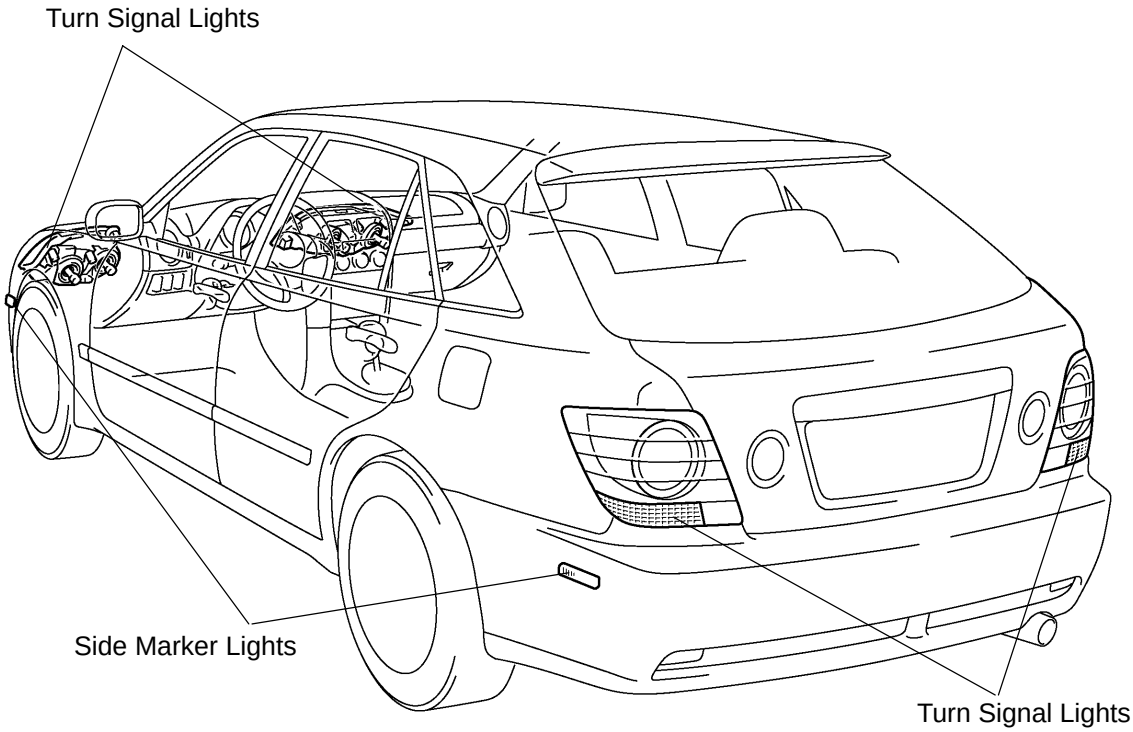
LOCATION



Sedan:



Wagon:

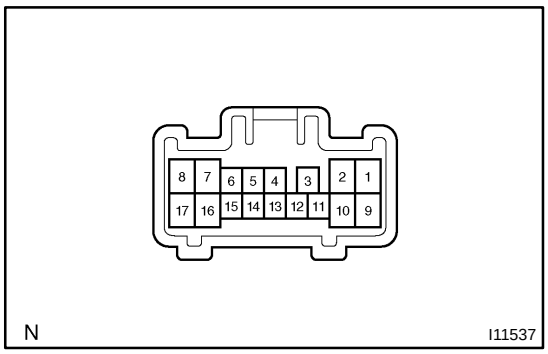


C

I27808

BE1WS-03

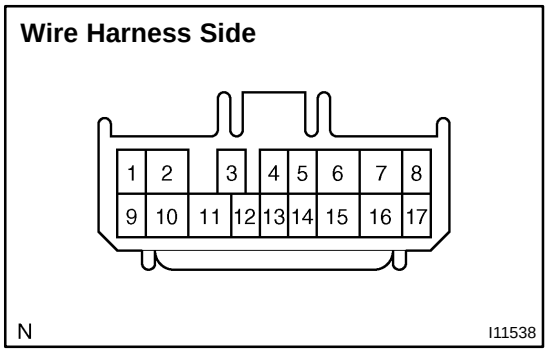
INSPECTION



1. INSPECT TURN SIGNAL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Left turn	1 - 2	Continuity
Neutral	-	No continuity
Right turn	2 - 3	Continuity

If continuity is not as specified, replace the switch.

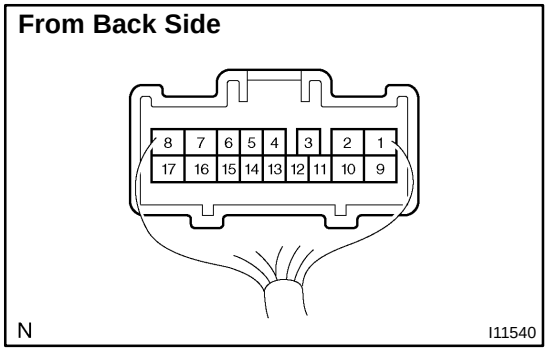


2. Connector disconnected: INSPECT TURN SIGNAL SWITCH CIRCUIT

Disconnect the connector from the combination switch and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
2 - Ground	Always	Continuity

If circuit is not as specified, inspect the wire harness.



3. Connector connected: INSPECT TURN SIGNAL SWITCH CIRCUIT

Connect the wire harness side connector to the combination switch and inspect the connector form the back side, as shown.

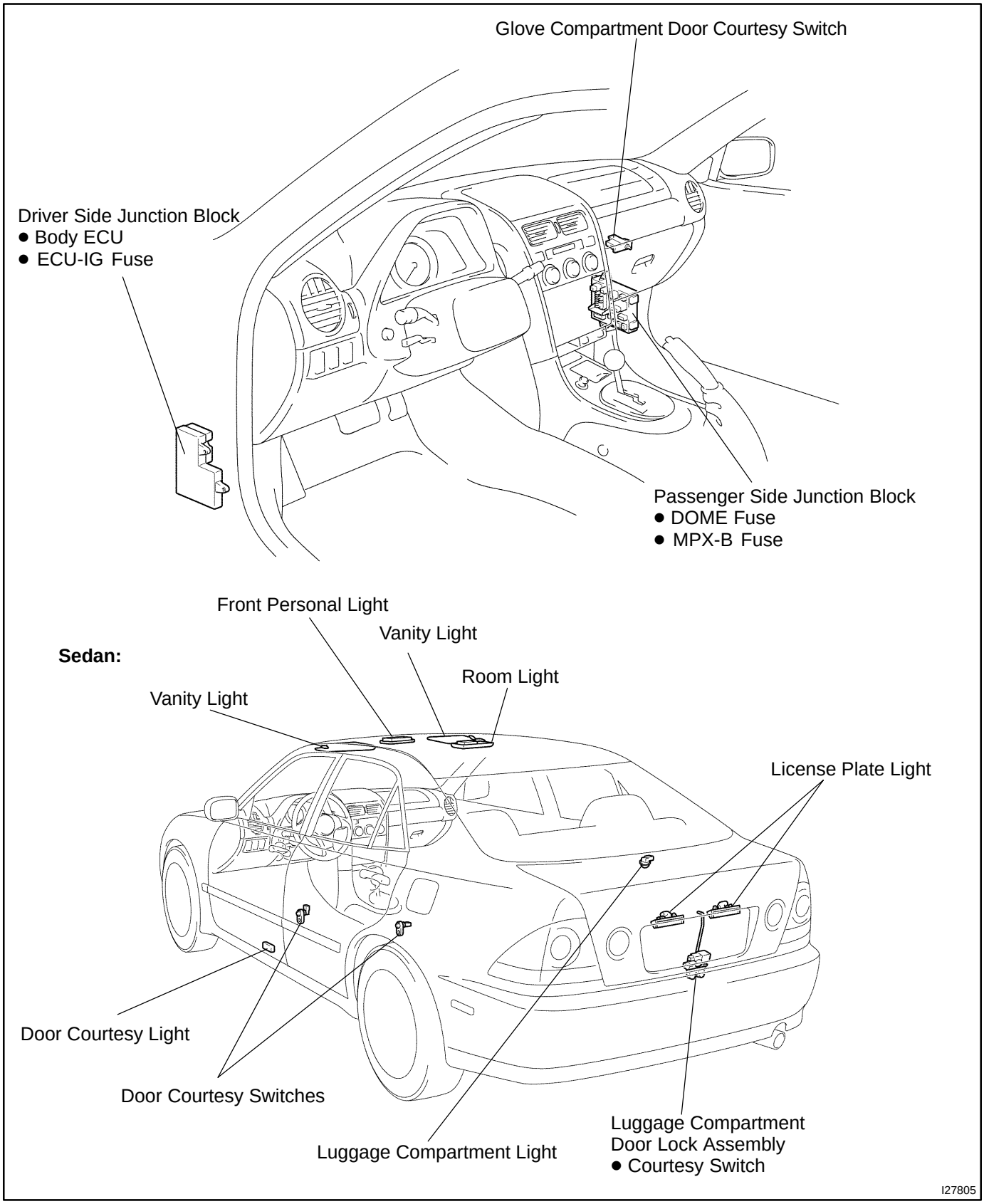
Tester connection	Condition	Specified condition
2 - Ground	Ignition switch ON and turn signal switch Neutral	No voltage
1 - Ground	Ignition switch ON and turn signal switch Left	Battery Positive Voltage ↔ 0 V
3 - Ground	Ignition switch ON and turn signal switch Right	Battery Positive Voltage ↔ 0 V

If circuit is not as specified, inspect the circuits connected to other parts.

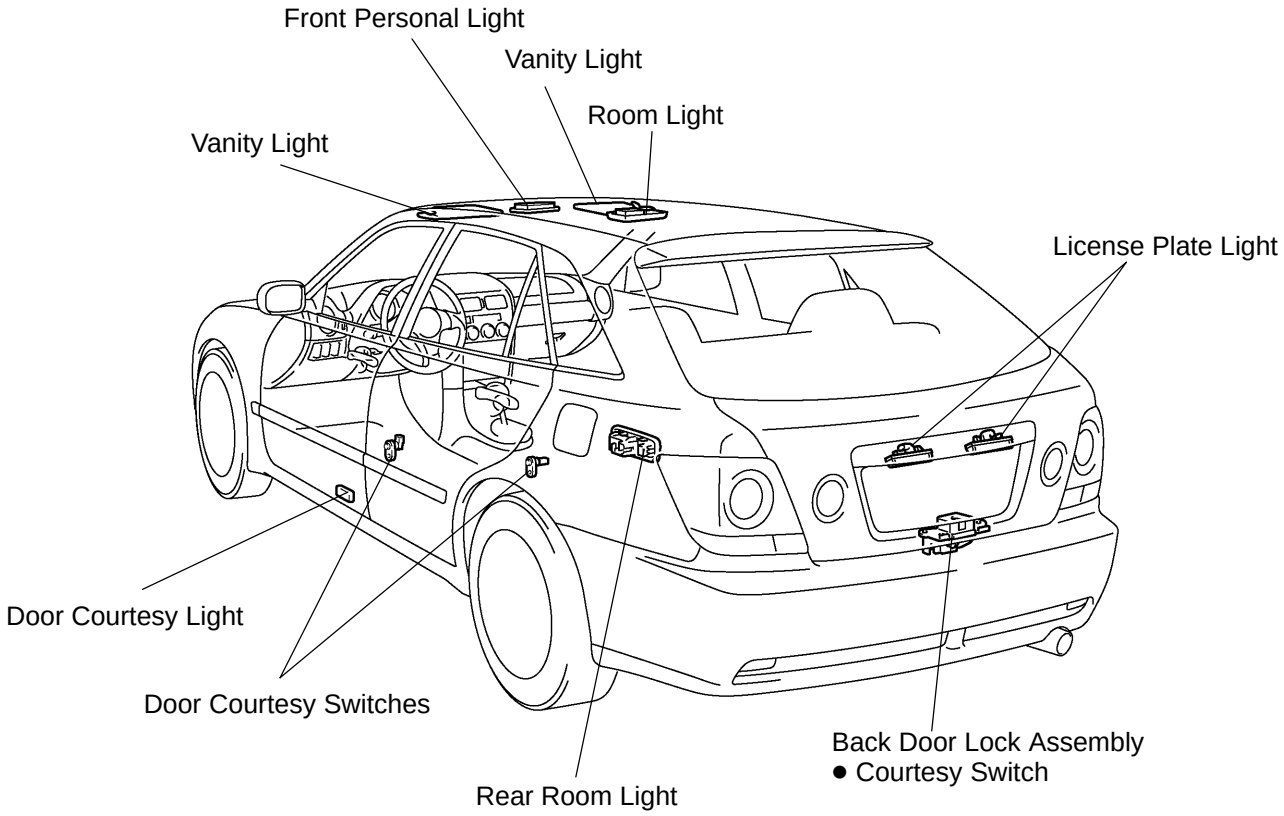
INTERIOR LIGHT SYSTEM

LOCATION

BE29U-02



Wagon:

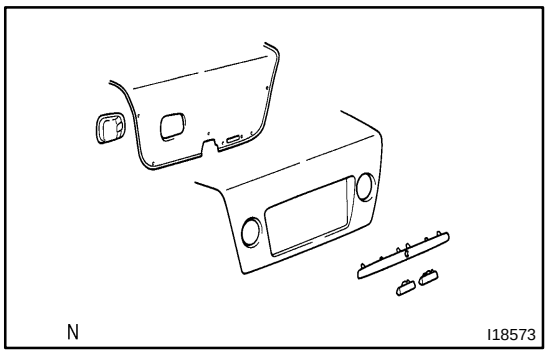


C

I27806

BE29V-02

REMOVAL

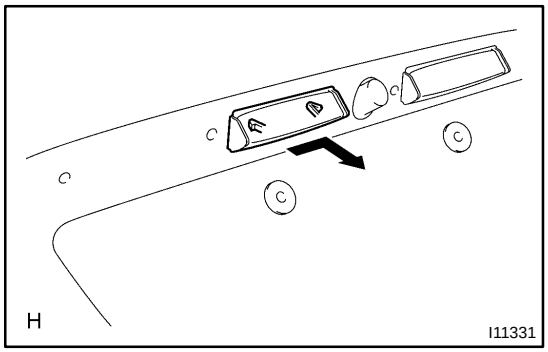


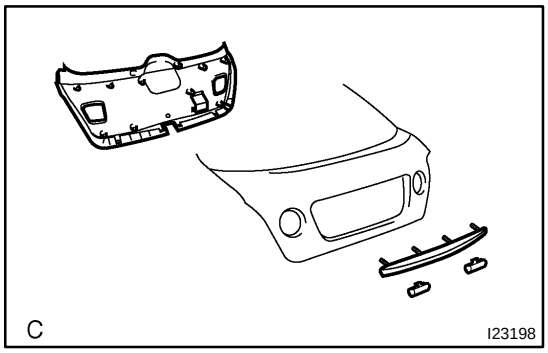
1. Sedan:
REMOVE LICENSE PLATE LIGHT

HINT:

- Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.
- Follow the same procedure for RH as for LH.

(a) Remove the Internal Trunk Release Handle.
(b) Remove a part of luggage compartment door trim.
(c) Remove the 4 nuts.
(d) Remove luggage compartment door outer garnish.
(e) Disconnect the connector.
(f) Pull the claw towards the inside of the vehicle as shown in the illustration, disconnect the engagement of 2 claws, and remove the license plate light assembly.



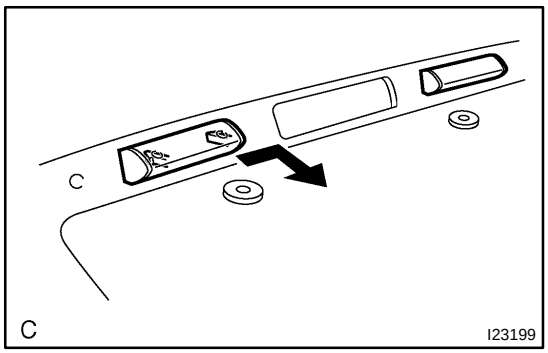


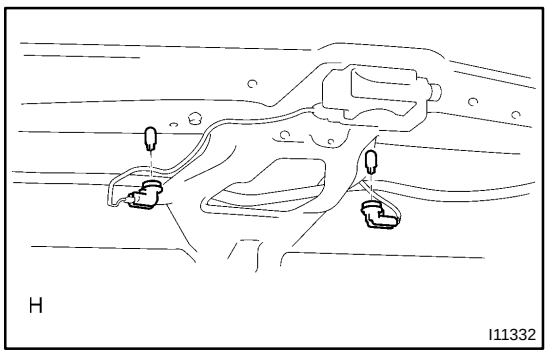
2. Wagon:
REMOVE LICENSE PLATE LIGHT

HINT:

- Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.
- Follow the same procedure for RH as for LH.

(a) Remove the back door trim.
(b) Remove the 4 nuts.
(c) Remove back door outer garnish.
(d) Disconnect the connector.
(e) Pull the claw towards the inside of the vehicle as shown in the illustration, disconnect the engagement of 2 claws, and remove the license plate light assembly.



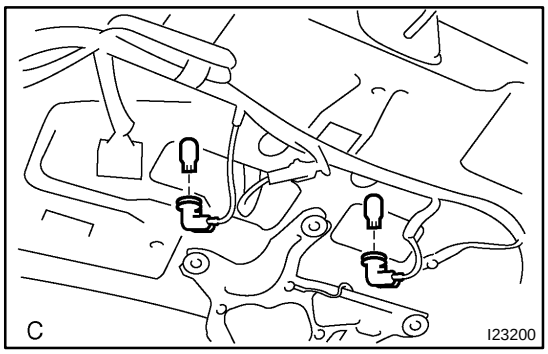


3. Sedan:
REMOVE LICENSE PLATE BULB

HINT:

Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.

(a) Remove a part of luggage compartment door trim.
(b) Disconnect the bulb sockets and remove the bulbs.



4. Wagon:
REMOVE LICENSE PLATE BULB

HINT:

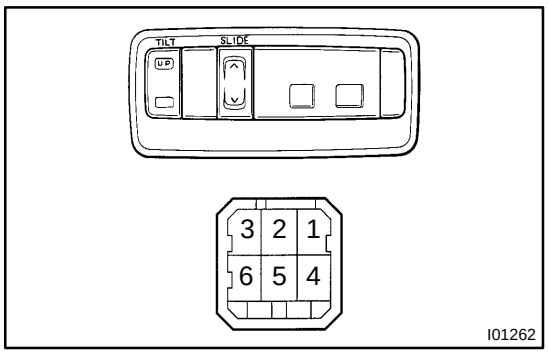
Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.

(a) Remove the back door trim.

(b) Disconnect the bulb sockets and remove the bulbs.

BE29W-03

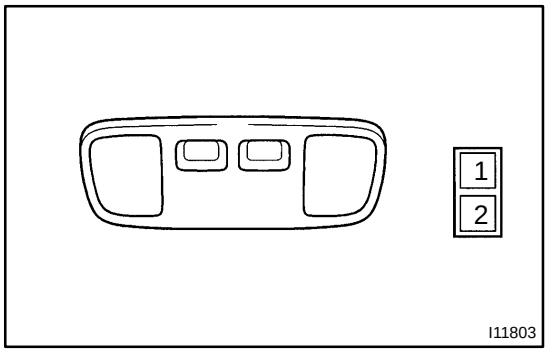
INSPECTION



1. w/ Sliding Roof:
INSPECT FRONT PERSONAL LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	-	No continuity
ON	1 - 4	Continuity

If continuity is not as specified, replace the light assembly or bulb.

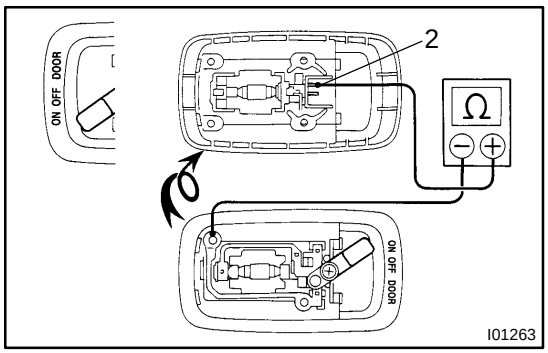


2. w/o Sliding Roof:
INSPECT FRONT PERSONAL LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	-	No continuity
ON	1 - 2	Continuity

If continuity is not as specified, replace the light assembly or bulb.

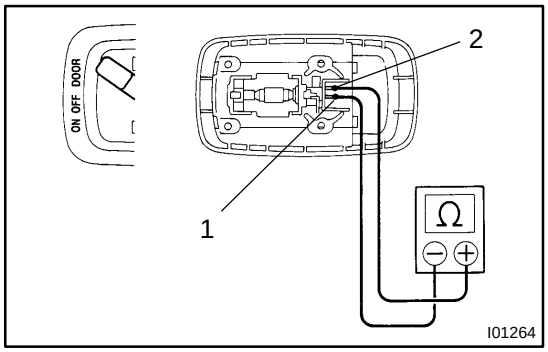
3. INSPECT FRONT PERSONAL LIGHT SWITCH CIRCUIT (See page DI-907)



4. w/o Reader sensor:
INSPECT ROOM LIGHT CONTINUITY

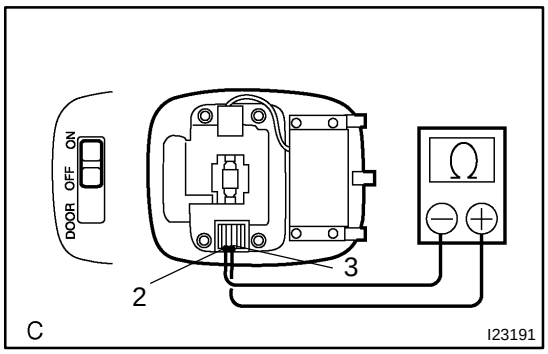
(a) Disconnect the connector from the room light.

(b) Turn the room light switch ON, check that continuity exists between terminal 2 and body ground.



(c) Turn the room light switch DOOR, check that continuity exists between terminals 1 and 2.

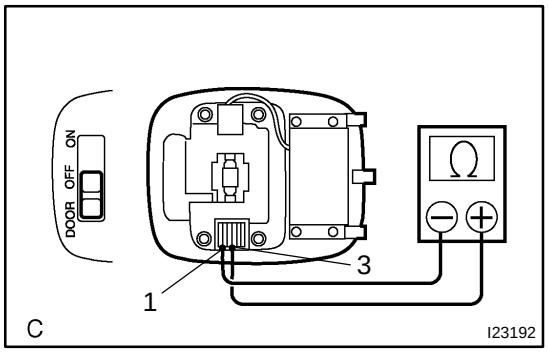
If continuity is not as specified, replace the light assembly or bulb.



5. w/ Reader sensor:
INSPECT ROOM LIGHT CONTINUITY

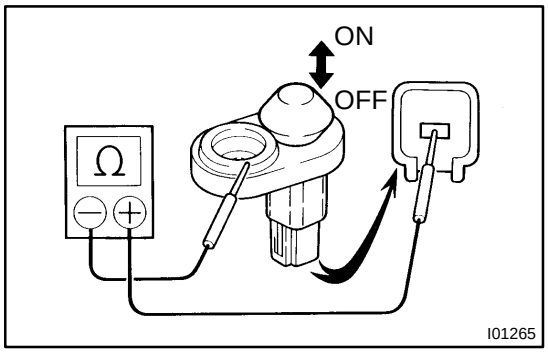
(a) Disconnect the connector from the room light.

(b) Turn the room light switch ON, check that continuity exists between terminal 2 and 3.



(c) Turn the room light switch DOOR, check that continuity exists between terminals 1 and 3.

If continuity is not as specified, replace the light assembly or bulb.

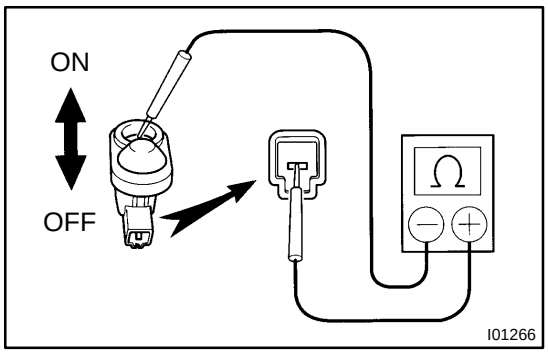


6. INSPECT FRONT DOOR COURTESY SWITCH CONTINUITY

(a) Check that continuity exists between terminals and the switch body with the switch ON (switch pin released: opened door).

(b) Check that no continuity exists between terminals and the switch body with the switch OFF (switch pin pushed in: closed door).

If operation is not as specified, replace the switch.

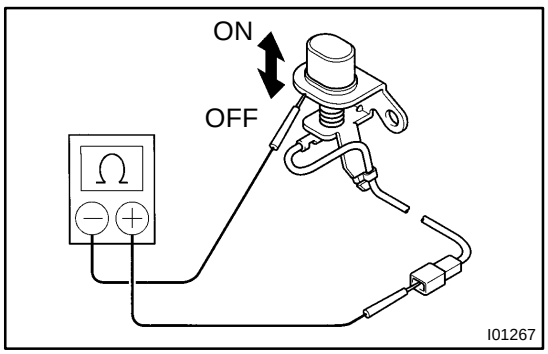


7. INSPECT REAR DOOR COURTESY SWITCH CONTINUITY

(a) Check that continuity exists between terminals and the switch body with the switch ON (switch pin released: opened door).

(b) Check that no continuity exists between terminals and the switch body with the switch OFF (switch pin pushed in: closed door).

If operation is not as specified, replace the switch.

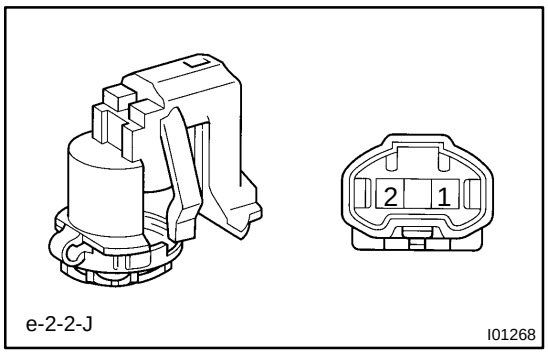


8. INSPECT LUGGAGE COMPARTMENT DOOR COURTESY SWITCH CONTINUITY

(a) Check that continuity exists between terminals and the switch body with the switch ON (switch pin released: opened door).

(b) Check that no continuity exists between terminals and the switch body with the switch OFF (switch pin pushed in: closed door).

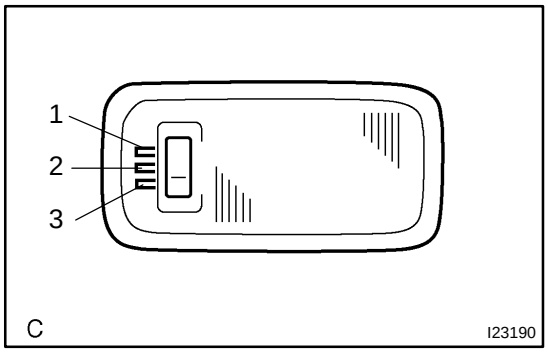
If operation is not as specified, replace the switch.



9. INSPECT LUGGAGE COMPARTMENT LIGHT CONTINUITY

Using the ohmmeter, check that continuity exists between terminals.

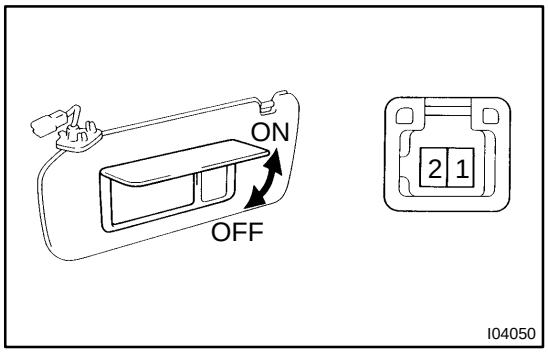
If continuity is not as specified, replace the light assembly or bulb.



10. REAR ROOM LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	1 - 2	No continuity
ON	2 - 3	Continuity

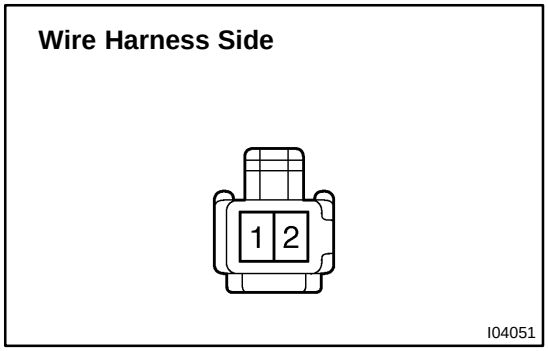
If continuity is not as specified, replace the light assembly or bulb.



11. INSPECT VANITY LIGHT CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	-	No continuity
ON (opened)	1 - 2	Continuity

If continuity is not as specified, replace the vanity light assembly or bulb.



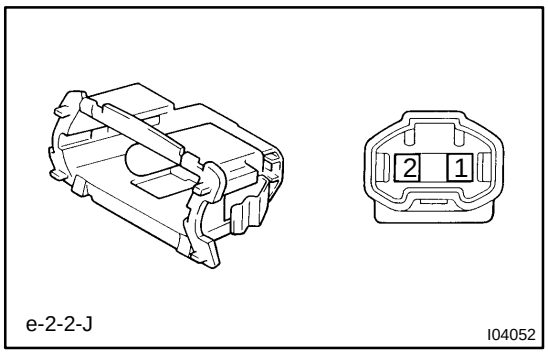
12. INSPECT VANITY LIGHT CIRCUIT

(See page DI-907)

Disconnect the connector from the light and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
2 - Ground	Always	Continuity
1 - Ground	Always	Battery Positive Voltage

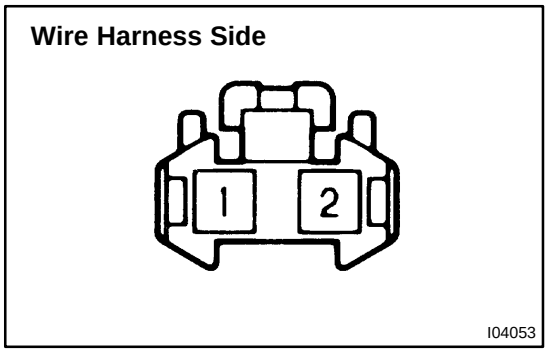
If circuit is not as specified, inspect power source or wire harness.



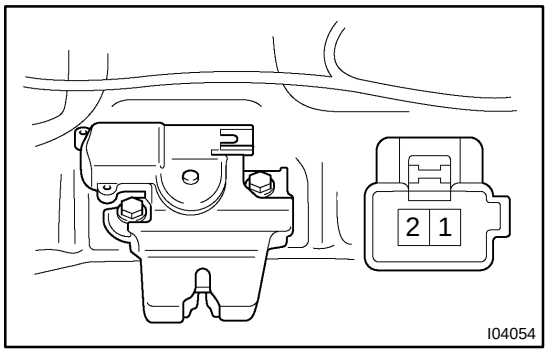
13. INSPECT DOOR COURTESY LIGHT CONTINUITY

Using an ohmmeter, check that continuity exists between terminals.

If continuity is not as specified, replace the light assembly or bulb.



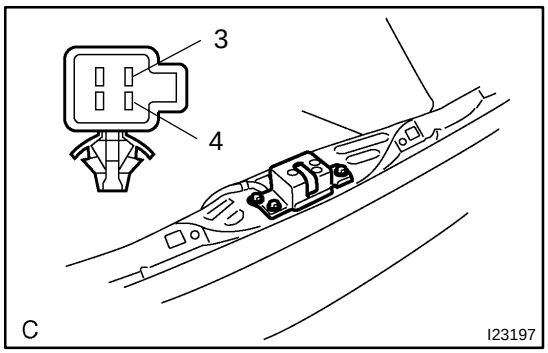
14. INSPECT DOOR COURTESY LIGHT CIRCUIT
(See page DI-907)



15. INSPECT LUGGAGE COMPARTMENT DOOR COURTESY SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	-	No continuity
ON (opened)	2 - Switch body	Continuity

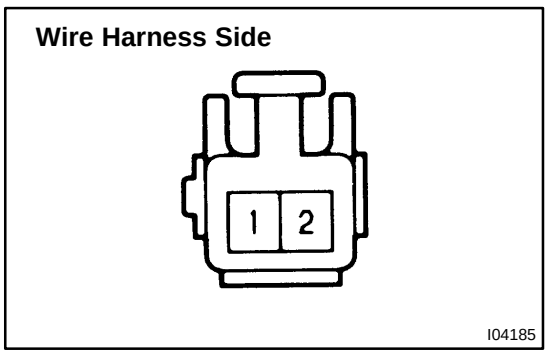
If continuity is not as specified, replace the switch.



16. BACK DOOR COURTESY SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	-	No continuity
ON (opened)	3 - 4	Continuity

If continuity is not as specified, replace the switch.

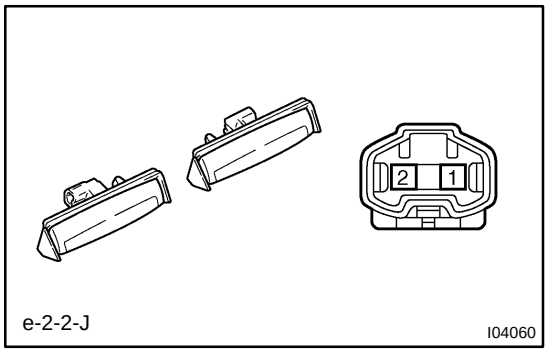


17. INSPECT LUGGAGE COMPARTMENT DOOR COURTESY SWITCH CIRCUIT
(See page DI-923)

Disconnect the connector from the switch and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
2 - Body ground	Luggage compartment door courtesy switch ON (door opened)	Continuity

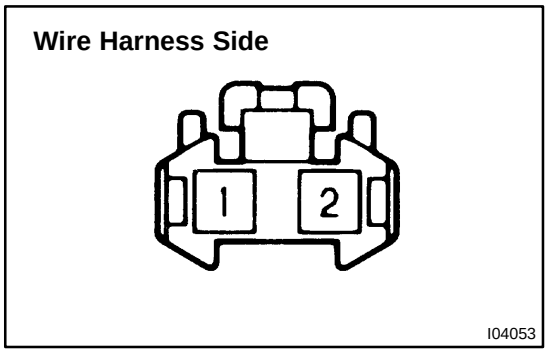
If circuit is not as specified, inspect power source or wire harness.



18. INSPECT LICENSE PLATE LIGHT CONTINUITY

Using an ohmmeter, check that continuity exists between terminals.

If continuity is not as specified, replace the light assembly or bulb.



19. INSPECT LICENSE PLATE LIGHT CIRCUIT

Disconnect the connector from the light and inspect the connector on the wire harness side, as shown.

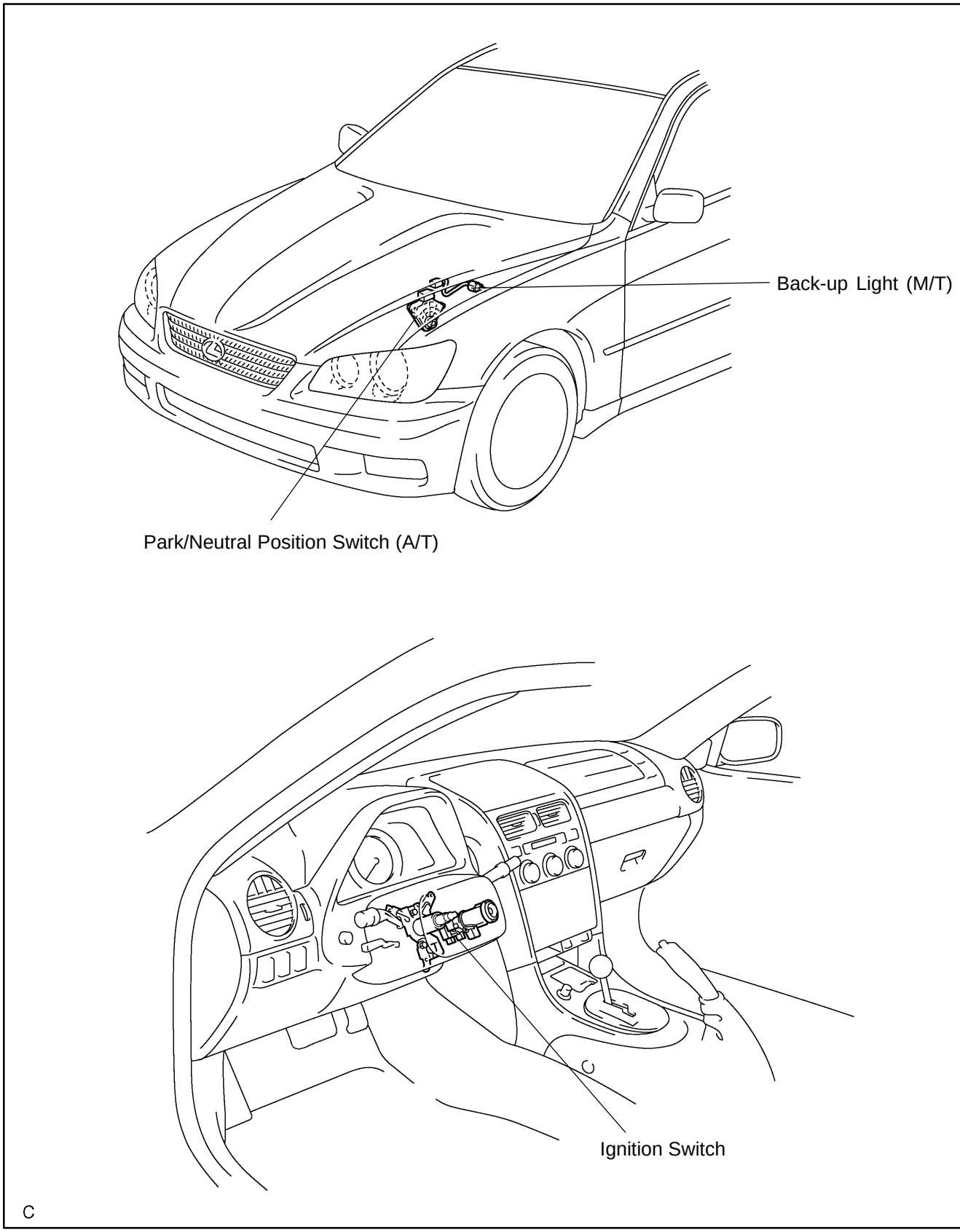
Tester connection	Condition	Specified condition
1 - Ground	Always	Continuity
2 - Ground	Light control switch TAIL or HEAD	Battery Positive Voltage

If circuit is not as specified, inspect power source or wire harness.

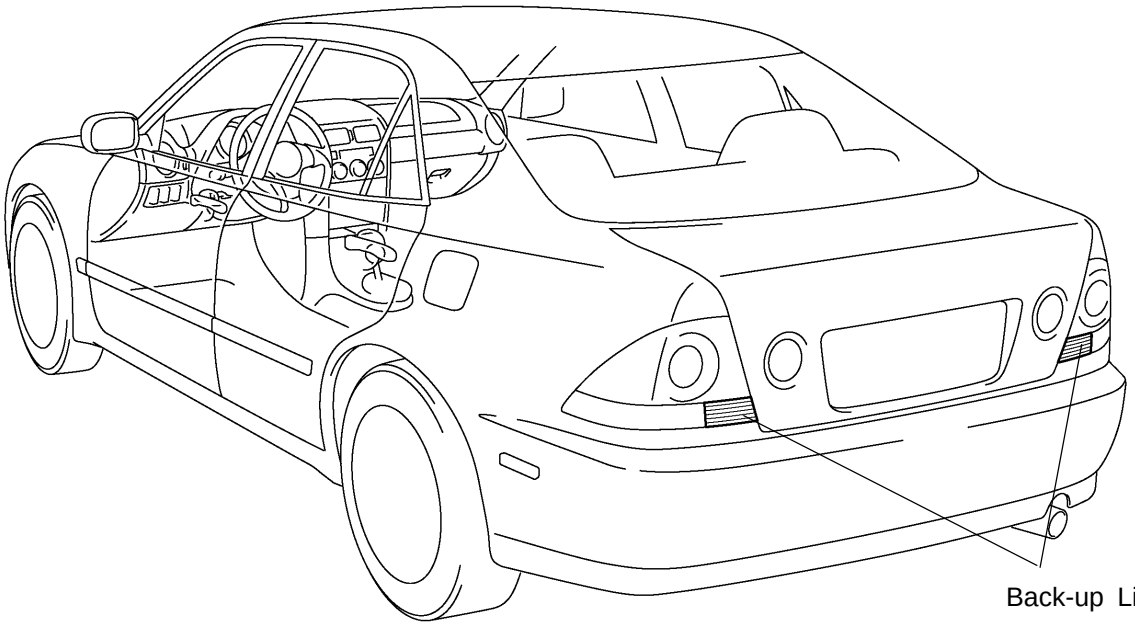
BACK-UP LIGHT SYSTEM

LOCATION

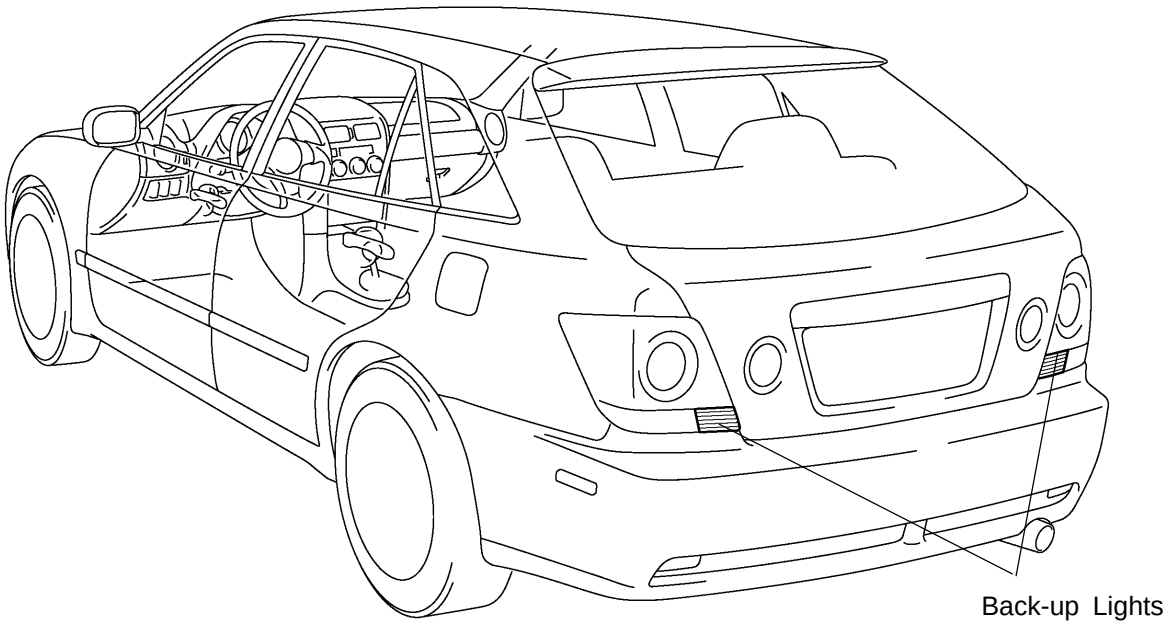
BE29X-03



Sedan:



Wagon:



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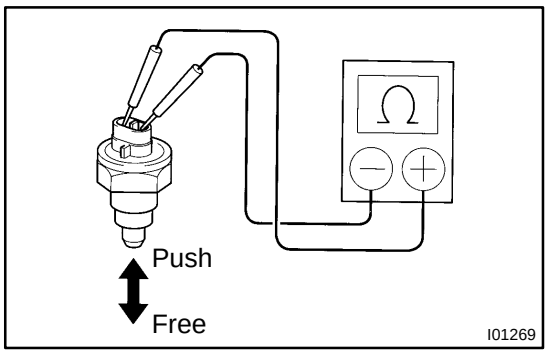
BE169-05



INSPECTION

1. INSPECT BACK- UP LIGHT SWITCH CONTINUITY (M/T)

Switch position	Specified condition
Push	Continuity
Free	No continuity

If continuity is not as specified, replace the switch.

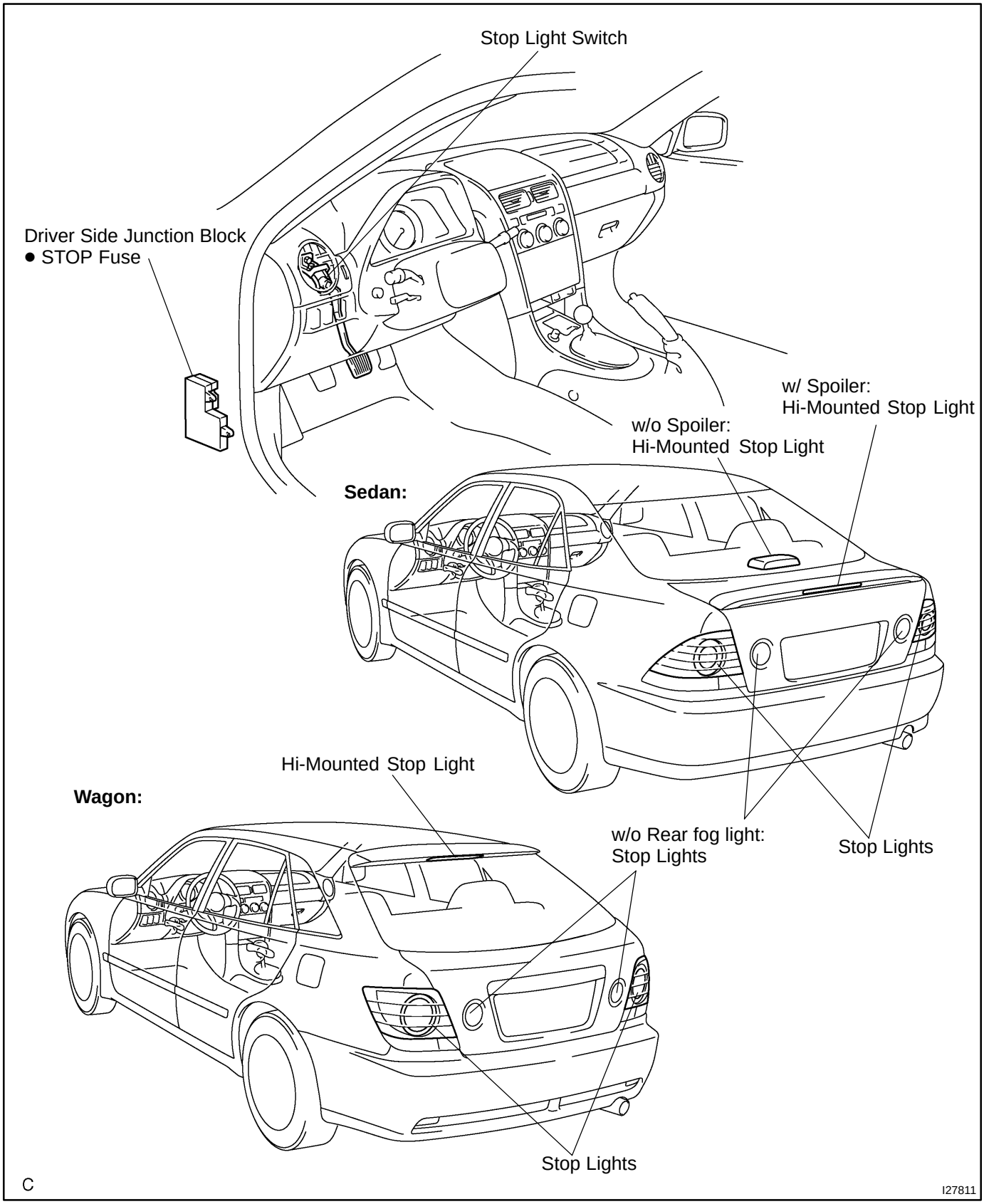
2. INSPECT PARK/NEUTRAL POSITION SWITCH CONTINUITY (A/T)

(See page DI-371)

STOP LIGHT SYSTEM

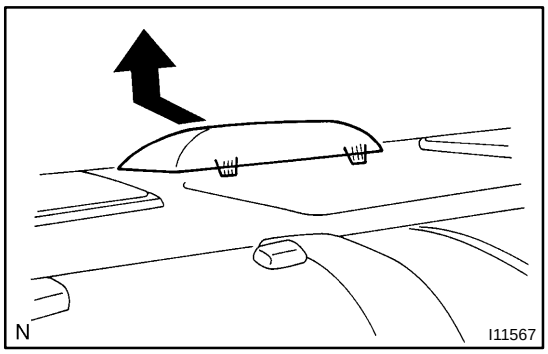
LOCATION

BE0H6-14



BE16A-04

REMOVAL



1. w/o Spoiler:
REMOVE HI-MOUNTED STOP LIGHT ASSEMBLY

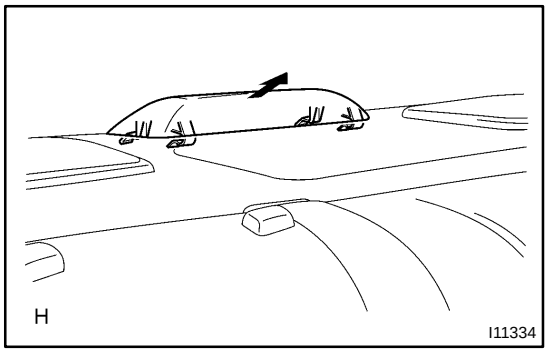
HINT:

Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.

(a) Insert the clip remover in the position as shown in the illustration, pull it upwards, and disconnect the engagement of the 2 front claws.

(b) Pull the center stop light assembly in the direction as shown in the illustration, and disconnect the engagement of 4 claws.

(c) Separate the connector, and remove the center stop light assembly.



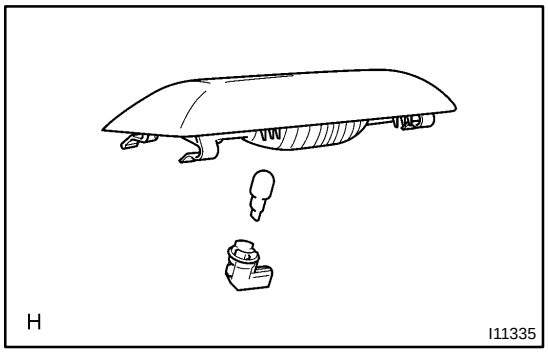
2. w/o Spoiler:
REMOVE HI-MOUNTED STOP LIGHT BULB

HINT:

Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.

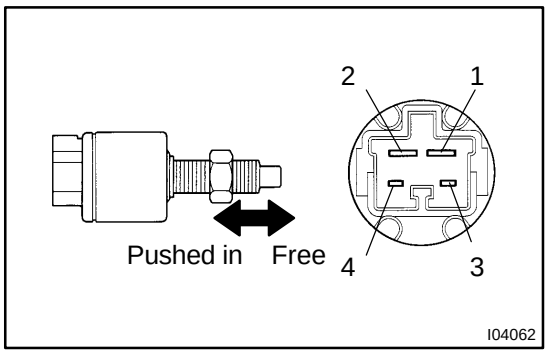
(a) Remove center stop light assembly.

(b) Remove the bulb sockets and bulbs.



BE29Y-03

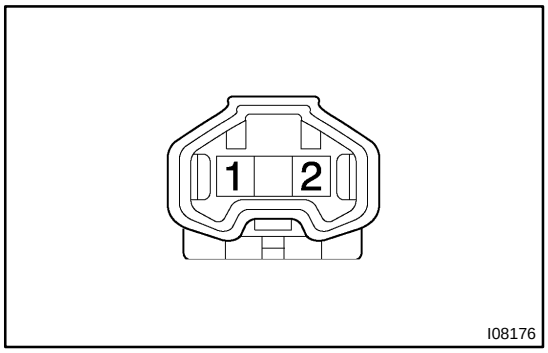
INSPECTION



1. INSPECT STOP LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Switch pin pushed in (Pedal released)	1 - 2	Continuity
Switch pin free (Pedal depressed)	1 - 2	No continuity
Switch pin free (Pedal depressed)	3 - 4	Continuity
Switch pin pushed in (Pedal released)	3 - 4	No continuity

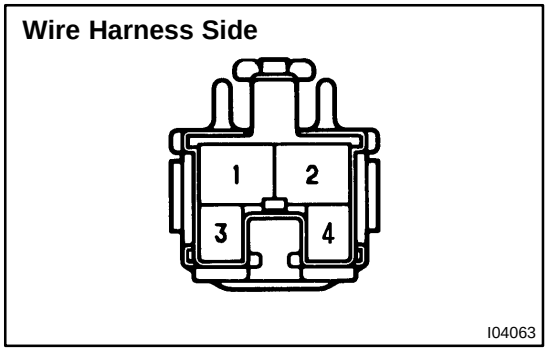
If continuity is not as specified, replace the switch.



2. w/ Spoiler: INSPECT HI- MOUNTED STOP LIGHT ASSEMBLY CONTINUITY

Using the ohmmeter, check that continuity exists between terminals.

If continuity is not as specified, replace the bulb or light assembly.



3. INSPECT STOP LIGHT SWITCH CIRCUIT

(See page DI-830)

Disconnect the connector from the switch and inspect the connector on the wire harness side, as shown.

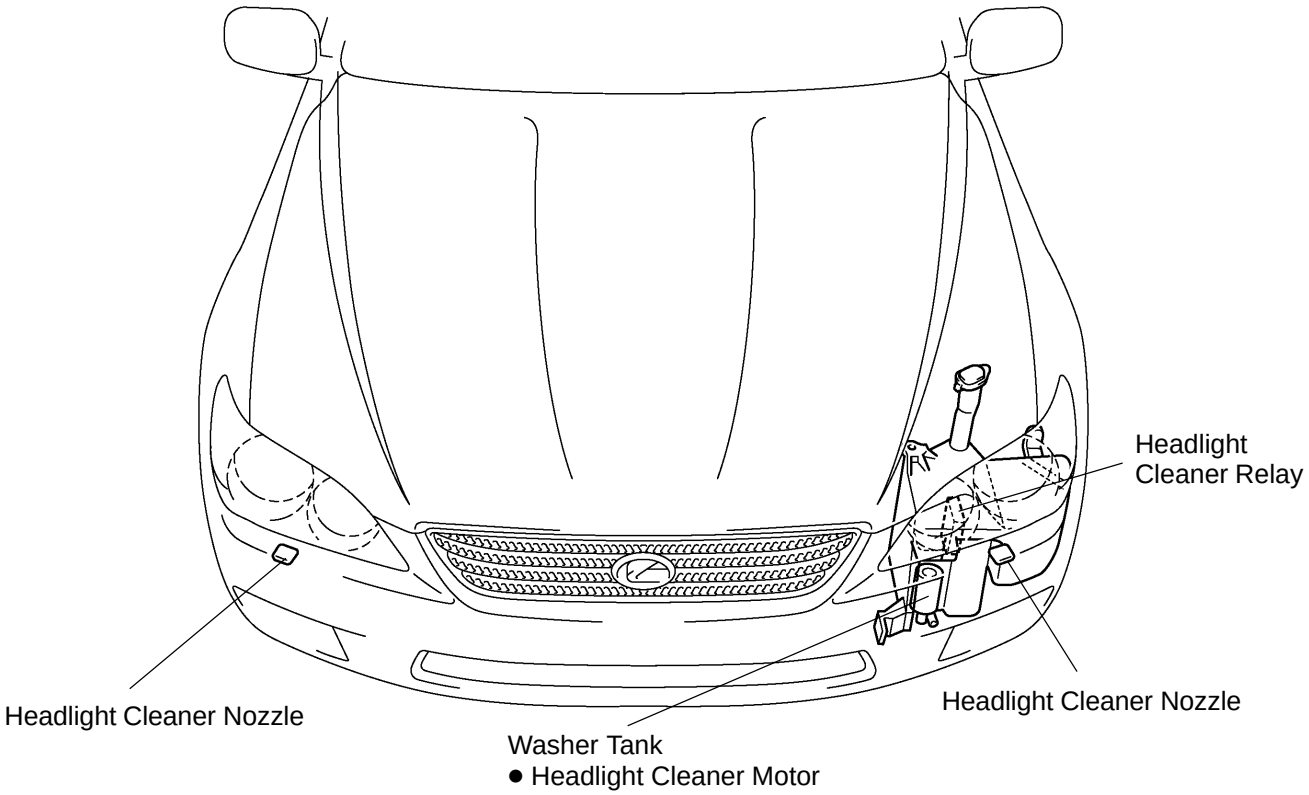
Tester connection	Condition	Specified condition
2 - Ground	Always	Battery Positive Voltage

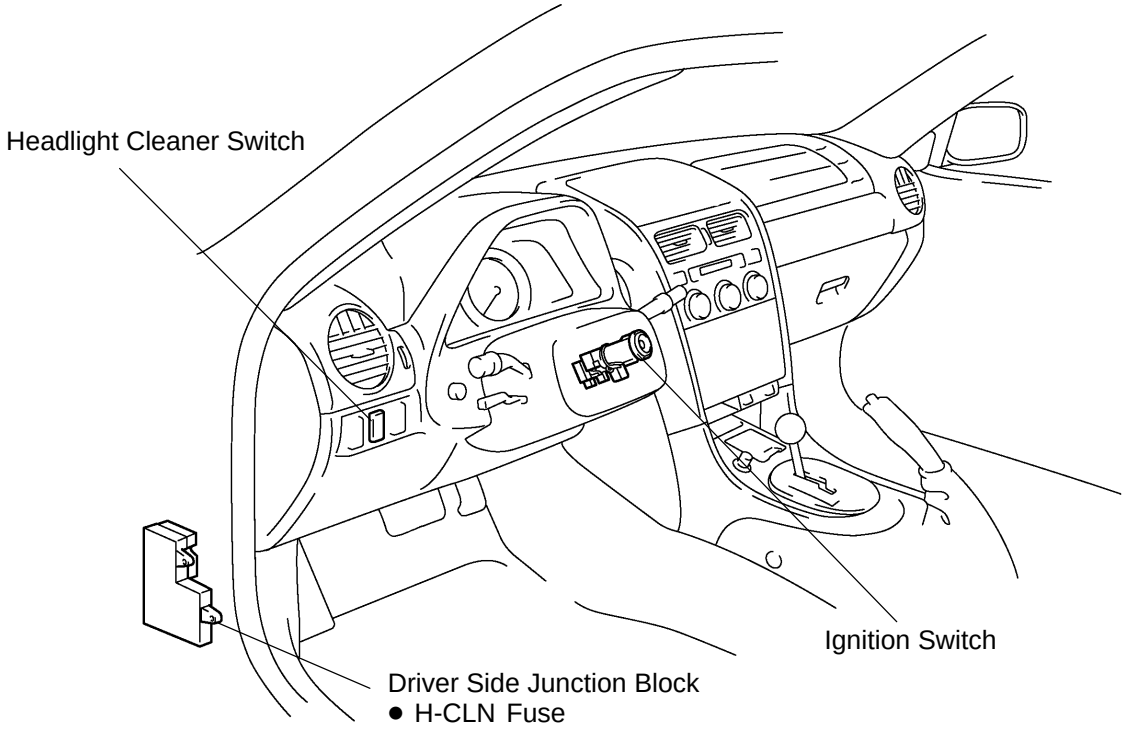
If circuit is not as specified, inspect the power source or wire harness.

HEADLIGHT CLEANER SYSTEM

LOCATION

BE023-13





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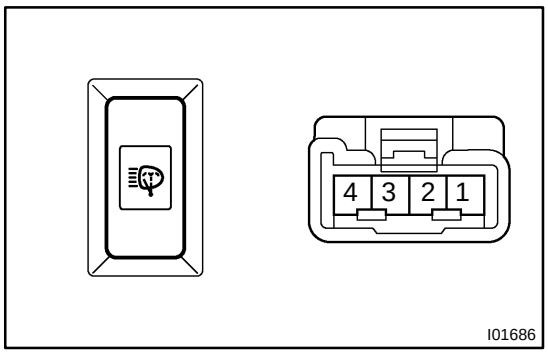
BE0HM-07

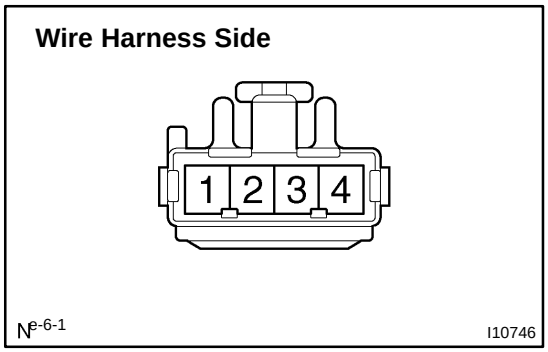
INSPECTION



1. INSPECT HEADLIGHT CLEANER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	-	No continuity
ON	1 - 4	Continuity
Illumination circuit	2 - 3	Continuity

If continuity is not as specified, replace the switch.

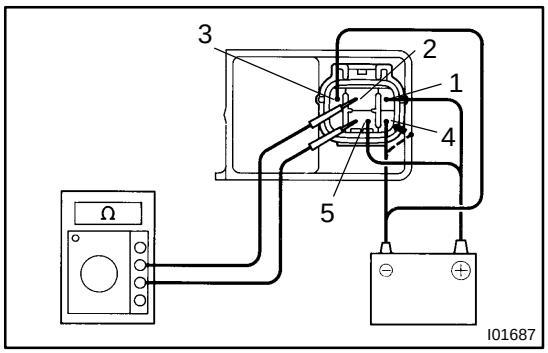


2. INSPECT HEADLIGHT CLEANER SWITCH CIRCUIT

Disconnect the switch connector and inspect the connector on wire harness side, as shown.

Tester connection	Condition	Specified condition
1 - Ground	Headlight ON	Continuity
1 - Ground	Headlight OFF	No continuity

If circuit is not as specified, inspect the circuits connected to other parts.



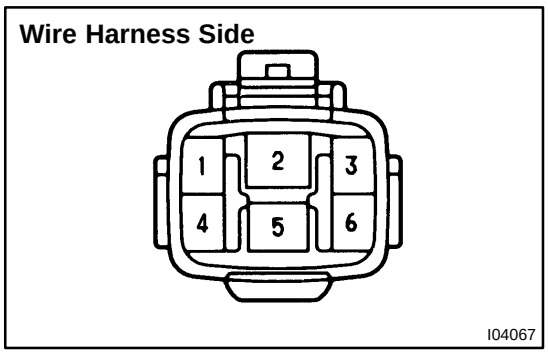
3. INSPECT HEADLIGHT CLEANER RELAY OPERATION

(a) Check that no continuity exists between terminals 2 and 5.

(b) Connect the positive (+) lead from the battery to terminals 1 and 5, and the negative (-) lead to terminal 3.

(c) Connect the negative (-) lead from the battery to terminal 4, and check that continuity exists between terminals 2 and 5 for 0.9 - 1.1 seconds, then no continuity exists.

If operation is not as specified, replace the motor.

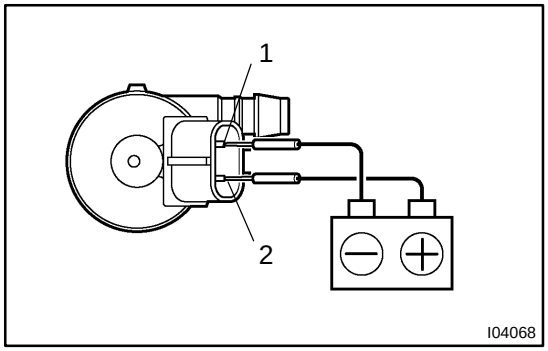


4. INSPECT HEADLIGHT CLEANER RELAY CIRCUIT

Disconnect the connector from the relay and inspect the connector on wire harness side, as shown.

Tester connection	Condition	Specified condition
2 - Ground 3 - Ground	Always	Continuity
4 - Ground	Ignition switch ON, light control switch in HEAD and cleaner switch OFF	No continuity
4 - Ground	Ignition switch ON, light control switch in HEAD and cleaner switch ON or daytime running light system operating	Continuity
1 - Ground	Ignition switch OFF or ACC	No voltage
1 - Ground	Ignition switch ON	Battery voltage
5 - Ground	Always	Battery voltage

If circuit is not as specified, inspect the circuits connected to other parts.



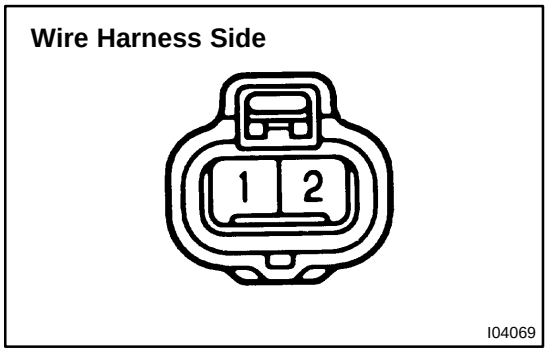
5. INSPECT HEADLIGHT CLEANER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1, check that the motor operates.

NOTICE:

These tests must be performed quickly (within 20 seconds) to prevent the coil from burning out.

If operation is not as specified, replace the motor.



6. INSPECT HEADLIGHT CLEANER MOTOR CIRCUIT

Disconnect the connector from the cleaner motor and inspect the connector on wire harness side, as shown.

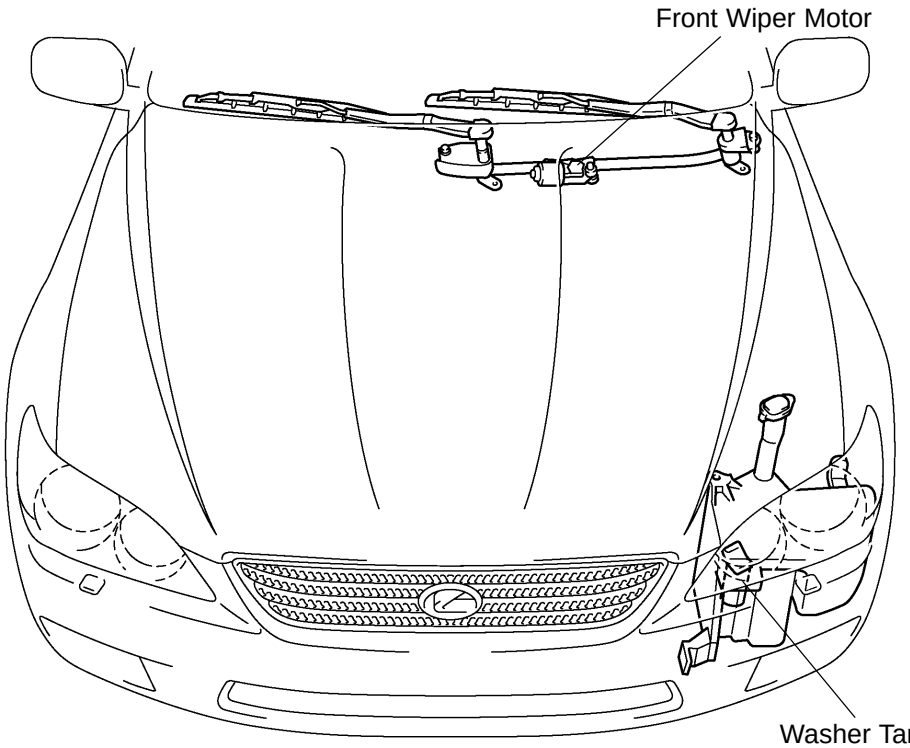
Tester connection	Condition	Specified condition
2 - Ground	Always	Continuity

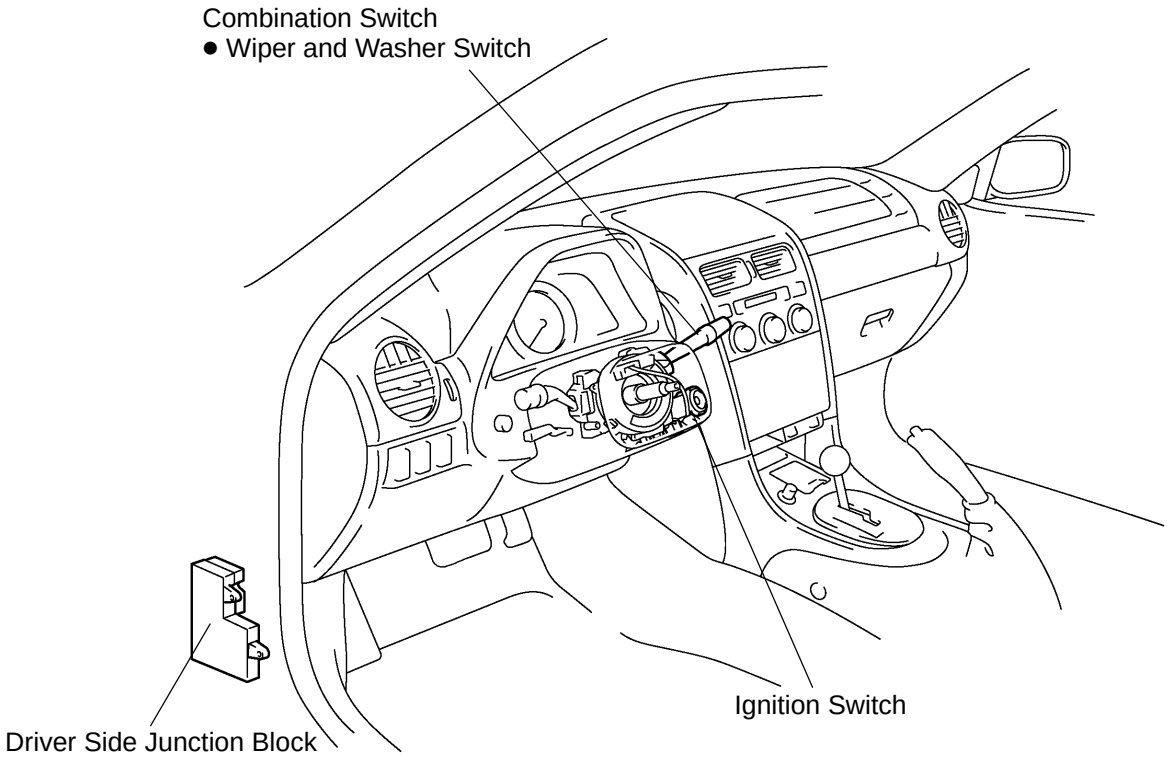
If circuit is not as specified, inspect the circuits connected to other parts.

WIPER AND WASHER SYSTEM

BE29Z-04

LOCATION





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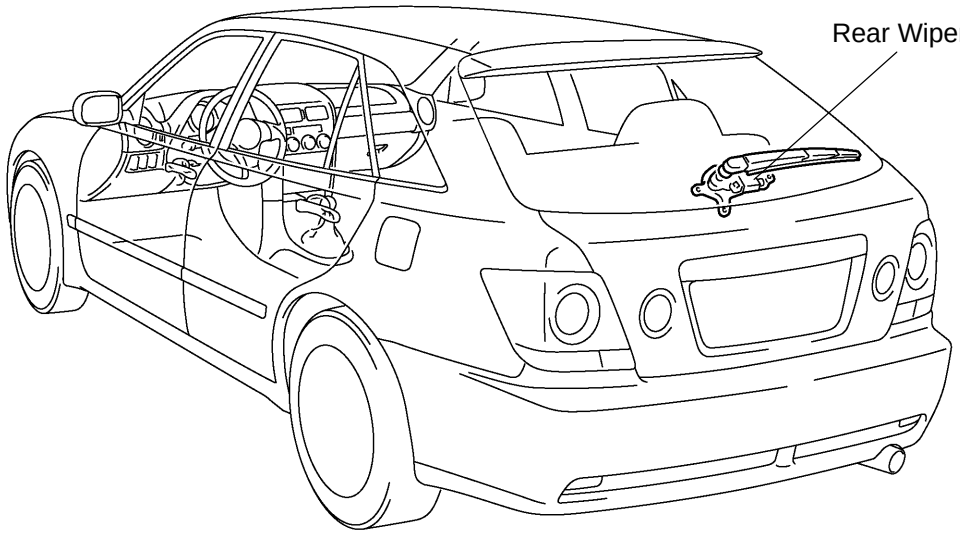
Wagon:



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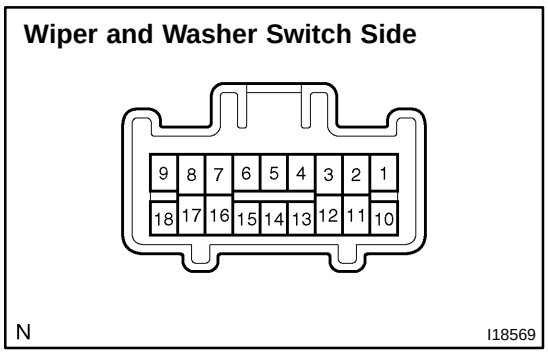
BE2MV-02



INSPECTION

1. INSPECT FRONT WIPER AND WASHER SWITCH CONTINUITY

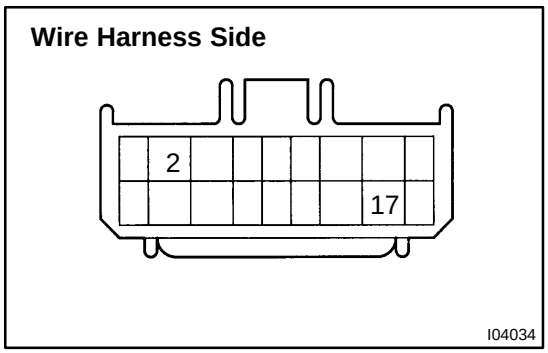
Switch position	Tester connection	Specified condition
OFF	7 - 16	Continuity
INT	7 - 16	Continuity
LO	7 - 17	Continuity
HI	8 - 17	Continuity
Washer OFF	-	No continuity
Washer ON	2 - 11	Continuity

If continuity is not as specified, replace the switch.

2. INSPECT REAR WIPER AND WASHER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	-	Continuity
INT	2 - 13	Continuity
ON	2 - 10	Continuity
Washer OFF	-	No continuity
Washer ON	2 - 12	Continuity

If continuity is not as specified, replace the switch.

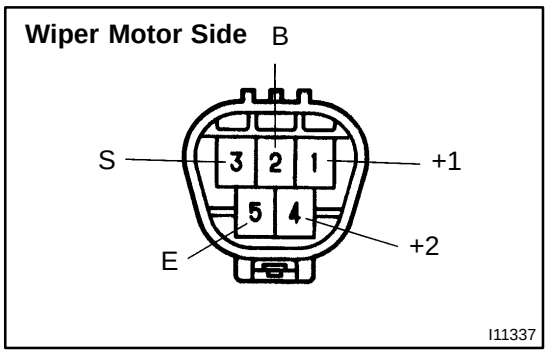


3. Connector disconnected: INSPECT WIPER AND WASHER SWITCH CIRCUIT

Disconnect the connector from the motor and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
2 - Ground	Always	Continuity
17 - Ground	Ignition switch LOCK or ACC	No voltage
17 - Ground	Ignition switch ON	Battery Positive Voltage

If circuit is not as specified, inspect the circuits connected to other parts.



4. Low speed:
INSPECT FRONT WIPER MOTOR OPERATION

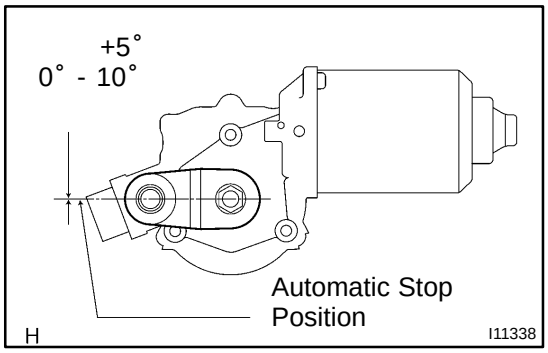
Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 5, check that the motor operates at low speed.

If operation is not as specified, replace the motor.

5. High speed:
INSPECT FRONT WIPER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 4 and the negative (-) lead to terminal 5, check that the motor operates at high speed.

If operation is not as specified, replace the motor.



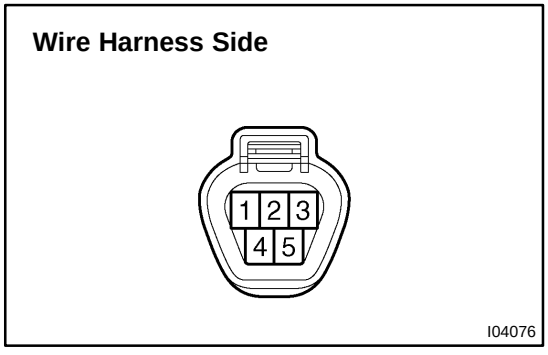
6. Stopping at stop position:
INSPECT FRONT WIPER MOTOR OPERATION

(a) Operate the motor at low speed and stop the motor operation anywhere except at the stop position by disconnecting positive (+) lead from terminal 1.

(b) Connect terminals 1 and 3.

(c) Connect the positive (+) lead from the battery to terminal 2 and negative (-) lead to terminal 5, check that the motor stops running at the stop position after the motor operates again.

If operation is not as specified, replace the motor.

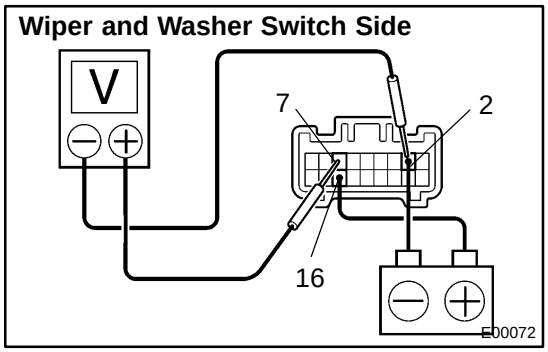


7. Connector disconnected:
INSPECT FRONT WIPER MOTOR CIRCUIT

Disconnect the connector from the motor and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
4 - Ground	Always	Continuity
2 - Ground	Ignition switch LOCK or ACC	No voltage
2 - Ground	Ignition switch ON	Battery Positive Voltage

If circuit is not as specified, inspect the circuits connected to other parts.

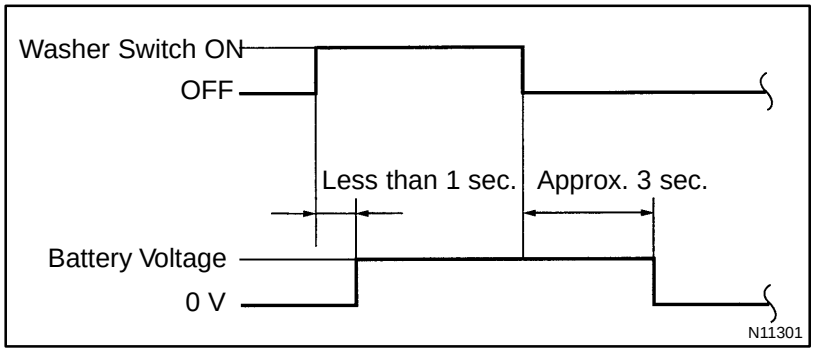


8. INSPECT FRONT WASHER LINKED OPERATION

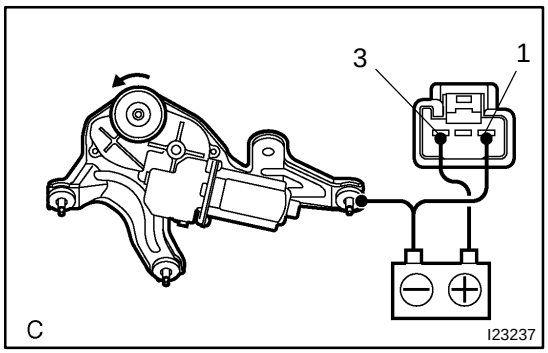
(a) Connect the positive (+) lead from the battery to terminal 16 and the negative (-) lead to terminal 2.

(b) Connect the positive (+) lead from the voltmeter to terminal 7 and the negative (-) lead to terminal 2.

(c) Push in the washer switch, and check that the voltage changes as shown in the table.

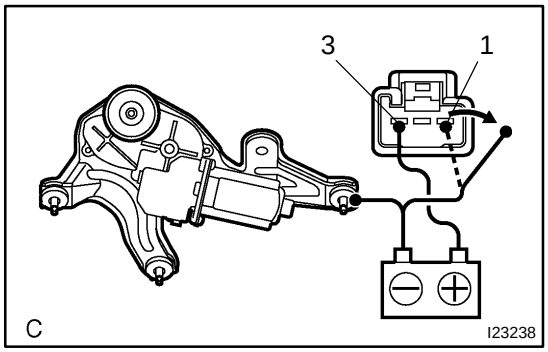


If operation is not as specified, replace the wiper and washer switch.



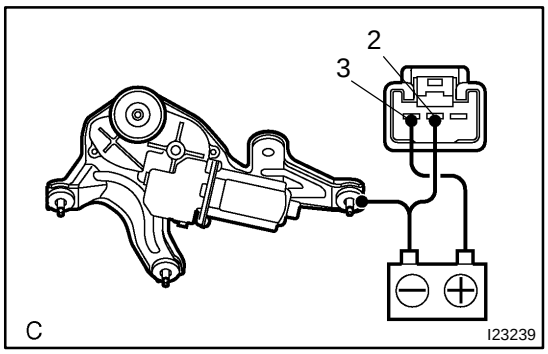
9. INSPECT REAR WIPER MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 3 and negative (-) lead to terminal 1 and the motor body, check that the motor operates.



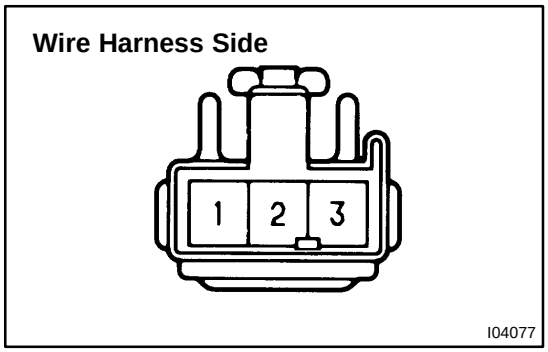
(b) Disconnect the negative (-) lead from terminal 1, check that the motor stops running at the stop position.

If operation is not as specified, replace the motor.



10. Intermittent:
INSPECT REAR WIPER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 2 and the motor body, check that the motor operates intermittently for 9-15 seconds.
If operation is not as specified, replace the motor.



11. Connector disconnected:
INSPECT REAR WIPER MOTOR CIRCUIT

Disconnect the connector from the motor and inspect the connector on the wire harness side, as shown.

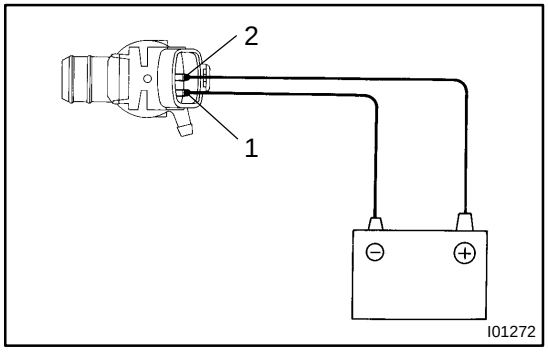
Tester connection	Condition	Specified condition
1 - Ground	Always	Continuity
2 - Ground	Always	Continuity
3 - Ground	Ignition switch OFF or ACC	No voltage
3 - Ground	Ignition switch ON	Battery positive voltage

If circuit is not as specified, inspect the circuits connected to other parts.

12. Wagon:
INSPECT REAR WASHER LINKED OPERATION

Make sure that the rear wiper operates simultaneously with the washer when the rear washer switch is turned ON.

- If the rear wiper does not operates, inspect the rear wiper motor.
- If washer fluid dose not come out, inspect the washer motor.
- If necessary, replace the wiper and washer switch.



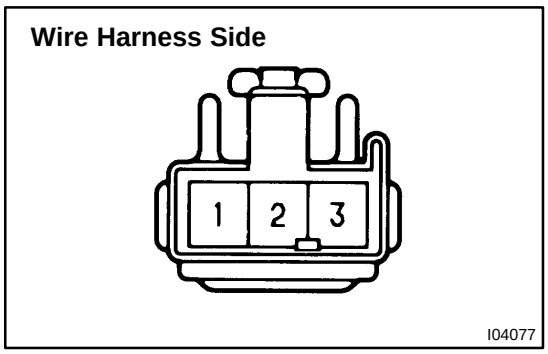
13. Sedan:
INSPECT WASHER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1, check that the motor operates.

NOTICE:

These tests must be performed quickly (within 20 seconds) to prevent the coil from burning out.

If operation is not as specified, replace the motor.

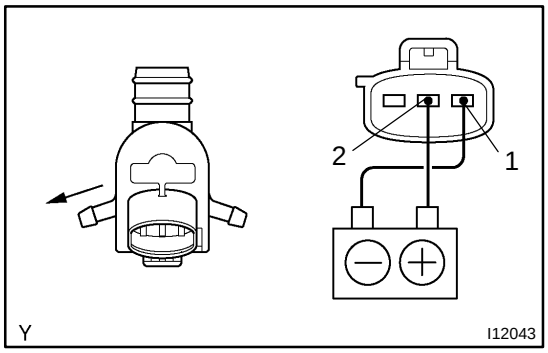


14. Sedan, Connector disconnected:
INSPECT FRONT WASHER MOTOR CIRCUIT

Disconnect the connector from the motor and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
2 - Ground	Ignition switch ON	Battery Positive Voltage

If circuit is not as specified, inspect the power source, wire harness and wiper switch.



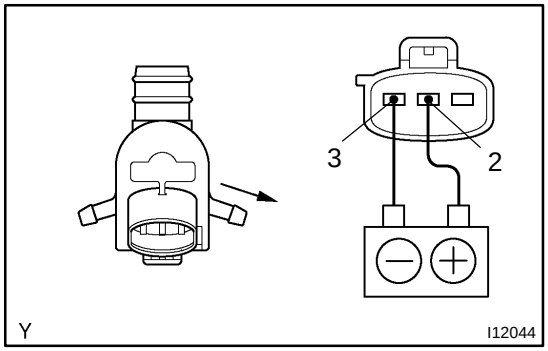
15. Wagon:
INSPECT FRONT WASHER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1, check that the motor operates.

NOTICE:

These tests must be performed quickly (within 20 seconds) to prevent the coil from burning out.

If operation is not as specified, replace the motor.



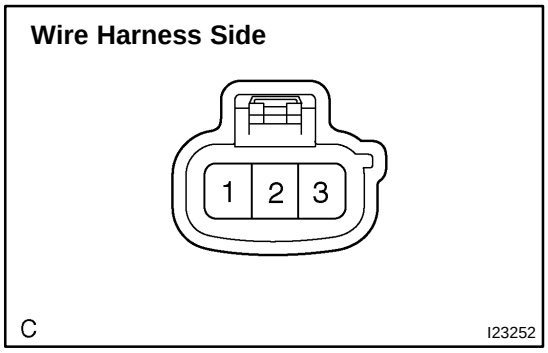
16. INSPECT REAR WASHER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 3, check that the motor operates.

NOTICE:

These tests must be performed quickly (within 20 seconds) to prevent the coil from burning out.

If operation is not as specified, replace the motor.



17. Wagon, Connector disconnected:
INSPECT WASHER MOTOR CIRCUIT

Disconnect the connector from the motor and inspect the connector on the wire harness side, as shown.

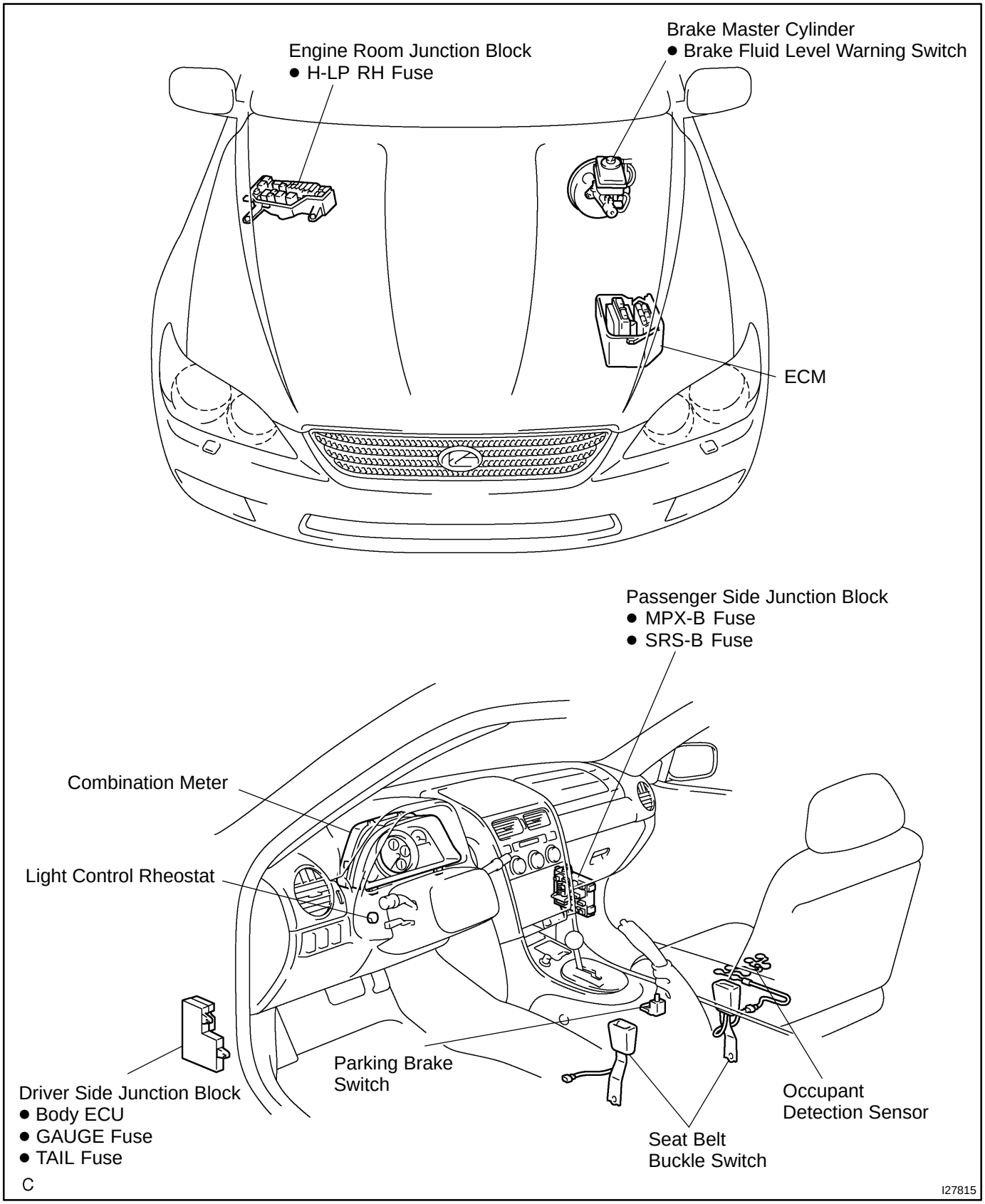
Tester connection	Condition	Specified condition
2 - Ground	Ignition switch ON	Battery positive voltage

If circuit is not as specified, inspect the power source, wire harness and wiper switch.

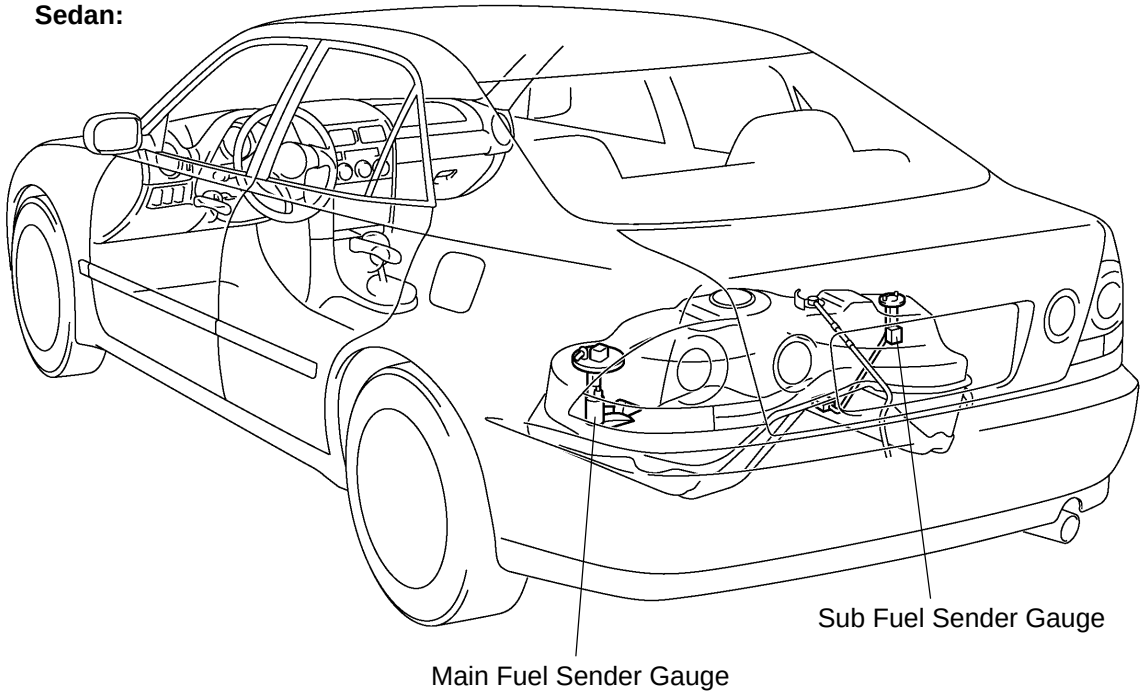
COMBINATION METER

LOCATION

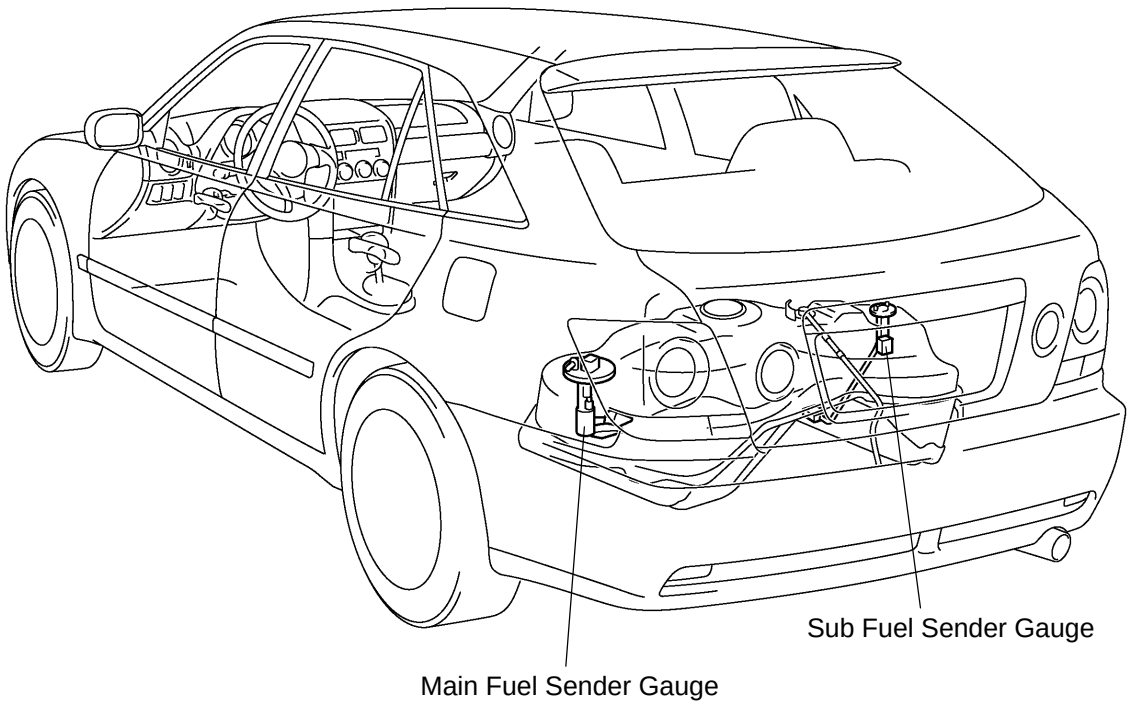
BE2A1-03



Sedan:



Wagon:



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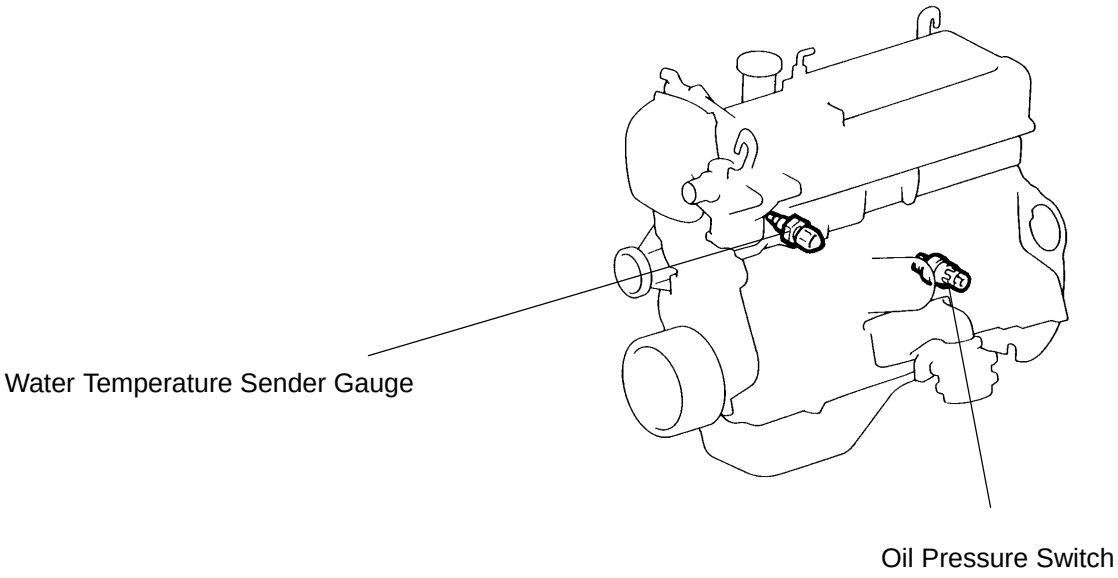
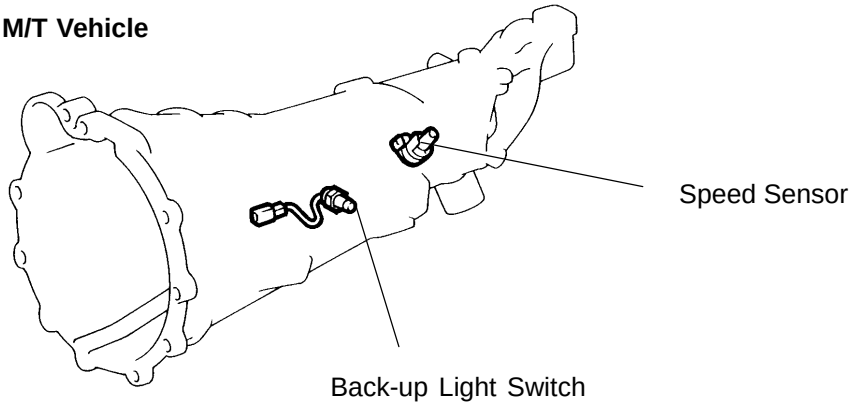
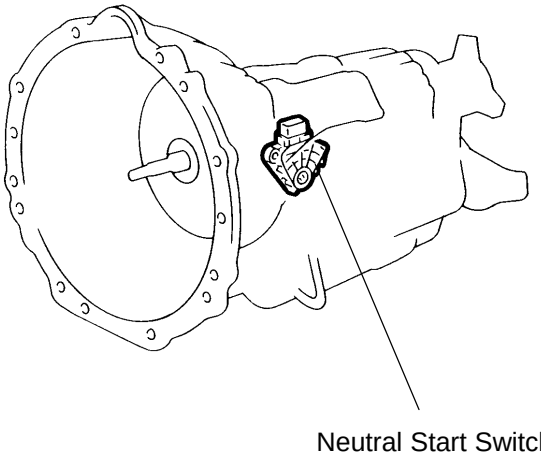


M/T Vehicle



A/T Vehicle



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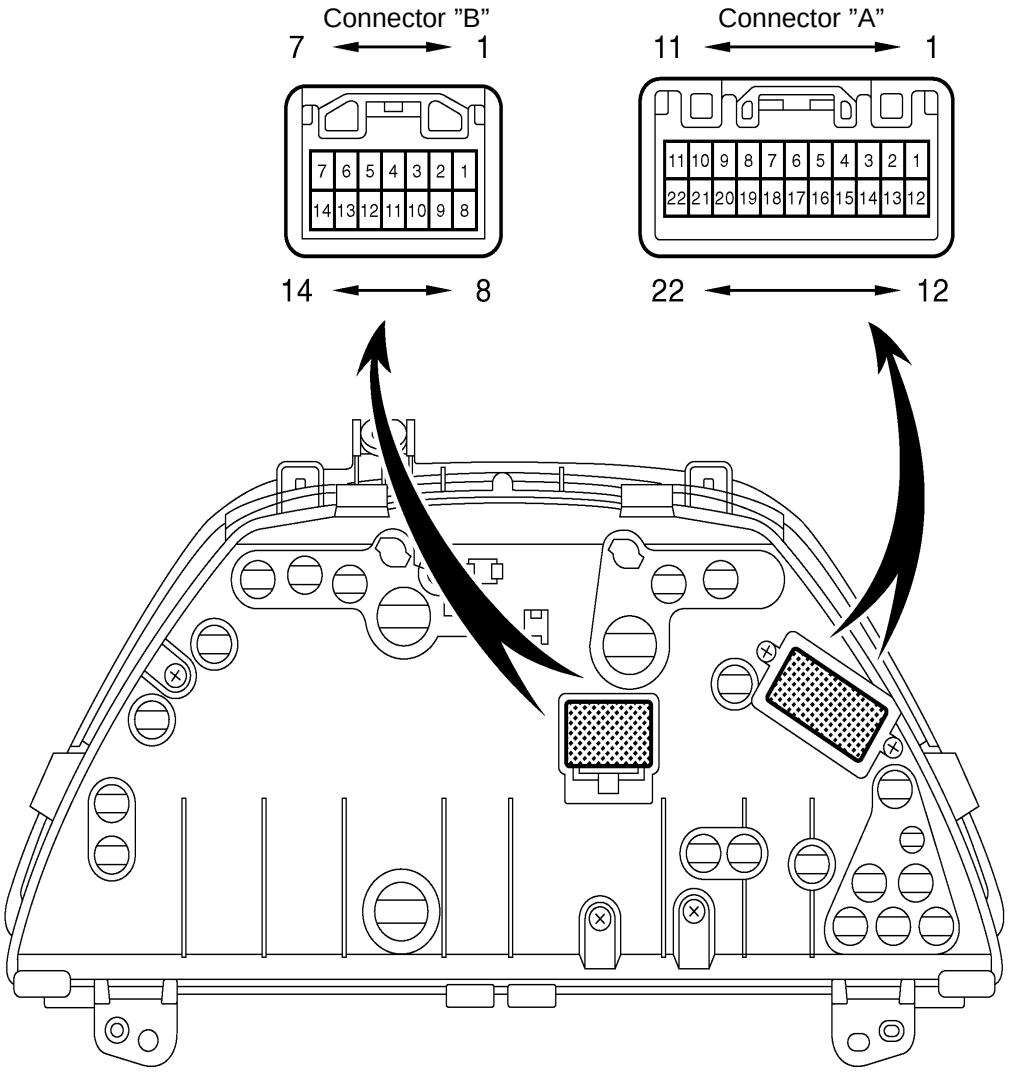
BE16C-04

CIRCUIT



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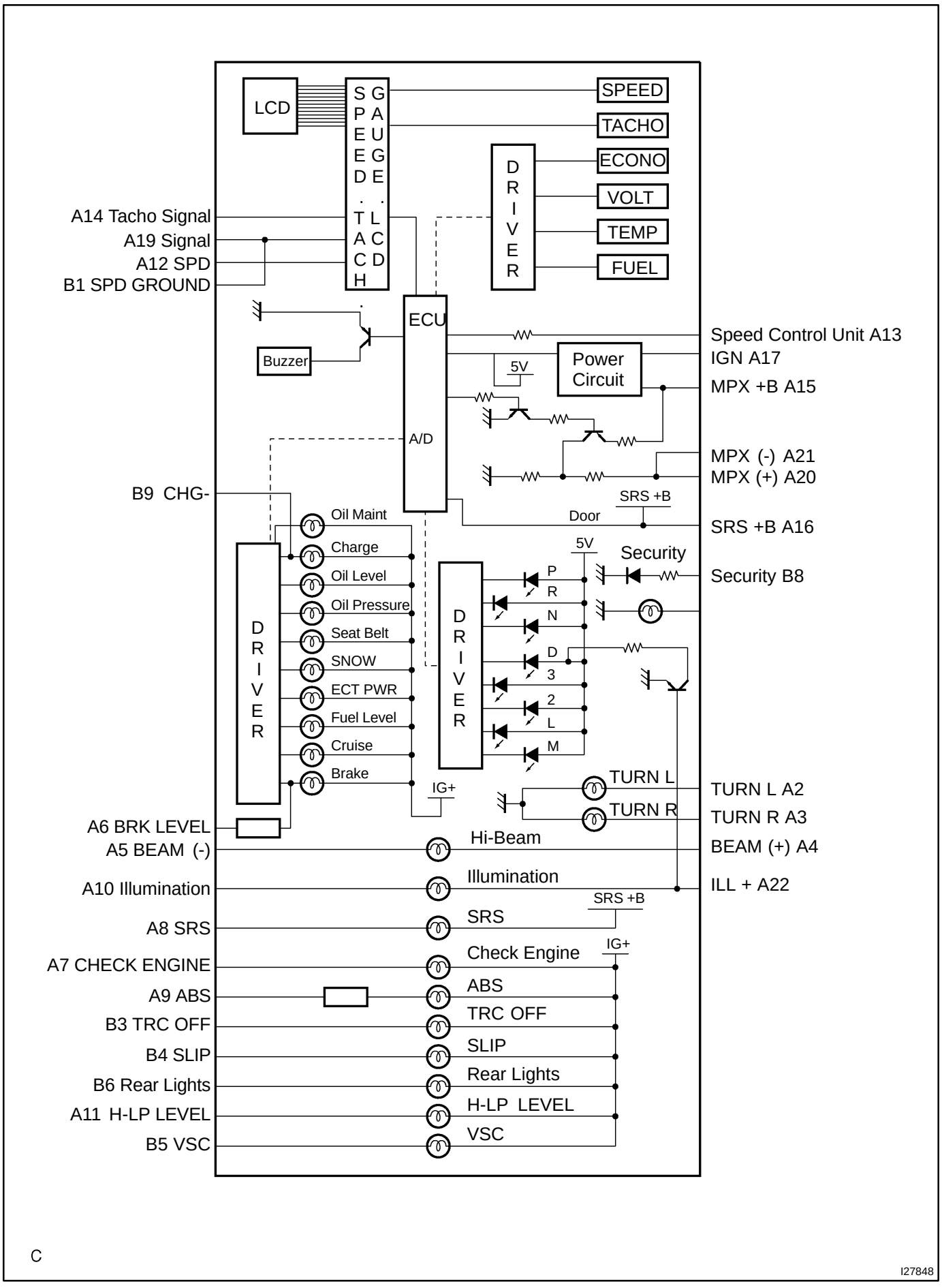
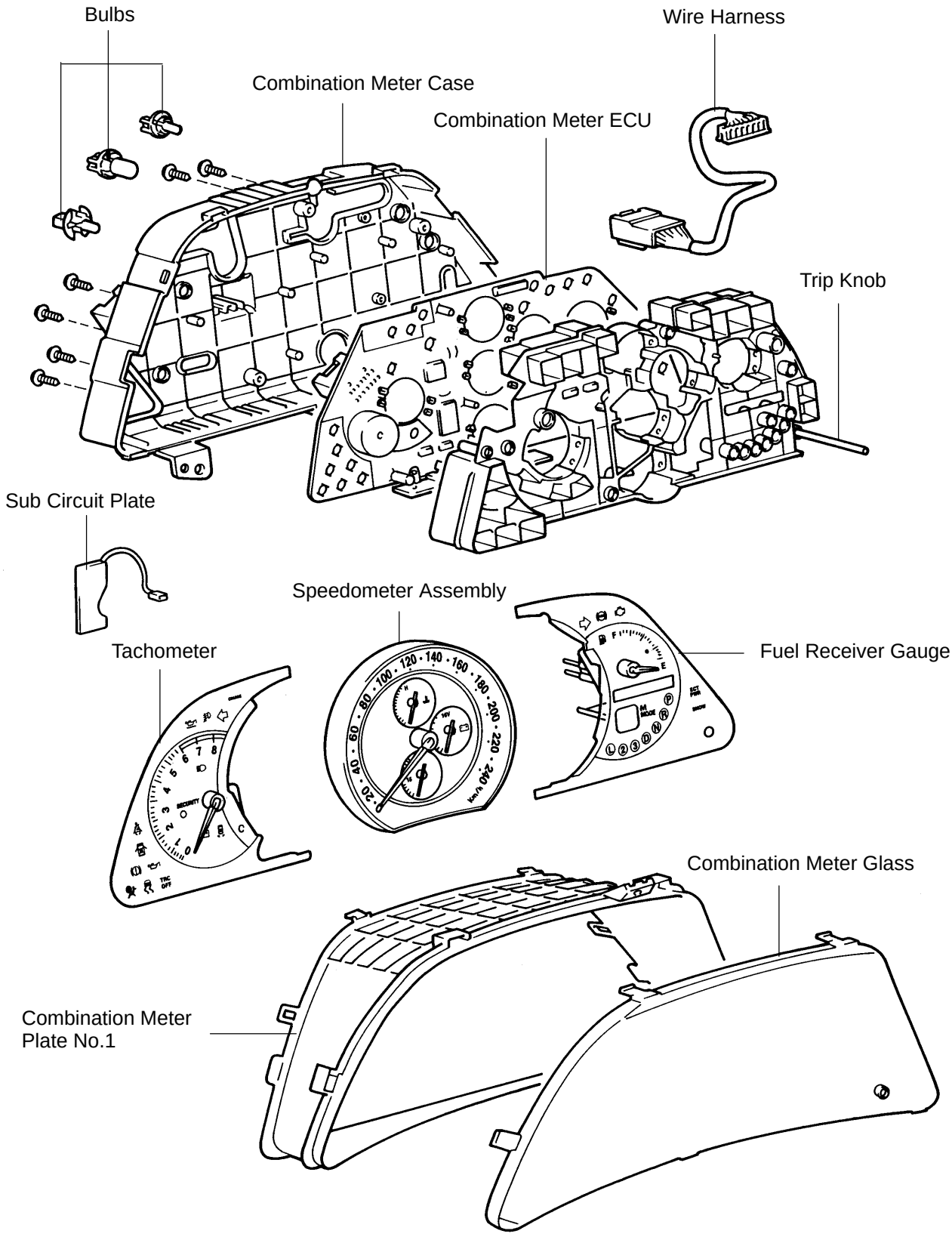
I18580


LCD
SPEED. TACH
GAUGE. LCD
SPEED
TACHO
ECONO
VOLT
TEMP
FUEL
DRIVER
A14 Tacho Signal
A19 Signal
A12 SPD
B1 SPD GROUND
ECU
A/D
Buzzer
5V
Power Circuit
Speed Control Unit A13
IGN A17
MPX +B A15
MPX (-) A21
MPX (+) A20
B9 CHG-
SRS +B
Door
SRS +B A16
Oil Maint
Charge
Oil Level
Oil Pressure
Seat Belt
SNOW
ECT PWR
Fuel Level
Cruise
Brake
DRIVER
DRIVER
5V
Security
Security B8
P
R
N
D
3
2
L
M
IG+
TURN L
TURN R
TURN L A2
TURN R A3
A6 BRK LEVEL
A5 BEAM (-)
Hi-Beam
BEAM (+) A4
A10 Illumination
Illumination
ILL + A22
SRS +B
A8 SRS
SRS
IG+
A7 CHECK ENGINE
Check Engine
A9 ABS
ABS
B3 TRC OFF
TRC OFF
B4 SLIP
SLIP
B6 Rear Lights
Rear Lights
A11 H-LP LEVEL
H-LP LEVEL
B5 VSC
VSC
C
I27848

No.		Wiring connector side
A	2	Turn signal light switch (Left)
	3	Turn signal light switch (Right)
	4	HEAD Fuse
	5	Headlight dimmer switch
	6	Brake fluid level warning switch
	7	ECM
	8	Airbag sensor assembly
	9	ABS ECU
	10	Rheostat light control volume
	11	Headlight beam level control ECU
	12	Speed sensor (M/T) or ABS ECU (A/T)
	13	Speed control unit
	14	ECM
	15	MPX+B Fuse
	16	SRS+B Fuse
	17	GAUGE Fuse
	18	Power ground
	19	Signal ground
	20	Multiplex communication circuit (MPX+)
	21	Multiplex communication circuit (MPX-)
	22	TAIL Fuse
B	1	Speed signal ground (M/T vehicle only)
	3	ABS and TRC ECU
	4	ABS and TRC ECU
	5	ABS and TRC ECU (w/ VSC)
	6	Light failure sensor
	8	Theft deterrent ECU
	9	Daytime running light ECU

BE0HJ-13

COMPONENTS



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I18579

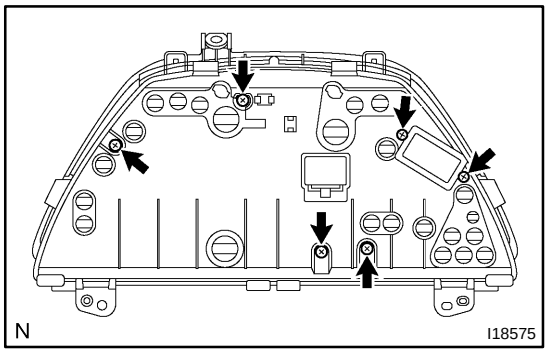
BE16D-04

DISASSEMBLY

HINT:

Installation is in the reverse order of removal. Only if there is a specified procedure for installation it is shown.

1. **REMOVE INSTRUMENT PANEL LWR**
   (See page BO-135)
2. **REMOVE INSTRUMENT CLUSTER FINISH PANEL**
3. **REMOVE COMBINATION METER ASSEMBLY**
4. **REMOVE COMBINATION METER GLASS**
5. **REMOVE COMBINATION METER PLATE NO. 1**

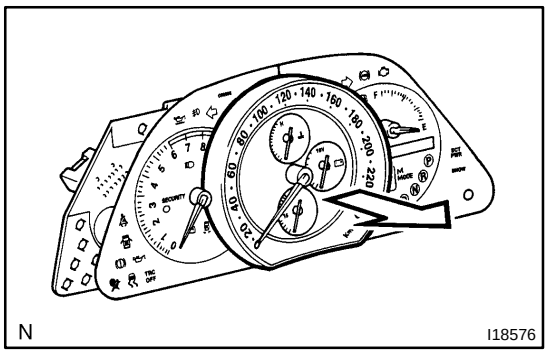


6. **REMOVE COMBINATION METER CASE**

(a) Separate the wire harness connector at the upper side of the combination meter assembly from the combination meter computer.

(b) Remove the 6 screws as shown in the illustration, and remove the combination meter.

7. **REMOVE THE WIRE HARNESS**



8. **REMOVE SPEEDOMETER ASSEMBLY**

Pull the speed meter assembly in the direction indicated by the arrow in the illustration and disconnect the engagement of the combination meter computer assembly to remove the speed meter assembly.

NOTICE:

Use gloves so as not to scratch or stain the panel surface.
Do not apply unnatural force.

9. **REMOVE ENGINE TACHO METER ASSEMBLY**

HINT:

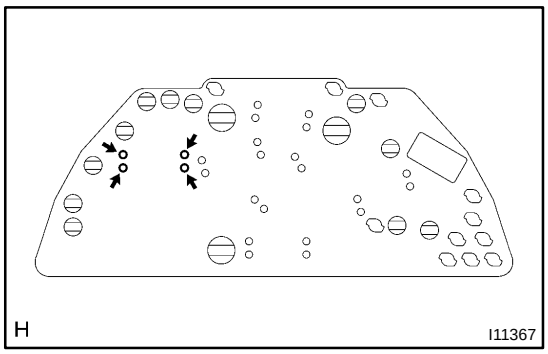
Remove it in the same procedure as for the speed meter assembly.

10. **REMOVE FUEL RECEIVER GAUGE.**

HINT:

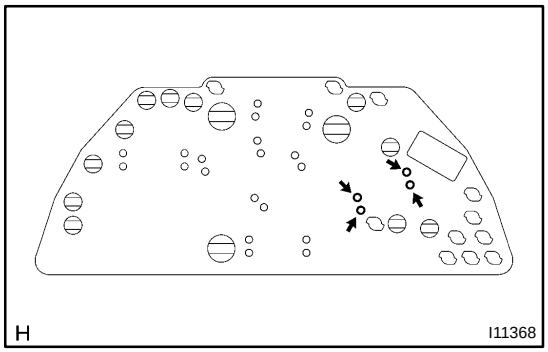
Remove it in the same procedure as for the speed meter assembly.

11. **REMOVE TRIP KNOB**
12. **REMOVE COMBINATION METER COMPUTER ASSEMBLY**



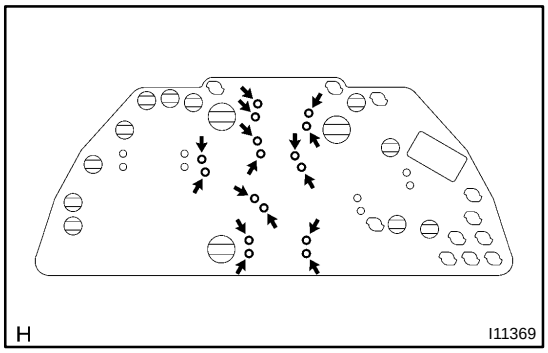
13. INSTALL FUEL RECEIVER GAUGE

Install the fuel receiver gauge to the combination meter computer assembly, and check that the gauge terminal shown in the illustration are fitted in securely.



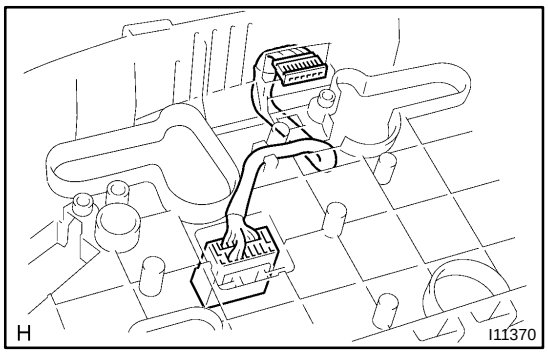
14. INSTALL ENGINE TACHO METER ASSEMBLY

Install the engine tacho meter assembly to the combination meter computer assembly, and check that the gauge terminals shown in the illustration are fitted in securely.



15. INSTALL SPEEDOMETER ASSEMBLY

Install the speedometer assembly to the combination meter computer assembly, and check that the gauge terminals shown in the illustration are fitted in securely.



16. INSTALL WIRE HARNESS

Route the wire harness as shown in the illustration and install it to the combination meter case.

BE1WU-04

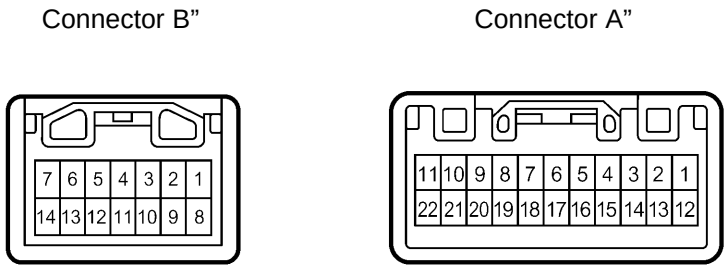
INSPECTION

1. INSPECT COMBINATION METER CIRCUIT

Connector connected:

Connect connector ”A” and ”B” from the combination meter and inspect the connectors on the wire harness side as shown in the table.

Connector connected



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Tester connection	Condition	Specified condition
A2 - Ground (Turn L)	Ignition switch ON and turn signal switch Left	Battery voltage
A3 - Ground (Turn R)	Ignition switch ON and turn signal switch Right	Battery voltage
A4 - Ground (Beam +)	Always	Battery voltage
A5 - Ground (Beam -)	Headlight dimmer switch HI	Battery voltage
A6 - Ground (BRK level)	Ignition switch ON and Brake fluid level warning switch LO	Battery voltage
A7 - Ground (Check engine)	Ignition switch ON and engine running	Battery voltage
A8 - Ground (SRS)	SRS warning light does not light up	Battery voltage
A9 - Ground (ABS)	Ignition switch ON and ABS warning does not lights up	Battery voltage
A10 - Ground (ILL-)	Light control switch TAIL or HEAD	Continuity
A11 - Ground (Headlight beam level)	Headlight beam level control system is operation	Battery voltage
A12 - Ground (Speed signal input)	Ignition switch ON and turn propeller shaft slowly	Battery voltage
A13 - Ground (Speed signal output)	Ignition switch ON and turn propeller shaft slowly	1 V to 4.5 - 5.5 V
A14 - Ground (Tachometer signal)	Engine running	Pulse generation *1
A15 - Ground (MPX +B)	Always	Battery voltage

A16 - Ground (DOME +B)	Always	Battery voltage
A17 - Ground (IGN)	Ignition switch ON	Battery voltage
A18 - Ground (Power ground)	Always	Continuity
A19 - Ground (Signal ground)	Always	Continuity
A20 - Ground (MPX+)	Ignition switch ON	Pulse generation
A21 - Ground (MPX-)	Ignition switch ON	Pulse generation
A22 - Ground (ILL+)	Light control switch TAIL or HEAD	Battery voltage
B1 - Ground (SP ground)	Always	Continuity
B3 - Ground (TRC OFF)	Ignition switch ON and TRC OFF indicator does not light up	Battery voltage
B4 - Ground (SLIP)	Ignition switch ON and SLIP indicator does not light up	Battery voltage
B5 - Ground (VSC)	Ignition switch ON and VSC indicator does not light up	Battery voltage
B6 - Ground (Rear Lights)	Ignition Switch ON and rear lights bulb is blown	Battery voltage
B8 - Ground (Security)	Theft deterrent system is operating	Battery voltage
B9 - Ground (Alternator L terminal)	Engine running	Battery voltage

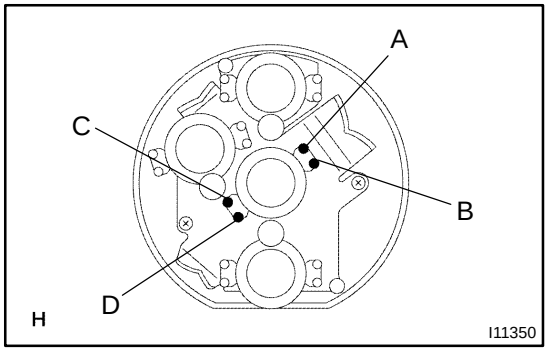
If circuit is not as specified, wiring diagram and inspect the circuits connected to other parts.

2. INSPECT SPEEDOMETER/ON-VEHICLE

Using a speedometer tester, inspect the speedometer for allowable indication error and check the operation of the odometer.
HINT:
Tire wear and tire over or under inflation will increase the indication error.

USA (mph)		CANADA (km/h)	
Standard indication	Allowable range	Standard indication	Allowable range
20	18.5 - 21.5	20	18 - 23
40	38 - 41.5	40	40 - 44
60	58 - 62	60	60 - 64.5
80	77.5 - 82	80	80 - 85
100	97 - 102	100	100 - 105
120	116.5 - 122	120	120 - 125.5
140	136 - 142	140	140 - 146
		160	160 - 167
		180	180 - 188
		200	200 - 209
		220	220 - 230
		240	240 - 251

If error is excessive, replace the speedometer.



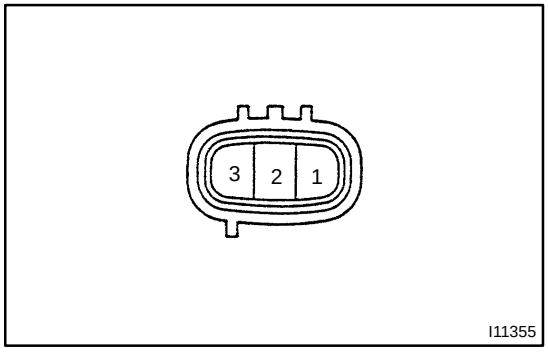
3. INSPECT SPEEDOMETER RESISTANCE

(See page DI-877)

Measure the resistance between terminals with fixing pointer to the stopper.

Tester connection	Resistance (Ω)
A - D	160
B - C	160

If resistance value is not as the specified, replace the meter.



4. INSPECT VEHICLE SPEED SENSOR OPERATION

(See page DI-885)

(a) Connect the positive (+) lead from battery to terminal 1 and negative (-) lead to terminal 2.
(b) Connect the positive (+) lead from tester to terminal 3 and negative (-) lead to terminal 2.
(c) Rotate shaft.
(d) Check that there is a voltage change from approx. 0 V to 11 V or more between terminals 2 and 3.

HINT:
The voltage change should be 4 times for every revolution of the speed sensor shaft.
If operation is not as specified, replace the sensor.

5. INSPECT TACHOMETER/ON-VEHICLE

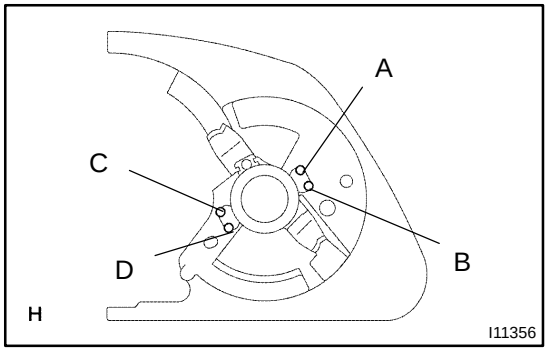
(a) Connect a tune-up test tachometer, and start the engine.

NOTICE:

- **Reversing the connection of the tachometer will damage the transistors and diodes inside.**
- **When removing or installing the tachometer, be careful not to drop or subject it to heavy shocks.**

(b) Compare the tester and tachometer indications.
DC 13.5 V 25 ˚C at (77˚F)

Standard indication	Allowable range
700	630 - 770
1,000	(900 - 1,100)
2,000	(1,850 - 2,150)
3,000	2,850 - 3,150
4,000	(3,800 - 4,200)
5,000	4,800 - 5,200
6,000	(5,750 - 6,250)
7,000	6,700 - 7,300
8,000	7,700 - 8,300

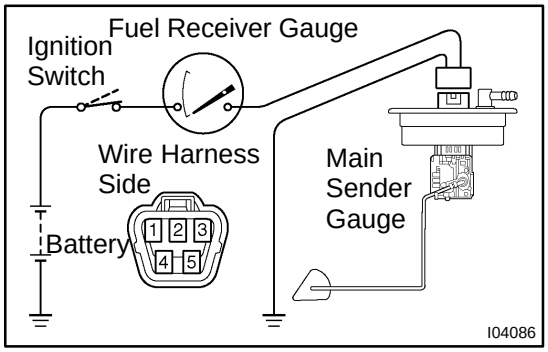


6. INSPECT TACHOMETER RESISTANCE
(See page DI-878)

Measure the resistance between terminals with fixing pointer to the stopper.

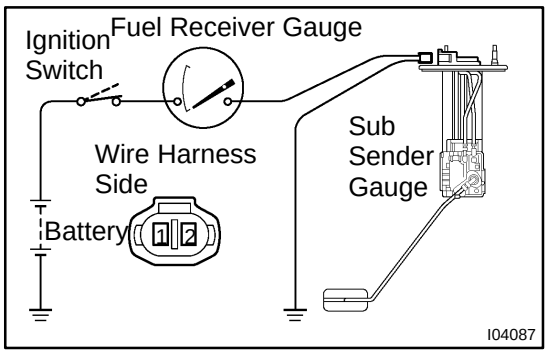
Tester connection	Resistance (Ω)
A - D	160
B - C	160

If resistance value is not as specified, replace the meter.



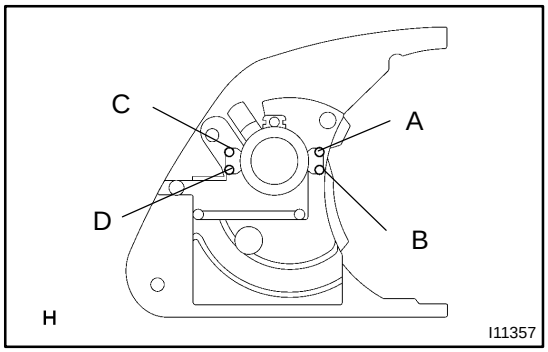
7. INSPECT FUEL RECEIVER GAUGE OPERATION (See page DI-879)

(a) Disconnect the connector from the main sender gauge.
(b) Turn the ignition switch ON, check that the receiver gauge needle indicates EMPTY.



(c) Connect the main sender gauge.
(d) Disconnect the connector from the sub sender gauge.
(e) Turn the ignition switch ON, check that the receiver gauge needle indicates EMPTY.

HINT:
Because of the silicon oil in the gauge, it will take a short time for needle to stabilize.
If operation is not as specified, inspect the receiver gauge resistance.

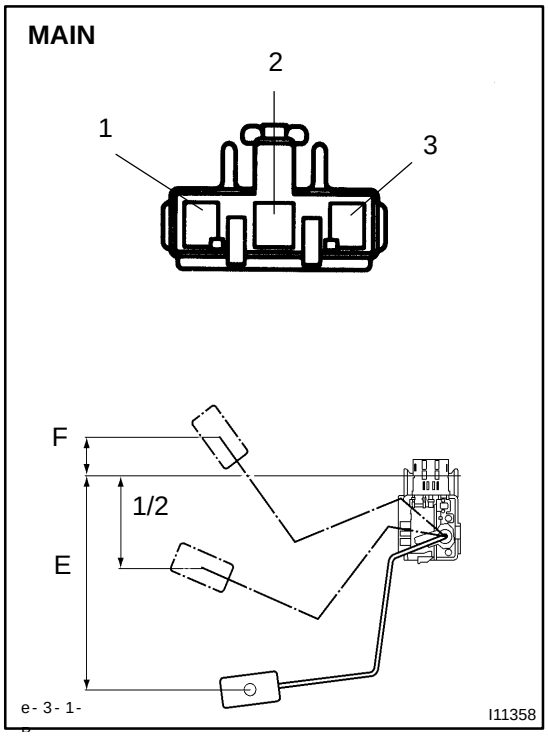


8. INSPECT FUEL RECEIVER GAUGE RESISTANCE (See page DI-919)

Measure the resistance between terminals with fixing pointer to the stopper.

Tester connection	Resistance (Ω)
A - D	160
B - C	160

If resistance value is not as specified, replace the receiver gauge.

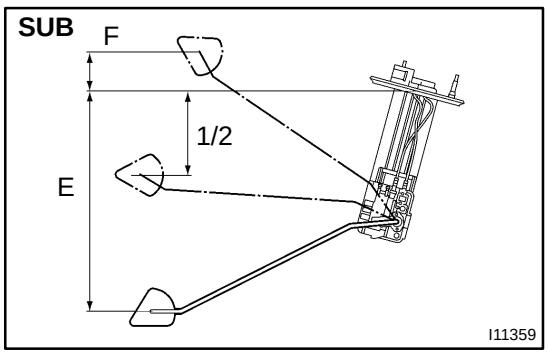


9. INSPECT FUEL MAIN SENDER GAUGE RESISTANCE

Measure the resistance between terminals 1 and 2 for each float position.

Float position mm (in.)	Resistance (Ω)
F: Approx. 22.9 (0.90) ± 3 (0.12)	Approx. 2.0 ± 1.0
1/2: Approx. 58.3 (2.30) ± 3 (0.12)	Approx. 30.3 ± 3.0
E: Approx. 133.6 (5.26) ± 3 (0.12)	Approx. 55.0 ± 1.0

If resistance value is not as specified, replace the main sender gauge.



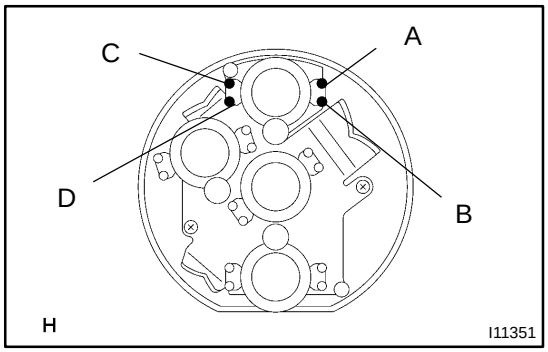
10. INSPECT FUEL SUB SENDER GAUGE RESISTANCE

Measure the resistance between terminals 1 and 2 for each float position.

Float position mm (in.)	Resistance (Ω)
F: Approx. 29.1 (1.15) ± 3 (0.12)	Approx. 2.0 ± 1.0
1/2: Approx. 65.8 (2.59) ± 3 (0.12)	Approx. 29.7 ± 3.0
E: Approx. 169.5 (6.67) ± 3 (0.12)	Approx. 55 ± 1.0

If resistance value is not as specified, replace the sub sender gauge.

11. INSPECT WATER TEMPERATURE RECEIVER GAUGE OPERATION (See page DI-881)



12. INSPECT WATER TEMPERATURE RECEIVER GAUGE RESISTANCE

Measure the resistance between terminals with fixing pointer to the stopper.

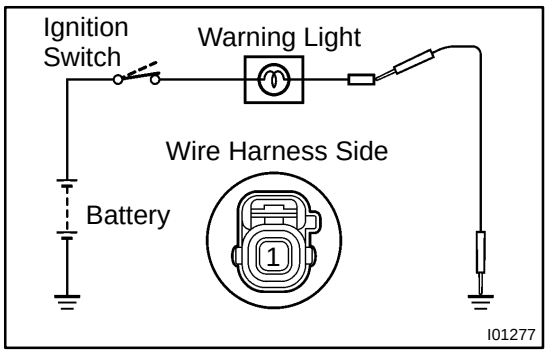
Tester connection	Resistance (Ω)
A - D	160
B - C	160

If resistance value is not as specified, replace the receiver gauge.

HINT:

This circuit includes the diode.

If resistance value is not as specified, replace the receiver gauge.

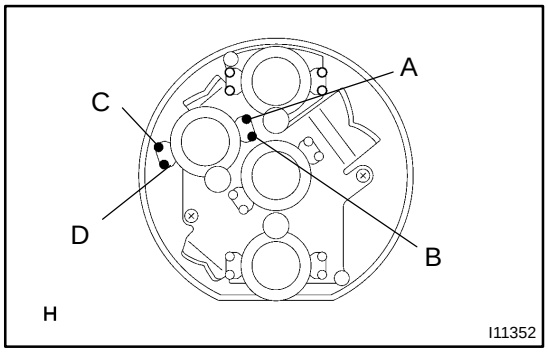


13. INSPECT LOW OIL PRESSURE WARNING LIGHT

(a) Disconnect the connector from the warning switch and ground terminal on the wire harness side connector.

(b) Turn the ignition switch ON and check that the warning light lights up.

If the warning light does not light up, test the bulb.

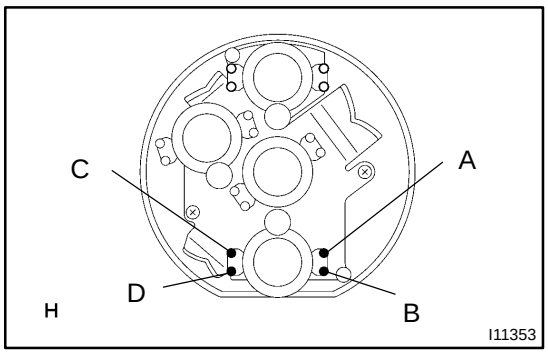


14. INSPECT VOLTAGE GAUGE RESISTANCE (See page DI-883)

Measure the resistance between terminals with fixing pointer to the stopper.

Tester connection	Resistance (Ω)
A - D	160
B - C	160

If resistance value is not as specified, replace the receiver gauge.

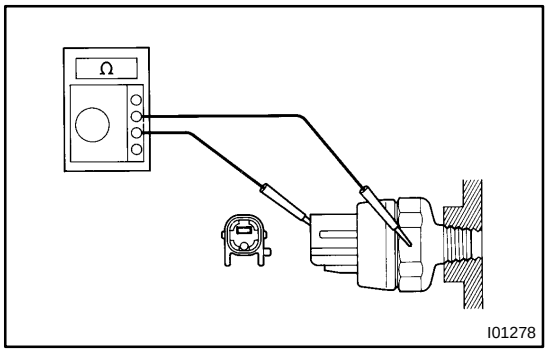


15. INSPECT SPECIFIC FUEL CONSUMPTION GAUGE RESISTANCE (See page DI-884)

Measure the resistance between terminals with fixing pointer to the stopper.

Tester connection	Resistance (Ω)
A - D	160
B - C	160

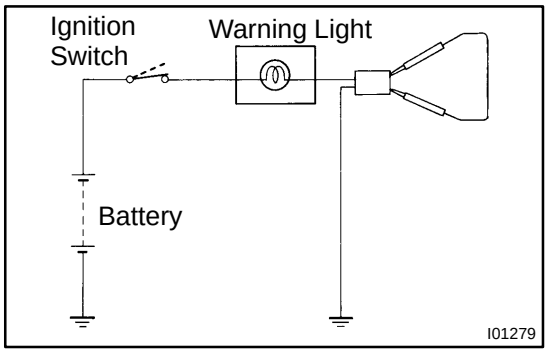
If resistance value is not as specified, replace the meter.



16. INSPECT OIL PRESSURE SENDER CONTINUITY

(a) Disconnect the connector from the oil presser sender.
(b) Check that no continuity exists between terminal and ground with the engine stopped.
(c) Check that continuity exists between terminal and ground with the engine running.

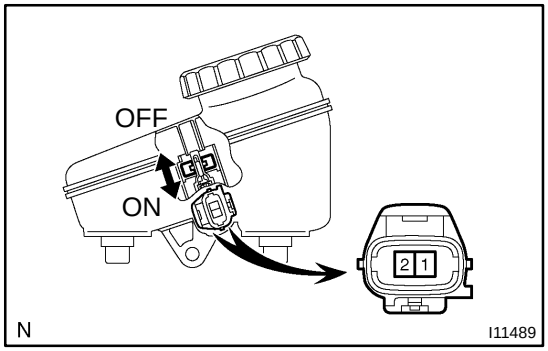
HINT:
Oil pressure should be over 24.5 kPa (0.25 kgf/cm^2, 3.55 psi).
If operation is not as specified, replace the oil pressure sender.



17. INSPECT BRAKE WARNING LIGHT

(a) Disconnect the connector from the brake fluid warning switch.
(b) Release the parking brake pedal.
(c) Connect the terminals on the wire harness side of the level warning switch connector.
(d) Start the engine, check that the warning light lights up.

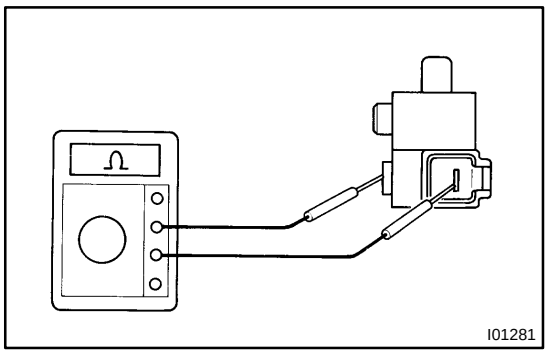
If the warning light does not light up, test the bulb or wire harness.



18. INSPECT BRAKE FLUID LEVEL WARNING SWITCH CONTINUITY

(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the connector.
(c) Check that no continuity exists between the terminals with the switch OFF (float up).
(d) Use siphon, etc. to take fluid out of the reservoir tank.
(e) Check that continuity exists between the terminals with the switch ON (float down).
(f) Pour the fluid back in the reservoir tank.

If operation is not as specified, replace the switch.

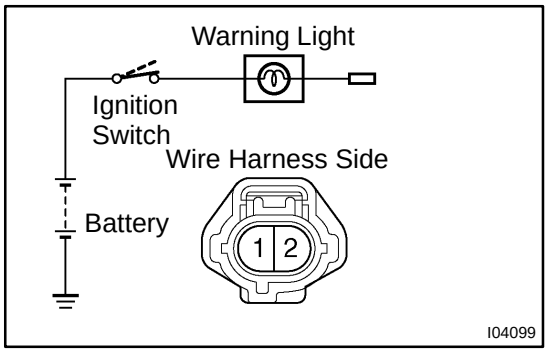


19. INSPECT PARKING BRAKE SWITCH CONTINUITY

(a) Check that continuity exists between the terminal and switch body with the switch ON (switch pin released).

(b) Check that no continuity exists between the terminal and switch body with the switch OFF (switch pin pushed in).

If operation is not as specified, replace the switch or inspect ground point.



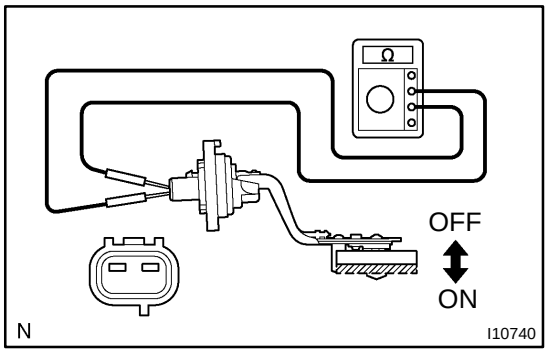
20. INSPECT ENGINE OIL LEVEL WARNING LIGHT

(a) Disconnect the connector from the switch.

(b) Run the engine.

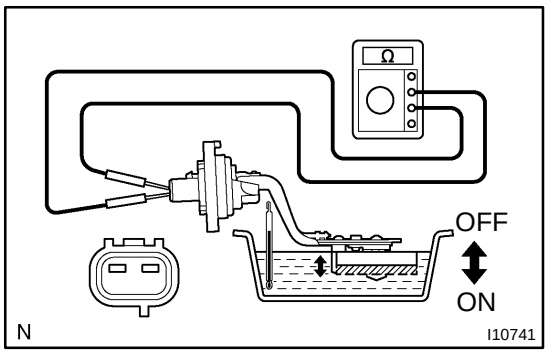
(c) Turn the ignition switch ON, check that the warning light lights up approximately 40 seconds later.

If the warning light does not light up, inspect bulb or wire harness.



21. INSPECT ENGINE OIL LEVEL WARNING SENSOR

(a) Check that continuity exists between terminals when the sensor-sensed temperature drops to 40 °C or less with the float down.

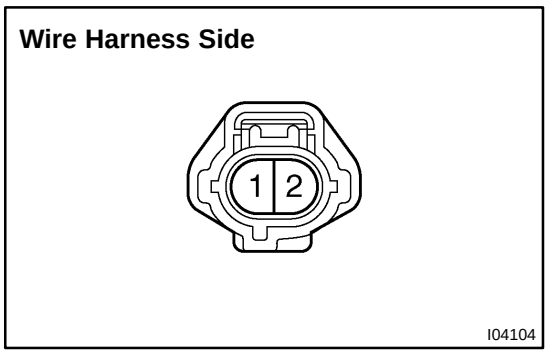


(b) Heat the switch to above 60 °C (140 °F) in an oil bath.

(c) Check that there is continuity between terminals with the switch ON (float down).

(d) Check that there is no continuity between terminals with the switch OFF (float up).

If operation is not as specified, replace the sensor.

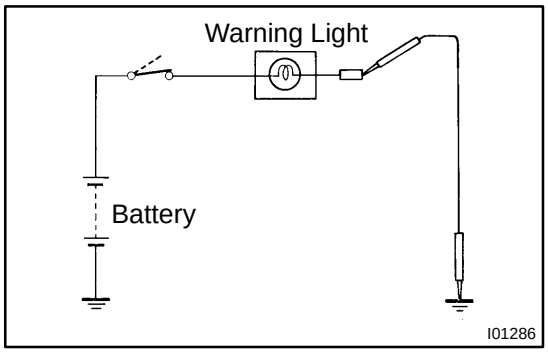


22. INSPECT ENGINE OIL LEVEL WARNING SENSOR CIRCUIT

Disconnect the switch connector and inspect the connector on wire harness side, as shown.

Tester connection	Condition	Specified condition
2 - Ground	Always	Continuity

If continuity is not as specified, inspect the wire harness or ground point.

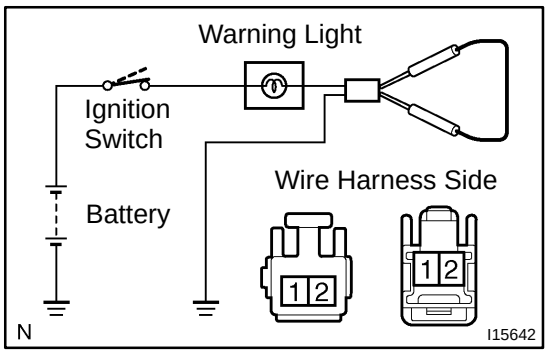


23. INSPECT OPEN DOOR WARNING LIGHT

Disconnect the connector from the door courtesy switch and ground terminal 1 on the wire harness side, and check that the warning light lights up.

If the warning light does not light up, inspect the bulb or wire harness.

24. INSPECT DOOR COURTESY SWITCH CONTINUITY AND CIRCUIT (See page DI-921)



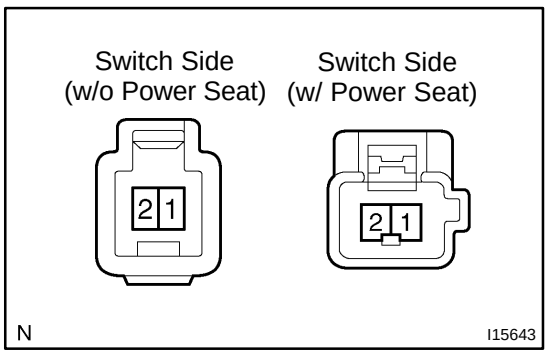
25. INSPECT SEAT BELT WARNING LIGHT

(a) Disconnect the connector from the buckle switch.

(b) Connect terminal on the wire harness side of the buckle switch connector.

(c) Turn the ignition switch ON and check that the warning light lights up.

If the warning light does not light up, inspect the bulb or wire harness.



26. INSPECT SEAT BELT BUCKLE SWITCH CONTINUITY

(a) Check that continuity exists between the terminals 1 and 2 on the switch side connector with the switch ON (belt fastened).

(b) Check that continuity exists between the terminals 1 and 2 on the switch side connector with the switch OFF (belt unfastened).

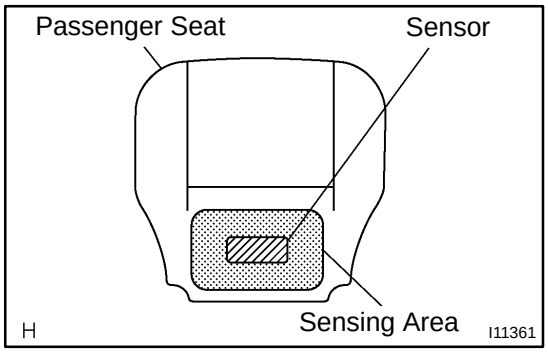
If operation is not as specified, replace the switch.

27. INSPECT SEAT BELT BUCKLE SWITCH CIRCUIT (See page DI-917)

Disconnect the switch connector and inspect the connector on wire harness side, as shown.

Tester connection	Condition	Specified condition
2 - Ground	Always	Continuity

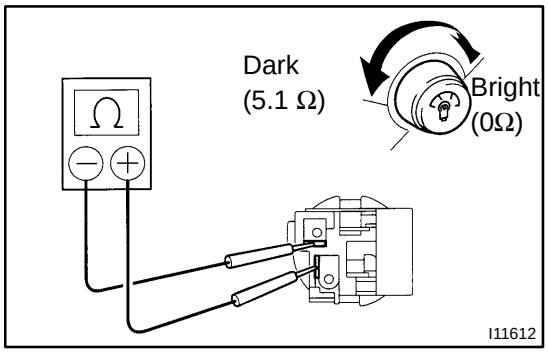
If continuity is not as specified, inspect the circuits connected to other parts.



28. Passenger seat only: INSPECT SEAT BELT WARNING OCCUPANT DETECTION SENSOR CONTINUITY

Check that continuity exists between the terminals 1 and 2 when pressing the sensing part.

If operation is not as specified, replace the sensor.

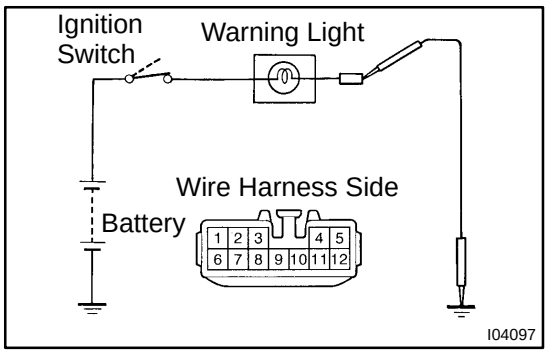


29. INSPECT LIGHT CONTROL RHEOSTAT OPERATION

(a) Turn the rheostat knob max. dark side and check that the resistance 5.1 Ω. (Rheostat knob turned to fully counterclockwise)

(b) Gradually, turn the rheostat knob from the dark side to bright side and check that the resistance decreases from 5.1 to 0 Ω. (Rheostat knob turned to clockwise)

If operation is not as specified, replace the rheostat light control.

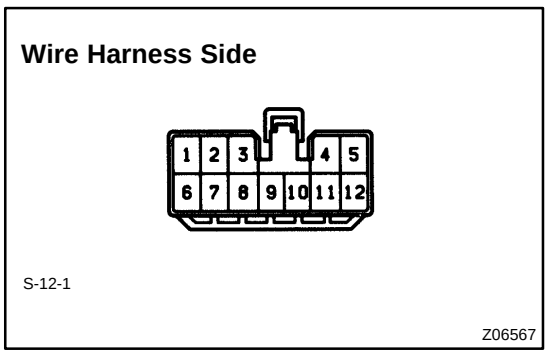


30. INSPECT REAR LIGHTS WARNING LIGHT

(a) Disconnect the connector from the light failure sensor and ground terminal 4, 5 or 9 on the wire harness side connector.

(b) Start the engine, check that the warning light lights up.

If the warning light does not light up, inspect the bulb or wire harness.



31. INSPECT LIGHT FAILURE SENSOR CIRCUIT

Disconnect the connector from the sensor and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
1 - Ground	Always	* Continuity
2 - Ground	Always	* Continuity
3 - Ground	Taillight ON	Battery Positive Voltage
9 - Ground	Always	* Continuity
11 - Ground	Always	Continuity
3 - Ground	Taillight or Headlight OFF	No voltage
3 - Ground	Taillight or Headlight ON	Battery Positive Voltage
4 - Ground	Ignition switch LOCK or ACC	No voltage
4 - Ground	Ignition switch ON	Battery Positive Voltage
7 - Ground	Stop light switch OFF	No voltage
7 - Ground	Stop light switch ON	Battery Positive Voltage
8 - Ground	Ignition switch LOCK or ACC	No voltage
8 - Ground	Ignition switch ON	Battery Positive Voltage

*: There is resistance because this circuit is grounded through the bulb.

If the circuit is not as specified, inspect the circuits connected to other parts.

32. MAINTENANCE LIQUID RESETTING PROCEDURE

Indicator Condition:

State	Condition	Specified condition
Blinking	The vehicle runs 4,500 miles after the previous setting.	The indicator blinks for 15 seconds after the ignition switch is turned on (Incluing 3 seconds for a valve check)
Continuously illuminated	The vehicle runs 5,000 miles after the previous setting.	The indicator is continuously illuminated after the ignition switch is turned on.

(a) Set the display window to ODO.

(b) Turn the ignition switch off.

(c) Pressing the reset switch, turn the ignition switch (Keep pressing for at least 5 seconds).

(d) The reset procedure is completed.

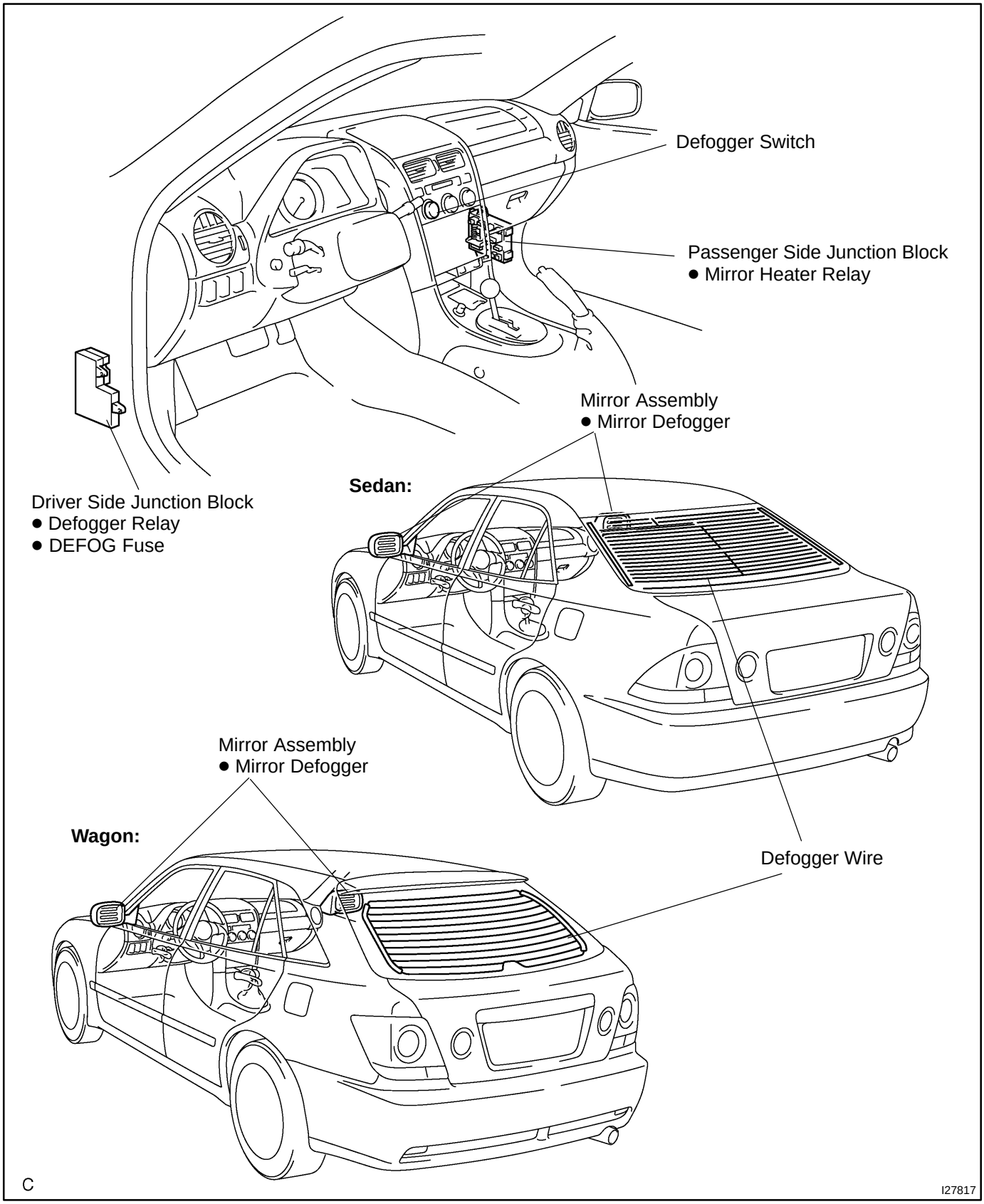
HINT:

- If the ignition switch is turned off during the reset procedure, reset mode is canceled.
- If the reset switch is turned off during the reset procedure, reset mode is canceled.

DEFOGGER SYSTEM

LOCATION

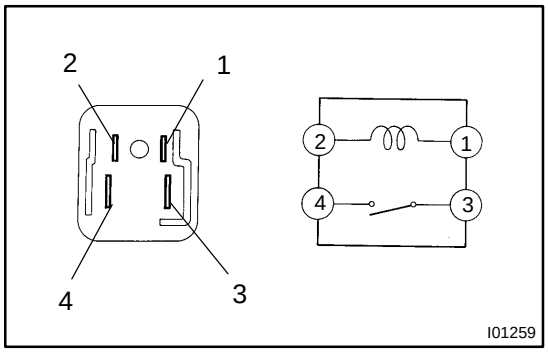
BE0GS-21



BE1WV-03

INSPECTION

1. INSPECT DEFOGGER SWITCH (See page AC-88)

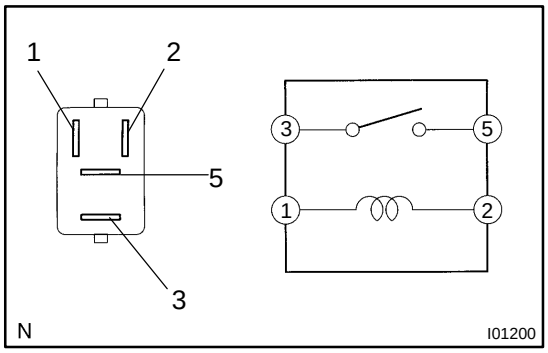


2. INSPECT DEFOGGER RELAY CONTINUITY

Condition	Tester connection	Specified condition
Always	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 4	Continuity

If continuity is not as specified, replace the relay.

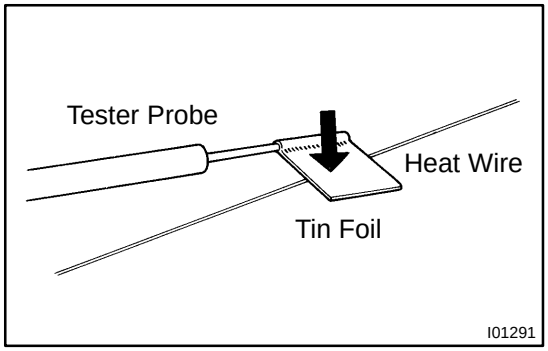
3. INSPECT DEFOGGER RELAY CIRCUIT (See page DI-940)



4. INSPECT MIRROR DEFOGGER RELAY CONTINUITY

Condition	Tester connection	Specified condition
Always	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

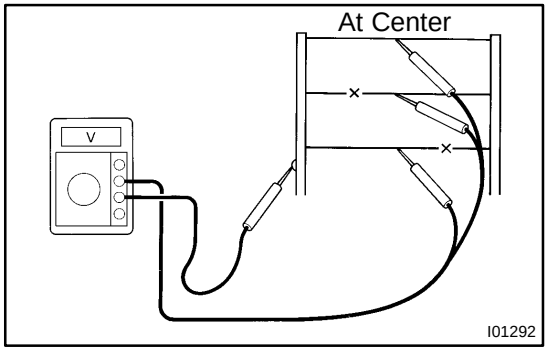
If continuity is not as specified, replace the relay.



5. INSPECT DEFOGGER WIRE

NOTICE:

- **When cleaning the glass, use a soft, dry cloth, and wipe the glass in the direction of the wire. Take care not to damage the wires.**
- **Do not use detergents or glass cleaners with abrasive ingredients.**
- **When measuring voltage, wrap a piece of tin foil around the tip of the negative probe and press the foil against the wire with your finger, as shown.**

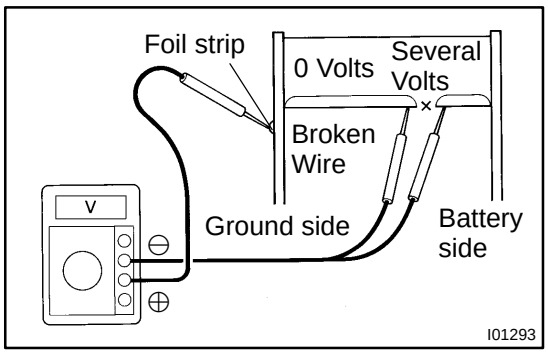


(a) Turn the ignition switch ON.

(b) Turn the defogger switch ON.

(c) Inspect the voltage at the center of each heat wire, as shown.

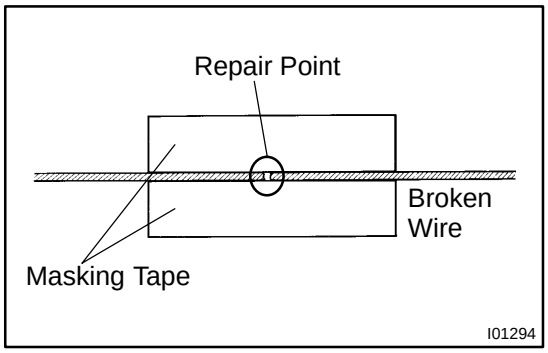
Voltage	Criteria
Approx. 5V	Okay (No break in wire)
Approx. 10V or 0V	Broken wire



HINT:
If there is approximately 10 V, the wire is broken between the center of the wire and the positive (+) end. If there is no voltage, the wire is broken between the center of the wire and ground.

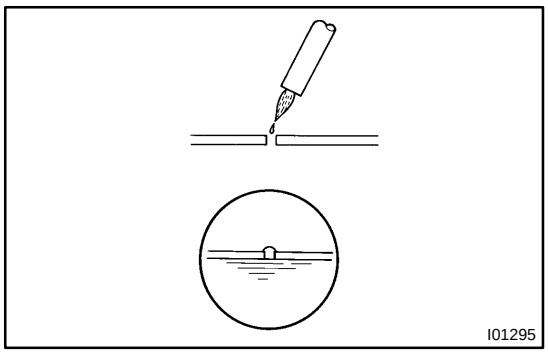
(d) Place the voltmeter positive (+) lead against the defogger wire on the battery side.
(e) Place the voltmeter negative (-) lead with the foil strip against the wire on the ground side.
(f) Slide the positive (+) lead from battery to ground side.
(g) The point where the voltmeter deflects from several V to zero V is the place where the defogger wire is broken.

HINT:
If the heat wire is not broken, the voltmeter indicates 0 V at the positive (+) end of the heat wire but gradually increases to about 12 V as the meter probe moves to the other end.

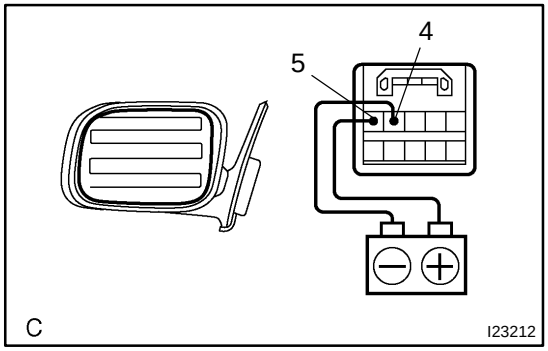


6. IF NECESSARY, REPAIR DEFOGGER WIRE

(a) Clean the broken wire tips with grease, wax and silicone remover.
(b) Place the masking tape along both sides of the wire for repair.
(c) Thoroughly mix the repair agent (Dupont paste No. 4817).



(d) Using a fine tip brush, apply a small amount of the agent to the wire.
(e) After a few minutes, remove the masking tape.
(f) Do not repair the defogger wire for at least 24 hours.



7. w/ Mirror heater:
INSPECT MIRROR DEFOGGER OPERATION

(a) Connect the positive (+) lead from the battery to terminal 5 and the negative (-) lead to terminal 4.
(b) Check that the mirror becomes warm.

HINT:
It will take a short time for the mirror to become warm.

POWER WINDOW CONTROL SYSTEM

BE02C-15

TROUBLESHOOTING

Malfunction symptoms	Applicable chart
Driver's door does not operate.	1
Passenger's and all rear doors do not operate by using the switches at each seat.	2
Any of passenger's and rear doors does not operate by using the switches of each seat.	3
Passenger's and all rear doors are not controlled remotely by using the master switch. (Switches of each door can be operated.)	4
AUTO UP and AUTO DOWN does not operate. (Prepare a normal master switch.)	5
DOWN operation operates during door glass AUTO UP operation.	6
Even though a foreign object is caught, DOWN operation does not function.	7
After ignition switch has been turned to OFF by using a key, power window function does not operate.	8

1	**Driver's door does not operate.**

Remove the power window regulator master switch and disconnect the connector.

Check there is voltage of 10 of 14 V between terminal 1 of vehicle side connector of master switch and body ground.

No → Wire harness defective (between power fuse terminal 1 of master switch.)

Yes

With ignition switch ON, is there voltage of 10 to 14 V between the terminal 2 and 4 of vehicle side connector of the master switch and body ground.

Yes → Wire harness (between terminal of the power main relay and 2 or 4 terminal of the master switch.)

No

Does continuity exist between 9 terminal of vehicle side connector of the master switch and body ground?

No → Wire harness defective (between 9 terminal of the master switch and body ground.)

Yes

When battery voltage is supplied to the vehicle side connector of the master switch, check if the door glass operate.

Yes → Power window regulator master switch defective.

Connection	Glass operation
Battery positive - 8 terminal Battery negative - 20 terminal	UP
Battery positive - 20 terminal Battery negative - 8 terminal	DOWN

No

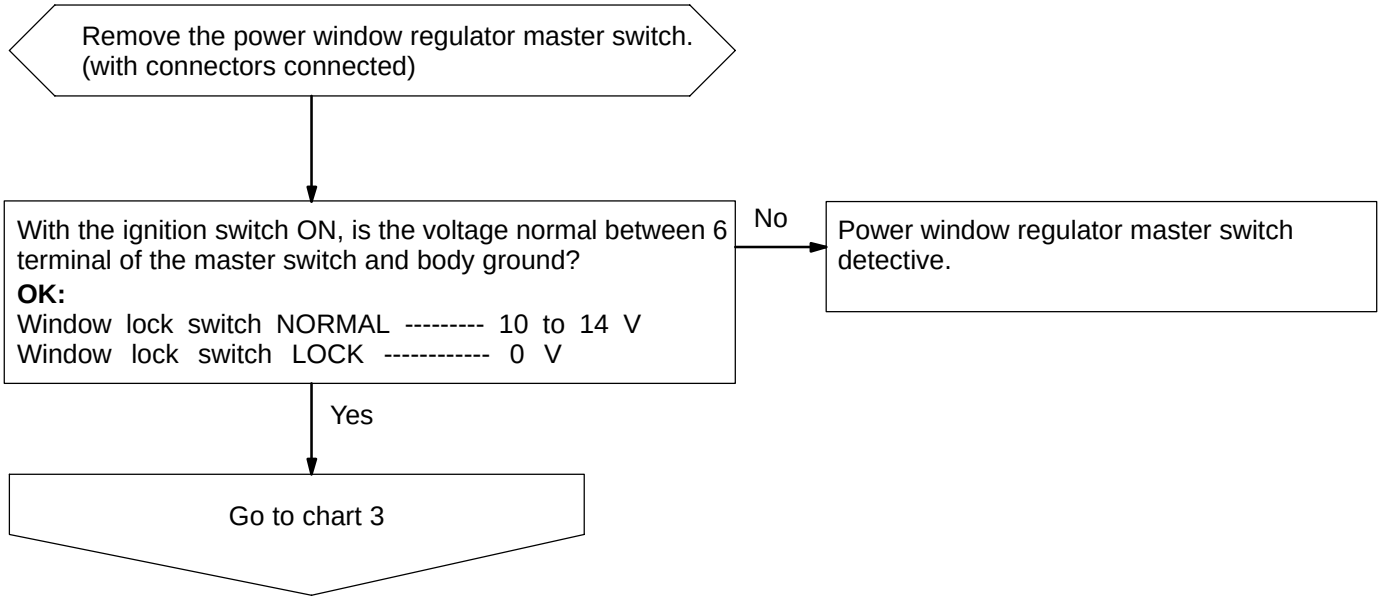
Is the power motor normal?

No → Power window motor defective.

Yes

Wire harness (between 20 terminal of the master switch and 2 terminal of the power window motor or 8 terminal of the master switch and 1 terminal of the power window).

2	**Passenger's and all rear doors do not operate by using the switches of each seat.**



3	**Any of passenger's and all rear doors does not operate by using the switches at each seat.**

Remove the power window regulator switch at the seat where the operation is unavailable and disconnect the connector.

With the ignition switch ON and window lock switch NORMAL, is there voltage of 10 to 14 V between 11 terminal of the vehicle side connector of the regulator switch and body ground?

- No → Wire harness defective (between 6 terminal of master switch and 11 terminal of regulator.)
- Yes ↓

Is there the voltage of 10 to 14 V between 7 terminal of vehicle side connector of the regulator switch and body ground?

- Yes → Wire harness defective (between POWER fuse and 7 terminal of the regulator.)
- No ↓

Is there continuity between 7 terminal of the vehicle side connector of the regulator switch and body ground.

- No → Wire harness defective (between 12 terminal of the regulator and body ground.)
- Yes ↓

When battery voltage is supplied to the vehicle side connector of the regulator switch, check if the door glass operate.

- Yes → Power window regulator master switch defective.

Connection	Glass operation
Battery positive - 6 terminal Battery negative - 1 terminal	UP
Battery positive - 1 terminal Battery negative - 6 terminal	DOWN

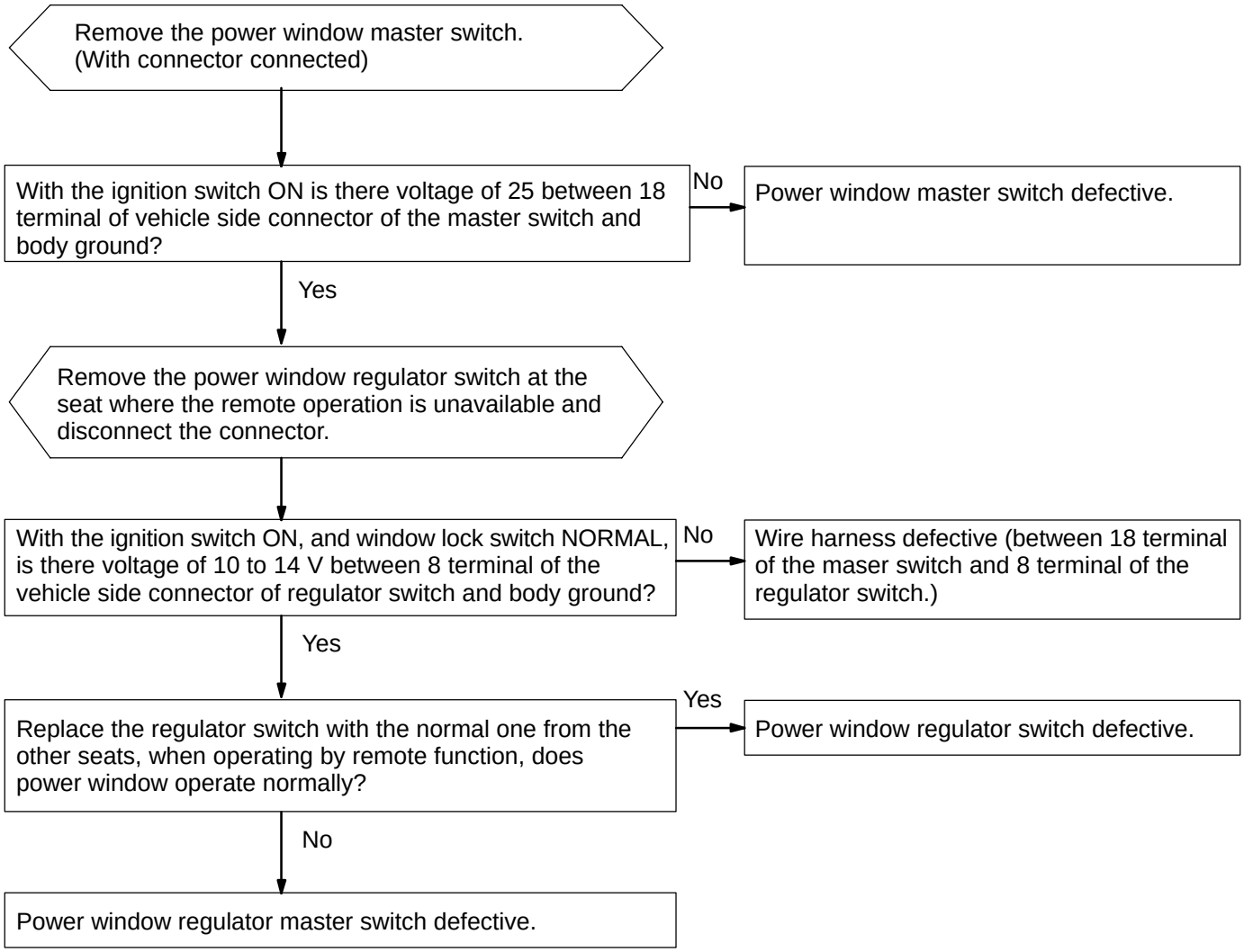
- No ↓

Is the power motor normal?

- No → Power window motor defective.
- Yes ↓

Wire harness (between 6 terminal of the regulator switch and 4 terminal of the power window motor or 1 terminal of the regulator switch and 1 terminal of the power window motor).

4	**Passenger's and all rear doors are not controlled remotely by using the master switch. (Switches at each door can be operated.)**



5	**AUTO UP and AUTO DOWN do not operate. (Prepare a normal master switch.)**

Remove the master switch or regulator switch at the seat where AUTO UP and AUTO DOWN is unavailable. (With connectors connected)

Master of regulator switch inspection:
Are the voltage and continuity of the connectors connected to the master switch or regulator switch normal?

OK:

Terminal No.		Item	Inspection condition	Standard
13	3	Voltage	Fully open by manual operation → fully close → switch OFF	Less than 1 → 10 V to 14 → 0 V
12	4	Voltage	During power window operation	Approx. 5.5 V
10	2	Continuity	Constant	Continuity

No

Yes → Master or regulator switch defective.

Disconnect the connectors of the master switch or regulator switch and power window motor.

Does continuity exist between connectors of the following vehicle side connectors?
Switch side ↔ Motor side
13 (3) terminal ↔ 3 terminal
12 (4) terminal ↔ 4 terminal
10 (2) terminal ↔ 2 terminal
The number in parenthesis shows the terminal No.

No → Wire harness defective (Open circuit in each terminal)

Yes

Does continuity exist between 13 (3), 12 (4) and 10 (2) terminals on the switch side or 3, 4, 2 terminals and body ground?

No → Wire harness defective (Short circuit).

Yes

Connect the connector of power window motor.

Connect the normal master switch or regulator switch and check if AUTO UP and DOWN operates.

Yes → Master switch or regulator switch.

No

Power window motor defective.

6	DOWN operates during door glass AUTO UP operation.

When UP operates by AUTO UP operation or starting up by key OFF operation, is there any factor to increase the sliding resistance of door glass around the reverse position?

Yes → Disassemble the door and repair or replace the malfunction part.

No ↓

Remove the window regulator assembly.

↓

After assembling and raising the door glass manually, does it slide smoothly without being caught?

No → Inspect and replace the door glass run and window guide.

Yes ↓

Remove the power window motor from the power window regulator assembly?

↓

When the power window regulator is slide manually, does it slide smoothly without being caught or is there any damage to the gear parts?

No → Power window regulator defective.

Yes ↓

Does the power window motor rotate smoothly?

No → Power window motor defective.

Yes ↓

Reset the power window motor (Initial position setting of limit switch), assemble the power window regulator to the vehicle.

↓

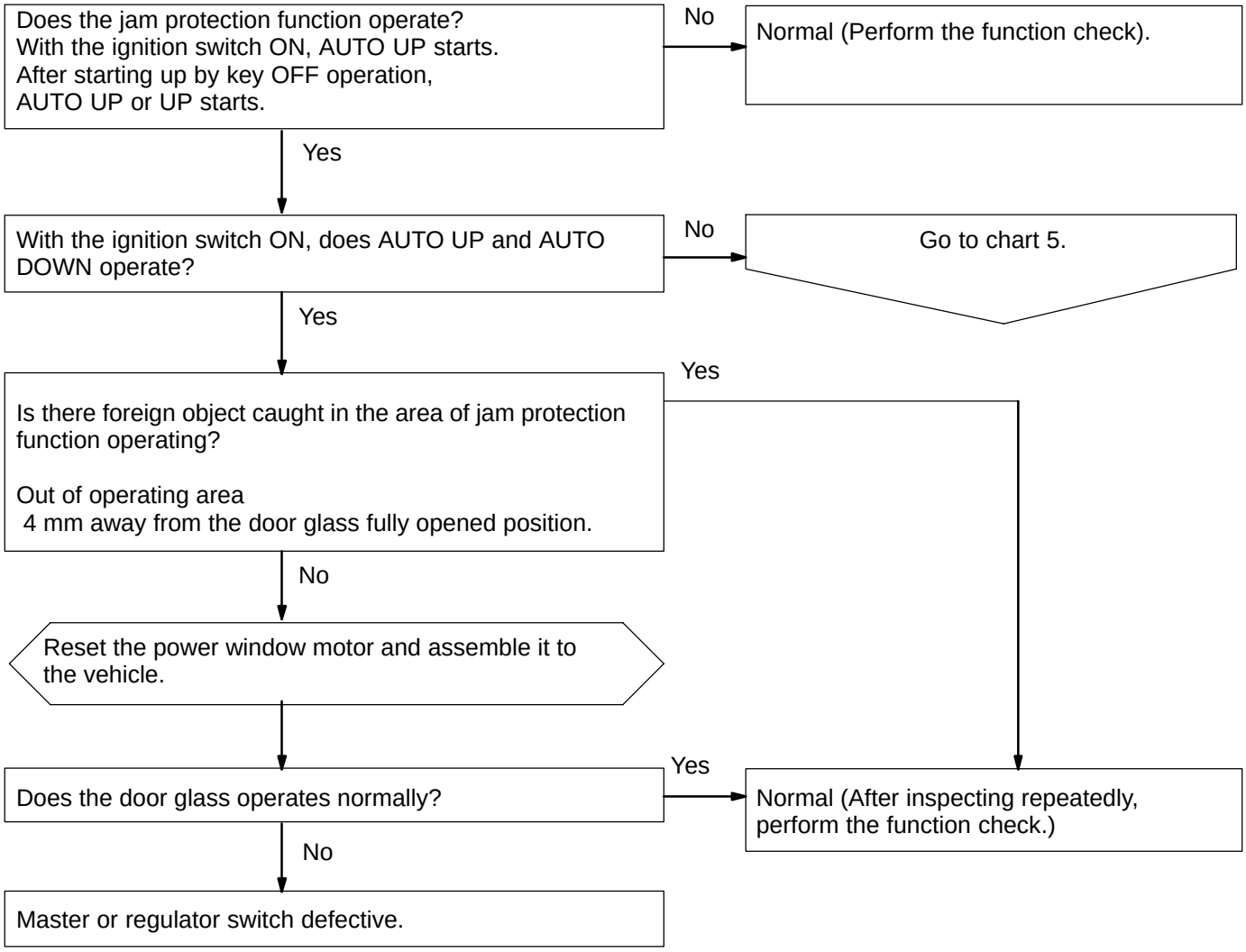
Does the door glass operates normally?

Yes → Normal (Perform the function check.)

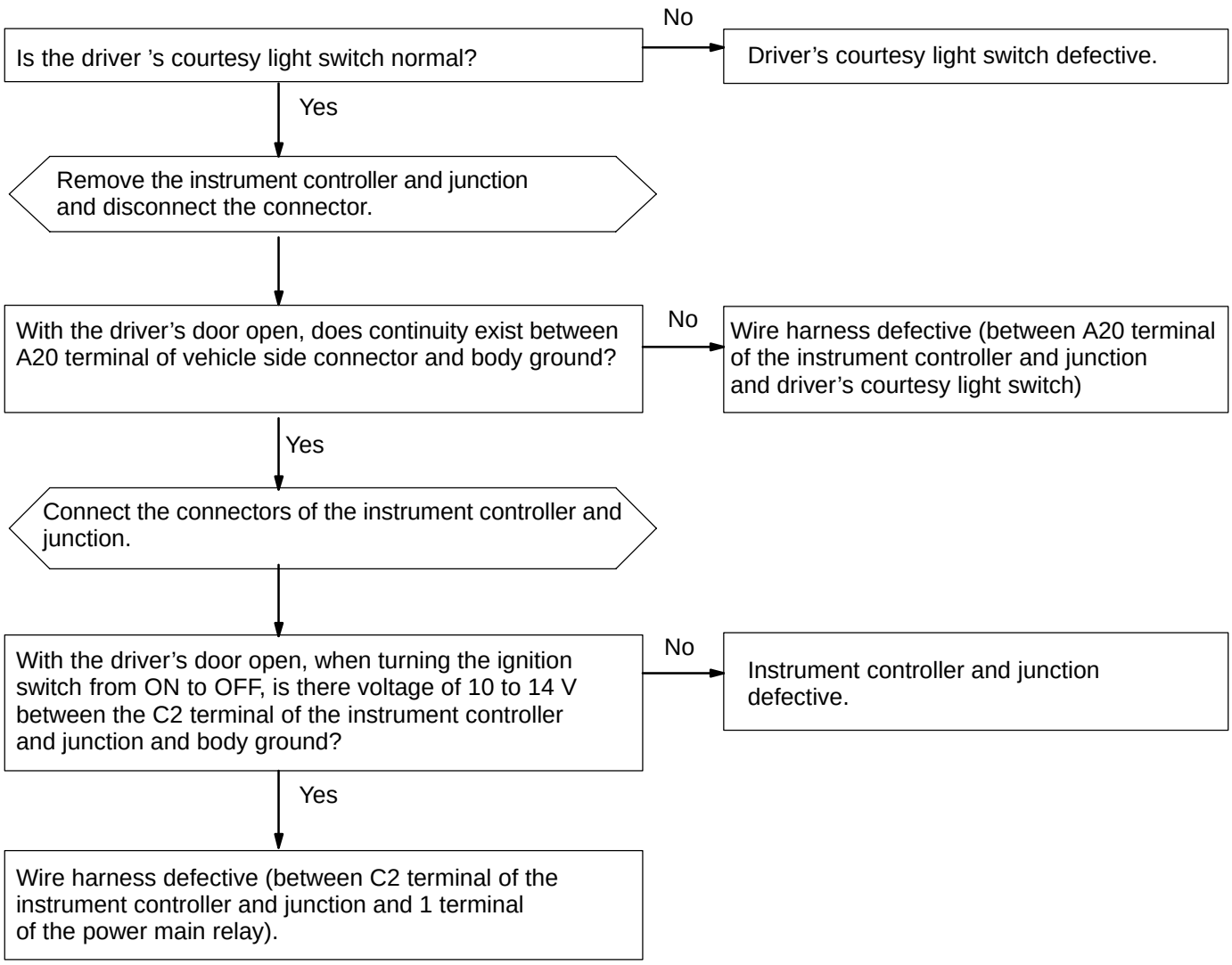
No ↓

Master or regulator switch defective.

7	**Even through a foreign object is caught, DOWN operation does not function.**

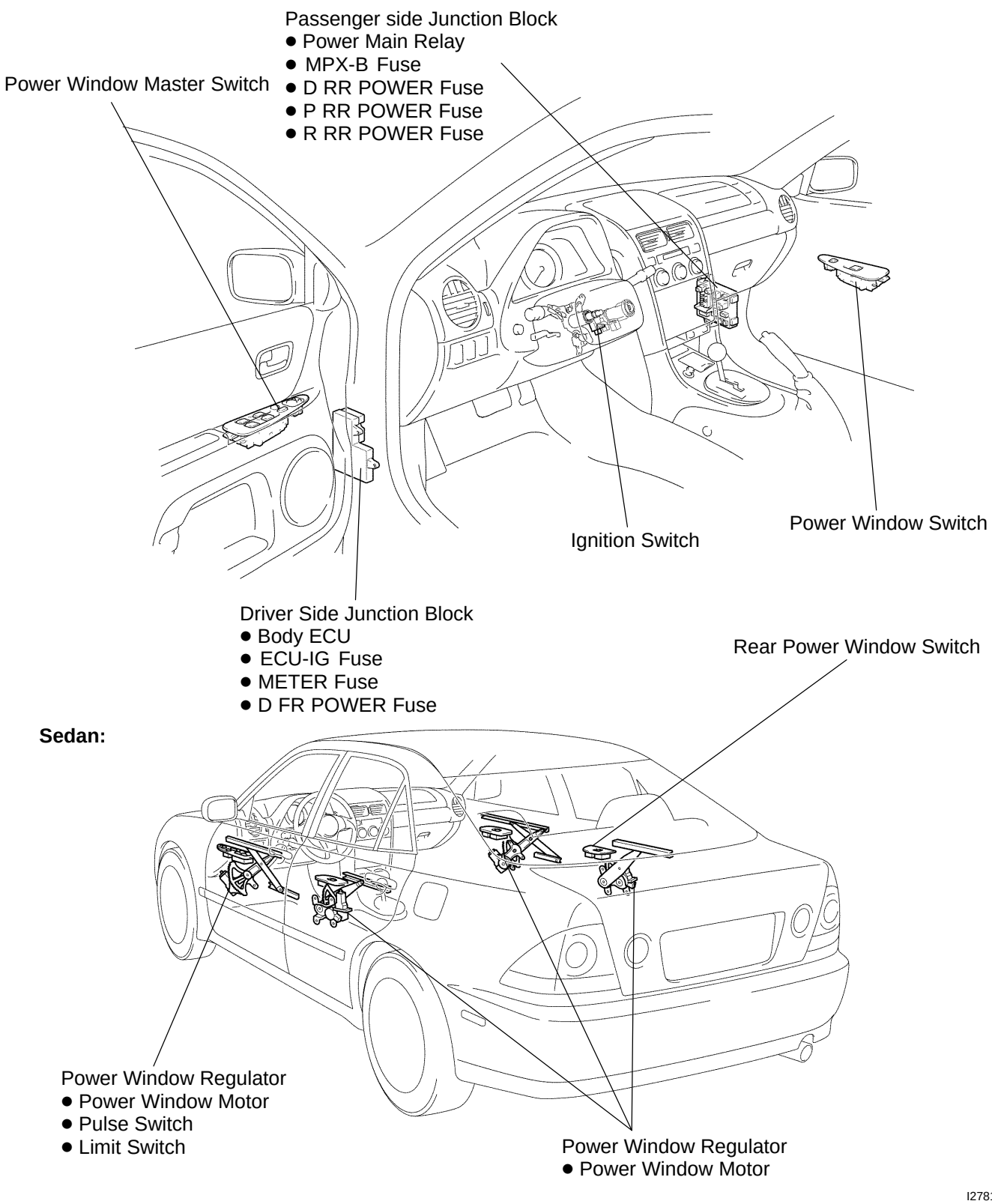


8	**After ignition switch has been turned OFF by using a key, power window function does not operate.**



BE2A2-02

LOCATION



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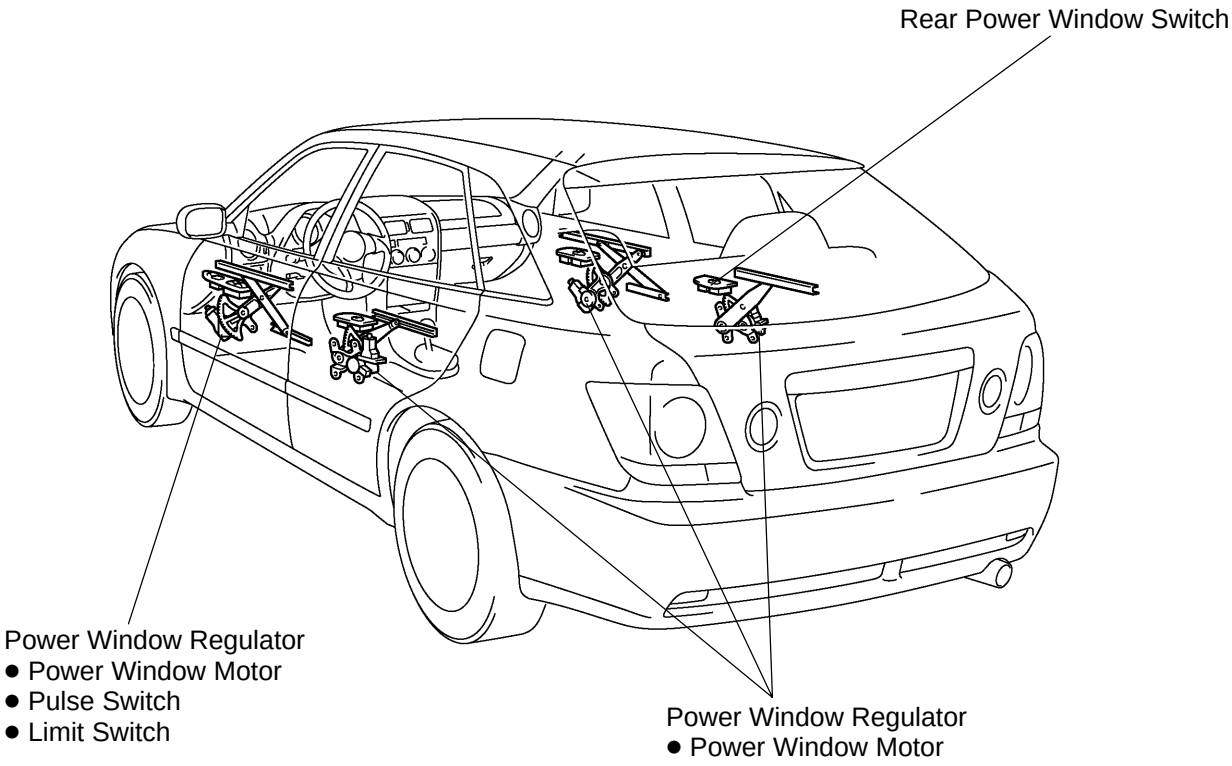

Rear Power Window Switch
Power Window Regulator
● Power Window Motor
● Pulse Switch
● Limit Switch
Power Window Regulator
● Power Window Motor
C
I27819

BE16F-04

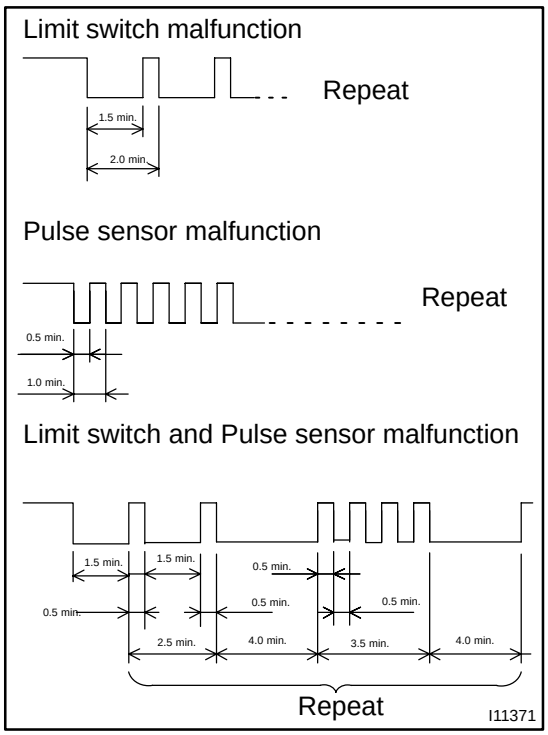
INSPECTION

1. INSPECT DIAGNOSIS CODE IS OUTPUT

Check that the master switch assembly automatic light flash under the condition of KEY off operation (for 45 secs. after the starter switch has been turned from ON to OFF with the driver's door open.)

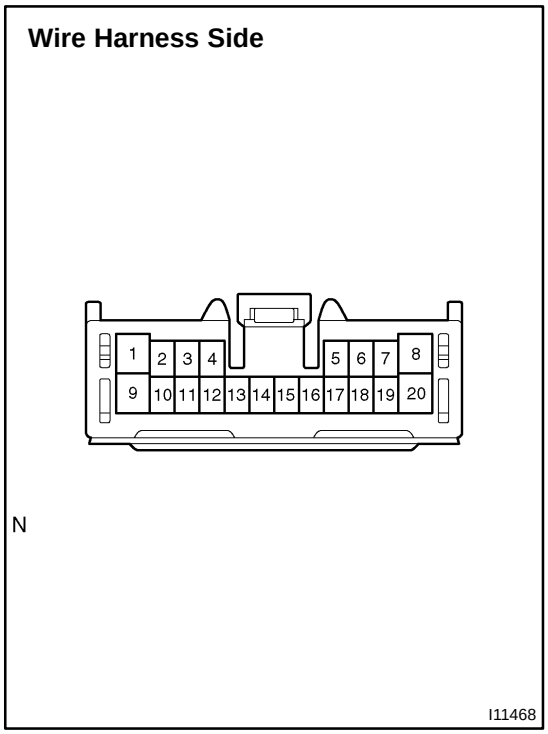
HINT:

- Limit switch malfunction:
  Even though the glass goes down from the fully closed position, the power window regulator switch assembly does not detect a change in limit switch signal within 2.0 secs. after the operation has started.
- Pulse sensor malfunction:
  Even though the glass goes down from the fully closed position, the power window regulator switch assembly does not detect a change in pulse switch signal within 2.0 secs. after the operation has started.



2. Connector disconnected:
INSPECT POWER WINDOW MASTER SWITCH CIRCUIT

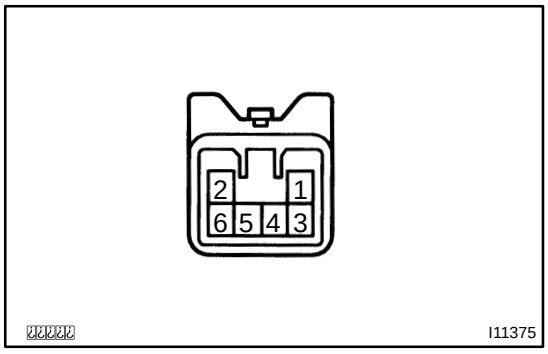
Disconnect the connectors from the switch and inspect connector on the wire harness side.



Tester connection	Condition	Specified condition
9 - Ground	Always	Continuity
1, 5 - Ground	Always	Battery Positive Voltage
2, 4 - Ground	Ignition switch LOCK	No voltage
2, 4 - Ground	Ignition switch ACC or ON	Battery Positive Voltage

If circuit is not as specified, replace the switch.

3. INSPECT POWER WINDOW MASTER SWITCH CIRCUIT (See page DI-935)



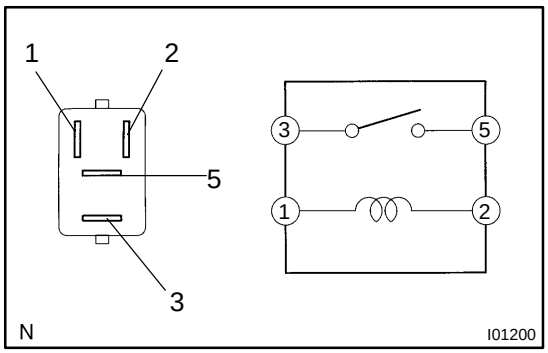
4. INSPECT POWER WINDOW SWITCH CONTINUITY

Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 6.

Switch position	Tester connection	Specified condition
UP	2 - 3 4 - 5	Continuity
OFF	-	No continuity
DOWN	2 - 4 3 - 5	Continuity

If continuity is not as specified, replace the switch.

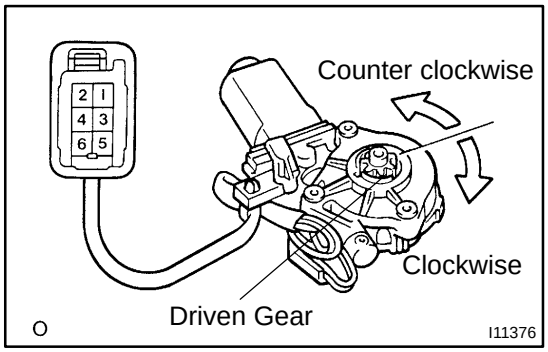
5. INSPECT POWER WINDOW SWITCH CIRCUIT (See page DI-938)



6. INSPECT POWER MAIN RELAY CONTINUITY

Condition	Tester connection	Specified condition
Always	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

If continuity is not as specified, replace the relay.

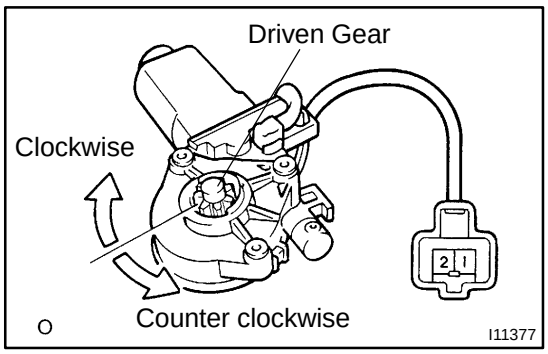


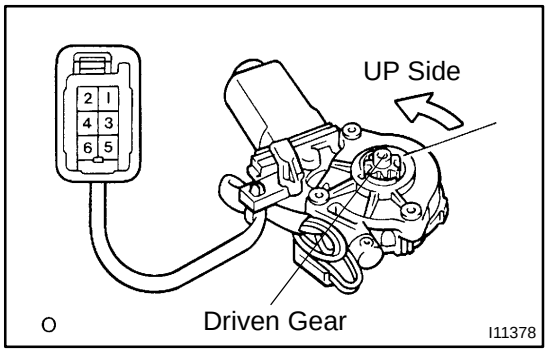
7. Driver's door:
INSPECT POWER WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, and check that the motor turns clockwise.

(b) Reverse the polarity, check that the motor turns counter-clockwise.

If operation is not as specified, replace the motor.





8. Front passenger's door and rear door:
INSPECT POWER WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, and check that the motor turns clockwise.

(b) Reverse the polarity, check that the motor turns counter-clockwise.

If operation is not as specified, replace the motor.

9. INSPECT POWER WINDOW MOTOR CIRCUIT (See page DI-935)

10. INSPECT POWER WINDOW MOTOR PTC OPERATION

(a) Disconnect the connector from the master switch.

(b) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2 on the wire harness side connector and raise the window to full closed position.

(c) Continue to apply voltage, check that there is a PTC operation noise within approximately 4 to 90 seconds.

(d) Reverse the polarity, check that the window begins to descend within approximately 60 seconds.

If operation is not as specified, replace the motor.

11. INSPECT JAM PROTECTION FUNCTION

NOTICE:

Never, ever be caught any part of your body when checking.

HINT:

In case of performing resetting of the limit switch, do checking after repeating up and down of the glass with automatic operation.

(a) Confirmation of AUTO up operation:
Confirm that the window will be fully close with AUTO up operation.

(b) Checking of the operation of the jam protection function:
(1) Move up the window with AUTO up operation and check that the window will go down when it touches the handle of the hammer stetted.
(2) Confirm that the window will then stop going down about 200 mm.

HINT:

In case of removing the glass, glass guide, regulator and etc. be sure to perform checking of the jam protection function.

If the jam protection is not functioned properly, adjust power window motor reset switch and pulse switch.

BE0HG-21

ADJUSTMENT

HOW TO RESET POWER WINDOW MOTOR (RESET SWITCH AND PULSE SWITCH)

If the jam protection is not functioned properly, perform the following procedure.

HINT:

It is necessary to reset the power window motor (in initial position for the limit switch) when separating the window regulator from the power window motor or operating the window regulator with the door glass not installed.

(a) Remove the power window motor (See page BO-17 , BO-28).

HINT:

Place the matchmarks on the power window motor and window regulator gear.

(b) Connect the power window motor and power window switch to wire harness of the vehicle.

(c) Turn the ignition switch ON and operate the power window switch to idle the power window motor in UP side direction for more than 6 rotations or less than 10 rotates (4 seconds or more).

(d) Assemble the power window motor and regulator.

HINT:

- Install the motor when the regulator arm is below the middle point.
- Align the matchmarks on the power window motor and window regulator gear.

(e) Assemble the power window regulator and door glass.

HINT:

Never rotate the motor to the down direction until the completion of the window glass installation.

(f) Connect power window switch to wire harness and turn the ignition switch ON.

(g) Repeat UP and DOWN operation several times manually.

(h) Check if AUTO UP → AUTO DOWN operates in automatic operation.

HINT:

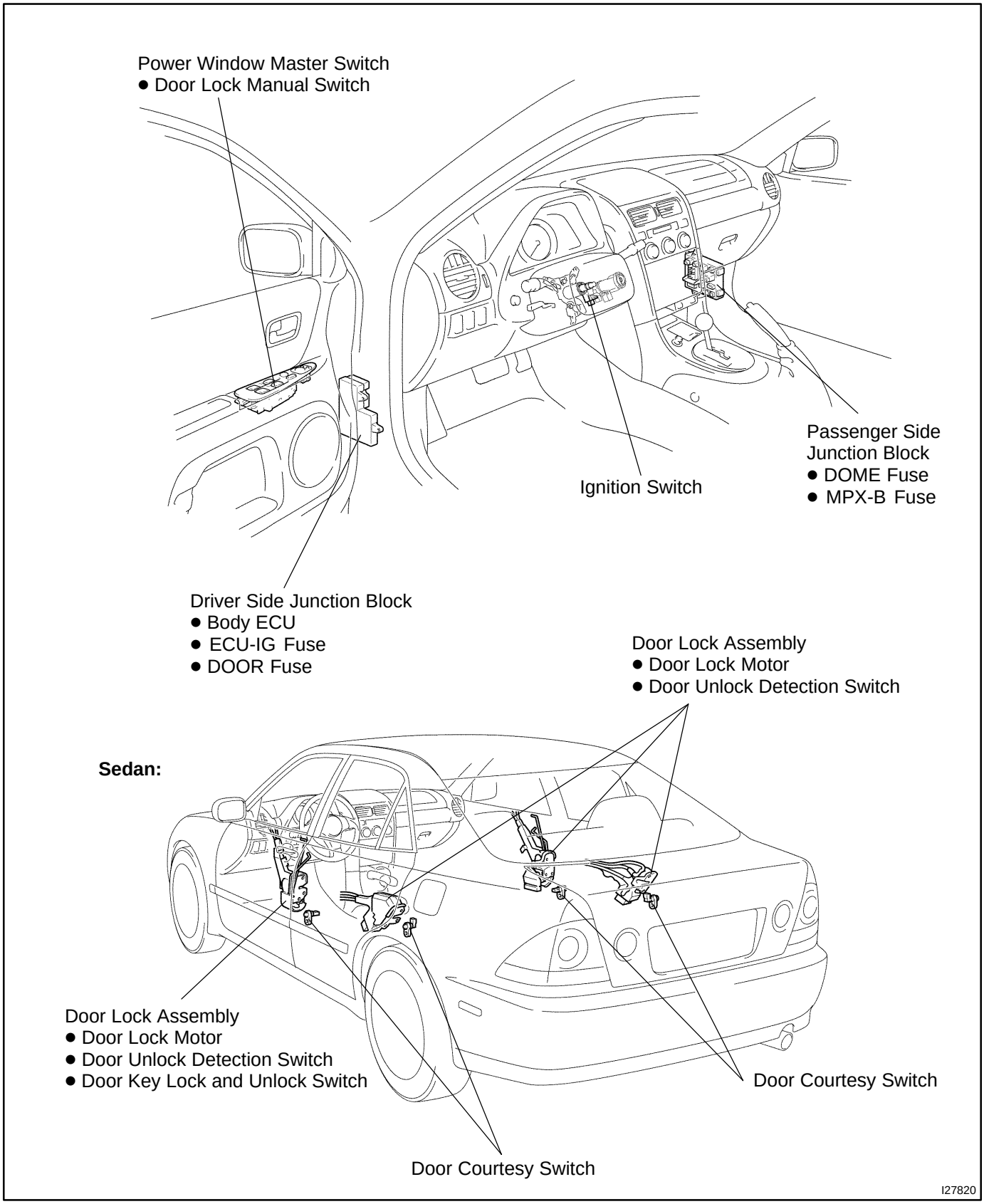
- Take care that the jam protection function does not operate just after resetting.
- Reset the regulator again when performing the reverse operating after closing the window fully by AUTO UP operation.

(i) Check the power window function.

POWER DOOR LOCK CONTROL SYSTEM

LOCATION

BE2A3-02



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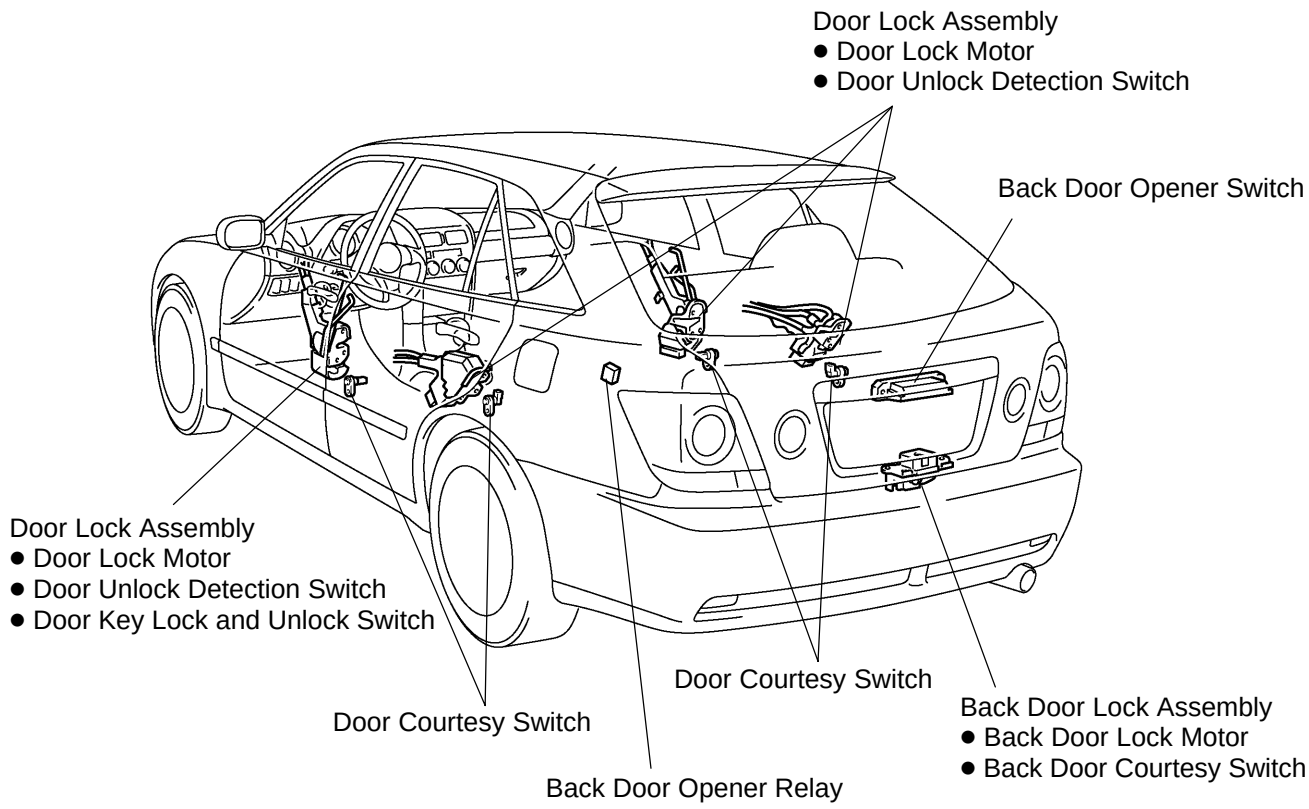

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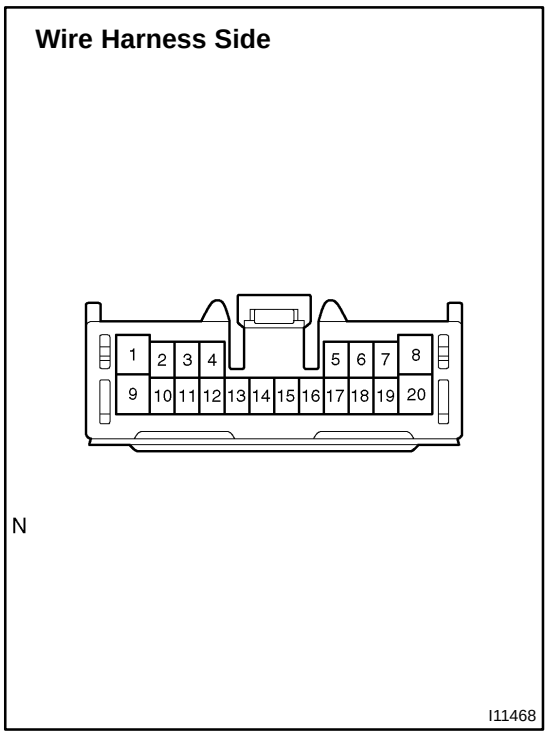
BE2A4-02

INSPECTION

1. Connector disconnected:

INSPECT POWER WINDOW MASTER SWITCH CIRCUIT

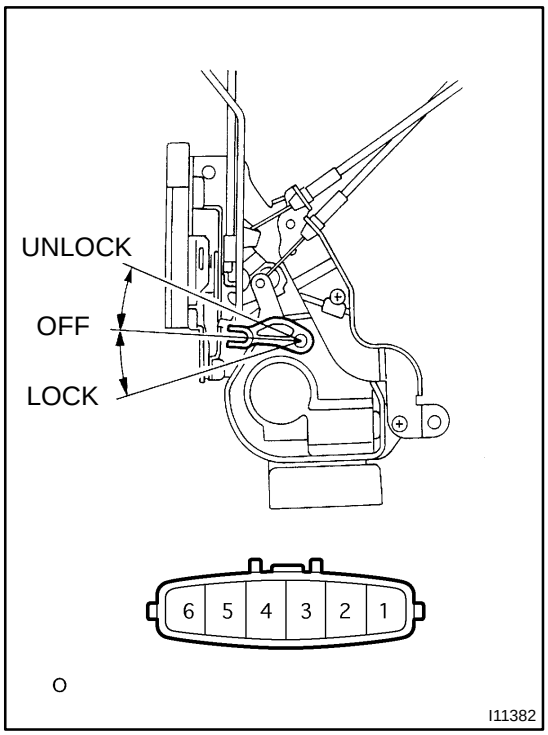
Disconnect the connectors from the switch and inspect connector on the wire harness side.



Tester connection	Condition	Specified condition
9 - Ground	Always	Continuity
1, 5 - Ground	Always	Battery Positive Voltage
2, 4 - Ground	Ignition switch LOCK	No voltage
2, 4 - Ground	Ignition switch ACC or ON	Battery Positive Voltage
15 - Ground (LHD)	Driver's door key lock and unlock switch LOCK	No Continuity
15 - Ground (LHD)	Driver's door key lock and unlock UNLOCK	Continuity
16 - Ground	Each door courtesy switch ON (door opened)	No Continuity
16 - Ground	Each door courtesy switch OFF (door closed)	Continuity
6 - Ground (RHD)	Driver's door key lock and unlock switch LOCK	No Continuity
6 - Ground (RHD)	Driver's door lock and unlock switch UNLOCK	Continuity

If circuit is not as specified, inspect power source or wire harness.

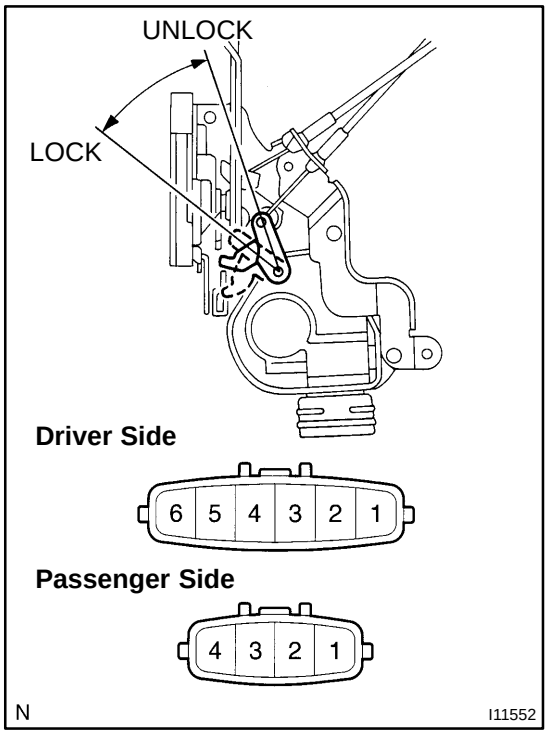
2. INSPECT POWER WINDOW MASTER SWITCH CIRCUIT (See page DI-935)



3. INSPECT DOOR KEY LOCK AND UNLOCK SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	2 - 4	Continuity
OFF	-	No continuity
UNLOCK	2 - 3	Continuity

If continuity is not as specified, replace the door lock assembly.



4. INSPECT DRIVER SIDE DOOR UNLOCK DETECTION SWITCH CONTINUITY

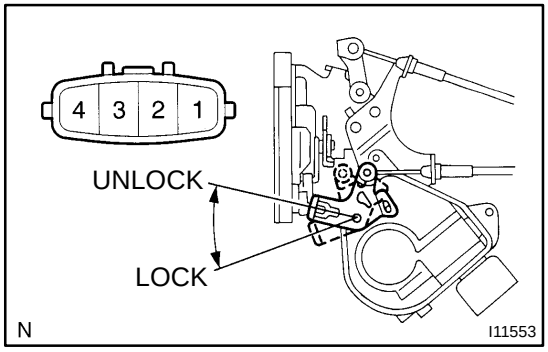
Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	-	No continuity
ON (Door Lock set to UNLOCK)	1 - 2	Continuity

If continuity is not as specified, replace the door lock assembly.

5. INSPECT PASSENGER DOOR UNLOCK DETECTION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	-	No continuity
ON (Door Lock set to UNLOCK)	3 - 4	Continuity

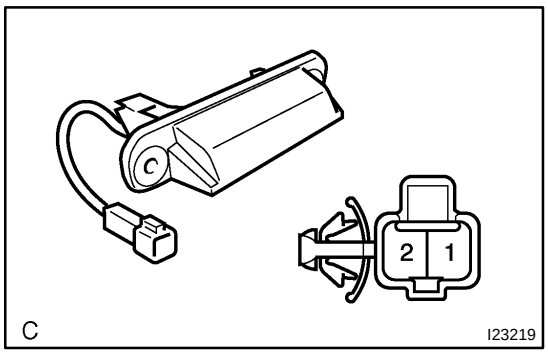
If continuity is not as specified, replace the door lock assembly.



6. INSPECT REAR DOOR UNLOCK DETECTION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	-	No continuity
ON (Door Lock set to UNLOCK)	1 - 2 (LH side) 3 - 4 (RH side)	Continuity

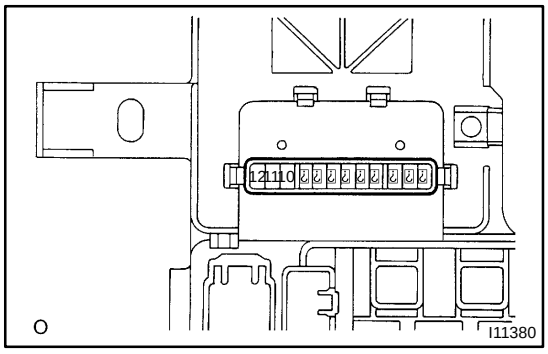
If continuity is not as specified, replace the door lock assembly.



7. INSPECT BACK DOOR OPENER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	-	No continuity
ON	1 - 2	Continuity

If continuity is not as specified, replace the switch.



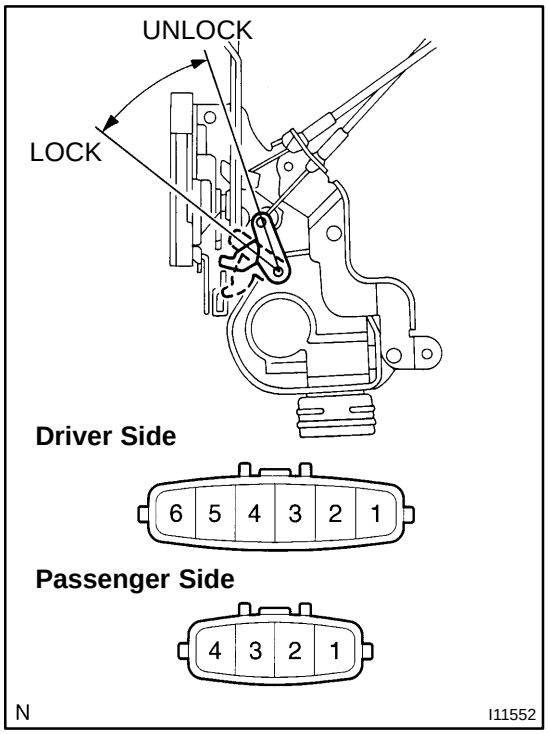
8. INSPECT DOOR LOCK MOTOR AND J/B CIRCUIT

(a) Remove the body ECU from the driver's side junction block.

(b) Connect the positive (+) lead from the battery to J/B terminal 9 and the negative (-) lead to J/B terminal 10, and check that the door lock link moves to LOCK position.

(c) Reverse the polarity and check that the door link moves to UNLOCK position.

If operation is not as specified, inspect door lock motor.



9. INSPECT DRIVER SIDE DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 5 and the negative (-) lead to terminal 6, and check that the door lock link moves to LOCK position.

(b) Reverse the polarity and check that the door lock link moves to UNLOCK position.

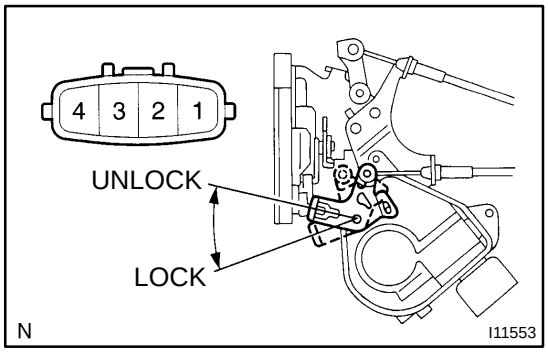
If operation is not as specified, replace the door lock assembly.

10. INSPECT PASSENGER SIDE DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, and check that the door lock link moves to LOCK position.

(b) Reverse the polarity and check that the door lock link moves to UNLOCK position.

If operation is not as specified, replace the door lock assembly.



11. INSPECT REAR DOOR LOCK MOTOR OPERATION ( ): RH side

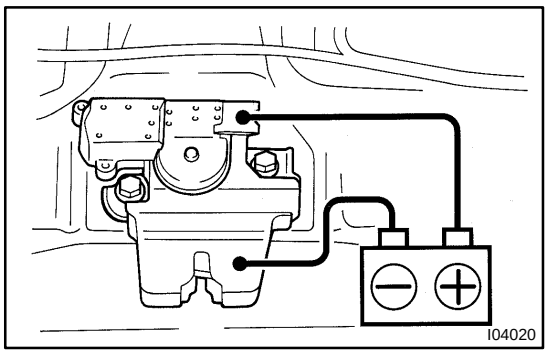
(a) Connect the positive (+) lead from the battery to terminal 3 (1) and the negative (-) lead to terminal 4 (2), and check that the door lock link moves to LOCK position.

(b) Reverse the polarity and check that the door lock link moves to UNLOCK position.

If operation is not as specified, replace the door lock assembly.

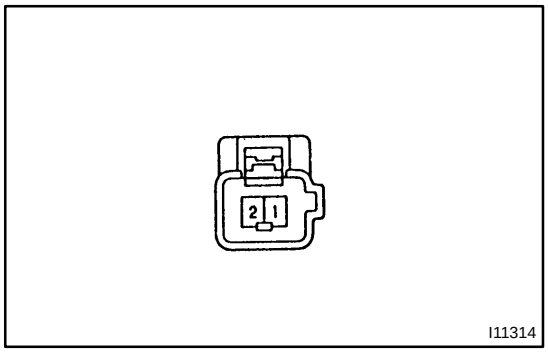
12. INSPECT DOOR LOCK MOTOR CIRCUIT

(See page DI-931)

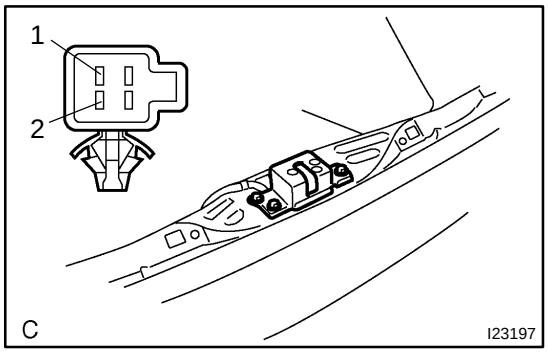


13. INSPECT LUGGAGE COMPARTMENT DOOR OPENER MOTOR OPERATION

Connect positive (+) lead to the terminal 1 and negative (-) lead to the opener motor body, and check that the motor operates.
If operation is not as specified, replace the motor assembly.



14. INSPECT LUGGAGE COMPARTMENT DOOR OPENER MOTOR CIRCUIT (See page DI-927)



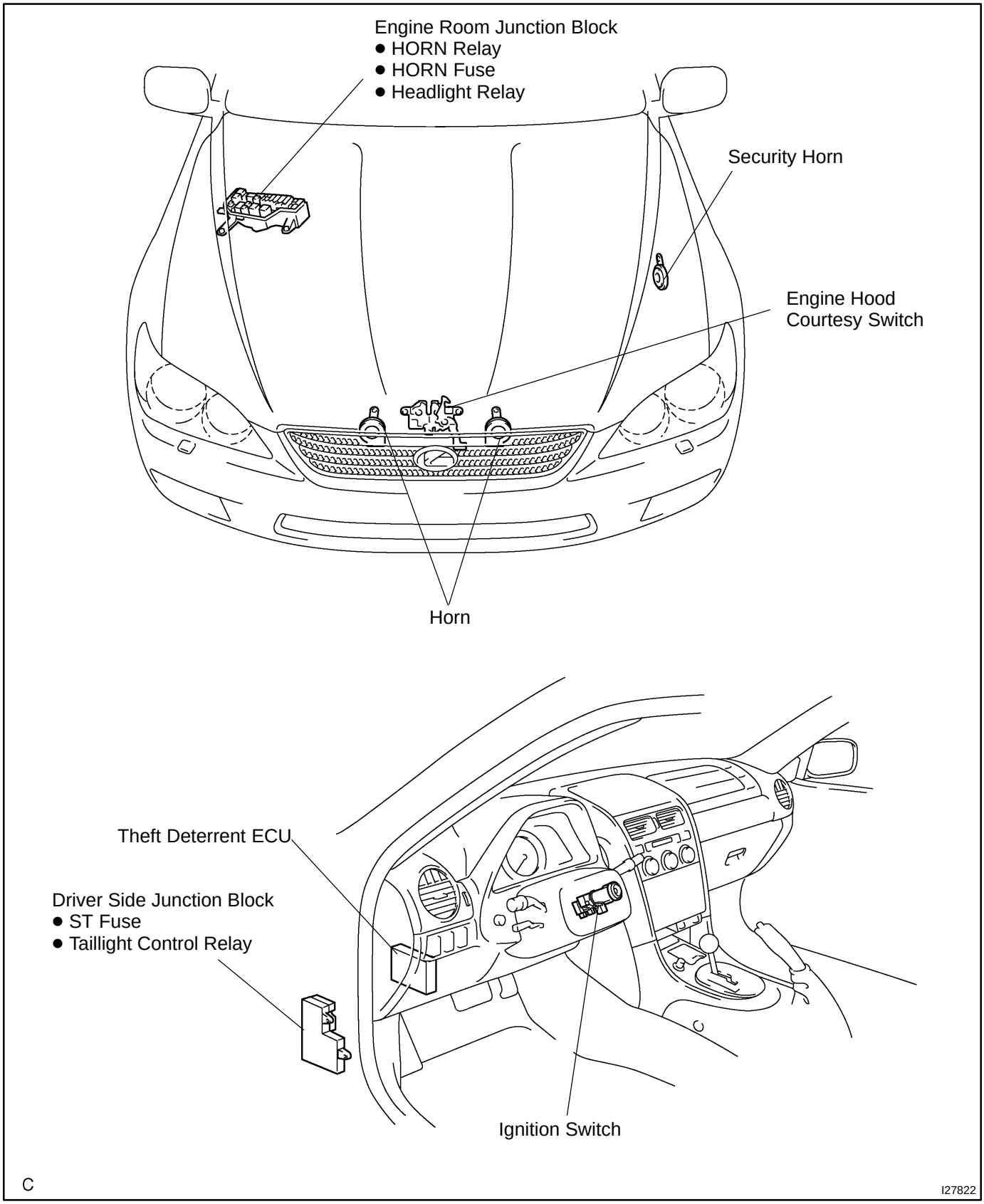
15. INSPECT BACK DOOR OPENER MOTOR OPERATION

Connect positive (+) lead to the terminal 1 and negative (-) lead to the terminal 2, and check that the motor operates.
If operation is not as specified, replace the motor assembly.

THEFT DETERRENT SYSTEM

BE2A5-02

LOCATION



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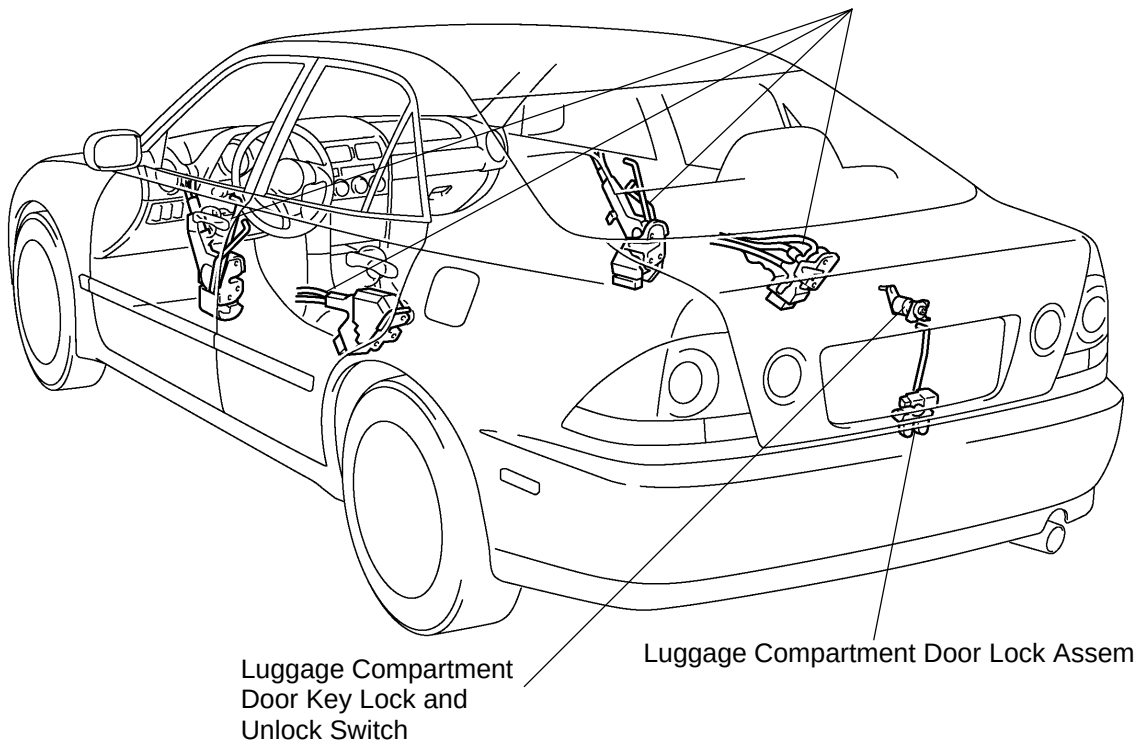

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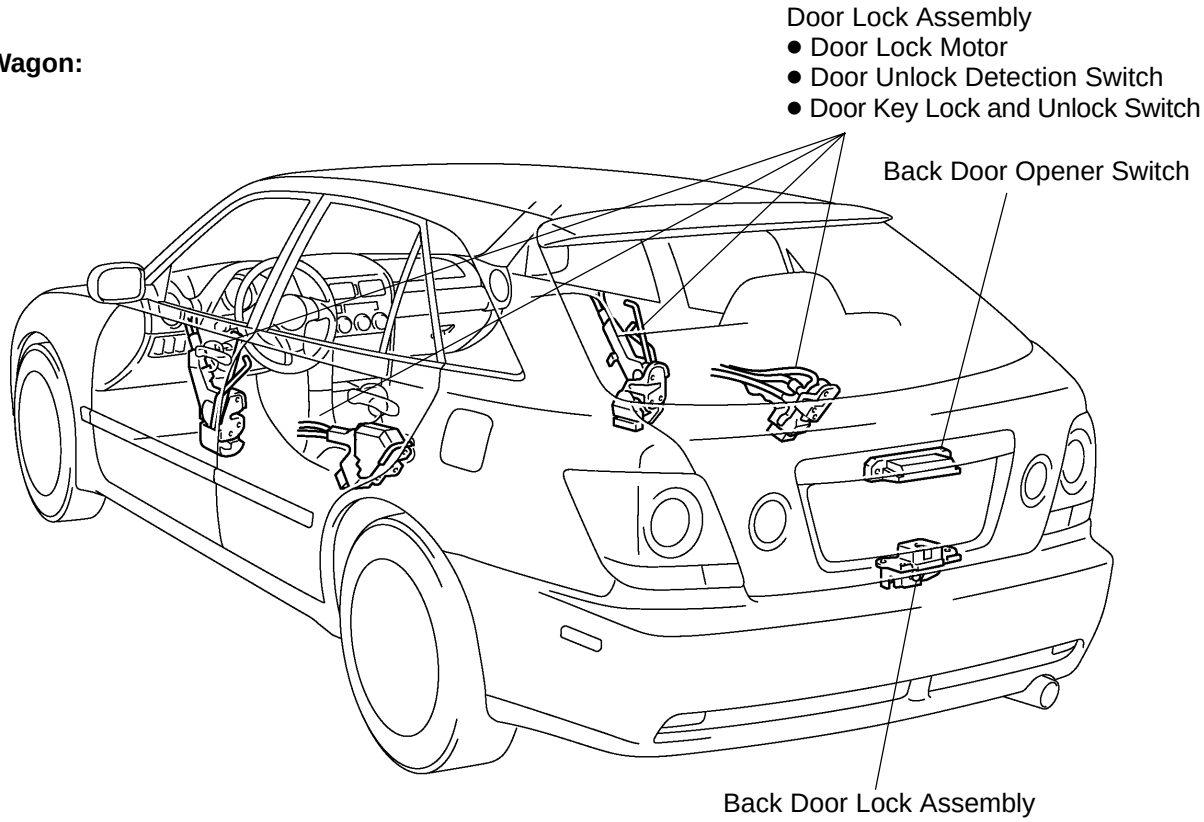

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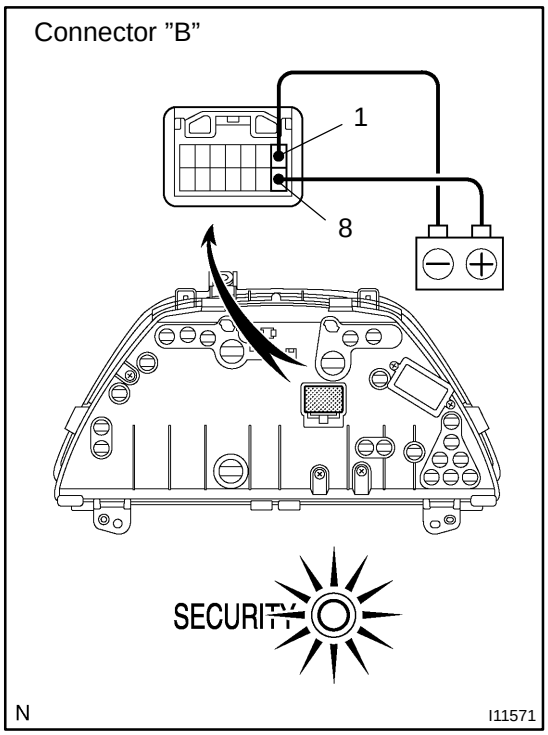
BE16R-03

INSPECTION



1. INSPECT THEFT DETERRENT INDICATOR LIGHT OPERATION

(a) Remove the combination meter.

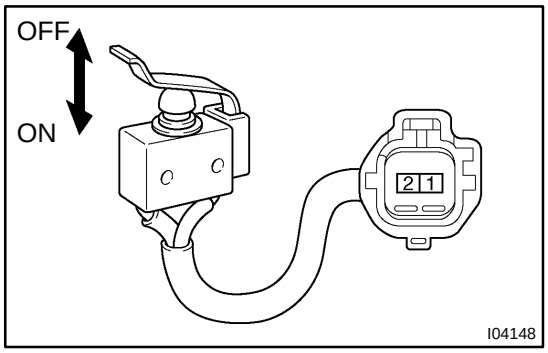
(b) Disconnect the combination meter connector.

(c) Check indicator light lights up when connect the positive (+) lead from the battery to terminal B8 and the negative (-) lead to terminal B1 of combination meter connector.

If operation is not as specified, replace the indicator light.

2. INSPECT THEFT DETERRENT INDICATOR LIGHT CIRCUIT

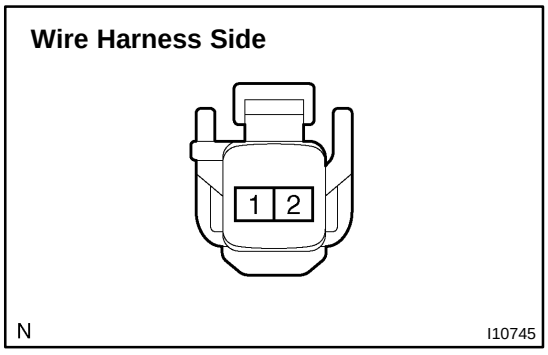
(See page DI-790)



3. INSPECT ENGINE HOOD COURTESY SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	-	No continuity
ON (opened)	1 - 2	Continuity

If continuity is not as specified, replace the switch.



4. INSPECT ENGINE HOOD COURTESY SWITCH CIRCUIT

(See page DI-816)

Disconnect the connector from the switch and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
2 - Ground	Always	Continuity

If circuit is not as specified, inspect power source or wire harness.

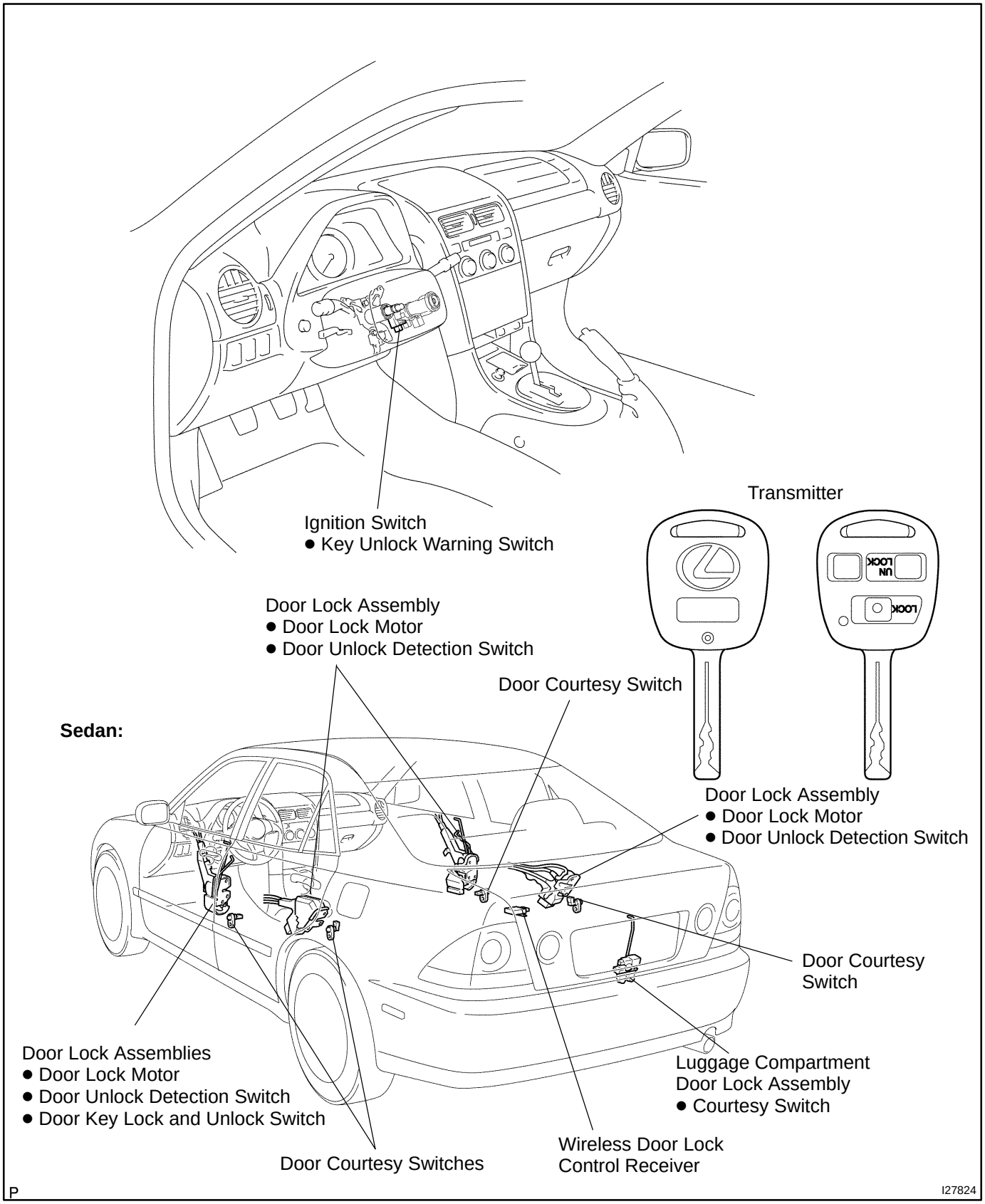
5. INSPECT THEFT DETERRENT SIREN BATTERY

(a) The internal battery is fully discharged.
(b) Set the system inside the vehicle.
(c) Disconnect the connector of theft deterrent ECU in this condition, and sounds the siren for open detection.
(d) The siren battery is normal when the siren sounds for 30 seconds, stops, then after 5 seconds, seconds again.
(e) Replace the siren battery when the siren stops sounding before 30 seconds elapse the battery because the battery life has run out.

WIRELESS DOOR LOCK CONTROL SYSTEM

LOCATION

BE2A6-03



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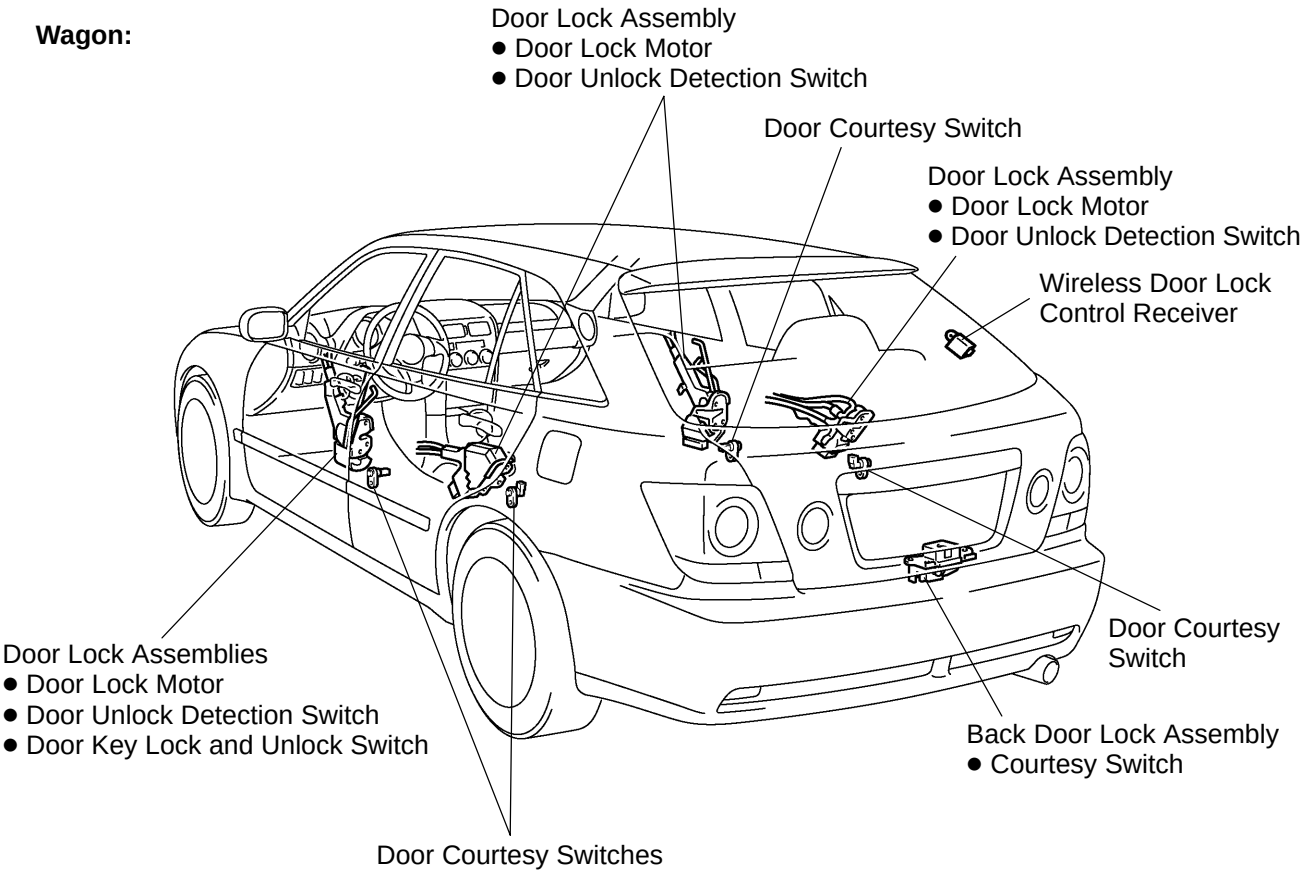

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I27825

BE0GN-11

PRE-CHECK

Only wireless function (Remote control) will not operate.
(If a new transmitter or a transmitter of the same type that works properly with the vehicle is not available.)

Make the vehicle in the initialized condition:
The initialized condition is the condition when the following conditions are satisfied.
(1) Key plate has not been inserted in the ignition key cylinder.
(2) All the doors are closed. (Door warning light is OFF.)
(3) All the doors are locked.

Basic function check:

Under the standard operation, when repeating UNLOCK and LOCK switch 3 times or more alternately, check the UNLOCK-LOCK operation from 3rd time onward.
● Following procedures are standard operation.
(1) Keep about 1 M away to the right direction from the outside handle of a driver's seat.
(2) Face the transmitter toward the vehicle and press one of transmitter switches for about 1 sec.
<Reference>
● As of the security function, even the wireless function is normal, there may be the case that only UNLOCK operation will not work.

No

Yes

Transmitter LED inspection:

Check when pressing UNLOCK switch and LOCK switch under standard operation, that the transmitter LED lights up once more.

No

Yes

Normal
<Reference>
● Operative distance may differ according to an operator, the way of holding the transmitter or position.
● Because weak electric wave is used, when there is strong wave or noise in the used frequency ,operation distance might be shortened.

Transmitter battery check:

Replace the transmitter battery with a new or normal one and check UNLOCK-LOCK function works under the standard operation.
<Reference>
● The battery should be replaced by only the shops with sufficient skill as new or normal battery is necessary.
● Battery quality can be judged by checking the remnant volume of the battery.

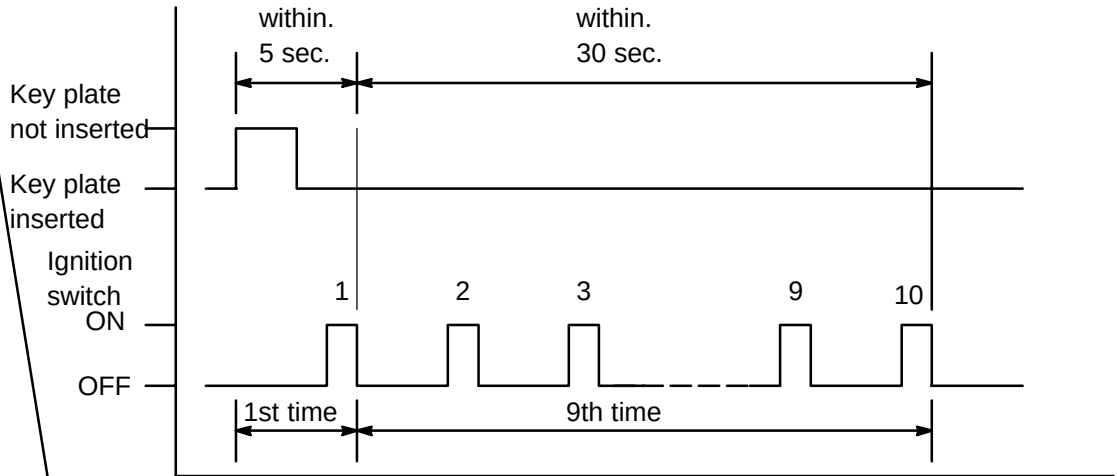
Yes → Battery faulty.

No

Make the vehicle be in the initialized condition.

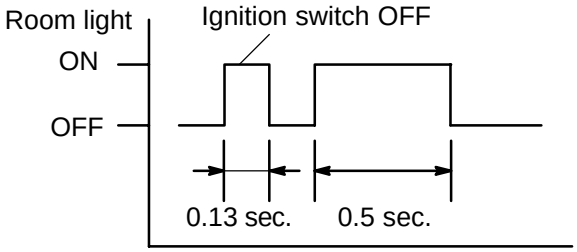
Inspection start by using self diagnostic mode:

Enter into the self diagnostic mode.
If operating door control receiver in the order of 1 through 2, the mode turns to diagnostic mode.
(1) Insert the key plate in the ignition key cylinder and pull out, then insert it again and turn ignition switch OFF → ON → OFF once within 5 seconds after pulling out.
(2) After completing the procedure within 30 seconds, turn the ignition switch OFF → ON → OFF 9 times.
HINT:
In the case that either (1) or (2) condition is not satisfied, transfer to normal mode.
<Reference>
When completing self diagnostic mode, turn the ignition switch ON.
LOCK and UNLOCK operation and output of luggage door opener signal are not performed under the self diagnostic mode.



Self diagnostic mode operation check:

After the self diagnostic mode input operation has been performed, check that the room light



No
(Not entered in self diagnostic mode)

Is the method to enter into the diagnostic mode correct?

No

Yes

Is the chirping function of operation confirmation room light normal?

No

Check door control room light

Yes

Yes
(Entered in self diagnostic mode)

Key unlock warning switch inspection:

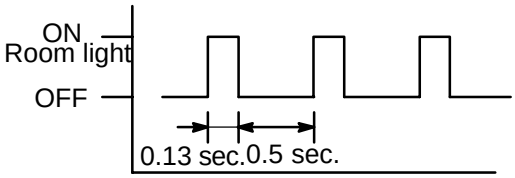
Check that continuity exists between connector terminal A3 of MPX body ECU on the vehicle side and ground by inserting the key plate into the ignition key cylinder.

Check key unlock warning switch.

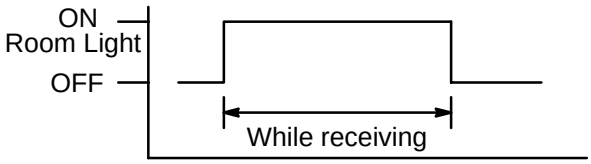
Self diagnostic mode check:

Check that how the room light when pressing each transmitter switch.

(1) Receiver normal wave of LOCK, UNLOCK or TRUCK switch.



(2) Incompatibility of the recognition code or out from synchronization of rolling code.



<Reference>:
While turning the ignition switch ON in the self diagnostic mode, the mode returns to normal mode.

(2) is output.
(All room light response is same.)

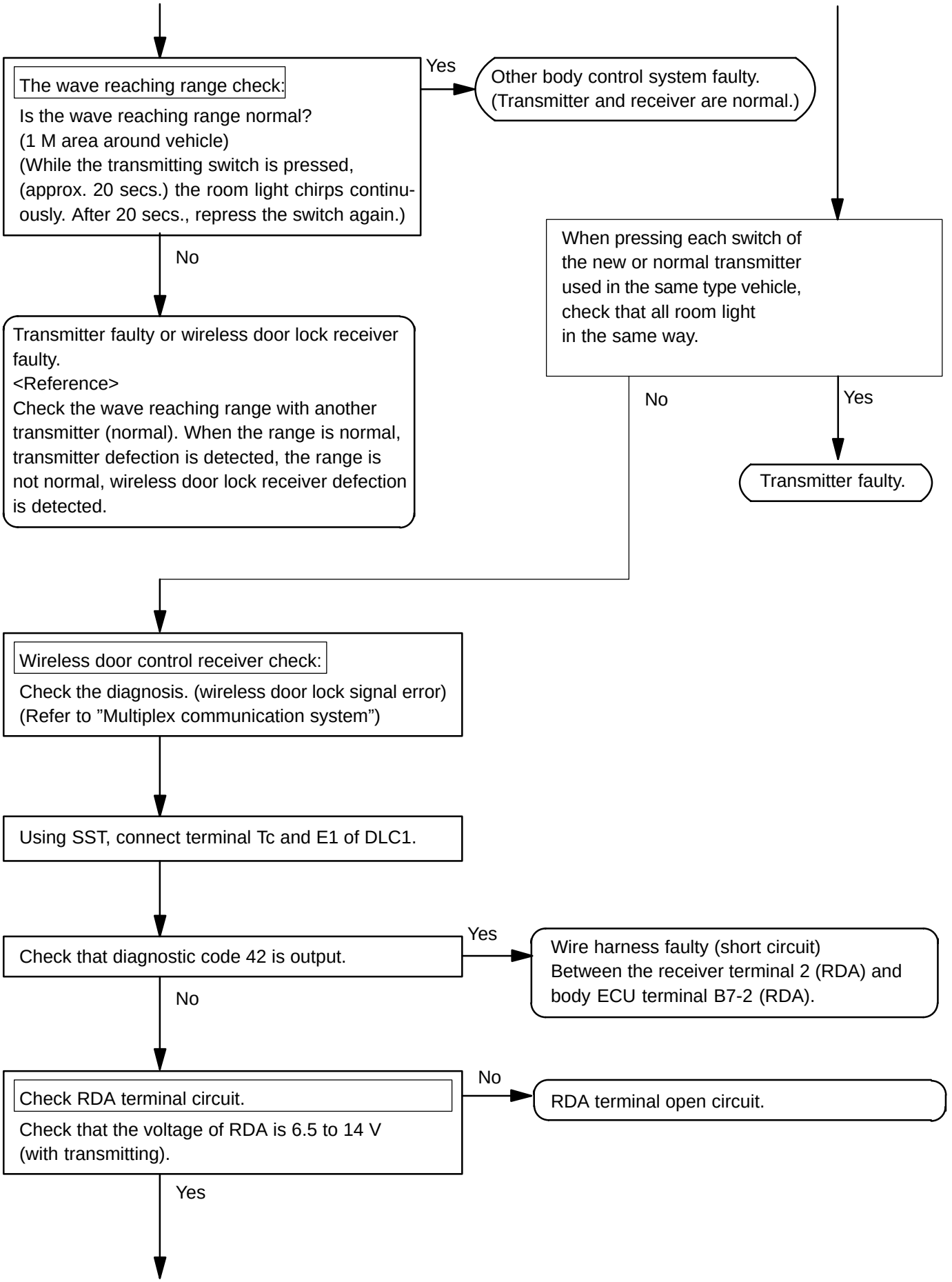
Recognition code registration function check:

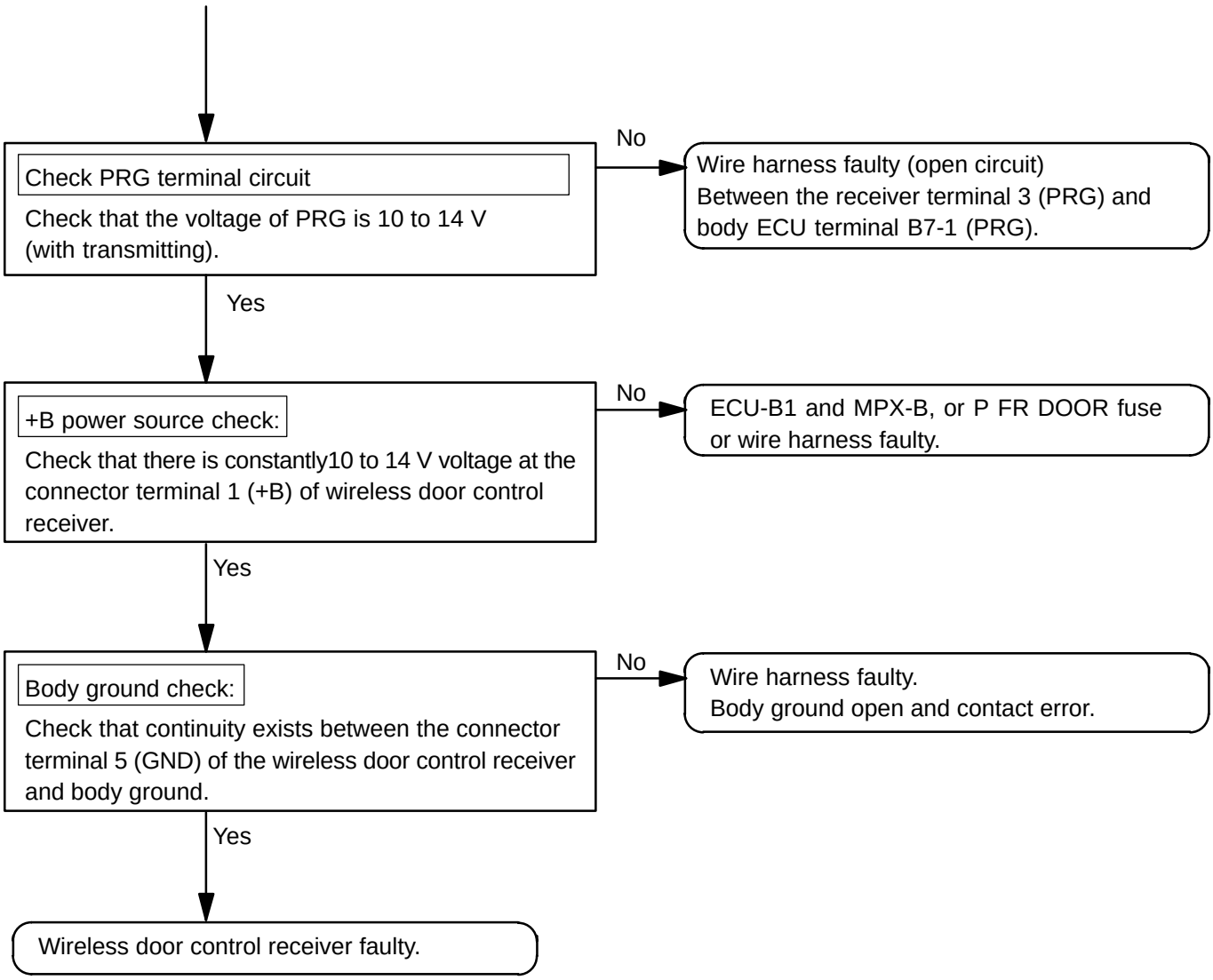
Check that it is possible to enter into rewrite mode or add mode.
(Refer to "Wireless door lock receiver and transmitter" - "Recognition code registration".)

Wireless door lock operates normally when recognition code is registered.

No response from room light

(1) is output.


The wave reaching range check:
Is the wave reaching range normal?
(1 M area around vehicle)
(While the transmitting switch is pressed, (approx. 20 secs.) the room light chirps continuously. After 20 secs., repress the switch again.)
Yes
Other body control system faulty.
(Transmitter and receiver are normal.)
No
Transmitter faulty or wireless door lock receiver faulty.
<Reference>
Check the wave reaching range with another transmitter (normal). When the range is normal, transmitter defection is detected, the range is not normal, wireless door lock receiver defection is detected.
When pressing each switch of the new or normal transmitter used in the same type vehicle, check that all room light in the same way.
No
Yes
Transmitter faulty.
Wireless door control receiver check:
Check the diagnosis. (wireless door lock signal error)
(Refer to ”Multiplex communication system”)
Using SST, connect terminal Tc and E1 of DLC1.
Check that diagnostic code 42 is output.
Yes
Wire harness faulty (short circuit)
Between the receiver terminal 2 (RDA) and body ECU terminal B7-2 (RDA).
No
Check RDA terminal circuit.
Check that the voltage of RDA is 6.5 to 14 V (with transmitting).
No
RDA terminal open circuit.
Yes


Check PRG terminal circuit
Check that the voltage of PRG is 10 to 14 V (with transmitting).
No
Wire harness faulty (open circuit)
Between the receiver terminal 3 (PRG) and body ECU terminal B7-1 (PRG).
Yes
+B power source check:
Check that there is constantly10 to 14 V voltage at the connector terminal 1 (+B) of wireless door control receiver.
No
ECU-B1 and MPX-B, or P FR DOOR fuse or wire harness faulty.
Yes
Body ground check:
Check that continuity exists between the connector terminal 5 (GND) of the wireless door control receiver and body ground.
No
Wire harness faulty.
Body ground open and contact error.
Yes
Wireless door control receiver faulty.

BE1WW-02

INSPECTION

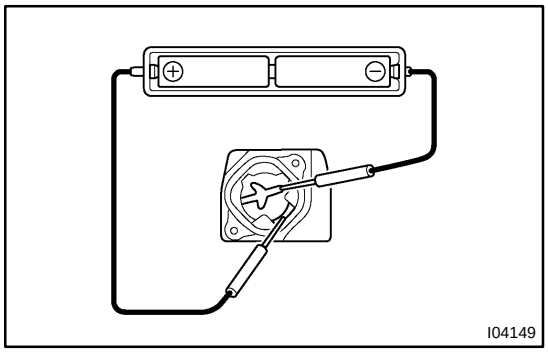
1. INSPECT WIRELESS DOOR LOCK TRANSMITTER OPERATION

HINT:

Refer to "Wireless door lock control transmitter battery replacement" on page BE-140 .

(a) Using a screwdriver, remove the screw and cover.

(b) Remove the battery (lithium battery).



(c) Install a new or normal battery (lithium battery).

HINT:

When a new or normal battery can not be obtained, connect 2 new 1.5 V batteries in series, connect the battery (+) to the battery receptacle side terminal and battery (-) to the bottom terminal, then apply 3 V voltage to the transmitter.

(d) In the location where is approx. 1 M away from driver's outside handle in the right direction, face the key plate of the transmitter to the vehicle, and check the transmitter operation when pressing transmission switch on the side of the transmitter body.

Standard:

- **Remote control of vehicle door lock can be operated.**
- **LED lights up more than once.**

HINT:

- The minimum operation distance differs according to operator, the way of holding the transmitter, and location.
- As weak wave is used, operation distance might be shortened when noise is detected in strong wave or used frequency.

(e) Install the battery (lithium battery).

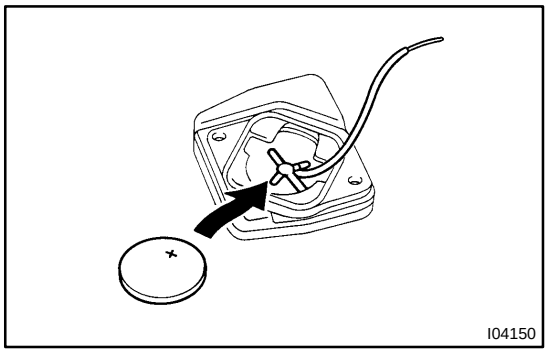
(f) Install a cover so that O-ring is not distorted or slipped off.

(g) Using a screwdriver, tighten the screw.

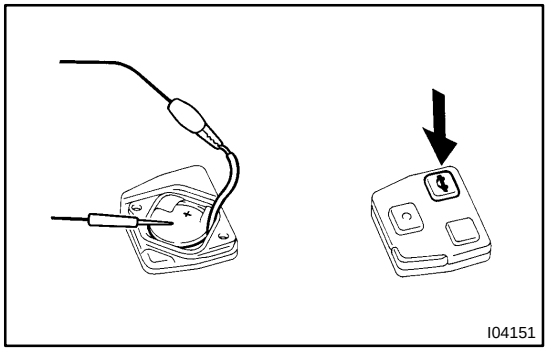
2. CHECK BATTERY CAPACITY

HINT:

- Make sure to use the LEXUS electrical tester.
- With the battery unloaded, judge can not be made whether the battery is available or not on the test.
- When the transmitter is faulty, the energy amount left in the battery might not be checked correctly.
- On the lithium battery used for the transmitter, the voltage more than 2.5 V with the battery unloaded is shown on the tester until the energy is completely consumed.
  Accordingly when inspecting the energy amount left in the battery, it is necessary to measure the voltage when the battery is loaded. (1.2 kΩ).



(a) Remove the screws and cover using a (-) driver.
(b) Remove the battery (lithium battery) from the transmitter.
(c) Connect the lead to the (-) terminal of the transmitter and install the battery.

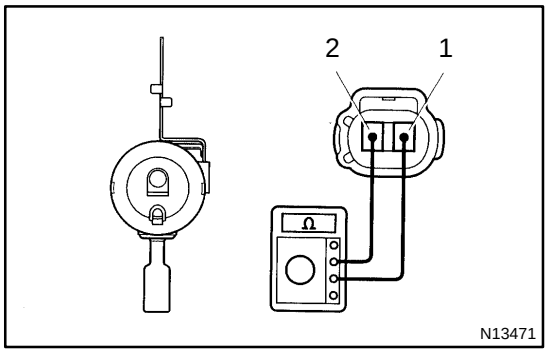


(d) Connect the (+) tester to the (+) battery (lithium battery), and (-) tester to the lead respectively.
(e) Press one of the transmitting switches on the transmitter for approx. 1 second.
(f) Press the transmitting switch on the transmitter again to check the voltage.
Standard: 2.1 V or more

HINT:

- When the temperature of the battery is low, the judge can not be made correctly.
  When the outcome of the test is less than 2.1 V, conduct the test again after leaving the battery in the place at 18 °C for more than 30 minutes.
- By auto power off function, the voltage becomes no load voltage (more than 2.5 V) condition 0.8 seconds after the switch was pressed.
  Make sure to read the voltage before of it.
- High voltage might be shown 1 to 2 times after leaving the battery, judge should be made with the voltage shown at the 3rd time or later.

(g) Disconnect the lead.
(h) Set the battery (lithium battery) in the transmitter.
(i) Install the cover, so that the O-ring is not distorted or slipped off.
(j) Using a screwdriver, tighten the screws.

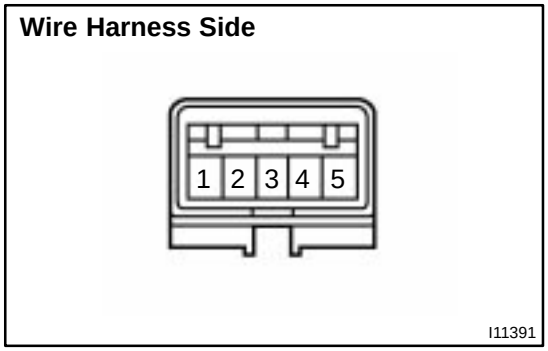


3. INSPECT WIRELESS DOOR LOCK BUZZER OPERATION

Connect the positive (+) lead from the ohmmeter to terminal 1 and the negative (-) lead to terminal 2, and measure resistance of approx. 1 kΩ.

If resistance is not as specified, replace the buzzer.

4. INSPECT WIRELESS DOOR LOCK BUZZER CIRCUIT (See page DI-945)



5. Connector disconnected:
INSPECT WIRELESS DOOR LOCK CONTROL RECEIVER CIRCUIT (See page DI-905)

Disconnect the connector from the receiver and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
1 - Ground	Always	Continuity
5 - Ground	Always	Battery Positive Voltage

If the circuit is not as specified, inspect the circuits connected to other parts.

6. Connector connected:
INSPECT WIRELESS DOOR LOCK CONTROL RECEIVER CIRCUIT

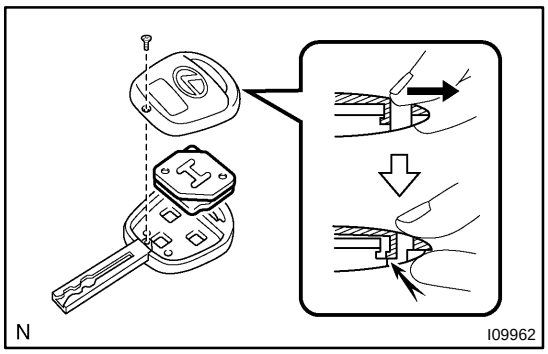
Connect the wire harness side connector to the receiver and inspect the wire harness side connector from the back side, as shown.

Tester connection	Condition	Specified condition
3 - Ground	Always	Battery Positive Voltage
2 - Ground	All door closed Transmitter OFF → ON	0 V - 6 V → 0 V

If circuit is as specified, replace the receiver.
If the circuit is not as specified, inspect the circuits connected to other parts.

BE0GP-17

REPLACEMENT



1. REPLACE TRANSMITTER (LITHIUM) BATTERY

NOTICE:

Special caution should be taken for handling each component as they are precision electronic components.

(a) Using a screwdriver, remove the screw and cover.

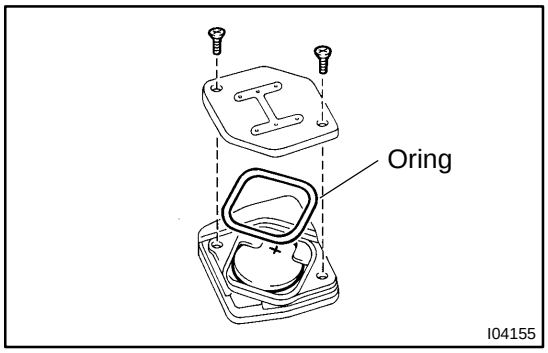
NOTICE:

Do not pry out the cover forcibly.

HINT:

Push the cover with a finger as shown in the illustration, so that there becomes clearance, then pry out the cover from that clearance.

(b) Remove the transmitter.

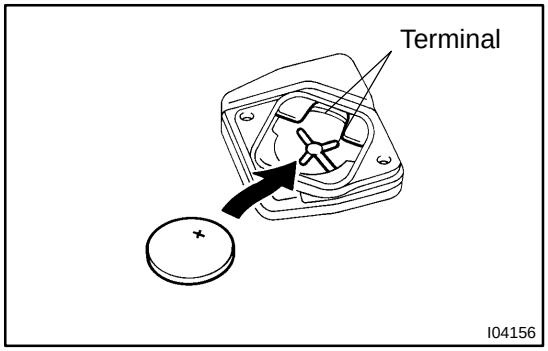


(c) Using a screwdriver, remove the 2 screws and cover.

(d) Remove the battery (lithium battery).

NOTICE:

- **Do not push the terminals with a finger.**
- **If prying up the battery (lithium battery) forcibly to remove, the terminals are deformed.**



(e) Install a battery (lithium battery) as shown in the illustration.

NOTICE:

Face the battery upward. Take care not to deform the terminals.

(f) Check that O-ring is not distorted or slipped off, and install the cover.

(g) Using a screwdriver, tighten the 2 screws.

NOTICE:

When the shrews are tightened loosely, it might cause faulty contact of battery (lithium battery) and terminals.

(h) Assemble the transmitter to the key plate and the cover.

(i) Using a screwdriver, tighten the screw.

2. REPLACE DOOR CONTROL RECEIVER AND TRANSMITTER

NOTICE:

When replacing the door control receiver and transmitter, registration of recognition code is necessary because they are provided as single components.

(a) Select which operation mode should be performed from the following modes.
- Add mode
- Rewrite mode
- Prohibition mode
- Confirmation mode

HINT:
- The add mode is used to retain codes already registered while you register new recognition codes. This mode is used when adding a transmitter. However, if the number of registered codes exceeds 4 codes, previously registered codes are correspondingly erased in order, starting from the first registered code.
- The rewrite mode is used to erase all previously registered codes and register only new recognition codes.
- The prohibition mode is used to erase all registered codes and cancels the wireless door lock function. Use this mode when the transmitter is lost.
- The confirmation mode is for confirming how many recognition codes are already registered before you register additional recognition codes.

(b) Follow the chart on the following pages to register the transmitter recognition code at the wireless door lock control receiver.

HINT:
- When procedure is out of the specified, the operation returns to normal operation.
- Maximum 4 recognition codes can be registered.

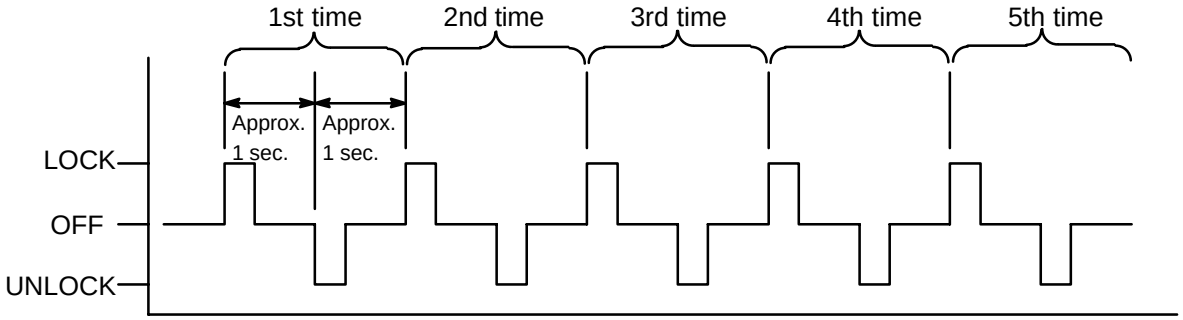
Start registration of recognition code

The vehicle should be in the following conditions.
- The key is not inserted in the ignition key cylinder.
- Driver's door is OPEN. (Other doors are CLOSED)
- Driver's door is UNLOCKED.

Insert the key into the ignition key cylinder, then pull it out.

Within 40 secs.

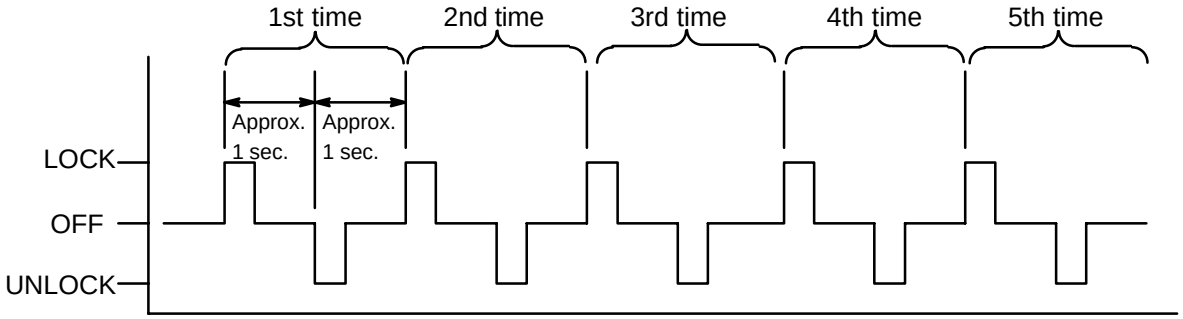
Press the door lock control switch (for manual operation) 5 times to LOCK/UNLOCK at approx. 1 sec. interval.



Close the driver's door, then open it.

Within 40 secs.

Again press the door lock control switch (for manual operation) 5 times to LOCK/UNLOCK at approx. 1 sec. interval.

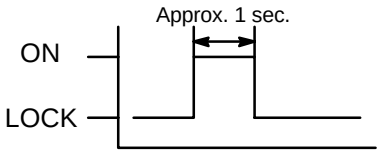


Insert the key into the ignition key cylinder.

Turn the ignition switch from ON to LOCK at approx. 1 sec. interval 1 to 5 times to select the mode.

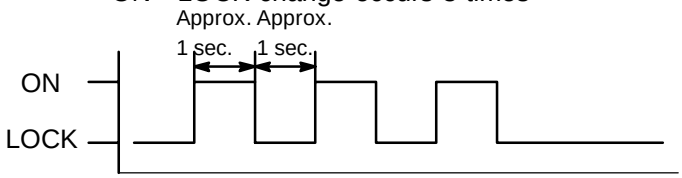
Add mode

ON - LOCK change occurs 1 time



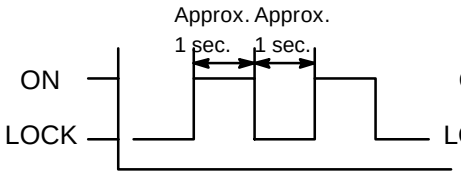
Confirmation mode

ON - LOCK change occurs 3 times



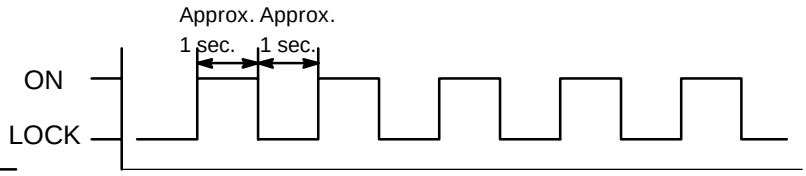
Rewrite mode

ON - LOCK change occurs 2 times



Prohibition mode

ON - LOCK change occurs 5 times



Pull out the key plate from the ignition key cylinder.

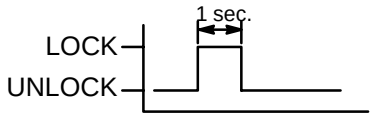
When add mode or rewrite mode is selected.

MPX body ECU automatically performs the LOCK-UNLOCK operation once or twice at 1 sec. interval to inform the operator that either the add mode or rewrite mode has been selected.

Within 3 secs.

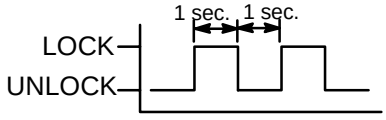
LOCK-UNLOCK occurs once

Indicates that add mode has been selected.



LOCK-UNLOCK occurs twice

Indicates that rewrite mode has been selected.

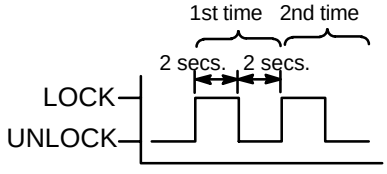


When prohibition mode is selected.

When confirmation mode is selected.

MPX body ECU automatically performs the LOCK-UNLOCK operation 1 to 4 times at 2 sec. interval to inform the operator of the number of the registered codes.
HINT:
When the number of the registered code is 0, the operation is automatically performed 5 times.

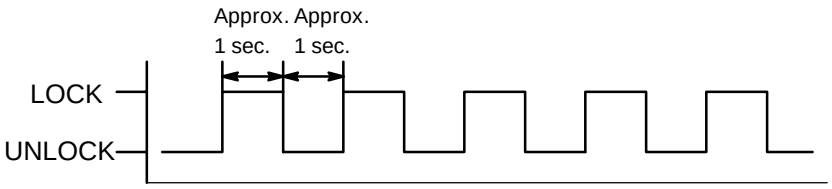
Example:
When the operation is performed twice, it directs that 2 types of recognition code have been registered.



Registration of recognition code (Confirmation mode and prohibition mode) is completed.

When prohibition mode is selected.

MPX body performs LOCK-UNLOCK operation 5 times at a 1 sec. interval to inform the operator that prohibition mode has been selected.



Within 40 secs.

Press the lock and unlock switches on the transmitter simultaneously within. 1.5 sec.

Within 3 secs.

Press again either one of 3 switches on the transmitter for more than 1 sec.

Within 3 secs.

MPX body ECU automatically performs LOCK-UNLOCK operation once or twice at a 1 sec. interval to inform the operator that the receiver has received the signal from the transmitter.

LOCK-UNLOCK occurs once

Registration of recognition code is completed

LOCK-UNLOCK occurs twice

Registration of recognition code has not been completed.
- Recognition code received first time and second time did not match.

If LOCK-UNLOCK operation can not be performed at all, the mode returns to the normal mode, then start with ”Start registration of recognition code”.

Proceed to finish registration

Proceed to continue registration

Within 40 secs.

If even one of the following conditions is satisfied, registration of recognition codes is completed.
- 40 secs. elapses since the MPX body ECU response.
- The driver’s door is closed.
- The key plate is inserted in the ignition key cylinder.
- 4 type recognition codes are registration at one time.

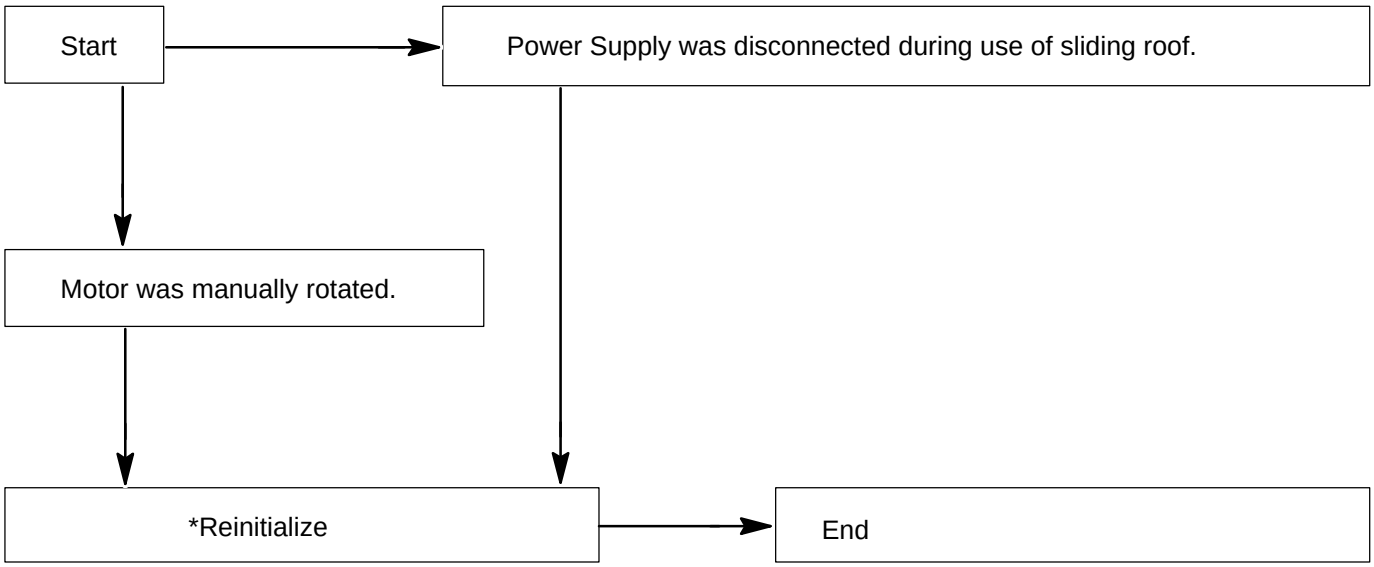
Registration of recognition codes (add mode or rewrite mode) is completed.

SLIDING ROOF SYSTEM

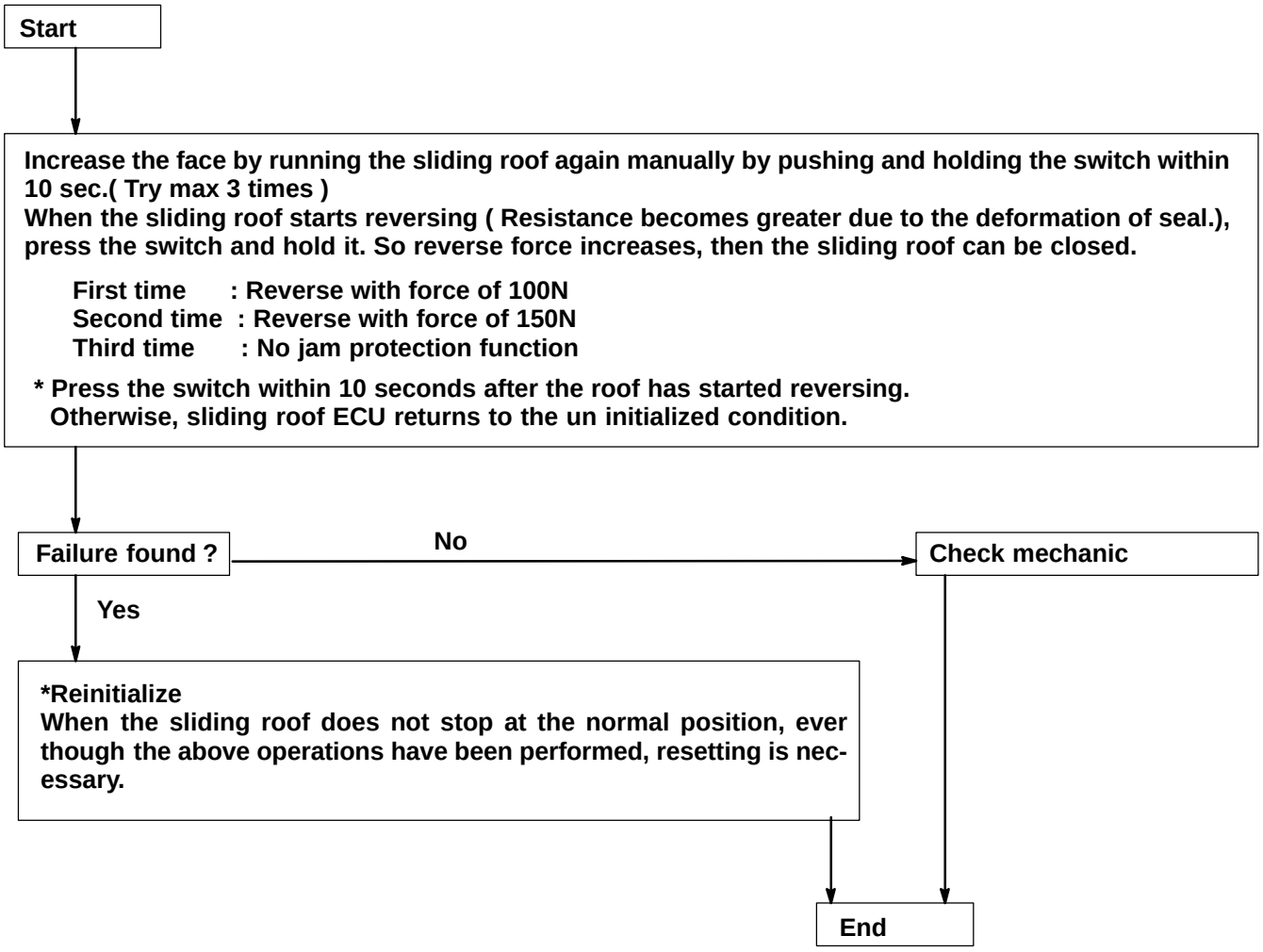
TROUBLESHOOTING

BE0O9-08

1	**Sliding Roof does not stop at correct position.**



2	**Sliding Roof always reopens (anti trap function).**

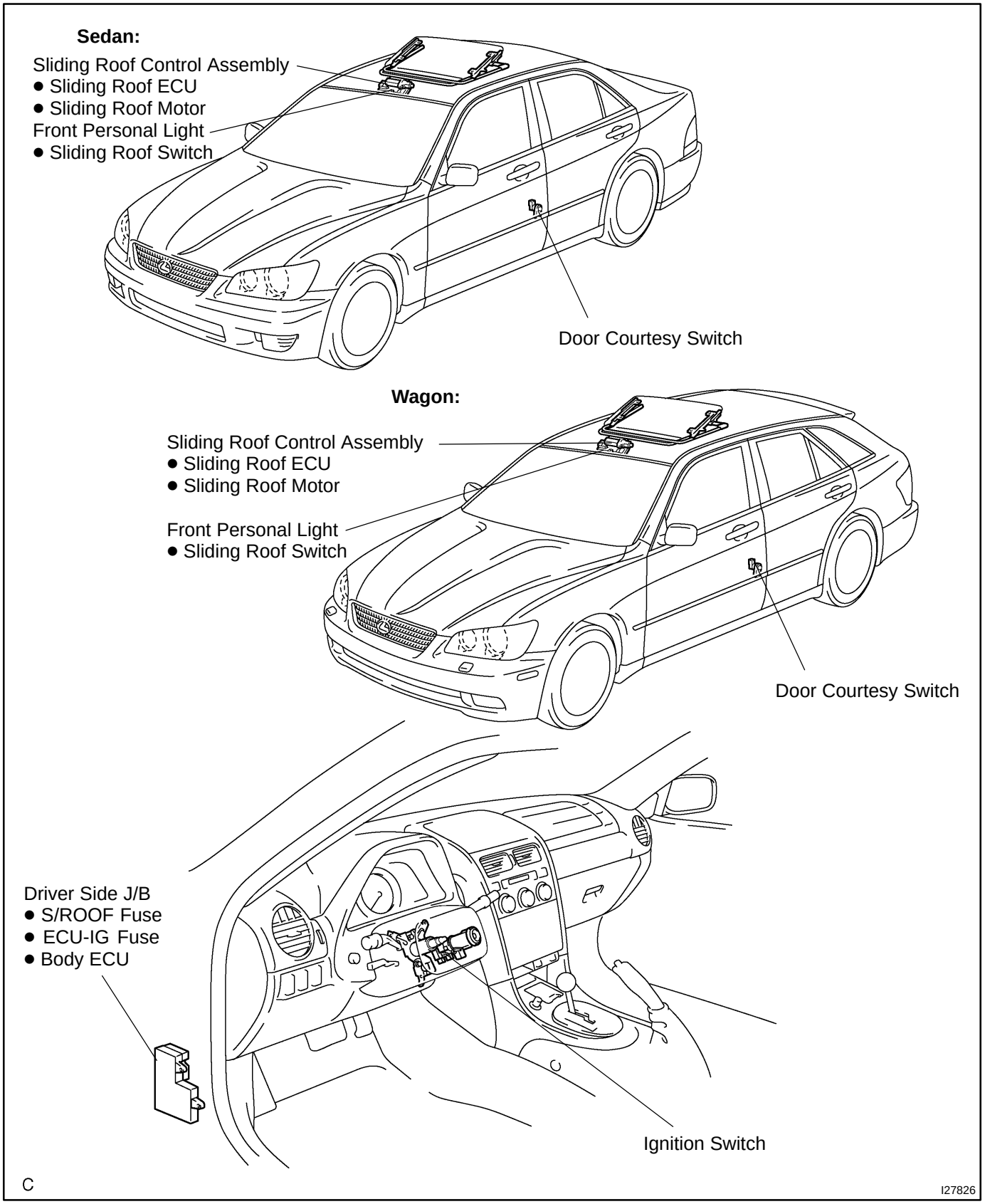


*Reinitializing method
(a) Move the sliding roof to the maximum tilted position.
(b) Release the switch, press the switch again and hold it for 10 secs.
(c) The sliding roof operates in a cycle of TILT DOWN → SLIDE OPEN → SLIDE CLOSE → TILT UP.
THis completes reinitializing.

SLIDING ROOF SYSTEM

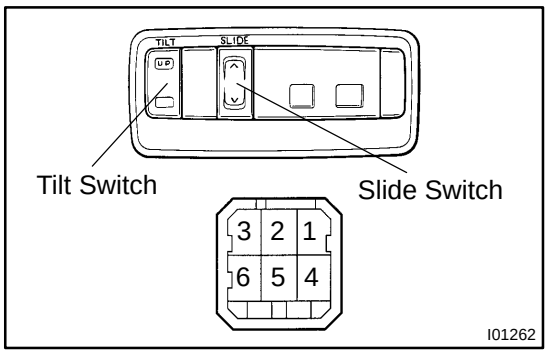
LOCATION

BE05Q-07



BE10K-05

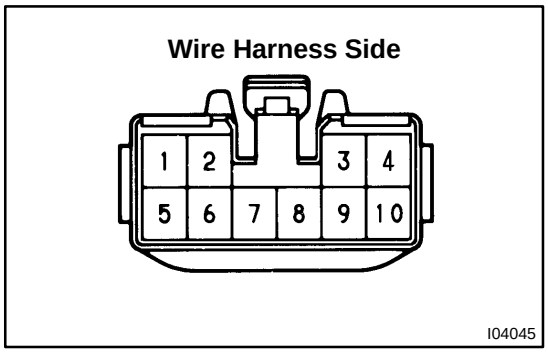
INSPECTION



1. INSPECT SLIDING ROOF SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
SLIDE OPEN	3 - 4	Below 10 Ω
SLIDE OFF	3 - 4, 4 - 6	10k Ω or higher
SLIDE CLOSE	4 - 6	Below 10 Ω
TILT DOWN	2 - 4	Below 10 Ω
TILT OFF	2 - 4, 4 - 5	10k Ω or higher
TILT UP	4 - 5	Below 10 Ω

If continuity is not as specified, replace the front personal light (sliding roof switch).



2. INSPECT SLIDING ROOF CONTROL ASSEMBLY CIRCUIT

Disconnect the connector from the sliding roof control assembly and inspect the connector on the wire harness side, as shown in the chart below.

Tester connection	Condition	Specified condition
5 - Ground	Sliding roof control switch (TILT) UP	Below 100 Ω
6 - Ground	Sliding roof control switch (TILT) DOWN	Below 100 Ω
1 - Ground	Sliding roof control switch (SLIDE) CLOSE	Below 100 Ω
2 - Ground	Sliding roof control switch (SLIDE) OPEN	Below 100 Ω
8, 7 - Ground	Always	Below 1 V
10 - Ground	Front door is opened	Below 1 Ω
3 - Ground	Ignition switch LOCK or ACC	Below 2 V
3 - Ground	Ignition switch ON	10 to 14 V
4 - Ground	Always	10 to 14 V

If the circuit condition is as specified, replace the sliding roof control assembly.

3. CHECK AUTO SLIDE-OPEN/CLOSE OPERATION

NOTICE:

If the sliding roof system has not been initialized, then AUTO slide open/close operation does not work.

HINT:

Initialize the sliding roof system after any of the following is done:

- The battery is disconnected.
- The S/ROOF fuse is replaced.
- The sliding roof assembly (sliding roof ECU) is replaced.
- The sliding roof is removed and then reinstalled or replaced.

(a) Initialize the sliding roof system.
  (1) Turn the ignition switch to the ON position.
  (2) Using the tilt switch, tilt the roof fully upward, and then fully downward.
  (3) Using the slide switch, fully open the roof, and then fully close it.

(b) Check AUTO slide-open operation.
  (1) Turn the ignition switch to the ON position.
  (2) If the roof glass is not fully closed, slide or tilt it so that it is fully closed.
  (3) Press the sliding roof OPEN switch for 0.3 seconds or more. The roof glass should automatically slide open and stop slightly before the fully open position.

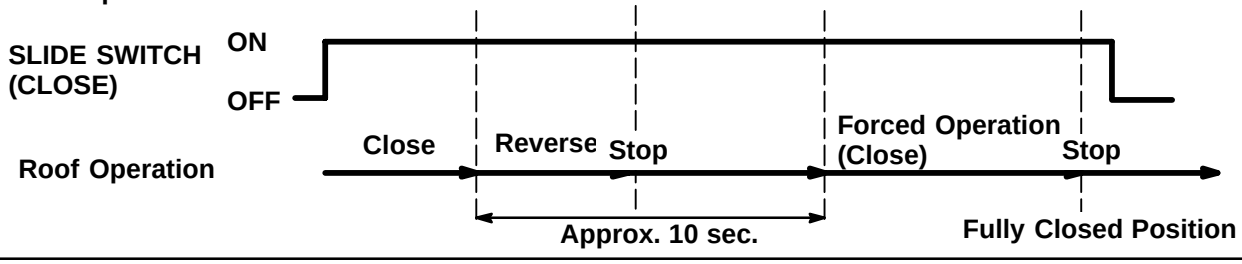
(c) Check the AUTO slide-close operation.
  (1) Turn ignition switch to the ON position.
  (2) Press the sliding roof CLOSE switch for 0.3 seconds or more. The roof glass should automatically close.
  (3) If the CLOSE, OPEN, UP, or DOWN switch is pressed while the roof glass is in motion, the roof glass will stop moving.
  (4) If the roof glass cannot be fully closed using AUTO operation (opens due to the jam protection function):
  - Visually check if there is any foreign object between the sliding roof rail and the sliding roof glass.
  - Check if the alignment of the sliding roof glass is within the specified range (see page BO-126).

  If no problems are found with the above checks, then perform the following operation to fully close the roof glass forcibly and check if AUTO operation return to normal. (Forced operation)

Perform forced operation.*

Caution:
The jam protection function does not operate during forced operation.
Be careful not to get any part of your body caught between the vehicle body and the roof glass.

***: Pressing and holding the CLOSE switch inhibits the jam protection function approx.10 sec. after starting the reverse operation.**
If the switch is kept pressed, the sliding roof starts close operation and stops when detecting the fully closed position.



If the roof glass does not operate normally even after performing above procedures, then replace the sliding roof control assembly.

4. CHECK AUTO TILT-UP/DOWN OPERATION

NOTICE:

If the sliding roof system has not been initialized, then AUTO slide tilt-up/down operation does not work.

HINT:

Initialize the sliding roof system after any of the following is done:

- The battery is disconnected.
- The S/ROOF fuse is replaced.
- The sliding roof assembly (sliding roof ECU) is replaced.
- The sliding roof is removed and then reinstalled or replaced.

(a) Initialize the sliding roof system.
  (1) Turn the ignition switch to the ON position.
  (2) Using the tilt switch, tilt the roof fully upward, and then fully downward.
  (3) Using the slide switch, fully open the roof, and then fully close it.

(b) Check AUTO tilt-up operation.
  (1) Turn the ignition switch to the ON position.
  (2) If the roof glass is not fully closed, slide or tilt it so that it is fully closed.
  (3) Press the sliding roof UP switch for 0.3 seconds or more. The roof glass should automatically tilt upward until it is fully open.

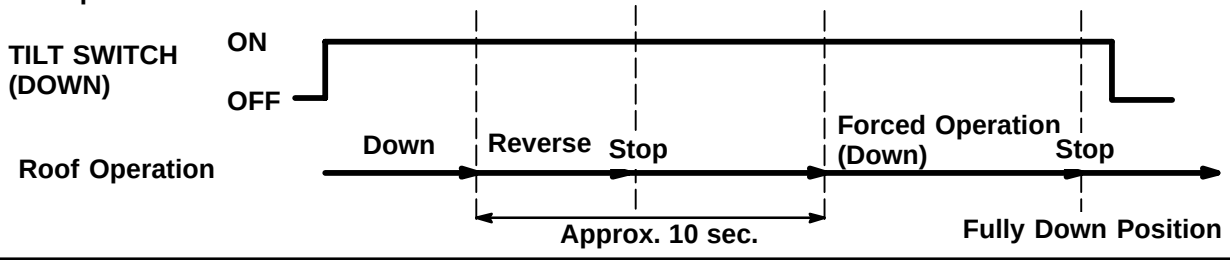
(c) Check the AUTO tilt-down operation.
  (1) Turn the ignition switch to the ON position.
  (2) When the roof glass is fully tilted upward, press the sliding roof DOWN switch for 0.3 seconds or more. The roof glass should automatically tilt downward until it is fully closed.
  (3) If the CLOSE, OPEN, UP, or DOWN switch is pressed while the roof glass is in motion, the roof glass will stop moving.
  (4) If the roof glass cannot be fully tilted using AUTO operation (opens due to the jam protection function):
  - Visually check if there is any foreign object between the sliding roof rail and the sliding roof glass.
  - Check if the alignment of the sliding roof glass is within the specified range (see page BO-126).

  If no problems are found with the above checks, then perform the following operation to fully down the roof glass forcibly and check if AUTO operation return to normal. (Forced operation)

Perform forced operation.*

Caution:
The jam protection function does not operate during forced operation.
Be careful not to get any part of your body caught between the vehicle body and the roof glass.

***: Pressing and holding the DOWN switch inhibits the jam protection function approx.10 sec. after starting the reverse operation.**
If the switch is kept pressed, the sliding roof starts down operation and stops when detecting the fully down position.



If the roof glass does not operate normally even after performing above procedures, then replace the sliding roof control assembly.

5. CHECK KEY-OFF SLIDING ROOF OPERATION

HINT:

The sliding roof can be operated for approximately 45 seconds after the ignition switch is turned from ON to OFF with all doors closed. However, if the driver side door is opened during this time, the operation is canceled.

(a) Check the sliding roof operation function after the ignition switch is turned from ON to OFF.

(1) Turn the ignition switch from ON to OFF. Sliding roof AUTO operation should be possible. However, opening either of the front doors should disable AUTO operation.

(2) Turn the ignition switch from ON to OFF. Wait approximately 45 seconds. AUTO operation should be prohibited.

(3) Turn the ignition switch from ON to OFF with either of the front doors open. AUTO operation should immediately stop functioning.

If operation is not as specified, then inspect each part following the problem symptom table
(see page BE-2).

6. CHECK JAM PROTECTION FUNCTION

HINT:

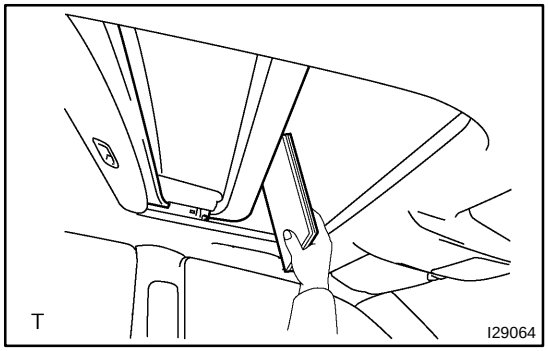
When sliding roof AUTO operation is being used, the jam protection function prevents objects from being caught between the vehicle body and the roof glass.

Operative condition:

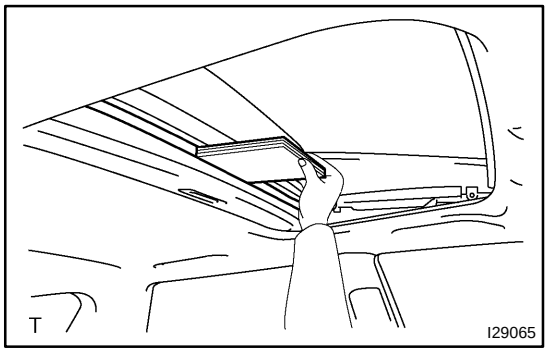
- AUTO CLOSE with ignition switch ON.
- AUTO CLOSE during sliding operation after the ignition switch is turned OFF.
- AUTO TILT-DOWN with ignition switch ON.
- AUTO TILT-DOWN during sliding operation after the ignition switch is turned OFF.

CAUTION:

- **Do not use any part of your body such as your hand, or any object to check the jam protection function. Do not allow anything to become caught in the sliding roof by accident during this procedure.**
- **The jam protection function may not work against an object less than 5 mm (0.20 in.) in width.**



(a) When sliding roof AUTO operation is being used:
check that the roof glass should open a distance of 200 mm (7.87 in.) from the point of contact with the object, or fully open if 200 mm (7.87 in.) of opening distance is not available when an object is caught between the vehicle body and the roof glass.



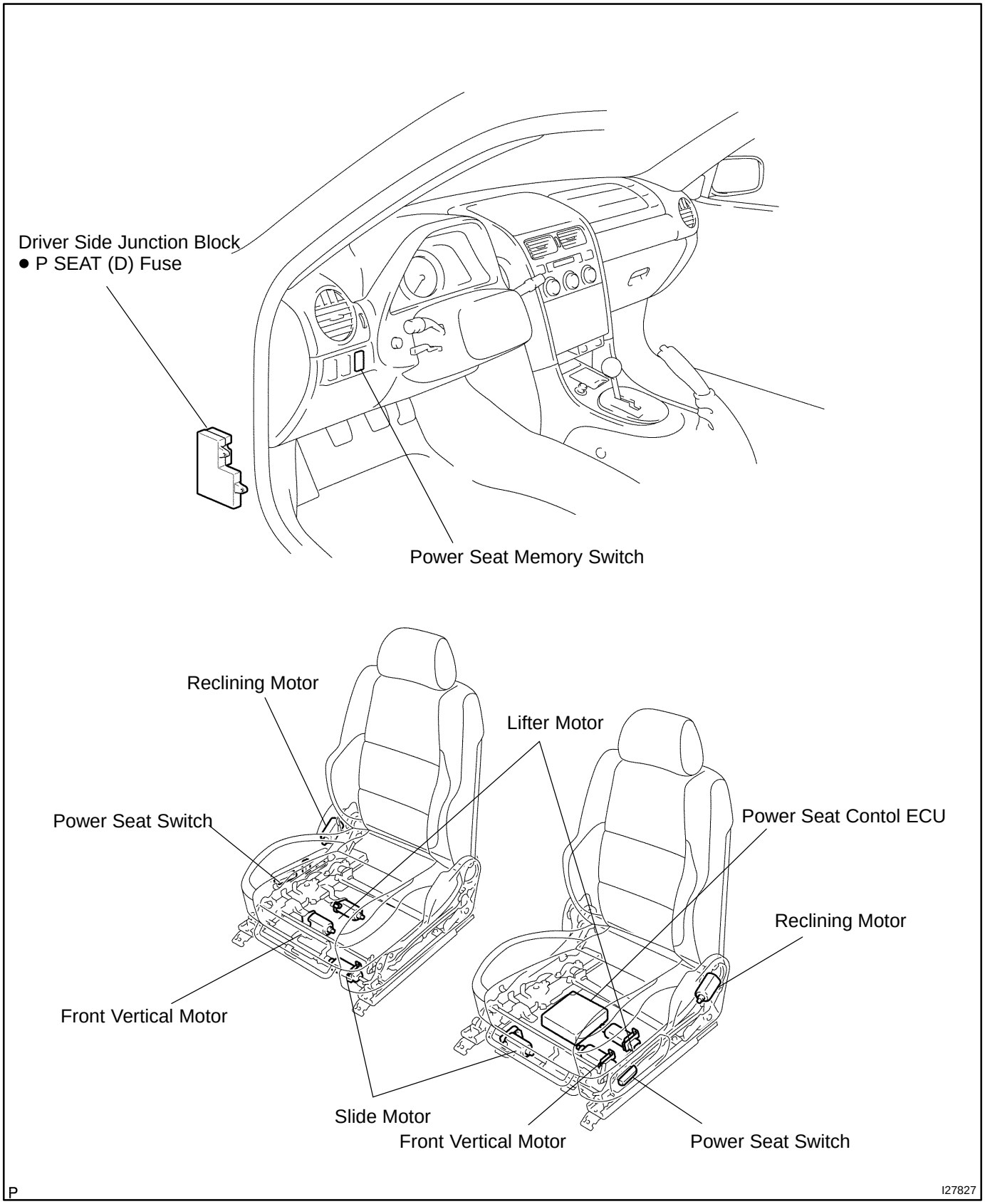
(b) When the tilt-down operation is being used:
Check that the sliding roof fully tilts up when an object is caught between the vehicle body and the roof glass.

If operation is not as specified, then replace the sliding roof control assembly.

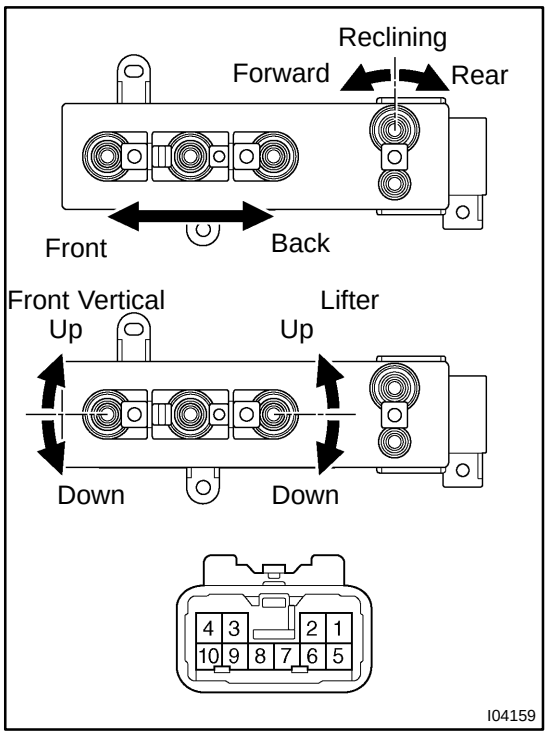
POWER SEAT CONTROL SYSTEM

LOCATION

BE0GK-11



BE2JV-01



INSPECTION

1. INSPECT DRIVER'S POWER SEAT SWITCH CONTINUITY

Slide switch:

Switch position	Tester connection	Specified condition
FRONT	1 - 9 4 - 6	Continuity
OFF	4 - 6 4 - 9	Continuity
BACK	1 - 6 4 - 9	Continuity

Front vertical switch:

Switch position	Tester connection	Specified condition
UP	1 - 10 4 - 5 (*1)	Continuity
OFF	4 - 5 (*1) 4 - 10 (*1)	Continuity
DOWN	1 - 5 4 - 10 (*1)	Continuity

Lifter switch:

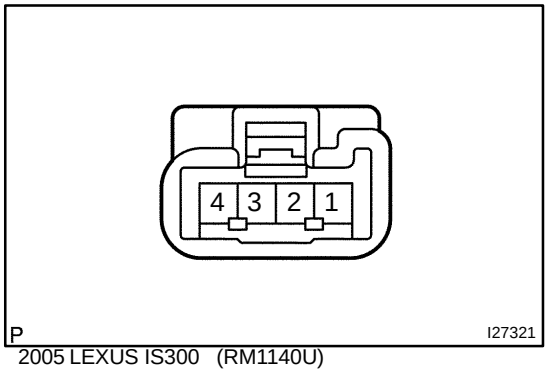
Switch position	Tester connection	Specified condition
UP	1 - 7 4 - 8 (*1)	Continuity
OFF	4 - 7 (*1) 4 - 8 (*1)	Continuity
DOWN	1 - 8 4 - 7 (*1)	Continuity

Reclining switch:

Switch position	Tester connection	Specified condition
FORWARD	1 - 3 2 - 4	Continuity
OFF	2 - 4 3 - 4	Continuity
REAR	1 - 2 3 - 4	Continuity

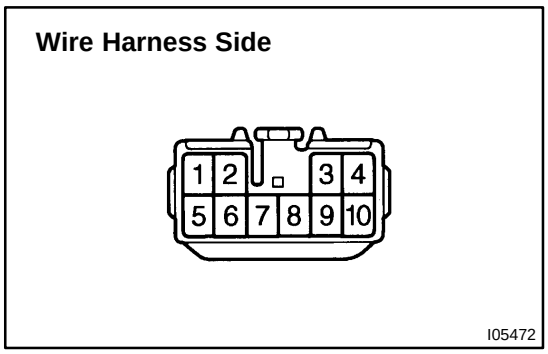
*1: w/ power seat memory switch

If continuity is not as specified, replace the switch.



2. INSPECT POWER SEAT MEMORY SWITCH

Switch position	Tester connection	Specified condition
SET	1 - 4	Continuity
SW1	2 - 4	Continuity
SW2	3 - 4	Continuity



3. INSPECT DRIVER'S POWER SEAT SWITCH CIRCUIT

(a) Disconnect the switch connector and connect the seat wire harness to the floor wire harness.

(b) Inspect the connector on the wire harness side.

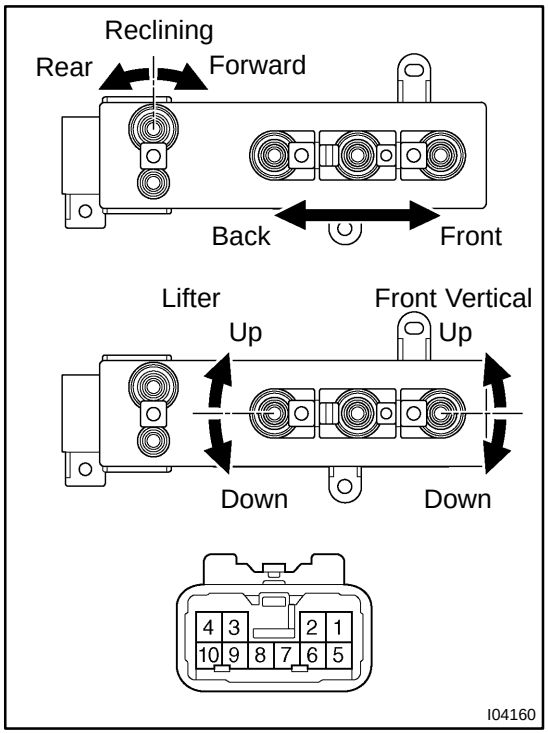
w/o Power seat memory switch:

Tester connection	Condition	Specified condition
4 - Ground	Always	Continuity
1 - Ground	Always	Battery Positive Voltage

w/ Power seat memory switch:

Tester connection	Condition	Specified condition
1 - Ground	Always	Continuity

If circuit is not as specified, inspect the circuits connected to other parts.



4. INSPECT PASSENGER'S POWER SEAT SWITCH CONTINUITY

Slide switch:

Switch position	Tester connection	Specified condition
FRONT	1 - 9 4 - 6	Continuity
OFF	4 - 6 4 - 9	Continuity
BACK	1 - 6 4 - 9	Continuity

Front vertical switch:

Switch position	Tester connection	Specified condition
UP	1 - 5 4 - 10	Continuity
OFF	4 - 5 4 - 10	Continuity
DOWN	1 - 10 4 - 5	Continuity

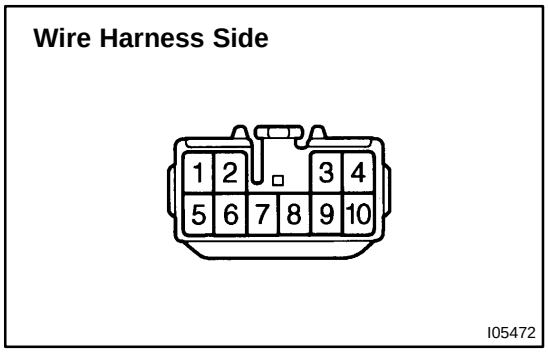
Lifter switch:

Switch position	Tester connection	Specified condition
UP	1 - 8 4 - 7	Continuity
OFF	4 - 7 4 - 8	Continuity
DOWN	1 - 7 4 - 8	Continuity

Reclining switch:

Switch position	Tester connection	Specified condition
FORWARD	1 - 3 2 - 4	Continuity
OFF	2 - 4 3 - 4	Continuity
REAR	1 - 2 3 - 4	Continuity

If continuity is not as specified, replace the switch.



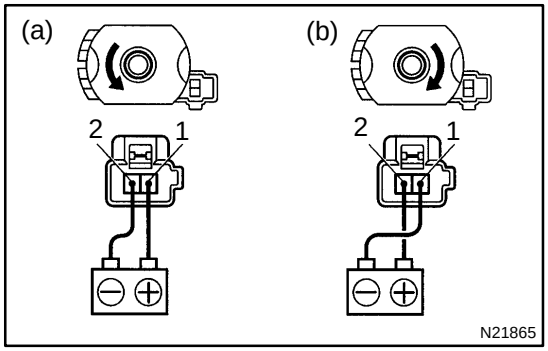
5. INSPECT PASSENGER'S POWER SEAT SWITCH CIRCUIT

(a) Disconnect the switch connector and connect the seat wire harness to the floor wire harness.

(b) Inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
4 - Ground	Always	Continuity
1 - Ground	Always	Battery positive voltage

If circuit is not as specified, inspect the circuits connected to other parts.

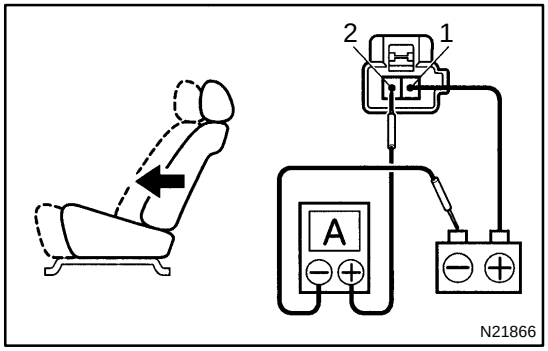


6. INSPECT SLIDE MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, check that the motor turns counterclockwise.

(b) Reverse the polarity, check that the motor turns clockwise.

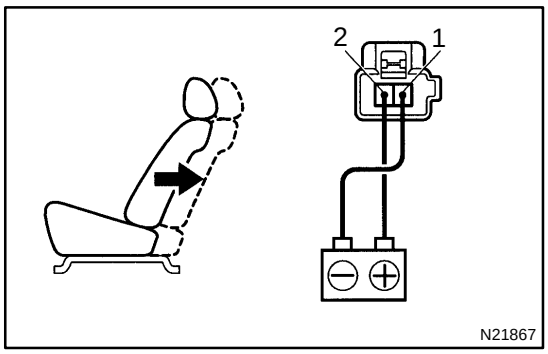
If operation is not as specified, replace the seat adjuster.



7. INSPECT SLIDE MOTOR PTC THERMISTOR OPERATION

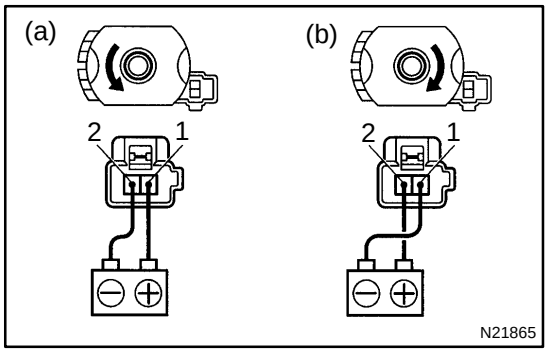
(a) ( ): Passenger side
Connect the positive (+) lead from the battery to terminal 1 (2), the positive (+) lead from the ammeter to terminal 2 (1) and the negative (-) lead to the battery negative (-) terminal, then move the seat cushion to the front position.

(b) Continue to apply voltage, check that current changes to less than 1 ampere within 4 to 90 seconds.



(c) Disconnect the leads from terminals.
(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 (1) and the negative (-) lead to terminal 1 (2), check that the seat cushion begins to move backwards.

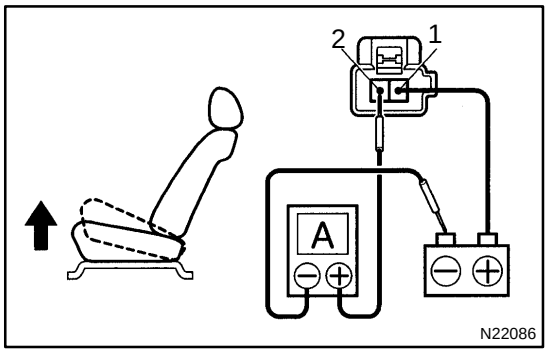
If operation is not as specified, replace the seat adjuster.



8. INSPECT FRONT VERTICAL MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, check that the motor turns counterclockwise.
(b) Reverse the polarity, check that the motor turns clockwise.

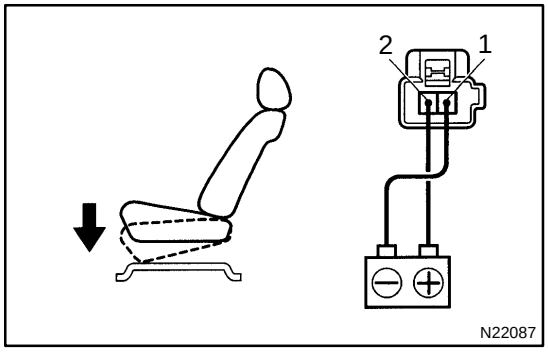
If operation is not as specified, replace the seat adjuster.

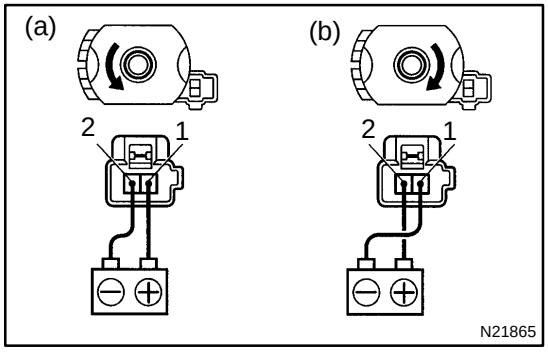


9. INSPECT FRONT VERTICAL MOTOR PTC THERMISTOR OPERATION

(a) ( ): Passenger side
Connect the positive (+) lead from the battery to terminal 1 (2), the positive (+) lead from the ammeter to terminal 2 (1) and the negative (-) lead to the battery negative (-) terminal, then move the seat cushion to the highest position.
(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.
(c) Disconnect the leads from the terminals.
(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 (1) and the negative (-) lead to terminal 1 (2), check that the seat cushion begins to descend.

If operation is not as specified, replace the seat adjuster.

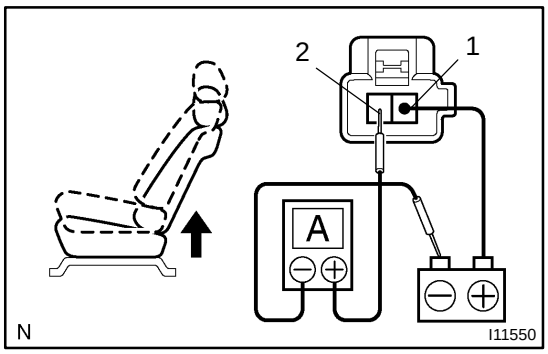




10. INSPECT LIFTER MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, check that the motor turns counterclockwise.
(b) Reverse the polarity, check that the motor turns clockwise.

If operation is not as specified, replace the seat adjuster.



11. INSPECT LIFTER MOTOR PTC THERMISTOR OPERATION

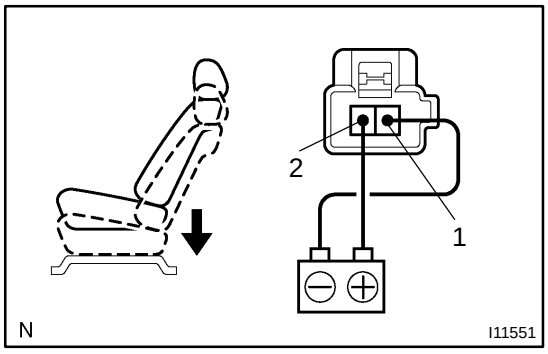
(a) ( ): Passenger side
Connect the positive (+) lead from the battery to terminal 1 (2), the positive (+) lead from the ammeter to terminal 2 (1) and the negative (-) lead to the battery negative (-) terminal, then move the seat cushion to the highest position.

(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.

(c) Disconnect the leads from the terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 (1) and the negative (-) lead to terminal 1 (2), check that the seat cushion begins to descend.

If operation is not as specified, replace the seat adjuster.

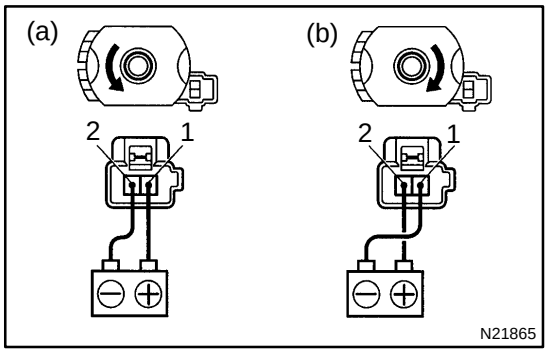


12. INSPECT RECLINING MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, check that the motor turns counterclockwise.

(b) Reverse the polarity, check that the motor turns clockwise.

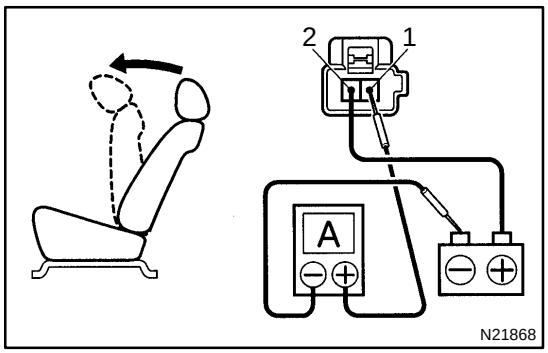
If operation is not as specified, replace the seat adjuster.



13. INSPECT RECLINING MOTOR PTC THERMISTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2, the positive (+) lead from the ammeter to terminal 1 and the negative (-) lead to the battery negative (-) terminal, then recline the seat back to the most forward position.

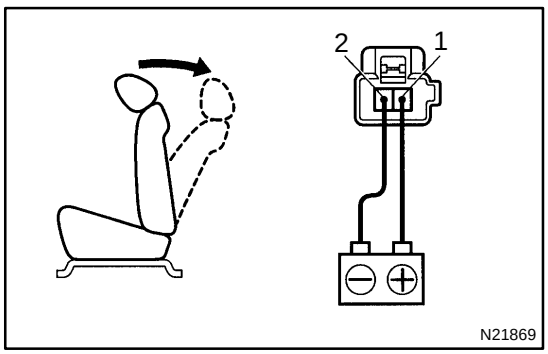
(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.



(c) Disconnect the leads from the terminals.

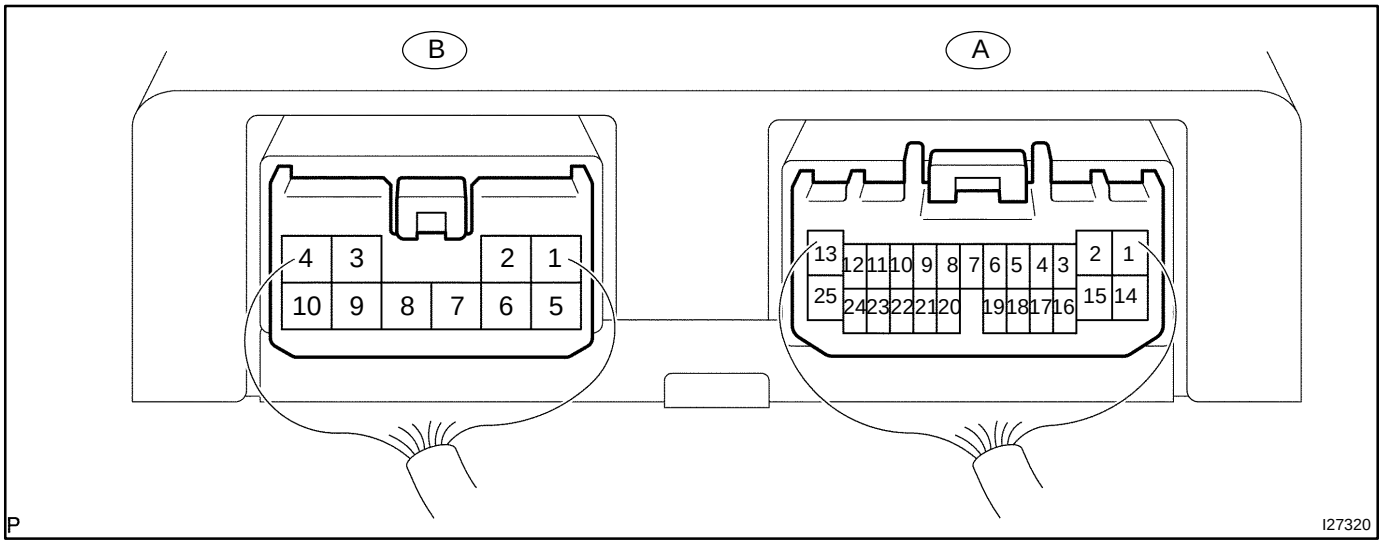
(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, check that the seat back begins to fall backward.

If operation is not as specified, replace the seat adjuster.



14. INSPECT POWER SEAT CONTROL ECU

(a) Check power seat control ECU with connector A and B still connected.



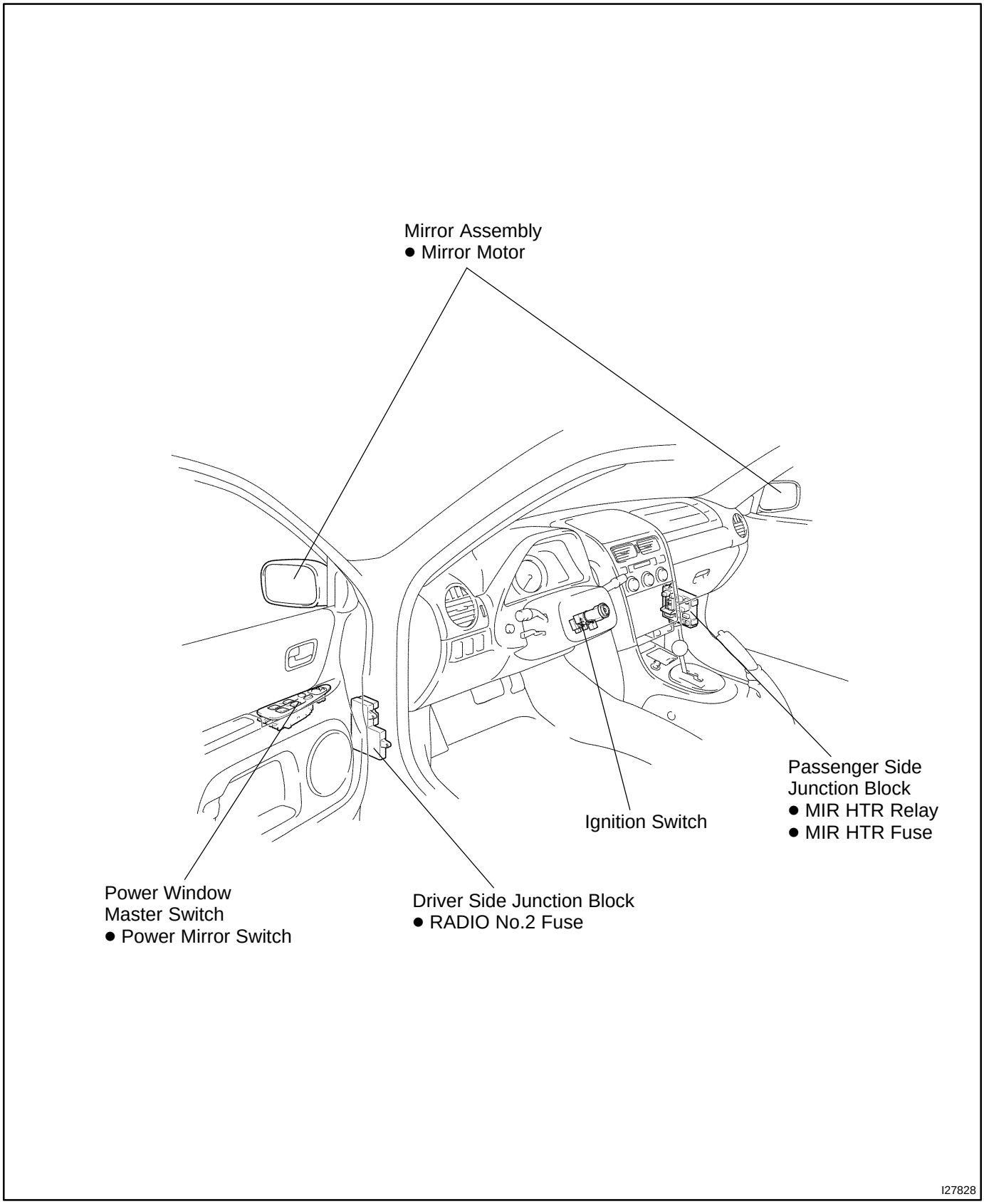
Symbols (Terminal No.)	Condition	Specified condition
PKB (A-1) - Body ground	Parking brake switch ON	Blow 2 V
P (A-2) - Body ground	Neutral position switch is P	10-14 V
SSRS (A-3) - Body ground	Slide position sensor OFF → ON	Blow 2 V → 6.6 V or higher
SSFV (A-4) - Body ground	Front vertical sensor OFF → ON	Blow 2 V → 6.6 V or higher
PCVV (A-5) - Body ground	Ignition switch ON	Blow 8 V
SLDF (A-6) - Body ground	Manual switch (Front slide) OFF → ON	1 kΩ or higher → Below 10 Ω
SLDR (A-8) - Body ground	Manual switch (Rear slide) OFF → ON	1 kΩ or higher → Below 10 Ω
MMRY (A-9) - Body ground	Memory switch OFF → ON	10 kΩ or higher → Below 100 Ω
RCLF (A-10) - Body ground	Manual switch (Rear reclining) OFF → ON	1 kΩ or higher → Below 10 Ω
RDWN (A-11) - Body ground	Manual switch (Rear vertical down) OFF → ON	1 kΩ or higher → Below 10 Ω
RCLR (A-12) - Body ground	Manual switch (Front reclining) OFF → ON	1 kΩ or higher → Below 10 Ω
IG (A-13) - Body ground	Ignition switch ON	10-14 V
SI (A-14)	Communication line	-
DCTY (A-15) - Body ground	Door courtesy switch OFF → ON	10 kΩ or higher → Below 100 Ω
SSRR (A-16) - Body ground	Reclining position sensor OFF → ON	Blow 1 V → Blow 2 V
SSRV (A-17) - Body ground	Rear vertical sensor OFF → ON	Blow 2 V → 6.6 V or higher
SGND (A-19) - Body ground	Always	Blow 1 Ω
SW2 (A-20) - Body ground	Memory switch OFF → ON	10 kΩ or higher → Below 100 Ω
SW1 (A-21) - Body ground	Memory switch OFF → ON	10 kΩ or higher → Below 100 Ω
RUP (A-22) - Body ground	Manual switch (Rear vertical up) OFF → ON	1 kΩ or higher → Below 10 Ω
FUP (A-23) - Body ground	Manual switch (Front vertical up) OFF → ON	1 kΩ or higher → Below 10 Ω
FDWN (A-24) - Body ground	Manual switch (Front vertical down) OFF → ON	1 kΩ or higher → Below 10 Ω
RCL- (B-1) - Body ground	Manual switch (Rear reclining) OFF → ON	Blow 1 V → 10-14 V
RCL+ (B-2) - Body ground	Manual switch (Front reclining) OFF → ON	Blow 1 V → 10-14 V
SLD- (B-3) - Body ground	Manual switch (Rear slide) OFF → ON	Blow 1 V → 10-14 V
SLD+ (B-4) - Body ground	Manual switch (Front slide) OFF → ON	Blow 1 V → 10-14 V
RRV- (B-5) - Body ground	Manual switch (Rear vertical down) OFF → ON	Blow 1 V → 10-14 V
RRV+ (B-6) - Body ground	Manual switch (Rear vertical up) OFF → ON	Blow 1 V → 10-14 V

GND (B-7) - Body ground	Always	Blow 1 Ω
+B (B-8) - Body ground	Always	10-14 V
FRV- (B-9) - Body ground	Manual switch (Front vertical down) OFF → ON	Blow 1 V → 10-14 V
FRV+ (B-10) - Body ground	Manual switch (Front vertical up) OFF → ON	Blow 1 V → 10-14 V

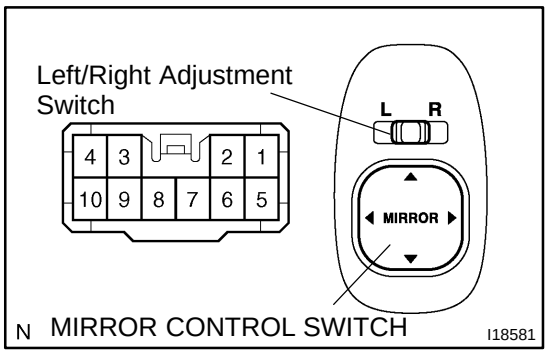
POWER MIRROR CONTROL SYSTEM

BE02J-17

LOCATION



BE1X6-01



INSPECTION

1. Left/right adjustment switch (Left side): INSPECT MIRROR SWITCH CONTINUITY

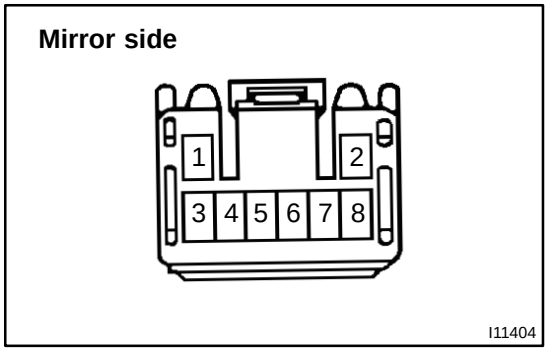
Switch position	Specified condition
UP	1 - 10 3 - 4
RIGHT	1 - 3 9 - 4
DOWN	1 - 3 10 - 4
LEFT	1 - 9 3 - 4

If continuity is not as specified, replace the switch.

2. Left/right adjustment switch (Right side): INSPECT MIRROR SWITCH CONTINUITY

Switch position	Specified condition
UP	1 - 6 3 - 4
RIGHT	1 - 3 2 - 4
DOWN	1 - 3 6 - 4
LEFT	1 - 2 3 - 4

If continuity is not as specified, replace the switch.



3. INSPECT MIRROR MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 8 and the negative (-) lead to terminal 7, and check that the mirror turns to the upward.

(b) Reverse the polarity, and check that the mirror turns to the downward.

(c) Connect the positive (+) lead from the battery to terminal 6 and the negative (-) lead to terminal 7, and check that the mirror turns to the inside.

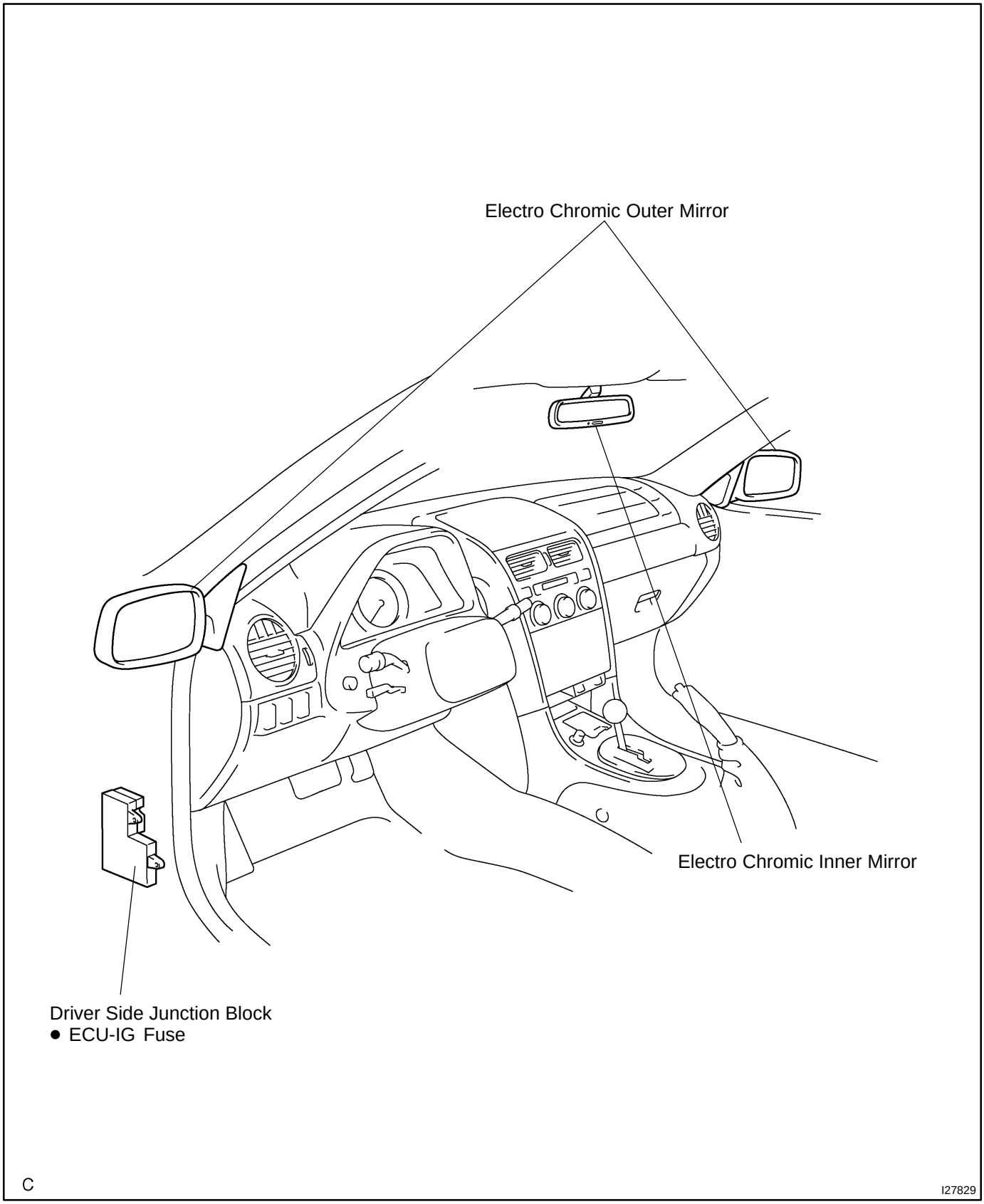
(d) Reverse the polarity, and check that the mirror turns outside.

If operation is not as specified, replace the mirror assembly.

ELECTRO CHROMIC MIRROR SYSTEM

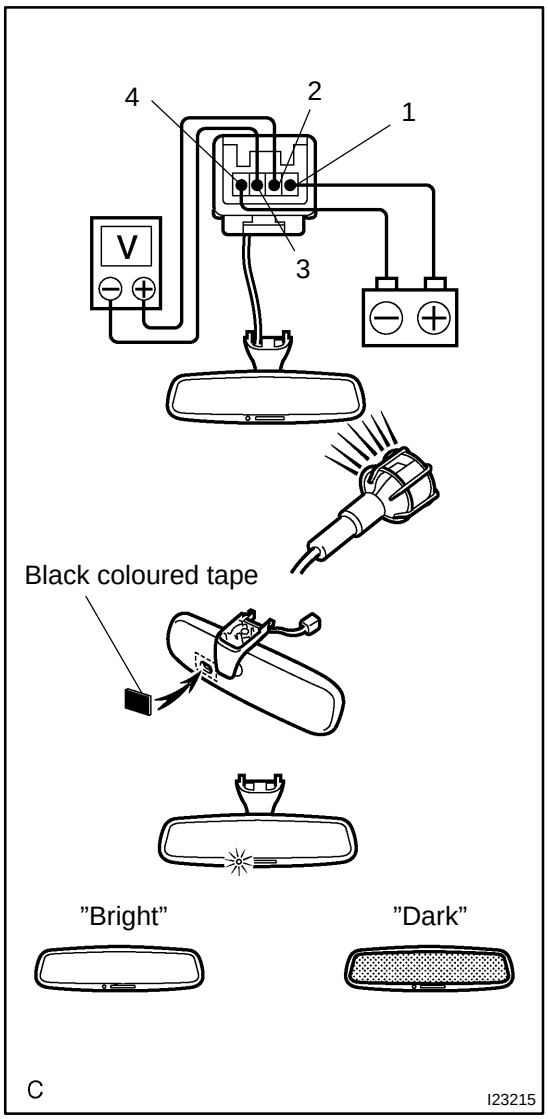
BE0HC-13

LOCATION



BE2A7-02

INSPECTION



1. INSPECT ELECTRO CHROMIC INNER MIRROR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 4.

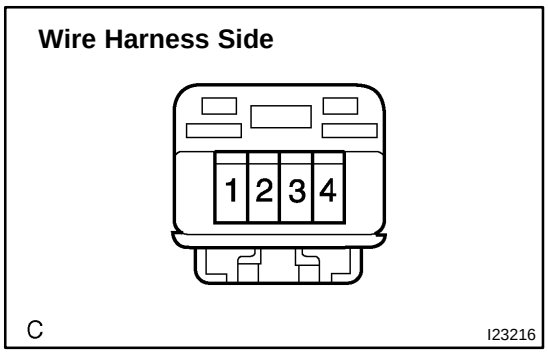
(b) Connect the positive (+) lead from the voltmeter to terminal 2 and the negative (-) lead to terminal 3.

(c) Attach a black coloured tape to forward sensor to prevent it from sensing.

(d) When the mode is turned to AUTO, check that indicator light lights up.

(e) Light up the mirror with an electric light, and check that there is battery positive voltage and mirror surface changes ”bright” to ”dark”.

If operation is not as specified, replace the inner mirror.

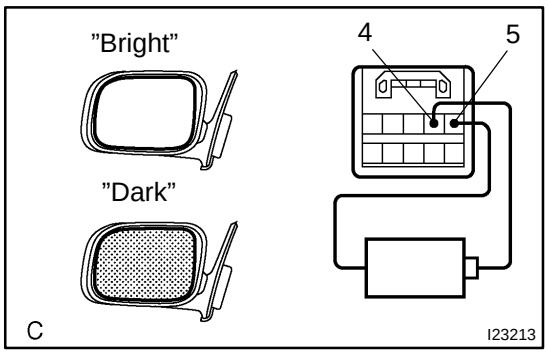


2. INSPECT ELECTRO CHROMIC INNER MIRROR CIRCUIT

Disconnect the connector from the mirror and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
4 - Ground	Always	Continuity
1 - Ground	Ignition switch LOCK or ACC	No voltage
1 - Ground	Ignition switch ON	Battery positive voltage

If circuit is not as specified, inspect the circuits connected to other parts.



3. INSPECT ELECTRO CHROMIC OUTER MIRROR OPERATION

(a) Disconnect the outer mirror connector.

(b) Connect the positive (+) lead from the dry cell battery to terminal 4 and the negative (-) lead to terminal 5, then check that the mirror surface changes to ”dark”.

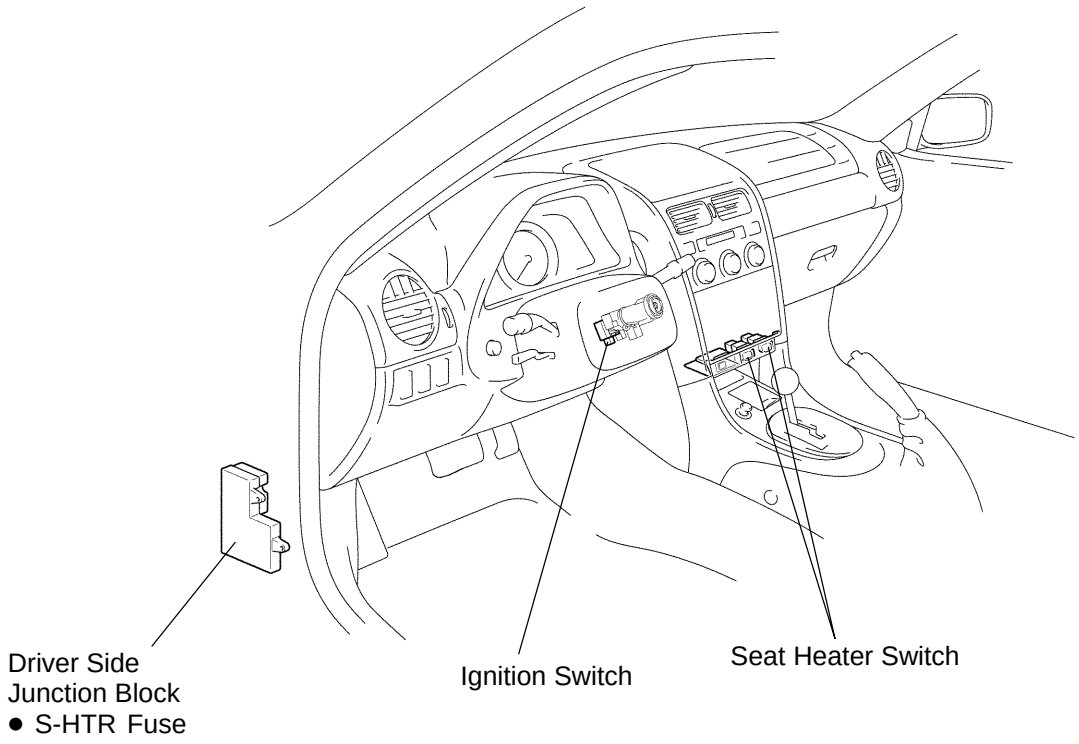
(c) Check the mirror turns to ”bright” after disconnecting the battery.

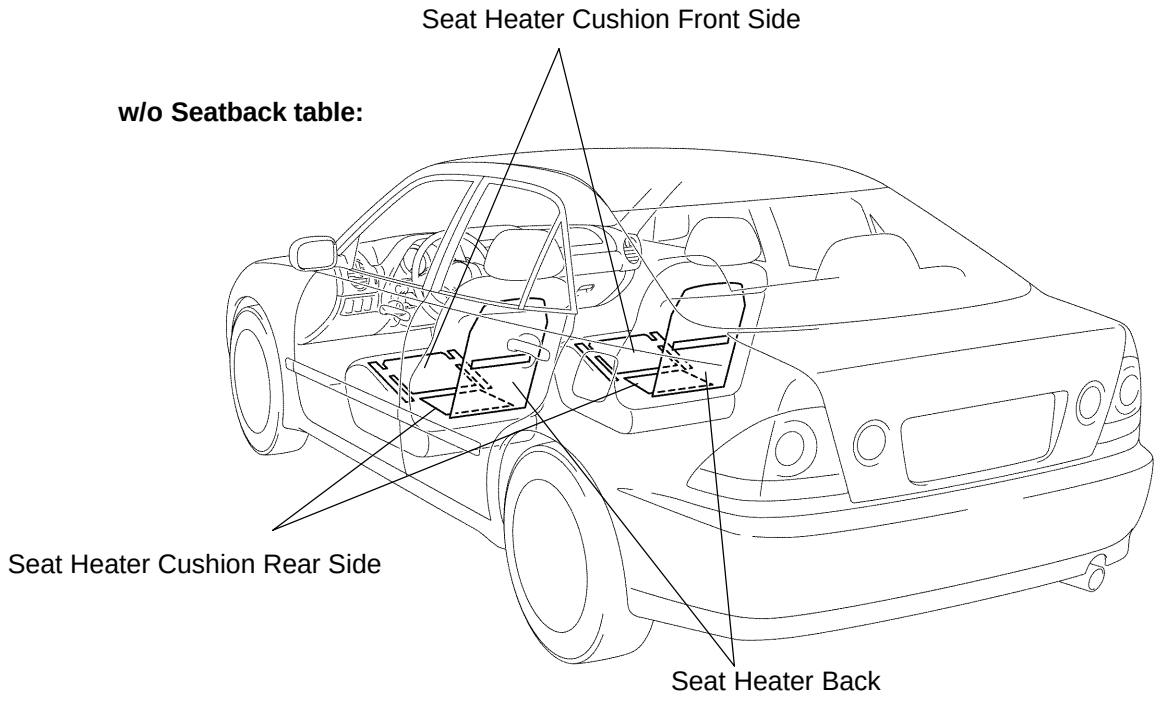
If operation is not as specified, replace the mirror assembly.

SEAT HEATER SYSTEM

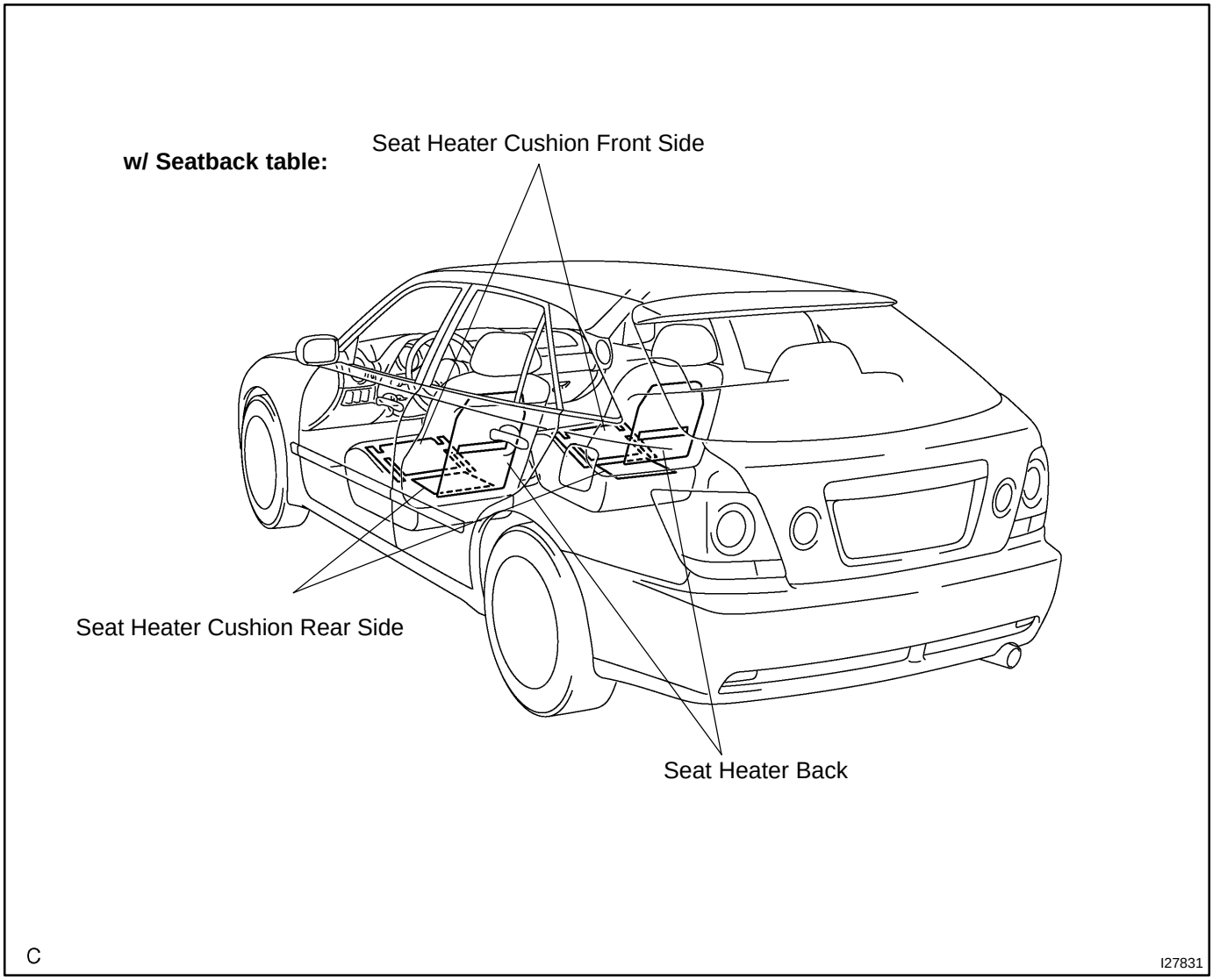
BE2A8-03

LOCATION



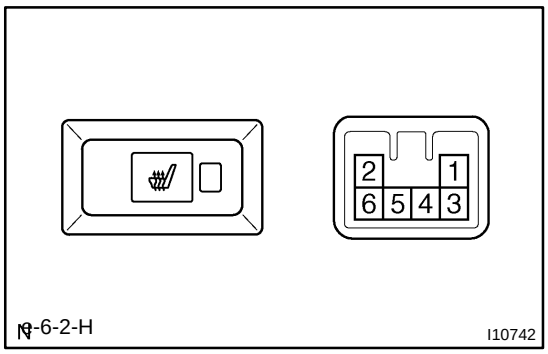


I27830


w/ Seatback table:
Seat Heater Cushion Front Side
Seat Heater Cushion Rear Side
Seat Heater Back
C
I27831

BE2F1-01

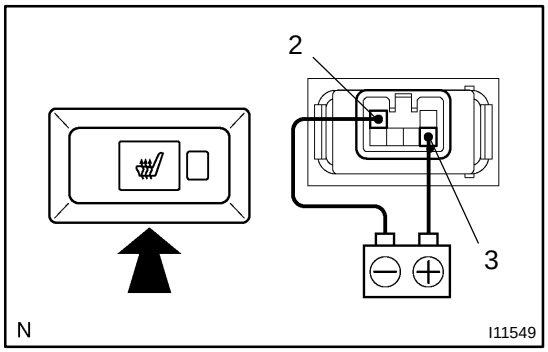
INSPECTION



1. INSPECT SEAT HEATER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
ON	2 - 3 - 6	Continuity
OFF	-	No continuity
Illumination circuit	1 - 4	Continuity

If continuity is not as specified, replace the switch.

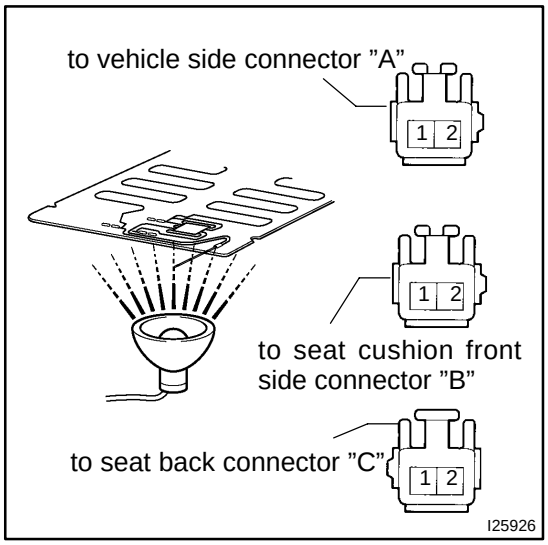


2. INSPECT SEAT HEATER INDICATOR LIGHT OPERATION

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 2.

(b) Push the seat heater switch ON that the indicator light lights up.

If operation is not as specified, replace the switch and inspect the circuits connected to other parts.



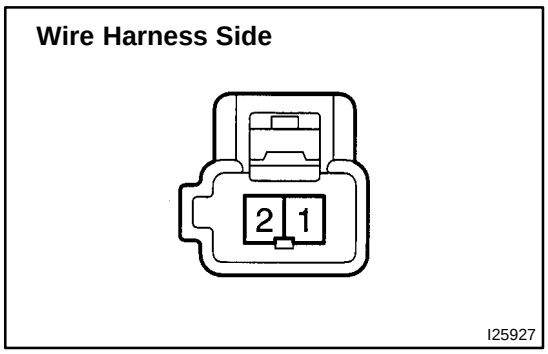
3. INSPECT SEAT HEATER CUSHION REAR SIDE CONTINUITY

(a) Heat the thermostat with a light.

(b) Inspect the seat heater cushion continuity between terminals, as shown.

Tester connection	Condition	Specified condition
A1 - B2	Seat heater temperature below 25 °C (77 °F)	Continuity
A1 - B2	Seat heater temperature above 45 °C (113 °F)	No continuity
A2 - B1	Always	Continuity
A2 - C1	Always	Continuity
B2 - C2	Always	Continuity

If continuity is not as specified, replace the seat cushion pad.

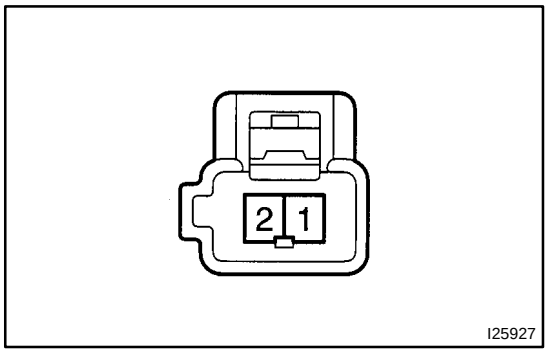


4. INSPECT SEAT HEATER CUSHION CIRCUIT

Disconnect the connector from the seat heater cushion and inspect the connector on wire harness side, as shown.

Tester connection	Condition	Specified condition
2 - Body ground	Seat heater switch ON	Battery Positive Voltage

If circuit is not as specified, inspect the wire harness.

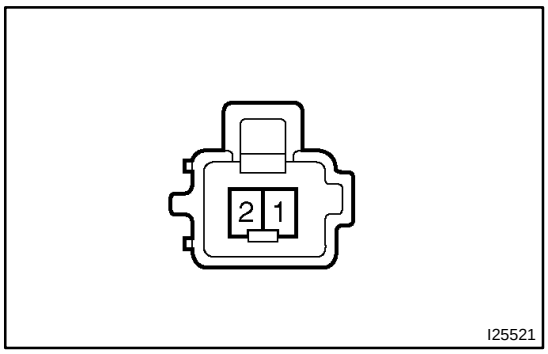


5. INSPECT SEAT CUSHION FRONT SIDE CONTINUITY

Inspect the seat cushion front side continuity between terminals, as shown.

Tester connection	Condition	Specified condition
1 - 2	Always	Continuity

If continuity is not as specified, replace the seat cushion pad.



6. INSPECT SEAT BACK CONTINUITY

Inspect the seat back continuity between terminals, as shown.

Tester connection	Condition	Specified condition
1 - 2	Always	Continuity

If continuity is not as specified, replace the seat back pad.

AUDIO SYSTEM

DESCRIPTION

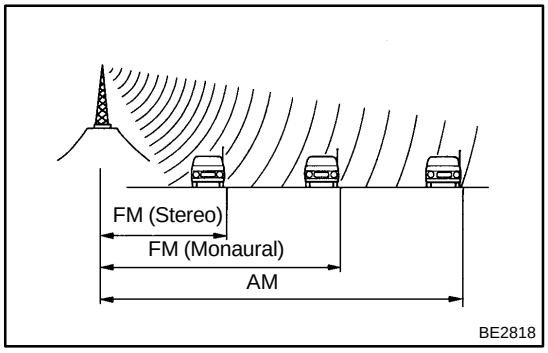
BE1X4-03

1. RADIO WAVE BAND

The radio wave bands used in radio broadcasting are as follows:

Frequency	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio wave	LW ⟷	AM (MW) ⟷	SW ⟷	FM (UKW) ⟷	
Modulation	Amplitude modulation			Frequency modulation	

LF: Low Frequency
MF: Medium Frequency
HF: High Frequency
VHF: Very High Frequency

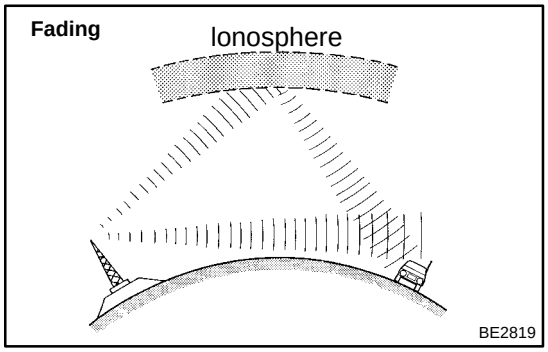


2. SERVICE AREA

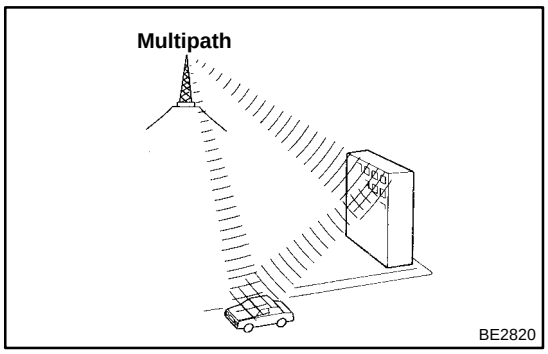
There are great differences in the size of the service area for AM and FM monaural. Sometimes FM stereo broadcasts cannot be received even through AM can be received in very clearly.
Not only does FM stereo have the smallest service area, but it also picks up static and other types of interference (”noise”) easily.

3. RECEPTION PROBLEMS

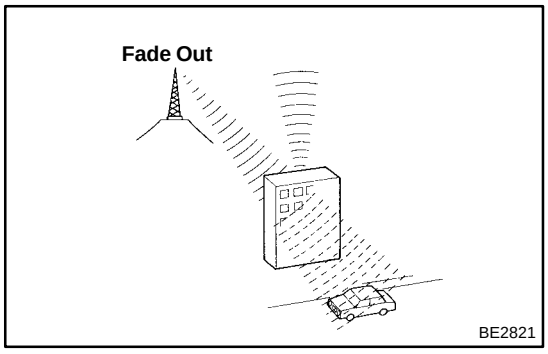
Besides the problem of static, there are also the problems called ”fading”, ”multipath” and ”fade out”. These problems are caused not by electrical noise but by the nature of the radio waves themselves.



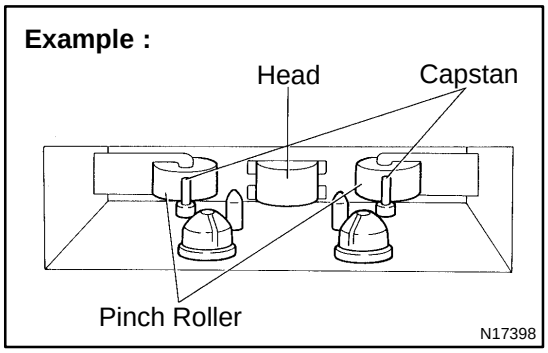
- Fading
  Besides electrical interference, AM broadcasts are also susceptible to other types of interference, especially at night. This is because AM radio waves bounce off the ionosphere at night. These radio waves then interfere with the signals from the same transmitter that reach the vehicle’s antenna directly. This type of interference is called ”fading”.



- Multipath
  One type of interference caused by the bounce of radio waves off of obstructions is called ”multipath”. Multipath occurs when a signal from the broadcast transmitter antenna bounces off buildings and mountains and interferes with the signal that is received directly.



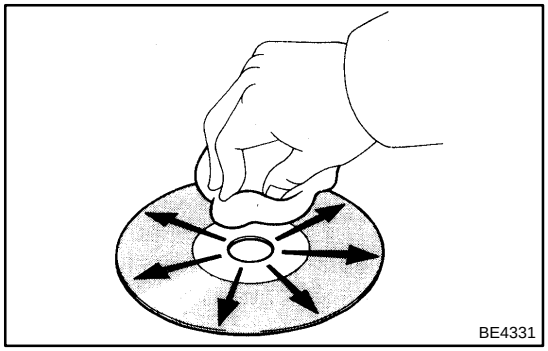
- Fade Out
  Because FM radio waves are of higher frequencies than AM radio waves, they bounce off buildings, mountains, and other obstructions. For this reason, FM signals often seem to gradually disappear or fade away as the vehicle goes behind a building or other obstruction. This is called ”fade out”.



4. Tape Player/Head Cleaning:
MAINTENANCE

(a) Raise the cassette door with your finger.
Next, using a pencil or similar object, push in the guide.

(b) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.



5. CD Player/Disc Cleaning:
MAINTENANCE

If the disc gets dirty, clean the disc by wiping the surface from the center to outside in the radial directions with a soft cloth.

NOTICE:

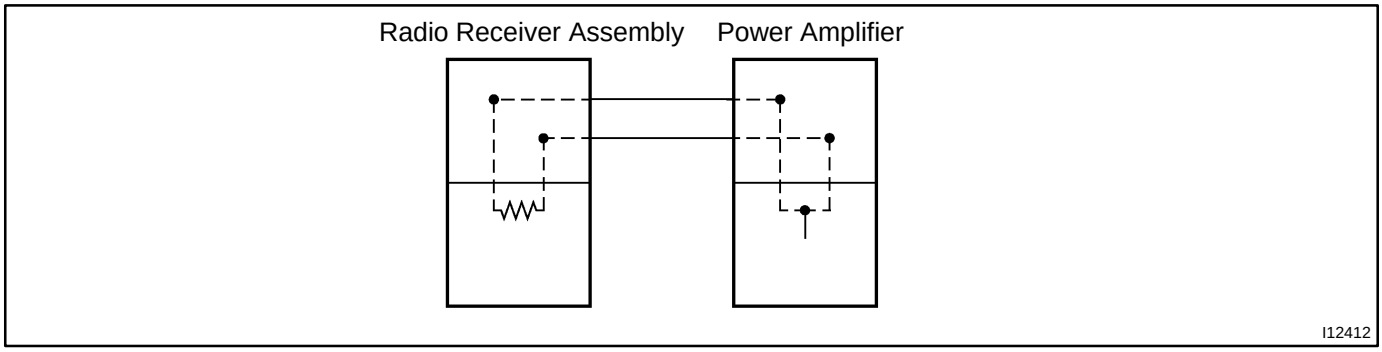
Do not use a conventional record cleaner or anti-static preservative.

6. OUTLINE OF AVC-LAN

(a) What is AVC-LAN?

AVC-LAN is the abbreviation, which stands for Audio Visual Communication-Local Area Network. This is a unified standard co-developed by 6 audio manufactures associated with Toyota Motor Corporation.

The Unified standard covers signals, such as audio signal, visual signal, signal for switch indication and communication signal.



(b) Objectives

Recently the car audio system has been rapidly developed and functions have been changed drastically. The conventional system has been switched to the multi-media type such as a navigation system. At the same time the level of customers needs to audio system has been upgraded. This lies behind this standardization.

The concrete objectives are explained below.

(1) When products by different manufactures were combined together, there used to be a case that malfunction occurred such as sound did not come out. This problem has been resolved by standardization of signals.

(2) Various types of after market products have been able to add or replace freely.

(3) Because of the above (2), each manufacture has become able to concentrate on developing products in their strongest field. This has enabled many types of products provided inexpensively.

(4) Conventionally, a new product developed by a manufacture could not be used due to a lack of compatibility with other manufactures products. Because of this new standard, users can enjoy compatible products provided for them timely.

The above descriptions are the objectives to introduce AVC-LAN. By this standardization, development of new products will no longer cause systematic errors. Thus, this is very effective standard for a product in the future.

HINT:

- When +B short or GND short is detected in AVC-LAN circuit, communication stops. Accordingly the audio system does not function normally.
- When audio system is not equipped with a navigation system, audio head unit is the master unit. (When audio system is equipped with a navigation system, navigation ECU is the master unit.)
- The car audio system using AVC-LAN circuit has a diagnosis function.
- Each product has its own specified numbers called physical address. Numbers are also allotted to each function in one product, which are called logical address.

7. DIAGNOSIS FUNCTION

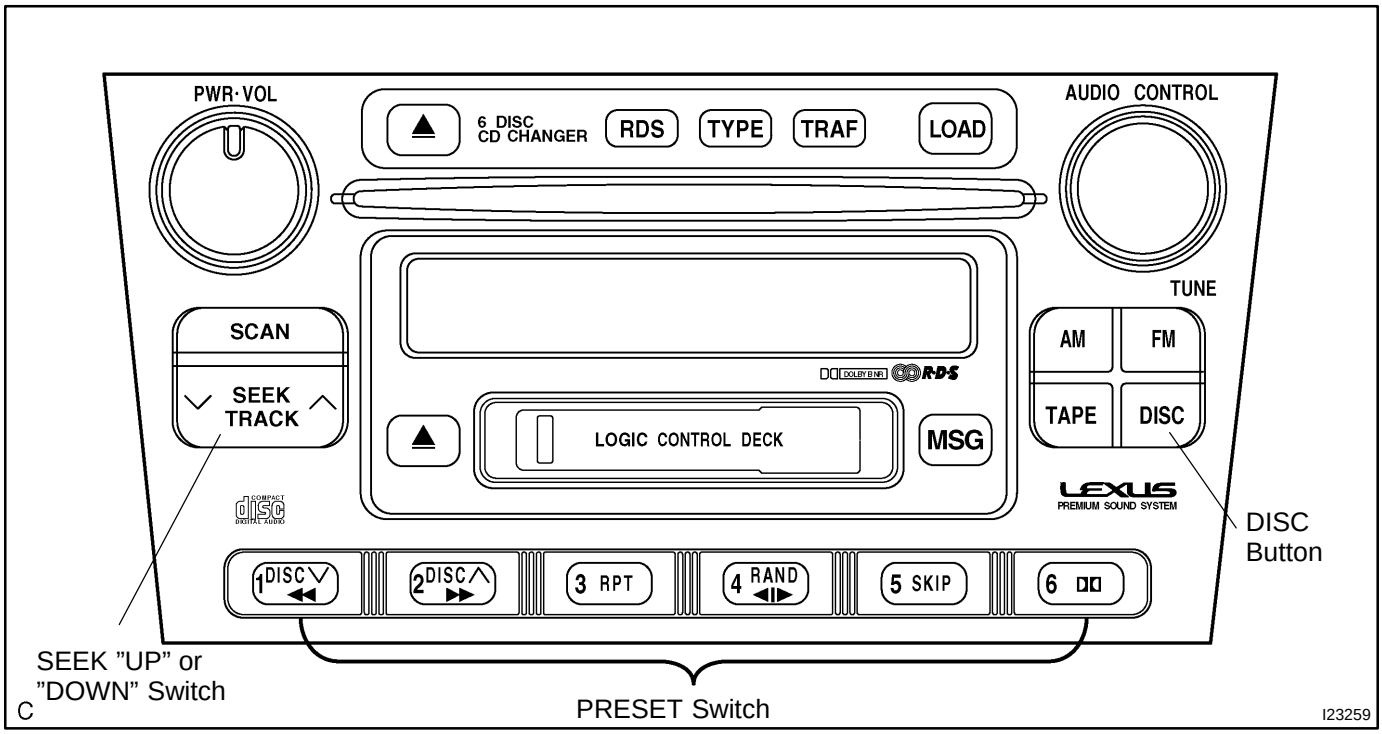
Error codes over tuner and connected equipment are displayed on the screen of tuner.

(a) Starting and Finishing Diagnosis Mode

With the audio system OFF and the ignition switch in ACC, while simultaneously pressing the preset buttons ”1” and ”6”, push ”DISC” or ”CD” 3 times.

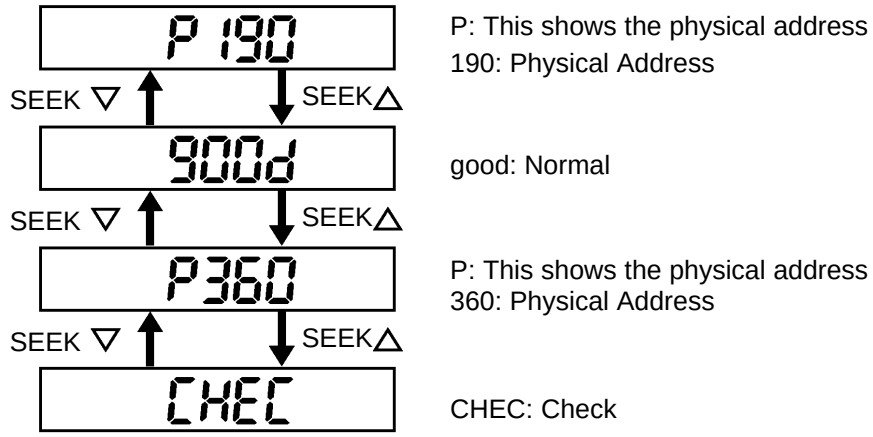
HINT:

- A beep sound 3 times and the system goes on to the Service Check Mode.
- System check and diagnosis memory check is performed in the Service Check Mode and the check result is displayed in ascending order of the component codes.
- It may take about 40 sec. to complete these checks.



(b) Displaying Result in Service Check Mode (For checking the system condition at present and in the past)

(1) By the ”SEEK” switch operation, confirm the check result of each component.



- This illustration shows an example that the system has components of code 190 and 360 and an error occurs in the physical address 360.
- Component codes are displayed in ascending order, and each of them is followed by its check result.

N I18570

Code No. (physical address) List

Code No. (physical address)	Equipment name
190	Radio receiver assembly (Audio head unit)
440	Power amplifier

(2) If ”CHEC” or ”ECHm” is detected in a component, activate the Detail Display mode and check its DTC.

(3) To restart the Service Check, press the preset button ”1”.

(4) To exit the diagnosis mode, press ”DISC” or ”CD” for 2 sec. or more, or turn the ignition switch OFF.

(c) DISPLAYING RESULTS

Results for each check are displayed as follows:

( ): Meaning

- good (Normal)
  No DTC is detected for both ”System Check Confirmation” and ”Diagnosis Memory Response”.
- nCon(No connection)
  Although identified by the system at the time of registration, it has transmitted no response when the diagnosis mode is started.
- CHEC(Check)
  If this is displayed, activate the Detail Display Mode and Check the DTC.
- ECHn(Exchange)
  -ditto-
- OLd (Old Version)
  An old version diagnosis system applies to this component.
- nrES (No Response)
  In spite of response identified when the diagnosis mode is started, no diagnostic information has been responded.

(d) Detail Display Mode (For displaying DTC of erratic components)

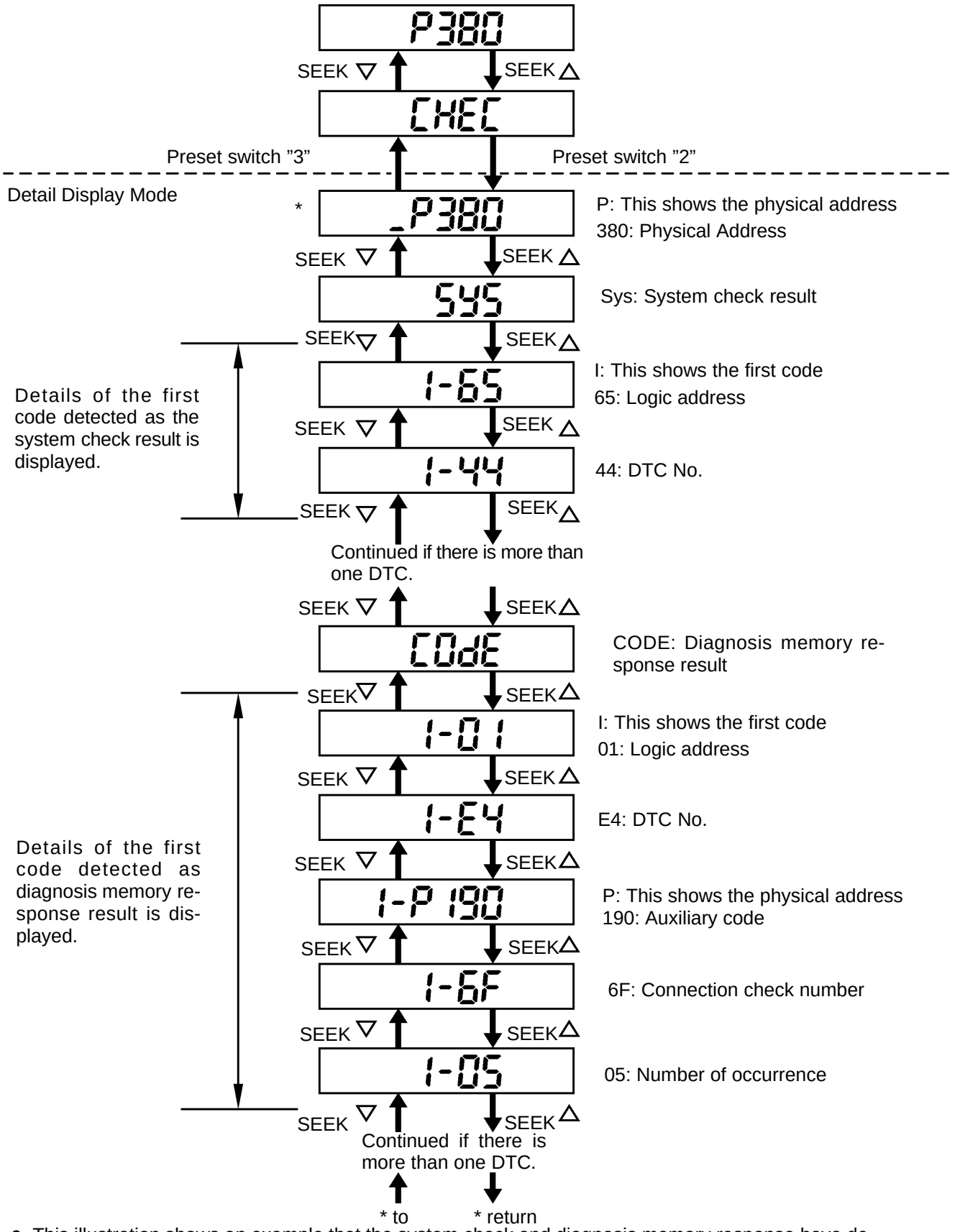
(1) While ”CHEC” or ECHn” is displayed, press the preset button ”2” to go on to the Detail Display Mode.

(2) By the ”SEEK” switch operation, ”the system check result (SYS)” and ”the diagnosis memory response result (COdE)” can be displayed.

(3) Refer to the diagnosis code list and inspect the defective part(s).

(4) Press the preset button ”3” to return to the Service Check Mode.

(e) Service Check Mode



- This illustration shows an example that the system check and diagnosis memory response have detected DTC "44" and "E4" in the component code 380.
- In the Detail Display Mode, a system check result is displayed before the diagnosis memory response result.
- If a DTC does not have any auxiliary code, no auxiliary code is displayed.

N

I18571

(f) DISPLAY IN DETAIL DISPLAY MODE

Segment for DTC	Meaning	Display Order by "SEEK UP" button operation (Reverse order when operating "SEEK DOWN" button)
Sys	System check result	Physical address → DTC
COdE	Diagnosis memory response result	Physical address → DTC → Auxiliary code → Connection check number → Number of occurrence

(g) Deleting DTC memory (Deleting DTC stored in the past)

(1) After repairing defective part(s), start the diagnosis mode.

(2) Press the preset button "5" for 2 sec. or more. (Display: "CLr")

HINT:

When DTC memory is completely deleted, a beep sounds once.

(3) Pressing the preset button "1", perform the Service Check again and confirm that no error is displayed for all component codes.

8. DIAGNOSTIC TROUBLE CODE CHART

Terms	Meaning
Physical address	Three-digit code (shown in hexadecimal) which is given to each component comprising the AVC - LAN Corresponding to the function, individual symbols are specified..
Logical address	Two-digit code (shown in hexadecimal) which is given to each function comprising the inner system of the AVC - LAN.

Physical address: 440 Power amplifier

Logical address	DTC	Diagnosis item	Diagnosis content	Countermeasure and inspected parts
01 (Communication control)	21	ROM Error	Abnormal condition of ROM is detected.	Replace power amplifier.
01 (Communication control)	22	RAM Error	Abnormal condition of RAM is detected.	Replace power amplifier.
01 (Communication Control)	D6	Absence of Master	Component in which this code is recorded has been disconnected from system with ignition in ACC or ON. Or, when this code was recorded, power amplifier was disconnected.	● Check harness for power supply system of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● Check harness for power supply system of power amplifier. ● Check harness for communication system of power amplifier.
01 *6 (Communication Control)	D7	Connection Check Error	Component in which this code is recorded has been disconnected from system after engine start. Or, when this code was recorded, power amplifier was disconnected.	● Check harness for power supply system of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● Check harness for power supply system of power amplifier. ● Check harness for communication system of power amplifier.
01 (Communication Control)	DC	Transmission Error	Transmission to component shown by auxiliary code has been failed. (This code does not necessarily mean actual failure.)	If same auxiliary code is recorded in other component(s), check harness for power supply and communication system of components shown sub code.
01 (Communication Control)	DD	Master Reset (Momentary Interruption)	After engine is started, power amplifier was disconnected from system.	● Check harness for power supply system of power amplifier. ● Check harness for communication system of power amplifier. ● If error occurs frequently, replace power amplifier.
01 (Communication Control)	DF	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment . Error occurs in communication between sub-master (audio) and master component.	● Check harness for power supply of power amplifier. ● Check harness for communication system of power amplifier. ● Check harness for communication system between power amplifier and sub-master component.

01 (Communication Control)	E2	ON/OFF Instruction Parameter Error	Error is detected in ON/OFF control command from power amplifier.	Replace power amplifier.
01 (Communication Control)	E4	Plural Frame Abort	Plural frame transmission is aborted.	● Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.

*6: When 210 sec. has passed after pulling out the power supply connector of the master component with the ignition switch in ACC or ON, this code is stored.

Physical address: 190 Radio receiver assembly

Logical address	DTC	Diagnosis item	Diagnosis content	Countermeasure and inspected parts
01 (Communication Control)	21	ROM Error	Error is detected in internal ROM.	Replace radio receiver assembly.
01 (Communication Control)	22	RAM Error	Error is detected in internal RAM.	Replace radio receiver assembly.
01 *3 (Communication Control)	D8	No Response to Connection Check	Component shown by auxiliary code is or had been disconnected from system after engine start.	● Check harness for power supply system of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code.
01 *2 (Communication Control)	D9	Last Mode Error	Component operated (sounds and/or images were provided) before engine stop is or has been disconnected with ignition switch in ACC or ON.	Check harness for power supply system of component shown by auxiliary code. Check harness for communication system of component shown by auxiliary code.
01 (Communication Control)	DA	No Response to ON/OFF Instruction	No response is identified when changing mode (audio and visual mode change). Detected when sound and picture does not change by button operation.	● Check harness for power supply of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code. ● If error occurs again, replace component shown by auxiliary code.
01 *2 (Communication Control)	DB	Mode Status Error	Dual alarm is detected.	● Check harness for power supply of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code.
01 *4 (Communication Control)	DC	Transmission Error	Transmission to component shown by auxiliary code has been failed. (Detecting this DTC does not necessary mean actual failure.)	● If same auxiliary code is recorded in other component, check harness for power supply and communication system of components shown sub code.

01 *5 (Communication Control)	DD	Master Reset (Momentary Interruption)	After engine is started, multi-display assembly was disconnected from system.	● If this error occurs frequently, replace multi-display assembly.
01 *5 (Communication Control)	DE	Slave Reset (Momentary Interruption)	After engine is started, slave component was disconnected from system.	● Check harness for power supply of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code.
01 *6 (Communication Control)	DF	Master Error	Due to defective condition of radio receiver assembly, master function is switched to audio equipment. Error occurs in communication between sub-master (audio) and radio receiver assembly.	● Check harness for power supply of multi-display assembly. ● Check harness for communication system of radio receiver assembly. ● Check harness for communication system between radio receiver assembly and sub-master component.
01 *2 (Communication Control)	E1	Audio processor ON error	While source equipment is operating, AMP output is stopped.	● Check harness for power supply of multi-display assembly. ● Check harness for communication system of radio receiver assembly.
01 (Communication Control)	E2	ON/OFF Instruction Parameter Error	Error occurs in ON/OFF controlling command from radio receiver assembly.	● Replace radio receiver assembly.
01 (Communication Control)	E4	Plural Frame Abort	Plural frame transmission is aborted.	● Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.
60 (Radio receiver assembly)	43	AM Tuner Error	Abnormal condition is detected in AM tuner. Inspect radio receiver assembly.	Replace radio receiver assembly.
60 (Radio receiver assembly)	44	FM Tuner Error	Abnormal condition is detected in FM tuner.	Replace radio receiver assembly.
61 (Cassette switch)	40	Mechanical or Media Error	Malfunction due to mechanical failure is identified. Or, cassette tape is cut or entangled.	Inspect cassette tape.
63 (In-dash CD changer)	47	CD High Temp	High temperature is detected in CD changer.	Replace radio receiver assembly.
63 (In-dash CD changer)	48	CD Excess Current	Excess current is applied to CD changer.	Replace radio receiver assembly.

*2: Even if no failure is detected, it may be stored depending on the battery condition or voltage for starting an engine.

*3: It is stored when 180 sec. has passed after the power supply connector is pulled out after engine start.

*4: It may be stored when the engine key is turned again 1 min. after engine start.

*5: It may be stored when the engine key is turned again after engine start.

*6: When 210 sec. has passed after pulling out the power supply connector of the master component with the ignition switch in ACC or ON, this code is stored.

BE1X5-03

TROUBLESHOOTING

NOTICE:

When replacing the internal mechanism (computer part) of the audio system, be careful that no part of your body or clothing comes in contact with the terminals of the leads from the IC, etc. of the replacement part (spare part).

HINT:

This inspection procedure is a simple troubleshooting which should be carried out on the vehicle during system operation and was prepared on the assumption of system component troubles (except for the wires and connectors, etc.).

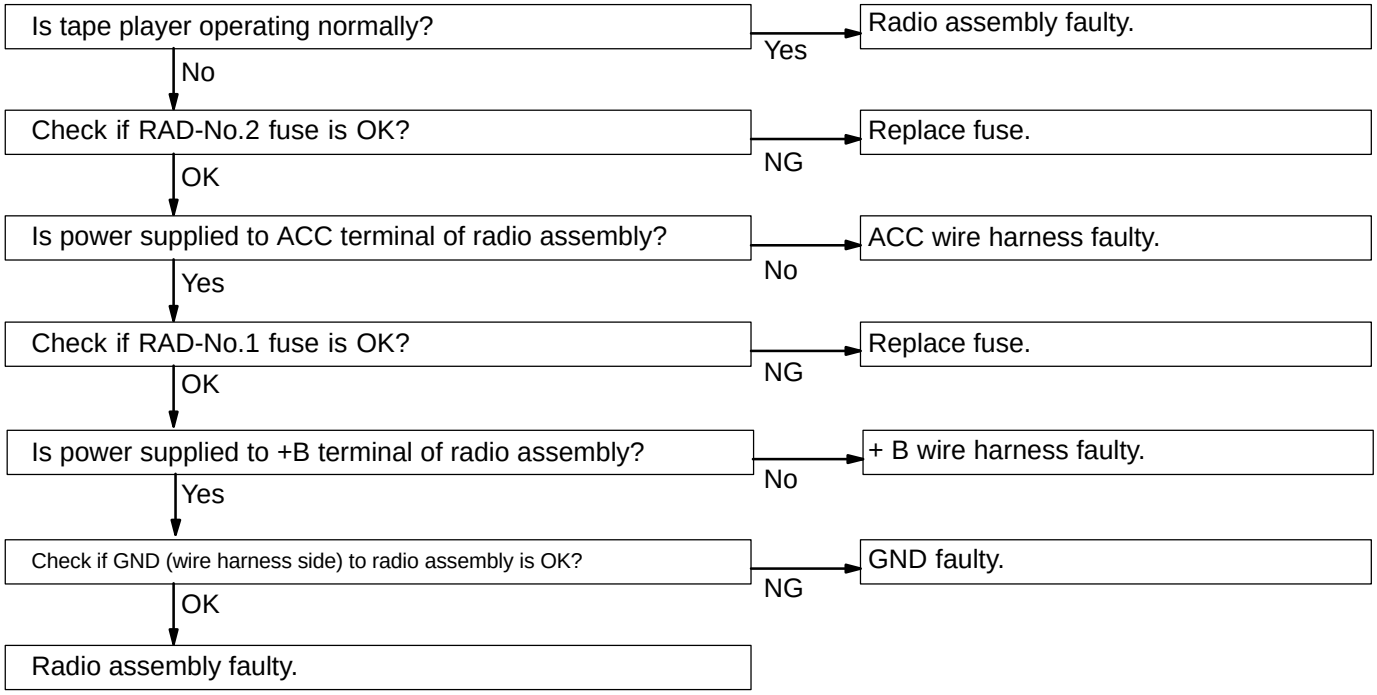
Always inspect the trouble taking the following items into consideration.

- Open or short circuit of the wire harness
- Connector or terminal connection fault

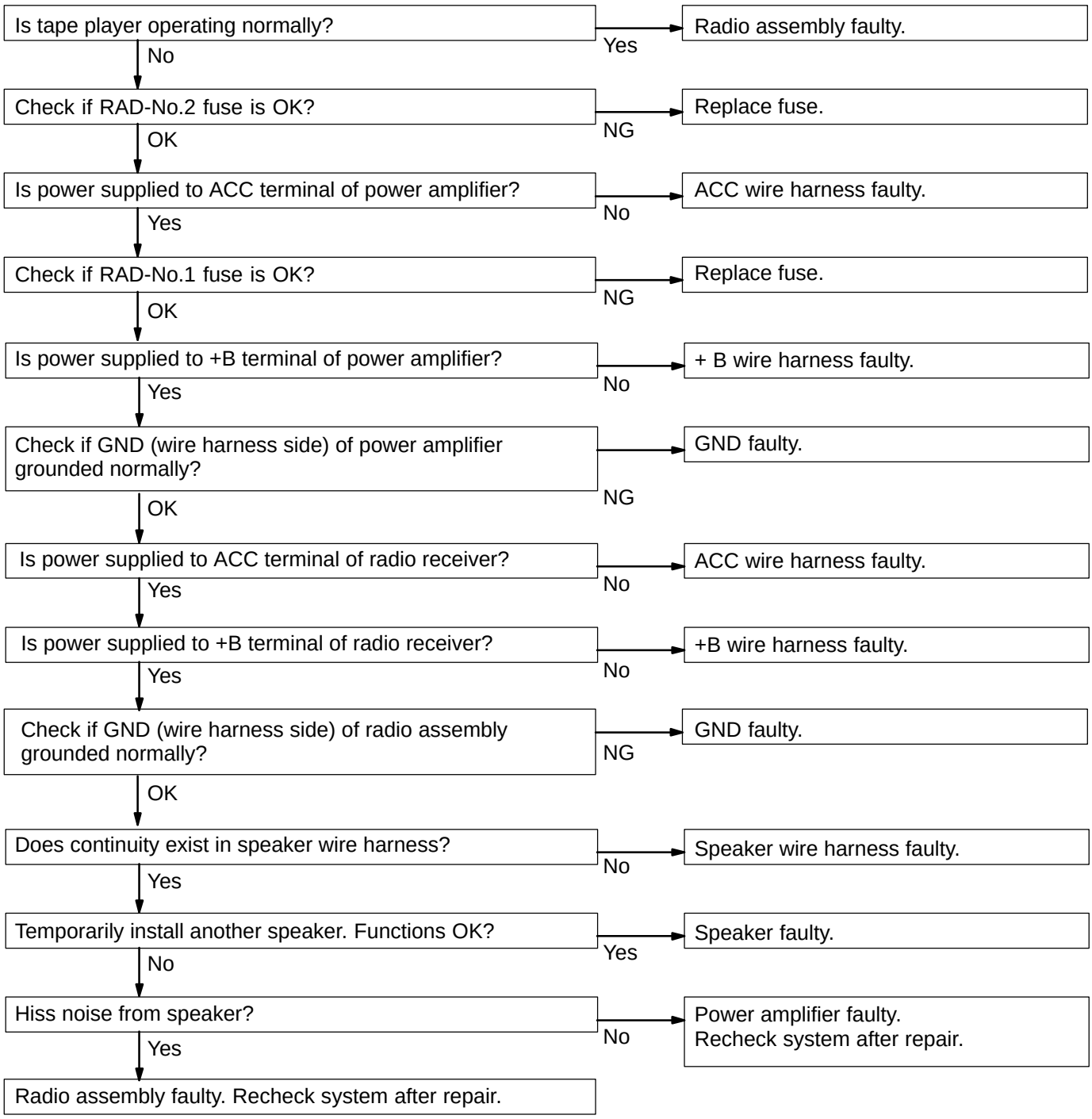
	Problem	No.
Radio	Radio not operating when power switch turned to 'ON'.	1
	Display indicates when power switch turned to 'ON', but no sound (including 'noise') is produced.	2
	Noise present, but AM - FM not operating.	3
	Any speaker does not work.	4
	Any AM or FM does not work.	5
	Few preset turning bands.	5
	Reception poor.	6
	Sound quality poor.	7
	Preset memory disappears.	8
Tape Player	Cassette tape cannot be inserted.	9
	Cassette tape inserted, but no power.	10
	Power coming in, but tape player not operating.	11
	Any speaker does not work.	12
	Sound quality poor.	13
	Tape jammed, malfunction with tape speed or auto-reverse.	14
	Cassette tape will not eject.	15
CD Player	CD cannot be inserted.	16
	CD inserted, but no power.	17
	Power coming in, but CD player not operating.	18
	Sound jumps.	19
	Sound quality poor (Volume faint).	20
	Any speaker does not work.	21
	CD will not be ejected.	22
Power Amplifier	No power coming in.	23
	Power coming in, but power amplifier not operating.	24
	Any speaker does not work.	25
Noise	Noise occurs	26
	Noise produced by vibration or shock while driving.	27
	Noise produced when engine starts.	28

The term "AM" includes LW, MW and SW, and the term "FW" includes UKW.

1	Radio	RADIO NOT OPERATING WHEN POWER SWITCH TURNED TO ”ON”



2	Radio	DISPLAY INDICATES WHEN POWER SWITCH TURNED TO ”ON”, BUT NO SOUND (INCLUDING ”NOISE”) IS PRODUCED

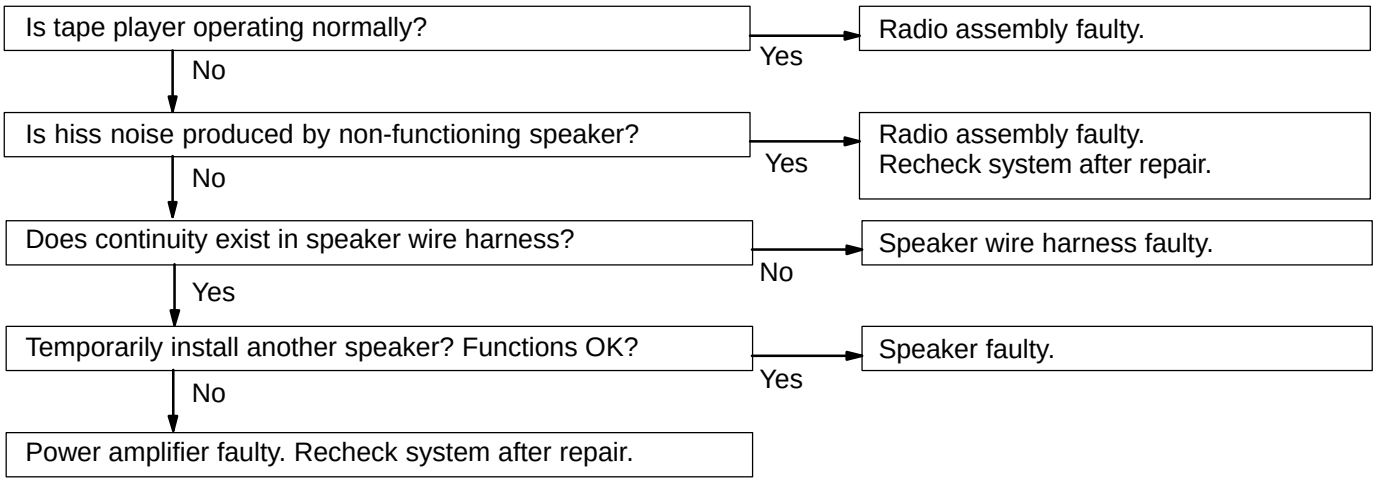


3	Radio	NOISE PRESENT, BUT AM-FM NOT OPERATING

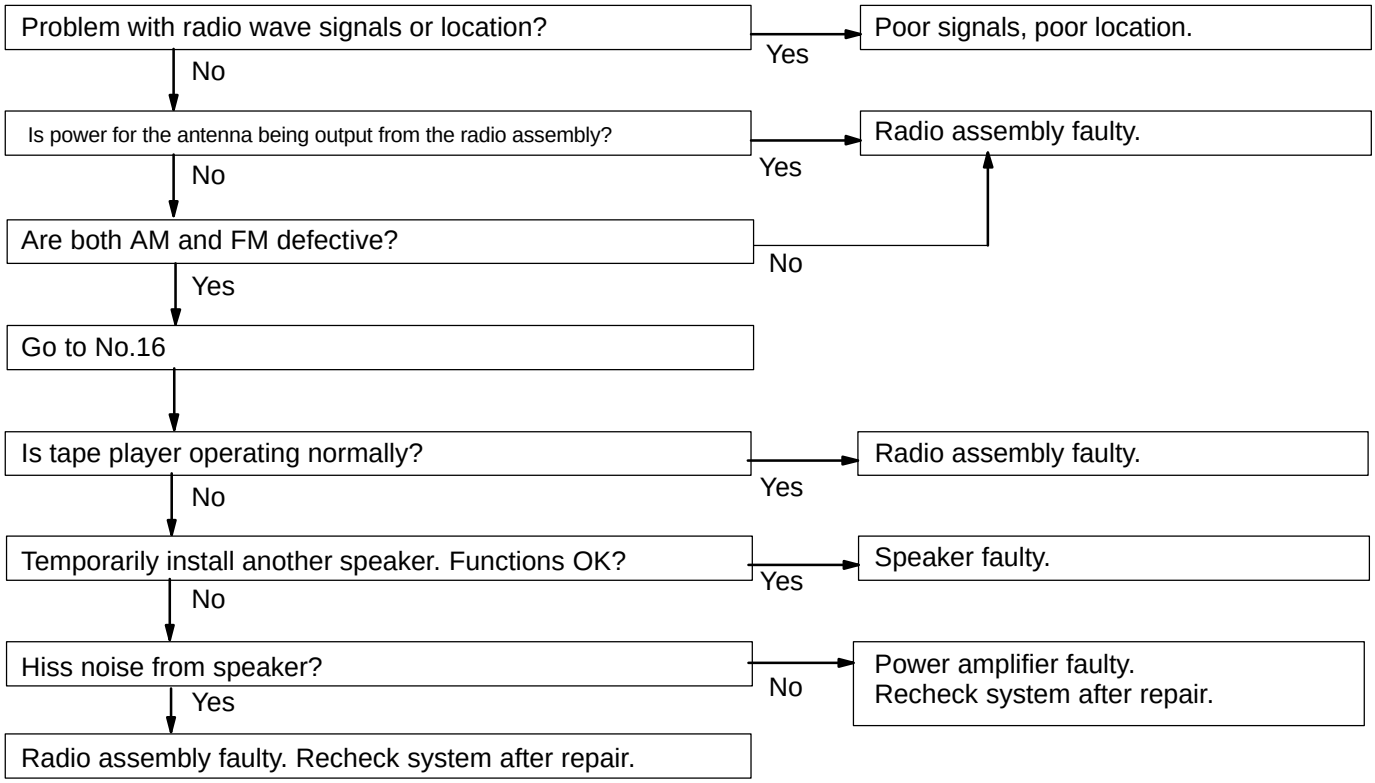
Go to No.25

If radio side faulty. → Radio faulty.

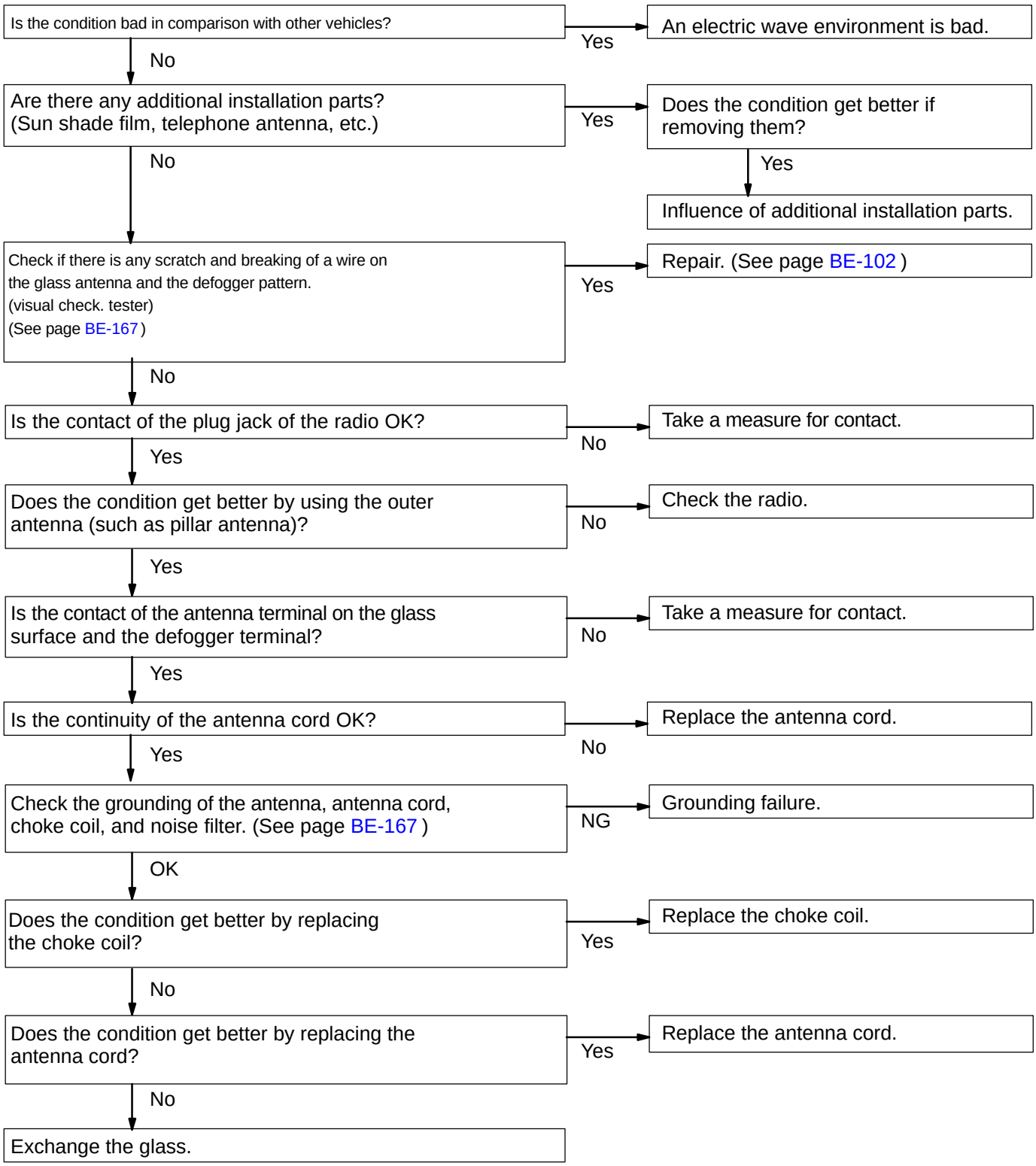
4	Radio	ANY SPEAKER DOSE NOT WORK



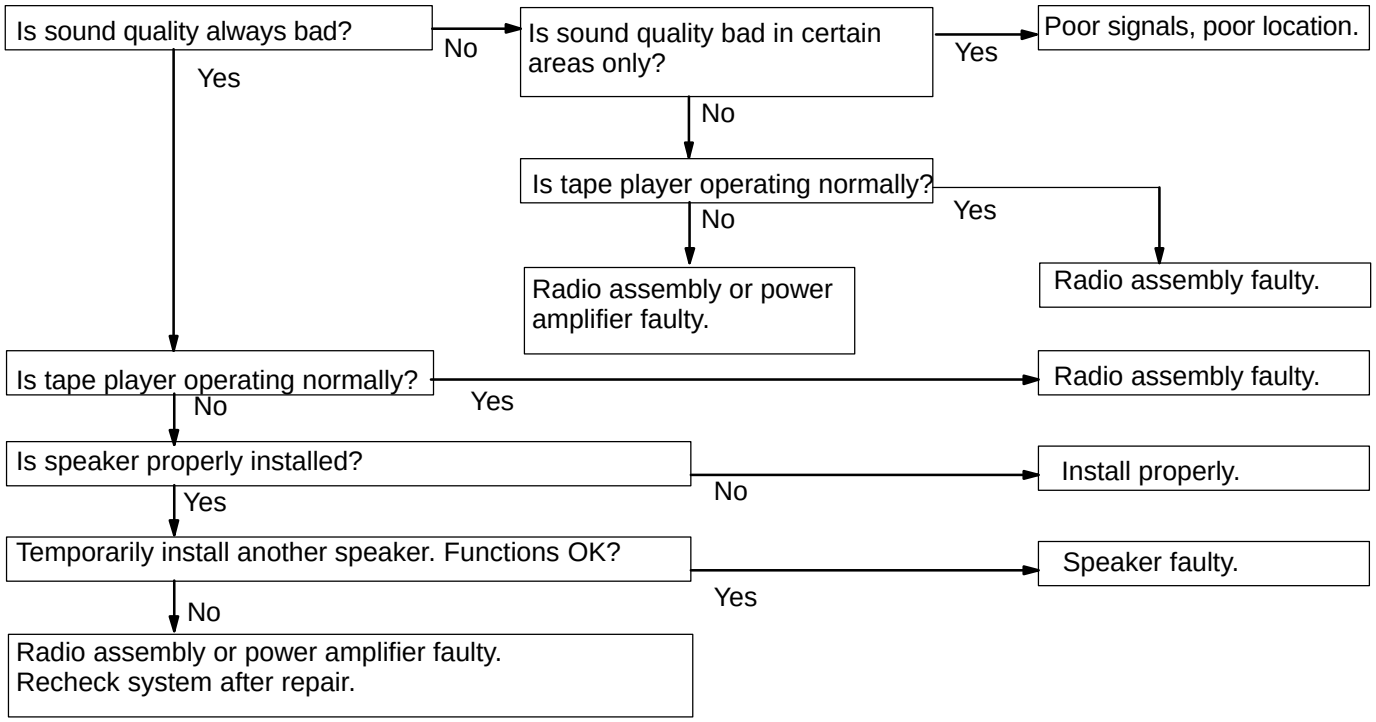
5	Radio	ANY AM OR FM DOES NOR WORK FEW PRESET TUNING BANDS



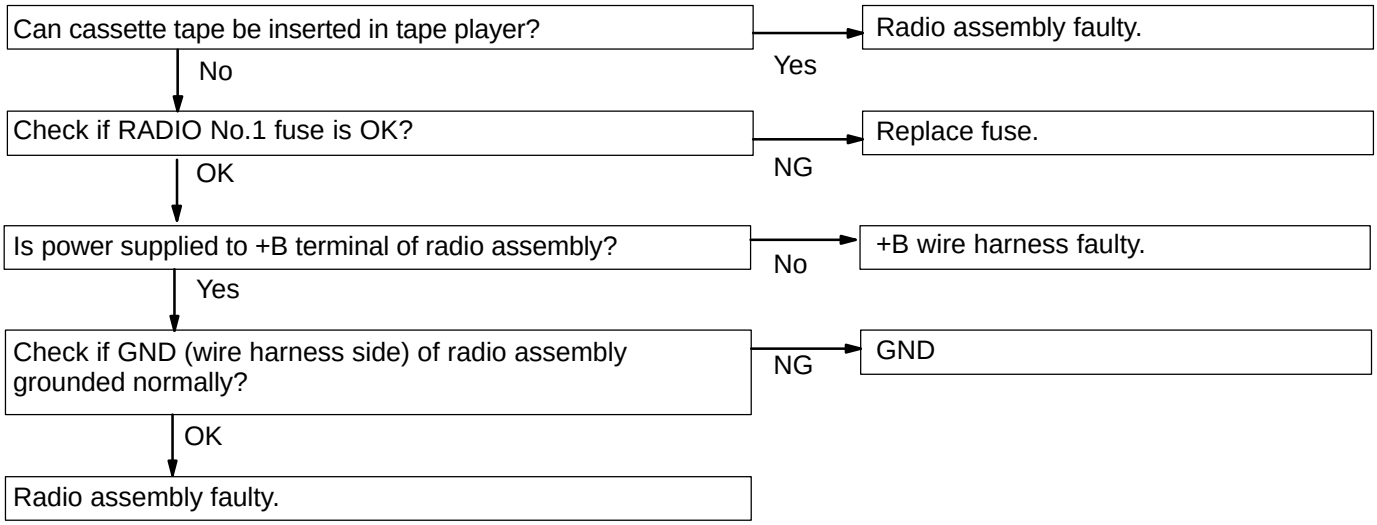
6	Radio	POOR RECEPTION



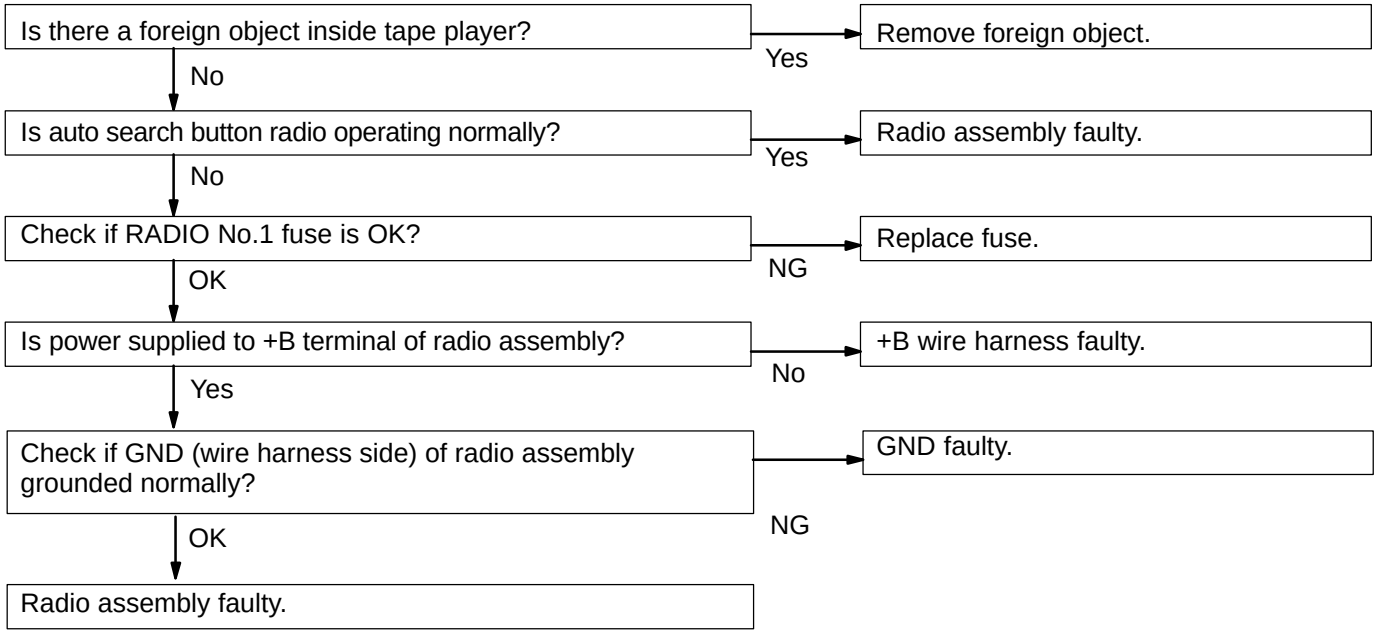
7	Radio	SOUND QUALITY POOR



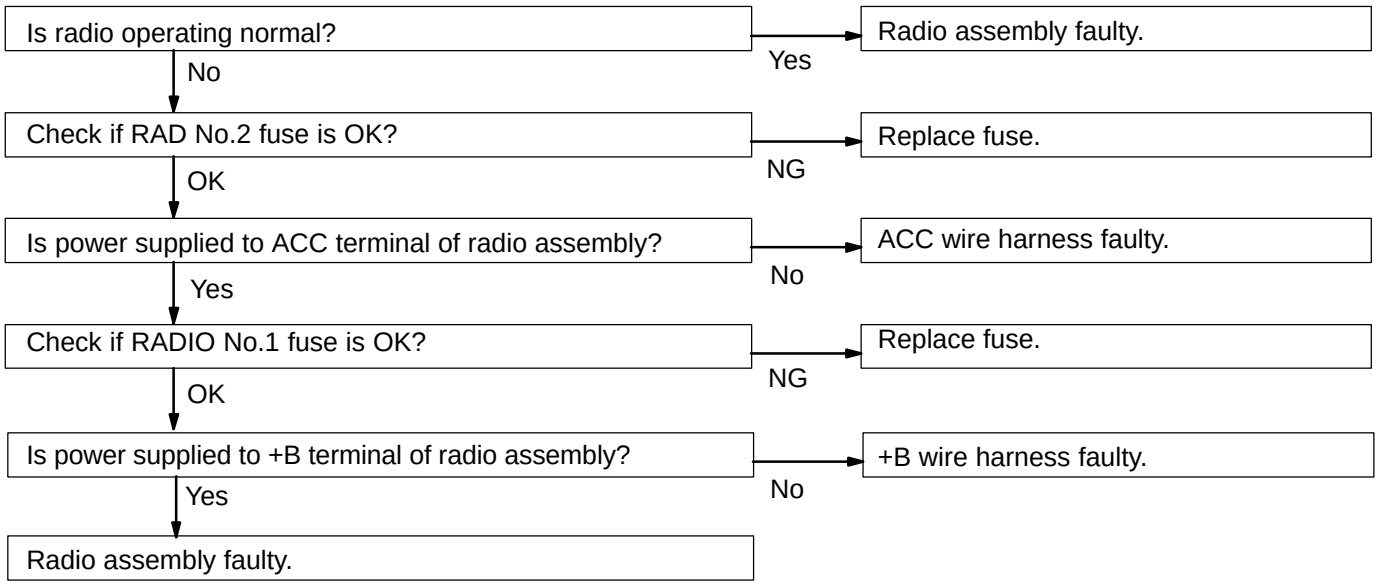
8	Radio	PRESET MEMORY DISAPPEARS



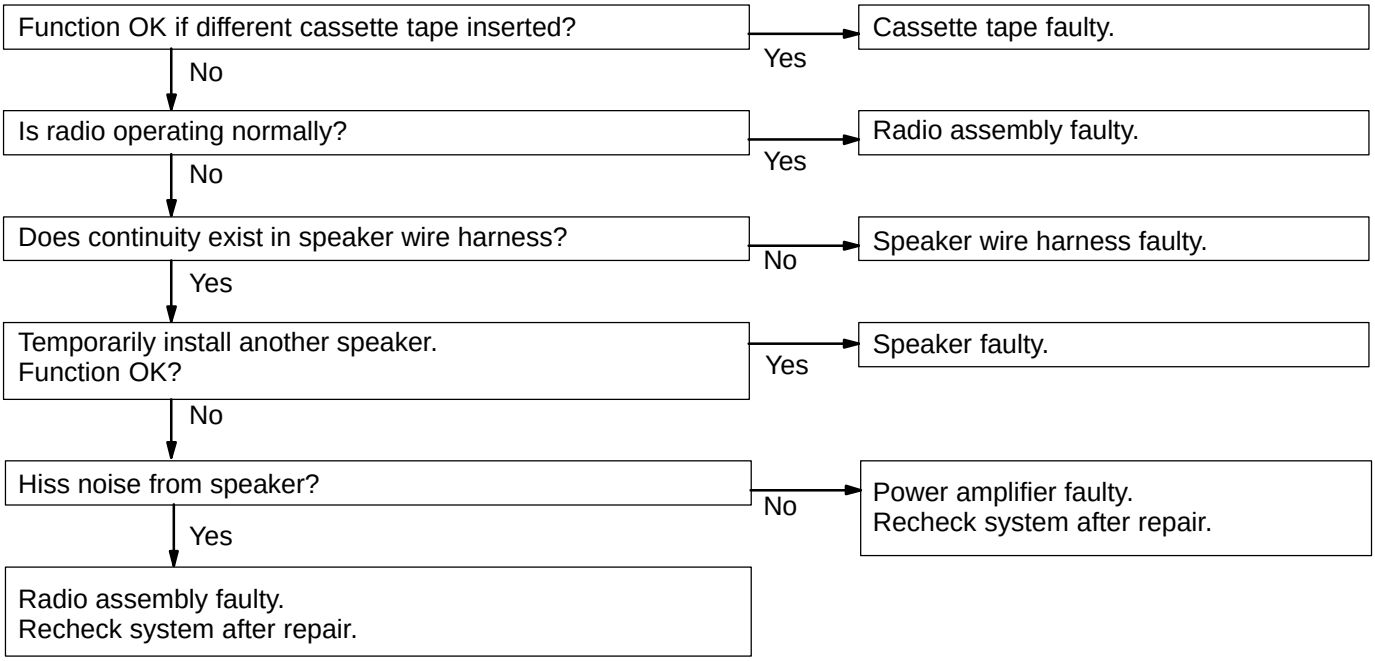
9	Tape Player	CASSETTE TAPE CANNOT BE INSERTED



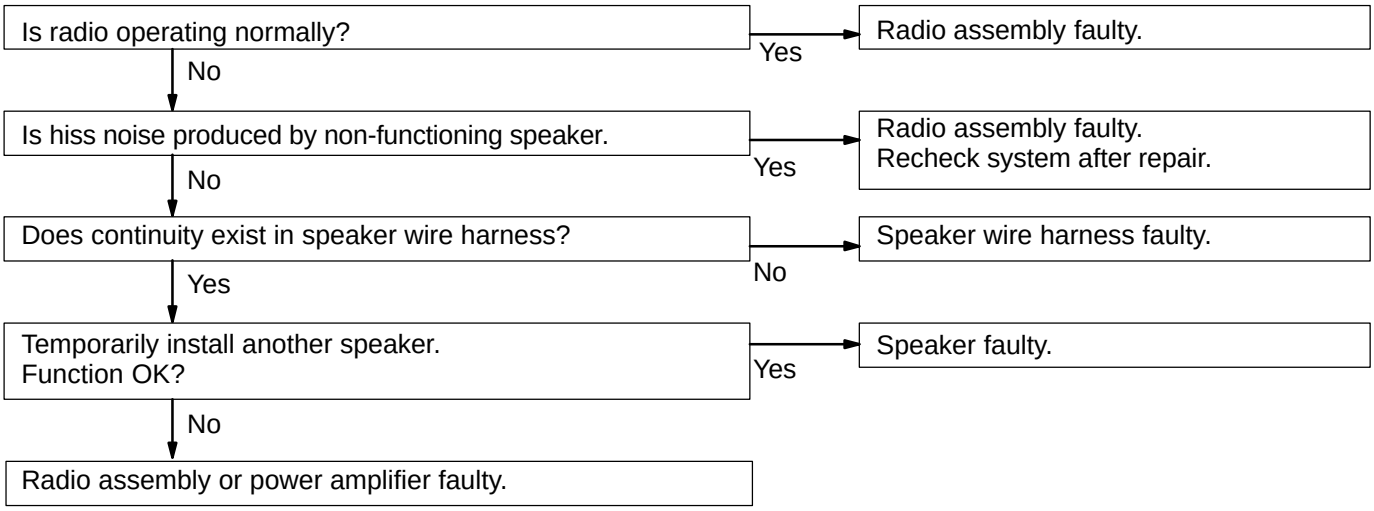
10	Tape Player	CASSETTE TAPE INSERTED, BUT NO POWER



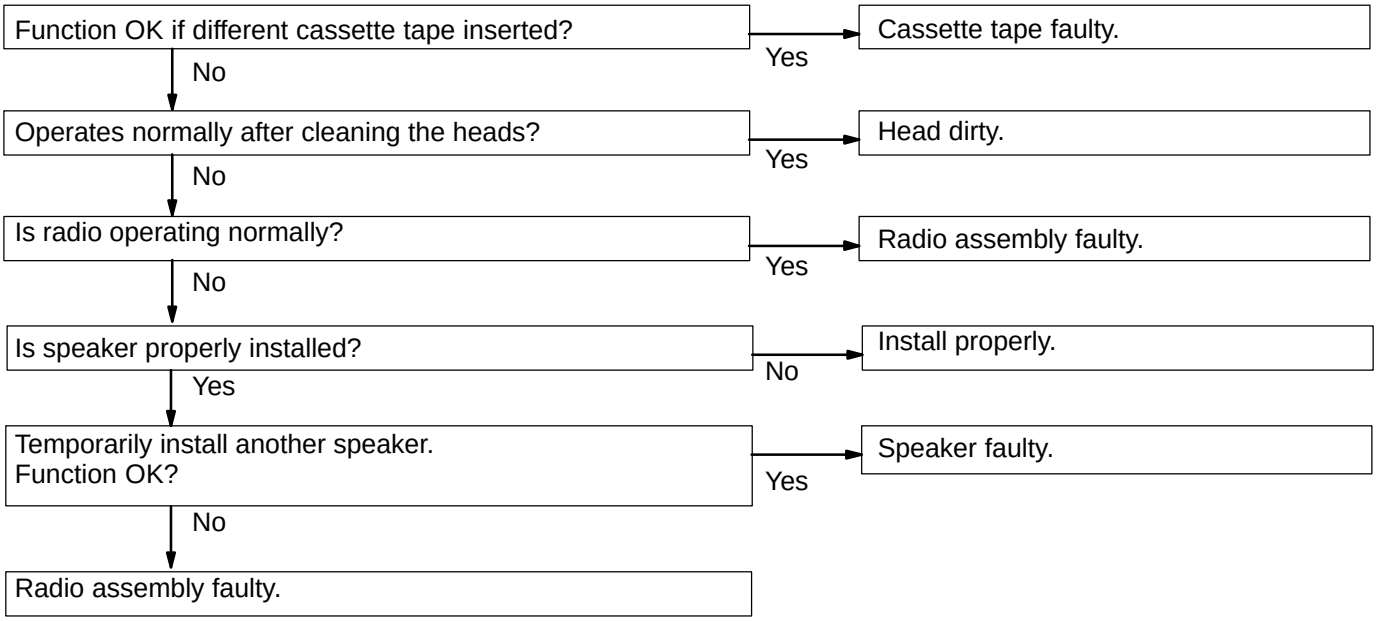
11	Tape Player	POWER COMING IN, BUT TAPE PLAYER NOT OPERATING



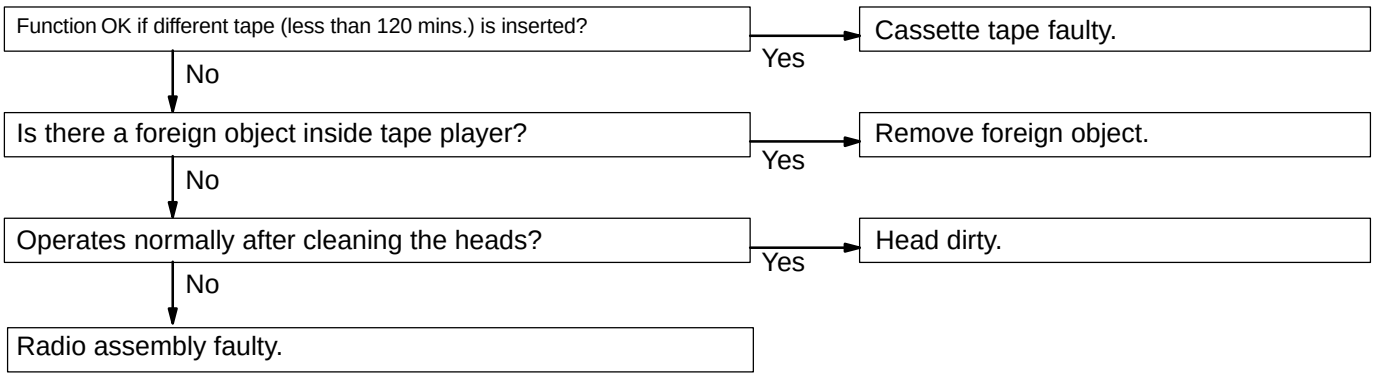
12	Tape Player	ANY SPEAKER DOES NOT WORK



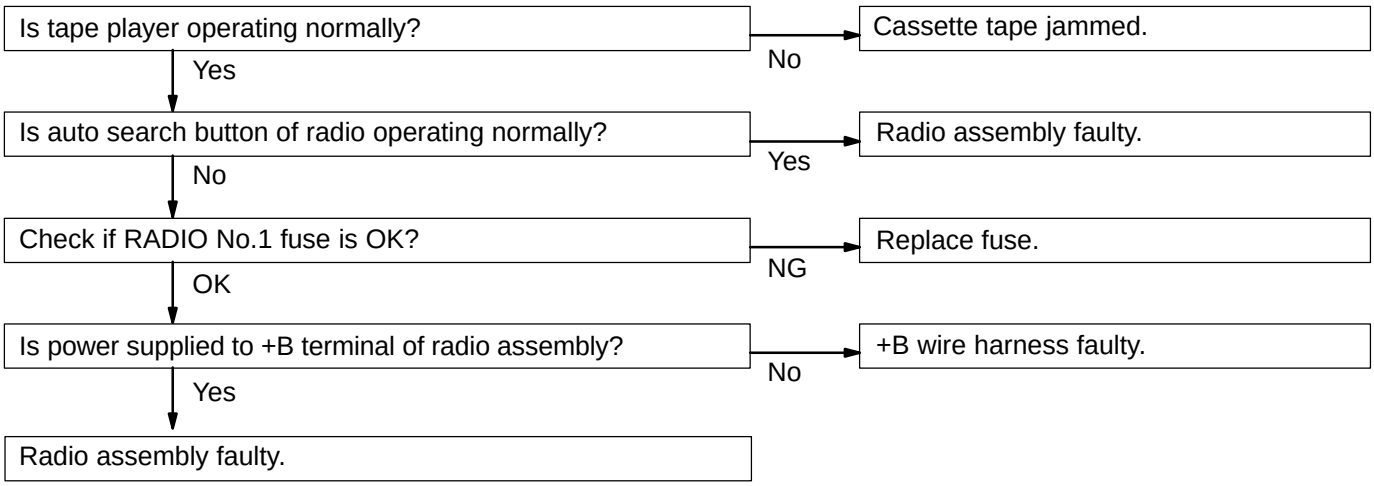
13	Tape Player	SOUND QUALITY POOR (VOLUME FAINT)



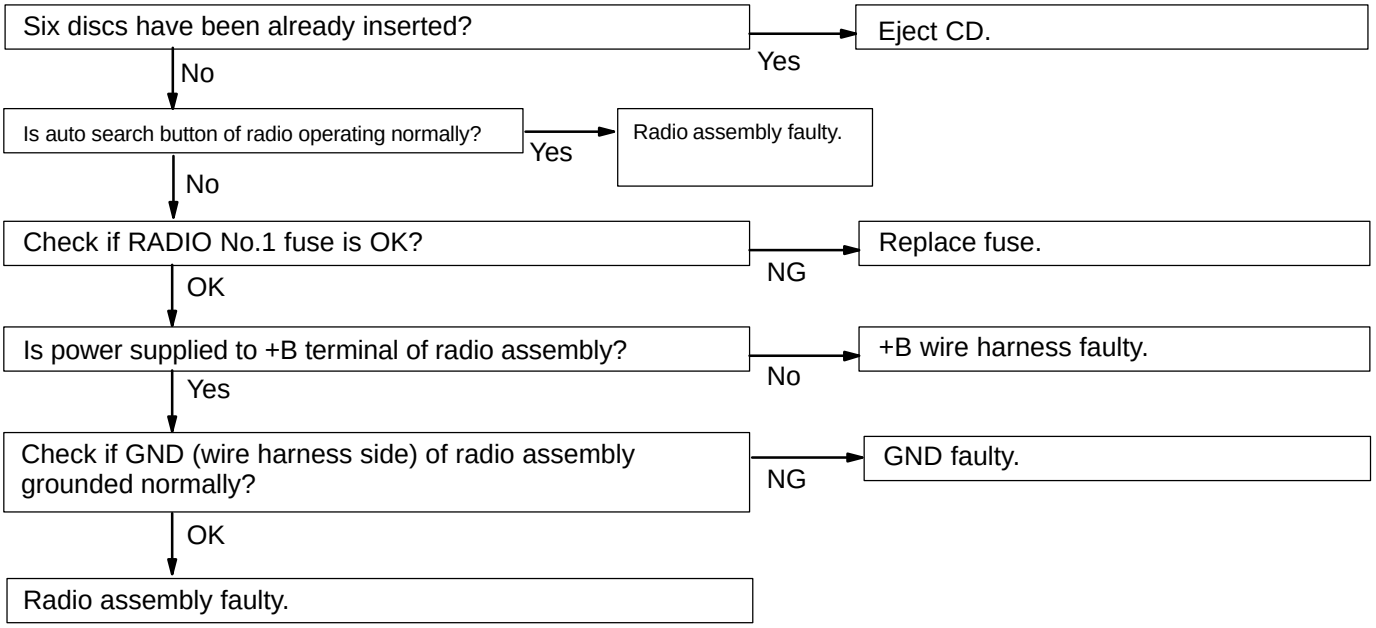
14	Tape Player	TAPE JAMMED MALFUNCTION WITH TAPE SPEED OR AUTO-REVERSE



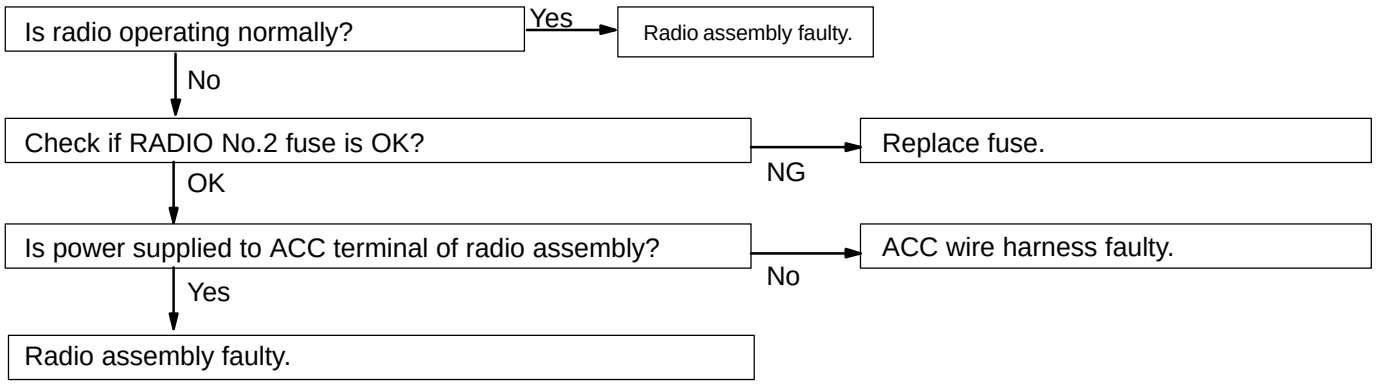
15	Tape Player	CASSETTE TAPE WILL NOT BE EJECTED



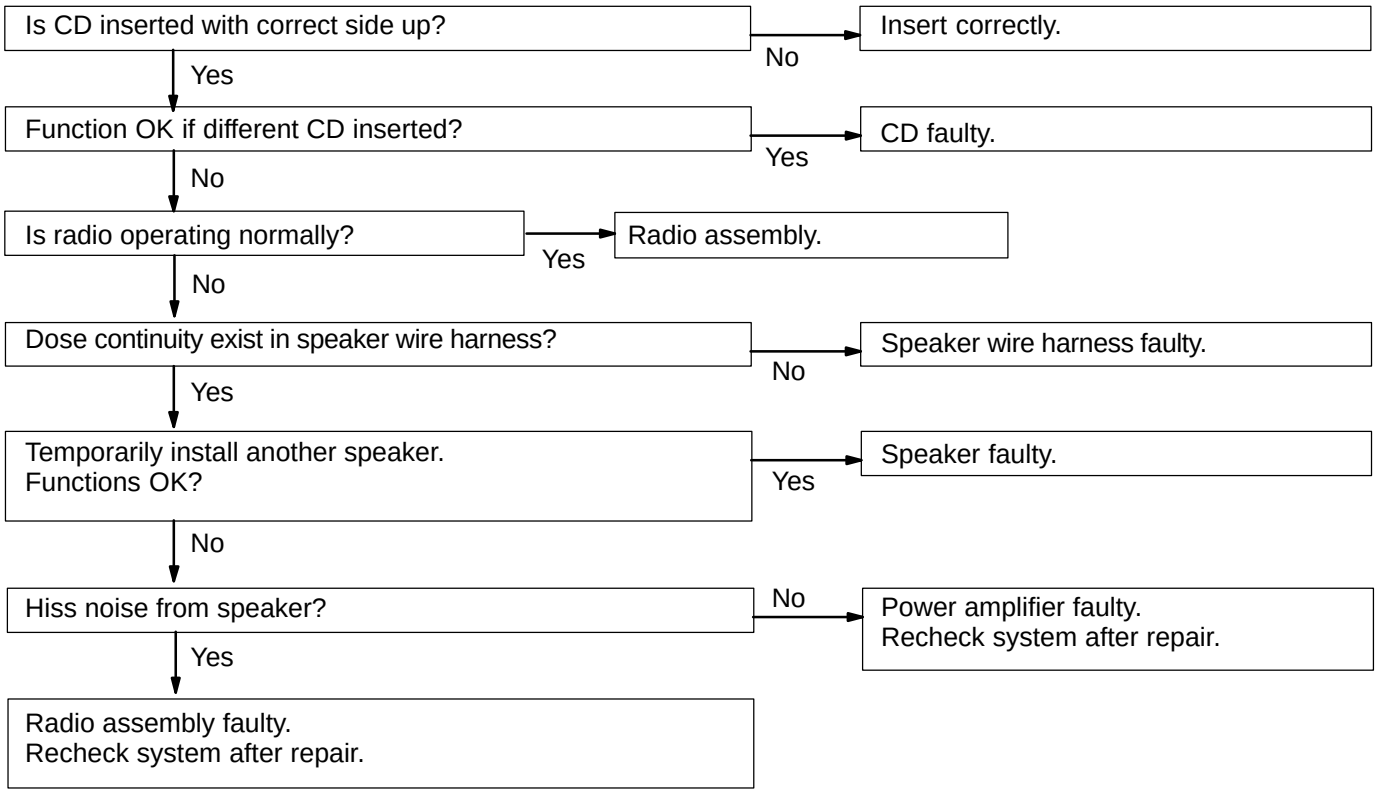
16	CD Player	CD CANNOT BE INSERTED



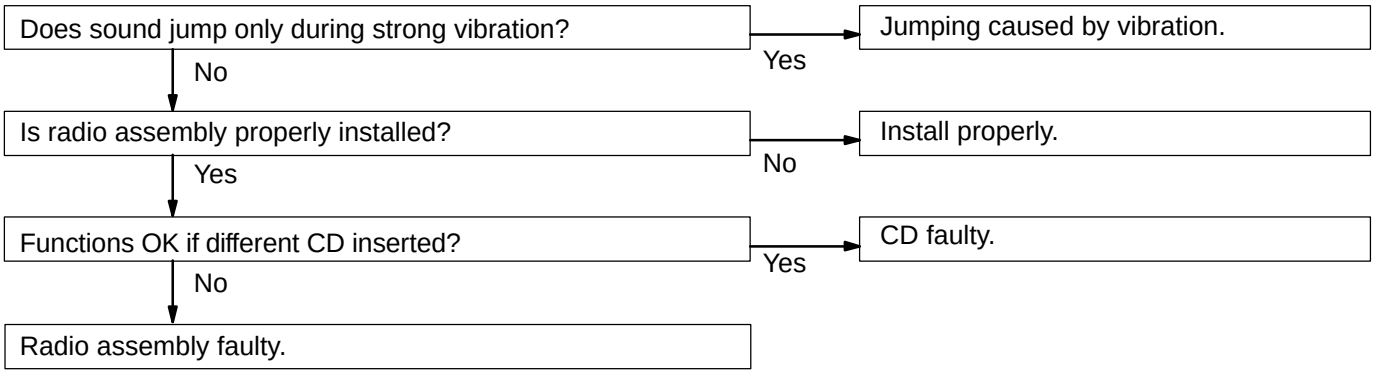
17	CD Player	CD INSERTED, BUT NO POWER



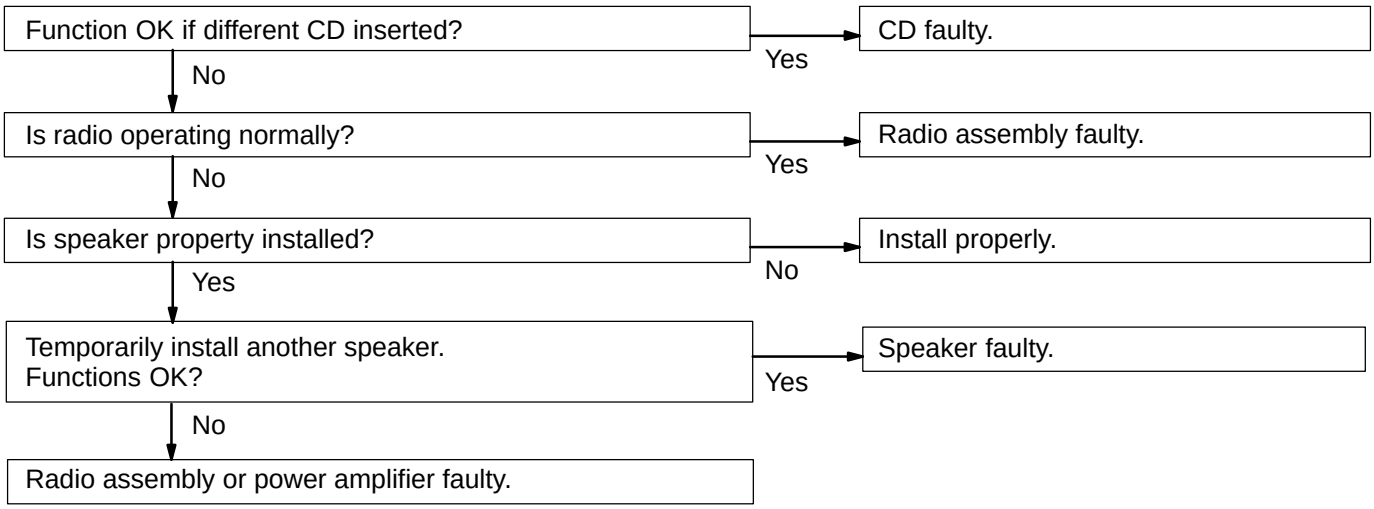
18	CD Player	POWER COMING IN, BUT CD PLAYER NOT OPERATING



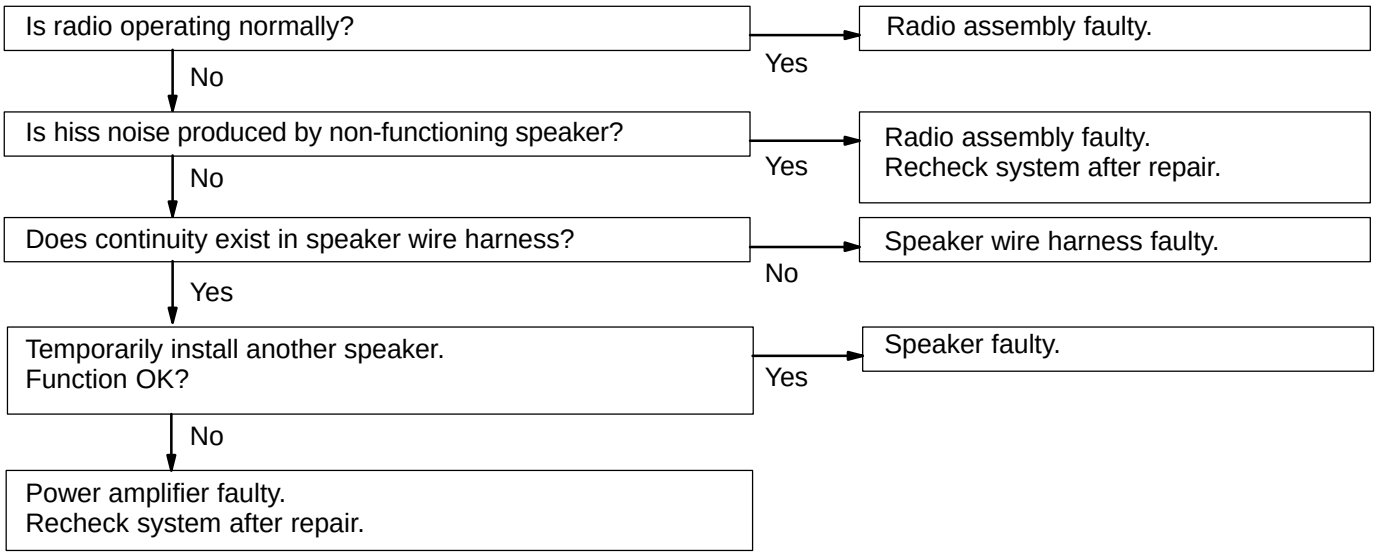
19	CD Player	SOUND JUMPS



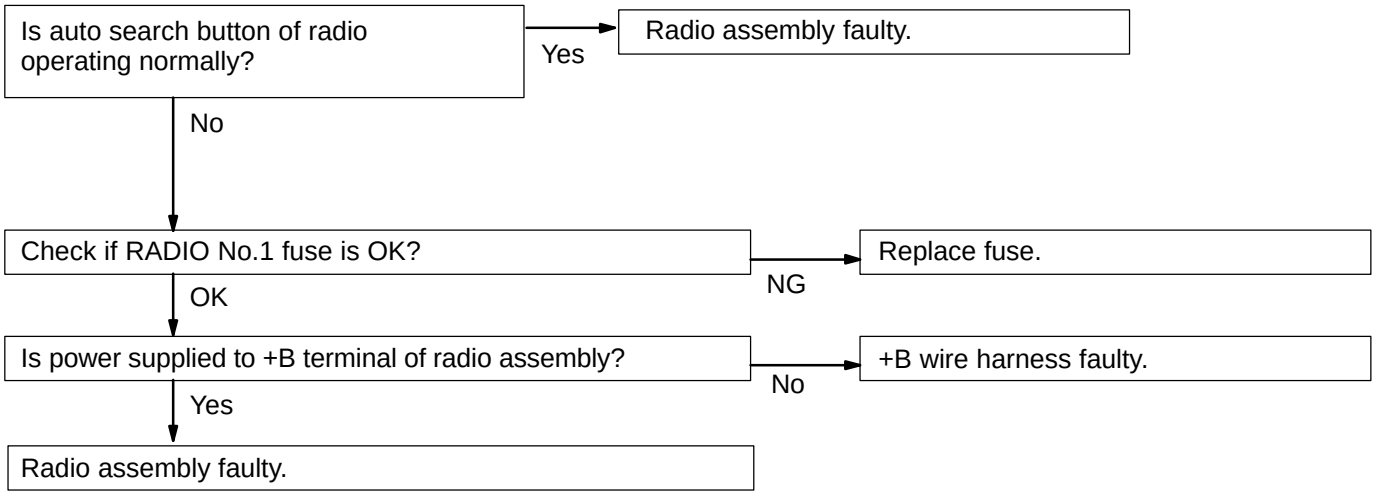
20	CD Player	SOUND QUALITY POOR (VOLUME FAINT)



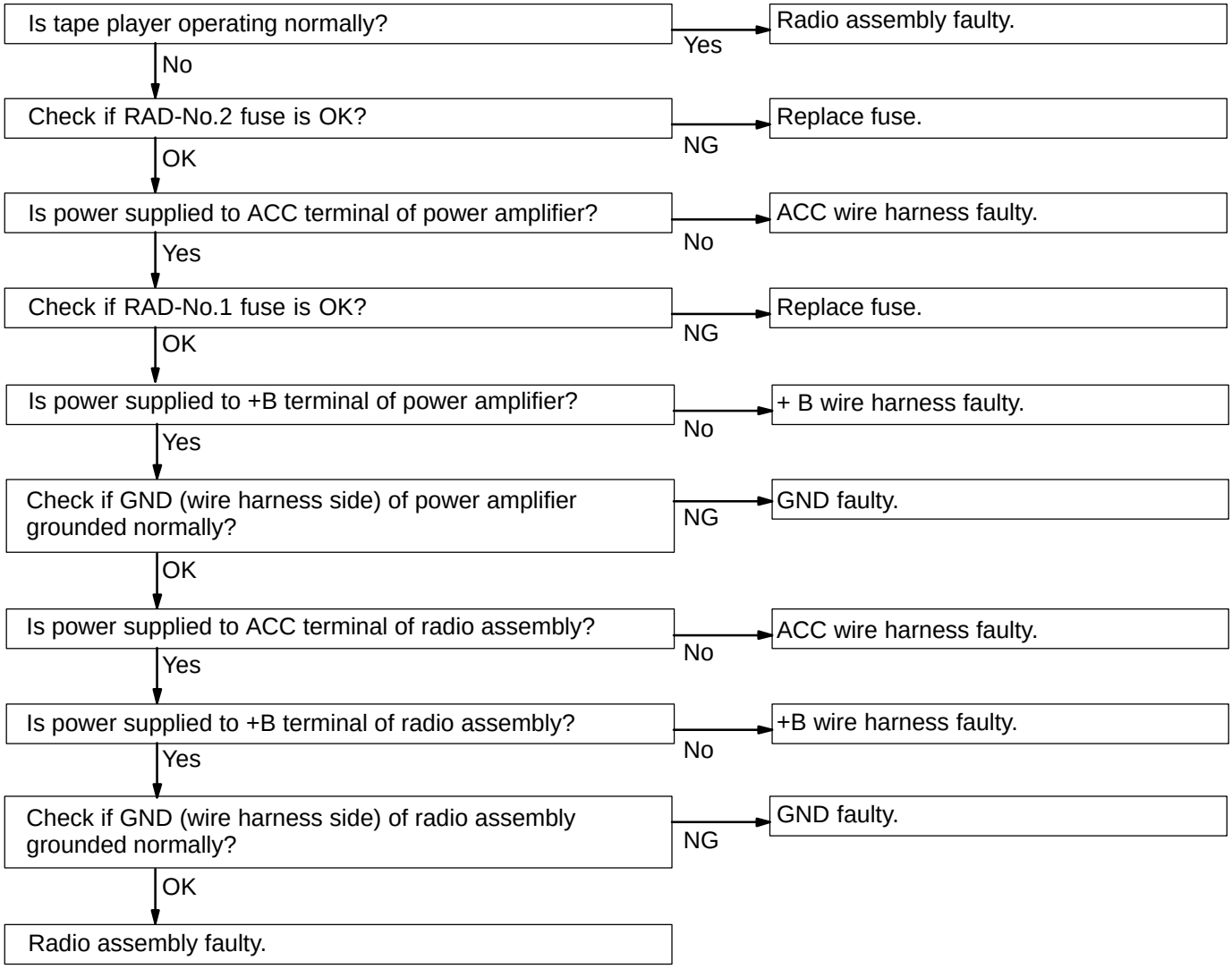
21	CD Player	ANY SPEAKER DOES NOT WORK



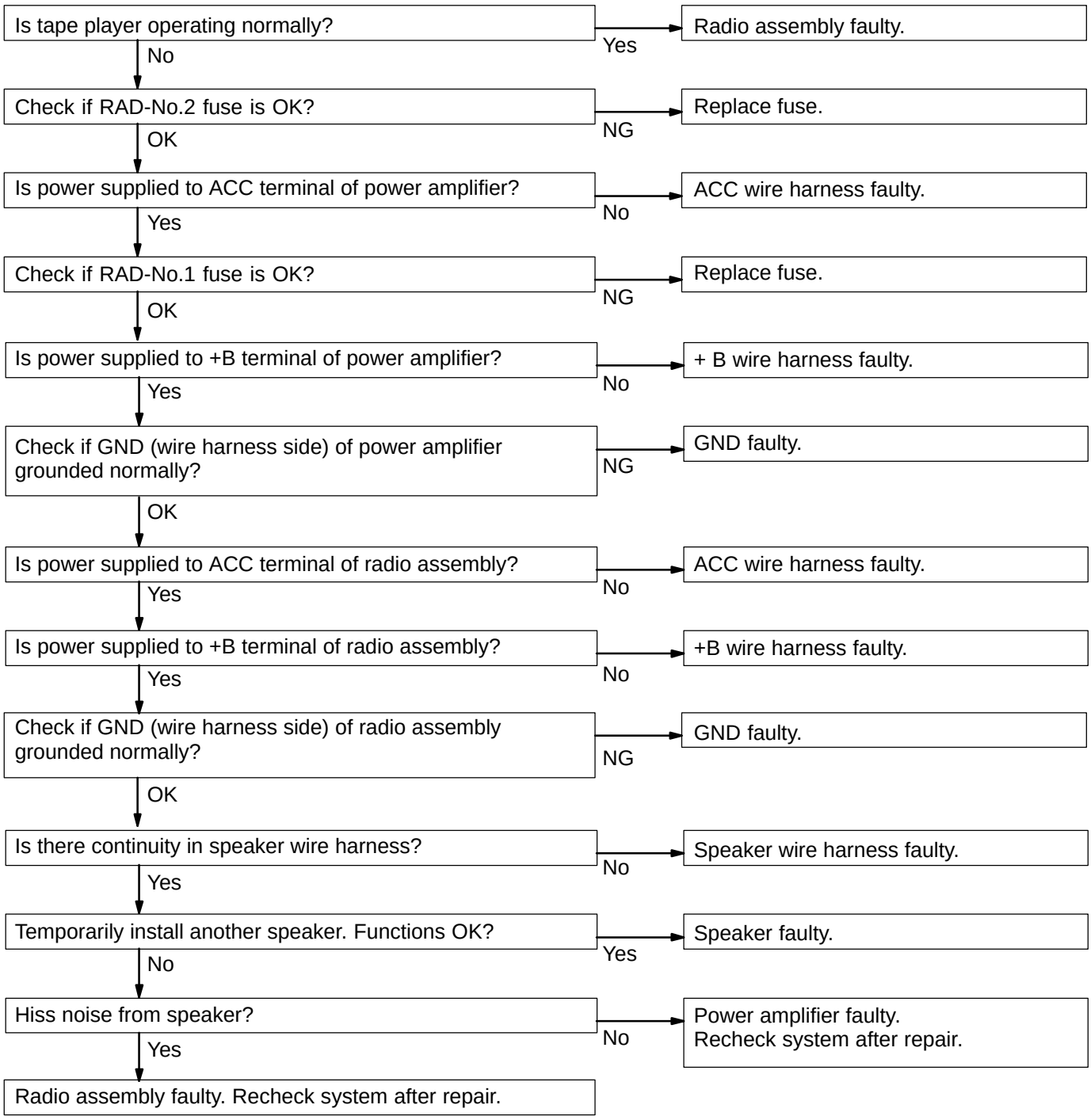
22	CD Player	CD WILL NOT BE EJECTED



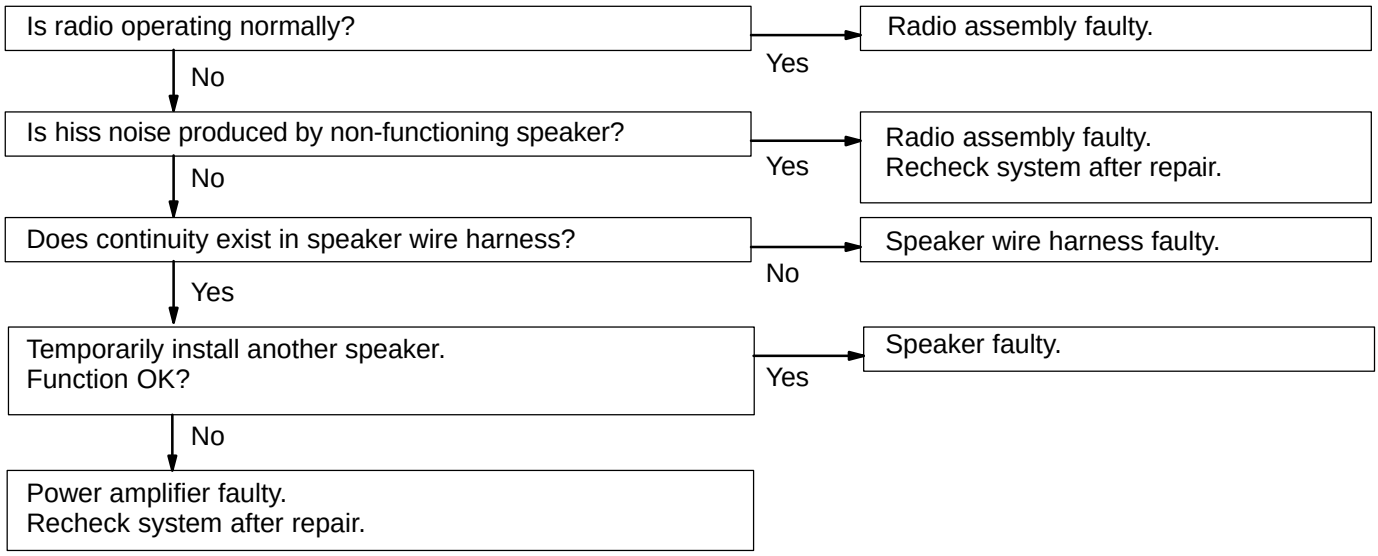
23	Power Amplifier	NO POWER COMING IN



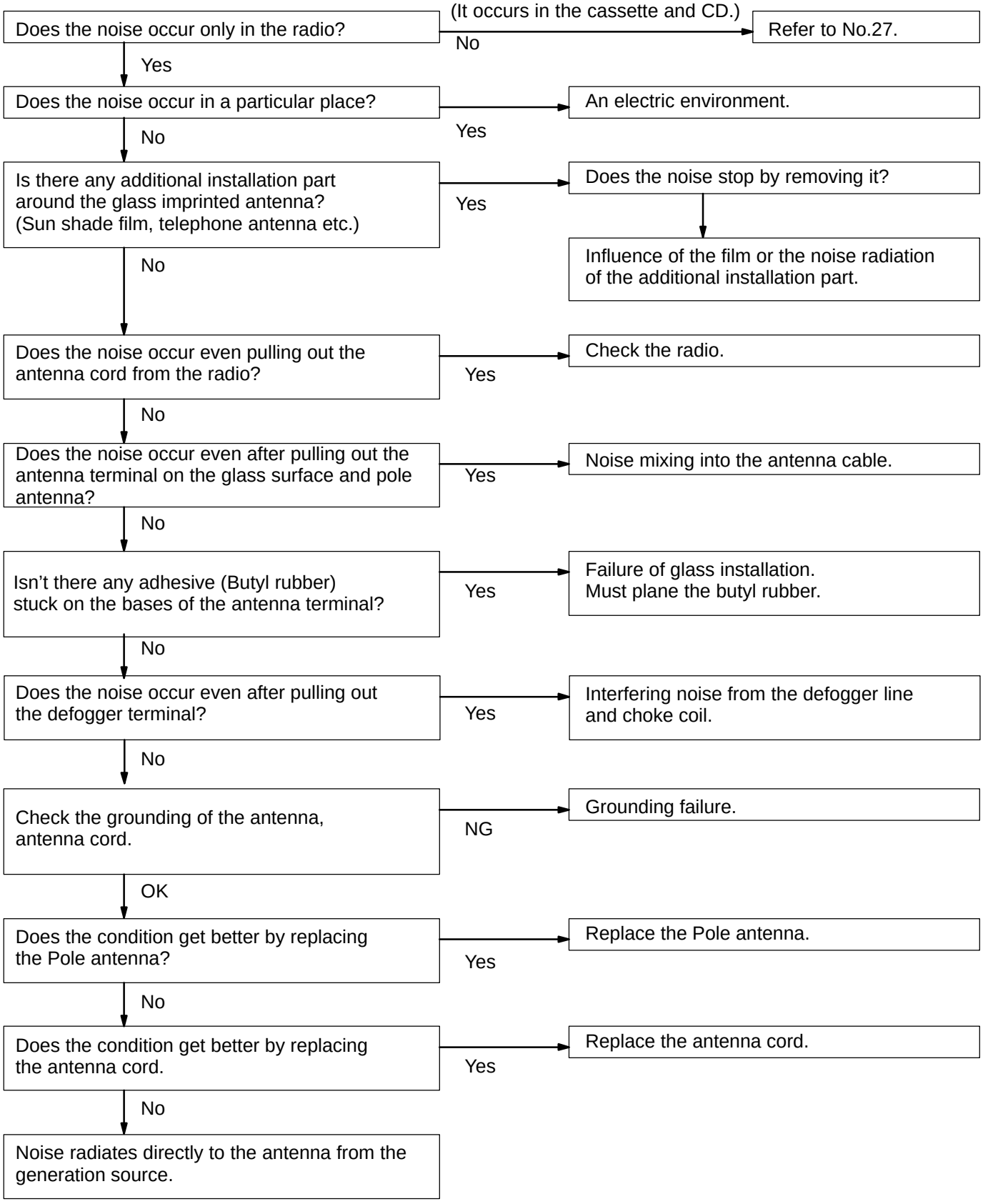
24	Power Amplifier	POWER COMING IN, BUT WOOFER (POWER) AMPLIFIER NOT OPERATING



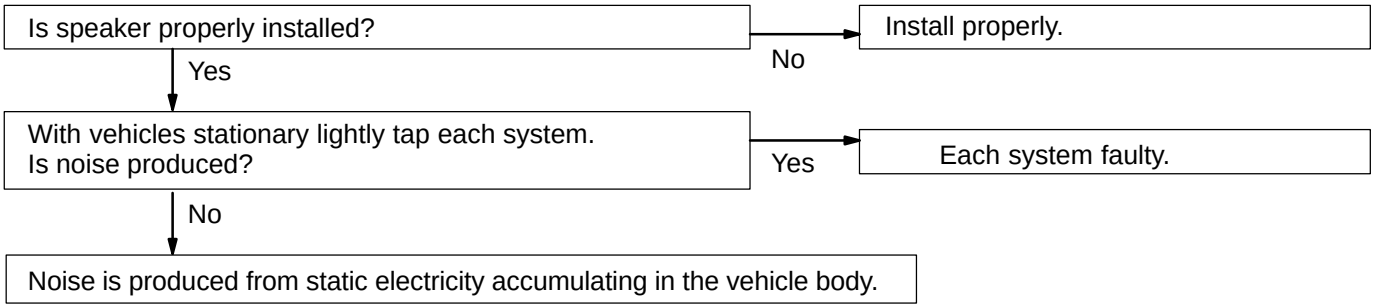
25	Power Amplifier	ANY SPEAKER DOES NOT WORK



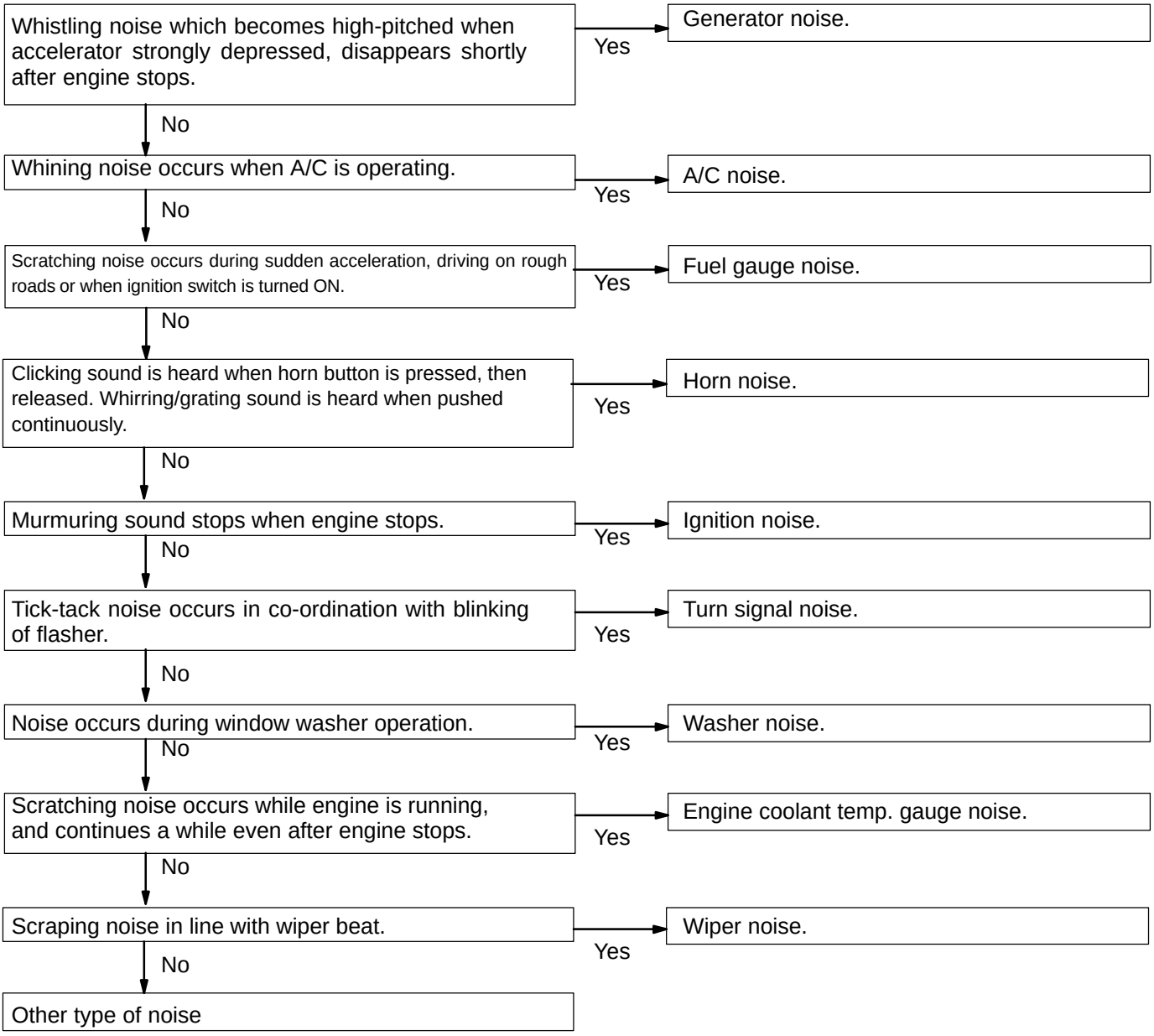
26	Noise	NOISE OCCURS



27	Noise	NOISE PRODUCED BY VIBRATION OR SHOCK WHILE DRIVING

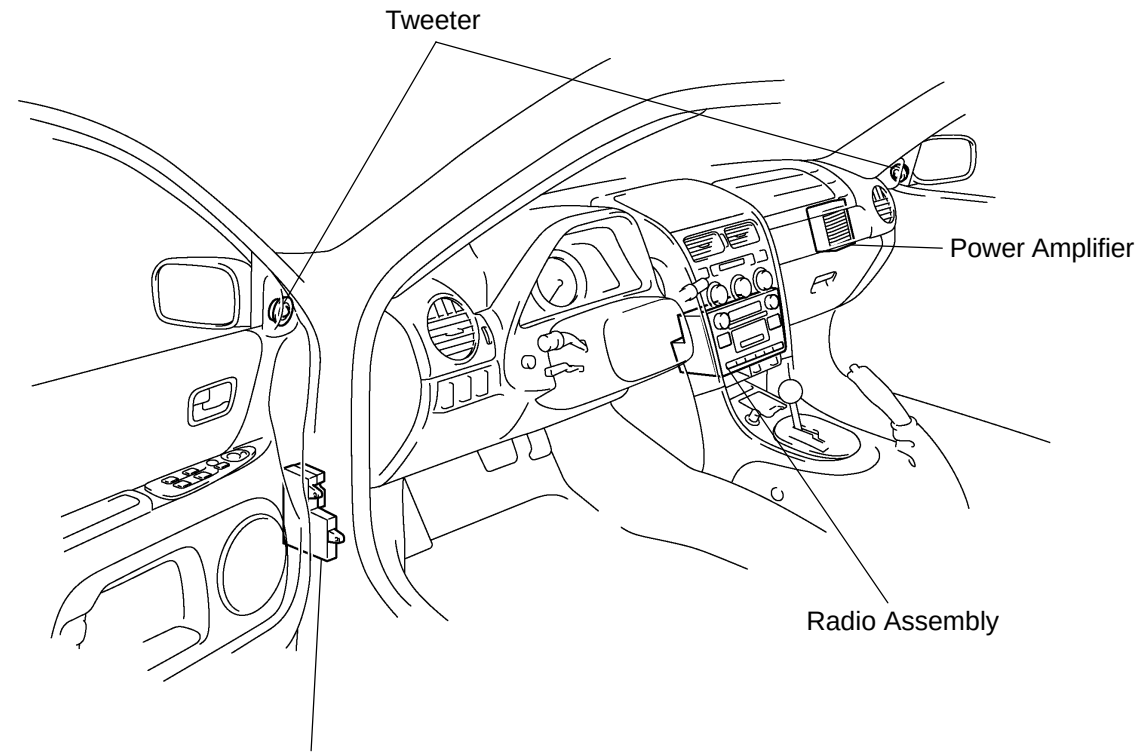


28	Noise	NOISE PRODUCED WHEN ENGINE STARTS

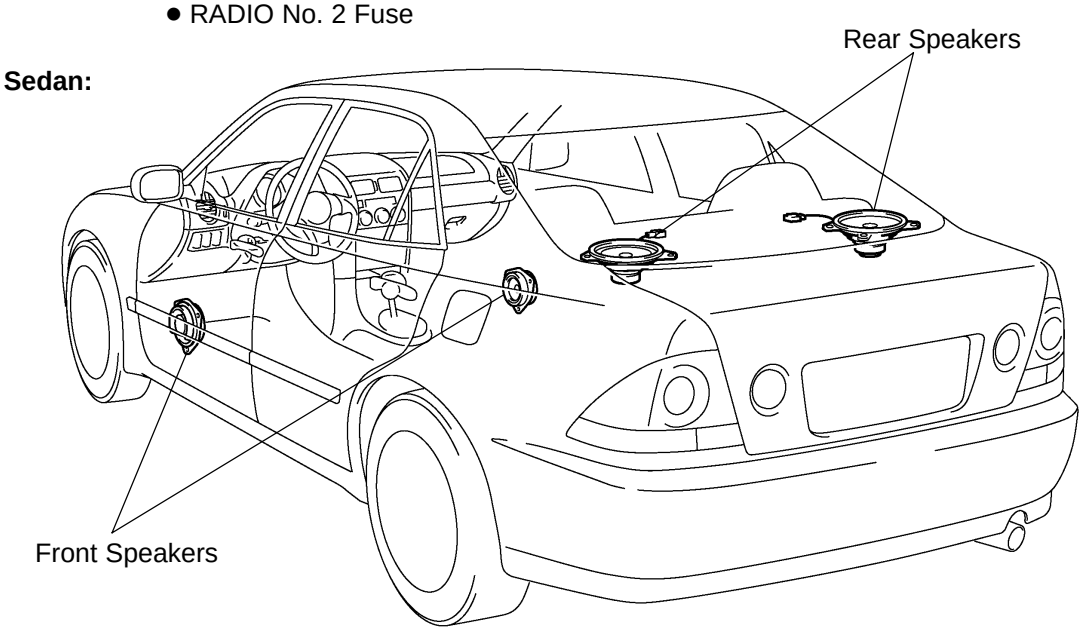


BE2A9-02

LOCATION



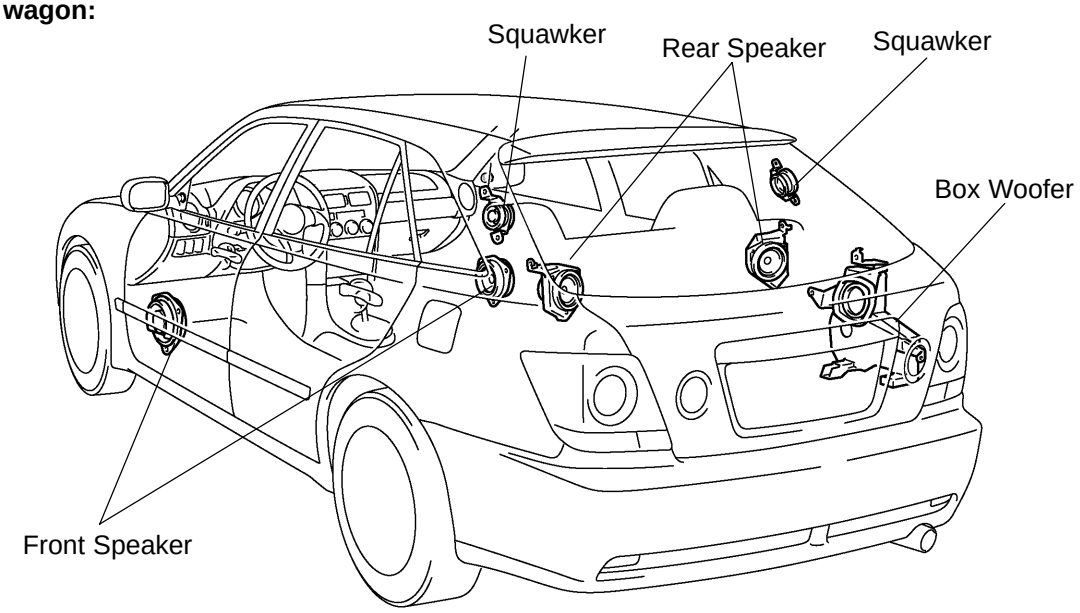
Sedan:



C

I27832

wagon:



C

I27833

BE16M-07

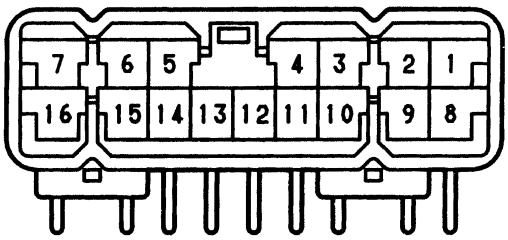
INSPECTION

1. INSPECT POWER AMPLIFIER CIRCUIT

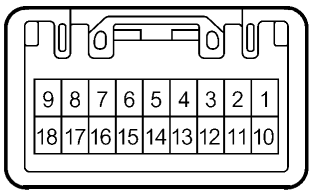
Connect the connector from power amplifier and inspect the connector on the wire harness side.

Power amplifier side

Connector "A"



Connector "B"



e16220A

I11410

Tester connection	Condition	Specified condition
A1 - Ground (FL+)	Audio sounding	5 - 7 V
A2 - Ground (FR+)	Audio sounding	5 - 7 V
A3 - Ground (RL+)	Audio sounding	5 - 7 V
A4 - Ground (WL+)	Audio sounding	5 - 7 V
A5 - Ground (RR+)	Audio sounding	5 - 7 V
A6 - Ground (WR+)	Audio sounding	5 - 7 V
A7 - Ground (BU+)	Audio sounding	Battery voltage
A8 - Ground (FL-)	Audio sounding	5 - 7 V
A9 - Ground (FR-)	Audio sounding	5 - 7 V
A10 - Ground (RL-)	Audio sounding	5 - 7 V
A11 - Ground (WL-)	Audio sounding	5 - 7 V
A12 - Ground (GND)	Constant	Continuity
A14 - Ground (RR-)	Audio sounding	5 - 7 V
A15 - Ground (WR-)	Audio sounding	5 - 7 V
A16 - Ground (ACC)	Ignition switch ACC	Battery voltage
B1 - Ground (TX+)	Constant	Battery voltage
B2 - Ground (CTX+)	Radio power switch ON	Battery voltage

B5 - Ground (N-MUTE)	Audio sounding	Battery voltage
B6 - Ground (T-MUTE)	Audio sounding	Battery voltage
B7 - Ground (MUTE)	Audio sounding	1 V or below
B8 - Ground (L+)	Audio sounding	1 V or below
B9 - Ground (R+)	Audio sounding	1 V or below
B10 - Ground (TX-)	Constant	Continuity
B11 - Ground (CTX-)	Constant	Continuity
B14 - Ground (GND)	Constant	Continuity
B15 - Ground (GND)	Constant	Continuity
B17 - Ground (L-)	Audio sounding	1 V or below
B18 - Ground (R-)	Audio sounding	1 V or below

If the circuit is not as specified, inspect the circuits connected to other parts.

2. INSPECT RADIO RECEIVER ASSEMBLY CIRCUIT

Connect the connectors from the radio receiver assembly, and inspect the connector on the wire harness side.

Radio Receiver Side

N

I15534

Tester connection	Condition	Specified condition
A1 - Ground (B)	Constant	Battery Positive Voltage
A2 - Ground (ILL+)	Light switch ON	Battery Positive Voltage
A3 - Ground (AMP)	Ignition switch ACC	10 - 14 V
A7 - Ground (MUTE)	Ignition switch ACC and Audio OFF	1 V or below
A8 - Ground (CDR+)	Audio sounding	Approx. 0.7 V
A9 - Ground (CDL+)	Audio sounding	Approx. 0.7 V
A11 - Ground (ACC)	Ignition switch ACC	Battery Positive Voltage
A12 - Ground (ILL-)	Light switch ON	0 - 14 V (Variable)
A13 - Ground (ANT)	Radio power switch ON	Battery Positive Voltage
A16 - Ground (SGND)	Constant	Continuity
A18 - Ground (CDR-)	Audio sounding	Approx. 0.7 V
A19 - Ground (CDL-)	Audio sounding	Approx. 0.7 V
A20 - Ground (E)	Constant	Continuity
B9 - Ground (TX-)	System check mode	-
B10 - Ground (TX+)	System check mode	-

*: w/ LEXUS navigation system

If the circuit is not as specified, inspect the circuits connected to other parts.

HINT:
Check the wire harness between radio receiver assembly and power amplifier.

3. INSPECT GLASS IMPRINTED ANTENNA

Use same procedure as for ”INSPECT DEFOGGER WIRES” on page BE-102 .

4. REPAIR GLASS IMPRINTED ANTENNA

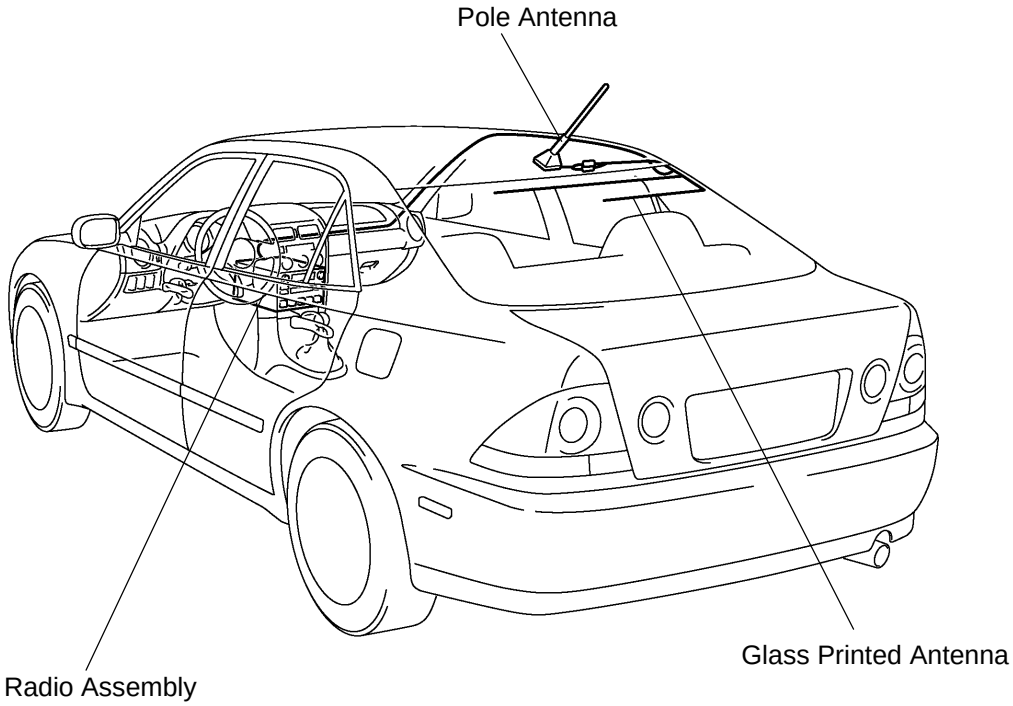
Use same procedure as for ”REPAIR DEFOGGER WIRES” on page BE-102 .

ANTENNA

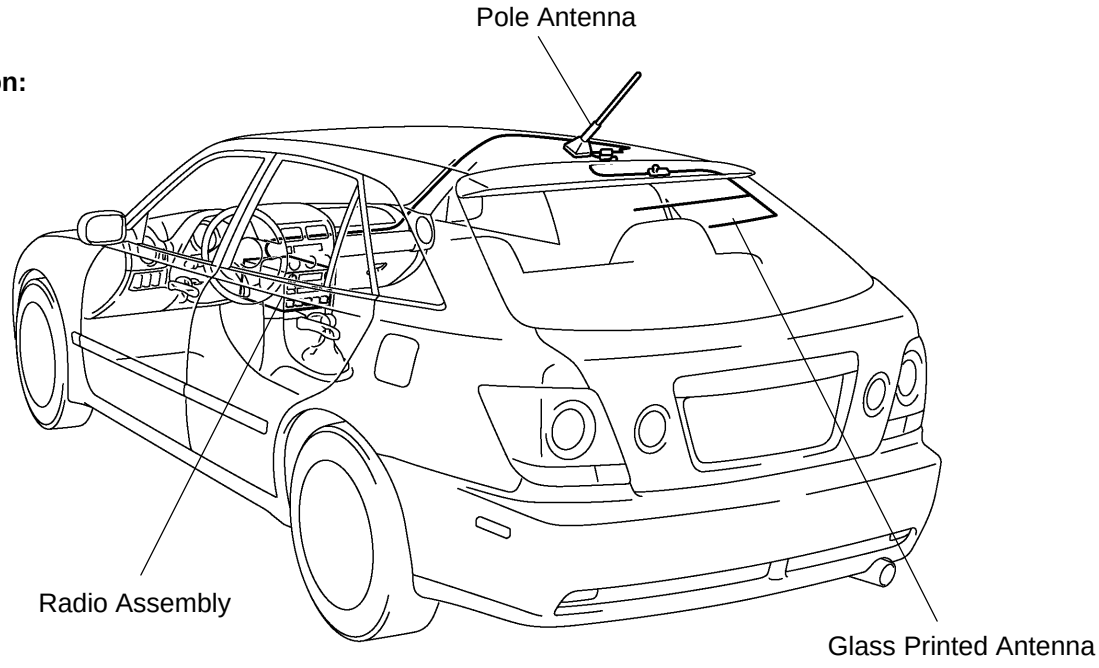
LOCATION

BE16N-04

Sedan:



Wagon:



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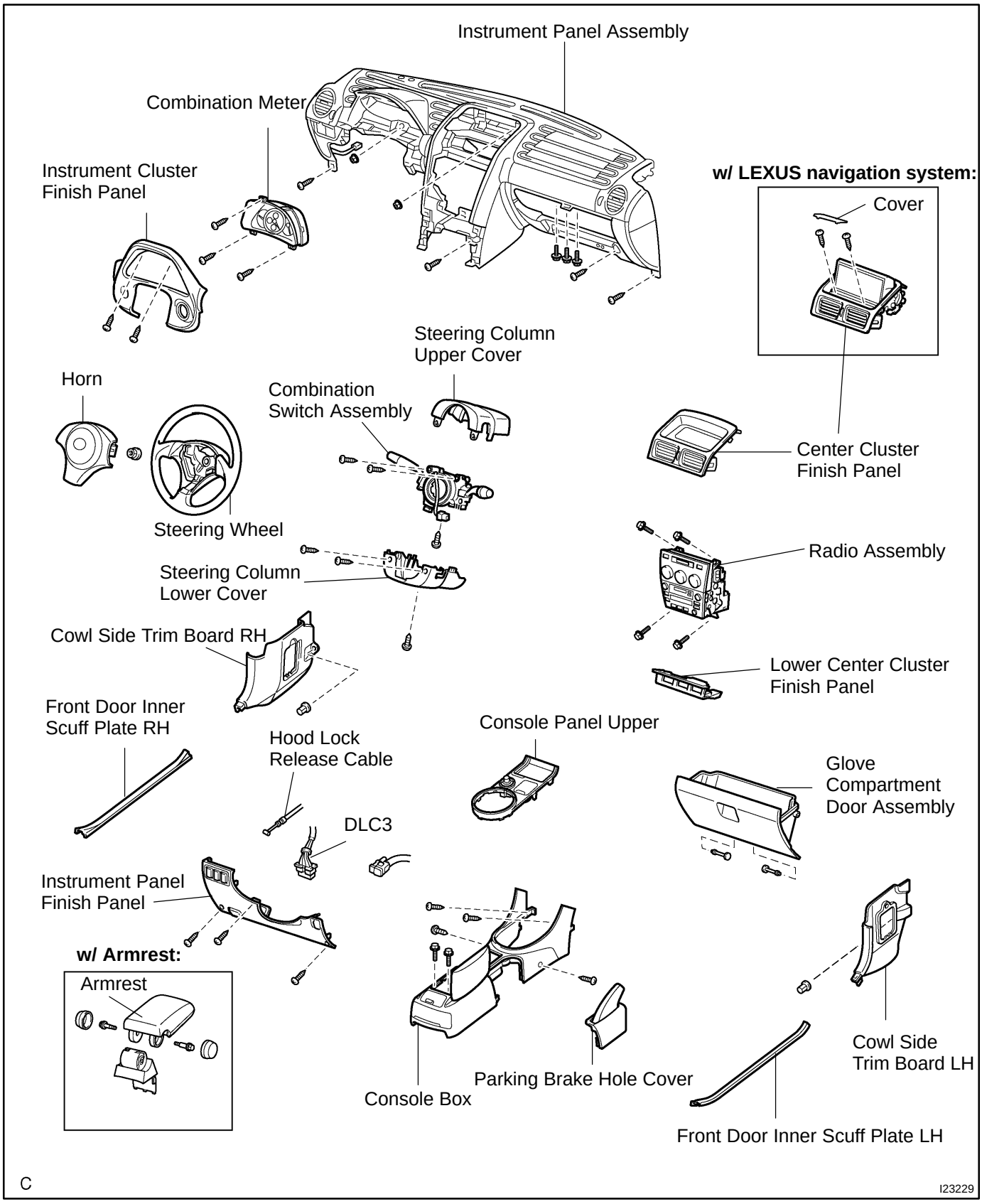
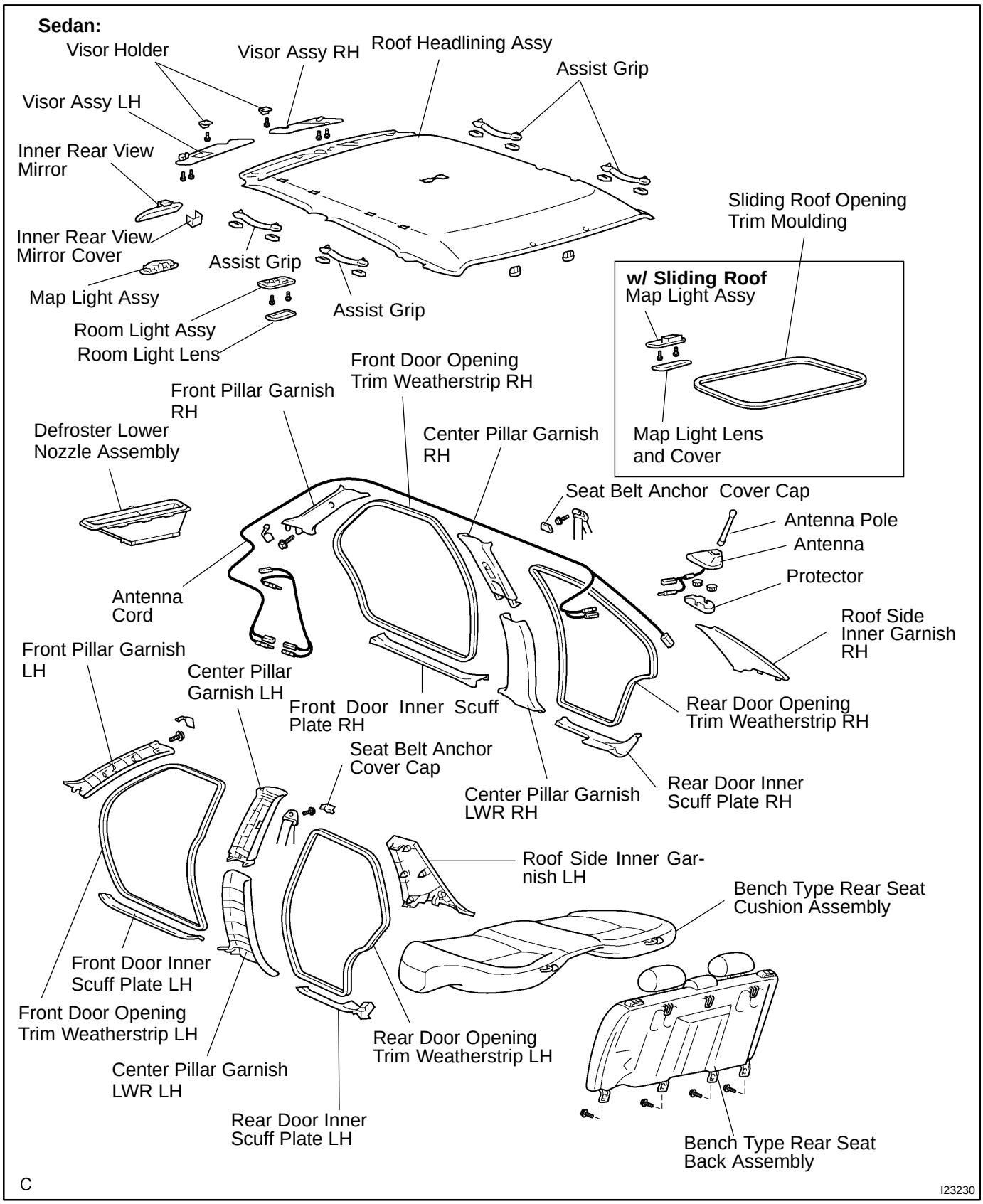
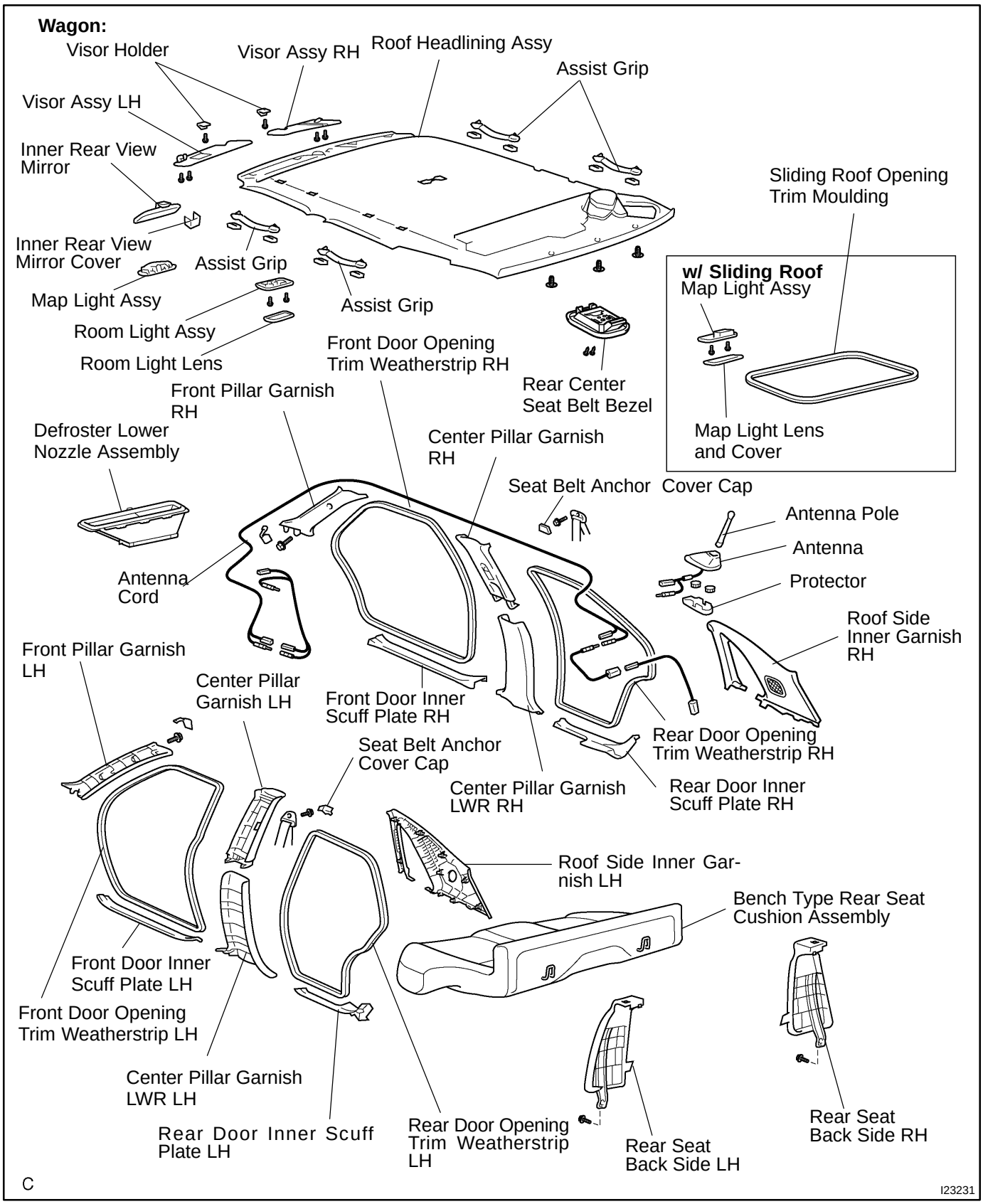
BE2AA-01

COMPONENTS




Sedan:
Visor Holder
Visor Assy RH
Roof Headlining Assy
Assist Grip
Visor Assy LH
Inner Rear View Mirror
Sliding Roof Opening Trim Moulding
Inner Rear View Mirror Cover
Assist Grip
w/ Sliding Roof
Map Light Assy
Map Light Assy
Assist Grip
Room Light Assy
Room Light Lens
Front Door Opening Trim Weatherstrip RH
Front Pillar Garnish RH
Defroster Lower Nozzle Assembly
Center Pillar Garnish RH
Map Light Lens and Cover
Seat Belt Anchor Cover Cap
Antenna Pole
Antenna
Protector
Antenna Cord
Roof Side Inner Garnish RH
Front Pillar Garnish LH
Center Pillar Garnish LH
Front Door Inner Scuff Plate RH
Rear Door Opening Trim Weatherstrip RH
Seat Belt Anchor Cover Cap
Center Pillar Garnish LWR RH
Rear Door Inner Scuff Plate RH
Roof Side Inner Garnish LH
Bench Type Rear Seat Cushion Assembly
Front Door Inner Scuff Plate LH
Front Door Opening Trim Weatherstrip LH
Rear Door Opening Trim Weatherstrip LH
Center Pillar Garnish LWR LH
Rear Door Inner Scuff Plate LH
Bench Type Rear Seat Back Assembly
C
I23230


Wagon:
Visor Holder
Visor Assy RH
Roof Headlining Assy
Assist Grip
Visor Assy LH
Inner Rear View Mirror
Sliding Roof Opening Trim Moulding
Inner Rear View Mirror Cover
Assist Grip
w/ Sliding Roof
Map Light Assy
Map Light Assy
Assist Grip
Room Light Assy
Room Light Lens
Front Door Opening Trim Weatherstrip RH
Rear Center Seat Belt Bezel
Front Pillar Garnish RH
Defroster Lower Nozzle Assembly
Center Pillar Garnish RH
Seat Belt Anchor Cover Cap
Map Light Lens and Cover
Antenna Pole
Antenna
Protector
Antenna Cord
Roof Side Inner Garnish RH
Front Pillar Garnish LH
Center Pillar Garnish LH
Front Door Inner Scuff Plate RH
Rear Door Opening Trim Weatherstrip RH
Seat Belt Anchor Cover Cap
Center Pillar Garnish LWR RH
Rear Door Inner Scuff Plate RH
Roof Side Inner Garnish LH
Bench Type Rear Seat Cushion Assembly
Front Door Inner Scuff Plate LH
Front Door Opening Trim Weatherstrip LH
Center Pillar Garnish LWR LH
Rear Door Inner Scuff Plate LH
Rear Door Opening Trim Weatherstrip LH
Rear Seat Back Side LH
Rear Seat Back Side RH
C
I23231

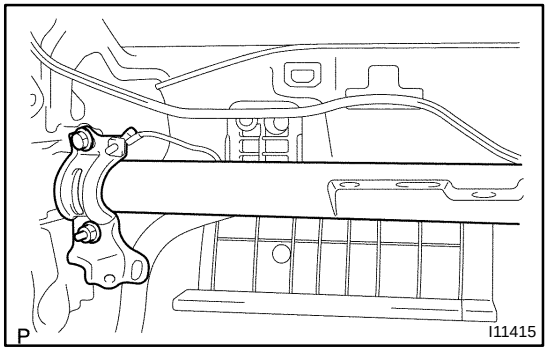
BE16P-02

REMOVAL

HINT:

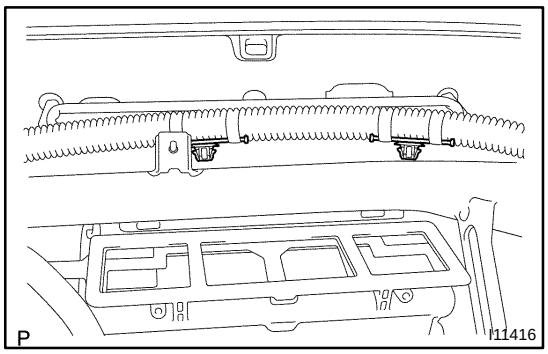
Installation is in the reverse order of removal.

1. **REMOVE INSTRUMENT CLUSTER FINISH PANEL CENTER**
2. **REMOVE INSTRUMENT CLUSTER FINISH PANEL CENTER LOWER**
3. **REMOVE AIR CONDITIONER ASSEMBLY**
4. **REMOVE CONSOLE PANEL UPPER**
5. **REMOVE PARKING BRAKE HOLE COVER**
6. **REMOVE CONSOLE BOX**
7. **REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY**
8. **REMOVE HORN BUTTON**
9. **REMOVE STEERING WHEEL**
10. **REMOVE STEERING COLUMN LOWER COVER**
11. **REMOVE STEERING COLUMN UPPER COVER**
12. **REMOVE TURN SIGNAL SWITCH ASSEMBLY**
13. **REMOVE INSTRUMENT PANEL FINISH PANEL LOWER**
14. **REMOVE INSTRUMENT CLUSTER FINISH PANEL**
15. **REMOVE COMBINATION METER**
16. **REMOVE FRONT DOOR INNER SCUFF PLATE RH**
17. **REMOVE FRONT DOOR INNER SCUFF PLATE LH**
18. **REMOVE COWL SIDE TRIM BOARD RH**
19. **REMOVE COWL SIDE TRIM BOARD LH**
20. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH**
21. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH**
22. **REMOVE FRONT PILLAR GARNISH RH**
23. **REMOVE FRONT PILLAR GARNISH LH**
24. **DISCONNECT PASSENGER AIRBAG CONNECTOR**
25. **REMOVE INSTRUMENT PANEL ASSEMBLY**



26. **REMOVE INSTRUMENT PANEL REINFORCEMENT BRACKET**

Remove the bolt and nut and pull instrument panel reinforcement.



27. REMOVE A PART OF INSTRUMENT PANEL WIRE

Remove the 2 clips and a part of instrument panel wire.

28. REMOVE DEFROSTER LOWER NOZZLE

29. REMOVE BENCH TYPE REAR SEAT CUSHION ASSEMBLY

30. REMOVE BENCH TYPE REAR SEAT BACK ASSEMBLY

31. REMOVE REAR DOOR INNER SCUFF PLATE RH

32. REMOVE REAR DOOR INNER SCUFF PLATE LH

33. REMOVE REAR DOOR OPENING TRIM WEATHER STRIP RH

34. REMOVE REAR DOOR OPENING TRIM WEATHER STRIP LH

35. REMOVE CENTER PILLAR GARNISH LOWER RH

36. REMOVE CENTER PILLAR GARNISH LOWER LH

37. REMOVE SEAT BELT ANCHOR COVER CAP

38. REMOVE FRONT SEAT OUTER BELT ASSEMBLY RH

39. REMOVE FRONT SEAT OUTER BELT ASSEMBLY LH

40. REMOVE CENTER PILLAR GARNISH RH

41. REMOVE CENTER PILLAR GARNISH LH

42. REMOVE ROOF SIDE INNER GARNISH RH

43. REMOVE ROOF SIDE INNER GARNISH LH

44. REMOVE ASSIST GRIP COVER

45. REMOVE ASSIST GRIP

46. REMOVE VISOR ASSEMBLY RH

47. REMOVE VISOR ASSEMBLY LH

48. REMOVE INNER REAR VIEW MIRROR STAY HOLDER COVER

49. REMOVE INNER REAR VIEW MIRROR

50. REMOVE MAP LIGHT ASSEMBLY

51. REMOVE ROOM LIGHT ASSEMBLY

52. w/ Sliding Roof:
REMOVE SLIDING ROOF OPENING TRIM MOULDING

53. REMOVE VISOR HOLDER

54. REMOVE ROOF HEADLINING ASSEMBLY

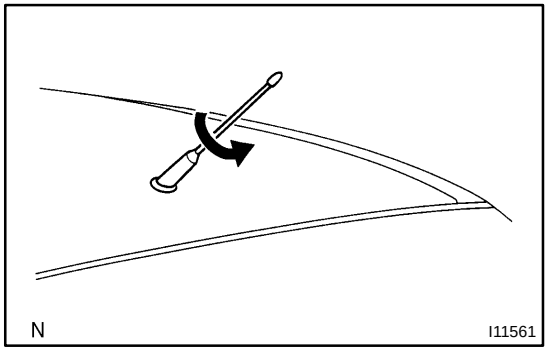
55. REMOVE ANTENNA ASSEMBLY

(a) Remove the 2 nuts and disconnect the connector.

(b) Remove the antenna assembly.

56. REMOVE ANTENNA COED

Remove the clamp and the antenna cord.



57. REMOVE ANTENNA POLE

Turn the antenna pole counterclockwise to remove.

CLOCK

TROUBLESHOOTING

BE0G0-13

HINT:

Troubleshoot the clock according to the table below.

Troubleshooting	No.
Passenger seat belt warning light does not light up.	1
Clock will not operate	1
Clock loses or gains time	2

± 1.5 seconds / day

1. INSPECT CLOCK CIRCUIT (See page DI-1009)

2. TROUBLESHOOTING NO. 1

1	**PASSENGER SEAT BELT WARNING LIGHT DOES NOT OPERATE**
	CLOCK WILL NOT OPERATE

(a) Check that the battery positive voltage is 10 - 16 V.

If voltage is not as specified, replace the battery.

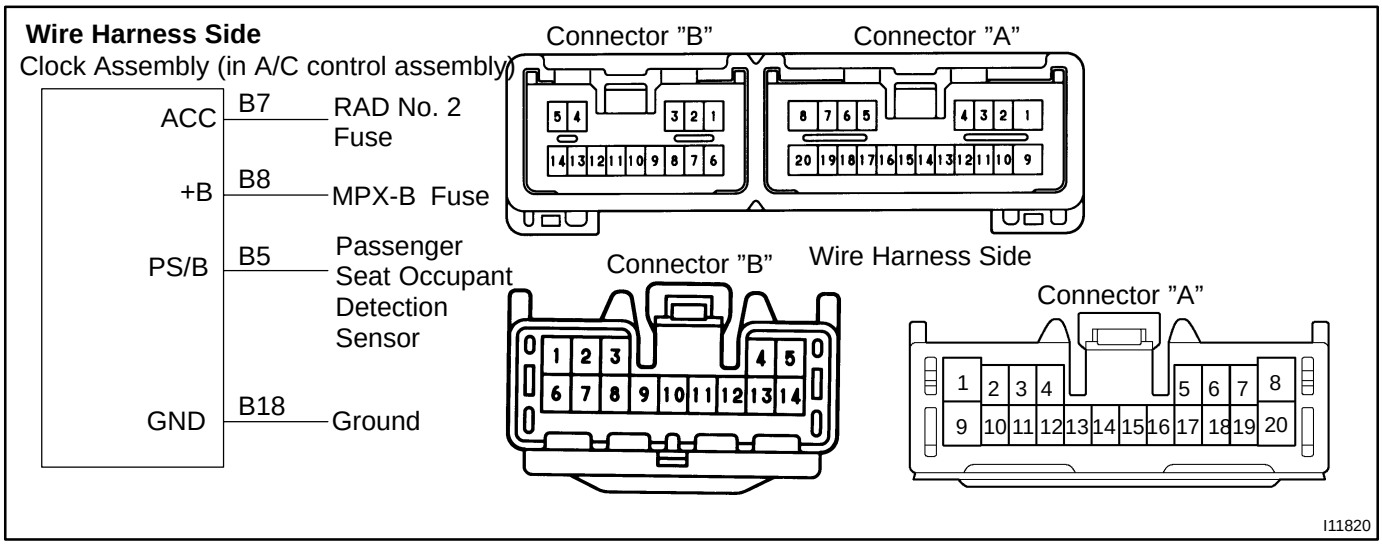
(b) Check that the MPX-B and RAD No. 2 fuses are not blown.

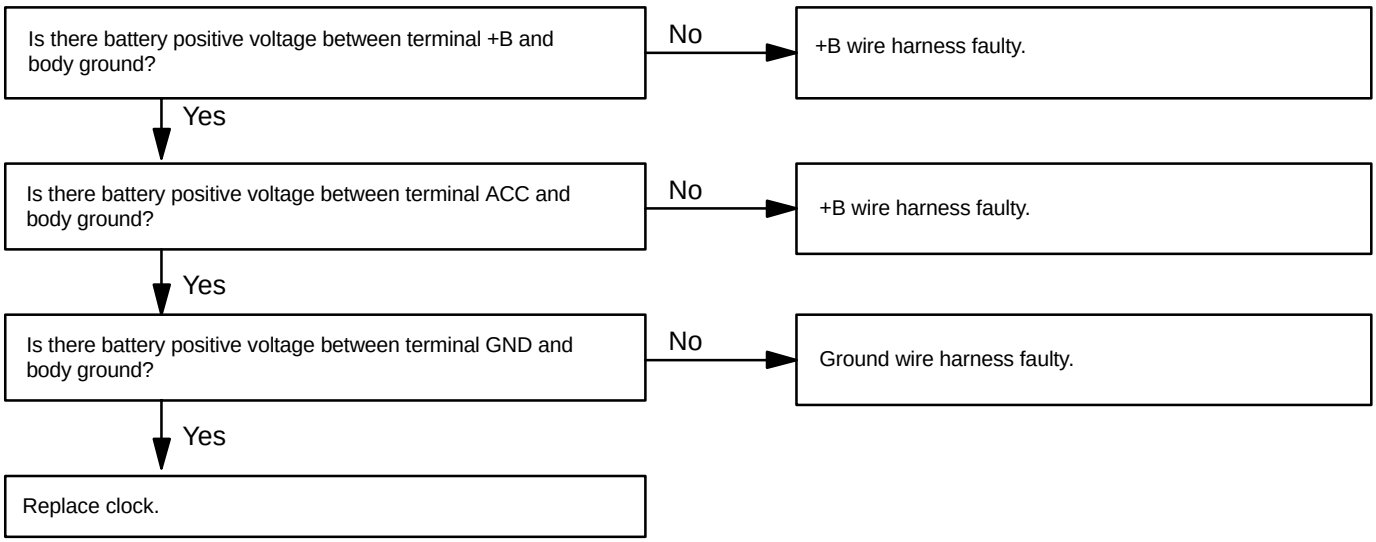
If the fuse is blown, replace the fuse and check for short.

(c) Troubleshoot the clock as follows.

HINT:

Inspect the connector on the wire harness side.





3. TROUBLESHOOTING NO. 2

2	**CLOCK LOSES OR GAINS TIME**

(a) Check that the battery positive voltage is 10 - 16 V.

If voltage is not as specified, replace the battery.

(b) Inspect the error of the clock.

Allowable error (per day): ± 1.5 seconds

If the error exceeds the allowable error, replace the clock.

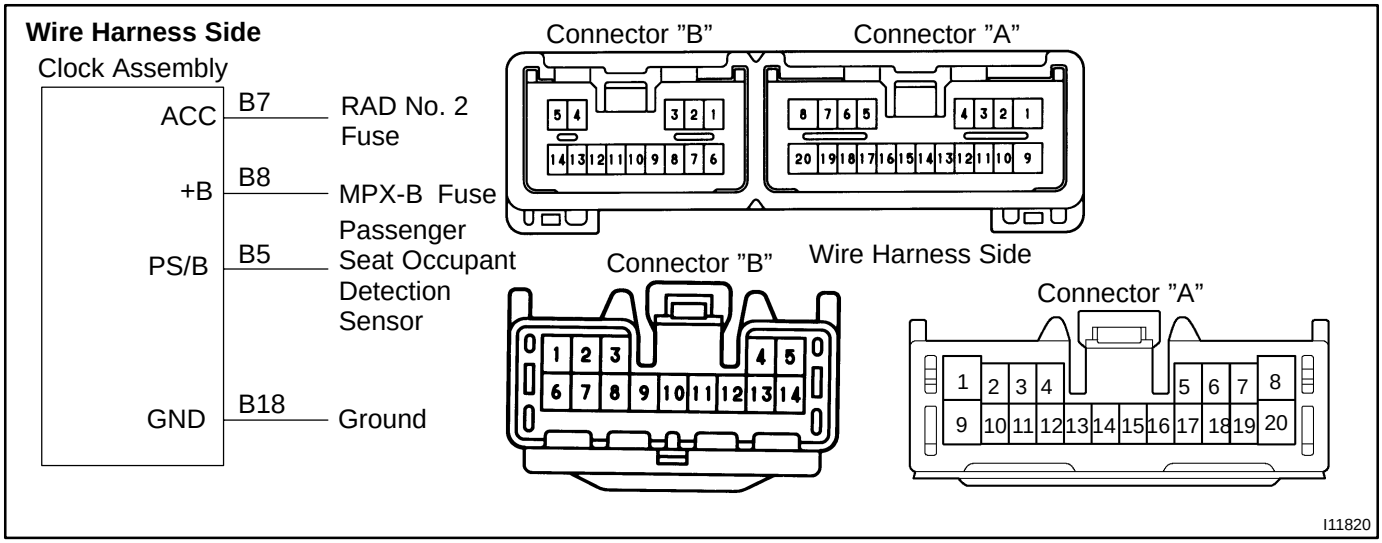
(c) Check that the clock adjusting button is sticking in position and has failed to return.

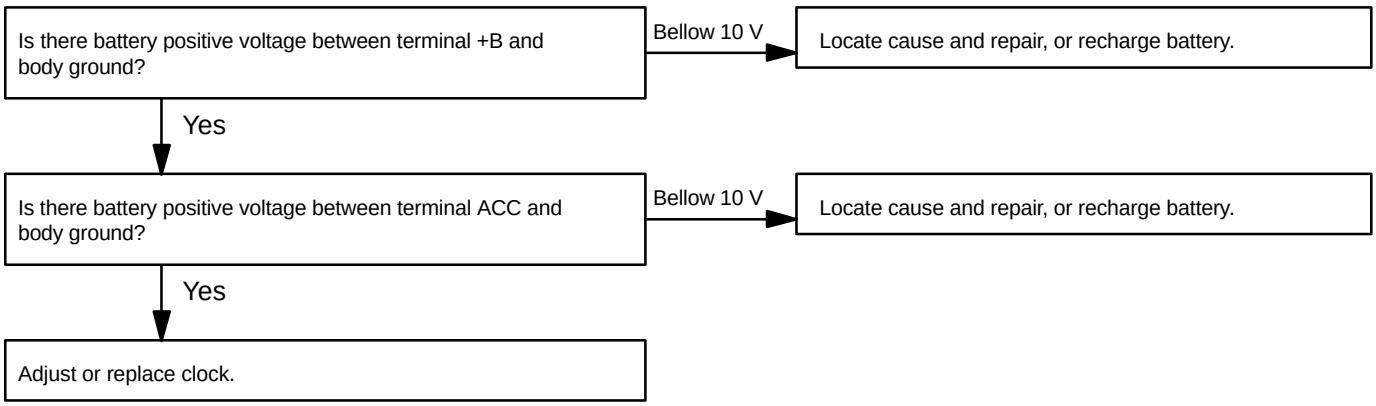
If the error exceeds the allowable error, replace the clock.

(d) Troubleshoot the clock as follows.

HINT:

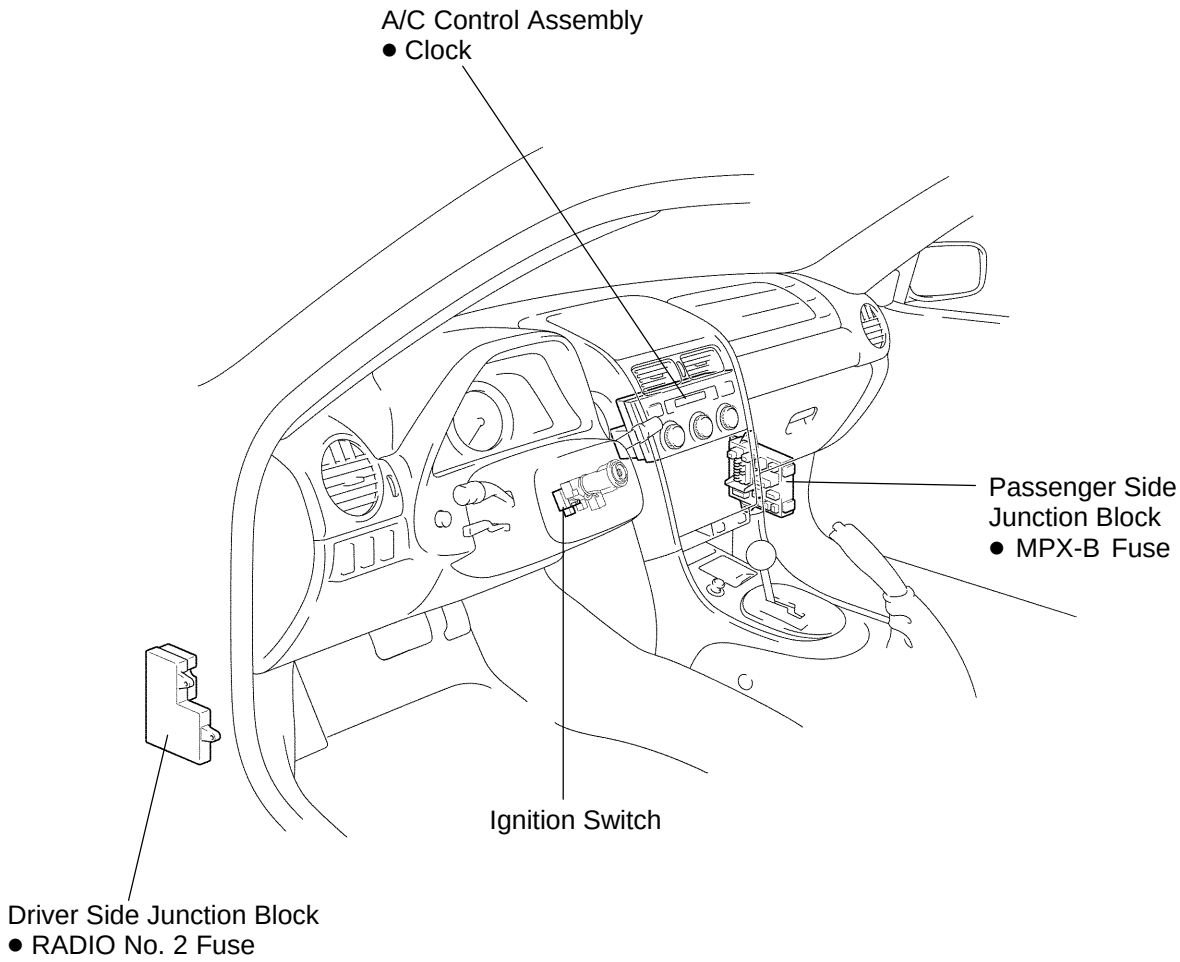
Inspect the connector on the wire harness side.




Is there battery positive voltage between terminal +B and body ground?
Bellow 10 V
Locate cause and repair, or recharge battery.
Yes
Is there battery positive voltage between terminal ACC and body ground?
Bellow 10 V
Locate cause and repair, or recharge battery.
Yes
Adjust or replace clock.

BE0G1-13

LOCATION



I27835

GARAGE DOOR OPENER SYSTEM

BE0L6-04

REGISTRATION PROCEDURE

1. NEW CODE REGISTRATION

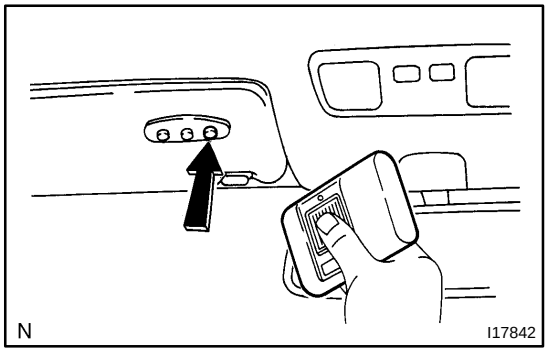
NOTICE:

- **If pressing the switch of the original transmitter to register the code, the system might operate.**
- **When registering the transmitter codes such as for garage or gate, check that there is nobody around those places then register.**

(a) Press the switch for the item to be registered for 20 seconds

HINT:

When transferring to registration mode, LED (red) blinks in 1 Hz cycle.

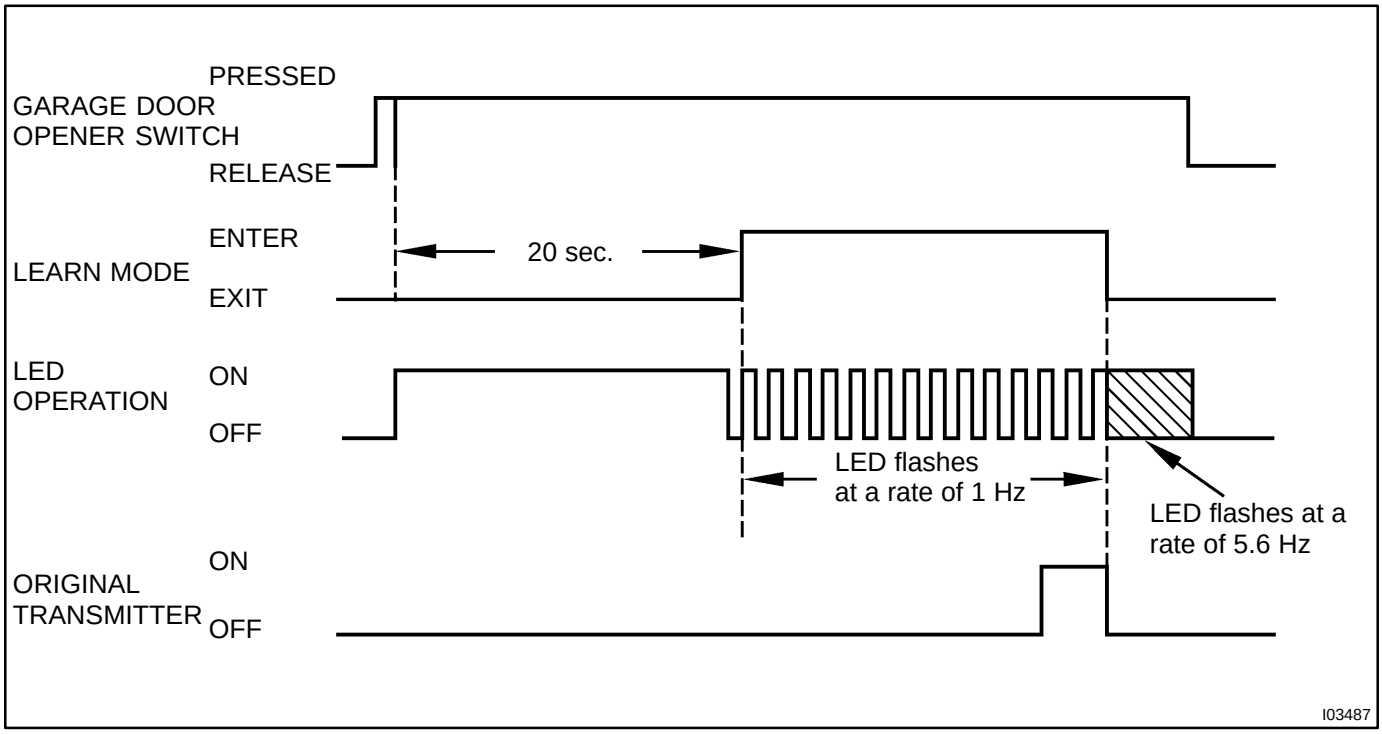


(b) In the condition of (a), bring the original transmitter to within 1-inch area around the garage door opener and press the switch. (code transmitting).

HINT:

When code registration completes correctly, LED (red) blinks in 5.6 Hz cycle.

New code registration timing chart



If a code can not be registered, observe the following conditions.

HINT:

- If the battery of original transmitter is consumed.
- Press the switch of the transmitter repeatedly in registration mode, as some transmitters stop transmitting for 1 to 2 seconds.
- This system is not applicable to the garage door opener which had been made before 1982.

2. CODE DELETION

(a) Press the switches at both ends of garage door opener simultaneously for 20 seconds.

HINT:

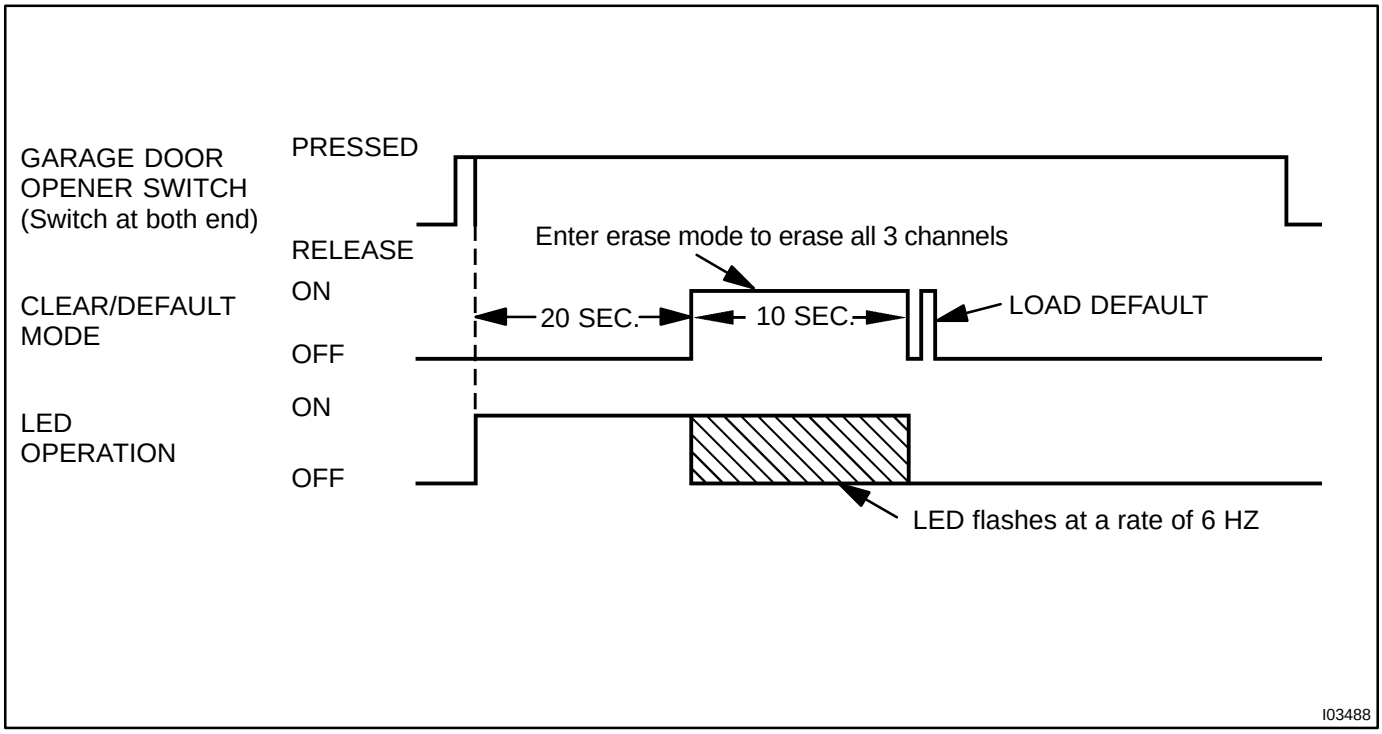
When transferring to deletion mode, LED (red) blinks in 6 Hz cycle.

(b) When releasing the switch within 10 seconds after transferring to deletion mode, all the registered codes will be erased.

HINT:

Press the switch until blinking in 6 Hz cycle stops, so that the default code for check is set.

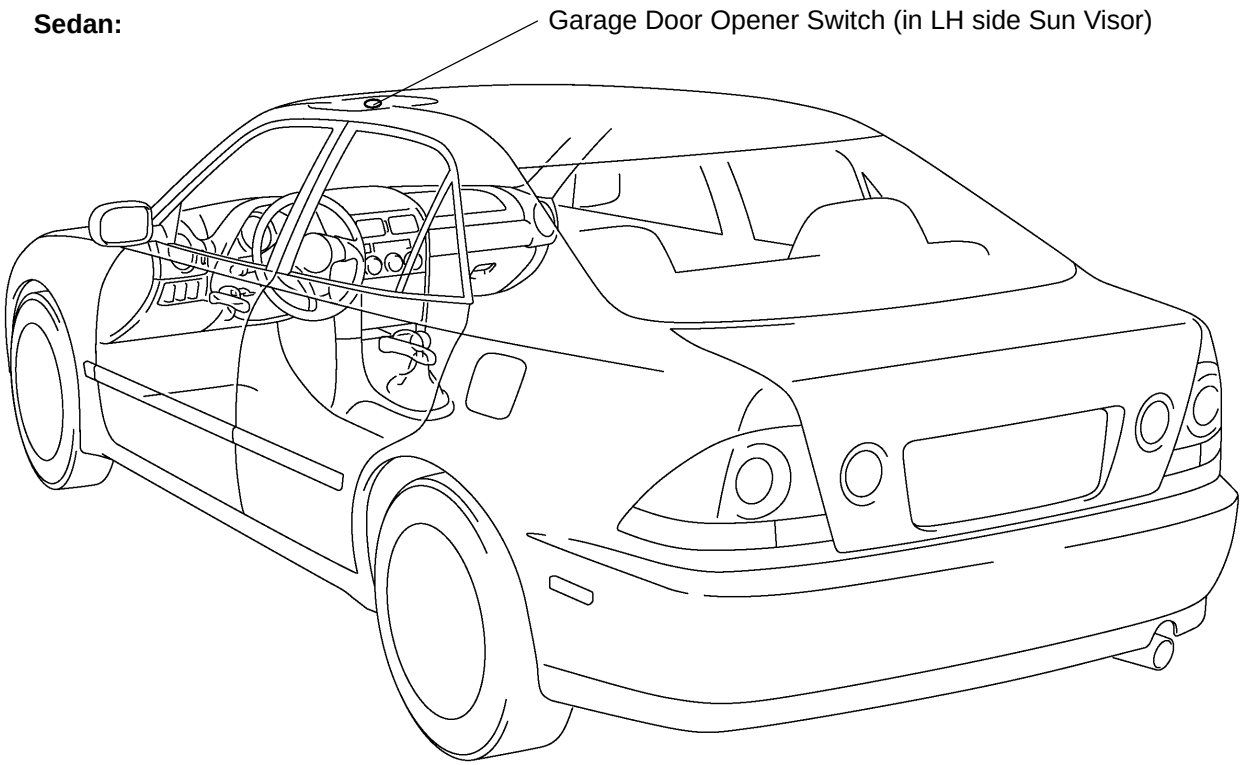
Code deletion timing chart



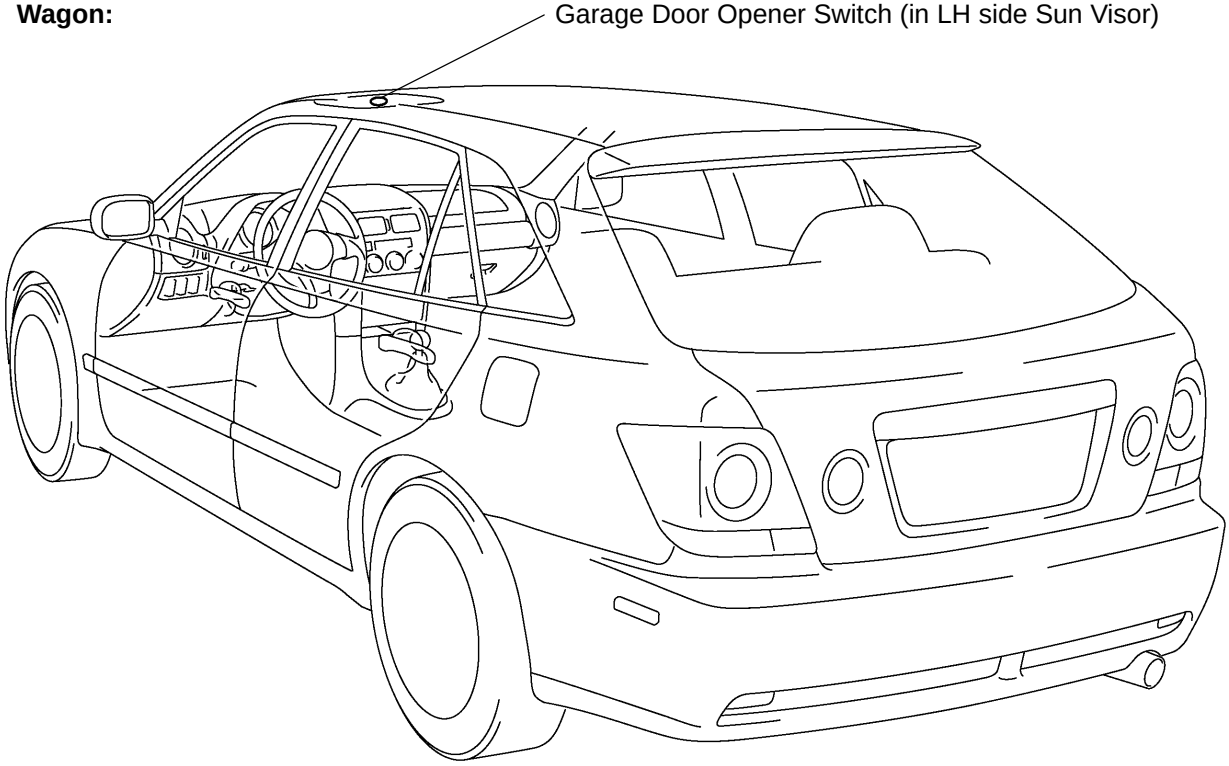
BE0L7-05

LOCATION

Sedan:



Wagon:



I27836

BE0L8-02

REMOVAL

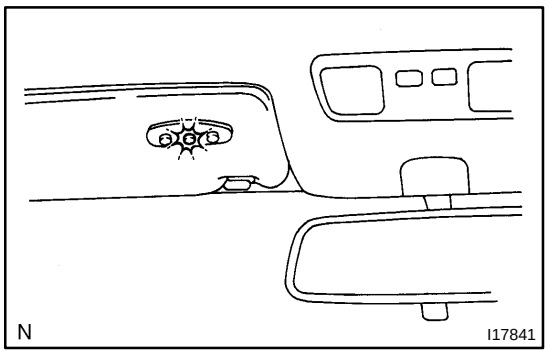
REMOVE LH SIDE SUN VISOR

(a) Remove the 2 screws.

(b) Disconnect the garage door opener switch connector.

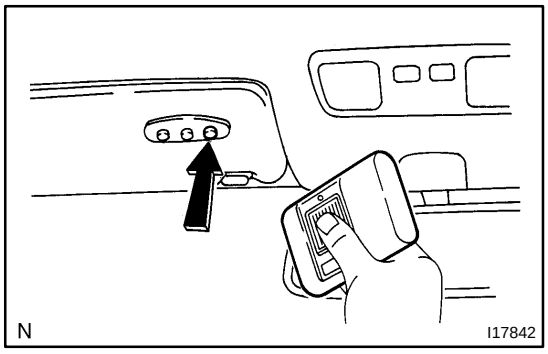
BE0L9-04

INSPECTION



1. INSPECT GARAGE DOOR OPENER

Press the switch and check that each LED (red) lights up.
Even if only one switch is found not to light up, replace it.

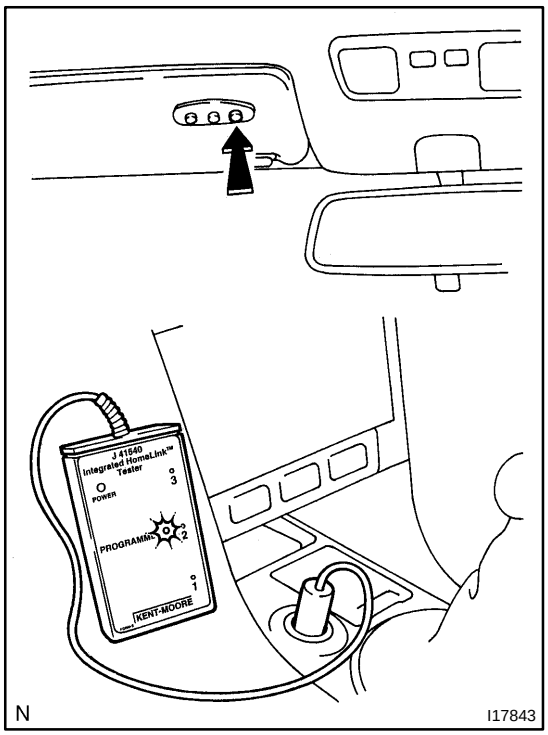


2. INSPECT GARAGE DOOR OPENER REGISTRATION AND TRANSMITTING

HINT:
Use the home link tester made by KENT MORE for this test.
As it is necessary to record the code of the hand held transmitter, customer's code will be erased. When the inspection completes, please register the customer's again.

(a) Check that the code of hand held transmitter for inspection can be recorded.
(See page BE-213)

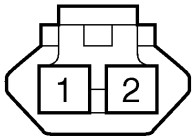
If the code can not be registered, replace garage door opener.



(b) Press the switch which an inspection code has been registered for and check that LED (green) of the home link tester lights up.

If the LED (green) does not light up, replace the garage door opener.

Wire Harness Side



I04287

3. INSPECT GARAGE DOOR OPENER CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
2 - Ground	Always	Continuity
1 - Ground	Always	Battery positive voltage

If the circuit is not as specified, inspect the circuits connected to other parts.

BE0LA-02

INSTALLATION

INSTALL GARAGE DOOR OPENER SWITCH

(a) Connect the garage door opener switch connector.

(b) Install the 2 screws and the LH side sun visor.

ENGINE IMMOBILISER SYSTEM

BE27I-02

REGISTRATION PROCEDURE

HINT:

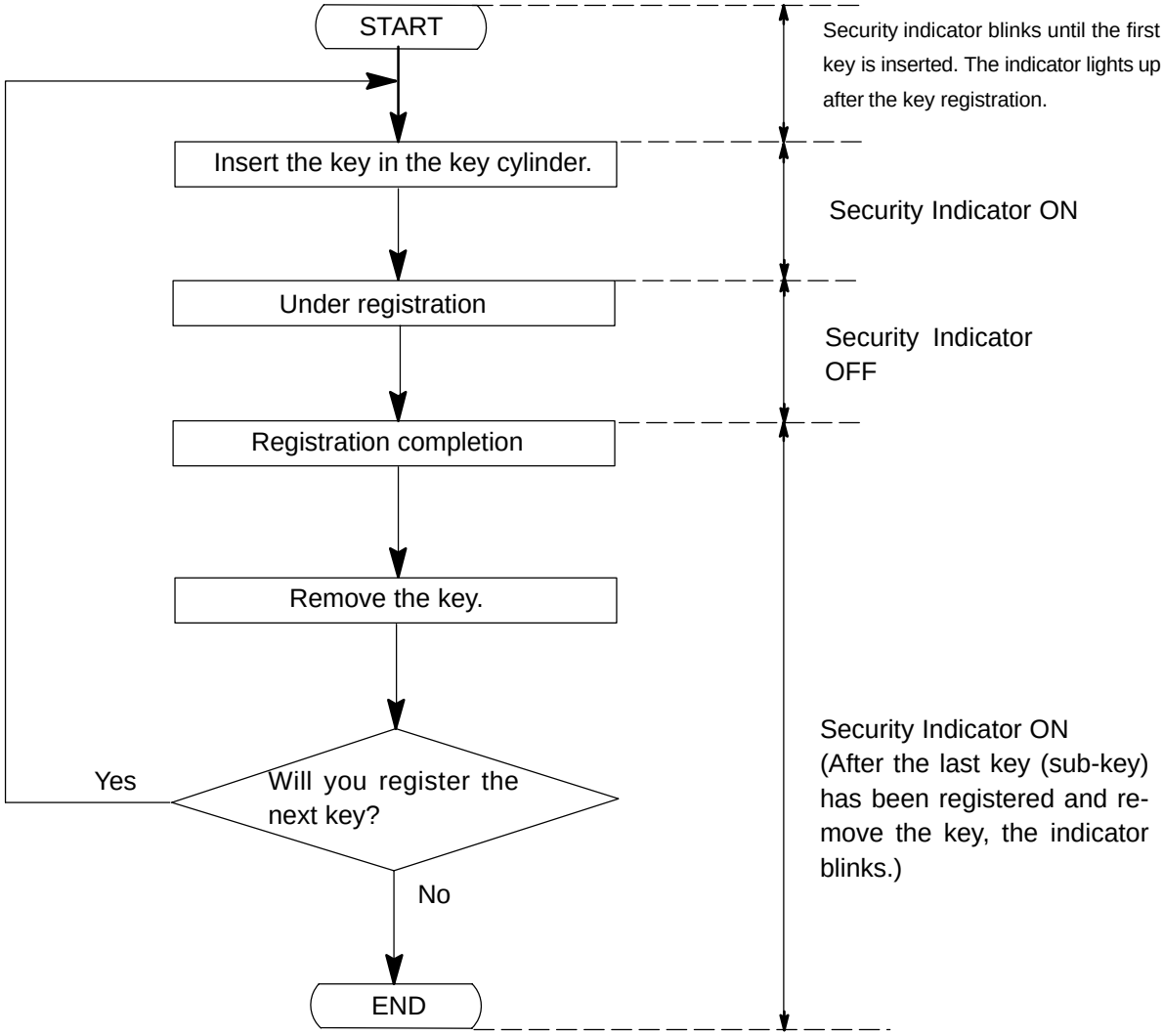
In case of having lost all the already registered master keys, you are not able to do additional registration or deletion. Change the ECM and then must register the new key codes according to the following registration procedure of the automatic registration mode.

1. KEY REGISTRATION IN AUTOMATIC REGISTRATION MODE

(a) Registration of a new transponder key.

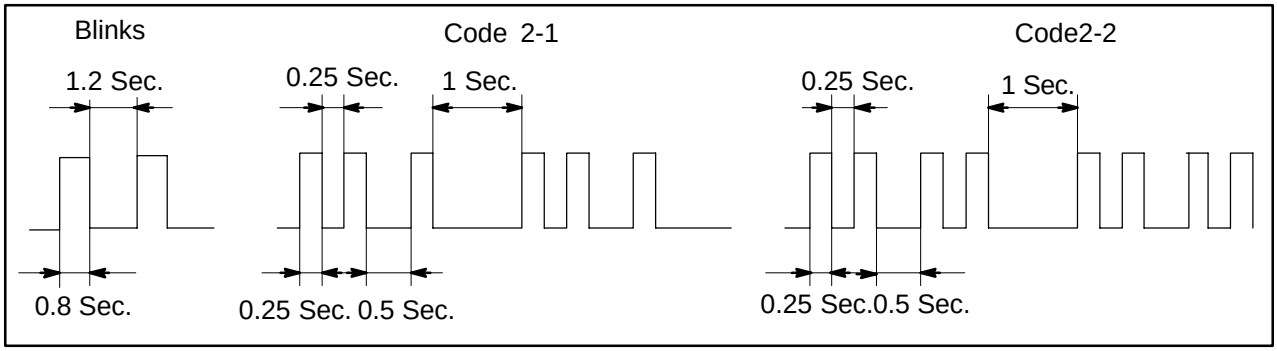
HINT:

- This must be done when you install a new ECM.
- The new ECM is on the automatic key code registration mode. The already fixed number of key codes for this ECM can be registered.
  On this type of vehicle, up to 3 key codes can be registered.
- In the automatic registration mode, the last key registered becomes sub-key.



HINT:

- When a key is not inserted in the key cylinder on the automatic registration mode, the security indicator always lights on.
- When the immobiliser system operates normally and the key is pull out, the security indicator blinks.
- When key code registration could not be performed on the automatic registration mode, code 2-1 is output from the security indicator and when inserting the already registered key, code 2-2 is output.



(b) Automatic registration mode completion

If completing the mode forcibly when more than 1 key code have been registered on the automatic registration mode, perform the following procedures.

After 1 more key code have been registered with master key, perform step (1) or (2) without pulling the key out or inserting the already registered key.

(1) Depress and release brake pedal 5 times or more within 15 sec.

(2) With the hand-held tester, require automatic registration mode completion.

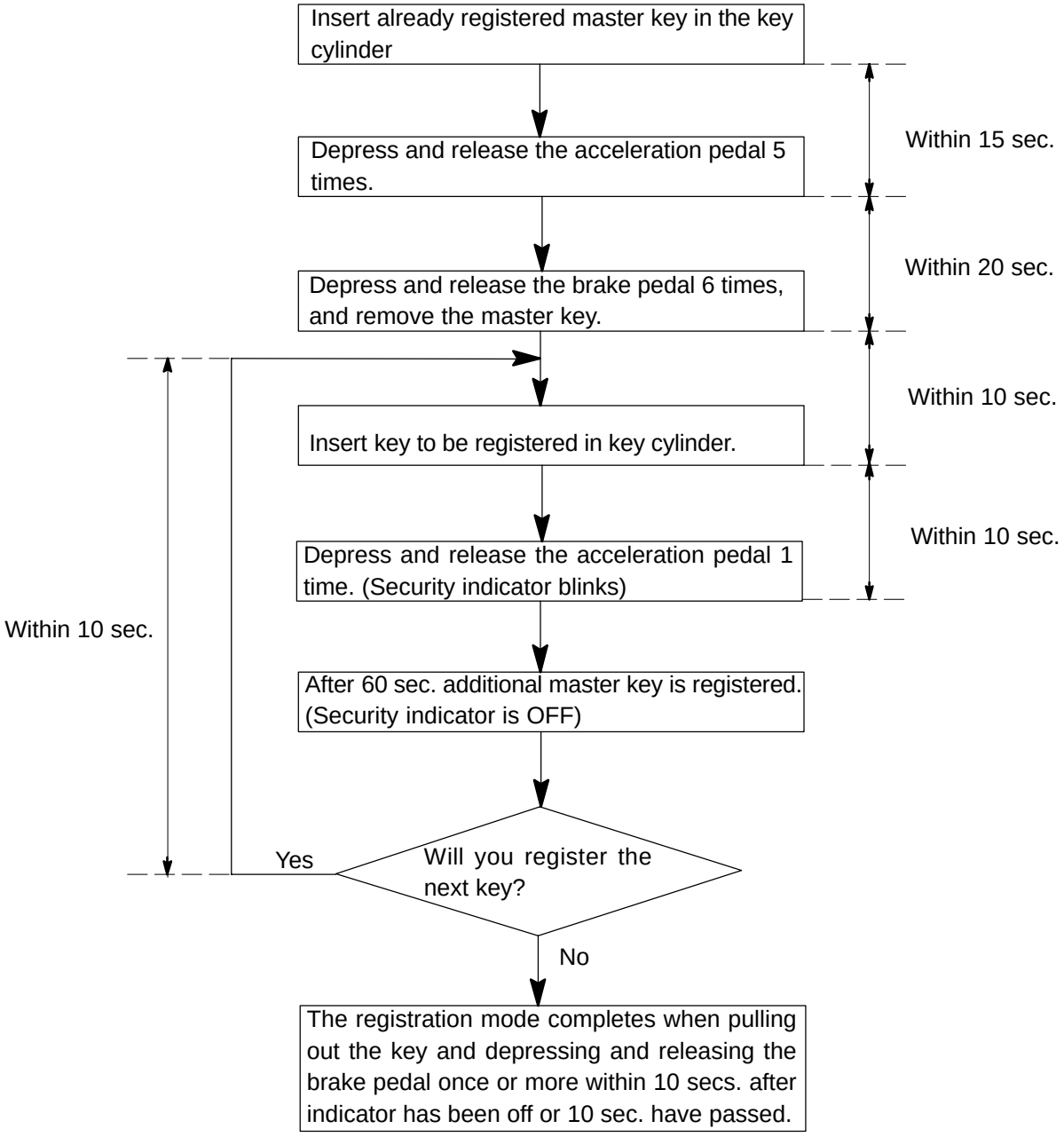
2. REGISTRATION OF ADDITIONAL MASTER KEY

There are 2 ways for registration of additional master key, one way is depressing brake pedal and acceleration pedal and the other way is using hand-held tester.

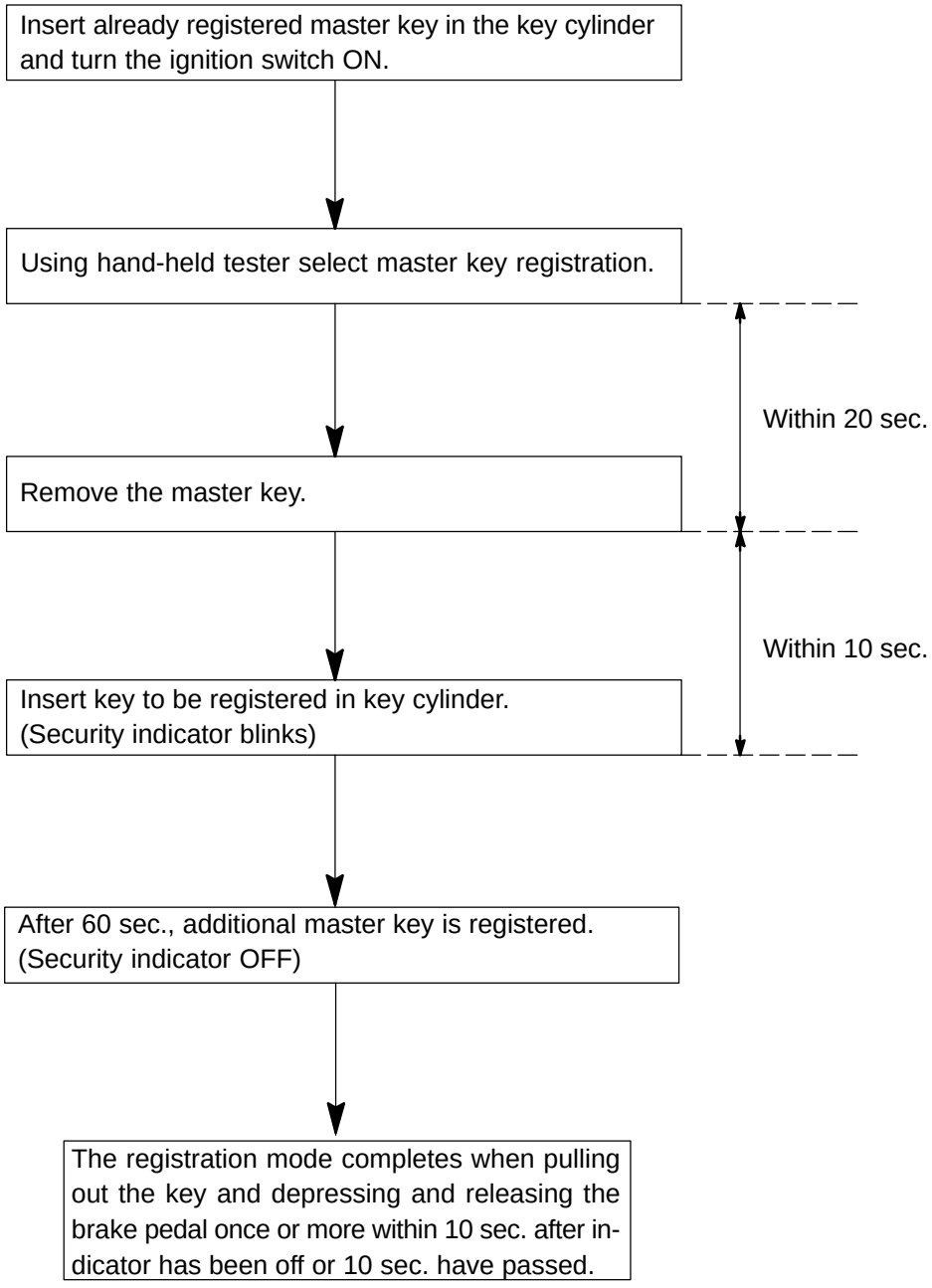
HINT:

- It is possible to register up to 7 master key codes including the already registered key code.
- When any operation time described below is over, registration mode completes.
- When the next procedure is performed while the timer is working, the timer completes counting time, then next timer starts.
- When replacing ”Ignition Cylinder Key Set” or ”Lock Cylinder Set” and register according to the following procedure using the original master key. However, after the registration of the additional master key, as the original master key and the original sub-key is not necessary any more, so erase registration of those key codes.

(1) Depressing brake pedal and acceleration pedal:



(2) Using hand-held tester:



HINT:
Please follow the screen of the hand-held tester for more detailed procedure.

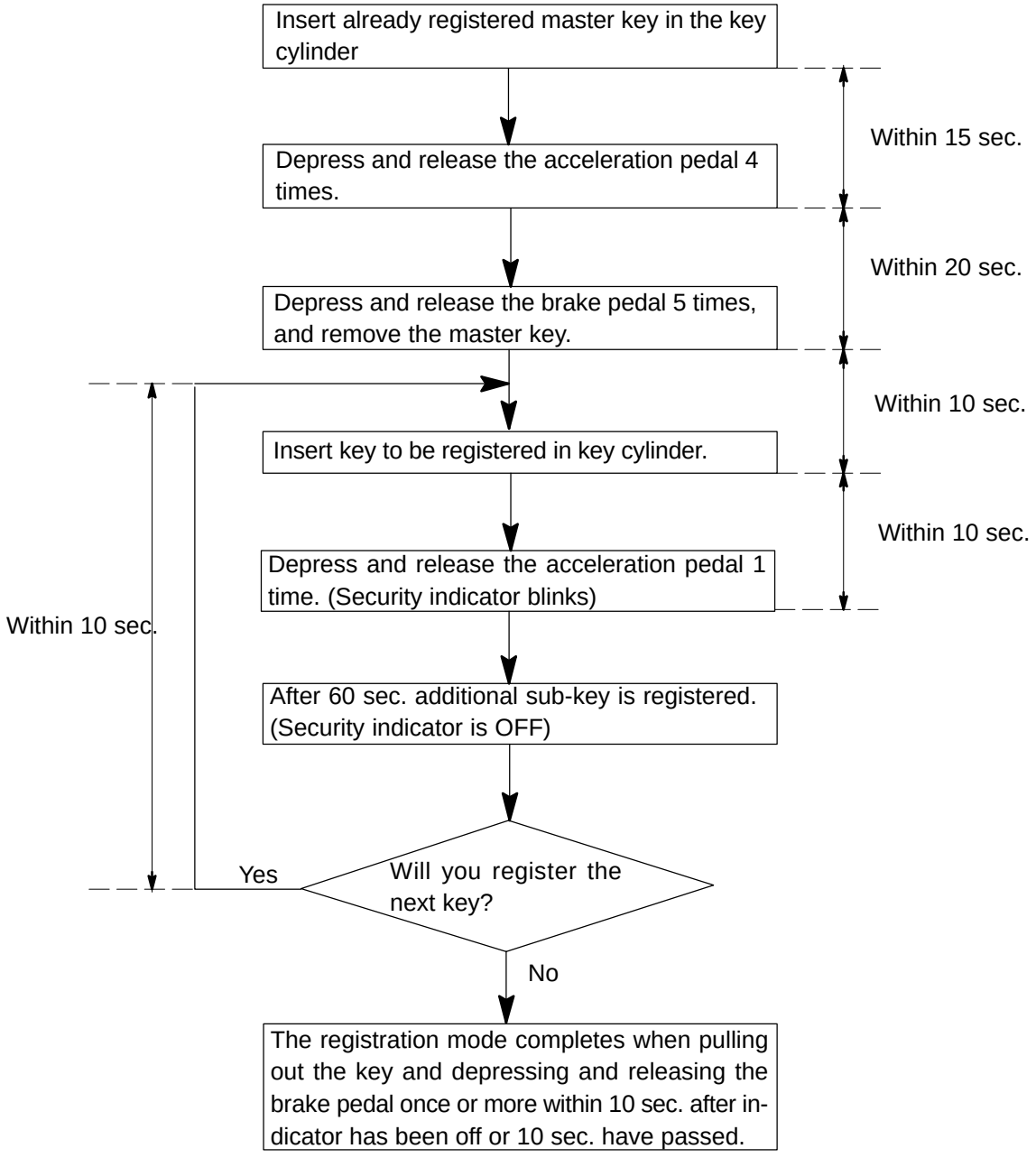
3. REGISTRATION OF ADDITIONAL SUB-KEY

There are 2 ways for registration of additional sub-key, one way is depressing brake pedal and acceleration pedal and the other way is using hand-held tester.

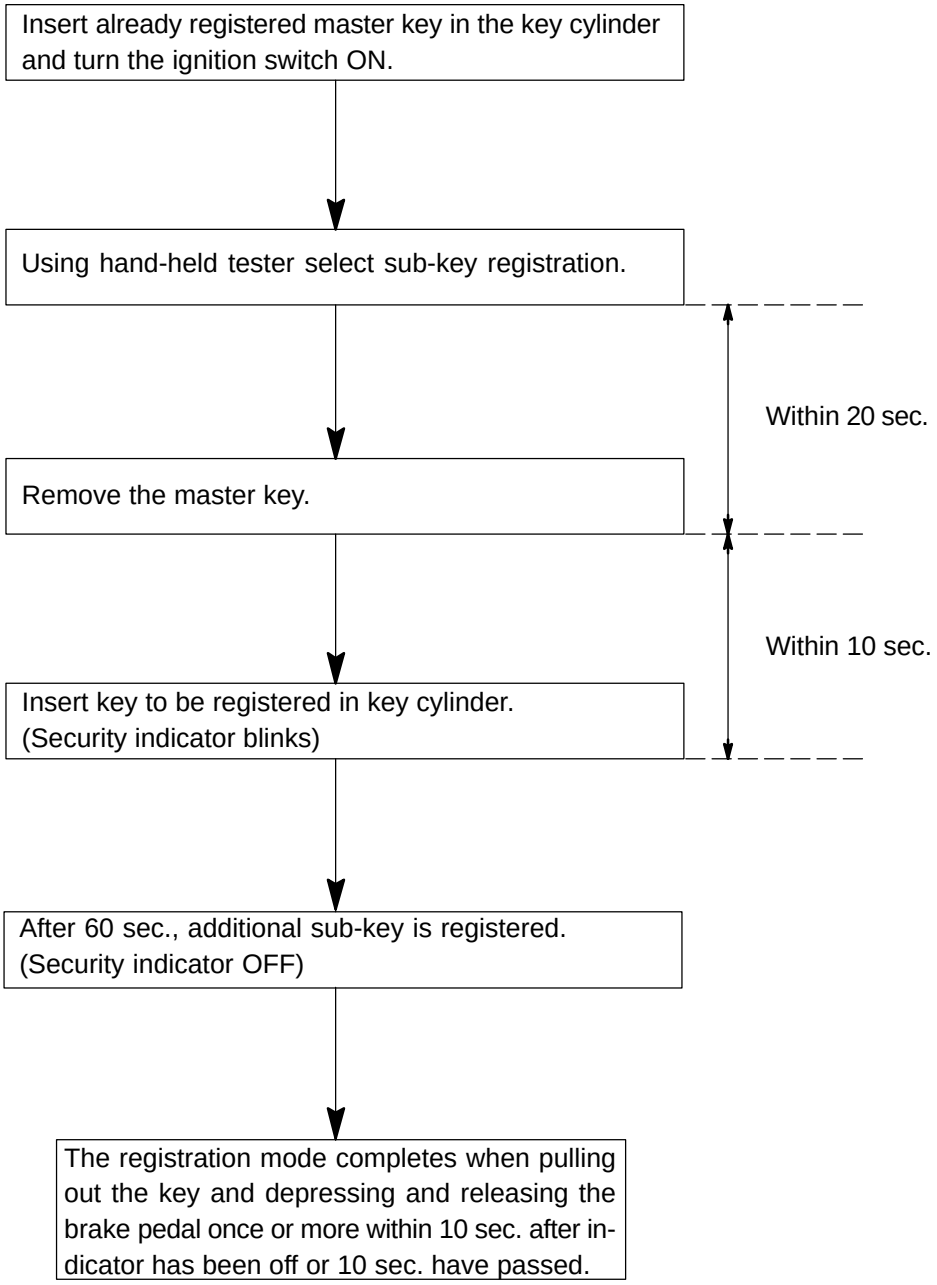
HINT:

- It is possible to register up to 3 sub-key codes including the already registered key code.
- When any operation time described below is over, registration mode completes.
- When the next procedure is performed while the timer is working, the timer completes counting time, then next timer starts.

(1) Depressing brake pedal and acceleration pedal:



(2) Using hand-held tester:



HINT:
Please follow the screen of the hand-held tester for more detailed procedure.

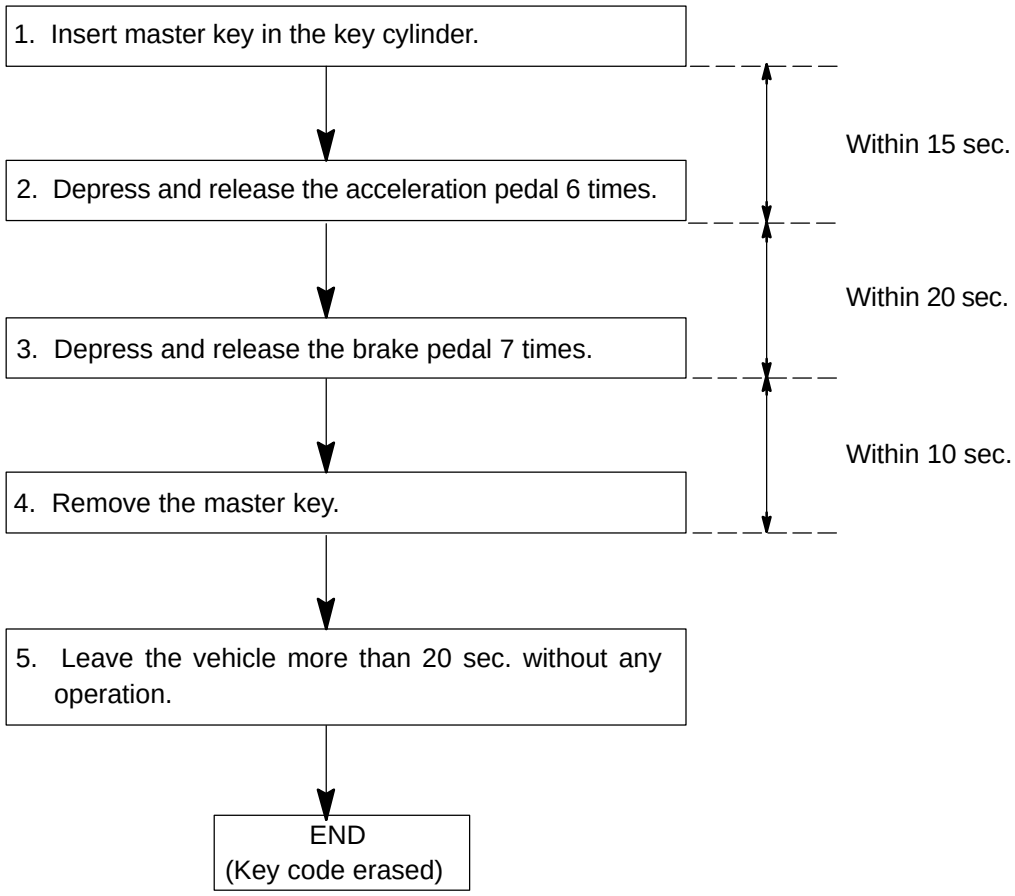
4. ERASURE OF TRANSPONDER KEY CODE

There are 2 ways for erasure of transponder key code, one way is depressing brake pedal and acceleration pedal and the other way is using hand-held tester.

HINT:

- Delete all other master and sub-key codes leaving the master key code to use the operation. When using the key which was used before deletion, it is necessary to register the code again.
- When any operation time described below is over, registration mode completes.
- When the next procedure is performed while the timer is working, the timer completes counting time, then next timer starts.

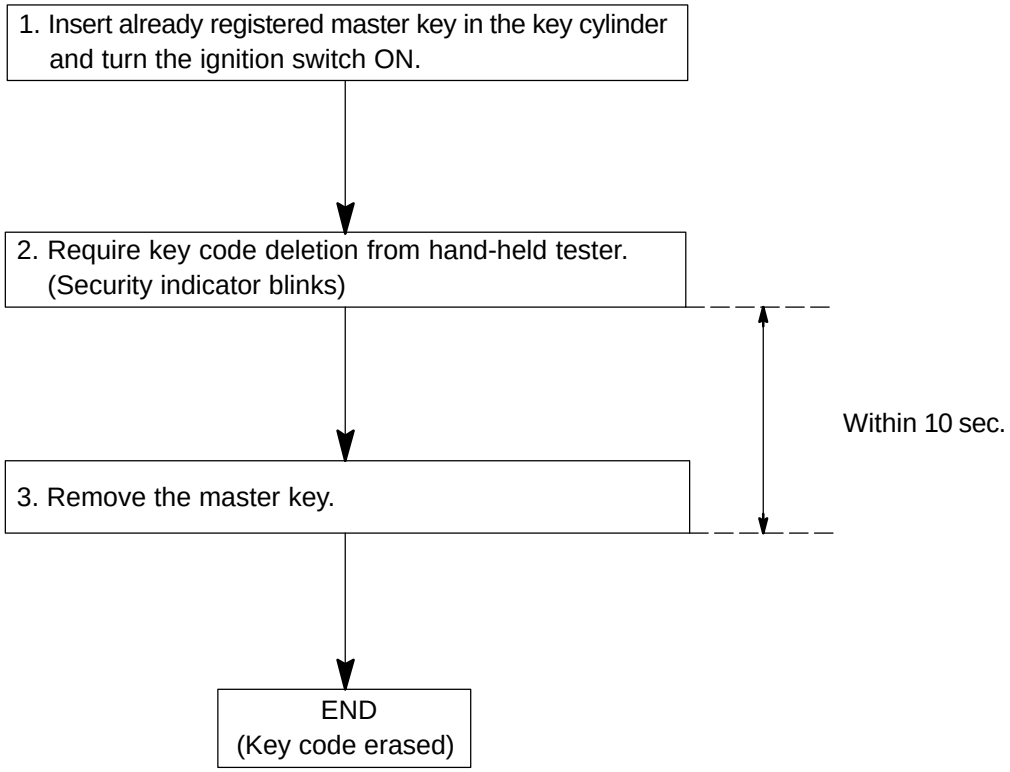
(1) Depressing brake pedal and acceleration pedal:



HINT:

If the key cannot be pulled out within 30 sec. from the first brake depression in the step 3, the key code deletion is canceled.

(2) Using hand-held tester:

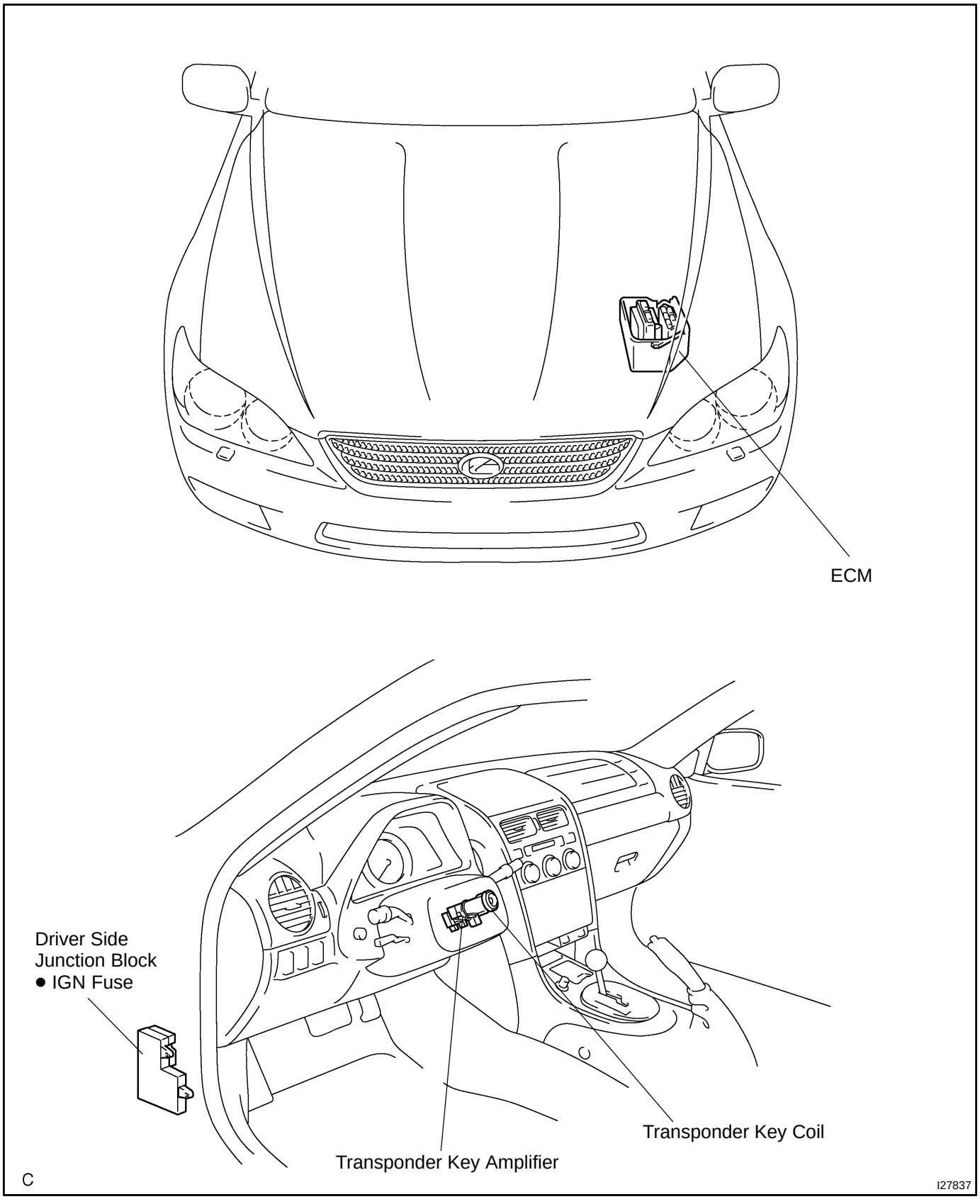


HINT:

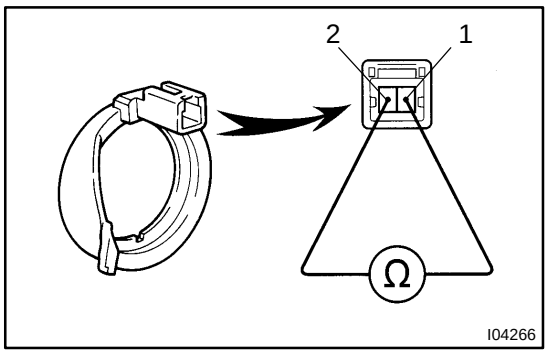
- When the key cannot be pulled out in the step 3, key code deletion is canceled. (Security indicator is OFF.)
- Please follow the screen of the hand-held tester for more detailed procedure.

BE02Q-26

LOCATION



BE0G8-10



INSPECTION

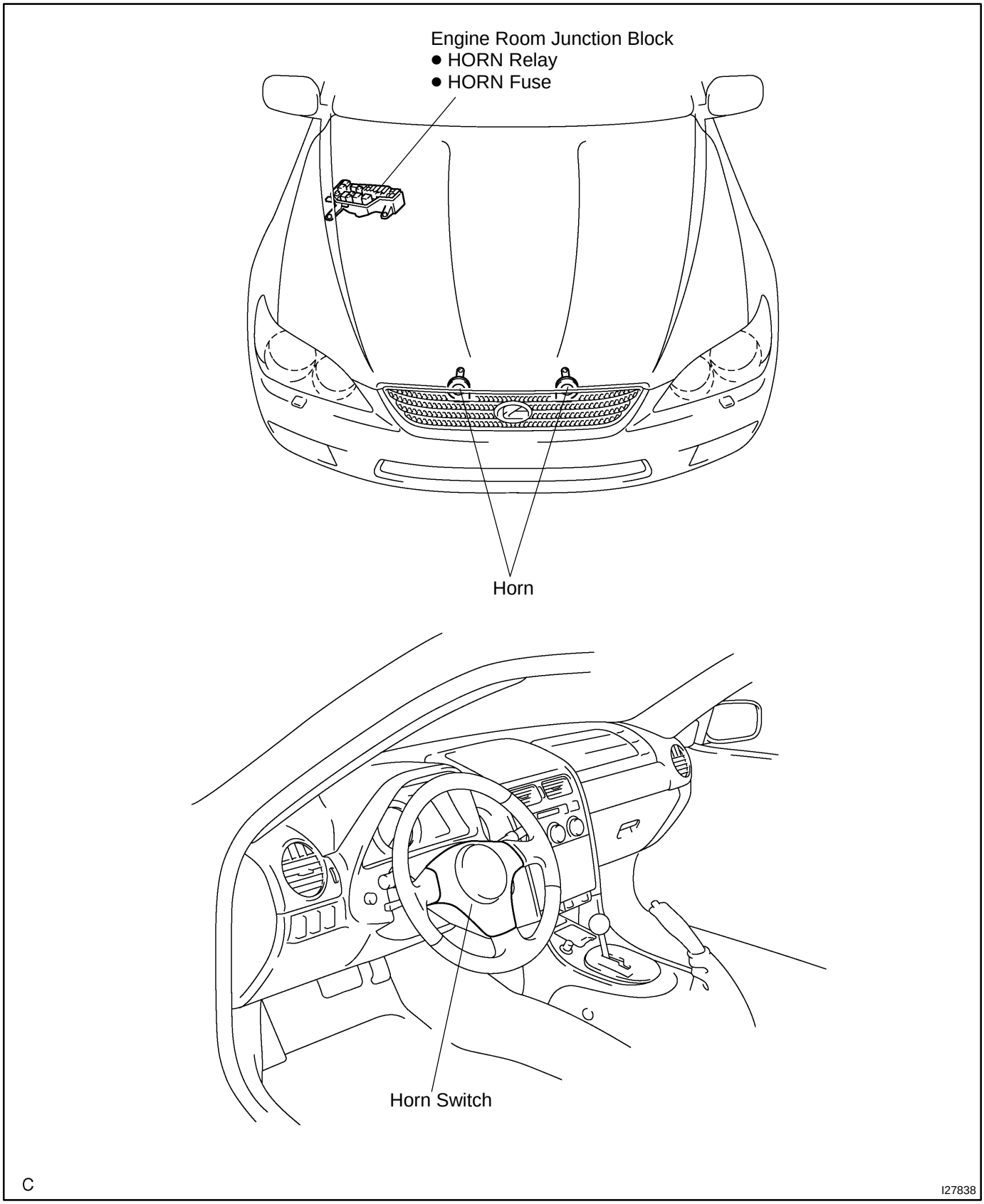
INSPECTION TRANSPONDER KEY COIL CONTINUITY

Check that continuity exists between terminals 1 and 2.
If continuity is not as specified, replace the coil.

HORN SYSTEM

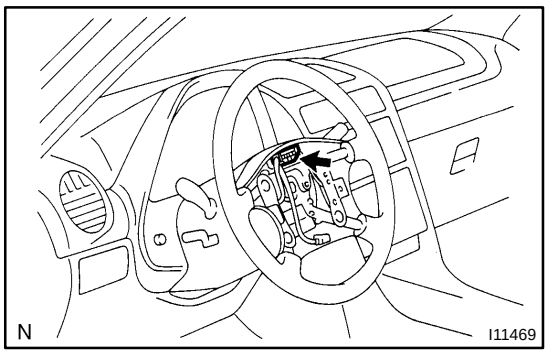
LOCATION

BE0FY-31



BE0FZ-20

INSPECTION

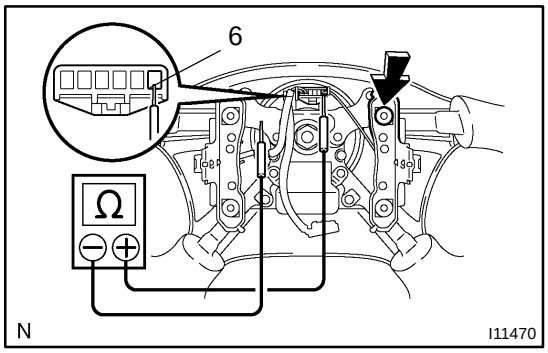


1. INSPECT HORN SWITCH

(a) Disconnect the negative (-) terminal from the battery.
(b) Remove the left and right covers from the steering wheel.
(c) Using a torx socket wrench, loosen the 2 bolts.
(d) Pull up the horn pad and place it on the steering column, as shown.

HINT:
Do not disconnect the connector from the horn pad.

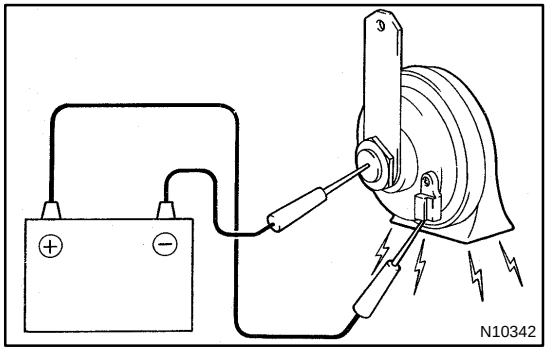
(e) Disconnect the connector from the slip ring.



(f) Check that no continuity exists between terminal 6 of the connector and body ground.
(g) Check that continuity exists between terminal 6 of the connector and body ground when the horn contact plate is pressed against the steering spoke assembly.

If continuity is not as specified, repair or replace the steering wheel or wire harness as necessary.

(h) Install the horn pad in place and using a torx socket wrench, torque the 2 bolts.
Torque: 7.1 N·m (72 kgf·cm, 62 in.·lbf)
(i) Install the left and right covers.
(j) Connect the negative (-) terminal to the battery.

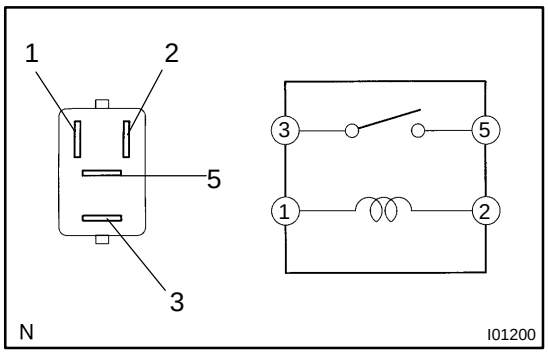


2. INSPECT HORN OPERATION

Connect the positive (+) lead from the battery to the terminal and negative (-) lead to the horn body and check that the horn blows.

If operation is not as specified, replace the horn.

3. INSPECT HORN SWITCH CIRCUIT
(See page DI-800)



4. INSPECT HORN RELAY CONTINUITY

Condition	Tester connection	Specified condition
Always	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

If continuity is not as specified, replace the relay.

5. INSPECT HORN RELAY CIRCUIT

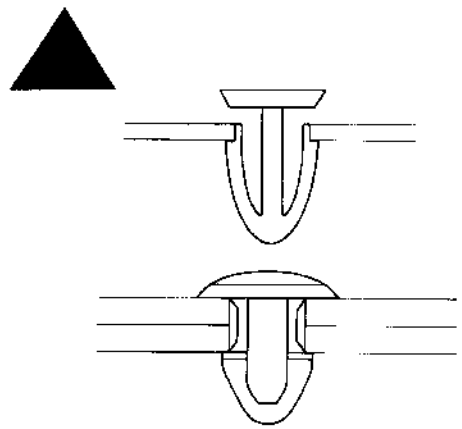
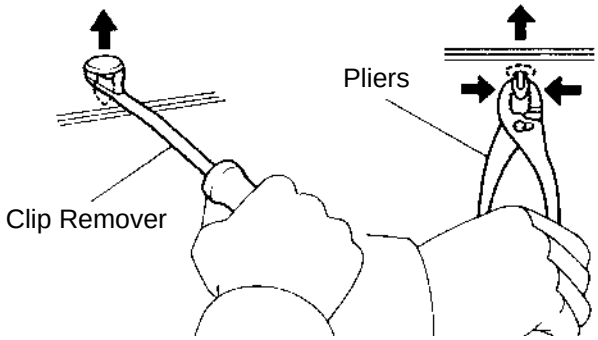
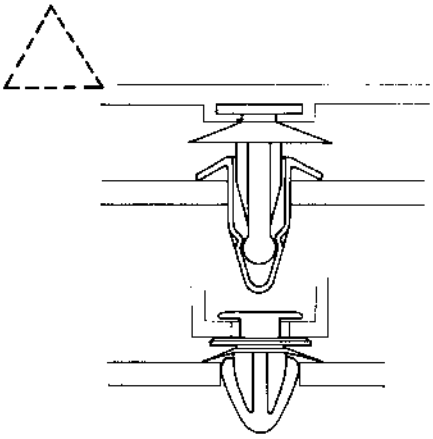
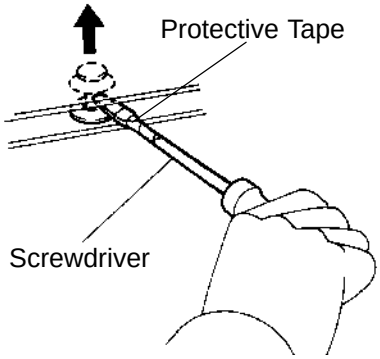
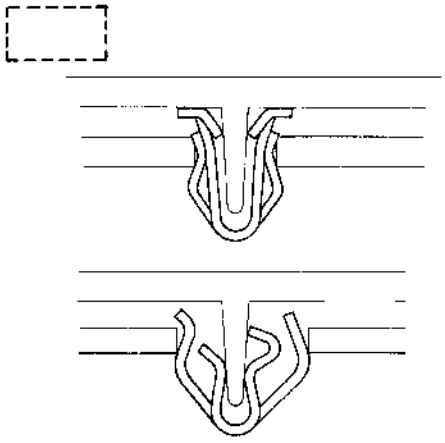
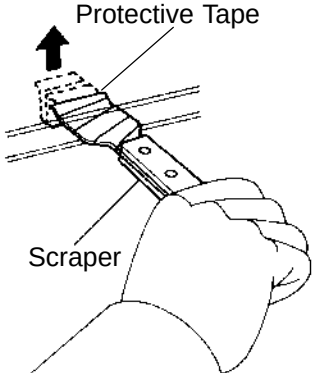
(See page DI-800)

CLIP

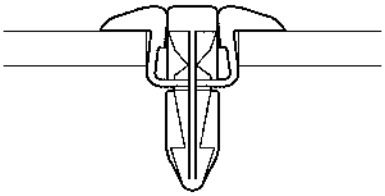
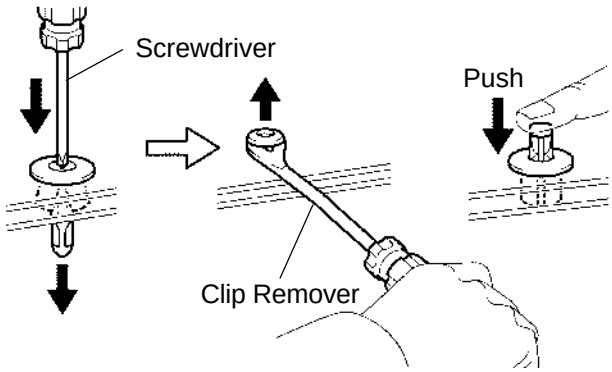
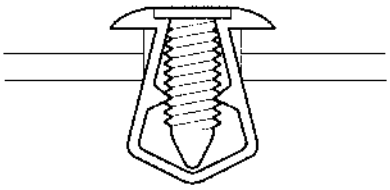
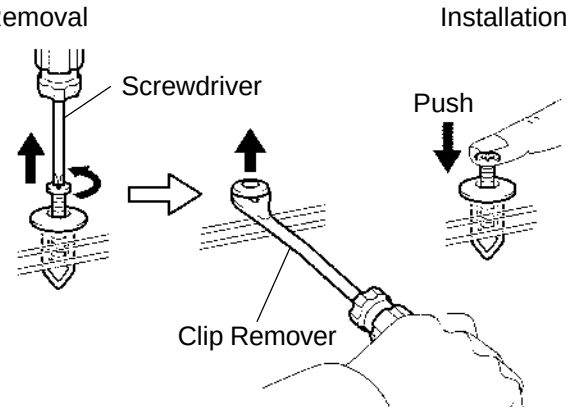
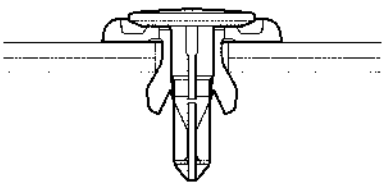
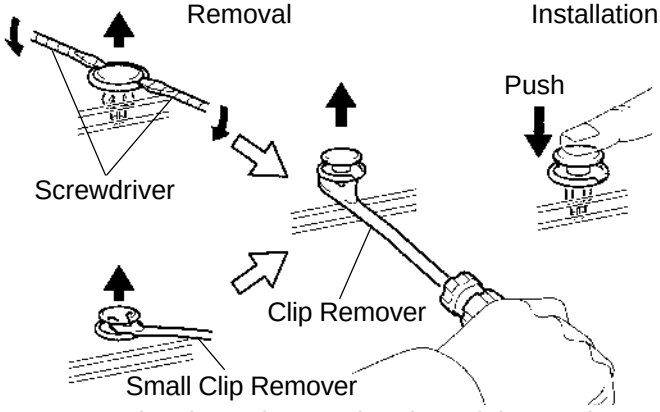
BO0VU-09

REPLACEMENT

The removal and installation methods of typical clips used in body parts are shown in the table below.
HINT:
If the clip is damaged during the operation, always replace it with a new clip.

Shape (Example)	Removal / Installation
	 Remove clips from front or rear using clip remover or pliers.
	 Remove clips from front or rear using clip remover or pliers.
	 Remove clips from front or rear using clip remover or pliers.

V00005

Shape (Example)	Removal/Installation
	 Remove rivet by pushing the center pin through and prying out the rivet shell.
	 Remove rivet by unscrewing the center pin and prying out the rivet shell.
	 Remove rivet by prying out the pin and then prying out the rivet shell.

P

V30002

SRS AIRBAG

BO0VV-13

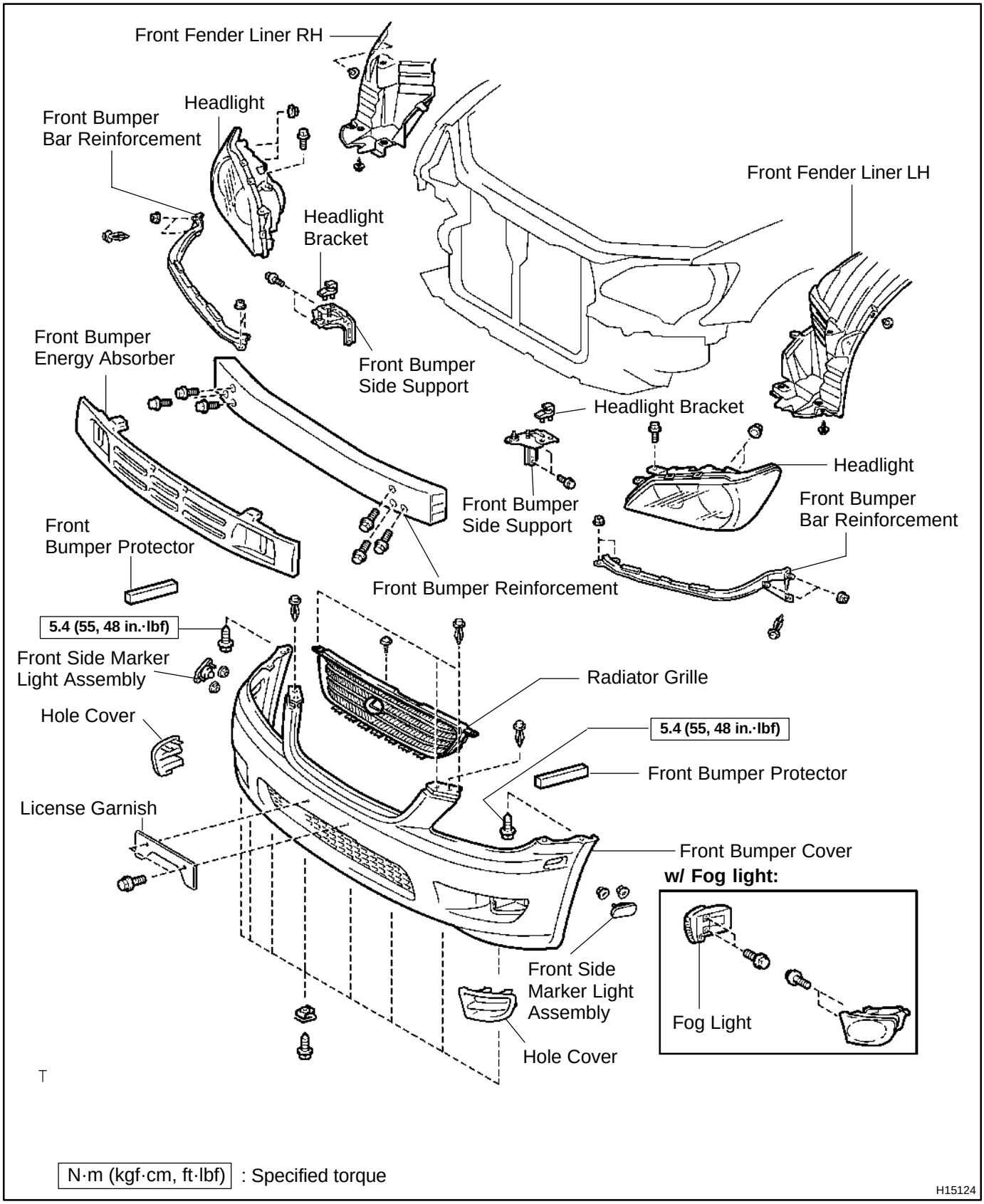
PRECAUTION

The LEXUS IS300 is equipped with an SRS (Supplemental Restraint System) such as the driver airbag, front passenger airbag and side airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during the servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.

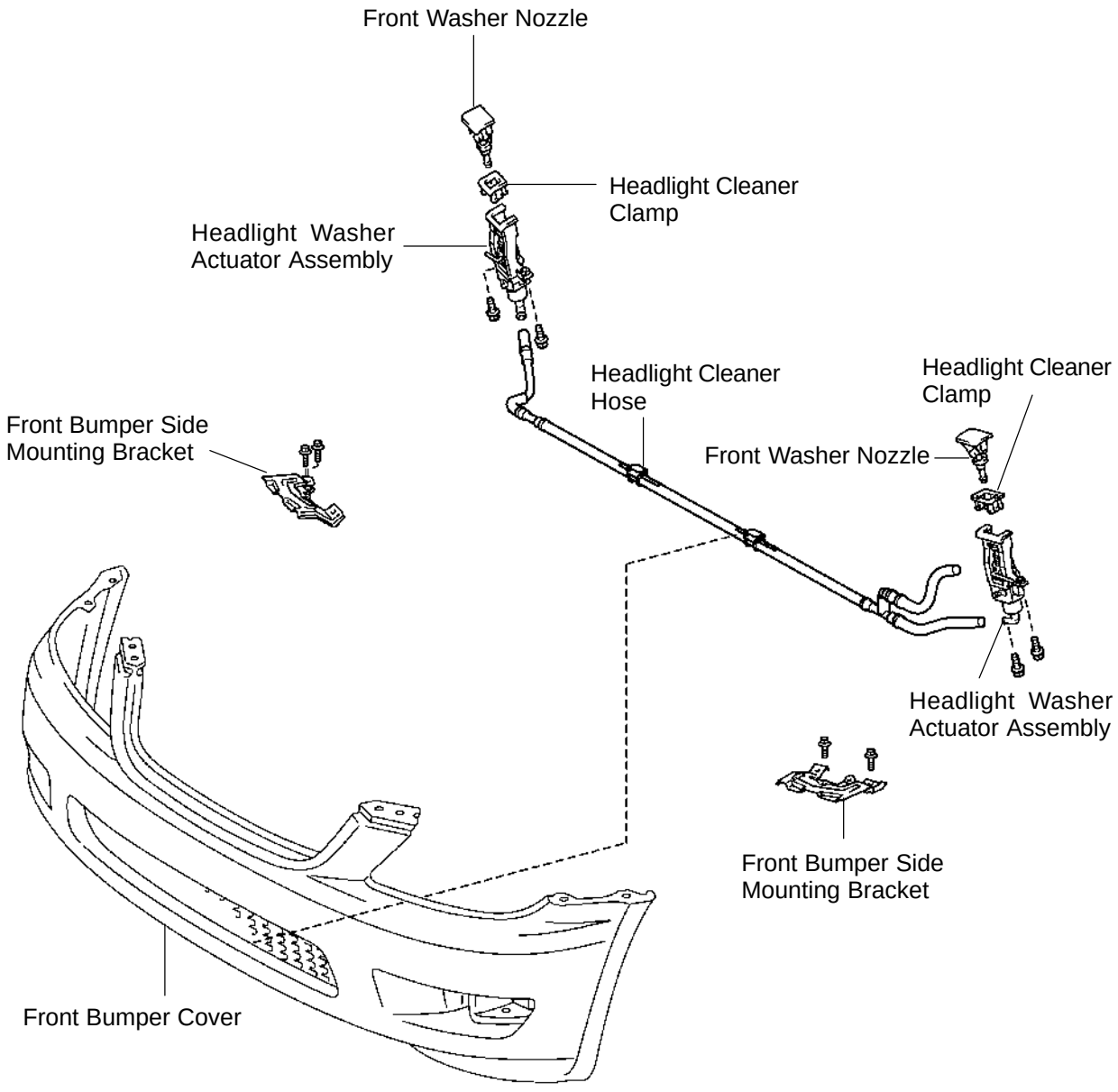
FRONT BUMPER

COMPONENTS

BO4CW-03

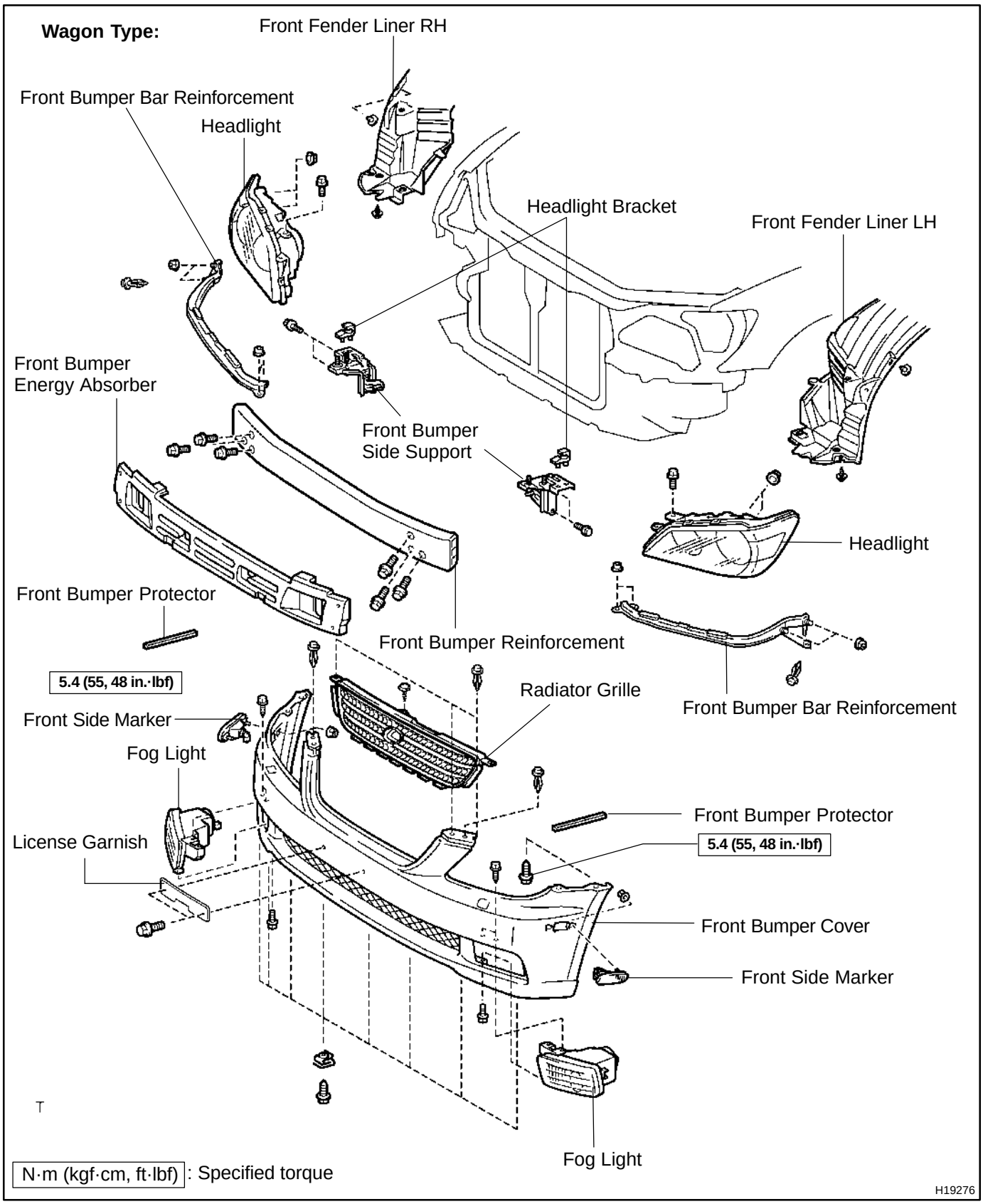


w/ Headlight washer:

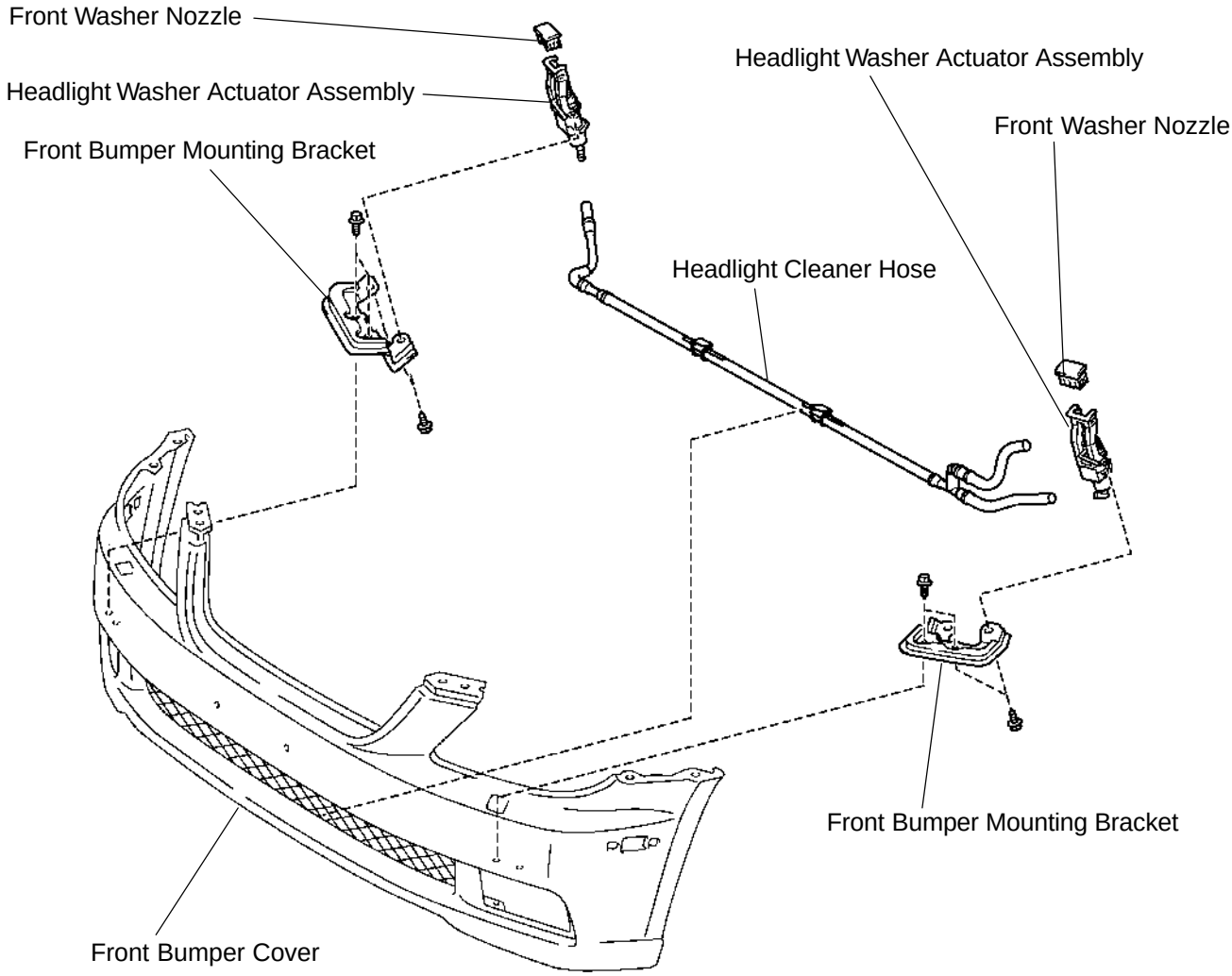


T

H15125


Wagon Type:
Front Fender Liner RH
Front Bumper Bar Reinforcement
Headlight
Headlight Bracket
Front Fender Liner LH
Front Bumper Energy Absorber
Front Bumper Side Support
Headlight
Front Bumper Protector
Front Bumper Reinforcement
5.4 (55, 48 in.·lbf)
Radiator Grille
Front Bumper Bar Reinforcement
Front Side Marker
Fog Light
Front Bumper Protector
License Garnish
5.4 (55, 48 in.·lbf)
Front Bumper Cover
Front Side Marker
T
Fog Light
N·m (kgf·cm, ft·lbf): Specified torque
H19276

w/ Headlight Washer:



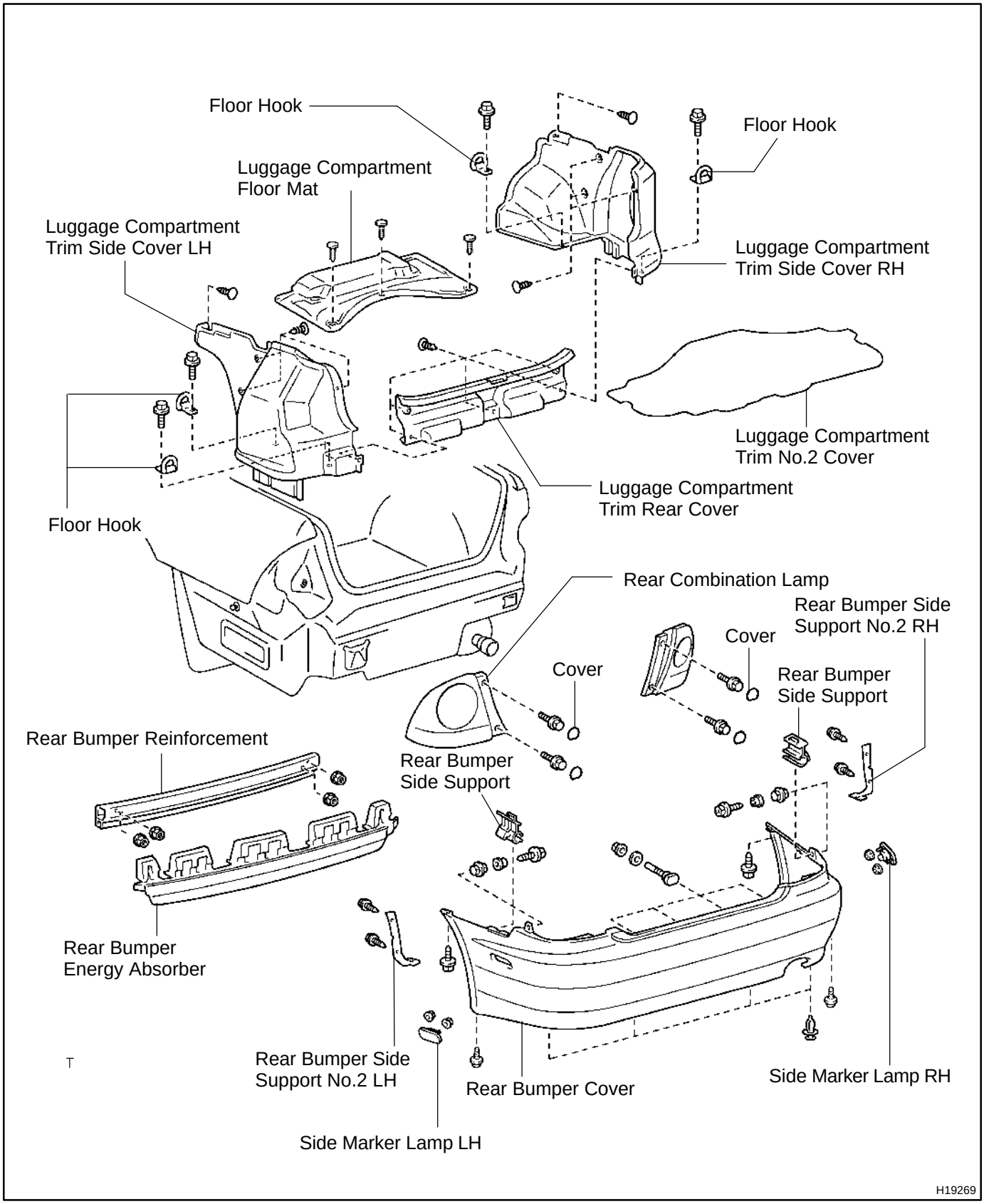
T

H19436

REAR BUMPER (Sedan)

COMPONENTS

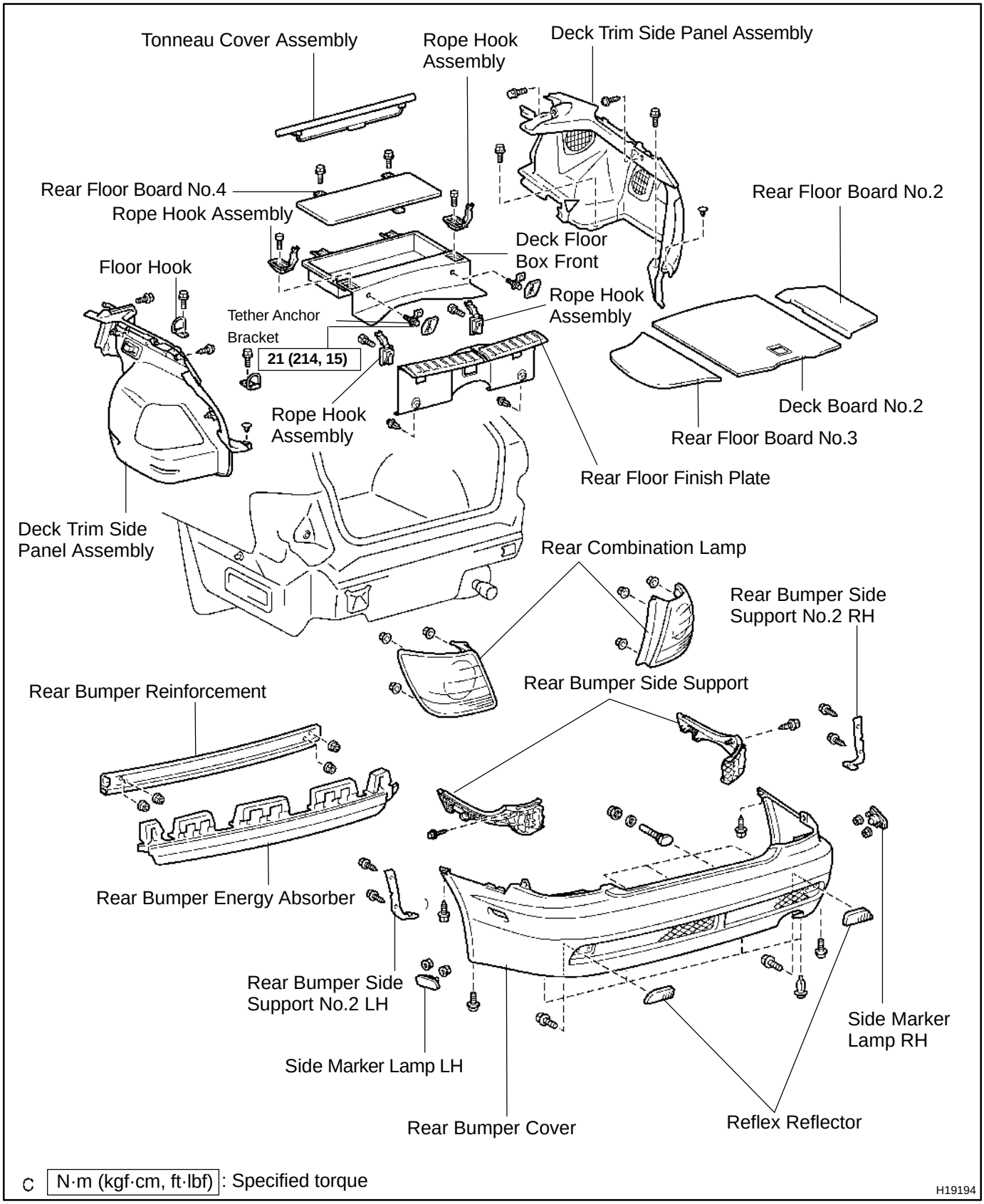
BO4CX-02



REAR BUMPER (Wagon)

BO4CY-02

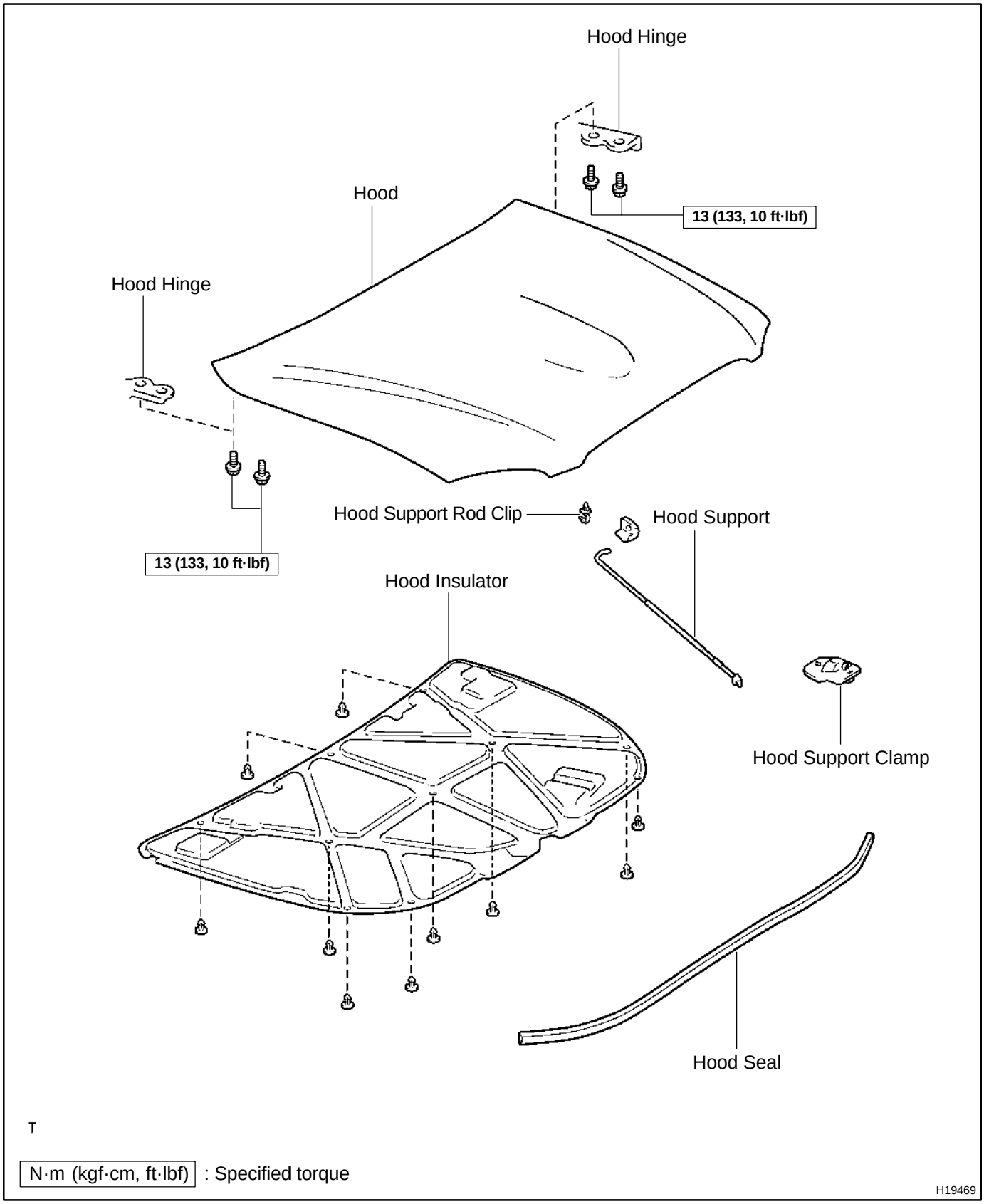
COMPONENTS



HOOD

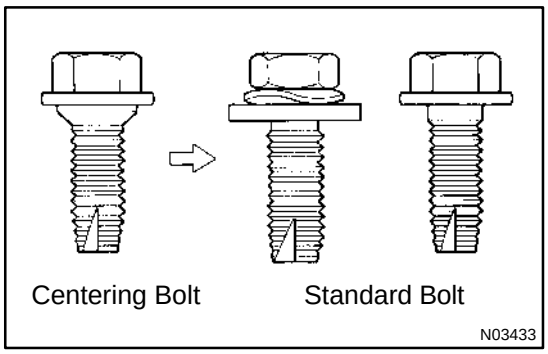
COMPONENTS

BO0VZ-09



BO0W0-10

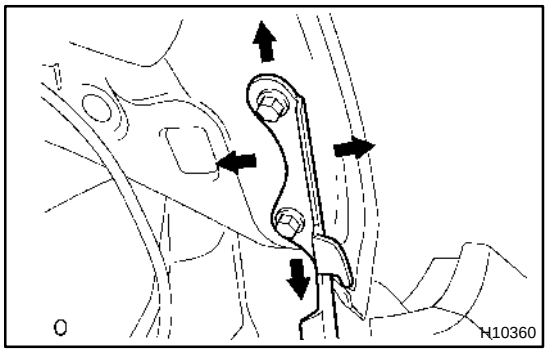
ADJUSTMENT



HINT:

Since the centering bolt is used as a hood hinge and hood lock set bolt, the hood and hood lock cannot be adjusted.

Substitute the bolt with a washer for the centering bolt.



1. ADJUST HOOD IN FORWARD/REARWARD

Adjust the hood by loosening the hood side hinge bolts.

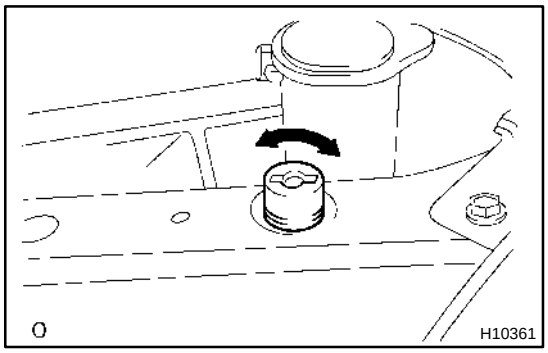
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)

2. ADJUST HOOD IN VERTICAL DIRECTIONS

(a) Remove the bolts and increase or decrease the number of washers between the hinge and the hood.

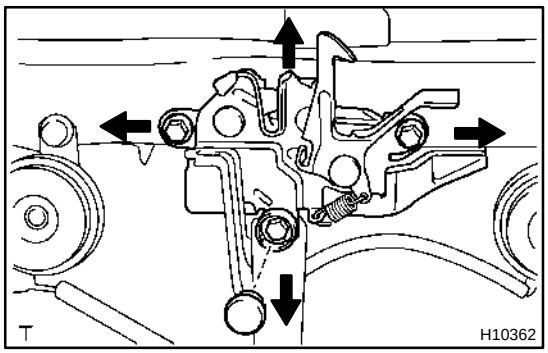
(b) Install the bolts again.

Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)



3. ADJUST FRONT EDGE OF HOOD IN VERTICAL DIRECTION

Adjust the hood by turning the cushions.



4. ADJUST HOOD LOCK

(a) Remove the screw, 2 clips and radiator grille.

(b) Using a screwdriver, remove the hood lock bolt cap.

HINT:

Tape the screwdriver tip before use.

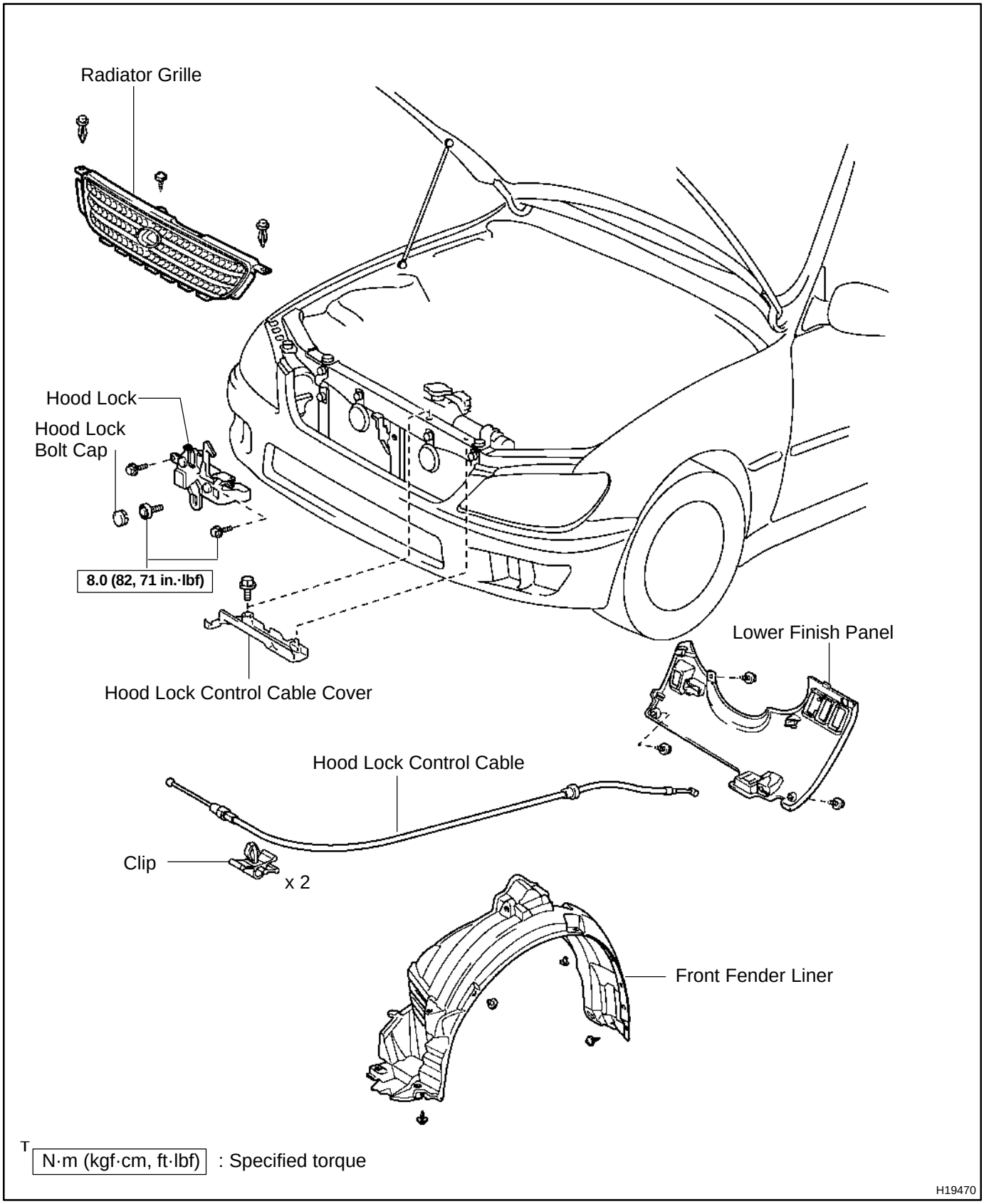
(c) Adjust the hood lock by loosening the bolts.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

HOOD LOCK CONTROL

COMPONENTS

BO0VW-06



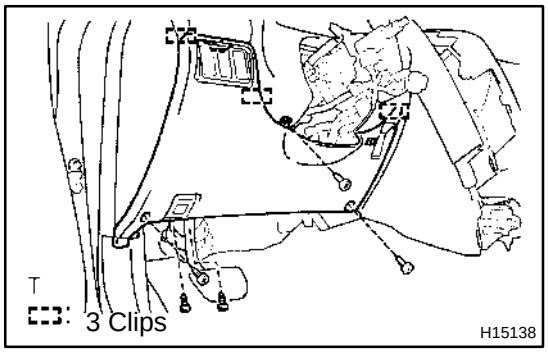
BO0VX-09

REMOVAL

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE FRONT FENDER LINER



2. REMOVE LOWER FINISH PANEL

(a) Remove the 3 screws and lower finish panel.

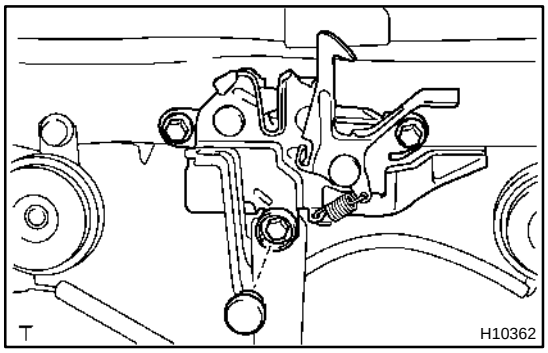
(b) Disconnect the connectors and hood lock control cable.

3. REMOVE RADIATOR GRILLE

Remove the screw, 2 clips and radiator grille.

4. REMOVE HOOD LOCK CONTROL CABLE COVER

Remove the bolt and hood lock control cable cover.



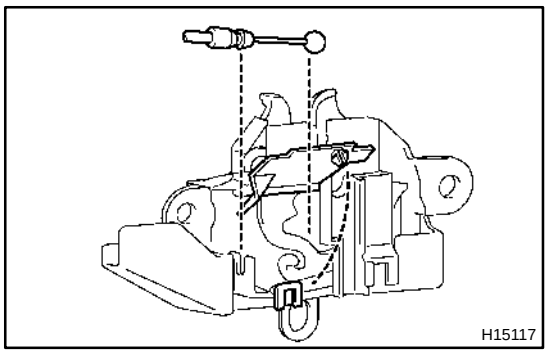
5. REMOVE HOOD LOCK

(a) Using a screwdriver, remove the hood lock bolt cap.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 3 bolts and hood lock.



(c) Using a screwdriver, open the cover, then disconnect the hood lock control cable.

HINT:

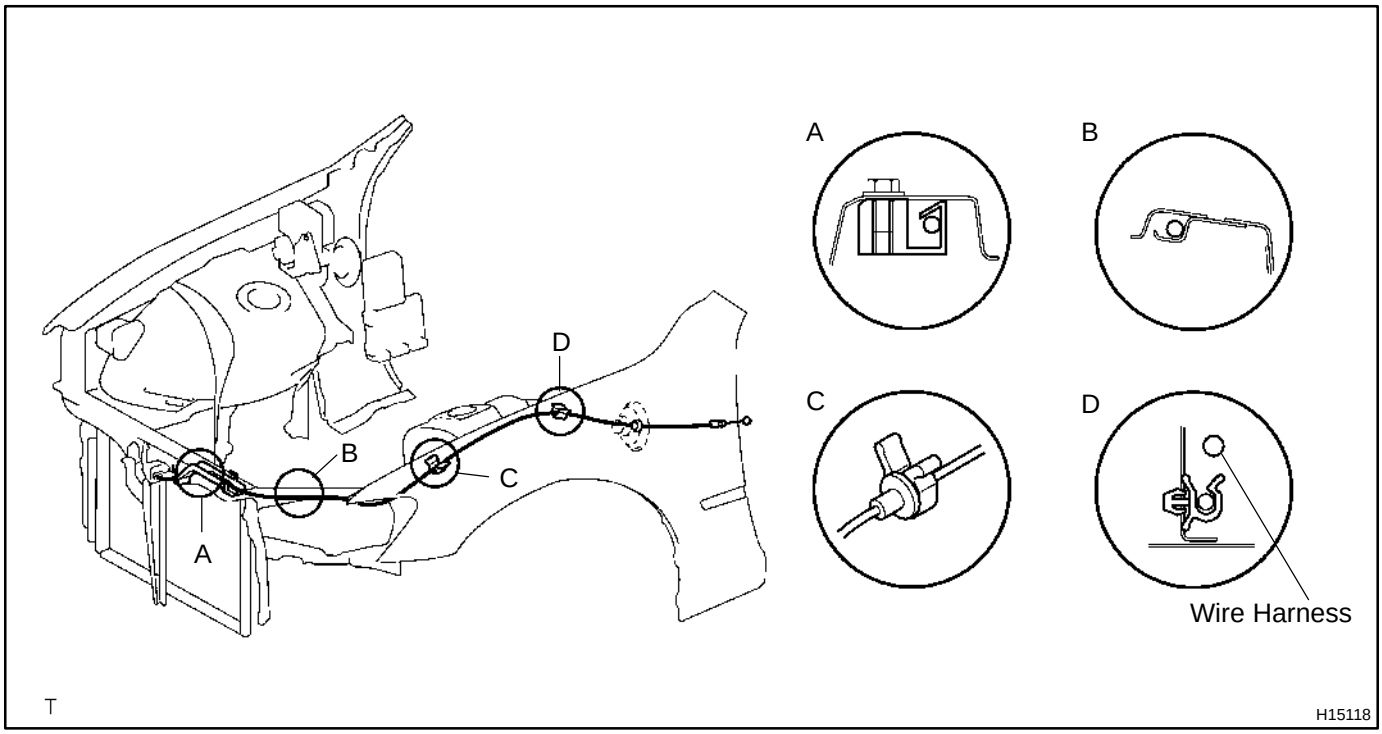
Tape the screwdriver tip before use.

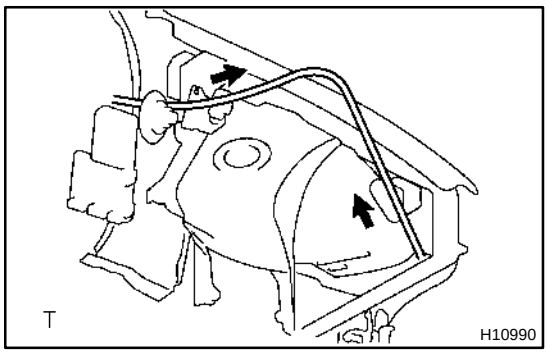
6. REMOVE HOOD LOCK CONTROL CABLE

(a) Using a screwdriver, disconnect the cable from the clamps.

HINT:

Tape the screwdriver tip before use.

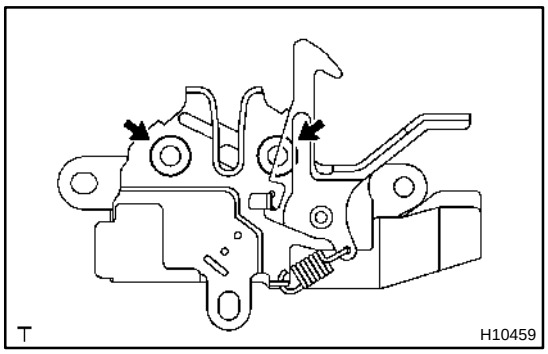




(b) Pull the cable from the engine room to remove it.

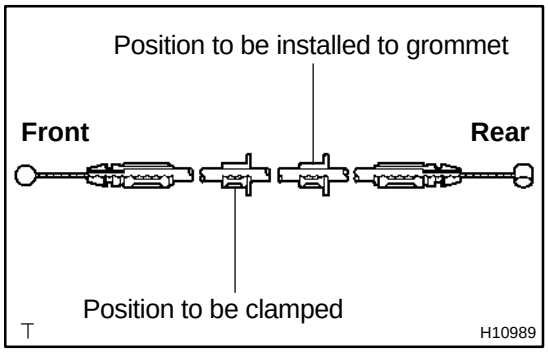
BO2C2-03

INSTALLATION



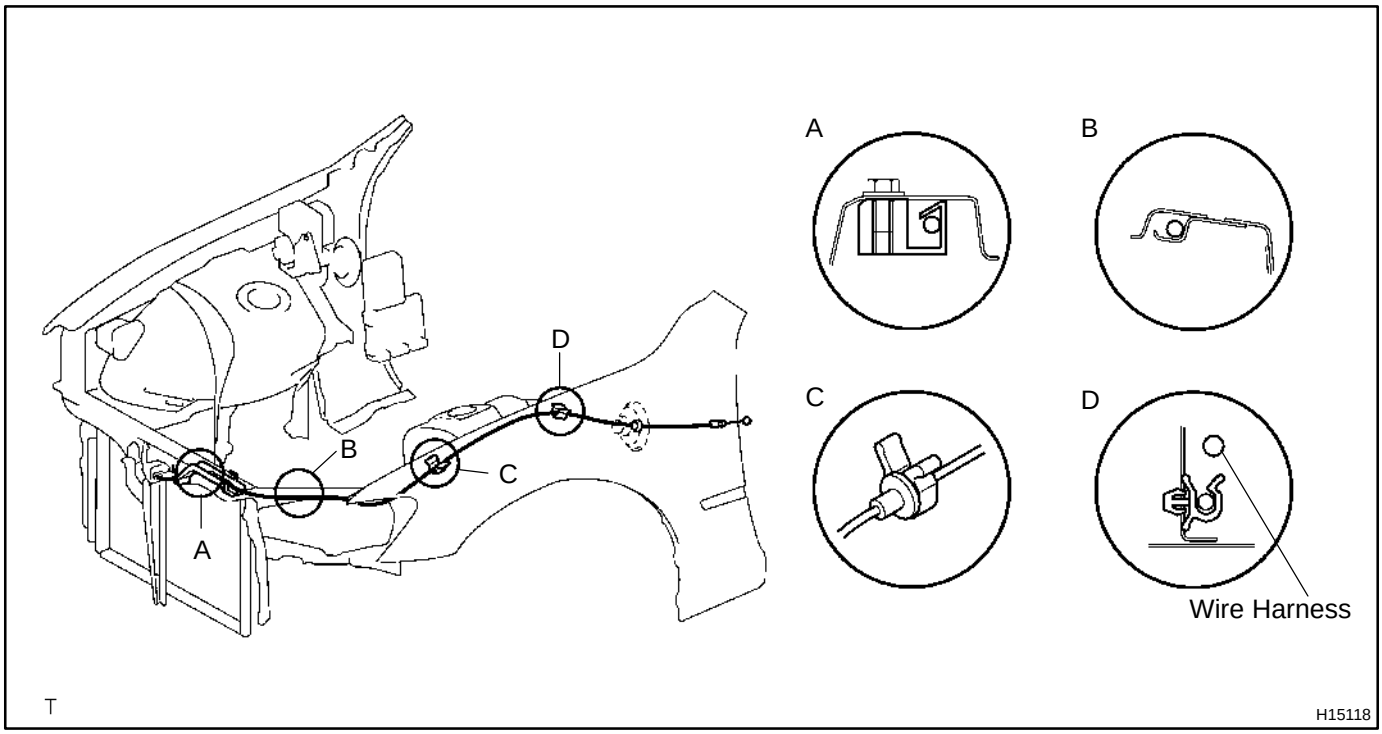
1. BEFORE INSTALLING PARTS, COAT LOCK WITH MP GREASE

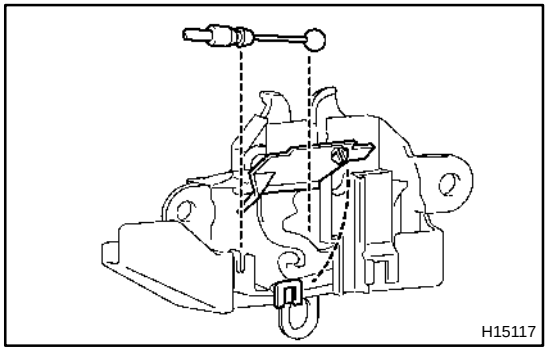
Apply MP grease to the sliding surface of the lock.



2. INSTALL HOOD LOCK CONTROL CABLE

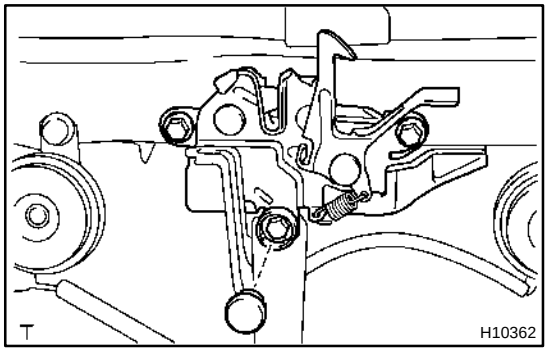
(a) Push the rear side cable through the grommet.
(b) Push the cable stopper to the grommet.
(c) Pass the front side cable through the upper radiator support.
(d) Install the cable with clamps.
(e) Push the cable stopper to the clamp.





3. INSTALL HOOD LOCK

(a) Connect the hood lock control cable to the hood lock, then close the cover.



(b) Install the hood lock with the 3 bolts.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

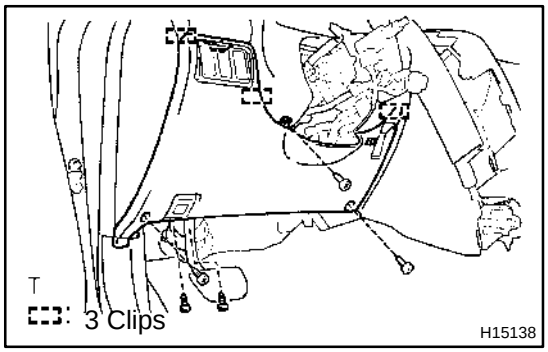
(c) Install the hood lock bolt cap.

4. INSTALL HOOD LOCK CONTROL CABLE COVER

Install the hood lock control cable cover with the bolt.

5. INSTALL RADIATOR GRILLE

Install the radiator grille with the screw and 2 clips.



6. INSTALL LOWER FINISH PANEL

(a) Connect the connectors and hood lock control cable to the lower finish panel.

(b) Install the lower finish panel with the 3 screws.

7. CHECK HOOD LOCK CONTROL FOR PROPER OPERATION

After checking for proper operation, tighten the 3 bolts to install the lock.

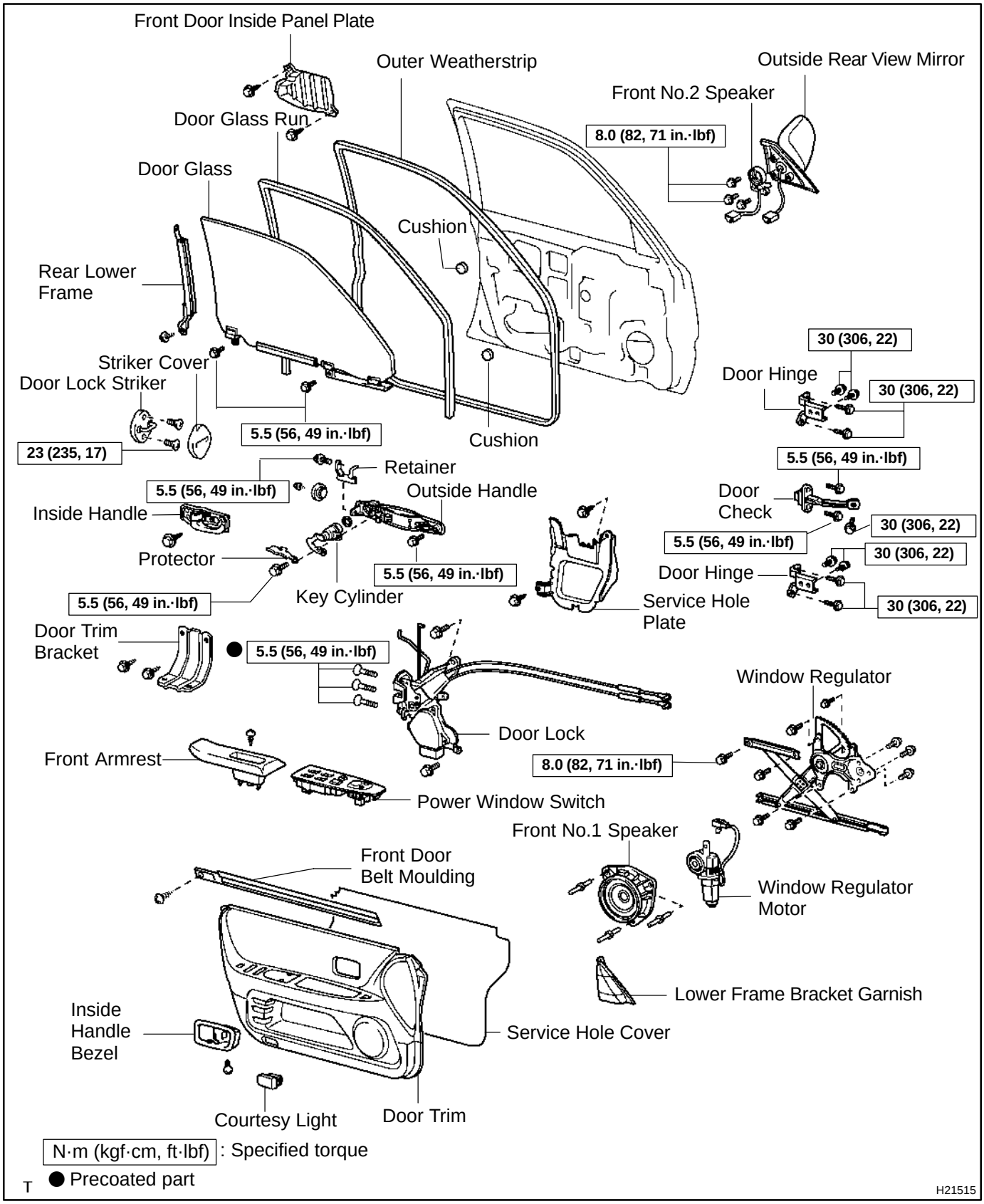
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

8. INSTALL FRONT FENDER LINER

FRONT DOOR

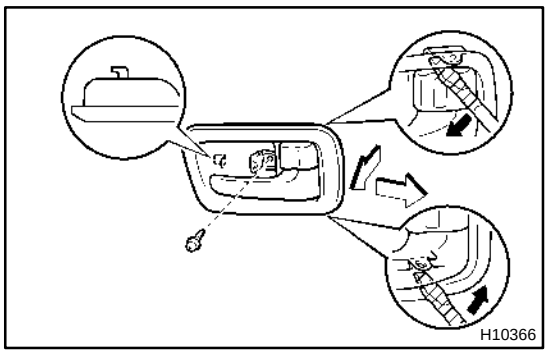
COMPONENTS

BO2C3-05



BO2C6-05

DISASSEMBLY



HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE INSIDE HANDLE BEZEL

(a) Using a screwdriver, open the screw cap.

HINT:

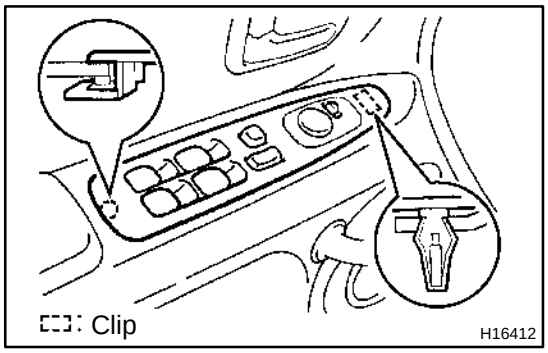
Tape the screwdriver tip before use.

(b) Remove the screw.

(c) Using a screwdriver, remove the inside handle bezel as shown in the illustration.

HINT:

Tape the screwdriver tip before use.



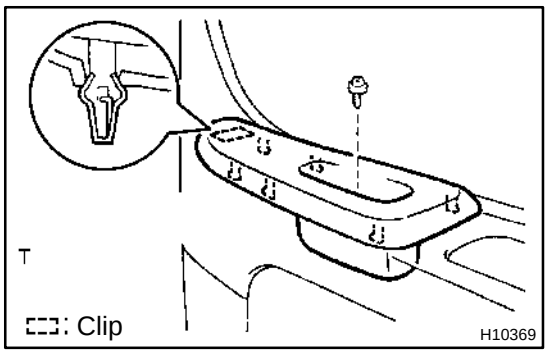
2. REMOVE POWER WINDOW SWITCH

(a) Using a screwdriver, remove the power window switch.

HINT:

Tape the screwdriver tip before use.

(b) Disconnect the connectors.



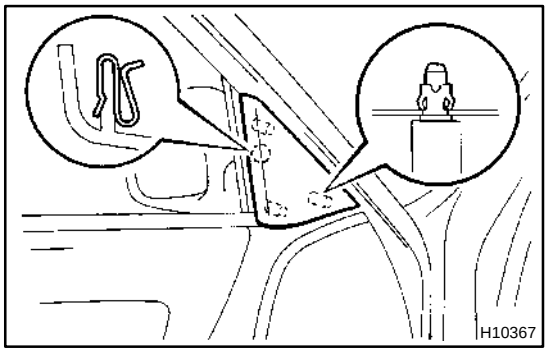
3. REMOVE FRONT ARMREST

(a) Remove the screw.

(b) Using a screwdriver, remove the front armrest as shown in the illustration.

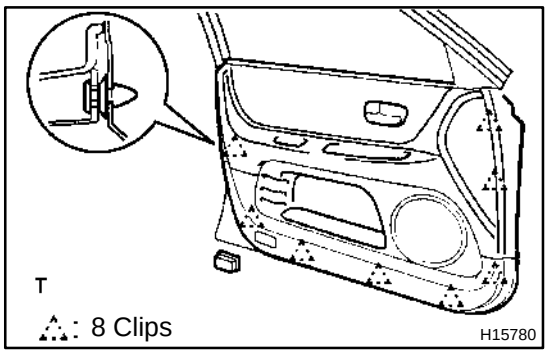
HINT:

Tape the screwdriver tip before use.



4. REMOVE LOWER FRAME BRACKET GARNISH

Remove the lower frame bracket garnish.



5. REMOVE DOOR TRIM

(a) Using a screwdriver, remove the courtesy light, then disconnect the connector.

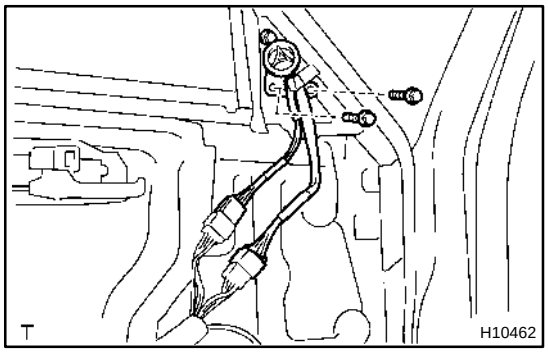
HINT:

Tape the screwdriver tip before use.

(b) Using a screwdriver, disengage the clips, then pull the trim upward to remove it.

HINT:

Tape the screwdriver tip before use.



6. REMOVE FRONT NO.2 SPEAKER

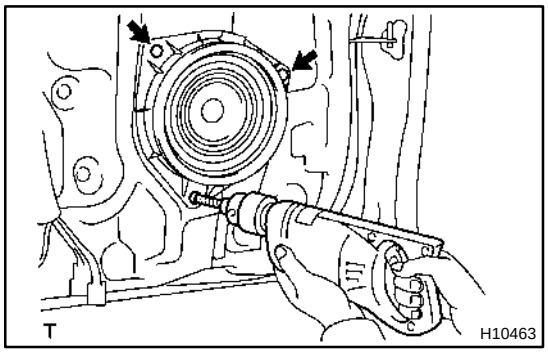
(a) Disconnect the 2 connectors.

(b) Remove the 2 bolts and front No.2 speaker.

7. REMOVE OUTSIDE REAR VIEW MIRROR

(a) Disconnect the connector.

(b) Remove the bolt and outside rear view mirror.



8. REMOVE FRONT NO.1 SPEAKER

(a) Disconnect the connector.

(b) Using a drill of less than ø 4 mm (0.16 in.), drill out the rivet heads and remove the speaker.

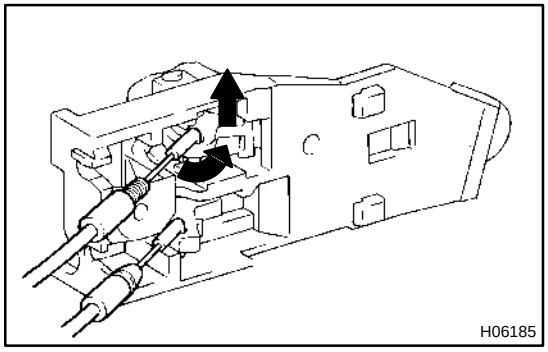
(c) Gently and vertically put the drill to the rivet, and cut the rivet flanges.

NOTICE:

- **Prizing the hole with a drill can lead to damage to the rivet hole or breaking the drill.**
- **Take care as the cut rivet is hot.**

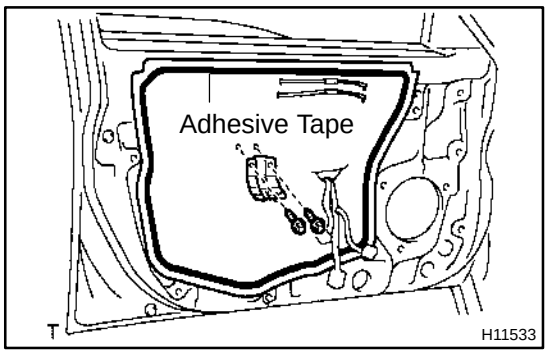
(d) Even if a flange is taken off, continue drilling and push out remaining fragments with the drill.

(e) Using a vacuum cleaner, remove the drilled rivet and their dust from the inside of the door.



9. REMOVE INSIDE HANDLE

Remove the screw and inside handle, disconnect the 2 cables from the inside handle.



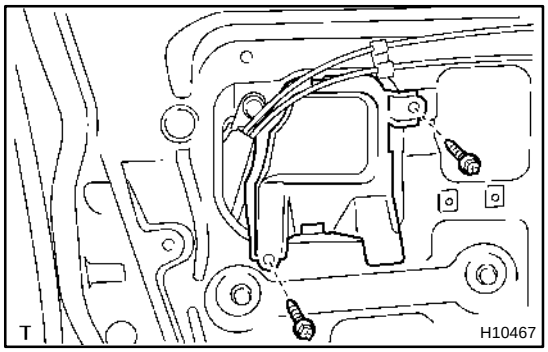
10. REMOVE SERVICE HOLE COVER

(a) Remove the 2 screws and door trim bracket.

(b) Remove the service hole cover.

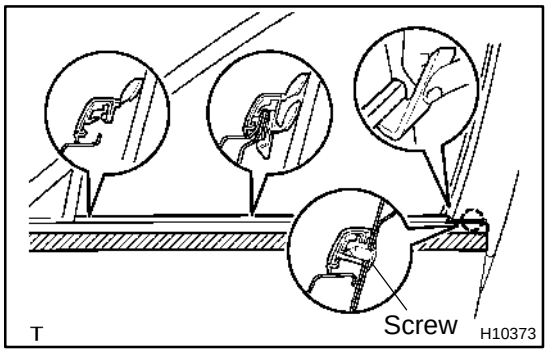
11. REMOVE FRONT DOOR INSIDE PANEL PLATE

Remove the 2 screws and front door inside panel plate.



12. REMOVE NO.2 SERVICE HOLE COVER

Remove the 2 screws and No.2 service hole cover.

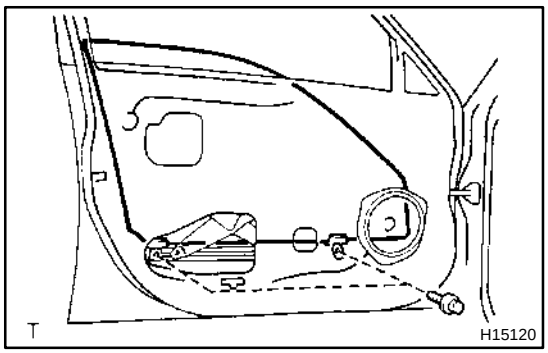


13. REMOVE FRONT DOOR BELT MOULDING

(a) Remove a screw.

(b) Apply protective tape to the outer surface as shown in the illustration, to keep the surface from being scratched.

(c) Using a moulding remover, remove the front door belt moulding as shown in the illustration.



14. REMOVE DOOR GLASS

HINT:

Insert a shop rag inside the door panel to prevent scratching the glass.

(a) Open the door glass until the bolts appear in the service hole.

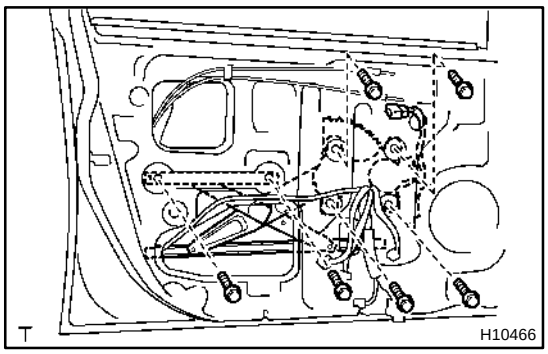
(b) Remove the 2 bolts and door glass.

NOTICE:

Do not damage the door glass.

HINT:

Pull the glass upward to remove it.



15. REMOVE WINDOW REGULATOR

(a) Disconnect the connector and disengage the clamps.

(b) Remove the 6 bolts and window regulator.

16. REMOVE WINDOW REGURATOR MOTOR

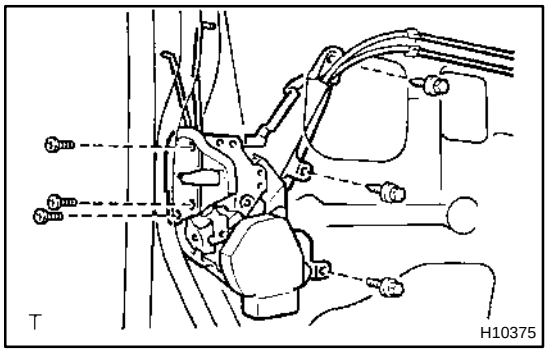
(a) Place matchmarks on the window regurator motor bracket and regurator gear.

(b) Remove the 3 screws and motor.

17. REMOVE DOOR GLASS RUN

18. REMOVE REAR LOWER FRAME

Remove the bolt and rear lower frame.



19. REMOVE DOOR LOCK

(a) Disconnect the 2 links from the outside handle and key cylinder.

(b) Remove the bolt and 2 screws.

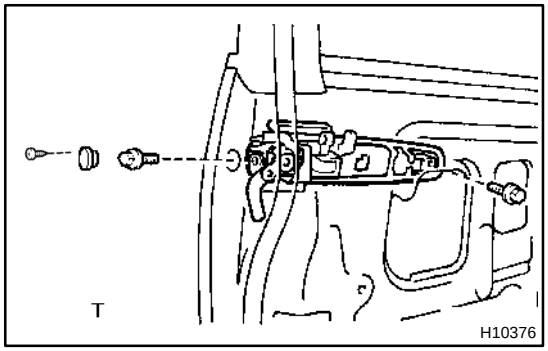
(c) Using a torx socket wrench, remove the 3 torx screws and door lock.

Torx socket wrench: T30 (Part No. 09042-00010 or locally manufactured tool)

(d) Disconnect the connector.

HINT:

Remove the door lock through the service hole.



20. REMOVE OUTSIDE HANDLE AND KEY CYLINDER

(a) Remove the screw and hole cover.

(b) Remove the 2 bolts and outside handle with the key cylinder.

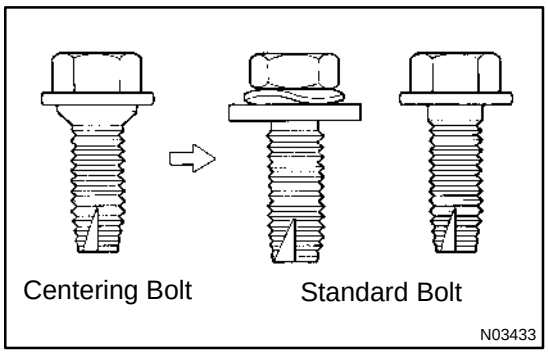
(c) Remove the retainer from the outside handle.

(d) Remove the bolt, key cylinder and protector from the outside handle.

21. REMOVE CUSHIONS

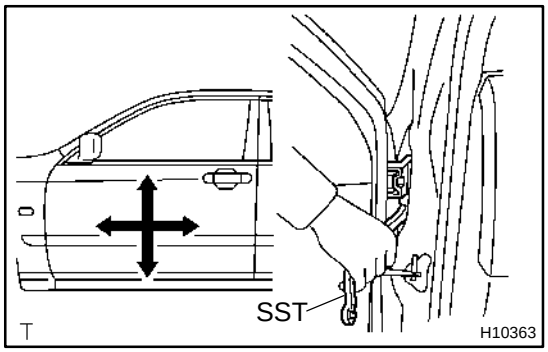
BO3TS-03

ADJUSTMENT



HINT:

Since the centering bolt is used as a door side hinge bolt, the door hinge cannot be adjusted. Substitute the bolt with a washer for the centering bolt.

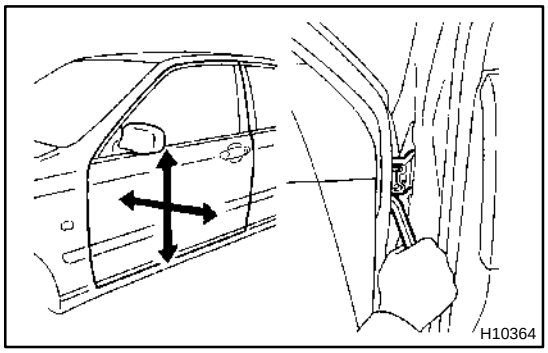


1. ADJUST FRONT DOOR IN FORWARD/REARWARD AND VERTICAL DIRECTIONS

Using SST, adjust the door by loosening the body side hinge bolts.

SST 09812-00010

Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)



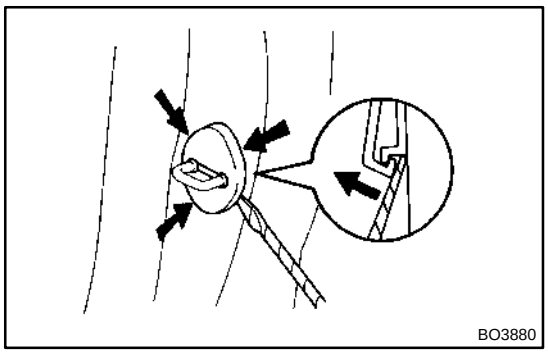
2. ADJUST FRONT DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

Adjust the door by loosening the door side hinge bolts.

Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)

3. ADJUST FRONT DOOR LOCK STRIKER

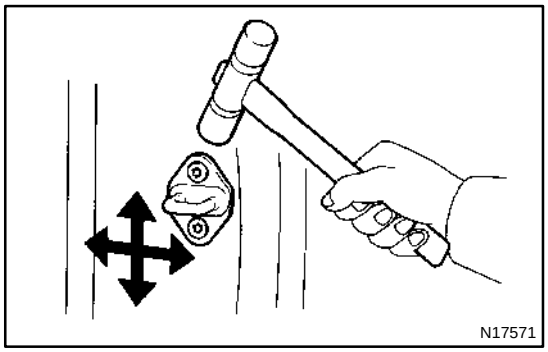
(a) Check that the door fit and door lock linkages are adjusted correctly.



(b) Using a screwdriver, remove the striker cover.

HINT:

Tape the screwdriver tip before use.



(c) Adjust the striker position by slightly loosening the striker mounting screws, and hitting the striker with a hammer.

(d) Tighten the striker mounting screws again.

Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)

(e) Install the striker cover.

BO2C5-04

REASSEMBLY

1. INSTALL OUTER WEATHERSTRIP

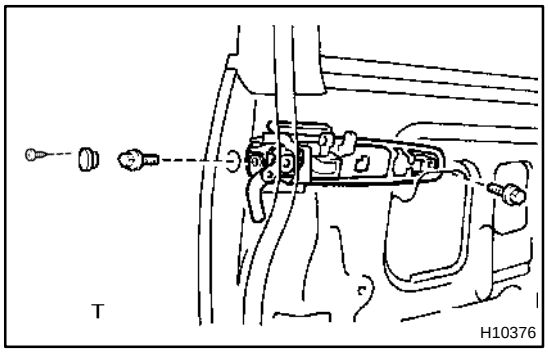
2. INSTALL CUSHIONS

3. INSTALL OUTSIDE HANDLE AND KEY CYLINDER

(a) Install the key cylinder and protector with the bolt to the outside handle.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

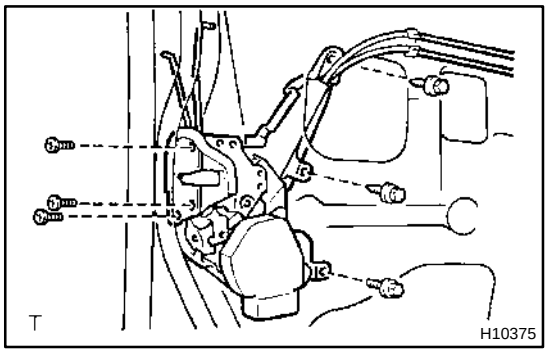
(b) Install the retainer to the outside handle.



(c) Install the outside handle with the key cylinder to the door panel with the 2 bolts.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(d) Install the hole cover with the screw.



4. INSTALL DOOR LOCK

(a) Connect the connector.

(b) Using a torx socket wrench, install the door lock with the 3 torx screws.

Torx socket wrench: T30 (Part No. 09042-00010 or locally manufactured tool)

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

HINT:

Apply adhesive to the 3 torx screws.

Part No. 08833-00070, THREE BOND 1324 or equivalent

(c) Install the bolt and 2 screws.

(d) Connect the 2 links to the outside handle and key cylinder.

5. INSTALL REAR LOWER FRAME

Install the rear lower frame with the bolt.

6. INSTALL DOOR GLASS RUN

7. INSTALL WINDOW REGURATOR MOTOR

(a) Align the matchmarks on the regulator motor bracket and regulator gear.

(b) Install the 3 screws.

NOTICE:

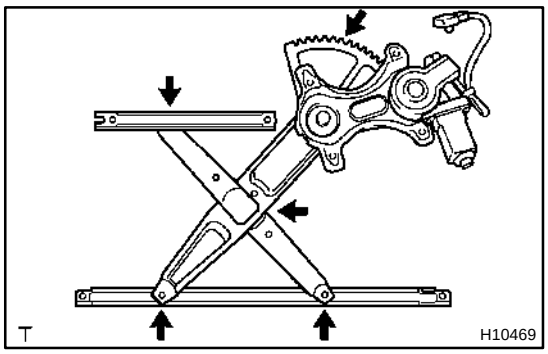
Driver's side:

If only the motor is rotated, reset the motor (See page BE-1 18).

HINT:

Driver's side:

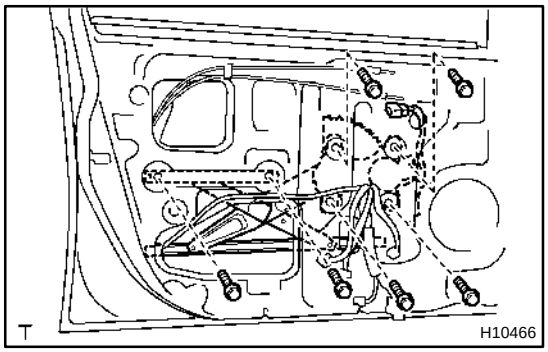
Never rotate the motor to the down direction mention of the window glass until completing the installation.



8. INSTALL WINDOW REGULATOR

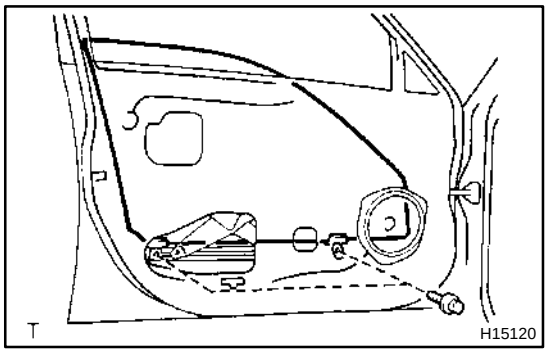
HINT:

Apply MP grease to the sliding and rotating parts of the window regulator.



(a) Install the window regulator with the 6 bolts.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

(b) Connect the connector and attach the clamps.



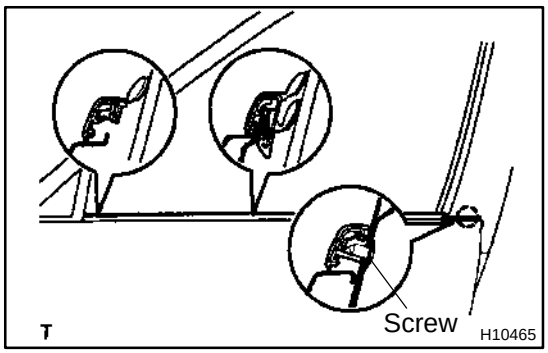
9. INSTALL DOOR GLASS

NOTICE:

Do not damage the door glass.

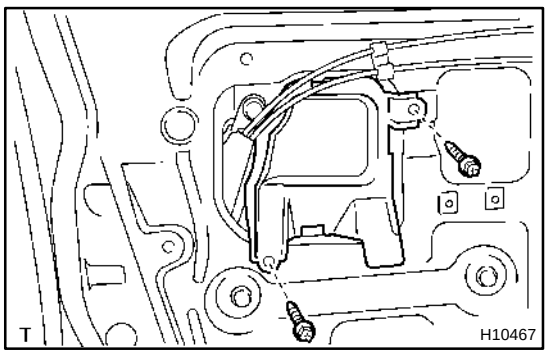
(a) Put the door glass in the door panel carefully.

(b) Install the door glass with the 2 bolts to the window regulator.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)



10. INSTALL FRONT DOOR BELT MOULDING

Install the front door belt moulding with the screw.

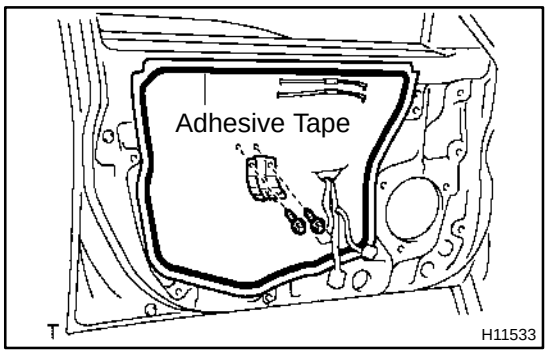


11. INSTALL NO.2 SERVICE HOLE COVER

Install the No.2 service hole cover with the 2 screws.

12. INSTALL FRONT DOOR INSIDE PANEL PLATE

Install the front door inside panel plate with the 2 screws.



13. INSTALL SERVICE HOLE COVER

(a) Install the service hole cover to the door panel.

HINT:

- When installing the service hole cover, pull out the links and the connectors through the service hole cover.
- There should be no wrinkles or folds after attaching the service hole cover.
- After attaching the service hole cover, sealing condition should be confirmed.

(b) Install the door trim bracket with the 2 screws.

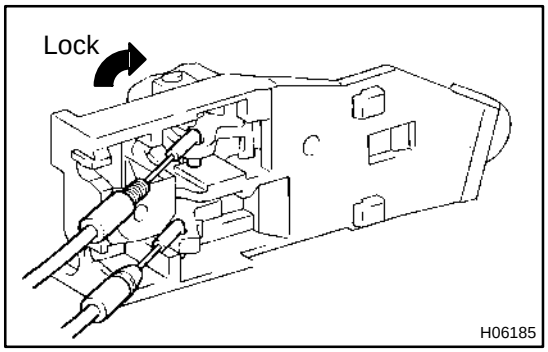
14. INSTALL INSIDE HANDLE

Connect the 2 cables to the inside handle, then install the inside handle with the screw.

NOTICE:

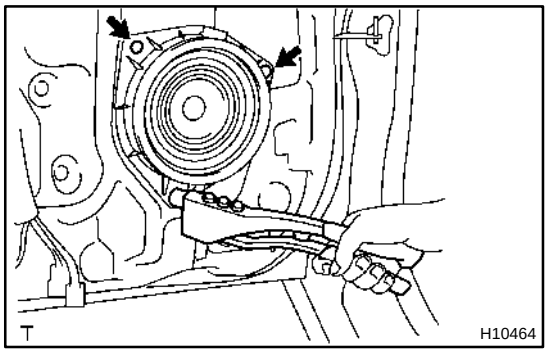
At the time of locking cable reassembly, please refer to the following items.

- **Set the door lock assembly to the LOCK position.**
- **Hold the lock knob to the LOCK position by hand, and do not pull the cable while connecting the locking cable.**



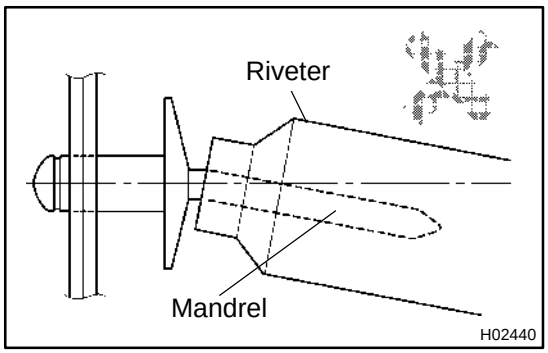
15. INSTALL FRONT NO.1 SPEAKER

(a) Using an air riveter or hand riveter, install the front No.1 speaker.

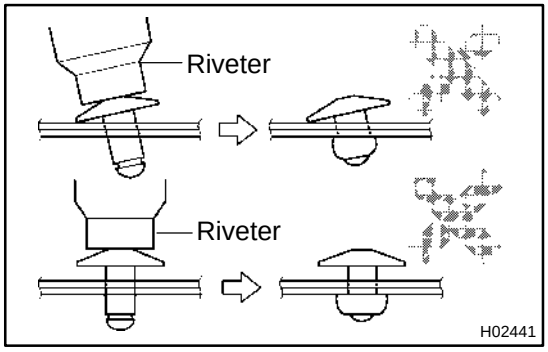


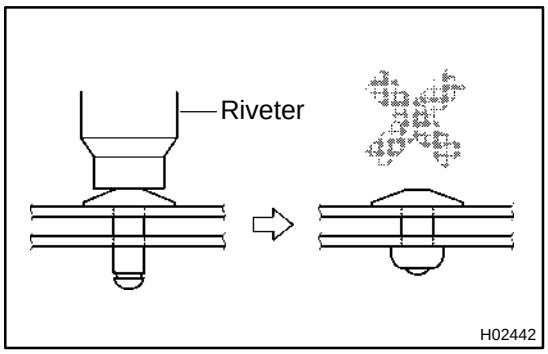
NOTICE:

- **Do not prize a riveter. It could damage the riveter and cause loose fitting and mandrel bend.**



- **Do not tilt the riveter when fastening the rivet to the material to avoid loose fitting.**
- **Do not allow gap spacing between the rivet head and the material.**





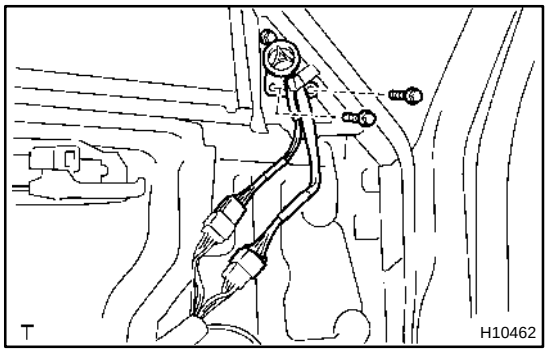
● **Do not allow gap spacing between the materials.**

(b) Connect the connector.

16. INSTALL OUTSIDE REAR VIEW MIRROR

(a) Install the outside rear view mirror with the bolt.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

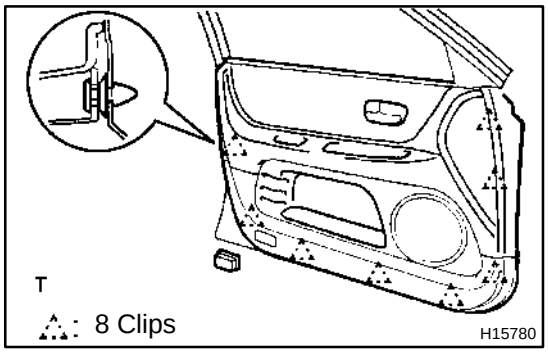
(b) Connect the connector.



17. INSTALL FRONT NO.2 SPEAKER

(a) Install the front No.2 speaker with the 2 bolts.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

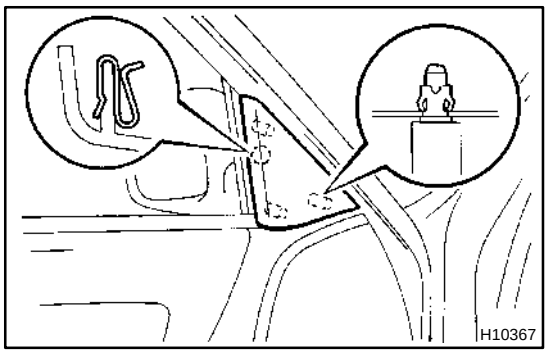
(b) Connect the 2 connectors.



18. INSTALL DOOR TRIM

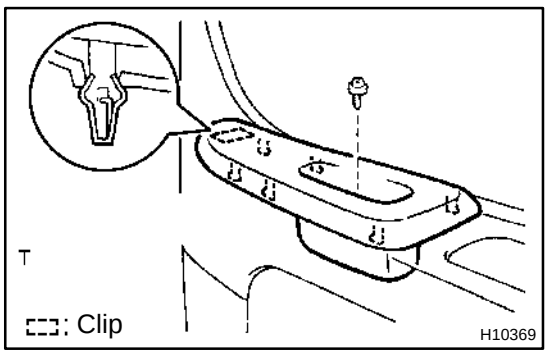
(a) Install the door trim to the door panel.

(b) Connect the connector, then install the courtesy light.



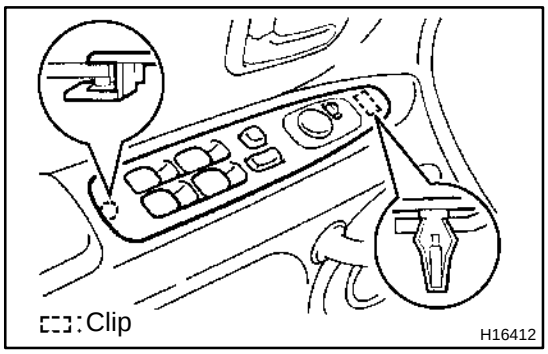
19. INSTALL LOWER FRAME BRACKET GARNISH

Install the lower frame bracket garnish to the door panel.



20. INSTALL FRONT ARMREST

Install the front armrest with the screw.



21. INSTALL POWER WINDOW SWITCH

(a) Connect the connectors.

(b) Install the power window switch.

22. INSTALL INSIDE HANDLE BEZEL

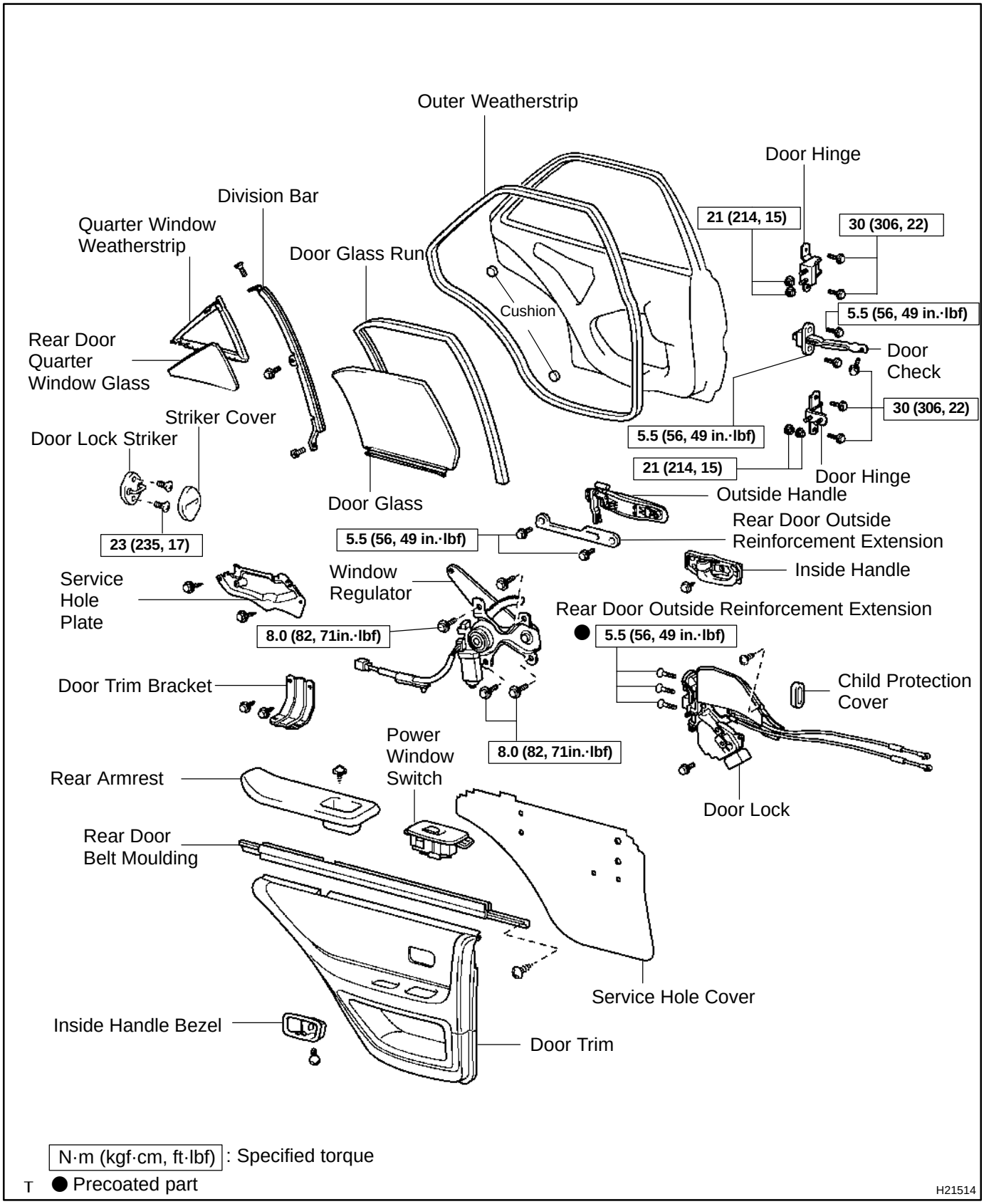
(a) Install the inside handle bezel with the screw.

(b) Close the screw cap.

REAR DOOR

COMPONENTS

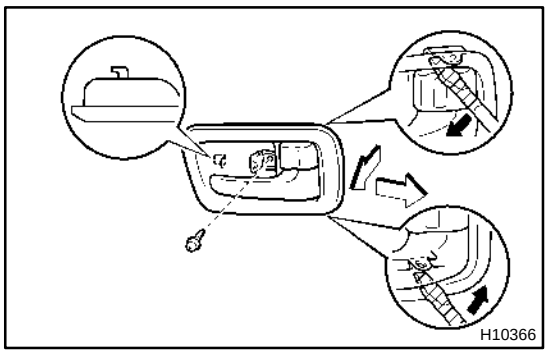
BO2C7-05



T

BO2C8-05

DISASSEMBLY



HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE INSIDE HANDLE BEZEL

(a) Using a screwdriver, open the screw cap.

HINT:

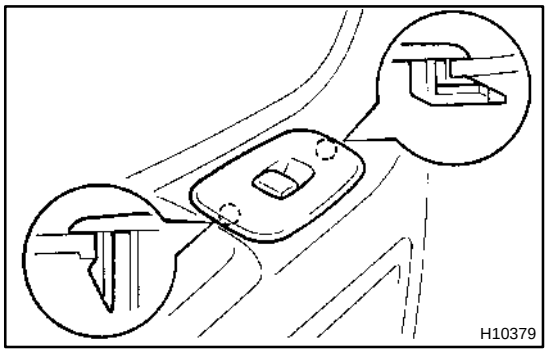
Tape the screwdriver tip before use.

(b) Remove the screw.

(c) Using a screwdriver, remove the inside handle bezel as shown in the illustration.

HINT:

Tape the screwdriver tip before use.



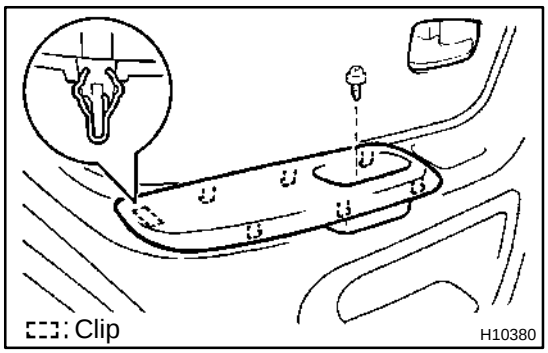
2. REMOVE POWER WINDOW SWITCH

(a) Using a screwdriver, remove the power window switch.

HINT:

Tape the screwdriver tip before use.

(b) Disconnect the connector.



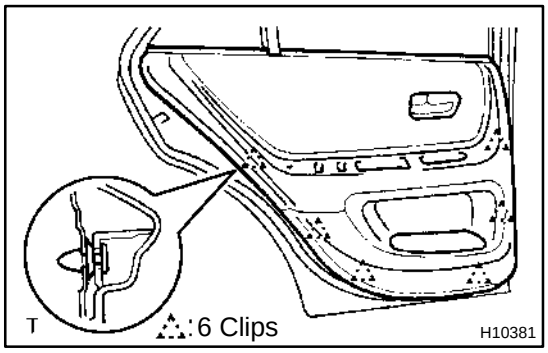
3. REMOVE REAR ARMREST

(a) Remove the screw.

(b) Using a screwdriver, remove the rear armrest.

HINT:

Tape the screwdriver tip before use.

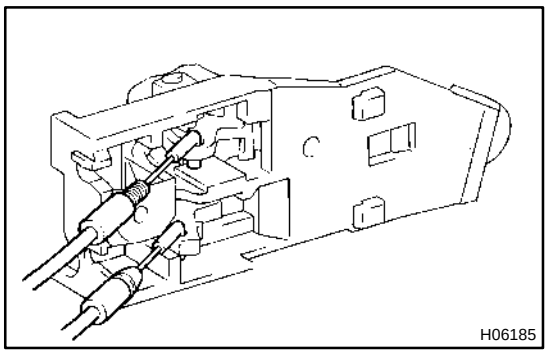


4. REMOVE DOOR TRIM

Using a screwdriver, disengage the clips, then pull the trim upward to remove it.

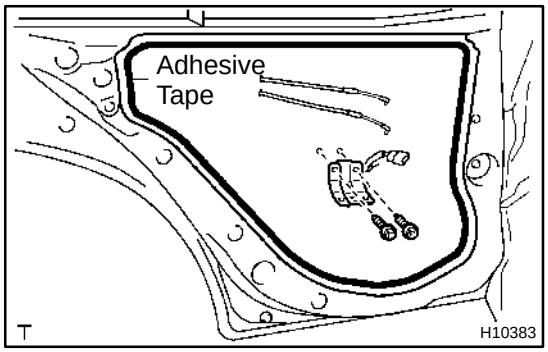
HINT:

Tape the screwdriver tip before use.



5. REMOVE INSIDE HANDLE

Remove the screw and inside handle, and disconnect the 2 cables from the inside handle.



6. REMOVE SERVICE HOLE COVER

(a) Disconnect the connector.

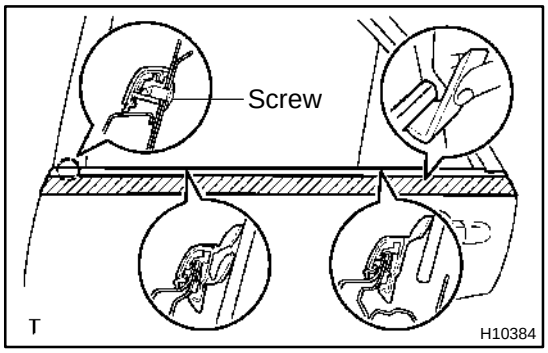
(b) Remove the 2 screws and door trim bracket.

(c) Remove the service hole cover.

7. REMOVE SERVICE HOLE PLATE

Remove the 2 screws and service hole plate.

8. REMOVE DOOR GLASS RUN

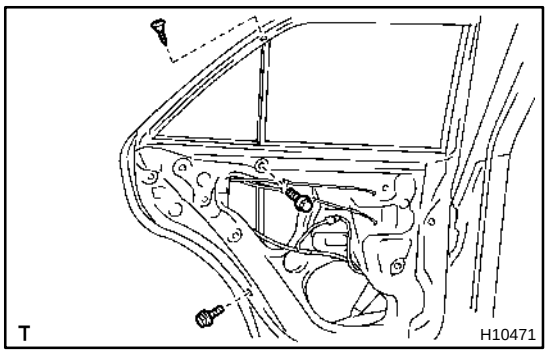


9. REMOVE REAR DOOR BELT MOULDING

(a) Remove the screw.

(b) Apply protective tape to the outer surface as shown in the illustration to keep the surface from being scratched.

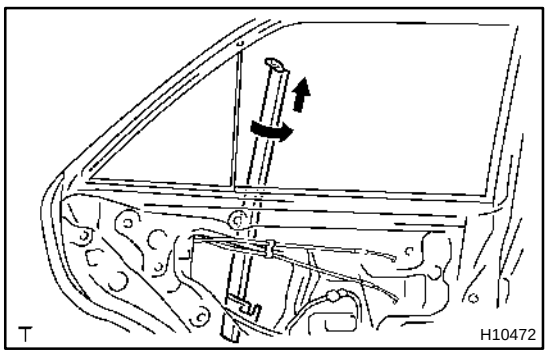
(c) Using a moulding remover, remove the rear door belt moulding as shown in the illustration.



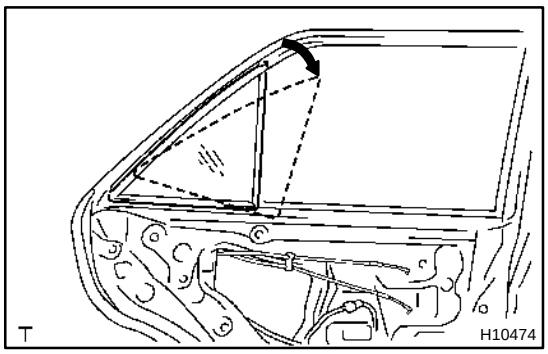
10. REMOVE DIVISION BAR

(a) Remove the 2 bolts and screw.

(b) Pull the division bar forward.



(c) Rotate the division bar 90° and pull it upward as shown in the illustration.



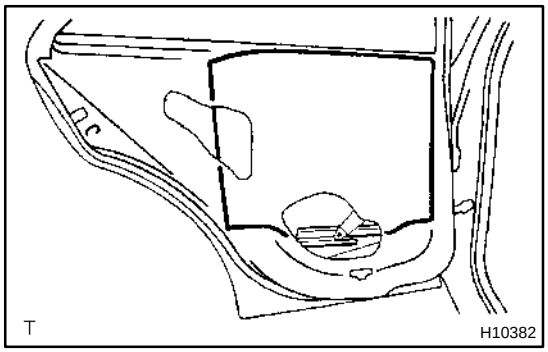
11. REMOVE REAR DOOR QUARTER WINDOW GLASS

(a) Remove the rear door quarter window glass as shown in the illustration.

NOTICE:

Do not damage the glass.

(b) Remove the quarter window weatherstrip from the glass.



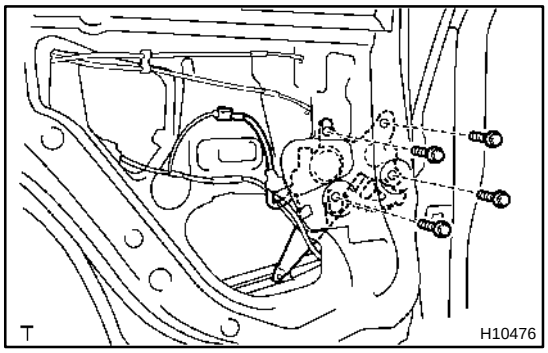
12. REMOVE DOOR GLASS

HINT:

Insert a shop rag inside the door panel to prevent scratching the glass.

(a) Open the door glass.

(b) Tilt the door glass and disconnect the roller of the regulator from the glass channel to remove the door glass.



13. REMOVE WINDOW REGULATOR

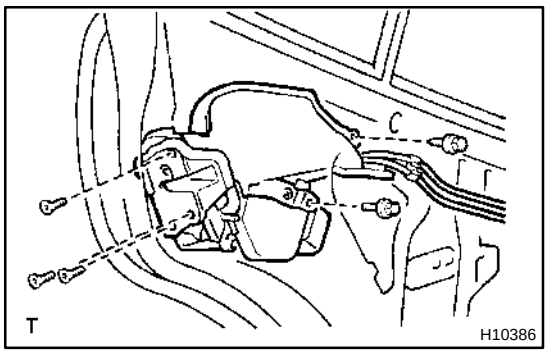
(a) Disconnect the connector.

(b) Remove the 4 bolts and window regulator.

14. REMOVE DOOR LOCK

(a) Remove the child protection cover.

(b) Disconnect the 2 links from the outside handle and key cylinder.



(c) Remove the bolt and screw.

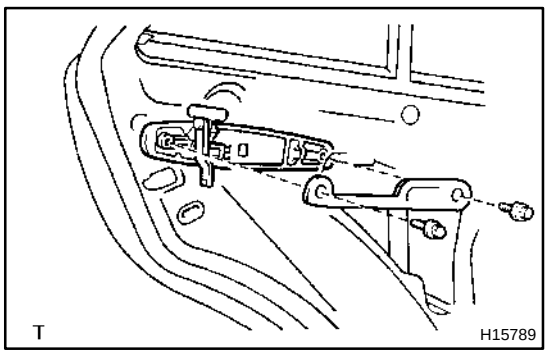
(d) Using a torx socket wrench, remove the 3 torx screws and door lock.

Torx socket wrench: T30 (Part No. 09042-00010 or locally manufactured tool)

HINT:

Remove the door lock through the service hole.

(e) Disconnect the connector.



15. REMOVE OUTSIDE HANDLE

Remove the 2 bolts, rear door outside reinforcement extension and outside handle.

16. REMOVE CUSHIONS

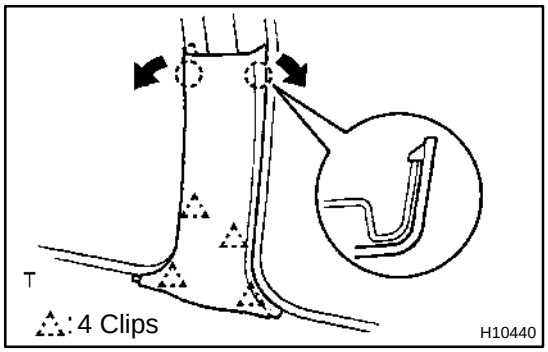
BO3TT-03

ADJUSTMENT

1. ADJUST DOOR IN FORWARD/REARWARD AND VERTICAL DIRECTIONS

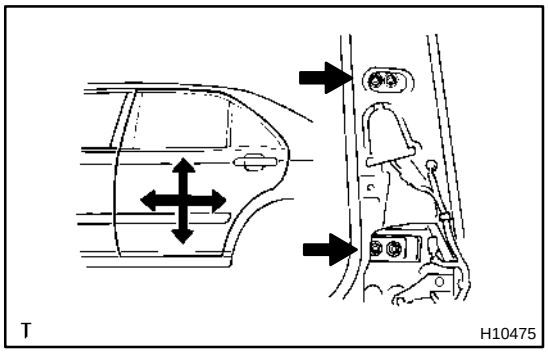
(a) Remove the front door inside scuff plate.

(b) Remove the rear door inside scuff plate.



(c) Remove the center pillar lower garnish.

(d) Remove the seat belt pretensioner (See page BO-217).



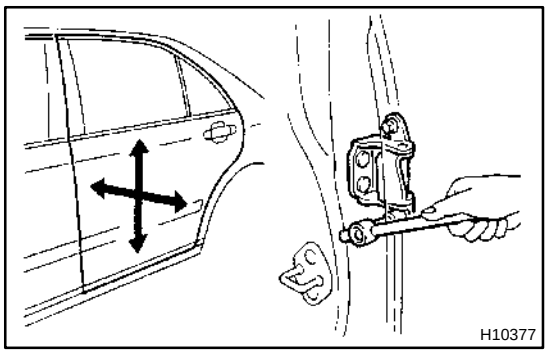
(e) Adjust the door by loosening the body side hinge nuts.
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

(f) Install the seat belt pretensioner (See page BO-226).

(g) Install the lower center pillar garnish.

(h) Install the rear door inside scuff plate.

(i) Install the front door inside scuff plate.

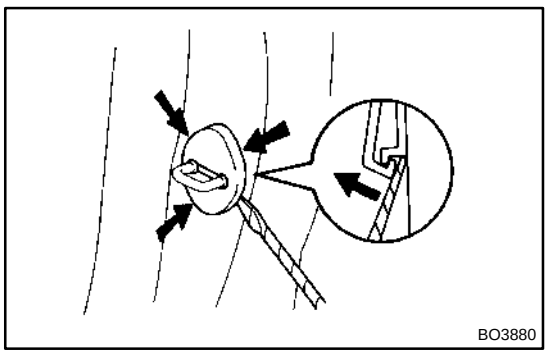


2. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

Adjust the door by loosening the door side hinge bolts.
Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)

3. ADJUST DOOR LOCK STRIKER

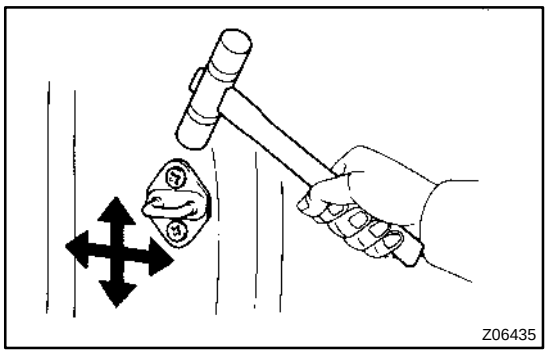
(a) Check that the door fit and door lock linkages are adjusted correctly.



(b) Using a screwdriver, remove the striker cover.

HINT:

Tape the screwdriver tip before use.



(c) Adjust the striker position by slightly loosening the striker mounting screws and hitting the striker with a hammer.

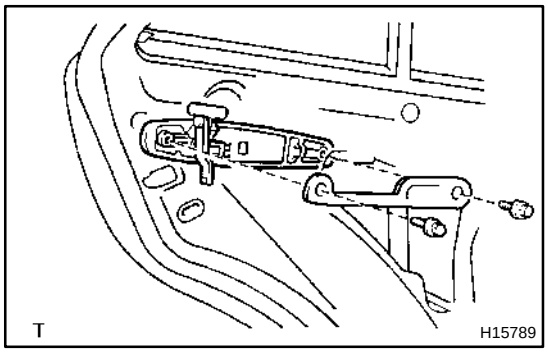
(d) Tighten the striker mounting screws again.
Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)

(e) Install the striker cover.

BO2CA-04

REASSEMBLY

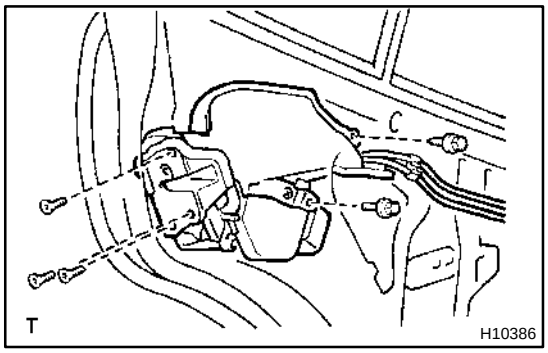
1. INSTALL CUSHIONS



2. INSTALL OUTSIDE HANDLE

Install the outside handle and rear door outside reinforcement extension with the 2 bolts.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)



3. INSTALL DOOR LOCK

(a) Connect the connector.

(b) Using a torx socket wrench, install the door lock with the 3 torx screws.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

Torx socket wrench: T30 (Part No. 09042-00010 or locally manufactured tool)

HINT:

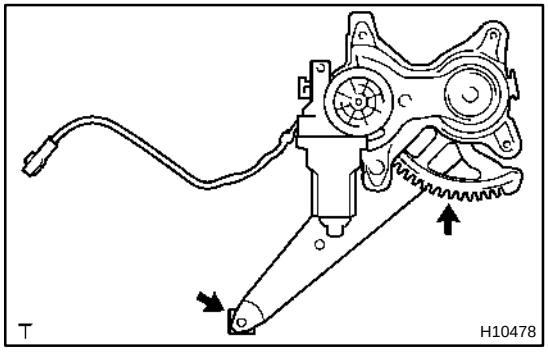
Apply adhesive to the 3 torx screws.

Part No. 08833-00070, THREE BOND 1324 or equivalent

(c) Install the bolt and screw.

(d) Connect the 2 links to the outside handle and key cylinder.

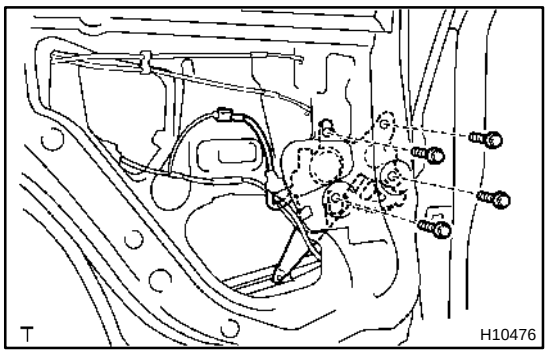
(e) Install the child protection cover.



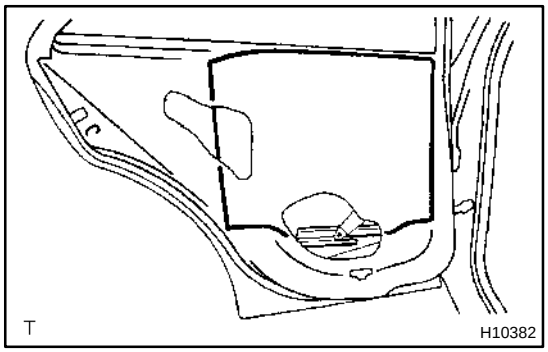
4. INSTALL WINDOW REGULATOR

HINT:

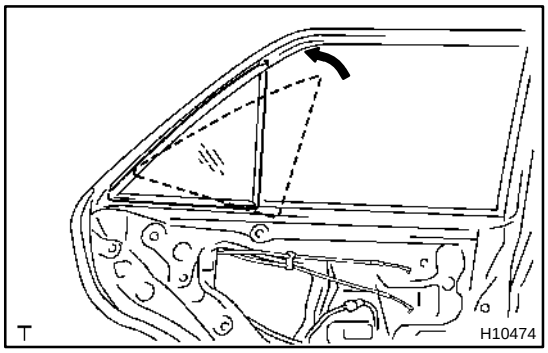
Apply MP grease to the sliding and rotating parts of the window regulator.



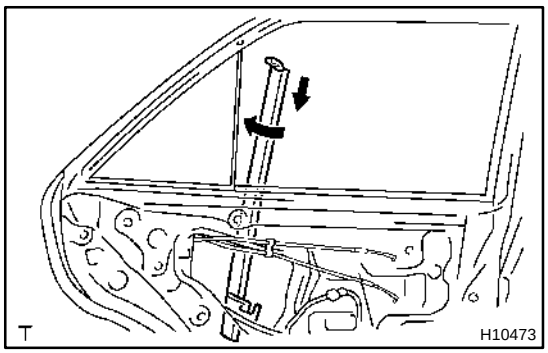
(a) Install the window regulator with the 4 bolts.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)
(b) Connect the connector.



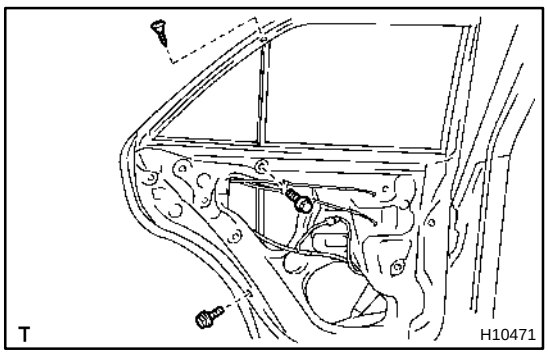
5. INSTALL DOOR GLASS
HINT:
Insert a shop rag inside the door panel to prevent scratching the glass.
Tilt the door glass and connect the roller of the regulator to the glass channel to install the door glass.



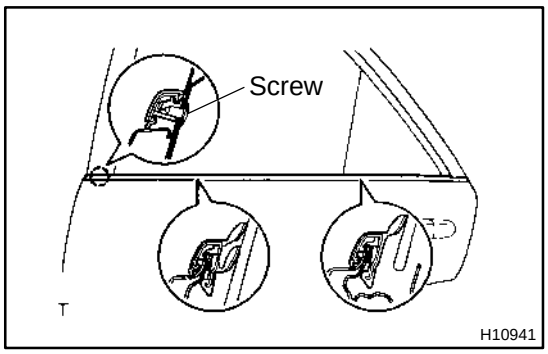
6. INSTALL QUARTER WINDOW GLASS
(a) Install the quarter window weatherstrip to the glass.
NOTICE:
Do not damage the glass.
(b) Install the rear door quarter window glass as shown in the illustration.



7. INSTALL DIVISION BAR
(a) Insert the division bar to the door panel, then rotate it 90°.



(b) Install the 2 bolts and screw.
8. INSTALL DOOR GLASS RUN

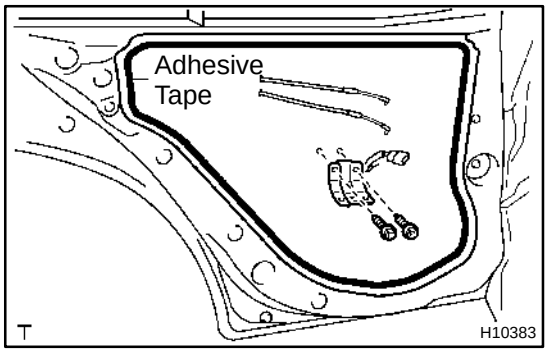


9. INSTALL REAR DOOR BELT MOULDING

Install the rear door belt moulding with the screw.

10. INSTALL SERVICE HOLE PLATE

Install the service hole plate with the 2 screws.



11. INSTALL SERVICE HOLE COVER

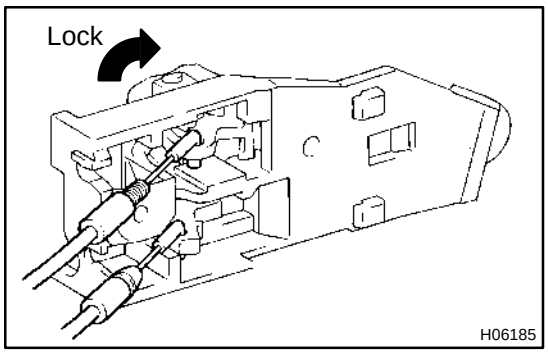
(a) Install the service hole cover to the door panel.

HINT:

- When installing the service hole cover, pull out the links and connectors through the service hole cover.
- There should be no wrinkles or folds after attaching the service hole cover.
- After attaching the service hole cover, sealing condition should be confirmed.

(b) Install the door trim bracket with the 2 screws.

(c) Connect the connector.



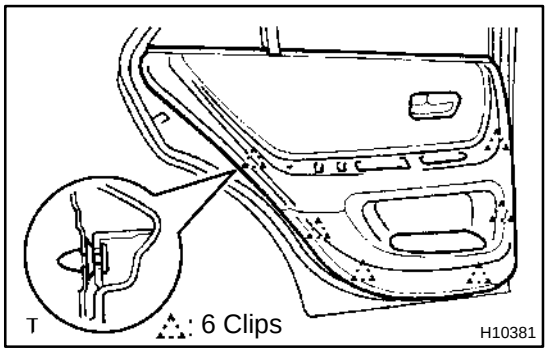
12. INSTALL INSIDE HANDLE

Connect the 2 cables to the inside handle, then install the inside handle with the screw.

NOTICE:

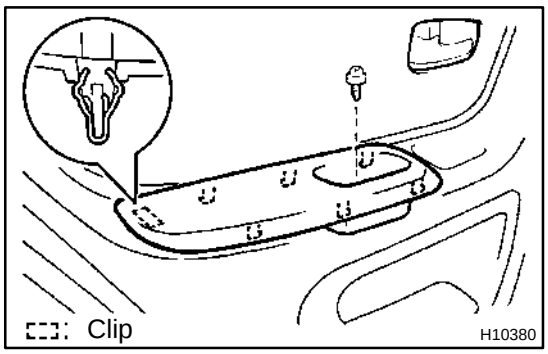
At the time of locking cable reassembly, please refer to the following items.

- **Set the door lock assembly to the LOCK position.**
- **Hold the lock knob to the LOCK position by hand, and do not pull the cable while connecting the locking cable.**



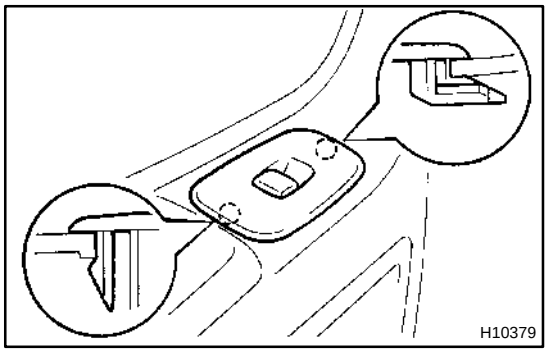
13. INSTALL DOOR TRIM

Install the door trim to the door panel.



14. INSTALL REAR ARMREST

Install the rear armrest with the screw.



15. INSTALL POWER WINDOW SWITCH

(a) Connect the connector.

(b) Install the power window switch to the door trim.

16. INSTALL DOOR INSIDE HANDLE BEZEL

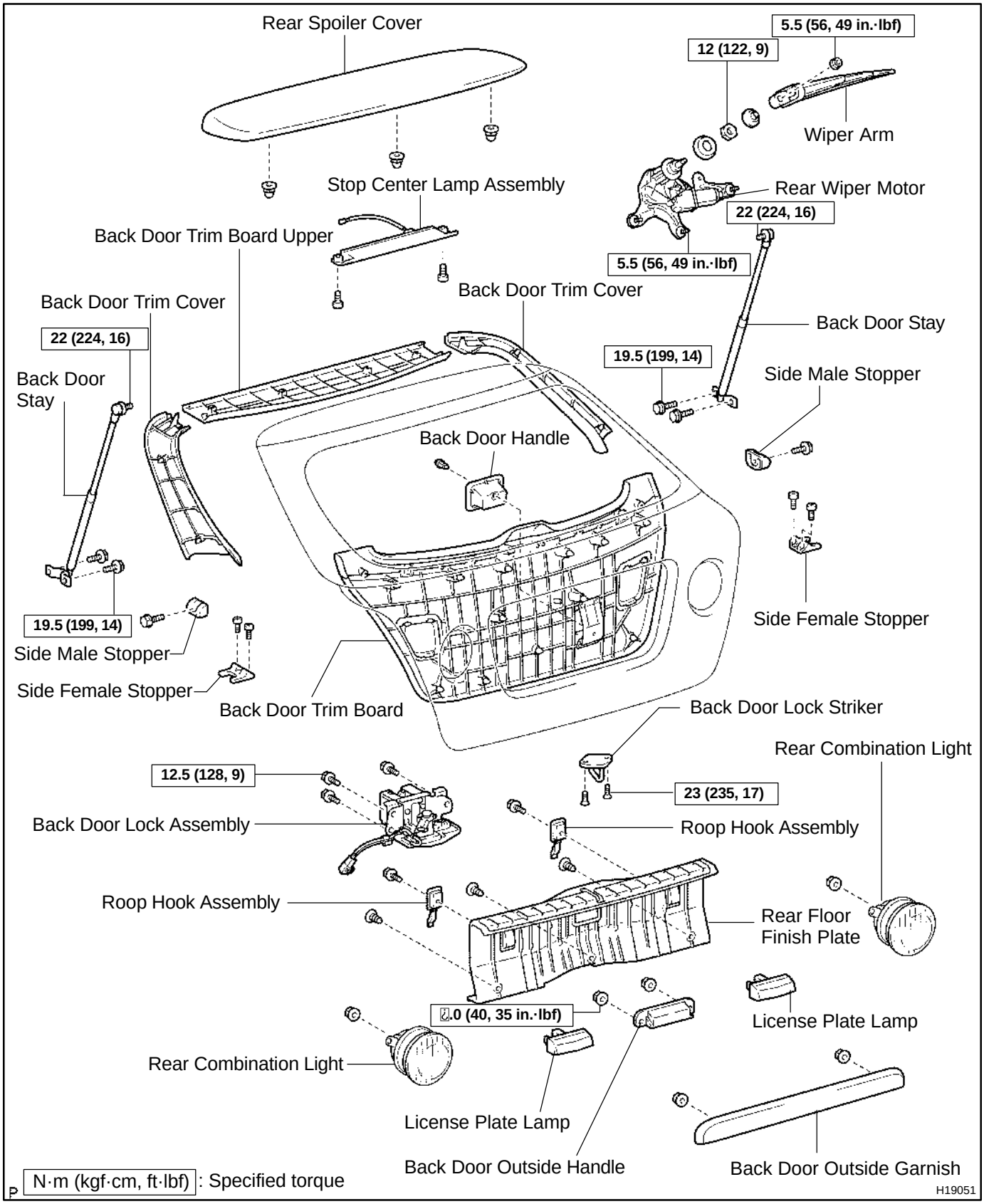
(a) Install the door inside handle bezel with the screw.

(b) Close the cap.

BACK DOOR

COMPONENTS

BO4CZ-02

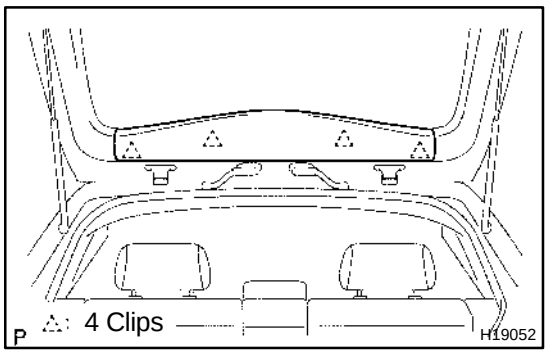


BO4D0-03

DISASSEMBLY

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

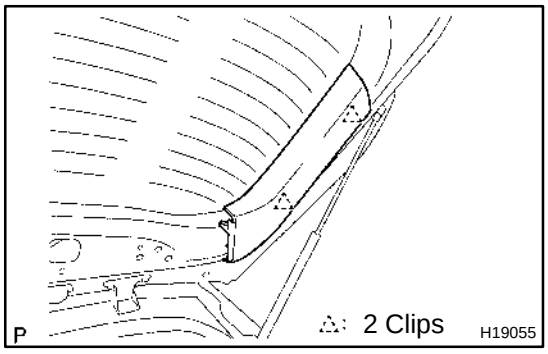


1. REMOVE BACK DOOR TRIM BOARD UPPER

Using a screwdriver, remove the back door trim board upper.

HINT:

Tape the screwdriver tip before use.



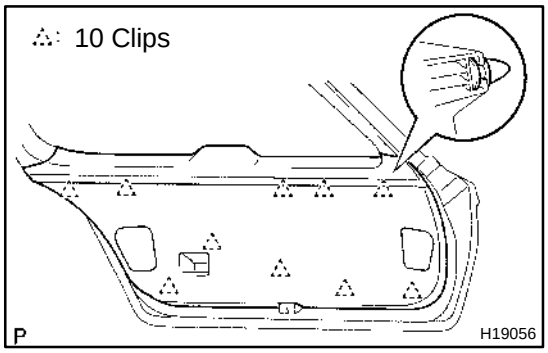
2. REMOVE BACK DOOR TRIM COVERS

(a) Insert a screwdriver between the back door panel and back door trim cover to pry the cover.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



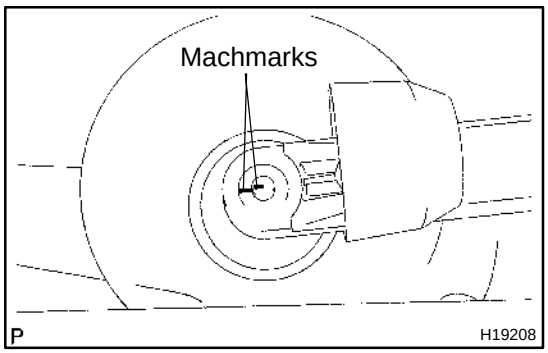
3. REMOVE BACK DOOR TRIM BOARD

(a) Remove the clip and back door handle.

(b) Using a screwdriver, remove the back door trim board.

HINT:

Tape the screwdriver tip before use.

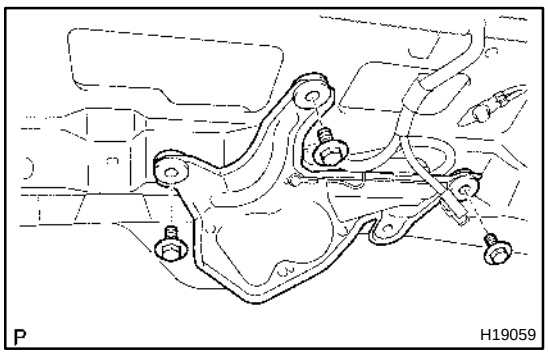


4. REMOVE REAR WIPER ARM

(a) Open the wiper arm cover.

(b) Place matchmarks on the wiper arm and wiper motor.

(c) Remove the nut and rear wiper arm.



5. REMOVE REAR WIPER MOTOR

(a) Remove the nut and washer on the outer side of the back door panel.

(b) Disconnect the connector.

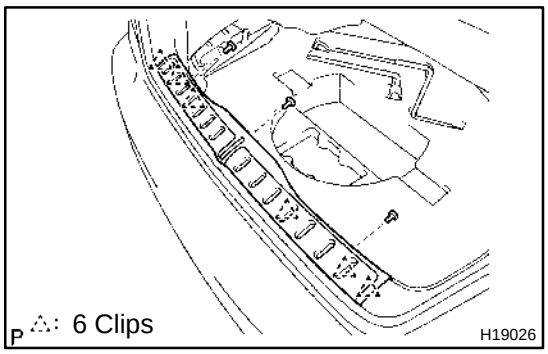
(c) Remove the 3 bolts and rear wiper motor.

6. REMOVE REAR COMBINATION LIGHT

(a) Disconnect the connector.

(b) Remove the nut and rear combination light.

(c) Employ the same manner described above to the other side.



7. REMOVE REAR FLOOR FINISH PLATE

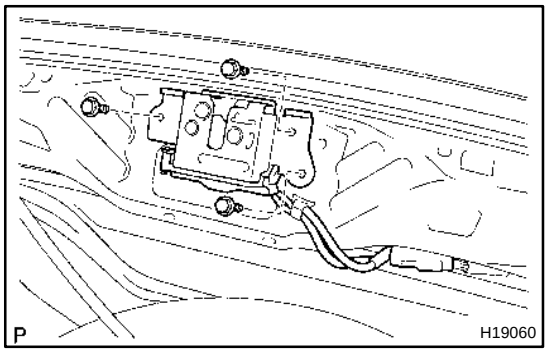
(a) Remove the 2 bolts and the 2 rope hook assemblies.

(b) Remove the 3 clips.

(c) Using a screwdriver, remove the rear floor finish plate.

HINT:

Tape the screwdriver tip before use.

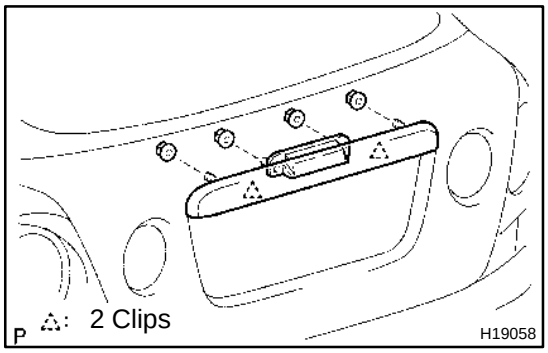


8. REMOVE BACK DOOR LOCK ASSEMBLY

Remove the 3 bolts and the back door lock assembly, then disconnect the connector.

9. REMOVE LICENSE PLATE LAMPS

Remove the license plate lamps, then disconnect the connectors.



10. REMOVE BACK DOOR OUTSIDE GARNISH

(a) Remove the 4 nuts and back door outside garnish.

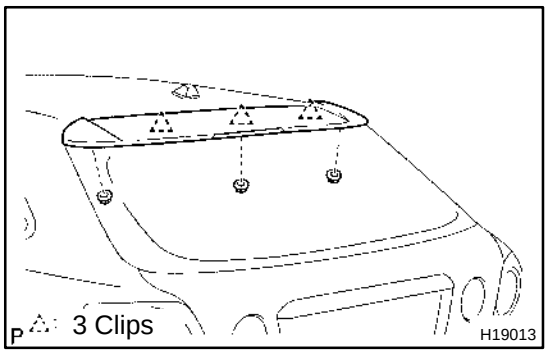
(b) Using a screwdriver, remove the back door outside garnish.

HINT:

Tape the screwdriver tip before use.

11. REMOVE BACK DOOR OUTSIDE HANDLE

Remove the 2 bolts and back door outside handle, then disconnect the connector.



12. REMOVE REAR SPOILER COVER

(a) Remove the 3 nuts.

(b) Using a screwdriver, remove the rear spoiler cover, then disconnect the connector.

HINT:

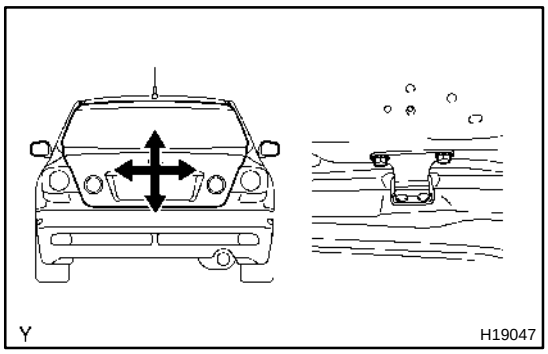
Tape the screwdriver tip before use.

13. REMOVE STOP CENTER LAMP ASSEMBLY

Remove the 2 screws and the stop center lamp assembly.

BO4D1-02

ADJUSTMENT

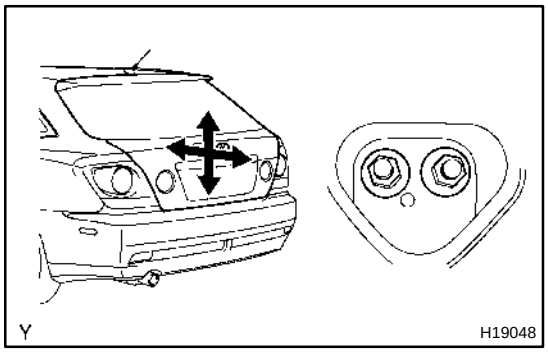


1. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

Adjust the door by loosening the door side hinge bolts.

Torque: 15 N·m (153 kgf·cm, 11 ft·lbf)

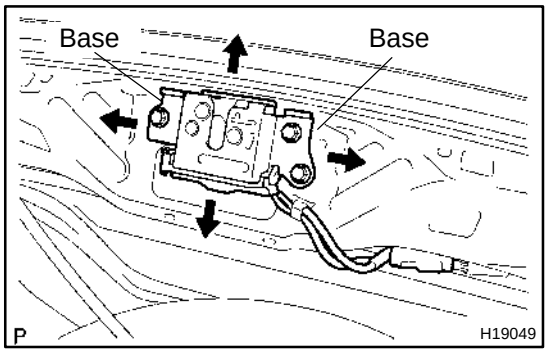
2. ADJUST DOOR IN FORWARD/ REARWARD AND VERTICAL DIRECTIONS



(a) Pull down rear part of roof headlining.
(See page BO-164)

(b) Adjust the door by loosening the body side hinge nuts.

Torque: 11.5 N·m (117 kgf·cm, 8 ft·lbf)



3. ADJUST BACK DOOR LOCK ASSEMBLY

(a) Check that the door fit and door linkage are adjusted correctly.

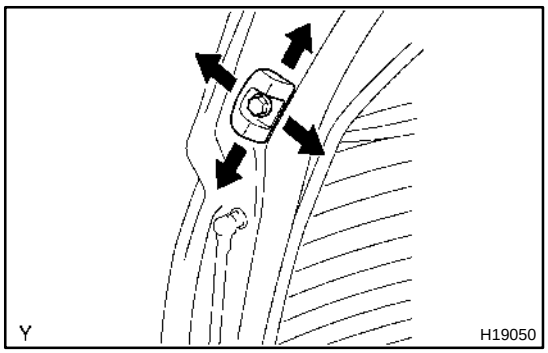
(b) Adjust the back door lock assembly by loosening the back door lock bolts.

Torque: 12.5 N·m (128 kgf·cm, 9 ft·lbf)

(c) Using a plastic hammer, tap the back door lock assembly to adjust.

NOTICE:

Tap the base for adjustment.



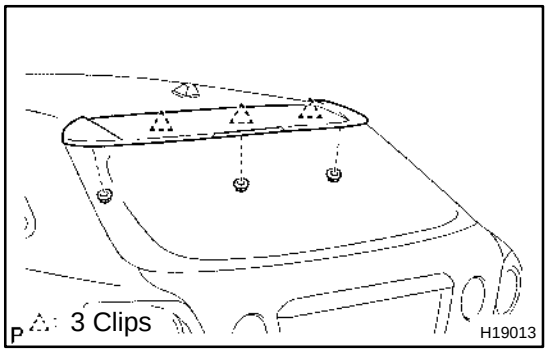
4. ADJUST SIDE MALE STOPPER

Adjust the side male stopper by loosening the stopper mounting bolt.

BO4D2-02

REASSEMBLY

1. INSTALL STOP CENTER LAMP ASSEMBLY



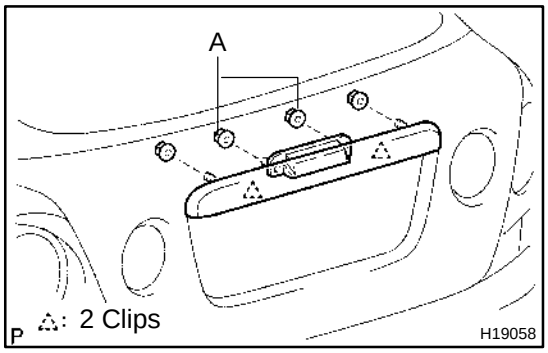
2. INSTALL REAR SPOILER COVER

Install the rear spoiler cover with the 3 nuts.

3. INSTALL BACK DOOR OUTSIDE HANDLE

(a) Connect the connector.

(b) Install the back door outside handle with the 2 bolts.



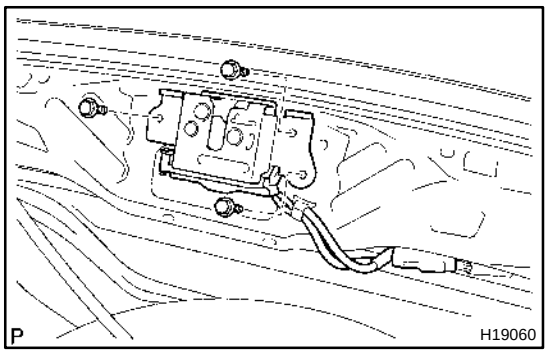
4. INSTALL BACK DOOR OUTSIDE GARNISH

Install the back door outside garnish with the 4 nuts.

Torque:

A: 4.0 N·m (40 kgf·cm, 35 in.·lbf)

5. INSTALL LICENSE PLATE LAMPS

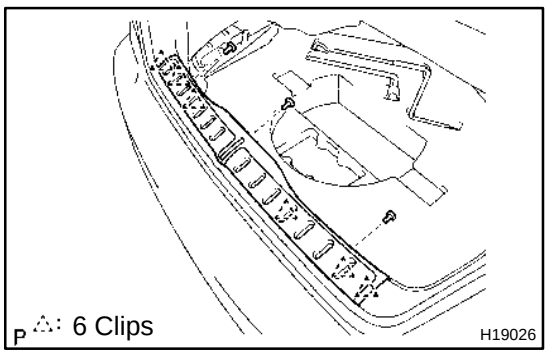


6. INSTALL BACK DOOR LOCK ASSEMBLY

(a) Install the back door lock assembly with the 3 bolts .

Torque: 12.5 N·m (128 kgf·cm, 9 ft·lbf)

(b) Connect the connector.

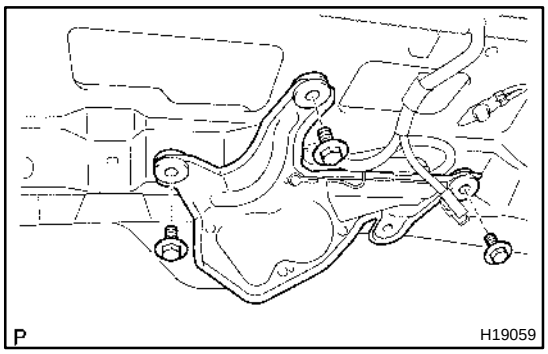


7. INSTALL REAR FLOOR FINISH PLATE

(a) Install the rear floor finish plate with the 3 clips.

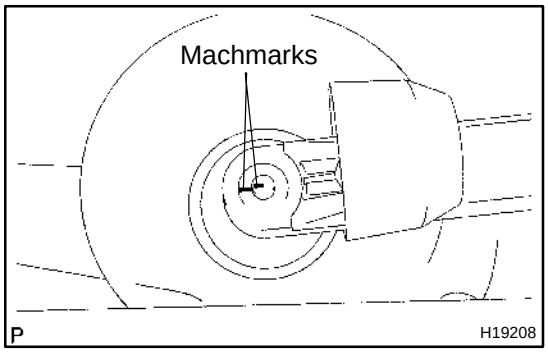
(b) Install the 2 rope hook assemblies with the 2 bolts.

8. INSTALL REAR COMBINATION LIGHTS



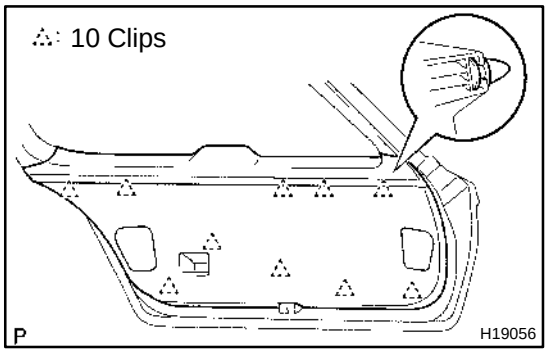
9. INSTALL REAR WIPER MOTOR

(a) Install the rear wiper motor with the 3 bolts.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)
(b) Connect the connector.
(c) Install the nut and washer on the outer side of the back door panel.
Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)



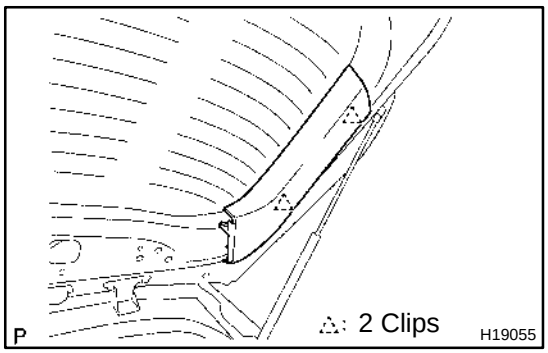
10. INSTALL REAR WIPER ARM

(a) Install the wiper arm and tighten the nut by hand. Operate the wiper once and turn the wiper switch OFF.
(b) Align the machmarks on the wiper arm and wiper motor.
(c) Install the rear wiper arm with the nut.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)
(d) Close the wiper arm cover.



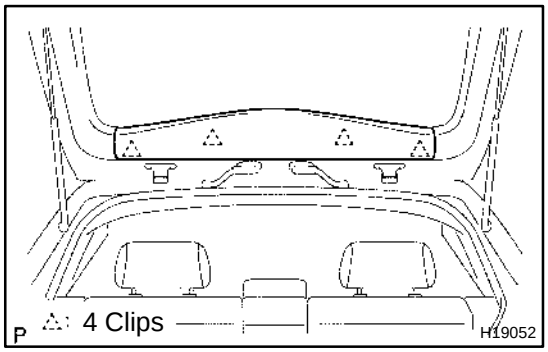
11. INSTALL BACK DOOR TRIM BOARD

(a) Install the back door trim board to the back door panel.
(b) Install the back door handle with the clip.



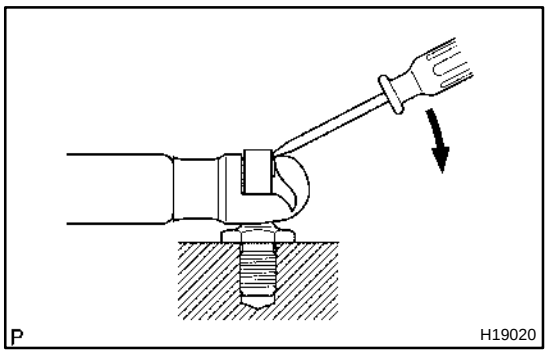
12. INSTALL BACK DOOR TRIM COVERS

Install the back door trim cover to the body.



13. INSTALL BACK DOOR TRIM BOARD UPPER

Install the back door trim board upper to the body.



BACK DOOR STAY

BO4D3-02

REPLACEMENT

1. REMOVE BACK DOOR STAY

(a) Using a screwdriver, remove the back door stay from the back door panel.

HINT:

While supporting the back door by hand, remove the back door stay.

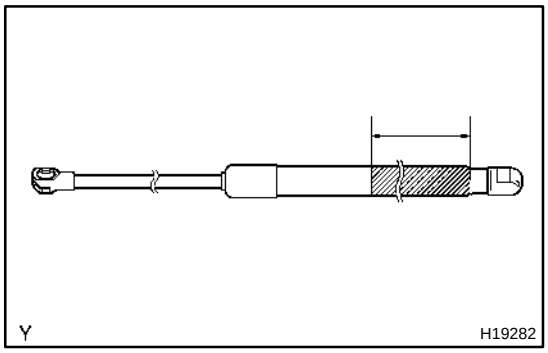
(b) Remove the bolt and back door stay from the body.

2. IF NECESSARY, REPLACE BACK DOOR STAY

NOTICE:

When handling the back door stay.

- **Do not disassemble the back door stay because the cylinder is filled with pressurized gas.**



- **When replacing the back door stay, drill a 2.0 - 3.0 mm (0.079 - 0.118 in.) hole in the lower half of the bottom of the back door stay as shown in the illustration to completely release the high-pressure gas before disposing of it.**
- **When drilling, chips may fly out, so work carefully.**
- **The gas is colorless, odorless and non-toxic.**
- **When working, handle the back door stay carefully. Never score or scratch the exposed part of the piston rod, and never allow paint or oil to get on it.**
- **Do not turn the piston rod and cylinder with the back door stay fully extended.**

3. INSTALL BACK DOOR STAY

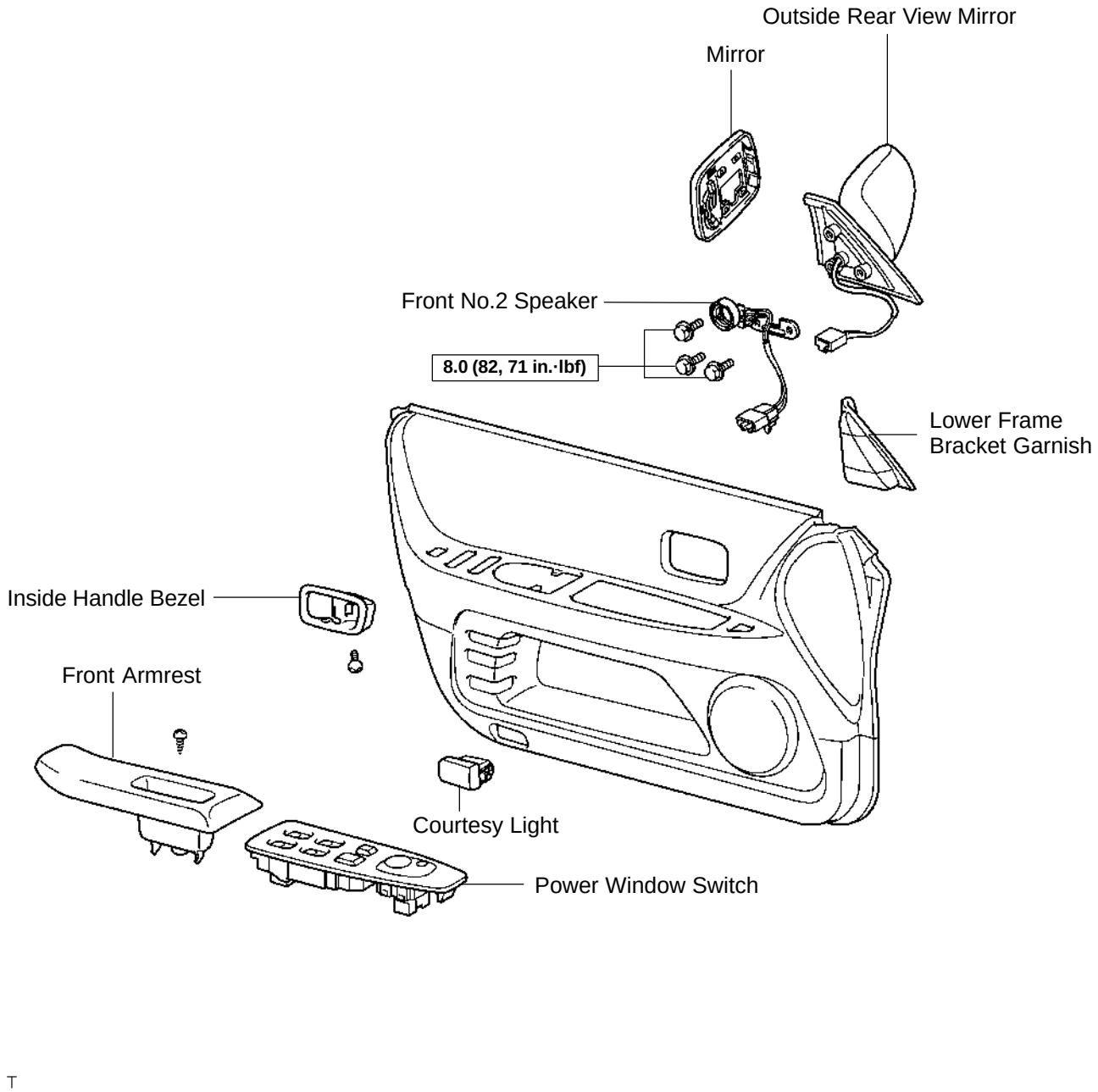
(a) Install the back door stay to the body with the bolt.
Torque: 19.5 N·m (199 kgf·cm, 14 ft.·lbf)

(b) Install the back door stay to the back door panel with the bolts.
Torque: 22 N·m (224 kgf·cm, 16 ft.·lbf)

OUTSIDE REAR VIEW MIRROR

COMPONENTS

BO0UO-08

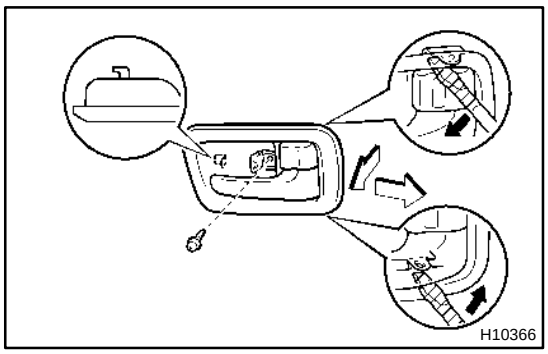


N·m (kgf·cm, ft·lbf) : Specified torque

H15122

BO2CB-05

REMOVAL



HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE INSIDE HANDLE BEZEL

(a) Using a screwdriver, open the screw cap.

HINT:

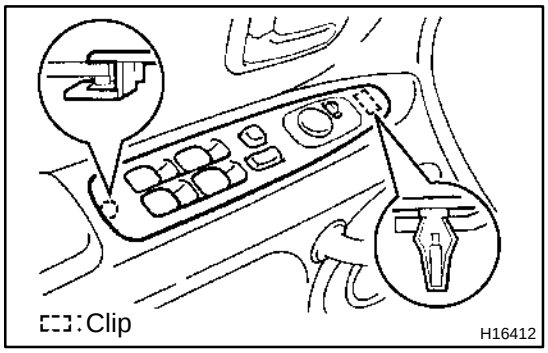
Tape the screwdriver tip before use.

(b) Remove the screw.

(c) Using a screwdriver, remove the inside handle bezel as shown in the illustration.

HINT:

Tape the screwdriver tip before use.



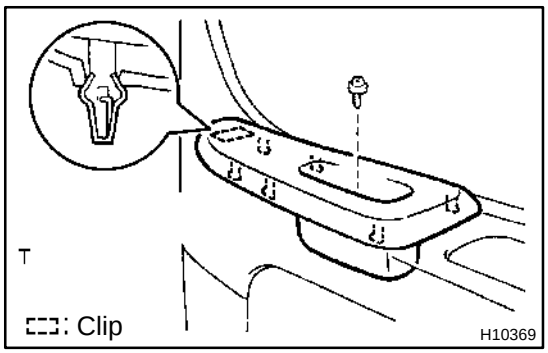
2. REMOVE POWER WINDOW SWITCH

(a) Using a screwdriver, remove the power window switch.

HINT:

Tape the screwdriver tip before use.

(b) Disconnect the connectors.



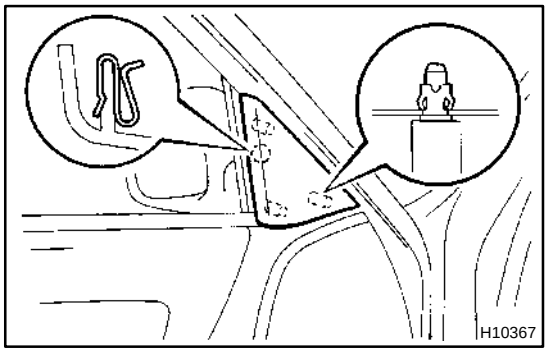
3. REMOVE FRONT ARMREST

(a) Remove the screw.

(b) Using a screwdriver, remove the front armrest as shown in the illustration.

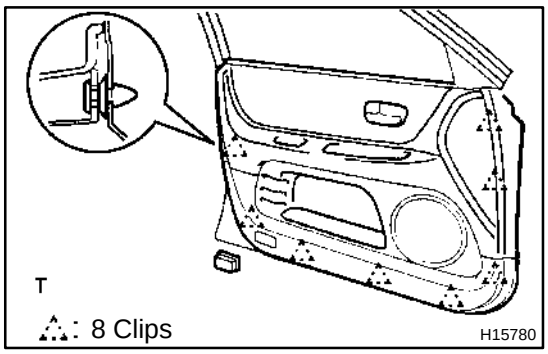
HINT:

Tape the screwdriver tip before use.



4. REMOVE LOWER FRAME BRACKET GARNISH

Remove the lower frame bracket garnish.



5. REMOVE DOOR TRIM

(a) Using a screwdriver, remove the courtesy light, then disconnect the connector.

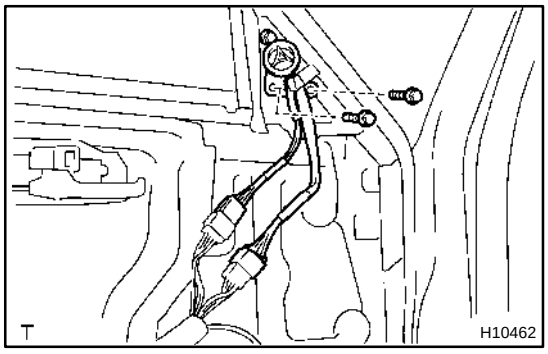
HINT:

Tape the screwdriver tip before use.

(b) Using a screwdriver, disengage the clips, then pull the trim upward to remove it.

HINT:

Tape the screwdriver tip before use.



6. REMOVE FRONT NO.2 SPEAKER

(a) Disconnect the connector.

(b) Remove the 2 bolts and front No.2 speaker.

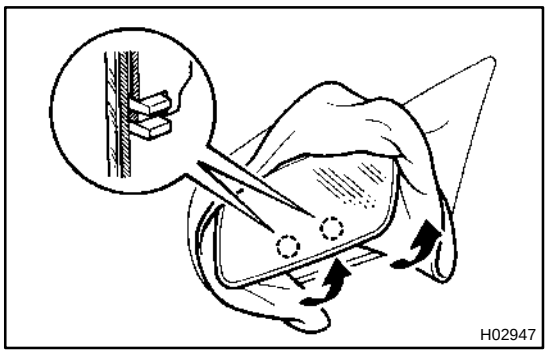
7. REMOVE OUTSIDE REAR VIEW MIRROR

(a) Disconnect the connector.

(b) Remove the bolt and outside rear view mirror.

BO0UQ-07

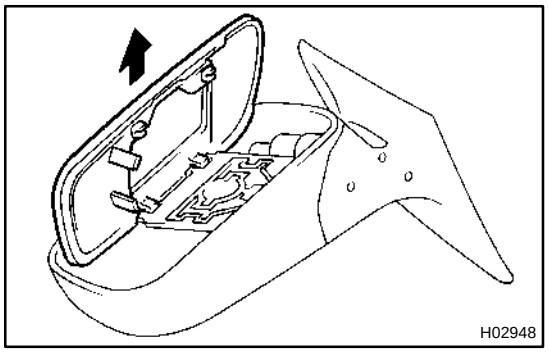
REPLACEMENT



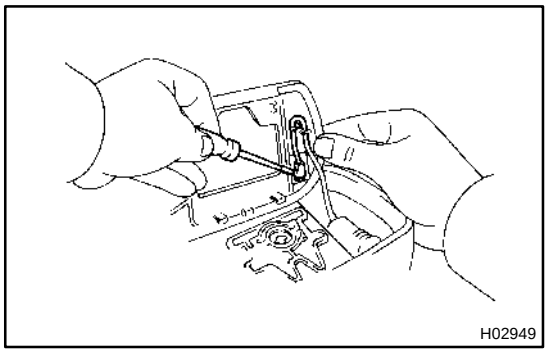
1. IF NECESSARY, DISCONNECT MIRROR

(a) Insert a shop rag between the mirror and the mirror body.

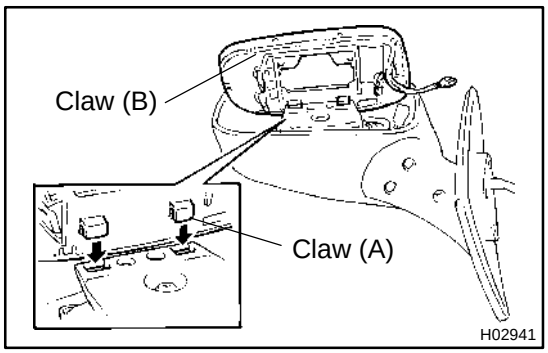
(b) Pull up the lower side of the shop rag to disconnect the mirror joint.



(c) Pull up the mirror and disconnect it.



(d) Disconnect the connectors.



2. CONNECT MIRROR

(a) Connect the connectors.

(b) Fit the claws (A) in the holes and set the mirror to the mirror body.

(c) Push the mirror to fix it by fitting the claws (B) in the holes.

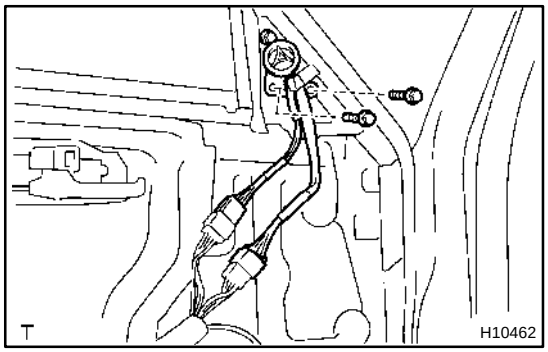
BO2CC-04

INSTALLATION

1. INSTALL OUTSIDE REAR VIEW MIRROR

(a) Install the outside rear view mirror with the bolt.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

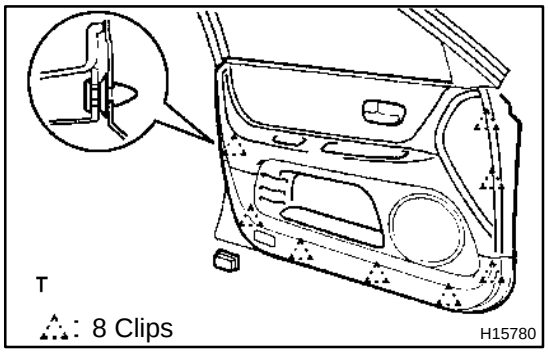
(b) Connect the connector.



2. INSTALL FRONT NO.2 SPEAKER

(a) Install the front No.2 speaker with the 2 bolts.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

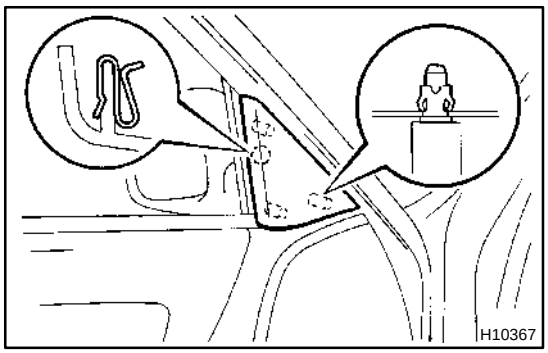
(b) Connect the connector.



3. INSTALL DOOR TRIM

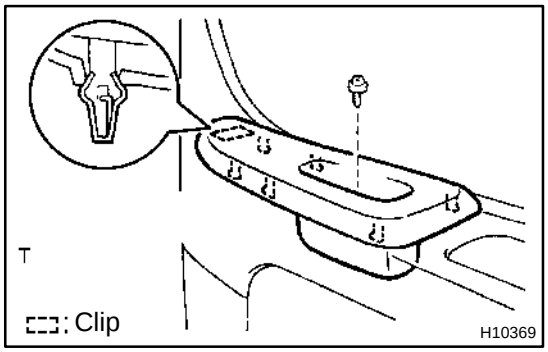
(a) Install the door trim to the door panel.

(b) Connect the connector, then install the courtesy light.



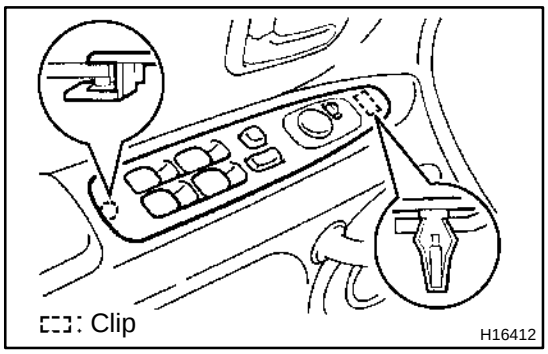
4. INSTALL LOWER FRAME BRACKET GARNISH

Install the lower frame bracket garnish to the door panel.



5. INSTALL FRONT ARMREST

Install the front armrest with the screw.



6. INSTALL POWER WINDOW SWITCH

(a) Connect the connectors.

(b) Install the power window switch.

7. INSTALL INSIDE HANDLE BEZEL

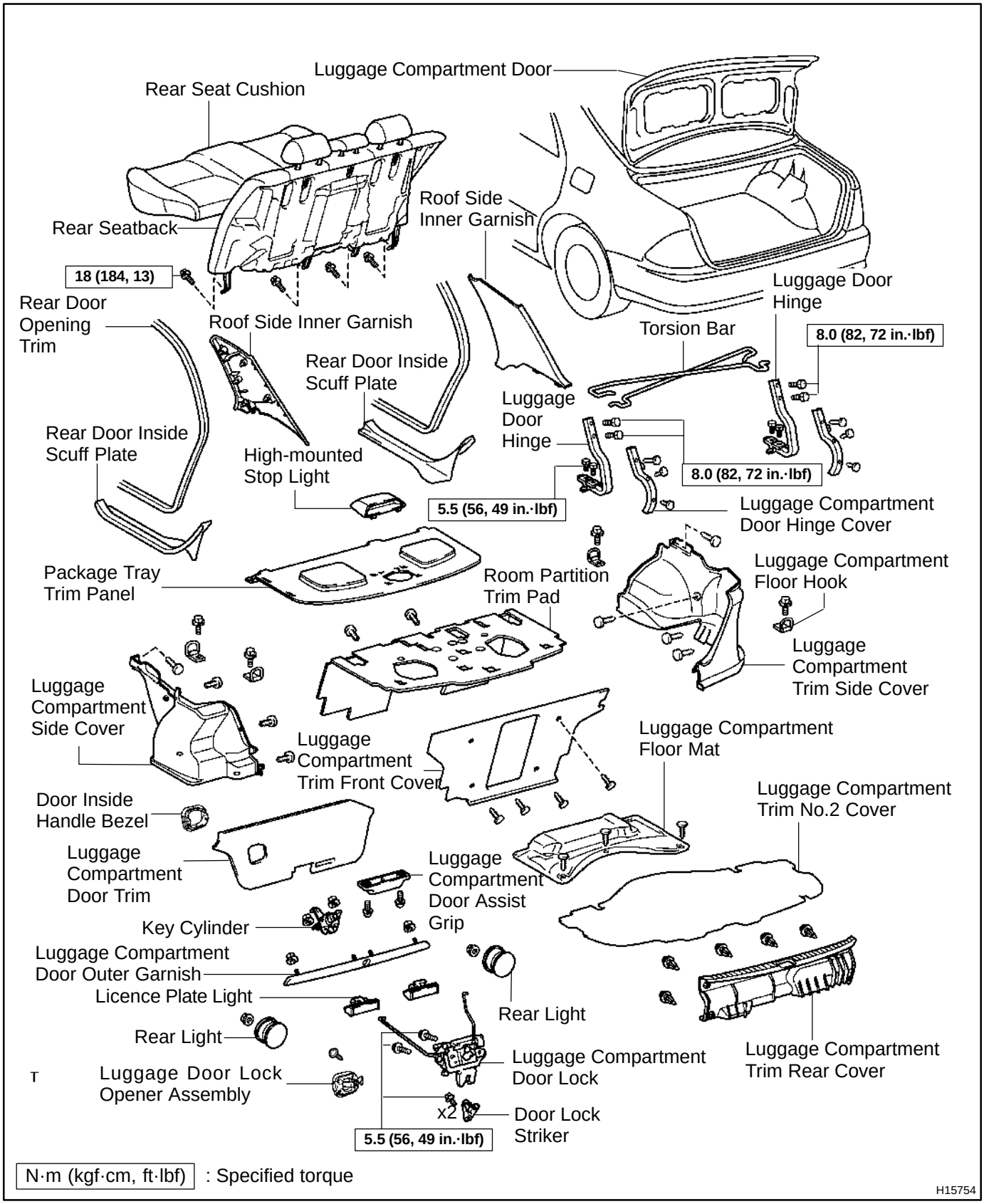
(a) Install the inside handle bezel with the screws.

(b) Close the screw cap.

LUGGAGE COMPARTMENT DOOR AND HINGE

COMPONENTS

BO0XB-11

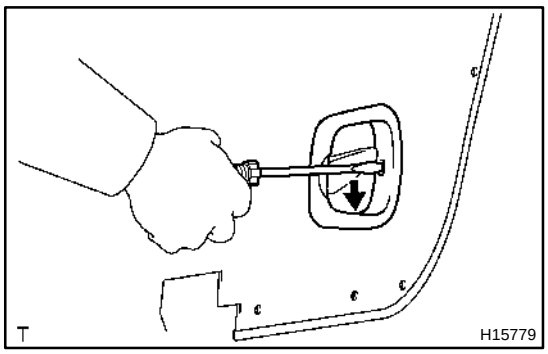


N·m (kgf·cm, ft·lbf) : Specified torque

H15754

BO3TU-04

REMOVAL



1. REMOVE DOOR INSIDE HANDLE BEZEL

Using a screwdriver, remove the door inside handle bezel.

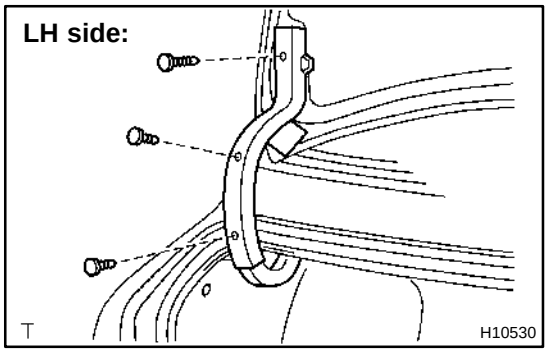
HINT:

Tape the screwdriver tip before use.

2. REMOVE LUGGAGE COMPARTMENT DOOR TRIM

(a) Remove the 2 screws and luggage compartment door assist grip.

(b) Remove the 14 clips and luggage compartment door trim.



3. REMOVE LUGGAGE COMPARTMENT DOOR HINGE COVERS

(a) Remove the 3 clips.

(b) Open the cover and remove the hinge cover.

(c) Employ the same manner described above to the other side.

4. REMOVE LUGGAGE COMPARTMENT DOOR

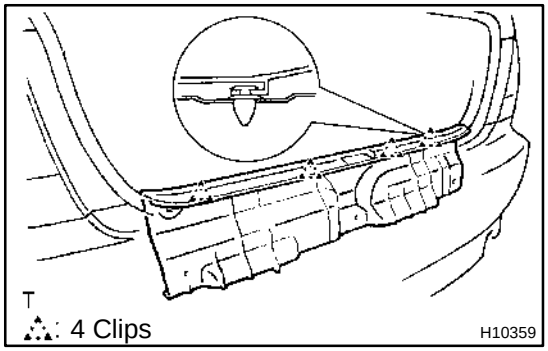
(a) Disconnect the connector.

(b) Disengage the clamps.

(c) Remove the 4 bolts and door.

Torque: 8.0 N·m (82 kgf·cm, 72 in.·lbf)

5. REMOVE LUGGAGE COMPARTMENT TRIM NO.2 COVER



6. REMOVE LUGGAGE COMPARTMENT TRIM REAR COVER

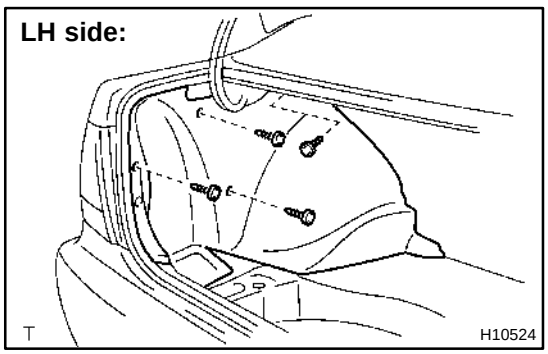
(a) Using a clip remover, remove the 5 clips.

(b) Using a screwdriver, remove the luggage compartment trim rear cover.

HINT:

Tape the screwdriver tip before use.

7. REMOVE LUGGAGE COMPARTMENT FLOOR HOOKS



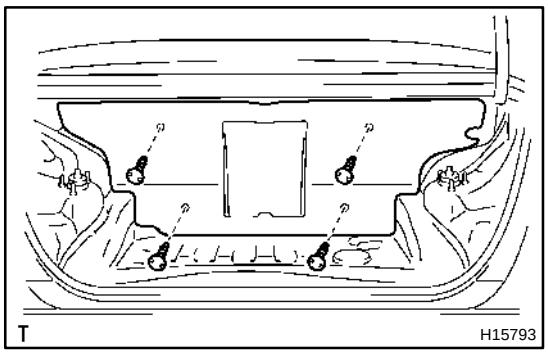
8. REMOVE LUGGAGE COMPARTMENT TRIM SIDE COVER LH AND RH

(a) Remove the 4 clips and luggage compartment trim side cover.

(b) Employ the same manner described above to the other side.

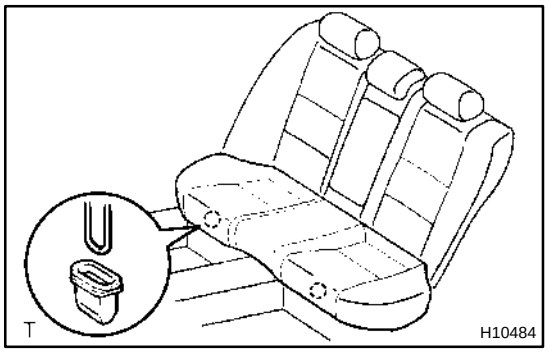
9. REMOVE LUGGAGE COMPARTMENT FLOOR MAT

Remove the 3 clips and luggage compartment floor mat.



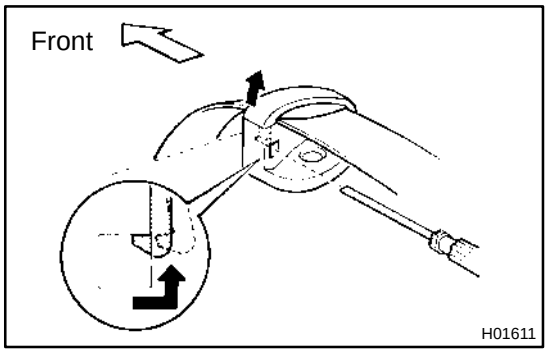
10. REMOVE LUGGAGE COMPARTMENT TRIM FRONT COVER

Remove the 4 clips and luggage compartment trim front cover.



11. REMOVE REAR SEAT CUSHION

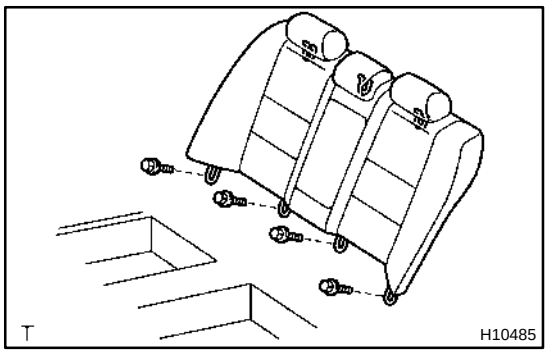
Pull up the front portion of the seat cushion, then remove it.



12. REMOVE REAR SEATBACK

(a) Using a screwdriver, remove the rear seat belt from the belt guide as shown in the illustration.

(b) Employ the same manner described above to the other side.

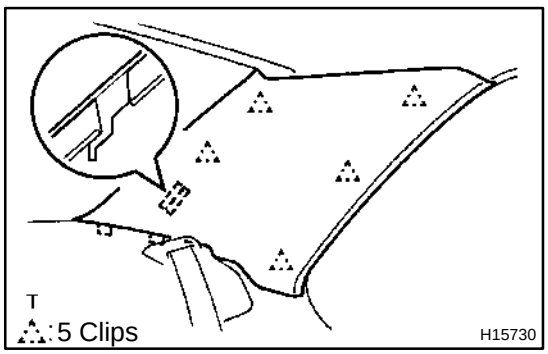


(c) Remove the 4 bolts.
Torque: 18 N·m (184 kgf·cm, 13ft·lbf)

(d) Pull up the seatback to remove it.

NOTICE:

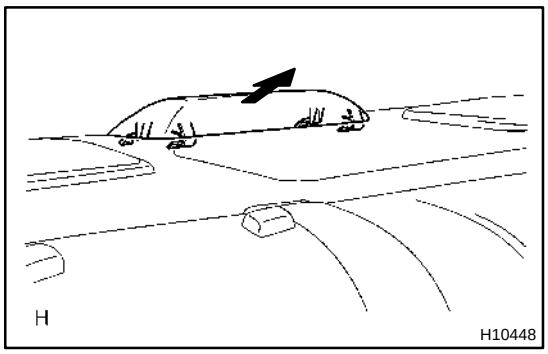
Be careful not to damage the body.



13. REMOVE ROOF SIDE INNER GARNISH

(a) Using a screwdriver, remove the roof side inner garnish.

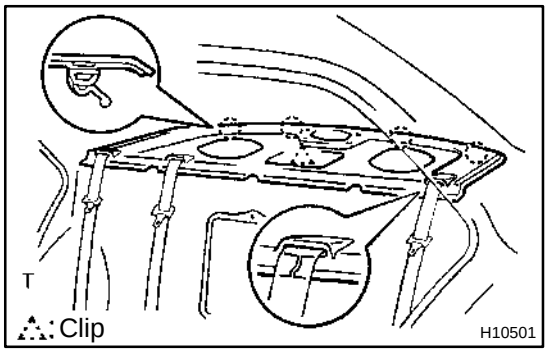
(b) Employ the same manner described above to the other side.



14. REMOVE HIGH-MOUNTED STOP LIGHT

(a) Remove the high-mounted stop light as shown in the illustration.

(b) Disconnect the connector.



15. REMOVE PACKAGE TRAY TRIM PANEL

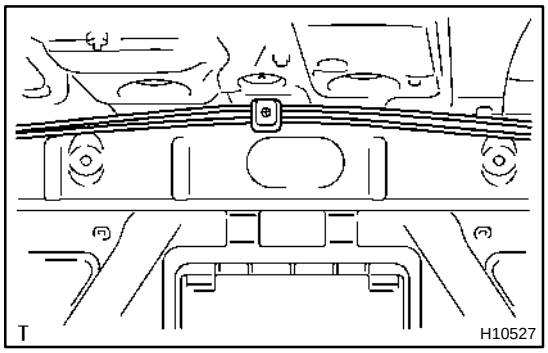
(a) Pull the package tray trim panel upward to disengage the clips.

(b) Remove the rear seat outer belts through the cutout on the package tray trim panel.

(c) Pull the package tray trim panel forward to remove it.

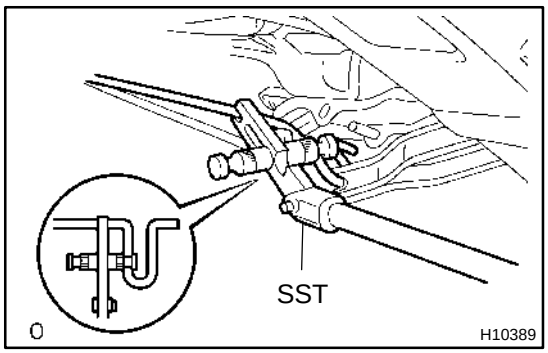
16. REMOVE ROOM PARTITION TRIM PAD

Remove the 2 clips and room partition trim pad.

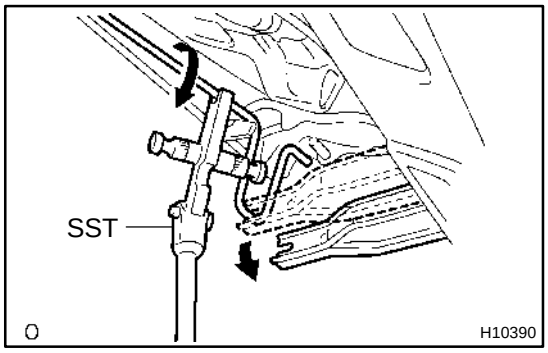


17. REMOVE TORSION BAR

(a) Remove the torsion bars from the center bracket.

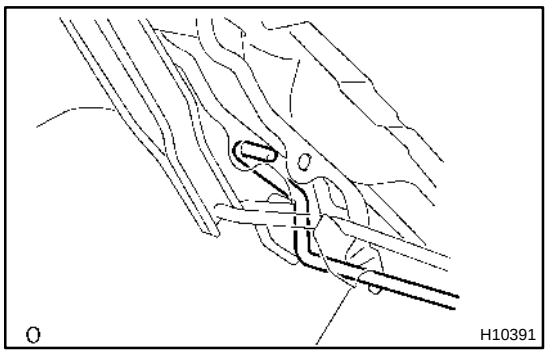


(b) Install SST to the torsion bar on the hinge side.
SST 09804-24010



(c) Push down SST to pull the luggage compartment door hinge from the torsion bar.

(d) Slowly lift SST, and remove the torsion bar from the torsion bar bracket with SST.



(e) Disconnect the torsion bar from the bracket.
(f) Employ the same manner described above to the other side.

HINT:

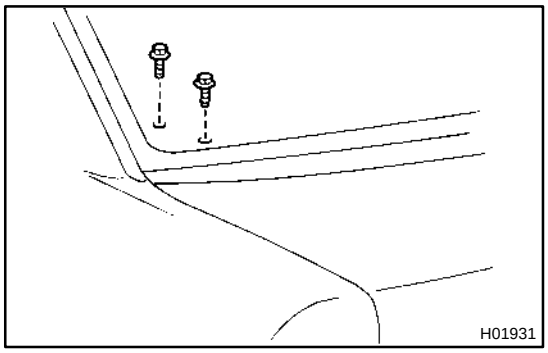
Check the color of marks on the torsion bar when replacing or installing the torsion bar.

w/o Rear spoiler:

Side	Color
RH	Yellow
LH	Pink

w/ Rear spoiler:

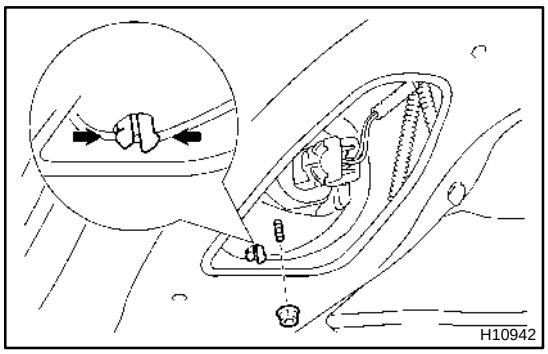
Side	Color
RH	Green
LH	Orange



18. REMOVE LUGGAGE COMPARTMENT DOOR HINGE

(a) Remove the 2 bolts.
(b) Remove the hinge.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)
(c) Employ the same manner described above to the other side.

BO2CE-05



DISASSEMBLY

1. REMOVE REAR LIGHT

(a) Remove the nut.

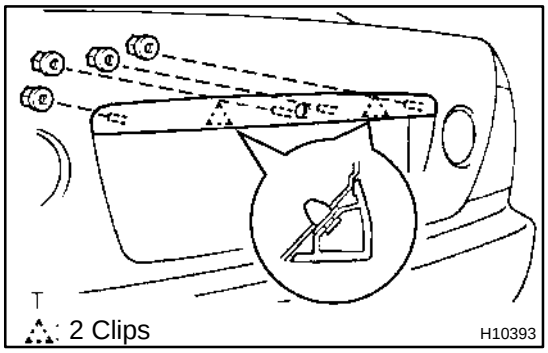
(b) Disengage the clip.

(c) Disconnect the connector, then remove the rear light.

(d) Employ the same manner described above to the other side.

2. REMOVE LUGGAGE COMPARTMENT DOOR OUTER GARNISH

(a) Disconnect the cable and link from the key cylinder.

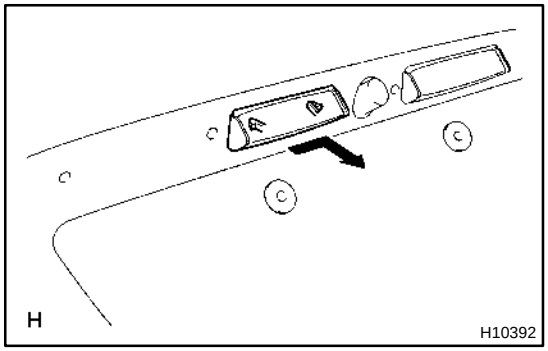


(b) Remove the 4 nuts and key cylinder.

(c) Using a screwdriver, remove the luggage compartment door outer garnish.

HINT:

Tape the screwdriver tip before use.



3. REMOVE LICENCE PLATE LIGHT

(a) Disconnect the connector.

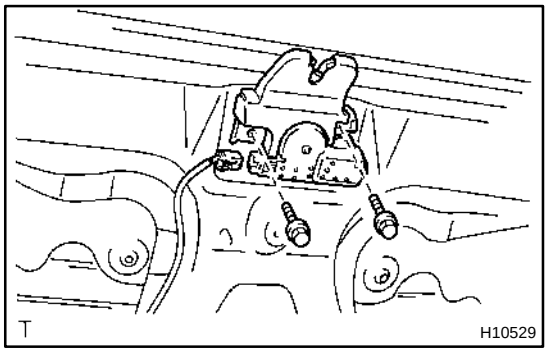
(b) Remove the licence plate light as shown in the illustration.

(c) Employ the same manner described above to the other side.

4. REMOVE LUGGAGE DOOR LOCK OPENER ASSEMBLY

(a) Disconnect the link.

(b) Remove the screw and luggage door lock opener assembly.



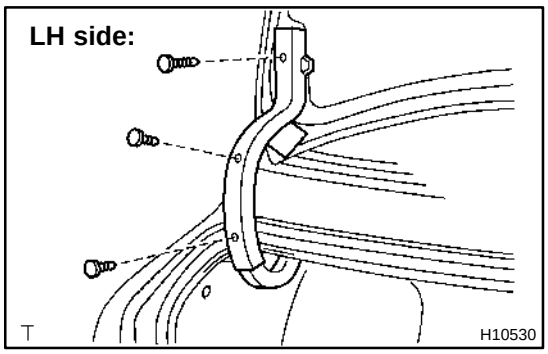
5. REMOVE LUGGAGE COMPARTMENT DOOR LOCK

(a) Disconnect the connector.

(b) Remove the 2 bolts and luggage compartment door lock.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

BO2CF-04

ADJUSTMENT

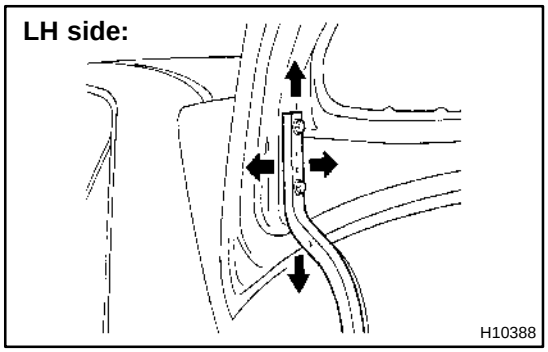


1. ADJUST LUGGAGE COMPARTMENT DOOR

(a) Remove the 3 clips.

(b) Open the cover and remove the hinge cover.

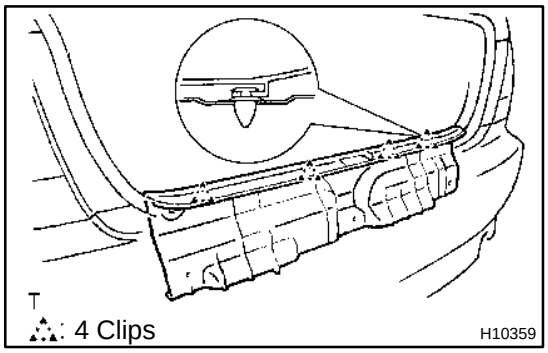
(c) Employ the same manner described above to the other side.



(d) For forward / rearward and left / right adjustments, loosen the bolts.

(e) For vertical adjustment of front end of the door, increase or decrease the number of washers between the hinge and the door.

Torque: 8.0 N·m (82 kgf·cm, 72 in.·lbf)



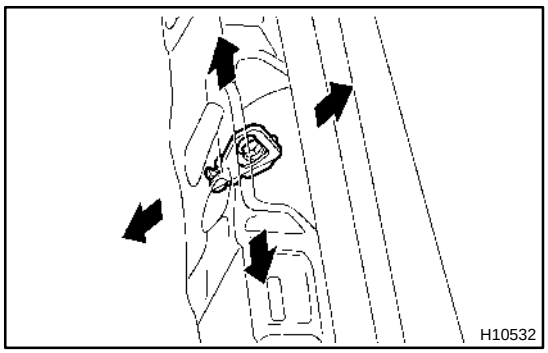
2. ADJUST DOOR LOCK STRIKER

(a) Using a clip remover, remove the 5 clips.

(b) Using a screwdriver, remove the rear floor finish plate.

HINT:

Tape the screwdriver tip before use.



(c) Using a hammer and brass bar, tap the striker to adjust it.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

BO0XF-02

REASSEMBLY

The reassembly procedures are the disassembly procedures in reverse order (See page BO-56).

BO0XG-04

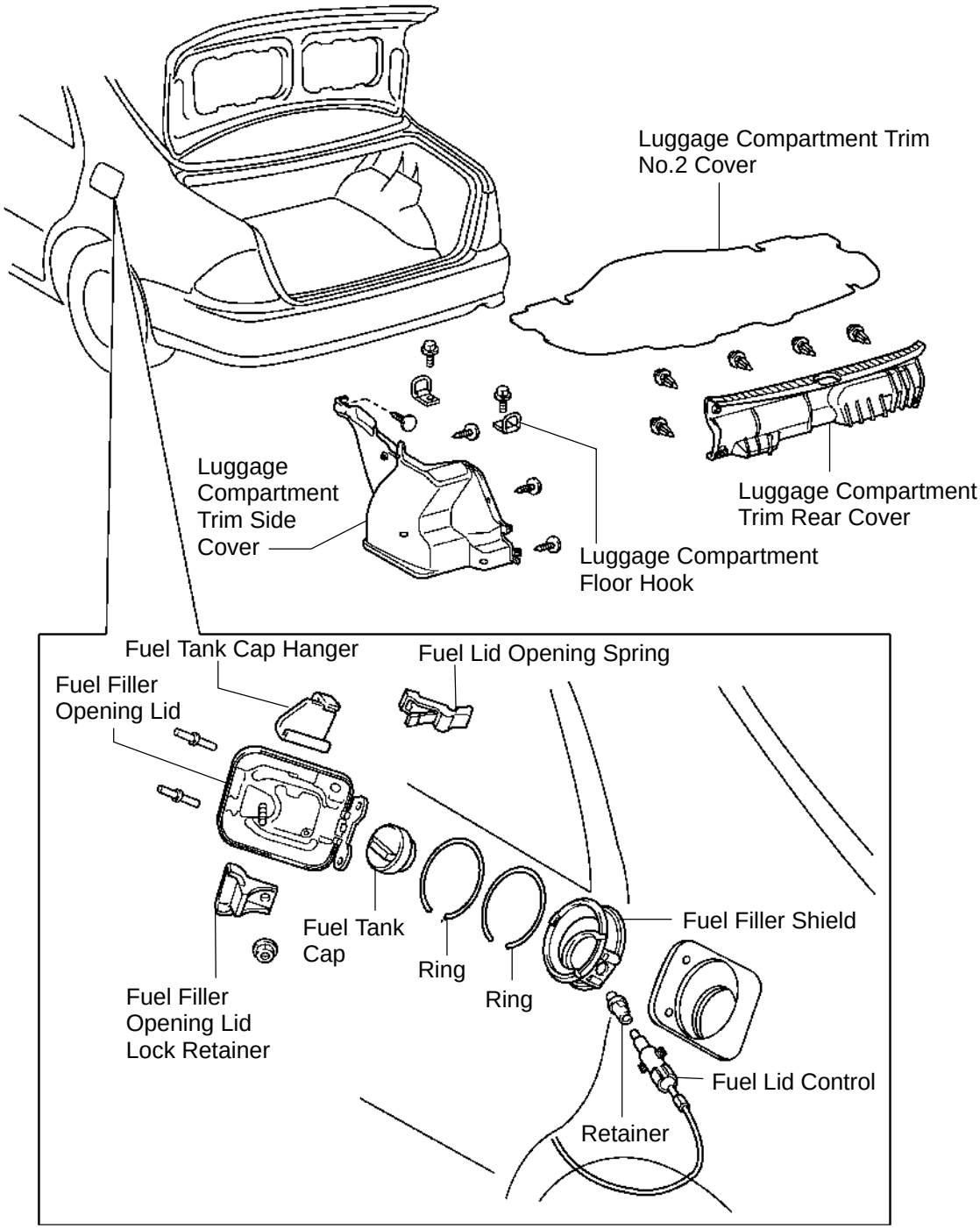
INSTALLATION

The installation procedures are the removal procedures in reverse order (See page BO-52).

FUEL LID (Sedan)

BO4D4-01

COMPONENTS



T

H15790

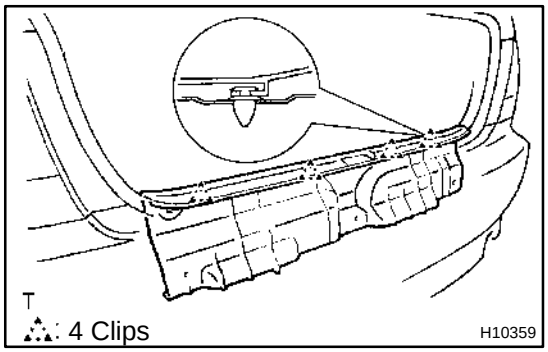
BO4D5-03

REMOVAL

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE LUGGAGE COMPARTMENT TRIM NO.2 COVER



2. REMOVE LUGGAGE COMPARTMENT TRIM REAR COVER

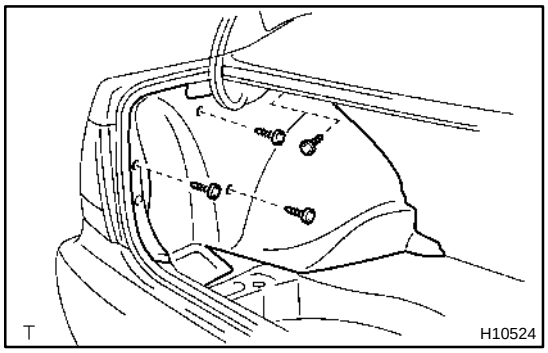
(a) Using a clip remover, remove the 5 clips.

(b) Using a screw driver, remove the luggage compartment trim rear cover.

HINT:

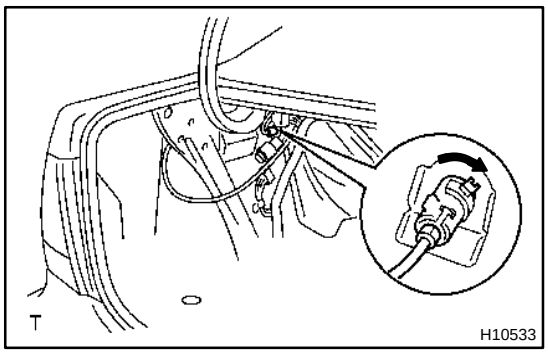
Tape the screwdriver tip before use.

3. REMOVE LUGGAGE COMPARTMENT FLOOR HOOKS



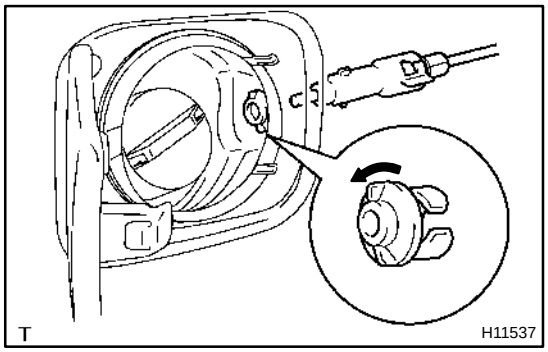
4. REMOVE LUGGAGE COMPARTMENT TRIM SIDE COVER LH

Remove the 4 clips and luggage compartment trim side cover LH.

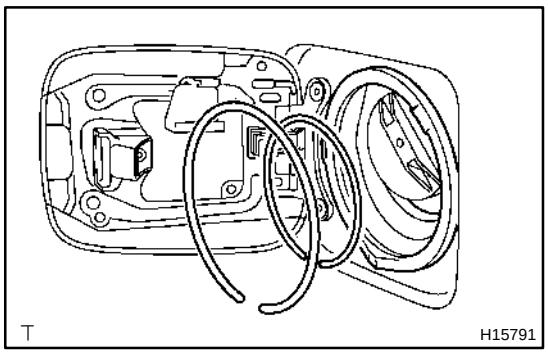


5. REMOVE FUEL LID LOCK CONTROL

(a) Rotate the fuel lid lock right to disengage the lock, then pull it out.



(b) Rotate the retainer left to disengage the lock, then pull it out.



6. REMOVE FUEL FILLER SHIELD

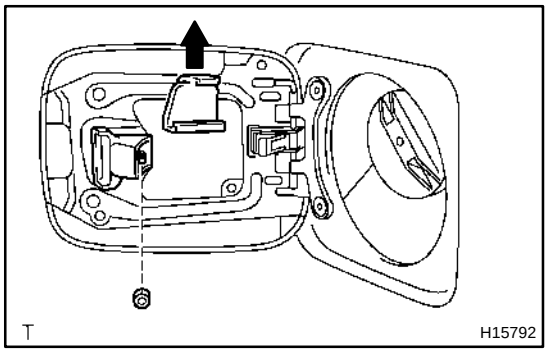
(a) Remove the 2 rings from the fuel filler shield.

(b) Remove the fuel tank cap and shield.

CAUTION:

Always keep the tank cap closed when it is not required to be open. Keep open fire away during the operation.

(c) Install the fuel tank cap quickly.

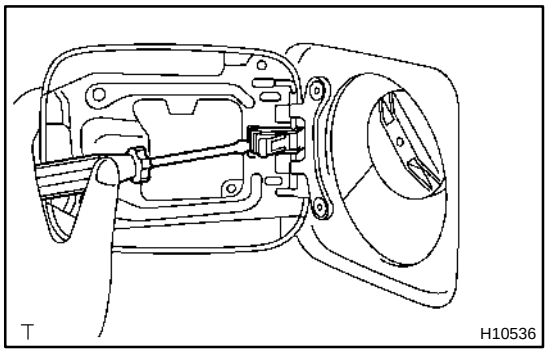


7. REMOVE FUEL TANK CAP HANGER

Pull up the fuel tank cap hanger to remove it.

8. REMOVE FUEL FILLER OPENING LID LOCK RETAINER

Remove the nut and fuel filler opening lid lock retainer.

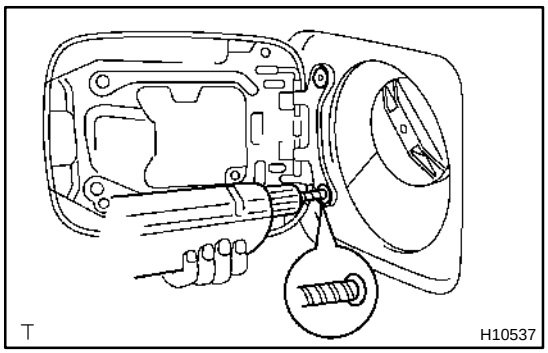


9. REMOVE FUEL LID OPENING SPRING

Insert a screwdriver between the spring and fuel filler opening lid to remove the spring as shown in the illustration.

HINT:

Tape the screwdriver tip before use.



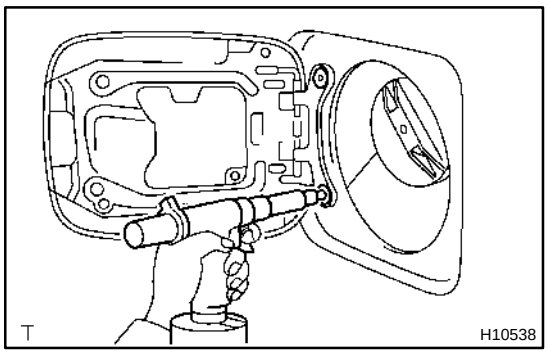
10. REMOVE FUEL FILLER OPENING LID

(a) Using a drill, drill out the rivet heads.

(b) Remove the fuel filler opening lid.

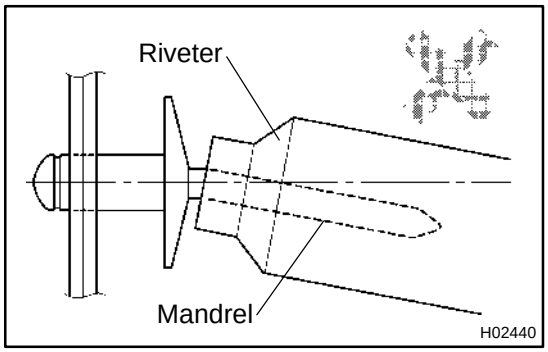
BO4D6-02

INSTALLATION



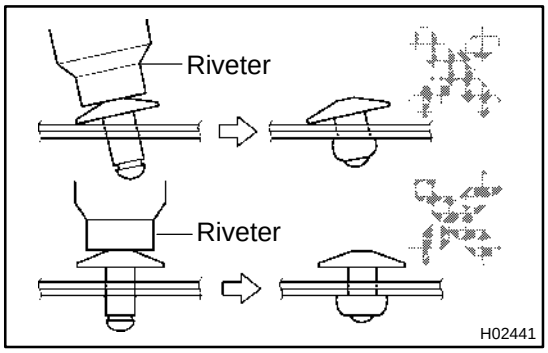
1. INSTALL FUEL FILLER OPENING LID

Using a riveter, install the fuel filler opening lid with the 2 rivets to the body.

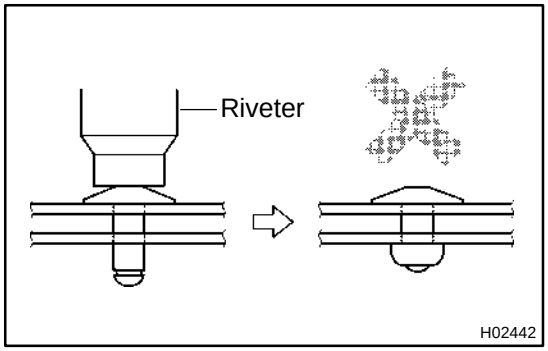


NOTICE:

- **Do not prize a riveter. It could damage the riveter and cause loose fitting and mandrel bend.**

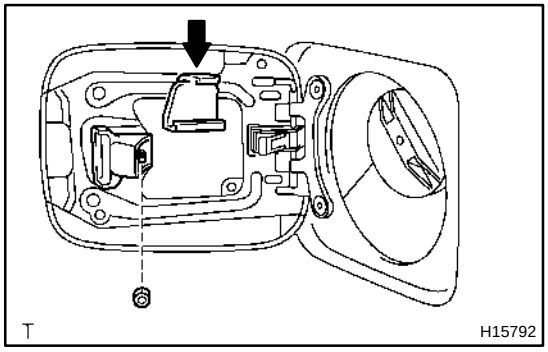


- **Do not tilt the riveter when fastening the rivet to the material to avoid loose fitting.**
- **Do not allow gap spacing between the rivet head and the material.**



- **Do not allow gap spacing between the materials.**

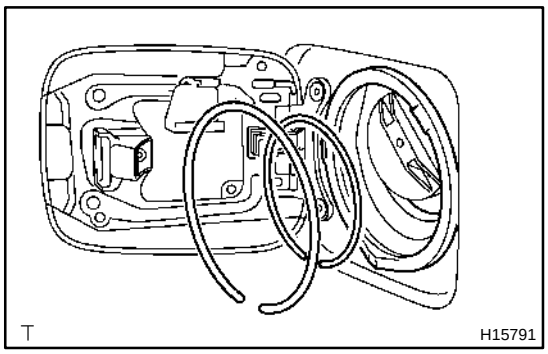
2. INSTALL FUEL FILLER OPENING SPRING



3. INSTALL FUEL FILLER OPENING LID LOCK RETAINER

Install the fuel filler opening lid lock retainer with the nut.

4. INSTALL FUEL TANK CAP HANGER



5. INSTALL FUEL FILLER SHIELD

(a) Remove the fuel tank cap.

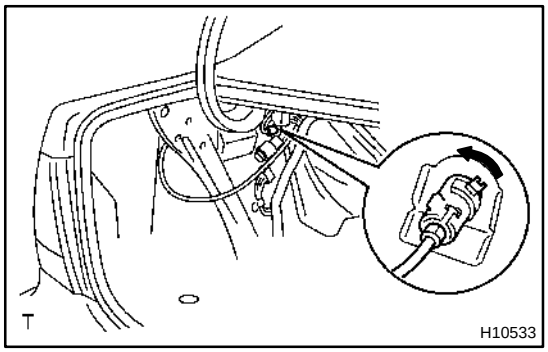
(b) Install the fuel filler shield to the body.

(c) Install the fuel tank cap quickly.

CAUTION:

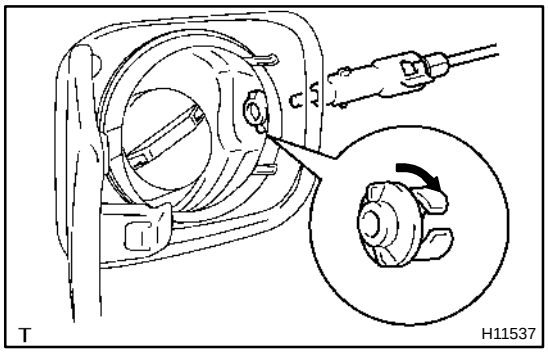
Always keep the tank cap closed when it is not required to be open. Keep open fire away during the operation.

(d) Install the 2 rings to the fuel filler shield as shown in the illustration.

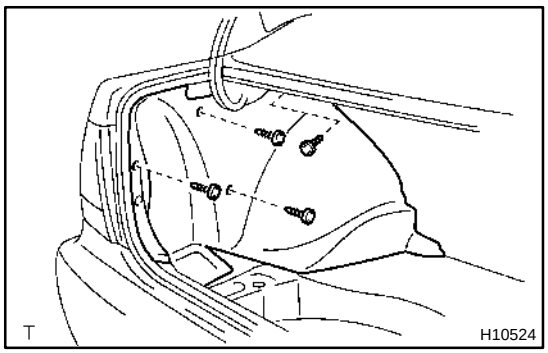


6. INSTALL FUEL LID LOCK CONTROL

(a) Install the retainer to the body from the outside of the vehicle and rotate it to the right to lock.



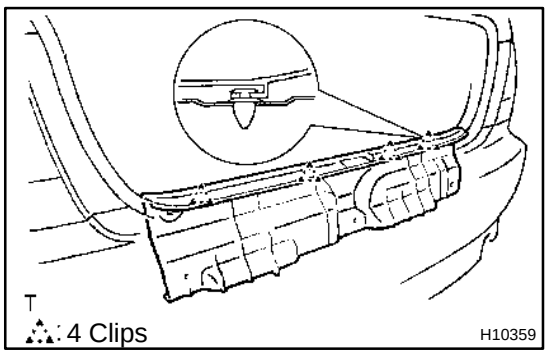
(b) Insert the fuel lid lock control to the retainer and rotate it to the left to lock.



7. INSTALL LUGGAGE COMPARTMENT TRIM SIDE COVER LH

Install the luggage compartment trim side cover LH with the 3 clips.

8. INSTALL LUGGAGE COMPARTMENT FLOOR HOOKS



9. INSTALL LUGGAGE COMPARTMENT TRIM REAR COVER

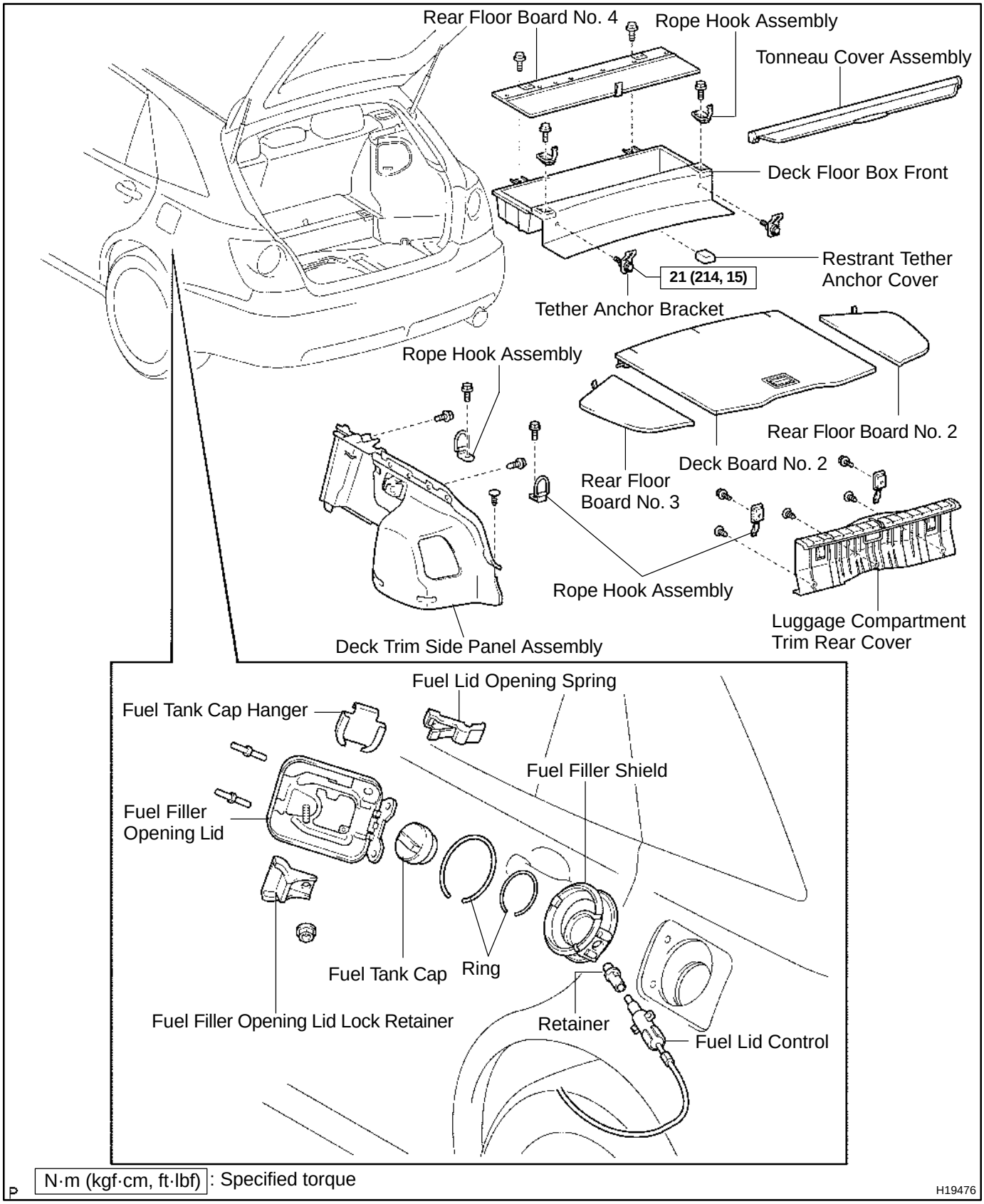
Install the luggage compartment trim rear cover with the 5 clips.

10. INSTALL LUGGAGE COMPARTMENT TRIM NO.2 COVER

FUEL LID (Wagon)

COMPONENTS

BO4D7-03



BO4D8-03

REMOVAL

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE REAR SEAT CUSHION (See page BO-204)

2. REMOVE SIDE SEATBACK ASSEMBLY (See page BO-204)

3. REMOVE REAR SEAT FLOOR BOARD NO. 4

(a) Remove the seat back board carpets.

(b) Remove the 2 bolts and rear floor board.

4. REMOVE DECK FLOOR BOX FRONT

(a) Remove the 2 bolts and the 2 rope hook assemblies.

(b) Remove the 2 bolts and 2 tether anchor brackets.

(c) Remove the restraint seat tether anchor cover.

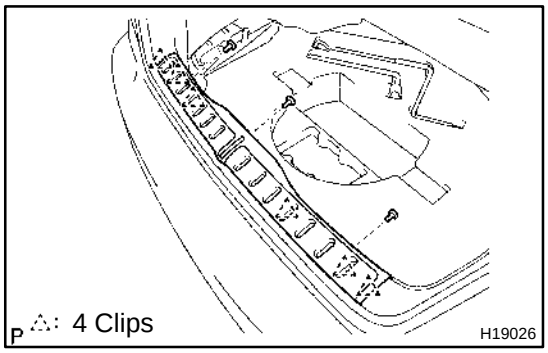
(d) Remove the deck floor box.

5. REMOVE DECK BOARD NO. 2

6. REMOVE REAR FLOOR BOARD NO. 2

7. REMOVE REAR FLOOR BOARD NO. 3

8. REMOVE TONNEAU COVER ASSEMBLY



9. REMOVE REAR FLOOR FINISH PLATE

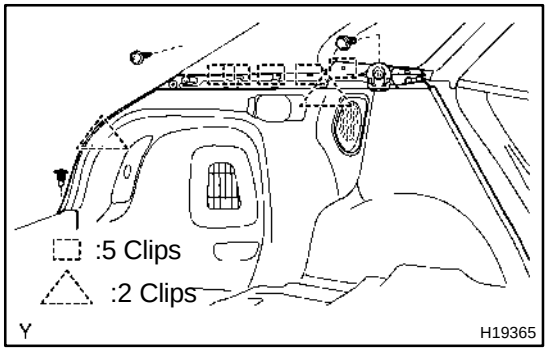
(a) Remove the 2 bolts and the 2 rope hook assemblies.

(b) Remove the 3 clips.

(c) Using a screwdriver, remove the rear floor finish plate.

HINT:

Tape the screwdriver tip before use.



10. REMOVE DECK TRIM SIDE PANEL ASSEMBLY

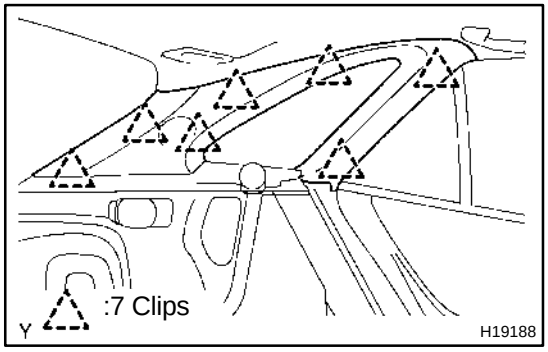
(a) Remove the 2 bolts and 2 floor hooks.

(b) Remove the screw, bolt and clip.

(c) Using a screwdriver, remove the deck trim side panel assembly, then disconnect the connector.

HINT:

Tape the screwdriver tip before use.

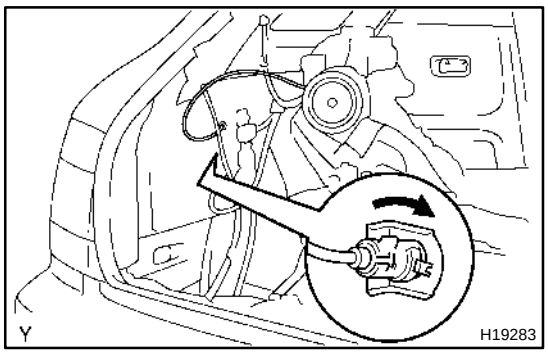


11. REMOVE ROOF SIDE INNER GARNISH

Using a screwdriver, remove the roof side inner garnish.

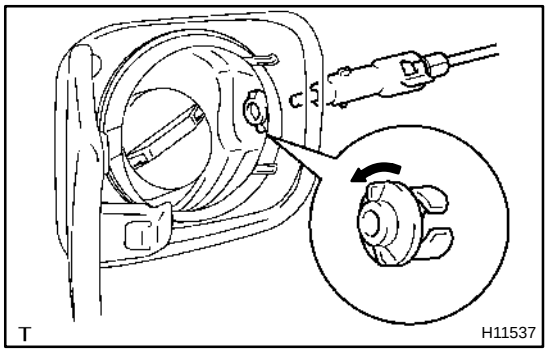
HINT:

Tape the screwdriver tip before use.

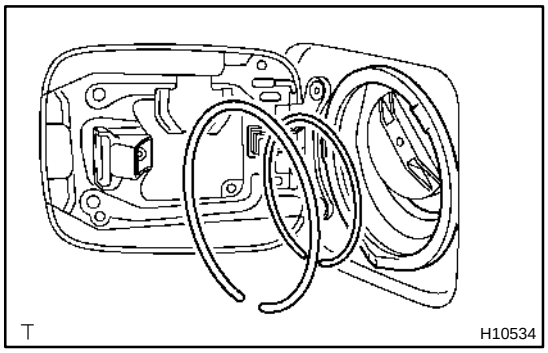


12. REMOVE FUEL LID LOCK CONTROL

(a) Rotate the fuel lid lock to the right to disengage the lock, then pull it out.



(b) Rotate the retainer to the left to disengage the lock, then pull it out.



13. REMOVE FUEL FILLER SHIELD

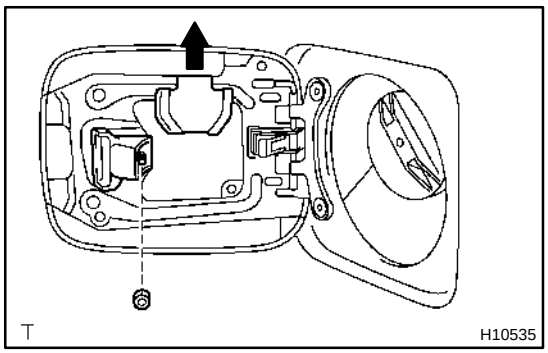
(a) Remove the 2 rings from the fuel filler shield.

(b) Remove the fuel tank cap and shield.

CAUTION:

Always keep the tank cap closed when it is not required to be open. Keep open fire away during the operation.

(c) Install the fuel tank cap quickly.

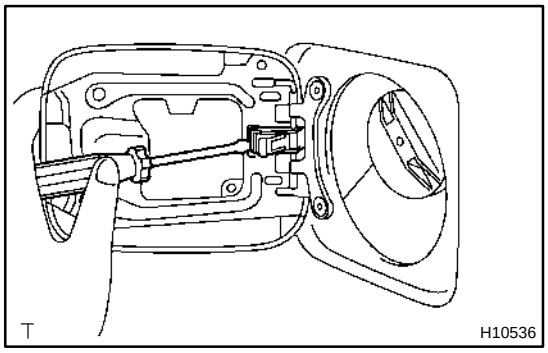


14. REMOVE FUEL TANK CAP HANGER

Pull up the fuel tank cap hanger to remove it.

15. REMOVE FUEL FILLER OPENING LID LOCK RETAINER

Remove the nut and fuel filler opening lid lock retainer.

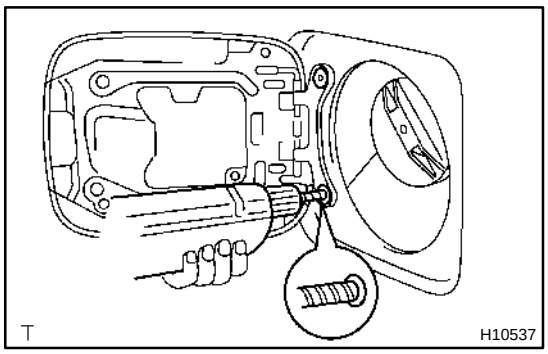


16. REMOVE FUEL LID OPENING SPRING

Insert a screwdriver between the spring and fuel filler opening lid to remove the spring as shown in the illustration.

HINT:

Tape the screwdriver tip before use.



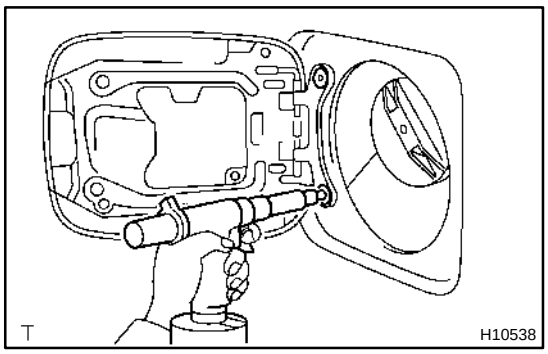
17. REMOVE FUEL FILLER OPENING LID

(a) Using a drill, drill out the rivet heads.

(b) Remove the fuel filler opening lid.

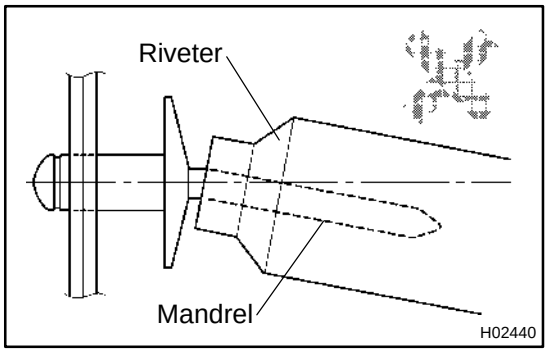
BO4D9-02

INSTALLATION



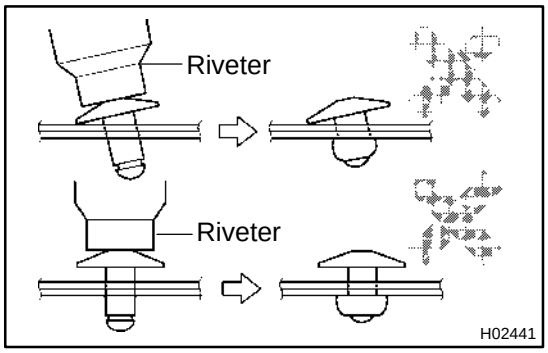
1. INSTALL FUEL FILLER OPENING LID

Using a riveter, install the fuel filler opening lid with the 2 rivets to the body.

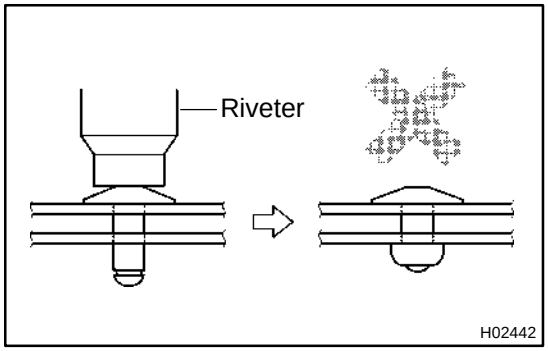


NOTICE:

- **Do not prize a riveter. It could damage the riveter and cause loose fitting and mandrel bend.**

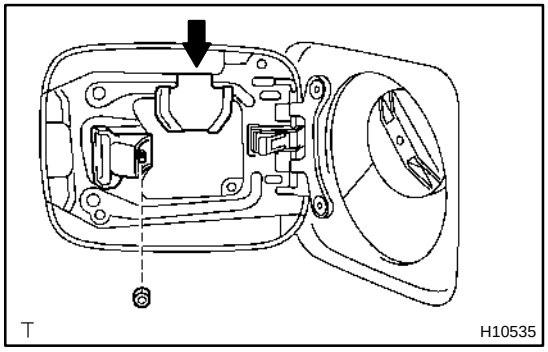


- **Do not tilt the riveter when fastening the rivet to the material to avoid loose fitting.**
- **Do not allow gap spacing between the rivet head and the material.**



- **Do not allow gap spacing between the materials.**

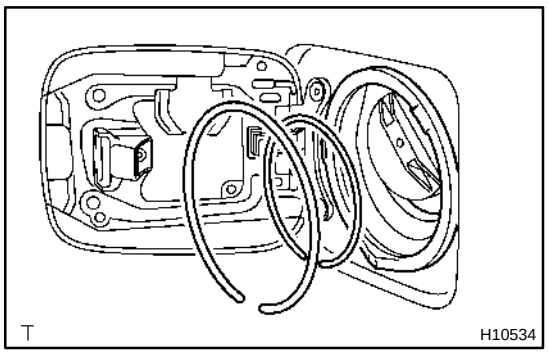
2. INSTALL FUEL FILLER OPENING SPRING



3. INSTALL FUEL FILLER OPENING LID LOCK RETAINER

Install the fuel filler opening lid lock retainer with the nut.

4. INSTALL FUEL TANK CAP HANGER



5. INSTALL FUEL FILLER SHIELD

(a) Remove the fuel tank cap.

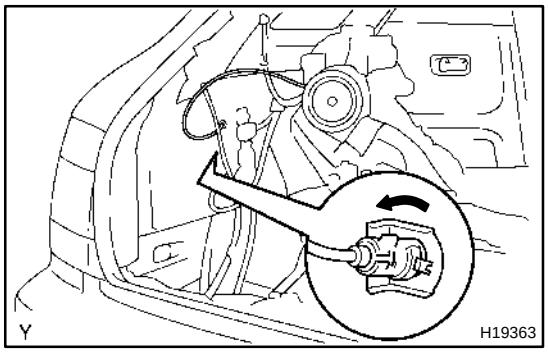
(b) Install the fuel filler shield to the body, and put the fuel tank cap back immediately.

(c) Install the fuel tank cap quickly.

CAUTION:

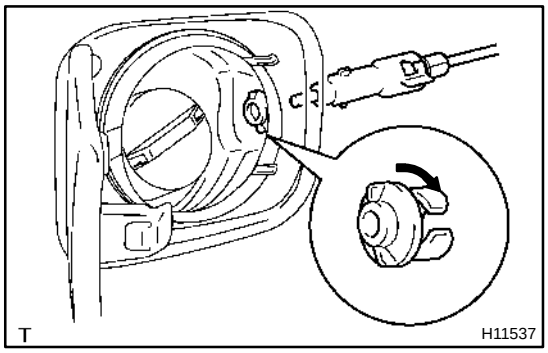
Always keep the tank cap closed when it is not required to be open. Keep open fire away during the operation.

(d) Install the 2 rings to the fuel filler shield as shown in the illustration.

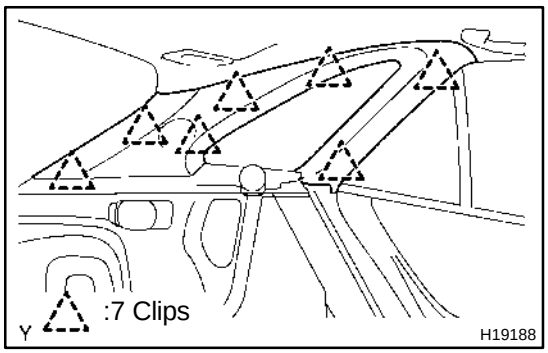


6. INSTALL FUEL LID LOCK CONTROL

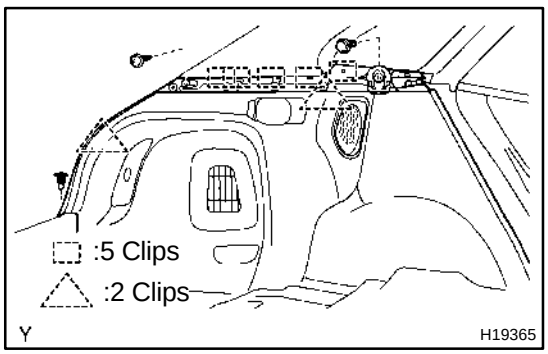
(a) Install the retainer to the body from the outside of the vehicle and rotate it right to lock.



(b) Insert the fuel lid lock control to the retainer and rotate it to the left to lock.



7. INSTALL ROOF SIDE INNER GARNISH

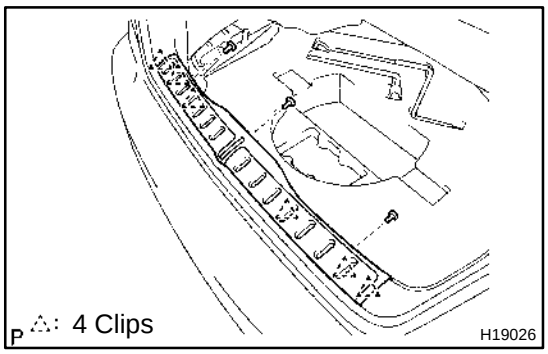


8. INSTALL DECK TRIM SIDE PANEL ASSEMBLY

(a) Install the deck trim side panel assembly then connect the connector.

(b) Install the screw, bolt and clip.

(c) Install the 2 floor hooks with the 2 bolts.



9. INSTALL REAR FLOOR FINISH PLATE

(a) Install the rear floor finish plate.

(b) Install the 3 clips.

(c) Install the 2 rope hook assemblies with the 2 bolts.

10. INSTALL TONNEAU COVER ASSEMBLY

11. INSTALL REAR FLOOR BOARD NO. 3

12. INSTALL REAR FLOOR BOARD NO. 2

13. INSTALL DECK BOARD NO. 2

14. INSTALL DECK FLOOR BOX FRONT

(a) Install the deck floor box.

(b) Install the 2 tether anchor brackets with the 2 bolts.

Torque: 21 N·m (214 kgf·cm, 15ft·lbf)

(c) Install the restraint seat tether anchor cover.

(d) Install the 2 rope hook assemblies with the 2 bolts.

15. INSTALL REAR SEAT FLOOR BOARD NO. 4

(a) Install the rear floor board with the 2 bolts.

(b) Install the seat back board carpets.

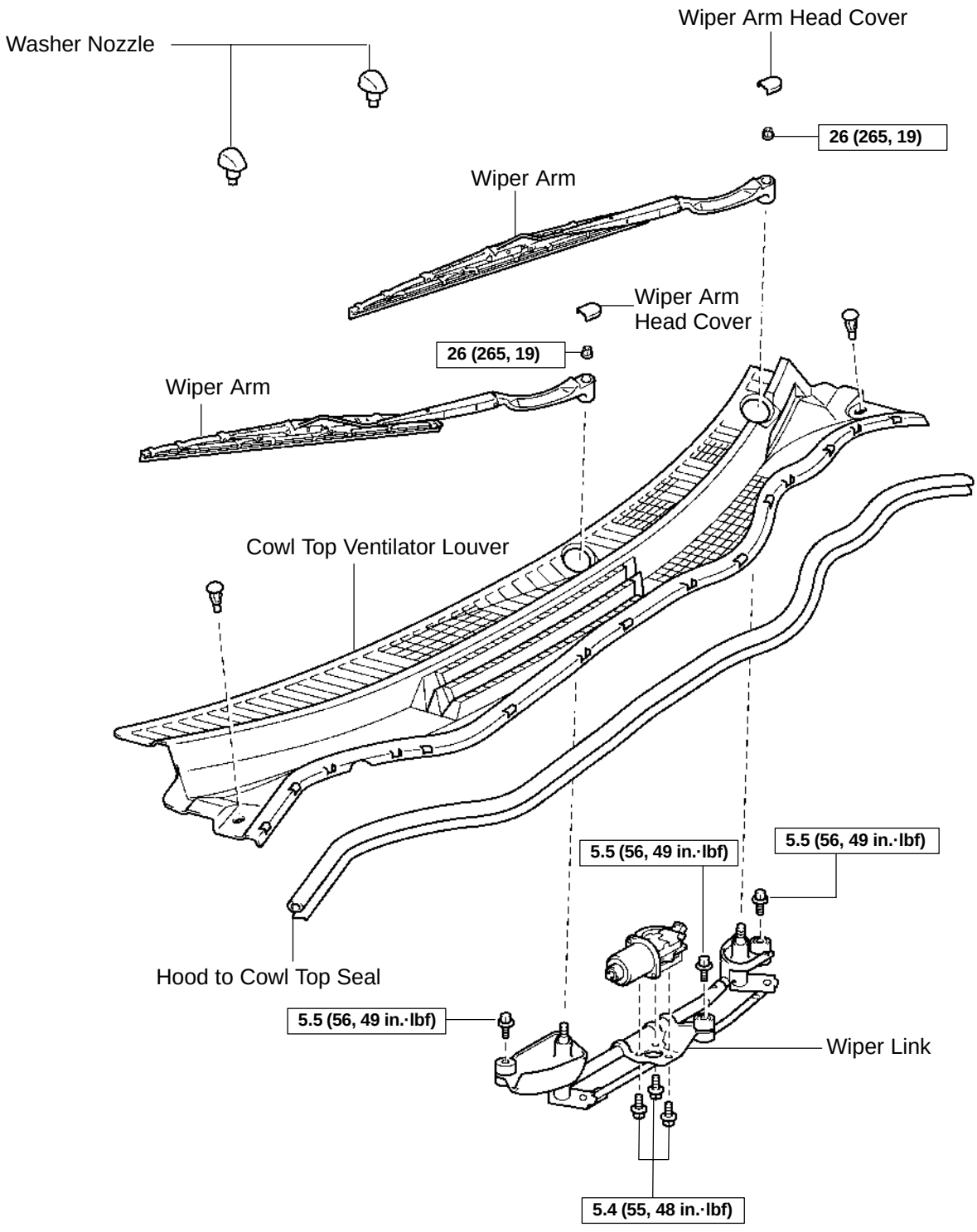
16. INSTALL SIDE SEAT BACK ASSEMBLY (See page BO-204)

17. INSTALL REAR SEAT CUSHION (See page BO-204)

FRONT WIPER AND WASHER

COMPONENTS

BO0UX-07



T N·m (kgf·cm, ft·lbf) : Specified torque

H15723

BO2CI-03

REMOVAL

1. REMOVE WIPER ARMS

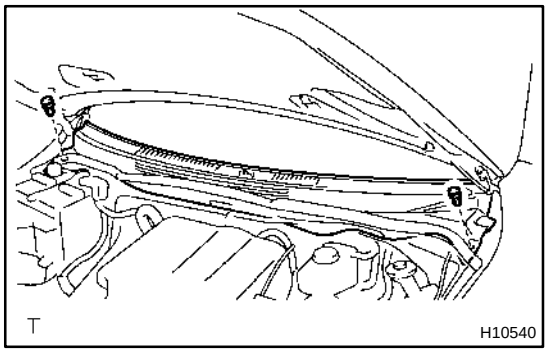
(a) Using a screwdriver, remove the wiper arm head covers.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 nuts and 2 wiper arms.

2. REMOVE HOOD TO COWL TOP SEAL



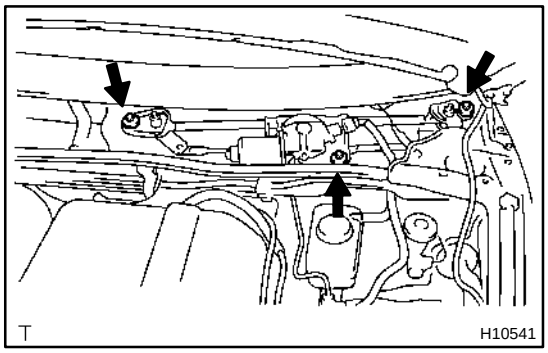
3. REMOVE COWL TOP VENTILATOR LOUVER

(a) Remove the 2 clips

(b) Using a screwdriver, remove the cowl top ventilator louver.

HINT:

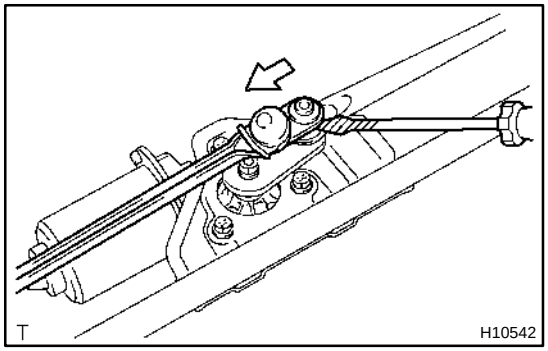
Tape the screwdriver tip before use.



4. REMOVE WIPER LINK ASSEMBLY

(a) Disconnect the connector.

(b) Remove the 3 bolts and wiper link assembly.

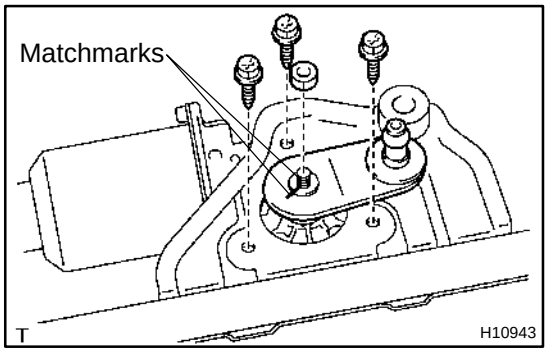


5. REMOVE WIPER MOTOR

(a) Using a screwdriver, disconnect the wiper link from the motor.

HINT:

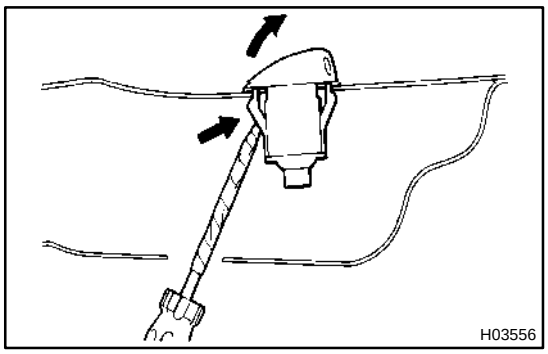
Tape the screwdriver tip before use.



(b) Remove the nut.

(c) Place the matchmarks on the wiper link and motor.

(d) Remove the 3 screws and wiper motor from the wiper link.



6. REMOVE WASHER NOZZLE

(a) Remove the hood insulator.

(b) Disconnect the washer hose.

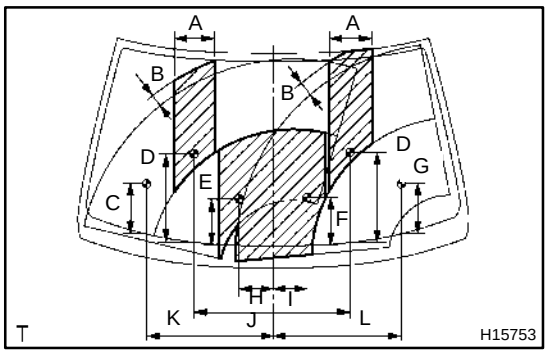
(c) Using a screwdriver, remove the washer nozzle.

HINT:

Tape the screwdriver tip before use.

(d) Employ the same manner described above to the other side.

BO0UZ-10



INSPECTION

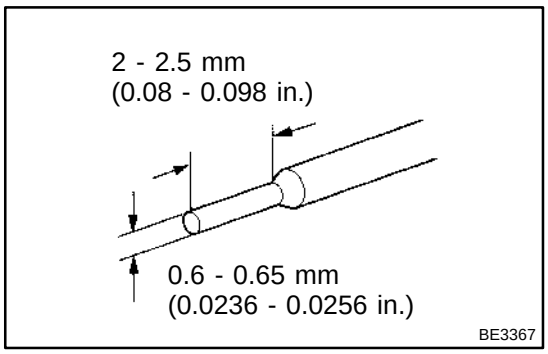
INSPECT WASHER NOZZLE

(a) While operating the washer, check whether the points where the washer fluid hits the windshield and the surge area are within the range indicated by the hatched line.

A: Approx. 150 mm (5.91 in.)
B: Approx. 50 mm (1.97 in.)
C: Approx. 181.4 mm (7.142 in.)
D: Approx. 320.6 mm (12.622 in.)
E: Approx. 175.9 mm (6.925 in.)
F: Approx. 176.5 mm (6.949 in.)
G: Approx. 181 mm (7.13 in.)
H: Approx. 117.8 mm (4.638 in.)
I: Approx. 120 mm (4.72 in.)
J: Approx. 546.6 mm (21.520 in.)
K: Approx. 443.7 mm (17.468 in.)
L: Approx. 447 mm (17.60 in.)

(b) Check if the outer point where the washer fluid hits the windshield is within the range of the wiping pattern (the area of the glass which is wiped by the wiper blades).

BO0V0-07



ADJUSTMENT

ADJUST WASHER NOZZLE

Using a tool like the one shown in the illustration, change the direction of the nozzle hole to adjust the point where washer fluid hits the windshield.

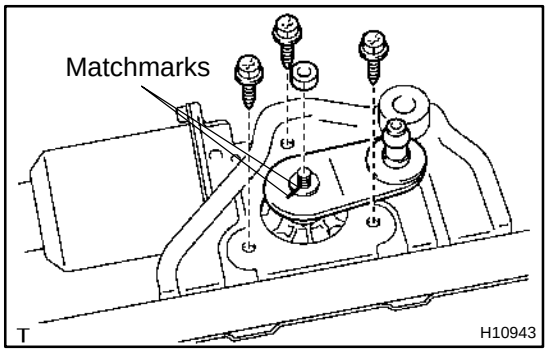
BO2CJ-04

INSTALLATION

1. INSTALL WASHER NOZZLES

(a) Install the washer nozzles, then connect the washer hoses.

(b) Install the hood insulator.

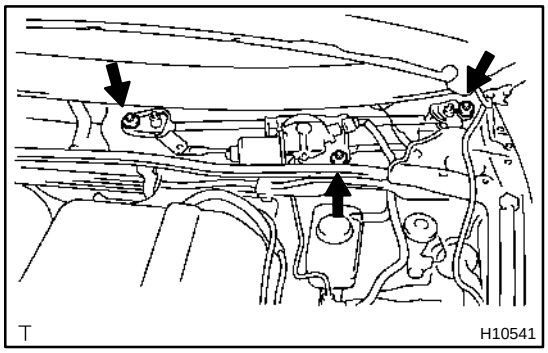


2. INSTALL WIPER MOTOR

(a) Install the wiper motor with the 3 bolts to the wiper link.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(b) Align the matchmakers on the wiper link and wiper motor, then install the nut.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

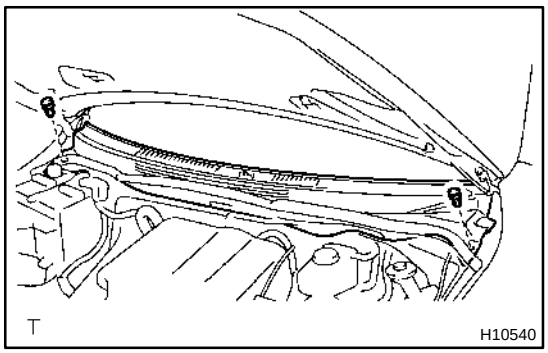
(c) Connect the wiper link to the wiper motor.



3. INSTALL WIPER LINK ASSEMBLY

(a) Install the wiper link assembly and fasten the 3 bolts.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(b) Connect the connector.



4. INSTALL COWL TOP VENTILATOR LOUVER

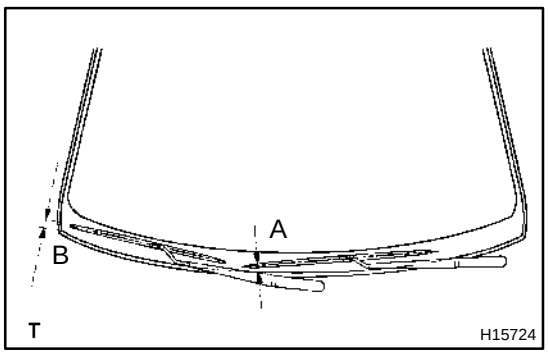
Install the cowl top ventilator louver with the 2 clips.

5. INSTALL HOOD TO COWL TOP SEAL

6. INSTALL WIPER ARMS

(a) Operate the wipers once and turn the wiper switch OFF.

(b) Install the wiper arms and tighten the nuts by hand.



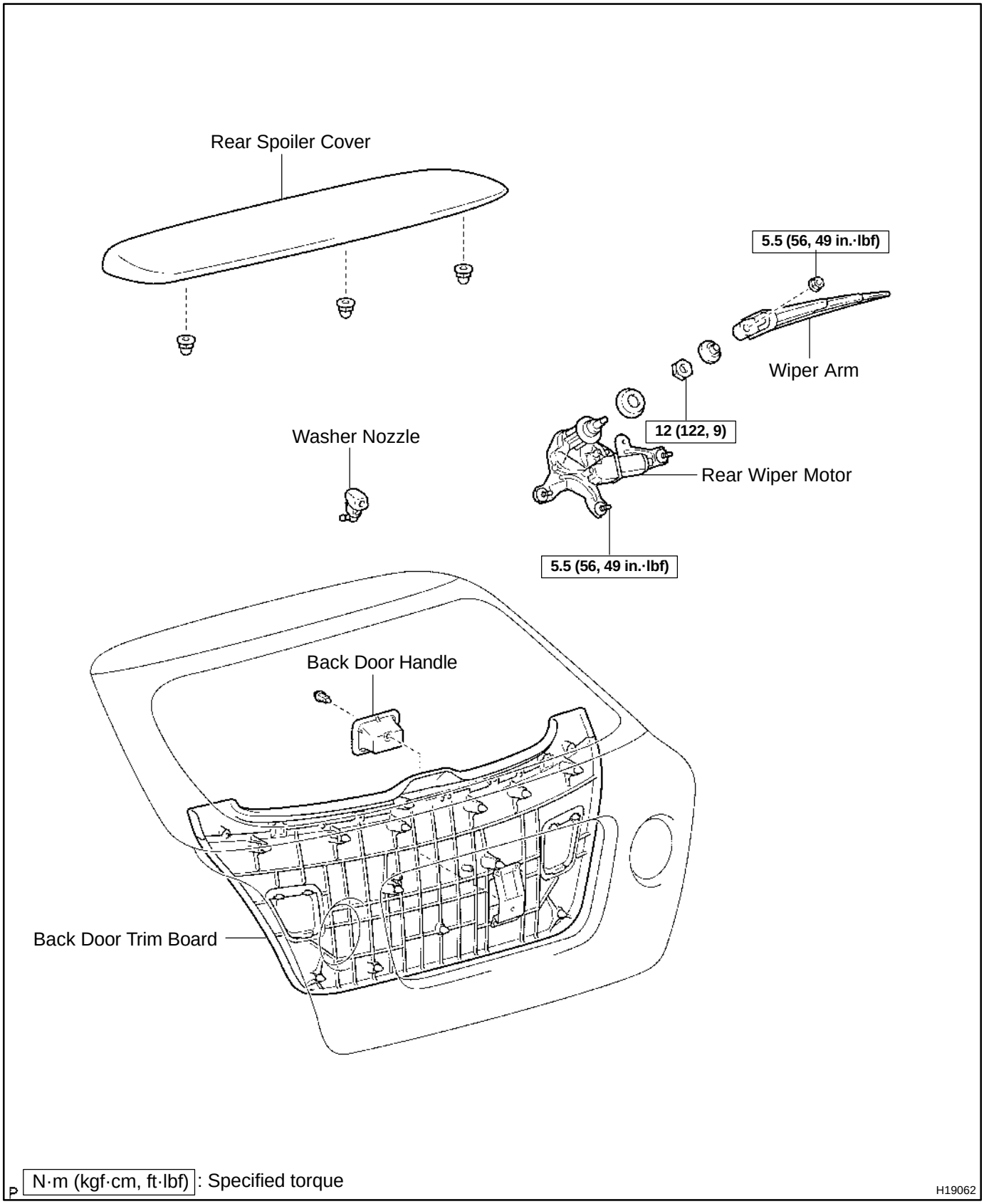
(c) Adjust the installation positions of the wiper arms to the positions as shown in the illustration.
A: 20.0 mm (0.787 in.)
B: 28.0 mm (1.102 in.)

(d) Torque the nuts.
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

REAR WIPER AND WASHER (Wagon)

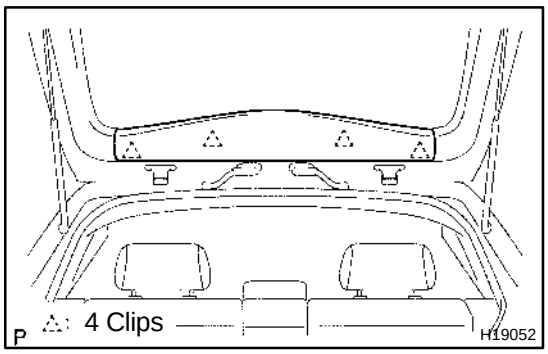
BO4DA-01

COMPONENTS



BO4DB-02

REMOVAL

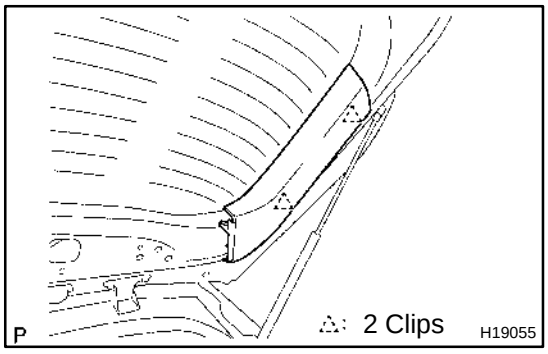


1. REMOVE BACK DOOR TRIM BOARD UPPER

Using a screwdriver, remove the back door trim board upper.

HINT:

Tape the screwdriver tip before use.



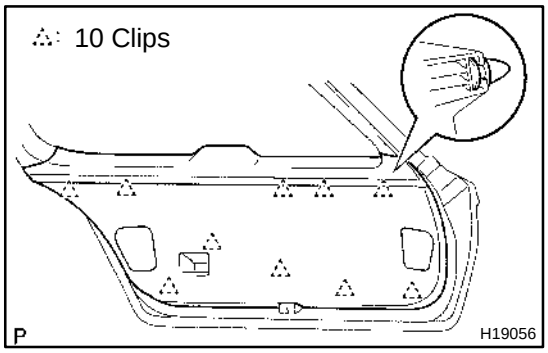
2. REMOVE BACK DOOR TRIM COVERS

(a) Insert a screwdriver between the back door panel and back door trim cover to pry the cover.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



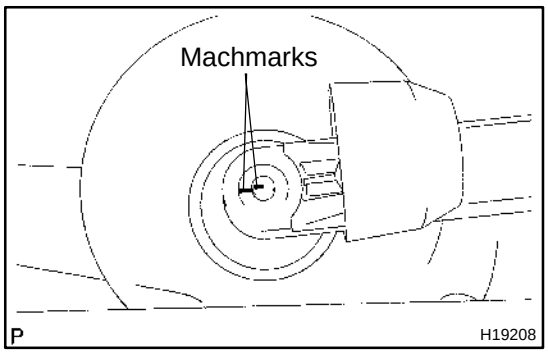
3. REMOVE BACK DOOR TRIM BOARD

(a) Remove the clip and back door handle.

(b) Using a screwdriver, remove the back door trim board.

HINT:

Tape the screwdriver tip before use.

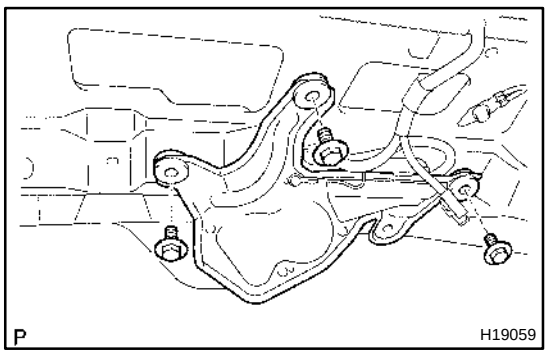


4. REMOVE REAR WIPER ARM

(a) Open the wiper arm cover.

(b) Place matchmarks on the wiper arm and wiper motor.

(c) Remove the nut and rear wiper arm.



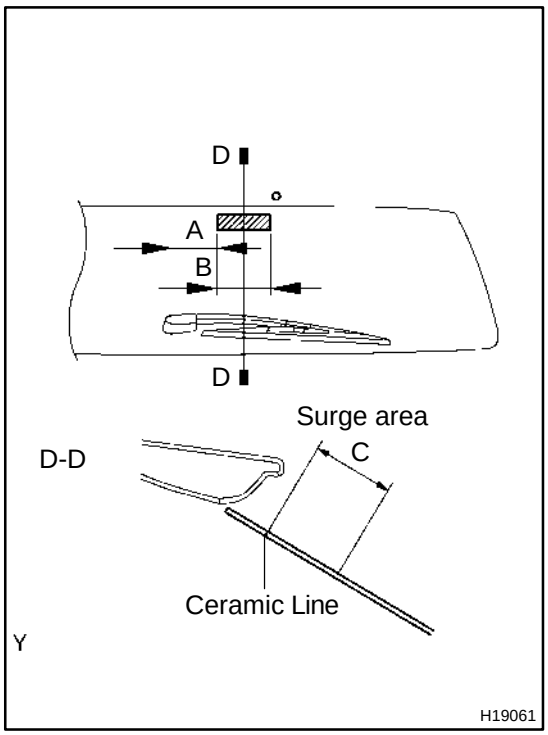
5. REMOVE REAR WIPER MOTOR

(a) Remove the nut and washer on the outer side of the back door panel.

(b) Disconnect the connector.

(c) Remove the 3 bolts and rear wiper motor.

BO4DC-01



INSPECTION

INSPECT WASHER NOZZLE

(a) While operating the washer, check whether the upper point where the washer fluid hits the back door glass and the surge area are within the range indicated by the hatched line.

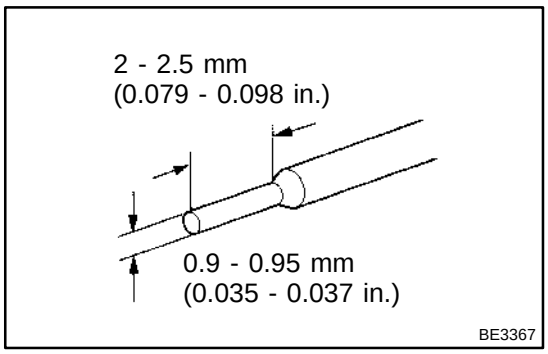
A: 88 mm (3.46 in.)

B: 100 mm (3.94 in.)

C: 55 mm (2.17 in.)

(b) Check if the lower point where the washer fluid hits the back door glass is within the range of the wiping pattern (the are of the glass which is wiped by the wiper blades).

BO4DD-01



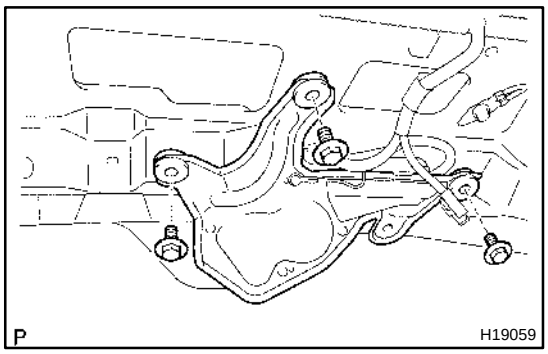
ADJUSTMENT

ADJUST WASHER NOZZLE

Using a tool like the one shown in the illustration, change the direction of the nozzle hole to adjust the point where washer fluid hits the back door glass.

BO4DE-01

INSTALLATION

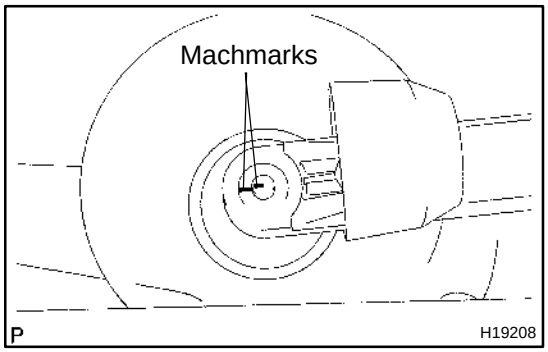


1. INSTALL REAR WIPER MOTOR

(a) Install the rear wiper motor with the 3 bolts.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(b) Connect the connector.

(c) Install the nut and washer on the outer side of the back door panel.
Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)



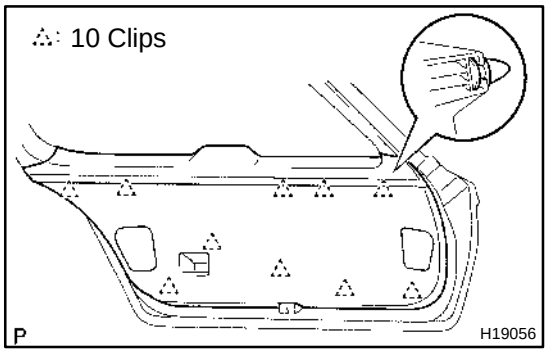
2. INSTALL REAR WIPER ARM

(a) Install the wiper arm and tighten the nut by hand. Operate the wiper once and turn the wiper switch OFF.

(b) Align the machmarks on the wiper arm and wiper motor.

(c) Install the rear wiper arm with the nut.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

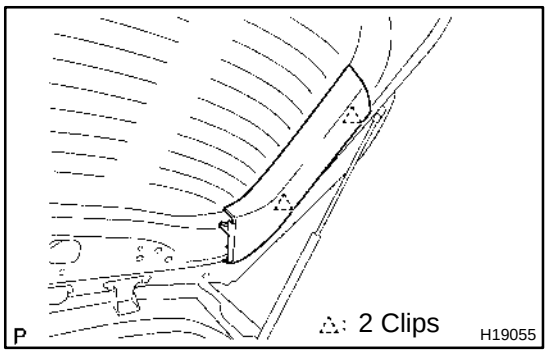
(d) Install the wiper arm cover.



3. INSTALL BACK DOOR TRIM BOARD

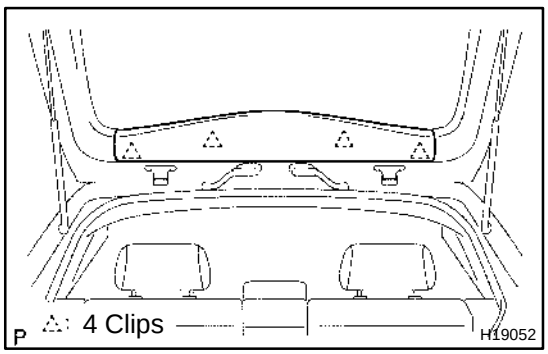
(a) Install the back door trim board to the back door panel.

(b) Install the back door handle with the clip.



4. INSTALL BACK DOOR TRIM COVERS

Install the trim covers to the body.



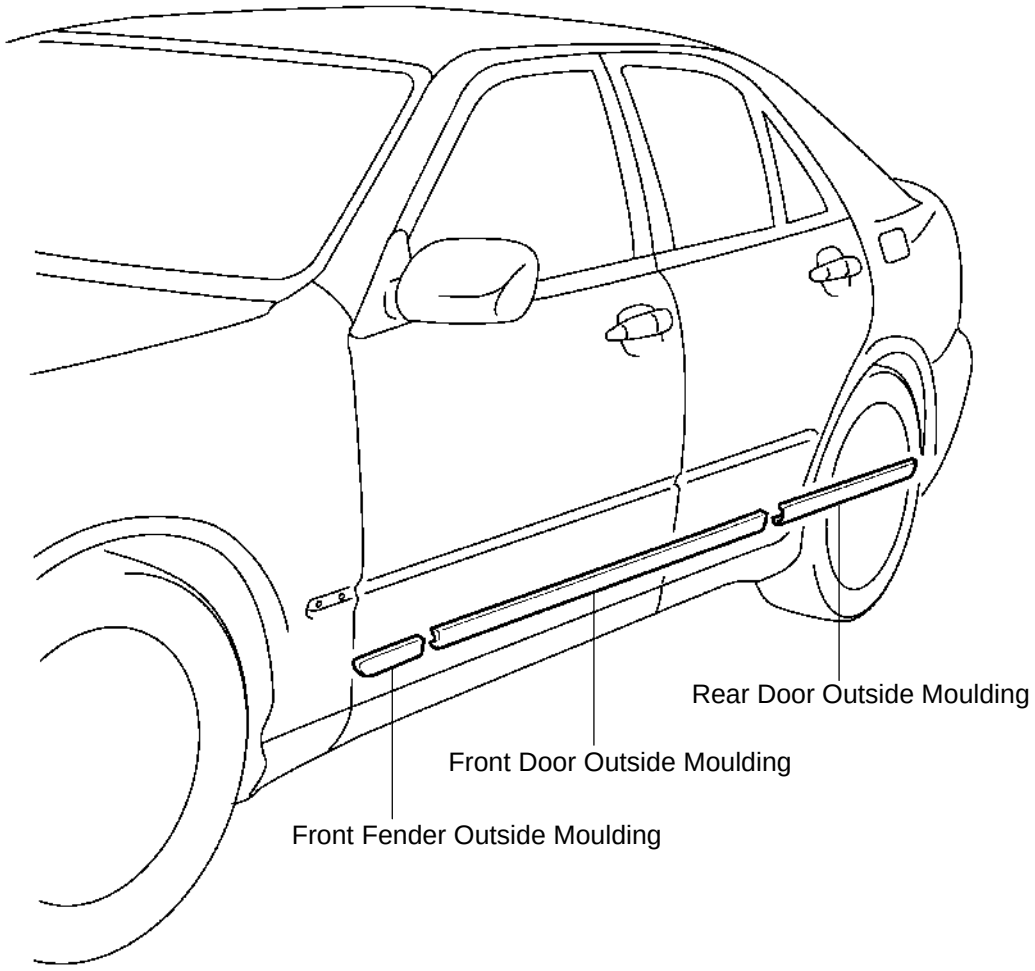
5. INSTALL BACK DOOR TRIM BOARD UPPER

Install the back door trim board upper to the body.

BODY OUTSIDE MOULDING

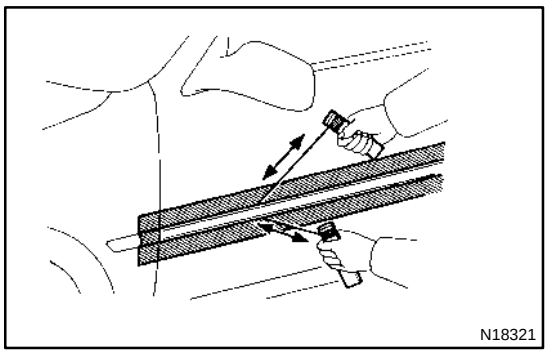
COMPONENTS

BO229-05



H15794

BO22A-04



REMOVAL

1. HEAT MOULDING

Using a heat light, heat the moulding to 20 - 30 ˚C (68 - 86 ˚F).

NOTICE:

Do not heat the moulding excessively.

2. REMOVE MOULDING

(a) Tie both piano wire ends to wooden blocks or similar objects.

(b) Cut the adhesive tape by pulling the piano wire as shown in the illustration.

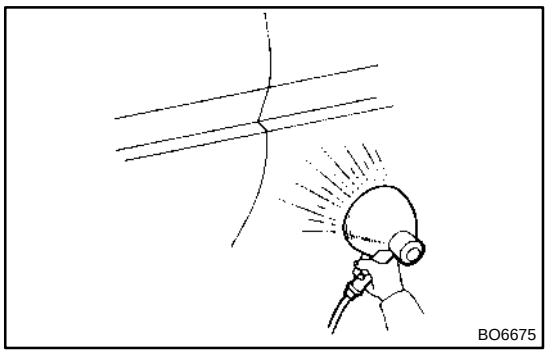
NOTICE:

- **If reusing the moulding, take care not to damage the moulding.**
- **Do not damage the body.**

(c) Remove the moulding.

BO2CK-04

INSTALLATION



1. CLEAN BODY MOUNTING SURFACE

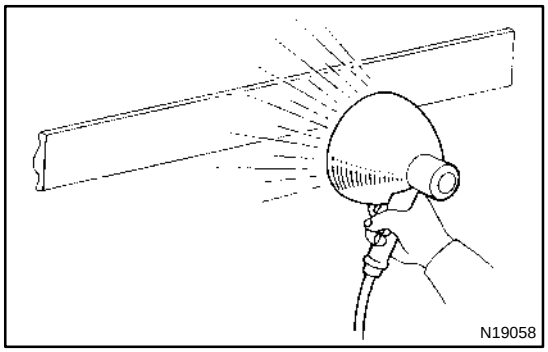
(a) Using a heat light, heat the body mounting surface to 40 - 60 ˚C (104 - 140 ˚F).

NOTICE:

Do not heat the body excessively.

(b) Remove the adhesive tape from the body.

(c) Wipe off stains with cleaner.



2. If reusing the moulding:
CLEAN MOULDING

(a) Using a heat light, heat the moulding to 20 - 30 ˚C (68 - 86 ˚F).

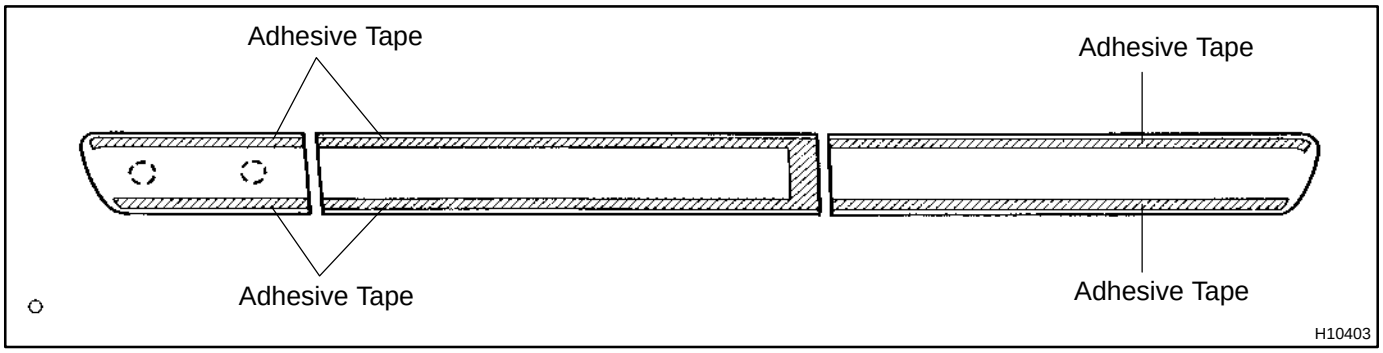
NOTICE:

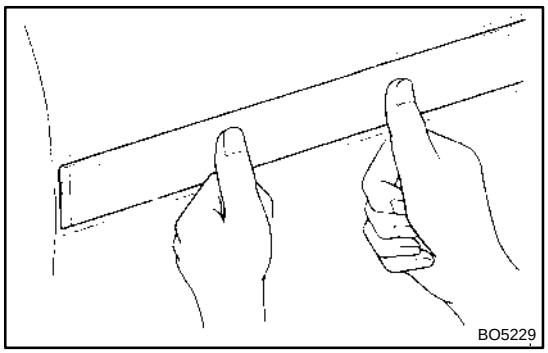
Do not heat the moulding excessively.

(b) Remove the adhesive tape from the moulding.

(c) Wipe off stains with cleaner.

(d) Apply a new adhesive tape to the moulding as shown in the illustration.





3. INSTALL MOULDING

(a) Using a heat light, heat the body and moulding.
Body: 40 - 60 ˚C (104 - 140 ˚F)
Moulding: 20 - 30 ˚C (68 - 86 ˚F)

NOTICE:

Do not heat the moulding excessively.

(b) Lift the moulding release sheet from face of the moulding.

NOTICE:

Before installing the moulding release sheet, make sure that there is no dirt or dust can get on the adhesive surface of the moulding.

(c) Front fender outside moulding:
Align the bosses with their corresponding holes in the body, and press firmly on the moulding.

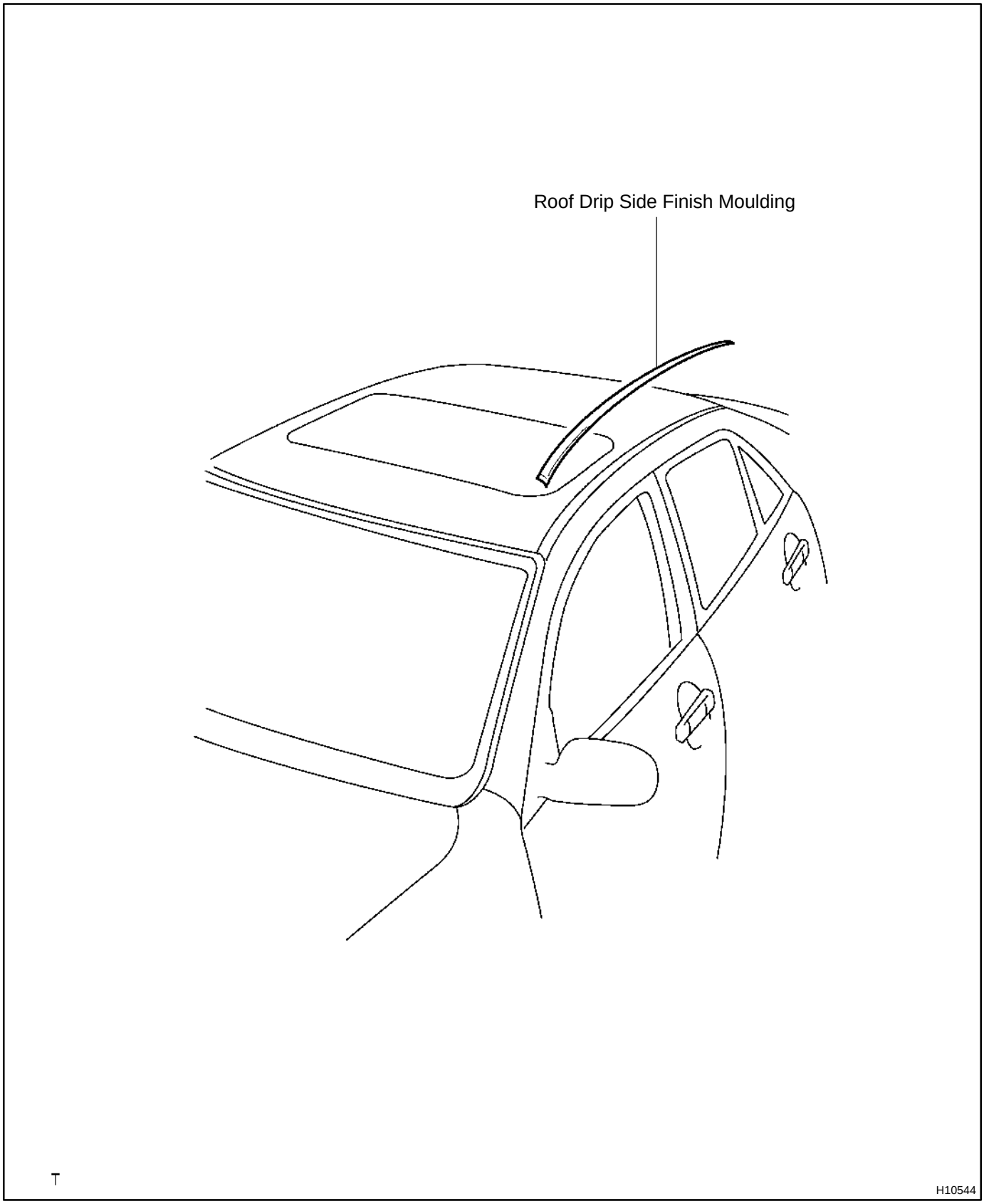
NOTICE:

Do not apply excessive force on to the moulding, but steady pressure with thumbs.

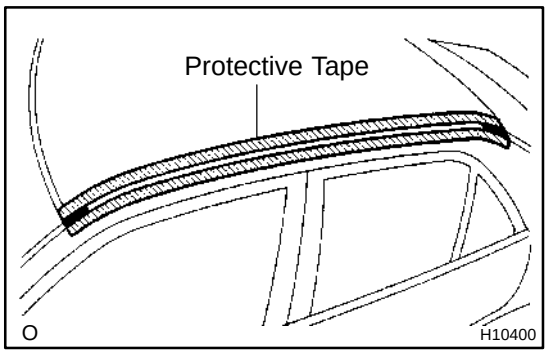
ROOF DRIP SIDE FINISH MOULDING (Sedan)

BO4DF-01

COMPONENTS



BO4DG-02



REMOVAL

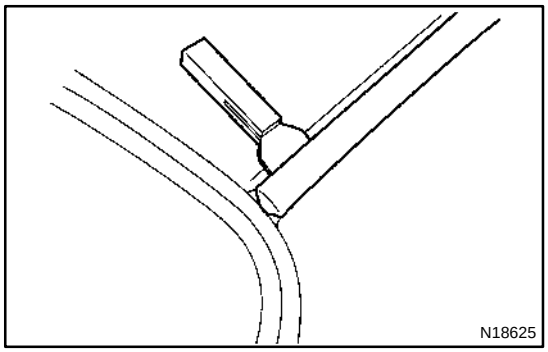
1. REMOVE ENDS OF MOULDING

(a) Apply protective tape to the outer surface as shown in the illustration to keep the surface from being scratched.

(b) Using a heat light, heat the moulding to 20 - 30 °C (68 - 86 °F).

NOTICE:

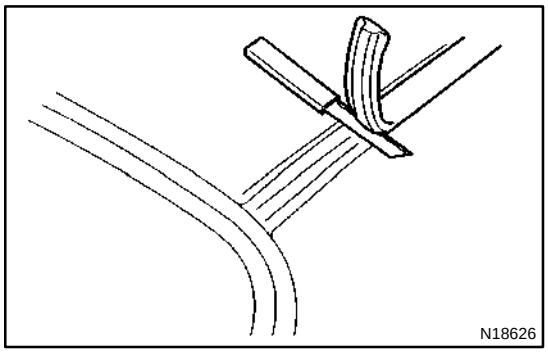
Do not heat the moulding excessively.



(c) Using a scraper, pull off the roof drip side finish moulding from the front end and rear end.

HINT:

Tape the scraper tip before use.



2. REMOVE MOULDING AND ADHESIVE

(a) Pull off the moulding by cutting the adhesive with a knife at the front and rear ends.

(b) Remove the moulding.

NOTICE:

Do not damage the body with the knife.

BO4DH-02

INSTALLATION

1. CLEAN CONTRACT SURFACE OF BODY

(a) Using a heat light, heat the moulding surface to 40 - 60 ˚C (104 - 140 ˚F).

NOTICE:

Do not heat the body excessively.

(b) Using a knife, cut away any rough areas on the body.

NOTICE:

Be careful not to damage the body.

(c) Wipe off stains with cleaner.

2. If reusing the moulding:
CLEAN MOULDING

(a) Using a heat light, heat the moulding surface to 20 - 30 ˚C (68 - 86 ˚F).

NOTICE:

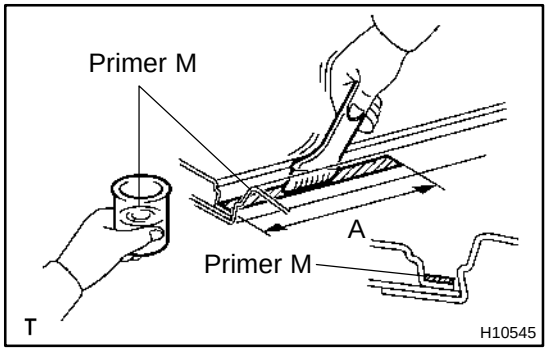
Do not heat the moulding excessively.

(b) Using a knife, cut the remaining adhesive from the moulding.

NOTICE:

Be careful not to damage the moulding.

(c) Wipe off stains with cleaner.



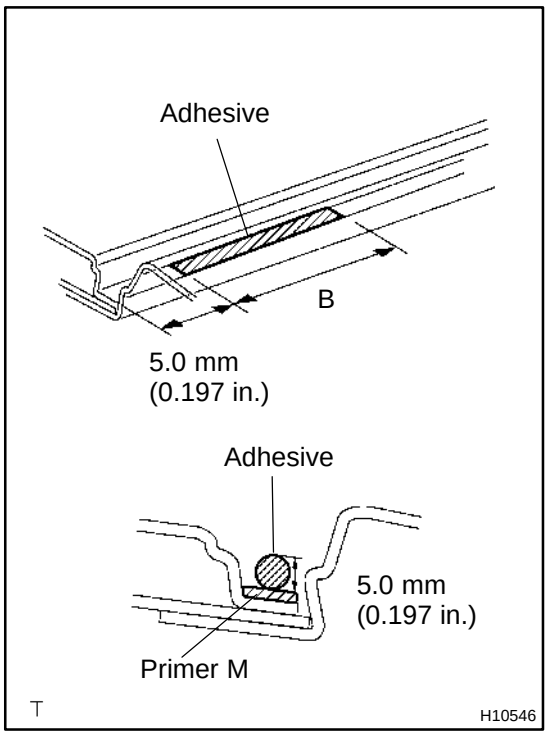
3. COAT CONTRACT SURFACE OF BODY WITH PRIMER "M"

Using a brush, coat the contact surface on the body with Primer M as shown in the illustration.

Front end:
A: 40 mm (1.57 in.)
Rear end:
A: 35 mm (1.38 in.)

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not coat the adhesive.**
- **Do not keep any of the opened Primer M for later use.**



4. APPLY ADHESIVE

(a) Cut off the tip of the cartridge nozzle.

Part No. 08850-00801 or equivalent

HINT:

After cutting off the tip, finish off adhesive within the time described in the chart below.

Temperature	Tackfree time
35 ˚C (95 ˚F)	15 minutes
20 ˚C (68 ˚F)	100 minutes
5 ˚C (41 ˚F)	8 hours

(b) Load the cartridge into the sealer gun.

(c) Apply adhesive to the hatched area in the illustration for both front and rear of the vehicle.

Front end:

B: 30 mm (1.18 in.)

Rear end:

B: 25 mm (0.98 in.)

HINT:

When removing the moulding, apply adhesive throughly to the part where the body sealer is removed.

5. INSTALL MOULDING

Push the moulding to the body.

NOTICE:

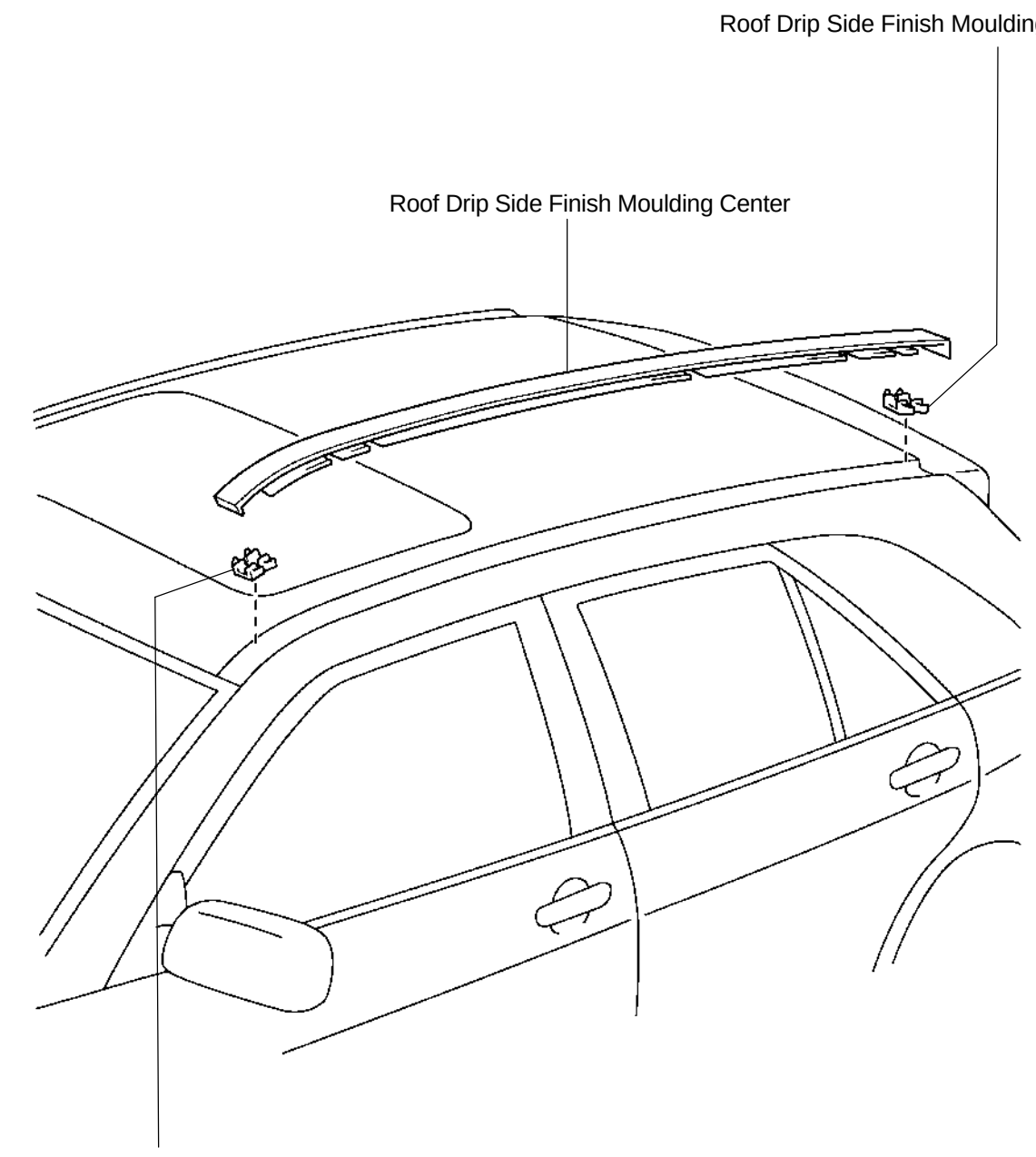
- **Make sure that the body and moulding are heated to the proper temperature.**
- **Do not depress the adhesive coated parts excessively but just hold them down with your thumb.**
- **Scrape off any overflowing adhesive with a plastic spatula and clean the surface with a dry rag.**
- **Take care not to drive the vehicle during the time described in the chart below.**

Temperature	Minimum time prior to driving the vehicle
35 ˚C (95 ˚F)	1.5 hours
20 ˚C (68 ˚F)	5 hours
5 ˚C (41 ˚F)	24 hours

ROOF DRIP SIDE FINISH CENTER MOULDING (Wagon)

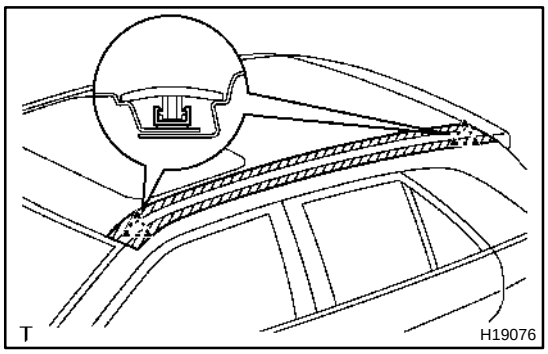
BO4DI-01

COMPONENTS



H19075

BO4DJ-02



REMOVAL

REMOVE ROOF DRIP SIDE FINISH MOULDING CENTER

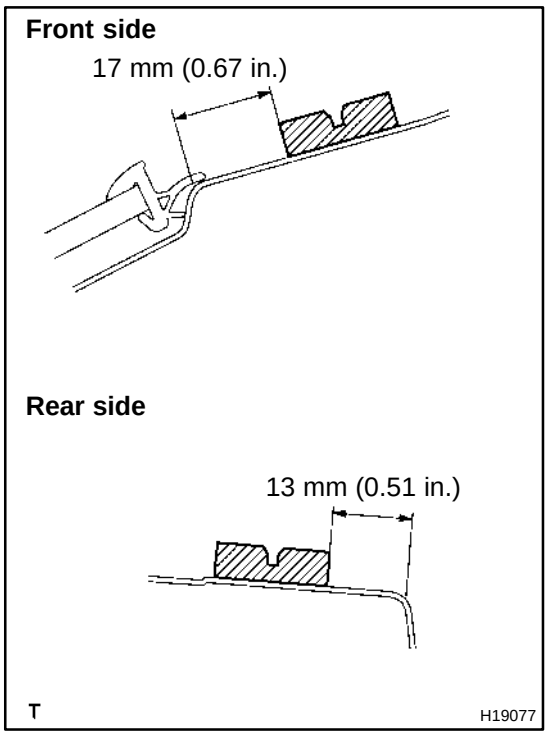
(a) Tape around the moulding for protection.

(b) Using a remover for the roof moulding, release both clip engagements in the front end and the rear ends of the moulding, and then remove the roof drip side finish moulding.

NOTICE:

- **Do not remove the clips.**
- **In case that the clips are damaged or removed accidentally, replace them with new ones.**

BO4DK-02



INSTALLATION

1. INSTALL ROOF DRIP SIDE FINISH MOULDING CLIP

NOTICE:

Only when exchanging the clips.

(a) Remove the adhesive tape that remains on the moulding surface of the body, and then clean the surface with white gasoline.

(b) Heat up the moulding and its installation surfaces on the body with a heat light.

Body: 40 - 60˚C (104 - 140˚F)

Moulding: 20 - 30˚C (68 - 86˚F)

NOTICE:

Do not heat the moulding excessively.

(c) Set the supplied clips into the positions as shown in the illustration, and press-fit those clips by hand to install them.

(d) The installation of the moulding should be carried out 30 minutes or more after press-fitting the clips.

HINT:

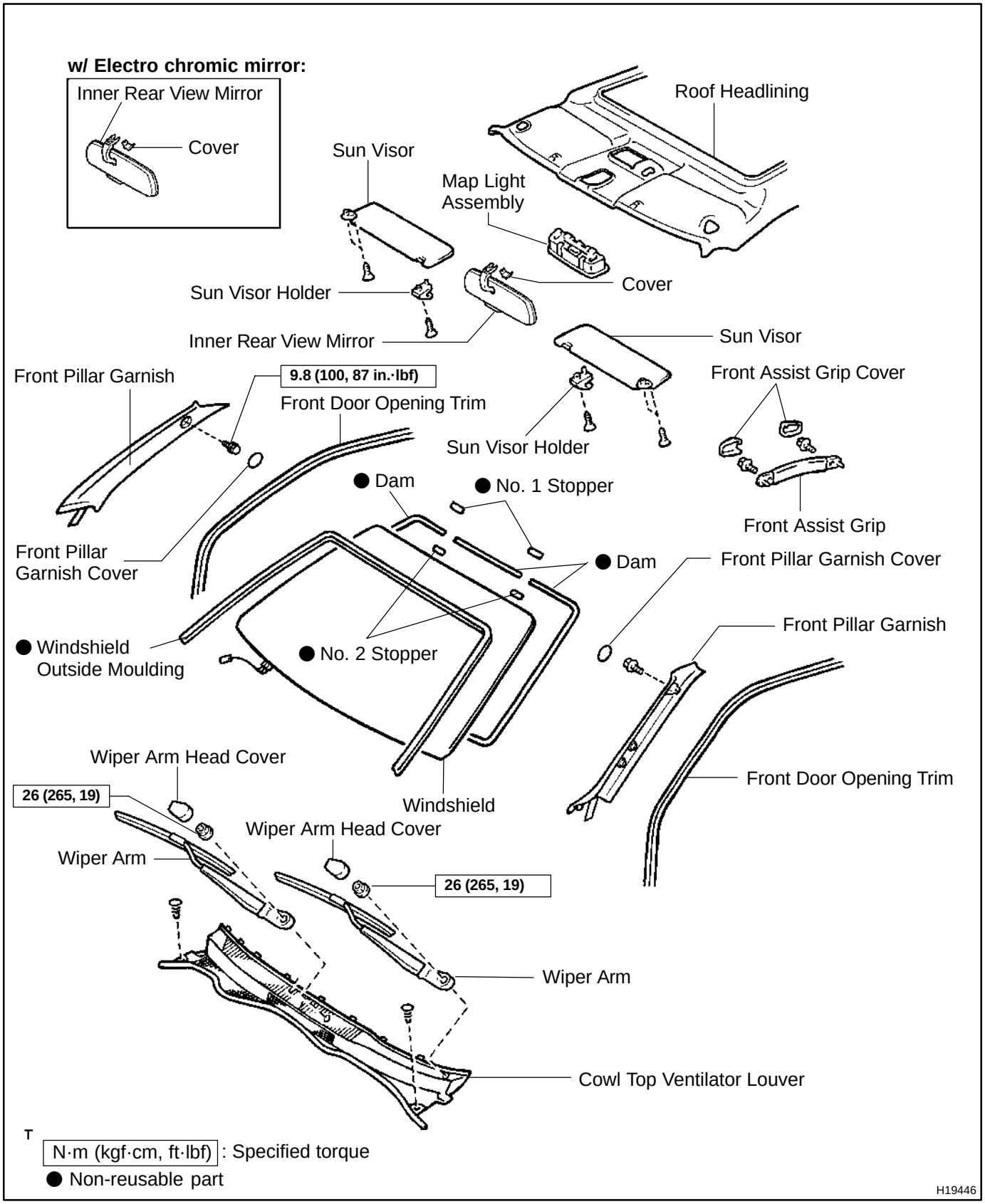
- Initial hardening time: 30 minutes
- Perfect hardening time: 24 hours

2. INSTALL MOULDING

WINDSHIELD

COMPONENTS

BO22F-08



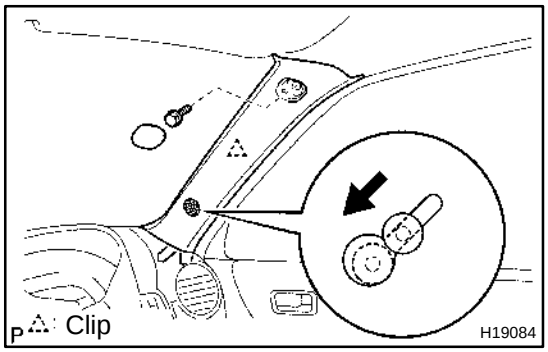
BO4DL-03

REMOVAL

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE FRONT PART OF FRONT DOOR OPENING TRIMS



2. REMOVE FRONT PILLAR GARNISH

(a) Using a screwdriver, remove the front pillar garnish cover.

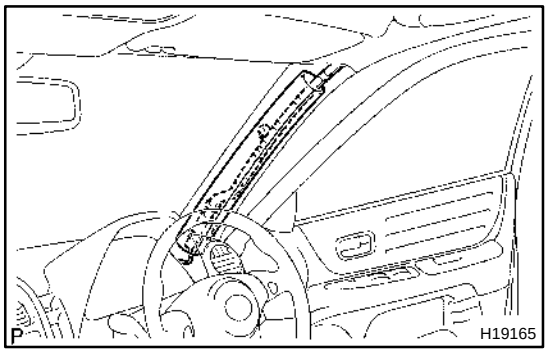
HINT:

Tape the screwdriver tip before use.

(b) Remove the bolt.

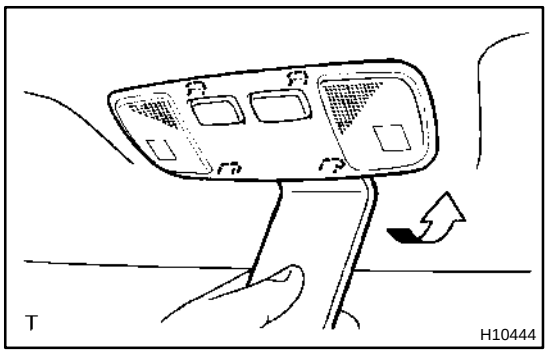
(c) Using a screwdriver, remove the front pillar garnish.

(d) Remove the bolt.



(e) Pack the airbag with protection cover.

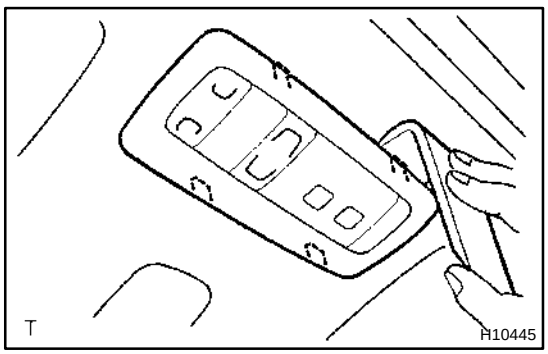
(f) Employ the same manner described above to the other side.



3. w/o Sliding roof:
REMOVE MAP LIGHT ASSEMBLY

(a) Using a moulding remover, remove the lens.

(b) Remove the 2 screws and the map light assembly, then disconnect the connectors.



4. w/ Sliding roof:
REMOVE MAP LIGHT ASSEMBLY

(a) Using a moulding remover, remove the cover.

(b) Remove the 2 screws and the map light assembly.

(c) Disconnect the connectors.

5. REMOVE SUN VISORS

(a) Remove the 2 screws and sun visor, then disconnect the connector.

(b) Employ the same manner described above to the other side.

6. REMOVE SUN VISOR HOLDERS

Remove the 2 screws and sun visor holders.

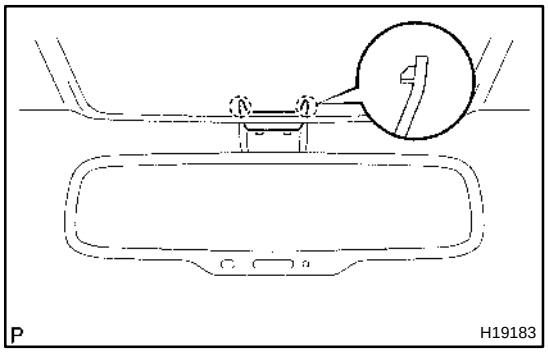
7. REMOVE FRONT ASSIST GRIP

(a) Using a screwdriver, remove the front assist grip covers.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 bolts and assist grip.

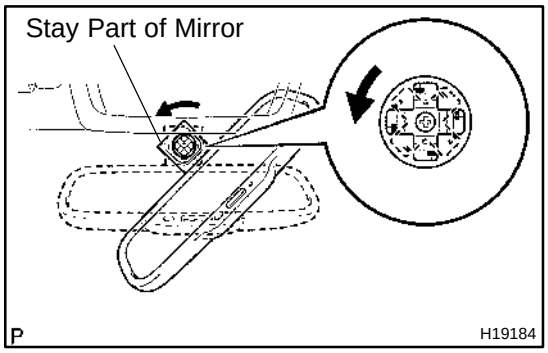


8. REMOVE INNER REAR VIEW MIRROR

(a) Using a screwdriver, remove the inner rear view mirror stay holder cover.

HINT:

Tape the screwdriver tip before use.



(b) w/ electro chromic inner mirror:
Disconnect the connector.

(c) Remove the mirror assembly by turning the stay part of the mirror counterclockwise.

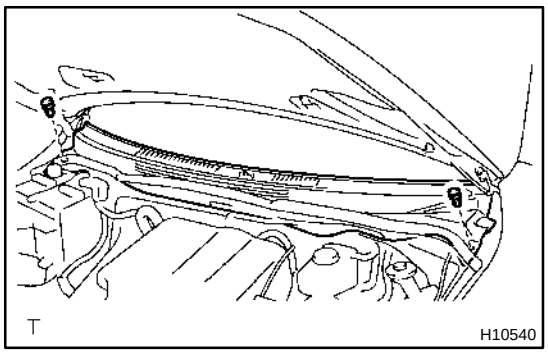
9. REMOVE WIPER ARMS

(a) Using a screwdriver, remove the 2 wiper arm head covers.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 nuts and 2 wiper arms.

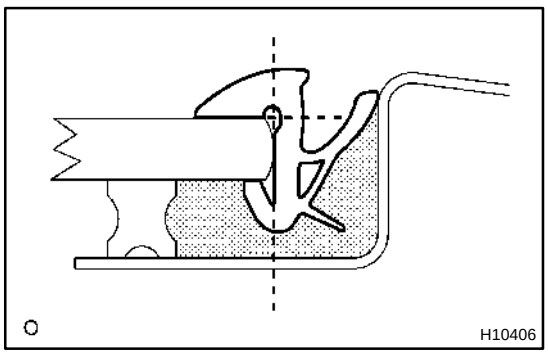


10. REMOVE COWL TOP VENTILATOR LOUVER

(a) Remove the hood to cowl top seal.

(b) Remove the 2 clips and cowl top ventilator louver.

11. PULL DOWN FRONT PART OF ROOF HEADLINING



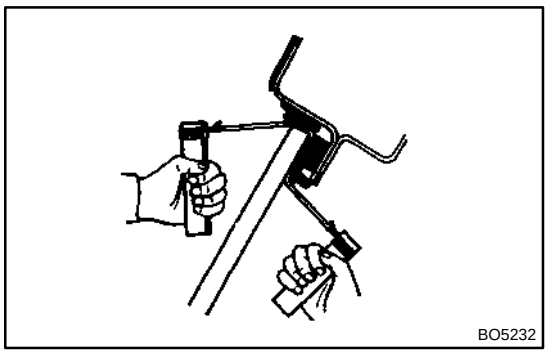
12. REMOVE WINDSHIELD OUTSIDE MOULDING

(a) Using a knife, cut off the moulding as shown in the illustration.

NOTICE:

Do not damage the body with the knife.

(b) Remove the remaining moulding.



13. REMOVE WINDSHIELD GLASS

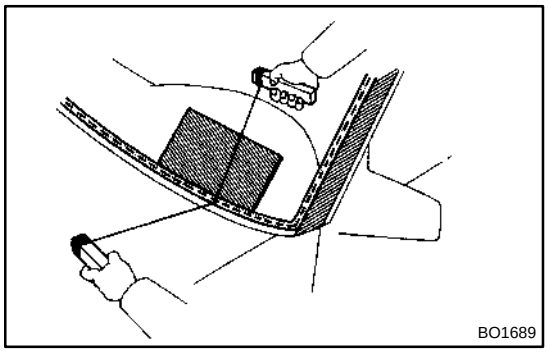
(a) Push piano wire through between the body and glass from the interior.

(b) Tie both wire ends to wooden blocks or similar objects.

(c) w/ Front window defogger:
Disconnect the connector.

NOTICE:

Be careful not to damage the wire harness.



(d) Cut the adhesive by pulling the piano wire around it.

NOTICE:

When separating the glass, take care not to damage the paint and exterior ornaments. To prevent scratching the safety pad when removing the windshield, place a plastic sheet between the piano wire and safety pad.

HINT:

Apply protective tape to the outer surface to keep the surface from being scratched.

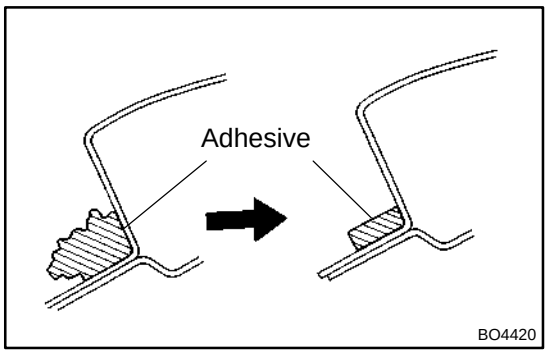
(e) Remove the glass.

NOTICE:

Leave as much of the adhesive on the body as possible when cutting off the glass.

BO2CP-04

INSTALLATION



1. CLEAN AND SHAPE CONTACT SURFACE OF BODY

(a) Using a knife, cut away any rough areas on the body.

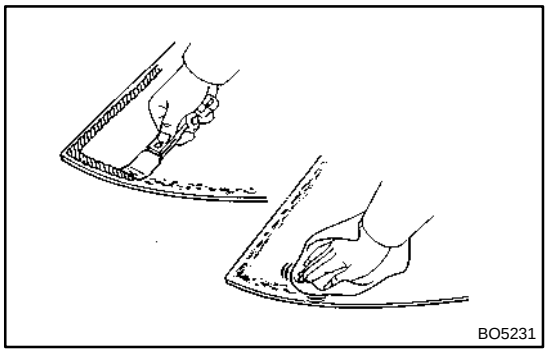
HINT:

Leave as much of the adhesive on the body as possible.

(b) Clean the cutting surface of the adhesive with a piece of shop rag soaked with cleaner.

HINT:

Even if all the adhesive has been removed with knife, clean the body with the shop rag.



2. CLEAN REMOVED GLASS

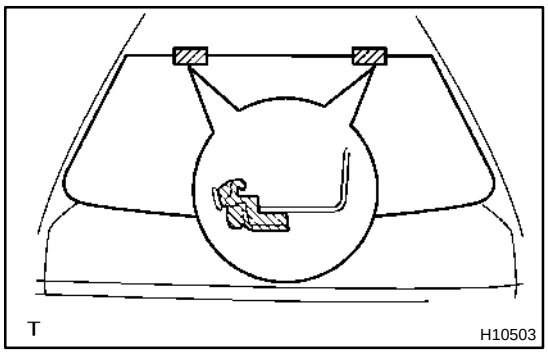
(a) Remove the damaged No. 2 stoppers and dams.

(b) Using a scraper, remove the adhesive sticking to the glass.

(c) Clean the glass with cleaner.

NOTICE:

- **Be careful not to damage the glass.**
- **Do not touch the glass face after cleaning it.**



3. REPLACE NO. 1 STOPPERS

(a) Remove the damaged stoppers.

(b) Cut off the old adhesive around the stoppers installation area.

NOTICE:

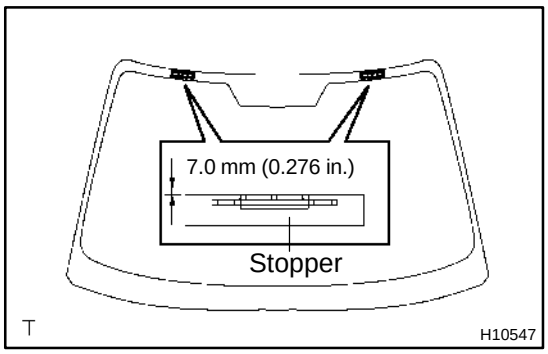
Be careful not to damage the body.

(c) Clean the installation area.

(d) Attach new stoppers to the body with the notches on the body aligned with the stoppers as shown in the illustration.

HINT:

Make sure that the stoppers are installed in the correct direction.

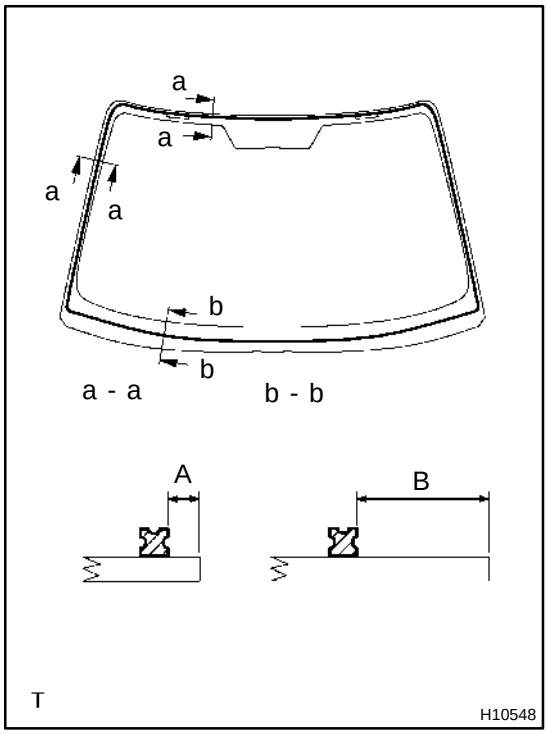


4. INSTALL NEW NO. 2 STOPPERS

Attach new stoppers to the glass with the ceramic notches on the glass aligned with the stoppers as shown in the illustration.

HINT:

Make sure that the stoppers are installed in the correct direction.

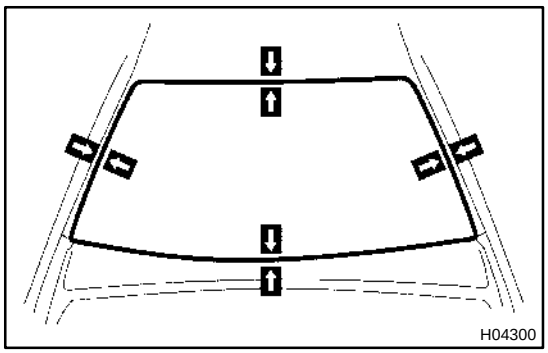


5. INSTALL NEW DAMS

Install new dams with double-stick tape as shown in the illustration.

A: 7.0 mm (0.276 in.)

B: 35.9 mm (1.413 in.)



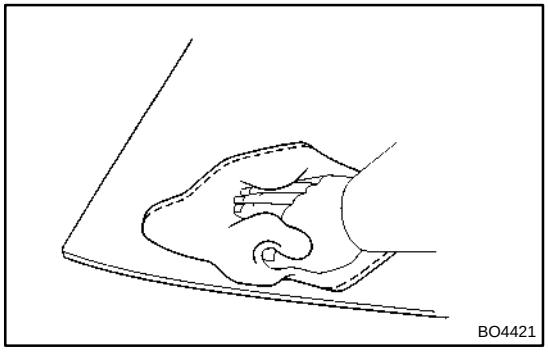
6. POSITION GLASS

(a) Place the glass in the correct position.

(b) Check that all contacting parts of the glass rim are perfectly even.

(c) Place reference marks between the glass and body.

(d) Remove the glass.

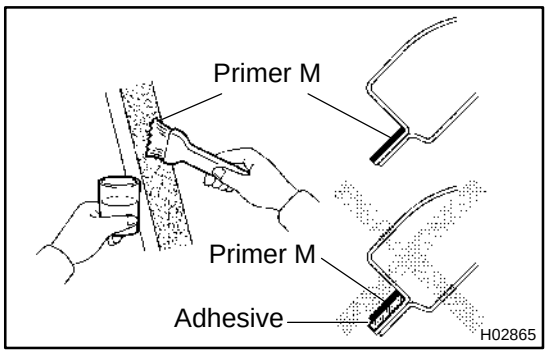


7. CLEAN CONTACT SURFACE OF GLASS

Using a cleaner, clean the contact surface which is black-colored area around the entire glass rim.

NOTICE:

Do not touch the glass face after cleaning it.

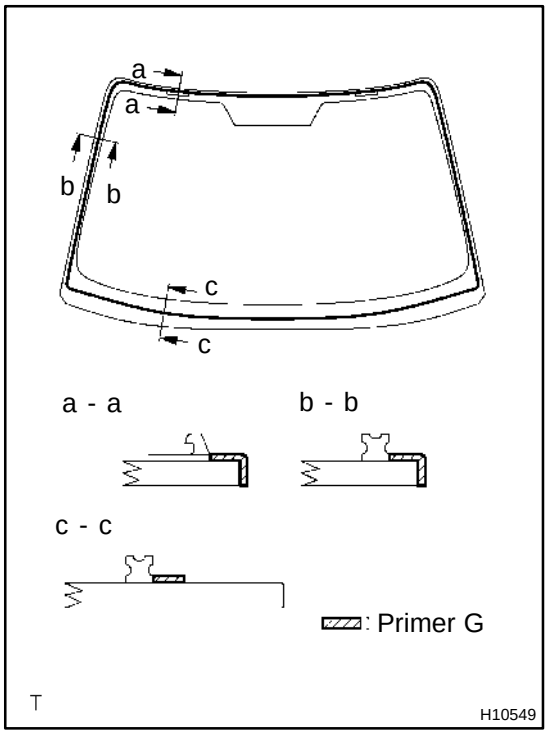


8. COAT CONTACT SURFACE OF BODY WITH PRIMER "M"

Using a brush, coat Primer M to the exposed part of body on the vehicle side.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not coat Primer M to the adhesive.**
- **Do not keep any of the opened Primer M for later use.**



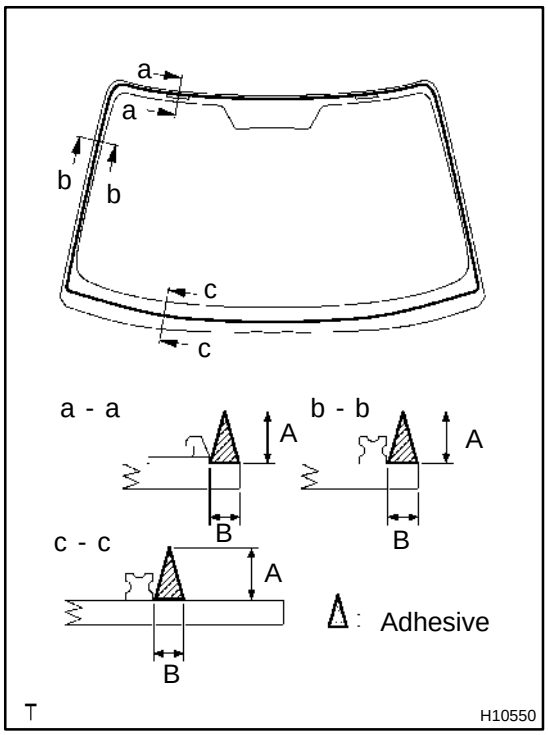
9. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

(a) Using a brush or sponge, coat the edge of the glass and the contact surface with Primer G as shown in the illustration.

(b) When the primer is coated wrongly to the area other than the specified by accident, wipe it off with a clean shop rag before the primer dries.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**



10. APPLY ADHESIVE

(a) Cut off the tip of the cartridge nozzle.
Part No. 08850-00801 or equivalent

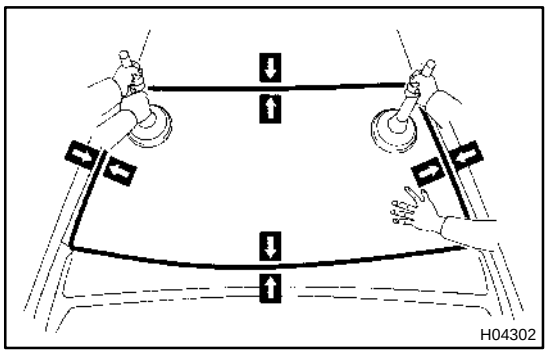
HINT:

After cutting off the tip, finish off the adhesive within the time described in the table below.

Temperature	Tackfree time
35˚C (95˚F)	15 minutes
20˚C (68˚F)	100 minutes
5˚C (41˚F)	8 hours

(b) Load the cartridge into the sealer gun.

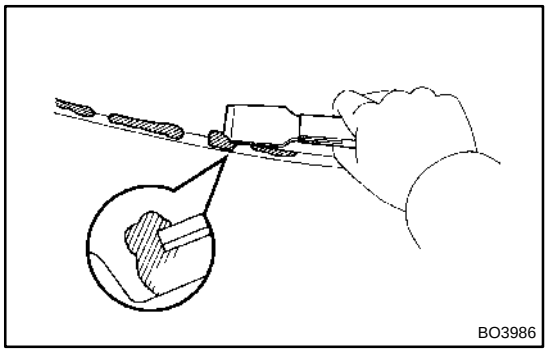
(c) Coat the glass with adhesive as shown in the illustration.
A: 12.5 mm (0.492 in.)
B: 8.0 mm (0.315 in.)



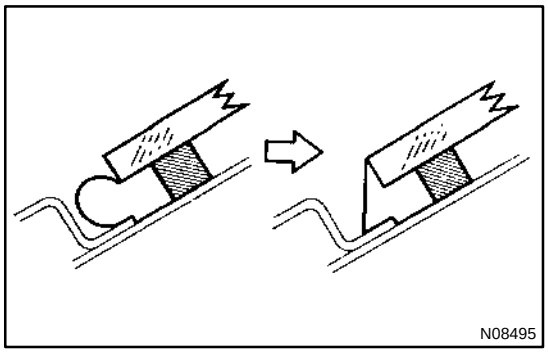
11. INSTALL GLASS

(a) Position the glass so that the reference marks are lined up, and press in gently along the rim.

(b) Using a spatula, apply adhesive on the glass rim.



(c) Use a scraper to remove any excess or protruding adhesive.



HINT:

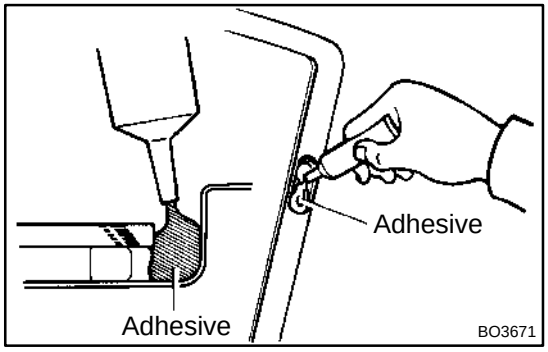
Confirm that the dam is attached to the body panel as shown in the illustration.

(d) Hold the windshield glass in place securely with a protective tape or equivalent until the adhesive hardens.

NOTICE:

Take care not to drive the vehicle during the time described in the table below.

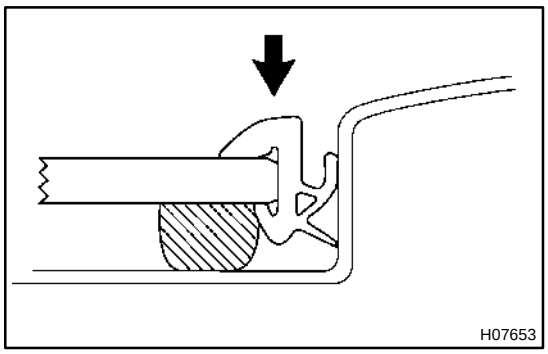
Temperature	Minimum time prior to driving the vehicle
35˚C (95˚F)	1.5 hours
20˚C (68˚F)	5 hours
5˚C (41˚F)	24 hours



12. APPLY ADHESIVE TO MOULDING INSTALLATION AREA

Apply adhesive to the moulding installation area between the glass and the body.

Part No. 08833-00030 or equivalent



13. INSTALL WINDSHIELD OUTSIDE MOULDING

Place new moulding onto the body and tap it by hand.

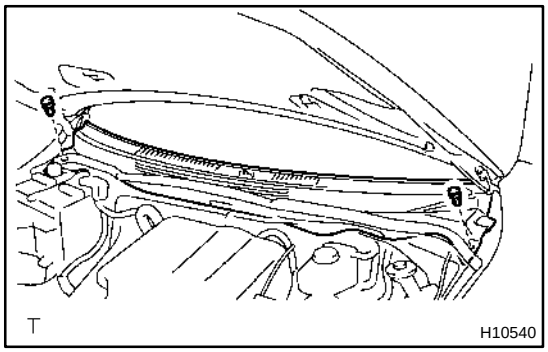
14. INSPECT FOR LEAK AND REPAIR

(a) Conduct a leak test after the hardening time has elapsed.

(b) Seal any leak with sealant.

Part No. 08833-00030 or equivalent

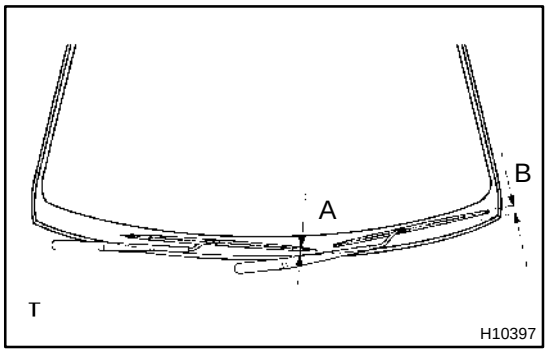
15. INSTALL FRONT PART OF ROOF HEADLINING



16. INSTALL COWL LOUVER

(a) Install the cowl louver with the 2 clips.

(b) Install the hood to cowl top seal.



17. INSTALL WIPER ARMS

(a) Operate the wipers once and turn the wiper switch OFF.

(b) Install the wiper arms and tighten the nuts by hand.

(c) Adjust the installation positions of the wiper arms to the positions as shown in the illustration.

A: 20.0 mm (0.787 in.)

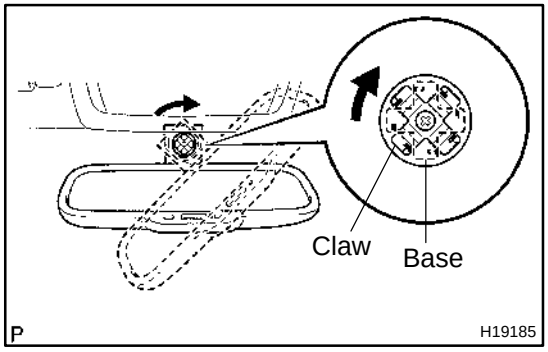
B (Europe models): 25.0 mm (0.984 in.)

B (Australia models): 28.0 mm (1.102 in.)

(d) Install the 2 wiper arms with the 2 nuts.

Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

(e) Install the 2 wiper arm head covers.



18. REMOVE ELECTRO CHROMIC INNER MIRROR

(a) Match the claw part of the mirror with a cut part of the base.

(b) Turn the stay part of the mirror clockwise so that the stay comes to the original position, and then install the mirror assembly.

(c) w/ Electro chromic inner mirror:
Connect the inner rear view mirror connector.

19. INSTALL FRONT ASSIST GRIP

(a) Install the assist grip with the 2 screws.

(b) Install the caps.

20. INSTALL SUN VISOR HOLDERS

Install the sun visor holders with the 2 screws.

21. INSTALL SUN VISORS

Connect the connectors, then install the sun visors with the 4 screws.

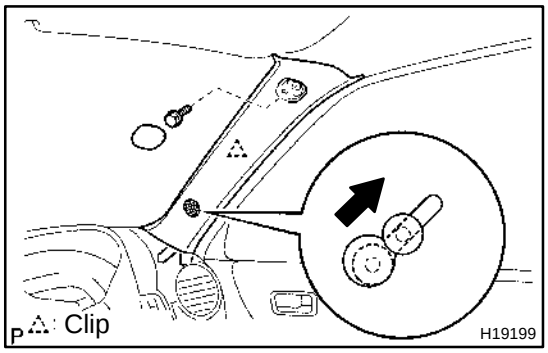
22. INSTALL MAP LIGHT ASSEMBLY

(a) Connect the connectors.

(b) Install the map light assembly with the 2 screws.

(c) w/o Sliding roof:
Install the lens.

(d) w/ Sliding roof:
Install the cover.



23. INSTALL FRONT PILLAR GARNISH

(a) Remove the protection cover.

(b) Install the bolt.
Torque: 9.8 N·m (100 kgf·cm, 87 in.·lbf)

(c) Install the front pillar garnish to the body.

(d) Install the bolt.

(e) Install the front pillar garnish cover.

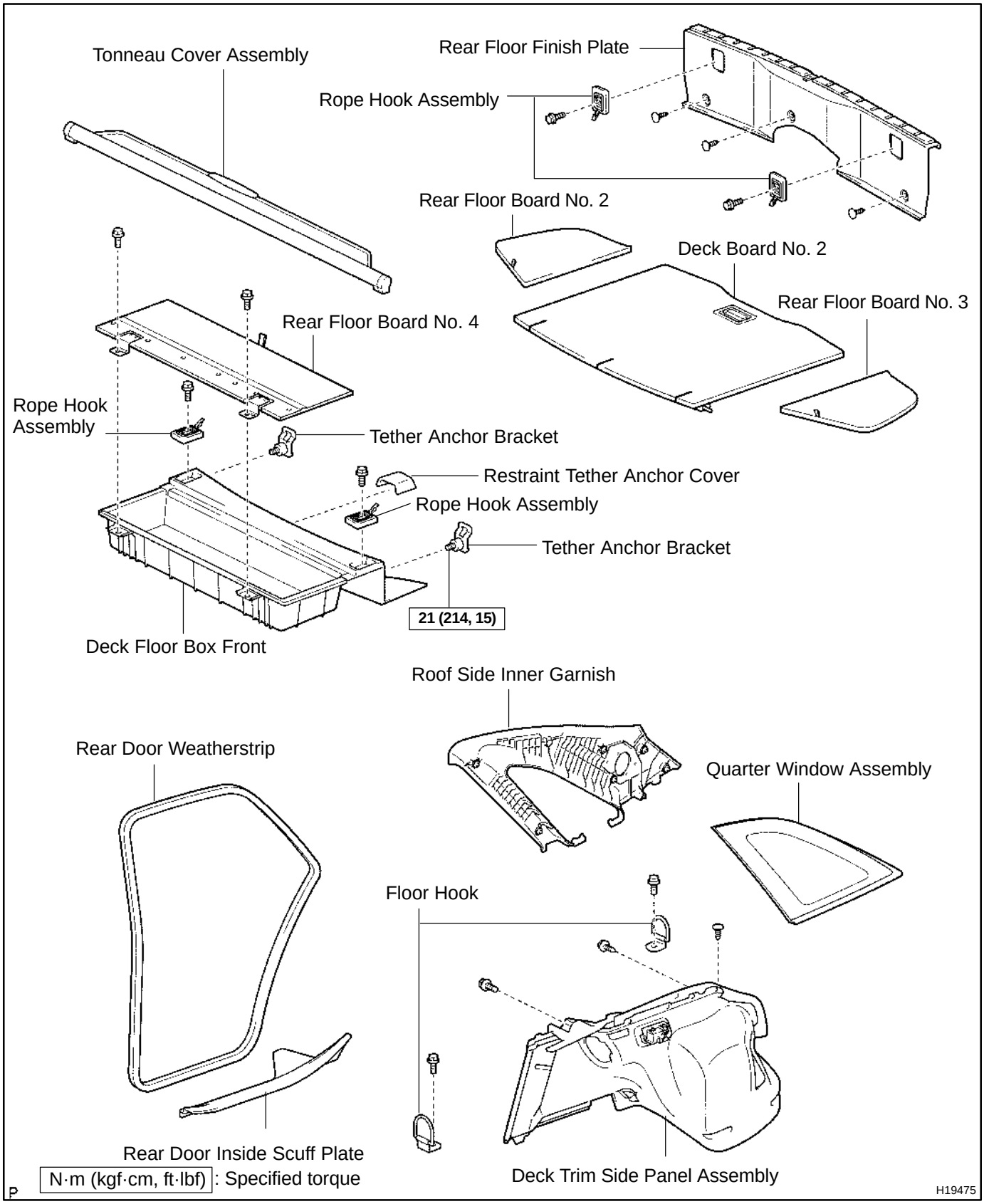
(f) Employ the same manner described above to the other side.

24. INSTALL FRONT PART OF FRONT DOOR OPENING TRIMS

QUARTER WINDOW GLASS

BO4DM-02

COMPONENTS



BO4DN-03

REMOVAL

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE REAR SEAT CUSHION (See page BO-204)

2. REMOVE SIDE SEATBACK ASSEMBLY (See page BO-204)

3. REMOVE REAR SEAT FLOOR BOARD NO. 4

(a) Remove the seat back board carpets.

(b) Remove the 2 bolts and rear floor board.

4. REMOVE DECK FLOOR BOX FRONT

(a) Remove the 2 bolts and the 2 rope hook assemblies.

(b) Remove the 2 bolts and 2 tether anchor brackets.

(c) Remove the restraint seat tether anchor cover.

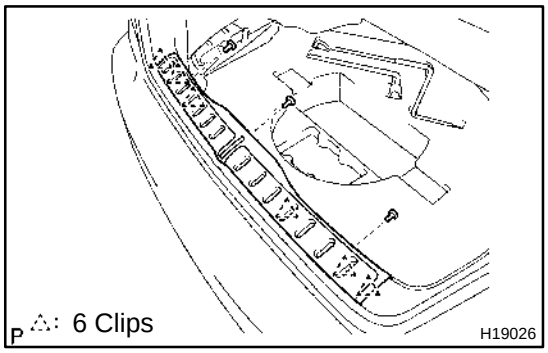
(d) Remove the deck floor box front.

5. REMOVE DECK BOARD NO. 2

6. REMOVE REAR FLOOR BOARD NO. 2

7. REMOVE REAR FLOOR BOARD NO. 3

8. REMOVE TONNEAU COVER ASSEMBLY



9. REMOVE REAR FLOOR FINISH PLATE

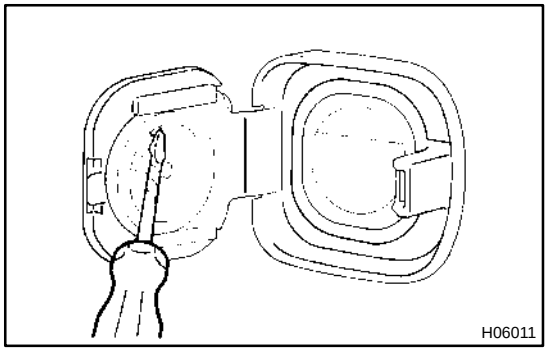
(a) Remove the 2 bolts and the 2 rope hook assemblies.

(b) Remove the 3 clips.

(c) Using a screwdriver, remove the rear floor finish plate.

HINT:

Tape the screwdriver tip before use.

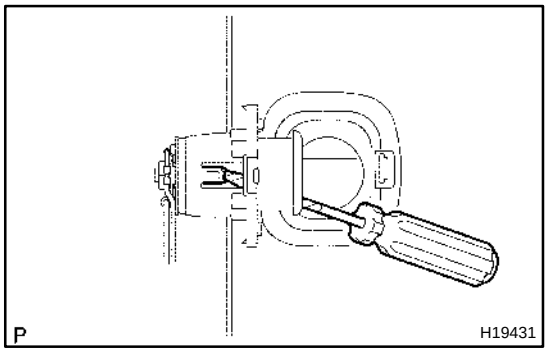


10. RH side:
REMOVE ACCESSORY SOCKET

(a) Using a screwdriver, disengage the claw on the accessory socket cover from the hole in the accessory socket, then pull out the accessory socket approx. 15 mm (0.59 in.).

HINT:

Tape the screwdriver tip before use.



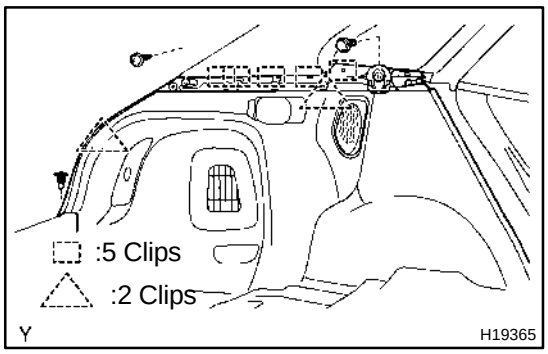
(b) Using a screwdriver, disengage the claw on the accessory socket cover from the body and remove the accessory socket and cover as a unit.

HINT:

Tape the screwdriver tip before use.

(c) Disconnect the connector.

(d) Disassemble the accessory socket from the socket cover.



11. REMOVE DECK TRIM SIDE PANEL ASSEMBLY

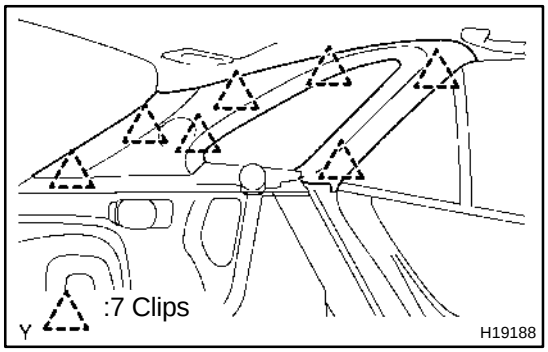
(a) Remove the 2 bolts and 2 floor hooks.

(b) Remove the screw, bolt and clip.

(c) Using a screwdriver, remove the deck trim side panel assembly, then disconnect the connector.

HINT:

Tape the screwdriver tip before use.



12. REMOVE ROOF SIDE INNER GARNISH

Using a screwdriver, remove the roof side inner garnish.

HINT:

Tape the screwdriver tip before use.

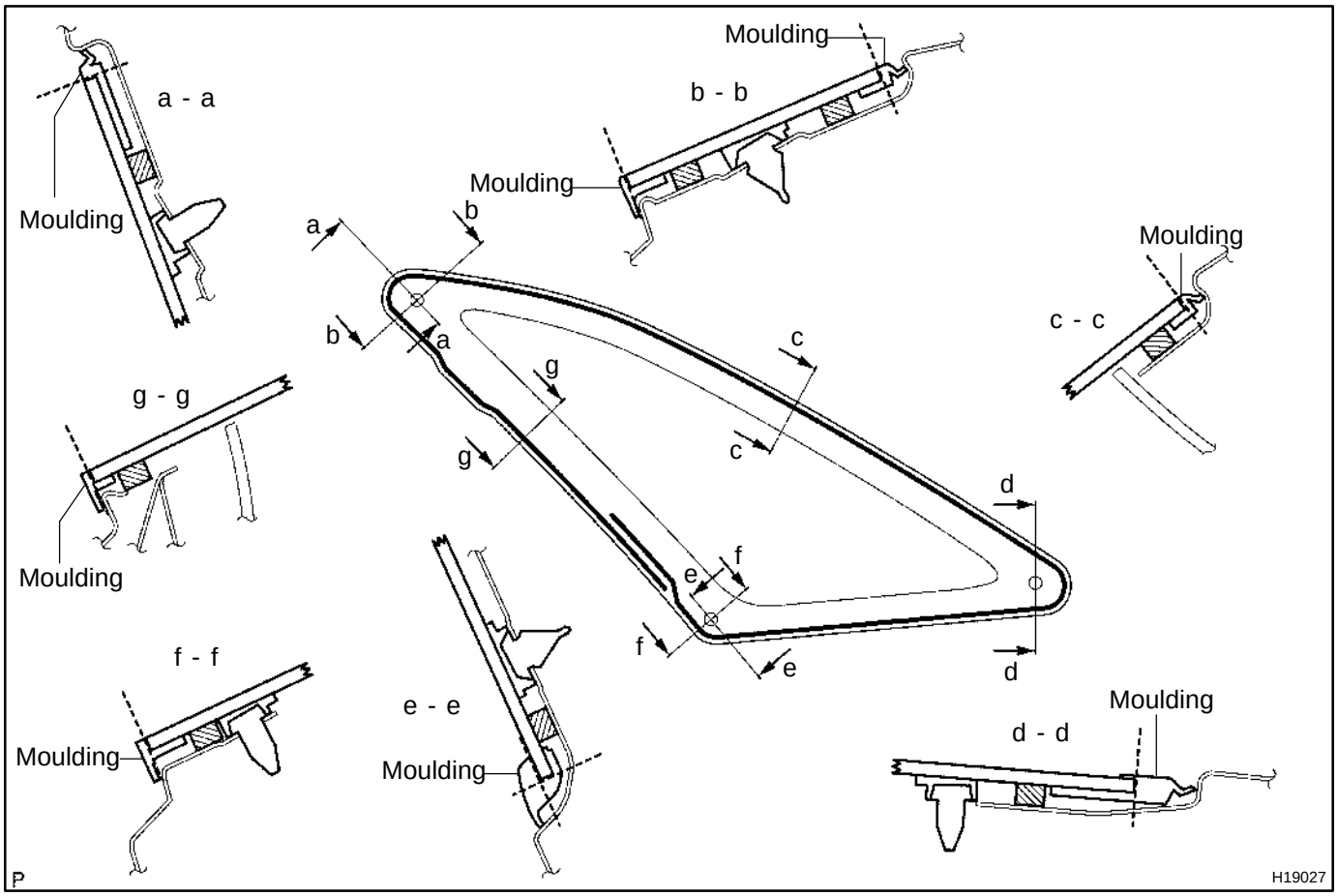
13. REMOVE QUARTER WINDOW GLASS

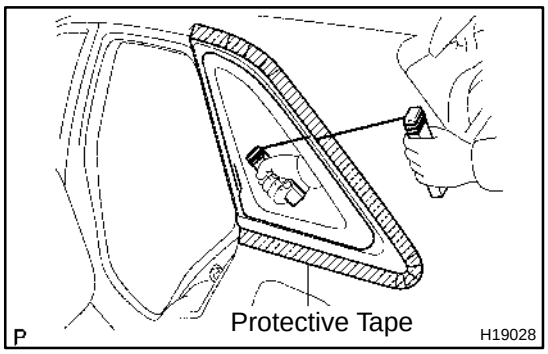
(a) Using a knife, cut off the moulding as shown in the illustration.

NOTICE:

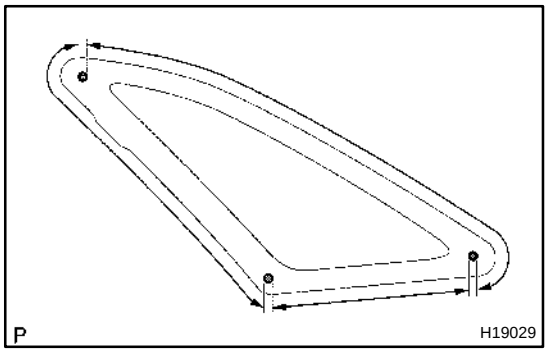
Do not damage the body with a knife.

(b) Disconnect the connector.

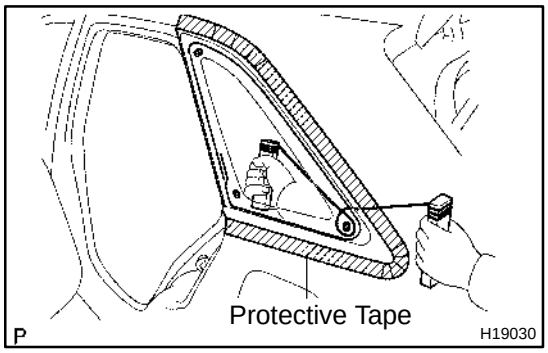




(c) Push a piano wire through from the interior.
(d) Tie both wire ends to wooden blocks or similar object.
HINT:
Apply protective tape to the outer surface to keep the surface from being scratched.
NOTICE:
When separating the glass, take care not to damage the paint and exterior.



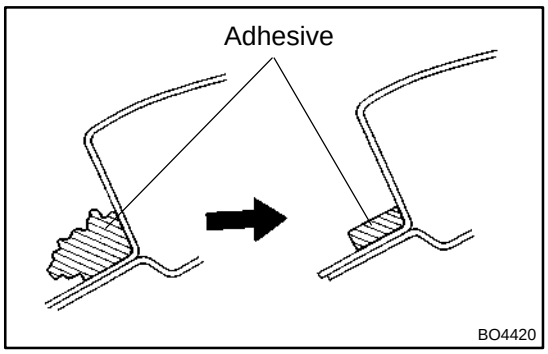
(e) Cut the adhesive by pulling the piano wire around it.
HINT:
Cut the adhesive areas as shown in the illustration, leaving the adhesive where the clips are.



(f) Push the piano wire through as shown in the illustration, and cut off the adhered part to the clips.
(g) Remove the glass.
NOTICE:
Leave as much of the adhesive on the body as possible when cutting off the glass.

BO4DO-02

INSTALLATION



1. CLEAN AND SHAPE CONTACT SURFACE OF BODY PANEL

(a) Using a knife, cut away any rough areas on the body.

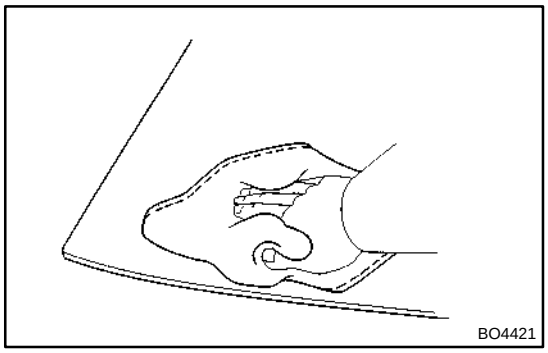
HINT:

Leave as much of the adhesive on the body as possible.

(b) Clean the cutting surface of the adhesive with a piece of shop rag soaked with cleaner.

HINT:

Even if all the adhesive has been removed with a knife, clean the body with the shop rag.

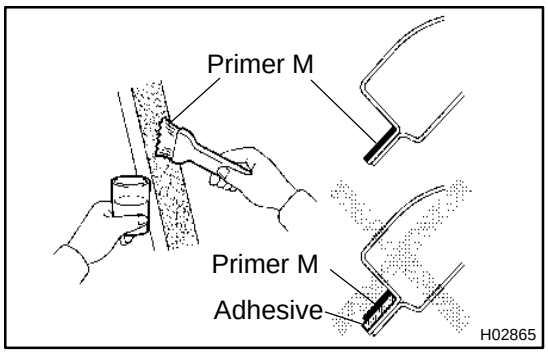


2. CLEAN CONTACT SURFACE OF GLASS

Using a cleaner, clean the contact surface which is black-colored area around the entire glass rim.

NOTICE:

Do not touch the glass face after cleaning it.



3. COAT CONTACT SURFACE OF BODY WITH PRIMER "M"

Using a brush, coat Primer M to the exposed part of body on the vehicle side.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not coat Primer M to the adhesive.**
- **Do not keep any of the opened Primer M for later use.**

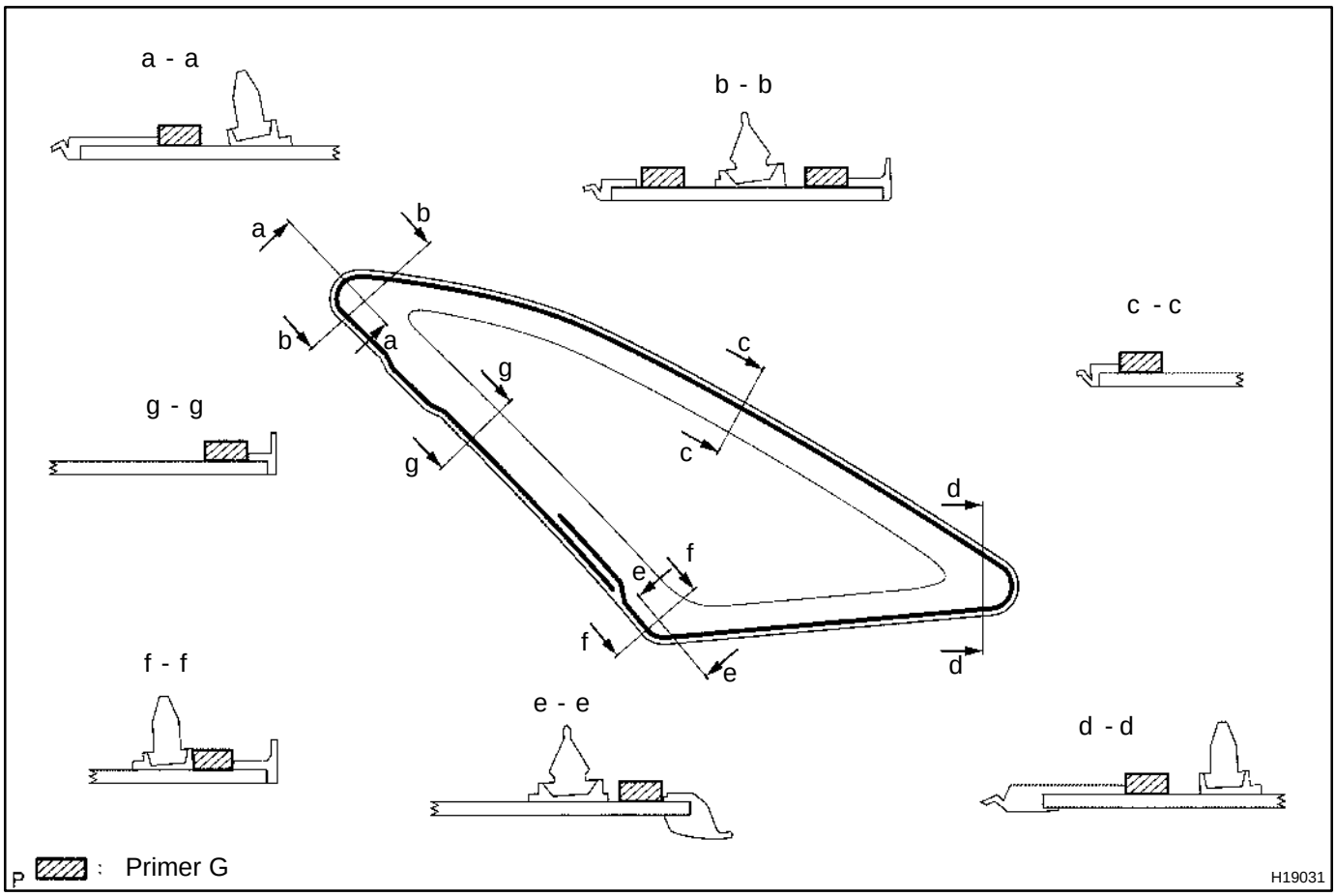
4. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

(a) Using a brush or sponge, coat the edge of the glass and the contact surface with Primer G as shown in the illustration on the following page.

(b) When the primer is coated wrongly to the area other than the specified, wipe it off with a clean shop rag before the primer dries.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**



5. APPLY ADHESIVE

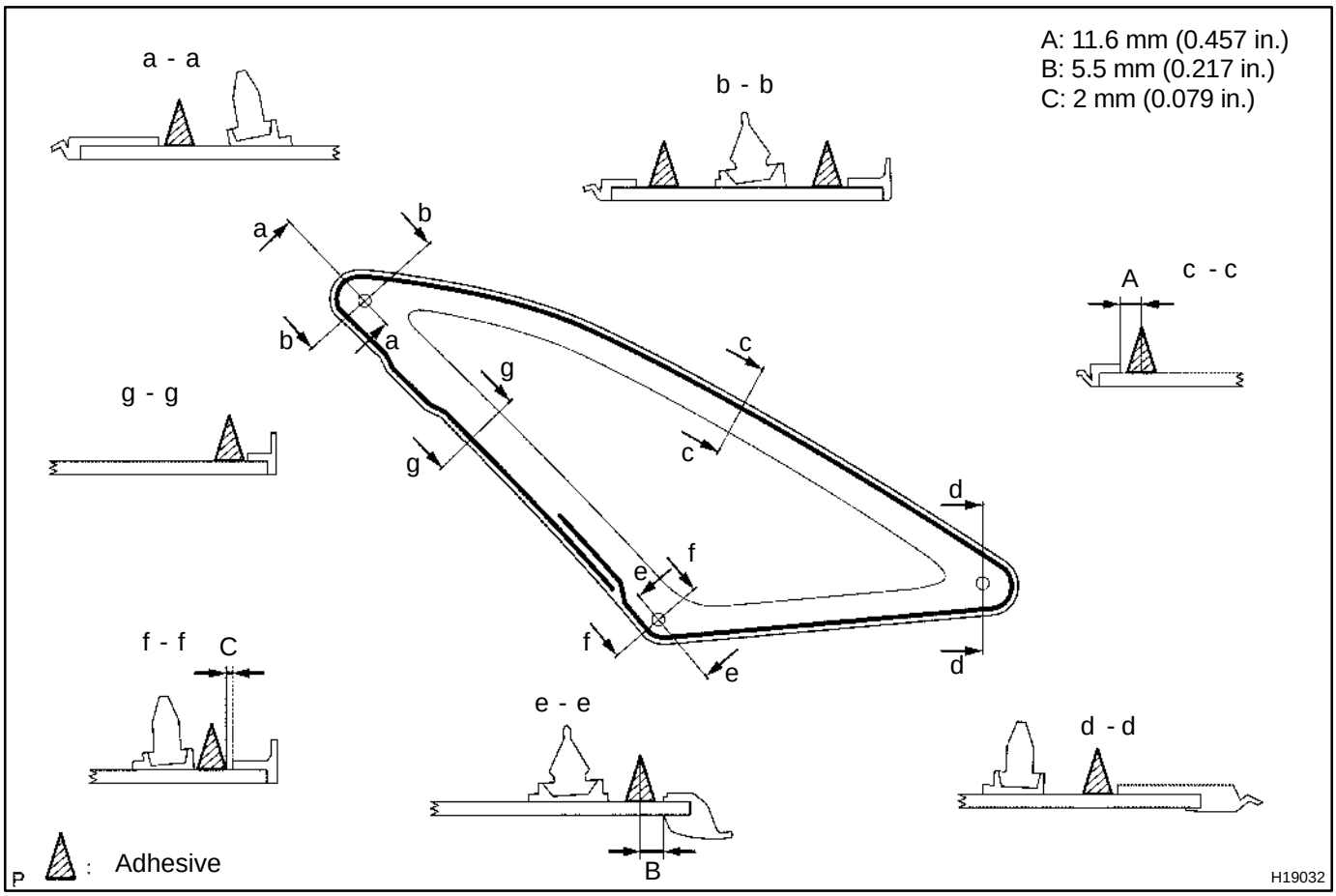
(a) Cut off the tip of the cartridge nozzle.
Part No. 08850-00801 or equivalent.

HINT:
After cutting off the tip, finish off the adhesive within the time described in the table below.

Temperature	Tackfree time
35˚C (95˚F)	15 minutes
20˚C (68˚F)	100 minutes
5˚C (41˚F)	8 hours

(b) Load the cartridge into the sealer gun.

(c) Coat the glass with adhesive as shown in the illustration on the following page.
Adhesive height: 12.5 mm (0.492 in.)
Adhesive width: 8.0 mm (0.315 in.)



6. INSTALL GLASS

(a) Install the glass to the body.

(b) Hold the glass in place securely with a protective tape or equivalent until the adhesive hardens.

NOTICE:

Take care not to drive the vehicle during the time described in the table below.

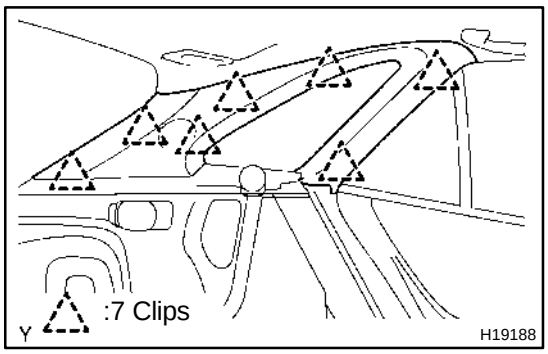
Temperature	Minimum time prior to driving the vehicle
35˚C (95˚F)	1.5 hours
20˚C (68˚F)	5 hours
5˚C (41˚F)	24 hours

7. INSPECT FOR LEAK AND REPAIR

(a) Conduct a leak test after the hardening time has elapsed.

(b) Seal any leak with sealant.

Part No. 08833-00030 or equivalent.

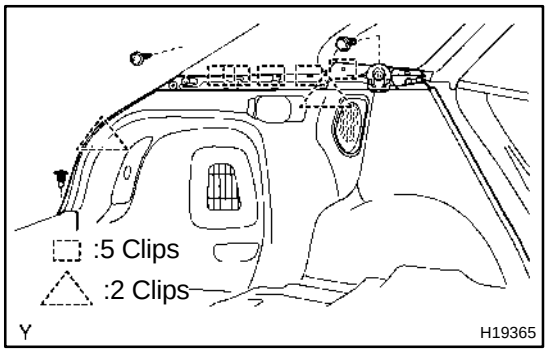


8. INSTALL ROOF SIDE INNER GARNISH

Install the roof side inner garnish to the body.

HINT:

After cutting off the tip, finish off the adhesive within the time described in the table below.



9. INSTALL DECK TRIM SIDE PANEL ASSEMBLY

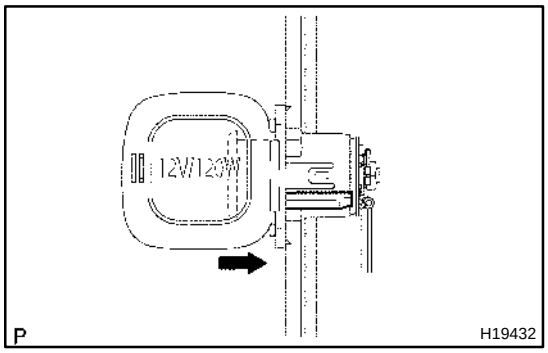
(a) Install the deck trim side panel with the screw, bolt and clip.

(b) Install the 2 floor hooks with the 2 bolts.

10. RH side:

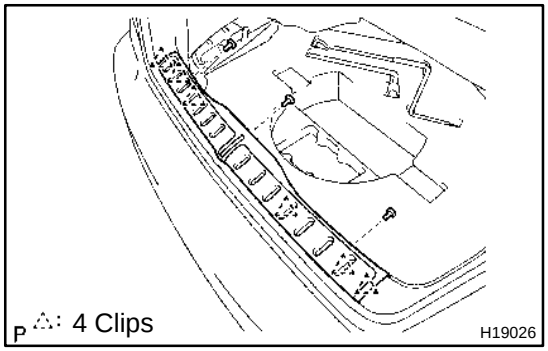
INSTALL ACCESSORY SOCKET

(a) Assemble the accessory socket to the accessory socket cover at the position 15 mm (0.59 in.) away from full lock position and ensure that they are temporarily locked.



(b) Align the cut-out on the body with the claw on the accessory socket cover, and install the accessory socket and cover to the body.

(c) After installing them, push in the accessory socket approx. 15 mm (0.59 in.) to lock it.



11. INSTALL REAR FLOOR FINISH PLATE

(a) Install the rear floor finish plate with the 3 clips.

(b) Install the 2 rope hook assemblies with the 2 bolts.

12. INSTALL TONNEAU COVER

13. INSTALL REAR FLOOR BOARD NO. 3

14. INSTALL REAR FLOOR BOARD NO. 2

15. INSTALL DECK BOARD NO. 2

16. INSTALL DECK FLOOR BOX FRONT

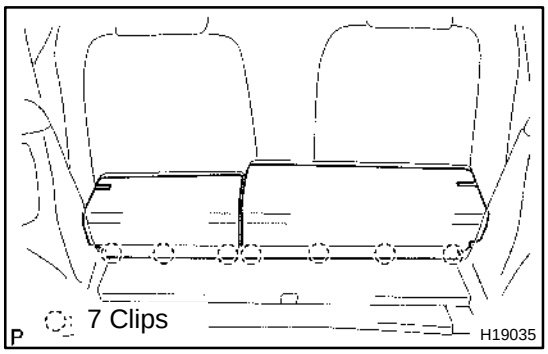
(a) Install the deck floor box.

(b) Install the 2 tether anchor brackets with the 2 bolts.

Torque: 21 N·m (214 kgf·cm, 15ft·lbf)

(c) Install the restraint seat tether anchor cover.

(d) install the 2 rope hook assemblies with the 2 bolts.



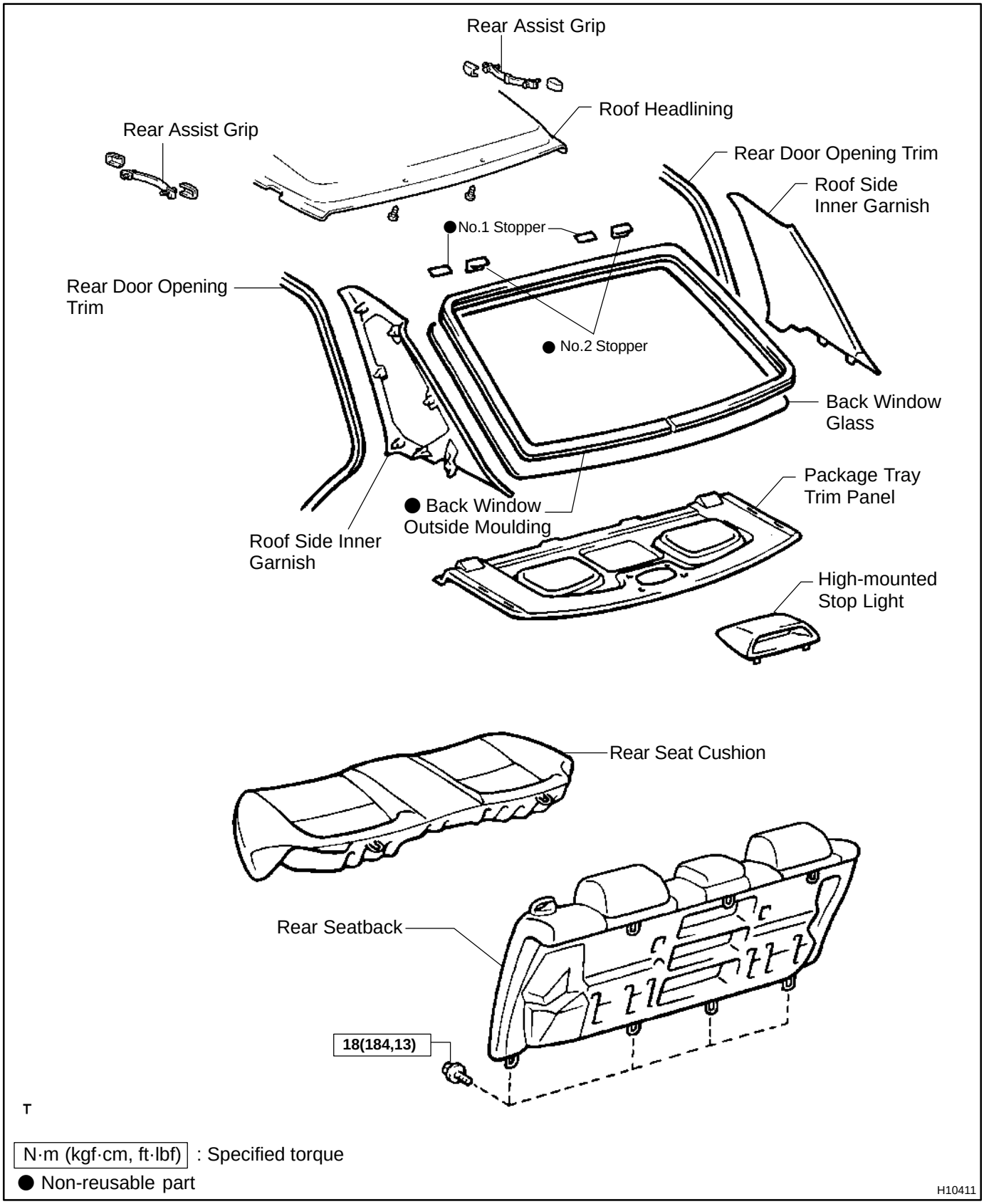
17. INSTALL REAR SEAT FLOOR BOARD NO. 4

Install the rear floor board with the 2 bolts.

BACK WINDOW GLASS

COMPONENTS

BO22L-09



N·m (kgf·cm, ft·lbf) : Specified torque

● Non-reusable part

H10411

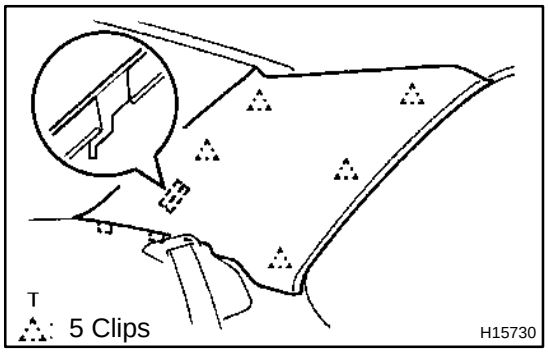
BO2CQ-04

REMOVAL

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. **REMOVE REAR SEAT CUSHION (See page BO-196)**
2. **REMOVE REAR SEATBACK (See page BO-196)**
3. **REMOVE UPPER PART OF REAR DOOR OPENING TRIMS**



4. **REMOVE ROOF SIDE INNER GARNISH**

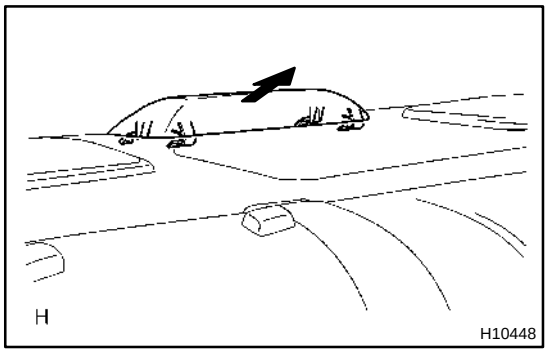
(a) Using a screwdriver, disengage the clips.

HINT:

Tape the screwdriver tip before use.

(b) Pull the garnish upward to remove it.

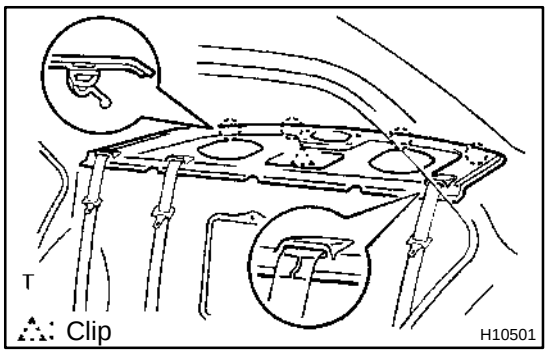
(c) Employ the same manner described above to the other side.



5. **REMOVE HIGH-MOUNTED STOP LIGHT**

(a) Remove the high-mounted stop light as shown in the illustration.

(b) Disconnect the connector.



6. **REMOVE PACKAGE TRAY TRIM PANEL**

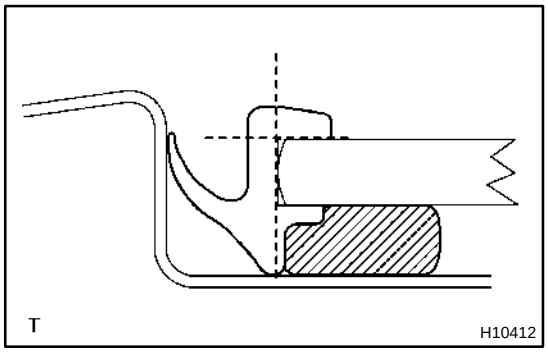
(a) Pull the package tray trim panel upward to disengage the clips.

(b) Remove the rear seat outer belts through the cutout on the package tray trim.

(c) Pull the package tray trim panel forward to remove it.

7. **REMOVE REAR ASSIST GRIPS**
8. **REMOVE REAR PART OF ROOF HEADLINING**

Remove the 2 clips.



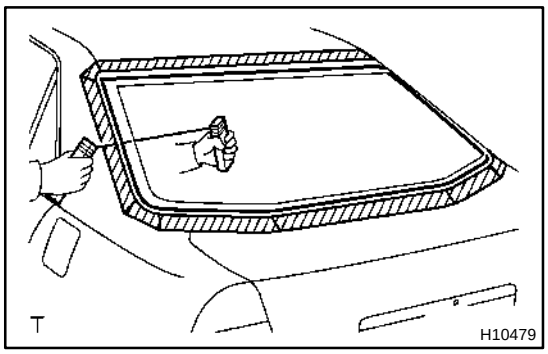
9. **REMOVE BACK WINDOW OUTSIDE MOULDING**

(a) Using a knife, cut off the moulding as shown in the illustration.

NOTICE:

Do not damage the body with the knife.

(b) Remove the remaining moulding.



10. REMOVE BACK WINDOW GLASS

(a) Disconnect the connector.

(b) Push piano wire through from the interior.

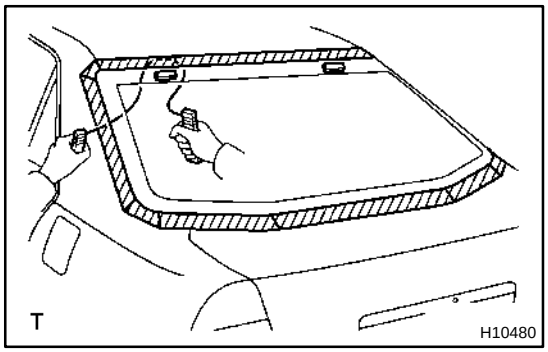
(c) Tie both wire ends to wooden blocks or similar objects.

HINT:

Apply protective tape to the outer surface to keep the surface from being scratched.

NOTICE:

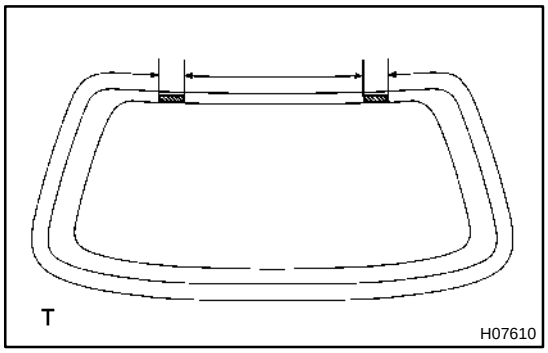
When separating the glass, take care not to damage the paint and exterior.



(d) Cut the adhesive by pulling the piano wire around it.

HINT:

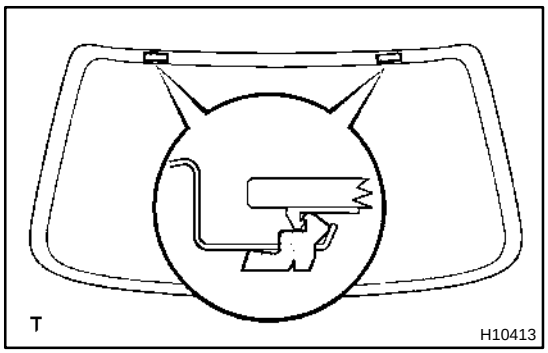
Cut the adhesive areas as shown in the illustration, leaving the adhesive where the stoppers are.



(e) Let the piano wire pass as shown in the illustration, cut off the adhesive sticking to the stoppers.

NOTICE:

Do not damage the glass stoppers.



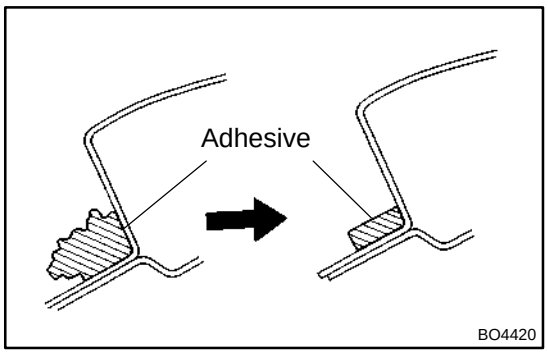
(f) Disengage the stoppers, then remove the glass.

NOTICE:

Leave as much of the adhesive on the body as possible when cutting off the glass.

BO2CR-04

INSTALLATION



1. CLEAN AND SHAPE CONTACT SURFACE OF BODY

(a) Using a knife, cut away any rough areas on the body.

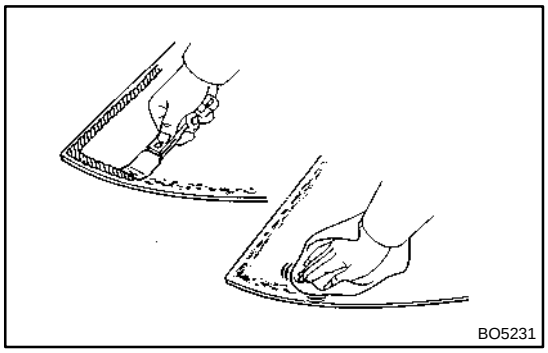
HINT:

Leave as much of the adhesive on the body as possible.

(b) Clean the cutting surface of the adhesive with a piece of shop rag saturated in cleaner.

HINT:

Even if all the adhesive has been removed with a knife, clean the body with the shop rag.



2. CLEAN REMOVED GLASS

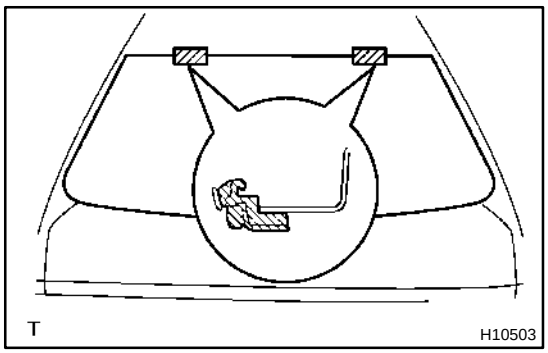
(a) Remove the damaged No.2 stoppers.

(b) Using a scraper, remove the adhesive sticking to the glass.

(c) Clean the glass with cleaner.

NOTICE:

- **Be careful not to damage the glass.**
- **Do not touch the glass face after cleaning it.**



3. REPLACE NO.1 STOPPERS

(a) Remove the damaged stoppers.

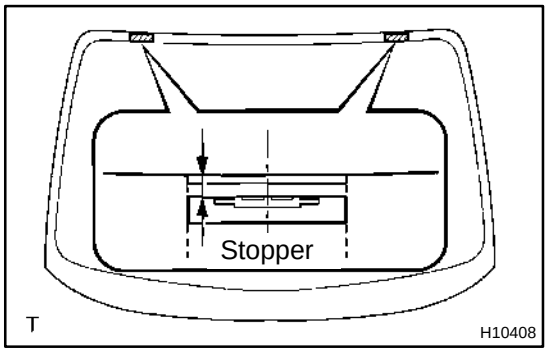
(b) Cut off the old adhesive around the stoppers installation area.

NOTICE:

Be careful not to damage the body.

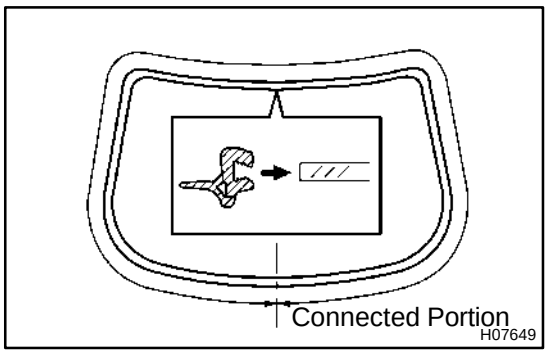
(c) Clean the installation area.

(d) Attach new stoppers to the body with the notches on the body aligned with the stoppers as shown in the illustration.



4. INSTALL NEW NO.2 STOPPERS

Attach new stoppers to the glass with the ceramic notches on the glass aligned with the stoppers as shown in the illustration.

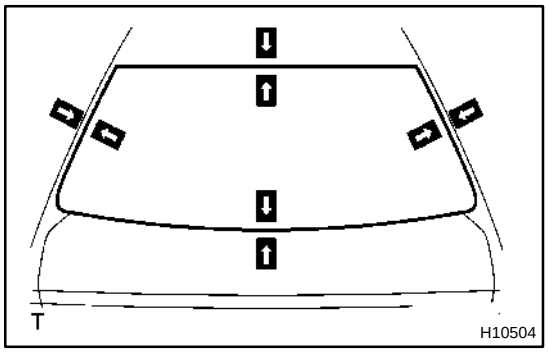


5. INSTALL NEW BACK WINDOW OUTSIDE MOULDING

Install new back window outside moulding to the back window glass as shown in the illustration.

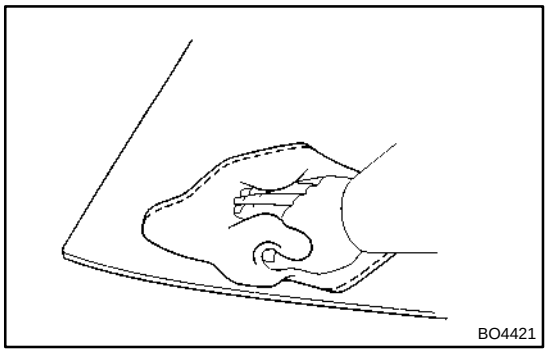
HINT:

- Install the back window outside moulding from the center of the glass on the lower side of the vehicle.
- When installing the back window outside moulding, do not stretch it.



6. POSITION GLASS

(a) Place the glass in the correct position.
(b) Check that all contacting parts of the glass rim are perfectly even.
(c) Place reference marks between the glass and body.
(d) Remove the glass.

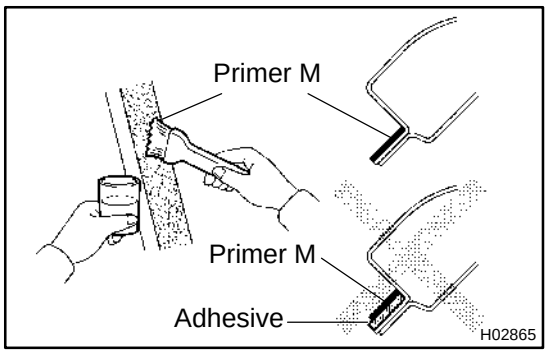


7. CLEAN CONTACT SURFACE OF GLASS

Using a cleaner, clean the contact surface which is black-colored area around the entire glass rim.

NOTICE:

Do not touch the glass face after cleaning it.

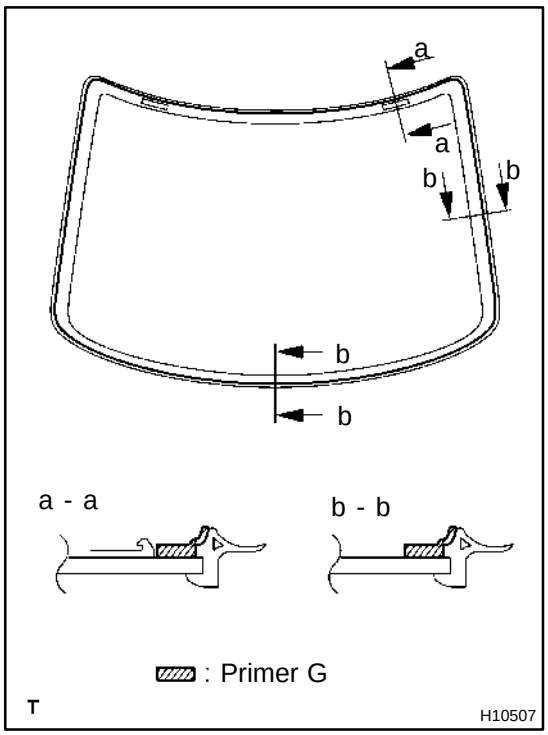


8. COAT CONTACT SURFACE OF BODY WITH PRIMER "M"

Using a brush, coat Primer M to the exposed part of body on the vehicle side.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not coat Primer M to the adhesive.**
- **Do not keep any of the opened Primer M for later use.**



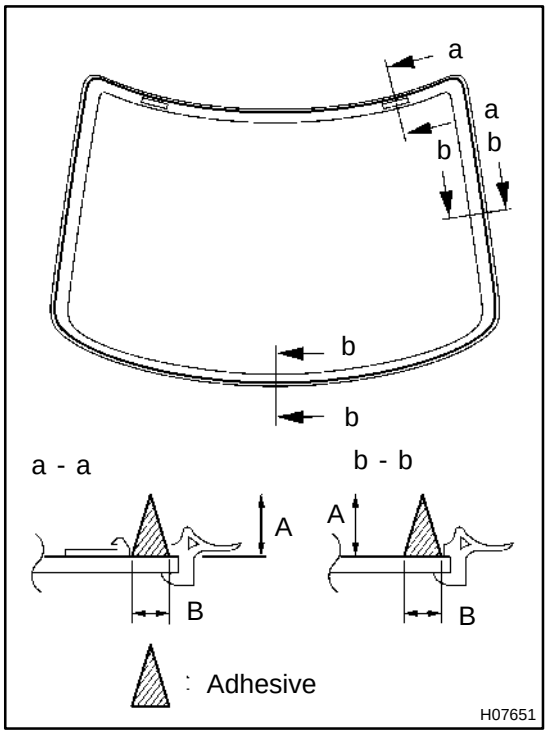
9. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

(a) Using a brush or sponge, coat the edge of the glass and the contact surface with Primer G as shown in the illustration.

(b) When the primer is coated wrongly to the area other than the specified by accident, wipe it off with a clean shop rag before the primer dries.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**



10. APPLY ADHESIVE

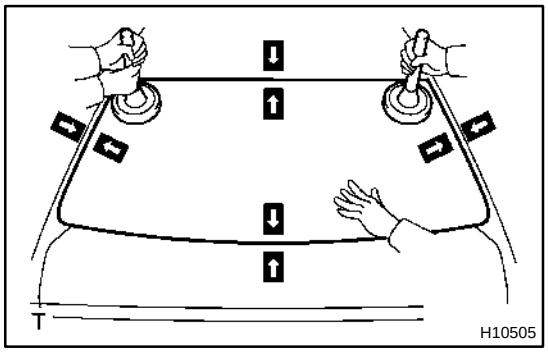
(a) Cut off the tip of the cartridge nozzle.
Part No. 08850-00801 or equivalent

HINT:
After cutting off the tip, finish off the adhesive within the time described in the table below.

Temperature	Tackfree time
35 ˚C (95 ˚F)	15 minutes
20 ˚C (68 ˚F)	100 minutes
5 ˚C (41 ˚F)	8 hours

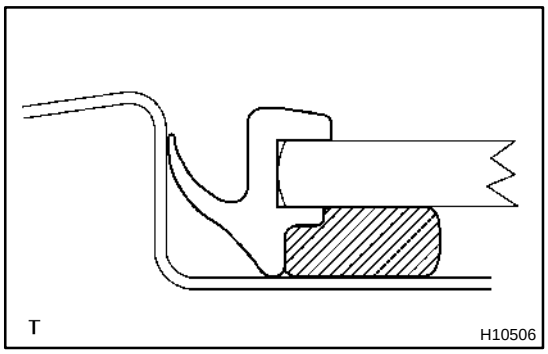
(b) Load the cartridge into the sealer gun.

(c) Coat the glass with adhesive as shown in the illustration.
A: 12.5 mm (0.492 in.)
B: 8.0 mm (0.315 in.)



11. INSTALL GLASS

(a) Position the glass so that the reference marks are lined up, and press in gently along the rim.



HINT:
Confirm that the moulding is attached to the body panel as shown in the illustration.

(b) Hold the back window glass in place securely with a protective tape or equivalent until the adhesive hardens.

NOTICE:

Take care not to drive the vehicle during the time described in the table below.

Temperature	Minimum time prior to driving the vehicle
35 ˚C (95 ˚F)	1.5 hours
20 ˚C (68 ˚F)	5 hours
5 ˚C (41 ˚F)	24 hours

12. INSPECT FOR LEAK AND REPAIR

(a) Conduct a leak test after the hardening time has elapsed.

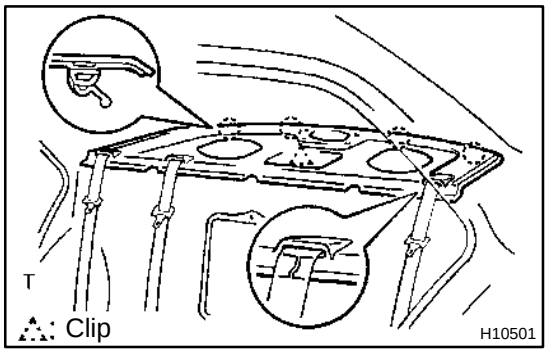
(b) Seal any leak with sealant.

Part No. 08833-00030 or equivalent

13. INSTALL REAR PART OF ROOF HEADLINING

Install the 2 clips.

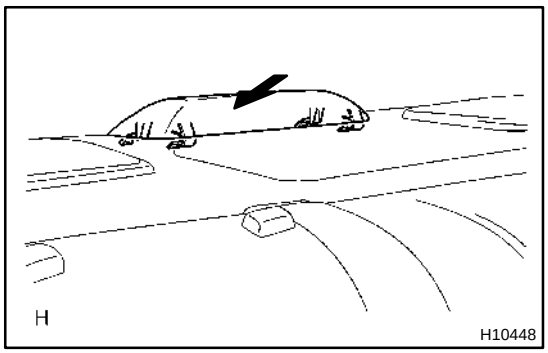
14. INSTALL REAR ASSIST GRIPS



15. INSTALL PACKAGE TRAY TRIM PANEL

(a) Install the seat belt through the cutout of the package tray trim.

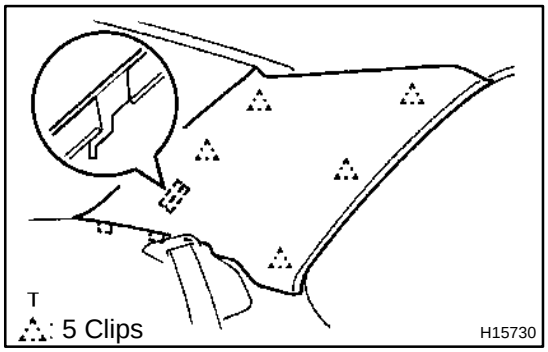
(b) Install the package tray trim as shown in the illustration.



16. INSTALL HIGH-MOUNTED STOP LIGHT

(a) Connect the connector.

(b) Install the high-mounted stop light as shown in the illustration.



17. INSTALL ROOF SIDE INNER GARNISH

(a) Install the roof side inner garnish as shown in the illustration.

(b) Employ the same manner described above to the other side.

18. INSTALL UPPER PART OF REAR DOOR OPENING TRIMS

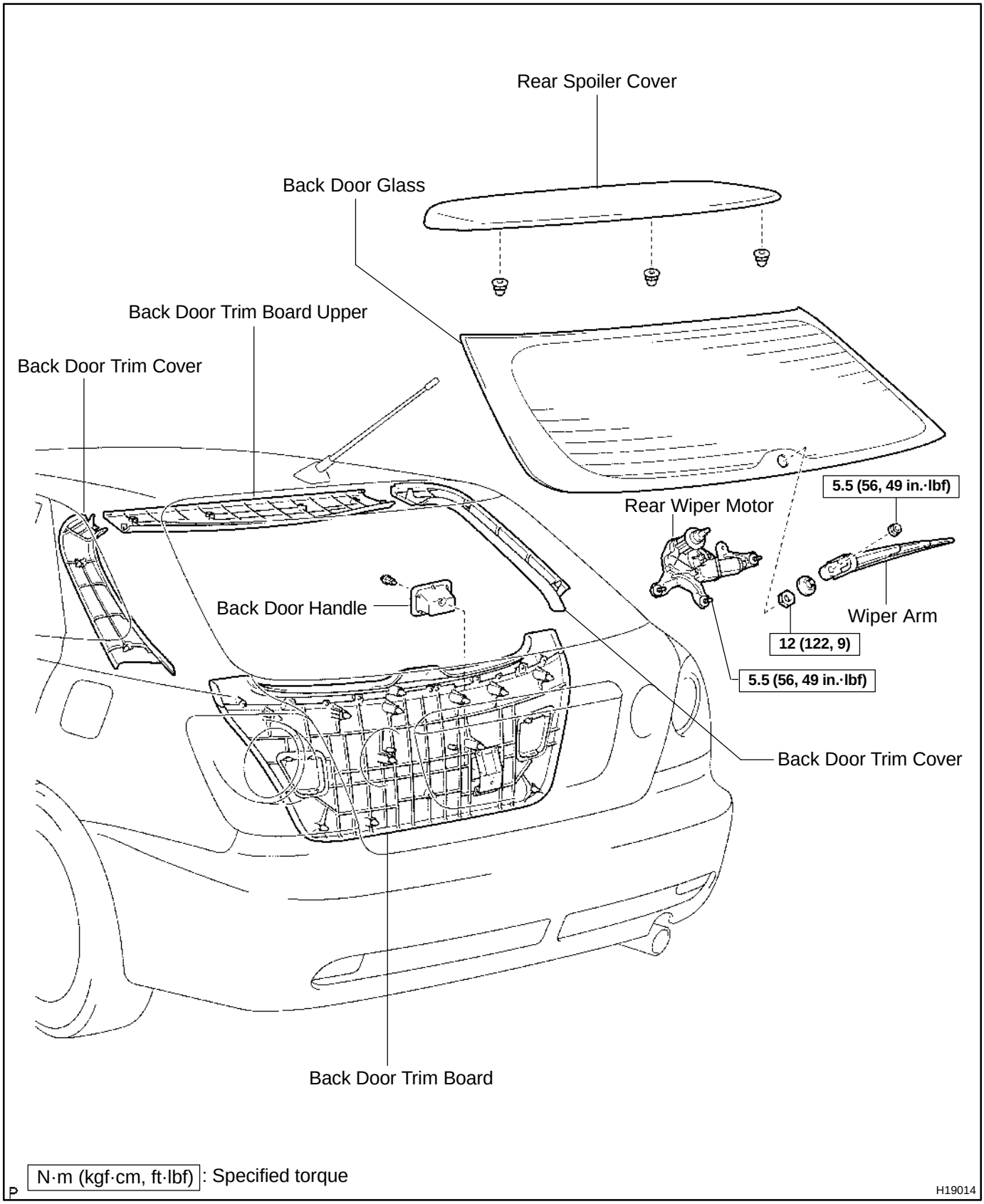
19. INSTALL REAR SEATBACK (See page BO-201)

20. INSTALL REAR SEAT CUSHION (See page BO-201)

BACK DOOR GLASS

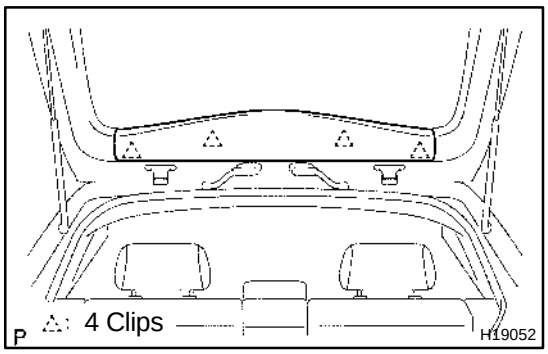
COMPONENTS

BO4DP-02



BO4DQ-03

REMOVAL



HINT:

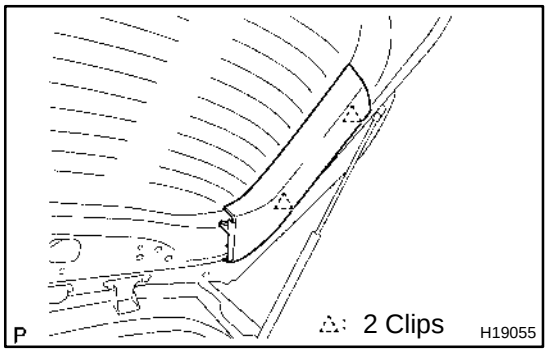
A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE BACK DOOR TRIM BOARD UPPER

Using a screwdriver, remove the back door trim board upper.

HINT:

Tape the screwdriver tip before use.



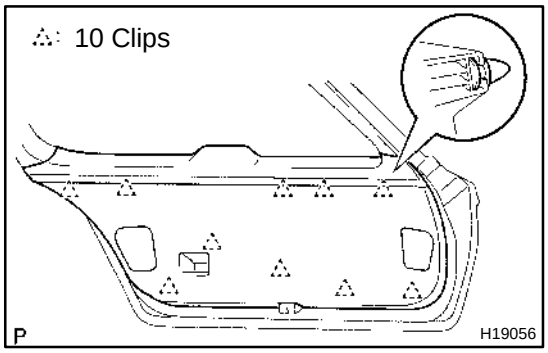
2. REMOVE BACK DOOR TRIM COVERS

(a) Insert a screwdriver between the back door panel and back door trim cover to pry the cover.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



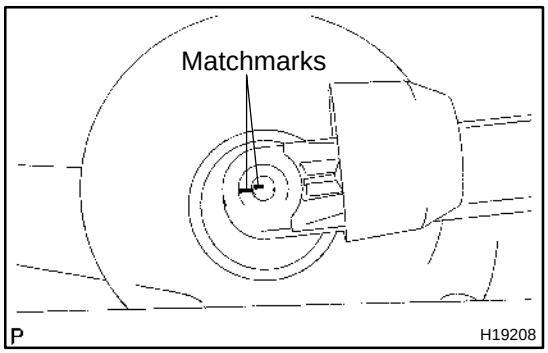
3. REMOVE BACK DOOR TRIM BOARD

(a) Remove the clip and back door handle.

(b) Using a screwdriver, remove the back door trim board.

HINT:

Tape the screwdriver tip before use.

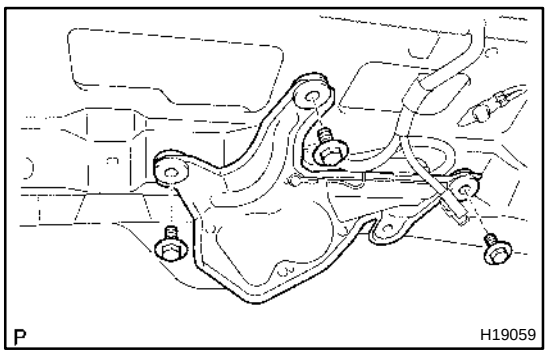


4. REMOVE REAR WIPER ARM

(a) Remove the wiper arm cover.

(b) Place matchmarks on the wiper arm and wiper motor.

(c) Remove the nut and rear wiper arm.

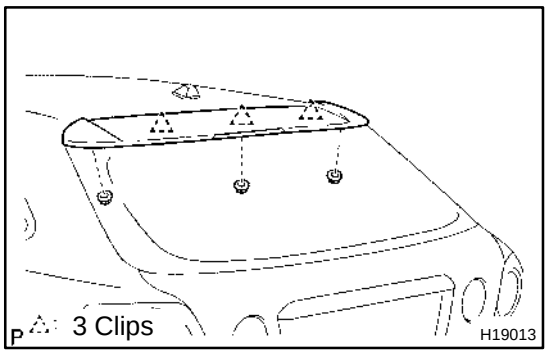


5. REMOVE REAR WIPER MOTOR

(a) Remove the nut and washer on the outer side of back door panel.

(b) Disconnect the connector.

(c) Remove the 3 bolts and rear wiper motor.



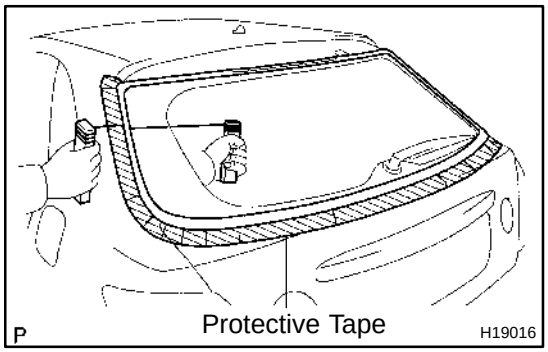
6. REMOVE REAR SPOILER COVER

(a) Remove the 3 nuts.

(b) Using a screwdriver, remove the rear spoiler cover then disconnect the connector.

HINT:

Tape the screwdriver tip before use.



7. REMOVE BACK DOOR GLASS

(a) Disconnect the connector.

(b) Push piano wire through from the interior.

(c) Tie both wire ends to wooden blocks or similar object.

HINT:

Apply protective tape to the outer surface to keep the surface from being scratched.

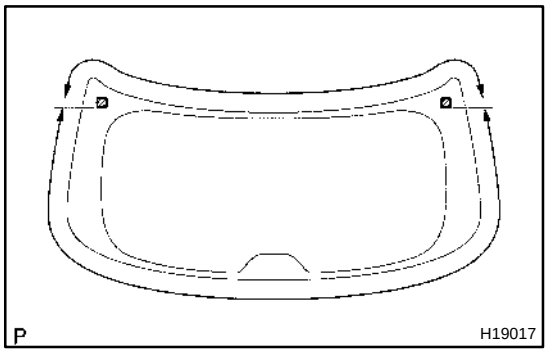
NOTICE:

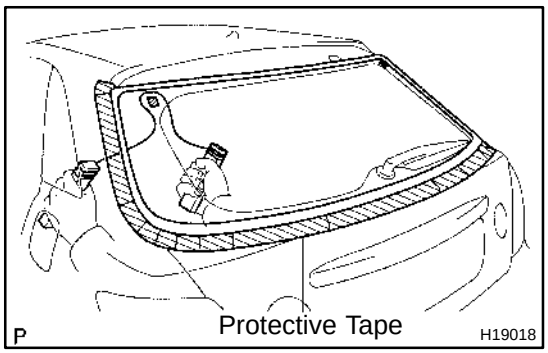
When separating the glass, take care not to damage the paint and exterior.

(d) Cut the adhesive by pulling the piano wire around it.

HINT:

Cut the adhesive areas as shown in the illustration, leaving the adhesive where the clips are.





(e) Let the piano wire pass as shown in the illustration, cut off the adhered part to the clips.

NOTICE:

Do not damage the glass retainers.

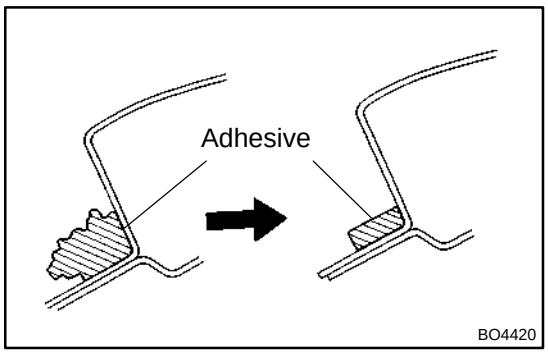
(f) Remove the glass.

NOTICE:

Leave as much of the adhesive on the body as possible when cutting off the glass.

BO4DR-02

INSTALLATION



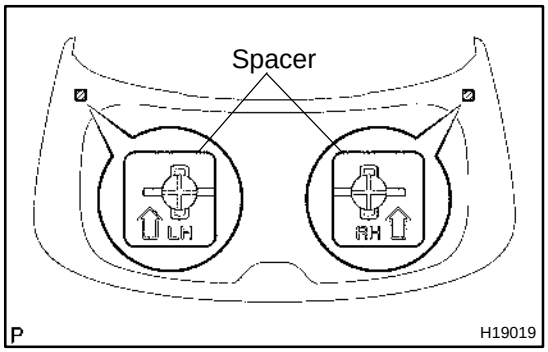
1. CLEAN AND SHAPE CONTACT SURFACE OF BODY

(a) Using a knife, cut away any rough areas on the body.

HINT:

Leave as much of the adhesive on the body as possible.

(b) Clean the cutting surface of the adhesive with a piece of shop rag soaked with cleaner.



2. REPLACE SPACER

(a) Remove the damaged spacers.

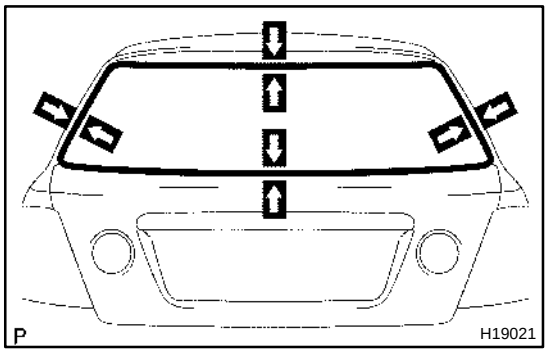
(b) Cut off the old adhesive around the spacers installation area.

NOTICE:

Be careful not to damage the body.

(c) Clean the installation area.

(d) Attach the new spacers to the glass with the ceramic notch on the glass aligned with the spacers as shown in the illustration.



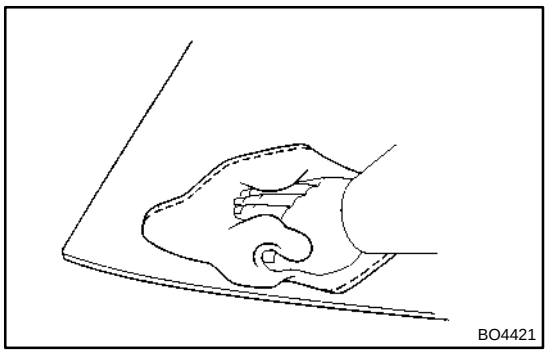
3. POSITION GLASS

(a) Place the glass in the correct position.

(b) Check that all contacting part of the glass rim are perfectly even.

(c) Place reference marks between the glass and body.

(d) Remove the glass.

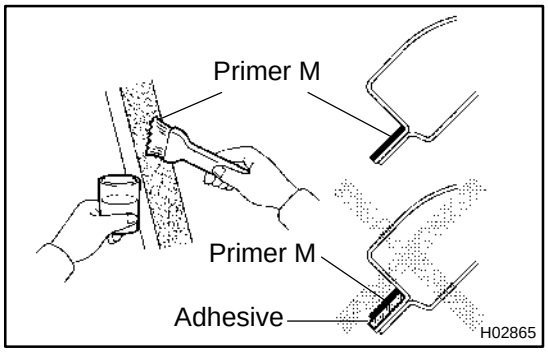


4. CLEAN CONTACT SURFACE OF GLASS

Using a cleaner, clean the contact surface which is black-colored area around the entire glass rim.

NOTICE:

Do not touch the glass face after cleaning it.

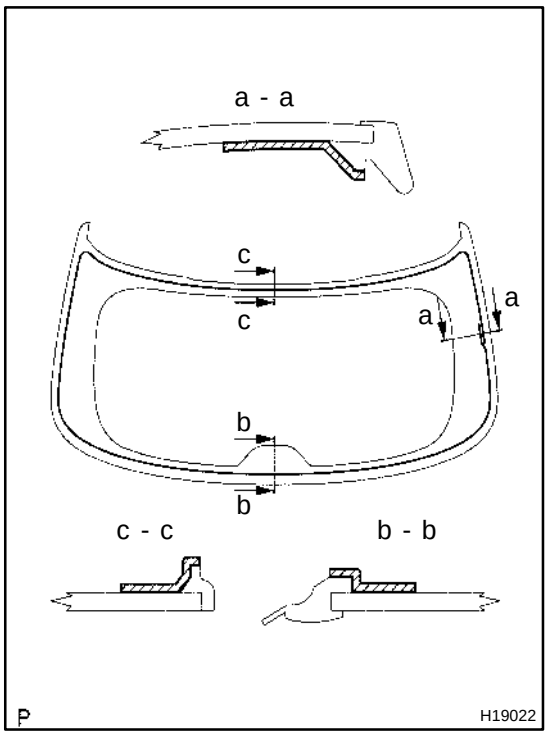


5. COAT CONTACT SURFACE OF BODY WITH PRIMER "M"

Using a brush, coat Primer M to the exposed part of body on the vehicle side.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not coat Primer M to the adhesive.**
- **Do not keep any of the opened Primer M for later use.**



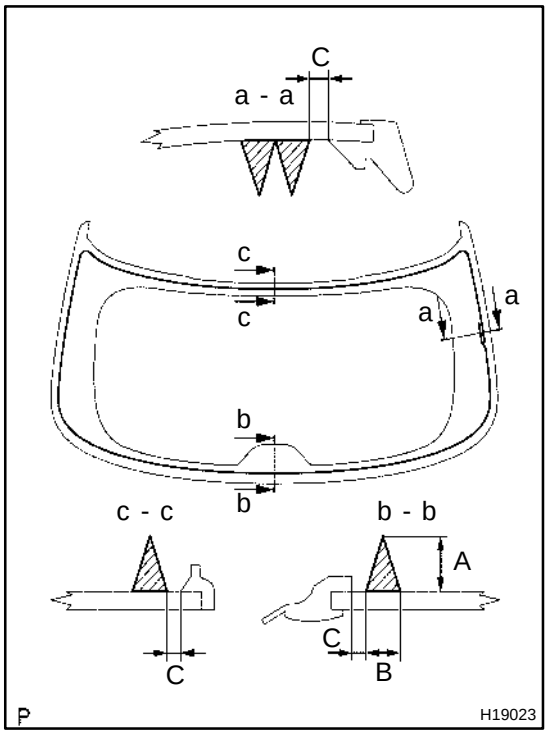
6. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

(a) Using a brush or sponge, coat the edge of the glass and the contact surface with Primer G as shown in the illustration.

(b) When the primer is coated to the area other than the specified by accident, wipe it off with a clean shop rag before the primer dries.

NOTICE:

- **Let the primer coating dry for 3 minutes or more.**
- **Do not keep any of the opened Primer G for later use.**



7. APPLY ADHESIVE

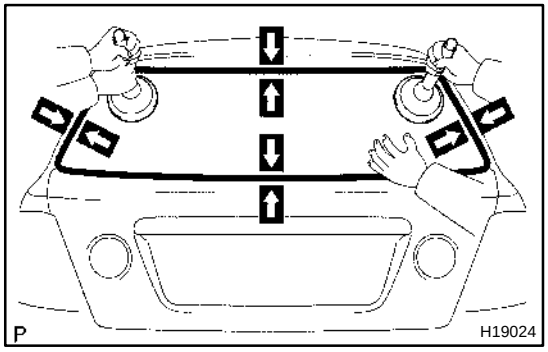
(a) Cut off the tip of the cartridge nozzle.
Part No. 08850-00801 or equivalent.

HINT:
After cutting off the tip, finish off the adhesive within the time described in the table below.

Temperature	Tackfree time
35˚C (95˚F)	15 minutes
20˚C (68˚F)	100 minutes
5˚C (41˚F)	8 hours

(b) Load the cartridge into the sealer gun.

(c) Coat the glass with adhesive as shown in the illustration.
A: 12.0 mm (0.472 in.)
B: 8.0 mm (0.315 in.)
C: 3.0 mm (0.118 in.)

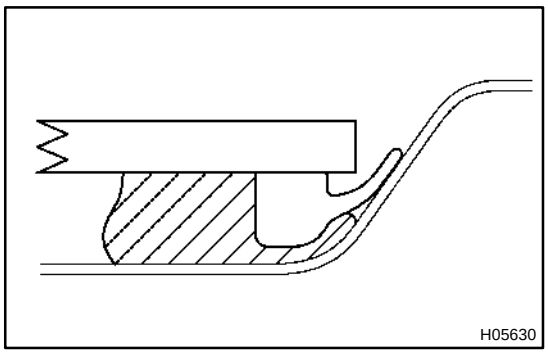


8. INSTALL GLASS

(a) Position the glass so that the reference marks are lined up, and press in gently along the rim.

(b) Using a spatula, apply adhesive on the glass rim.

(c) Use a scraper to remove any excess or protruding adhesive.



HINT:

Confirm that the moulding is attached to the body panel as shown in the illustration.

(d) Hold the back door glass in place securely with a protective tape or equivalent until the adhesive hardens.

NOTICE:

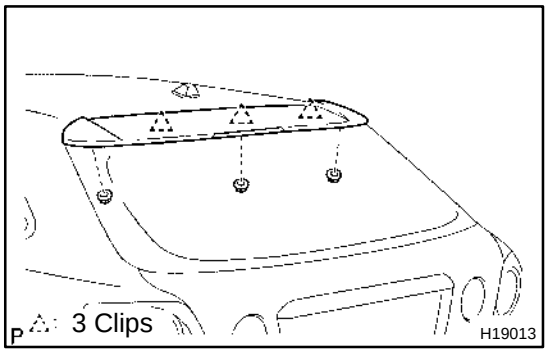
Take care not to drive the vehicle during the time described in the table below.

Temperature	Minimum time prior to driving the vehicle
35˚C (95˚F)	1.5 hours
20˚C (68˚F)	5 hours
5˚C (41˚F)	24 hours

9. INSPECT FOR LEAK AND REPAIR

(a) Conduct a leak test after the hardening time has elapsed.

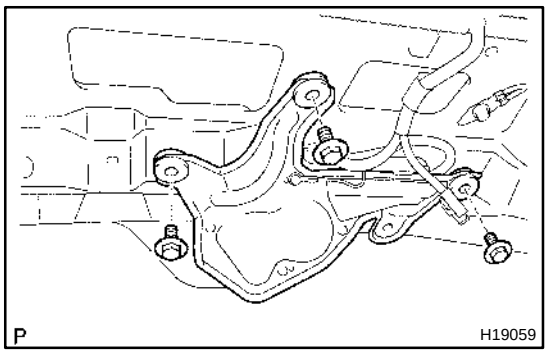
(b) Seal any leak with sealant.
Part No. 08833-00030 or equivalent.



10. INSTALL REAR SPOILER COVER

Install the rear spoiler cover with the 3 nuts.

11. INSTALL BACK DOOR OUTSIDE HANDLE

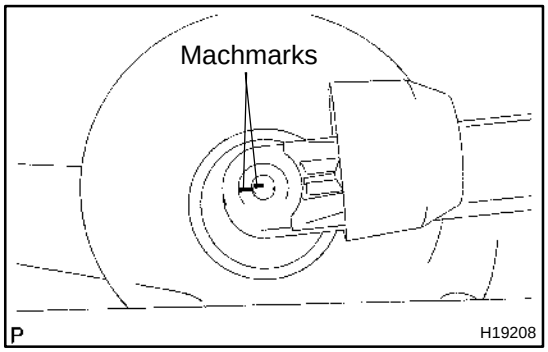


12. INSTALL REAR WIPER MOTOR

(a) Install the rear wiper motor with the 3 bolts.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(b) Connect the connector.

(c) Install the nut and washer on the outer side of the back door panel.
Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)



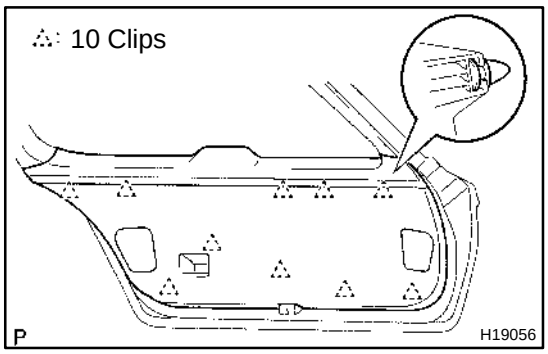
13. INSTALL REAR WIPER ARM

(a) Install the wiper arm and tighten the nut by hand. Operate the wiper once and turn the wiper switch OFF.

(b) Align the machmarks on the wiper arm and wiper motor.

(c) Install the rear wiper arm with the nut.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

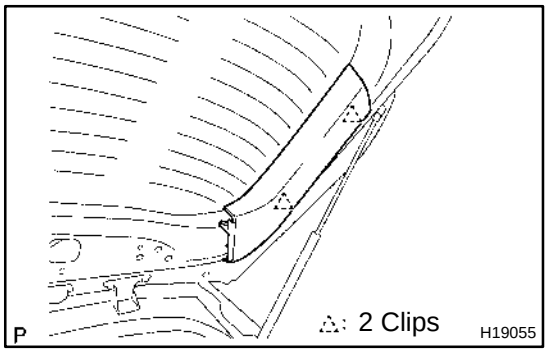
(d) Install the wiper arm cover.



14. INSTALL BACK DOOR TRIM BOARD

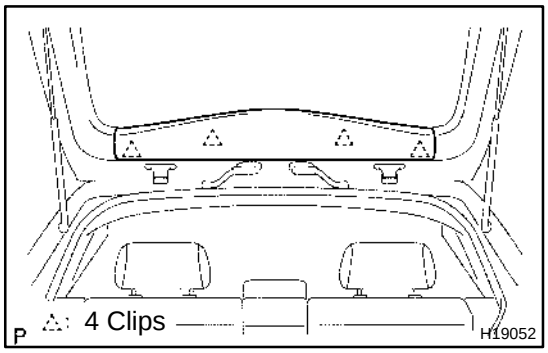
(a) Install the back door trim board to the back door panel.

(b) Install the back door handle with the clip.



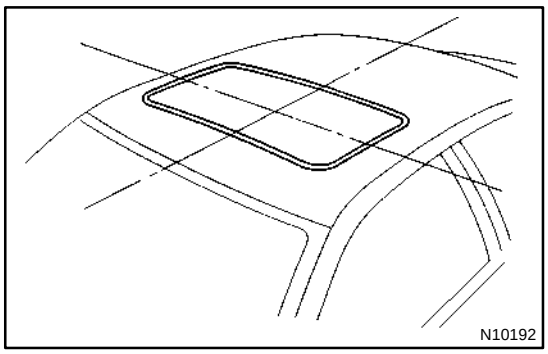
15. INSTALL BACK DOOR TRIM COVERS

Install the trim cover to the body.



16. INSTALL BACK DOOR TRIM BOARD UPPER

Install the back door trim board upper to the body.



SLIDING ROOF

BO0M1-07

ON-VEHICLE INSPECTION

INSPECT SLIDING ROOF GLASS ALIGNMENT

(a) Start the engine and check the operation time of the sliding roof.
Operation time:
Approx. 6 secs.

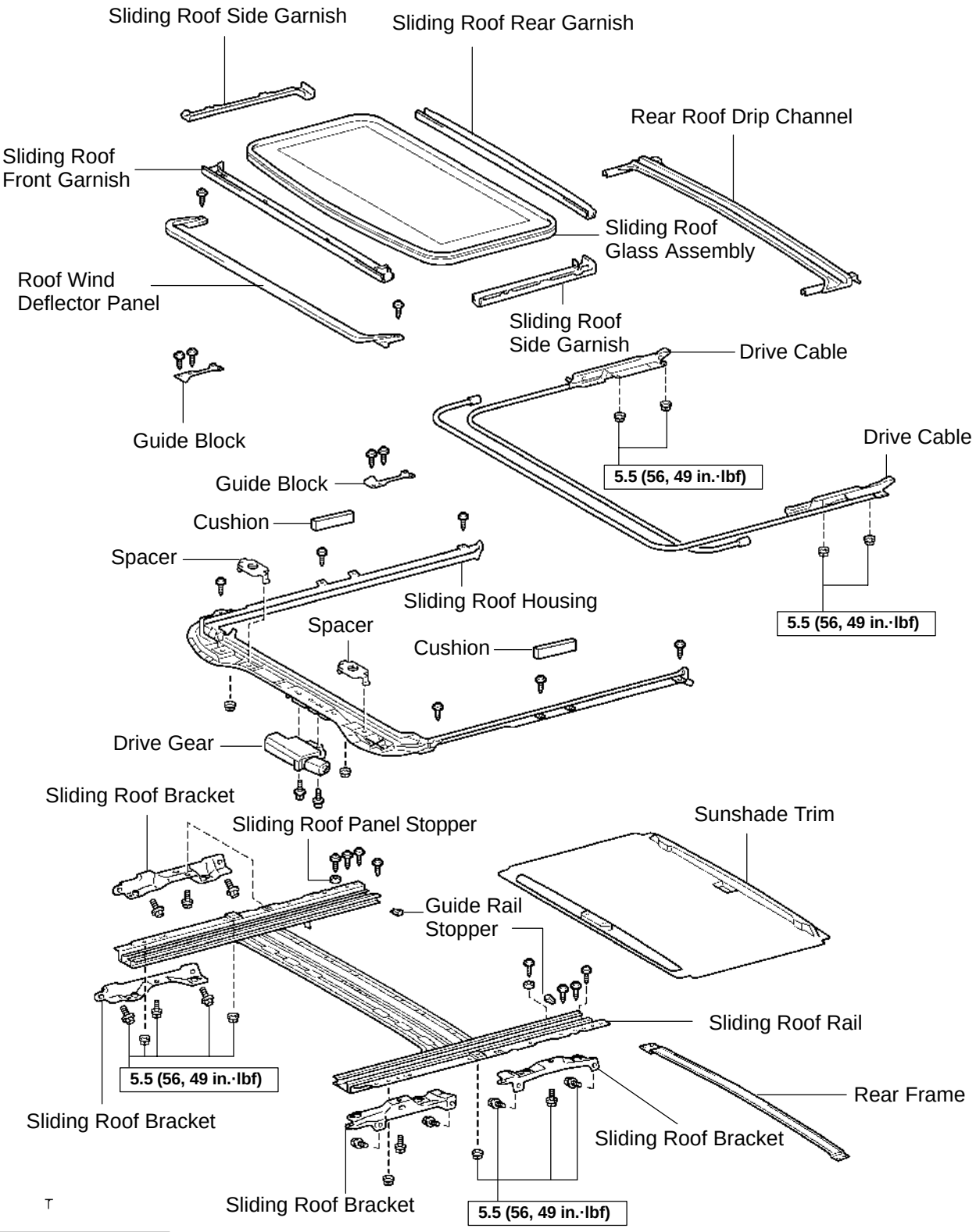
(b) Check for abnormal noise or closed condition during operation.

(c) With the sliding roof fully closed, check for water leakage.

(d) Check for a difference in level between the sliding roof weatherstrip and roof panel.
Front end:
0 – 2.0 mm (0 - 0.079 in.)
0 + 1.0 mm (0 + 0.039 in.)
Side end:
0 ± 1.5 mm (0 ± 0.059 in.)
Rear end:
0 - 1.0 mm (0 - 0.039 in.)
0 + 2.0 mm (0 + 0.079 in.)

BO0M2-06

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

H10510

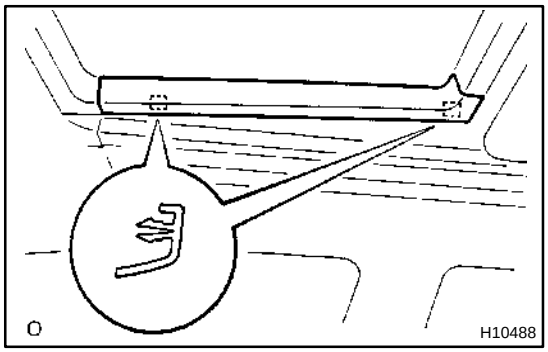
BO2CS-04

REMOVAL

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. **Sedan type:**
   REMOVE ROOF HEADLINING (See page BO-156)
2. **Wagon type:**
   REMOVE ROOF HEADLINING (See page BO-164)



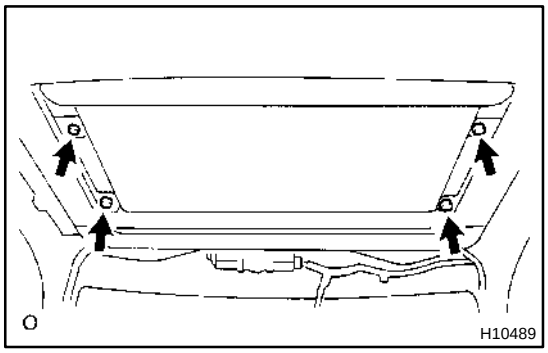
3. **REMOVE SLIDING ROOF SIDE GARNISH**

(a) Using a screwdriver, remove the garnish.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



4. **REMOVE SLIDING ROOF GLASS ASSEMBLY**

(a) Using a torx wrench, remove the 4 nuts.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

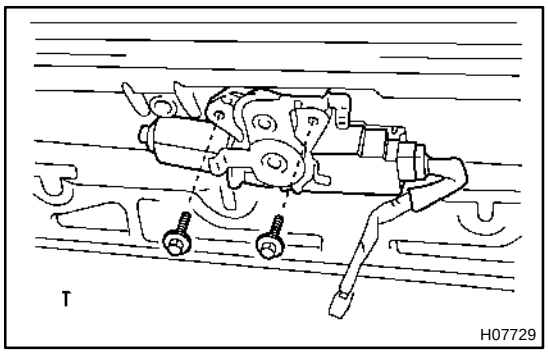
(b) Pull the glass upward to remove it.

5. **REMOVE SLIDING ROOF FRONT AND REAR GARNISHES**

Using a screwdriver, remove the front and rear garnishes.

HINT:

Tape the screwdriver tip before use.



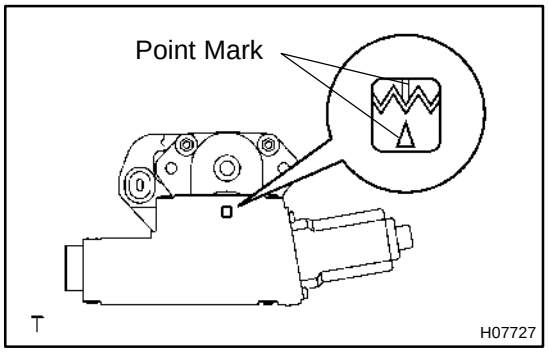
6. **REMOVE DRIVE GEAR**

NOTICE:

Remove the drive gear with the sliding roof fully closed.

(a) Disconnect the connector.

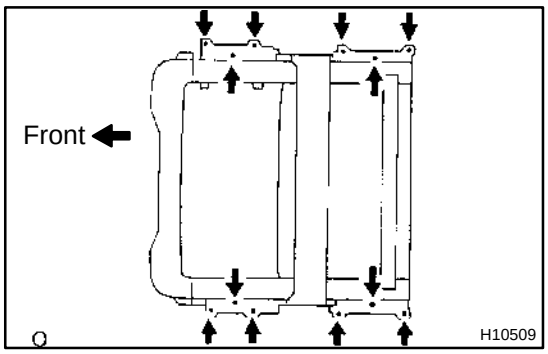
(b) Remove the 2 bolts and drive gear.



(c) Turn the drive gear to align the point marks as shown in the illustration.

NOTICE:

At the time of installation, if the sliding roof position and drive gear fully closed position are not matched, the sliding roof does not operate normally.



7. REMOVE SLIDING ROOF BRACKET

(a) Remove the 3 bolts and sliding roof bracket.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

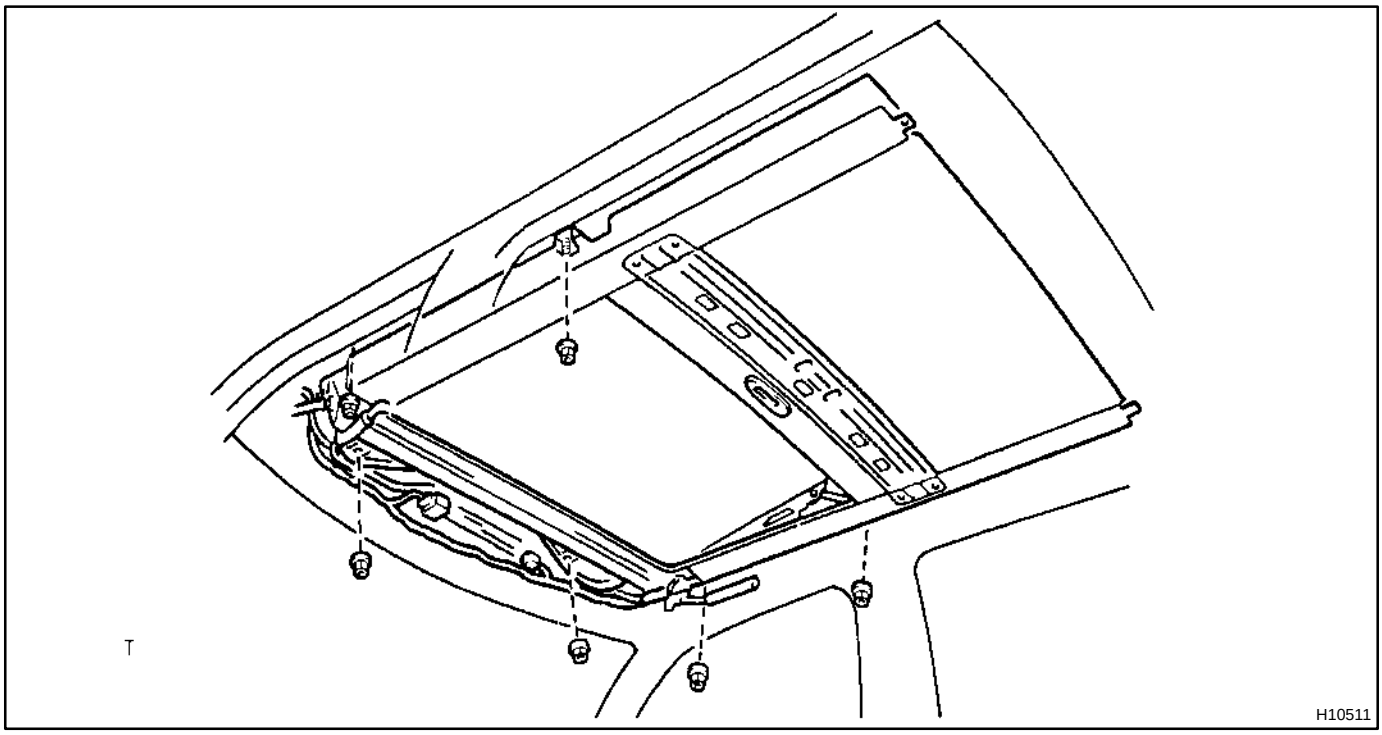
(b) Employ the same manner described above to the other sides.

8. REMOVE SLIDING ROOF HOUSING

(a) Disconnect the 4 drain hoses from the housing.

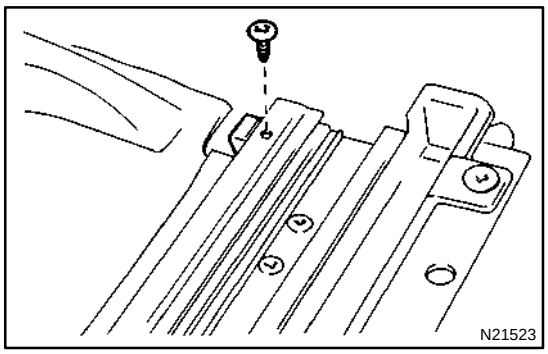
(b) Disengage the wire harness clamps.

(c) Remove the 6 nuts, then remove the housing as shown in the illustration.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)



BO0M4-06

DISASSEMBLY

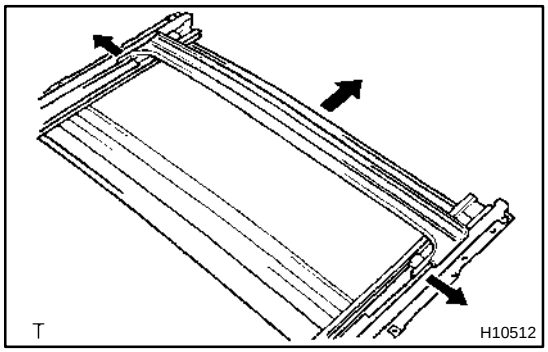


1. REMOVE GUIDE RAIL STOPPER

(a) Remove the screw and stopper.

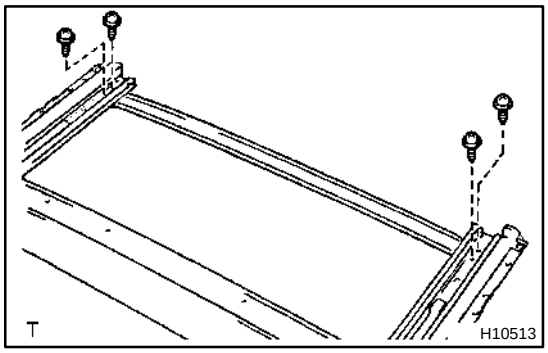
(b) Employ the same manner described above to the other side.

2. REMOVE SUNSHADE TRIM



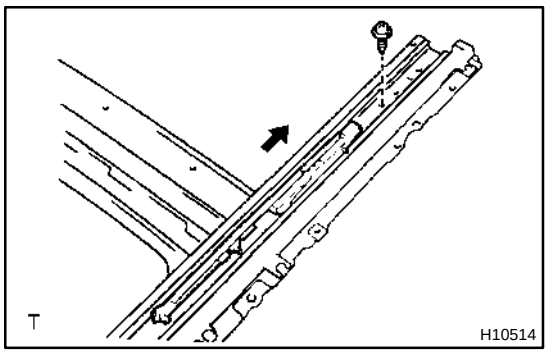
3. REMOVE REAR ROOF DRIP CHANNEL

Remove the rear roof drip channel as shown in the illustration.



4. REMOVE REAR FRAME

Remove the 4 screws and rear frame.

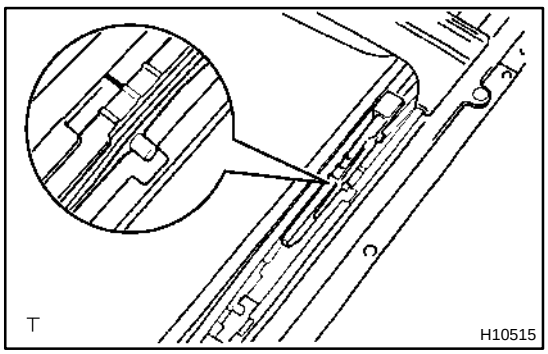


5. REMOVE DRIVE CABLE

(a) Remove the screw and sliding roof panel stopper.

(b) Slide the drive cable rearward, then remove it.

(c) Employ the same manner described above to the other side.

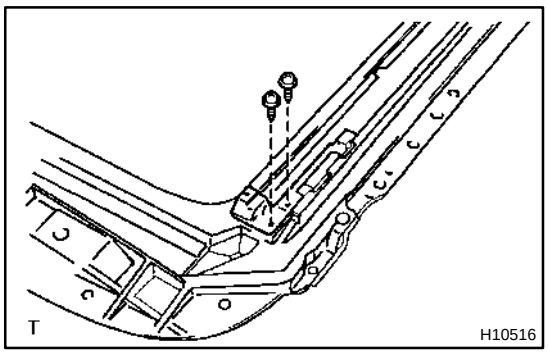


HINT:

At the time of reassembly, please refer to the following items.

- Adjust the drive cable at the closed and tilted position.
- Slide the cable forward or backward to align the 2 marks as shown in the illustration.
- Slide the cable to the forefront with fingers.

6. REMOVE ROOF WIND DEFLECTOR PANEL

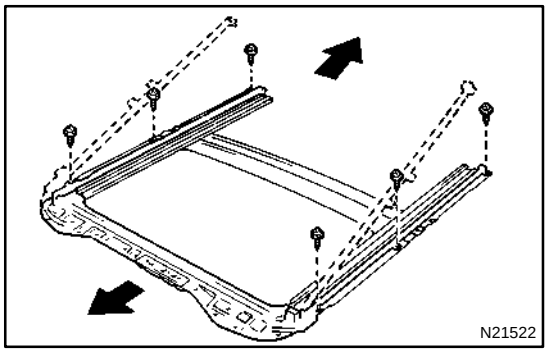


7. REMOVE GUIDE BLOCK

(a) Remove the 2 screws and guide block.

(b) Employ the same manner described above to the other side.

8. REMOVE CUSHIONS

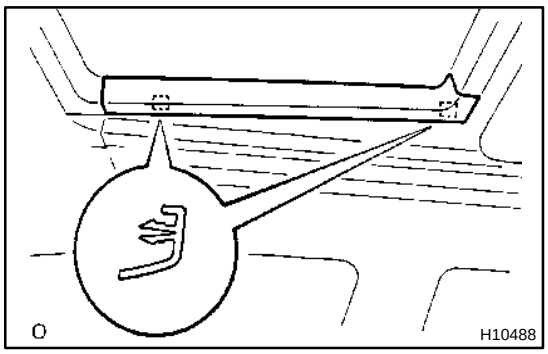


9. REMOVE SLIDING ROOF HOUSING

Remove the 6 screws and sliding roof housing.

BO0M5-05

ADJUSTMENT



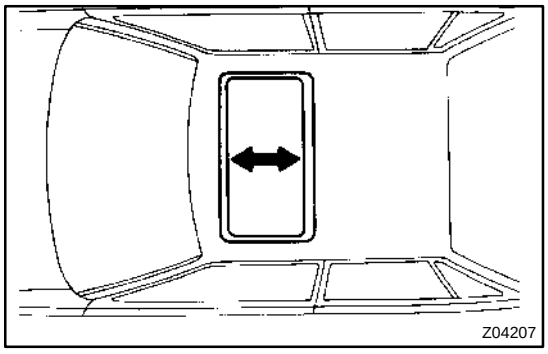
1. REMOVE SIDE GARNISH

HINT:

- Tape the screwdriver tip before use.
- After adjustment, reinstall the side garnishes.

(a) Before making adjustments, using a screwdriver, remove the side garnish.

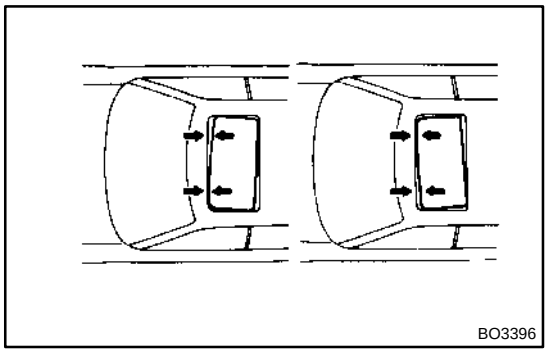
(b) Employ the same manner described above to the other side.



2. TO ADJUST FORWARD OR REARWARD

(a) Loosen the sliding roof glass installation nuts.

(b) Adjust the sliding roof glass forward and rearward.

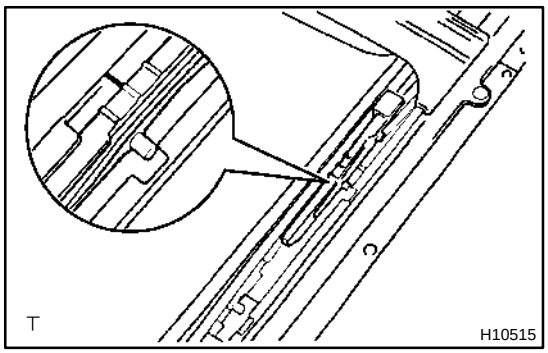


3. TO ADJUST CLEARANCE (Difference in left and right clearance)

(a) When the front or rear alignment is not correct, remove the drive gear and sliding roof glass, then adjust the drive rail.

NOTICE:

Remove the drive gear with sliding roof fully closed.



(b) Adjust by sliding the cable forward or rearward to align the 2 marks as shown in the illustration.

(c) Install the drive gear and sliding roof glass.

BO22O-03

REASSEMBLY

The reassembly procedures are the disassembly procedures in reverse order (See page BO-130).

BO0M7-04

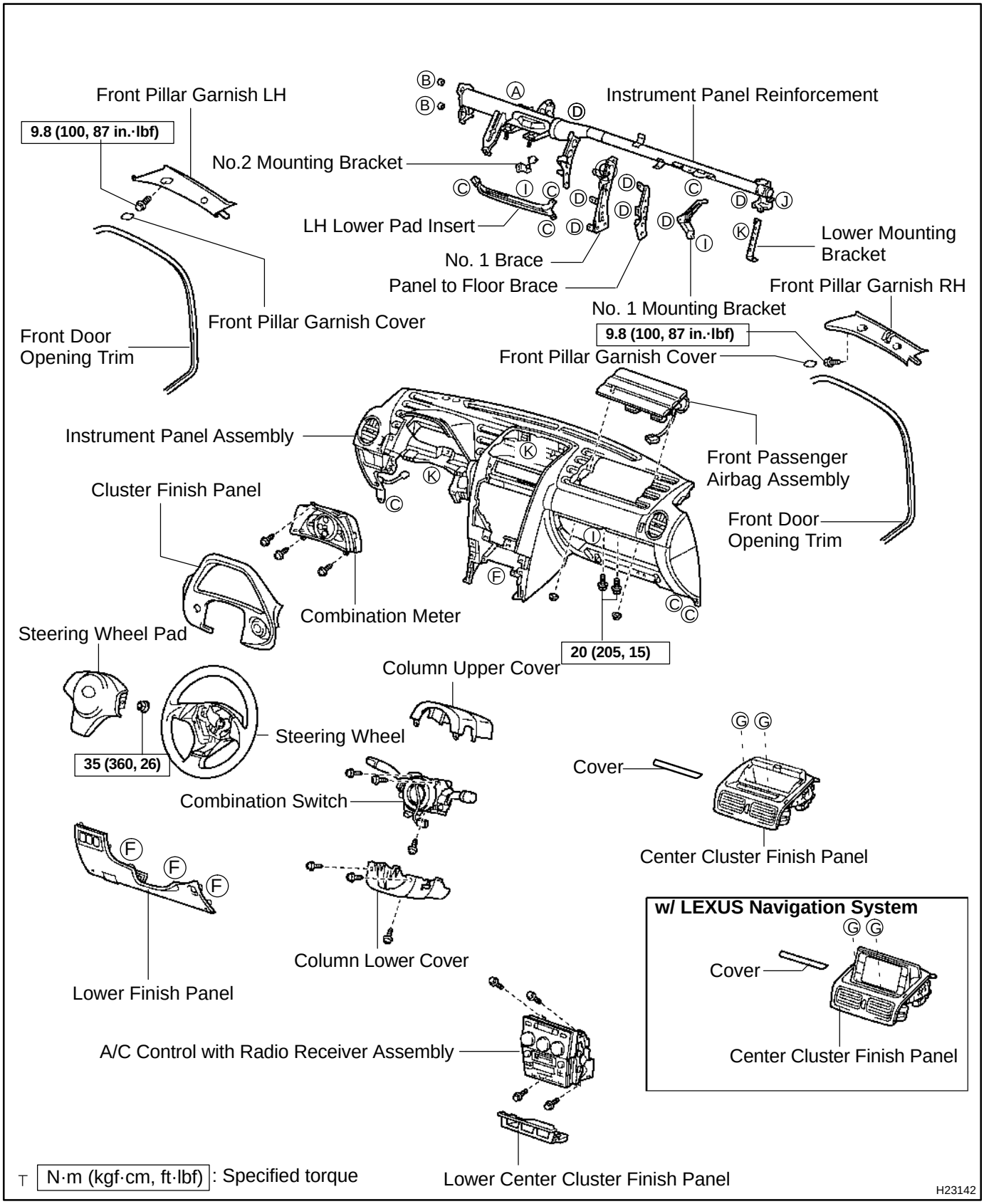
INSTALLATION

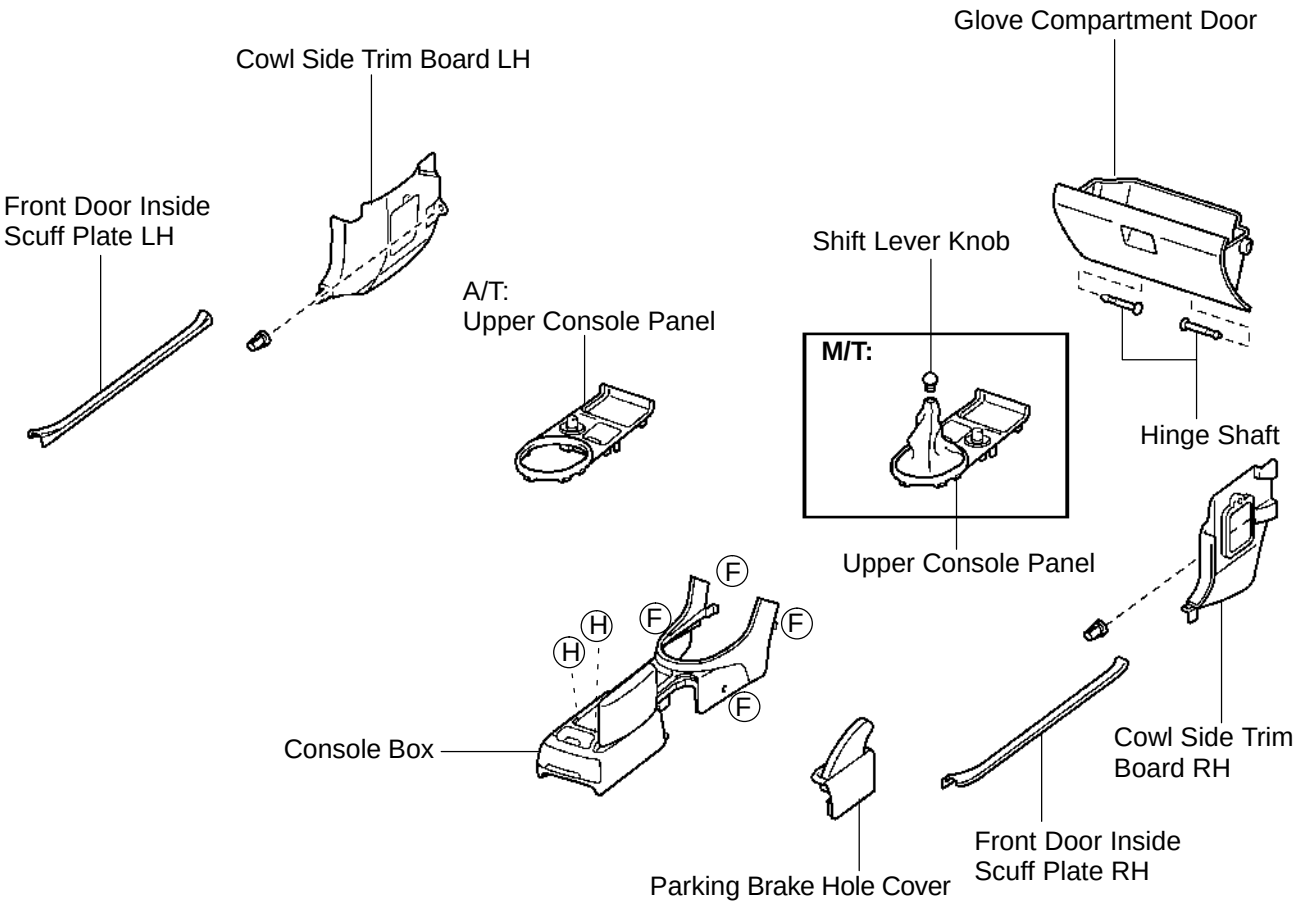
The installation procedures are the removal procedures in reverse order (See page BO-128).

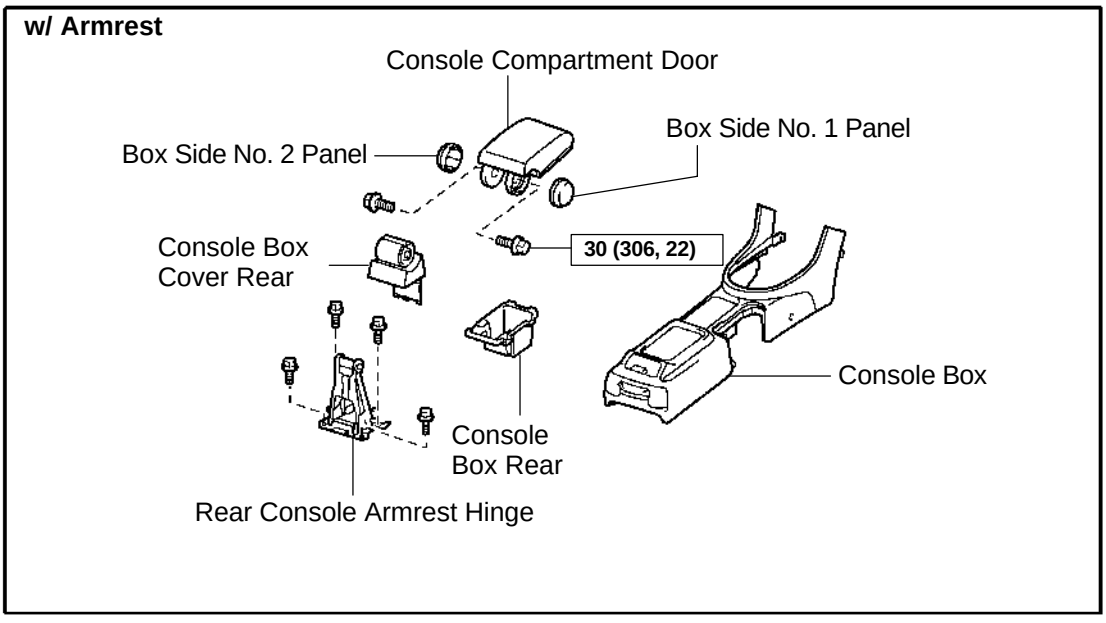
INSTRUMENT PANEL

COMPONENTS

BO4DS-03

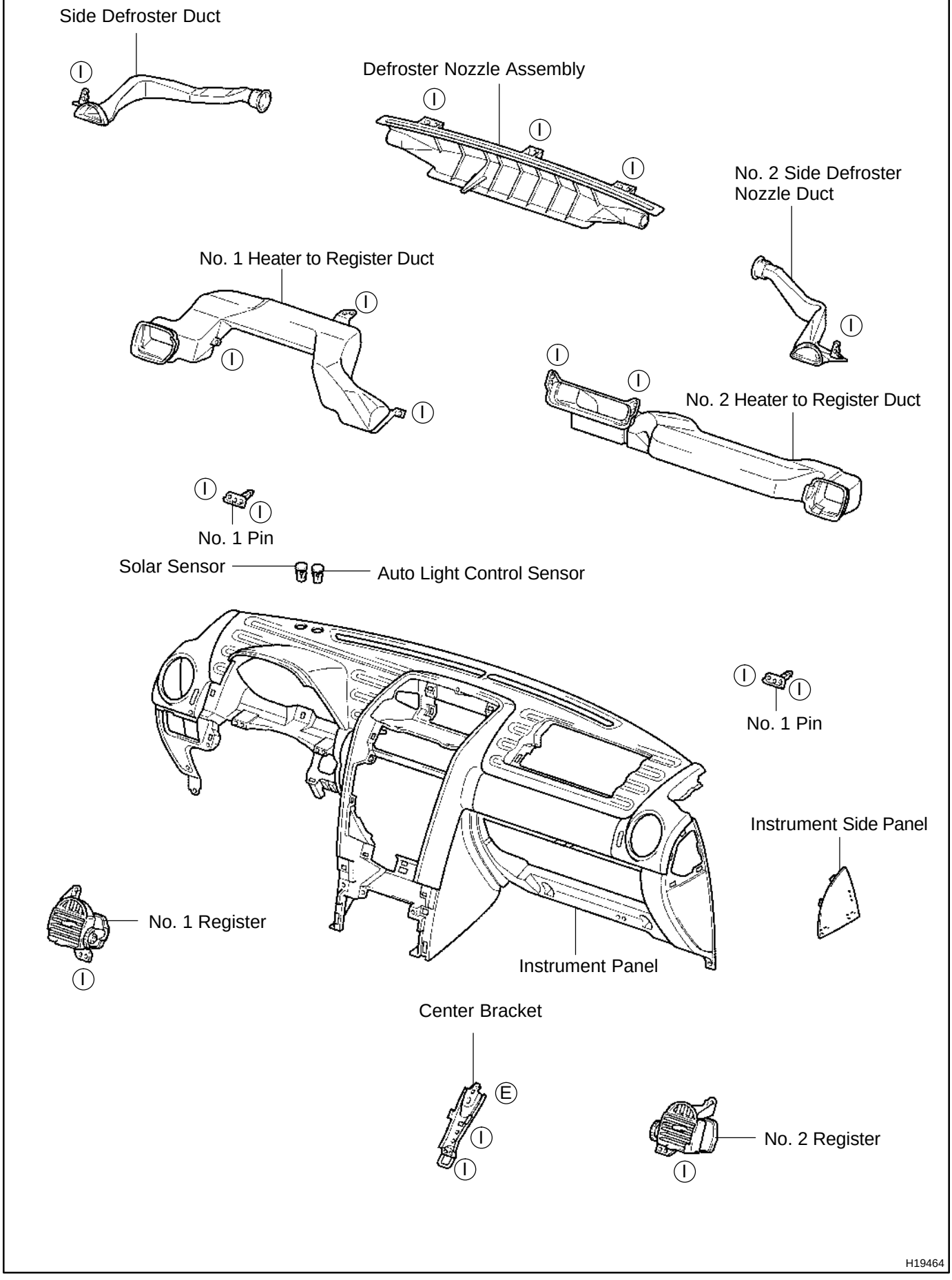






T N·m (kgf·cm, ft·lbf) : Specified torque

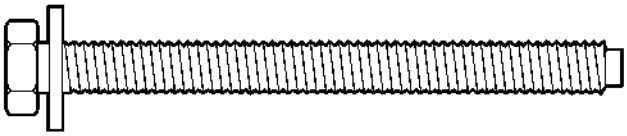
H22779

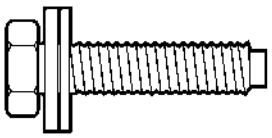
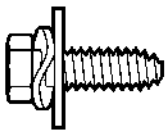

Side Defroster Duct
Defroster Nozzle Assembly
No. 2 Side Defroster Nozzle Duct
No. 1 Heater to Register Duct
No. 2 Heater to Register Duct
No. 1 Pin
Solar Sensor
Auto Light Control Sensor
No. 1 Pin
Instrument Side Panel
No. 1 Register
Instrument Panel
Center Bracket
E
No. 2 Register
H19464

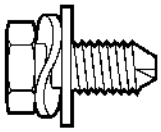
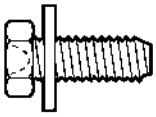
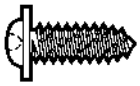
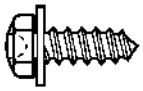
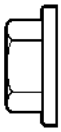
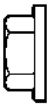
HINT:

Screw shapes and sizes are indicated in the table below. The codes (”A” - ”K”) correspond to those indicated on the previous pages.

mm (in.)

code	Shape	Size
Ⓐ		ø = 8 (0.31) L = 90 (3.54)

code	Shape	Size	code	Shape	Size
Ⓑ		ø = 8 (0.31) L = 35 (1.38)	Ⓒ		ø = 6 (0.24) L = 20 (0.79)

code	Shape	Size	code	Shape	Size	code	Shape	Size
Ⓓ		ø = 8 (0.31) L = 18 (0.71)	Ⓔ		ø = 6 (0.24) L = 18 (0.71)	Ⓕ		ø = 5.22 (0.2055) L = 16 (0.63)
Ⓖ		ø = 5 (0.20) L = 16 (0.63)	Ⓗ		ø = 5 (0.20) L = 16 (0.63)	Ⓘ		ø = 5 (0.20) L = 14 (0.55)
Ⓙ		ø = 8 (0.31)	Ⓚ		ø = 6 (0.24)			

T

H11337

BO4OU-01

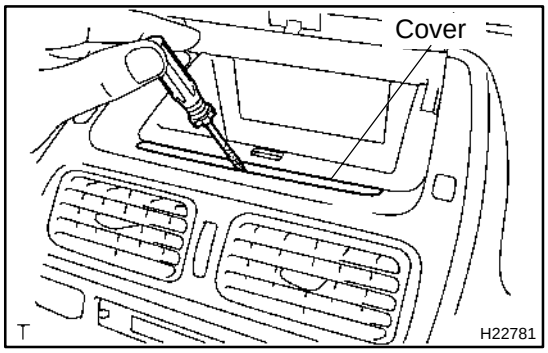
REMOVAL

CAUTION:

Work must be started more than 90 seconds after the ignition switch is turned into the "LOCK" position and the negative (-) terminal cable is disconnected from the battery. The SRS is equipped with a back-up power source. If work is started within 90 seconds from disconnecting the negative (-) terminal cable of the battery, the SRS may be deployed.

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

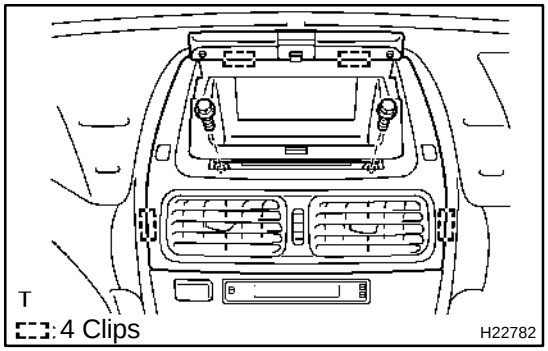


1. REMOVE CENTER CLUSTER FINISH PANEL

(a) Using a screwdriver, pry out the cover.

HINT:

Tape the screwdriver tip before use.



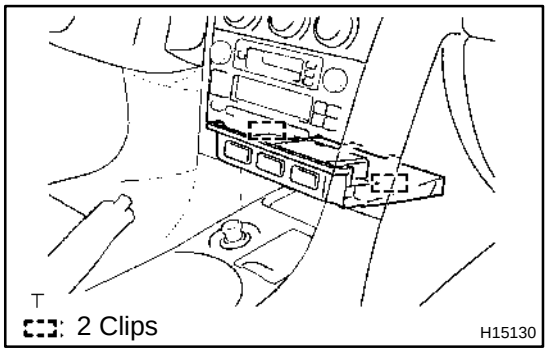
(b) Remove the 2 screws.

(c) Using a screwdriver, disengage the 4 clips and remove the center cluster finish panel.

HINT:

Tape the screwdriver tip before use.

(d) w/ LEXUS navigation system:
Disconnect the connectors.



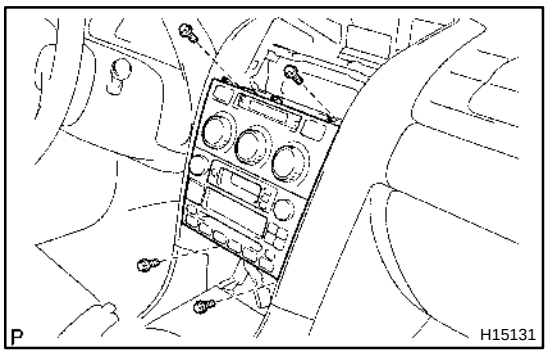
2. REMOVE LOWER CENTER CLUSTER FINISH PANEL

(a) Using a screwdriver, disengage the 2 clips and remove the lower center cluster finish panel.

HINT:

Tape the screwdriver tip before use.

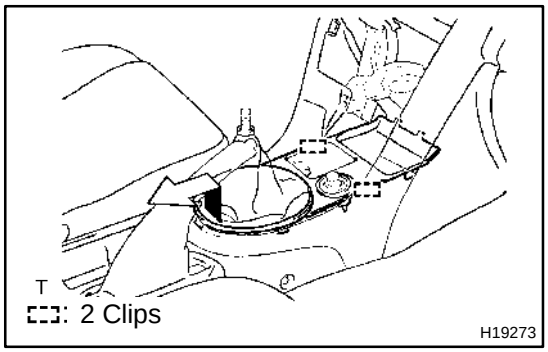
(b) Disconnect the connectors.



3. REMOVE A/C CONTROL WITH RADIO RECEIVER ASSEMBLY

(a) Remove the 4 bolts and A/C control with radio receiver assembly.

(b) Disconnect the connectors.



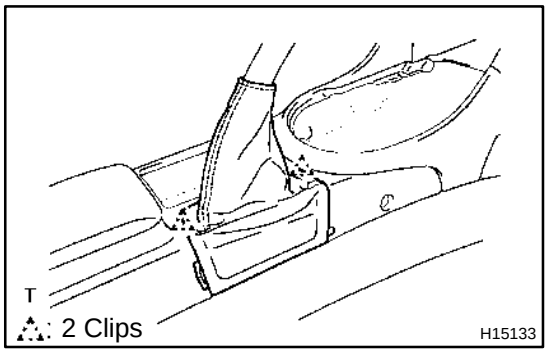
4. REMOVE UPPER CONSOLE PANEL

(a) M/T:
Remove the shift lever knob.

(b) Using a screwdriver, disengage the 2 clips and remove the upper console panel as shown in the illustration.

HINT:
Tape the screwdriver tip before use.

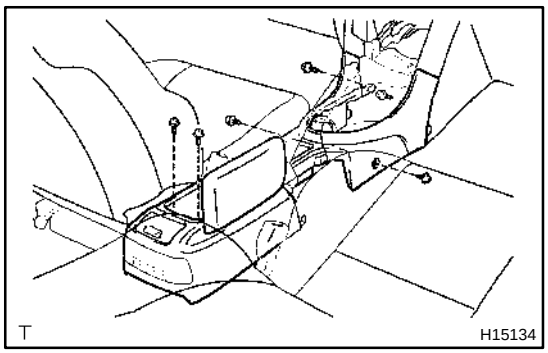
(c) Disconnect the connector.



5. REMOVE PARKING BRAKE HOLE COVER

Using a screwdriver, disengage the 2 clips and remove the parking brake hole cover.

HINT:
Tape the screwdriver tip before use.

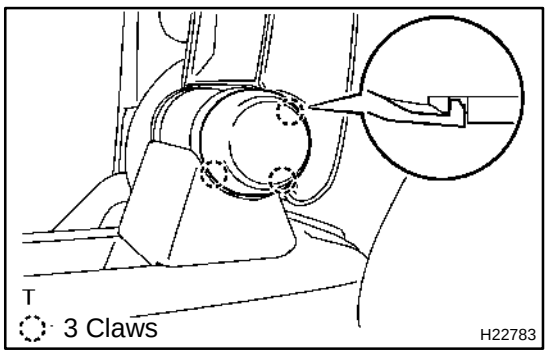


6. w/o Arm rest:
REMOVE CONSOLE BOX

(a) Remove the 6 screws.

(b) w/o LEXUS navigation system:
Pull the console box rearward to remove it.

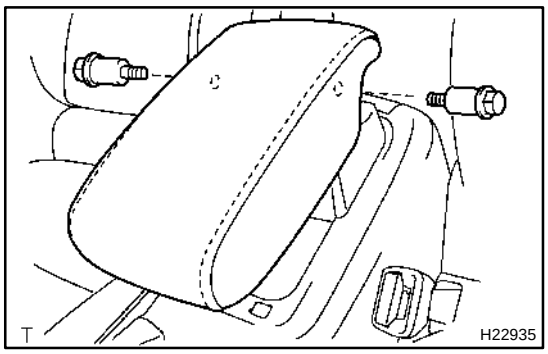
(c) w/ LEXUS navigation system:
Pull the console box rearward to remove it, then disconnect the connector.



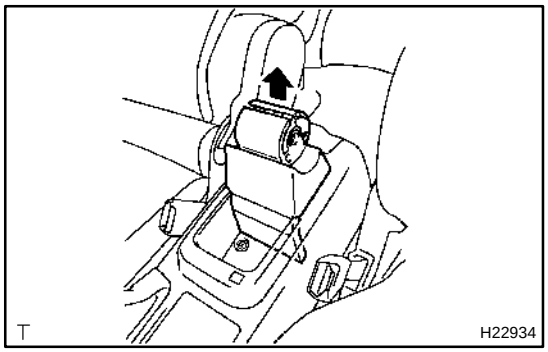
7. w/ Arm rest:
REMOVE CONSOLE BOX

(a) Using a screwdriver, disengage the 3 claws and remove the box side No. 1 and No. 2 panels.

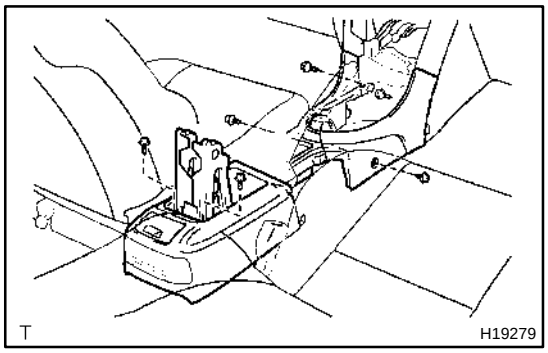
HINT:
Tape the screwdriver tip before use.



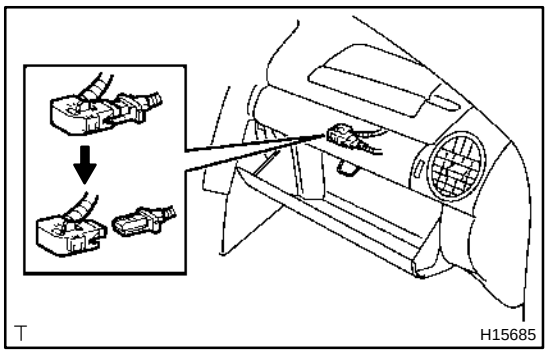
(b) Remove the 2 bolts and remove the console compartment door.
Torque:30 N·m (306 kgf·cm, 22 ft·lbf.)



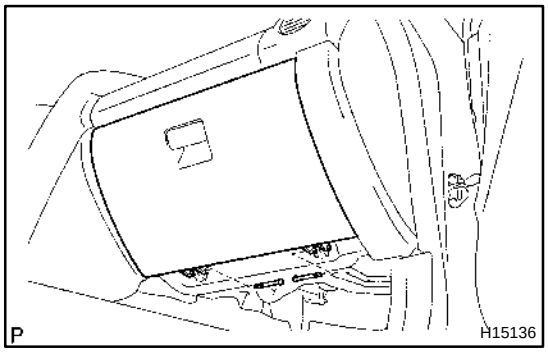
(c) Remove the console box cover rear.



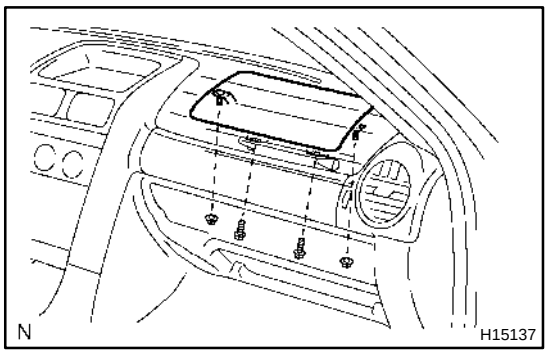
(d) Remove the 6 screws.
(e) w/o LEXUS navigation system:
Pull the console box rearward to remove it.
(f) w/ LEXUS navigation system:
Pull the console box rearward to remove it, then disconnect the connector.
(g) Remove the 4 bolts and rear console armrest hinge.



8. DISCONNECT PASSENGER AIRBAG CONNECTOR
(a) Using a clip remover, disengage the connector clamp.
(b) Disconnect the passenger airbag connector.
NOTICE:
When disconnecting the airbag connector, take care not to damage the airbag wire harness.



9. REMOVE GLOVE COMPARTMENT DOOR
Disconnect the hinge shaft and remove the glove compartment door.



10. REMOVE FRONT PASSENGER AIRBAG ASSEMBLY

Remove the 2 bolts, 2 nuts and the passenger airbag assembly from the instrument panel.

Torque:
20 N·m (205 kgf·cm, 15 ft·lbf.) for bolt
5.5 N·m (56 kgf·cm, 49 in.·lbf) for nut

CAUTION:

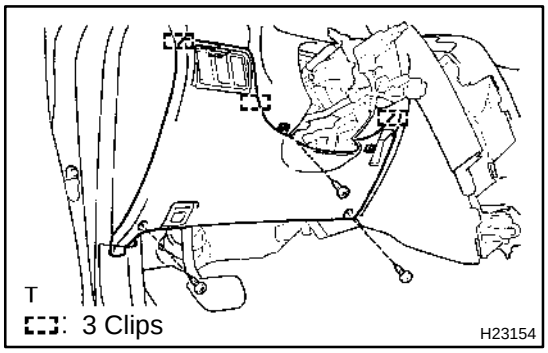
- **Do not store the front passenger airbag assembly with the airbag deployment side facing down.**
- **Never disassemble the front passenger airbag assembly.**

11. REMOVE STEERING WHEEL PAD (See page SR-13)

12. REMOVE STEERING WHEEL (See page SR-13)

13. REMOVE COLUMN UPPER AND LOWER COVERS (See page SR-13)

14. REMOVE SPIRAL CABLE (See page SR-13)



15. REMOVE LOWER FINISH PANEL

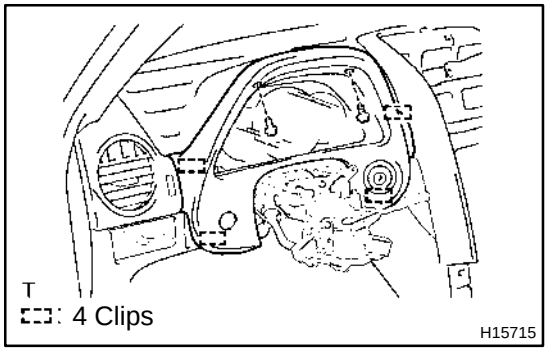
(a) Remove the 3 screws.

(b) Using a screwdriver, disengage the 3 clips and remove the lower finish panel.

HINT:

Tape the screwdriver tip before use.

(c) Disconnect the connectors and hood lock control cable.



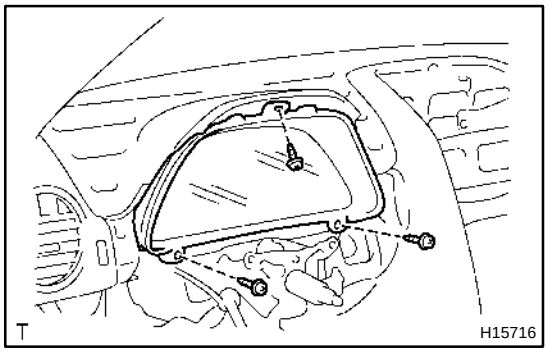
16. REMOVE CLUSTER FINISH PANEL

(a) Remove the 2 screws.

(b) Using a screwdriver, disengage the 4 clips and remove the cluster finish panel.

HINT:

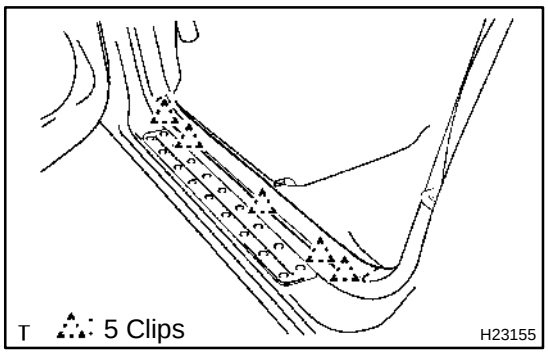
Tape the screwdriver tip before use.



17. REMOVE COMBINATION METER

(a) Remove the 3 screws and combination meter.

(b) Disconnect the connector.



18. REMOVE FRONT DOOR INSIDE SCUFF PLATE LH

(a) Using a screwdriver, disengage the 5 clips and remove the front door inside scuff plate.

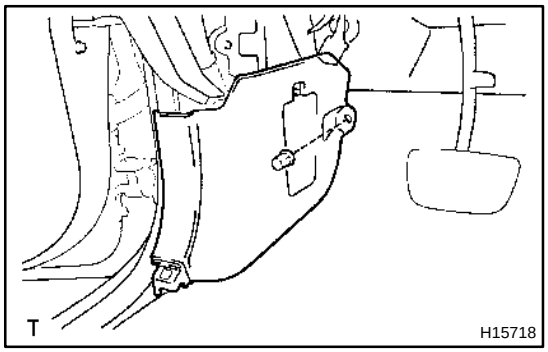
HINT:

Tape the screwdriver tip before use.

19. REMOVE FRONT DOOR INSIDE SCUFF PLATE RH

HINT:

Use the same procedures described for the LH side.



20. REMOVE COWL SIDE TRIM BOARD LH

(a) Remove the clip.

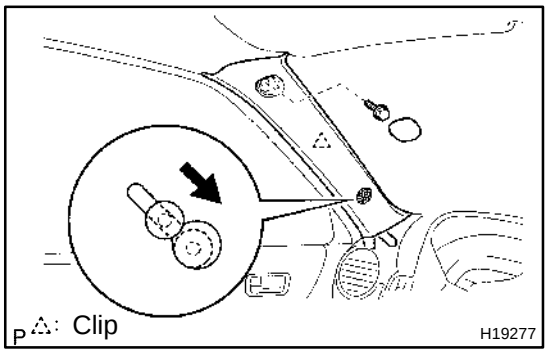
(b) Pull the cowl side trim board rearward to remove it.

21. REMOVE COWL SIDE TRIM BOARD RH

HINT:

Use the same procedures described for the LH side.

22. REMOVE FRONT PART OF FRONT DOOR OPENING TRIMS



23. REMOVE FRONT PILLAR GARNISH LH

(a) Using a screwdriver, remove the pillar garnish cover.

(b) Remove the bolt.

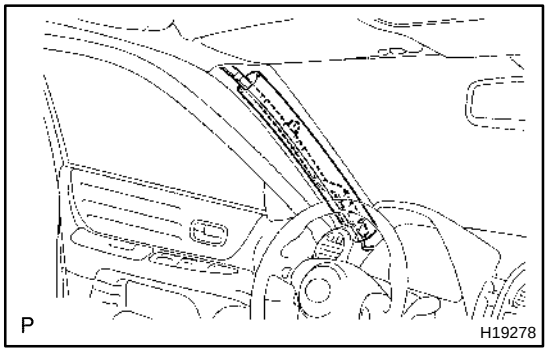
(c) Using a screwdriver, remove the pillar garnish.

HINT:

Tape the screwdriver tip before use.

(d) Remove the bolt.

Torque: 9.8 N·m (100 kgf·cm, 87in.·lbf)



(e) Cover the airbag with protective cover as shown in the illustration..

24. REMOVE FRONT PILLAR GARNISH RH

HINT:

Use the same procedures described for the LH side.

25. REMOVE INSTRUMENT PANEL

(a) Disconnect the connectors.

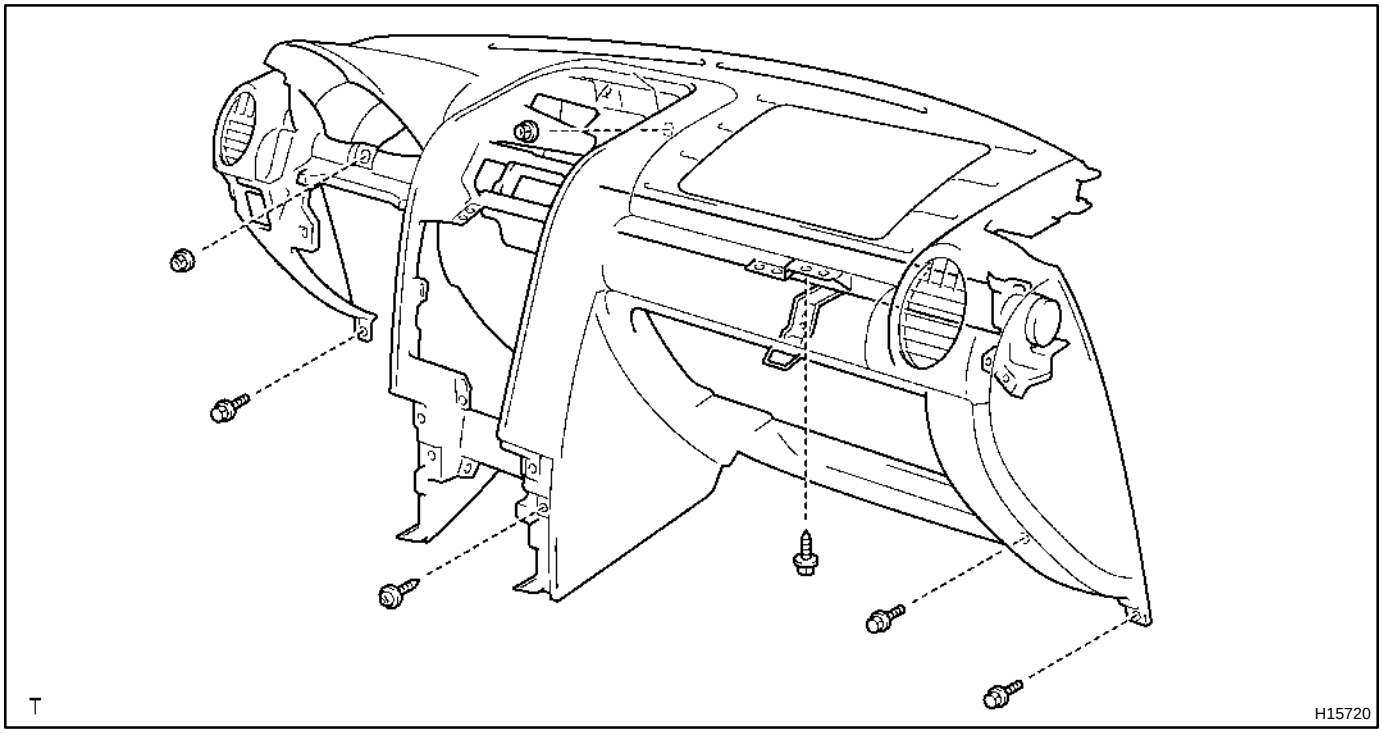
(b) Disengage the wire harness clamps.

(c) Remove the 3 bolts, 2 screws and 2 nuts.

(d) Pull the instrument panel rearward to remove it.

NOTICE:

Be careful not to damage the instrument panel and wire harness

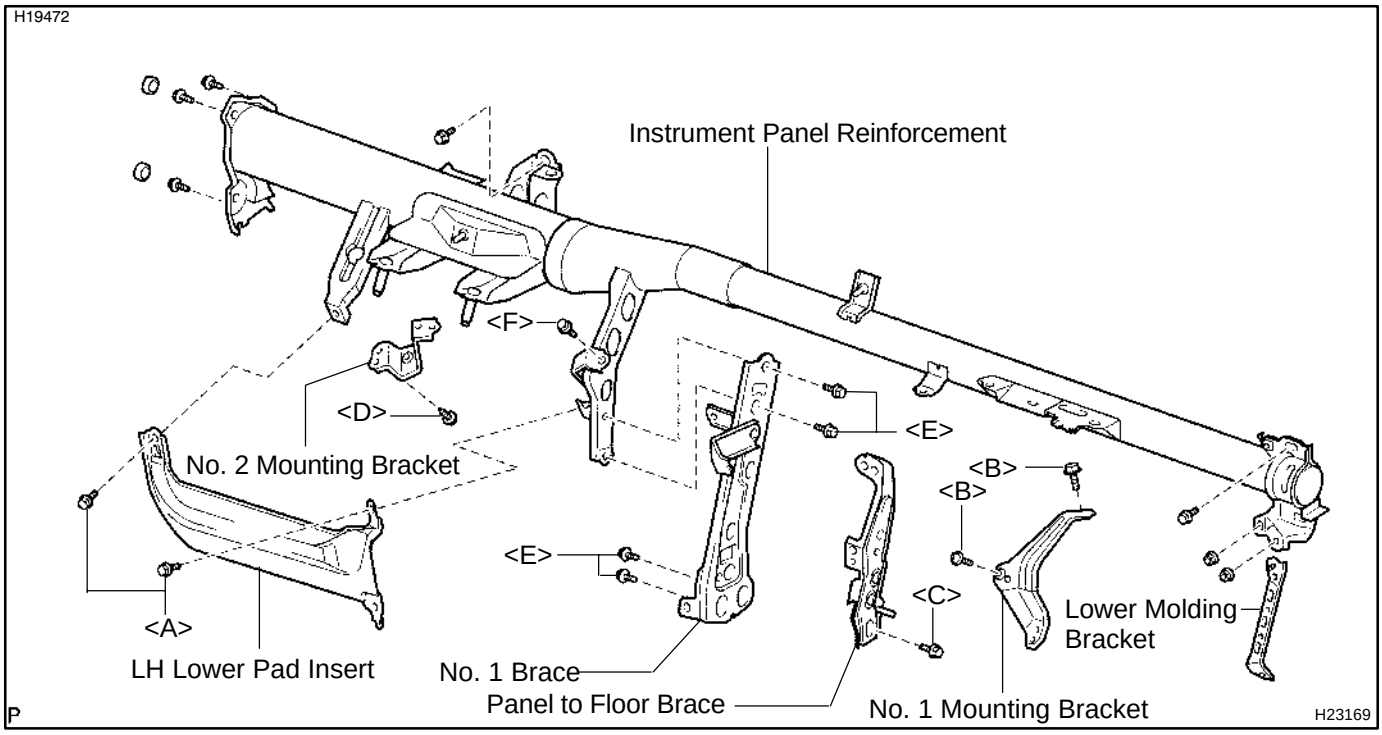


26. REMOVE INSTRUMENT PANEL REINFORCEMENT

(a) Disengage the wire harness clamps.
(b) Remove the bolt<F> and ground cable.
(c) Remove the 2 bolts <A> and LH lower pad insert.
(d) Remove the bolt<B>, screw<B> and No. 1 mounting bracket.
(e) Remove the bolt<C> and panel to floor brace.
(f) Remove the bolt<D> and No. 2 mounting bracket.
(g) Remove the 4 bolts<E> and No. 1 brace.
(h) Remove the 5 bolts, 2 nuts, instrument panel reinforcement and the lower mounting bracket.

NOTICE:

Be careful not to damage the body and wire harness.



BO2CV-04

DISASSEMBLY

1. REMOVE SIDE DEFROSTER DUCT

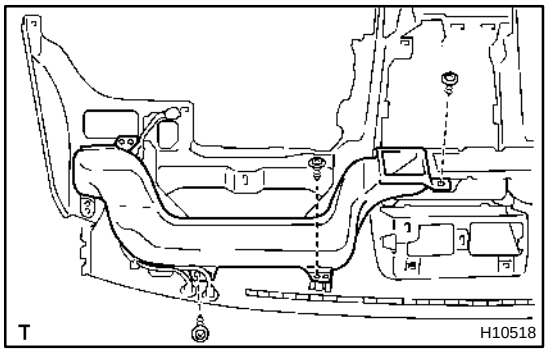
Remove the screw, then disconnect the side defroster duct as shown in the illustration.

2. REMOVE NO. 2 SIDE DEFROSTER NOZZLE DUCT

Remove the screw and side defroster nozzle duct.

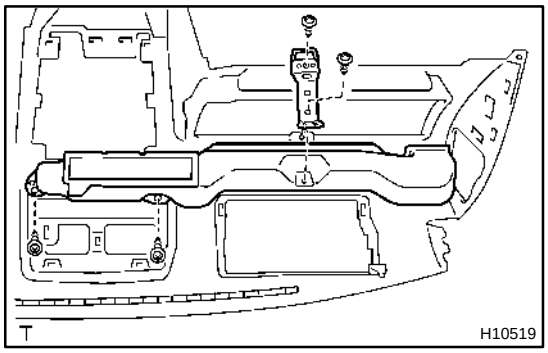
3. REMOVE DEFROSTER NOZZLE ASSEMBLY

Remove the 3 screws and defroster nozzle assembly.



4. REMOVE NO. 1 HEATER TO REGISTER DUCT

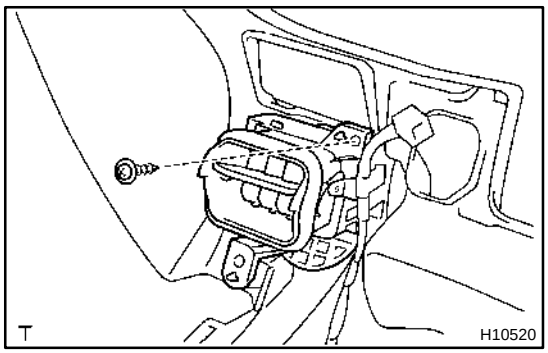
Remove the 3 screws and heater to register duct.



5. REMOVE NO. 2 HEATER TO REGISTER DUCT

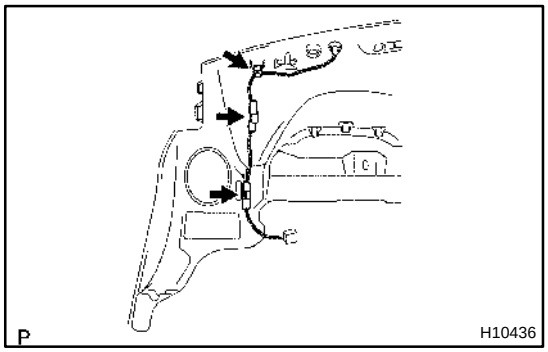
(a) Remove the 2 screws and center bracket.

(b) Remove the 2 screws and heater to register duct.



6. REMOVE NO. 1 REGISTER AND NO. 2 REGISTER

Remove the screw and register as shown in the illustration.



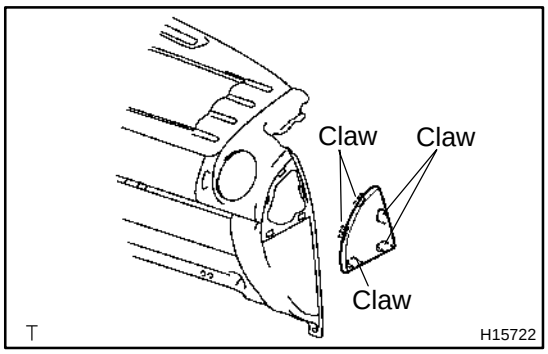
7. REMOVE NO. 2 INSTRUMENT PANEL WIRE

(a) Disconnect the connectors.

(b) Disengage the wire harness clamps and remove the instrument panel wire.

8. REMOVE SOLAR SENSOR

9. REMOVE LIGHT CONTROL SWITCH SENSOR AND HOLE COVER



10. REMOVE INSTRUMENT SIDE PANEL

Using a screwdriver, disengage the 5 claws and remove the instrument side panel.

HINT:

Tape the screwdriver tip before use.

11. REMOVE NO. 1 PINS

Remove the 4 screws and pins.

12. REMOVE INSTRUMENT PANEL END PAD

(a) Using a heat light, heat the end pad between 20 to 30˚C (68 to 86˚F).

NOTICE:

Do not heat the end pad excessively.

(b) Remove the end pad.

HINT:

When replacing the end pad, use a new pad.

BO2CX-03

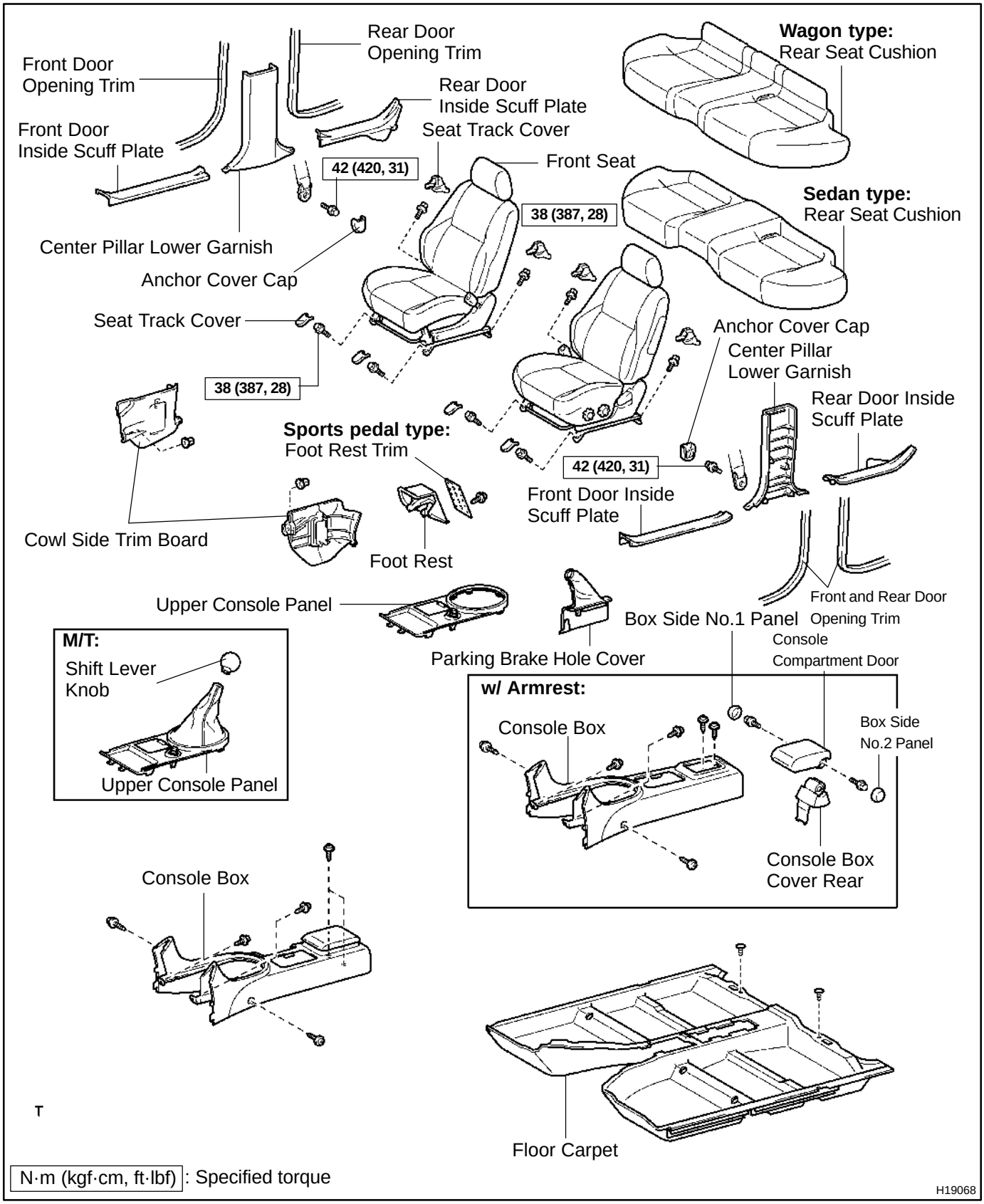
INSTALLATION

The installation procedures are the removal procedures in reverse order (see page BO-139).

FLOOR CARPET

COMPONENTS

BOOWI-10



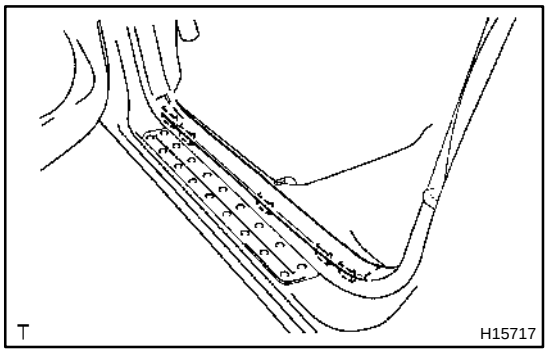
BO2CY-05

REMOVAL

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. **REMOVE FRONT SEAT**
   (See page BO-173 and BO-185)
2. **Sedan Type:**
   REMOVE REAR SEAT CUSHION (See page BO-204)
3. **Wagon Type:**
   REMOVE REAR SEAT CUSHION (See page BO-204)



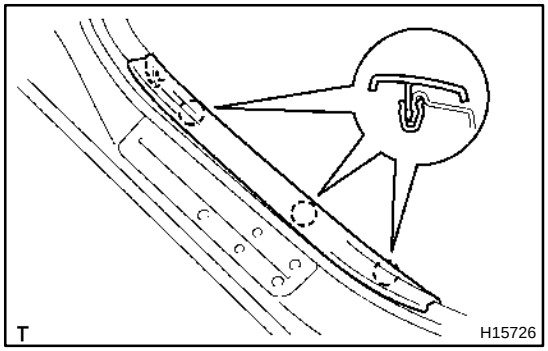
4. **REMOVE FRONT DOOR INSIDE SCUFF PLATE**

(a) Using a screwdriver, remove the front door inside scuff plate.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



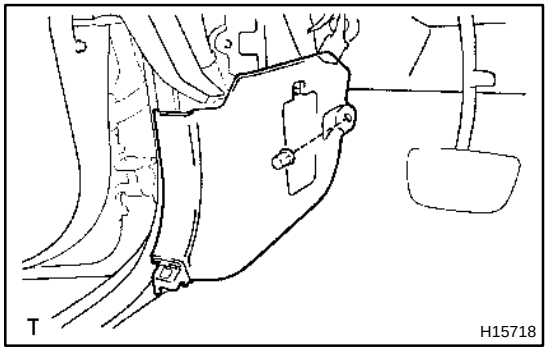
5. **REMOVE REAR DOOR INSIDE SCUFF PLATE**

(a) Using a screwdriver, remove the rear door inside scuff plate.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



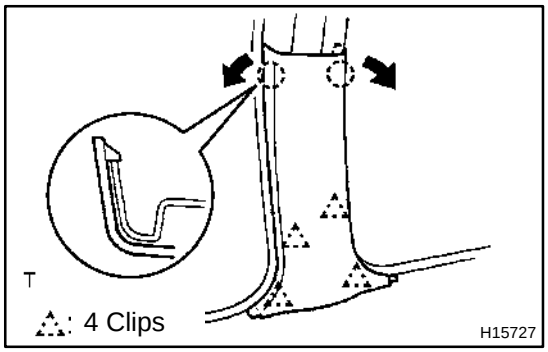
6. **REMOVE COWL SIDE TRIM BOARD**

(a) Remove the clip and cowl side trim board.

(b) Employ the same manner described above to the other side.

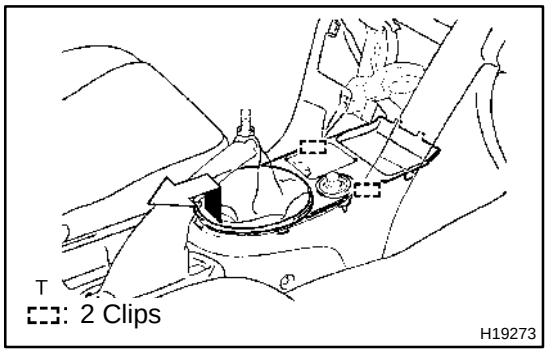
7. **REMOVE FRONT DOOR OPENING TRIMS**
8. **REMOVE REAR DOOR OPENING TRIMS**
9. **REMOVE FRONT SEAT OUTER BELT FLOOR ANCHORS**

(a) Using a screwdriver, remove the floor anchor cover caps.
HINT:
Tape the screwdriver tip before use.
(b) Remove the 2 bolts and floor anchors.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

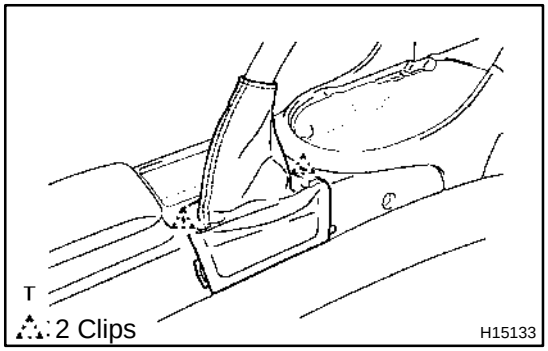


10. REMOVE CENTER PILLAR LOWER GARNISH
(a) Remove the center pillar lower garnish as shown in the illustration.
(b) Employ the same manner described above to the other side.

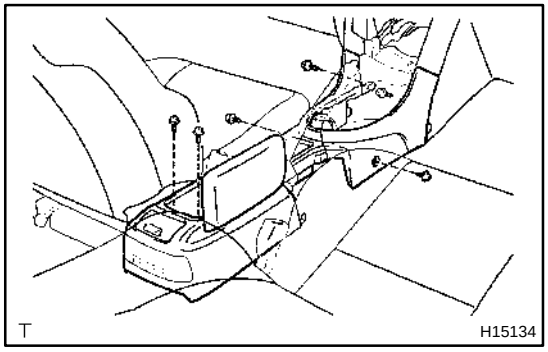
11. M/T:
REMOVE SHIFT LEVER KNOB



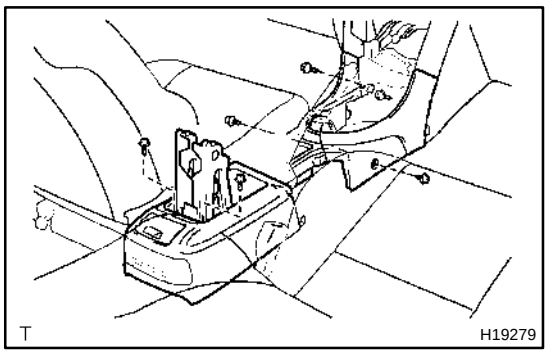
12. REMOVE UPPER CONSOLE PANEL
(a) M/T:
Remove the shift lever knob.
(b) Using a screwdriver, remove the upper console panel as shown in the illustration.
HINT:
Tape the screwdriver tip before use.
(c) Disconnect the connector.



13. REMOVE PARKING BRAKE HOLE COVER
Using a screwdriver, remove the parking brake hole cover.
HINT:
Tape the screwdriver tip before use.



14. w/o Arm Rest:
REMOVE CONSOLE BOX
(a) Remove the 6 screws.
(b) w/o LEXUS navigation system:
Pull the console box rearward to remove it.
(c) w/ LEXUS navigation system:
Pull the console box rearward to remove it, then disconnect the connector.



15. w/ Arm Rest:
REMOVE CONSOLE BOX

(a) Using a screwdriver, remove the box side No.1 and No.2 panel.

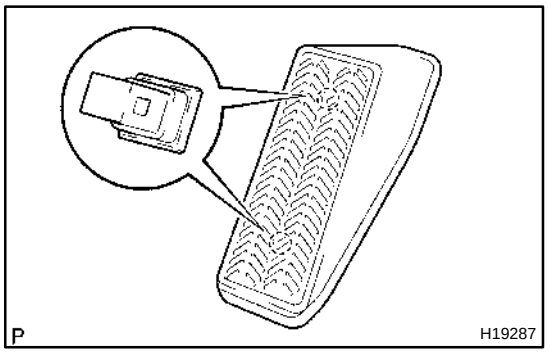
HINT:

Tape the screwdriver tip before use.

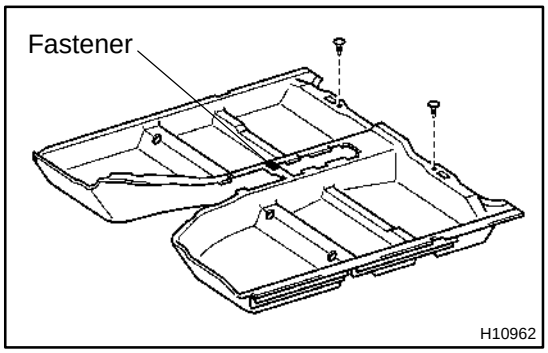
(b) Remove the 2 bolts and console compartment door.
(c) Remove the console box cover rear.
(d) Remove the 6 screws.
(e) w/o LEXUS navigation system:
Pull the console box rearward to remove it.
(f) w/ LEXUS navigation system:
Pull the console box rearward to remove it, then disconnect the connector.

16. REMOVE FOOT REST

(a) Sports pedal type:
Remove the 4 screws and foot rest trim.



(b) Using a screwdriver, remove the foot rest as shown in the illustration.



17. REMOVE FLOOR CARPET

(a) Peel off the fastener.
(b) Remove the 2 clips.
(c) Disengage the hooks and remove the floor carpet.

NOTICE:

Be careful not to pull the wire harness.

HINT:

At the time of installation, please refer to the following items.

- When installing the floor mat, pull out the wire harness and levers through the cutout of the floor carpet.
- There should be no wrinkles or folds after attaching the floor carpet.

BO0WK-03

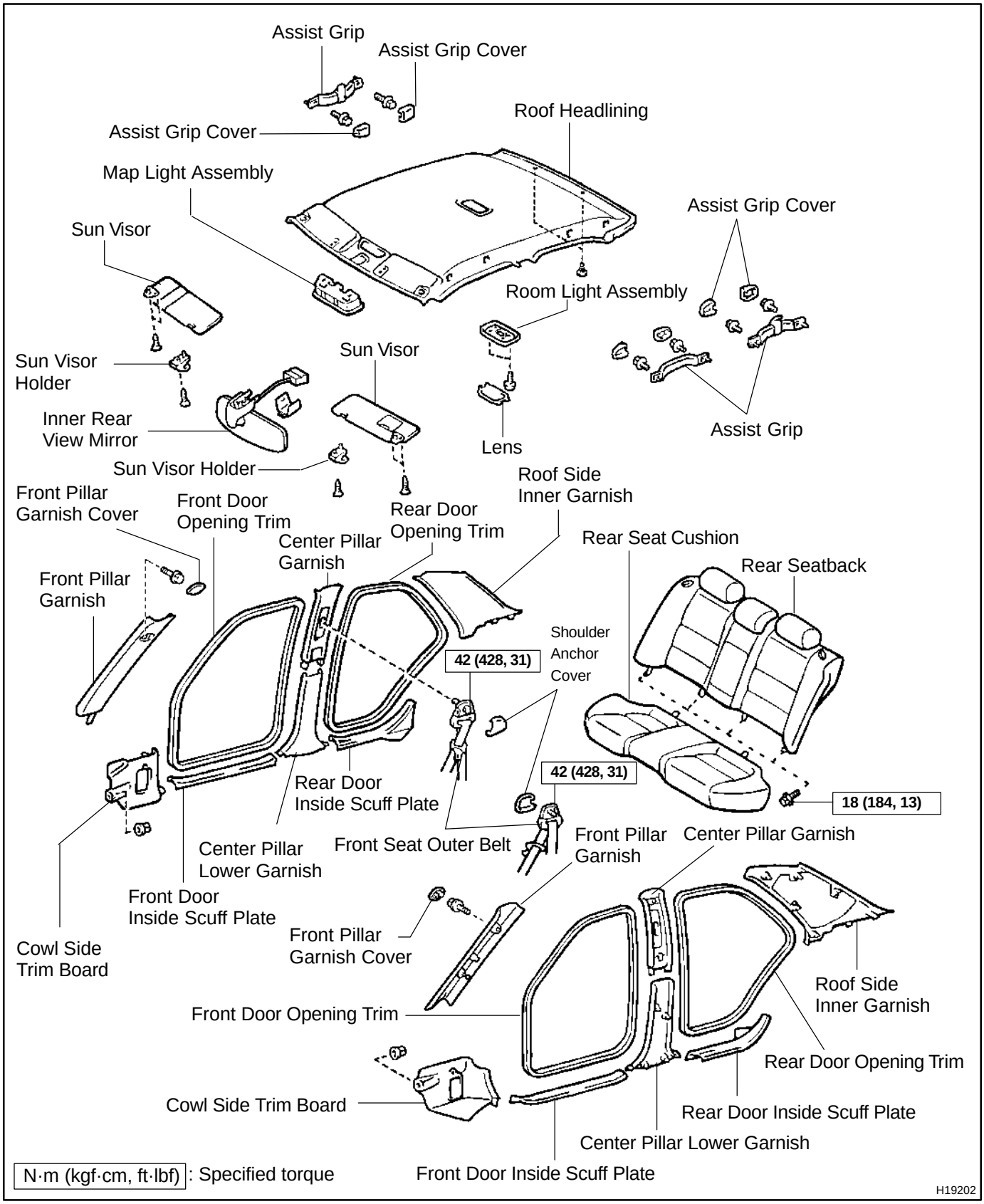
INSTALLATION

The installation procedures are the removal procedures in reverse order (See page BO-151).

ROOF HEADLINING (Sedan)

BO4DU-02

COMPONENTS



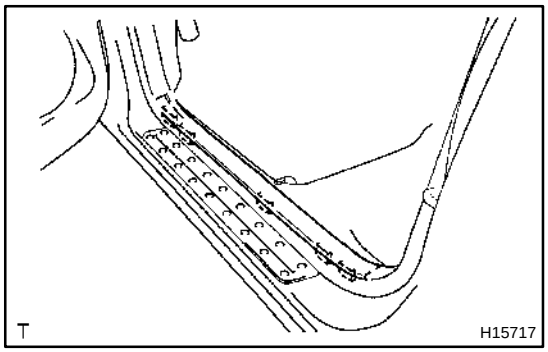
BO4DV-02

REMOVAL

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. **REMOVE REAR SEAT CUSHION (See page BO-196)**
2. **REMOVE REAR SEATBACK (See page BO-196)**



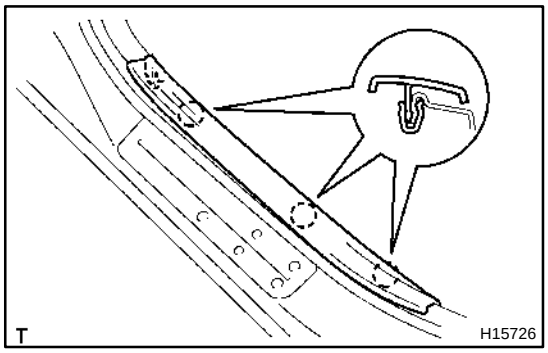
3. **REMOVE FRONT DOOR INSIDE SCUFF PLATE**

(a) Using a screwdriver, remove the front door inside scuff plate as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



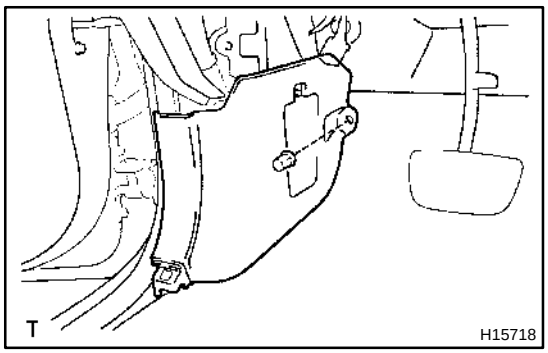
4. **REMOVE REAR DOOR INSIDE SCUFF PLATE**

(a) Using a screwdriver, remove the rear door inside scuff plate as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.

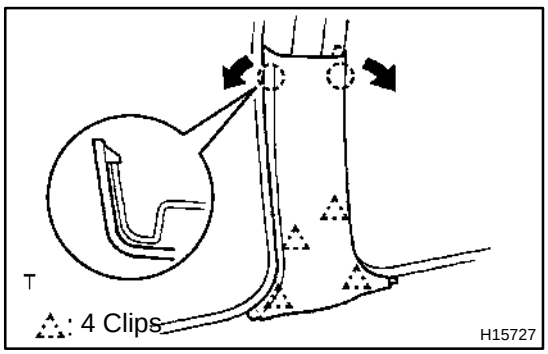


5. **REMOVE COWL SIDE TRIM BOARD**

(a) Remove the clip and cowl side trim board.

(b) Employ the same manner described above to the other side.

6. **REMOVE FRONT DOOR OPENING TRIMS**
7. **REMOVE REAR DOOR OPENING TRIMS**



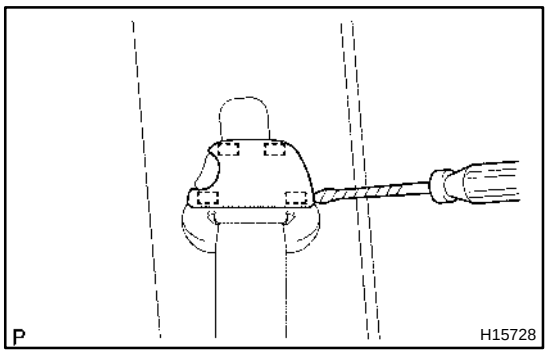
8. **REMOVE CENTER PILLAR LOWER GARNISH**

(a) Using a screwdriver, remove the center pillar lower garnish.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



9. REMOVE FRONT SEAT OUTER BELT SHOULDER ANCHOR

(a) Using a screwdriver, remove the anchor cap.

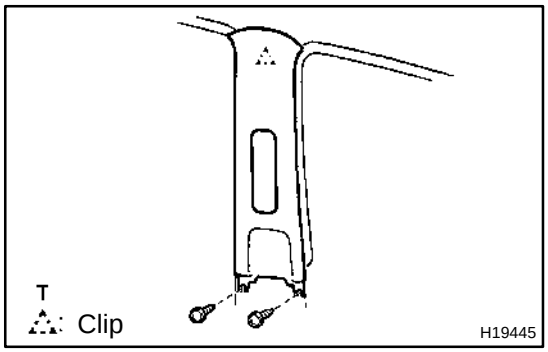
HINT:

Tape the screwdriver tip before use.

(b) Remove the bolt and front seat outer belt shoulder anchor.

Torque: 42 N·m (428 kgf·cm, 31 ft·lbf)

(c) Employ the same manner described above to the other side.



10. REMOVE CENTER PILLAR GARNISH

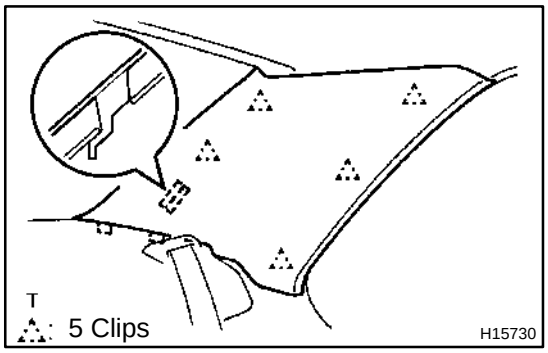
(a) Remove the 2 screws.

(b) Using a screwdriver, remove the center pillar garnish.

HINT:

Tape the screwdriver tip before use.

(c) Employ the same manner described above to the other side.



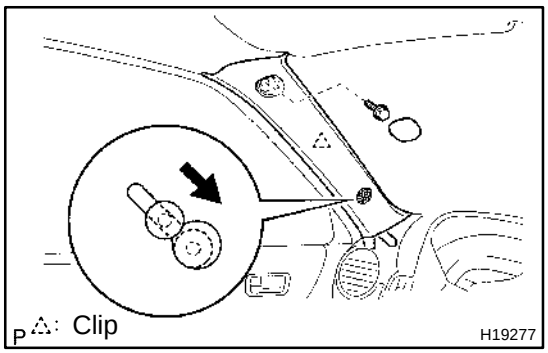
11. REMOVE ROOF SIDE INNER GARNISH

(a) Using a screwdriver, remove the roof side inner garnish.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



12. REMOVE FRONT PILLAR GARNISH

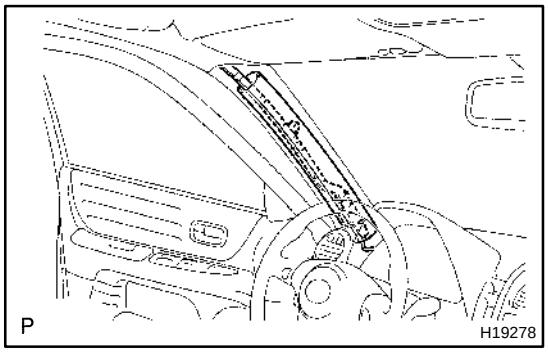
(a) Using a screwdriver, remove the front pillar garnish cover.

HINT:

Tape the screwdriver tip before use.

(b) Remove the bolt.

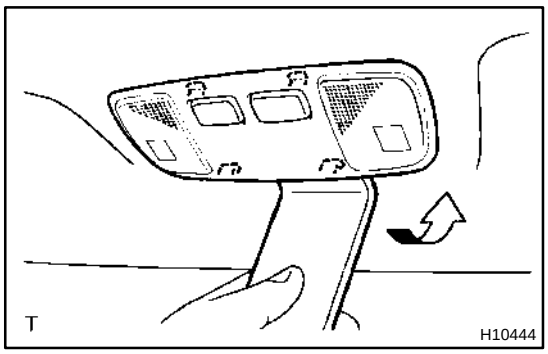
(c) Using a screwdriver, remove the front pillar garnish.



(d) Remove the bolt.

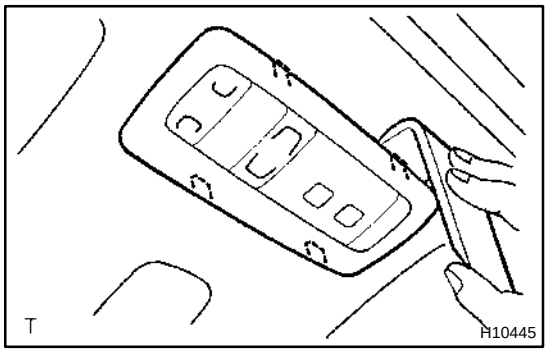
(e) Pack the airbag with protection cover.

(f) Employ the same manner described above to the other side.



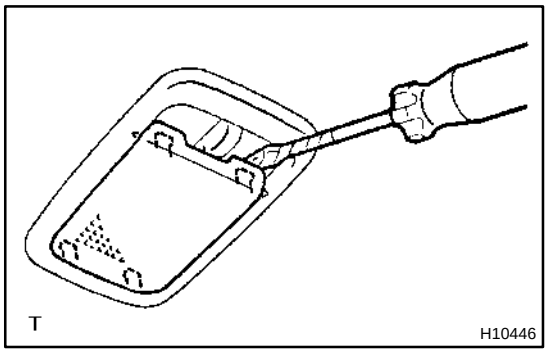
13. w/o Sliding roof:
REMOVE MAP LIGHT ASSEMBLY

(a) Using a moulding remover, remove the lens.
(b) Remove the 2 screws and the map light assembly.
(c) Disconnect the connector.



14. w/ Sliding roof:
REMOVE MAP LIGHT ASSEMBLY

(a) Using a moulding remover, remove the cover.
(b) Remove the 2 screws and the the map light assembly.
(c) Disconnect the connector.



15. REMOVE ROOM LIGHT ASSEMBLY

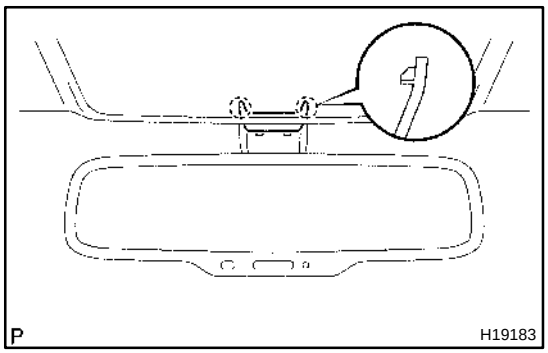
(a) Using a screwdriver, remove the lens.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 screws and the room light assembly.
(c) Disconnect the connector.

16. w/ Sliding roof:
REMOVE ROOF OPENING TRIM

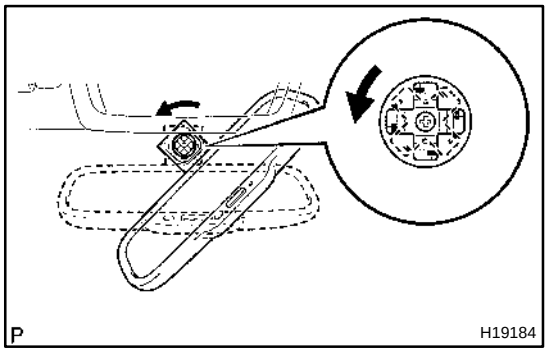


17. REMOVE INNER REAR VIEW MIRROR

(a) Using a screwdriver, remove the inner rear view mirror stay holder cover.

HINT:

Tape the screwdriver tip before use.



(b) Electro chromic inner mirror:
Disconnect the connector.
(c) Remove the mirror assembly by turning the stay part of the mirror counterclockwise.

18. REMOVE ASSIST GRIPS

(a) Using a screwdriver, remove the caps.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 6 bolts and 3 assist grips.

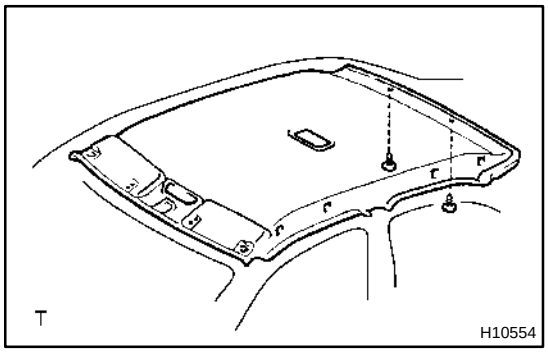
19. REMOVE SUN VISORS

(a) Remove the 4 screws and pull the sun visors downward.

(b) Disconnect the connectors.

20. REMOVE SUN VISOR HOLDERS

Remove the 2 screws and 2 holders.



21. REMOVE ROOF HEADLINING

(a) Remove the 2 clips.

(b) Pull the roof headlining downward to remove it.

BO4DW-02

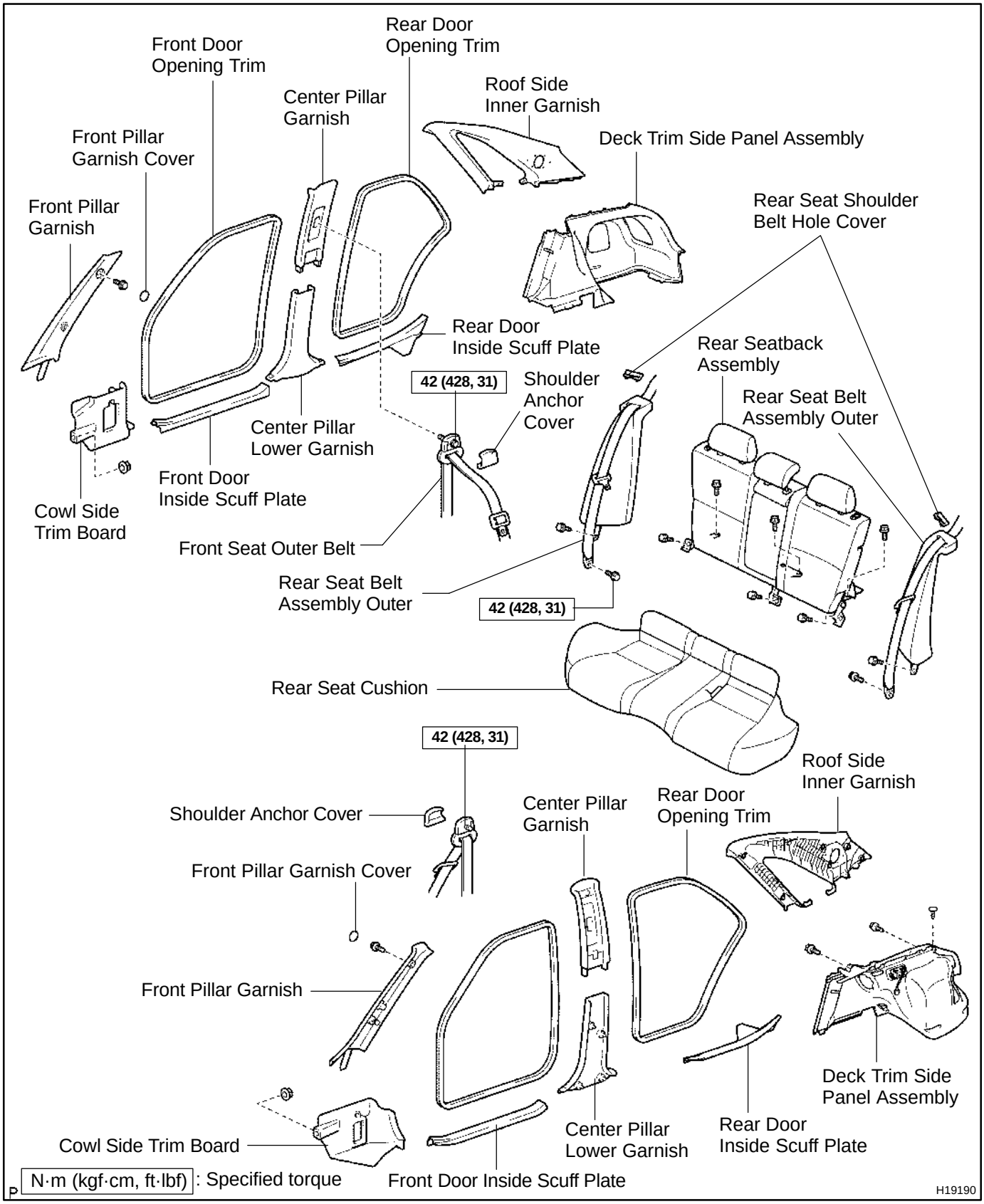
INSTALLATION

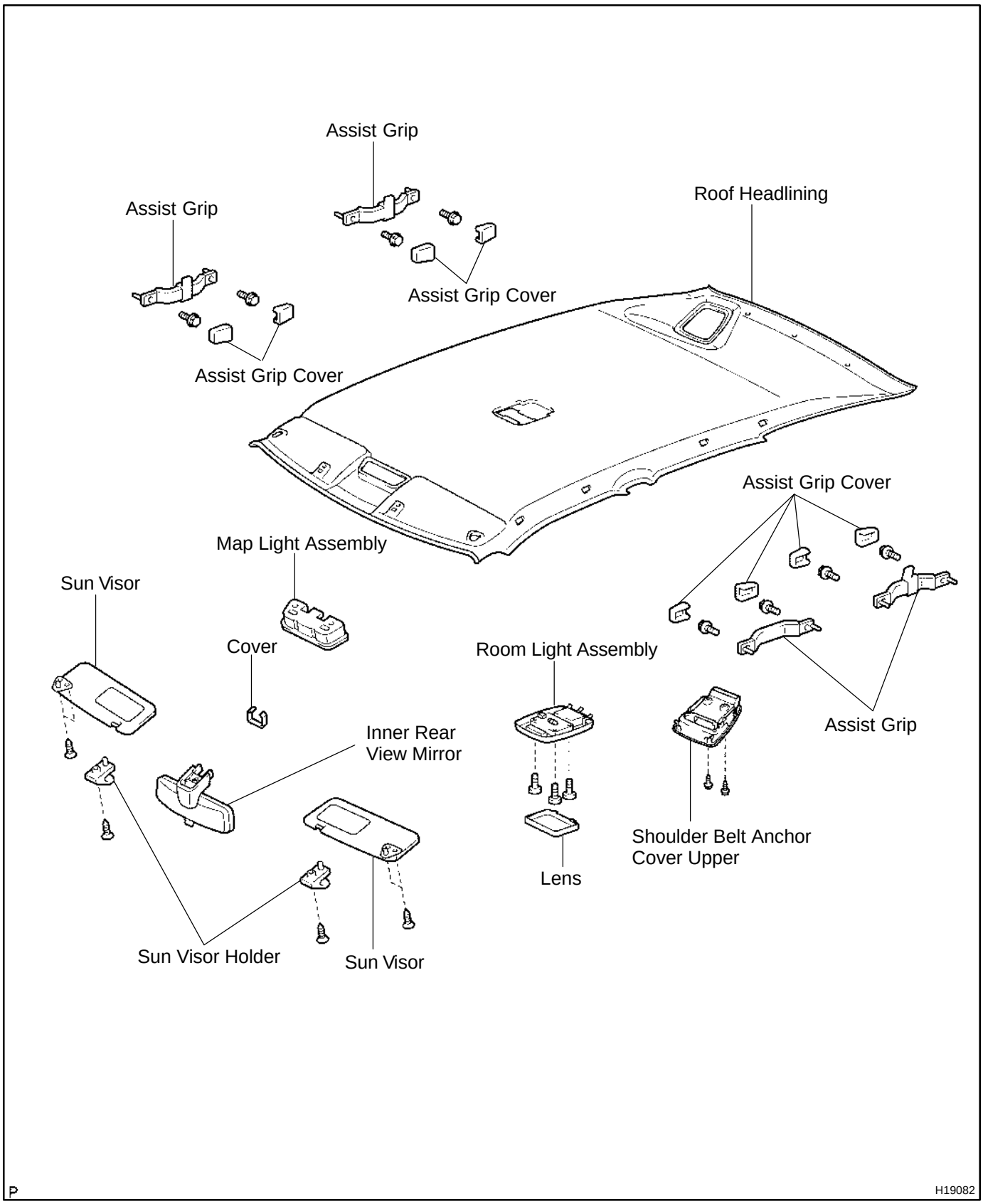
The installation procedures are the removal procedures in reverse order (See page BO-156).

ROOF HEADLINING (Wagon)

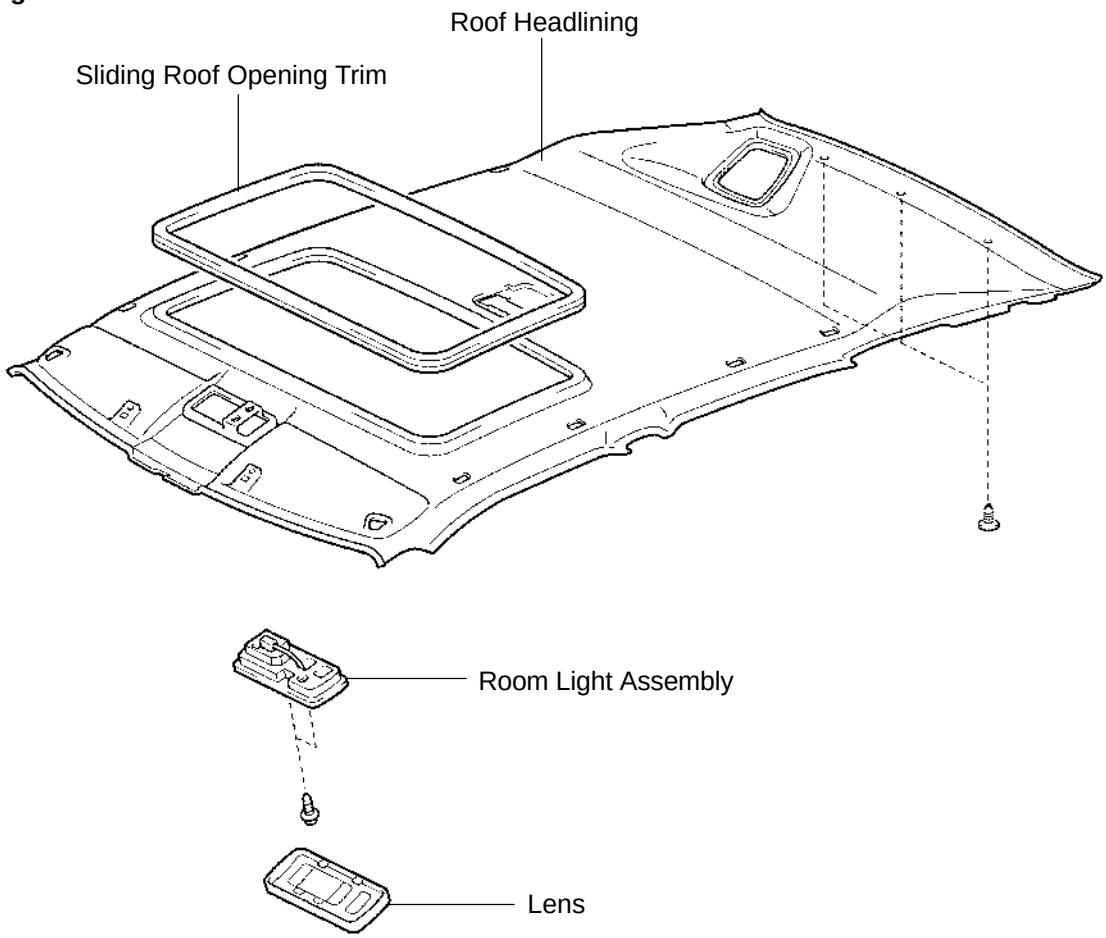
BO4DX-02

COMPONENTS




Assist Grip
Assist Grip
Roof Headlining
Assist Grip Cover
Assist Grip Cover
Assist Grip Cover
Map Light Assembly
Sun Visor
Cover
Room Light Assembly
Assist Grip
Inner Rear
View Mirror
Shoulder Belt Anchor
Cover Upper
Lens
Sun Visor Holder
Sun Visor
P
H19082

w/ Sliding Roof:



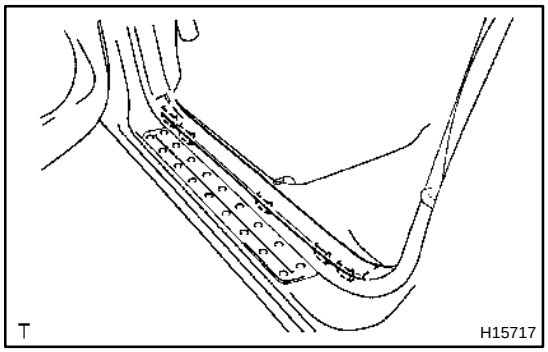
BO4DY-03

REMOVAL

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. **REMOVE REAR SEAT CUSHION (See page BO-204)**
2. **REMOVE SIDE SEATBACK ASSEMBLY(See page BO-204)**



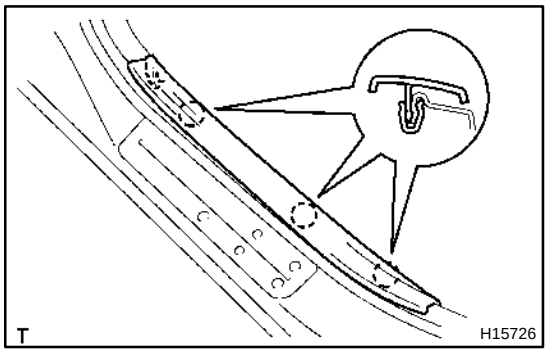
3. **REMOVE FRONT DOOR INSIDE SCUFF PLATE**

(a) Using a screwdriver, remove the front door inside scuff plate as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



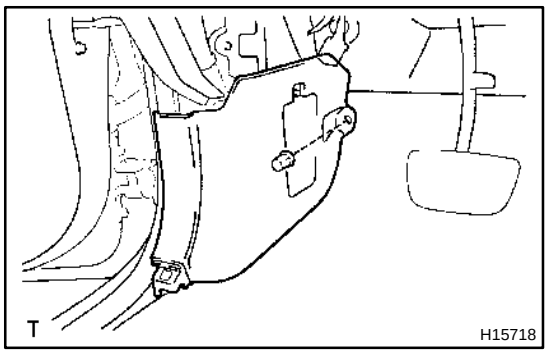
4. **REMOVE REAR DOOR INSIDE SCUFF PLATE**

(a) Using a screwdriver, remove the rear door inside scuff plate as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.

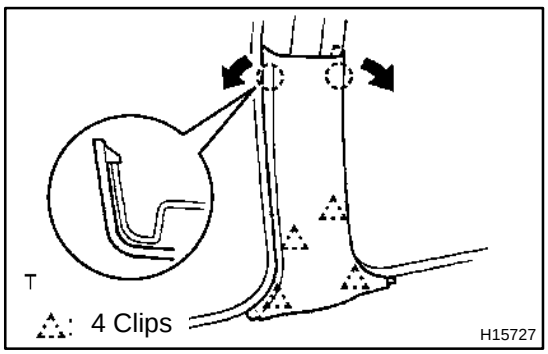


5. **REMOVE COWL SIDE TRIM BOARD**

(a) Remove the clip and cowl side trim board.

(b) Employ the same manner described above to the other side.

6. **REMOVE FRONT DOOR OPENING TRIMS**
7. **REMOVE REAR DOOR OPENING TRIMS**



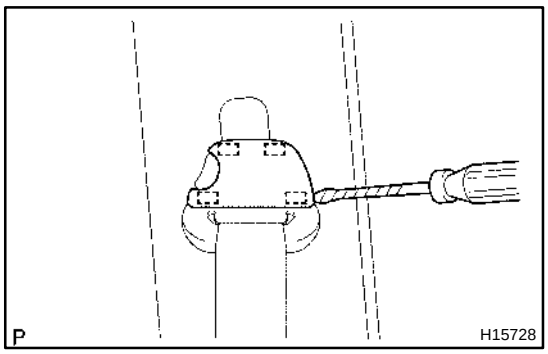
8. **REMOVE CENTER PILLAR LOWER GARNISH**

(a) Using a screwdriver, remove the center pillar lower garnish.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



9. REMOVE FRONT SEAT OUTER BELT SHOULDER ANCHOR

(a) Using a screwdriver, remove the anchor cap.

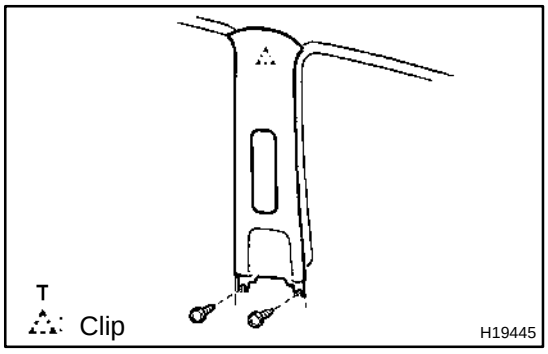
HINT:

Tape the screwdriver tip before use.

(b) Remove the bolt and front seat outer belt shoulder anchor.

Torque: 42 N·m (428 kgf·cm, 31 ft·lbf)

(c) Employ the same manner described above to the other side.



10. REMOVE CENTER PILLAR GARNISH

(a) Remove the 2 screws.

(b) Using a screwdriver, remove the center pillar garnish.

HINT:

Tape the screwdriver tip before use.

(c) Employ the same manner described above to the other side.

11. REMOVE REAR SEAT CUSHION (See page BO-204)

12. REMOVE REAR SIDE SEAT BACK (See page BO-204)

13. REMOVE REAR SEAT FLOOR BOARD NO.4

(a) Remove the seat back board carpets.

(b) Remove the 2 bolts and rear floor board No.4.

14. REMOVE DECK FLOOR BOX FRONT

(a) Remove the 2 bolts and 2 rope hook assemblies.

(b) Remove the 2 bolts and 2 tether anchor brackets.

Torque: 21 N·m (214 kgf·cm, 15ft·lbf)

(c) Remove the restraint seat tether anchor cover.

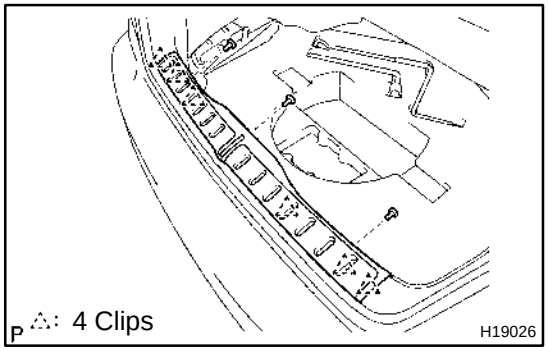
(d) Remove the deck floor box front.

15. REMOVE DECK BOARD NO.2

16. REMOVE REAR FLOOR BOARD NO.2

17. REMOVE REAR FLOOR BOARD NO.3

18. REMOVE TONNEAU COVER ASSEMBLY



19. REMOVE REAR FLOOR FINISH PLATE

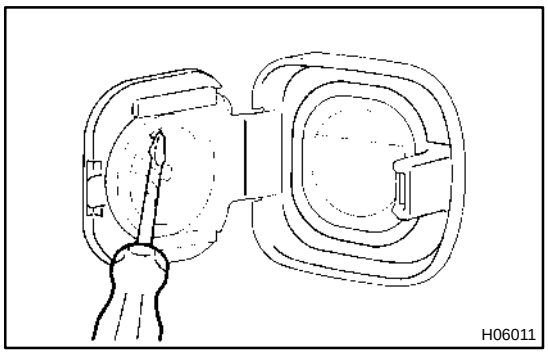
(a) Remove the 2 bolts and 2 rope hook assemblies.

(b) Remove the 3 clips.

(c) Using a screwdriver, remove the rear floor finish plate.

HINT:

Tape the screwdriver tip before use.

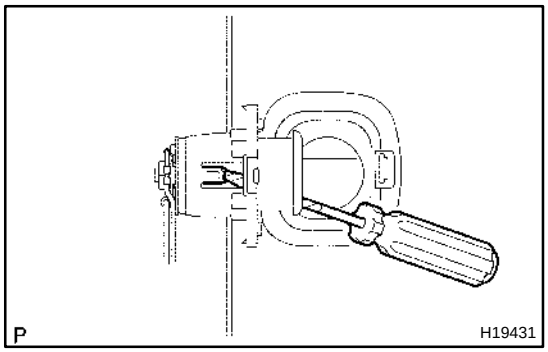


20. RH Side:
REMOVE ACCESSORY SOCKET

(a) Using a screwdriver, disengage the claw on the accessory socket cover from the hole in the accessory socket, then pull out the accessory socket approx. 10 mm (0.39 in.).

HINT:

Tape the screwdriver tip before use.



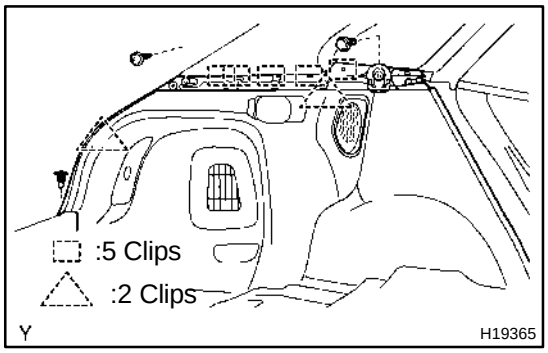
(b) Using a screwdriver, disengage the claw on the accessory socket cover from the body and remove the accessory socket and cover as a unit.

HINT:

Tape the screwdriver tip before use.

(c) Disconnect the connector.

(d) Disassemble the accessory socket from the socket cover.



21. REMOVE DECK TRIM SIDE PANEL ASSEMBLY

(a) Remove the 2 bolts and 2 floor hooks.

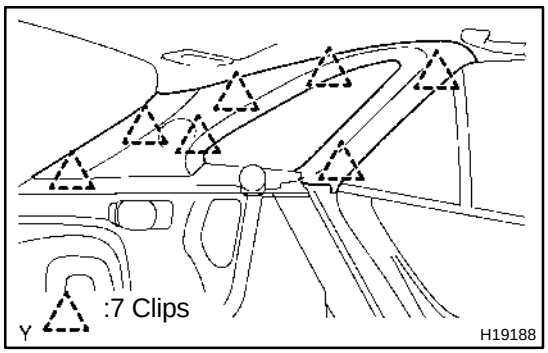
(b) Remove the screw, bolt and clip.

(c) Using a screwdriver, remove the deck trim side panel assembly then disconnect the connector.

HINT:

Tape the screwdriver tip before use.

(d) Employ the same manner described above to the other side.



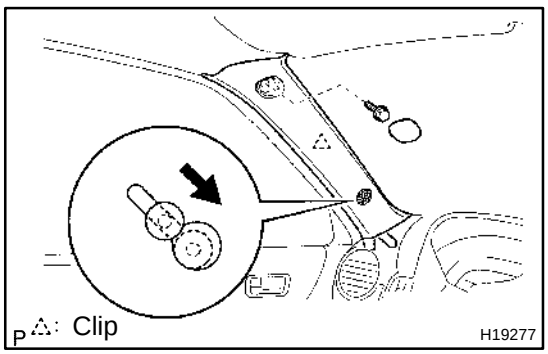
22. REMOVE ROOF SIDE INNER GARNISH

(a) Using a screwdriver, remove the roof side inner garnish.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.



23. REMOVE FRONT PILLAR GARNISH

(a) Using a screwdriver, remove the front pillar garnish cover.

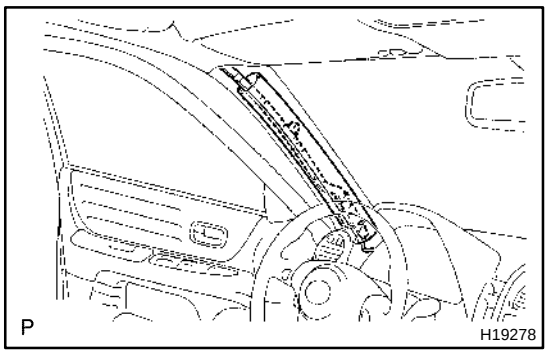
HINT:

Tape the screwdriver tip before use.

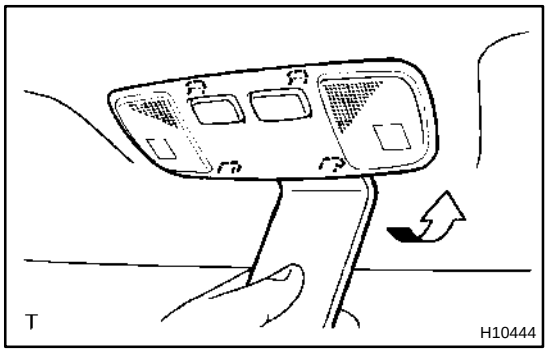
(b) Remove the bolt.

(c) Using a screwdriver, remove the front pillar garnish.

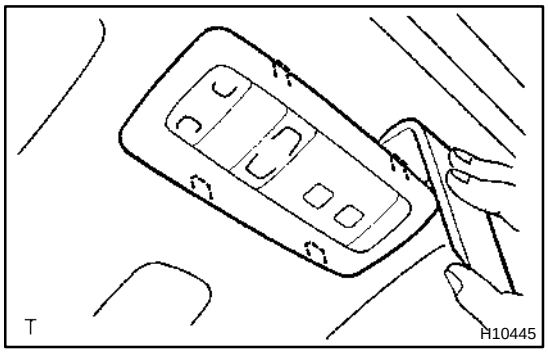
(d) Remove the bolt.



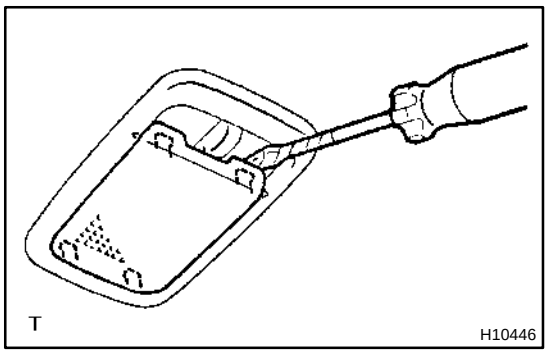
(e) Pack the airbag with protection cover.
(f) Employ the same manner described above to the other side.



24. w/o Sliding roof:
REMOVE MAP LIGHT ASSEMBLY
(a) Using a moulding remover, remove the lens.
(b) Remove the 2 screws and map light assembly.
(c) Disconnect the connector.

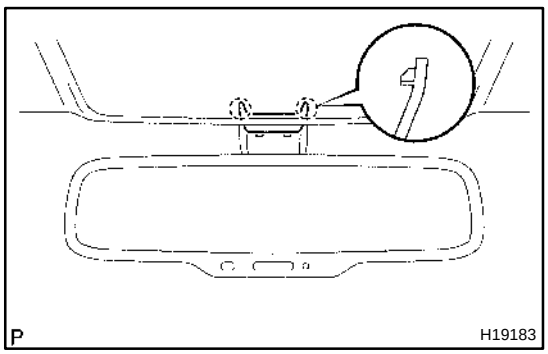


25. w/ Sliding roof:
REMOVE MAP LIGHT ASSEMBLY
(a) Using a moulding remover, remove the cover.
(b) Remove the 2 screws and map light assembly.
(c) Disconnect the connector.

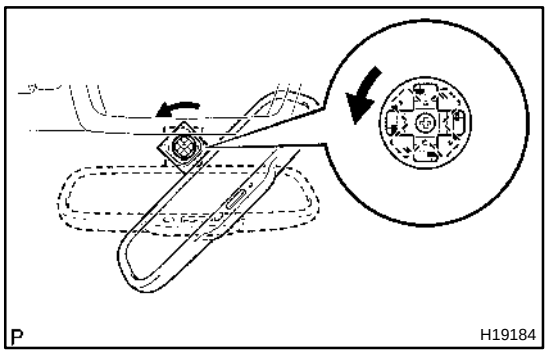


26. REMOVE ROOM LIGHT ASSEMBLY
(a) Using a screwdriver, remove the lens.
HINT:
Tape the screwdriver tip before use.
(b) Remove the 2 screws and room light assembly.
(c) Disconnect the connector.

27. w/ Sliding Roof:
REMOVE SLIDING ROOF OPENING TRIM



28. REMOVE INNER REAR VIEW MIRROR
(a) Using a screwdriver, remove the inner rear view mirror stay holder cover.
HINT:
Tape the screwdriver tip before use.



(b) Electro Chromic Inner Mirror:
Disconnect the connector.

(c) Remove the mirror assembly by turning the stay part of the mirror counterclockwise.

29. REMOVE ASSIST GRIPS

(a) Using a screwdriver, remove the caps.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 6 bolts and 3 assist grips.

30. REMOVE 2 SUN VISOR

(a) Remove the 4 screws and pull the sun visors downward.

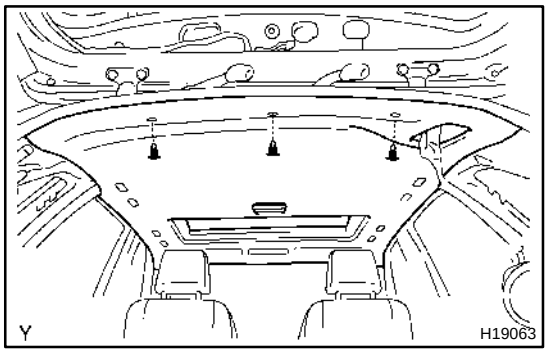
(b) Disconnect the connectors.

31. REMOVE 2 SUN VISOR HOLDER

Remove the 2 screws and 2 holders.

32. REMOVE SHOULDER BELT ANCHOR COVER UPPER

Remove the 2 screws and shoulder belt anchor cover upper.



33. REMOVE ROOF HEADLINING

(a) Remove the 3 clips.

(b) Pull the roof headlining downward to remove it.

BO4DZ-02

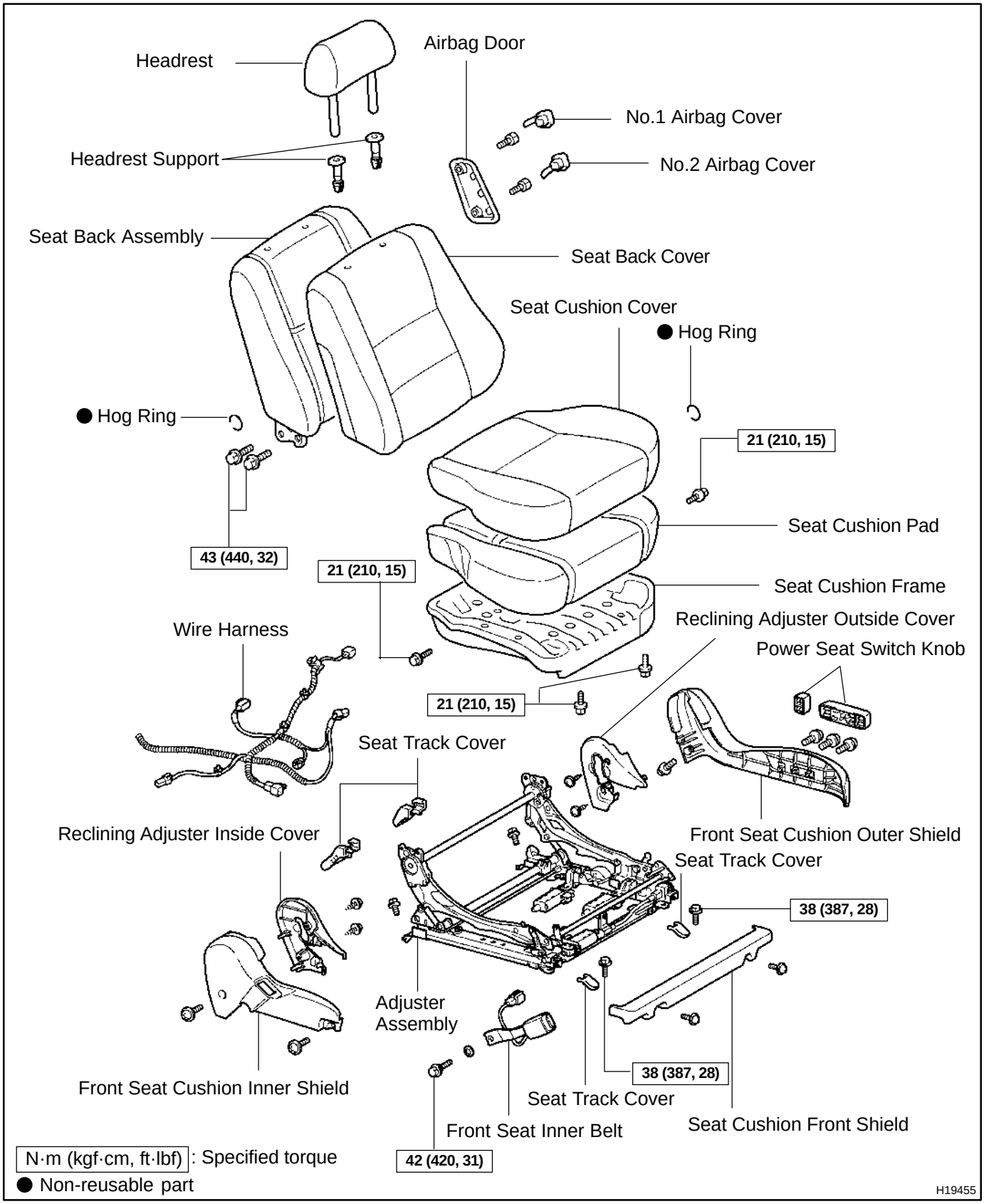
INSTALLATION

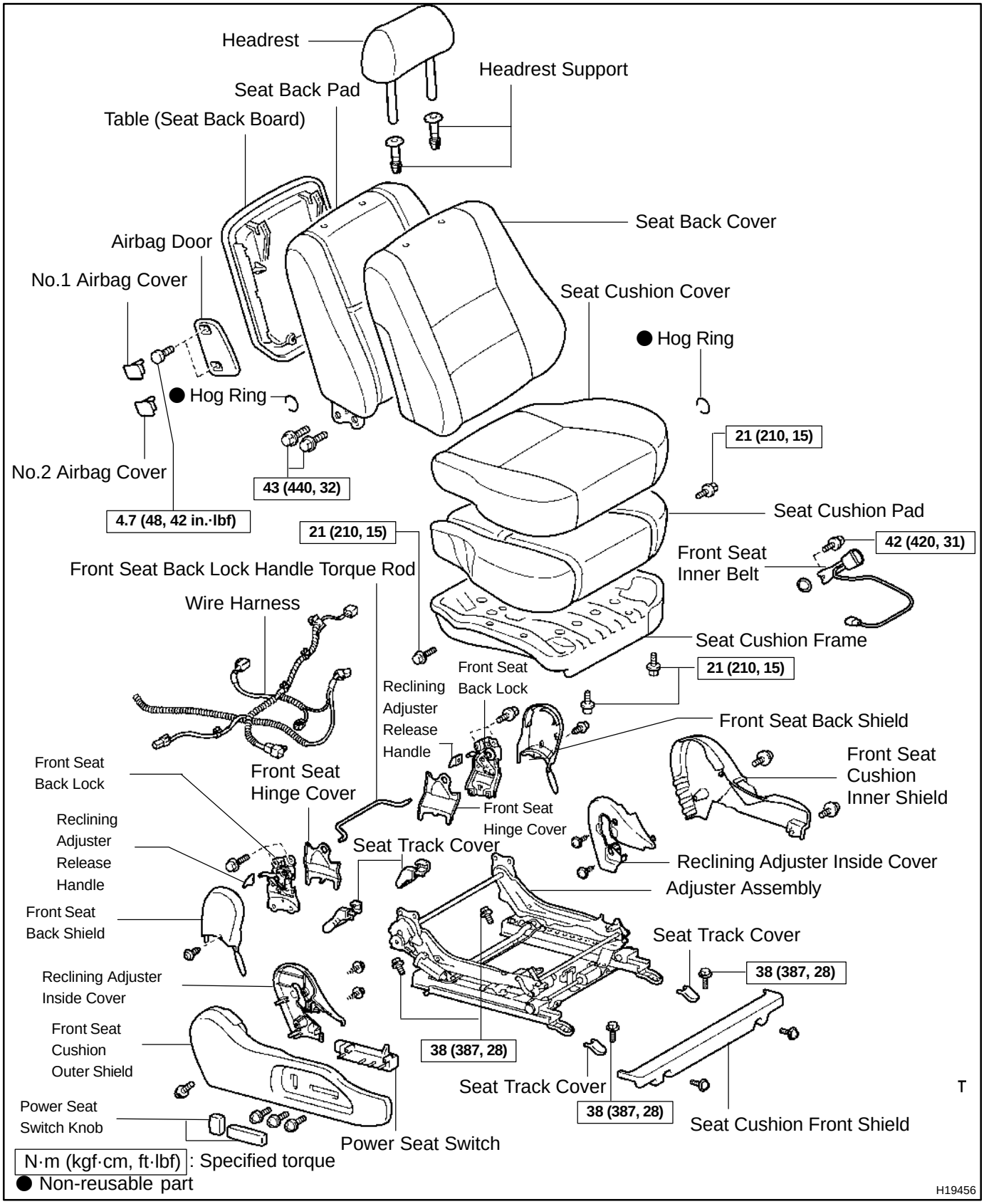
The installation procedures are the removal procedures in reverse order (See page BO-164).

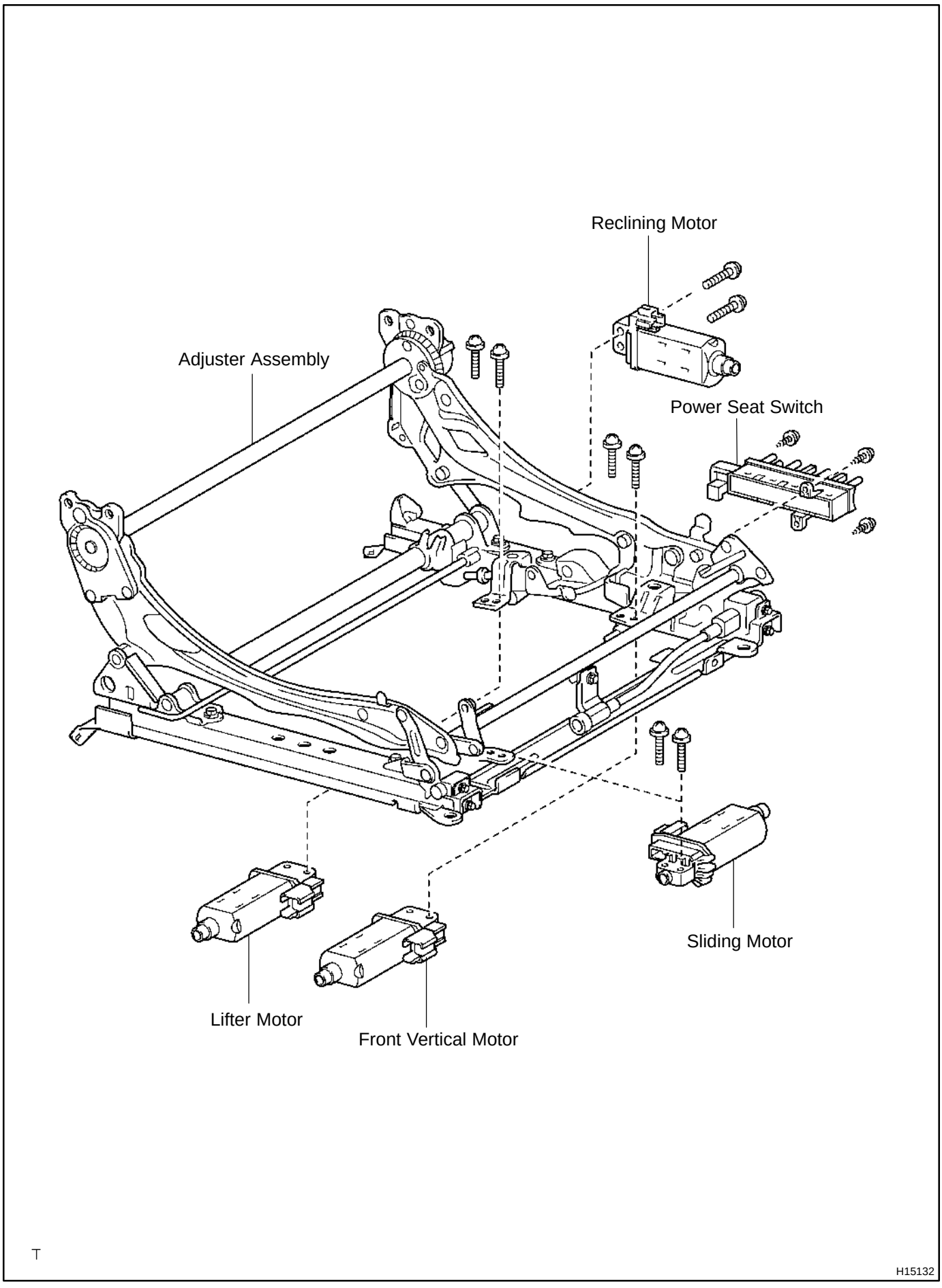
FRONT SEAT (Power Adjuster Type)

BO4E0-02

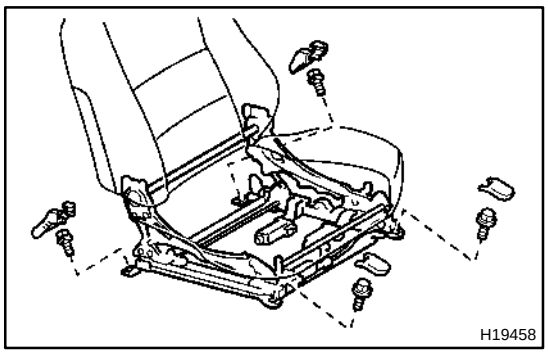
COMPONENTS




Headrest
Headrest Support
Seat Back Pad
Table (Seat Back Board)
Seat Back Cover
Airbag Door
No.1 Airbag Cover
Seat Cushion Cover
● Hog Ring
● Hog Ring
21 (210, 15)
No.2 Airbag Cover
43 (440, 32)
4.7 (48, 42 in.·lbf)
Seat Cushion Pad
21 (210, 15)
42 (420, 31)
Front Seat Inner Belt
Front Seat Back Lock Handle Torque Rod
Wire Harness
Seat Cushion Frame
Front Seat Back Lock
Reclining Adjuster Release Handle
21 (210, 15)
Front Seat Back Shield
Front Seat Back Lock
Front Seat Hinge Cover
Front Seat Cushion Inner Shield
Reclining Adjuster Release Handle
Front Seat Hinge Cover
Seat Track Cover
Reclining Adjuster Inside Cover
Adjuster Assembly
Front Seat Back Shield
Seat Track Cover
38 (387, 28)
Reclining Adjuster Inside Cover
Front Seat Cushion Outer Shield
38 (387, 28)
Seat Track Cover
38 (387, 28)
Seat Cushion Front Shield
Power Seat Switch Knob
Power Seat Switch
N·m (kgf·cm, ft·lbf): Specified torque
● Non-reusable part
H19456


Reclining Motor
Adjuster Assembly
Power Seat Switch
Sliding Motor
Lifter Motor
Front Vertical Motor
T
H15132

BO2D3-04



REMOVAL

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE SEAT TRACK COVERS

Using a screwdriver, remove the 4 seat track covers.

HINT:

Tape the screwdriver tip before use.

2. REMOVE FRONT SEAT

(a) Remove the 4 bolts.

(b) Disconnect the connectors.

(c) Remove the front seat.

NOTICE:

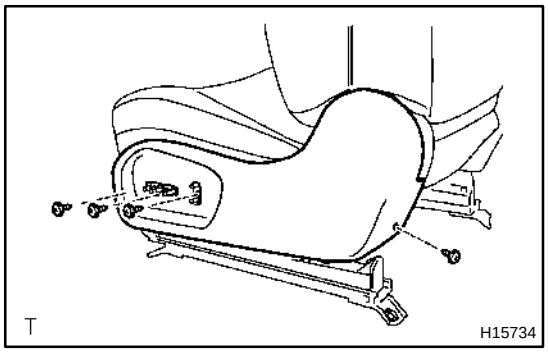
Be careful not to damage the body.

BO4E1-02

DISASSEMBLY

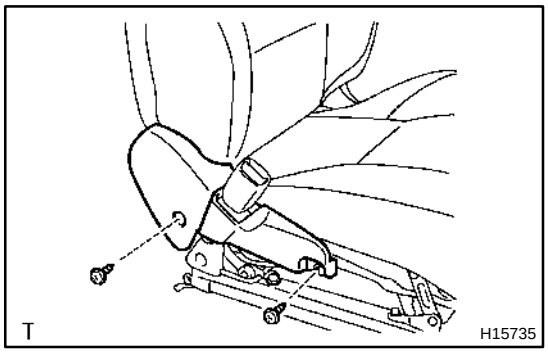
1. REMOVE HEADREST

2. REMOVE POWER SEAT SWITCH KNOB



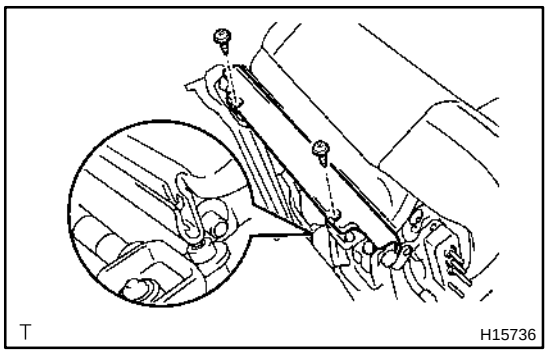
3. REMOVE FRONT SEAT CUSHION OUTER SHIELD

Remove the 4 screws and front seat cushion outer shield.



4. REMOVE FRONT SEAT CUSHION INNER SHIELD

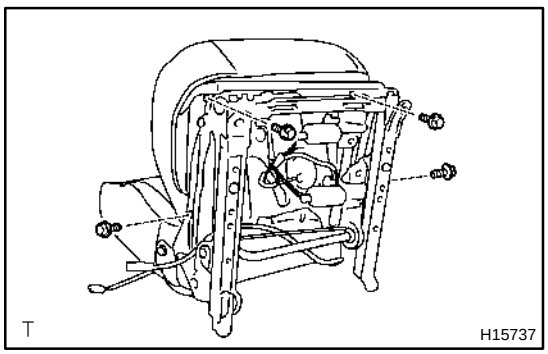
Remove the 2 screws and front seat cushion inner shield.



5. REMOVE SEAT CUSHION FRONT SHIELD

(a) Remove the 2 screws.

(b) Unlatch the seat cushion cover hook, then remove the seat cushion front shield.

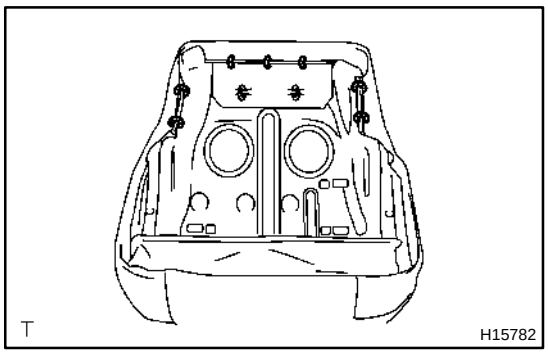


6. REMOVE SEAT CUSHION ASSEMBLY

(a) Disconnect the connectors and unlatch the wire harness clamps.

(b) Remove the 4 bolts and seat cushion assembly with wire harness.

(c) Unlatch the wire harness clamps to remove the wire harness from seat cushion assembly.

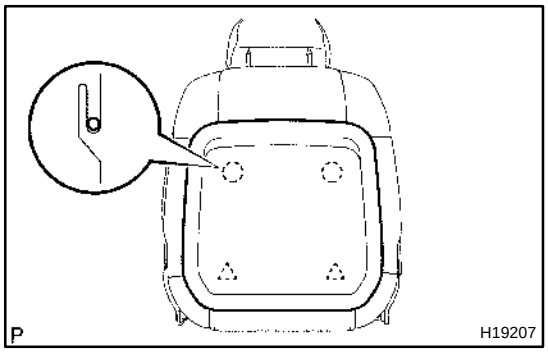


7. REMOVE SEAT CUSHION COVER

(a) Remove the hog rings.

(b) Unlatch the seat cushion cover hooks and remove the seat cushion frame from the seat cushion cover with pad.

(c) Remove the hog rings and seat cushion cover from the seat cushion pad.



8. w/ Table:
REMOVE SEATBACK BOARD

Using a screwdriver, remove the seatback board.

HINT:

Tape the screwdriver tip before use.

9. REMOVE SEATBACK ASSEMBLY

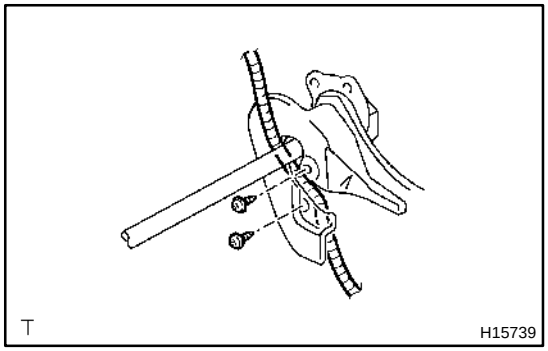
(a) Remove the hog rings.

(b) Turn the seatback cover over, then remove the hog rings.

(c) Remove the 4 seatback assembly set bolts.

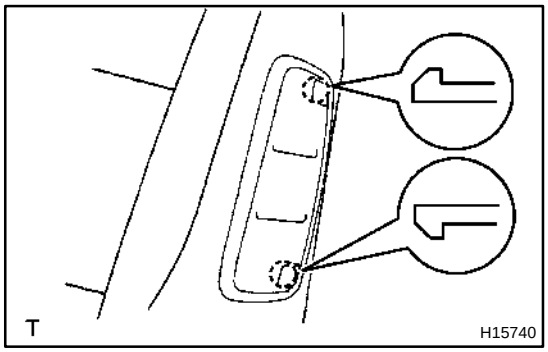
NOTICE:

Be careful not to pull the side airbag assembly wire harness.



(d) Remove the 2 screws and reclining adjuster inside cover and employ the same manner described above to the other side.

(e) Disengage the side airbag assembly wire harness from the reclining adjuster inside cover, then remove the seatback assembly.

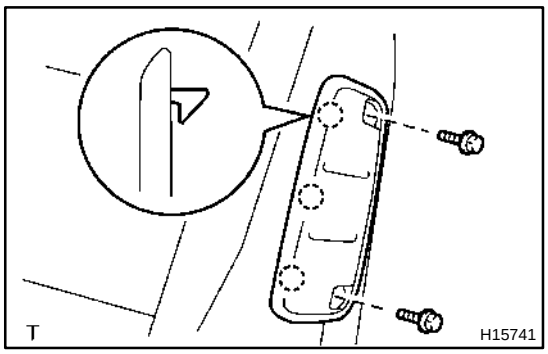


10. REMOVE SEATBACK COVER

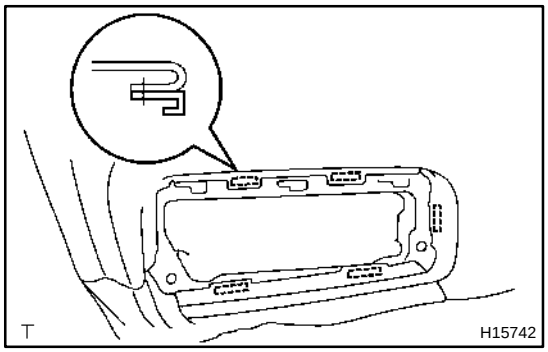
(a) Using a screwdriver, remove the No. 1 and No. 2 airbag covers.

HINT:

Tape the screwdriver tip before use.

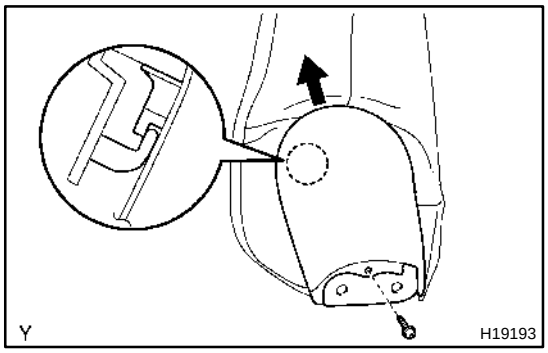


(b) Remove the 2 bolts.
(c) Slide the airbag door upward to remove it.



(d) Disengage the seatback cover hooks around the side airbag assembly.
(e) w/ Table:
Using a screwdriver, remove the reclining adjuster release handle and and employ the same manner described above to the other side.

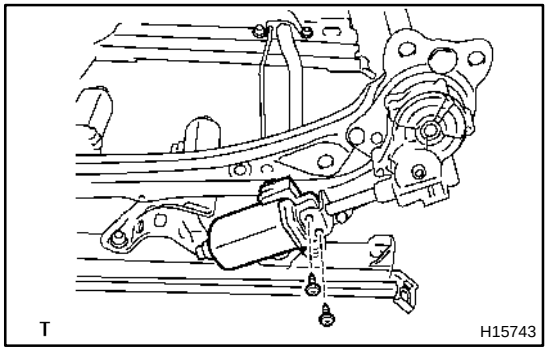
HINT:
Tape the screwdriver tip before use.



(f) w/ Table:
Remove the screw and front seatback shield and employ the same manner described above to the other side.
(g) w/ Table:
Remove the 2 bolts and front seatback lock and employ the same manner described above to the other side.
(h) Remove the hog rings, headrest supports and seatback cover.
(i) Remove the hog rings, headrest supports and seatback cover as shown in the illustration.

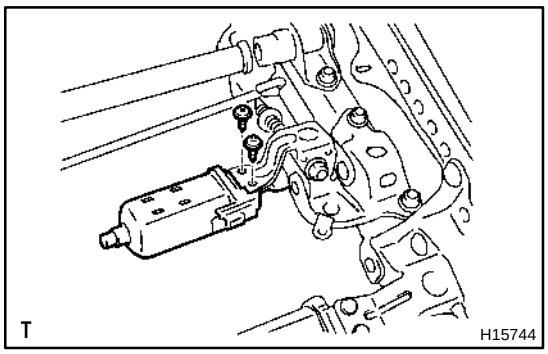
11. REMOVE FRONT SEAT INNER BELT

Remove the bolt, washer and front seat inner belt.



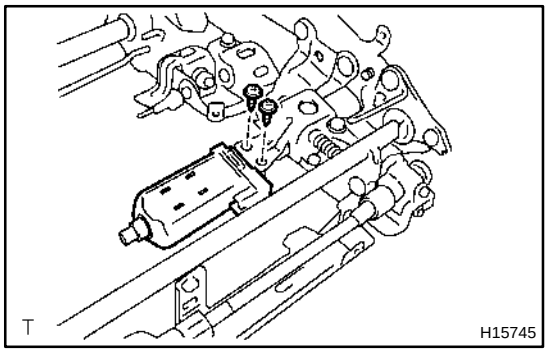
12. REMOVE RECLINING MOTOR

Remove the 2 screws, then disconnect the reclining motor.



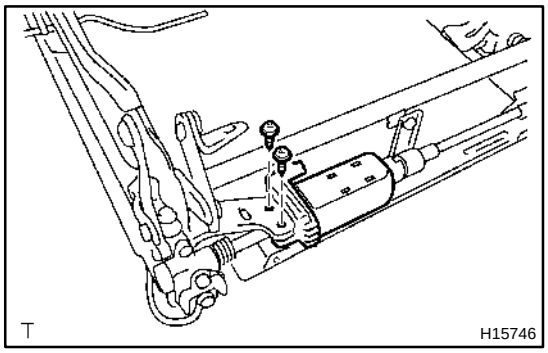
13. REMOVE LIFTER MOTOR

Remove the 2 screws, then disconnect the lifter motor.



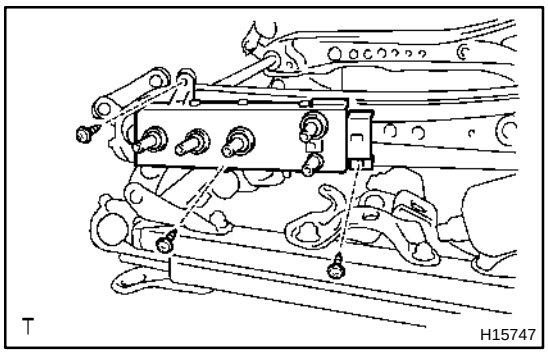
14. REMOVE FRONT VERTICAL MOTOR

Remove the 2 screws, then disconnect the front vertical motor.



15. REMOVE SLIDING MOTOR

Remove the 2 screws, then disconnect the sliding motor.

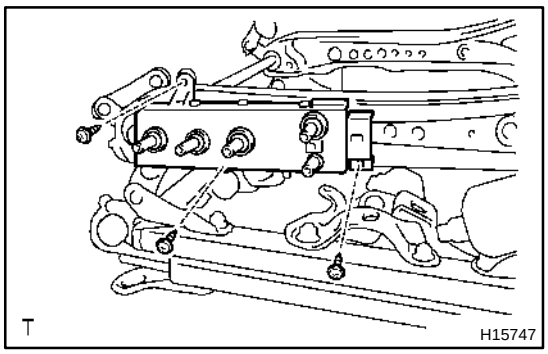


16. REMOVE POWER SEAT SWITCH

Remove the 3 screws and power seat switch.

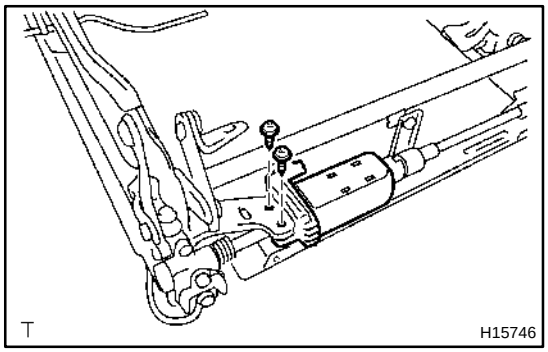
BO4E2-02

REASSEMBLY



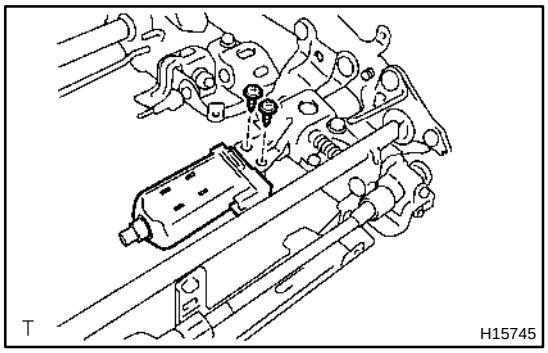
1. INSTALL POWER SEAT SWITCH

Install the power seat switch with the 3 screws.



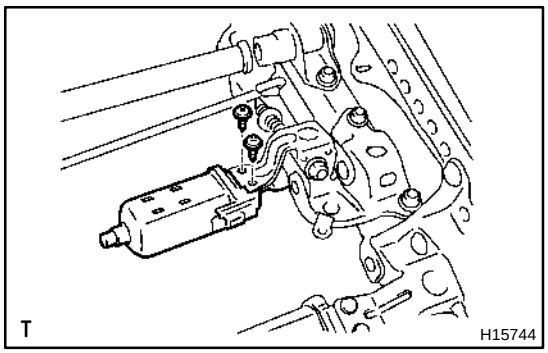
2. INSTALL SLIDING MOTOR

Connect the slide motor to the shaft, then install the 2 screws.



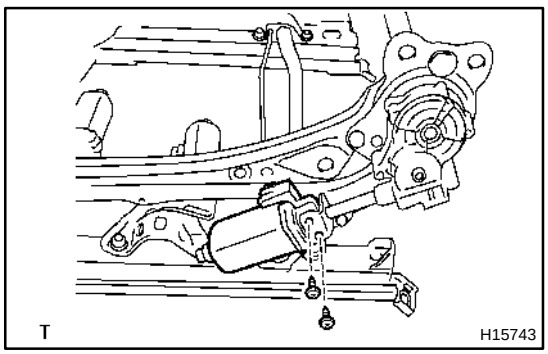
3. INSTALL FRONT VERTICAL MOTOR

Connect the front vertical motor, then install the 2 screws.



4. INSTALL LIFTER MOTOR

Connect the lifter motor, then install the 2 screws.



5. INSTALL RECLINING MOTOR

Connect the reclining motor, then install the 2 screws.

6. INSTALL FRONT SEAT INNER BELT

Install the front seat inner belt with the bolt and washer.

Torque: 42 N·m (428 kgf·cm, 31 ft·lbf)

7. INSTALL SEATBACK COVER

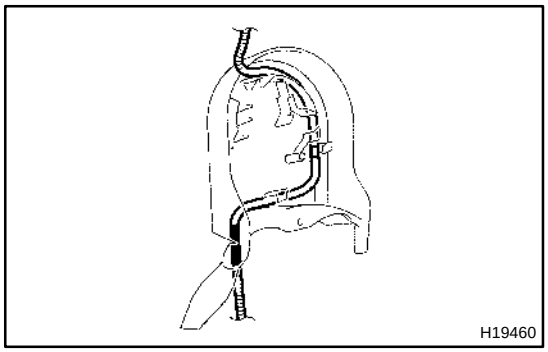
(a) Install the seatback cover with new hog rings.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.

(b) Install the headrest supports.

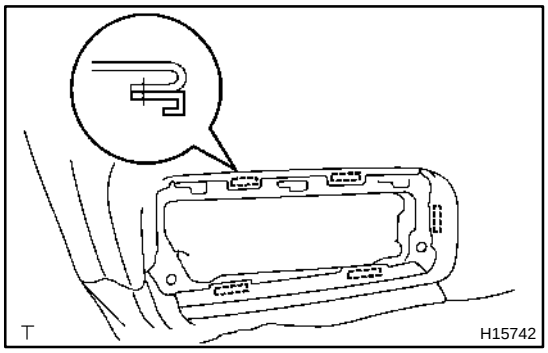
(c) w/ Table:
Install the front seatback lock with the 2 bolts, and employ the same manner described above to the other side.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)



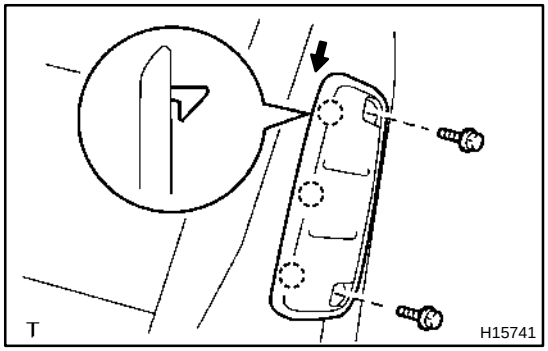
(d) w/ Table:
Set the side airbag assembly wire harness to the front seat back shield.

(e) w/ Table:
Install the front seatback shield with the screw, and employ the same manner described above to the other side.

(f) w/ Table:
Install the reclining adjuster release handle, and employ the same manner described above to the other side.

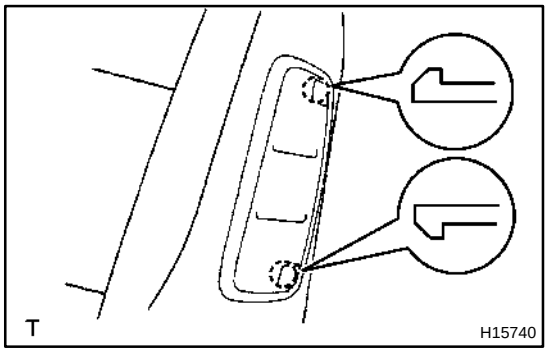


(g) Hook the seatback cover hooks through the holes around the side airbag assembly.

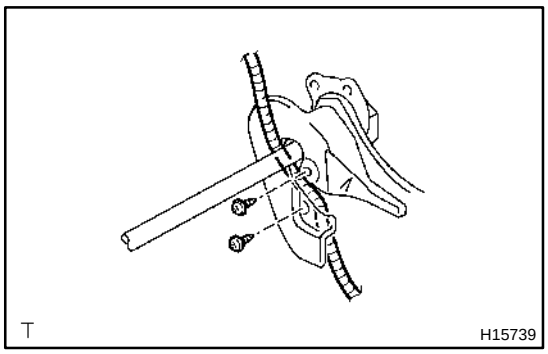


(h) Slide the airbag door downward to install it.

(i) Install the 2 bolts.
Torque: 4.7 N·m (48 kgf·cm, 42 in.·lbf)



(j) Install the No.1 and No.2 airbag covers.



8. INSTALL SEATBACK ASSEMBLY

NOTICE:

Never use the seatback assembly from another vehicle. When replacing parts, replace them with new parts.

(a) Set the side airbag assembly wire harness to the reclining adjuster inside cover.

(b) Install the 2 screws and reclining adjuster inside cover, and employ the same manner described above to the other side.

(c) Install the seatback assembly with the 4 bolts.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

(d) Turn the seatback cover over, then install new hog rings.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.

(e) Install new hog rings.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.

9. w/ Table:

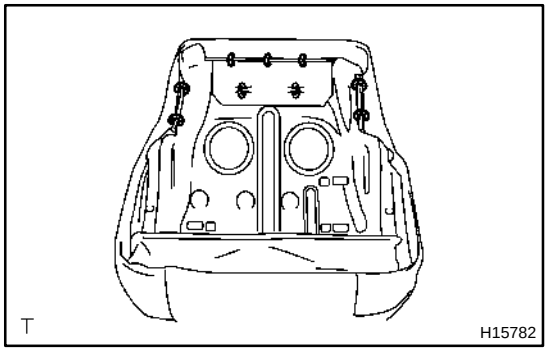
INSTALL SEAT BACK BOARD

10. INSTALL SEAT CUSHION COVER

(a) Install the seat cushion cover with new hog rings to the seat cushion pad.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.

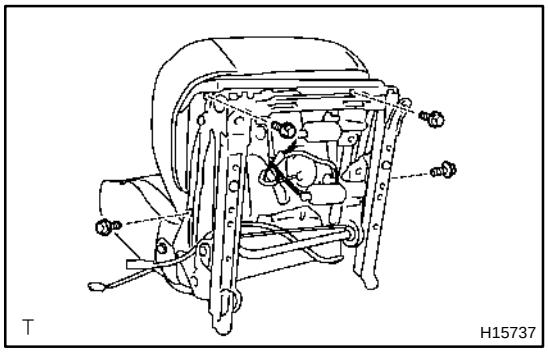


(b) Latch the seat cushion cover hooks to install the seat cushion cover with pad to the seat cushion pad.

(c) Install 6 new hog rings.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.



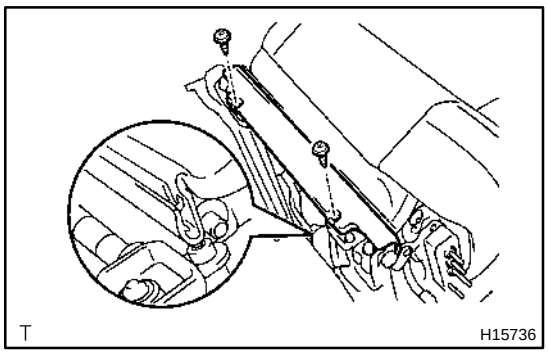
11. INSTALL SEAT CUSHION ASSEMBLY

(a) Install the seat cushion assembly with the 4 bolts.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

(b) Attach the wire harness clamps.

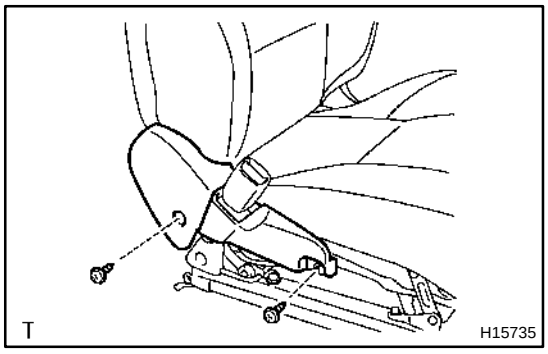
(c) Attach the side airbag assembly wire harness clamps.



12. INSTALL SEAT CUSHION FRONT SHIELD

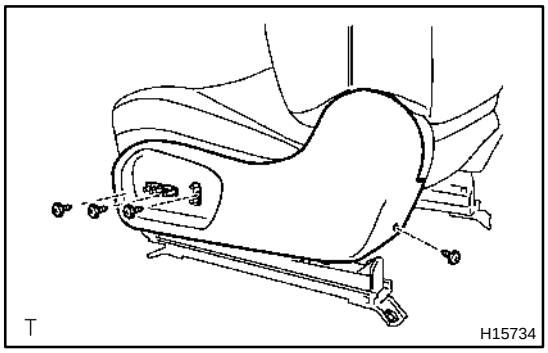
(a) Latch the seat cushion cover hook to the seat cushion front shield.

(b) Install the seat cushion front shield with the 2 screws.



13. INSTALL FRONT SEAT CUSHION INNER SHIELD

Install the front seat cushion inner shield with the 2 screws.



14. INSTALL FRONT SEAT CUSHION OUTER SHIELD

Install the front seat cushion outer shield with the 4 screws.

15. INSTALL POWER SEAT SWITCH KNOBS

16. INSTALL HEADREST

BO2D6-04

INSTALLATION

1. INSTALL FRONT SEAT

(a) Mount the front seat to the vehicle.

NOTICE:

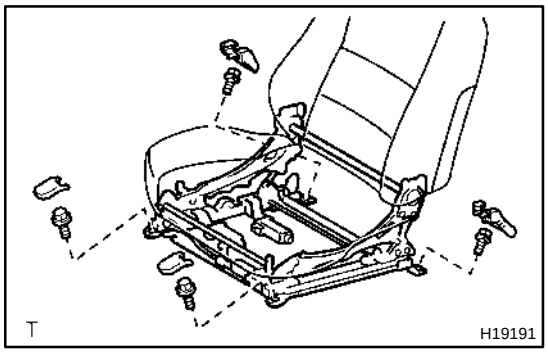
Be careful not to damage the body.

(b) Connect the connectors.

NOTICE:

When the wiring connector of the side airbag assembly is disconnected and the ignition switch is at ON or ACC position, DTC will be recorded. To clear DTC, see page DI-607 .

(c) Slide the front seat to the rearmost position.



(d) Temporarily tighten the bolts on the front side. Then, tighten them to the final torque starting from the inner side.
Torque: 38 N·m (387 kgf·cm, 28 ft·lbf)

(e) Slide the front seat to the most front position.

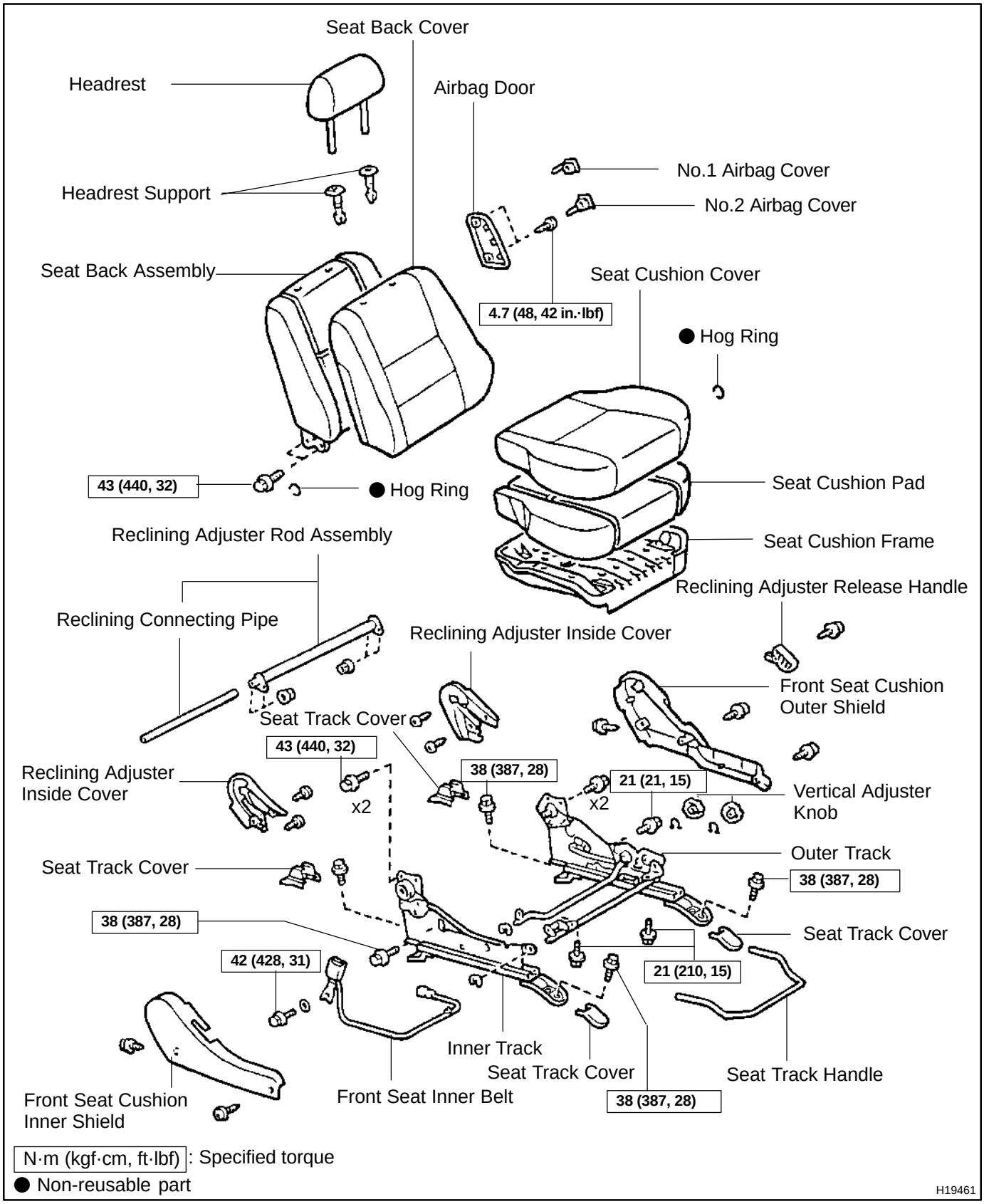
(f) Temporarily tighten the bolts on the rear side. Then, tighten them to the final torque starting from the inner side.
Torque: 38 N·m (387 kgf·cm, 28 ft·lbf)

2. INSTALL SEAT TRACK COVERS

FRONT SEAT (Manual Adjuster Type)

BO4E3-02

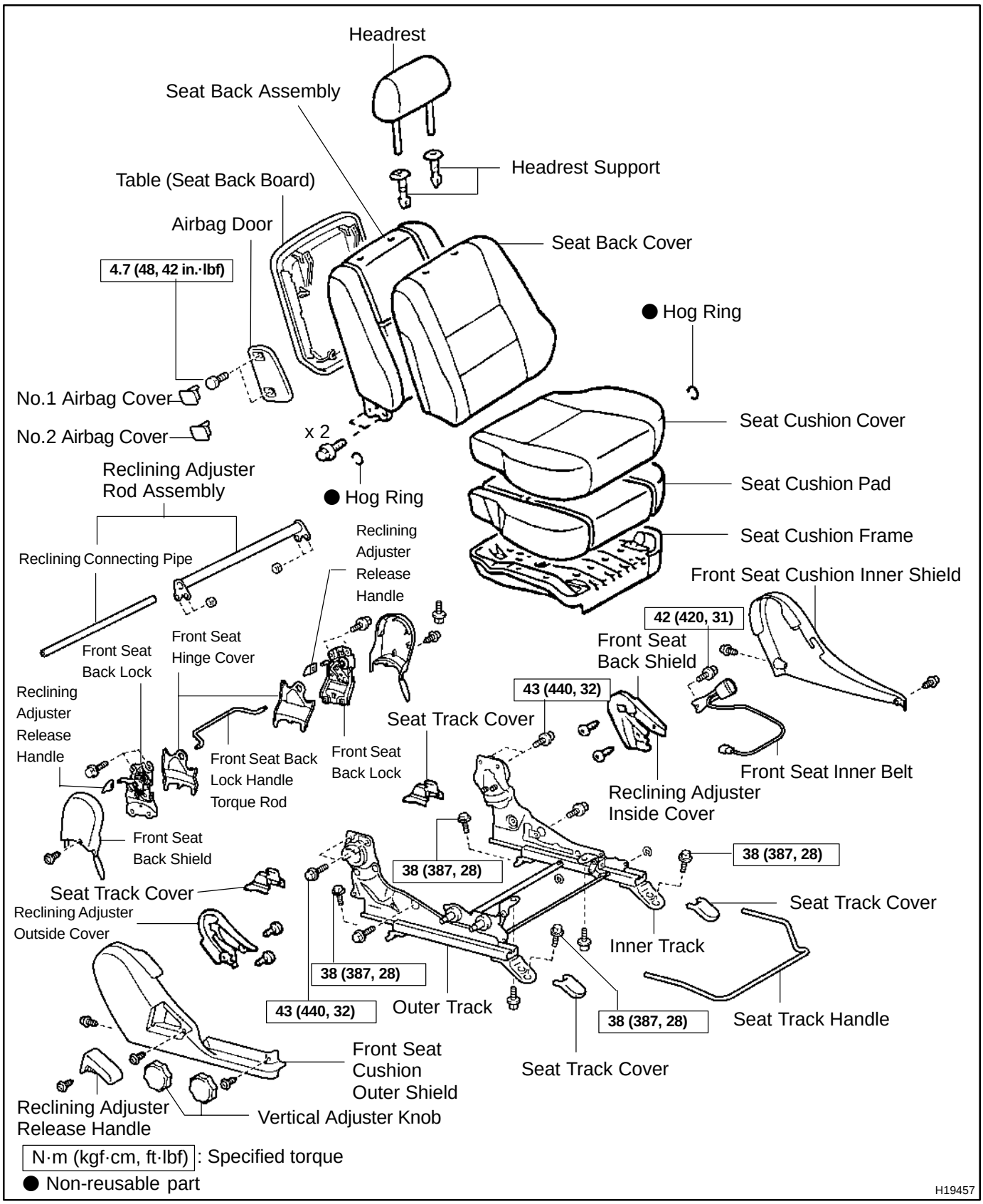
COMPONENTS



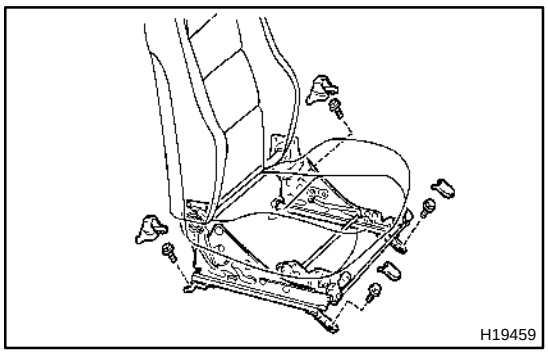
N·m (kgf·cm, ft·lbf): Specified torque

● Non-reusable part

H19461


Headrest
Seat Back Assembly
Headrest Support
Table (Seat Back Board)
Airbag Door
Seat Back Cover
4.7 (48, 42 in.·lbf)
Hog Ring
No.1 Airbag Cover
No.2 Airbag Cover
x 2
Seat Cushion Cover
Reclining Adjuster Rod Assembly
Hog Ring
Seat Cushion Pad
Seat Cushion Frame
Reclining Connecting Pipe
Reclining Adjuster Release Handle
Front Seat Cushion Inner Shield
42 (420, 31)
Front Seat Back Shield
Front Seat Back Lock
Front Seat Hinge Cover
Reclining Adjuster Release Handle
43 (440, 32)
Seat Track Cover
Front Seat Back Lock Handle Torque Rod
Front Seat Back Lock
Front Seat Inner Belt
Reclining Adjuster Inside Cover
Front Seat Back Shield
38 (387, 28)
38 (387, 28)
Seat Track Cover
Seat Track Cover
Reclining Adjuster Outside Cover
Inner Track
38 (387, 28)
43 (440, 32)
Outer Track
38 (387, 28)
Seat Track Handle
Front Seat Cushion Outer Shield
Seat Track Cover
Reclining Adjuster Release Handle
Vertical Adjuster Knob
N·m (kgf·cm, ft·lbf): Specified torque
Non-reusable part
H19457

BO2D8-04



REMOVAL

HINT:

A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE SEAT TRACK COVERS

Using a screwdriver, remove the 4 seat track covers.

HINT:

Tape the screwdriver tip before use.

2. REMOVE FRONT SEAT

(a) Remove the 4 bolts.

(b) Disconnect the connector.

(c) Remove the front seat.

NOTICE:

Be careful not to damage the body.

BO4E4-02

DISASSEMBLY

1. REMOVE HEADREST

2. REMOVE VERTICAL ADJUSTER KNOBS

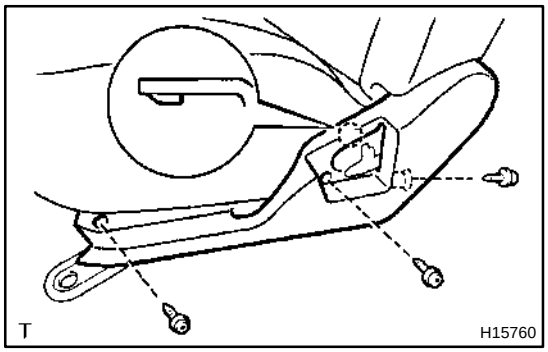
Using a screwdriver, remove the 2 clips and 2 vertical adjuster knobs.

HINT:

Tape the screwdriver tip before use.

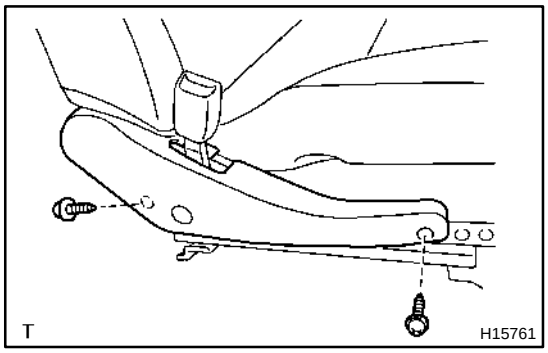
3. REMOVE RECLINING ADJUSTER RELEASE HANDLE

Remove the screw and reclining adjuster release handle.



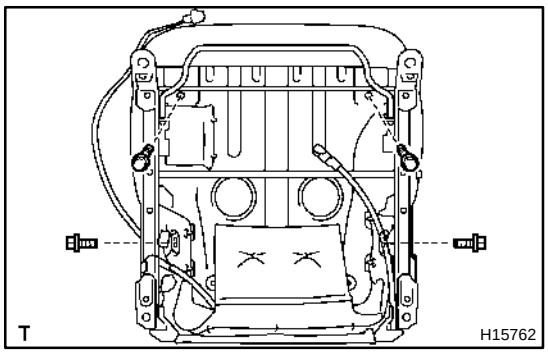
4. REMOVE FRONT SEAT CUSHION OUTER SHIELD

Remove the 3 screws and front seat cushion outer shield.



5. REMOVE FRONT SEAT CUSHION INNER SHIELD

Remove the 2 screws and front seat cushion inner shield.

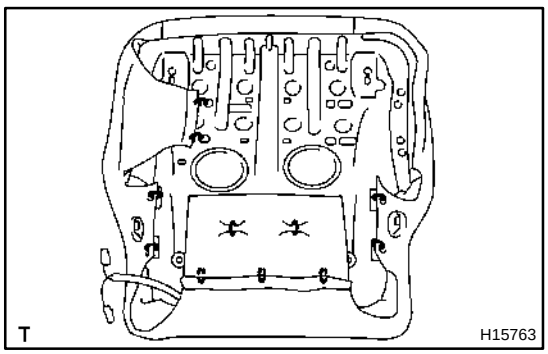


6. REMOVE SEAT CUSHION ASSEMBLY

(a) Unlatch the side airbag assembly wire harness clamps.

(b) Disengage the wire harness clamp.

(c) Remove the 4 bolts and the seat cushion assembly.

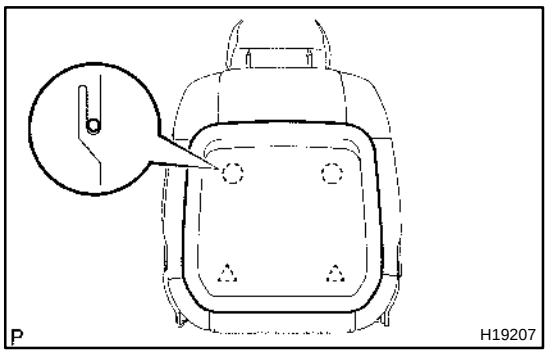


7. REMOVE SEAT CUSHION COVER

(a) Remove the hog rings.

(b) Unlatch the seat cushion cover hooks and remove the seat cushion frame from the seat cushion cover with pad.

(c) Remove the hog rings and seat cushion cover from the seat cushion pad.



8. w/ Table:
REMOVE SEATBACK BOARD

Using a screwdriver, remove the seatback board.

HINT:

Tape the screwdriver tip before use.

9. REMOVE SEATBACK ASSEMBLY

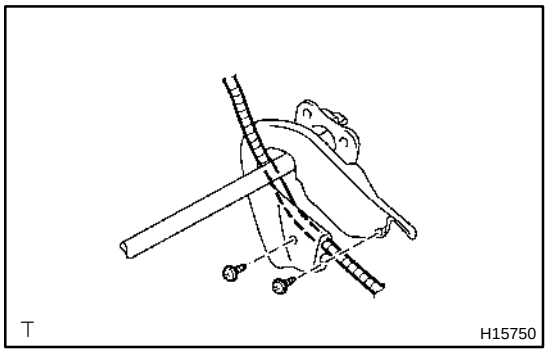
(a) Remove the hog rings.

(b) Turn the seatback cover over, then remove the hog rings.

(c) Remove the 4 seatback assembly set bolts.

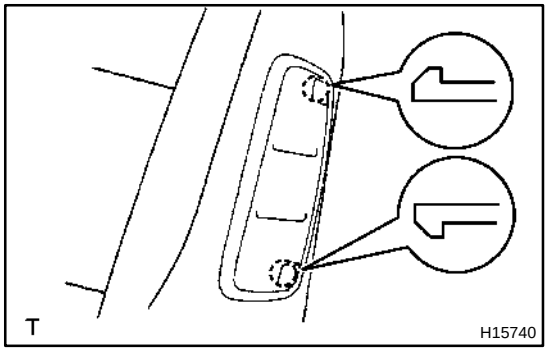
NOTICE:

Be careful not to pull the side airbag assembly wire harness.



(d) Remove the 2 screws and reclining adjuster inside cover and employ the same manner described above to the other side.

(e) Disengage the side airbag assembly wire harness from the reclining adjuster inside covers, then remove the seatback assembly.

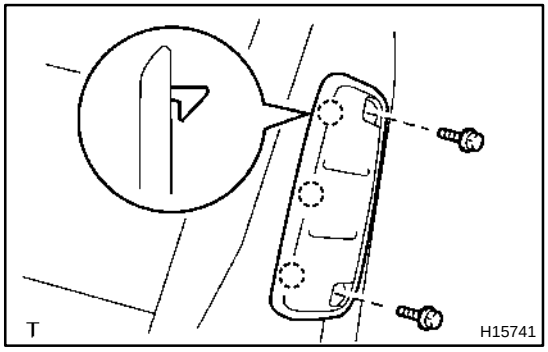


10. REMOVE SEATBACK COVER

(a) Using a screwdriver, remove the No.1 and No.2 airbag covers.

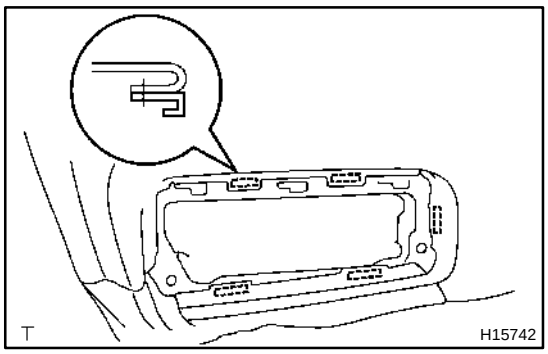
HINT:

Tape the screwdriver tip before use.



(b) Remove the 2 bolts.

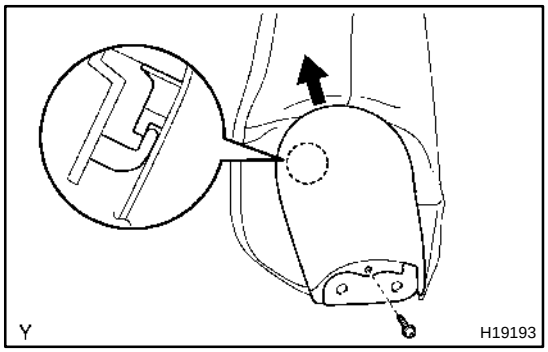
(c) Slide the airbag door upward to remove it.



(d) Unlatch the seatback cover hooks around the side airbag assembly.

(e) w/ Table:
Using a screwdriver, remove the reclining adjuster release handle and employ the same manner described above to the other side.

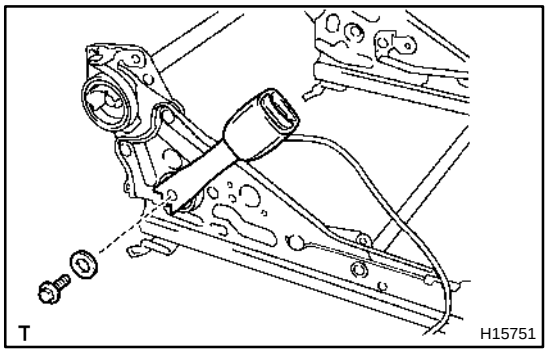
HINT:
Tape the screwdriver tip before use.



(f) w/ Table:
Remove the screw and front seatback shield, and employ the same manner described above to the other side.

(g) w/ Table:
Remove the 2 bolts and front seatback lock, and employ the same manner described above to the other side.

(h) Remove the hog rings, headrest supports and seatback cover.



11. REMOVE FRONT SEAT INNER BELT

Remove the bolt, washer and front seat inner belt.

12. REMOVE SEAT TRACK HANDLE

Using a screwdriver, remove the seat track handle.

HINT:
Tape the screwdriver tip before use.

13. REMOVE RECLINING ADJUSTER ROD ASSEMBLY

Remove the 4 nuts and the reclining adjuster rod assembly.

14. DISASSEMBLE OUTER TRACK AND INNER TRACK

Using a screwdriver, remove the 2 E-rings from the outer side on the inner track.

HINT:
Tape the screwdriver tip before use.

BO2DA-01

INSPECTION

INSPECT RECLINING LOCK POSITION AND SLIDING LOCK POSITION SLIPPING OFF

(a) When reclining the seat, inspect that the outer and inner recliners are released at the same time.

HINT:

When the reclining lock position slips off, disassemble the seat to adjust the position.

(b) When sliding the seat, inspect that the outer and inner tracks are locked at the same time.

HINT:

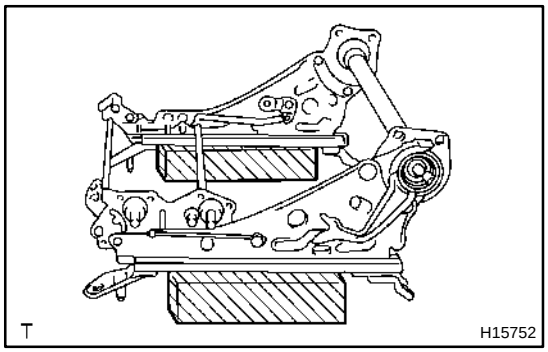
When sliding lock positions slip off, loosen the bolts to adjust the position.

BO4E5-02

REASSEMBLY

1. ASSEMBLE OUTER TRACK AND INNER TRACK

Assemble the outer track and inner track with 2 new E-rings.



2. INSTALL RECLINING ADJUSTER ROD ASSEMBLY

(a) Adjust the reclining lock positions of the seat adjusters.

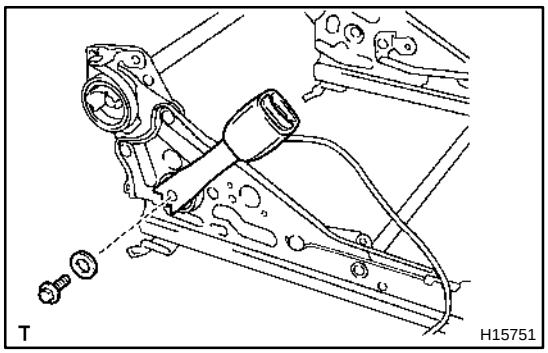
(b) Slide the seat adjusters to the most front position.

(c) Place the adjusters on a spacer to adjust the seat rails in parallel and install the reclining adjuster rod assembly with the 4 nuts.

HINT:

When installing the connecting pipe while raising up the adjusters, the lock positions adjusted in 2 - (a) step slip off, and that will lead to locker error.

3. INSTALL SEAT TRACK HANDLE



4. INSTALL FRONT SEAT INNER BELT

Install the front seat inner belt with the washer and bolt.

Torque: 42 N·m (428 kgf·cm, 31 ft·lbf)

5. INSTALL SEATBACK COVER

(a) Install the seatback cover with new hog rings.

HINT:

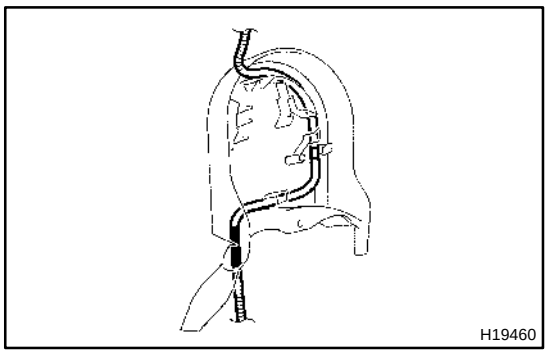
When installing the hog rings, take care to prevent wrinkles as little as possible.

(b) Install the 2 headrest supports.

(c) w/ Table:

Install the front seatback lock with the 2 bolts and employ the same manner described above to the other side.

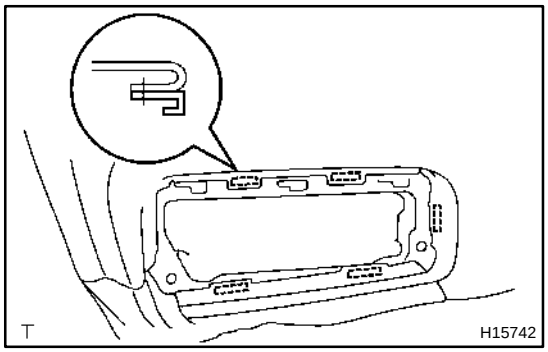
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)



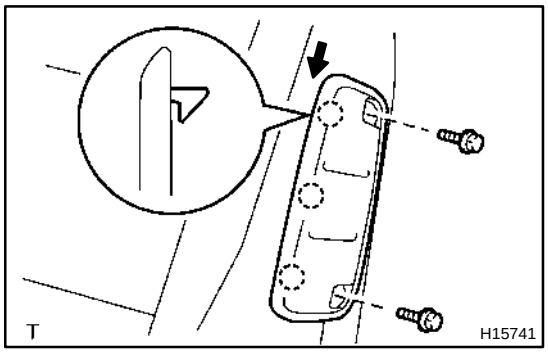
(d) w/ Table:
Set the side airbag assembly wire harness to the front seat back shield.

(e) w/ Table:
Install the front seatback shield with the screw and employ the same manner described above to the other side.

(f) w/ Table:
Install the reclining adjuster release handle and employ the same manner described above to the other side.

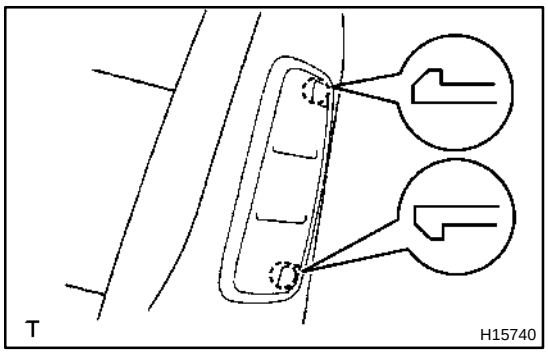


(g) Hook the seatback cover hooks through the holes in the circumference of the side airbag assembly.

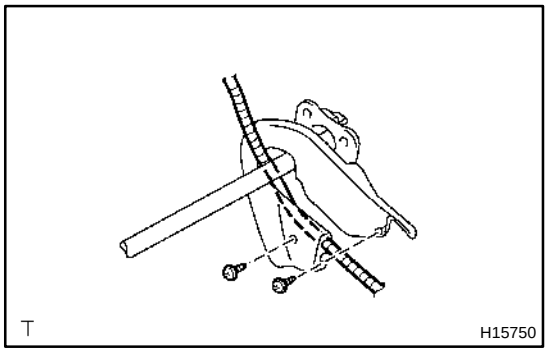


(h) Slide the airbag door downward to install it.

(i) Install the 2 bolts.
Torque: 4.7 N·m (48 kgf·cm, 42 in.·lbf)



(j) Install the No.1 and No.2 airbag covers.



6. INSTALL SEATBACK ASSEMBLY

NOTICE:

Never use the seatback assembly from another vehicle. When replacing parts, replace them with new parts.

(a) Set the side airbag assembly wire harness to the reclining adjuster inside covers.

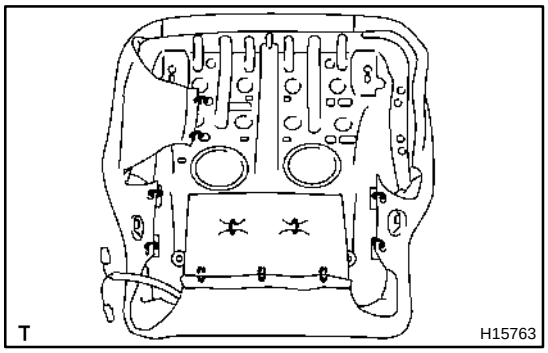
(b) Install the reclining adjuster inside cover with the 2 screws and employ the same manner described above to the other side.

(c) Install the seatback assembly with the 4 bolts.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)
(d) Turn the seatback cover over, then install new hog rings.
HINT:
When installing the hog rings, take care to prevent wrinkles as little as possible.
(e) Install new hog rings.
HINT:
When installing the hog rings, take care to prevent wrinkles as little as possible.

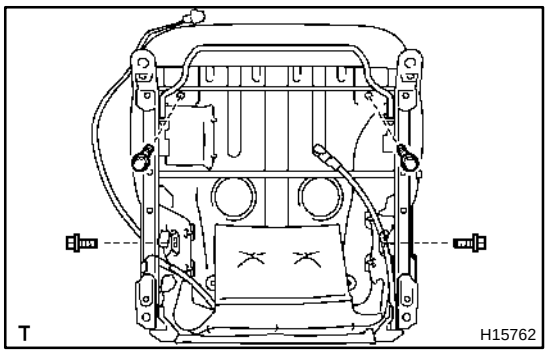
7. w/ Table:
INSTALL SEATBACK BOARD

8. INSTALL SEAT CUSHION COVER

(a) Install the seat cushion cover with new hog rings to the seat cushion pad.
HINT:
When installing the hog rings, take care to prevent wrinkles as little as possible.

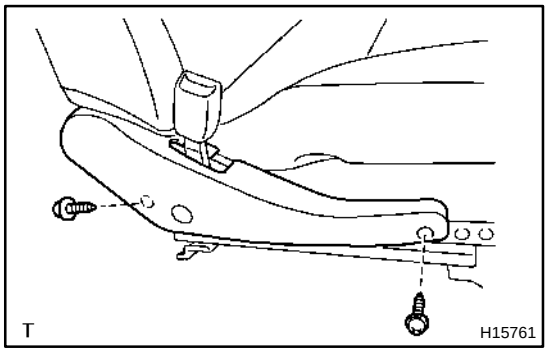


(b) Latch the seat cushion cover hooks to install the seat cushion cover with pad to the seat cushion pad.
(c) Install new hog rings.
HINT:
When installing the hog rings, take care to prevent wrinkles as little as possible.



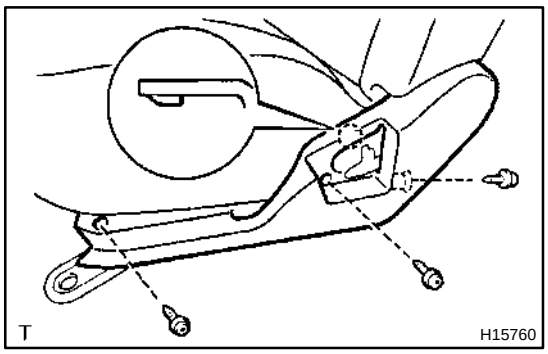
9. INSTALL SEAT CUSHION ASSEMBLY

(a) Install the seat cushion assembly with the 4 bolts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)
(b) Attach the wire harness clamps.
(c) Attach the side airbag assembly wire harness clamps.



10. INSTALL FRONT SEAT CUSHION INNER SHIELD

Install the front seat cushion inner shield with the 2 screws.



11. INSTALL FRONT SEAT CUSHION OUTER SHIELD

Install the front seat cushion outer shield with the 3 screws.

12. INSTALL RECLINING ADJUSTER RELEASE HANDLE

Install the reclining adjuster release handle with the screw.

13. INSTALL VERTICAL ADJUSTER KNOBS

Install the 2 vertical adjuster knobs with the 2 clips.

14. INSTALL HEADREST

BO2DC-04

INSTALLATION

1. INSTALL FRONT SEAT

(a) Mount the front seat to the vehicle.

NOTICE:

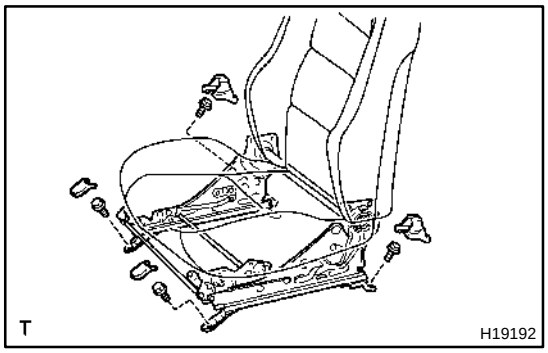
Be careful not to damage the body.

(b) Connect the connectors.

NOTICE:

When the wiring connector of the side airbag assembly is disconnected and the ignition switch is at ON or ACC position, DTC will be recorded. To clear DTC, see page DI-607 .

(c) Slide the front seat to the rearmost position .



(d) Temporarily tighten the bolts on the front side. Then, tighten them to the final torque starting from the inner side.
Torque: 38 N·m (387 kgf·cm, 28 ft·lbf)

(e) Slide the front seat to the most front position.

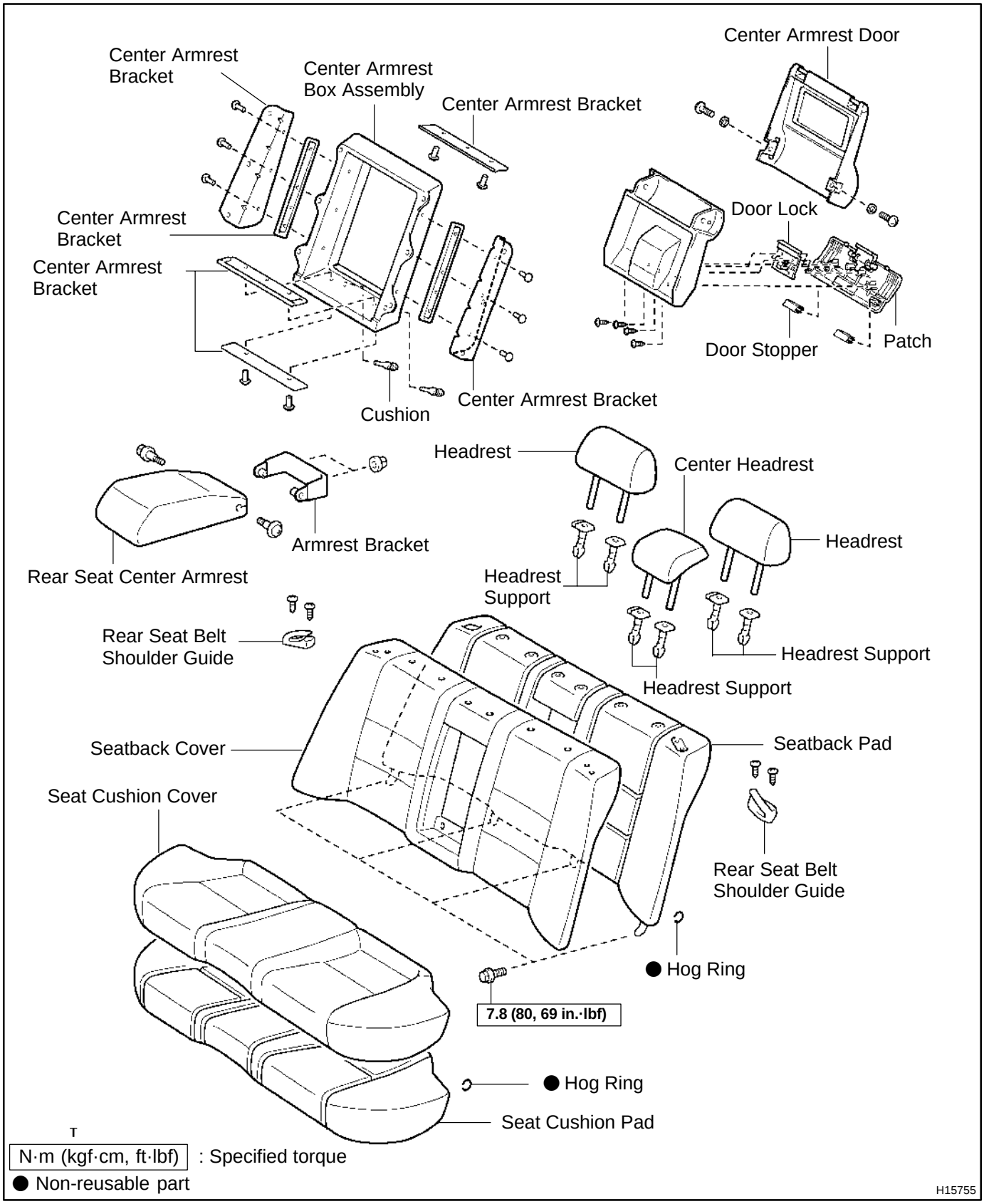
(f) Temporarily tighten the bolts on the rear side. Then, tighten them to the final torque starting from the inner side.
Torque: 38 N·m (387 kgf·cm, 28 ft·lbf)

2. INSTALL SEAT TRACK COVERS

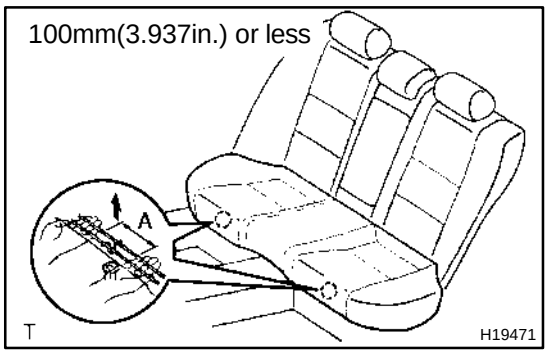
REAR SEAT (Sedan)

COMPONENTS

BO4E6-02



BO4E7-03



REMOVAL

HINT:

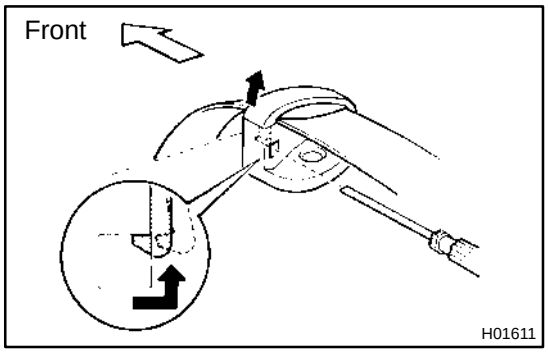
A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE SEAT CUSHION ASSEMBLY

Pull up the front portion of the seat cushion assembly, then remove it.

NOTICE:

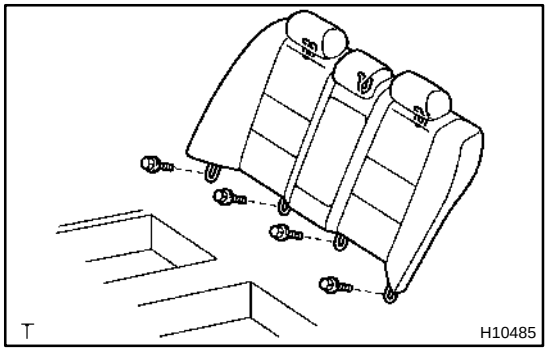
Hold up the clip base to prevent the cushion frame from being distorted.



2. REMOVE SEATBACK ASSEMBLY

(a) Using a screwdriver, remove the rear seat belt from the belt guide as shown in the illustration.

(b) Employ the same manner described above to the other sides.



(c) Remove the 4 bolts, then raise the seatback assembly upward to remove the seatback assembly.

3. REMOVE REAR SEAT CENTER ARMREST BOX ASSEMBLY

Remove the 6 bolts and rear seat center armrest box assembly.

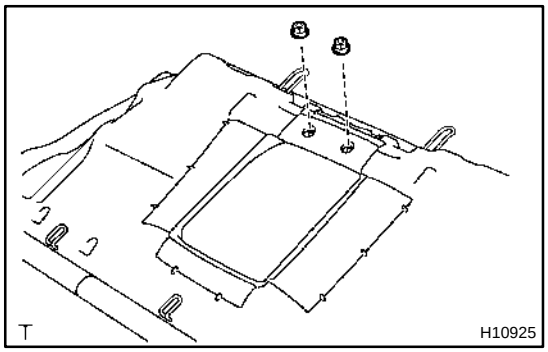
BO4E8-02

DISASSEMBLY

1. REMOVE HEADRESTS

2. REMOVE REAR SEAT BELT SHOULDER GUIDES

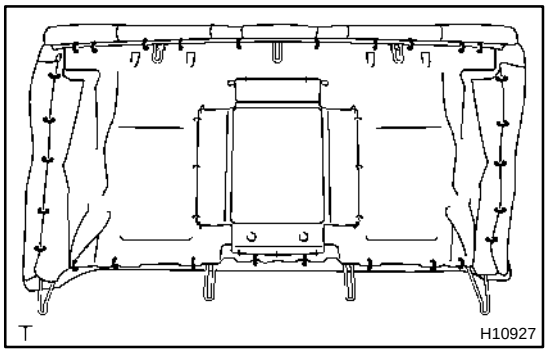
Remove the 4 screws and rear seat belt shoulder guides.



3. REMOVE REAR SEAT CENTER ARMREST

(a) Remove the 2 nuts and rear seat center armrest with bracket.

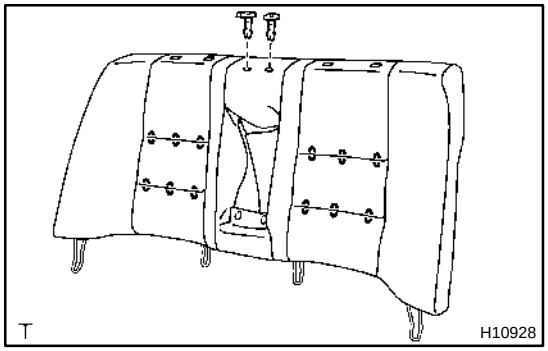
(b) Remove the 2 screws and armrest bracket.



4. REMOVE SEATBACK COVER

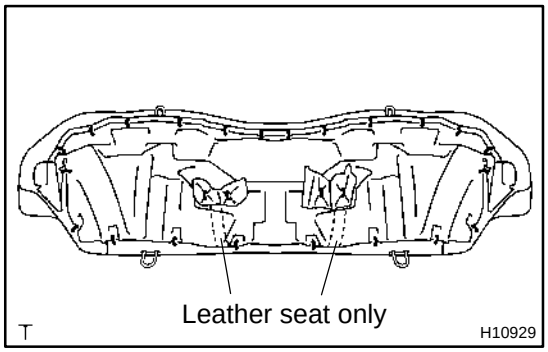
(a) Remove the 4 headrest supports.

(b) Remove the hog rings on the back of seatback assembly.



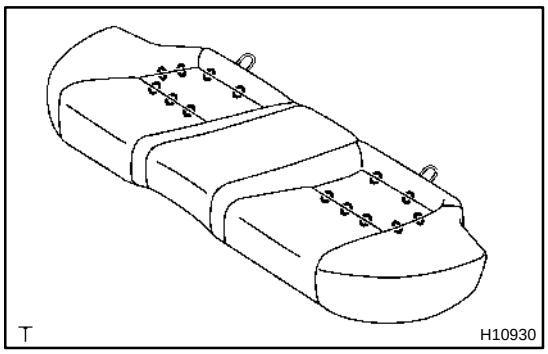
(c) Remove the center headrest supports.

(d) Remove the hog rings and seatback cover on the front of seatback assembly.



5. REMOVE SEAT CUSHION COVER

(a) Remove the hog rings on the back of seat cushion assembly.



(b) Remove the hog rings and seat cushion cover on the front of the seat cushion assembly.

6. REMOVE REAR SEAT CENTER ARMREST DOOR, DOOR LOCK, PATCH AND STOPPER

(a) Remove the rear seat center armrest door from the rear seat center armrest box.
(b) Remove the 2 screws and door lock.
(c) Remove the 2 screws and patch.
(d) Remove the 2 door stoppers.
(e) Remove the 2 screws, 2 shims and rear seat center armrest door.

7. REMOVE REAR SEAT CENTER ARMREST BRACKETS FROM REAR SEAT CENTER ARMREST BOX

(a) Using a drill of less than 4.0 mm (0.157 in.), drill out the rivet heads.

HINT:

Gently and vertically put the drill to the rivet, and cut the rivet flanges.

CAUTION:

Take care as the cut rivet is hot.

NOTICE:

Prizing the hole with a drill can lead to damage to the rivet hole or breaking the drill.

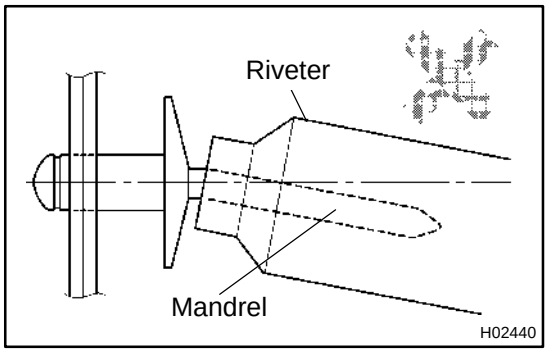
(b) Remove the rear seat center armrest brackets.

BO4E9-02

REASSEMBLY

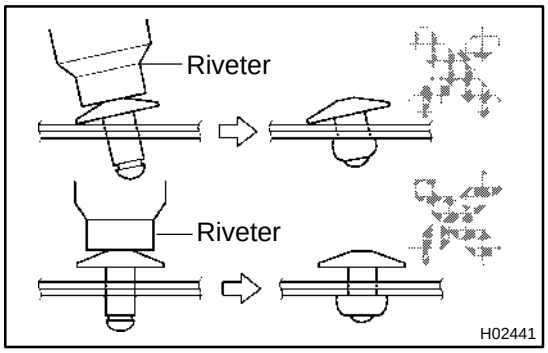
1. INSTALL REAR SEAT CENTER ARMREST BRACKETS TO REAR SEAT CENTER ARMREST BOX

Using a air riveter with nose piece No. 1, install the rivets to the brackets and box.

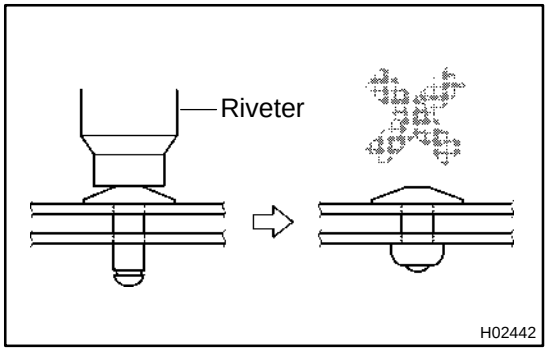


NOTICE:

- **Do not prize a riveter. It could damage the riveter and cause loose fitting and mandrel bend.**



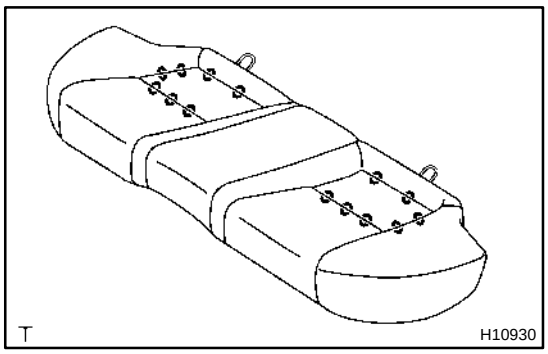
- **Do not tilt the riveter when fastening the rivet to the material to avoid loose fitting.**
- **Do not allow gap spacing between the rivet head and the material.**



- **Do not allow gap spacing between the materials.**

2. INSTALL REAR SEAT CENTER ARMREST DOOR, DOOR LOCK, PATCH AND STOPPER

(a) Install the rear seat center armrest door with the 2 shims and 2 screws.
(b) Install the 2 door stoppers.
(c) Install the patch with the 2 screws.
(d) Install the door lock with the 2 screws.
(e) Install the rear seat center armrest door to the rear seat center armrest box.

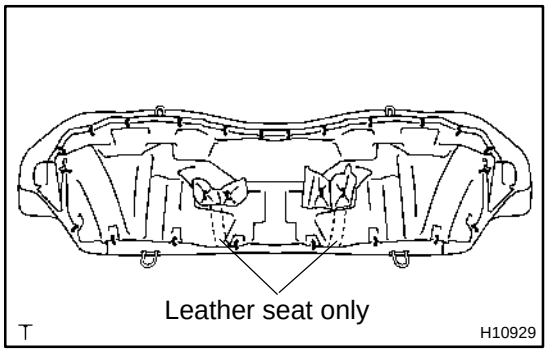


3. INSTALL SEAT CUSHION COVER

(a) Install the seat cushion cover with new hog rings to the front of seat cushion assembly.

HINT:

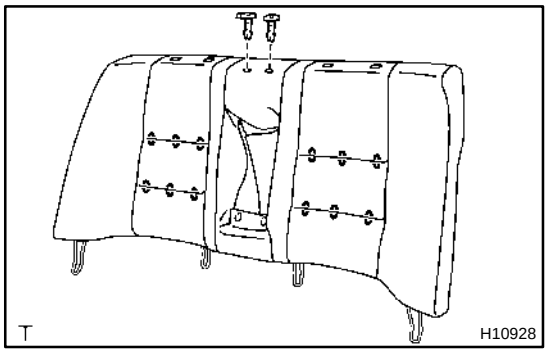
When installing the hog rings, take care to prevent wrinkles as little as possible.



(b) Install new hog rings to the back of seat cushion assembly.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.



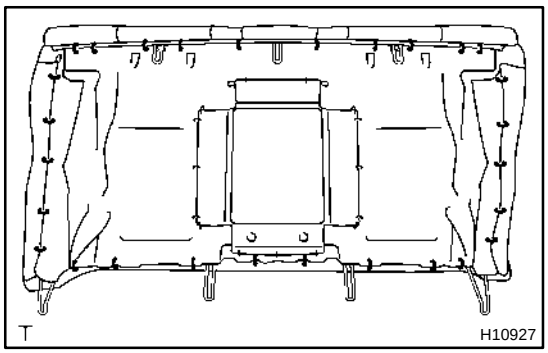
4. INSTALL SEATBACK COVER

(a) Install seatback cover with new hog rings to the front of seatback assembly.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.

(b) Install the center headrest supports.

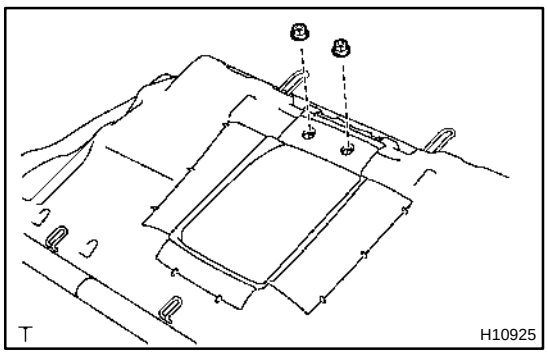


(c) Install new hog rings on the back of seatback assembly.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.

(d) Install the 4 headrest supports.



5. INSTALL REAR SEAT CENTER ARMREST

(a) Install the armrest bracket with the 2 screws to the rear seat center armrest.

(b) Install the rear seat center armrest with the bracket to the seatback assembly with the 2 nuts.

6. INSTALL REAR SEAT BELT SHOULDER GUIDES

Install the rear seat belt shoulder guides with the 4 screws to the seatback assembly.

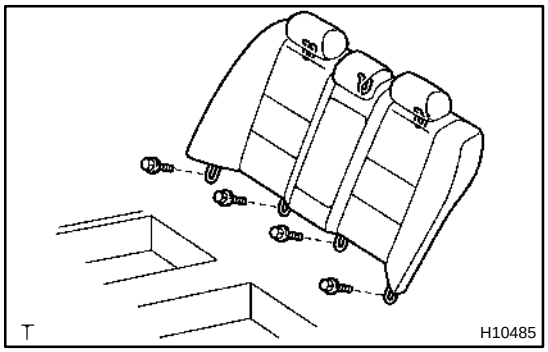
7. INSTALL HEADRESTS

BO4EA-01

INSTALLATION

1. INSTALL REAR SEAT CENTER ARMREST BOX ASSEMBLY

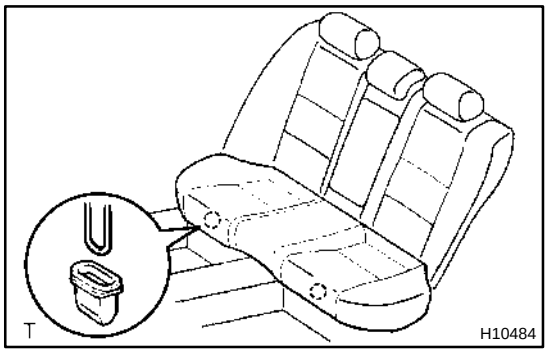
Install the rear seat center armrest box assembly with the 6 bolts.



2. INSTALL SEATBACK ASSEMBLY

(a) Install the seatback assembly with the 4 bolts.
Torque: 7.8 N·m (80 kgf·cm, 69 in.·lbf)

(b) Install the rear seat belts to the belt guides, then close the belt guides.



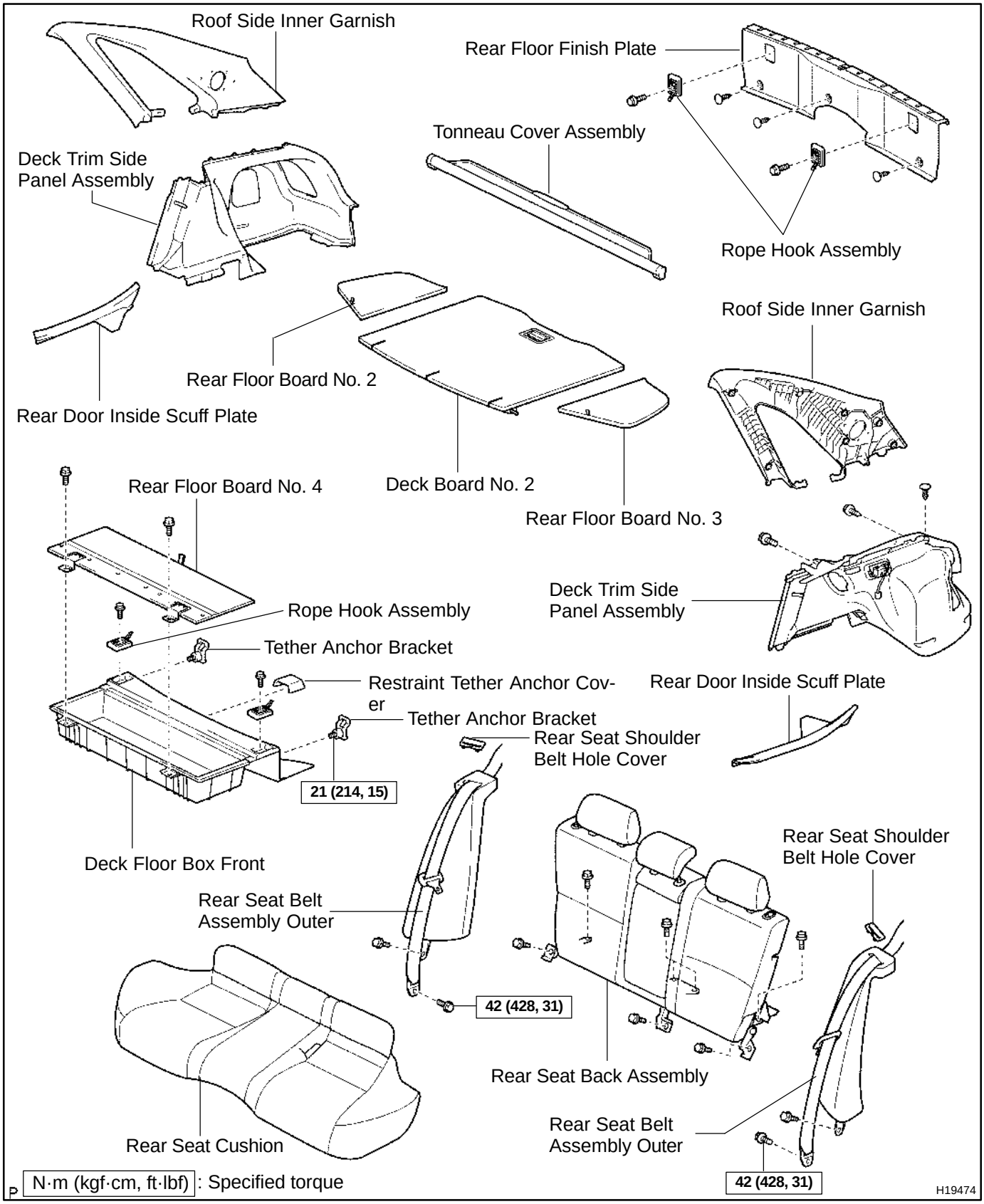
3. INSTALL SEAT CUSHION ASSEMBLY

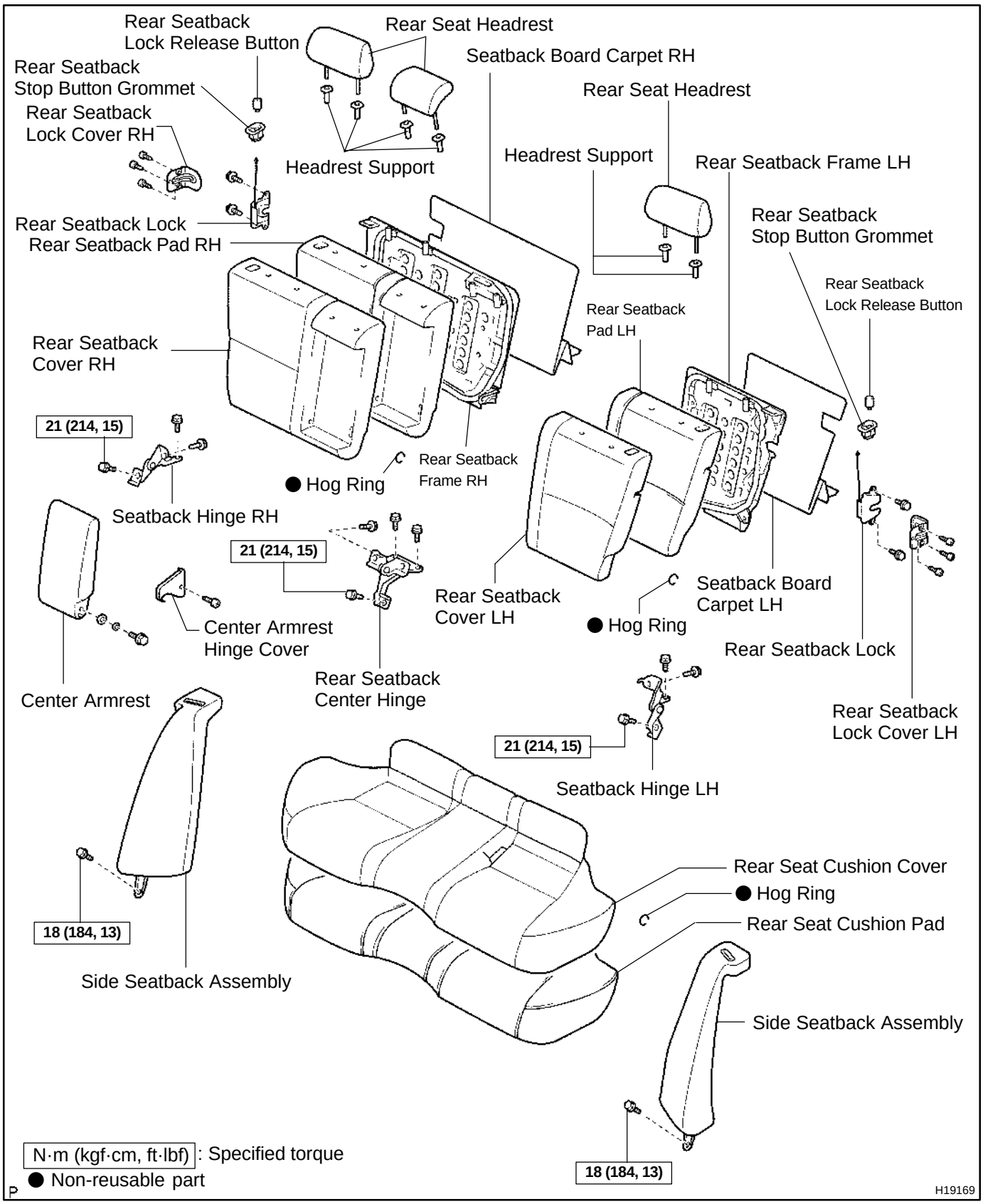
Push down the front portion of the seat cushion assembly to install it.

REAR SEAT (Wagon)

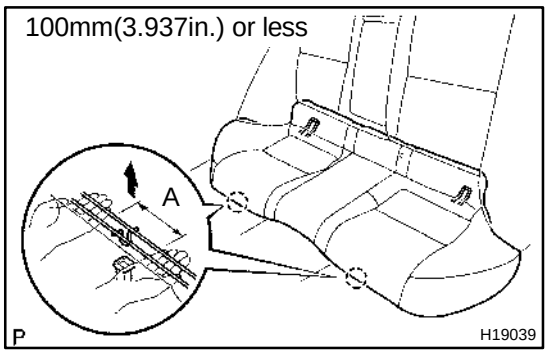
COMPONENTS

BO4EB-02




Rear Seatback Lock Release Button
Rear Seat Headrest
Seatback Board Carpet RH
Rear Seatback Stop Button Grommet
Rear Seat Headrest
Rear Seatback Lock Cover RH
Headrest Support
Headrest Support
Rear Seatback Frame LH
Rear Seatback Lock
Rear Seatback Pad RH
Rear Seatback Stop Button Grommet
Rear Seatback Lock Release Button
Rear Seatback Pad LH
Rear Seatback Cover RH
21 (214, 15)
Rear Seatback Frame RH
● Hog Ring
Seatback Hinge RH
21 (214, 15)
Rear Seatback Cover LH
Seatback Board Carpet LH
● Hog Ring
Center Armrest Hinge Cover
Rear Seatback Lock
Rear Seatback Center Hinge
Center Armrest
Rear Seatback Lock Cover LH
21 (214, 15)
Seatback Hinge LH
Rear Seat Cushion Cover
● Hog Ring
Rear Seat Cushion Pad
18 (184, 13)
Side Seatback Assembly
Side Seatback Assembly
18 (184, 13)
N·m (kgf·cm, ft·lbf): Specified torque
● Non-reusable part
H19169

BO4EC-03



REMOVAL

HINT:

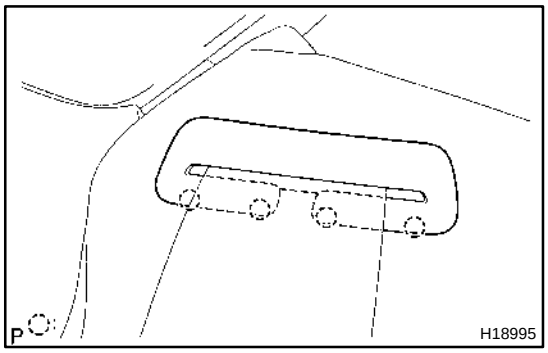
A bolt without a torque specification is shown in the standard bolt chart. (see page SS-2)

1. REMOVE SEAT CUSHION ASSEMBLY

Pull up the front portion of the seat cushion assembly, then remove it.

NOTICE:

Hold up the clip base to prevent the cushion frame from being distorted.



2. REMOVE SIDE SEAT BACK ASSEMBLY

(a) Remove the bolt and floor anchor.

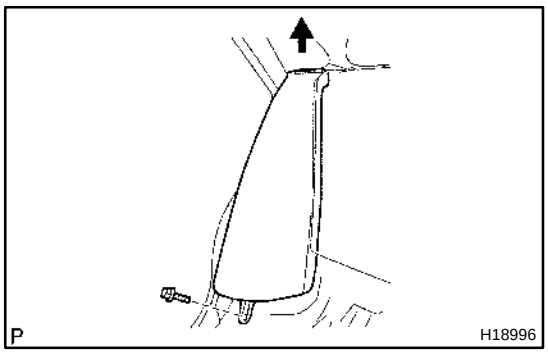
Torque: 42 N·m (428 kgf·cm, 31ft·lbf)

(b) Using a screwdriver, remove the rear seat shoulder belt hole cover.

HINT:

Tape the screwdriver tip before use.

(c) Employ the same manner described above to the other sides.



(d) Remove the bolt and side seat back assembly as shown in the illustration.

Torque: 18 N·m (184 kgf·cm, 13ft·lbf)

3. REMOVE REAR SEAT FLOOR BOARD NO.4 (See page BO-164)

4. REMOVE DECK FLOOR BOX FRONT (See page BO-164)

5. REMOVE DECK BOARD NO.2 (See page BO-164)

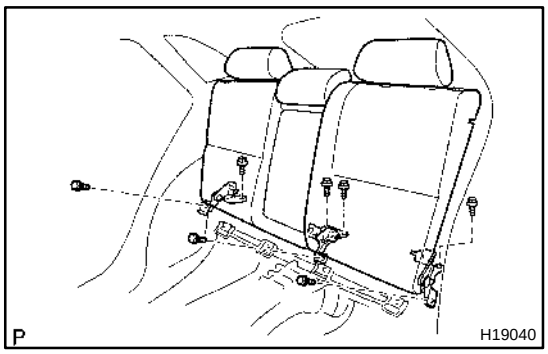
6. REMOVE REAR FLOOR BOARD NO.2 (See page BO-164)

7. REMOVE REAR FLOOR BOARD NO.3 (See page BO-164)

8. REMOVE TONNEAU COVER ASSEMBLY (See page BO-164)

9. REMOVE REAR FLOOR FINISH PLATE (See page BO-164)

10. REMOVE DECK TRIM SIDE PANEL ASSEMBLY (See page BO-164)



11. REMOVE SEAT BACK ASSEMBLY

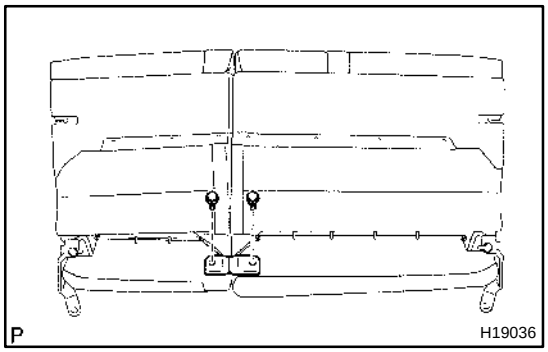
Remove the 7 bolts and seat back assembly.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

BO4ED-02

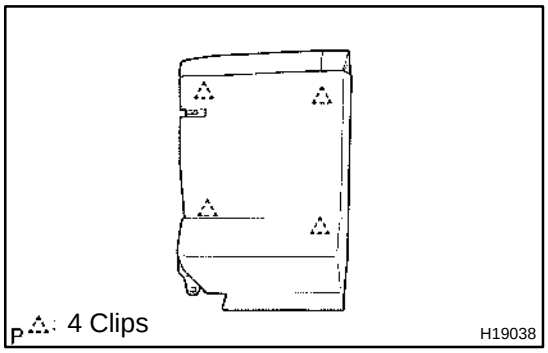
DISASSEMBLY

1. REMOVE REAR SEAT HEADRESTS



2. REMOVE REAR SEAT BACK CENTER HINGE SUB-ASSEMBLY

Remove the 2 bolts and rear seat center hinge sub-assembly.



3. REMOVE REAR SEAT BACK BOARD CARPET LH

(a) Remove the 3 screws and rear seat back lock cover LH.

(b) Using a screwdriver, remove the seat back board carpet LH.

HINT:

Tape the screwdriver tip before use.

4. REMOVE REAR SEAT BACK COVER LH

(a) Remove the bolt and rear seat back hinge LH.

(b) Remove the headrest supports.

(c) Remove the rear back lock release button.

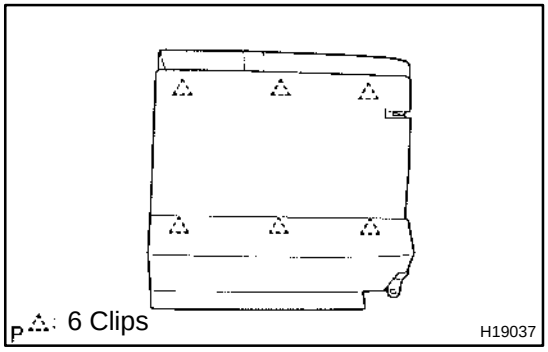
(d) Remove the rear seat back stop button grommet.

(e) Remove the hog rings and rear seat back cover with pad.

(f) Remove the hog rings and rear seat back cover LH from the seat back pad.

5. REMOVE REAR SEAT BACK LOCK ASSEMBLY LH

Remove the 2 bolts and rear seat back lock assembly.



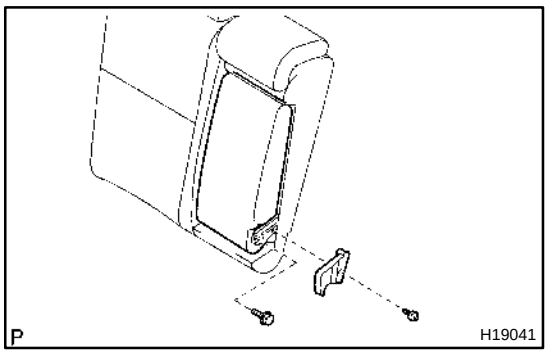
6. REMOVE REAR SEAT BACK BOARD CARPET RH

(a) Remove the 3 screws and rear seat back lock cover RH.

(b) Using a screwdriver, remove the rear seat back board carpet RH.

HINT:

Tape the screwdriver tip before use.



7. REMOVE CENTER ARMREST

(a) Remove the screw and center armrest hinge cover.
(b) Remove the bolt and center armrest.

8. REMOVE REAR SEAT BACK COVER RH

(a) Remove the bolt and rear seat back hinge RH.
(b) Remove the headrest supports.
(c) Remove the rear back lock release button.
(d) Remove the rear seat back stop button grommet.
(e) Remove the hog rings and rear seat back cover with pad from the seat back frame.
(f) Remove the hog rings and rear seat back cover RH from the seat back pad.

9. REMOVE REAR SEAT BACK LOCK ASSEMBLY RH

Remove the 2 bolts and rear seat back lock assembly RH.

10. REMOVE REAR SEAT CUSHION COVER

Remove the hog rings and rear seat cushion cover from the seat cushion pad.

BO4EE-02

REASSEMBLY

1. INSTALL REAR SEAT CUSHION COVER

Install the rear seat cushion cover with new hog rings to the front of seat cushion pad.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.

2. INSTALL REAR SEATBACK LOCK ASSEMBLY RH

3. INSTALL REAR SEATBACK COVER RH

(a) Install rear seatback cover with new hog rings to the seatback pad.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.

(b) Install seatback cover with pad to the seatback frame with new hog rings.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.

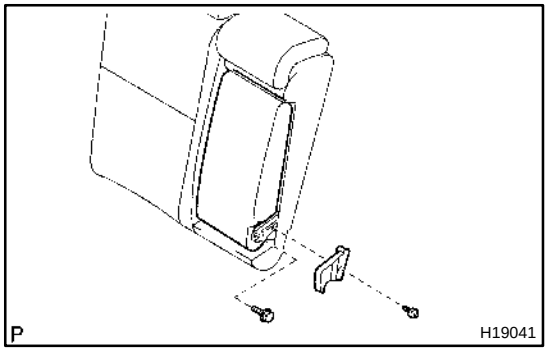
(c) Install the 6 headrest supports.

(d) Install the rear seatback stop button grommet.

(e) Install the rear back lock release button.

(f) Install the bolt and rear seatback hinge RH.

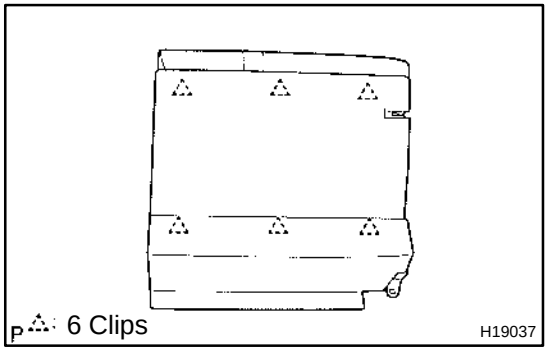
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)



4. INSTALL CENTER ARMREST

(a) Install the center armrest with the bolt.

(b) Install the center armrest hinge cover with the screw.



5. INSTALL SEATBACK BOARD CARPET RH

(a) Install the seatback board carpet RH.

(b) Install the rear seatback lock cover RH.

6. INSTALL REAR SEATBACK LOCK ASSEMBLY LH

7. INSTALL SEATBACK COVER LH

(a) Install rear seatback cover with new hog rings to the seatback pad.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.

(b) Install seatback cover with pad to the seatback frame with new hog rings.

HINT:

When installing the hog rings, take care to prevent wrinkles as little as possible.

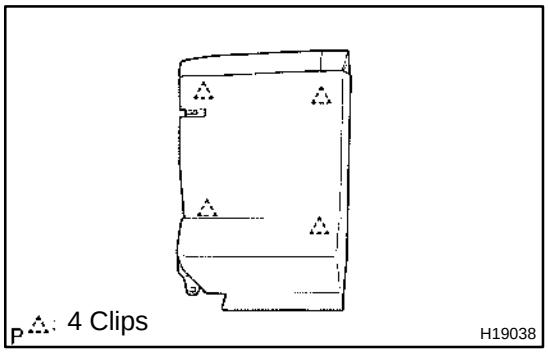
(c) Install the 6 headrest supports.

(d) Install the rear seatback stop button grommet.

(e) Install the rear back lock release button.

(f) Install the bolt and rear seatback hinge LH.

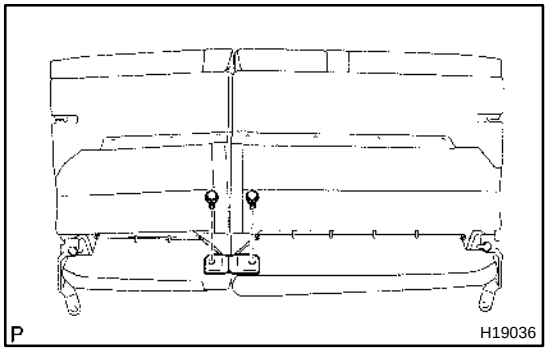
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)



8. INSTALL SEATBACK BOARD CARPET RH

(a) Install the seatback board carpet LH.

(b) Install the rear seatback lock cover LH.



9. INSTALL REAR SEATBACK CENTER HINGE

Install the rear seat center hinge with the 2 bolts.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

10. INSTALL REAR SEAT HEADRESTS

BO4EF-02

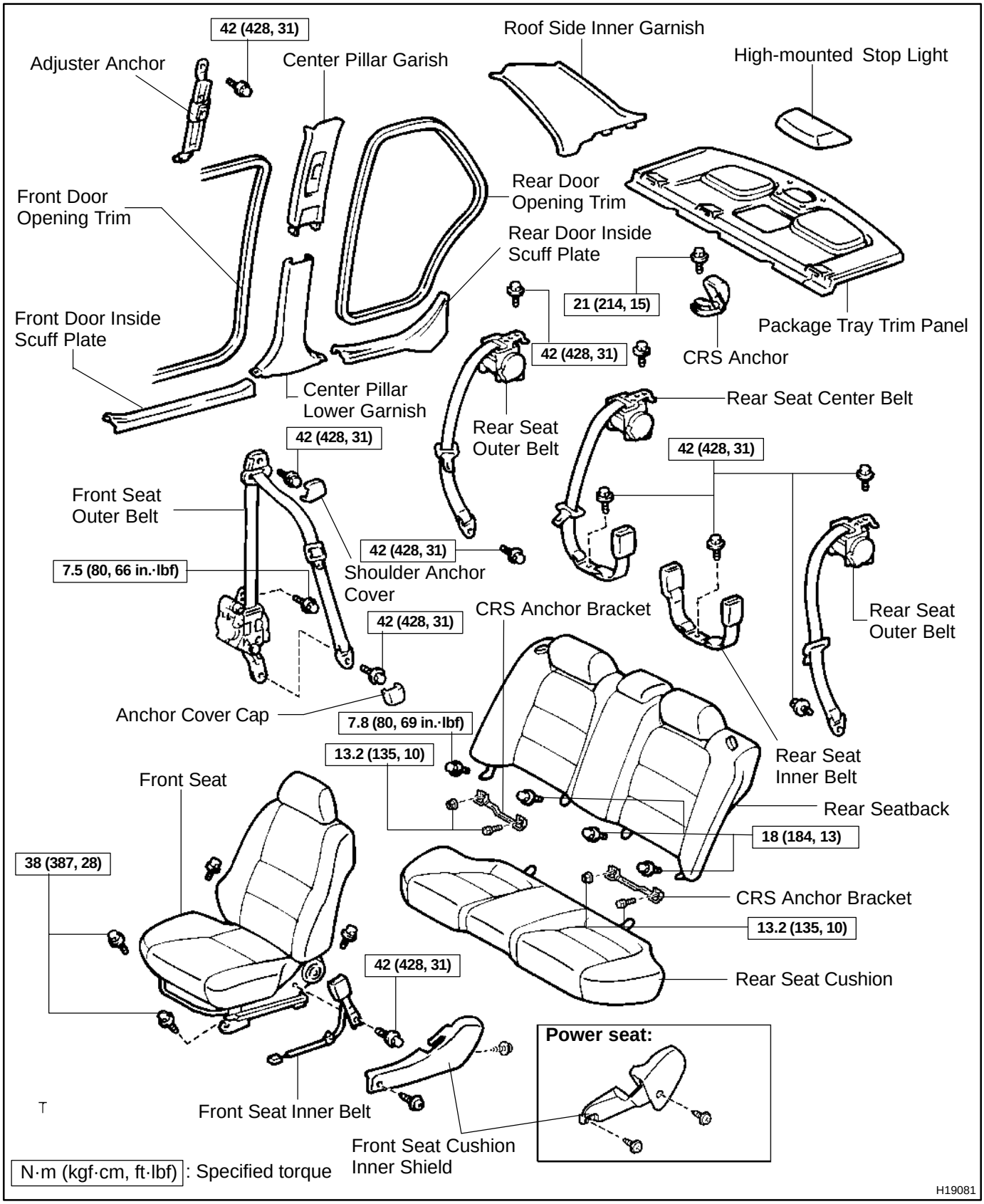
INSTALLATION

The installation procedures are the removal procedures in reverse order (See page BO-204).

SEAT BELT (Sedan)

BO4EG-02

COMPONENTS



BO4EH-02

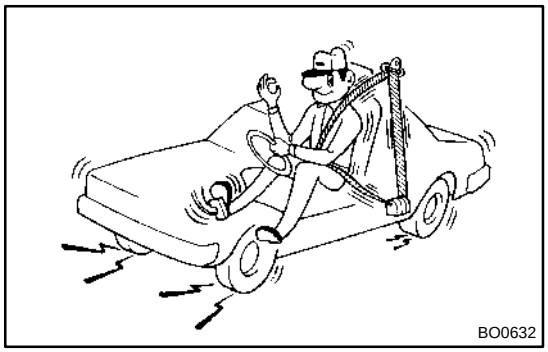
INSPECTION

CAUTION:

Replace the seat belt assembly (outer belt, inner belt, bolts or nuts) if it has been used in a severe impact. The entire assembly should be replaced even if damage is not obvious.

1. RUNNING TEST (IN SAFE AREA)

(a) Fasten the front seat belts.


BO0632

(b) Drive the car at 10 mph (16 km/h) and slam on the brakes. Check that the belt locks and cannot be extended at this time.

HINT:

Conduct this test in a safe area. If the belt does not lock, remove the belt mechanism assembly and conduct the following static check. Also, whenever installing a new belt assembly, verify the proper operation before installation.

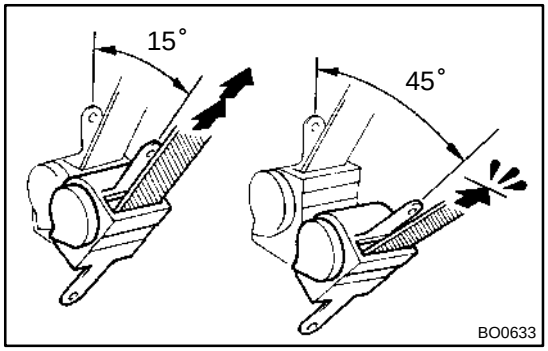
2. Driver's Seat Belt (ELR):

STATIC TEST

(a) Make sure that the belt locks when pulled out quickly.

(b) Remove the locking retractor assembly.

(c) Tilt the retractor slowly.



BO0633

(d) Make sure that the belt can be pulled out at a tilt of 15 degrees or less, and cannot be pulled out over 45 degrees of tilt.

If a problem is found, replace the assembly.

3. Except Driver's Seat Belt (ELR/ALR):

STATIC TEST

(a) Make sure that the belt locks when pulled out quickly.

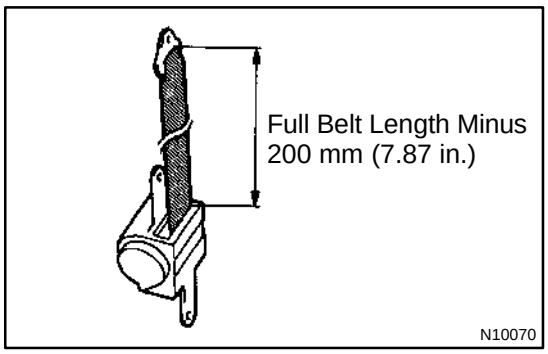
(b) Remove the locking retractor assembly.

(c) Pull out the whole belt and measure the length of the whole belt.

Then retract the belt slightly and pull it out again

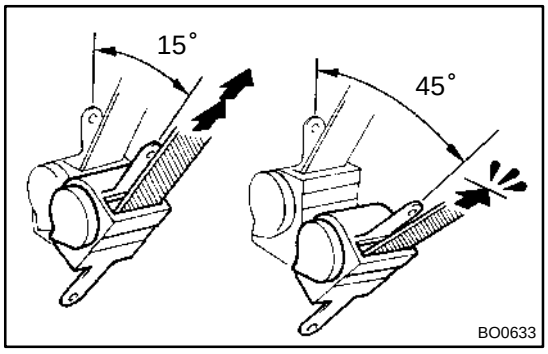
(d) Make sure that the belt cannot be extended further.

If a problem is found, replace the assembly.



(e) Retract the whole belt, then pull out the belt until 200 mm (7.87 in.)of belt remains in the retractor.

(f) Tilt the retractor slowly.



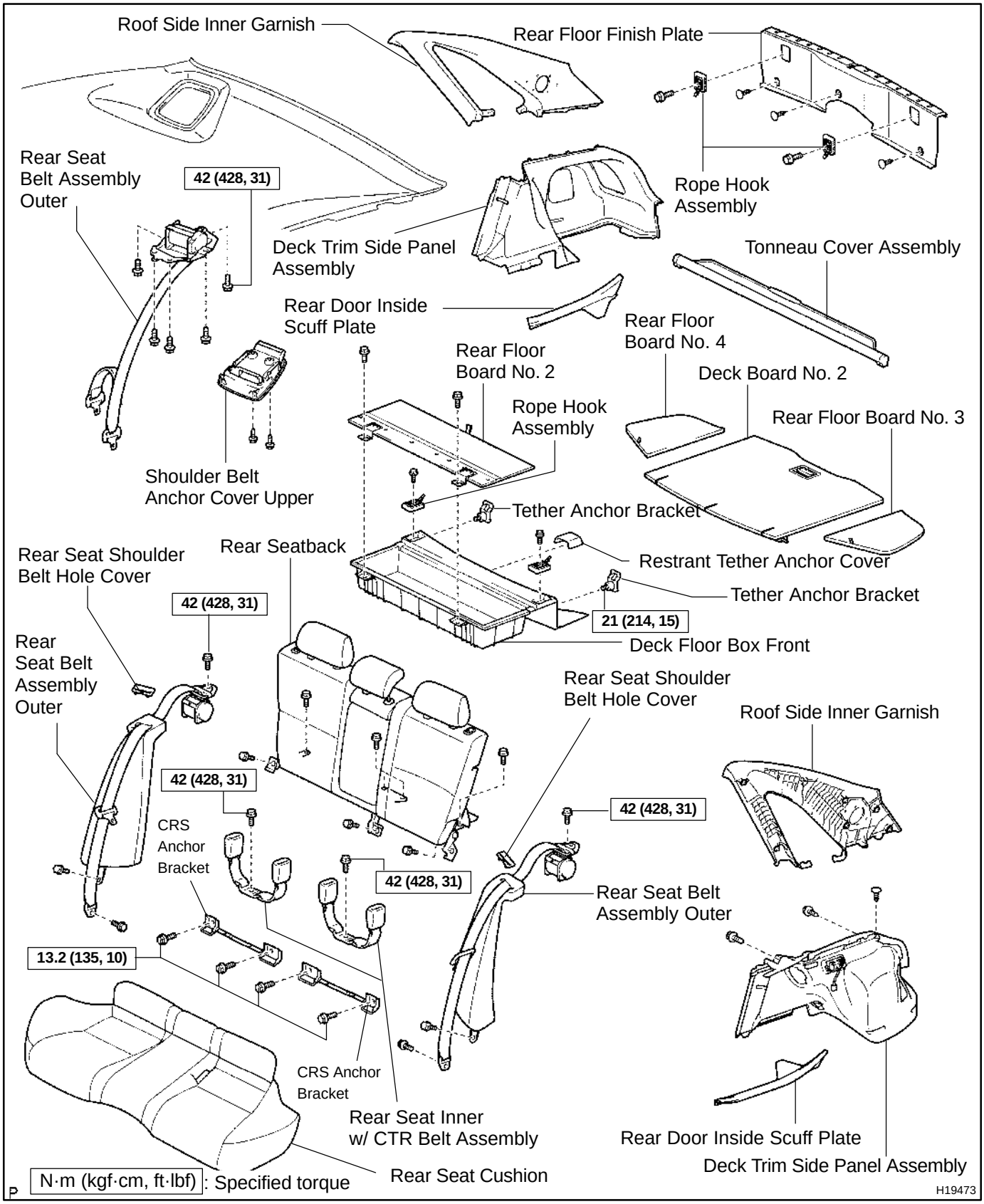
(g) Make sure that the belt can be pulled out at a tilt of 15 degrees or less, and cannot be pulled out at over 45 degrees of tilt.

If a problem is found, replace the assembly.

SEAT BELT (Wagon)

BO4EI-02

COMPONENTS



BO4EJ-02

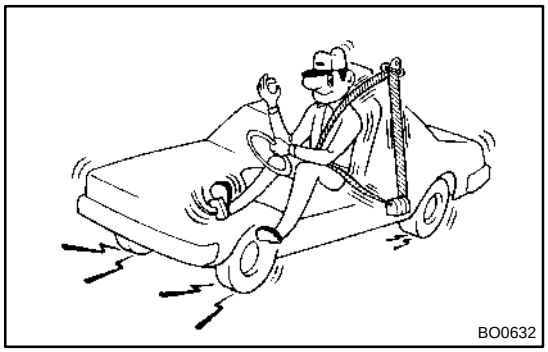
INSPECTION

CAUTION:

Replace the seat belt assembly (outer belt, inner belt, bolts or nuts) if it has been used in a severe impact. The entire assembly should be replaced even if damage is not obvious.

1. RUNNING TEST (IN SAFE AREA)

(a) Fasten the front seat belts.


BO0632

(b) Drive the car at 10 mph (16 km/h) and slam on the brakes. Check that the belt locks and cannot be extended at this time.

HINT:

Conduct this test in a safe area. If the belt does not lock, remove the belt mechanism assembly and conduct the following static check. Also, whenever installing a new belt assembly, verify the proper operation before installation.

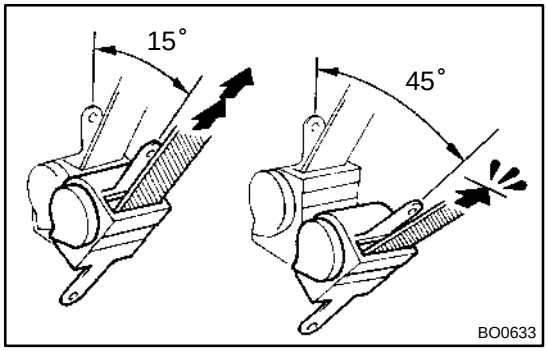
2. Driver's Seat Belt (ELR):

STATIC TEST

(a) Make sure that the belt locks when pulled out quickly.

(b) Remove the locking retractor assembly.

(c) Tilt the retractor slowly.



BO0633

(d) Make sure that the belt can be pulled out at a tilt of 15 degrees or less, and cannot be pulled out over 45 degrees of tilt.

If a problem is found, replace the assembly.

3. Except Driver's Seat Belt (ELR/ALR):

STATIC TEST

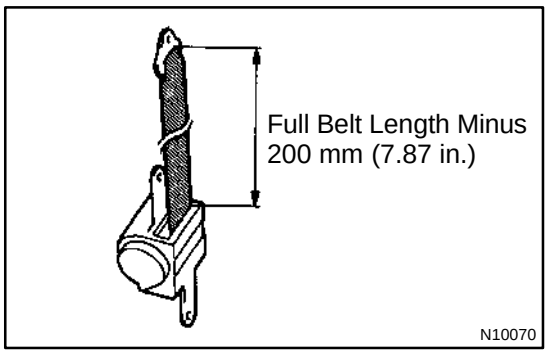
(a) Make sure that the belt locks when pulled out quickly.

(b) Remove the locking retractor assembly.

(c) Pull out the whole belt and measure the length of the whole belt. Then retract the belt slightly and pull it out again.

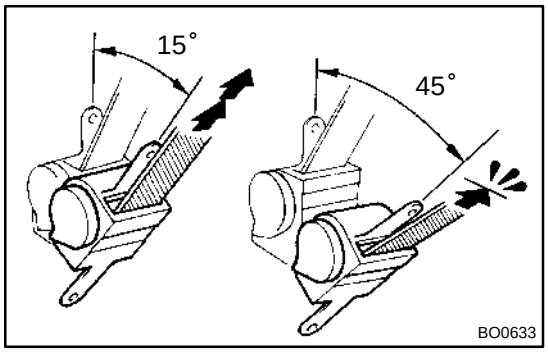
(d) Make sure that the belt cannot be extended further.

If a problem is found, replace the assembly.



(e) Retract the whole belt, then pull out the belt until 200 mm (7.87 in.) of belt remains in the retractor.

(f) Tilt the retractor slowly.



(g) Make sure that the belt can be pulled out at a tilt of 15 degrees or less, and cannot be pulled out at over 45 degrees of tilt.

If a problem is found, replace the assembly.

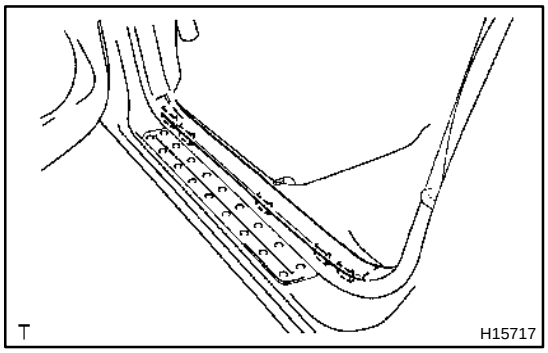
SEAT BELT PRETENSIONER

BO2DG-05

REMOVAL

NOTICE:

- **If the wiring connector of the seat belt pretensioner is disconnected with the ignition switch at ON or ACC, diagnostic trouble codes will be recorded.**
- **Never use seat belt pretensioner from another vehicle. When replacing parts, replace them with new parts.**

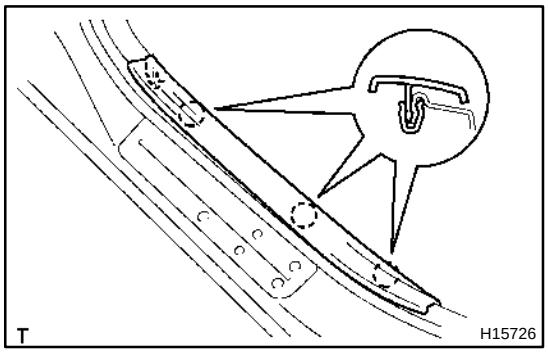


1. REMOVE FRONT DOOR INSIDE SCUFF PLATE

Using a screwdriver, remove the front door inside scuff plate.

HINT:

Tape the screwdriver tip before use.



2. REMOVE REAR DOOR INSIDE SCUFF PLATE

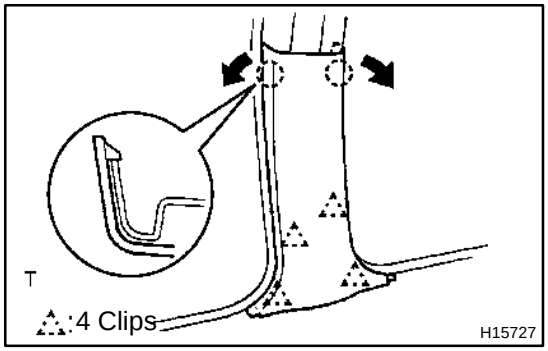
Using a screwdriver, remove the rear door inside scuff plate.

HINT:

Tape the screwdriver tip before use.

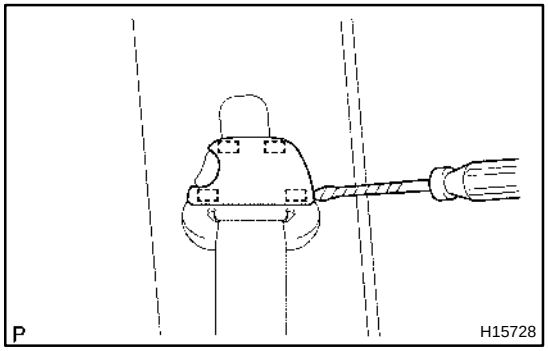
3. REMOVE REAR PART OF FRONT DOOR OPENING TRIM

4. REMOVE FRONT PART OF REAR DOOR OPENING TRIM



5. REMOVE CENTER PILLAR LOWER GARNISH

Remove the center pillar lower garnish as shown in the illustration.



6. REMOVE FRONT SEAT OUTER BELT

(a) Using a screwdriver, remove the shoulder anchor cover.

HINT:

Tape the screwdriver tip before use.

(b) Remove the bolt and shoulder anchor.

(c) Using a screwdriver, remove the floor anchor cover.

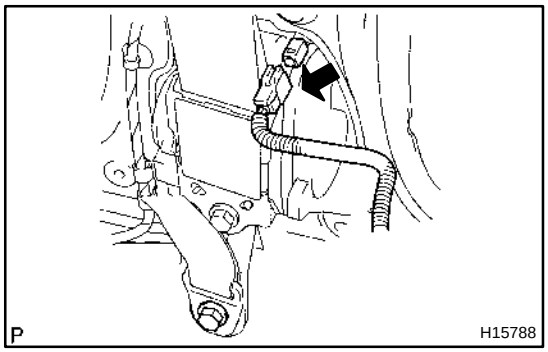
HINT:

Tape the screwdriver tip before use.

(d) Remove the bolt and floor anchor.

(e) Remove the retractor of front seat outer belt.

CAUTION:
Never disassemble the front seat outer belt.
NOTICE:
When removing the retractor of front seat outer belt, take care not to pull the seat belt pretensioner wire harness.



(1) Disconnect the pretensioner connector as shown in the illustration.

CAUTION:
When removing the seat belt pretensioner, work must be started within 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.

(2) Remove the upper bolt and retractor of front seat outer belt.

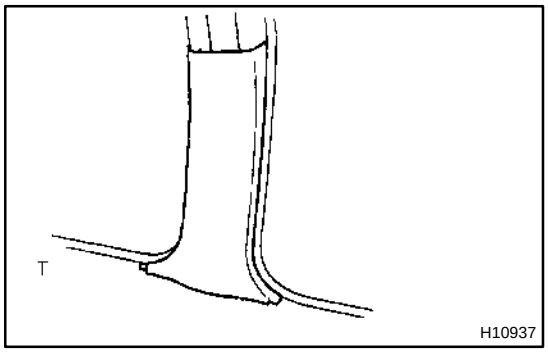
NOTICE:
Except when disposing of the seat belt pretensioner, do not remove the shoulder belt anchor plate from the retractor.

BO259-07

INSPECTION

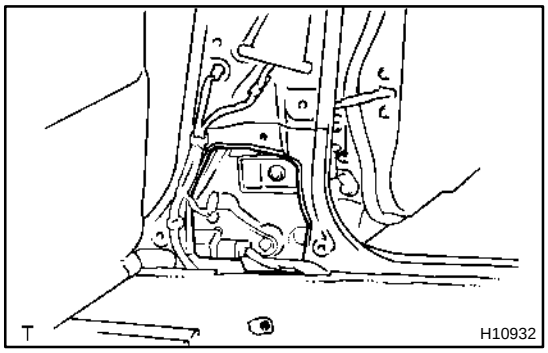
1. PRETENSIONER IS NOT ACTIVATED

(a) Perform a diagnostic system check.
(See page DI-607)

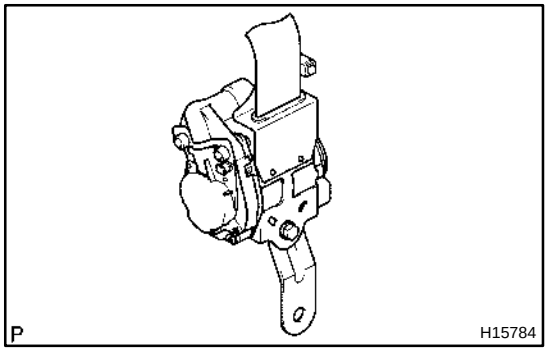


(b) Perform a visual check which includes the following items with the front seat outer belt removed from the vehicle.

- Check for cuts and cracks in, or marked discoloration on the center pillar lower garnish.
- Check for cuts and cracks in wire harness, and for chipping in connectors.



- Check for deformation of the center pillar.



- Check for small cuts and miute cracks in wire harness or marked discoloration on the front seat outer belt.

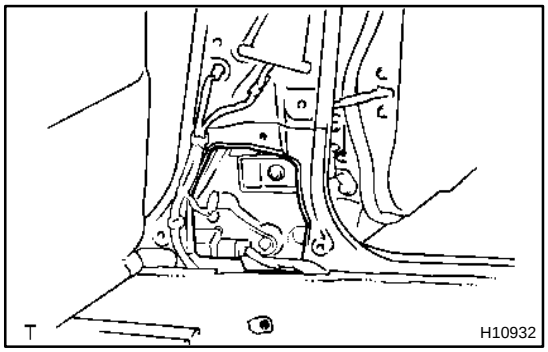
CAUTION:
For removal and installation of the front seat outer belt, see page BO-217 and BO-226 .
Be sure to follow the correct procedure.

2. PRETENSIONER IS ACTIVATED

(a) Perform a diagnostic system check.
(See page DI-607)

(b) Perform a visual check which includes the following items with the front seat outer belt removed from the vehicle.

- Check for deformation of the center pillar.
- Check for damage on the connector and wire harness.

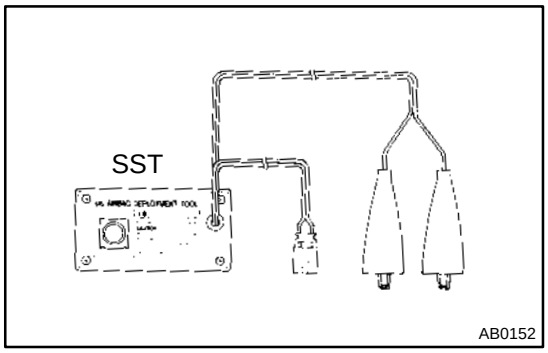


BO2DH-06

DISPOSAL

HINT:

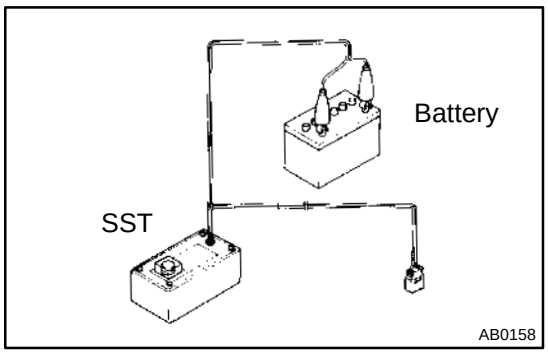
When scrapping vehicles equipped with a seat belt pretensioner or disposing of a front seat outer belt (with seat belt pretensioner), always first activate the seat belt pretensioner in accordance with the procedure described below. If any abnormality occurs in the seat belt pretensioner operation, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A. INC. When disposing of a front seat outer belt (with seat belt pretensioner) activated in a collision, follow the same procedure given in step 1-(e) in "DISPOSAL".



CAUTION:

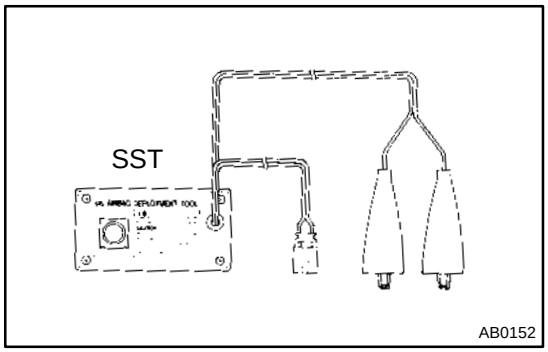
- **Never dispose of front seat outer belt which has an inactivated pretensioner.**
- **The seat belt pretensioner produces a sizeable exploding sound when it activates, so perform the operation outdoors and where it will not create a nuisance to nearby residents.**
- **When activating the seat belt pretensioner, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**

  SST 09082-00700, 09082-00730
- **When activating a front seat outer belt (with seat belt pretensioner), perform the operation at least 10 m (33 ft) away from the front seat outer belt.**
- **Use gloves and safety glasses when handling the front seat outer belt with activated pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to the front seat outer belt with activated pretensioner.**



1. SEAT BELT PRETENSIONER ACTIVATION WHEN SCRAPPING VEHICLE

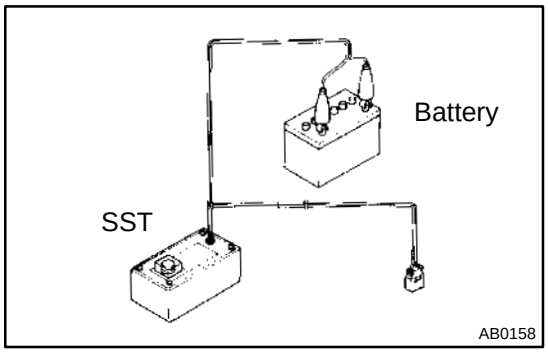
HINT:
Have a battery ready as the power source to activate the seat belt pretensioner.



(a) Check the functioning of SST.

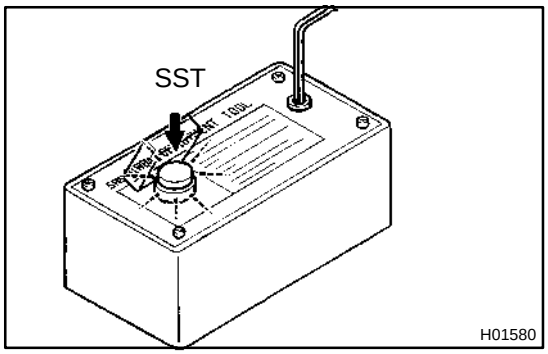
CAUTION:
When activating the seat belt pretensioner, always use the specified SST: SRS Airbag Deployment Tool.

SST 09082-00700, 09082-00730



(1) Connect the SST to the battery.
Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.

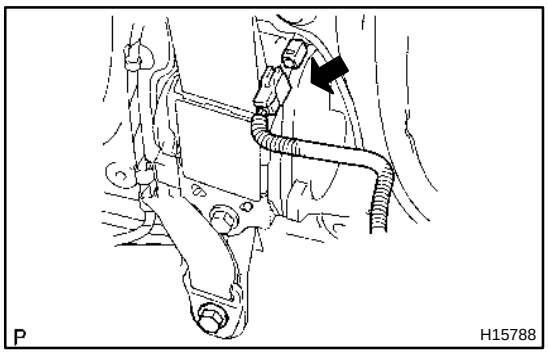
HINT:
Do not connect the yellow connector to the battery which should be connected with the seat belt pretensioner.



(2) Press the SST activation switch, and check the LED of the SST activation switch comes on.

CAUTION:
If the LED comes on when the activation switch is not being pressed, SST malfunction is probable, so definitely do not use the SST.

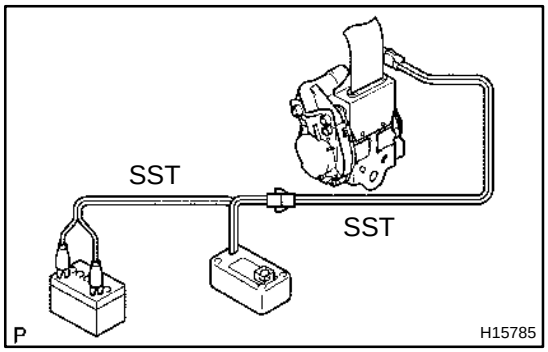
(b) Disconnect the pretensioner connector.
(1) Remove the front door inside scuff plate.
(2) Remove the rear door inside scuff plate.
(3) Remove the rear part of front door opening trim.
(4) Remove the front part of rear door opening trim.
(5) Remove the center pillar lower garnish.



(6) Disconnect the pretensioner connector as shown in the illustration.

(c) Install the SST.

(1) Buckle the front seat belt and check that there is no looseness and slack in the front seat inner belt and front seat outer belt.

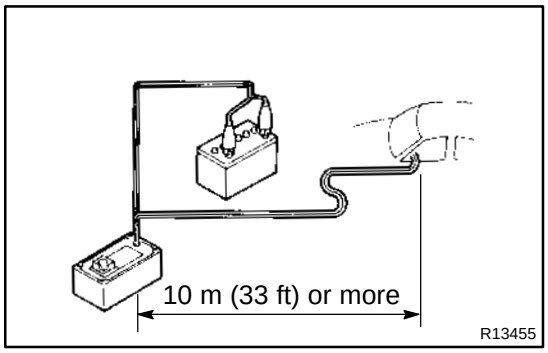


(2) Connect the 2 SST, then connect them to the seat belt pretensioner.

SST 09082-00700, 09082-00730

NOTICE:

Avoid damaging the SST connector and wire harness.



(3) Move the SST to at least 10 m (33 ft) away from the front of the vehicle.

(4) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(5) Connect the SST red clip to the battery positive (+) terminal and the SST black clip to the negative (-) terminal.

(d) Activate the seat belt pretensioner.

(1) Confirm that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.

(2) Press the SST activation switch and activate the seat belt pretensioner.

HINT:

The seat belt pretensioner operates simultaneously as the LED of the SST activation switch comes on.

(e) Dispose of front seat outer belt (with seat belt pretensioner).

CAUTION:

- **The front seat outer belt is very hot when the seat belt pretensioner is activated, so leave it alone for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a front seat outer belt with activated seat belt pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with activated seat belt pretensioner.**

HINT:
When scrapping a vehicle, dispose the seat belt pretensioner and scrap the vehicle with activated front seat outer belt being installed.

2. ACTIVATION WHEN DISPOSING OF FRONT SEAT OUTER BELT ONLY

NOTICE:

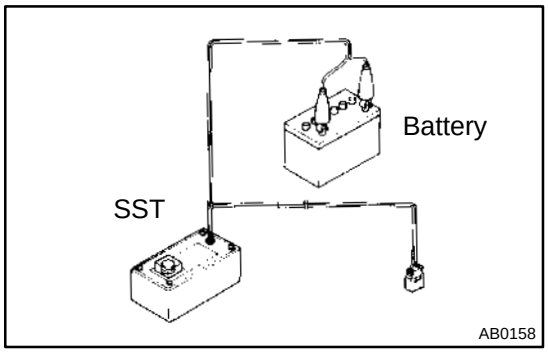
- **When disposing of the front seat outer belt (with seat belt pretensioner) only, never use the customer's vehicle to activate the seat belt pretensioner.**
- **Be sure to follow the procedure given on the next page when activating the seat belt pretensioner.**

HINT:
Have a battery ready as the power source when activating the seat belt pretensioner.

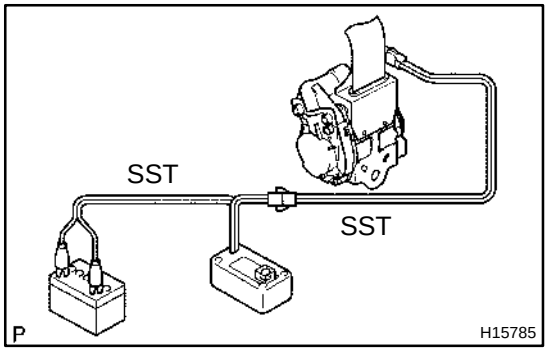
(a) Remove the front seat outer belt (See page BO-217).

HINT:
Cut the belt near the seat belt retractor.

(b) Remove the bolt and the shoulder belt anchor plate.

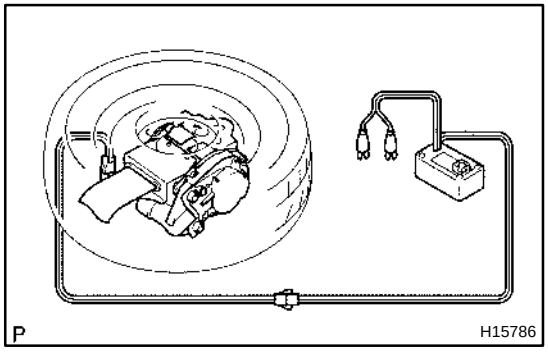


(c) Check functioning of SST (See step 1-(a)).
SST 09082-00700, 09082-00730



(d) Install the SST.
(1) Connect the 2 SST, then connect them to the seat belt pretensioner.
SST 09082-00700, 09082-00730

NOTICE:
Take care not to damage the SST connector and wire harness.



(2) Place the front seat outer belt on the ground, and cover it with the disc wheel with tire.

NOTICE:
Place the front seat outer belt as shown in the illustration.

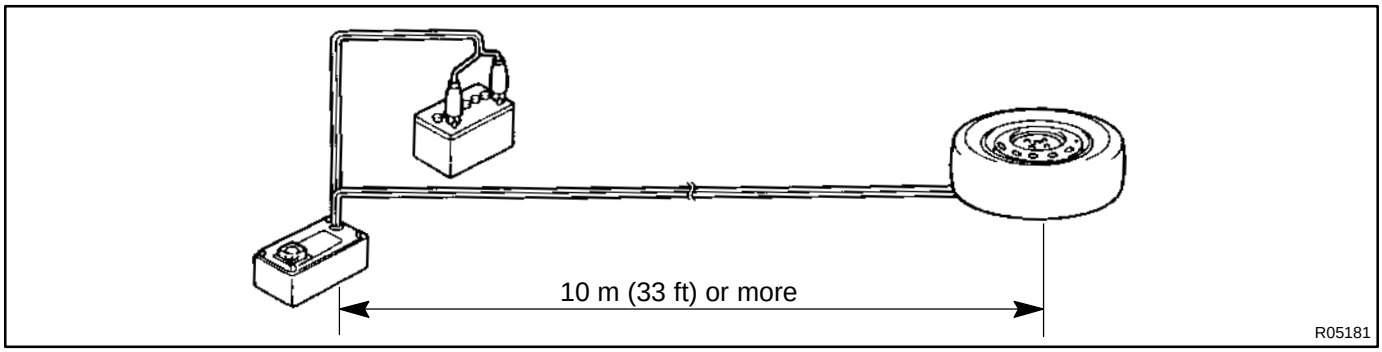
(3) Move the SST at least 10 m (33 ft) away from the disc wheel.

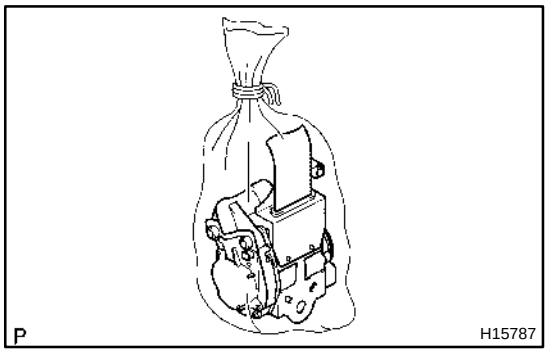
NOTICE:
Take care not to damage the SST wire harness.

(e) Activate the seat belt pretensioner.

(1) Connect the SST red clip to the battery positive (+) terminal and the SST black clip to the battery negative (-) terminal.
(2) Check that no one is within 10 m (33 ft) area around the disc wheel.
(3) Press the SST activation switch and activate the seat belt pretensioner.

HINT:
The seat belt pretensioner operates simultaneously as the LED of the SST activation switch comes on.





(f) Dispose of front seat outer belt (with seat belt pretensioner).

CAUTION:

- **The front seat outer belt is very hot when the seat belt pretensioner is activated, so leave it alone for at least 30 minutes after activation.**
- **Use gloves and safety glasses when handling a front seat outer belt with activated seat belt pretensioner.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front seat outer belt with activated seat belt pretensioner.**

(1) Remove the disc wheel and SST.
(2) Place the front seat outer belt in a vinyl bag, and tie the end tightly and dispose of it in the same way as other general parts.

BO1QY-07

REPLACEMENT

REPLACE REQUIREMENTS

In the following cases, replace the seat belt pretensioner.

- If the seat belt pretensioner has been activated.
- If the seat belt pretensioner has been found to be faulty in troubleshooting.
- If the front seat outer belt has been found to be faulty during checking items 1-(b) or 2-(b) (See page BO-219).
- If the front seat outer belt has been dropped.

CAUTION:

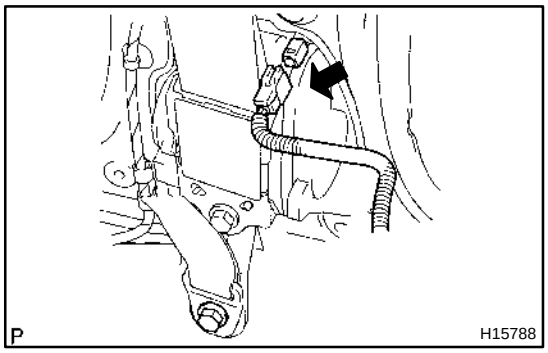
For removal and installation of the seat belt pretensioner, see page BO-217 and BO-226 .
Be sure to follow the correct procedure.

BO2DI-05

INSTALLATION

NOTICE:

- **Never use seat belt pretensioner from another vehicle. When replacing parts, replace them with new parts.**
- **Make sure that the front seat outer belt is installed with the specified torque.**
- **If the front seat outer belt has been dropped, or if there are cracks, dents or other defects in the case or connector, replace the front seat outer belt with a new one.**
- **When installing the front seat outer belt, take care that the wiring does not interfere with other parts and is not pinched between other parts.**



1. INSTALL FRONT SEAT OUTER BELT

(a) Install the retractor of front seat outer belt.

(1) Install the retractor of front seat outer belt with the upper bolt.

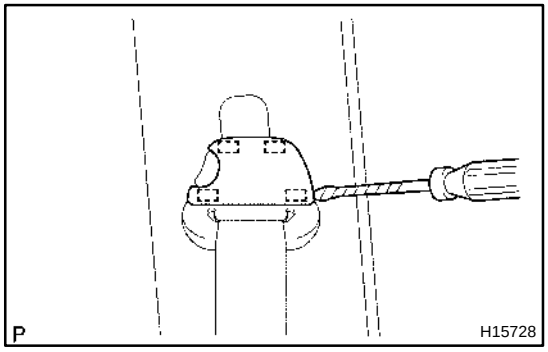
Torque: 7.8 N·m (80 kgf·cm, 69 in.·lbf)

(2) Connect the pretensioner connector as shown in the illustration.

(b) Install the floor anchor with the bolt.

Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

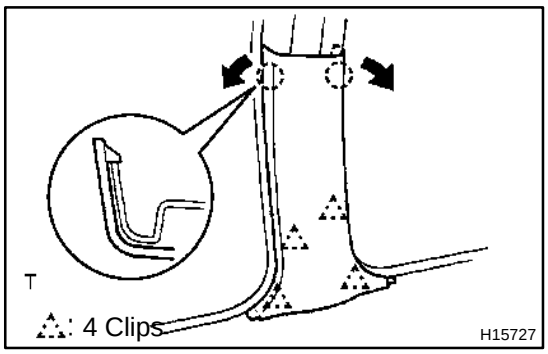
(c) Install the floor anchor cover.



(d) Install the shoulder anchor with the bolt.

Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(e) Install the shoulder anchor cover.

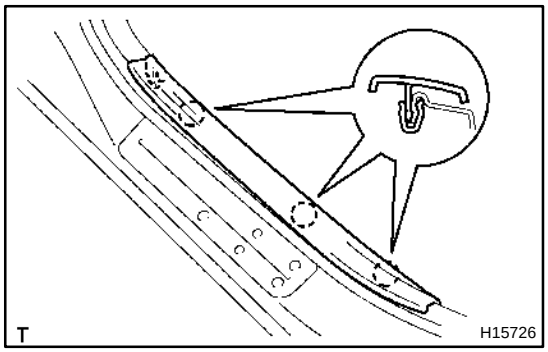


2. INSTALL CENTER PILLAR LOWER GARNISH

Install the center pillar lower garnish to the body.

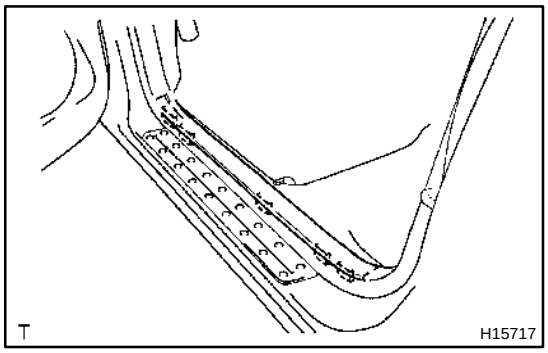
3. INSTALL FRONT PART OF REAR DOOR OPENING TRIM

4. INSTALL REAR PART OF FRONT DOOR OPENING TRIM



5. INSTALL REAR DOOR INSIDE SCUFF PLATE

Install the rear door inside scuff plate to the body.



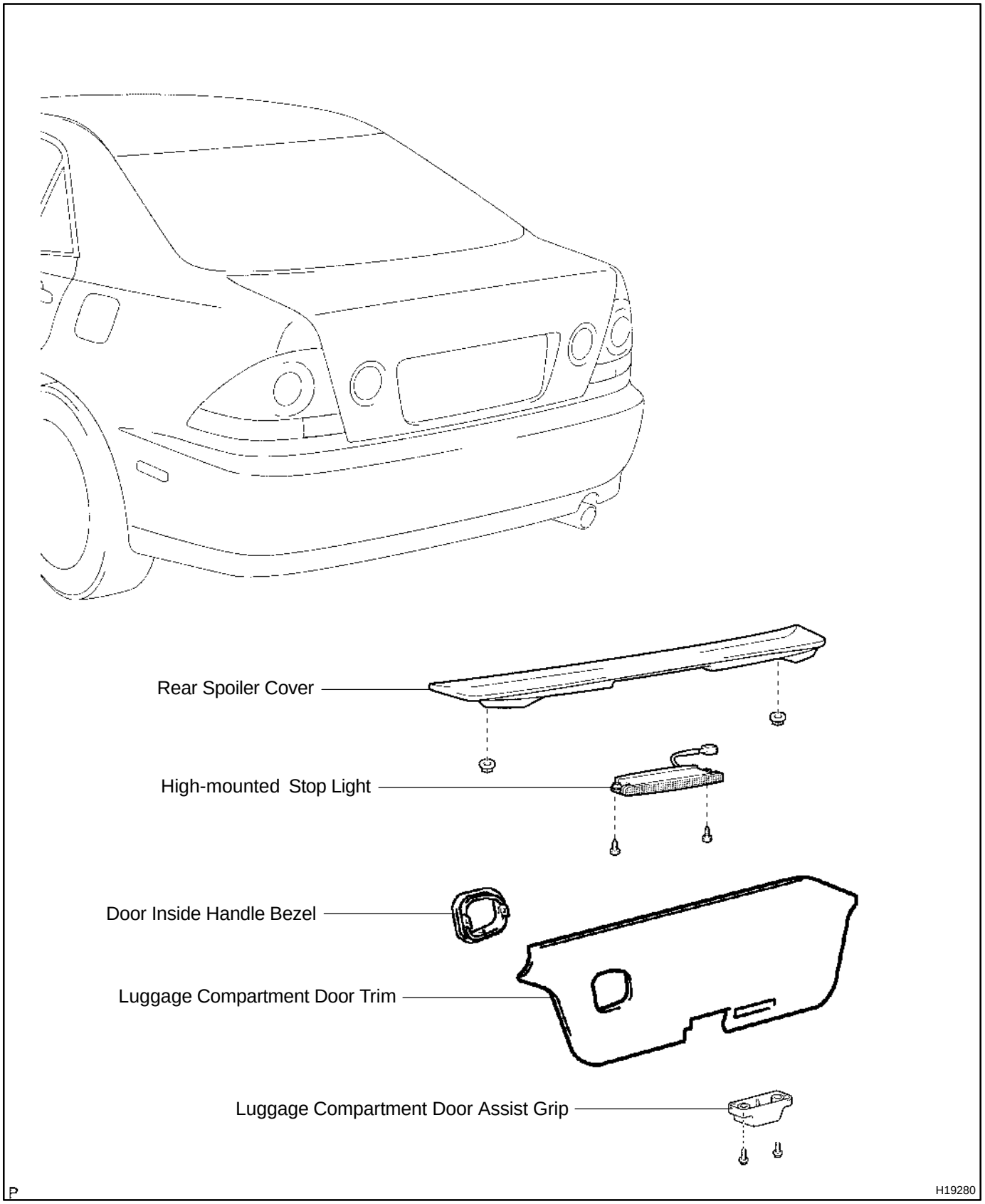
6. INSTALL FRONT DOOR INSIDE SCUFF PLATE

Install the front door inside scuff plate to the body.

SPOILER (Sedan)

COMPONENTS

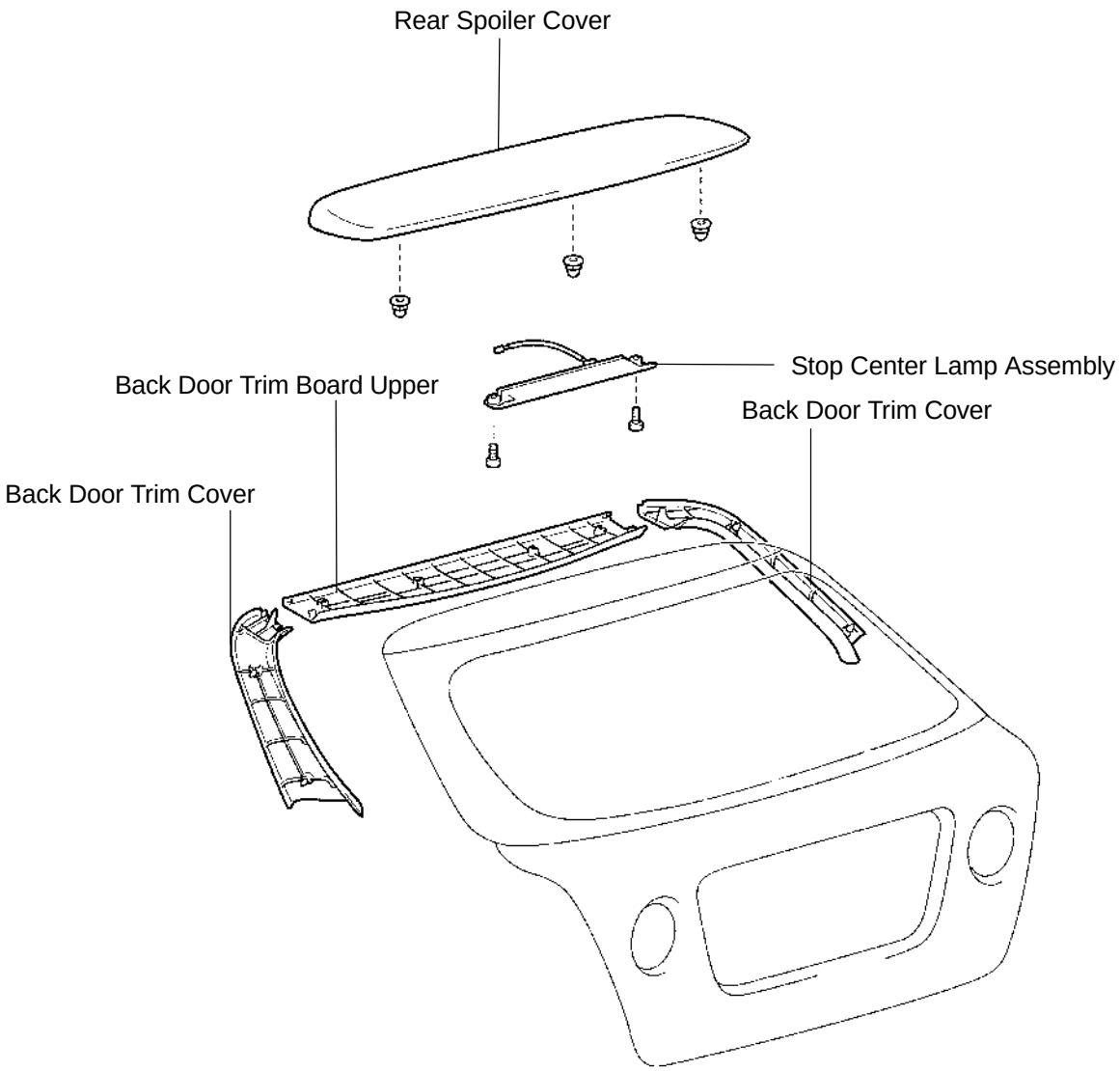
BO4EK-01



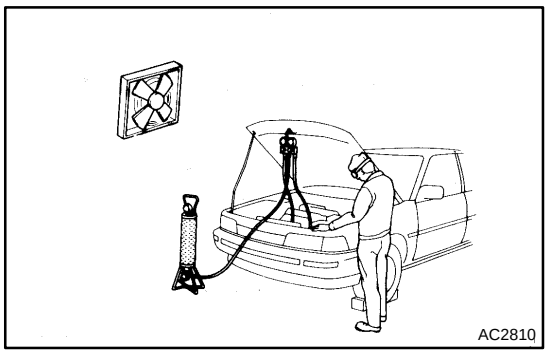
SPOILER (Wagon)

COMPONENTS

BO4EL-01



H19205


AC2810

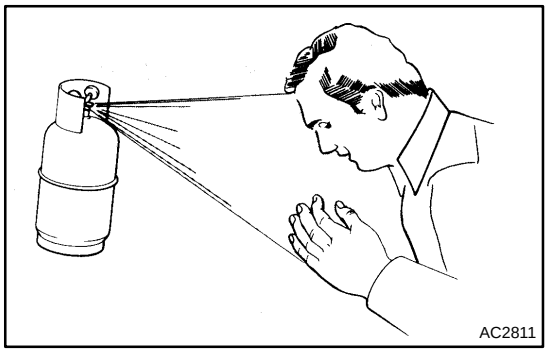
AIR CONDITIONING SYSTEM

AC15I-04

PRECAUTION

1. DO NOT HANDLE REFRIGERANT IN AN ENCLOSED AREA OR NEAR AN OPEN FLAME

2. ALWAYS WEAR EYE PROTECTION


AC2811

3. BE CAREFUL NOT TO GET LIQUID REFRIGERANT IN YOUR EYES OR ON YOUR SKIN

If liquid refrigerant gets in your eyes or on your skin.

(a) Wash the area with lots of cool water.

CAUTION:

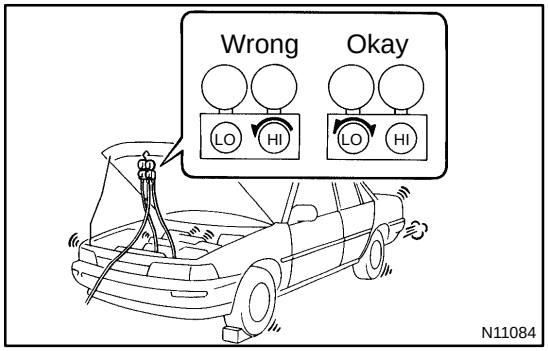
Do not rub your eyes or skin.

(b) Apply clean petroleum jelly to the skin.

(c) Go immediately to a physician or hospital for professional treatment.

4. NEVER HEAT CONTAINER OR EXPOSE IT TO NAKED FLAME

5. BE CAREFUL NOT TO DROP CONTAINER AND NOT TO APPLY PHYSICAL SHOCKS TO IT



N11084

6. DO NOT OPERATE COMPRESSOR WITHOUT ENOUGH REFRIGERANT IN REFRIGERANT SYSTEM

If there is not enough refrigerant in the refrigerant system oil lubrication will be insufficient and compressor burnout may occur, so take care to avoid this, necessary care should be taken.

7. DO NOT OPEN HIGH PRESSURE MANIFOLD VALVE WHILE COMPRESSOR IS OPERATING

If the high pressure valves opened, refrigerant flows in the reverse direction and could cause the charging cylinder to rupture, so open and close the only low pressure valve.

8. BE CAREFUL NOT TO OVERCHARGE SYSTEM WITH REFRIGERANT

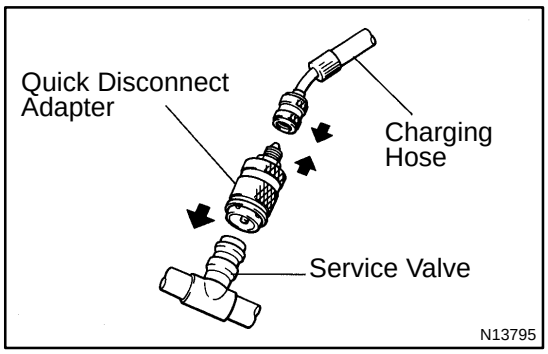
If refrigerant is overcharged, it causes problems such as insufficient cooling, poor fuel economy, engine overheating etc.

9. SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

The LEXUS IS300 is equipped with an SRS (Supplemental Restraint System) such as the driver, passenger and side airbag. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.

AC15K-05

EVACUATING



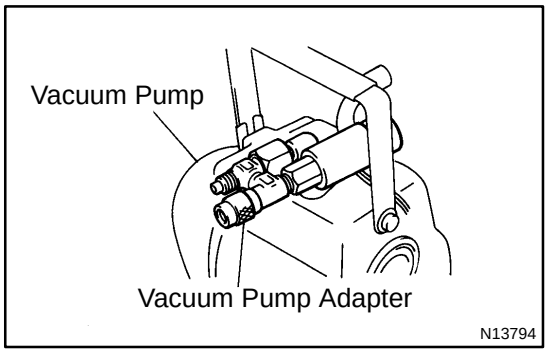
1. CONNECT QUICK DISCONNECT ADAPTER TO CHARGING HOSES

2. REMOVE CAPS FROM SERVICE VALVES ON REFRIGERANT LINES

3. SET ON MANIFOLD GAUGE SET

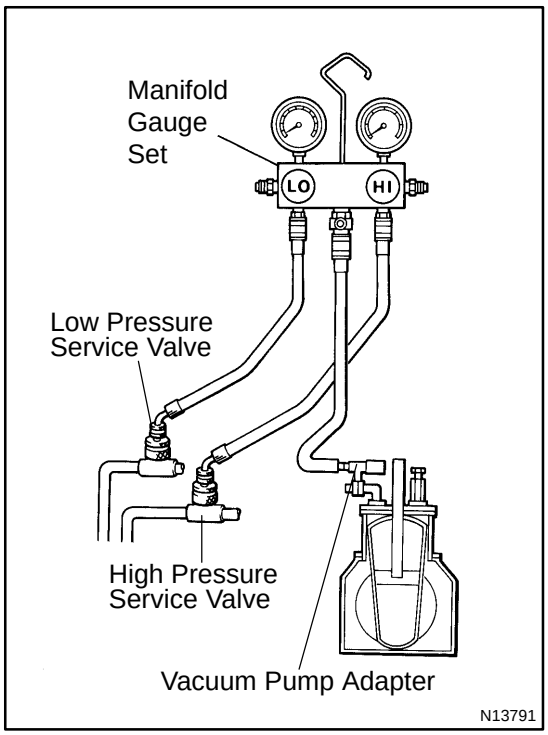
(a) Close both hand valves of manifold gauge set.

(b) Connect the quick disconnect adapters to the service valves.



4. EVACUATE AIR FROM REFRIGERATION SYSTEM

(a) Connect the vacuum pump adapter to the vacuum pump.



(b) Connect the center hose of the manifold gauge set to the vacuum pump adapter.

(c) Open both the high and low hand valves and run the vacuum pump.

(d) After 10 minutes or more, check that the low pressure gauge indicates 750 mmHg (30 in. Hg) or more.

HINT:

If the reading is 750 mmHg (30 in. Hg) or more, close both hand valves of manifold gauge set and stop the vacuum pump.

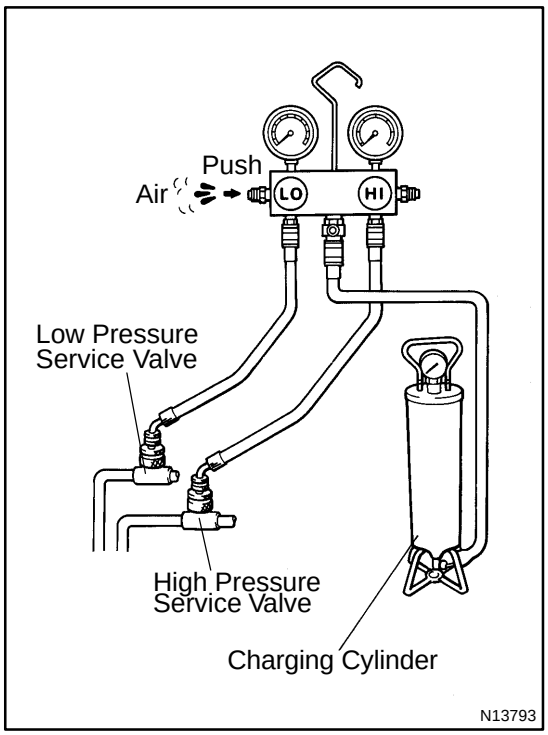
Check the system for leaks and repair if necessary.

(e) Close both the high and low hand valves and stop the vacuum pump.

(f) Leave the system in this condition for 5 minutes or more and check that there is no gauge indicator.

AC25K-02

CHARGING



1. INSTALL CHARGING CYLINDER

HINT:

When handling the charging cylinder, always follow the directions given in the instruction manual.

(a) Charge the proper amount of refrigerant into the charging cylinder.

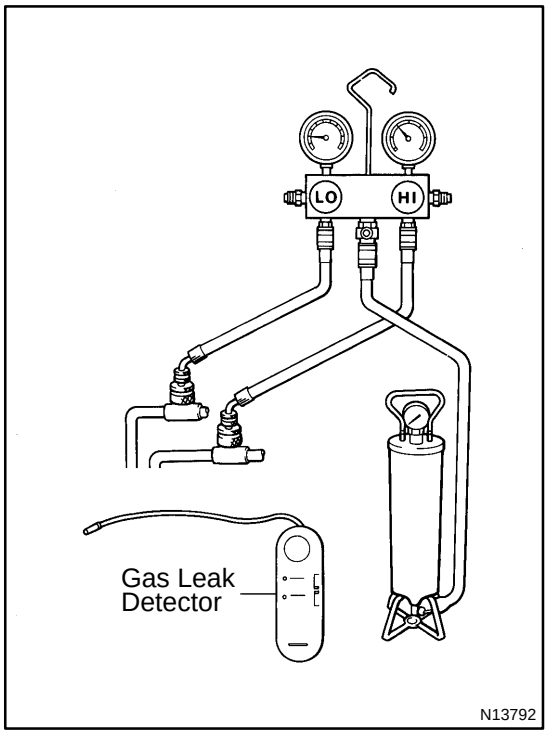
(b) Connect the center hose to the charging cylinder.

CAUTION:

Do not open both high and low hand valves of manifold gauge set.

(c) Open the valve of charging cylinder.

(d) Press the valve core on the side of manifold gauge and expel the air inside of the center hose.



2. INSPECT REFRIGERATION SYSTEM FOR LEAKS

(a) Open the high pressure hand valve and charge refrigerant.

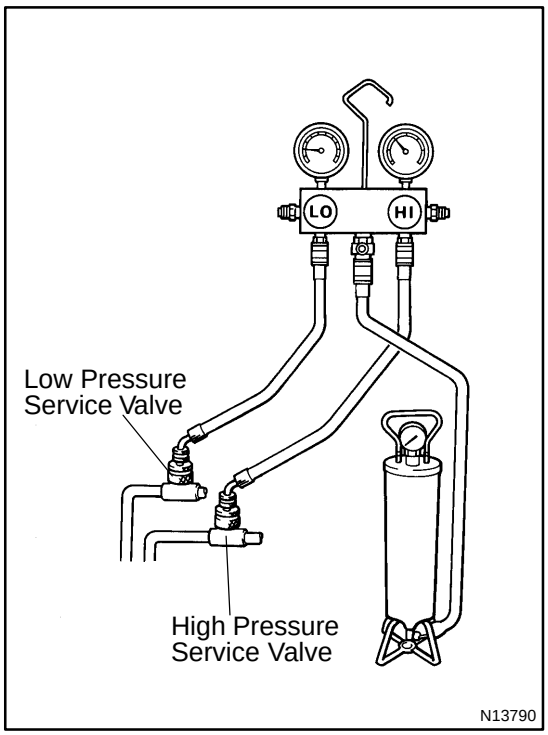
(b) When the low pressure gauge indicates 98 kPa (1 kgf/cm^2, 14 psi) close the high pressure hand valve.

(c) Using a gas leak detector, check the system for leakage.

If leak is found, repair the faulty component or connection.

CAUTION:

Use the refrigerant recovery/ recycling machine to recover the refrigerant whenever replacing parts.



3. CHARGE REFRIGERANT INTO REFRIGERATION SYSTEM

If there is no leak after refrigerant leak check charge, the proper amount of refrigerant in to refrigeration system.

CAUTION:

- **Never run the engine when charging the system through the high pressure side.**
- **Do not open the low pressure hand valve when the system is being charged with liquid refrigerant.**

(a) Open he high pressure hand valve fully.

(b) Charge specified amount of refrigerant, then close the high pressure hand valve.

HINT:

A fully charged system is indicated by the sight glass being free of any bubbles.

(c) Charge partially refrigeration system with refrigerant.

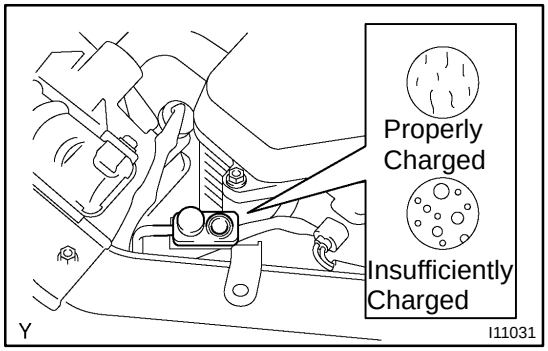
(1) Set vehicle in these conditions:

- Running engine at 1,500 rpm
- Blower speed control set at ”HI”
- Temperature control set at ”MAX. COOL” position
- Air inlet control set at ”RECIRC”
- Fully open doors (Sliding roof : closed)

(2) Open the low pressure hand valve.

CAUTION:

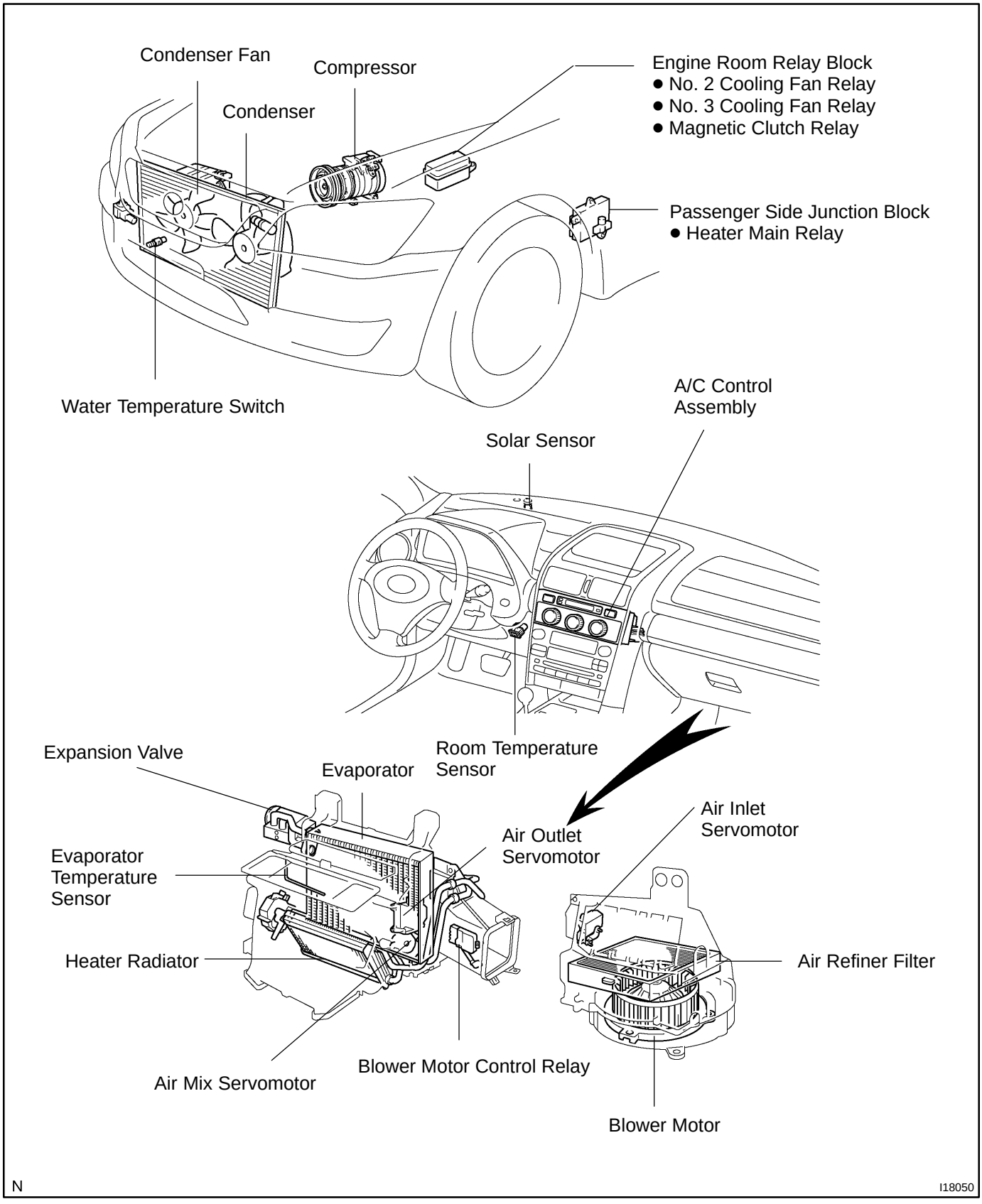
Do not open the high pressure hand valve.



(3) Charge refrigerant until bubbles disappear and check the pressure on the gauge through the sight glass.

AC15M-03

LOCATION



N

I18050

TROUBLESHOOTING

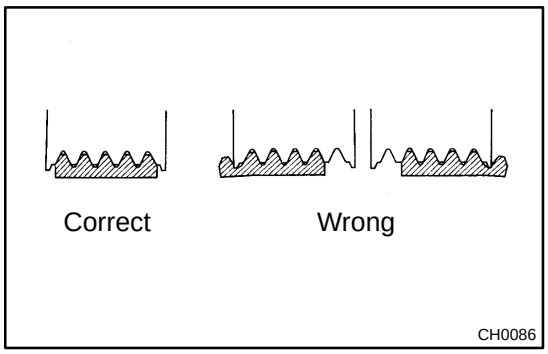
AC20D-03

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order If necessary , replace these parts.

Symptom	Suspect Area	See page
Whole functions of A/C system do not operate	1. A.C Fuse	-
	2. A/C control assembly	AC-79
No blower operation	1. Heater main relay	AC-69
	2. Blower motor	AC-55
	3. Blower motor control relay	AC-56
	4. A/C control assembly	AC-79
	5. Wire harness	-
No blower control	1. Blower motor	AC-55
	2. Blower motor control relay	AC-56
	3. A/C control assembly	AC-79
	4. Wire harness	-
Insufficient air out	1. Blower motor	AC-55
No cool air comes out	1. Refrigerant volume	AC-3
	2. Drive belt	AC-16
	3. Refrigerant pressure	AC-3
	4. Compressor	AC-38
	5. Pressure switch	AC-66
	6. Igniter circuit	-
	7. Air mix servomotor	AC-30
	8. Room temp. sensor	AC-62
	9. Ambient temp. sensor	AC-63
	10.A/C control assembly	AC-79
	11.Wire harness	-
No warm air comes out	1. Engine coolant volume	-
	2. Air mix servomotor	AC-30
	3. Ambient temp. sensor	AC-63
	4. Room temp. sensor	AC-62
	5. A/C control assembly	AC-79
	6. Heater radiator	AC-30
Out put air is warmer or cooler than the set temperature or response is slow	1. Refrigerant volume	AC-3
	2. Engine coolant volume	-
	3. Drive belt	AC-16
	4. Refrigerant pressure	AC-3
	5. Condenser fan	AC-72
	6. Ambient temp. sensor	AC-63
	7. Evaporator temp. sensor	AC-64
	8. Solar sensor	AC-61
	9. Air mix servomotor	AC-30
	10.Compressor	AC-38
	11.Condenser	AC-47
	12.Evaporator	AC-30
	13.Heater radiator	AC-30
	14.Expansion valve	AC-52
	15.A/C control assembly	AC-79
	16.Wire harness	-
No temperature control	1. Air mix servomotor	AC-30
	2. A/C control assembly	AC-79

No air inlet control	1. Air inlet servomotor 2. A/C control assembly 3. Wire harness	AC-57 AC-79 -
No mode control	1. Air outlet servomotor 2. A/C control assembly 3. Wire harness	AC-59 AC-79 -
No engine idle-up when A/C switch ON	1. A/C control assembly 2. Wire harness	AC-79 -
Set temperature value does not match up with operation of temperature control switch	1. A/C control assembly	AC-79
Brightness does not change when light control switch is turned	1. Headlight and taillight system 2. A/C control assembly	BE-31 AC-79



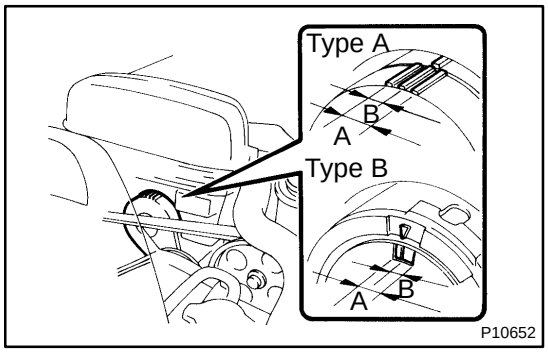
DRIVE BELT

AC37T-01

ON-VEHICLE INSPECTION

1. INSPECT DRIVE BELT'S INSTALLATION CONDITION

Check that the drive belt fits properly in the ribbed grooves.



2. INSPECT DRIVE BELT TENSION

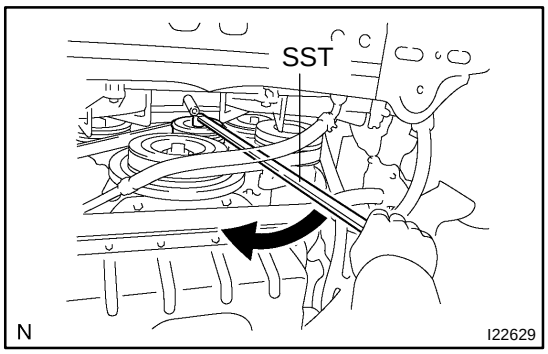
Check that the arrow mark on the belt tensioner falls within area "A" of the scale.

If it is out side area "A", replace the drive belt.

HINT:

When a new belt is installed, it should be lie within area B.

AC17Z-05



REMOVAL

1. REMOVE ENGINE UNDER COVER

2. REMOVE DRIVE BELT

Using SST, loosen the drive belt tension by turning the drive belt tensioner arm clockwise from the bottom side, and remove the drive belt.

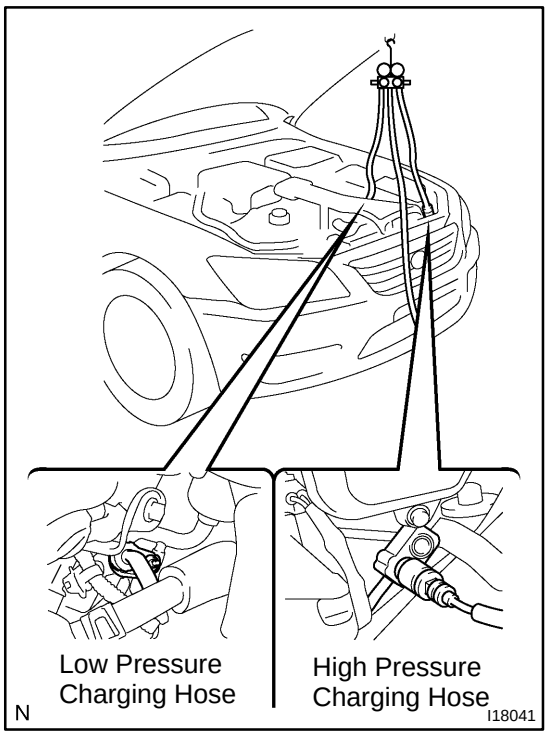
SST 09216-00041

AC37U-01

INSTALLATION

Installation is in the reverse order of removal (See page AC-17).

AFTER INSTALLATION, CHECK DRIVE BELT'S INSTALLATION CONDITION



MANIFOLD GAUGE SET

AC15Q-04

SET ON

1. CONNECT CHARGING HOSES TO MANIFOLD GAUGE SET

Tighten the nuts by hand.

CAUTION:

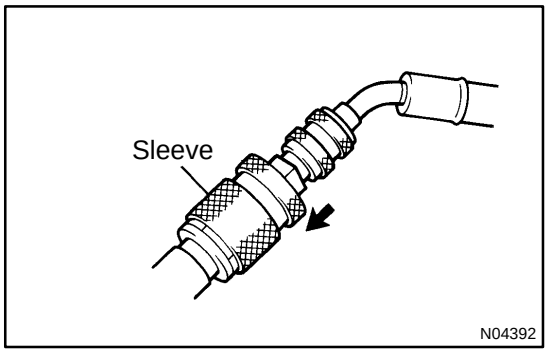
Do not connect the wrong hoses.

2. CONNECT QUICK DISCONNECT ADAPTERS TO CHARGING HOSES

Tighten the nuts by hand.

3. CLOSE BOTH HAND VALVES OF MANIFOLD GAUGE SET

4. REMOVE CAPS FROM SERVICE VALVE ON REFRIGERANT LINES

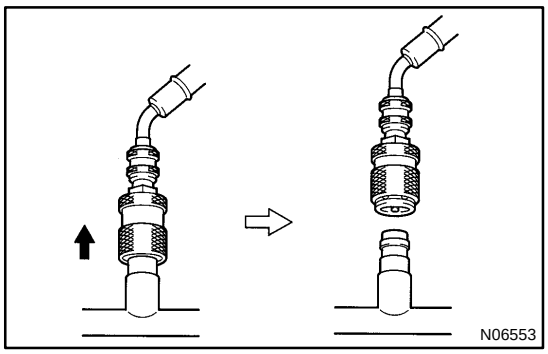


5. CONNECT QUICK DISCONNECT ADAPTERS TO SERVICE VALVES

HINT:

Push the quick disconnect adapter onto the service valve, then slide the sleeve of the quick disconnect adapter downward to lock it.

AC15R-04



SET OFF

1. **CLOSE BOTH HAND VALVES OF MANIFOLD GAUGE SET**
2. **DISCONNECT QUICK DISCONNECT ADAPTERS FROM SERVICE VALVES ON REFRIGERANT LINE**

HINT:

Slide the sleeve of the quick disconnect adapter upward to unlock the adapter and remove it from the service valve.

3. **INSTALL CAPS TO SERVICE VALVES ON REFRIGERANT LINES**

REFRIGERANT LINE

AC15S-01

ON-VEHICLE INSPECTION

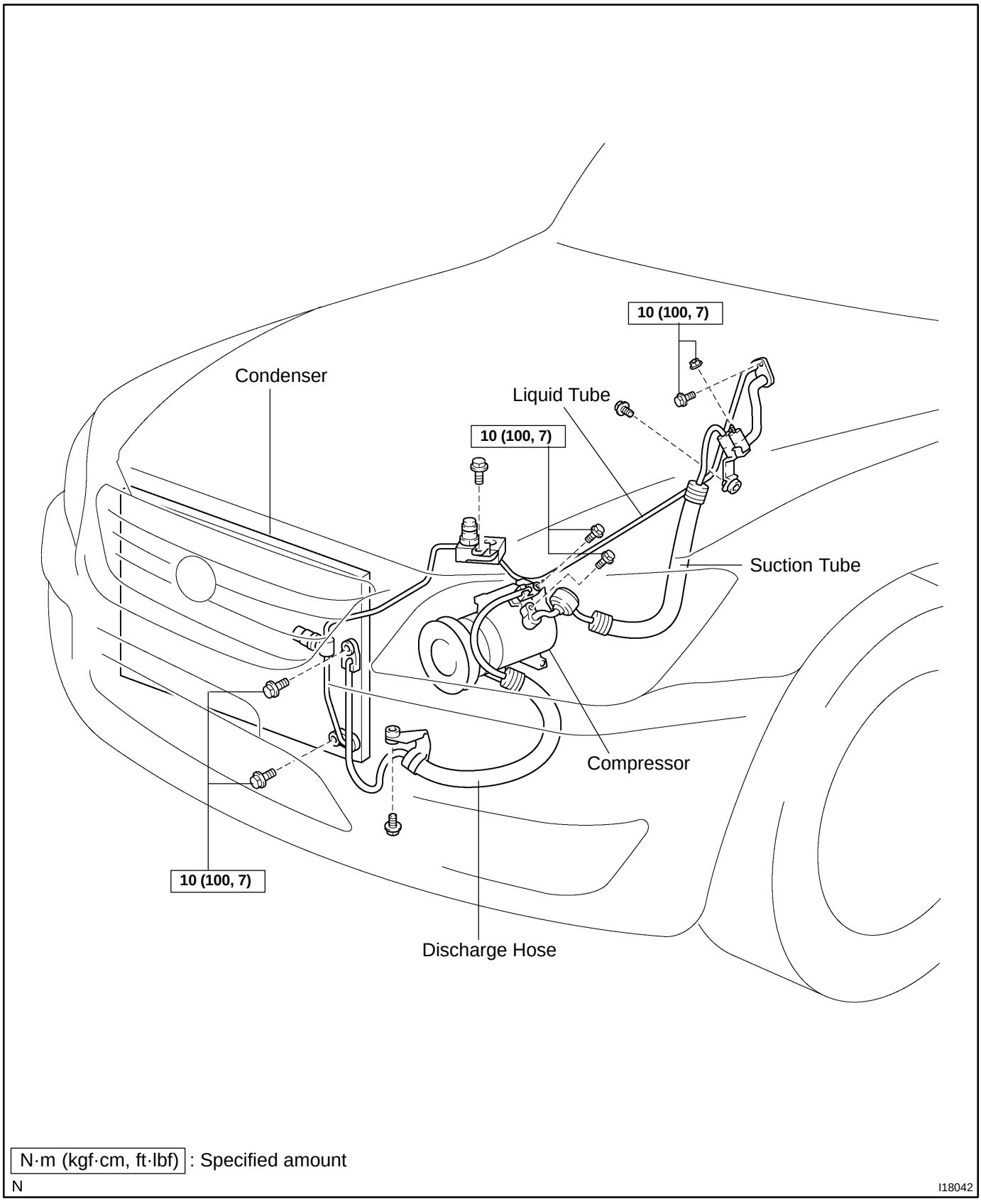
1. INSPECT HOSE AND TUBE CONNECTIONS FOR LOOSENESS

2. INSPECT HOSES AND TUBES FOR LEAKAGE

Using a gas leak detector, check for leakage of refrigerant.

AC15T-04

COMPONENTS



AC15U-02

REPLACEMENT

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

2. REPLACE FAULTY TUBE OR HOSE

NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

3. TIGHTEN JOINT OF BOLT OR NUT TO SPECIFIED TORQUE

NOTICE:

Connections should not be torqued tighter than the specified torqued.

Part tightened	N·m	kgf·cm	ft·lbf
Compressor x Discharge hose	10	100	7
Compressor x Suction hose	10	100	7
Condenser x Discharge hose	10	100	7
Condenser x Liquid tube	10	100	7
A/C unit x Liquid and Suction tubes	10	100	7
Suction line (Block joint)	10	100	7

4. EVACUATE AIR FROM REFRIGERATION SYSTEM AND CHARGE SYSTEM WITH REFRIGERANT
Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)

5. INSPECT FOR LEAKAGE OF REFRIGERANT

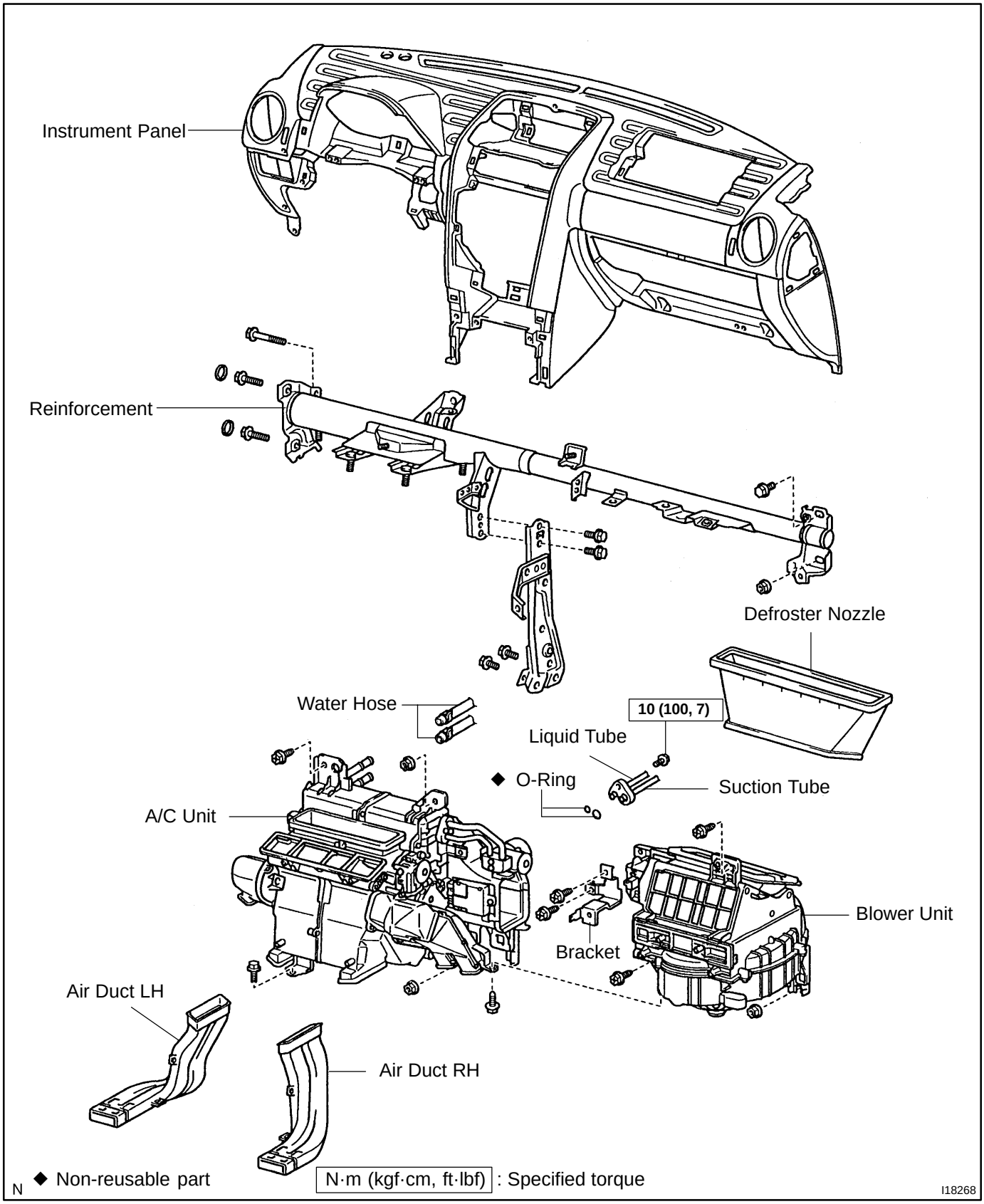
Using a gas leak detector, check for leakage of refrigerant.

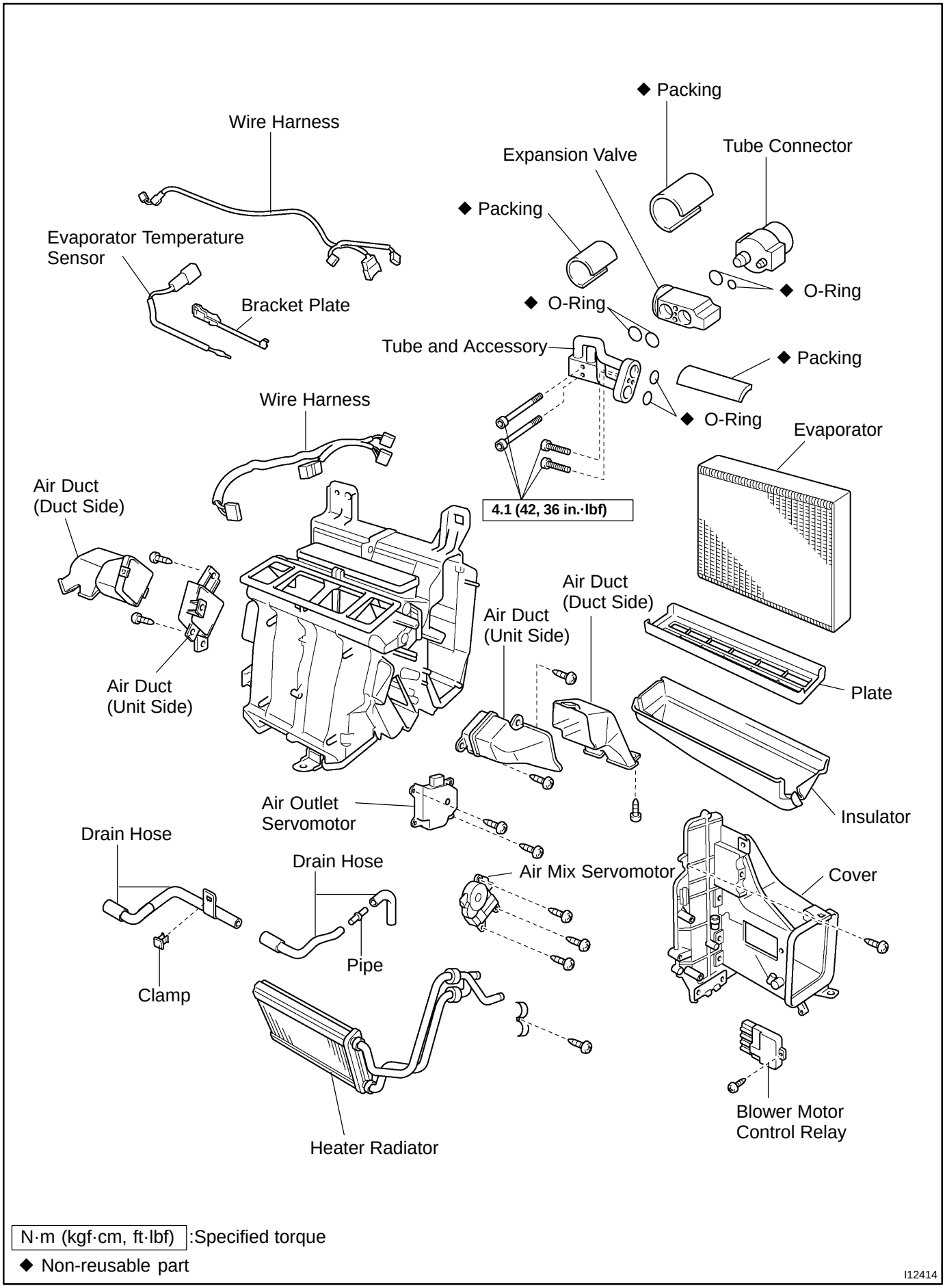
6. INSPECT AIR CONDITIONING OPERATION

AIR CONDITIONING UNIT

AC37V-01

COMPONENTS




◆ Packing
Wire Harness
Expansion Valve
Tube Connector
◆ Packing
Evaporator Temperature Sensor
◆ O-Ring
Bracket Plate
◆ O-Ring
Tube and Accessory
◆ Packing
◆ O-Ring
Wire Harness
Evaporator
Air Duct (Duct Side)
4.1 (42, 36 in.·lbf)
Air Duct (Duct Side)
Air Duct (Unit Side)
Air Duct (Unit Side)
Plate
Air Outlet Servomotor
Insulator
Drain Hose
Drain Hose
Air Mix Servomotor
Cover
Pipe
Clamp
Blower Motor Control Relay
Heater Radiator
N·m (kgf·cm, ft·lbf) :Specified torque
◆ Non-reusable part
I12414

AC15W-03

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of installation, please refer to the following item.

Evacuate air from refrigeration system.

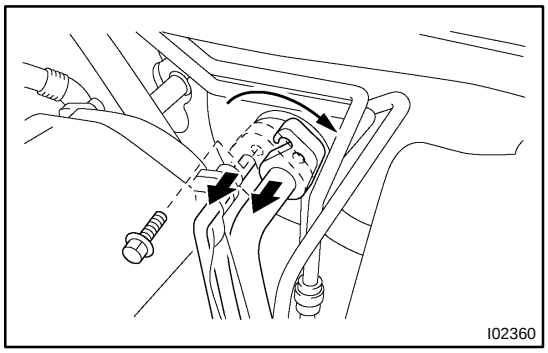
Charge system with refrigerant and inspect for leakage of refrigerant.

Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)

2. DRAIN ENGINE COOLANT FROM RADIATOR

HINT:

It is not necessary to drain out all coolant.



3. DISCONNECT LIQUID TUBE AND SUCTION HOSE FROM A/C UNIT

Remove the bolt and slide the plate, then disconnect the both tubes.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

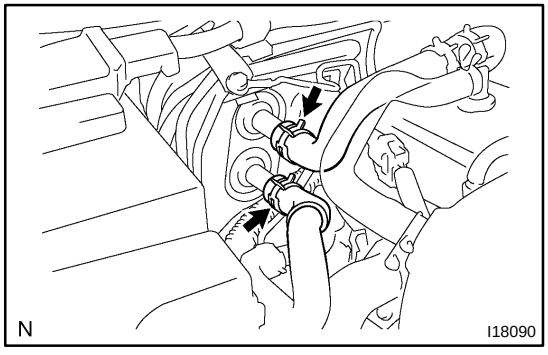
NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

HINT:

At the time of installation, please refer to the following item.

Lubricate 2 new O-rings with compressor oil and install them to the tubes.

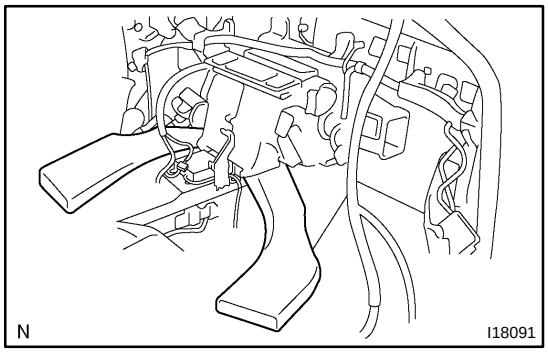


4. DISCONNECT WATER HOSES FROM HEATER RADIATOR PIPES

(a) Grip the claws of the hose clip and slide the hose clip along the hose.

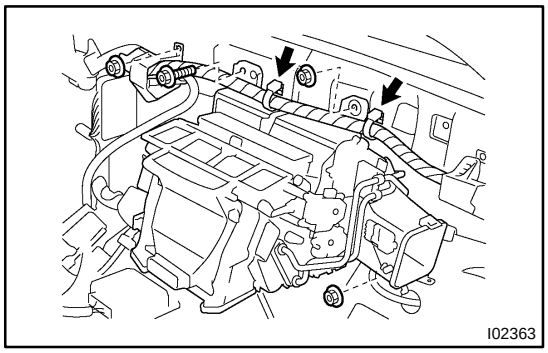
(b) Disconnect the water hose.

5. **REMOVE COOLER NO. 1 GROMMET**
6. **REMOVE HEATER PIPE GROMMET**
7. **REMOVE DRAIN HOSE GROMMET**
8. **REMOVE INSTRUMENT PANEL AND REINFORCEMENT (See page BO-139)**
9. **REMOVE BLOWER UNIT (See page AC-34)**



10. REMOVE 2 AIR DUCTS

(a) Slide the floor carpet backward.
(b) Remove the air ducts LH, RH.



11. REMOVE A/C UNIT

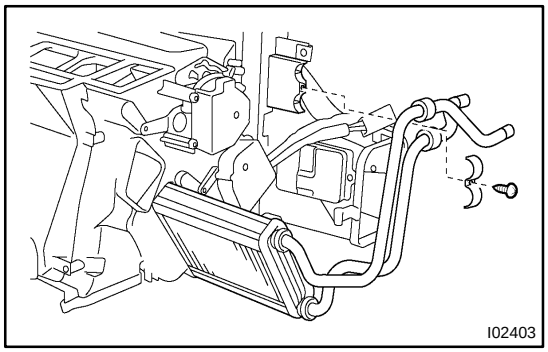
(a) Disconnect the connectors.
(b) Disconnect the wire harness clamps.
(c) Remove the 2 nuts, 2 bolt and A/C unit.

AC37W-01

DISASSEMBLY

1. REMOVE WIRE HARNESS

2. REMOVE DRAIN HOSE



3. REMOVE HEATER RADIATOR

(a) Remove the screw and clamp.

(b) Pull out the heater radiator.

4. REMOVE BLOWER MOTOR CONTROL RELAY

Remove the screw and blower motor control relay.

5. REMOVE AIR MIX SERVOMOTOR

Remove the 3 screws and servomotor.

6. REMOVE AIR OUTLET SERVOMOTOR

Remove the 2 screws and servomotor.

7. REMOVE EXPANSION VALVE

(a) Pry out the packing.

HINT:

At the time of reassembly, please refer to the following item.

Do not reuse the packing.

(b) Using SST, remove the 2 bolts, then separate the expansion valve, and tube connector.

SST 07110-61050

Torque: 4.1 N·m (42 kgf·cm, 36 in.·lbf)

HINT:

At the time of reassembly, please refer to the following item.

Lubricate 4 new O-rings with compressor oil and install them to the valve.

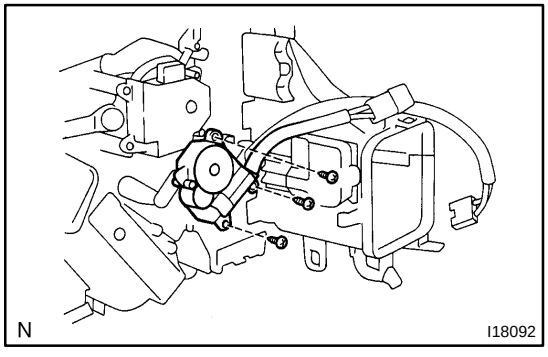
8. REMOVE EVAPORATOR TEMPERATURE SENSOR

(a) Using a screwdriver, pull out the sensor with bracket plate.

HINT:

Tape the screwdriver tip before use.

(b) Release the 2 claws and sensor from bracket plate.

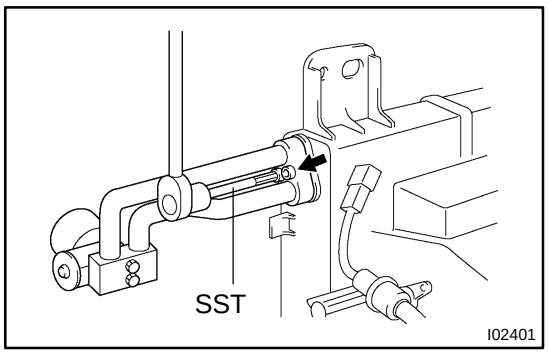


9. REMOVE EVAPORATOR

(a) Remove air mix servomotor.

(1) Disconnect the connector.

(2) Remove the 3 screws and servomotor.



(b) Remove tube and accessory.

(1) Pry out packing.

HINT:

At the time of installation, please refer to the following item.

Do not reuse the packing.

(2) Using SST, remove the 2 bolts and the tube and accessory.

SST 07110-61050

Torque: 4.1 N·m (42 kgf·cm, 36 in.·lbf)

NOTICE:

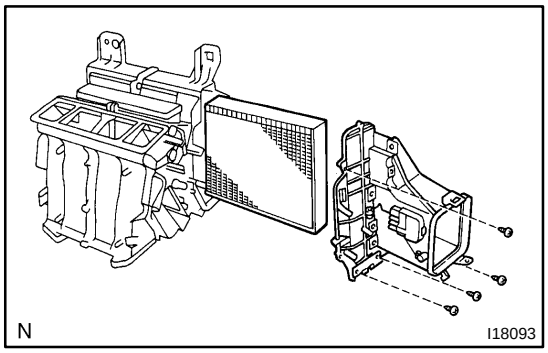
Cap the open fittings immediately to keep moisture or dirt out of the system.

HINT:

At the time of installation, please refer to the following item.

Lubricate 2 new O-rings with compressor oil and install them to the tube.

(3) Remove screw and drain pipe.



(c) Remove evaporator.

(1) Remove the screw and drain hose.

(2) Remove the 4 screws and cover.

(3) Pull out the evaporator.

HINT:

At the time of installation, please refer to the following item.

If evaporator is replaced, add compressor oil to evaporator.

Add 40 cc (1.4 fl.oz.)

Compressor oil: ND-OIL 8 or equivalent

10. REMOVE INSULATOR FROM HEATER CASE

11. REMOVE AIR DUCT

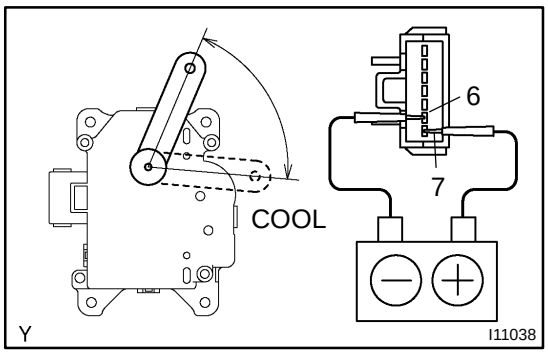
AC25N-02

INSPECTION

1. INSPECT AIR MIX SERVOMOTOR

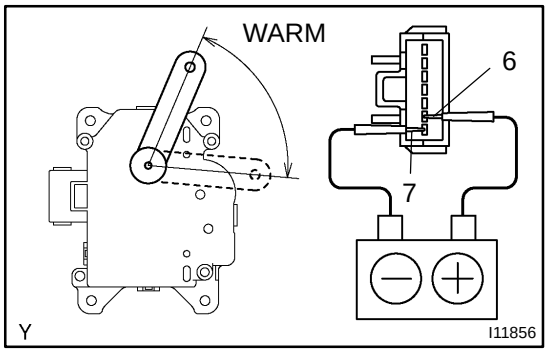
(a) Inspect the air mix servomotor operation.

(1) Connect the positive (+) lead from the battery to terminal 7 and negative (-) lead to terminal 6, then check that the arm turns to "COOL" side smoothly.



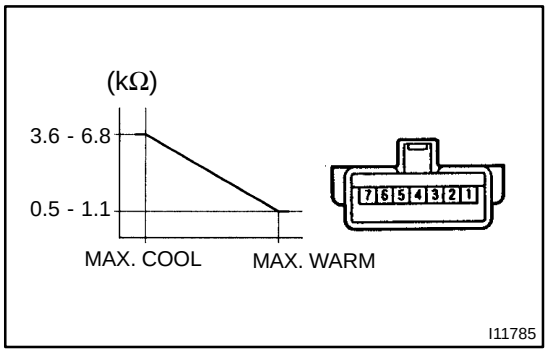
(2) Connect the positive (+) lead from the battery to terminal 6 and negative (-) lead to terminal 7, then check that the arm turns to "WARM" side smoothly.

If operations are not as specified, replace the servomotor.



(b) Inspect position sensor resistance.

Measure resistance between terminals at servomotor arm each position as shown in the chart.



Tester connection	Condition	Specified condition
1 - 3	Constant	4.2 - 7.8 kΩ
1 - 5	Max. cool	3.6 - 6.8 kΩ
1 - 5	Max. warm	0.5 - 1.1 kΩ

If resistance is not as specified, replace the servomotor.

2. INSPECT EVAPORATOR

(a) Check evaporator fins for blockage.

If the fins are clogged, clean them with compressed air.

NOTICE:

Never use water to clean the evaporator.

(b) Check fitting for cracks or scratches.

If necessary, repair or replace.

3. INSPECT HEATER RADIATOR

Inspect fins for blockage.

If the fins are clogged, clean them with compressed air.

AC15Y-02

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC-28).

AC15Z-02

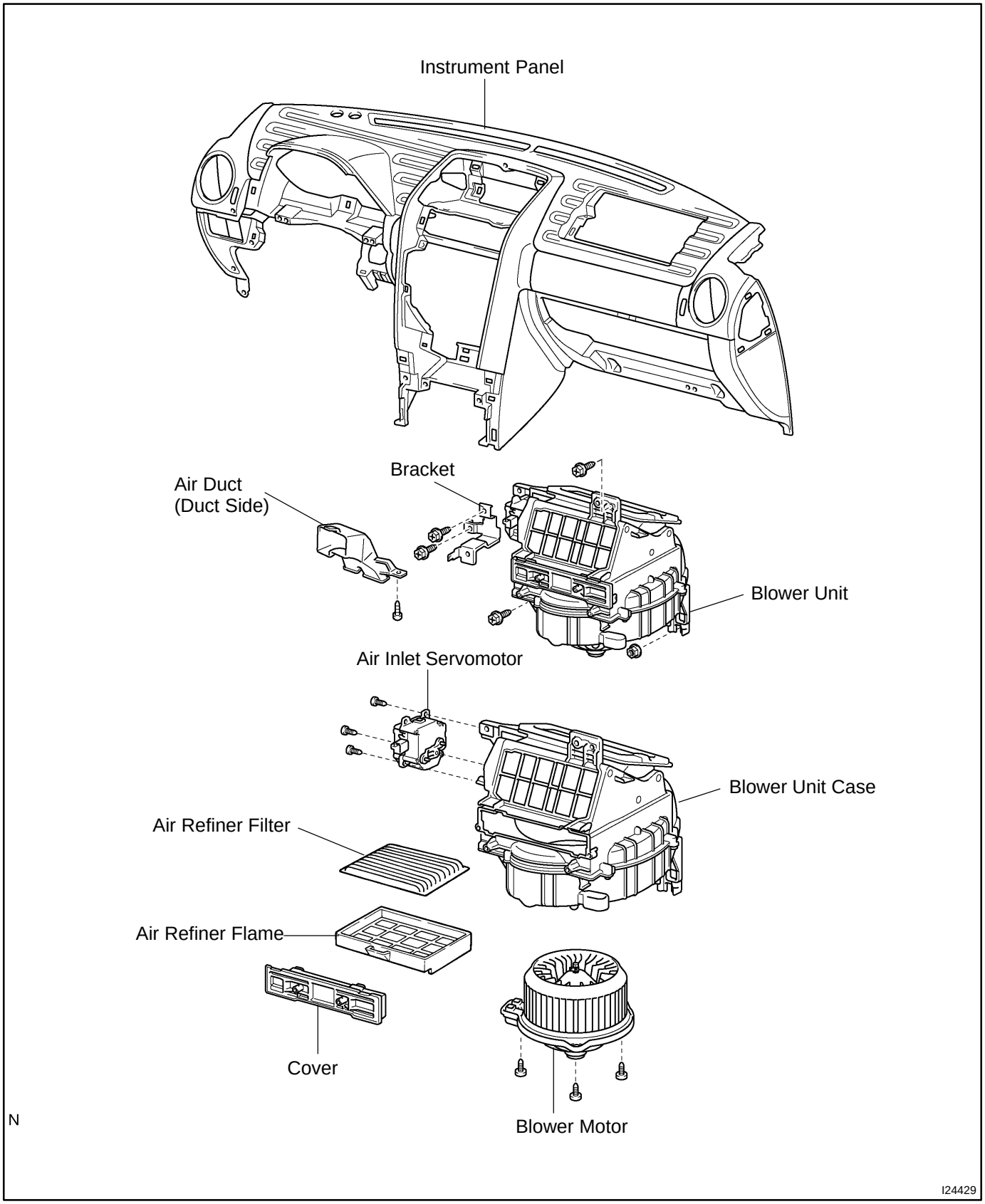
INSTALLATION

Installation is in the reverse order of removal (See page AC-26).

BLOWER UNIT

COMPONENTS

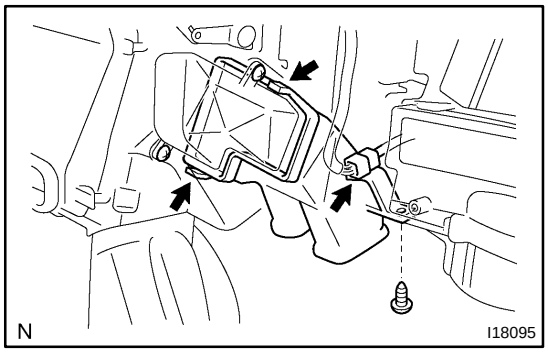
AC160-05



AC25O-03

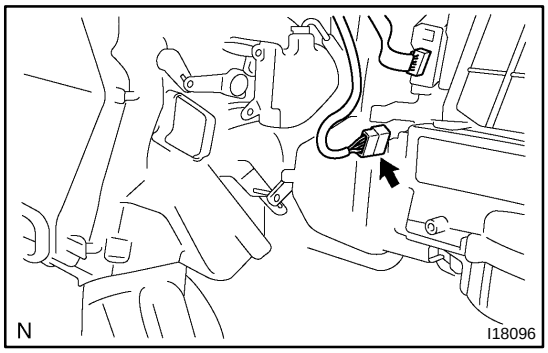
REMOVAL

1. REMOVE INSTRUMENT PANEL (See page BO-139)



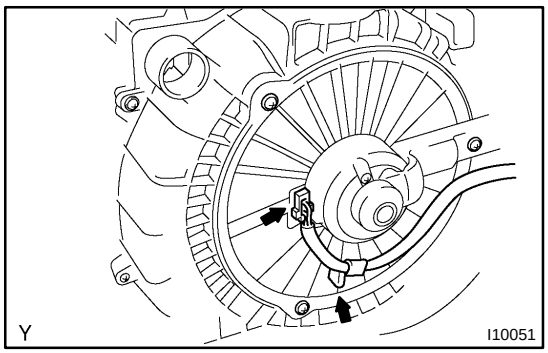
2. REMOVE AIR DUCT (DUCT SIDE)

(a) Disconnect the connector and connector clamp.
(b) Remove the screw.
(c) Release the 2 claws and pull out the air duct.

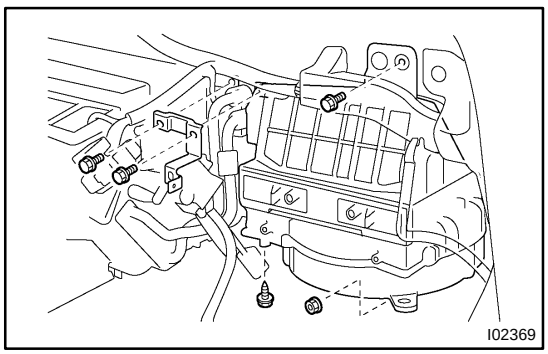


3. DISCONNECT WIRE HARNESS

(a) Disconnect the connector and connector clamp.



(b) Remove the wire harness clamp and disconnect the connector.



4. REMOVE BLOWER UNIT

(a) Remove the 2 bolts and bracket.
(b) Remove the bolt, screw and nut.
(c) Release the claw and remove the blower unit.

AC162-02

DISASSEMBLY

1. REMOVE AIR REFINER FILTER

(a) Release the 4 claws and remove the cover.

(b) Pull out the air refiner filter.

2. REMOVE AIR INLET SERVOMOTOR

Remove the 3 screws and servomotor.

3. REMOVE BLOWER MOTOR

Remove the 3 screws and blower motor.

AC163-01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC-35).

AC164-01

INSTALLATION

Installation is in the reverse order of removal (See page AC-34).

COMPRESSOR AND MAGNETIC CLUTCH

AC37X-01

ON-VEHICLE INSPECTION

1. INSPECT COMPRESSOR FOR METALLIC SOUND

Check there is abnormal metallic sound from the compressor when the A/C switch is ON.

If abnormal metallic sound is heard, replace the compressor assembly.

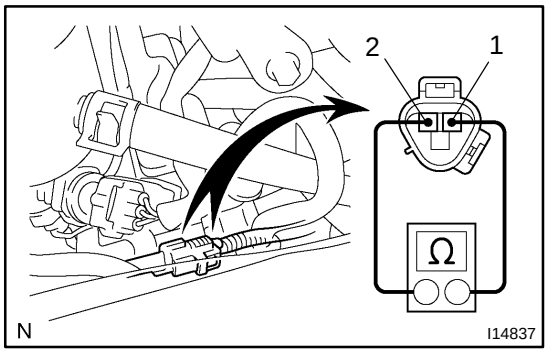
2. INSPECT REFRIGERANT PRESSURE

(See page AC-3)

3. INSPECT VISUALLY FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leakage of refrigerant.

If there is any leakage, replace the compressor assembly.



4. INSPECT COMPRESSOR LOCK SENSOR RESISTANCE

(a) Disconnect the connector.

(b) Measure resistance between terminals 1 and 2.

Standard resistance: 990 - 1,210 Ω at 20˚C (68 ˚F)

If resistance is not as specified, replace the compressor.

5. MAKE THESE VISUAL CHECKS:

(a) Leakage of grease from the clutch bearing.

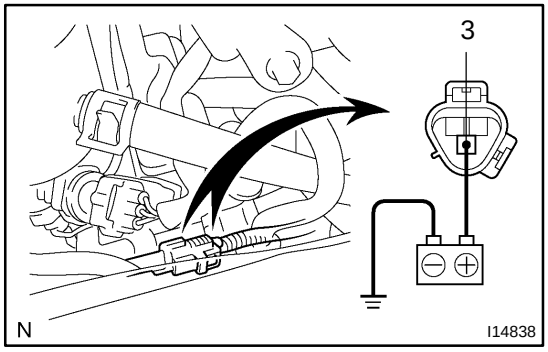
(b) Signs of oil on the pressure plate or rotor.

6. INSPECT MAGNETIC CLUTCH BEARING FOR NOISE

(a) Start engine.

(b) Check for abnormal noise from the compressor when the A/C switch is OFF.

If abnormal noise is being emitted, replace the rotor of magnetic clutch.



7. INSPECT MAGNETIC CLUTCH OPERATION

(a) Disconnect the connector.

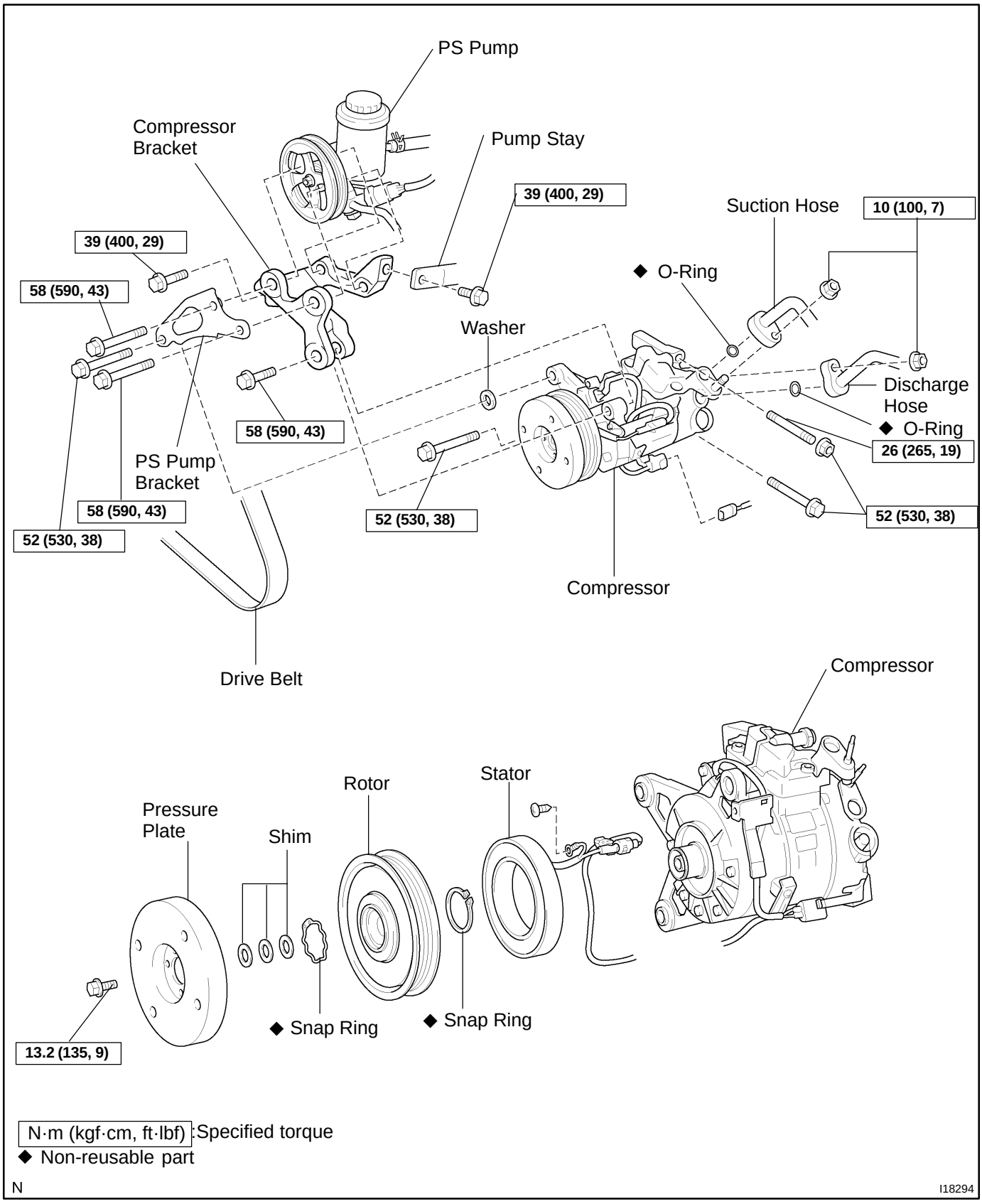
(b) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to the body ground.

(c) Check that the magnetic clutch is energized.

If operation is not as specified, replace the magnetic clutch.

AC0YY-05

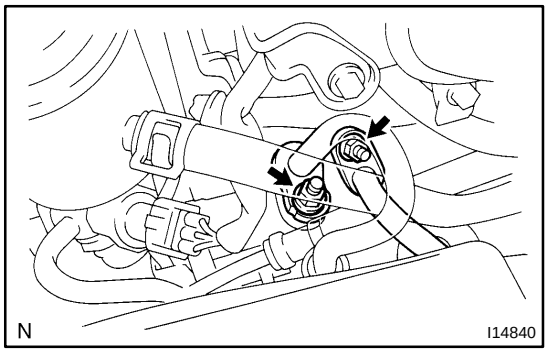
COMPONENTS



AC37Y-01

REMOVAL

1. **RUN ENGINE AT IDLE SPEED WITH A/C ON FOR APPROX. 10 MINUTES**
2. **STOP ENGINE**
3. **DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY**
4. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM**
5. **REMOVE DRIVE BELT (See page AC-17)**

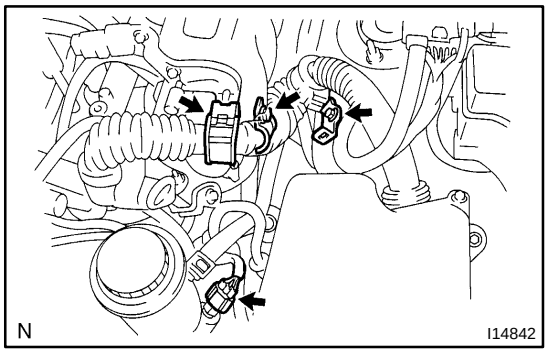


6. **DISCONNECT DISCHARGE AND SUCTION HOSES**

Remove the 2 nuts and disconnect the both hoses.

NOTICE:

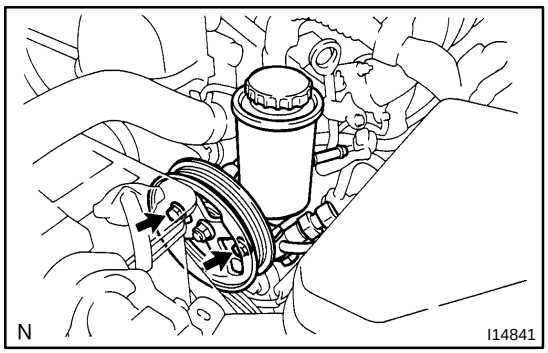
Cap the open fitting immediately to keep moisture or dirt out of the system.



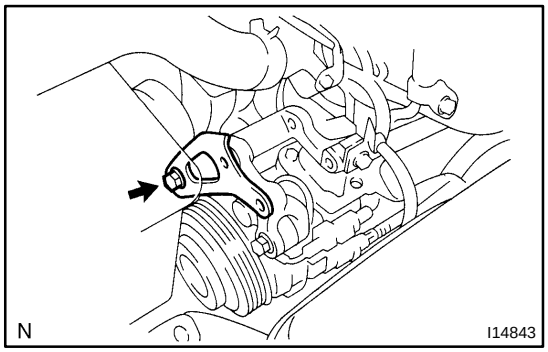
7. **REMOVE PS PUMP WITH PRESSURE FEED AND RETURN TUBES STILL CONNECTED**

(a) Disconnect the PS pump connector and PS pump tube clamp.

(b) Disconnect the engine wire.

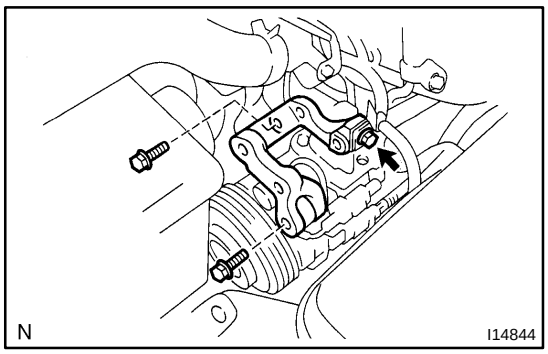


(c) Remove the 2 PS pump set bolts and slide the PS pump backward.

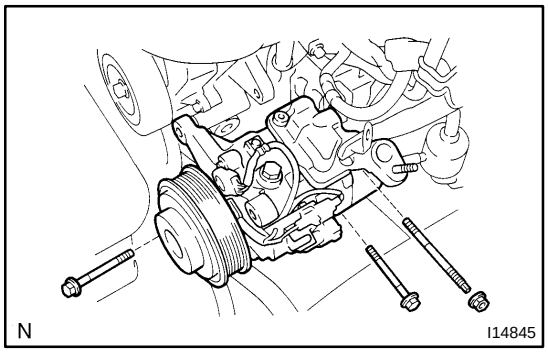


8. **REMOVE COMPRESSOR**

(a) Remove the bolt and PS pump bracket.



(b) Remove the 3 bolts and compressor bracket.
(c) Disconnect the connector.



(d) Remove the nut and 2 bolts.
(e) Using a torx socket (E10), remove the stud bolt and compressor.

AC37Z-01

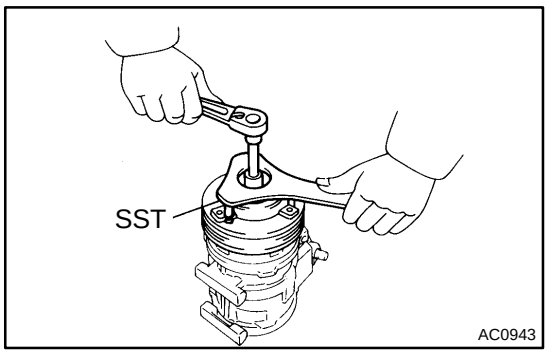
DISASSEMBLY

DISASSEMBLE MAGNETIC CLUTCH

(a) Remove the pressure plate.

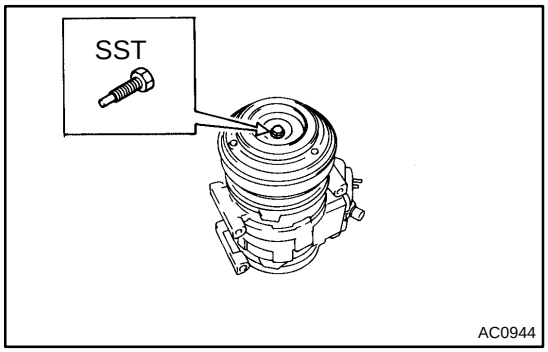
(1) Using SST and a socket wrench, remove the shaft bolt.

SST 07112-76060



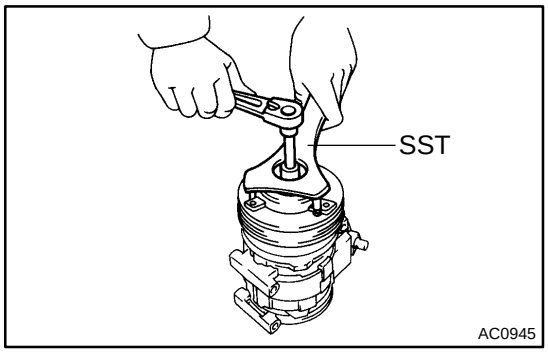
(2) Install SST on the pressure plate.

SST 07112-66040

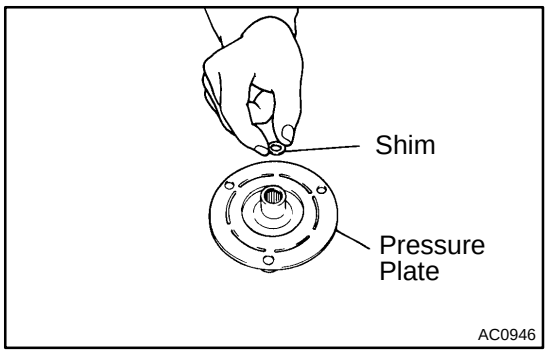


(3) Using SST and a socket wrench, remove the pressure plate.

SST 07112-66040, 07112-76060

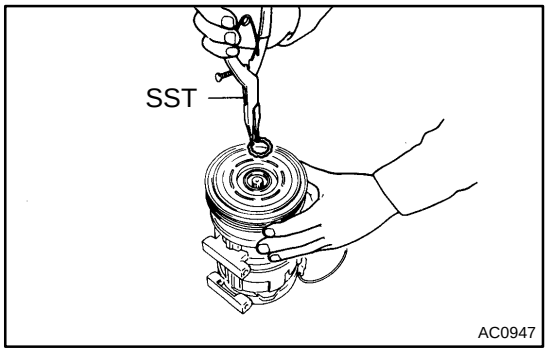


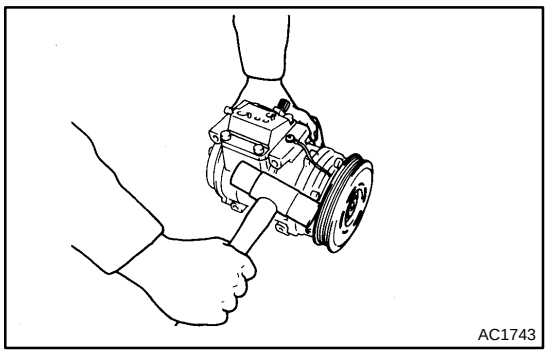
(4) Remove the shims from the pressure plate.



(b) Remove the rotor.

(1) Remove the snap ring.

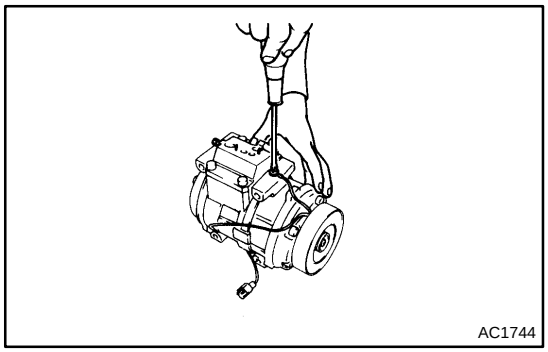




(2) Using a plastic hammer, tap the rotor off the shaft.

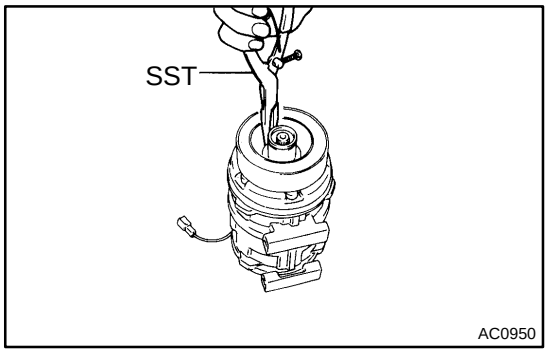
NOTICE:

Be careful not to damage the pulley when tapping on the rotor.

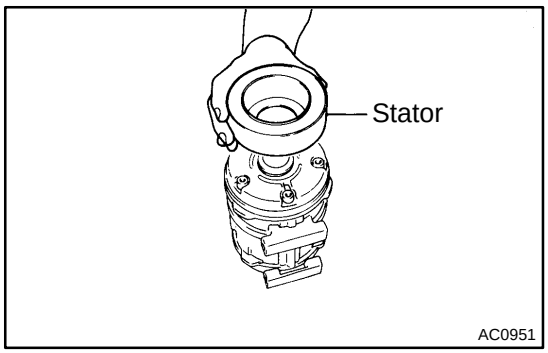


(c) Remove the stator.

(1) Disconnect the stator lead wire from the compressor.



(2) Remove the snap ring.



(3) Remove the stator.

AC380-01

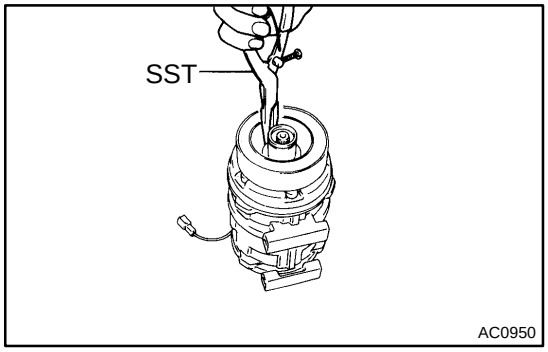
REASSEMBLY

1. ASSEMBLE MAGNETIC CLUTCH

(a) Install the stator.

(1) Install the stator on compressor.

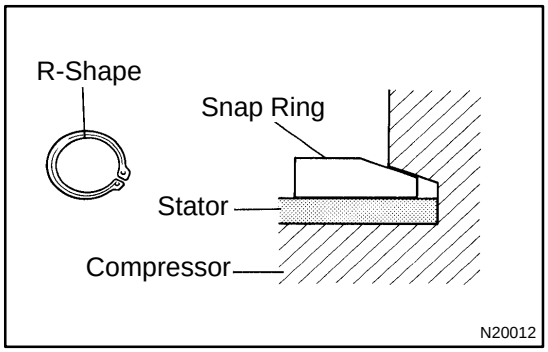
(2) Install the new snap ring.



NOTICE:

The snap ring should be installed so that its beveled side faces up.

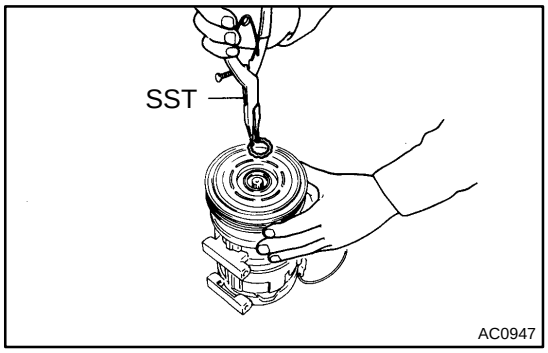
(3) Connect the stator lead wire to the compressor.



(b) Install the rotor.

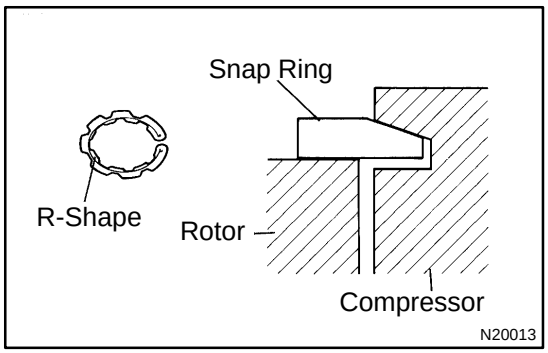
(1) Install the rotor on the compressor.

(2) Install the new snap ring.



NOTICE:

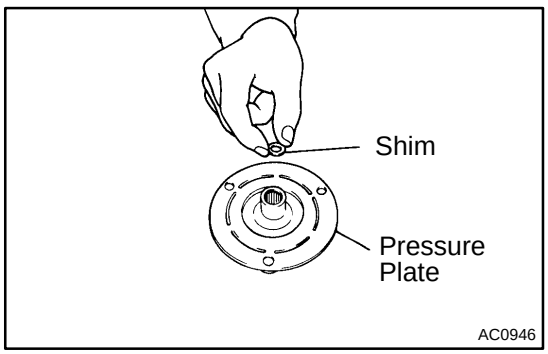
The snap ring should be installed so that its beveled side faces up.

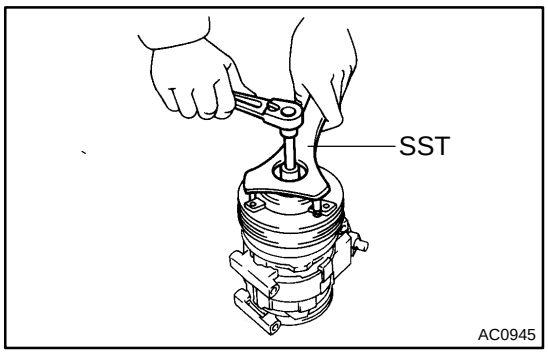


(c) Install the pressure plate.

(1) Install the shims to the pressure plate.

(2) Install the pressure plate on the rotor.

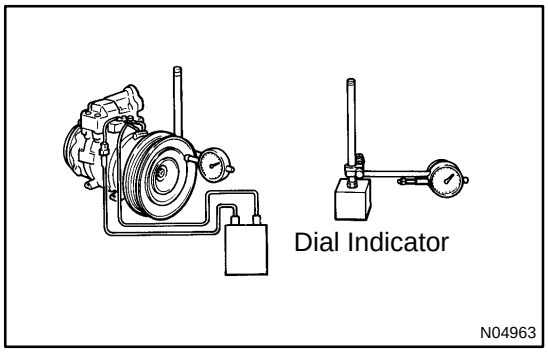




(3) Using SST and a torque wrench, install the shaft bolt.

Torque: 13.2 N·m (135 kgf·cm, 9 ft·lbf)

SST 07112-76060



2. AFTER REASSEMBLY, CHECK MAGNETIC CLUTCH CLEARANCE

(a) Set the dial indicator to the pressure plate of the magnetic clutch.

(b) Connect the magnetic clutch lead wire to the positive (+) terminal of the battery.

(c) Check the clearance between the pressure plate and rotor when connecting the negative (-) terminal to the battery.

Standard clearance:

0.5 ± 0.15 mm (0.020 ± 0.0059 in.)

If the clearance is not within the standard clearance, adjust the clearance using shims to obtain the standard clearance.

Shim thickness:

0.1 mm (0.004 in.)

0.3 mm (0.012 in.)

0.5 mm (0.020in.)

AC381-01

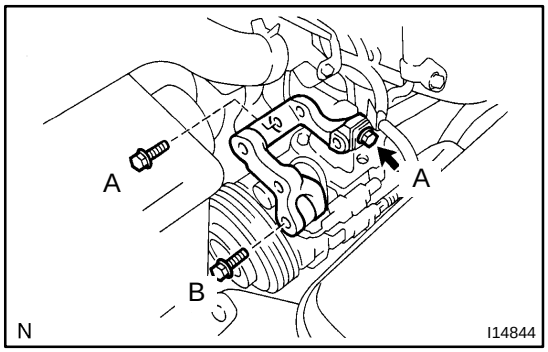
INSTALLATION

1. INSTALL COMPRESSOR

(a) Install the compressor with the stud bolt.
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

(b) Install the 2 bolts and nut.
Torque:
Bolt: 52 N·m (530 kgf·cm, 38 ft·lbf)
Nut: 52 N·m (530 kgf·cm, 38 ft·lbf)

(c) Connect the connector.



(d) Install the compressor bracket with the 3 bolts.
Torque:
bolt A: 39 N·m (400 kgf·cm, 29 ft·lbf)
bolt B: 52 N·m (530 kgf·cm, 38 ft·lbf)

(e) Install the PS pump bracket with the bolt.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

2. INSTALL PS PUMP

(a) Install 2 PS pump set bolt.
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)

(b) Connect the engine wire.

(c) Connect the PS pump connector and wire harness clamp.

3. CONNECT DISCHARGE AND SUCTION HOSES

Connect the both hoses with 2 nut.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

NOTICE:
Hose should be connected immediately after the caps have been removed.

HINT:
Lubricate 2 new O-rings with compressor oil and install them to the hoses.

4. INSTALL DRIVE BELT (See page AC-18)

5. INSPECT DRIVE BELT TENSION (See page AC-16)

6. CONNECT NEGATIVE (-) TERMINAL CABLE TO BATTERY

7. EVACUATE AIR FROM REFRIGERATION SYSTEM AND CHARGE SYSTEM WITH REFRIGERANT
Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)

8. INSPECT FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leakage of refrigerant.
If there is leakage, check the tightening torque at the joints.

9. INSPECT A/C OPERATION

CONDENSER

AC16B-01

ON-VEHICLE INSPECTION

1. INSPECT CONDENSER FINS FOR BLOCKAGE OR DAMAGE

If the fins are clogged, wash them with water and dry with compressed air.

NOTICE:

Be careful not to damage the fins.

If the fins are bent, straighten them with a screwdriver or pliers.

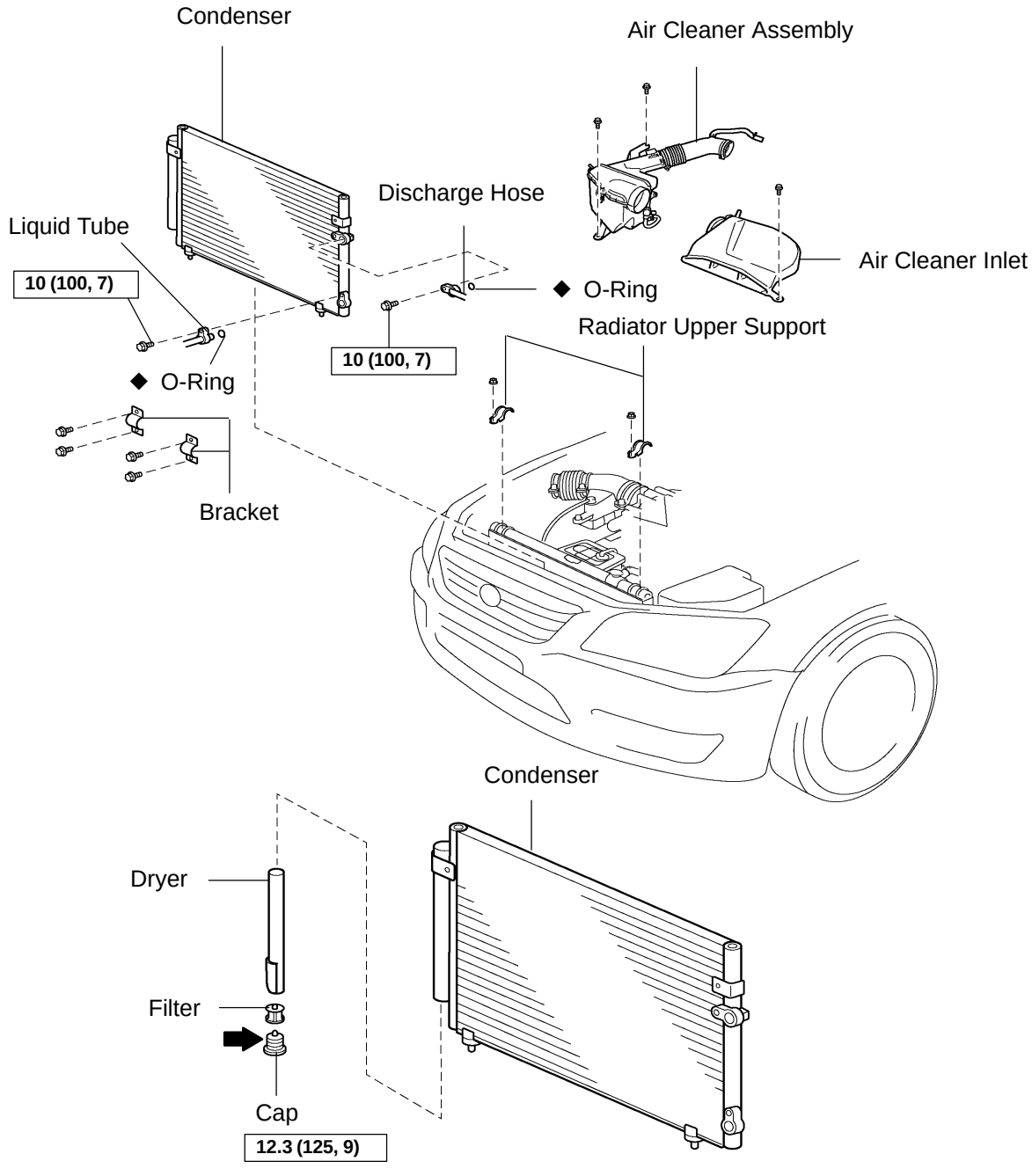
2. INSPECT CONDENSER AND FITTINGS FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leakage of refrigerant.

If there is leakage, check the tightening torque at the joints.

AC25R-03

COMPONENTS



N N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

⬅ Compressor oil ND-OIL 8 or equivalent

I18097

AC382-01

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of installation, please refer to the following item.

Evacuate air from refrigeration system.

Charge system with refrigerant and inspect for leakage of refrigerant.

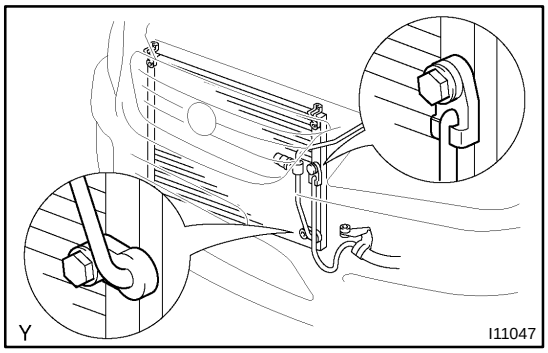
Specified amount : 600 ± 50 g (21.16 ± 1.76 oz.)

2. REMOVE AIR CLEANER DUCT AND AIR CLEANER ASSEMBLY

3. REMOVE ECU OUTLET DUCT

4. REMOVE 2 RADIATOR UPPER SUPPORTS

Remove the 2 bolts and upper supports.



5. DISCONNECT DISCHARGE HOSE AND LIQUID TUBE

Remove the 2 bolts and disconnect the hose and tube.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

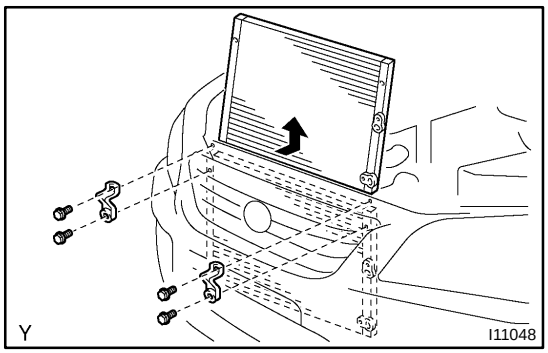
NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

HINT:

At the time of installation, please refer to the following item.

Lubricate 2 new O-rings with compressor oil and install them to the hose and tube.



6. REMOVE CONDENSER

(a) Remove the 4 bolts and 2 brackets.

(b) Push the radiator toward engine.

(c) Push the condenser toward radiator and pull it upward.

HINT:

At the time of installation, please refer to the following item.

If condenser is replaced, add compressor oil to the condenser.

Add 40 cc (1.4 fl. oz)

Compressor oil: ND - OIL 8 or equivalent

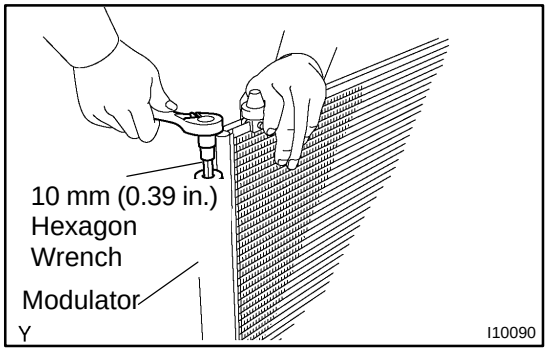
AC22C-07

REPLACEMENT

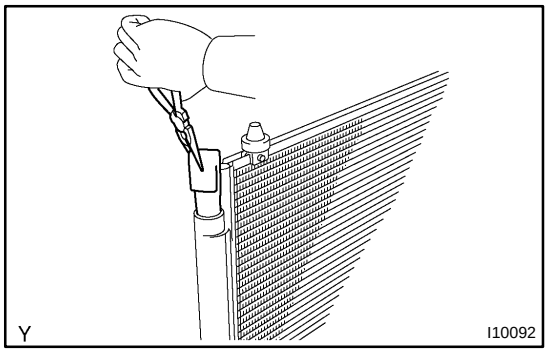
REPLACE DRYER FROM MODULATOR

(a) Using a hexagon wrench (10 mm, 0.39 in.), remove the cap from the modulator.

(b) Remove the filter from the modulator.



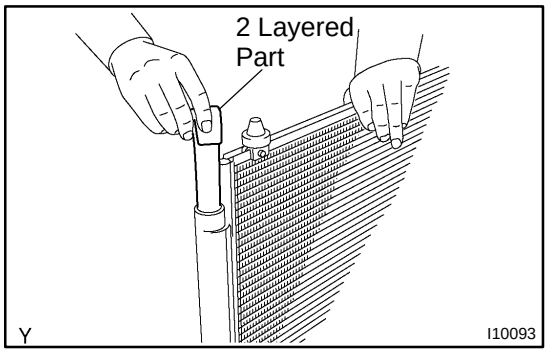
(c) Using pliers, remove the dryer.



(d) Insert a new dryer into the modulator.

NOTICE:

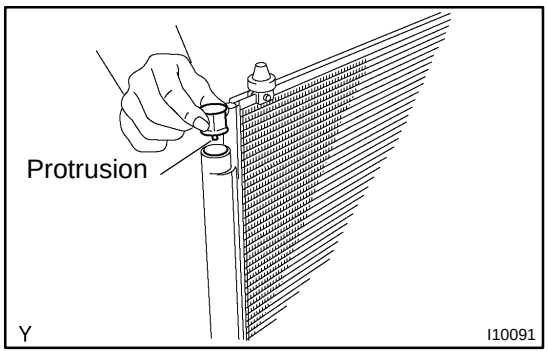
- **Do not remove the dryer from a vinyl bag until inserting it into the modulator.**
- **Install the dryer with its 2 layered part faced upward to the modulator.**



(e) Insert the filter into the modulator.

NOTICE:

Install the filter with its protrusion faced downward to the modulator.



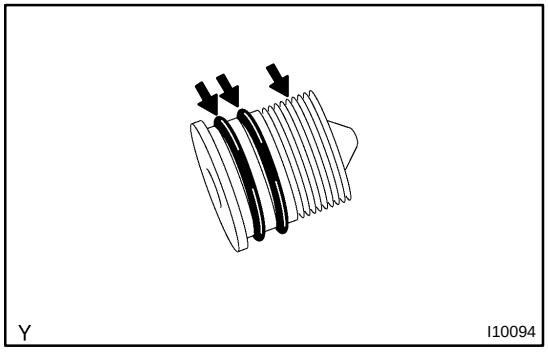
(f) Install the cap to the modulator.

(1) Apply compressor oil to the O-rings and screw part of the cap.

Compressor oil: ND-OIL 8 or equivalent

(2) Using a hexagon wrench (10 mm, 0.39 in.), install the caps.

Torque: 12.3 N·m (125 kgf·cm, 9 ft·lbf)



AC16D-01

INSTALLATION

Installation is in the reverse order of removal (See page AC-49).

EXPANSION VALVE

AC16K-03

ON-VEHICLE INSPECTION

1. CHECK QUANTITY OF GAS DURING REFRIGERATION CYCLE

2. SET ON MANIFOLD GAUGE SET (See page AC-19)

3. RUN ENGINE

Run the engine at 1,500 rpm for at least 5 minutes.

Then check that the high pressure reading is 1.37 - 1.57 MPa (14 - 16 kgf/cm^2, 199 -228 psi).

4. CHECK EXPANSION VALVE

If the expansion valve is faulty, the low pressure reading will drop to 0 kPa (0 kgf/cm^2, 0 psi).

AC383-01

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of installation, please refer to the following item.

Evacuate air from refrigeration system.

Charge system with refrigerant and inspect for leakage of refrigerant.

Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)

2. REMOVE INSTRUMENT PANEL (See page BO-139)

3. REMOVE EXPANSION VALVE

(a) Pry out the packings.

HINT:

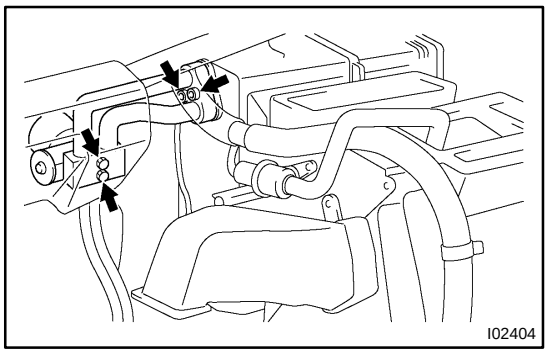
At the time of installation, please refer to the following item.

Do not reuse the packing.

(b) Using SST, remove the 4 bolts and separate the expansion valve and tube and accessory.

SST 07110-61050

Torque: 4.1 N·m (42 kgf·cm, 36 in.·lbf)



NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

HINT:

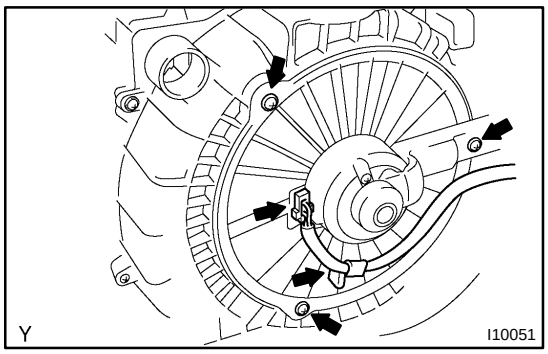
At the time of installation, please refer to the following item.

Lubricate 6 new O-rings with compressor oil and install them to the tube and valve.

AC16M-01

INSTALLATION

Installation is in the reverse order of removal (See page AC-53).



BLOWER MOTOR

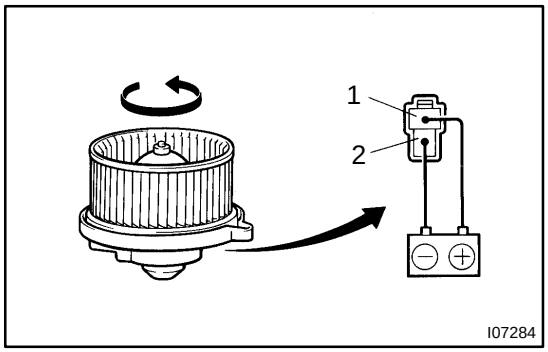
AC20I-03

INSPECTION

1. REMOVE BLOWER MOTOR

(a) Remove the wire harness clamp and disconnect the connector.

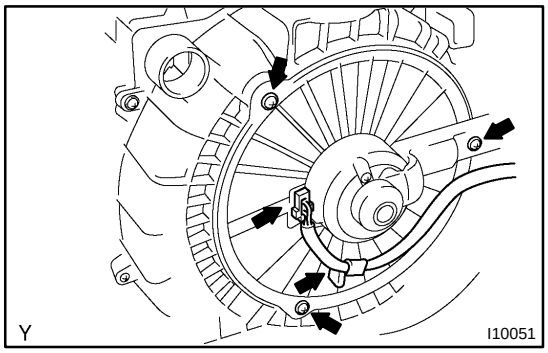
(b) Remove the 3 screws and blower motor.



2. INSPECT BLOWER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 2 and negative (-) lead to terminal 1, then check that the motor operations smoothly.

If operation is not as specified, replace the blower motor.



3. INSTALL BLOWER MOTOR

(a) Install the blower motor with the 3 screws.

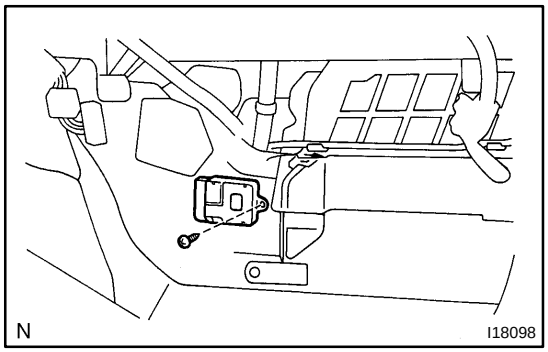
(b) Connect the connector and wire harness clamp.

BLOWER MOTOR CONTROL RELAY

AC25T-02

INSPECTION

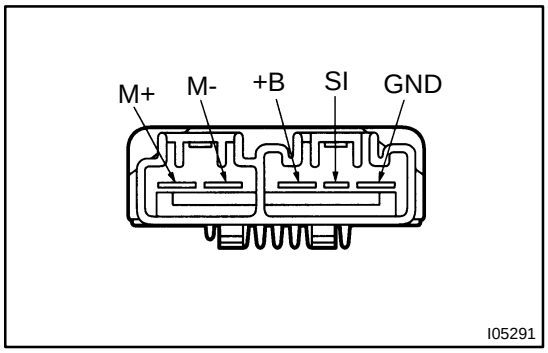
1. **REMOVE GLOVE COMPARTMENT DOOR**
   (See page BO-139)



2. **REMOVE BLOWER MOTOR CONTROL RELAY**

(a) Disconnect the connectors.

(b) Remove the screw and blower motor control relay.



3. **INSPECT BLOWER MOTOR CONTROL CIRCUIT**

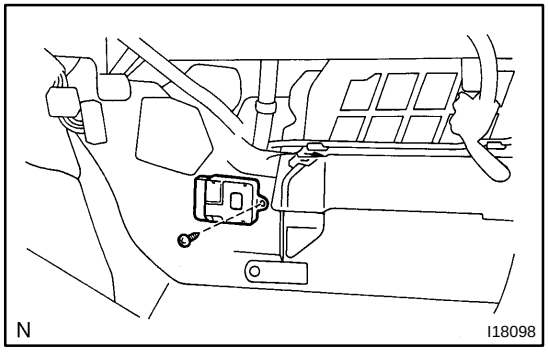
Inspect the wire harness side connector from the back side, as shown in the chart.

Test conditions:

- Turn ignition switch to ON
- Operate blower motor (High blower speed)

Terminals	Standard Value
GND ↔ Body Ground	Continuity
+B ↔ Body Ground	Battery positive voltage
+M ↔ Body Ground	Battery positive voltage
M+ ↔ M-	Battery positive voltage
SI ↔ Body Ground	1 - 3 V

If resistance is not as specified, replace the blower motor control relay.



4. **INSTALL BLOWER MOTOR CONTROL RELAY**

(a) Install the blower motor control relay with the screw.

(b) Connect the connectors.

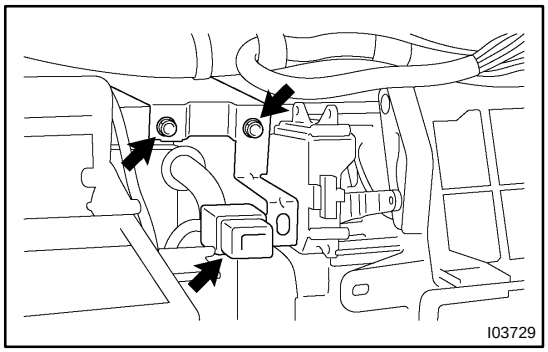
5. **INSTALL GLOVE COMPARTMENT DOOR**
   (See page BO-149)

AIR INLET SERVOMOTOR

AC384-01

INSPECTION

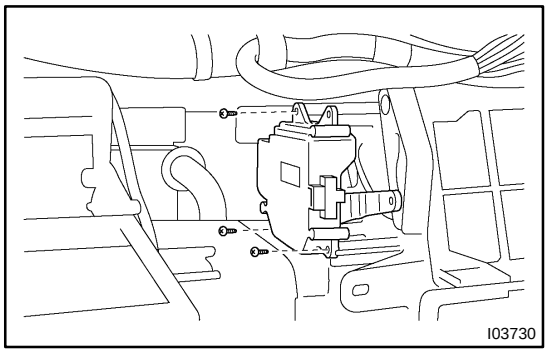
1. REMOVE GLOVE COMPARTMENT DOOR
(See page BO-139)



2. REMOVE BRACKET

(a) Disconnect the wire harness clamp.

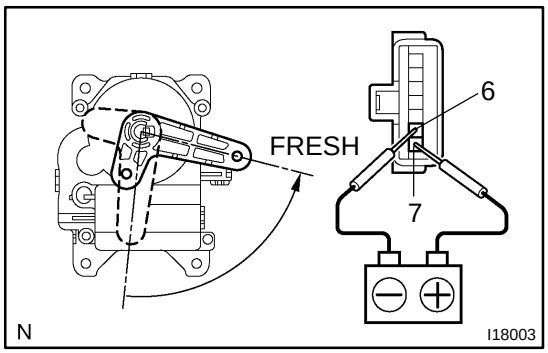
(b) Remove the 2 bolts and bracket.



3. REMOVE AIR INLET SERVOMOTOR

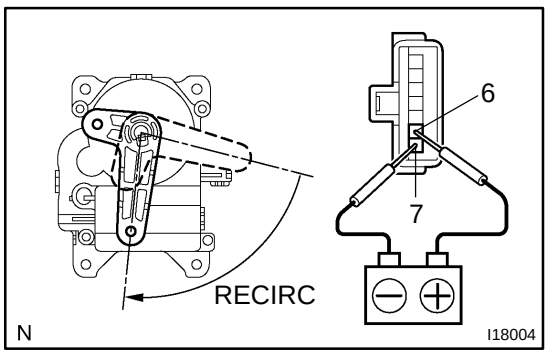
(a) Disconnect the connector.

(b) Remove the 3 screws and servomotor.



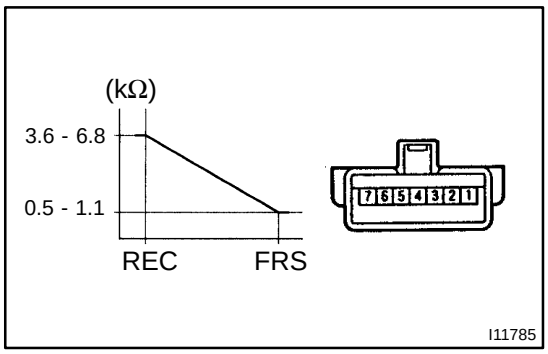
4. INSPECT AIR INLET SERVOMOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 7 and negative (-) lead to terminal 6, then check that the arm turns to ”FRESH” side smoothly.



(b) Connect the positive (+) lead from the battery to terminal 6 and negative (-) lead to terminal 7, then check that the arm turns to ”RECIRC” side smoothly.

If operations are not as specified, replace the servomotor.

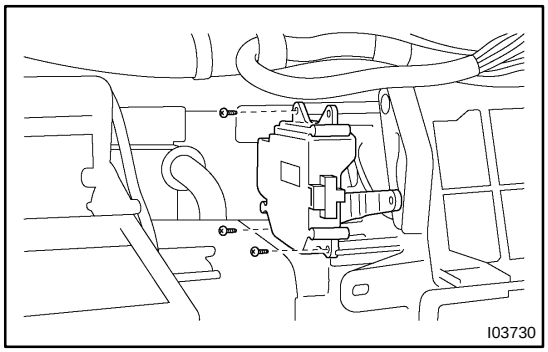


5. INSPECT POSITION SENSOR RESISTANCE

Measure resistance between terminals at servomotor arm each position as shown in the chart.

Tester connection	Condition	Specified condition
1 - 3	Constant	4.2 - 7.8 kΩ
3 - 5	REC	3.1 - 5.8 kΩ
3 - 5	FRS	0.8 - 1.6 kΩ

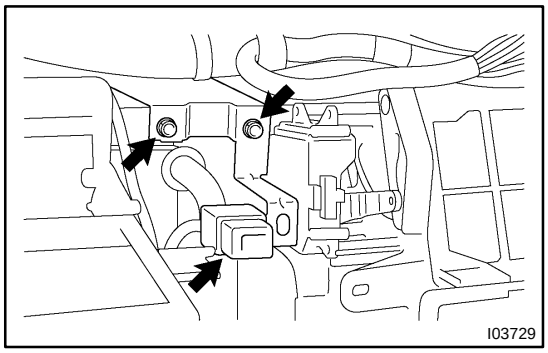
If resistance is not as specified, replace the servomotor.



6. INSTALL AIR INLET SERVOMOTOR

(a) Install the servomotor with the 3 screws.

(b) Connect the connector.



7. INSTALL BRACKET

(a) Install the bracket with 2 bolts.

(b) Connect the wire harness clamp.

8. INSTALL GLOVE COMPARTMENT DOOR

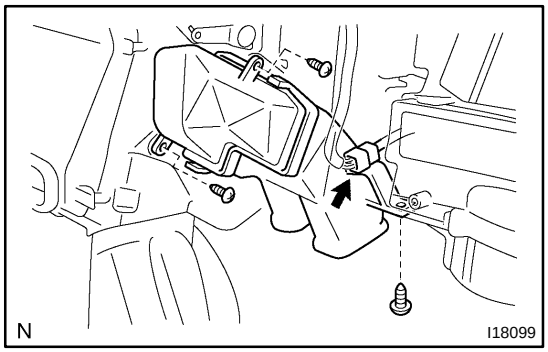
(See page BO-149)

AIR OUTLET SERVOMOTOR

AC25W-02

INSPECTION

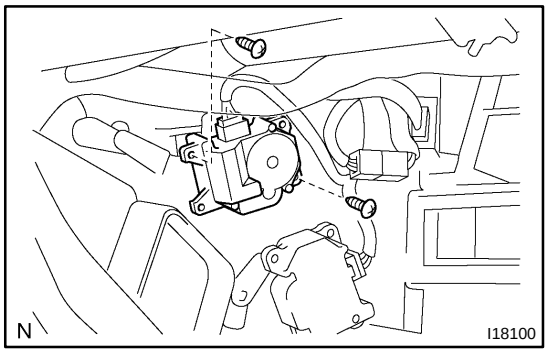
1. REMOVE INSTRUMENT PANEL (See page BO-139)



2. REMOVE AIR DUCT

(a) Disconnect the connector clamp.

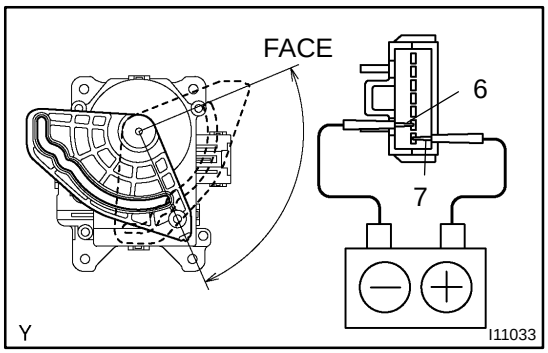
(b) Remove the 3 screws and air duct.



3. REMOVE AIR OUTLET SERVOMOTOR

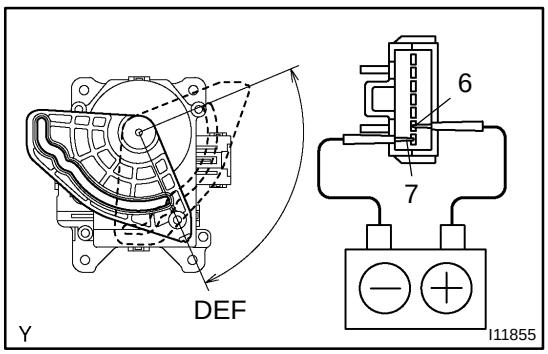
(a) Disconnect the connector.

(b) Remove the 2 screws and servomotor.



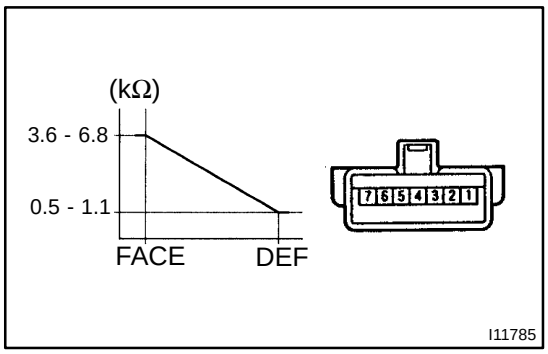
4. INSPECT AIR OUTLET SERVOMOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 7 and negative (-) lead to terminal 6, then check that the arm turns to ”FACE” side smoothly.



(b) Connect the positive (+) lead from the battery to terminal 6 and negative (-) lead to terminal 7, then check that the arm turns to ”DEF” side smoothly.

If operations are not as specified, replace the servomotor.

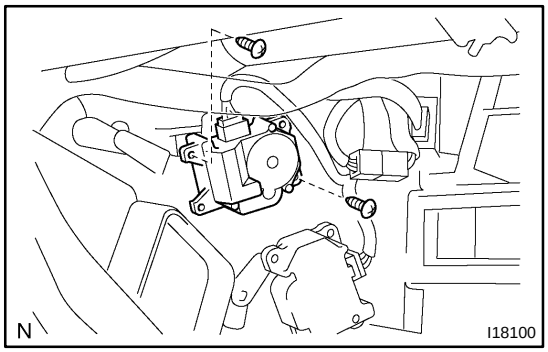


5. INSPECT POSITION SENSOR RESISTANCE

Measure resistance between terminals at servomotor arm each position as shown in the chart.

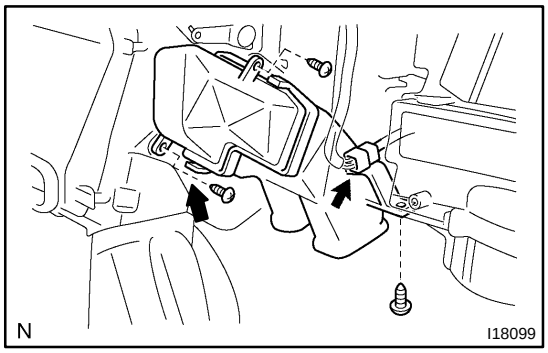
Tester connection	Condition	Specified condition
1 - 3	Constant	4.2 - 7.8 kΩ
3 - 5	FACE	3.6 - 6.8 kΩ
3 - 5	DEF	0.5 - 1.1 kΩ

If resistance is not as specified, replace the servomotor.



6. INSTALL AIR OUTLET SERVOMOTOR

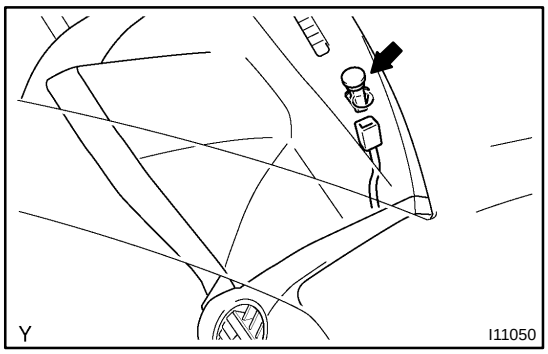
(a) Install the servomotor with the 2 screws.
(b) Connect the connector.



7. INSTALL AIR DUCT

(a) Install the air duct with the 3 screws.
(b) Connect the connector clamp.

8. INSTALL INSTRUMENT PANEL (See page BO-149)



SOLAR SENSOR

AC25X-02

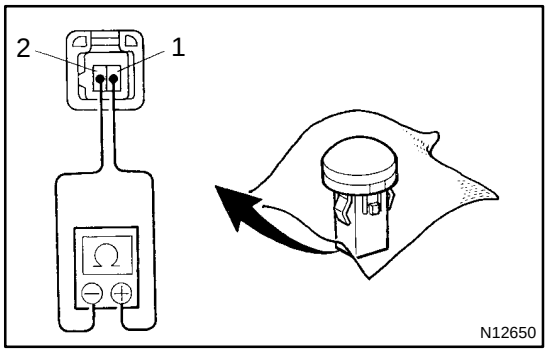
INSPECTION

1. REMOVE SOLAR SENSOR

Using a screwdriver, pull out the sensor, then disconnect the connector.

HINT:

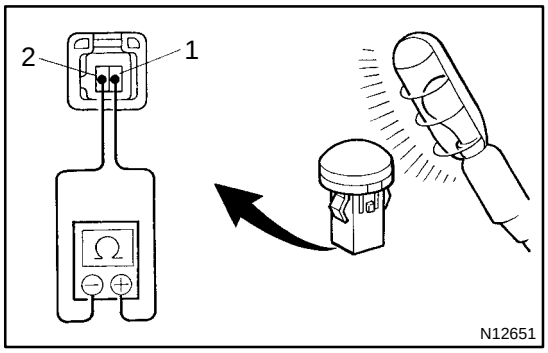
Tape the screwdriver tip before use.



2. INSPECT SOLAR SENSOR CONTINUITY

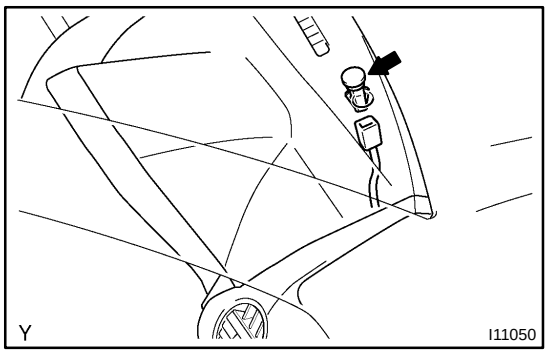
(a) Cover the sensor with a cloth, check that the no continuity exists between terminals.

If continuity exists, replace the sensor.



(b) Remove the cloth from the sensor and subject the sensor to electric light, check that continuity exists between terminals.

If no continuity exists, replace the sensor.



3. INSTALL SOLAR SENSOR

Connect the connector and install the solar sensor.

ROOM TEMPERATURE SENSOR

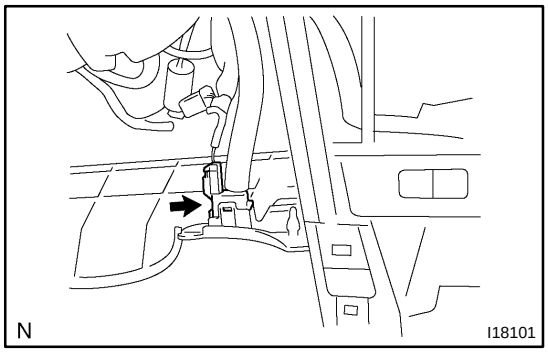
AC20Q-04

INSPECTION

1. REMOVE LOWER FINISH PANEL

(a) Remove the 3 screws.

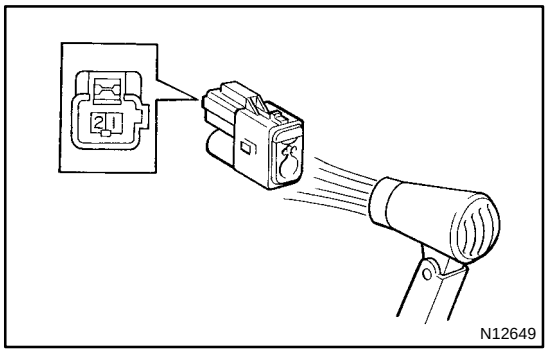
(b) Release the 3 claws and pull out the lower finish panel.



2. REMOVE ROOM TEMPERATURE SENSOR

(a) Disconnect the connector and aspirator hose.

(b) Release the 2 claws and pull out the sensor.

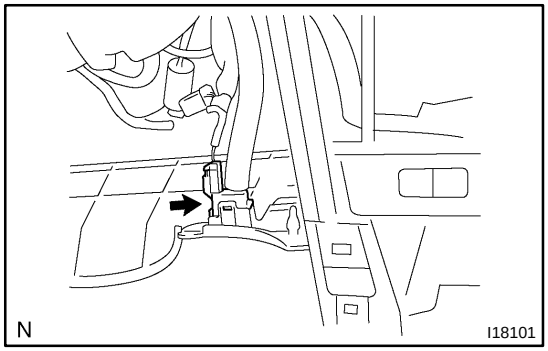


3. INSPECT ROOM TEMPERATURE SENSOR RESISTANCE

Measure resistance between terminals at each temperature as shown in the chart.

Temperature	Specified condition
25 °C (77 °F)	1.6 - 1.8 kΩ
50 °C (122 °F)	0.6 - 0.8 kΩ

If resistance is not as specified, replace the sensor.



4. INSTALL ROOM TEMPERATURE SENSOR

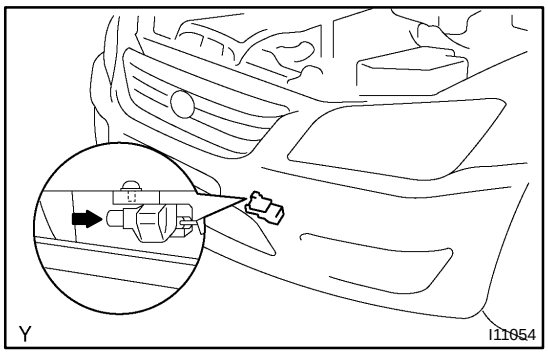
(a) Install the sensor and fit the 2 claws.

(b) Connect the aspirator hose and connector.

5. INSTALL LOWER FINISH PANEL

(a) Install the lower finish panel and fit the 3 claws.

(b) Install the 3 screws.



AMBIENT TEMPERATURE SENSOR

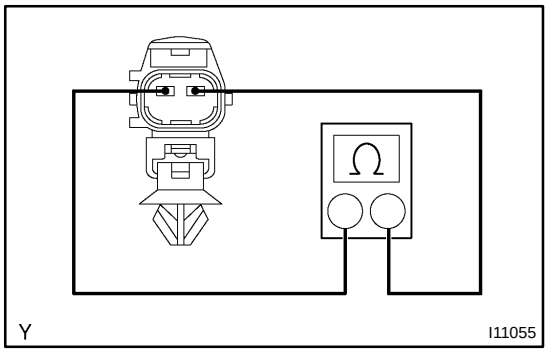
AC20R-03

INSPECTION

1. REMOVE AMBIENT TEMPERATURE SENSOR

(a) Disconnect the connector.

(b) Using a clip remover, pull out the sensor from bumper reinforcement.

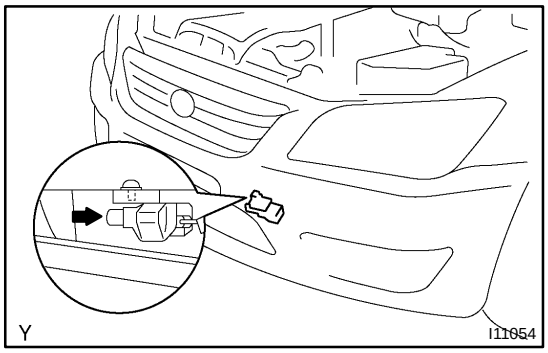


2. INSPECT AMBIENT TEMPERATURE SENSOR RESISTANCE

Measure resistance between terminals at each temperature as shown in the chart.

Temperature	Specified condition
25 °C (77 °F)	1.6 - 1.8 kΩ
50 °C (122 °F)	0.5 - 0.7 kΩ

If resistance is not as specified, replace the sensor.



3. INSTALL AMBIENT TEMPERATURE SENSOR

(a) Push the sensor in bumper reinforcement.

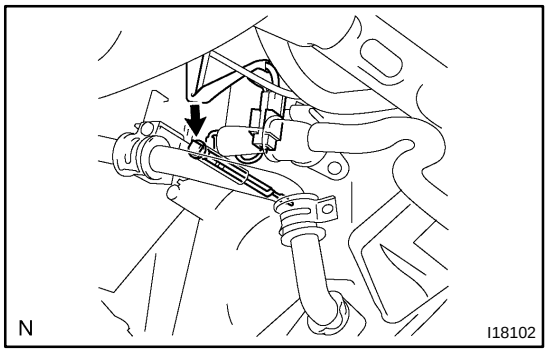
(b) Connect the connector.

EVAPORATOR TEMPERATURE SENSOR

AC25Y-02

INSPECTION

1. REMOVE LOWER FINISH PANEL (See page BO-139)



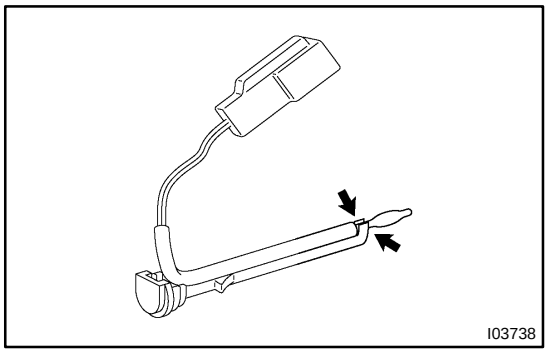
2. REMOVE EVAPORATOR TEMPERATURE SENSOR

(a) Disconnect the connector.

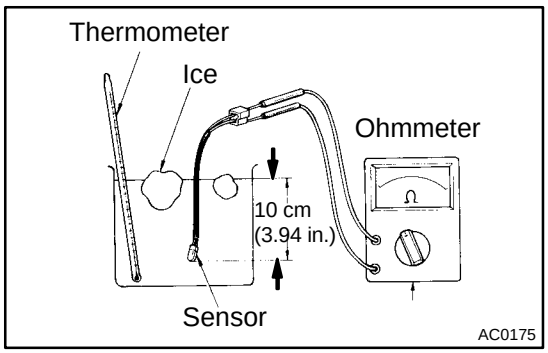
(b) Using a screwdriver, pull out the sensor with bracket plate.

HINT:

Tape the screwdriver tip before use.

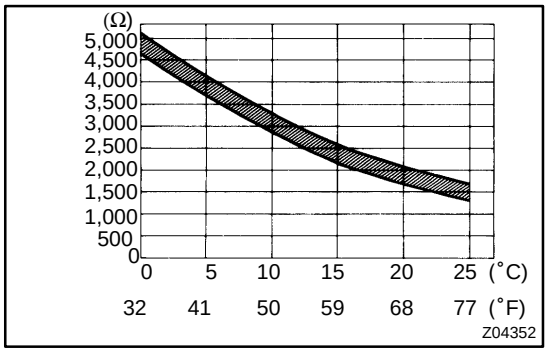


(c) Release the 2 claws and remove the sensor from bracket plate.



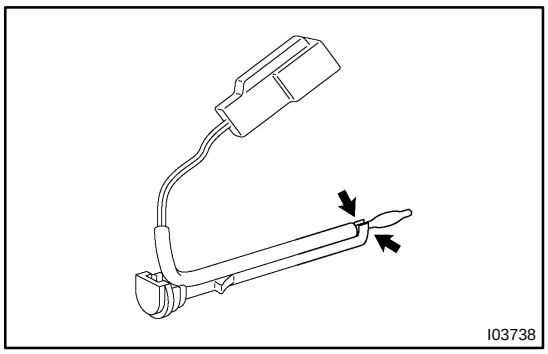
3. INSPECT EVAPORATOR TEMPERATURE SENSOR RESISTANCE

(a) Place the sensor in cold water, and while changing the temperature of the water, measure resistance at the connector and at the same time, measure temperature of the water with a thermometer.



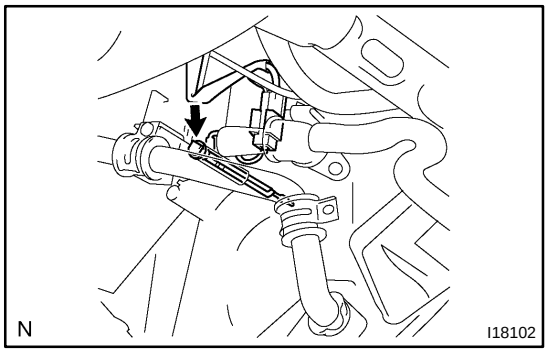
(b) Compare the 2 readings on the chart.

If resistance value is not as specified, replace the sensor.



4. INSTALL EVAPORATOR TEMPERATURE SENSOR

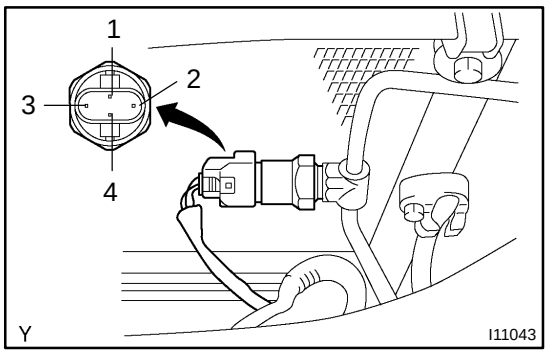
(a) Install the sensor in bracket plate and 2 claws.



(b) Push in the sensor with the bracket plate.

(c) Connect the connector.

5. INSTALL LOWER FINISH PANEL (See page BO-149)

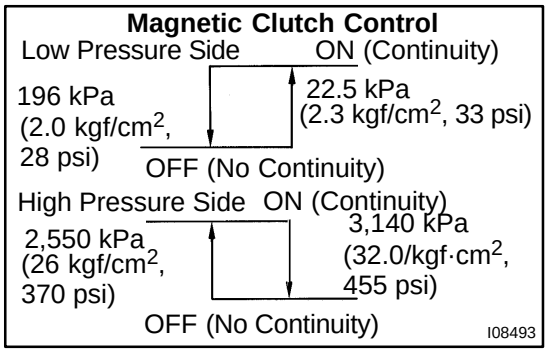


PRESSURE SWITCH

AC16Z-04

ON-VEHICLE INSPECTION

1. **SET ON MANIFOLD GAUGE SET (See page AC-19)**
2. **DISCONNECT CONNECTOR FROM PRESSURE SWITCH**
3. **RUN ENGINE AT APPROX. 1,500 RPM**

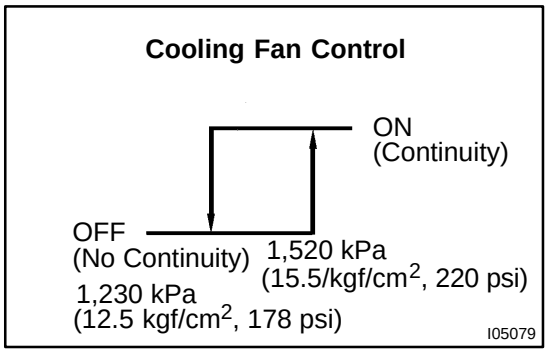


4. **Magnetic clutch control:**
   INSPECT PRESSURE SWITCH OPERATION

(a) Connect the positive (+) lead from the ohmmeter to terminal 4 and the negative (-) lead to terminal 1.

(b) Check continuity between terminals when refrigerant pressure is changed, as shown in the illustration.

If operation is not as specified, replace the pressure switch.



5. **Cooling fan control:**
   INSPECT PRESSURE SWITCH OPERATION

(a) Connect the positive (+) lead from the ohmmeter to terminal 2 and the negative (-) lead to terminal 3.

(b) Check continuity between terminals when refrigerant pressure is changed, as shown in the illustration.

If operation is not as specified, replace the pressure switch.

6. **STOP ENGINE AND SET OFF MANIFOLD GAUGE SET**
7. **CONNECT CONNECTOR TO PRESSURE SWITCH**

AC170-04

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

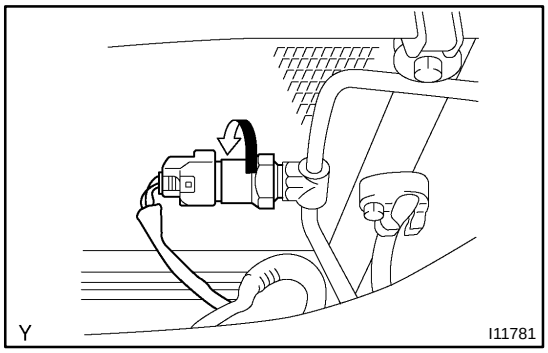
At the time of installation, please refer to the following item.

Evacuate air from refrigeration system.

Charge system with refrigerant and inspect for leakage of refrigerant.

Specified amount: 600 ± 50 g (21.16 ± 1.76 oz.)

2. REMOVE RADIATOR GRILLE (See page BO-4)



3. REMOVE PRESSURE SWITCH FROM LIQUID TUBE

Disconnect the connector and remove the pressure switch.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

HINT:

- Lock the switch mount on the tube with an open end wrench, being careful not to deform the tube, and remove the switch.
- At the time of installation, please refer to the following item.
  Lubricate a new O-ring with compressor oil and install the switch.

AC171-01

INSTALLATION

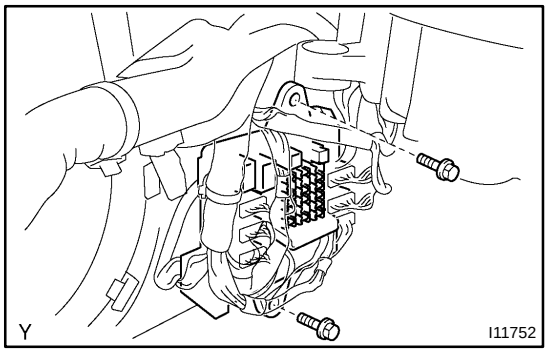
Installation is in the reverse order of removal (See page AC-67).

HEATER MAIN RELAY

AC25Z-02

INSPECTION

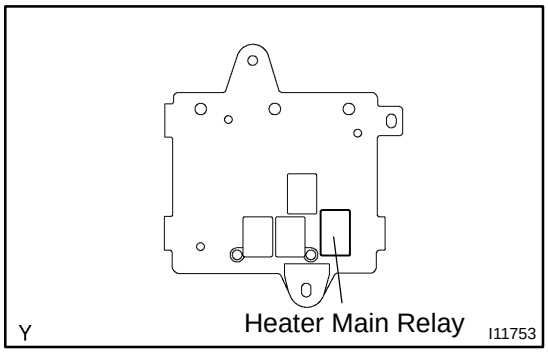
1. **REMOVE FRONT DOOR SCUFF PLATE LH**
   (See page BO-139)
2. **REMOVE COWL SIDE TRIM BOARD LH**
   (See page BO-139)



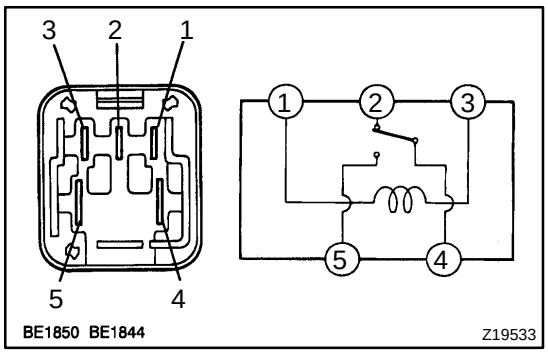
3. **REMOVE HEATER MAIN RELAY**

(a) Disconnect the connectors.

(b) Remove the 2 passenger side junction block set nuts.



(c) Remove the heater main relay from passenger side junction block.



4. **INSPECT HEATER MAIN RELAY CONTINUITY**

Condition	Tester connection	Specified condition
Constant	2 - 4 1 - 3	Continuity
Apply B+ between terminals 1 and 3.	4 - 5	Continuity

If continuity is not as specified, replace the relay.

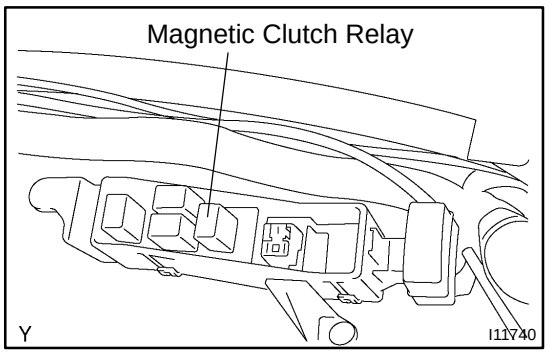
5. **INSTALL HEATER MAIN RELAY**

(a) Install the heater main relay to passenger side junction block.

(b) Install the passenger side junction block set nuts.

(c) Connect the connectors.

6. **INSTALL COWL SIDE TRIM BOARD LH**
   (See page BO-149)
7. **INSTALL FRONT DOOR SCUFF PLATE LH**
   (See page BO-149)

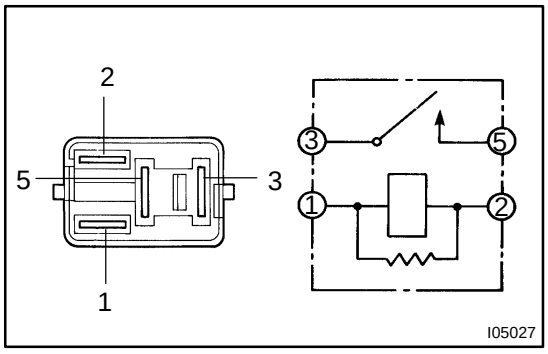


MAGNETIC CLUTCH RELAY

AC20U-05

INSPECTION

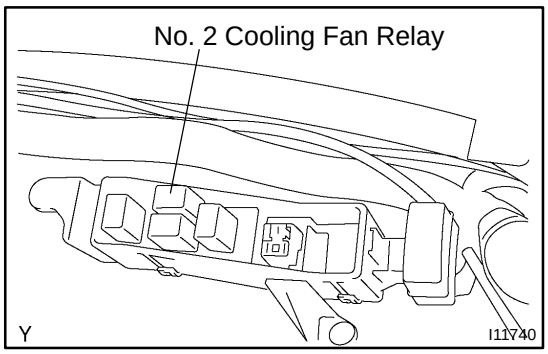
1. REMOVE MAGNETIC CLUTCH RELAY FROM RELAY BLOCK NO.3



2. INSPECT MAGNETIC CLUTCH RELAY (Marking: A.C COMP) CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

If continuity is not as specified, replace the relay.

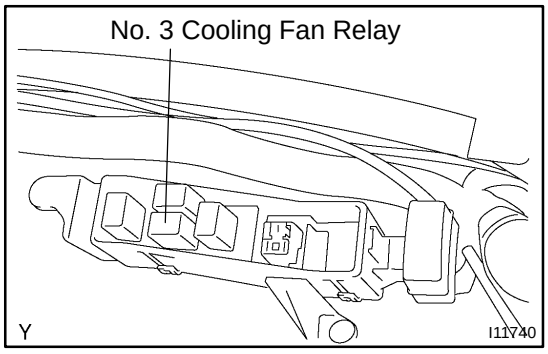


COOLING FAN RELAY

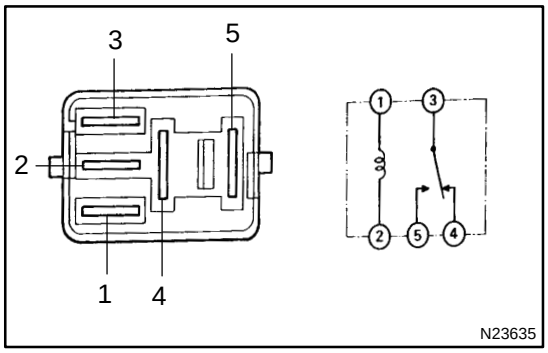
AC260-02

INSPECTION

1. REMOVE NO.2 COOLING FAN RELAY FROM RELAY BLOCK NO.3



2. REMOVE NO.3 COOLING FAN RELAY FROM RELAY BLOCK NO.3



3. INSPECT NO.2 COOLING FAN RELAY (Marking: FAN NO.2) CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 2 3 - 4	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

If continuity is not as specified, replace the relay.

4. INSPECT NO.3 COOLING FAN RELAY (Marking: FAN NO.3) CONTINUITY

Check the relay in the same way as for ”MAGNETIC CLUTCH RELAY”.

CONDENSER FAN

AC173-03

ON-VEHICLE INSPECTION

1. INSPECT CONDENSER FAN OPERATION

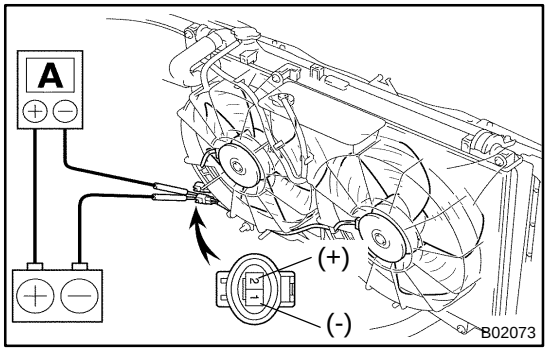
Inspect the fan operation, as shown in the chart below.

Test conditions:

- Ignition switch ON
- Blower speed control switch position ”HI”
- Temperature control dial at ”MAX. COOL” position
- Install manifold gauge set”
- A/C switch ON

Condition	Fan operation (Fan speed)
Engine coolant temperature 91˚C (196 ˚F) or below	Rotate (Low speed)
Engine coolant temperature 100˚C (212 ˚F) or above	Rotate (High speed)
Refrigerant pressure is less than 1,520 kPa (15.5 kgf·cm^2, 220 psi)	Rotate (Low speed)
Refrigerant pressure is 1,520 kPa (15.5 kgf·cm^2, 220 psi) or above	Rotate (High speed)

If operation is not as specified, proceed to the next inspection.



2. INSPECT CONDENSER FAN MOTOR OPERATION

(a) Disconnect the fan connector.

(b) Connect battery and ammeter.

(c) Check that the fan rotates smoothly, and then check the reading on the ammeter.

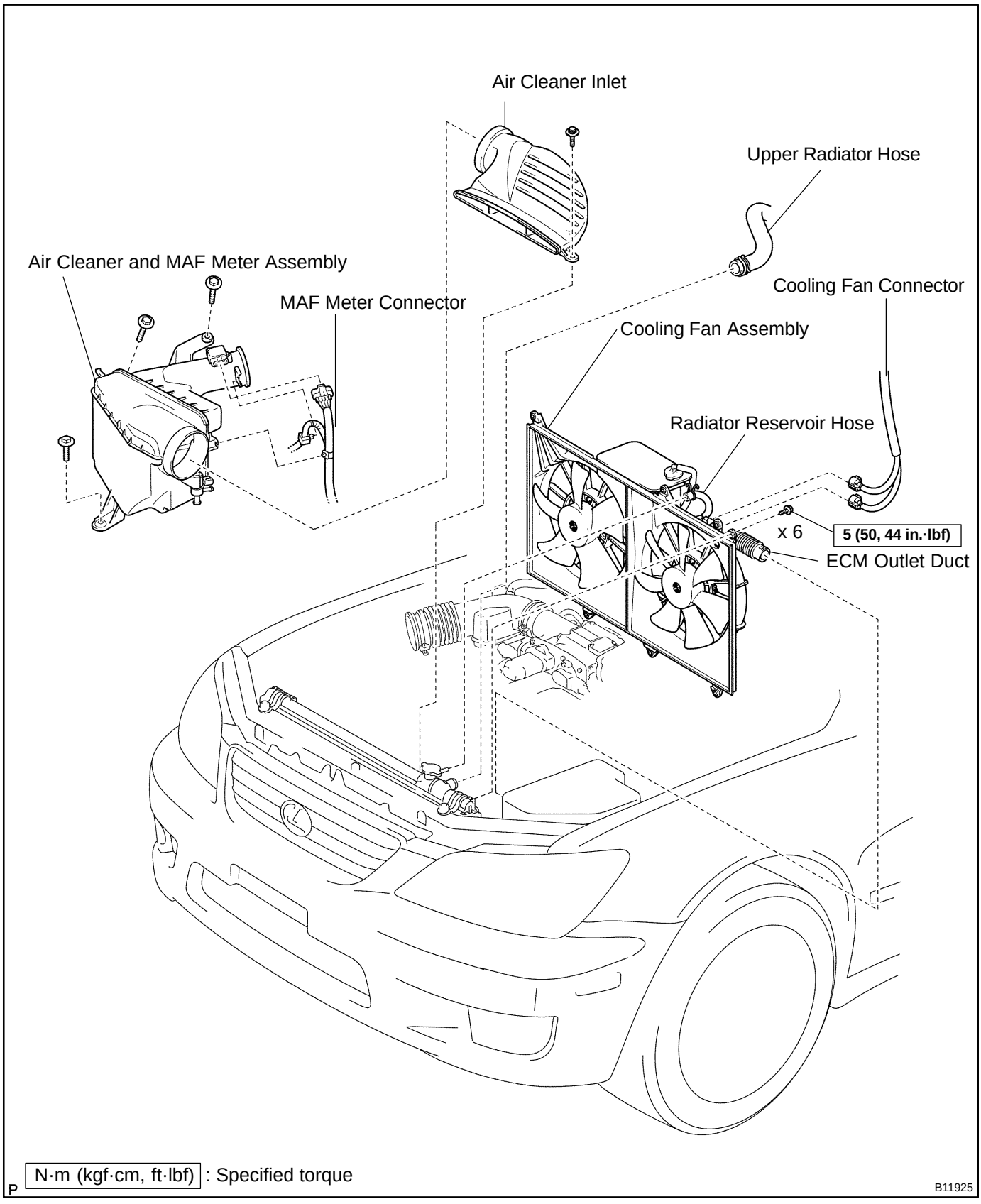
Specified amperage: 8.5 - 11.5 A ar 20 ˚C (68 ˚F)

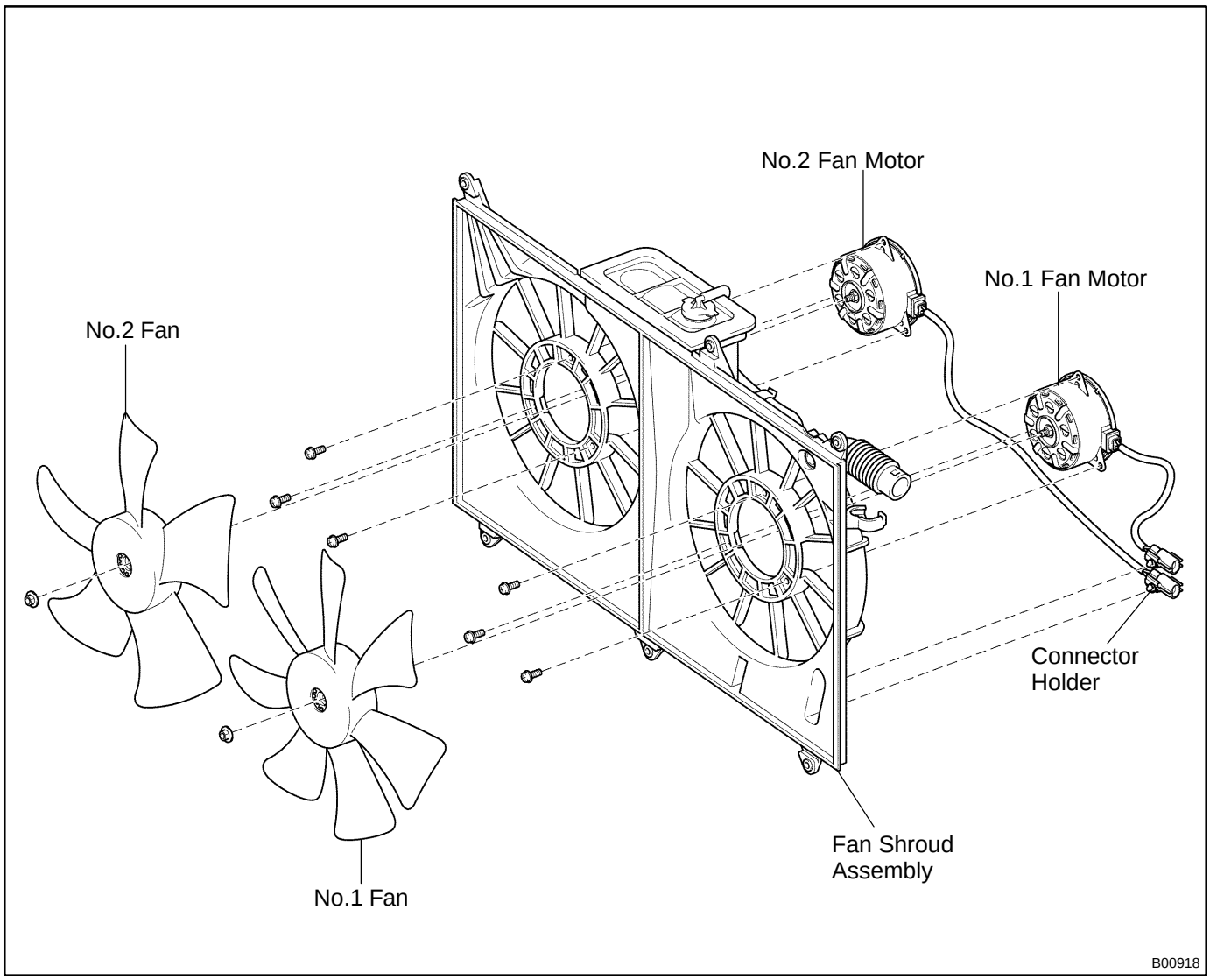
If operation is not as specified, replace the fan motor.

If operation is as specified, check the pressure switch, cooling fan relays and engine coolant temp. switch.

AC386-01

COMPONENTS




No.2 Fan Motor
No.1 Fan Motor
No.2 Fan
Connector Holder
Fan Shroud Assembly
No.1 Fan
B00918

AC387-01

REMOVAL

1. DRAIN ENGINE COOLANT FROM RADIATOR

HINT:

It is not necessary to drain out all coolant.

2. REMOVE AIR CLEANER INLET

3. REMOVE AIR CLEANER AND MAF METER ASSEMBLY

4. REMOVE COOLING FAN

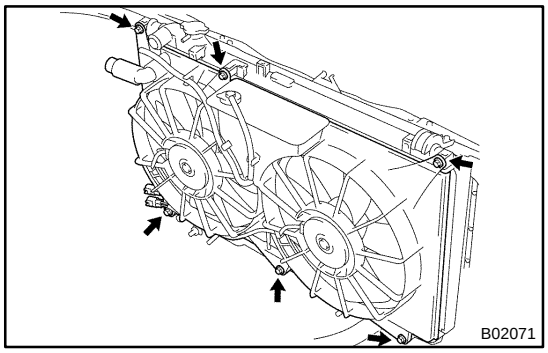
(a) Disconnect the upper radiator hose from the radiator.

(b) Disconnect the ECM outlet duct from the ECM box.

(c) Disconnect the wire for cooling fan from the clamp on the cooling fan.

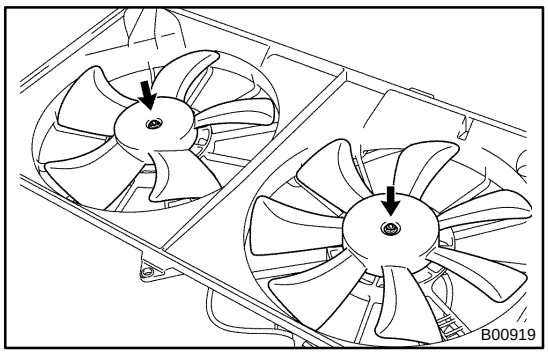
(d) Disconnect the 2 cooling fan connector.

(e) Disconnect the radiator reservoir hose from the radiator.



(f) Remove the 6 bolts and cooling fan.

AC388-01

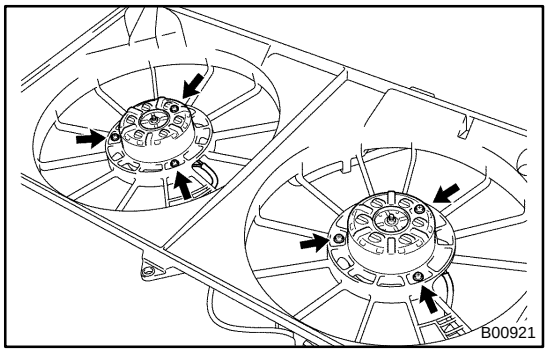


DISASSEMBLY

1. REMOVE FANS

(a) Remove the nut and fan.

(b) Remove the 2 fans.



2. REMOVE FAN MOTORS

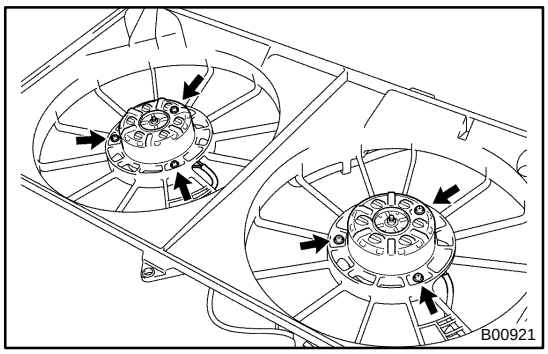
(a) Disconnect the wires and connector holders from the fan shroud.

(b) Remove the 3 screws and fan motor.

(c) Remove the 2 fan motors.

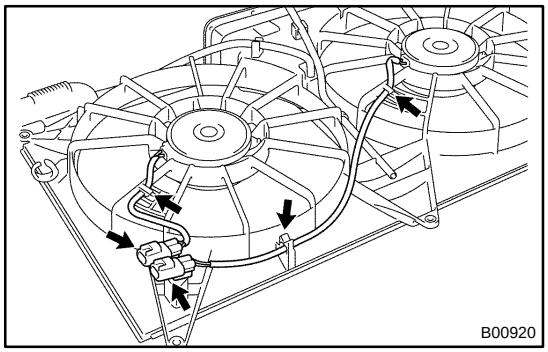
AC389-01

REASSEMBLY

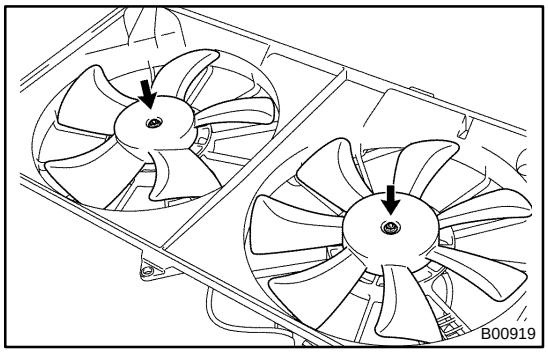


1. INSTALL FAN MOTORS

(a) Install the fan motor with the 3 screws. Install the 2 fan motors.



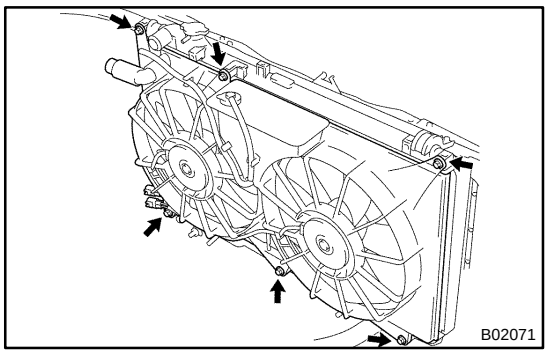
(b) Install the wires and connector holders to the fan shroud as shown in the illustration.



2. INSTALL FANS

Install the fan with the nut. Install the 2 fans.

AC38A-01



INSTALLATION

1. INSTALL COOLING FAN

(a) Install the cooling fan with the 6 bolts.
Torque: 5.0 N·m (50 kgf·cm, 44 in.·lbf)

(b) Connect the upper radiator hose to the radiator.

(c) Connect the ECM outlet duct to the ECM box.

(d) Connect the wire for cooling fan to clamp on the cooling fan.

(e) Connect the 2 cooling fan connectors.

(f) Connect the radiator reservoir hose to the radiator.

2. INSTALL AIR CLEANER AND MAF METER ASSEMBLY

3. INSTALL AIR CLEANER INLET

4. FILL WITH ENGINE COOLANT

5. START ENGINE AND CHECK FOR COOLANT LEAKS

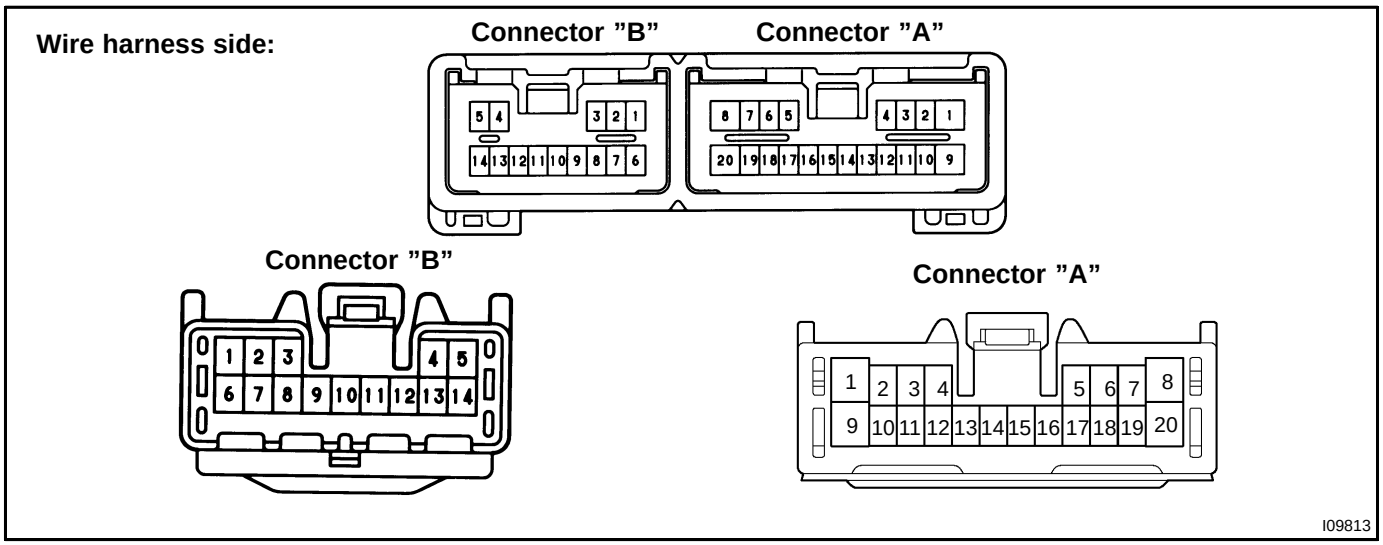
AIR CONDITIONING CONTROL ASSEMBLY

AC261-03

ON-VEHICLE INSPECTION

1. **REMOVE A/C CONTROL ASSEMBLY**
   (See page AC-84)
2. **INSPECT A/C CONTROL ASSEMBLY CIRCUIT**

(a) Disconnect the connector from the A/C control assembly and inspect the connector on the wire harness side, as shown in the chart below.
Test condition:
Turn ignition switch ON



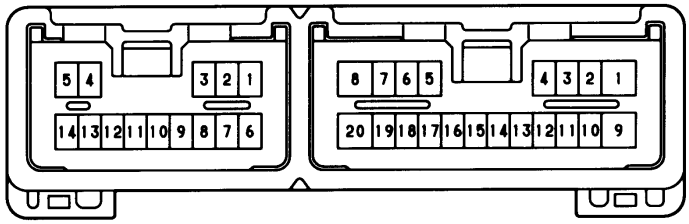
Tester connection	Condition	Specified condition
A13 - A6	Cover solar sensor with a cloth	No continuity
	Solar sensor subject to electric light	Continuity
B14 - Ground	Constant	Continuity
A17 - A18	Cabin temperature at 25 °C (77 °F)	Approx. 1.7 kΩ
A5 - A18	Evaporator temperature at 25 °C (77 °F)	Approx. 1.5 kΩ
B4 - Ground	Turn ignition switch to ACC	Battery positive voltage
B13 - Ground	Turn ignition switch to ON	Battery positive voltage
	Turn ignition switch to LOCK or ACC	No voltage
B12 - Ground	Turn light control switch to "TAIL"	Battery positive voltage
B5 - Ground	Constant	Battery positive voltage

If the circuit is not as specified, inspect the circuit connected to other parts.
If the circuit is as specified, proceed to "INSPECTION" on page AC-88 .

(b) Connect the connector to amplifier and inspect the wire harness side connector from the back side, as shown in the chart.
Test conditions:
- Running engine at idle speed
- Blower speed control dial at ”HI” position
- Temperature control dial at ”MAX. COOL” position
- A/C switch ON

From back side:

Connector ”B” **Connector ”A”**



I07266

Tester connection	Condition	Specified condition
A18 - Ground	Constant	Continuity
A1 - Ground	Hazard switch: OFF	No continuity
	Hazard switch: ON	Continuity
A2 - Ground	R/F switch: FRESH	Battery positive voltage
	R/F switch: RECIRC	Below 1.0 V
A3 - Ground	Mode control dial: FACE	Below 1.0 V
	Mode control dial: DEF	Battery positive voltage
A4 - Ground	Temperature control dial: MAX COOL	Below 1.0 V
	Temperature control dial: MAX HOT	Battery positive voltage
A6 - A18	Constant	5.0 ± 0.5 V
A9 - Ground	R/F switch: FRESH	Below 1.0 V
	R/F switch: RECIRC	Battery positive voltage
A10 - Ground	Mode control dial: DEF	Below 1.0 V
	Mode control dial: FACE	Battery positive voltage
A11 - Ground	Temperature control dial: MAX HOT	Below 1.0 V
	Temperature control dial: MAX COOL	Battery positive voltage
A14 - A18	Temperature control dial: MAX HOT	Approx. 1.0 V
	Temperature control dial: MAX COOL	Approx. 4.0 V
A15 - A18	Mode control dial: DEF	Approx. 1.0 V
	Mode control dial: FACE	Approx. 4.0 V
A16 - A18	R/F switch: FRESH	Approx. 1.0 V
	R/F switch: RECIRC	Approx. 4.0 V
B2 - Ground	Parking drake lever: Release	Battery positive voltage
	Parking drake lever: Operate	Below 1.0 V
B3 - Ground	Pattern select switch: Except PWR	Battery positive voltage
	Pattern select switch: PWR	Below 1.0 V

B6 - Ground	Ignition switch: ON	Below 1.0 V
	Ignition switch: OFF	Battery positive voltage
B7 - Ground	Blower motor: ON	Pulse generation
	Blower motor: OFF	Approx. 5.0 V
B8 - Ground	Pattern select switch: Except SNOW	Battery positive voltage
	Pattern select switch: SNOW	Below 1.0 V
B10 - Ground	Passenger seat belt: unfastened	Below 1.0 V
	Passenger seat belt: fasted	Battery positive voltage

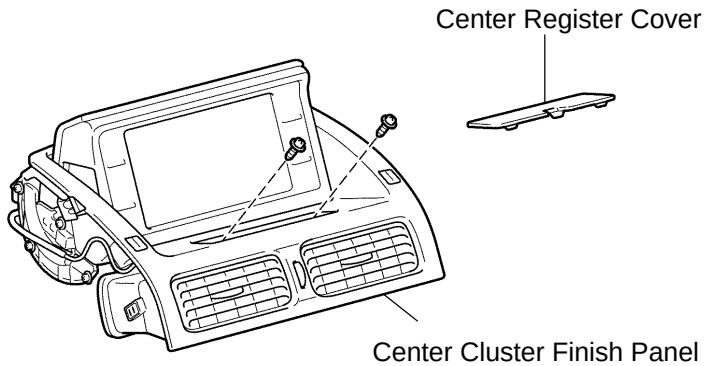
If the circuit is not as specified, proceed to ”INSPECTION” on page AC-88 .

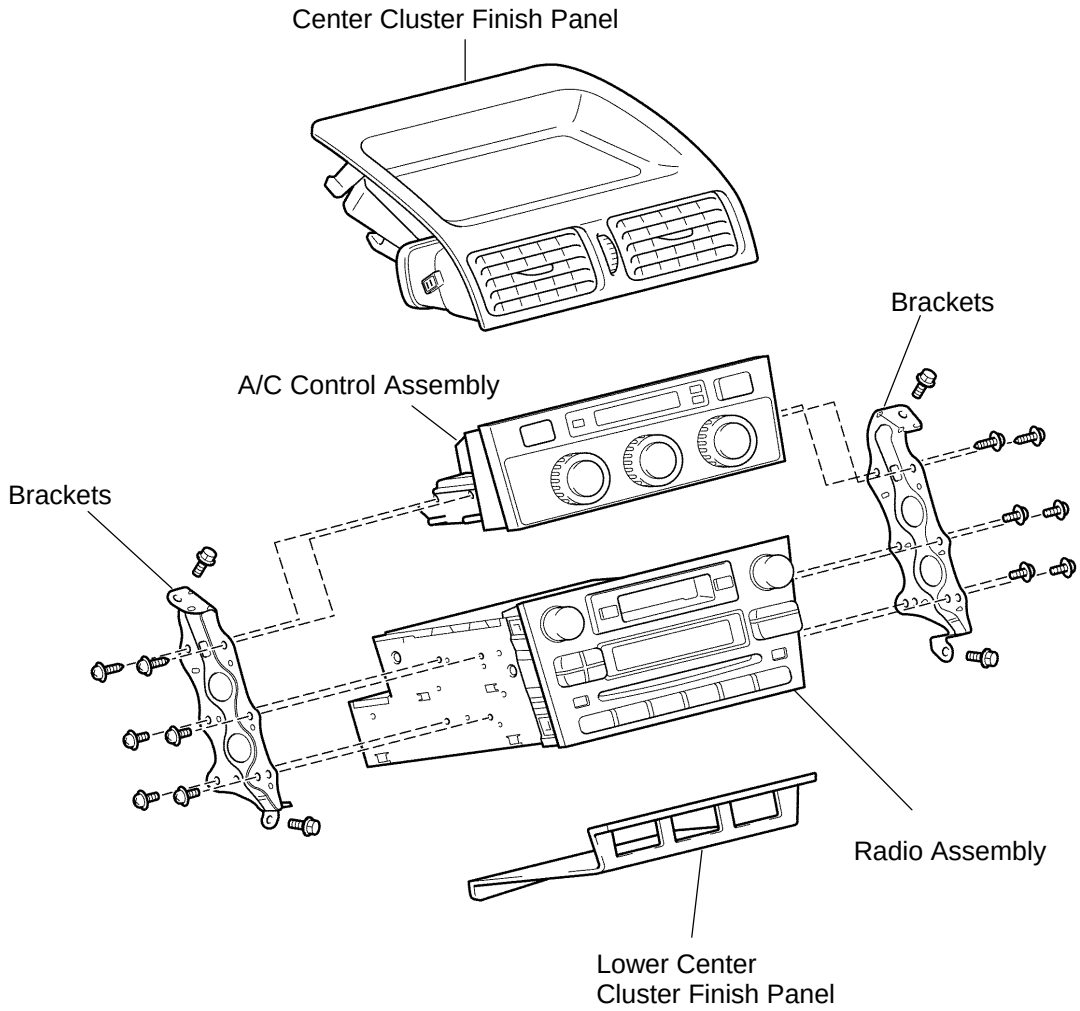
3. INSTALL A/C CONTROL ASSEMBLY
(See page AC-91)

AC262-02

COMPONENTS

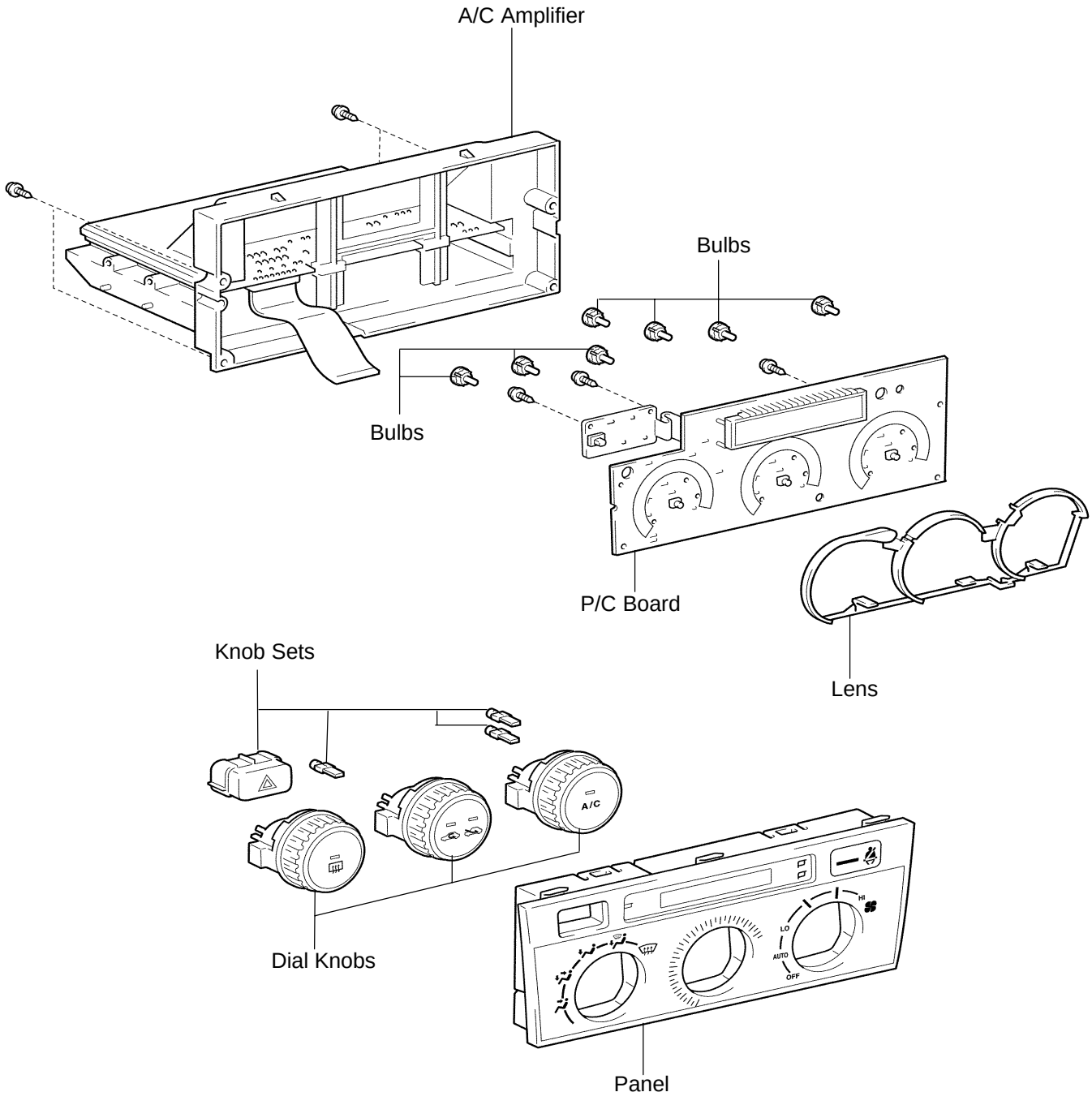
w/ LEXUS Navigation System:





P

I11755

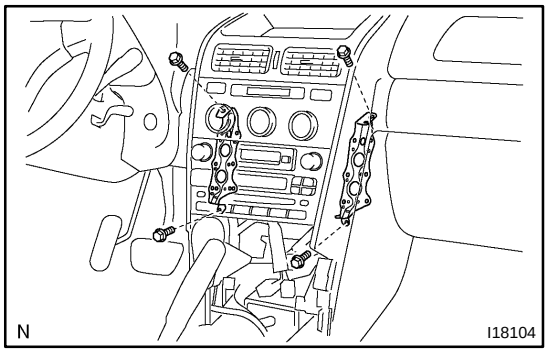

A/C Amplifier
Bulbs
Bulbs
P/C Board
Lens
Knob Sets
A/C
Dial Knobs
HI
LO
AUTO
OFF
Panel
I18269

P

AC263-02

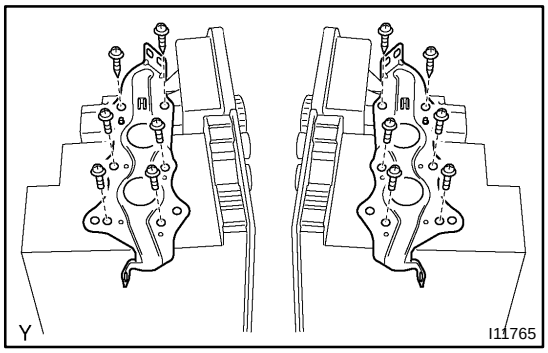
REMOVAL

1. **REMOVE CENTER CLUSTER FINISH PANEL (See page BO-139)**
2. **REMOVE LOWER CENTER CLUSTER FINISH PANEL (See page BO-139)**



3. **REMOVE A/C CONTROL ASSEMBLY**

(a) Remove the 4 bolts and pull out the A/C control assembly with radio assembly, then disconnect the connectors.



(b) Remove the 12 screws and 2 brackets.

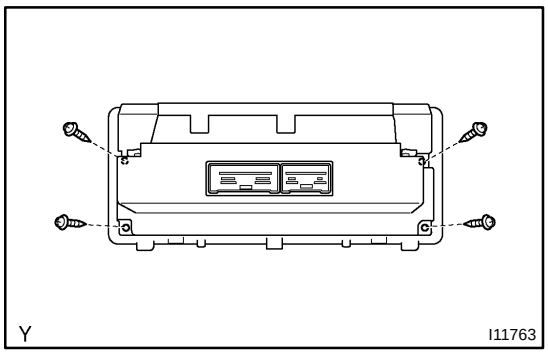
(c) Separate the A/C control assembly and radio assembly.

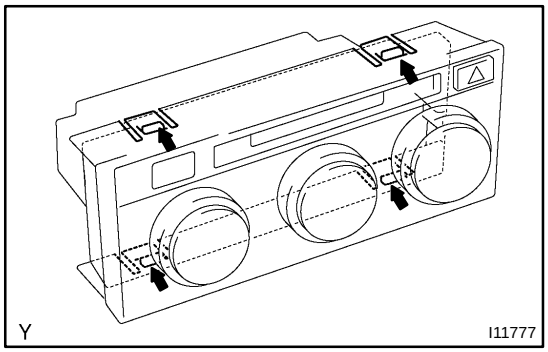
AC264-02

DISASSEMBLY

1. REMOVE A/C AMPLIFIER

(a) Remove the 4 screws.

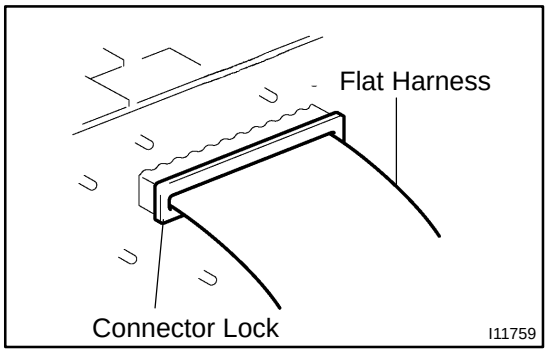




(b) Using a screwdriver, release the 4 claws and pull out the A/C amplifier.

HINT:

Tape the screwdriver tip before use.



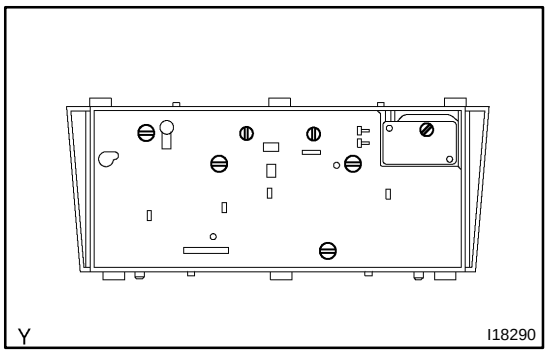
(c) Release the connector lock and pull out the flat harness.

NOTICE:

Pull the lock of the connector securely toward you and pull off the flexible flat cable.

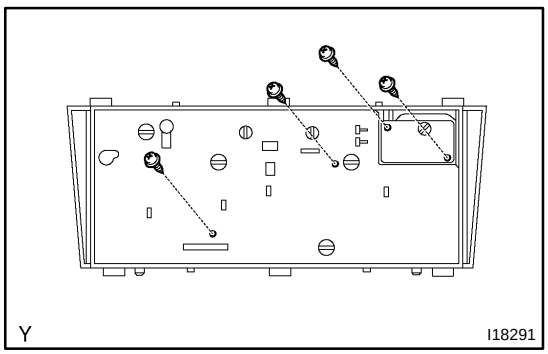
2. REMOVE BULBS

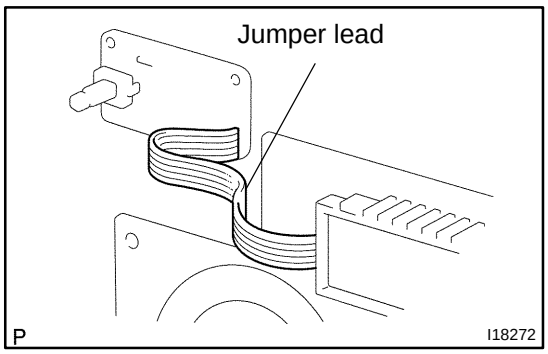
Using a screwdriver, turn the bulbs to the left and pull out the bulbs.



3. REMOVE P/C BOARD

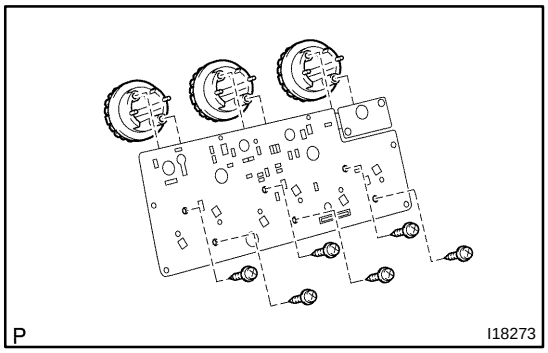
Remove the 4 screws and P/C board.





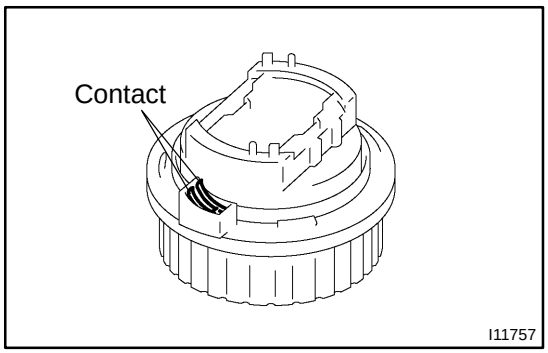
NOTICE:

- **Do not let any oil, dirt or foreign object on the connecting part of the P/C board.**
- **When holding the P/C board by hand, hold it at the edge and do not touch the soldered part and connecting part.**
- **Do not apply unnecessary force to the jumper lead.**
- **Do not let the accumulated static electricity in an operator apply to the electronic components.**
- **Do not tumble the LED as this soldered to the P/C board at right angles.**



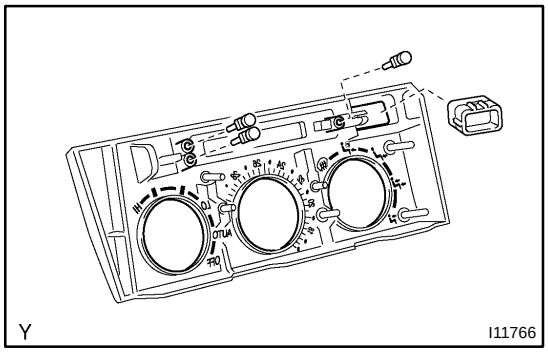
4. REMOVE DIAL KNOBS

Remove the 6 screws and dial knobs.



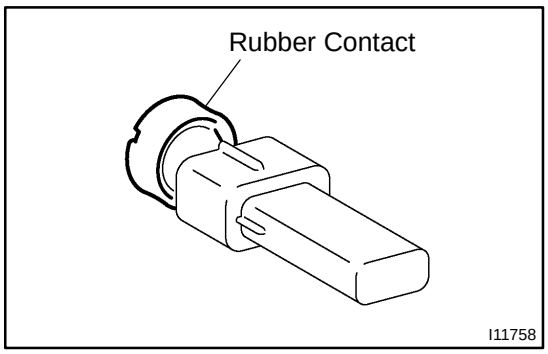
NOTICE:

- **Do not let any oil, dirt or foreign object attach on the connecting part of the connector.**
- **Do not deform the contact.**
- **Be careful not to drop the contact.**

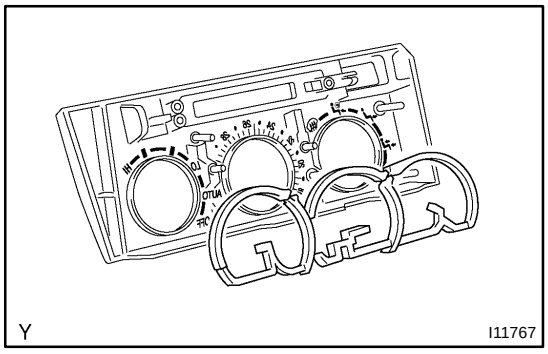


5. REMOVE KNOB SETS

Pull out the knob sets.

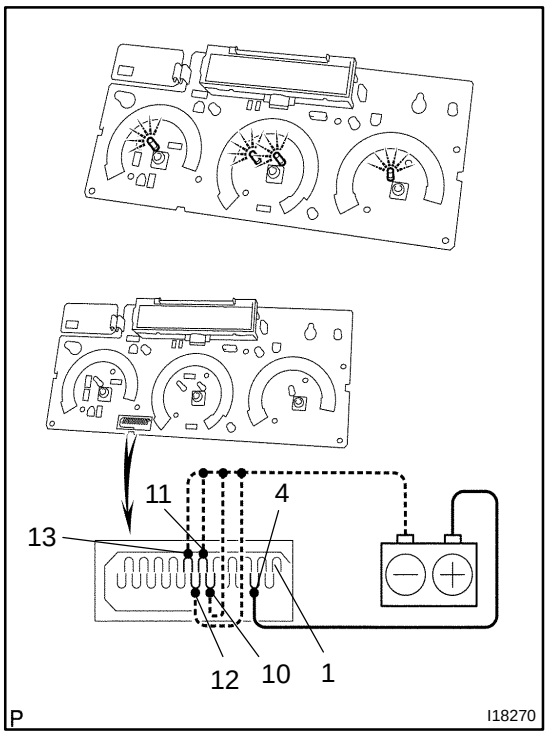


NOTICE:
Do not let any oil, dirt or foreign object attach on the rubber contact part.



6. REMOVE LENS

AC265-03



INSPECTION

1. INSPECT INDICTOR OPERATION

Connect the positive (+) lead from the battery to terminal 4 and negative (-) lead to each terminal, then check that the indicator lights up as shown in the chart.

Switch	Tester connection
DEF	13
FRESH	12
RECIRC	11
A/C	10

If operation is not as specified, replace the P/C board.

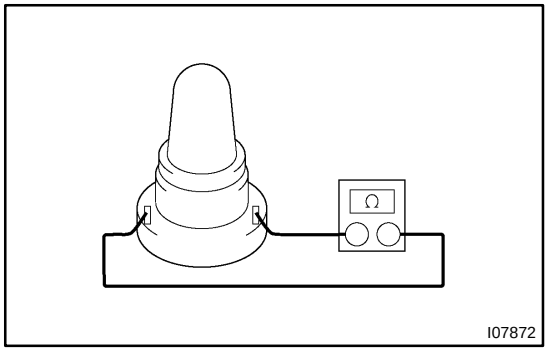
2. INSPECT INDICATOR DIMMING OPERATION

(a) Perform each indicator light up (See step 1).

(b) Connect the positive (+) lead from the battery to terminal 1 and check that the each indicator dims.

If the operation is not as specified, replace the P/C board.

If the operation is as specified, replace the A/C amplifier.

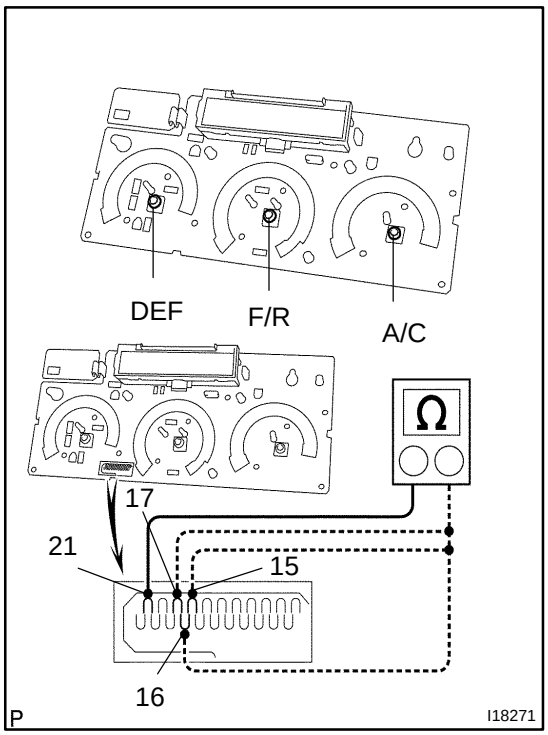


3. INSPECT BULB OPERATION

Apply the tester as shown in the illustration to the test for continuity.

If continuity exists, replace the P/C board.

If on continuity exists, replace the bulb.



4. INSPECT SWITCH OPERATION

Check the continuity exists between terminals while the switch is pressed.

Switch	Tester connection	Specified condition
A/C	15 - 21	Continuity
DEF	16 - 21	Continuity
F/R	17 - 21	Continuity

If operations is not as specified, replace the P/C board.
If operations is as specified, check the wire harness or replace the A/C amplifier.

AC266-02

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page AC-85).

AC267-02

INSTALLATION

Installation is in the reverse order of removal (See page AC-84).

ENGINE COOLANT TEMPERATURE (ECT) SWITCH

AC385-01

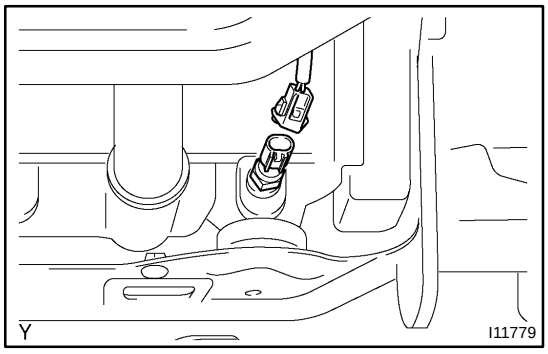
INSPECTION

1. REMOVE ENGINE UNDER COVER

2. DRAIN ENGINE COOLANT FROM RADIATOR

HINT:

It is not necessary to drain out all coolant

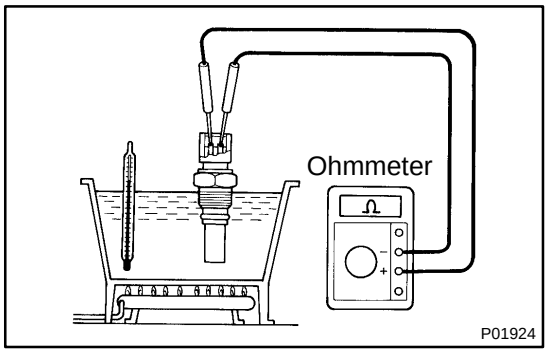


3. REMOVE ENGINE COOLANT TEMPERATURE SWITCH

(a) Disconnect the connector.

(b) Remove the engine coolant temperature switch.

(c) Remove the O-ring from the switch.



4. INSPECT ENGINE COOLANT TEMPERATURE SWITCH

(a) Using an ohmmeter, check that no continuity exists between the terminals when the coolant temperature is above 100 ˚C (212 ˚F).

If continuity exists, replace the switch.

(b) Using an ohmmeter, check that continuity exists between the terminals when the coolant temperature is below 91 ˚C (196 ˚F).

If there no continuity exists, replace the switch.

5. INSTALL ENGINE COOLANT TEMPERATURE SWITCH

(a) Install the new O-ring to the switch.

(b) Install the engine coolant temperature switch.

Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

6. FILL WITH ENGINE COOLANT TO RADIATOR

7. INSTALL ENGINE UNDER COVER

AC0Y1-01

INSTALLATION

Installation is in the reverse order of removal (See page AC-93).