Mazda
626

Workshop Manual

JMZ GF12P2
JMZ GF12F2
JMZ GF12F5
JMZ GF14P2
JMZ GF14P5
JMZ GF14F2
JMZ GF14F5
JMZ GF14S2
JMZ GF14S5

4/97 1577-10-97D

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Mazda 626 Workshop Manual

FOREWORD

This manual contains on vehicle service and diagnosis for the Mazda 626.

For proper repair and maintenance, a horough familiarization with this manual is important, and it should always be kept in a handy place for quick and easy reference.

All the contents of this manual, including drawings and specifications, are the latest available at the time of printing. As modifications affecting repair or maintenance occur, relevant information supplementary to this volume will be made available at Mazda dealers. This manual should be kept up-to-date.

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WARRANTY

The manufacturer's warranty on Mazda vehicles and engines can be voided if improper service or repairs are performed by persons other than those at an Authorized Mazda Dealer.

Mazda Motor Corporation
HIROSHIMA, JAPAN

APPLICATION:
This manual is applicable to vehicles beginning with the Vehicle Identification Numbers (VIN), and related materials shown on the following page.

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VEHICLE IDENTIFICATION NUMBERS (VIN)

JMZ GF12P20# 100001 —
JMZ GF12F20# 100001 —
JMZ GF12F50# 100001 —
JMZ GF14P20# 100001 —
JMZ GF14P50# 100001 —
JMZ GF14F20# 100001 —
JMZ GF14F50# 100001 —
JMZ GF14S20# 100001 —
JMZ GF14S50# 100001 —

RELATED MATERIALS

626 Training Manual (Europe)	3303-10-97D
Engine Workshop Manual FP FS	1579-10-97D
Manual Transaxle Workshop Manual G25M-R	1441-10-94F
Automatic Transaxle Workshop Manual GF4A-EL	1393-10-93H
626 Wiring Diagram (Europe (L.H.D.))	5406-10-97D
626 Wiring Diagram (UK)	5407-10-97D

GENERAL INFORMATION

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HOW TO USE THIS MANUAL

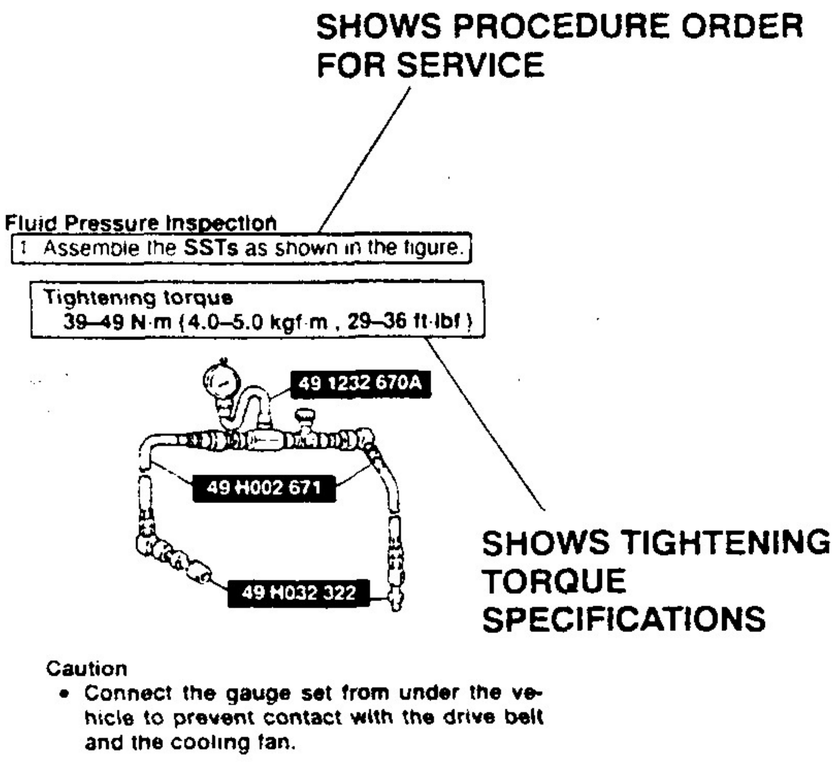
RANGE OF TOPICS

- This manual contains the procedures for performing all of the required service operations The procedures are divided into the following five basic operations.
  (1) Removal/Installation
  (2) Disassembly/Assembly
  (3) Replacement
  (4) Inspection
  (5) Adjustment
- Simple operations which can be performed easily just by looking at the vehicle such as removal/installation of parts, jacking, vehicle lift, cleaning of parts, and visual inspection, have been omitted.

SERVICING PROCEDURE

Inspection, Adjustment

- The procedures for inspections and adjustments are divided into steps. Important points in regard to the location and contents of the procedures are explained in detail and are shown in the illustrations.

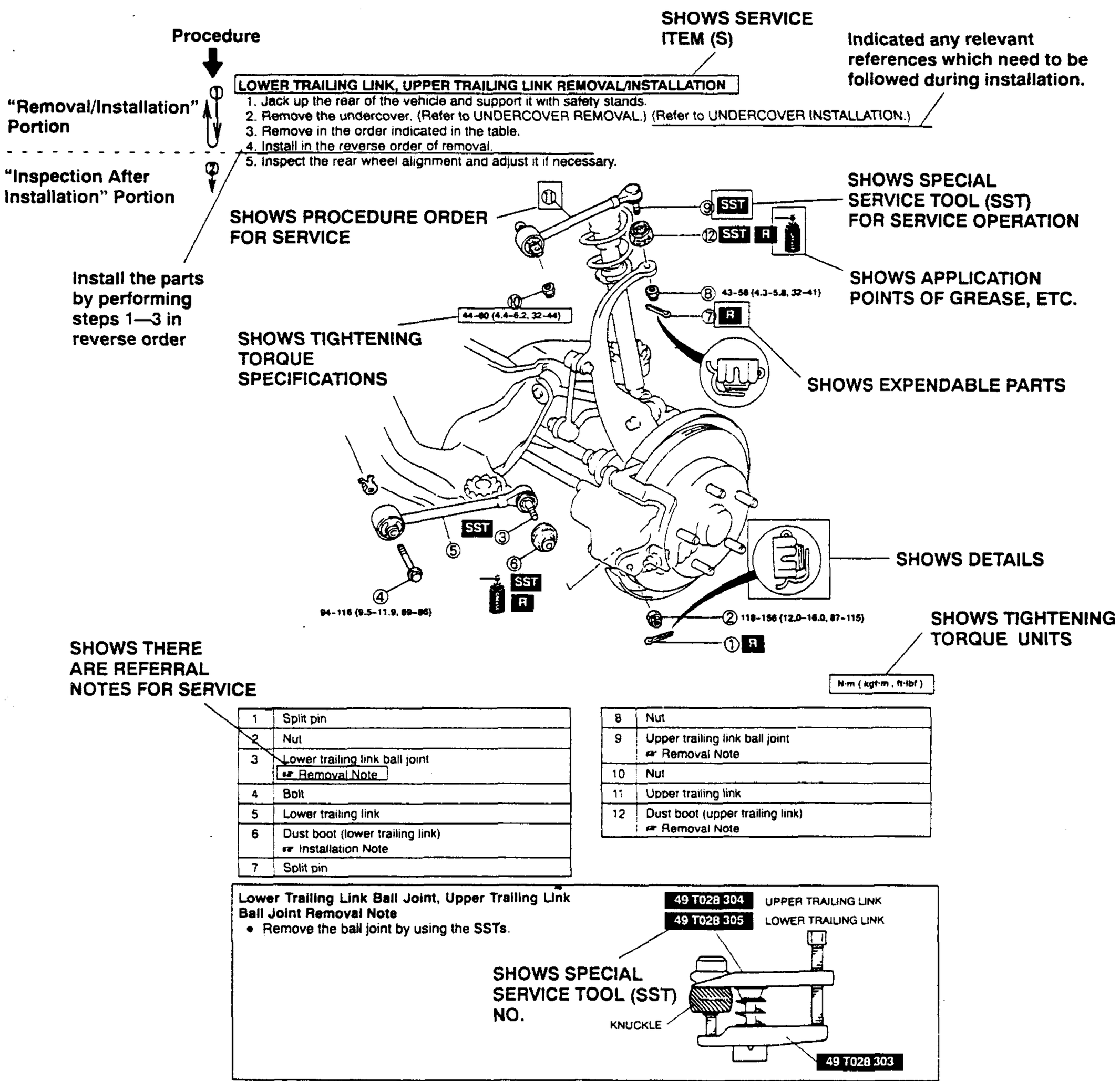


Caution
- Connect the gauge set from under the vehicle to prevent contact with the drive belt and the cooling fan.

HOW TO USE THIS MANUAL

Repair procedure

1. Most repair operations begin with an overview illustration. It identifies the components, shows how the parts fit together, and describes visual part inspection. However, only the removal/ installation procedures which need to be performed methodically have written instructions.
2. Expendable parts, tightening torques, and symbols for oil, grease, and sealant are shown in the overview illustration. In addition, symbols indicating parts which require the use of special service tools for removal/installation are also shown.
3. The procedures are numbered and the part that is the main point of that procedure is shown in the illustration with the corresponding number. Occasionally, there are important points or information concerning a procedure. Refer to this information when servicing the related part.



1	Split pin
2	Nut
3	Lower trailing link ball joint ☞ Removal Note
4	Bolt
5	Lower trailing link
6	Dust boot (lower trailing link) ☞ Installation Note
7	Split pin
8	Nut
9	Upper trailing link ball joint ☞ Removal Note
10	Nut
11	Upper trailing link
12	Dust boot (upper trailing link) ☞ Removal Note

Lower Trailing Link Ball Joint, Upper Trailing Link Ball Joint Removal Note

- Remove the ball joint by using the SSTs.

SHOWS REFERRAL NOTES FOR SERVICE

SYMBOLS

- There are eight symbols indicating oil, grease, sealant, and the use of **SSTs**. These symbols show the points of applying or using such materials during service.

Symbol	Meaning	Kind
	Apply oil	Appropriate new engine oil or gear oil
	Apply brake fluid	Appropriate new brake fluid
	Apply automatic tranaxle/ transmission fluid	Appropriate new automatic transaxle/ transmission fluid
	Apply grease	Appropriate grease
	Apply sealant	Appropriate sealant
	Apply petroleum jelly	Appropriate petroleum jelly
	Replace part	O-ring, gasket, etc.
	Use SST	Appropriate SST

ADVISORY MESSAGES

You'll find several **Warnings**, **Cautions**, **Notes**, **Specifications** and **Upper and lower limits** in this manual.

Warning

- **A Warning indicates a situation in which serious injury or death could result if the warning is ignored.**

Caution

- **A Caution indicates a situation in which damage to the vehicle could result if the caution is ignored.**

Note

- A **Note** provides added information that will help you to complete a particular procedure.

Specification

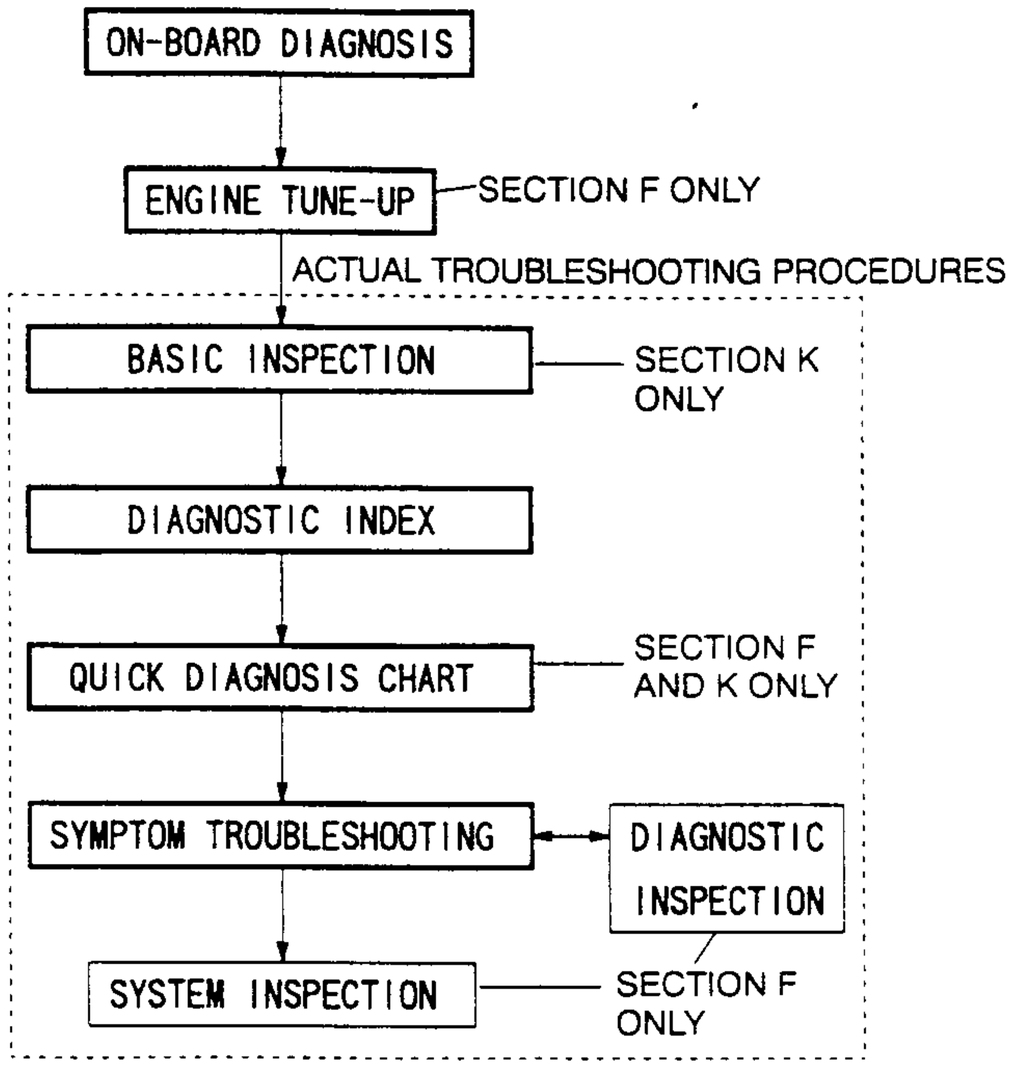
- The values indicates the allowable range when performing inspections or adjustments.

Upper and lower limits

- The values indicate the upper and lower limits that must not be exceeded when performing inspections or adjustments.

TROUBLESHOOTING PROCEDURE

Basic Flow of Troubleshooting



On-board diagnosis

- The service codes are important hints for repairing malfunctions that are difficult to simulate. By following the service code, perform the inspection to quickly and accurately diagnose the malfunction.
- The self-diagnostic function is used during inspection. When a service code is shown, specifying the cause of a malfunction, continue the inspection according to the items indicated by the self-diagnostic function.

Engine tune-up (section F)

- Any necessary adjustments are made after starting the engine.

Basic inspection (section K)

- The basic inspection is performed to quickly narrow down the possible causes after a malfunction occurs regardless of the symptoms. The basic inspection is performed to also locate the region of many malfunction symptoms.

Diagnostic index

- The diagnostic index lists the symptoms of the malfunctions. Select the symptoms pertaining or most closely pertaining to the actual malfunction.

Quick diagnosis chart (section F, K)

- The quick diagnosis chart lists the diagnosis and inspection procedures to be performed specifically relating to the cause of the malfunction.

Symptom troubleshooting

- Symptom troubleshooting quickly determines the location of the malfunction according to the type of symptoms.

HOW TO USE THIS MANUAL

Procedures For Use

Using the basic inspection

- Perform the basic inspection before the symptom troubleshooting.
- Perform each step in the order shown.
- The reference column lists the location of the detailed procedure for each basic inspection.
- Although inspection and adjustment are performed as according to the procedures referred to in the reference column, if the cause of the malfunction is discovered during the basic inspection, continue the procedures as indicated in the remarks column.

SHOWS INSPECTION ORDER

SHOWS ITEM NAMES FOR THE DETAILED PROCEDURES

SHOW POINTS REQUIRING ATTENTION IN REGARD TO INSPECTION RESULTS

STEP	INSPECTION		ACTION
1	Turn ignition switch to ON Does hold indicator light (illuminate/go out) correspond to hold switch position (ON/OFF)?	Yes	Go to next step
		No	Perfor malfunction diagnosis according to No.26 "HOLD INDICATOR LIGHT DOES NOT IMMULINATE WHE HOLD SWITCH IS TURNED ON" or No.27 "HOLD INDICATOR LIGHT IMMULINATES WHEN HOLD SWITCH IS NOT TURNED ON"
2	Check the ATF color and condition Are ATF color and odor normal?	Yes	Go to next step
		No	Repair or replace any defective parts
3	Perform the line pressure test (Refer to MECHANICAL SYSTEM TEST, Line Pressure Test) Is line pressure OK?	Yes	Go to next step
		No	Repair or replace any defective parts
4	Perform the stall test (Refer to MECHANICAL SYSTEM TEST, Stall Test) Is stall speed OK?	Yes	Go to next step
		No	Repair or replace any defective parts
5		Yes	Perform symptom troubleshooting

Using the diagnostic index

- The symptoms of the malfunctions are listed in the diagnostic index for system troubleshooting.
- The exact malfunction symptoms can be selected by using the details.

No.	TROUBLESHOOTING ITEM	DESCRIPTION
1	Discharged battery	—
2	Will not crank or cranks slowly	—
3	No combustion	Engine cranks at normal speed but shows on sign of firing
4	Combustion observed but engine will not start	Engine shows combustion while cranking but will not continue to run when ignition switch is turned from STA to ON
5	Cranks normal by hard to start	Engine cranks at normal speed but requires excessive cranking time before starting Engine runs normally at idle after started
6	Low idle speed/Engine stalls or vibrates	Engines idles at low speed, stalls, or vibrates when engine is cold, hot, or normal temperature
7	High idle speed Idle speed hard to high	Idle speed excessively high and will not go down after warm–up
8	High idle speed Idle speed hard to lower	Idle speed excessively high and requires time to be lowered to normal speed after warm–up
9	Rough idle/Engine stalls when E/L, P/S, or A/C ON	Engine runs normally at idle with no load but stalls or vibrates excessively when load (E/L, P/S, or A/C) is ON
10	[illegible]	Engine runs normally at idle but stalls or vibrates excessively during N–D shift
		—

Using the quick diagnosis chart

- The chart lists the relation between the symptoms and cause of the malfunction.
- The chart is effective in quickly narrowing down the relation between the symptoms and cause of the malfunction and specifying the region of the common cause when multiple malfunction symptoms occur.
- The appropriate diagnostic inspection relating to the cause of the malfunction as specified by the symptoms can be selected by looking down the diagnostic inspection column of the chart.

PART WHICH MAY BE THE SYMPTOM

② PARTS WHICH MAY BE THE CAUSE OF PROBLEMS

① CHOOSE THE ACTUAL SYMPTOM

QUICK DIAGNOSIS CHART

No	Item (Trouble symptom)	Intake-air system — Intake air system components — Leakage	Intake-air system — Intake air system components — Clogs	Intake-air system — Throttle body — Throttle valve not close fully	Intake-air system — Throttle body — AAS passage clogged	Intake-air system — Throttle body — No accelerator free play	Fuel system — Fuel line (Fuel pump–pressure tank) — Leakage	Fuel system — Fuel line (Fuel pump–pressure tank) — Clogs	Fuel system — Fuel line (Pressure regulator–fuel tank) — Leakage	Fuel system — Fuel line (Pressure regulator–fuel tank) — Clogs	Fuel system — Fuel pump — Inoperative	Fuel system — Fuel pump — Poor performance	Fuel system — Fuel pump — Relief valve always ON	Fuel system — Fuel pump — Check valve inoperative	Fuel system — Fuel filter (High-pressure side) — Leakage	Fuel system — Fuel filter (High-pressure side) — Clogs	Fuel system — Fuel injector — Leakage	Fuel system — Fuel injector — Clogs	Fuel system — Fuel injector — Always open	Fuel system — Fuel injector — Always closed	Fuel system — Pressure regulator inoperative	Exhaust system — Exhaust system components — Leakage	Exhaust system — Exhaust system components — Clogs	Emission control system — Check valve — No airflow at fuel tank side	Emission control system — Check valve — No airflow at charcoal canister side	Emission control system — Charcoal canister — Leakage	Emission control system — Charcoal canister — Clogs	Emission control system — PCV valve — Always open	Emission control system — PCV valve — Always closed	Emission control system — PCV valve — Not activated	Control system — PCM — Internal damage	Control system — Mass air flow sensor — No signal output	Control system — Mass air flow sensor — Erratic signal output	Control system — Crankshaft position sensor — No signal output	Control system — Crankshaft position sensor — Erratic signal output
1	Discharged battery																																		
2	Will not crank or cranks slowly																																		
3	No combustion										O	O						O		O	O							O		O	O			O	O
4	Cambustion observed engine will not start	O	O		O			O				O				O	O	O	O	O	O		O					O			O	O	O		O
5	Cranks normally but hard to start													O																	O				
6	Low idle speed/Engine stalls or vebrates	O	O		O			O		O		O	O			O	O	O	O	O	O		O					O			O	O	O		O
7	High idle speed			O		O																									O				
8	Idle speed hard to lower			O																											O				
9	Rough idle/Engine stalls when E/L, P/S or A/C ON				O																										O				
10	Rough idle/Engine stalls during N–D shift				O																										O				
11	Engine stalls when vehicle about to run																																O		
12	**Engine stalls on acceleration and while cruising**										O	O								O											O			O	O
13	Poor acceleration/Insufficient power surges while cruising/Hesitates	O	O					O		O		O	O			O	O	O	O	O	O		O								O	O	O		O
14	Runs rough during deceleration backfire				O												O														O				
15	Knocking	O										O				O					O										O		O		
16	Overheating																																		
17	Poor fuel economy									O							O				O												O		
18	Fuel odor						O		O						O											O									

③ DETERMINE THE CAUSE OF THE TROUBLE DETERMINED AT PROCEDURE ②, BASED ON THE RESULT OF THE MECHANICAL SYSTEM TEST

Inspection method — Item	Result	Intake air system components — Leakage	Intake air system components — Clogs	Throttle body — Throttle valve not close fully	Throttle body — AAS passage clogged	Throttle body — No accelerator free play	Fuel line (Fuel pump–pressure tank) — Leakage	Fuel line (Fuel pump–pressure tank) — Clogs	Fuel line (Pressure regulator–fuel tank) — Leakage	Fuel line (Pressure regulator–fuel tank) — Clogs	Fuel pump — Inoperative	Fuel pump — Poor performance	Fuel pump — Relief valve always ON	Fuel pump — Check valve inoperative	Fuel filter — Leakage	Fuel filter — Clogs	Fuel injector — Leakage	Fuel injector — Clogs	Fuel injector — Always open	Fuel injector — Always closed	Pressure regulator inoperative	Exhaust system components — Leakage	Exhaust system components — Clogs	Check valve — No airflow at fuel tank side	Check valve — No airflow at charcoal canister side	Charcoal canister — Leakage	Charcoal canister — Clogs	PCV valve — Always open	PCV valve — Always closed	PCV valve — Not activated	PCM — Internal damage	Mass air flow sensor — No signal output	Mass air flow sensor — Erratic signal output	Crankshaft position sensor — No signal output	Crankshaft position sensor — Erratic signal output
Spark plug condition inspection	Wet/carbon stuck on specific plug																O		O												O				
	Graysh white with specific plug																	O		O											O				
	Wet/carbon stuck on all plus		O							O											O		O								O		O		
	Grayish white all plugs						O					O	O			O					O										O		O		
Cylinder balance test	Engine speed will not derease																	O	O	O															
Diagnostic trouble code inspection	Diagnostic trouble code(s) output																															O		O	
Inspection using oscilloscope	Induction voltage not generated																		O	O															

THE PART CAUSING TROUBLE, AS DETERMINED FROM THE RESULT OF THE MECHANICAL SYSTEM TEST.

HOW TO USE THIS MANUAL

Using the quick diagnosis chart

- Symptom troubleshooting shows diagnosis procedure, inspection method, and proper action to take for each trouble symptom.

TROUBLESHOOTING HINTS describes possible point of malfunction.

TROUBLE SYMPTOM

1	Vehicle does not move in D, S, L ranges, or in R position

TROUBLESHOOTING HINTS

If the vehicle does not move in D, S, L ranges or R position, basically, the malfunction is in the automatic transmission. (Vehicle will move even with a malfunction in the PCM.) Since a malfunction in the sensor circuit or output circuit is the cause of the malfunction in the automatic transmission, inspect the sensors, output circuit, and the related harnesses.

(1) Clutch slippage, worn (D, S, L ranges – Forward clutch, R position – Reverse clutch, Low and reverse brake)
① Line pressure low

STEP	INSPECTION		ACTION
1	With vehicle stopped on a flat, paused road and engine off, does vehicle move when pushed? (in D, S ranges or N, R positions and brake released)	Yes	Go to next step
		No	Check for parking nechanism (Refer to AT workshop manual)
2	Does vehicle move when selector lever is in between N position and D range	Yes	Go to next step
		No	Inspect or adjust the selector lever (Refer to SHIFT MECHANISM, SELECTOR LEVER REMOVAL / INSTALLATION)
3	Check the voltage at the following terminal of the powertrain control module (Refer to section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION). • Pressure control solenoid signal Is terminal voltage OK?	Yes	Go to next step
		No	Repair or replace any defective parts
4	Check duty of pressure control colenoid (Refer to AUTOMATIC TRANSMISSION, SOLENOID VALVE INSPECTION, Pressure Control Solenoid Output Duty Inspection) Is duty OK?	Yes	Overhaul control valve body and repair or replace any defective parts (Refer to AT worksnop manual) If problem remains, overhaul transmission and repair or replace any defective parts (Refer to AT workshop manual)
		No	Check the voltages at the following terminals of the powertrain control module (Refer to section F, CONTROL SYST…

STEP shows the order of troubleshooting.

INSPECTION describes an inspection (method) to quickly determine the failed part.

Reference page(s) for the detailed procedure to perform INSPECTION is shown.

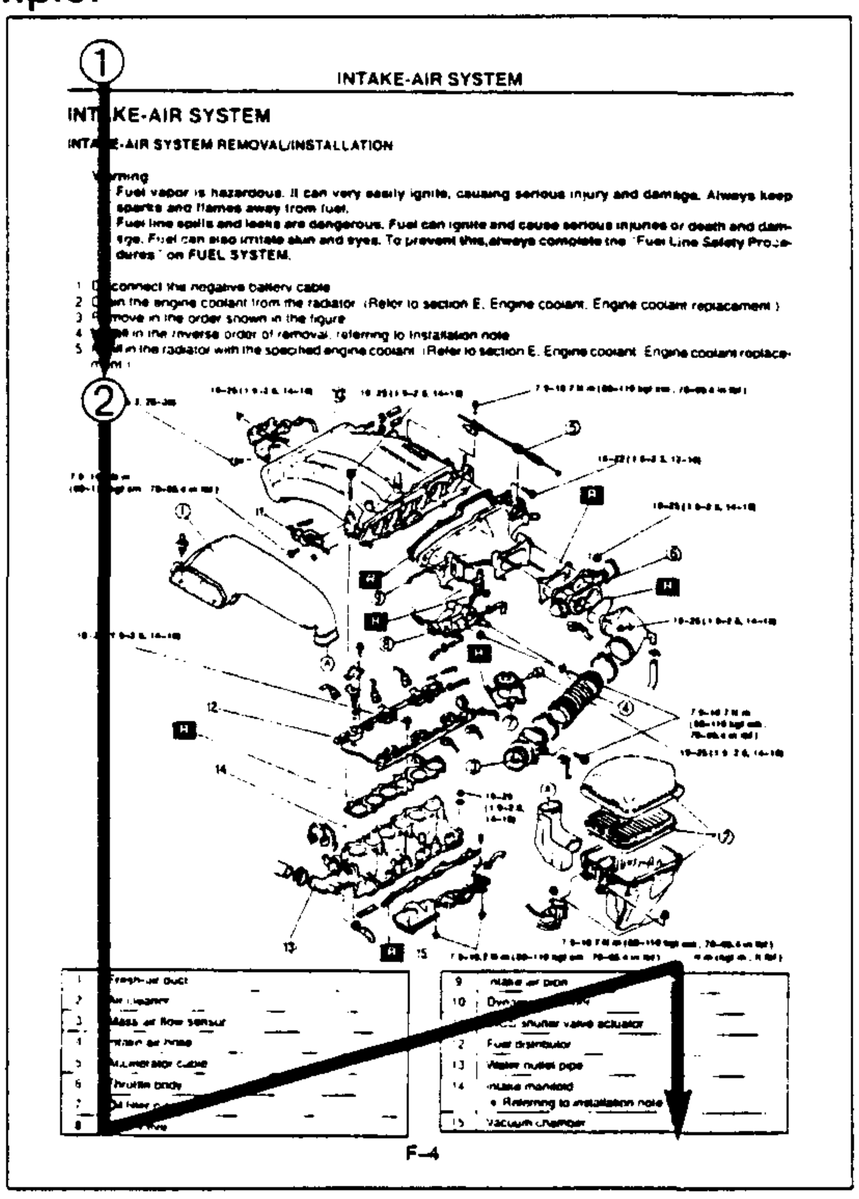
ACTION describes the appropriate action to take as a result (Yes/No) of INSPECTION.

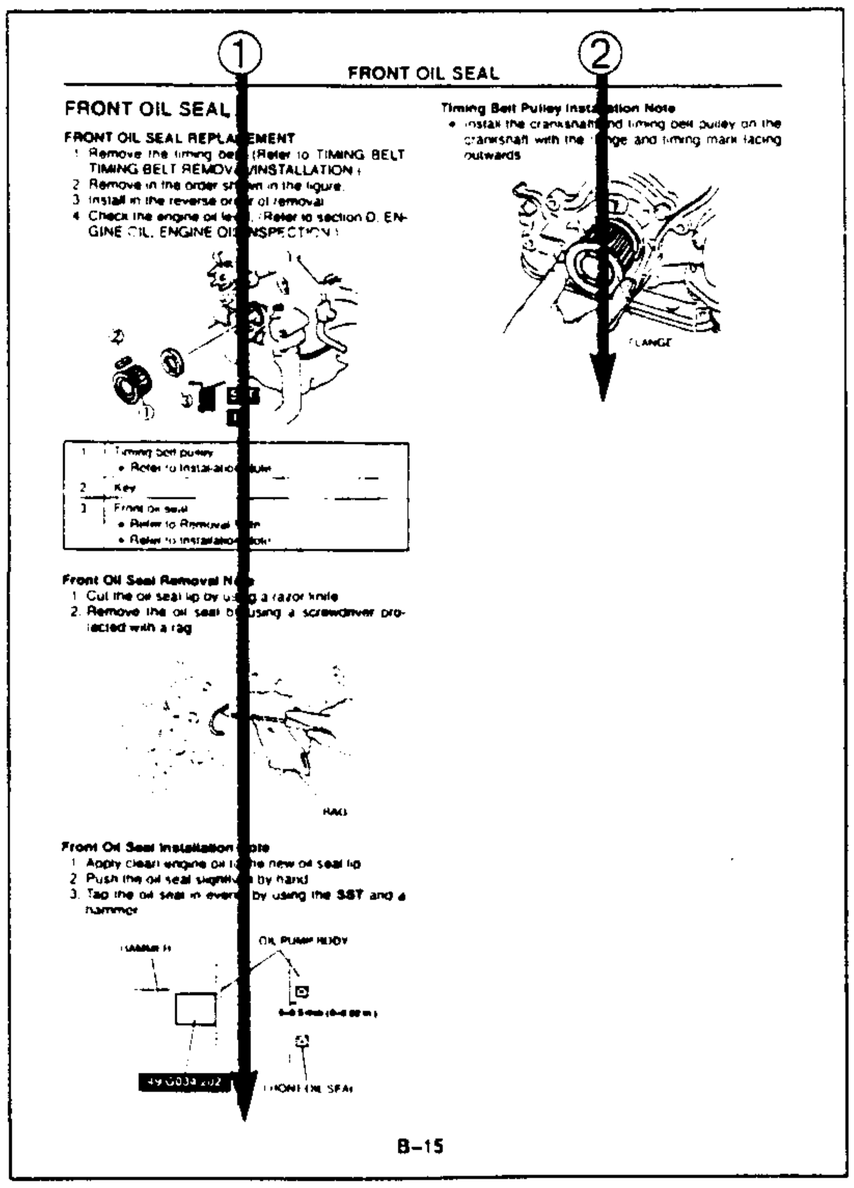
How to perform ACTION is described on the reference page shown.

TEXT SEQUENCE

- The text sequence is as indicated by the arrows shown below.

Example:





UNITS

Electrical current	A (ampere)
Electric potential	V (volt)
Electric power	W (watt)
Length	mm (millimeter)
	in (inch)
Negative pressure	kPa (kilo pascal)
	mmHg (millimeters of mercury)
	inHg (inches of mercury)
Positive pressure	kPa (kilo pascal)
	kgf/cm^2 (kilogram force per square centimeter)
	psi (pounds per square inch)
Resistance	Ω (ohm)
Speed	rpm (revolution per minute)
Torque	N·m (Newton meter)
	kgf·m (kilogram force per meter)
	kgf·cm (kilogram force per centimeter)
	ft·lbf (foot pound)
	in·lbf (inch pound)
Volume	L (liter)
	US qt (U.S. quart)
	Imp qt (Imperial quart)
	ml (milliliter)
	cc (cubic centimeter)
	cu in (cubic inch)
	fl oz (fluid ounce)
Weight	g (gram)
	oz (ounce)

Conversion to SI Units (Système International d'Unités)

- All numerical values in this manual are based on SI units. Numbers shown in conventional units are converted from these values.

Rounding off

- Converted values are rounded off to the same number of places are the SI unit value. For example, if the SI unit value is 17.2 and the value after conversion is 37.84, the converted value will be rounded off to 37.8.

Upper and lower limits

- When the data indicates upper and lower limits, the converted values are rounded down if the SI unit value is an upper limit and rounded up if the SI unit value is a lower limit. Therefore, converted values for the same SI unit value may differ after conversion. For example, consider 2.7 kgf/cm^2 in the following specifications:

  210—260 kPa { 2.1—2.7 kgf/cm^2 , 30—38 psi }
  270—310 kPa { 2.7—3.2 kgf/cm^2 , 39—45 psi }

- The actual converted values for 2.7 kgf/cm^2 are 264 kPa and 38.4 psi. In the top specification, 2.7 is used as an upper limit, so its converted values are rounded down to 260 and 38. In the bottom specification, 2.7 is used as a lower limit, so its converted values are rounded up to 270 and 39.

GI

NEW STANDARDS

- Following is a comparison of the previous standard and the new standard.

Previous Standard		New Standard		
Abbreviation	**Name**	**Abbreviation**	**Name**	**Remark**
—	Accelerator Pedal	AP	Accelerator Pedal	
—	Air Cleaner	ACL	Air Cleaner	
—	Air Conditioning	A/C	Air Conditioning	
—	Airflow Meter	VAF	Volume Air Flow Sensor	
—	Airflow Sensor	MAF	Mass Air Flow Sensor	
—	Alternator	GEN	Generator	
—	ATF Thermosensor	—	Transmission (Transaxle) Fluid Temperature Sensor	
—	Atmospheric Pressure	BARO	Barometric Pressure	
V_B	Battery Voltage	B+	Battery Positive Voltage	
—	Catalytic Converter	OC	Oxidation Catalytic Converter	
		TWC	Three Way Catalytic Converter	
		WU-TWC	Warm Up Three Way Catalytic Converter	#1
—	Circuit Opening Relay	FPR	Fuel Pump Relay	#2
—	Clutch Position	CPP	Clutch Pedal Position	
—	Crank Angle Sensor	CMP	Camshaft Position Sensor	
—	Crank Angle Sensor 2	CKP	Crankshaft Position Sensor	
—	Diagnosis Connector	DLC	Data Link Connector	
—	Diagnosis/Self-Diagnosis	OBD	On-Board Diagnostic	
—	Direct Ignition	DLI	Distributorless Ignition	
—	EC-AT Control Unit	TCM	Transmission (Transaxle) Control Module	
EGI	Electronic Gasoline Injection System	CIS	Continuous Fuel Injection System	
—	Electronic Spark Ignition	EI	Electronic Ignition	#3
ECU	Engine Control Unit	PCM	Powertrain Control Module	#4
		ECM	*Engine Control Module*	
—	Engine Modification	EM	Engine Modification	
—	Engine RPM Signal	—	Engine Speed Input Signal	
—	Evaporative Emission	EVAP	Evaporative Emission	
—	Exhaust Gas Recirculation	EGR	Exhaust Gas Recirculation	
—	Fan Control	FC	Fan Control	
—	Feedback System	CLS	Closed Loop System	
—	Flexible Fuel	FF	Flexible Fuel	
—	Fuel Pump	FP	Fuel Pump	
—	Fully Closed	CTP	Closed Throttle Position	
—	Fully Open	WOT	Wide Open Throttle	
—	Ground/Earth	GND	Ground	
—	IC Regulator	VR	Voltage Regulator	

#1 : Directly connected to exhaust manifold
#2 : In some models, there is a fuel pump relay that controls pump speed. That relay is now called the fuel pump relay (speed).
#3 : Controlled by the ECM/PCM
#4 : Device that controls engine and powertrain

NEW STANDARDS

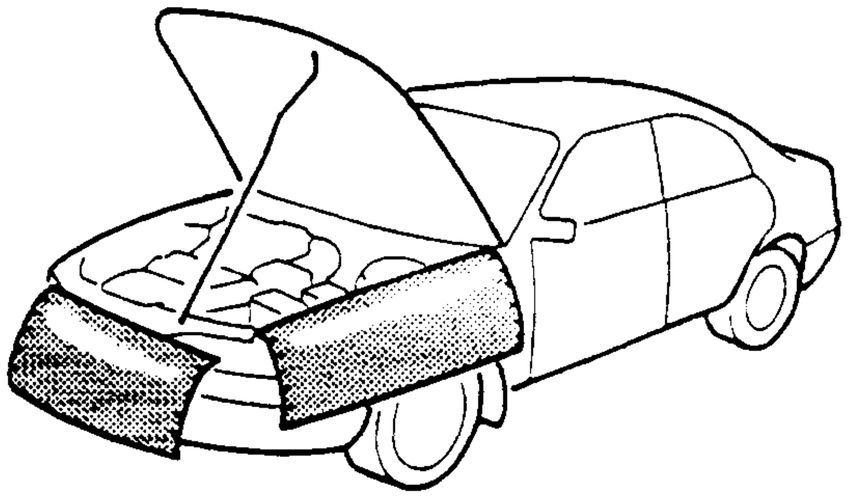
Previous Standard		New Standard		
Abbreviation	**Name**	**Abbreviation**	**Name**	**Remark**
—	Idle Speed Control	IAC	Idle Air Control	
—	Idle Switch	—	Closed Throttle Position Switch	
—	Igniter	ICM	Ignition Control Module	
—	Inhibitor	TR	Transmission (Transaxle) Range	
—	Intake Air Pressure	MAP	Manifold Absolute Pressure	
—	Intake Air Thermo	IAT	Intake Air Temperature	
—	Intercooler	CAC	Charge Air Cooler	
—	Knock Sensor	KS	Knock Sensor	
—	Line Pressure Solenoid Valve	—	Pressure Control Solenoid	
—	Lock-up	TCC	Torque Converter Clutch	
—	Malfunction Indicator Light	MIL	Malfunction Indicator Lamp	
—	Multiport Fuel Injection	MFI	Multiport Fuel Injection	
—	Open Loop	OL	Open Loop	
–	Overdrive	4GR	Fourth Gear	
—	Oxygen Sensor	HO2S	Heated Oxygen Sensor	With heater
		O2S	Oxygen Sensor	
—	Park/Neutral Range	PNP	Park/Neutral Position	
—	Power Steering Pressure	PSP	Power Steering Pressure	
—	Pulse Generator	—	Input/Turbine Speed Sensor	
—	Reed Valve	SAPV	Secondary Air Pulse Valve	
—	Secondary Air Injection System	PAIR	Pulsed Secondary Air Injection	Pulsed injection
		AIR	Secondary Air Injection	Inject with compressor
—	Sequential Fuel Injection	SFI	Sequential Multipoint Fuel Injection	
—	Service Code(s)	DTC	Diagnostic Trouble Code(s)	
—	Spark Ignition	DI	Distributor Ignition	
—	Stoplight Switch	—	Brake Switch	
—	Test Mode	DTM	Diagnostic Test Mode	#5
—	Throttle Body	TB	Throttle Body	
—	Throttle Sensor	TP	Throttle Position Sensor	
—	Turbocharger	TC	Turbocharger	
—	Vehicle Speed Sensor	VSS	Vehicle Speed Sensor	
—	Vehicle Speed Sensor 1	—	Output Speed Sensor	
—	Water Thermo	ECT	Engine Coolant Temperature	
—	1—2 Shift Solenoid Valve Shift+A Solenoid Valve	—	Shift Solenoid A	
—	2—3 Shift Solenoid Valve Shift+B Solenoid Valve	—	Shift Solenoid B	
—	3—4 Shift Solenoid Valve	—	Shift Solenoid C	
—	3rd Gear	3GR	Third Gear	
—	—	—	Incorrect Gear Ratio	

#5 : Diagnostic trouble codes depend on the diagnostic test mode

FUNDAMENTAL PROCEDURES

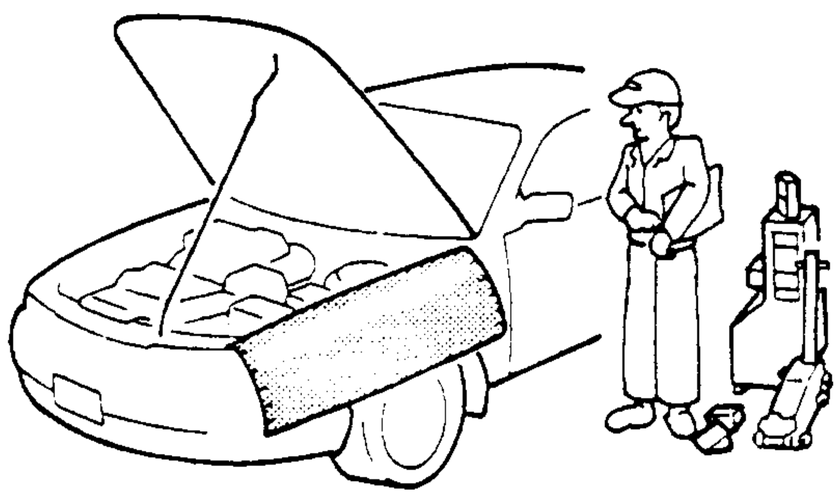
PROTECTION OF THE VEHICLE

- Always be sure to cover fenders, seats, and floor areas before starting work.



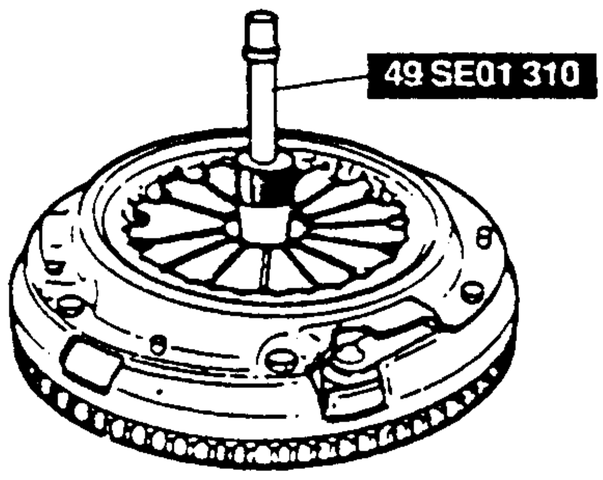
PREPARATION OF TOOLS AND MEASURING EQUIPMENT

- Be sure that all necessary tools and measuring equipment are available before starting any work.



SPECIAL TOOLS

- Use special tools when they are required.

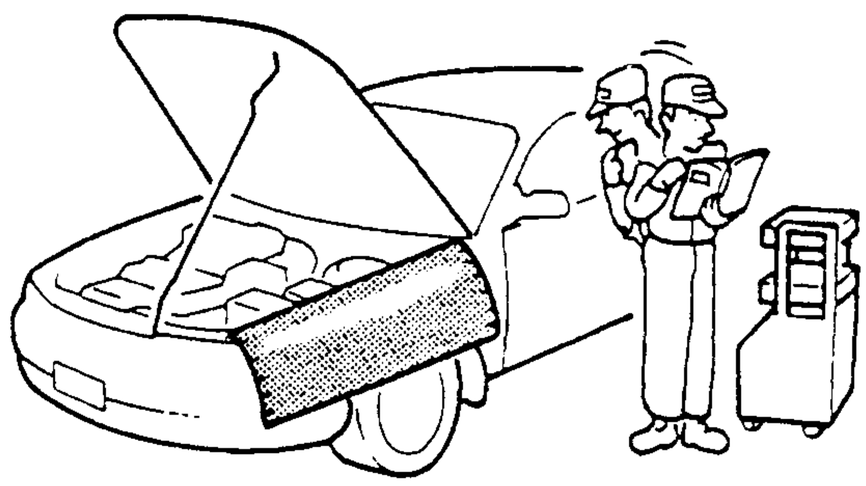


DISCONNECTION OF THE NEGATIVE BATTERY CABLE

- Before beginning any work, turn the ignition switch to LOCK, then disconnect the negative battery cable and wait for more than 1 minute to allow the backup power supply of the SAS unit and side air bag sensors to deplete its stored power.

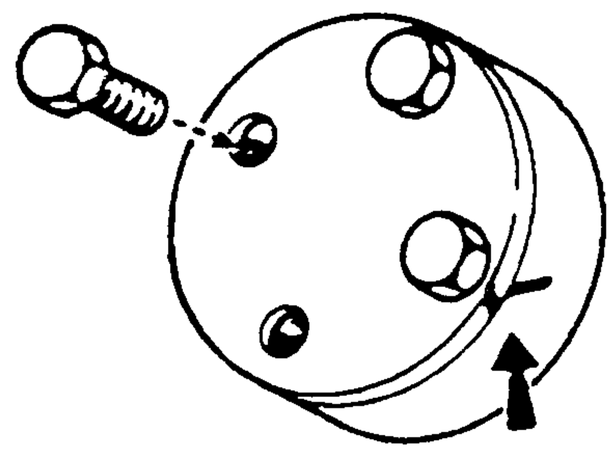
REMOVAL OF PARTS

- While correcting a problem, try also to determine its cause. Begin work only after first learning which parts and subassemblies must be removed and disassembled for replacement or repair. After removing the part, plug all holes and ports to prevent foreign material from entering.



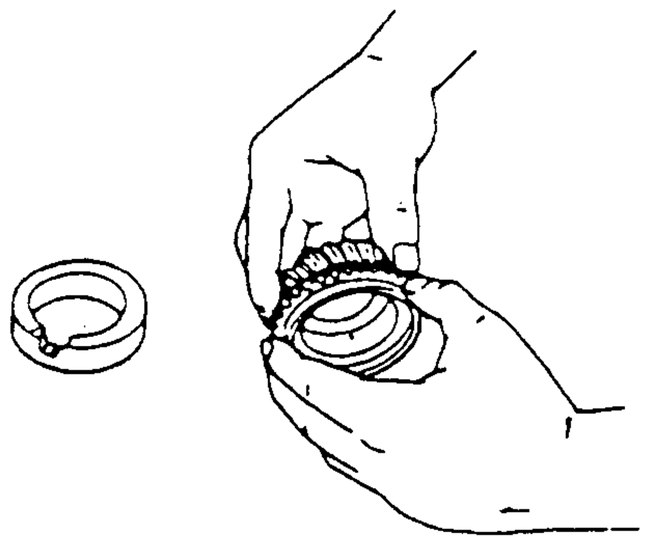
DISASSEMBLY

- If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be disassembled in a way that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



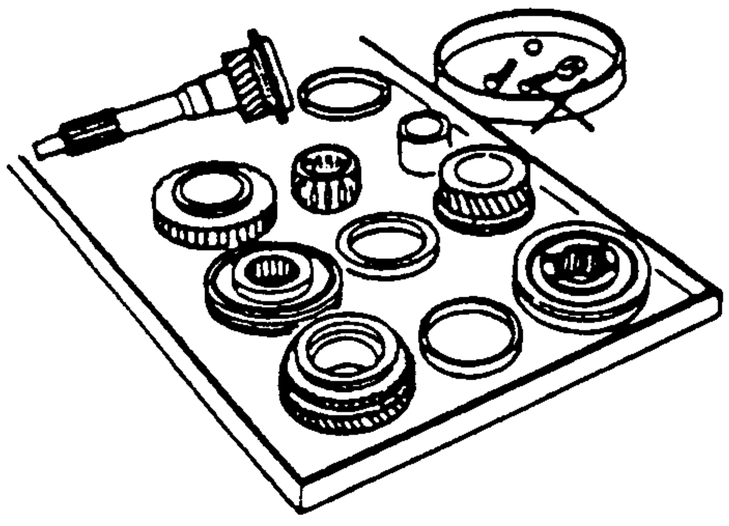
INSPECTION DURING REMOVAL, DISASSEMBLY

- When removed, each part should be carefully inspected for malfunctioning, deformation, damage, and other problems.



ARRANGEMENT OF PARTS

- All disassembled parts should be carefully arranged for reassembly.
- Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.

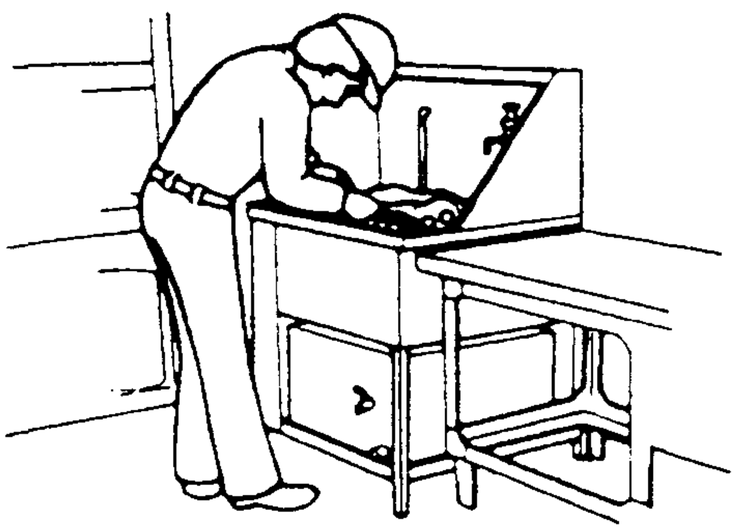


CLEANING OF PARTS

- All parts to be reused should be carefully and thoroughly cleaned in the appropriate method.

Warning

- **Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eye wear whenever using compressed air.**

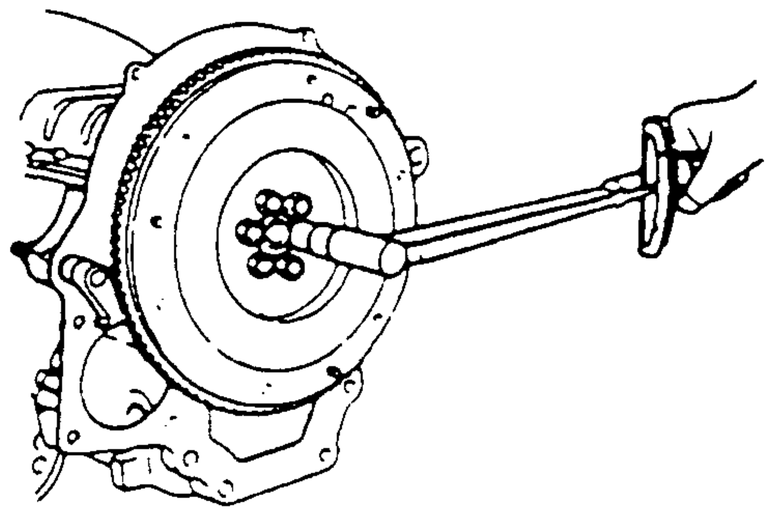


REASSEMBLY

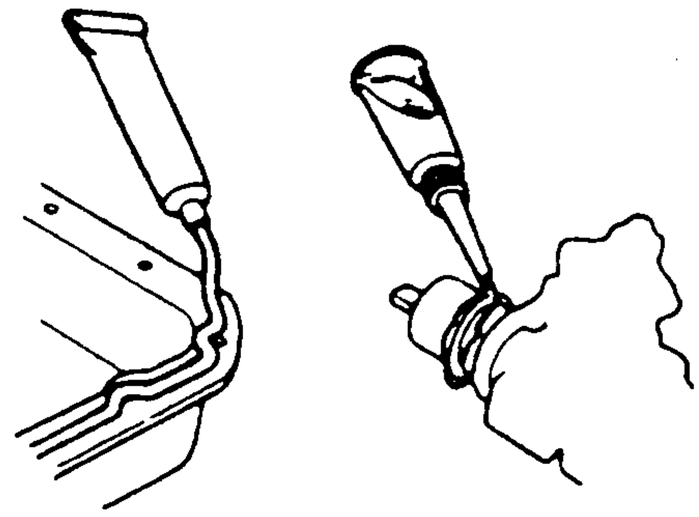
- Standard values, such as torques and certain adjustments, must be strictly observed in the reassembly of all parts.

If removed, these parts should be replaced with new ones:

1	Oil seals	2	Gaskets
3	O-rings	4	Lockwashers
5	Cotter pins	6	Nylon nuts

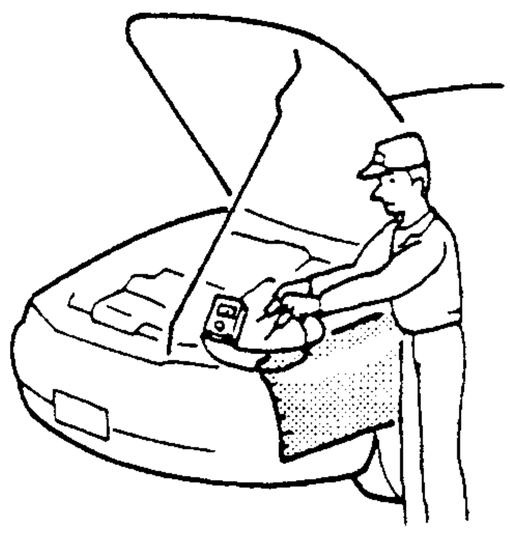


1. Sealant, gasket, or both should be applied to the specified locations. When sealant is applied, parts should be installed before sealant hardens. Hardened sealant causes leaks.
2. Oil should be applied to the moving components of parts.
3. Specified oil or grease should be applied at the prescribed locations (such as oil seals) before reassembly.



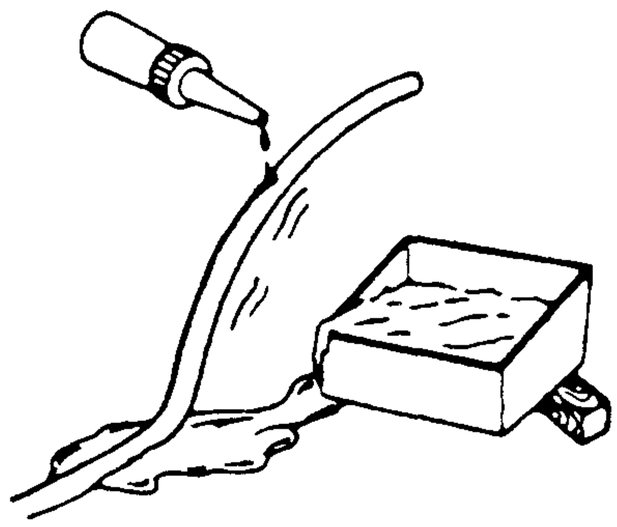
ADJUSTMENT

- Use suitable gauges and testers when making adjustments.



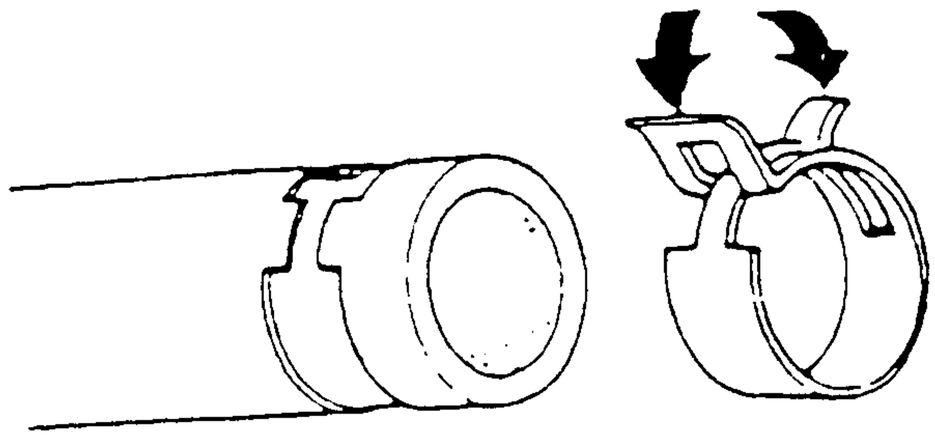
RUBBER PARTS AND TUBING

- Prevent gasoline or oil from getting on rubber parts or tubing.



HOSE CLAMPS

- When reinstalling, position the hose clamp in the original location on the hose, and squeeze the clamp lightly with large pliers to ensure a good fit.

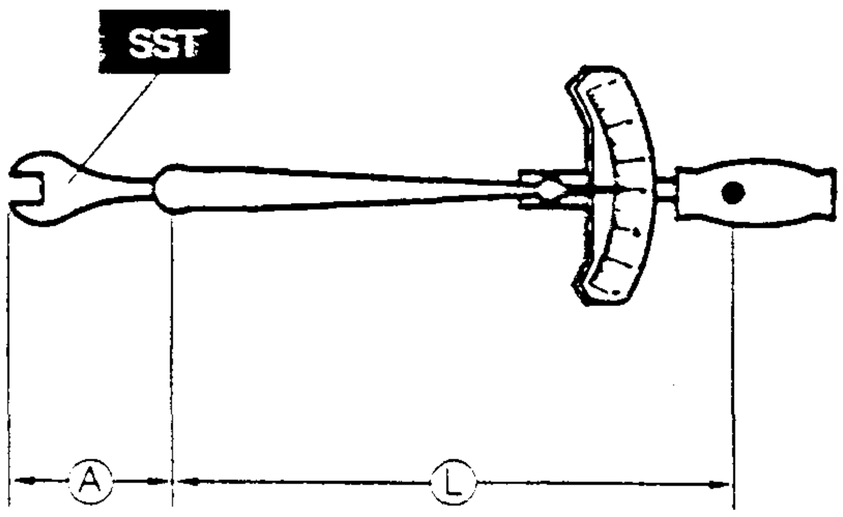


TORQUE FORMULAS

- When using a torque wrench-**SST** combination, the written torque must be recalculated due to the extra length that the **SST** adds to the torque wrench. Recalculate the torque by using the following formulas. Choose the formula that applies to you.

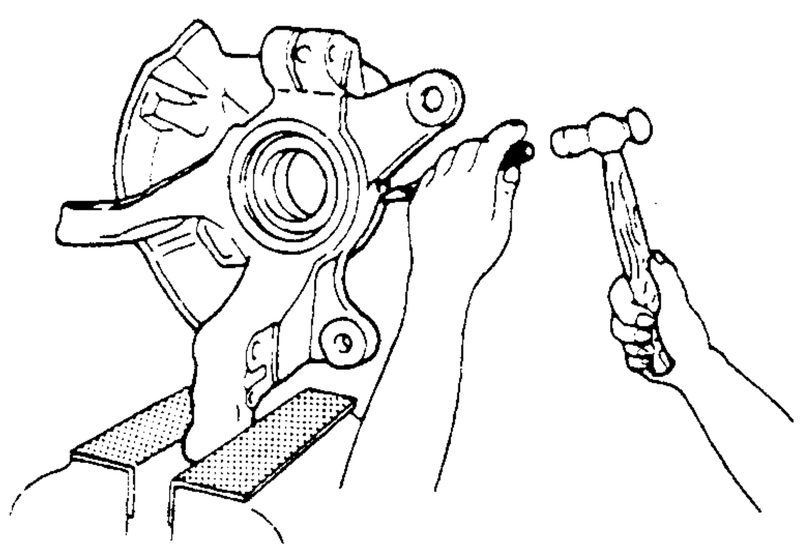
Torque Unit	Formula
kgf·m	kgf·m × [L/(L+A)]
kgf·cm	kgf·cm × [L/(L+A)]
ft·lbf	ft·lbf × [L/(L+A)]
in·lbf	in·lbf × [L/(L+A)]

A: The length of the **SST** past the torque wrench drive.
L: The length of the torque wrench.



VISE

- When using a vise, put protective plates in the jaws of the vise to prevent damage to parts.



DYNAMOMETER

When test-running a vehicle on dynamometer

- Place a fan, preferably a vehicle-speed proportional type, in front of the vehicle.
- Connect an exhaust gas ventilation unit.
- Cool the exhaust pipes with a fan.
- Keep the area around the vehicle uncluttered.
- Watch the water temperature gauge.

Note

- ABS warning light illuminates when the vehicle is on a chassis roller and rotate only front wheel for more than **20 seconds** (60 seconds for ABS/TCS model). Turn ignition switch OFF and ON again, then drive the vehicle faster than **20 km/h {12.4 mph }**. Verify that ABS warning light goes out. DTC does not memorized.

INSTALLATION OF RADIO SYSTEM

If a radio system is installed improprerly or if a high-powered type is used, the CIS and other systems my be affected.
When the vehicle is to be equipped with a radio, observe the following precautions.

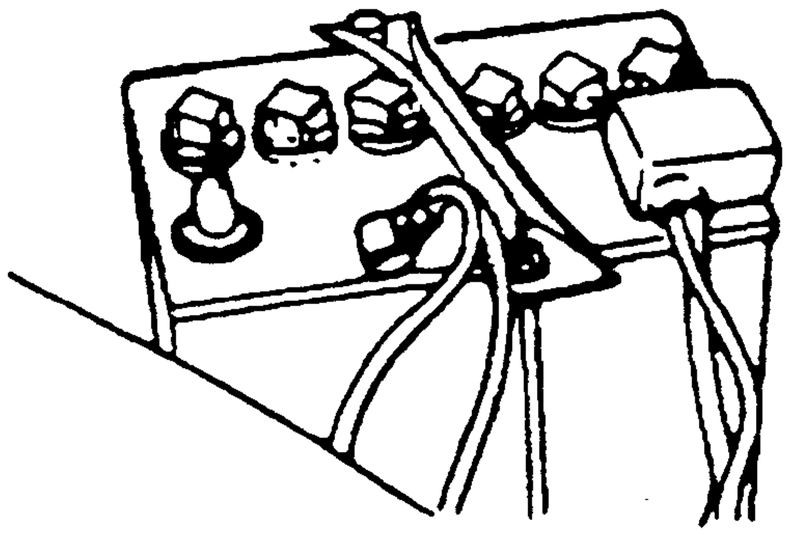
1. Install the antenna at the farthest point from control modules.
2. Install the antenna feeder as far as possible from the control modules harness, and perpendicular to wiring harnesses.
3. Do not install a high-powered radio system.
4. After installing the radio system, start and idle the engine, then confirm that the engine is not influenced by output waves from the system.

ELECTRICAL SYSTEM

ELECTRICAL PARTS

Battery Cable

- Before disconnecting connectors or removing electrical parts, disconnect the negative battery cable.



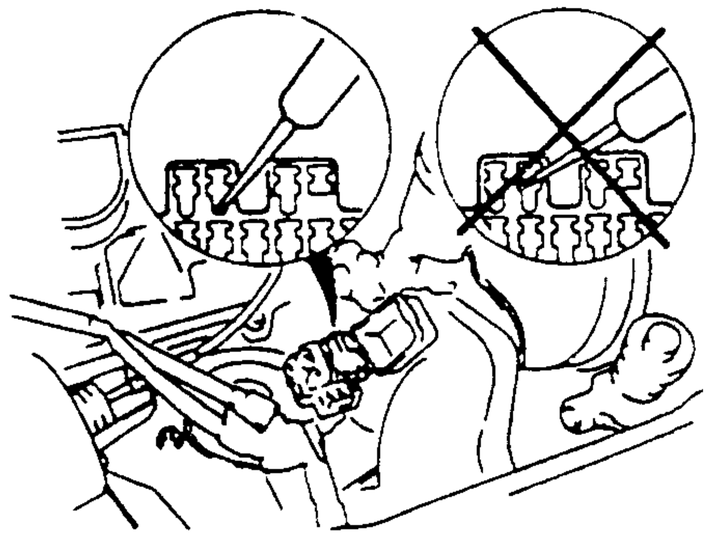
CONNECTORS

Data Link Connector

- Insert the probe into the service hole when connecting a jumper wire to the data link connector.

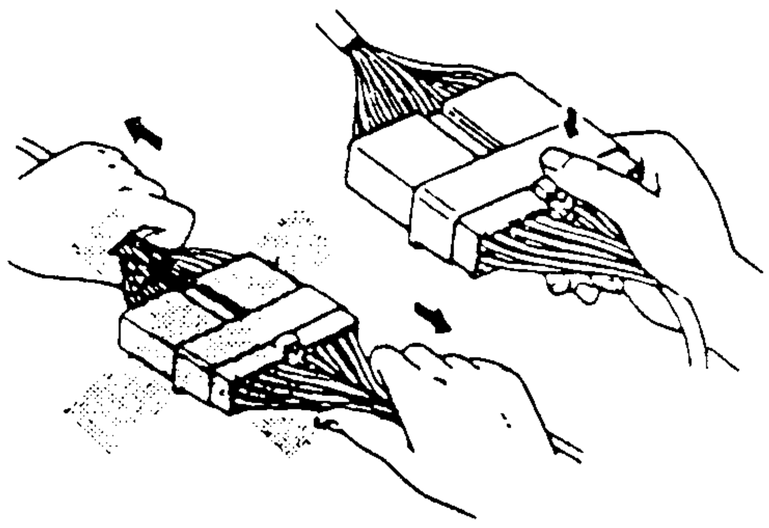
Caution

- **Inserting a jumper wire probe into the data link connector terminal may damage the terminal.**

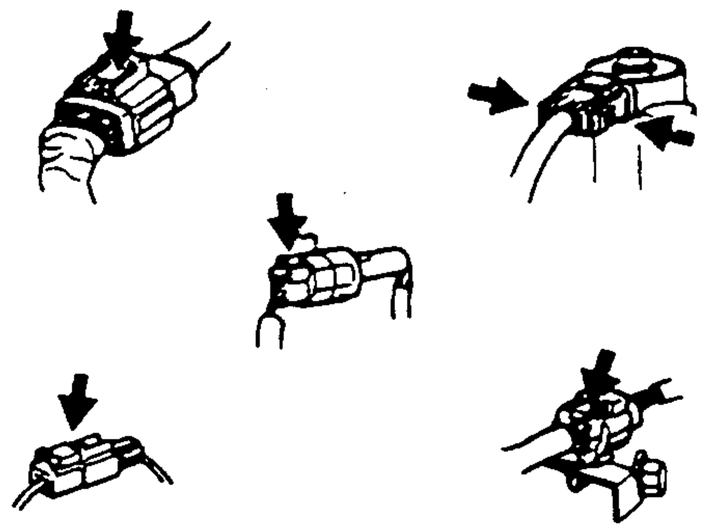


Disconnecting Connectors

- When disconnecting two connectors, grasp the connectors, not the wires.

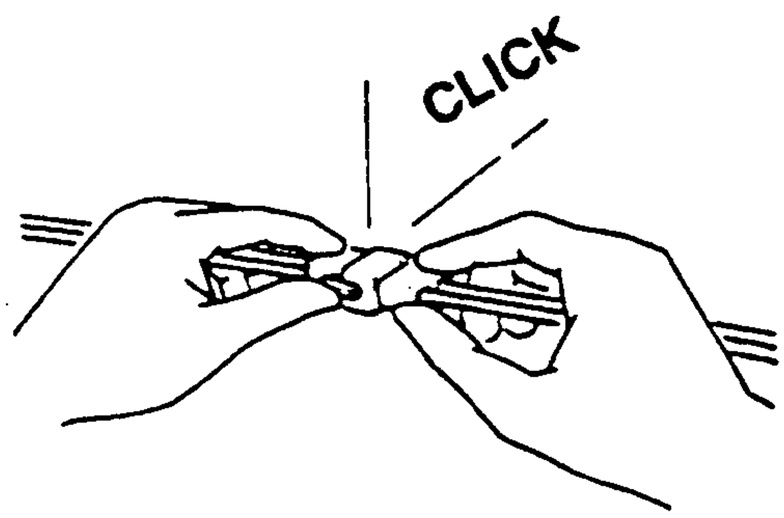


- Connectors can be disconnected by pressing or pulling the lock lever as shown.



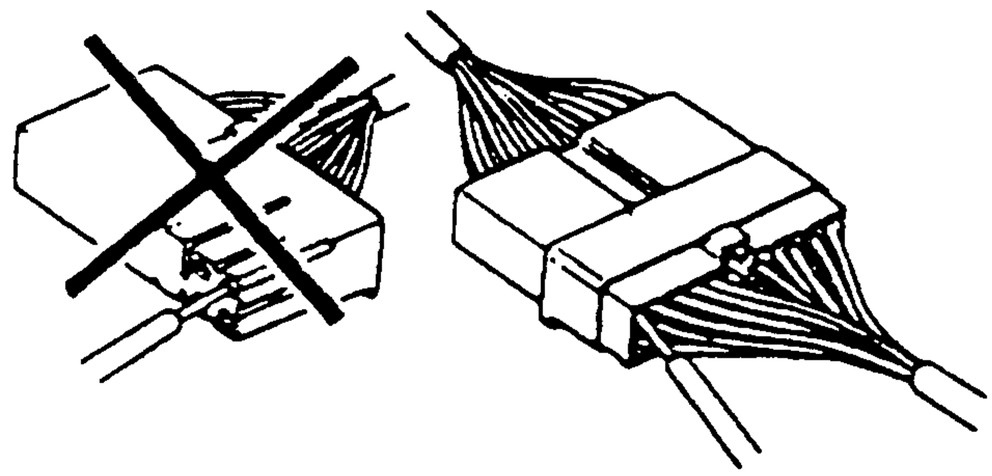
Locking Connector

- When locking connectors, listen for a click that will indicate they are securely locked.



Inspection

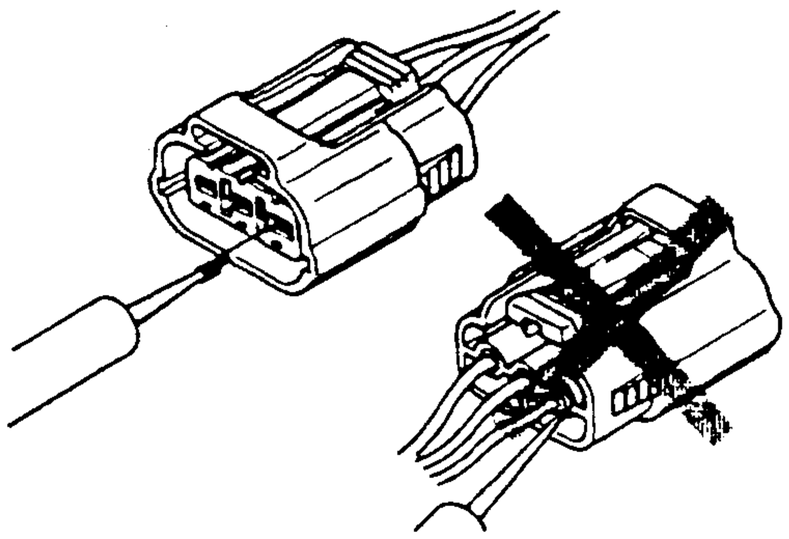
1. When a tester is used to check for continuity or to measure voltage, insert the tester probe from the wiring harness side.



2. Check the terminals of waterproof connectors from the connector side, as they cannot be accessed from the wiring harness side.

Caution

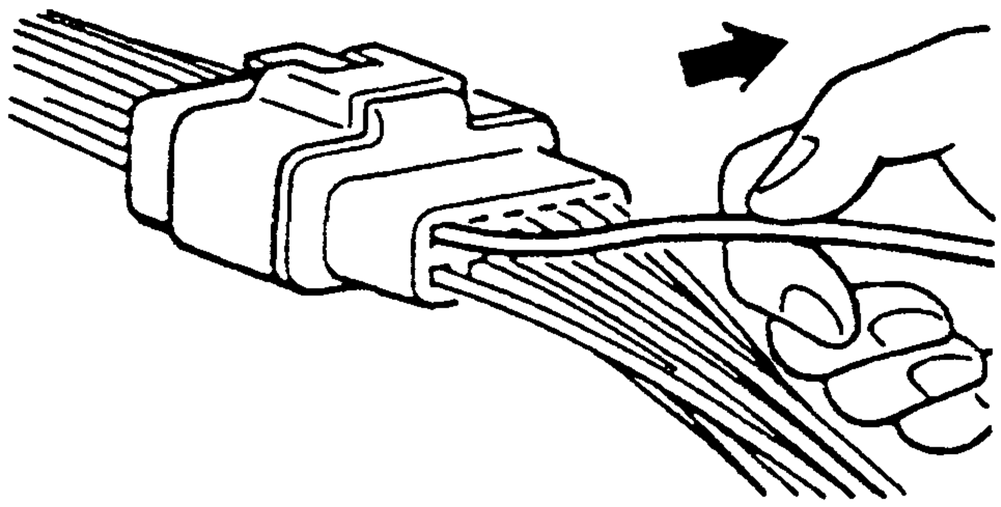
- **To prevent damage to the terminal, wrap a thin wire around the lead before inserting it into the terminal.**



Terminals

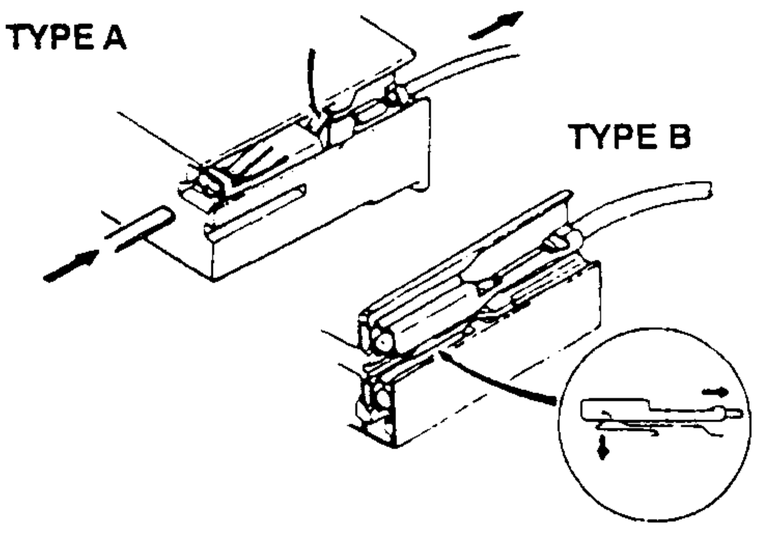
Inspection

- Pull lightly on individual wires to check that they are secured in the terminal.



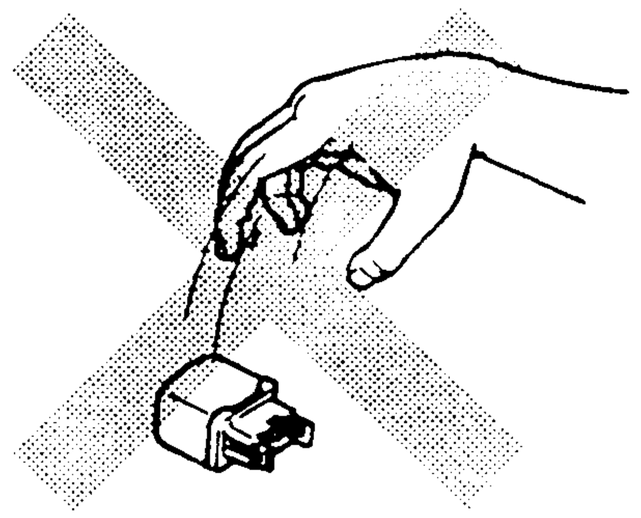
Replacement

- Use the appropriate tools to remove a terminal as shown. When installing a terminal, be sure to insert it until it locks securely.
- Insert a thin piece of metal from the terminal side of the connector, and then, with the terminal locking tab pressed down, pull the terminal out from the connector.



Sensors, Switches, and Relays

- Handle sensors, switches, and relays carefully. Do not drop them or strike them against other objects.

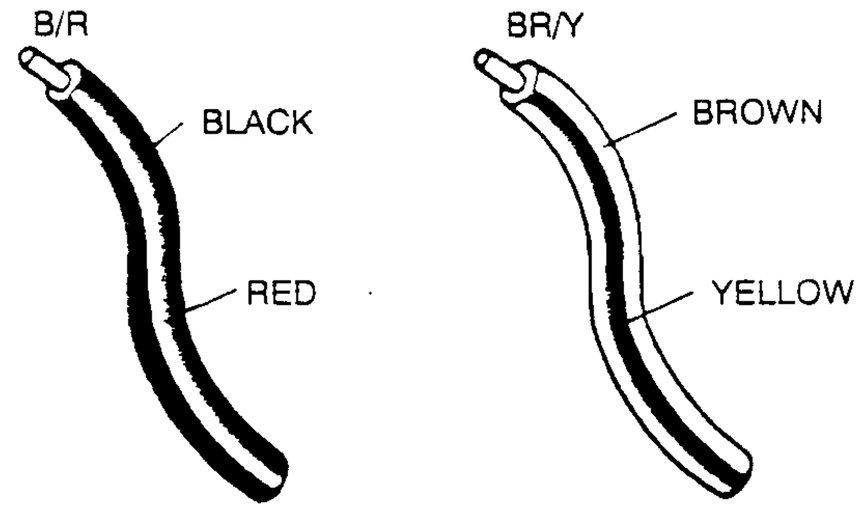


Wiring Harness

Wiring color codes

- Two-color wires are indicated by a two-color code symbol.
- The first letter indicates the base color of the wire and the second the color of the stripe.

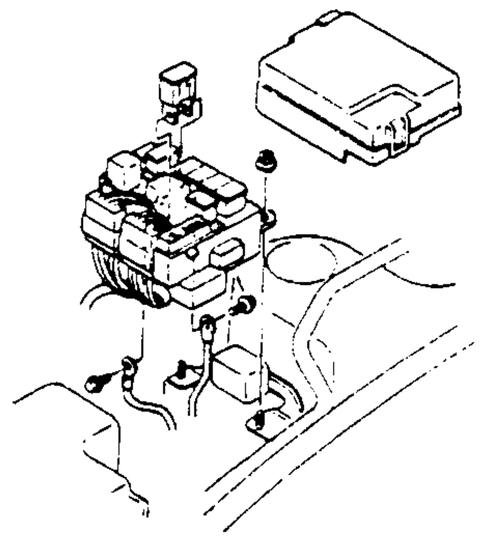
CODE	COLOR		CODE	COLOR
B	Black		O	Orange
BR	Brown		P	Pink
G	Green		R	Red
GY	Gray		V	Violet
L	Blue		W	White
LB	Light Blue		Y	Yellow
LG	Light Green			



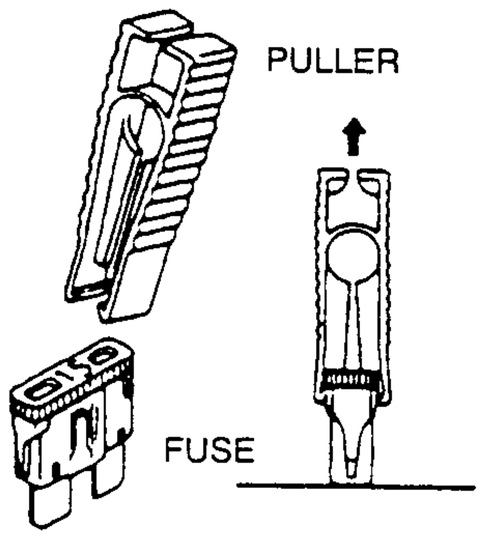
Fuse

Replacement

1. When replacing a fuse, be sure to replace it with one of the specified capacity. If a fuse again fails after it has been replaced, the circuit probably has a short and the wiring should be checked.
2. Be sure the negative battery terminal is disconnected before replacing a main fuse.



3. When replacing a pullout fuse, use the fuse puller.



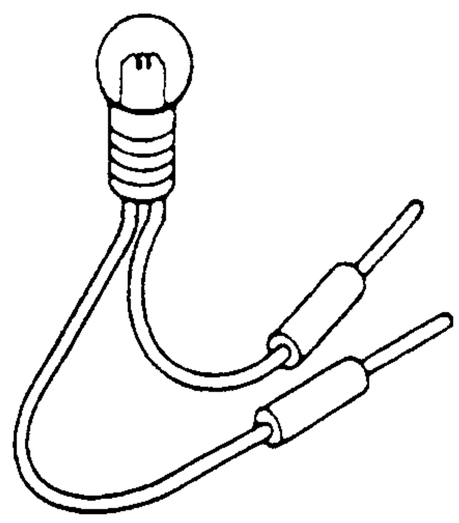
ELECTRICAL TROUBLESHOOTING TOOLS

Test Light

- The test light, as shown in the figure, uses a 12 V bulb. The two lead wires should be connected to probes. The test light is used for simple voltage checks and for checking for short circuits.

Caution

- **Using a bulb over 3.4 W when checking the control unit may damage the control unit.**

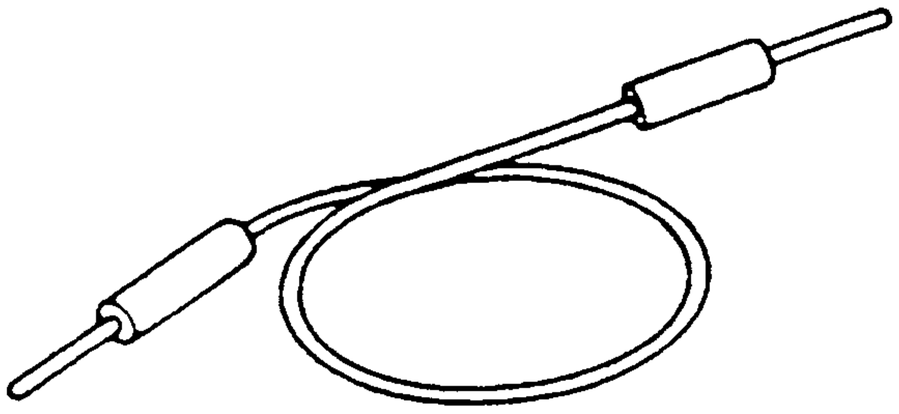


Jumper Wire

- A jumper wire is used to create a temporary circuit. Connect the jumper wire between the terminals of a circuit to bypass a switch.

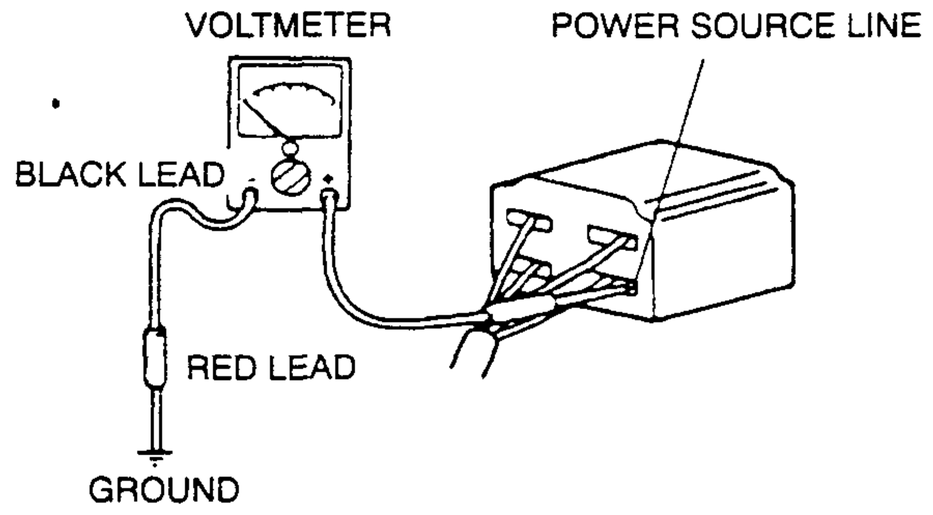
Caution

- **Do not connect a jumper wire from the power source line to a body ground; this may cause burning or other damage to wiring harnesses or electronic components.**



Voltmeter

- The DC voltmeter is used to measure circuit voltage. A voltmeter with a range of 15 V or more is used by connecting the positive (+) probe (red lead wire) to the point where voltage is to be measured and the negative (–) probe (black lead wire) to a body ground.

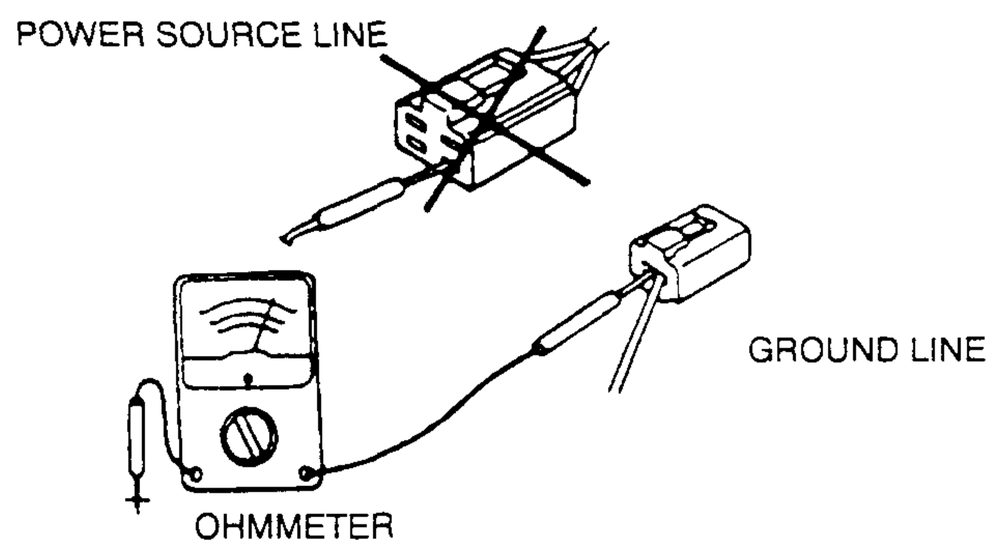


Ohmmeter

- The ohmmeter is used to measure the resistance between two points in a circuit, and to check for continuity and short circuits.

Caution

- **Do not connect the ohmmeter to any circuit to which voltage is applied. This will damage the ohmmeter.**



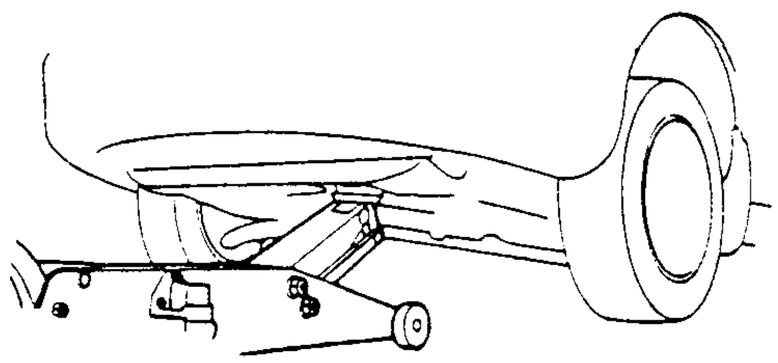
JACKING POSITIONS

Warning

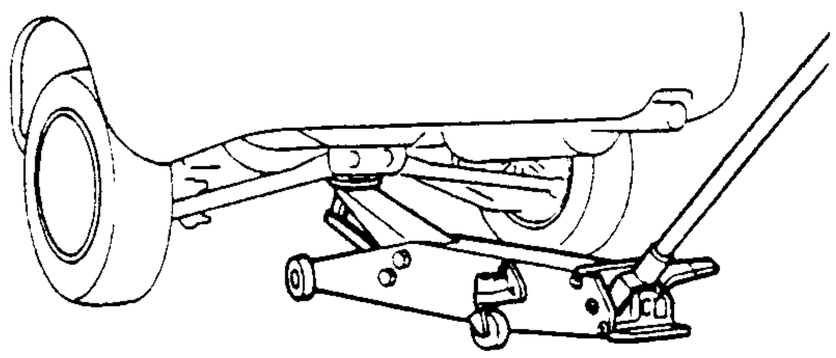
- **Improperly jacking a vehicle is dangerous. The vehicle can slip off the jack and cause serious injury. Use only the correct front and rear jacking positions and block the wheels.**

Use safety stands to support the vehicle after it has been lifted.

FRONT

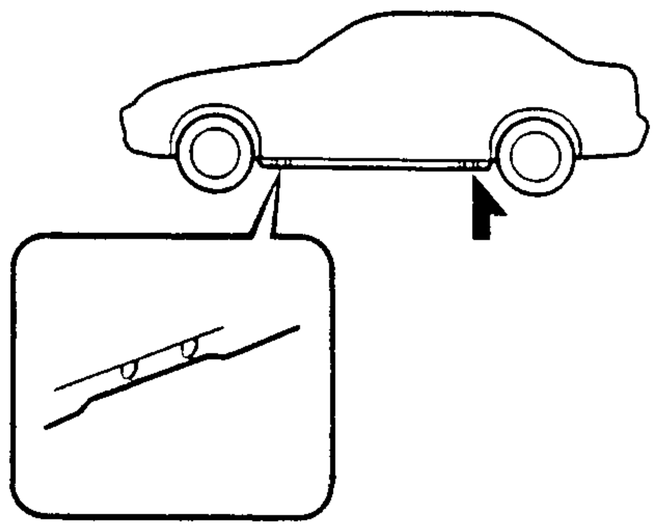


REAR



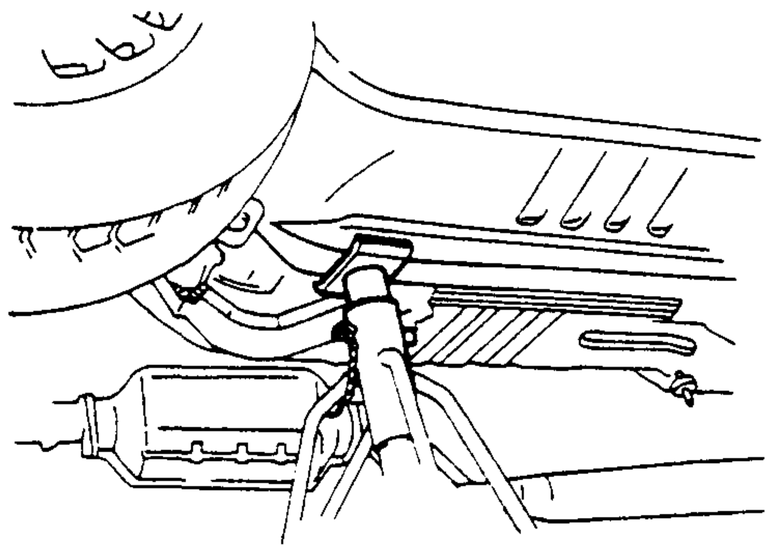
VEHICLE LIFT (2 SUPPORTS) POSITIONS

FRONT AND REAR

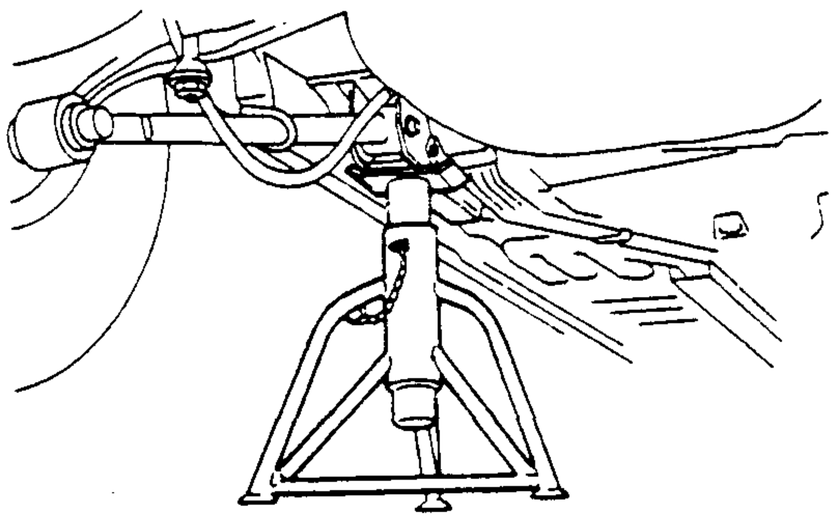


SAFETY STAND POSITIONS

FRONT



REAR

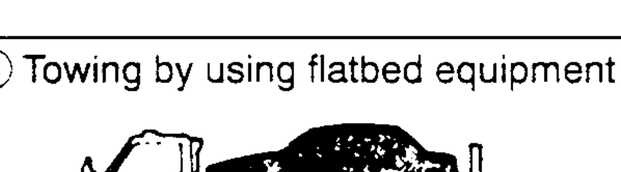


TOWING

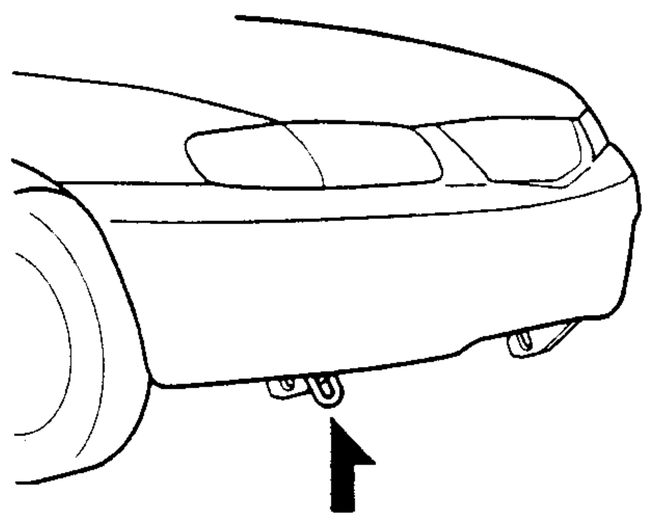
- Proper towing equipment is necessary to prevent damage to the vehicle.
- Laws and regulations applicable to vehicles in tow must always be observed.
- As a general rule, towed vehicles should be pulled with the driving wheels off the ground. If excessive damage or other conditions prevent towing the vehicle with the driving wheels off the ground, use wheel dollies.
- For vehicles which are not equipped with towing hooks, do not use the tiedown hooks except during emergencies (stuck in snow, etc.). If it is necessary to use the towing hooks, use a rope or chain and tow the vehicle forward only.

Caution

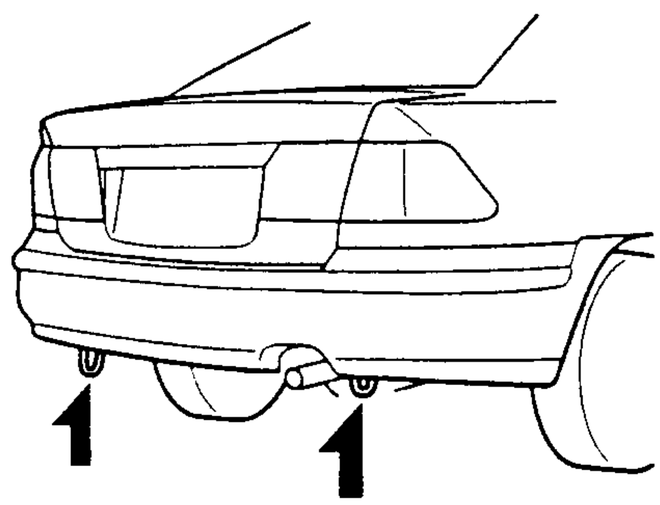
- **Don't use the tiedown hooks under the front and rear for towing. They are designed ONLY for tying down the vehicle when it's being transported. Using them for towing will damage the bumper.**

TOWING METHOD	PARKING BRAKE	TRANSAXLE/ TRANSMISSION SHIFT LEVER POSITION	REMARKS
① Towing by using a rope 	Released	Neutral	Set iginition switch in ACC or ON position.
② Towing with the front or rear wheels off the ground	Released	Neutral	Remove the propeller shaft. (4-wheel drive vehicles)
③ Towing by using wheel dollies	Released	Neutral	Remove the propeller shaft. (4-wheel drive vehicles)
④ Towing by using flatbed equipment	Set	Any position	Secure vehicle so it does not move.

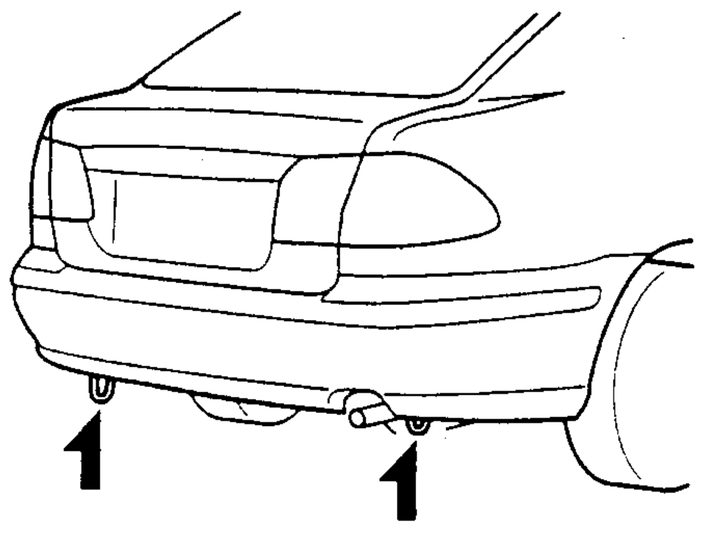
TOWING HOOK
FRONT



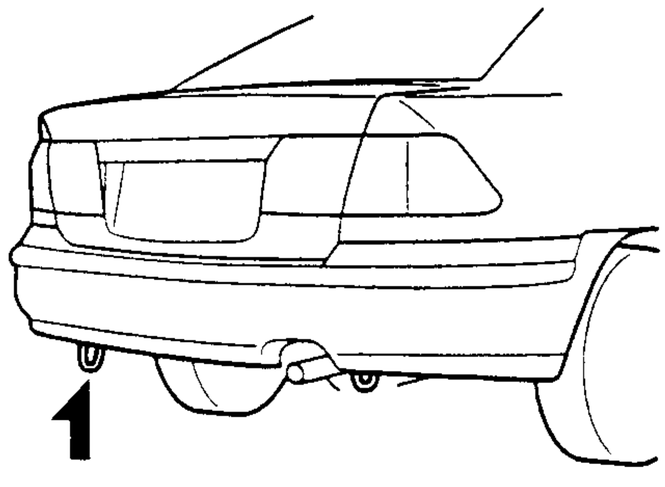
REAR
SEDAN



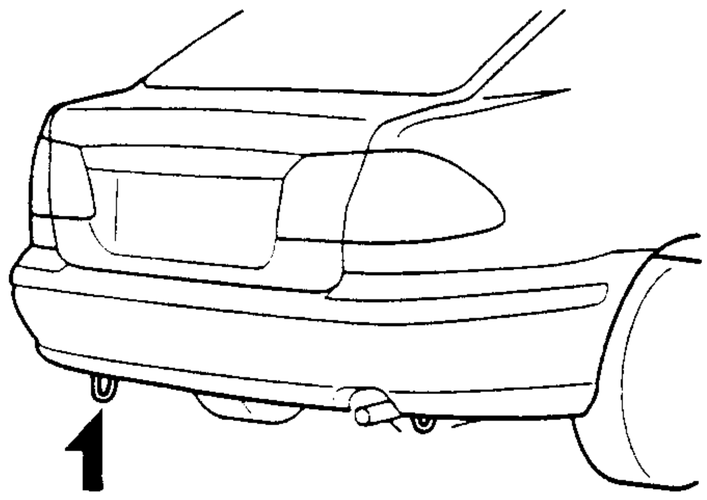
HATCHBACK



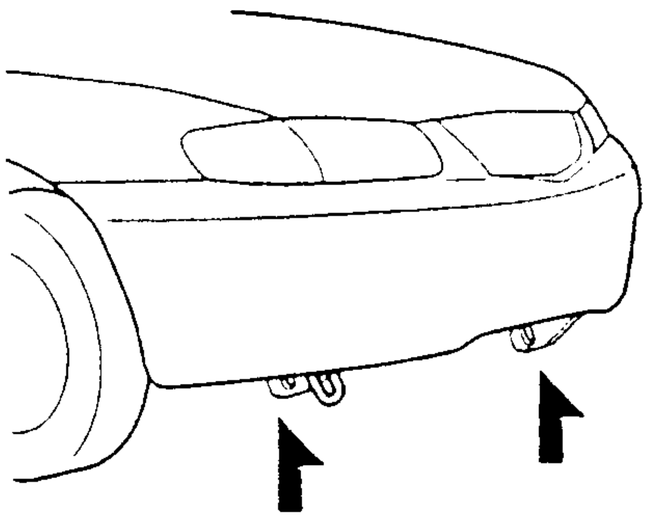
REAR
SEDAN



HATCHBACK

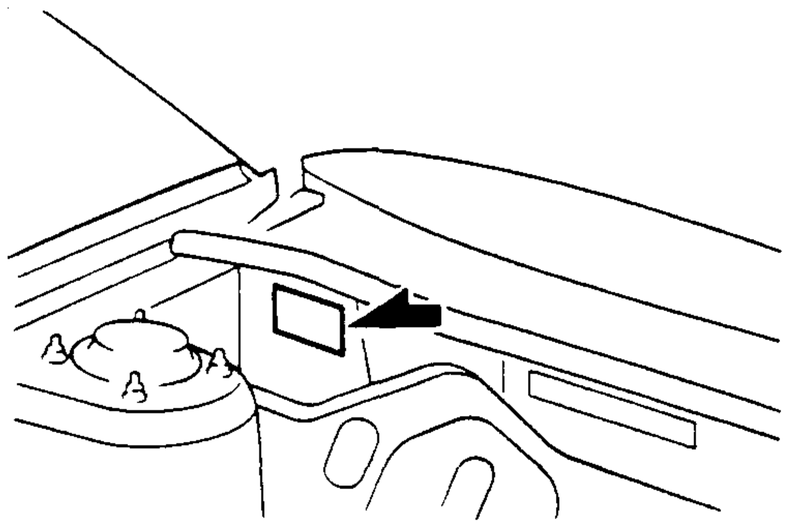


TIEDOWN HOOKS
FRONT

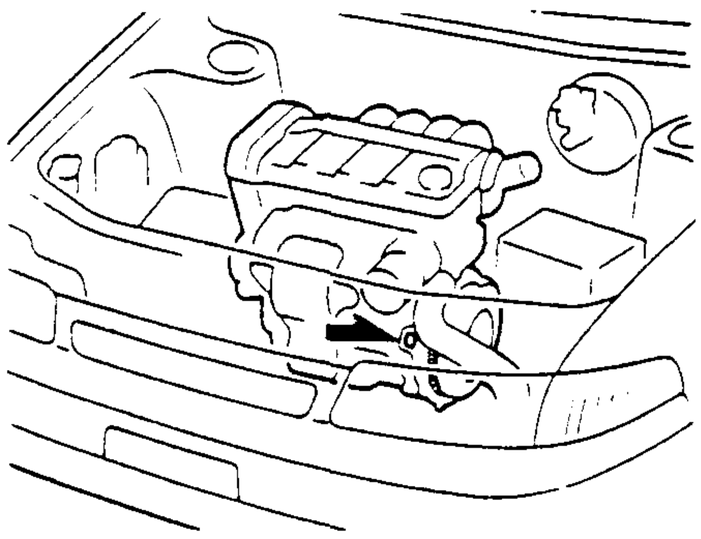


IDENTIFICATION NUMBER LOCATIONS

VEHICLE IDENTIFICATION NUMBER



ENGINE IDENTIFICATION NUMBER



ABBREVIATIONS

ABS	Anti-lock brake system
ACC	Accessories
ATF	Automatic transaxle fluid
ATX	Automatic transaxle
CM	Control module
CID	Cylinder identification
COM	Communication
DEF	Defroster
EX	Exhaust
FET	Field-effect transistor
HI	High
HU	ABS hydraulic unit
IG	Ignition
IGN	Ignition
IN	Intake
INT	Intermittent
KAM	Keep alive memory
KAPWR	Keep alive power
LCD	Liquid crystal display
LED	Light emitting diode
LF	Left front
LH	Left hand
L.H.D.	Left hand drive
LO	Low
LR	Left rear
M	Motor
MOS	Metal oxide semiconductor
MTX	Manual transaxle
OFF	Switch off
ON	Switch on
PCV	Positive crankcase ventilation
PRC	Pressure regulator control
P/S	Power steering
PWR GND	Power ground
REC	Recirculate
RF	Right front
RH	Right hand
R.H.D.	Right hand drive
RR	Right rear
RTN	Return
SAS	Sophisticated air bag sensor
SIG	Signal
SST	Special service tool
SW	Switch
TCS	Traction control system
TNS	Tail number side lights
VPWR	Vehicle power
VREF	Reference voltage
1GR	First gear
2GR	Second gear
5HB	5 Door Hatchback

PRE-DELIVERY INSPECTION

PRE-DELIVERY INSPECTION TABLE

EXTERIOR

INSPECT and **ADJUST**, if necessary, the following items to specification:
- ☐ Glass, exterior bright metal and paint for damage
- ☐ Wheel lug nuts
- ☐ Tire pressures
- ☐ All weatherstrips for damage or detachment
- ☐ Operation of bonnet release and lock
- ☐ Operation of trunk lid (liftgate) and fuel lid opener
- ☐ Door operation and alignment
- ☐ Headlight aiming

INSTALL the following parts:
- ☐ Wheel caps or rings (if equipped)

UNDER BONNET-ENGINE OFF

INSPECT and **ADJUST**, if necessary, the following items to specification:
- ☐ Fuel, coolant and hydraulic lines, fittings, connections and components for leaks
- ☐ Engine oil level
- ☐ Power steering fluid level
- ☐ Brake and clutch master cylinder fluid level
- ☐ Windshield washer reservoir fluid level
- ☐ Radiator coolant level and specific gravity
- ☐ Tightness of water hose clamps
- ☐ Tightness of battery terminals
- ☐ Drive belt(s) tension
- ☐ Accelerator cable and linkage for free movement
- ☐ Headlight cleaner fluid level (if equipped)

CLEAN the spark plugs

INTERIOR

INSTALL the following parts:
- ☐ Fuse for accessories

CHECK the operation of the following items:
- ☐ Seat controls and headrest
- ☐ Door locks including childproof door locks (if equipped)
- ☐ Seat belts
- ☐ Air bag system using warning light (if equipped)
- ☐ Ignition switch and steering lock
- ☐ All lights including warning and indicator lights
- ☐ Sound warning system
- ☐ Headlight cleaner (if equipped)
- ☐ Horn, wipers and washer
- ☐ Wiper blades performance
  Clean the wiper blades and windshield, if necessary
- ☐ Radio and antenna
- ☐ Cigarette lighter and clock (if equipped)
- ☐ Power outside mirrors (if equipped)
- ☐ Heated outside mirrors (if equipped)
- ☐ Power window (if equipped)
- ☐ Power door lock (if equipped)
- ☐ Heater and air conditioner at various mode selections (if equipped)
- ☐ Sliding sunroof (if equipped)
- ☐ Seat warmers (if equipped)

ADJUST antenna trimmer on radio (if equipped)

CHECK the following items:
- ☐ Presence of spare fuse
- ☐ Upholstery and interior finish

CHECK and **ADJUST**, if necessary, the following items:
- ☐ Operation and fit of windows
- ☐ Pedal height and free play of brake and clutch pedal
- ☐ Parking brake

UNDER BONNET—ENGINE RUNNING AT OPERATING TEMPERATURE

CHECK the following items:
- ☐ Operation of idle-up system for air conditioner or power steering
- ☐ Automatic transaxle fluid level
- ☐ Initial ignition timing
- ☐ Idle speed

ON HOIST

CHECK the following items:
- ☐ Underside fuel, coolant and hydraulic lines, fittings, connections and components for leaks
- ☐ Tires for cuts or bruises
- ☐ Steering linkage, suspension, exhaust system and all underside hardware for looseness or damage
- ☐ Manual transaxle oil level

ROAD TEST

CHECK the following items:
- ☐ Brake operation
- ☐ Clutch operation
- ☐ Steering control
- ☐ Operation of meters and gauges
- ☐ Squeaks, rattles or unusual noises
- ☐ Engine general performance
- ☐ Emergency locking retractors
- ☐ Cruise control system (if equipped)

AFTER ROAD TEST

REMOVE the seat and floor mat protective covers

CHECK for the necessary owner information materials, tools and spare tire in vehicle

SCHEDULED MAINTENANCE

SCHEDULED MAINTENANCE TABLE

Chart symbols:

I : Inspect
Inspect and clean, repair, or replace if necessary. (As for the air cleaner element, inspect, and if necessary replace.)
R : Replace
T : Tighten
L : Lubricate

Remarks:

- To ensure efficient operation of the engine and all systems related to emission control, the ignition and fuel systems must be serviced regularly. It is strongly recommended that all servicing related to these systems be done by an authorized Mazda Dealer.
- After 180,000 km {108,000 miles } or 144 months, continue to follow the described maintenance at the recommended intervals.
- Refer below for a description of items marked* in the maintenance chart.
  - *1 Also adjust and inspect the power steering and air conditioner drive belts, if equipped.
  - *2 Replacement of the timing belt is required at every 90,000 km {54,000 miles }. Failure to replace the timing belt may result in damage to the engine.
  - *3 If the vehicle is operated under any of the following conditions, change the engine oil and oil filter every 10,000 km {6,000 miles } or shorter.
    - a) Driving in dusty conditions.
    - b) Extended periods of idling or low speed operation.
    - c) Driving for long period in cold temperatures or driving regularly at short distances (less than 8 km {5 miles }) only.
  - *4 If the vehicle is operated in very dusty or sandy areas, inspect and replace, if necessary the air cleaner element more often than the recommended intervals.
  - *5 This is a full function check of electrical systems such as lights, wiper and washer systems (including wiper blades), and power windows.
  - *6 If the brakes are used extensively (for example, continuous hard driving or mountain driving) or if the vehicle is operated in extremely humid climates, change the brake fluid annually.

SCHEDULED MAINTENANCE

Maintenance Item	Number of months or km { miles }, Whichever comes first												
	Months		12	24	36	48	60	72	84	96	108	120	132	144
	×1000	km	15	30	45	60	75	90	105	120	135	150	165	180
		miles	9	18	27	36	45	54	63	72	81	90	99	108

ENGINE

Engine valve clearance		Inspect every 90,000 km {54,000 miles }											
Drive belts	*1	I	I	I	I	I	I	I	I	I	I	I	I
Engine timing belt	*2	Replace every 90,000 km {54,000 miles }											
Engine oil	*3	R	R	R	R	R	R	R	R	R	R	R	R
Oil filter	*3	R	R	R	R	R	R	R	R	R	R	R	R

COOLING SYSTEM

Cooling system (including coolant level adjustment)			I		I		I		I		I		I
Engine coolant		Replace at first 4 years or 90,000 km {54,000 miles }; after that, every 2 years											

FUEL SYSTEM

Idle speed		I		I		I		I		I		I	
Air cleaner element	*4	I	I	R	I	I	R	I	I	R	I	I	R
Fuel filter							R						R
Fuel lines & hoses			I		I		I		I		I		I

IGNITION SYSTEM

Spark plugs (Except for Sweden)				I			I			I			I
Spark plugs (For Sweden)		Inspect every 50,000 km {30,000 miles }											

EXHAUST EMISSION CONTROL SYSTEM

Evaporative system (Except for Sweden)					I				I				I
Evaporative system (For Sweden)		Inspect every 80,000 km {48,000 miles }											
EGR system (Except for Sweden)					I				I				I
EGR system (For Sweden)		Inspect every 80,000 km {48,000 miles }											

ELECTRICAL SYSTEM

Battery electrolyte level & specific gravity		I	I	I	I	I	I	I	I	I	I	I	I
All electrical system	*5	I	I	I	I	I	I	I	I	I	I	I	I
Headlight alignment			I		I		I		I		I		I

SCHEDULED MAINTENANCE

Maintenance Item	Number of months or km { miles }, Whichever comes first												
	Months		12	24	36	48	60	72	84	96	108	120	132	144
	×1000	km	15	30	45	60	75	90	105	120	135	150	165	180
		miles	9	18	27	36	45	54	63	72	81	90	99	108

CHASSIS & BODY

Brake & clutch pedals	I	I	I	I	I	I	I	I	I	I	I	I	I
Brake lines, hoses & connections	I	I	I	I	I	I	I	I	I	I	I	I	I
Brake & clutch fluid *6	I	R	I	R	I	R	I	R	I	R	I	R	
Parking brake	I	I	I	I	I	I	I	I	I	I	I	I	I
Power brake unit & hoses	I	I	I	I	I	I	I	I	I	I	I	I	I
Disc brakes	I	I	I	I	I	I	I	I	I	I	I	I	I
Drum brakes	I	I	I	I	I	I	I	I	I	I	I	I	I
Power steering fluid	I	I	I	I	I	I	I	I	I	I	I	I	I
Power steering system & hoses	I	I	I	I	I	I	I	I	I	I	I	I	I
Manual transaxle oil			I			R			I			R	
Automatic transaxle fluid		I		I		I		I		I		I	
Steering & front suspension	I	I	I	I	I	I	I	I	I	I	I	I	I
Front suspension ball joints			I		I		I		I		I		
Driveshaft dust boots			I		I		I		I		I		
Bolts & nuts on chassis & body	T	T	T	T	T	T	T	T	T	T	T	T	T
Body condition (for rust, corrosion & perforation)	Inspect annually												
Exhaust system & heat shields		I		I		I		I		I		I	
Types (Including spare tyre) (With inflation pressure adjustment)	I	I	I	I	I	I	I	I	I	I	I	I	
Hinges & catches	L	L	L	L	L	L	L	L	L	L	L	L	
Seat belts		I		I		I		I		I		I	
Road test	I	I	I	I	I	I	I	I	I	I	I	I	

AIR CONDITIONER SYSTEM (IF EQUIPPED)

Refrigerant amount	I		I		I		I		I		I	
Compressor operation	I		I		I		I		I		I	

ENGINE

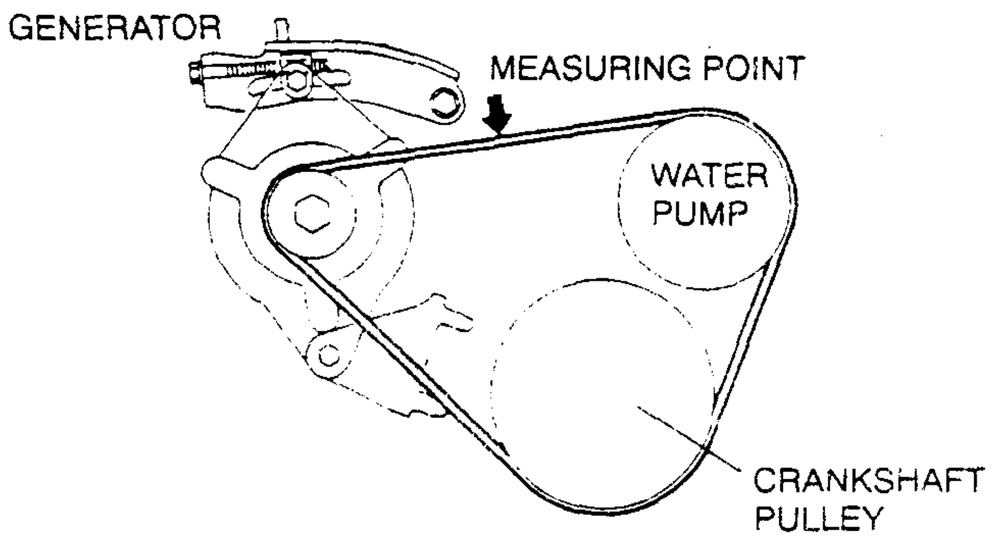
DRIVE BELT ..... B- 1
DRIVE BELT INSPECTION ..... B- 1
DRIVE BELT ADJUSTMENT ..... B- 2
VALVE CLEARANCE ..... B- 2
VALVE CLEARANCE INSPECTION ..... B- 2
VALVE CLEARANCE ADJUSTMENT ..... B- 3
COMPRESSION INSPECTION ..... B- 4
TIMING BELT ..... B- 5
TIMING BELT REMOVAL / INSTALLATION .. B- 5
CYLINDER HEAD GASKET ..... B- 9
CYLINDER HEAD GASKET REPLACEMENT B- 9
FRONT OIL SEAL B-12
FRONT OIL SEAL REPLACEMENT B-12
REAR OIL SEAL B-13
REAR OIL SEAL REPLACEMENT B-13
ENGINE B-14
ENGINE REMOVAL / INSTALLATION B-14
ENGINE DISASSEMBLY / ASSEMBLY B-16

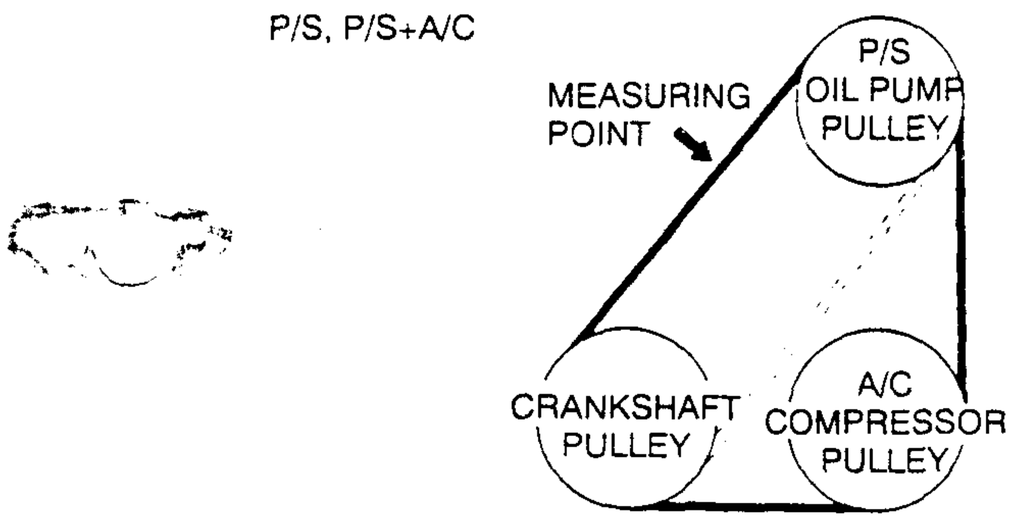
DRIVE BELT

DRIVE BELT INSPECTION

Drive Belt Deflection Check

1. Check the drive belt deflection when the engine is cold, or at least 30 minutes after the engine has stopped. Apply moderate pressure **98 N { 10 kgf , 22 lbf }** midway between the specified pulleys.





Deflection

mm { in }

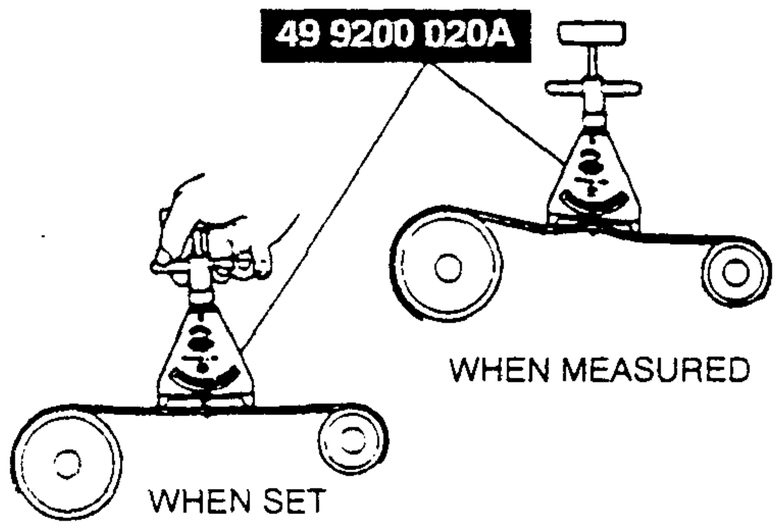
Drive belt	*New	Used	limit
Generator	6.5—7.0 {0.26—0.27}	7.0—9.0 {0.28—0.35}	10.0 {0.39}
P/S, P/S+A/C	7.5—9.0 {0.30—0.35}	8.0—9.5 {0.31—0.37}	11.0 {0.43}

* A belt that has been on a running engine for less than five minutes.

2. If the deflection is not within the specification, adjust it. (Refer to DRIVE BELT, DRIVE BELT ADJUSTMENT.)

Drive Belt Tension Check

1. Belt tension can be checked in place of belt deflection. Check the drive belt tension when the engine is cold, or at least 30 minutes after the engine has stopped. Using the **SST**, check the belt tension between any two pulleys.



Tension

N { kgf , lbf }

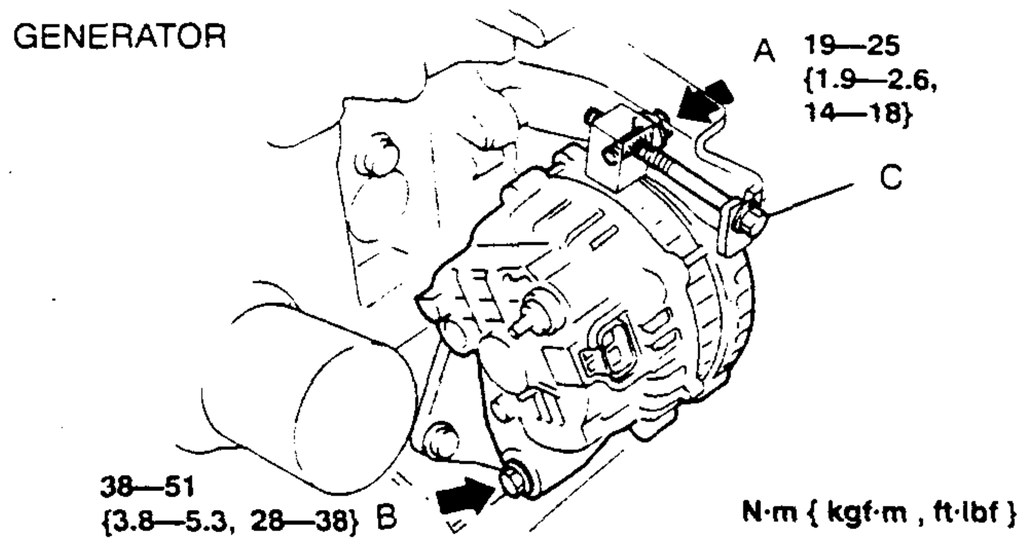
Drive belt	*New	Used	limit
Generator	736—833 {75—85, 165—187}	491—686 {50—70, 110—154}	392 {40, 88}
P/S, P/S+A/C	589—784 {60—80, 132—176}	491—686 {50—70, 110—154}	392 {40, 88}

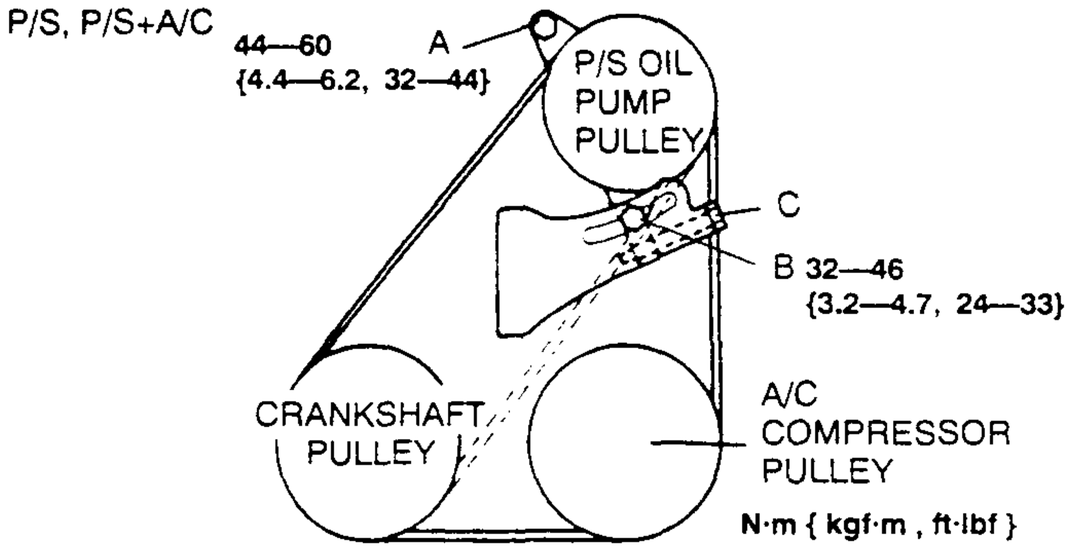
* A belt that has been on a running engine for less than five minutes.

2. If the tension is not within the specification, adjust it. (Refer to DRIVE BELT, DRIVE BELT ADJUSTMENT.)

DRIVE BELT ADJUSTMENT

1. Loosen mounting bolt A, and B.
2. Adjust the belt deflection or tension by turning the adjusting bolt C. (Refer to DRIVE BELT, DRIVE BELT INSPECTION.)
3. Tighten mounting bolt A and B.





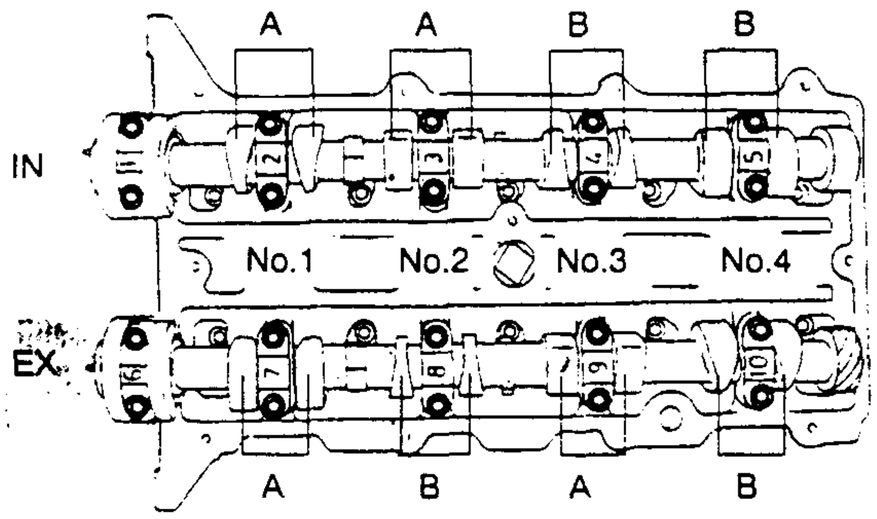
4. Check the belt deflection or tension. (Refer to DRIVE BELT, DRIVE BELT INSPECTION.)

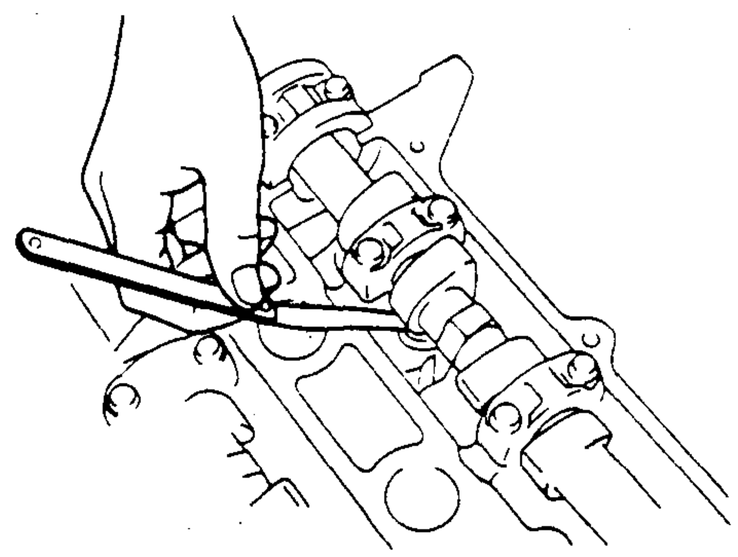
VALVE CLEARANCE

VALVE CLEARANCE INSPECTION

1. Remove the cylinder head cover.
2. Verify that the engine is in cold condition.
3. Measure the valve clearance.
   (1) Turn the crankshaft clockwise so that the No.1 piston is at TDC of the compression stroke.
   (2) Measure the valve clearance at A in the figure.

Standard [Engine cold]
IN: 0.225—0.295 mm {0.009—0.011 in } (0.26 ± 0.035 mm {0.010 ± 0.001 in })
EX: 0.225—0.295 mm {0.009—0.011 in } (0.26 ± 0.035 mm {0.010 ± 0.001 in })





   (3) If the valve clearance exceeds the standard, replace the adjustment shim. (Refer to VALVE CLEARANCE, VALVE CLEARANCE ADJUSTMENT.)
   (4) Turn the crankshaft 360° clockwise so that the No.4 piston is at TDC of the compression stroke.
   (5) Measure the valve clearance at B in the figure.

Standard [Engine cold]
IN: 0.225—0.295 mm {0.009—0.011 in } (0.26 ± 0.035 mm {0.010 ± 0.001 in })
EX: 0.225—0.295 mm {0.009—0.011 in } (0.26 ± 0.035 mm {0.010 ± 0.001 in })

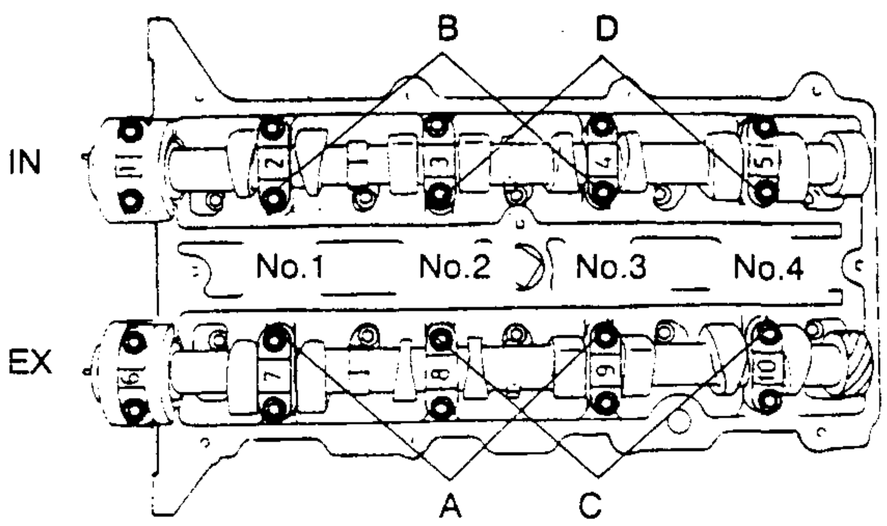
   (6) If the valve clearance exceeds the standard, replace the adjustment shim. (Refer to VALVE CLEARANCE, VALVE CLEARANCE ADJUSTMENT.)

4. Install the cylinder head cover.

VALVE CLEARANCE ADJUSTMENT

Perform this same procedure for all camshafts requiring valve clearance adjustment.

1. Turn the crankshaft clockwise so that the cams on the camshaft requiring valve clearance adjustment are positioned straight up.
2. Remove the camshaft cap bolts as necessary. Remove only one pair of cap bolts at a time. Reinstall the cap bolts before removing the next pair.
   A: For EX side No.1, 2, 3 cylinder adjustment shim removal.
   B: For IN side No.1, 2, 3 cylinder adjustment shim removal.
   C: For EX side No.2, 3, 4 cylinder adjustment shim removal.
   D: For IN side No.2, 3, 4 cylinder adjustment shim removal.

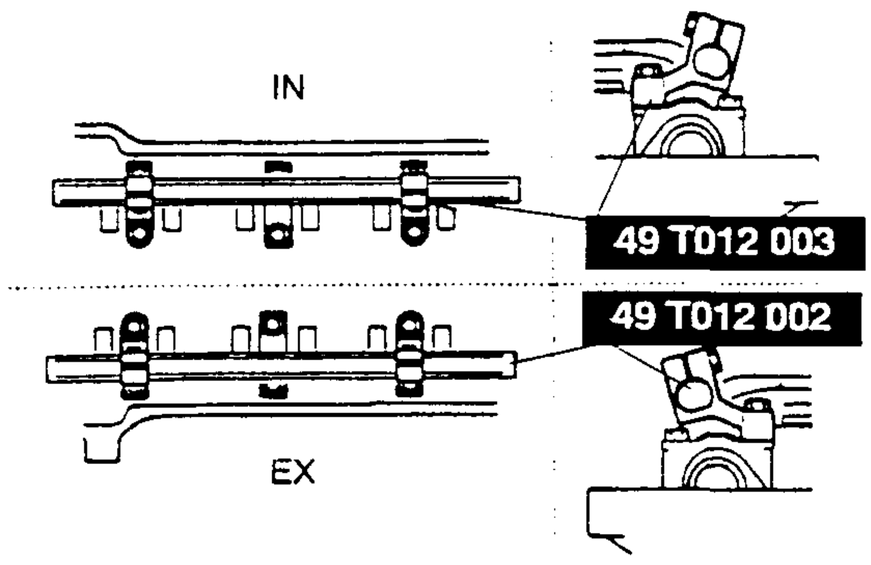


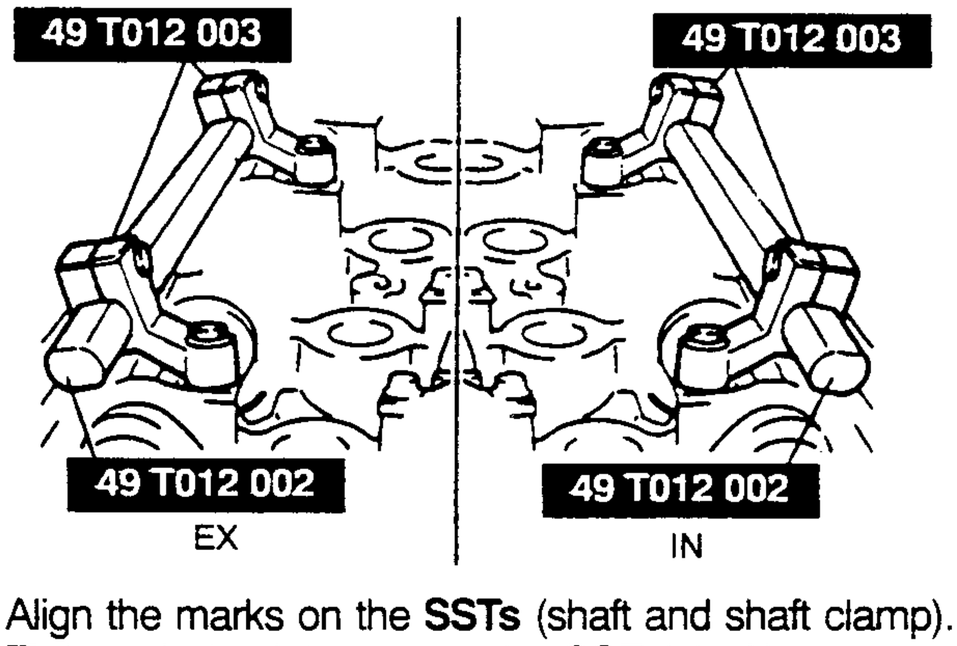
Note

- For EX side No.2, 3 cylinder adjustment shim removal, remove bolts either A or C.
- For IN side No.2, 3 cylinder adjustment shim removal, remove bolts either B or D.

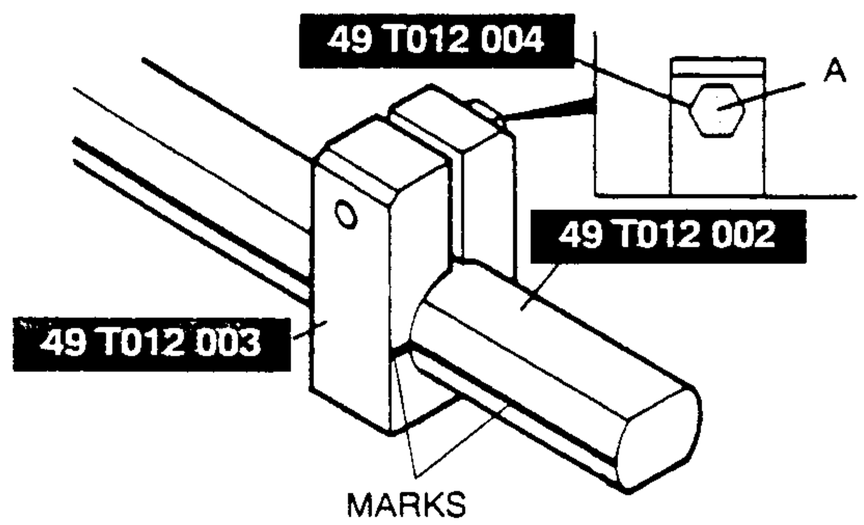
3. Install the **SSTs** on the camshaft using the camshaft cap bolt holes.

Tightening torque
11.3—14.2 N·m
{115—145 kgf·cm, 100—125 in·lbf }

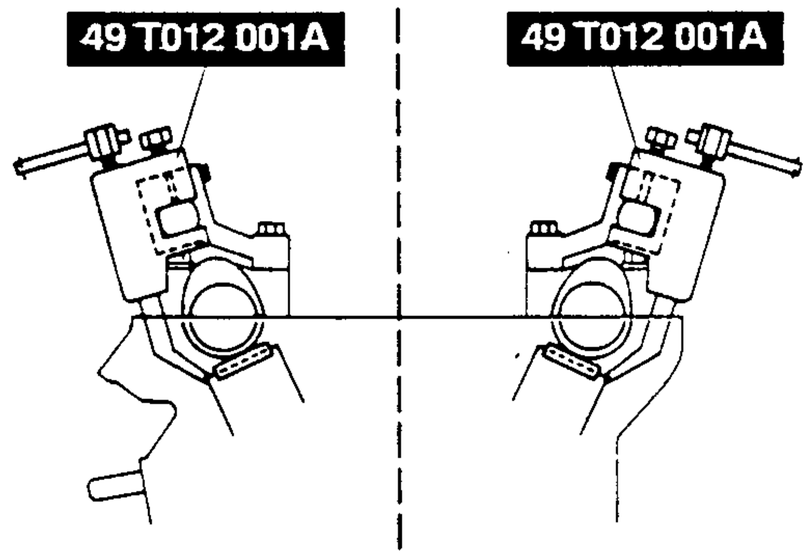




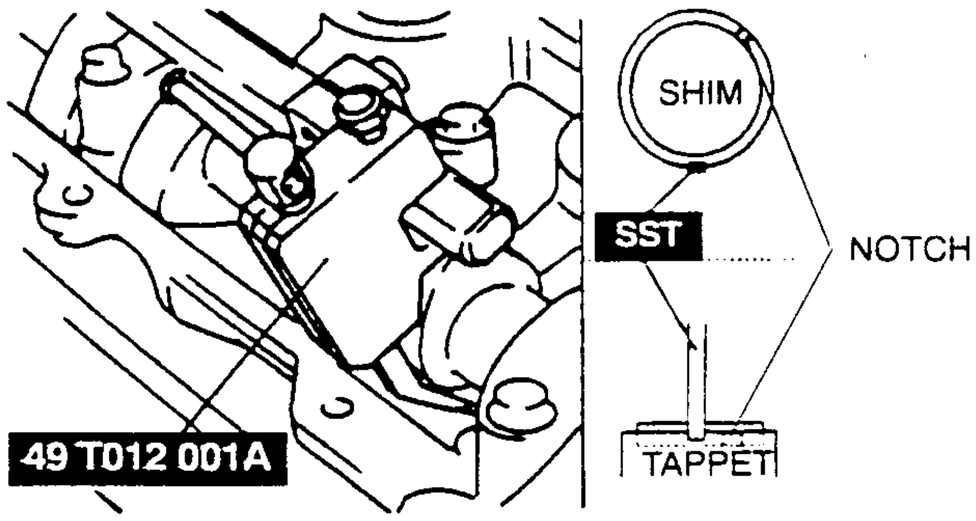
4. Align the marks on the **SSTs** (shaft and shaft clamp).
5. Tighten bolts A to secure the **SST** (shaft).



6. Face the **SST** (body) outside of the cylinder head, and mount it on the **SST** (shaft) at the point of the adjustment shim to be replaced.



7. Face the notch of the tappet so that a fine screwdriver can be inserted.

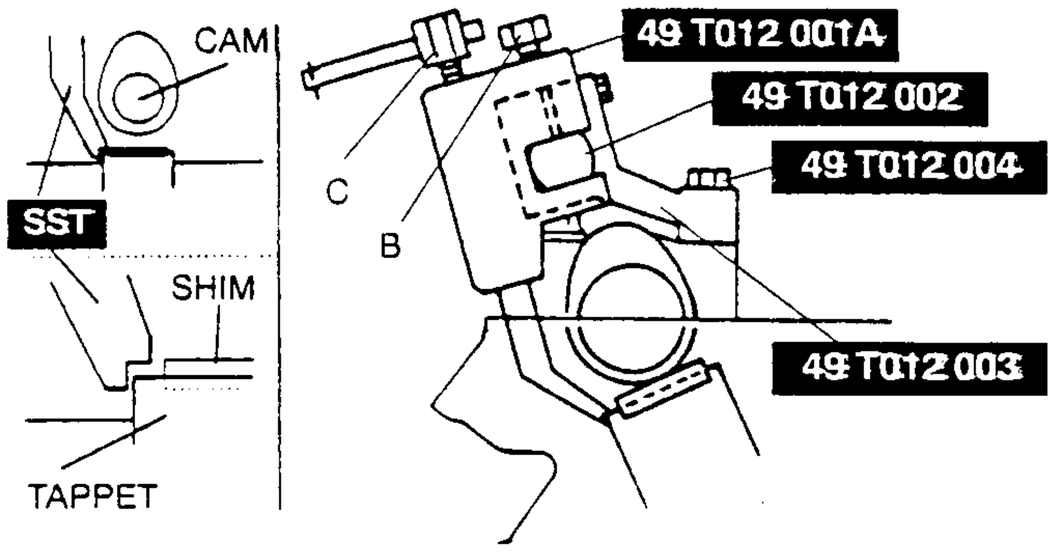


8. Set the **SST** on the tappet by its notch.
9. Tighten bolt B to secure the **SST** (body).

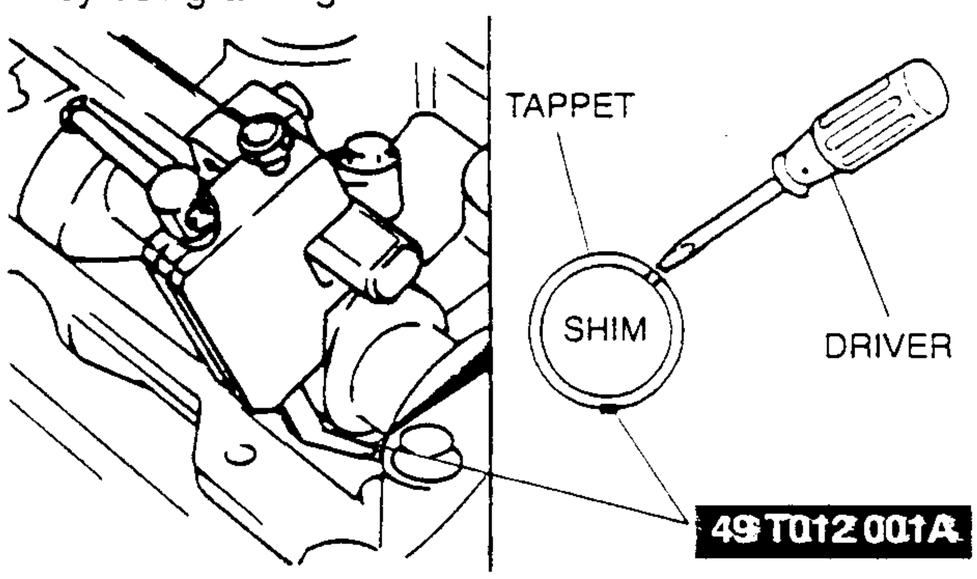
Caution

- **Cylinder head can be damaged when the tappet is pressed down.**

10. Tighten bolt C, and press down the tappet.



11. Using a fine screwdriver, pry up the adjustment shim through the notch on the tappet. Remove the shim by using a magnet.



12. Select proper adjustment shim.

    New adjustment shim
    = Removed shim thickness + Measured valve clearance — Standard valve clearance (0.26 mm {0.010 in })

13. Push the selected shim into the tappet.
14. Loosen bolt C to allow the tappet to move up.
15. Loosen bolt B and remove the **SST** (body).
16. Remove the **SSTs** and tighten the camshaft cap bolts.

    Tightening torque
    11.3—14.2 N·m
    {115—145 kgf·cm, 100—125 in·lbf }

17. Check the valve clearance. (Refer to VALVE CLEARANCE, VALVE CLEARANCE INSPECTION.)

COMPRESSION INSPECTION

Warning

- **When the engine and the oil are hot, they can badly burn. Be careful not to burn yourself during removal/installation of each component.**

1. Verify that the battery is fully charged. Recharge it if necessary. (Refer to section G, CHARGING SYSTEM, BATTERY INSPECTION, Battery.)
2. Warm up the engine to the normal operating temperature.
3. Stop the engine and allow it to cool off for about 10 minutes.
4. Perform "Fuel Line Safety Procedures". Leave the fuel pump relay removed. (Refer to section F, FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)
5. Remove the spark plugs.
6. Disconnect the ignition coil connector.
7. Connect a compression gauge into the No.1 spark plug hole.
8. Fully depress the accelerator pedal and crank the engine.
9. Note the maximum gauge reading.
10. Check each cylinder as above.

Compression

kPa { kgf/cm^2 , psi } [rpm]

Item	Engine
	FP, FS
Standard	1471 {15.0, 213} [300]
Minimum	1030 {10.5, 149} [300]
Maximum difference between cylinders	196 kPa { 2.0 kgf/cm^2 , 28 psi }

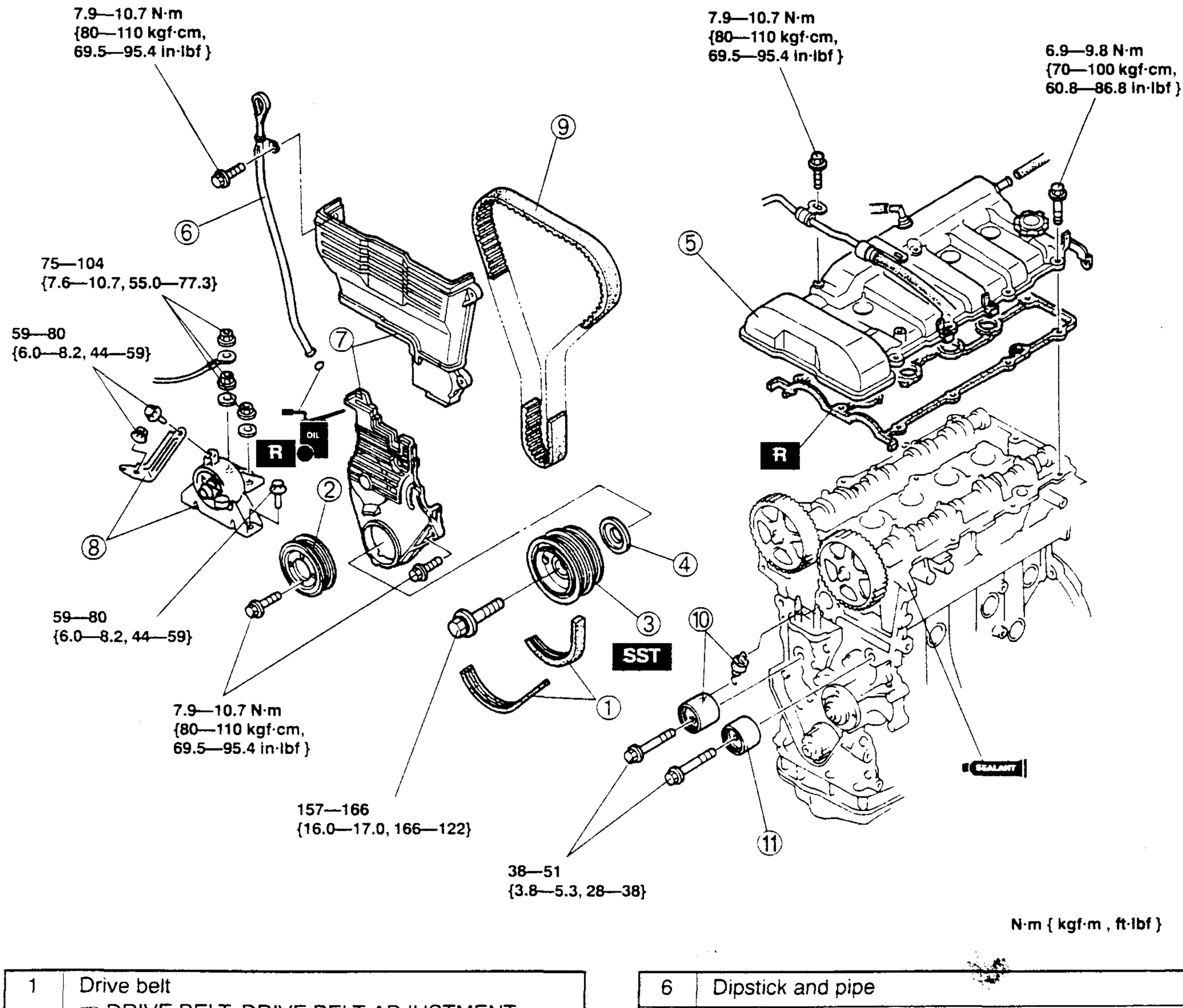
11. If the compression in one or more cylinders is low or the compression difference between cylinders exceeds the maximum, pour a small amount of clean engine oil into the cylinder and recheck the compression.
    (1) If the compression increases, the piston, the piston rings, or cylinder wall may be worn and overhaul is required.
    (2) If the compression stays low, a valve may be stuck or improperly seated and overhaul is required.
    (3) If the compression in adjacent cylinders stays low, the cylinder head gasket may be damaged or the cylinder head distorted and overhaul is required.
12. Disconnect the compression gauge.
13. Connect the ignition coil connector.
14. Install the fuel pump relay.
15. Install the spark plugs.

    Tightening torque
    15—22 N·m { 1.5—2.3 kgf·m , 11—16 ft·lbf }

TIMING BELT

TIMING BELT REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the camshaft position sensor and crankshaft position sensor.
3. Remove the spark plug.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Check the air gap. (Refer to section F, CONTROL SYSTEM, CRANKSHAFT POSITION SENSOR INSPECTION.)
7. Start the engine and
   (1) check the pulleys and drive belt for runout and contact.
   (2) check the ignition timing. (Refer to section F, ENGINE TUNE-UP, IGNITION TIMING INSPECTION.)



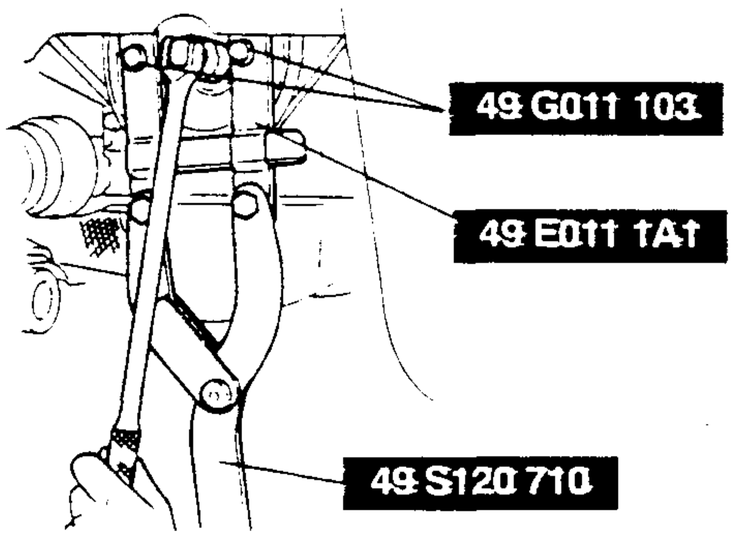
N·m { kgf·m , ft·lbf }

1	Drive belt ☞ DRIVE BELT, DRIVE BELT ADJUSTMENT
2	Water pump pulley ☞ Installation Note
3	Crankshaft pulley ☞ Removal Note ☞ Installation Note
4	Guide plate
5	Cylinder head cover ☞ Removal Note ☞ Installation Note

6	Dipstick and pipe
7	Timing belt cover
8	No.3 Engine mount rubber ☞ Removal Note
9	Timing belt ☞ Removal Note ☞ Installation Note
10	Tensioner, tensioner spring ☞ Installation Note
11	Idler

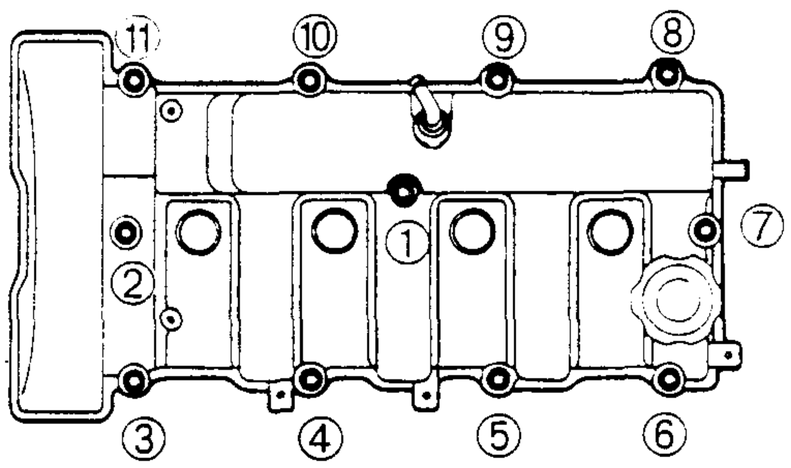
Crankshaft Pulley Removal Note

- Hold the crankshaft by using the **SST**.



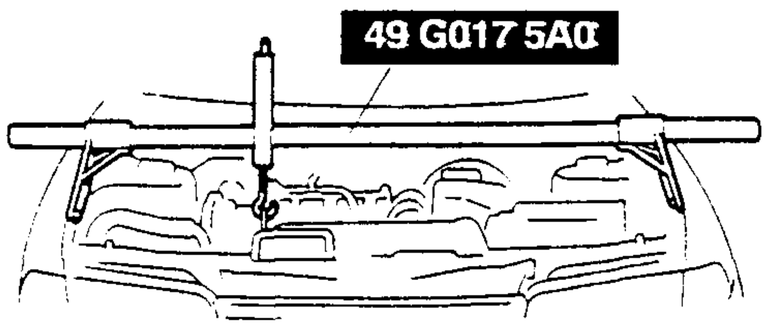
Cylinder Head Cover Removal Note

- Loosen the cylinder head cover bolts in two or three steps in the order shown.



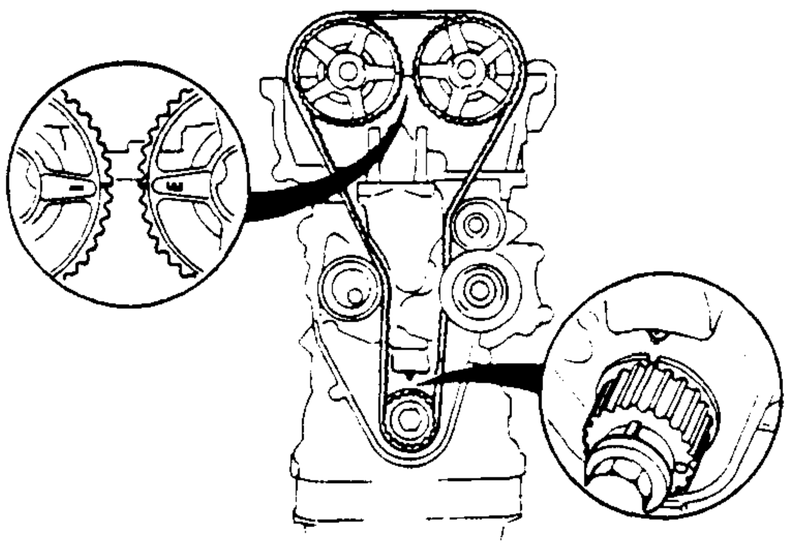
No.3 Engine Mount Rubber Removal Note

- Suspend the engine by using the **SST**.

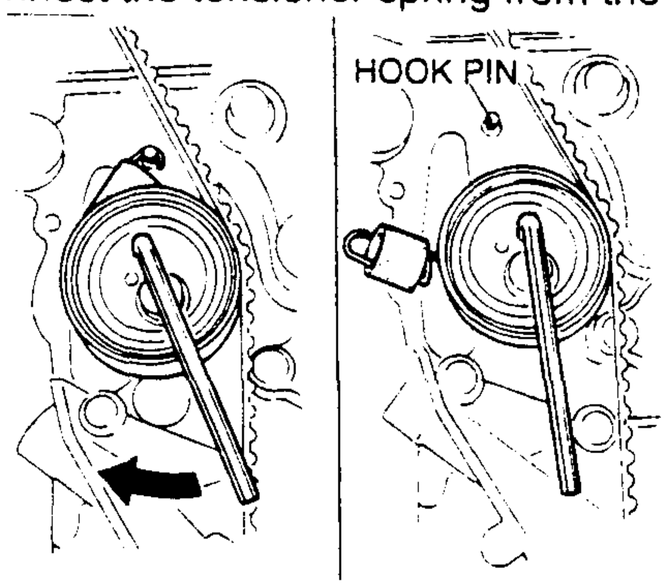


Timing Belt Removal Note

1. Install the pulley lock bolt.
2. Turn the crankshaft clockwise and align the timing marks.



3. Turn the tensioner clockwise by using an Allen wrench.
4. Disconnect the tensioner spring from the hook pin.

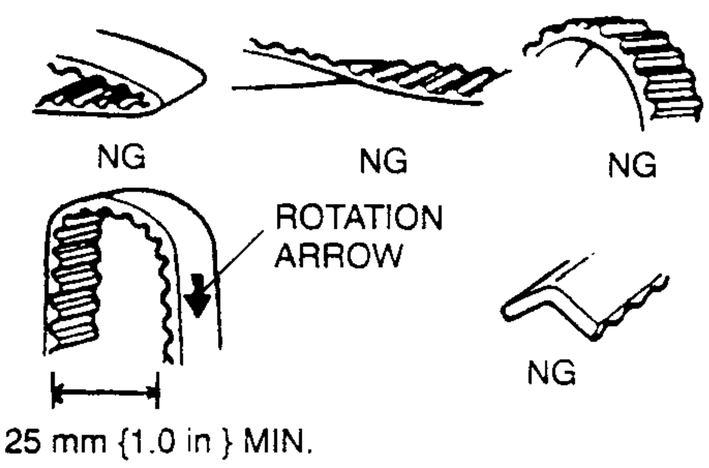


Caution

- **The following will damage the belt and shorten its life; Forcefully twisting it, turning it inside out, or allowing oil or grease on it.**

Note

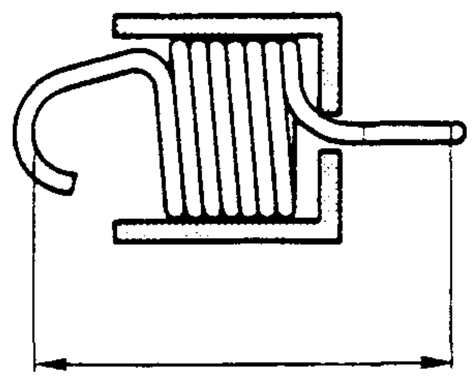
- Mark the timing belt rotation on the belt for proper reinstallation.



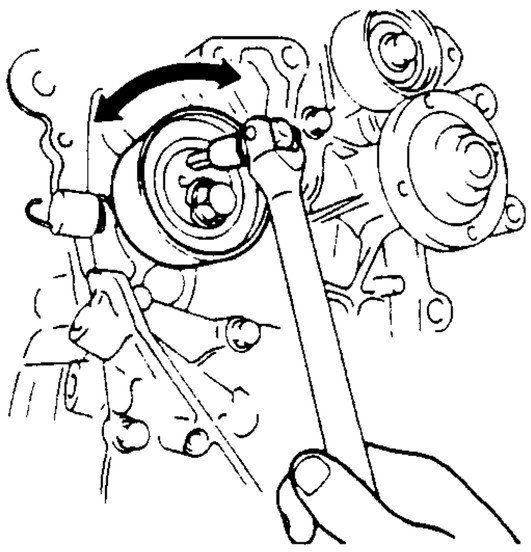
Tensioner, Tensioner Spring Installation Note

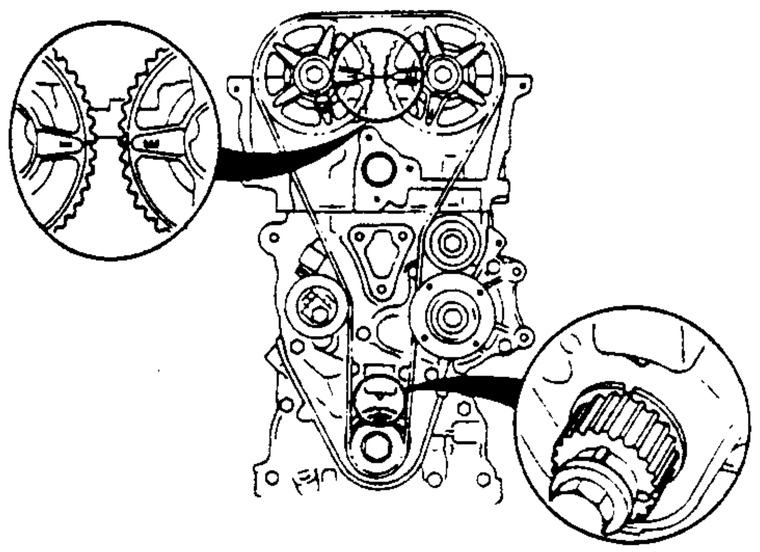
1. Measure the tensioner spring free length. If not within the specification, replace the tensioner spring.

Free length
36.6 mm {1.44 in }



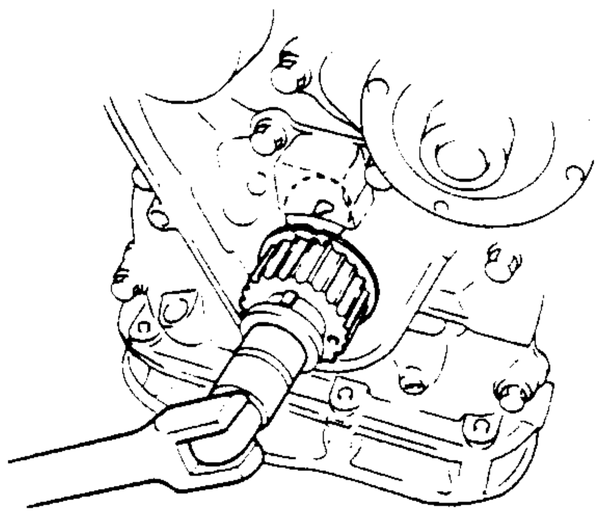
2. Install the tensioner
3. Rotate the tensioner. If tensioner rotates with no resistance or does not rotate, replace the tensioner.

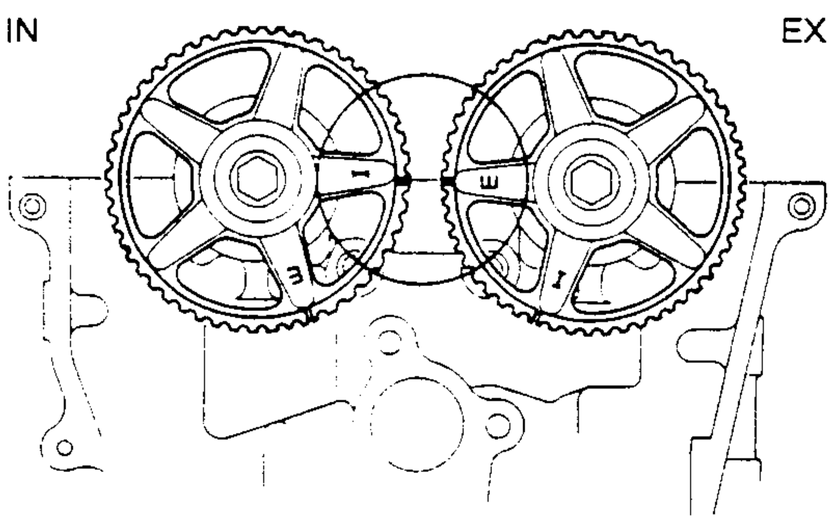




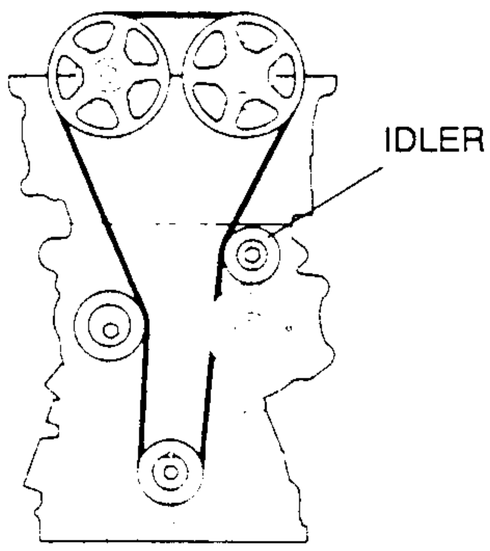
Timing Belt Installation Note

1. Verify that the timing belt pulley mark and camshaft pulley marks are aligned with the timing marks as shown.





2. Install the timing belt so that there is no looseness at the idler side.

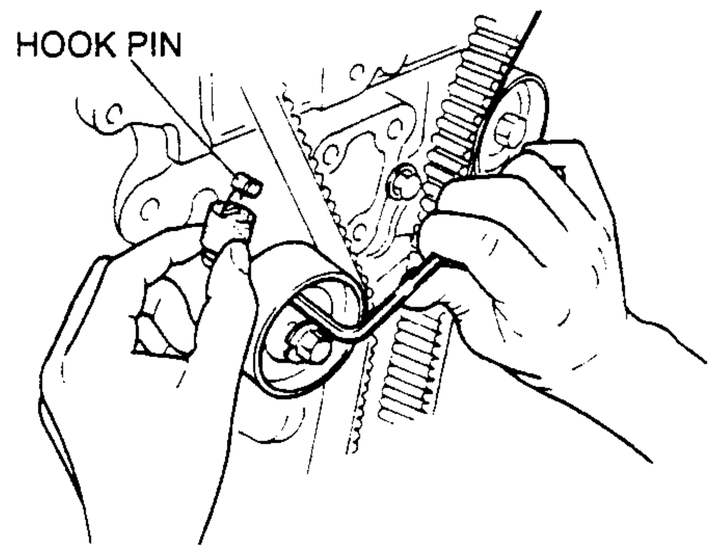


3. Turn the crankshaft clockwise twise, and align the timing marks.
4. Verify that all timing marks are correctly aligned. If not aligned, remove the timing belt and repeat from step 1.

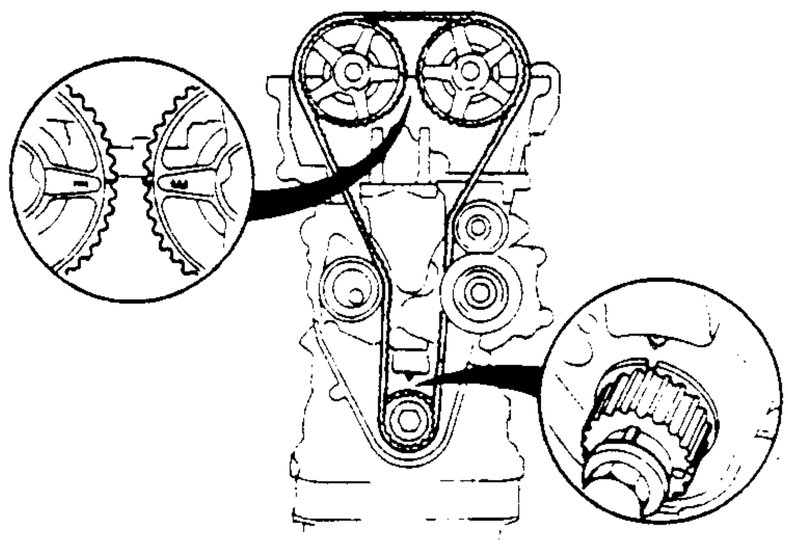
Caution

- **Be sure not to apply tension other than that of the tensioner spring.**

5. Turn the tensioner clockwise by using an Allen wrench.
6. Connect the tensioner to the hook pin.

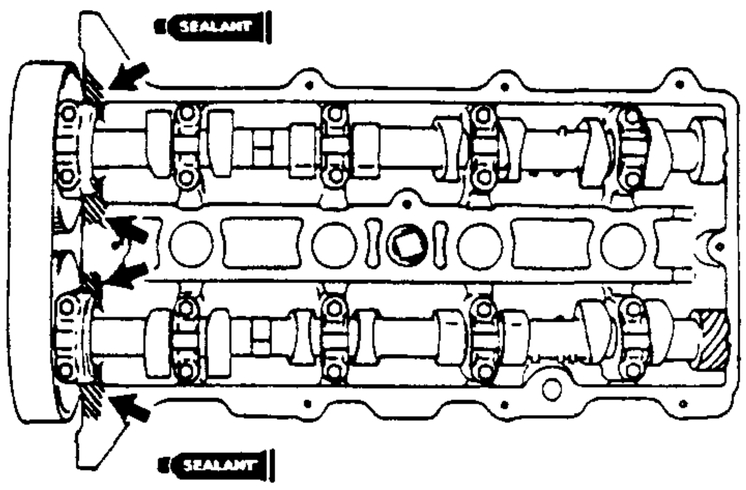


7. Turn the crankshaft clockwise twise, and verify that all timing marks are aligned. If not aligned, repeat from step 1.

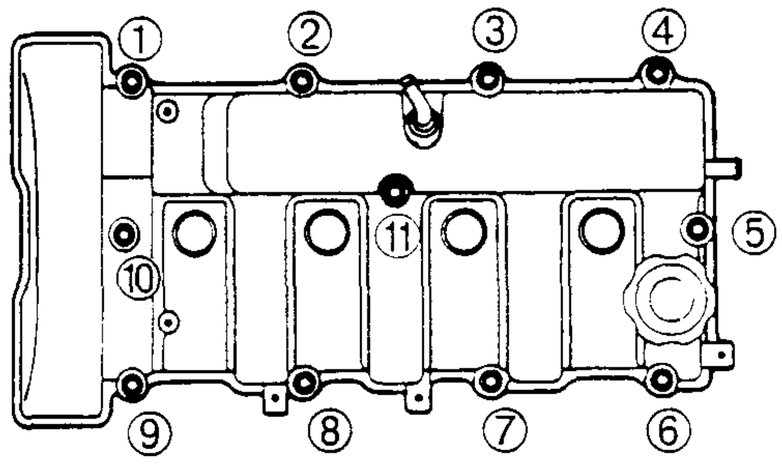


Cylinder Head Cover Installation Note

1. Verify that the grooves on the cylinder head cover are free of oil, water and other foreign material.
2. Install the cylinder head cover gasket into the cylinder head cover.
3. Apply silicone sealant to the cylinder head as shown.

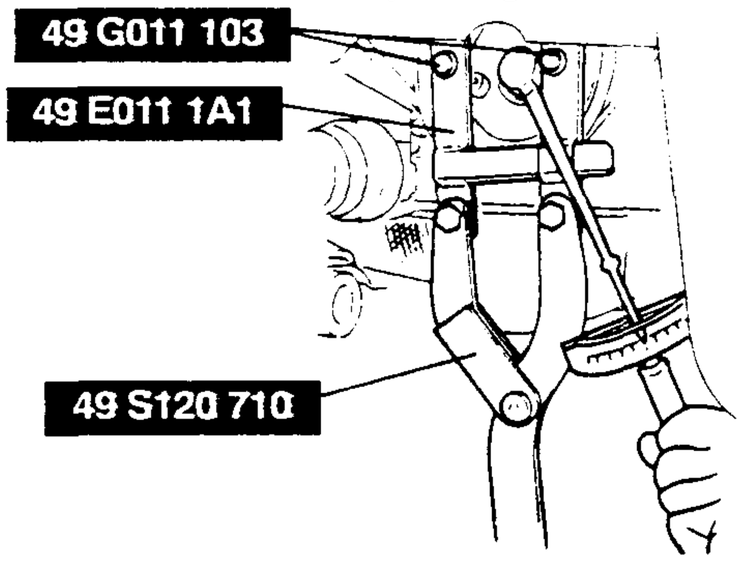


4. Tighten the cylinder head cover bolts in two or three steps in the order shown.



Crankshaft Pulley Installation Note

- Hold the crankshaft by using the **SST**.

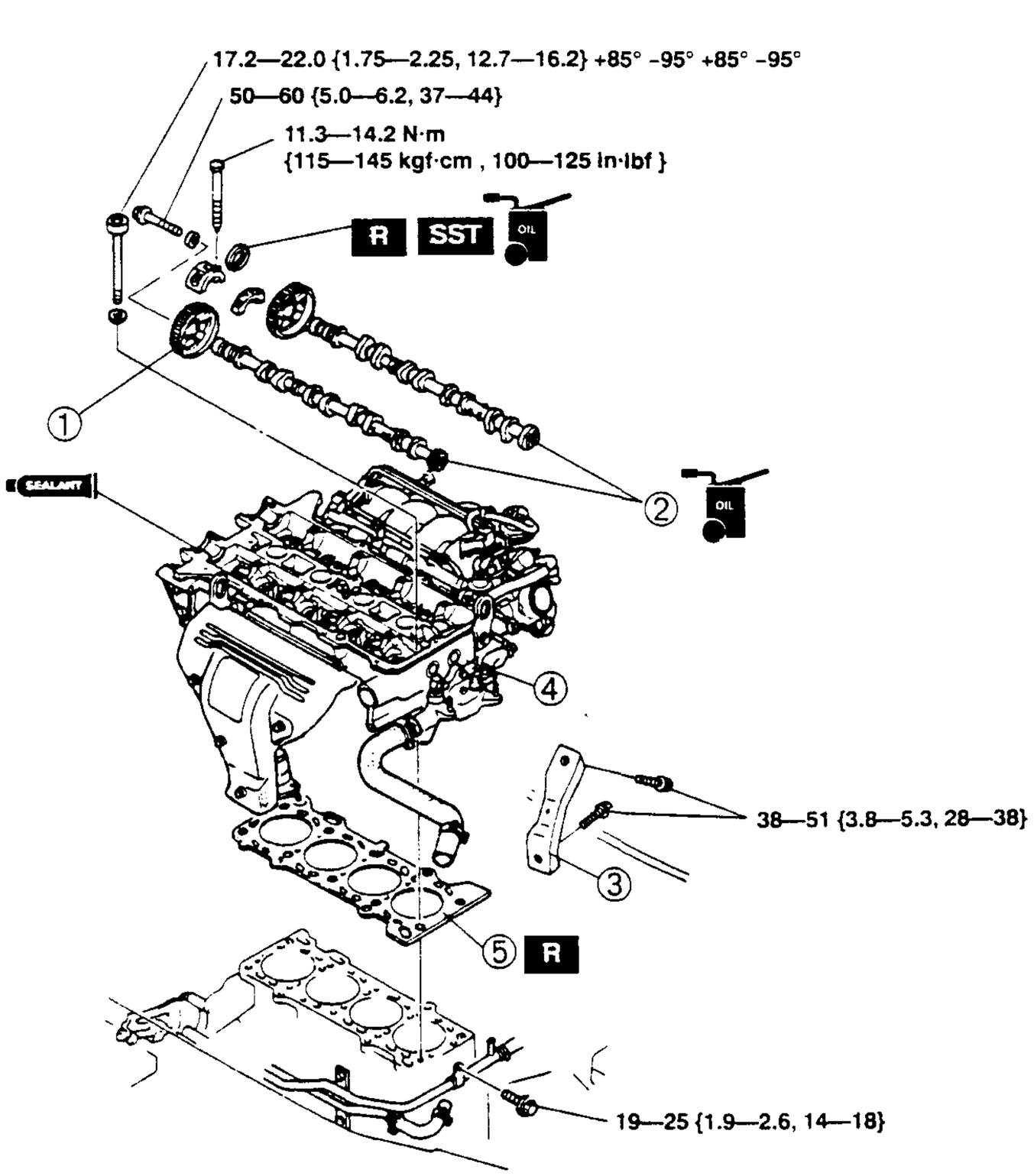


CYLINDER HEAD GASKET

CYLINDER HEAD GASKET REPLACEMENT

Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on section F. (Refer to section F, FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)**

1. Remove the timing belt. (Refer to TIMING BELT, TIMING BELT REMOVAL/INSTALLATION.)
2. Remove the front pipe. (Refer to section F, EXHAUST SYSTEM, EXHAUST SYSTEM REMOVAL/INSTALLATION.)
3. Remove the air cleaner.
4. Remove the P/S oil pump and bracket with the oil hose still connected.
5. Remove the accelerator cable. (Refer to section F, INTAKE-AIR SYSTEM, ACCELERATOR CABLE INSPECTION/ADJUSTMENT.)
6. Disconnect the fuel hose. (Refer to section F, FUEL SYSTEM, BEFORE REPAIR PROCEDURE.) (Refer to section F, FUEL SYSTEM, AFTER REPAIR PROCEDURE.)
7. Remove ignition coil.
8. Drain the engine coolant. (Refer to section E, ENGINE COOLANT, ENGINE COOLANT REPLACEMENT.)
9. Remove in the order indicated in table.
10. Install in the reverse order of removal.
11. Check the engine oil level. (Refer to section D, ENGINE OIL, ENGINE OIL INSPECTION.)
12. Check the engine oil, engine coolant, and fuel leakage.
13. Check the compression. (Refer to COMPRESSION INSPECTION.)
14. Start the engine and
    (1) check the pulleys and the drive belt for runout and contact.
    (2) check the ignition timing. (Refer to section F, ENGINE TUNE-UP, IGNITION TIMING INSPECTION.)
    (3) check the idle speed. (Refer to section F, ENGINE TUNE-UP, IDLE SPEED ADJUSTMENT.)

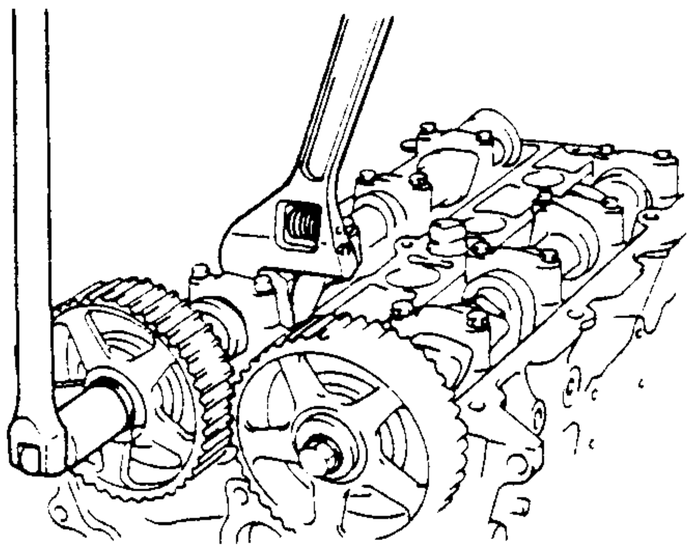


N·m { kgf·m , ft·lbf }

1	Camshaft pulley ☞ Removal Note ☞ Installation Note
2	Camshaft ☞ Removal Note ☞ Installation Note
3	Intake manifold bracket
4	Cylinder head ☞ Removal Note ☞ Installation Note
5	Cylinder head gasket

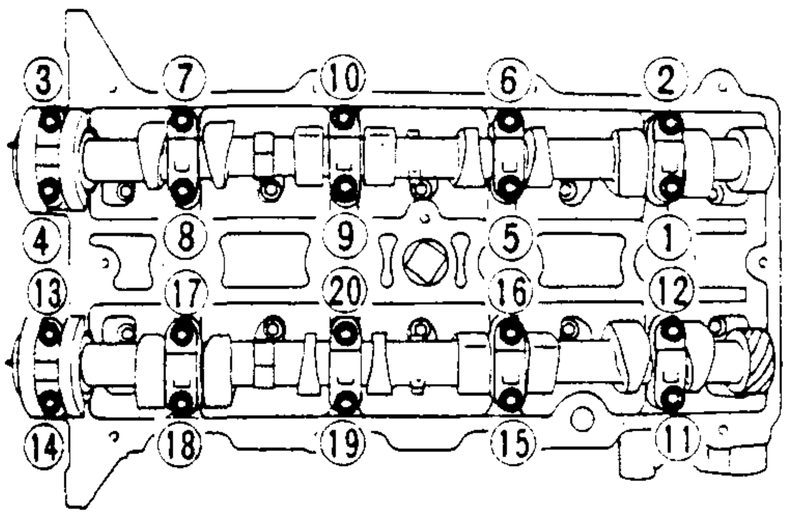
Camshaft Pulley Removal Note

- Hold the camshaft by using a wrench on the cast hexagon as shown.



Camshaft Removal Note

- Loosen the camshaft cap bolts in two or three steps in the order shown.



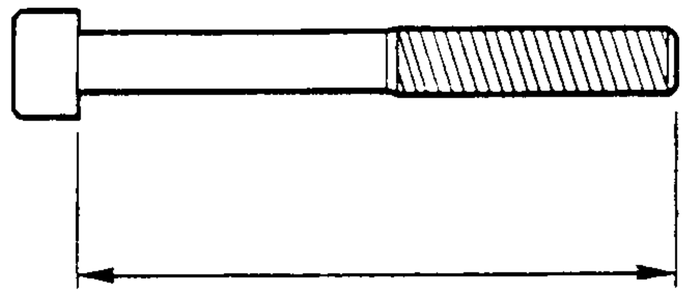
Cylinder Head Removal Note

- Loosen the cylinder head bolts in two or three steps in the order shown.

Cylinder Head Installation Note

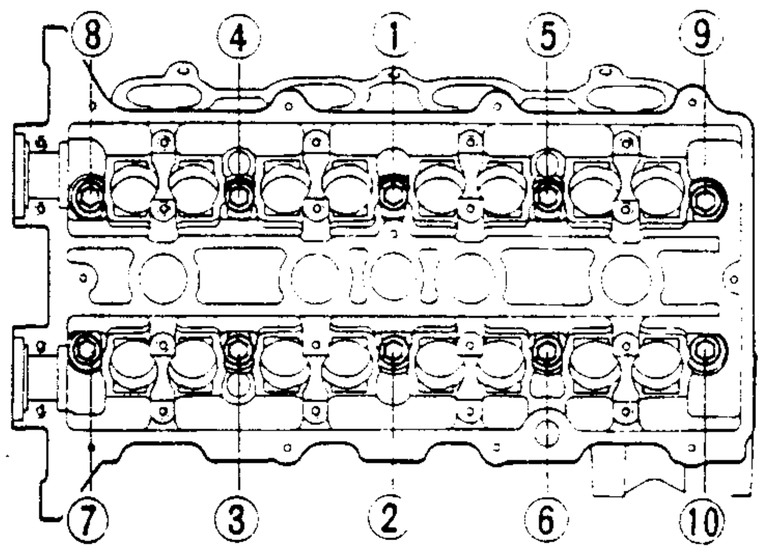
1. Measure the length of each bolt.
   Replace any that exceed the maximum length.

   Standard length
   104.2—104.8 mm {4.103—4.125 in }
   Maximum length
   105.5 mm {4.154 in }

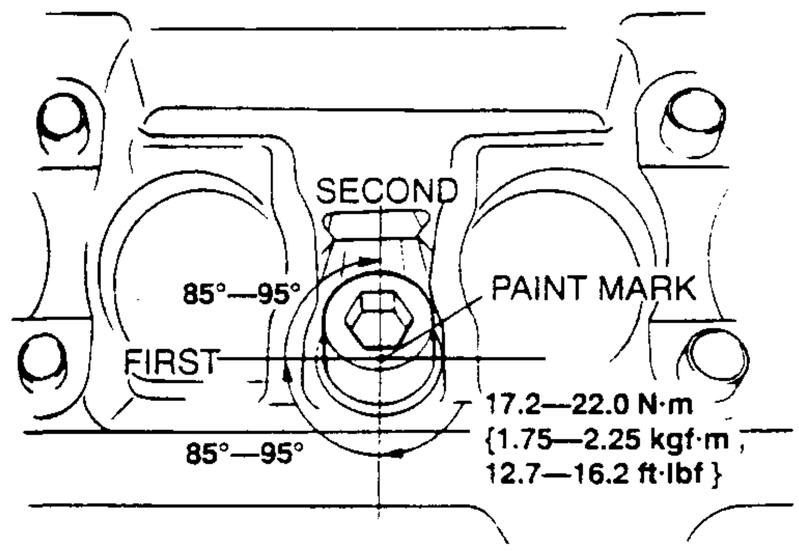


2. Tighten the cylinder head bolts in two or three steps in the order shown.

   Tightening torque
   17.2—22.0 N·m {1.75—2.25 kgf·m ,
   12.7—16.2 ft·lbf }



3. Put a paint mark on each bolt head.
4. Using the marks as a reference, tighten the bolts by turning each **85° —95°** in the sequence shown.
5. Further tighten each bolt by turning another **85°—95°** in the sequence shown.

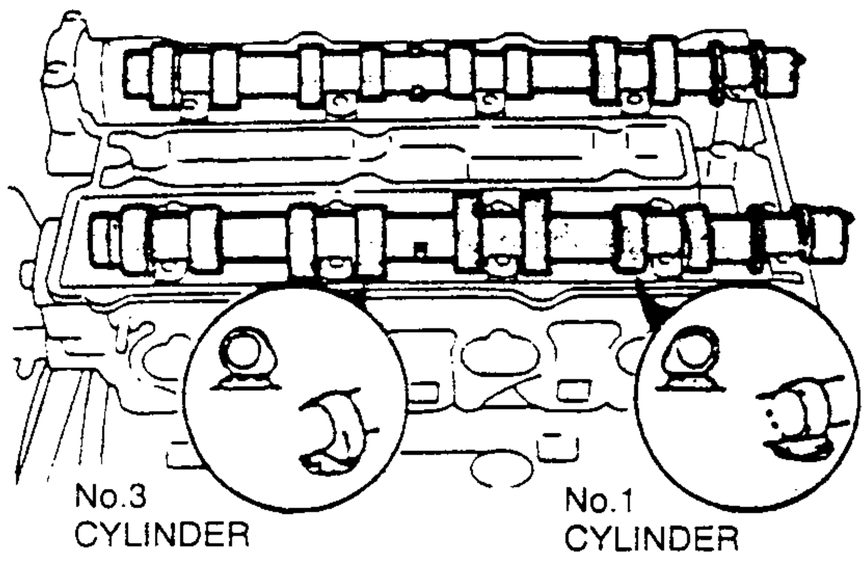


Camshaft Installation Note

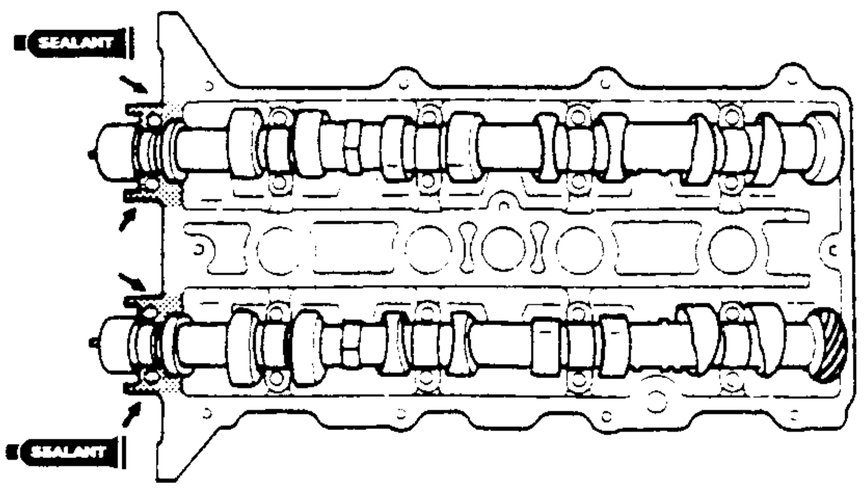
Caution

- **Because there is little camshaft thrust clearance, the camshaft must be held horizontally while it is installed. Otherwise, excessive force will be applied to the thrust area, causing burr on the thrust receiving area of the cylinder head journal. To avoid this, the following procedure must be observed.**

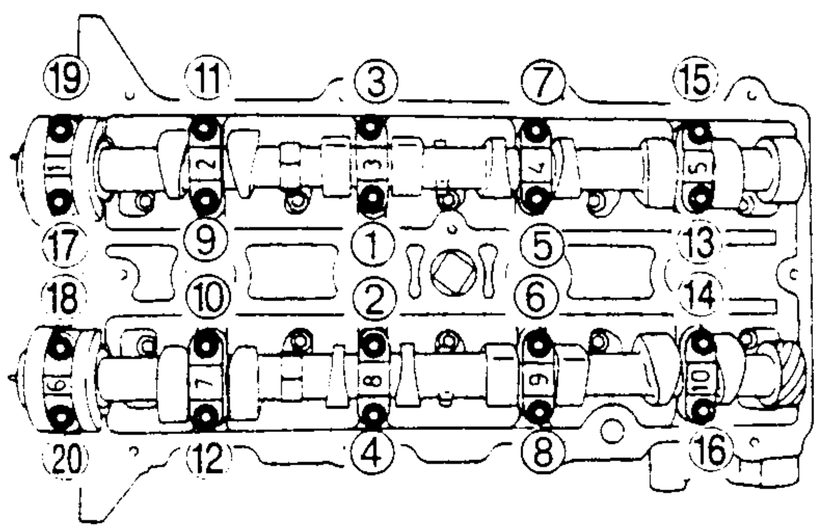
1. Assemble camshaft onto the cylinder head, facing the cam noses at No.1 and No.3 cylindders as shown.



2. Apply silicone sealant to the areas shown. Keep the camshaft sliding surface free of sealant to prevent engine damage.

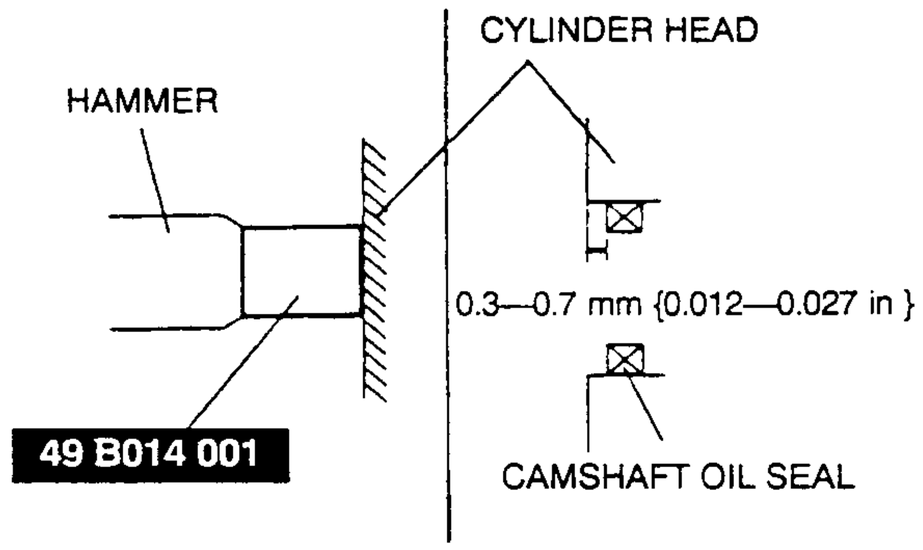


3. Apply engine oil to the camshaft and the cylinder head journals.
4. Install the camshaft caps to the positions from which they were removed.
5. Hand tighten the camshaft cap bolts marked 5, 7, 2, and 4.
6. Tighten the camshaft cap bolts in two or three steps in the order shown.



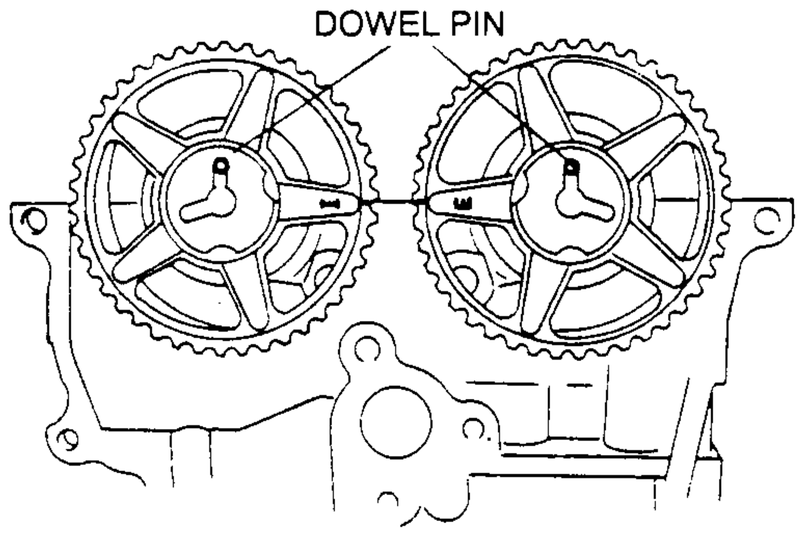
7. Verify that the camshaft settles horizontally when two bearing cap bolts at No.3 journal are tightened.

8. Apply clean engine oil to the camshaft oil seal.
9. Push the oil seal slightly in by hand.
10. Tap the oil seals in evenly by using the **SST** and a hammer.

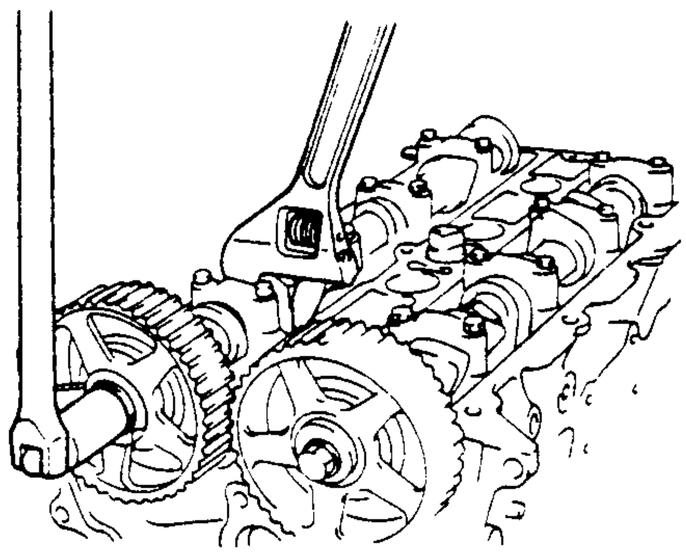


Camshaft Pulley Installation Note

1. Install the camshaft pulleys, positioning the dowel pins as shwon.



2. Hold the camshaft by using a wrench on the cast hexagon as shown.

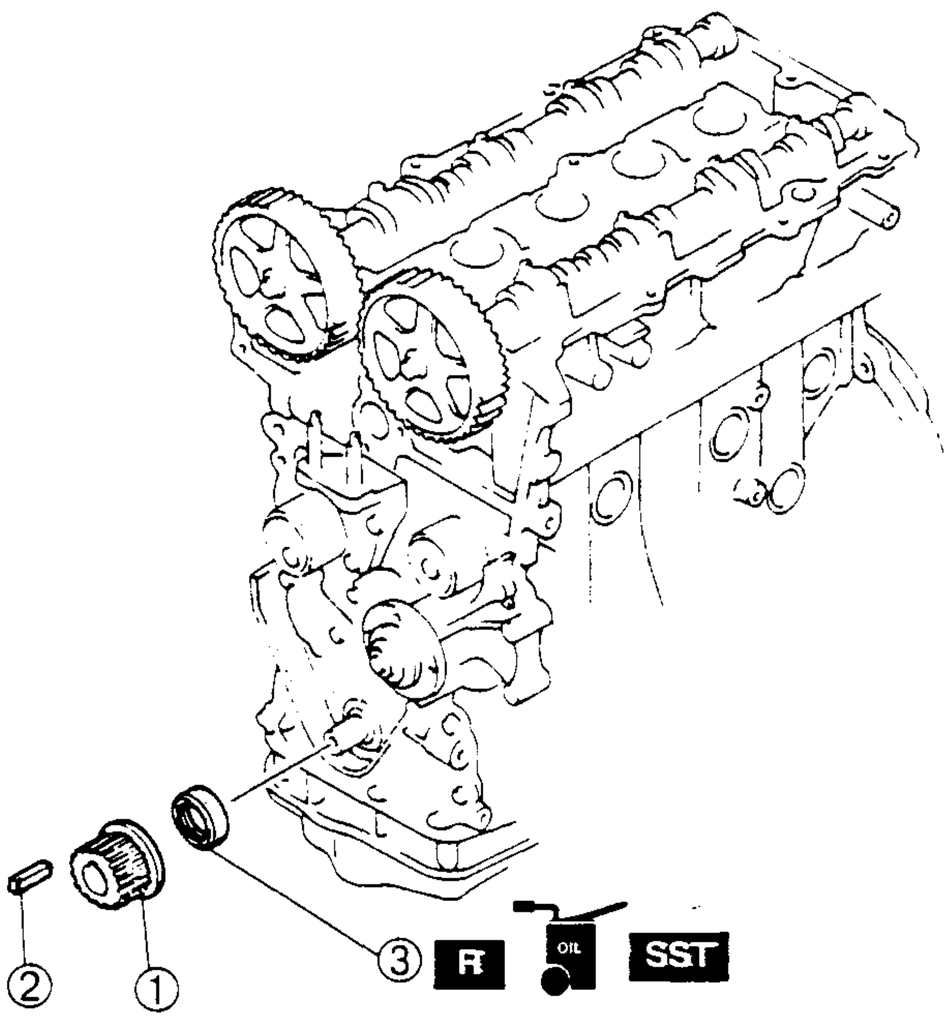


7. Verify that the camshaft settles horizontally when two bearing cap bolts at No.3 journal are tightened.

FRONT OIL SEAL

FRONT OIL SEAL REPLACEMENT

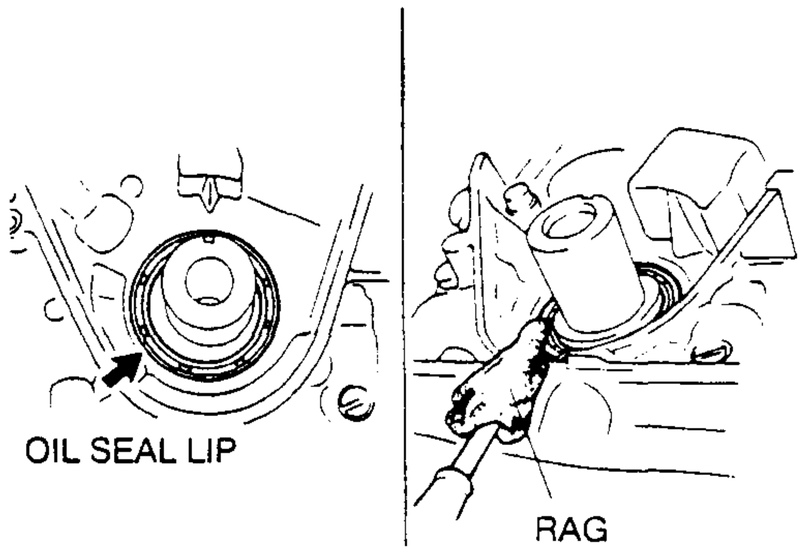
1. Remove the timing belt. (Refer to TIMING BELT, TIMING BELT REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Timing belt pulley
2	Key
3	Front oil seal ☞ Removal Note ☞ Installation Note

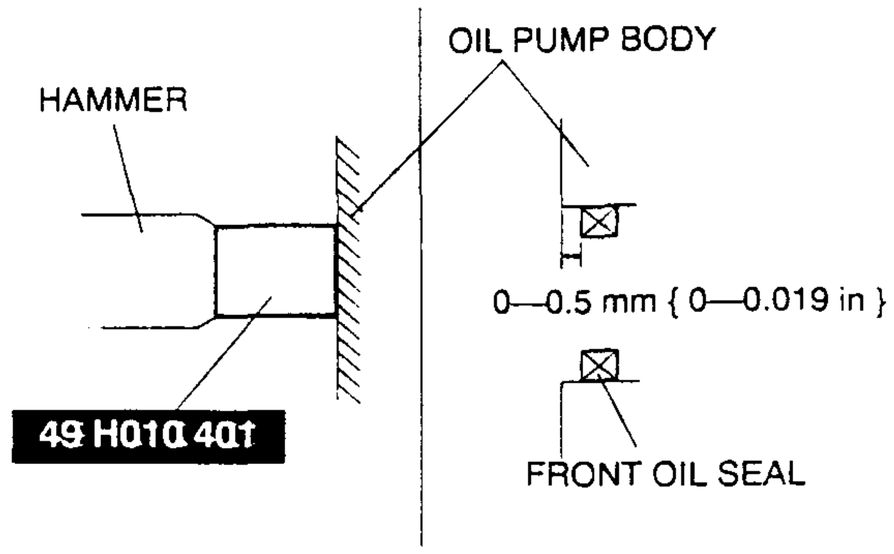
Front Oil Seal Removal Note

1. Cut the oil seal lip by using a razor knife.
2. Remove the oil seal by using a screwdriver protected with a rag.

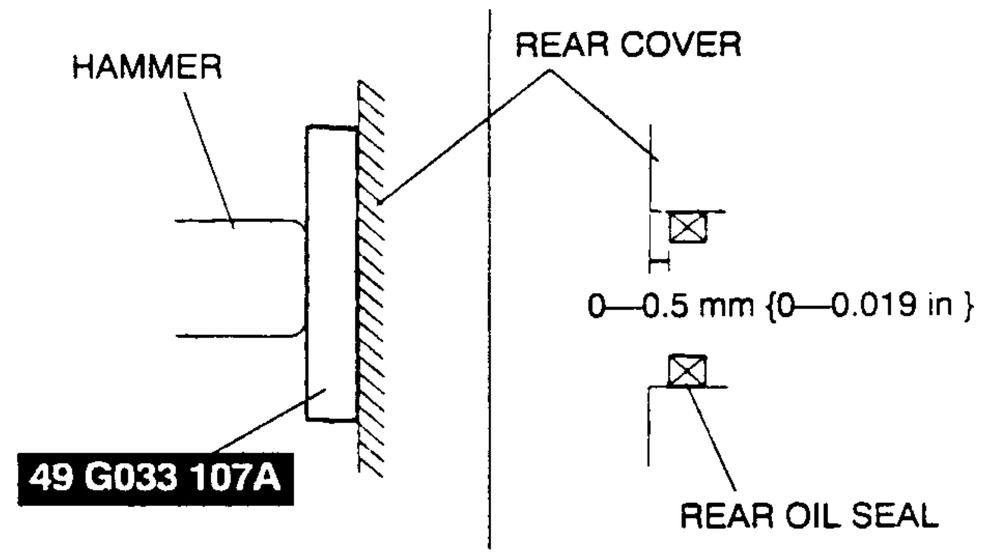


Front Oil Seal Installation Note

1. Apply clean engine oil to the oil seal lip.
2. Push the oil seal slightly in by hand.
3. Tap the oil seal in evenly by using the **SST** and a hammer.

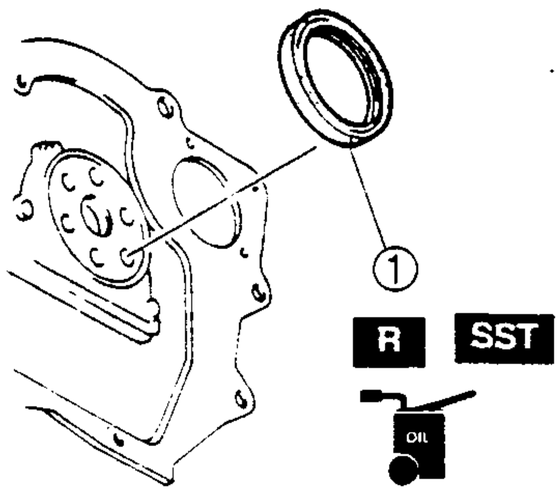


REAR OIL SEAL



REAR OIL SEAL REPLACEMENT

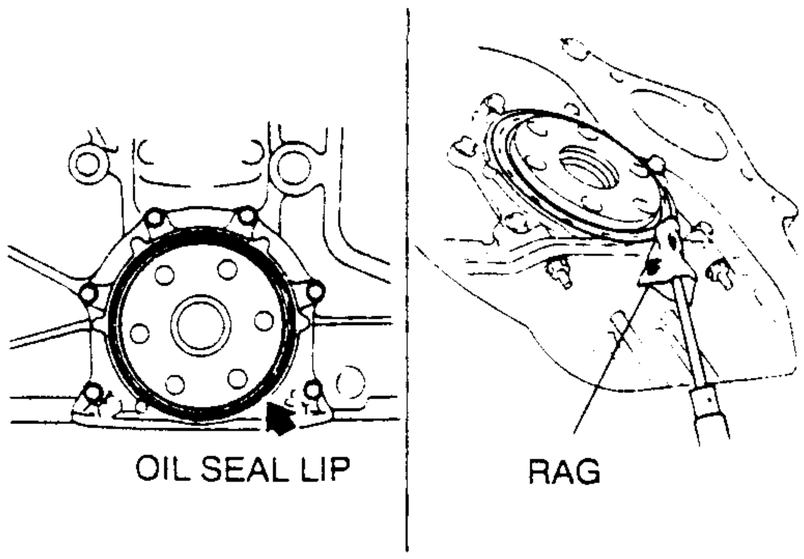
1. Remove the flywheel. (MTX) (Refer to section H, CLUTCH, CLUTCH UNIT REMOVAL/ INSTALLATION.)
2. Remove the drive plate. (ATX) (Refer to section K, AUTOMATIC TRANSAXLE, DRIVE PLATE REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



1	Rear oil seal ☞ Removal Note ☞ Installation Note

Rear Oil Seal Removal Note

1. Cut the oil seal lip by using a razor knife.
2. Remove the oil seal by using a screwdriver protected with a rag.



Rear Oil Seal Installation Note

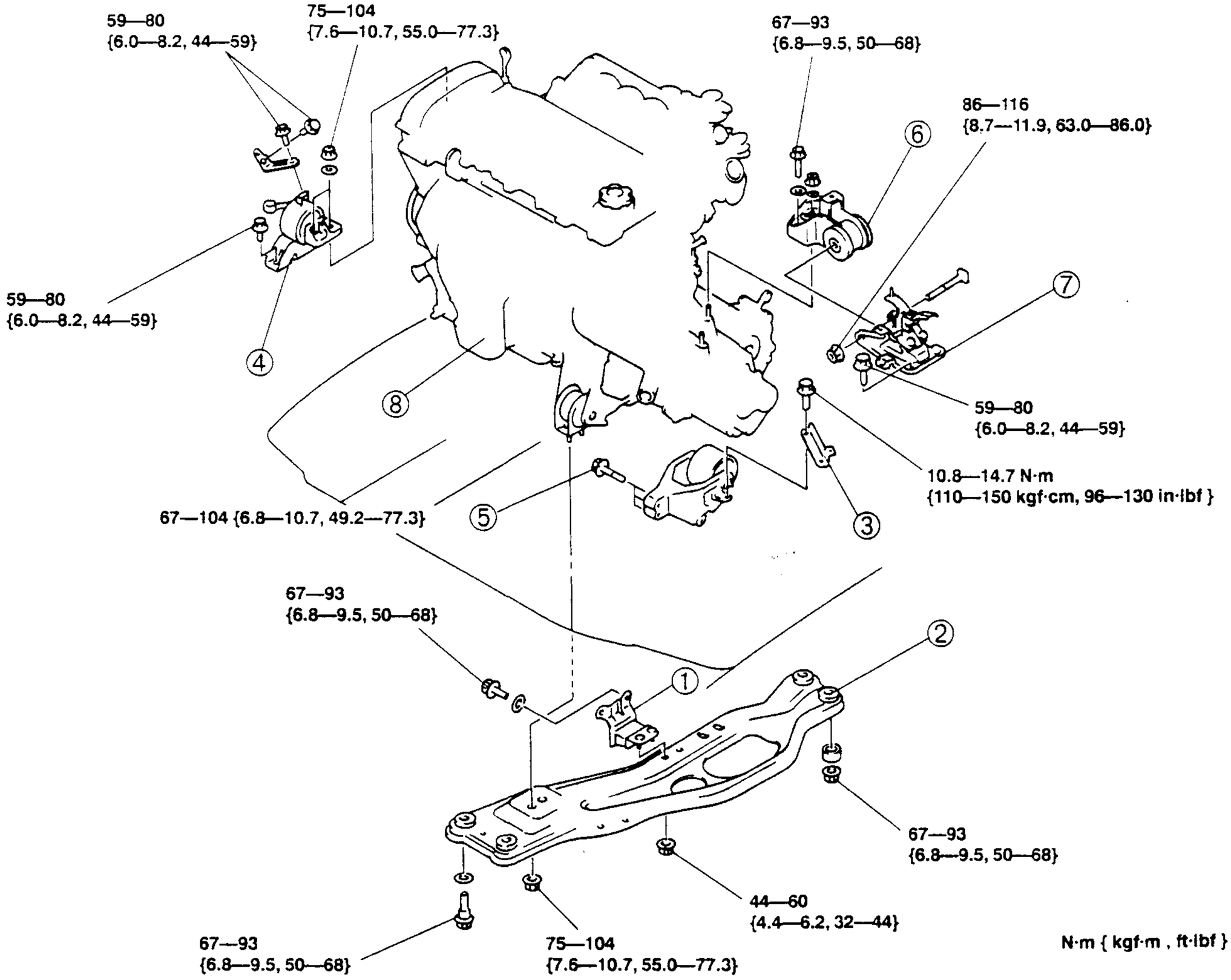
1. Apply clean engine oil to the new oil seal lip.
2. Push the oil seal slightly in by hand.
3. Tap the oil seal in evenly by using the **SST** and a hammer.

ENGINE

ENGINE REMOVAL/INSTALLATION

Warning
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" in section F. (Refer to section F, FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)**

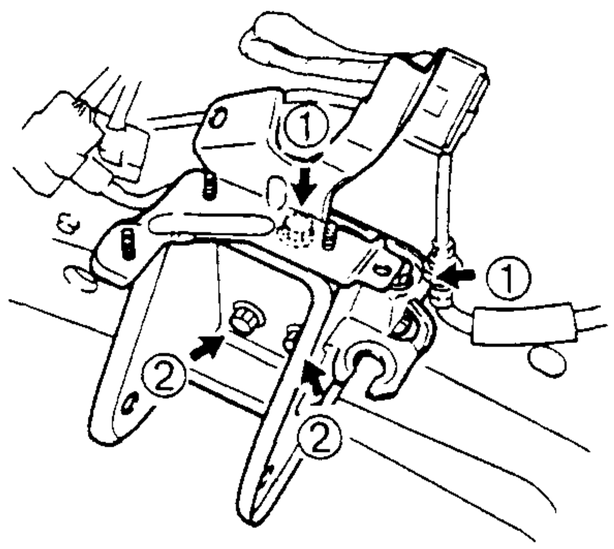
1. Disconnect the negative battery cable.
2. Remove the radiator. (Refer to section E, RADIATOR, RADIATOR REMOVAL/INSTALLATION.)
3. Remove the air cleaner.
4. Remove the accelerator cable. (Refer to section F, INTAKE-AIR SYSTEM, ACCELERATOR CABLE INSPECTION/ ADJUSTMENT.)
5. Disconnect the fuel hose. (Refer to section F, FUEL SYSTEM, BEFORE REPAIR PROCEDURE.) (Refer to section F, FUEL SYSTEM, AFTER REPAIR PROCEDURE.)
6. Remove the front pipe. (Refer to section F, EXHAUST SYSTEM, EXHAUST SYSTEM REMOVAL/INSTALLATION.)
7. Remove the rods, cables and pipes related to the transaxle.
8. Remove the battery.
9. Remove the fuse box.
10. Remove the P/S oil pump with the oil hose still connected. Position the P/S oil pump so that it is out of the way.
11. Remove the A/C compressor with the pipe still connected. Position the A/C compressor so that it is out of the way.
12. Remove the drive shaft. (Refer to section M, DRIVE SHAFT, DRIVE SHAFT REMOVAL/INSTALLATION.)
13. Remove in the order indicated in the table.
14. Install in the reverse order of removal.
15. Start the engine and
    (1) check the engine oil, engine coolant, transaxle oil and fuel leakage.
    (2) check the ignition timing, idle speed and idle mixture. (Refer to section F, ENGINE TUNE-UP.)
16. Perform a road test.



1	No.5 Engine mount rubber
2	Engine mount member
3	No.1 Engine mount stay bracket
4	No.3 Engine mount rubber ☞ Installation Note
5	No.1 Engine mount bolt
6	No.4 Engine mount rubber ☞ Installation Note
7	No.4 Engine mount bracket ☞ Installation Note
8	Engine, transaxle

No.4 Engine Mount Bracket Installation Note

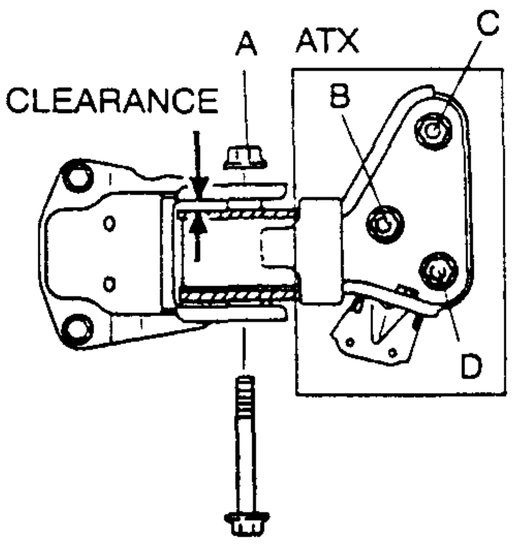
- Tighten the bolt in the order shown.



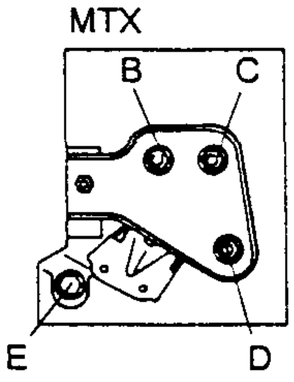
No.3, No.4 Engine Mount Rubber Installation Note

1. Hand tighten the No.3 and No.4 engine mount rubber bolts and nuts (A–K).

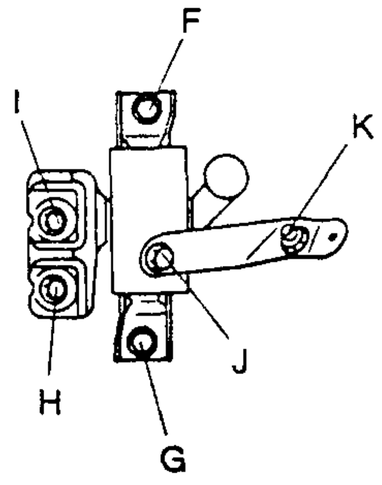
No.4 ENGINE MOUNT RUBBER



MTX



No.3 ENGINE MOUNT RUBBER

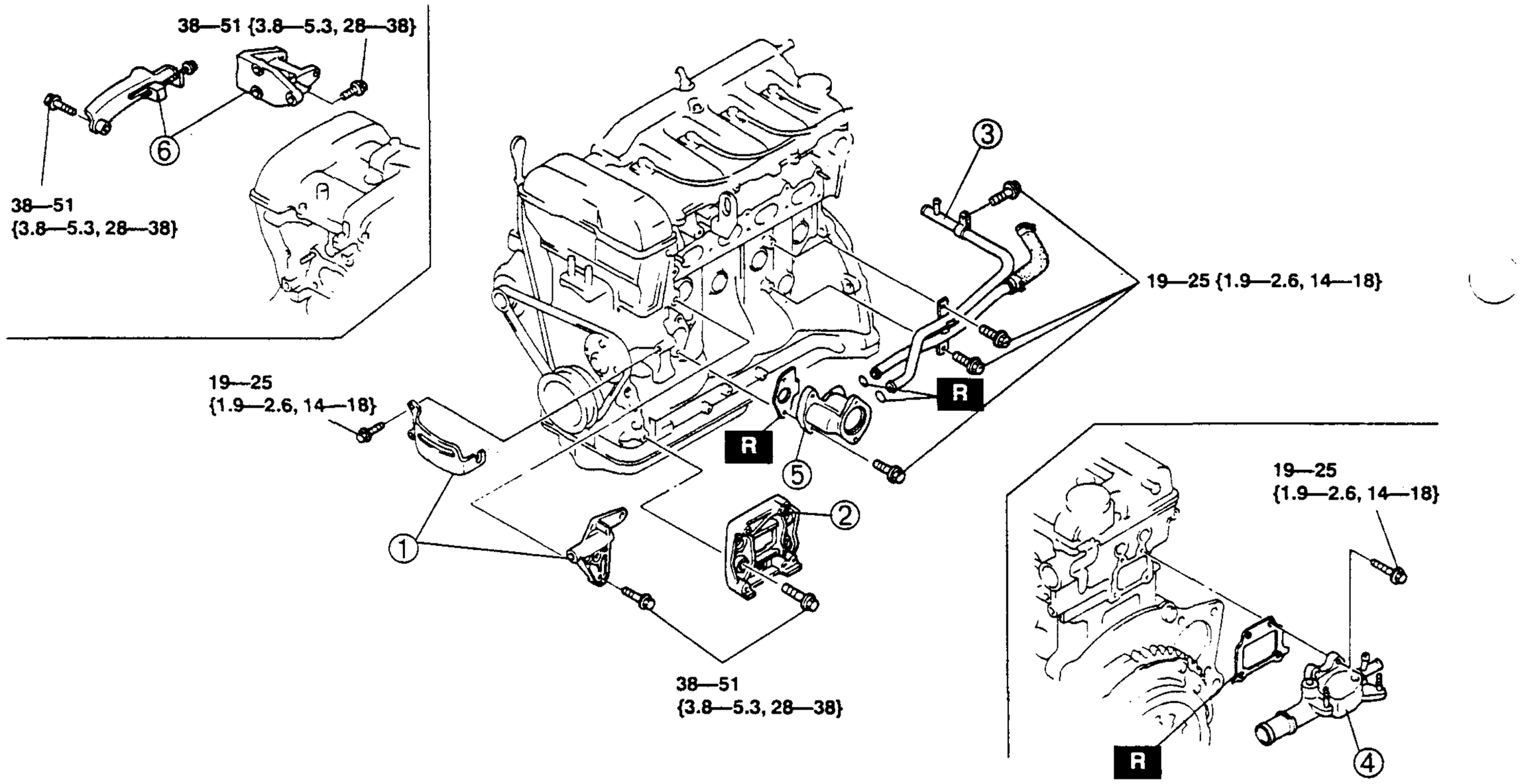


2. Tighten the No.4 engine mount rubber bolts and nuts (A–E).
3. Tighten the No.3 engine mount rubber bolts and nuts (F–K).
4. Measure the No.4 engine mount rubber clearance. If not within the specification, repeat from step 1.

Standard clearance
3.0—4.0 mm {0.12—0.15 in }

ENGINE DISASSEMBLY/ASSEMBLY

1. Disconnect the engine and transaxle. (Refer to section J, MANUAL TRANSAXLE, TRANSAXLE REMOVAL/INSTALLATION.) (Refer to section K, AUTOMATIC TRANSAXLE, TRANSAXLE REMOVAL/INSTALLATION.)
2. Remove the intake-air system.
3. Remove the exhaust system.
4. Remove the oil filter. (Refer to section D, OIL FILTER, OIL FILTER REPLACEMENT.)
5. Remove the oil cooler. (FS)
6. Remove the thermostat. (Refer to section E, THERMOSTAT, THERMOSTAT REMOVAL/INSTALLATION.)
7. Remove the ignition coil.
8. Remove the generator.
9. Disassemble in the order indicated in the table.
10. Assemble in the reverse order of disassembly.



N·m { kgf·m , ft·lbf }

1	P/S oil pump bracket
2	A/C compressor bracket
3	Water bypass pipe

4	Water outlet
5	Thermostat housing
6	Generator bracket

LUBRICATION SYSTEM

OIL PRESSURE INSPECTION **D-1**
ENGINE OIL **D-2**
ENGINE OIL INSPECTION **D-2**
ENGINE OIL REPLACEMENT **D-2**
OIL FILTER **D-2**
OIL FILTER REPLACEMENT **D-2**
OIL COOLER **D-3**
OIL COOLER REMOVAL/INSTALLATION **D-3**
OIL PAN **D-3**
OIL PAN REMOVAL/INSTALLATION **D-3**

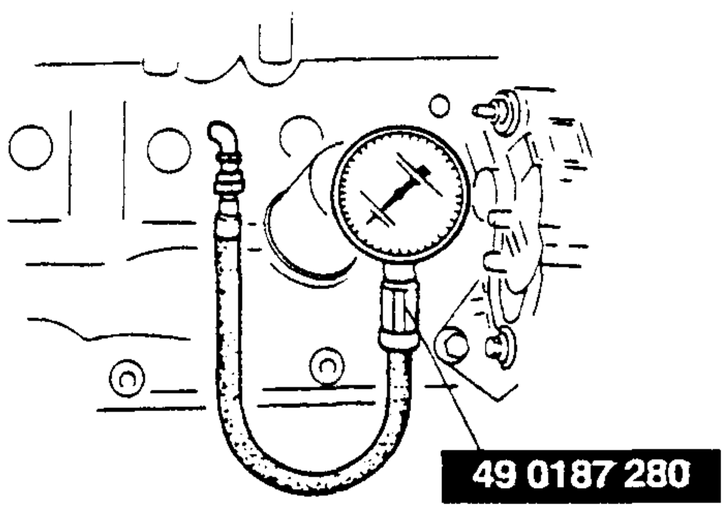
D

OIL PRESSURE INSPECTION

Warning

- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**
- **When the engine and the oil are hot, they can badly burn. Turn off the engine and wait until they are cool.**

1. Remove the intake manifold bracket.
2. Remove the oil pressure switch.
3. Screw the **SST** into the oil pressure switch installation hole.



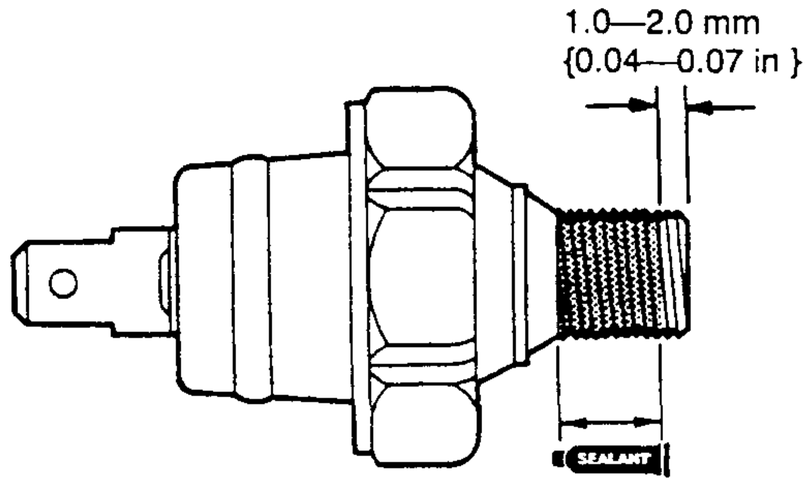
4. Warm up the engine to normal operating temperature.
5. Run the engine at the specified speed, and note the gauge readings.

Note

- The oil pressure can vary with oil viscosity and temperature.

Oil pressure
393—490 kPa {4.0—5.0 kgf/cm^2 , 57—71 psi }
[3,000 rpm]

6. If the pressure is not as specified, check for the cause and repair or replace as necessary.
7. Stop the engine and wait until it is cool.
8. Remove the **SST**.
9. Apply silicone sealant to the oil pressure switch threads as shown.



10. Install the oil pressure switch.

Tightening torque
12—17 N·m { 1.2—1.8 kgf·m , 9—13 ft·lbf }

11. Start the engine and check for oil leaks.
12. Install the intake manifold bracket.

ENGINE OIL

ENGINE OIL INSPECTION

1. Position the vehicle on level ground.
2. Warm up the engine to normal operating temperature and stop it.
3. Wait for five minutes.
4. Remove the dipstick and check for oil level and condition. Verify that the oil level is within the F and L marks on the dipstick.
5. Add or replace oil if necessary.

ENGINE OIL REPLACEMENT

Warning

- **When the engine and the engine oil are hot, they can badly burn. Don't burn yourself with either.**
- **A vehicle that is lifted but not securely supported on safety stands is dangerous. It can slip or fall, causing death or serious injury. Never work around or under a lifted vehicle if it is not securely supported on safety stands.**
- **Continuous exposure with USED engine oil has caused skin cancer in laboratory mice. Protect your skin by washing with soap and water immediately after this work.**

1. Position the vehicle on level ground.
2. Remove the oil filler cap and the oil pan drain plug.
3. Drain the oil into a container.
4. Install the drain plug.

Tightening torque
30—41 N·m { 3.0—4.2 kgf·m , 22—30 ft·lbf }

5. Refill the engine with the specified type and amount of engine oil.
6. Refit the oil filler cap.
7. Run the engine and check for oil leaks.
8. Check the oil level and add oil if necessary. (Refer to ENGINE OIL, ENGINE OIL INSPECTION.)

Note

- The actual oil level may vary from the specified capacity in some cases.

Oil capacity

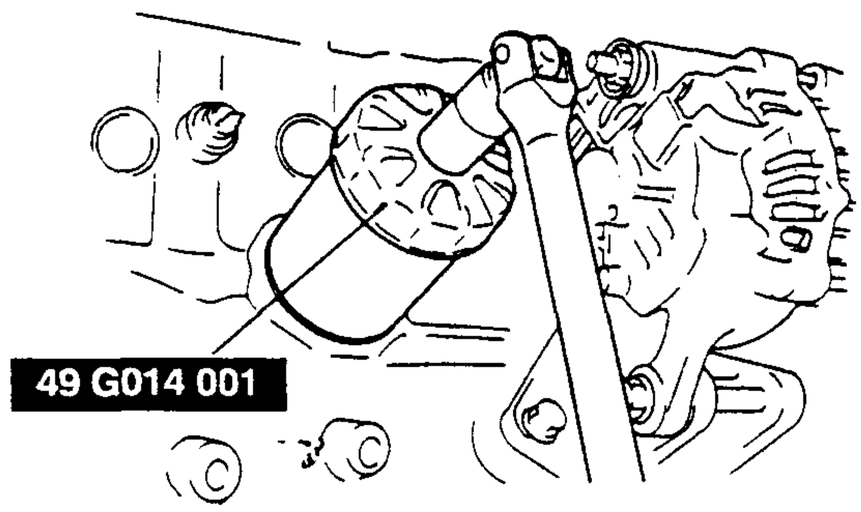
L { US qt , Imp qt }

Item	Engine	
	FP	FS
Oil replacement	3.3 {3.5, 2.9}	
Oil and oil filter replacement	3.5 {3.7, 3.1}	
Total (dry engine)	3.7 {3.9, 3.3}	

OIL FILTER

OIL FILTER REPLACEMENT

1. Remove the oil filter by using the **SST**.

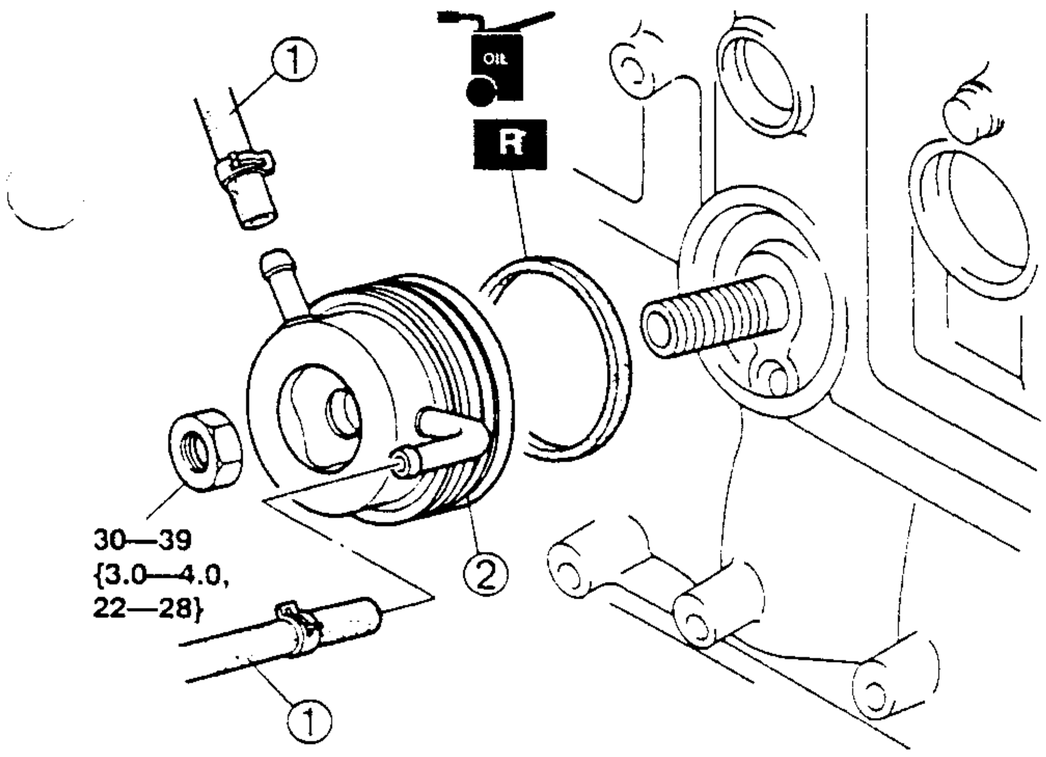


2. Use a clean rag to wipe off the mounting surface on the oil filter body.
3. Tighten the filter according to the installation direction on the side of it or packing box by using the **SST**.
4. Start the engine and check for oil leaks.
5. Check the oil level and add oil if necessary. (Refer to ENGINE OIL, ENGINE OIL INSPECTION.)

OIL COOLER

OIL COOLER REMOVAL/INSTALLATION
FS

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to section E, ENGINE COOLANT, ENGINE COOLANT REPLACEMENT.)
3. Remove the oil filter. (Refer to OIL FILTER, OIL FILTER REPLACEMENT.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Start the engine, and check the engine oil and the engine coolant leakage.



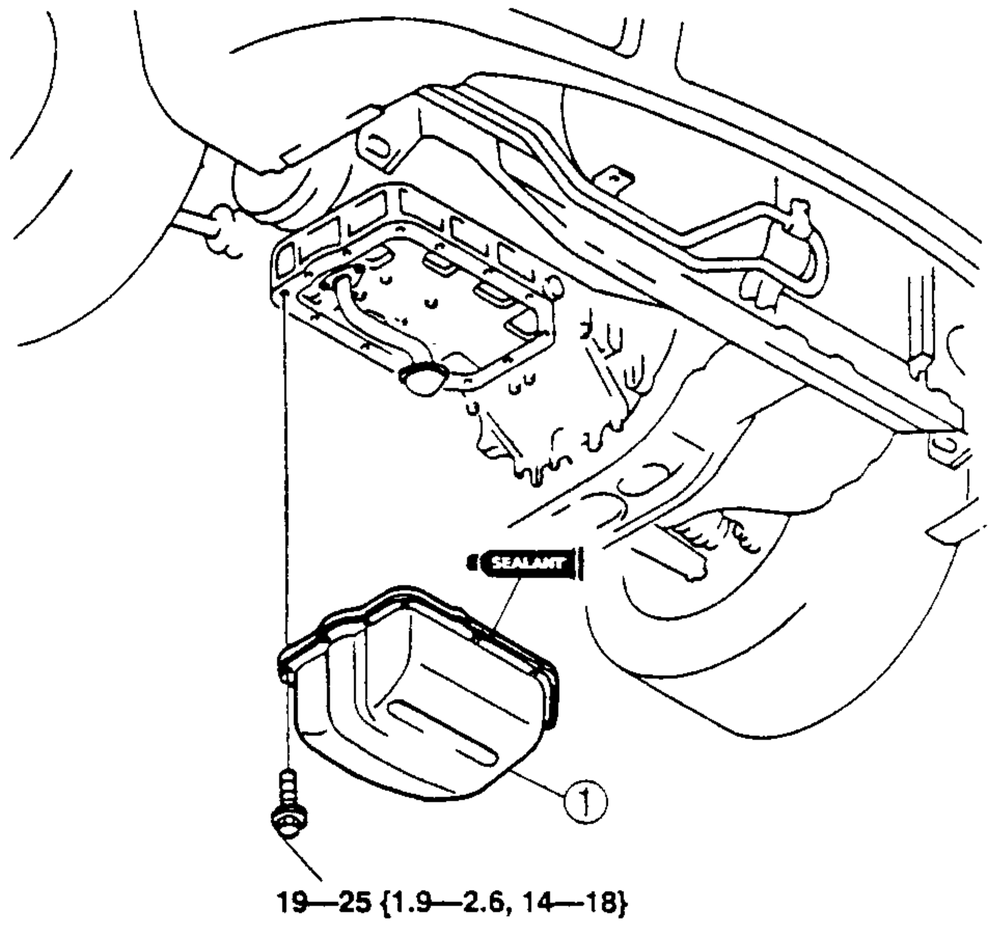
N·m { kgf·m , ft·lbf }

1	Oil cooler hose
2	Oil cooler

OIL PAN

OIL PAN REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine oil. (Refer to ENGINE OIL, ENGINE OIL REPLACEMENT.)
3. Remove the front pipe. (Refer to section F, EXHAUST SYSTEM, EXHAUST SYSTEM REMOVAL/INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order removal.



N·m { kgf·m , ft·lbf }

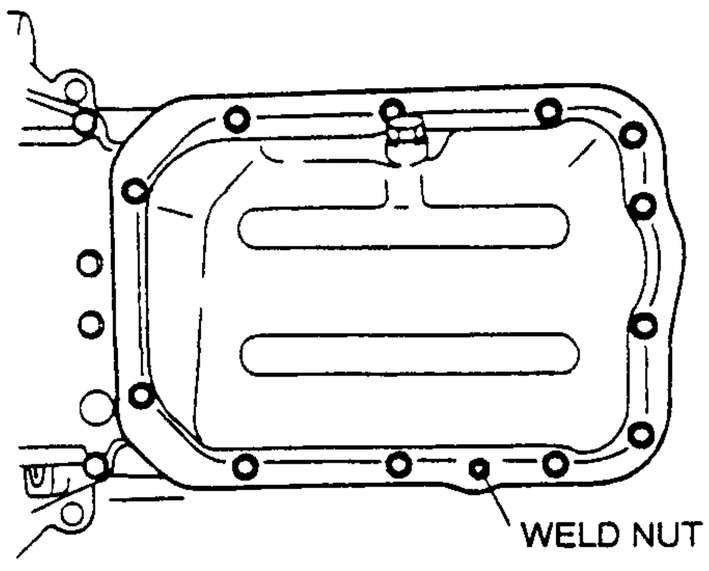
1	Oil pan ☞ Removal Note ☞ Installation Note

Oil Pan Removal Note

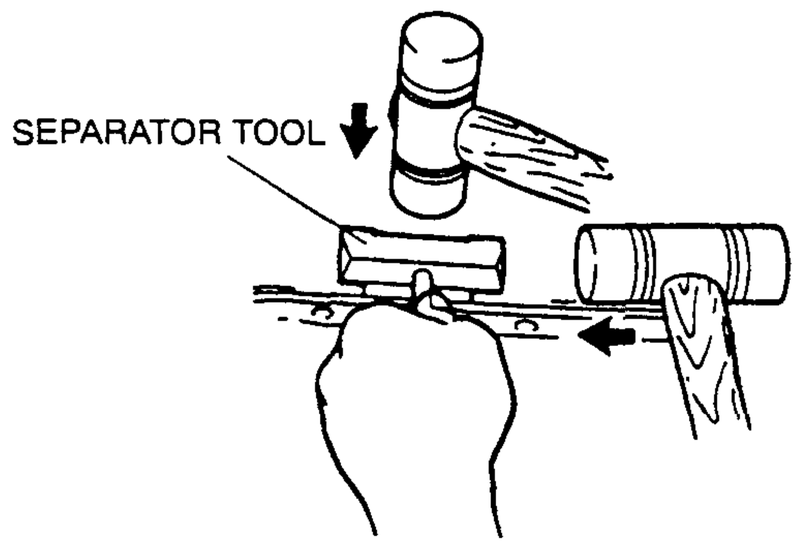
Caution

- **Pry tools can easily scratch the oil pan mounting surfaces. Prying off the oil pan can also easily bend the oil pan flange. Refer to the following instructions before removing the oil pan.**

1. Screw in a oil pan bolt in a weld nut hole to make a small gap between the oil pan upper block and the oil pan.



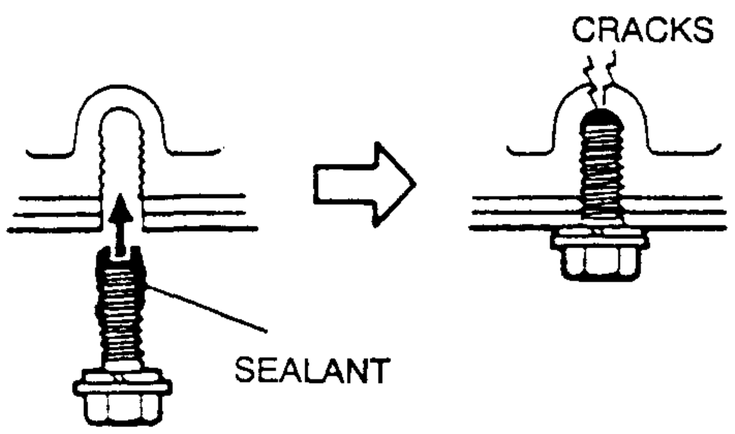
2. Insert a screwdriver or a separator tool between the oil pan upper block and the oil pan.



Oil Pan Installation Note

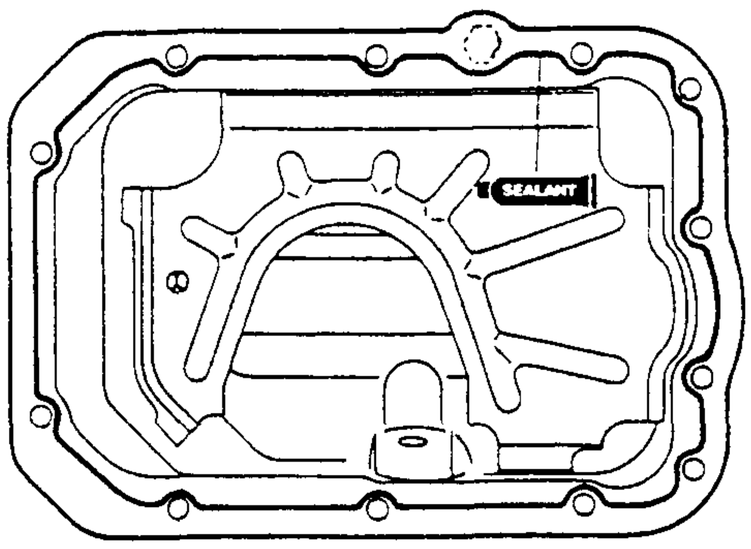
Caution

- **If the bolts are reused, remove the old sealant from the bolt threads. Tightening a bolt that has old sealant on it can cause thread damage.**



- Apply silicone sealant to the oil pan along the inside of the bolt holes and overlap the ends.

Thickness
ø2.0—3.0 mm {0.079—0.118 in }



COOLING SYSTEM

COOLING SYSTEM SERVICE WARNINGS **E-1**
ENGINE COOLANT **E-1**
ENGINE COOLANT LEVEL INSPECTION ... **E-1**
ENGINE COOLANT REPLACEMENT **E-1**
ENGINE COOLANT LEAKAGE INSPECTION **E-2**
RADIATOR CAP **E-3**
RADIATOR CAP INSPECTION **E-3**
RADIATOR **E-3**
RADIATOR REMOVAL / INSTALLATION **E-3**
THERMOSTAT **E-4**
THERMOSTAT REMOVAL / INSTALLATION . **E-4**
THERMOSTAT INSPECTION **E-4**
WATER PUMP **E-5**
WATER PUMP REMOVAL / INSTALLATION .. **E-5**
COOLING FAN MOTOR **E-5**
COOLING FAN MOTOR INSPECTION **E-5**
COOLING FAN MOTOR REMOVAL / INSTALLATION **E-5**
COOLING FAN RELAY **E-6**
COOLING FAN RELAY INSPECTION **E-6**

E

COOLING SYSTEM SERVICE WARNINGS

Warning

- **Removing the radiator cap or loosening the radiator drain plug while the engine is running, or when the engine and radiator are hot is dangerous. Scalding coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
- **Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
- **When you're sure all the pressure is gone, press down on the cap-still using a cloth-turn it, and remove it.**
- **When the engine and the engine coolant are hot, they can badly burn. Turn off the engine and wait until they are cool before draining the engine coolant.**

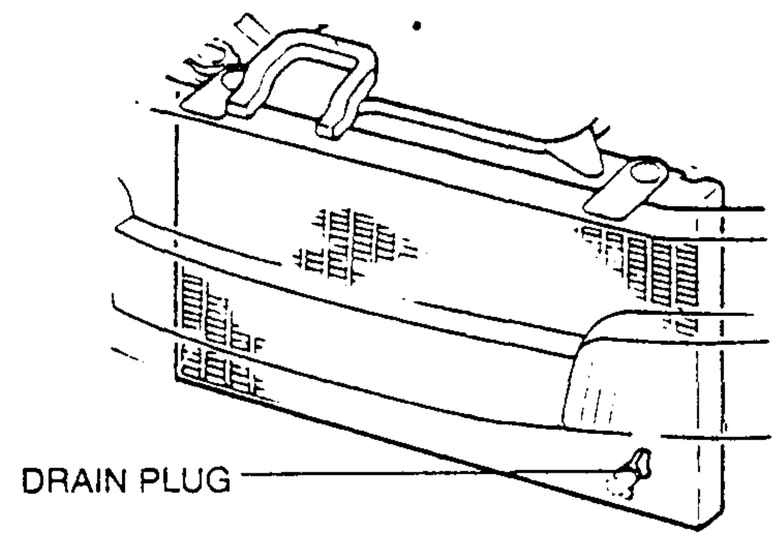
ENGINE COOLANT

ENGINE COOLANT LEVEL INSPECTION

1. Remove the radiator cap.
2. Verify that the coolant level is near the radiator filler neck.
3. Verify that the coolant level on the coolant dipstick is between the F and L marks.
4. Add coolant if necessary.

ENGINE COOLANT REPLACEMENT

1. Drain the coolant in the coolant reservoir.
2. Remove the radiator cap and loosen the radiator drain plug.



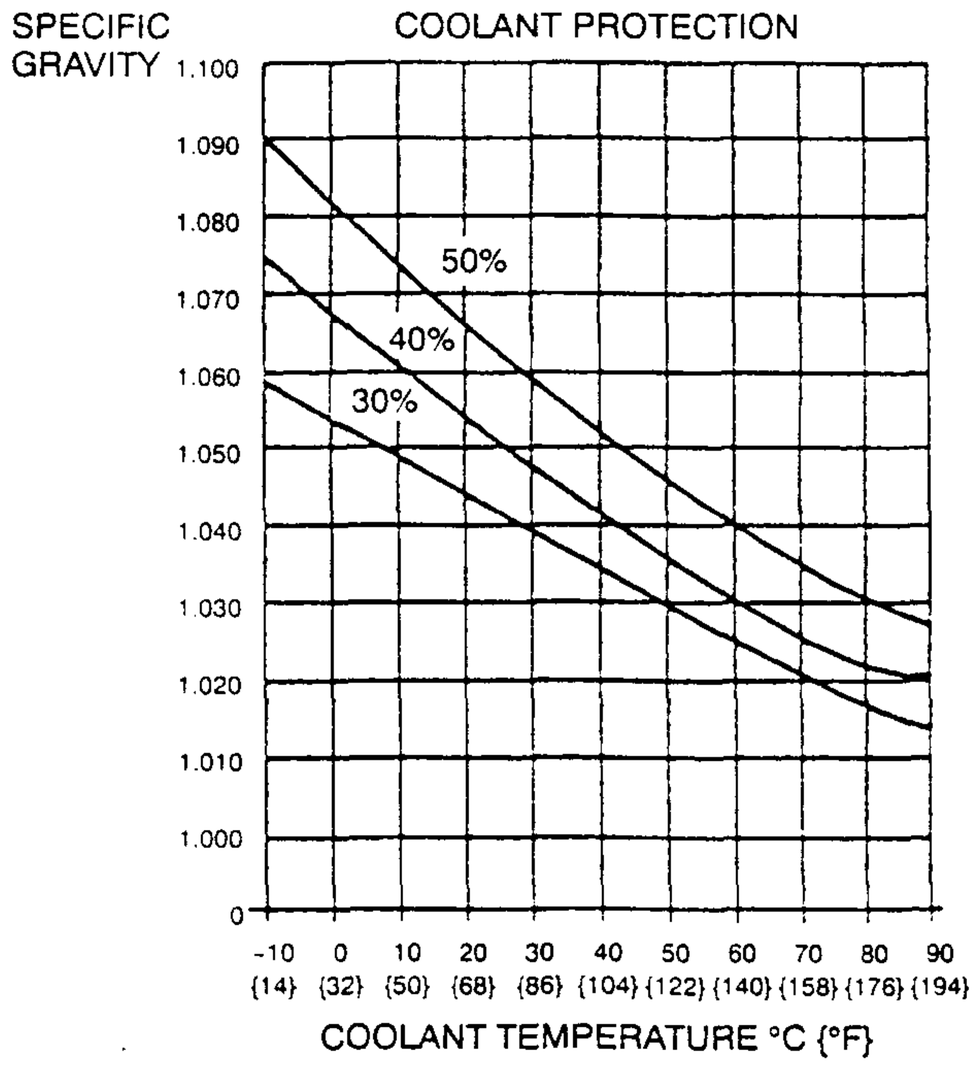
3. Drain the coolant into a container.
4. Flush the cooling system with water until all traces of color are gone.
5. Left the system drain completely.
6. Tighten the radiator drain plug.

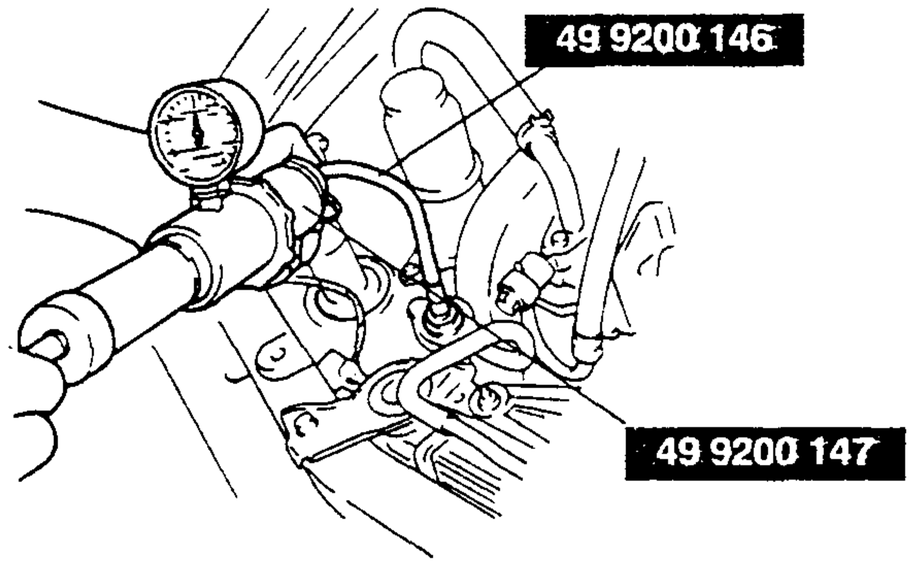
Caution

- **The engine has aluminum parts that can be damaged by alcohol or methanol antifreeze. Do not use alcohol or methanol in the cooling system. Use only ethylene-glycol-based coolant.**
- **Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will cut down on the coolant's effectiveness.**

7. Referring to the following graph and chart, select proper gravity of the coolant. Slowly pour the coolant into the radiator up to the coolant filler port.

Filling pace
1.0 L { 1.1 US qt , 0.9 Imp qt }/min. [max]





Caution
- **Applying more than 123 kPa { 1.25 kgf/cm^2 , 17.8 psi } can damage the hoses, fittings, and other components, and cause leaks.**

4. Apply pressure to the radiator.

Pressure
123 kPa { 1.25 kgf/cm^2 , 17.8 psi }

5. Verify that the pressure is held. If not, check the system for coolant leakage.

Antifreeze solution mixture percentage

Coolant protection	Volume percentage		Gravity at 20 °C { 68 °F }
	Water	Coolant	
Above -16 °C { 3 °F }	65	35	1.054
Above -26 °C { -15 °F }	55	45	1.066
Above -40 °C { -40 °F }	45	55	1.078

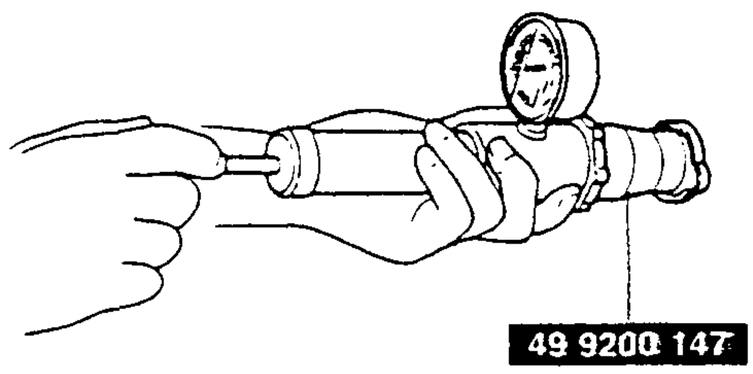
8. Fill the coolant into the reservoir up to the F mark on the coolant dipstick.
9. Fully install the radiator cap.
10. Start the engine and let it idle for approx. 10 minutes. If the coolant temperature becomes too high, stop the engine to prevent it from overheating.
11. After engine warms up, run it at approx. 2,500 rpm for five minutes.
12. Increase the engine speed to approx. 3,000 rpm for five seconds, then return to idle. Repeat several times.
13. Stop the engine and wait until it is cool.
14. Check the coolant level. If it is low, repeat steps 7–12.
15. Check the coolant leaks.

ENGINE COOLANT LEAKAGE INSPECTION
1. Check the coolant level. (Refer to ENGINE COOLANT, ENGINE COOLANT LEVEL INSPECTION.)
2. Remove the radiator cap.
3. Connect a radiator cap tester and the **SST** to the radiator filler neck.

RADIATOR CAP

RADIATOR CAP INSPECTION

1. Attach the radiator cap to a radiator cap tester with the **SST**. Apply pressure gradually.



2. Verify that the pressure becomes stable within the specification.

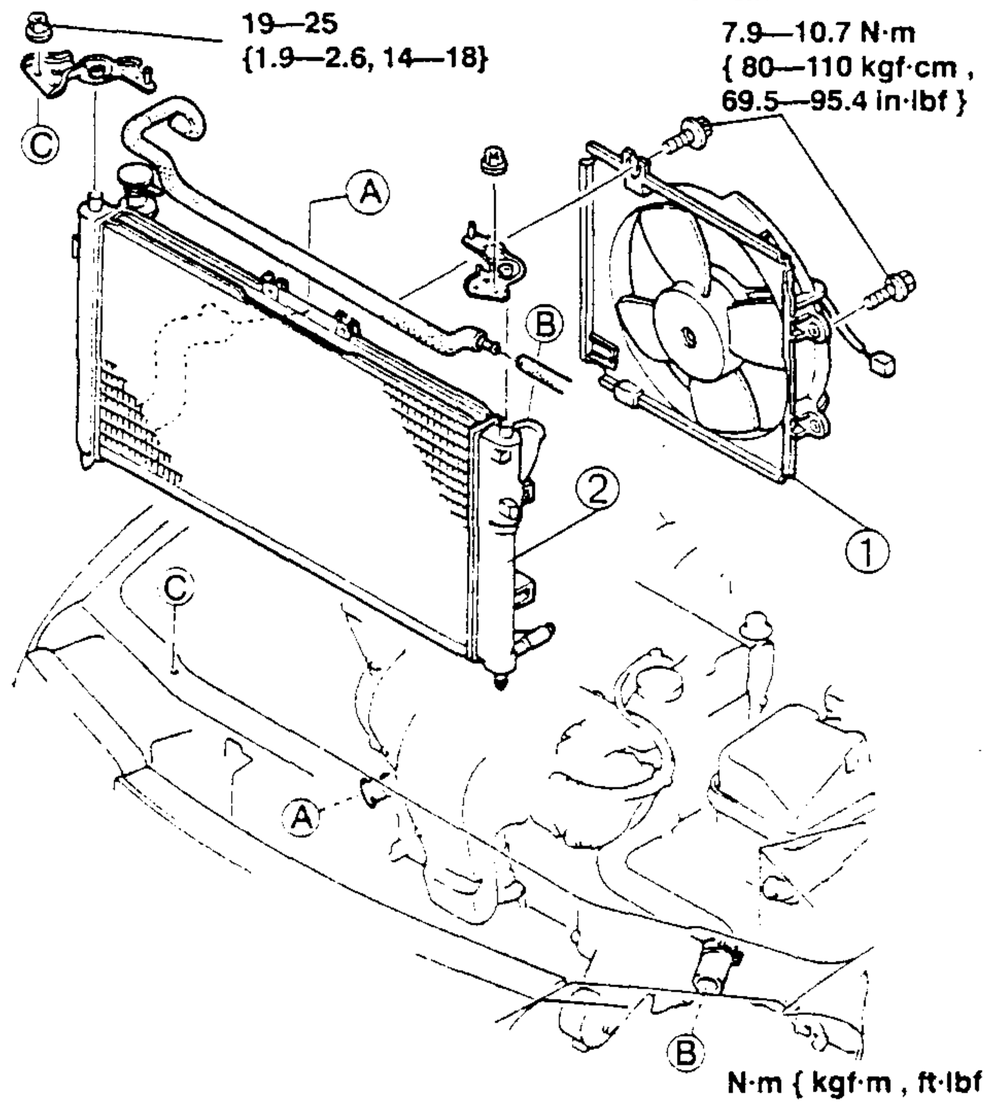
   Pressure
   94—122 kPa
   {0.95—1.25 kgf/cm^2 , 13.5—17.7 psi }

3. If the pressure is held for 10 seconds, the radiator cap is normal.

RADIATOR

RADIATOR REMOVAL/INSTALLATION

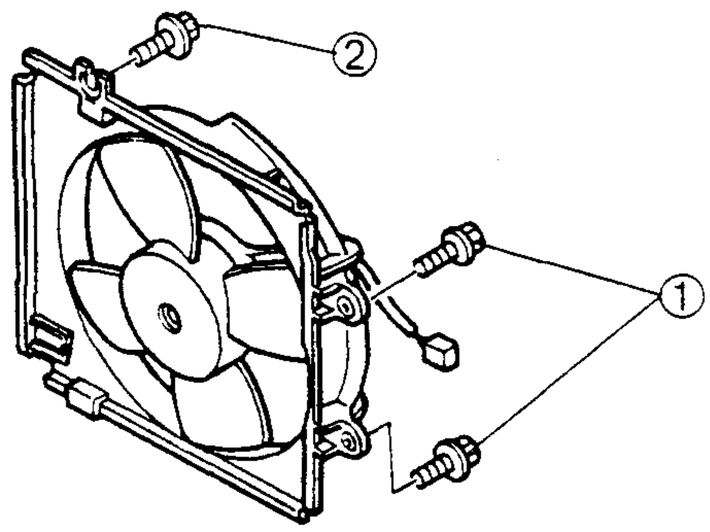
1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to ENGINE COOLANT, ENGINE COOLANT REPLACEMENT.)
3. Remove the fresh air duct.
4. Remove the condenser fan.
5. Remove the oil pipe (ATX).
6. Remove in the order indicated in the table.
7. Install in the reverse order of removal.



1	Cooling fan component ☞ Installation Note
2	Radiator

Cooling Fan Component Installation Note

- Tighten the cooling fan component bolts in the order shown.



THERMOSTAT

THERMOSTAT REMOVAL/INSTALLATION

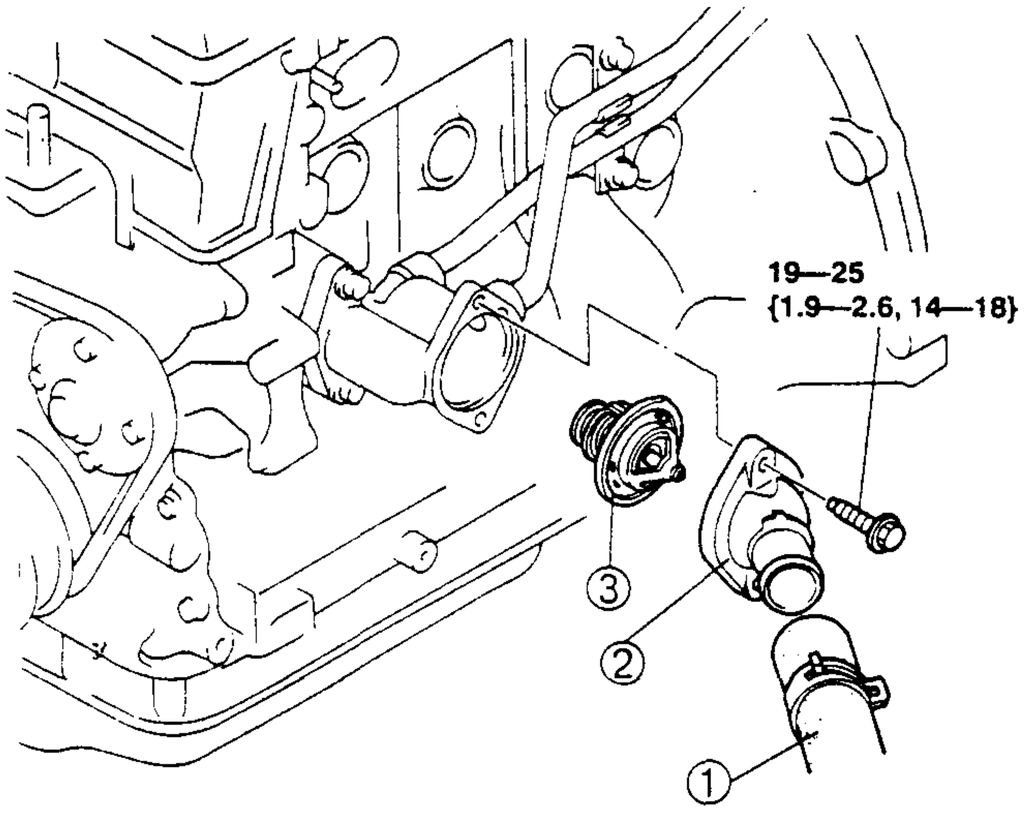
1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to ENGINE COOLANT, ENGINE COOLANT REPLACEMENT.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.

THERMOSTAT INSPECTION

Check the thermostat for the following and replace if necessary.

- Open valve in room temperature
- Opening temperature and lift of the valve

Initial-opening temperature °C { °F }	80—84 {176—183}
Full-open temperature °C { °F }	95 {203}
Full-open lift mm { in }	8.5 { 0.33 } min.

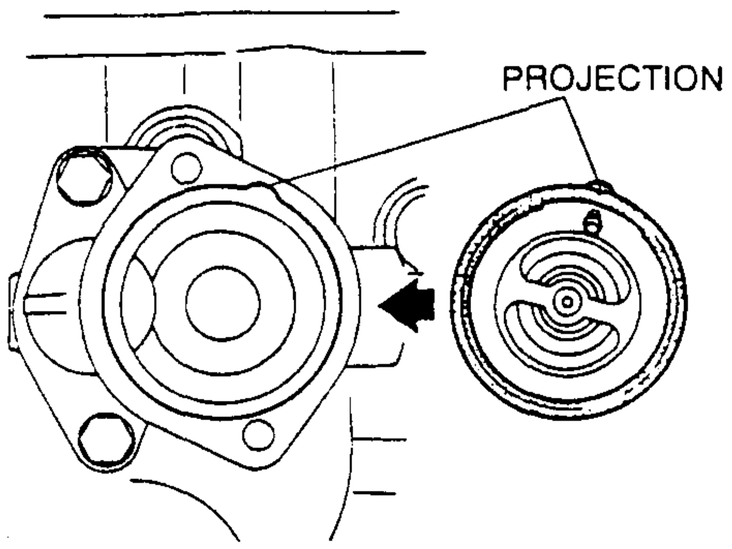


N·m { kgf·m , ft·lbf }

1	Lower radiator hose
2	Thermostat cover
3	Thermostat ☞ Installation Note

Thermostat Installation Note

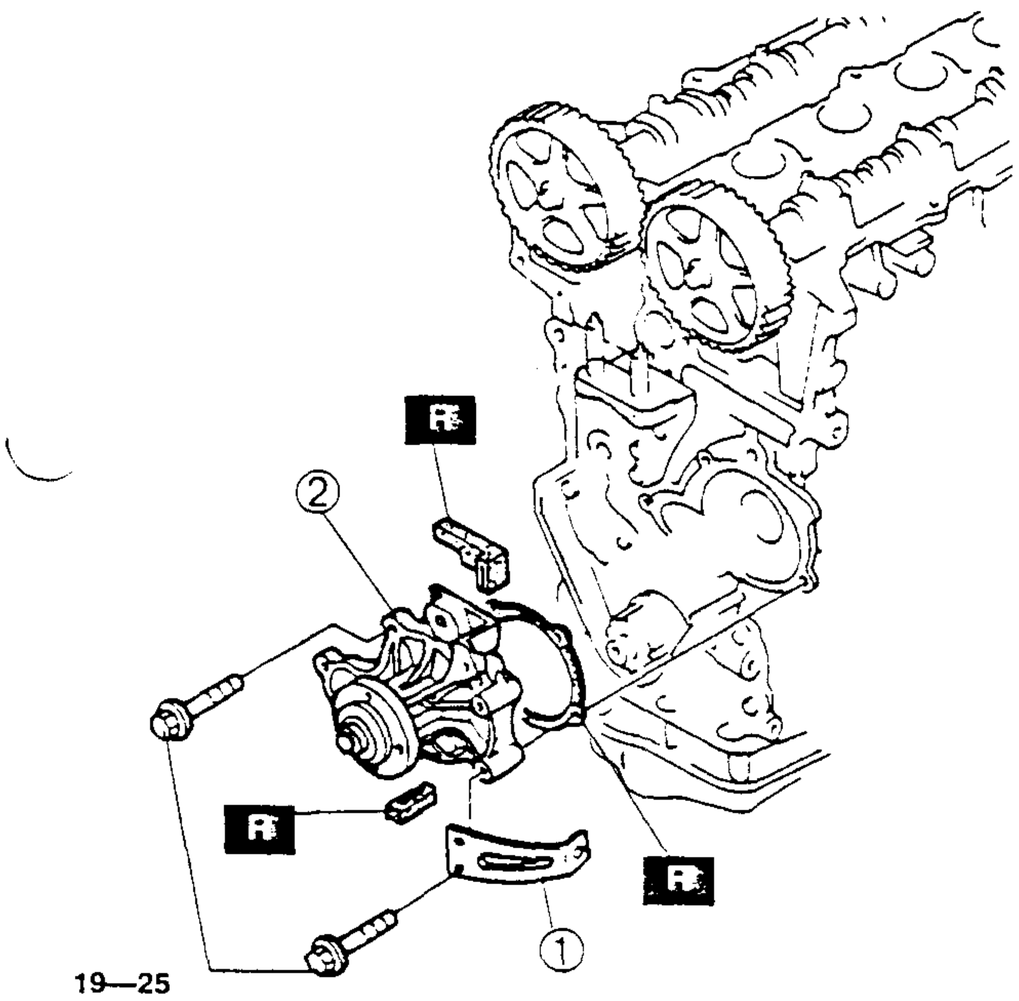
- Install the thermostat into the thermostat case, aligning the projection on the gasket to the thermostat case as shown.



WATER PUMP

WATER PUMP REMOVAL / INSTALLATION

1. Remove the timing belt. (Refer to section B, TIMING BELT, TIMING BELT REMOVAL / INSTALLATION.)
2. Drain the engine coolant. (Refer to ENGINE COOLANT, ENGINE COOLANT REPLACEMENT.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



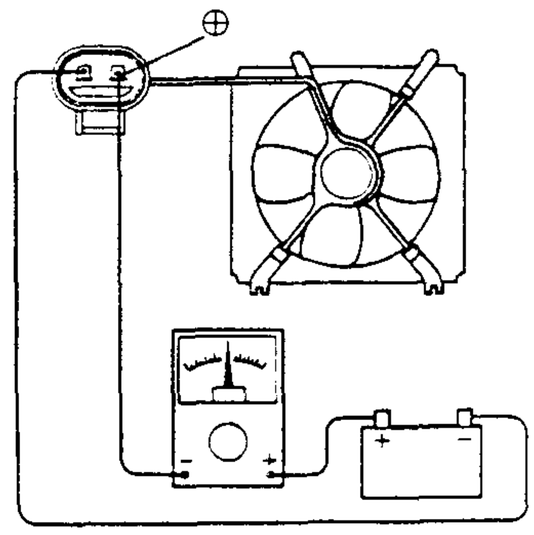
19—25 {1.9—2.6, 14—18} N·m { kgf·m , ft·lbf }

1	P/S oil pump adjuster
2	Water pump

COOLING FAN MOTOR

COOLING FAN MOTOR INSPECTION

1. Verify that the battery is fully charged. (Refer to section G, CHARGING SYSTEM , BATTERY INSPECTION, Battery.)
2. Disconnect the cooling fan motor connector.
3. Connect battery positive voltage and an ammeter to the cooling fan motor connector.



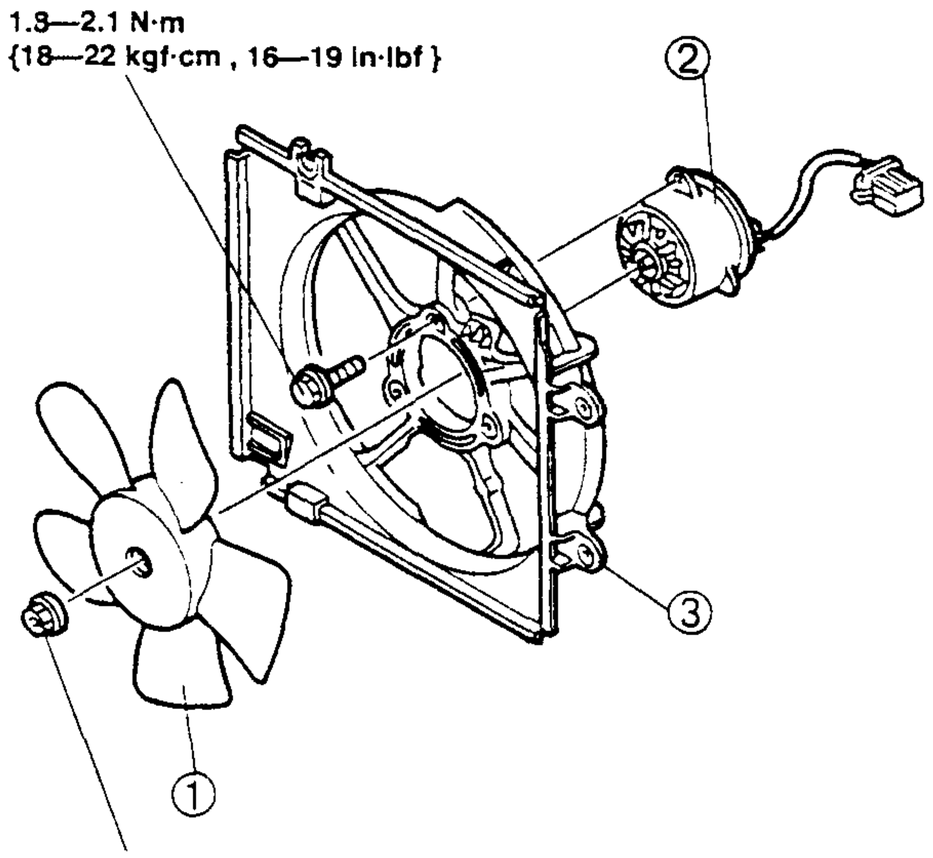
4. Verify that the cooling fan motor operates smoothly at the standard current draw.

Item	Engine	
	FP	FS
Current (A)	5.6—7.6	

5. If not as specified, replace the cooling fan motor.

COOLING FAN MOTOR REMOVAL/ INSTALLATION

1. Remove the cooling fan component. (Refer to RADIATOR, RADIATOR REMOVAL / INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order to removal.



1	Cooling fan blade
2	Cooling fan motor
3	Radiator cowling

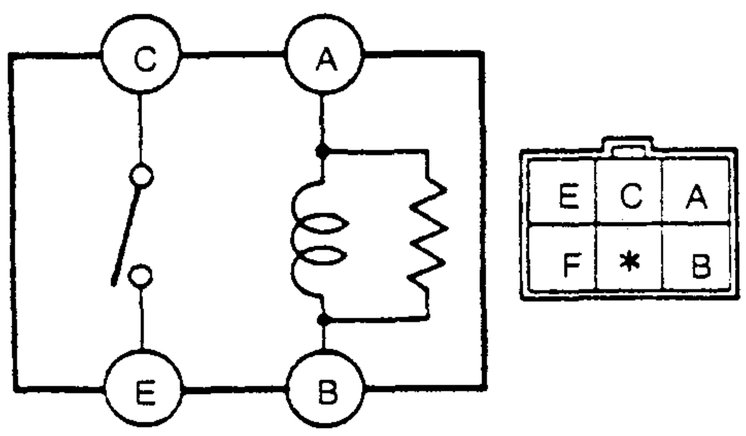
COOLING FAN RELAY

COOLING FAN RELAY INSPECTION

1. Apply battery positive voltage and check for continuity between terminals of the cooling fan relay by using an ohmmeter.

○—○ : Continuity

Step	Terminal			
	A	B	C	E
1	○——○			
2	B+	GND	○——○	



2. If not as specified, replace the cooling fan relay.

FUEL AND EMISSION CONTROL SYSTEMS

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ENGINE TUNE-UP

ENGINE TUNE-UP PREPARATION

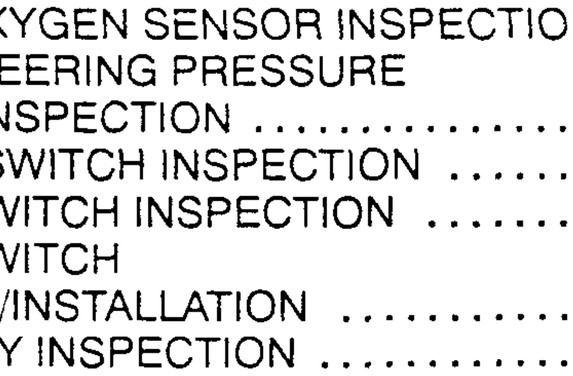
Using SSTs (NGS)

1. Connect the **SSTs** (NGS) to the data link connector and battery.

49 T088 030A 49 T088 031A

49 T088 032A 49 T088 033A

49 T088 0A4



2. Select "PID/DATA MONITOR AND RECORD" and press TRIGGER.

3. Select "RPM" and press TRIGGER.
4. Press SET UP and turn test mode on.(press ON)
5. Press CANCEL.
6. Press START.
7. Turn off all electrical loads.
   - A/C switch
   - Headlight switch
   - Fan switch
8. Shift the transaxle into Neutral (MTX) or P position (ATX).
9. Warm up the engine to normal operating temperature.
10. Verify that the battery is fully charged.
11. Wait until the cooling fan and condenser fan stop.

Not Using SSTs (NGS)

1. Turn off all electrical loads.
   - A/C switch
   - Headlight switch
   - Fan switch
2. Shift the transaxle into Neutral (MTX) or P position (ATX).
3. Warm up the engine to normal operating temperature.
4. Verify that the battery is fully charged.
5. Wait until the cooling fan and condenser fan stop.

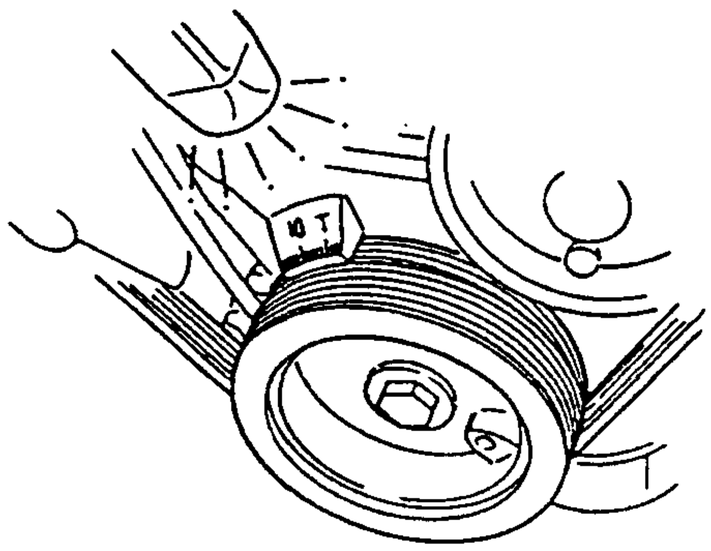
IGNITION TIMING INSPECTION

Using SSTs (NGS)

1. Perform "ENGINE TUNE-UP PREPARATION".
2. Verify that the idle speed is within the specification.

Specification
550—750 rpm

3. If not as specified,adjust the idle speed. (Refer to IDLE SPEED ADJUSTMENT)
4. Connect a timing light to the high-tension lead of the No.1 cylinder.
5. Verify that the timing mark (yellow) is within the specification.



Specification
BTDC 6—18° /550—750 rpm

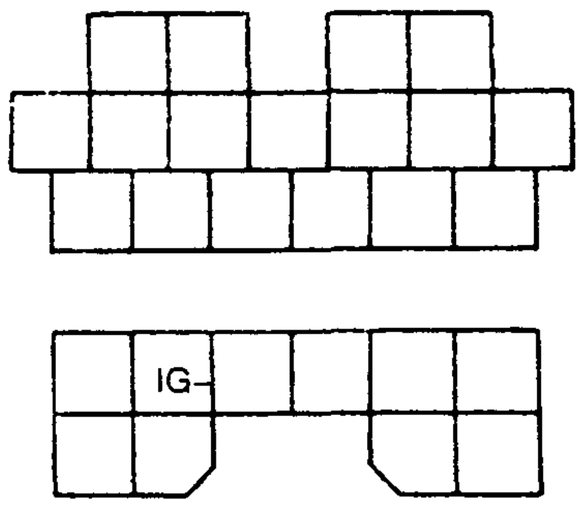
6. If not as specified,inspect the following.
   - Camshaft position sensor
   - Crankshaft position sensor
   - Crankshaft position sensor air gap
   - Throttle position sensor
   - Engine coolant temperature sensor
   - Neutral switch (MTX)
   - Clutch switch (MTX)
   - Transaxle range switch (ATX)
7. If the devices are normal,replace the ECM (PCM).

Not Using SSTs (NGS)

1. Perform "ENGINE TUNE-UP PREPARATION".

Warning

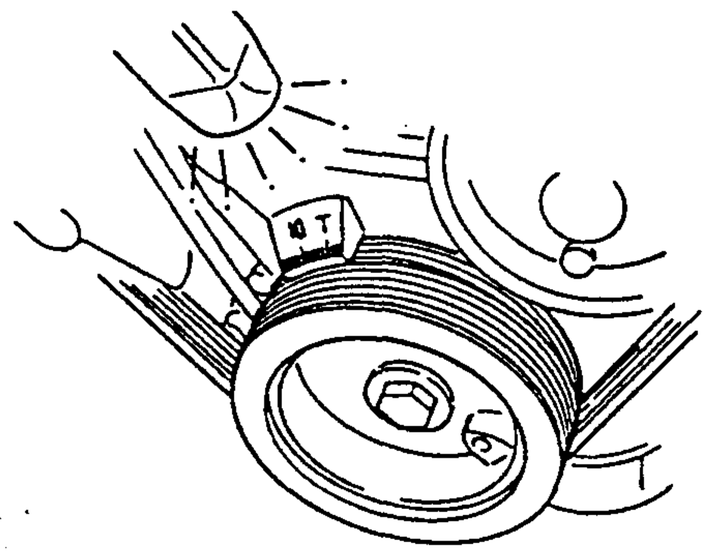
- **Misconnecting the data link connector terminals will possibly cause malfunction. Properly connect the specified terminals only.**



2. Connect a dwell tacho tester to the data link connector terminal IG-.
3. Verify that the idle speed is within the specification.

Specification
550—750 rpm

4. If not as specified,adjust the idle speed. (Refer to IDLE SPEED ADJUSTMENT)
5. Connect a timing light to the high-tension lead of the No.1 cylinder.
6. Verify that the timing mark (yellow) is within the specification.



Specification
BTDC 6—18° /550—750 rpm

7. If not as specified,inspect the following.
   - Camshaft position sensor
   - Crankshaft position sensor
   - Crankshaft position sensor air gap
   - Throttle position sensor
   - Engine coolant temperature sensor
   - Neutral switch (MTX)
   - Clutch switch (MTX)
   - Transaxle range switch (ATX)

8. If the devices are normal,replace the ECM (PCM).

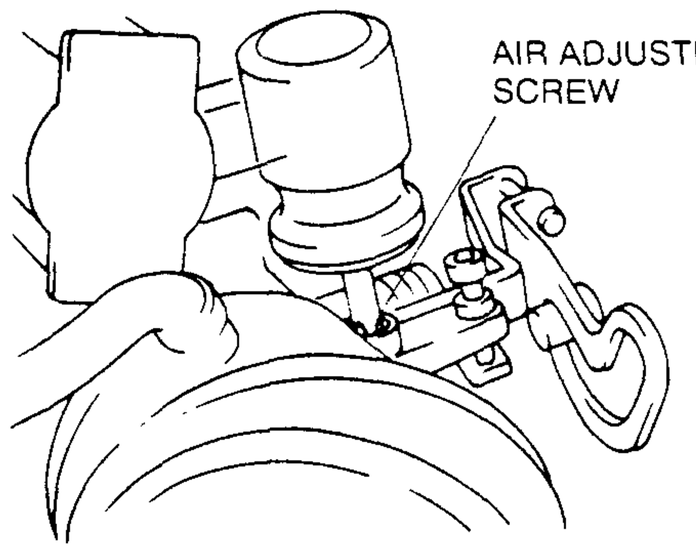
IDLE SPEED ADJUSTMENT
Using SSTs (NGS)
1. Perform "ENGINE TUNE-UP PREPARATION".
2. Verify that the idle speed is within the specification.

Specification
550—750 rpm

3. If not within the specification, race the engine and operate the A/C with no load.
4. Stop racing and the A/C, and check the idle speed.
5. If idle speed is below the specification.
- Disconnect the IAC valve connector and check the engine speed.
  (1) If the engine speed does not change, inspect the IAC valve.
  (2) If the engine speed changes excessively (due to engine stall), inspect the ECM (PCM) and related wiring harness and connectors.

Caution
- **The throttle adjusting screw is set at the factory and must not be adjusted. Any adjustment will negatively effect the engine performance.**

6. If idle speed is over the specification
- Disconnect the IAC valve connector and check the engine speed.
  (1) If the engine speed does not change,adjust with the air adjusting screw (AAS) within specification.



Specification
550—750 rpm

  (2) If the engine speed changes excessively, inspect the ECM (PCM) and related wiring harnesses and connectors.

Not Using SSTs (NGS)
1. Perform "ENGINE TUNE-UP PREPARATION".

Caution
- **Misconnecting the data link connector terminals will possibly cause malfunction. Properly connect the specified terminals only.**

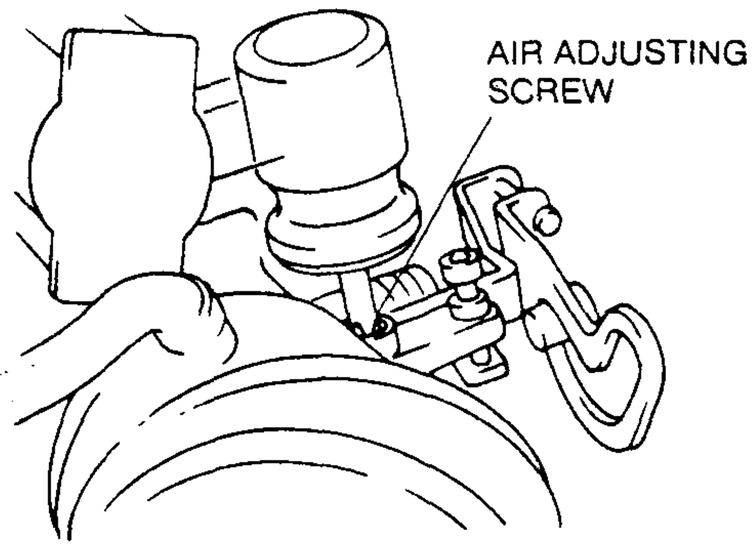
2. Connect a dwell tacho tester to the data link connector terminal IG−.
3. Verify that the idle speed is within the specification.

Specification
550—750 rpm

4. If not within the specification, race the engine and operate the A/C with no load.
5. Stop racing and the A/C, and check the idle speed.
6. If idle speed is below the specification.
- Disconnect the IAC valve connector and check the engine speed.
  (1) If the engine speed does not change, inspect the IAC valve.
  (2) If the engine speed changes excessively (due to engine stall), inspect the ECM (PCM) and related wiring harness and connectors.

Caution
- **The throttle adjusting screw is set at the factory and must not be adjusted.Any adjustment will negatively effect the engine performance.**

7. If idle speed is over the specification
- Disconnect the IAC valve connector and check the engine speed.
  (1) If the engine speed does not change,adjust with the air adjusting screw (AAS) within specification.



Specification
550—750 rpm

  (2) If the engine speed changes excessively, inspect the ECM (PCM) and related wiring harnesses and connectors.

IDLE-UP SPEED INSPECTION

Using SSTs (NGS)

1. Perform "ENGINE TUNE-UP PREPARATION".
2. Verify that the idle speed is normal.
3. Verify that the idle-up speed is within the specification.

Specification

Load condition	Idle-up speed (rpm)*1		
	MTX	ATX	
		N,P position	D range
E/L ON*2	550—750	550—750	550—750
A/C ON*3	550—750	550—750	550—750
P/S ON*4	550—750	550—750	550—750

*1: Excludes temporary idle speed drop just after the electrical loads (E/L) are turned on.
*2: Equal load with
· Headlight
· Fan switch (3rd or higher)
· Cooling fan
*3: A/C switch and fan switch are turned ON.
*4: Steering wheel fully turned.

4. If not as specified with all loads condition,check the idle air control valve.
5. If not as specified with some load condition,check related input switches,harnesses and connectors.

Not Using SSTs (NGS)

1. Perform "ENGINE TUNE-UP PREPARATION".

Caution

- **Misconnecting the data link connector terminals will possibly cause malfunction. Properly connect the specified terminals only.**

2. Connect a dwell tacho tester to the data link connector terminal IG−.
3. Verify that the idle speed is normal.
4. Verify that the idle-up speed is within the specification.

Specification

Load condition	Idle-up speed (rpm)*1		
	MTX	ATX	
		N,P position	D range
E/L ON*2	550—750	550—750	550—750
A/C ON*3	550—750	550—750	550—750
P/S ON*4	550—750	550—750	550—750

*1: Excludes temporary idle speed drop just after the electrical loads (E/L) are turned on.
*2: Equal load with
· Headlight
· Fan switch (3rd or higher)
· Cooling fan
*3: A/C switch and fan switch are turned ON.
*4: Steering wheel fully turned.

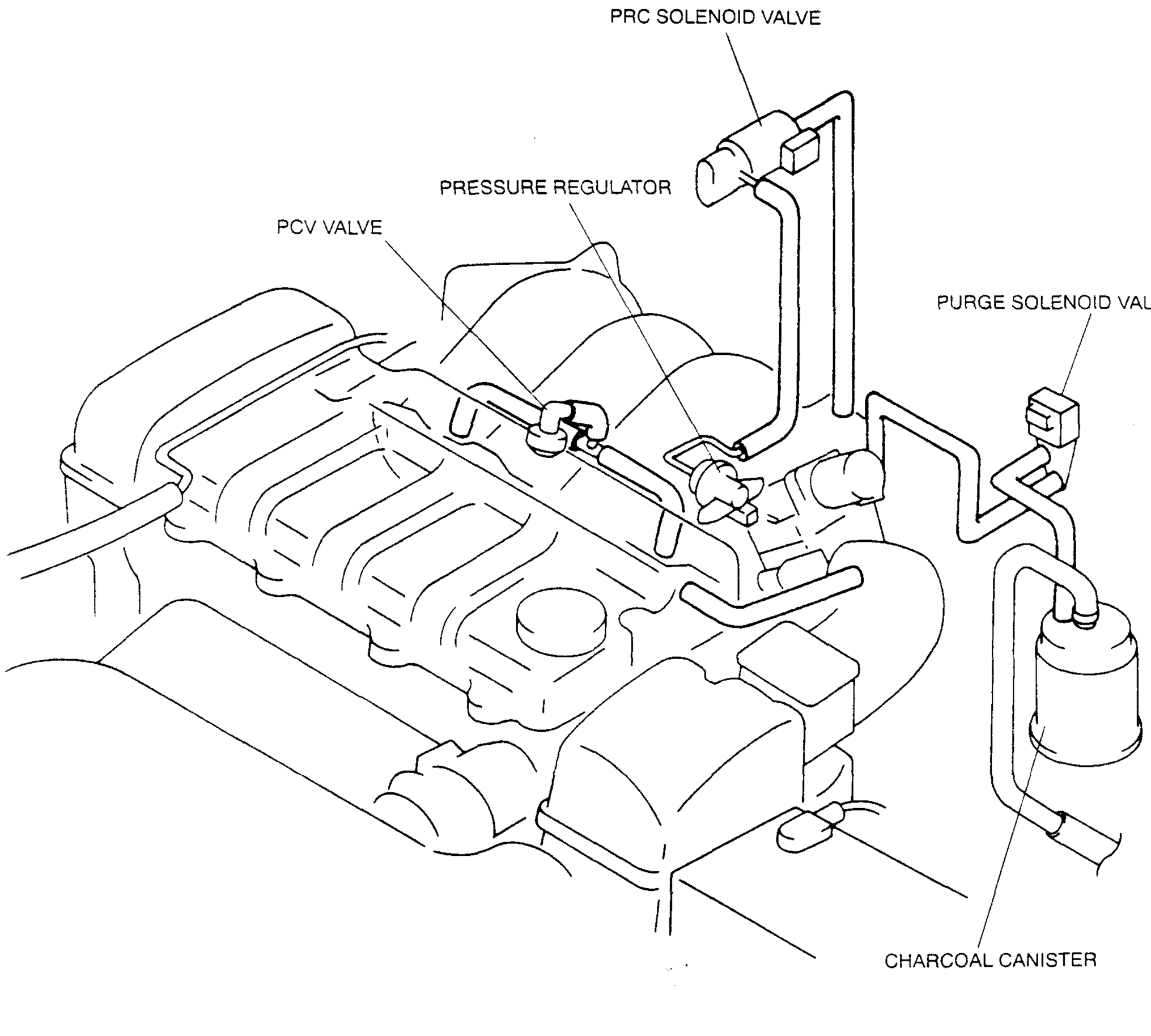
5. If not as specified with all loads condition,check the idle air control valve.
6. If not as specified with some load condition,check related input switches,harnesses and connectors.

IDLE MIXTURE INSPECTION

1. Perform "ENGINE TUNE-UP PREPARATION".
2. Verify that the idle speed and ignition timing are within the specification.
3. Insert an exhaust gas analyzer to the tailpipe.
4. Verify that the CO and HC concentrations are within the regulation.
5. If not,inspect the following.
   - On-board diagnostic system
   - Heated oxygen sensor
   - Intake manifold vacuum
   - Fuel line pressure
   - Ignition timing control
6. If the systems are normal,replace the three way catalytic converter.

INTAKE-AIR SYSTEM

VACUUM HOSE ROUTING DIAGRAM

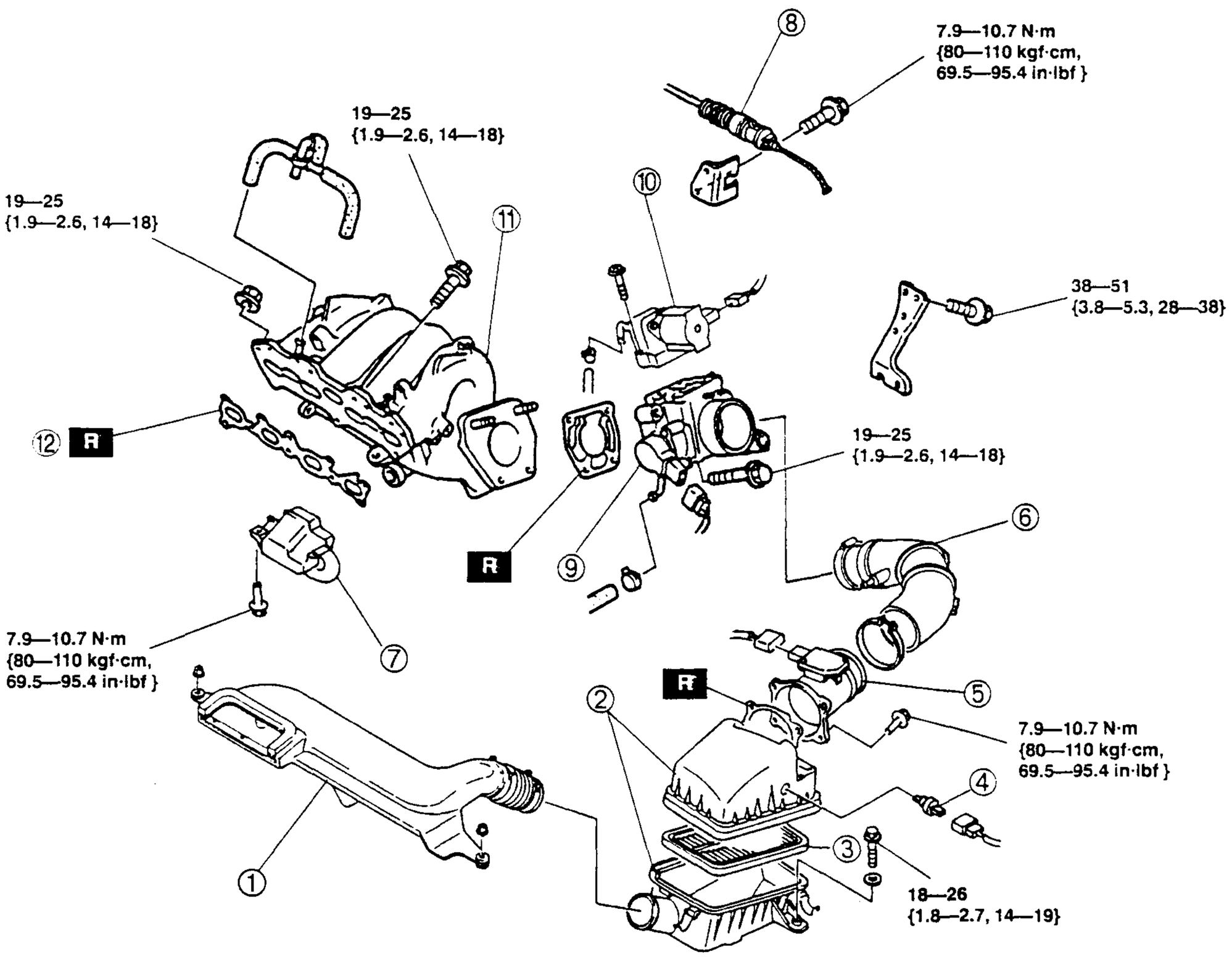


INTAKE-AIR SYSTEM REMOVAL/INSTALLATION

Warning

- **When the engine and intake-air system are hot, they can badly burn. Turn off the engine and wait until they are cool before removing or installing the intake-air system.**

1. Disconnect the negative battery cable.
2. Drain the engine coolant from radiator. (Refer to section E, COOLING SYSTEM SERVICE WARNINGS.) (Refer to section E, ENGINE COOLANT, ENGINE COOLANT REPLACEMENT.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Refill the engine coolant to radiator. (Refer to section E, ENGINE COOLANT, ENGINE COOLANT REPLACEMENT.)



N·m { kgf·m , ft·lbf }

1	Fresh-air duct
2	Air cleaner
3	Air cleaner element
4	Intake-air temperature sensor
5	Mass air flow sensor
6	Air hose
7	Resonance chamber (FS engine model only)

8	Accelerator cable ☞ Installation Note
9	Throttle body
10	IAC valve
11	Intake manifold ☞ Removal Note
12	Intake manifold gasket ☞ Installation Note

Intake Manifold Removal Note

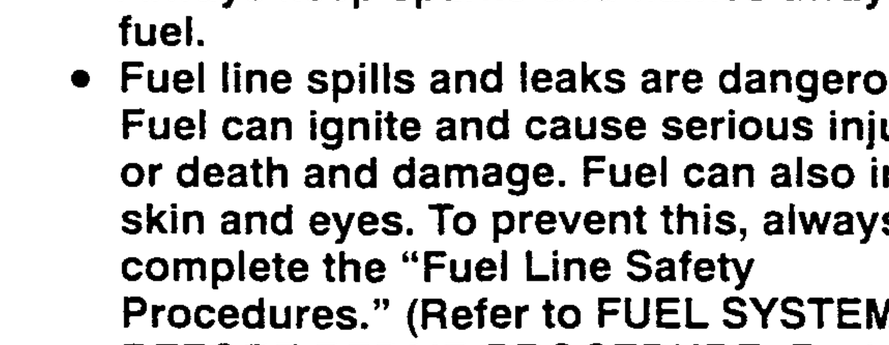
Warning

- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures." (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE, Fuel Line Safety Procedures.)**

- To remove the intake manifold, remove the fuel distributor, EGR pipe, and EGR valve.

Intake Manifold Gasket Installation Note

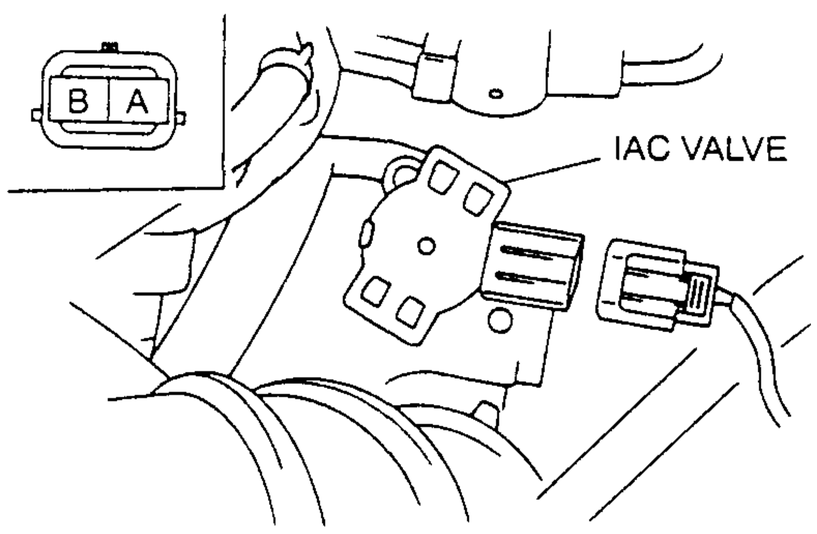
- To install the intake manifold gasket, make sure that the convex side of the gasket is faced to the intake manifold side.



IAC VALVE INSPECTION

1. Verify that the ignition switch is OFF.
2. Disconnect the idle air control valve connector.
3. Measure the resistance between the IAC valve terminals by using an ohmmeter.

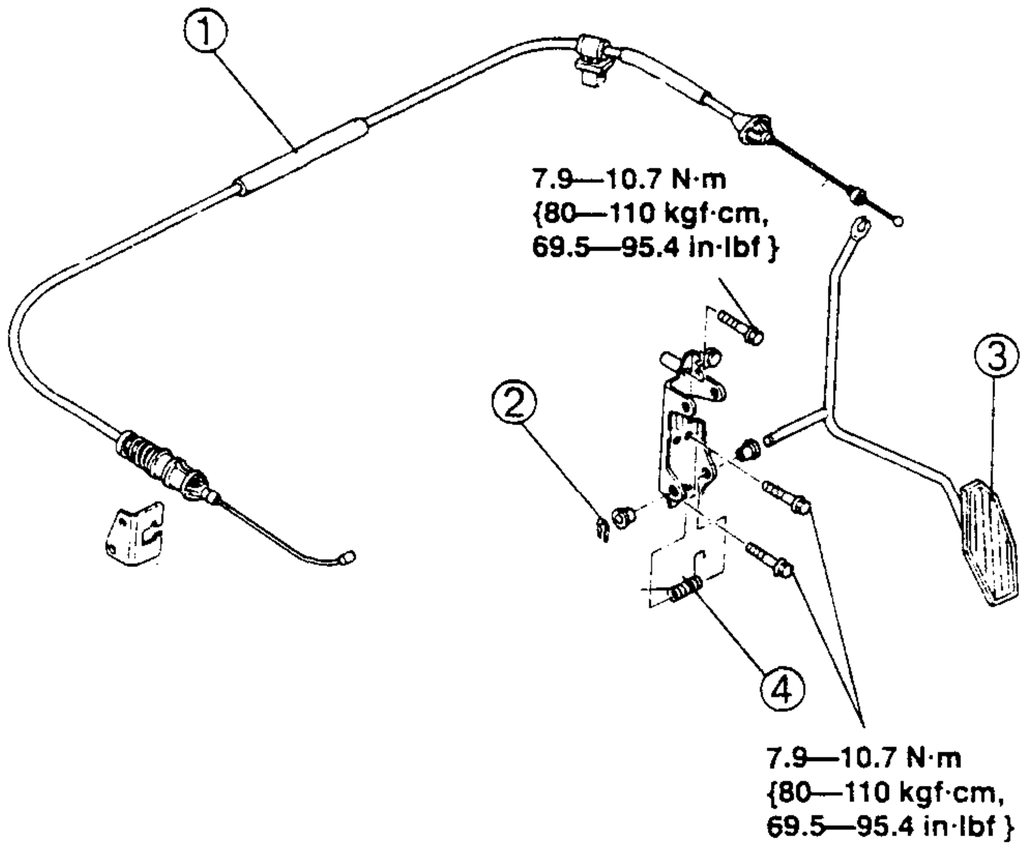
Resistance
7.7—9.3 Ω [23 °C {73.4 °F }]



4. If not specified, replace the IAC valve.

ACCELERATOR PEDAL REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



1	Accelerator cable ☞ Installation Note
2	Retainer
3	Accelerator pedal
4	Return spring

Accelerator Cable Installation Note

- Carry out the "ACCELERATOR CABLE INSPECTION/ADJUSTMENT" procedure after install the accelerator cable. (Refer to ACCELERATOR CABLE INSPECTION/ADJUSTMENT.)

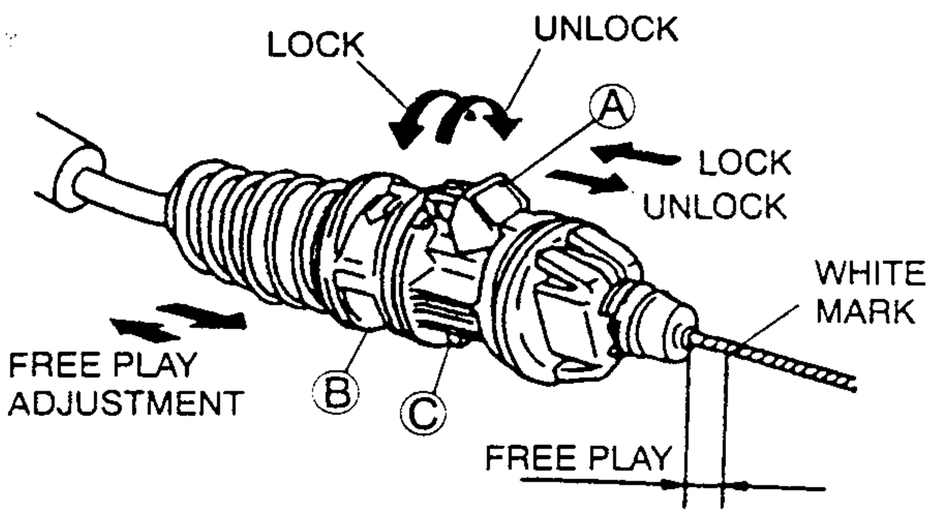
ACCELERATOR CABLE INSPECTION/ADJUSTMENT

1. Verify that the throttle valve is closed
2. Measure the free play of throttle cable.

Note

- To measure cable free play, push the cable into the housing and put a white mark on the cable at the end of the housing, then pull the cable out and measure distance from the white mark to the end of the cable hosing.

Free play
1.5—4.0 mm {0.06—0.15 in }



3. If not within the specification, adjust the accelerator cable as follows.
   (1) Move the white locking tab A to the unlock position.
   (2) Turn stopper B to the unlock position.

   Note
   - If the stopper B will not unlock, it may be necessary to carefully bend the tab C out using a suitable tool.

   (3) To adjust the free play, push or pull the throttle cable housing directly behind the spring.
   (4) Turn the stopper B to the lock position.
4. Measure the throttle cable free play once again, making sure that it is within the specification.
5. Move the white locking the tab A to the locked position.
6. Confirm correct accelerator operation.

FUEL SYSTEM

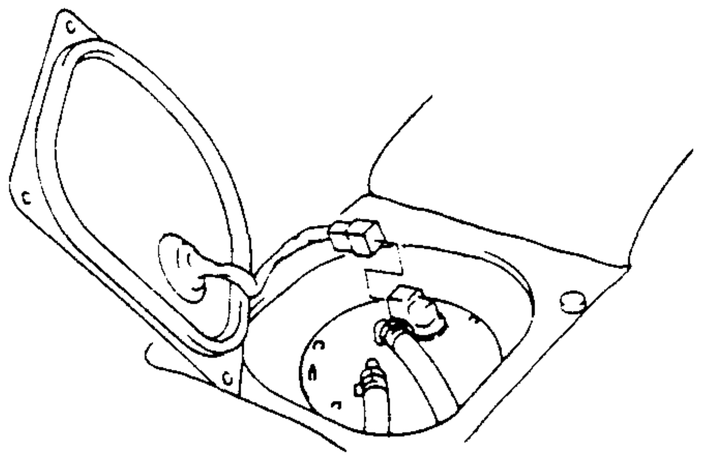
BEFORE REPAIR PROCEDURE

Warning
- **Fuel vapor is hazardous. It can easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

- Fuel in the fuel system is under high pressure when the engine is not running.

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the following "Fuel Line Safety Procedures".**

Fuel Line Safety Procedures
1. Remove the rear seat cushion.
2. Remove the service hole cover.
3. Disconnect the fuel pump connector.

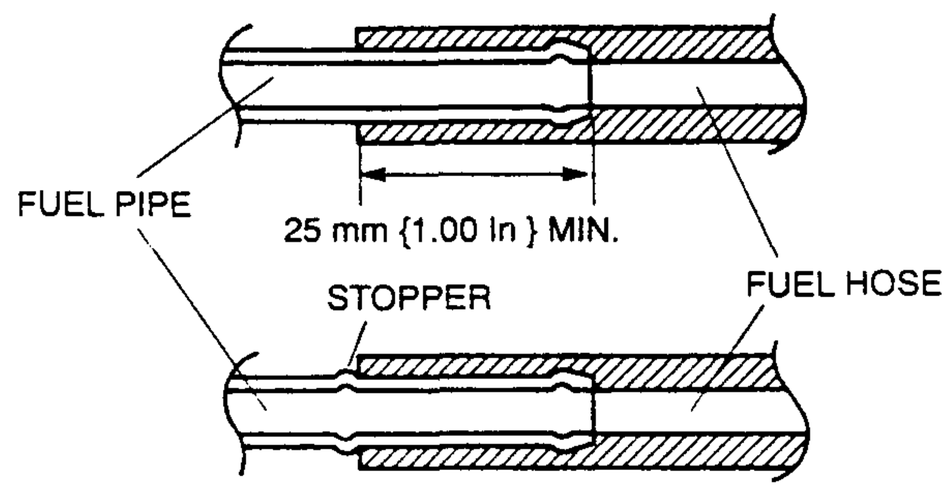


4. Start the engine.
5. After the engine stalls, crank the engine several times.
6. Turn off the ignition switch.
7. Install in the reverse order of removal.

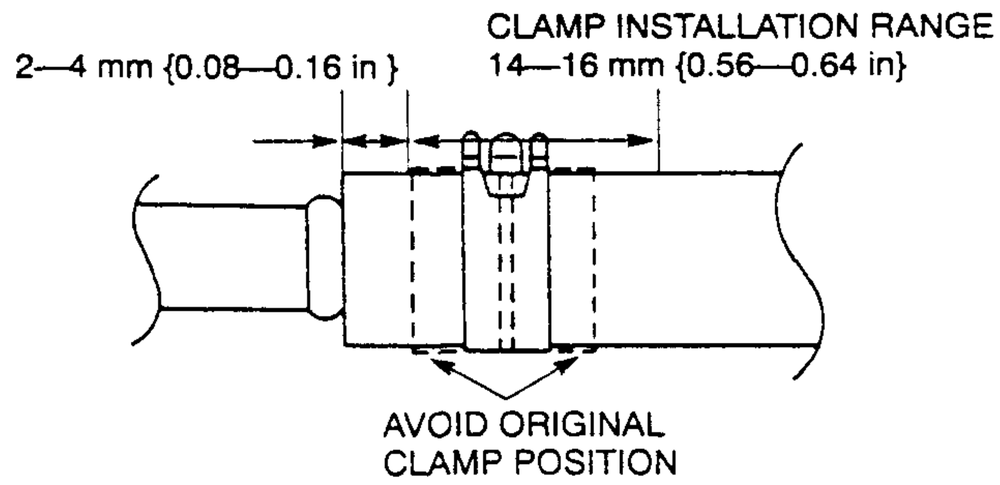
AFTER REPAIR PROCEDURE

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. When installing the fuel hose, observe "Fuel Hose Installation" and "Fuel Leakage Inspection" described below.**

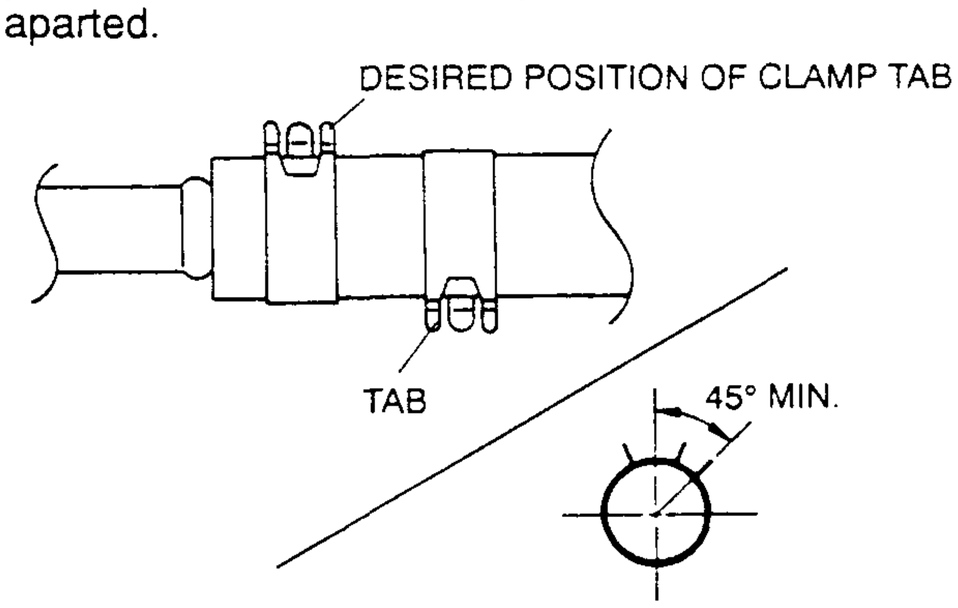
Fuel Hose Installation
1. Replace damaged or deformed fuel hose, fuel pipe, and hose clamps.
2. When installing the fuel hose onto the fuel pipe, fit the hose onto the pipe **over 25 mm {1.00 in }**. When the pipe has a stopper, fit the hose until it contacts the stopper.



3. Install a hose clamp over the fuel hose within the clamp installation range as shown, avoiding the original clamp position.



4. When installing two clamps, their tabs must be positioned **more than 45° (desired 180°)** aparted.

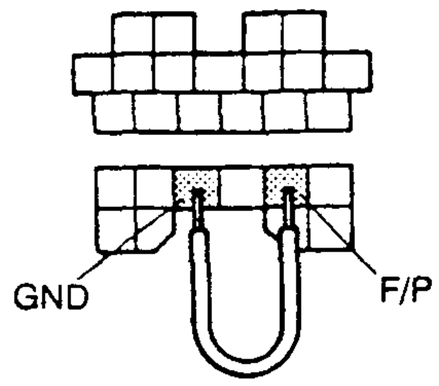


Fuel Leakage Inspection

Warning
- **Fuel can ignite and cause serious injuries or death and damage if fuel is spilled over a hot engine. Always carry out the following procedure with the engine stopped.**

Caution
- **Misconnecting the data link connector terminals will possibly cause a malfunction. Properly connect the specified terminals only.**

1. Connect data link connector terminals F/P and GND by using a jumper wire.



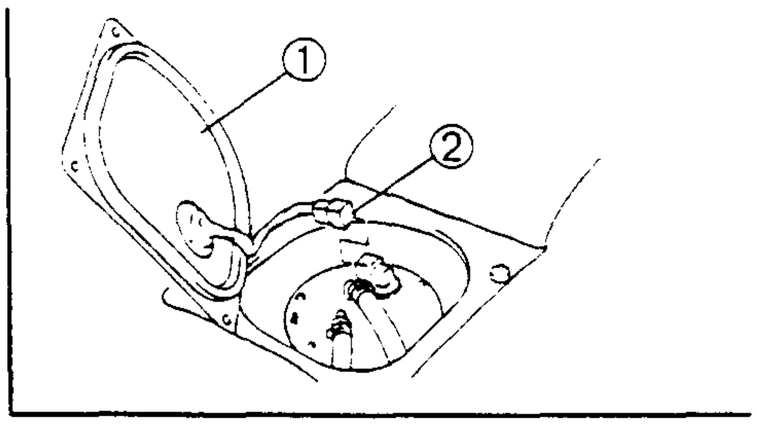
2. Turn the ignition switch to ON to operate the fuel pump.
3. With the fuel pressure applied, check for fuel leakage at the fuel hose fitting position. Leakage must not be observed for **at least 5 minutes**.
4. If there is fuel leakage, check for damaged fuel hose, hose clamps, and fuel pipe sealing surface and replace as necessary.
5. Reassemble the system and repeat steps 1—3.

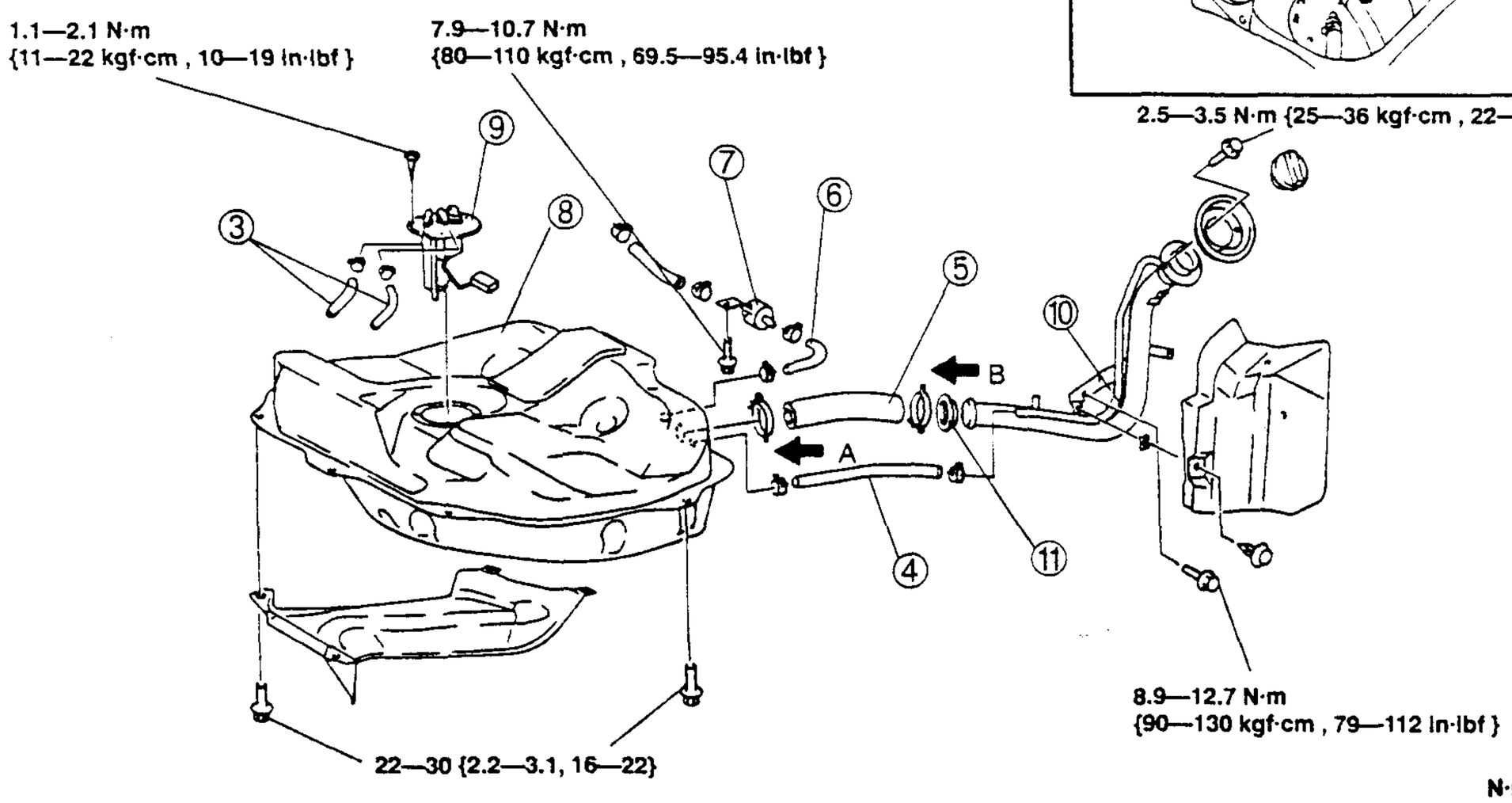
FUEL TANK REMOVAL/INSTALLATION

Warning

- **Repairing a fuel tank that has not been properly steam cleaned can be dangerous. Explosion or fire may cause death or serious injury. Always properly steam clean a fuel tank before repairing it.**

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Suck up the fuel from the fuel tank. (Refer to Fuel Draining Note.)
4. Remove the rear seat cushion.
5. Remove the presilencer. (Refer to EXHAUST SYSTEM, EXHAUST SYSTEM REMOVAL/INSTALLATION.)
6. Remove in the order indicated in the table.
7. Install the reverse order of removal.
8. Complete the "AFTER REPAIR PROCEDURE". (Refer to FUEL SYSTEM, AFTER REPAIR PROCEDURE.)





N·m { kgf·m , ft·lbf }

1	Service hole cover
2	Connector
3	Fuel hose
4	Breather hose
5	Joint hose ☞ Installation Note

6	Evaporative hose
7	Check valve (TWO-WAY)
8	Fuel tank
9	Fuel pump
10	Fuel filler pipe
11	Nonreturn valve

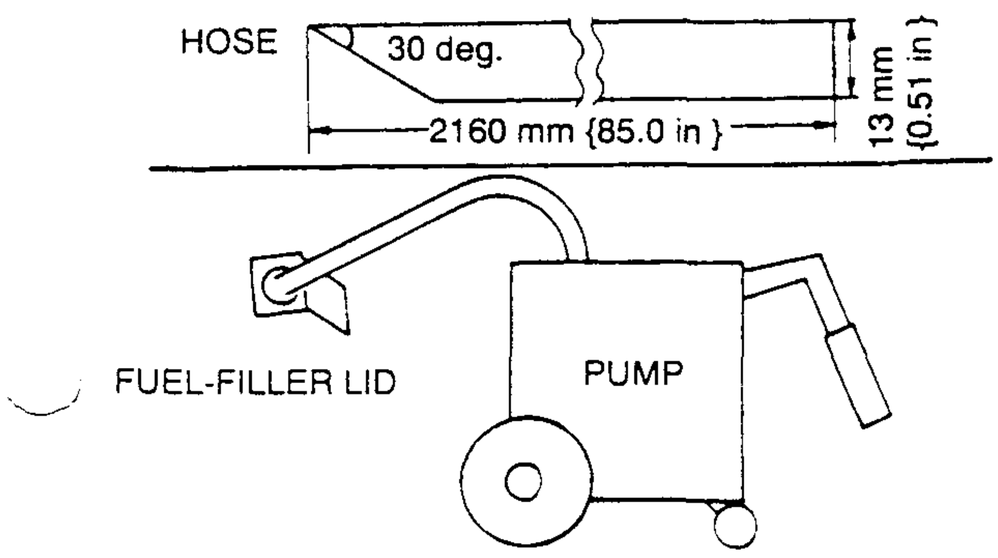
Fuel Draining Note

1. Remove the fuel filler cap and insert a hose into the fuel tank through the fuel filler pipe.
2. Suck up the fuel into a container by using a fuel removing pump.

Note

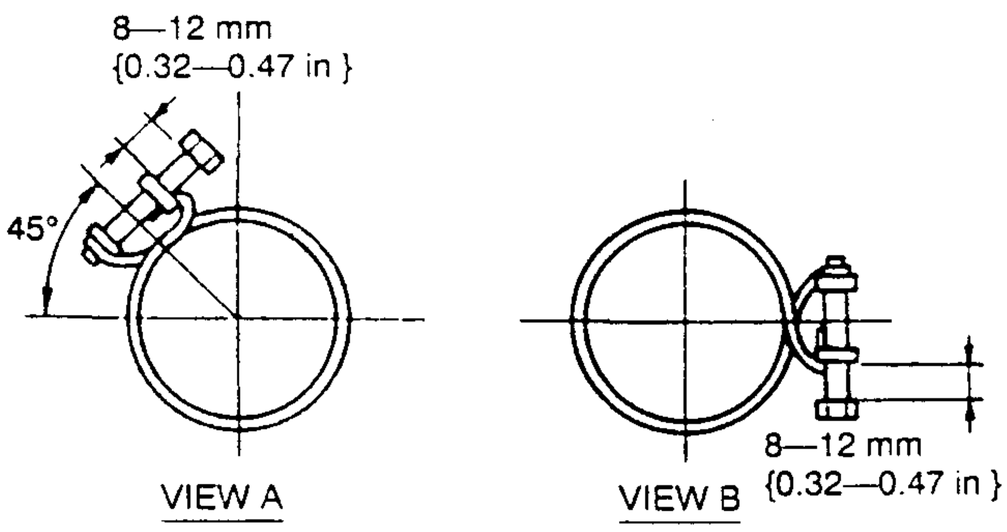
- For easier work, prepare a hose of following size.

Outer diameter: 13 mm {0.51 in }
Length: 2,160 mm {85.0 in }



Joint Hose Installation Note

- Install clamps as shown.



NONRETURN VALVE INSPECTION

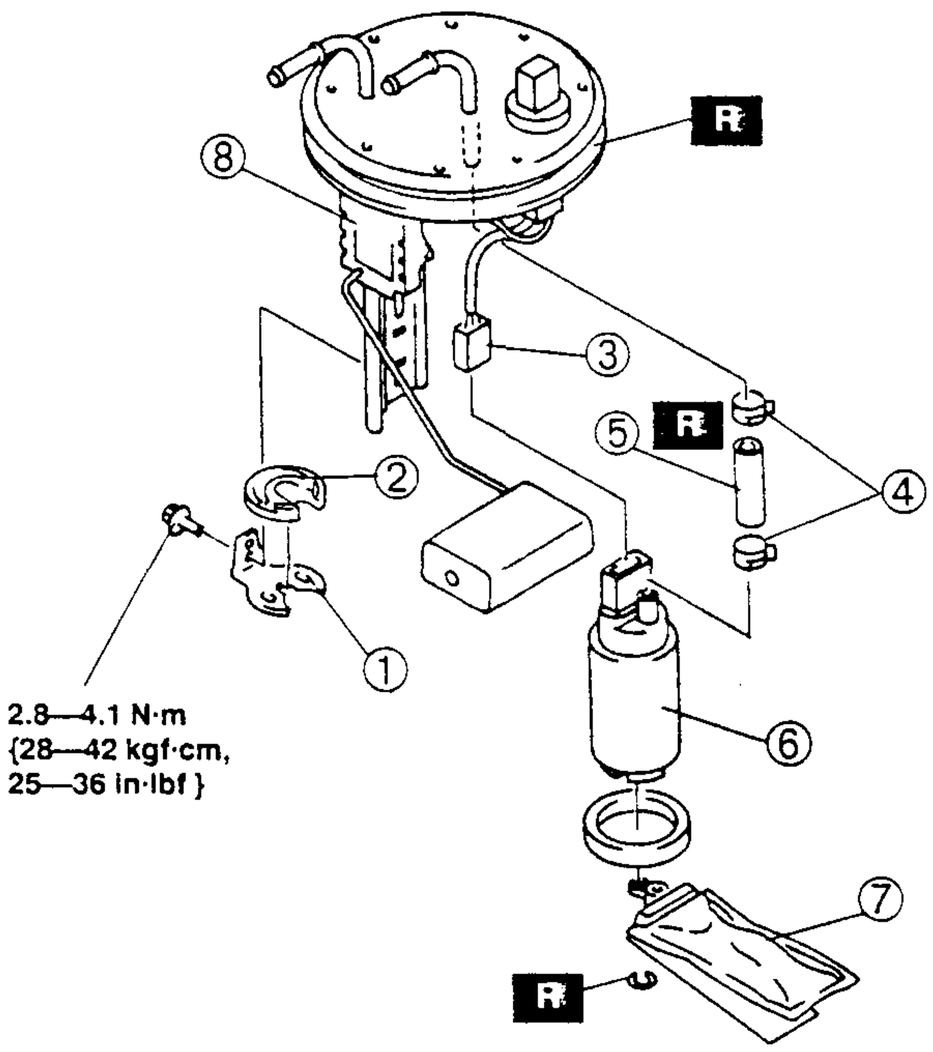
1. Remove the nonreturn valve.
2. Verify that the nonreturn valve operates under its own weight.
3. If the valve does not operate, replace the nonreturn valve.

FUEL PUMP REMOVAL/INSTALLATION

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Remove the rear seat cushion.
4. Remove the service hole cover.
5. Disconnect the fuel pump connector and fuel hoses.
6. Remove the fuel pump. (Refer to FUEL SYSTEM, FUEL TANK REMOVAL/INSTALLATION.)
7. Install in the reverse order of removal.
8. Complete the "AFTER REPAIR PROCEDURE". (Refer to FUEL SYSTEM, AFTER REPAIR PROCEDURE.)

FUEL PUMP DISASSEMBLY/ASSEMBLY

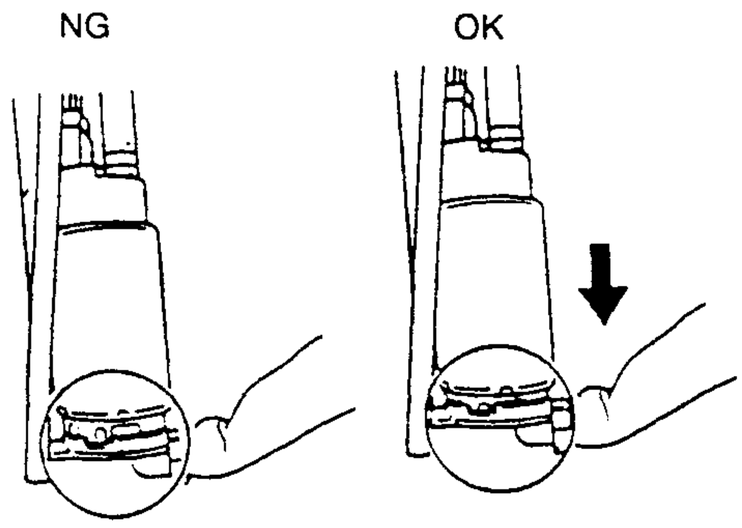
1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



1	Bracket
2	Rubber mount
3	Fuel pump connector
4	Clamp
5	Fuel hose ☞ Assembly Note
6	Fuel pump ☞ Assembly Note
7	Fuel filter (low pressure side)
8	Fuel gauge sender unit

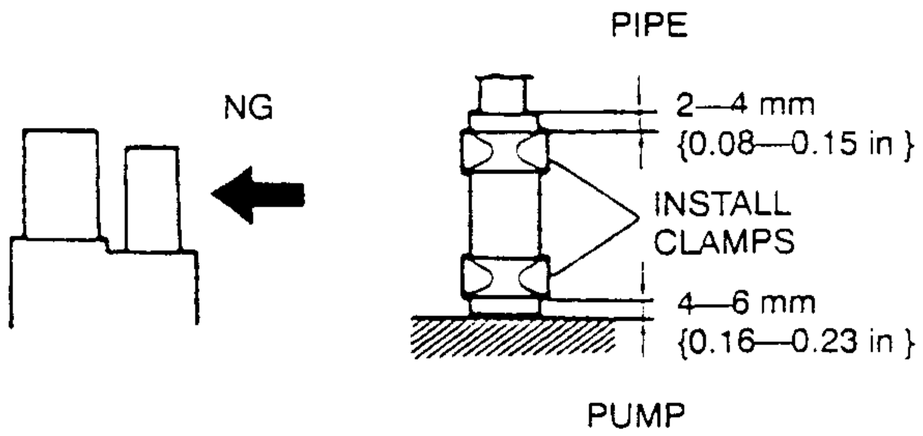
Fuel Pump Assembly Note

- After installing the fuel pump to the bracket, pull the pump down so that it is tight against the bracket.



Fuel Hose Assembly Note

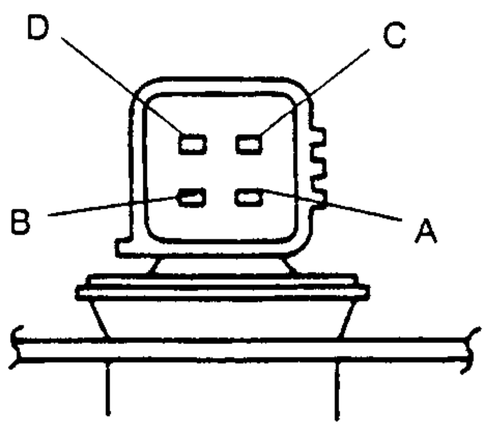
1. Do not apply excessive side force when pushing the fuel hose onto the fuel pump nipple.
2. Install the clamps as shown.



FUEL PUMP INSPECTION

Fuel Pump Continuity

1. Remove the rear seat cushion.
2. Remove the service hole cover.
3. Disconnect the fuel pump connector.
4. Check for continuity between fuel pump connector terminals B and D.



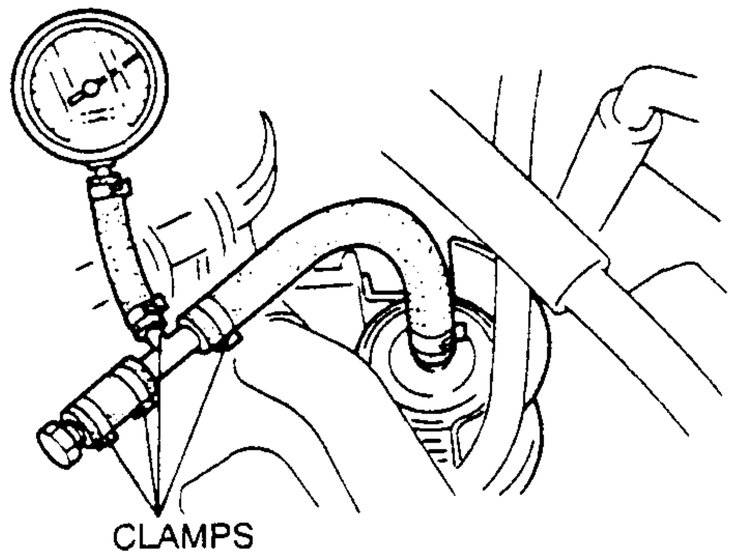
5. If there is no continuity, replace the fuel pump.

Hold Pressure

Warning

- **Fuel can ignite and cause serious injuries or death and damage if fuel is spilled over a hot engine. Always carry out the following procedure with the engine stopped.**

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Connect a fuel pressure gauge to the fuel filter and plug the outlet of the gauge as shown. (Install clamps as shown.)

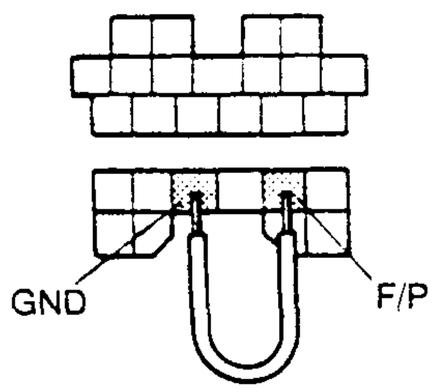


4. Connect the negative battery cable.

Caution

- **Misconnecting the data link connector terminals will possibly cause a malfunction. Properly connect the specified terminals only.**

5. Connect data link connector terminals F/P and GND by using a jumper wire.



6. Turn the ignition switch to ON.
7. Turn the ignition switch to OFF. Measure the fuel pressure **after 5 minutes**.

Fuel pressure
More than 343 kPa {3.5 kgf/cm^2, 50 psi }

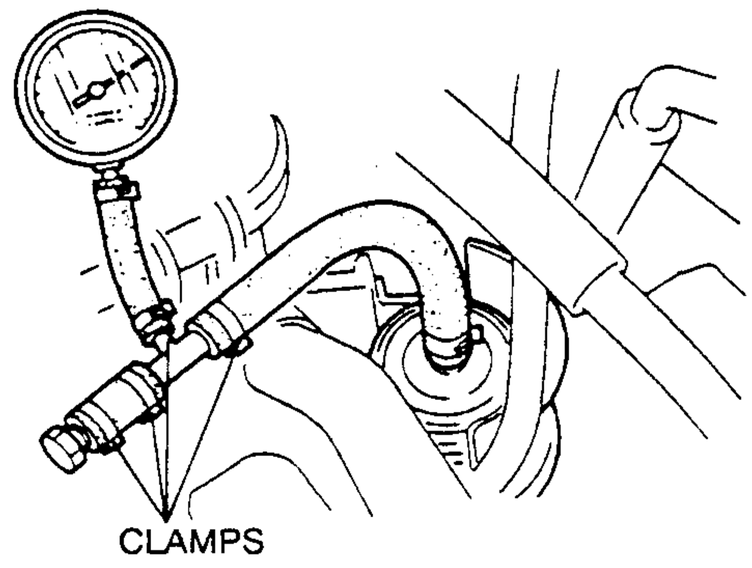
8. Disconnect the jumper wire.
9. If not as specified, replace the fuel pump.
10. Complete the "AFTER REPAIR PROCEDURE". (Refer to FUEL SYSTEM, AFTER REPAIR PROCEDURE.)

Fuel Pump Maximum Pressure

Warning

- **Fuel can ignite and cause serious injuries or death and damage if fuel is spilled over a hot engine. Always carry out the following procedure with the engine stopped.**

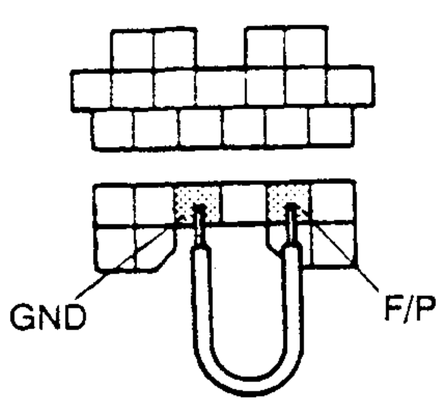
1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Connect a fuel pressure gauge to the fuel filter and plug the outlet of the gauge as shown. (Install clamps as shown.)



4. Connect the negative battery cable.

Caution
- **Misconnecting the data link connector terminals will possibly cause a malfunction. Properly connect the specified terminals only.**

5. Connect data link connector terminals F/P and GND by using a jumper wire.

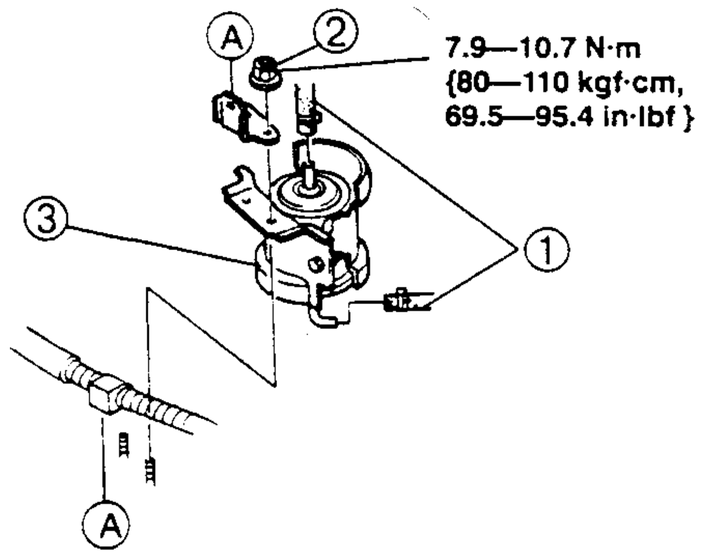


6. Turn the ignition switch to ON. Measure the fuel pump pressure.

Fuel pump maximum pressure
500—630 kPa {5.0—6.5 kgf/cm², 64—92 psi }

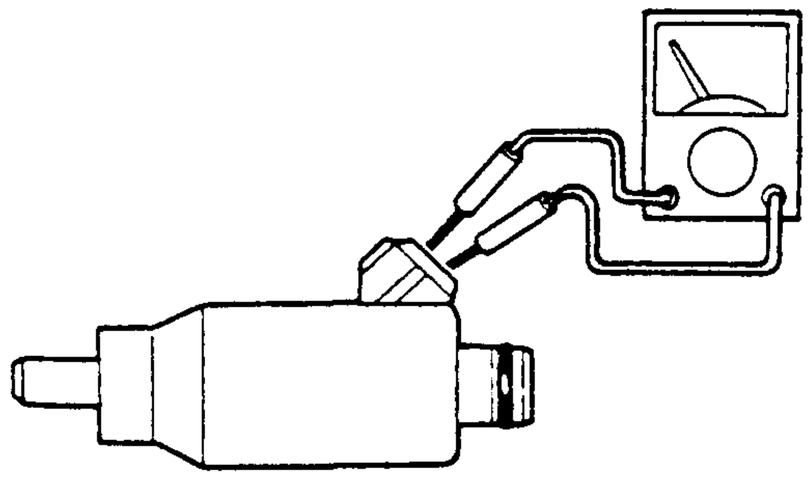
7. Turn the ignition switch to OFF and disconnect the jumper wire.
8. If not as specified, replace the fuel pump.
9. Complete the "AFTER REPAIR PROCEDURE". (Refer to FUEL SYSTEM, AFTER REPAIR PROCEDURE.)

FUEL FILTER (HIGH PRESSURE SIDE) REMOVAL/INSTALLATION
1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Remove the air cleaner.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Complete the "AFTER REPAIR PROCEDURE". (Refer to FUEL SYSTEM, AFTER REPAIR PROCEDURE.)



1	Fuel hose
2	Nut
3	Fuel filter

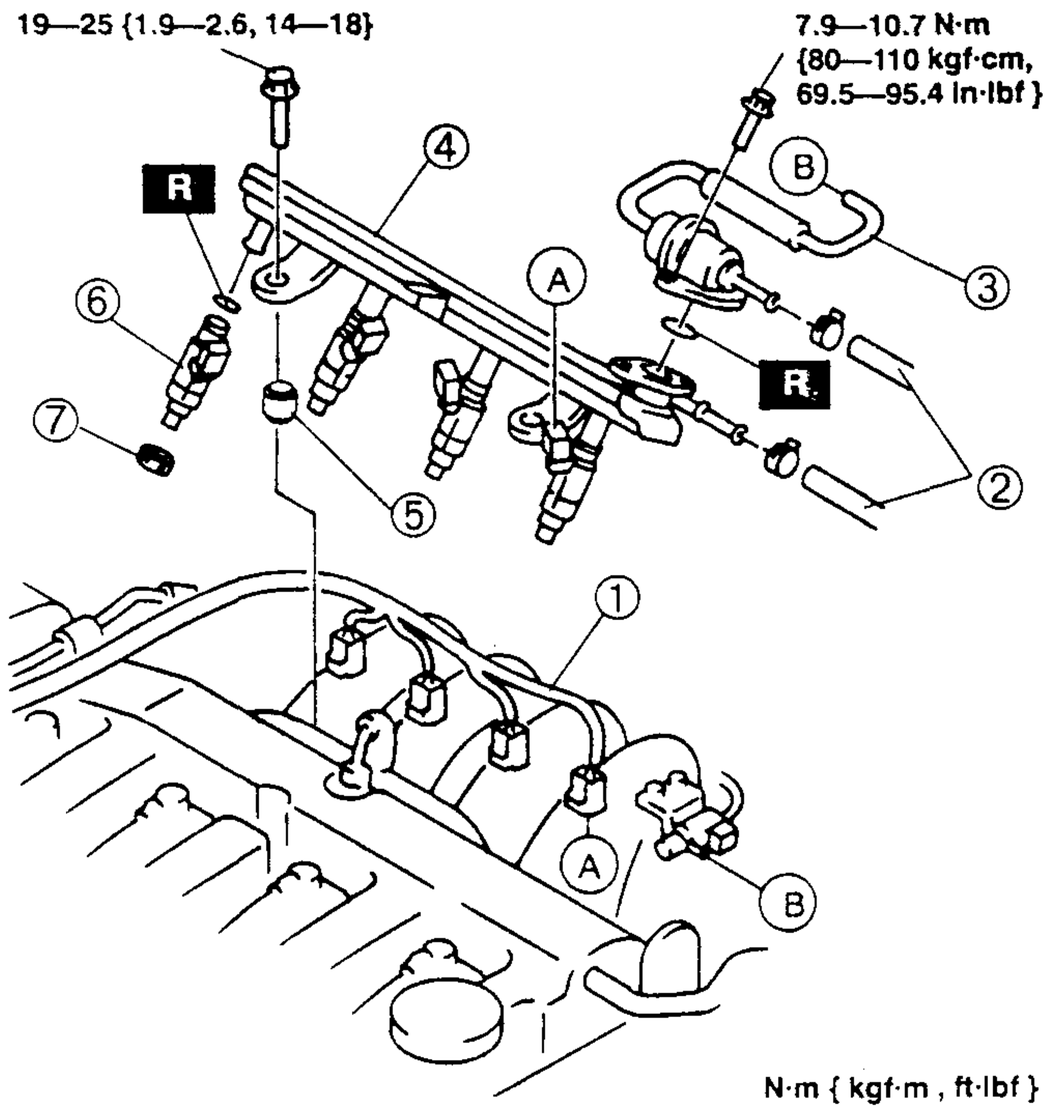
FUEL INJECTOR RESISTANCE INSPECTION
1. Turn the ignition switch to OFF and disconnect the fuel injector connectors.
2. Measure resistance of the fuel injector with an ohmmeter.



Resistance
12—16 Ω [at 20 °C {68 °F }]

3. If not as specified, replace the fuel injector.

FUEL INJECTOR REMOVAL/INSTALLATION
1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Complete the "AFTER REPAIR PROCEDURE". (Refer to FUEL SYSTEM, AFTER REPAIR PROCEDURE.)



N·m { kgf·m , ft·lbf }

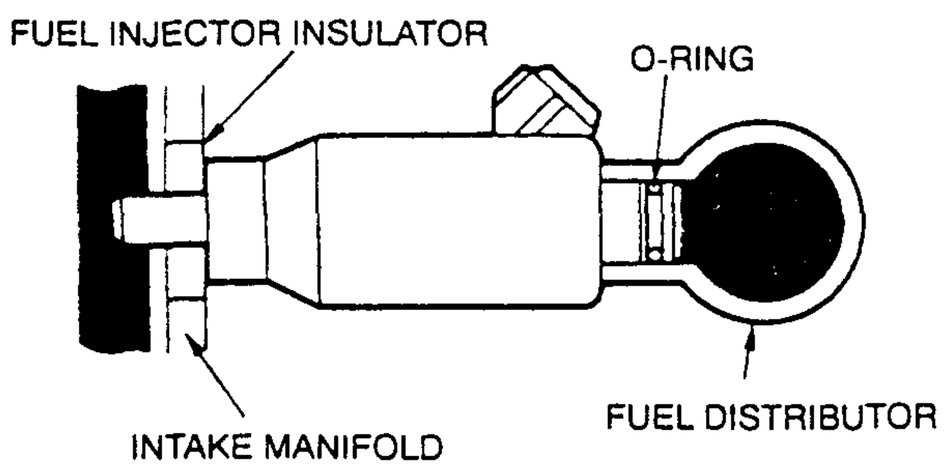
1	Connector
2	Fuel hose
3	Vacuum hose
4	Fuel distributor
5	Fuel distributor insulator
6	Fuel injector ☞ Installation Note
7	Fuel injector insulator

Fuel Injector Installation Note

1. Install each fuel injectors as indicated in the table.

Cylinder number	Fuel injector body color
No.1, No.2 cylinder	blue
No.3, No.4 cylinder	brown

2. Use new fuel injector O-rings.
3. Apply a small amount of engine oil to the O-rings and install them into the fuel distributor.
4. Verify that the O-rings and the fuel injector sealing surfaces are free of foreign materials. Clean with gasoline if necessary.
5. Align the fuel injector notch with the fuel distributor and install the fuel injectors in the fuel distributor with light twisting motion so that the O-rings will not be folded.



FUEL INJECTOR INSPECTION

Fuel Leakage Test

Warning

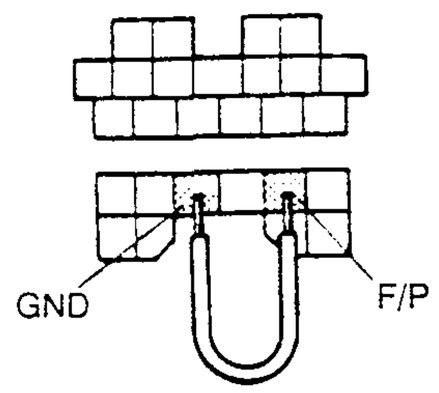
- **Fuel can ignite and cause serious injuries or death and damage if fuel is spilled over a hot engine. Alway carry out the following procedure with the engine stopped.**

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)
2. Remove the fuel injectors together with the fuel distributor.
3. Fasten the fuel injectors firmly to the fuel distributor with wire and connect the fuel hoses.

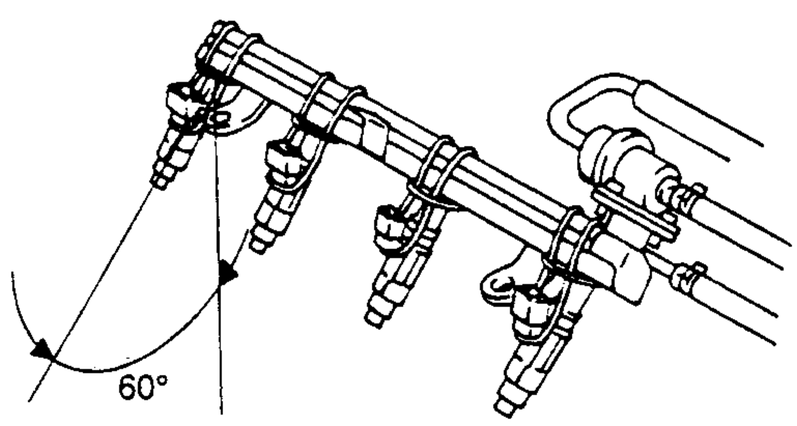
Caution

- **Misconnecting the data link connector terminals will possibly cause a malfunction. Properly connect the specified terminals only.**

4. Connect data link connector terminals F/P and GND by using a jumper wire.



5. Turn the ignition switch to ON.
6. Tilt the fuel injectors **approx. 60 degrees** and verify that no fuel leaks from the fuel injector nozzles.



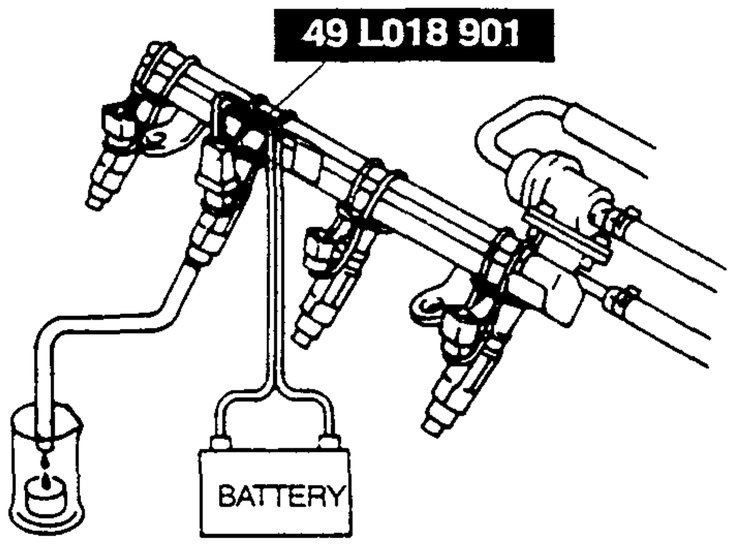
Fuel leakage
Less than 1 drop/2 minutes

7. If fuel leaks more than specified, replace the fuel injector.
8. Turn the ignition switch to OFF and remove the jumper wire.
9. Complete the "AFTER REPAIR PROCEDURE". (Refer to FUEL SYSTEM, AFTER REPAIR PROCEDURE.)

Volume Test

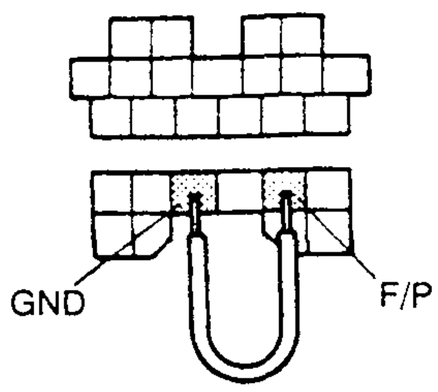
Warning
- **Fuel can ignite and cause serious injuries or death and damage if fuel is spilled over a hot engine. Alway carry out the following procedure with the engine stopped.**

1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)
2. Remove the fuel injectors together with the fuel distributor.
3. Fasten the fuel injectors firmly to the fuel distributor with wire and connect the fuel hoses.
4. Connect the **SST** as shown in the figure.



Caution
- **Misconnecting the data link connector terminals will possibly cause a malfunction. Properly connect the specified terminals only.**

5. Connect data link connector terminals F/P and GND by using a jumper wire.



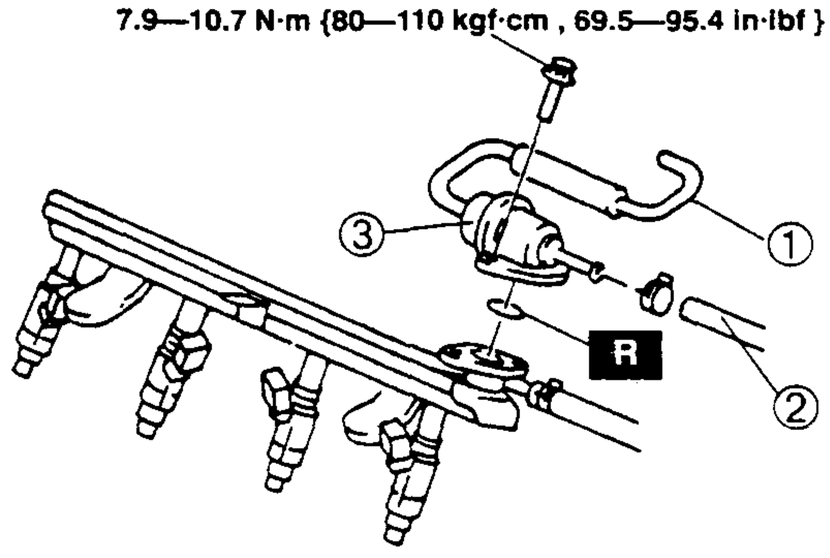
6. Turn the ignition switch to ON.
7. Measure the injection volume of each fuel injector by using a graduated container.

Injection volume
56—61 mℓ {56—61 cc , 1.9—2.0 floz }

8. Turn the ignition switch to OFF and disconnect the jumper wire.
9. If not as specified, replace the fuel injector.
10. Complete the "AFTER REPAIR PROCEDURE". (Refer to FUEL SYSTEM, AFTER REPAIR PROCEDURE.)

PRESSURE REGULATOR REMOVAL/INSTALLATION

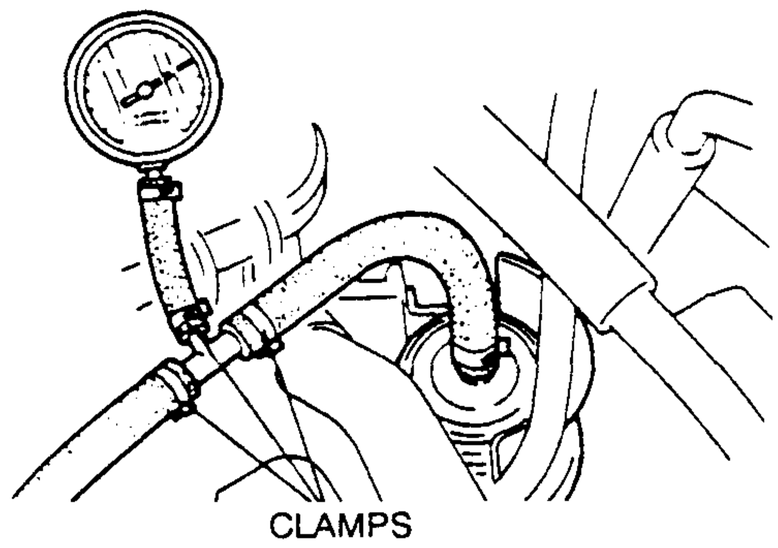
1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Complete the "AFTER REPAIR PROCEDURE". (Refer to FUEL SYSTEM, AFTER REPAIR PROCEDURE.)



1	Vacuum hose
2	Fuel return hose
3	Pressure regulator

PRESSURE REGULATOR INSPECTION

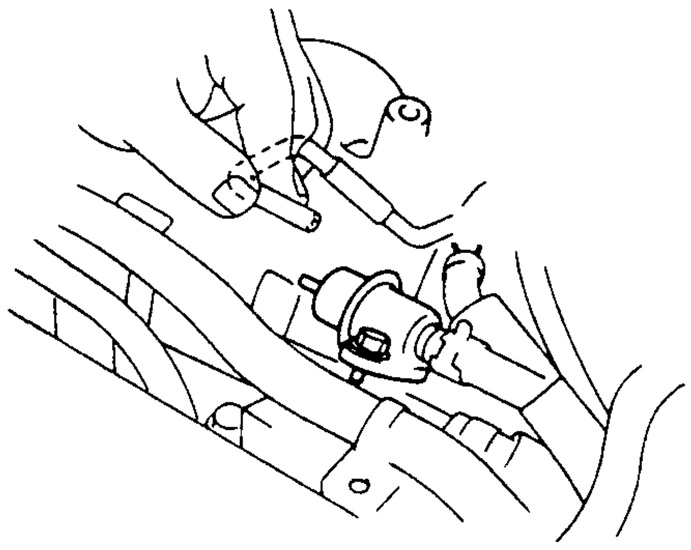
1. Complete the "BEFORE REPAIR PROCEDURE". (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE.)
2. Disconnect the negative battery cable.
3. Connect a fuel pressure gauge between the fuel filter and the fuel distributor. (Install clamps as shown.)



4. Connect the negative battery cable.
5. Start the engine and let it idle.
6. Measure the fuel line pressure **after approx. 2 minutes**.

Fuel line pressure
210—260 kPa {2.1—2.6 kgf/cm^2 , 30—36 psi }

7. Disconnect the vacuum hose from the pressure regulator.



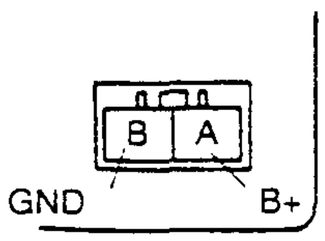
8. Measure the fuel line pressure.

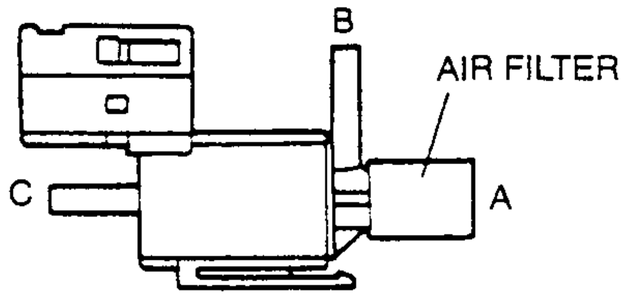
Fuel line pressure
260—310 kPa {2.6—3.2 kgf/cm^2 , 37—45 psi }

9. If not as specified, replace the pressure regulator.
10. Complete the "AFTER REPAIR PROCEDURE". (Refer to FUEL SYSTEM, AFTER REPAIR PROCEDURE.)

PRC SOLENOID VALVE INSPECTION

1. Remove the PRC solenoid valve located behind the pressure regulator.
2. Check the airflow between each port under the following conditions.





○—○ : Continuity ○═○ : Airflow

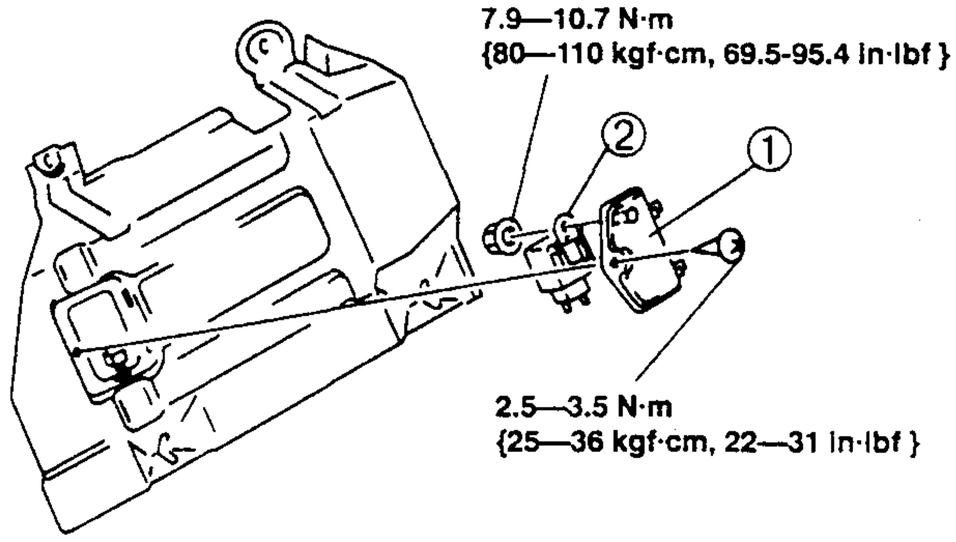
Step	Terminal		Port		
	A	B	A	B	C
1	○—○			○═○	
2	B+	Ground	○═○		

3. If not as specified, replace the PRC solenoid valve.

FUEL PUMP RELAY REMOVAL/INSTALLATION

Note
- The fuel pump relay is fitted onto the under side of the ECM (PCM) cover, which is located at the passenger compartment.

(RHD)
1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



1	Service hole cover
2	Fuel pump relay

(LHD)
1. Remove the ECM (PCM) cover (Refer to CONTROL SYSTEM, ECM (PCM) REMOVAL/INSTALLATION.)
2. Remove the fuel pump relay.
3. Install in the reverse order of removal.

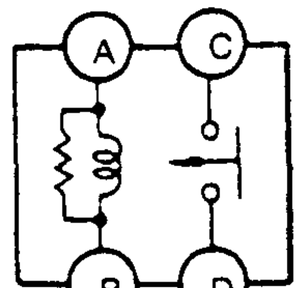
Tightening torque
7.9—10.7 N·m
{80—110 kgf·cm , 69.5—95.4 in·lbf }

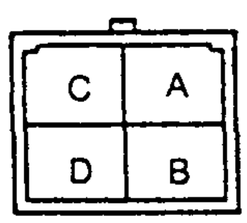
FUEL PUMP RELAY INSPECTION

1. Remove the fuel pump relay.
2. Check the continuity between the fuel pump relay terminals by using an ohmmeter.

○—○ : Continuity

Step	Terminal			
	A	B	C	D
1	○—○			
2	B+	Ground	○—○	





3. If not as specified, replace the fuel pump relay.

EXHAUST SYSTEM

EXHAUST SYSTEM INSPECTION

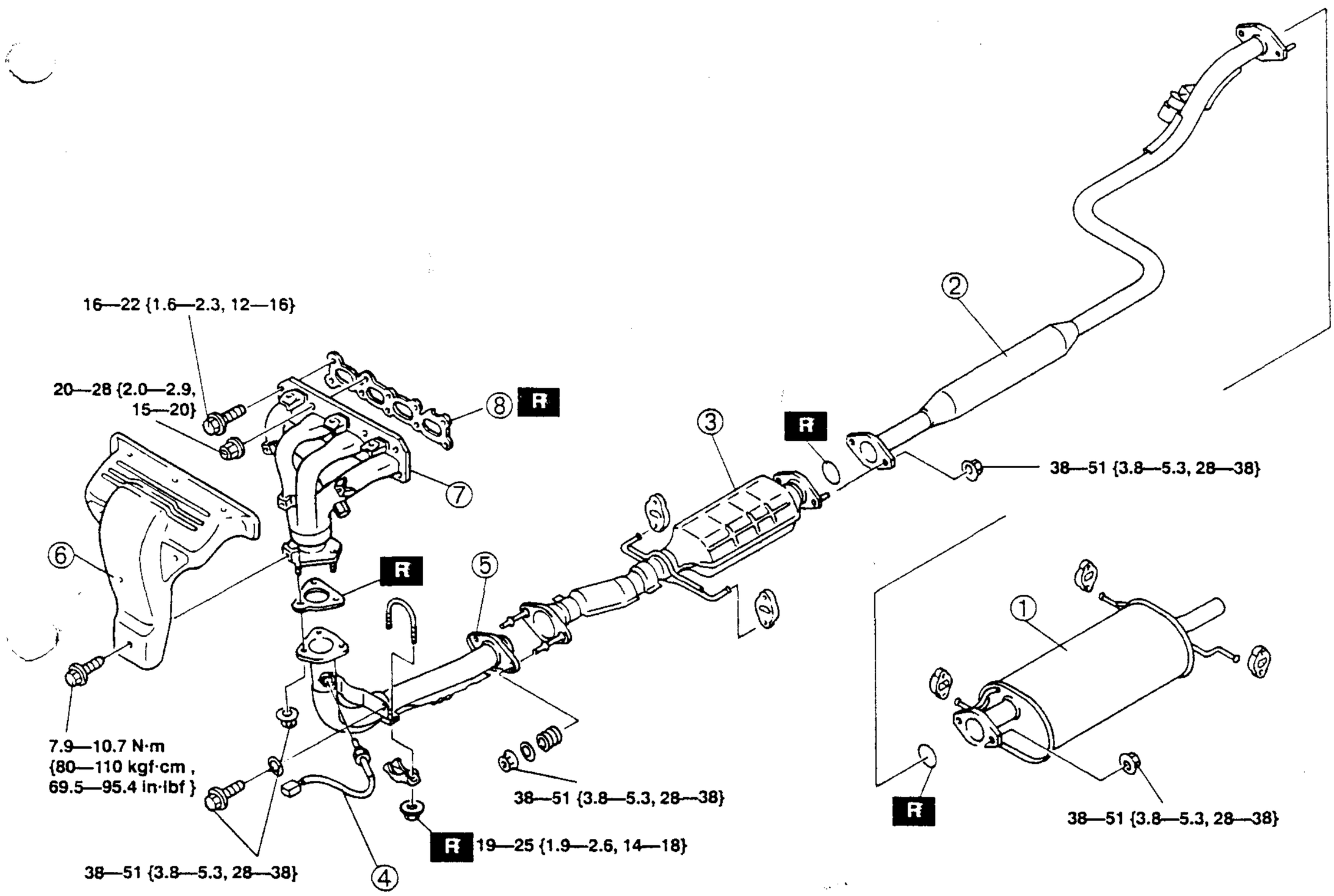
1. Start the engine and check each exhaust system component for exhaust gas leakage.
2. If leakage is found, repair or replace as necessary.

EXHAUST SYSTEM REMOVAL/INSTALLATION

Warning

- **When the engine and exhaust system are hot, they can badly burn. Turn off the engine and wait until they are cool before removing or installing the exhaust system.**

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



N·m { kgf·m , ft·lbf }

1	Main silencer
2	Presilencer
3	Three way catalytic converter
4	Heated oxygen sensor
5	Front pipe

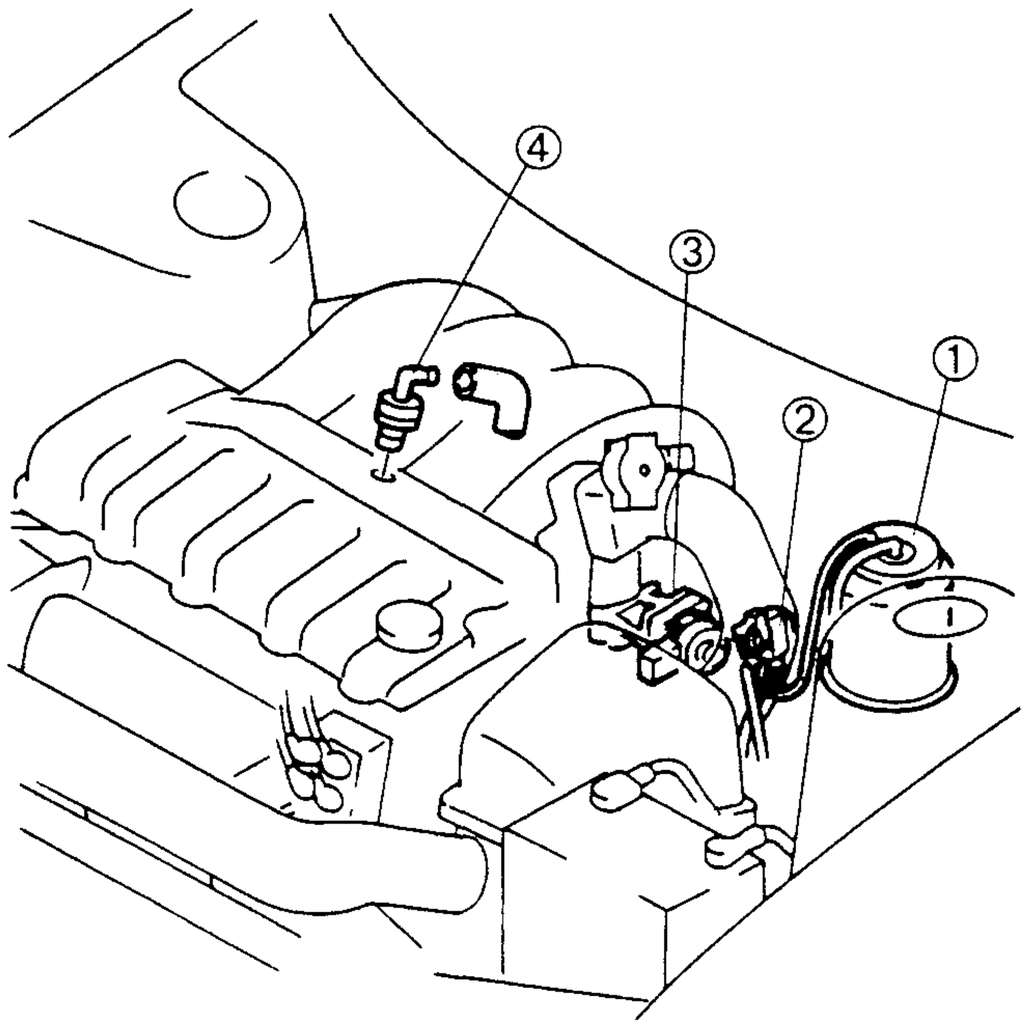
6	Exhaust manifold insulator
7	Exhaust manifold
8	Exhaust manifold gasket ☞ Installation Note

Exhaust Manifold Gasket Installation Note

- To install the exhaust manifold gasket, make sure that the convex side of the gasket is faced to the exhaust manifold side.

EMISSION SYSTEM

EMISSION SYSTEM (ENGINE COMPARTMENT SIDE) COMPONENT LOCATION

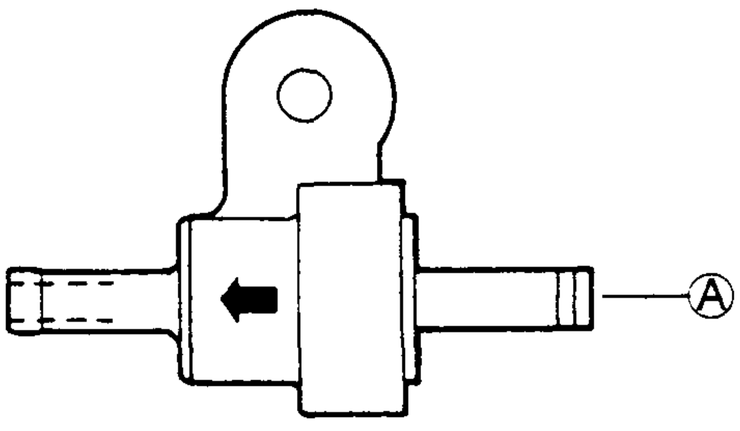


1	Charcoal canister
2	Purge solenoid valve
3	EGR valve
4	PCV valve

CHECK VALVE (TWO-WAY) INSPECTION

1. Remove the check valve (two-way).
2. Check operation of the valve with a vacuum pump.

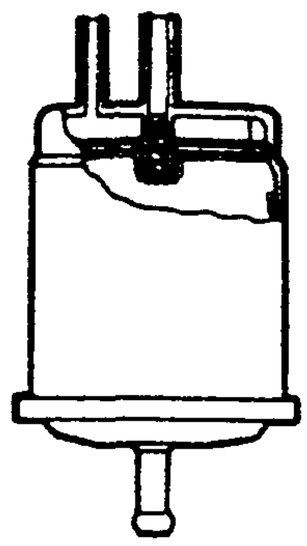
Condition	Airflow
Apply below + 2.9 kPa {+ 22 mmHg , + 0.87 inHg } pressure to port A	No
Apply over + 5.9 kPa {+ 44 mmHg , + 1.7 inHg } pressure to port A	Yes
Apply over − 0.98 kPa {− 7.35 mmHg , − 0.29 inHg } vacuum to port A	Yes



3. If not as specified, replace the check valve (two-way).

CHARCOAL CANISTER INSPECTION

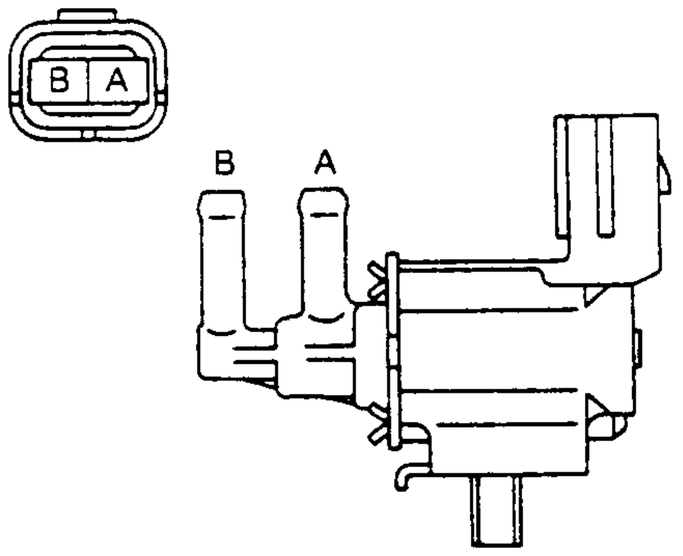
1. Remove the charcoal canister.



2. Visually check the charcoal canister for damage and leakage.
3. Blow through each port and verify that air flows.
4. Shake the charcoal canister upside down and verify that no pieces of charcoal falls from either nipple.
5. Replace the charcoal canister if necessary.
6. Verify that there is no clog in the hoses between the charcoal canister and check valve, and between the charcoal canister and purge solenoid valve.
7. Replace the hoses if necessary.

PURGE SOLENOID VALVE INSPECTION

1. Remove the purge solenoid valve.
2. Check the airflow of the valve under the following conditions.



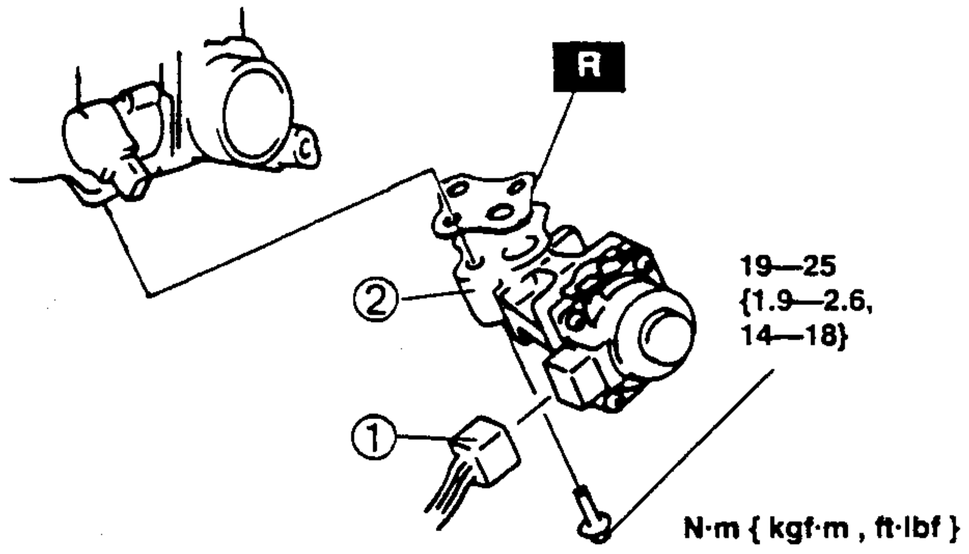
○—○ : Continuity ○═○ : Airflow

Step	Terminal		Port	
	A	B	A	B
1	○—○			
2	B+	Ground	○═○	

3. If not as specified, replace the purge solenoid valve.

EGR VALVE REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



1	EGR valve connector
2	EGR valve

EGR VALVE INSPECTION

On-vehicle inspection

1. Crank the engine and listen for initialization noise (clicks) of the EGR valve by using a screwdriver or a soundscope.

Note

- EGR valve initialization is closing action of the valve observed before and after the engine is started, and when the engine is stopped.

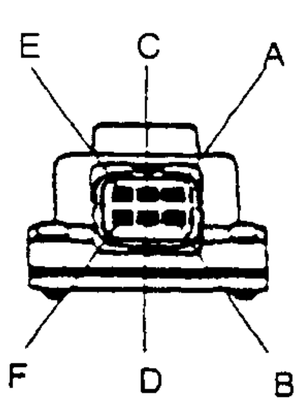
2. If the initialization noize is not heard, check for continuity of the wiring harness between the EGR valve and the ECM (PCM), and inspect the EGR valve.

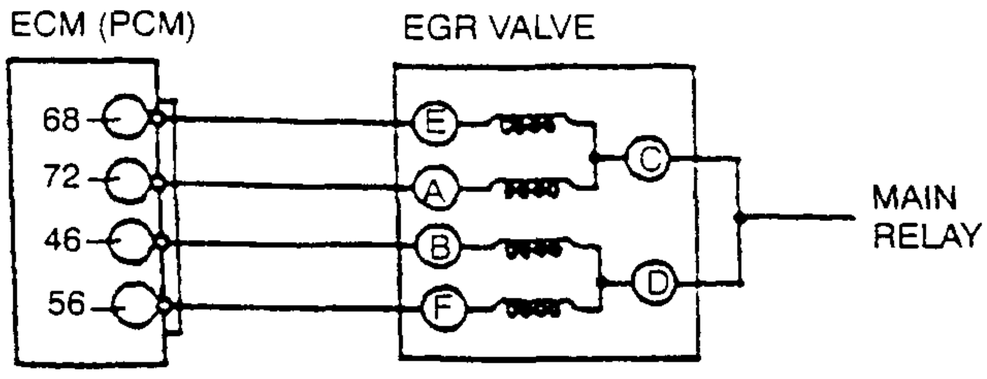
EGR Valve Inspection

1. Check the resistance of the EGR valve coils.

Terminals	Resistance (Ω)
C—E C—A D—B D—F	Approx. 22

EGR VALVE



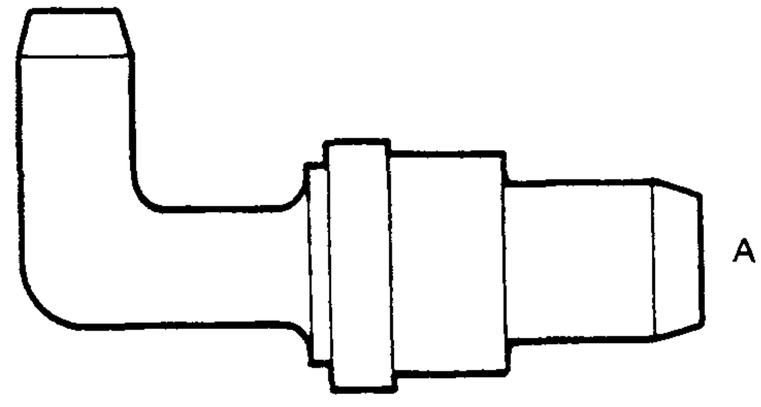


2. If not as specified, replace the EGR valve.

PCV VALVE INSPECTION

1. Remove the PCV valve.
2. Blow through the valve and verify that air flows as specified.

Condition	Airflow
Air applied to port A	Yes
Air applied to port B	No

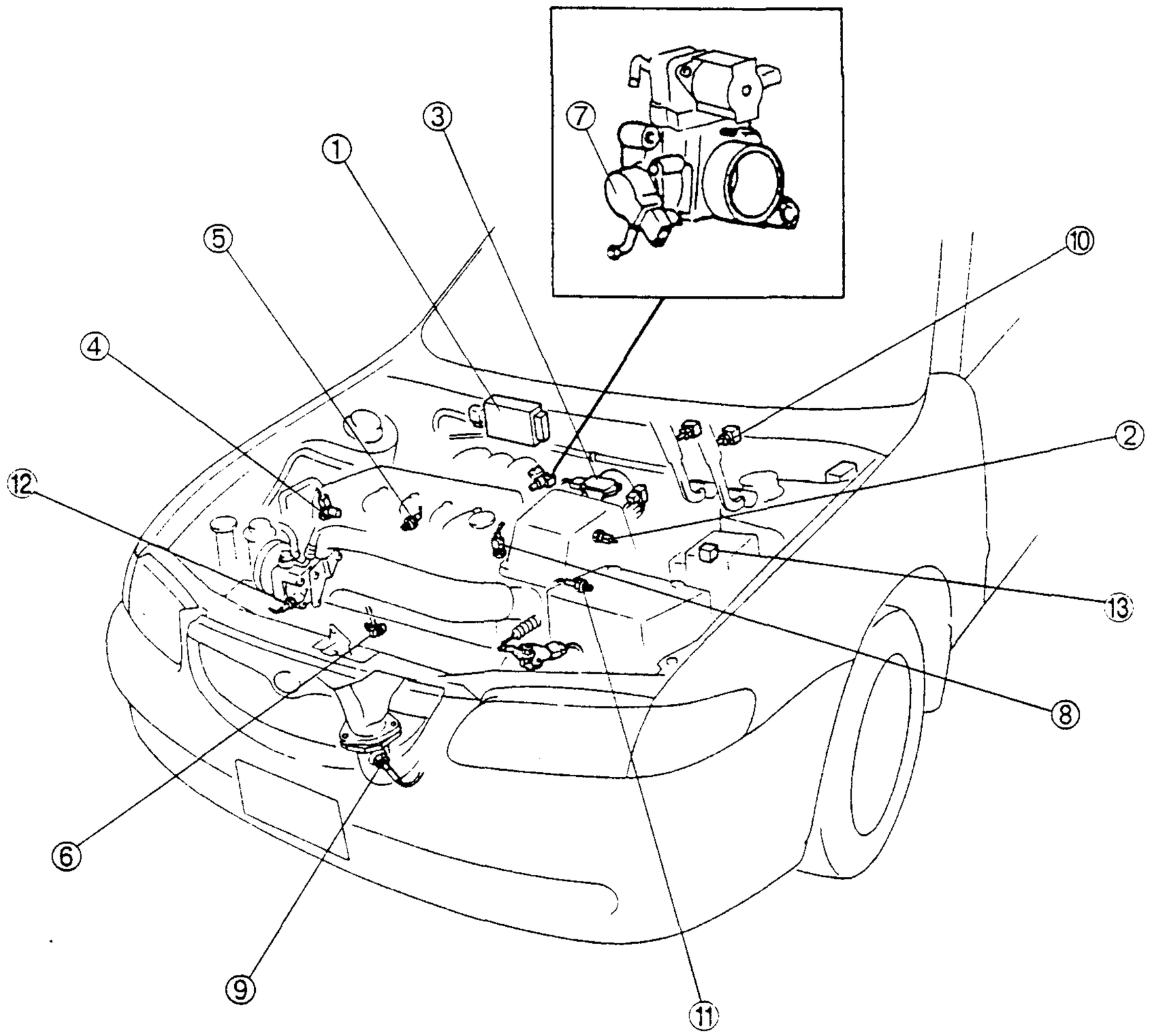


3. If not as specified, replace the PCV valve.

CONTROL SYSTEM

COMPONENT PARTS

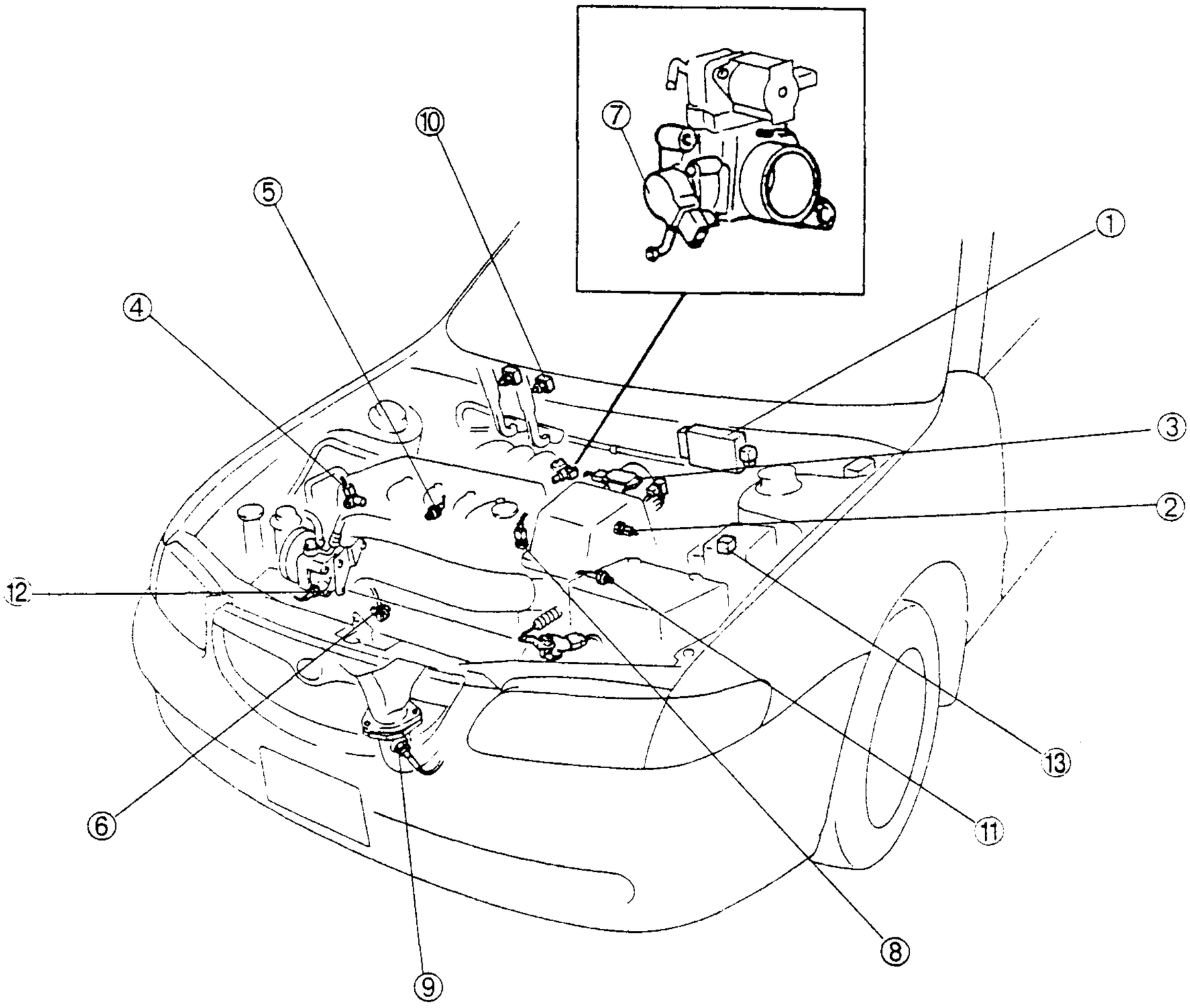
LHD



1	ECM (PCM)
2	Intake air temperature sensor
3	Mass air flow sensor
4	Camshaft position sensor
5	Knock sensor
6	Crankshaft position sensor
7	Throttle position sensor

8	Engine coolant temperature sensor
9	Heated oxygen sensor
10	Clutch switch
11	Neutral switch
12	Power steering pressure switch
13	Main relay

RHD



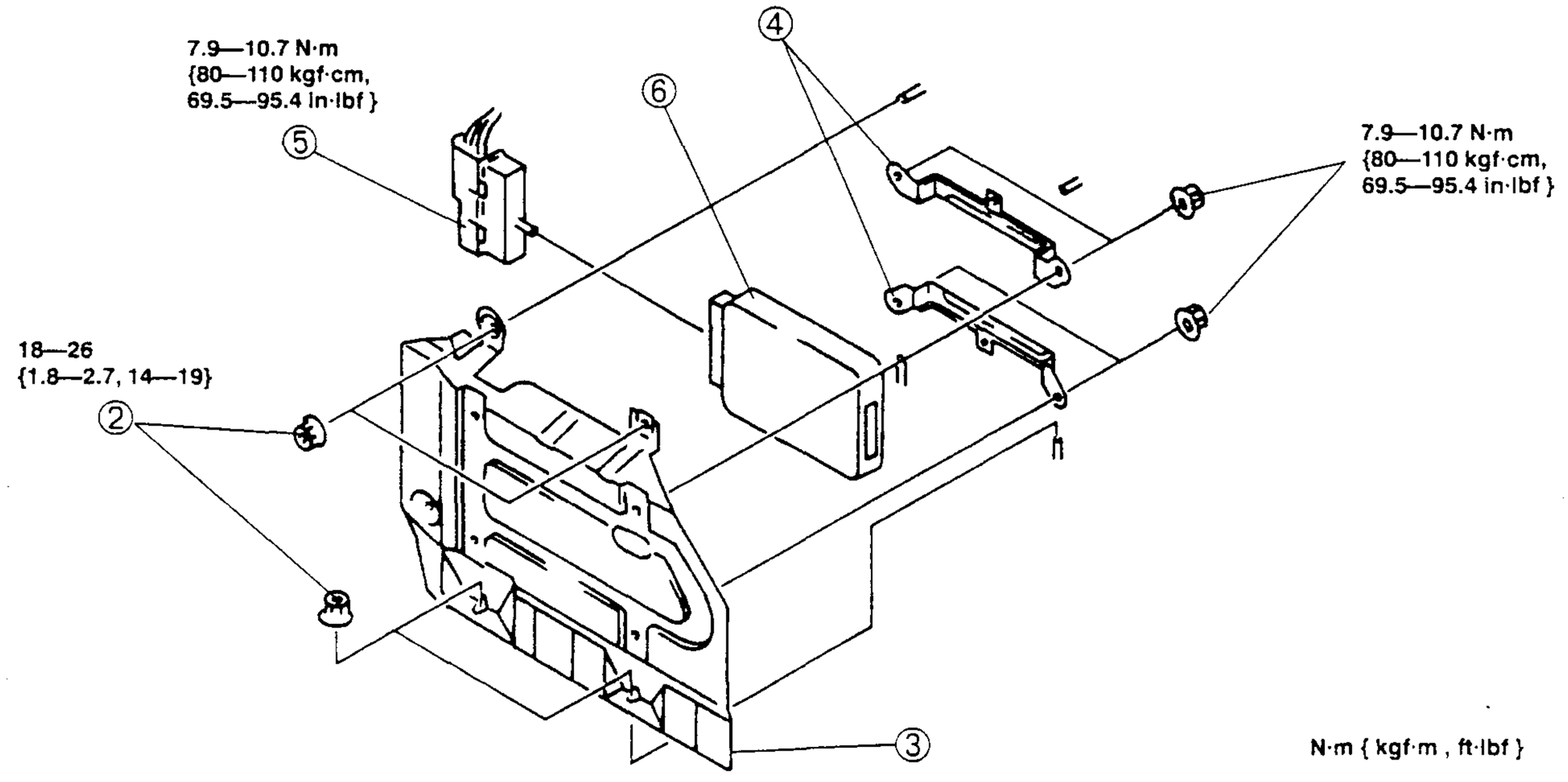
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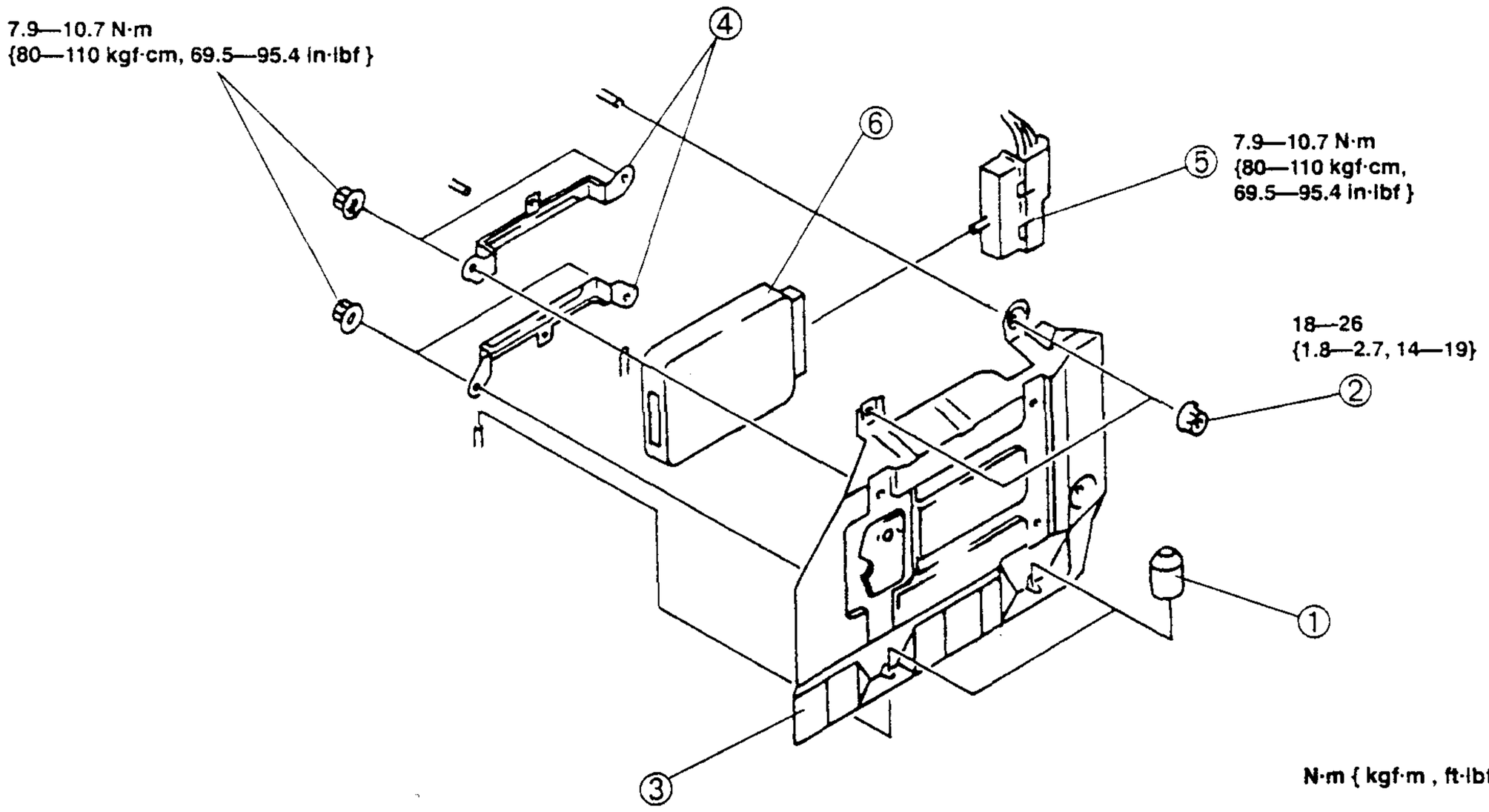
ECM (PCM) REMOVAL/INSTALLATION

1. Disconnect the battery negative cable.
2. Lift up the floormat in front of the passenger's seat.
3. Remove in the order indicated in the table.
4. Install in the reverce order of removal.

LHD



RHD

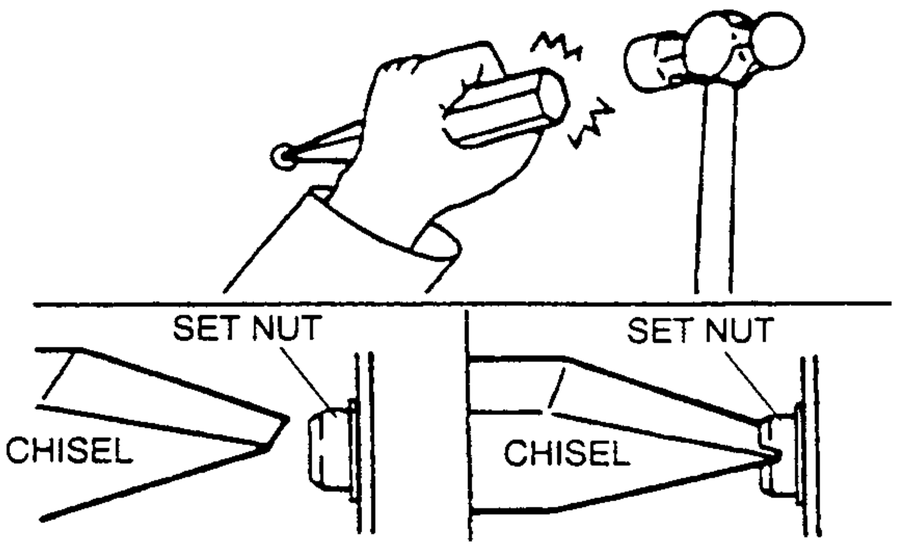


1	Set nut (RHD model) ☞ Removal Note ☞ Installation Note
2	Nut

3	Cover
4	Bracket
5	ECM (PCM) connector
6	ECM (PCM)

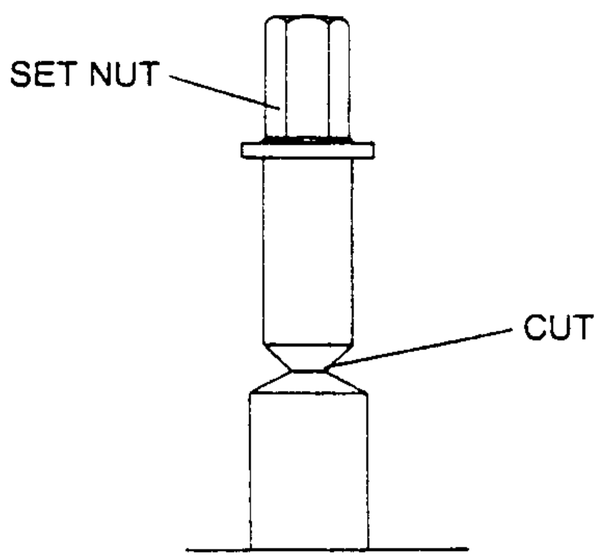
Set Nut Removal Note

1. Cut a groove on the head of the set nut so that a screwdriver can be inserted, by using a chisel and a hammer.
2. Loosen the set nut by using an impact screwdriver or pliers.



Set Nut Installation Note

- Install new set nut and tighten it until the neck of the nut is cut.

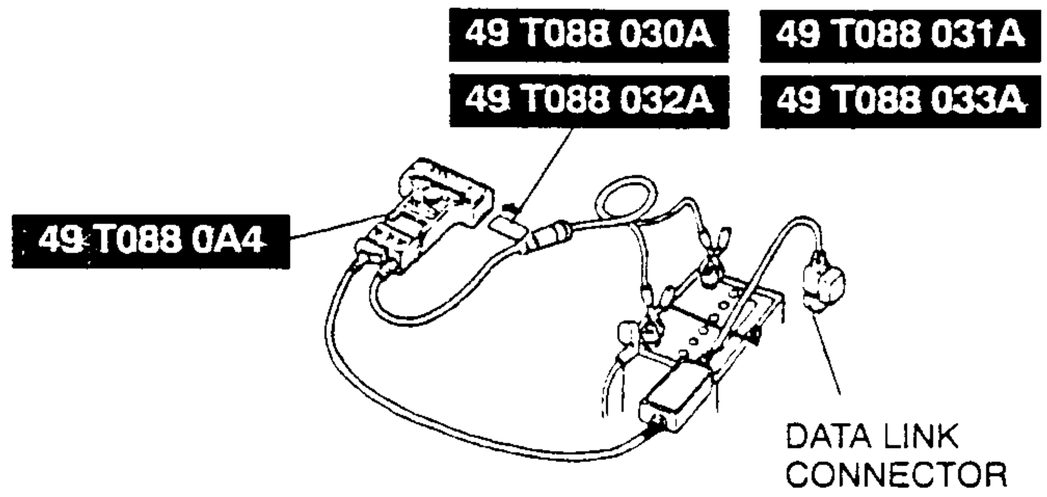


ECM (PCM) INSPECTION

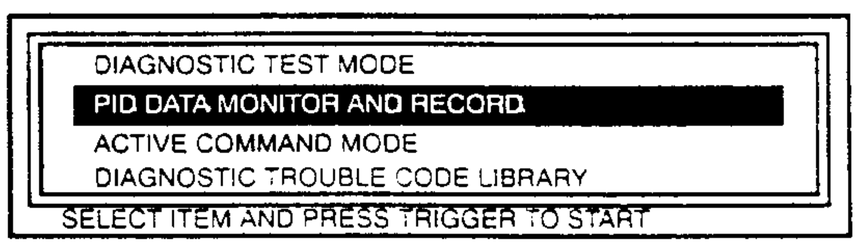
Caution

- **If monitoring carry out using SST (NGS), remove the data link connector from the vehicle. If not remove the data link connector, the vehicle is wounded.**

1. Connect the **SSTs** (NGS) to the data link connector.



2. Referring to the NGS operation manual, select the "PID/DATA MONITOR AND RECORD" functions.



Note

- The "PID/DATA MONITOR AND RECORD" function is to monitor the calculation value of input/output signals in the ECM (PCM). Deviation in the value does not always indicate malfunction in the related input/output devices (sensors and solenoids).

3. If normal output signal cannot be detected when all input signals are normal, replace the ECM (PCM). (Refer to CONTROL SYSTEM, ECM (PCM) REMOVAL/INSTALLATION.)

Reference voltage

PID	PID units/ conditions	Related ECM (PCM) Pin	Signal	Connect to	Condition		ECM (PCM) voltage	Possible malfunction
ACCS	ON/OFF	41	A/C	A/C amplifier	Idle	A/C switch and fan switch ON	Below 1.0	• A/C switch • Refrigerant pressure switch • A/C amplifier • Related harness
						A/C switch OFF	B+	
ALT V	V	34	Generator output voltage	Generator	Ignition switch ON		Below 1.0	• Generator • Related harness
					Idle		Approx. 4.0	
ALTFDC	%	47	Generator field coil control	Generator	Ignition switch ON		0	• Generator • Related harness
					Idle		0.74	
BOO*1	ON/OFF	92	Brake switch	Brake switch	Brake pedal released		Below 1.0	• Brake switch • Related harness
					Brake pedal depressed		B+	
CPP/ PNP*2	ON/OFF	64	Load/no load condition	Neutral/Clutch switch	Ignition switch ON	Other than neutral position and clutch pedal released	B+	• Neutral/Clutch switch • Related harness
						Neutral position or clutch pedal depressed	Below 1.0	
DTC CNT	DTCs	–	–	–	–		–	–
ECT	°C	38	Engine coolant temperature	Engine coolant temperature sensor	Ignition switch ON	Engine coolant temperature 20 °C {68 °F }	1.31	• Engine coolant temperature sensor • Related harness
ECT V	V					After warm up	0.64	
EGRCD1	ON/OFF	68	EGR control #1 coil	EGR valve	Ignition switch ON		Below 1.0	• EGR valve • Related harness
					Idle			
EGRCD2	ON/OFF	72	EGR control #2 coil		Ignition switch ON		B+	
					Idle		Below 1.0	
EGRCD3	ON/OFF	46	EGR control #3 coil		Ignition switch ON		B+	
					Idle			
EGRCD4	ON/OFF	56	EGR control #4 coil		Ignition switch ON			
					Idle		Below 1.0	
EPC*1	%	81	Pressure control solenoid	Solenoid valve	Idle	Throttle valve close throttle position	Approx. 7.0	• Solenoid valve • Related harness
						Throttle valve wide open throttle	Approx. 0.4	

*1: ATX only
*2: MTX only

PID	PID units/ conditions	Related ECM (PCM) Pin	Signal	Connect to	Condition		ECM (PCM) voltage	Possible malfunction
EVAPPDC	%	67	Purge control	Purge solenoid valve	Ignition switch ON		B+	• Purge solenoid valve • Related harness
					Idle			
FPRC	ON/OFF	19	Pressure regulator control	PRC solenoid valve	Idle (Hot condition)		Below 1.0	• PRC solenoid valve • Related harness
					Other		B+	
FUELPW1	ms	75/101 /74 /100	Fuel injector control	Fuel injectors	Ignition switch ON	Idle	B+	• Fuel injector • Related harness
GEAR*1	MODE	–	–	–	–			–
HFC	ON/OFF	17	Condenser fan control	Condenser fan relay	Condenser fan operating		Below 1.0	• Condenser fan relay • Related harness
					Condenser fan stops		B+	
IAC	%	20	Idle air control (positive)	Idle air control valve	Ignition switch ON		B+	• Idle air control valve • Related harness
					Idle (After warm up and no E/L ON)			
		83	Idle air control (negative)		Ignition switch ON			
					Idle (After warm up and no E/L ON)		9.4	
IAT	°C	39	Intake air temperature	Intake air temperature sensor	Ignition switch ON	Intake air temperature 20 °C {68 °F }	2.87	• Intake air temperature sensor • Related harness
IAT V	V							
LFC	ON/OFF	98	Cooling fan control	Cooling fan relay	Cooling fan operating		Below 1.0	• Cooling fan relay • Related harness
					Cooling fan stops		B+	
LOAD	%	–	–	–	–			–
LONGFT1	%	–	–	–	–			–
MAF	Gm/sec	88	Mass air flow	Mass air flow sensor	Ignition switch ON		Approx. 0.02	• Mass air flow sensor • Related harness
					Idle (After warm up)		Approx. 0.8	
O2S11	V	60	Heated oxygen sensor	Heated oxygen sensor	After warm up	Idle	0—1.0	• Heated oxygen sensor • Related harness
						Acceleration	0.5—1.0	
						Deceleration	0—0.5	
PSP	LOW/ HIGH	31	Power steering pressure	Power steering pressure switch	Ignition switch ON		B+	• Power steering pressure switch • Related harness
PSP V	V				Idle	Steering wheel straight ahead position		
						Steering is wheel fully turned	Below 1.0	

*1:ATX only

PID	PID units/ conditions	Related ECM (PCM) Pin	Signal	Connect to	Condition		ECM (PCM) voltage	Possible malfunction
RPM	RPM	48	Engine speed	Instrument cluster ABS/TCS CM Data link connector (Terminal IG–)	Ignition switch ON		10.0	• Instrument cluster • ABS/TCS CM • Related harness
					Idle		4—8	
SHRTFT1	%	–	–	–	–		–	–
SPRKADV	Deg.	–	–	–	–		–	–
SS1*1	ON/OFF	27	Shift solenoid A	Solenoid valve	Solenoid valve ON		B+	• Solenoid valve • Related harness
					Solenoid valve OFF		Below 1.0	
SS2*1	ON/OFF	1	Shift solenoid B	Solenoid valve	Solenoid valve ON		B+	• Solenoid valve • Related harness
					Solenoid valve OFF		Below 1.0	
SS3*1	ON/OFF	53	Shift solenoid C	Solenoid valve	Solenoid valve ON		B+	• Solenoid valve • Related harness
					Solenoid valve OFF		Below 1.0	
TCS*1	ON/OFF	29	HOLD switch	HOLD switch	HOLD switch	Release	B+	• HOLD switch • Related harness
						Depressed	Below 1.0	
TFT*1	°C	37	Transaxle fluid temperature	Transaxle fluid temperature sensor	Verify that voltage decreases according to ATF temperature rise For resistance, if the ATF is 20 °C {68 °F } the voltage should be 3.5 V. If the ATF is 130 °C {260 °F } the voltage shold be 0.6 V		Approx. 0.6— 4.8	• Transaxle fluid temperature sensor • Related harness
TFT V*1	V							
TP V	V	89	Throttle position	Throttle position sensor	Ignition switch ON	Closed throttle position	0.51	• Throttle position sensor • Related harness
						Wide open throttle	4.33	
TR*1	MODE	–	–	–	–		–	–
TR V*1	V	64	Load/no load condition	Transaxle range switch	R position, all ranges		B+	• Transaxle range switch • Related harness
					P or N position		Below 1.0	
TSS/ISS*1	RPM	23	Ground (Input/turbine speed sensor)	Input/turbine speed sensor (TSS)	Constant		Below 1.0	• ECM (PCM) 23 terminal harness
		84	Input/turbine speed sensor		Ignition switch ON			• Input/turbine speed sensor • Related harness
					Idle (N position)		0.1— 1.0	
VPWR	V	71/97	Power supply	Main relay	Ignition switch	ON	B+	• Main relay • Related harness
						OFF	Below 1.0	

*1:ATX only

PID	PID units/ conditions	Related ECM (PCM) Pin	Signal	Connect to	Condition		ECM (PCM) voltage	Possible malfunction
VSS	KPH	58	Vehicle speed	Vehicle speedometer	Idle (AC range)		Below 1.0	• ABS system • Vehicle speedometer sensor • Related harness
					48 km/h {30 mph } (AC range)		6.5	
					88 km/h {50 mph } (AC range)		6.4	
WAC	ON/OFF	69	A/C control	A/C switch	Ignition switch ON		B+	• A/C switch • Related harness
					Idle	A/C operating	Below 1.0	
						A/C stops	B+	

Note

- The following PIDs are displayed on the NGS are not used for inspection or, because of these devices are not applied for this model.
  - 4X4L
  - AIR
  - ARC
  - BLRMTR
  - CCS
  - DRIVECT
  - RRLMP
  - EGRBARO
  - EGRC
  - EGRCF
  - EGRV
  - EGRVF
  - EVAPCP
  - FP
  - HDLMP
  - IMRC
  - LONGFT2
  - MIL
  - O2S12
  - O2S22
  - O2S22
  - RDEF
  - SHRTFT2
  - TCC
  - TCIL
  - TRAC
  - TRIP
  - TRIPCNT

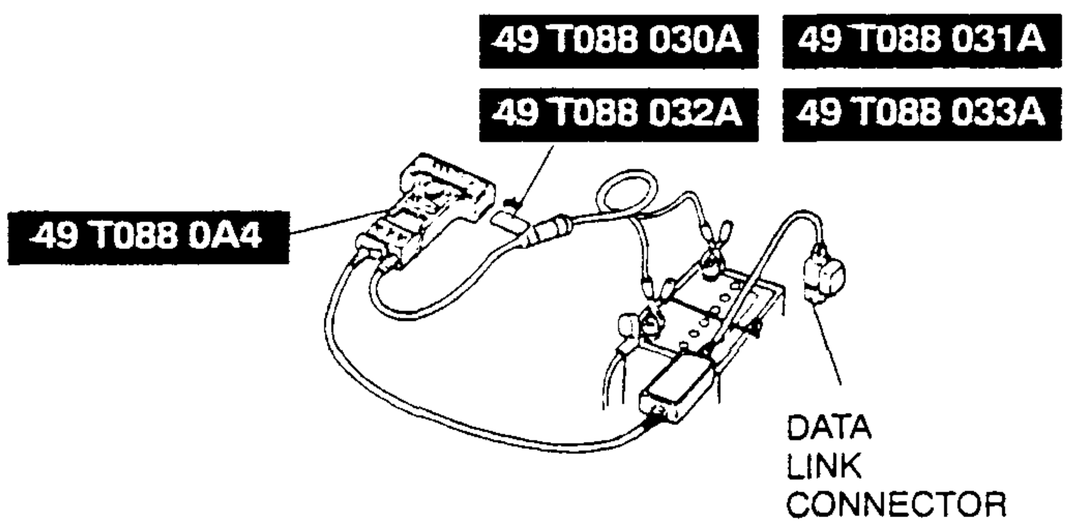
ECM (PCM) Connector Pin Usage Chart

Pin	Application	Abbreviation
1	Shift solenoid B	HSS2
5	Communication (with immobilizer)	COM
6	D range	TSD
7	L range	TS1
8	SGC –	CID–
9	S range	TS2
11	Torque reduction request	TSCRQST
14	Cruise control	ASC
15	Diagnostic trouble code output	BUS–
16	Diagnostic trouble code input	BUS+
17	Condenser fan control	HEDF
18	Generator warning light control	GENLMP
19	Pressure regulator control	FPRC
20	Idle air control (Positive)	ISCP
21	NE +	CAS+
22	NE –	CAS–
23	Ground (Input turbine speed sensor)	TSS–
24	Ground	PWRGND
26	IGT 1	CD1
27	Shift solenoid A	HSS1
28	3–2 timing solenoid valve	HSS5
29	HOLD switch	ODS
31	Power steering pressure	PSPS
32	R position	TSR
34	Generator output voltage	ALTT
36	Mass air flow sensor signal return	MAFRTN
37	Transaxle fluid temperature	TOT
38	Engine coolant temperature	ECT
39	Intake air temperature	ACT
41	A/C	ACD
43	Torque converter clutch solenoid valve	HSLIP
46	EGR control #3 coil	STM3
47	Generator field coil control	ALTF
48	Engine speed	CTO
51	Ground	PWRGND
52	IGT 2	CD2
53	Shift solenoid C	HSS3
54	Torque converter clutch solenoid valve (TSS)	HLUP
55	Back-up power supply	KAPWR
56	EGR control #4 coil	STM4
57	Knocking	KS
58	Vehicle speed	VSS

Pin	Application	Abbreviation
60	Heated oxygen sensor	HEGO
64	Load/no load distinction	NDS (MTX) PNP (ATX)
67	Purge control	CANP
68	EGR control #1 coil	STM1
69	A/C control	ACON
70	Fuel pump control (with immobilizer)	FP
71	Power supply	VPWR
72	EGR control #2 coil	STM2
74	Fuel injector No.3 control	INJ–3
75	Fuel injector No.1 control	INJ–1
76	Ground	PWRGND
77	Ground	PWRGND
79	HOLD indicator light	ODF
80	Fuel pump control (without immobilizer)	FP
81	Pressure control solenoid	HEPC
82	Torque reduction inhibit	TSCINH
83	Idle air control (Negative)	ISC–BPA
84	Input/turbine speed sensor	TSS+
85	SGC –	CID+
88	Mass air flow sensor	MAF
89	Throttle position	TP
90	Constant voltage (Vref)	VREF
91	Ground	SIGRTN
92	Brake	BOO
93	Heated oxygen sensor heater control	HEGOHTR
97	Power supply	VPWR
98	Cooling fan control	EDF
99	Communication (Fuel econo module)	FEM
100	Fuel injector No.4 control	INJ–4
101	Fuel injector No.2 control	INJ–2
103	Ground	PWRGND

MASS AIR FLOW SENSOR INSPECTION

1. Check the mass air flow sensor for damage and cracks.
2. Shift the transaxle into neutral (MTX) or P position (ATX).
3. Open the bonnet.
4. Warm up the engine to normal operating temperature.
5. Turn off all loads.
   - A/C switch
   - Power steering
   - Fan switch
6. Wait until the cooling fan stops.
7. Connect the **SSTs** (NGS) to the data link connector.



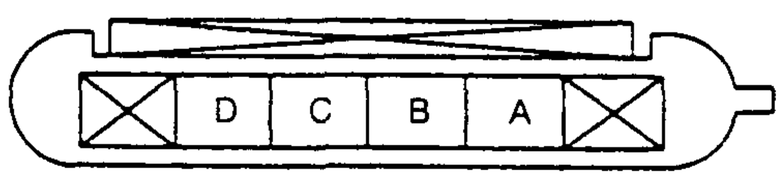
8. Select "PID/DATA MONITOR AND RECORD" and press TRIGGER.
9. Select "MAF" and press TRIGGER.
10. Press START.
11. Verify that the voltage is within the specification.

Specification

Engine	Transaxle	"MAF" PID (Gm/sec)	
		Idle	Approx. 2,500 rpm
FP	MTX/ATX	Approx. 1.9	Approx. 6.8
FS	MTX	Approx. 2.0	Approx. 7.1
	ATX	Approx. 2.2	Approx. 8.1—8.3

12. If not as specified, perform following inspection.
    (1) Harness continuity
    - Between ECM (PCM) terminal 88 and mass air flow sensor terminal E.
    - Between ECM (PCM) terminal 36 and mass air flow sensor terminal D.
    - Between ECM (PCM) terminal 103 and mass air flow sensor terminal C.
    - Between main relay terminal D and mass air flow sensor terminal B.

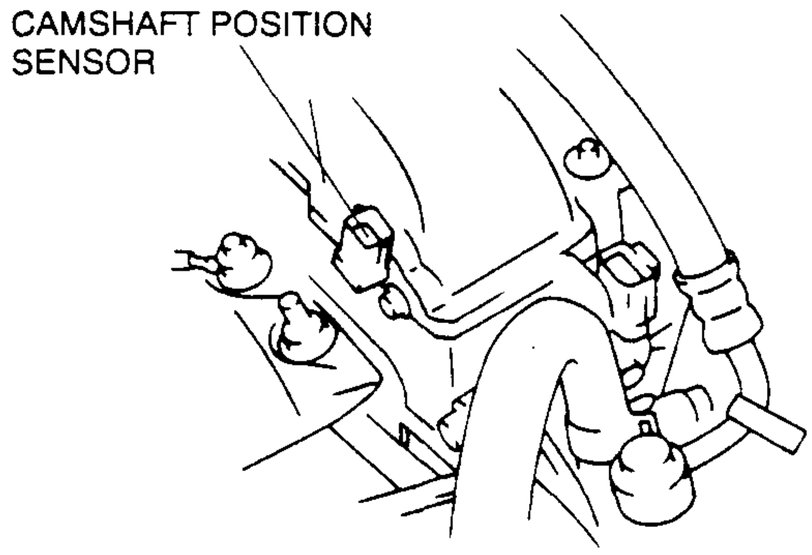
    (2) Terminal voltage (Ignition switch ON)
    - Mass air flow sensor terminal B voltage (at the vehicle harness connector): Battery positive voltage.
    - Mass air flow sensor terminal C voltage (at the vehicle harness connector): Below 1.0 V.



13. If the terminal voltage correct and there is harness continuity, replace the mass air flow sensor.

CAMSHAFT POSITION SENSOR INSPECTION

1. Disconnect the camshaft position sensor connector.
2. Measure the resistance between terminals A and B by using a ohmmeter.



Specification
0.95—1.25 kΩ [20 °C {68 °F }]

3. If not specified, check related wiring harness. If they are okay, replace the crankshaft position sensor.

Tighting torque
7.9—10.7 N·m
{80—110 kgf·cm , 69.5—95.4 in·lbf }

KNOCK SENSOR INSPECTION

1. Verify that the ignition switch is OFF.
2. Disconect knock sensor connector.
3. Measure the resistance between knock sensor terminal A and the knock sensor body by using an ohmmeter.

Specification
Approx. 560 kΩ

4. If not as specified, replace the knock sensor.

KNOCK SENSOR REPLACEMENT

1. Remove the oil filter element.
2. Remove and install the knock sensor.

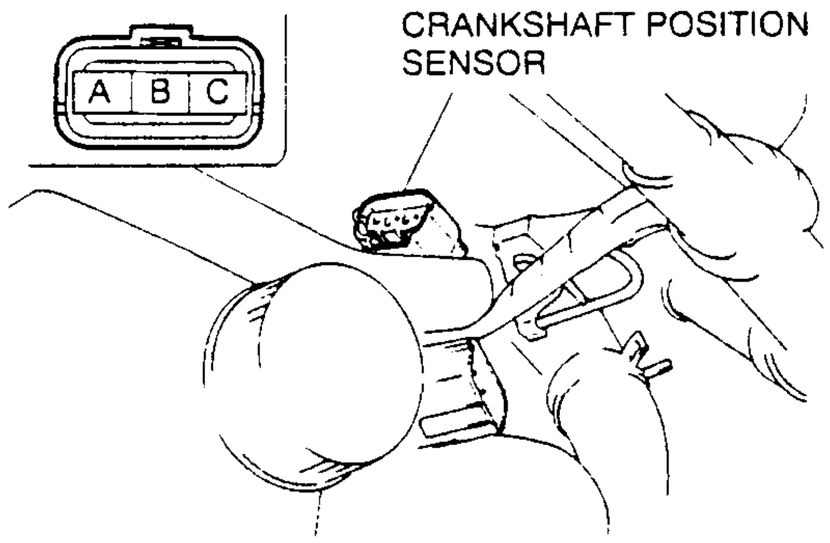
Tighting torque
19.7—34.3 N·m {2.0—3.5 kgf·m, 15—25 ft·lbf }

3. Install the oil filter element.

CRANKSHAFT POSITION SENSOR INSPECTION

Resistance

1. Disconnect the crankshaft position sensor connector.
2. Measure the resistance between terminals A and B by using an ohmmeter.

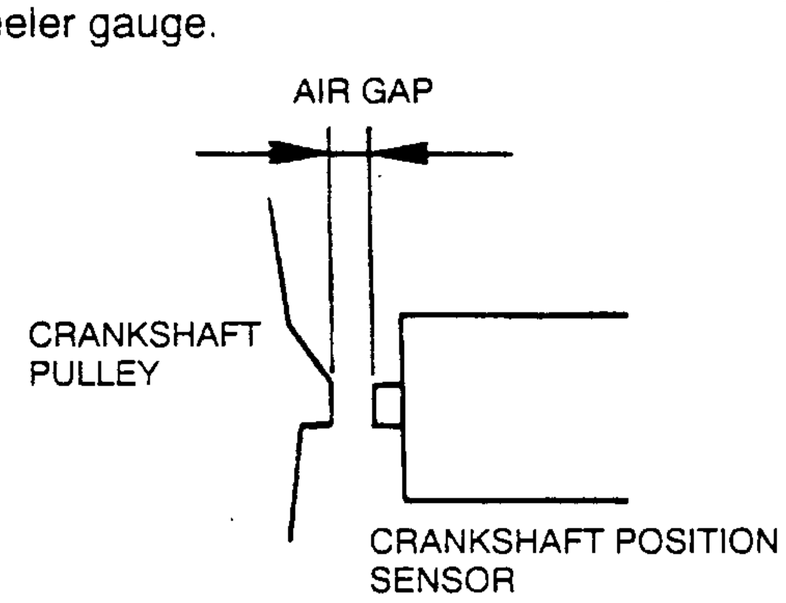


Specification
Approx. 550 Ω

3. If not as specified, check related wiring harness. If they are okay, replace the crankshaft position sensor.

Air Gap

1. Verify that the crankshaft position sensor is installed correctly and securely.
2. Measure the air gap between the crankshaft pulley and the crankshaft position sensor by using a feeler gauge.



Specification
0.5—1.5 mm {0.020—0.059 in }

3. If not as specified, replace the crankshaft pulley or the crankshaft position sensor. (Refer to CRANKSHAFT POSITION SENSOR REPLACEMENT.)

CRANKSHAFT POSITION SENSOR REPLACEMENT

1. Disconnect the negative battery cable.
2. Disconnect the crankshaft position sensor connector.
3. Remove the crankshaft position sensor.
4. Install in the reverse order of removal.

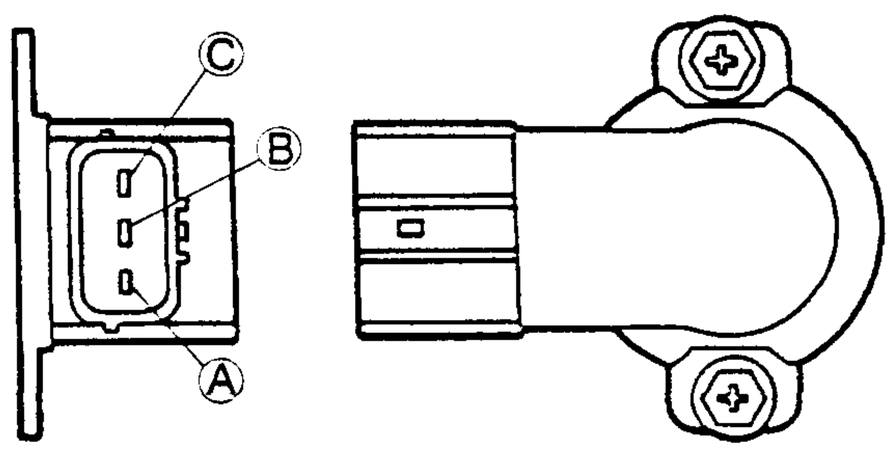
Tightening torque
7.9—10.7 N·m {80—110 kgf·cm , 69.5—95.4 in·lbf }]

5. Adjust the air gap.

THROTTLE POSITION SENSOR INSPECTION

Inspection of Resistance

1. Disconnect the throttle position sensor connector.
2. Using an ohmmeter, measure the resistance between throttle position sensor terminal A and C.

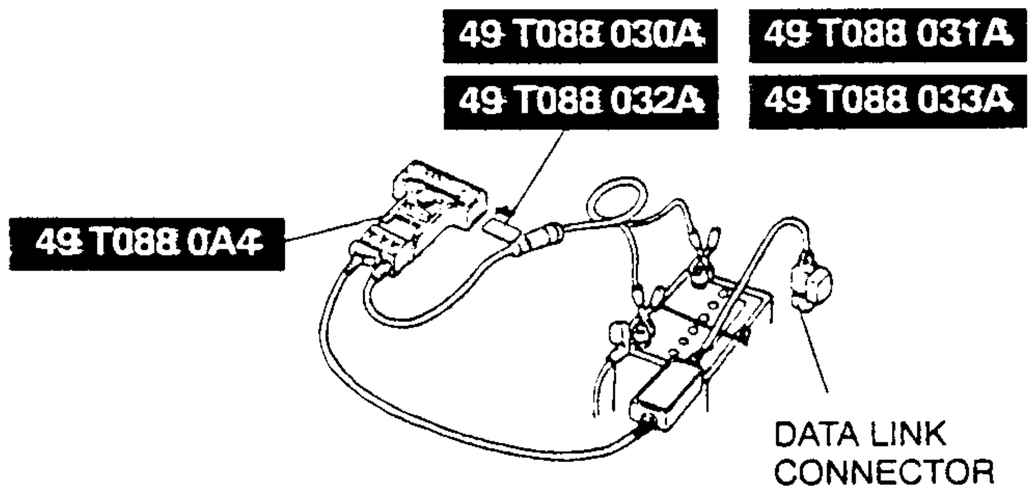


Specification
4—6 kΩ

3. If not as specified, replace the throttle position sensor.
4. Reconnect the throttle position sensor connector.

Inspection of Output Voltage

1. Connect the **SSTs** (NGS) to the data link connector.



2. Verify that the throttle valve is at the closed throttle position.
3. Turn the ignition switch to ON.
4. Select the "PID/DATA MONITOR AND RECORD" function on the NGS display (and press TRIGGER).
5. Select "TP V" on the NGS display and press START. NGS measures and shows the voltage.

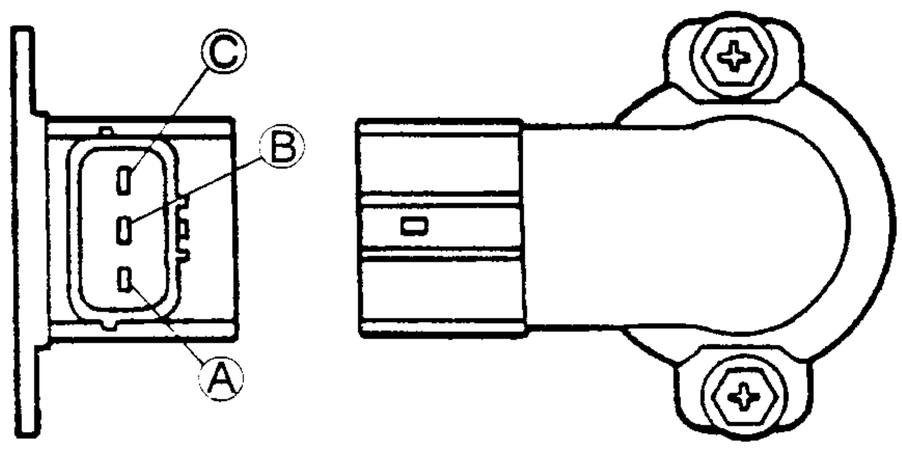
Specification
Closed throttle position: Approx. 0.5 V
Wide open throttle: Approx. 4.3 V
(Verify that the voltage increase is directly proportioned to the throttle valve opening angle.)

6. If not as specified, adjust the throttle position sensor.

THROTTLE POSITION SENSOR ADJUSTMENT

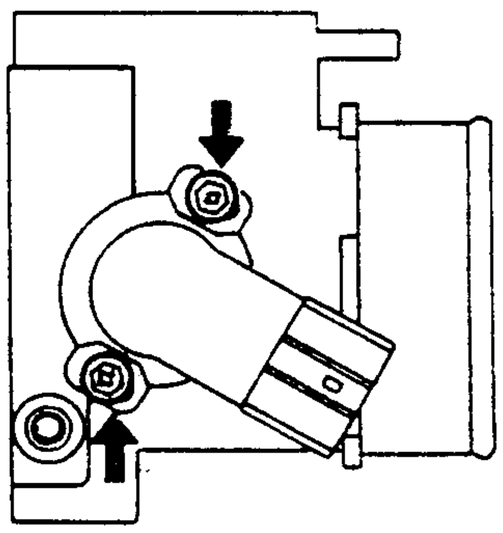
Caution
- **The throttle position sensor is adjusted at the factory before shipment. Unnecessary adjustment will negatively effect the engine performance.**
- **Adjusting the throttle position sensor by using the throttle adjusting screw (TAS) will negatively effect the engine performance.**

1. Verify that the throttle valve is at the closed throttle position.
2. Disconnect the throttle position sensor connector.
3. Turn the ignition switch to ON.
4. Measure the voltage at the vehicle harness connector terminal A by using an ohmmeter and record it.

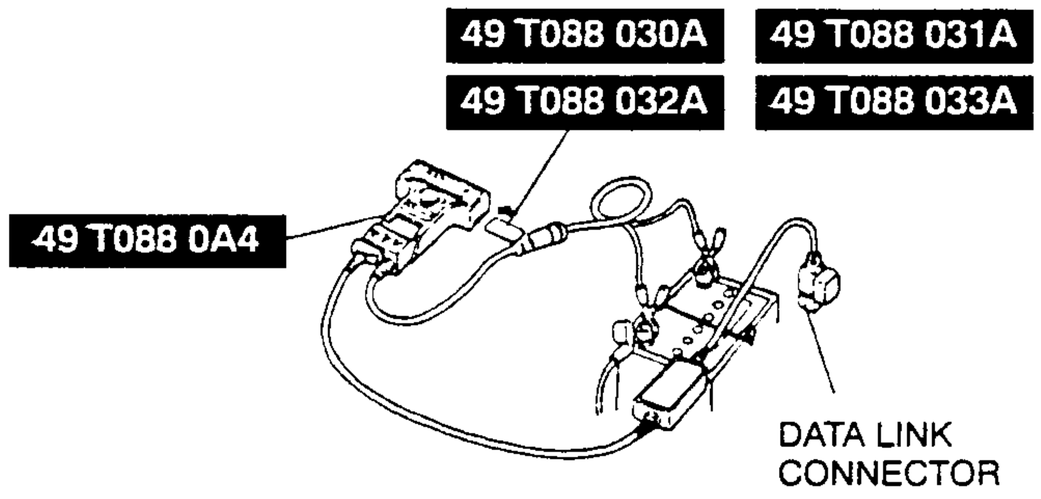


Specification
4.5—5.5 V

5. Turn the ignition switch to OFF.
6. Connect the throttle position switch connector.
7. Loosen the attaching screws.



8. If the **SSTs** (NGS) are used, check in the following order.
   (1) Connect the **SSTs** (NGS) to the data link connector.



   (2) Verify that the throttle valve is at the closed throttle position.
   (3) Turn the ignition switch to ON.
   (4) Select the "PID/DATA MONITOR AND RECORD" function on the NGS display and press TRIGGER.
   (5) Select "TP V" on the NGS display and press START. NGS measures and shows the voltage.

Specification (At closed throttle position)

Throttle position sensor harness side connector terminal A voltage (V)	"TP V" voltage (V)
4.5—4.9	0.4—0.5
4.9—5.1	0.4—0.6
5.1—5.5	0.5—0.6

   (6) Tighten the attaching screws.

Specification
1.6—2.3 N·m {16—24 kgf·m , 14—21 ft·lbf }

   (7) When the throttle valve is at the wide open throttle, verify that the "TP V" voltage is in the specification.

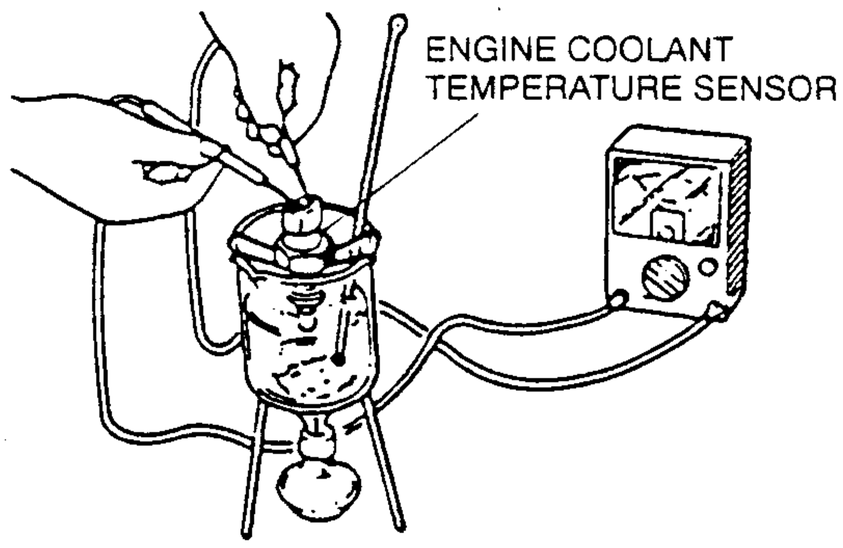
Specification(At wide open throttle)

Throttle position sensor harness side connector terminal A voltage (V)	"TP V" voltage (V)
4.5—4.7	3.5—4.4
4.7—4.8	3.6—4.5
4.8—4.9	3.7—4.6
4.9—5.0	3.7—4.8
5.0—5.1	3.8—4.9
5.1—5.3	4.0—5.0
5.3—5.4	4.1—5.1
5.4—5.5	4.2—5.2

   (8) If not as specified, check related wiring harness. If they are okay, replace the throttle body.

ENGINE COOLANT TEMPERATURE SENSOR INSPECTION

1. Remove the engine coolant temperature sensor.
2. Place the sensor in water with a thermometer, and heat the water gradually.
3. Measure the resistance of the sensor by using an ohmmeter.



Specification

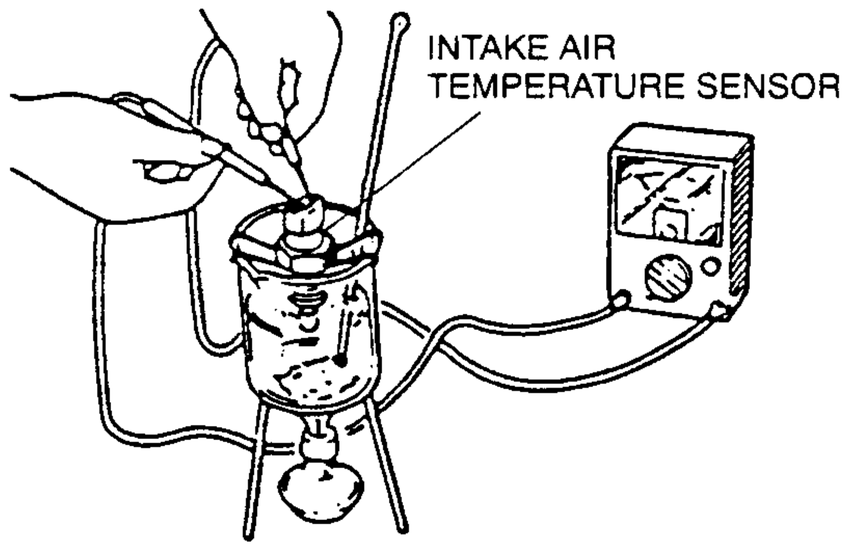
Water temperature °C { °F }	Resistance kΩ
20 {68}	35.4—39.2
60 {140}	7.18—7.92

4. If not as specified, replace the engine coolant temperature sensor.

Tightening torque
15.7—23.5 N·m {1.6—2.4 kgf·m , 11.6—17.3 ft·lbf }

INTAKE AIR TEMPERATURE SENSOR INSPECTION

1. Remove the intake air temperature sensor.
2. Place the sensor in water with a thermometer, and heat the water gradually.
3. Measure the resistance of the sensor by using an ohmmeter.



Specification

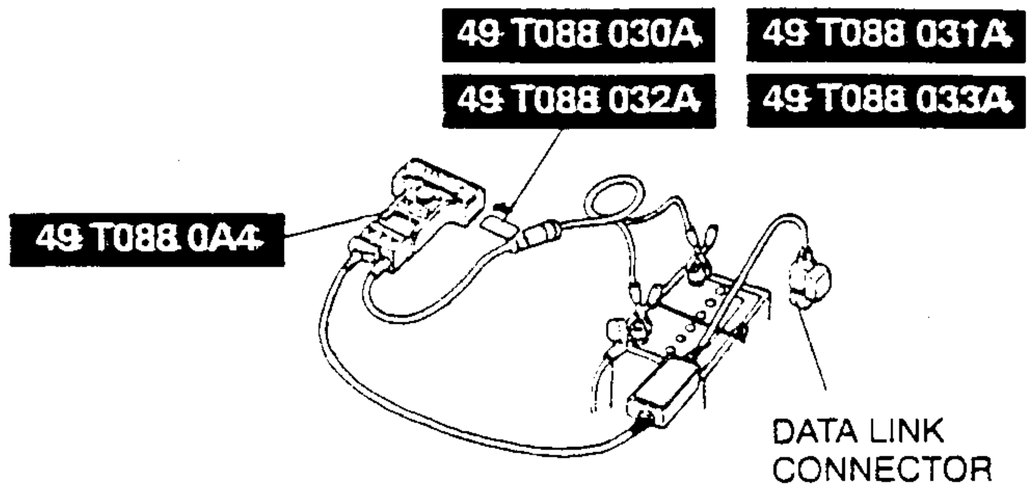
Water temperature °C { °F }	Resistance kΩ
20 {68}	35.4—39.3
60 {140}	7.18—7.92

4. If not as specified, replace the intake air temperature sensor.

Tightening torque
8.9—11.7 N·m {90—120 kgf·cm , 79—104 ft·lbf }

HEATED OXYGEN SENSOR INSPECTION

1. Connect the **SSTs** (NGS) to the data link connector.



2. Warm up the engine to normal operating temperature.
3. Select the "PID/DATA MONITOR AND RECORD" function on the NGS display.
4. Select "O2S11" on the NGS display and press START. The NGS measures and shows the voltage.

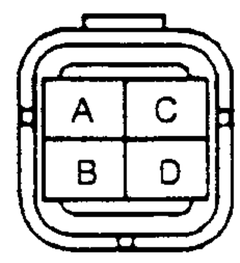
Specification

Engine condition	"O2S11" voltage (V)
Idle	0—1.0
Deceleration	0.5—1.0
Acceleration	0—0.5

5. If not as specified, inspect the following.
   - Intake-air system
   - Fuel system
   - On-board diagnostic system
   - Related harness
6. If these systems are okay, replace the heated oxygen sensor. (Refer to EXHAUST SYSTEM, EXHAUST SYSTEM REMOVAL/INSTALLATION)

Heater

1. Disconnect the heated oxygen sensor connector.
2. Measure the resistance between heated oxygen sensor terminals C and D by using an ohmmeter.



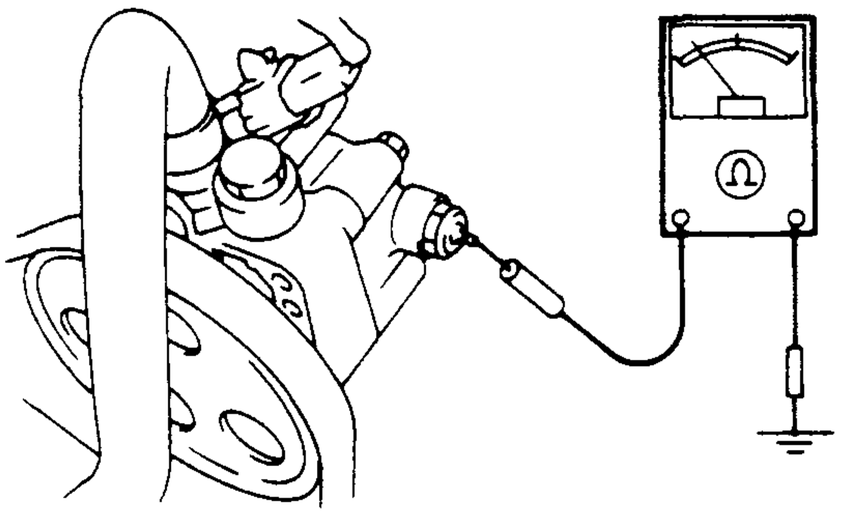
Specification
Approx. 6 kΩ

3. If not as specified, replace the heated oxygen sensor. (Refer to EXHAUST SYSTEM, EXHAUST SYSTEM REMO-VAL/INSTALLATION)

POWER STEERING PRESSURE SWITCH INSPECTION

Not Using the SSTs (NGS)

1. Disconnect the power steering pressure switch connector.
2. Connect an ohmmeter to the power steering pressure switch.



3. Start the engine run it at idle. Check continuity of the sensor while turning the steering wheel.

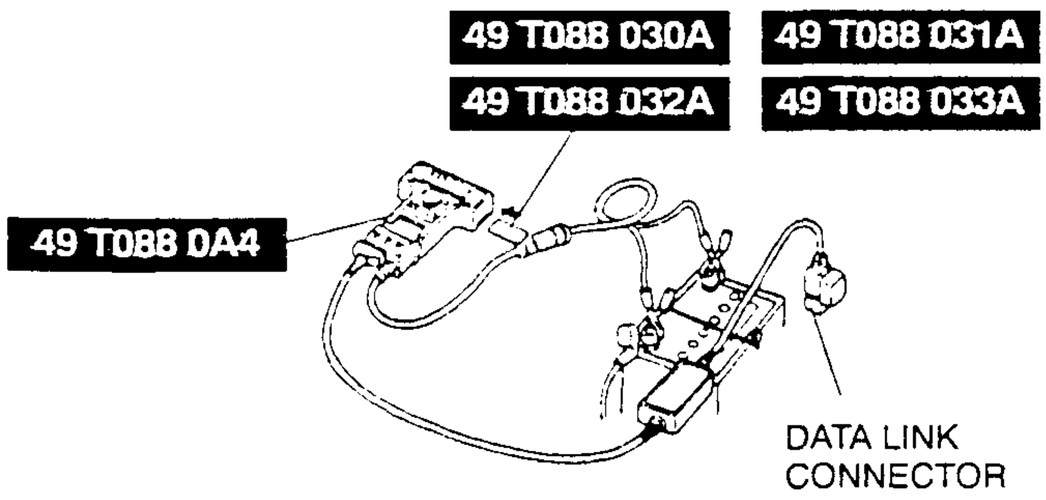
Specification

Steering wheel condition	Voltage (V)
Steering wheel fully turned	B+
Steering wheel straight ahead position	Below 1.0

4. If not as specified, check the related harness.
5. Replace the power steering pressure switch. (Refer to section N, POWER STEERING OIL PUMP DISASSEMBLY/ASSEMBLY.)

Using the SSTs (NGS)

1. Connect the **SSTs** (NGS) to the data link connector.



2. Select the "PID/DATA MONTOR AND RECORD" function on the NGS display.
3. Select "PSP" on the NGS display and press START. The NGS measures and shows the operation.

Specification

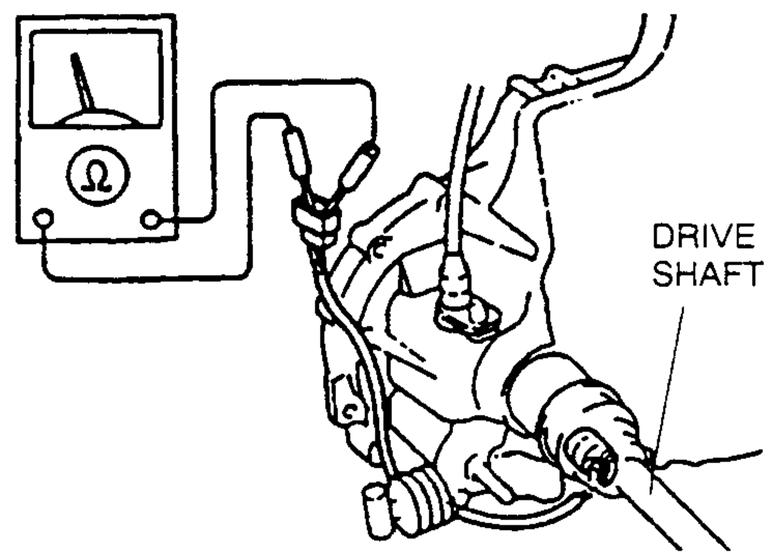
Steering wheel condition	"PSP" operation
Steering wheel fully turned	HIGH
Steering wheel straight ahead position	LOW

4. If not as specified, check the related harness.
5. If okay, replace the power steering pressure switch. (Refer to section N, POWER STEERING OIL PUMP DISASSEMBLY/ASSEMBLY.)

NEUTRAL SWITCH INSPECTION

Not Using the SSTs (NGS)

1. Disconnect the neutral switch connector.
2. Check continuity of the switch by using an ohmmeter.



○—○ : Continuity

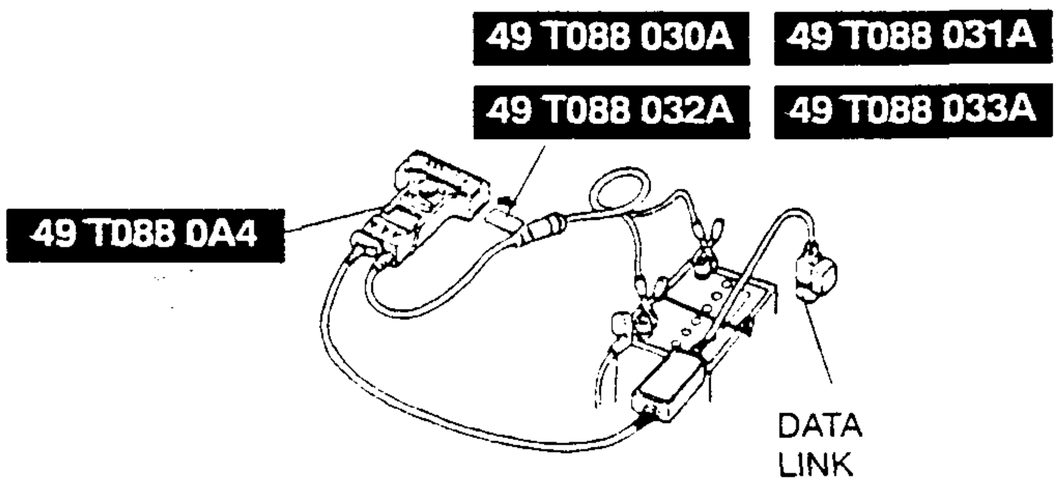
Condition	Terminal	
	A	B
Neutral	○	○
Other		

3. If not as specified, replace the neutral switch.

Tightening torque
20—29 N·m
{2.0—3.0 kgf·m , 15—21 ft·lbf }

Using the SSTs (NGS)

1. Connect the SSTs to the data link connector.



2. Turn the ignition switch to ON.
3. Select the "PID/DATA MONITOR AND RECORD" functin on the NGS display.
4. Select "CPP/PNP" on the NGS display and press START. The NGS measures and shows the operation.

Specification

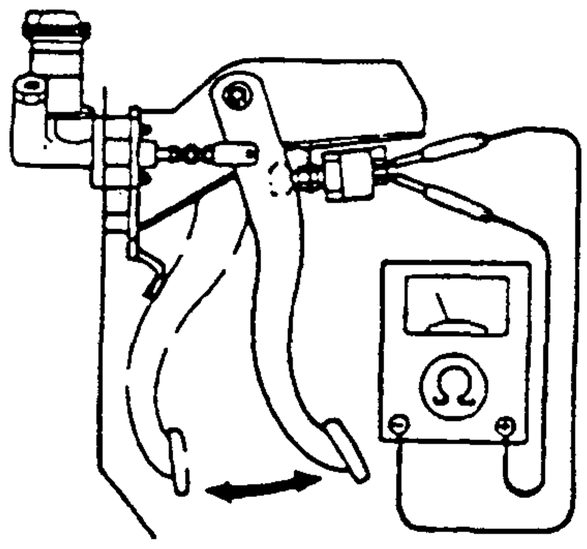
Condition	"CPP/PNP" operation
Other than neutral position and clutch pedal released	OFF
Neutral position and clutch pedal depressed	ON

5. Is not as specified, check the related harness and neutral switch continuity.
6. If okay, check for the clutch switch.

CLUTCH SWITCH INSPECTION

Not Using the SSTs (NGS)

1. Disconnect the clutch switch connector.
2. Check continuity of the switch by using an ohmmeter.



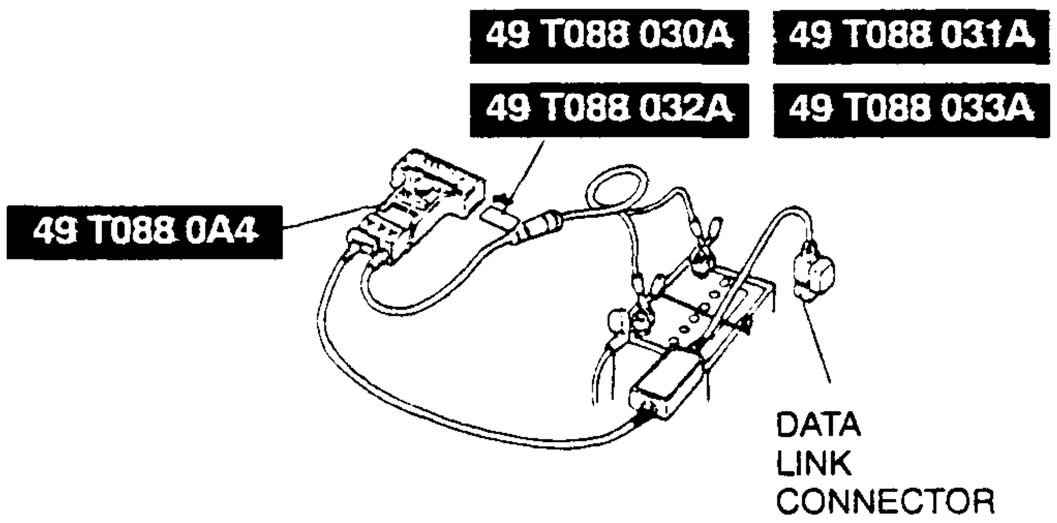
○—○ : Continuity

Condition	Terminal	
	A	B
Clutch pedal depressed	○	○
Clutch pedal released		

3. If not as specified, replace the clutch switch.

Using the SSTs (NGS)

1. Connect the **SSTs** (NGS) to the data link connector.



2. Turn the ignition switch to ON.
3. Select the "PID/DATA MONITOR AND RECORD" function on the NGS display.
4. Select the "CPP/PNP" on the NGS display and press START. The NGS display and press START. The NGS measures and shows the operation.

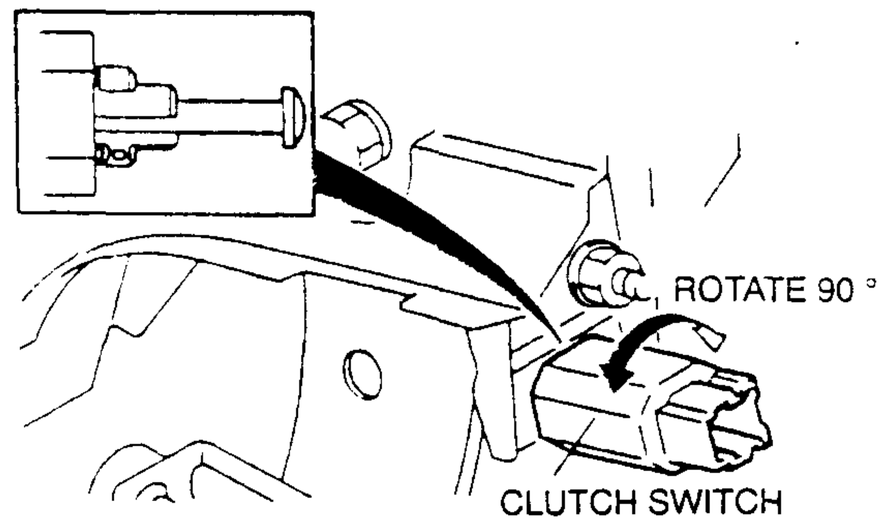
Specification

Condition	"CPP/PNP" operation
Other than neutral position and clutch pedal released	OFF
Neutral position and clutch pedal depressed	ON

5. Is not as specified, check the related harness and neutral switch continuity.
6. If okay, check for the clutch switch.

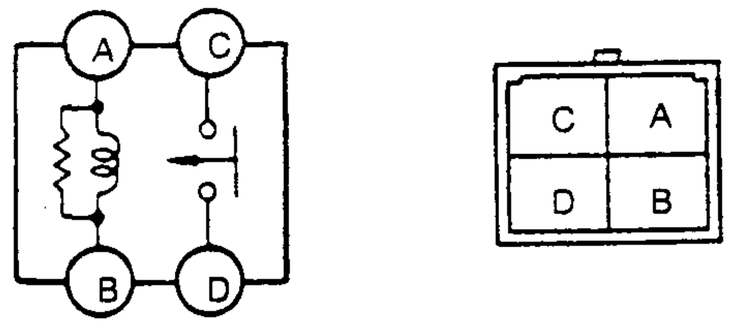
CLUTCH SWITCH REMOVAL/INSTALLATION

1. Disconnect the battery negative cable.
2. Disconnect the clutch switch connector.
3. Remove the clutch switch.
4. Install the clutch switch as shown in the figure.



MAIN RELAY INSPECTION

1. Remove the main relay.
2. Apply battery positive voltage and check continuity between terminals of the relay by using an ohmmeter.



○—○ : Continuity

Step	Terminal			
	A	B	C	D
1	○	○		
2	B+	GND	○	○

3. If not as specified, replace the main relay.

ON-BOARD DIAGNOSTIC SYSTEM

DESCRIPTION

Failure Detection Description

- Failure Detection Function is divided into three special tests: Key On Engine Off Self-Test, Key On Engine Running Self-Test and Continuous Memory DTC access. Failure Detection Function also provides a quick check of the powertrain control system and usually performed at the start of each diagnostic procedure and at the end of most troubleshooting for verification of repair and to ensure no other faults exist.

Failue Detection Description

- Diagnostic trouble code inspection is divided into three

Key ON Engine OFF (KOEO) Self-Test

- The Key On Engine Off is a functional test of powertrain control system performed on demand. A fault has to be present at the time of testing for Key On Engine Off Self-Test to detect the fault. When a fault is detected, a Diagnostic Trouble Code (DTC) will be output on the data link when requested by a NGS.

Key On Engine Running (KOER) Self-Test

- The Key On Engine On is a functional test of the powertrain control system performed on demand with the engine running and vehicle stopped. A check of the inputs and outputs is made during operating conditions and at normal temperature. A fault has to be present at the time of testing. When a fault is detected, a Diagnostic Trouble Code (DTC) will be output on the data link when requested by a NGS.

Continuous Memory DTC Access Self-Test

- The Continuous Memory DTC access is also a functional test of the powertrain control system. The Continuous Memory self-test is always active. The test consist of all the systems and components, and designed to detect failures contributing to drivability and emission concerns.

Parameter Identification (PID) Access

- The PID mode allows access to certain data values, analog and digital inputs and outputs, caluculated values, and system states information.

Brake On/Off Test

- On vehicle equipped with Brake On/Off (BOO) input, the brake pedal **MUST** be depressed and released after the Key On Engine Running self-test is initiated.

HOLD Switch Test (ATX only)

- On vehicles equipped with an HOLD switch, the switch **MUST** be cycled after the Key On Engine Running self-test is initiated.

Wiggle/Tap Test

- The wiggle/tap test is performed by the technician in an attempt to re-created an intermittent fault.

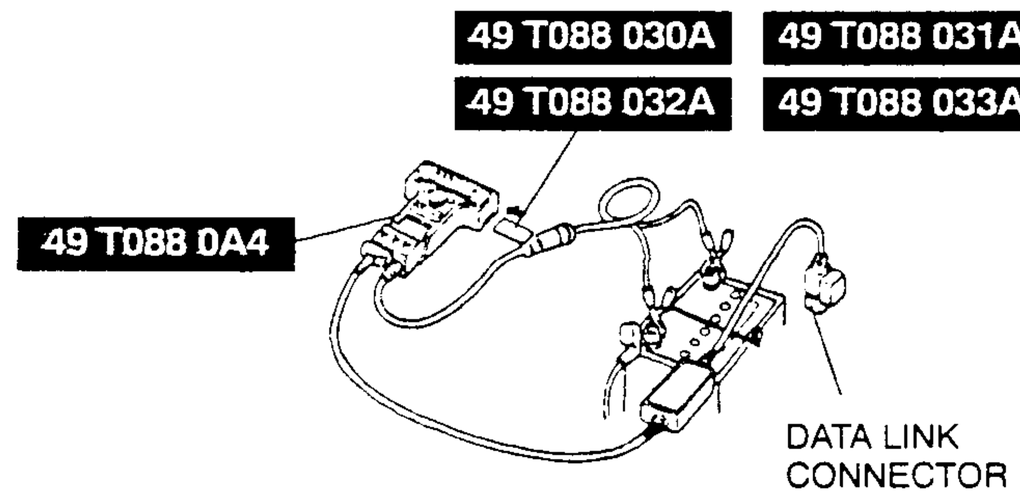
DIAGNOSTIC TROUBLE CODE INSPECTION

Key On Engine Off (KOEO) Inspection

Note

- Start the engine and bring up to operating temperature before running KOEO inspection.

1. Connect the **SSTs** (NGS) to the data link connector.



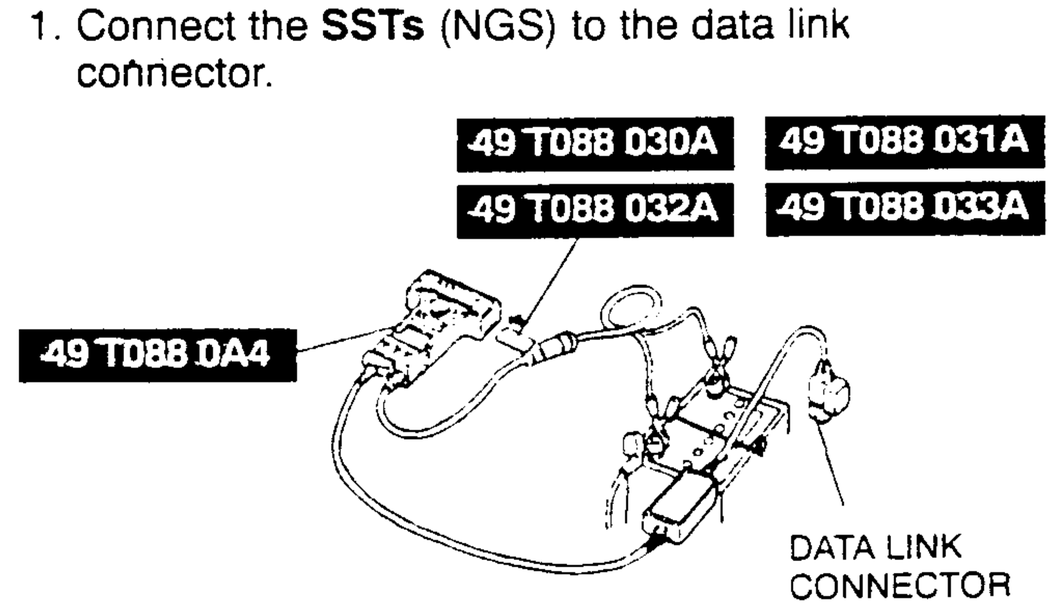
2. Select vehicle and engine selection.
3. Select diagnostic data link.
4. Select PCM.
5. Select diagnostic test mode.
6. Select key ON engine off on-demand self-test.
7. Turn key ON. Press trigger to start. Follow the operating procedures displayed on the NGS screen.

Key On Engine Running (KOER) Inspection

Note

- The brake pedal must be depressed and released after KOER is initiated. If not performed, DTC 1703 will be indicated on the NGS.
- On automatic transaxle-equipped vehicles, the HOLD switch must be cycled after KOER is initiated. If not performed, DTC 1780 will be indicated on the NGS.
- The steering wheel must be to turned to right and left after KOER is initiate. If not performed, DTC 1650 will be indicated on the NGS.
- Start the engine and bring up to normal operating temperature before running KOER inspection.

1. Connect the **SSTs** (NGS) to the data link connector.



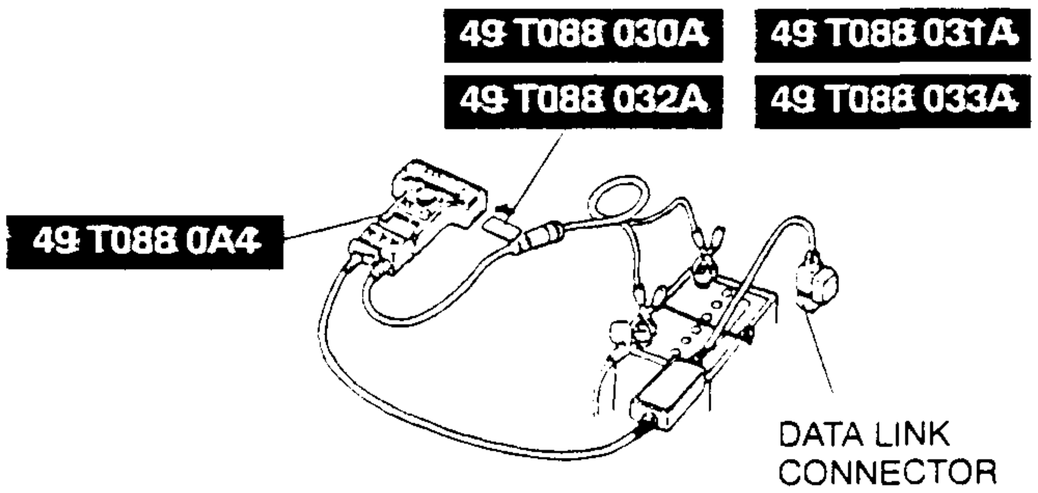
2. Select vehicle and engine selection.
3. Select diagnostic data link.
4. Select PCM.
5. Select diagnostic test mode.
6. Select Key ON Engine Running on-demand self-test.
7. Start the vehicle. Press trigger to start.
8. Follow the operating instructions from the NGS menu screen and perform BOO, PSP, and HOLD switch cycling.

Accessing All Continuous Memory DTCs Inspection

Note

- Start the engine and bring up to operation temperature before running Continuous memory DTCs inspection.

1. Connect the **SSTs** (NGS) to the data link connector.



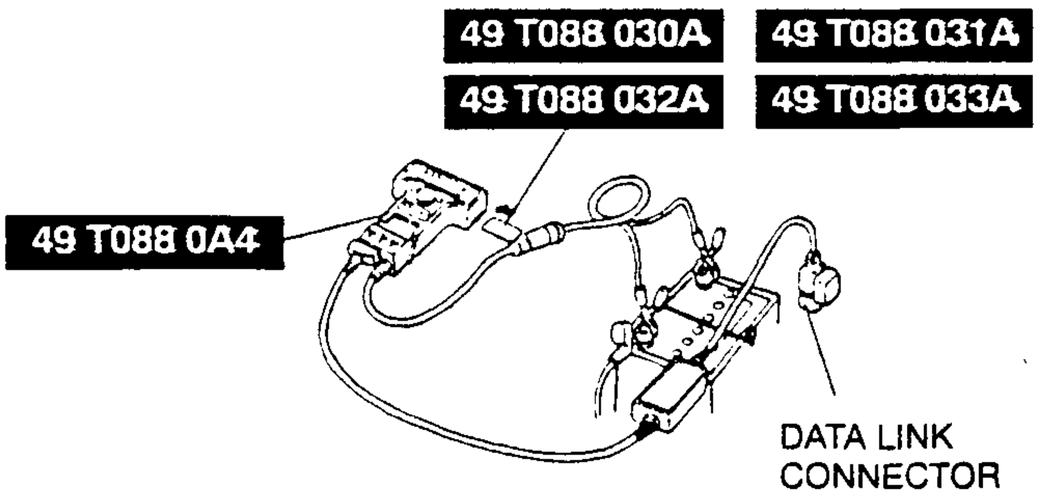
2. Select vehicle and engine selection.
3. Select diagnostic data link.
4. Select PCM.
5. Select diagnostic test mode.
6. Select Retrieve/Clear continuous DTCs.
7. Turn the key ON. Press trigger to start
8. Follow the operating instruction displayed on the NGS.

Output Control Test

Note

- Start the engine and bring up to normal operating temperature before running the Output Control Test.

1. Perform the necessary vehicle preparation and visual inspection. Connect the **SSTs** (NGS) to the data link connector.



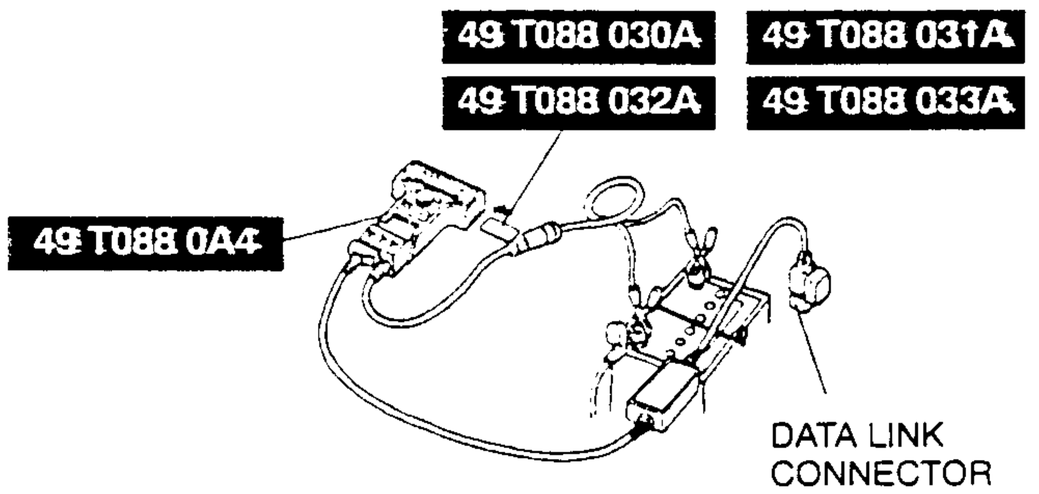
2. Select vehicle and engine selection.
3. Select diagnostic data link.
4. Select PCM
5. Select active tests.
6. Select output test mode.
7. Turn the key ON. Press start and trigger. Follow the operating instructions from the menu.

After Repair Procedure

Caution

- **Do not disconnect the battery to clear diagnostic trouble codes. This will erase the keep alive memory information which may cause a drivability concern.**
- **After repairing a failure, perform this procedure to verify that the fault has been corrected.**

1. Connect the **SSTs** (NGS) to the data link connector.



2. Select clear code function and clear the DTCs.
3. Perform the diagnostic trouble code inspection to ensure that the customer's concern has been resolved.

Diagnostic Trouble Code Table

Note

- DTCs that are not directly related to Mazda previous vehicles (ones not described in the Workshop Manual) may appear on the NGS screen. Please ensure that only DTCs described is Workshop Manual are used.

○: Applied

DTC	Displayed on the NGS	Diagnosed circuit	Condition	Test condition		
				KOEO	KOER	Continuous
0102	MAF/VAF-CIRCUIT LOW INPUT	Mass Air Flow (MAF) sensor	Circuit low input			○
0103	MAF/VAF-CIRCUIT HIGH INPUT		Circuit high input			○
0112	IAT-CIRCUIT LOW INPUT	Intake Air Temperature (IAT) sensor	Circuit low input	○	○	○
0113	IAT-CIRCUIT HIGH INPUT		Circuit high input	○	○	○
0117	ECT-CIRCUIT LOW INPUT	Engine Coolant Temperature (ECT) sensor	Circuit low input	○	○	○
0118	ECT-CIRCUIT HIGH INPUT		Circuit high input	○	○	○
0122	TP-CIRCUIT LOW INPUT	Throttle Position (TP) sensor	Circuit low input	○	○	○
0123	TP-CIRCUIT HIGH INPUT		Circuit high input	○	○	○
0125	EXCESSIVE TIME TO ENTER CLOSED LOOP	Engine Coolant Temperature (ECT) sensor	Insufficient coolant temperature to enter a closed loop fuel control		○	
0171	BANK 1-SYSTEM TOO LEAN	Adaptive fuel control system	Fuel adaptive system is at the lean correction limit.			○
0172	BANK 1-SYSTEM TOO RICH		Fuel adaptive system is at the rich correction limit.			○
0230	FP-PRIMARY CIRCUIT MALFUNCTION	Fuel pump	Fuel pump primary circuit malfunction	○		○
0320	IGN/DIST ENGINE SPEED-CKT MALFUNCTION	Ignition engine speed	Circuit malfunction			○
0325	KNOCK SENSOR 1-CIRCUIT MALFUNCTION	Knock sensor	Circuit malfunction		○	○
0326	KNOCK SENSOR 1-CIRCUIT RANGE/PERF		Circuit performance		○	○
0340	CAMSHAFT POS SENSOR-CKT MALFUNCTION	Camshaft Position (CMP) sensor	Circuit malfunction			○
0351	IGN COIL A CIRCUIT MALFUNCTION	Ignition coil	Ignition coil A primary circuit malfunction (No.1 and No.4 cylinder)			○
0352	IGN COIL B CIRCUIT MALFUNCTION		Ignition coil B primary circuit malfunction (No.2 and No.3 cylinder)			○
0500	VEHICLE SPEED SENSOR-MALFUNCTION	Vehicle Speed Sensor (VSS)	Sensor malfunction			○
0603	INTERNAL CONTROL MODULE KAM ERROR	ECM (PCM)	Keep alive memory (KAM) test error	○		
0605	INTERNAL CONTROL MODULE		Read only memory (ROM) test error	○		
0710*	TRANS FLUID TEMP SENS -CKT MALFUNCTION	Transaxle fluid temperatrue sensor	Open or short circuit			○
0715*	INPUT/TSS -CIRCUIT MALFUNCTION	Input/turbine speed sensor	No signal driving			○
0743*	TORQUE CONV CLUTCH SYS -ELECTRICAL	Torque converter clutch control solenoid valve	Open or short circuit			○
0745*	PRESSURE CTRL SOLENOID -MALFUNCTION	Pressure control solenoid	Open or short circuit			○

* : For ATX (Refer to section K)

DTC	Displayed on the NGS	Diagnosed circuit	Condition	Test condition		
				KOEO	KOER	Continuous
0750*	SHIFT SOLENOID A -MALFUNCTION	Shift solenoid A	Open or short circuit			○
0755*	SHIFT SOLENOID B -MALFUNCTION	Shift solenoid B	Open or short circuit			○
0760*	SHIFT SOLENOID C -MALFUNCTION	Shift solenoid C	Open or short circuit			○
1100	MAF SENSOR-INTERMITTENT	Mass Air Flow (MAF) sensor	Sensor intermittent			○
1101	MAF-OUT OF SELF TEST RANGE		Out of self-test range	○	○	
1112	IAT SENSOR-INTERMITTENT	Intake Air Temperature (IAT) sensor	Sensor intermittent			○
1117	ECT SENSOR-INTERMITTENT	Engine Coolant Temperature (ECT) sensor	Sensor intermittent			○
1120	TP-SENSOR OUT OF RANGE LOW	Throttle Position (TP) sensor	Out of range low	○	○	○
1125	TP-SENSOR INTERMITTENT		System intermittent			○
1130	HO2S11-ADAPTIVE FUEL AT LIMIT	Heated Oxygen Sensor (HO2S)	Fuel control system has reached its maximum compensation			○
1131	HO2S11-SENSOR INDICATES LEAN		A/F is correcting lean in extreme rich condition		○	○
1132	HO2S11-SENSOR INDICATES RICH		A/F is correcting rich in extereme lean condition		○	○
1221	TRACTION CONTROL SYSTEM MALFUNCTION	Traction Control System (TCS)	System malfunction			○
1250	R/P CONTROL SOLENOID SYSTEM	PRC solenoid valve	Circuit malfunction	○	○	
1409	EGR-CONTROL CIRCUIT MALFUNCTION	EGR valve	Stepping motor control circuit open or short			○
1474	FC-LOW FAN PRIMARY CKT MALFUNCTION	Cooling Fan Control system	Cooling control primary circuit malfunction	○	○	○
1500	VEHICLE SPEED SENSOR INTERMITTENT	Vehicle Speed Sensor (VSS)	Circuit intermittent			○
1504	IAC-CKT MALFUNCTION	Idle Air Control (IAC) system	Circuit intermittent			○
1602	IMMOBILIZER UNIT-ECM(PCM) COMM ERROR	Immobilizer system	Communication error			○
1603	ID NUMBER-UNREGISTERED		Key ID unregistered			○
1604	CODE WORD-UNREGISTERED		Code word unregistered			○
1621	CODE WORD-DO NOT MATCH		Code words don't match			○
1622	ID NUMBER-DO NOT MATCH		Key IDs don't match			○
1623	CODE WORD/ID NUMBER-WRITE/READ ERROR		Cord word/ID white error			○
1624	IMMOBILIZER COMMUNICATION COUNTER=0		ECM (PCM) is not recieved unlock signal from the immobilizer unit (ECM (PCM) is okay)			○

* : For ATX (Refer to section K)

DTC	Displayed on the NGS	Diagnosed circuit	Condition	Test condition		
				KOEO	KOER	Continuous
1631	GENERATOR-NO GENERATE ELECTRICITY	Generator control system	Low generator output voltage			○
1632	BATTERY VOLTAGE CIRCUIT -MALFUNCTION		Low battery positive voltage			○
1633	BATTERY VOLTAGE-OVER CHARGE		Battery overcharge			○
1634	GENERATOR BATTERY TERMINAL-OPEN		High generator output voltage and low battery positive voltage			○
1650	PSPS-OUT OF SELF TEST RANGE	Power Steering Pressure (PSP) switch	Out of self-test range	○	○	
1744*	TCC-SYSTEM PERFORMANCE	Torque converter clutch solenoid valve	Open or short circuit			○
1795*	TIMING SOLENOID SYSTEM	3—2 timing solenoid valve	Open or short circuit			○

* : For ATX (Refer to section K)

CODE No.	0102 (Continuous)
DESCRIPTION	• Diagnostic Trouble Code (DTC) 0102 indicates the MAF signal went below 0.39 volts sometime during normal engine operation

[Possible Cause]

- Damaged MAF sensor
- MAF sensor disconnected
- MAF circuit open
- VPWR circuit open
- PWR GND circuit open
- MAF RTN circuit open
- MAF circuit shorted to ground
- Air Intake Leak (near MAF sensor)
- Throttle Position (TP) system (possible closed throttle indication)
- Damaged ECM (PCM)

STEP	INSPECTION		ACTION
1	CHECK MAF SIGNAL LOW INPUT TO ECM (PCM) • Check broken/loose air outlet tube clamps (throttle body and air cleaner assembly ends), cracks/holes in air outlet tube, worn gaskets between MAF sensor and air cleaner assembly. Service as necessary. • Bonnet opened. • Start engine and bring to idle. • Run engine up 1,500 rpm for 5 seconds, then bring it back to idle. • Access MAF PID with the NGS. • **Is the MAF PID following?** **-FP engine : Approx. 1.9 Gm/sec** **-FS engine (MTX) : Approx. 2.0 Gm/sec** **-FS engine (ATX) : Approx. 2.2 Gm/sec**	Yes	The MAF SIG voltage is lower than acceptable minimum. Go to next step.
		No	Go to step 10.
2	CHECK VPWR CIRCUIT VOLTAGE • Key off. • Disconnect MAF sensor. • Key on, engine off. • Measure the voltage between VPWR circuit at the MAF sensor vehicle harness connector and the battery negative post. • **Is the voltage greater than 10.5 volts?**	Yes	VPWR harness circuit from CCRM to MAF sensor okay. Go to next step.
		No	Service open VPWR circuit. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Return diagnostic trouble code inspection
3	CHECK CONTINUITY OF VPWR CIRCUIT • Key off. • MAF sensor disconnected. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between VPWR circuit at the MAF sensor vehicle harness connector and terminal 71 or 97 (VPWR) at the ECM (PCM) vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	VPWR harness circuit to ECM (PCM) is okay. Go to next step.
		No	Service open VPWR harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Return diagnostic trouble code inspection
4	CHECK MAF CIRCUIT FOR SHORTS TO GROUND AND MAF RTN CIRCUIT • Key off. • MAF sensor disconnected. • ECM (PCM) disconnected. • Disconnect the NGS from Data Link Connector (DLC). • Measure the resistance between terminal 88 (MAF SIG) and terminal 36 (MAF RTN) and 24 or 103 (PWR GND) at the ECM (PCM) vehicle harness connector. • **Is each resistance greater than 10,000 ohms?**	Yes	MAF SIG, NAF RTN and GROUND harness circuits to ECM (PCM) are okay. Reconnect the NGS. Go to next step.
		No	Service short circuit between MAF SIG and GROUND or MAF RTN. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection

STEP	INSPECTION		ACTION
5	CHECK CONTINUITY OF MAF SIG CIRCUIT • Key off. • MAF sensor disconnected. • ECM (PCM) disconnected. • Measure resistance between MAF circuit at the MAF sensor vehicle harness connector and terminal 88 (MAF SIG) at the ECM (PCM) vehicle harnass connector. • **Is resistance less than 5.0 ohms?**	Yes	MAF SIG harness circuit to ECM (PCM) is okay. Go to next step.
		No	Serbice open in MAF SIG harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.
6	CHECK PWR GND CIRCUIT TO MAF SENSOR • Key off. • MAF sensor disconnected. • Key on, engine off. • Measure the voltage between VPWR circuit and PWR GND circuit at the MAF sensor vehicle harness connector. • **Is the voltage greater less than 10.5 volts?**	Yes	PWR GND harness circuit from battery negative post to MAF sensor is okay. Go to step 8.
		No	Go to next step.
7	CHECK PWR GND CIRCUIT CONTINUITY • Key off. • MAF sensor disconnected. • Disconnect ECM (PCM). • Disconnect the NGS from DLC. • Measure the resistance between PWR GND circuit at the MAF sensor vehicle harness connector and battery negative post. • **Is resistance less than 10 ohms?**	Yes	PWR GND harness circuit to MAF sensor is okay. Reconnect the NGS. Go to next step.
		No	Service open in PWR GND harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerum diagnostic trouble code inspection.
8	CHECK MAF RTN CIRCUIT CONTINUITY • Key off. • MAF sensor disconnected. • ECM (PCM) disconnected. • Measure the resistance between MAF RTN circuit at the MAF sensor vehicle harness connector and terminal 36 (MAF RTN) at the ECM (PCM) vehicle harness connector. • **Is the resistance less than 5.0 ohms?**	Yes	MAF RTN harness circuit to ECM (PCM) is okay. Go to next step.
		No	Service open in MAF RTN harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.
9	CHECK MAF CIRCUIT FOR SHORT TO GROUND IN ECM (PCM) • Key off. • MAF sensor disconnected. • ECM (PCM)disconnected. • Disconnec the NGS from DLC. • Measure the resistance between terminal 88 (MAF SIG) and terminals 36 (MAF RTN) and 24 or 103 (PWR GND) at the ECM (PCM) vehicle harnsss connector. • **Is each resistance greater than 10,000 ohms?**	Yes	Reconnec the NGS. Go to next step.
		No	MAF SIG short to PWR GND or MAF RTN in the ECM (PCM). Reconnect MAF sensor. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.
10	CHECK MAF SENSOR OUTPUT • Key off. • MAF sensor connected. • ECM (PCM) connected. • NGS connected. • Key on, engine running. **NOTE:** If a stabilized idle is not at least 700 rpm, go to TROUBLESHOOTING. • Open the bonnet. • Access MAF PID with the NGS. • **Is the MAF PID following?** **-FP engine : Approx. 1.9 Gm/sec** **-FS engine (MTX) : Approx. 2.0 Gm/sec** **-FS engine (ATX) : Approx. 2.2 Gm/sec**	Yes	MAF SIG to the ECM (PCM) is okay. Go to next step.
		No	MAF SIG or PWR GND is open in the MAF sensor, or MAF SIG is shorted to MAF RTN in the MAF sensor. Replace MAF sensor. Reconnect ECM (PCM). Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.

STEP	INSPECTION		ACTION
11	CHECK MAF CIRCUIT OUTPUT WITH NGS • Key off. • MAF sensor connected. • ECM (PCM) connected. • Key on, engine running. • Open the bonnet. • Access MAF PID with the NGS at idle. • **Is the MAF PID following?** **-FP engine : Approx. 1.9 Gm/sec** **-FS engine (MTX) : Approx. 2.0 Gm/sec** **-FS engine (ATX) : Approx. 2.2 Gm/sec**	Yes	Unable to identify fault at this time. Check possible intermittent. Go to SYMPTOM TROUBLESHOOTING No.28
		No	MAF SIG or MAF RTN is open or shorted together in the ECM (PCM). Replace ECM (PCM). Reconnect ECM (PCM). Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.

CODE No.	0103 (Continuous)		
DESCRIPTION	• DTC 0103 indicates that the Mass Air Flow (MAF) sensor signal went above 4.35 volts during normal engine operation		
[Possible Cause] • Blocked MAF sensor screen • Damaged MAF sensor • MAF SIG harness short to VPWR • Damaged ECM (PCM)			
STEP	**INSPECTION**		**ACTION**
1	CHECK MAF SIGNAL HIGH INPUT TO ECM (PCM) • Open the bonnet. • Start engine and bring to idle. • Run throttle up to 1,500 rpm for 5 seconds, and bring it back to idle. • Access MAF PID with the NGS. **NOTE:** MAF PID should be greater than 0.88 Gm/sec. • Key off. • Disconnect MAF sensor. • Jumper PWR GND nad SIG RTN pins at the MAF sensor vehicle harness connector. • Key on, engine running. • Again access MAF PID with the NGS. • **Did the MAF PID drop from the previous reading below 0.88 Gm/sec?**	Yes	MAF SIG shorted to VPWR in MAF sensor. Remove jumper. Replace MAF sensor. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Power short circuit, but not in MAF sensor. Remove jumper. Go to next step.
2	RERUN SELF-TEST WITH MAF SENSOR DISCONNECTED • Key off. • Disconnect MAF sensor. • Disconnect ECM (PCM). • Inspect for damage or pushed out pins, corrosion loose wires, etc. Service as necessary. • Key on, engine off. • Measure the voltage between terminal 88 (MAF SIG) and terminal 24 on 103 (PWR GND) at ECM (PCM) vehicle harness conector. • **Is the voltage greater than 10.5 volts?**	Yes	Service short between MAF SIG and Power (excluding VREF), in harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Go to next step.
3	CHECK MAF SIG FOR SHORT TO VPWR • Key off. • MAF sensor disconnected. • Disconnect the NGS from data link connector. • Measure resistance between terminal 88 (MAF SIG) and terminal 71 or 97 (VPWR) at the ECM (PCM) vehicle harness connector. • **Is resistance greater than 10,000 ohms?**	Yes	MAF SIG shorted to power in the ECM (PCM). Replace damaged ECM (PCM). Reconnect MAF sensor. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Service short between MAF SIG and VREF in harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.

NOTE: DTC 0103 could be generated by foreign material blocking the mass air flow sensor screen causing an air flow restriction. If contaminants are found on the screen, check air filter installation in air cleaner tray and proper sealing of air cleaner and air tube before proceeding. Rerun diagnostic trouble code inspection after repair.

CODE No.	0112, 0117 (Continuous)
DESCRIPTION	• DTC 0117 (ECT) or 0112 (IAT) indicates that the corresponding sensor's signal is less than the Self-Test minimum. The IAT and ECT sensor minimum is 0.2 volt 121°C {250°F}

[Possible Cause]
- Grounded circuit in harness
- Damaged ECM (PCM)
- Damaged sensor
- Improper harness connection

STEP	INSPECTION		ACTION
1	SIMULATE OPPOSITE SIGNAL TO ECM (PCM) • Key off. • Disconnect vehicle harness from suspect sensor. Inspect for damaged or pushed out pins or loose wires, etc. Service as necessary. • Key on. • **Is the ECT or IAT PID more than 4.2 volts (less than -40°C {-40°F})?**	Yes	Replace sensor. Reconnect harness. Rerun diagnostic trouble code inspection.
		No	Go to next step.
2	CHECK VREF CIRCUIT VOLTAGE AT THROTTLE POSITION SENSOR • Key off. • Suspect temperature sensor disconnected. • Disconnect TP sensor. • Key on, engine off. • Measure voltage between VREF circuit and SIG RTN circuit at the TP sensor vehicle harness connector. • **Is voltage between 4.5 volts and 5.5 volts?**	Yes	Reconnect TP sensor. Go to next step.
		No	Repair open in VREF circuit.
3	CHECK TEMPERATURE SENSOR SIGNAL CIRCUIT FOR SHORT TO GROUND • Key off. • Suspect temperature sensor disconnected. • Disconnect ECM (PCM) Inspect for damaged or pushed out pins, corrosion loose wires, etc. Service as necessary. • Leave ECM (PCM) disconnected. • Measure resistance between terminal 38 (ECT) or 39 (IAT) and terminals 24 and 103 at the ECM (PCM) vehicle harness connector. • **Is each resistance greater than 10,000 ohms?**	Yes	Replace ECM (PCM). Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Sensor short circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.

CODE No.	0112, 0113, 0117, 1117, 0118 (KOEO, KOER) 1112, (Continuous)
DESCRIPTION	• Diagnostic Trouble Codes (DTCs) 0112, 1112 or 0113 (IAT DTCs) and 0117, 1117 or 0118 (ECT DTCs) are not received during KOEO and KOER Self-Test, but are output during continuous Memory Self-Test and may be intermittent

[Possible Cause]
- Damaged IAT or ECT sensor
- Damaged harness
- Low coolant (ECT)
- Damaged harness connector
- Damaged ECM (PCM)

STEP	INSPECTION		ACTION
1	CHECK IAT AND ECT SIGNALS HIGH INPUT TO ECM (PCM) • Key off. • NGS connected. • Key on. • Monitor the ECT or IAT PID. • While observing the PID, perform the following: – Tap on the sensor to simulate road shock – Wiggle the sensor connector • **Is there any change in the temperature reading?**	Yes	Disconnect and Inspect connectors. If okay, Replace the sensor. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inapection.
		No	Go to next step.
2	CHECK ECM (PCM) VEHICLE HARNESS • Still monitoring PID. • While obsering the approprate PID, perform the following: – Hold the vehicle harness close to the sensor connector. Wiggle, shake and bend small section of wiring harness while working toward the ECM (PCM) • **Is there any damage in the temperature reading?**	Yes	Isolate fault. Service as necessary. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inapection.
		No	Go to next step.
3	CHECK ECM (PCM) AND VEHICLE HARNESS CONNECTORS. • Key off. • Disconnect ECM (PCM). • Disconnect sensor connector. • Inspect for damage, loose or pushed outpins, loose or poorly crimped wires. • **Are connectors and terminals okay?**	Yes	Fault is not present. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inapection.
		No	Service as necessary. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inapection.

CODE No.	0113, 0118 (Continuous)		
DESCRIPTION	• DTC 0118 (ECT) or 0113 (IAT) indicates that the corresponding sensor signal is greater than the Self-Test maximum. The maximum for ECT and IAT sensor is 4.6 volt or -50°C {-46°F}		
[Possible Cause] • Open in harness (IAT or ECT) • Damaged sensor • Improper harness connection • Damaged ECM (PCM)			
STEP	**INSPECTION**		**ACTION**
1	CHECK IAT AND ECT SIGNALS INPUT TO ECM (PCM) • Key off. • Disconnect suspect temperature sensor. • Connect a jumper wire between the sensor signal circuit and SIG RTN circuit at the temperature sensor vehicle harness connector. • NGS installed. • Key on. **NOTE:** If any NGS communication problem exists, remove jumper wire immediatery and go to Step 3 • Access ECT or IAT PID. • **Is the ECT or IAT PID less than 0.2 volts (greater than 120°C {248°F})?**	Yes	Replace suspect sensor. Remove jumper wire. Reconnect vehicle harness. Rerun diagnostic trouble code inspection.
		No	Remove jumper wire. Go to next step.
2	CHECK CONTINUITY OF SENSOR SIGNAL AND SIG RTN CIRCUITS • Key off. • Suspect temperature sensor disconnected. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wire, etc. Service as necessary. • Measure resistance between sensor signal circuit at the temperature sensor vehicle harness connector and Terminal 38 (ECT) or 39 (IAT) at the ECM (PCM) vehicle harness connector. • Measure resistance between SIG RTN circuit at the temperature sensor vehicle harness connector and terminal 91 (SIG RTN) at the ECM (PCM) vehicle harness connector. • **Is each resistance less than 5.0 ohms?**	Yes	Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.
		No	Service open circuit. Reconnect all components. Rerun diagnostic trouble code inspection.
3	CHECK FOR SENSOR SIGNAL SHORTED TO VREF • Key off. • Suspect temperature sensor disconnected. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between sensor signal circuit terminal 38 (ECT) or 39 (IAT) and VREF at the ECM (PCM) vehicle harness connctor. • **Is each resistance greater than 10,000 ohms?**	Yes	Replace ECM (PCM). Rerun diagnostic trouble code inspection.
		No	Locate and Repair short to VREF. Rerun diagnostic trouble code inspection.

CODE No.	0122 (Continuous, KOEO, KOER)
DESCRIPTION	• DTC 0122 indicates Throttle Position (TP) Sensor signal is less than the Self-Test minimum value of 3.43% (0.17 volts)

[Possible Cause]
- TP not seated properly (tightened down)
- Damaged TP sensor
- Open TP SIG or VREF harness
- TP SIG harness short to SIG RTN or PWR GND
- Damaged ECM (PCM)

STEP	INSPECTION		ACTION
1	DTC 0122 ATTEMPT TO GENERATE APPOSITE DTC 0123. • Key off. • Disconnect TP sensor. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Leave TP sensor disconnected. • Jumper VREF circuit to TP circuit at TP sensor vehicle harness connector. • Key on, engine off. **NOTE:** If any NGS communication problem exists, remove jumper and go directly Step 4 • Access TP pid (TP V) with the NGS. • Is the TP pid (TP V) greater than 92.27 % (4.79 V)? **Is DTC 0123 present (ignore all other DTC's)?**	Yes	TP SIG shorted to SIG RTN in TP sensor, or TP SIG or VREF open in TP sensor. Replace TP sensor. Remove jumper wire. Rerun diagnostic trouble code inspection.
		No	VREF or TP SIG open in harness or ECM (PCM) or TP SIG shorted to SIG RTN (or PWR GND) in harness or ECM (PCM). Remove jumper wire. Go to next step.
2	CHECK VREF CIRCUIT VOLTAGE. • Key off. • TP sensor disconnected. • Key on engine off. • Measure voltage between VREF circuit and SIG RTN circuit at the TP sensor vehicle harness connector. • **Is voltage between 4.0 and 6.0 volts?**	Yes	Go to next step.
		No	KEY off. Reconnect all components. Repair open in VREF circuit.
3	CHECK TP CIRCUIT CONTINUITY. • Key off. • TP sensor disconnected. • Disconnect ECM (PCM) inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between TP circuit at the TP sensor vehicle harness connector and terminal 89 (TP SIG) at the ECM (PCM) vehicle harness connector. • **Is the resistance less than 5.0 ohms?**	Yes	TP SIG harness circuit to ECM (PCM) is okay. Go to next step.
		No	Service open in TP SIG harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inapection.
4	CHECK TP CIRCUIT FOR SHORTS TO SIG RTN OR PWR GND. • Key off. • TP sensor disconnected. • ECM (PCM) disconnected. • Measure resistance between terminal 89 (TP SIG) and terminal 91 (SIG RTN) and 24 or 103 (PWR GND) at the ECM (PCM) vehicle harness connector. • **Is each resistance greater than 10,000 ohms?**	Yes	TP SIG open or shorted to SIG RTN (or PWR GND) in the ECM (PCM). Replace ECM (PCM). Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inapection
		No	Service TP SIG shorted to SIG RTN (or PWR GND) in the harness. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inapection

NOTE: An intermittant fault can cause a continuous memory DTC 0122. If a continuous memory DTC 0122 is still present after Step 1 through Step 4, go to CODE No. 1125.

CODE No.	0123 (Continuous, KOEO, KOER)
DESCRIPTION	• DTC 0123 indicates Throttle Position (TP) Sensor signal is greater than the Self-Test maximum value of 92.27% (4.79 volts)

[Possible Cause]

- TP seated properly (tightened down)
- Damaged TP sensor
- TP SIG harness short to VREF or VPWR
- VREF harness short to VPWR
- Open SIG RTN harness circuit
- Damaged ECM (PCM)

STEP	INSPECTION		ACTION
1	ATTEMPT TO GENERATE THE OPPOSITE THROTTLE POSITION ANGLE (VOLTAGE) PID READING • Key off. • Disconnect TP sensor. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Leave TP sensor disconnected. • Key on, engine off. • Access TP PID (TPV PID) with the NGS. • **Is the TP PID (TPV PID) less than 3.43% (0.17 volts)?**	Yes	TP SIG is either shorted to VREF in TP sensor or SIG RTN is open in the TP sensor or harness. Go to next step.
		No	TP SIG circuit is shorted to VREF or VPWR. Go to step 3.
2	CHECK VREF CIRCUIT VOLTAGE • Key off. • TP sensor disconnected. • Key on, engine off. • Measure voltage between VREF circuit and SIG RTN circuit at the TP sensor vehicle harness connector. • **Is voltage between 4.0 and 6.0 volts?**	Yes	TP SIG shorted to VREF on SIG RTN open in the TP sensor. Replace TP sensor. Rerun diagnostic trouble code inspection.
		No	KEY off. Reconnect all components. Repair open in VREF circuit.
3	CHECK TP SENSOR CIRCUIT FOR SHORTS TO POWER • Key off. • TP sensor disconnected. • Disconnect ECM (PCM), Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between terminal 89 (TP SIG) and terminal 90 (VREF) and 71 or 97 (VPWR) at the ECM (PCM) vehicle harness connector. • **Is each resistance greater than 10,000 ohms?**	Yes	TP SIG is shorted to VREF or VPWR in ECM (PCM). Replace ECM (PCM). Reconnect TP sensor. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Service Short circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.

NOTE: An intermittent fault can cause a Continuous Memory DTC 0123. If Continuous Memory DTC 0123 still present after Step 1 through Step 3, go to CODE No. 1120 or 1125.

CODE No.	0125 (KOER)		
DESCRIPTION	• DTC 0125 indicates the ECT sensor has not achieved the required temperature level to enter closed loop operating conditions within a specified amount of time after engine.		
[Possible Cause] • Insufficient warm up time • Leaky or stuck open thermostat • Low engine coolant level			
STEP	INSPECTION		ACTION
1	DTC 0125 INDICATES EXCESSIVE TIME TO ENTER CLOSED LOOP FUEL CONTROL • Check coolant level. • **Is the coolant level correct?**	Yes	Check the thermostat. ☞SECTION E, THERMOSTAT INSPECTION
		No	Fill to proper level. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic code inspection.

CODE No.	0171, 0172, 1130 (Continuous) 1131, 1132 (Contunuous, KOER)
DESCRIPTION	• DTC 0171 indicate the fuel/air ratio is too lean. The fuel adaptive system is at the rich correction limit • DTC 0172 indicate the fuel/air ratio is too rich. The fuel adaptive system is at the lean correction limit • DTC 1130 indicate the fuel control system has reached its maximum compensation for lean or rich condition and the HO2S is not switching • DTC 1131 indicate the fuel/air ratio is correcting rich for an overly lean condition. The HO2S voltage is less than 0.45 volts • DTC 1132 indicate the fuel/air ratio is correcting lean for an overly rich condition. The HO2S voltage is greater than 0.45 volts

[Possible Cause]

Fuel System
- Excessive fuel pressure
- Leaking fuel injector(s)
- Low fuel pressure
- Contaminated injector(s)

Base Engine
- Oil overfill
- Cam timing
- Cylinder compression
- Exhaust leaks before or near the HO2S's

Induction System
- Air leaks after the MAF sensor
- Vacuum leaks
- Restricted air inlet
- PCV system
- Fuel purge system
- Improperly seated Dipstick

EGR System
- Leaking gasket
- Stuck open EGR valve

STEP	INSPECTION		ACTION
1	VISUAL CHECKS: • Check air intake for leaks, obstructions, and damage. • Check air filter, air filter housing for blockage. • Verify integrity of the PCV system. • Check for vacuum leaks. • **Are there any of the above concerns?**	Yes	Repair as necessary. Rerun diagnostic trouble code inspection
		No	Go to next step.
2	INITIATE KOER SELF-TEST • Key off. • NGS connected. • Disconnect Fuel Vapor hose from intake manifold and plug fiting at intake manifold. • Start engine and run at 2,000 rpm for 1 minute and return to idle. • Enter Key On Engine Running (KOER) Self-Test. • **Are HO2S DTCs 1131 or 1132 present?**	Yes	Go to next step.
		No	**For DTC 0171, 0172, 1130:** Go to next step. **If DTC 1132 are no longer present:** Reconnect Fuel Vapor line. **All others:** The fault that produced the DTC is an intermittent. Intermittent poor connection or component malfunction (Repair or Replace as necessary). Go to SYMPTOM TROUBLESHOOTING No.28.
3	CHECK FUEL PRESSURE **Warning: The fuel system is pressurized when the engine is not running. To prevent injury or fire, use caution when working on the fuel system.** • Key off. • Install fuel pressure gauge. • Verify vacuum source to fuel pressure regulator. **If engine will start:** • Start engine and idle. Record fuel pressure. • Increase engine speed to 2,500 rpm and maintain for one minute. Record fuel pressure. **No Start:** • Cycle key on and off several times. Record fuel pressure. • ***Is the fuel pressure between 30—46 psi (210—310 kPa)?***	Yes	Fuel system is capable of required fuel pressure. *Go to next Step.*
		No	Fuel pressure out of specification.

<table>
<tr><th>STEP</th><th>INSPECTION</th><th></th><th>ACTION</th></tr>
<tr><td rowspan="2">4</td><td rowspan="2">CHECK SYSTEM ABILITY TO HOLD FUEL PRESSURE
• Fuel pressure gauge installed.
• Cycle key on and off several times.
• Verify there are no external leaks (repair as necessary).
• Does the fuel pressure remain within 5 psi (34 kPa) of the highest reading after one minute?</td><td>Yes</td><td>For DTCs 0171, 0172 and 1130: Go to next step.
For No starts: Go to step 6.
All other DTCs: Go to step 11.</td></tr>
<tr><td>No</td><td>Excessive pressure less.</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">CHECK SYSTEM ABILITY TO HOLD FUEL PRESSURE WITH KEY ON
• Fuel pressure gauge installed.
• Cycle key on then off several times.
• Turn key on and engine off, monitor fuel pressure gauge.
• Does the fuel pressure remain within 5 psi of the highest reading after 10 seconds?</td><td>Yes</td><td>For DTCs 0171 and 1130
Go to step 7.</td></tr>
<tr><td>No</td><td>For DTC 0172
Go to step 9.</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">CHECK ABILITY OF INJECTOR(S) TO DELIVER FUEL
• Pressure gauge installed.
• Cycle key several times.
• Monitor pressure gauge while cranking the engine for at least five seconds.
• Was there a pressure drop greater than 5 psi (34 kPa)?</td><td>Yes</td><td>The fuel and emission control systems are not the cause of the no start.
Remove the fuel pressure gauge.
Refer to TROUBLESHOOTING for further diagnosis.</td></tr>
<tr><td>No</td><td>Remove fuel pressure gauge.
Go to next step.</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">CHECK RESISTANCE OF INJECTOR(S) AND HARNESS
• Key off.
• Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary.

NOTE: This erases Continuous Memory DTCs.
NOTE: If a misfire DTC(s) are displayed with the Fuel Control DTC(s), use the misfire DTC(s) to determine the injector circuit(s) requiring testing.

• Measure resistance between suspect injector terminal(s) and terminal 71 or 97 at the ECM (PCM) vehicle harness connector using the chart below.
<table><tr><th>Cyl. No.</th><th>Terminal</th></tr><tr><td>1</td><td>75</td></tr><tr><td>2</td><td>101</td></tr><tr><td>3</td><td>74</td></tr><tr><td>4</td><td>100</td></tr></table>• Is the resistance between 11.0—18.0 ohms?</td><td>Yes</td><td>Fuel injector and harness resistance is okay.
Go to step 10.</td></tr>
<tr><td>No</td><td>Go to step.</td></tr>
</table>

STEP	INSPECTION		ACTION
8	CHECK CONTINUITY OF FUEL INJECTOR HARNESS • Key off. • ECM (PCM) disconnected. • Disconnect injector harness connector at the suspect injector. • Measure the resistance between terminal 71 or 97 at the ECM (PCM) vehicle harness connector and the VPWR pin at the injector harness connector. • Measure resistance between the Injector terminal(s) at the ECM (PCM) vehidle harness connector and the Injector Signal Pin at the injector connector. (Refer to chart in step 7 for Injector Pin location.) • **Is each resistance less than 5.0 ohms?**	Yes	Go to step.
		No	Service open harness circuit. Reconnect ECM (PCM) and fuel injectors. Rerun diagnostic trouble code inspection.
9	CHECK INJECTOR HARNESS CIRCUIT FOR SHORT TO POWER OR GROUND • Key off. • ECM (PCM) disconnected. • Suspect fuel injector harness disconnected. • Measure resistance between the Injector terminal(s) and teminal 71 or 97, 24, 76 and 103 at the ECM (PCM) vehicle harness connector (refer to chart in step 7). • Measure the resistance between the Injector terminal(s) at the ECM (PCM) vehicle harness connectior and chassis ground. • **Is each resistance greater than 10,000 ohms?**	Yes	Reconnect ECM (PCM). Go to next step.
		No	Service short circuit. Reconnect ECM (PCM) and all fuel injector(s). Rerun diagnostic trouble code inspection.
10	CHECK INJECTOR DRIVER SIGNAL • Key off. • Connect the NGS to data link connector. • Access the FUELPW1 PID. • Crank or start engine. • **Is FUELPW1 PID approx. 2.0—4.0 ms**	Yes	Go to next step.
		No	No light/Continuous bright light. Replae ECM (PCM). Remove engine signal monitor. Rerun diagnostic trouble code inspection.
11	FLOW TEST FUEL INJECTOR(S) • **Is the leakage and flow within specification?**	Yes	**DTCs 0171 and 0172:** The fault that produced the **DTC is an intermittent:** Intermittent poor connection or component malfunction (Repair or Replace as necessary). **DTC 1130:** Go to step 13. **All others:** Go to next step.
		No	Replace Fuel injector. Rerun diagnostic trouble code inspection.
12	CHECK CYLINDER COMPRESSION **NOTE:** Use the Misfire DTC(s) displayed on prior DTC retrieval to determine which cylinder(s) to check compression. • Check cylinder compression. ☞ SECTION B, COMPRESSION INSPECTION • **Are cylinder compression readings within specification?**	Yes	**For DTCs 1130 and 1131:** Go to next step. **For DTC 1132:** Go to step 19.
		No	Repair as necessary. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun daiagnostic trouble code inspection.

STEP	INSPECTION		ACTION
13	CHECK HO2S INTEGRITY DTC 1131 and/or 1130 indicate HO2S always lean, slow to switch, lack of switching or fuel at adaptive limit. Possible causes: – Moisture inside the HO2S harness connector resulting in a short to ground – HO2S coated with contaminates – HO2S circuit open – HO2S circuit shorted to ground • Key off. • Inspect HO2S harness for chafing, burned out wires or other damage and service. • Inspect HO2S and connector for indications of submersions in water, oil, coolant, etc., and service. • Run engine at 2,000 rpm for two minutes. • Key off. • Activate Key On Engine Running (KOER) Self-Test. • **Is DTC 1131 present?**	Yes	Go to next step.
		No	HO2S system is okay. Fuel delivery system is okay. Faults may have been repaired while doing inspection. Testing is complete at this time.
14	CHECK HO2S ABILITY TO GENERATE A VOLTAGE GREATER THAN 0.5 VOLT Any vacuum or air leaks in non-EEC areas could cause DTCs 1131 and 1130. Possible causes: – Leaking vacuum actuators – Engine sealing – EGR system – PCV system – Unmetered air leaks between throttle body and Mass Air Flow (MAF) sensor assembly – Silicone contaminated HO2S • Key off. • Disconnect the suspect HO2S from vehicle harness. • Connect circuit tester to the HO2S Signal and HO2S SIG RTN or HO2S GND at the HO2S sensor connector. • Circuit tester on 20 volt scale. • Run engine at 2,000 rpm for two minutes. • Rerun KOER Self-Test and monitor HO2S voltage. • **Does circuit tester indicate greater than 0.5 volt during or at the end of Self-Test?**	Yes	Go to next step.
		No	Replace HO2S. Rerun diagnostic trouble code inspection.
15	CHECK CONTINUITY OF HO2S AND HO2S GROUND CIRCUITS • Key off. • ECM (PCM) disconnected. • Disconnect suspect HO2S from harness. Inspect both ends of connetor for damaged or pushed out pins, moisture, corrosion, loose pins, etc., and service. • Measure the resistance between HO2S signal teminal at the ECM (PCM) vehicle harness connector and the HO2S vehicle harness connector. Use the Pin assignment below and record the reading. • Measure resistance between SIG RTN at the ECM (PCM) vehicle harness connector and HO2S SIG RTN vehicle harness connector. Record readings. – HO2S-11 SIG = 60 – HO2S SIG RTN = 91 **Is the resistance reading less than 5.0 ohms?**	Yes	Go to next step.
		No	Service open circuit. Reconnect ECM (PCM) and HO2S. Rerun diagnostic trauble code inspection.

STEP	INSPECTION		ACTION
16	CHECK HO2S CIRCUIT WIRING HARNESS FOR SHORT TO GROUND • Key off. • ECM (PCM) disconnected. • HO2S disconnected. • Measure resistance between the HO2S Signal terminal and terminals 24, 51, 76, 77 and 103 at the ECM (PCM) vehicle harnass connector. • **Is each resistance greater than 10,000 ohms?**	Yes	Go to next step.
		No	Service short circuit. Reconnect ECM (PCM) and HO2S. Rerun diagnostic trouble code inspection.
17	CHECK HO2S FOR SHORT TO GROUND • Key off. • ECM (PCM) disconnected. • HO2S connected. • Measure resistance between PWR GND/SIG RTN terminal and HO2S Signal terminal at the ECM (PCM) vehicle harness connector. HO2S-11 SIG = 60 HO2S PWR GND = 24, 76 and 103 HO2S SIG RTN = 91 • **Is reistance greater than 10,000 ohms?**	Yes	For DTCs 1130 Go to next step. For DTCs 1131 Go to step 23. For KOER DTCs 1131. Reconnect HO2S. Replace ECM (PCM).
		No	Replace HO2S. Reconnect ECM (PCM). Rerun diagnostic trouble code inspection.
18	CHECK FOR DTCS 1132 WITH 1130 • Key off. • NGS connected. • Activate Key On Engine Running (KOER) Self-Test. • **Is DTC 1132 present?**	Yes	Go to next step.
		No	The fault that produced the DTC is an intermittent. Intermittent poor connection or component malfunction (Repair or Replace as necessary). Go to SYMPTOM TROUBLESHOOTING No.28.
19	CHECK FOR HO2S SIGNAL SHORTED TO POWER Diagnostic Trouble Codes (DTCs) 1132 and/or 1130 indicate HO2S always rich. Possible causes: – Moisture inside the HO2S harness connector resulting in a short to power – HO2S circuit shorted to power – DTC 1130, 1132=HO2S-11 • Key on, engine off. • NGS connected. • Access the Parameter Identification (PID) for the DTC generated. **NOTE:** HO2S displayed as O2S on NGS. • **Is the voltage greater than 1.0 volt and less than 4.0 volts?**	Yes	An over voltage condition exists in the HO2S circuit. Go to next step.
		No	Go to step 22.
20	CHECK FOR SHORTS TO VOLTAGE SOURCE IN THE HARNESS CIRCUIT • Key off. • Disconnect NGS from DLC. • Suspect sensor disconnected. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Use the following list to measure the resistance between the appropriate terminals at the breakout box. – DTC 1130, 1132=HO2S-11 terminal 60 and terminals 71, 93 and 97 • **Is the resistance greater than 10,000 ohms?**	Yes	Reconnect ECM (PCM). Go to next step.
		No	Repair short to power. Reconnect all components. Rerun diagnostic trouble code inspection.

STEP	INSPECTION		ACTION
21	CHECK FOR HO2S SIGNAL SHORTED TO HO2S HEATER CIRCUIT IN THE SENSOR • Key off. • Suspect HO2S sensor disconnected. • NGS connected. • Key on, engine off. • Access HO2S PID corresponding to DTCs received. **NOTE:** HO2S displayed as O2S on NGS. • **Is the HO2S voltage less than 0.2 volt?**	Yes	Replace HO2S. Reconnect all components. Rerun diagnostic trouble code inspection.
		No	Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.
22	ATTEMPT TO GENERATE DTC 1131 • Key off. • HO2S disconnected. • Jumper HO2S Signal at the HO2S harness vehicle connector to the battery negative post. • Activate Key On Engine Running (KOER) Self-Test. • **Is DTC 1131 present?**	Yes	Remove jumper. Go to next step.
		No	Remove jumper. Reconnect HO2S. Disconnect ECM (PCM). Inspect both ends of connector for damaged or pushed out pins, moisture, corrosion, loose pins, etc. And service as necessary. If okay, replace ECM (PCM). Rerun KOER Self-Test.
23	HO2S CHECK • Key off. • Suspect HO2S disconnected. • Connect circuit tester to HO2S Signal circuit and HO2S SIG RTN at the HO2s sensor connector. • Circuit tester on 20 volt scale. • Disconnect vacuum hose from vacuum tree. • Start engine and run at 2,000 rpm. • **Does the circuit tester indicate less than 0.4 volt within 30 seconds?**	Yes	Reconnect vacuum hose and HO2S. Go to next step.
		No	Replace HO2S. Reconnect vacuum hose. Rerun diagnostic trouble code inspection.
24	MONITOR HO2S (PID) FOR NORMAL SWITCHING • Key on, engine running. • Engine at operating temperature. • Access suspect HO2S PID using NGS. **NOTE:** HO2S displayed as O2S on NGS. • Access HO2S PID while wiggling, bending, and shaking small sections of the ECM (PCM) harness from the ECM (PCM) to the HO2S. • **Did the HO2S voltage stay high (greater than 0.45 volt) or low (less than 0.45 volt)?**	Yes	Isolate cause of lack of HO2S switches and service. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Go to next step.
25	TEST DRIVE WHILE MONITORING HO2S PID FOR NORMAL SWITCHING **NOTE:** This test step requires an observer to monitor PID for proper operation. • NGS still attached. • Access HO2S PID. • While observer views PID, test drive vehicle under different road conditions in an attempt to simulate the original fault. • **Does HO2S appear to switch properly?**	Yes	Unable to duplicate fault. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Testing complete at this time.
		No	Replace HO2S. Reset the ECM (PCM) to completely clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.

CODE No.	0230 (KOEO)		
DESCRIPTION	• DTC 0230 indicates a fuel pump circuit failure		
[Possible Cause] • Damaged Fuel Pump Relay (FPR) • Damaged ECM (PCM) • Open or shorted circuit in Fuel Pump circut (ECM (PCM) terminal 80 (without immobilizer) , 70 (with immobilizer))			
STEP	**INSPECTION**		**ACTION**
1	CHECK FOR VPWR TO FPR • Disconnect the FPR. • Key on, engine off. • Measure voltage between VPWR circuit at the FPR vehicle harness connector and chassis ground. • **Is voltage greater than 10.5 volts?**	Yes	Go to next step.
		No	Service open in VPWR circuit between the ignition switch and the FPR. Reconnect the FPR. Rerun diagnostic trougle code inspection.
2	CHECK FPR • **Is FPR okay?**	Yes	Go to next step.
		No	Replace FPR. Rerun diagnostic trougle code inspection.
3	CHECK FUEL PUMP CIRCUIT FOR SHORT TO POWER • Key off. • FPR disconnected. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Key on, engine off. • Measure voltage between terminal 80 (FP) (without immobilizer) or 70 (FP) (with immobilizer) at the ECM (PCM) vehicle harness connector and chassis ground. • **Is voltage less than 1.0 volt?**	Yes	Go to next step.
		No	Service short to power. Reconnect all components. Rerun diagnostic trougle code inspection.
4	CHECK FUEL PUMP CIRCUIT FOR SHORT TO GROUND • Key off. • Disconnect NGS from DLC. • ECM (PCM) disconnected. • FPR disconnected. • Measure resistance between terminal 80 (without immobillzer) or 70 (FP) (with immobilizer) and terminal 51 or 103 (PWR GND) and 91 (SIG RTN) at the ECM (PCM) vehicle harness connector. • **Is resistance greater than 10,000 ohms?**	Yes	Go to next step.
		No	Service short circuit. Reconnect all components. Rerun diagnostic trougle code inspection.
5	CHECK FUEL PUMP CIRCUIT CONTINUITY • Key off. • ECM (PCM) disconnected. • FPR disconnected. • Measure resistance between Fuel Pump circuit at the FPR vehicle harness connector and terminal 80 (without immobilizer) or 70 (with immobilizer) at the ECM (PCM) vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.
		No	Service open circuit. Reconnect all components. Rerun diagnostic trouble code inspection.

NOTE: FP terminal is 80 (without immobilizer) or 70 (with immobilizer).

CODE No.	0230 (Continuous)		
DESCRIPTION	• DTC 0230 indicates a fuel pump circuit failure has occurred during vehicle operation		
[Possible Cause] • Open in VPWR to FPR • Open coil in FPR • Open in Fuel Pump circuit (ECM (PCM) terminal 80 (without immobilizer), 70 (with immobilizer))			
STEP	**INSPECTION**		**ACTION**
1	CHECK ECM (PCM) HARNESS • NGS connected. • Key on, engine off. Wait 5 seconds. • Access FPF PID. The FPF PID will be off, indicating that the ECM (PCM) detects VPWR voltage through the FPR coil and FP circuit (Pin 80) to the ECM (PCM). • Observe the FPF PID for an indication of a fault while performing the following (the FPF PID will turn on, when an open is detected (this is because the ECM (PCM) will not detect VPWR voltage on terminal 80 (without immobilizer), 70 (with immobilizer) (FP))): – Shake, wiggle, bend the fuel pump circuit between the ECM (PCM) terminal 80 (without immobilizer), 70 (with immobilizer) and the FPR – Shake, wiggle, bend the VPWR circuit between the ignition switch and the FPR – Lightly tap the FPR (to simulate road shock) • Key off. • Inspect the ECM (PCM) and FPR connectors for corrosion, damaged pins, etc. • **Is a fault indicated?**	Yes	Isolate fault and service as necessary. Go to SYMPTOM TROUBLESHOOTING No.28. Reset the ECM (PCM) to completer clear the DTCs. ☞ After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Repair open in VREF circuit. ☞ Reference Voltage Test

NOTE: FP terminal is 80 (without immobilizer) or 70 (with immobilizer).

CODE No.	0320 (Continuous)
DESCRIPTION	• Two succesive Profile Ignition Pickup (PIP) pulses occurred resulting in an engine miss fire or stall

[Possible Cause]
- Loose wires/connectors
- Arching secondary ignition components
- On-board transmitter (2-way radio)

STEP	INSPECTION		ACTION
1	CHECK FOLLOWING COMPONENTS – Loose wires/connectors. – Arcing secondary ignition components (coil, wires, plugs, etc.). – On-board transmitter (2-way radio). • **Are any of the above present? Verify all 2-way radio installation instructions regarding the routing of antenna and power lead.**	Yes	Service as necessary. Rerun diagnostic trouble code inspection.
		No	**For No Starts:** Go to SYMPTOM TROUBLESHOOTING No.5. **For Intermittent faults:** Go to SYMPTOM TROUBLESHOOTING No.28. **All others:** Loss of PIP. Replace ECM (PCM).

CODE No.	0325,0326 (Continuous, KOER)
DESCRIPTION	• DTC 0325 indicates spark knock system failed. • DTC 0326 indicates spark knock has not been sensed.

[Possible Cause]
- ECM(PCM) not receiving the signal at high altitude
- Open or short in harness
- Damaged knock sensor
- Damaged ECM (PCM)

STEP	INSPECTION		ACTION
1	CHECK SENSOR VOLTAGE • Key off. • Disconnect ECM (PCM). Inspect for damage or pushed out pins, corrosion and loose wires. Service as necessary. • Key on. • Read DC voltage between terminal 57 at the ECM (PCM) vehicle harness connector and ground. • **Is the reading between 2.2 and 2.6 volts?**	Yes	Go to next step
		No	**Less than 2.2 volts:** Go to step 4. **Greater than 2.6 volts:** Go to step 6.
2	CHECK FOR INTERMITTENT CIRCUIT FAULT • Key on. • While viewing the voltmeter, grasp the vehicle harness as close to the knock sensor as possible. Shake and bend a small section of the harness from the knock sensor to ECM (PCM). • Tap the ECM (PCM) and knock sensor connectors if possible. • **Is knock sensor reading changing?**	Yes	Isolate fault and service as required. Reconnect ECM (PCM). Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Go to next step
3	CHECK FOR VOLTAGE INCREASE • Key off. • ECM(PCM) connected. • Disconnect NGS. • Start and run engine. • Monitor voltage on AC setting at idle and at 3,000 rpm between suspect knock sensor and ground. • **Does the AC voltage reading increase?**	Yes	Replace ECM(PCM). Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Go to next step
4	CHECK RESISTANCE OF KNOCK SENSOR CIRCUIT • Key off. • ECM(PCM) disconnected. • Disconnect knock sensor. • Measure resistance of the knock sensor signal circuit between terminal A at the knock sensor vehicle harness connector and terminal 57 at the ECM(PCM) vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	Go to next step.
		No	Service open circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
5	CHECK KNOCK SENSOR CIRCUIT SHORT TO GROUND • Key off. • ECM(PCM) disconnected. • Measure resistance between terminal 57 at the ECM(PCM) vehicle harness connector and ground. • **Is resistance greater than 10,000 ohms?**	Yes	Replace knock sensor. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Service short circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.

STEP	INSPECTION		ACTION
6	CHECK KNOCK SENSOR CIRCUIT SHORT TO POWER • Key off. • ECM(PCM) disconnected. • Knock sensor disconnected. • Key on, engine off. • Measure voltage between terminals 57 and 77/103 (PWR GND) at the ECM(PCM) vehicle harness connector. • **Is voltage less than 0.5 volts?**	Yes	Replce ECM(PCM). Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Service short to ground. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
7	CHECK RESISTANCE OF KNOCK SENSOR • Key off. • ECM(PCM) disconnected. • Knock sensor connected. • Measure resistance between terminal 57 at the ECM(PCM) vehicle harness connector and ground. • **Is resistance greater than 5.11 megaohms?**	Yes	Replce knock sensor. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Replce ECM(PCM). Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.

CODE No.	0340 (Continuous)		
DESCRIPTION	• DTC 0340 indicates that Self-Test has detected a Camshaft Position (CMP) sensor circuit failure		
[Possible Cause] • Camshaft Position (CMP) Sensor circuit open • Camshaft Position (CMP) Sensor circuit shorted to GND • Camshaft Position (CMP) Sensor circuit shorted to PWR • PWR GND open • VPWR open • Damaged CMP Sensor • Damaged ECM (PCM)			
STEP	**INSPECTION**		**ACTION**
1	START ENGINE • Start engine. • **Will the engine start?**	Yes	Go to next step
		No	DTC 0340 is not the cause of no start. Go to No start symptom.
2	CLEAR AND ATTEMPT TO RE-GENERATE DTC 0340 • Complete ECM (PCM) Reset to clear DTCs. • Start engine. • Increase rpm to greater than 1,500 rpm for 10 seconds. Repeat two times. • Key off. • Retrieve all Continuous Memory DTCs. • **Is DTC 0340 present?**	Yes	Go to next step
		No	The fault that produced DTC 0340 is intermittent. Intermittent poor connection or component malfunction (Repair or replace as necessary). Go to SYMPTOM TROUBLESHOOTING No.28.
3	CHECK VPWR TO CAMSHAFT POSITION (CMP) SENSOR • Key off. • Disconnect CMP sensor vehicle harness connector. • Key on, engine off. • Measure voltage between VPWR circuit at the CMP vehicle harness connector and battery negative post. • **Is voltage greater than 10.5 volts?**	Yes	Go to next step
		No	Service open in VPWR circuit. Reconnect all components. Complete ECM (PCM). Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
4	CHECK PWR GND TO CAMSHAFT POSITION (CMP) SENSOR • Key off. • CMP sensor disconnected. • Measure resistance between PWR GND circuit at the CMP vehicle harness connector and battery negative post. • **Is resistance less than 5.0 ohms?**	Yes	Go to next step.
		No	Service open in PWR GND circuit. Complete ECM (PCM). Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
5	CHECK CONTINUITY TO ECM (PCM) • Key off. • CMP sensor vehicle harness connector disconnected. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between CID circuit at the CMP vehicle harness connector and terminal 85 (CID) at the ECM (PCM) vehicle harness connector. • **Are resistance measurements less than 5.0 ohms?**	Yes	Go to next step.
		No	Service open circuit. Reconnect all components. Rerun diagnostic trouble code inspection.
6	CHECK CID FOR SHORT TO POWER • Key off. • CMP sensor disconnected. • ECM (PCM) disconnected. • Key on, engine off. • Measure voltage between terminals 85, 8 (CID) and terminals 51 and 103 (PWR GND) at the ECM (PCM) vehicle harness connector. • **Is voltage less than 1.0 volt?**	Yes	Go to next step.
		No	Service CID circuit for short to power. Reconnect all components. Rerun diagnostic trouble code inspection.

7	CHECK CID FOR SHORT TO GND • Key off. • ECM (PCM) disconnected. • CMP sensor disconnected. • Disconnect the NGS from DLC. • Measure resistance between terminals 85, 8 (CID) and terminals 51, 103 (PWR GND) and 91 (SIG RTN). • **Is each resistance greater than 10,000 ohms?**	Yes	Go to next step.
		No	Service CID circuit for short to GND or SIG RTN. Reconnect all components. Rerun diagnostic trouble code inspection.
8	CHECK FOR SHORTS IN ECM (PCM) • Key off. • CMP sensor disconnected. • Measure resistance between CMP sensor terminals A, B at the vehicle harness connector and ground. • **Is each resistance greater than 500 ohms?**	Yes	Replace CMP sensor. Reconnect all components. Rerun diagnostic trouble code inspection.
		No	Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.

CODE No.	0351,0352 (Continuous)		
DESCRIPTION	• DTC 0351 indicates ignition coil No. 1 primary circuit malfunction • DTC 0352 indicates ignition coil No. 2 primary circuit malfunction		
[Possible Cause] • Damaged ignition coil • Damaged ECM (PCM) • Open or short circuit IGT1 signal circuit • Open or short circuit IGT2 signal circuit			
STEP	**INSPECTION**		**ACTION**
1	CHECK FOR SPARK DURING CRANK **Note**: Electronic ignition engine timing is entirely controlled by the ECM (PCM). Electronic ignition engine timing is not adjustable. Do not attempt to check base timing. You will receive false readings • When using timing light, place grooved end as close as possible to plug boot. • Veary weak or no flashing may be caused by fouled plug • **Is spark consistent on all high-tension leads (one spark per crankshaft revolution)?**	Yes	Ignition system is okay. Check other system
		No	Spark fault. Go to next step.
2	CHECK SPARK PLUGS AND WIRES • Key off. • Check high-tension leads for insulation damage, looseness, strong or other damage. • Remove and check spark plugs for damage, wear, carbon deposits and proper plug gap. • Examine all wiring harness and connectors for damaged, burned or overheated insulation, damaged pins, and loose or broken conditions. • **Are spark plugs and leads okay?**	Yes	Reinstall plugs and leads. Go to next step.
		No	Repair or replace damaged component. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
3	CHECK FOR COIL PWR AT COIL • Key off. • Disconnect ignition coil. Inspect for damaged or pushed out pins, corrosion and loose wires. Service as necessary. • Key on, engine off. • Measure voltage between terminal B at the ignition coil vehicle harness connector and chassis ground. • **Is voltage greater than 10.5 volts?**	Yes	Go to next step.
		No	COIL PWR circuit is open. Check connectors, service or replace harness. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
4	CHECK FOR IGT1 HIGH AT COIL PACK • Key off. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion and loose wires. Service as necessary. • Key on, engine off. • Measure voltage between terminal 26 at the ECM (PCM) vehicle harness connector and chassis ground. • **Is the voltage greater than 10.5 volts?**	Yes	Go to next step.
		No	IGT1 low fault. Go to step 12.
5	CHECK FOR IGT2 HIGH AT COIL PACK • Key off. • ECM (PCM) disconnected. • Key on, engine off. • Measure voltage between terminal 52 at the ECM (PCM) vehicle harness connector and chassis ground. • **Is the voltage greater than 10.5 volts?**	Yes	Go to next step.
		No	IGT2 low fault. Go to step 14.

STEP	INSPECTION		ACTION
6	CHECK FOR IGT1 HIGH AT ECM(PCM) • Key off. • Install engine signal monitor and reconnect ECM (PCM) connector. • Key on, engine off. • Measure the voltage terminal 26 at the ECM (PCM). • **s the voltage greater than 10.5 volts?**	Yes	Go to next step.
		No	IGT1 is open. Check connectors, service or replace harness. Remove all test equipment. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
7	CHECK FOR IGT2 HIGH AT ECM(PCM) • Key off. • Engine signal monitor installed. • ECM (PCM) connected. • Key on, engine off. • Measure the voltage terminal 52 at the ECM (PCM). • **Is the voltage greater than 10.5 volts?**	Yes	Go to next step.
		No	IGT2 is open. Check connectors, service or replace harness. Remove all test equipment. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
8	CHECK FOR IGT1 LOW AT COIL CONNECTOR • Key off. • Disconnect ignition coil. • Key on, engine off. • Measure voltage between terminal C and B at the ignition coil vehicle harness connector. • **Is voltage greater than 0.5 volts?**	Yes	Go to next step.
		No	IGT1 high fault. Go to step 16.
9	CHECK FOR IGT1 LOW AT COIL CONNECTOR • Key off. • Ignition coil disconnected. • Key on, engine off. • Measure voltage between terminal A and B at the ignition coil vehicle harness connector. • **Is voltage greater than 0.5 volts?**	Yes	Go to next step.
		No	IGT2 high fault. Go to step 17.
10	CHECK IGT1 COIL CONNECTOR WHILE CRANKING ENGINE • Connect the timing light to the high-tension lead at the No.1 or No.4 cylinder. • Crank the engine. • **Are each spark consistent on high-tension leads (one spark per crankshaft revolution)?**	Yes	Go to next step.
		No	IGT1 open. Replace ECM (PCM). Remove timing light. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
11	IGT2 COIL CONNECTOR WHILE CRANKING ENGINE • Connect the timing light to the high-tension lead at the No.2 or No.3 cylinder. • Crank the engine. • **Are each spark consistent on high-tension leads (one spark per crankshaft revolution)?**	Yes	Input to ignition coil is okay, but no high voltage output. Replace ignition coil. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	IGT1 open. Replace ECM (PCM). Remove timing light. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
12	CHECK FOR IGT1 OPEN • Key off. • Disconnect ignition coil. • Measure resistance between terminal C and B at the ignition coil vehicle harness connector. • **Is resistance greater than 2,000 ohms?**	Yes	IGT1 open in the igniton coil. Replace igntion coil. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Go to next step.

STEP	INSPECTION		ACTION
13	CHECK FOR IGT1 SHORT LOW • Key off. • Disconnect ECM (PCM) from vehicle harness connector. • Measure the resistance between terminal 26 at the ECM (PCM) vehicle harness connector and terminal C at the ignition coil vehicle harness connector. • **Is resistance greater than 10,000 ohm?**	Yes	IGT1 is shorted in ECM (PCM). Replace ECM (PCM). Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	IGT1 is shorted low. Check connectors, service or replace harness. **Note**: A IGT1 short to ground may have damaged the ignition coil. Remove all test component. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
14	CHECK FOR IGT2 SHORT LOW • Key off. • Disconnect ignition coil. • Measure resistance between terminal A and B at the ignition coil vehicle harness connector. • **Is resistance greater than 2,000 ohms?**	Yes	IGT2 open in ignition coil. Replace igniiotn coil. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Go to next step.
15	CHECK IGT2 LOW • Key off. • Disconnect ECM (PCM) from vehicle harness connector. • Measure the resistance between terminal 52 at the ECM (PCM) vehicle harness connector and terminal C at the ignition coil vehicle harness connector. • **Is resistance greater than 10,000 ohm?**	Yes	IGT2 is shorted in ECM (PCM). Replace ECM (PCM). Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	IGT2 is shorted low. Check connectors, service or replace harness. **Note**: A IGT2 short to ground may have damaged the ignition coil. Remove all test component. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
16	CHECK FOR IGT1 HIGH • Key off. • Disconnect ECM (PCM) from vehicle harness connector. • Key on, engine off. • Measure the voltage voltage between terminal C and B at the ignition coil vehicle harness connector. • **Is voltage less than 0.5 volts?**	Yes	IGT1 is shorted high. Replace ECM (PCM). Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	IGT1 is shorted high. Check connector, service or replace harness. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.

STEP	INSPECTION		ACTION
17	CHECK FOR IGT2 HIGH • Key off. • Disconnect ECM (PCM) from vehicle harness connector. • Key on, engine off. • Measure the voltage voltage between terminal A and B at the ignition coil vehicle harness connector. • **Is voltage less than 0.5 volts?**	Yes	IGT2 is shorted high. Replace ECM (PCM). Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	IGT2 is shorted high. *Check connector, service or replace harness.* Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.

CODE No.	0500 (Continuous)		
DESCRIPTION	• DTC 0500 indicates the VSS input signal has been detected out of Self-Test range		
[Possible Cause] • Damaged VSS • Damaged ECM (PCM) • Open in VSS harness circuit • *Short to GND in VSS harness circuit* • Short to PWR			
STEP	INSPECTION		ACTION
1	CHECK CONTINUITY OF VSS HARNESS CIRCUIT • Key off. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Disconnect VSS. • Measure resistance between terminal 58 at the ECM (PCM) vehicle harness connector and VSS circuit at VSS vehicle harness connector. • **Is each resistance less than 5.0 ohms?**	Yes	Go to next step.
		No	Service open in harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Run VSS to verify repair.
2	CHECK VSS HARNESS CIRCUITS FOR SHORTS TO SIG RTN AND GROUND • Key off. • VSS disconnected. • ECM (PCM) disconnected. • Measure resistance between terminal 58 and terminal 51, 103, 91 and 71 at ECM (PCM) vehicle harness connector. • **Is each resistance greater than 500 ohms?**	Yes	Go to next step.
		No	Service short circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Run VSS verify the repair.
3	CHECK VSS RESISTANCE • Key off. • VSS disconnected. • Measure the resistance of the VSS. • **Is resistance between 190 and 250 ohms?**	Yes	Replace ECM (PCM). Reconnect VSS. Run VSS verify the repair.
		No	Replace VSS. Reconnect ECM (PCM). Run VSS verify the repair.

CODE No.	0603, 0605 (KOEO)		
DESCRIPTION	• DTC 0603/0605 indicates the ECM (PCM) has experienced a power interrupt in KAPWR circuit		
[Possible Cause] • Battery terminals corrosion or loose connections • Improper KAPWR circuit wire routing • Harness open in KAPWR circuit • Damaged ECM (PCM)			
STEP	**INSPECTION**		**ACTION**
1	CHECK BATTERY TERMINALS **NOTE:** If KAPWR is interrupted to the ECM (PCM) , DTC 0603/0605 may be generated on the first power-up. • Inspect the battery cables for loose connections, corrosion, etc. • **Are the battery terminal connections in good condition?**	Yes	Battery terminals are okay? Go to next step.
		No	Service battery terminals as necessary. Rerun diagnostic trouble code inspection..
2	INSPECT ENGINE COMPARTMENT FOR PROPER WIRE ROUTING • Inspect ECM (PCM) wiring for proximity to ignition components or wires. • **Is wiring too close to ignition components or wires?**	Yes	Reroute as necessary. Rerun diagnostic trouble code inspection.
		No	Engine compartment wire routing is okay. Go to next step.
3	CHECK KEEP ALIVE POWER (KAPWR) TO ECM (PCM) • Key off. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure voltage between terminal 55 (KAPWR) and terminal 51 or 103 (PWR GND) at the ECM (PCM) vehicle harness connecter. • While observing circuit tester, grasp the ECM (PCM) harness and wiggle, shake or bend a small section while working from the ECM (PCM) to the dash panel. • **Does the circuit tester indicate less than 10.5 volts?**	Yes	Isolate and service open in KAPWR circuit. Reconnect the ECM (PCM). Rerun diagnostic trouble code inspection.
		No	No open in KAPWR harness circuit detected. Reconnect the ECM (PCM). Go to next step.
4	• CHECK FOR REPEAT OF DTC 0603/0605 • Activate Key On Engine Off Self-Test. • **Is DTC 0603/0605 present?**	Yes	Replace the ECM (PCM). Rerun diagnostic trouble code inspection.
		No	Service other DTCs as necessary. If none, testing is completed. DTC 0603/0605 was due to previous service action mentioned in the NOTE in Step 1.

CODE No.	1100 (Continuous)		
DESCRIPTION	• Continuous Memory DTC 1100 indicates the MAF sensor signal went below 0.39 volts or above 4.35 volts sometime during the last 40 warm-up cycles		
[Possible Cause] • MAF sensor connector with poor continuity • MAF harness with poor continuity • MAF harness intermittent short • MAF sensor internal intermittent open or short			
STEP	**INSPECTION**		**ACTION**
1	CHECK FOR MAF CIRCUIT INTERMITTENT VOLTAGE INPUT • Start engine and bring to idle. **NOTE**: If a stabilized idle is not at least 700 rpm, go to TROUBLESHOOTING. • NGS connected. • Open the bonnet. • Run throttle up to 1,500 rpm for 5 seconds, and bring back to idle. • Access MAF PID for a fault indication while performing the following: – Lightly tap on MAF sensor and wiggle harness connector to simulate road shock • **Is the MAF PID changing below the minimum 0.88 Gm/sec or above the maximum 135.95 Gm/sec?**	Yes	Disconnect and Inspect the MAF sensor connector. If okay, Replace the MAF sensor. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Go to next step.
2	CHECK MAF HARNESS TO ECM (PCM) FOR INTERMITTENT OPENS OR SHORTS • Start engine and bring to idle. **NOTE**: If a stabilized idle is not at least 700 rpm, go to TROUBLESHOOTING. • NGS connected. • Run throttle up to 1,500 rpm for 5 seconds, and bring back to idle. • Access MAF PID for fault indication while performing the following: – Grasp the vehicle harness closest to the MAF sensor connector – Shake and bend a small section of the harness all the way to the dash panel – Wiggle, shake and bend the harness from the dash panel to the ECM (PCM) • **Is the voltage changing below the minimum 0.88 Gm/sec or above the maximum 135.95 Gm/sec?**	Yes	Isolate fault and service as necessary. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Unable to duplicate and/or identify fault at this time. Intermittent poor connection or component malfunction (REPAIR or REPLACE as necessary). Go to SYMPTOM TROUBLESHOOTING No.28.

CODE No.	1101 (KOEO, KOER)		
DESCRIPTION	• Key On Engine Running (KOER) DTC 1101 indicates the MAF signal was not between 0.34 and 1.96 volts during KOER Self-Test		
STEP	INSPECTION		ACTION
1	CHECK FOR MAF SENSOR CONTINUOUS MEMORY CODES • Drive vehicle for 6 to 10 minutes. • Rerun KOEO and Continuous Memory Self-Test. • **Is a Continuous Memory DTC present with the KOER DTC 1101?**	Yes	**For Continuous Memory DTC 0102:** Go to address the MAF sensor Monitor DTC. **For Continuous Memory DTC 0103:** Go to address the MAF sensor Monitor DTC. **For all other Continuous Memory DTCs:** Go to Powertrain Diagnostic Code Charts.
		No	Go to next step.
2	CHECK PWR GND CIRCUIT CONTINUITY • Key off. • MAF sensor disconnected. • Disconnect ECM (PCM). • Disconnect NGS from DLC. • Measure the resistance between PWR GND circuit at the MAF sensor vehicle harness connector and battery negative post. • **Is the resistance less than 10 ohms?**	Yes	PWR GND harness circuit to MAF sensor is okay. Reconnect the NGS. Go to next step.
		No	Service open in PWR GND harness circut. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
3	CHECK MAF RTN CIRCUIT CONTINUITY • Key off. • MAF sensor disconnected. • ECM (PCM) disconnected. • Measure the resistance between MAF RTN circuit at the MAF sensor vehicle harness connector and terminal 36 (MAF RTN) at the vehicle harness connector. • **Is the resistance less than 5.0 ohms?**	Yes	MAF RTN harness circuit to ECM (PCM) is okay. Go to next step.
		No	Service open in MAF RTN harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
4	CHECK MAF CIRCUIT FOR SHORT TO GROUND IN ECM (PCM) • Key off. • MAF sensor disconnected. • Reconnect ECM (PCM). • Disconnect the NGS from DLC (if applicable). • Measure the resistance between terminal E (MAF SIG) and terminal D (MAF RTN) at the MAF sensor vehicle harness connector and battery negative post. • **Is the resistance greater than 10,000 ohms?**	Yes	Reconnect the NGS. Go to next step.
		No	MAF SIG shorted to PWR GND or MAF RTN in the ECM (PCM). Reconnect MAF sensor. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
5	CHECK MAF RTN CIRCUIT FOR SHORT TO PWR GND IN ECM (PCM) • Key off. • MAF sensor disconnected. • ECM (PCM) connected. • NGS disconnect from DLC. • Measure resistance between terminal D at the MAF sensor vehicle harness connector and battery negative post. • **Is the resistance greater 10,000 ohms?**	Yes	Reconnect the NGS. Go to next step.
		No	MAF RTN shorted to PWR GND in ECM (PCM). Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.
6	CHECK MAF CIRCUIT OUTPUT WITH NGS • Key off. • MAF sensor connected. • ECM (PCM) connected. • Open the bonnet. • Key on, engine running. • Access MAF PID with a NGS at idle. • **Is the MAF PID following?** **– FP engine: Approx. 1.9 Gm/sec** **– FS engine (MTX): Approx. 2.0 Gm/sec** **– FS engine (ATX): Approx. 2.2 Gm/sec**	Yes	Unable to identify fault at this time. Check possible intermittent. Go to SYMPTOM TROUBLESHOOTING No. 28.
		No	MAF SIG or MAF RTN is open or shorted together in the ECM (PCM). Repalce ECM (PCM). Reconnect ECM (PCM). Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.

STEP	INSPECTION		ACTION
7	CHECK CONTINUITY OF VPWR CIRCUIT • Key off. • MAF sensor disconnected. • Disconnect the ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Leave ECM (PCM) disconnected. • Measure resistance between terminal B (VPWR) circuit at the MAF sensor vehicle harness connector and terminal 71 or 97 (VPWR) at the ECM (PCM) vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	VPWR harness circuit to ECM (PCM) is okay. Go to next step.
		No	Service open in VPWR harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
8	CHECK MAF CIRCUIT FOR SHORTS TO GROUND AND MAF RTN CIRCUIT • Key off. • MAF sensor disconnected. • ECM (PCM) disconnected. • Disconnect the NGS from Data Link Connector (DLC). • Measure the resistance between terminal 88 (MAF SIG) and terminals 36 (MAF RTN) and 24 or 103 (PWR GND) at the ECM (PCM) vehicle harness connector. • **Is each resistance greater than 10,000 ohms?**	Yes	MAF SIG, MAF RTN and GROUND harness circuits to ECM (PCM) are okay. Reconnect the NGS. Go to next step.
		No	Service short circuit between MAF SIG and GROUND or MAF RTN. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
9	CHECK MAF CIRCUIT SHORTS TO PWR GND CIRCUITS • Key off. • MAF sensor disconnected. • ECM (PCM) disconnected. • NGS disconnected from DLC. • Measure resistance between terminal 36 (MAF RTN) and terminals 51 or 103 (PWR GND) at the ECM (PCM) vehicle harness connector. • **Is each resistance greater than 10,000 ohms?**	Yes	Reconnect the NGS. Go to next step.
		No	Service short circuit between MAF RTN and PWR GND. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
10	CHECK CONTINUITY OF MAF SIG CIRCUIT • Key off. • MAF sensor disconnected. • ECM (PCM) disconnected. • Measure resistance between terminal E (MAF SIG) at the MAF sensor vehicle harness connector and terminal 88 (MAF SIG) at the ECM (PCM) vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	MAF SIG harness circuit to ECM (PCM) is okay. Go to next step.
		No	Service open in MAF SIG harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
11	CHECK PWR GND CIRCUIT TO MAF SENSOR • Key off. • MAF sensor disconnected. • ECM (PCM) connected. • Key on, engine off. • Measure the voltage between terminal B (VPWR) and terminal C (PWR GND) at the MAF sensor vehicle harness connector. • **Is the voltage greater than 10.5 volts?**	Yes	PWR GND harness circuit from battery negative post to MAF sensor is okay. Go to Step 3.
		No	Go to Step 2.

CODE No.	1120 (Continuous, KOEO, KOER)		
DESCRIPTION	• DTC 1120 indicates Throttle Position (TP) signal within the Self-Test range but with the closed throttle position range of below 0.17 volts		
[Possible Cause] • Frayed wires • Corrosion on TP sensor, ECM (PCM) or harness connectors • VREF harness open or shorts • Damaged TP sensor • Damaged ECM (PCM)			
STEP	**INSPECTION**		**ACTION**
1	CHECK FRAYED TP CIRCUIT WIRES OR CORROSION ON CONNECTORS • Do a complete visual inspection of the harness connector at the TP sensor (including pins) for corrosion. • Do a complete visual inspection of the harness wires between the TP sensor and the ECM (PCM) for insulation fraying and corrosion. • **Is a fault present?**	Yes	Service as necessary. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Go to next step.
2	CHECK FOR STUCK TP SENSOR • Key on, engine off. • Access TP PID (TPV PID) with the NGS. • Slowly move throttle from closed throttle position to wide open throttle and observe the TP PID (TPV PID). • **While opening the throttle, the TP PID (TPV PID) below 9.80% (0.49 volts)?**	Yes	Go to next step.
		No	Go to Code No. 1125.
3	CHECK VREF CIRCUIT VOLTAGE • Key off. • TP sensor disconnected. • Key on, engine off. • Measure voltage between VREF circuit and SIG RTN circuit at the TP sensor vehicle harness connector. • **Is the voltage between 4.0 and 6.0 volts?**	Yes	Go to next step.
		No	Key off. Reconnect all components. Repair open in VREF circuit.
4	CHECK TP CIRCUIT CONTINUITY • Key off. • TP sensor disconnected. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure the resistance between TP circuit at the TP sensor vehicle harness connector and terminal 89 (TP SIG) at the ECM (PCM) vehicle harness connecter. • **Is the resistance less than 5.0 ohms?**	Yes	TP SIG harness circuit to ECM (PCM) is okay. Go to next step.
		No	Service corrosion or open in TP SIG harness circuit. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
5	CHECK TP SENSOR SIGNAL TO ECM (PCM) • Key off. • Connect ECM (PCM). • Connect TP sensor. • Access TP PID (TPV PID) with the NGS. • Start engine and idle for 2 minutes. • Slowly open the throttle from closed position to wide open throttle and observe the TP PID (TPV PID). • **Is the TP PID (TPV PID) between 0.17 to 0.49 volts?**	Yes	TP sensor is damaged. Replace TP sensor. Rerun diagnostic trouble code inspection.
		No	Rerun diagnostic trouble code inspection. If DTC 1120 is still present, Go to Code No. 1120 or 1125.

CODE No.	1125 (Continuous)
DESCRIPTION	• Continuous Memory DTC 1125 indicates the TP sensor signal went below 9.80% (0.17 volts) or above 92.27% (4.60 volts) same time during the last 80 warm up cycles

[Possible Cause]
- TP sensor connector with poor continuity
- TP harness with poor continuity
- TP harness intermittent short
- TP sensor internal electrical or substrate open or electrical short

STEP	INSPECTION		ACTION
1	CHECK FOR TP CIRCUIT INTERMITTENT VOLTAGE INPUT • Start engine and bring to idle. • Run engine up to 1,500 rpm for 5 seconds. • Key on, engine running. • Access TP PID (TPV PID) for a fault indication with the NGS while performing the following: – Lightly tap on TP sensor and wiggle harness connector to simulate road shock • **Is the TP PID (TPV PID) changing below the minimum 9.80% (0.49 volts) or above the maximum 92.27% (4.60 volts)?**	Yes	Disconnect and inspect the TP sensor connector. If okay, Replace the TP sensor. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Go to next step.
2	CHECK TP HARNESS TO PCM FOR INTERMITTENT OPENS OR SHORTS • Key off. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Reconnect ECM (PCM). • Key on, engine off. • Access TP PID (TPV PID) for fault indication with the NGS while performing the following: – Grasp the vehicle harness closest to the TP sensor connector – Shake and bend a small section of the harness all the way to the dash panel – Wiggle, shake and bend the harness from the dash panel to the ECM (PCM) • **Is the voltage changing below the minimum 0.49 volts or above the maximum 4.60 volts?**	Yes	Isolate fault and service as necessary. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Unable to duplicate and/or identify fault at this time. Intermittent poor connection or component malfunction (Repair or replace as necessary). Go to SYMPTOM TROUBLESHOOTING No.28.

CODE No.	1221 (Continuous)		
DESCRIPTION	• *Open or short circuit observed between ECM (PCM) terminal 11 and ABS/TCS CM terminal R when ignition switch turned ON*		
[Possible Cause] • ABS/TCS CM malfunction • Open or short circuit in wiring from ABS/TCS CM terminal R to ECM (PCM) terminal 11			
STEP	**INSPECTION**		**ACTION**
1	CHECK CONNCTOR CONNECTION • Check connection of ECM (PCM) and ABS/TCS CM connectors. • **Does each connectors have poor connection?**	Yes	Repair or or replace connector. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Go to next step.
2	CHECK CONTINUITY FOR TORQUE REDUCTION REQUEST SIGNAL CIRCUIT • Key off. • Disconnect ECM (PCM) and ABS/TCS CM. Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between terminal R at the ABS/TCS CM vehicle harness connector and terminal 11 at the ECM (PCM) vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	Go to next step.
		No	Repair or replace wiring harness. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
3	CHECK ABS/TCS CM • **Is ABS/TCS CM okay?**	Yes	Replace ABS/TCS CM. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.

CODE No.	1250 (KOEO, KOER)		
DESCRIPTION	• DTC 1250 indicates a fuel pressure requlator control solenoid valve circuit malfunction		
[Possible Cause] • Damaged fuel pressure regulator control solenoid valve • Open or shorted circuit • Damaged ECM (PCM)			
STEP	INSPECTION		ACTION
1	CHECK FOR VPWR TO PRC SOLENOID VALVE • Disconnect the PRC solenoid valve connector. • Key on, engine off. • Measure voltage between VPWR circuit at the PRC solenoid valve vehicle harness connector and chassis ground. • **Is voltage greater than 10.5 volts?**	Yes	Go to next step.
		No	Service open in VPWR circuit between the ignition switch and the PRC solenoid valve.
2	CHECK PRC SOLENOID VALVE • Key off. • PRC solenoid valve disconnected. • Measure resistance between terminals A and B at the PRC solenoid valve. • **Is resistance less than 5.0 ohms?**	Yes	Go to next step.
		No	Replace PRC solenoid valve. Rerun diagnostic trouble code inspection.
3	CHECK PRC SOLENOID VALVE CIRCUIT FOR SHORT TO POWER • Key off. • PRC solenoid valve disconnected. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Key on, engine off. • Measure voltage between terminal 19 (PRC) at the ECM (PCM) vehicle harness connector and chassis ground. • **Is voltage less than 1.0 volt?**	Yes	Go to next step.
		No	Service short to power. Reconnect all components. Rerun diagnostic trouble code inspection.
4	CHECK PRC SOLENOID VALVE CIRCUIT FOR SHORT TO GROUND • Key off. • Disconnect the NGS from DLC. • ECM (PCM) disconnected. • PRC solenoid valve disconnected. • Measure resistance between terminal 19 and terminals 51 or 103 (PWR GND) and 91 (SIG RTN) at the ECM (PCM) vehicle harness connector. • **Is resistance greater than 10,000 ohms?**	Yes	Go to next step.
		No	Service short circuit. Reconnect all components. Rerun diagnostic trouble code inspection.
5	CHECK PRC SOLENOID VALVE CIRCUIT CONTINUITY • Key off. • ECM (PCM) disconnected. • PRC solenoid valve disconnected. • Measure resistance between PRC solenoid valve circuit at the PRC vehicle harness connector and terminal 19 at the ECM (PCM) vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.
		No	Service open circuit. Reconnect all components. Rerun diagnostic trouble code inspection.

CODE No.	1409 (Continuous)		
DESCRIPTION	• Open or short circuit is observed in EGR valve		
[Possible Cause] • Damaged EGR valve coil • EGR valve control signal circuit open • EGR valve control signal circuit short to ground • EGR valve VPWR circuit open			
STEP	INSPECTION		ACTION
1	CHECK CONNECTOR CONNECTION • Check for connection of EGR valve and ECM(PCM). • **Is connection of connectors okay?**	Yes	Go to next step.
		No	Service as necessary. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
2	CHECK EGR VALVE VPWR CIRCUIT VOLTAGE Key off. • Disconnect EGR valve. • Key on, engine off. • Measure voltage between VPWR circuit at the EGR valve harness connector terminal C or D, and the battery negative post. • **Is each voltage greater than 10.5 volts?**	Yes	VPWR harness circuit from main relay to EGR valve okay. Go to next step.
		No	Service open VPWR circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
3	CHECK EGR VALVE CONTROL SIGNAL CIRCUIT SHORT TO GROUND • Key off. • EGR valve disconnected. • Disconnect ECM(PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between following terminals at the vehicle harness connector and bettery negative post. – F at the EGR valve – B at the EGR valve – A at the EGR valve – E at the EGR valve • **Is each resistance greater than 10,000 ohms?**	Yes	EGR valve control signal harness circuits to ECM(PCM) is okay. Go to next step.
		No	Service short circuit between EGR valve control signal. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
4	CHECK CONTINUITY EGR VALVE CONTROL SIGNAL CIRCUIT OPEN • Key off. • EGR valve disconnected. • ECM(PCM) disconnected. • Measure resistance between following terminals at the vehicle harness connector. – F at the EGR valve and 56 at the ECM(PCM) – B at the EGR valve and 46 at the ECM(PCM) – A at the EGR valve and 72 at the ECM(PCM) – E at the EGR valve and 68 at the ECM(PCM) • **Is each resistance less than 5.0 ohms?**	Yes	EGR valve control signal harness circuits to ECM(PCM) is okay. Go to next step.
		No	Service open in EGR valve control signal harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
5	CHECK RESISTANCE OF EGR VALVE STEPPING MOTOR COIL • EGR valve disconnected. • Measure resistance between following terminals at the EGR valve vehicle harness connector. – F and D – B and D – A and C – E and C • **Is each resistance Approx. 22 ohms?**	Yes	Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun Diagnostic Trouble Code Inspection. Carry out troubleshooting of diagnostic trouble code No. if displayed.
		No	Replace EGR valve. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.

CODE No.	1474 (KOEO, KOER)
DESCRIPTION	• DTC 1474 indicates a Cooling Fan Control primary circuit failure

[Possible Cause]
- Open or shorted cooling fan control circuit
- Open VPWR circuit to cooling fan relay
- Damaged cooling fan relay
- Damaged ECM (PCM)

STEP	INSPECTION		ACTION
1	CHECK FOR VPWR TO COOLING FAN RELAY • Key off. • Disconnect cooling fan relay. • Key on. • Measure voltage between the VPWR circuit at the cooling fan relay vehicle harness connector and the battery negative post. • **Is voltage greater than 10.5 volts?**	Yes	Go to next step.
		No	Service open VPWR circuit to cooling fan relay. Reconnect cooling fan relay. Rerun diagnostic trouble code inspection.
2	CHECK FOR COOLING FAN CONTROL CIRCUIT CYCLING • Key on, engine off. • NGS connected. • Access Output Test Mode on the NGS. • Connect circuit tester positive lead to the VPWR circuit and the negative lead to the cooling fan control circuit at the cooling fan control relay vehicle harness connector. • While observing circuit tester, command the cooling fan on and off a couple times. • **Does voltage change more than 0.5 volts when the cooling fan output is commanded on and off?**	Yes	Key off. Replace cooling fan relay. Rerun diagnostic trouble code inspection.
		No	Key off. Go to next step.
3	CHECK FC CIRCUIT FOR SHORT TO POWER • Key off. • Cooling fan relay disconnected. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Key on, engine off. • Measure voltage between the cooling fan control circuit at the cooling fan relay vehicle harness connector and the battery negative post. • Key off. • **Was voltage less than 1.0 volt?**	Yes	Go to next step.
		No	Service cooling fan control circuit short to power. Reconnect all components. Rerun diagnostic trouble code inspection.
4	CHECK FC CIRCUIT FOR SHORT TO GROUND • Key off. • Disconnect the NGS from DLC. • Cooling fan relay disconnected. • ECM (PCM) disconnected. • Measure resistance between terminal 98 and terminals 51, 103 (PWR GND) and 91 (SIG RTN) at the ECM (PCM) vehicle harness connector. • **Is each resistance greater than 10,000 ohms?**	Yes	Go to next step.
		No	Service cooling fan control circuit short to ground. Reconnect all components. Rerun diagnostic trouble code inspection.
5	CHECK FC CIRCUIT CONTINUITY • Key off. • Cooling fan relay disconnected. • ECM (PCM) disconnected. • Measure resistance between terminal 98 at the breakout box and the cooling fan control circuit at the cooling fan relay vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.
		No	Service open cooling fan control circuit. Reconnect all components. Rerun diagnostic trouble code inspection.

CODE No.	1474 (Continuous)		
DESCRIPTION	• DTC 1474 indicates that a cooling fan control circuit failure has occured during vehicle operation		
[Possible Cause] • Open or shorted cooling fan control circuit • Open VPWR circuit to cooling fan control			
STEP	INSPECTION		ACTION
1	CONTINUOUS MEMORY DTC 1474: CHECK COOLING FAN CONTROL CIRCUIT FOR OPEN OR SHORT TO POWER • Key off. • Turn A/C and rear window defroster off. • Disconnect cooling fan connector. • Inspect connectors for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Connect a non-powered test lamp between Power to Fan circuit and ground circuit at the cooling fan vehicle harness connector. • Key on, engine off. • Access Output Test Mode on the NGS. • Command cooling fan on. • Observe test lamp for an indication of a fault while performing the following (the lamp will turn off when a fault detected, indicating an open or short to power): – Shake, wiggle, bend the cooling fan control circuit between the ECM (PCM) and cooling fan relay. – Shake, wiggle, bend the VPWR or IGN. Start/Run circuit to the cooling fan relay. – Lightly tap on the cooling fan relay to simulate road shock. • **Is a fault indicated?**	Yes	Key off. Isolate fault and service as necessary. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Go to next step.
2	CHECK FOR COOLING FAN CONTROL CIRCUIT FOR SHORT TO GROUND • Key on, engine off. • Cooling fan disconnected, test lamp installed. • NGS connected. • Command cooling fan off. • Observe test lamp for an indication of a fault while performing the following (the lamp will turn on when a fault is detected, indicating an cooling fan control circuit short to ground): – Shake, wiggle, bend the cooling fan control circut between the ECM (PCM) and cooling fan control relay. – Lightly tap on the cooling fan relay to simulate road shock. • Key off. • **Is a fault indicated?**	Yes	Isolate fault and service as necessary. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Unable to duplicate or identify fault at this time. Intermittent poor connection or component malfunction. (Repair or replace as necessary.)

CODE No.	1500 (Continuous)
DESCRIPTION	• DTC 1500 indicates that the VSS input signal was intermittent

[Possible Cause]
- Damaged VSS
- Damaged ECM (PCM)
- Intermittent VSS connections
- Intermittent open in VSS harness circuit(s)
- Intermittent short in VSS harness circuit(s)

STEP	INSPECTION		ACTION
1	VISUAL INSPECTION • Key off. • Visually inspect the VSS and VSS harness circuits for any potential failures. Use the *following check list for reference*: – Loose VSS connector – Pushed out VSS connector pins – Damaged VSS wiring harness insulation – Incorrect harness routing – Incorrect VSS mounting • **Did the visual inspection reveal a potential failure?**	Yes	Service fault as necessary. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Run VSS to verify the repair.
		No	Reconnect all components. Unable to duplicate or identify fault at this time. Intermittent poor connection or component malfunction (Repair or replace as necessary). Go to SYMPTOM TROUBLESHOOTING No.28.

CODE No.	1504 (Continuous)
DESCRIPTION	• DTC 1504 indicates that Self-Test has detected an IAC circuit malfunction

[Possible Cause]

- IAC circuit open
- IAC circuit shorted to PWR
- IAC short to GND
- VPWR circuit open
- Damaged IAC valve assembly
- Damaged ECM (PCM)

STEP	INSPECTION		ACTION
1	CHECK VPWR TO IAC VALVE • Key off. • Disconnect IAC valve vehicle harness connector. • Key on. • Measure voltage between VPWR circuit at the IAC valve vehicle harness connector and battery ground. • **Is voltage greater than 10.5 volts?**	Yes	Go to next step.
		No	Service open in VPWR to IAC valve. Reconnect all components. Rerun diagnostic trouble code inspection.
2	CHECK IAC VALVE RESISTANCE • Key off. • IAC valve vehicle harness connector disconnected. • Measure solenoid resistance. **NOTE:** Due to diode in solenoid, place circuit tester (+) lead on VPWR pin and (-) lead on IAC pin. • **Is resistance between 6.0 and 13.0 ohms?**	Yes	Go to next step.
		No	Service IAC valve assembly. Reconnect all components. Rerun diagnostic trouble code inspection.
3	CHECK IAC VALVE FOR AN INTERNAL SHORT TO IAC CASE • Key off. • IAC valve vehicle harness connector disconnected. • Measure resistance from either IAC valve pin to IAC valve assembly case. • **Is resistance greater than 10,000 ohms?**	Yes	Go to next step.
		No	Replace IAC valve assembly. Reconnect all components. Rerun diagnostic trouble code inspection.
4	CHECK IAC CIRCUIT CONTINUITY • Key off. • IAC valve disconnected. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between terminal 20, 83 (IAC) at the ECM (PCM) vehicle harness connector and IAC circuit at IAC valve vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	Go to next step.
		No	Service open circuit. Reconnect all components. Rerun diagnostic trouble code inspection.
5	CHECK IAC CIRCUIT FOR SHORT TO PWR • Key off. • ECM (PCM) disonnected. • IAC valve disconnected. • Key on, engine off. • Measure voltage between terminal 20, 83 (IAC) at the ECM (PCM) vehicle harness connector and chassis ground. • **Is voltage less than 1.0 volt?**	Yes	Go to next step.
		No	Service short circuit. Reconnect all components. Rerun diagnostic trouble code inspection.
6	CHECK IAC CIRCUIT FOR SHORT TO GROUND • Key off. • ECM (PCM) disconnected. • IAC valve disconnected. • Measure resistance between terminal 20, 83 (IAC) and terminal 51 and 103 (PWR GND) at the ECM (PCM) vehicle harness connector • **Is each resistance greater than 10,000 ohms?**	Yes	Go to next step.
		No	Service short circuit. Reconnect all components. Rerun diagnostic trouble code inspection.

7	CHECK IAC SIGNAL FROM ECM (PCM) • Key off. • Reconnect ECM (PCM). • Reconnect IAC valve. • NGS connected. • Access the IAC PID switch a NGS. • With engine at normal operating temperature. • **Is the IAC PID changing between 20% and 45%?**	Yes	Go to next step. Inspect throttle body for damage, service as necessary. If okay, replace IAC valve assembly. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.
8	CHECK IAC SYSTEM FOR INTERMITTENT OPEN OR SHORT • NGS connected. • Key on engine running. • Access IAC and RPM PIDs switch a NGS. • With engine at normal operating temperature, accessories off and at idle, the IAC duty cycle should between 20% and 45%. • Observe the IAC and RPM PIDs for an indication of a fault while performing the following at idle: – Lightly tap on IAC valve assembly and wiggle harness connector to simulate road shock – Grasp the vehicle harness closest to the IAC valve assembly. Shake and bend a small section of the harness from the IAC to the dash panel and from the dash panel to ECM (PCM) • **Do the IAC or RPM PIDs suddenly change in value indicating a fault?**	Yes	Isolate fault and service as necessary. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
		No	**For idle quality, starting, or stalling symptoms currently present:** Replace IAC valve assembly. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection. **All others:** Unable to duplicate and/or identify fault at this time. Intermittent poor connection or component malfunction (Repair or replace as necessary). Go to SYMPTOM TROUBLESHOOTING No.28.

CODE No.	1602 (Continuous)
DESCRIPTION	• Command transmission exceeded limit

[Possible Cause]
- Damaged immobilizer unit
- Damaged ECM (PCM)
- Immobilizer unit–ECM(PCM) communication line (COM) circuit open
- Immobilizer unit–ECM(PCM) communication line (COM) circuit short

STEP	INSPECTION		ACTION
1	CHECK DTC PRESENT • Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure • Rerun Diagnostic Trouble Code Inspection. • **Is same code No. displayed?**	Yes	Go to next step.
		No	Carry out troubleshooting of other diagnostic trouble code No. if displayed.
2	CHECK CONTINUITY OF COM CIRCUIT • Key off. • Disconnect immobilizer unit connector. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between COM circuit at the immobilizer unit vehicle harness connector terminal A and terminal 5 at the ECM (PCM) vehicle harness connector. • **Is resistance less than 5 ohms?**	Yes	COM harness circuit to ECM (PCM) is okay. Go to next step.
		No	Service open COM harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
3	CHECK COM CIRCUIT FOR SHORT TO GROUND • Key off. • Immobilizer unit disconnected. • ECM(PCM) disconnected. • Measure the resistance between COM circuit at the immobilizer unit vehicle harness connector terminal A and terminal 5 at the ECM (PCM) vehicle harness connector. • **Is resistance greater than 10,000 ohms?**	Yes	COM harness circuit to ECM (PCM) is okay. Go to next Step.
		No	Service short COM harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
4	CHECK ENGINE IS RUNNING NORMALLY • Reconnect all components. • Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure • Start engine. • **Does engine continue running normally?**	Yes	Carry out troubleshooting of other diagnostic trouble code No. if displayed.
		No	If code No. 1602 displayed again, Inspect immobilizer unit. Go to next step.
5	CHECK ENGINE IS RUNNING NORMALLY AGAIN • All components connected. • Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure • Start engine. • **Does engine continue running normally?**	Yes	Carry out troubleshooting of other diagnostic trouble code No. if displayed.
		No	If code No. 1602 displayed again, Replace immobilizer unit with previous one and replace ECM (PCM).

CODE No.	1603, 1604
DESCRIPTION	• ID number is not stored in ECM (PCM) (1603) • Code word is not stored in ECM(PCM) (1604)

[Possible Cause]
- ECM(PCM) replacement procedure not correct

–	Reinput ID number

CODE No.	1621, 1623 (Continuous)
DESCRIPTION	• Code words stored in immobilizer unit and ECM(PCM) do not much

[Possible Cause]
- Transformation of code word stored in immobilizer unit
- Transformation of code word stored in ECM (PCM)

STEP	INSPECTION		ACTION
1	CHECK DTC PRESENT • Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure • Rerun diagnostic trouble code inspection. • **Is same code No. displayed?**	Yes	Go to next step.
		No	Carry out troubleshooting of other diagnostic trouble code No. if displayed.
2	CHECK DTC 1623 PRESENT • **Is code No. 1623 also displayed?**	Yes	Carry out troubleshooting of other diagnostic trouble code No. 1623.
		No	Go to next step.
3	CHECK KEY DUPLICATION FUNCTION • Using new key, carry out key duplication. ☞SECTION T, IMMOBILIZER SYSTEM • **Is code word (required for key duplication) entered?**	Yes	Replace ECM (PCM).
		No	Replace immobilizer unit.

Do not use ECM(PCM) on other vehicle for testing. Diagnostic trouble code No. 1621 will be displayed.

CODE No.	1622 (Continuous)
DESCRIPTION	• ID numbers stored in immobilizer unit and ECM (PCM) do not much (Symptom occurs only after immobilizer unit is replaced and key ID number is registered

[Possible Cause]
- Unregistered key is used
- Transformation of ID number stored in ECM (PCM)

STEP	INSPECTION		ACTION
1	CHECK DTC PRESENT • Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure • Rerun diagnostic trouble code inspection. • **Is same code No. displayed?**	Yes	Go to next step.
		No	Carry out troubleshooting of other diagnostic trouble code No. if displayed.
2	CHECK ENGINE IS STARTING NORMALLY USING ANOTHER REGISTERED KEY • Start engine using another registered key. • **Does engine start normally?**	Yes	Previous key defective or unregistered.
		No	Replace immobilizer unit and ECM (PCM).

CODE No.	1624 (Continuous)
DESCRIPTION	ECM (PCM) not received unlock signal from the immobilizer unit (ECM (PCM) is okay)

[Possible Cause]

- Immobilizer unit-ECM(PCM) communication (COM) *line circuit open*
- Immobilizer unit-ECM(PCM) communication (COM) line circuit short
- Damaged immobilizer unit
- *Damaged coil*
- Damaged pre-amplifier
- Damaged key

STEP	INSPECTION		ACTION
1	CHECK CODE NO. 1624 DISPLAYED • Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure • Disconnect battery cable. • Reconnect battery cable. • Key On Engine Off for approx. 2 seconds. **Note**: Code No. 1624 may be obtained, while Key On Engine Off Approx. 2 seconds after battery cable terminal connected (immobilizer system is okay). • **Is code No. 1624 displayed?**	Yes	Go to next step.
		No	Carry out troubleshooting of other diagnostic trouble code No. if displayed.
2	CHECK ENGINE IS STARTING NORMALLY USING ANOTHER REGISTERED KEY • Start engine using another registered key. • **Does engine start normally?**	Yes	Previous key defective or unregistered.
		No	Go to next step.
3	CHECK CONTINUITY OF COM CIRCUIT • Key off. • *Disconnect immobilizer unit connector.* • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, ect. Service as necessary. • Measure resistance between COM circuit at the immobilizer unit vehicle harness connector terminal A and terminal 5 at the ECM(PCM) vehicle harness connector. • **Is resistance less than 5 ohms?**	Yes	COM harness circuit to ECM (PCM) is okay. Go to next step.
		No	Service open circuit COM harness circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
4	CHECK COM CIRCUIT SHORT TO GROUND • Key off. • Immobilizer unit disconnected. • ECM(PCM) disconnected. • Measure the resistance between COM circuit at the immobilizer unit vehicle harness connector terminal A and terminal 5 at the ECM(PCM) vehicle harness connector. • **Is resistance greater than 10,000 ohms?**	Yes	COM harness circuit to ECM (PCM) is okay. Go to next step.
		No	Service short circuit between COM circuit. Reconnect all components. Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.

CODE No.	1650 (KOEO, KOER)		
DESCRIPTION	• DTC 1650 indicates PSP signal out of self-test range		
[Possible Cause] • PSP switch/shorting bar damaged • SIG RTN open or shorted to GND • ECM (PCM) damaged • PSP signal circuit open or shorted to SIG RTN			
STEP	**INSPECTION**		**ACTION**
1	VERIFY ELECTRICAL FUNCTION • Key on, engine running. • View PSP PID with the NGS while turning the steering wheel back and forth. • **Does the NGS indicate voltage Low/High or High/Low?**	Yes	Intermittent poor connection or component malfunction (Repair or replace as necessary).
		No	Go to next step.
2	CHECK PSP SWITCH OPERATION • Key off. • Start engine and let idle in Park/Neutral. • Install dwell tacho tester. • Disconnect PSP switch, vehicle harness connector and inspect both ends for damage. Service as necessary. • Jumper the PSP signal circuit to GND at the PSP vehicle harness connector. • **Does engine rpm increase?**	Yes	Replace PSP switch. Verify repair.
		No	Remove jumper wire. Go to next step.
3	CHECK CONTINUITY OF PSP CIRCUITS • Key off. • PSP switch disconnected. • Disconnect ECM (PCM) Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between terminal 31 at the ECM (PCM) vehicle harness connector and PSP circuit at the PSP switch vehicle harness connector. • **Is each resistance less than 5.0 ohms?**	Yes	Go to next step.
		No	Service open circuit. Reconnect all components. Rerun diagnostic trouble code inspection.
4	CHECK PSP CIRCUIT FOR SHORT • Key off. • PSP switch disconnected. • Leave ECM (PCM) disconnected. • Measure resistance between terminal 31 and terminal 91 at the ECM (PCM) vehicle harness connector. • Measure resistance between terminal 31 at the ECM (PCM) vehicle harness connector chassis ground. • **Is either resistance less than 10,000 ohms?**	Yes	Service short in harness. Reconnect all components. Verify repair.
		No	Go to next step.
5	CHECK PSP SWITCH RESISTANCE • Key off. • PSP switch vehicle harness disconnected. • Start engine and let it idle in Park/Neutral. • Measure resistance between the PSP switch terminals while turning the steering wheel. • **Is the resistance less than 5.0 ohms?**	Yes	Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.
		No	Replace PSP switch. Reconnect all components. Rerun diagnostic trouble code inspection.

CODE No.	1631 (Continuous)
DESCRIPTION	• DTC 1631 indicates that ECM (PCM) damaged current above 20 A to generator, ECM (PCM) judges generator output voltage below 8.5 volts.

[Possible Cause]
- Damaged generator
- Generator output voltage signal circuit open
- Generator field coil control circuit open
- Generator output voltage signal circuit short to ground
- Generator field coil control circuit short to ground

STEP	INSPECTION		ACTION
1	CHECK CONNECTOR CONNECTION • Check for connection of generator and ECM (PCM). • **Is connection of connectors okay?**	Yes	Go to next step.
		No	Service as necessary. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
2	CHECK GENERATOR GENERATING CURRENT • Key on, engine running. • Check generator generating current. • **Is generator generating current okay?**	Yes	Go to next step.
		No	Go to step 9.
3	CHECK GENERATOR OUTPUT VOLTAGE SIGNAL CIRCUIT VOLTAGE • Key off. • Disconnect ECM (PCM). Inspect for damaged or pushed out of pins, corrosion, loose wires etc. Service as necessary. • Connect engine signal monitor and ECM (PCM). • Measure voltage terminal 34 at ECM (PCM). • **Is voltage at following conditions?** **– Ignition switch ON: Below 1.0 volt** **– Idle: 3—8 volts**	Yes	Go to step 9.
		No	Go to next step.
4	CHECK RESISTANCE OF GENERATOR OUTPUT VOLTAGE CIRCUIT • Key off. • ECM (PCM) disconnected. • Disconnect generator. • Measure resistance of generator output voltage signal circuit between terminal P at generator vehicle harness connector and terminal 34 at ECM (PCM) vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	Go to next step.
		No	Service as necessary. Reconnect all components. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
5	CHECK GENERATOR OUTPUT VOLTAGE SIGNAL CIRCUIT SHORT TO GROUND • Key off. • ECM (PCM) disconnected. • Measure resistance of generator output voltage signal circuit between terminal 34 at ECM (PCM) vehicle harness connector and ground. • **Is resistance greater than 10,000 ohms?**	Yes	Go to next step.
		No	Service short circuit. Reconnect all components. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
6	CHECK GENERATOR FIELD COIL CONTROL SIGNAL CIRCUIT VOLTAGE • Key off. • Connect the NGS to the DLC. • Access ALTFDC PID with the NGS. • Turn on the following electrical loads. – Headlight – Blower (3rd or higher) – A/C – Rear window defroster • **Is ALTFDC PID changed?**	Yes	Go to step 9.
		No	Go to next step.

STEP	INSPECTION		ACTION
7	CHECK RESISTANCE OF GENERATOR FIELD COIL CONTROL SIGNAL CIRCUIT • Key off. • Disconnect ECM (PCM). • Disconnect generator. • Measure resistance of generator field coil control circuit between terminal D at generator vehicle harness connector and terminal 47 at ECM (PCM) vehicle harness connector. • **Is resistance 5.0 ohms?**	Yes	Go to next step.
		No	Service open circuit. Reconnect all components. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
8	CHECK GENERATOR FIELD COIL CONTROL SIGNAL CIRCUIT SHORT TO GROUND • Key off. • ECM (PCM) disconnected. • Generator disconnected. • Measure resistance of generator field coil control circuit between terminal 47 at ECM (PCM) vehicle harness connector and ground. • **Is resistance greater than 10,000 ohms?**	Yes	Go to next step.
		No	Service short circuit. Reconnect all components. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
9	CHECK DTC REPRESENT • Key off. • Reconnect all components. • Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure • Rerun diagnostic trouble code inspection. • **Is DTC represent?**	Yes	Go to appropriate inspection procedure.
		No	Finished.

CODE No.	1632 (Continuous)
DESCRIPTION	• DTC 1632 indicates that ECM (PCM) judges battery voltage below 8 volts

[Possible Cause]
- Damaged ROOM fuse.
- Back-up power supply circuit open.
- Back-up power supply circuit short to ground.

STEP	INSPECTION		ACTION
1	CHECK FOR ROOM FUSE • Check for ROOM fuse (Burned or determination). • **Is ROOM fuse okay?**	Yes	Go to next step.
		No	Go to SYMPTOM TROUBLESHOOTING No. 1.
2	CHECK CONNECTOR CONNECTION • *Check for connection of ECM (PCM).* • **Is connection of connector okay?**	Yes	Go to next step.
		No	Service as necessary. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
3	CHECK FOR BACK-UP POWER SUPPLY • Key off. • Disconnect ECM (PCM). Inspect for damaged or pushed out of pins, corrosion, loose wires etc. Service as necessary. • Measure voltage terminal 55 at the ECM (PCM) vehicle harness connector and battery negative post. • **Is voltage constant 10.5 volts?**	Yes	Go to next step.
		No	Check for wiring harness between battery positive post and ECM (PCM) short to ground. Service as necessary. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
4	CHECK DTC REPRESENT • Key off. • Reconnect all components. • Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure • Rerun diagnostic trouble code inspection. • **Is DTC represent?**	Yes	Go to appropriate inspection procedure.
		No	Finished.

CODE No.	1633 (Continuous)
DESCRIPTION	• DTC 1633 indicates that ECM (PCM) judges generator output voltage above 18.5 volts or battery voltage above 16 volts.

[Possible Cause]
- Damaged generator (overcharge)
- Damaged ECM (PCM)
- Generator field coil control signal circuit open
- Generator field coil control signal circuit short to ground

STEP	INSPECTION		ACTION
1	CHECK DTC PRESENT • Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure • Rerun diagnostic trouble code inspection. • **Is same code No. displayed?**	Yes	Go to next step.
		No	The system detected surging voltage momentarily when the battery terminal was disconnected. Finished.
2	CHECK CONNECTOR CONNECTION • Check connection of ECM (PCM) connector. • **Is connection of connector okay?**	Yes	Go to next step.
		No	Repair or replace as necessary. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
3	CHECK GENERATOR GENERATING CURRENT • Key on, engine running. • Check generator generating current. • **Is generator generating current okay?**	Yes	Go to next step.
		No	Go to step 8.
4	CHECK GENERATOR TERMINAL D VOLTAGE • Key off. • Disconnect terminal D of generator. • Key on, engine off. • Measure voltage between terminal D at the vehicle harness connector and ground. • **Is voltage greater less than 1.0 volts?**	Yes	Go to step 8.
		No	Go to next step.
5	CHECK GENERATOR FIELD COIL CONTROL SIGNAL CIRCUIT VOLTAGE • Key off. • Connect terminal D of generator. • Disconnect ECM (PCM). Inspect for damaged or pushed out of pins, corrosion, loose wires etc. Service as necessary. • Connect engine signal monitor and ECM (PCM). • Key on, engine off. • Measure voltage terminal 47 at ECM (PCM). • **Is voltage less than 1.0 volt?**	Yes	Go to next step.
		No	Go to step 8.
6	CHECK RESISTANCE OF GENERATOR FIELD COIL CONTROL SIGNAL CIRCUIT • Key off. • Disconnect ECM (PCM) and engine signal monitor. • Disconnect generator. • Measure resistance of generator field coil control circuit between terminal D at generator vehicle harness connector and terminal 47 at ECM (PCM) vehicle harness connector. • **Is resistance 5.0 ohms?**	Yes	Go to next step.
		No	Service open circuit. Reconnect all components. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.

STEP	INSPECTION		ACTION
7	CHECK GENERATOR FIELD COIL CONTROL SIGNAL CIRCUIT SHORT TO GROUND • Key off. • ECM (PCM) *disconnected*. • Generator disconnected. • Measure resistance of generator field coil control circuit between terminal 47 at ECM (PCM) vehicle harness connector and ground. • **Is resistance greater than 10,000 ohms?**	Yes	Go to next step.
		No	Service short circuit. Reconnect all components. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
8	CHECK DTC REPRESENT • Key off. • Reconnect all components. • Reset the ECM (PCM) to completely clear the DTCs. ☞After Repair Procedure • Rerun diagnostic trouble code inspection. • **Is DTC represent?**	Yes	Go to appropriate inspection procedure.
		No	Finished.

CODE No.	1634 (Continuous)
DESCRIPTION	• DTC 1634 indicates that ECM (PCM) judges generator output voltage above 16 volts and battery positive voltage below 11 volts.

[Possible Cause]
- Damaged generator
- Damaged battery
- Open circuit in wiring from battery and generator
- Short to ground circuit in wiring from battery and generator

STEP	INSPECTION		ACTION
1	CHECK CONNECTOR CONNECTION • Check connector of terminal B at the generator connector. • **Is connection of connector okay?**	Yes	Go to next step.
		No	Service as necessary. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
2	CHECK BATTERY VOLTAGE • Measure voltage of battery. • **Is voltage greater than 11 volts?**	Yes	Go to next step.
		No	Charge or replace as necessary. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
3	CHECK GENERATOR TERMINAL B VOLTAGE • Key off. • Disconnect generator terminal B connector. • Measure voltage between terminal B at the generator vehicle harness connector and ground. • **Is voltage greater than 11 volts?**	Yes	Go to next step.
		No	Go to step 6.
4	CHECK GENERATOR VOLTAGE AT IDLE • Key off. • Generator terminal B disconnected. • Measure voltage between terminal B at the generator terminal and ground. • **Is voltage between 13 and 15 volts?**	Yes	Go to next step.
		No	Check generator.
5	CHECK RESISTANCE OF BETWEEN GENERATOR TERMINAL B AND BATTERY POSITIVE POST • Key off. • Generator terminal B disconnected. • Disconnect battery negative post. • Disconnect battery positive post. • Measure resistance between terminal B at the generator terminal and battery positive post at the vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	Go to next step.
		No	Service as necessary. Reconnect all components. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
6	CHECK BETWEEN GENERATOR TERMINAL B AND BATTERY POSITIVE POST SHORT TO GROUND • Battery negative and positive post disconnected. • Measure resistance between terminal B at the generator vehicle harness connector and ground. • **Is resistance greater than 10,000 ohms.**	Yes	Go to next step.
		No	Service short circuit. Reconnect all components. Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure Rerun diagnostic trouble code inspection.
7	CHECK DTC REPRESENT • Key off. • Reconnect all components. • Reset the ECM(PCM) to completely clear the DTCs. ☞After Repair Procedure • Rerun diagnostic trouble code inspection. • **Is DTC represent?**	Yes	Go to appropriate inspection procedure.
		No	Finished.

Reference Voltage Test

STEP	INSPECTION		ACTION
1	CHECK VREF VOLTAGE • **Is VREF greater than 6.0 volts?**	Yes	Go to step 10. (to check VREF for short to power).
		No	Go to next step.
2	CHECK BATTERY VOLTAGE • Key on, engine off. • Measure voltage across battery terminals. • **Is voltage greater than 10.5 volts?**	Yes	Go to next step.
		No	Key off. Refer to the Charging/Electrical Group in the Service Manual to service discharged battery.
3	CHECK SIG RTN CIRCUIT TO SENSOR WHERE VREF FAILED • Key on, engine off. • Sensor where VREF check failed disconnected. • Measure voltage between battery positive post and SIG RTN circuit at the appropriate sensor vehicle harness connector. • **Is voltage greater than 10.5 volts and within 1.0 volt of battery voltage?**	Yes	Go to next step.
		No	SIG RTN/PWR GND fault present. Go to step 9.
4	CAN THE ECT BE ACCESSED? **NOTE:** The purpose of this test step is to detemine if the NGS is able to communicate with the ECM (PCM). • Key on, engine off. • Attempt to access the ECT PID. • **Can the ECT PID be accessed?**	Yes	Go to step 14 (to check VREF for opens).
		No	Go to next step.
5	CHECK FOR VPWR TO IAC VALVE • Key off. • TP sensor disconnected. • Disconnect Idle Air Control (IAC) valve. • Key on, engine off. • Measure voltage between the VPWR circuit at IAC vehicle harness connector and the battery negative post. • Key off. • **Was voltage greater than 10.5 volts?**	Yes	Reconnect IAC valve. Go to next step.
		No	VPWR is not present. Reconnect TP sensor. Test for an open or short to PWR in the VPWR circuit.
6	CHECK VPWR TO ECM (PCM) • Key off. • TP sensor disconnected. • All other sensors wired to VREF disconnected from the test steps. (TP) • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Key on, engine off. • Measure voltage between terminal 71 (VPWR) and terminal 77 (PWR GND) at the ECM (PCM) vehicle harness connector. • **Is voltage greater than 10.5 volts?**	Yes	Go to next step.
		No	Service open VPWR circuit between ECM (PCM) and splice to IAC valve. Reconnect all components. Rerun diagnostic trouble code inspection.
7	CHECK VREF CIRCUIT FOR SHORT TO GROUND OR SIG RTN • Key off. • TP sensor disconnected. • All other sensors wired to VREF disconnected. • ECM (PCM) disconnected. • Disconnect the NGS from DLC. • Measure resistance between terminal 90 (VREF) and terminal 51 or 103 (PWR GND) and 91 (SIG RTN) at the ECM (PCM) vehicle harness connector. • **Is each resistance greater than 10,000 ohms?**	Yes	Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.
		No	Service VREF short to ground. Reconnect all components. Rerun diagnostic trouble code inspection.

STEP	INSPECTION		ACTION
8	CHECK VREF FOR SHORT TO POWER • Key off. • Sensor where VREF check failed disconnected. • Disconnect all other sensors connected to VREF (TP). • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires etc. Service as necessary. • Leave ECM (PCM) disconnected. • Key on, engine off. • Measure voltage between the VREF circuit at the TP sensor vehicle harness connector and the battery negative post. • **Is voltage less than 0.5 volts?**	Yes	Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.
		No	Service VREF short to power in harness. Reconnect all components. Rerun diagnostic trouble code inspection.
9	CAN THE ECT PID BE ACCESSED? **NOTE:**The purpose of this test step is to determine if the NGS is able to communicate with the ECM (PCM). • Key off, engine off. • Attempt to access the ECT PID. • **Can the ECT PID be accessed?**	Yes	Go to next step.
		No	Go to step 12.
10	ARE KOEO DTCS PRESENT FOR TWO OR MORE SENSORS/SWITCHES CONNECTED TO THE SIG RTN CIRCUIT? • **Are KOEO DTCs presents for two or more sensors/switches connected to the SIG RTN circuit? (Refer to wiring diagram)**	Yes	Go to next step.
		No	Service open SIG RTN circuit. Refer to the wiring diagram and DTCs received to help pinpoint the location of the open. Reconnect all components. Rerun diagnostic trouble code inspection.
11	CHECK SIG RTN CIRCUIT CONTINUITY TO ECM (PCM). • Key off. • NGS disconnected. • Sensor where VREF check failed disconnected. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between the SIG RTN circuit at the appropriate sensor vehicle harness connector and terminal 91 (SIG RTN) at the ECM (PCM) vehicle horness connector. • **Is resistance less than 5.0 ohms?**	Yes	Reconnect sensor. Go to next step.
		No	Service open SIG RTN circuit. Refer to the wiring diagram and DTCs received to help pinpoint the location of the open circuit. Rerun diagnostic trouble code inspection.
12	CHECK GROUND CIRCUITS IN ECM (PCM) • Key off. • NGS disconnected. • Measure resistance between the battery negative post and terminal 51, 77 and 103 (PWR GND) at the ECM (PCM) vehicle harnness connector. • **Is each resistance less than 5.0 ohm?**	Yes	Go to next step.
		No	Service open circuit. Reconnect all components. Rerun diagnostic trouble code inspection.
13	CHECK GROUND CIRCUITS IN ECM (PCM). • Key off. • NGS disconnected. • Disconnect and measure resistance between following terminals at the vehicle harness connector and ground. – ECT sensor terminal B – IAT sensor terminal B – TP sensor terminal C • **Is each resistance less than 5.0 ohms?**	Yes	SIG RTN/PWR GND circuits are okay in the harness and ECM (PCM). Verify results of previous test steps. Rerun diagnostic trouble code inspection to verify DTC/symptom
		No	Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.

STEP	INSPECTION		ACTION
14	CHECK VREF CONTINUITY TO ECM (PCM) • Key off. • Sensor where VREF check failed disconnected. • Disconnect ECM (PCM). Inspect for damaged or pushed out pins, corrosion, loose wires, etc. Service as necessary. • Measure resistance between terminal 90 (VREF) at the breakout box and the VREF circuit at the appropriate sensor vehicle harness connector. • **Is resistance less than 5.0 ohms?**	Yes	Replace ECM (PCM). Reconnect all components. Rerun diagnostic trouble code inspection.
		No	Service open VREF circuit. Refer to wiring diagram and DTCs received to help pinpoint the location of the open. Reconnect all components. Rerun diagnostic trouble code inspection.

TROUBLESHOOTING

FOREWORD

- Before proceeding with the following troubleshooting.
  (1) Refer to section GI to understand the basic troubleshooting procedure.
  (2) Perform the diagnostic trouble code inspection.
  (3) If the diagnostic trouble code displayed, proceed with inspection steps for the code.
  (4) When the engine can be started, perform "ENGINE TUNE-UP".

SYMPTOM TROUBLESHOOTING

- Confirm trouble symptom by using thte following diagnostic index, then go to appropriate troubleshooting chart.

TROUBLESHOOTING ITEM			DESCRIPTION
No.	TROUBLE		
1	Melts main or other fuse		—
2	Will not crank		Starter does not work
3	Hard start/long crank/erratic start/erratic crank		Starter cranks engine at normal speed but engine requires excessive cranking time before starting
4	Engine stalls	After start	Engine stops unexpectedly at idle and/or after start
		At idle	
5	Cranks normally but will not start		Starter cranks engine at normal speed but engine will not run
6	Slow return to idle		Engine takes more time than normal to return to idle speed
7	Engine runs rough/rolling idle	At idle	Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake
8	Fast idle/runs on		Engine speed continues at fast idle after warm-up Engine runs after ignition switch is turned off
9	Low idle/stalls during deceleration		Engine stops unexpectedly at beginning of deceleration or recovery from deceleration
10	Engine stalls/quits	Acceleration/cruise	Engine stops unexpectedly at beginning of acceleration or during acceleration Engine stops unexpectedly while cruising
	Engine runs rough	Acceleration/cruise	Engine speed fluctuates during acceleration or cruising
	Misses	Acceleration/cruise	Engine misses during acceleration or cruising
	Buck/jerk	Acceleration/cruise deceleration	Vehicle bucks/jerks during acceleration, cruising, or deceleration
	Hesitation/stumble	Acceleration	Momentary pause at beginning of acceleration, or during acceleration
	Surges	Acceleration/cruise	Momentary minor irregularity in engine output
11	Afterburn	Idle/acceleration/ deceleration	Sound produced from exhaust system
12	Lack/loss of power	Acceleration/cruise	Performance poor under load (i.e., power down when climbing hills)
13	Knocking/pinging	Acceleration/cruise	Sound produced when air/fuel mixture is ignited by something other than spark plug (i.e., hot spot in combustion chamber)
14	Poor fuel economy		Fuel economy unsatisfactory
15	Emissions compliance		Fails emissions test
16	Automatic transaxle concerns	Upshift/downshift/ engagement	Automatic transaxle concerns not related to engine performance
17	High oil consumption/leaks		Oil consumption excessive
18	Cooling system concerns	Overheating	Engine runs at higher than normal temperature/overheats
19	Cooling system concerns	Runs cold	Engine does not reach normal operating temperature
20	Exhaust smoke		Blue, black, or white smoke from exhaust system
21	Fuel odor (in engine compartment)		Gasoline fuel smell or visible leaks
22	Engine noise		Engine noise from under hood
23	Vibration concerns (engine)		Vibration from under hood or driveline
24	A/C does not work sufficiently		A/C compressor magnetic clutch does not engage when A/C is turned on
25	A/C always on/ A/C compressor runs continuously		A/C compressor magnetic clutch does not disengage
26	A/C does not cut off under wide open throttle conditions		A/C compressor magnetic clutch does not disengage under wide open throttle
27	Exhaust sulphur smell		Rotten egg smell (sulphur) from exhaust
28	Intermittent concerns		Symptom occurs randomly and is difficult to diagnose

Quick Diagnosis Chart

Troubleshooting item			Possible factor	No spark	Incorrect ignition timing	Excessive spark advance	No firing in some cylinders	No fuel supply	Insufficient fuel supply	Fuel injector restrained	Fuel injector clogged	No injection in some cylinders	Throttle position sensor malfunction	Low fuel pressure	Fuel pressure not held	START signal not input to PCM	Air sucked in	A/F lean during acceleration	Some fuel injector remains open	Excessive fuel injector operation time	Excessive fuel pressure	Fuel leakage from fuel injector	A/F rich during acceleration	IAC valve not operation	Open or short circuit between main relay IAC valve or between IAC valve-ECM (PCM)	IAC valve internal circuit open	IAC correction over limit	Intake air system clogged
				A/F Lean														A/F Rich						Insufficient intake air				
1	Melts main or other fuse			Battery power and/or reference voltage circuit short to ground, Determination																								
2	Will not crank																											
3	Hard start/long crank/erratic start/erratic crank						○	○	○	○		○	○	○	○						○						
4	Engine stalls	After start			○		○		○	○	○	○		○			○		○	○		○		○	○	○		○
		At idle			○		○		○	○	○	○		○			○		○	○		○		○	○	○	○	○
5	Cranks normally but will not start			○	○		○	○	○	○	○	○		○	○	○	○		○	○		○						○
6	Slow return to idle												○				○											
7	Engine runs rough at idle/rolling idle				○		○		○	○	○	○		○			○		○	○	○	○		○	○	○	○	○
8	Fast idle/runs on				○	○											○								○			
9	Low idle/stalls during deceleration						○						○				○							○	○	○		
10	Engine stalls/quits	Acceleration/cruise						○	○	○			○	○			○	○	○	○	○	○	○					
	Engine runs rough	Acceleration/cruise				○		○	○	○	○	○	○	○			○	○	○	○	○	○	○					
	Misses	Acceleration/cruise				○		○	○	○	○	○	○	○			○	○	○	○	○	○	○					
	Buck/jerk	Acceleration/cruise/deceleration				○		○	○	○	○	○	○	○			○	○	○	○	○	○	○					
	Hesitation/stumble	Acceleration				○		○	○	○	○	○	○	○			○	○	○	○	○	○	○					
	Surges	Acceleration/cruise				○		○	○	○	○	○	○	○			○	○	○	○	○	○	○					
11	After burn	Idle/acceleration/deceleration				○													○	○		○					○	
12	Lack/loss of power	Acceleration/cruise			○		○		○			○	○	○			○	○		○	○		○					○
13	Knocking/pinging	Acceleration/cruise				○								○							○							
14	Poor fuel economy				○		○							○						○	○							○
15	Emission compliance						○							○	○													
16	Automatic transaxle concens	Upshift/downshift/engagement		Refer to section K																								
17	High oil consumption/leaks																											
18	Cooling system concens	Overheating																										
19	Cooling system concens	Runs cold																										
20	Exhaust smoke					○					○		○								○	○						
21	Fuel odor (in engine compartment)																											
22	Engie noise																○											
23	Vibration concerns (engine)			Loose components, Misadjustment of engine mount, Uneven wire and wheel balance, Malfunction of suspension																								
24	A/C does not work sufficiently																											
25	A/C always on/A/C compressor runs continuously																											
26	A/C does not cut off under wide open throttle conditions											○																
27	Exhaust sulphur smell												○	○						○								
28	Intermittent concens			Open and/or short circuit intermittently, wrong signal outputs from electrical parts due to loosen parts or part vibration																								

Exhaust system clogged	Inert gas flow	Evaporative gas inflow	Evaporative gas leakage	Fuel leakage	Improper fuel	Low fuel octane number	Improper ECM (PCM) ground point	Not fuel cut during deceleration	Delayed fuel injection recovery timing	Incorrect fuel amount at fuel injection recovery	Knocking	Preignition	Overheating	Insufficient air flow	Inoperative radiator	Coolant leakage	Poor coolant circulatin	Possible factor / Troubleshooting item		
Battery power and/or reference voltage circuit short to ground, Determination																		Melts main or other fuse		1
																		Will not crank		2
○			○															Hard start/long crank/erratic start/erratic crank		3
○	○	○		○			○											Engine stalls	After start	4
○	○	○		○			○												At idle	
○		○		○			○											Cranks normally but will not start		5
																		Slow return to idle		6
○	○	○		○	○		○											Engine runs rough at idle/rolling idle		7
																		Fast idle/runs on		8
	○							○	○	○								Low idle/stalls during deceleration		9
		○					○				○							Engine stalls/quits	Acceleration/cruise	10
○	○	○			○		○				○							Engine runs rough	Acceleration/cruise	
○	○	○			○		○				○							Misses	Acceleration/cruise	
○	○	○					○				○							Buck/jerk	Acceleration/cruise/deceleration	
○	○	○					○				○							Hesitation/stumble	Acceleration	
○	○	○			○		○				○							Surges	Acceleration/cruise	
○								○	○	○								After burn	Idle/acceleration/deceleration	11
○	○				○		○				○		○					Lack/loss of power	Acceleration/cruise	12
					○	○					○	○	○					Knocking/pinging	Acceleration/cruise	13
○				○													○	Poor fuel economy		14
○		○															○	Emission compliance		15
Refer to section K																		Automatic transaxle concens	Upshift/downshift/engagement	16
																		High oil consumption/leaks		17
					○						○			○	○	○	○	Cooling system concens	Overheating	18
																	○	Cooling system concens	Runs cold	19
																○		Exhaust smoke		20
			○	○														Fuel odor (in engine compartment)		21
			○								○					○		Engie noise		22
Loose components, Misadjustment of engine mount, Uneven wire and wheel balance, Malfunction of suspension																		Vibration concems (engine)		23
																		A/C does not work sufficiently		24
																		A/C always on/A/C compressor runs continuously		25
																		A/C does not cut off under wide open throttle conditions		26
				○	○													Exhaust sulphur smell		27
Open and/or short circuit intermittently, wrong signal outputs from electrical parts due to loosen parts or part vibration																		Intermittent concens		28

Troubleshooting item		Possible factor	Engine coolant temperature gauge points H	Excessive mechanical resistance	Insufficient/no compression in all cylinders	Insufficient/no compression in some cylinders	High compression pressure	Excessive valve overlap	Incorrect valve timing	Insufficient starter power	Malfunction of starting system -related components	A/C load will not turn off	Excessive A/C load	Warning light malfunction	Clutch disc slippage (MTX)	Brake dragging	Low tire pressure	Discharged battery	In-mobilizer system operation inproperly	PCV valve operation inproperly	EGR system operation inproperly
1	Melts main or other fuse		Battery power and/or reference voltage circuit short to ground, Determination																		
2	Will not crank			○						○	○							○			
3	Hard start/long crank/erratic start/erratic crank									○								○		○	○
4	Engine stalls	After start				○		○	○											○	○	○
		At idle				○		○	○				○							○	○	○
5	Cranks normally but will not start				○	○		○	○											○		○
6	Slow return to idle																					
7	Engine runs rough at idle/rolling idle					○		○	○			○	○								○	○
8	Fast idle/runs on																					
9	Low idle/stalls during deceleration																					
10	Engine stalls/quits	Acceleration/cruise											○								○	○
	Engine runs rough	Acceleration/cruise				○		○	○				○								○	○
	Misses	Acceleration/cruise				○		○	○												○	○
	Buck/jerk	Acceleration/cruise/deceleration				○		○	○												○	○
	Hesitation/stumble	Acceleration				○		○	○												○	○
	Surges	Acceleration/cruise				○		○	○												○	○
11	After burn	Idle/acceleration/deceleration				○																
12	Lack/loss of power	Acceleration/cruise				○		○	○			○	○		○	○						○
13	Knocking/pinging	Acceleration/cruise				○	○														○	
14	Poor fuel economy					○									○	○	○					
15	Emission compliance					○															○	○
16	Automatic transaxle concens	Upshift/downshift/engagement	Refer to section K																			
17	High oil consumption/leaks																				○	
18	Cooling system concens	Overheating	○																			
19	Cooling system concens	Runs cold																				
20	Exhaust smoke					○			○												○	
21	Fuel odor (in engine compartment)																					
22	Engie noise																					
23	Vibration concerns (engine)		Loose components, Misadjustment of engine mount, Uneven wire and wheel balance, Malfunction of suspension																			
24	A/C does not work sufficiently												○									
25	A/C always on/A/C compressor runs continuously											○										
26	A/C does not cut off under wide open throttle conditions																					
27	Exhaust sulphur smell																					
28	Intermittent concens		Open and/or short circuit intermittently, wrong signal outputs from electrical parts due to loosen parts or part vibration																			

1	MELTS MAIN OR OTHER FUSE		
DESCRIPTION	—		
TROUBLESHOOTING HINTS	• Battery power and/or reference voltage circuit • Determination shorts to ground		
STEP	**INSPECTION**		**ACTION**
1	CHECK CONDITION OF FUSE • Remove the fuse. • Check condition of fuse. • **Is the fuse determitnated?**	Yes	Replace determinated fuse.
		No	If relay is burnt, go to next step.
2	CHECK BURND FUSE RELATED HARNESSES • If MAIN fuse is burnd, check following harness. – Main fuse-Generator • If BTN fuse is burnd, check following harness. – BTN fuse-ROOM fuse • If ROOM fuse burnd, check following harness. – ROOM fuse-ECM (PCM) terminal • If EGI INJ fuse is burnd, check following harnesses. – Main relay-Fuel injectors – Main relay-ECM (PCM) terminal – Main relay-PRC solenoid valve – Main relay-EGR valve – Main relay-Purge solenoid valve – Main relay-Mass air flow sensor • If ENGINE fuse is burnt, check following harnesses. – ENGINE fuse-Main relay – ENGINE fuse-Fuel pump relay • If METER fuse is burnd, check following harnesses. – METER fuse-Transaxle range switch • If WIPER fuse is burnd, check following harness. – WIPER fuse-Heated oxygen sensor • **Are these harnesses okay?**	Yes	Replace burnt fuse.
		No	Relair or replace wiring harness. Replace burnt fuse.

2	WILL NOT CRANK
DESCRIPTION	• Starter does not work
TROUBLESHOOTING HINTS	• Discharged battery • Malfunction of starting system • Malfunction of starter interlock switch (MTX) • Malfunction or misadjustment of TR sensor (ATX) • Malfunction of START circuit between battery and starter through ignition switch • Excessive mechanical resistance

STEP	INSPECTION		ACTION
1	Is a clicking sound heard from the starter when the ignition switch is turned to START?	Yes	Go to next step
		No	Go to step 3
2	Check the starting system Is the starting system okay?	Yes	Check for seized/hydrolocked engine, flywheel
		No	Service as required ☞ SECTION G, STARTING SYSTEM
3	*Do any other electrical accessories work?*	Yes	*Go to next step*
		No	Check the charging system
4	Retrieve and record any continuous memory diagnostic trouble code. Is any continuous memory diagnostic trouble code displayed.	Yes	Diagnostic trouble code No. displayed. Check for cause (Refer to related chart)
		No	No diagnostic trouble codes displayed Go to next step
5	Is any diagnostic trouble code displayed during Key On Engine Off inspection?	Yes	**Diagnostic trouble code No. displayed** Check for cause (Refer to related chart)
		No	*No diagnostic trouble codes displayed* Check the followings: • Ignition switch (START circuit) • Transaxle linkage adjustment • Transaxle range switch • Transaxle range switch adjustment If okay, go to next step
6	Verify test results. If okay, return to diagnostic index to service any additional symptoms		

3	HARD START/LONG CRANK/ERRATIC START/ERRATIC CRANK		
DESCRIPTION	• Starter cranks engine at normal speed but engine requires excessive cranking time before start • Battery in normal condition		
TROUBLESHOOTING HINTS	• Fuel injector restrained or clogged • Fuel leakage from injector • Malfunction of fuel pump and/or circuit • Malfunction of fuel pressure regulator • Fuel line include fuel filter clogged • Exhaust system clogged • Malfunction of PCV valve		• Malfunction of mass air flow sensor and/or circuit • Malfunction of EGR system • Discharged battery • Malfunction of starting system • Malfunction of evaporative emission control system and/or circuit
STEP	**INSPECTION**		**ACTION**
1	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection, Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code no. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
2	Connect a jumper wire between F/P terminal at data link connector and ground Is fuel line pressure correct with ignition switch ON? **Fuel line pressure** **260—310 kPa {2.6—3.2 kgf/cm^2 , 37—46 psi }**	Yes	Go to next step
		No	**Zero or low:** • Check fuel pump circuit • Check pressure regulator diaphragm **High:** • Check pressure regulator for high pressure cause ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection • Check for clogged fuel return line
3	Is fuel line pressure held after ignition switch is turned off? **Fuel line pressure** **More than 150 kPa {1.5 kgf/cm^2 , 21 psi } for 5 min.**	Yes	Go to next step
		No	Check pressure regulator diaphragm condition If condition is okay, check fuel injector If condition is not okay, replace pressure regulator
4	Disconnect the vacuum hose from the pressure regulator and plug hose. Start the engine. Does the fuel line pressure remain within ±20 kPa {0.21 kgf/cm^2, 3 psi} while driving vehicle?	Yes	Go to next step
		No	Check for clogged fuel filter
5	Connect the vacuum hose to the pressure regulator. Install a vacuum gauge to the intake manifold. Start the engine. Does fuel pressure gauge reading increase as the vacuum gauge reading decreases and/or does fuel pressure gauge reading decrease as the vacuum gauge reading increases?	Yes	Go to next step
		No	Connect vacuum pump to pressure regulator. Start the engine. Check that fuel pressure reading changed as vacuum changes • If changes, check vacuum line • If no change, replace pressure regulator
6	Is idle speed correct? ☞ ENGINE TUNE-UP, IDLE SPEED ADJUSTMENT	Yes	Go to next step
		No	Adjust idle speed ☞ ENGINE TUNE-UP, IDLE SPEED ADJUSTMENT
7	Is there a restriction in the exhaust system?	Yes	Check exhaust system
		No	Go to next step
8	Remove PCV valve and shake PCV valve. Does PCV valve rattle?	Yes	Go to next step
		No	Replace PCV valve
9	Check for contaminated mass air flow sensor. Is there any contamination?	Yes	Replace the mass air flow sensor
		No	Go to next step

STEP	INSPECTION		ACTION
10	Crank the engine condition while tapping the EGR control valve housing. Does the engine condition improve?	Yes	Check for the loosen connector or poor contact of the terminals If okay, remove the EGR valve and perform the visual inspection for the mechanical stuck of the EGR control valve
		No	Check the continuity of stepping motor coil If okay, go to next step
11	Check starting system ☞ SECTION G, STARTING SYSTEM Is starting system normal?	Yes	Verify test results If okay, return to diagnostic index to service any additional symptoms
		No	Repair or replace components as required

4	ENGINE STALLS	• AFTER START • AT IDLE

DESCRIPTION	• Engine stops unexpectedly at idle and/or after start
TROUBLESHOOTING HINTS	• Incorrect ignition timing • Malfunction of ignition system and circuit • Fuel injector restrained or clogged • Fuel injector remains open • Fuel leakage from fuel injector • Malfunction of fuel pump and/or circuit • Malfunction of fuel pressure regulator • Malfunction of Idle air control valve and/or circuit • Malfunction of in-mobilizer system (DTC 1624) and/or circuit • Excessive A/C load due to malfunction of A/C system • Exhaust system clogged • Air leakage or clogged in intake air system • Low engine compression • Malfunction of EGR system and/or circuit • Poor powertrain control module ground circuit • Malfunction of evaporative emission control system and/or circuit

STEP	INSPECTION		ACTION
1	**Note:** The following test should be performed on the vehicle equipped immobilizer system. Skip this test for the non-immobilizer system equipped vehicle. Attempt to start the engine at least four times Then, retrieve and record any continuous memory diagnostic trouble code Is code No. stored?	Yes	Go to on-board diagnostic inspection
		No	Go to next step
2	Does the vehicle now stall at idle in park/neutral with all accessories off?	Yes	Go to step 4
		No	Go to next step
3	Retrieve and and record any continuous memory, Key On Engine OFF and Key On Engine Running diagnostic trouble code. If stall, retrieve continuous memory and Key On Engine Off diagnostic trouble code. Is any diagnostic trouble code displayed?	Yes	**Diagnostic trouble code no. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to Step 13
4	Retrieve and record any continuous memory and Key On Engine Off diagnostic trouble code. Is any diagnostic trouble code displayed?	Yes	**Diagnostic trouble code no. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
5	Attempt to start engine at part throttle Will engine run smooth at part throttle?	Yes	Check idle air control valve and wiring harness
		No	Go to next step
6	Is strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	• Go to next step • If symptom occurs during A/C ON, go to step 13
		No	Check follows: ☞ SECTION G, IGNITION SYSTEM • Ignition coid • High-tension lead(s) • Wiring harness for ignition system • Spark plug swamp, damage • Crankshaft position sensor
7	Are spark plugs okay? ☞ SECTION G, IGNITION SYSTEM	Yes	Go to next step
		No	Clean or replace
8	Remove PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next step
		No	Replace PCV valve
9	Is there a restriction in the exhaust system?	Yes	Check exhaust system
		No	Go to next step

STEP	INSPECTION		ACTION
10	Connect a jumper wire between F/P terminal at data link connector and a ground. Is fuel line pressure correct when the ignition switch is cycled ON and OFF? **Fuel line pressure** **260—310 kPa {2.6—3.2 kgf/cm^2 , 37—46 psi }**	Yes	Go to next step
		No	**Zero or low:** • Check fuel pump circuit • Check pressure regulator diaphragm **High:** • Check pressure regulator for high pressure cause ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection • Check for clogged fuel return line
11	Visually look for fuel leakage at fuel injector O-ring, pressure regulator, and fuel line. Service as necessary. Is fuel line pressure held after ignition switch is turned OFF? **Fuel line pressure** **More than 150 kPa {1.5 kgf/cm^2, 21 psi}** ☞ SYSTEM INSPECTION, Fuel Pressure Hold Inspection	Yes	Go to next step
		No	Check pressure regulator diaphragm condition • If condition is okay, check fuel injector ☞ FUEL SYSTEM, FUEL INJECTOR RESISTANCE INSPECTION, FUEL INJECTOR INSPECTION • If condition is not okay, replace pressure regulator ☞ FUEL SYSTEM, PRESSURE REGULATOR REMOVAL/INSTALLATION
12	Does EGR valve seat properly (fully closed)?	Yes	Go to next step
		No	Replace EGR valve
13	**Note:** The following test is for stall concern with the A/C to ON. If other symptom exists, go to next step. Connect pressure gauge to A/C line. Start the engine and run it at idle. Turn A/C ON. Measure low side and high side pressures. Are the pressure within specification?	Yes	Go to next step
		No	Check followings: • Refrigerant charging amount • A/C pressure switch • Condenser fan operation • Evaporator thermo sensor • A/C relay
14	Is air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace
		No	Go to next step
15	Is engine compression correct? ☞ SECTION B, COMPRESSION INSPECTION	Yes	Go to next step
		No	Check for cause
16	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

5	CRANKS NORMALLY BUT WILL NOT START
DESCRIPTION	• Starter cranks engine at normal speed but engine will not run • Refer to "ENGINE STALLS" if this symptom appears after engine stall • Fuel in tank • Battery in normal condition
TROUBLESHOOTING HINTS	• Incorrect ignition timing • Malfunction of ignition system and/or circuit • Malfunction of crankshaft position sensor and/or circuit • Malfunction of camshaft position sensor and/or circuit • Fuel injector restrained or clogged • Fuel injector remains open • Fuel leakage from fuel injector • Malfunction of fuel pump and/or circuit • Malfunction of fuel pressure regulator • Malfunction of immobilizer system (DTC 1624) and/or circuit • Air leakage or clogged in intake air system • Exhaust system clogged • Low engine compression • Poor powertrain control module ground circuit • Malfunction of evaporative emission control system and/or circuit • Malfunction of EGR system and/or circuit • Short circuit between powertrain control module and FEPS at data link connector

STEP	INSPECTION		ACTION
1	**Note:** The following test should be performed on the vehicle equipped immobilizer system. Skip this test for the non-immobilizer system equipped vehicle. Attempt to start the engine at least four time. Then, retrieve and record any continuous memory diagnostic trouble code. Is code No. stored?	Yes	Go to on-board diagnostic inspection
		No	Go to next step
2	Retrieve and not any continuous memory and Key On Engine Off diagnostic trouble code. Is any diagnostic trouble code displayed?	Yes	**Diagnostic trouble code no. displayed or no diagnostic trouble codes displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
3	Does engine start now with the throttle closed?	Yes	Go to step 7
		No	Go to next step
4	Will the engine start and run smoothly at part throttle?	Yes	Check idle air control valve and wiring harness
		No	Go to next step
5	Connect NGS tester to data link connector Turn the ignition switch to ON . Access VPWP PID. Is VPWR PID reading the battery voltage?	Yes	Go to next step
		No	Check open circuit in power circuit between battery to ECM (PCM)
6	Disconnect the throttle position sensor connector. Is there correct voltage at throttle position sensor connector terminal A with the ignition switch ON? **Specification** **4.5—5.5 V**	Yes	Go to next step
		No	Check short to ground in VREF circuit between throttle position sensor and ECM (PCM)
7	Disconnect NGS tester. Turn the ignition switch to ON. Check terminal voltage of "IG-" at data link connector. Is reading voltage greater than 9 V?	Yes	Go to next step
		No	Check short to ground in "IG-" line between data link connector and ECM (PCM)

STEP	INSPECTION		ACTION
8	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	Go to step 5
		No	Check follows: • Crankshaft position sensor and related wire harness • Camshaft position sensor and related wire harness • Power circuit between ignition switch and ignition coil • Circuits between ignition coil and ECM (PCM) • Condenser • Ignition coil • Spark plug • High tension leads
9	Connect a jumper wire between F/P terminal at the data link connector and a ground. Is fuel line pressure correct when the ignition switch is cycled ON and OFF 5 times? **Fuel line pressure** **260—310 kPa {2.6—3.2 kgf/cm^2 , 37—46 psi }**	Yes	Go to next step
		No	Zero or low: • Check fuel pump circuit • Check pressure regulator diaphram High: • Check pressure regulator for high pressure cause • Check for clogged fuel return line
10	Visually look for fuel leakage at fuel injector O-ring, pressure regulator, and fuel line. Service as necessary. Connect a jumper wire between F/P terminal at the data link connector and a ground. Is fuel line pressure held after ignition switch tuned off? **Fuel line pressure** **More than 150 kPa {1.5 kgf/cm^2 , 21 psi }** **for 5 min.**	Yes	Go to next step
		No	Check pressure regulator diaphragm condition • If condition is okay, check fuel injector ☞ FUEL SYSTEM, FUEL INJECTOR RESISTANCE INSPECTION, FUEL INJECTOR INSPECTION • If condition is not okay, replace pressure regulator ☞ FUEL SYSTEM, PRESSURE REGULATOR REMOVAL/INSTALLATION
11	Crank engine for 5 sec. Does pressure drop more than 34 kPa {0.35 kgf/cm^2, 5 psi} by the end of five second crank cycle?	Yes	Go to next step
		No	Check resistance of fuel injector(s) ☞ FUEL SYSTEM, FUEL INJECTOR RESISTANCE INSPECTION • If resistance is okay, check follows: • Fuel injector drive signal • Injection flow rate • ECM (PCM) • If resistance is not okay, check follows: • Open circuit in fuel injector circuit
12	Crank the engine condition while tapping the EGR control valve housing. Does the engine condition improve?	Yes	Check for the loosen connector or poor contact of the terminals If okay, remove the EGR valve and perform the visual inspection for the mechanical stuck of the EGR control valve
		No	Check the continuity of stepping motor coil If okay, go to next step
13	Is there a restriction in exhaust system?	Yes	Check exhaust system
		No	Go to next step
14	Is engine compression correct? ☞ SECTION B, COMPRESSION INSPECTION	Yes	Go to next step
		No	Check for causes
15	Verify test result. If okay, return to diagnostic index to service any additional symptoms		

6	SLOW RETURN TO IDLE		
DESCRIPTION	• Engine takes more time than normal to return to idle speed		
TROUBLESHOOTING HINTS	• Air leakage in intake air system • Malfunction of throttle body		• Malfunction of throttle position sensor and/or circuit • Malfunction of engine coolant temperature sensor and/or circuit
STEP	**INSPECTION**		**ACTION**
1	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed or no diagnostic trouble codes displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
2	Is the throttle body free of contamination?	Yes	Go to next step
		No	Clean or replace the throttle body
3	Is air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace
		No	Go to next step
4	Verify test results. If okay, return to diagnostic index to service any additional symptoms		

7	ENGINE RUNS ROUGH/ROLLING IDLE	• AT IDLE
DESCRIPTION	• Engine speed fluctuates between specified idle speed and lower speed and excessive engine shake • Idle speed too slow and excessive engine shake	
TROUBLESHOOTING HINTS	• Incorrect ignition timing • Malfunction of ignition system and/or circuit • Fuel injector restrained or clogged • Fuel injector remains open • Fuel leakage from injector • Malfunction of fuel pump and /or circuit • Malfunction of fuel pressure regulator • Malfunction of idle air control valve and/or circuit • Air leakage or clogged in intake air system • Exhaust system clogged	• Low engine compression • Poor powertrain control module ground circuit • Malfunction of evaporative emission control system and/or circuit • Malfunction of EGR system and/or circuit • Excessive A/C load due to malfunction of A/C system • Malfunction of PCV valve • Malfunction of power steering pressure switch and/or circuit

STEP	INSPECTION		ACTION
1	Retrieve and record any continuous memory, Key On Engine OFF and Key On Engine Running. Is any diagnostic trouble code displayed? during Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed or no diagnostic trouble codes displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
2	**Note:** The following test is for runs rough at with the A/C ON. If other symptom exists, go to next step. Connect pressure gauge to A/C line Start the engine and run it at idle. Turn A/C ON. Measure low side and high side pressures Are the pressure within specification?	Yes	Go to next step
		No	Check follows: • Refrigerant charging amount • A/C pressure switch • Condenser fan operation • Evaporator thermo sensor • A/C relay
3	**Note:** The following test is for runs rough with P/S ON. If other symptom exists, go to next step. Turn the ignition switch to ON. Disconnect power steering pressure switch connector. Measure voltage at connector. Is voltage greater than 10 V?	Yes	Check power steering pressure switch
		No	Check for open or short to ground at P/S pressure switch related circuit. Go to next step
4	Start the engine and disconnect the idle air control valve connector Does the rpm drop or does the engine stall?	Yes	Go to next step
		No	Check the idle air control valve and wiring harness
5	Connect NGS tester to data link connector Start the engine and run it at idle. Access LONGFT1 PID. Measure the LONGFT1 PID at idle. Is PID within specification? **Specification** **(-)20%—(+)27%**	Yes	Go to next step
		No	LONGFT1 PID is out of specification **Less than specification (Too Rich) :** Go to next step for check evaporative emission control system If system is okay, go to step 8 **Greater than specification (Too Lean) :** Check for air leakage at intake air system components If system is okay, go to step 8
6	Check for opens (hoses) between engine vacuum port and charcoal canister. Is a fault detected?	Yes	Go to next step
		No	Go to step 8
7	Check purge solenoid valve Is the solenoid valve operating properly? ☞ SYSTEM INSPECTION Purge Control Inspection	Yes	Go to next step
		No	Repair or replace

STEP	INSPECTION		ACTION
8	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ SYSTEM INSPECTION, Fuel Line Pressure Inspection **Fuel line pressure** **210—260 kPa {2.1—2.6 kgf/cm², 30—37 psi }**	Yes	Go to next step
		No	**Low:** • Check pressure regulator diaphragm • Check fuel pump maximum pressure **High:** • Check pressure regulator for high pressure cause • Check for clogged fuel return line
9	Is fuel line pressure held after ignition switch turned ON? **Fuel line pressure** **More than 150 kPa {1.5 kgf/cm², 21 psi } for 5 min,**	Yes	Go to next step
		No	Check pressure regulator diaphragm condition • If condition is okay, check fuel injector • If condition is not okay, replace pressure regulator
10	Remove PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next step
		No	Replace PCV valve
11	Are spark plugs okay?	Yes	Go to next step
		No	Clean or replace
12	Is there a restriction in the exhaust system?	Yes	Check exhaust system
		No	Go to next step
13	Does EGR valve seat properly (fully closed)?	Yes	Go to next step
		No	Replace EGR valve
14	Is engine compression correct? ☞ SECTION B, COMPRESSION INSPECTION	Yes	Go to next step
		No	Check for cause
15	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

8	FAST IDLE/RUNS ON
DESCRIPTION	• Engine speed continues at fast idle after warm-up • Engine runs after ignition switch is turned off
TROUBLESHOOTING HINTS	• Incorrect ignition timing • Air leakage in intake air system • Malfunction of idle air control valve and/or circuit

STEP	INSPECTION		ACTION
1	Connect NGS tester to data link connector. Access ECT PID. Start the engine. Warm up the engine at normal operating temperature and run it at idle. Is ECT PID reading between 112 °C {234 °F } and 82 °C {180 °F }?	Yes	Go to next step
		No	Go to flow chart 18 for engine overheating Go to flow chart 19 for a runs cold condition
2	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed or no diagnostic trouble codes displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
3	Is there air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace parts as necessary
		No	Go to next step
4	Verify test results. If okay, return to diagnostic index to service any additional symptoms		

9	LOW IDLE/STALLS DURING DECELERATION
DESCRIPTION	• Engine stops unexpectedly at beginning of deceleration or recovery from deceleration
TROUBLESHOOTING HINTS	• Malfunction of ignition system and circuit • Malfunction of throttle position sensor and/or circuit • Air leakage or clogged in intake air system • Malfunction of evaporative emission control system and/or circuit • Malfunction of idle air control valve and/or circuit

STEP	INSPECTION		ACTION
1	Does the engine idle rough?	Yes	Go to flow chart 7
		No	Go to next step
2	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection, Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code no. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next Step
3	Does idle speed drop in the following conditions? **Condition** • **Air conditioner ON**	Yes	Check as follows: • Circuit from idle air control valve to ECM (PCM) for open or short • Idle air control valve for sticking If okay, go to next step
		No	Check follows: • Ignition coil connector • Fuel pump connector • Main relay • ECM (PCM) connector
4	Connect NGS tester to data link connector. Access LONGFT1 PID, TP V PID and MAF PID. Are PIDs proper reading?	Yes	Go to next step
		No	Check for cause **LONGFT1 PID:** Check air leakage, evaporative emission system operation or fuel line pressure **TP V PID:** Check for throttle sensor **MAF PID:** Check for mass air flow sensor

10	ENGINE STALLS/QUITS ENGINE RUNS ROUGH MISSES BUCK/JERK HESITATION/STUMBLE SURGES	• ACCELERATION/CRUISE • ACCELERATION/CRUISE • ACCELERATION/CRUISE • ACCELERATION/CRUISE/DECELERATION • ACCELERATION • ACCELERATION/CRUISE

DESCRIPTION	• Engine stops unexpectedly at beginning of acceleration or during acceleration • Engine stops unexpectedly while cruising • Engine speed fluctuates during acceleration or cruising • Engine misses during acceleration or cruising • Vehicle bucks/jerks during acceleration, cruising, or deceleration • Momentary pause at beginning of acceleration or during acceleration • Momentary minor inregularity in engine output
TROUBLESHOOTING HINTS	• Malfunction of ignition system and/or circuit • Malfunction of crankshaft position sensor and/or circuit • Fuel injector restrained or clogged • Fuel injector remains open • Fuel leakage from fuel injector • Malfunction of fuel pump and/or circuit • Malfunction of fuel pressure regulator • Malfunction of throttle body • Exhaust system clogged • Low engine compression • Malfunction of evaporative emission control system and/or circuit • Poor powertrain control module ground circuit • Excessive A/C load due to malfunction of A/C system • Malfunction of PCV valve • Malfunction of EGR control system and/or circuit • Clutch (MTX) or ATX internal parts slippage

STEP	INSPECTION		ACTION
1	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed** Check for cause (Refer to related harness)
		No	**No diagnostic trouble code displayed** Go to next step
2	Remove data link connector from the vehicle connect NGS tester to data link connecter. Access LONGFT1 PID, VPWR PID, MAF PID, TPV PID and VSS PID. Drive the vehicle witch monitoring PIDs. Are PID valves within specification?	Yes	Go to next step
		No	Check for cause: **LONGFT1 PID:** Check air leakage, evaporative emission system operation or fuel pressure **MAF PID:** Check for mass air flow sensor and related harness **VPWR PID:** Check for open intermittently **TPV PID:** Throttle sensor and related harness **VSS PID:** Vehicle speed sensor and related harness
3	Verify diagnostic trouble code of traction control system. Is diagnostic trouble code displayed?	Yes	Go to section P for diagnosis
		No	Go to next step
4	Disconnect EGR valve connector. Is drive symptom eliminated?	Yes	Check as follows: • EGR valve for sticking
		No	Go to next step
5	Start engine and run it at idle. Measure fuel line pressure at idle. Is fuel line pressure correct at idle? ☞ SYSTEM INSPECTION, Fuel Line Pressure Inspection **Fuel line pressure** **210—260 kPa {2.1—2.6 kgf/cm^2 , 30—37 psi }**	Yes	Go to next step
		No	**Low:** • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ FUEL SYSTEM, FUEL PUMP INSPECTION, Fuel Pump Maxmum Pressure **High:** • Check pressure regulator for high pressure cause • Check for clogged fuel return line

STEP	INSPECTION		ACTION
6	Is fuel line pressure held after ignition switch turned off? **Fuel line pressure** **More than 150 kPa {1.5 kgf/cm^2 , 21 psi } for 5 min.**	Yes	Go to next step
		No	Check pressure regulator diaphragm • If condition is okay, check fuel injector ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection • If condition is not okay, replace pressure regulator
7	Run engine at 2000 rpm for two minutes. Are diagnostic trouble codes present?	Yes	Check heated oxygen sensor wiring harness
		No	Check heated oxygen sensor heater *If okay, go to next step*
8	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	Check spark plugs and crankshaft position sensor • If okay, go to next step • If not okay, clean or replace spark plug or readjust crankshaft position sensor
		No	Check follows: ☞ SECTION G, IGNITION SYSTEM • High-tension leads • Ignition coil and connector
9	Check that throttle lever is resting on throttle valve stop screw and/or throttle valve orifice plug. Are any faults present?	Yes	Adjust as necessary
		No	Go to next step
10	Remove PCV valve and shake PCV valve. Does PCV valve rattle?	Yes	Go to next step
		No	Replace PCV valve
11	Is there a restriction in the exhaust system?	Yes	Check exhaust system
		No	Go to next step
12	Check for opens (hoses) between engine vacuum port and charcoal canister. Is a fault detected?	Yes	Replace vacuum hose Go to next step
		No	Go to step 14
13	Check purge solenoid valve. Is the solenoid valve operating properly? **☞ SYSTEM INSPECTION, Purge Control Inspection**	Yes	Go to next step
		No	Replace the purge solenoid valve
14	Measure resistance of the heated oxygen sensor heater. Is the resistance within specification? **Resistance** **Approx. 6 Ω**	Yes	Go to next step
		No	Replace heated oxygen sensor
15	Measure voltage of heated oxygen sensor heater. Is voltage more than 10.5 V?	Yes	Go to section B If engine okay, go to next step
		No	Check heated oxygen sensor heater circuit
16	**Note:** The following test is for symptom with cruise control ON. If other symptom exists, go to next step. Check for cruise control system. Is cruise control system okay?	Yes	Go to next step
		No	Repair or replace
17	Check follows: • Engine timing belt • Transaxle internal part (ATX) • Clutch (MTX) Is fault indicated?	Yes	Go to next step
		No	Repair or replace
18	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

11	AFTERBURN		• IDLE/ACCELERATION/DECELERATION
DESCRIPTION	• Sound produced from exhaust system		
TROUBLESHOOTING HINTS	• Malfunction of ignition system and/or circuit • Fuel leakage from fuel injector • Malfunction of camshaft position sensor and/or circuit		• Exhaust system clogged • Malfunction of throttle body • Low engine compression
STEP	**INSPECTION**		**ACTION**
1	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection, Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
2	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	Check spark plugs and camshaft position sensor • If okay, go to next step • If not okay, clean or replace spark plug or readjust camshaft posion sensor
		No	Check follows: ☞ SECTION G, IGNITION SYSTEM • High-tension leads • Ignition coil and connector
3	Is there restriction in the exhaust system?	Yes	Check exhaust system
		No	Go to next step
4	Is engine compression correct? ☞ SECTION B, COMPRESSION INSPECTION	Yes	Go to next step
		No	Check for cause
5	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

12	LACK/LOSS OF POWER	• ACCELERATION/CRUISE
DESCRIPTION	• Performance poor under load (i.e., power down when climbing hills)	
TROUBLESHOOTING HINTS	• Malfunction of ignition system and/or circuit • Fuel injector restrained or clogged • Malfunction of fuel pump and/or circuit • Malfunction of fuel pressure regulator • Malfunction of throttle position sensor • Air leakage or clogged in intake air system • Malfunction of evaporative emission control system and/or circuit • Poor powertrain control module ground circuit	• Malfunction of idle air control valve and circuit • Exhaust system clogged • Engine overheating • Malfunction of EGR system and/or circuit • Brake dragging • Clutch (MTX) or ATX internal parts slippage • Excessive A/C load due to malfunction of A/C system • Malfunction of traction control system

STEP	INSPECTION		ACTION
1	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
2	Remove the data link connector from the vehicle. Connect NGS tester to data link connector. Access LONGFT1 PID, VPWR PID, MAF PID and VSS PID. Drive the vehicle with monitoring PIDs. Are PID values within specification?	Yes	Go to next step
		No	Check for cause **LONKFT1 PID:** Check air leakage, evaporative emission system operation or fuel line pressure **MAF PID:** Check for mass air flow sensor and related harness **VSS PID:** Check for vehicle speed sensor and related harness **VPWR PID:** Check for open circuit intermittently
3	Verify diagnositic trouble code for traction control system. Is diagnostic trouble code displayed?	Yes	Go to section P for diagnosis
		No	Go to next step
4	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	Check spark plugs or camshaft position sensor • If okay, go to next step • If not okay, clean or replace spark plug or readjust camshaft posion sensor
		No	Check follows: ☞ SECTION G, IGNITION SYSTEM • High-tension leads • Ignition coil and connector
5	Start engine and run it at idle. Measure fuel line pressure at idle. Is fuel line pressure correct at idle? ☞ SYSTEM INSPECTION, Fuel Line Pressure Inspection **Fuel line pressure:** **210—260 kPa {2.1—2.6 kgf/cm^2, 30—37 psi}**	Yes	Go to next step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ FUEL SYSTEM, FUEL PUMP INSPECTION, Fuel Pump Maximum Pressure High: • Check pressure regulator for high pressure cause ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection • Check for clogged fuel return line

STEP	INSPECTION		ACTION
6	Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned ON?	Yes	Go to next step
		No	Check pressure regulator for high pressure cause ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection
7	Is there a restriction in the exhaust system?	Yes	Check exhause system
		No	Go to next step
8	Is there air leakage felt or heard at intake air system components while racing engine to higher speed?	Yes	Repair or replace
		No	Go to next step
9	Is engine compression correct? ☞ SECTION B, COMPRESSION INSPECTION	Yes	Go to next step
		No	Check for cause
10	Is the brake system functioning properly?	Yes	Go to next step
		No	Check for cause
11	Does EGR valve seat properly?	Yes	Go to next step
		No	Check follows: • EGR valve malfunction • EGR flange gasket leaking • EGR valve attaching nuts or bolts loose or missing • EGR valve comtamination
12	Check for A/C cut-off operation Is operation properly?	Yes	Go to next step
		No	Check the A/C system
13	Check follows: • Engine timing belt • Automatic transaxle (slippage) • Clutch Is fault indicated?	Yes	Repair or replace
		No	Go to next step
14	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

13	KNOCKING/PINGING	• ACCELERATION/CRUISE
DESCRIPTION	• Sound produced when air/fuel mixture is ignited by something other than spark plug (i.e., hot spot in combustion chamber)	
TROUBLESHOOTING HINTS	• Malfunction of engine coolant temperature sensor and/or circuit • Malfunction of ignition system and circuit • Fuel leakage from fuel injector • Low engine compression	• Malfunction of PCV valve • Malfunction of fuel pump and circuit • Malfunction of fuel pressure regulator • Malfunction of knocking sensor and circuit

STEP	INSPECTION		ACTION
1	Remove the data link connector from the vehicle. Connect the NGS tester to data link connector. Access ECT PID. Verify ECT PID is less than 116 °C {240 °F } during driving. Is ECT PID less than specification?	Yes	Go to next step
		No	Inspect cooling system for cause of overheating
2	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection. Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
3	Is engine compression correct? ☞ SECTION B, COMPRESSION INSPECTION	Yes	Go to next step
		No	Check for cause
4	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ SYSTEM INSPECTION, Fuel Line Pressure Inspection **Fuel line pressure:** **210—260 kPa {2.1—2.6 kgf/cm^2, 30—37 psi}**	Yes	Go to next step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ FUELSYSTEM, FUEL PUMP INSPECTION, Fuel Pump Maximum Pressure High: • Check pressure regulator for high pressure cause ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection • Check for clogged fuel return line
5	Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned ON? ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection	Yes	Go to next step
		No	Check pressure regulator for high pressure cause ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection
6	Is knock sensor function propeerly?	Yes	Check ignition timing If timing is okay, go to next step
		No	Replace knock sensor
7	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

14	POOR FUEL ECONOMY		
DESCRIPTION	• Fuel economy unsatisfactory		
TROUBLESHOOTING HINTS	• Incorrect ignition timing • Malfunction of fuel pump and/or circuit • Malfunction of fuel pressure regulator • Clogged in intake air system • Exhaust system clogged • Malfunction of cooling system	• Low engine compression • Brake dragging • Clutch (MTX) or ATX internal parts slippage • Low tire pressure • Charcoal canister full of fuel	
STEP	**INSPECTION**		**ACTION**
1	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
2	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? **Fuel line pressure** **210—260 kPa {2.1—2.6 kgf/cm², 30—37 psi}**	Yes	Go to next step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ FUELSYSTEM, FUEL PUMP INSPECTION, Fuel Pump Maximum Pressure High: • Check pressure regulator for high pressure cause ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection • Check for clogged fuel return line
3	Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned ON? ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection	Yes	Go to next step
		No	Check pressure regulator for high pressure cause ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection
4	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	Check spark plugs • If okay, go to next step • If not okay, clean or replace spark plug
		No	Check follows: ☞ **SECTION G, IGNITION SYSTEM** • High-tension leads • Ignition coil and connector
5	Is there a restriction in the exhaust system?	Yes	Check exhause system
		No	Go to next step
6	Does the engine cooling system function properly? ☞ SYSTEM INSPECTION, Cooling Fan Control Inspection, Condenser Fan Control Inspection	Yes	Go to next step
		No	Check for cause
7	Remove the PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next step
		No	Replace PCV valve
8	Is the brake system functioning properly?	Yes	Go to next step
		No	Check for cause
9	Is engine compression correct? ☞ SECTION B, COMPRESSION INSPECTION	Yes	Go to next step
		No	Check for cause
10	Check for contaminated mass air flow sensor. Is there any contamination?	Yes	Replace the mass air flow sensor
		No	Go to next step
11	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

15	EMISSIONS COMPLIANCE
DESCRIPTION	• Fails emission test
TROUBLESHOOTING HINTS	• Malfunction of ignition system and/or circuit • Malfunction of fuel pump and/or circuit • Malfunction of fuel pressure regulator • Malfunction of exhaust system • Malfunction of PCV valve • Charcoal canister full of fuel • Malfunction of EGR control system and/or circuit • Malfunction of evaporative emission control system and/or circuit • Malfunction of cooling system • Low engine compression

STEP	INSPECTION		ACTION
1	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed or no diagnostic trouble codes displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
2	Is any other drivability concern present?	Yes	Go to appropreate flow chart
		No	Go to next step
3	Access ECT PID. Verify ECT PID is within range. Is the engine running at the proper operating temperature?	Yes	Go to next step
		No	Check cooling system or cause
4	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	Check spark plugs • If okay, go to next step • If not okay, clean or replace spark plug
		No	Check follows: ☞ SECTION G, IGNITION SYSTEM • High-tension leads • Ignition coil and connector
5	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection **Fuel line pressure** **210—260 kPa {2.1—2.6 kgf/cm^2, 30—37 psi}**	Yes	Go to next step
		No	**Low:** • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ FUELSYSTEM, FUEL PUMP INSPECTION, Fuel Pump Maximum Pressure **High:** • Check pressure regulator for high pressure cause ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection • Check for clogged fuel return line
6	Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned okay? ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection	Yes	Go to next step
		No	Check pressure regulator for high pressure cause ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection
7	Remove the PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next step
		No	Replace PCV valve
8	Check charcoal canister for fuel saturation Is excess amount of liquid fuel present in canister?	Yes	Replace charcoal canister
		No	Check fuel tank vent system Go to next step
9	Is there a restriction in the exhaust system?	Yes	Check exhause system
		No	Go to next step

STEP	INSPECTION		ACTION
10	Does EGR valve seat properly?	Yes	Go to next step
		No	Check follows: • EGR valve malfunction • EGR flange gasket leaking • EGR valve attaching nuts or bolts loose or missing • EGR valve comtamination
11	Is engine compression correct? ☞ SECTION B, COMPRESSION INSPECTION	Yes	Go to next step
		No	Check for cause
12	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

17	HIGH OIL CONSUMPTION/LEAKS		
DESCRIPTION	• Oil consumption excessive		
TROUBLESHOOTING HINTS	• Malfunction of PCV valve	• Engine oil leakage	

STEP	INSPECTION		ACTION
1	Remove PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next step
		No	Replace PCV valve
2	Is blue smoke coming from exhaust?	Yes	Check for cause
		No	Go to next step
3	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

18	COOLING SYSTEM CONCERNS		• OVERHEATING
DESCRIPTION	• Engine runs at higher than normal temperature/overheats		
TROUBLESHOOTING HINTS	• Malfunction of cooling system include restricted of air flow through radiator • Coolant leakage		• Malfunction of engine coolant temperature gauge, sensor or circuit
STEP	**INSPECTION**		**ACTION**
1	Is drive belt okay? ☞ SECTION B, DRIVE BELT, DRIVE BELT INSPECTION	Yes	Go to next step
		No	Replace drive belt ☞ SECTION B, DRIVE BELT, DRIVE BELT ADJUSTMENT
2	Is cooling system operating properly? ☞ **SYSTEM INSPECTION, Cooling Fan Control Inspection, Condenser Fan Control Inspection**	Yes	Go to next step
		No	Check for cause
3	Inspect engine block for leaks or blockage Is fault present?	Yes	Repair or replace
		No	Go to next step
4	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

19	COOLING SYSTEM CONCERNS		• RUNS COLD
DESCRIPTION	• Engine does not reach normal operating temperature		
TROUBLESHOOTING HINTS	• Malfunction of cooling system		• Malfunction of heater system
STEP	**INSPECTION**		**ACTION**
1	Is coolant system operating properly? ☞ SYSTEM INSPECTION, Cooling Fan Control Inspection, Condenser Fan Control Inspection	Yes	Go to next step
		No	Check for cause
2	Is complaint "Lack of passenger compartment heat" and the engine is operating at normal temperature?	Yes	Check the A/C and heater system
		No	Go to next step
3	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

20	EXHAUST SMOKE		
DESCRIPTION	• Blue, black, or white smoke from exhaust system		
TROUBLESHOOTING HINTS	• Malfunction of ignition system and circuit • Fuel injector clogged or restrained • Fuel leakage from injector • Malfunction of fuel pump and circuit		• Malfunction of fuel pressure regulator • Coolant leakage • Low engine compression • Malfunction of PCV valve
STEP	**INSPECTION**		**ACTION**
1	What is the color of smoke coming from exhaust system?	Blue	Go to next step
		White	Go to step 4
		Black	Go to step 5
2	Remove PCV valve and shake PCV valve Does PCV valve rattle?	Yes	Go to next step
		No	Replace PCV valve
3	Is engine compression correct? ☞ SECTION B, COMPRESSION INSPECTION	Yes	Verify test results. If olay, return to diagnostic index to service any additional symptoms
		No	Check for cause
4	Does cooling system hold pressure? ☞ SECTION E, RADIATOR CAP, RADIATOR CAP INSPECTION	Yes	Verify test results. If olay, return to diagnostic index to service any additional symptoms
		No	Check for cause
5	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
6	Start engine and run it at idle. Measure fuel line pressure at idle Is fuel line pressure correct at idle? ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection **Fuel line pressure** **210—260 kPa {2.1—2.6 kgf/cm^2, 30—37 psi}**	Yes	Go to next step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ FUELSYSTEM, FUEL PUMP INSPECTION, Fuel Pump Maximum Pressure High: • Check pressure regulator for high pressure cause ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection • Check for clogged fuel return line
7	Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned ON? ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection	Yes	Go to next step
		No	Check pressure regulator diaphragm • If okay, check fuel injector ☞ FUEL SYSTEM, FUEL PUMP INSPECTION, Fuel Pump Pressure Inspection • If not okay, replace pressure regulator
8	Is a strong blue spark visible at each disconnected high-tension lead while cranking engine?	Yes	Check spark plugs • If okay, engine for oil leak and/or coolant leak, go to next step • If not okay, clean or replace spark plug
		No	Check follows: ☞ SECTION G, IGNITION SYSTEM • High-tension leads • Ignition coil and connector
9	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

21	FUEL ODOR (IN ENGINE COMPARTMENT)		
DESCRIPTION	• Gasoline fuel smell or visible leaks		
TROUBLESHOOTING HINTS	• Malfunction of evaporative emission control system include charcoal canister full of fuel • Fuel leakage		
STEP	**INSPECTION**		**ACTION**
1	Visually look for fuel leakage at fuel injector O-ring, pressure regulator, and fuel line. Service as necessary. Connect a jumper wire between F/P terminal at data link connector and ground. Does fuel line pressure connect and remain at specification for 60 seconds when the ignition switch is turned ON and OFF? ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection **Fuel line pressure** **260—310 kPa {2.6—3.2 kgf/cm^2, 37—46 psi}**	Yes	Go to next step
		No	Check pressure regulator diaphragm condition • If condition is okay, check fuel injector • If condition is not okay, replace pressure regulator
2	Check for opens (hoses) between engine vacuum port and charcoal canister. Check for blockage in fuel tank vent system Is a fault detected?	Yes	Replace vacuum hose
		No	Go to next step
3	Check purge solenoid valve. Is the solenoid operating properly? ☞ SYSTEM INSPECTION, Purge Control Inspection	Yes	Go to next step
		No	Replace the purge solenoid valve
4	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
5	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

22	ENGINE NOISE		
DESCRIPTION	• Engine noise from under hood		
TROUBLESHOOTING HINTS	• Improper engine oil level • Improper tension of drive belt • Loosen components • Coolant leakage • Air leakage in intake air system		• Malfunction of evaporative emission control system • Engine knocking • Noise from engine internally (i.e., accumulated carbon in combustion chamber, MLA noise)
STEP	**INSPECTION**		**ACTION**
1	Is a squeal, click or chirp sound present?	Yes	Check follows: • Engine oil level • Drive belts
		No	Go to next step
2	Is a rumble or grind sound present?	Yes	Check drive belt
		No	Go to next step
3	Is a rattle sound present?	Yes	Check location of rattle for loose parts
		No	Go to next step
4	Is a hiss sound present?	Yes	Check follows: • Engine cooling system for leaks • Vacuum leaks • Spark plug loose • Intake air system leaks • Fuel evaporative system leaks
		No	Go to next step
5	Is a snap sound present?	Yes	Check secondary ignition system for shorts
		No	Go to next step
6	Is a rap or roar sound present?	Yes	Check exhaust system for loose parts
		No	Go to next step
7	Is a knock sound present?	Yes	Go to the "KNOCKING/PINGING" diagnostic chart
		No	Go to next step
8	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

23	VIBRATION CONCERNS (ENGINE)		
DESCRIPTION	• Vibration from under hood or driveline		
TROUBLESHOOTING HINTS	• Loosen components • Misadjustment of engine mount		• Uneven tire and wheel balance • Malfunction of suspension
STEP	**INSPECTION**		**ACTION**
1	Check the following components for loose attaching bolts or worn parts: • Cooling fan • Drive belt and pulleys • Engine mounts Is a fault present?	Yes	Repair or replace Readjust engine mount installation position
		No	Go to next step
2	Check the following system for malfunctioning components: • Wheels • Transaxle • Driveline • Suspension Is a fault present?	Yes	Repair or replace
		No	Go to next step
3	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

24	A/C DOES NOT WORK SUFFICIENTLY		
DESCRIPTION	• A/C compressor magnetic clutch does not engage when A/C is turned on		
TROUBLESHOOTING HINTS	• Malfunction of A/C related parts include additional fan parts • Excessive A/C load due to malfunction of A/C system		• Malfunction of power steering pressure switch and circuit
STEP	**INSPECTION**		**ACTION**
1	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
2	Disconnect power steering pressure switch connector Is there a continuity between connector terminal and ground?	Yes	Short to ground Repair or replace related harness
		No	Check power steering pressure switch If power steering pressre switch is okay, go to next step If power steering pressre switch is not okay, replace power steering pressure switch
3	Disconnect the A/C compressor connector. Start the engine and turn on the A/C switch. Is there correct voltage at terminal of the A/C compressor connector? **Specification: More than 10.5 V**	Yes	Check the A/C system
		No	Go to next step
4	Check the A/C relay. Is the A/C relay okay?	Yes	Repair or replace related harness. Go to next step
		No	Replace A/C relay
5	Verify test results. If okay, return to diagnostic index to service any additional symptoms.		

25	A/C ALWAYS ON/A/C COMPRESSOR RUNS CONTINUOUSLY
DESCRIPTION	• A/C compressor magnetic clutch does not disengage
TROUBLESHOOTING HINTS	• Malfunction of A/C related parts

STEP	INSPECTION		ACTION
1	Disconnect the A/C compressor connector. Start the engine and turn OFF the Air conditioning switch. Is there correct voltage at terminal of the A/C compressor connector? **Specification** **Less than 2.0 V**	Yes	Check the A/C system
		No	Go to next step
2	Is the A/C relay okay?	Yes	Go to next step
		No	Replace A/C relay
3	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection. Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Check the A/C system

26	A/C DOES NOT CUT OFF UNDER WIDE OPEN THROTTLE CONDITIONS
DESCRIPTION	• A/C compressor magnetic clutch does not disengage under wide open throttle
TROUBLESHOOTING HINTS	• Malfunction of throttle position sensor and circuit

STEP	INSPECTION		ACTION
1	Remove the A/C relay. Is there correct voltage at battery power terminal of the A/C relay connector with the ignition switch ON? **Specification** **Less than 10.5 V**	Yes	Go to next step
		No	Repair A/C power circuit
2	Is the A/C relay okay?	Yes	Check wiring harness between A/C relay and ECM (PCM) for open or short circuit If relay is okay, replace ECM (PCM)
		No	Repair A/C relay

27	EXHAUST SULPHUR SMELL
DESCRIPTION	• Rotten egg smell (sulphur) from exhaust **NOTE:** • Some slight sulphur smell may be normal. Catalysts with less than 8—16 thousand kilometers (5—10 thousand miles) are more likely to have a sulphur smell concern due to the highly active state of new catalysts. Replacing the catalyst if no catalyst if no problem is found may actually make the symptom worse.
TROUBLESHOOTING HINTS	• High sulfur content fuel used • Malfunction of fuel pressure regulator • Charcoal canister full fuel

STEP	INSPECTION		ACTION
1	Is any drivability or exhaust smoke concern present?	Yes	Go to appropriate flow chart
		No	Go to next step
2	Start engine and run it at idle. Measure fuel line pressure at idle. Is fuel line pressure correct at idle? ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection **Fuel line pressure** **210—260 kPa {2.1—2.6 kgf/cm², 30—37 psi}**	Yes	Go to next step
		No	Low: • Check pressure regulator diaphragm • Check fuel pump maximum pressure ☞ FUEL SYSTEM, FUEL PUMP INSPECTION, Fuel Pump Maximum Pressure High: • Check pressure regulator for high pressure cause ☞ SYSTEM INSPECTION, Pressure Regulator Control Inspection • Check for clogged fuel return line
3	Does fuel line pressure remain at specification for 60 seconds when ignition switch is turned on?	Yes	Go to next step
		No	Check pressure regulator diaphragm
4	Is any diagnostic trouble code displayed during continuous memory diagnostic trouble code inspection Key On Engine Off inspection and Key On Engine Running inspection?	Yes	**Diagnostic trouble code No. displayed** Check for cause (Refer to related chart)
		No	**No diagnostic trouble code displayed** Go to next step
5	Check charcoal canister for fuel saturation. Is excess amount of liquid fuel present in canister?	Yes	Replace charcoal canister
		No	Check fuel tank vent system If okay, try different brand of fuel to resolve concern If not okay, service fuel tank vent system

28	INTERMITTENT CONCERNS		
DESCRIPTION	• Symptom occurs randomly and is difficult to diagnose		
TROUBLESHOOTING HINTS	• Open and/or short circuit intermittently	• Wrong signal outputs from electrical parts due to loosen parts or part vibration	
STEP	**INSPECTION**		**ACTION**
1	Talk to the customer and fill out the "Check Sheet". Review the vehicle service history. Does the vehicle have a number of previous repairs and components replaced for a certain symptom?	Yes	Go to next step
		No	Go to diagnostic chart for symptom
2	Key off. Connect the NGS to the data link connector. Access PIDs based on information from the Symptom. Charts Lightly tap on component while viewing PID values. Wiggle and pull each component wire (Signal, Signal Return and VREF, if applicable) at the component. Wiggle and pull each sensor wire (Signal, Signal Return and VREF, if applicable) from the component back to the PCM connector. Look for abrupt changes in PID values. Are any PID values out of range or suddenly drop out and back into range?	Yes	Possible wiring or component problem. Check each wire for corrosion, bent or loose terminals and poor wire terminal crimps. Service as necessary. Otherwise, Replace component. Verify repair.
		No	Go to next step
3	Continue to monitor the information from the previous step. Key on, engine running. Lightly tap on component while viewing PID values. Also wiggle and pull each component wire (Signal, Signal Return and VREF, if applicable) from the component back to the ECM (PCM) connector. Look for abrupt changes in PID values Are any PID values out of range or suddenly drop out and back into range?	Yes	Possible wiring or component problem. Check each wire for corrosion, bent or loose terminals and poor wire terminal crimps. Service as necessary. Otherwise, Replace component. Verify repair.
		No	Go to next step
4	Continue to monitor PIDs listed in the previous step. With the engine still running, continue to individually water soak the wires and connectors which are related to the monitor items. Look for abrupt changes in PID values or engine running conditions. Are any PID values out of range or suddenly drop out and back into range or was there a noticeable engine misfire/stumble?	Yes	Fault area is identified. If fault occurred while spraying on component, Replace part and Verify repair. If unable to verify, Reinstall original part. If fault occurred while spraying the wiring, Check each circuit wire for corrosion, bent or loose terminals and poor wire terminal crimps. Service as necessary. If fault occurred while spraying the vacuum line. Service as necessary. Verify repair.
		No	Go to next step
5	Continue to monitor the information from the previous step. Drive the vehicle under the "Check Sheet" condition. Look for abrupt changes in PID values. Are any PID values out of range or suddenly drop out and back into range?	Yes	Possible wiring or component problem. Check each wire for corrosion, bent or loose terminals and poor wire terminal crimps. Service as necessary. Otherwise, Replace component. Verify repair.
		No	Reconfirm the "Check Sheet" and reselect the related PIDs.

SYSTEM INSPECTION

Idle Air Control Valve Inspection

1. Start the engine and run it at idle.
2. Disconnect the IAC valve connector and verify that the engine speed drops or stalls.
3. Is the engine speed does not drop or does not stall, do as follows.
   - Check IAC valve.
   - Check IAC valve air passage.
   - Check open or short circuit between IAC valve and ECM (PCM).
4. Warm up the engine to normal operating temperature and run it at idle.
5. Turn the electrical loads ON and verify the engine speed with in the specification.

Specification

Load condition	Idle-up speed (rpm)*1		
	MTX	ATX	
		N,P position	D range
E/L ON*2	550—750	550—750	550—750
A/C ON*3	550—750	550—750	550—750
P/S ON*4	550—750	550—750	550—750

*1: Excludes temporary idle speed drop just after the electrical loads (E/L) are turned on.
*2: Equal load with
- Headlight
- Fan switch (3rd or higher)
- Cooling fan

*3: A/C switch and fan switch are turned ON.
*4: Steering wheel turned fully.

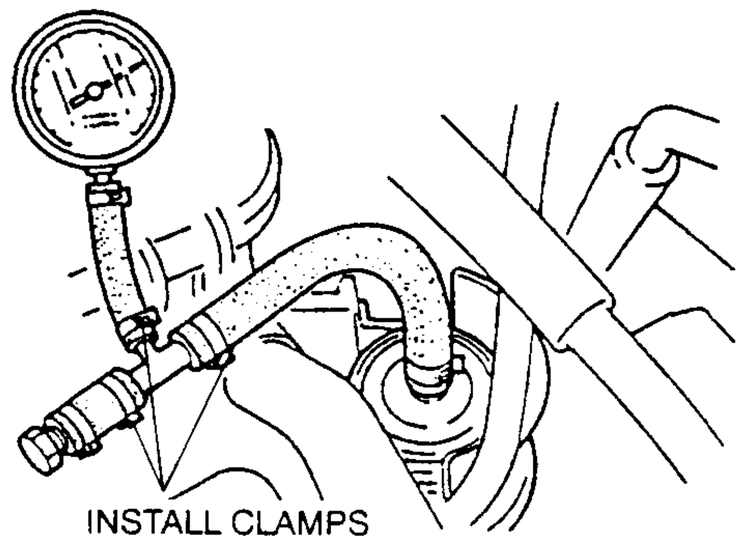
Note
- Excludes temporary idle speed drop just after the electrical loads are turned ON.

6. If not as specified, check the related switches and wiring harnesses.

Fuel Pressure Hold Inspection

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "BEFORE REPAIR PROCEDURE" (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE).**

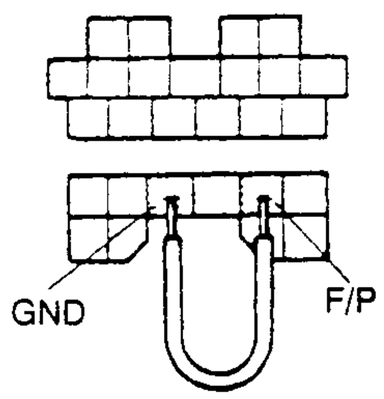
1. Disconnect the negative battery cable.
2. Install a fuel pressure gauge between the fuel filter and the main fuel hose. (Install clamps as shown.)



3. Connect the negative battery cable.

Caution
- **Misconnecting the datalink connector terminals will possibly cause a malfunction. Properly connect the specified terminals only.**

4. Connect a jumper wire between F/P terminal at data link connector and a ground.



5. Turn the ignition switch to ON for 10 seconds to operate the fuel pump.
6. Turn the ignition switch to OFF and disconnect the jumper wire.
7. Observe the fuel pressure after 5 minutes.

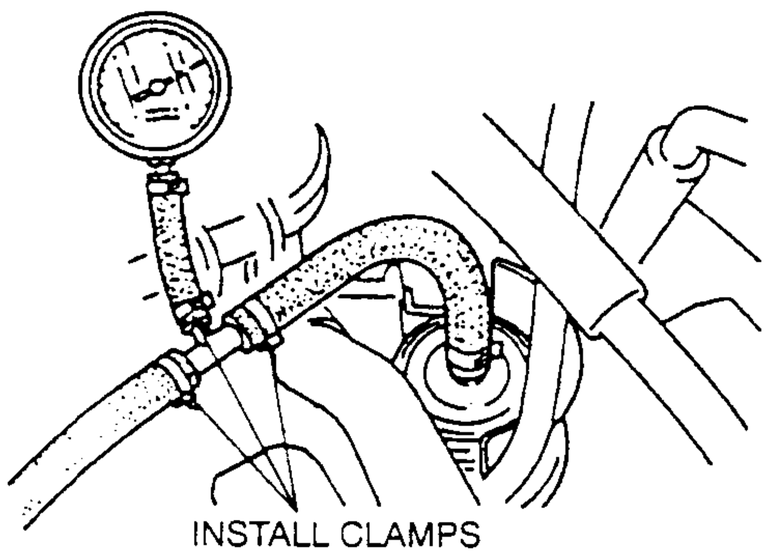
Fuel pressure
More than 150 kPa {1.5 kgf/cm^2 , 21 psi }

8. If not as specified, perform the following inspections.
   - Fuel pump hold pressure.
   - Pressure regulator hold pressure.
   - Injector fuel leakage.

Fuel Line Pressure Inspection

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "BEFORE REPAIR PROCEDURE" (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE).**

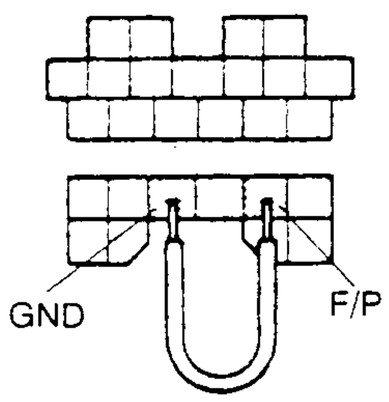
1. Disconnect the negative battery cable.
2. Install a fuel pressure gauge between the fuel filter and the main fuel hose. (Install clamps as shown.)



3. Connect the negative battery cable.

Caution
- **Misconnecting the datalink connector terminals will possibly cause a malfunction. Propely connect the specified terminals only.**

4. Connect a jumper wire between F/P terminal at data link connector and a ground.



5. Turn the ignition switch to ON.
6. Measure the fuel line pressure.

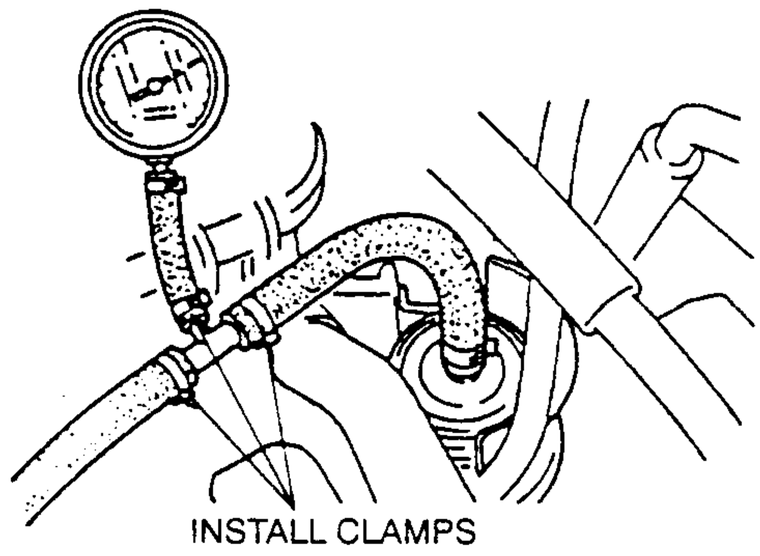
Fuel line pressure
210—260 kPa {2.1—2.6 kgf/cm^2 , 30—36 psi }

7. If not as specifid, perform the following inspections.
   - Fuel pump maximum pressure.
   - Fuel line clogging and restriction.
   - Fuel filter clogging and restriction.
   - Pressure regulator hold pressure.

Pressure Regulator Control Inspection

Warning
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "BEFORE REPAIR PROCEDURE" (Refer to FUEL SYSTEM, BEFORE REPAIR PROCEDURE).**

1. Install the fuel pressure gauge.



2. Measure the fuel pressure under the following conditions.

Specification

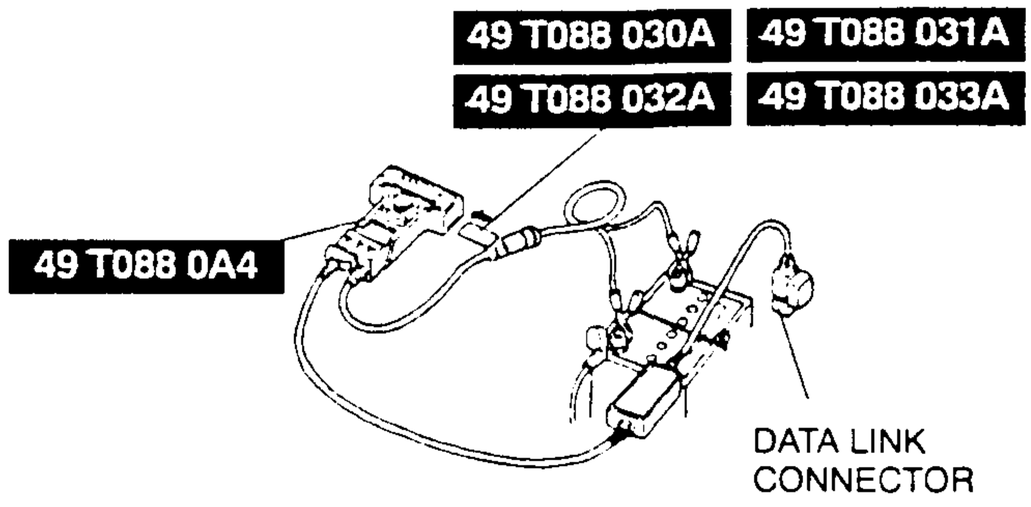
	Fuel pressure (kPa { kgf/cm^2 , psi })		
Idling	210—260 {2.1—2.6, 30—36}		
During 60 sec. of hot start*	260—310 {2.6—3.2, 37—46}	210—260 {2.1—2.6, 30—36}	260—310 {2.6—3.2, 37—46}
After 60 sec. of hot start*	210—260 {2.1—2.6, 30—36}		
Judging	Normal	Not normal (Perform Inspection 1)	Not normal (Perform Inspection 2)

* Engine coolant temperature is above 90 °C {194 °F } and intake air temperature is above 90 °C {194 °F }

3. If the fuel pressure is not within the specification, carry out either Inspection 1 or Inspection 2 as required.

Inspection 1

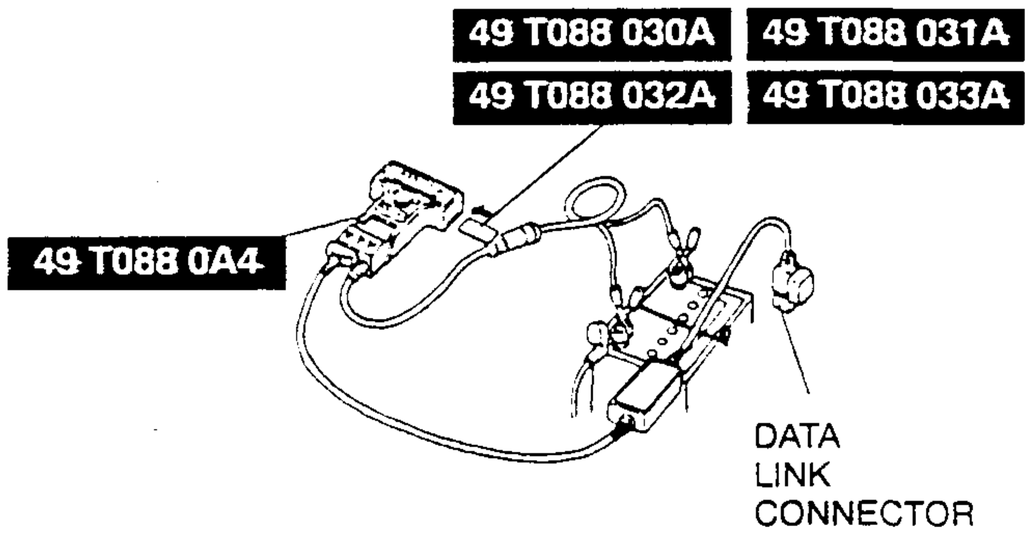
1. Connect the **SSTs** (NGS) to data link connector.



2. Access following PIDs:
   - ECT PID
   - IAT PID
   - TP V PID
3. Check the PID values.
4. If all checks okay, test:
   - Pressure regulator
   - PRC solenoid valve
   - Wiring between PRC solenoid valve and ECM (PCM) terminal 19 (Open circuit)
   - Wiring between main relay and PRC solenoid valve (Open circuit)

Inspection 2

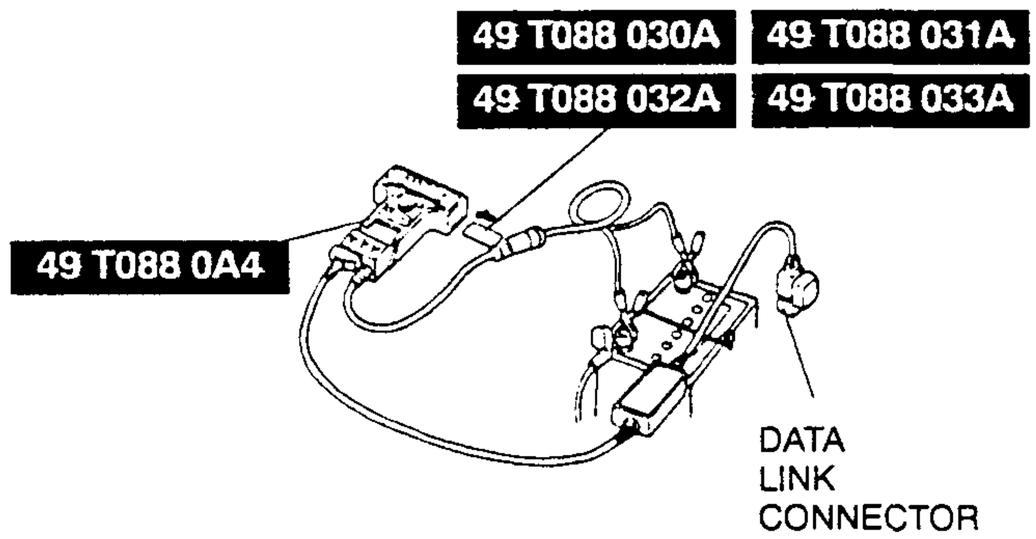
1. Connect the **SSTs** (NGS) to data link connector.



2. Access following PIDs:
   - ECT PID
   - IAT PID
3. If all checks okay, test:
   - Loose or damaged vacuum hose between the pressure regulator, PRC solenoid valve, and intake manifold.
   - PRC solenoid valve.
   - Wiring between PRC solenoid valve and ECM (PCM) terminal 19 (Short circuit).

EGR Control Inspection

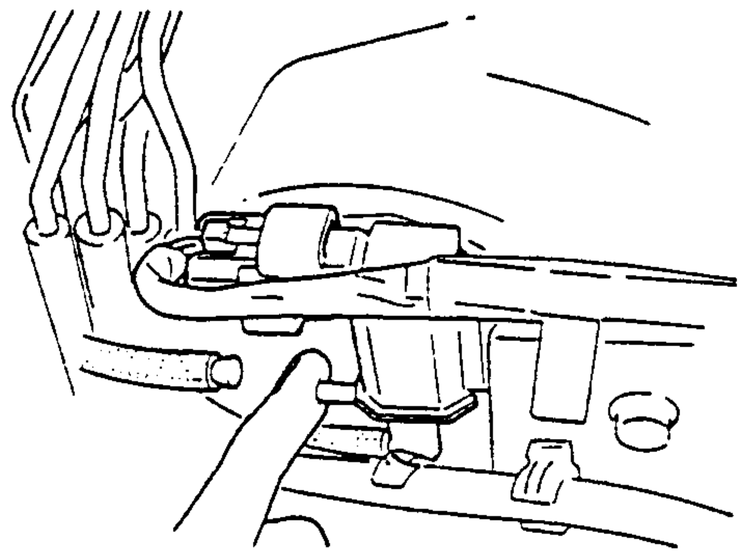
1. Connect the **SSTs** (NGS) to the data link connector.



2. Activate Continuous memory DTC inspection, Key On Engine Off inspection and Key On Engine Running inspection.
3. Check the any diagnostic trouble code displayed.
4. If any code is displayed, go to On-board diagnostic chart.
5. If no code is displayed, remove EGR valve and check for stick.
6. If valve is sticking, replace the EGR valve.

Purge Control Inspection

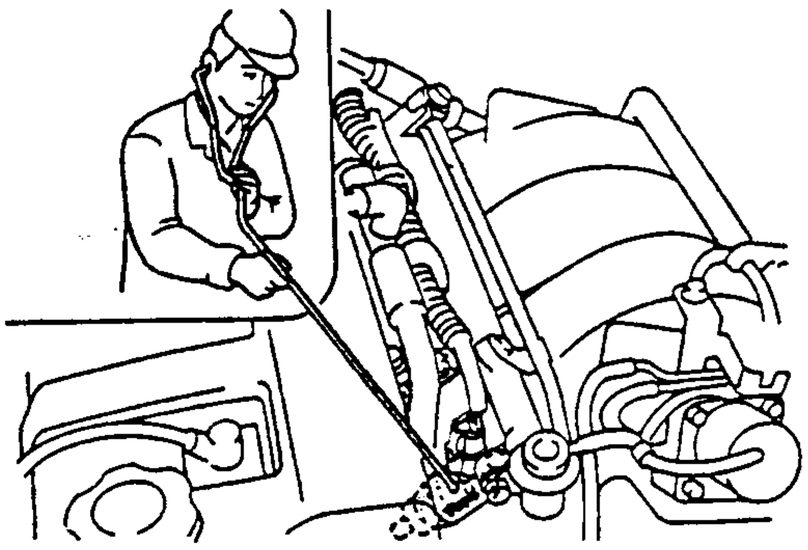
1. Start and warm up the engine to normal operating temperature.
2. Let the engine idle.
3. Disconnect the vacuum hose between the purge solenoid valve and chacoal canister.
4. Put a finger to the purge solenoid valve and verify that there is no vacuum applied.



5. If there is vacuum, do as follows.
   - Check the purge solenoid valve.
   - Check for loose or damaged vacuum hose.
   - Check wiring between purge solenoid valve and ECM (PCM) terminal 67 (Short circuit).

Fuel Cut Control Inspection

1. Warm up the engine to normal operating temperature and it let idle.
2. Increase the engine speed to 3,000 rpm, then suddenly release the throttle.
3. Check if there is no operational sound of each injector with a screwdriver or sound scope while the engine speed is above approx. 2,500 rpm on deceleration.



A/C Cut-off Control Inspection

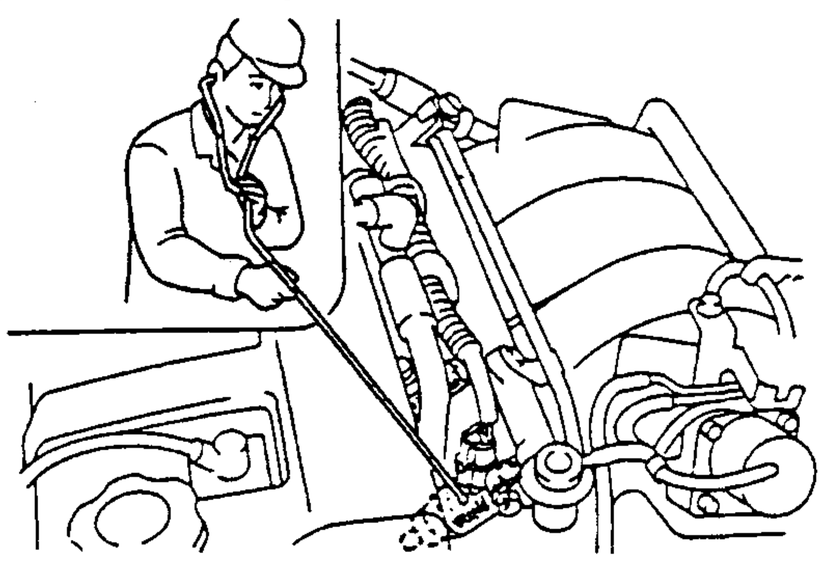
1. Start the engine and it let idle.
2. Turn the A/C switch and the fan switch ON.

3. Check if the operation sound of the A/C compressor electromagnetic clutch is heard.
4. Fully open the throttle valve. Check if the operation sound of the A/C compressor electromagnetic clutch is heard (A/C compressor stops). Then 3-6 seconds after, check if the operation sound of the A/C compressor electromagnetic clutch is heard (A/C compressor starts to work again).
5. Turn the A/C switch and the fan switch OFF.
6. If the operation sound is not heared, do as follows.
   (1) Connect the jumper wire between both terminals of low pressure switch connector.
   (2) Turn the ignition switch ON.
   (3) Turn the A/C switch and fan switch ON. Verify that operation sound is heard from A/C relay.
      ① If the operation sound is heard, check the following PID using the **SSTs** (NGS).
      - TP V PID

      ② If the operation sound is not heard, check the following.
      - A/C relay
      - Open circuit in wiring harnesses and connectors. (Main relay-A/C relay-ECM (PCM) terminal 69)
      - A/C related parts

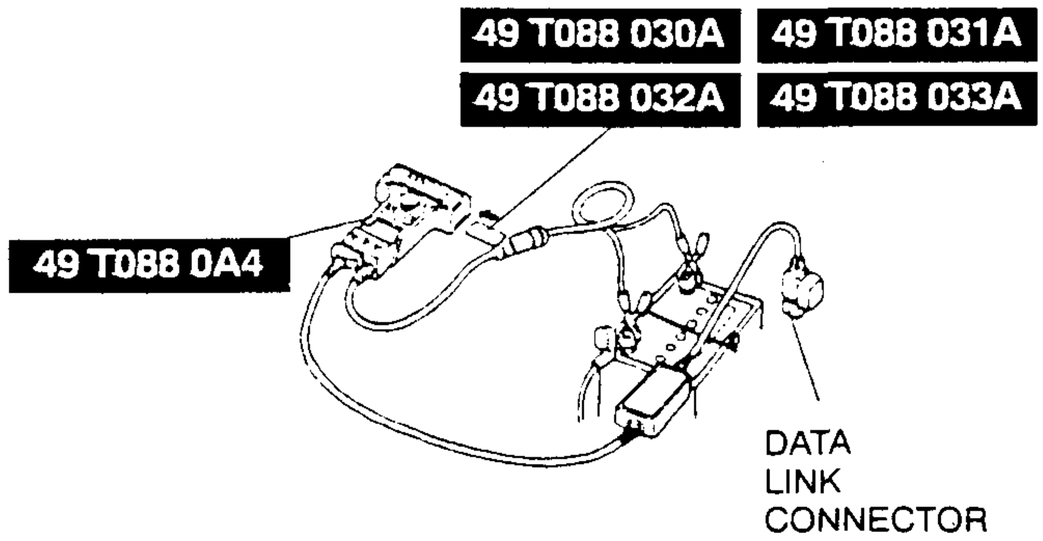
Dechoke Control Inspection

1. Turn the ignition switch to START and verify that the fuel injector operating sound is heard.
2. Depress the accelerator pedal fully and turn the ignition switch to START. Verify that no fuel injector operating sound is heard.

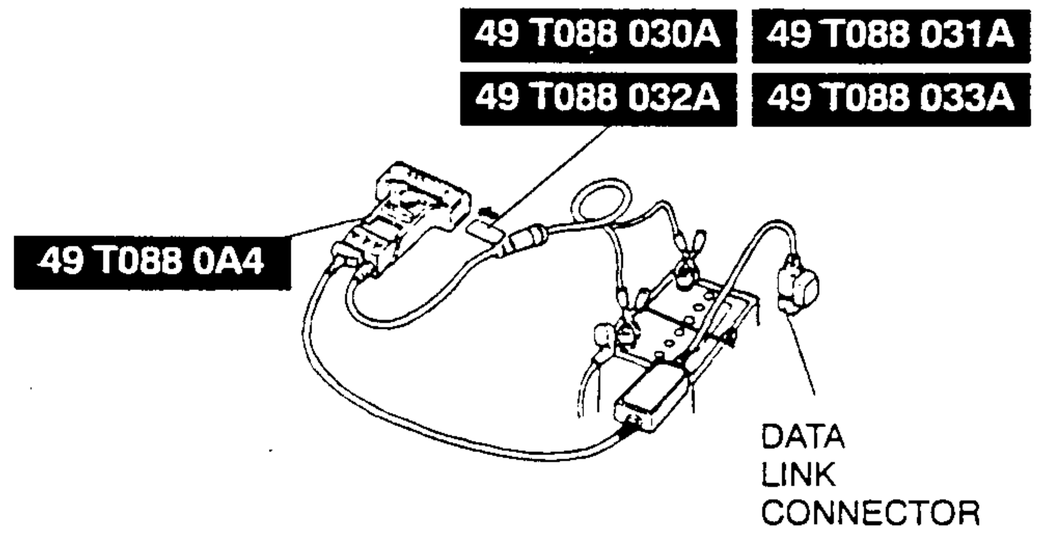


3. If operating sound is heard, check the TP V PID using the **SSTs** (NGS).

Cooling Fan Control Inspection



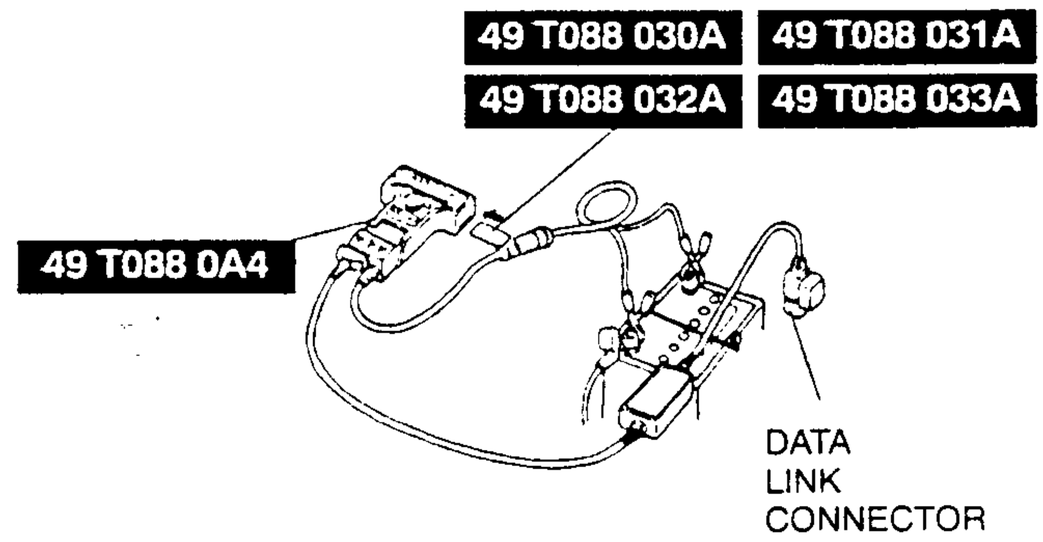
1. Verify that the engine is cold.
2. Verify that the A/C switch and the fan switch are OFF.
3. Turn the ignition switch to ON.
4. Verify that the cooling fan is not operating.
5. If the cooling fan is operating, do as follows.
   (1) Connect the **SSTs** (NGS) to the data link connector.



   (2) Select the "ACCTIVE COMAND" and "OUTPUT TEST" function on the NGS display.
   (3) Selct the "ALL OFF" and press "START". Verify that the cooling fan is OFF.
      ① If the cooling fan stays ON, check the following.
      - Cooling fan relay
      - Short to ground circuit between cooling fan relay and ECM (PCM)
      - Short to power circuit between cooling fan and cooling fan relay.
      - ECT PID
      - Diagnostic trouble code for engine coolant temperature sensor

      ② If the cooling fan is OFF, check the following.
      - Cooling fan relay

6. Start the engine.
7. Verify that the cooling fan is operating when engine is hot.
8. If the cooling fan does not operate, do as follows.
   (1) Connect the **SSTs** (NGS) to the data link connector.



   (2) Select the "ACCTIVE COMAND" mode.
   (3) Select "OUTPUT TEST" mode function.
   (4) Select "ALL ON" mode.
   (5) Press "START".
      ① If the cooling fan operates, check as follows.

- Diagnostic trouble code for engine coolant temperature sensor
- ECT PID

② If the cooling fan does not operate, do as follows.
- Select "ALL ON" mode function as stated above. Operate cooling fan by selecting "START", and verify that operation sound is heard from the cooling fan relay.
- If the operation sound is heard, check following.
- Wiring harness and connectors (Cooling fan relay–Cooling fan motor)
- Cooling fan motor
- If the operation sound is not heard, check the following.
  Cooling fan relay
  —Open circuit in wiring harness and
  —connectors (Main relay–Cooling fan relay–ECM (PCM))

9. Turn the A/C switch and fan switch ON.
10. Verify that the cooling fan is operating.
11. If does not operate, if the operation sound is heard from A/C compressor electromagnetic clutch.
    (1) If the operating sound is heard, check for open circuit between cooling fan relay and ECM (PCM).
    (2) If the operation sound is heard, check the A/C system.

Condenser Fan Control Inspection

1. Verify that the A/C switch and fan switch are OFF.
2. Start the engine and let it at idle.
3. Verify that the condenser fan is not operating.
4. If the condenser fan operating, do as follows.
   - Condenser fan relay
   - Short to power in circuit between condenser fan relay and condenser fan
   - Short to ground circuit between condenser fan relay and ECM (PCM) terminal 17
5. Turn the A/C switch and fan switch ON.
6. Verify that the condenser fan is operating and the operating sound of A/C compresser electromagnetic clutch is heard.
7. Turn the A/C switch and fan switch OFF.
8. If the condenser fan does not operate but the operation sound of A/C compressor electromagnetic clutch is heard, check as follows.
   - Open circuit between ignition switch and condenser fan relay
   - Open circuit between battery and condenser fan relay
   - Open circuit condenser fan relay and ECM (PCM)
   - Open circuit between condenser fan relay and condenser fan motor or motor ground
   - Condenser fan relay
   - Condenser fan motor
9. If the condenser fan and A/C compressor do not operate, check as follows.
   - TP V PID
   - A/C system

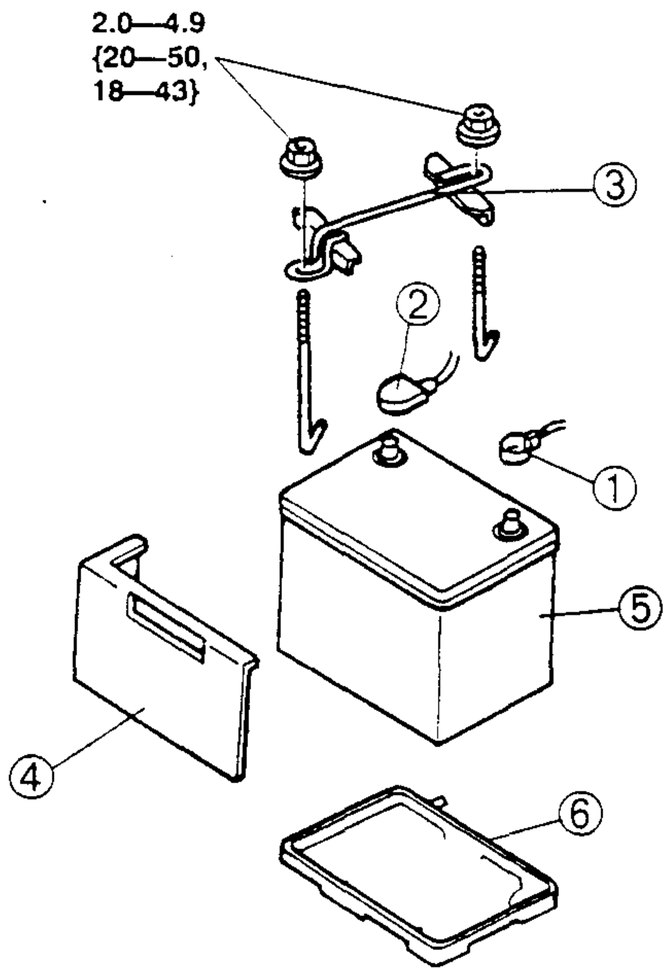
ENGINE ELECTRICAL SYSTEM

CHARGING SYSTEM **G-1**
BATTERY REMOVAL/INSTALLATION **G-1**
BATTERY INSPECTION **G-1**
BATTERY RECHARGING **G-2**
GENERATOR REMOVAL/INSTALLATION **G-2**
GENERATOR INSPECTION **G-2**
IGNITION SYSTEM **G-3**
IGNITION COIL REMOVAL/
INSTALLATION **G-3**
IGNITION COIL INSPECTION **G-3**
HIGH-TENSION LEAD REMOVAL/
INSTALLATION **G-4**
SPARK PLUG INSPECTION **G-4**
STARTING SYSTEM **G-5**
STARTER REMOVAL/INSTALLATION **G-5**
STARTER INSPECTION **G-5**

CHARGING SYSTEM

BATTERY REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



N·m { kgf·cm , in·lbf }

1	Negative battery cable
2	Positive battery cable
3	Battery clamp
4	Battery cover
5	Battery
6	Battery tray

BATTERY INSPECTION

Battery

- Check the battery in the following procedure.

Step	Inspection		Action
1	Measure open circuit voltage of battery.	Above 12.4 V	Go to step 3.
		Below 12.4 V	Go to next step.
2	Quick charge for 30 minutes and recheck voltage.	Above 12.4 V	Go to next step.
		Below 12.4 V	Replace battery.
3	Apply test load (see test load chart) to battery using a battery load tester and record battery voltage after 15 seconds. Is voltage more than specification?	Yes	Battery OK.
		No	Replace battery.

Test load chart

Battery	Load (A)
55D23L	180
75D26L	195

Battery positive voltage with load

Approximate battery temp.	Minimum voltage(V)
21 °C { 70 °F }	9.6
15 °C { 60 °F }	9.5
10 °C { 50 °F }	9.4
4 °C { 40 °F }	9.3
- 1 °C { 30 °F }	9.1
- 7 °C { 20 °F }	8.9
-12 °C { 10 °F }	8.7
-18 °C { 0 °F }	8.5

Dark Current

1. Verify that the ignition switch is at the OFF position and that the ignition key has been removed.
2. Disconnect the negative battery cable.

Caution
- **Operating electrical loads while measuring the dark current can damage the circuit tester.**

3. Measure the dark current between the negative battery terminal and the negative battery cable.

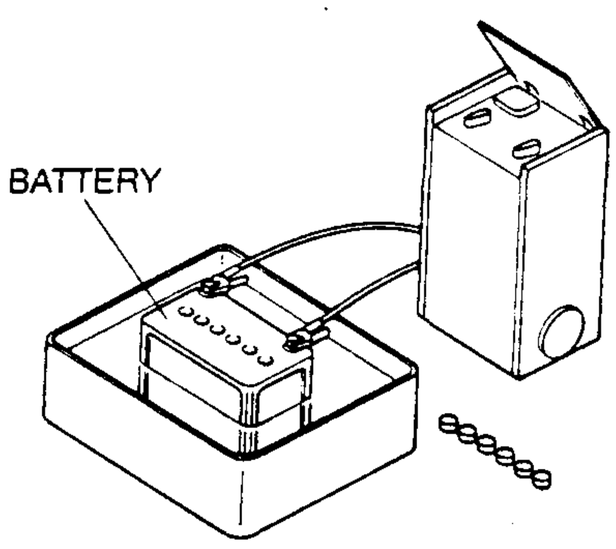
Dark current
20 mA max.

4. If the current exceeds the maximum, remove the fuse in the main fuse block and the fuse block one by one while measuring the dark current.
5. Inspect and repair harnesses and connectors of the fuse at which the current reduces.

BATTERY RECHARGING

Caution
- **When disconnecting the battery, remove the negative cable first and install it last to prevent damage to electrical components or the battery.**
- **To avoid deformation or damage to the battery, remove the battery plugs while charging the battery.**
- **Do not quick charge for over 30 minutes. It will damage the battery.**

1. Place a battery in a pan of water to prevent it from overheating. The water level should come up about halfway on the battery. Keep water off the top of the battery.



2. Connect a battery charger to the battery.
3. Adjust the charging current as follows.

Battery type (5 hours rate)	Slow charge (A)	Quick charge (A)/(30 min.)
55D23L (48)	4.5—5.5	30
75D26L (52)	5.0—6.0	35

4. After the battery has been recharged, measure the battery positive voltage and verify that the battery keeps specified voltage for more than 1 hour.

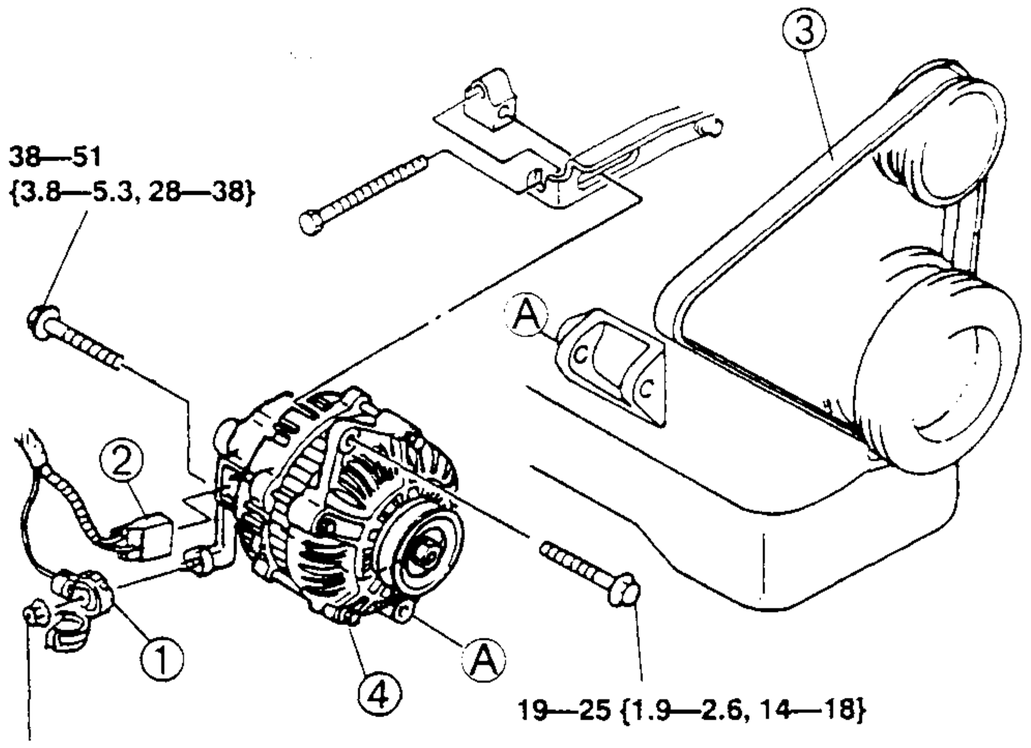
Specification
Above 12.4 V

5. If not as specified, replace the battery.

GENERATOR REMOVAL/INSTALLATION

Warning
- **When the battery cables are connected, touching the vehicle body with generator terminal B will generate sparks. This can cause personal injury, fire, and damage to the electrical components. Always disconnect the battery before performing the following operation.**

1. Disconnect the negative battery cable.
2. Remove the transverse member.
3. Remove the front pipe.(Refer to section F, EXHUAST SYSTEM, EXHUAST SYSTEM, REMOVAL/INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Check the drive belt deflection/tension. (Refer to section B, DRIVE BELT, DRIVE BELT INSPECTION.)



N·m { kgf·m , ft·lbf }

1	Terminal B wire
2	Connector
3	Drive belt (generator)
4	Generator

GENERATOR INSPECTION

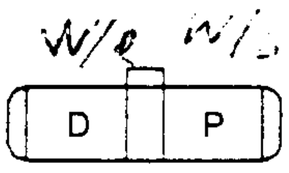
Generator Warning Light

1. Verify that the battery is fully charged.
2. Verify that the drive belt deflection/tension is correct. (Refer to section B, DRIVE BELT, DRIVE BELT INSPECTION.)
3. Turn the ignition switch to ON and verify that the generator warning light comes on.
4. If not, inspect the generator warning light, wiring harnesses between the battery, generator warning light, and ECM (PCM) terminal 18. When the generator warning light and the wiring harnesses are OK, replace the ECM (PCM)
5. Verify that the generator warning light goes out after the engine started.

6. If not, check the diagnostic trouble code numbers displayed. (Refer to section F, ON-BOARD DIAGNOSTIC SYSTEM, DIAGNOSTIC TROUBLE CODE INSPECTION.)

Generator

1. Verify that the battery is fully charged.
2. Verify that the drive belt deflection/tension is within the specification. (Refer to section B, DRIVE BELT, DRIVE BELT INSPECTION.)
3. Turn off all electrical loads.
4. Turn the ignition switch to START and verify that the generator turns smoothly without any noise while the engine is running.
5. Measure the voltage at the terminals shown in the table.



Standard voltage

B+: Battery positive voltage

Terminal	Ignition switch ON		Idle [20 °C { 68 °F }]	
	FP	FS	FP	FS
B	B+		13—15 V	
P	Below approx. 1 V		Approx. 3—8 V	
D	Approx. 0 V		Approx. 0.7—2 V	

6. Measure the current at terminal B.

Generated current (Reference)

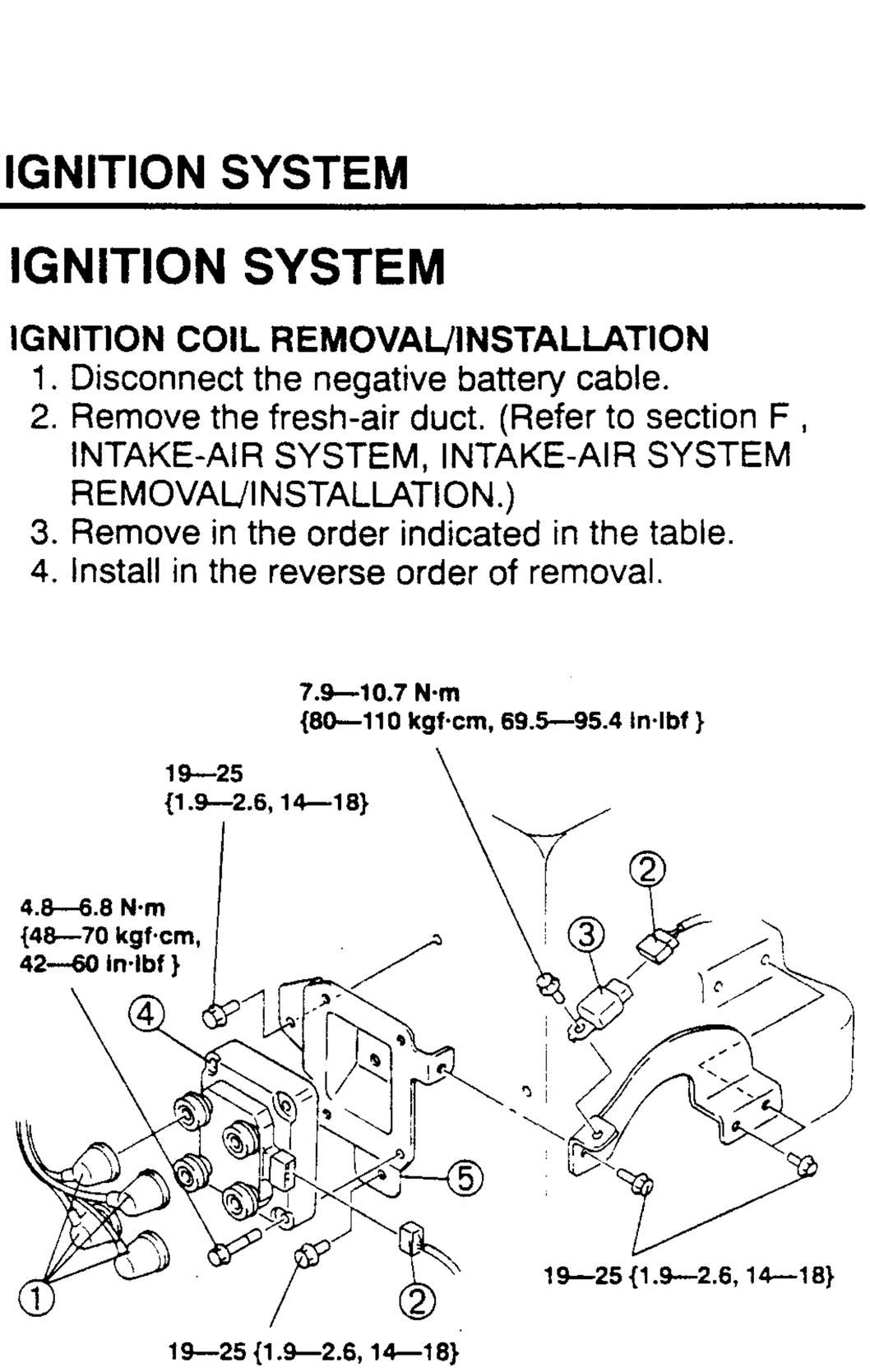
Engine speed (rpm)	Terminal B current (A)	
	FP	FS
1,000	Approx. 0—59	
2,000	Approx. 0—77	

7. If the voltage and/or current are not as specified, turn on the following electrical loads one by one. Verify that the current at generator terminal B increases accordingly.
   - Headlight
   - Blower motor
   - Rear window defroster
8. If not, disassemble and inspect the generator.

IGNITION SYSTEM

IGNITION COIL REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the fresh-air duct. (Refer to section F , INTAKE-AIR SYSTEM, INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



N·m { kgf·m , ft·lbf }

1	High-tension lead
2	Connector
3	Condenser
4	Ignition coil
5	Ignition coil bracket

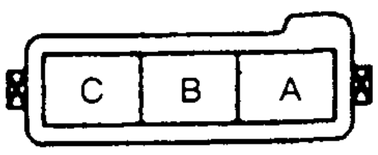
IGNITION COIL INSPECTION

Primary Coil Winding

1. Disconnect the ignition coil connector.
2. Measure the resistance from terminal A to B, and terminal B to C by using an ohmmeter.

Specification

0.45—0.55 Ω [20 °C {68 °F }]

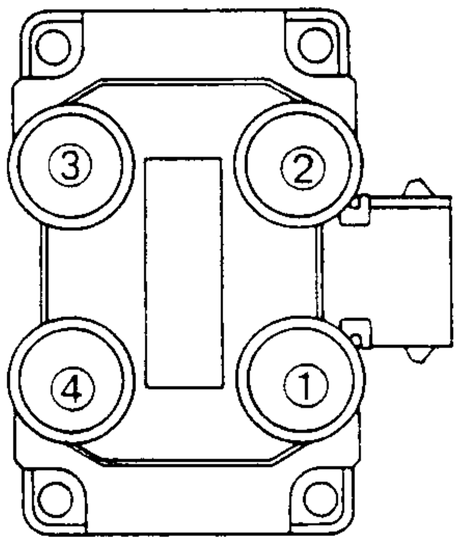


3. If not as specified, replace the ignition coil.

Secondary Coil Winding

1. Disconnect the high-tension leads.
2. Measure the resistance from lead hole 1 to 4, and lead hole 2 to 3 by using an ohmmeter.

Specification
11.5—15.5 kΩ [20 °C { 68 °F }]

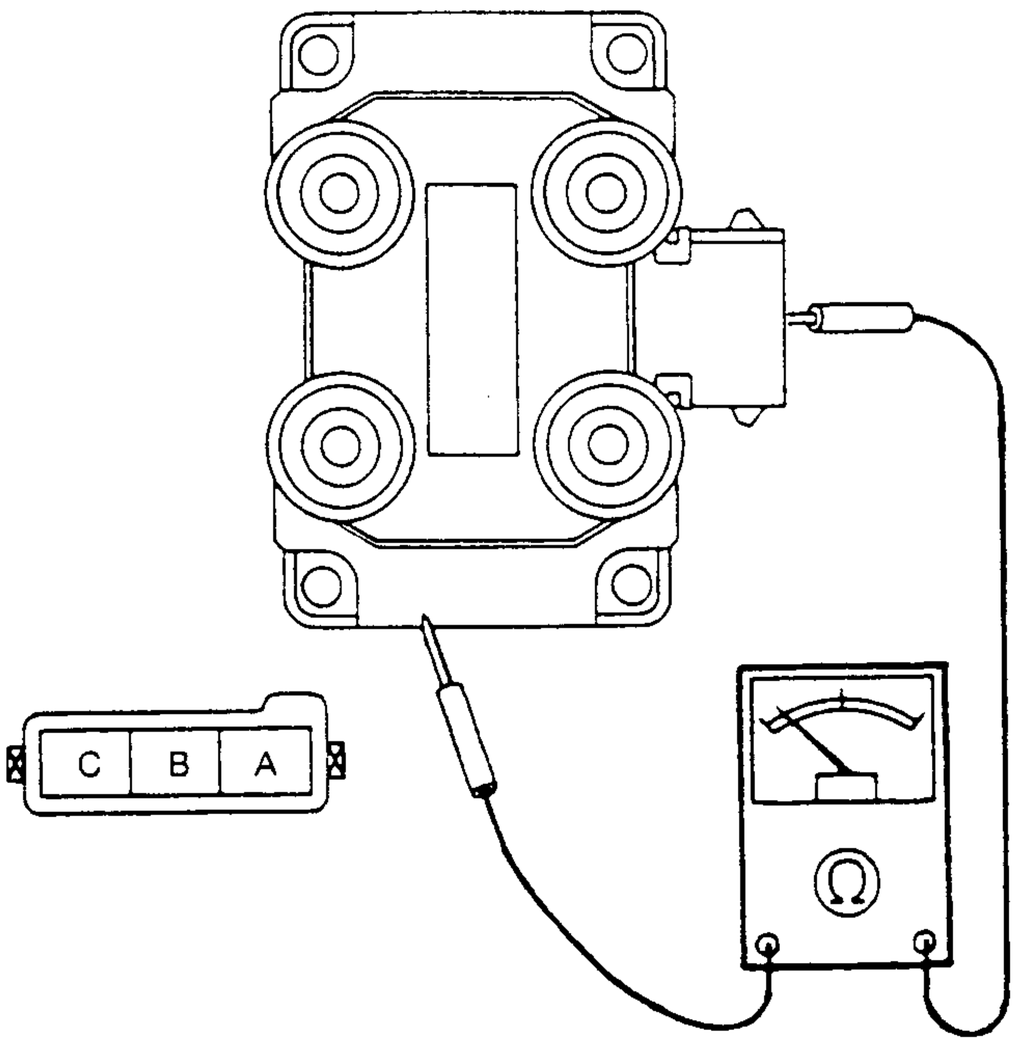


3. If not as specified, replace the ignition coil.

Insulation Resistance of Case

1. Disconnect the high-tension leads and ignition coil connector.
2. Measure the insulation resistance between terminal B and ignition coil case by using a 500 V mega tester.

Specification
Above 10 MΩ



3. If not as specified, replace the ignition coil.

HIGH-TENSION LEAD REMOVAL/INSTALLATION

Caution
- **The high-tension leads must be reinstalled to their original positions. Incorrect installation can damage the leads and cause power loss, and negatively effect the electronic components.**

SPARK PLUG INSPECTION

Caution
- **To protect the platinum electrode:**
  1. **Do not use a wire brush to clean the electrode.**
  2. **Use a plug cleaner for a maximum of 20 seconds and air pressure below 589 kPa {6.00 kgf/cm^2 , 85.0 psi }**
  3. **Do not adjust the plug gap.**

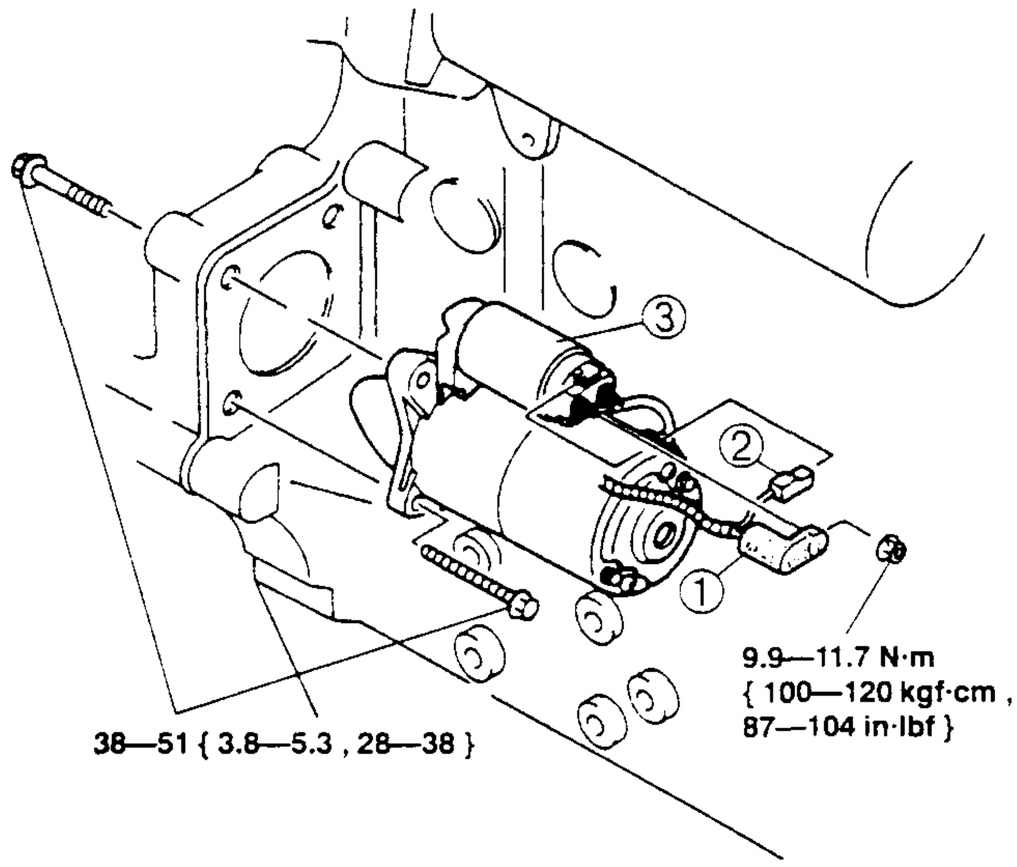
STARTING SYSTEM

STARTER REMOVAL/INSTALLATION

Warning

- **When the battery cable are connected, touching the vehicle body with starter terminal B will generate sparks. This can cause personal injury, fire, and damage to the electrical components. Always disconnect the battery before performing the following operation.**

1. Remove the battery.
2. Remove the air cleaner component. (Refer to section F, INTAKE-AIR SYSTEM, INTAKE-AIR SYSTEM REMOVAL/INSTALLATION.)
3. Remove the transverse member.
4. Remove the intake manifold bracket.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.



N·m { kgf·m , ft·lbf }

1	Terminal B wire
2	Terminal S wire
3	Starter

STARTER INSPECTION

On-Vehicle Inspection

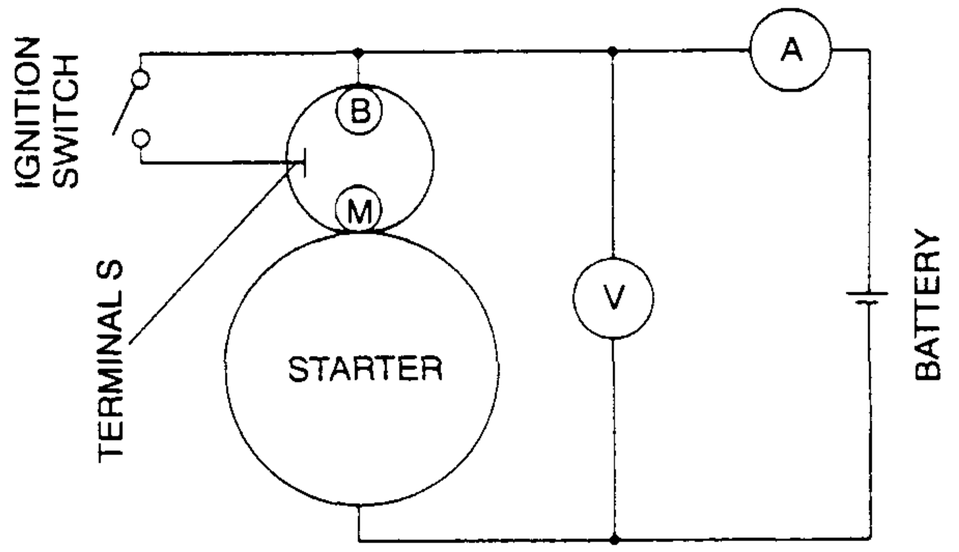
1. Verify that the battery is fully charged.
2. Crank the engine and verify that the starter turns smoothly without any noise.
3. If not as specified, measure the voltage at terminals S and B when the ignition switch is in START position.

   Specification
   Above 8 V

4. If the voltage is within the specification, remove the starter and inspect the magnetic switch and the starter.
5. If the voltage is not as specified, check the wiring harness, ignition switch, and transaxle range switch (ATX).

No Load Test

1. Verify that the battery is fully charged.
2. Connect the starter, battery, voltmeter, and ammeter as shown.



3. Operate the starter and verify that it turns smoothly.
4. Measure the voltage and current while the starter is operating.

Specification

Item	Engine	
	FP	FS
Voltage (V)	11	
Current (A)	Below 90	

5. If not as specified, repair or replace the inner parts as necessary.

CLUTCH

GENERAL PROCEDURES ..... **H- 1**
CLUTCH FLUID ..... **H- 1**
CLUTCH FLUID INSPECTION ..... **H- 1**
CLUTCH FLUID REPLACEMENT/AIR BLEEDING ..... **H- 1**
CLUTCH PEDAL ..... **H- 2**
CLUTCH PEDAL INSPECTION/ADJUSTMENT ..... **H- 2**
CLUTCH PEDAL REMOVAL/INSTALLATION ..... **H- 4**
CLUTCH MASTER CYLINDER ..... **H- 5**
CLUTCH MASTER CYLINDER REMOVAL/INSTALLATION ..... **H- 5**
CLUTCH MASTER CYLINDER DISASSEMBLY/ASSEMBLY ..... **H- 7**
CLUTCH RELEASE CYLINDER ..... **H- 8**
CLUTCH RELEASE CYLINDER REMOVAL/INSTALLATION ..... **H- 8**
CLUTCH RELEASE CYLINDER DISASSEMBLY/ASSEMBLY ..... **H- 8**
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CLUTCH UNIT REMOVAL/INSTALLATION .. **H- 9**
CLUTCH COVER **H-11**
CLUTCH COVER INSPECTION **H-11**
CLUTCH DISC **H-11**
CLUTCH DISC INSPECTION **H-11**
CLUTCH RELEASE COLLAR **H-12**
CLUTCH RELEASE COLLAR INSPECTION . **H-12**
PILOT BEARING **H-12**
PILOT BEARING INSPECTION **H-12**
FLYWHEEL **H-13**
FLYWHEEL INSPECTION **H-13**

H

GENERAL PROCEDURES

Clutch Pipe Removal/Installation

1. If a clutch pipe(s) has been disconnected any time during the procedure, add brake fluid, bleed the air, and inspect for leakage after the procedure has been completed.
2. If removing the clutch pipe, remove it by using the **SST** (49 0259 770B). If installing the clutch pipe, modify the clutch pipe tightening torque to allow for the use of a torque wrench—**SST** (49 0259 770B) combination, and then tighten the clutch pipe by using the **SST** (49 0259 770B).

CLUTCH FLUID

CLUTCH FLUID INSPECTION

Note

- The fluid in the reservoir must be maintained between the MIN/MAX level during replacement.

CLUTCH FLUID REPLACEMENT/AIR BLEEDING

1. Remove the fresh air duct.

Caution

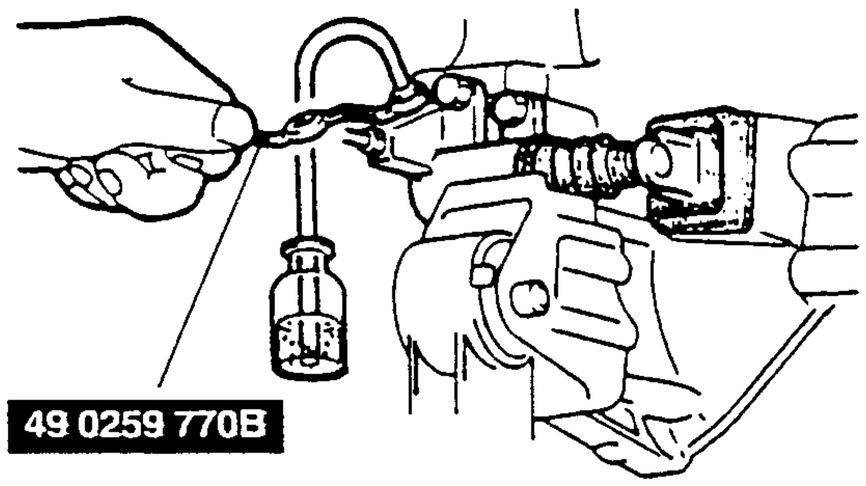
- **Be careful not to spill clutch fluid on a painted surface. If this should happen, wash it off immediately.**
- **Do not mix different brands of clutch fluid.**
- **Do not reuse the clutch fluid that was drained out.**

2. Draw the fluid from the reserve tank with a suction pump.
3. Remove the bleeder cap from the clutch release cylinder and attach a vinyl hose to the bleeder plug.
4. Place the other end of the vinyl hose into a container.
5. Slowly pump the clutch pedal several times.
6. With the clutch pedal depressed, loosen the bleeder screw by using the **SST** to let fluid escape. Close the bleeder screw by using the **SST**.
7. Repeat steps 5 and 6 until only clean fluid is seen.
8. Tighten the bleeder screw.

Tightening torque
5.9—8.8 N·m {60—90 kgf·cm, 52—78 in·lbf }

9. Add fluid to the MAX mark.
10. Install the fresh air duct.

11. Check for correct clutch operation.



CLUTCH PEDAL

CLUTCH PEDAL INSPECTION/ADJUSTMENT

Clutch Pedal Height

1. Measure the distance from the upper surface of the pedal pad to the carpet.

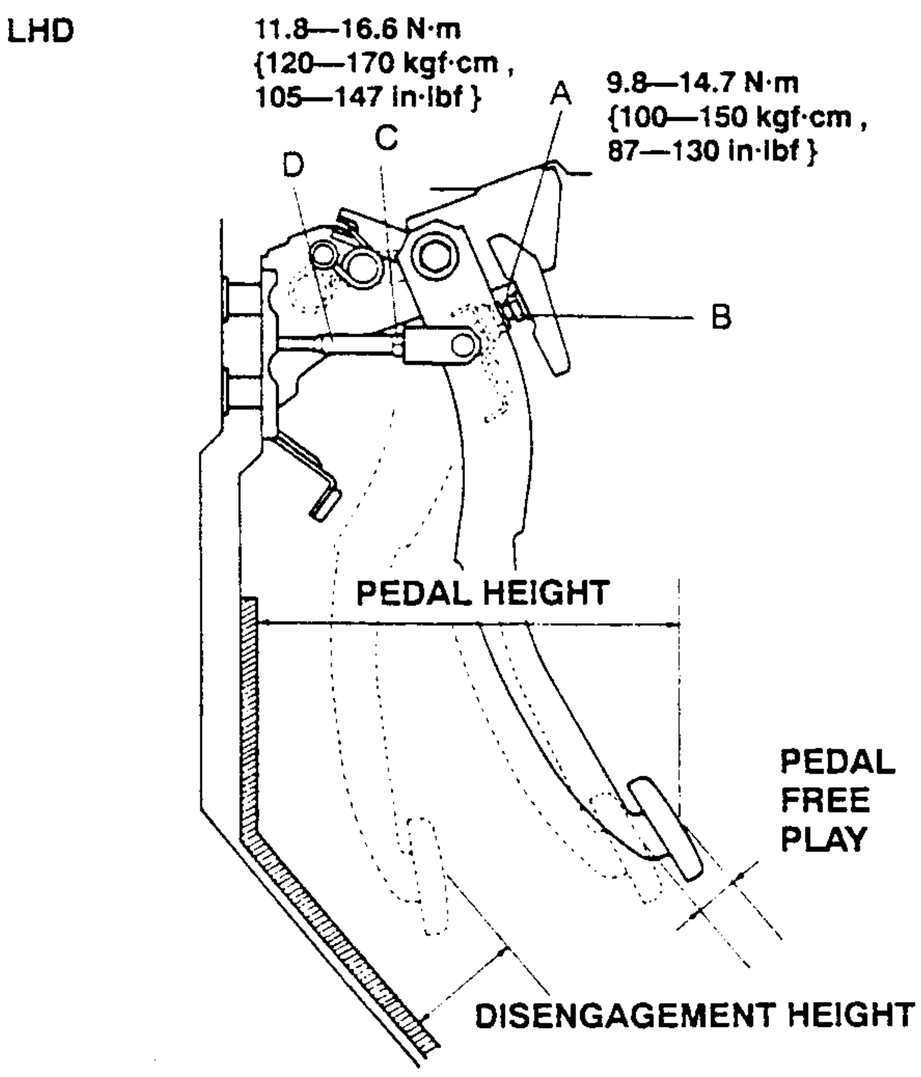
Pedal height
LHD:196—204 mm {7.72—8.03 in } (with carpet)
RHD:203—210 mm {7.99—8.72 in } (with carpet)

2. If necessary, adjust the pedal height by turning adjustment bolt A and locknut B.

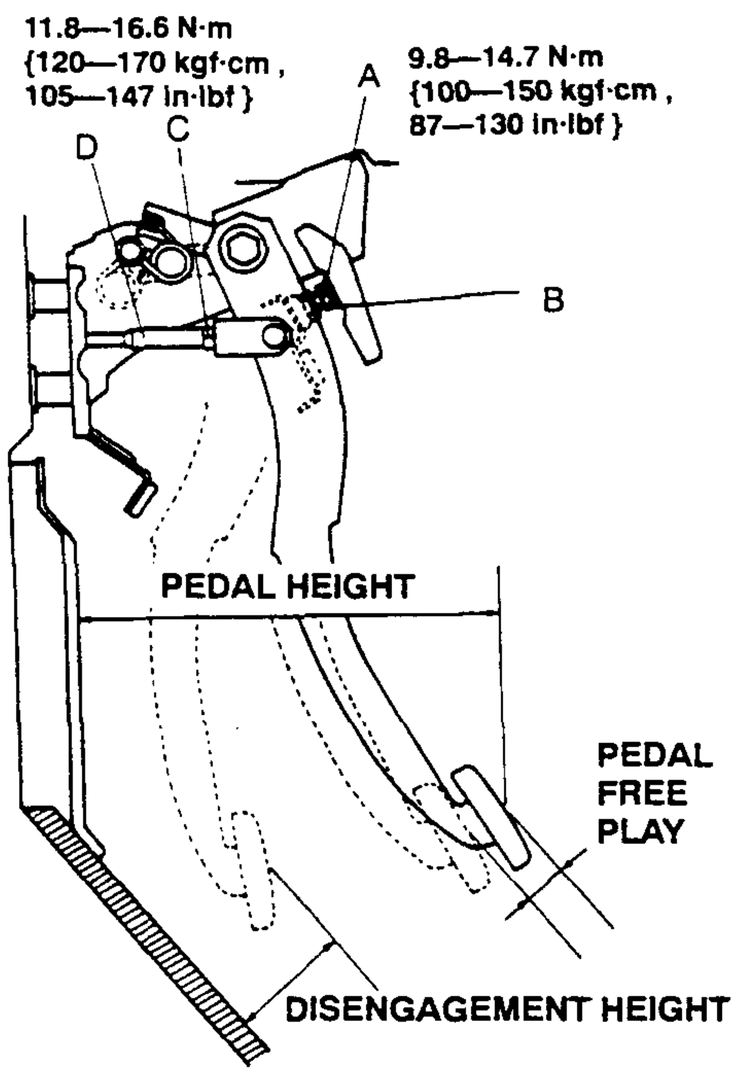
Clutch Pedal Free Play

1. Depress the clutch pedal by hand until clutch resistance is felt, and measure the pedal free play.

Pedal free play
1.0—3.0 mm {0.04—0.12 in }
Total pedal free play
5.0—14.0 mm {0.20—0.55 in }



RHD



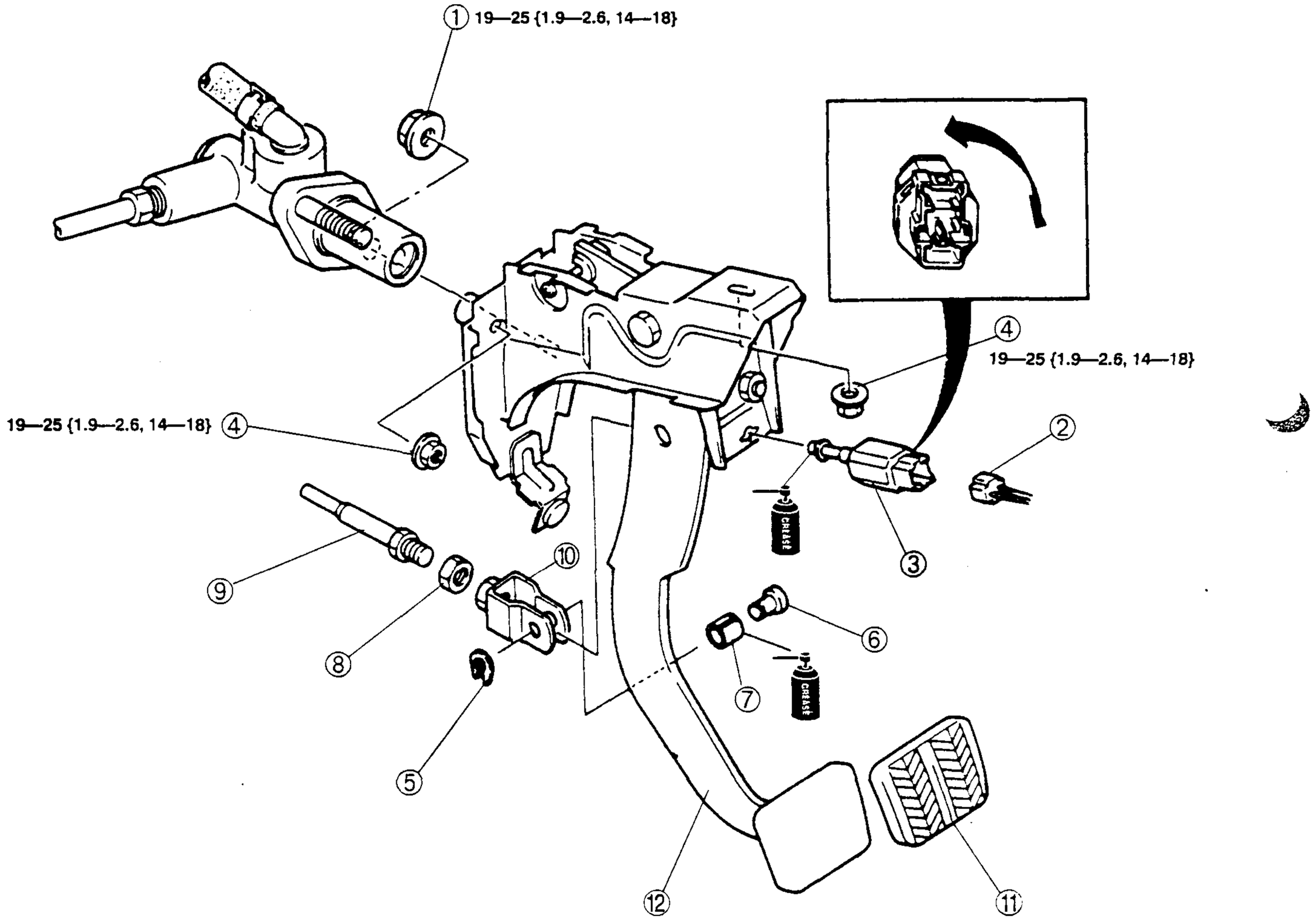
2. If necessary, adjust the pedal free play by turning locknut C and adjusting push rod D.
3. Verify that the disengagement height (from the upper surface of the pedal pad to the carpet) is correct when the pedal is fully depressed.

Minimum disenagement height
52 mm {2.05 in } (With carpet)

H

CLUTCH PEDAL REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



N·m { kgf·m, ft·lbf }

1	Nut
2	Clutch switch connector
3	Clutch switch
4	Nut
5	Eclip
6	Pin
7	Bushing
8	Nut
9	Push rod
10	Clevis
11	Pedal pad
12	Clutch pedal ☞ Installation Note

Clutch Pedal Installation Note

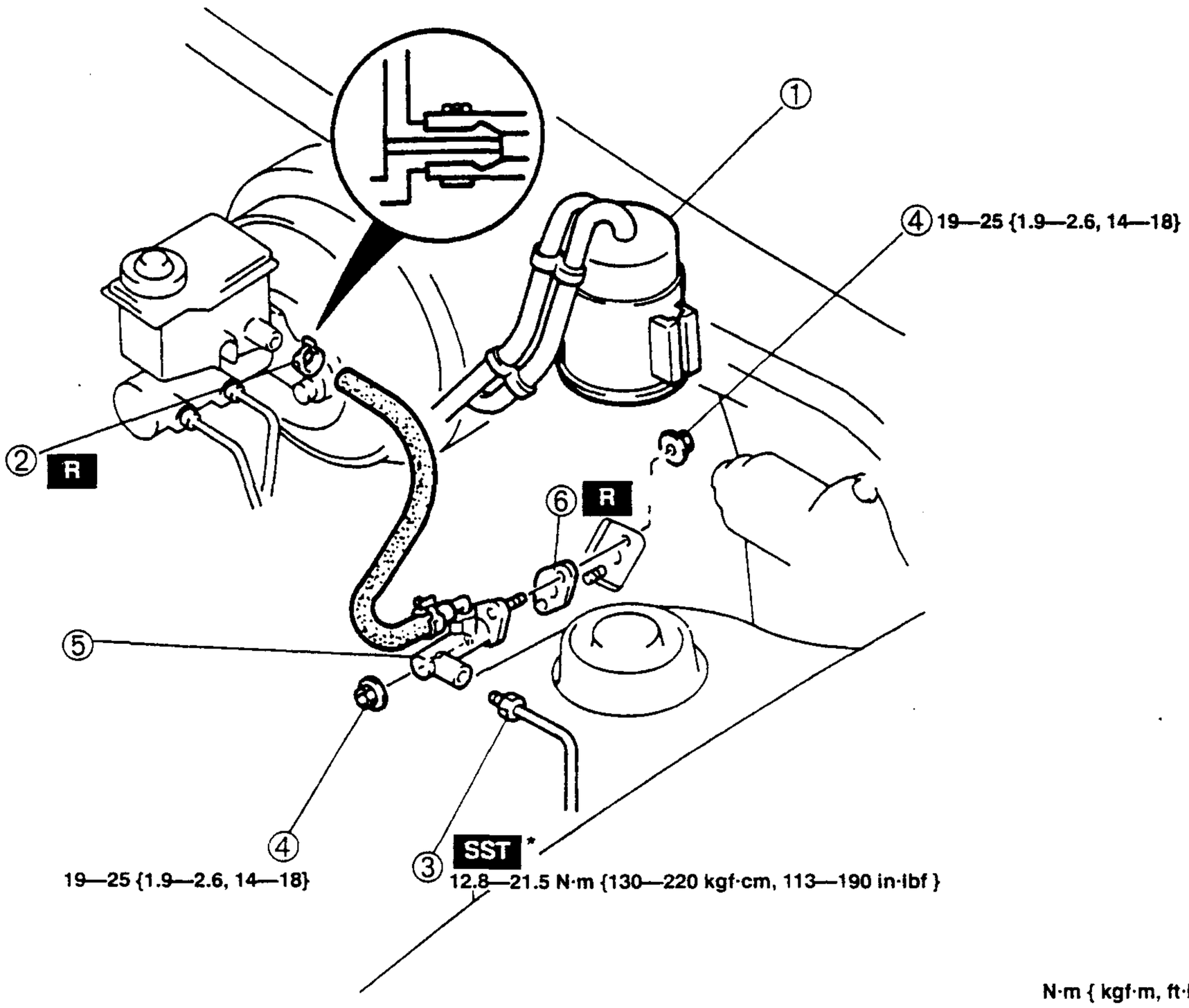
- After installation, adjust the pedal height and free play.
  (Refer to CLUTCH PEDAL, CLUTCH PEDAL INSPECTION/ADJUSTMENT.)

CLUTCH MASTER CYLINDER

CLUTCH MASTER CYLINDER REMOVAL/INSTALLATION

LHD

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



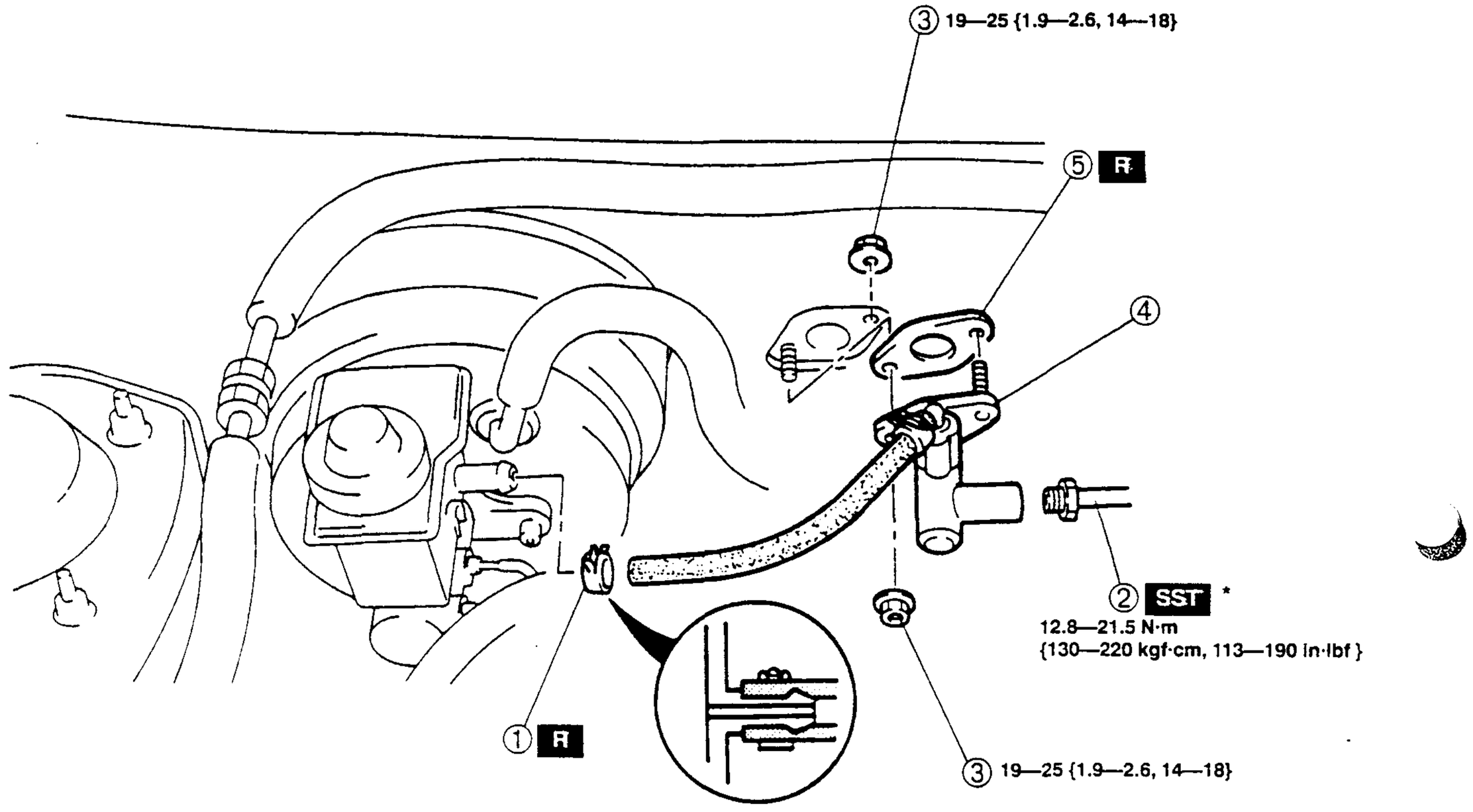
* 49 0259 770B

N·m { kgf·m, ft·lbf }

1	Charcoal canister
2	Clip
3	Clutch pipe
4	Nut
5	Clutch master cylinder
6	Gasket

RHD

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



* 49 0259 770B

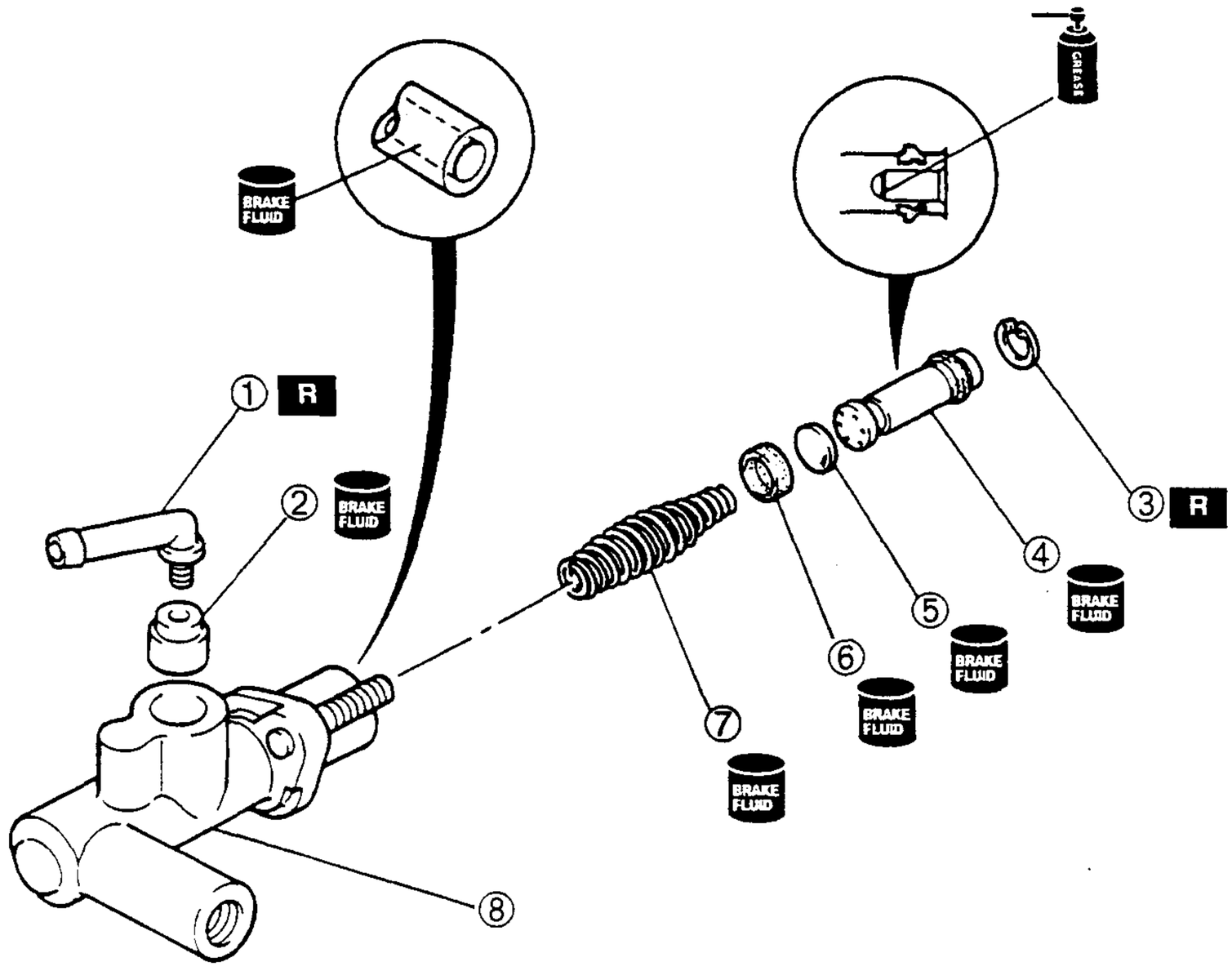
N·m { kgf·m, ft·lbf }

1	Clip
2	Clutch pipe
3	Nut

4	Clutch master cylinder
5	Gasket

CLUTCH MASTER CYLINDER DISASSEMBLY/ASSEMBLY

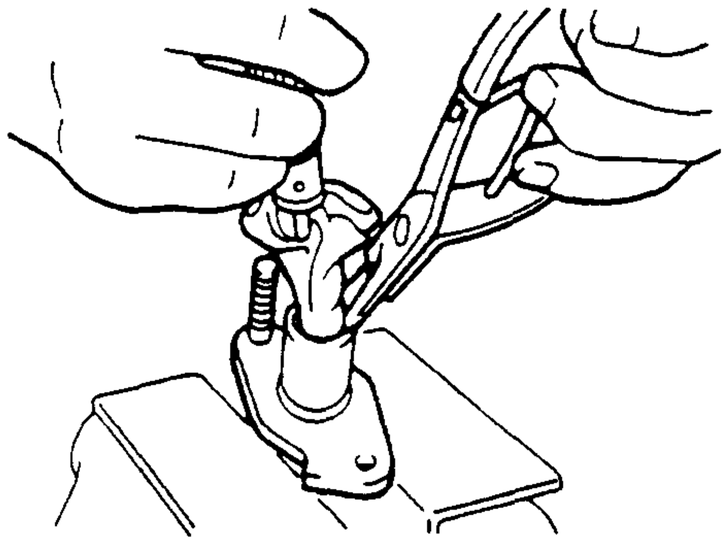
1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



1	Joint
2	Bushing
3	Snap ring ☞ Disassembly/Assembly Note
4	Piston and secondary cap
5	Spacer
6	Primary cap
7	Return spring
8	Master cylinder body

Snap Ring Disassembly/Assembly Note

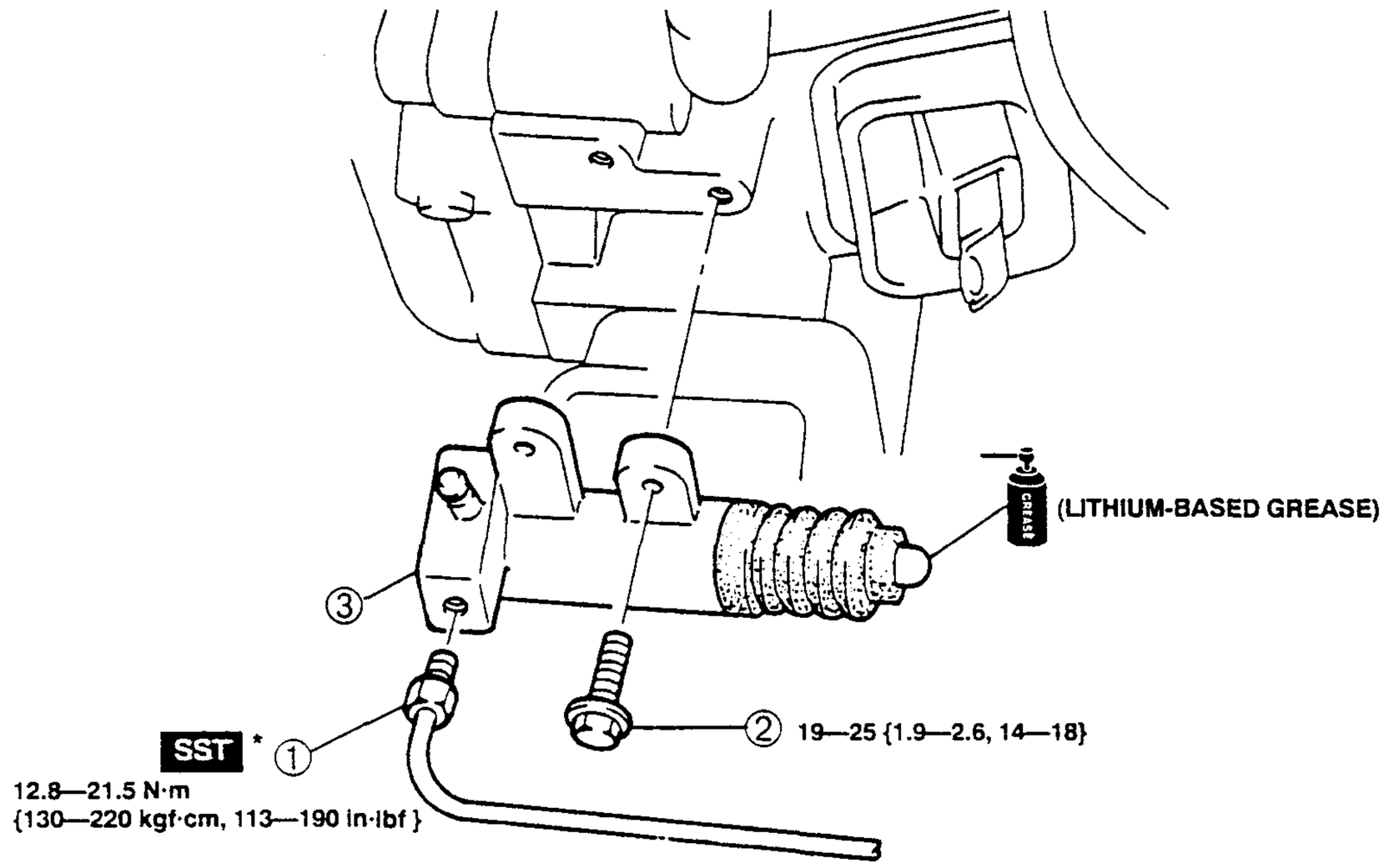
- Hold the piston down by using a cloth-wrapped pin punch. If disassembling, remove the snap ring; if assembling, install it.



CLUTCH RELEASE CYLINDER

CLUTCH RELEASE CYLINDER REMOVAL/INSTALLATION

1. Remove the fresh air duct.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



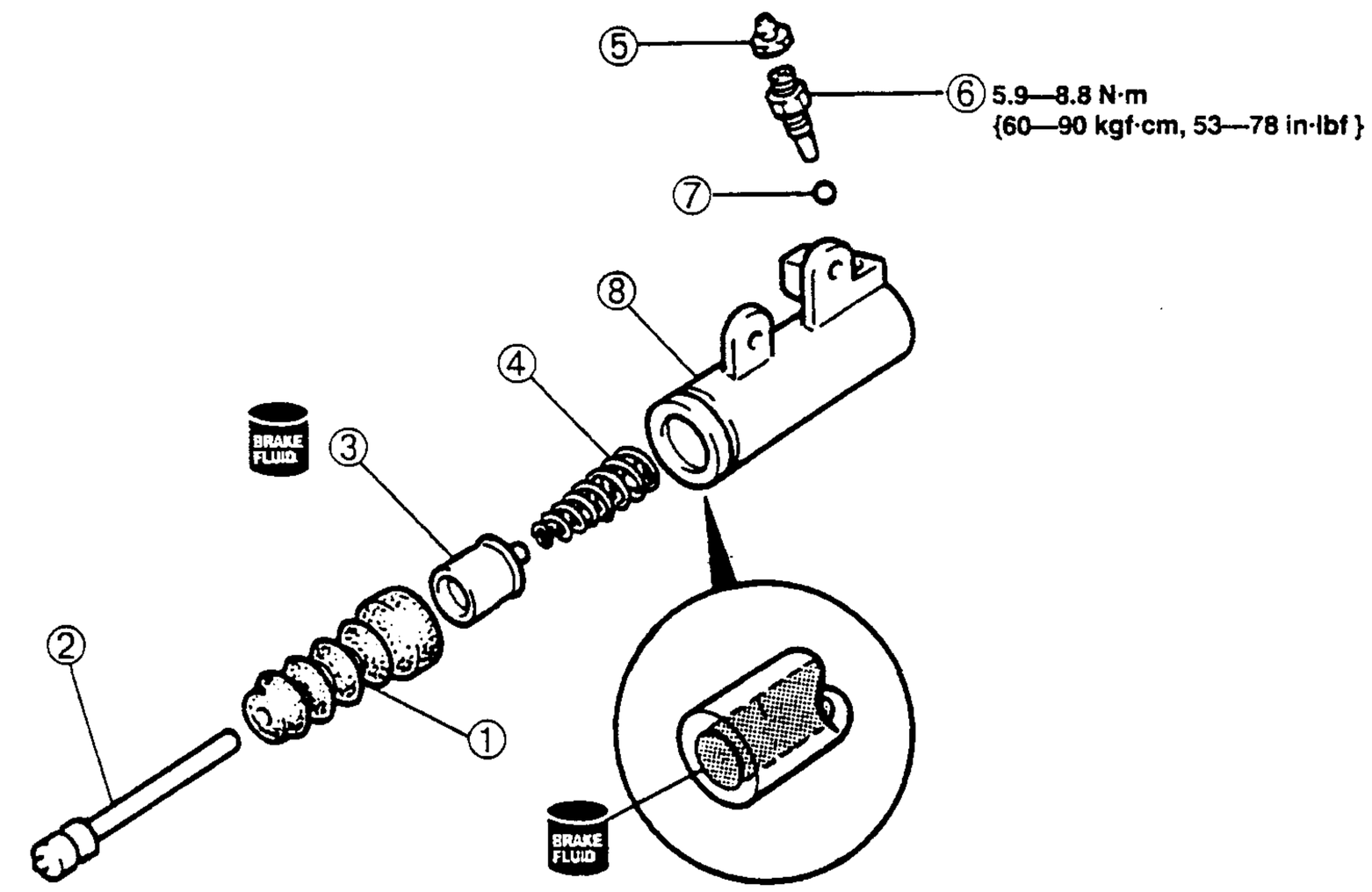
* 49 0259 770B

N·m { kgf·m, ft·lbf }

1	Clutch pipe
2	Bolt
3	Clutch release cylinder

CLUTCH RELEASE CYLINDER DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



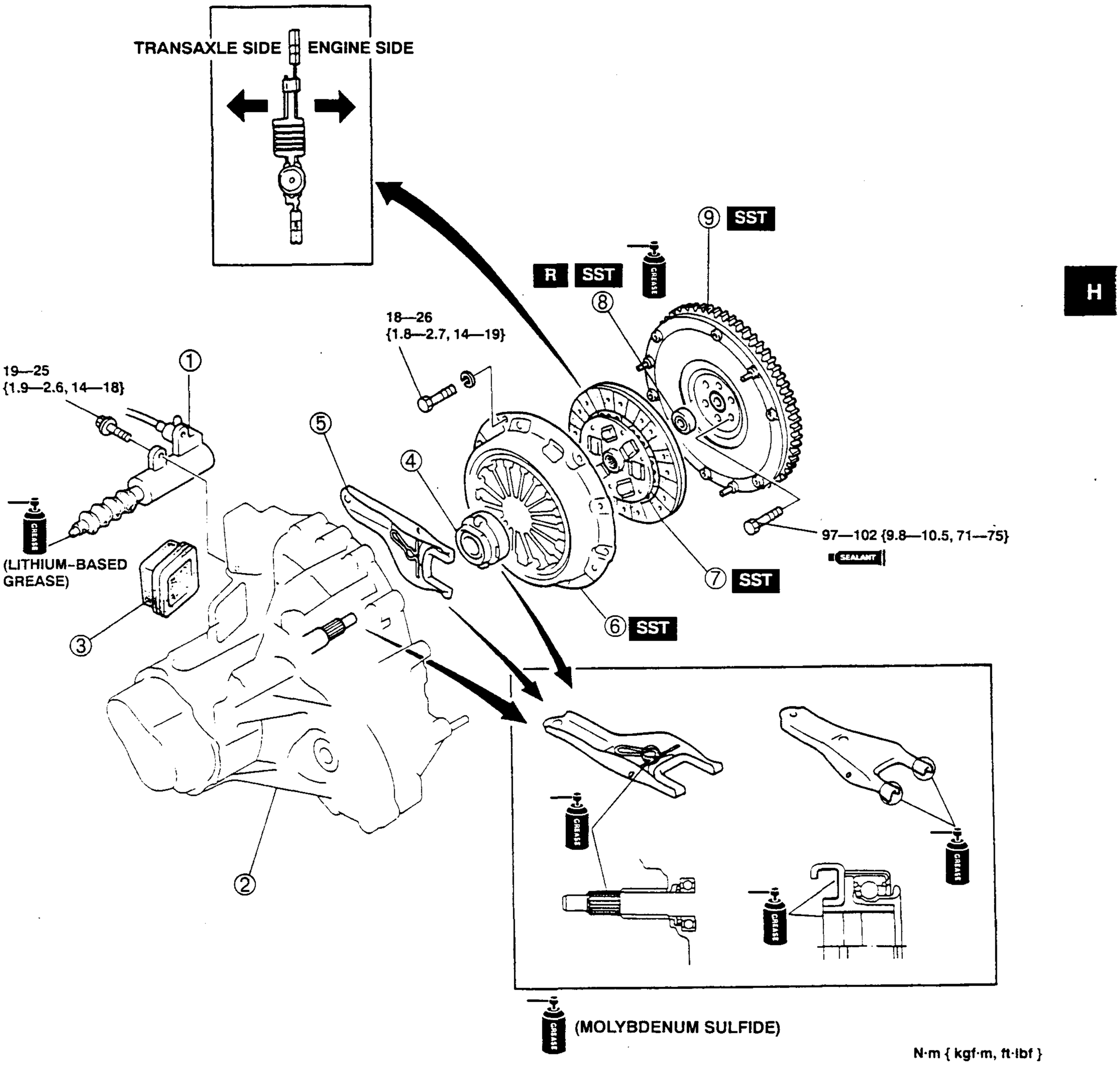
1	Boot
2	Push rod
3	Piston and cap
4	Return spring

5	Bleeder cap
6	Bleeder screw
7	Steel ball
8	Release cylinder body

CLUTCH UNIT

CLUTCH UNIT REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.

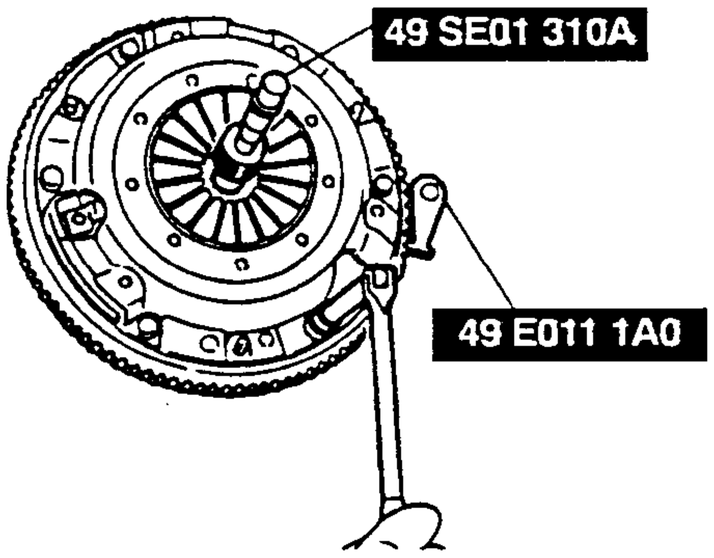


N·m { kgf·m, ft·lbf }

1	Clutch release cylinder
2	Manual transaxle ☞ Removal Note
3	Boot
4	Clutch release collar
5	Clutch release fork
6	Clutch cover ☞ Removal Note ☞ Installation Note
7	Clutch disc ☞ Removal Note ☞ Installation Note
8	Pilot bearing ☞ Removal Note ☞ Installation Note
9	Flywheel ☞ Removal Note ☞ Installation Note

Manual Transaxle Removal Note
(Refer to section J. MANUAL TRANSAXLE, MANUAL TRANSAXLE REMOVAL/INSTALLATION.)

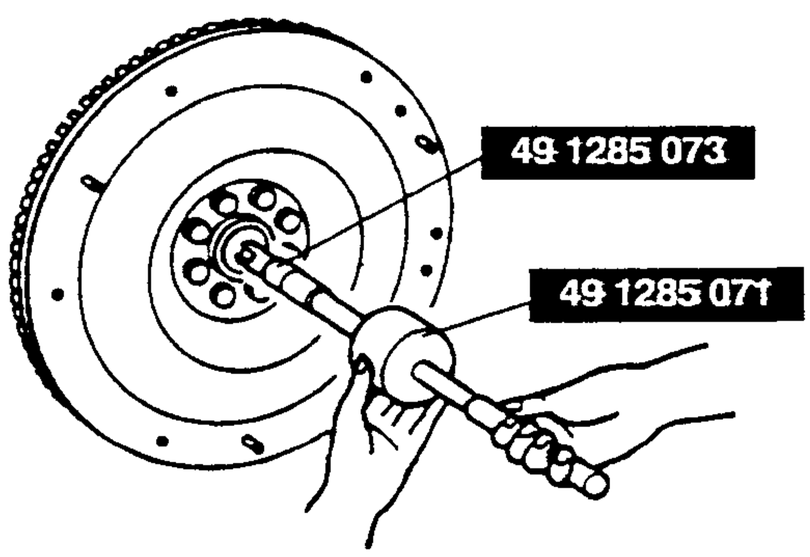
Clutch Cover and Disc Removal Note
1. Install the **SST**.
2. Loosen each bolt one turn at a time in a crisscross pattern until spring tension is released.
3. Remove the clutch cover and disc.



Pilot Bearing Removal Note

Note
- The pilot bearing does not need to be removed unless you are replacing it.

- Use the **SST** to remove the pilot bearing.

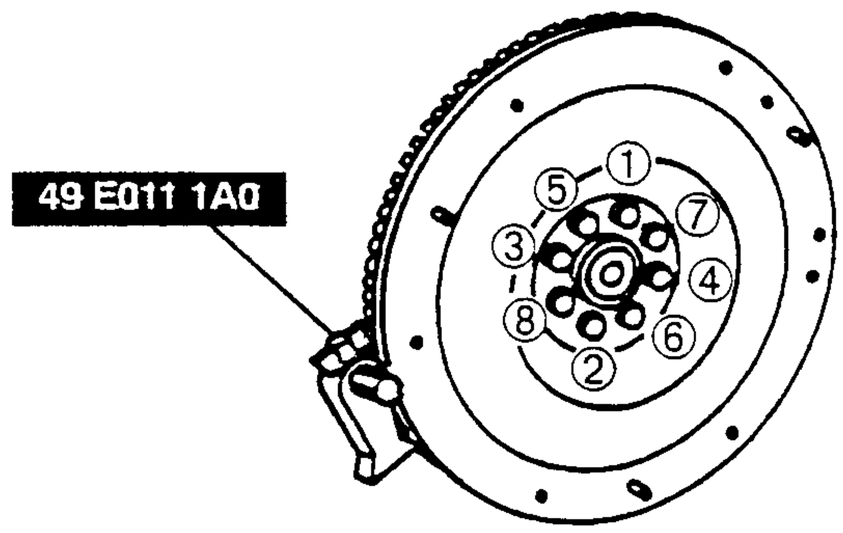


Flywheel Removal Note
1. Hold the flywheel by using the **SST**.
2. Remove the bolts evenly and gradually in a crisscross pattern.
3. Remove the flywheel.

Flywheel Installation Note
1. Install the flywheel to the crankshaft.
2. When reusing the bolts, clean and apply sealant to the threads.

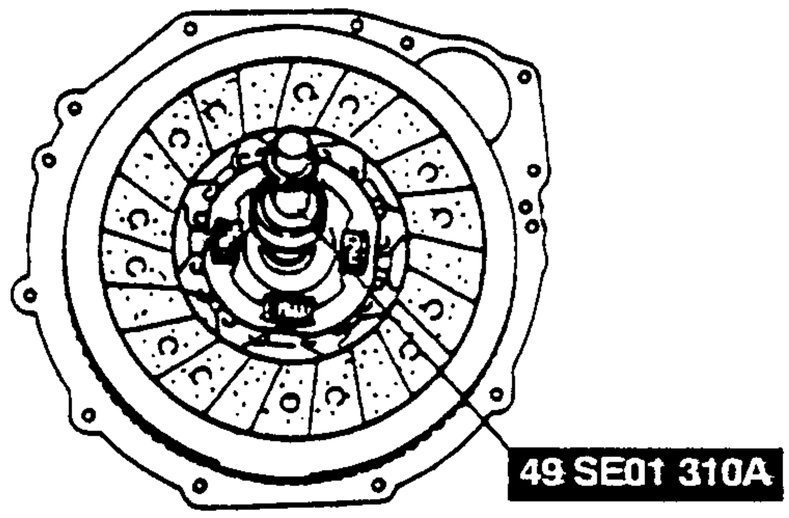
Note
- No sealant is needed when using new bolts.

3. Hand-tighten the flywheel lock bolts.
4. Install the **SST** to the flywheel.
5. Gradually tighten the flywheel lock bolts in a crisscross pattern.



Pilot Bearing Installation Note
- Install a new pilot bearing by using a suitable pipe.

Clutch Disc Installation Note
- Hold the clutch disc position by using the **SST**.



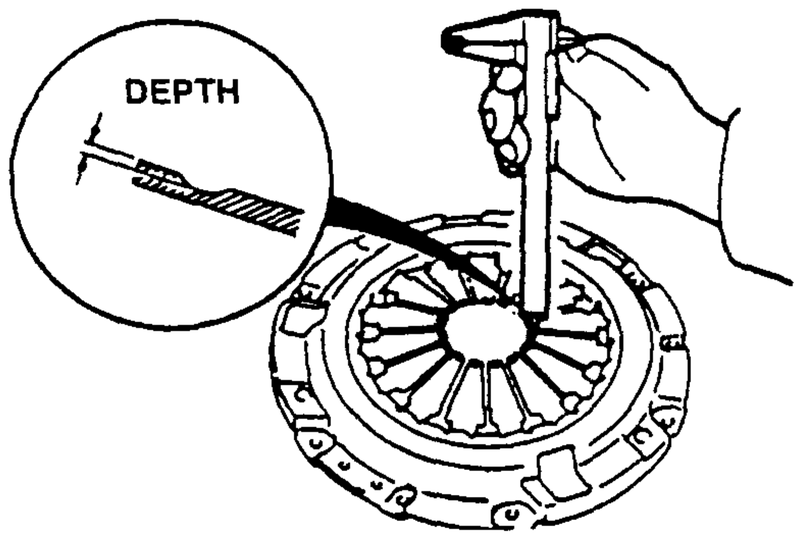
Clutch Cover Installation Note
1. Install the **SSTs**.
2. Tighten the bolts evenly and gradually in a crisscross pattern.

CLUTCH COVER

CLUTCH COVER INSPECTION

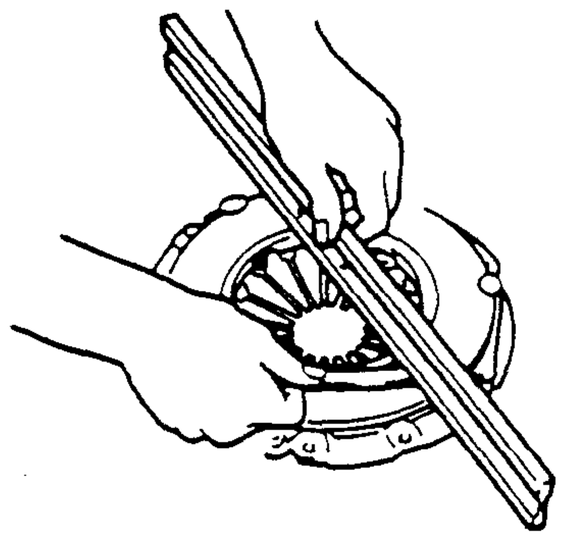
1. Measure the wear of the diaphragm spring fingers.

Depth
0.6 mm {0.024 in } max.



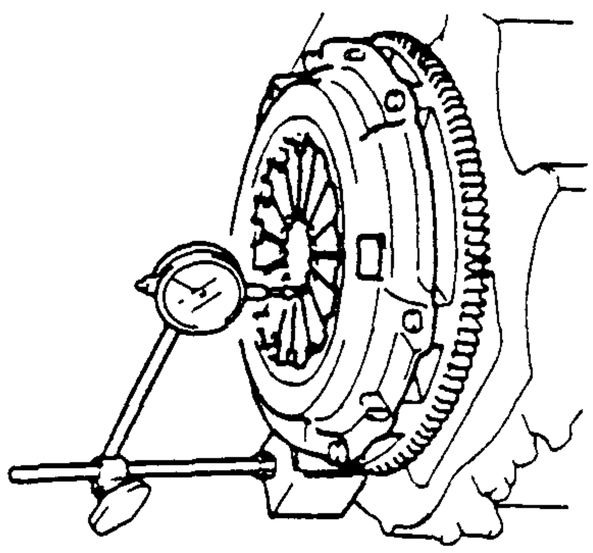
2. Measure the flatness of the pressure plate by using a straight edge and a feeler gauge.

Maximum clearance
0.5 mm {0.020 in }



3. When checking the diaphragm spring fingers, mount a dial indicator on the cylinder block.
4. Rotate the flywheel and check for misaligned diaphragm spring fingers.

Misalignment
0.600 mm {0.0236 in } max.



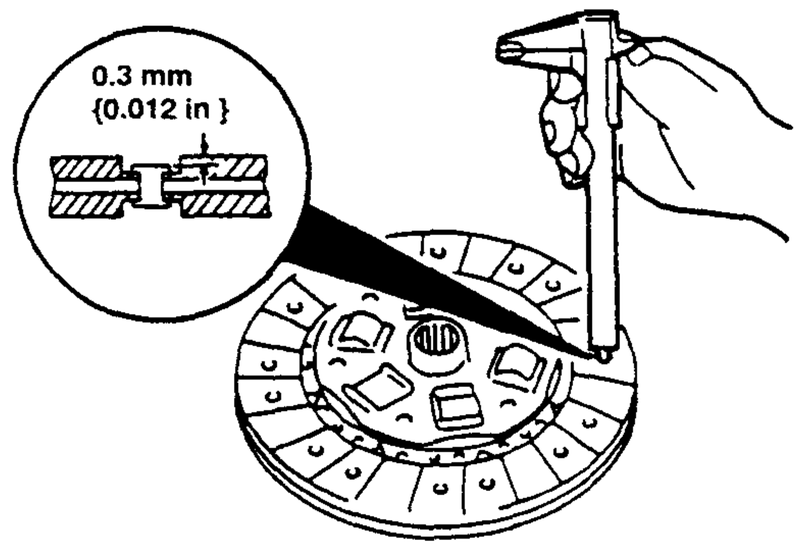
5. Replace the clutch cover if not as specified.

CLUTCH DISC

CLUTCH DISC INSPECTION

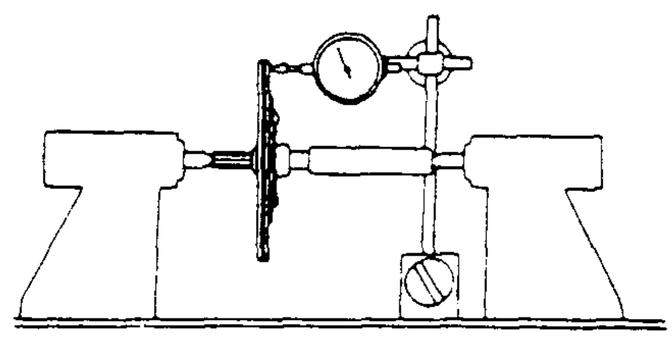
1. Using vernier calipers, measure the thickness of the lining at a rivet head on both sides.
Replace the clutch disc if its thickness is less than the minimum.

Thickness
0.3 mm {0.012 in } min.



2. Measure the clutch disc run out by using a dial indicator. Replace the clutch disc if runout is excessive.

Runout
0.700 mm {0.0286 in } max.



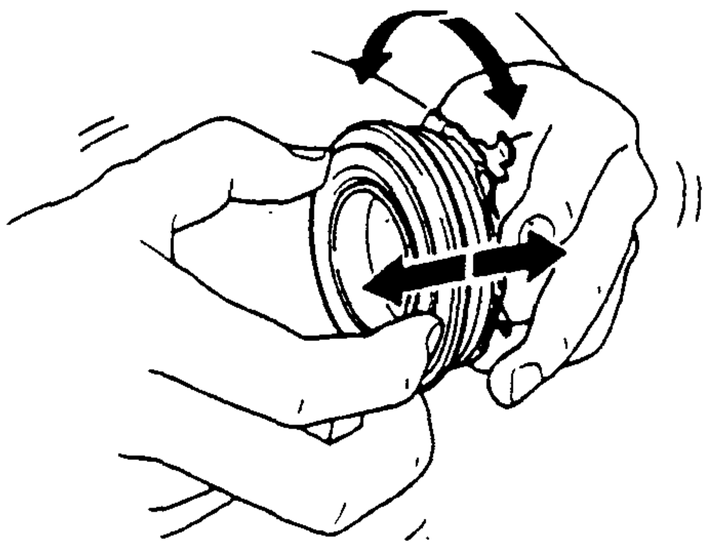
CLUTCH RELEASE COLLAR

CLUTCH RELEASE COLLAR INSPECTION

Caution

- **Cleaning the clutch release collar with cleaning fluids or a steam cleaner can wash the grease out of the sealed bearing.**

1. Turn the collar while applying force in the axial direction.

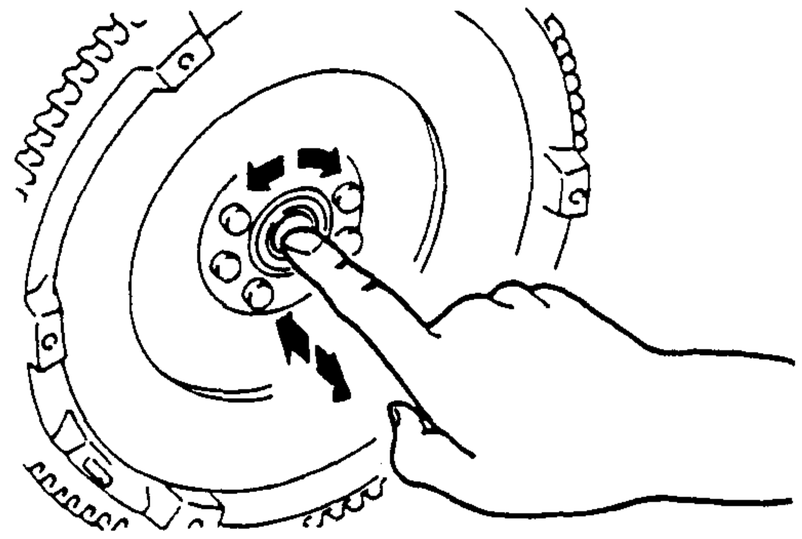


2. If the collar sticks or has excessive resistance, replace it.

PILOT BEARING

PILOT BEARING INSPECTION

1. Without removing the pilot bearing from the flywheel, turn the bearing while applying force in the axial direction.



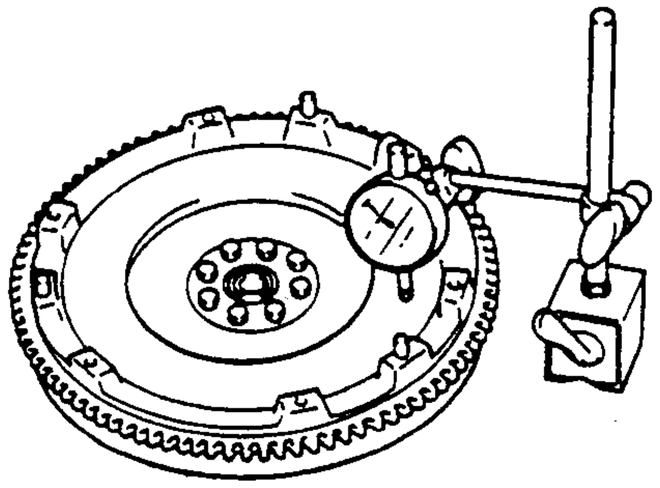
2. If the bearing sticks or has excessive resistance, replace it.

FLYWHEEL

FLYWHEEL INSPECTION

1. Install a dial gauge on the cylinder block.
2. Measure the flywheel runout by using a dial indicator. Replace the flywheel if runout is excessive.

Runout
0.200 mm {0.078 in } max.



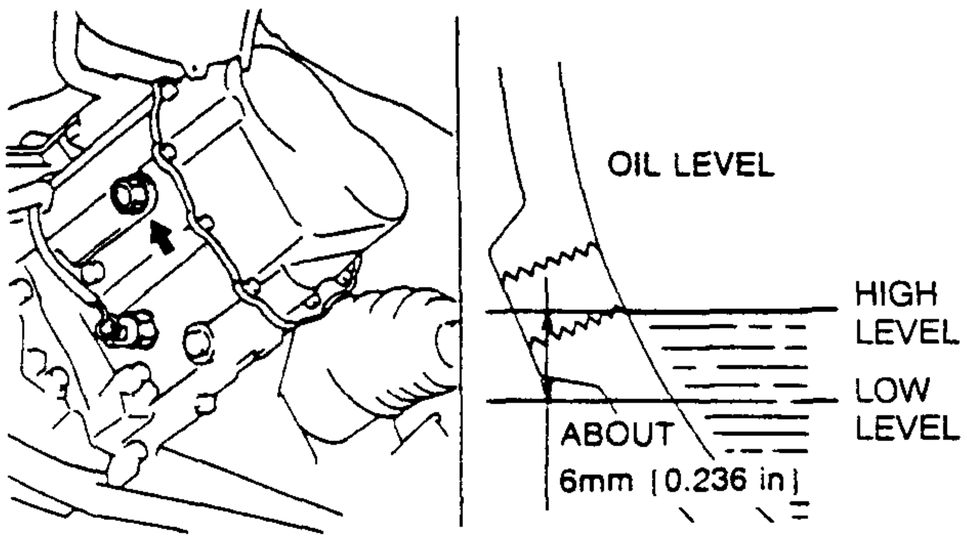
MANUAL TRANSAXLE

MANUAL TRANSAXLE **J-1**
TRANSAXLE OIL INSPECTION **J-1**
TRANSAXLE OIL REPLACEMENT **J-1**
OIL SEAL (DIFFERENTIAL) REPLACEMENT **J-2**
VEHICLE SPEEDOMETER SENSOR REMOVAL/INSTALLATION **J-2**
VEHICLE SPEEDOMETER SENSOR INSPECTION **J-2**
MANUAL TRANSAXLE REMOVAL/INSTALLATION **J-3**
SHIFT MECHANISM **J-5**
SHIFT MECHANISM REMOVAL/INSTALLATION **J-5**

MANUAL TRANSAXLE

TRANSAXLE OIL INSPECTION

1. Park the vehicle on level ground.
2. Remove the oil level plug and washer.
3. Verify that the oil is near the brim of the plug port.



4. If the oil level is lower than the low level, add the specified amount and type of oil through the oil level plug hole.

Specified oil
Grade:
API Service GL-4 or GL-5
Viscosity:

All-season	**SAE 75W-90**
Above 10 °C {50 °F }	**SAE 80W-90**

5. Install a new washer and the oil level plug.

Tightening torque
40—58 N·m {4.0—6.0 kgf·m , 29—43 ft·lbf }

TRANSAXLE OIL REPLACEMENT

1. Remove the drain plug with the washer.
2. Drain the oil into a suitable container.
3. Install a new washer and the drain plug.

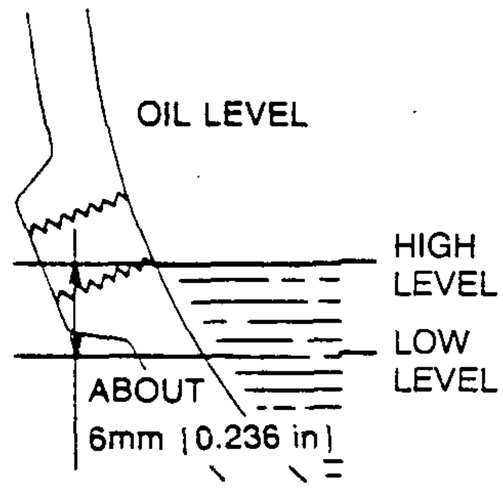
Tightening torque
40—58 N·m {4.0—6.0 kgf·m , 29—43 ft·lbf }

4. Remove the oil level plug with the washer and add the specified amount and type of oil through the oil level plug hole until the level reaches the bottom of the oil level plug hole.

Specified oil
Grade:
API Service GL-4 or GL-5
Viscosity:

All-season	**SAE 75W-90**
Above 10 °C {50 °F }	**SAE 80W-90**

Capacity
2.7 L {2.9 US qt ,2.4 Imp qt }

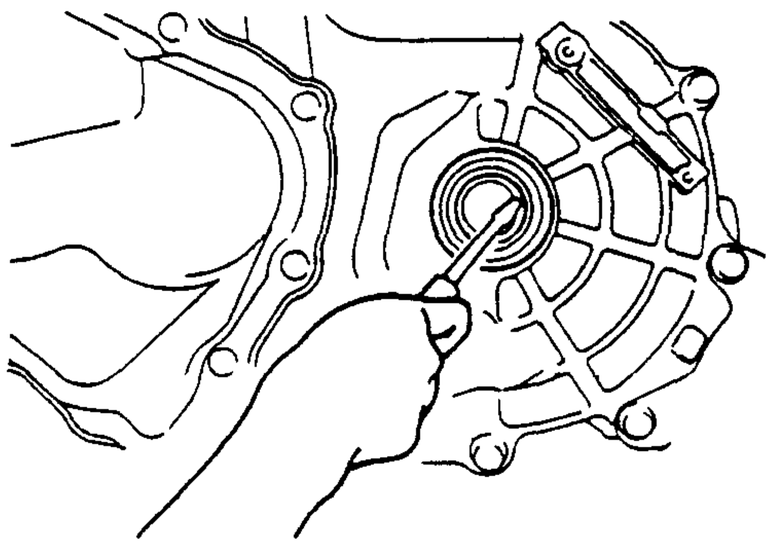


5. Install a new washer and the oil level plug.

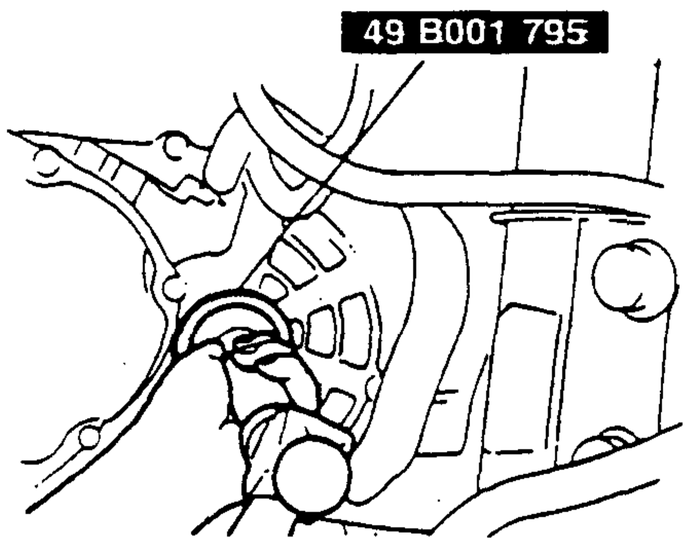
Tightening torque
40—58 N·m {4.0—6.0 kgf·m , 29—43 ft·lbf }

OIL SEAL (DIFFERENTIAL) REPLACEMENT

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Drain the oil from the transaxle.
3. Remove the front wheels and splash shields.
4. Separate the drive shaft and joint shaft from the transaxle.
   (Refer to section M, DRIVE SHAFT, DRIVE SHAFT REMOVAL/INSTALLATION.)
   (Refer to section M, DRIVE SHAFT, JOINT SHAFT REMOVAL/INSTALLATION.)
5. Remove the oil seals by using a screwdriver.



6. Using the **SST** and a hammer, tap each new oil seal in evenly until the **SST** contacts the transaxle case.



7. Coat the lip of each oil seal with transaxle oil.
8. Insert the drive shaft and joint shaft to the transaxle.
   (Refer to section M, DRIVE SHAFT, DRIVE SHAFT REMOVAL/INSTALLATION.)
   (Refer to section M, DRIVE SHAFT, JOINT SHAFT REMOVAL/INSTALLATION.)
9. Install the wheels and splash shields.
10. Add the specified amount and type of oil. (Refer to MANUAL TRANSAXLE, TRANSAXLE OIL REPLACEMENT.)

VEHICLE SPEEDOMETER SENSOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the air cleaner component.
3. Disconnect the vehicle speedometer sensor connector.
4. Remove the vehicle speedometer sensor.
5. Apply transaxle oil to a new O-ring and install it on a new vehicle speedometer sensor.
6. Install the vehicle speedometer sensor.

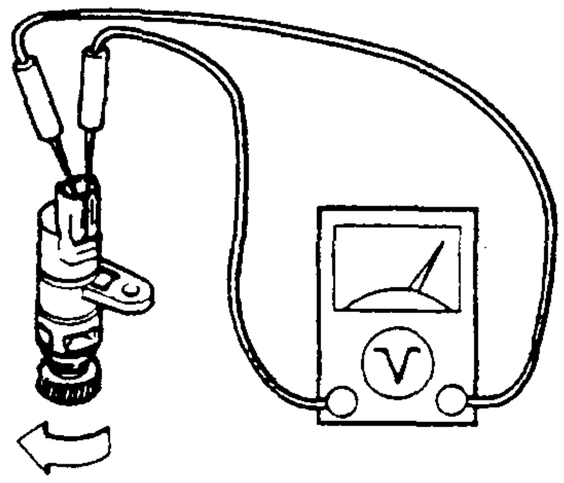
   Tightening torque
   7.9—11.2 N·m
   {80—115 kgf·cm, 69.5—99.8 in· lbf }

7. Connect the vehicle speedometer sensor connector.
8. Install the air cleaner component.
9. Connect the negative battery cable.

VEHICLE SPEEDOMETER SENSOR INSPECTION

1. Remove the vehicle speedometer sensor.
2. Measure voltage between terminals of the vehicle speedometer sensor while the gear is turning.

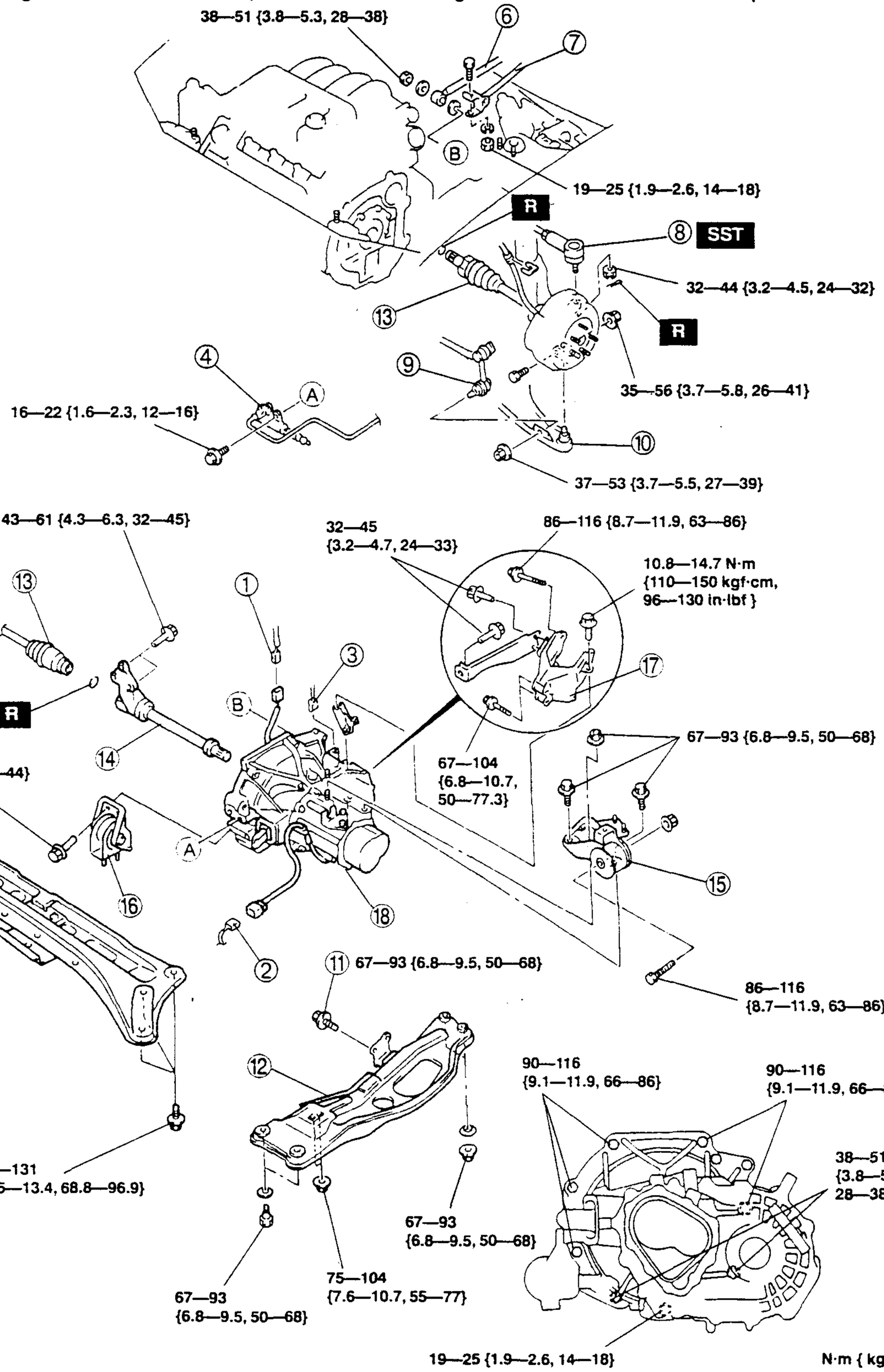
Meter needle	Action
Moves slightly under 5 V	Repair wiring harness (Instrument cluster-Vehicle speedometer sensor)
Does not move	Replace vehicle speedometer sensor



3. Install the vehicle speedometer sensor.

MANUAL TRANSAXLE REMOVAL/INSTALLATION

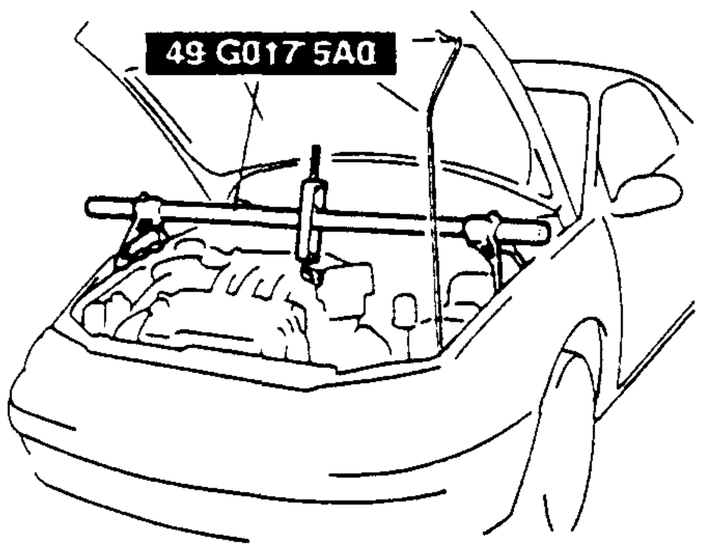
1. Remove the battery, battery cover, and battery tray.
2. Remove the fresh air duct and air cleaner component.
3. Remove the wheels and tires and splash shields.
4. Drain the transaxle oil into a container.
5. Remove the starter. (Refer to section G, STARTING SYSTEM, STARTER REMOVAL/INSTALLATION.)
6. Remove in the order indicated in the table.
7. Install in the reverse order of removal.
8. Add the specified amount of the specified transaxle oil. (Refer to MANUAL TRANSAXLE, TRANSAXLE OIL REPLACEMENT.)
9. Warm up the engine and transaxle, inspect for the oil leakage, and check the transaxle operation.



1	Neutral switch connector
2	Back-up light switch connector
3	Speedometer sensor connector
4	Clutch release cylinder
5	Transverse member
6	Extension bar
7	Change control rod
8	Tie-rod end ball joint ☞ section N, ENGINE SPEED SENSING POWER STEERING, POWER STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION, Tie-rod End Ball Joint Removal Note
9	Stabilizer control link
10	Lower arm ball joint
11	No.5 engine mount bolt
12	Engine mount member ☞ Removal Note ☞ Installation Note
13	Drive shaft ☞ section M, DRIVE SHAFT, DRIVE SHAFT REMOVAL/INSTALLATION
14	Joint shaft ☞ section M, DRIVE SHAFT, JOINT SHAFT REMOVAL/INSTALLATION
15	No.4 engine mount rubber ☞ section B, ENGINE, ENGINE REMOVAL/INSTALLATION, No.3, No.4 Engine Mount Rubber Installation Note
16	No.2 engine mount
17	No.1 engine mount bracket
18	Transaxle ☞ Removal Note ☞ Installation Note

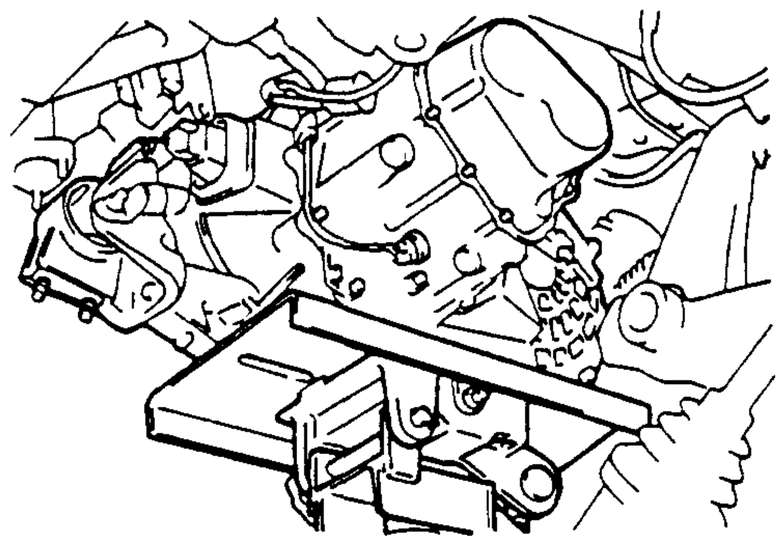
Engine Mount Member Removal Note

1. Support the engine by using the **SST** before removing the engine mount member.
2. Remove the engine mount member.



Transaxle Removal Note

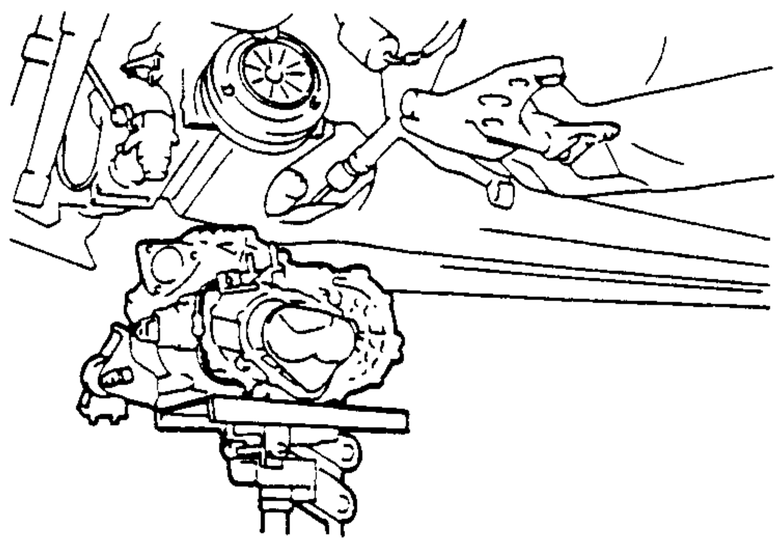
1. Loosen the **SST** (49 G017 5A0) and lean the engine toward the transaxle.
2. Support the transaxle on a jack.



3. Remove the transaxle mounting bolts.
4. Remove the transaxle.

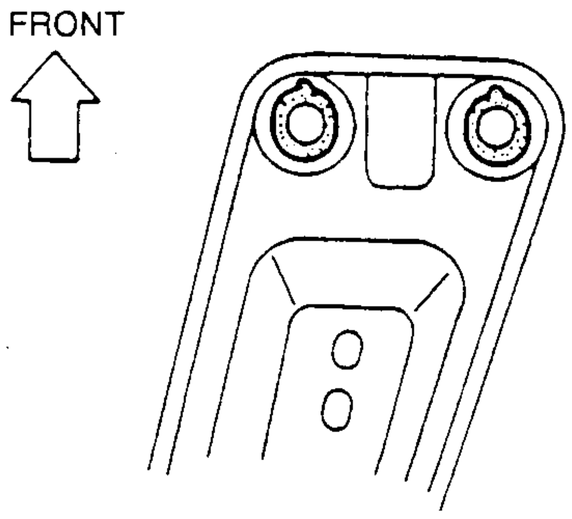
Transaxle Installation Note

1. Set the transaxle on a jack and lift into place.
2. Install the transaxle mounting bolts.



Engine Mount Member Installation Note

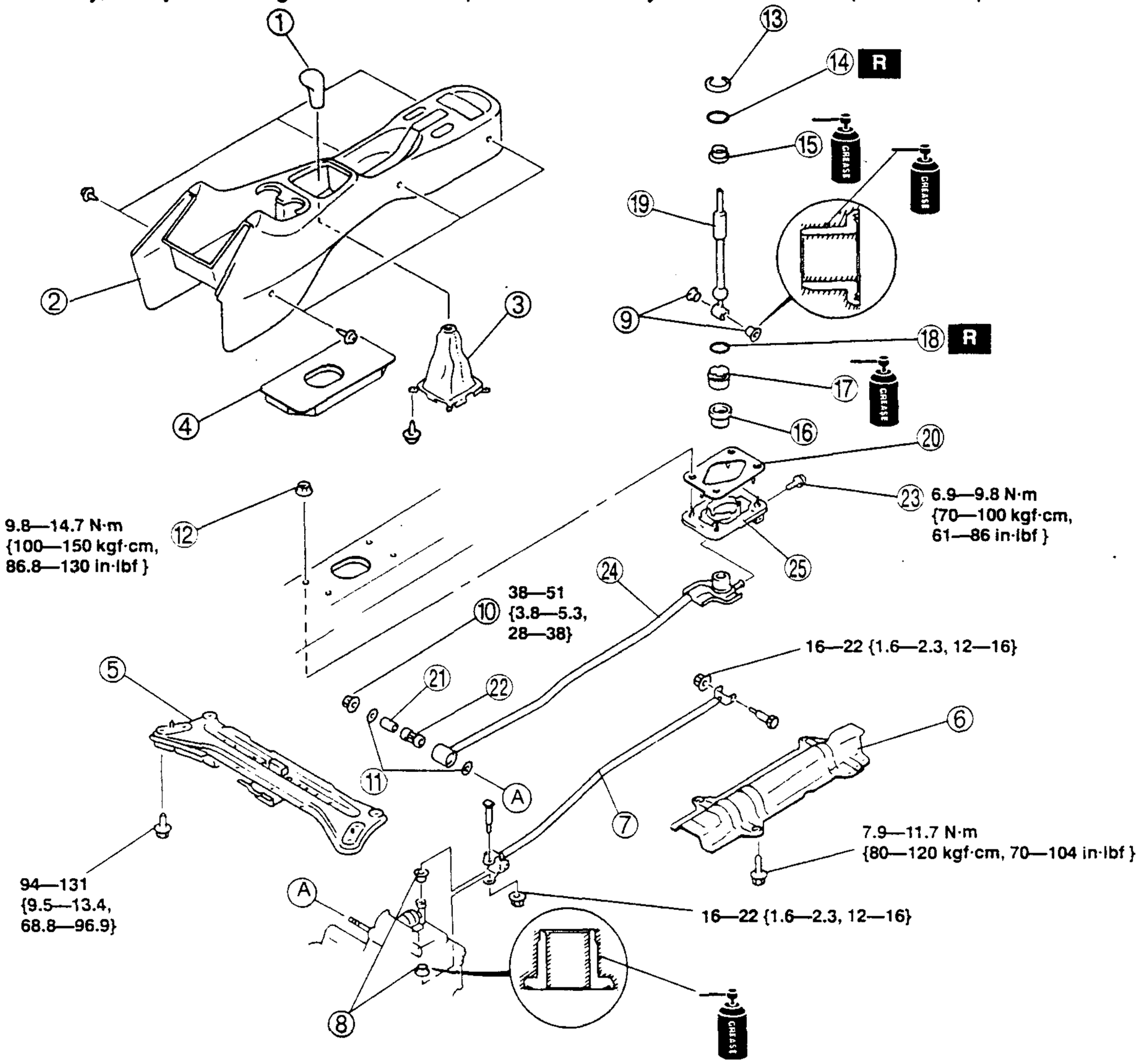
- Verify that the engine mount rubbers are installed as shown.



SHIFT MECHANISM

SHIFT MECHANISM REMOVAL/INSTALLATION

1. Remove the three-way catalytic converter. (Refer to section F, EXHAUST SYSTEM, EXHAUST SYSTEM REMOVAL/INSTALLATION.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly.
4. After assembly, verify that the gear shift lever operates smoothly when the clutch pedal is depressed.



N·m { kgf·m , ft·lbf }

1	Shift knob
2	Front console
3	Boot
4	Insulator
5	Transverse member
6	Heat insulator
7	Change control rod
8	Bushing
9	Bushing
10	Nut
11	Washer
12	Nut
13	Retaining ring

14	O-ring
15	Upper ball seat
16	Boot
17	Lower ball seat
18	O-ring
19	Gear shift lever
20	Seal rubber
21	Pipe
22	Bushing
23	Bolt
24	Extension bar
25	Base plate

AUTOMATIC TRANSAXLE

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AUTOMATIC TRANSAXLE

MECHANICAL SYSTEM TEST

Mechanical System Test

1. Engage the parking brake and use wheel chocks at the front and rear of the wheels.
2. Check the engine coolant. (Refer to section E, ENGINE COOLANT, ENGINE COOLANT INSPECTION.)
3. Check the engine oil. (Refer to section D, ENGINE OIL, ENGINE OIL INSPECTION.)
4. Check the ATF levels. (Refer to AUTOMATIC TRANSAXLE, AUTOMATIC TRANSAXLE FLUID (ATF) INSPECTION, ATF Level Inspection.)
5. Check the ignition timing. (Refer to section F, ENGINE TUNE-UP, IGNITION TIMING ADJUSTMENT.)
6. Check the idle speed. (Refer to section F, ENGINE TUNE-UP, IDLE SPEED ADJUSTMENT.)

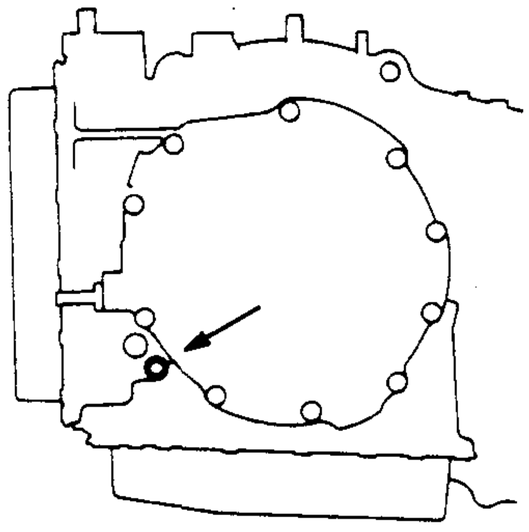
Line Pressure Test

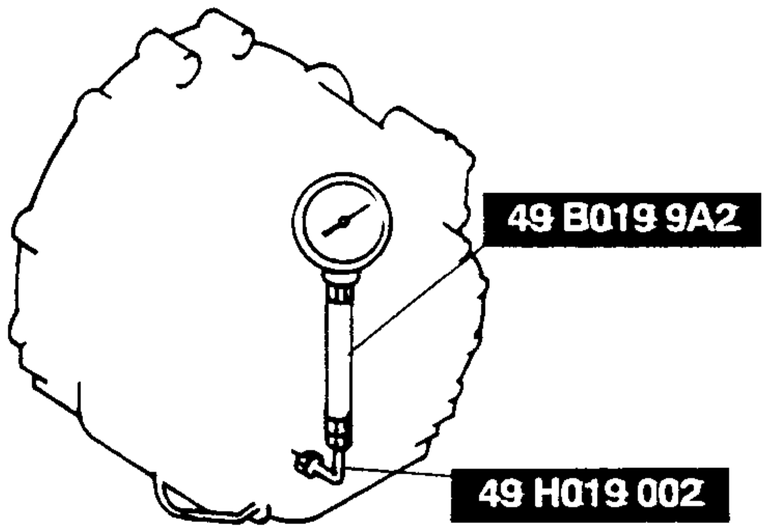
1. Perform mechanical system test preparation. (Refer to AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST, Mechanical System Test Preparation.)

Warning

- **Removing the square-head plug when the ATF is hot can be dangerous. Hot ATF can come out of the opening and badly burn. Before removing the square-head plug, allow the ATF to cool.**

2. Connect the **SSTs (49 B019 9A2 and 49 H019 002)** to the line pressure inspection port.





3. Shift the selector lever to D range and read the line pressure at idle.
4. Connect the **SST (49 0378 400B and 49 H019 002)** to the line pressure inspection port.

Caution

- **If the accelerator pedal is pressed for longer than 5 seconds while the brake pedal is pressed, the transaxle could be damaged. Therefore, do steps 5 and 6 within 5 seconds each.**

5. Firmly depress the brake pedal with the left foot, and then gradually depress the accelerator pedal with the right.
6. When the engine no longer increases, quickly read the line pressure and release the accelerator pedal.
7. Shift the selector to N position and let the engine idle for 1 minute or more to cool the ATF.
8. Read the line pressure at idle and at the engine stall speed for the S, L ranges and R position in the same manner.

Specified line pressure

Position/ range	Line pressure kPa { kgf/cm², psi }	
	Idle	Stall
D, S, L	412—539 {4.2—5.5, 60—78}	1099—1196 {11.2—12.0, 160—170}
R	726—1010 {7.4—10.3, 106—146}	1903—2029 {19.4—20.7, 276—294}

Warning

- **Removing the SST when the ATF is hot can be dangerous. Hot ATF can come out of the opening and badly burn you. Before removing the SST, allow the ATF to cool.**

9. Remove the **SST**.
10. Install a new square head plug in the inspection port.

Tightening torque

5. 0—9.8 N·m {50—100 kgf·cm , 44—86 in·lbf }

Evaluation of line pressure test

Line pressure	Possible cause
Low pressure in every position	• Worn oil pump • Oil leaking from oil pump, control valve body, and/or transaxle case • Pressure regulator valve sticking • Pressure control solenoid malfunction • Pressure modulator valve sticking • Solenoid reducing valve sticking
Low pressure in D and S only	• Oil leaking from hydraulic circuit of forward clutch
Low pressure in L and R only	• Oil leaking from hydraulic circuit of low and reverse brake
Low pressure in R only	• Oil leaking from hydraulic circuit of reverse clutch
Higher than specification	• Pressure control solenoid malfunction • Pressure regulator valve sticking • Pressure modulator valve sticking

Stall Test

1. Perform mechanical system test preparation. (Refer to AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST, Mechanical System Test Preparation.)
2. Shift the selector lever to R position.

Caution

- **If the accelerator pedal is pressed for longer than 5 seconds while the brake pedal is pressed, the transaxle could be damaged. Therefore, do step 3 and 4 within 5 seconds for each.**

3. Firmly depress the brake pedal with the left foot, and gently depress the accelerator pedal with the right.
4. When the engine speed no longer increases, quickly read the speed and release the accelerator pedal.
5. Shift the selector to N and let the engine idle for 1 minute or more to cool the ATF.
6. Perform a stall test of D, S, and L ranges in the same manner.

Engine stall speed
FS engine: 2,090—2,400 rpm
FP engine: 2,440—2,730 rpm

K

Evaluation of stall test

Condition	Possible Cause	
Above specification	Insufficient line pressure	• Worn oil pump
		• Oil leaking from oil pump, control valve, and/or transaxle case
		• Pressure regulator valve sticking
		• Pressure control solenoid malfunction
		• Pressure modulator valve sticking
	In forward ranges	• Forward clutch slipping • One-way clutch 1 slipping
	In D range	• One-way clutch 2 slipping
	In D (HOLD) and S (HOLD) ranges	• 2—4 brake band slipping
	In L and R ranges	• Low and reverse brake slipping
	In R position	• Low and reverse brake slipping • Reverse clutch slipping Perform road test to determine whether problem is on low and reverse brake or reverse clutch • Engine braking felt in L range (HOLD)→ Reverse clutch is defective. • Engine braking not felt in L range (HOLD)→ Low and reverse brake is defective.
Below specification		• Engine out of turn
		• One-way clutch slipping within torque converter

Time Lag Test

1. Perform mechanical system test preparation. (Refer to AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST, Mechanical System Test Preparation.)
2. Shift the selector from N position to D range. (non HOLD mode)
3. Use a stopwatch to measure the time it takes from shifting until shock is felt. Make three measurements for each test and take the average from the results.
4. Perform the test for the following shifts in the same manner.

(1) N position→
D range (HOLD mode)
(2) N position→
R position

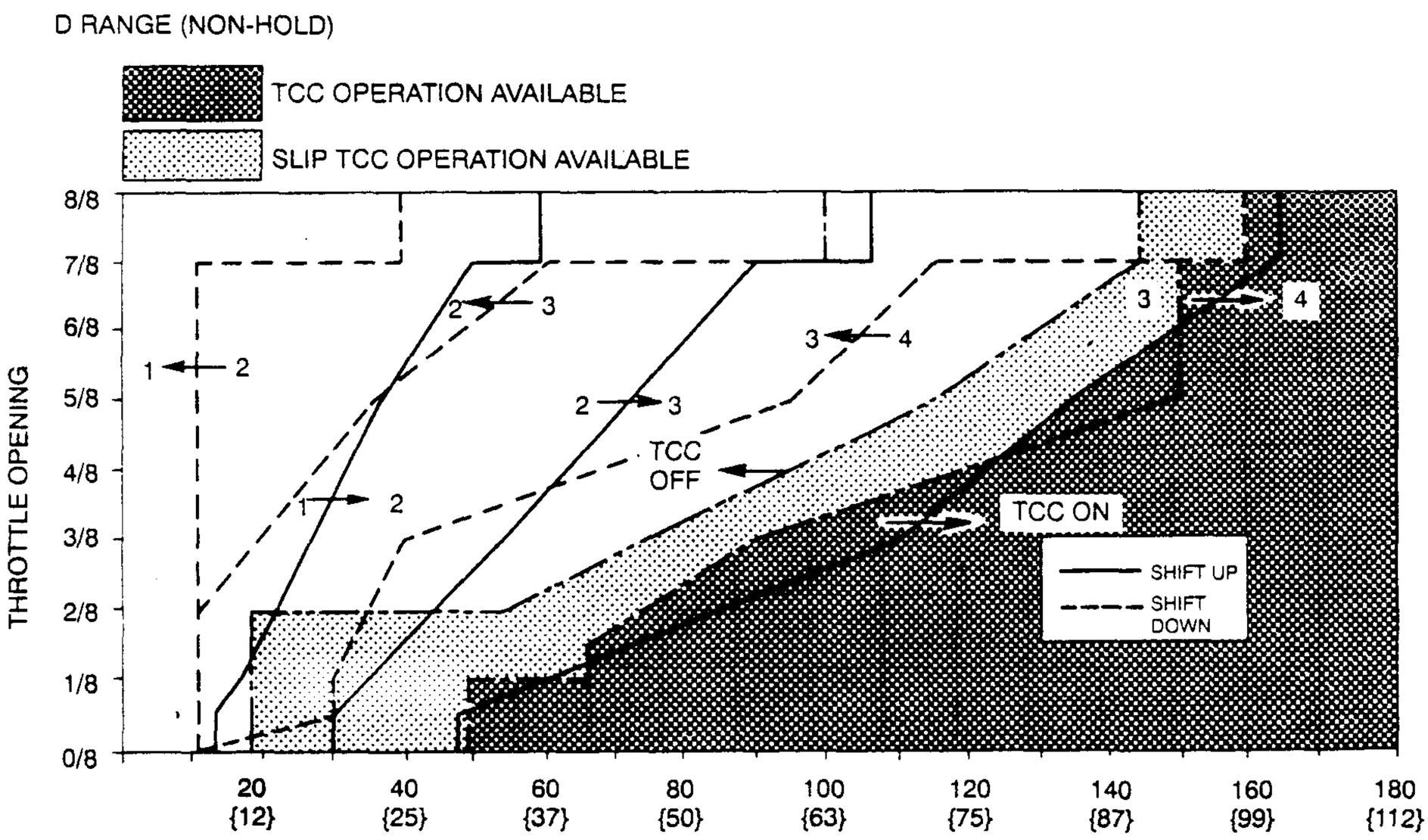
Time lag
N position →D range: 0.9 sec.
N position →R position: 1.1 sec.

Evaluation of time lag test

Condition		Possible Cause
N→D shift	More than specification	• Insufficient line pressure • Forward clutch slipping • One-way clutch 1 slipping • One-way clutch 2 slipping
	Less than specification	• N—D accumulator not operating properly • Excessive line pressure
N→D (HOLD) shift	More than specification	• Insufficient line pressure • Forward clutch slipping • 2—4 brake band slipping • One-way clutch 1 slipping
	Less than specification	• 1—2 accumulator not operating properly • Excessive line pressure
N→R shift	More than specification	• Insufficient line pressure • Low and reverse brake slipping • Reverse clutch slipping
	Less than specification	• N—R accumulator not operating properly • Excessive line pressure

ROAD TEST
Road Test Preparation
1. Check the engine coolant. (Refer to Section E, ENGINE COOLANT, ENGINE COOLANT INSPECTION.)
2. Check the engine oil. (Refer to Section D, ENGINE OIL, ENGINE OIL INSPECTION.)
3. Check the ATF levels. (Refer to AUTOMATIC TRANSAXLE, AUTOMATIC TRANSAXLE FLUID (ATF) INSPECTION, ATF Level Inspection.)
4. Check the ignition timing. (Refer to Section F, ENGINE TUNE-UP, IGNITION TIMING ADJUSTMENT.)
5. Check the idle speed. (Refer to Section F, ENGINE TUNE-UP, IDLE SPEED ADJUSTMENT.)

Shift Diagram



D Range Test

1. Perform road test preparation. (Refer to AUTOMATIC TRANSAXLE, ROAD TEST, Road Test Preparation.)
2. Shift the selector lever to D range.
3. Accelerate the vehicle with the half, and the wide open throttle.
4. Verify that 1—2, 2—3, and 3—4 upshifts and downshifts are obtained. The shift points must be as shown in the vehicle speed at shift point table.
5. Drive the vehicle in fourth, third, and second gears and verify that kickdown occurs for 4—3, 3—2, 2—1 downshifts, and that the shift points are as shown in the vehicle speed at shift point table.
6. Decelerate the vehicle and verify that engine braking effect is felt in fourth gear.
7. Drive the vehicle and verify that torque converter clutch operation is obtained. The operation points must be as shown in the vehicle speed at shift point table.
8. Select HOLD mode.
9. Accelerate the vehicle with the half, and the wide open throttle, and verify that 2—3 upshift and downshift are obtained. The shift points must be as shown in the vehicle speed at shift point table.

Vehicle speed at shift point table

Range	Mode	Throttle condition	Shift	Vehicle speed km/h { mph }	Turbine speed (rpm)
D	POWER	Wide open throttle	$D_1 \rightarrow D_2$	58—64 {36—39}	5,650—6,200
			$D_2 \rightarrow D_3$	105—113 {66—70}	5,650—6,000
			$D_3 \rightarrow D_4$	162—172 {101—106}	5,650—5,950
		Half throttle	$D_1 \rightarrow D_2$	36—46 {23—28}	3,550—4,450
			$D_2 \rightarrow D_3$	14—86 {9—53}	750—4,600
			$D_3 \rightarrow D_4$	124—149 {77—92}	4,350—5,150
		Closed throttle position	$D_4 \rightarrow D_3$	8—14 {5—8}	200—300
			$D_3 \rightarrow D_1$	8—14 {5—8}	300—450
		Kickdown	$D_4 \rightarrow D_3$	155—165 {97—102}	3,800—4,000
			$D_3 \rightarrow D_2$	96—104 {60—64}	3,350—3,600
			$D_2 \rightarrow D_1$	37—43 {23—26}	2,000—2,300
	NORMAL	Wide open throttle	$D_1 \rightarrow D_2$	58—64 {36—39}	5,650—6,200
			$D_2 \rightarrow D_3$	105—113 {66—70}	5,650—6,000
			$D_3 \rightarrow D_4$	162—172 {101—106}	5,650—5,950
			TCC ON (D_4)	162—172 {101—106}	3,950—4,150
		Half throttle	$D_1 \rightarrow D_2$	27—36 {17—22}	2,650—3,500
			$D_2 \rightarrow D_3$	55—71 {35—44}	2,950—3,750
			$D_3 \rightarrow D_4$	110—135 {68—83}	3,850—4,650
			TCC ON (D_4)	110—135 {68—83}	2,700—3,250
		Closed throttle position	$D_4 \rightarrow D_3$	8—14 {5—8}	200—300
			$D_3 \rightarrow D_1$	8—14 {5—8}	300—450
		Kickdown	$D_4 \rightarrow D_3$	155—165 {97—102}	3,800—4,000
			$D_3 \rightarrow D_2$	96—104 {60—64}	3,350—3,600
			$D_2 \rightarrow D_1$	37—43 {23—26}	2,000—2,300
	HOLD	—	$D_2 \rightarrow D_3$	15—25 {10—15}	850—1,300
		Wide open throttle	TCC ON (D_3)	115—125 {72—77}	4,000—4,300
		Close throttle position	TCC ON (D_3)	105—115 {66—71}	3,650—3,950
		—	$D_3 \rightarrow D_2$	7—13 {5—8}	250—450

S Range Test

1. Perform road test preparation. (Refer to AUTOMATIC TRANSAXLE, ROAD TEST, Road Test Preparation.)
2. Shift the selector lever to S range.
3. Accelerate the vehicle with the half, and the wide open throttle.
4. Verify that 1—2 and 2—3 upshifts and downshifts are obtained. The shift points must be as shown in the vehicle speed at shift point table.

Vehicle speed at shift point table

Range	Mode	Throttle condition	Shift	Vehicle speed km/h { mph }	Turbine speed (rpm)
S	Non-HOLD	Wide open throttle	$S_1 \rightarrow S_2$	58—64 {36—39}	3,550—6,200
			$S_2 \rightarrow S_3$	105—113 {66—70}	5,650—6,000
			TCC ON (S_3)	118—126 {74—78}	4,150—4,350
		Half throttle	$S_1 \rightarrow S_2$	36—46 {23—28}	3,550—4,450
			$S_2 \rightarrow S_3$	74—92 {46—57}	4,000—4,900
			TCC ON (S_3)	104—116 {65—71}	3,650—4,000
		Closed throttle position	$D_4 \rightarrow S_3$	162—168 {101—104}	3,950—4,050
			$S_3 \rightarrow S_1$	8—14 {5—8}	300—450
		Kickdown	$S_3 \rightarrow S_2$	96—104 {60—64}	3,350—3,600
			$S_2 \rightarrow S_1$	37—43 {23—26}	2,000—2,300
	HOLD	Wide open throttle	TCC ON (S_3)	115—125 {72—77}	4,000—4,300
		Closed throttle position		105—115 {66—71}	3,650—3,950
		—	$D_4 \rightarrow S_3$	162—168 {101—104}	3,950—4,050
			$S_3 \rightarrow S_2$	104—110 {65—68}	3,650—3,800

L Range Test

1. Perform road test preparation. (Refer to AUTOMATIC TRANSAXLE, ROAD TEST, Road Test Preparation.)
2. Shift the selector lever to L range.
3. Accelerate the vehicle with the half, and the open throttle.
4. Verify that 1—2 upshift and downshift are obtained. The shift points must be as shown in the vehicle speed at shift point table.
5. Drive the vehicle in second gear and verify that kickdown occurs for 2—1 downshift, and that the shift point is as shown in the vehicle speed at shift point table.
6. Decelerate the vehicle and verify that engine braking effect is felt in second gear.
7. Select HOLD mode.
8. Accelerate the vehicle with the half throttle opening and the wide open throttle, and verify that first gear is held.
9. Decelerate the vehicle and verify that engine braking effect is felt.

Vehicle speed at shift point table

Range	Mode	Throttle condition	Shift	Vehicle speed km/h { mph }	Turbine speed (rpm)
L	Non-HOLD	Wide open throttle	$L_1 \rightarrow L_2$	58—64 {36—39}	5,650—6,200
		Half throttle	$L_1 \rightarrow L_2$	35—45 {22—27}	3,450—4,350
		Closed throttle position	$L_1 \rightarrow L_2$	4—10 {3—6}	400—950
		Kickdown	$L_2 \rightarrow L_1$	37—43 {23—26}	2,000—2,300
	HOLD	—	$L_2 \rightarrow L_1$	43—49 {27—30}	2,350—2,600

P Position Test

- Shift into P position on a gentle slope. Release the brake and verify that the vehicle does not roll.

AUTOMATIC TRANSAXLE FLUID (ATF) INSPECTION

ATF Condition Inspection

- One way of determing whether the transaxle should be disassembled is by noting:
  1. If the ATF is muddy or varnished.
  2. If the ATF smalls strange or unusual.

ATF condition

Condition			Possible cause
Clear red		Normal	–
Light red: pink		Contaminated with water	• Broken oil cooler inside of radiator • Poor breather hose installation: By water contamination, problem could be occurring to parts inside of transaxle. It is necessary to overhaul transaxle and detect defected parts. If necessary, exchange transaxle.
Reddish brown	Has burnt smell and metal specs are found	Deteriorated ATF	Defect powertrain components inside of transaxle: Specs cause wide range of problems by plugging up in oil pipe, control valve body and oil cooler in radiator. • When large amount of metal specs are found, overhaul transaxle and detect defected parts. If necessary, exchange transaxle. • Implement flushing operation as there is a possibility to have specs plugged in oil pipe and/or oil cooler inside of radiator.
	Has no burnt smell	Normal	• Discoloration by oxidation.

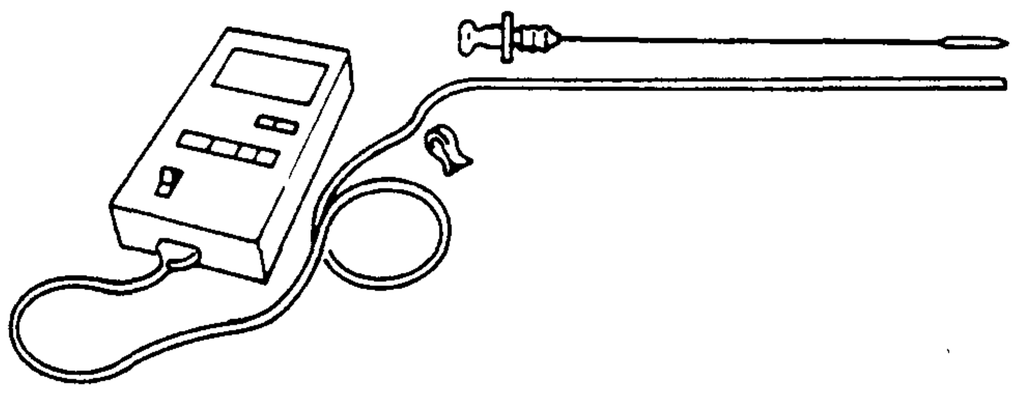
3. If ATF condition is poor, repair as follows.
   (1) Dark color condition
      - Overhaul transaxle and repair or replace parts as necessary.
   (2) Light pink and/or reddish-brown condition.
      - Replace ATF.

ATF Level Inspection

Caution

- **The ATF amount varies according to ATF's temperature. There for, when checking the ATF level or replacing the ATF, use a thermometer to measure the temperature then adjust the ATF amount to the specified level according to the specified temperature.**

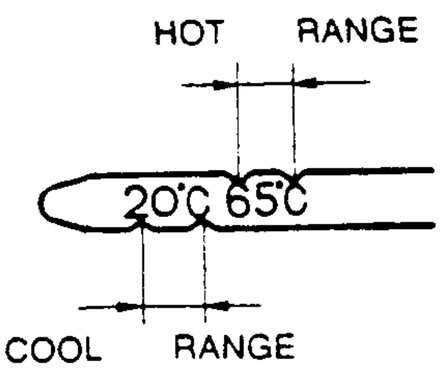
1. Park the vehicle on level ground.
2. Apply the parking brake and position wheel chocks securely to prevent the vehicle from rolling.
3. Adjust the length or thermistor probe measure the same as the depth gauge and hold the probe with a paper holder. Insert into the filler tube and measure the temperature.



4. If necessary, inspect the ATF before warming up the engine. In this case, use the cool range **(15—25 °C {59—77 °F })**.
5. Warm up the engine until the ATF reaches **60—70 °C {140—158 °F }**
6. While depressing the brake pedal, shift the selector lever to each range (P–L), pausing momentarily in each range.
7. Shift back to P position.
8. While the engine is idling, verify that the ATF level is in the HOT **65 °C{149 °F }** range. Add ATF to the specification, if necessary.

ATF type

M-III or equivalent (e.g. Dexron® II)



AUTOMATIC TRANSAXLE FLUID (ATF) REPLACEMENT

Warning

- **When the transaxle and ATF are hot, they can badly burn you. Turn off the engine and wait until they are cool before changing the ATF.**

1. Remove the dipstick.
2. Remove the drain plug and washer.
3. Drain the ATF into a container.
4. Install a new washer and the drain plug.

Tightening torque
40—53 N·m {4.0—5.5 kgf·m , 29—39 in·lbf }

5. Add the specified amount and type of ATF through the oil filler tube.

ATF type
M-III or equivalent (e.g. Dexron® II)
Fill amount
8.0 L {8.5 US qt , 7.0 Imp qt }

6. Install the dipstick.
7. Ensure that the ATF level is in the HOT **65 °C {149 °F }** range.
8. Add ATF to the specified level if necessary.

HOLD SWITCH INSPECTION

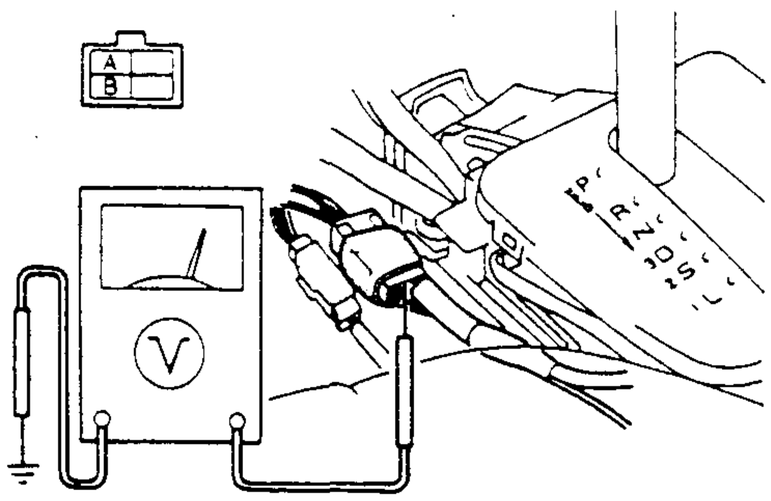
Inspection of Operation

1. Turn the ignition switch from OFF to ON.
2. Verify that the HOLD indicator light is not illuminated. Depress the HOLD switch and verify that the HOLD indicator light illuminates.
3. If not as specified, check the terminal. Voltage of the HOLD switch.

Inspection of Voltage

1. Remove the center console.
2. Turn the ignition switch at ON.
3. Measure the voltage at the HOLD switch connector.

Position	Connector terminal	
	A	B
Normal	B+	0
Depressed	0	0



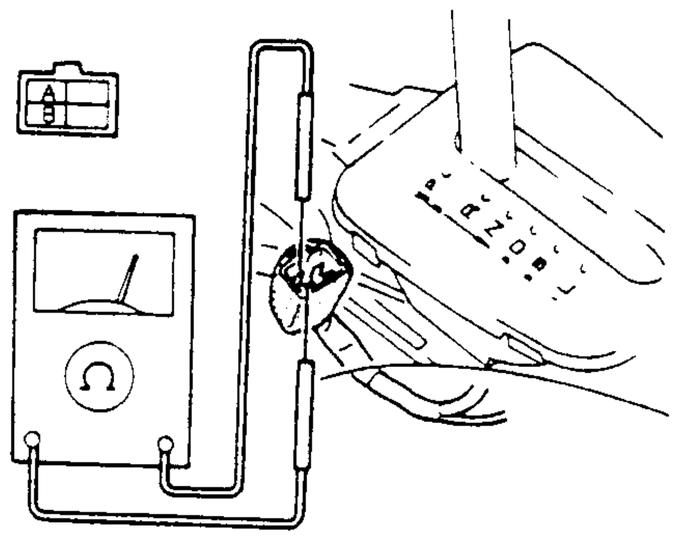
4. If not as specified, check for continuity at the HOLD switch.

Inspection of Continuity

1. Disconnect the negative battery cable.
2. Disconnect the HOLD switch connector.
3. Check for continuity at the HOLD switch.

○—○ : Continuity

Position	Connector terminal	
	A	B
Normal		
Depressed	○	○



4. If not as specified, replace the selector lever knob assembly.
5. If the switch is okay, check the wiring harness. (HOLD switch-Powertrain control module, HOLD switch-Body ground.)
6. Install the center console.
7. Connect the negative battery cable.

HOLD SWITCH REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the center console.
3. Disconnect the connector and remove the HOLD switch terminals. (Refer to AUTOMATIC TRANSAXLE, SELECTOR LEVER DISASSEMBLY/ASSEMBLY, Connector Disassembly Note.)
4. Remove the selector lever knob assembly.
5. Install a new selector lever knob assembly.

Tightening torque
2. 0—2.9 N·m {20—30 kgf·cm ,18—26 in·lbf }

6. Install the HOLD switch terminals and connect the connector.
7. Install the center console.
8. Connect the negative battery cable.

TRANSAXLE RANGE SWITCH INSPECTION

Inspection of Operation

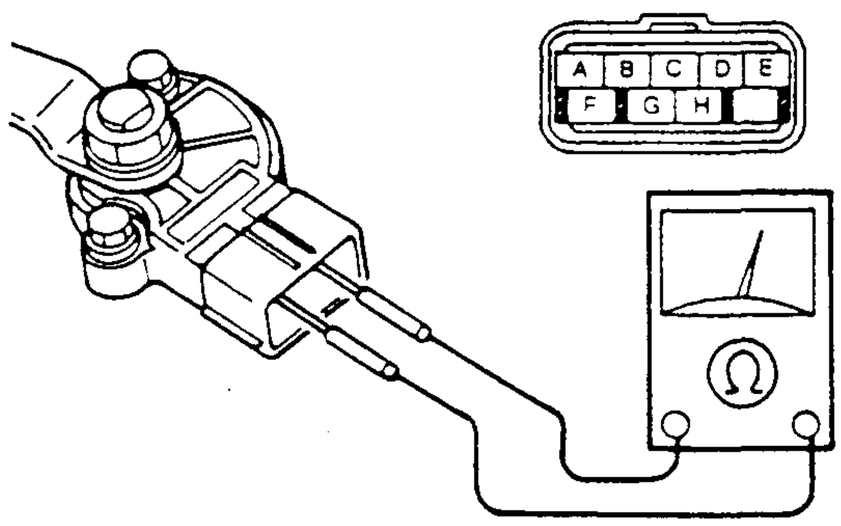
1. Verify that the starter operates only with the ignition switch at the START position and selector lever in P/N position.
2. Verify that the back-up lights illuminate when shifted to R position with the ignition switch at the ON position.
3. Check the transaxle range switch, if not as specified.

Inspection of Continuity

1. Disconnect the negative battery cable.
2. Remove the air cleaner assembly.
3. Disconnect the transaxle range switch connector.
4. Check for continuity at the transaxle range switch.

○—○ : Continuity

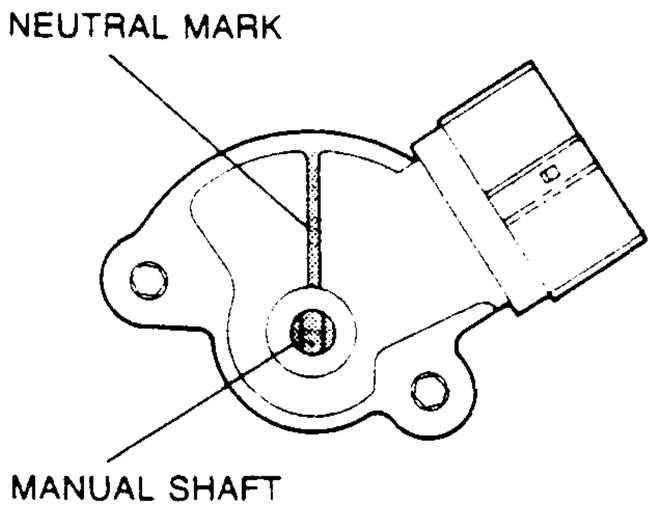
Position	Connector terminal								
	A	B	C	D	E	F	G	H	I
P	○	—	—	—	○	○	—	—	○
R	○	—	—	○					
N	○					○	—	—	○
D	○	—	○						
S	○	—	—	—	—	—	○		
L	○	—	○						



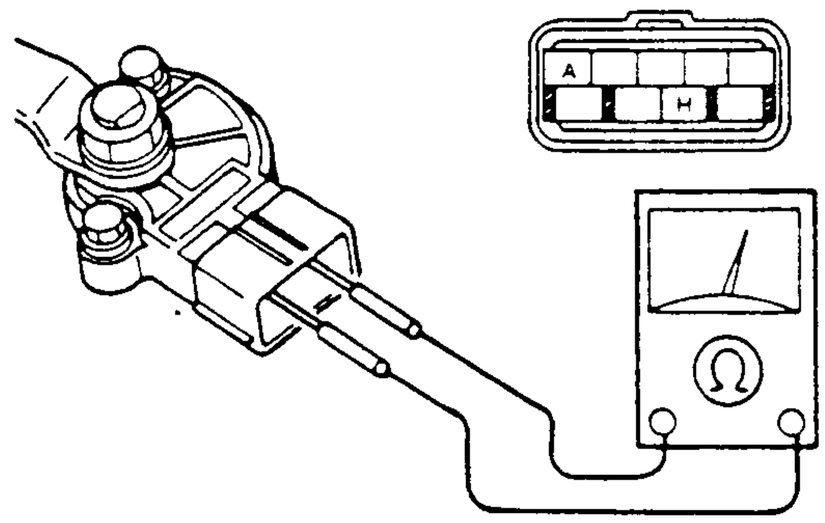
5. If not as specified, replace or adjust the transaxle range switch.
6. Connect the transaxle range switch connector.
7. Install the air cleaner assembly.
8. Connect the negative battery cable.

TRANSAXLE RANGE SWITCH REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the air cleaner assembly.
3. Disconnect the transaxle range switch connector.
4. Remove the nut and clip, and disconnect the selector cable.
5. Remove the manual shaft nut.
6. Remove the lock-washer and lever.
7. Remove the transaxle range switch.
8. Rotate the manual shaft to the N position.
9. Turn the transaxle range switch so that the neutral mark is in line with the flat, straight surfaces on either side of the manual shaft.



10. Hand-tighten the transaxle range switch bolts.
11. Verify that there is continuity between terminals A and H of the transaxle range switch connector.



12. Tighten the transaxle range switch mounting bolts.

Tightening torque
7.9—10.7 N·m
{80—110 kgf·cm , 69.5—95.4 in·lbf }

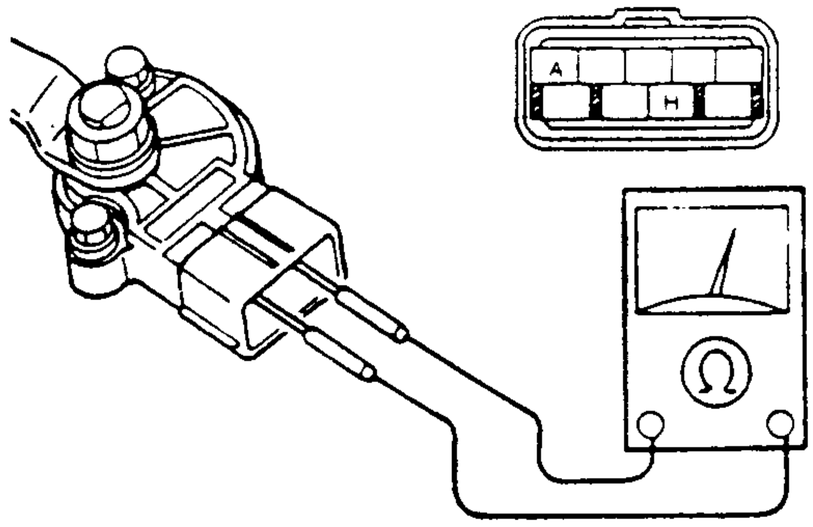
13. Install the lever and spring washer.
14. Tighten the manual shaft nut by using a torque wrench.

Tightening torque
32—46 N·m {3.2—4.7 kgf·m , 24—33 ft·lbf }

15. Verify that the selector lever range position and transaxle range switch are aligned, then connect the selector cable and install a new spring pin and clip.
16. Check for continuity at the transaxle range switch.
17. Connect the transaxle range switch connector.
18. Install the air cleaner assembly.
19. Connect the negative battery cable.
20. Check operation of the transaxle range switch.

TRANSAXLE RANGE SWITCH ADJUSTMENT

1. Disconnect the negative battery cable.
2. Remove the air cleaner assembly.
3. Remove the nut and clip, and disconnect the selector cable.
4. Rotate the manual shaft to the N position.
5. Disconnect the transaxle range switch connector.
6. Loosen the transaxle range switch mounting bolts.
7. Connect an ohmmeter between terminals A and H.



8. Adjust the switch to the point where there is continuity between the terminals.
9. Tighten the transaxle range switch mounting bolts.

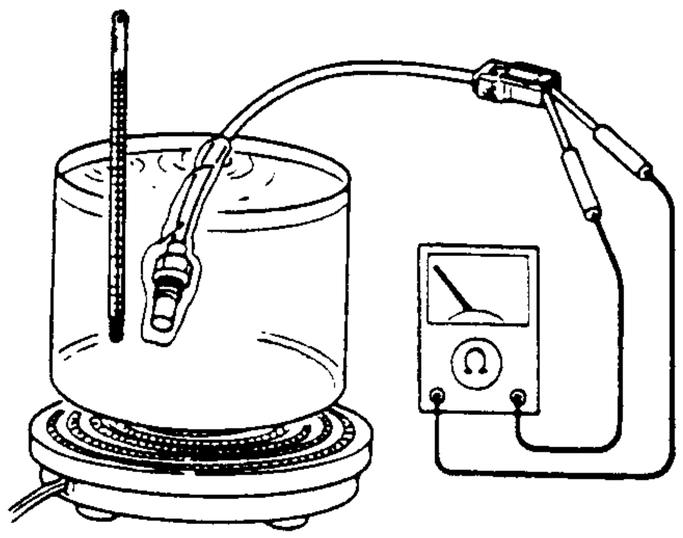
Tightening torque
7.9—10.7 N·m
{80—110 kgf·cm , 69.5—95.4 in·lbf }

10. Verify that the selector lever range position and transaxle range switch are aligned.
11. Connect the transaxle range switch connector.
12. Connect the selector cable and install the nut and clip.
13. Install the air cleaner assembly.

TRANSAXLE FLUID TEMPERATURE SENSOR INSPECTION

1. Remove the transaxle fluid temperature sensor. (Refer to AUTOMATIC TRANSAXLE, TRANSAXLE FLUID TEMPERATURE SENSOR REMOVAL/INSTALLATION.)
2. Place the transaxle fluid temperature sensor in ATF and a thermometer as shown, and heat the ATF gradually.
3. Measure the resistance between the terminals of the transaxle fluid temperature sensor.

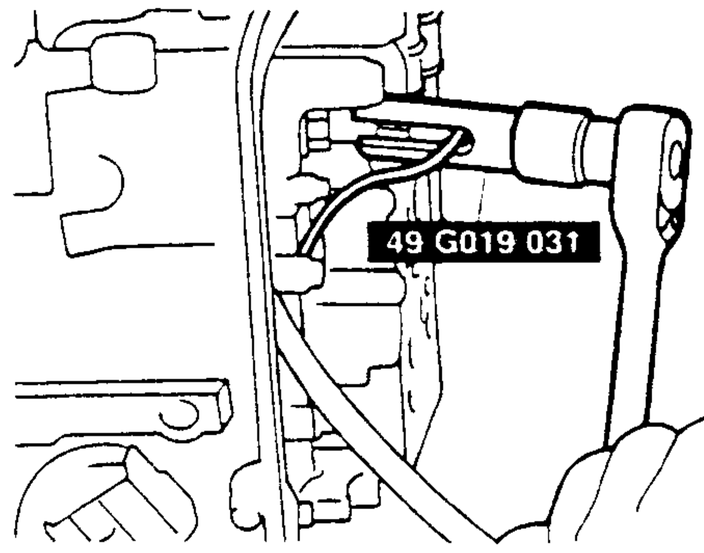
ATF temperature °C { °F }	Resistance (kΩ)
-20 {-4}	13.47-17.17
0 {32}	5.445-6.678
20 {68}	2.441-2.894
40 {104}	1.193-1.374
60 {140}	0.6284-0.7048
80 {176}	0.3527-0.3865
100 {212}	0.2091-0.2245
120 {248}	0.1301-0.1372
130 {266}	0.1044-0.1090



4. If not as specified, replace the transaxle fluid temperature sensor.
5. Install the transaxle fluid temperature sensor. (Refer to AUTOMATIC TRANSAXLE, TRANSAXLE FLUID TEMPERATURE SENSOR REMOVAL/INSTALLATION.)

TRANSAXLE FLUID TEMPERATURE SENSOR REMOVAL/INSTALLATION

1. Remove the control valve body cover. (Refer to AUTOMATIC TRANSAXLE, CONTROL VALVE BODY REMOVAL/INSTALLATION, On-Vehicle Removal.)
2. Disconnect the transaxle fluid temperature sensor connector.
3. Remove the transaxle fluid temperature sensor by using the **SST**.



4. Install a new transaxle fluid temperature sensor by using the **SST**.

Tightening torque
7.9—10.7 N·m
{80—110 kgf·cm , 69.5—95.4 in·lbf }

5. Connect the transaxle fluid temperature sensor connector.
6. Install the control valve body cover. (Refer to AUTOMATIC TRANSAXLE, CONTROL VALVE BODY REMOVAL/INSTALLATION, On-Vehicle Installation.)
7. Carry out the mechanical system test. (Refer to AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST.)

INPUT/TURBINE SPEED SENSOR INSPECTION

Inspection Of Resistance

1. Disconnect the input/turbine speed sensor connector. (Refer to AUTOMATIC TRANSAXLE, INPUT/TURBINE SPEED SENSOR REMOVAL/INSTALLATION.)
2. Measure the resistance between the terminals of the input/turbine speed sensor.

Resistance
253—604 Ω (ATF temperature:
-40—160 °C {-40—320 °F })

3. If not as specified, replace the input/turbine speed sensor.
4. Connect the input/turbine speed sensor connector. (Refer to AUTOMATIC TRANSAXLE, INPUT/TURBINE SPEED SENSOR REMOVAL/INSTALLATION.)

INPUT/TURBINE SPEED SENSOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the air cleaner assembly, battery, and battery carrier.
3. Disconnect the input/turbine speed sensor connector.
4. Remove the input/turbine speed sensor.
5. Apply ATF to a new O-ring and install it on a new input/turbine speed sensor.
6. Install the input/turbine speed sensor.

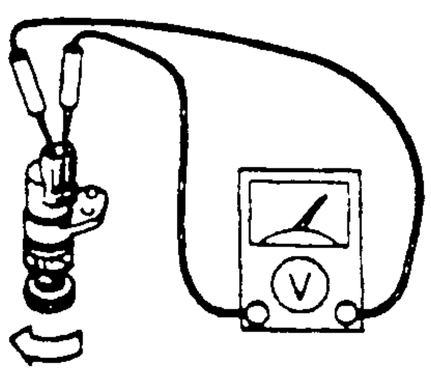
Tightening torque
7.9—10.7 N·m
{80—110 kgf·cm , 69.5—95.4 in·lbf }

7. Connect the input/turbine speed sensor connector.
8. Install the battery, battery carrier, and air cleaner assembly.
9. Connect the negative battery cable.

VEHICLE SPEEDOMETER SENSOR INSPECTION

1. Remove the vehicle speedometer sensor.
2. Measure voltage between terminals of the vehicle speedometer sensor while the gear is turning.

Meter needle	Action
Moves slightly under 5 V	Repair wiring harness (Instrument cluster-Vehicle speedometer sensor)
Does not move	Replace vehicle speedometer sensor



3. Install the vehicle speedometer sensor.

VEHICLE SPEEDOMETER SENSOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the air cleaner assembly, battery and battery carrier.
3. Disconnect the vehicle speedometer sensor connector.
4. Remove the vehicle speedometer sensor.
5. Apply ATF to a new O-ring and install it on a new vehicle speedometer sensor.
6. Install the vehicle speedometer sensor.

Tightening torque
7.9—10.7 N·m
{80—110 kgf·cm , 69.5—95.4 in·lbf }

7. Connect the vehicle speedometer sensor connector.
8. Install the battery and battery carrier, air cleaner assembly.
9. Connect the negative battery cable.

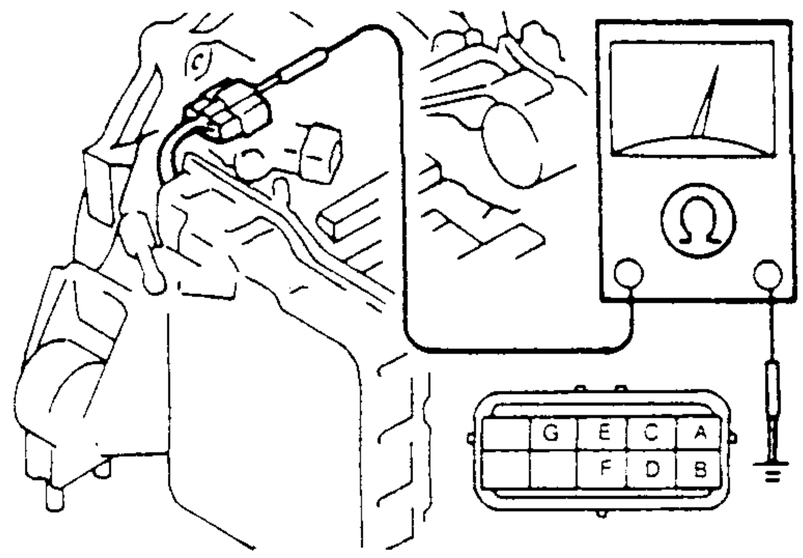
SOLENOID VALVES INSPECTION

Inspection of Resistance

1. Disconnect the negative battery cable.
2. Remove the air cleaner assembly.
3. Disconnect the solenoid valve connector.
4. Measure the resistance between terminals A through G and a ground.

ATF temperature: -40—160 °C {-40—320 °F }

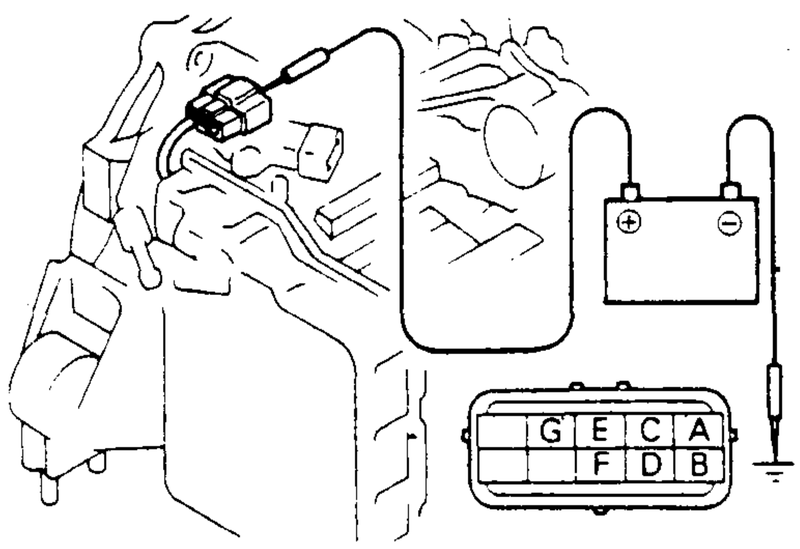
Terminal	Solenoid valve	Resistance (Ω)
A	Shift solenoid A	11—27
B	Shift solenoid B	11—27
C	Shift solenoid C	11—27
D	TCC control	11—27
E	3—2 timing	11—27
F	TCC	9—18
G	Pressure control	9—18



5. If not as specified, check the wiring harness or replace the solenoid valves.
6. Connect the solenoid valve connector.
7. Install the air cleaner assembly.
8. Connect the negative battery cable.

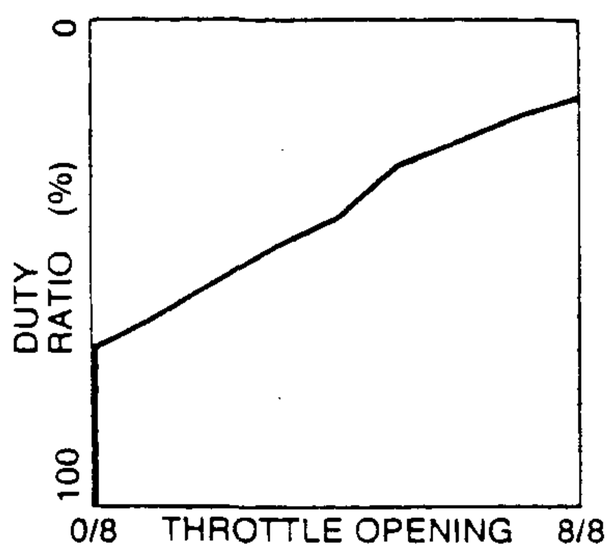
Operating Inspection

1. Disconnect the negative battery cable.
2. Disconnect the solenoid connector.
3. Inspect the voltage at terminals A to G and listen for a "click" sound at all solenoid valves.
4. If the "click" is not heard, replace the solenoid valve.



Inspection of Output Duty
Pressure control solenoid

1. Connect the **SSTs** (NGS) to the data link connector.
2. Engage the parking brake and set wheel chocks at the front and rear of the wheels.
3. Start the engine.
4. Select the "PID/DATA MONITOR AND RECORD" function on the NGS display (and press TRIGGER).
5. Select "EPC" on the NGS display and press START.
6. Depress the brake pedal firmly.
7. Shift the selector lever to D range.
8. Depress the accelerator pedal slowly and verify the duty ration changes as shown in the figure.



9. If not as specified, check the powertrain control module and pressure control solenoid.

SOLENOID VALVES REMOVAL/INSTALLATION

1. Remove the control valve body. (Refer to AUTOMATIC TRANSAXLE, CONTROL VALVE BODY REMOVAL/INSTALLATION, On-Vehicle Removal.)
2. Remove the solenoid valve(s).
3. Apply ATF to a new O-ring and install it on the solenoid valve.
4. Install the solenoid valve in the control valve body.

   Tightening torque
   6.5—7.8 N·m {66—80 kgf·cm , 58—69 in·lbf }

5. Install the control valve body. (Refer to AUTOMATIC TRANSAXLE, CONTROL VALVE BODY REMOVAL/INSTALLATION, On-Vehicle Installation.)
6. Pour in ATF and, with the engine idling, check the ATF level and check for leaks. (Refer to AUTOMATIC TRANSAXLE, AUTOMATIC TRANSAXLE FLUID (ATF) INSPECTION, ATF Level Inspection.)
7. Carry out the mechanical system test. (Refer to AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST.)
8. Carry out the road test. (Refer to AUTOMATIC TRANSAXLE, ROAD TEST.)

HOLD INDICATOR LIGHT INSPECTION
Inspection of Operation

1. Turn the ignition switch from OFF to ON.

   Note
   - The HOLD indicator light flashes when any malfunction exists in the EC-AT system components.

2. Verify that the HOLD indicator light is not illuminating.
3. Depress the switch and verify that the HOLD indicator light illuminates.
4. If the HOLD switch does not function as specified, check the HOLD switch, and then check the terminal voltage of the HOLD indicator light.

POWERTRAIN CONTROL MODULE INSPECTION
(Refer to Section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION.)

POWERTRAIN CONTROL MODULE REMOVAL/INSTALLATION
(Refer to Section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE REMOVAL/INSPECTION.)

AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION

1. Drain the ATF. (Refer to AUTOMATIC TRANSAXLE, AUTOMATIC TRANSAXLE FLUID (ATF) REPLACEMENT.)

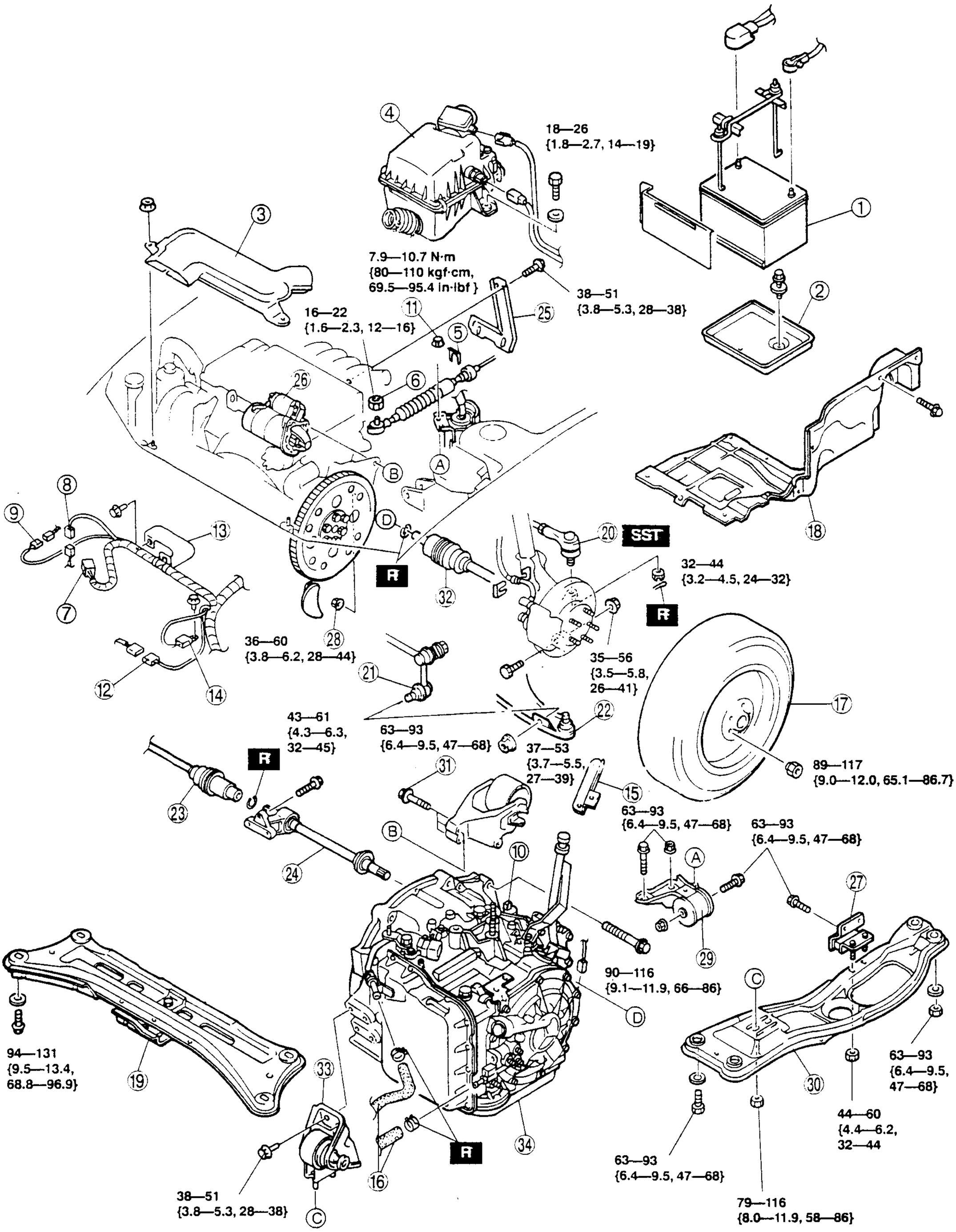
   Warning
   - **Improperly jacking a transaxle is dangerous. It can slip off the jack and may cause serious injury.**

2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.
4. Add ATF to the specified level. (Refer to AUTOMATIC TRANSAXLE, AUTOMATIC TRANSAXLE FLUID (ATF) REPLACEMENT.)
5. Carry out the mechanical system test. (Refer to AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST.)

Service item	Test item		
	Line pressure test	Stall test	Time lag test
Automatic transaxle replacement	○		
Automatic transaxle overhaul	○	○	○
Torque converter replacement	○	○	
Oil pump replacement	○		
Clutch system replacement	○		

○: Test to be performed after the service work

6. Carry out the road test. (Refer to AUTOMATIC TRANSAXLE, ROAD TEST.)

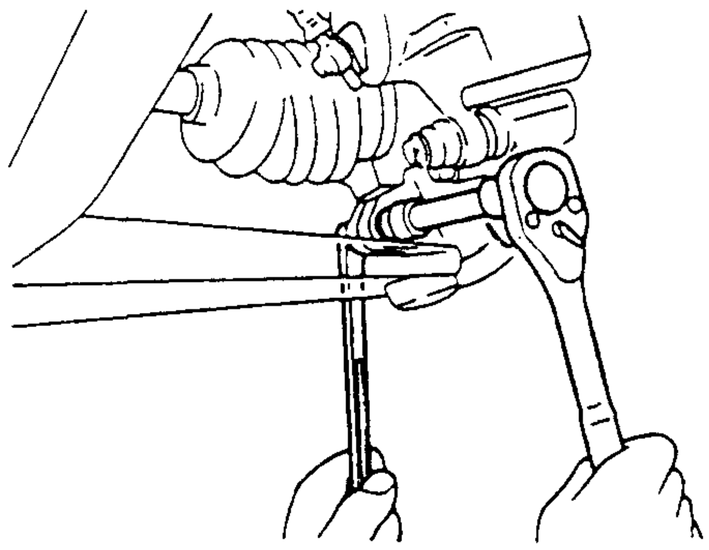


N·m { kgf·m , ft·lbf }

1	Battery
2	Battery carrier
3	Fresh air duct
4	Air cleaner assembly
5	Clip
6	Nut
7	Transaxle range switch connector
8	Solenoid valve connector
9	Heated oxygen sensor connector
10	Vehicle speedometer sensor connector
11	Fuel filter mounting nuts
12	Input/turbine speed sensor connector
13	Harness bracket
14	Ground
15	Engine mount stay
16	Oil hose ☞ Installation Note
17	Wheel and tire
18	Splash shield
19	Transverse member
20	Tie rod end ☞ Section N, ENGINE SPEED SENSING POWER STEERING, STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION
21	Stabilizer control link
22	Lower arm ☞ Removal Note
23	Drive shaft ☞ Section M, FRONT DRIVE SHAFT, DRIVE SHAFT REMOVAL/INSTALLATION
24	Joint shaft ☞ Section M, FRONT DRIVE SHAFT, DRIVE SHAFT REMOVAL/INSTALLATION.
25	Intake manifold stay
26	Starter
27	No. 5 engine mount rubber
28	Torque converter installation nuts ☞ Removal Note
29	No. 4 engine mount
30	Engine mounting member ☞ Removal Note ☞ Installation Note
31	No. 1 engine mount bolts ☞ Installation Note
32	Drive shaft ☞ Section M, FRONT DRIVE SHAFT, DRIVE SHAFT REMOVAL/INSTALLATION
33	No. 2 engine mount
34	Transaxle ☞ Removal Note ☞ Installation Note

Lower Arm Removal Note

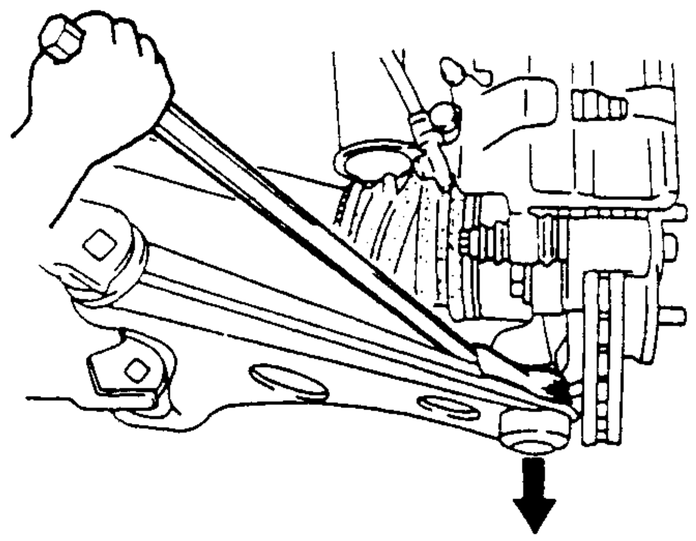
1. Remove the clinch bolt from the lower arm ball joint.



Caution

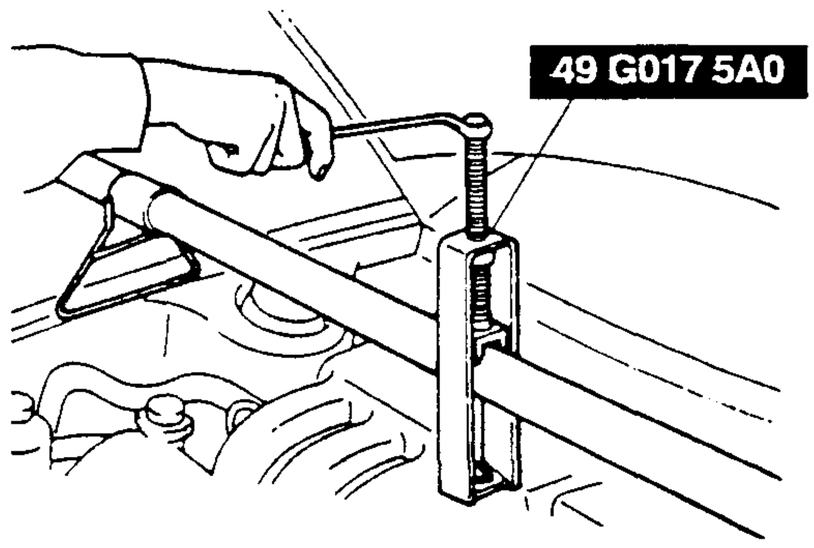
- **Wrap a rag around the ball joint dust seal to protect it from getting damages.**

2. Pry the lower arm out of the knuckle.



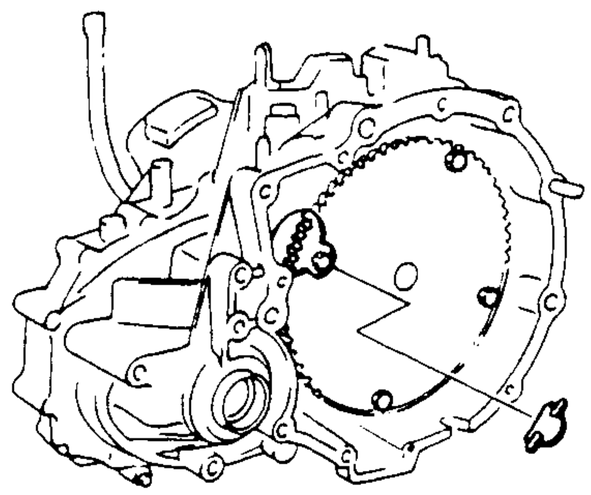
Engine Mounting Member Removal Note

1. Support the engine by using the **SST** before removing the engine mounting member.
2. Remove the engine mounting member.

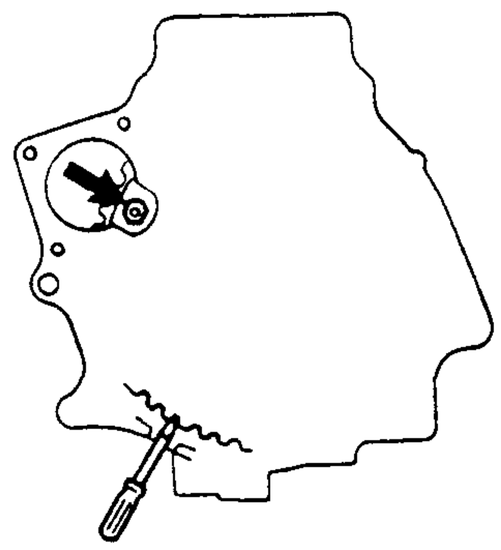


Torque Converter Installation Nuts Removal Note

1. Remove the seal rubber from the end plate.

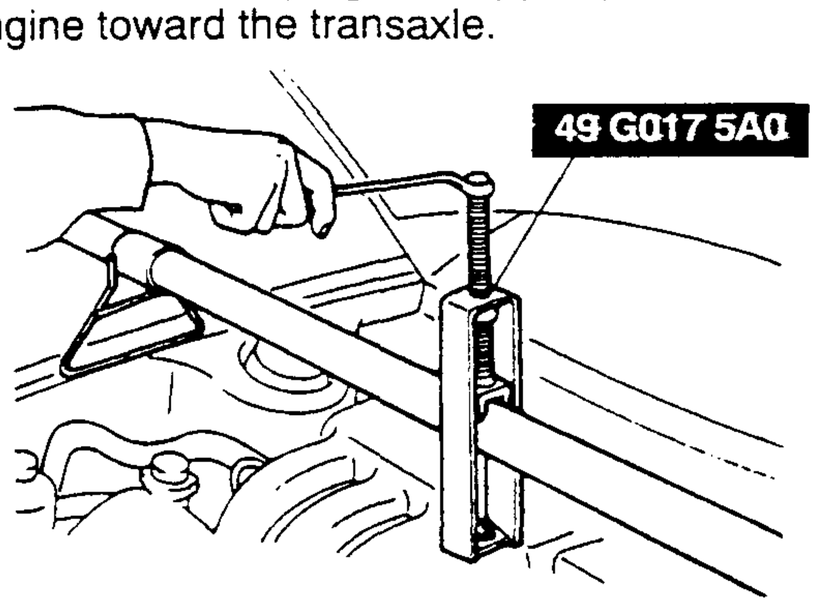


2. Remove the torque converter nuts.



Transaxle Removal Note

1. Loosen the **SST (engine support)** and lean the engine toward the transaxle.

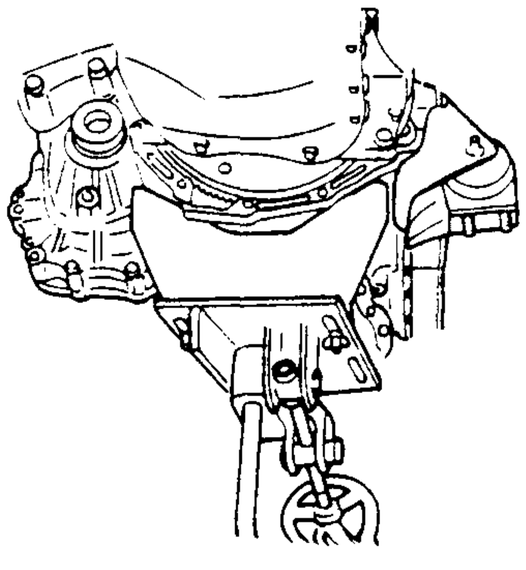


2. Support the transaxle on a jack.

Warning

- **Do not allow the transaxle to fall from the jack.**

3. Remove the transaxle mounting bolts.
4. Remove the transaxle.



Transaxle Installation Note

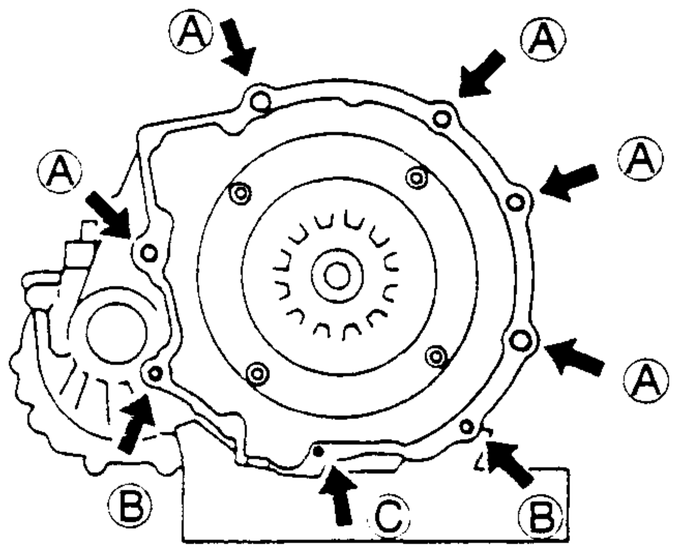
Warning

- **Do not allow the transaxle to fall from the jack.**

1. Set the transaxle on a jack and lift it.
2. Install the transaxle mounting bolts.

Tightening torque

A: 90—116 N·m {9.1—11.9 kgf·m, 66—86 ft·lbf }
B: 38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf }
C: 19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf }



3. Install the torque converter nuts.

Tightening torque

38—60 N·m {3.8—6.2 kgf·m, 28—44 ft·lbf }

4. Loosely tighten No. 4 engine mount nuts.

No. 1 Engine Mount Bolts Installation Note

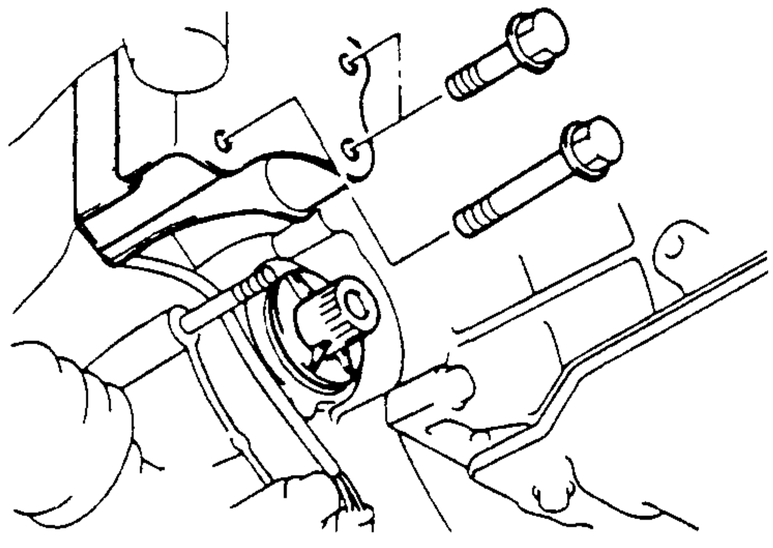
Caution

- **Misaligning the bolts may cause damage to the bolt holes.**

1. Use the **SST(engine support)** verify the transaxle bolt holes and No. 1 engine mount alignment.
2. Tighten the bolts to the specified torque.

Tightening torque

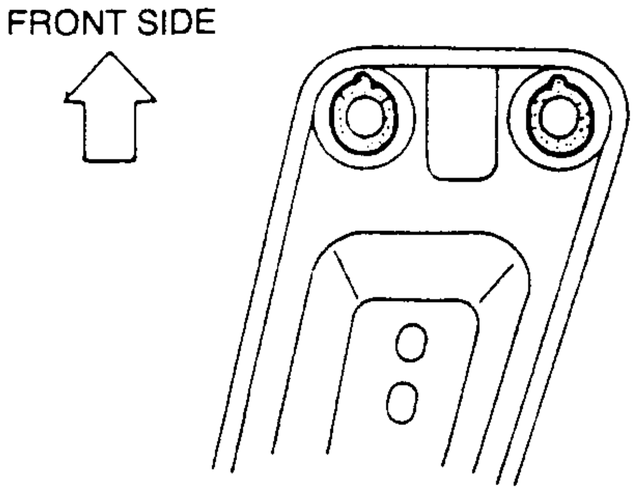
63—93 N·m {6.4—9.5 kgf·m, 47—68 ft·lbf }



Engine Mounting Member Installation Note

Note

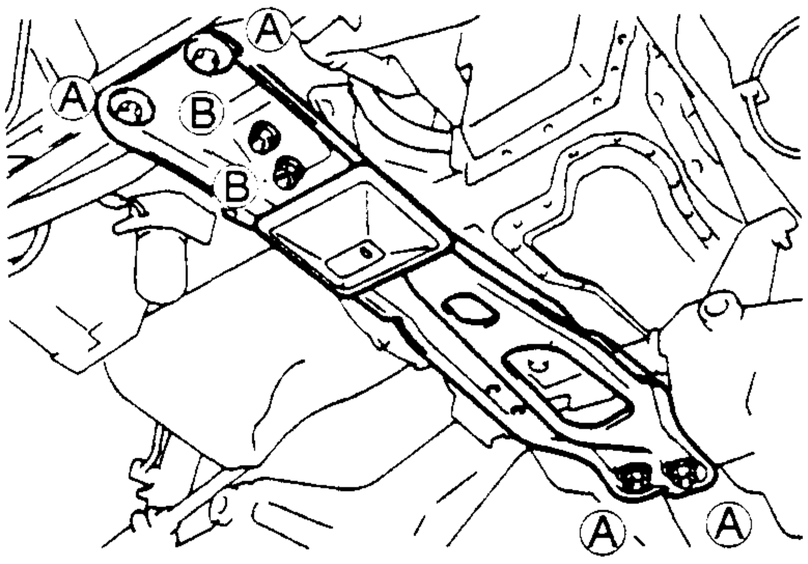
- Verify that the engine mounting rubbers are installed as shown.
- Put the No. 2 engine mount stud bolts in the installing holes when installing the engine mounting member.



1. Install the bolts and nuts A as shown.

   Tightening torque
   63—93 N·m {6.4—9.5 kgf·m, 47—68 ft·lbf }

2. Loosely tighten the nuts B as shown.

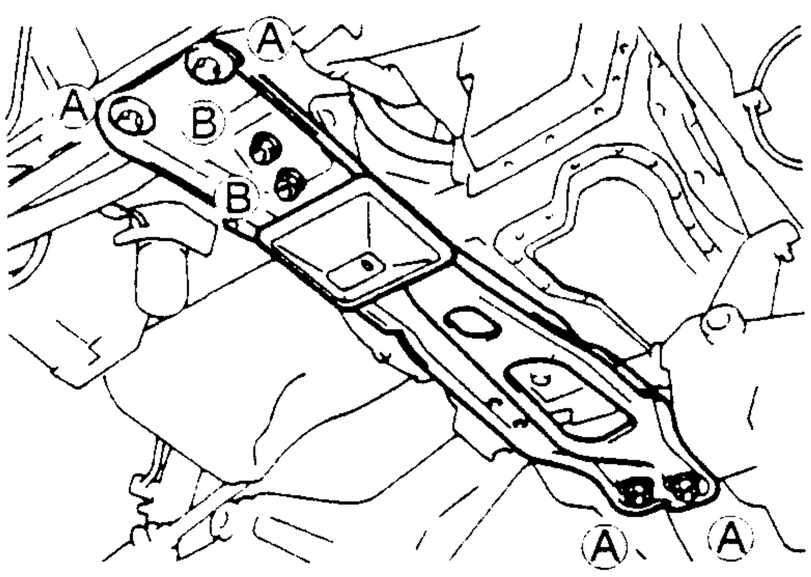


3. Tighten No. 4 engine mount nuts.

   Tightening torque
   38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf }

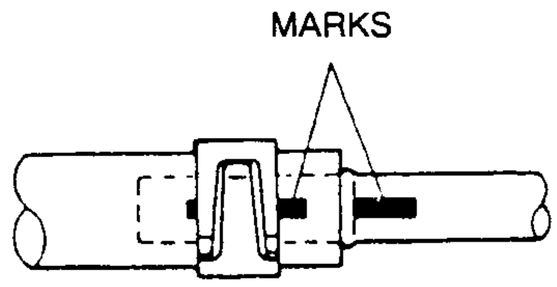
4. Remove the **SST(engine support)**.
5. Tighten the bolts B as shown.

   Tightening torque
   79—116 N·m {8.0—11.9 kgf·m, 58—86 ft·lbf }

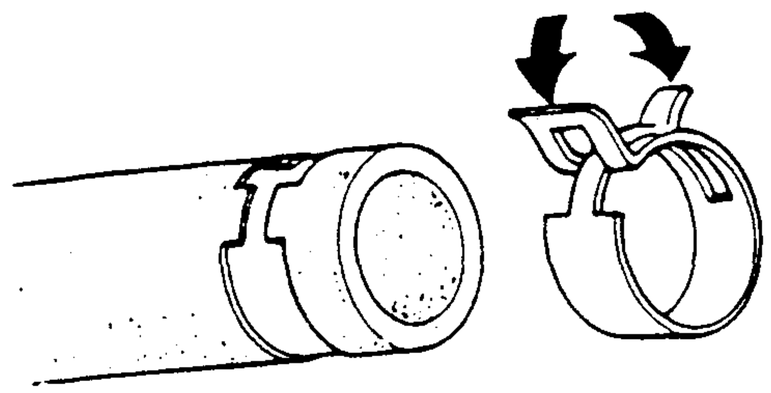


Oil Hose Installation Note

1. Align the marks, and slide the oil hose onto the oil pipe until it is fully seated as shown.



2. Install the hose clamp onto the hose. If reusing the hose, install a new hose clamp exactly into the mark left by the previous hose clamp.



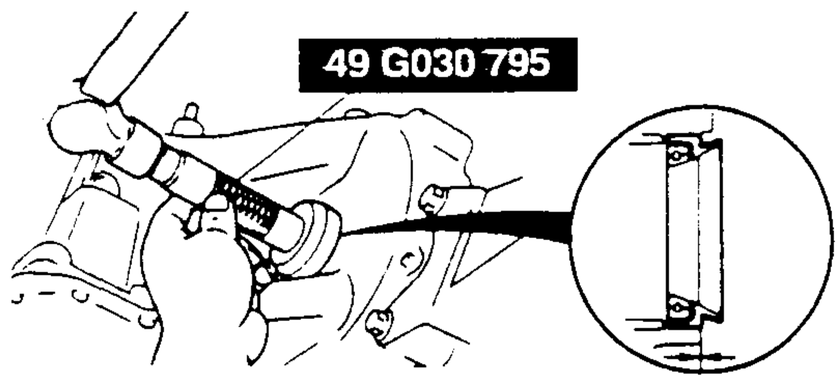
3. Verify that the hose clamp does not interfere with any other components.

OIL SEAL (TRANSAXLE) REPLACEMENT

1. Drain the ATF. (Refer to AUTOMATIC TRANSAXLE, AUTOMATIC TRANSAXLE FLUID (ATF) REPLACEMENT.)

   Caution
   - **The oil seal is easily damaged by the sharp edges of the drive shaft splines. Do not let the splines contact the oil seal.**

2. Remove the drive shaft.(Refer to Section M, FRONT DRIVE SHAFT, DRIVE SHAFT REMOVAL/INSTALLATION.)
3. Remove the oil seal.
4. Using the **SST** and a hammer, tap a new oil seal in evenly until the **SST** contacts the transaxle case.



-0.5—0.5 mm {-0.02—0.02in }

5. Coat the lip of the oil seal with transaxle oil.
6. Install the drive shaft.(Refer to Section M, FRONT DRIVE SHAFT, DRIVE SHAFT REMOVAL/INSTALLATION.)
7. Add ATF to the specified level.(Refer to AUTOMATIC TRANSAXLE, AUTOMATIC TRANSAXLE FLUID (ATF) REPLACEMENT.)
8. Carry out the mechanical system test.(Refer to AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST.)

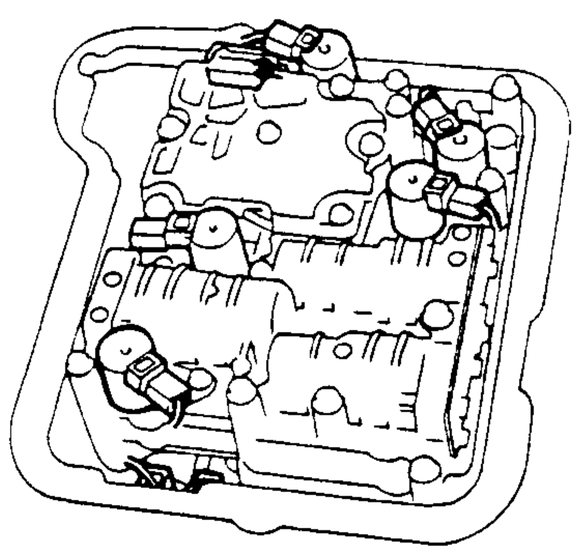
CONTROL VALVE BODY

REMOVAL/INSTALLATION

On-Vehicle Removal

Caution
- **Clean the transaxle exterior thoroughly with a stem cleaner or cleaning solvents before removal.**

1. Disconnect the negative battery cable.
2. Drain the ATF into a separate suitable container. (Refer to AUTOMATIC TRANSAXLE, AUTOMATIC TRANSAXLE FLUID (ATF) REPLACEMENT.
3. Remove the splash shield.
4. Remove the oil cooler hose and pipes.
5. Remove the control valve body cover and gaskets.
6. Disconnect the solenoid connectors and transaxle fluid temperature sensor connector.



7. Remove the control valve body assembly.

On-Vehicle Installation

Caution
- **Be sure to align the manual plate and the manual valve.**

1. Install the control valve body assembly.

Tightening torque
10. 8—14.7 N·m
{110—150 kgf·cm, 96—130 ft·lbf }

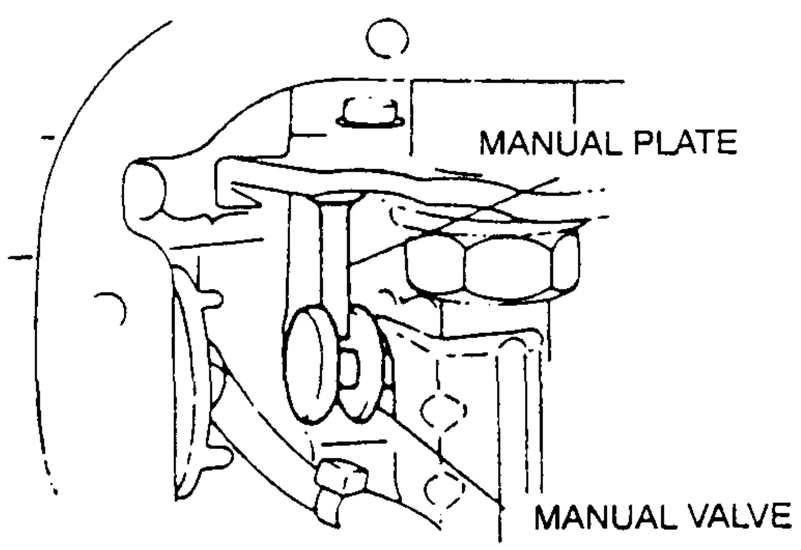
2. Match the harness colors, then connect the solenoid connector and transaxle fluid temperature sensor connector.
3. Install a new gasket and the control valve body cover.

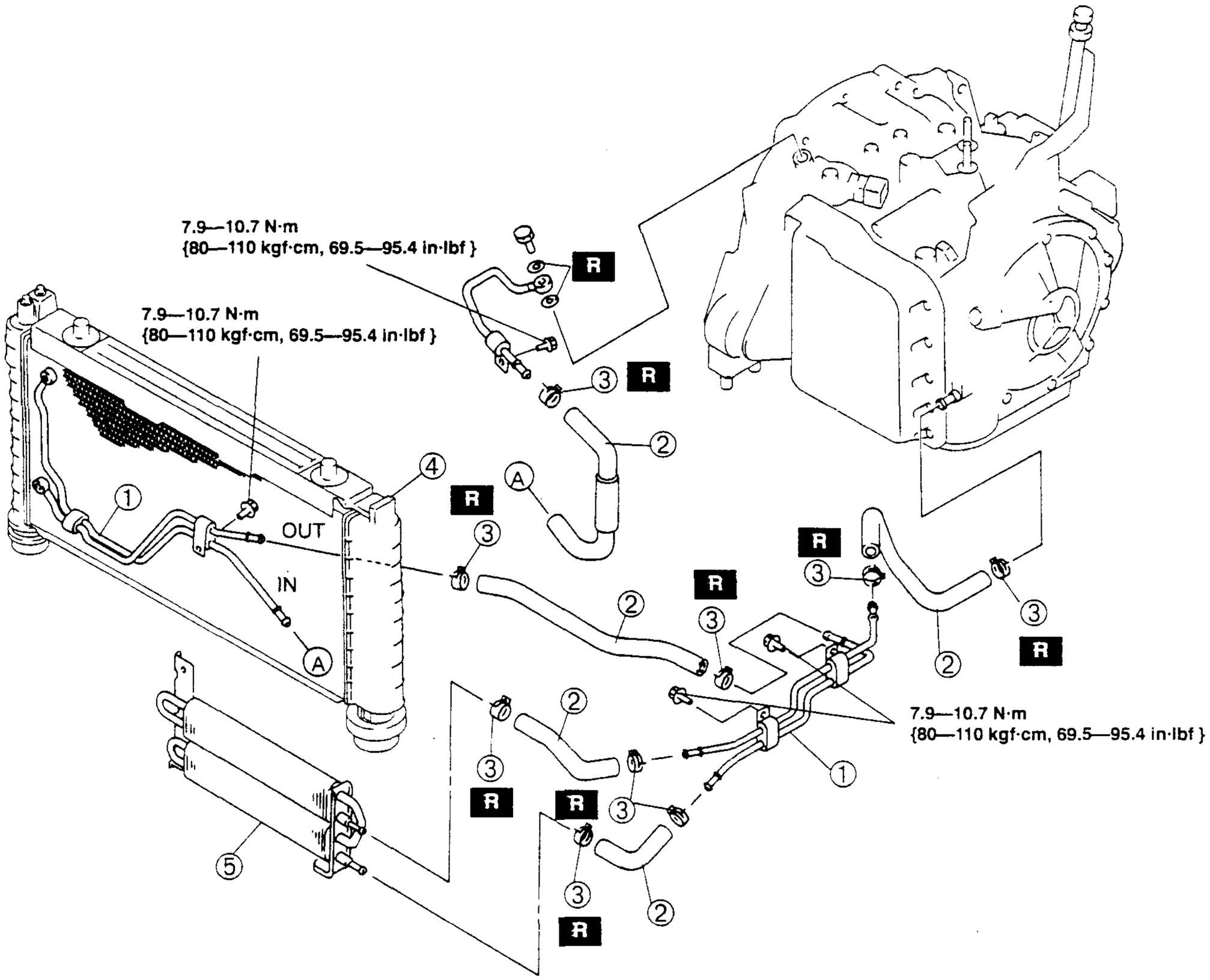
Tightening torque
8. 4—10.7 N·m
{85—110 kgf·cm, 73.8—95.4 ft·lbf }

4. Align the marks, and slide the oil cooler hose onto the oil cooler pipe until it is fully seated.
5. Install the hose clamp onto the hose at the center of the mark and the ends of the clamp are on the mark.
6. Verify that the hose clamp does not interfere with any other parts.
7. Install the hose clamp on the hose.
8. Squeeze it tight with large pliers to ensure a good fit.
9. Install the splash shield.
10. Connect the negative battery cable.
11. Pour in ATF and with the engine idling, check the ATF level.(Refer to AUTOMATIC TRANSAXLE, AUTOMATIC TRANSAXLE FLUID (ATF) REPLACEMENT.)
12. Carry out the mechanical system test.(Refer to AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST.)
13. Carry out the road test.(Refer to AUTOMATIC TRANSAXLE, ROAD TEST.)

OIL COOLER REMOVAL/INSTALLATION

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.
3. Add ATF to the specified level.(Refer to AUTOMATIC TRANSAXLE, AUTOMATIC TRANSAXLE FLUID (ATF) REPLACEMENT.)
4. Carry out the mechanical system test.(Refer to AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST.)
5. Carry out the road test.(Refer to AUTOMATIC TRANSAXLE, ROAD TEST.)



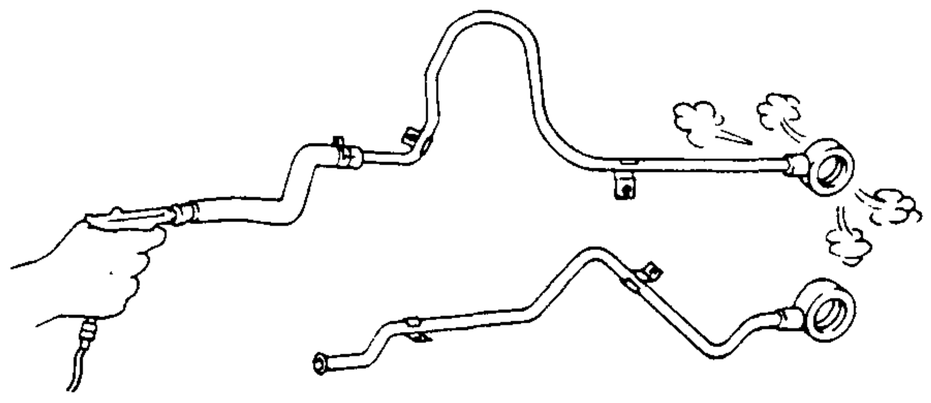


1	Oil pipe ☞ Installation Note
2	Oil hose ☞ Installation Note
3	Hose clamp

4	Radiator (in tank oil cooler) ☞ Installation Note
5	Oil cooler

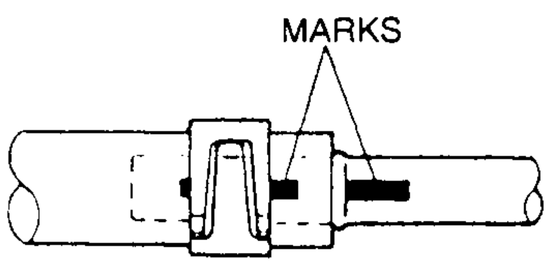
Radiator (in tank oil cooler) Installation Note

1. The automatic transaxle oil cooler flushing must be performed whenever a transaxle is removed for service, because the existing fluid may be contaminated and to prevent contamination of new fluid. The flushing must be performed after installation of the overhauled or replaced transaxle.
2. Follow the instruction in the manufacturers publication for flushing operation.

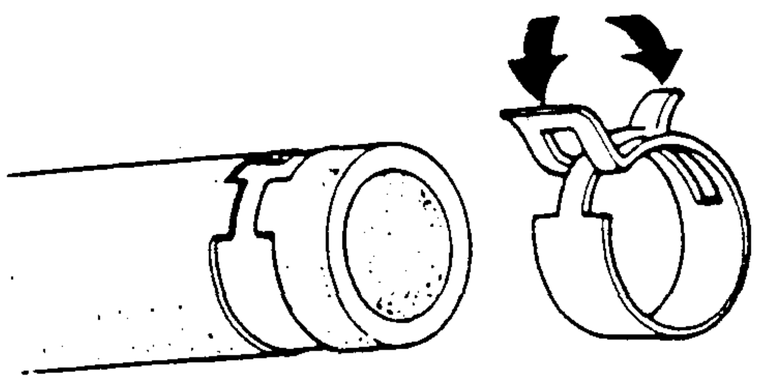


Oil Hose And Oil Pipe Installation Note

1. Apply compressed air to cooler-side opening, and blow any remaining grime and foreign materials from the cooler pipes. Compressed air should be applied for no less than one minute.
2. Align the marks, and slide the oil hose onto the oil pipe until it is fully seated as shown.



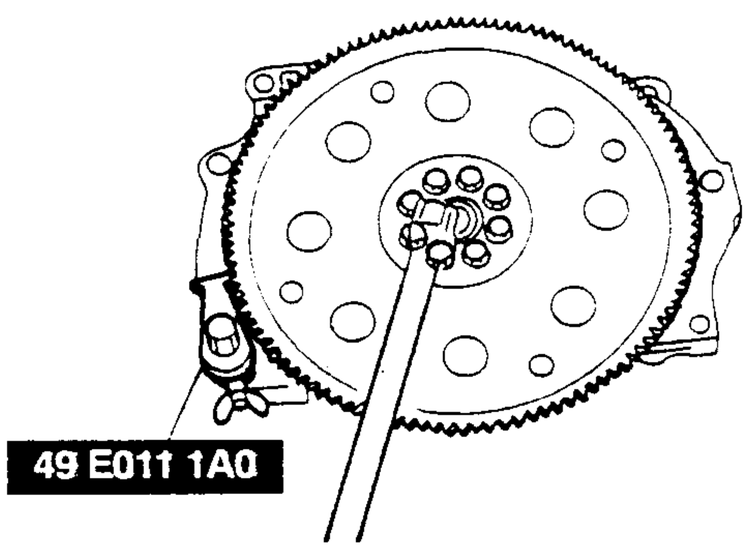
3. Install the hose clamp onto the hose. If reusing the hose, install the new hose clamp exactly on the *mark left by the previous hose clamp.*



4. Verify that the hose clamp does not interfere with any other components.

DRIVE PLATE REMOVAL/INSTALLATION

1. Remove the transaxle.(Refer to AUTOMATIC TRANSAXLE, AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION.)
2. Set the **SST** or equivalent against the drive plate.



3. Remove the drive plate mounting bolts.
4. Remove the adapter.
5. Remove the drive plate.
6. Remove the backing plate.

Caution

- **If the bolts are reused, remove the oil sealant from the bolt threads. Tightening a bolt that has old sealant on it can cause thread damage.**

7. Remove the sealant from the bolts hole in the crankshaft and from the drive plate mounting bolts.

Note

- If all the previous sealant cannot be removed from a bolt, replace the bolts.
- Do not apply sealant if a new bolts is used.

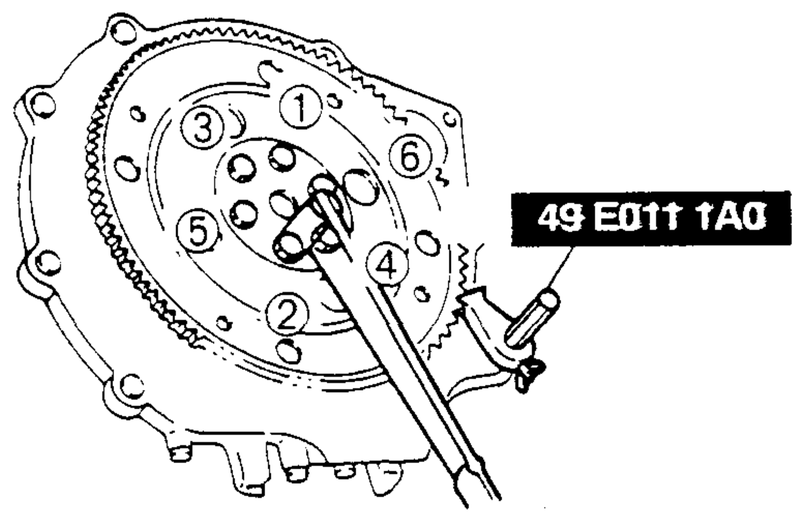
8. Install the backing plate.
9. Install the drive plate.
10. Install the adapter.
11. Apply sealant to the drive plate mounting bolts and install them.
12. Set the **SST** or equivalent against the drive plate.

Caution

- **When installing sealant covered bolts tighten them immediately. Leaving these bolts in a half installed condition could cause them to be stuck that way, due to the natural hardening or the sealant.**

13. Tighten the drive plate installation bolts in two or three steps as shown.

Tightening torque
97—102 N·m {9.8—10.5 kgf·m, 71—75 ft·lbf }

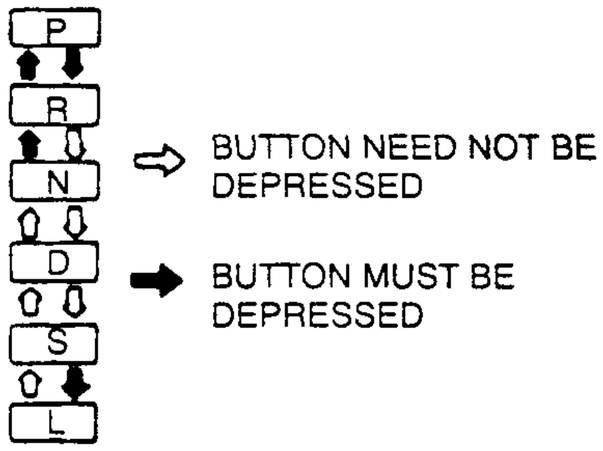


14. Install the transaxle.(Refer to AUTOMATIC TRANSAXLE, AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION.)

SHIFT MECHANISM

SELECTOR LEVER INSPECTION

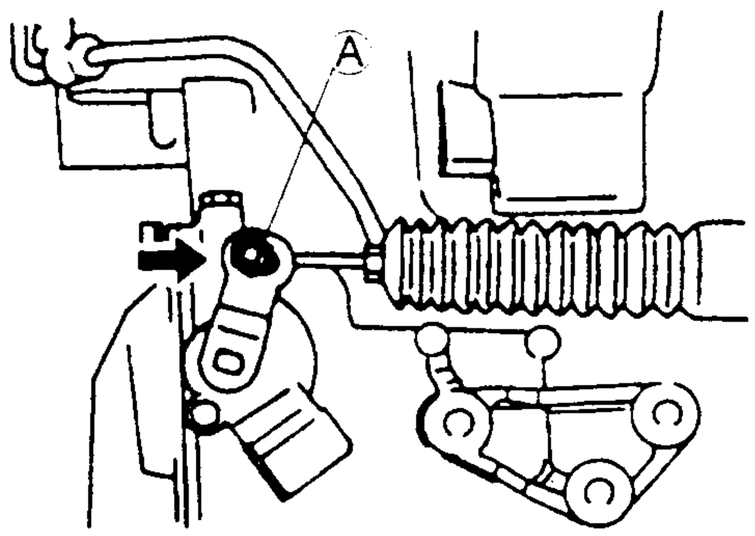
1. Turn the ignition switch to ON(engine is at OFF).
2. With the brake pedal depressed, verify that there is a "click" at each range when shifted.
3. Verify that the selector lever can be shifted.
4. Verify that there is a "click" at each position when shifted from P position to L range.
5. Verify that the position of the selector lever and the indicator and aligned.



6. Verify that the position of the selector lever and the selector illumination light are aligned.
7. If not as specified, adjust the transaxle range switch.(Refer to AUTOMATIC TRANSAXLE, TRANSAXLE RANGE SWITCH INSPECTION.)
8. Verify that the vehicle operates in each selected range.

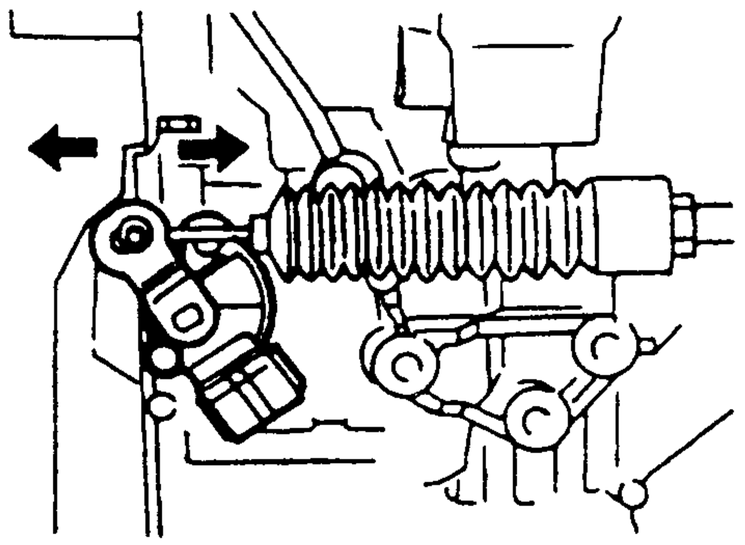
SELECTOR CABLE ADJUSTMENT

1. Remove the battery, battery carrier, and air cleaner assembly.
2. Shift the selector lever to P position.
3. Loosen nut A as shown in the figure.



4. Push the selector cable in the direction of the arrow until it does not move any further.
5. Position the selector cable so that there is no load in the direction of the arrows, then tighten the nut.

Tightening torque
16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf }

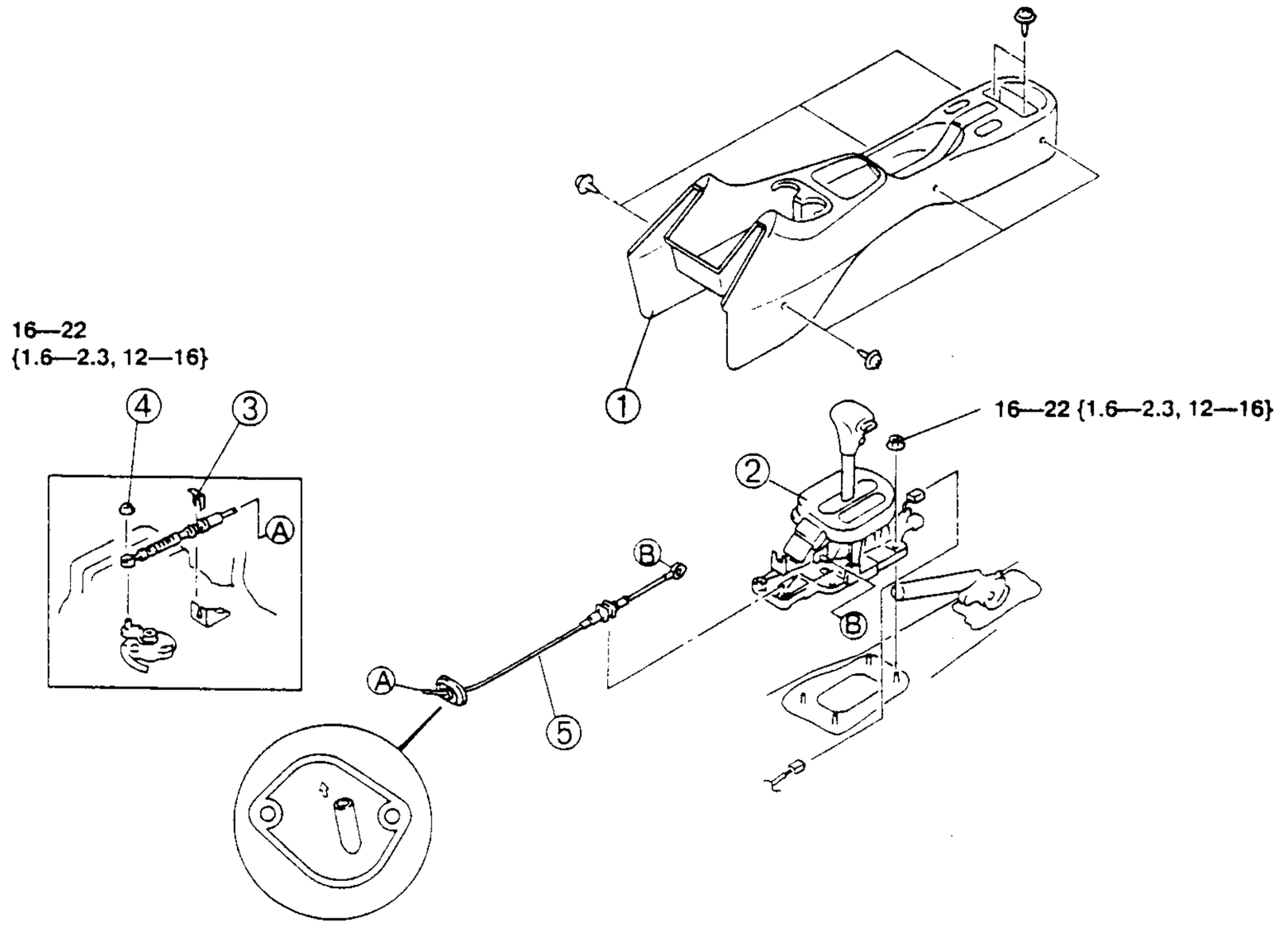


6. Install the air cleaner assembly, battery carrier, and battery.
7. Shift the selector lever from P position to L range, and make sure that there is no other components in that area to interfere the lever.

SELECTOR LEVER REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure.
3. Install the reverse order of disassembly.

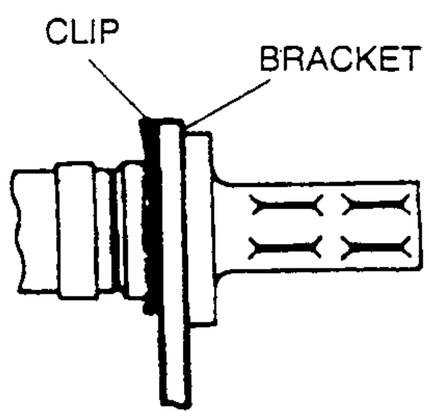
SHIFT MECHANISM



1	Console
2	Selector lever
3	Clip ☞ Installation Note
4	Nut
5	Selector cable ☞ Installation Note

Clip Installation Note

- Install a new clip flush to the selector cable bracket.



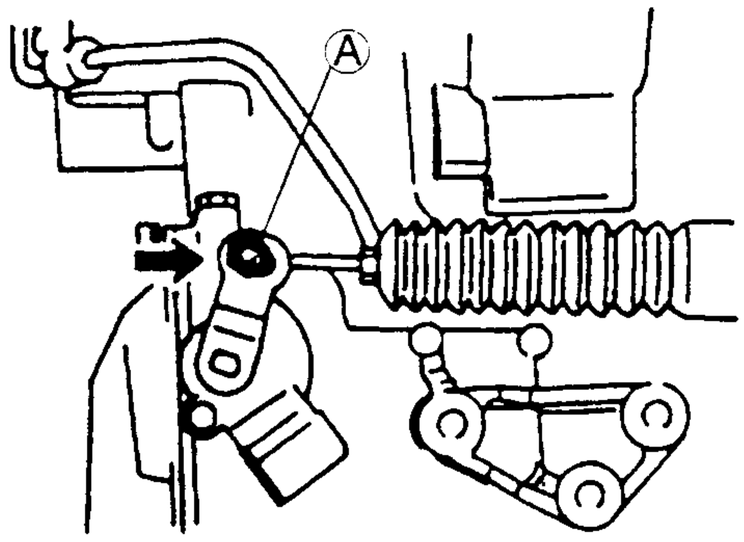
Selector Cable Installation Note

Caution

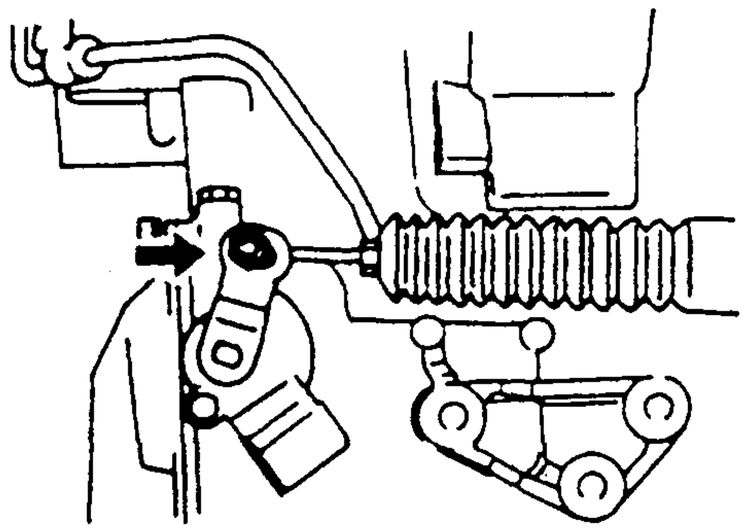
- **Bending the selector cable in the manner shown in the figure will damage the cable and become loose during shifting. When installing the selector cable, hold it straight.**



1. Shift the selector lever and manual shift to P position.
2. After verifying that the selector cable boot is not twisted, install the selector cable to the selector lever, and tighten the nut A.

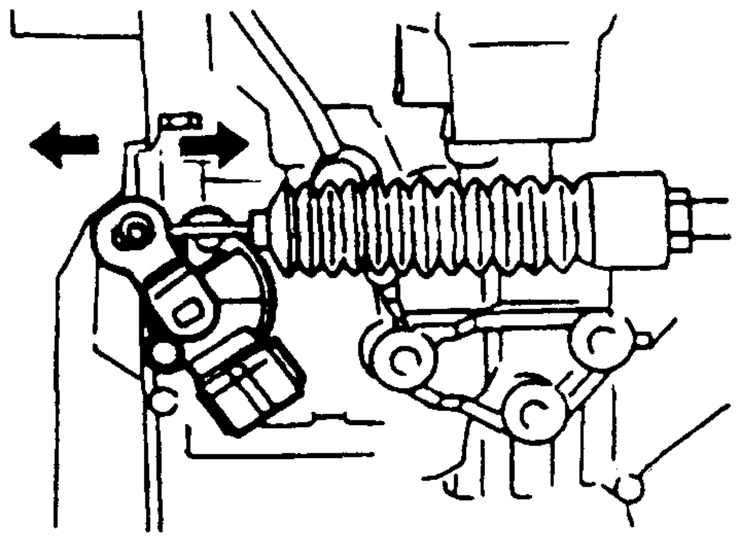


3. Push the selector cable in the direction of the arrow until it does not move any further.



4. Position the selector cable so that there is no load in the direction of the arrows, then tighten the nut.

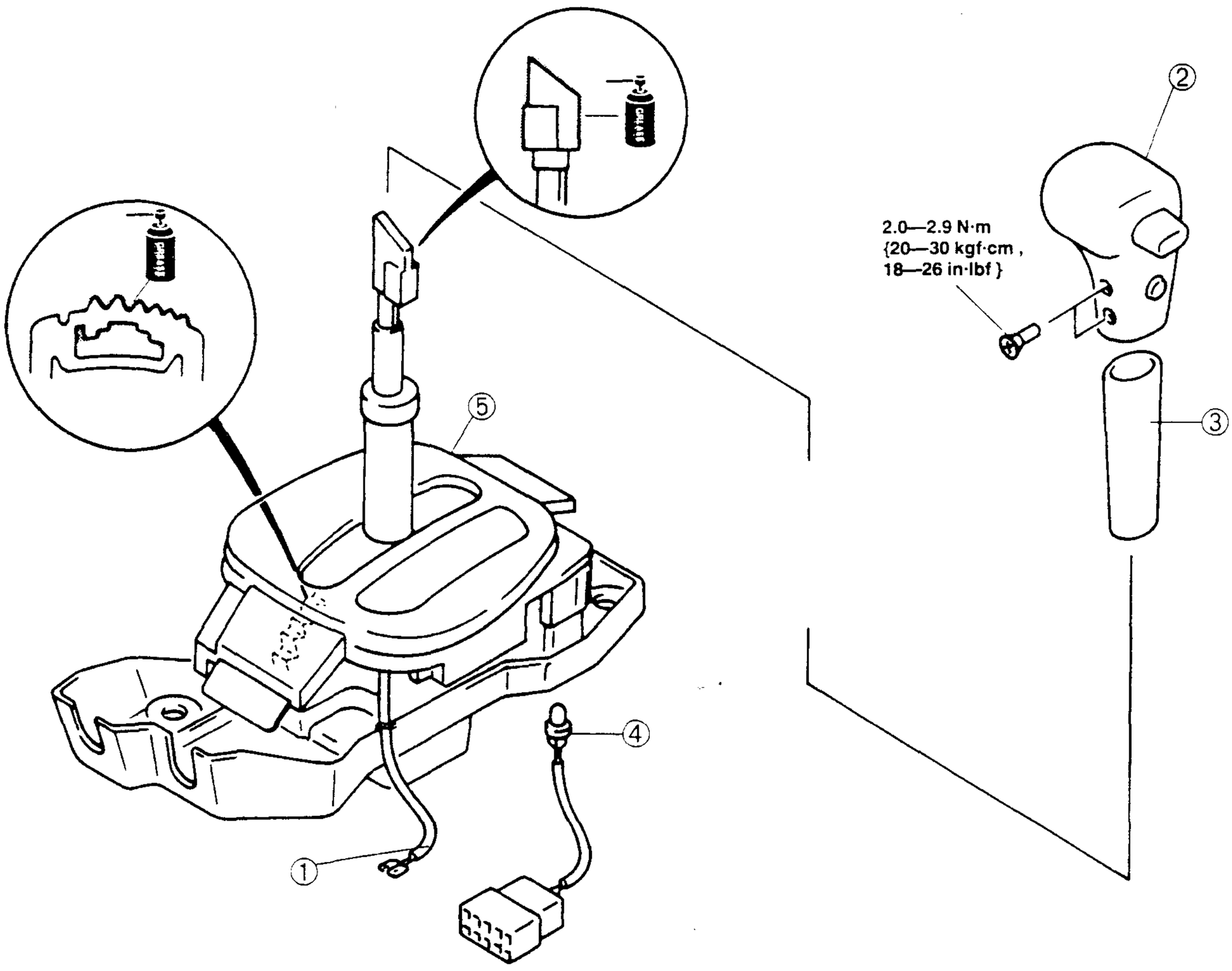
Tightening torque
16—22 N·m {1.6—2.3 kgf·m, 12—16 ft·lbf }



5. Shift the selector lever from P position to L range, and make sure that there is no other components in that area to interfere the lever.

SELECTOR LEVER DISASSEMBLY/ASSEMBLY

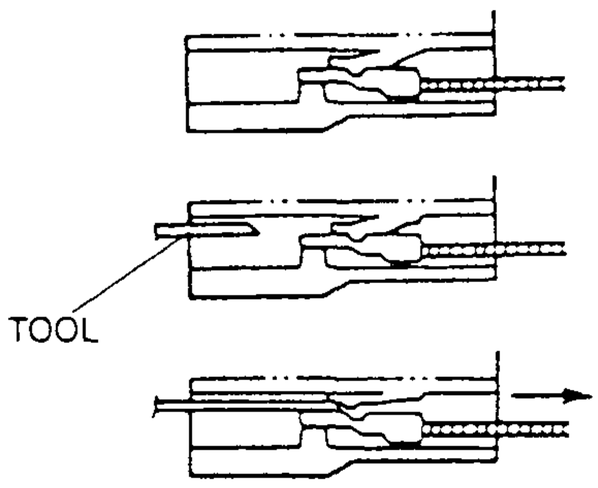
1. Disassembly in the order shown in the figure.
2. Assemble in the reverse order of disassembly.



1	Connector ☞ Disassembly Note
2	Selector lever knob
3	Cover
4	Selector illumination light
5	Selector lever

Connector Disassembly Note

1. Insert a thin metal from the terminal side of the connector, and press down the terminal locking tab.



2. Pull the terminal out of the connector.

ON-BOARD DIAGNOSTIC SYSTEM

DIAGNOSTIC TROUBLE CODE INSPECTION

Inspection Procedure

- Check the diagnostic trouble code. (Refer to section F, ON-BOARD DIAGNOSTIC SYSTEM, DIAGNOSTIC TROUBLE CODE INSPECTION.)

Diagnostic Trouble Code Table

DTC No.	Display on the NGS	Condition
0710	TRANS FLUID TEMP SENS-CKT MALFUNCTION	Transaxle Fluid Temperature Sensor
0715	INPUT/TSS-CIRCUIT MALFUNCTION	Input/Turbine Speed Sensor
0743	TORQUE CONV CLUTCH SYS-ELECTRICAL	Torque Converter Clutch Control Solenoid Valve
0745	PRESSURE CTRL SOLENOID-MALFUNCTION	Pressure Control Solenoid
0750	SHIFT SOLENOID A-MALFUNCTION	Shift Solenoid A
0755	SHIFT SOLENOID B-MALFUNCTION	Shift Solenoid B
0760	SHIFT SOLENOID C-MALFUNCTION	Shift Solenoid C
1744	TCC-SYSTEM PERFORMANCE	Torque Converter Clutch Solenoid Valve
1765	TIMING SOLENOID SYSTEM	3—2 Timing Solenoid Valve

DTC 0710	TRANS FLUID TEMP SENS-CKT MALFUNCTION
DETECTION CONDITION	Powertrain control module input voltage is less than 0.09 V or more than 5.0 V
POSSIBLE CAUSE	• Transaxle fluid temperature sensor malfunction • Damaged wiring or connectors between transaxle fluid temperature sensor and powertrain control module • Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Are powertrain control module and transaxle fluid temperature sensor connections at the connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector, then go to step 6
2	Check NGS display • Connect NGS to data link connector. Is ATF temperature correct?	Yes	Go to step 6
		No	Go to next step
3	Check for continuity between terminals of transaxle fluid temperature sensor and powertrain control module. • Disconnect negative battery cable. • Disconnect transaxle fluid temperature sensor and powertrain control module connectors. Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring, then go to step 6
4	Measure resistance between transaxle fluid temperature sensor terminals. • Disconnect negative battery cable. • Disconnect transaxle fluid temperature sensor connector Is resistance between terminals correct? (☞AUTOMATIC TRANSAXLE, TRANSAXLE FLUID TEMPERATURE SENSOR INSPECTION.)	Yes	Go to next step
		No	Replace transaxle fluid temperature sensor, then go to step 6 (☞AUTOMATIC TRANSAXLE, TRANSAXLE FLUID TEMPERATURE SENSOR REMOVAL/INSTALLATION)
5	Erase diagnostic trouble code from memory. Is same code number present after performing "After Repair Procedure"?	Yes	Return to step 1
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step
6	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure
		No	Troubleshooting completed.

DTC 0715	INPUT/TSS CIRCUIT MALFUNCTION
DETECTION CONDITION	Signal from input/turbine speed sensor is not input to powertrain control module when vehicle is moving
POSSIBLE CAUSE	• Input/turbine speed sensor malfunction • Damaged harness or connectors between input/turbine speed sensor and powertrain control module • Powertrain control module malfunction

STEP	INSPECTION		ACTION
1	Are powertrain control module and input/turbine speed sensor connection at the connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector, then go to step 6
2	Check NGS display • Connect NGS to data link connector. Is input/turbine speed sensor revolution correct?	Yes	Go to step 6
		No	Go to next step
3	Check for continuity between terminals of input/turbine speed sensor and powertrain control module. • Disconnect negative battery cable. • Disconnect input/turbine speed sensor and powertrain control module connectors Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring, then go to step 6
4	Measure resistance between input/turbine speed sensor terminals • Disconnect negative battery cable. • Disconnect input/turbine speed sensor connector Is resistance between terminals correct? (☞AUTOMATIC TRANSAXLE, INPUT/TURBINE SPEED SENSOR INSPECTION.)	Yes	Go to next step
		No	Replace input/turbine speed sensor, then go to step 6 (☞AUTOMATIC TRANSAXLE, INPUT/TURBIN SPEED SENSOR REMOVAL/INSTALLATION)
5	Erase diagnostic trouble code from memory. Is same code number present after performing "After Repair Procedure"?	Yes	Return to step 1
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step
6	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure
		No	Troubleshooting completed.

DTC 0743	TORQUE CONV CLUTCH SYS-ELECTRICAL
DETECTION CONDITION	• Damaged wiring or connectors between torque converter clutch control solenoid valve and powertrain control module • Short or open circuit in torque converter clutch control solenoid valve • Short or open circuit in powertrain control module internal transistors
POSSIBLE CAUSE	• Damaged wiring or connectors between torque converter clutch control solenoid valve and powertrain control module • Short or open circuit in torque converter clutch control solenoid valve • Short or open circuit in powertrain control module internal transistor

STEP	INSPECTION		ACTION
1	Are powertrain control module and torque converter clutch control solenoid valve connections at connector and connector pins Okay?	Yes	Go to next step
		No	Repair or replace connector, then go to step 5
2	Check for continuity between terminals of torque converter clutch control solenoid valve and powertrain control module. • Disconnect negative battery cable. • Disconnect solenoid connector and powertrain control module connector Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring, then go to step 5
3	Measure resistance at torque converter clutch control solenoid valve terminal • Disconnect negative battery cable • Disconnect solenoid connector Is resistance correct? (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Resistance.)	Yes	Go to next step
		No	Replace torque converter clutch control solenoid valve, then go to step 5 (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE REMOVAL/INSTALLATION.)
4	Erase diagnostic trouble code from memory. Is same code number present after performing "After Repair Procedure"?	Yes	Return to step 1
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step
5	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure
		No	Troubleshooting completed.

DTC 0745	PRESSURE CTRL SOLENOID-MALFUNCTION
DETECTION CONDITION	• Damaged wiring or connectors between pressure control solenoid and powertrain control module • Short or open circuit in pressure control solenoid • Short or open circuit in powertrain control module internal transistors
POSSIBLE CAUSE	• Damaged wiring or connectors between pressure control solenoid and powertrain control module • Short or open circuit in pressure control solenoid • Short or open circuit in powertrain control module internal transistors

STEP	INSPECTION		ACTION
1	Are powertrain control module and pressure control solenoid connections at connector and connect or pins Okay?	Yes	Go to next step
		No	Repair or replace connector, then go to step 5
2	Check for continuity between terminals of pressure control solenoid and powertrain control module. • Disconnect negative battery cable. • Disconnect solenoid connector and powertrain control module connectors Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring, then go to step 5
3	Measure resistance between pressure control solenoid terminals • Disconnect negative battery cable • Disconnect solenoid connector Is resistance between terminals correct? (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Resistance.)	Yes	Go to next step
		No	Replace pressure control solenoid (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE REMOVAL/INSTALLATION.)
4	Erase diagnostic trouble code from memory. Is same code number present after performing "After Repair Procedure"?	Yes	Return to step 1
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step
5	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure
		No	Troubleshooting completed.

DTC 0750	SHIFT SOLENOID A-MALFUNCTION
DETECTION CONDITION	• Damaged wiring or connectors between shift solenoid A and powertrain control module • Short or open circuit in shift solenoid A • Short or open circuit in powertrain control module internal transistor
POSSIBLE CAUSE	• Damaged wiring or connectors between shift solenoid A and powertrain control module • Short or open circuit in shift solenoid A • Short or open circuit in powertrain control module internal transistor

STEP	INSPECTION		ACTION
1	Are powertrain control module and shift solenoid A connections at connector and connector pins Okay?	Yes	Go to next step
		No	Repair or replace connector, then go to step 5
2	Check for continuity between terminals of shift solenoid A and powertrain control module. • Disconnect negative battery cable. • Disconnect solenoid connector and powertrain control module connector Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring, then go to step 5
3	Measure resistance at shift solenoid A terminal. • Disconnect negative battery cable • Disconnect solenoid connector Is resistance correct? (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Resistance.)	Yes	Go to next step
		No	Replace shift solenoid A, then go to step 5 (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE REMOVAL/INSTALLATION.)
4	Erase diagnostic trouble code from memory. Is same code number present after performing "After Repair Procedure"?	Yes	Return to step 1
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step
5	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure
		No	Troubleshooting completed.

DTC 0755	SHIFT SOLENOID B-MALFUNCTION
DETECTION CONDITION	• Damaged wiring or connectors between shift solenoid B and powertrain control module • Short or open circuit in shift solenoid B • Short or open circuit in powertrain control module internal transistors
POSSIBLE CAUSE	• Damaged wiring or connectors between shift solenoid B and powertrain control module • Short or open circuit in shift solenoid B • Short or open circuit in powertrain control module internal transistors

STEP	INSPECTION		ACTION
1	Are powertrain control module and shift solenoid B connections at connector and connector pins Okay?	Yes	Go to next step
		No	Repair or replace connector, then go to step 5
2	Check for continuity between terminals of shift solenoid B and powertrain control module. • Disconnect negative battery cable. • Disconnect solenoid connector and powertrain control module connector Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring, then go to step 5
3	Measure resistance at shift solenoid B terminal. • Disconnect negative battery cable • Disconnect solenoid connector Is resistance correct? (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Resistance.)	Yes	Go to next step
		No	Replace shift solenoid B, then go to step 5 (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE REMOVAL/INSTALLATION.)
4	Erase diagnostic trouble code from memory. Is same code number present after performing "After Repair Procedure"?	Yes	Return to step 1
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step
5	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure
		No	Troubleshooting completed.

DTC 0760	SHIFT SOLENOID C-MALFUNCTION
DETECTION CONDITION	• Damaged wiring or connectors between shift solenoid C and powertrain control module • Short or open circuit in shift solenoid C • Short or open circuit in powertrain control module internal transistor
POSSIBLE CAUSE	• Damaged wiring or connectors between shift solenoid C and powertrain control module • Short or open circuit in shift solenoid C • Short or open circuit in powertrain control module internal transistors

STEP	INSPECTION		ACTION
1	Are powertrain control module and shift solenoid C connectors at connector and connector pins Okay?	Yes	Go to next step
		No	Repair or replace connector, then go to step 5
2	Check for continuity between terminals of shift solenoid C and powertrain control module. • Disconnect negative battery cable. • Disconnect solenoid connector and powertrain control module connector Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring, then go to step 5
3	Measure resistance at shift solenoid C terminal. • Disconnect negative battery cable. • Disconnect solenoid connector. Is resistance correct? (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Resistance.)	Yes	Go to next step
		No	Replace shift solenoid C, then go to step 5 (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE REMOVAL/INSTALLATION.)
4	Erase diagnostic trouble code from memory. Is same code number present after performing "After Repair Procedure"?	Yes	Return to step 1
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step
5	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure
		No	Troubleshooting completed.

DTC 1744	TCC-SYSTEM PERFORMANCE
DETECTION CONDITION	• Damaged wiring or connectors between torque converter clutch solenoid valve and powertrain control module • Short or open circuit in torque converter clutch solenoid valve • Short or open circuit in powertrain control module internal transistors
POSSIBLE CAUSE	• Damaged wiring or connectors between torque converter clutch solenoid valve and powertrain control module • Short or open circuit in torque converter clutch solenoid valve • Short or open circuit in powertrain control module internal transistors

STEP	INSPECTION		ACTION
1	Are powertrain control module and torque converter clutch solenoid valve connections at connector and connector pins Okay?	Yes	Go to next step
		No	Repair or replace connector, then go to step 5
2	Check for continuity between terminals of torque converter clutch solenoid valve and powertrain control module • Disconnect negative battery cable • Disconnect solenoid connector and powertrain control module connector Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring, then go to step 5
3	Measure resistance at torque converter clutch solenoid valve terminal • Disconnect negative battery cable • Disconnect solenoid connector Is resistance correct? (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Resistance.)	Yes	Go to next step
		No	Replace torque converter clutch solenoid valve, then go to step 5 (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE REMOVAL/INSTALLATION.)
4	Erase diagnostic trouble code from memory. Is same code number present after performing "After Repair Procedure"?	Yes	Return to step 1
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step
5	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure
		No	Troubleshooting completed

DTC 1765	TIMING SOLENOID SYSTEM
DETECTION CONDITION	• Damage wiring or connectors between 3—2 timing solenoid valve and powertrain control module • Short or open circuit in 3—2 timing solenoid valve • Short or open circuit in powertrain control module internal transistors
POSSIBLE CAUSE	• Damaged wiring or connectors between 3—2 timing solenoid valve and powertrain control module • Short or open circuit in 3—2 timing solenoid valve • Short or open circuit in powertrain control module internal transistors

STEP	INSPECTION		ACTION
1	Are powertrain control module and 3—2 timing solenoid valve connections at connector and connector pins Okay?	Yes	Go to next step
		No	Repair or replace connector, then go to step 5
2	Check for continuity between terminals of 3—2 timing solenoid valve and powertrain control module • Disconnect negative battery cable • Disconnect solenoid connector and powertrain control module connector Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring, then go to step 5
3	Measure resistance at 3—2 timing solenoid valve terminal • Disconnect negative battery cable • Disconnect solenoid connector Is resistance correct? (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Resistance.)	Yes	Go to next step
		No	Replace 3—2 timing solenoid valve, then go to step 5 (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE REMOVAL/INSTALLATION.)
4	Erase diagnostic trouble code from memory. Is same code number present performing "After Repair Procedure"?	Yes	Return to step 1
		No	Intermittent or poor connection of harness or connector. Repair connector and/or harness, then go to next step
5	Erase diagnostic trouble code from memory. Can code be output after performing "After Repair Procedure"?	Yes	Go to appropriate inspection procedure
		No	Troubleshooting completed

TROUBLESHOOTING

FOREWORD

- Refer to section GI and thoroughly read and understand the basic flow of troubleshooting in order to properly perform the procedures.

BASIC INSPECTION

STEP	INSPECTION		ACTION
1	Turn ignition switch to ON Does HOLD indicator light (illuminate/go out) correspond to HOLD switch position (ON/OFF)	Yes	Go to next step
		No	Perform malfunction diagnosis according to No. 26 "HOLD INDICATOR LIGHT DOES NOT ILLUMINATE WHEN HOLD SWITCH IS TURNED ON", or No. 27 "HOLD INDICATOR LIGHT ILLUMINATES WHEN HOLD SWITCH IS NOT TURNED ON"
2	Turn ignition switch to ON. When selector lever is moved, does the selector illumination indicate synchronized position to lever location? Also, when other ranges are selected from N or P during idling, does vehicle creep within 1 to 2 seconds?	Yes	Go to next step
		No	Inspect selector lever. Repair or replace defected areas. (☞SHIFT MECHANISM, SELECTOR LEVER INSPECTION.)
3	Check the ATF color and condition (☞AUTOMATIC TRANSAXLE, ATF INSPECTION) Are ATF color and smell normal?	Yes	Go to next step
		No	Repair or replace any defective parts
4	Perform the line pressure test (☞MECHANICAL SYSTEM TEST, Line Pressure Test) Is line pressure okay?	Yes	Go to next step
		No	Repair or replace any defective parts
5	Perform the stall test (☞MECHANICAL SYSTEM TEST, Stall Test) Is stall speed okay?	Yes	Go to next step
		No	Repair or replace any defective parts
6	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V • TFT • VSS • TR • TR V Is PID value okay?	Yes	Perform symptom troubleshooting
		No	Repair or replace any defective parts

DIAGNOSTIC INDEX

- Use the chart below to verify the symptoms of the trouble in order to diagnose the appropriate area.

No	TROUBLESHOOTING ITEM	DESCRIPTION
1	Vehicle does not move in D, S, L ranges, or in R position	Vehicle does not move when accelerator pedal depressed.
2	Vehicle moves in N position	Vehicle creeps in N position. Vehicle creeps if brake pedal is not depressed in N position.
3	Vehicle moves in P position, or parking gear does not disengage when P is disengaged	Vehicle rolls when on a downward slope and tires do not lock in P position. Tires are locked when P is disengaged, vehicle does not move in D, S, L ranges, and R position when accelerator pedal is depressed, and engine remains in stall condition.
4	Excessive creep	Vehicle accelerates in D, S, L ranges, and R position without depressing accelerator pedal.
5	No creep at all	Vehicle does not move in D, S, L ranges, or R position when idling on flat paved road.
6	Low maximum speed and poor acceleration	Vehicle acceleration is poor at start.
7	No shifting	Single shift range only. Sometimes it shifts correctly.
8	Does not shift to fourth gear	Vehicle does not upshift from 3GR to 4GR eventhough vehicle speed is increased. Vehicle does not shift to 4GR even though accelerator pedal is released in D range at 60 km/h {37 mph }
9	Abnormal shifting	Shift incorrectly (incorrect shift pattern).
10	Frequent shifting	Downshifting occurs immediately even when accelerator pedal is depressed slightly in D, S, L ranges except HOLD mode.
11	Shift point is high or low	Shift point is considerably different from automatic shift diagram. Shift delayes when accelerating. Shift occurs quickly when accelerating and engine speed does not increase.
12	Torque converter clutch non-operation	Torque converter clutch does not operate when vehicle reaches torque converter clutch operation range
13	No kickdown	Does not downshift when accelerator pedal is fully depressed within kickdown range.
14	Engine flares up or slips when upshifting or downshifting	When accelerator pedal is depressed for driveway, engine speed increases but vehicle speed increase slowly. When accelerator is depressed while driving, engine speed increases but vehicle does not.
15	Engine flares up or slips when accelerating vehicle	Engine flares up when accelerator pedal is depressed for upshifting.
16	Judder upon torque converter clutch operation	Vehicle jolts when torque converter clutch is engaged.
17	Excessive shift shock from N to D or N to R position/range	Strong shock is felt when shifting from N to D or N to R position/range at idle.
18	Excessive shift shock is given when upshifting and downshifting	Excessive shift shock is felt when depressing accelerator pedal to accelerate at upshifting. During cruising, excessive shift shock is felt when depressing accelerator pedal at downshifting.
19	Excessive shift shock on torque converter clutch	Strong shock is felt when torque converter clutch is engaged.
20	Noise occurs at idle when vehicle stopped in all positions/ranges	Transaxle is noisy in all positions and ranges when vehicle is idling.
21	Noise occurs at idle when vehicle stopped in D, S, L ranges, or in R position	Transaxle is noisy in driving ranges when vehicle is idling.

No	TROUBLESHOOTING ITEM	DESCRIPTION
22	No engine braking in HOLD mode	Engine speed drops to idle but vehicle coasts when accelerator pedal is released during cruising atmedium to high speeds. Engine speed drops to idle but vehicle coasts when accelerator pedal is released when in L range at low vehicle speed.
23	Transaxle overheats	Burnt smell is emitted from transaxle. Smoke is emitted from transaxle.
24	Engine stalls when shifted to D, S, L ranges, or in R position	Engine stalls when shifting from N or P position D, S, L ranges or R position at idle.
25	Engine stalls when driving at slow speeds or stopping	Engine stalls when brake pedal is depressed while driving at low speed or stopping.
26	HOLD indicator light dose not illuminate when HOLD switch is turned to ON	HOLD indicator light in dashboard dose not illuminate when HOLD switch is turned on and ignition switch at ON.
27	HOLD indicator light illuminates when HOLD switch is not turned to ON	HOLD indicator light in dashboard illuminates even though HOLD switch is turned to OFF and ignition switch is at ON

QUICK DIAGNOSIS CHART

1	Vehicle does not move in D, S, L ranges, or in R position	○		○				○	○	○	○										○
2	Vehicle moves in N position	○		○				○	○	○	○										○
3	Vehicle moves in P position, or parking gear does not disengage when P is disengaged	○																			
4	Excessive creep			○	○	○															
5	No creep at all	○		○				○	○	○	○										○
6	Low maximum speed and poor acceleration			○		○	○	○	○	○	○	○	○								○
7	No shifting			○				○	○	○	○	○	○								○
8	Does not shift to fourth gear			○			○	○	○	○	○	○	○								○
9	Abnormal shifting	○		○			○	○	○	○	○										○
10	Frequent shifting			○				○	○	○	○										○
11	Shift point is high or low				○	○		○	○	○	○										○
12	TCC non-operation			○			○	○	○	○	○	○	○			○	○	○			
13	No kickdown							○	○												○
14	Engine flares up or slips when upshifting or downshifting	○		○				○	○	○	○										○
15	Engine flares up or slips when accelerating vehicle	○		○				○	○	○	○										○
16	Judder upon TCC operation			○		○		○	○	○	○				○						
17	Excessive N to D or N to R position/range shift shock			○	○			○	○	○	○										
18	Excessive shift shock when upshifting and downshifting			○				○	○	○	○										
19	Excessive TCC shift shock			○				○	○	○	○										
20	Noise at idle when vehicle stopped in all positions/ranges							○	○												
21	Noise at idle when vehicle stopped in L, D, S, ranges, and or in R position	○					○	○	○												
22	No engine braking in HOLD mode	○		○			○	○	○	○	○	○	○								
23	Transaxle overheats			○																	
24	Engine stalls when shifted to D, S, L ranges, and/or in R position				○		○														
25	Engine stalls when driving at slow speed or stopping				○		○														
26	HOLD indicator light does not illuminate when HOLD switch is tumed to ON											○	○								
27	HOLD indicator light illuminates when HOLD switch is not turned to ON											○	○								

No.	Item	Selector lever is misadjusted	Ignition system malfunction	Not within line pressure specification	Idle speed is misadjusted	Ignition timing is misadjusted	Transaxle range switch is misadjusted	Electrical system components													
								ATX outer parts													
								Throttle position sensor		Input/turbine speed sensor		HOLD switch		Brake switch		Vehicle speedometer sensor					
	Symptom / Cause of trouble / Inspection method							No signal output	Malfunction signal is output	No signal output	Malfunction signal is output	No signal output	Malfunction signal is output	No signal output	Malfunction signal is output	No signal output	Malfunction signal is output	Poor ground			
	Line pressure test																				
	Stall test																				
	Time lag test																				
	Diagnostic trouble code							○		○						○					

TROUBLESHOOTING

No.	Item	Signal is not input	Malfunction signal is output	Signal is not output	Malfunction signal is output	Shift solenoid A (Open or short)	Shift solenoid B (Open or short)	Shift solenoid C (Open or short)	TCC control solenoid valve (Open or short)	3—2 timing solenoid valve (Open or short)	TCC solenoid valve (Open or short)	Pressure control solenoid (Open or short)	Control valve is not operating properly	1—2 accumulator is not operating properly	2—3 accumulator is not operating properly	N→D accumulator is not operating properly	N—R accumulator is not operating properly	Oil cooler is not operating properly	Slipping (Brake, clutch)	Burnt (Brake, clutch)	Torque converter is not operating properly	TCC piston burnt
		Electrical system components				ATX inner parts							Hydraulic system components						Powertrain system			
1	Vehicle does not move in D, S, L ranges, or in R position					○	○	○				○	○						○	○	○	
2	Vehicle moves in N position					○	○	○				○	○							○		
3	Vehicle moves in P position, or parking gear does not disengage when P is disengaged																			○		
4	Excessive creep																					
5	No creep at all					○	○	○				○	○						○	○	○	
6	Low maximum speed and poor acceleration			○		○	○	○				○	○						○	○	○	
7	No shifting					○	○	○				○	○						○	○		
8	Does not shift to fourth gear			○	○	○	○	○					○						○			
9	Abnormal shift					○	○	○				○	○						○	○		
10	Frequent shifting											○	○						○			
11	Shift point is high or low											○										
12	TCC non-operation	○	○	○	○				○		○		○						○		○	
13	No kickdown					○	○	○					○						○	○		
14	Engine flares up or slips when upshifting or downshifting					○	○	○				○	○						○			
15	Engine flares up or slips when accelerating vehicle					○	○	○				○	○						○			
16	Judder upon TCC operation								○		○		○								○	○
17	Excessive N to D or N to R position/range shift shock											○	○			○	○		○	○		
18	Excessive shift shock when upshifting and downshifting					○	○	○		○		○	○	○	○				○	○		
19	Excessive TCC shift shock								○		○		○									
20	Noise at idle when vehicle stopped in all positions/ranges					○	○	○													○	
21	Noise at idle when vehicle stopped in L, D, S, ranges, and or in R position																				○	
22	No engine braking in HOLD mode							○					○						○			
23	Transaxle overheats			○	○				○			○								○		○
24	Engine stalls when shifted to D, S, L ranges, and/or in R position								○				○									○
25	Engine stalls when driving at slow speeds or stopping								○				○									○
26	HOLD indicator light does not illuminate when HOLD switch is turned to ON																					
27	HOLD indicator light illuminates when HOLD switch is not turned to ON																					

Item \ Cause of trouble	Signal is not input	Malfunction signal is output	Signal is not output	Malfunction signal is output	Shift solenoid A (Open or short)	Shift solenoid B (Open or short)	Shift solenoid C (Open or short)	TCC control solenoid valve (Open or short)	3—2 timing solenoid valve (Open or short)	TCC solenoid valve (Open or short)	Pressure control solenoid (Open or short)	Control valve is not operating properly	1—2 accumulator is not operating properly	2—3 accumulator is not operating properly	N→D accumulator is not operating properly	N—R accumulator is not operating properly	Oil cooler is not operating properly	Slipping (Brake, clutch)	Burnt (Brake, clutch)	Torque converter is not operating properly	TCC piston burnt
Line pressure test												○						○	○	○	
Stall test												○						○	○	○	
Time lag test															○	○		○	○	○	
Diagnostic trouble code	○		○		○	○	○	○	○	○	○										

SYMPTOM TROUBLESHOOTING

1 VEHICLE DOES NOT MOVE IN D, S, L RANGES, OR IN R POSITION

TROUBLESHOOTING HINTS

If the vehicle does not move in D, S, L ranges or R position, basically, the malfunction is in the automatic transaxle. (Vehicle will move even with a malfunction is in the PCM.) Since a malfunction is in the sensor circuit or output circuit is the cause of the malfunction in the automatic transaxle, inspect the sensors, output circuit, and the related harnesses.

1. Clutch slippage, worn (D, S, L ranges—Forward clutch, R position—Reverse clutch, Low and reverse brake)

① Line pressure is low

② Malfunction of input sensor system. Disparity in setting sensor settings.
- Throttle position sensor
- Vehicle speedometer sensor
- Input/turbine speed sensor
- Sensor ground

③ Malfunction of output solenoid valve system (Sticking)
- Shift solenoid A
- Shift solenoid B
- Shift solenoid C
- Pressure control solenoid
- Body ground

④ Malfunction of control valve body system (Poor operation, sticking)
- Forward clutch hydraulic pressure system
- Low and reverse brake hydraulic pressure system
- Reverse clutch hydraulic pressure system

2. Malfunction of selector lever
3. Parking mechanism is not properly operating

STEP	INSPECTION		ACTION
1	When vehicle is stopped on a flat, paued road and engine is off, does vehicle move when pushed? (in D, S ranges or N, R positions and brake is released)	Yes	Go to next step
		No	Check for parking mechanism (☞ATX workshop manual)
2	Check the value at the following PID using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V Is PID value okay?	Yes	Go to next step
		No	Repair or replace any defective parts
3	*Disconnect PCM* Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	*Go to next step*
		No	Repair open ground circuit Reconnect PCM
4	Check the duty value at the EPC PID (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Output Duty.) Is duty value okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, Overhaul transaxle and repair or replace any defective parts. (☞ATX workshop manual)
		No	Repair or replace any defective parts

2 VEHICLE MOVES IN N POSITION

TROUBLESHOOTING HINTS

If the vehicle moves in N position, basically, the malfunction is in the automatic transaxle. Since a malfunction is in the sensor circuit or output circuit is the cause of the malfunction in the automatic transaxle, inspect the sensors, output circuit, and the related harnesses.

1. Clutch burned (Forward clutch, coasting clutch)

① Line pressure is low

② Malfunction of input sensor system. Disparity in setting sensor settings
- Throttle position sensor
- Vehicle speedometer sensor
- Input/turbine speed sensor
- Sensor ground

③ Malfunction of output solenoid valve system (Sticking)
- Shift solenoid A
- Shift solenoid B
- Shift solenoid C
- Pressure control solenoid
- Body ground

④ Malfunction of control valve body system (Poor operation, sticking)
- Forward clutch hydraulic pressure system

2. Selector lever position disparity. Although the selector indicator light shows N position, the hydraulic circuit shows D, R range.

STEP	INSPECTION		ACTION
1	Does vehicle creep when selector lever is moved slightly in N position?	Yes	Go to next step
		No	Adjust selector lever (☞SHIFT MECHANISM, SELECTOR LEVER REMOVAL/INSTALLATION)
2	Check the value at the following PID using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V Is PID value okay?	Yes	Go to next step
		No	Repair or replace any defective parts
3	Disconnect PCM Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	Go to next step
		No	Repair open ground circuit Reconnect PCM
4	Check the duty value at the EPC PID (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Output Duty.) Is duty value okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts. (☞ATX workshop manual)
		No	Repair or replace any defective parts

3 VEHICLE MOVES IN P POSITION, OR PARKING GEAR DOES NOT DISENGAGE WHEN P IS DISENGAGED

TROUBLESHOOTING HINTS

1. Malfunction of parking mechanism (May have effect on noise or shock from transaxle)
2. Poor adjustment of selector lever (Only if vehicle move when in P position or L range)
3. If vehicle moves in N position, perform No.2 "Vehicle moves in N position".

4 EXCESSIVE CREEP

TROUBLESHOOTING HINTS

1. Engine idle speed is high (transaxle system is not the cause of problem)
2. Go to No.7 "High idle speed, idle speed remains high" (☞section F, TROUBLESHOOTING, SYMPTOM TROUBLESHOOTING)

5 NO CREEP AT ALL

TROUBLESHOOTING HINTS

If the vehicle creeps only in L range, the fail-safe is operating. Otherwise, either the transaxle is stuck in third gear position, or there is clutch circuit slippage because the 3—4 clutch is stuck.

1. Clutch is burned

① Line pressure is low

② Malfunction of input sensor system
- Throttle position sensor
- Vehicle speedometer sensor
- Input/turbine speed sensor
- Sensor ground

③ Malfunction of output solenoid valve system (Sticking)
- Shift solenoid A
- Shift solenoid B
- Shift solenoid C
- Pressure control solenoid
- Body ground

④ Malfunction of control valve body system (Poor operation, sticking)
- Forward clutch hydraulic pressure system

2. Transaxle is fixed in 3GR (Operation of fail-safe function)
- Short or open circuit in wiring
- Poor connection of connector
- The electronic parts of output and input system is malfunction

3. The engine torque does not start
- The torque converter is malfunctioning

STEP	INSPECTION		ACTION
1	Does vehicle creep in any range/position?	Yes	Go to next step
		No	Inspect or adjust selector lever (☞SHIFT MECHANISM, SELECTOR LEVER REMOVAL/INSTALLATION)
2	Check the value at the following PID using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V Is PID value okay?	Yes	Go to next step
		No	Repair or replace any defective parts
3	Disconnect PCM Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	Go to next step
		No	Repair open ground circuit Reconnect PCM
4	Check the duty value at the EPC PID (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Output Duty.) Is duty value okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
		No	Repair or replace any defective parts

6 LOW MAXIMUM SPEED AND POOR ACCELERATION

TROUBLESHOOTING HINTS

If the clutch is stuck or does not stay in third or fourth gear, the malfunction is in the engine circuit.

1. Clutch slippage, burned

① Line pressure is low

② Malfunction of input sensor system
- Throttle position sensor
- Vehicle speedometer sensor
- Input/turbine speed sensor
- Sensor ground

③ Malfunction of output solenoid valve system (Sticking)
- Shift solenoid A
- Shift solenoid B
- Shift solenoid C
- Pressure control solenoid
- Body ground

④ Malfunction of control valve body system (Poor operation, sticking)
- Forward clutch hydraulic pressure system
- 3—4 clutch hydraulic pressure system

2. Transaxle is fixed in 3GR (Operation of fail-safe function)
- Short or open circuit in wiring
- Poor connection of connector
- The electronic parts of output and input system is malfunction

3. Insufficient torque start (Suspected when in-gear condition, shift control, and engine circuit are normal)
- The torque converter is malfunctioning (Poor operation, sticking)

4. Enlargement of TCC operation range (Operation of fail-safe function)
- Malfunction of TFT sensor (Short or open circuit)

STEP	INSPECTION		ACTION
1	With ignition switch at ON, does HOLD indicator light indication correspond to HOLD switch operation?	Yes	Go to next step
		No	Go to No. 26 "HOLD INDICATOR LIGHT DOES NOT ILLUMINATE WHEN HOLD SWITCH IS TURNED ON.". No.27 "HOLD INDICATOR LIGHT ILLUMINATES WHEN HOLD SWITCH IS NOT TURNED ON."
2	Go to No. 13 "Poor acceleration/Insufficient power/Surges while cruising/Hesitates" (☞section F, TROUBLESHOOTING SYMPTOM TROUBLESHOOTING) Does CIS system okay?	Yes	Go to next step
		No	Repair or replace any defective parts
3	Disconnect solenoid connector. Does vehicle operate as follows? **D, S ranges 3GR (fixed)** **L range 1GR (fixed)** **R position Reverse**	Yes	Go to next step
		No	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts. (☞ATX workshop manual)
4	Drive vehicle in D, S, and L ranges except HOLD mode. Does vehicle start from stop in first gear?	Yes	Go to next step
		No	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V • TR • VSS • TSS/ISS Repair or replace any defective parts
5	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • SS1 • SS2 • SS3 Are PID values okay?	Yes	Go to next step
		No	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V • VSS • TSS/ISS Repair or replace any defective parts
6	Perform the stall test (☞AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST, Stall Test) Is stall speed okay?	Yes	Reverify symptoms of malfunction
		No	Overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)

7 NO SHIFT

TROUBLESHOOTING HINTS

When the gear position is fixed in third gear due to the fail-safe operation, the malfunction is in the automatic transaxle.
Perform malfunction diagnosis according No.6 "Low maximum speed and poor acceleration".

1. Clutch is burned

① Line pressure is low

② Malfunction of input sensor system
- Throttle position sensor
- Vehicle speedometer sensor
- Input/turbine speed sensor
- Sensor ground

③ Malfunction of output solenoid valve system (Sticking)
- Shift solenoid A
- Shift solenoid B
- Shift solenoid C
- Pressure control solenoid
- Body ground

④ Malfunction of control valve body system (Poor operation, sticking)
- 2—4 brake band hydraulic pressure system
- 3—4 clutch hydraulic pressure system

2. The 3GR is fixed (Operation in fail-safe function)
- Short or open circuit in wiring
- Poor connection of connector
- The electronic parts of output and input system is malfunctioning.

8 DOES NOT SHIFT TO FOURTH GEAR

TROUBLESHOOTING HINTS

Although the malfunction is basically the same as No.7 "NO SHIFT", there are also other unique malfunctions.

1. Operation in fail-safe function

① TFT sensor
- Short or open circuit in wiring
- Poor connection of connector
- Malfunction of sensor

② Transaxle range switch (Judge of S range)
- Short or open circuit in wiring
- Poor connection of connector
- Malfunction of sensor
- Selector lever adjustment incorrect

2. Malfunction of HOLD switch
- Short or open circuit in wiring
- Poor connection of connector

STEP	INSPECTION		ACTION
1	With indicator switch at ON, does HOLD indicator light indication correspond to HOLD switch operation?	Yes	Go to next step
		No	Go to No.26 "HOLD INDICATOR LIGHT DOES NOT ILLUMINATE WHEN HOLD SWITCH IS TURNED ON.", No.27 "HOLD INDICATOR LIGHT ILLUMINATES WHEN HOLD SWITCH IS NOT TURNED ON."
2	Check the value at the following PID using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TFT Is PID value okay?	Yes	Go to next step
		No	Repair or replace any defective parts
3	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • SS1 • SS2 • SS3 Are PID values okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
		No	Go to next step
4	Disconnect PCM Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TR • TSS/ISS • VSS Repair or replace any defective parts
		No	Repair open ground circuit Reconnect PCM

9 ABNORMAL SHIFT

TROUBLESHOOTING HINTS

There is a malfunction in the signal circuit which controls shifting throttle position sensor, input/turbine speed, vehicle speedometer sensor, the control valve, or the clutch circuit is stuck.

1. Clutch slippage, burned

① Line pressure is low

② Malfunction of input sensor system
- Throttle position sensor
- Vehicle speedometer sensor
- Input/turbine speed sensor
- Sensor ground

③ Malfunction of output solenoid valve system (Sticking)
- Shift solenoid A
- Shift solenoid B
- Shift solenoid C
- Pressure control solenoid
- Body ground

④ Malfunction of control valve body system (Poor operation, sticking)
- 2—4 brake band hydraulic pressure system
- 3—4 clutch hydraulic pressure system

2. *Throttle position sensor malfunction (Not operating linearly)*
3. Input/turbine speed sensor, vehicle speedometer sensor malfunction

STEP	INSPECTION		ACTION
1	Disconnect PCM Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	Go to next step
		No	Repair open ground circuit Reconnect PCM
2	Check the value at the following PIDs using the NGS tester. (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V • TSS/ISS • VSS Is PID value Okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
		No	Repair or replace any defective parts

10 FREQUENT SHIFTING

TROUBLESHOOTING HINTS

The circuit is the cause and it is basically the same as for No.9 "Abnormal shift". However, a malfunction of the input signal to the throttle position sensor, input/turbine speed sensor vehicle speedometer sensor including the sensor ground, sensor harness, and connector, or clutch slippage: clutch stuck, low pressure in line, may also be the cause.

11 SHIFT POINT HIGH OR LOW

TROUBLESHOOTING HINTS

- If the transaxle does not abnormally shift, there is a malfunction of the input signal to the throttle position sensor, input/turbine speed sensor, or vehicle speedometer sensor.
- If the engine speed is high or low regardless the normal shifting, inspect the tachometer.
- Verify that the output signal of the throttle position sensor changes linearly.

12 TCC NON-OPERATION

TROUBLESHOOTING HINTS

Basically, the TCC does not operate when the fail-safe is operating. Verify the diagnostic trouble code at first. If the TCC operates only when driving at high speeds only, the malfunction: poor adjustment, is in the HOLD switch circuit or transaxle range switch circuit.

Caution

- **If the TCC or piston is stuck, inspect them. In addition, inspect the oil cooler for foreign particles which may have mixed in with the ATF.**

1. TCC piston slippage, burned
   ① Line pressure is low
   ② Malfunction of input sensor system
   - Throttle position sensor
   - Transaxle fluid temperature sensor
   - *Vehicle speedometer sensor*
   - Input/turbine speed sensor
   - Sensor ground

   ③ Malfunction of output solenoid valve system (Sticking)
   - Torque converter clutch control solenoid valve
   - Torque converter clutch solenoid valve

   ④ Malfunction of control valve body system (Poor operation, sticking)
   - TCC piston hydraulic pressure system
2. Malfunction of throttle position sensor (Not operating linear)
3. Malfunction of input/turbine speed sensor or vehicle speedometer sensor

STEP	INSPECTION		ACTION
1	With indicator switch at ON, does HOLD indicator light indication correspond to HOLD switch operation?	Yes	Go to next step
		No	Go to No.26 "HOLD INDICATOR LIGHT DOES NOT ILLUMINATE WHEN HOLD SWITCH IS TURNED ON.", No.27 "HOLD INDICATOR LIGHT ILLUMINATES WHEN HOLD SWITCH IS NOT TURNED ON."
2	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V • VSS • TSS/ISS Are PID values okay?	Yes	Go to next step
		No	Repair or replace any defective parts
3	Disconnect PCM Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	Go to next step
		No	Repair open ground circuit
4	Check resistance between TCC control circuit at PCM connector and control valve body connector Check resistance between TCC circuit at PCM connector and control valve body connector Are the resistances less than 5.0 ohms?	Yes	Go to next step
		No	Repair TCC control or TCC circuit Reconnect PCM
5	Inspect TCC control solenoid valve and TCC solenoid valve (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION) Are the solenoid valves operating properly?	Yes	Replace PCM
		No	Overhaul control valve body and repair or replace any defective parts (☞ATX *workshop manual*) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)

13 NO KICKDOWN

TROUBLESHOOTING HINTS

If the transaxle does not al downshift al though shifting is normal, the malfunction is in the throttle position sensor circuit including the sensor ground, sensor harness, and connector.

14 ENGINE FLARES UP OR SLIPS WHEN UPSHIFTING OR DOWNSHIFTING

TROUBLESHOOTING HINTS

Clutch slip occurs because the clutch is stuck or the line pressure is low.

1. Clutch is stuck or slips (forward clutch, 3—4 clutch, 2—4 brake band, one-way clutch 1, one-way clutch 2)

① Line pressure is low

② Malfunction of input signal system
- Throttle position sensor
- Vehicle speedometer sensor
- Input/turbine speed sensor
- Sensor ground

③ Malfunction of output solenoid valve system (Sticking)
- Shift solenoid A
- Shift solenoid B
- Shift solenoid C
- Pressure control solenoid
- Body ground

④ Malfunction of control valve body (Poor operation, sticking)
- Forward clutch hydraulic pressure system
- 2—4 brak band hydraulic pressure system
- 3—4 clutch hydraulic pressure system

2. Poor operating of mechanical pressure
- Selector lever position disparity
- Transaxle range switch position disparity

STEP	INSPECTION		ACTION
1	Is shift point okay?	Yes	Go to next step
		No	Go to No.9 "ABNORMAL SHIFT"
2	Check the value at the following PID using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V Is PID value okay?	Yes	Go to next step
		No	Repair or replace any defective parts
3	Disconnect PCM Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	Go to next step
		No	Repair open ground circuit Reconnect PCM
4	Check the duty value at the EPC PID (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Output Duty.) Is duty value okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
		No	Repair or replace any defective parts

15 ENGINE FLARES UP OR SLIPS WHEN ACCELERATING VEHICLE

TROUBLESHOOTING HINTS

The malfunction is basically the same as for No.14 "Engine flares up or slips when accelerating vehicle". If conditions for No.14 worsen, the malfunction will develop into No.15.

16 JUDDER UPON TCC OPERATION

TROUBLESHOOTING HINTS

Poor TCC engagement due to either slippage because the TCC piston is stuck, or the line pressure is low.

Caution

- **If the TCC or piston is stuck, inspect them. In addition, inspect the oil cooler for foreign particles which may have mixed in with the ATF.**

1. Torque converter clutch piston slippage, burned

① Line pressure is low

② Malfunction of input signal system
- Throttle position sensor
- Vehicle speedometer sensor
- Input/turbine speed sensor
- Sensor ground

③ Malfunction of output solenoid valve system (Sticking)
- Torque converter clutch solenoid valve
- Torque converter clutch control solenoid valve

④ Malfunction of control valve body system (Poor operation, sticking)
- TCC piston hydraulic pressure system

STEP	INSPECTION		ACTION
1	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V • VSS • TSS/ISS Are PID values okay?	Yes	Go to next step
		No	Repair or replace any defective parts
2	Disconnect PCM Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	Go to next step
		No	Repair open ground circuit
3	Check resistance between TCC control circuit at PCM connector and control valve body connector Check resistance between TCC circuit at PCM connector and control valve body connector Are the resistances less than 5.0 ohms?	Yes	Go to next step
		No	Repair TCC control or TCC circuit
4	Inspect TCC control solenoid valve and TCC solenoid valve (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION) Are the solenoid valves operating properly?	Yes	Go to next step
		No	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
5	Check the duty value at the EPC PID (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Output Duty) Is duty value okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
		No	Replace PCM

17 EXCESSIVE SHIFT SHOCK FROM N TO D OR N TO R POSITION/RANGE

TROUBLESHOOTING HINTS

Shift shock may worsen when the fail-safe is operating. Verify the diagnostic trouble code first. However, if no diagnostic trouble code is output, the shift shock may worsen due to poor operation of the control valve body or sticking of the clutch.

1. Clutch burned (N→D: Forward clutch, N→R: Reverse clutch or low and reverse brake)

① Line pressure is low

② Malfunction of input signal system
- Throttle position sensor
- TFT sensor
- Sensor ground

③ Malfunction of output solenoid valve system (Sticking)
- Pressure control solenoid.

④ Malfunction of control solenoid valve system (Poor operation, sticking)
- Forward clutch hydraulic pressure
- Low and reverse brake hydraulic pressure system
- Reverse brake hydraulic pressure system

2. Poor hydraulic operation (Malfunction in range change)
3. Idle speed high
4. Poor tightening torque of engine mount, exhaust mount

STEP	INSPECTION		ACTION
1	Does shift shock occur only when engine cold?	Yes	Go to next step
		No	Go to step 3
2	Disconnect PCM Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V • TFT Repair or replace any defective parts
		No	Repair open ground circuit Reconnect PCM
3	Perform the stall test (☞AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST, Stall Test) Is stall speed okay?	Yes	Go to next step
		No	Go to step 5
4	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TR • TR V Are PID values okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
		No	Repair or replace any defective parts
5	Check the value at the following PID using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V Is PID value okay?	Yes	Go to next step
		No	Repair or replace any defective parts
6	Disconnect PCM Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	Go to next step
		No	Repair open ground circuit Reconnect PCM
7	Check the duty value at the EPC PID (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Output Duty.) Is duty value okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
		No	Repair or replace any defective parts

18 EXCESSIVE SHIFT SHOCK IS GIVEN WHEN UPSHIFTING AND DOWNSHIFTING

TROUBLESHOOTING HINTS

Shift shock may worsen when the fail-safe is operating. Verify the diagnostic trouble code first. The shift shock may worsened if the throttle position sensor, input/turbine speed sensor, or vehicle speedometer sensor signal malfunctions.

1. Clutch slippage, burned (2—4 brake band, 3—4 clutch)

① Line pressure is low, high

② Malfunction of input signal system
- Throttle position sensor
- Vehicle speedometer sensor
- Input/turbine speed sensor
- TFT sensor
- Sensor ground

③ Malfunction of solenoid valve system (Sticking)
- Shift solenoid A
- Shift solenoid B
- Shift solenoid C
- 3—2 timing solenoid valve
- Pressure control solenoid
- Body ground

④ Malfunction of control valve body system (Poor operation, sticking)
- 2—4 brake band hydraulic pressure system
- 3—4 clutch hydraulic pressure system

STEP	INSPECTION		ACTION
1	Perform the stall test (☞AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST, Stall Test) Is stall speed okay?	Yes	Go to next step
		No	Repair or replace any defective parts
2	Check the value at the following PID using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V Is PID value okay?	Yes	Go to next step
		No	Repair or replace any defective parts
3	Disconnect PCM Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	Go to next step
		No	Repair open ground circuit Reconnect PCM
4	Check the duty value at the EPC PID (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Output Duty.) Is duty value okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
		No	Repair or replace any defective parts

19 EXCESSIVE SHIFT SHOCK ON TCC

TROUBLESHOOTING HINTS

Sensor setting disparity of input sensor circuit or malfunction of the TCC piston adjustment pressure circuit.

- Perform malfunction diagnosis according to No.16 "Judder upon TCC operation".

1. High pressure in Torque converter clutch piston

① Line pressure is low

② Malfunction of input signal system

- Throttle position sensor
- Vehicle speedometer sensor
- Input/turbine speed sensor
- Sensor ground

③ Malfunction of output solenoid valve system (Sticking)

- Torque converter clutch control solenoid valve
- Torque converter clutch solenoid valve
- Body ground

④ Malfunction of control valve body system (Poor operation, sticking)

- TCC piston hydraulic pressure system

20 NOISE AT IDLE WHEN VEHICLE STOPPED IN ALL POSITIONS/RANGES

TROUBLESHOOTING HINTS

The malfunction in the line pressure solenoid valve or oil pump causes a high-pitched noise to be emitted from the transaxle at idle.

Note

- If noise is emitted only during shifting, the malfunction is in shift solenoid A, B, or C. If noise is emitted during shifting at certain gears only or during deceleration, it is gear noise.

STEP	INSPECTION		ACTION
1	Does noise stop when solenoid connector is disconnected?	Yes	Go to next step
		No	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
2	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V • VSS • TSS/ISS Are PID values okay?	Yes	Go to next step
		No	Repair or replace any defective parts
3	Disconnect PCM Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	Go to next step
		No	Repair open ground circuit Reconnect PCM
4	Check the duty value at the EPC PID (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Output Duty.) Is duty value okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
		No	Repair or replace any defective parts

21 NOISE AT IDLE WHEN VEHICLE STOPPED IN L, D, S, RANGES, OR IN R POSITION

TROUBLESHOOTING HINTS
Although the malfunction is basically the same as for No.20 "Noise at idle when vehicle stopped in all positions/ranges", selector lever position disparity or transaxle range switch position disparity also may the cause.

22 NO ENGINE BRAKING IN HOLD MODE

TROUBLESHOOTING HINTS
1. Clutch slippage, burned (Coasting clutch, low and reverse brake)
① Line pressure is low
② Malfunction of input sensor system
   - Vehicle speedometer sensor
   - Input/turbine speed sensor
   - Sensor ground
③ Malfunction of output solenoid valve system (Sticking)
   - 3—4 shift solenoid valve
   - Body ground
④ Malfunction of control valve body system (Poor operation, Sticking)
   - Coasting clutch hydraulic pressure system
2. HOLD mode is not judged by PCM (Short, or open circuit, Poor operation)
   - Malfunction of hold switch signal system

STEP	INSPECTION		ACTION
1	With ignition switch at ON, does HOLD indication light correspond to HOLD switch operation?	Yes	Go to next step
		No	Go to No.26 "HOLD INDICATOR LIGHT DOES NOT ILLUMINATE WHEN HOLD SWITCH IS TURNED ON.", No.27 "HOLD INDICATOR LIGHT ILLUMINATES WHEN HOLD SWITCH IS NOT TURNED ON."
2	Do the following symptoms concurrently occur? • Engine flares up or slips during accelerating • Engine flares up or slips when shifting	Yes	Go to No.14 "ENGINE FLARES UP OR SLIPS WHEN ACCELERATING VEHICLE", No.15 "ENGINE FLARES UP OR SLIPS WHEN UPSHIFTING OF DOWNSHIFTING"
		No	Go to next step
3	Check the value at the PIDs using NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • SS3 • TSS/ISS • VSS Are PID values okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
		No	Repair or replace any defective parts

23 TRANSAXLE OVERHEATS

TROUBLESHOOTING HINTS

The malfunction occurs only with faully coolant at the oil cooler. In addition, overheating the transaxle may be caused by a malfunction of the transaxle fluid temperature sensor.

1. Line pressure is low
   - Low ATF
   - Pressure control solenoid malfunction
   - Throttle position sensor malfunction
2. Oil cooler circuit malfunction Foreign material is mixed in with ATF
3. TFT sensor malfunction
4. Excessive amount of ATF

STEP	INSPECTION		ACTION
1	Perform the stall test (☞AUTOMATIC TRANSAXLE, MECHANICAL SYSTEM TEST, Stall Test) Is stall speed okay?	Yes	Go to next step
		No	Repair or replace any defective parts.
2	Check the value at the following PID using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V Is PID value okay?	Yes	Go to next step
		No	Repair or replace any defective parts
3	Disconnect PCM Is resistance between ground terminal at PCM connector and body ground less than 5.0 ohms?	Yes	Go to next step
		No	Repair open ground circuit Reconnect PCM
4	Check the duty value at the EPC PID (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION, Inspection of Output Duty.) Is duty value okay?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
		No	Repair or replace any defective parts

24 ENGINE STALLS WHEN SHIFTED TO D, S, L RANGES, OR IN R POSITION

TROUBLESHOOTING HINTS
The malfunction is on the engine control side (ISC control). Otherwise, the malfunction is in the input/turbine speed sensor (engine sometimes starts) or TCC piston circuit (engine always stalls).

STEP	INSPECTION		ACTION
1	Go to No.10 "Rough idle/Engine stalls during N–D shift" (☞section F, TROUBLESHOOTING, SYMPTOM TROUBLESHOOTING) Is EGI system okay?	Yes	Go to next step
		No	Repair or replace any defective parts
2	Is problem corrected when connectors of powertrain control module are disconnected?	Yes	Go to next step
		No	Go to step 4
3	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TR • TSS/ISS • TR V Are PID values okay?	Yes	Replace powertrain control module (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE REMOVAL/INSTALLATION)
		No	Repair or replace any defective parts
4	Check the value at the following PIDs using the NGS tester (☞section F, CONTROL SYSTEM, POWERTRAIN CONTROL MODULE INSPECTION) • TP V • VSS • TSS/ISS Are PID values okay?	Yes	Go to next step
		No	Repair or replace any defective parts
5	Disconnect PCM *Is resistance between ground terminal at PCM* connector and body ground less than 5.0 ohms?	Yes	Go to next step
		No	Repair open ground circuit Reconnect PCM
6	Check resistance between TCC control circuit at PCM connector and control valve body connector Check resistance between TCC circuit at PCM connector and control valve body connector Are the resistances less than 5.0 ohms?	Yes	Go to next step
		No	Repair TCC control or TCC circuit
7	Inspect TCC control solenoid valve and TCC solenoid valve (☞AUTOMATIC TRANSAXLE, SOLENOID VALVE INSPECTION) Are the solenoid valves operating properly?	Yes	Overhaul control valve body and repair or replace any defective parts (☞ATX workshop manual) If problem remains, overhaul transaxle and repair or replace any defective parts (☞ATX workshop manual)
		No	Replace PCM

25 ENGINE STALLS WHEN DRIVING AT SLOW SPEEDS OR STOPPING

TROUBLESHOOTING HINTS
The malfunction is on the engine control side (fuel injection control, ISC control)

STEP	INSPECTION		ACTION
1	Go to No.14 "Runs rough during deceleration/Backfire" (☞section F, TROUBLESHOOTING, SYMPTOM TROUBLESHOOTING) Is EGI system okay?	Yes	Go to No.24 "ENGINE STALLS WHEN SHIFTED TO D, S, L RANGES, OR IN R POSITION"
		No	Repair or replace any defective parts

26 HOLD INDICATOR LIGHT DOES NOT ILLUMINATE WHEN HOLD SWITCH IS TURNED TO ON

TROUBLESHOOTING HINTS
The malfunction is in the HOLD switch

STEP	INSPECTION		ACTION
1	Are other indicator lights illuminated with ignition switch is at ON?	Yes	Inspect meter fuse
		No	Go to next step
2	Check the HOLD switch (☞AUTOMATIC TRANSAXLE, HOLD SWITCH INSPECTION) Is HOLD switch okay?	Yes	Go to next step
		No	Repair or replace any defective parts
3	Disconnect PCM Ignition switch on Is voltage between 79 terminal at the PCM connector and body ground greater than 10.5 volts?	Yes	Replace PCM
		No	Reconnect PCM Go to next step
4	Check the HOLD indicator light Is HOLD indicator light okay?	Yes	Inspect for open circuit or disconnected connector in harness between the following • Ignition switch and HOLD indicator light • HOLD indicator light and PCM
		No	Repair or replace any defective parts

27 HOLD INDICATOR LIGHT ILLUMINATES WHEN HOLD SWITCH IS NOT TURNED ON

TROUBLESHOOTING HINTS
HOLD switch malfunction

STEP	INSPECTION		ACTION
1	Check the HOLD switch (☞AUTOMATIC TRANSAXLE, HOLD SWITCH INSPECTION) Is HOLD switch okay?	Yes	Go to next step
		No	Repair or replace any defective parts
2	Disconnect PCM Ignition switch off Is resistance between 79 terminal at the PCM connector and body ground greater than 10,000 ohms?	Yes	Replace PCM
		No	Repair short circuit between HOLD indicator light and PCM Reconnect PCM

FRONT AND REAR AXLES

GENERAL PROCEDURES ..... **M- 1**
FRONT AXLE ..... **M- 1**
WHEEL HUB, STEERING KNUCKLE INSPECTION ..... **M- 1**
WHEEL HUB ON-VEHICLE SERVICE ..... **M- 2**
WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION ..... **M- 2**
REAR AXLE (DRUM BRAKE TYPE) ..... **M- 5**
WHEEL HUB, HUB SPINDLE INSPECTION ... **M- 5**
WHEEL HUB, HUB SPINDLE REMOVAL/INSTALLATION ..... **M- 6**
REAR AXLE (DISC BRAKE TYPE) ..... **M- 8**
WHEEL HUB, HUB SPINDLE INSPECTION ... **M- 8**
WHEEL HUB ON-VEHICLE SERVICE ..... **M- 8**
WHEEL HUB, HUB SPINDLE REMOVAL/INSTALLATION ..... **M- 8**
DRIVE SHAFT ..... **M- 9**
JOINT SHAFT INSPECTION ..... **M- 9**
JOINT SHAFT REMOVAL/INSTALLATION .. **M-10**
JOINT SHAFT DISASSEMBLY/ASSEMBLY .. **M-12**
DRIVE SHAFT INSPECTION **M-13**
DRIVE SHAFT REMOVAL/INSTALLATION .. **M-14**
DRIVE SHAFT (MTX, DOUBLE OFF SET TYPE) DISASSEMBLY/ASSEMBLY **M-17**
DRIVE SHAFT (ATX, TRIPOD TYPE) DISASSEMBLY/ASSEMBLY **M-21**

GENERAL PROCEDURES

Wheel and tire removal/installation

- The removal and installation procedure for the wheels and tires are not mentioned in this section. When a wheel is removed, retighten it to **89—117 N·m {9.0—12.0 kgf·m , 66—86 ft·lbf }.**

Brake line disconnection/connection

Caution

- **Brake fluid will damage painted surfaces. If brake fluid does get on a painted surface, wipe it off immediately.**

- Tighten the brake pipe flare nut by using the **SST** (49 0259 770B). Be sure to modify the brake pipe flare nut tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI, FUNDAMENTAL PROCEDURES, TORQUE FORMULAS.)
- If any brake line has been disconnected any time during the procedure, add brake fluid, bleed the brakes, and inspect for leakage after the procedure has been completed.

Suspension arm removal/installation

- Tighten any part of the suspension that uses rubber bushings only after vehicle has been lowered and unloaded.*

*Unloaded: Fuel tank full; engine coolant and engine oil at specified level; spare tire, jack, and tools in designated position.

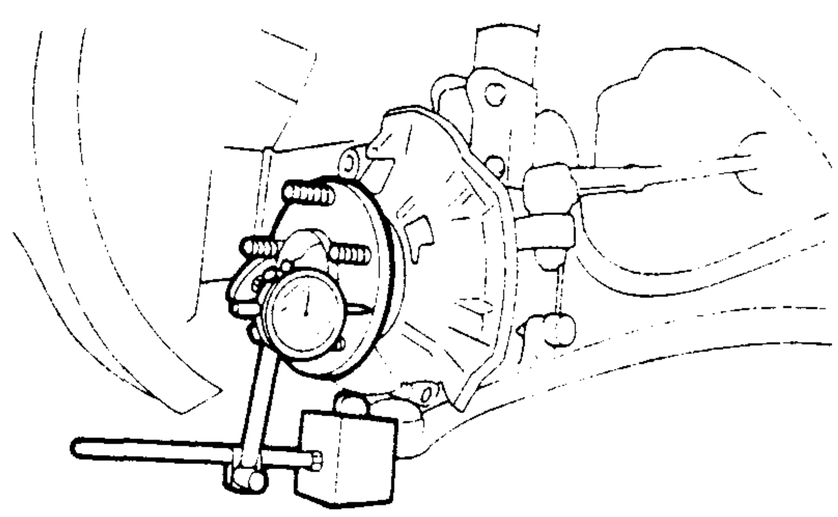
FRONT AXLE

WHEEL HUB, STEERING KNUCKLE INSPECTION

Wheel Bearing Play Inspection

1. Position a dial indicator against the wheel hub. Push and pull the wheel hub by hand in the axial direction and measure the wheel bearing play.

Wheel bearing play
0.05 mm {0.002 in }

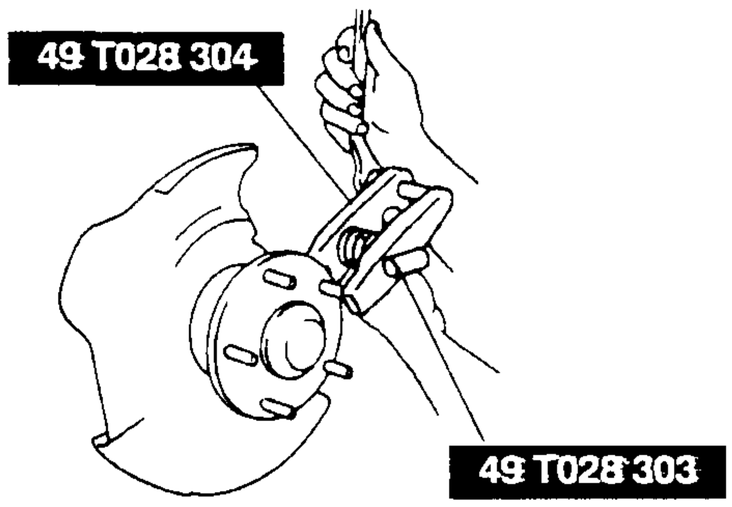


2. If the bearing play exceeds the specification, first, replace and tighten the locknut to the specified torque, then replace the wheel bearing if necessary.

WHEEL HUB ON-VEHICLE SERVICE

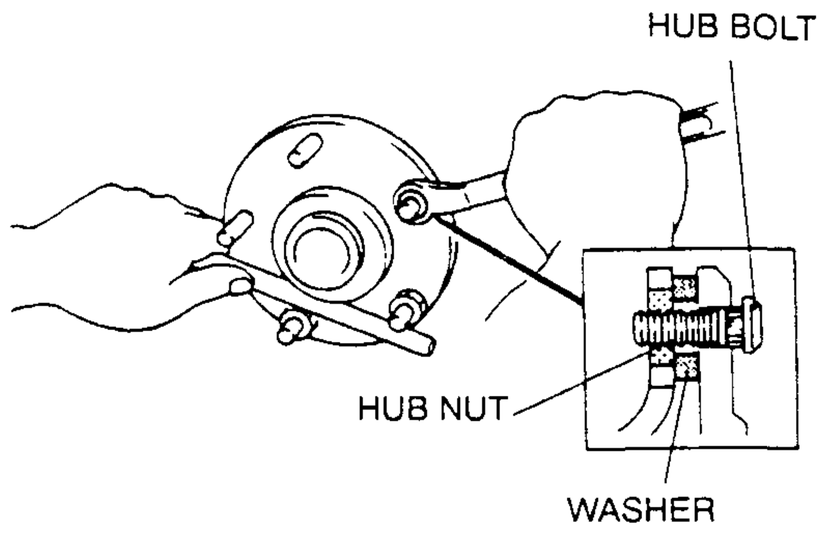
Hub Bolt Replacement

1. Remove the hub bolt by using the **SSTs**.



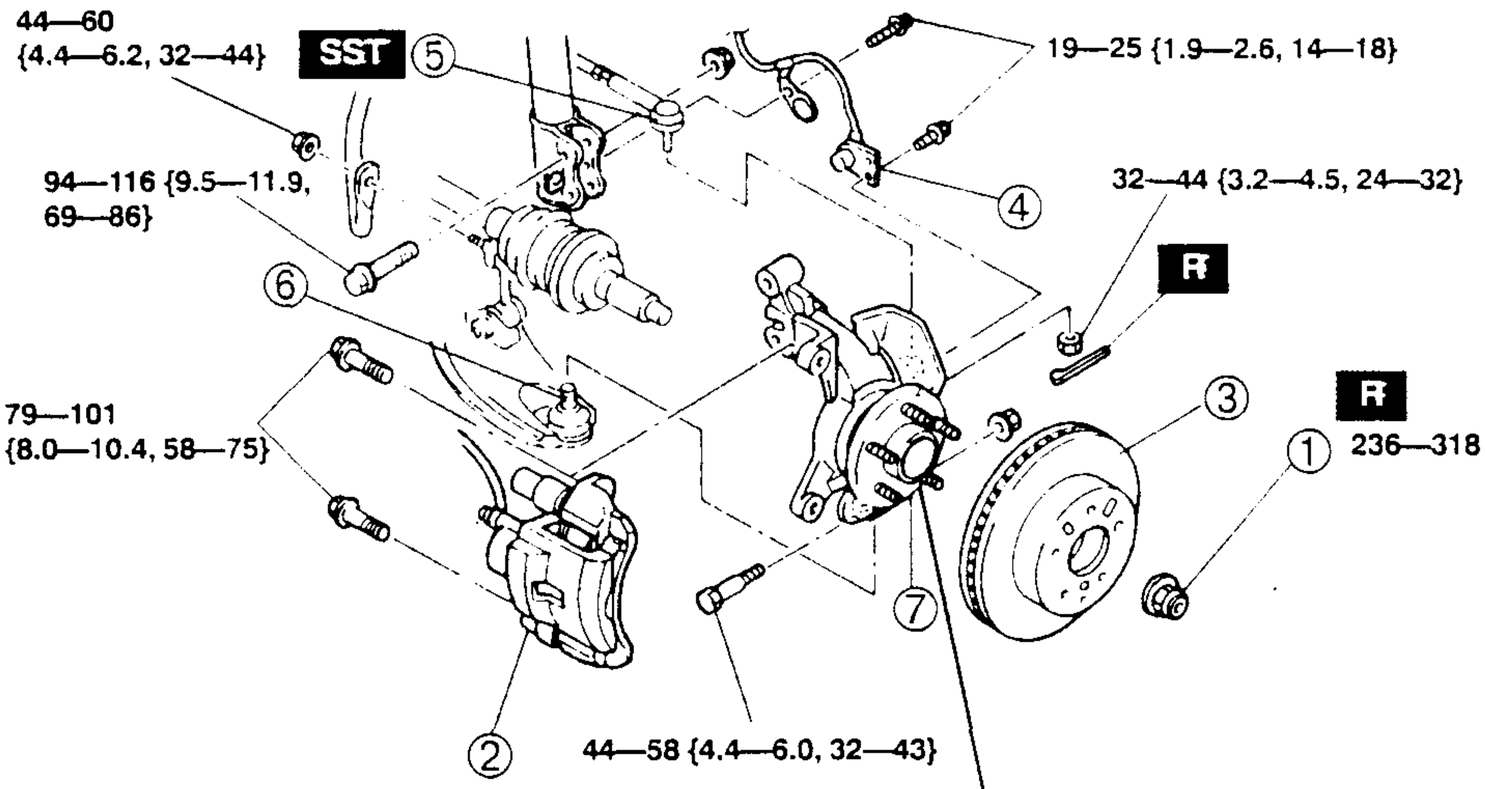
2. As shown in the figure, install the hub bolt into the wheel hub and set a washer and hub nut in the hub bolt.

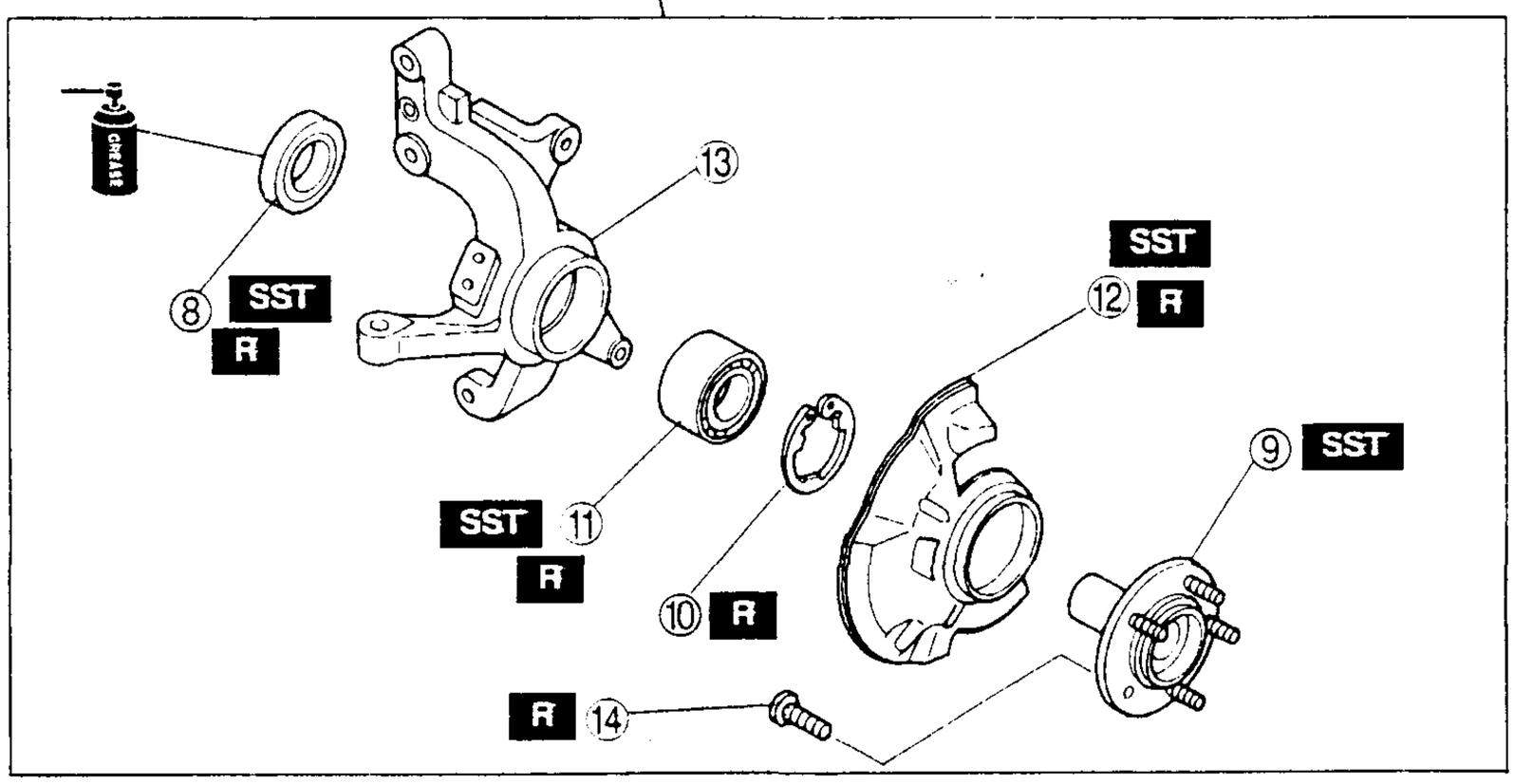
3. Tighten the hub nut while holding the wheel hub by using the brass bar.



WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.

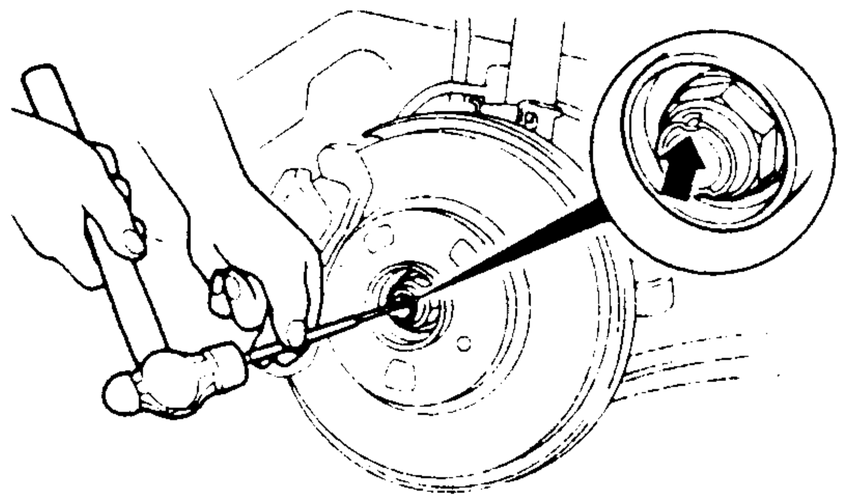




1	Locknut ☞ Removal Note ☞ Installation Note
2	Brake caliper component
3	Disc plate
4	ABS wheel-speed sensor (with ABS)
5	Tie-rod end ☞ Section N, ENGINE SPEED SENSING POWER STEERING, STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION, Tie-rod End Removal Note
6	Lower arm ball joint
7	Wheel hub, steering knuckle, dust cover
8	Oil seal ☞ Installation Note
9	Wheel hub component ☞ Removal Note ☞ Installation Note
10	Retaining ring
11	Wheel bearing ☞ Removal Note ☞ Installation Note
12	Dust cover ☞ Removal Note ☞ Installation Note
13	Steering knuckle
14	Hub bolt ☞ Removal Note ☞ Installation Note

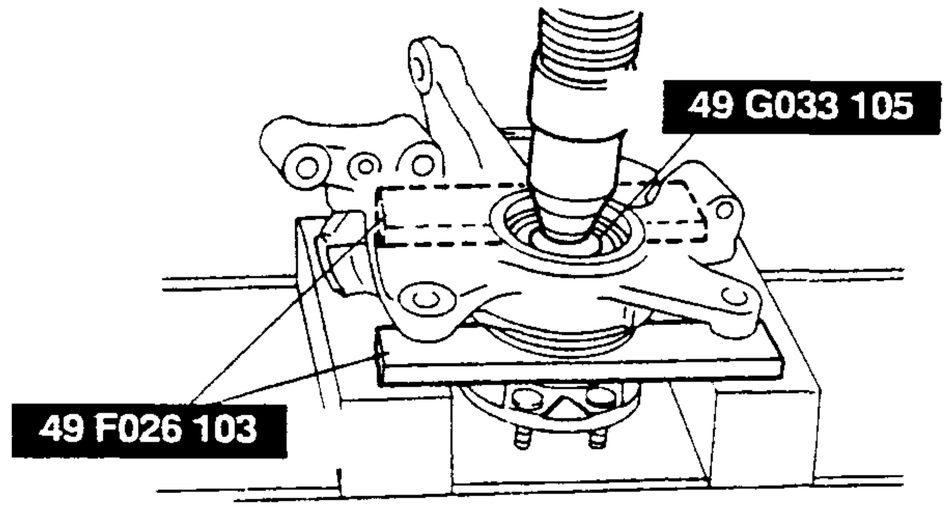
Locknut Removal Note

1. Knock the crimped portion of the locknut outward by using a small chisel and a hammer.
2. Lock the hub by applying the brakes.
3. Remove the locknut.

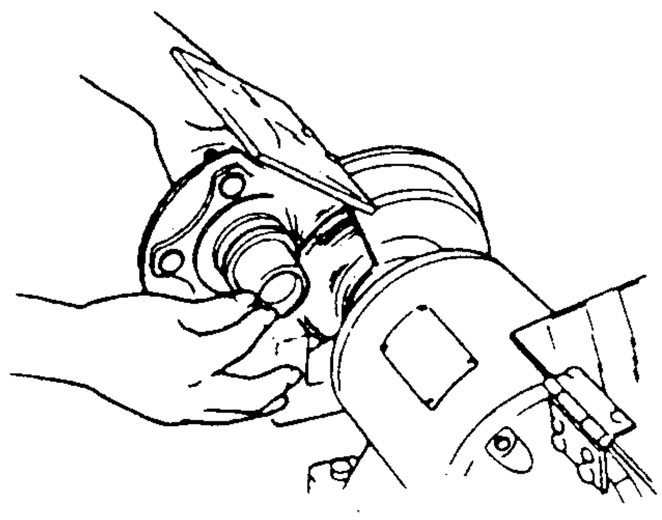


Wheel Hub Component Removal Note

1. Remove the wheel hub component by using the **SSTs**.

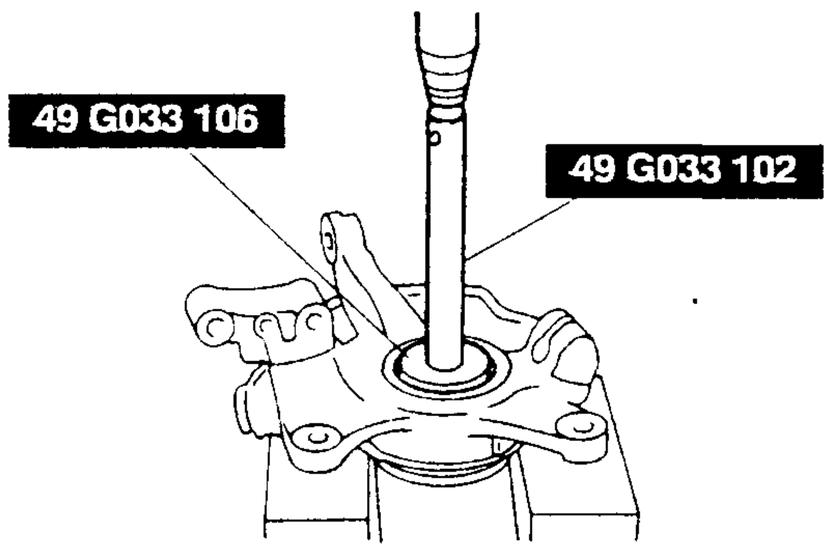


2. If the bearing inner race remains on the front wheel hub component, grind a section of the bearing inner race until **approx. 0.5 mm {0.020 in }** remains. Then remove it by using a chisel.



Wheel Bearing Removal Note

- Remove the wheel bearing by using the **SSTs**.

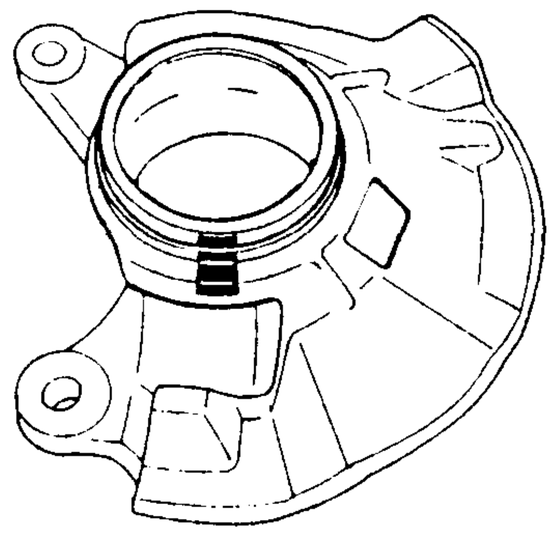


Dust Cover Removal Note

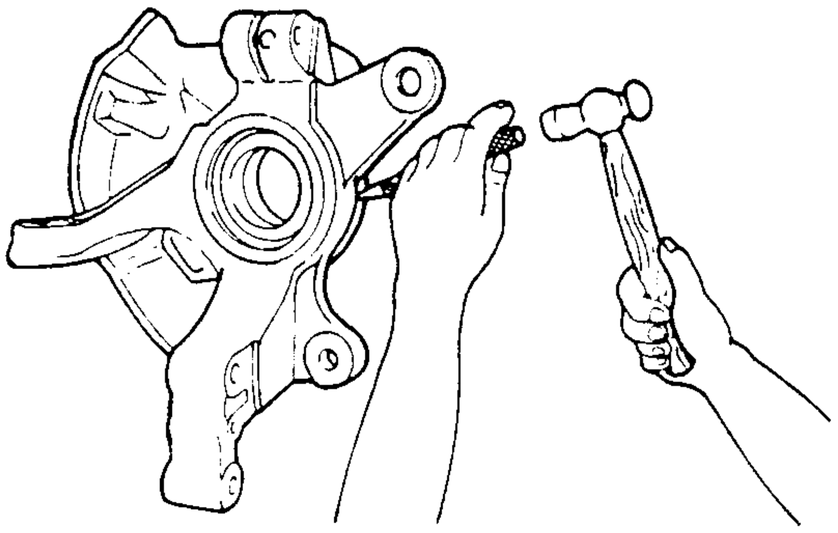
Note

- The dust cover does not need to be removed unless replacing it.

1. Mark the dust cover and steering knuckle for proper installation.



2. Remove the dust cover by using a chisel.

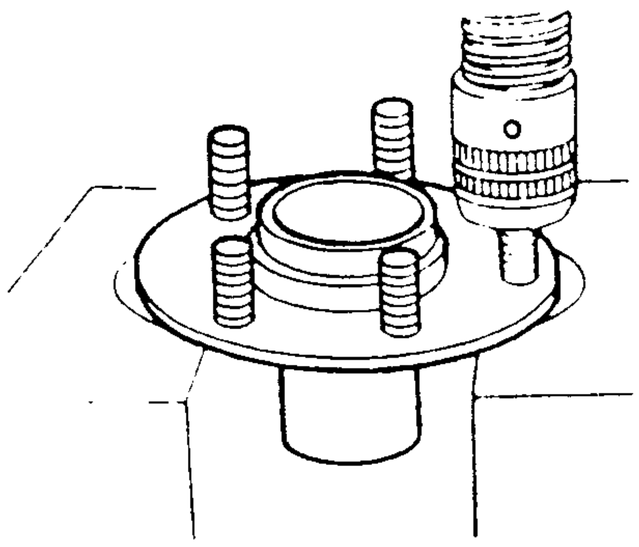


Hub Bolt Removal Note

Note

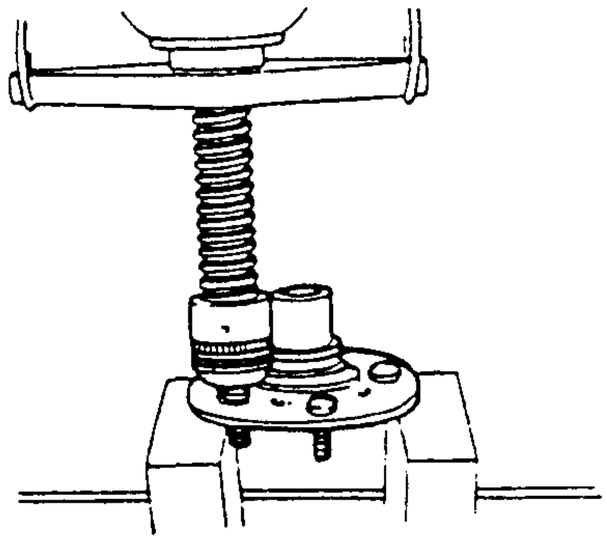
- The hub bolts do not need to be removed unless replacing them.

- Remove the hub bolts by using a press.



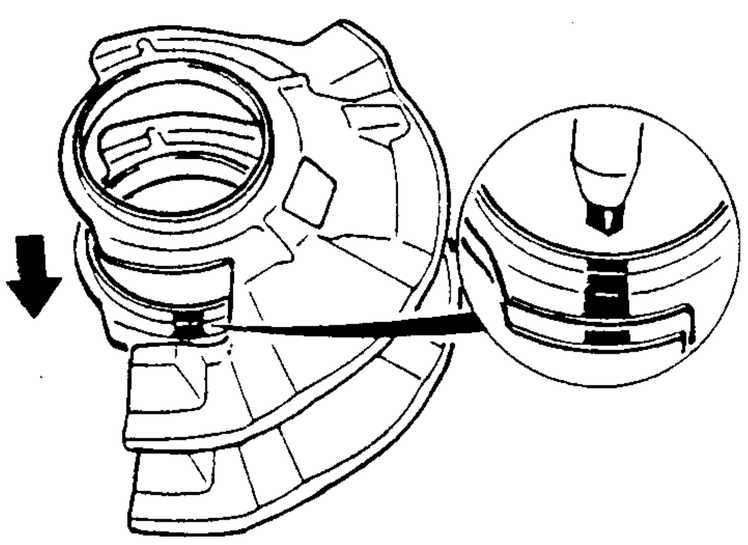
Hub Bolt Installation Note

- Install the new hub bolts by using a press.

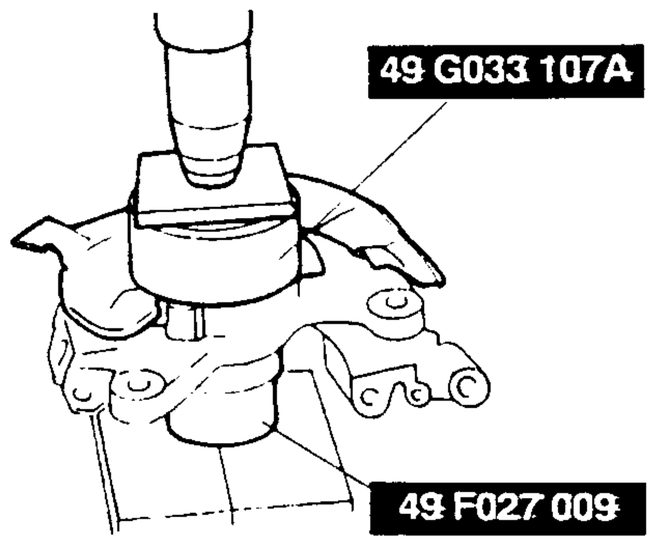


Dust Cover Installation Note

1. Mark the new dust cover as the removed one.

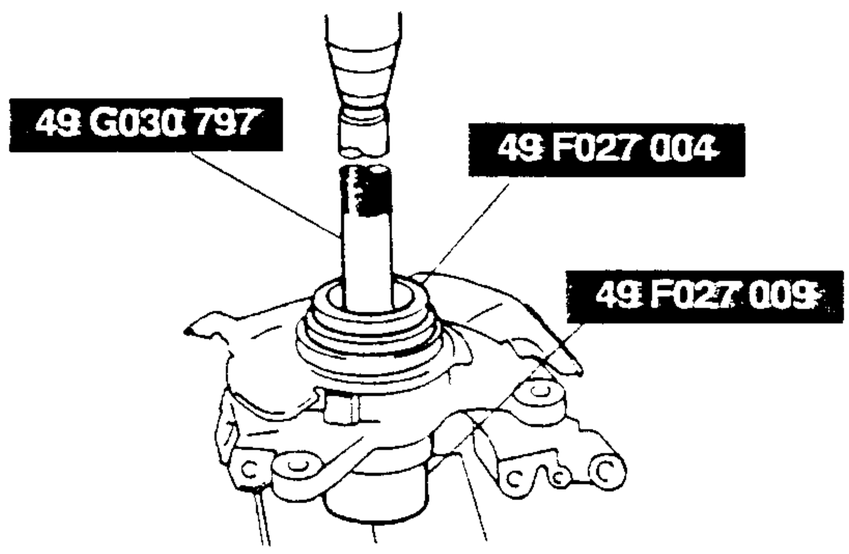


2. Align the marks of the new dust cover and the knuckle.
3. Install the new dust cover by using the **SSTs**.



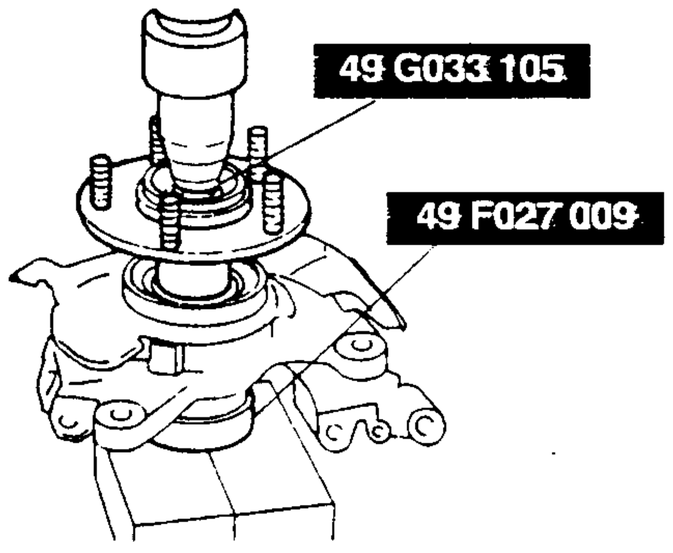
Wheel Bearing Installation Note

- Install the new wheel bearing by using the **SSTs**.



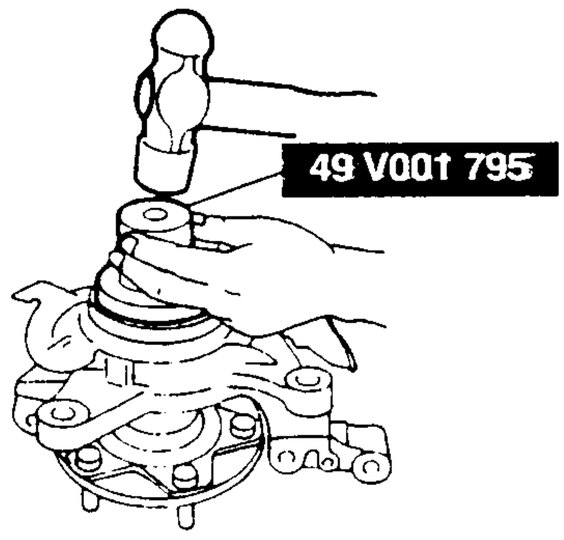
Wheel Hub Component Installation Note

- Install the wheel hub component by using the **SSTs**.



Oil Seal Installation Note

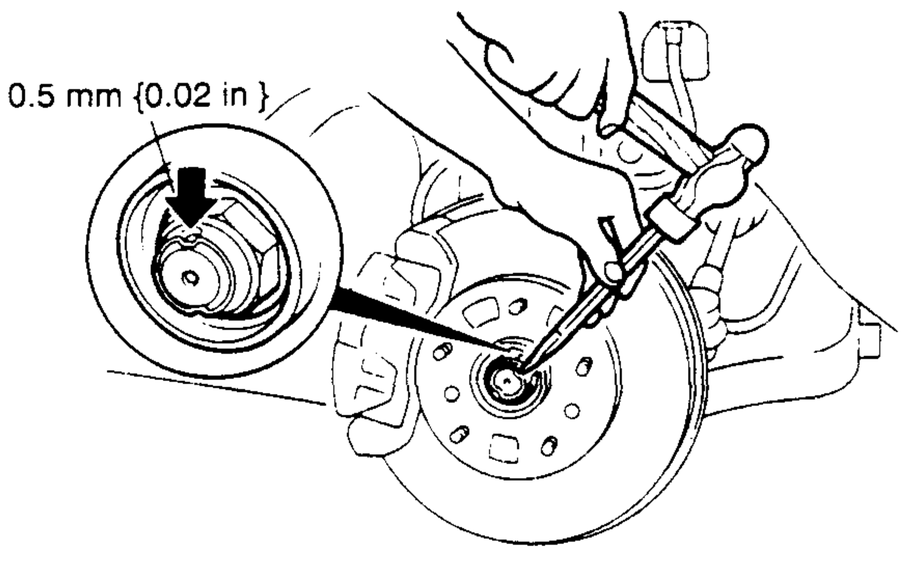
1. Apply grease to the new oil seal lip.
2. Install the new oil seal flush with the knuckle by using the **SST**.



Locknut Installation Note

- Install a new locknut and stake it as shown.

Tightening torque
236—318 N·m
{24.0—32.5 kgf·m , 174—235 ft·lbf }



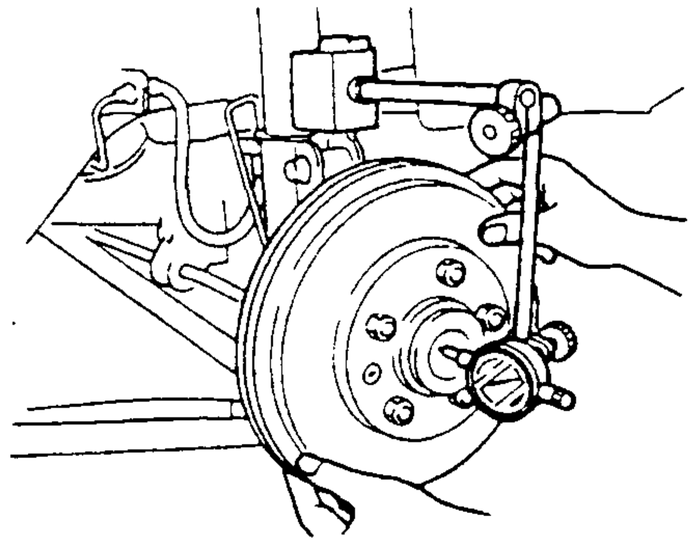
REAR AXLE (DRUM BRAKE TYPE)

WHEEL HUB, HUB SPINDLE INSPECTION

Wheel Bearing Play Inspection

1. Position a dial indicator against the brake drum. Push and pull the rear brake component by hand in the axial direction and measure the wheel bearing play.

Wheel bearing play
0.05 mm {0.002 in }



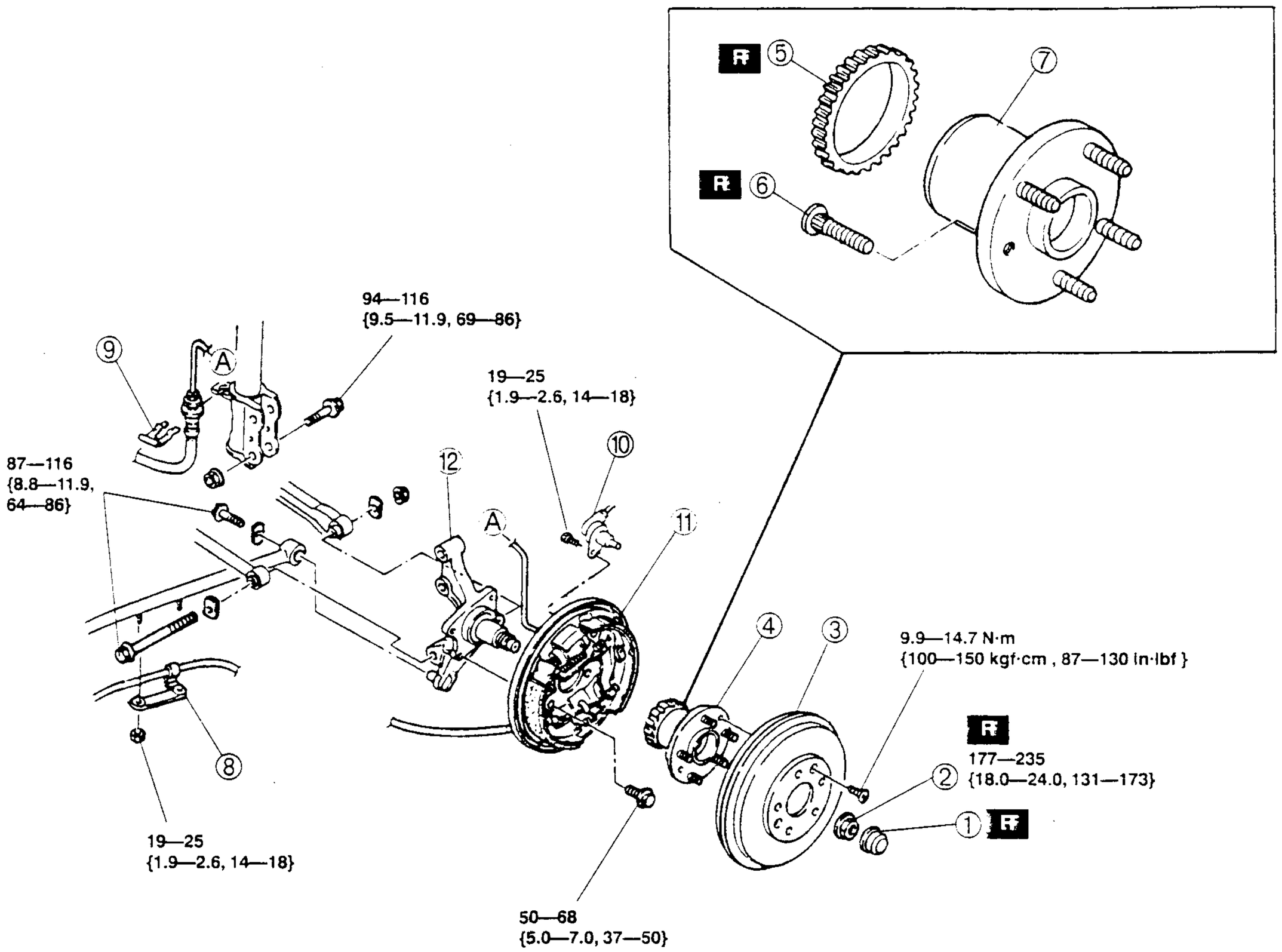
2. If the bearing play exceeds the specification, first, replace and tighten the locknut to the specified torque, then replace the wheel hub component if necessary.

M

REAR AXLE (DRUM BRAKE TYPE)

WHEEL HUB, HUB SPINDLE REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



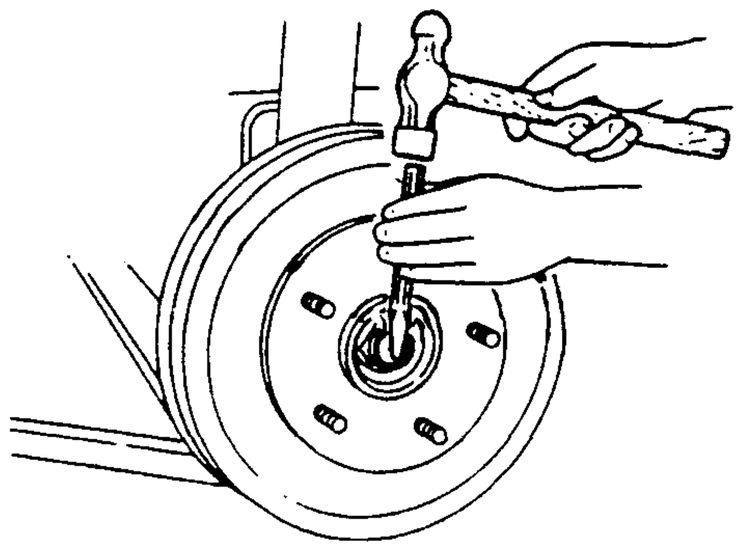
N·m { kgf·m , ft·lbf }

1	Hub cap
2	Locknut ☞ Removal Note ☞ Installation Note
3	Brake drum
4	Wheel hub and ABS sensor rotor (with ABS)
5	ABS sensor rotor (with ABS) ☞ Removal Note ☞ Installation Note

6	Hub bolt ☞ FRONT AXLE, WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION, Hub Bolt Removal/Installation Note
7	Wheel hub
8	Parking brake cable bracket
9	Clip
10	ABS wheel-speed sensor (with ABS)
11	Rear brake component
12	Hub spindle

Locknut Removal Note

1. Raise the staked portion of the locknut by using a small cape chisel and a hammer.
2. Lock the hub by applying the brakes.
3. Remove the locknut.

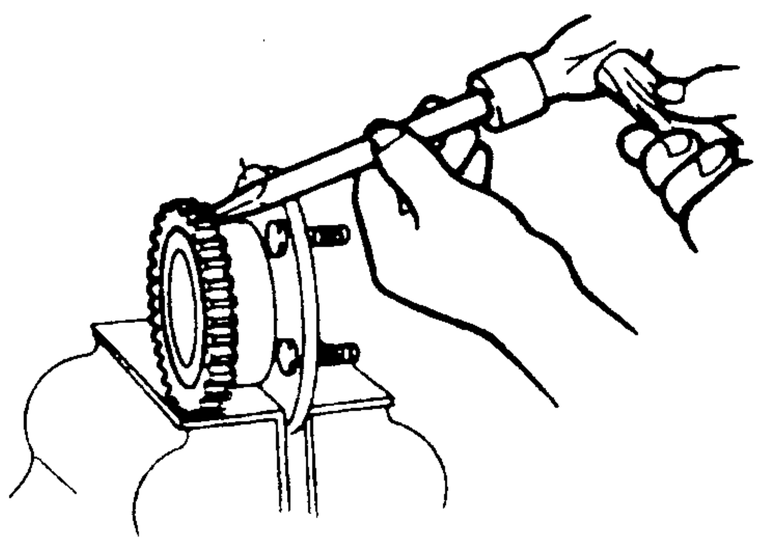


ABS Sensor Rotor (With ABS) Removal Note

Note

- The sensor rotor does not need to be removed unless replacing it.

- Remove the sensor rotor by using a chisel.

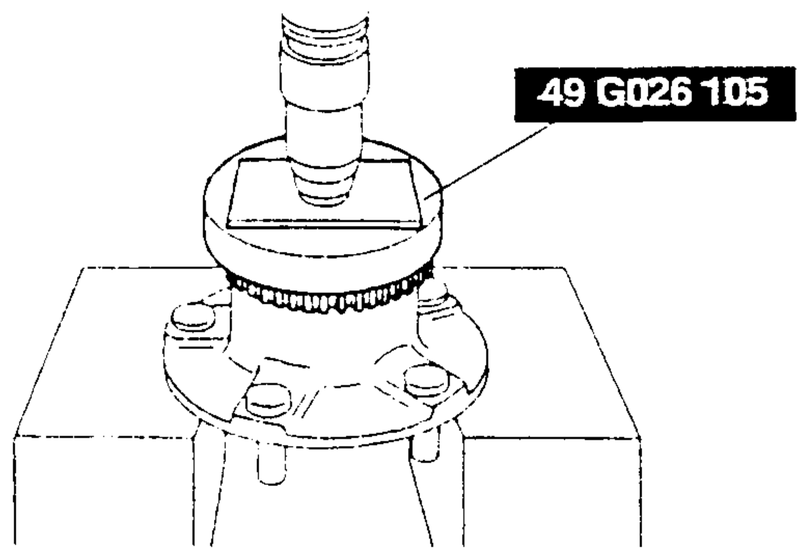


ABS Sensor Rotor (With ABS) Installation Note

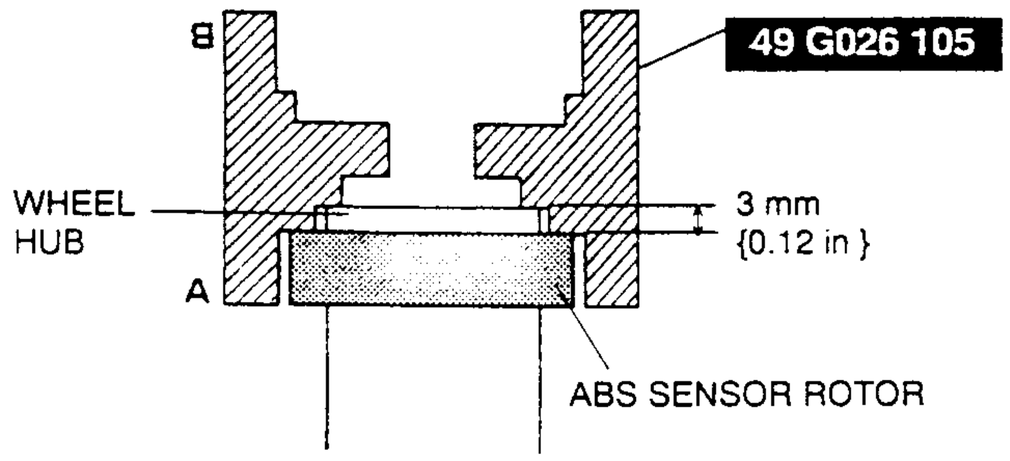
Caution

- **Position SST so that marking A faces the bottom.**

1. Set the **SST** as shown in the figure.



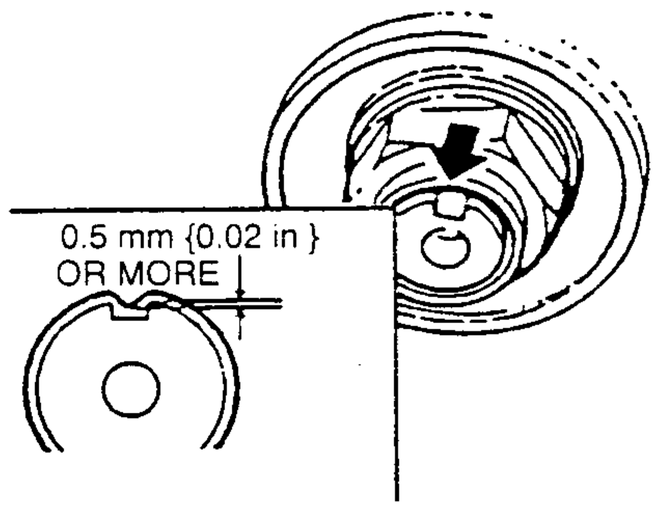
2. Press on the new sensor rotor by using the **SST** and a press.



Locknut Installation Note

- Install a new locknut and stake it as shown.

Tightening torque
177—235 N·m
{18.0—24.0 kgf·m , 130—173 ft·lbf }



REAR AXLE (DISC BRAKE TYPE)

WHEEL HUB, HUB SPINDLE INSPECTION

Wheel Bearing Play Inspection

(Refer to FRONT AXLE, WHEEL HUB, STEERING KNUCKLE INSPECTION, Wheel Bearing Play Inspection.)

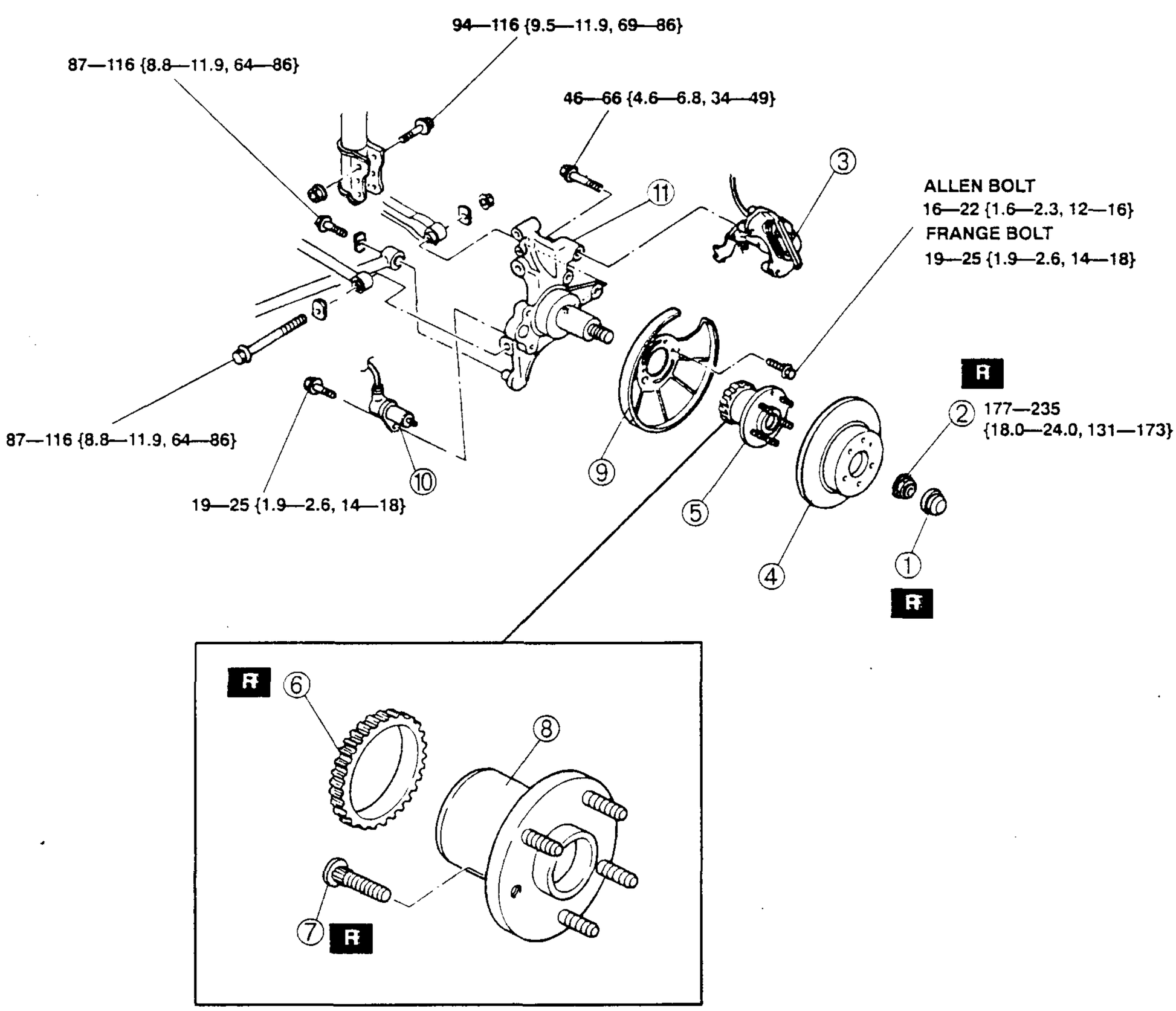
WHEEL HUB, HUB SPINDLE REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.

WHEEL HUB ON-VEHICLE SERVICE

Hub Bolt Replacement

(Refer to FRONT AXLE, WHEEL HUB ON-VEHICLE SERVICE, Hub Bolt Replacement.)



N·m { kgf·m , ft·lbf }

1	Hub cap
2	Locknut ☞ REAR AXLE (DRUM BRAKE TYPE), WHEEL HUB, HUB SPINDLE REMOVAL/INSTALLATION, Locknut Removal/Installation Note
3	Brake caliper component
4	Disc plate
5	Wheel hub and ABS sensor rotor (with ABS)

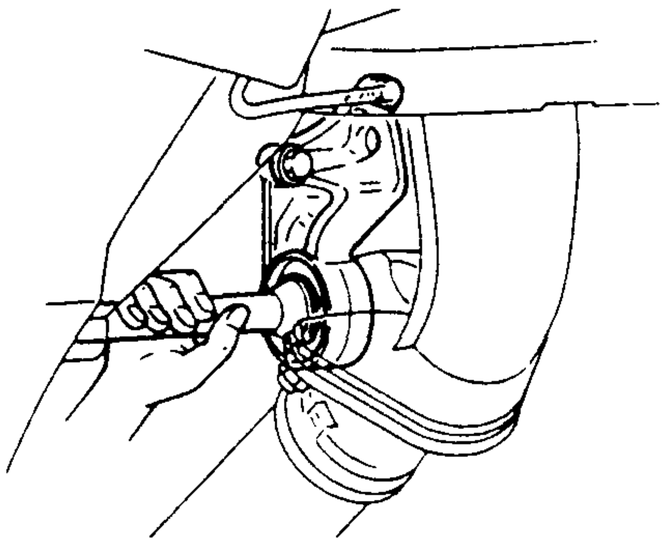
6	ABS sensor rotor (with ABS) ☞ REAR AXLE (DRUM BRAKE TYPE), WHEEL HUB, HUB SPINDLE REMOVAL/INSTALLATION, ABS Sensor Rotor (With ABS) Removal/Installation Note
7	Hub bolt ☞ FRONT AXLE, WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION, Hub Bolt Removal/Installation Note
8	Wheel hub component

9	Dust cover
10	ABS wheel-speed sensor (with ABS)
11	Hub spindle

DRIVE SHAFT

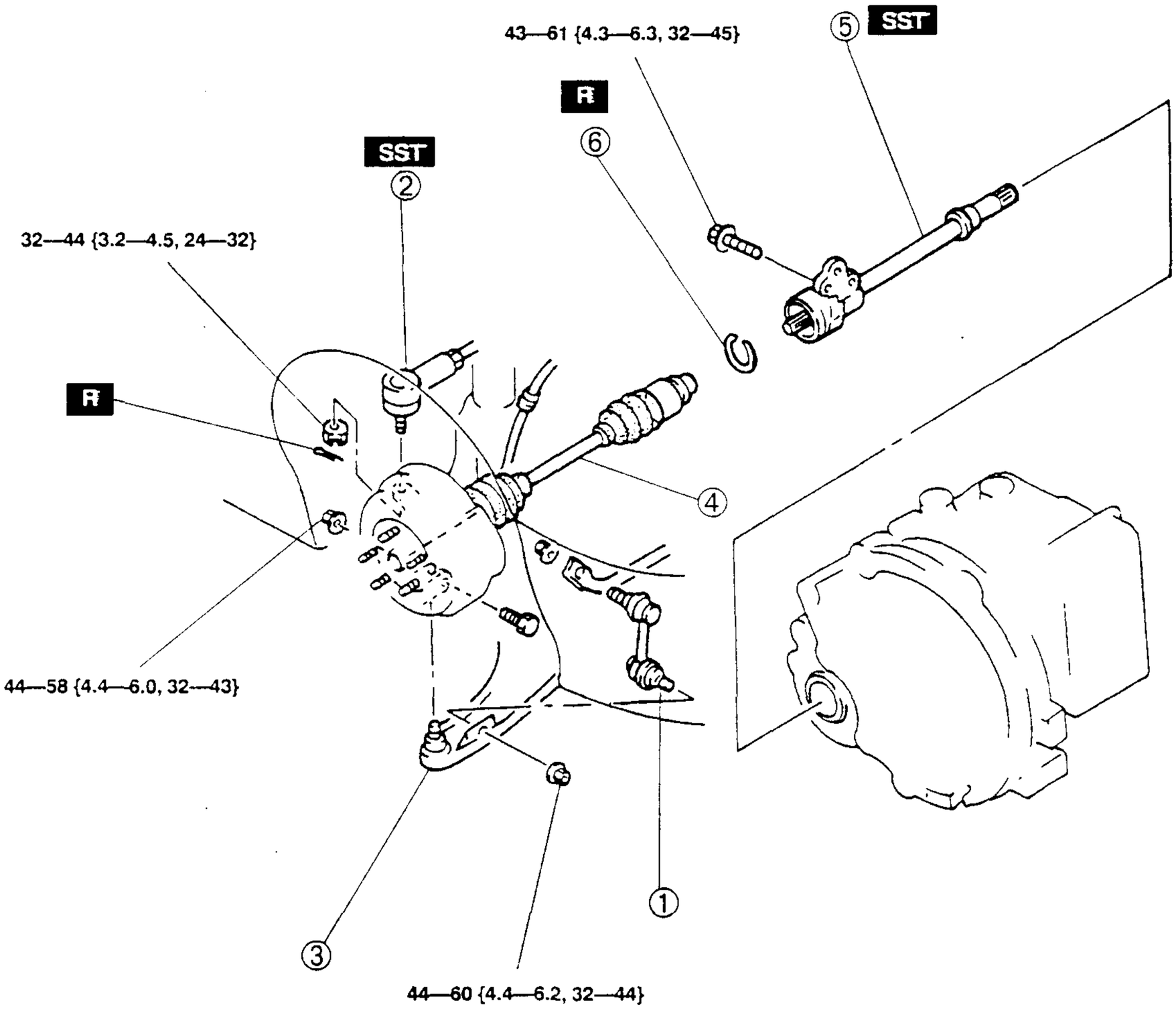
JOINT SHAFT INSPECTION

1. Verify that the joint shaft is not twisted or cracked. Replace it if necessary.
2. Turn the joint shaft by hand and verify that the bearing rotates smoothly and freely. Replace it if necessary.



JOINT SHAFT REMOVAL/INSTALLATION

1. Drain the transaxle oil. (Refer to section J, MANUAL TRANSAXLE, TRANSAXLE OIL REPLACEMENT.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.

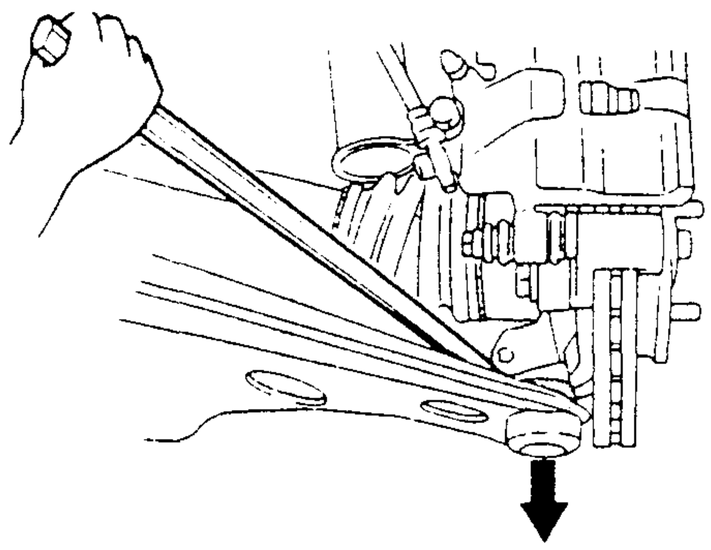


N·m { kgf·m , ft·lbf }

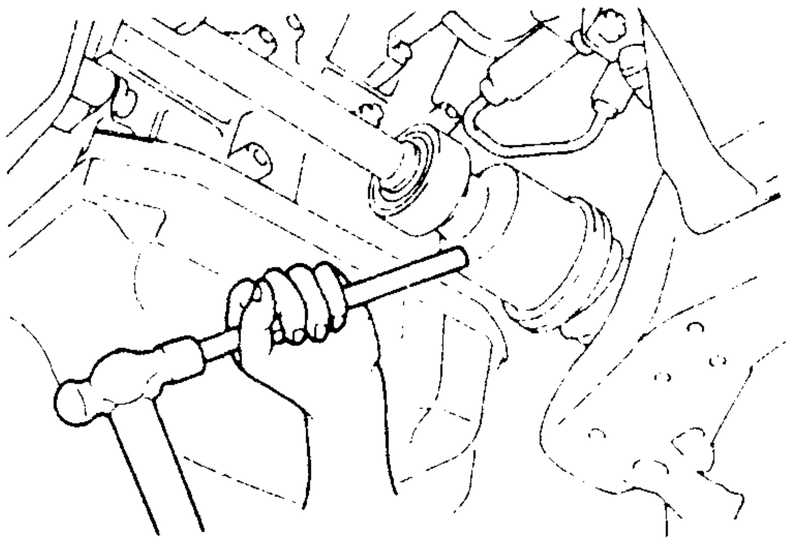
1	Stabilizer control link
2	Tie-rod end ☞ Section N, ENGINE SPEED SENSING POWER STEERING, STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION, Tie-rod End Removal Note
3	Lower arm ball joint
4	Right drive shaft and axle ☞ Removal Note ☞ Installation Note
5	Joint shaft ☞ Removal Note ☞ Installation Note
6	Clip ☞ Installation Note

Right Drive Shaft And Axle Removal Note

1. Remove the clinch bolt and nut.
2. Wrap a rag around the ball joint dust boot.
3. Pry the lower arm out of the knuckle.

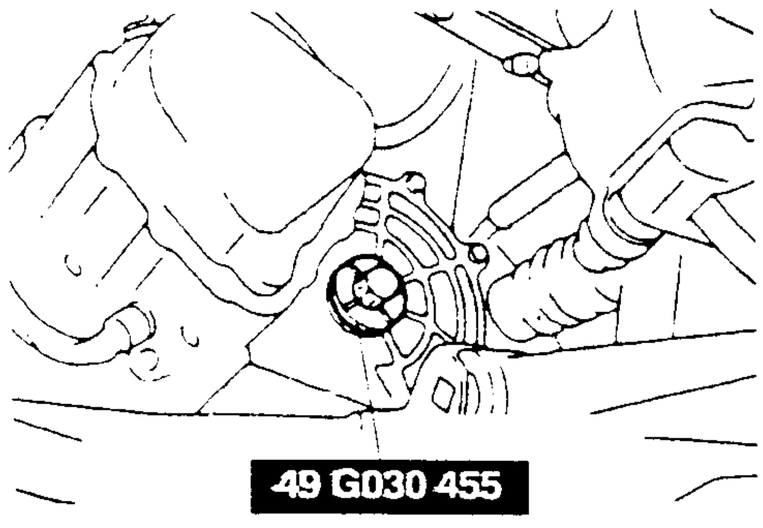


4. As shown in the figure, insert a pry bar between the right drive shaft and the joint shaft and tap on the bar to uncouple them.



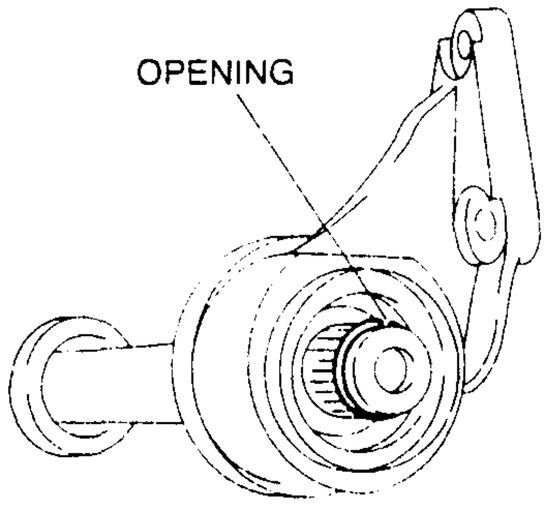
Joint Shaft Removal Note

- Install the **SST** into the transaxle to hold the side gears after joint shaft removed.



Clip Installation Note

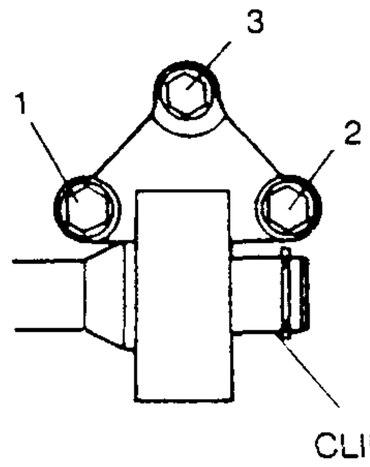
- Install the new clip by the opening facing upward.



Joint Shaft Installation Note

1. Install the joint shaft with the end-gap of a new clip facing upward.
2. Tighten the bolts in the order shown.

Tightening torque
43—61 N·m {4.3—6.3 kgf·m , 32—45 ft·lbf }

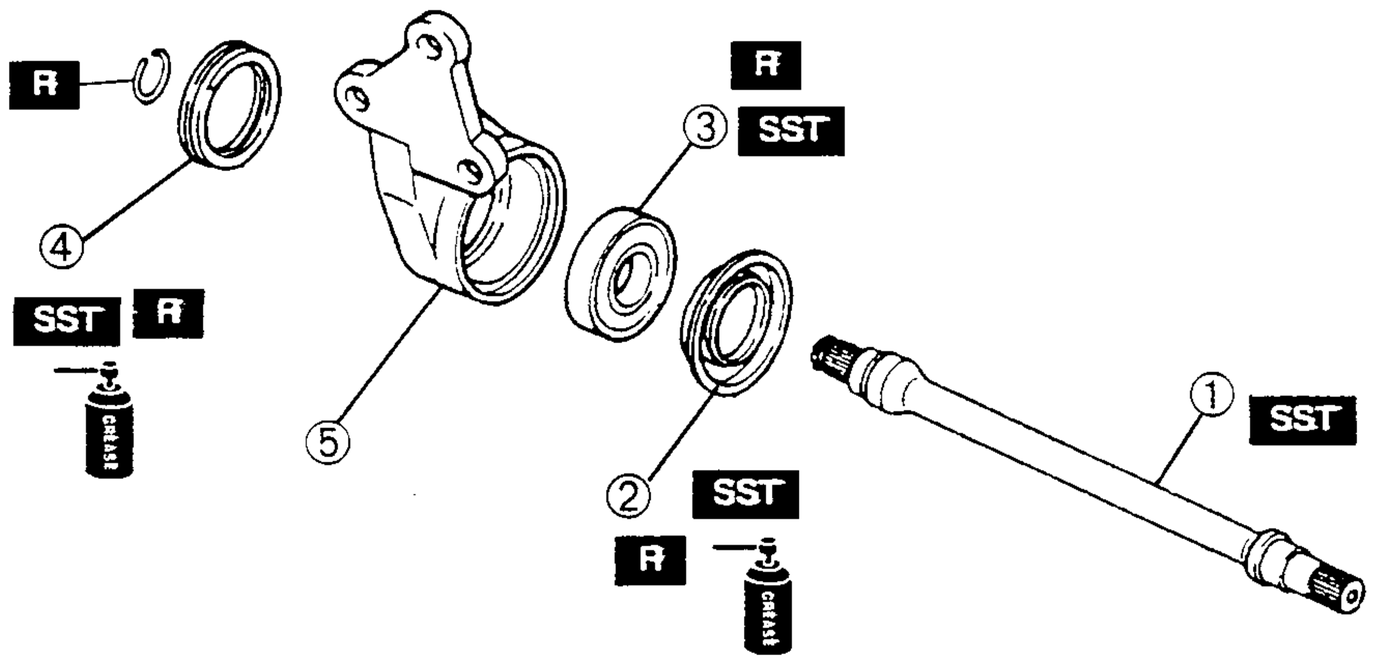


Right Drive Shaft And Axle Installation Note

1. Push the drive shaft into the joint shaft.
2. After installation, pull the front hub outward to verify that the drive shaft is securely held by the clip.

JOINT SHAFT DISASSEMBLY/ASSEMBLY

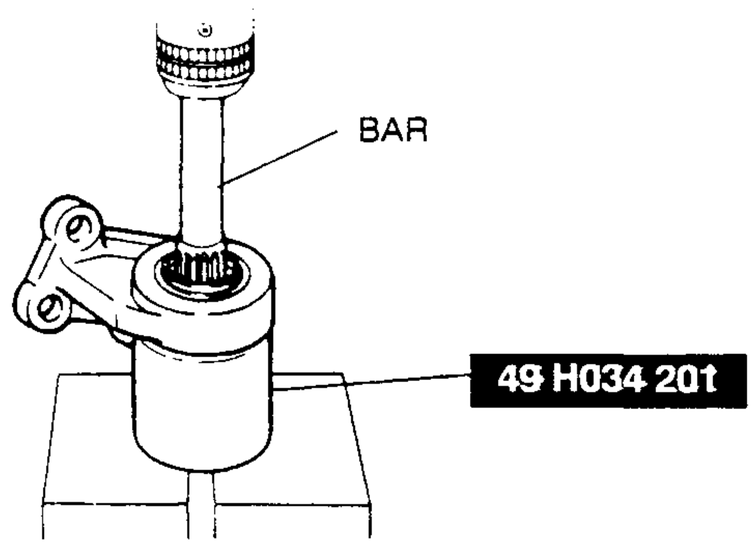
1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



1	Joint shaft ☞ Disassembly Note ☞ Assembly Note
2	Dust seal (left) ☞ Disassembly Note ☞ Assembly Note
3	Bearing ☞ Disassembly Note ☞ Assembly Note
4	Dust seal (right) ☞ Assembly Note
5	Bracket

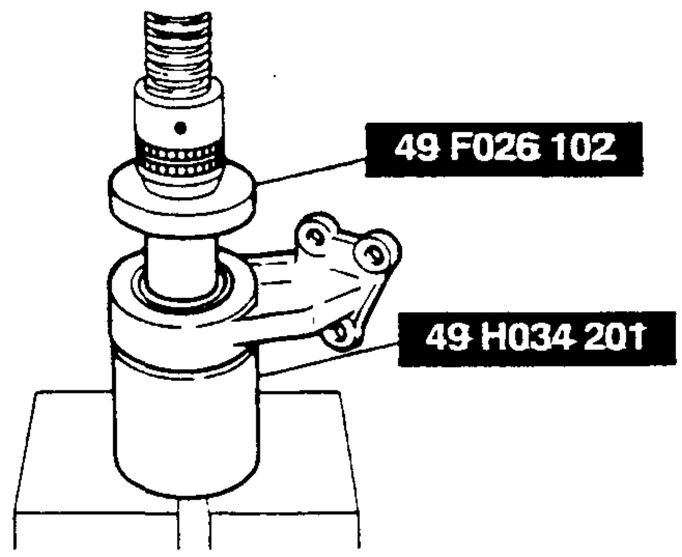
Joint Shaft Disassembly Note

- Disassemble the joint shaft by using the **SST**.



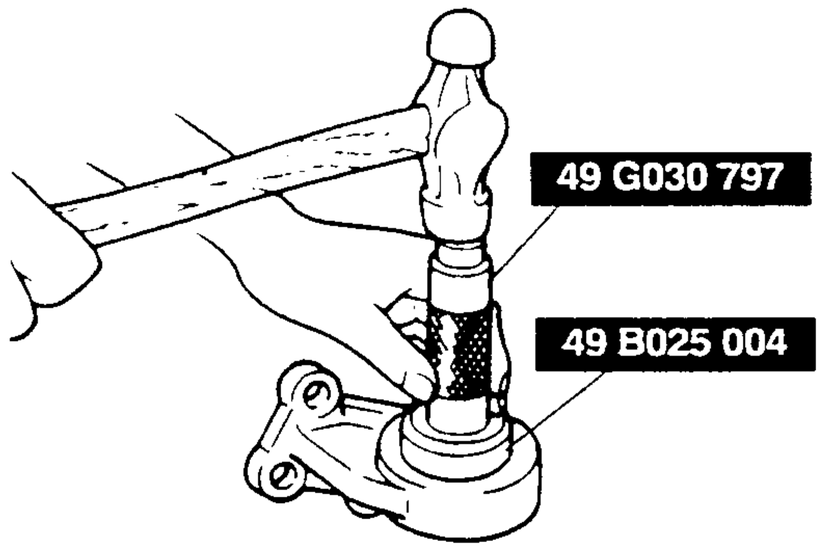
Dust Seal (Left), Bearing Disassembly Note

1. Remove the left side dust seal and bearing by using the **SSTs**.
2. Remove the right side dust seal.



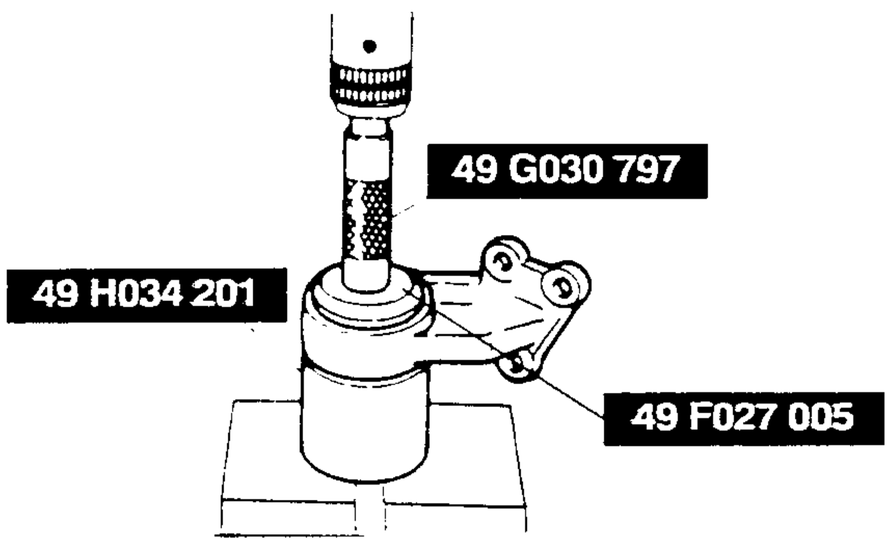
Dust Seal (Right) Assembly Note

- Install the new right side dust seal by using the **SSTs**.



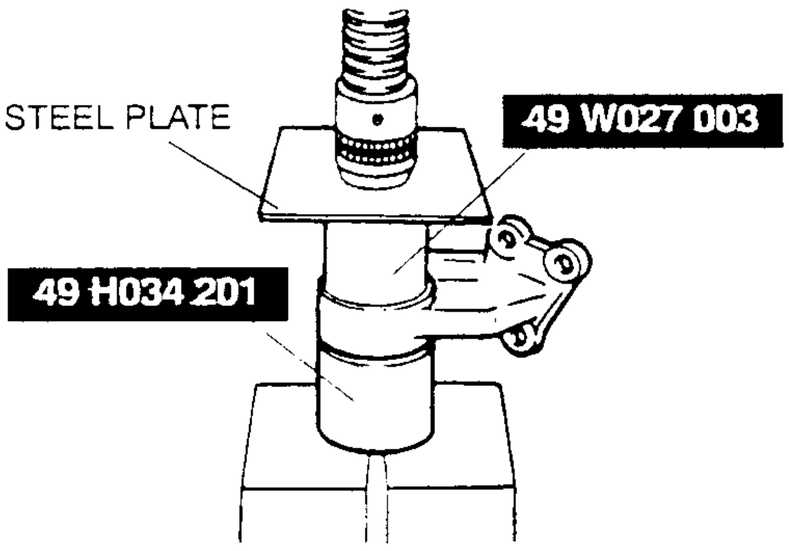
Bearing Assembly Note

- Install the new bearing by using the **SSTs**.



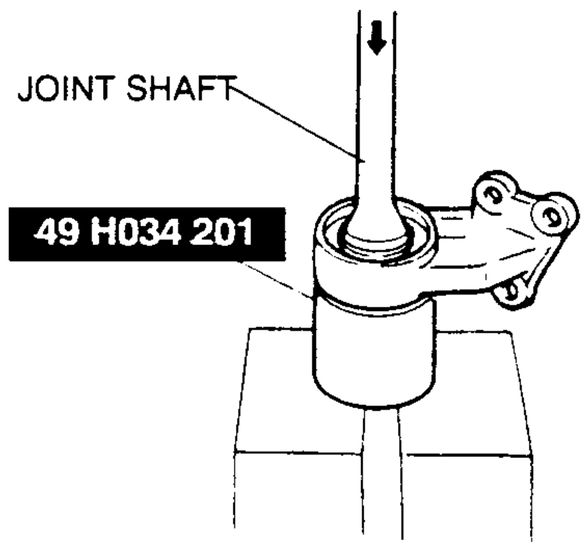
Dust Seal (Left) Assembly Note

- Assemble the new left side dust seal by using a steel plate and the **SSTs**.



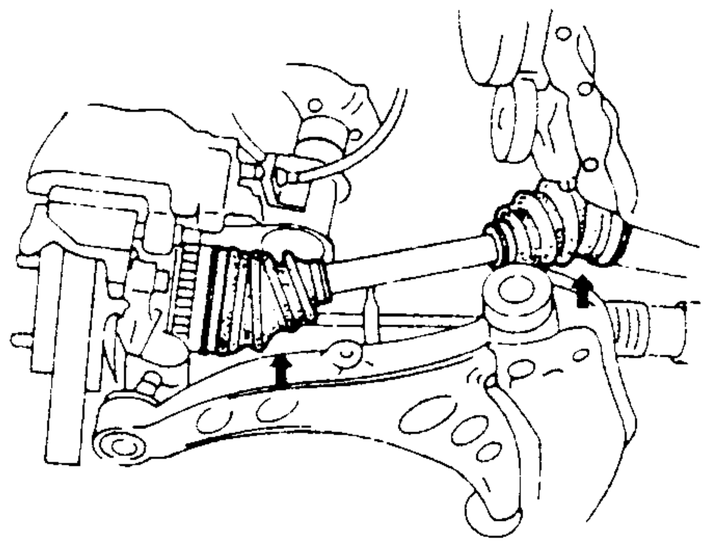
Joint Shaft Assembly Note

- Assemble the joint shaft by using a press and the **SST**.



DRIVE SHAFT INSPECTION

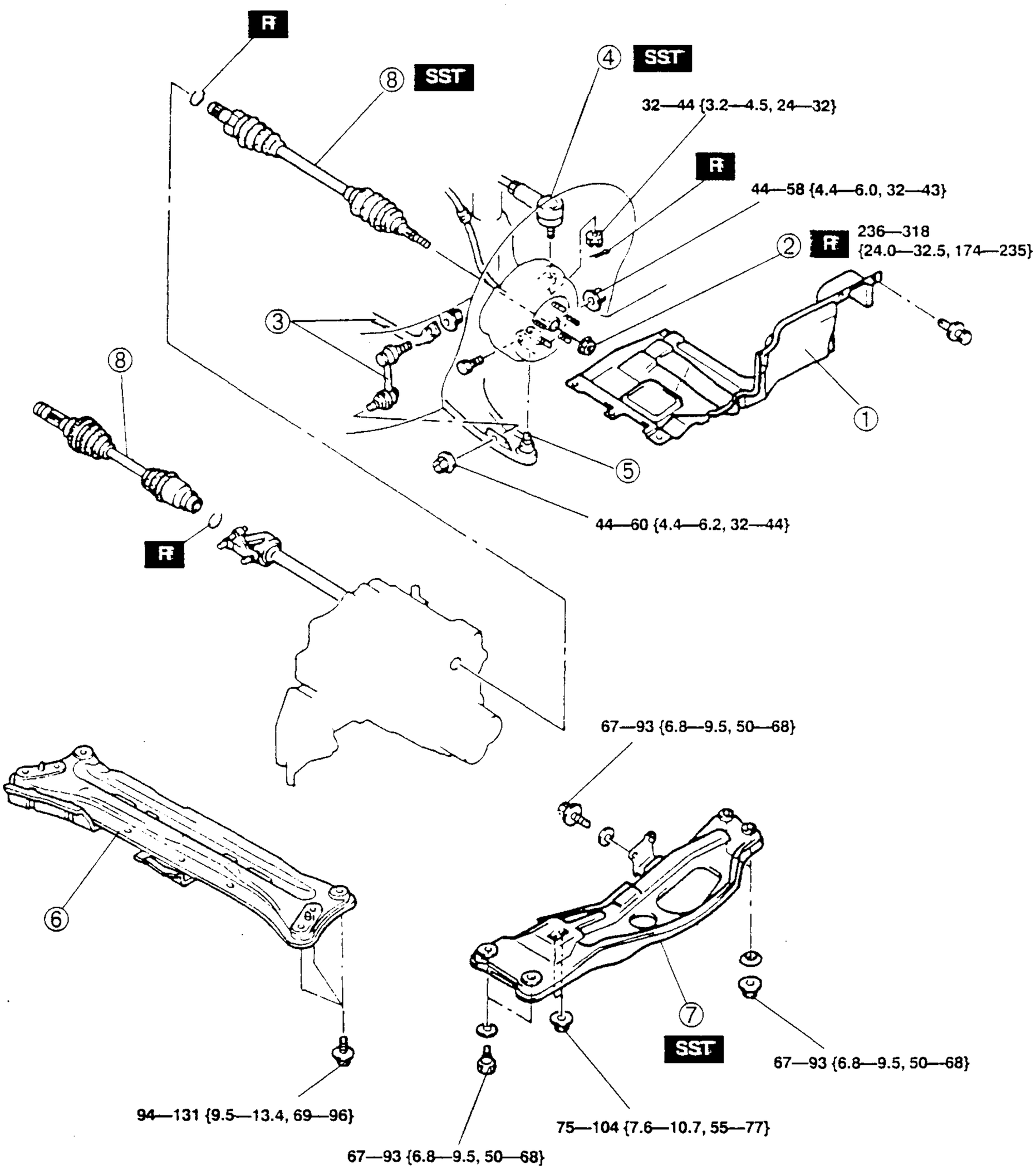
1. Check the dust boot on the drive shaft for cracks, damage, leaking grease, and a loose boot band.
2. Check the drive shaft for bend, crack, and wear of joints or splines.
3. Repair or replace the drive shaft if necessary.



DRIVE SHAFT

DRIVE SHAFT REMOVAL/INSTALLATION NOTE

1. Drain the transaxle oil. (Refer to section J, MANUAL TRANSAXLE, TRANSAXLE OIL REPLACEMENT.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.

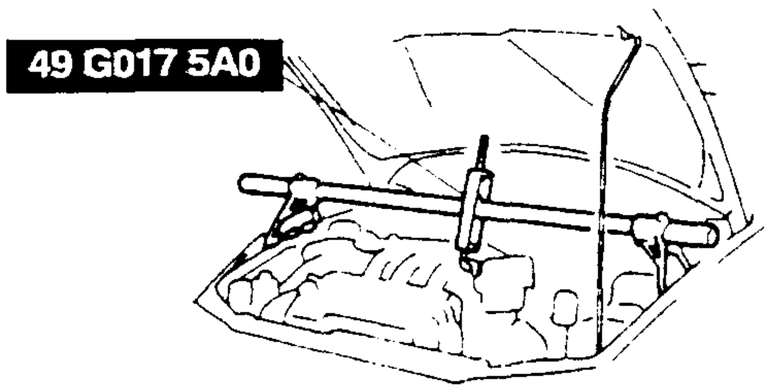


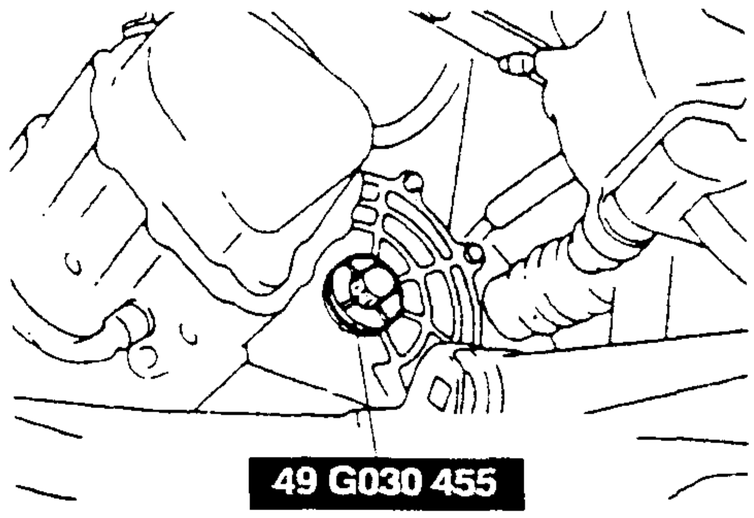
N·m { kgf·m , ft·lbf }

1	Splash shield
2	Locknut ☞ FRONT AXLE, WHEEL HUB, STEERING KNUCKLE REMOVAL/INSTALLATION, Locknut Removal/Installation Note
3	Stabilizer and control link
4	Tie-rod end ☞ Section N, ENGINE SPEED SENSING POWER STEERING, STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION, Tie-rod End Removal Note
5	Lower arm ball joint
6	Transverse member
7	Engine mounting member ☞ Removal Note
8	Drive shaft ☞ Removal Note ☞ Installation Note

Engine Mounting Member Removal Note

- Suspend the engine by using the **SST** and remove the engine mounting member.



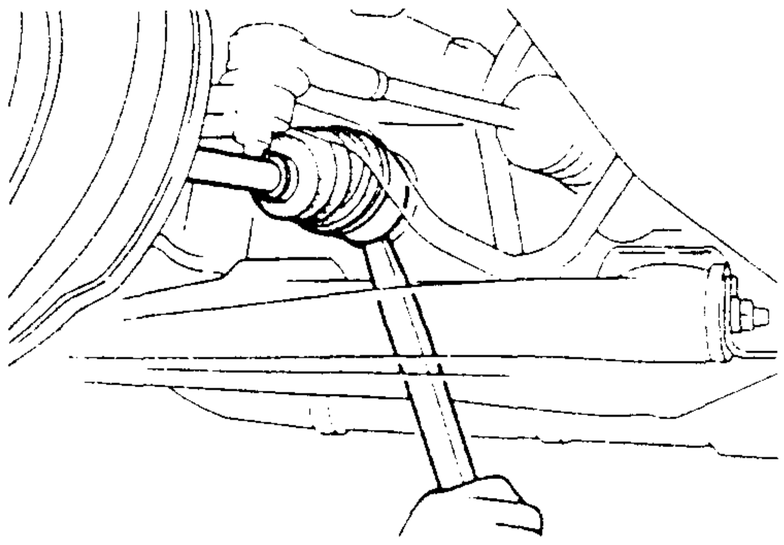


Drive Shaft Removal Note

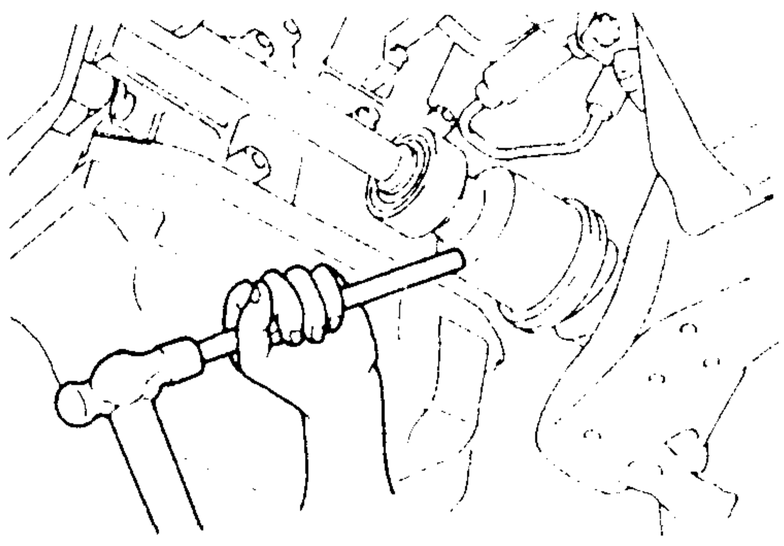
Caution

- **The sharp edges of the drive shaft can slice or puncture the oil seal. Be careful when removing the drive shaft from the transaxle.**

1. Separate the left side drive shaft from the transaxle by prying with a bar inserted between the outer ring and the transaxle, as shown in the figure.



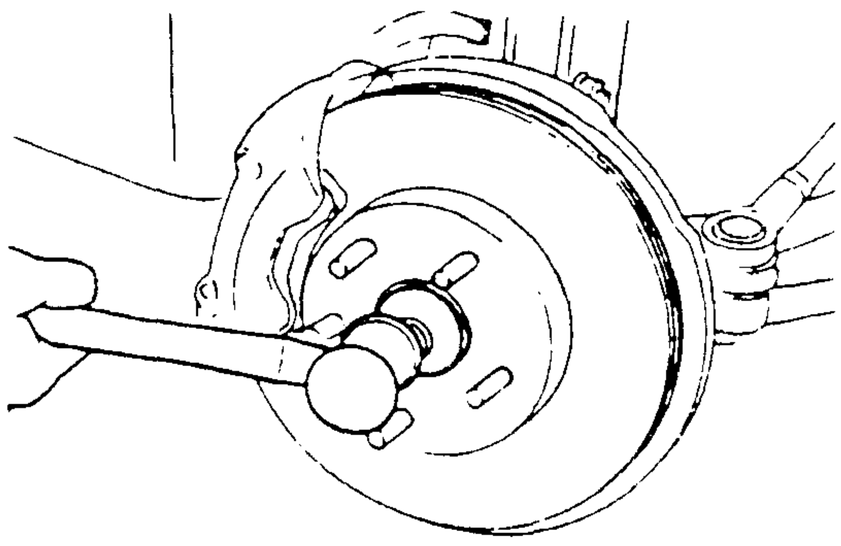
2. Separate the right side drive shaft from the joint shaft by hammering on a bar inserted between them.



3. Install the **SST** into the transaxle to hold the side gears after drive shaft removed.

Note

- If the drive shaft will not come out of the front wheel hub easily, install an already discarded nut onto the drive shaft so that the nut is flush with the end of the drive shaft. Tap the nut with a copper hammer to loosen the drive shaft from the front wheel hub.

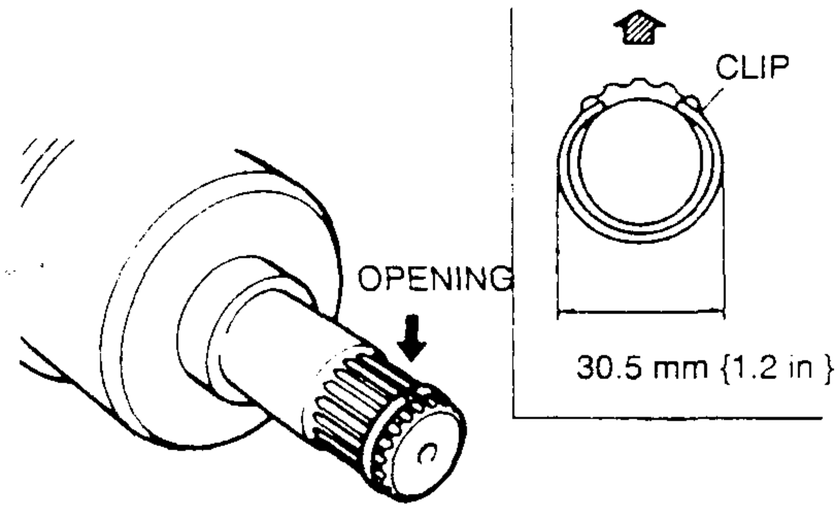


Drive Shaft Installation Note

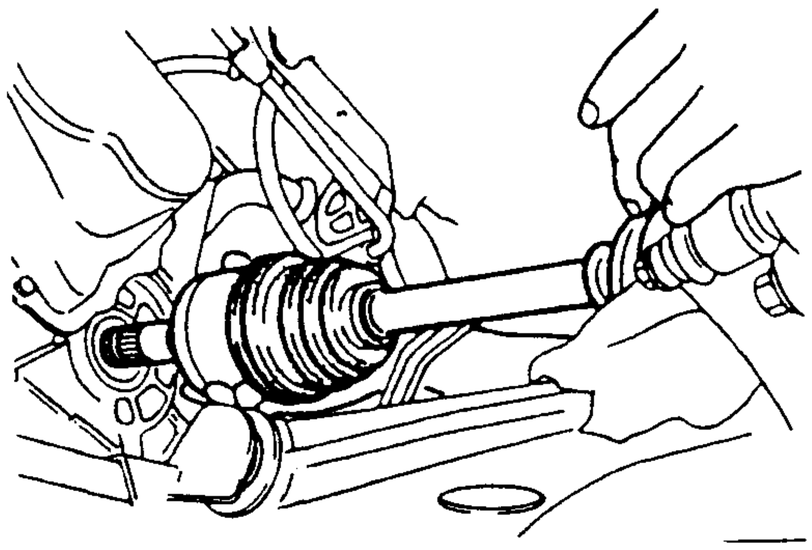
Caution

- **The sharp edges of the drive shaft can slice or puncture the oil seal. Be careful when installing the drive shaft to the transaxle.**
- **The oil seals are damaged easily if this procedure is not done correctly.**

1. Turn the clip with the opening facing upward.



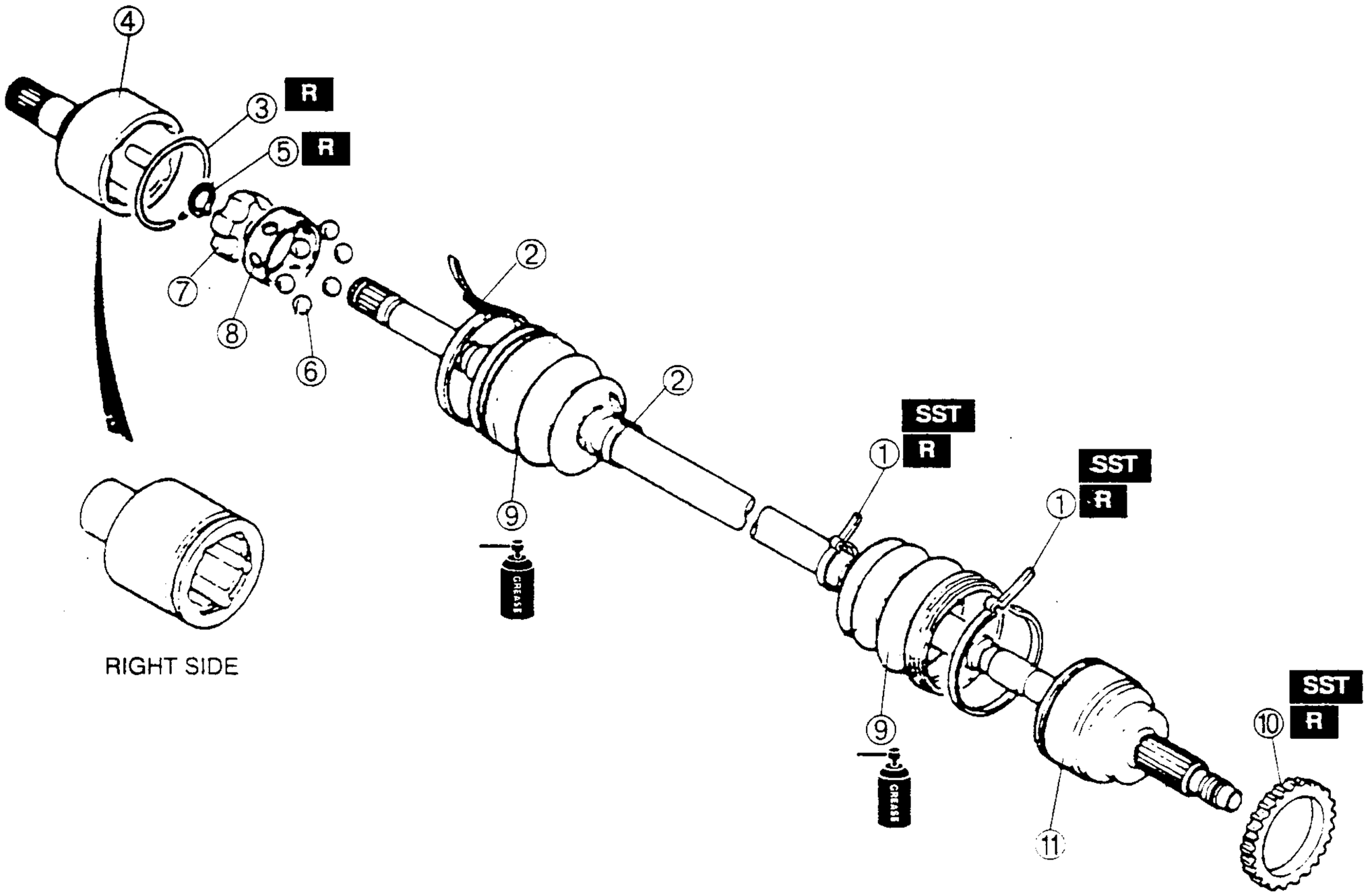
2. Apply grease to the ends of the drive shafts.
3. Push the drive shaft into the transaxle (left side) or joint shaft (right side).



4. After installation, pull the front hub outward to confirm that the drive shaft is securely held by the clip.

DRIVE SHAFT (MTX, DOUBLE OFFSET TYPE) DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



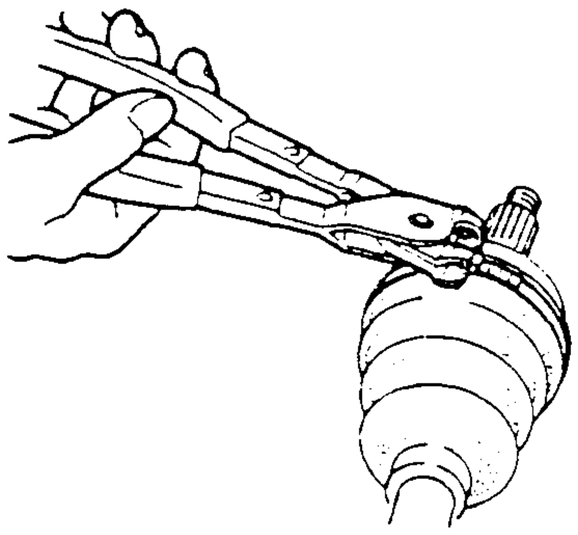
1	Boot band (wheel side) ☞ Disassembly Note ☞ Assembly Note
2	Boot band (transaxle side) ☞ Disassembly Note ☞ Assembly Note
3	Clip ☞ Disassembly Note ☞ Assembly Note
4	Outer ring ☞ Assembly Note
5	Snap ring ☞ Disassembly Note ☞ Assembly Note
6	Balls ☞ Disassembly Note ☞ Assembly Note

7	Inner ring ☞ Disassembly Note ☞ Assembly Note
8	Cage ☞ Disassembly Note ☞ Assembly Note
9	Boot ☞ Disassembly Note ☞ Assembly Note
10	ABS sensor rotor (with ABS) ☞ Disassembly Note ☞ Assembly Note
11	Shaft and ball joint component

Bood Band (Wheel Side) Disassembly Note

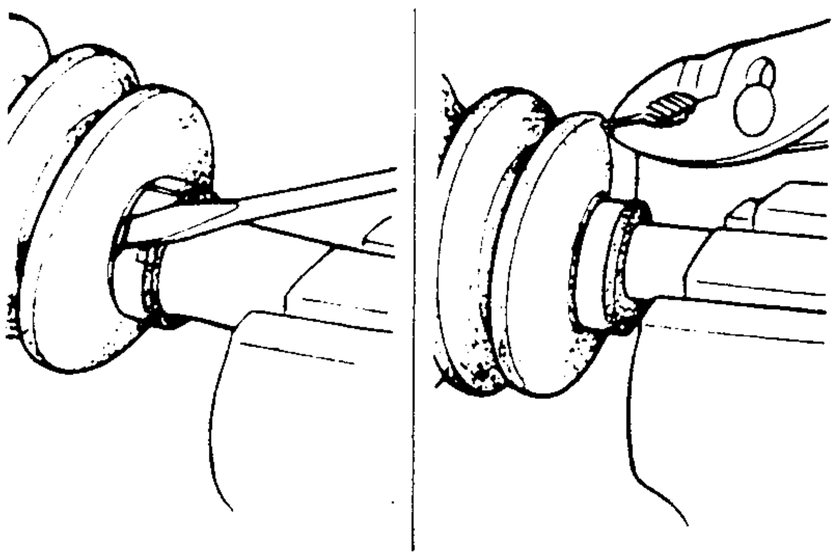
Note
- The boot band does not need to be removed unless replacing it.

- Remove the boot clamp with end clamp pliers as shown and discard the clamp.



Boot Band (Transaxle Side) Disassembly Note

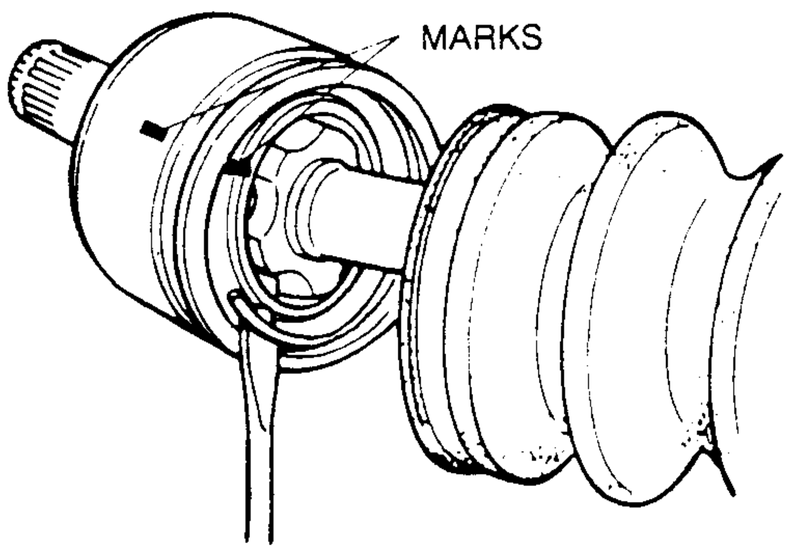
1. Pry up the locking clips by using a screwdriver.
2. Pull back the end of the band.



Clip Disassembly Note

Caution
- **Mark with paint; do not use a punch.**

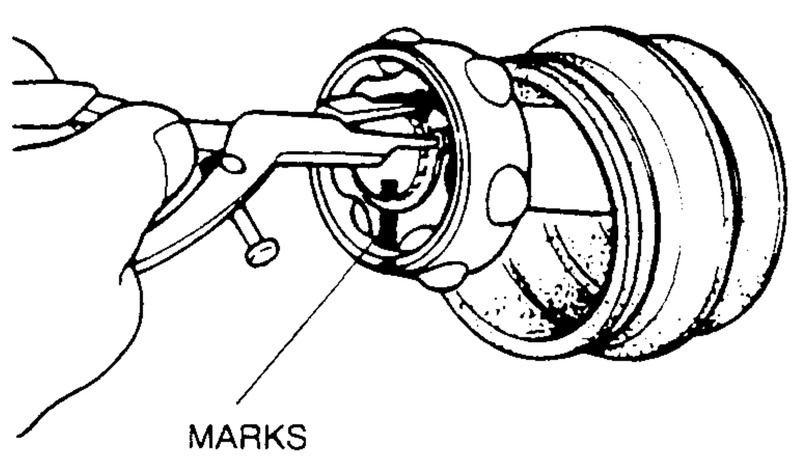
1. Mark the drive shaft and outer ring for proper assembly.
2. Remove the clip.



Snap Ring Disassembly Note

Caution
- **Mark with paint; do not use a punch.**

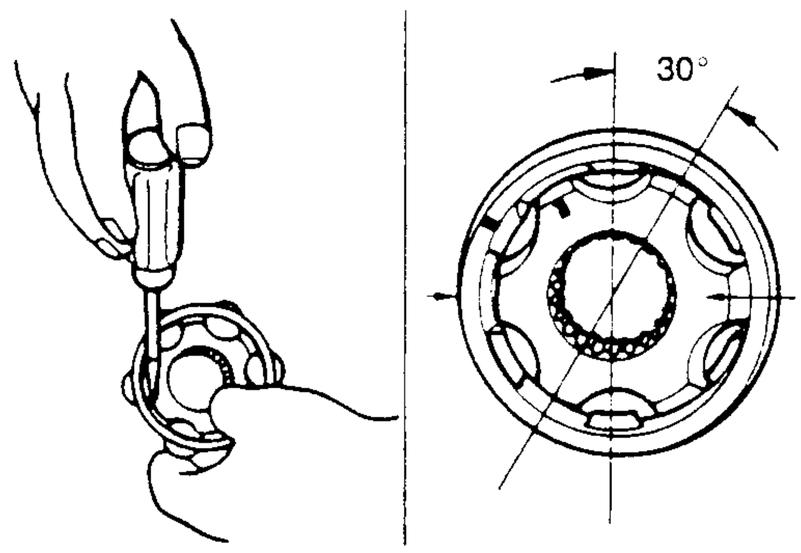
1. Mark the drive shaft and inner ring for proper assembly.
2. Remove the snap ring by using snap-ring pliers.



Balls, Inner Ring, Cage Disassembly Note

Caution
- **Mark with paint; do not use a punch.**

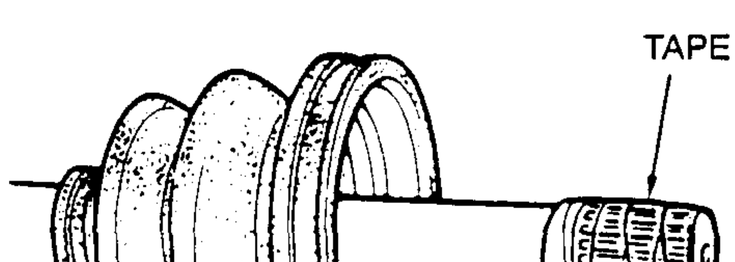
1. Mark the inner ring and cage.
2. Turn the cage **approximately 30 degrees** and pull the cage and balls away from the inner ring.



Boot Disassembly Note

Note
- The wheel side boot does not need to be removed unless replacing it or the bell joint and shaft component.
- Do not strip the tape until the boot is assembled.

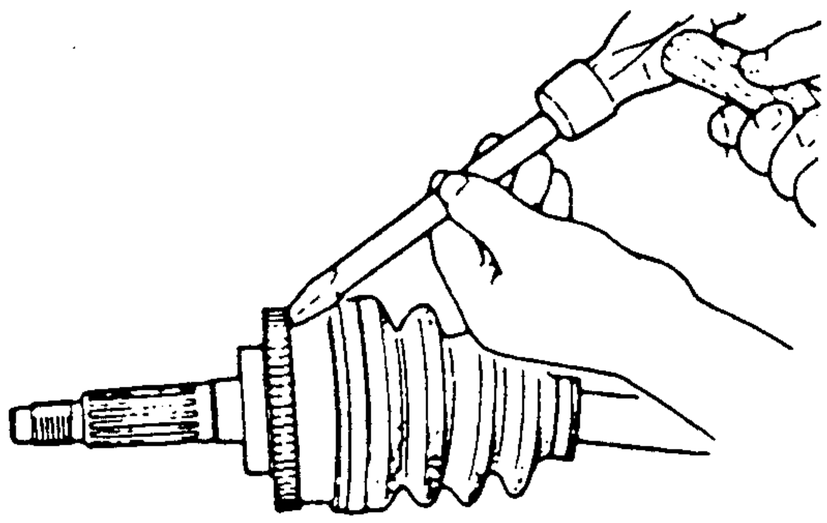
1. Wrap the shaft splines with tape.
2. Remove the boot.



ABS Sensor Rotor Disassembly Note

Note
- The sensor rotor does not need to be removed unless replacing it.

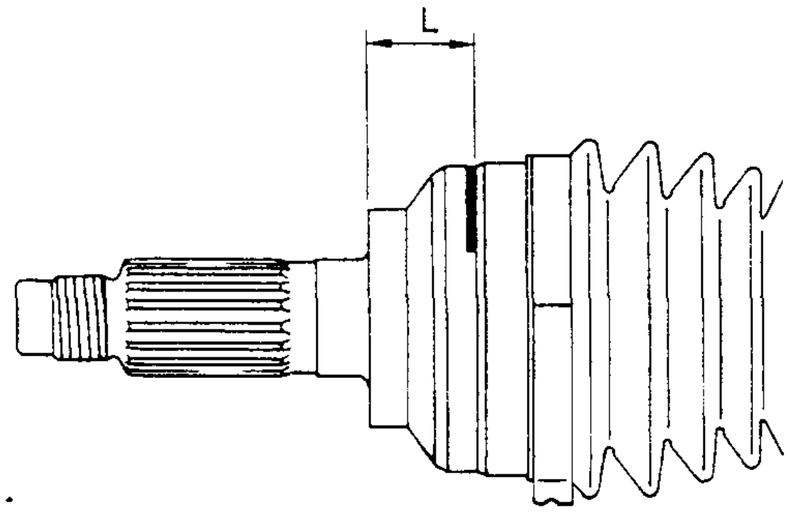
- Tap the ABS sensor rotor off the bell joint outer race by using a chisel.



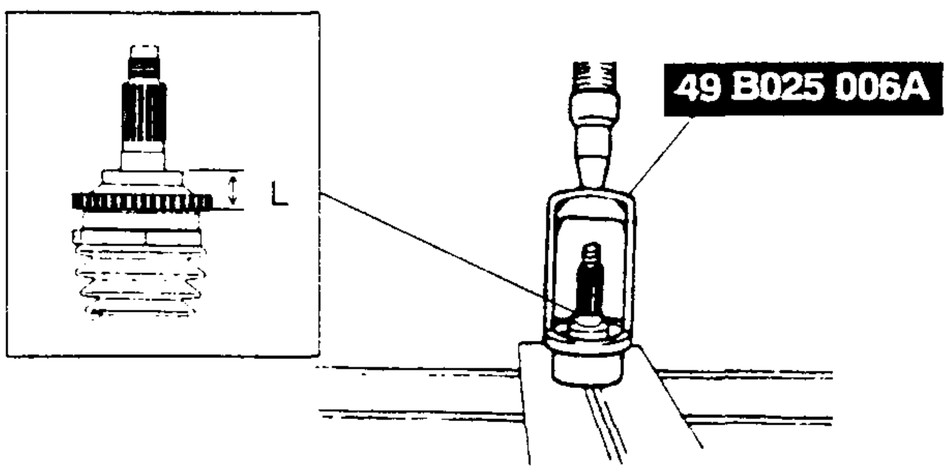
ABS Sensor Rotor Assembly Note

1. Mark the shaft as shown in the figure.

Length L
28 mm {1.1 in }



2. Press in the ABS sensor rotor to the marked position by using the **SST** and a press.



Boot Assembly Note

Note
- The wheel side and transaxle side boots are different.
- Use the specified grease that it is supplied in the boot kit.

1. Fill the boot (wheel side) with the specified grease.

Grease amount
FP engine: 75—95 g {2.7—3.3 oz }
FS engine: 90—100 g {3.2—3.5 oz }

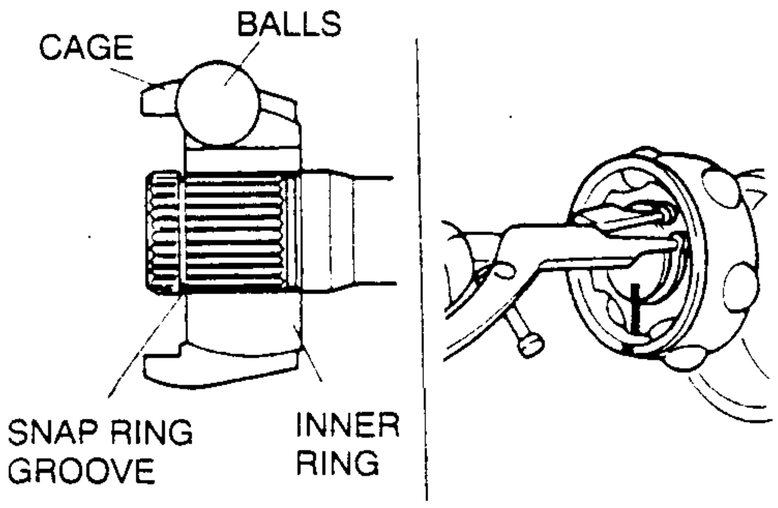
2. With the splines of the shaft still wrapped in tape from disassembly, install the boot.

Cage, Inner Ring, Balls, Snap Ring Assembly Note

1. Align the marks, and install the balls and cage to the inner ring in the direction shown in the figure.

Caution
- **Install the cage with the offset facing the snap ring groove. If incorrectly installed, the drive shaft may become disengaged.**

2. Install a new snap ring.



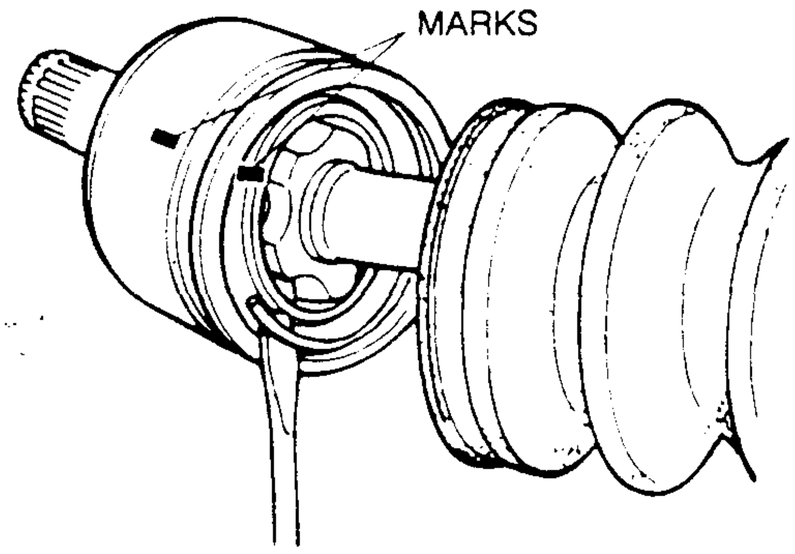
Outer Ring, Clip Assembly Note

Note
- Use the specified grease supplied in the boot kit and joint kit.

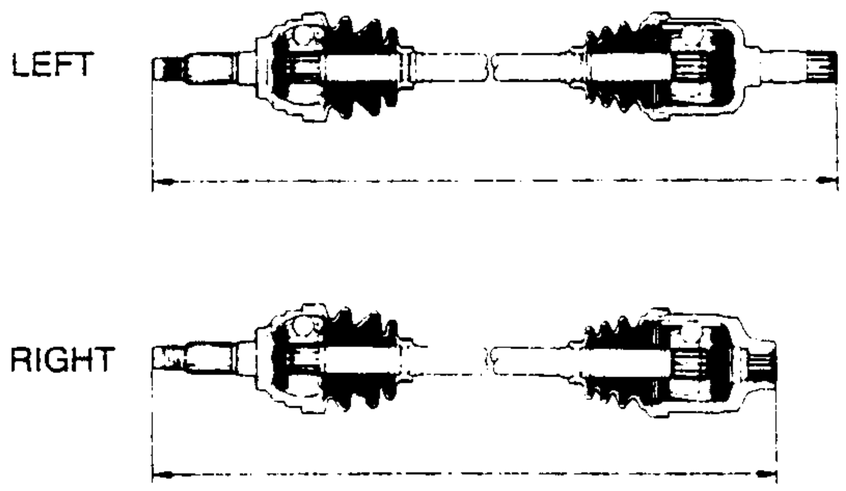
1. Fill the boot (transaxle side) and outer ring with the specified grease.

Grease amount
75—90 g {2.7—3.1 oz }

2. Align the marks, and install the outer ring onto the shaft.
3. Install a new clip.
4. Install the boot.

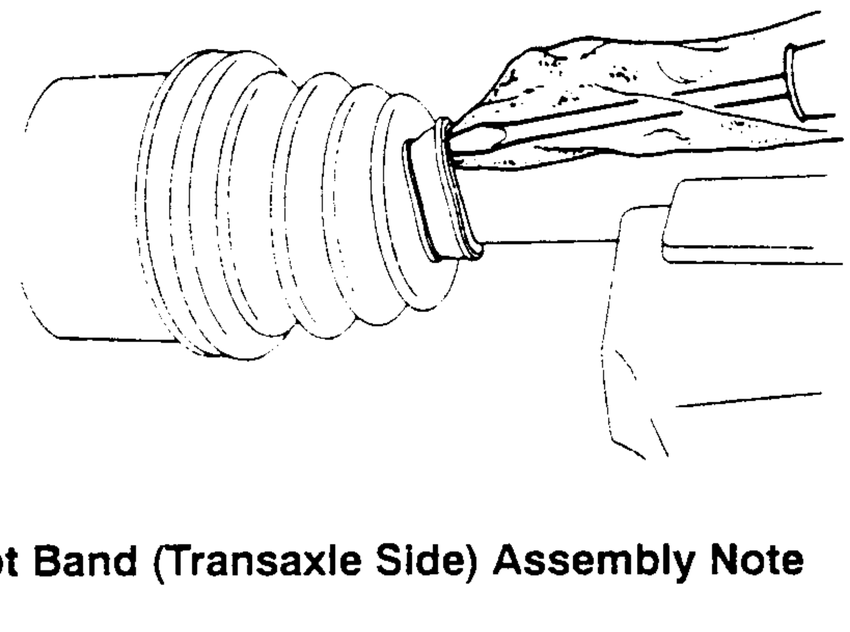


5. Set the drive shaft by keeping the standard length.



Standard length
Right side :591.5—601.5 mm {23.3—23.6 in }
Left side :641.0—651.0 mm {25.3—25.6 in }

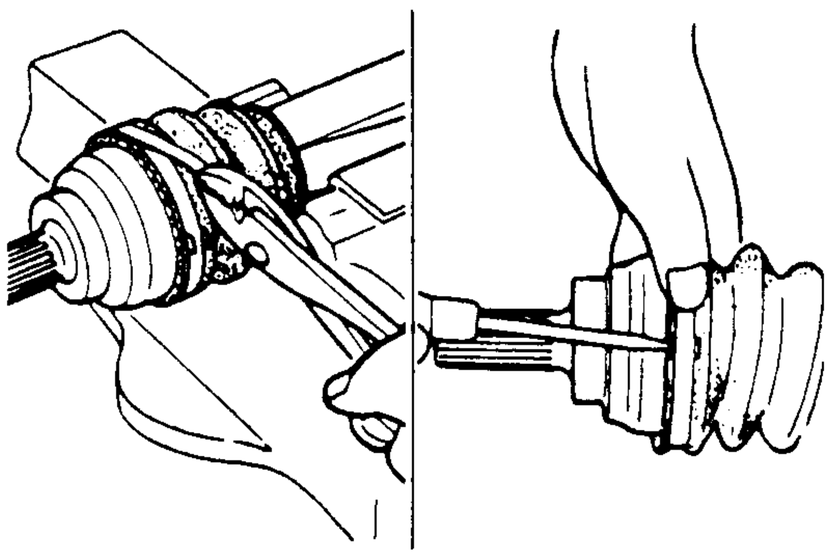
6. Release trapped air from inside the boot (transaxle side) by using a screwdriver covered with a rag.
7. Verify the drive shaft length is within the standard.



Boot Band (Transaxle Side) Assembly Note

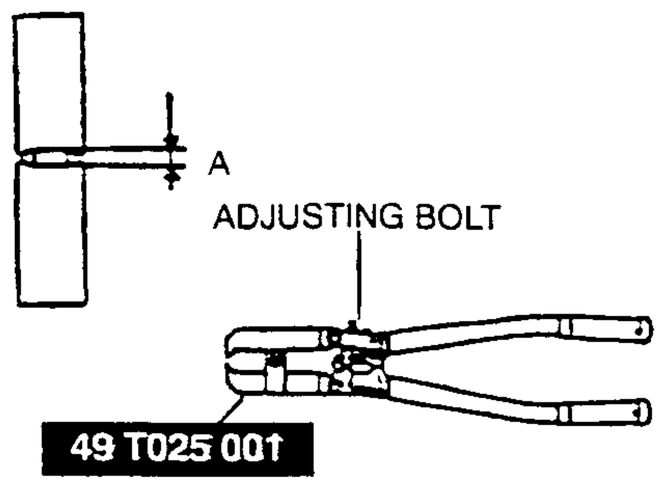
Note
- Always use new bands.
- The band should be folded in the direction opposite to the forward revolving direction of the drive shaft.

1. Fold the band back and use pliers to pull it tight.
2. Lock the end of the band by bending the locking clips.



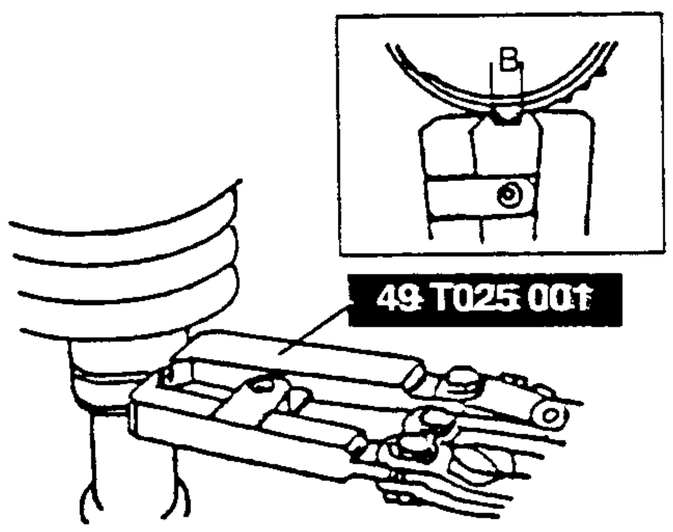
Boot Band (Wheel Side) Assembly Note
1. Adjust clearance A by turning the adjusting bolt of the **SST**.

Clearance A
2.9 mm {0.11 in }



2. Crimp the wheel side small boot band by using the **SST**. Verify that clearance B is within the specification.

Clearance B
2.4—2.8 mm {0.095—0.110 in }



3. If clearance B is more than the specification, reduce clearance A of the **SST** and crimp the boot again.
   If clearance B is less than the specification, replace the boot band, increase clearance A of the **SST**, and crimp the new boot.
4. Verify that the boot band does not protrude from the boot band installation area. If it does, replace the boot band and repeat steps 3 and 4.
5. Fill the boot with the repair kit grease.
6. Adjust clearance A by turning the adjusting bolt of the **SST**.

Clearance A
3.2 mm {0.13 in }

7. Crimp the wheel side big boot band by using the **SST**.
8. Verify that clearance B is within the specification.

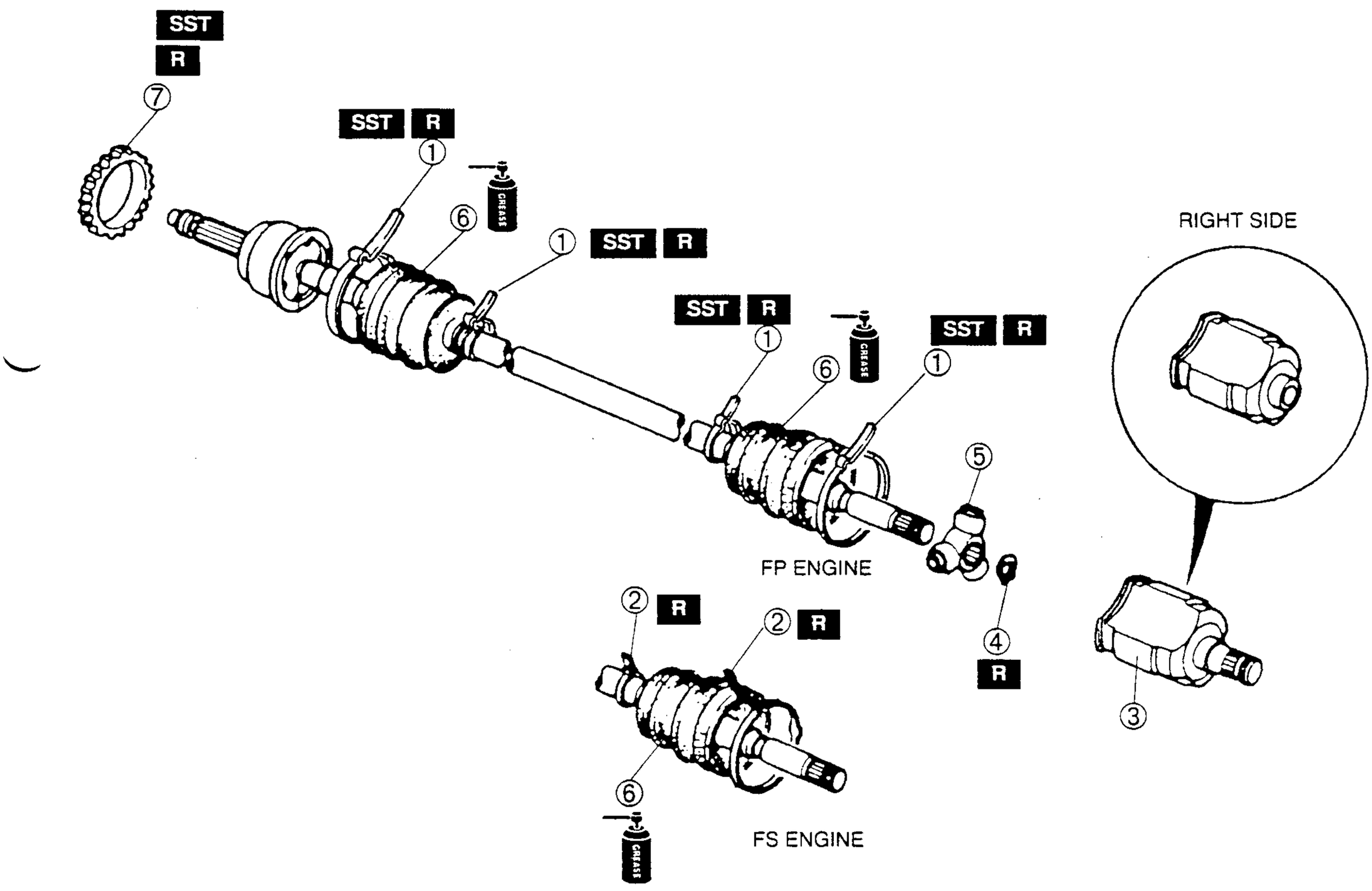
Clearance B
2.4—2.8 mm {0.095—0.110 in }

If clearance B is more than the specification, reduce clearance A of the **SST** and crimp the boot again.
If clearance B is less than the specification, replace the boot band, increase clearance A of the **SST** and crimp the new boot.

9. Verify that the boot band does not protrude from the boot band installation area. If it does, replace the boot band and repeat steps 7 and 8.

DRIVE SHAFT (ATX, TORIPOD TYPE) DISASSEMBLY/ASSEMBLY

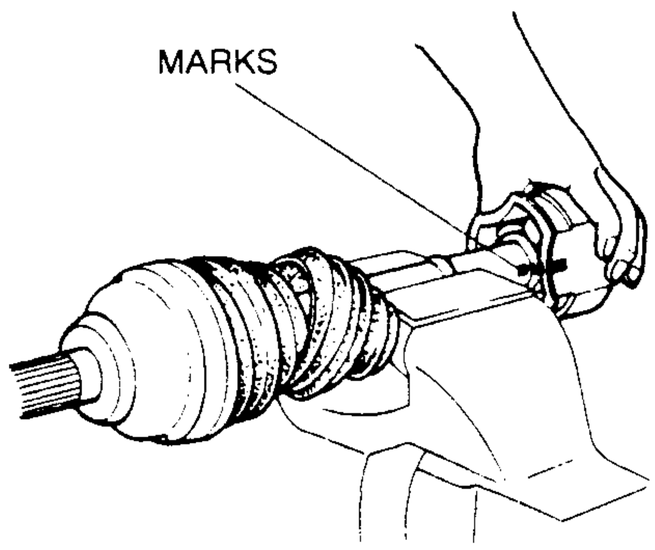
1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



1	Boot band ☞ DRIVE SHAFT (MTX, DOUBLE OFFSET TYPE) DISASSEMBLY/ASSEMBLY, Boot Band (Wheel Side) Disassembly/Assembly Note
2	Boot band ☞ DRIVE SHAFT (MTX, DOUBLE OFFSET TYPE) DISASSEMBLY/ASSEMBLY, Boot Band (Transaxle Side) Disassembly/Assembly Note
3	Outer ring ☞ Disassembly Note ☞ Assembly Note
4	Snap ring ☞ Disassembly Note ☞ Assembly Note
5	Tripod joint ☞ Disassembly Note ☞ Assembly Note
6	Boot ☞ Disassembly Note ☞ Assembly Note
7	ABS sensor rotor (with ABS) ☞ Disassembly Note ☞ Assembly Note

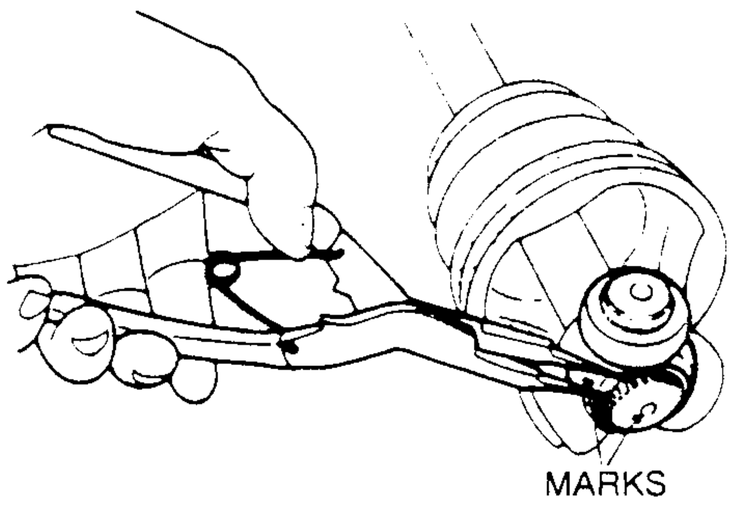
Outer Ring Disassembly Note

1. Mark the outer ring and the shaft for proper assembly.
2. Remove the outer ring.



Snap Ring, Tripod Joint Disassembly Note

1. Mark the shaft and tripod joint for proper assembly.
2. Remove the snap ring by using snap-ring pliers.
3. Remove the tripod joint from the shaft.

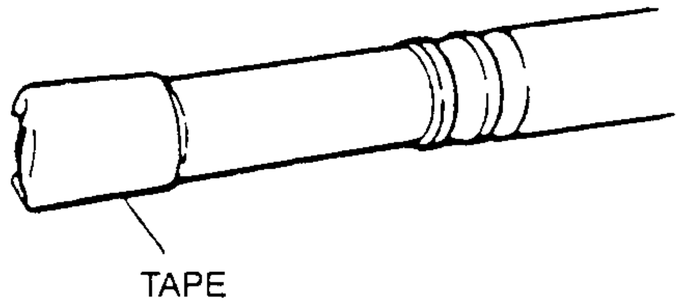


Boot Disassembly Note

Note

- The wheel side boot does not need to be removed unless replacing it or the bell joint and shaft component.
- Do not strip the tape until the boot is assembled.

1. Wrap the shaft splines with tape.
2. Remove the boot.

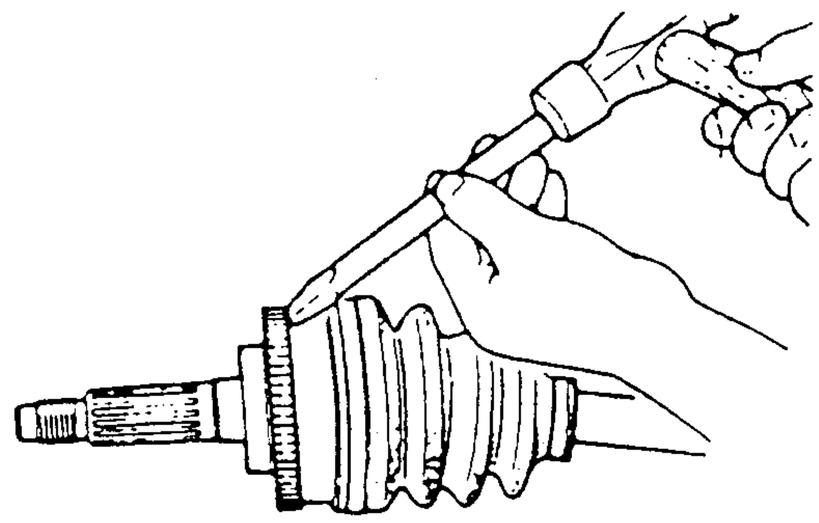


ABS Sensor Rotor (With ABS) Disassembly Note

Caution

- **Do not remove the sensor rotor unless it is necessary.**
- **Do not reuse the sensor rotor if removed.**

- Tap the ABS sensor rotor off the drive shaf by using a chisel.

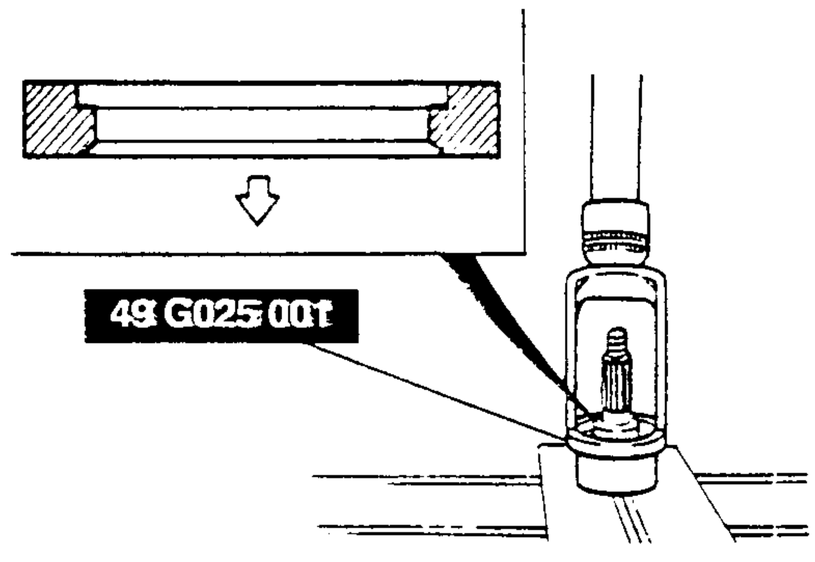


ABS Sensor Rotor (With ABS) Assembly Note

Caution

- **Verify the direction of the sensor rotor.**

- Set a new ABS sensor rotor on the drive shaft and press it on by using the **SST**.



Boot Assembly Note

Note

- The wheel side and transaxle side boots are different.
- Use the specified grease supplied in the boot kit.

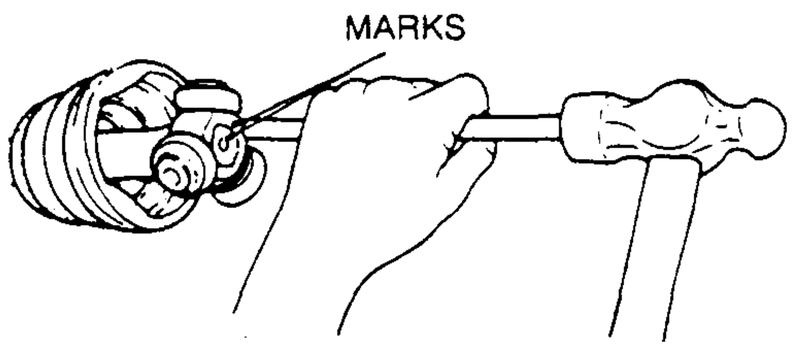
1. Fill the boot (wheel side) with the specified grease.

   Grease amount
   FP engine: 80—100 g {2.9—3.5 oz }
   FS engine: 125—145 g {4.5—5.1 oz }

2. With the splines of the shaft still wrapped in tape from disassembly, install the boot.
3. Remove the tape.

Tripod Joint, Snap Ring Assembly Note

1. Align the marks and install the tripod joint by using a bar and a hammer.



2. Install the new snap ring by using a snap-ring pliers.

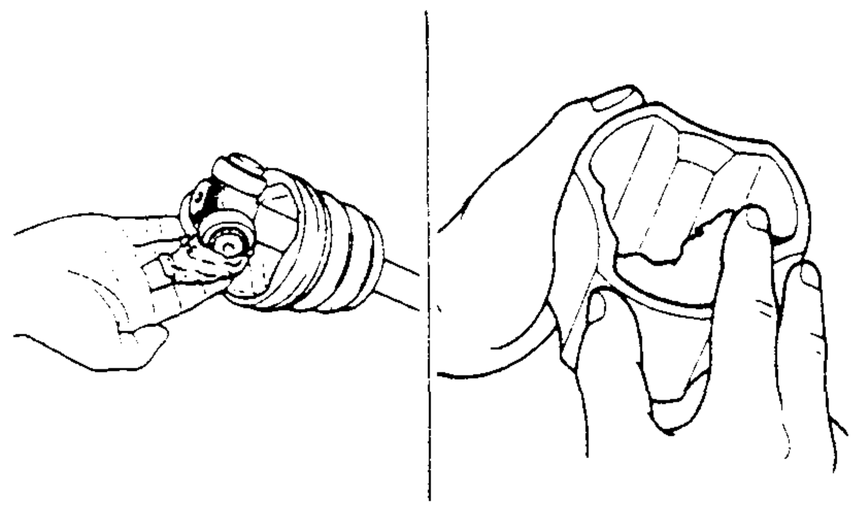
Outer Ring Assembly Note

Note

- Use the specified grease supplied in the boot kit.

1. Fill the outer ring and boot (transaxle side) with the specified grease.

Grease amount
FP engine: 130—150 g {4.6—5.2 oz }
FS engine: 150—170 g {5.3—6.0 oz }



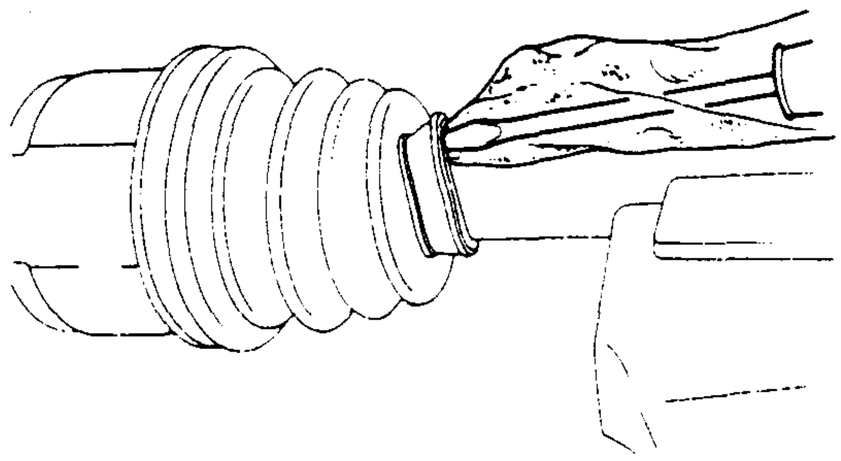
2. Install the outer ring.
3. Set the drive shaft to the standard length.

Standard length

mm {in}

Engine	Left side	Right side
FP	640.3—650.3 {25.3—25.6}	585.8—589.8 {23.1—23.2}
FS	639.2—649.2 {25.2—25.5}	582.2—592.2 {23.0—23.3}

4. Release any trapped air from the boots by carefully lifting up the small end of each boot with a clothwrapped screwdriver.



5. Verify that the drive shaft length is within the standard.

STEERING SYSTEM

GENERAL PROCEDURES ..... **N- 1**
ENGINE SPEED SENSING POWER STEERING ..... **N- 1**
AIR BLEEDING ..... **N- 1**
POWER STEERING FLUID INSPECTION .. **N- 2**
STEERING WHEEL AND COLUMN INSPECTION ..... **N- 3**
STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION ..... **N- 4**
STEERING SHAFT COMPONENT DISASSEMBLY/ASSEMBLY ..... **N- 5**
STEERING SHAFT INSPECTION ..... **N- 6**
STEERING LOCK (ATX MODEL) INSPECTION ..... **N- 6**
STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION ..... **N- 7**
STEERING GEAR AND LINKAGE DISASSEMBLY ..... **N- 9**
STEERING GEAR AND LINKAGE INSPECTION **N-12**
STEERING GEAR AND LINKAGE ASSEMBLY **N-14**
POWER STEERING OIL PUMP REMOVAL/INSTALLATION **N-21**
POWER STEERING OIL PUMP DISASSEMBLY/ASSEMBLY **N-22**

GENERAL PROCEDURES

Wheels and tires removal/installation

- The removal and installation procedures for the wheels and tires are not mentioned in this section. When a wheel is removed, retighten it to **89—117 N·m {9.0—12.0 kgf·m , 66—86 ft·lbf }**.

Power steering components removal/installation

- If any power steering fluid line has been disconnected anytime during the procedure, add ATF M-III or equivalent (e.g. Dexron® II), bleed the fluid lines, and inspect for leakage after the procedure has been completed.

Connectors disconnection/connection

- Disconnect the negative battery cable before doing any work that requires handling of connectors. Reconnect the negative battery cable only after the work is completed.

ENGINE SPEED SENSING POWER STEERING

AIR BLEEDING

1. Check the fluid level. (Refer to ENGINE SPEED SENSING POWER STEERING, POWER STEERING FLUID INSPECTION, Fluid Level Inspection.)
2. Jack up the front of the vehicle and support it on safety stands.
3. Turn the steering wheel fully to the left and right several times with the engine not running.
4. Recheck the fluid level. If it has dropped, add fluid.
5. Repeat steps 2 and 3 until the fluid level stabilizes.
6. Lower the vehicle.
7. Start the engine and let it idle.
8. Turn the steering wheel fully to the left and right several times.
9. Verify that the fluid is not foamy and that the fluid level has not dropped.
10. Add fluid if necessary and repeat steps 7 and 8.

POWER STEERING FLUID INSPECTION

Fluid Level Inspection

- Check the power steering fluid level. Add fluid to the specified level if necessary.

Fluid specification
ATF M-III or equivalent (e.g. Dexron® II)

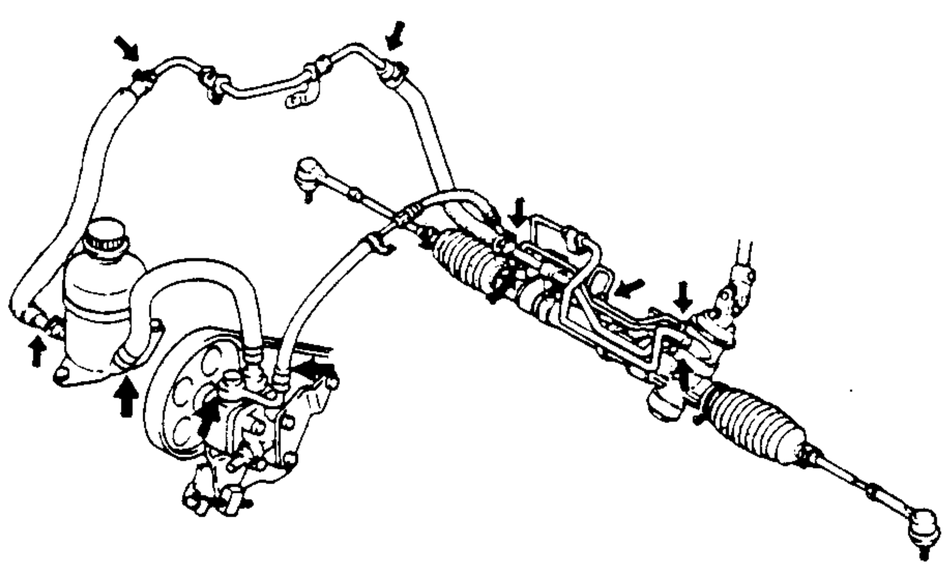
Fluid Leakage Inspection

Caution
- **To prevent damage to the steering system, do not keep the steering wheel in the fully turned position for more than 5 seconds.**

1. Start the engine and let it idle. Turn the steering wheel fully to the left and right to apply fluid pressure.

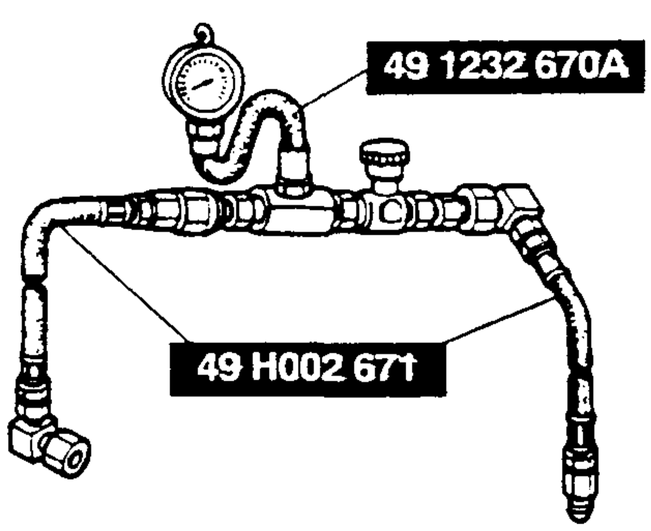
Note
- The points where fluid leakage may occur are indicated in the figure.

2. Check for fluid leakage.



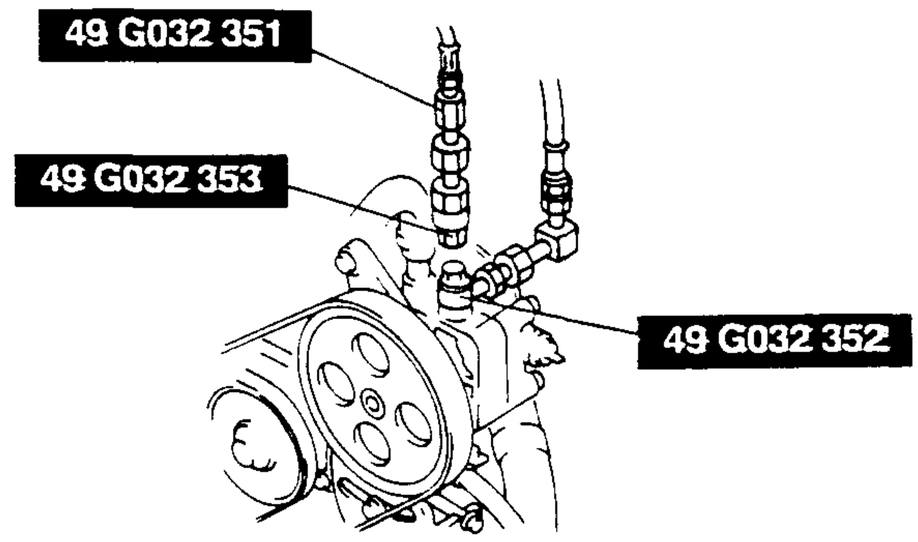
Fluid Pressure Inspection

1. Assemble the **SSTs** as shown in the figure.



2. Disconnect the pressure pipe from the oil pump, and connect the **SST**.

Tightening torque
40—49 N·m {4.0—5.0 kgf·m , 29—36 ft·lbf }

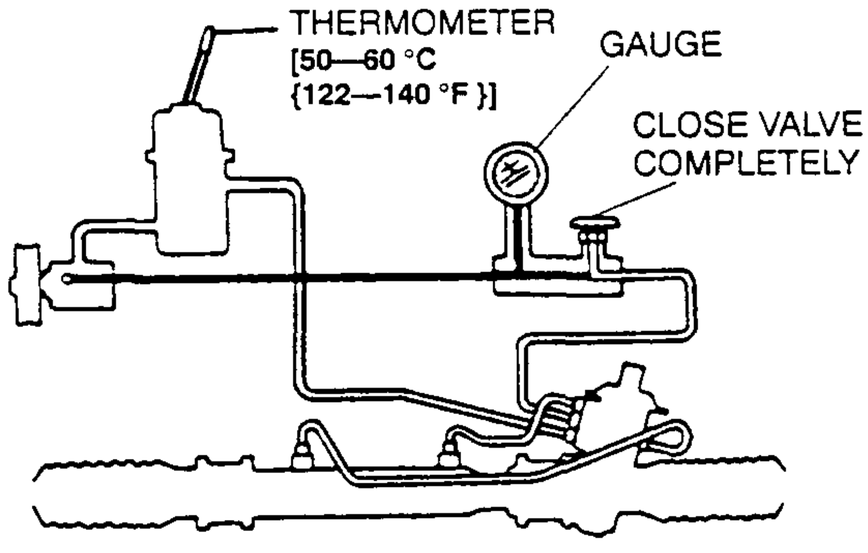


3. Bleed the air from the system.
4. Open the gauge valve fully. Start the engine and turn the steering wheel fully left and right to raise the fluid temperature to **50—60 °C {122—140 °F }**.

Caution
- **If the valve is left closed for more than 5 seconds, the fluid temperature will increase excessively and adversely affect the oil pump.**

5. Close the gauge valve completely. Increase the engine speed to **1,000—1,500 rpm** and measure the fluid pressure generated by the oil pump. If the pressure is not within the specification, repair or replace the oil pump component.

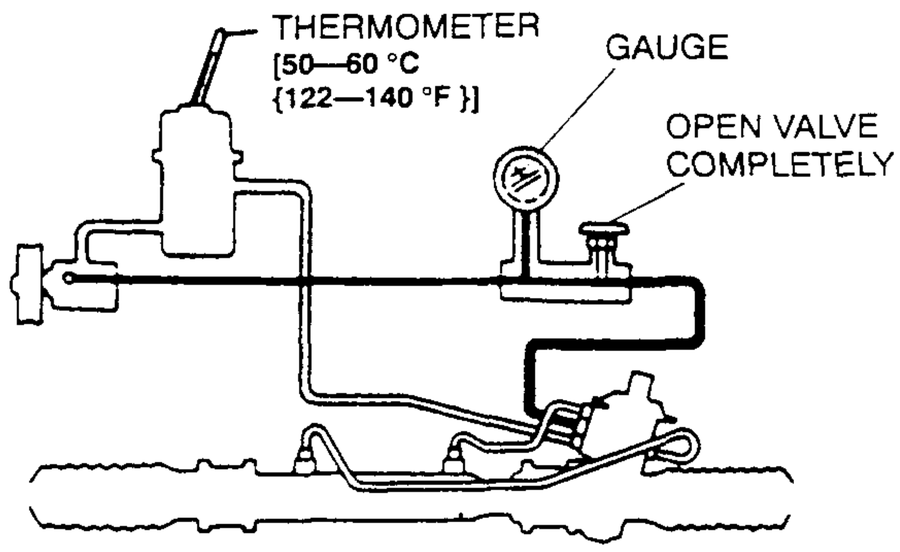
Oil pump fluid pressure
7.20—7.69 MPa
{73.5—78.5 kgf/cm^2 , 1046—1052 psi }



Caution
- **If the steering wheel is kept in the fully turned position for more than 5 seconds, the fluid temperature will rise excessively and adversely affect the oil pump.**

6. Open the gauge valve fully and increase the engine speed to **1,000—1,500 rpm**.
7. Turn the steering wheel fully to the left and right, then measure the fluid pressure generated at the gear housing. If the pressure is not within the specification, repair or replace the steering gear component.

Gear housing fluid pressure
7.20—7.69 MPa
{73.5—78.5 kgf/cm^2 , 1046—1052 psi }



8. Remove the gauge set. Install and tighten the pressure pipe to the specified torque.

Tightening torque
24—29 N·m {2.4—3.0 kgf·m , 18—21 ft·lbf }

9. Bleed the air from the system.

STEERING WHEEL AND COLUMN INSPECTION

Steering Wheel Play Inspection

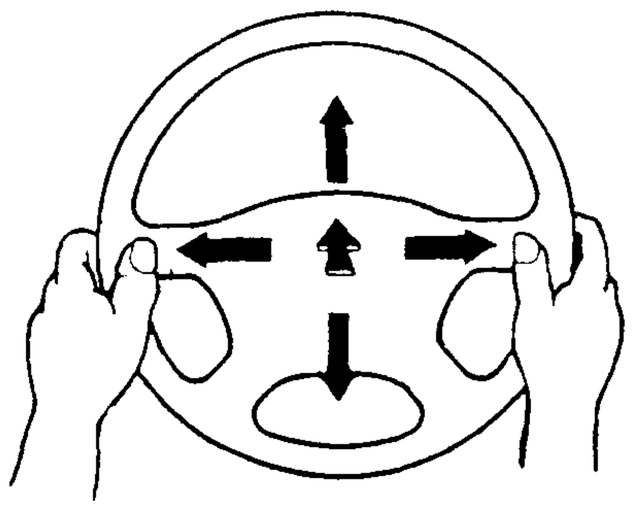
1. With the wheels in the straight-ahead position, gently turn the steering wheel to the left and right and verify that the play is within the specification.

Play
0—30 mm {0—1.18 in }

2. If the play exceeds the specification, either the steering joints are worn or the backlash of the steering gear is excessive. Correct if necessary.

Steering Wheel Looseness Inspection

- Move the steering wheel as shown in the figure to check for column bearing wear, steering shaft joint play, steering wheel looseness, and column looseness.



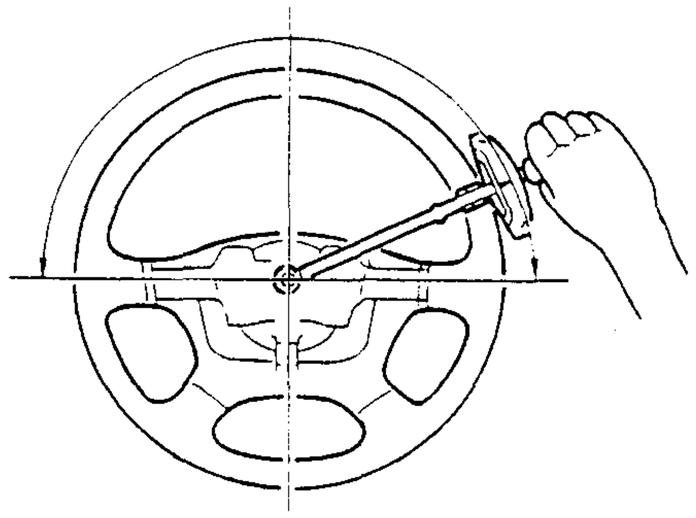
Steering Wheel Effort Inspection

1. Check the following points:
   (1) Tire size and tire pressure
   (2) Fluid level
   (3) Drive belt deflection
2. With the vehicle on a hard, level surface, put the wheels in the straight-ahead position.
3. Start the engine and warm the power steering fluid to **50—60 °C {122—140 °F }**.

Warning
- **Refer to section T, AIR BAG SYSTEM, DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION for removal/installation of the air bag module after inspection.**

4. Remove the air bag module.
5. Measure the steering wheel effort by using a torque wrench.

Steering wheel effort
7.8 N·m {80 kgf·cm , 69 in·lbf } max.

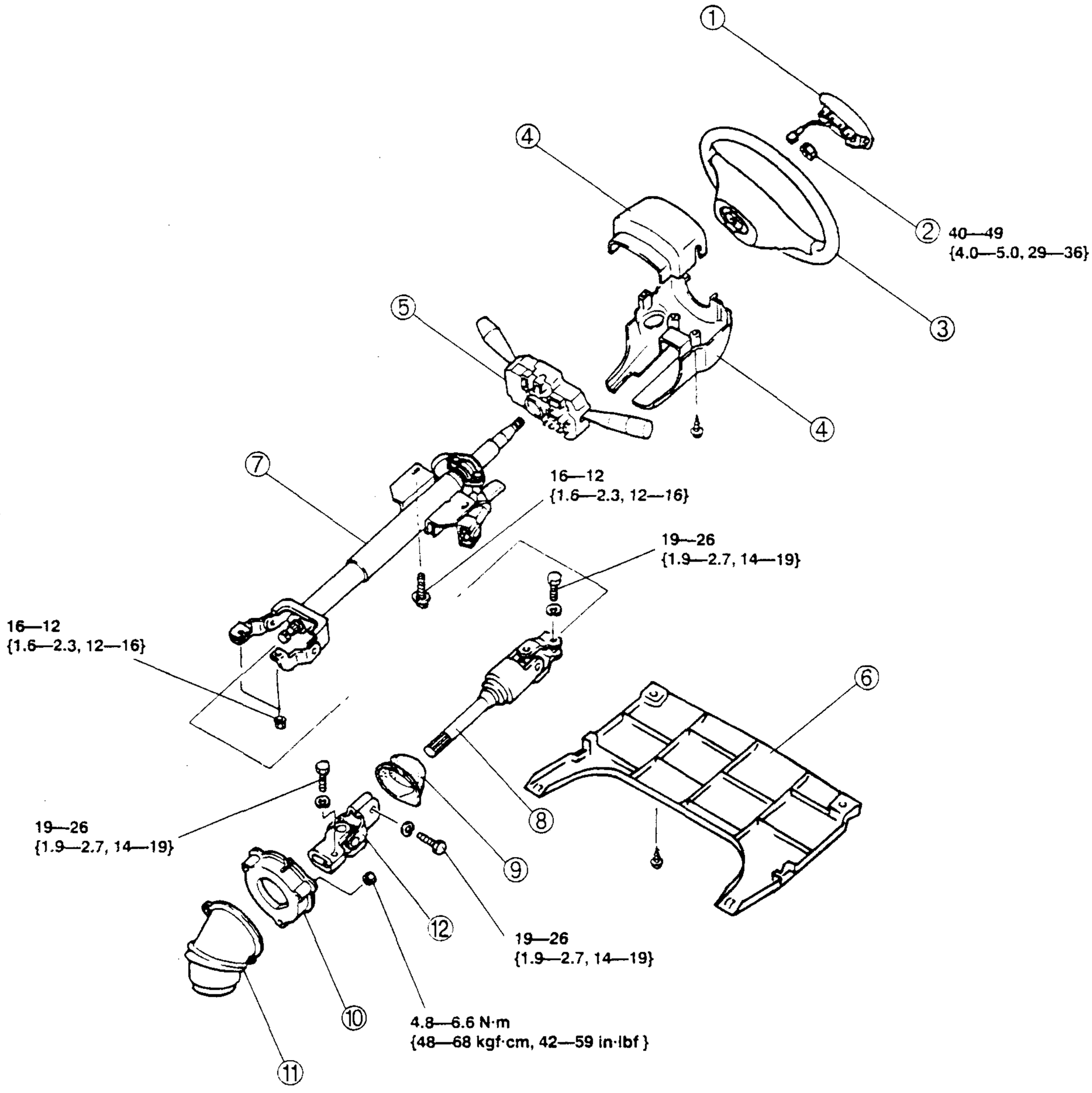


Note
- To determine whether the steering effort is satisfactory or not, perform the inspection on another vehicle of the same model and under the same conditions, and compare the results.
- The steering wheel effort varies with conditions as shown below.
  1. Road conditions, such as dry or wet, and asphalt or concrete.
  2. Tire conditions, such as brand, wear, and tire pressure.

6. If not within the specification, note the following:
   (1) Air in system
   (2) Fluid leakage at hose or connectors
   (3) Function of oil pump and steering gear

STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



N·m { kgf·m , ft·lbf }

1	Air bag *module* ☞ section T, AIR BAG SYSTEM, DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION
2	Locknut
3	Steering wheel ☞ *Removal Note* ☞ Installation Note
4	Column cover
5	Combination switch

6	Lower panel
7	Steering shaft component ☞ Installation Note
8	Intermediate shaft ☞ Installation Note
9	Shaft seal
10	Set plate
11	Dust cover
12	Universal joint

Steering Wheel Removal Note

Caution
- **Do not try to remove the steering wheel by hitting the shaft with a hammer. The column will collapse.**

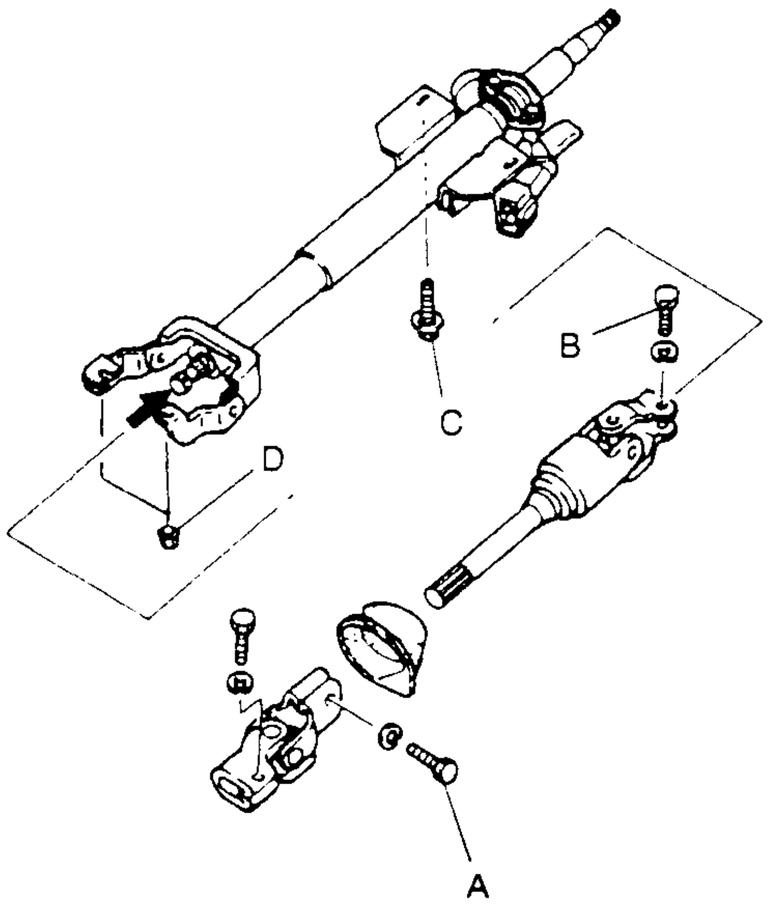
1. Set the vehicle in the straight-ahead position.
2. Remove the steering wheel by using a suitable puller.

Intermediate Shaft, Steering Shaft Component Installation Note

Caution
- **Do not apply the shock in the axial direction of the shaft.**

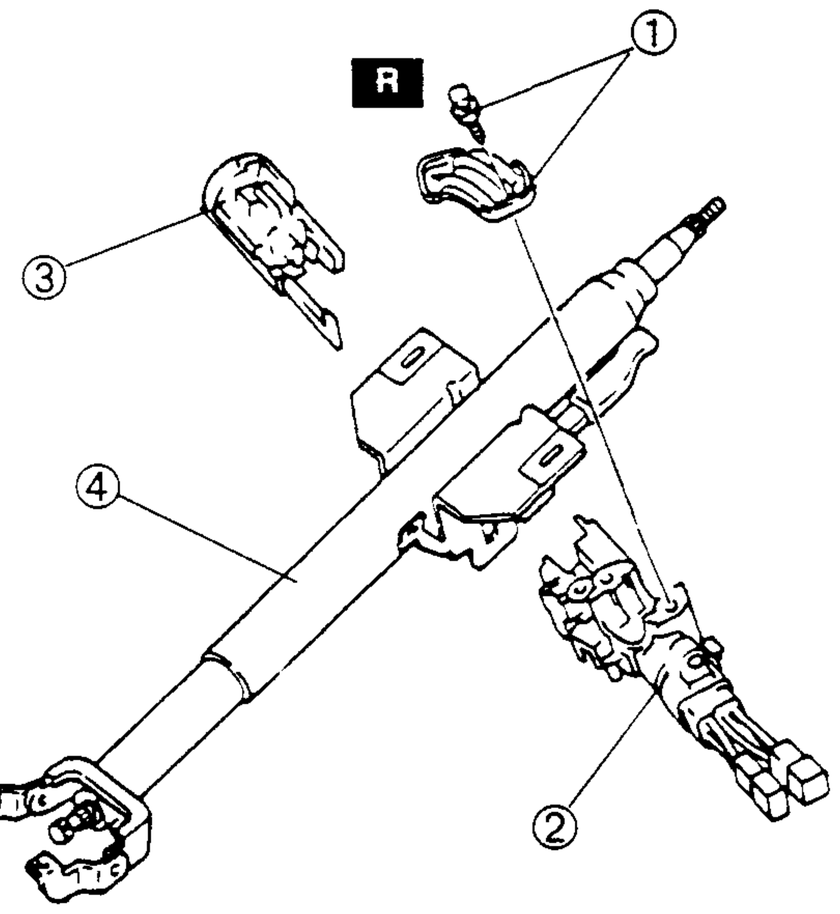
Note
- If the tilt lever does not move easily, loosen the D nuts, tap the lower bracket at the point shown and retighten.

1. Tighten bolt A after tightening bolt B.
2. Tighten bolt C with the steering shaft at its upper most tilt position.
3. After installation, lightly tap the lower bracket at the point shown by using a hammer to verify correct installation.



Steering Wheel Installation Note
- Set the wheels in the straight-ahead position, and install the steering wheel.

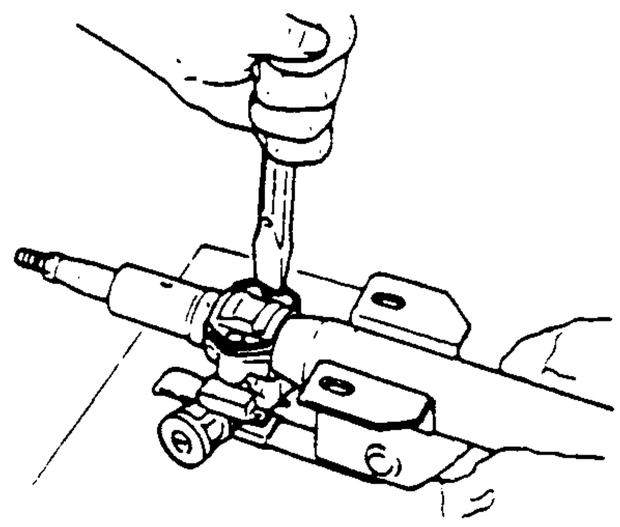
STEERING SHAFT COMPONENT DISASSEMBLY/ASSEMBLY
1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of removal.



N

1	Steering lock mounting bolts and bracket ☞ Disassembly Note ☞ Assembly Note
2	Steering lock component
3	Cylinder outer component ☞ Disassembly Note
4	Steering shaft component

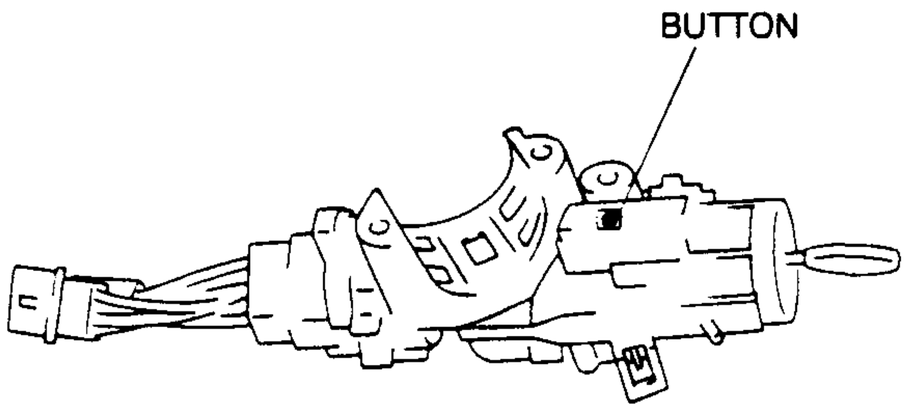
Steering Lock Mounting Bolts And Bracket Disassembly Note
1. Make a groove in the heads of the steering lock mounting bolts by using a chisel and a hammer.
2. Remove the bolts by using a screwdriver.
3. Disassemble the steering lock component.

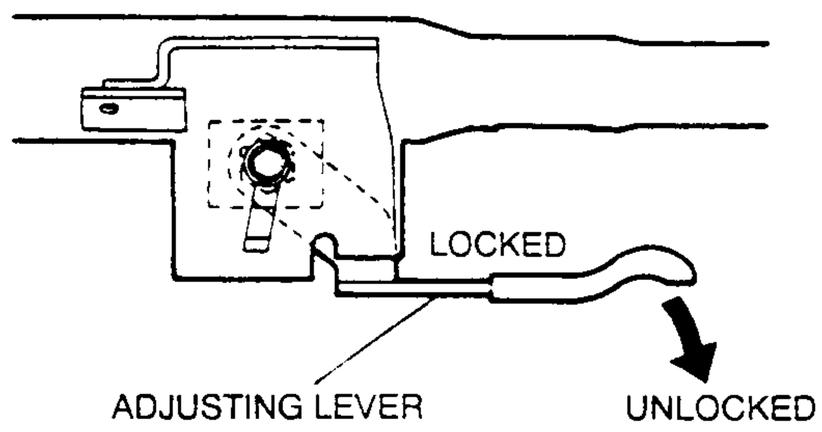


Cylinder Outer Component Disassembly Note

Caution
- **When replacing the cylinder outer component, the coil also must be replaced.**

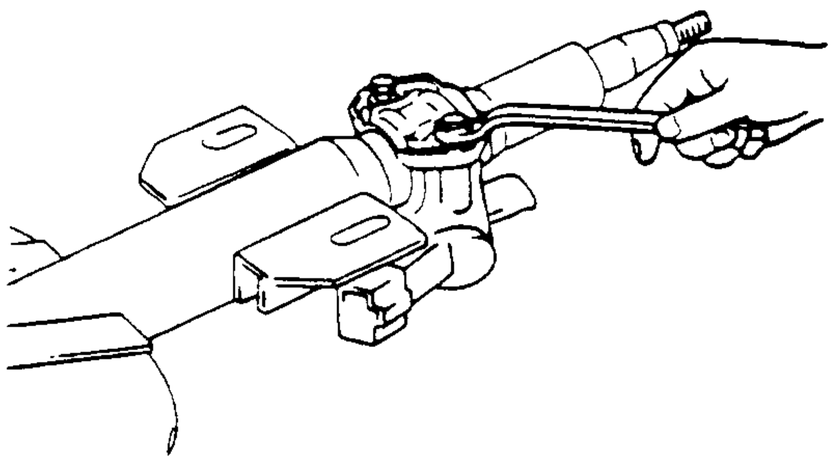
1. Set the key in the ACC position.
2. Keep pushing the button and pull the cylinder outer component.





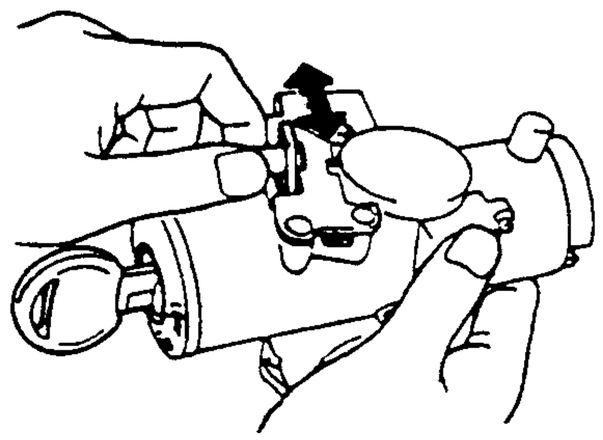
Steering Lock Mounting Bolts And Bracket Assembly Note

1. Assemble the steering lock component on the jacket.
2. Verify that the lock operates correctly.
3. Install new steering lock mounting bolts.
4. Tighten the bolts until the heads break off.



STEERING LOCK (ATX MODEL) INSPECTION

- Verify that the cable connector does not move when the key is in the LOCK position and that it moves freely with the key in other positions.

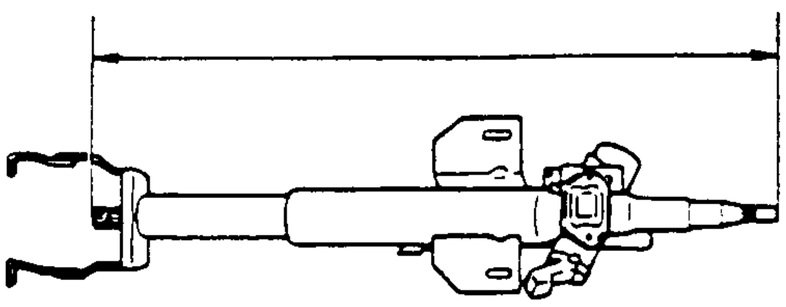


STEERING SHAFT INSPECTION

- Check for the following and replace the steering shaft component if necessary.

1. Column bearing damage
2. Steering shaft length

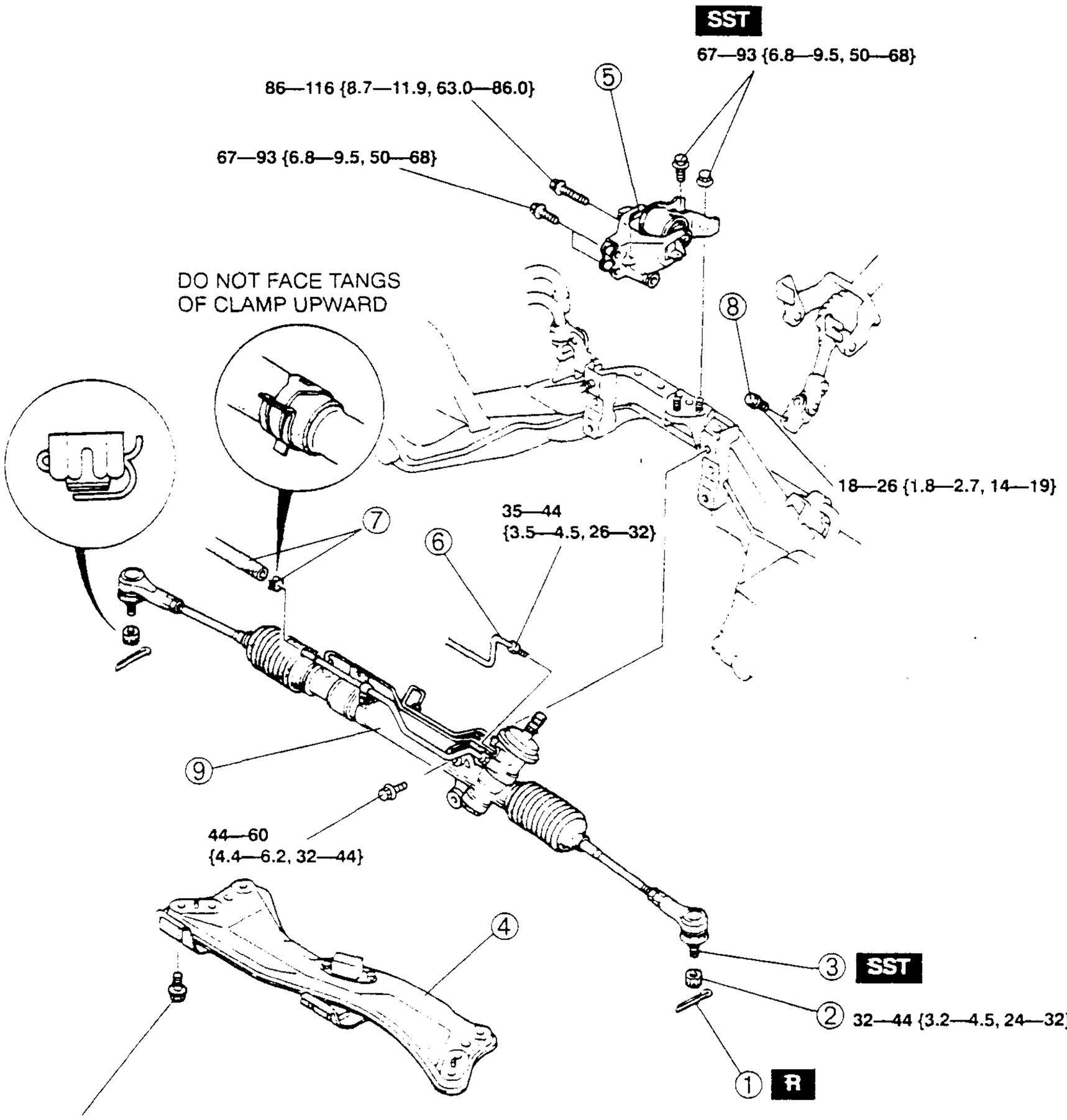
Length
576.6 mm {22.70 in }



3. Tilt operation
   (1) Verify that the adjusting lever moves smoothly from unlock position to lock position.
   (2) Verify that the steering shaft is fixed firmly when the adjusting lever is locked.

STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. After installation, check the toe-in. (Refer to section R, WHEEL ALIGNMENT, FRONT WHEEL ALIGNMENT.)

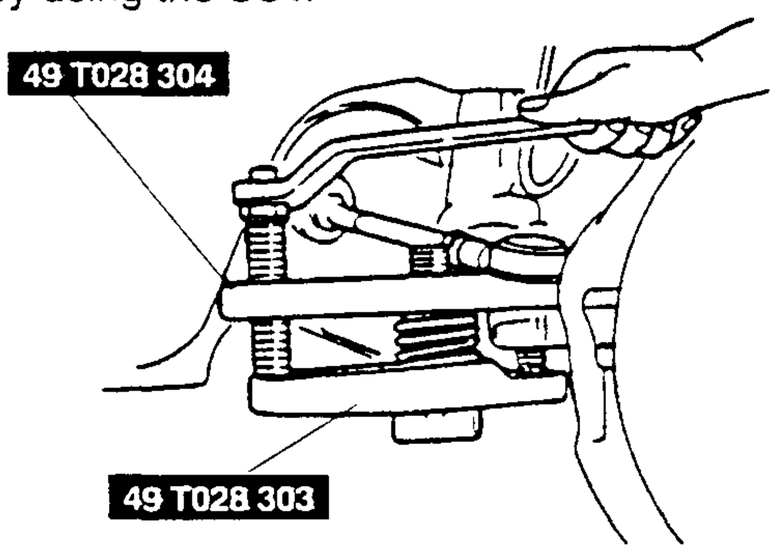


N·m { kgf·m , ft·lbf }

1	Cotter pin
2	Nut
3	Tie-rod end ☞ Removal Note
4	Transverse member
5	No.1 Engine mount component ☞ Removal Note
6	Pressure pipe
7	Return hose and clamp
8	Bolt (intermediate shaft) ☞ Removal Note ☞ Installation Note
9	Steering gear and linkage ☞ Removal Note

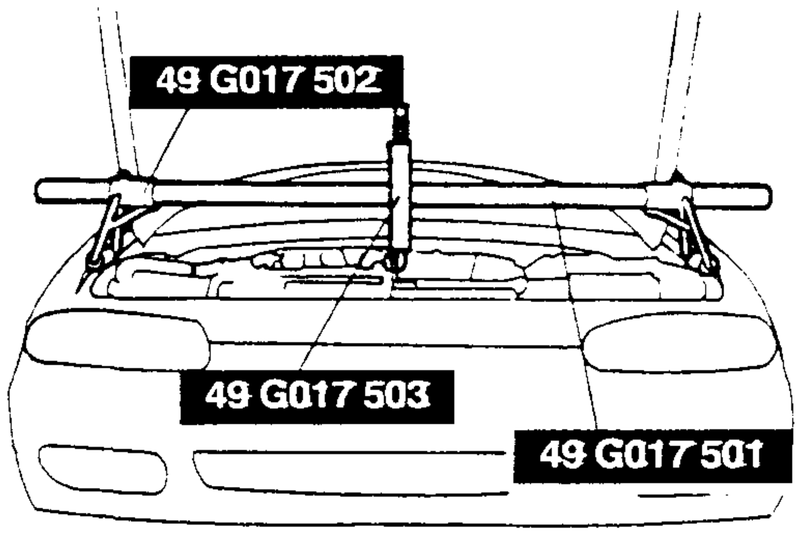
Tie-rod End Removal Note

1. Remove the tie rod nut.
2. Separate the tie-rod end from the steering knuckle by using the **SST**.



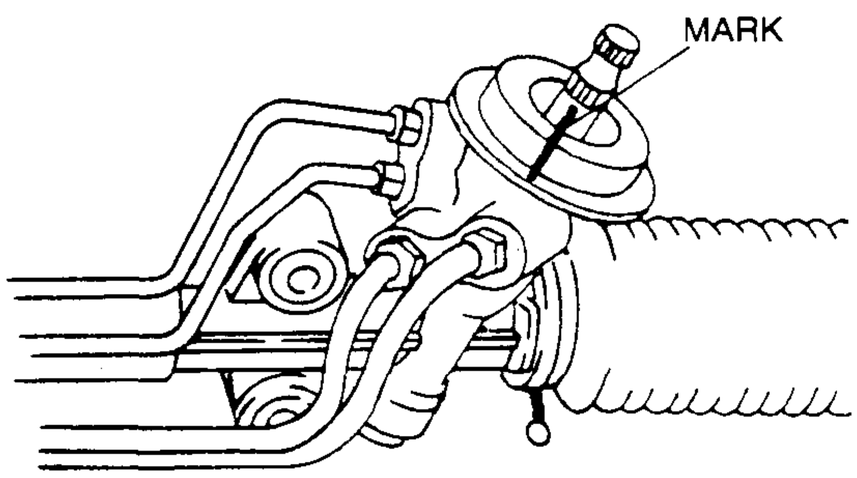
No.1 Engine Mount Component Removal Note

1. Set the **SSTs** as shown in the figure.
2. Remove the engine mount.



Bolt (Intermediate Shaft) Remove Note

- Mark the pinion shaft and gear housing for proper installation.



Steering Gear And Linkage Removal Note

- Remove the steering gear and linkage by pulling it from the right side.

Bolt (Intermediate Shaft) Installation Note

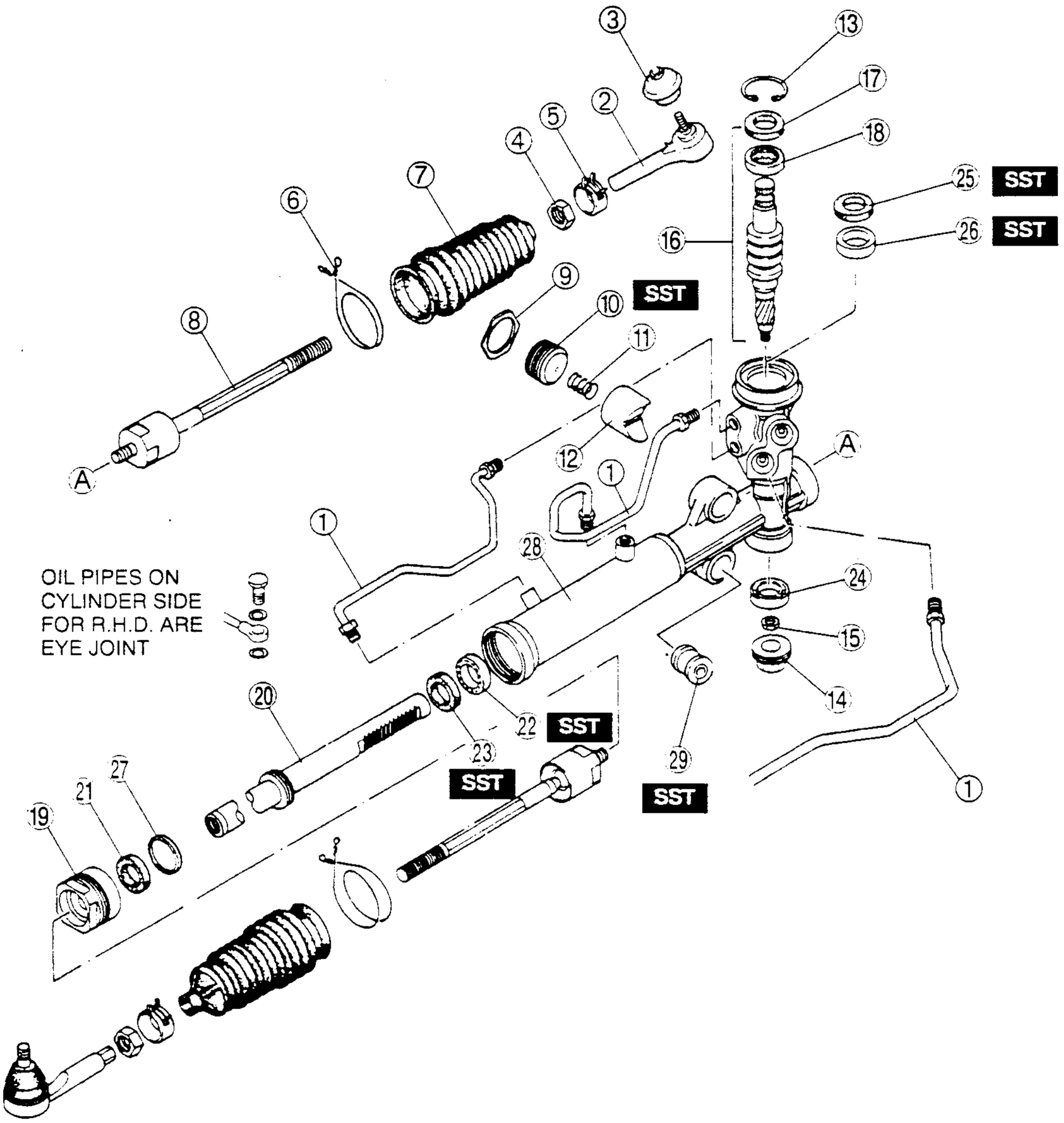
- Align the marks and install the intermediate shaft and bolt.

STEERING GEAR AND LINKAGE DISASSEMBLY

Caution

- **The steering gear is easily scratched or damaged when secured in a vise. Use protective plates in the jaws of the vise when securing the steering gear.**

- Disassemble in the order indicated in the table.



1	Oil pipe ☞ Disassembly Note
2	Tie-rod end ☞ Disassembly Note
3	Tie-rod end boot ☞ Disassembly Note
4	Locknut
5	Boot band
6	Boot wire
7	Boot
8	Tie-rod ☞ Disassembly Note

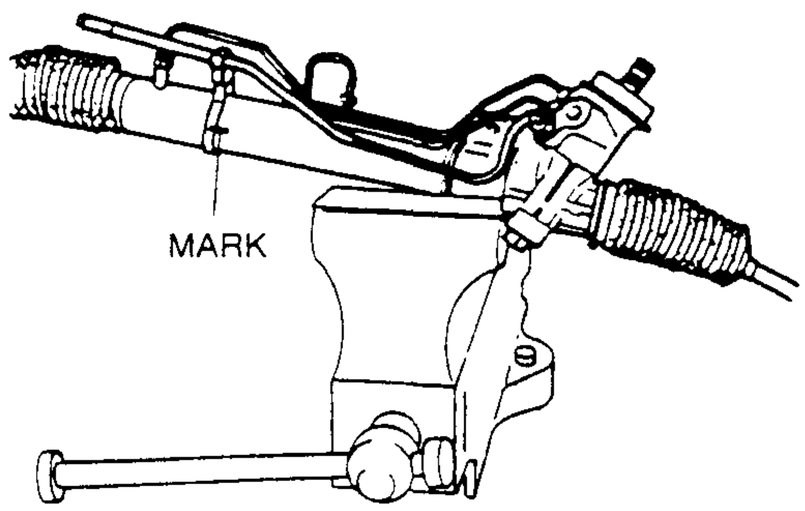
9	Locknut ☞ Disassembly Note
10	Adjusting cover ☞ Disassembly Note
11	Yoke spring
12	Support yoke ☞ Disassembly Note
13	Snap ring ☞ Disassembly Note
14	Housing cover ☞ Disassembly Note
15	Locknut

16	Pinion shaft component ☞ Disassembly Note
17	Oil seal
18	Upper bearing
19	Rack busing ☞ Disassembly Note
20	Steering rack ☞ Disassembly Note
21	Oil seal ☞ Disassembly Note
22	Spacer ☞ Disassembly Note
23	Oil seal ☞ Disassembly Note
24	Lower bearing ☞ Disassembly Note
25	Oil seal ☞ Disassembly Note
26	Collar ☞ Disassembly Note
27	Seal ring ☞ Disassembly Note
28	Gear housing
29	Mount bushing ☞ Disassembly Note

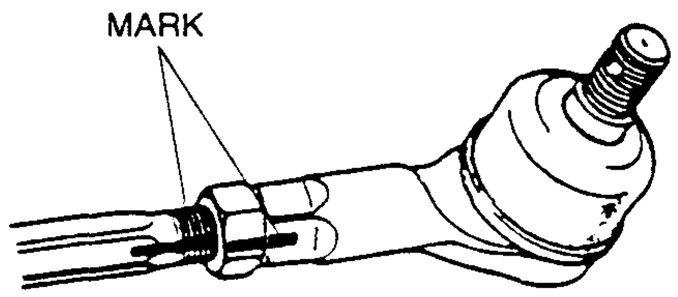
Oil Pipe Disassembly Note

Caution
- **Do not remove the pipe clip unless it is damaged.**
- **Mark the pipe clip and the gear housing for proper assembly.**

1. Secure the gear and linkage in a vise.
2. Disassemble the oil pipe.



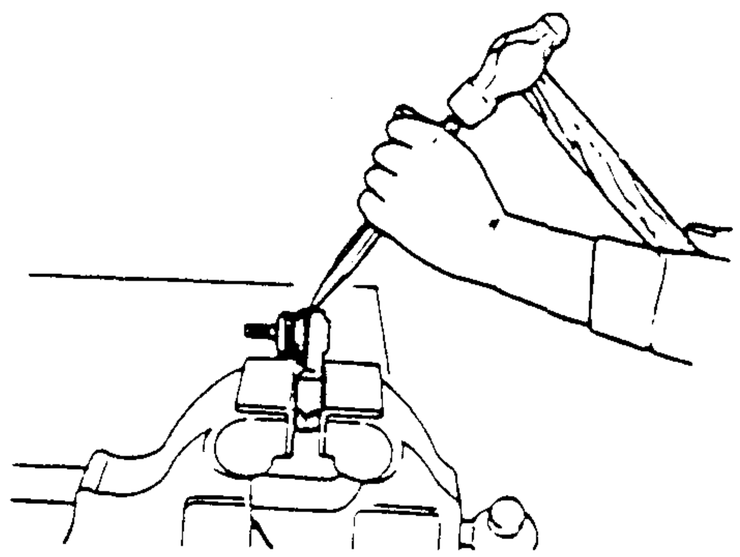
Tie-rod End Disassembly Note
- Before disassembling the tie-rod end, make a mark for proper assembly.



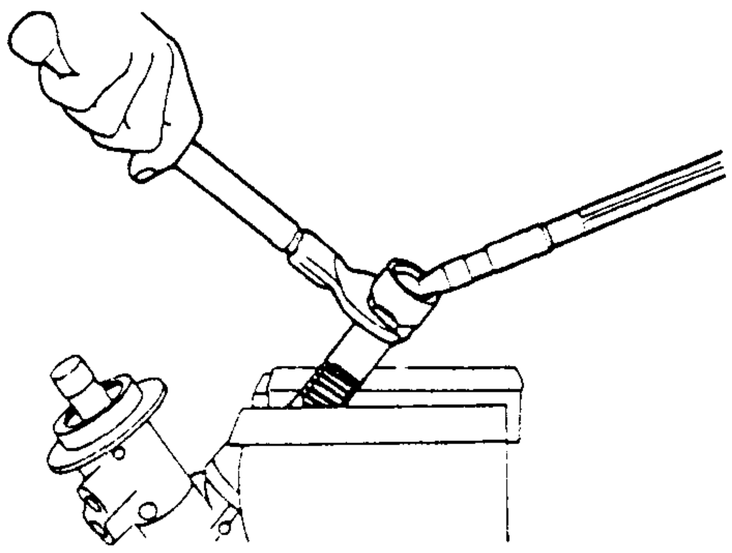
Tie-rod End Boot Disassembly Note

Caution
- ***Do not scar the part where the boot is attached to the tie-rod end.***

1. Secure the tie-rod end in a vise.
2. Place a chisel against the boot and hold it at the angle shown.
3. Disassemble the boot by tapping it with a hammer.

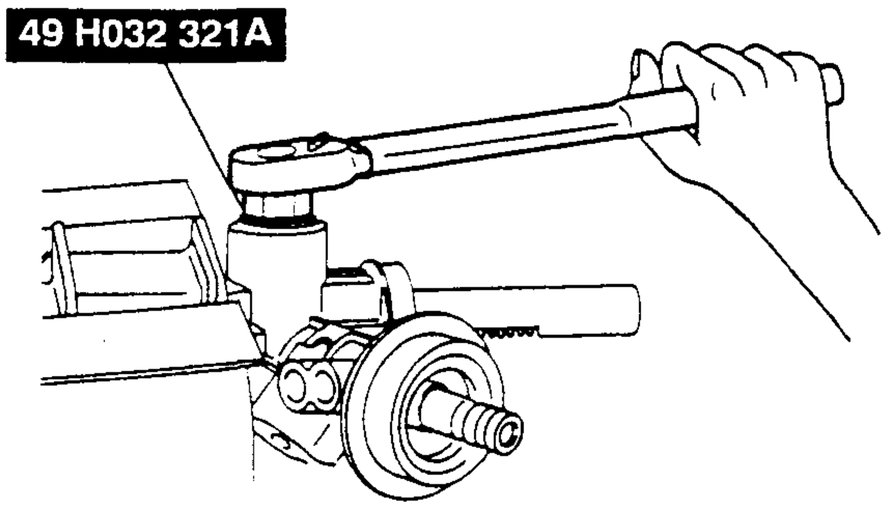


Tie-rod Disassembly Note
- Secure the tie-rod in a vise and disassemble the tie-rod from the rack.



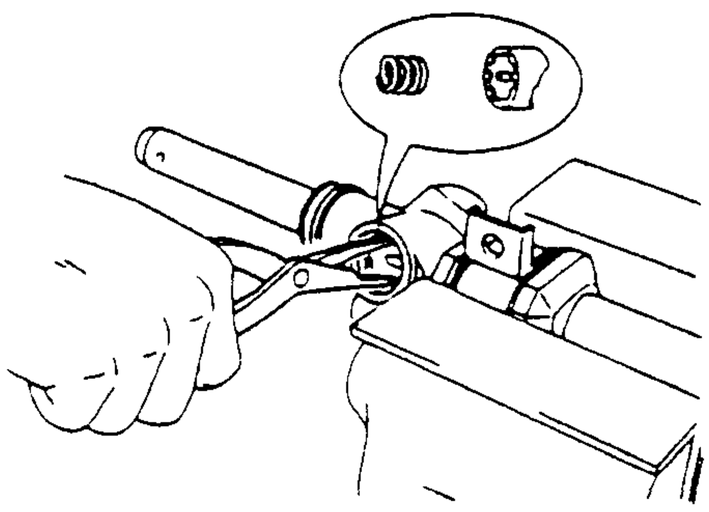
Locknut, Adjusting Cover Disassembly Note

1. Disassemble the locknut from the adjusting cover.
2. Disassemble the adjusting cover by using the **SST**.
3. Disassemble the spring and pressure pad.



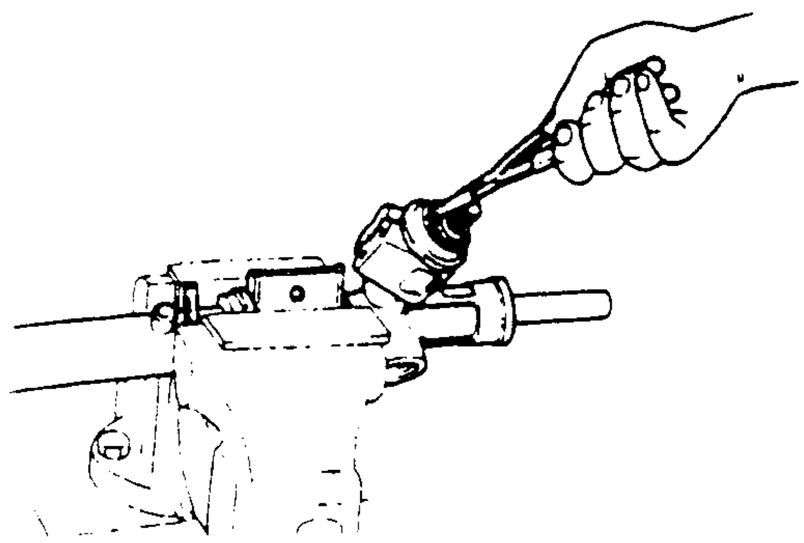
Support Yoke Disassembly Note

- Disassemble the support yoke by using snap-ring pliers.



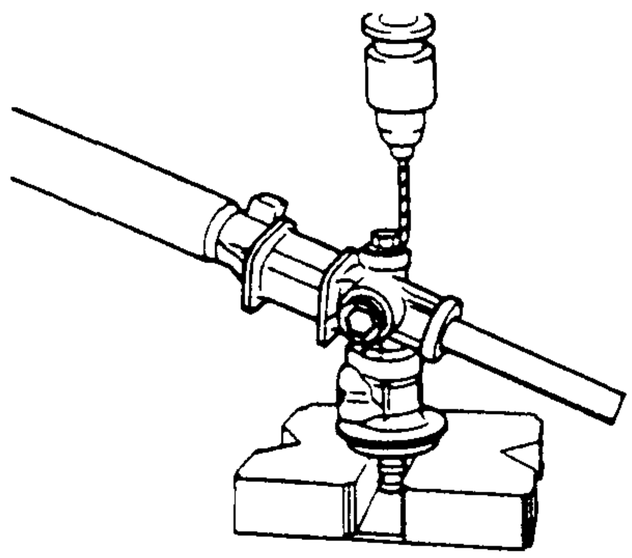
Snap Ring Disassembly Note

- Disassemble the snap ring by using snap-ring pliers.



Housing Cover Disassembly Note

1. Drill away the staked areas.
2. Disassemble the housing cover.



Pinion Shaft component Disassembly Note

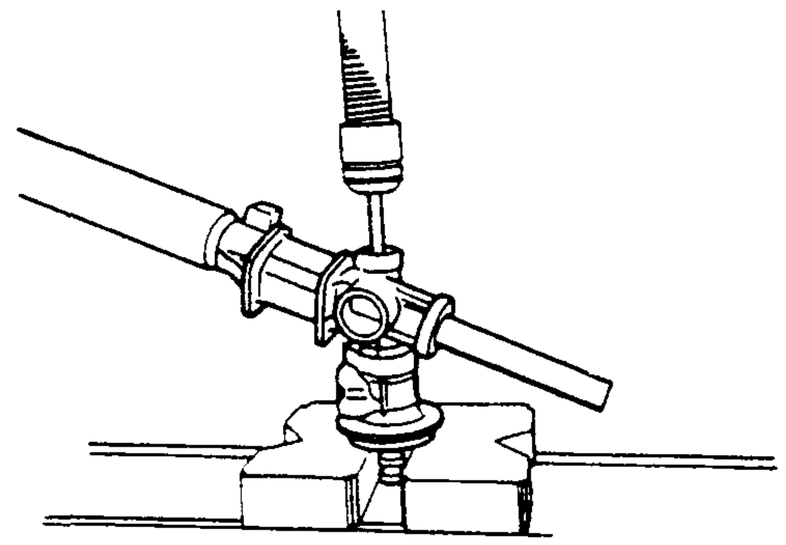
Caution

- **Do not damage the gear housing by the rack teeth.**

Note

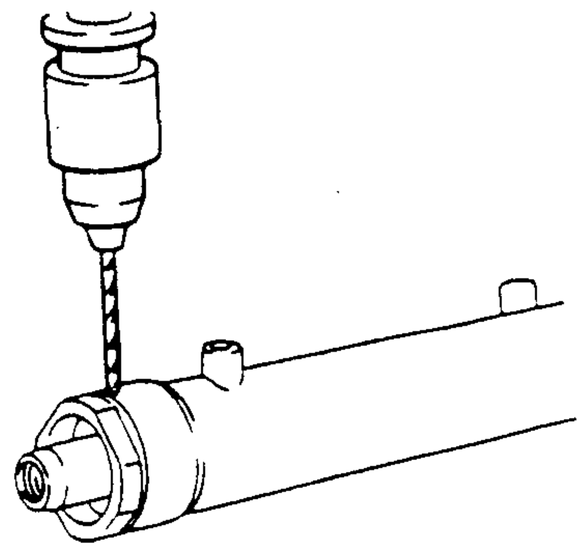
- Install the tie-rod so that the rack does not move.

1. Disassemble the locknut.
2. Set the gear housing component on a press and disassemble the pinion shaft component as shown in the figure.



Rack Bushing Disassembly Note

1. Drill away the staked areas.
2. Disassemble the rack bushing.

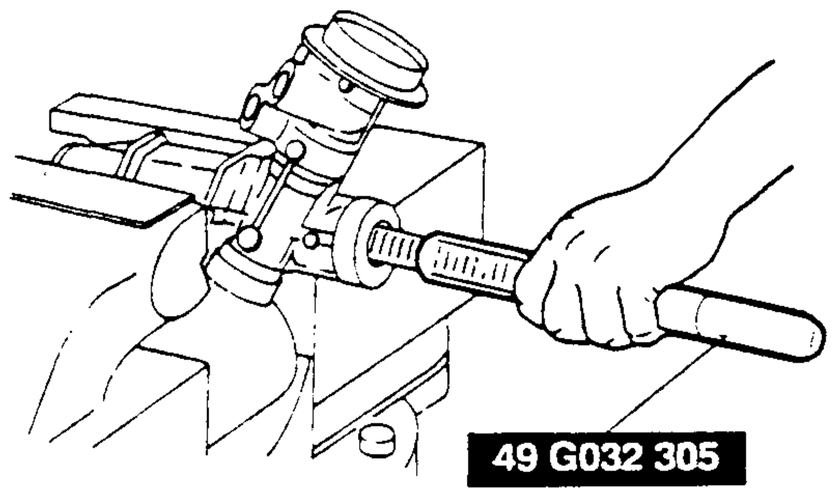


Steering Rack, Oil Seal Disassembly Note

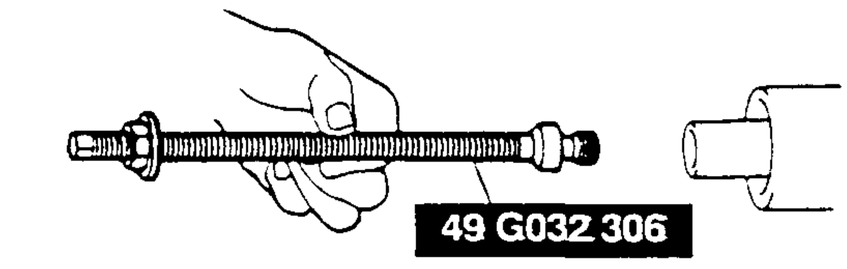
Caution

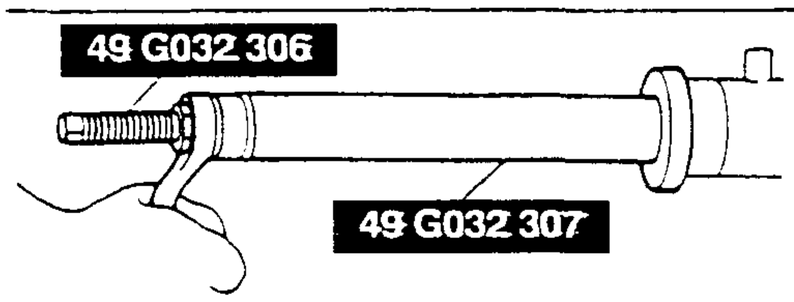
- **If the rack is disassembled without using the SST, there is the possibility that the rack housing may be damaged by the rack teeth.**

1. Slide the **SST** over the steering rack from the gear housing side.



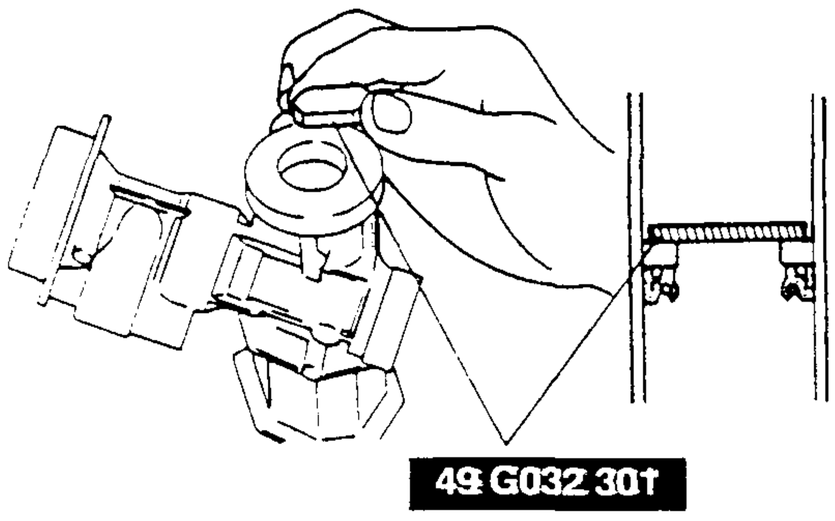
2. Screw the **SST** into the rack at the tube side.
3. Disassemble the oil seal at the tube side by using the **SST** to pull out the rack.



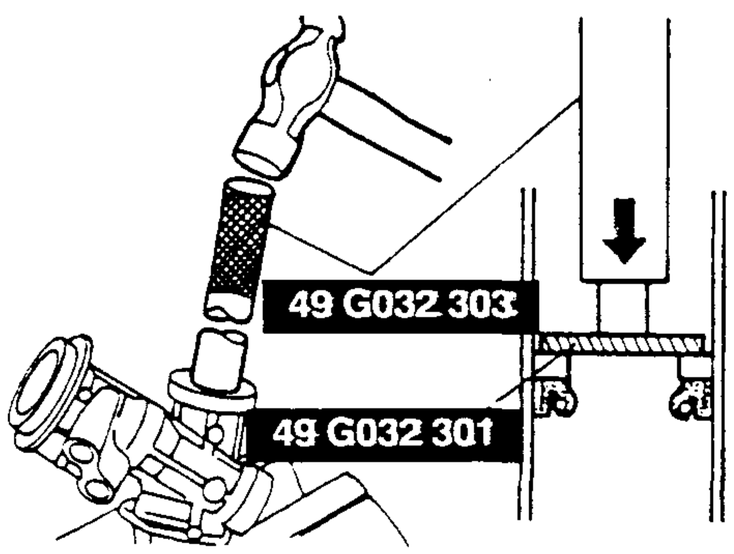


Spacer, Oil Seal Disassembly Note

1. Secure the gear housing in a vise.
2. Insert the **SST** from the pinion housing side so that it contacts the spacer.

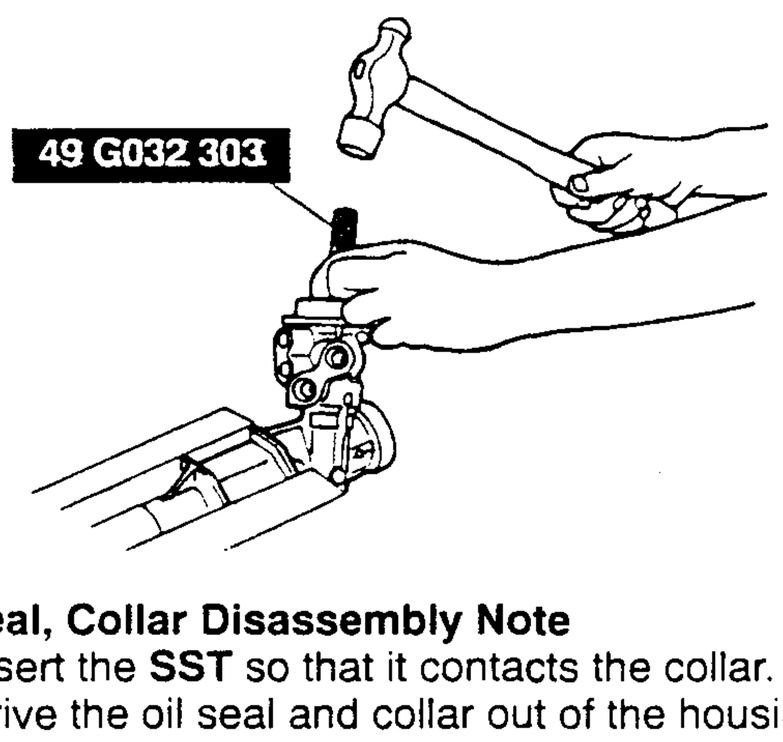


3. Set the **SST** against the **SST** inserted in Step 2.
4. Drive the spacer and oil seal out of the housing by using a hammer.



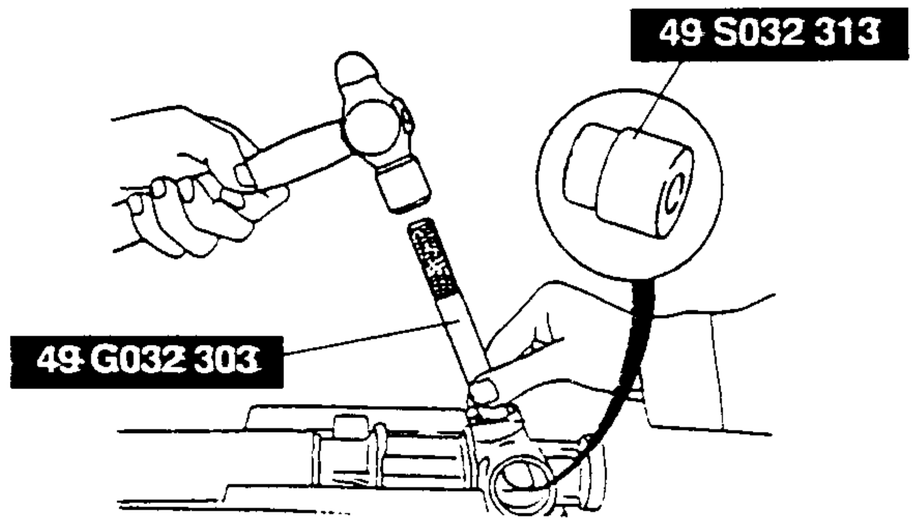
Lower Bearing Disassembly Note

- Drive the lower bearing out of the housing by using the **SST**.



Oil Seal, Collar Disassembly Note

1. Insert the **SST** so that it contacts the collar.
2. Drive the oil seal and collar out of the housing by using the **SSTs** and a hammer.

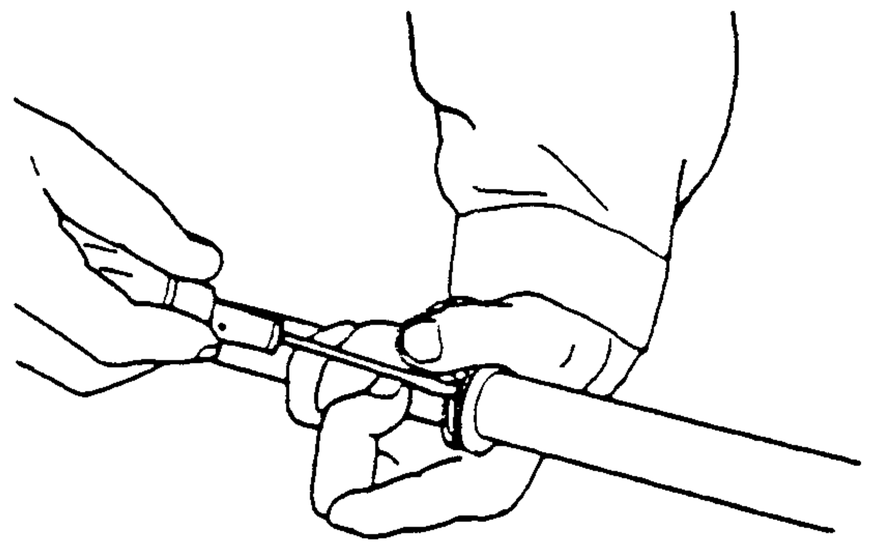


Seal Ring Disassembly Note

Caution

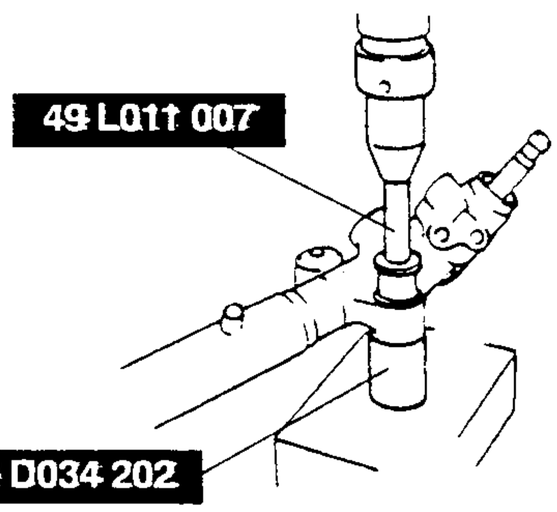
- **Do not damage the piston groove.**

- Disassemble the seal rings by using a small screwdriver.



Mount Bushing Disassembly Note

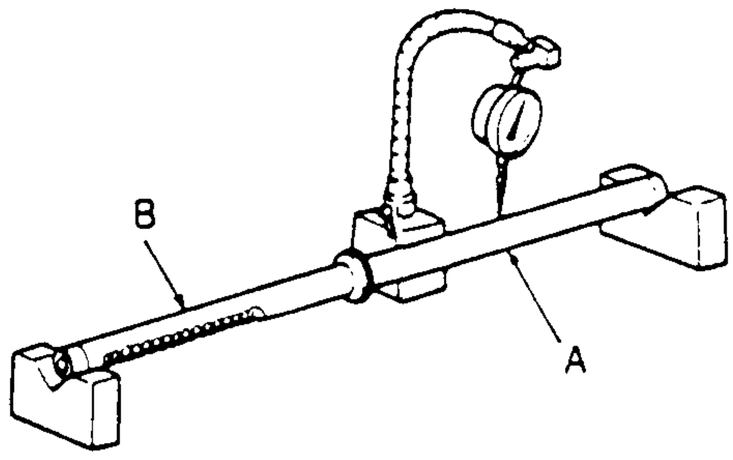
- Press the mount bushing out from the gear housing by using the **SSTs** and a press.



STEERING GEAR AND LINKAGE INSPECTION

Rack Inspection

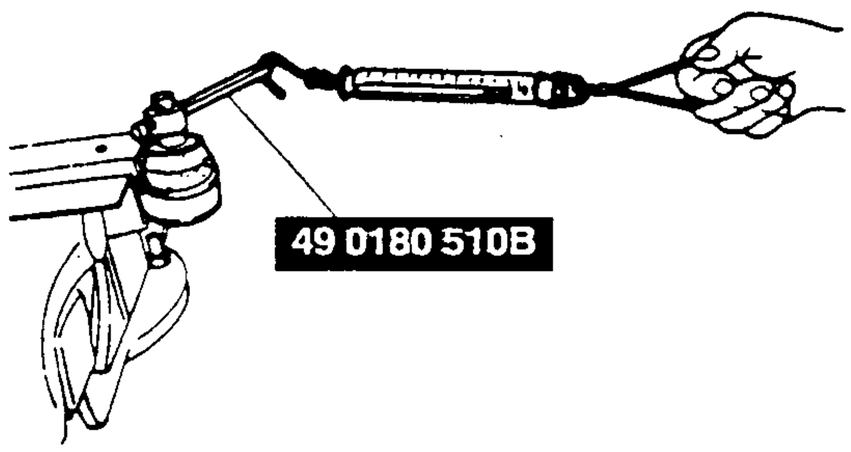
1. Inspect the rack for cracking, damage, and tooth wear. Replace it if necessary.
2. Measure the runout of the rack.



Runout
Near point A: 0.15 mm {0.006 in }
Near point B: 0.20 mm {0.008 in }

3. If not within the specification, replace the rack.

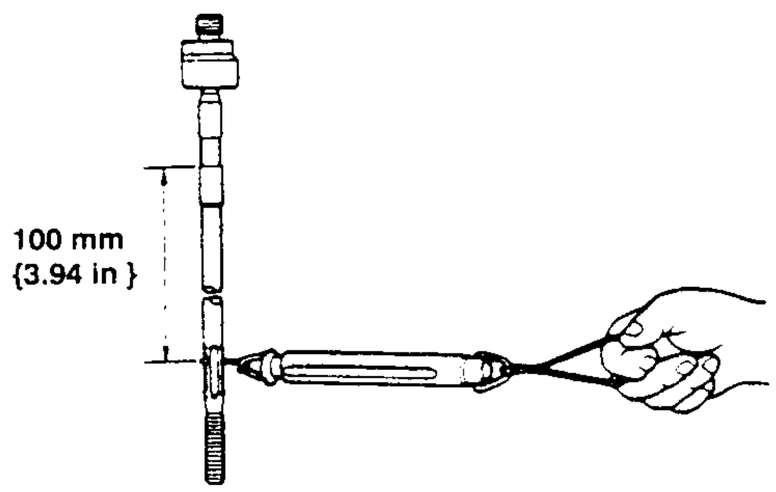
Tie-rod End Inspection
1. Inspect the tie-rod end for damage and boot cracks. Replace it if necessary.
2. Inspect the ball joint for looseness. Replace the tie-rod end if necessary.
3. Rotate the ball joint five times.
4. Measure the rotation torque of the ball joint using the **SST** and a pull scale.



Rotation torque
0.3—2.9 N·m {3—30 kgf·cm , 2.6—26 in·lbf }
Pull scale reading
3—29 N {0.3—3.0 kgf , 0.7—6.6 lbf }

5. If not within the specification, replace the tie-rod end.

Tie-rod Inspection
1. Inspect the tie-rod for bending and damage. Replace it if necessary.
2. Inspect the ball joint for looseness. Replace the tie-rod if necessary.
3. Swing the tie-rod five times.
4. Measure the swinging torque by using a pull scale.



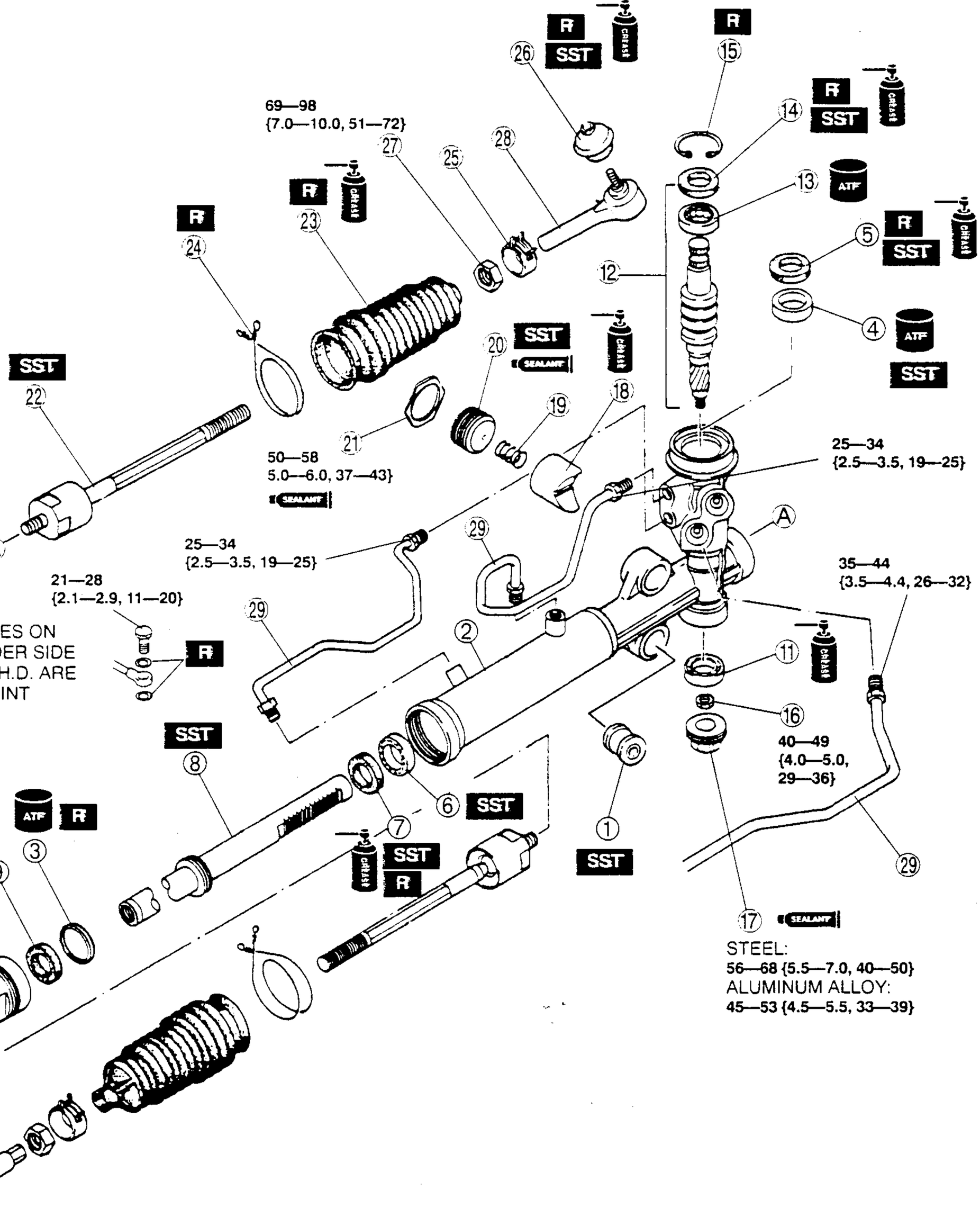
Swinging torque
0.1—3.4 N·m {1—35 kgf·cm, 0.9—30.3 in·lbf }
Pull scale reading
0.7—21.5 N·m {0.07—2.20 kgf, 0.16—4.84 lbf }

5. If not within the specification, replace the tie-rod.

STEERING GEAR AND LINKAGE ASSEMBLY

Caution
- **The steering gear is easily scratched or damaged when secured in a vise. Use protective plates in the jaws of the vise when securing the steering gear.**

- Assemble in the order indicated in the table.

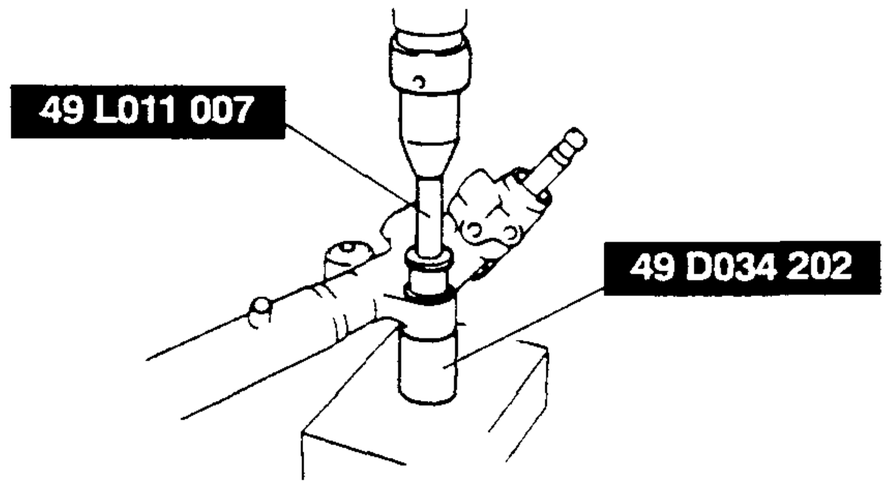


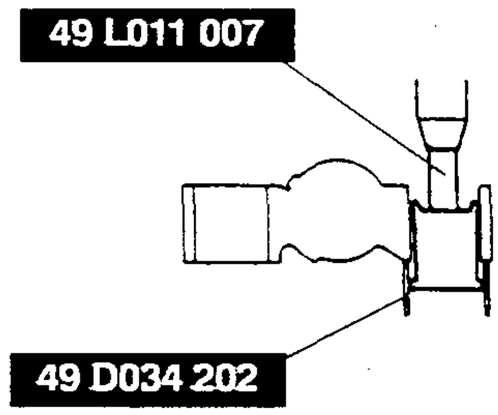
N·m { kgf·m , ft·lbf }

1	Mount bushing ☞ Assembly Note
2	Gear housing
3	Seal ring ☞ Assembly Note
4	Collar ☞ Assembly Note
5	Oil seal ☞ Assembly Note
6	Spacer ☞ Assembly Note
7	Oil seal ☞ Assembly Note
8	Steering rack ☞ Assembly Note
9	Oil seal ☞ Assembly Note
10	Rack bushing ☞ Assembly Note
11	Lower bearing ☞ Assembly Note
12	Pinion shaft component ☞ Assembly Note
13	Upper bearing ☞ Assembly Note
14	Oil seal ☞ Assembly Note
15	Snap ring ☞ Assembly Note
16	Locknut ☞ Assembly Note
17	Housing cover ☞ Assembly Note
18	Support yoke ☞ Assembly Note
19	Yoke spring ☞ Assembly Note
20	Adjusting cover ☞ Assembly Note
21	Locknut ☞ Assembly Note
22	Tie-rod ☞ Assembly Note
23	Boot ☞ Assembly Note
24	Boot wire ☞ Assembly Note
25	Boot band ☞ Assembly Note
26	Tie-rod end boot ☞ Assembly Note
27	Locknut
28	Tie-rod end ☞ Assembly Note
29	Oil pipe

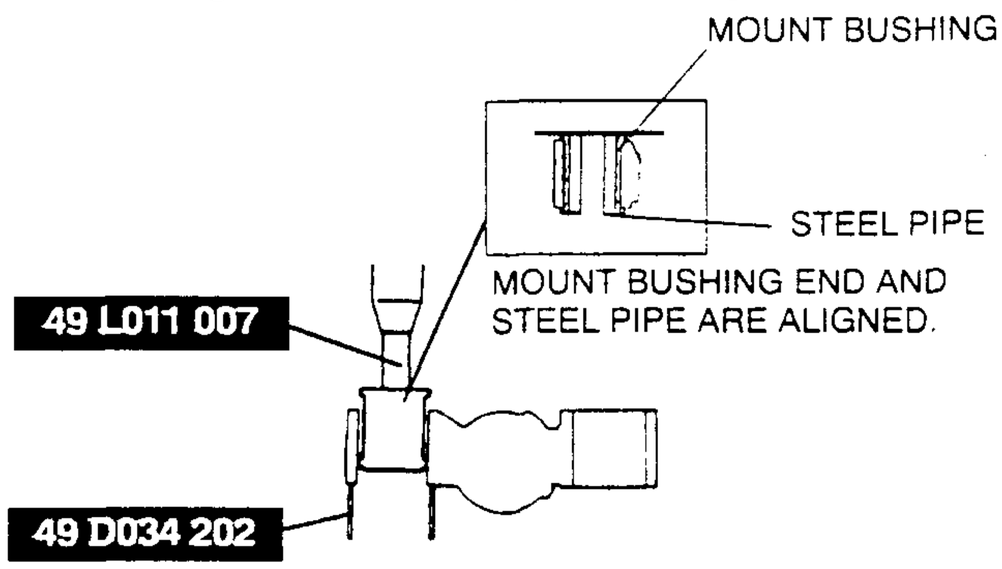
Mount Bushing Assembly Note

1. Apply soapy water to the rubber part of the mount bushing.
2. Press the mount bushing until the mount bushing end comes out completely from the gear housing by using the **SSTs** and a press.





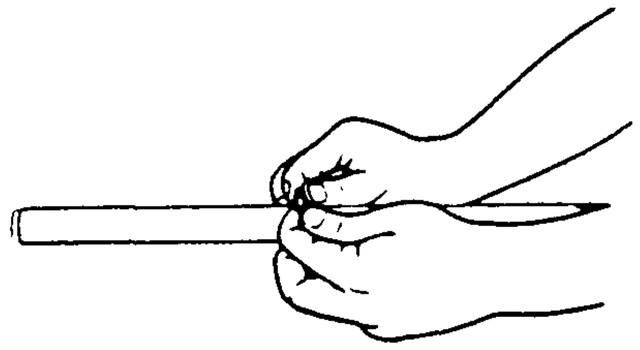
3. Reverse the gear housing, then press the mount bushing until the mount bushing end comes out completely from the other side. At this time, mount bushing end and steel pipe are aligned.



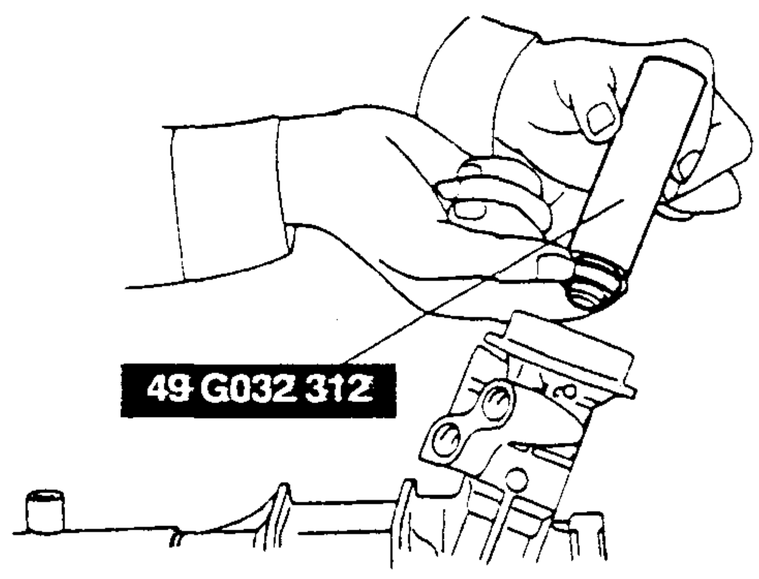
Seal Ring Assembly Note

Caution
- **Be careful not to cut or otherwise damage the edge of the seal ring.**

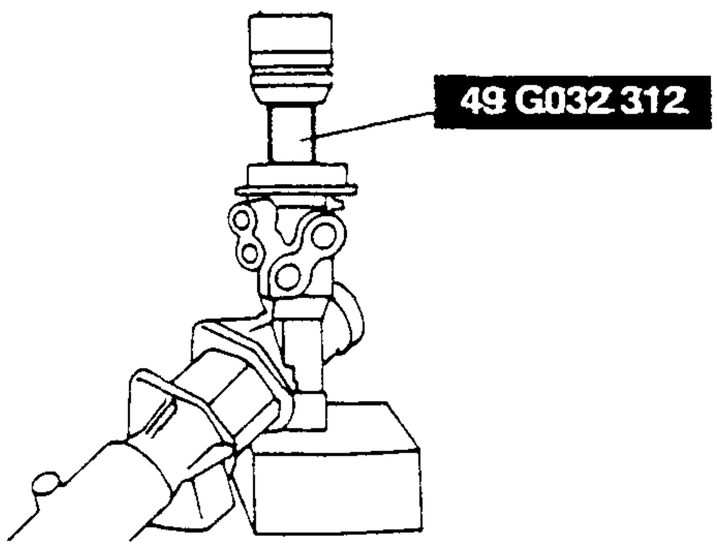
1. Apply ATF to a new seal ring.
2. Assemble the seal ring in the groove of the rack.
3. Compress the seal ring by hand to fit it into the groove.



Collar Assembly Note
1. Apply grease to the end of the **SST**.
2. Apply ATF to the collar.
3. Set the collar on the **SST**.
4. Insert the collar and the **SST** into the housing.

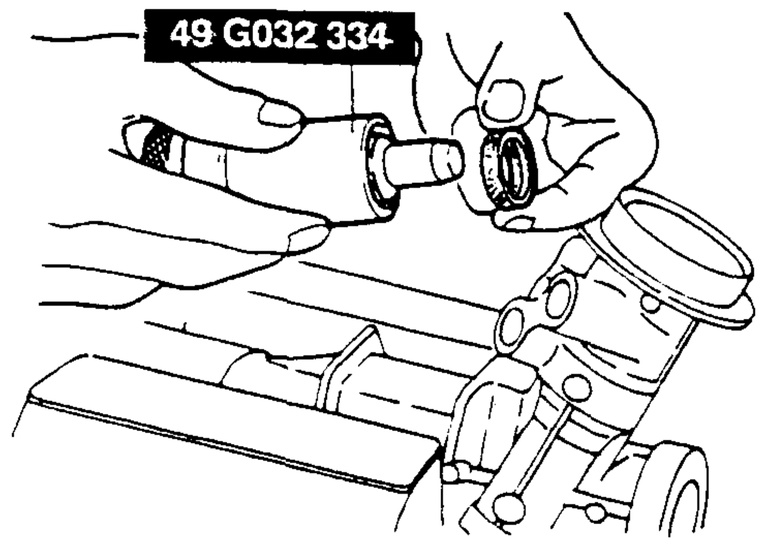


5. Press the collar and the **SST** into the housing.

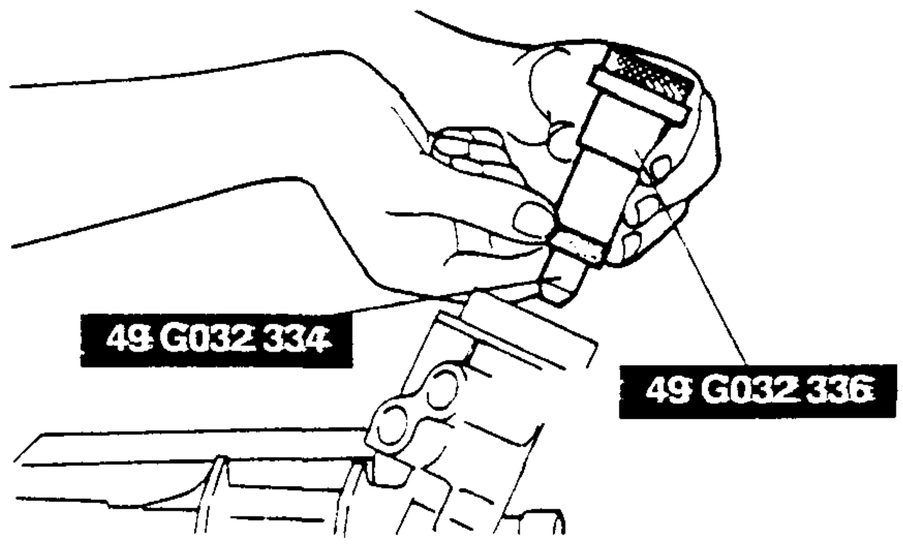


6. Remove the **SST**.

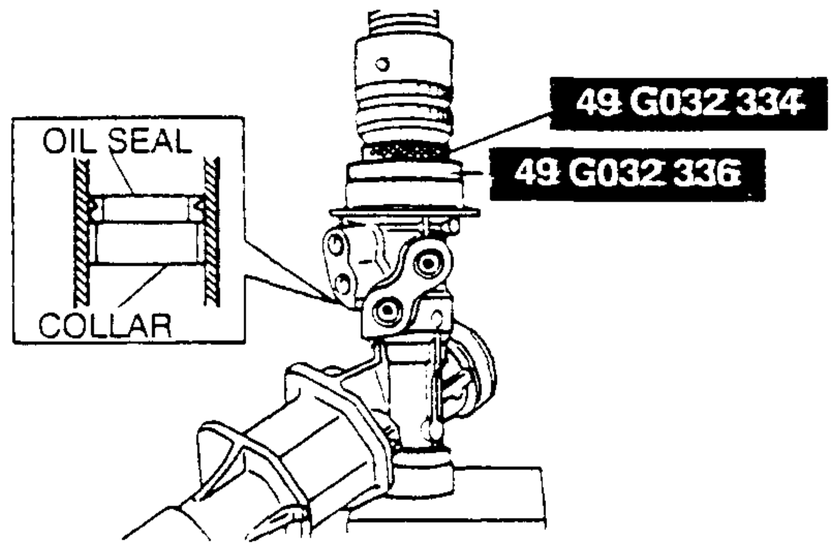
Oil Seal Assembly Note
1. Apply grease to the end of the **SST**.
2. Apply ATF to the new oil seal.
3. Set the oil seal on the **SST**.



4. Insert the oil seal and the **SST** into the housing.

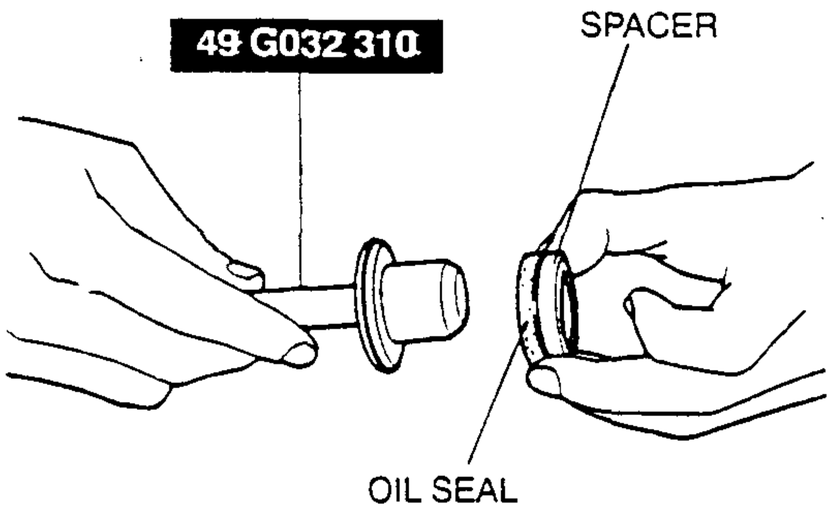


5. Press the oil seal and the **SST** into the housing.

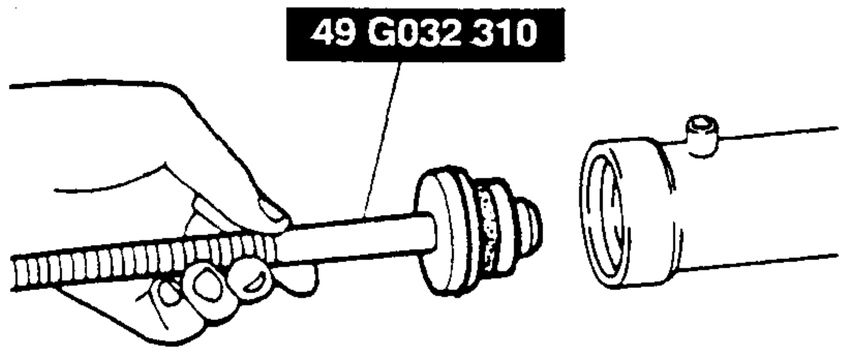


6. Remove the **SST**.

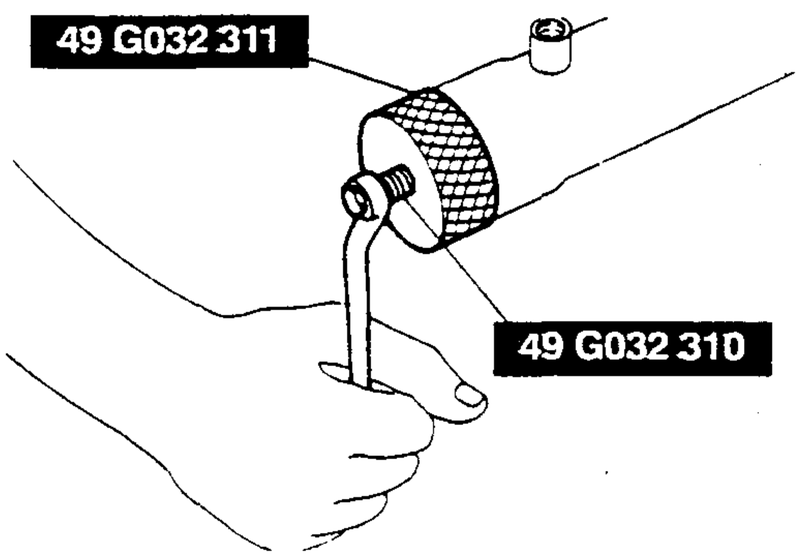
Spacer, Oil Seal Assembly Note
1. Apply grease to the face of the spacer.
2. Attach the new oil seal to the grease-coated surface of the spacer.
3. Apply ATF to the bore and outside edge of the spacer and the oil seal.
4. Set the oil seal and spacer on the **SST**.



5. Insert the **SST** from the tube side.

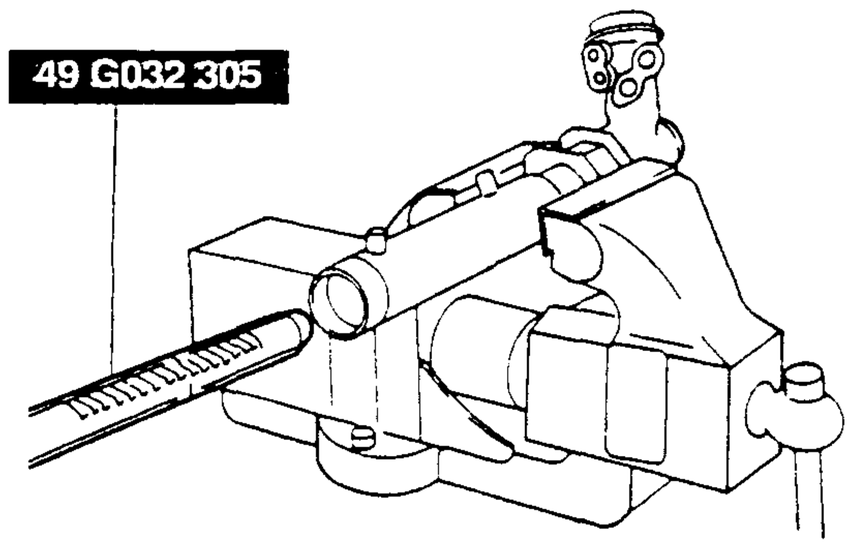


6. Install and tighten the **SST** against the tube.
7. Turn the **SST** in as far as it will go to push in the seal and spacer.
8. Remove the **SSTs**.



Steering Rack Assembly Note

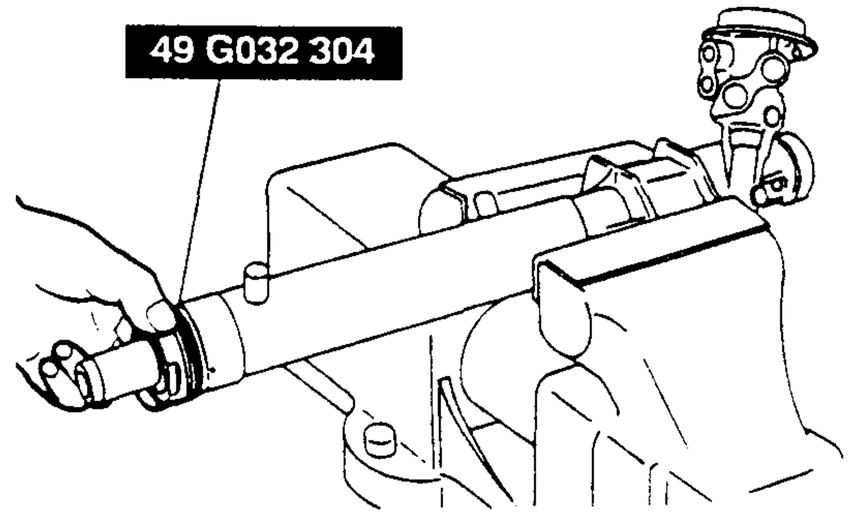
1. Apply grease to the friction surface and teeth of the rack.
2. Slide the **SST** over the rack and slide it in from the tube side.
3. Remove the **SST**.



4. Remove the **SST**.

Oil Seal Assembly Note

1. Apply ATF to a new oil seal and slide it on the rack.
2. Set the **SST** on the rack.
3. Turn the **SST** as far as it will go to push the oil seal into the tube.
4. Remove the **SST**.



5. Remove the **SST**.

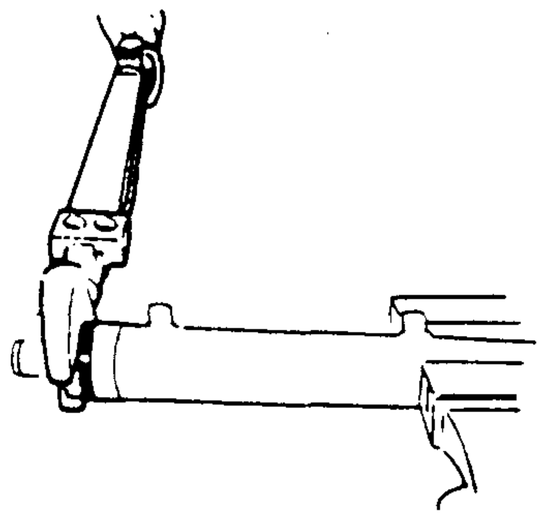
Rack Bushing Assembly Note

Note

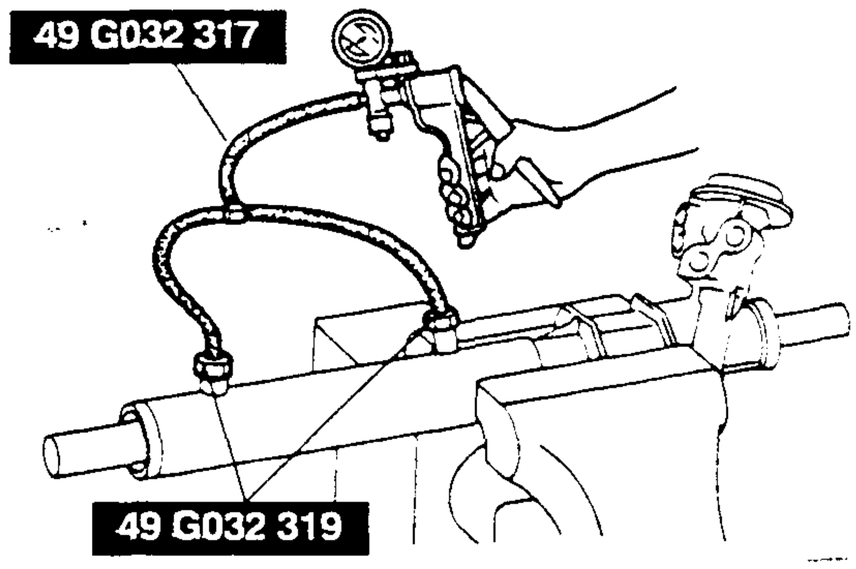
- The oil seal is pushed to the correct position in the rack housing by tightening the rack bushing.

1. Assemble the rack bushing component in the rack housing.

Tightening torque
89—98 N·m {9—10 kgf·m , 66—72 ft·lbf }



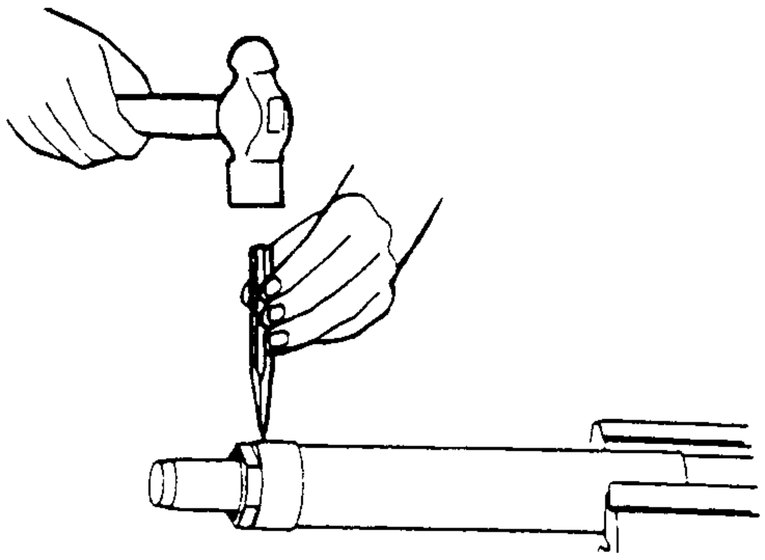
2. Perform the hermetic inspection of the cylinder.
   (1) Connect the **SST** to the cylinder housing.
   (2) Connect a vacuum pump to the **SST**.
   (3) Apply **53.3 kPa {400 mmHg , 15.7 inHg }** vacuum.
   (4) Verify that vacuum is held for at least **30 sec.** If not, check the seal component.



Caution

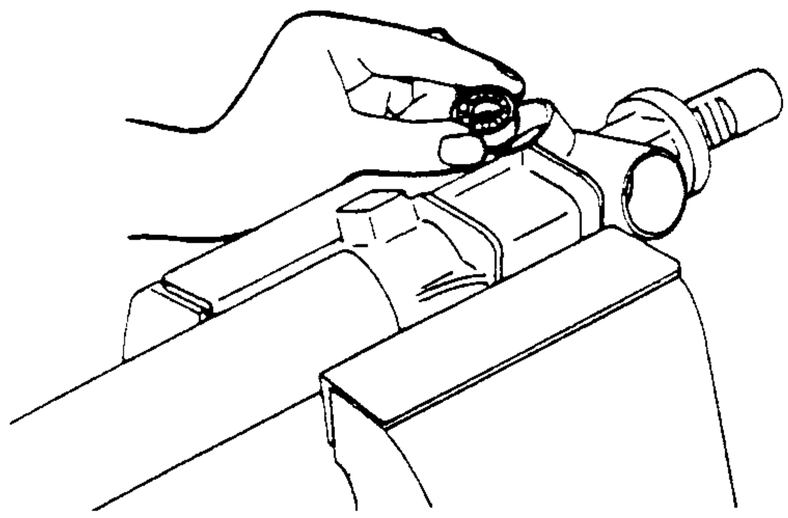
- **Stake a point 90 degree from the part cut away with a drill when disassembling.**

3. Stake the rack housing at two points **approx. 1.5 mm {0.06 in }** from the end by using a hammer and center punch.



Lower Bearing Assembly Note

1. Secure the gear housing in a vise so that the lower bearing bore faces upward.
2. Apply ATF to a lower bearing, and install it in the housing.
3. Press the bearing into the gear housing by tightening the housing cover until the resistance suddenly increases.

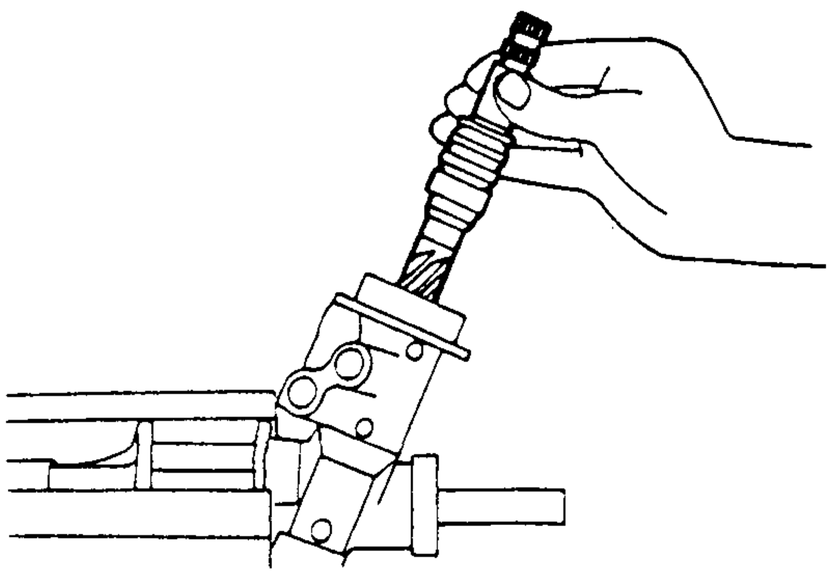


Pinion Shaft Component Assembly Note

Caution

- **Do not damage the oil seal by the teeth of the pinion shaft.**
- **Do not damage the edge of the seal ring and control valve.**

1. Apply grease to the teeth of the pinion shaft.
2. Apply ATF to a new seal ring and the friction surface of the control valve.
3. Assemble the pinion shaft component in the housing.



Upper Bearing Assembly Note

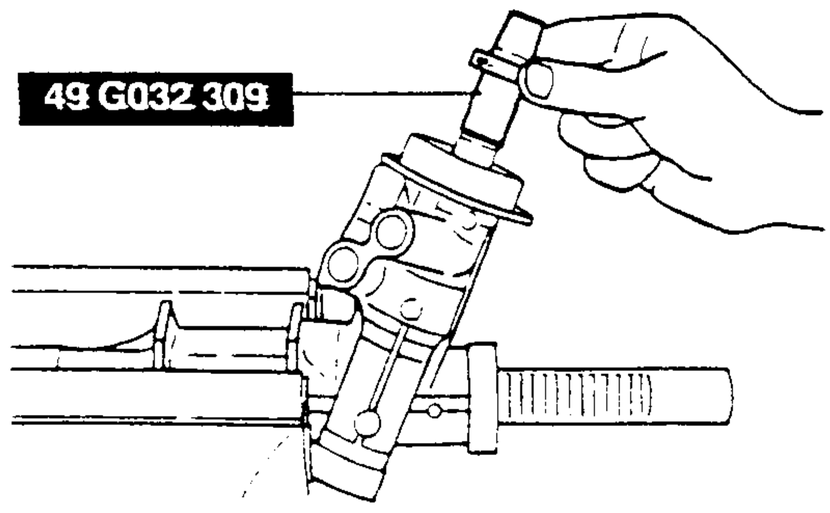
- Apply ATF to the upper bearing, and then assemble it.

Oil Seal Assembly Note

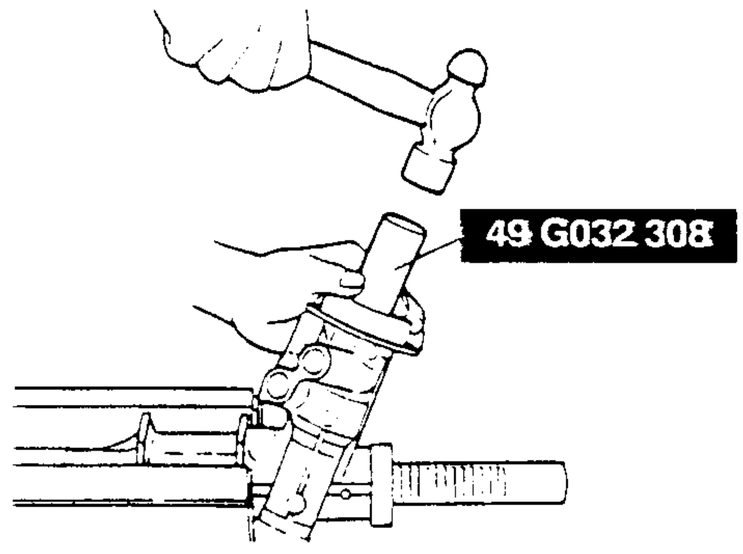
Note

- Apply uniform force to the oil seal when assembling.

1. Apply ATF to a new oil seal, and apply grease inside the lip.
2. Slide the **SST** over the serrations of the pinion shaft component.
3. Slide the oil seal over the **SST** and position it in the housing.



4. Tap the oil seal in by using the **SST** until the snap ring installation groove in the housing is just visible.

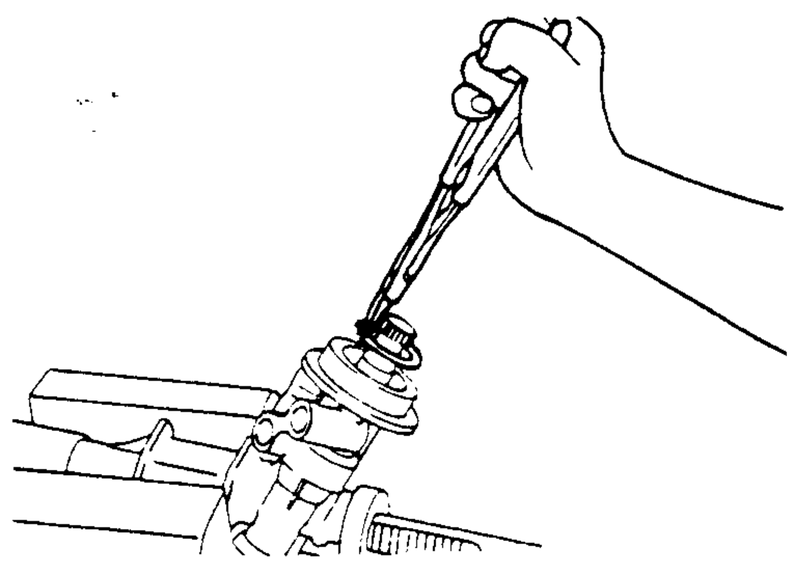


Snap Ring Assembly Note

Caution

- **Verify that the snap ring is correctly seated in the ring groove of the housing.**

- Assemble a new snap ring by using snap-ring pliers.



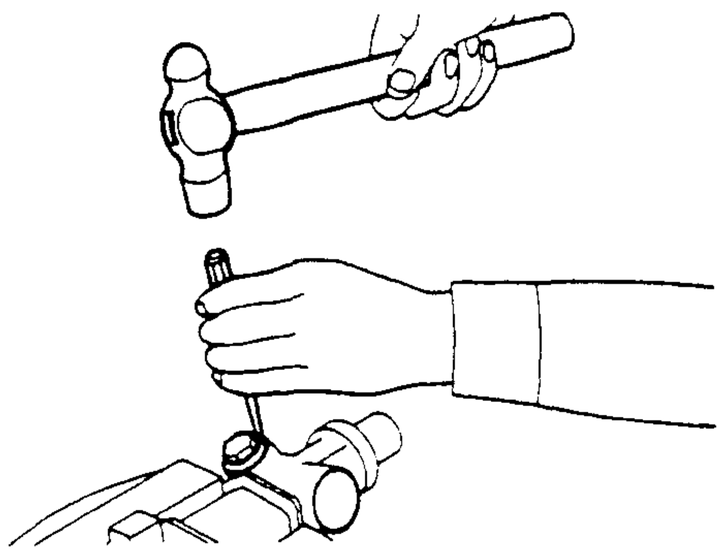
Locknut Assembly Note

1. Temporarily install the tie-rod on the tube side of the rack.

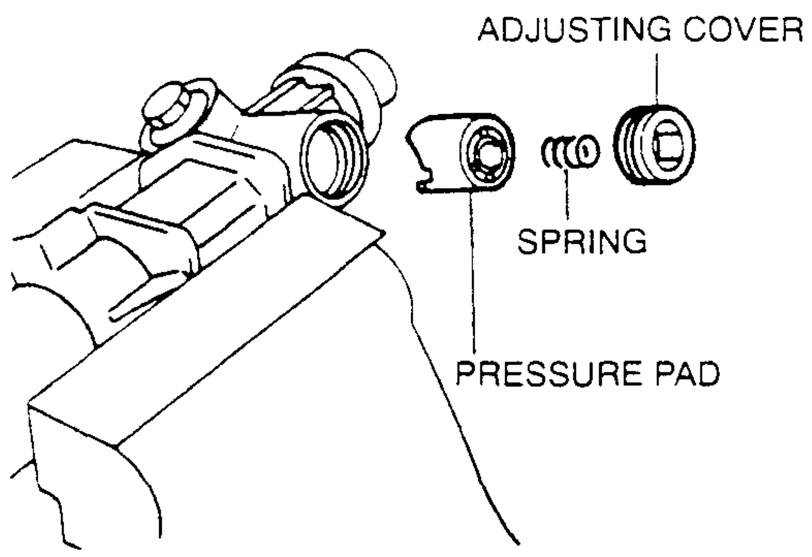
2. Invert the housing and install the locknut on the pinion shaft.
3. Turn it until the tie-rod contacts the tube.
4. Tighten the locknut.

Tightening torque
40—49 N·m {4.0—5.0 kgf·om , 29—36 ft·lbf }

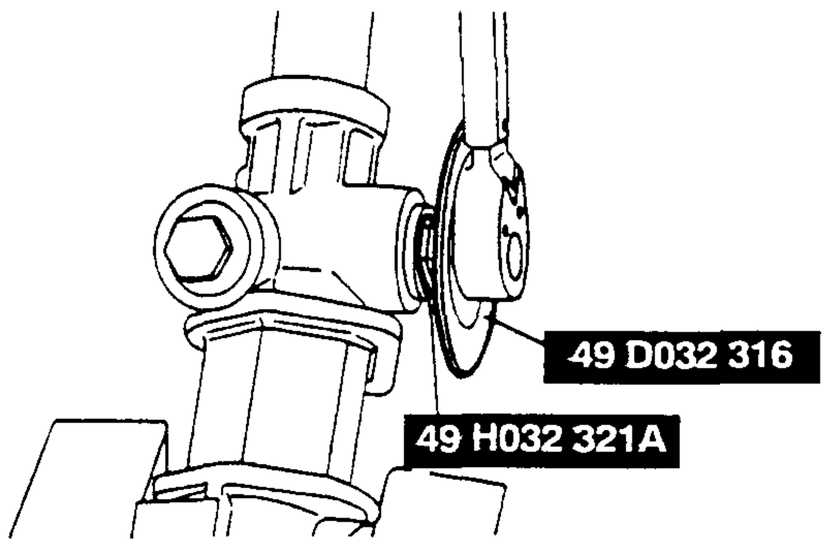
Housing Cover Assembly Note
1. Apply thread-locking compound to the housing cover threads.
2. Assemble the housing cover.
3. Stake between the rack housing and housing cover at two opposing points by using a center punch and a hammer.



Support Yoke, Yoke Spring Assembly Note
1. Secure the gear housing in a vise so that the support yoke installation position facing upward.
2. Apply grease to the rack friction surface of the support yoke, then assemble it in the housing.
3. Assemble the support yoke.
4. Assemble the yoke spring.

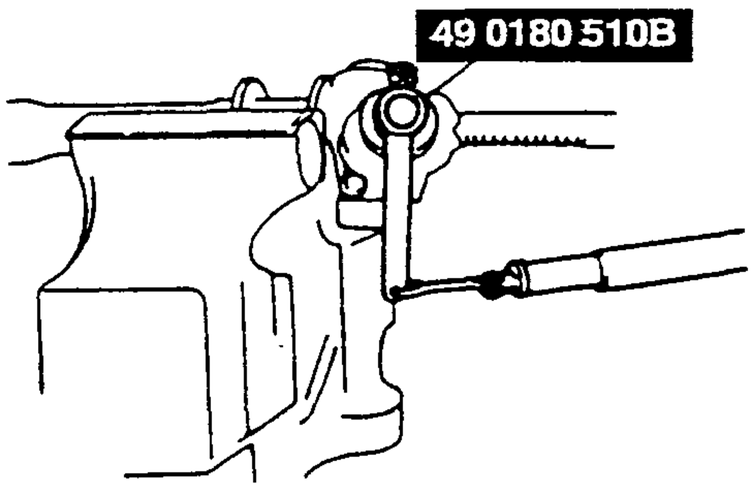


Adjusting Cover, Locknut Assembly Note (Pinion preload adjustment)
1. Set the rack in the center position.
2. Tighten the adjusting cover to **9.8 N·m {100 kgf·cm , 87 in·lbf }**, then loosen it.
3. Tighten again to **4.5—5.3 N·m {45—55 kgf·cm , 40—47 in·lbf }**, and then return it **45 degrees**.
4. Apply thread-locking compound to the exposed threads of the adjusting cover.



5. Measure pinion torque with the **SST** and pull acale.

Standard
Center of rack ±90 °
1.0—1.4 N·m
{10—14 kgf·cm , 8.7—12.2 in·lbf }
(Pull scale reading: 1.0—1.4 kgf {2.2—2.6 lbf })
At other position
1.6 N·m {17 kgf·cm , 14.7 in·lbf } max.
(Pull scale reading: 1.7 kgf {3.7 lbf } max.)

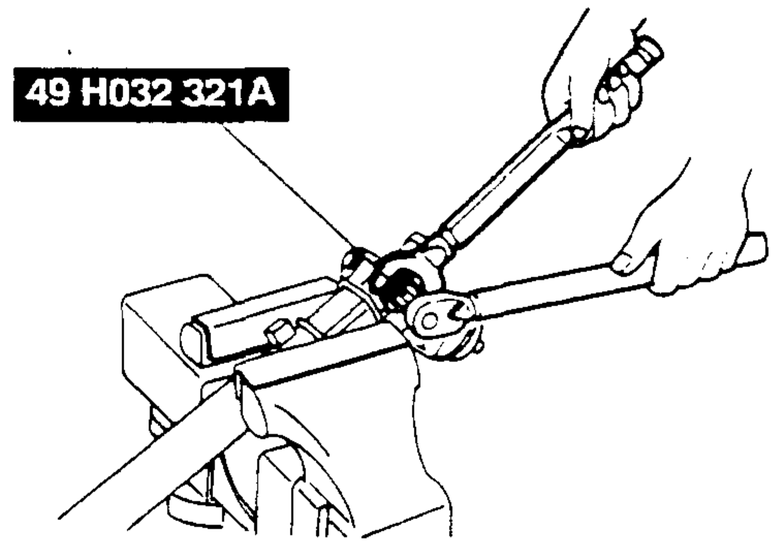


6. If not within the specification, repeat steps 2–5.

Caution
- **Do not allow the adjusting cover to turn.**

7. Apply thread-locking compound to the exposed threads of the adjusting cover.
8. Assemble and tighten the locknut while holding the adjusting cover by using the **SST**.

Tightening torque
50—58 N·m {5.0—6.0 kgf·m , 37—43 ft·lbf }



Tie-rod Assembly Note
1. Secure the rack in a vise.
2. Assemble the tie-rod onto the rack.

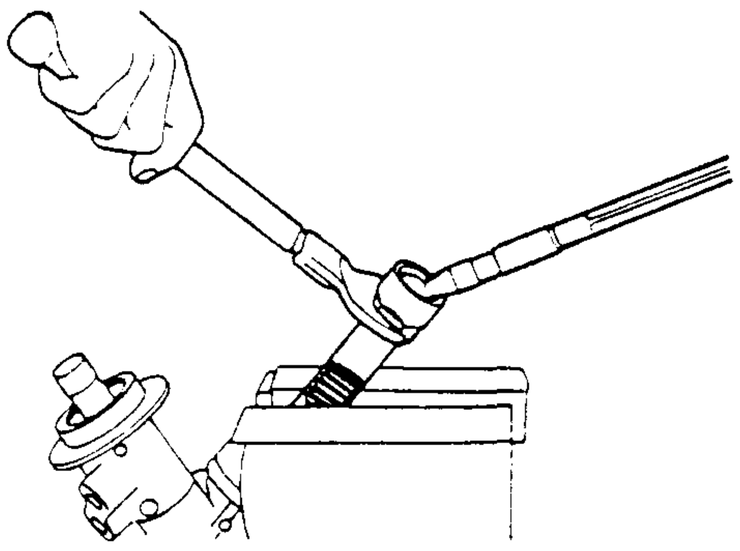
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Tightening torque
123—142 N·m
{12.5—14.5 kgf·m , 91—104 ft·lbf }

Boot, Boot Wire, Boot Band Assembly Note

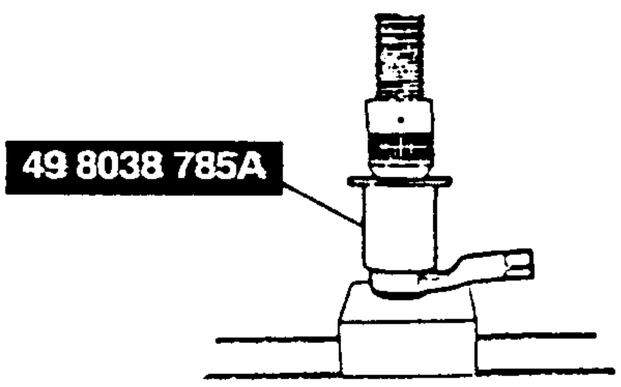
Note
- Do not break the boot wire.

1. Apply grease to the inside of the small end of the boot.
2. Assemble the boot. Wrap a new boot wire around the large end of the boot twice and then twist it 4 to 4.5 times. Bend the twisted part toward the mounting bracket.



3. Assemble the boot clamp on the small end of the boot.

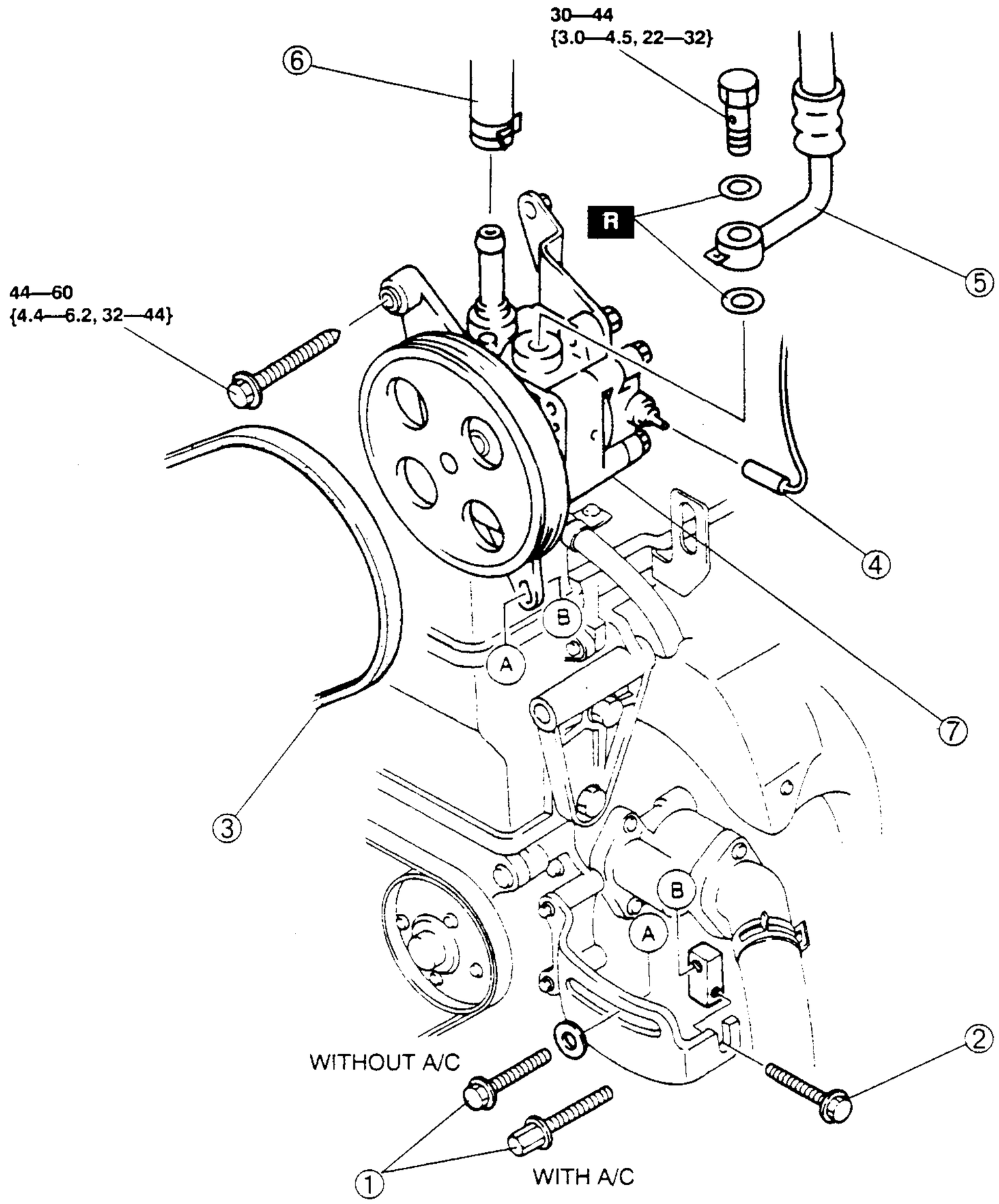
Tie-rod End Boot Assembly Note
1. Wipe away the grease on the ball joint.
2. Put a small amount of grease into the new boot and set it onto the tie-rod end.
3. Press the boot onto the tie-rod end by using the **SST** and a press.
4. Wipe away any grease expelled from the dust boot.



Tie-rod End Assembly Note

POWER STEERING OIL PUMP REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Adjust the drive belt. (Refer to Section B, DRIVE BELT, DRIVE BELT ADJUSTMENT)



N·m { kgf·m , ft·lbf }

1	Lock bolt
2	Adjusting bolt
3	Drive belt
4	Pressure switch connector

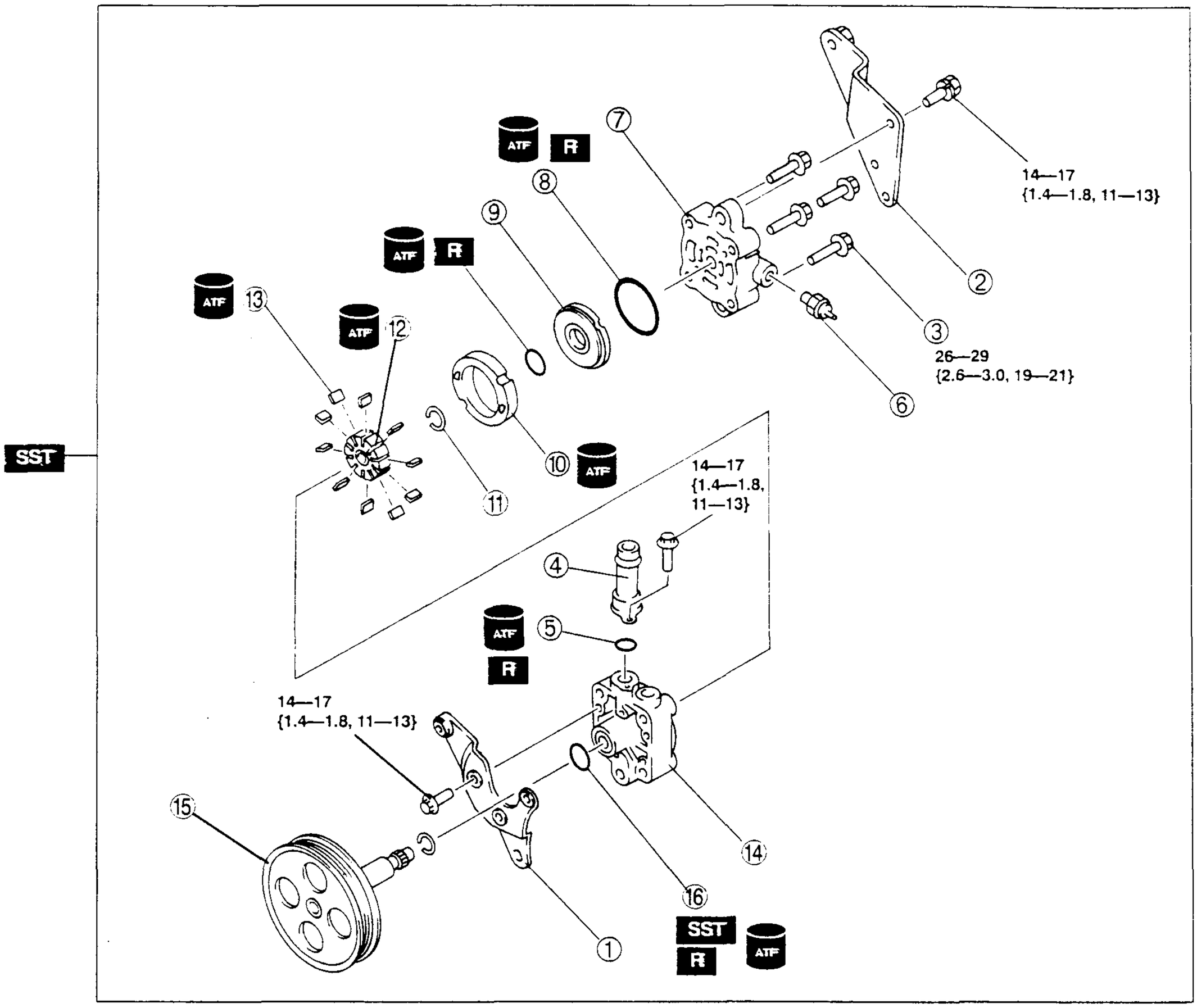
5	Pressure pipe
6	Return hose
7	Power steering oil pump and bracket

POWER STEERING OIL PUMP DISASSEMBLY/ASSEMBLY

Note

- The following procedure is for replacement of the O-ring, oil seal and shaft component only. Replace the pump component if other repairs are necessary.

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.

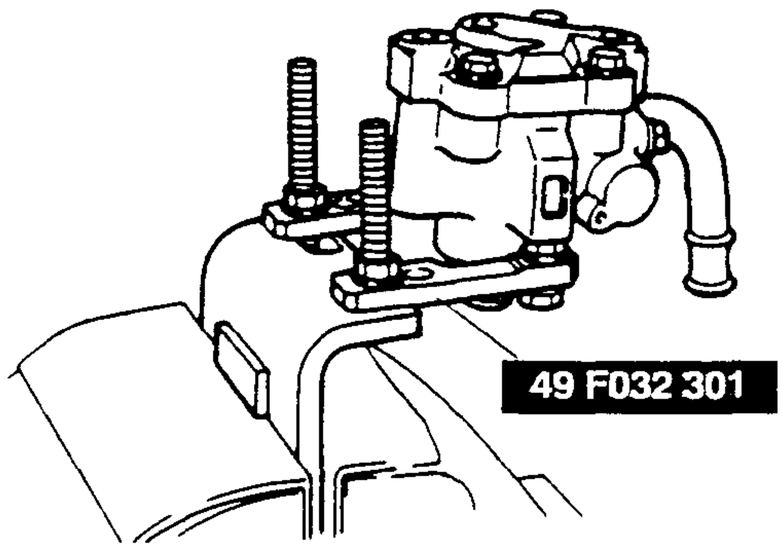


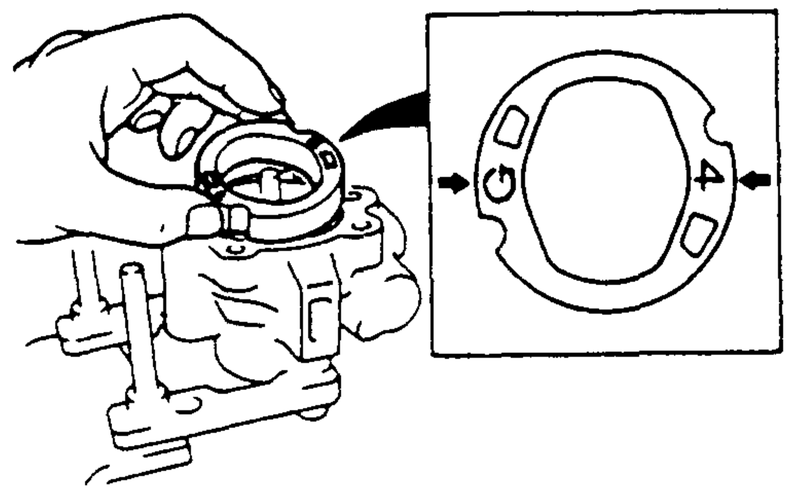
N·m { kgf·m , ft·lbf }

1	Front bracket
2	Rear bracket
3	Bolt
4	Suction pipe
5	O-ring
6	P.S.P switch component
7	Rear pump body ☞ Assembly Note
8	O-ring
9	Side plate
10	Cam ring ☞ Assembly Note
11	Backup ring
12	Rotor
13	Blade ☞ Assembly Note
14	Front pump body
15	Shaft component
16	Oil seal ☞ Assembly Note

Oil Pump Disassembly Note

Caution
- **Use the SST to prevent damage to the pump when securing it in a vise.**

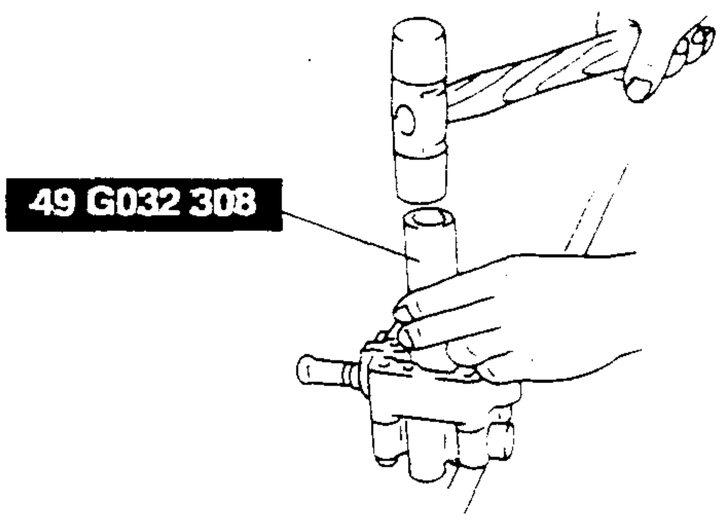




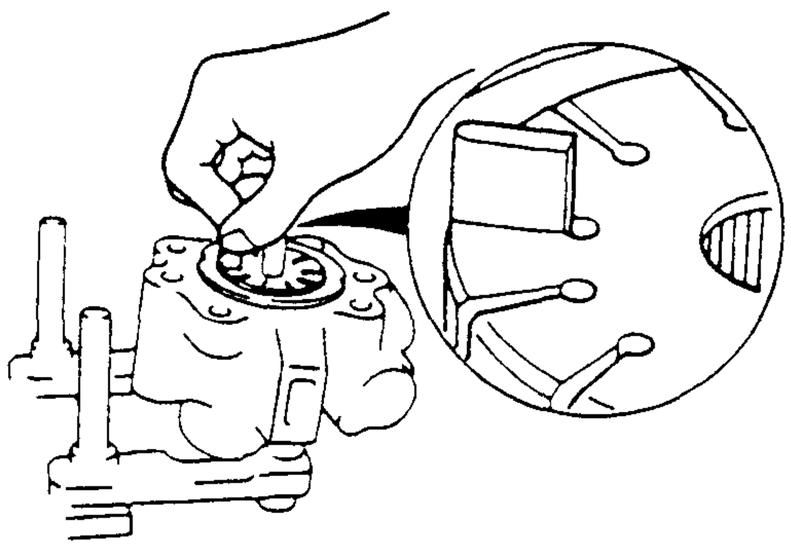
Oil Seal Assembly Note

Caution
- **The pump body should be put evenly.**

- Assemble the oil seal by using the **SST** and a hammer.



Blade Assembly Note
- Place the blades in the rotor with the rounded edges contacting the cam.



Cam Ring Assembly Note
- Install the cam ring in the front pump body with the mark facing upward.

BRAKING SYSTEM

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GENERAL PROCEDURES

Wheels and tires removal / installation

- The removal and installation procedures for the wheels and tires are not mentioned in this section. when a wheel is removed, retighten it to **89—117 N·m {9.0—12.0 kgf·m , 66—86 ft·lbf }**.

Brake lines disconnection/connection

Caution

- **Brake fluid will damage painted surfaces. If brake fluid does get on a painted surface, wipe it off immediately.**

- If the brake line has been disconnected anytime during the procedure, add brake fluid, bleed the brakes, and inspect for leakage after the procedure has been completed.

Brake pipe flare nut tightening

- Tighten the brake pipe flare nut by using the **SST** (49 0259 770B). Be sure to modify the brake pipe flare nut tightening torque to allow for use of a torque wrench-**SST** combination. (Refer to section GI, FUNDAMENTAL PROCEDURES, TORQUE FORMULAS.)

Connectors disconnection

- Disconnect the negative battery cable before doing any work that requires handling of connectors. Connect the negative battery cable only after the work is completed.

ABS/TCS component operations

- Make sure that there are no diagnostic trouble codes in the ABS/TCS memory after working on ABS/TCS components. If there are any codes in the memory, erase them. (Refer to ON-BOARD DIAGNOSTIC FUNCTION, ANTILOCK BRAKE SYSTEM AND TRACTION CONTROL SYSTEM, Post Repair Procedures.)

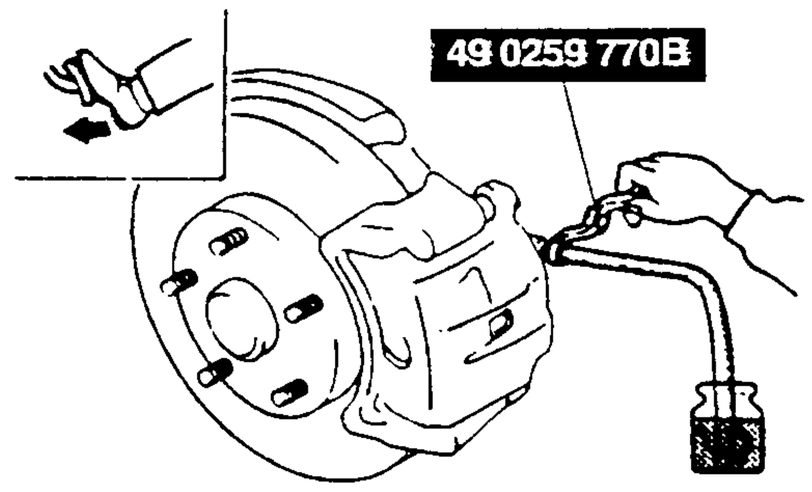
CONVENTIONAL BRAKE SYSTEM

AIR BLEEDING

Note

- The brakes should be bled whenever a brake line is disconnected. If a hydraulic line is disconnected at the master cylinder, start at the slave cylinder farthest from the brake master cylinder, and move to the next farthest slave cylinder until all four cylinders have been bled. If the disconnection point is anywhere except the master cylinder, start at the point closest to the disconnection, and move to the next closest slave cylinder until all four cylinders have been bled.

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Remove the bleeder cap and attach a vinyl tube to the bleeder screw.
3. Place the other end of the vinyl tube in a clear, fluidfilled container.
4. First person depresses the brake pedal a few times, and then holds it in the depressed position.
5. The second person loosens the bleeder screw, drains out the fluid and closes the screw by using the **SST**.



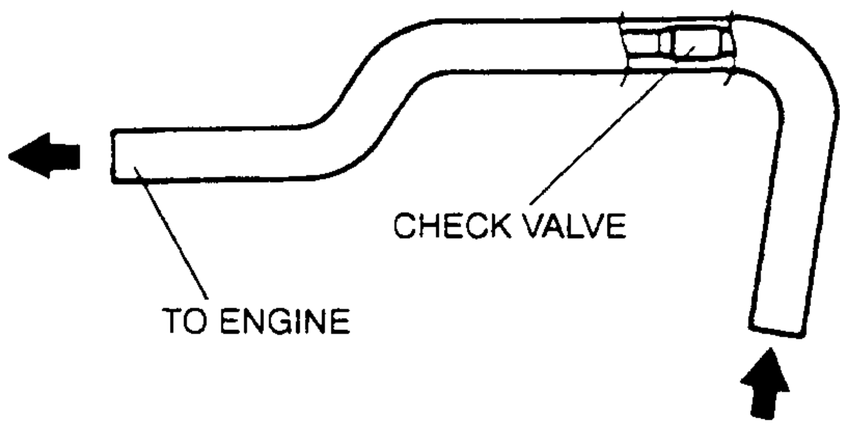
6. Repeat step 4 and 5 until no air bubbles are seen. The reservoir should be kept about 3/4 full during bleeding to prevent air from reentering the lines.

   Tightening torque
   5.9—8.8 N·m {60—90 kgf·cm , 53—78 in·lbf }

7. Check for correct brake operation.
8. Verify that there is no fluid leakage. Wipe off any spilled fluid immediately.
9. After bleeding the brakes, add brake fluid to the maximum level.

VACUUM LINE INSPECTION

1. Remove the clamps and vacuum hose.
2. Apply both suction and pressure to the engine-side hose, and verify that air blows only toward that side. If air flow in both directions or not at all, replace the vacuum hose.



BRAKE PEDAL INSPECTION

Brake Pedal Height Inspection

- Verify the distance from the center of the upper surface of the pedal pad to the carpet is as specified.

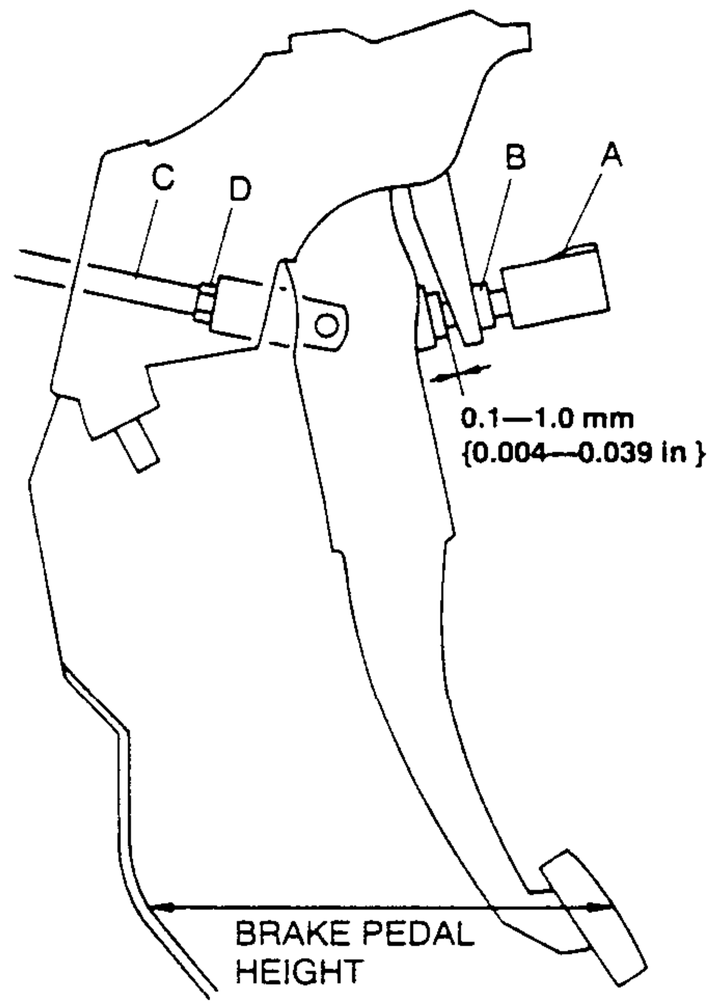
Pedal height (reference value)
L.H.D.: 185 mm {7.28 in }
R.H.D.: 200 mm {7.87 in }

Brake Pedal Height Adjustment

1. Disconnect the brake switch connector.
2. Loosen locknut B and turn switch A until it does not contact the pedal.
3. Loosen locknut D and turn rod C to adjust the height.
4. Tighten the bolt with locknut B so that clearance between the bolt for brake light switch A and pedal stopper is within the specification.

Specification
0.1—1.0 mm {0.004—0.039 in }
Tightening torque
14—17 N·m {140—180 kgf·cm , 122—156 in·lbf }

5. Connect the brake switch connector.
6. After adjustment, inspect the pedal play and the brake light operation.



Brake Pedal Play Inspection

1. Depress the pedal a few times to eliminate the vacuum in the system.
2. Remove the snap pin, verify that the holes in the fork and in the pedal are aligned, and reinstall the pin.
3. Gently depress the pedal by hand until resistance is felt, and check the play.

Pedal play
4—12 mm {0.16—0.47 in }

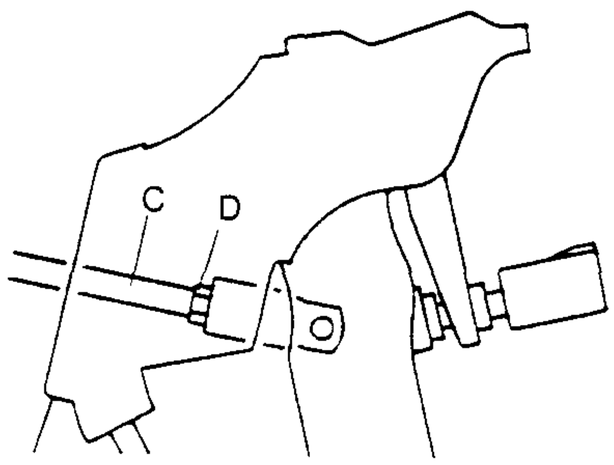


Brake Pedal Play Adjustment

1. Remove the snap pin and clevis pin.
2. Loosen locknut D and turn rod C to align the holes in the fork and in the pedal.
3. Install the clevis pin and the snap pin.
4. Tighten locknut D.

Tightening torque
24—34 N·m {2.4—3.5 kgf·m , 18—25 ft·lbf }

P



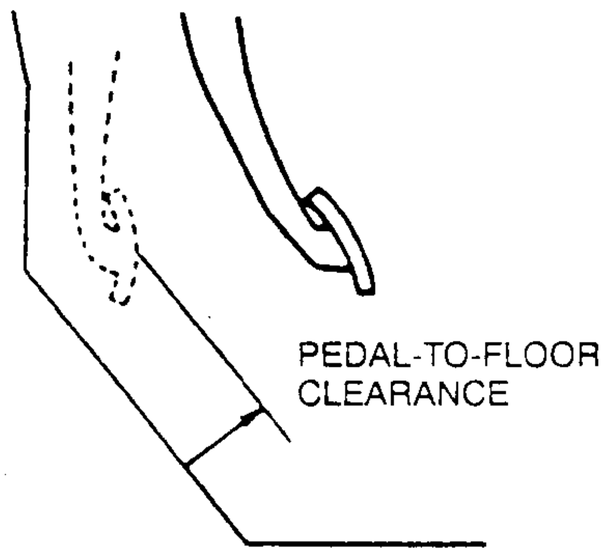
5. Check the pedal height and the brake light operation.

Pedal-to-floor Clearance Inspection

1. Start the engine and verify that the distance from the floor panel to the pedal pad center is as specified when the pedal is depressed with a force of **589 N {60 kgf , 132 lbf }**.

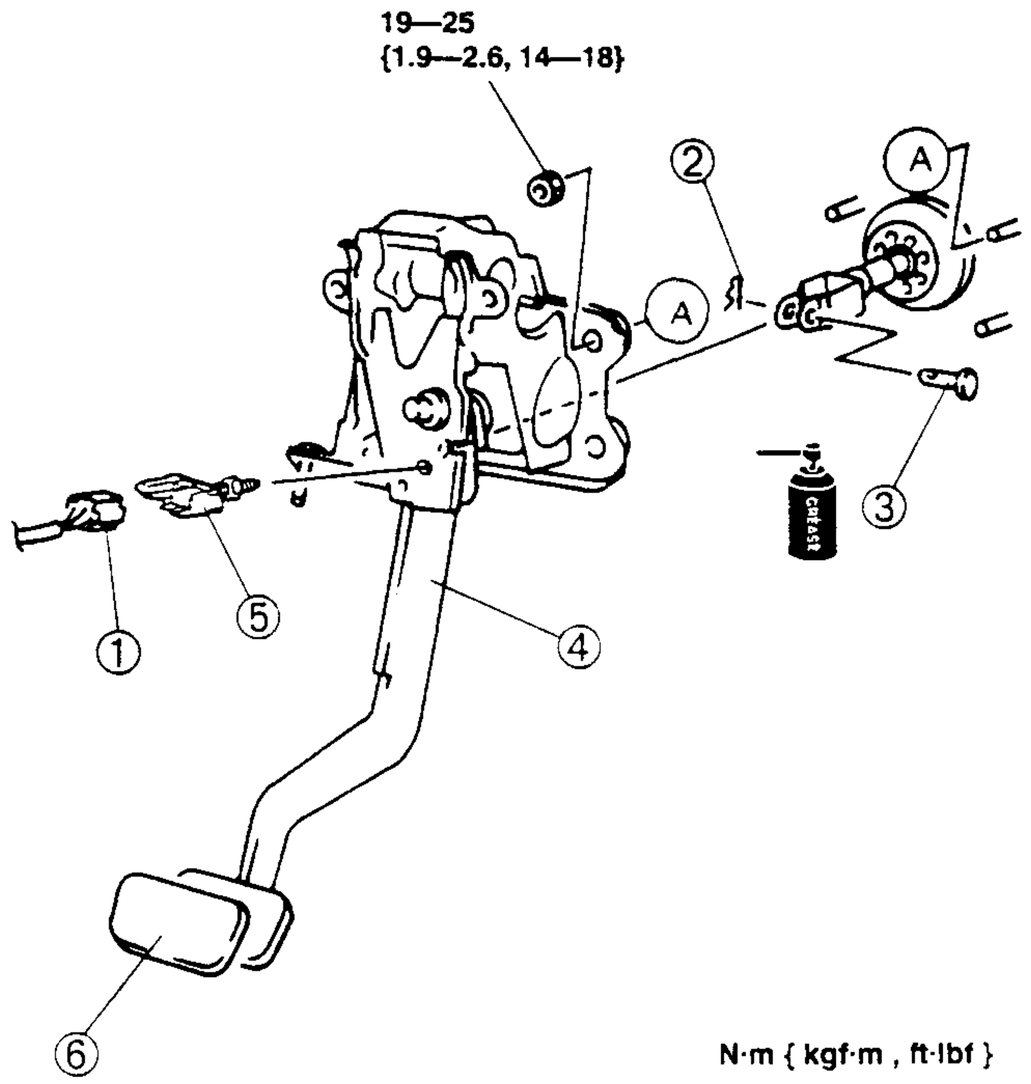
   Specification
   L.H.D.: 80 mm {3.1 in } min.
   R.H.D.: 95 mm {3.7 in } min.

2. If the distance is less than specified, check for the air in brake system.



BRAKE PEDAL REMOVAL/INSTALLATION

1. Remove the lock unit (ATX).
2. Remove the steering shaft. (Refer to section N ENGINE SPEED SENSING POWER STEERING, STEERING WHEEL AND COLUMN REMOVAL/ INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



N·m { kgf·m , ft·lbf }

1	Brake switch connector
2	Spring pin
3	Clevis pin
4	Brake pedal
5	Brake switch
6	Pedal pad

BRAKE SWITCH INSPECTION

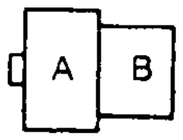
1. Disconnect the brake switch connector.
2. Check for continuity between the terminals of the brake switch connector by using the circuit tester.

○—○ : Continuity

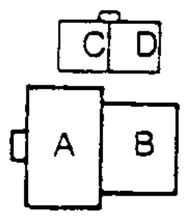
Condition	Terminal			
	A	B	C	D
When the brake pedal is depressed	○—○			
When the brake pedal is not depressed			○—○	

3. If not as specified, replace the brake switch.

WITHOUT CRUISE CONTROL SYSTEM

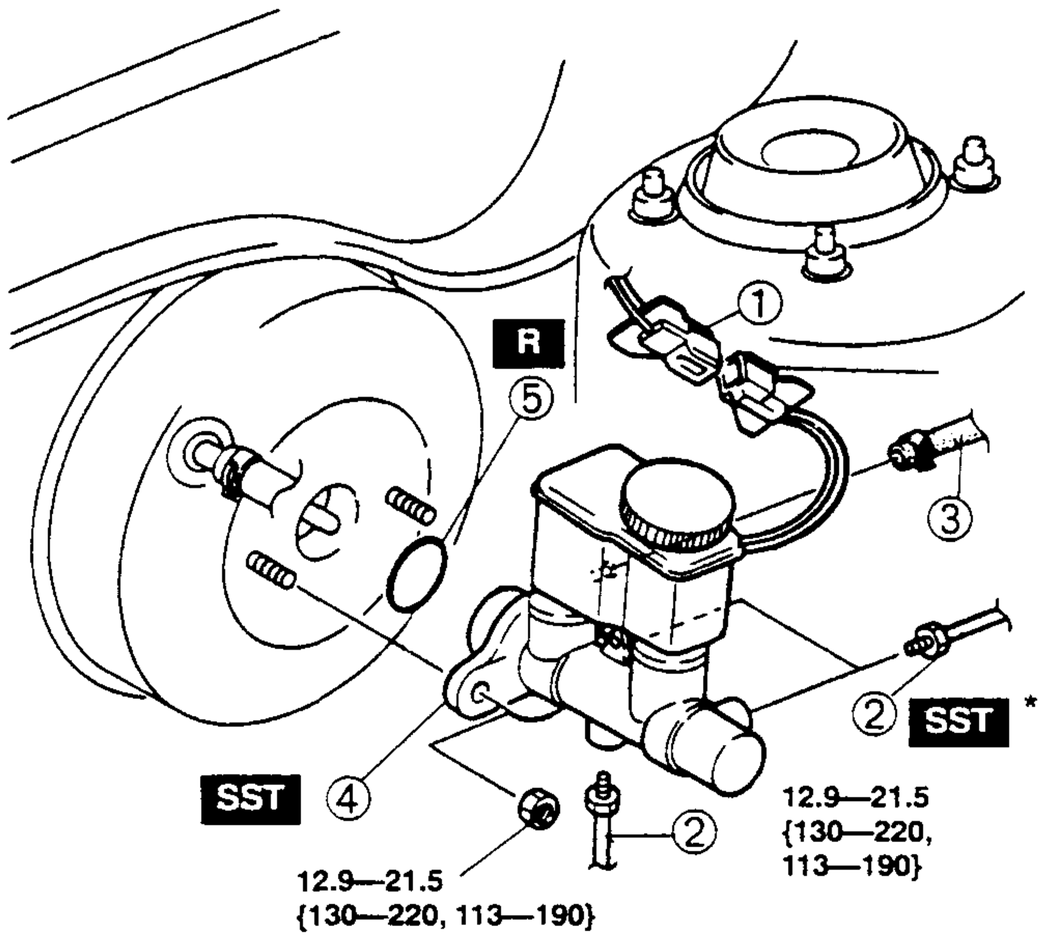


WITH CRUISE CONTROL SYSTEM



MASTER CYLINDER REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



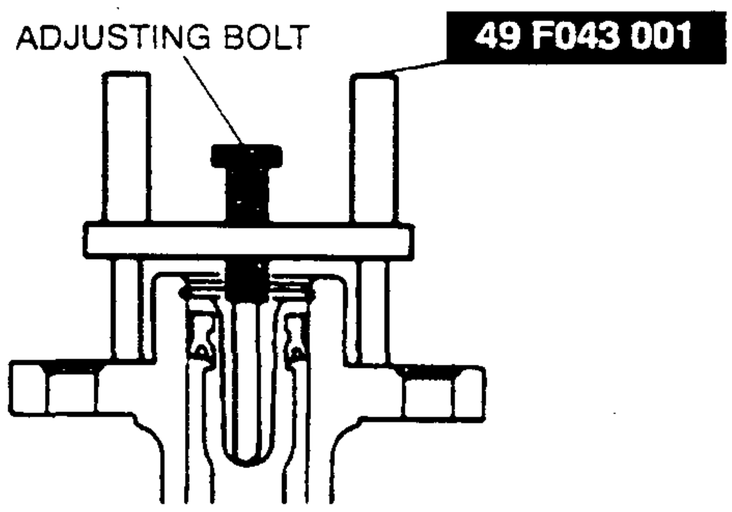
* 49 0259 770B

N·m { kgf·cm , in·lbf }

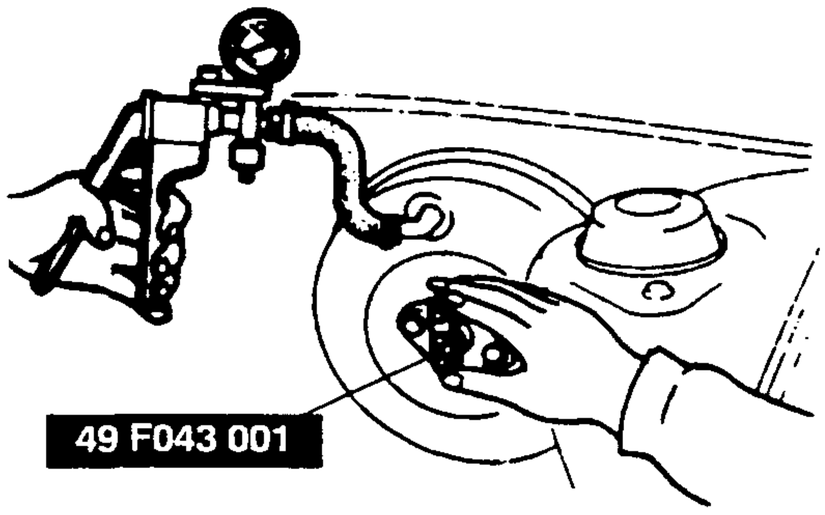
1	Brake fluid level sensor connector
2	Brake pipe
3	Hose (MTX)
4	Master cylinder ☞ Installation Note
5	O-ring

Master Cylinder Installation Note (MTX Without ABS)

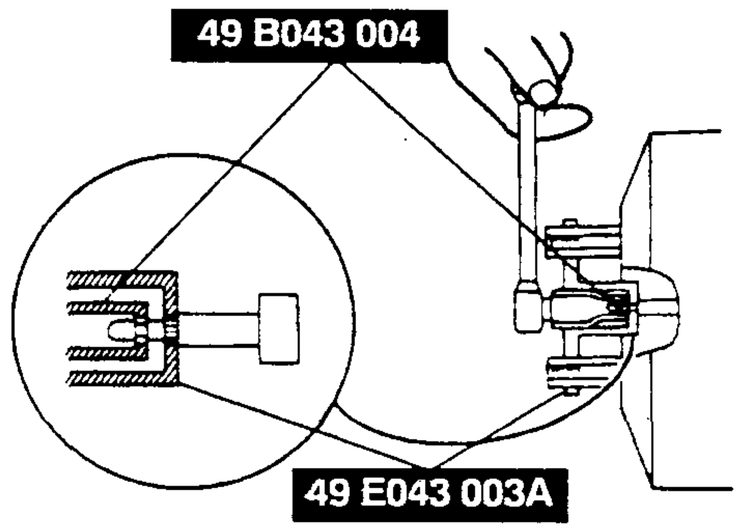
1. Place the **SST** atop the master cylinder. Turn the adjusting bolt until it touches the bottom of the push rod hole in the piston.



2. Apply **66.7 kPa {500 mmHg , 19 inHg }** vacuum to the power brake unit by using a vacuum pump.
3. Invert the **SST** used in step 1 and place it on the power brake unit.



4. Measure the clearance between the end of the **SST** and the push rod of the power brake unit. If it is not **0 mm {0 in }**, loosen the push rod locknut and turn the push rod to adjust it by using the **SSTs**.

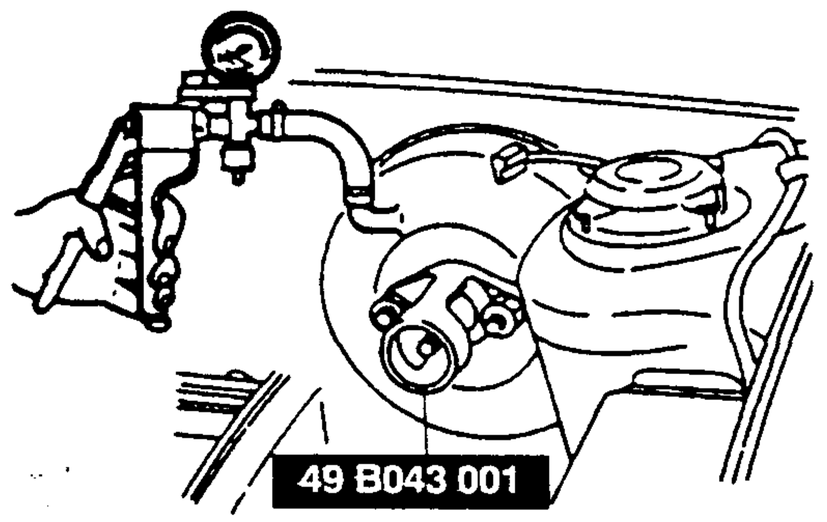


Master Cylinder Installation Note (Except MTX without ABS)

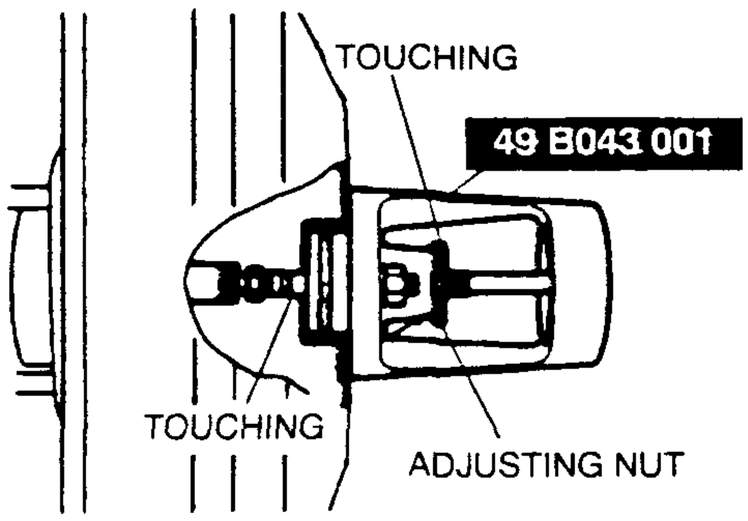
1. Loosen the adjusting nut of the **SST**.
2. Place the **SST** on the power brake unit and tighten the nut and washer.

Tightening torque
9.9—15.6 N·m {100—160 kgf·cm , 87—138 in·lbf }

3. Apply **66.7 kPa { 500 mmHg , 19.7 inHg }** vacuum to the power brake unit by using a vacuum pump.



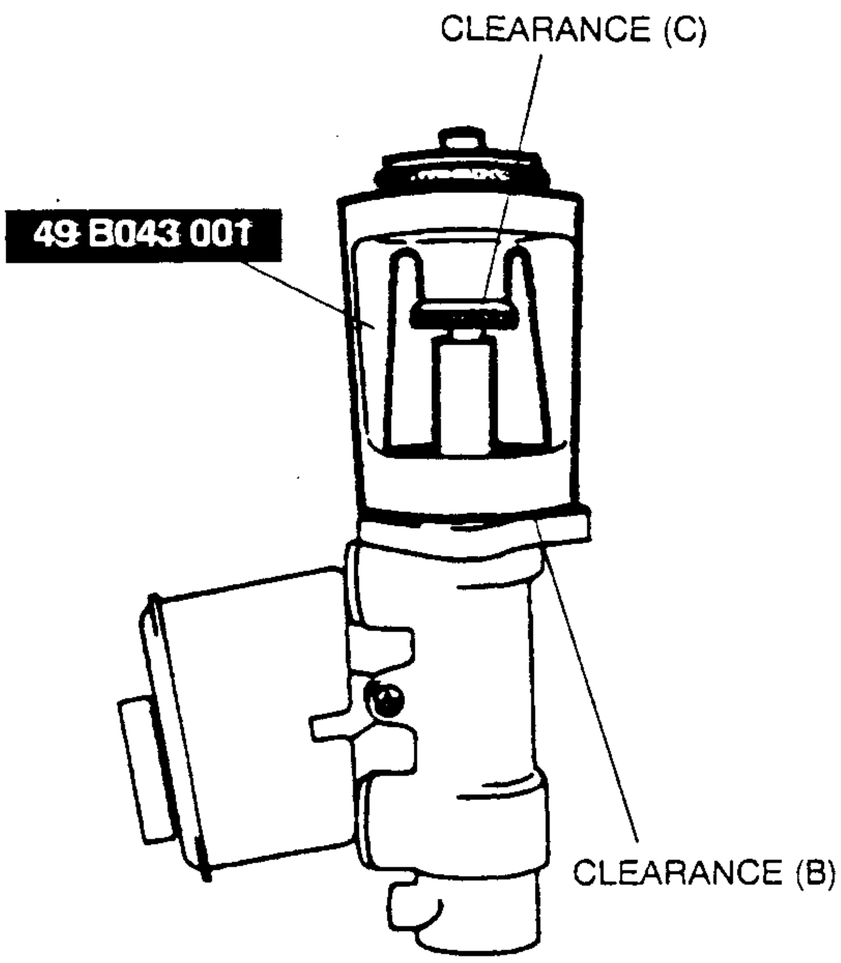
4. Turn the adjusting nut of the **SST** counterclockwise until the gauge rod just contacts the push rod end of the power brake unit. Push lightly on the end of the gauge rod to be sure it is seated. Verify that there is no gap between the adjusting nut and **SST** body.
5. Remove the **SST** from the power brake unit.



6. Remove the **SST** from the power brake unit without disturbing the adjusting nut. Set the **SST** onto the master cylinder as shown in the figure.
7. Push lightly on the end of the **SST** gauge rod to be sure that it is contacting the bottom of the master cylinder piston, but do not push so hard that the piston moves. Note any clearance between the **SST** body and the adjusting nut: clearance B, or between the body and the master cylinder: clearance C. Adjust the push rod as necessary as outlined in "Adjustment" below.

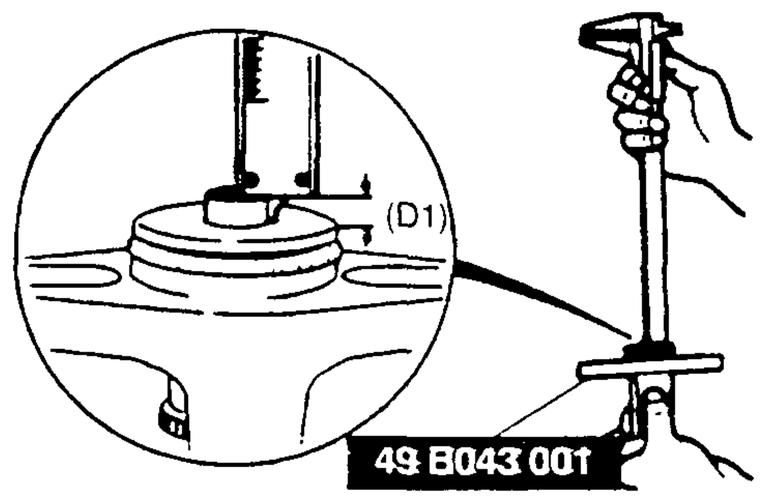
Adjustment

Measurement	Push rod
Clearance at B	Too long
Clearance at C	Too short
No clearance at B or C	OK

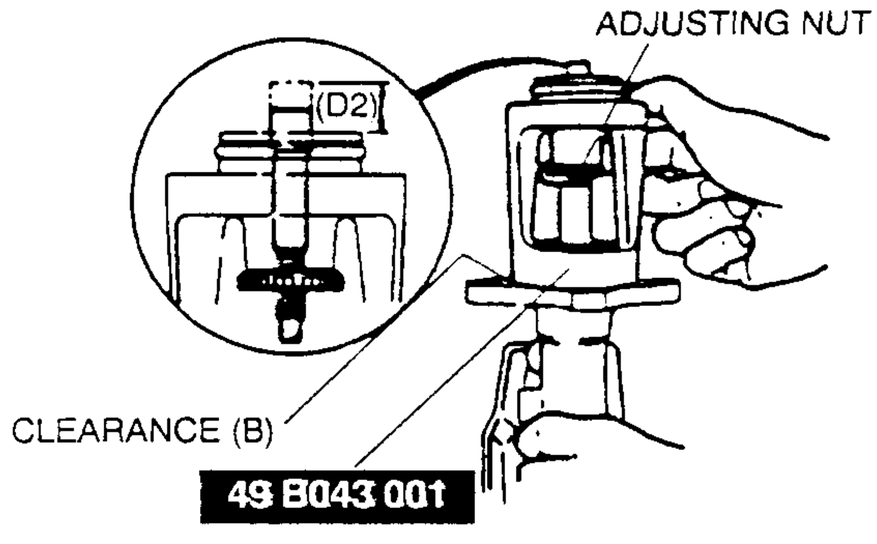


Clearance at B

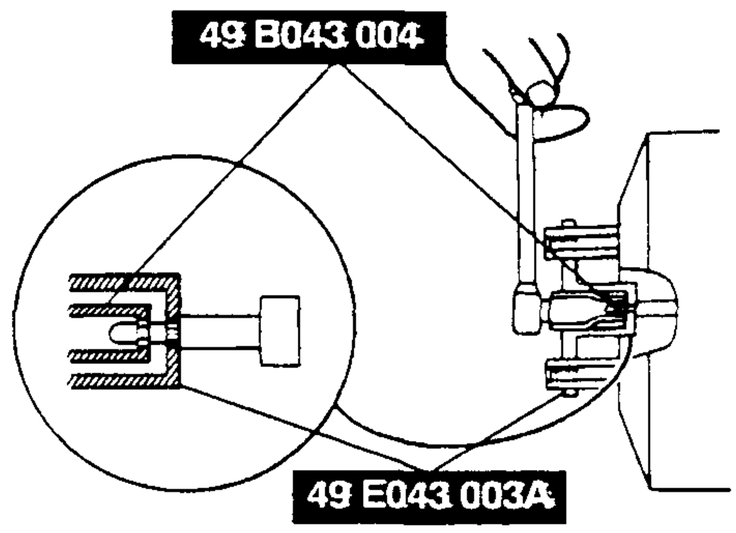
1. Measure and record the height D1 of the gauge rod.



2. Turn the adjusting nut until the **SST** body sets closely on the master cylinder. Turn only enough for the body to touch.
3. Measure and record height D2 of the gauge rod.

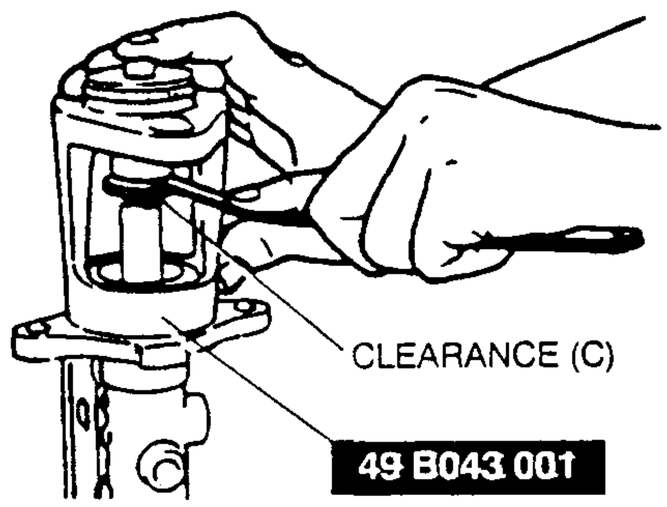


4. Subtract D1 from D2. By using the **SST**, turn the nut to shorten the power brake unit push rod an amount equal to the difference.

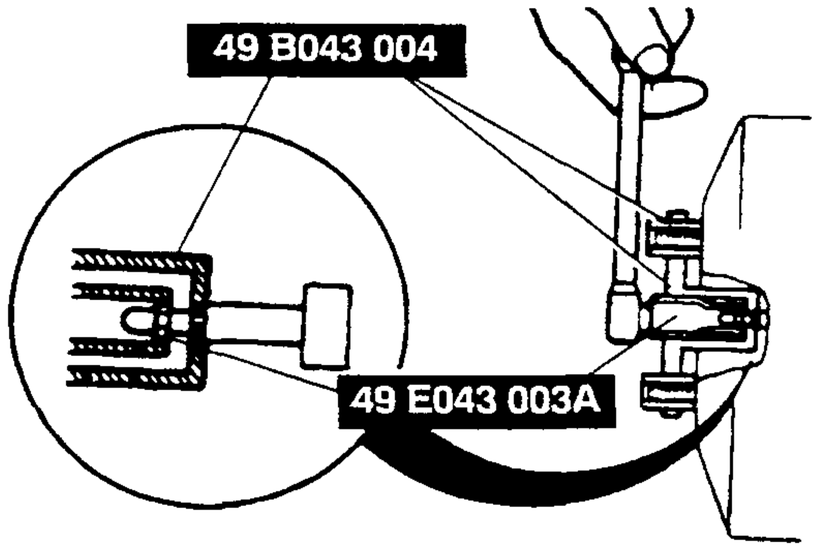


Clearance at C

1. Push lightly on the end of the **SST** gauge rod, and measure the clearance between the adjusting nut and the **SST** body.



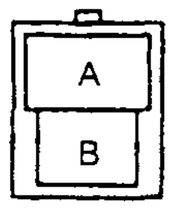
2. Using the **SSTs**, turn the nut to lengthen the power brake unit push rod an amount equal to the clearance measured at B.



○—○ : Continuity

Fluid level	Terminal	
	A	B
Above MIN	○—○	
Below MIN		

5. If not as specified, replace the sensor.



FLUID LEVEL SENSOR INSPECTION

1. Disconnect the sensor connector.
2. Connect an ohmmeter to the connector.
3. Starting with the fluid level above MIN, verify that there is no continuity.
4. Remove the brake fluid and verify that there is continuity when the level is below MIN.

MASTER CYLINDER DISASSEMBLY/ASSEMBLY

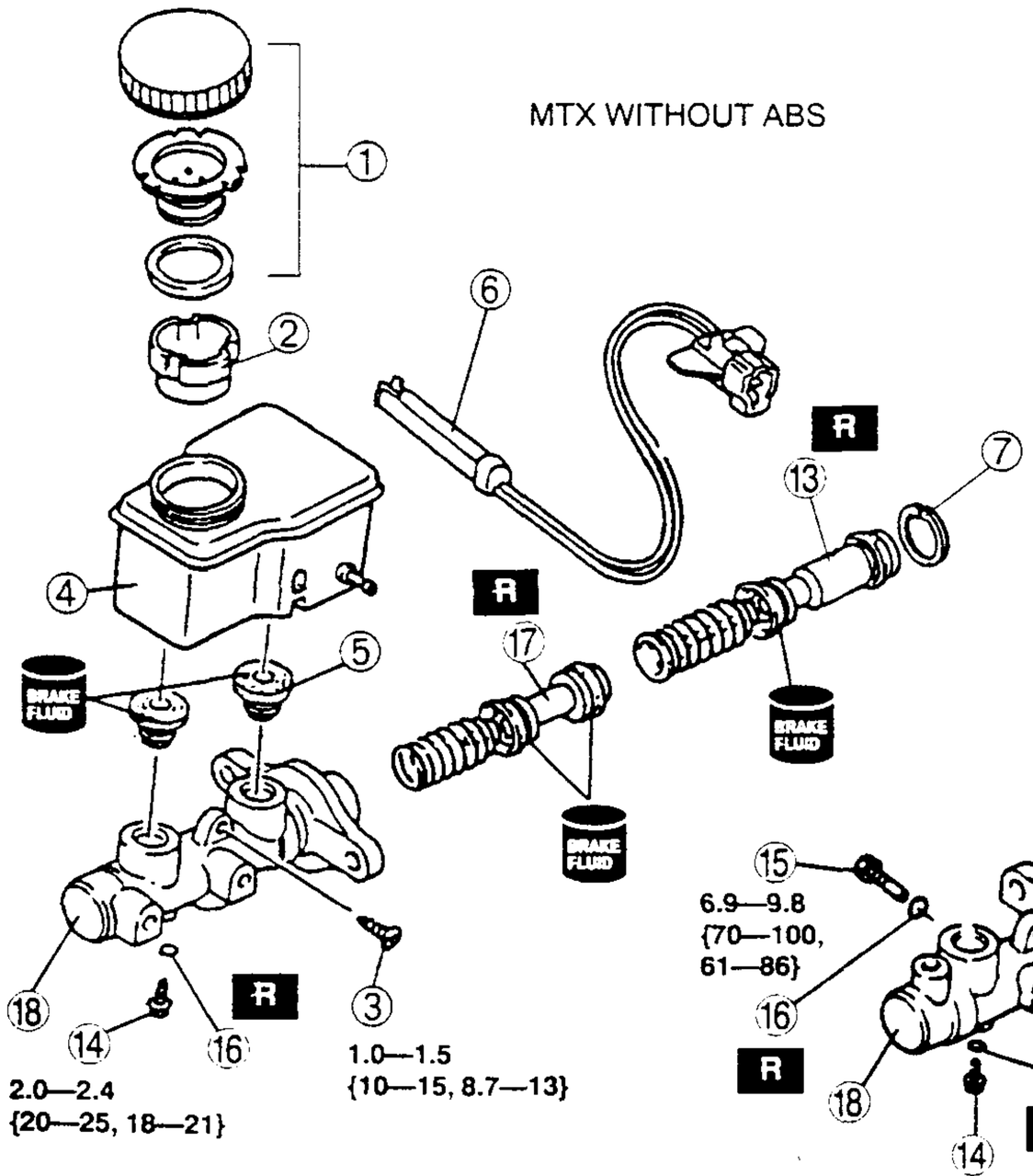
Caution

- **If the master cylinder body is damaged, replace the unit as an assembly. When securing the master cylinder in a vise, tighten only the flange of the master cylinder.**

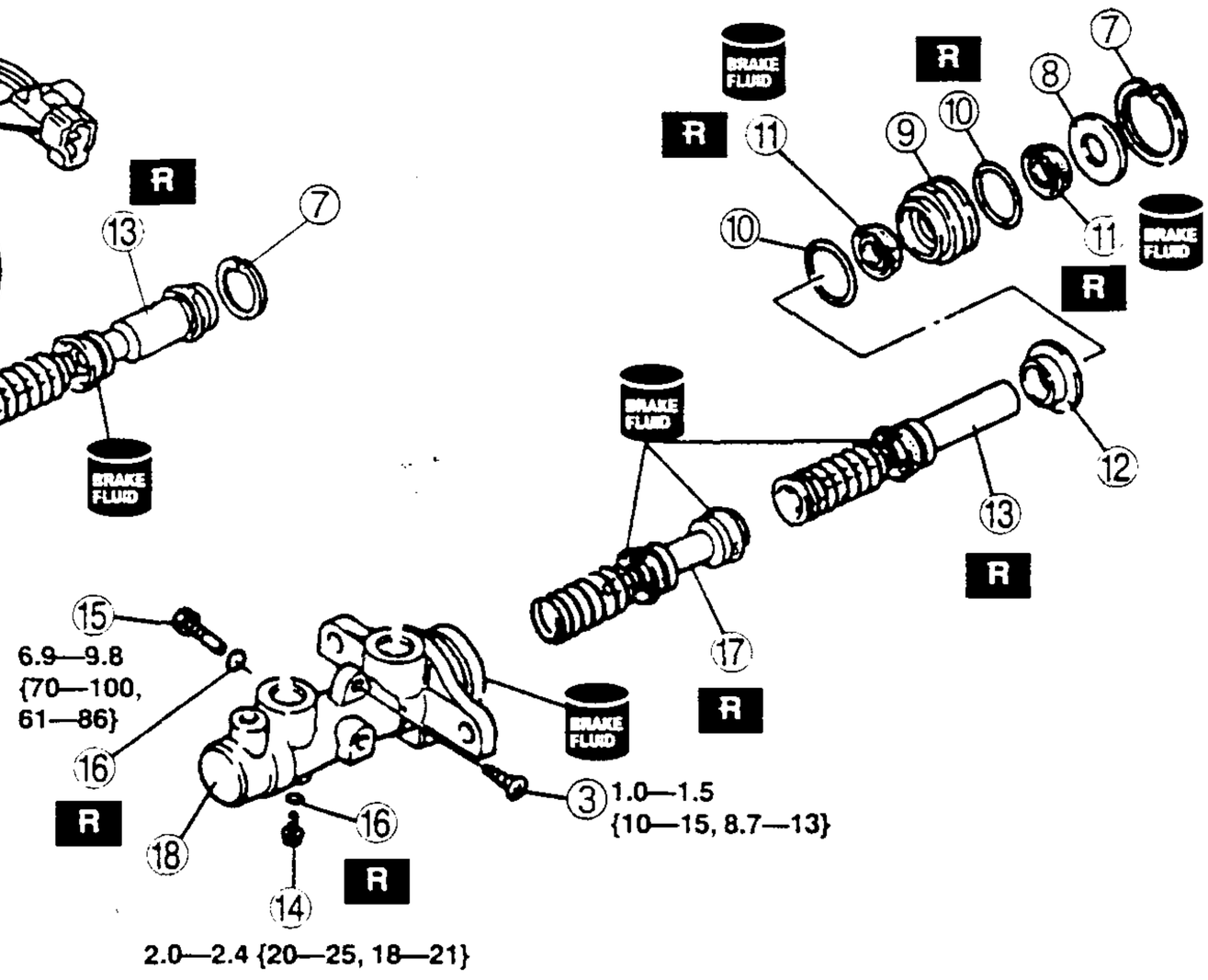
P

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.

MTX WITHOUT ABS



EXCEPT MTX WITHOUT ABS



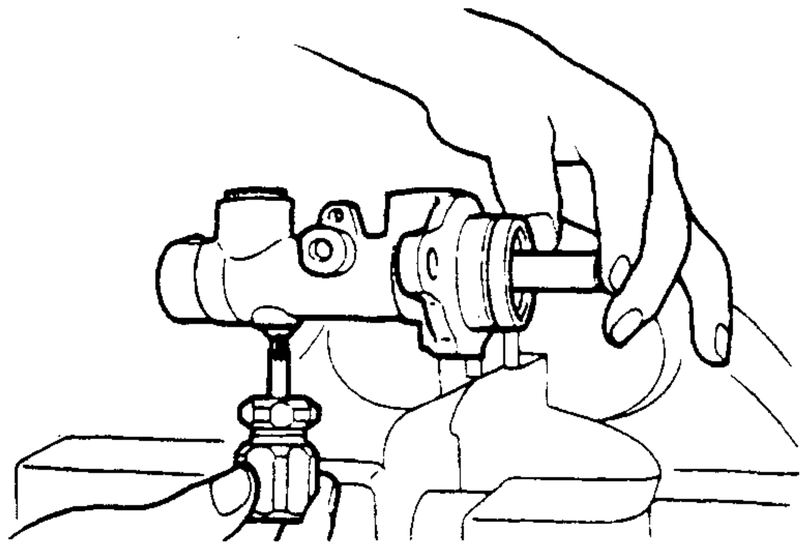
N·m { kgf·cm , in·lbf }

1	Cap set
2	Float
3	Screw
4	Reservoir
5	Joint bushing
6	Fluid level sensor
7	Snap ring
8	Spacer
9	Piston guide
10	O-ring
11	Cup
12	Primary piston stopper
13	Primary piston
14	Stop screw (without ABS) ☞ Assembly Note
15	Stop pin (with ABS) ☞ Assembly Note
16	O-ring
17	Secondary piston
18	Master cylinder body

Stop Screw and O-ring (without ABS) Assembly Note

1. Install the new O-ring onto the stop screw.
2. Push the primary piston assembly in full.
3. Install and tighten the stop screw.

Tightening torque
2.0—2.4 N·m {20—25 kgf·cm , 18—21 in·lbf }

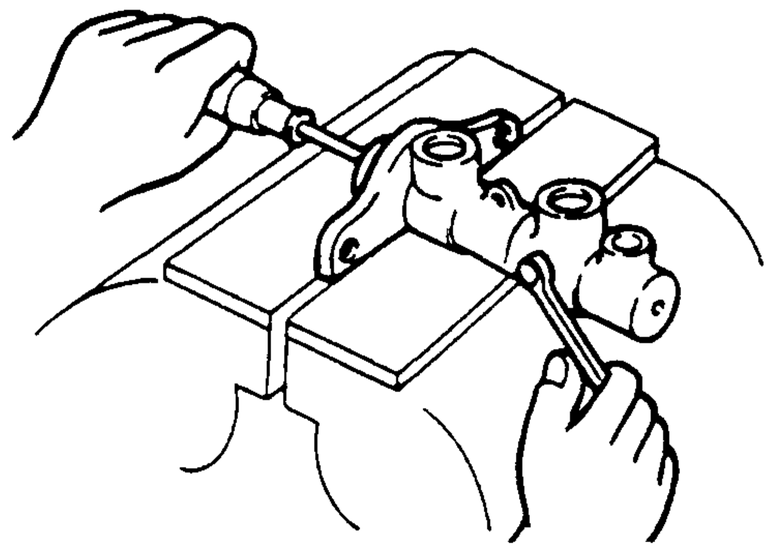


Stop Pin and O-ring (with ABS) Assembly Note

1. Install the secondary piston with the piston hole facing the stop pin.
2. Install the new O-ring onto the stop pin.
3. Install the stop pin.

Tightening torque
6.9—9.8 N·m
{70—100 kgf·cm , 60.8—86.8 in·lbf }

4. Push and release the secondary piston assembly to verify that it is held by the stop pin.



POWER BRAKE UNIT INSPECTION
Power Brake Unit Function Check
(Simple method)

Note
- Replace power brake unit assembly if necessary.

Step 1

1. With the engine stopped, depress the pedal a few times.
2. With the pedal depressed, start the engine.
3. If the pedal moves down slightly, immediately after the engine starts, the unit is operating.

Step 2

1. Start the engine.
2. Stop the engine after it has run for **1 or 2 minutes**.
3. Depress the pedal with the usual force.
4. If the first pedal stroke is long and becomes shorter with subsequent strokes, the unit is operating.

Note
- If a problem is found, inspect for damages on the check valve or vacuum hose, and examine the installation. Repair if necessary, and inspect it again.

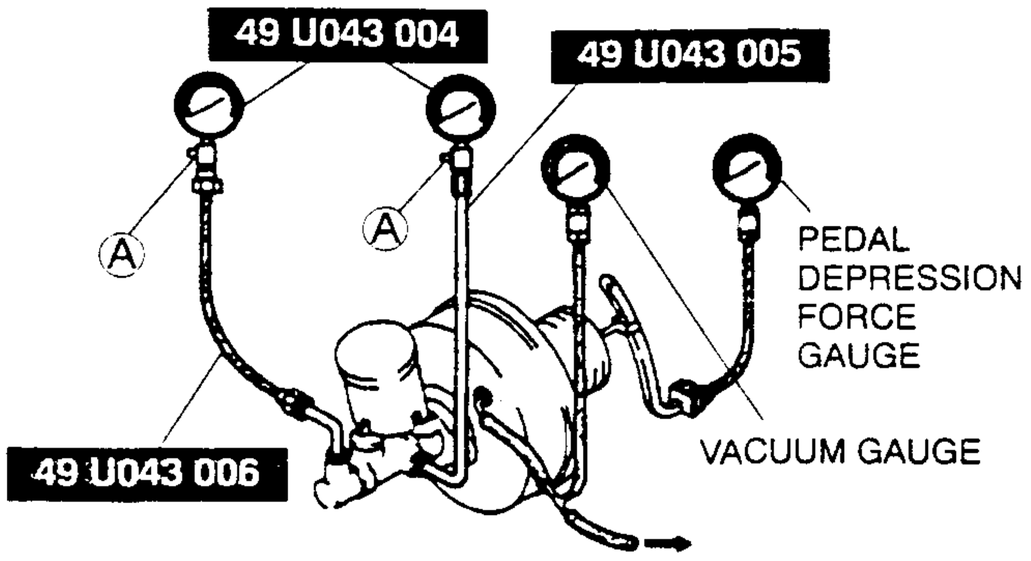
Step 3

1. Start the engine.
2. Depress the pedal with the usual force.
3. Stop the engine with the pedal held depressed.
4. Hold the pedal down for **about 30 seconds**.
5. If the pedal height does not change, the unit is operating.

(Inspection using the testers)

1. Connect the **SSTs**, vacuum gauge, and pedal depression force gauge as shown in the figure.

Note
- Use commercially available gauges and pedal depression force gauge.
- Bleed the air from the **SST** at gauge A.



2. After bleeding the air from the **SST**, conduct the test as described in the following steps.

a) Checking for vacuum loss
Unloaded condition
1. Start the engine.
2. Stop the engine when the vacuum gauge reading reaches **66.7 kPa {500 mmHg , 19.7 inHg }**.
3. Observe the vacuum gauge for **15 seconds**. If the gauge shows **63.3—66.7 kPa {475—500 mmHg , 18.7—19.7 inHg }**, the unit is operating.

Loaded condition
1. Start the engine.
2. Depress the brake pedal with a force of **196 N {20 kgf , 44 lbf }**.
3. With the brake pedal depressed, stop the engine when the vacuum gauge reading reaches **66.7 kPa {500 mmHg , 19.7 inHg }**.
4. Observe the vacuum gauge for **15 seconds**. If the gauge shows **63.3—66.7 kPa {475—500 mmHg , 18.7—19.7 inHg }**, the unit is operating.

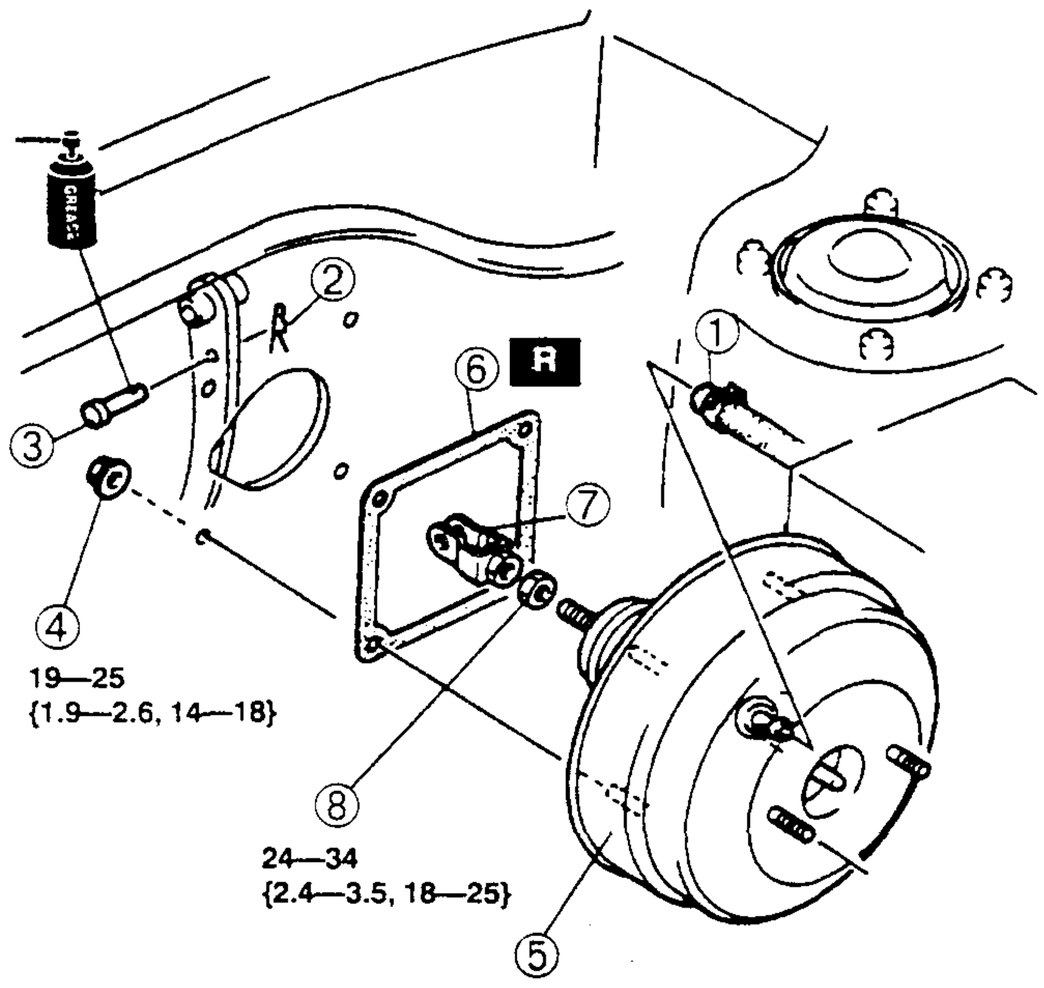
b) Checking for hydraulic pressure
1. When the engine is stopped (vacuum **0 kPa {0 mmHg , 0 inHg }**) and the fluid pressure is within the specification, the unit is operating.

Pedal force	Fluid pressure
196 N {20 kgf , 44 lbf }	790 kPa {8 kgf/cm^2 , 114 psi } min

2. Start the engine. Depress the brake pedal when the vacuum reaches **66.7 kPa { 500 mmHg , 19.7 inHg }**. If the fluid pressure is within the specification, the unit is operating.

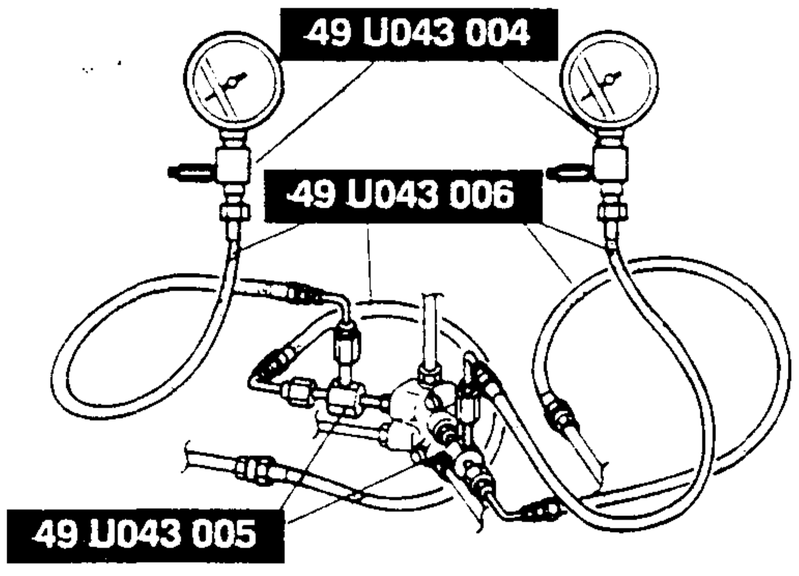
	Pedal force	Fluid pressure
MTX	196 N {20 kgf , 44 lbf }	7,100 kPa {72 kgf/cm^2 , 1,100 psi } min
ATX		8,820 kPa {90 kgf/cm^2 , 1,300 psi } min

POWER BRAKE UNIT REMOVAL/INSTALLATION
1. Remove the master cylinder. (Refer to CONVENTIONAL BRAKE SYSTEM, MASTER CYLINDER REMOVAL/INSTALLATION.)
2. For R.H.D. models, remove the P/S pipe bracket and A/C pipe bracket.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



1	Vacuum hose
2	Snap pin
3	Clevis pin
4	Nut
5	Power brake unit
6	Gasket
7	Fork
8	Nut

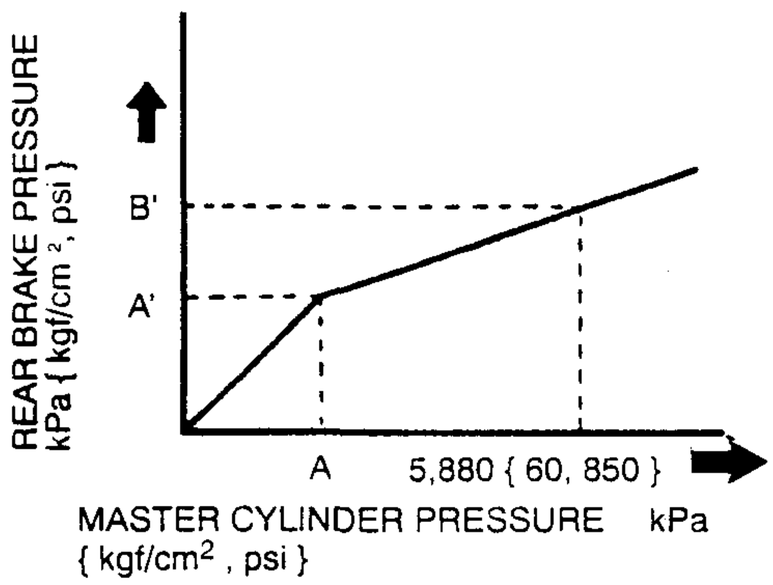
DUAL PROPORTIONING VALVE INSPECTION
1. Connect the **SSTs** to the brake pipes as shown in the figure.
2. Bleed the air from the brake system.
3. Measure the fluid pressure of the master cylinder and the rear brake.



Fluid pressure

kPa { kgf/cm^2 , psi }

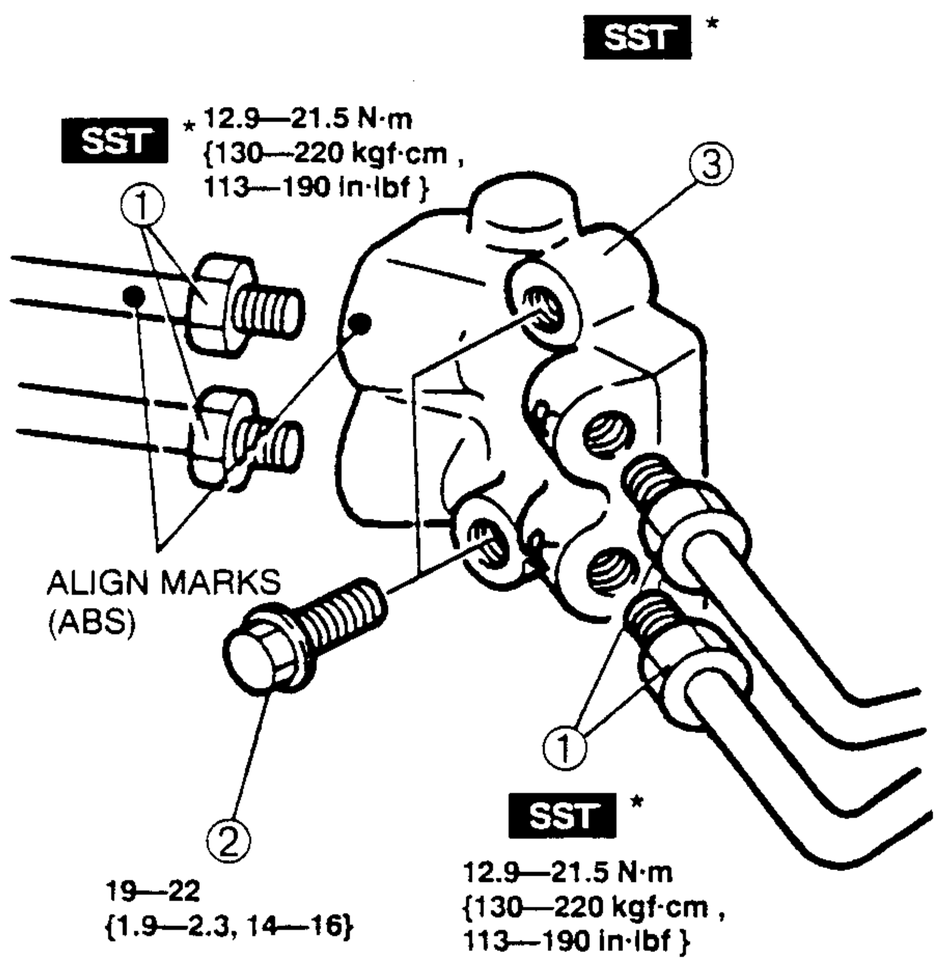
	A	'A'	B	B'
With ABS	2940 {30, 430}	2940 {30, 430} ±200 {2, 30}	5880 {60, 850}	3830 {39, 550} ±295 {3, 43}
MTX without ABS	2450 {25, 360}	2450 {25, 360} ±200 {2, 30}	5880 {60, 850}	3480 {35, 500} ±295 {3, 43}
ATX without ABS	3400 {35, 500}	3400 {35, 500} ±295 {3, 43}	5880 {60, 850}	4410 {45, 640} ±390 {4, 60}



4. If not within the specification, replace the dual proportioning valve.

DUAL PROPORTIONING VALVE REPLACEMENT

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



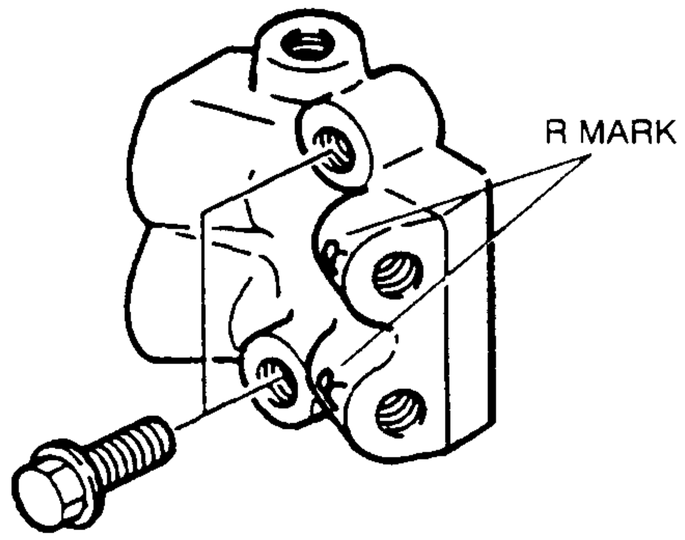
* 49 0259 770B

N·m { kgf·m , ft·lbf }

1	Brake pipe
2	Bolt
3	Dual proportioning valve ☞ Installation Note

Dual Proportioning Valve Installation Note

- Install the dual proportioning valve so that the R mark faces right side of the vehicle.



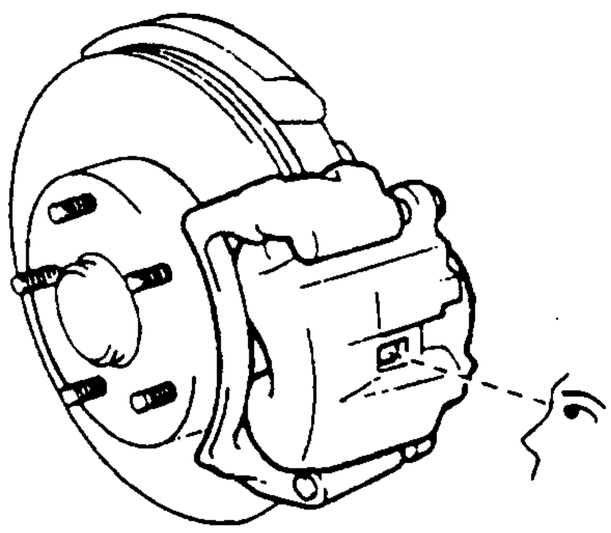
FRONT BRAKE (DISC) INSPECTION

Disc Pad

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove the wheels.
3. Verify the remaining thickness of the pads.

Thickness
2.0 mm {0.08 in } min.

4. Replace the pads as a set: right and left wheels, if either one is at or less than the minimum thickness.



Disc Plate Thickness Inspection

1. Measure the thickness of the disc plate.

Caution
- **When it is necessary to machine the disc plate, and the disc plate is removed from the vehicle then machined, excessive runout may result. Machine the disc plate which is installed on the vehicle.**

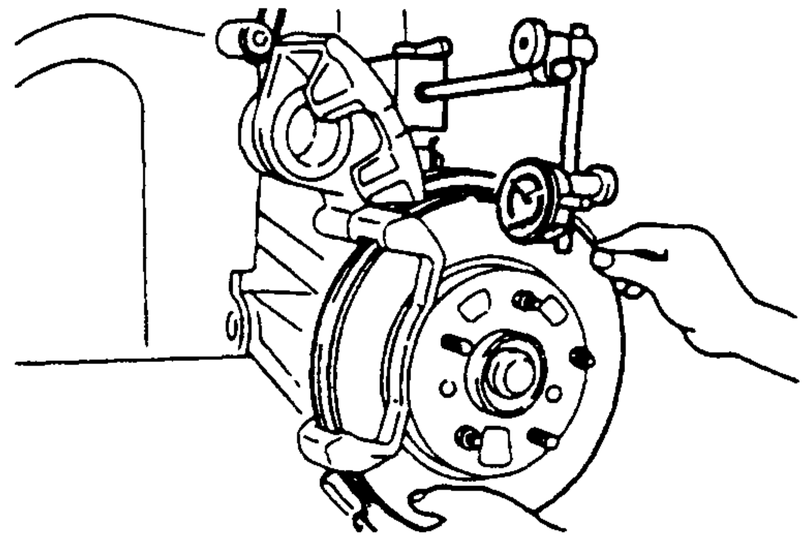
Minimum
22 mm {0.94 in }

Minimum thickness after machining by using a brake lathe on-vehicle
22.8 mm { 0.90 in }

2. If the thickness is not within the specification, replace the disc plate.

Disc Plate Runout Inspection

1. Verify that there is no looseness in wheel bearing. (Refer to section M, FRONT AXLE, WHEEL HUB, STEERING KNUCKLE INSPECTION, Wheel Bearing Play.)
2. Measure the runout at the outer edge of the contact surface of the disc pad.

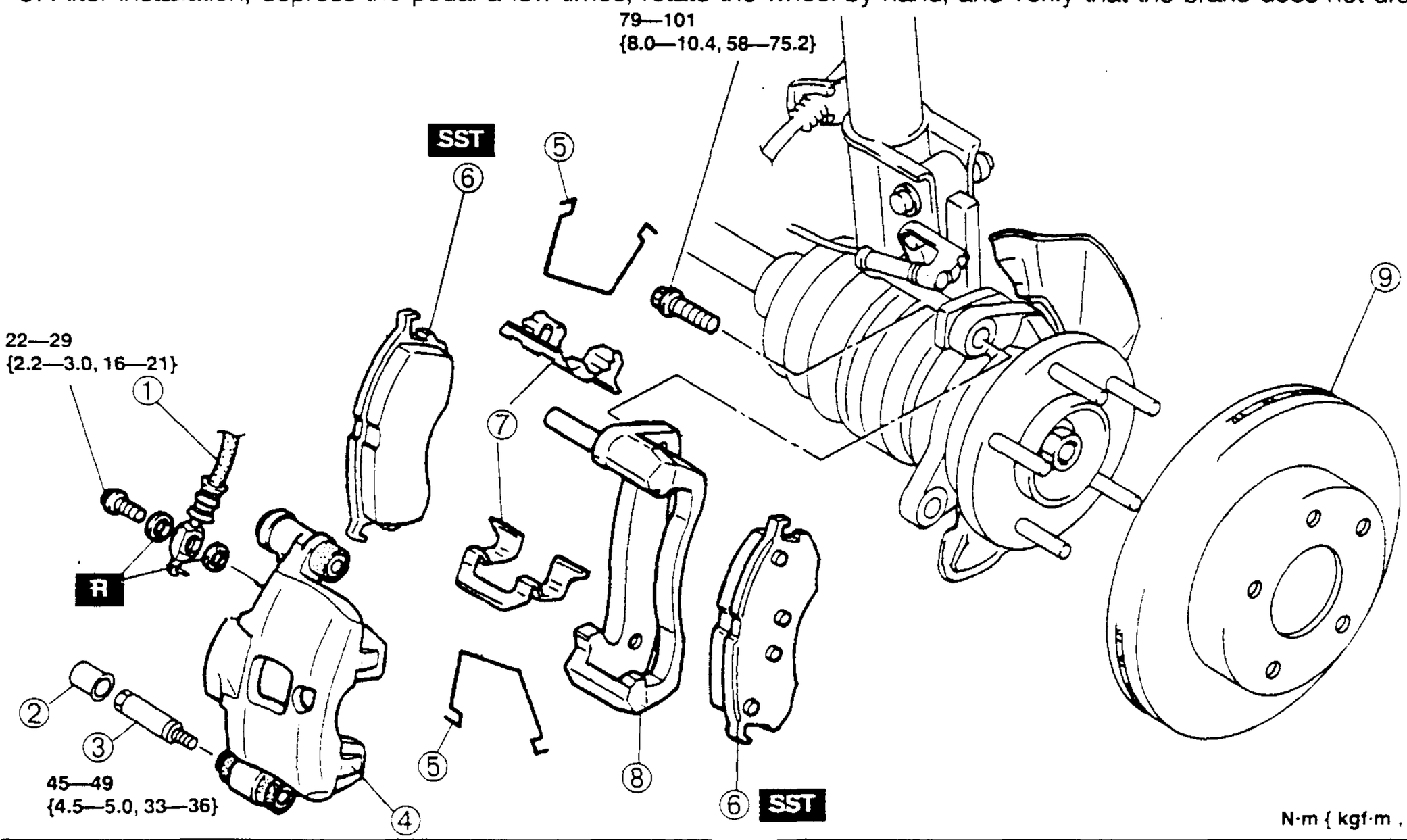


Runout
0.05 mm {0.002 in } max.

3. If the runout is not within the specification, repair or replace the disc plate.

FRONT BRAKE (DISC) REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. After installation, depress the pedal a few times, rotate the wheel by hand, and verify that the brake does not drag.



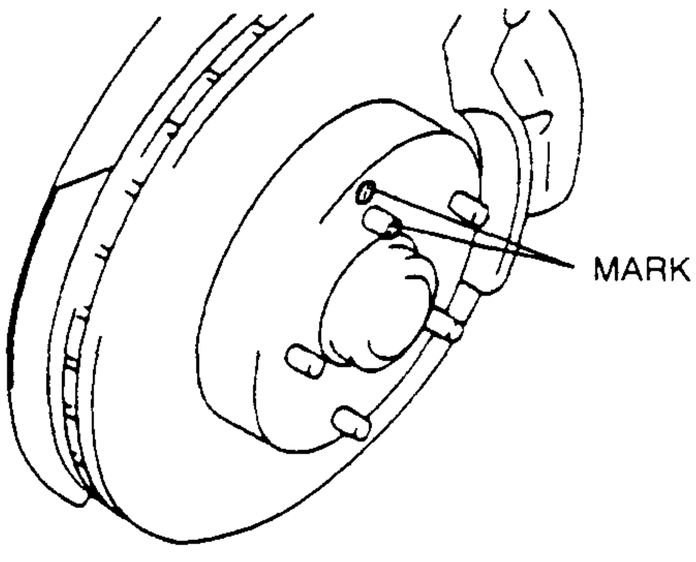
N·m { kgf·m , ft·lbf }

1	Flexible hose
2	Cap
3	Lock bolt
4	Caliper
5	M-spring
6	Disc pad ☞ Installation Note

7	Guide plate
8	Mounting support
9	Disc plate ☞ Removal Note ☞ Installation Note

Disc Plate Removal Note

- Mark the wheel hub bolt and disc plate before removal for guide during installation.

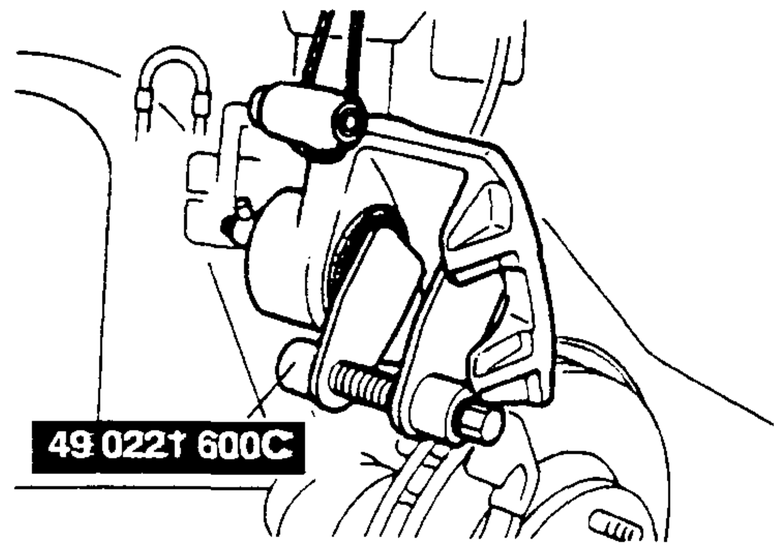


Disc Plate Installation Note

1. Remove any rust or grime on the contact face of the disc plate and wheel hub.
2. Install the disc plate and align the marks put before removal.

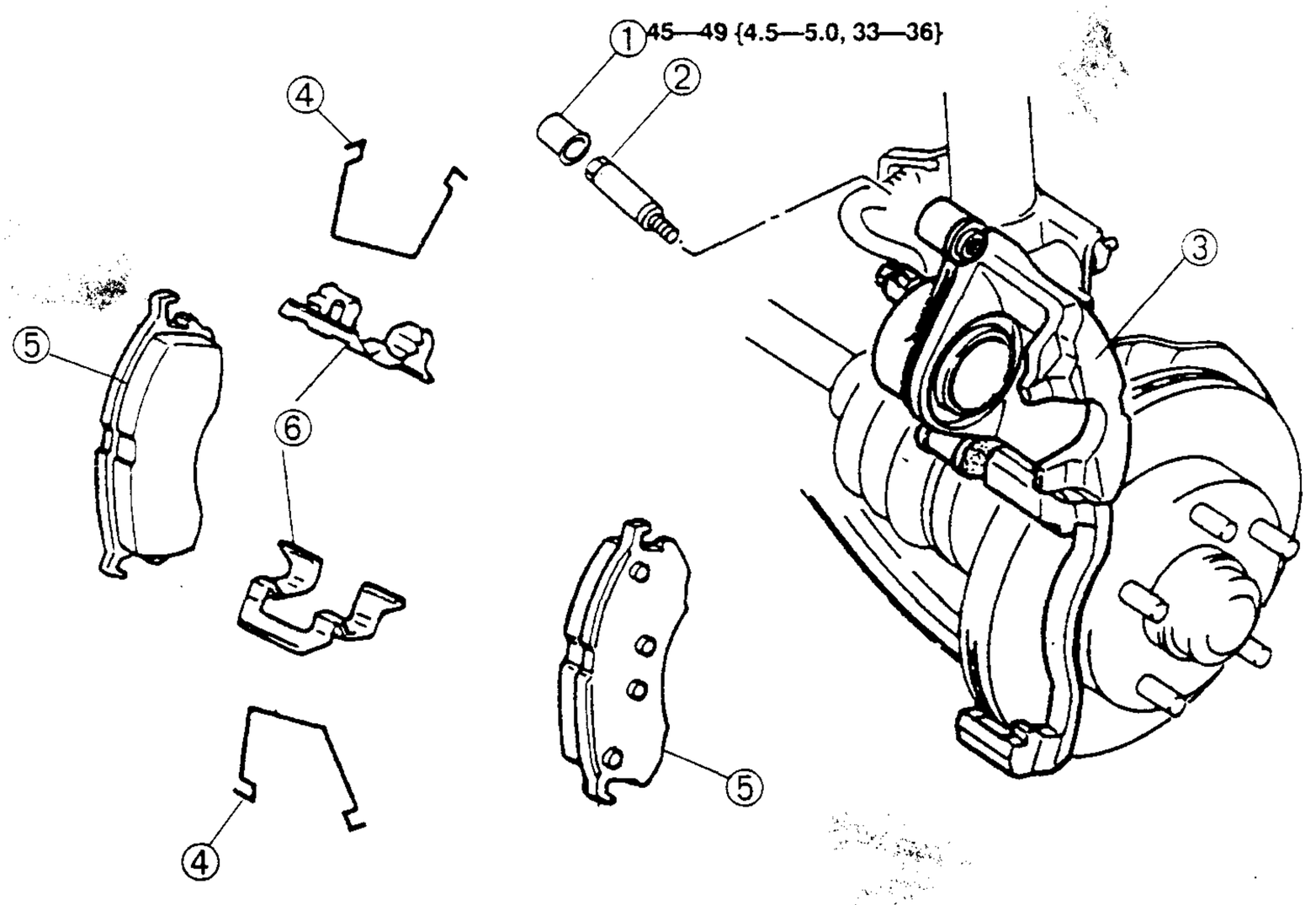
Disc Pad Installation Note

1. Push the piston fully inward by using the **SST**.
2. Install the disc pad.



DISC PAD (FRONT) REPLACEMENT

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.

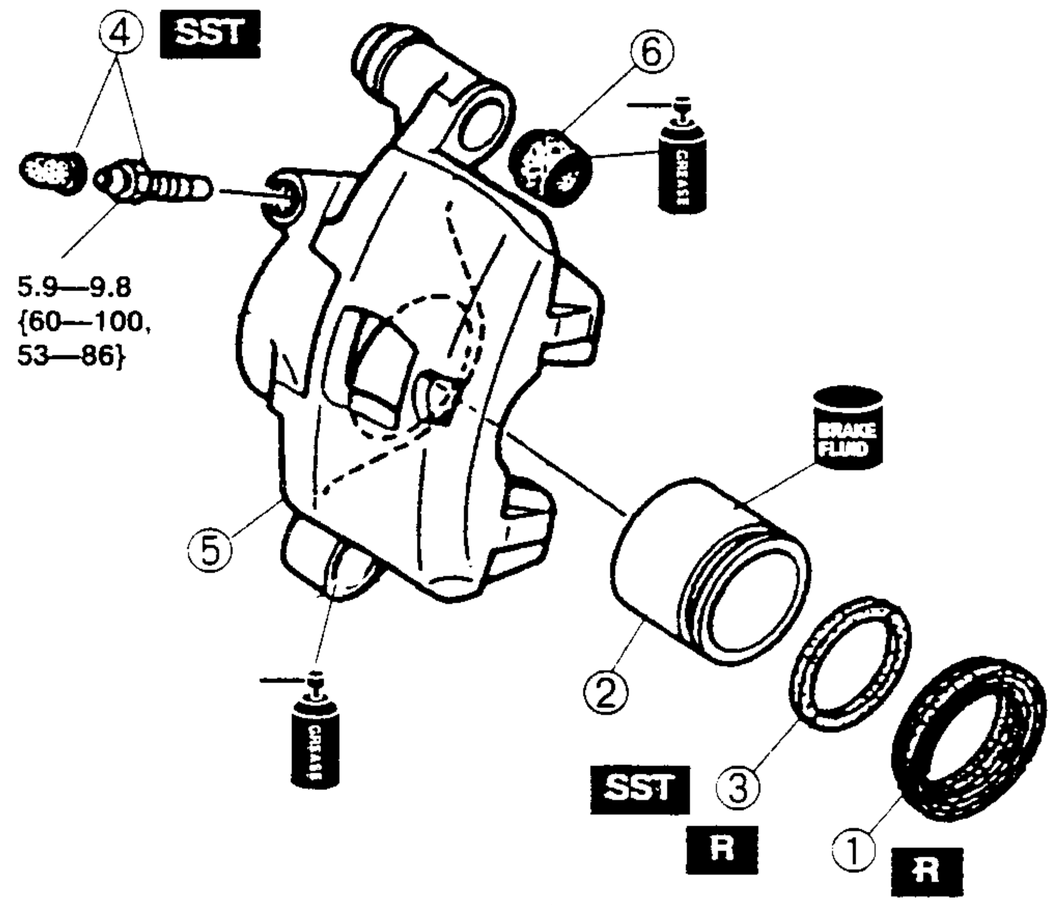


N·m { kgf·m , ft·lbf }

1	Cap
2	Lock bolt
3	Caliper
4	M-spring
5	Disc pad ☞ CONVENTIONAL BRAKE SYSTEM, FRONT BRAKE (DISC) REMOVAL/INSTALLATION, Disc Pad Installation Note.)
6	Guide plate

CALIPER (FRONT) DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of removal.



N·m { kgf·cm , in·lbf }

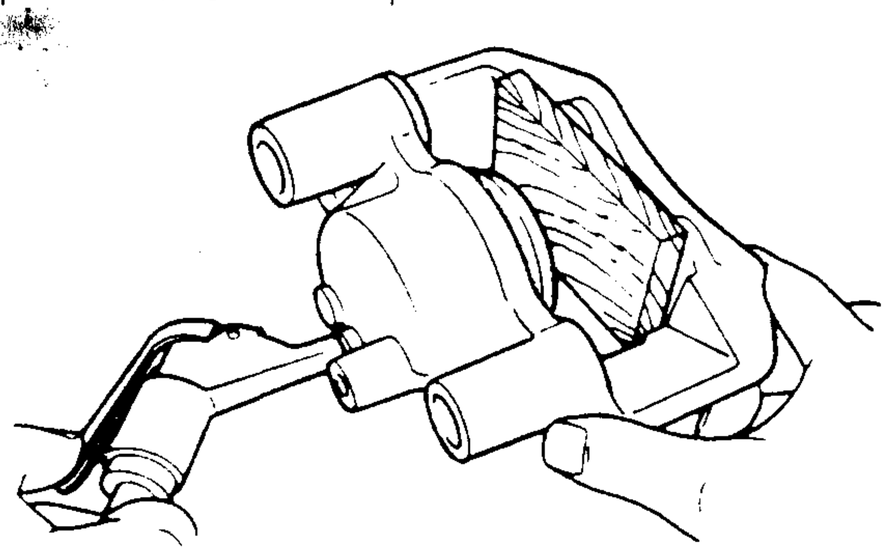
1	Dust seal
2	Piston ☞ Disassembly Note
3	Piston seal ☞ Disassembly Note
4	Bleeder cap, bleeder screw ☞ Assembly Note
5	Caliper body
6	Boot

Piston Disassembly Note

Caution

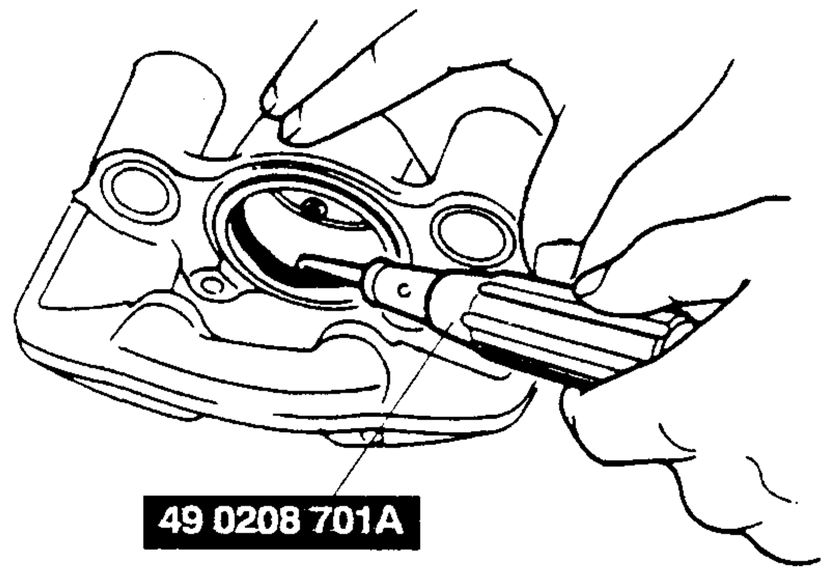
- **Blow the compressed air slowly to prevent the piston from suddenly popping out.**

- Place a piece of wood in the caliper, then blow compressed air through the hole to force the piston out of the caliper.



Piston Seal Disassembly Note

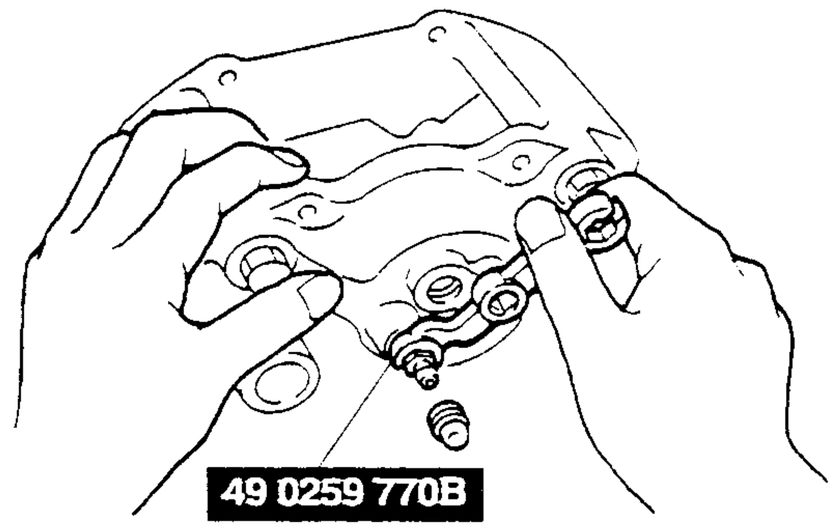
- Remove the piston seal from the brake caliper by using the **SST**.



Bleeder Screw Assembly Note

- Assemble the bleeder screw to the caliper by using the **SST**.

Tightening torque
5.9—8.8 N·m {60—90 kgf·cm , 53—78 in·lbf }



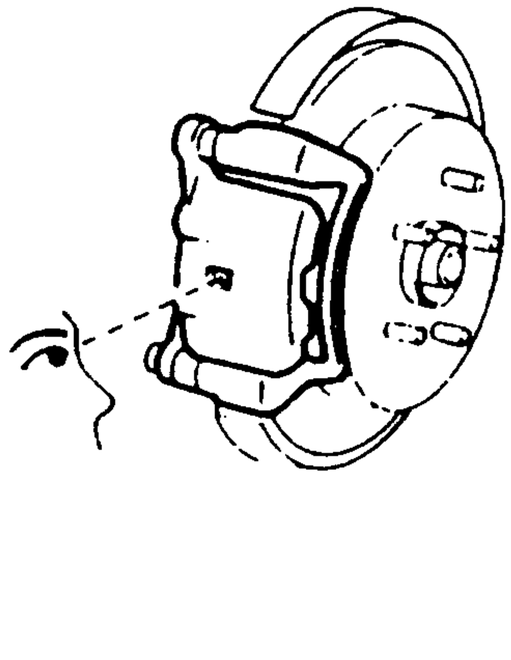
REAR BRAKE (DISC) INSPECTION

Disc Pad Thickness Inspection

1. Jack up the rear of the vehicle and support it on safety stands.
2. Remove the wheel and tires.
3. Lock through the caliper inspection hole and inspection the remaining thickness of the pads.

Thickness
2.0 mm {0.08 in }

4. Replace the pads as a set: right and left wheels, if either is less than the minimum thickness.



Disc Plate Thickness Inspection

1. Measure the thickness of the disc plate.

Caution

- **When it is necessary to machine the disc plate, and the disc plate is removed from the vehicle then machined, excessive runout may result. Machine the disc plate which is installed on the vehicle.**

Minimum
8 mm {0.31 in }
Minimum thickness after machining by using a brake lathe on-vehicle
8.8 mm {0.35 in }

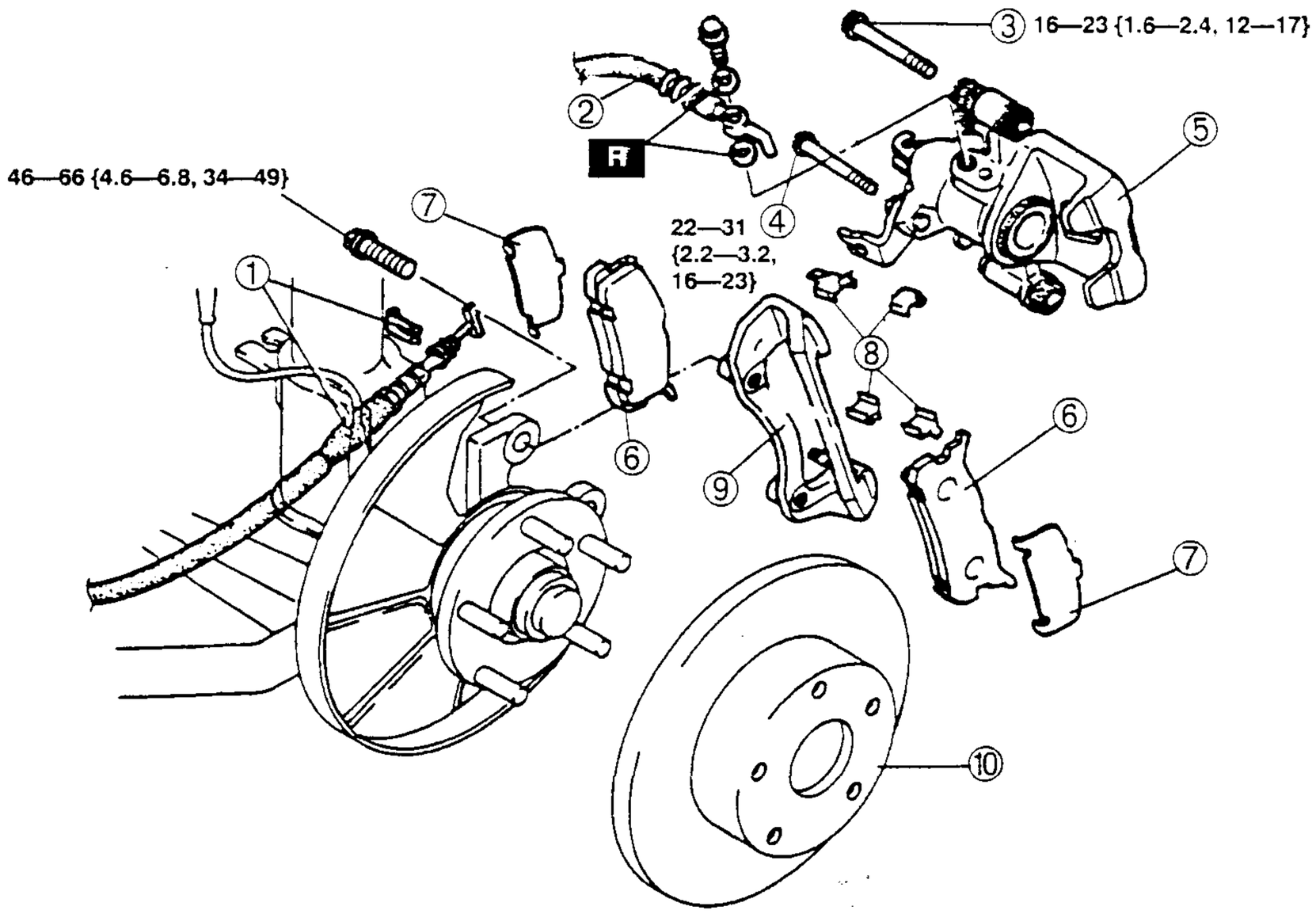
2. If the thickness is not within the specifications, replace the disc plate.

Disc Plate Runout Inspection

(Refer to CONVENTIONAL BRAKE SYSTEM, FRONT BRAKE (DISC) INSPECTION, Disc Plate Runout Inspection)

REAR BRAKE (DISC) REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. After installation, depress the pedal a few times, rotate the wheel by hand, and verify that the brake does not drag.



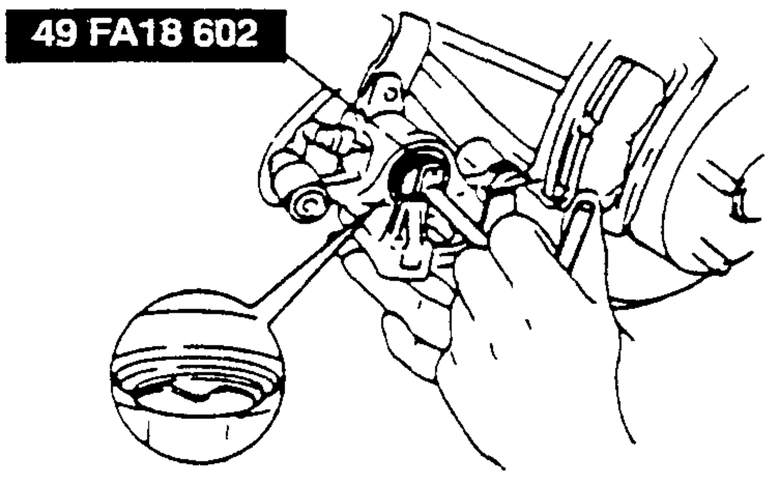
N·m { kgf·m , ft·lbf }

1	Parking brake cable, clip
2	Flexible hose
3	Lock bolt
4	Guide bolt
5	Caliper
6	Disc pad ☞ Installation Note
7	Shim

8	Guide plate
9	Mounting support
10	Disc plate ☞ CONVENTIONAL BRAKE SYSTEM, FRONT BRAKE (DISC) REMOVAL/INSTALLATION, Disc Plate Removal Note ☞ CONVENTIONAL BRAKE SYSTEM, FRONT BRAKE (DISC) REMOVAL/INSTALLATION, Disc Plate Installation Note

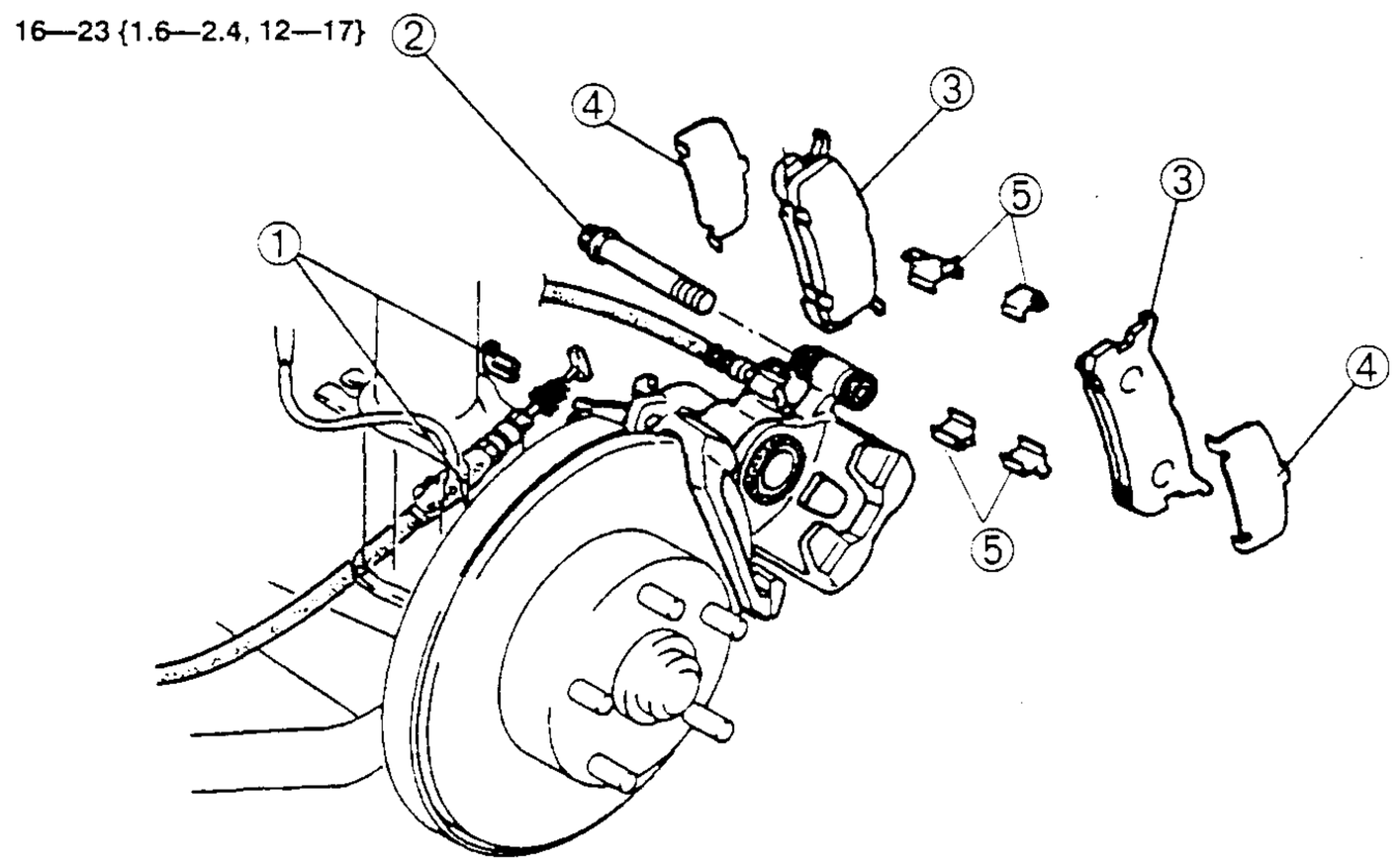
Disc Pad Installation Note

1. Push the piston fully inward by using the **SST**.
2. Install the disc pad.



DISC PAD (REAR) REPLACEMENT

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



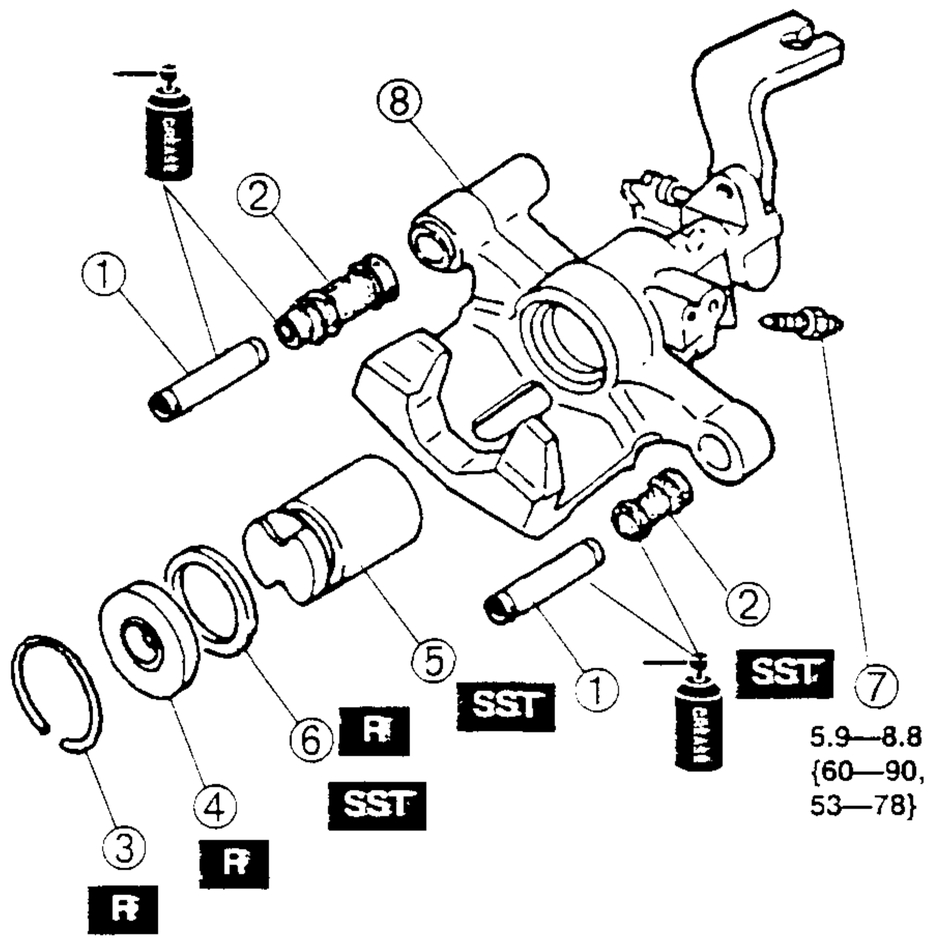
N·m { kgf·m , ft·lbf }

1	Parking brake cable, clip
2	Lock bolt
3	Disc pad ☞ CONVENTIONAL BRAKE SYSTEM, REAR BRAKE (DISC) REMOVAL/INSTALLATION, Disc Pad Installation Note

4	Shim
5	Guide plate

CALIPER (REAR) DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.

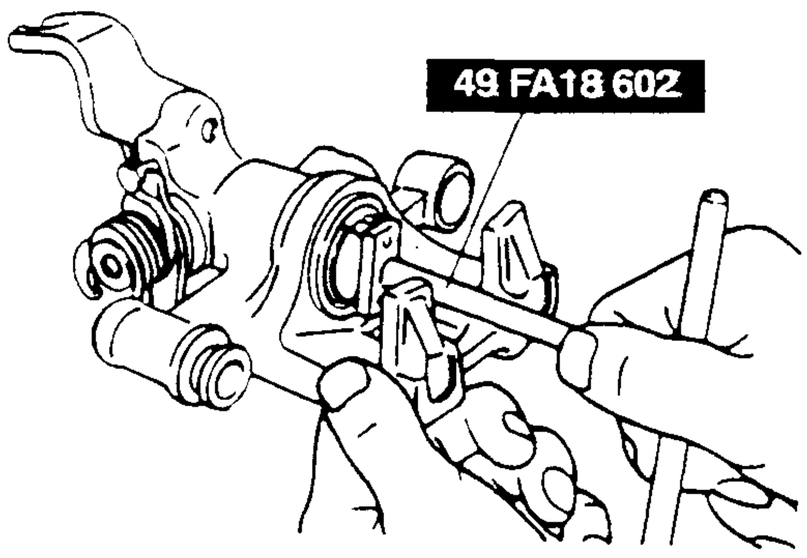


N·m { kgf·cm , in·lbf }

1	Sleeve
2	Boot
3	Snapring
4	Piston boot
5	Piston ☞ Disassembly/Assembly Note
6	Piston seal ☞ CONVENTIONAL BRAKE SYSTEM, CALIPER (FRONT) DISASSEMBLY/ASSEMBLY, Piston Seal Disassembly Note
7	Bleeder screw ☞ CONVENTIONAL BRAKE SYSTEM, CALIPER (FRONT) DISASSEMBLY/ASSEMBLY, Bleeder Screw Assembly Note
8	Caliper body

Piston Disassembly/Assembly Note

- Remove/install the piston by using the **SST**.



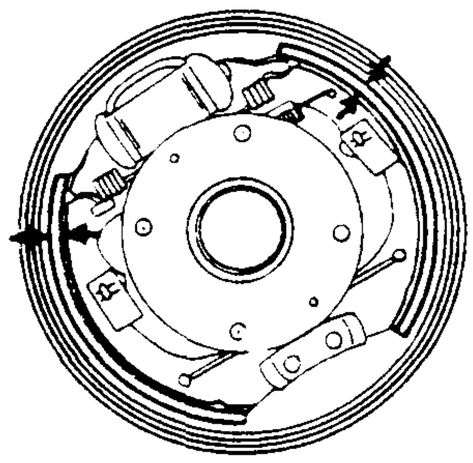
REAR BRAKE (DRUM) INSPECTION

Brake Lining Thickness Inspection

1. Remove the brake drum.
2. Inspect the remaining thickness of the lining.

Thickness
1.0 mm {0.04 in } min

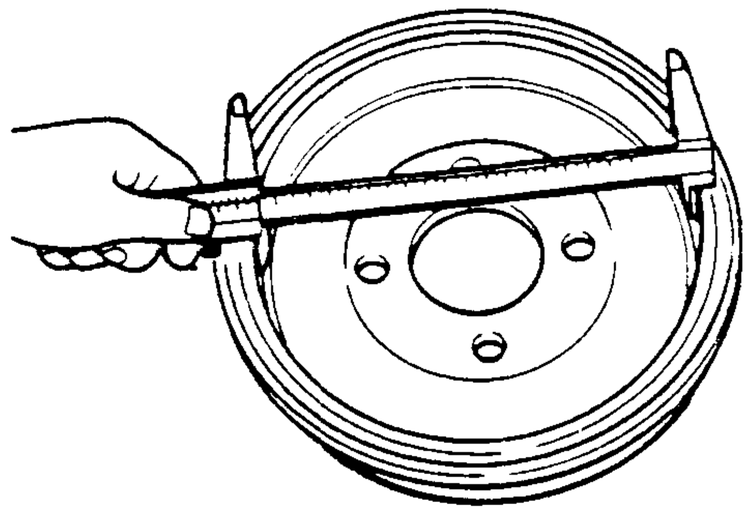
3. Replace both left and right brake shoes if either is at or less than the minimum thickness.



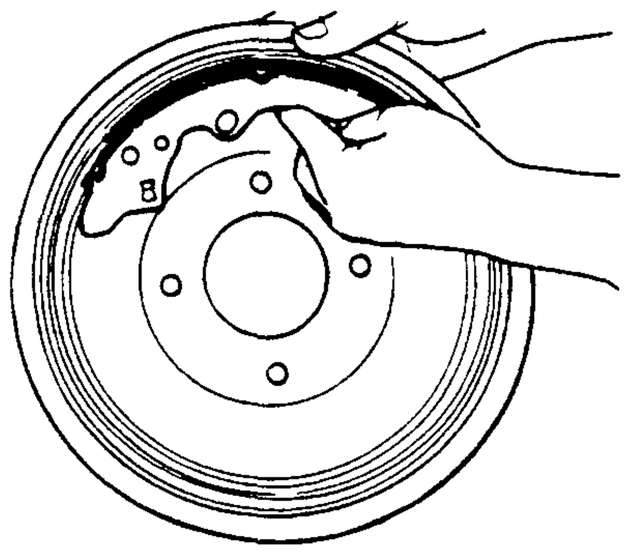
Brake Drum Inspection

1. Measure the inner diameter of the drum.

Maximum diameter
230.1 mm {9.059 in }

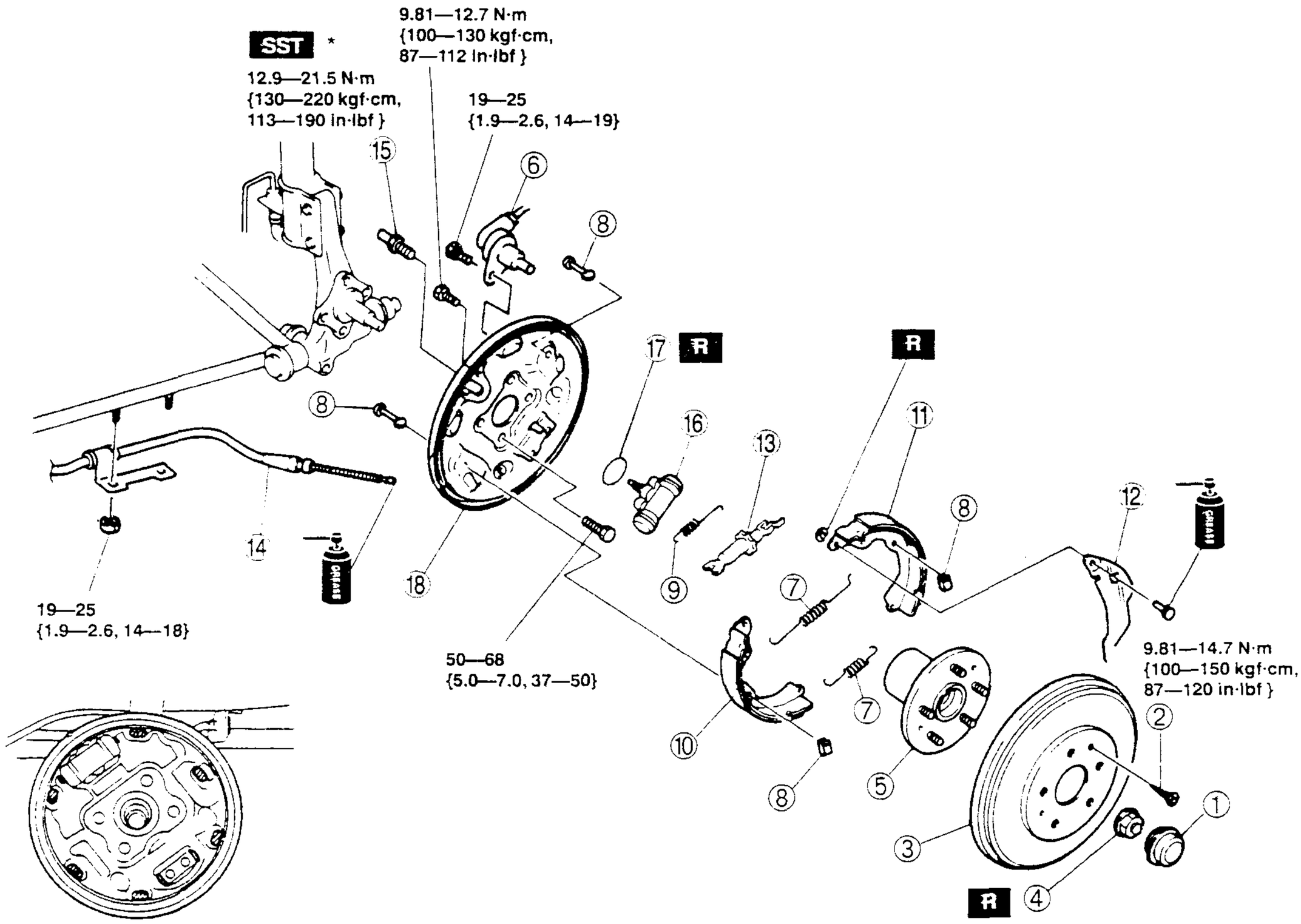


2. Check for scratches, uneven or abnormal wear inside the drum.
3. Repair or replace the drum if necessary.
4. When repairing or replacing the drum, check the contact with the shoes.



REAR BRAKE (DRUM) REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. After installation, do the followings.
   (1) Depress the brake pedal a few times. Then verify that the brakes do not drag.
   (2) Check the pedal-to-floor clearance.
   (3) Check the parking brake lever stroke.



N·m { kgf·m , ft·lbf }

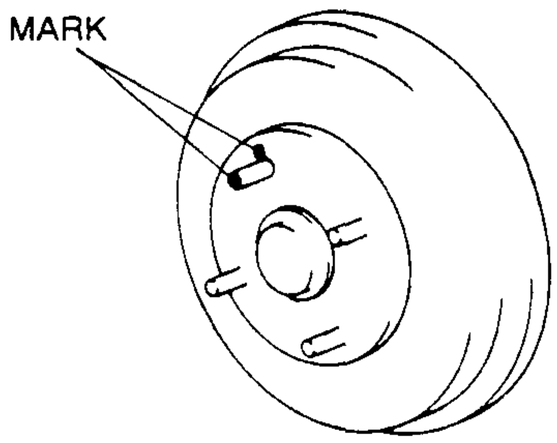
* 49 0259 770B

1	Hub cap
2	Screw
3	Brake drum ☞ Removal Note ☞ Installation Note
4	Locknut ☞ Section M, WHEEL HUB, STEERING KNUCLE REMOVAL/INSTALLATION, LOCKNUT Removal Note ☞ Section M, WHEEL HUB, STEERING KNUCLE REMOVAL/INSTALLATION, LOCKNUT Installation Note
5	Wheel hub
6	ABS wheel-speed sensor (if equipped)

7	Return spring
8	Hold pin and hold spring
9	Anti-rattle spring
10	Leading shoe
11	Trailing lever
12	Operating lever
13	Adjuster
14	Parking brake cable
15	Brake pipe
16	Wheel cylinder
17	O-ring
18	Backing plate

Brake Drum Removal Note

- Mark the wheel hub bolt and brake drum before removal for reference during installation.



Brake Drum Installation Note

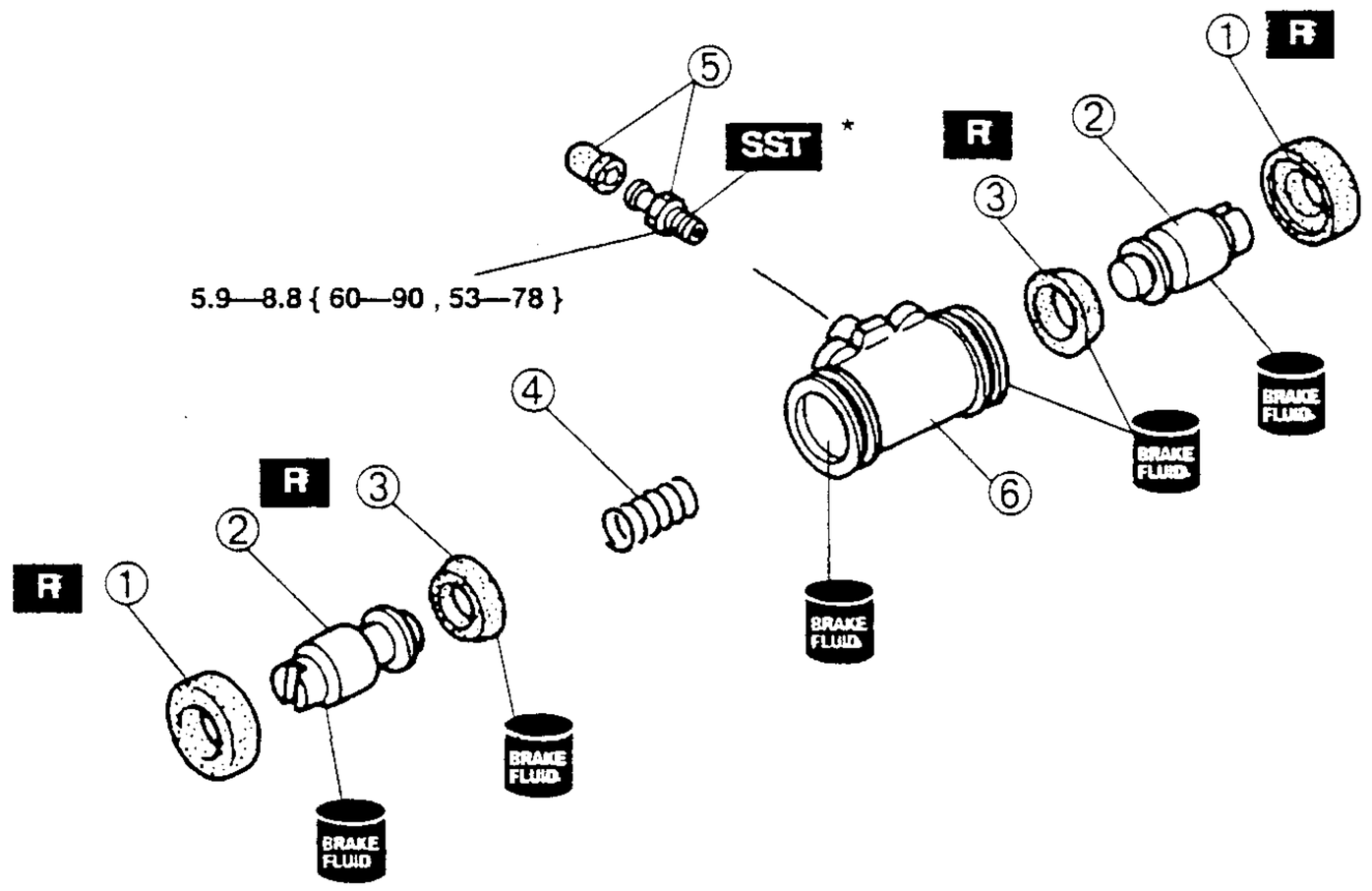
1. Remove any rust or grime on the contact face of the drum brake.
2. Install the brake drum and align the marks made before removal.

WHEEL CYLINDER DISASSEMBLY/ASSEMBLY

Caution

- **Replace the wheel cylinder assembly if a problem is found.**

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



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N·m { kgf·cm , in·lbf }

1	Boot
2	Wheel cylinder piston
3	Piston cup

4	Wheel cylinder spring and cap
5	Rubber cap and bleeder screw
6	Wheel cylinder body

PARKING BRAKE SYSTEM

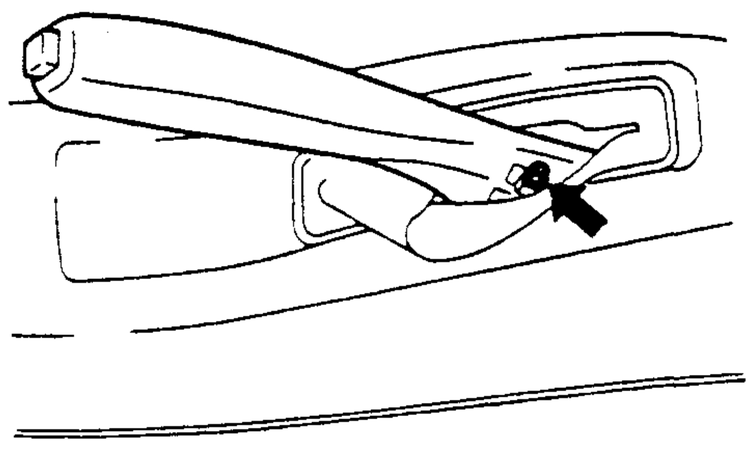
PARKING BRAKE (LEVER TYPE) INSPECTION

1. Pull the parking brake lever a few times.
2. Depress the parking brake pedal a few times.
3. Inspect the parking brake stroke by pulling the parking brake lever with a force of **98 N {10 kgf, 44 lbf }**.

Stroke
5—7 notches

PARKING BRAKE (LEVER TYPE) ADJUSTMENT

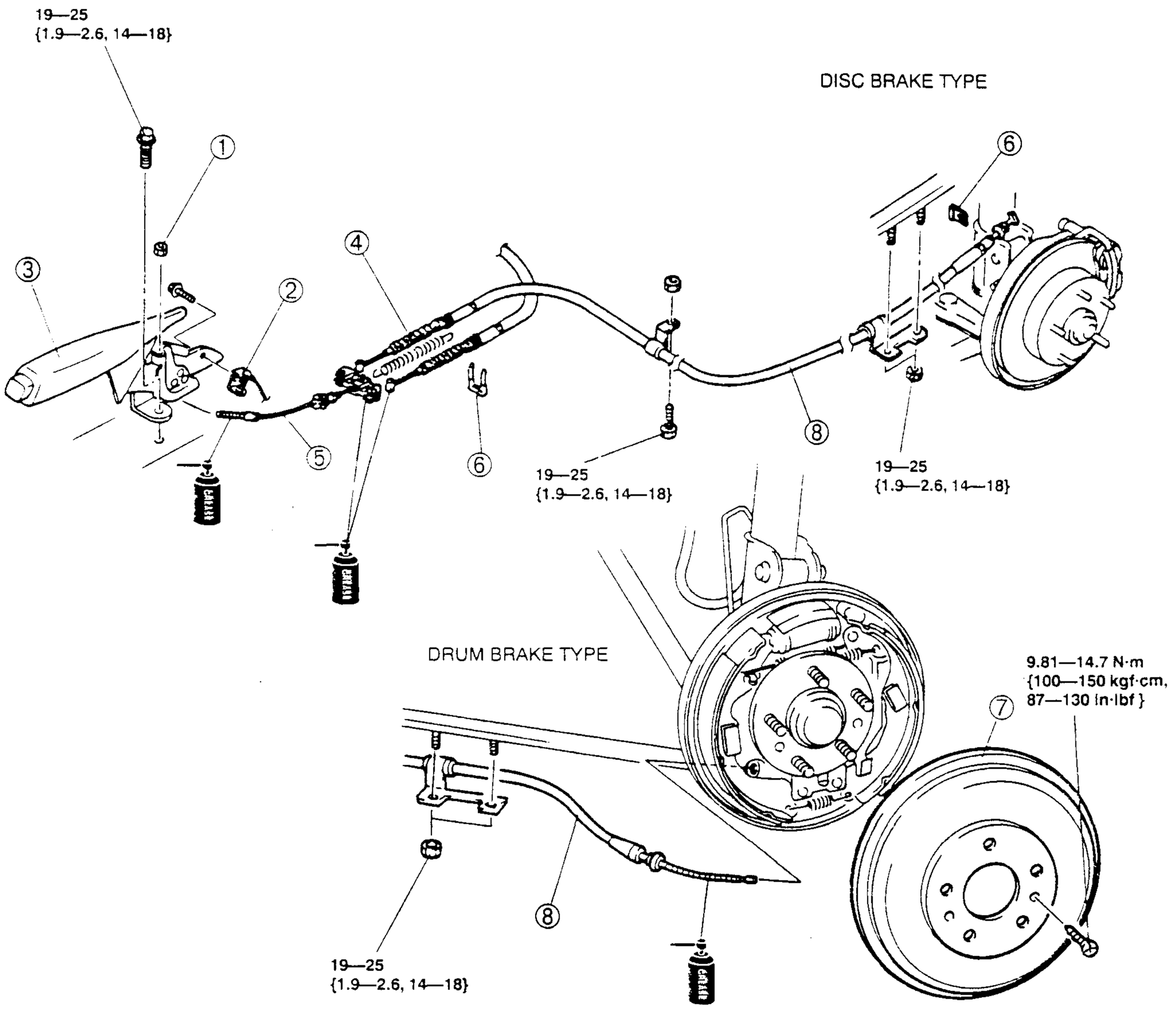
1. Start the engine and depress the brake pedal several times.
2. Stop the engine.
3. Turn the adjusting nut at the front of the parking cable.



4. After adjustment, check the following points:
   (1) Turn the ignition switch to ON, pull the parking brake lever one notch, and check that the park ing brake warning light illuminates.
   (2) Verify that the rear brakes do not drag.

PARKING BRAKE (LEVER TYPE) REMOVAL/INSTALLATION

1. Remove the rear console (Refer to section S, DASHBOARD AND CONSOLE, CONSOLE REMOVAL/INSTALLATION.)
2. Remove the exhaust pipe insulator bolts.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Adjust the parking brake stroke.



N·m { kgf·m , ft·lbf }

1	Adjusting nut
2	Connector
3	Parking brake lever
4	Parking brake switch
5	Return spring

6	Front cable and equalizer
7	Brake drum
8	Clip
9	Parking brake cable

ANTILOCK BRAKE SYSTEM (ABS)

ABS HYDRAULIC UNIT INSPECTION

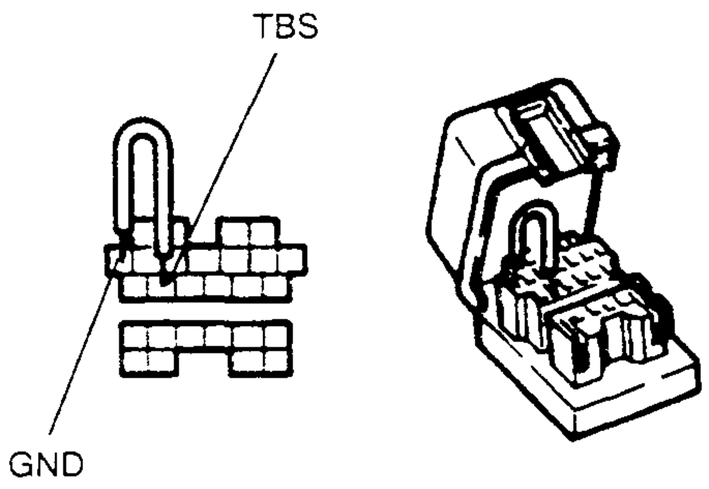
System Inspection

1. Verify that the battery is fully charged. With the ignition switch at ON, verify that the ABS warning light goes out after **2—4 seconds**.
2. If the light stays at ON after **2—4 seconds**, the ABS control module detects a failure and will not activate the ABS hydraulic unit. Follow the troubleshooting procedures.
3. Turn the ignition switch to OFF.
4. On level ground, jack up the vehicle and support it evenly on safety stands. Shift the transmission to neutral or N position.
5. Release the parking brake.
6. Rotate the wheels by hand, and inspect for brake drag.

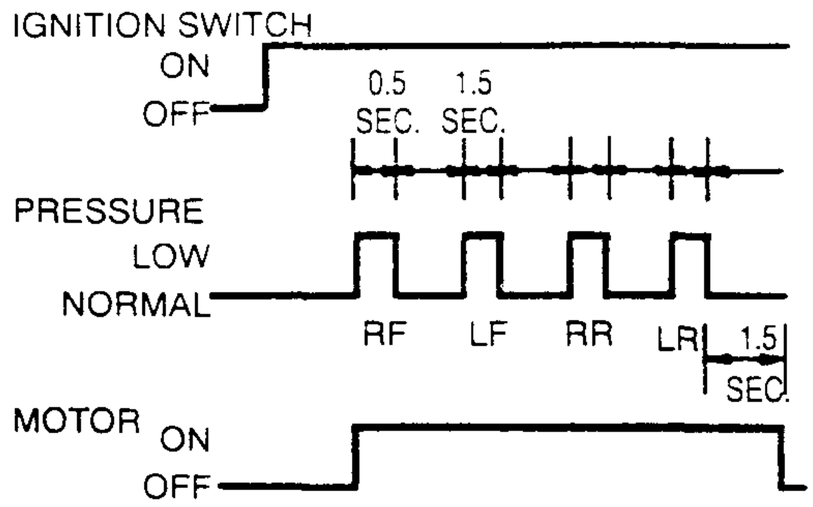
Caution

- **Misconnecting the data link connector terminals may cause a malfunction. Properly connect the specified terminals only.**

7. Using a jumper wire, connect the TBS and GND terminals of the data link connector.



8. Depress the brake pedal, and have an assistant verify that the right front wheel does not turn.
9. With the brake pedal still depressed, turn the ignition switch to ON and verify that the brake is released momentarily (**approx. 0.5 sec.**) and that the wheel turns when pressure-reduction operates.
10. Check the operation of the remaining wheels in order: right front, left front, right rear, left rear.



11. Turn the ignition switch to OFF and remove the jumper wire.
12. Replace the hydraulic unit if necessary.

Note

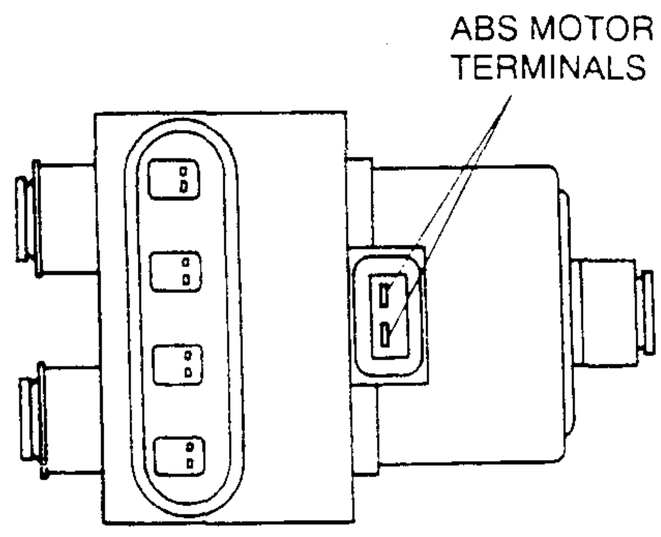
- If steps 9 and 10 show correct operation, the following systems are OK:
  1. Brake piping to ABS hydraulic unit
  2. Braking system, including ABS hydraulic unit
  3. Electrical system in ABS hydraulic unit (solenoid, ABS motor, etc.)
  4. ABS control module, its output system and harness
- The followings are not checked with the above steps
  1. Input system and harness of ABS control module
  2. Intermittent failure
  3. Fluid leakage

ABS Motor Inspection

1. Remove the ABS hydraulic unit. (Refer to ANTILOCK BRAKE SYSTEM (ABS) , ABS HYDRAULIC UNIT AND ABS CONTROL MODULE REMOVAL/INSTALLATION.)
2. Measure the resistance between the terminals.

Resistance

0—1 Ω



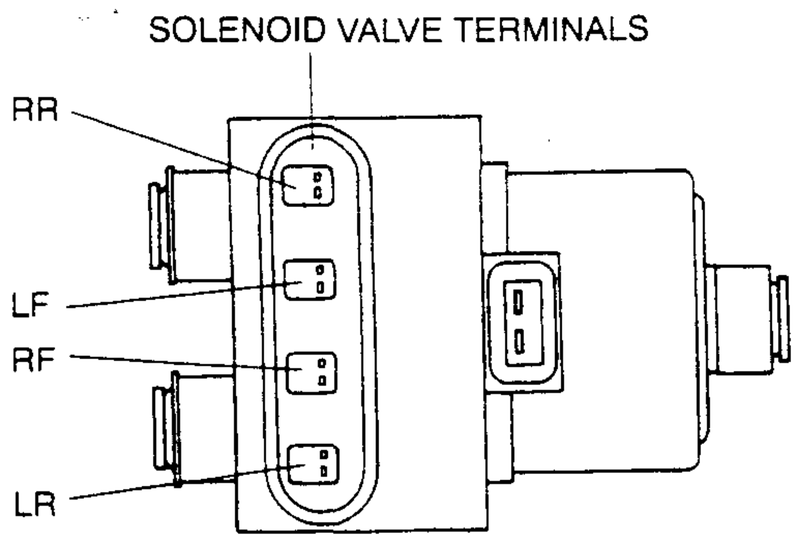
3. If not as specified, replace the ABS hydraulic unit.

Solenoid Valve Inspection

1. Remove the ABS hydraulic unit. (Refer to ANTILOCK BRAKE SYSTEM (ABS), ABS HYDRAULIC UNIT AND ABS CONTROL MODULE REMOVAL/INSTALLATION.)
2. Measure the resistance between the terminals.

Resistance

3—5 Ω



3. If not as specified, replace the ABS hydraulic unit.

ABS HYDRAULIC UNIT AND ABS CONTROL MODULE REMOVAL/INSTALLATION

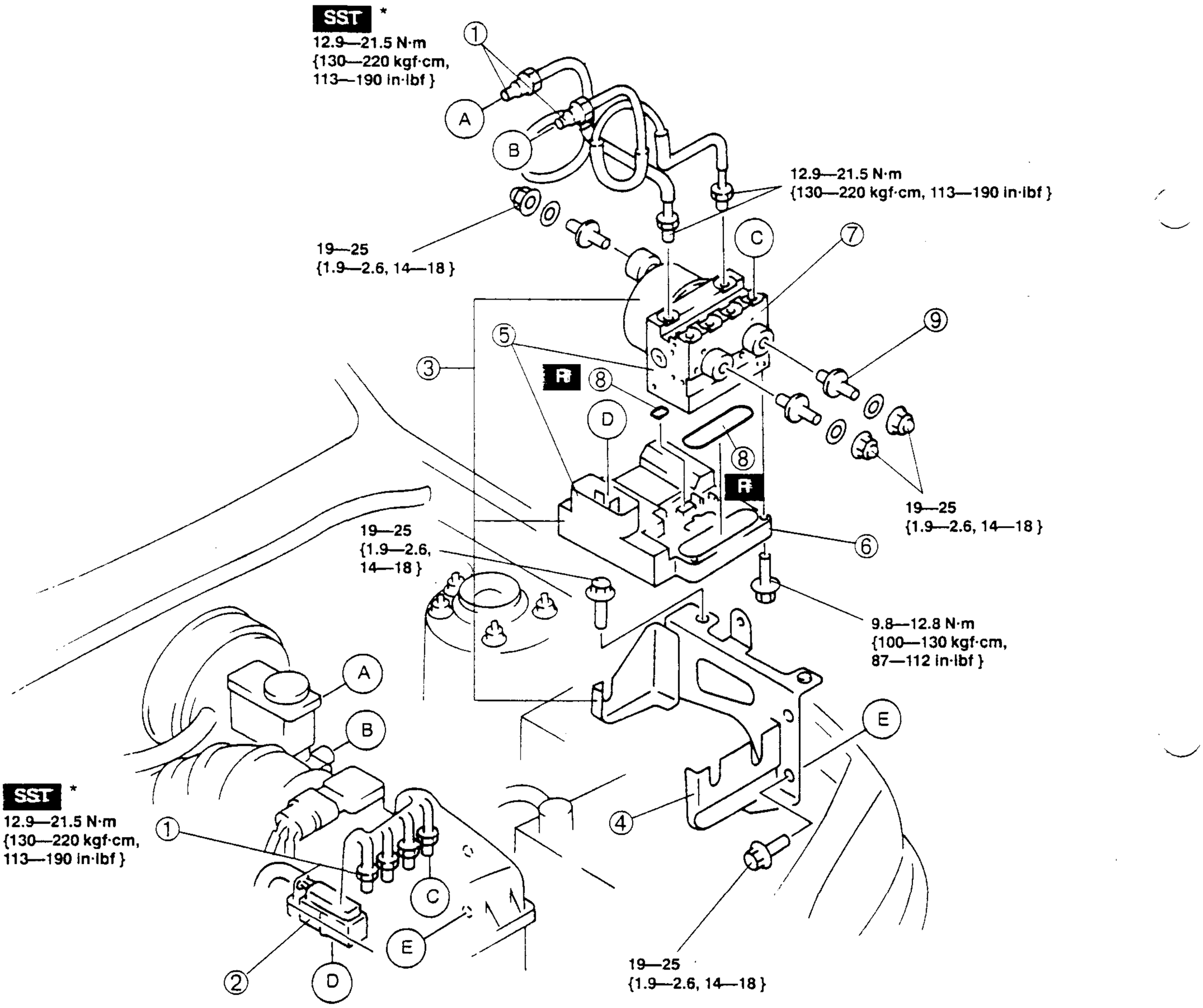
Caution

- **Do not drop the ABS hydraulic unit and ABS control module. Replace them if they are subjected to a impact.**

Note

- The ABS hydraulic unit and ABS control module is not purchased as one assembly part. Replace the ABS hydraulic unit or ABS control module if either is malfunctioning.

1. Remove the charcoal canister.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



* 49 0259 770B

N·m { kgf·m , ft·lbf }

1	Brake pipe
2	Connector ☞ Installation Note
3	ABS hydraulic unit, ABS control module and bracket
4	Bracket
5	ABS hydraulic unit and ABS control module ☞ Removal/Installation Note

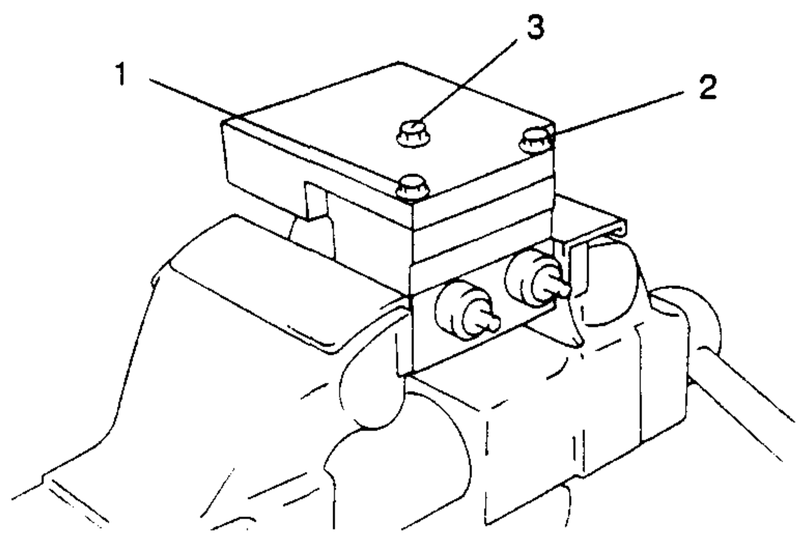
6	ABS control module ☞ Removal Note ☞ Installation Note
7	ABS hydraulic unit
8	Rubber seal
9	Stud

ABS Hydraulic Unit and ABS Control Module Removal/Installation Note

- When removing/installing the ABS hydraulic unit and ABS control module from/to the vehicle, attach a protect tape on the HU connector to prevent brake fluid from entering.

ABS Control Module Removal Note

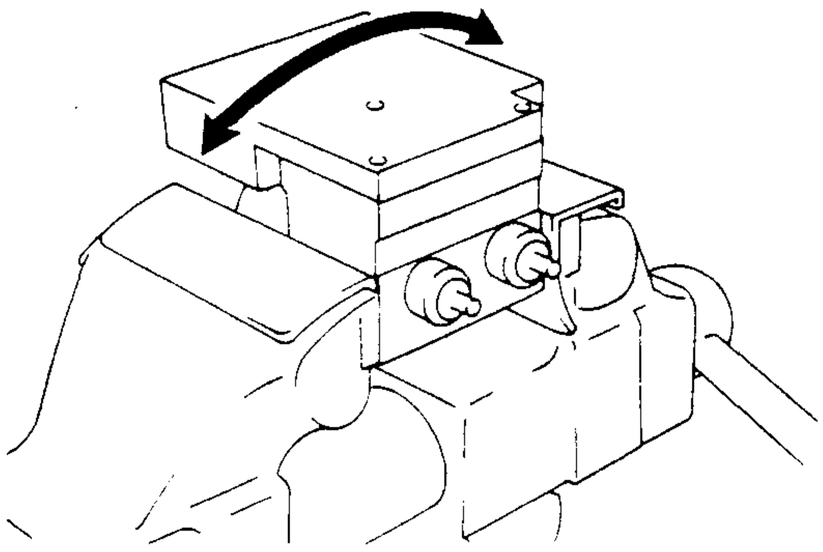
1. Clean the vise by compressed air.
2. Secure the ABS hydraulic unit as shown.
3. Remove the bolts.



Caution

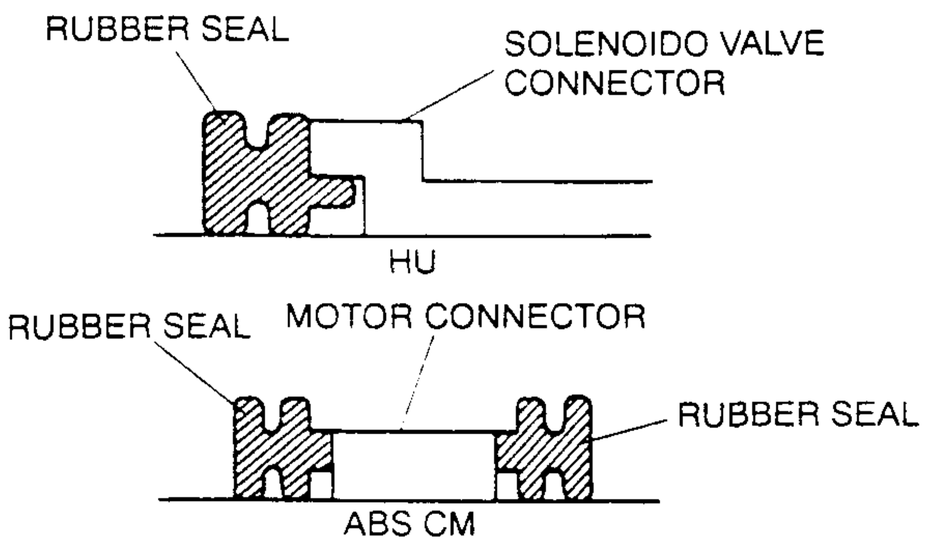
- **Moving the ABS CM to incorrect directions may damage the connector's male pins. If the ABS CM is moved to an incorrect direction, replace it.**
- **When removing the ABS CM, the connector remains on the HU. If it remains on the ABS CM, it indicates a malfunction. Replace the HU and ABS CM.**

4. Gently move the ABS CM to the directions indicated by arrows to remove it.



Rubber Seal Installation Note

- Install the rubber seal as shown.



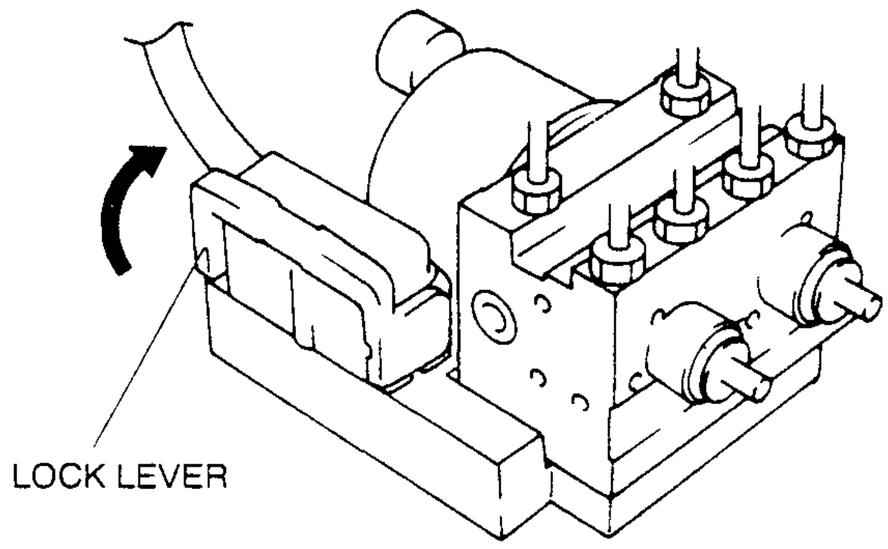
ABS Control Module Installation Note

1. Clean the contact surfaces of the HU and ABS CM by using compressed air.
2. Secure the HU in a vise as shown.
3. Place the ABS CM on the HU.
4. Tighten the bolts just under the specified torque.
5. Tighten the bolts to the specified torque in the order shown.

Tightening torque
9.8—12.8 N·m
{100—130 kgf·cm , 87—112 in·lbf }

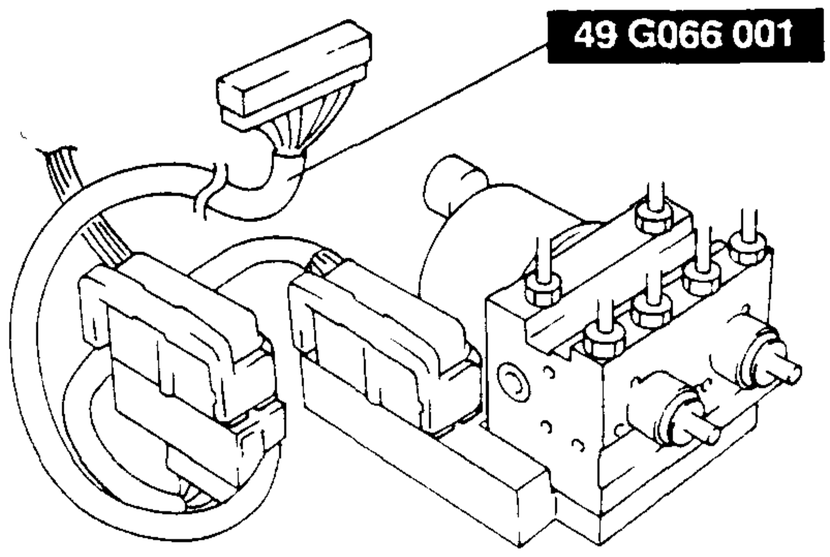
Connector Installation Note

- Verify that the lock lever of the harness connector is completely pulled up.



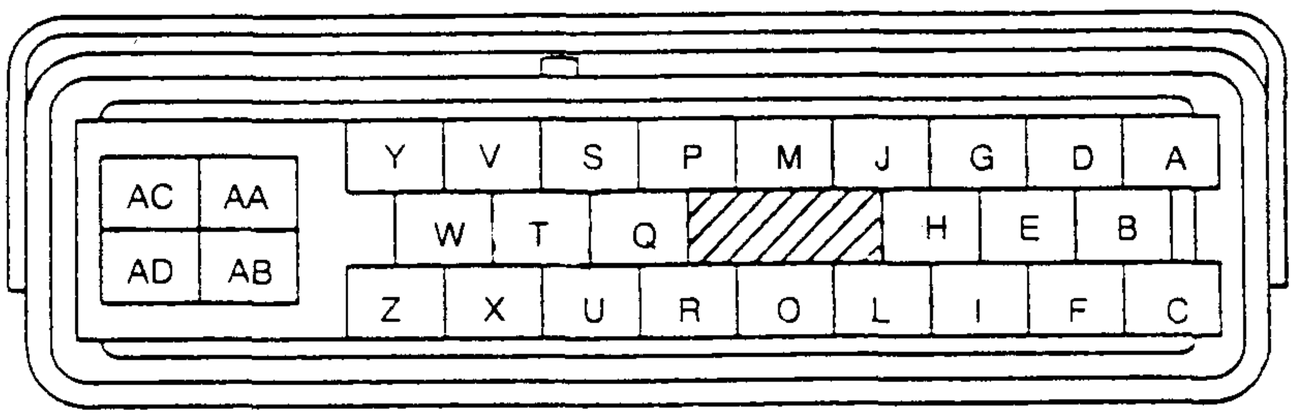
ABS CONTROL MODULE INSPECTION

1. Disconnect the negative battery cable.
2. Connect the **SST** between the ABS CM and harness connector with the ignition switch at OFF.
3. Attach the tester leads to the **SST** to check voltage by referring the table below.



Terminal voltage chart (reference value)

(Engine is idling, and connector is connected unless indicated otherwise)



Terminal	Signal name	Connected to	Condition	Voltage (V)	Inspection point
A	RR wheel-speed (+)	RR wheel-speed sensor	Vehicle is stopped	0 (AC)	• Harness (wheel-speed sensor-ABS/TCS CM) • Wheel-speed sensor
			Vehicle is driving at 10 km/h {6.2 mph }	0.3 min (AC)	
B	RR wheel-speed (–)		Vehicle is stopped	0 (AC)	
C	LR wheel-speed (+)	LR wheel-speed sensor	Vehicle is stopped	0 (AC)	
			Vehicle is driving at 10 km/h {6.2 mph }	0.3 min (AC)	
D	RF wheel-speed (–)	RF wheel-speed sensor	Vehicle is stopped	0 (AC)	
E	LF wheel-speed (–)	LF wheel-speed sensor	Vehicle is stopped	0 (AC)	
F	LR wheel-speed (–)	LR wheel-speed sensor	Vehicle is stopped	0 (AC)	
G	RF wheel-speed (+)	RF wheel-speed sensor	Vehicle is stopped	0 (AC)	
			Vehicle is driving at 10 km/h {6.2 mph }	0.3 min (AC)	
H	–	–	–	–	–
I	LF wheel-speed (+)	LF wheel-speed sensor	Vehicle is stopped	0 (AC)	• Harness (wheel-speed sensor-ABS/TCS CM) • Wheel-speed sensor
			Vehicle is driving at 10 km/h {6.2 mph }	0.3 min (AC)	
J	–	–	–	–	–
L*	Torque reduction inhibit	ECM (PCM)	–	Cycling between 0—12	• Harness (ABS/TCS CM-(ECM/PCM)) • ECM (PCM)
M*	TCS indicator	TCS indicator light	–	B+	• Harness, fuse (battery-TCS indicator-ABS/TCS CM)
O*	TCS OFF light	TCS OFF light	Illuminated	0	• Harness, fuse (battery-TCS OFF light-ABS/TCS CM)
			Not illuminated	B+	

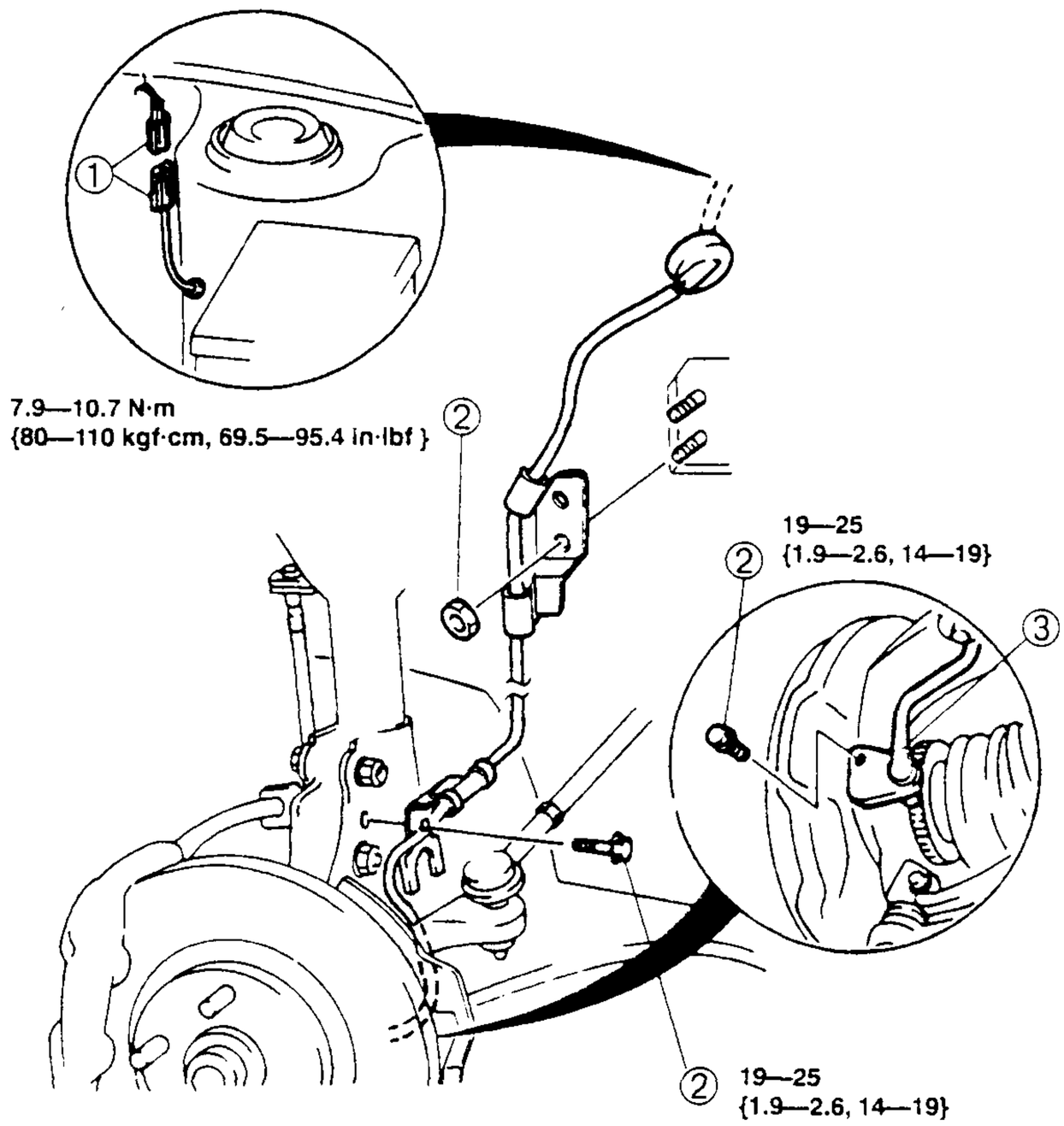
* For TCS, not used for ABS

Terminal	Signal name	Connected to	Condition	Voltage (V)	Inspection point
P*1	TCS OFF switch	TCS OFF switch	Switch is depressed	0	• Harness, fuse (battery-TCS indicator-ABS/TCS CM), switch
			Switch is released	B+	
Q	Vehicle speed output	Meter	Vehicle is stopped	0 (AC)	• Harness (ABS CM-meter) • Meter • Front ABS wheel speed sensors
			Vehicle is driving at 40 km/h {24.8 mph }	0.5 min. (AC)	
R*1	Torque reduction request	ECM (PCM)	Engine is idling	8—12	• ABS/TCS CM
			During TCS operation	Cycling between 5—12	
S*1	Engine speed	ECM (PCM)	-	4—8	• Harness (ABS/TCS CM-ECM (PCM))
T	On-board diagnosis	FBS terminal of DLC	-	0.1 max.	• Harness, fuse (battery-ABS/TCS CM-FBS terminal)
U*2	-	DLC	-	0	• Harness (ABS/TCS CM-DLC)
V	On-board diagnosis	TBS terminal of DLC	-	10—14	• Harness (battery-ABS/TCS CM-TBS terminal)
W	ABS warning light	ABS warning light	Illuminated	0.5 max.	• Harness, fuse (battery-warning light-ABS/TCS CM)
			Not illuminated	5—10	
X	-	-	-	-	-
Y	Brake switch	Brake switch	Brake pedal is depressed	B+	• Harness (battery-brake switch-ABS/TCS CM)
			Brake pedal is released	0.5max.	
Z	Battery	Ignition switch	-	B+	• Harness, fuse (battery-IG SW-ABS/TCS CM)
AA, AD	Ground	Ground	-	0	• Harness to ground point
AB	Battery (ABS motor)	Battery	-	B+	• Harness, fuse (battery-ABS CM)
AC	Battery (Solenoid valve)	Battery	-	B+	

*1 For TCS, not used for ABS.
*2 Used for vehicle manufacturing, not used for ABS/TCS.

ABS WHEEL-SPEED SENSOR (FRONT) REMOVAL/INSTALLATION

1. Remove the air cleaner when removing the right sensor, and remove the battery when removing the left sensor.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Connector
2	Bolt

3	ABS wheel-speed sensor (front)

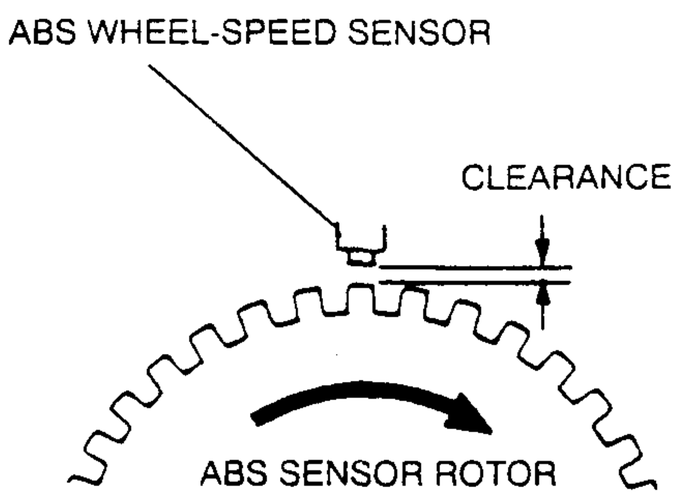
ABS WHEEL-SPEED SENSOR (FRONT) INSPECTION

- Remove the wheel and tire, and inspect the sensor for looseness and damage. Replace the sensor if necessary.

Clearance Inspection

- Check the clearance between the wheel-speed sensor and the sensor rotor.

Clearance
0.3—1.1 mm { 0.0012—0.0433 in }



Resistance Inspection

1. Disconnect the ABS wheel-speed sensor connector.
2. Check the resistance at the ABS wheel-speed sensor.

Resistance
1.4—1.8 kΩ

Voltage Inspection

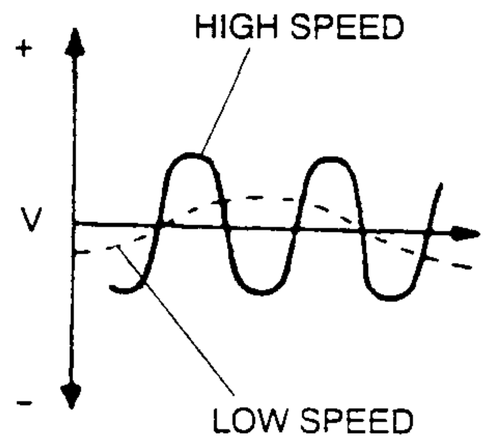
1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Disconnect the ABS wheel-speed sensor connector.
3. Check each wheel by rotating it at one revolution per second.

Voltage
0.25—1.2 V (AC)

4. If not as specified, replace the ABS wheel-speed sensor.

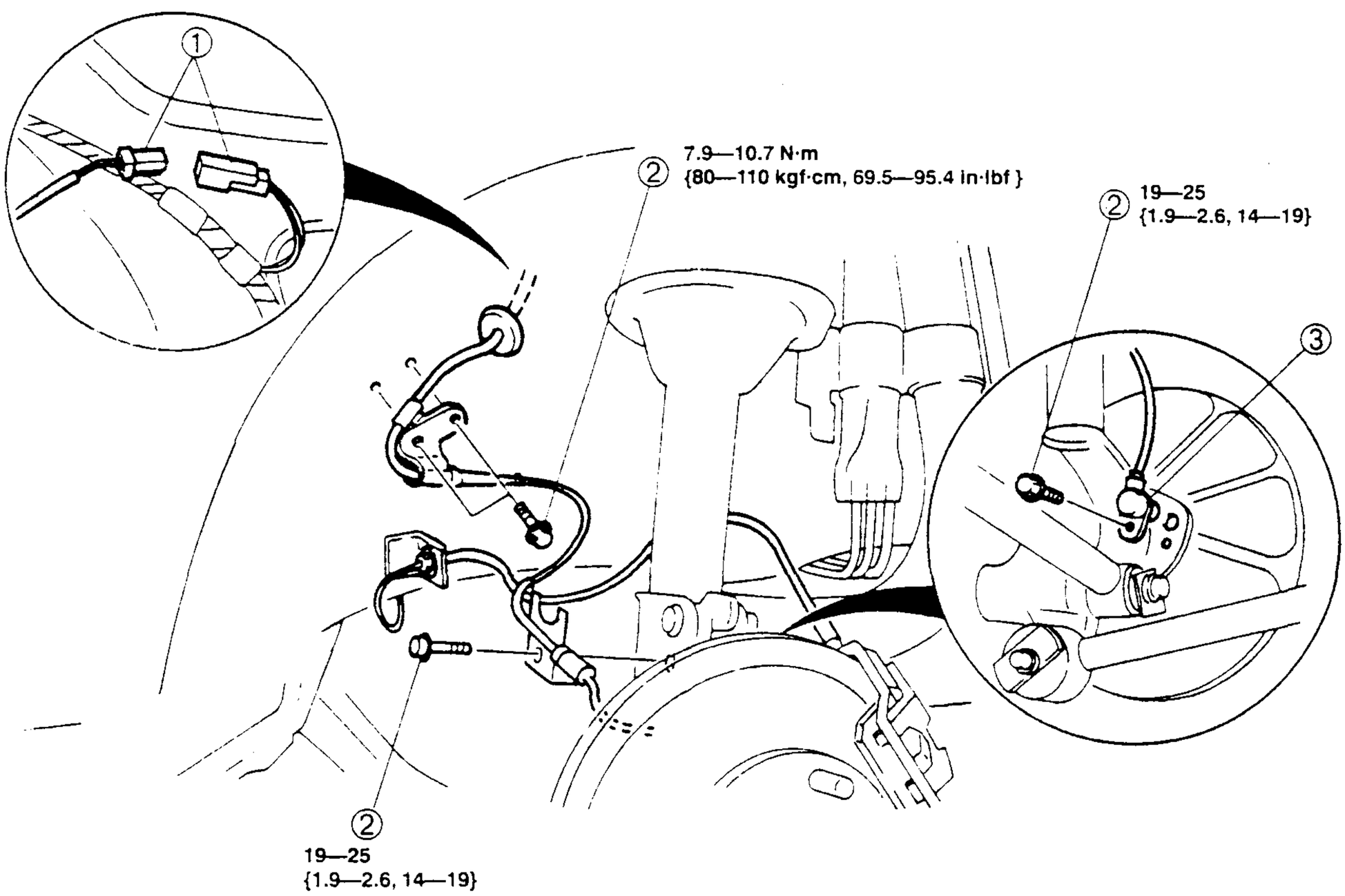
Voltage Pattern Inspection

1. One level ground, jack up the vehicle and support it evenly on safety stands.
2. Disconnect the ABS wheel-speed sensor connector.
3. Check voltage pattern by rotating it at one revolution per second.



ABS WHEEL-SPEED SENSOR (REAR) REMOVAL/INSTALLATION

1. Remove the trunk side trim. (Refer to section S, TRIM, TRUNK SIDE TRIM REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



N·m { kgf·m , ft·lbf }

1	Connector
2	Bolt
3	ABS wheel-speed sensor (rear)

ABS WHEEL-SPEED SENSOR (REAR) INSPECTION

- Inspect the ABS wheel-speed sensor (rear) in the same way as the front sensor. (Refer to ANTILOCK BRAKE SYSTEM (ABS), ABS WHEEL-SPEED SENSOR (FRONT) INSPECTION.)

TRACTION CONTROL SYSTEM (TCS)

TCS OPERATION INSPECTION

1. Place the front wheels on a chassis roller or jack up the front of the vehicle on level ground and support it on safety stands.
2. Start the engine, and verify that the TCS OFF light is out.

Note

- In order to protect the engine, if engine coolant temperature is extremely low, TCS control is temporarily interrupted until the engine coolant temperature rises. In such cases, the TCS OFF light illuminates.

3. If the light stays on after the engine is started, the ABS/TCS control module detects a failure. In that case, turn off the engine and follow the troubleshooting procedures.
4. Shift the transaxle to second or D range.
5. Depress the accelerater pedal for 5 seconds, and verify that the engine speed is held low and the TCS indicator light is flashing.

Note

- If the front wheels rotate for 60 seconds or more, the ABS warning light, TCS indicator light and TCS OFF lights illuminate, and the engine speed increases. In that case, turn the ignition switch to OFF and ON again, then drive the vehicle faster than **20 km/h {12.4 mph }** . Verify that those lights go out. ABS/TCS CM does not memorize DTC.

6. If not as described, follow the troubleshooting procedures.

ABS/TCS CONTROL MODULE REMOVAL/INSTALLATION

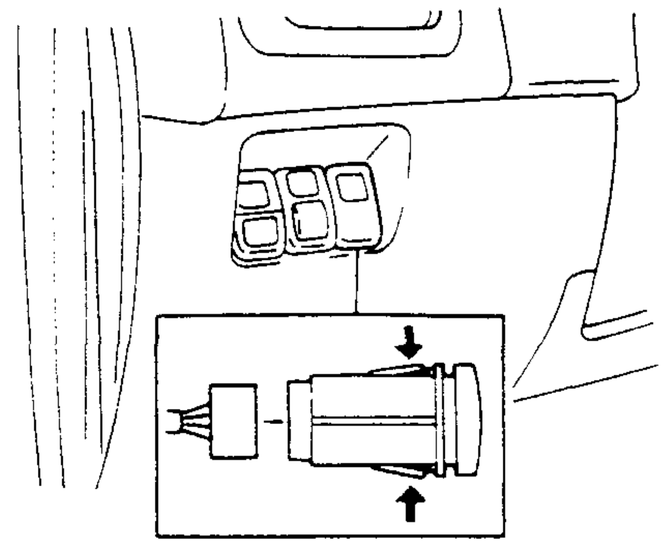
(Refer to ANTILOCK BRAKE SYSTEM, ABS HYDRAULIC UNIT AND ABS CONTROL MODULE REMOVAL/INSTALLATION.)

ABS/TCS CONTROL MODULE INSPECTION

(Refer to ANTILOCK BRAKE SYSTEM, ABS CONTROL MODULE INSPECTION.)

TCS OFF SWITCH REMOVAL/INSTALLATION

1. Press the hooks of the TCS OFF switch and pull the switch out.
2. Disconnect the connector.
3. Install in the reverse order of removal.

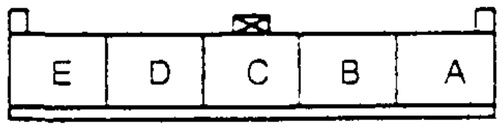


TCS OFF SWITCH INSPECTION

1. Remove the TCS OFF switch.
2. Measure the resistance between A and C of the connector.

Resistance
When switch is pressed: 100 Ω or less
when switch is released: ∞

3. If not within the specification, replace the TCS OFF switch.



ON-BOARD DIAGNOSTIC FUNCTION

ANTILOCK BRAKE SYSTEM AND TRACTION CONTROL SYSTEM

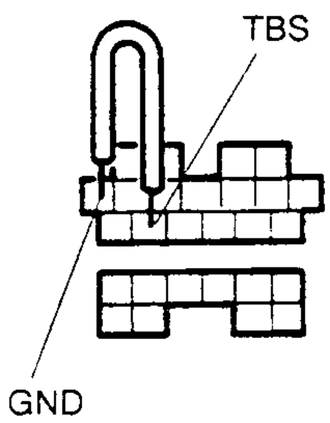
Diagnostic Trouble Code Inspection

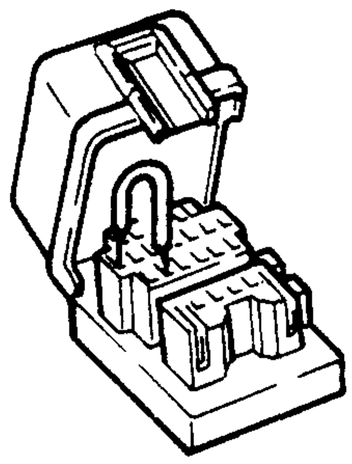
Using ABS warning light

Caution

- **Misconnecting the data link connector terminals may cause a malfunction. Properly connect the specified terminals only.**

1. Short the data link connector TBS terminal to the GND terminal by using a jumper wire.





2. Turn ignition to ON.

Note

- If the ignition switch is turned to ON before connecting the terminals, the diagnostic test mode will not start.

3. After the warning light illuminates for **three seconds**, it will indicate a diagnostic trouble code(s).
4. Read and note the code number(s) and check for the causes by referring to the Diagnostic chart. If normal, the ABS warning light does not illuminate.

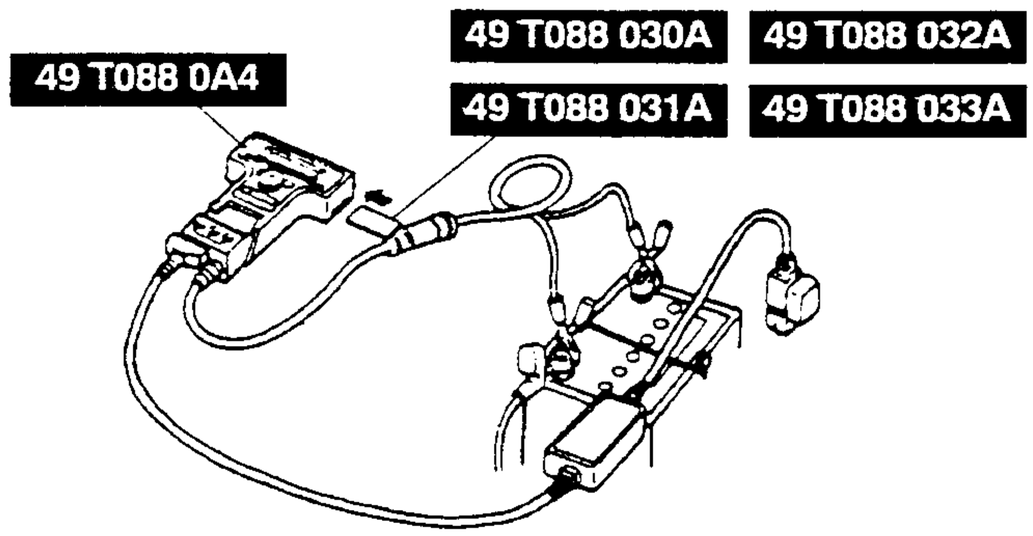
Note

- After ignition switch is turned to ON, the warning light illuminates for **three seconds** and goes out for **two seconds**; then it will indicate DTC(s).
- If TBS terminal is shorted to GND after ignition switch is turned to ON, illumination for **three seconds** will be skipped.
- If there are any malfunctions at present, ABS warning light remains illuminated and does not indicate DTC(s). Inspect it by using the **SST** or the circuit tester.

5. After completion of repairs, erase all DTC(s) from the memory. (Refer to ON-BOARD DIAGNOSTIC FUNCTION, ANTILOCK BRAKE SYSTEM AND TRACTION CONTROL SYSTEM, Post Repair Procedures)
6. Remove the jumper wire.

Using SST (NGS)

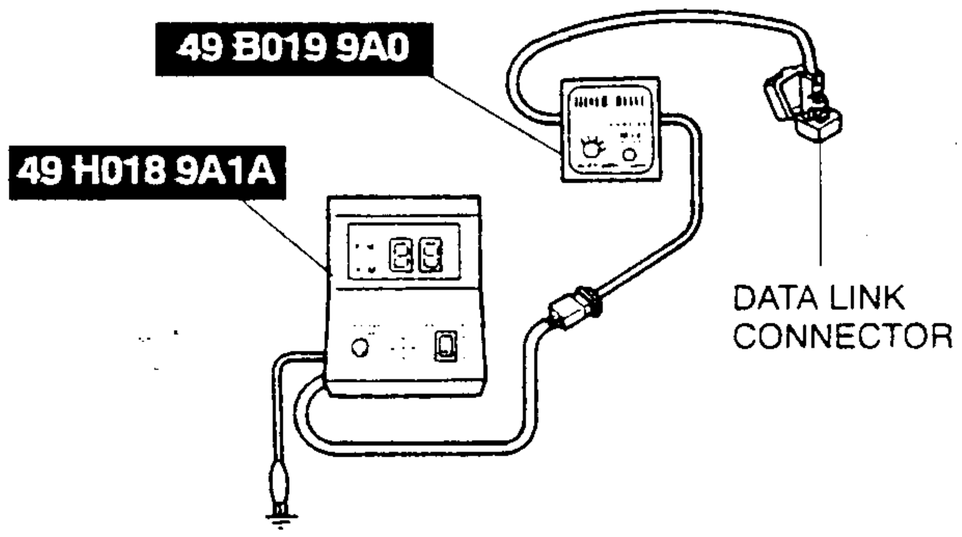
1. Connect the **SSTs** to the data link connector and battery.



2. Turn the ignition key to the ON position.
3. Select VEHICLE AND ENGINE SELECTION and press TRIGGER. (Select the model and specifications of the testing vehicle)
4. Select DIAGNOSTIC DATA LINK and press TRIGGER.
5. Select ABS-ANTI LOCK BRAKE MODULE and press TRIGGER.
6. Select DIAGNOSTIC TEST MODES and press TRIGGER.
7. Select READ/CLEAR DIAGNOSTIC TEST RESULTS and press TRIGGER.
8. Press START.
9. If normal, "NO CODES RECEIVED" will be indicated.
10. If a diagnostic trouble code is indicated, inspect the appropriate area and repair as necessary.
11. After completion of repairs, erase all diagnostic trouble codes from memory. (Refer to ON-BOARD DIAGNOSTIC FUNCTION, ANTILOCK BRAKE SYSTEM AND TRACTION CONTROL SYSTEM, Post Repair Procedures)
12. Remove the **SSTs**.

Using SST (Self-diagnosis checker and system selector)

1. Connect the **SSTs** to the data link connector and ground the black (negative) lead to the body.



2. Set the select switch on the **SST** (self-diagnosis checker) to A.
3. Turn the dial switch on the **SST** (system selector) to 3, and set the test switch to SELF-TEST.
4. Turn the ignition switch ON.
5. Verify that the buzzer sounds for approximately **3 seconds** and code "88" flashes for **5 seconds**. If normal, "00" will be indicated.

Note

- If "88" does not flash, inspect +B terminal of the data link connector, and the related harnesses and connectors.
- If "88" flashes and the buzzer sounds for more than **20 seconds**, inspect the harness between the ABS control module 2V terminal and data link connector. If the harness is normal, replace the ABS control module and reinspect.

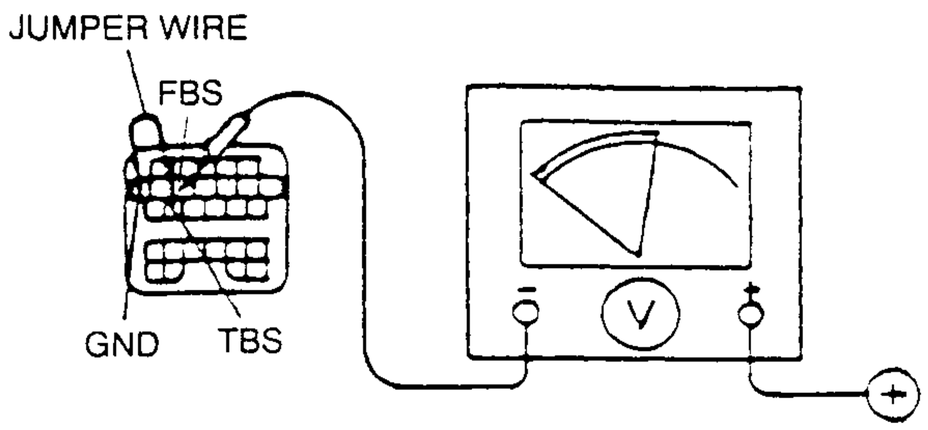
6. If a diagnostic trouble code is indicated, inspect the appropriate area and repair as necessary.
7. After completion of repairs, erase all diagnostic codes from the memory. (Refer to ON-BOARD DIAGNOSTIC FUNCTION, ANTILOCK BRAKE SYSTEM AND TRACTION CONTROL SYSTEM Post Repair Procedures.)
8. Remove the **SST**.

Using voltmeter

Caution

- **Misconnecting the data link connector terminals may cause a malfunction. Properly connect the specified terminals only.**

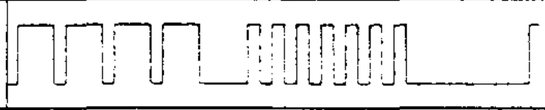
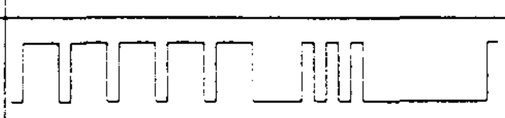
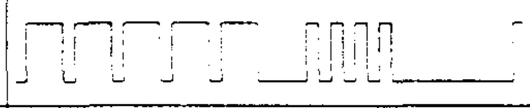
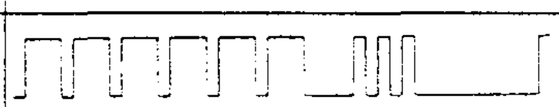
1. Short the data link connector TBS terminal to the GND terminal by using a jumper wire.
2. Connect the negative lead of the voltmeter (20 V range) to the data link connector FBS terminal, and the positive lead to the battery's positive terminal.



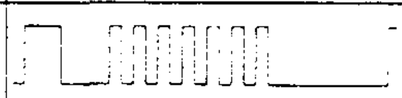
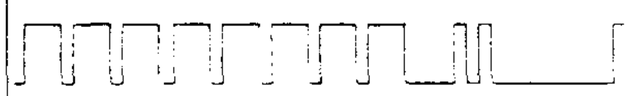
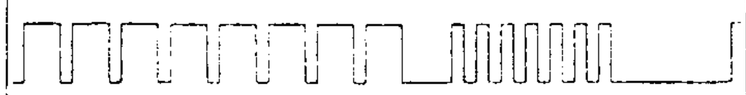
3. Turn the ignition switch to ON.
4. The voltmeter indicates the battery's voltage for approximately **3 seconds**, then indicates 0 V.
5. Read the diagnostic trouble code indicated by the movement of the voltmeter needle. If normal, the needle does not move.
6. If a diagnostic trouble code is indicated, inspect the appropriate area and repair as necessary.
7. After completion of repairs, erase all diagnostic trouble codes from the memory. (Refer to ON-BOARD DIAGNOSTIC FUNCTION, ANTILOCK BRAKE SYSTEM AND TRACTION CONTROL SYSTEM Post Repair Procedures)
8. Remove the voltmeter, and jumper wire.

Diagnostic Trouble Code Table

DTC	Output pattern	Display on the NGS	Diagnosis system component
11		WSS, SR (RF)—OPEN OR SHORT	Right front wheel-speed sensor
12		WSS, SR (LF)—OPEN OR SHORT	Left front wheel-speed sensor
13		WSS, SR (RR)—OPEN OR SHORT	Right rear wheel-speed sensor
14		WSS, SR (LR)—OPEN OR SHORT	Left rear wheel-speed sensor
22		HU/SOL.V (RF)/SOL.V (RF) AV—OPEN OR SHORT	Right front solenoid valve
24		SOL.V (LF)/(LF) AV—OPEN OR SHORT	Left front solenoid valve
26		SOL.V (RR)/(R) AV/(RR) AV—OPEN OR SHORT	Right rear solenoid valve
28		SOL.V (LR)/(LR) AV—OPEN OR SHORT	Left rear solenoid valve
29		BRAKE LINE (RF-LR), HU-MALFUNCTION	Right front-Left rear brake line in ABS hydraulic unit
30		BRAKE LINE (LF-RR), HU-MALFUNCTION	Left front-Right rear brake line in ABS hydraulic unit
32		SOL.V (RF), MOTOR—MALFUNCTION	Right front solenoid valve ABS motor
33		SOL.V (LF), MOTOR—MALFUNCTION	Left front solenoid valve ABS motor
34		SOL.V (RR), MOTOR—MALFUNCTION	Right rear solenoid valve ABS motor

DTC	Output pattern	Display on the NGS	Diagnosis system component
35		SOL.V (LR), MOTOR—MALFUNCTION	Left rear solenoid valve ABS motor
41		WSS, SR (RF)—OPEN OR SHORT	Right front wheel-speed sensor
42		WSS, SR (LF)—OPEN OR SHORT	Left front wheel-speed sensor
43		WSS, SR (RR)—OPEN OR SHORT	Right rear wheel-speed sensor
44		WSS, SR (LR)—OPEN OR SHORT	Left rear wheel-speed sensor
45		WHEEL SPEED SENSOR (RF) —MALFUNCTION	Right front wheel-speed sensor/sensor rotor
46		WHEEL SPEED SENSOR (LF) —MALFUNCTION	Left front wheel-speed sensor/sensor rotor
47		WHEEL SPEED SENSOR (RR) —MALFUNCTION	Right rear wheel-speed sensor/sensor rotor
48		WHEEL SPEED SENSOR (LR) —MALFUNCTION	Left rear wheel-speed sensor/sensor rotor
51		FAIL SAFE RELAY—OPEN OR SHORT	Fail-safe relay in ABS control module
52		FAIL SAFE RELAY—OPEN OR SHORT	Fail-safe relay in ABS control module
53		MOTOR, MOTOR RELAY—OPEN OR SHORT	ABS motor
54		MOTOR, MOTOR RELAY—OPEN OR SHORT	ABS motor
61		ABS/TCS CONTROL UNIT—DEFECT	ABS control module
63		POWER SUPPLY—MALFUNCTION	Battery Generator

TCS

DTC	Output pattern	Display on the NGS	Diagnosis system component
17		ENGINE SPEED SIGNAL —OPEN OR SHORT	Engine control system Engine speed signal line
82		ENGINE CONTROL SYSTEM— MALFUNCTION	Engine control system Torque reduction request signal line
83		TQR INHIBIT SIGNAL LINE— OPEN OR SHORT	Torque redaction inhibit signal line
87		ECT—TOO LOW	Engine coolant temperature

Post Repair Procedures

Memory cancel

Caution

- **Misconnecting the data link connector terminals may cause a malfunction. Properly connect the specified terminals only.**

1. Connect the TBS terminal to GND at the data link connector.
2. Turn the ignition switch to ON.
3. Output all memorized codes.
4. After verifying that the first code is repeated, depress the brake pedal **10 times** at intervals of less than **one second (1 sec.).**
5. Turn the ignition switch OFF and disconnect the TBS terminal to GND at the data link connector.

Note

- Diagnostic trouble codes cannot be canceled if the following occur:

1. Intervals of depressing the brake pedal **exceed one second (1 sec.).**
2. The brake switch has failed.

Diagnostic chart for ABS

Caution

- **When attaching the tester lead to the ABS CM or the ABS CM harness connector the SST must by used. Refer to ANTILOCK BRAKE SYSTEM (ABS), ABS CONTROL MODULE INSPECTION.**

DTC 11, 12, 13, 14, 41, 42, 43, 44, 45, 46, 47, 48	ABS wheel-speed sensor/sensor rotor (11, 41, 45: Right front 12, 42, 46: Left front 13, 43 ,47: Right rear 14, 44, 48: Left rear)
DETECTION CONDITION	11—14: When open or short circuit is detected 41—44: Wheel speed signal is out of specification during a vehicle is stopped or starting 45—48: Distortion/sudden change/noise of wheel speed signal is detected during driving vehicle
POSSIBLE CONDITION	• Open or short circuit of ABS wheel-speed sensor • Damaged ABS sensor rotor

STEP	INSPECTION		ACTION
1	With ABS CM is disconnected, inspect resistance between following sensor terminals of harness connector. RF: G-D, LF: E-I, RR: A-B, LR: C-F **Resistance** **1.4—1.8 kΩ** Is it as specified?	Yes	If any of DTC 41—44 or 45—48 is memorized, go to next step. If not, go to step 3.
		No	Go to step 3.
2	With ABS CM is disconnected, inspect resistance between sensor terminals and ground. RF: G, D, LF: E, I, RR: A, B, LR: C, F **Resistance** ∞ Are they as specified?	Yes	Go to step 4.
		No	There is a short to ground. Check short point and repair it if necessary.
3	Remove sensor connector and inspect resistance between sensor terminals. **Resistance** **1.4—1.8 kΩ** Is it as specified?	Yes	Go to next step.
		No	Replace ABS wheel-speed sensor.
4	Inspect clearance between sensor and rotor, and output voltage. (Refer to ANTILOCK BRAKE SYSTEM (ABS), ABS WHEEL-SPEED SENSOR (FRONT) INSPECTION.) Is sensor okay?	Yes	If any of DTC 45—48 is memorized, Go to next step. If not, go to step 6.
		No	Replace ABS wheel-speed sensor.
5	Visually inspect sensor rotor for missing, deformation and obstruction of teeth. Inspect output voltage pattern by using an oscilloscope. (Refer to ANTILOCK BRAKE SYSTEM, ABS WHEEL SPEED SENSOR (FRONT) INSPECTION, Voltage Pattern Inspection.) Is sensor rotor okay?	Yes	Go to next step
		No	Replace ABS sensor rotor
6	Erase DTC, and recheck for DTCs after driving over **10 km/h {6.2 mph }** Are any of above DTCs obtained?	Yes	Replace ABS CM
		No	There was a temporarily poor contact in wiring harness or connector

DTC 22, 24, 26, 28, 51, 52	HU, ABS CM, AC terminal of ABS CM (power supply)
DETECTION CONDITION	22, 24, 26, 28: When open or short circuit of solenoid valve is detected during vehicle is stopped or starting 51: Fail-safe relay does not turn to ON when IG SW is turned to ON 52: Fail-safe relay does not turn to OFF when IG SW is turned to ON
POSSIBLE CONDITION	• Open or short circuit of solenoid valve • Open or short circuit of fail-safe relay • Open circuit or low voltage at AC terminal of ABS CM

STEP	INSPECTION		ACTION
1	Is ABS fuse (60 A) okay?	Yes	Go to next step.
		No	Replace fuse.
2	With IG SW is ON, is **B+** correctly applied to AC terminal of ABS CM?	Yes	Go to next step.
		No	Inspect and repair harness or AC terminal.
3	Is DTC 63 also memorized?	Yes	Go to DTC 63 chart.
		No	If only DTC 52 is memorized, go to step 5. If any of DTC 22, 24, 26, 28 and 51 are memorized, go to next step.
4	Inspect resistance of HU solenoid valve. (Refer to ANTILOCK BRAKE SYSTEM (ABS). ABS HYDRAULIC UNIT INSPECTION, Solenoid Valve Resistance Inspection.) **Resistance** **3—5 Ω** Is resistance as specified? **Caution** • **Be careful not to catch rubber seal between HU and ABS CM connectors when installing HU. Catching rubber seal may cause any of DTC 22, 24, 26, 28 or 51.**	Yes	Replace ABS CM.
		No	Replace HU.
5	Erase DTC, and recheck for DTCs. Are any of above DTCs obtained?	Yes	Replace ABS CM.
		No	There was a temporarily poor contact in wiring harness or connector.

DTC 29, 30	Brake line (29: Right front-left rear 30: Left-front-right rear) in ABS hydraulic unit
DETECTION CONDITION	29: No input signal from RF and LR speed sensor circuit during ABS operation 30: No input signal from LF and RR speed sensor circuit during ABS operation
POSSIBLE CONDITION	• Malfunction of ABS pump

STEP	INSPECTION		ACTION
1	Perform ABS hydraulic unit system inspection. Is it okay?	Yes	Go to next step.
		No	Replace HU.
2	Inspect brake fluid level and for uneven brake force distribution (FR-LR and FL-RR). Are they okay?	Yes	Go to next step.
		No	Inspect conventional brake line.
3	Is brake dragging?	Yes	Repair parking brake system.
		No	System is normal. Erase DTC and observe symptom. Replace ABS hydraulic unit if the trouble recurs.

DTC 32, 33, 34, 35	ABS hydraulic unit
DETECTION CONDITION	*Wheel lock is detected during ABS operation (pressure reduction cannot be done)*
POSSIBLE CONDITION	• Malfunction of solenoid valve or ABS motor

STEP	INSPECTION		ACTION
1	Is DTC 63 also memorized?	Yes	Go to DTC 63 chart.
		No	Go to next step.
2	Is any of DTC 11—14, 41—44 or 45—48 also memorized?	Yes	Go to DTC 11—14, 41—44, 45—48 chart.
		No	Go to next step.
3	Is any of DTC 22—28 also memorized?	Yes	Go to DTC 22—28 chart.
		No	Go to next step.
4	Perform HU system inspection is HU OK?	Yes	Go to next step.
		No	Replace HU.
5	Erase DTC, and recheck for DTCs. Is any of above DTCs obtained?	Yes	Replace ABS CM.
		No	System is normal. Erase DTC and observe symptom. Replace HU if trouble recurs.

DTC 53, 54	**Motor relay. ABS Motor, malfunction of motor power supply (AB terminal of ABS CM), malfunction of motor ground (AD terminal of ABS CM)**
DETECTION CONDITION	53: ABS motor does not turn to ON during vehicle is starting or ABS operation 54: ABS motor does not turn to OFF during vehicle is starting or ABS operation
POSSIBLE CONDITION	• Open circuit of ABS CM AB or AD terminal • Open/short circuit of motor, motor lock • Open/short circuit of motor relay

STEP	INSPECTION		ACTION
1	Is DTC 63 also memorized?	Yes	Go to DTC 63 chart.
		No	Go to next step.
2	With IG SW is ON, is **B+** correctly applied to AB of ABS CM connector?	Yes	Go to next step.
		No	Electric power is not supplied to ABS CM Inspect and repair harness.
3	Is resistance between AD of ABS CM and ground **0—1Ω**?	Yes	Go to next step.
		No	AD terminal of ABS CM is not connected to ground. Inspect and repair harness.
4	Is resistance between ABS motor terminals as specified? (Refer to ANTILOCK BRAKE SYSTEM (ABS), ABS HYDRAULIC UNIT INSPECTION, ABS Motor Inspection.) **Resistance** **1 Ω or less** **Caution** • **Be careful not to catch rubber seal between HU and ABS CM connectors when installing HU. Catching rubber seal may cause any of DTC 22, 24 ,26, 28 or 51.**	Yes	Go to next step.
		No	Open circuit is in ABS Motor. Replace HU.
5	Is resistance between motor terminal of HU and motor case as specified? **Resistance** ∞	Yes	Go to next step.
		No	Replace HU.

STEP	INSPECTION		ACTION
6	*Erase DTC, and recheck for DTCs.* Is DTC 53 or 54 obtained?	Yes	Replace ABS CM.
		No	System is normal. Erase DTC and observe symptom. Replace HU if trouble recurs.

DTC 61	ABS control module
DETECTION CONDITION	The on-board diagnostic program defects computer malfunction
POSSIBLE CONDITION	• Malfunction of control module

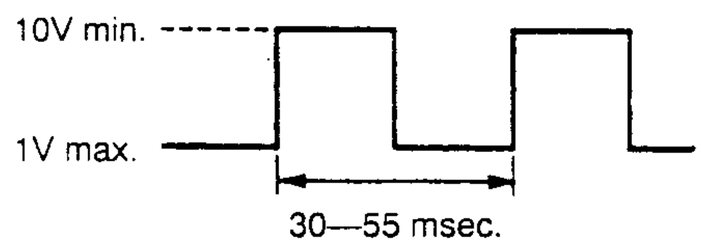
STEP	INSPECTION		ACTION
1	Erase DTC, and recheck for DTCs. Is DTC 61 obtained?	Yes	Replace ABS CM.
		No	Temporarily poor contact was in wiring harness or connector.

DTC 63	Battery or generator
DETECTION CONDITION	Voltage at AC terminal of ABS CM drops below approx. 10 V during driving a vehicle
POSSIBLE CONDITION	• Deteriorated battery • Malfunction of generator • Poor contact at AC terminal of ABS CM

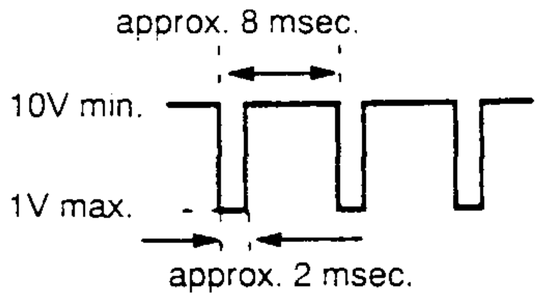
STEP	INSPECTION		ACTION
1	Is battery specific gravity as specified?	Yes	Go to next step.
		No	Replace battery.
2	Does generator operate correctly?	Yes	Go to next step.
		No	Repair or replace generator.
3	Is **B+** correctly applied to ABS fuse (60 A)?	Yes	Go to next step.
		No	Repair harness between battery and fuse.
4	*Is voltage at AC of ABS CM connector as specified?* **Voltage** **B+**	Yes	*System is normal.* Erase DTC and observe symptom.
		No	Repair harness between fuse and ABS CM connector.

Diagnostic chart for TCS

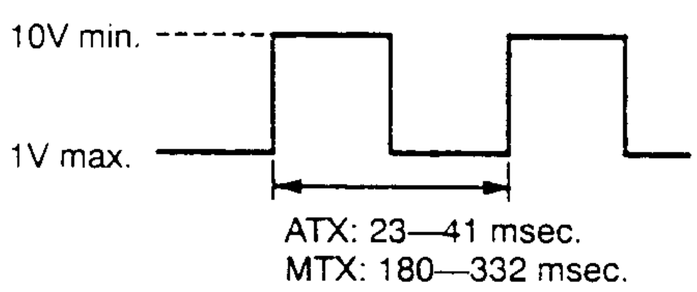
Caution
- **When attaching the tester lead to the ABS/TCS CM, the SST must be used. Refer to ANTILOCK BRAKE SYSTEM (ABS), ABS CONTROL MODULE INSPECTION.**

DTC 17		Engine control system, Engine speed signal line	
DETECTION CONDITION	Engine speed 0 rpm and vehicle speed 10 km/h {6.2 mph } continues for specified time		
POSSIBLE CONDITION	• Malfunction of engine control system • Malfunction of related wiring harness		
STEP	**INSPECTION**		**ACTION**
1	Is DTC for engine control system obtained? (Refer to section F, ONBOARD DIAGNOSTIC SYSTEM, DIAGNOSTIC TROUBLE CODE INSPECTION.)	Yes	Follow inspection procedures for engine control system.
		No	Go to next step.
2	Turn IG SW to OFF and disconnect ABS/TCS CM connector. With IG SW at ON, inspect voltage between S of ABS/TCS harness connector. Is it as specified? **Voltage** **6—12 V**	Yes	Go to step 4.
		No	Go to next step.
3	Turn IG SW to OFF, is there continuity between S of ABS/TCS connector and 48 of ECM (PCM)?	Yes	Replace ECM (PCM). If tachometer does not work, insped it.
		No	Repair or replace harness between ABS/TCS CM and ECM (PCM).
4	With engine idling, check voltage pattern at S of ABS/TCS CM by using an oscilloscope  Is voltage as specified?	Yes	System is normal. If DTC is a past failure, erase it and observe symptom. If DTC is a present failure, replace ABS/TCS CM.
		No	If tachometer does not work, inspect it. If tachometer works normally, replace ABS/TCS CM.

Note
- Code 17 may be memorized if the engine is stalled or the ignition switch is turned to OFF while the vehicle is driving at 10 km/h {6.2 mph } or more.

DTC 82			Engine control system, torque reduction request signal line
DETECTION CONDITION	After engine is warmed up the signal that indicates torque reduction signal malfunction or engine control system malfunction is received from ECM (PCM)		
POSSIBLE CONDITION	• Malfuncion of engine control system • Malfunction of reloted wiring harness		
STEP	**INSPECTION**		**ACTION**
1	Is DTC for engine control system obtained? (Refer to section F, ONBOARD DIAGNOSTIC SYSTEM, DIAGNOSTIC TROUBLE CODE INSPECTION.)	Yes	Follow inspection procedures for engine control system.
		No	Go to next step.
2	Turn IG SW to OFF and disconnect ABS/TCS CM connector. With IG SW at ON, is voltage between R and AA of ABS/TCS CM harness connector as specified? **Voltage** **8—14 V**	Yes	Go to step 5.
		No	Go to next step.
3	Turn IG SW to OFF. Is there continuity between R of ABS/TCS CM harness connector and 11 of ECM (PCM)?	Yes	Go to next step.
		No	There is open circuit. Repair or replace-harness between ABS/TCS CM and ECM (PCM).
4	Is there continuity between R of ABS/TCS CM harness connector and ground?	Yes	There is short to ground. Repair or replace harness
		No	Replace ECM (PCM).
5	Connect ABS/TCS CM connector and start engine. Inspect voltage pattern at R of ABS/TCS CM by using an oscilloscope.  Is voltage as specified?	Yes	System is normal. Erase DTC and observe symptom. If DTC 82 is obtained again, replace ABS/TCS CM.
		No	Erase DTC and observe symptom. If DTC 82 is obtained again, replace ECM (PCM).

DTC 83	Torque reduction inhibit signal line
DETECTION CONDITION	After engine is started, malfunction of torque reduction inhibit line is detected
POSSIBLE CONDITION	• Open or short circuit of torque reduction inhibit line

STEP	INSPECTION		ACTION
1	Disconnect ECM (PCM) connector and turn IG SW to ON. Inspect voltage between 82 of ECM (PCM) and ground. Is it as specified? **Voltage** **8—14 V**	Yes	Go to step 4.
		No	Go to next step.
2	Turn IG SW to OFF. Is there continuity between 82 of ECM (PCM) and L of ABS/TCS CM?	Yes	Go to next step.
		No	Repair or replace harness.
3	With IG SW at OFF, is there continuity between 82 of ECM (PCM) and ground?	Yes	Repair harness from short to ground.
		No	Erase DTC and observe symptom. If DTC 83 is obtained again, replace ABS/TCS CM.
4	Connect ECM (PCM) and ABS/TCS CM. With engine idling, check voltage pattern at L of ABS/TCS CM by using an oscilloscope.  Is voltage as specified?	Yes	System is normal. Erase DTC and observe symptom. If DTC 83 is obtained again, replace ABS/TCS CM.
		No	Erase DTC and observe symptom. If DTC 83 is obtained again, replace ECM (PCM).

DTC 87	Engine coolant temperature is 0 °C {32 °F } or less
DETECTION CONDITION	After engine is warmed up, engine coolant temperature is 0 °C {32 °F } or less, and TCS operation is inhibited by ECM (PCM). DTC is not memorized
POSSIBLE CONDITION	System is normal. When engine coolant temperature rises, TCS operation is excuted by ECM (PCM).

STEP	INSPECTION		ACTION
1	Is it before engine is warmed up?	Yes	Warm up engine. If TCS OFF light goes out, system is normal.
		No	Go to next step.
2	After engine is warmed up, is TCS indicator light also illuminated and DTC 82 obtained?	Yes	Go to DTC 82 chart.
		No	If TCS OFF LIGHT goes out, system is normal. If TCS OFF light does not go out, replace ABS/TCS CM.

Note
- To warm up the engine completely, idle the engine and wait for more than 5 minutes.

TROUBLESHOOTING

ANTILOCK BRAKE SYSTEM AND TRACTION CONTROL SYSTEM

Foreword

- Refer to section GI HOW TO USE THIS MANUAL, TROUBLESHOOTING PROCEDURE and thoroughly read and understand the basic flow of troubleshooting in order to properly perform the procedures.

Troubleshooting Notes

- Before performing the steps in Symptom Troubleshooting, perform the On-Board Diagnostic Inspection and the ABS Hydraulic Unit System Inspection. To check the diagnostic trouble code, follow the Diagnostic Trouble Code Inspection steps.
- For the steps which have an asterisk (*), gently move the wire harness of the connectors to inspect if there are any poor connections at connectors, terminals or wire harnesses causing malfunctions.

Precaution

When inspecting or servicing the ABS/TCS, note the following points:

1. The ABS warning light, the TCS indicator light and the TCS OFF light stay on until the ignition switch is turned to OFF when the rear wheel is locked by jack up, stack or chassis roller, and only the front wheels have been spun for more than **20 seconds** on vehicles with ABS or **60 seconds** on vehicles with ABS/TCS. In this case, turn the ignition switch to OFF then back to ON and drive the vehicle at higher than **10 km/h {6.2 mph }** to verify that system is normal. The lights will go off.
2. The ABS warning light might illuminate when driving in the following conditions.
   In this case, turn the ignition switch to OFF then bak to ON. If the ABS warning light illuminates for a few seconds then goes off, the ABS is operating normally.
   - Parking brake is not fully released while driving.
   - Continuous application of the brake
   - Sudden acceleration/deceleration
   - Left/right or front/rear tires are in different conditions. Tire sizes other than that listed on the tire label, or using tires with different radius, pressure or wear are used.
3. The TCS indicator light and the TSC OFF light might illuminate under the following conditions.
   In this case, the TCS is operating normally.
   Examine and determine if the light comes on before operation.
   - Using TCS OFF switch to stop TCS operation. Press the TCS OFF switch and the system is in standby mode.
   - The engine coolant temperature is below **0 °C {32 °F }**. In this case, TCS OFF light stays lit until the engine is warm. (**maximum 15 min.**)
   - Battery is low. In this case, TCS OFF light and ABS warning light stays lit until battery voltage is increased.
4. When performing repair, if the ABS/TCS related connectors are disconnected and the ignition switch is turned to ON, the ABS/TCS CM will mistakenly detect a fault and record it as a malfunction.
5. After repairing the ABS wheel-speed sensor or motor pump, the ABS warning light may not go off when ignition is switched to ON. In this case, drive the vehicle at a speed of more than **10km/h {6.2 mph }**. After the ABS warning light goes off, erase the DTC.
6. The ABS and TCS are composed of electrical and mechanical parts. It is necessary to categorize any malfunction as electrical system and hydraulic system when performing troubleshooting.
   (1) Malfunctions in electrical system:
   - ABS/TCS control module (ABS/TCS CM) has on-board diagnostic function. With this function, the ABS warning light comes on when there is a problem in the electrical system. Also, past and present malfunction is recorded in the ABS/TCS CM. This function can find malfunctions that does not occur during periodic inspection. Turn the ignition switch to ON by causing short on the data link connector TBS terminal GND terminal or by connecting **SST**, and **approx. 5 seconds** later the stored malfunction records will be displayed in the order of occurrence. To find out the causes of ABS/TCS malfunctions, use these on-board diagnostic result. Don't forget that after repair, it is necessary to delete the diagnostic trouble code in the ABS/TCS CM memory. Also, if ABS/TCS related parts have been replaced, verify that the diagnostic trouble code has been erased after repairs.
   - The ABS/TCS CM is composed of delicate electronic parts. If foreign materials get inside the CM, the CM will malfunction and ABS/TCS cannot operate. When replacing the CM, make sure there are no foreign materials in the CM's system connector.

   (2) Malfunctions in hydraulic system
   - Hydraulic system malfunction is similar to a malfunction in conventional brake system. Must be determined if malfunction is ABS components or conventional brake system. This guide omits information for conventional brake components and only contains information for ABS components (ABS hydraulic unit).
   - ABS hydraulic unit contains delicate mechanical parts. If foreign materials get in, malfunction could occur, and the ABS will fail to operate. Also, if the normal brake operates but ABS cannot, the cause of the problem is very difficult to determine. Therefore, when servicing ABS, such as exchanging brake fluid or pipe detachment, be careful that no foreign materials get inside.

Diagnostic Index

- Use the following table to determine the problem and go to appropriate "Symptom Troubleshooting."

(For ABS)

NO	TROUBLESHOOTING ITEM	DESCRIPTION
1	When IG switch is at ON, but ABS warning light doesn't illuminate.	• Burnt out bulb, or short/open in harness. • Malfunction in ABS CM *After IG is at ON, it's normal for ABS warning light to illuminate within **2—4** seconds.
2	When IG switch is at ON, ABS warning light stays on after more than **2—4** seconds.	• ABS CM is detecting malfunction in ABS. • ABS CM is detecting low battery voltage • Poor connection of ABS CM ground • Poor ABS warning light harness • Malfunction of combination meter • ABS CM has not activated *After IG is at ON until the vehicle starts running, this symptom might occur but there is no problem.
3	When IG switch is at ON, ABS warning light blinks (when the vehicle is not moving).	• ABS CM is in on-board diagnostic mode. (TBS terminal is connected to GND.) *When running the vehicle with the testing terminal (TBS terminal in the data link connector) connected to GND, ABS warning light illuminates but the system is normal. The same thing happens with the **SST** connected to DLC. Disconnect these testing terminals from GND except when system is being checked.
4	When IG switch is at ON, ABS warning light irregularly illuminates and goes off.	• ABS CM is detecting low battery voltage • Poor ABS CM grounding • Poor ABS warning light harness • Malfunction of combination meter • Malfunction in ABS CM
5	ABS warning light illuminates normally, but system has problem. • Brake pedal feels light. • When brake is applied, the vehicle responds abnormally.	• Poor installation of brake pedal and brake master cylinder attachment. • Air is inside of brake pipe • Malfunction of master cylinder • Malfunction of proportioning valve • Faulty installation of brake piping

(For ABS/TCS)

NO	TROUBLESHOOTING ITEM	DESCRIPTION
6	When IG switch is at ON, all following lights illuminate: • ABS warning light • TCS indicator light • TCS OFF light	• ABS/TCS CM is detecting malfunction in ABS • ABS/TCS CM is detecting low battery voltage • Malfunction of ABS/TCS CM • Abnormal harness between ABS/TCS CM and meter
7	When IG switch is at ON, both TCS indicator light and TCS OFF light illuminate	• Malfunction of ABS/TCS CM • Malfunction of engine control system • Abnormal relay between ABS/TCS CM and ECM (PCM).
8	When IG switch is at ON, only TCS OFF light illuminates.	• Malfunction of TCS OFF switch • Short to GND in TCS OFF light harness • Malfunction of TCS or engine • Malfunction of meter *When the engine is started while the engine coolant temperature is below **0 °C {32 °F }**, the TCS OFF light might stay lit until the engine is warm (**maximum 15min.**). If the light goes off after this, the system is normal. *When the engine isn't started, the TCS OFF light is illuminated. (Check again after engine is started)
9	TCS indicator light flashes when TCS is not activated during driving	• Improper tire size or pressure • Abnormal ABS wheel-speed sensor and sensor rotor. • Short to GND in TCS indicator light harness. *TCS activates easily when driving with different sized tires or when tire pressure is low. When TCS is activated, even if the TCS OFF switch is pressed, TCS will only deactivated when the current operation ends. *When TCS is engaged, it is normal for the TCS indicator light to blink and thus the system is normal. However if occurs frequently, check items above.
10	When IG switch is at ON, only TCS indicator light illuminates	• Malfunction of combination meter • Malfunction of ABS/TCS CM • Short to GND in TCS indicator light harness.
11	When IG switch is at ON, all following lights do not illuminate: • ABS warning light • TCS indicator light • TCS OFF light	• Malfunction of combination meter • Malfunction of ABS/TCS CM • Abnormal system connectors (Check for short)
12	Any of lights below had illuminated in the past. (Now they don't) • TCS indicator light • TCS OFF light	• Poor harnesses related to TCS indicator light, TCS OFF light or TCS OFF switch *When the engine is started while the engine coolant temperature is below **0 °C {32 °F }**, the TCS OFF light might stay lit until the engine is warm. (**maximum 15 min.**) If the light go off after this, the system is normal *When the engine isn't started, the TCS OFF light is illuminated. Check again after engine is started.
13	TCS is not working sufficiently	• Improper tire size or tire pressure • Faulty ECM (PCM) *When there is a possibility of engine stalling, TCS may allow spinning.

Symptom Troubleshooting

Caution

- **When attaching the tester lead to the ABS/TCS CM, the SST must be used. Refer to ANTILOCK BRAKE SYSTEM (ABS), ABS CONTROL MODULE INSPECTION.**
- **For the steps which have an asterisk (*), gently move the wire harness of the connectors to inspect if there are any poor connections at connectors, terminals or wire harnesses causing malfunctions.**
- **After all operation, check for DTC again. Inspect any items that were not inspected.**

Note

- If any problem symptoms have occurred before but is now okay, poor harness connection could be the possible cause and thus ABS CM is normal.

1	**When IG switch is at ON, but ABS warning light doesn't illuminate**		
[TROUBLESHOOTING HINTS] • Burnt out bulb or short in related harness • Malfunction of ABS CM			
STEP	**INSPECTION**		**ACTION**
1	Does other indicator lights illuminate when IG switch is at ON?	Yes	Check to see if DTC is in memory. If it is, repair it later. Go to next step.
		No	Inspect meter fuse.
2*	Inspect harnesses of ABS warning light from meter fuse to warning light; warning light to ABS CM. Is there continuity?	Yes	Go to next step.
		No	Repair or replace harness.
3	Inspect ABS warning light bulb. Is it okay?	Yes	Replace ABS CM.
		No	Replace bulb.

Note

- ABS warning light illuminates for **2—4 seconds** after ignition switch is at ON even if there is no fault.

2	**When IG switch is at ON, ABS warning light stays on after more than 2—4 seconds**		
[TROUBLESHOOTING HINTS] • ABS CM detects a malfunction in the ABS • ABS CM detects low voltage in power supply • Poor grounding for ABS CM • Poor ABS warning light harness • Malfunction of combination meter • ABS CM has not activated.			
STEP	**INSPECTION**		**ACTION**
1	Drive the vehicle at more than **10 km/h {6.2 mph }** for **5 seconds**. Did the light go off?	Yes	System is okay. Erase DTC.
		No	Go to next step.
2	Perform on-board diagnostic inspection. Is DTC displayed?	Yes	Perform DTC inspection.
		No	Go to next step.
3*	Connect the **SST** to ABS CM harness and inspect the continuity between the ABS warning light terminal (W) and GND. Is there continuity?	Yes	Repair or replace harness.
		No	Go to next step.
4*	Connect the **SST** to ABS CM harness and measure the terminal voltage of power source (Z). **Specification** **B+** Is the voltage normal?	Yes	Go to next step.
		No	Repair or replace harness.

STEP	INSPECTION		ACTION
5*	Disconnect ABS CM and connect the **SST** to the harness connector. Are there continuities between the following terminals and body grounding: • AA to body grounding • AD to body grounding	Yes	Replace ABS CM.
		No	Repair or replace harness.

Note
- ABS warning light stays illuminated after ignition switch is ON until driving begins even if there is no fault.

3	**When IG switch is at ON, ABS warning light blinks (when vehicle is not moving)**		
[TROUBLESHOOTING HINTS] • TBS terminal in the diagnosis connector is connected to GND.			
STEP	**INSPECTION**		**ACTION**
1	Is there continuity between the TBS terminal and GND terminal of data link connector?	Yes	Repair the connection between the TBS terminal and GND terminal.
		No	Replace ABS CM.

Note
- When running the vehicle with the test terminal (TBS terminal in the data link connector) connected to GND, ABS warning light will illuminate but the system is normal. The same will happen when the **SST** is connected to DLC. Disconnect these test terminals from GND when system is not being checked.

4	**When IG switch is at ON, ABS warning light irregularly illuminates and goes off**		
[TROUBLESHOOTING HINTS] • ABS CM is detecting low battery voltage • Poor grounding on ABS CM • Poor warning light harness • Malfunction of combination meter • Malfunction of ABS CM • Malfunction of ABS CM			
STEP	**INSPECTION**		**ACTION**
1	Is the vehicle not moving?	Yes	Go to next step.
		No	Go to step 7.
2	Is the battery voltage normal?	Yes	Go to next step.
		No	Recharge or replace the battery.
3	Is the connection of ABS CM system connector normal? (Forced attachment, incomplete fitting or unlocked levers)	Yes	Go to next step.
		No	Repair or replace harness.
4*	Connect ABS CM harness to the **SST**, and inspect the voltage between the power supply and the GND (AA). **Specification** **B+** Is the result okay?	Yes	Go to next step.
		No	Repair the power supply harness or GND harness.
5*	Connect the **SST** to ABS CM harness, and inspect the harness between ABS warning light terminal (W) and the combination meter. Is there continuity?	Yes	Replace ABS CM.
		No	Repair the harness between the ABS CM and the combination meter.
6	Does the combination meter operate normally?	Yes	Go to next step.
		No	Replace the combination meter.
7	After driving the vehicle at more than **6 km/h {3.7 mph }**, perform on-board diagnostic inspection. Is DTC displayed?	Yes	Check the corresponding DTC.
		No	Replace ABS CM.

Note
- ABS warning light illuminates for 2—4 seconds after ignition switch is at ON even if there is no fault.

5	**ABS warning light illuminates normally, but system has problem**		
[TROUBLESHOOTING HINTS] • Poor installation of brake pedal and brake master cylinder attachment • Air inside brake pipe • Malfunction of master cylinder • Malfunction of proportioning valve • Improper installation of brake pipes			
STEP	**INSPECTION**		**ACTION**
1	Is pedal and master cylinder attachment properly installed?	Yes	Go to next step.
		No	Install properly.
2	Is there air inside brake pipe?	Yes	Bleed the air.
		No	Go to next step.
3	Is brake piping of ABS hydraulic unit okay?	Yes	Inspect the following conventional brake system parts: • Master cylinder • Power brake unit • Proportioning valve, etc.
		No	Install the piping properly.

6	**When IG switch is at ON, all following lights illuminate: ABS warning light, TCS indicator light, and TCS OFF light**		
[TROUBLESHOOTING HINTS] • ABS/TCS CM detects malfunction of ABS • ABS/TCS CM detects low voltage in the power supply • ABS/TCS CM malfunction • Abnormal harness between ABS/TCS CM and the meter			
STEP	**INSPECTION**		**ACTION**
1	After driving the vehicle at more than **6 km/h {3.7 mph }**, perform on-board diagnostic inspection. Is DTC displayed?	Yes	Check the corresponding DTC.
		No	Go to next step.
2*	Inspect the harness between ABS/TCS CM and meters. Is there continuity with GND?	Yes	Repair or replace harness.
		No	Replace ABS/TCS CM

7	**When IG switch is at ON, both TCS indicator light and TCS OFF light illuminate**		
[TROUBLESHOOTING HINTS] • Malfunction of ABS/TCS CM • Malfunction of engine control system. • Abnormal relay between TCS and the ECM (PCM).			
STEP	**INSPECTION**		**ACTION**
1	Carry out engine on-board diagnostic inspection. Is DTC displayed?	Yes	Check the corresponding DTC.
		No	Go to next step.
2*	Inspect the harnesses between ABS/TCS CM and TCS OFF light, and between ABS/TCS CM and TCS indicator light. Is there continuity with GND?	Yes	Repair or replace harness.
		No	Replace ABS/TCS CM.

8	When IG switch is at ON, only TCS OFF light illuminates		
[TROUBLESHOOTING HINTS] • Malfunction of TCS OFF switch • Poor harnesses related to TCS OFF light • ABS/TCS CM detects malfunctions • ECM (PCM) detects malfunctions • Malfunction of combination meter			
STEP	**INSPECTION**		**ACTION**
1	Does the light only illuminate when the engine coolant temperature is below **0 °C {32 °F }**? (Does the light go out within **15 minutes** after the engine has been warmed for more than **15 minutes**?)	Yes	System is okay.
		No	Go to next step.
2*	Inspect the harnesses related to TCS OFF switch and OFF light. Is there continuity with GND?	Yes	Go to next step.
		No	If no abnormality is observed when OFF switch is activated, repair or replace the harnesses related to TCS OFF switch and TCS OFF light.
3	Carry out engine on-board diagnostic inspection. Is DTC displayed?	Yes	Check the corresponding DTC.
		No	Go to next step.
4*	Inspect the harness between ABS/TCS CM and TCS OFF light. Is there continuity with GND?	Yes	Repair or replace harness.
		No	Go to next step.
5	Is each bulb in the combination meter okay?	Yes	Replace ABS/TCS
		No	Replace the bulbs in the combination meter.

Note

- When the engine is started while the engine coolant temperature is below **0 °C {32 °F }**, the TCS OFF light might stay lit until the engine is warm. (**maximum 15 min.**) If the light go off after this, the system is normal
- When the engine isn't started, the TCS OFF light is illuminated. Check again after engine is started.

9	TCS Indicator light flashes when TCS is not activated during driving		
[TROUBLESHOOTING HINTS] • Incorrect tire size/pressure • Malfunction of ABS wheel-speed sensor or sensor rotor • When none of the above is applied, shorted harness could be the cause.			
STEP	**INSPECTION**		**ACTION**
1	Are tire size and pressure as specified?	Yes	Go to next step.
		No	Replace the tire with specified one, or adjust the pressure.
2	Are the ABS wheel-speed sensor and sensor rotor okay?	Yes	Go to next step.
		No	Repair or replace ABS wheel-speed sensor/sensor rotor.
3*	Is the harness between ABS/TCS and the wheel speed sensor normal? (No short to GND.)	Yes	Go to next step.
		No	Repair or replace harness.
4*	Is the harness between the ABS/TCS CM and the TCS indicator light normal? (No open or short to GND.)	Yes	Replace ABS/TCS CM.
		No	Repair or replace harness.

Note

- When tires of different sizes are used or tire pressure is insufficient, the TCS may go into operation. While the TCS is operating, it does not turn to off even if TCS OFF switch is pressed until the operation has been completed.
- When wheel spinning occurs, flashing of the TCS indicator light indicates that the system is operating properly and the TCS is normal. If flashing is observed too often, however, check the above items.

10	**When ignition switch is at ON, only TCS indicator light illuminates**		
[TROUBLESHOOTING HINTS] • Malfunction of combination meter • Malfunction of ABS/TCS CM • Short to GND in TCS indicator light harness			
STEP	**INSPECTION**		**ACTION**
1*	Inspect the harness between ABS/TCS CM and the TCS indicator light. Is there continuity with GND?	Yes	Go to next step.
		No	Repair or replace harness
2	Is the bulb in the combination meter okay?	Yes	Replace ABS/TCS CM
		No	Replace the bulb in the combination meter

11	**When IG switch is at ON, all following lights do not illuminate: ABS warning light, TCS indicator light and TCS OFF light**		
[TROUBLESHOOTING HINTS] • Malfunction in combination meter • ABS/TCS malfunction • Abnormal system connectors (disconnection or shorts)			
STEP	**INSPECTION**		**ACTION**
1	Are other lights illuminated when the ignition switch is ON?	Yes	Go to next step.
		No	Inspect meter fuse.
2*	Check harnesses between ABS/TCS CM and three lights on the combination meter, and between combination meter and ignition switch. Are there continuities? There should be no disconnection.	Yes	Go to next step
		No	Repair or replace harness.
3	Are the bulbs in the combination meter okay?	Yes	Go to next step
		No	Replace the bulbs in the combination meter.
4	Are the fitting condition of ABS/TCS CM system connectors okay? (Forced attachment, incomplete fitting or unlocked levers)	Yes	Go to next step
		No	Reinstall the system connectors properly, or replace.
5*	Connect the **SST** to ABS/TCS harness and inspect the voltage between the power supply (Z) and GND (AA). **Specification** **B+** Is the result okay?	Yes	Replace the ABS/TCS CM.
		No	Repair or replace harnesses.

12	**Any of lights below had illuminated in the past (Now they don't):** **TCS indicator light and TCS OFF light**		
[TROUBLESHOOTING HINTS] • ABS/TCS CM has detected malfunction in the past. • ECM (PCM) has detected malfunction in the past. • Poor harnesses related TCS indicator light, TCS OFF light and TCS OFF switch.			
STEP	**INSPECTION**		**ACTION**
1	Carry out engine on-board diagnostic inspection. Is DTC displayed?	Yes	Check the corresponding DTC.
		No	Go to next step.
2	Inspect the harnesses between ABS/TCS CM and TCS OFF light, and between ABS/TCS CM and TCS indicator light, as well as the harnesses related to TCS OFF switch. Is there continuity with GND?	Yes	Repair or replace harness.
		No	System is normal. Recheck customer's complaint

Note
- When the engine is started while the engine coolant temperature is below **0 °C {32 °F }**, the TCS OFF light might stay lit until the engine is warm. (**maximum 15 min.**) If the light go off after this, the system is normal
- When the engine isn't started, the TCS OFF light is illuminated. (Check again after engine is started)

13	**TCS is not warking suficiently**		
[TROUBLESHOOTING HINTS] • Incorrect tire size/pressure • Engine control system failure			
STEP	**INSPECTION**		**ACTION**
1	Are tire size and pressure as specified?	Yes	Go to next step.
		No	Replace the tire with specified one, or adjust the pressure.
2	Carry out engine on-board diagnostic inspection. Is DTC displayed?	Yes	Check the corresponding DTC.
		No	Perform the TCS operation inspection.

Note
- When there is a possibility of engine stalling, TCS may allow spinning and restrain the torque reduction amount in order to prevent the engine from stalling.

SUSPENSION

GENERAL PROCEDURES ..... **R- 1**
WHEEL ALIGNMENT ..... **R- 1**
WHEEL ALIGNMENT PREINSPECTION .... **R- 1**
FRONT WHEEL ALIGNMENT ..... **R- 2**
REAR WHEEL ALIGNMENT ..... **R- 3**
FRONT SUSPENSION ..... **R- 4**
FRONT SHOCK ABSORBER AND SPRING REMOVAL/INSTALLATION ..... **R- 4**
FRONT SHOCK ABSORBER INSPECTION . **R- 6**
FRONT SHOCK ABSORBER DISPOSAL ... **R- 6**
FRONT LOWER ARM REMOVAL/INSTALLATION ..... **R- 7**
FRONT LOWER ARM INSPECTION ..... **R- 8**
FRONT STABILIZER REMOVAL/INSTALLATION ..... **R- 8**
STABILIZER CONTROL LINK INSPECTION **R- 9**
TRANSVERSE MEMBER AND FRONT CROSSMEMBER REMOVAL/INSTALLATION **R-10**
REAR SUSPENSION **R-11**
REAR SHOCK ABSORBER AND SPRING REMOVAL/INSTALLATION **R-11**
REAR SHOCK ABSORBER INSPECTION .. **R-12**
REAR SHOCK ABSORBER DISPOSAL **R-12**
REAR STABILIZER REMOVAL/INSTALLATION **R-12**
STABILIZER CONTROL LINK INSPECTION **R-12**
LATERAL LINK AND TRAILING LINK REMOVAL/INSTALLATION **R-13**
REAR CROSSMEMBER REMOVAL/INSTALLATION **R-14**

GENERAL PROCEDURES

Wheels and tires removal/installation

- The removal and installation procedures for the wheels and tires are not mentioned in this section. When a wheel is removed, retighten it to **80—117 N·m { 9.0—12.0 kgf·m , 66—86 ft·lbf }**.

Suspension links removal/installation

- Tighten any part of the suspension that uses rubber bushings only after the vehicle has been lowered and *unloaded.

* unloaded...Fuel tank full; engine coolant and engine oil at specified levels; spare tire, jack and tools in designated position.

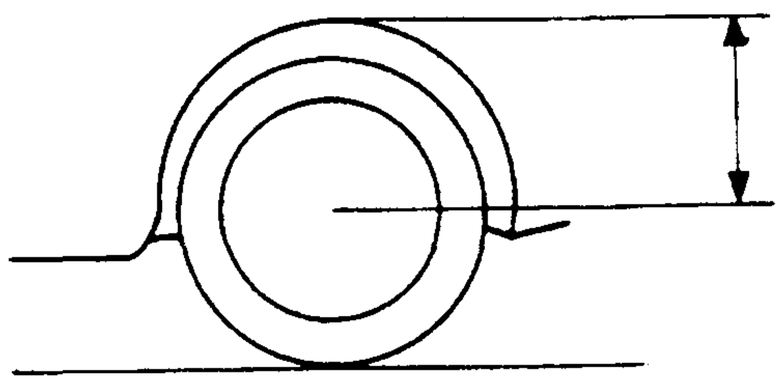
Power steering components removal/installation

- If any power steering fluid line has been disconnected anytime during the procedure, add ATF M-III or equivalent (e.g.Dexron® II) , bleed the fluid line, and inspect for leakage after the procedure has been completed.

WHEEL ALIGNMENT

WHEEL ALIGNMENT PREINSPECTION

1. Check the tire inflations, and adjust to the recommended pressure if necessary.
2. Inspect the front wheel bearing play and correct it if necessary.
3. Inspect the wheel and tire runouts.
4. Inspect the ball joints and steering linkage for excessive looseness.
5. Shake the vehicle to check the operation of the shock absorbers.
6. The vehicle must be on level ground and *unloaded.
7. Measure the height from the center of the wheel to the fender brim. The difference between the left and right measurement must not exceed **10 mm { 0.39 in }**.



* unloaded...Fuel tank full; engine coolant and engine oil at specified levels; spare tire, jack and tools in designated position.

FRONT WHEEL ALIGNMENT

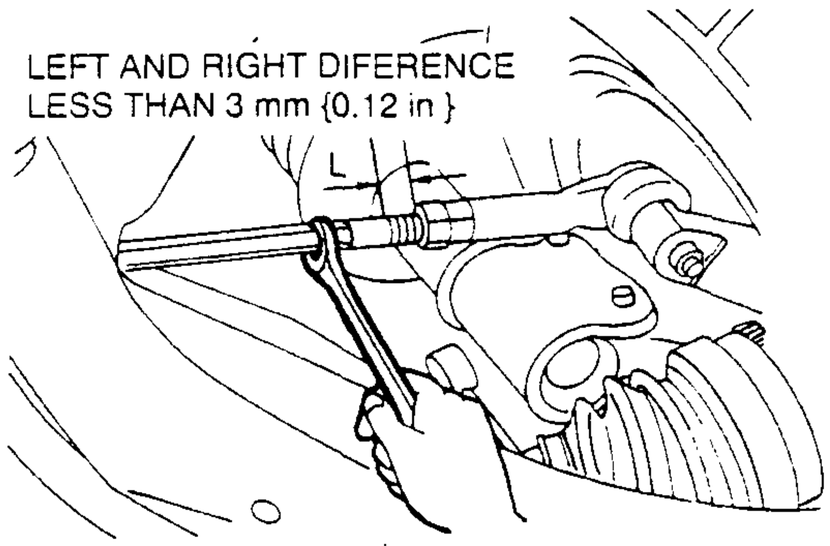
Specifications (Unloaded)*1

Fuel gauge indication		Empty	1/4	1/2	3/4	Full
Maximum steering angle	Inner	38° ±2°				
	Outer	32.5° ±2°				
Total toe-in	mm { in }	Rim inner: 2±4 {0.08±0.16} Tire: 3±4 {0.12±0.16}				
	Degree	0° 17' ± 0° 23'				
Camber angle*2		-0° 18' ±1°			-0° 20' ±1°	
Caster angle*2		1° 43' ±1°	1° 45' ±1°	1° 48' ±1°	1° 50' ±1°	1° 52' ±1°
SAI*3 (reference value)		12° 43'				

*1 Engine coolant and engine oil at specified level; spare tire, jack, and tools in designated position. Adjust to the median when carrying out wheel alignment.
*2 Difference between left and right must not exceed 1.5°
*3 SAI: Steering axis inclination

Maximum Steering Angle Adjustment

1. Loosen the tie-rod end locknuts.
2. Remove the steering gear boot clamp.
3. Turn the tie rods to equalize the length L.



Maximum left/right difference
3 mm {0.12 in }

Note
- Turn the tie rods equally.

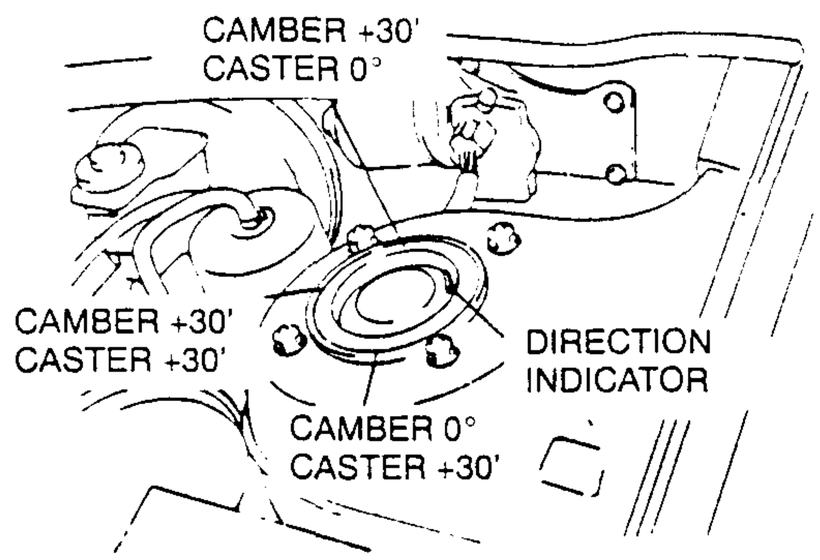
4. Turn the tie rod to provide the correct maximum steering angle.
5. Tighten the tie-rod end locknuts.

Tightening torque
69—98 N·m {7.0—10.0 kgf·m, 50.7—72.3 ft·lbf }

6. Verify that the boot is not twisted, and install the boot clamp.
7. Adjust the toe-in after adjusting the steering angle.

Camber and Caster Adjustment

1. Jack up the front of the vehicle and support it on safety stands.
2. Remove the mounting block nuts.
3. Push the mounting block downward, and turn it to the desired position.



4. Install and tighten the mounting nuts to the specified torque.

Tightening torque
47—62 N·m {4.7—6.4 kgf·m , 33—46 ft·lbf }

Total Toe-in Adjustment

1. Adjust the steering angle.
2. Remove the steering gear boot clamp.
3. Loosen the left and right tie rod locknuts and turn the tie rods equally. Both tie rods are right threaded, so turning the right tie rod toward the front of the vehicle and the left toward the rear increases toe-in.

Note
- Turning both tie rods one complete turn changes toe-in by **about 6 mm {0.24 in } (0° 36')**.

4. Tighten the tie rod locknuts to the specified torque.

Tightening torque
69–98 N·m {7.0–10.0 kgf·m , 50.7–72.3 ft·lbf }

5. Verify that the boot is not twisted, and install the boot clamp.

REAR WHEEL ALIGNMENT
Specifications (Unloaded)*1

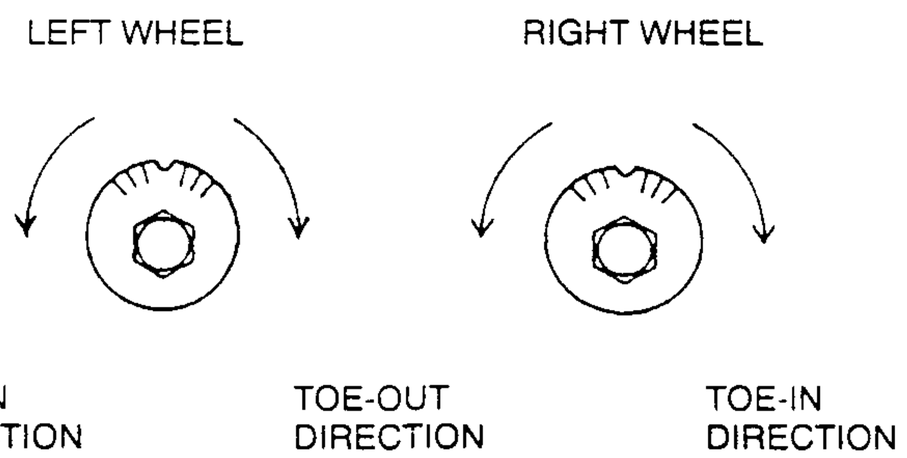
Fuel gauge indication		Empty	1/4	1/2	3/4	Full
Total toe-in	(mm { in })	Rim inner: 0.5 ± 4 {0.02 ± 0.16} Tire: 1 ± 4 {0.04 ± 0.16}				
	Degree	0° 05' ±0° 23'		0° 06' ±0° 23'		
Camber angle*2 (reference value)		-0° 41' ±1°	-0° 43' ±1°	-0° 44' ±1°	-0° 46' ±1°	-0° 47' ±1°
Thrust angle (reference value)		0° ±0°48'				

*1 Engine coolant and engine oil at specified levels; spare tire, jack, and tools in designated positions. Adjust to the median when carrying out wheel alignment.
*2 Difference between left and right must not exceed 1.5°.

Total Toe-in Adjustment

1. Remove the access hole caps of the rear crossmember.
2. Loosen the cam nut on the lateral link.
3. Turn the adjusting cam bolt as indicated to adjust the toe-in.

	Left wheel	Right wheel
Toe-in direction	Counterclockwise	Clockwise
Toe-out direction	Clockwise	Counterclockwise



Note
- Turning the adjusting cam bolt one graduation changes the toe-in **about 3.2 mm {0.13 in } (0° 18')**.

4. Tighten the cam nut.

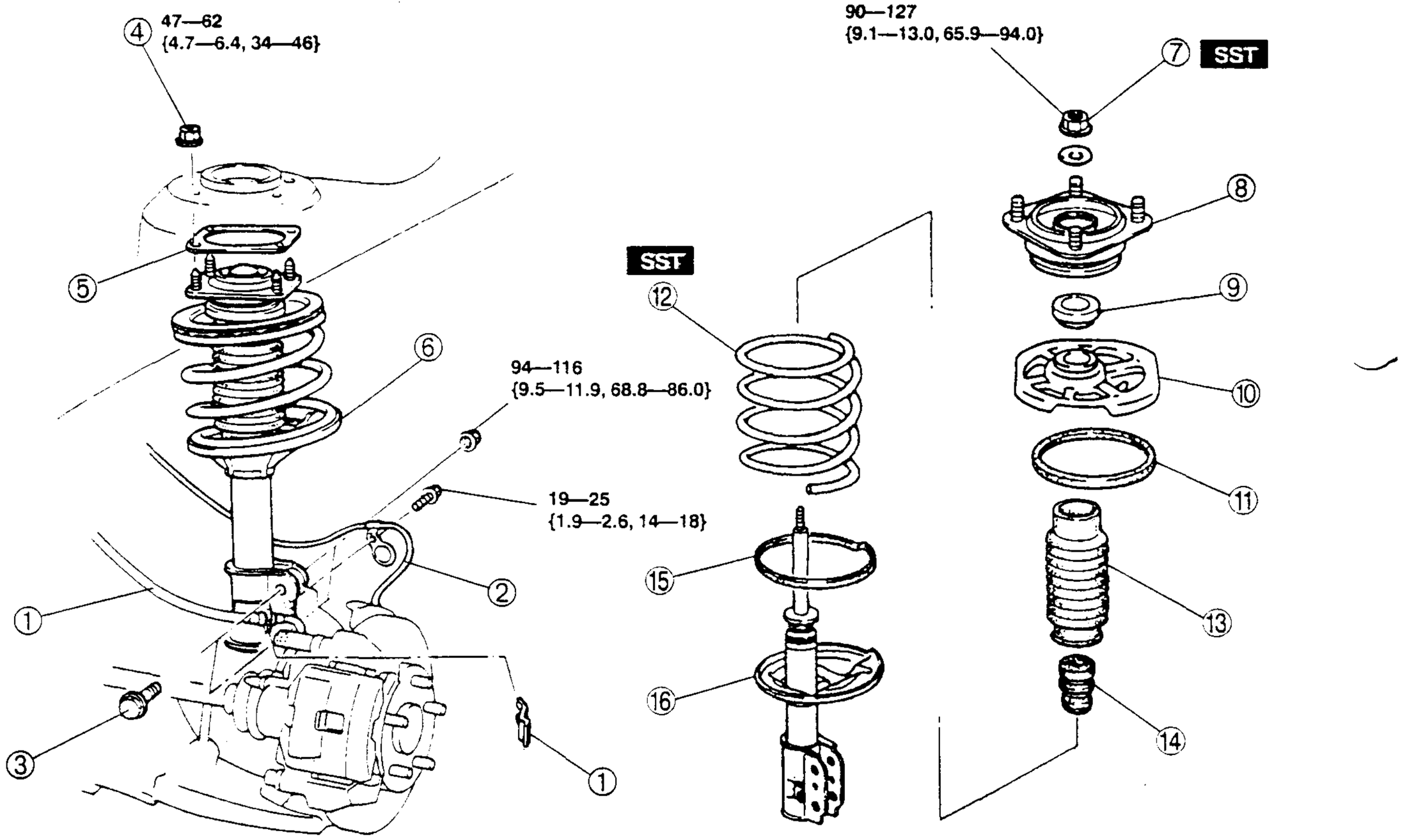
Tightening torque
87—116 N·m
{8.8—11.9 kgf·m , 63.7—86.0 ft·lbf }

5. Install the caps.

FRONT SUSPENSION

FRONT SHOCK ABSORBER AND SPRING REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Inspect the front wheel alignment and adjust it if necessary.



N·m { kgf·m , ft·lbf }

1	Clip and brake hose
2	ABS wheel-speed sensor harness (if equipped)
3	Shock absorber bolt
4	Nut
5	Sheet
6	Front shock absorber and spring ☞ Installation Note
7	Piston rod nut ☞ Removal Note
8	Mounting rubber

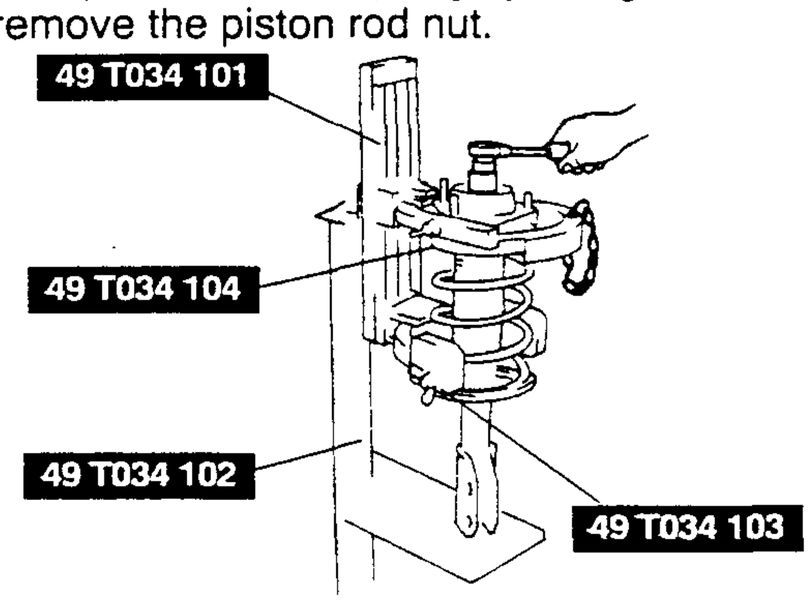
9	Thrust bearing
10	Upper spring seat
11	Upper spring seat rubber
12	Coil spring ☞ *Installation Note*
13	Dust cover
14	Bound stopper
15	Lower spring seat rubber
16	Shock absorber

Piston Rod Nut Removal Note

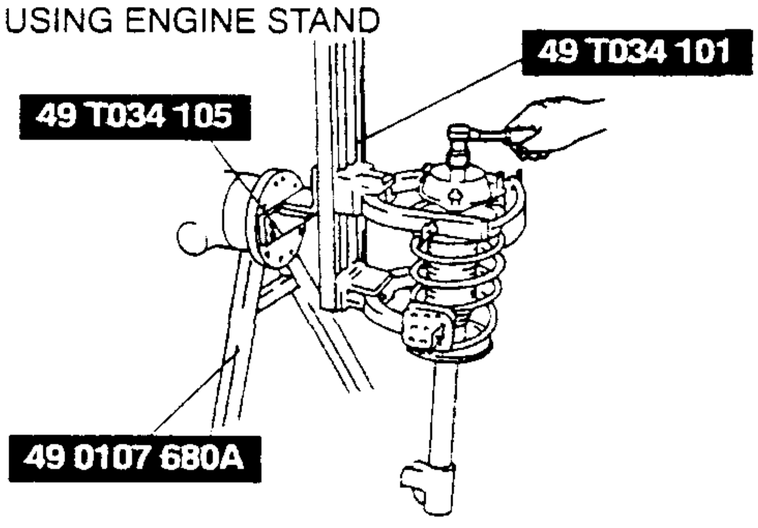
Warning

- **Removing the piston rod nut is dangerous. The shock absorber and spring could fly off under tremendous pressure and cause serious injury or death. Secure the shock absorber in the SSTs before removing the coil spring nut.**

1. Protect the coil spring by using a piece of cloth, then set the **SSTs**.
2. Compress the coil spring by using the **SSTs**, and remove the piston rod nut.

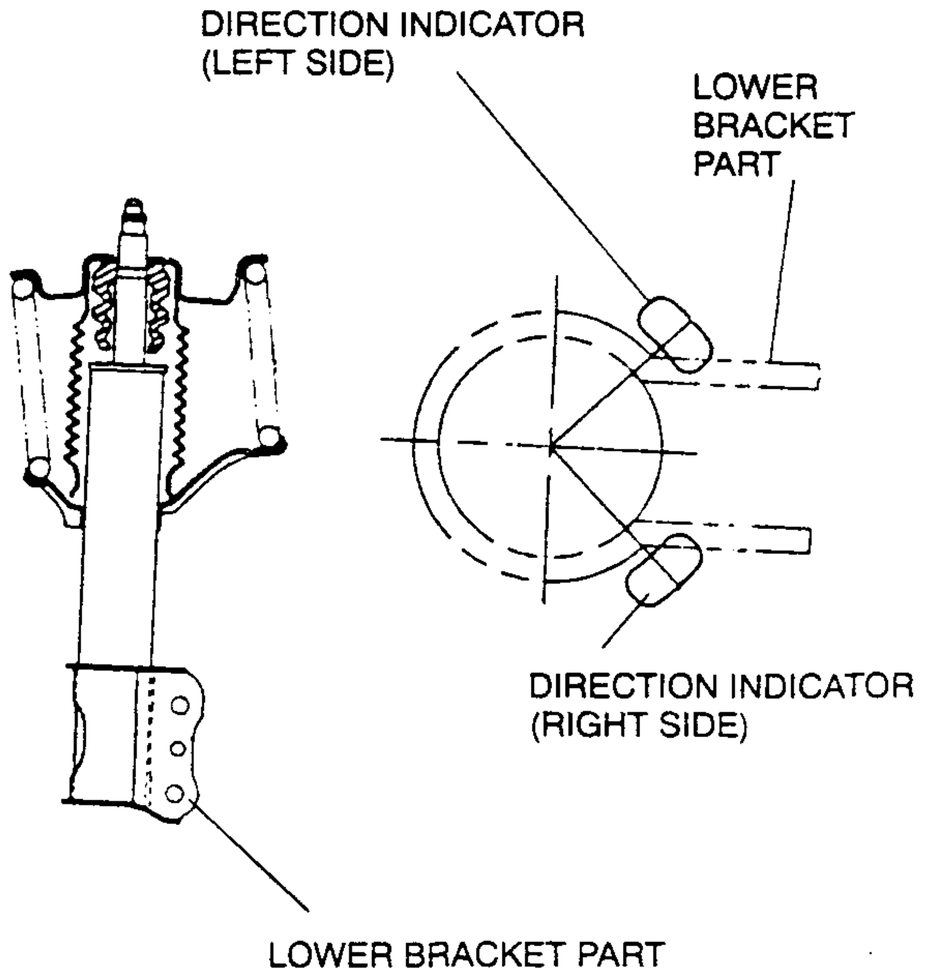


WHEN USING ENGINE STAND

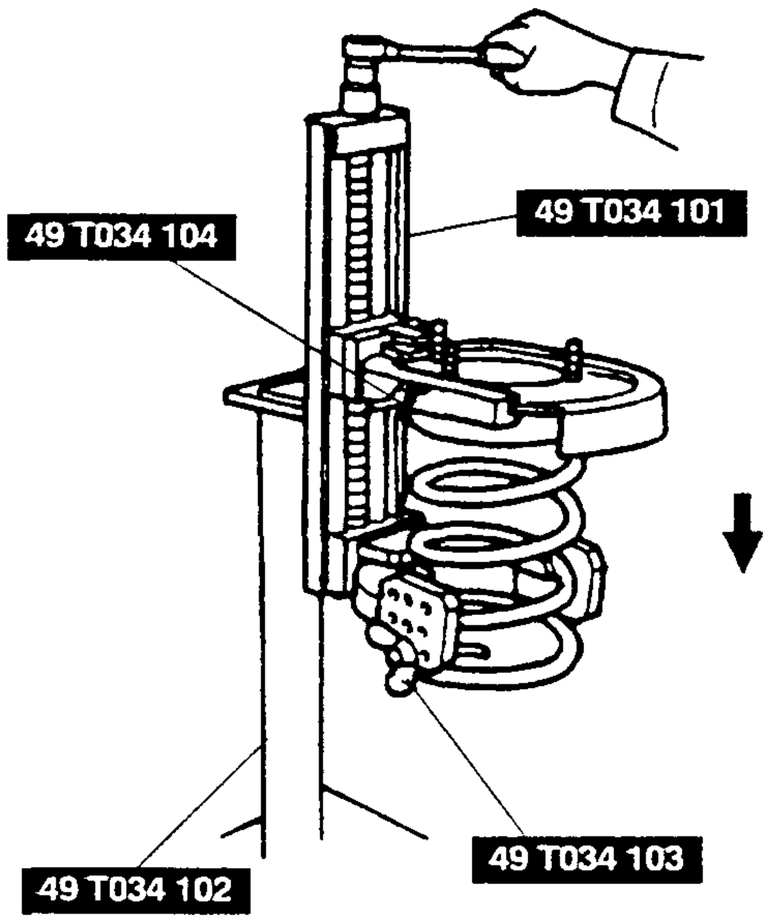


Coil Spring Installation Note

1. Temporarily install the coil spring, upper spring seat rubber, and upper spring seat, and mounting rubber on the shock absorber as shown.
2. Mark the coil spring and upper spring seat for proper installation.



3. Align the marks of the coil spring and upper spring seat. Protect the coil spring and upper seat spring by using a piece of cloth, then set the **SSTs**.
4. Compress the coil spring by using the **SSTs**.



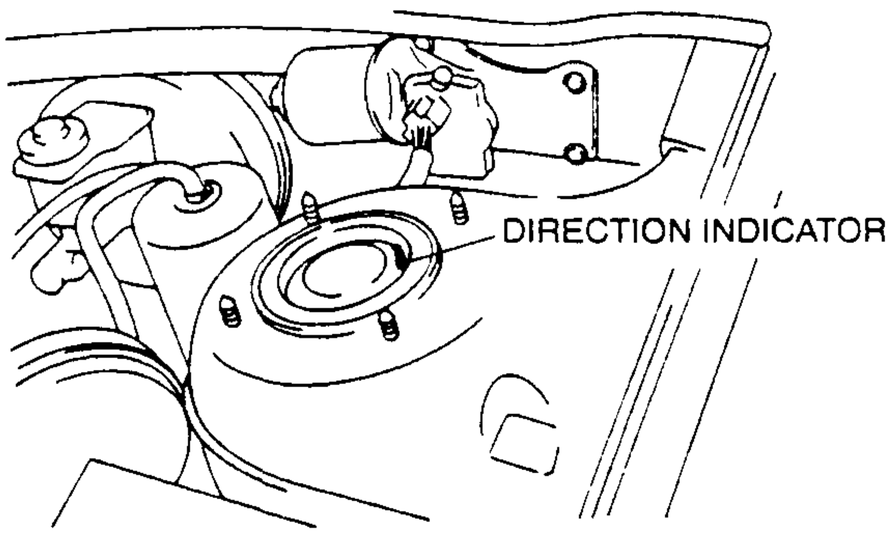
5. Install the shock absorber so that the lower end of the coil spring is seated on the step of the lower spring seat.
6. Make sure that the marks on the shock absorber and upper spring seat are aligned.
7. Install the thrust bearing, mounting rubber, and piston rod nut, then remove the **SSTs**.

Piston rod nut tightening torque
90—127 N·m {9.1—13.0 kgf·m , 65.9—94.0 ft·lbf }

Front Shock Absorber and Spring Installation

Note

- Face the mounting block direction indicator toward the rear outboard position, and install the shock absorber.



FRONT SHOCK ABSORBER INSPECTION

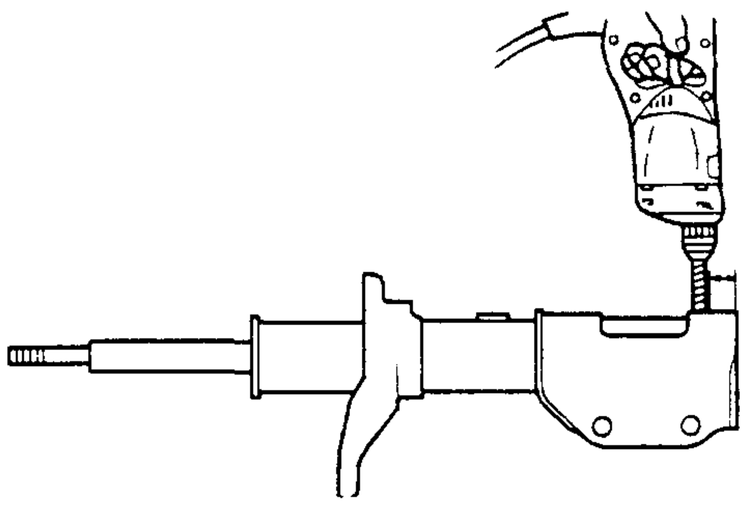
1. Remove the front shock absorber from the vehicle.
2. Inspect for damage and oil leakage.
3. Inspect the rubber bushing for deterioration and wear.
4. Compress and extend the shock piston at least three times. Verify that the operational force does not change and that there is no unusual noise.
   (1) Compress the shock absorber piston and release it.
   (2) Verify that the piston extends fully at a normal speed.
5. Replace the shock absorber if necessary.

FRONT SHOCK ABSORBER DISPOSAL

Warning

- **The gas in the shock absorber is pressurized, and could spray metal chips into the eyes and face when drilling. Whenever drilling into a shock absorber, wear protective eye wear.**

1. Clamp a shock absorber flat or with the piston downwards.
2. Drill a **2—3 mm {0.08—0.12 in }** hole at a point of **20—30 mm {0.08—0.12 in }** from the bottom of the tube, so that the gas can escape.



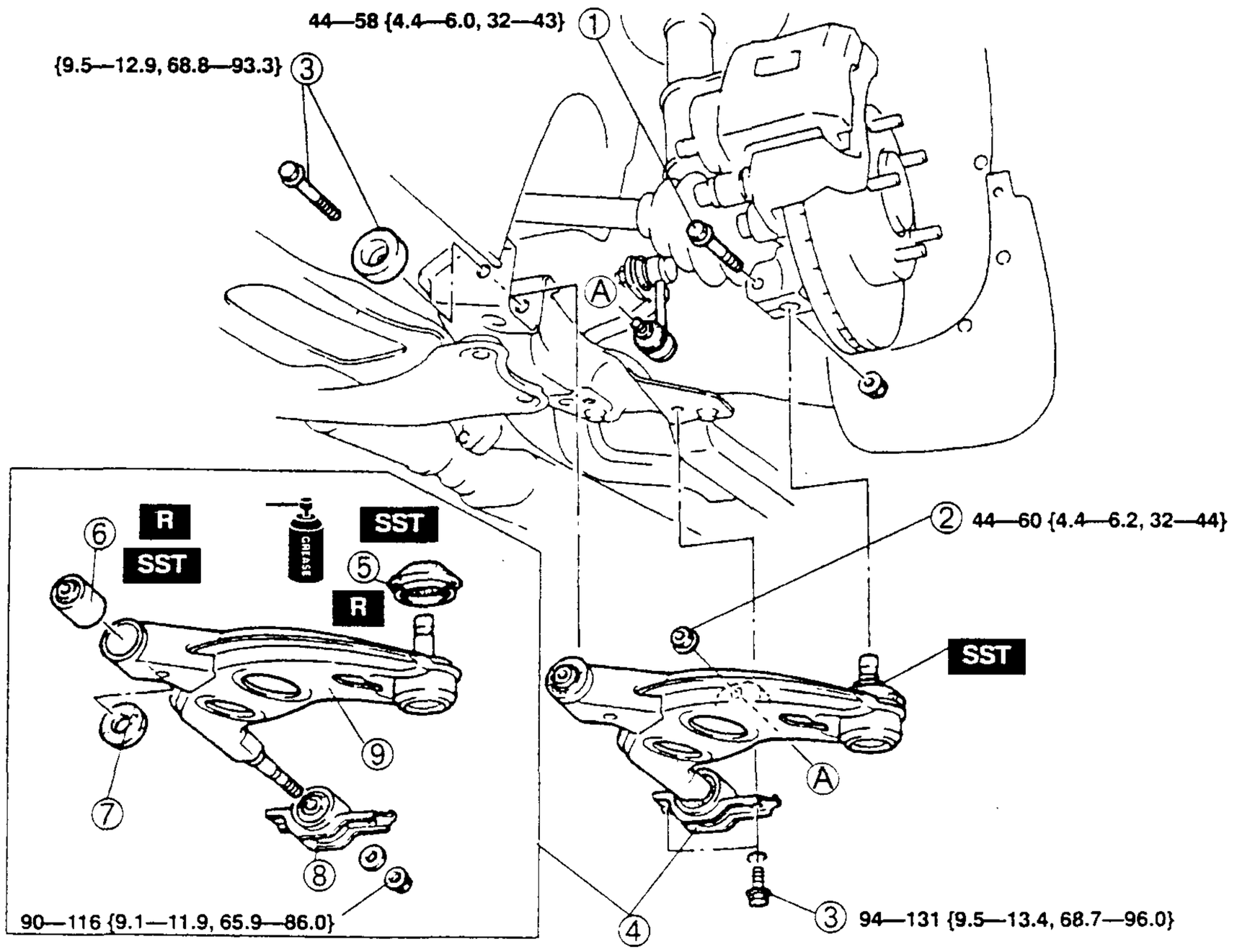
3. Turn the hole downwards.
4. The oil can be collected by moving the piston rod several times up and down and cutting the tube at the end.
5. Dispose of waste oil according to the waste disposal law.

Note

- Shock absorber gas is nitrogen gas.
- Shock absorber oil is mineral oil.

FRONT LOWER ARM REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.

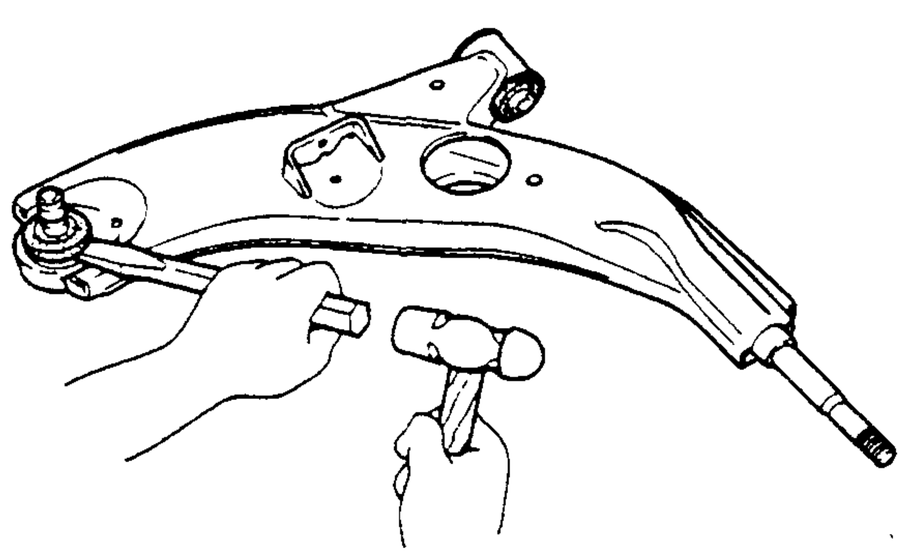


N·m { kgf·m , ft·lbf }

1	Bolt (Lower arm ball joint)
2	Nut (Stabilizer control link)
3	Bolt and dynamic damper
4	Lower arm component
5	Dust boot ☞ Removal Note ☞ Installation Note
6	Lower arm bushing (front) ☞ Removal Note ☞ Installation Note
7	Stopper
8	Lower arm bushing (rear)
9	Lower arm

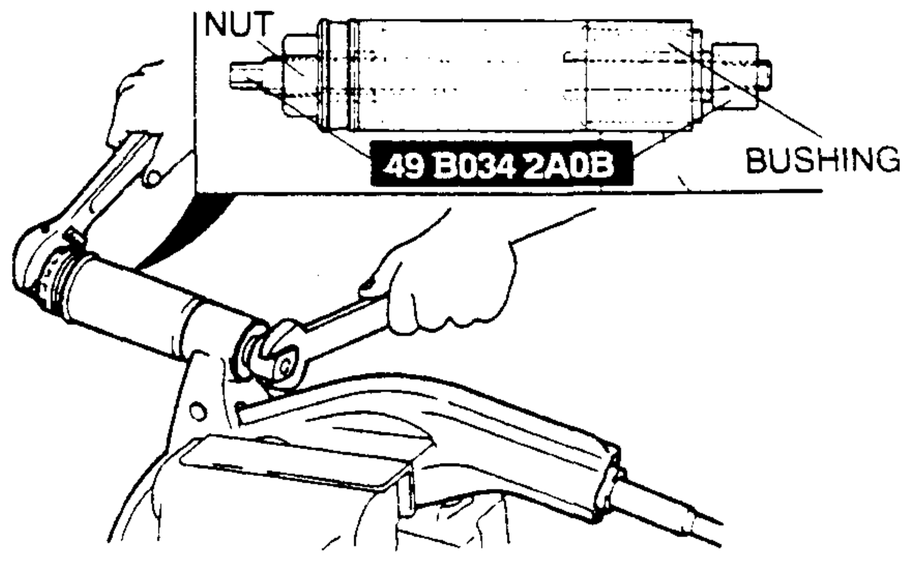
Dust boot Installation Note

- Remove the dust boot by using a chisel, being careful not to damage the ball joint and the arm.



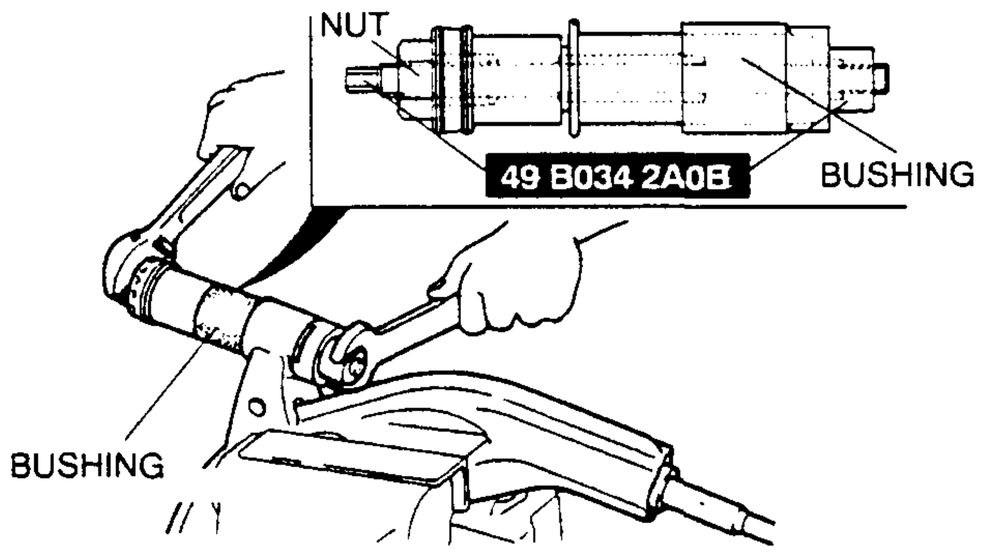
Lower Arm Bushing (Front) Removal Note

1. Cut away the projecting rubber of the lower arm bushing.
2. Set the **SST** onto the lower arm, and remove the bushing.



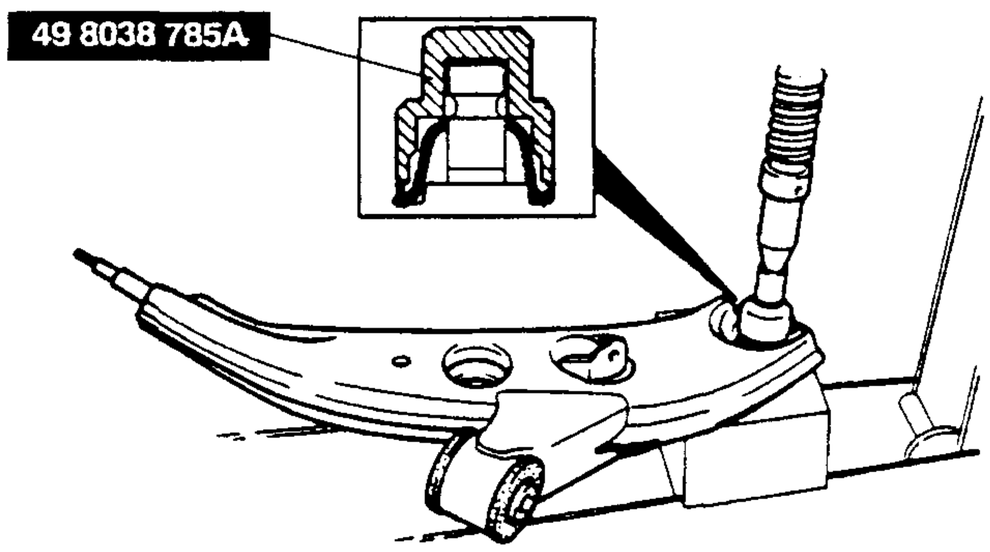
Lower Arm Bushing (Front) Installation Note

- Install the new bushing, and pull it into the lower arm by using the **SST**.



Dust Boot Installation Note

1. Wipe the grease off the ball stud.
2. Fill the inside of the new dust boot with grease.
3. Press the boot onto the ball joint by using the **SST**.
4. Wipe away the excess grease.

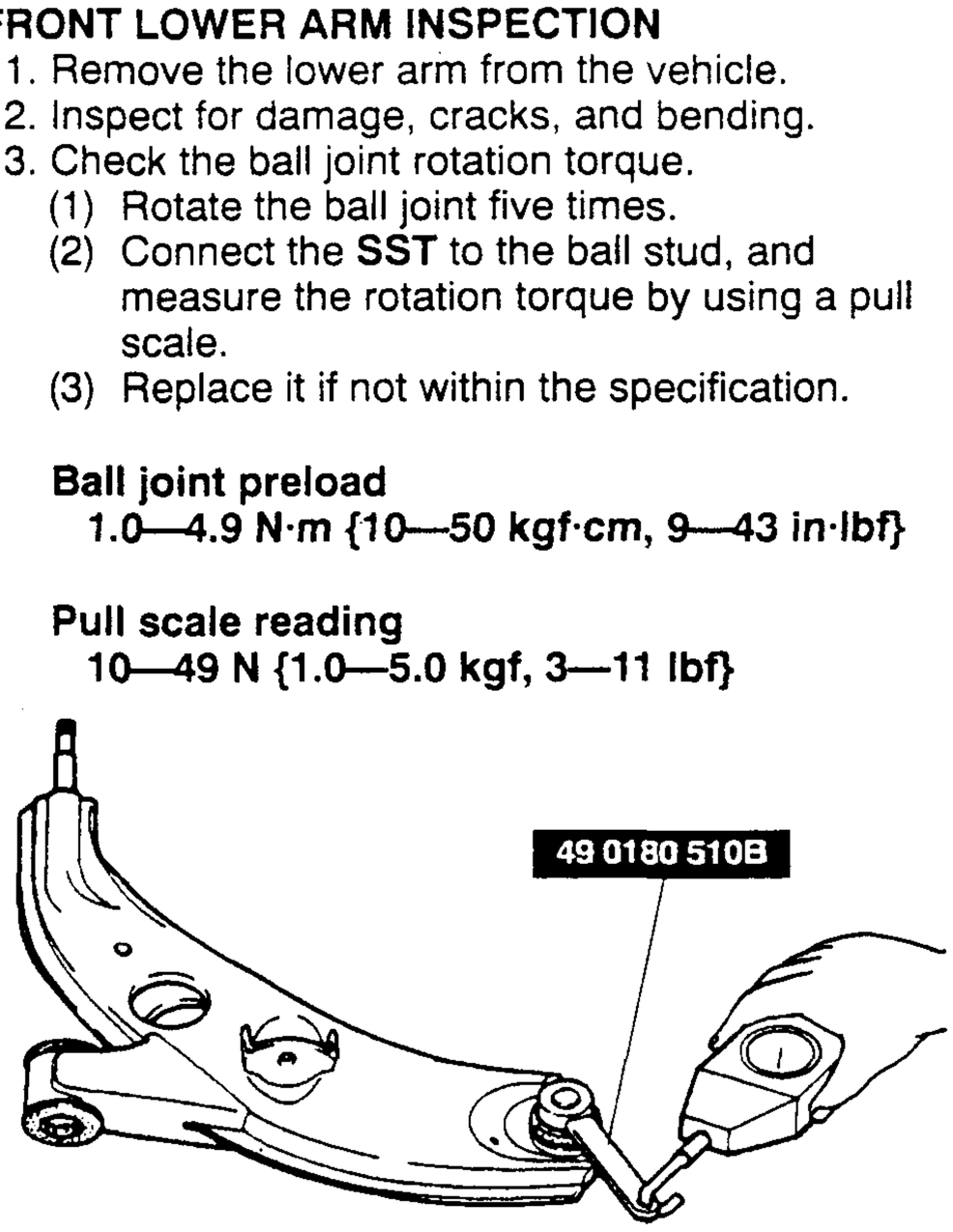


FRONT LOWER ARM INSPECTION

1. Remove the lower arm from the vehicle.
2. Inspect for damage, cracks, and bending.
3. Check the ball joint rotation torque.
   (1) Rotate the ball joint five times.
   (2) Connect the **SST** to the ball stud, and measure the rotation torque by using a pull scale.
   (3) Replace it if not within the specification.

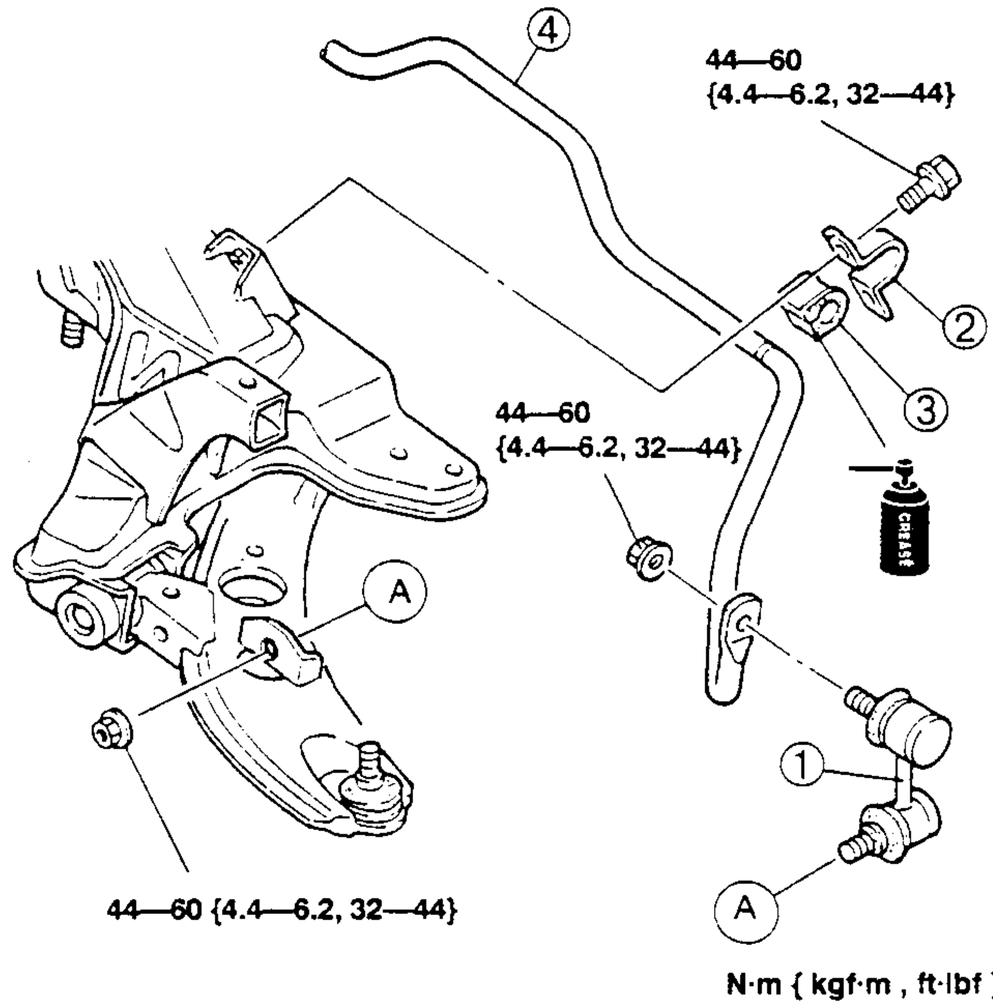
Ball joint preload
1.0—4.9 N·m {10—50 kgf·cm, 9—43 in·lbf}

Pull scale reading
10—49 N {1.0—5.0 kgf, 3—11 lbf}



FRONT STABILIZER REMOVAL/INSTALLATION

1. Remove the crossmember and steering gear component. (Refer to FRONT SUSPENSION. TRANSVERSE MEMBER AND FRONT CROSSMEMBER REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverser order of removal.
4. Inspect the front wheel alignment and adjust it if necessary.

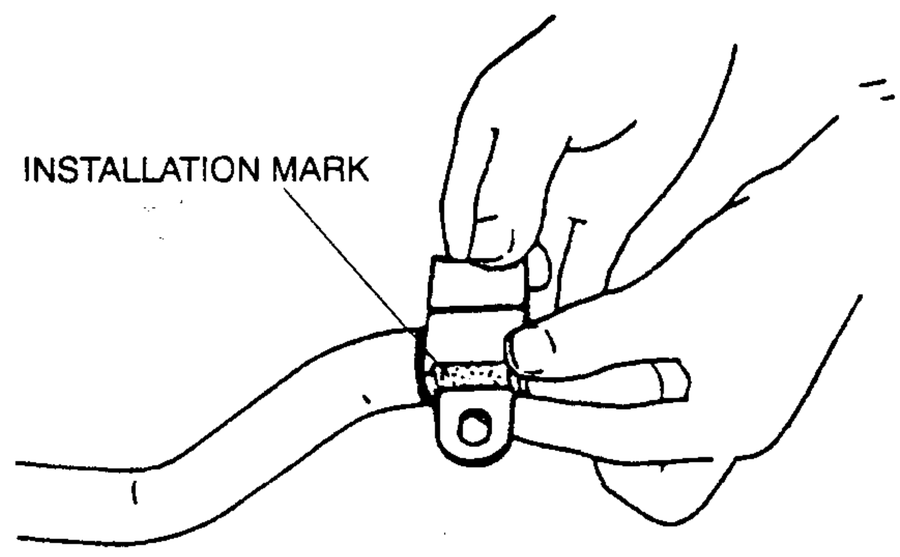


N·m { kgf·m , ft·lbf }

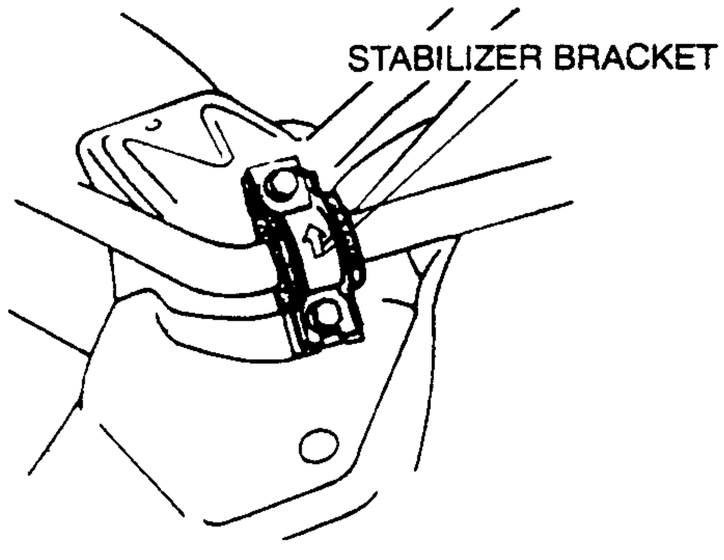
1	Stabilizer control link
2	Stabilizer bracket ☞ Installation Note
3	Stabilizer bushing ☞ Installation Note
4	Front stabilizer

Stabilizer Bushing and Bracket Installation Note

1. Apply rubber grease to the inside surface of the stabilizer bushing.
2. Align the bushing with the installation mark on the stabilizer bar.



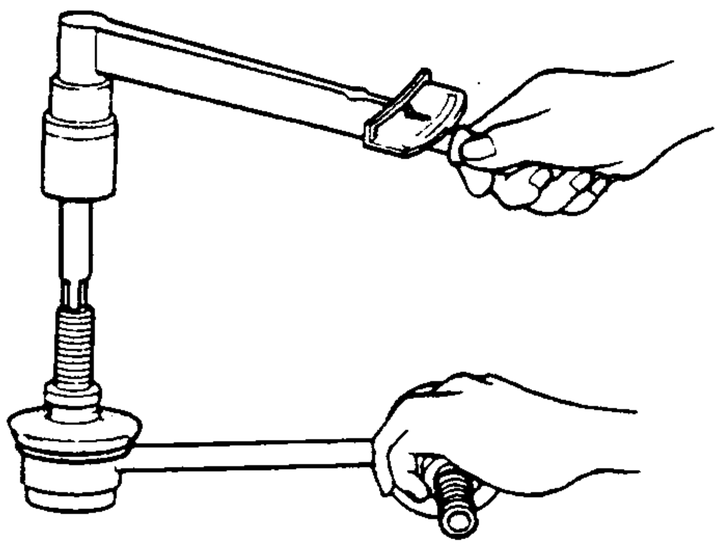
3. Install the stabilizer bracket in the direction shown.



STABILIZER CONTROL LINK INSPECTION

1. Remove the stabilizer control link from the vehicle.
2. Inspect for bending and damage.
3. Measure the ball joint starting torque.
   (1) Rock the ball joint stud side to side 10 times.
   (2) Rotate the ball joint stud 10 times.
   (3) Measure the starting torque by using a suitable Allen socket and a torque wrench.

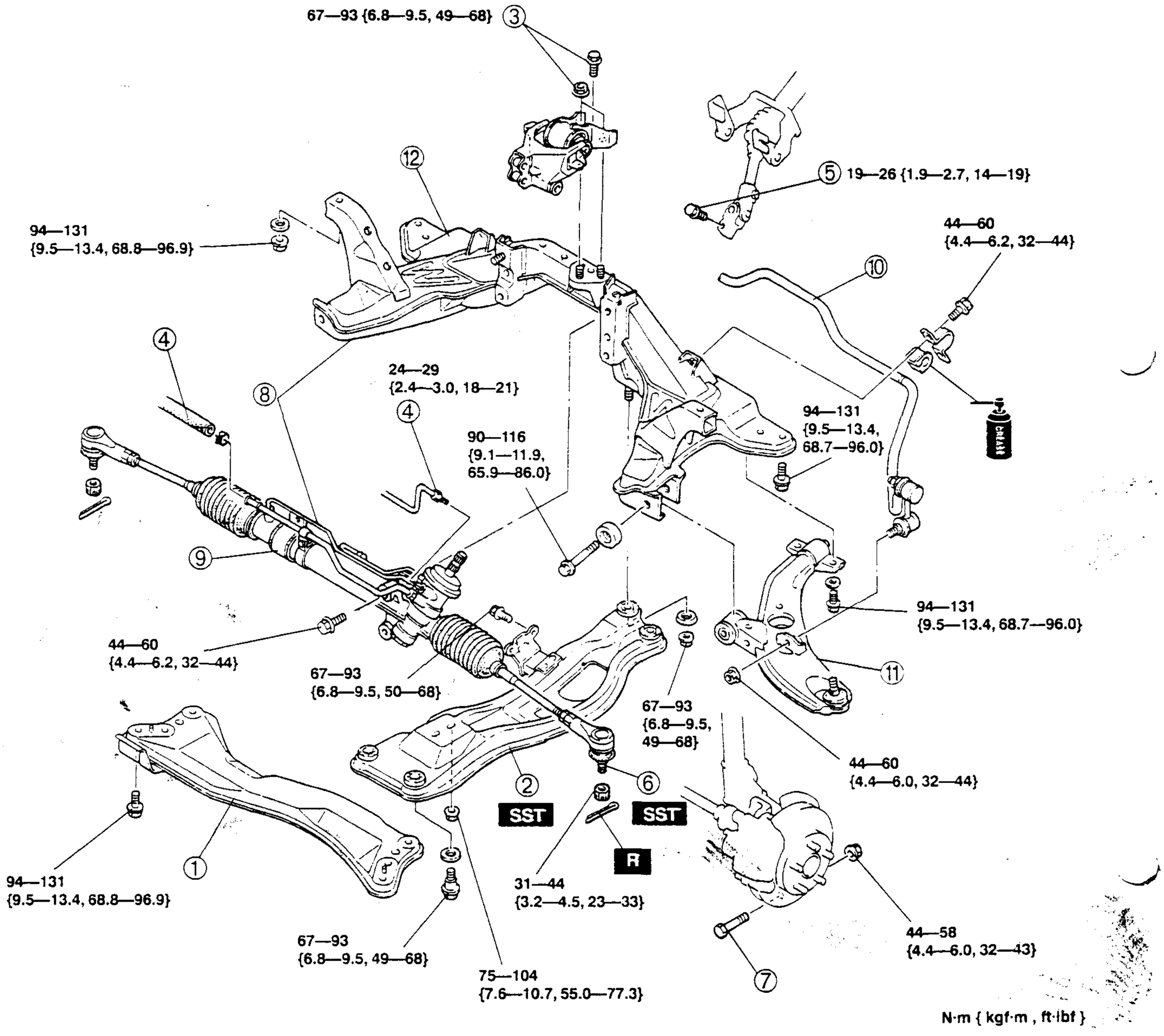
Starting torque
0.2—1.5 N·m
{2.0—15 kgf·cm, 2—13 in·lbf }



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TRANSVERSE MEMBER AND FRONT CROSSMEMBER REMOVAL/INSTALLATION

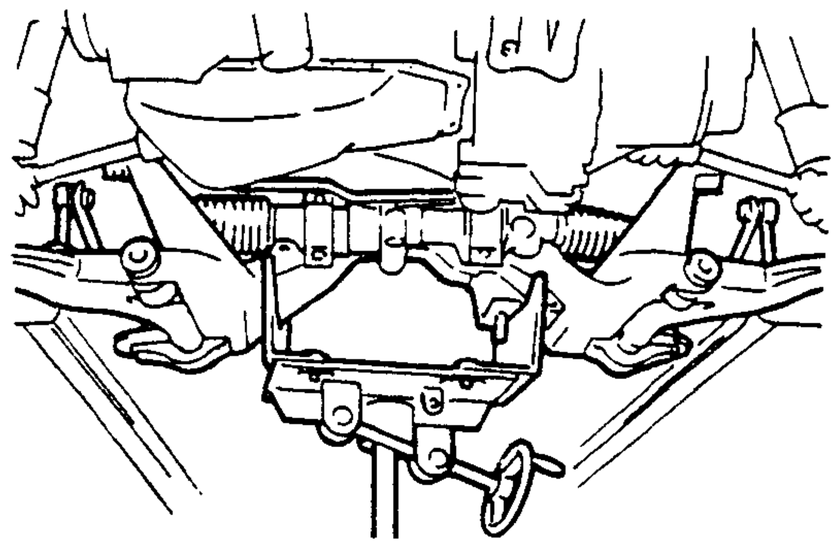
1. Remove the front exhaust pipe. (Refer to section F, EXHAUST SYSTEM, EXHAUST SYSTEM REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Inspect the front wheel alignment and adjust it if necessary.



1	Transverse member
2	Engine mount member ☞ Section J, MANUAL TRANSAXLE, MANUAL TRANSAXLE REMOVAL/INSTALLATION, Engine Mount Member Removal Note
3	No.1 engine mount nut and bolt
4	Pressure pipe and return hose
5	Intermediate shaft bolt
6	Tie-rod end ball joint ☞ Section N, ENGINE SPEED SENSING POWER STEERING, STEERING GEAR AND LINKAGE REMOVAL/INSTALLATION, Tie-rod End Ball Joint Removal Note
7	Lower arm ball joint bolt
8	Crossmember and steering gear component ☞ Removal Note
9	Steering gear and linkage
10	Front stabilizer ☞ FRONT SUSPENSION, FRONT STABILIZER REMOVAL/INSTALLATION ☞ FRONT SUSPENSION, FRONT STABILIZER REMOVAL/INSTALLATION
11	Front lower arm
12	Front crossmember

Crossmember and Steering Gear Component Removal Note

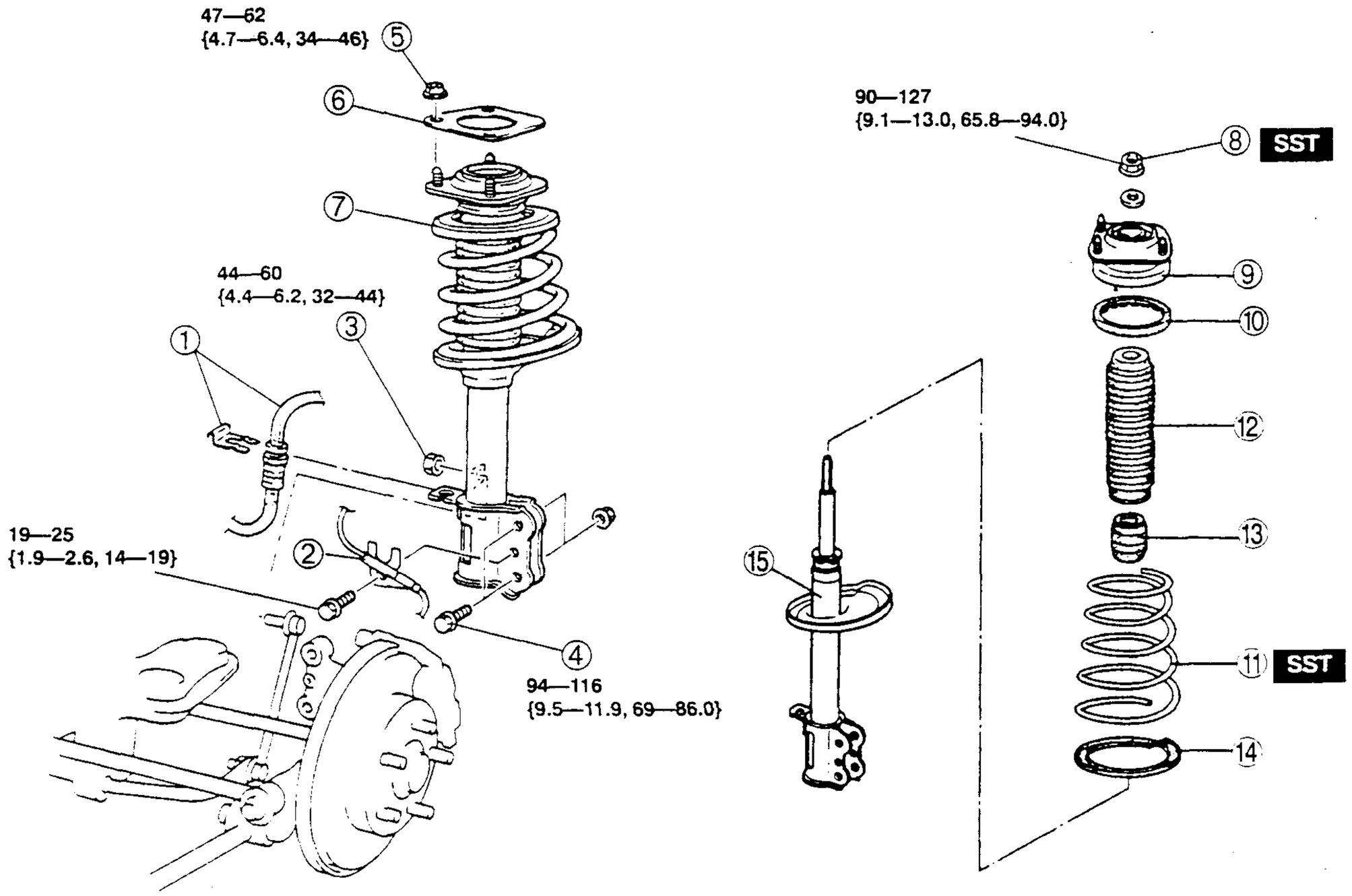
1. Support the crossmember by using a jack and remove the bolts and nuts.
2. Remove the crossmember and steering gear component.



REAR SUSPENSION

REAR SHOCK ABSORBER AND SPRING REMOVAL/INSTALLATION

1. For the sedan, remove the rear package trim. (Refer to section S, TRIM, REAR PACKAGE TRIM REMOVAL/INSTALLATION.) For the 5HB, remove the rear seat belt retractor. (Refer to section S, SEAT BELT, REAR SEAT BELT REMOVAL/INSTALLATION.)
2. Remove in the order indicate in the table.
3. Install in the reverse order of removal.



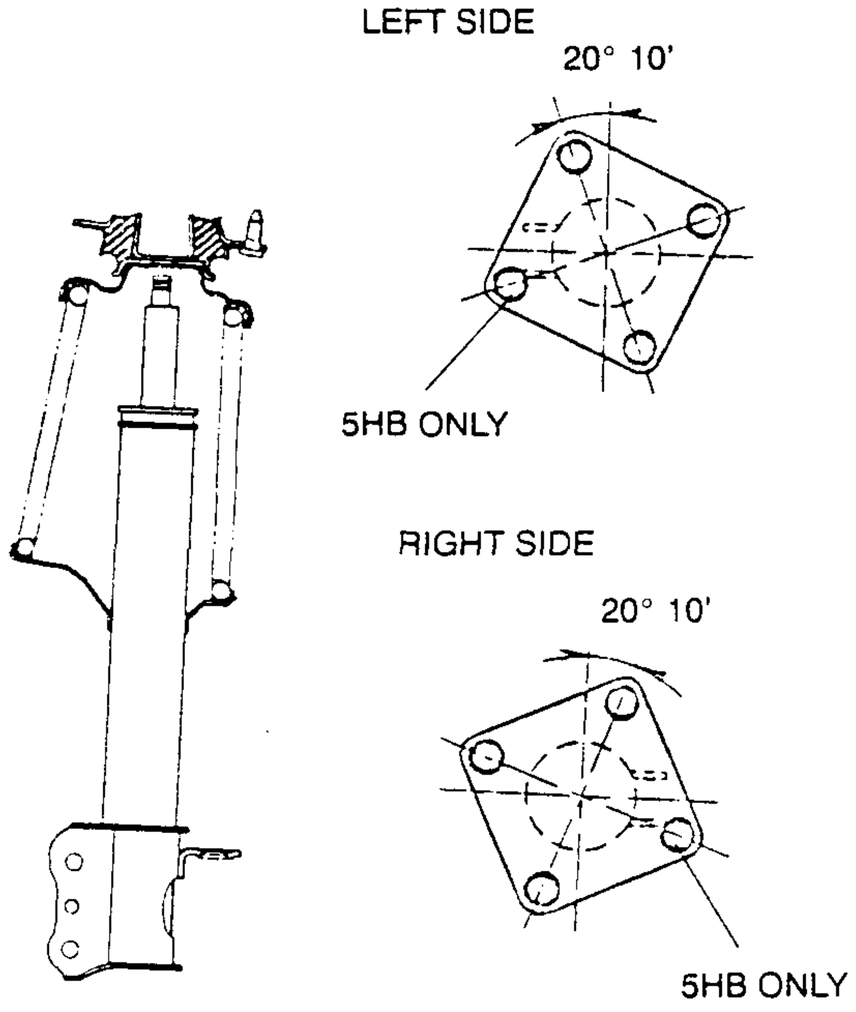
N·m { kgf·m , ft·lbf }

1	Clip and brake hose
2	ABS wheel-speed sensor harness (if equipped)
3	Stabilizer control link nut
4	Shock absorber bolt
5	Nut
6	Sheet
7	Rear shock absorber and spring
8	Piston rod nut ☞ FRONT SUSPENSION, FRONT SHOCK ABSORBER REMOVAL/INSTALLATION, Piston Rod Nut Removal Note

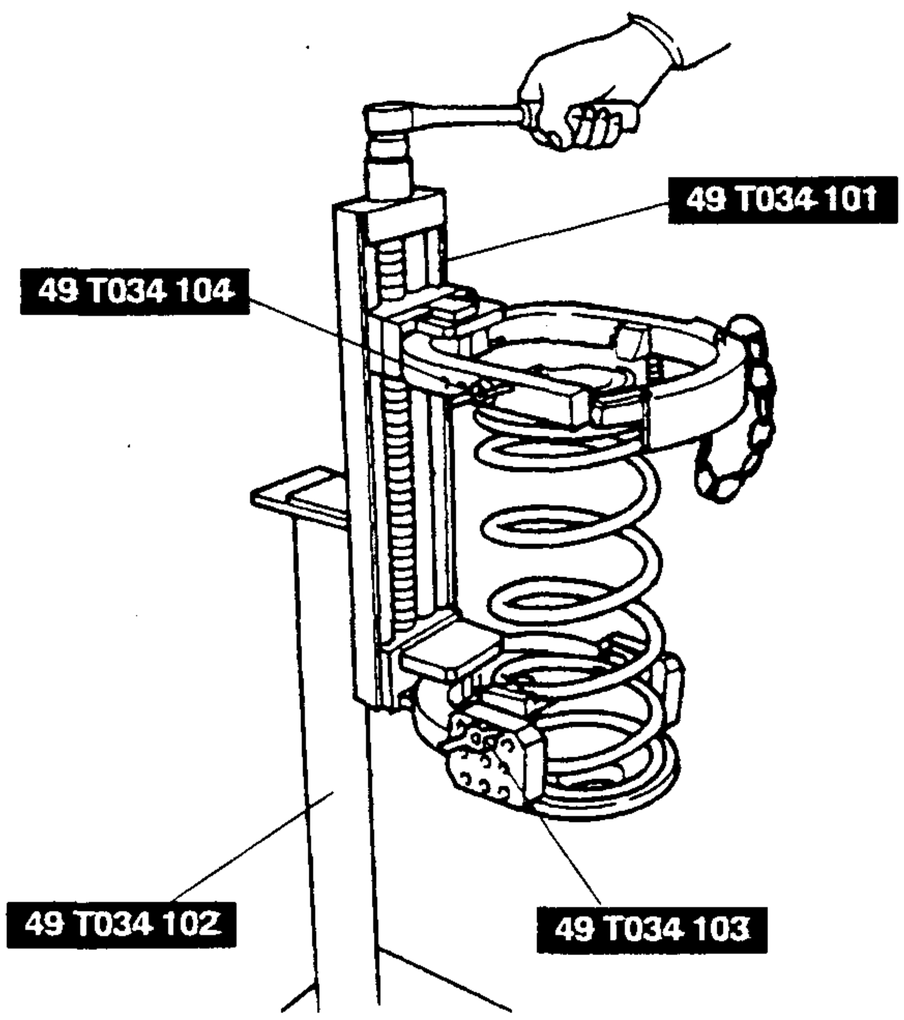
9	Mounting rubber
10	Upper spring seat
11	Coil spring ☞ Installation Note
12	Dust cover
13	Bound stopper
14	Lower spring seat
15	Rear shock absorber

Coil Spring Installation Note

1. Temporarily install the coil spring, upper spring seat and mounting rubber on the shock absorber as shown.
2. Mark the coil spring, upper spring seat, and mounting rubber for proper installation.



3. Align the marks of the coil spring and upper spring seat. Protect the coil spring and upper seat spring by using a piece of cloth, then set the **SSTs**.
4. Compress the coil spring by using the **SSTs**.



5. Install the shock absorber so that the lower end of the coil spring is seated on the step of the lower spring seat.
6. Align the marks of the coil spring and the mounting rubber.
   Install the mounting rubber and piston rod nut, then remove the **SSTs**.

Piston rod nut tightening torque
90—127 N·m
{9.1—13.0 kgf·m , 65.9—94.0 ft·lbf }

REAR SHOCK ABSORBER INSPECTION

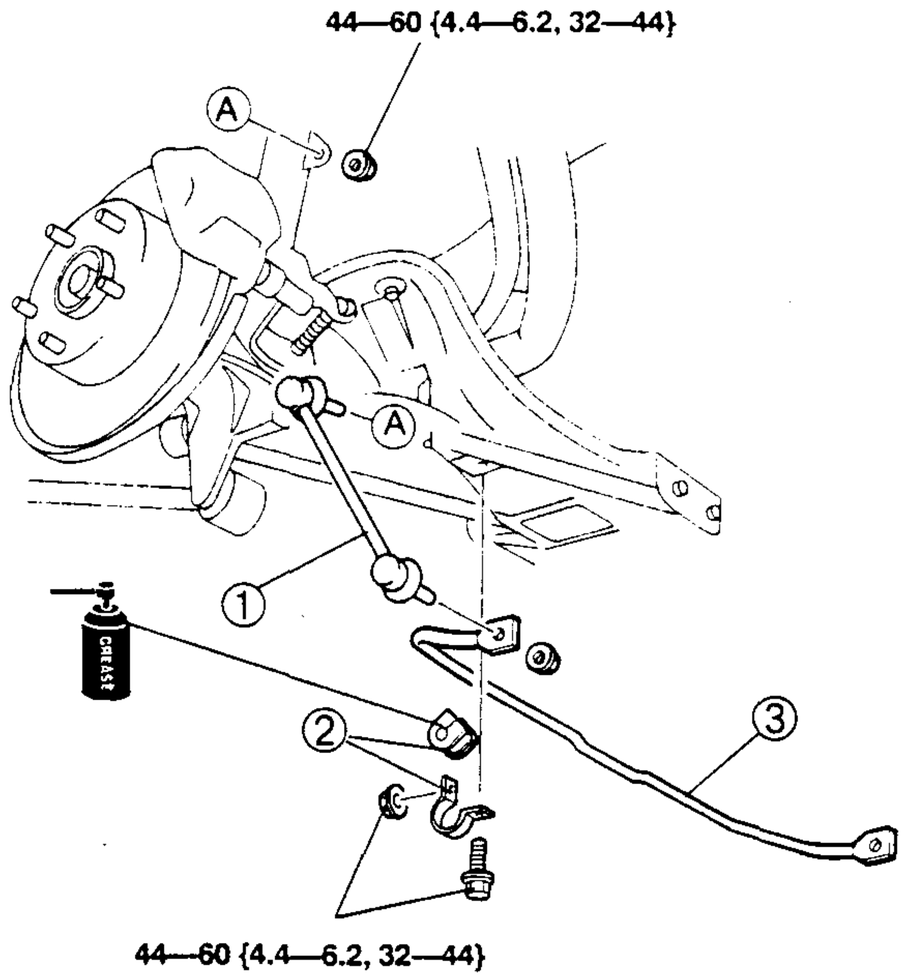
- Inspect the rear shock absorber in the same maner as the front shock absorber. (Refer to FRONT SUSPENSION, FRONT SHOCK ABSORBER INSPECTION.)

REAR SHOCK ABSORBER DISPOSAL

- Dispose the rear shock absorber in the same maner as the front shock absorber. (Refer to FRONT SVSPENSION, FRONT SHOCK ABSORBER DISPOSAL.)

REAR STABILIZER REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.

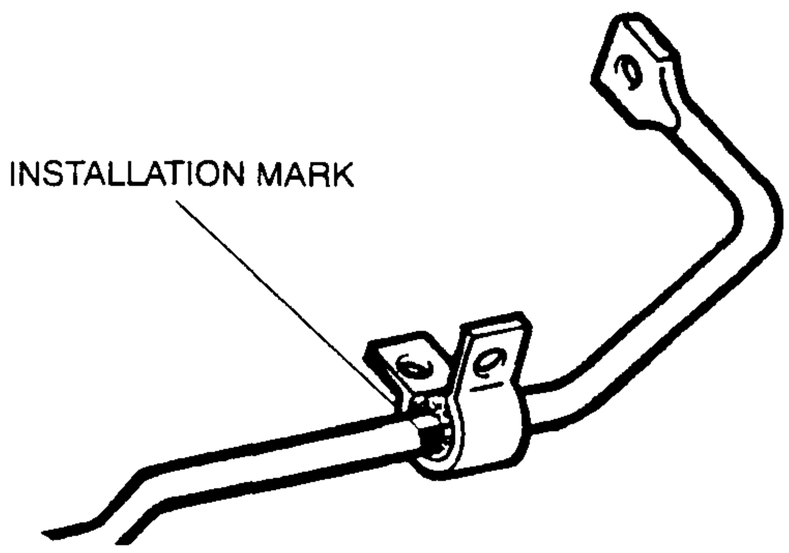


N·m { kgf·m , ft·lbf }

1	Stabilizer control link
2	Stabilizer bushing and bracket ☞ Installation Note
3	Rear stabilizer

Stabilizer Bushing Installation Note

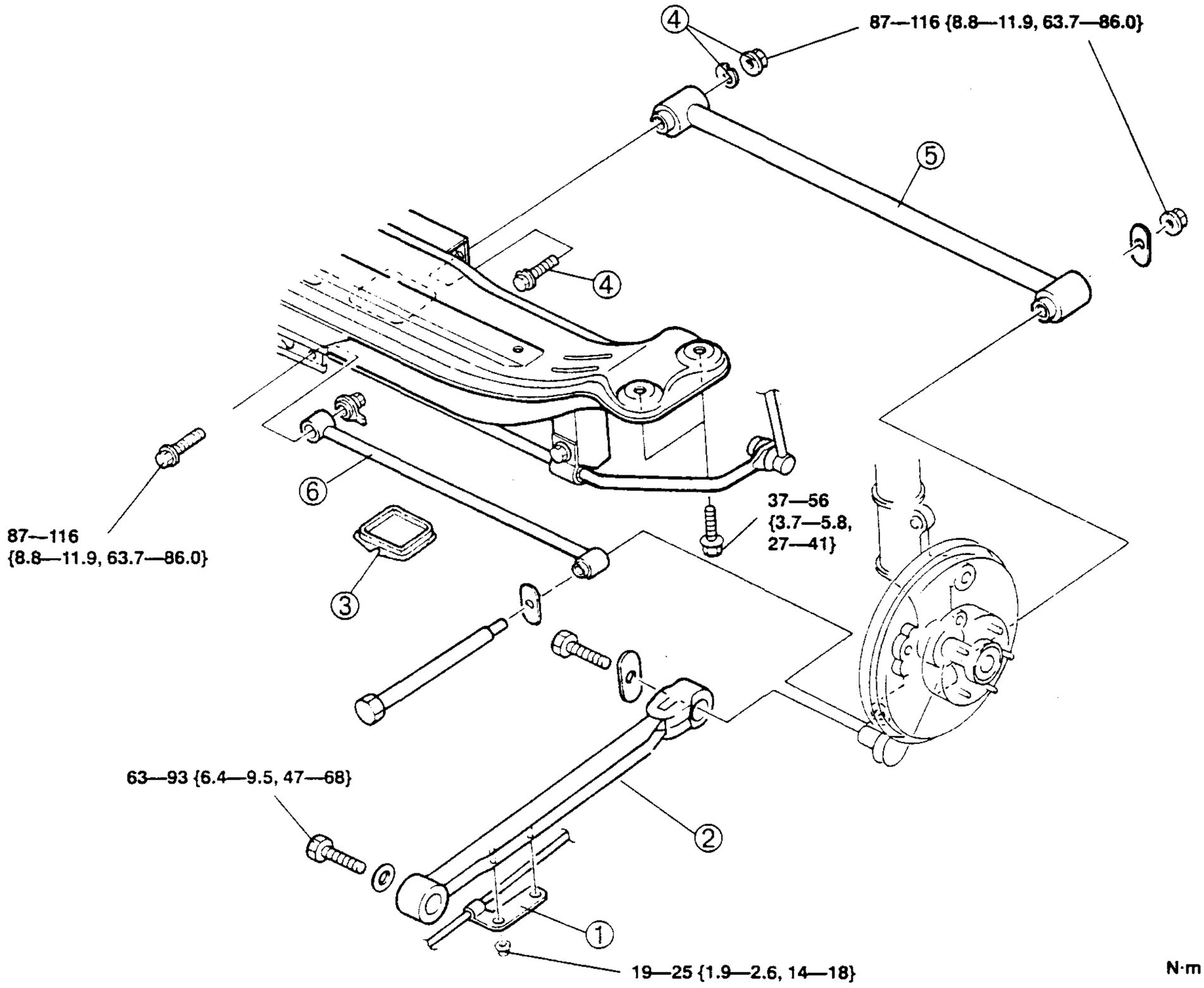
- Align the bushing with the installation mark on the stabilizer bar.



STABILIZER CONTROL LINK INSPECTION
(Refer to FRONT SUSPENSION, STABILIZER CONTROL LINK INSPECTION.)

LATERAL LINK AND TRAILING LINK REMOVAL/INSTALLATION

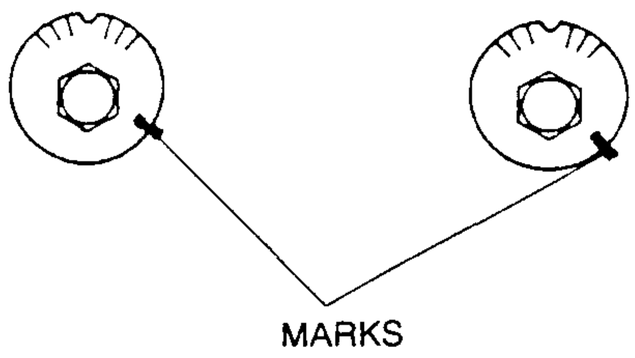
1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Inspect the rear wheel alignment and adjust it if necessary.



1	Parking brake cable bracket
2	Trailing link
3	Cap
4	Nut, cam plate, adjusting cam bolt ☞ Removal Note ☞ Installation Note
5	Rear lateral link
6	Front lateral link ☞ Removal Note

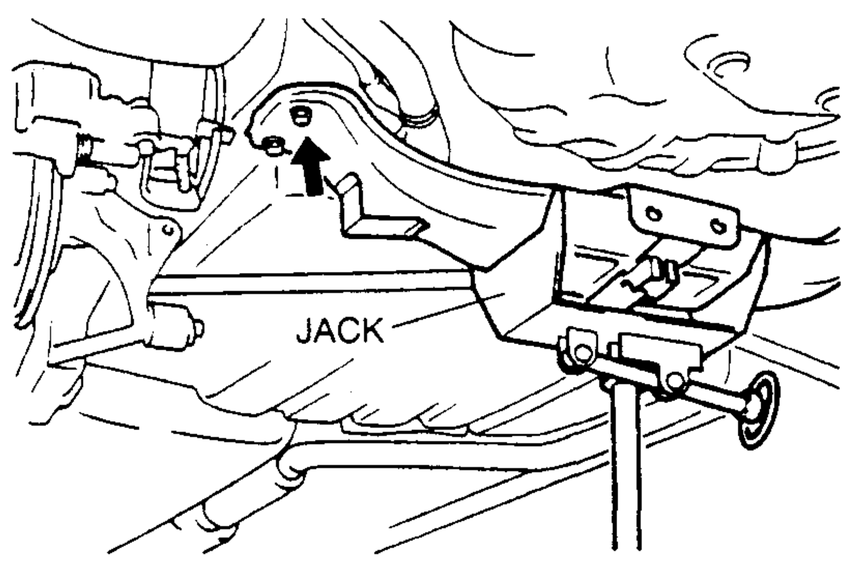
Nut, Cam Plate, and Adjusting Cam Bolt Installation Note

- Before loosening the nut, make a mark on the cam plate and the crossmember for reference during installation.



Front Lateral Link Removal Note

1. Support the rear crossmember by using a jack, then remove the crossmember bolts.



2. Lower the crossmember to remove the lateral link bolt.

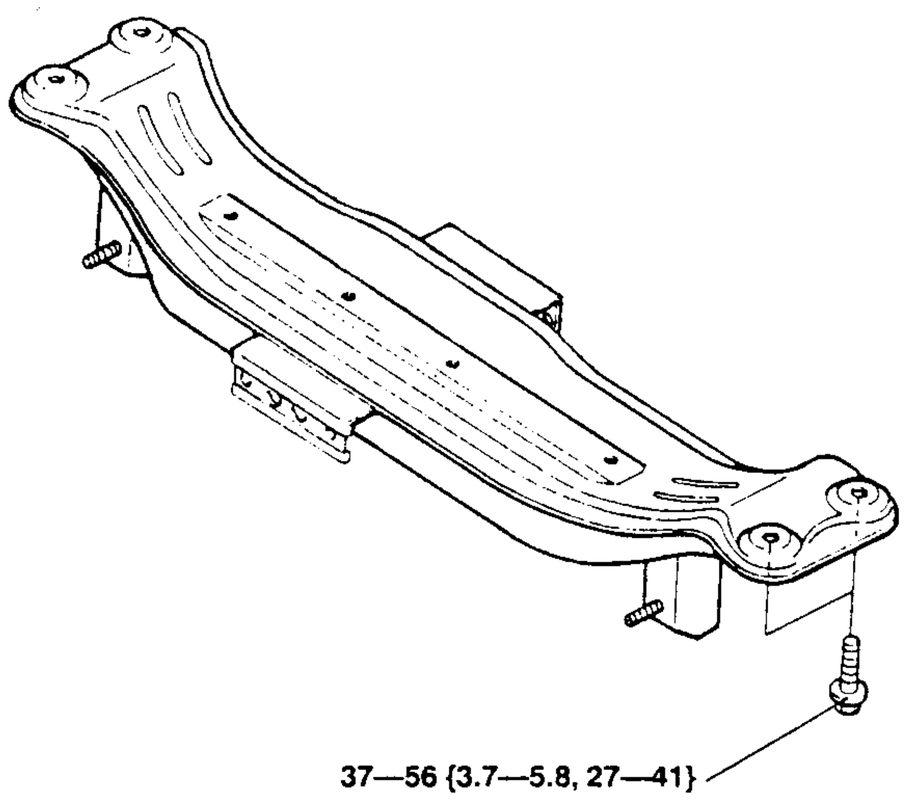
Nut, Cam Plate, and Adjusting Cam Bolt
Installation Note

1. Install the cam plate so that the notch faces the same direction as the adjusting cam bolt.
2. Align to the mark made before removing the adjusting cam bolt. Tighten the nut.

Tightening torque
87—116 N·m
{8.8—11.9 kgf·m, 63.7—86.0 ft·lbf }

REAR CROSSMEMBER REMOVAL/INSTALLATION

1. Remove the rear stabilizer. (Refer to REAR SUSPENSION, REAR STABILIZER REMOVAL/INSTALLATION.)
2. Remove the front and rear lateral links. (Refer to REAR SUSPENSION, LATERAL LINK AND TRAILING LINK REMOVAL/INSTALLATION.)
3. Remove the rear crossmember.
4. Install in the reverse order of removal.
5. Inspect the rear wheel alignment and adjust it if necessary.



N·m { kgf·m , ft·lbf }

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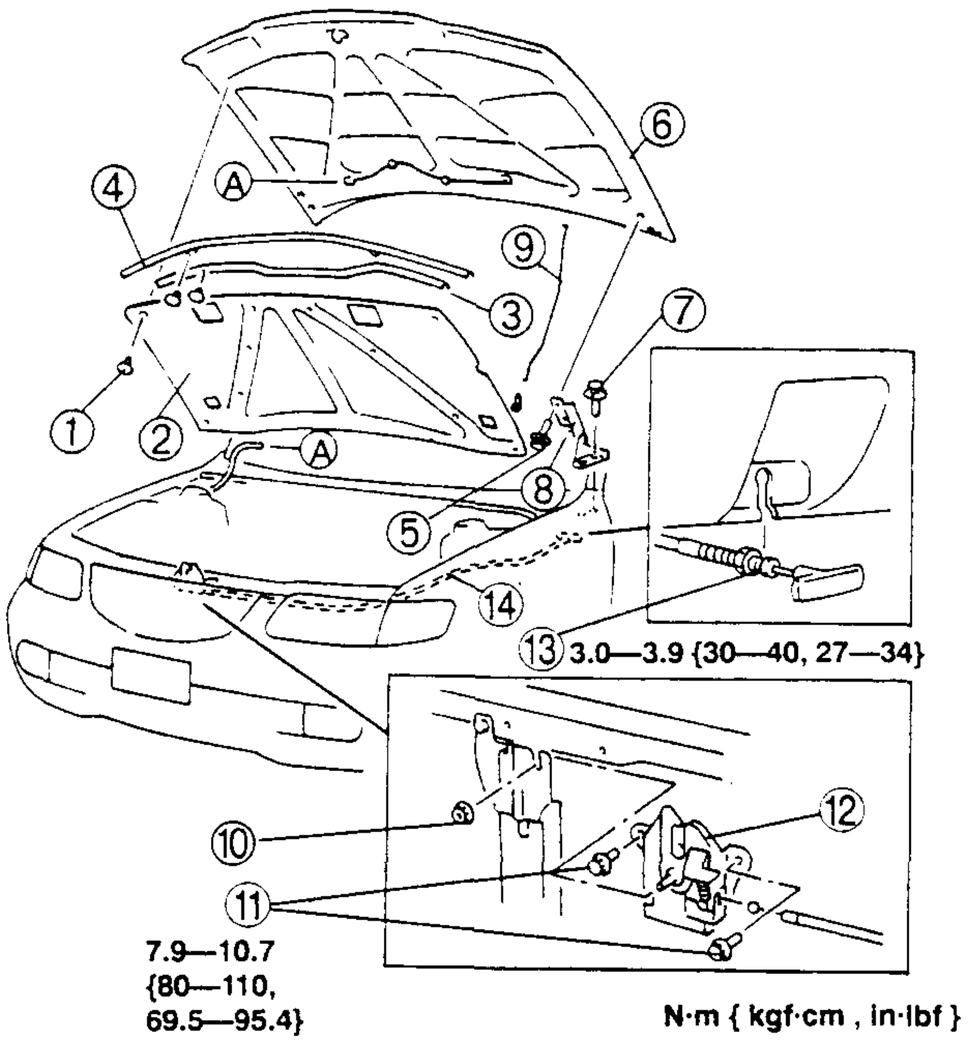
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BONNET

BONNET REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Pull out the windshield washer pipe.
3. To remove the bonnet hinge, remove the front bumper and front fender panel. (Refer to BUMPER, FRONT BUMPER REMOVAL/INSTALLATION.) (Refer to FRONT FENDER PANEL, FRONT FENDER PANEL REMOVAL/INSTALLATION.)
4. To remove the bonnet lock, remove the upper seal board.
5. To remove the bonnet release cable, remove the left (L.H.D.) or right (R.H.D.) mud guard.
6. Remove in the order indicated in the table.
7. Install in the reverse order of removal.
8. Adjust the bonnet. (Refer to BONNET ADJUSTMENT.)
9. Adjust the bonnet lock. (Refer to BONNET LOCK ADJUSTMENT.)
10. Adjust the front fog light. (Refer to section T, EXTERIOR LIGHTING SYSTEM, FRONT FOG LIGHT AIMING.)

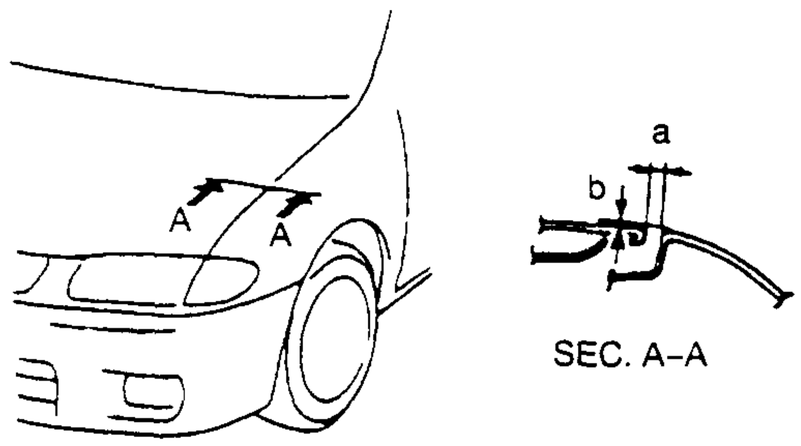


1	Fastener
2	Bonnet insulator
3	Shroud seal weatherstrip
4	Parting seal weatherstrip
5	Bolt A
6	Bonnet
7	Bolt B
8	Bonnet hinge
9	Bonnet stay
10	Nut A
11	Bolt C
12	Bonnet lock
13	Nut B
14	Bonnet release cable

BONNET ADJUSTMENT

1. Remove the bonnet lock.
2. Measure the gap and height between the bonnet and front fender panel.

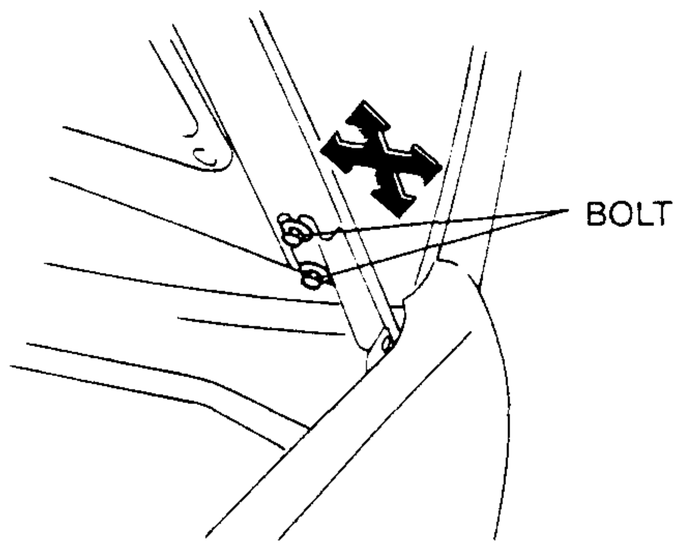
Clearance	Standard mm { in }	Minimum mm { in }	Maximum mm { in }
a	4.0 {0.16}	3.0 {0.12}	5.0 {0.19}
b	−0.5 {−0.02}	−1.5 {−0.05}	0 {0}



3. If not as specified, adjust the gap and height.
4. Install and adjust the bonnet lock. (Refer to BONNET LOCK ADJUSTMENT.)

Gap

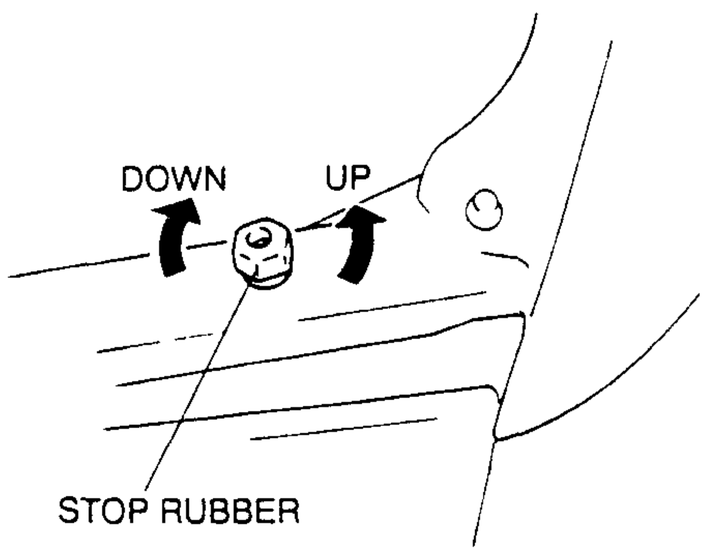
1. Loosen the bonnet installation bolts and reposition the bonnet.



2. Tighten the bonnet installation bolts.

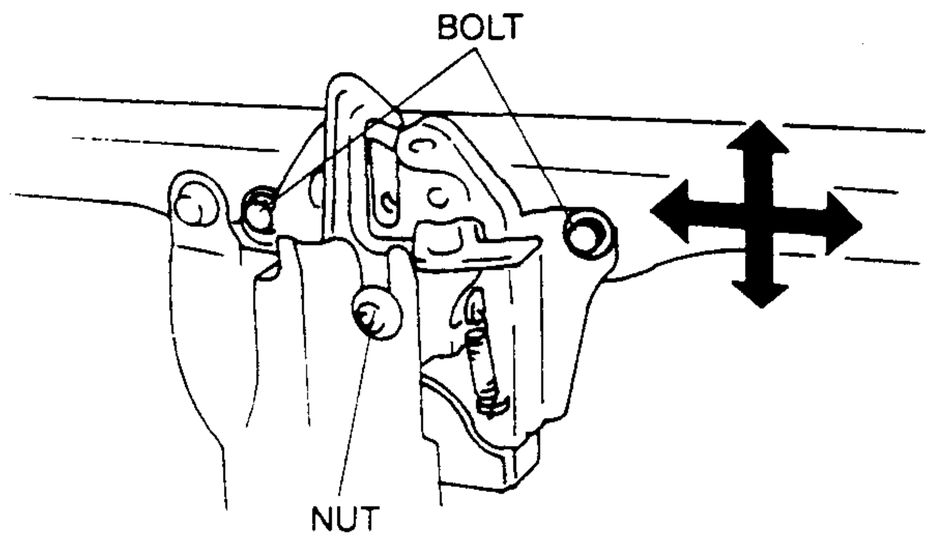
Height

- Turn the stop rubber to adjust the height of the bonnet.



BONNET LOCK ADJUSTMENT

1. Verify that the bonnet can be closed easily and that there is no looseness.
2. If not correct, loosen the bonnet lock installation bolts and nut, and move the bonnet lock horizontally or vertically.

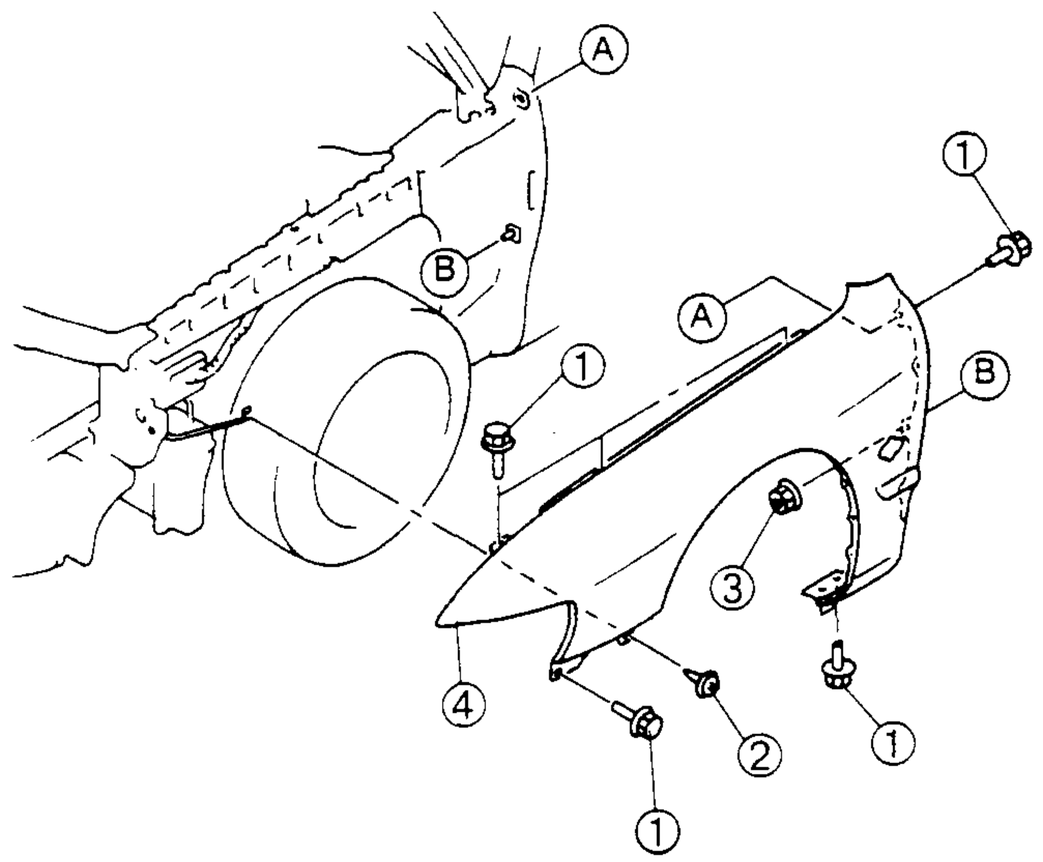


3. Tighten the bonnet lock installation bolts and the nut.

FRONT FENDER PANEL

FRONT FENDER PANEL REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the front bumper. (Refer to BUMPER, FRONT BUMPER REMOVAL/INSTALLATION.)
3. Remove the front side turn light.
4. Remove the front flap.
5. Remove the mud guard.
6. Remove the front fender seal plate.
7. Remove in the order indicated in the table.
8. Install in the reverse order of removal.
9. Adjust the front fog light aiming. (Refer to section T, EXTERIOR LIGHTING SYSTEM, FRONT FOG LIGHT AIMING.)

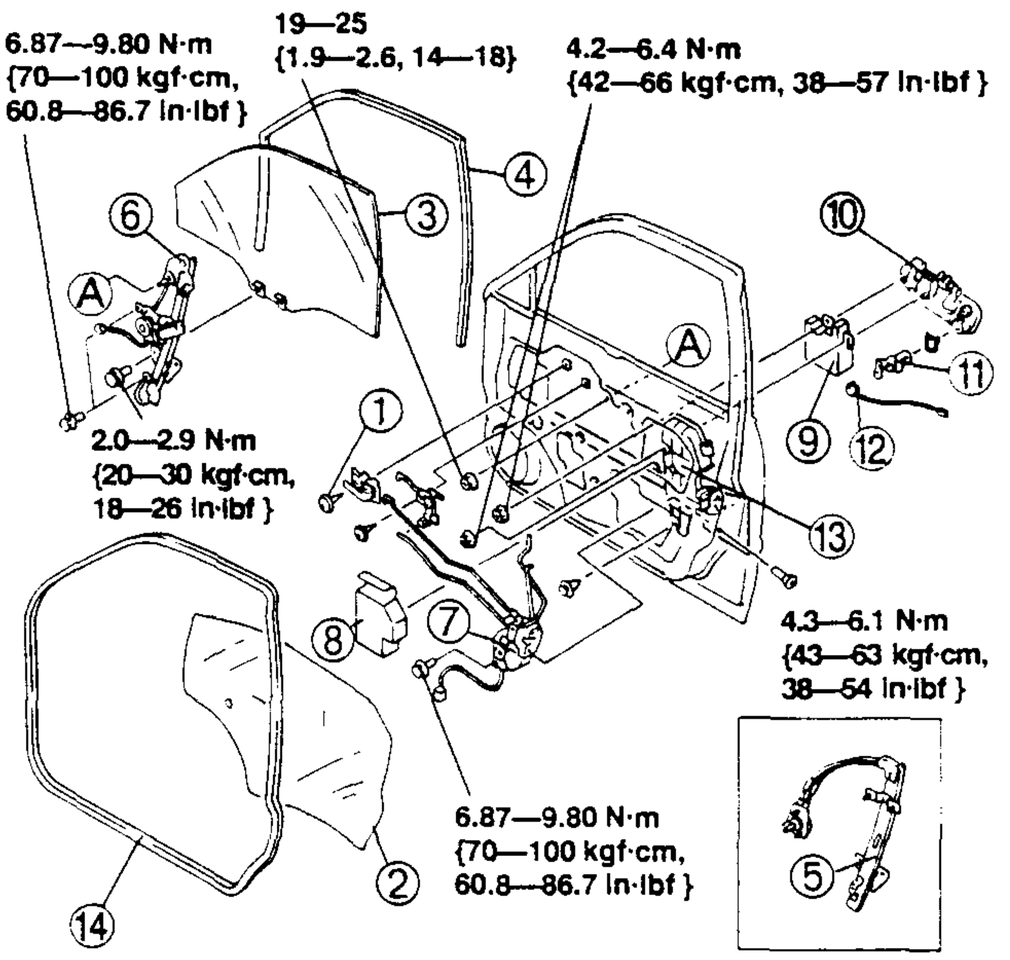


1	Bolt
2	Screw
3	Nut
4	Front fender panel

DOOR

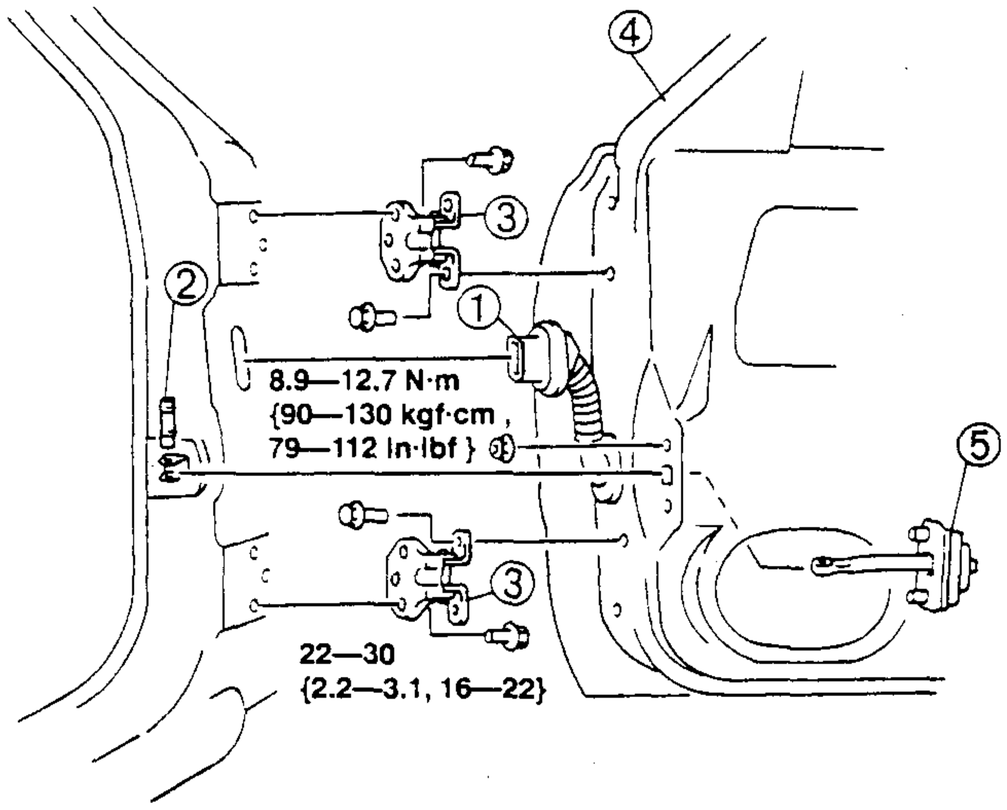
FRONT DOOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. To remove the door hinge, remove the front fender panel. (Refer to FRONT FENDER PANEL, FRONT FENDER PANEL REMOVAL/INSTALLATION.)
3. To remove the checker, remove the door speaker. (Refer to section T, AUDIO, DOOR SPEAKER REMOVAL/INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Adjust the front door gap and height. (Refer to FRONT DOOR ADJUSTMENT.)



N·m { kgf·m , ft·lbf }

1	Inner handle
2	Door screen
3	Front door glass
4	Glass run channel
5	Manual window regulator
6	Power window regulator
7	Front door lock
8	Pad A
9	Pad B
10	Outer handle
11	Door key cylinder
12	Door key cylinder switch
13	Rod protector
14	Door weatherstrip



N·m { kgf·m , ft·lbf }

1	Connector
2	Checker pin
3	Door hinge
4	Front door
5	Checker

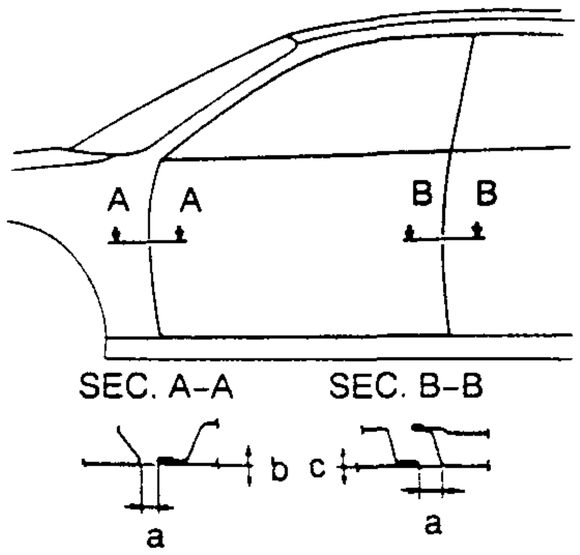
FRONT DOOR DISASSEMBLY/ASSEMBLY

1. Raise the rear edge of the front door glass **about 60 mm {2.4 in }** from the fully-lowered position.
2. Disconnect the negative battery cable.
3. Remove the front door trim. (Refer to TRIM, FRONT DOOR TRIM REMOVAL/INSTALLATION.)
4. Disassemble in the order indicated in the table.
5. Assemble in the reverse order of disassembly.

FRONT DOOR ADJUSTMENT

1. Remove the front door lock striker.
2. Measure the gap and height between the front door and the body.

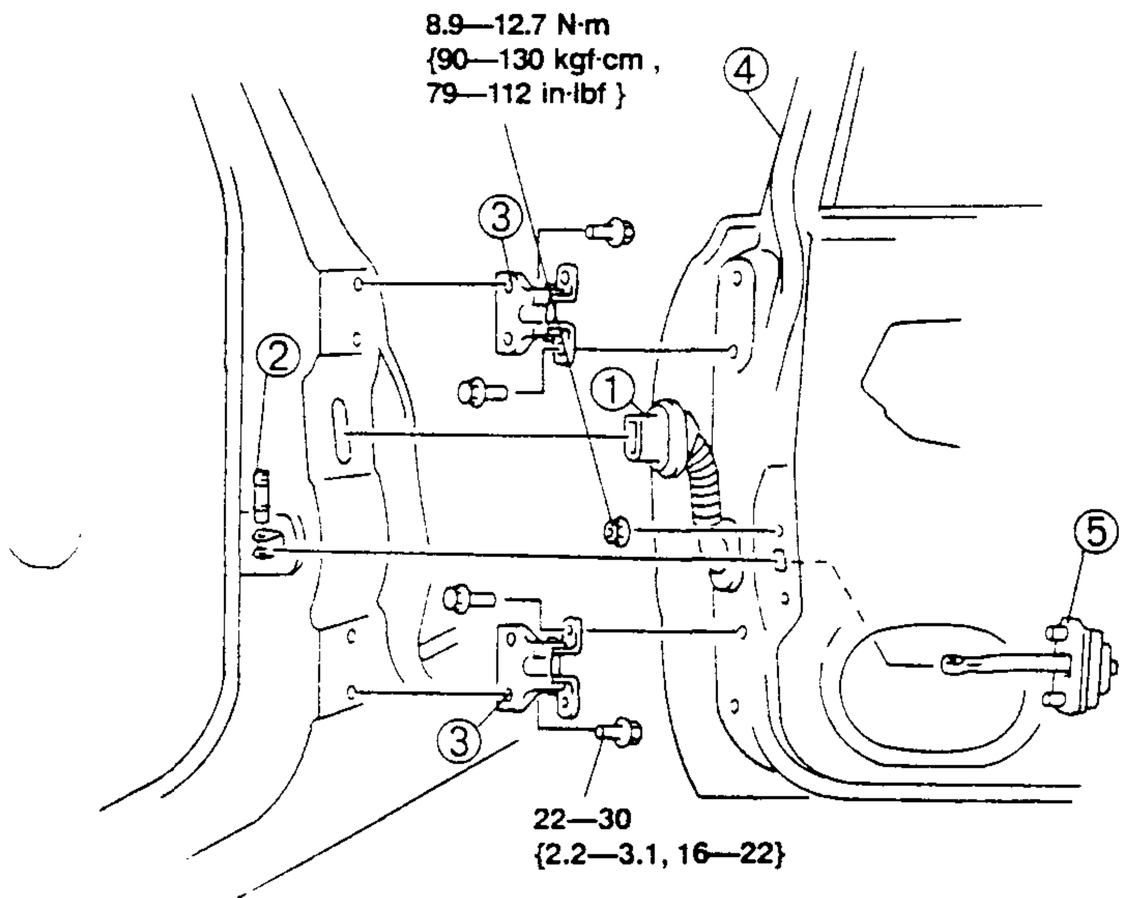
Clearance	Standard mm { in }	Minimum mm { in }	Maximum mm { in }
a	4.4 {0.17}	3.4 {0.14}	5.4 {0.21}
b	1.2 {0.05}	0.2 {0.01}	2.2 {0.08}
c	1.3 {0.05}	0.3 {0.02}	2.3 {0.09}



3. Hand tighten the door lock striker.
4. If not as specified, loosen the door hinge installation bolts and door lock striker installation screws, and reposition the door.
5. Tighten the bolts and the screws.
6. Adjust the door lock striker. (Refer to DOOR LOCK STRIKER ADJUSTMENT.)

REAR DOOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. To remove the checker, remove the door screen. (Refer to REAR DOOR DISASSEMBLY/ASSEMBLY.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Adjust the rear door gap and height. (Refer to REAR DOOR ADJUSTMENT.)

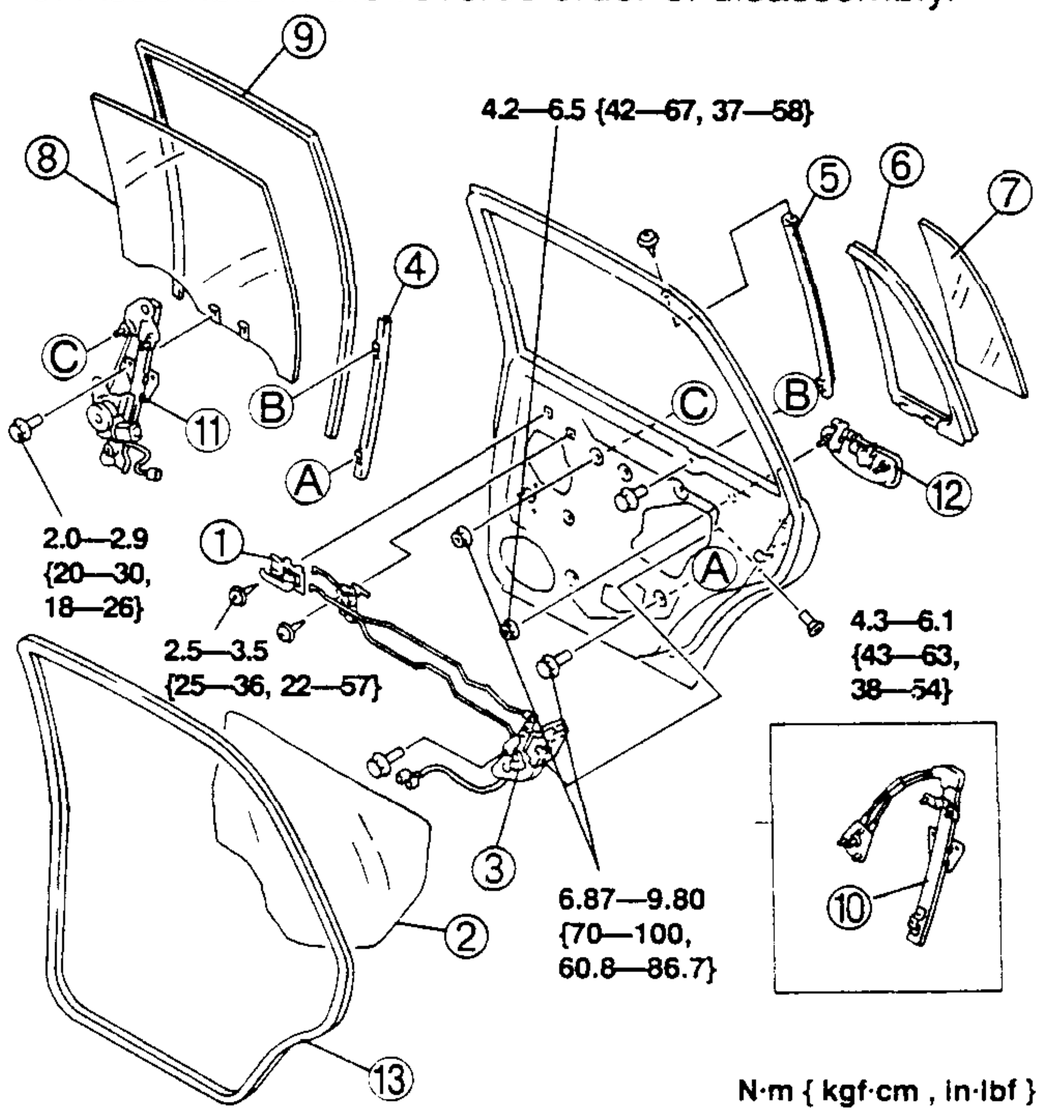


N·m { kgf·m , ft·lbf }

1	Connector
2	Checker pin
3	Door hinge
4	Rear door
5	Checker

REAR DOOR DISASSEMBLY/ASSEMBLY

1. Raise the rear edge of the rear door glass **about 110mm {4.3 in }** from the fully-lowered position.
2. Disconnect the negative battery cable.
3. Remove the rear door trim. (Refer to TRIM, REAR DOOR TRIM REMOVAL/INSTALLATION.)
4. Disassemble in the order indicated in the table.
5. Assemble in the reverse order of disassembly.



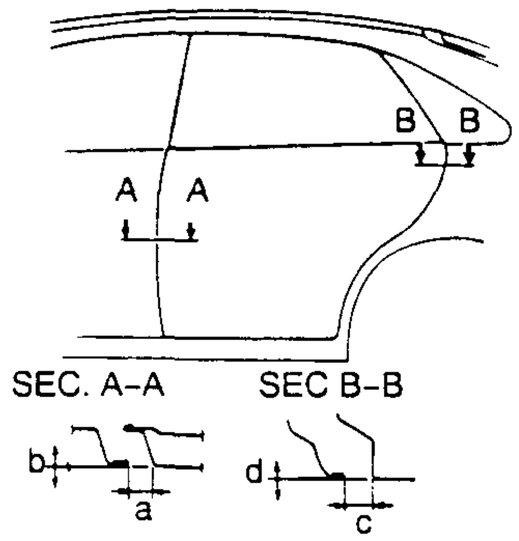
N·m { kgf·cm , in·lbf }

1	Inner handle
2	Door screen
3	Rear door lock
4	Lower glass guide
5	Upper glass guide
6	Door quarter window glass weatherstrip
7	Door quarter window glass
8	Rear door glass
9	Glass run channel
10	Manual window regulator
11	Power window regulator
12	Outer handle
13	Door weatherstrip

REAR DOOR ADJUSTMENT

1. Remove the rear door lock striker.
2. Measure the gap and height between the rear door and the body.

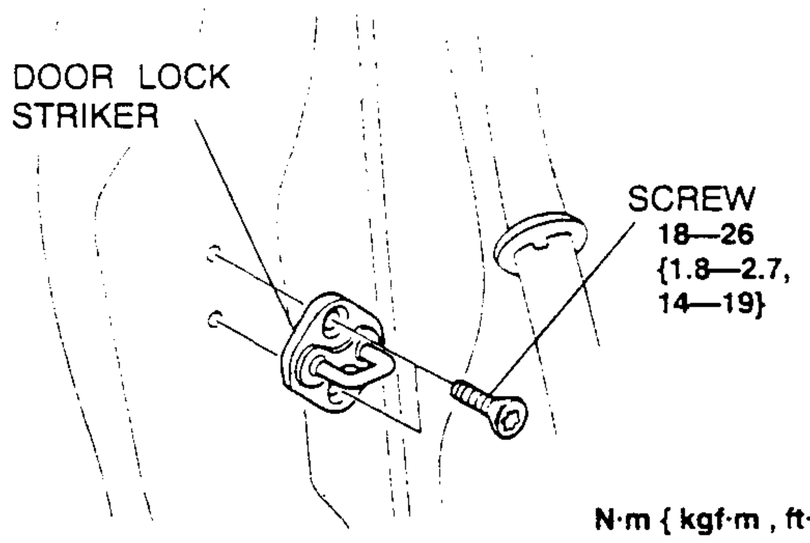
Clearance	Standard mm { in }	Minimum mm { in }	Maximum mm { in }
a	4.4 {0.17}	3.4 {0.14}	5.4 {0.21}
b	1.3 {0.05}	0.3 {0.02}	2.3 {0.09}
c	4.0 {0.16}	3.0 {0.12}	5.0 {0.19}
d	1.7 {0.07}	0.7 {0.03}	2.7 {0.10}



3. Hand tighten the door lock striker.
4. If not as specified, loosen the door hinge installation bolts and door lock striker installation screws, and reposition the door.
5. Tighten the bolts and the screws.
6. Adjust the door lock striker. (Refer to DOOR LOCK STRIKER ADJUSTMENT.)

DOOR LOCK STRIKER REMOVAL/INSTALLATION

1. Remove the screws.
2. Remove the door lock striker.



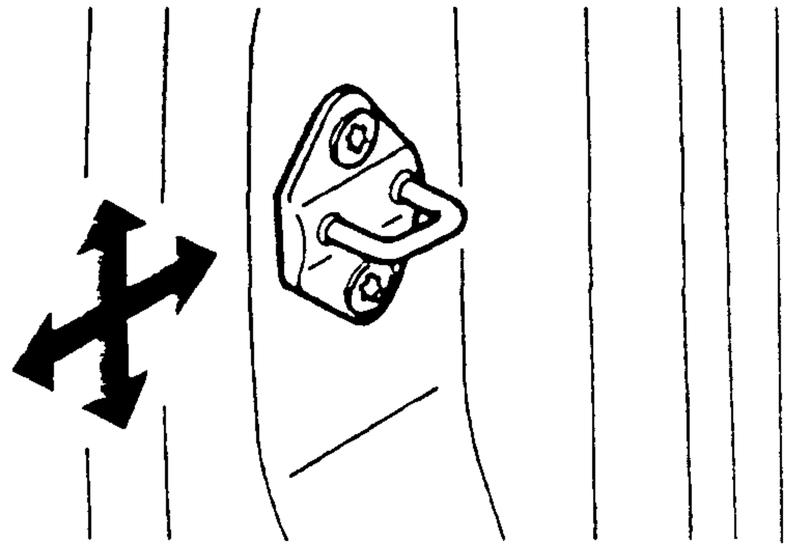
3. Install in the reverse order of removal.
4. Adjust the door lock striker. (Refer to DOOR LOCK STRIKER ADJUSTMENT.)

DOOR LOCK STRIKER ADJUSTMENT

Warning

- **Adjusting the front door lock striker could give the side air bag sensor shocks and can accidently deploy the side air bag module, which may seriously injure you. Disconnect the negative battery cable before adjusting the front door lock striker.**

1. Disconnect the negative battery cable. (If adjust the front door lock striker.)
2. Verify that the door can be closed easily and that there is no looseness.
3. If not correct, loosen the striker mounting screws and move the striker horizontally or vertically to adjust it.

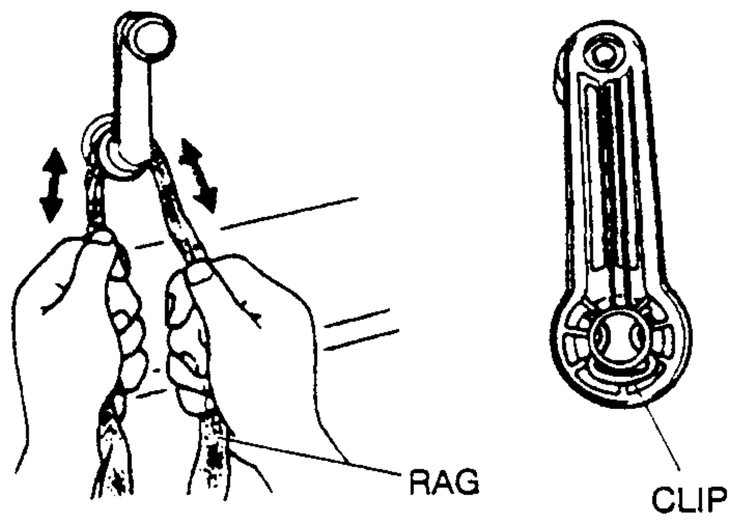


4. Tighten the striker mounting screws.

Tightening torque
18—26 N·m {1.8—2.7 kgf·m , 14—19 ft·lbf }

REGULATOR HANDLE REMOVAL

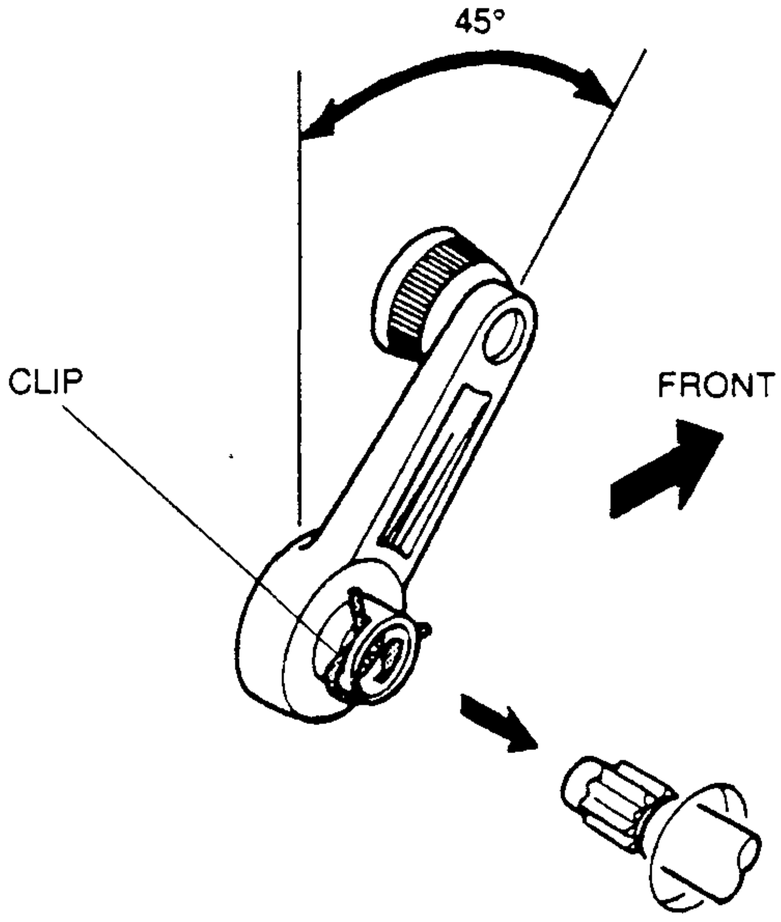
1. Remove the regulator handle clip by using a rag as shown.



2. Remove the regulator handle.

REGULATOR HANDLE INSTALLATION

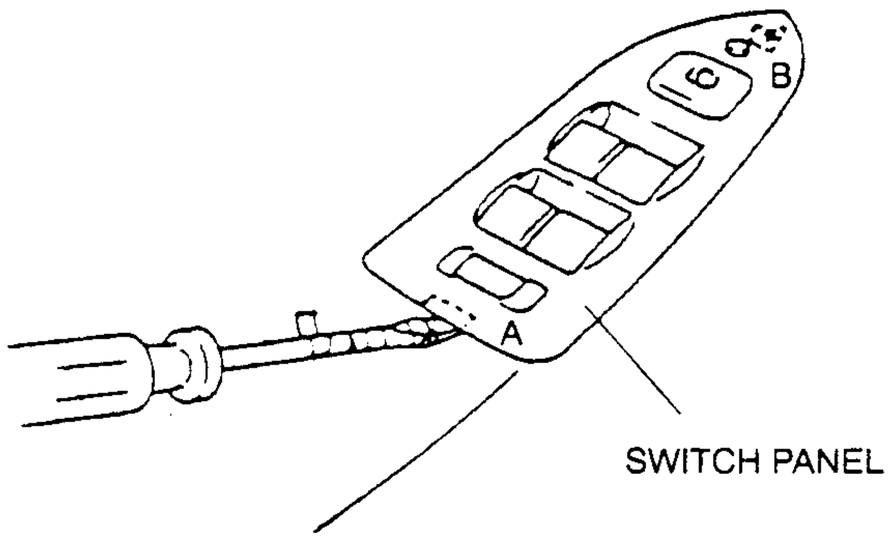
1. Install the clip in the regulator handle.
2. Set the door glass at the fully-raised position and push the regulator handle on as shown.



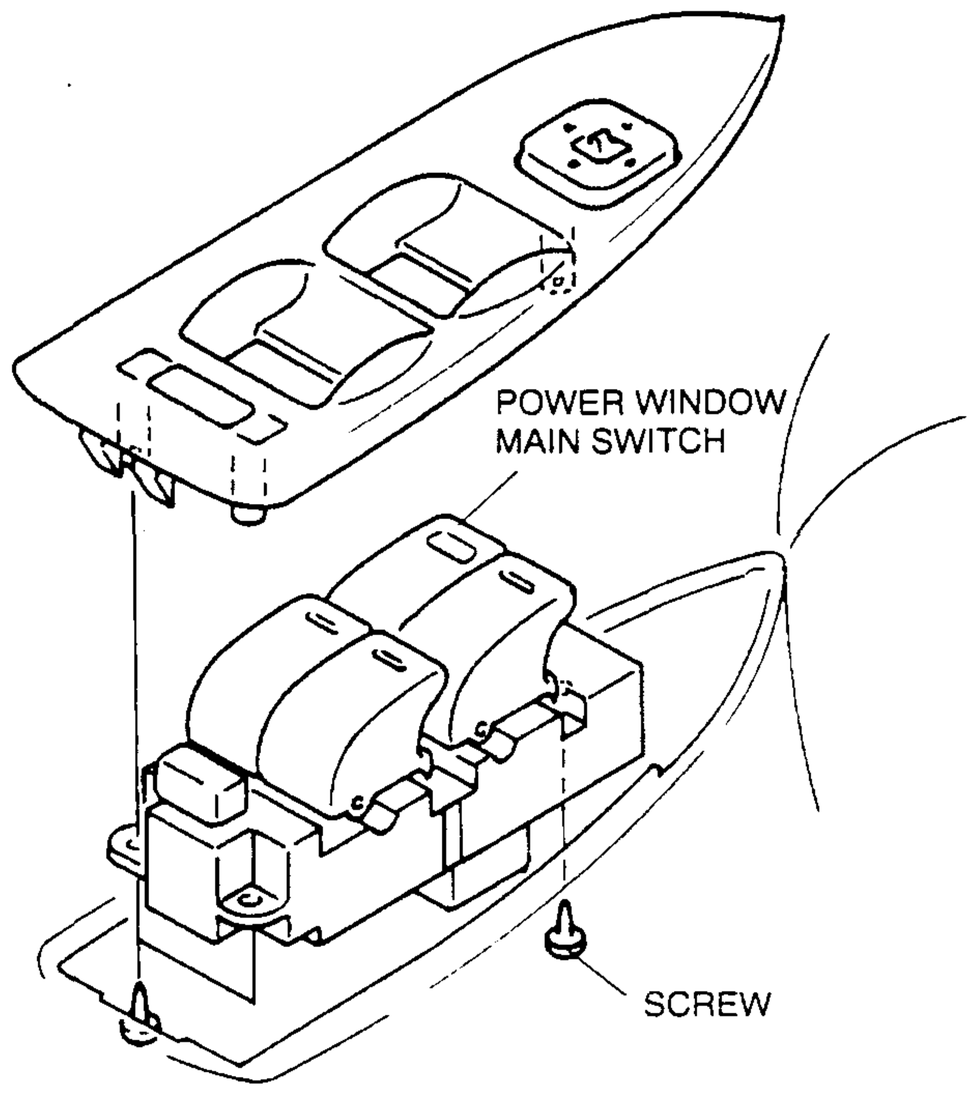
POWER WINDOW SYSTEM

POWER WINDOW MAIN SWITCH REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Disengage the clip A by using a tape-wrapped flathead screwdriver as shown in the figure.
3. Pull the switch panel upward to disengage hook B from the front door trim.



4. Disconnect the connector.
5. Remove the screws, and remove the power window main switch.



6. Install in the reverse order of removal.

POWER WINDOW MAIN SWITCH INSPECTION

1. Remove the switch panel. (Refer to TRIM, FRONT DOOR TRIM REMOVAL/INSTALLATION.)
2. Check for continuity between the power window main switch terminals by using an ohmmeter.
3. When checking the driver's side, connect the battery positive voltage to terminal F and connect the ground to the terminal H. (4 door power window system only.)
4. When checking the driver's side, connect the battery positive voltage to terminal D and connect the ground to the terminal H. (2 door power window system only.)

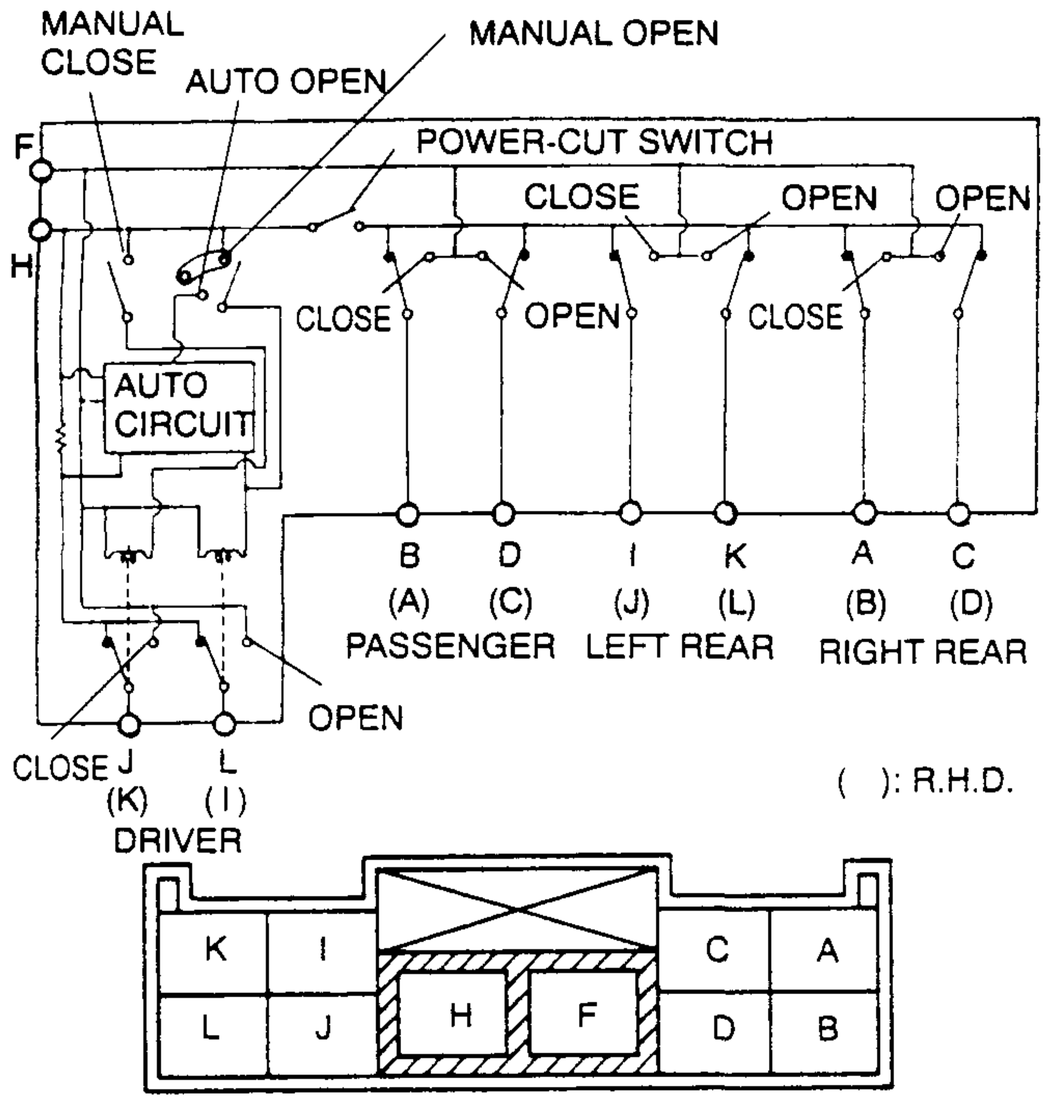
4 door power window system

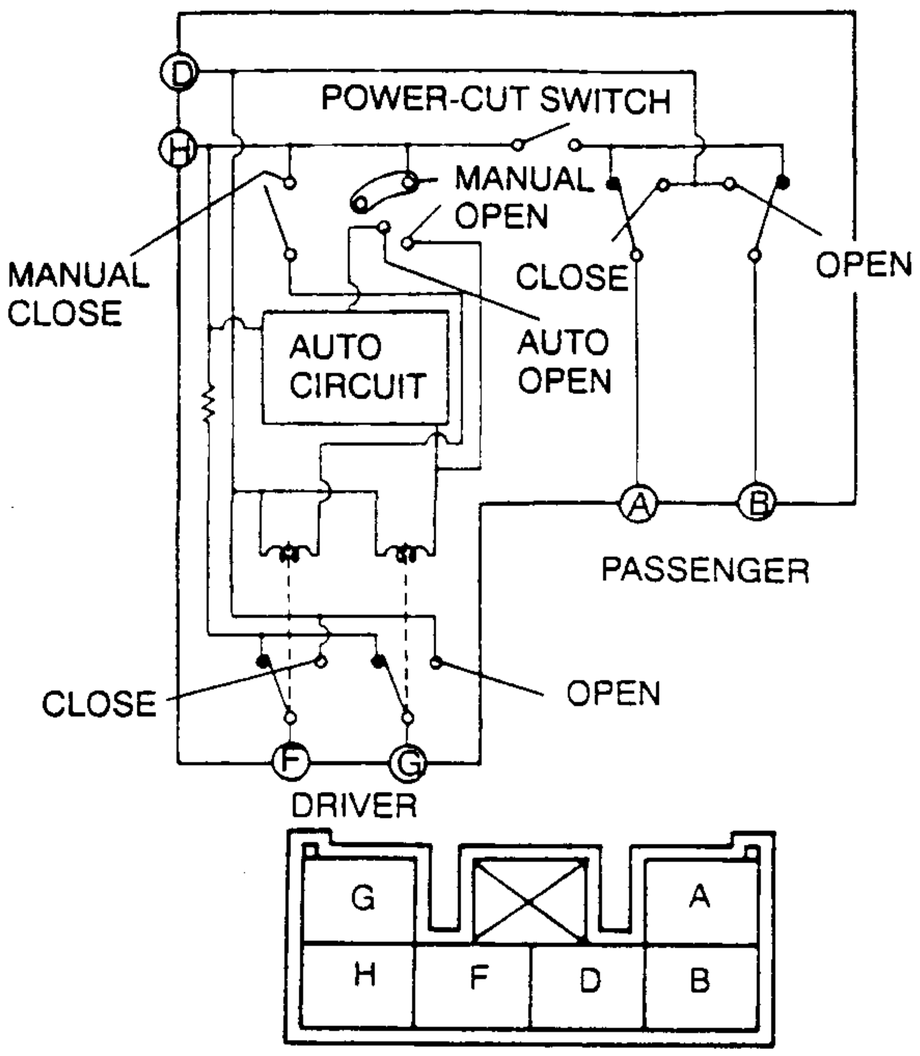
○—○ : Continuity

Power-cut switch	Switch Position		Terminal A (B)	B (A)	C (D)	D (C)	F (F)	H (H)	I (J)	J (K)	K (L)	L (I)
ON	OFF		○	○	○	○		○	○	○	○	○
	Driver	MANUAL CLOSE	○	○	○	○	○	○	○	○	○	○
		AUTO OPEN, MANUAL OPEN	○	○	○	○	○	○	○	○	○	○
	Passen-ger	CLOSE	○	○	○	○	○	○	○	○	○	○
		OPEN	○	○	○	○	○	○	○	○	○	○
	Left rear	CLOSE	○	○	○	○	○	○	○	○	○	○
		OPEN	○	○	○	○	○	○	○	○	○	○
	Right rear	CLOSE	○	○	○	○	○	○	○	○	○	○
		OPEN	○	○	○	○	○	○	○	○	○	○
OFF	OFF		○	○	○	○		○	○	○	○	○
	Driver	MANUAL CLOSE	○	○	○	○	○	○	○	○	○	○
		AUTO OPEN, MANUAL OPEN	○	○	○	○	○	○	○	○	○	○
	Passen-ger	CLOSE	○	○	○	○	○	○	○	○	○	○
		OPEN	○	○	○	○	○	○	○	○	○	○
	Left rear	CLOSE	○	○	○	○	○	○	○	○	○	○
		OPEN	○	○	○	○	○	○	○	○	○	○
	Right rear	CLOSE	○	○	○	○	○	○	○	○	○	○
		OPEN	○	○	○	○	○	○	○	○	○	○

( ) : R.H.D.

S





2 door power window system

○—○ : Continuity

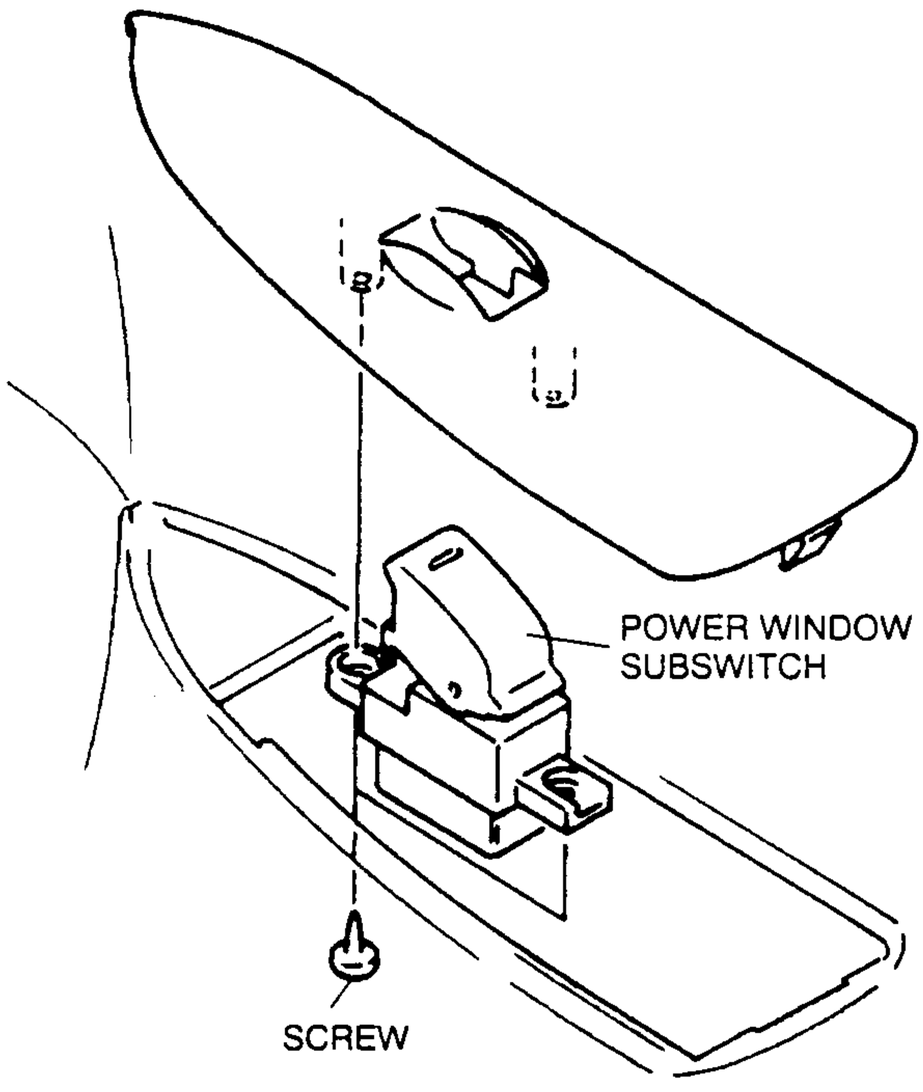
Power-cut switch	Switch Position		Terminal A	B	D	F	G	H
ON	OFF		○—○	○—○		○—○	○—○	○—○
	Driver	MANUAL CLOSE	○—○	○—○	○—○		○—○	○—○
		AUTO OPEN, MANUAL OPEN	○—○	○—○	○—○	○—○		○—○
	Pas-senger	CLOSE	○—○		○—○	○—○	○—○	○—○
		OPEN	○—○	○—○		○—○	○—○	○—○
OFF	OFF		○—○	○—○		○—○	○—○	○—○
	Driver	MANUAL CLOSE	○—○	○—○	○—○	○—○	○—○	○—○
		AUTO OPEN, MANUAL OPEN	○—○		○—○		○—○	○—○
	Pas-senger	CLOSE	○—○	○—○		○—○	○—○	○—○
		OPEN		○—○	○—○	○—○	○—○	○—○

5. If not as specified, replace the power window main switch.

POWER WINDOW SUBSWITCH REMOVAL/ INSTALLATION

Passenger Side

1. Disconnect the negative battery cable.
2. Remove the switch panel. (Refer to POWER WINDOW MAIN SWITCH REMOVAL/INSTALLATION.)
3. Remove the screws, and remove the power window subswitch.

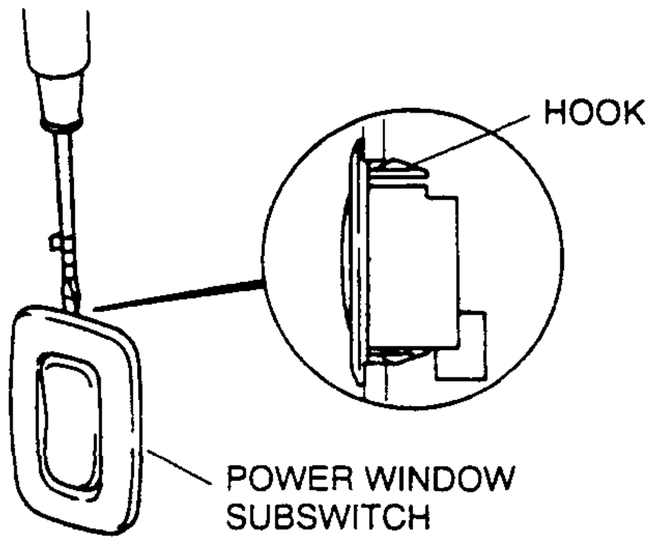


4. Install in the reverse order of removal.

Rear Side

1. Disconnect the negative battery cable.

2. Remove the hook by inserting a tape-wrapped, flathead screwdriver between the switch and the rear door trim.



3. Disconnect the connector, and remove the power window subswitch.
4. Install in the reverse order of removal.

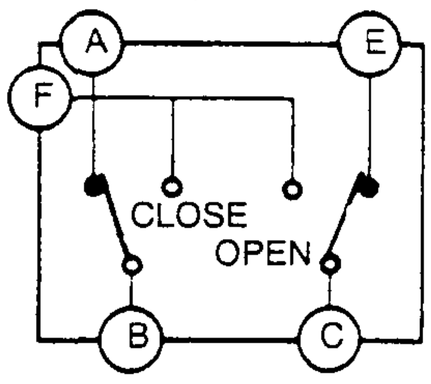
POWER WINDOW SUBSWITCH INSPECTION

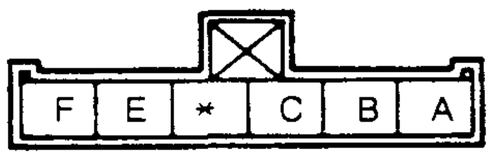
1. Remove the power window subswitch.
2. Check for continuity between the power window subswitch terminals by using an ohmmeter.

Passenger side

○—○ : Continuity

Switch Position	Terminal				
	A	B	C	E	F
CLOSE		○	○—○	○	○
OFF	○—○		○—○		
OPEN	○—○		○	○—○	○

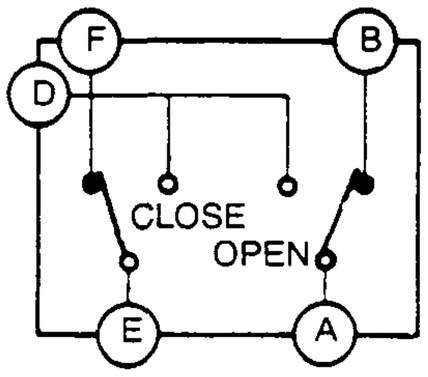


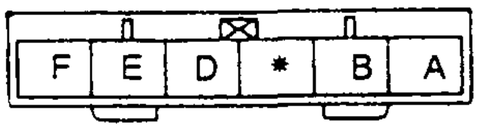


Rear side

○—○ : Continuity

Switch Position	Terminal				
	A	B	D	E	F
CLOSE	○—○		○—○		
OFF	○—○			○—○	
OPEN	○		○	○—○	





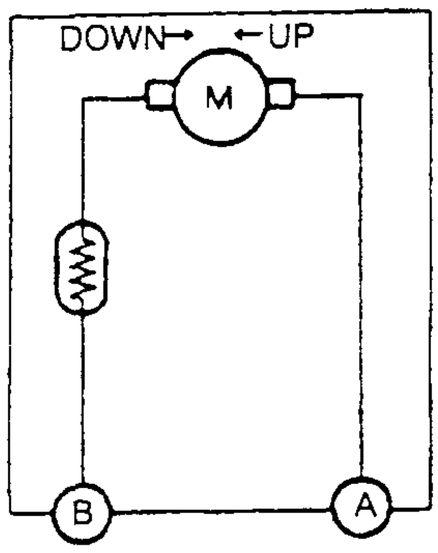
3. If not as specified, replace the power window subswitch.

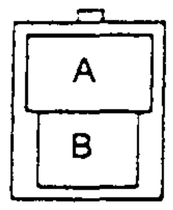
POWER WINDOW REGULATOR INSPECTION

1. Remove the power window regulator.
2. Apply battery positive voltage to the power window regulator terminals and check the operation of the power window regulator.

B+: Battery positive voltage

Connection		Regulator operation
B+	GND	
A	B	UP
B	A	DOWN

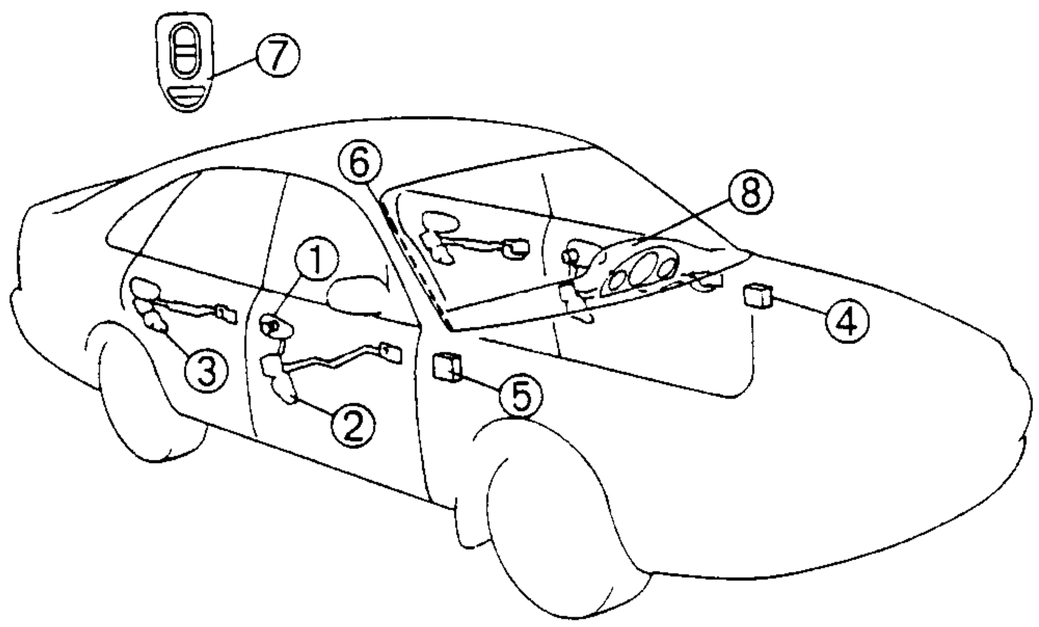




3. If not as specified, replace the power window regulator.

POWER DOOR LOCK SYSTEM

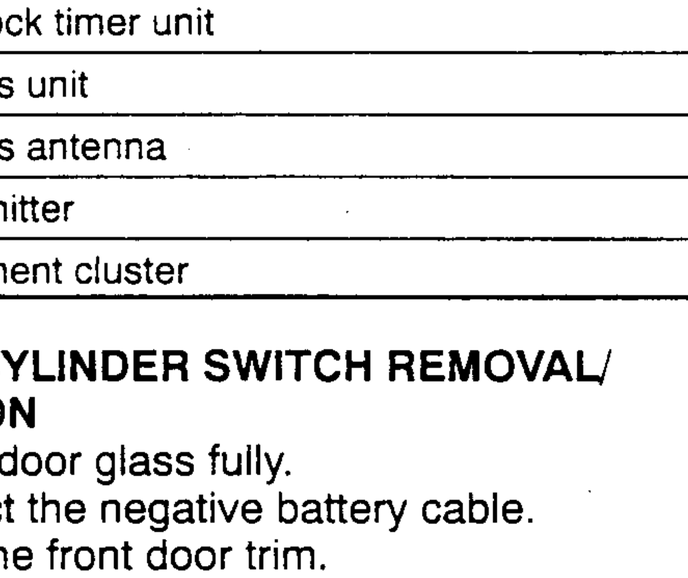
STRUCTURAL VIEW



1	Door key cylinder switch
2	Front door lock actuator
3	Rear door lock actuator
4	Door lock timer unit
5	Keyless unit
6	Keyless antenna
7	Transmitter
8	Instrument cluster

DOOR KEY CYLINDER SWITCH REMOVAL/ INSTALLATION

1. Raise the door glass fully.
2. Disconnect the negative battery cable.
3. Remove the front door trim.
4. Remove the door screen.
5. Release the outer handle and the door key cylinder installation rod.
6. Disconnect the door key cylinder switch connector.
7. Remove the outer handle.
8. Remove the door key cylinder switch.



9. Install in the reverse order of removal.

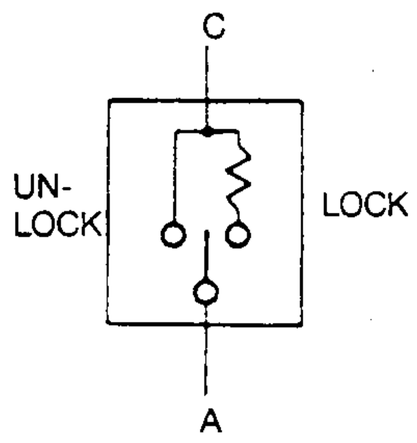
DOOR KEY CYLINDER SWITCH INSPECTION

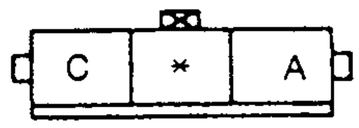
1. Raise the door glass fully.
2. Disconnect the negative battery cable.
3. Remove the front door trim.
4. Remove the door screen.
5. Disconnect the door key cylinder switch connector.
6. Check for continuity between the door key cylinder switch terminals by using an ohmmeter.

○—○ : Continuity ○-WW-○ : Resistance

Key cylinder position	Terminal	
	A	C
Neutral		
Lock	○-WW-○	R
Unlock	○——○	

R: 950—1050 Ω





7. If not as specified, replace the door key cylinder switch.

DOOR LOCK-LINK SWITCH INSPECTION

- (Refer to section T, THEFT-DETERRENT SYSTEM, DOOR LOCK-LINK SWITCH INSPECTION.)

POWER DOOR LOCK SYSTEM

FRONT DOOR LOCK ACTUATOR INSPECTION

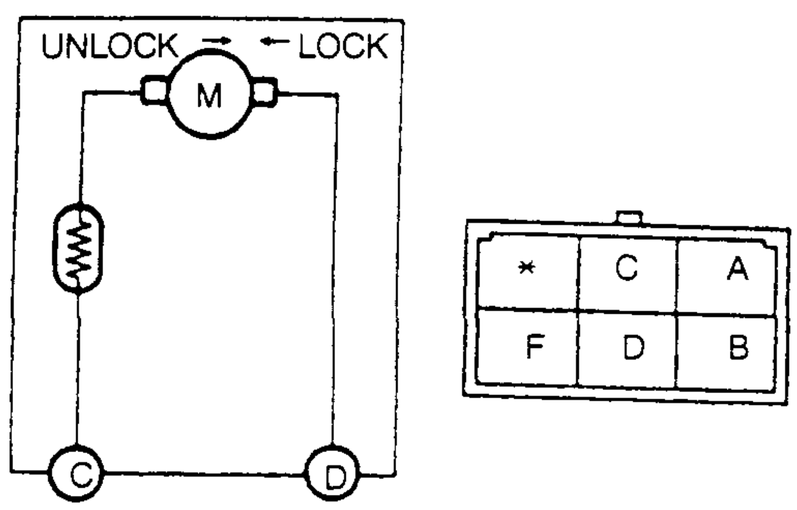
Note
- The front door lock actuator is together with the front door lock.

1. Disconnect the negative battery cable.
2. Remove the front door trim.
3. Remove the door screen.
4. Disconnect the front door lock actuator connector.
5. Apply battery positive voltage to the front door lock actuator terminals and check the operation of the front door lock actuator.

Without double locking system

B+: Battery positive voltage

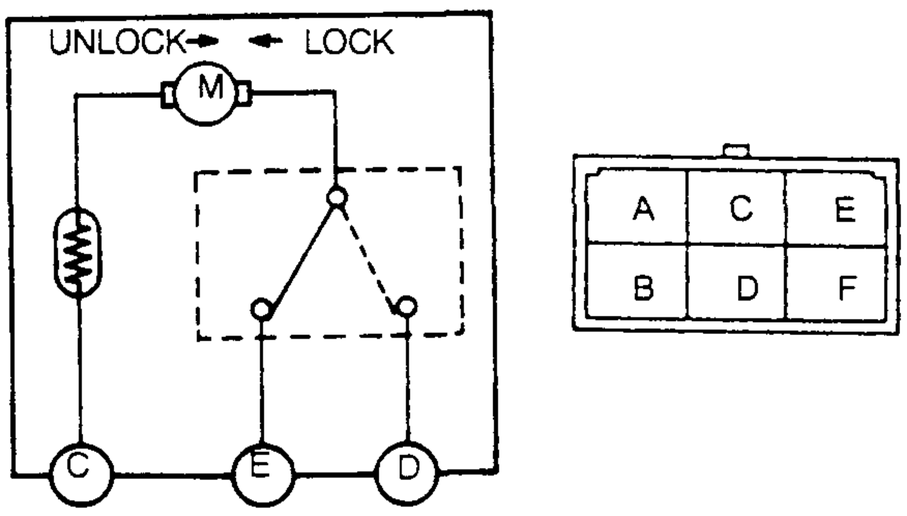
Connection		Actuator operation
B+	GND	
D	C	Lock
C	D	Unlock



With double locking system

B+: Battery positive voltage

Connection		Actuator operation
B+	GND	
D	C and E	Lock
D and E	C	Double lock
C	D and E	Unlock



6. If not as specified, replace the front door lock.

REAR DOOR LOCK ACTUATOR INSPECTION

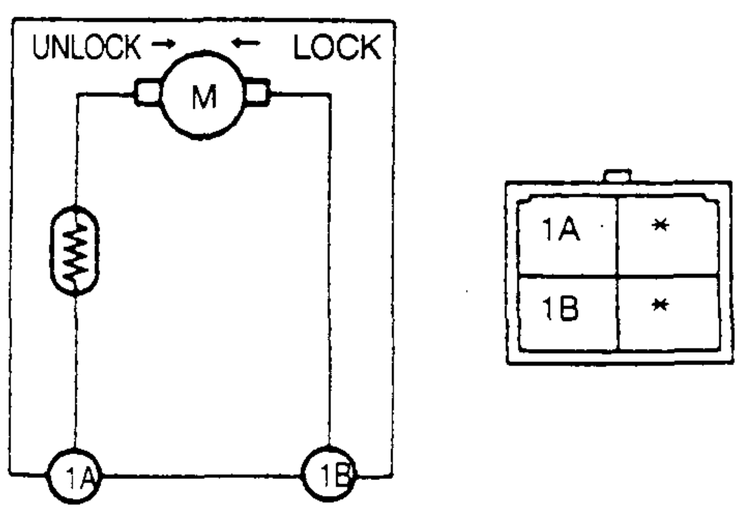
Note
- The rear door lock actuator is together with the rear door lock.

1. Disconnect the negative battery cable.
2. Remove the rear door trim.
3. Remove the door screen.
4. Disconnect the rear door lock actuator connector.
5. Apply battery positive voltage to the rear door lock actuator terminals and check the operation of the rear door lock actuator.

Without double locking system

B+: Battery positive voltage

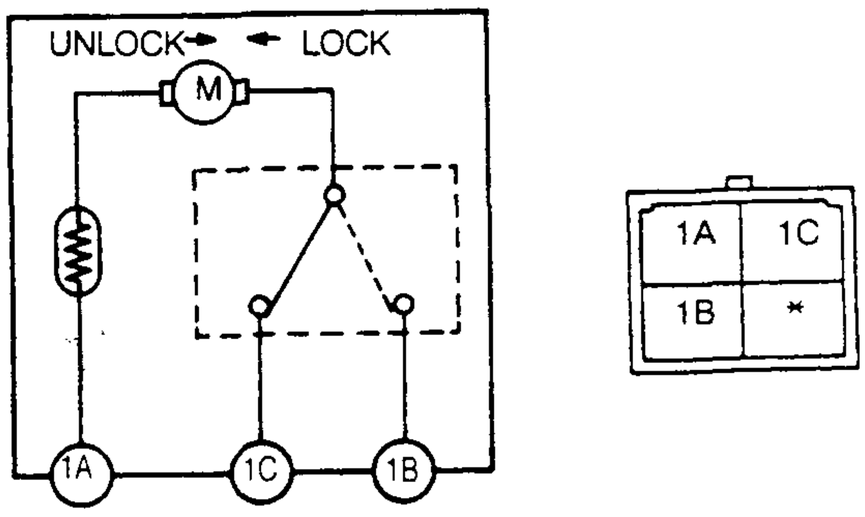
Connection		Actuator operation
B+	GND	
1B	1A	Lock
1A	1B	Unlock



With double locking system

B+: Battery positive voltage

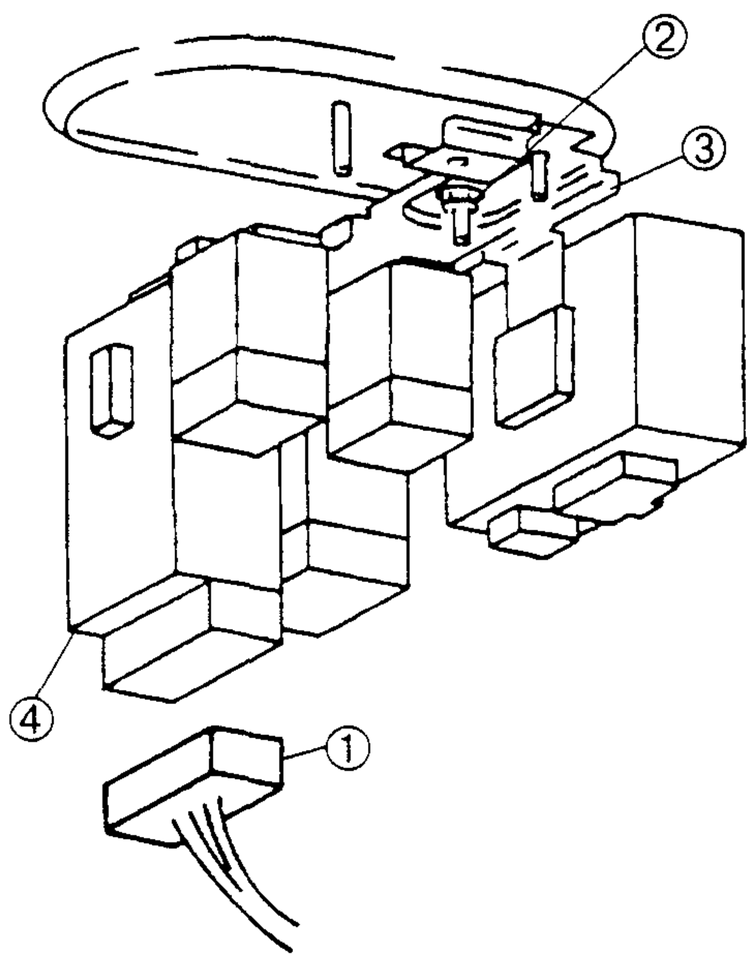
Connection		Actuator operation
B+	GND	
1B	1A and 1C	Lock
1C and 1B	1A	Double lock
1A	1B and 1C	Unlock



6. If not as specified, replace the rear door lock.

DOOR LOCK TIMER UNIT REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the lower panel.
3. Remove the theft-deterrent control module. (Refer to section T, THEFT-DETTERENT SYSTEM, THEFT-DETERRENT CONTROL MODULE REMOVAL/INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.



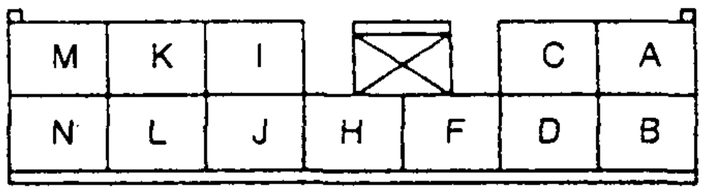
1	Connector
2	Nut
3	Bracket
4	Door lock timer unit

DOOR LOCK TIMER UNIT INSPECTION

1. Remove the lower panel.
2. Measure the voltage at the door lock timer unit terminals as indicated below.
3. Disconnect the door lock timer unit connector before checking for continuity at terminals M and N.
4. If not as specified, inspect the parts listed under "Inspection area" and the related wiring harnesses.
5. If the parts and wiring harnesses are okay but the system still does not work properly, replace the door lock timer unit.

Terminal Voltage List (Reference)

B+: Battery positive voltage

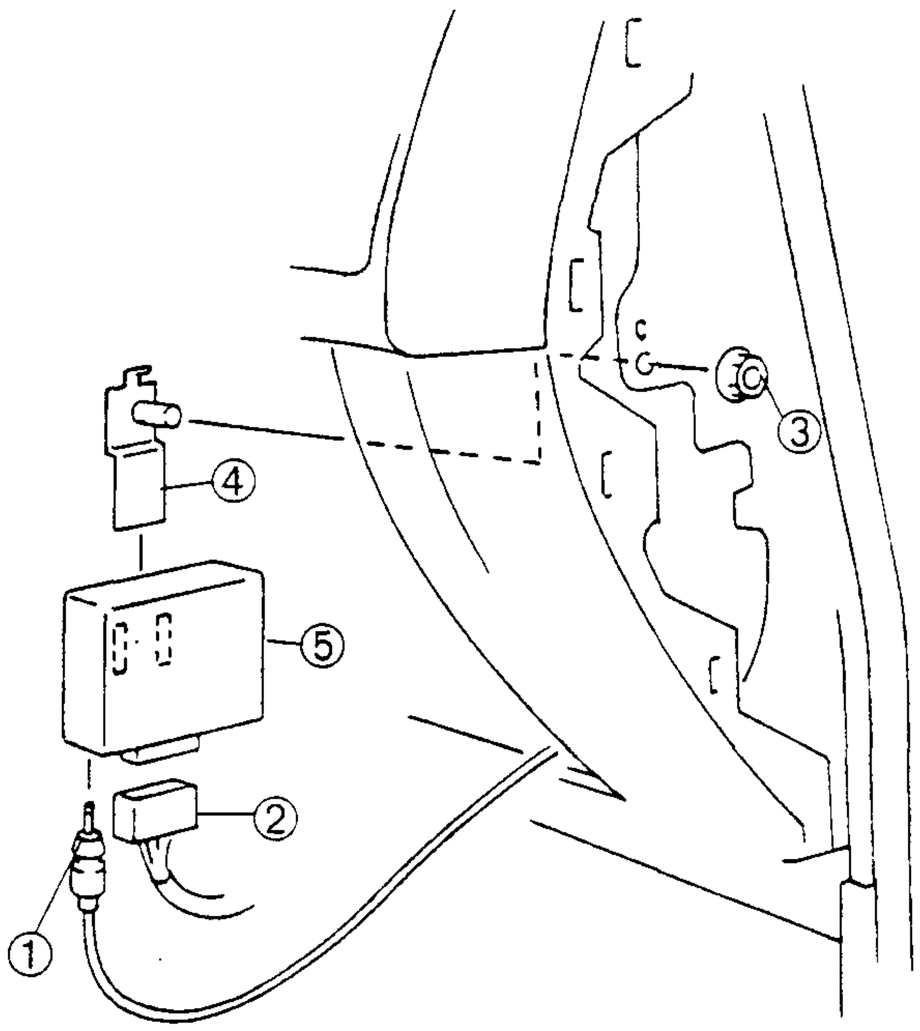


Terminal	Signal	Connection	Test condition	Voltage (V)/ Continuity	Inspection area
A	+B	DOOR LOCK 30 A fuse	Constant	B+	DOOR LOCK 30 A fuse
B	Double lock output (with double locking system)	Door lock actuator	Door lock actuator double locked	B+→0→B+	Door lock actuator
			Other	B+	
C	Unlock output	Door lock actuator	Door lock actuator unlocked	B+→0→B+	Door lock actuator
			Other	B+	
D	Lock output	Door lock actuator	Door lock actuator locked	B+→0→B+	Door lock actuator
			Other	B+	

Terminal	Signal	Connection	Test condition	Voltage (V) / Continuity	Inspection area
F	Lock/Unlock input	• Door key cylinder switch • Keyless unit	Key cylinder had been locked	2.5	Door key cylinder switch
			Key cylinder had been unlocked	5	
			Key cylinder at neutral position	0	
			Transmitter lock button pressed	2.5	• Keyless unit • Transmitter
			Transmitter unlock button pressed	5	
H	Security light output (with double locking system)	Instrument cluster	Double locking system oparated	0	Instrument cluster
			Other	B+	
I	IG 1 (with double locking system)	METER 15A fuse	Ignition switch at ON	B+	• METER 15 A fuse • Ignition switch
			Ignition switch at LOCK or ACC	0	
J	Key reminder switch (with double locking system)	Key reminder switch	Key reminder switch at on	B+	Key reminder switch
			Other	0	
K	Lock input	Door lock-link switch	Driver's side door locked	0	Door lock-link switch
			Driver's side door unlocked	B+	
L	Unlock input	Door lock-link switch	Driver's side door locked	B+	Door lock-link switch
			Driver's side door unlocked	0	
M	Signal ground (with double locking system)	GND	Constant: check for continuity to ground	Yes	—
N	Door lock timer unit ground	GND	Constant: check for continuity to ground	Yes	—

KEYLESS UNIT REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the passenger's side side panel.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



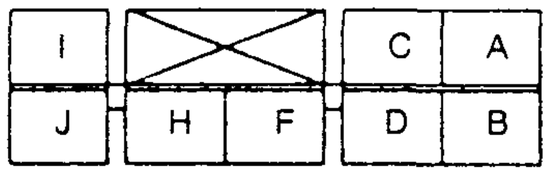
1	Antenna jack
2	Connector
3	Nut
4	Bracket
5	Keyless unit

KEYLESS UNIT INSPECTION

1. Remove the passenger's side side panel.
2. Measure the voltage at the keyless unit terminals as indicated below.
3. Disconnect the keyless unit connector before checking for continuity at terminals C and F.
4. If not as specified, inspect the parts listed under "Inspection area" and the related wiring harnesses.
5. If the parts and wiring harnesses are okay but the system still does not work properly, replace the keyless unit.

Terminal Voltage List (Reference)

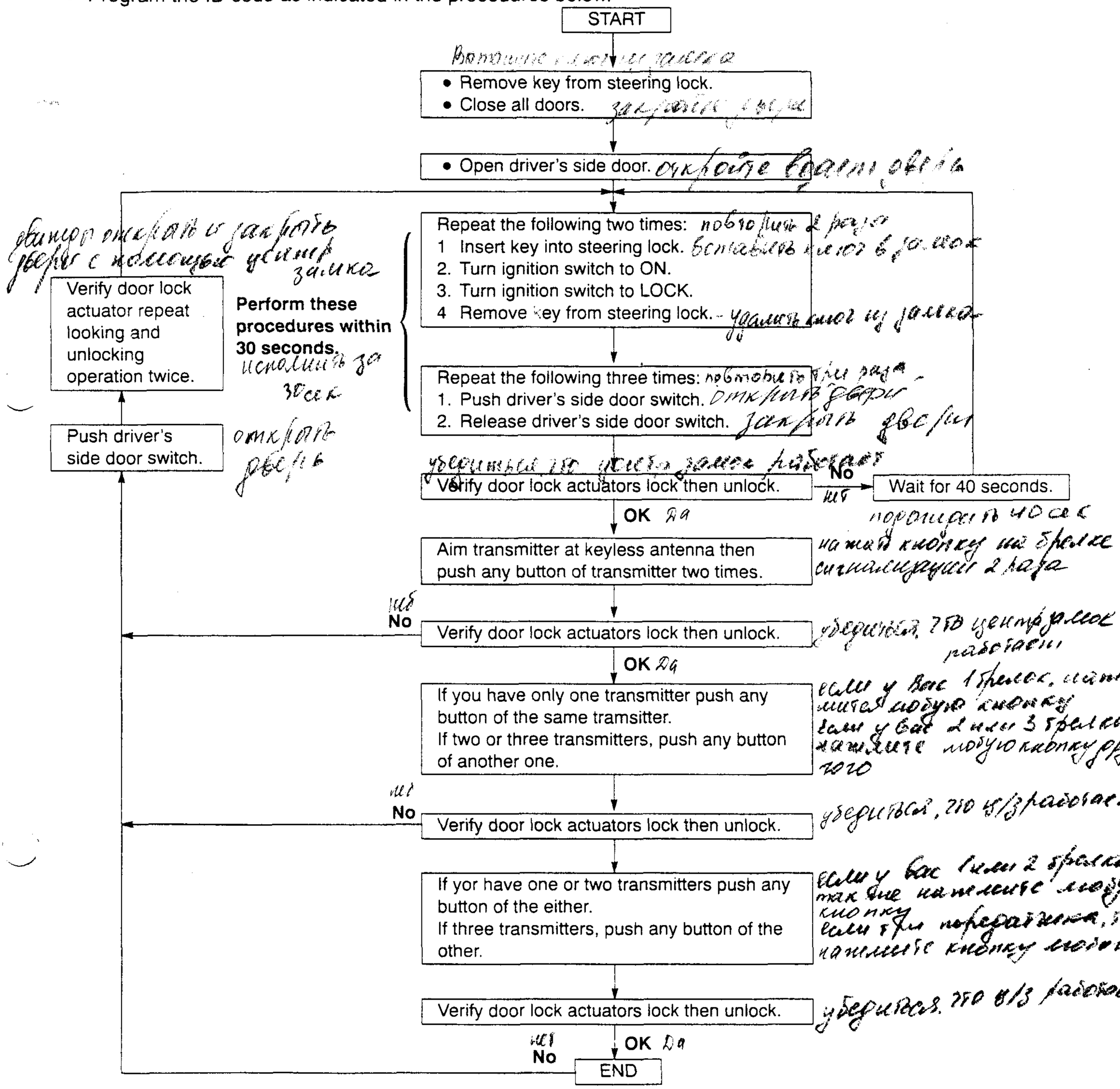
B+: Battery positive voltage



Terminal	Signal	Connection	Test condition		Voltage (V)/ Continuity	Inspection area
A	IG 1	METER 15 A fuse	Ignition switch at ON		B+	METER 15 A fuse
			Ignition switch at LOCK or ACC		0	
B	+B	ROOM 15 A fuse	Constant		B+	ROOM 15 A fuse
C	Door open / closed	Door switch	Check for continuity to ground	Any door open	Yes	Door switch
				All doors closed	No	
D	—	Not used	—		—	—
F	Keyless unit ground	GND	Constant : check for continuity to ground		Yes	—
H	—	Not used	—		—	—
I	—	Not used	—		—	—
J	Lock/unlock output	Door lock timer unit	Just when door lock is unlocked		B+→0→B+	Door lock timer unit
			Just when door lock is locked		B+→6→B+	
			Other		B+	

KEYLESS UNIT ID CODE CHANGE

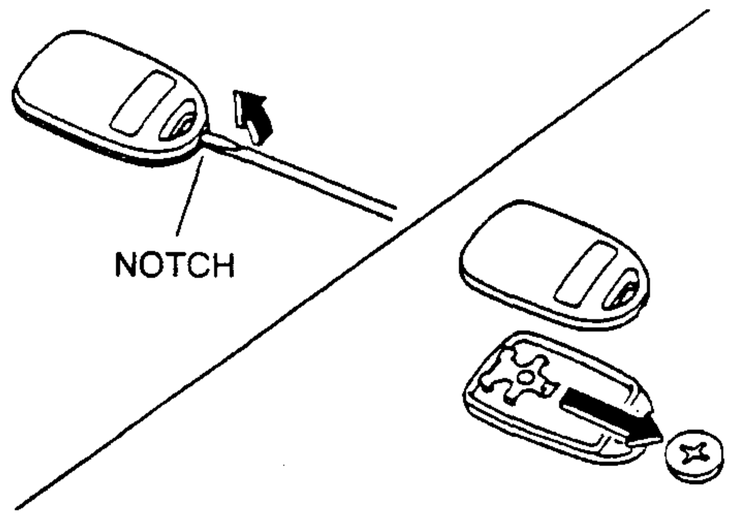
- When programming the ID code into a transmitter, verify that other transmitters are not being operated in the vicinity.
- Program the ID code as indicated in the procedures below.



TRANSMITTER BATTERY REPLACEMENT

1. Insert a flathead screwdriver into the notch of the transmitter.
2. Remove the cover by using the flathead screwdriver as shown.
3. Install the new batteries with the positive side facing up.

Battery specification:
Lithium CR 2025 × 1



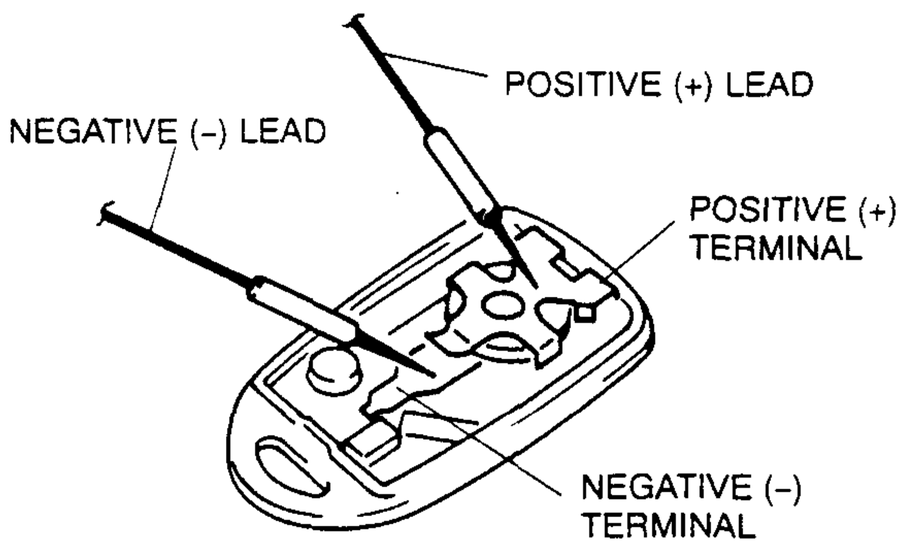
4. Install the cover.

Note
- The batteries will last about **2 years** when used **10 times** a day.

TRANSMITTER BATTERY INSPECTION

Note
- If the battery is not subject to load it cannot be properly inspected.
- Because there is a surge of voltage when the transmitter button is first pushed, be sure to push the button **at least 10 times** before inspecting.
- Since a correct measurement cannot be obtained if the battery temperature is **under 18 °C {64 °F }**, make sure the battery has been at **18 °C {64 °F } or more** for **at least 30 minutes** before inspecting.
- There is an auto power off function in the transmitter, so be sure to read the voltage **within 0.5 seconds** after pushing the button.
- If the transmitter is malfunctioning, the battery cannot be properly inspected.

1. Remove the transmitter cover.
2. Connect the positive (+) lead of the voltmeter to the positive (+) terminal of the transmitter and negative (–) lead to the negative (–) terminal.



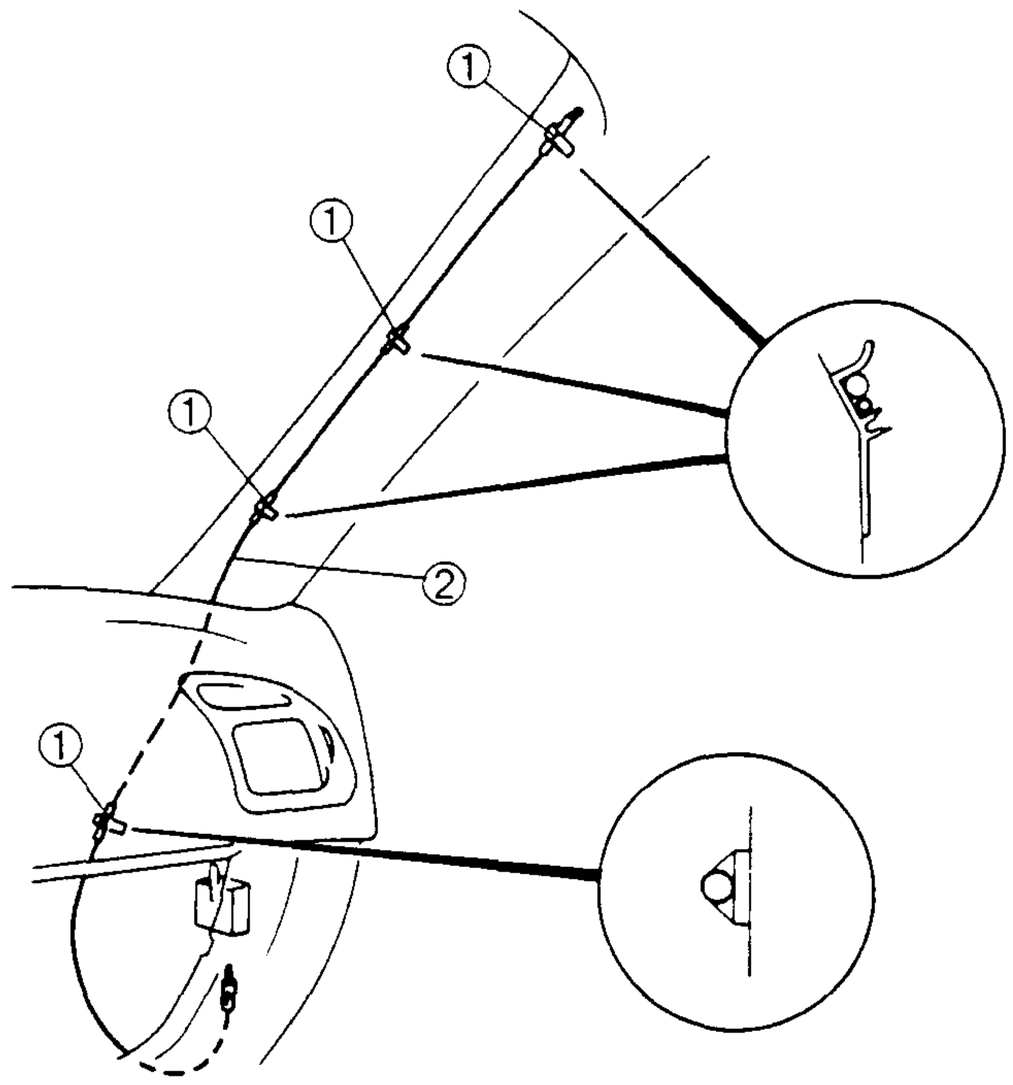
3. Push any button of transmitter **10 times or more** for **about a second** per each time then read the voltage **within 0.5 seconds** after pushing the button a final time..
4. Push any button of transmitter again and measure the voltage.

Standard voltage
2.8 V or more

5. If not as specified, inspect the transmitter.

KEYLESS ANTENNA REMOVAL/INSTALLATION

1. Disconnect negative battery cable.
2. Remove the passenger's side A-pillar trim.
3. Remove the glove compartment.
4. Disconnect the antenna jack.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.



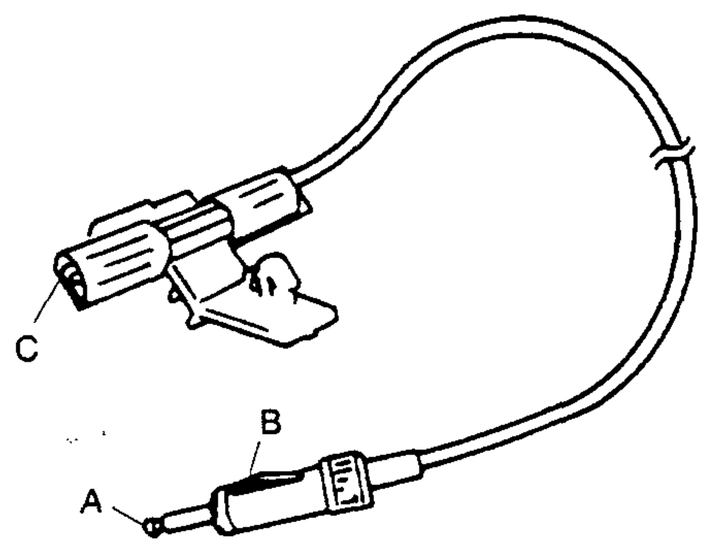
1	Clip
2	Keyless antenna

KEYLESS ANTENNA INSPECTION

1. Disconnect negative battery cable.
2. Remove the passenger's side A-pillar trim.
3. Disconnect the antenna jack.
4. Verify that there is no continuity between antenna terminals A and B by using an ohmmeter.
5. Check for continuity between the antenna terminals by using an ohmmeter.

○—○ : Continuity

Test condition	Terminal	
	A	C
Constant	○	○



6. If not as specified replace the keyless antenna.

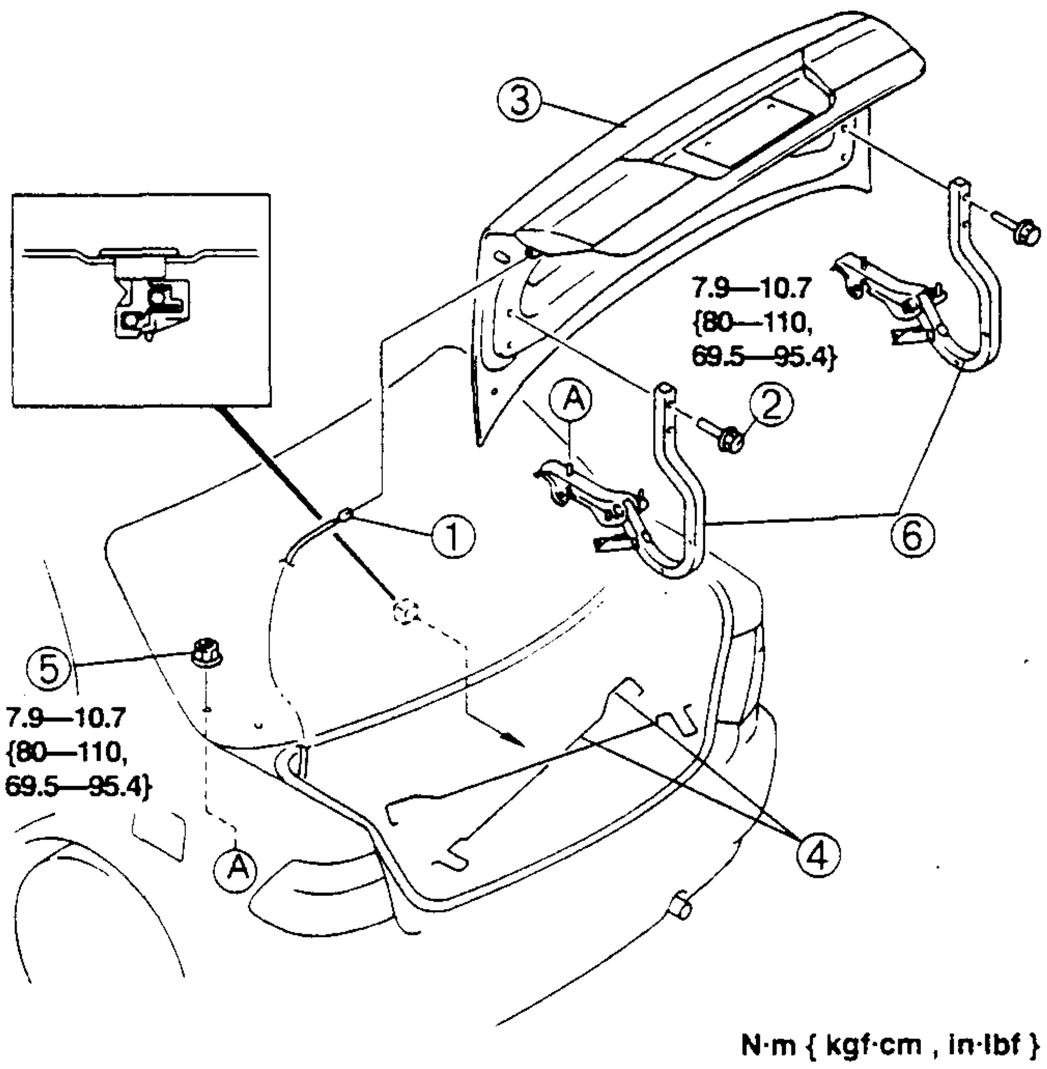
TRUNK LID

TRUNK LID REMOVAL/INSTALLATION

Warning

- **Removing the balance spring without supporting the trunk lid can be dangerous. The trunk lid may fall and injure you. Open the trunk lid fully and support it before removing the balance spring. Perform these procedures together with another person.**

1. Disconnect the negative battery cable.
2. To remove the trunk lid hinge, remove the rear package trim. (Refer to TRIM, REAR PACKAGE TRIM REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Adjust the trunk lid. (Refer to TRUNK LID ADJUSTMENT.)



N·m { kgf·cm , in·lbf }

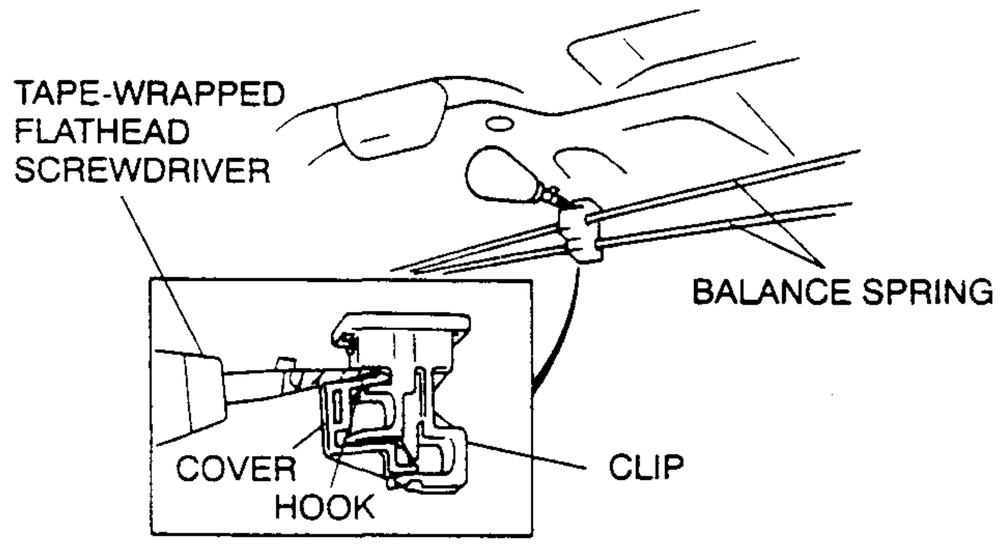
1	Connector
2	Bolt
3	Trunk lid
4	Balance spring ☞ Removal Note
5	Nut
6	Trunk lid hinge

Balance Spring Removal Note

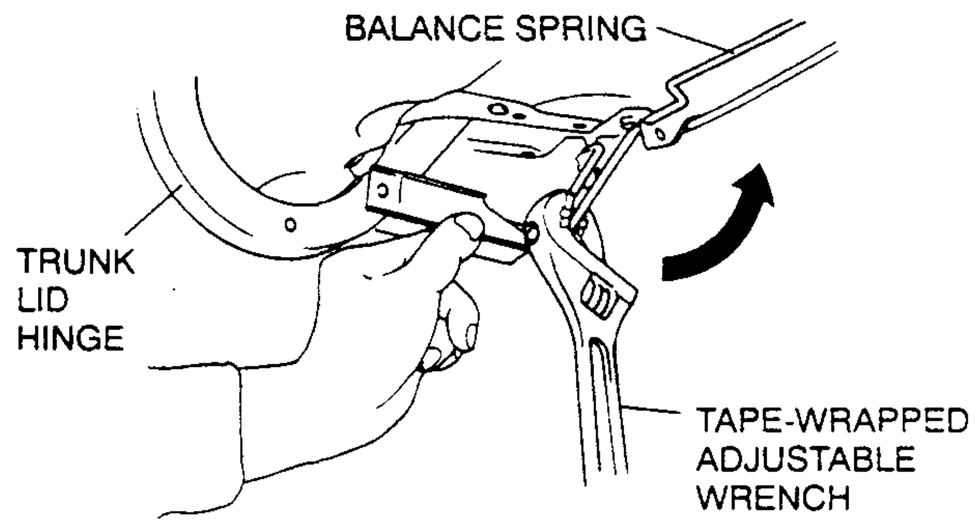
Note

- The balance springs are under high tension.

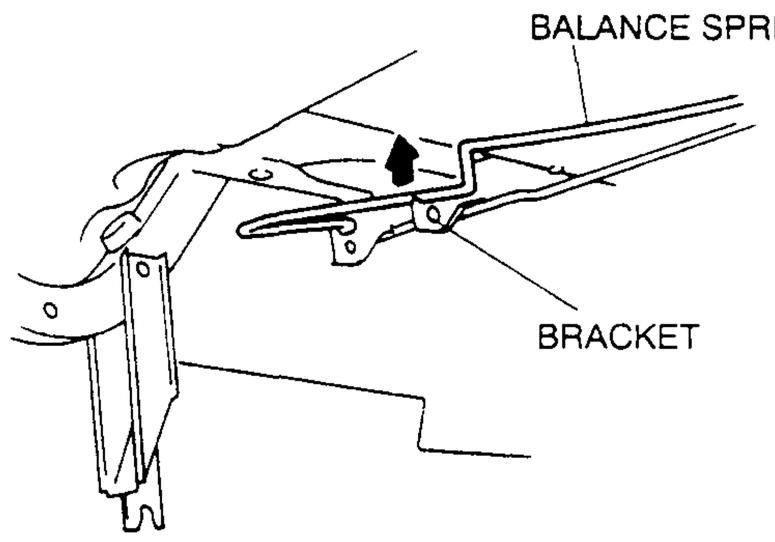
1. Push the hook of the clip to open the cover by using a tape-wrapped flathead screwdriver.
2. Remove the balance springs from the clip.



3. Remove the balance spring from the trunk lid hinge by using a tape-wrapped adjustable wrench.



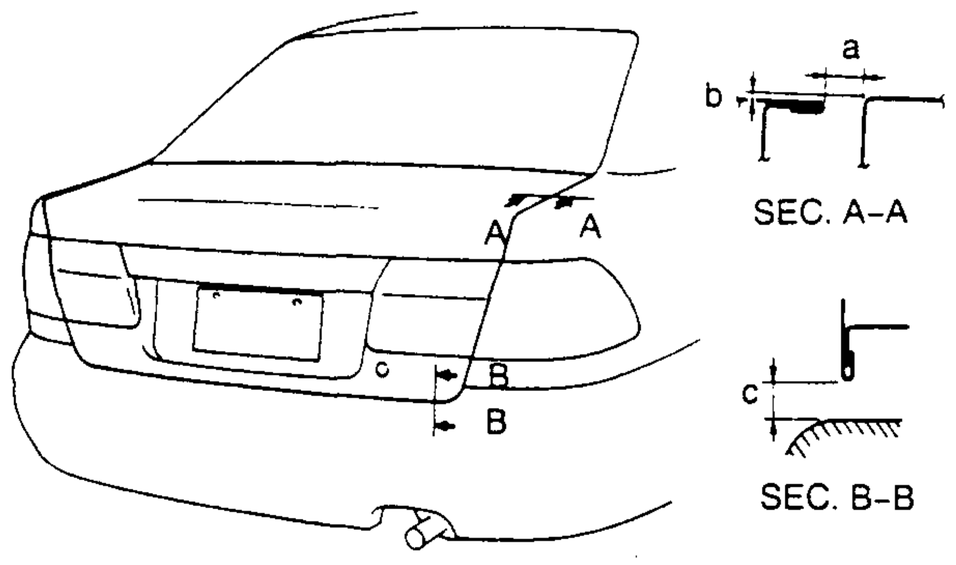
4. Remove the balance spring from the bracket.



TRUNK LID ADJUSTMENT

1. Remove the trunk lid striker.
2. Measure the gap and height between the trunk lid and the body.

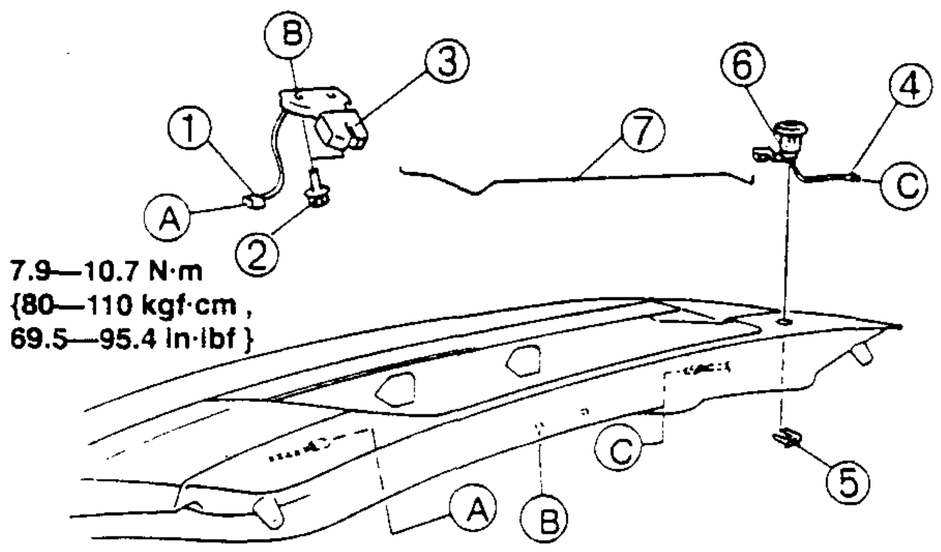
Clearance	Standard mm { in }	Minimum mm { in }	Maximum mm { in }
a	4.0 {0.16}	3.0 {0.12}	5.0 {0.19}
b	0.5 {0.02}	−0.5 {−0.01}	1.5 {0.05}
c	8.0 {0.31}	5.5 {0.22}	10.5 {0.41}



3. Hand-tighten the trunk lid striker installation bolts.
4. If not as specified, loosen the trunk lid hinge installation nuts and trunk lid striker installation bolts, and reposition the trunk lid.
5. Tighten the bolts and nuts.
6. Adjust the trunk lid striker. (Refer to TRUNK LID STRIKER ADJUSTMENT.)

TRUNK LID LOCK REMOVAL/INSTALLATION

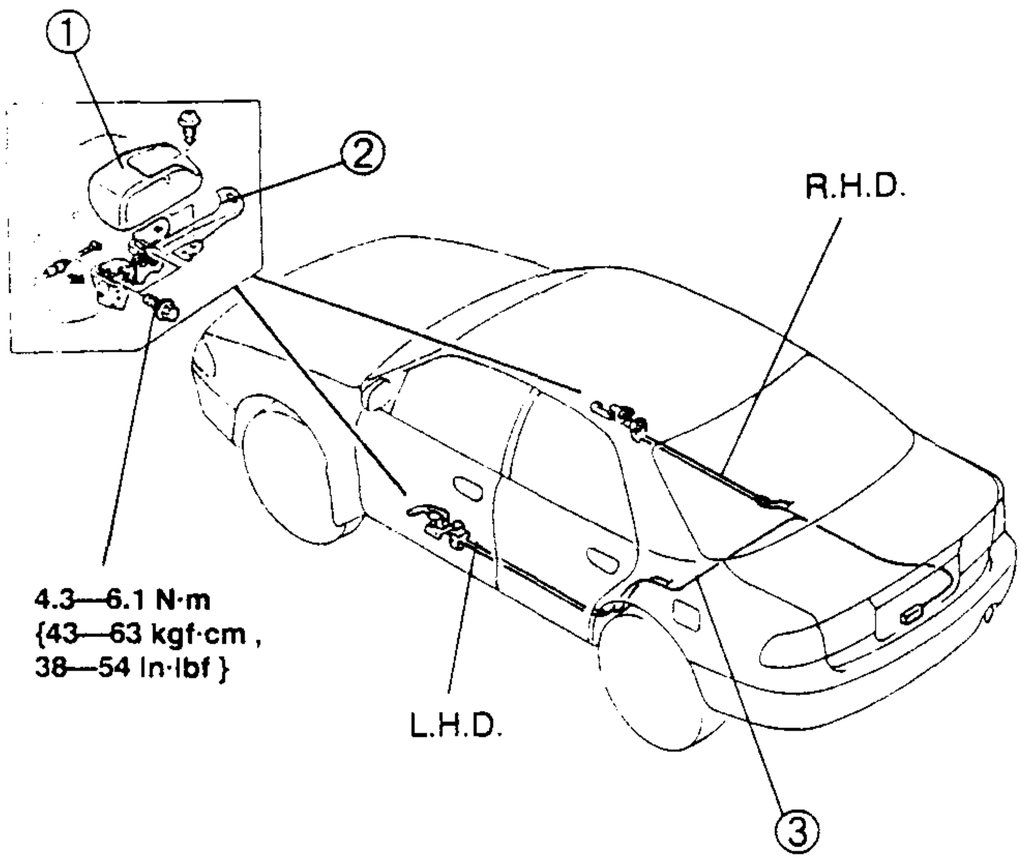
1. Disconnect the negative battery cable.
2. Remove the trunk lid trim.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



1	Connector A
2	Bolt
3	Trunk lid lock
4	Connector B
5	Trunk lid lock cylinder retainer
6	Trunk lid lock cylinder
7	Rod

TRUNK LID OPENER REMOVAL/INSTALLATION

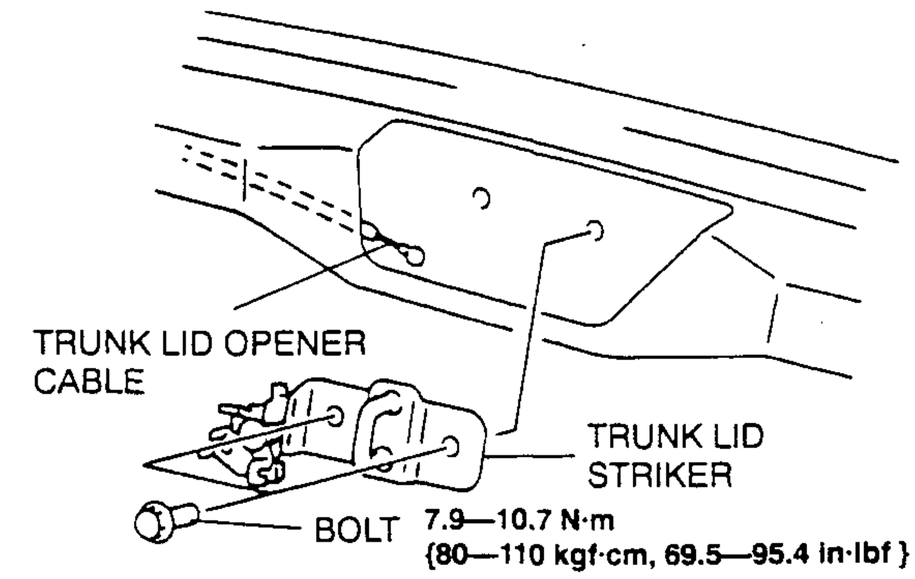
1. To remove the trunk lid opener cable, remove the driver's side front seat, driver's side front and rear scuff plate, driver's side B- pillar lower trim, driver's side front seat belt lower anchor, left (L.H.D.) or right (R.H.D.) side trunk side trim, and trunk end trim, and then turn over the front floor covering. (Refer to SEAT, FRONT SEAT REMOVAL/INSTALLATION.) (Refer to TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) (Refer to TRIM, TRUNK SIDE TRIM REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Cover
2	Trunk lid opener lever
3	Trunk lid opener cable

TRUNK LID STRIKER REMOVAL/INSTALLATION

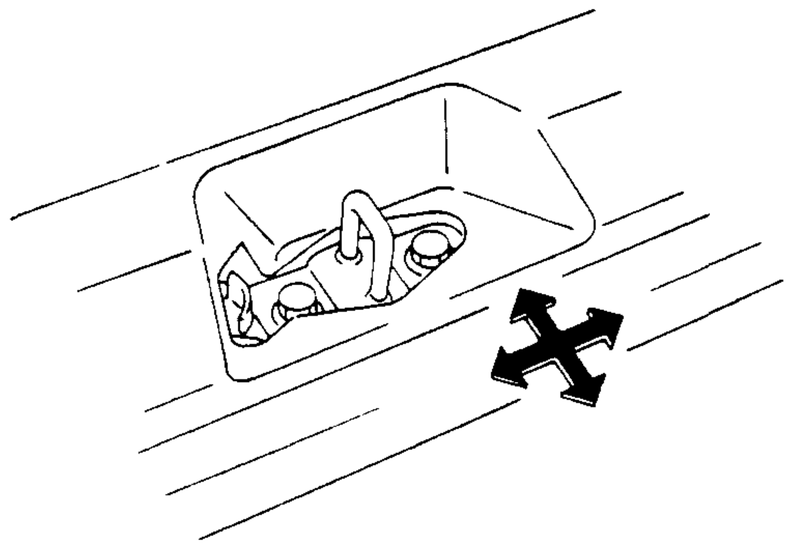
1. Remove the trunk end trim. (Refer to TRIM, TRUNK END TRIM REMOVAL/INSTALLATION.)
2. Remove the trunk lid opener cable from the trunk lid striker.
3. Remove the bolts, and remove the striker.



4. Install in the reverse order of removal.
5. Adjust the trunk lid striker. (Refer to TRUNK LID STRIKER ADJUSTMENT.)

TRUNK LID STRIKER ADJUSTMENT

1. Verify that the trunk lid can be closed easily and that there is no looseness.
2. If not correct, loosen the trunk lid striker installation bolts and align the striker with the trunk lid lock.



3. Tighten the trunk lid striker installation bolts.

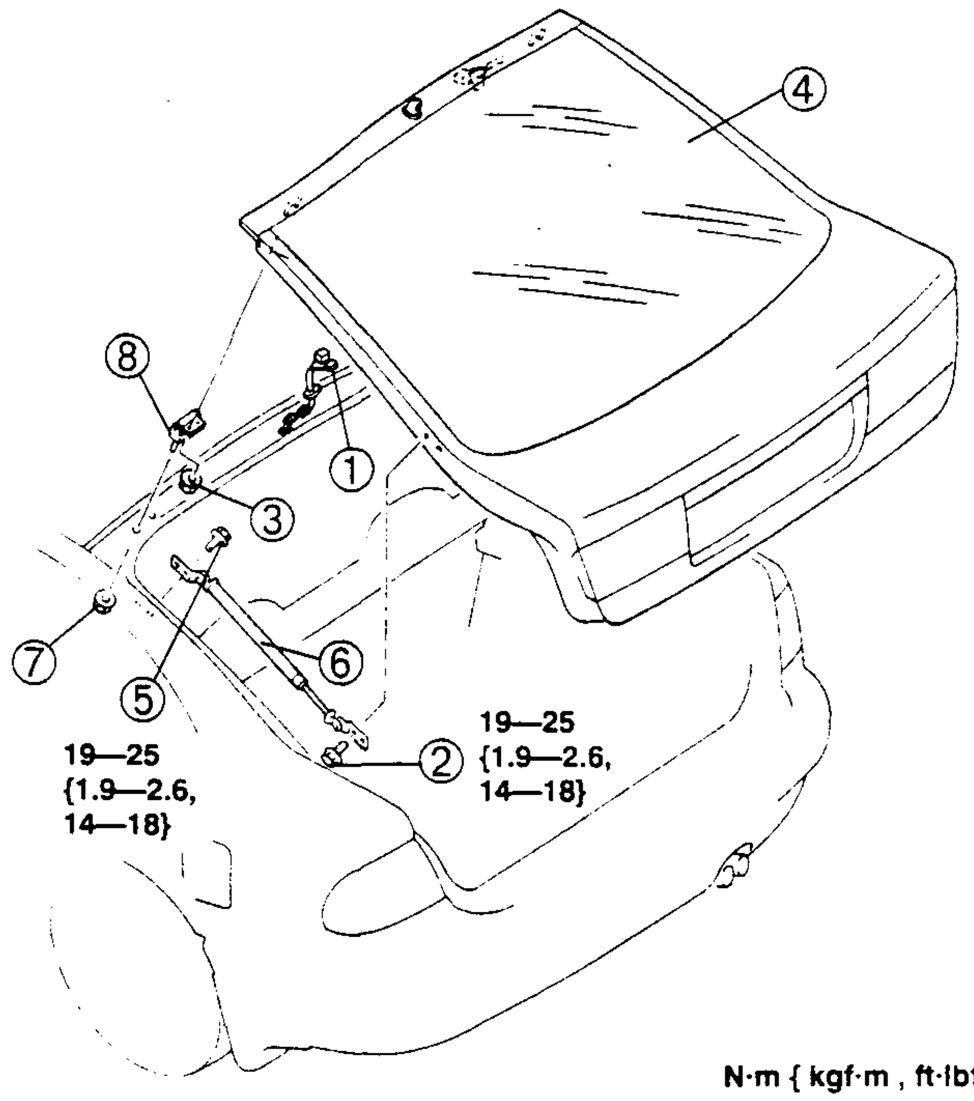
LIFTGATE

LIFTGATE REMOVAL/INSTALLATION

Warning

- **Removing the stay damper without supporting the liftgate can be dangerous. The liftgate may fall and injure you. Open the liftgate fully and support it before removing the stay damper. Perform these procedures together with another person.**

1. Disconnect the negative battery cable.
2. To disconnect the connector, remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
3. To remove the liftgate hinge, remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Adjust the liftgate. (Refer to LIFTGATE ADJUSTMENT.)



N·m { kgf·m , ft·lbf }

1	Connector
2	Bolt A
3	Nut A
4	Liftgate
5	Bolt B
6	Stay damper
7	Nut B
8	Liftgate hinge

STAY DAMPER DISPOSAL

Warning

- **Sawing through the stay damper body can cause metal shavings and filings to fly out, causing injury to the eyes. Wear protective eye wear whenever sawing through a stay damper before discarding it.**

Note

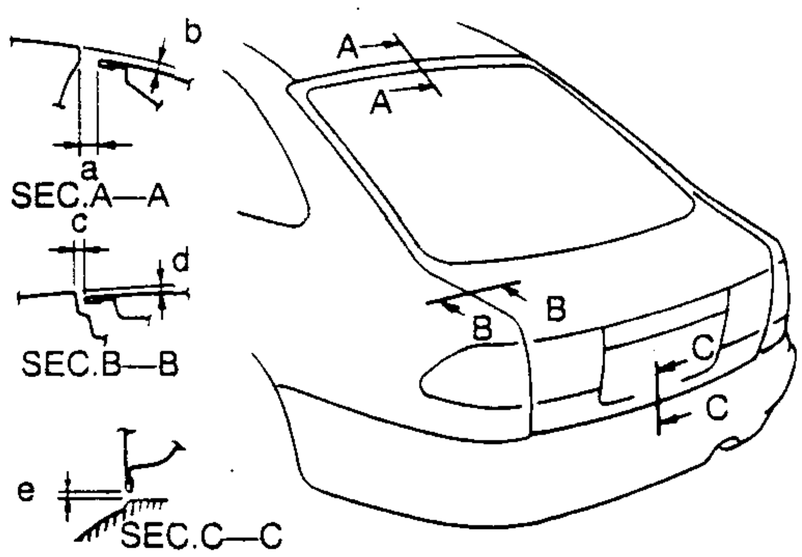
- The gas in the stay damper is colorless, odorless, and non-toxic.

1. Wear protective eye wear.
2. Lay the stay damper flat.
3. Saw through the stay damper body by using a hacksaw.
4. Allow the gas to escape from the stay damper.
5. Discard the stay damper.

LIFTGATE ADJUSTMENT

1. Remove the liftgate striker.
2. Measure the gap and height between the liftgate and the body.

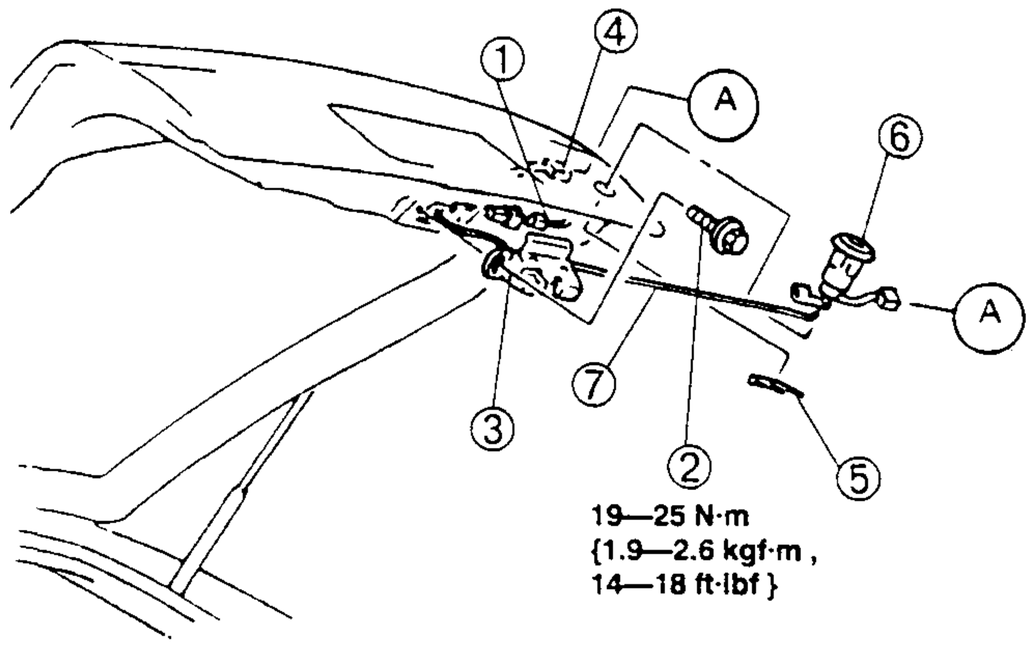
Clearance	Standard mm { in }	Minimum mm { in }	Maximum mm { in }
a	8.7 {0.34}	7.7 {0.31}	9.7 {0.38}
b	1.1 {0.04}	0.1 {0.004}	2.1 {0.08}
c	5.0 {0.20}	3.5 {0.14}	6.5 {0.25}
d	0.5 {0.02}	-0.5 {-0.01}	1.5 {0.05}
e	8.5 {0.33}	7.0 {0.28}	10.0 {0.39}



3. Hand-tighten the liftgate striker installation bolts.
4. If not as specified, loosen the liftgate hinge installation nuts and liftgate striker installation bolts, and reposition the liftgate.
5. Tighten the bolts and nuts.
6. Adjust the liftgate striker. (Refer to LIFTGATE STRIKER ADJUSTMENT.)

LIFTGATE LOCK REMOVAL/INSTALLATION

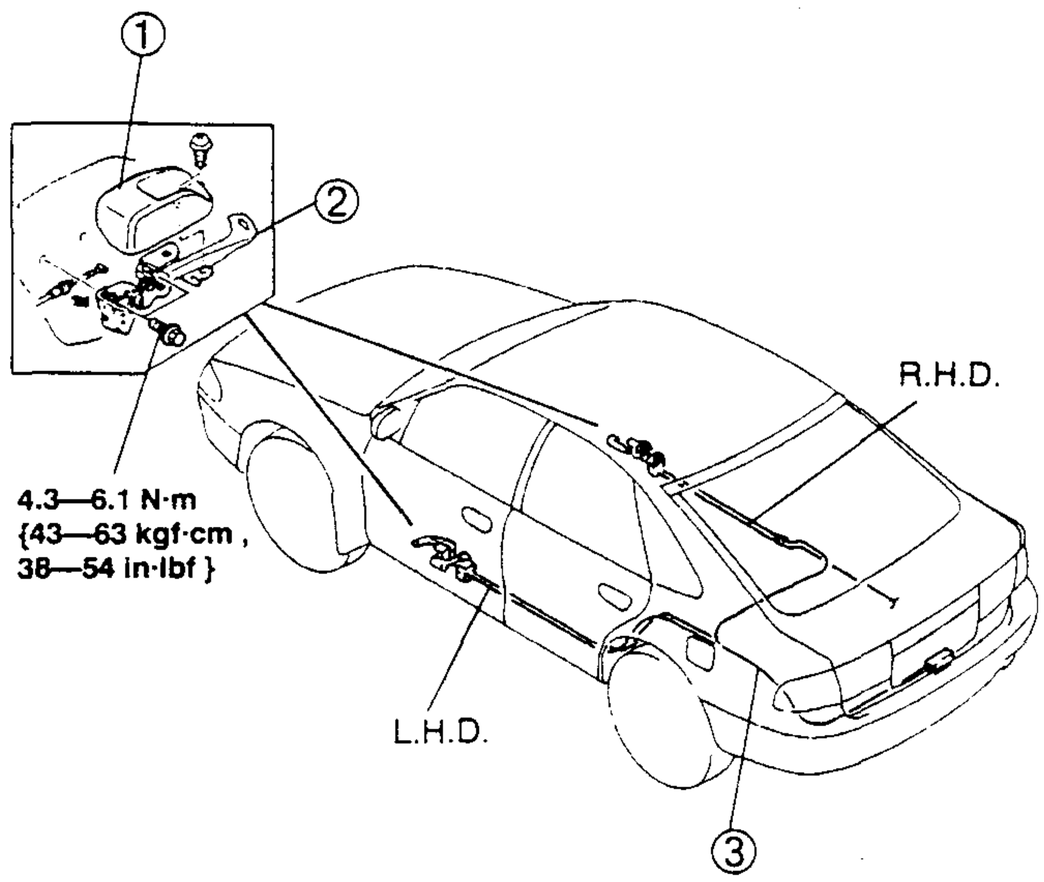
1. Disconnect the negative battery cable.
2. Remove the liftgate lower trim.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



1	Connector A
2	Bolt
3	Liftgate lock
4	Connector B
5	Liftgate lock cylinder retainer
6	Liftgate lock cylinder
7	Rod

LIFTGATE OPENER REMOVAL/INSTALLATION

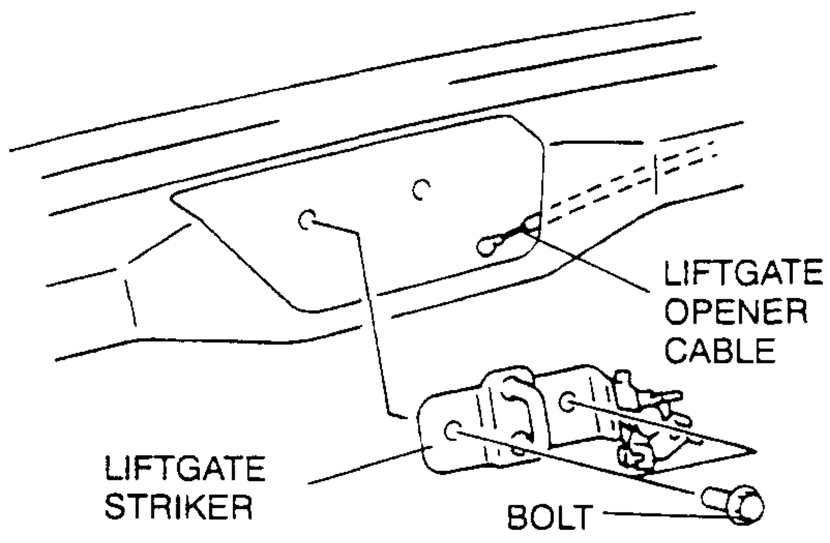
1. To remove the liftgate opener cable, remove the driver's side front seat, driver's side front and rear scuff plate, driver's side B-pillar lower trim, driver's side front seat belt lower anchor, left side trunk side trim, and trunk end trim, and turn over the front floor covering. (Refer to SEAT, FRONT SEAT REMOVAL/INSTALLATION.) (Refer to TRIM, B-PILLAR LOWER TRIM REMOVAL/ INSTALLATION.) (Refer to TRIM, TRUNK SIDE TRIM REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Cover
2	Liftgate opener lever
3	Liftgate opener cable

LIFTGATE STRIKER REMOVAL/INSTALLATION

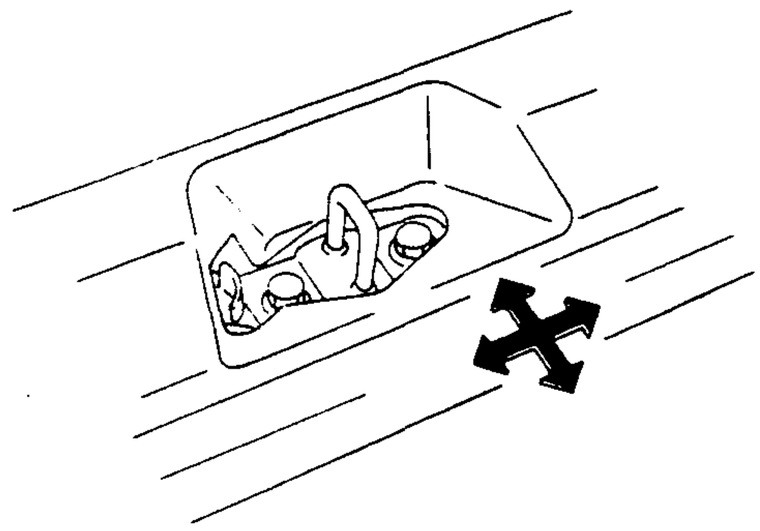
1. Remove the trunk end trim .(Refer to TRIM, TRUNK END TRIM REMOVAL/INSTALLATION.)
2. Remove the liftgate opener cable from the liftgate striker.
3. Remove the bolts, and remove the striker.



4. Install in the reverse order of removal.
5. Adjust the liftgate striker. (Refer to LIFTGATE STRIKER ADJUSTMENT.)

LIFTGATE STRIKER ADJUSTMENT

1. Verify that the liftagte can be closed easily and that there is no looseness.
2. If not correct, loosen the liftgate striker installation bolts and align the striker with the lifgate lock.

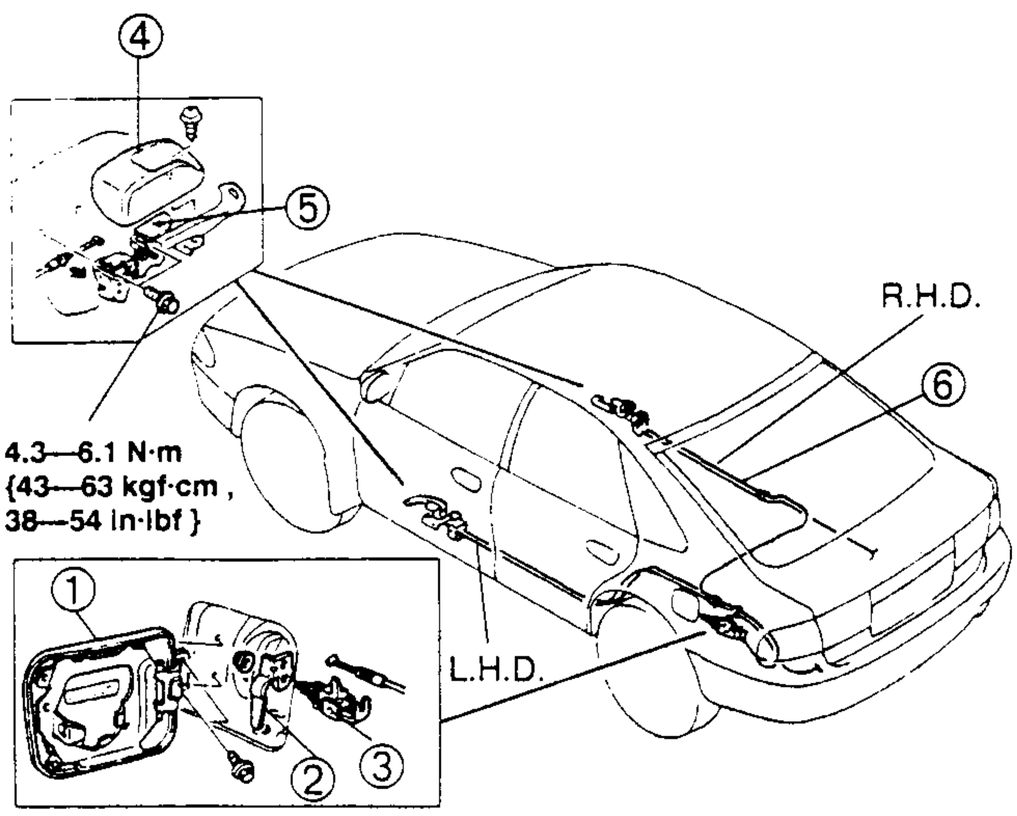


3. Tighten the liftgate striker installation bolts.

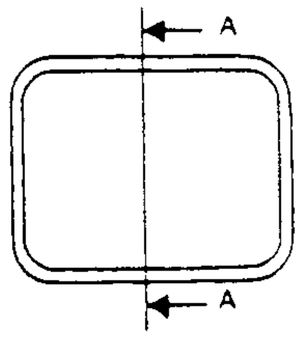
FUEL-FILLER LID AND OPENER

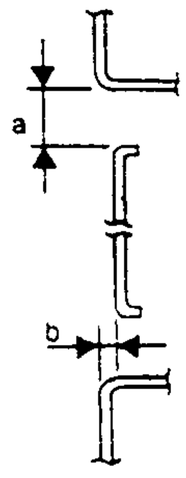
FUEL-FILLER LID AND OPENER REMOVAL/INSTALLATION

1. To remove the fuel-filler lid opener, remove the left side trunk side trim. (Refer to TRIM, TRUNK SIDE TRIM REMOVAL/INSTALLATION.)
2. To remove the fuel-filler lid opener cable, remove the driver's side front seat, driver's side front and rear scuff plate, driver's side B-pillar lower trim, driver's side front seat belt lower anchor, and left side trunk side trim, and then turn over the front floor covering. (Refer to SEAT, FRONT SEAT REMOVAL/INSTALLATION.) (Refer to TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) (Refer to TRIM, TRUNK SIDE TRIM REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Adjust the fuel-filler lid. (Refer to FUEL-FILLER LID ADJUSTMENT.)



1	Fuel-filler lid
2	Lift spring
3	Fuel-filler lid opener
4	Cover
5	Fuel-filler lid opener lever
6	Fuel-filler lid opener cable





SEC. A—A

2. If not as specified, loosen the fuel-filler lid installation bolts and reposition the fuel-filler lid.
3. Tighten the fuel-filler lid installation bolts.

FUEL-FILLER LID ADJUSTMENT

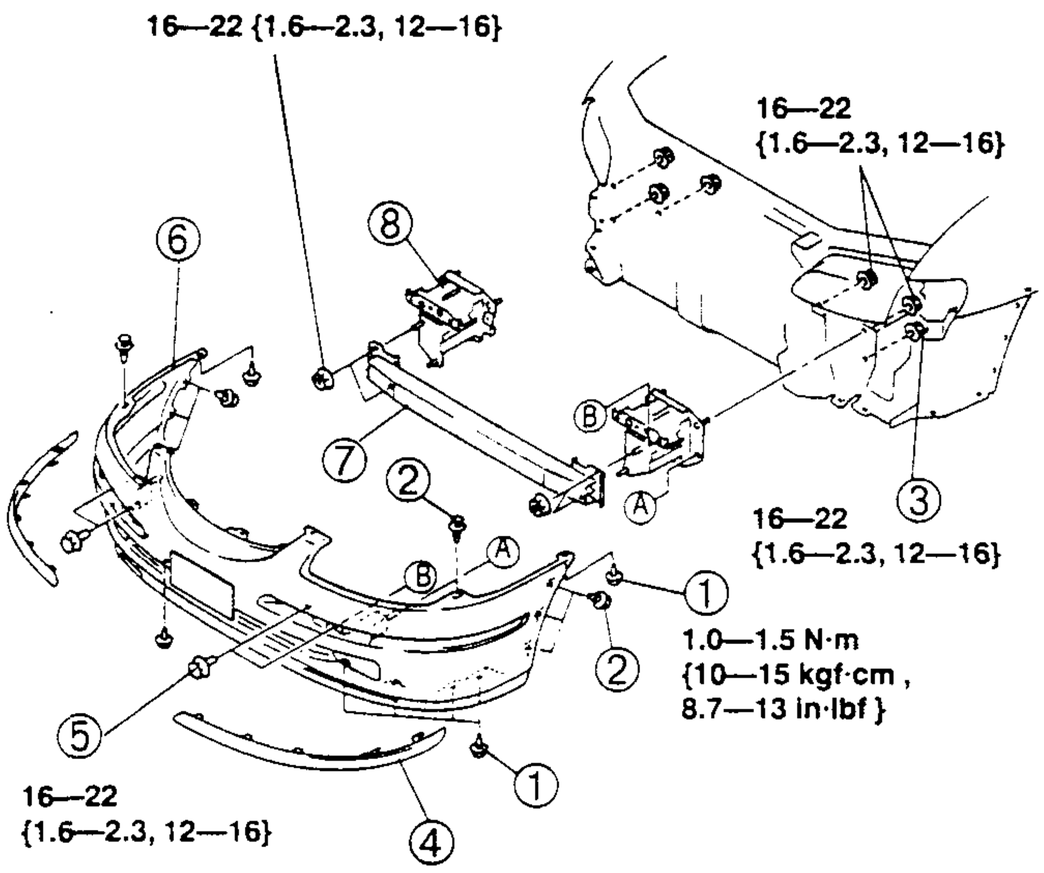
1. Measure the gap and height between the fuel-filler lid and the body.

Clearance	Standard mm { in }	Minimum mm { in }	Maximum mm { in }
a	3.5 {0.14}	2.5 {0.10}	4.5 {0.17}
b	0.5 {0.02}	-0.3 {-0.01}	1.3 {0.05}

BUMPER

FRONT BUMPER REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the radiator grille. (Refer to EXTERIOR ATTACHMENT, RADIATOR GRILLE REMOVAL/INSTALLATION.)
3. Remove the front turn light.
4. Remove the deflector.
5. Turn over the mud guard.
6. Remove the washer tank.
7. Disconnect the front fog light connector.
8. Remove in the order indicated in the table.
9. Install in the reverse order of removal.
10. Adjust the front fog light aiming. (Refer to section T, EXTERIOR LIGHTING SYSTEM, FRONT FOG LIGHT AIMING.)

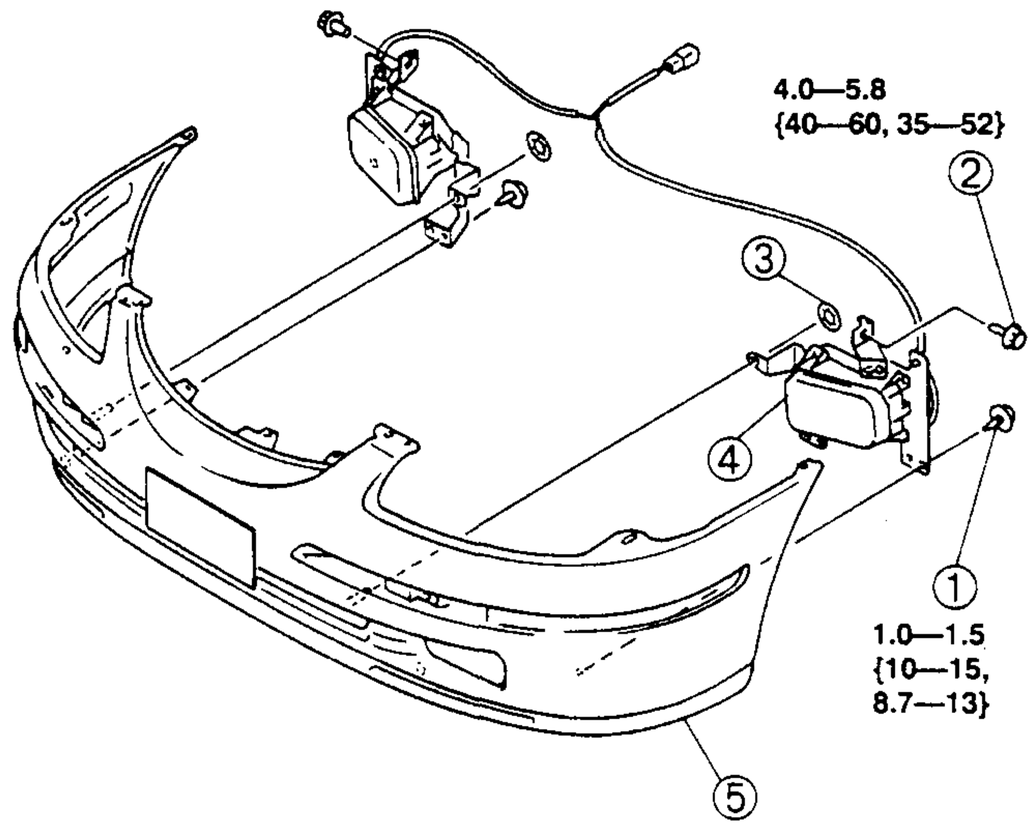


N·m { kgf·m , ft·lbf }

1	Screw
2	Fastener
3	Nut
4	Front bumper protector
5	Bolt
6	Front bumper
7	Reinforcement
8	Front bumper stay

FRONT BUMPER DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.

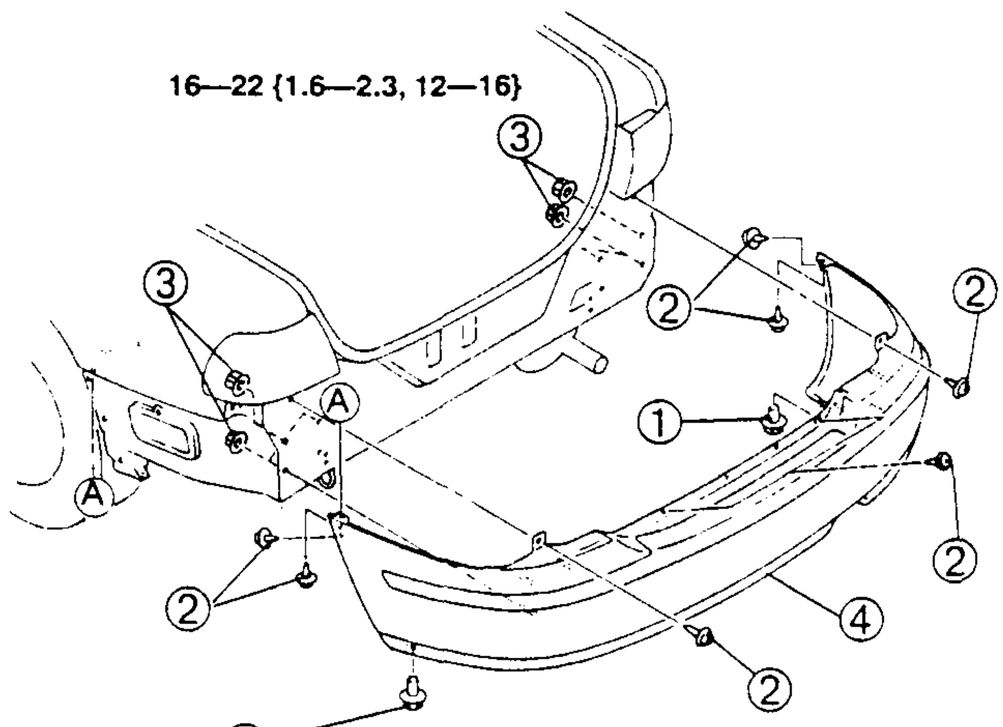


N·m { kgf·cm , in·lbf }

1	Screw
2	Bolt
3	Fastener
4	Front fog light
5	Front bumper fascia

REAR BUMPER REMOVAL/INSTALLATION

1. Remove the rear end extension. (Refer to EXTERIOR ATTACHMENT, REAR END EXTENSION REMOVAL/INSTALLATION.)
2. Remove the rear flap.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



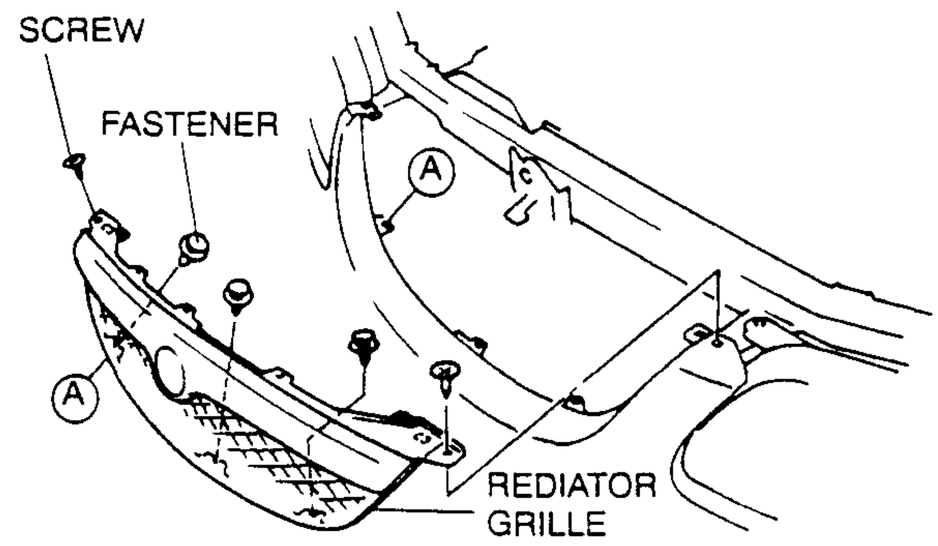
N·m { kgf·m , ft·lbf }

1	Bolt
2	Screw
3	Nut
4	Rear bumper

EXTERIOR ATTACHMENT

RADIATOR GRILLE REMOVAL/INSTALLATION

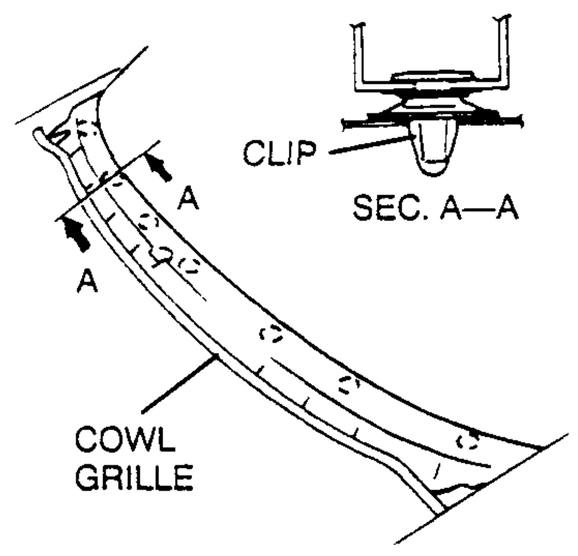
1. Remove the upper seal board.
2. Remove the fasteners and screws.
3. Remove the radiator grille.



4. Install in the reverse order of removal.

COWL GRILLE REMOVAL/INSTALLATION

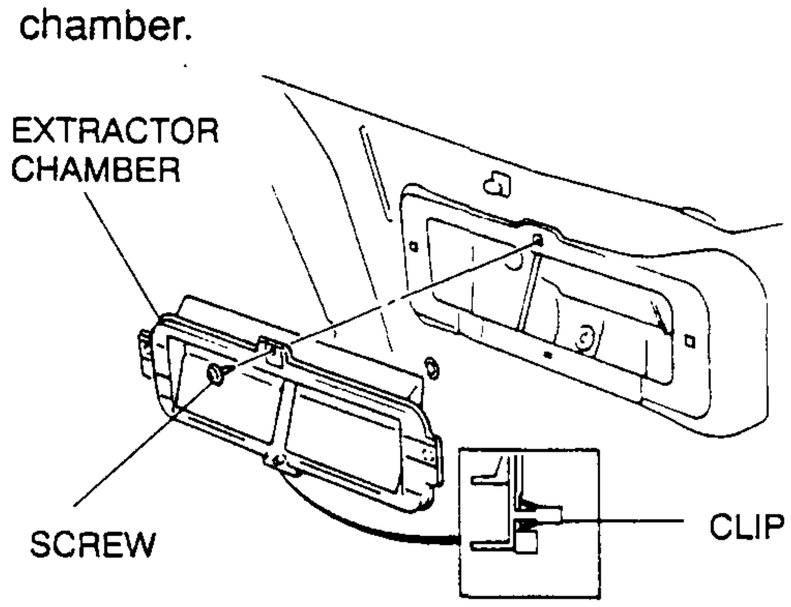
1. Remove the windshield wiper arm and blade. (Refer to section T, WIPER AND WASHER, WINDSHIELD WIPER ARM AND BLADE REMOVAL/INSTALLATION.)
2. Disengage the clips of the cowl grille by using a fastener remover to remove the cowl grille.



3. Install in the reverse order of removal.

EXTRACTOR CHAMBER REMOVAL/INSTALLATION

1. Remove the rear bumper. (Refer to BUMPER, REAR BUMPER REMOVAL/INSTALLATION.)
2. Remove the screw.
3. Disengage the clip by using a tape-wrapped flathead screwdriver to remove the extractor chamber.



4. Install in the reverse order of removal.

SIDE PROTECTOR NO.1, NO.2, NO.3 REMOVAL

1. Pry the side protector end **20—30 mm {0.79—1.18 in }** by using a flathead screwdriver or a razor knife.
2. Pull the side protector to remove it.

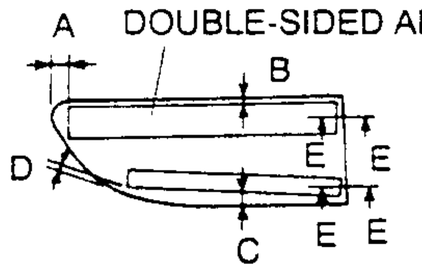
Note

- The side protector is installed with double-sided adhesive tape. If the side protector is difficult to remove, soften the double-sided adhesive tape by using a hot air blower.

SIDE PROTECTOR NO.1, NO.2, NO.3 INSTALLATION

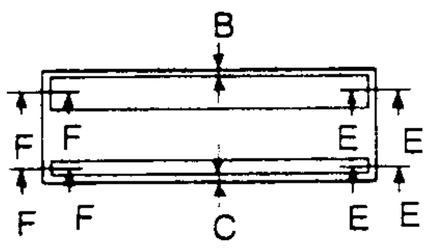
1. Remove the adhesive remaining on the side protector (if it will be reused) and the body by using a razor knife.
2. Remove any grease or dirt from the adhesion surface of the side protector (if it will be reused) and the body.
3. Attach double-sided adhesive tape to the side protector as shown (if it will be reused).

Clear-ance	Nominate mm { in }	Minimum mm { in }	Maximum mm { in }
A	6.5 {0.26}	—	8.5 {0.33}
B	2.0 {0.08}	1.0 {0.04}	3.0 {0.11}
C	1.5 {0.06}	0.5 {0.02}	2.5 {0.09}
D	2.0 {0.08}	1.0 {0.04}	3.0 {0.11}
a	1.0 {0.04}	—	3.0 {0.11}

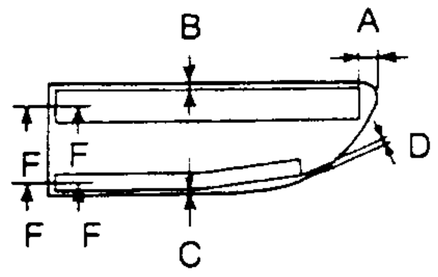


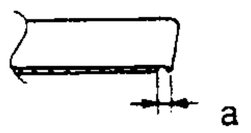
SIDE PROTECTOR NO.1
(FRONT FENDER)

SIDE PROTECTOR
NO.2
(FRONT DOOR)

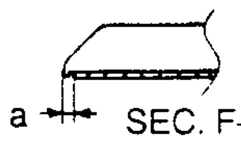


SIDE PROTECTOR NO.3
(REAR DOOR)





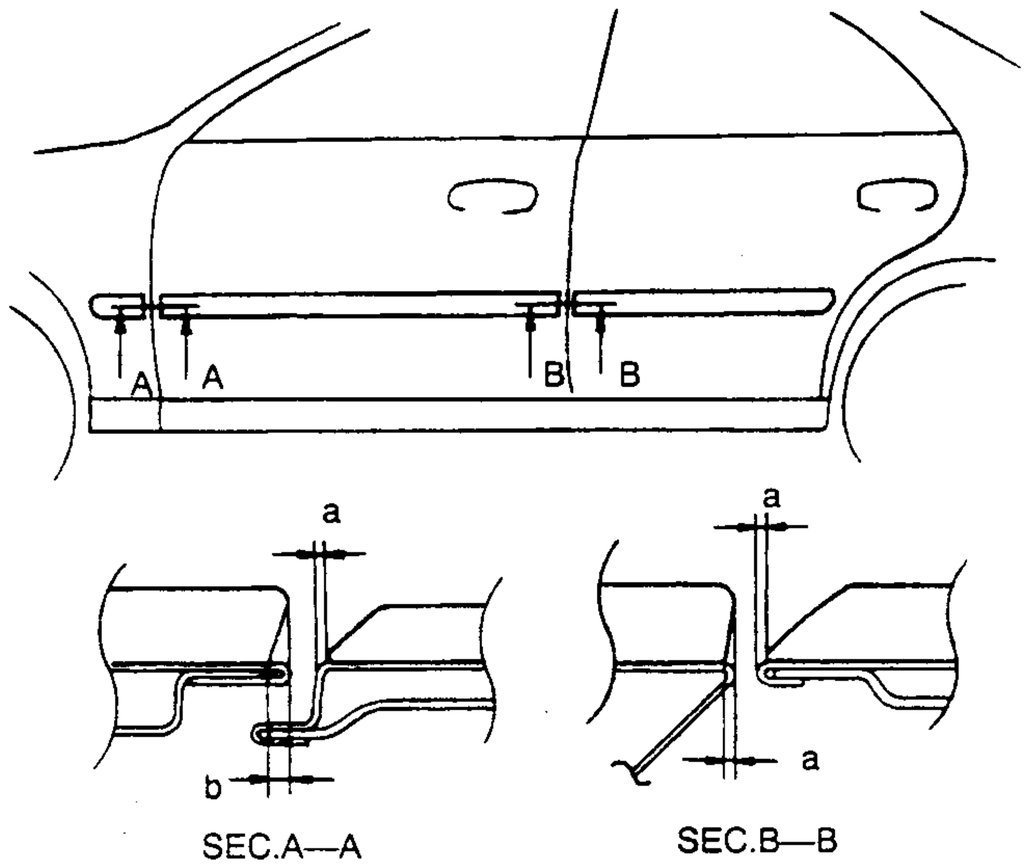
SEC. E—E



SEC. F—F

4. Peel off the backing paper from the double-sided adhesive tape and attach the side protector onto the body as shown.

Clearance	Nominate mm { in }
a	1.5 {0.06}
b	3.5 {0.14}

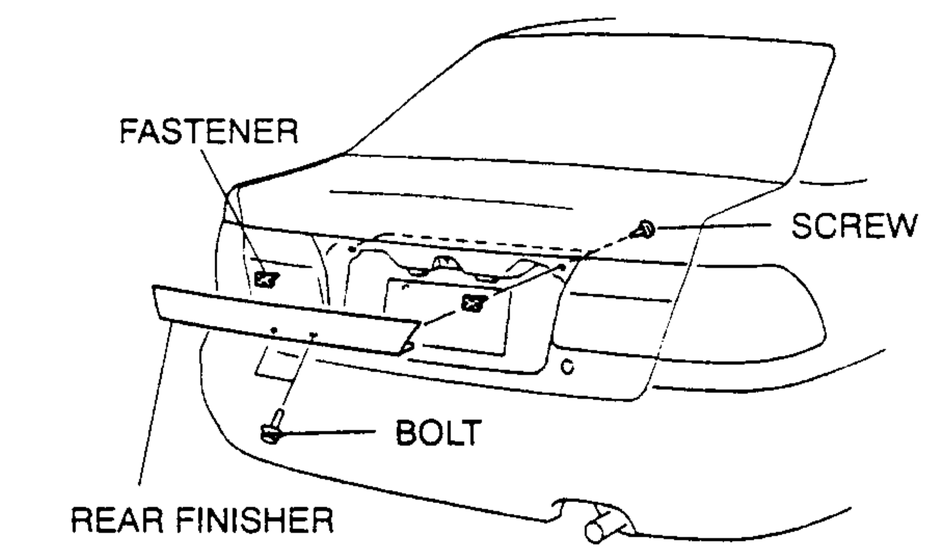


SEC.A—A

SEC.B—B

REAR FINISHER REMOVAL

1. Remove the trunk lid trim.
2. Remove the bolts, screws and fasteners.
3. Remove the rear finisher.

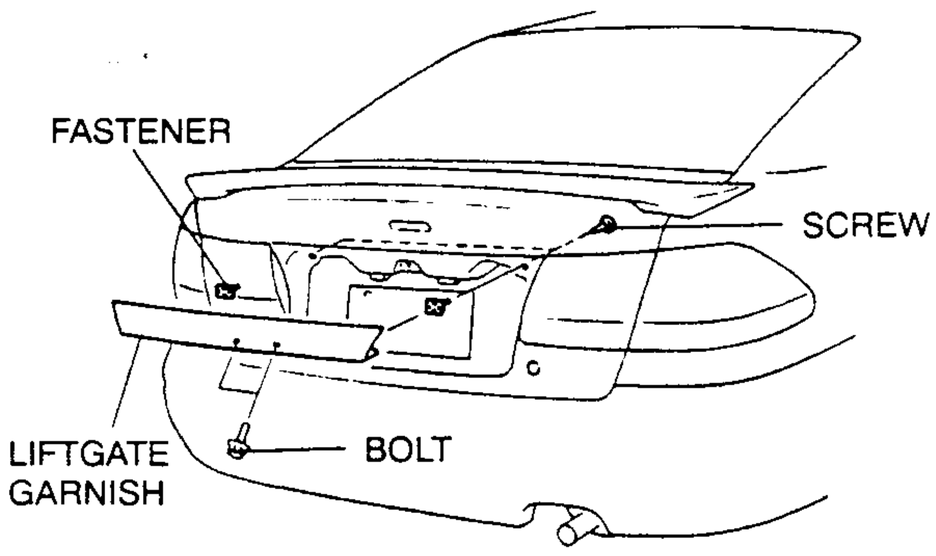


REAR FINISHER INSTALLATION

1. Install the fasteners, screws and bolts in the rear finisher.
2. Install the rear finisher.

LIFTGATE GARNISH REMOVAL

1. Remove the liftgate lower trim.
2. Remove the bolts, screws and fasteners.
3. Remove the liftgate garnish.



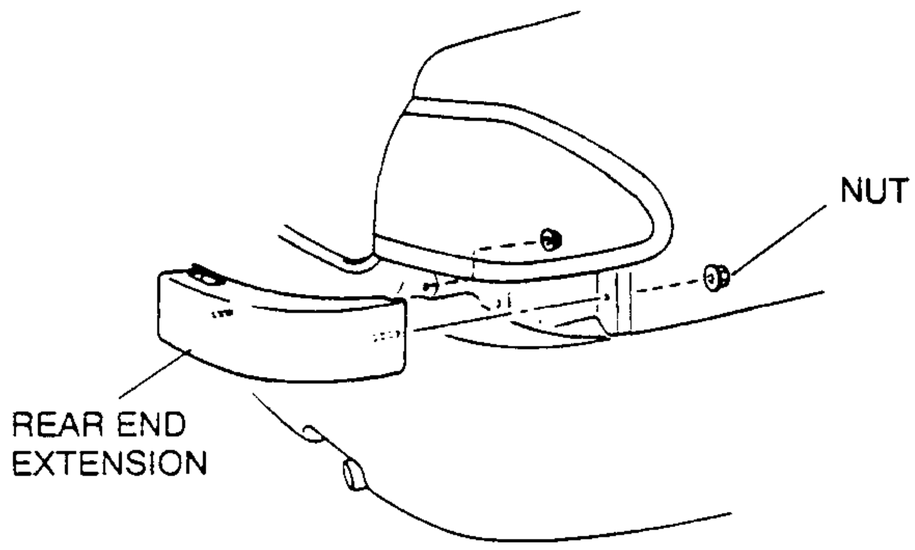
LIFTGATE GARNISH INSTALLATION

1. Install the fasteners, screws and bolts in the liftagte garnish.
2. Install the liftgate garnish.

REAR END EXTENSION REMOVAL/INSTALLATION

Sedan

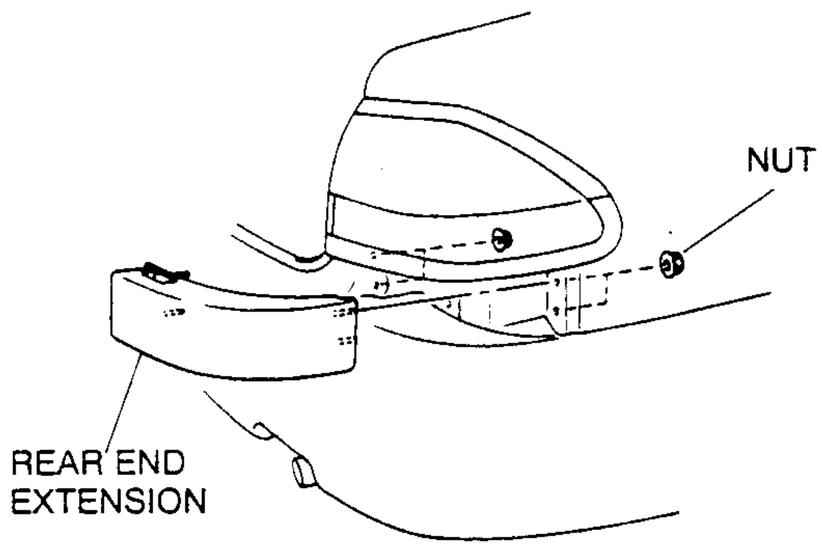
1. Remove the trunk end trim.
2. Partially peel the trunk side trim.
3. Remove the nuts.
4. Remove the rear end extension.



5. Install in the reverse order of removal.

5HB

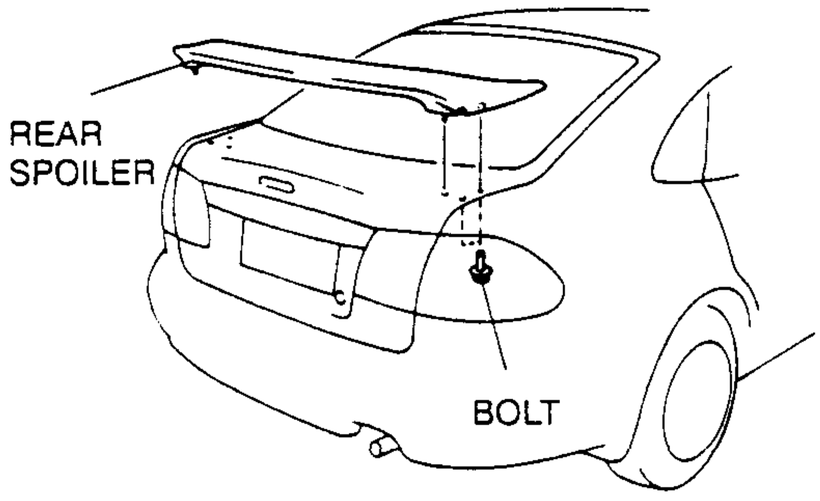
1. Remove the trunk end trim.
2. Remove the trunk side trim.
3. Remove the nuts.
4. Remove the rear end extension.



5. Install in the reverse order of removal.

REAR SPOILER REMOVAL/INSTALLATION

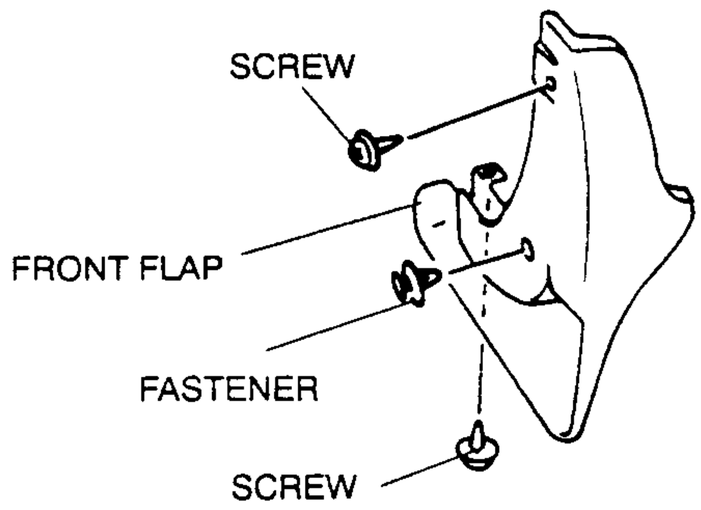
1. Remove the bolts.
2. Remove the rear spoiler.



3. Install in the reverse order of removal.

FRONT FLAP REMOVAL/INSTALLATION

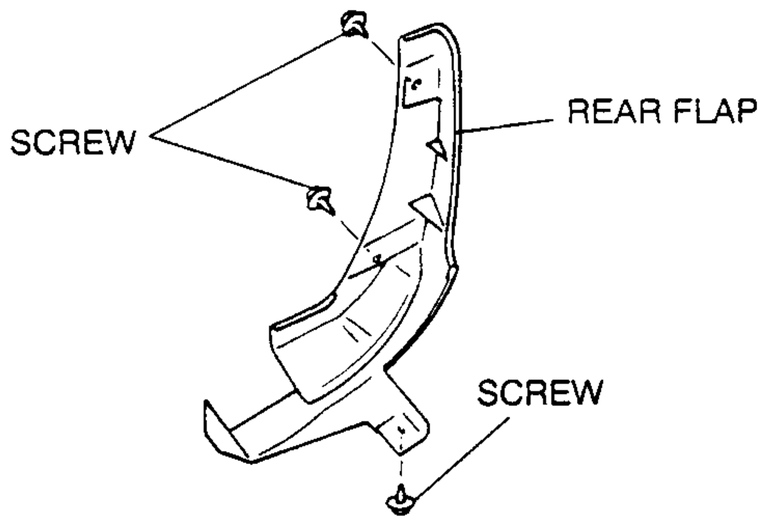
1. Remove the screws and fasteners.
2. Remove the front flap.



3. Install in the reverse order of removal.

REAR FLAP REMOVAL/INSTALLATION

1. Remove the screws.
2. Remove the rear flap.



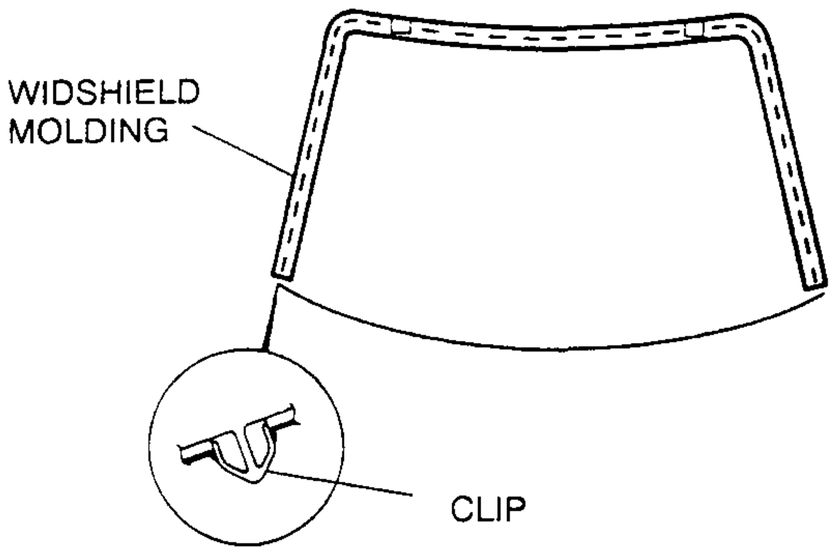
3. Install in the reverse order of removal.

MOLDING

WINDSHIELD MOLDING REMOVAL

Note
- Windshield molding is a replacement part.

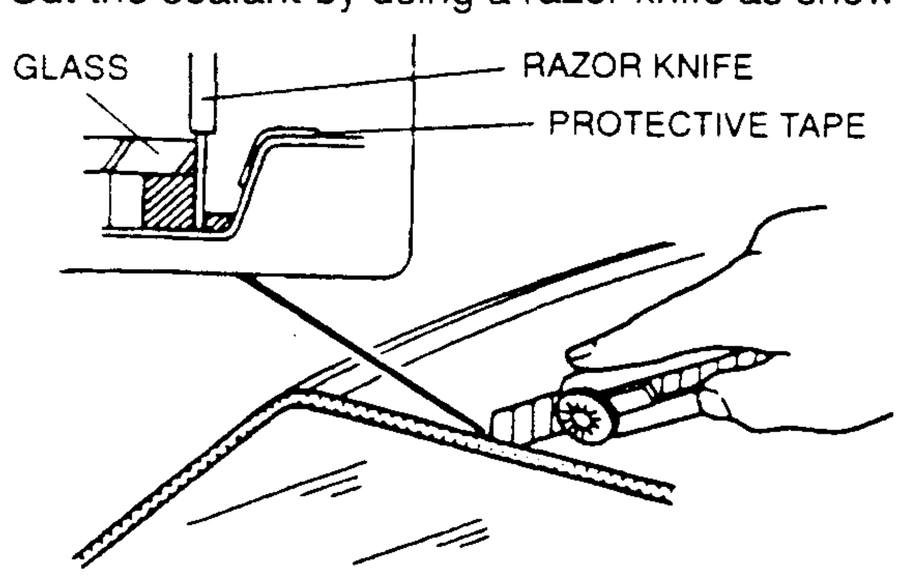
1. Remove the widshield molding installation clips from the cowl grille hole.



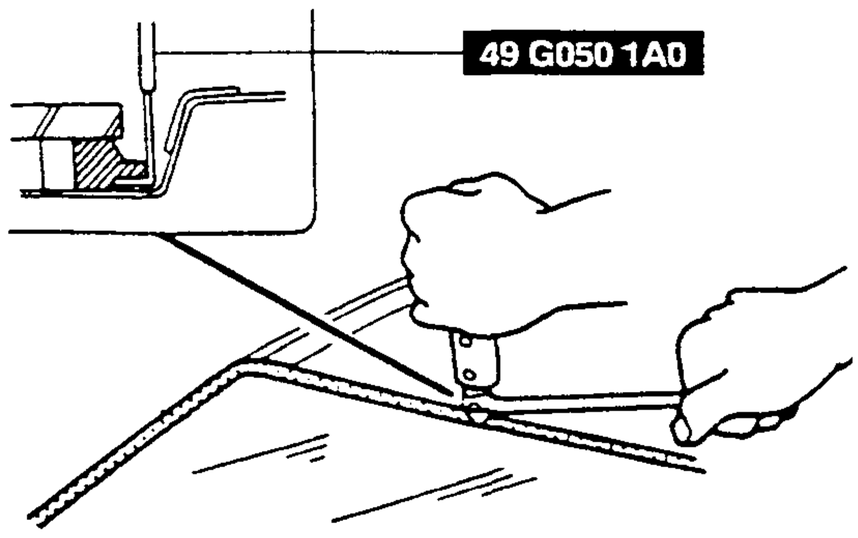
2. Remove the cowl grille. (Refer to EXTERIOR ATTACHMENT, COWL GRILLE REMOVAL/ INSTALLATION.)
3. Pull the windshield molding forward to remove it.

WINDSHIELD MOLDING INSTALLATION

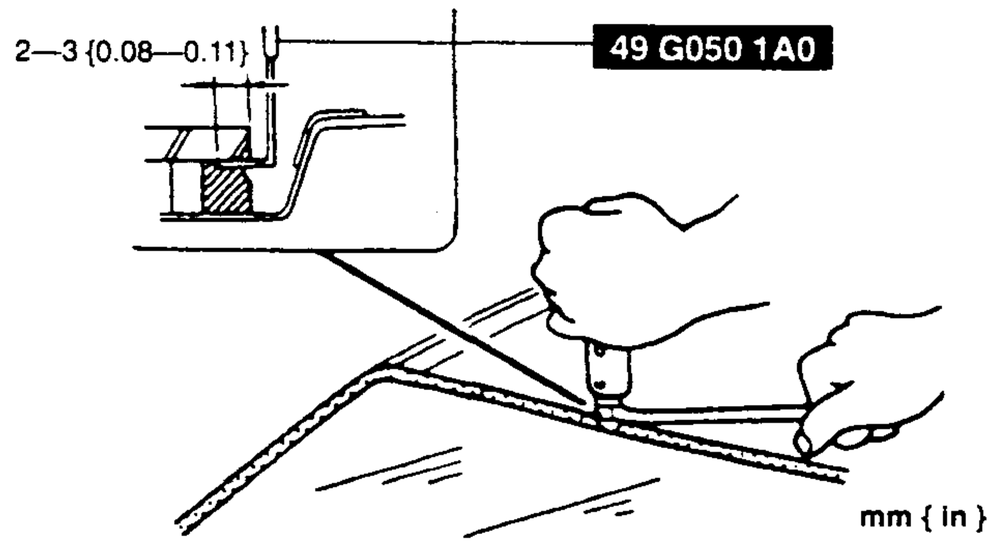
1. Apply protective tape along the edge of the body to protect it from damage.
2. Cut the sealant by using a razor knife as shown.



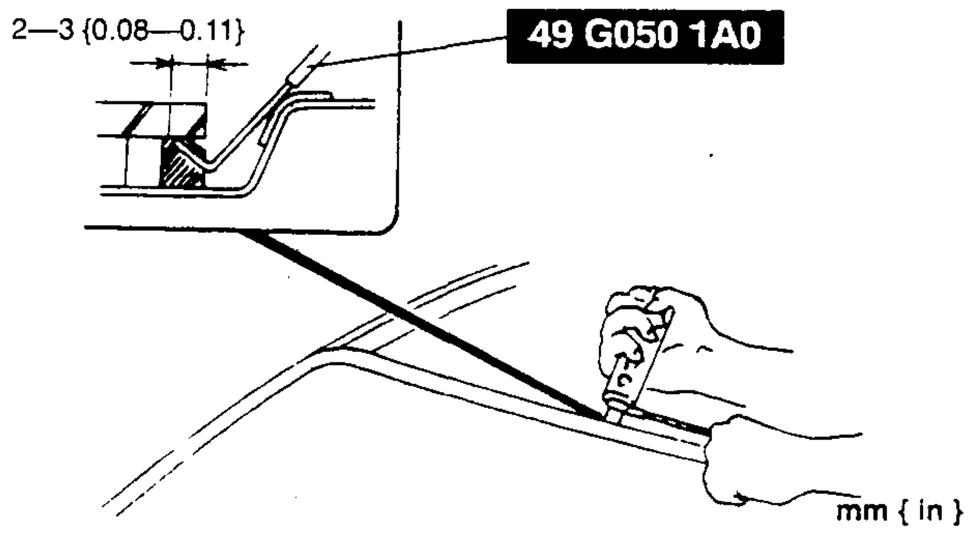
3. Insert the blade of the **SST** (sealant remover) into the sealant, and pull on the bar to cut the sealant near the body as shown.



4. Insert the blade of the **SST** (sealant remover) into the sealant, and pull on the bar to cut the sealant near the glass as shown.

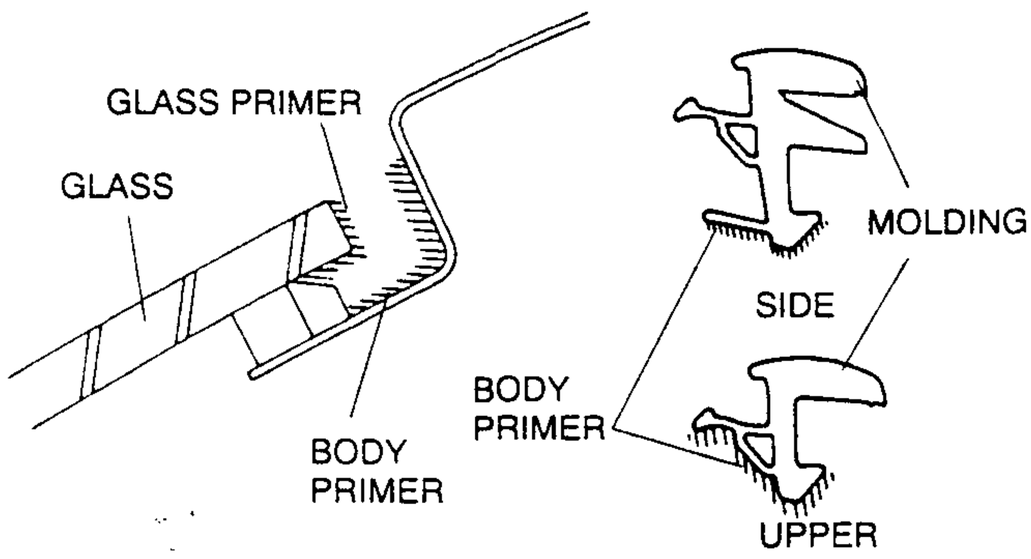


5. Remove as much sealant as possible from between the body and the glass.

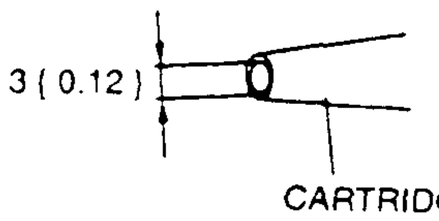


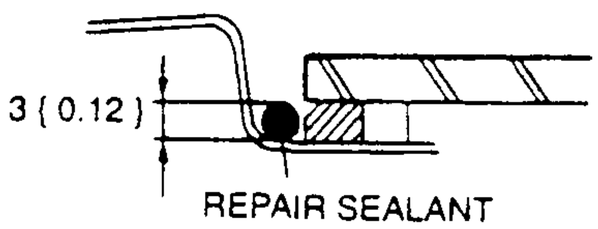
Caution
- **Keep the area free of dirt and grease, and do not touch the surface or the primer may not properly bond to the surface of the glass and body which may cause leaks to occur.**

6. Use a brush to apply primer to the bonding area of the glass and body within the region shown. Use only glass primer on the glass and body primer on the body and molding. Allow it to dry for **approximately 30 minutes**.

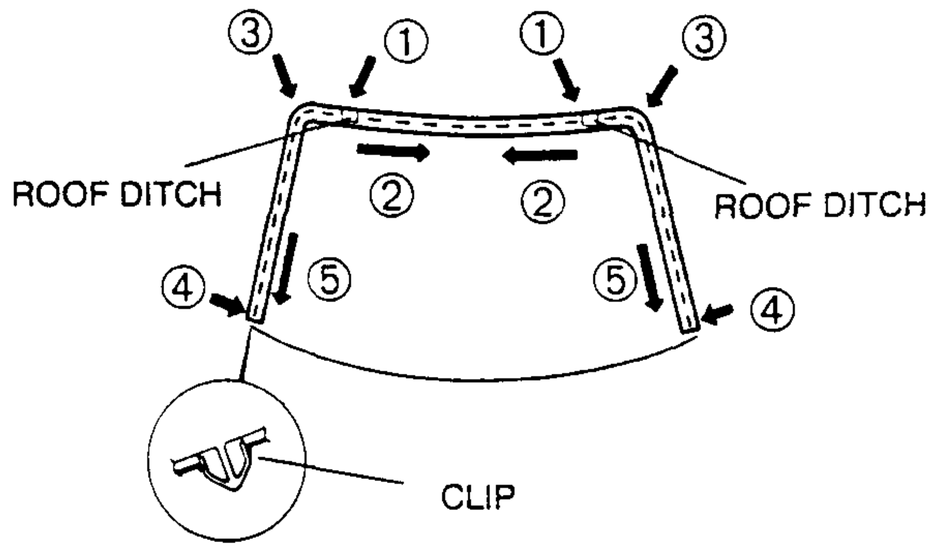


7. Insert at sealant tube cartridge into a sealant gun.
8. Apply a bead of repair sealant to a height of **3 mm { 0.12 in }** between the glass and the body.

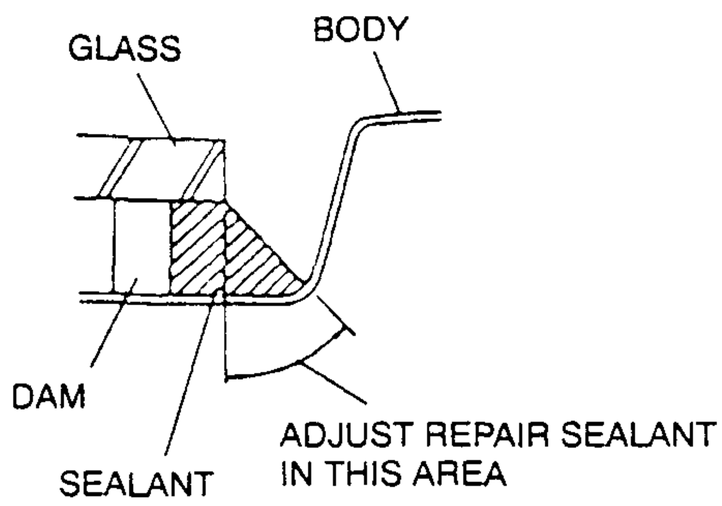




mm { in }



9. Reshape the repair sealant as shown if necessary.



Caution

- **Once the sealant has hardened, you will not be able to install the molding. Install the windshield molding within the time shown below.**

Harding time of sealant

Temperature	Surface harding time	Time required until car can be put into service
5 °C { 41 °F }	Approx. 1.5 h	12 h
20 °C { 68 °F }	Approx. 1 h	4 h
35 °C { 95 °F }	Approx. 10 min	2 h

10. Install the cowl grille. (Refer to EXTERIOR ATTACHMENT, COWL GRILLE REMOVAL/ INSTALLATION.)
11. Align the marking on the molding with the inner side of the roof ditch (groove). (①)
12. Install the upper edge starting from the outer ends and moving inward. (②)
13. Install the corners. (③)
14. Install the windshield molding installation clips to the cowl grille hole. (④)
15. Install the sides, starting from the upper edge and moving downward, being careful to not pull out the corners.(⑤)
16. Use white gasoline to remove any sealant that oozes out.
17. Check for water leaks. If a leak is found, wipe the water off well and repeat the installation.

REAR WINDOW MOLDING REMOVAL
Sedan

Note

- The rear window molding is a replacement part.
- Remove the rear window glass when removing the rear window molding. (Refer to WINDOW GLASS, REAR WINDOW GLASS REMOVAL, Sedan.)

5HB

Note

- The rear window molding is a replacement part.
- Remove the rear window glass when removing the rear window molding. (Refer to WINDOW GLASS, REAR WINDOW GLASS REMOVAL, 5HB.)

REAR WINDOW MOLDING INSTALLATION
Sedan

Note

- Install the rear window glass when installing the rear window molding. (Refer to WINDOW GLASS, REAR WINDOW GLASS INSTALLTION, Sedan.)

5HB

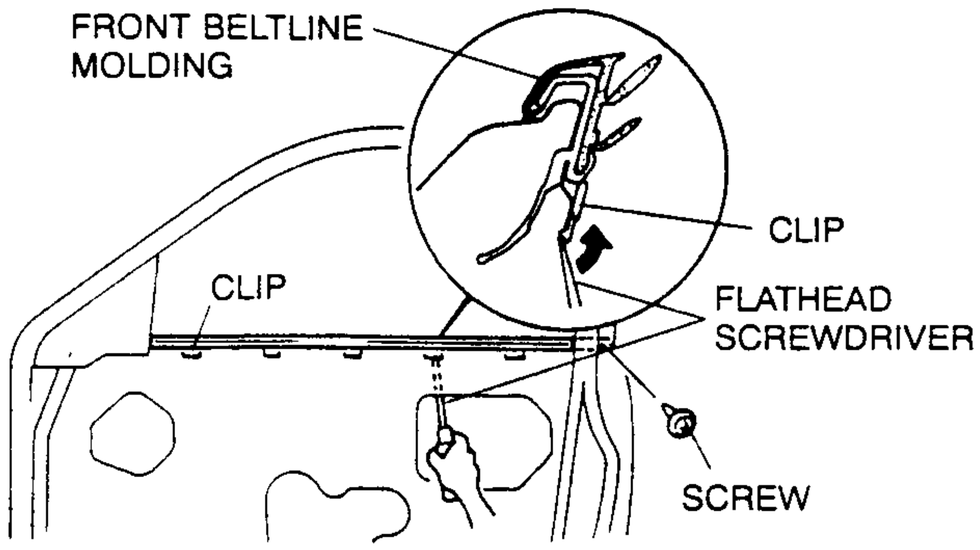
Note

- Install the rear window glass when installing the rear window molding. (Refer to WINDOW GLASS, REAR WINDOW GLASS INSTALLTION, 5HB.)

FRONT BELTLINE MOLDING REMOVAL

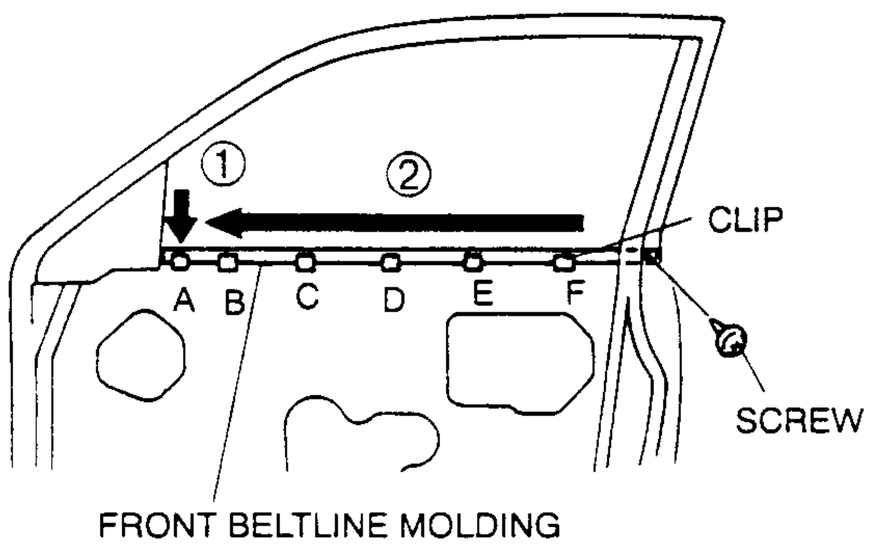
1. Remove the manual outside mirror or power outside mirror. (Refer to OUTSIDE MIRROR, MANUAL OUTSIDE MIRROR REMOVAL / INSTALLATION.) (Refer to OUTSIDE MIRROR, POWER OUTSIDE MIRROR REMOVAL / INSTALLATION.)
2. Remove the front door glass. (Refer to DOOR, FRONT DOOR DISASSEMBLY / ASSEMBLY.)
3. Remove the screw.

4. Insert a flathead screwdriver which has been wrapped in tape under the clip as shown.
5. Lift the flathead screwdriver and pull up on the front beltline molding to remove it.



FRONT BELTLINE MOLDING INSTALLATION

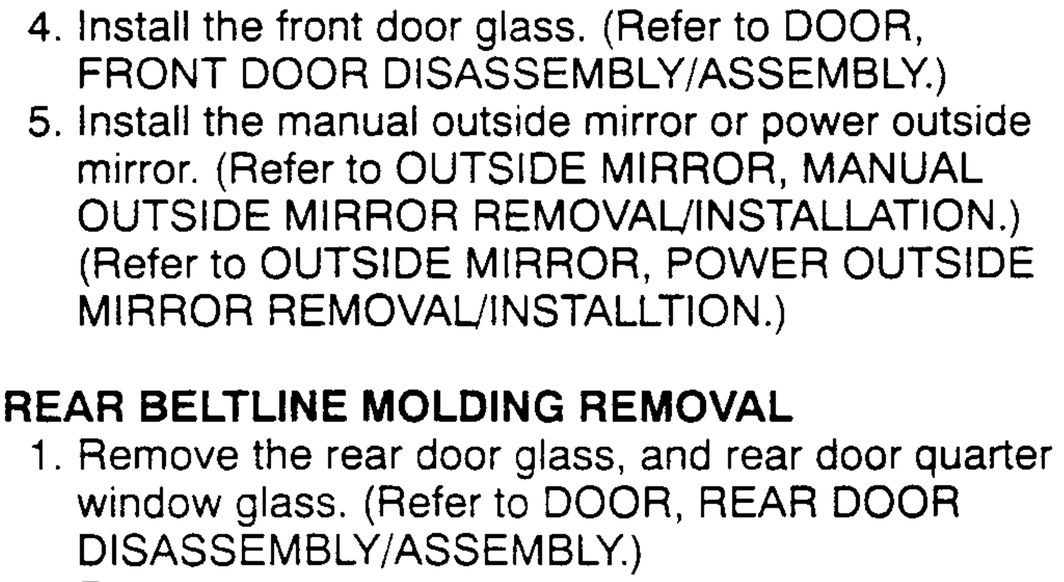
1. Install front beltline molding installation clip A. (①)
2. Install front beltline molding installation clips from F to B. (②)
3. Install the screw.



4. Install the front door glass. (Refer to DOOR, FRONT DOOR DISASSEMBLY/ASSEMBLY.)
5. Install the manual outside mirror or power outside mirror. (Refer to OUTSIDE MIRROR, MANUAL OUTSIDE MIRROR REMOVAL/INSTALLATION.) (Refer to OUTSIDE MIRROR, POWER OUTSIDE MIRROR REMOVAL/INSTALLTION.)

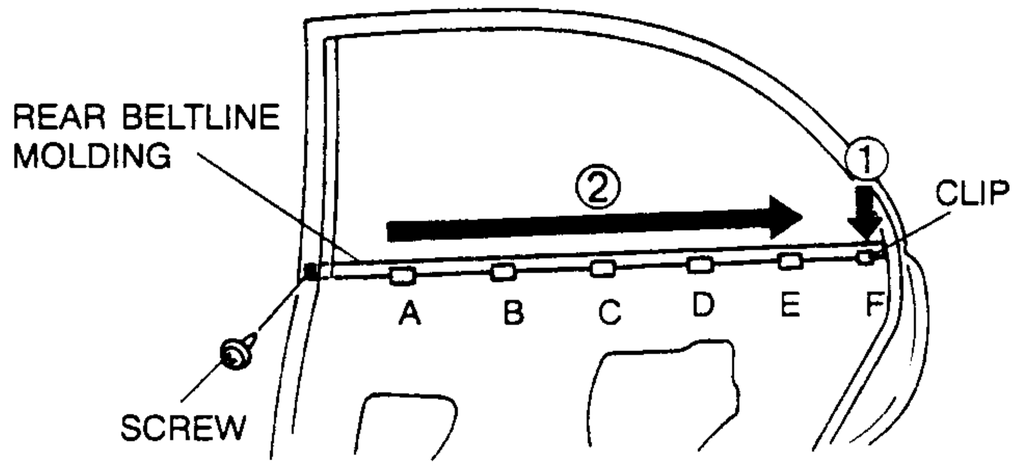
REAR BELTLINE MOLDING REMOVAL

1. Remove the rear door glass, and rear door quarter window glass. (Refer to DOOR, REAR DOOR DISASSEMBLY/ASSEMBLY.)
2. Remove the screw.
3. Insert a flathead screwdriver which has been wrapped in tape under the clip as shown.
4. Lift the flathead screwdriver and pull up on the rear beltline molding to remove it.



REAR BELTLINE MOLDING INSTALLATION

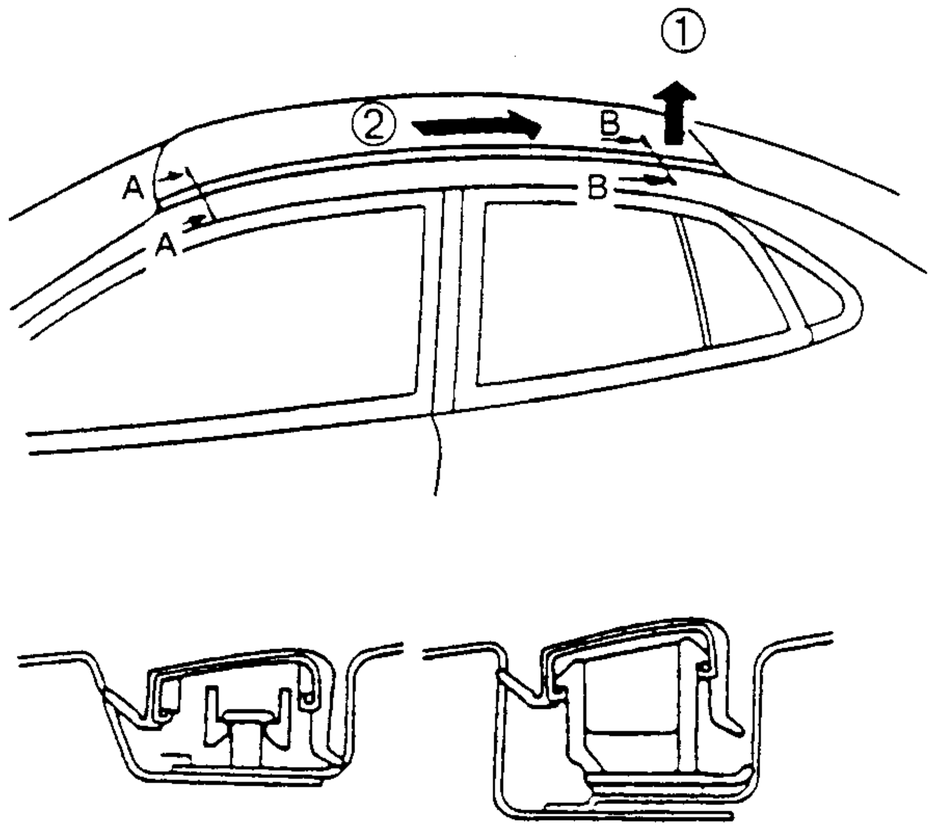
1. Install rear beltline molding installation clip F. (①)
2. Install rear beltline molding installation clips from A to E. (②)
3. Install the screw.



4. Install the rear door glass, and rear door quarter window glass. (Refer to DOOR, REAR DOOR DISASSEMBLY/ASSEMBLY.)

ROOF MOLDING REMOVAL/INSTALLATION

1. Pull up the rear edge of roof molding. (①)
2. Slide to remove the roof molding. (②)



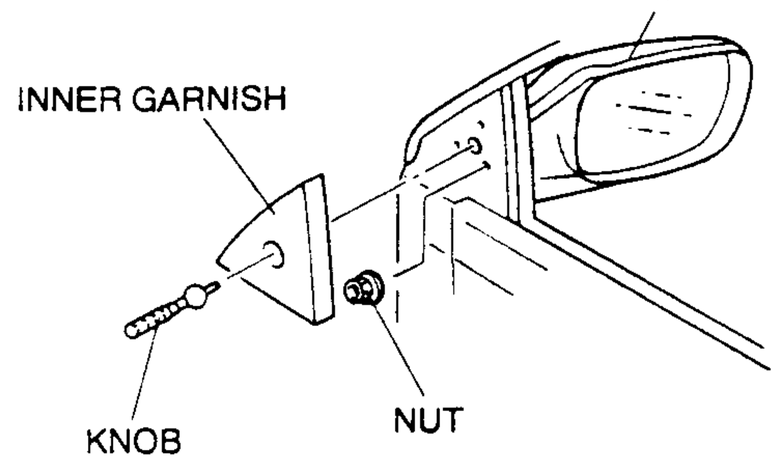
3. Install in the reverse order of removal.

OUTSIDE MIRROR

MANUAL OUTSIDE MIRROR REMOVAL/ INSTALLATION

1. Remove the knob.
2. Remove the inner garnish.
3. Remove the nuts, and the manual outside mirror.

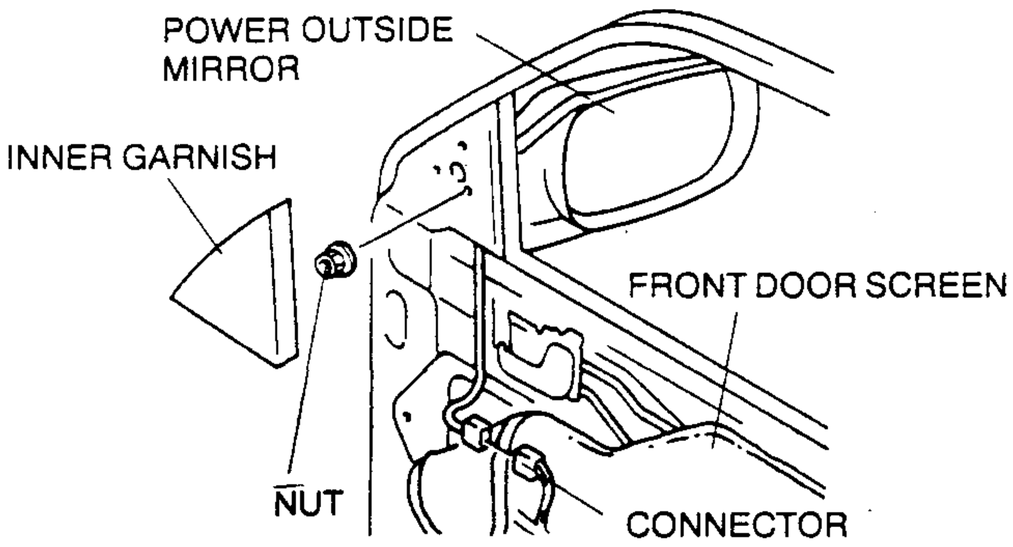
MANUAL OUTSIDE MIRROR



4. Install in the reverse order of removal.

POWER OUTSIDE MIRROR REMOVAL/ INSTALLATION

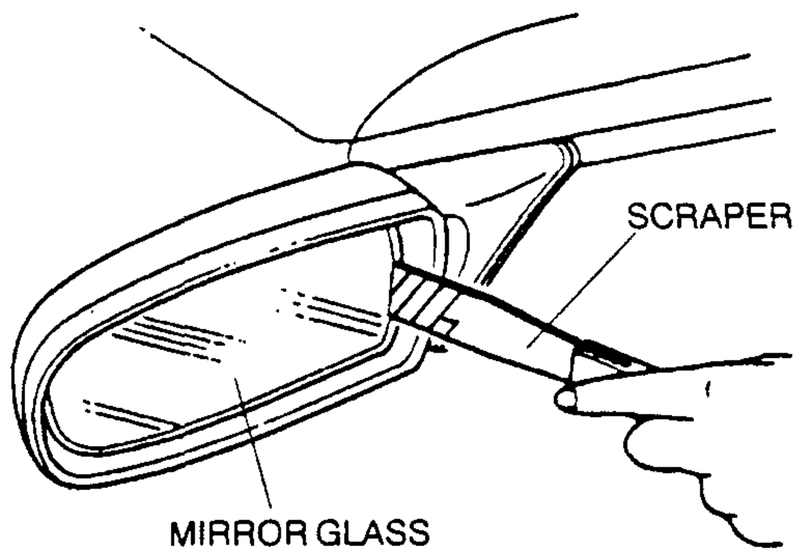
1. Disconnect the negative battery cable.
2. Remove the inner garnish.
3. Remove the front door trim. (Refer to TRIM, FRONT DOOR TRIM REMOVAL/INSTALLATION.)
4. Partially peel off the front door screen.
5. Disconnect the connector.
6. Remove the nuts and the power outside mirror.



7. Install in the reverse order of removal.

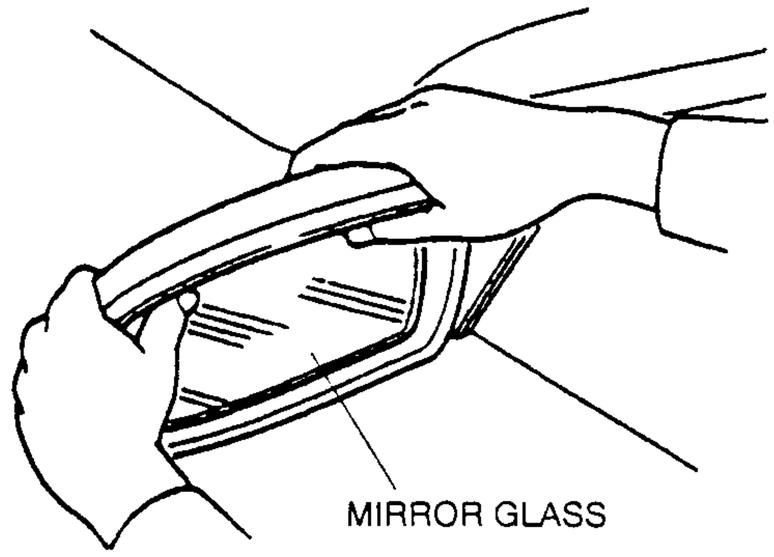
OUTSIDE MIRROR GLASS REMOVAL

1. Warm the frame and the mirror glass to **approximately 70 °C {158 °F }** for **3 minutes** by using a hot air blower.
2. Put on gloves and protective eye wear.
3. Insert a tape-wrapped scraper between the mirror glass and the frame, and pry the glass loose.



OUTSIDE MIRROR GLASS INSTALLATION

1. Clean and degrease the adhesion surface of the mirror glass.
2. Warm up the frame and the mirror glass by using a hot air blower.
3. Remove the paper backing from the double-sided adhesive tape on the back side of the mirror glass.
4. Insert the mirror glass into the frame, then press lightly on the glass to secure it.

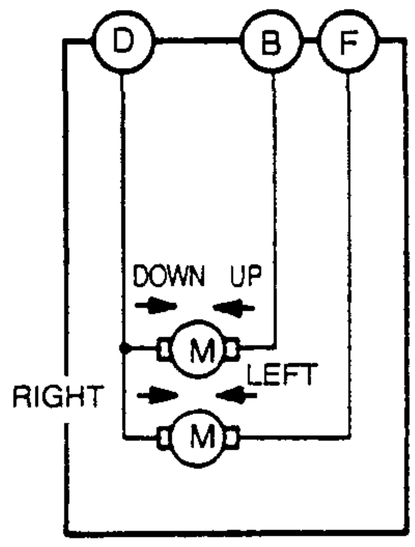


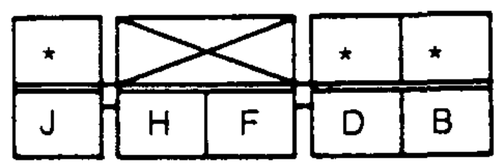
POWER OUTSIDE MIRROR INSPECTION

1. Remove the power outside mirror. (Refer to POWER OUTSIDE MIRROR REMOVAL/INSTALLATION.)
2. Apply battery positive voltage and check the operation of the power outside mirror.

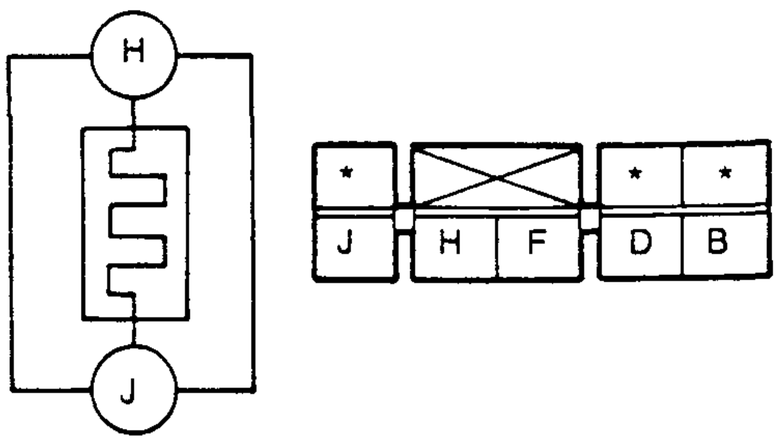
B+: Battery positive voltage

Terminal		Mirror operation
B+	GND	
B	D	Up
D	B	Down
F	D	Left
D	F	Right





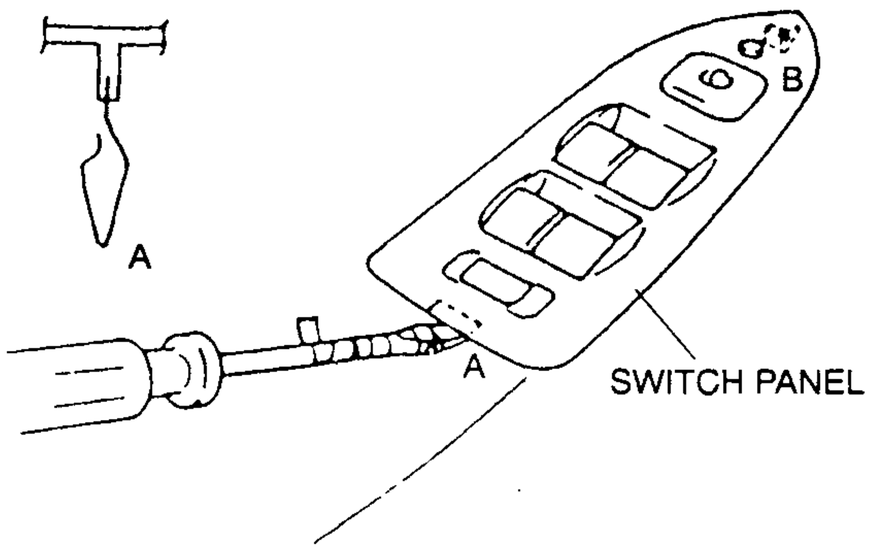
3. If not as specified, replace the power outside mirror.
4. Check for continuity between the power outside mirror terminals H and J by using an ohmmeter.



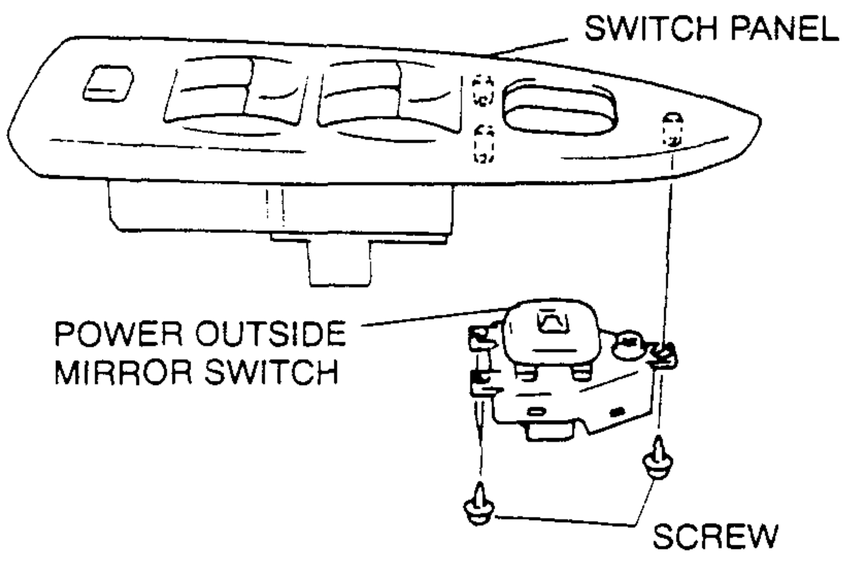
5. If not as specified, replace the power outside mirror.

POWER OUTSIDE MIRROR SWITCH REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Disengage the clip A by using a tape-wrapped flathead screwdriver as shown in the figure.
3. Pull the switch panel upward to disengage hook B from the front door trim.



4. Disconnect the connector.
5. Remove the screws, and removal the power outside mirror switch.



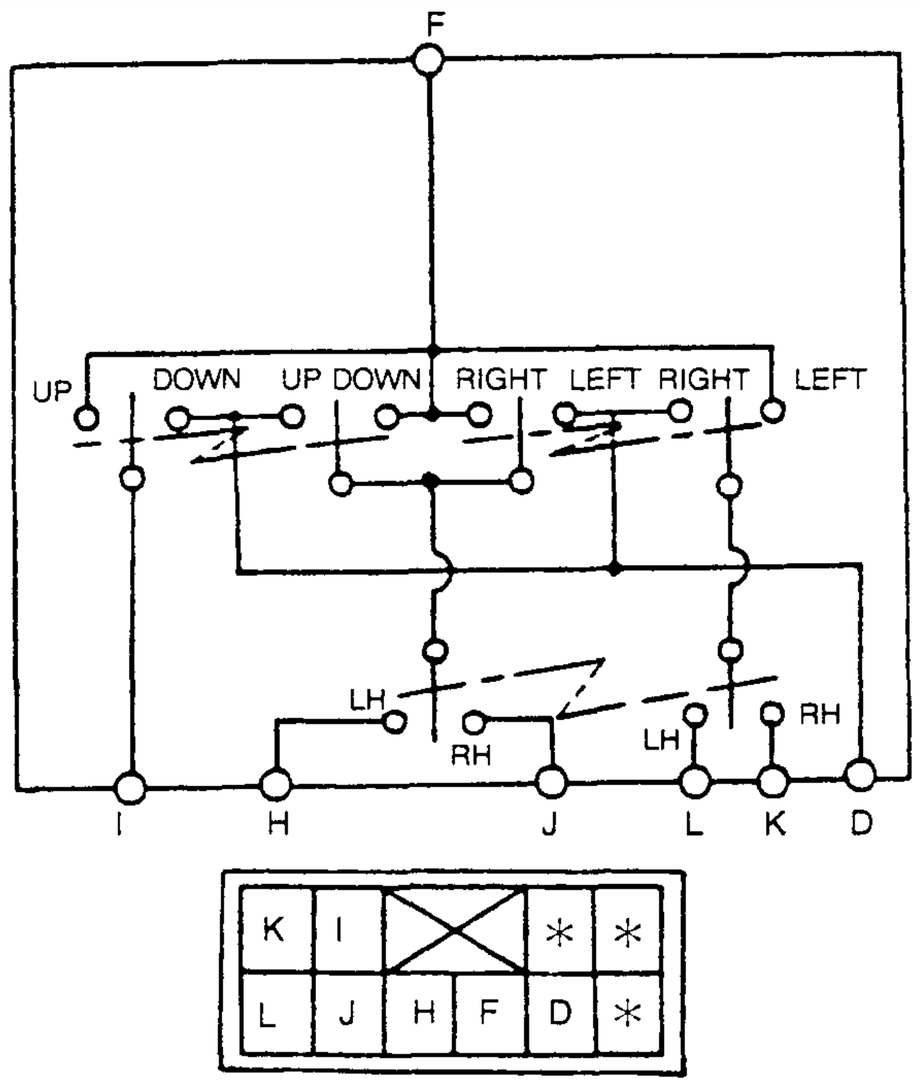
6. Install in the reverse order of removal.

POWER OUTSIDE MIRROR SWITCH INSPECTION

1. Remove the power outside mirror switch. (Refer to POWER OUTSIDE MIRROR SWITCH REMOVAL/INSTALLATION.)
2. Check for continuity between the power outside mirror switch terminals by using an ohmmeter.

○—○ : Continuity

Switch position	Operation	Terminal						
		F	D	H	L	J	K	I
LH	Up	○						○
			○	○				
	Down	○		○				
			○					○
	Left	○			○			
			○	○				
	Right		○	○				
					○			
RH	Up	○						○
			○			○		
	Down	○				○		
			○					○
	Left	○			–		○	
			○			○		
	Right	○				○		
			○				○	

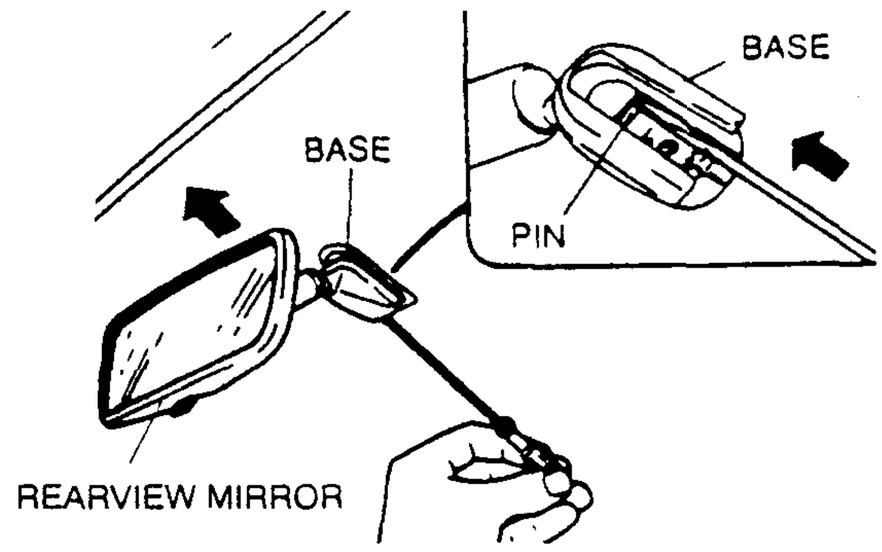


3. If not as specified, replace the power outside mirror switch.

REARVIEW MIRROR

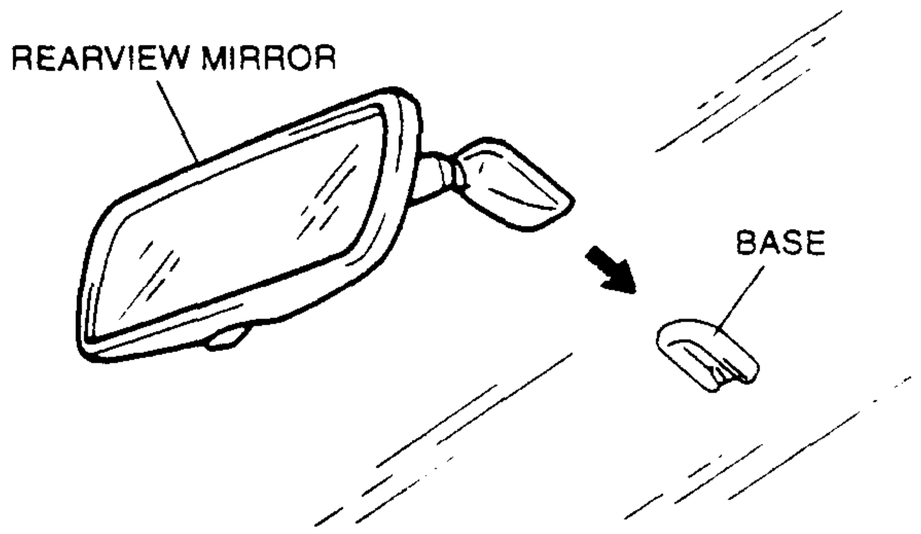
REARVIEW MIRROR REMOVAL

1. Insert a flathead screwdriver between the mirror and the base.
2. Push the base pin to remove the rearview mirror.



REARVIEW MIRROR INSTALLATION

- Install the rearview mirror onto the base.



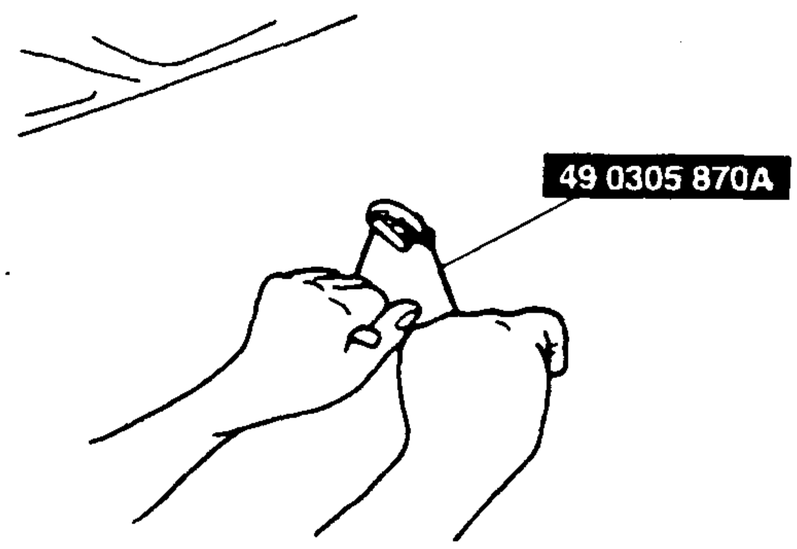
BASE REMOVAL

1. Remove the rearview mirror.
2. Wind each end of a wire around a bar.

Note

- Use the entire length of piano wire to prevent it from breaking when cutting through the sealant.

3. Saw through the sealant to remove the base. Use a long sawing action to spread the work over the whole length of the **SST** (piano wire) to prevent it from breaking.



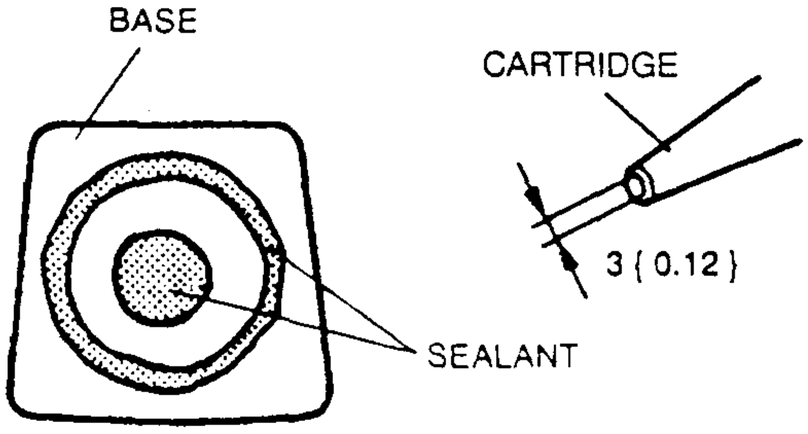
BASE INSTALLATION

1. Cut away all of the original sealant by using a razor knife.
2. Clean and degrease the ceramic coating on the glass and the base.

Caution

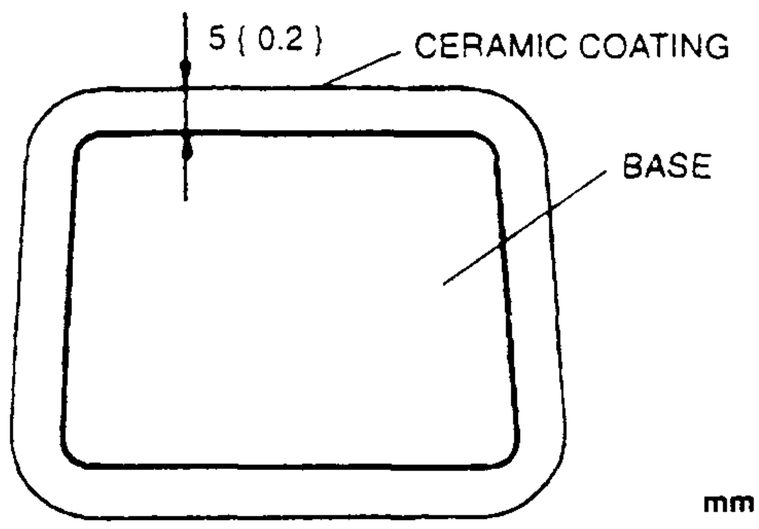
- **Keep the area free of dirt and grease, and do not touch the surface or the primer may not properly bond to the surface of the glass.**

3. Apply primer to the glass and the base. Use only glass primer on the glass and body primer on the base. Allow the primer to dry for **approximately 30 minutes**.
4. Apply a height of **3 mm {0.12 in }** bead of repair sealant to the base.



mm { In }

5. Center the base in the ceramic coating and press it onto the glass.



mm { In }

6. Use white gasoline to remove any excess repair sealant.

Hardening time of sealant

Temperature	Surface hardening time	Time required until car can be put into service
5 °C {41 °F }	Approx. 1.5 h	Approx. 12 h
20 °C {68 °F }	Approx. 1 h	Approx. 4 h
35 °C {95 °F }	Approx. 10 min	Approx. 2 h

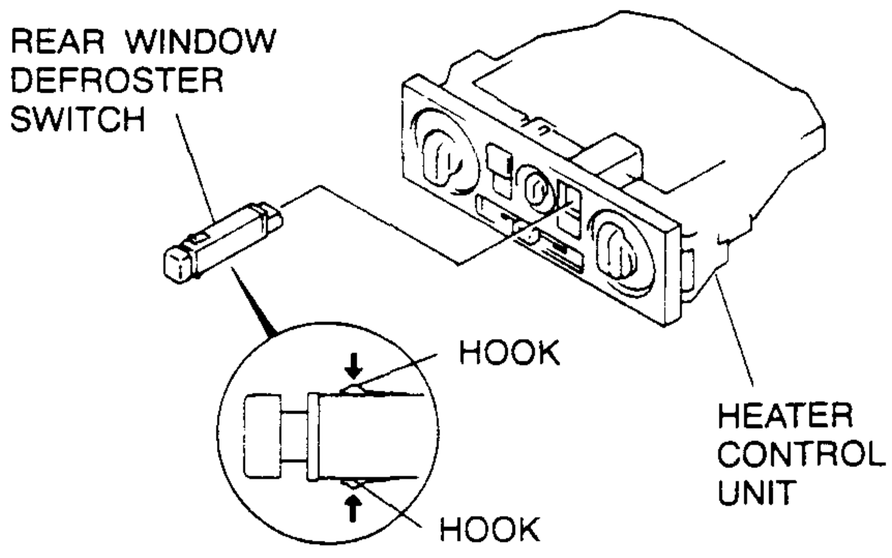
7. Install the rearview mirror.

REAR WINDOW DEFROSTER

REAR WINDOW DEFROSTER SWITCH REMOVAL/INSTALLATION

Manual Air Conditioner

1. Remove the heater control unit. (Refer to section U, CONTROL SYSTEM, HEATER CONTROL UNIT REMOVAL.) (Refer to section U, CONTROL SYSTEM, HEATER CONTROL UNIT INSTALLATION.)
2. Remove the rear window defroster switch from the heater control unit.



3. Install in the reverse order of removal.

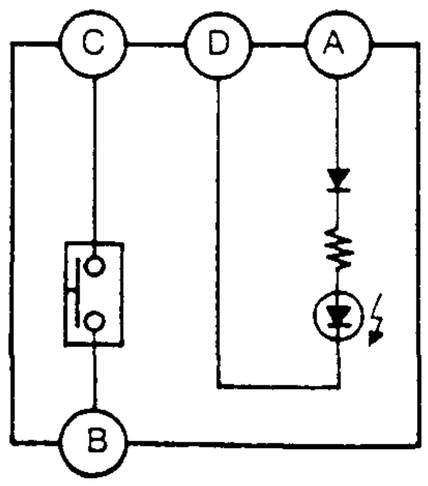
REAR WINDOW DEFROSTER SWITCH INSPECTION

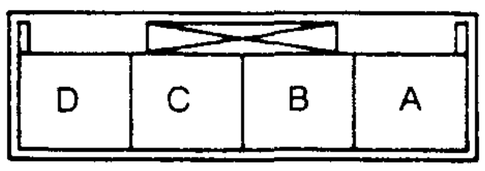
Manual Air Conditioner

1. Remove the rear window defroster switch. (Refer to REAR WINDOW DEFROSTER SWITCH REMOVAL/INSTALLATION.)
2. Check for continuity between the rear window defroster switch terminals by using an ohmmeter.

○—○ : Continuity

Switch position	Terminal	
	B	C
Off		
On	○	○





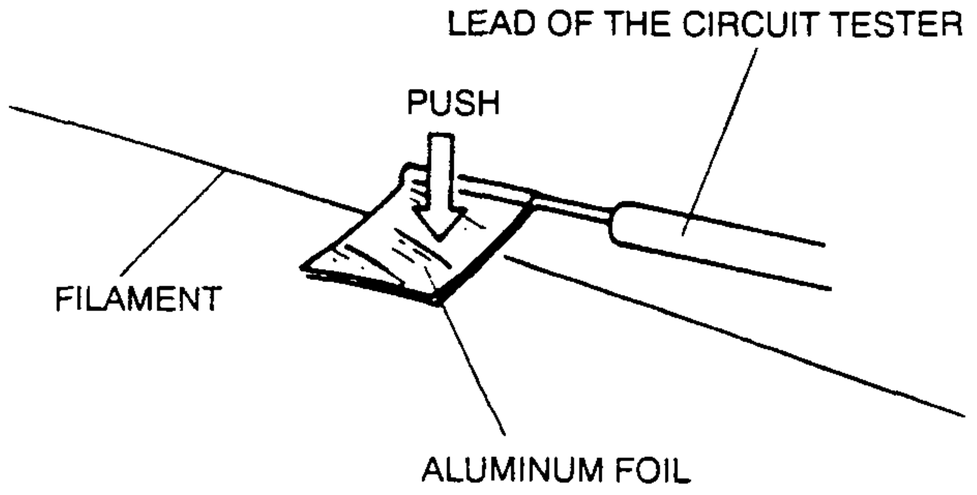
3. Connect battery positive voltage to terminal A and ground to the terminal D.
4. Verify that the LED illuminates.
5. If not as specified, replace the rear window defroster switch.

FILAMENT INSPECTION

1. Turn the ignition switch to ON.
2. Turn the rear window defroster switch on.

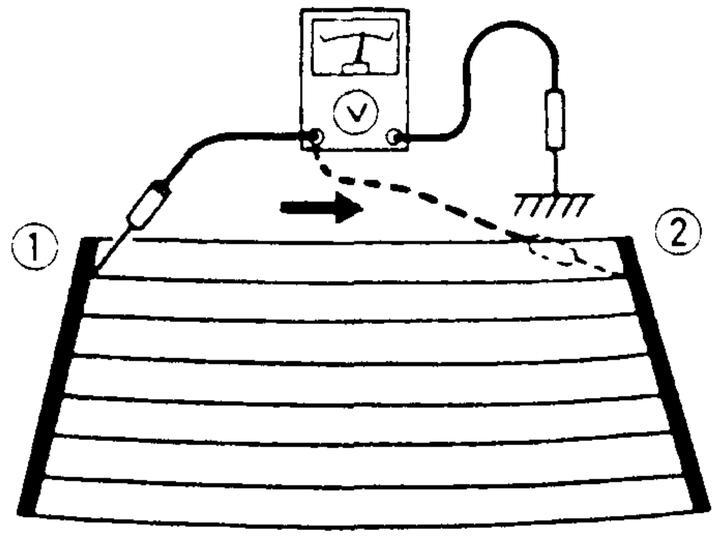
Caution

- **Directly touching the rear window defroster filament with the lead of the circuit tester will damage it. Wrap aluminum foil around the end of the lead and test the filament by touching it with the foil.**



3. Connect the positive (+) lead of the voltmeter to the positive side of each filament and the negative (–) lead to ground.
4. Gradually, slide the positive (+) lead from the positive side to the negative side and measure the voltage. Verify that the voltage decrease accordingly.

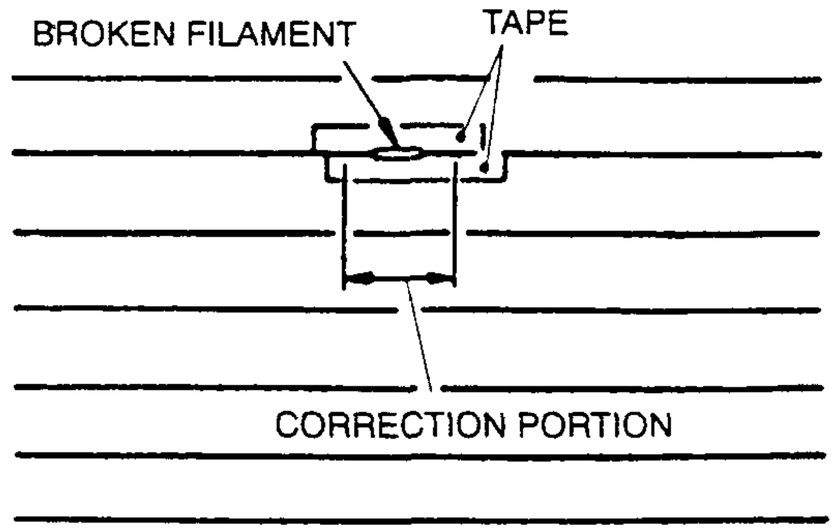
Measurement place	Voltage (Reference value)
①→②	Approx. 12 V →Approx. 0 V



5. If the voltage is not as specified or it changes rapidly, the filament is faulty. Repair the filament.

FILAMENT REPAIR

1. Use white gasoline to clean around the damaged section of the filament.
2. Attach tape above and below the damaged section of the filament.

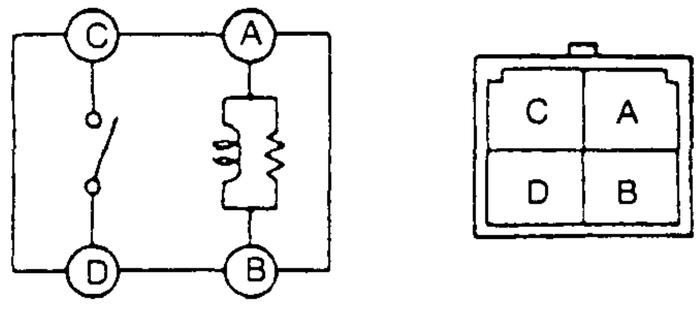


3. Using a small brush or marking pen, repair the filament with silver paint or equivalent.

4. After **approximately 2—3 minutes**, carefully remove the tape without disturbing the repaired area.

Caution
- **Do not use the rear window defroster until the paint is completely dry. It may cause other malfunctions if it is used before the paint is dry.**

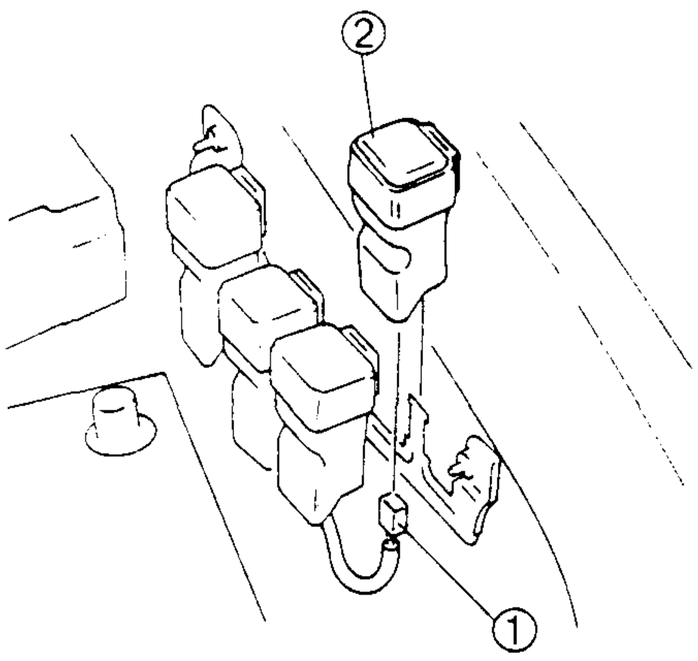
5. Use a hot air blower heated to **150 °C { 302 °F }** for **30 minutes** or let the paint set for **24 hours** at **25 °C { 77 °F }** to allow it to dry completely.



3. If not as specified, replace the rear window defroster relay.

REAR WINDOW DEFROSTER RELAY REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Connector
2	Rear window defroster relay

REAR WINDOW DEFROSTER RELAY INSPECTION

1. Remove the rear window defroster relay. (Refer to REAR WINDOW DEFROSTER RELAY REMOVAL/INSTALLATION)
2. Check for continuity between the rear window defroster relay terminals by using an ohmmeter.

○—○ : Continuity B+: Battery positive voltage

Step	Terminal			
	B	A	D	C
1	○—○			
2	B+	GND	○	—○

WINDOW GLASS

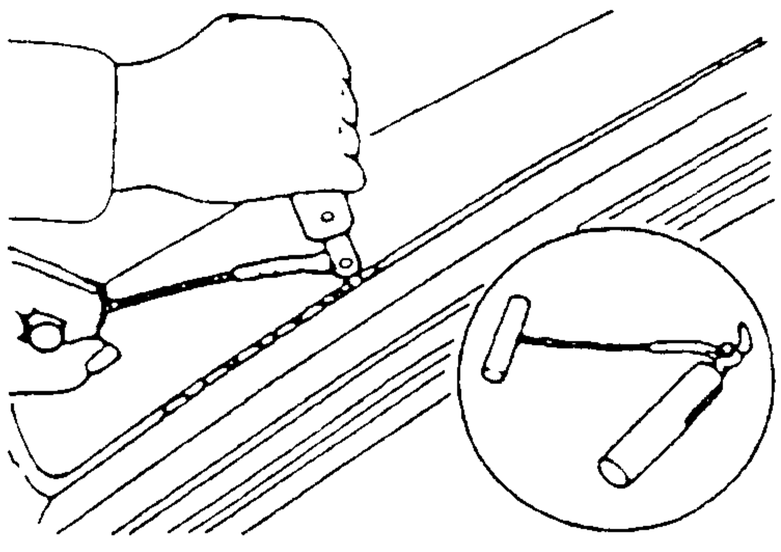
WINDSHIELD REMOVAL

1. Remove the rearview mirror. (Refer to REARVIEW MIRROR, REARVIEW MIRROR REMOVAL.)
2. Remove the A-pillar trim. (Refer to TRIM, A-PILLAR TRIM REMOVAL/INSTALLATION.)
3. Remove the cowl grille. (Refer to EXTERIOR ATTACHMENT, COWL GRILLE REMOVAL/ INSTALLATION.)
4. Remove the windshield molding. (Refer to MOLDING, WINDSHIELD MOLDING REMOVAL.)
5. Apply protective tape along the edge of the body to protect it from damage.
6. Remove the sunvisor, and apply protective tape along the edge of the headliner to protect it from damage.
7. Apply protective tape to the dashboard to protect it from damage.

Not Reusing Windshield

Note
- For the areas of the sealant that are difficult to cut, use a piano wire and follow the procedures under "Reusing Windshield".

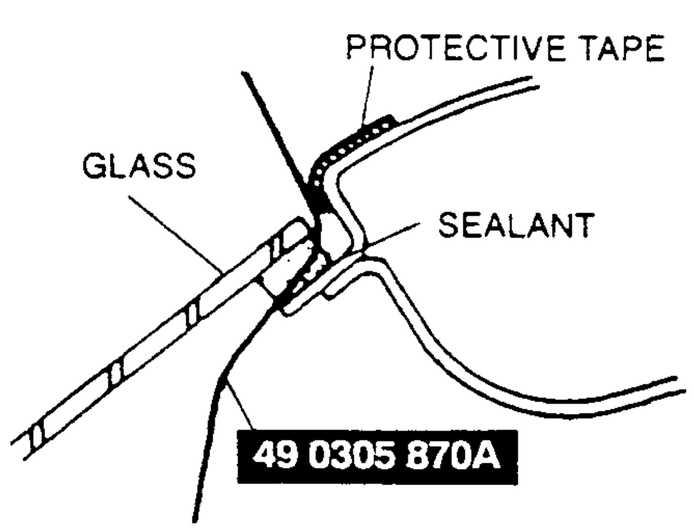
8. Use a tool like that shown in the figure, and insert the blade into the sealant.
9. Pull through the sealant around the edge of the glass.



10. Remove the glass.

Reusing Windshield

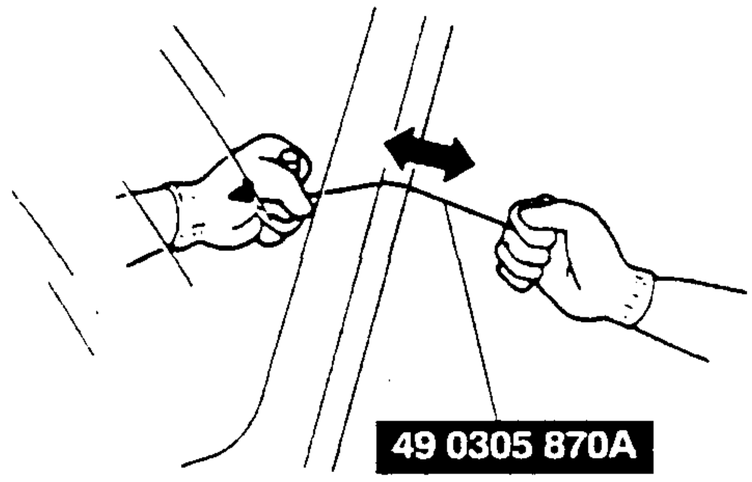
7. Make a hole through the sealant from the inside of the vehicle by using an awl.
8. Pass the **SST** (piano wire) through the hole.



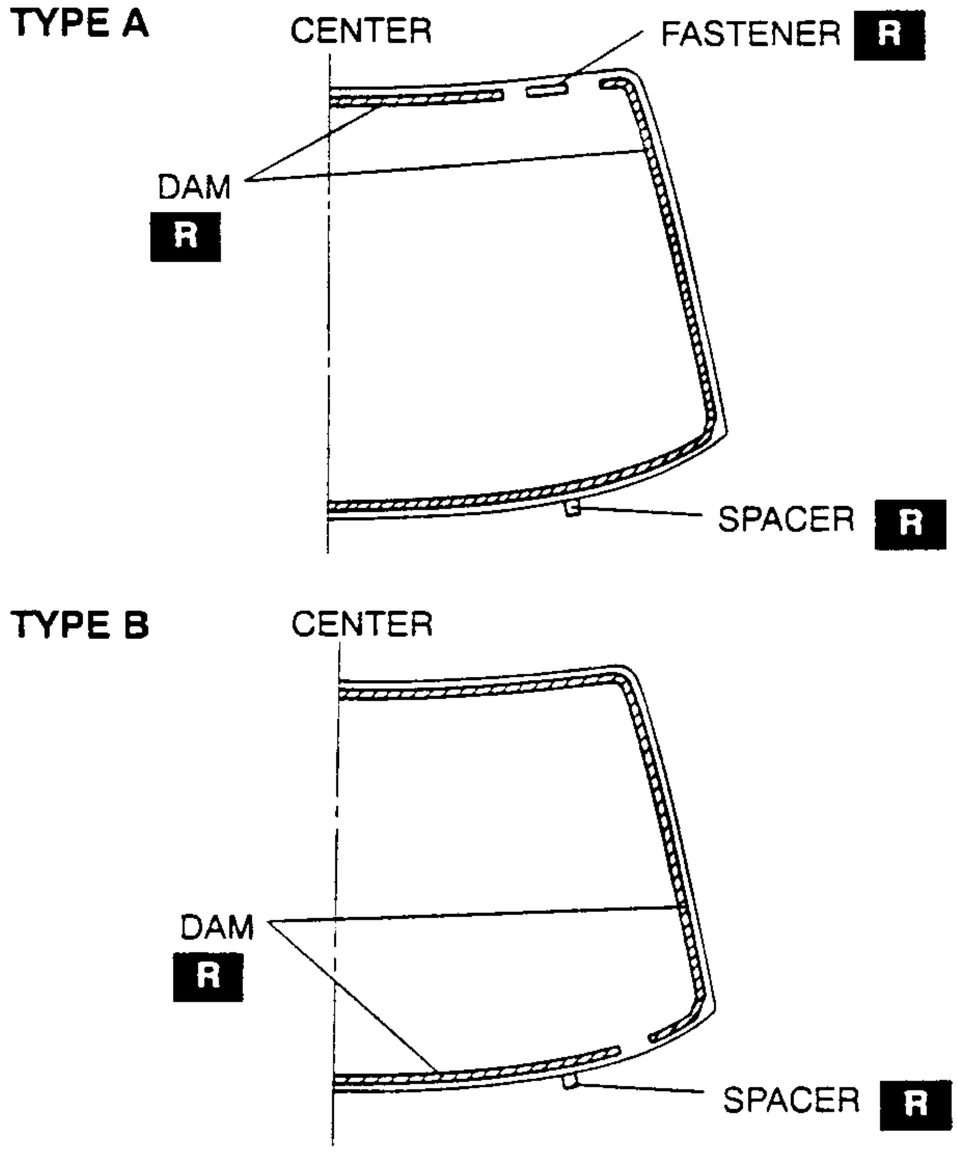
9. Wind each end of the wire around a bar.

Note
- Use the entire length of piano wire to prevent it from breaking when cutting through the sealant.

11. Working with another person, saw through the sealant around the edge of the glass, being careful to not damage the vehicle body or the dashboard.



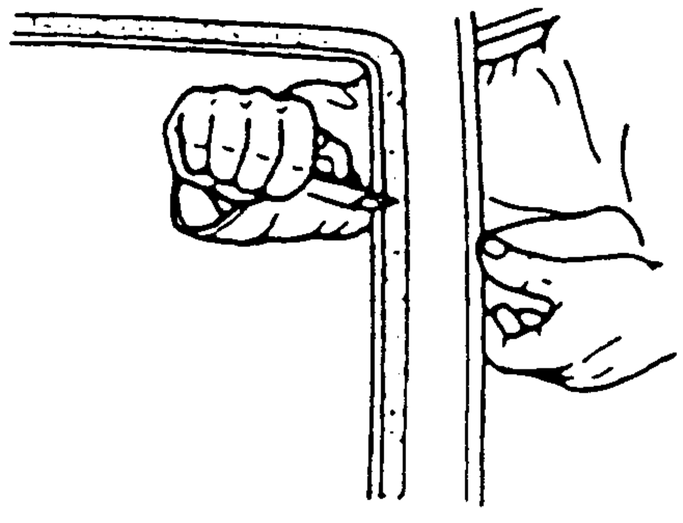
12. Remove the windshield.
13. Remove the spacers, fastener and dam.



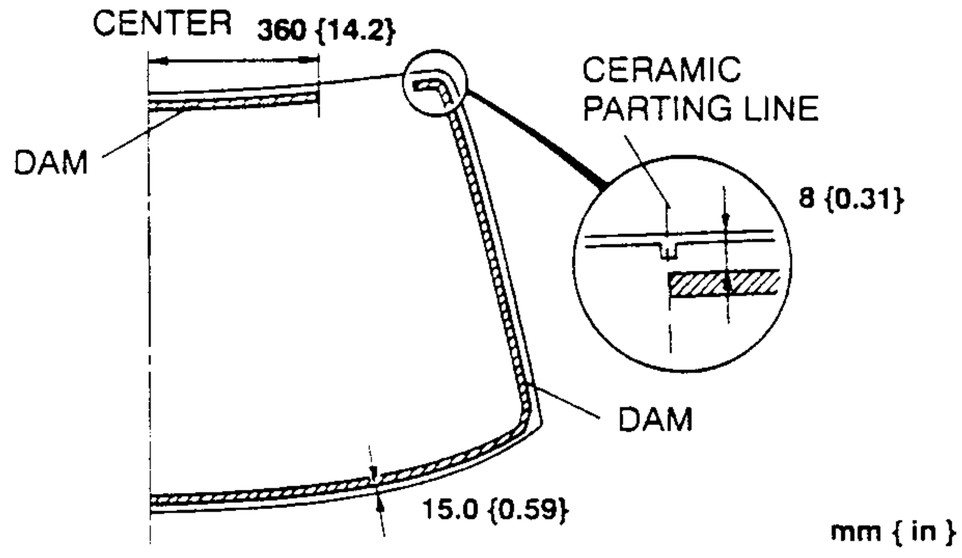
WINDSHIELD INSTALLATION

Caution
- **To prevent the sealant from cracking or the glass from being pushed out by air pressure if a door is closed, open all of the windows and leave them open until the sealant has hardened.**

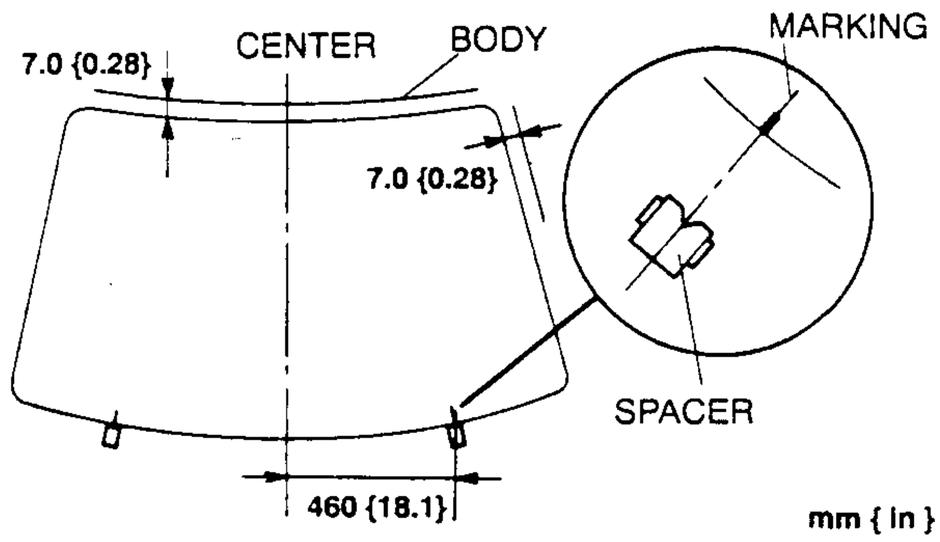
1. Cut away the old sealant by using a razor knife so that **1—2 mm {0.04—0.07 in }** thickness of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply some primer after degreasing, and allow it **30 minutes** to dry. Then put on new sealant to create a **2 mm {0.08 in }** layer.



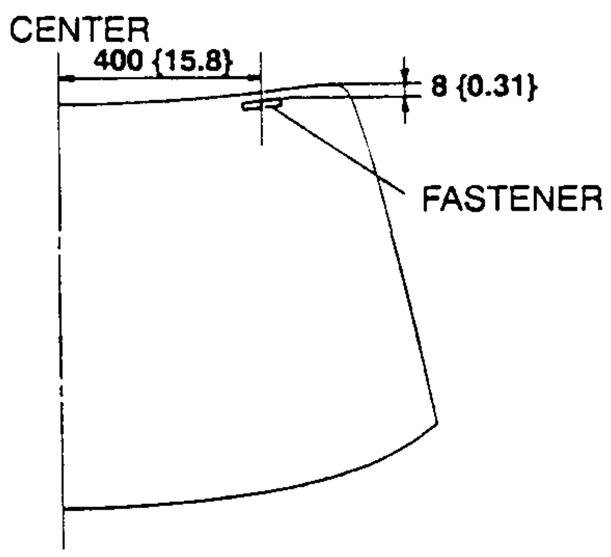
2. Clean and degrease an **approximately 50 mm {1.97 in }** wide strip around the circumference of the glass and the bonding area on the body.
3. Securely bond a dam along the circumference of the glass **8 mm {0.31 in }** from the upper and side edge and **15 mm {0.59 in }** from the lower edge.



4. Install spacers into the hole.
5. Temporarily install the glass onto the body and adjust the glass-to-body clearance.
6. Make a mark on the glass directly above the V-notch of spacers.
7. Verify that the gap along the upper and side edge is **7.0 mm {0.28 in }**.



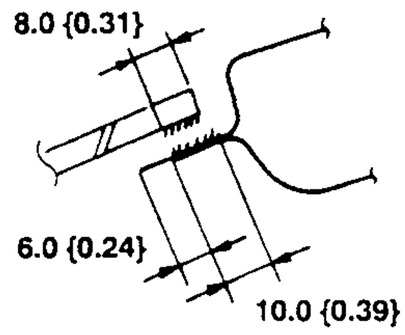
8. Remove the windshield.
9. Install the fasteners on the glass and body as shown.

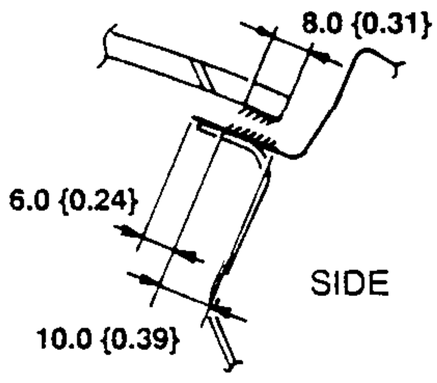


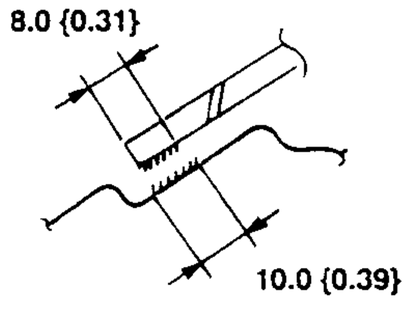
Caution

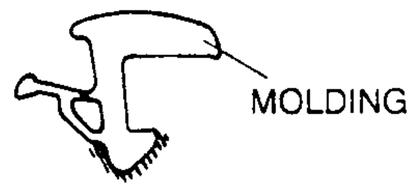
- **Keep the area free of dirt and grease, and do not touch the surface or the primer may not properly bond to the surface of the glass and body which may cause leaks to occur.**

10. Use a brush to apply primer to the bonding area of the glass and body within the region shown. Use only glass primer on the glass and body primer on the body and molding. Allow it to dry for **approximately 30 minutes.**

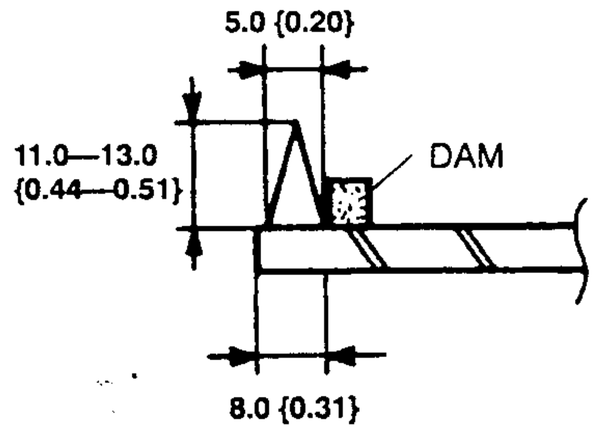




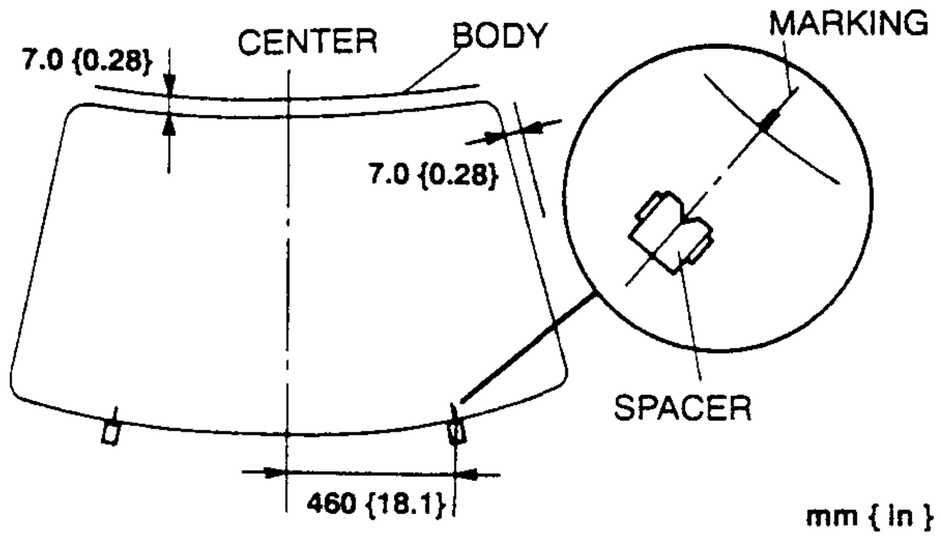




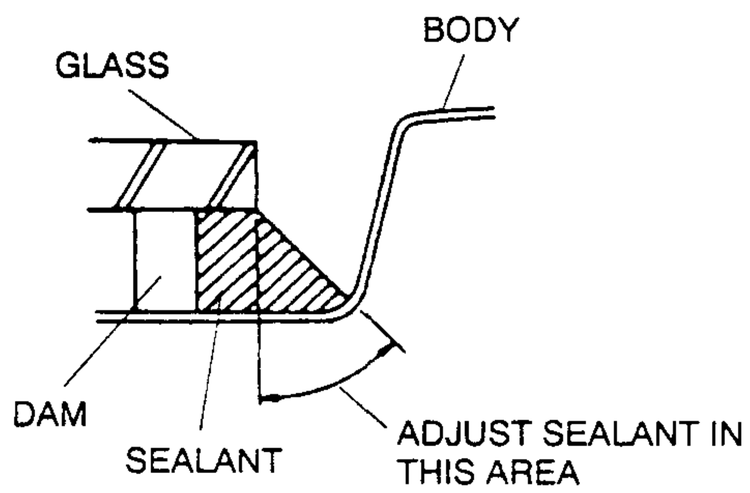
11. Once the primer is dry, apply sealant around the entire circumference to fill the gap between the dam and the edge of the glass with a **11—13 mm {0.44—0.51 in }** high **5 mm {0.2 in }** wide bead of sealant.



12. Align the glass marks with the V-notches in spacers and install the glass onto the body.
13. Press firmly inward on the glass to compress the sealant.
14. Verify that the gap along the upper and side edge is **7.0 mm {0.28 in }**.



15. Use a scraper to smooth away any sealant that oozes out. Add more sealant to any points of poor contact. Adjust the sealant as shown if necessary.



16. Before the surface of the sealant has hardened, install the windshield molding. (Refer to MOLDING, WINDSHIELD MOLDING INSTALLATION.)

Hardening time of sealant

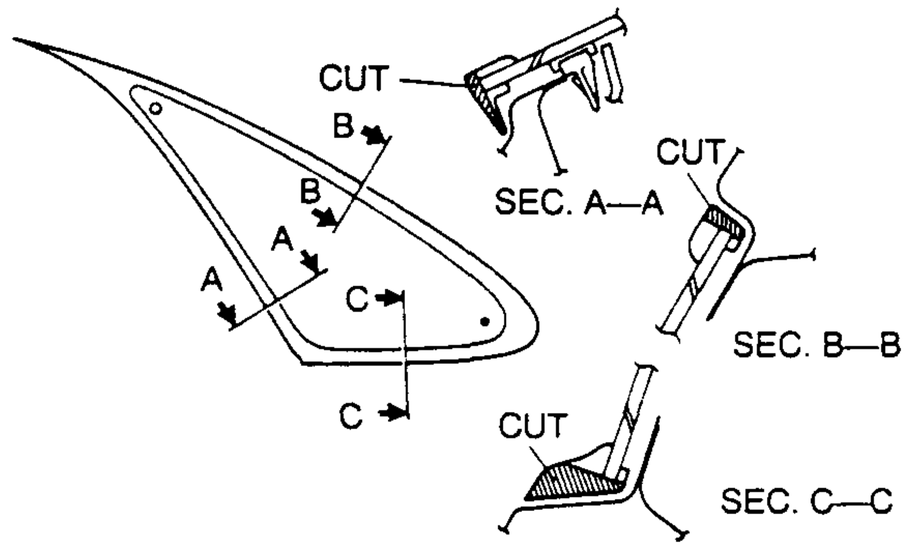
Temperature	Surface hardening time	Time required until car can be put into service
5 °C {41 °F }	Approx. 1.5 h	Approx. 12 h
20 °C {68 °F }	Approx. 1 h	Approx. 4 h
35 °C {95 °F }	Approx. 10 min	Approx. 2 h

17. Use white gasoline to remove any sealant that oozes out.
18. Check for water leaks. If a leak is found, wipe the water off well and add sealant where needed.
19. Install the cowl grille. (Refer to EXTERIOR ATTACHMENT, COWL GRILLE REMOVAL/INSTALLATION.)
20. Install the A-pillar trim. (Refer to TRIM, A-PILLAR TRIM REMOVAL/INSTALLATION.)
21. Install the rearview mirror.

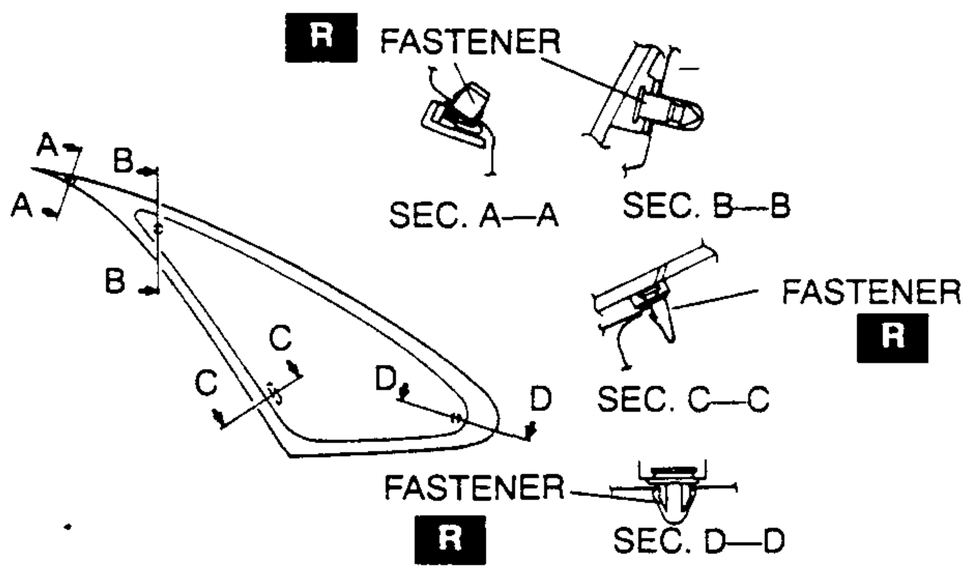
QUARTER WINDOW GLASS REMOVAL 5HB

Note
- Quarter window glass is a replacement part.

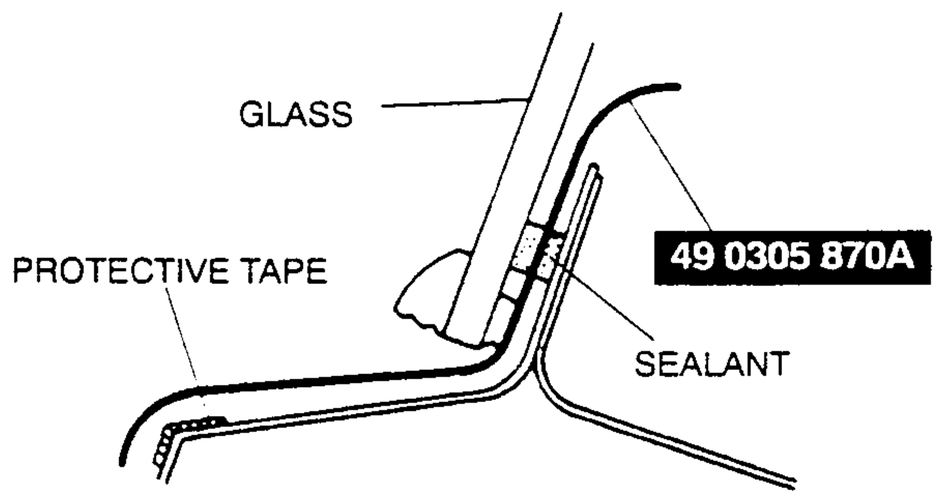
1. Remove the C-pillar trim. (Refer to TRIM, C-PILLAR TRIM REMOVAL/INSTALLATION, 5HB.)
2. Apply protective tape along the edge of body to protect it from damage.
3. Remove the lip of the quarter window molding by using a razor knife.



Note
- There are fasteners installed in the areas indicated in the figure.



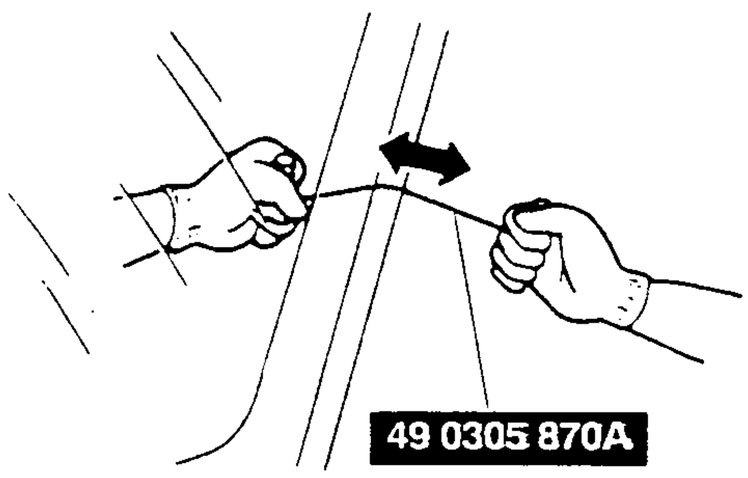
4. Make a hole through the sealant from the inside of the vehicle by using an awl.
5. Pass the **SST** (piano wire) through the hole.



6. Wind each end of the wire around a bar.

Note
- Use the entire length of piano wire to prevent it from breaking when cutting through the sealant.

7. Working with another person, saw through the sealant around the edge of the glass, being careful to not damage the vehicle body.



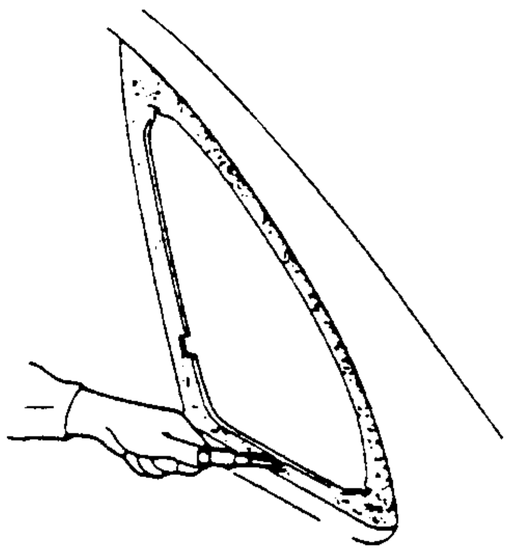
8. Remove the quarter window glass.
9. Remove the fasteners.

QUARTER WINDOW GLASS INSTALLATION 5HB

Caution

- **To prevent the sealant from cracking or the glass from being pushed out by air pressure if a door is closed, open all of the windows and leave them open until the sealant has hardened.**

1. Cut away the old sealant by using a razor knife so that **1—2 mm {0.04—0.07 in }** thickness of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply some primer after degreasing, and allow it **30 minutes** to dry. Then put on new sealant to create a **2 mm {0.08 in }** layer.

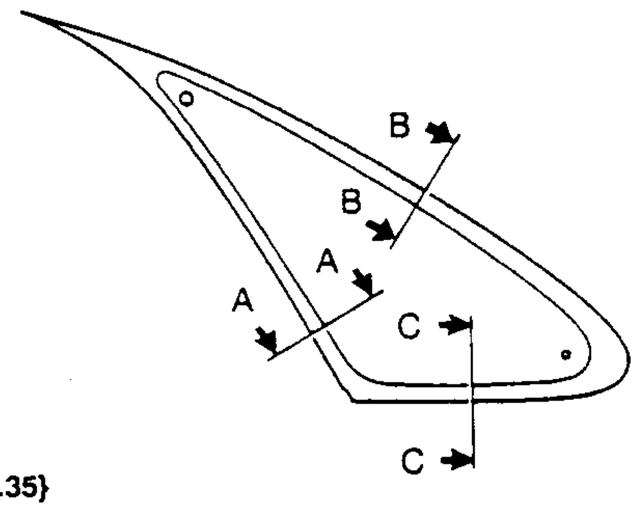


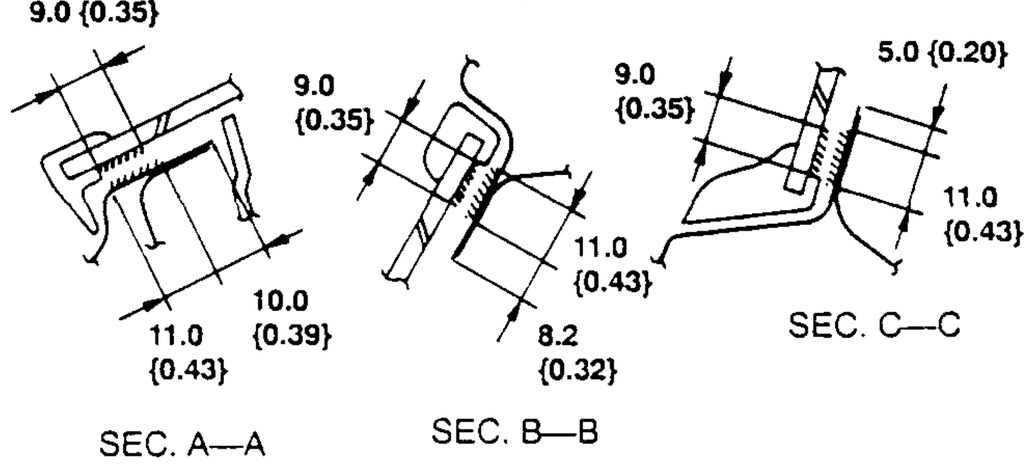
2. Clean and degrease the ceramic part of the glass and around the circumference of the bonding area on the body.

Caution

- **Keep the area free of dirt and grease, and do not touch the surface or the primer may not properly bond to the surface of the glass and body which may cause leaks to occur.**

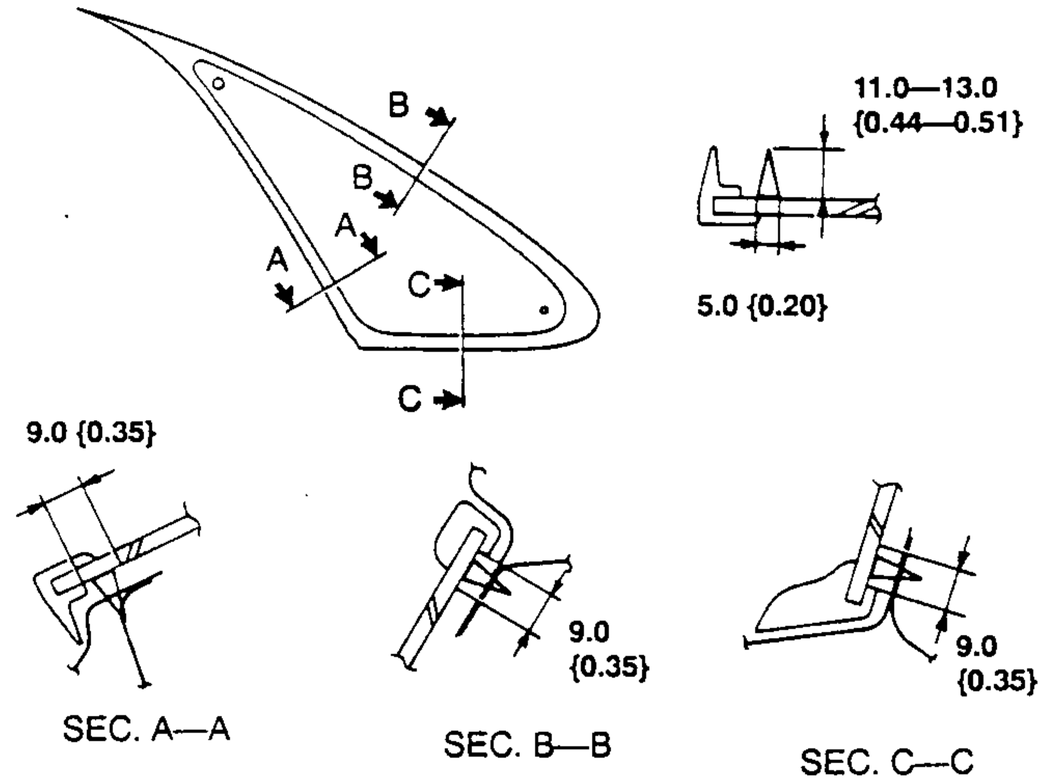
3. Use a brush to apply primer to the bonding area of the glass and body within the region shown. Use only glass primer on the glass and body primer on the body. Allow it to dry for **approximately 30 minutes**.





mm { in }

4. Once the primer is dry, apply sealant around the entire circumference with a **11.0—13.0 mm {0.44–0.51 in }** high **5.0 mm {0.20 in }** wide bead of sealant.



mm { in }

5. Align the fasteners and install the glass onto the body.
6. Press firmly inward on the glass to compress the sealant.

Hardening time of sealant

Temperature	Surface hardening time	Time required until car can be put into service
5 °C {41 °F }	Approx. 1.5 h	Approx. 12 h
20 °C {68 °F }	Approx. 1 h	Approx. 4 h
35 °C {95 °F }	Approx. 10 min	Approx. 2 h

7. Check for water leaks. If a leak is found, wipe the water off well and repeat the installation.
8. Install the C-pillar trim. (Refer to TRIM, C-PILLAR TRIM REMOVAL/INSTALLATION, 5HB.)

REAR WINDOW GLASS REMOVAL

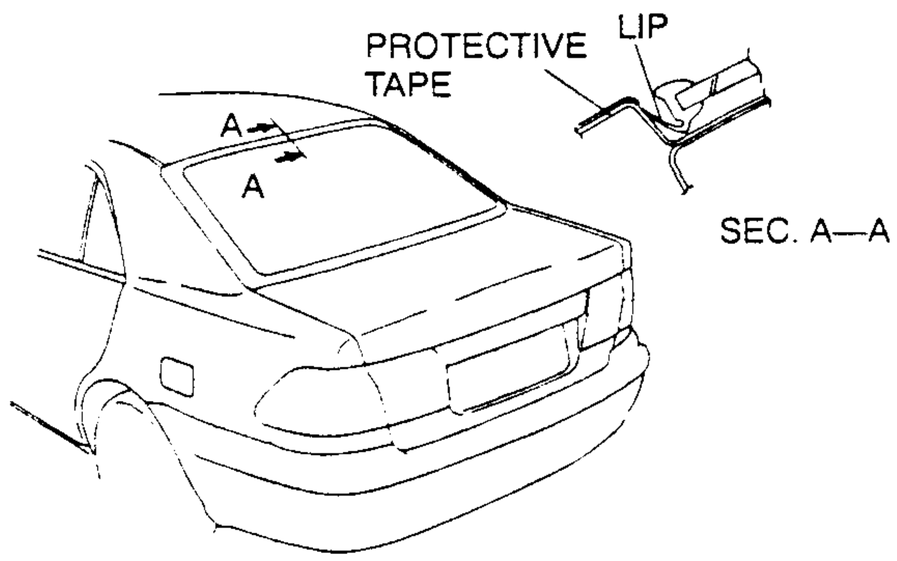
Sedan

1. Disconnect the negative battery cable.
2. Remove the C-pillar trim. (Refer to TRIM, C-PILLAR TRIM REMOVAL/INSTALLATION, Sedan.)
3. Remove the rear package trim. (Refer to TRIM, REAR PACKAGE TRIM REMOVAL/ INSTALLATION, Sedan.)
4. Apply protective tape along the edge of the headliner to protect it from damage.
5. Apply protective tape along the edge of body to protect it from damage.

Note

- The rear window molding is a replacement part.

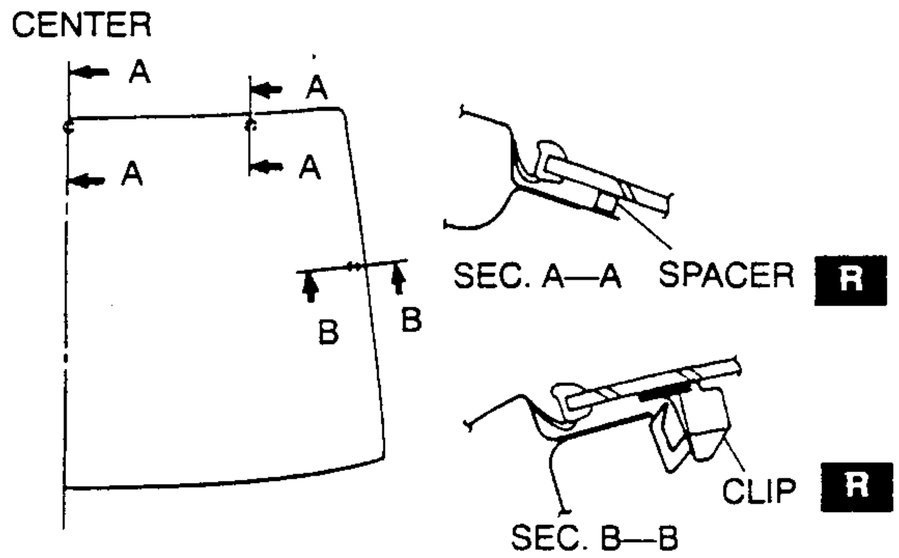
6. Remove the lip of the rear window molding by using a razor knife.



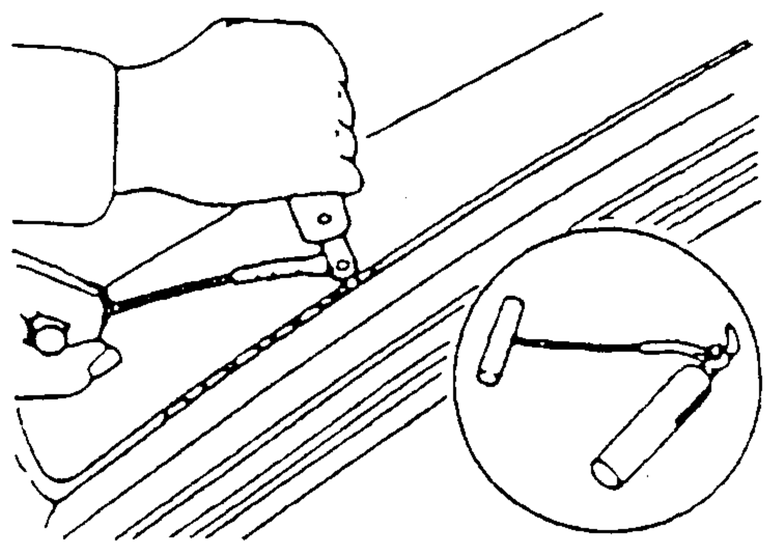
Not reusing rear window glass

Note

- For the areas of the sealant that are difficult to cut, use a piano wire and follow the procedures under "Reusing rear window glass".
- There are clips and spacers installed in the areas indicated in the figure.



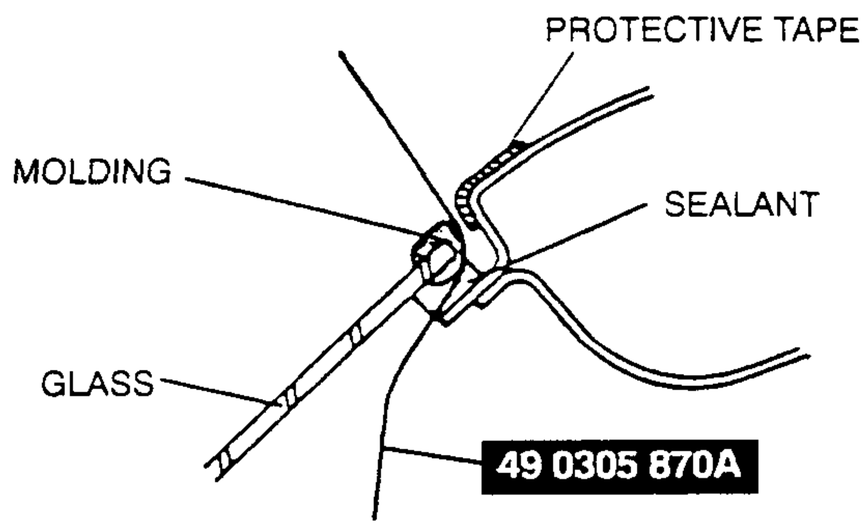
7. Use a tool like that shown in the figure, and insert the blade into the sealant.
8. Pull through the sealant around the edge of the glass.



9. Remove the glass.

Reusing rear window glass

7. Make a hole through the sealant from the inside of the vehicle by using an awl.
8. Pass the **SST** (piano wire) through the hole.

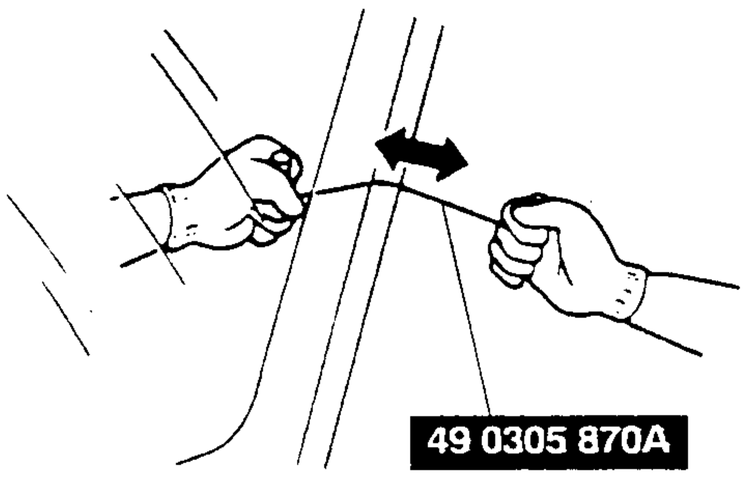


9. Wind each end of the wire around a bar.

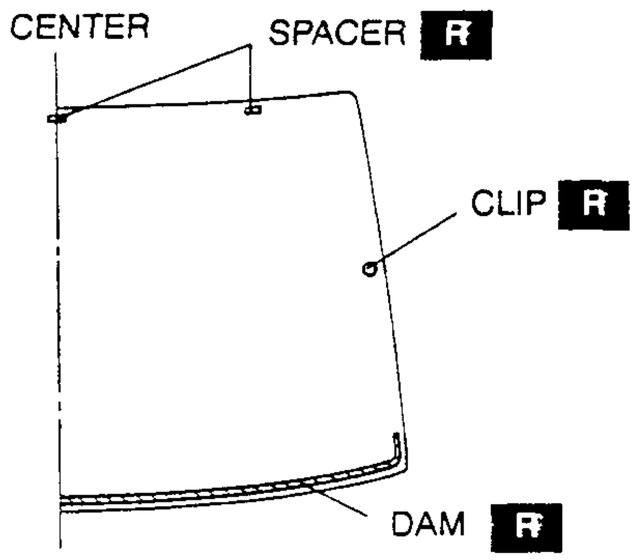
Note

- Use the entire length of piano wire to prevent it from breaking when cutting through the sealant.

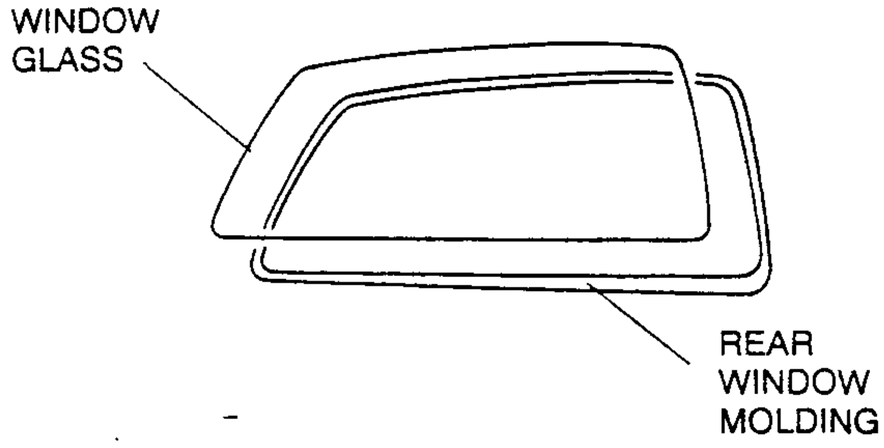
10. Working with another person, saw through the sealant around the edge of the glass, being careful to not damage the vehicle body.



11. Remove the rear window glass.
12. Remove the clips, spacers and dam.



13. Remove the clips from the body.
14. Remove the rear window molding from the rear window glass.



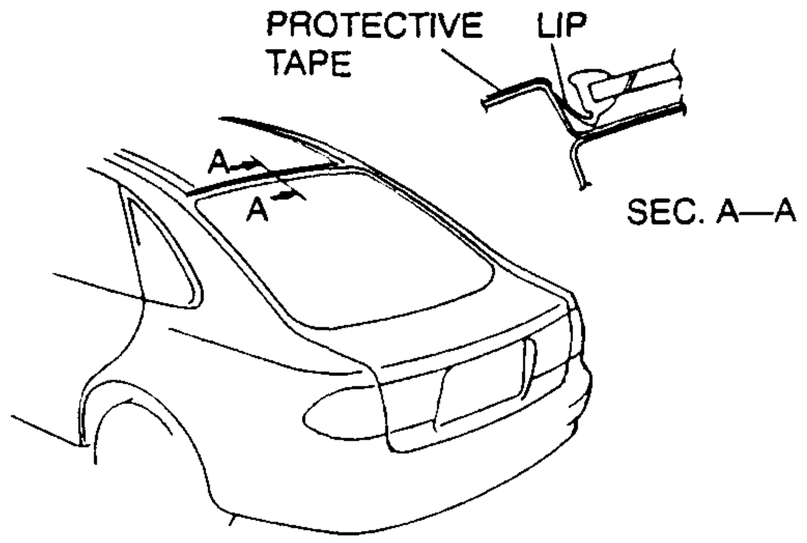
5HB

1. Disconnect the negative battery cable.
2. Remove the liftgate lower trim. (Refer to TRIM, LIFTGATE LOWER TRIM REMOVAL/INSTALLATION.)
3. Remove the rear wiper arm and blade. (Refer to section T, WIPER AND WASHER, REAR WIPER ARM AND BLADE REMOVAL/INSTALLATION.)
4. Remove the seaming weit.
5. Apply protective tape along the edge of the body to protect it from damage.

Note

- The rear window molding is replacement part.

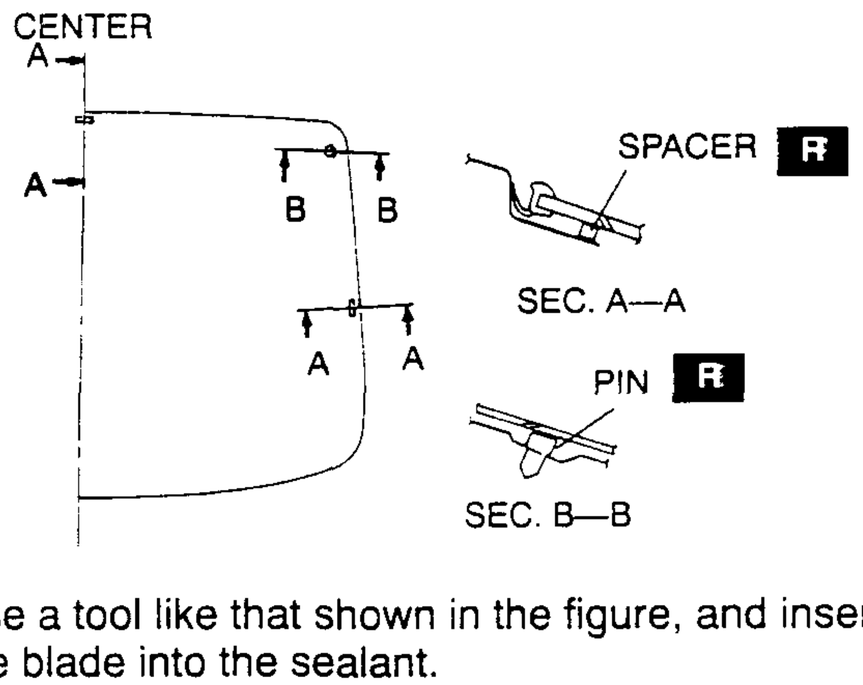
6. Remove the lip of the rear window molding by using a razor knife.



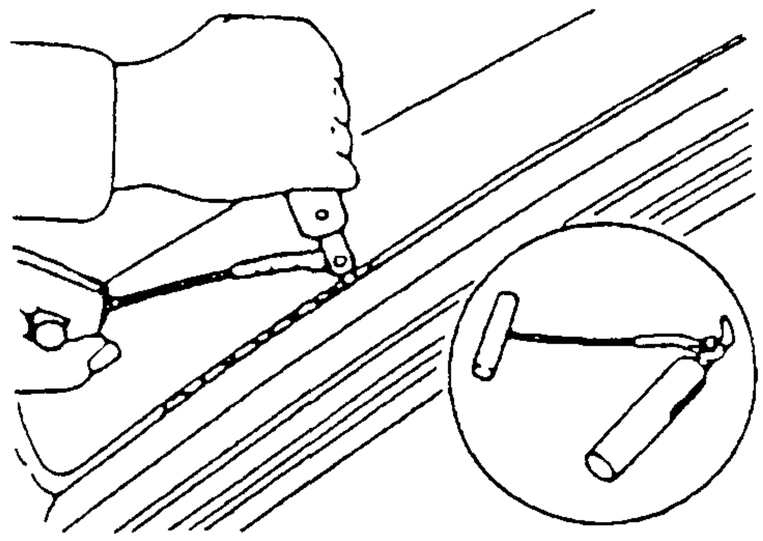
Not reusing rear window glass

Note

- For the areas of the sealant that are difficult to cut, use a piano wire and follow the procedures under "Reusing rear window glass".
- There are pins and spacers installed in the areas indicated in the figure.



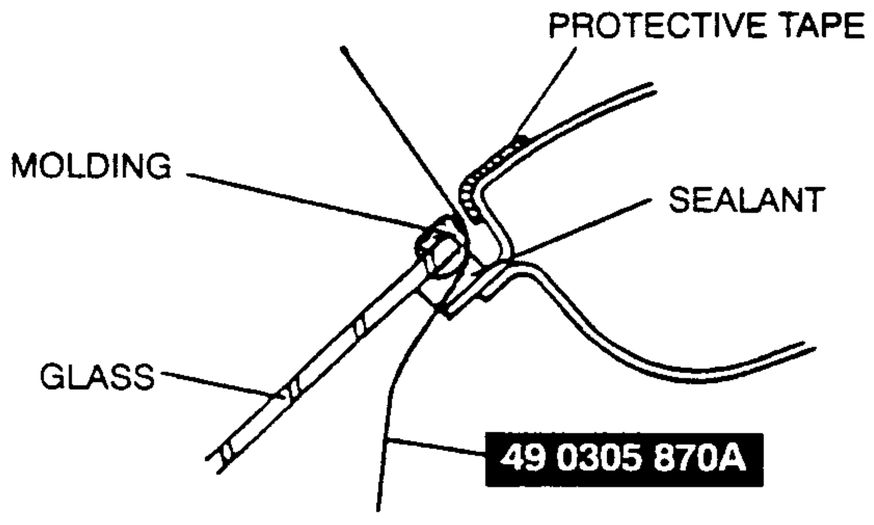
7. Use a tool like that shown in the figure, and insert the blade into the sealant.
8. Pull through the sealant around the edge of the glass.



9. Remove the glass.

Reusing rear window glass

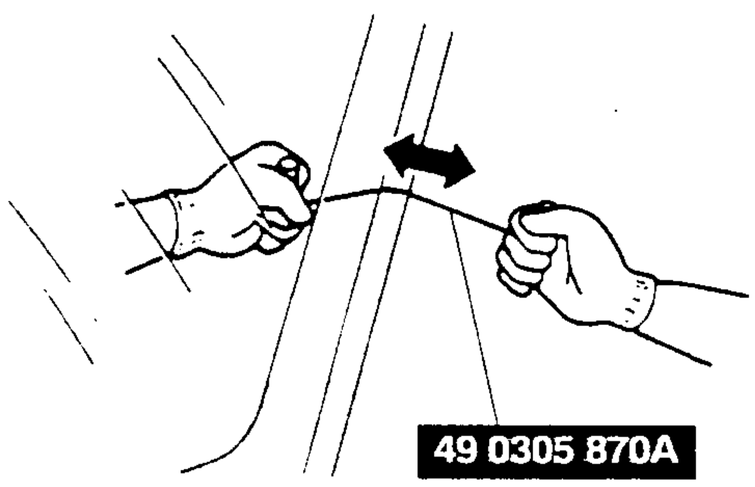
7. Make a hole through the sealant from the inside of the vehicle by using an awl.
8. Pass the **SST** (piano wire) through the hole.



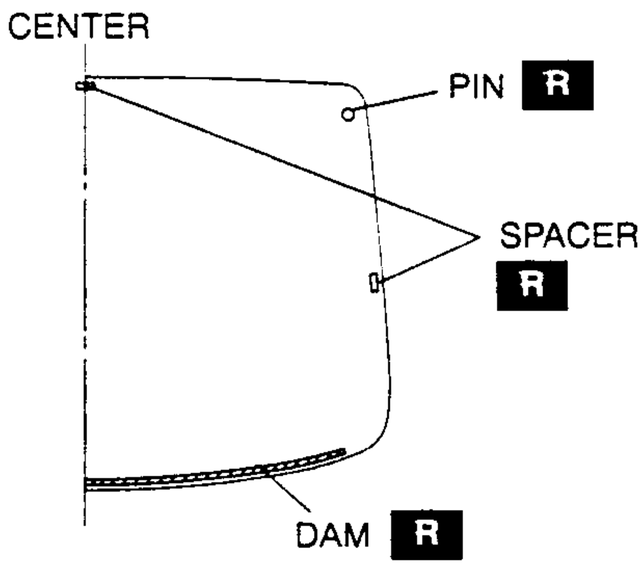
9. Wind each end of the wire around a bar.

Note
- Use the entire length of piano wire to prevent it from breaking when cutting through the sealant.

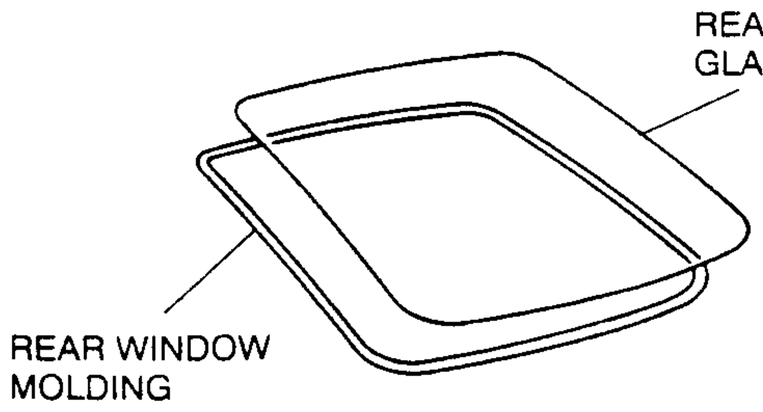
10. Working with another person, saw through the sealant around the edge of the glass, being careful to not damage the vehicle body.



11. Remove the rear window glass.
12. Remove the pins, spacers and dam.



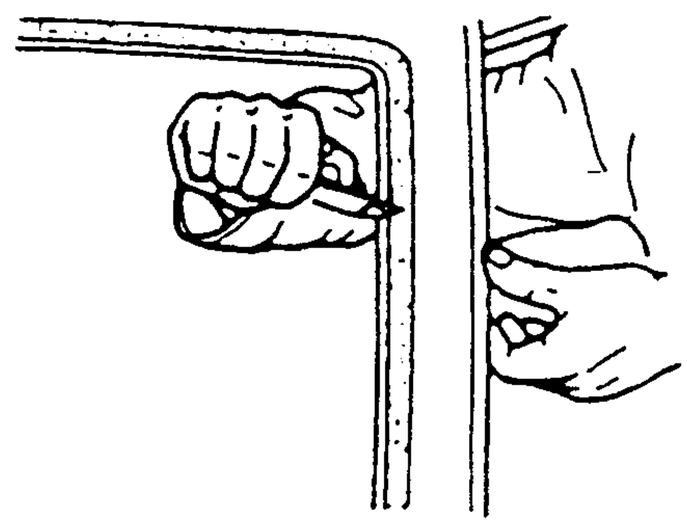
13. Remove the pins from the body.
14. Remove the rear window molding from the rear window glass.



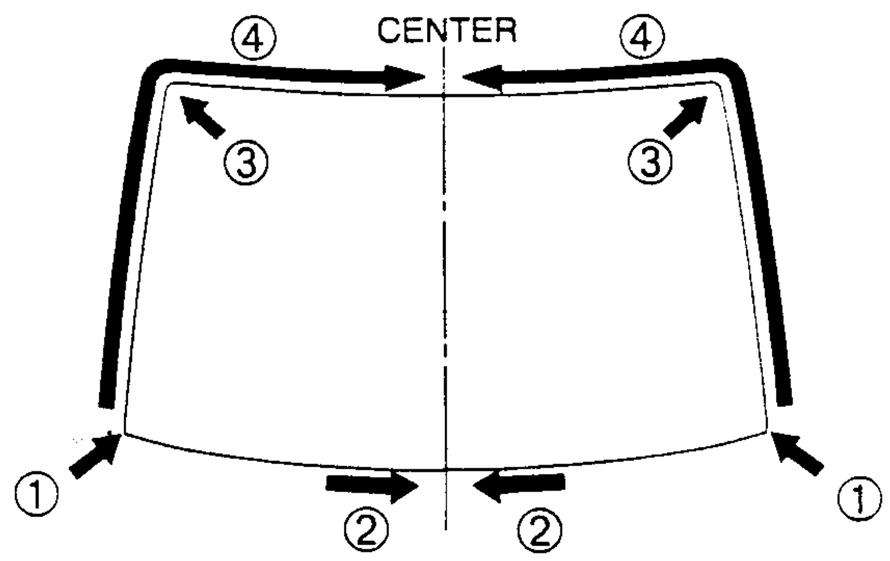
REAR WINDOW GLASS INSTALLATION
Sedan

Caution
- **To prevent the sealant from cracking or the glass from being pushed out by air pressure if a door is closed, open all of the windows and leave them open until the sealant has hardened.**

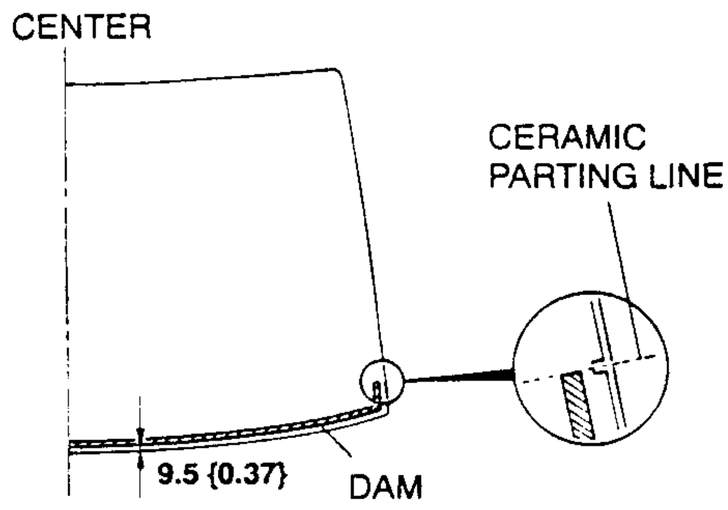
1. Cut away the old sealant by using a razor knife so that **1—2 mm {0.04—0.07 in }** thickness of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply some primer after degreasing, and allow it **30 minutes** to dry. Then put on new sealant to create a **2 mm {0.08 in }** layer.



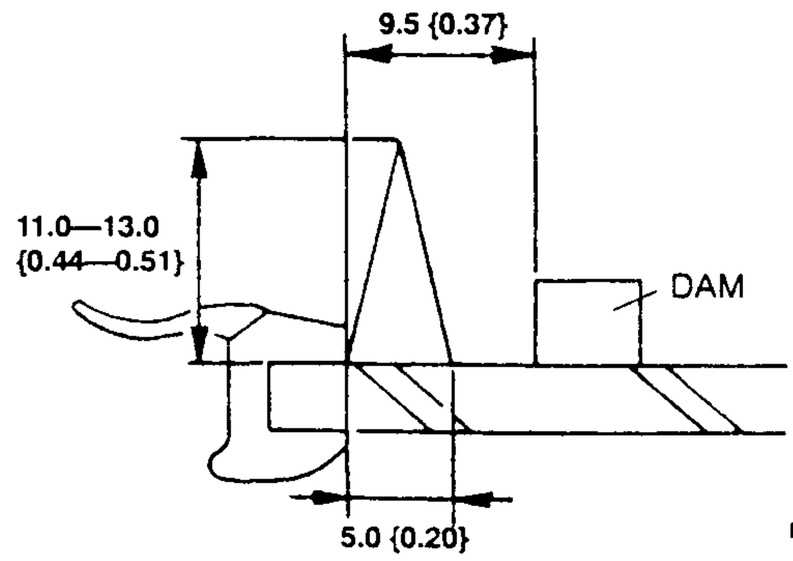
2. Clean and degrease an **approximately 50 mm {1.97 in }** wide strip around the circumference of the glass and the bonding area on the body.
3. Align the lower corners of the molding with that of glass. (①)
4. Install the lower, starting from the outer ends and moving inward. (②)
5. Align the marking of the molding with the ceramic parting line on the glass. (③)
6. Install the sides and upper, starting from the lower edge and moving upward and inward, being careful to not pull out the corners. (④)



7. Securely bond a dam on the lower side of the glass **9.5 mm {0.37 in }** from the edge.

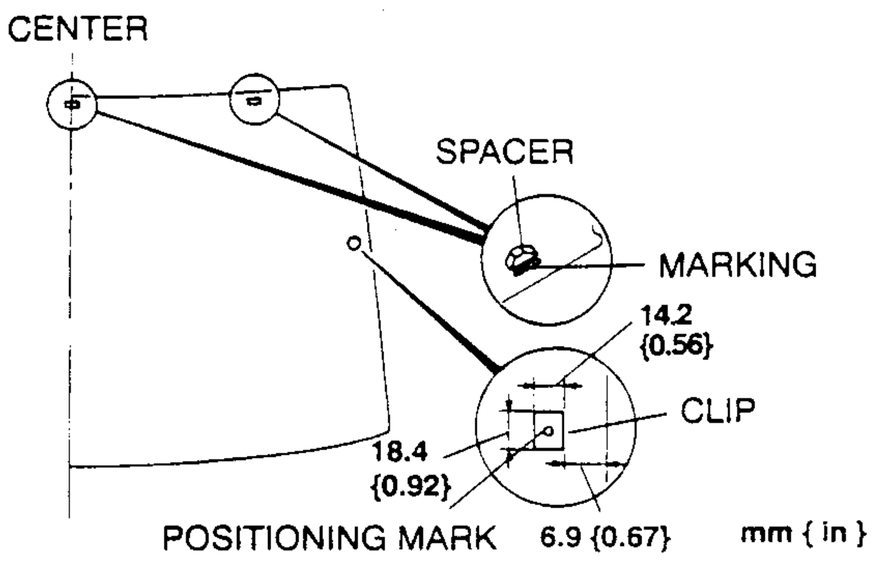


mm { in }



mm { in }

8. Install the clips and spacers onto the glass as shown.

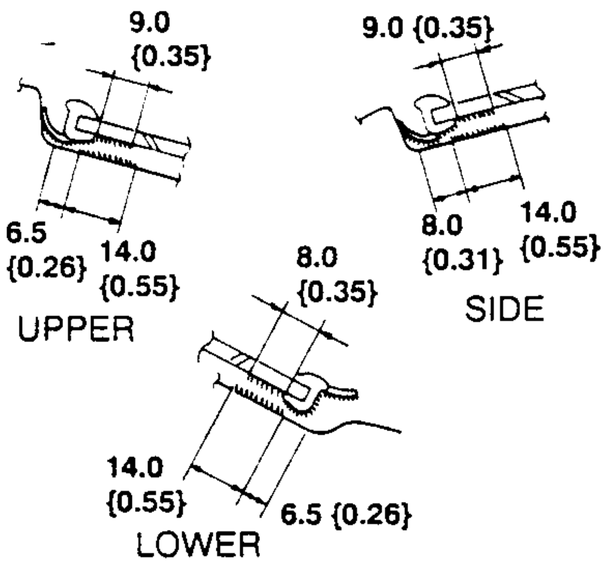


mm { in }

Caution

- **Keep the area free of dirt and grease, and do not touch the surface or the primer may not properly bond to the surface of the glass and body which may cause leaks to occur.**

9. Use a brush to apply primer to the bonding area of the glass and body within the region shown. Use only glass primer on the glass and body primer on the body. Allow it to dry for **approximately 30 minutes**.



mm { in }

10. Once the primer is dry, apply sealant around the entire circumference to fill the gap between the dam and the edge of the glass with a **11—13 mm {0.44—0.51 in }** high **5 mm {0.20 in }** wide bead of sealant.
11. Align the clips and install the glass on the body.
12. Press firmly inward on the glass to compress the sealant.

Hardening time of sealant

Temperature	Surface hardening time	Time required until car can be put into service
5 °C {41 °F }	Approx. 1.5 h	Approx. 12 h
20 °C {68 °F }	Approx. 1 h	Approx. 4 h
35 °C {95 °F }	Approx. 10 min	Approx. 2 h

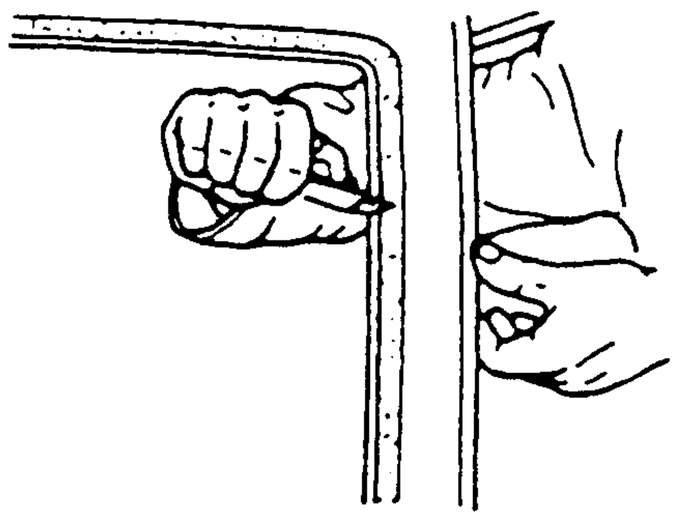
13. Check for water leaks. If the leak is found, wipe the water off well and repeat the installation.
14. Install the rear package trim. (Refer to TRIM, REAR PACKAGE TRIM REMOVAL/INSTALLATION, Sedan.)
15. Instal the C-pillar trim. (Refer to TRIM, C-PILLAR TRIM REMOVAL/INSTALLATION, Sedan.)

5HB

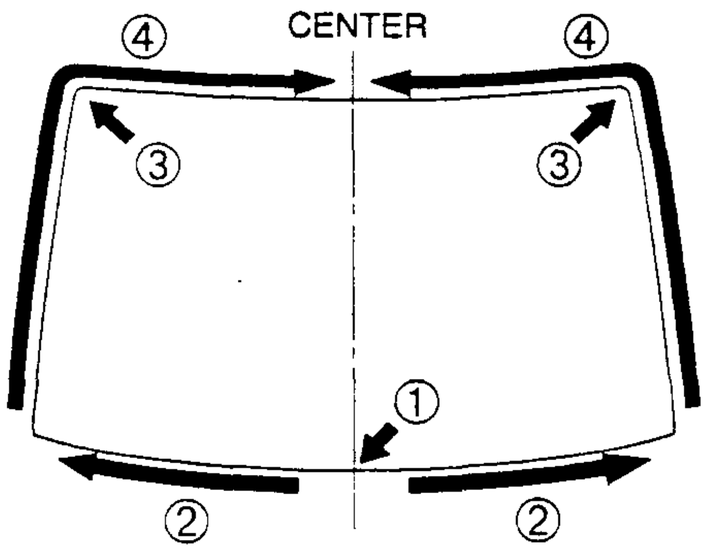
Caution

- **To prevent the sealant from cracking or the glass from being pushed out by air pressure if a door is closed, open all of the windows and leave them open until the sealant has hardened.**

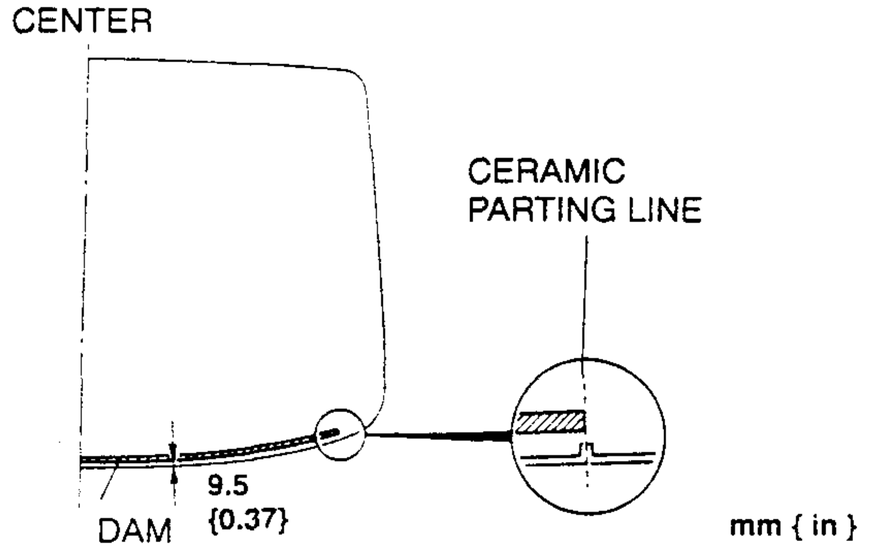
1. Cut away the old sealant by using a razor knife so that **1—2 mm {0.04—0.07 in }** thickness of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply some primer after degreasing, and allow it **30 minutes** to dry. Then put on new sealant to create a **2 mm {0.08 in }** layer.



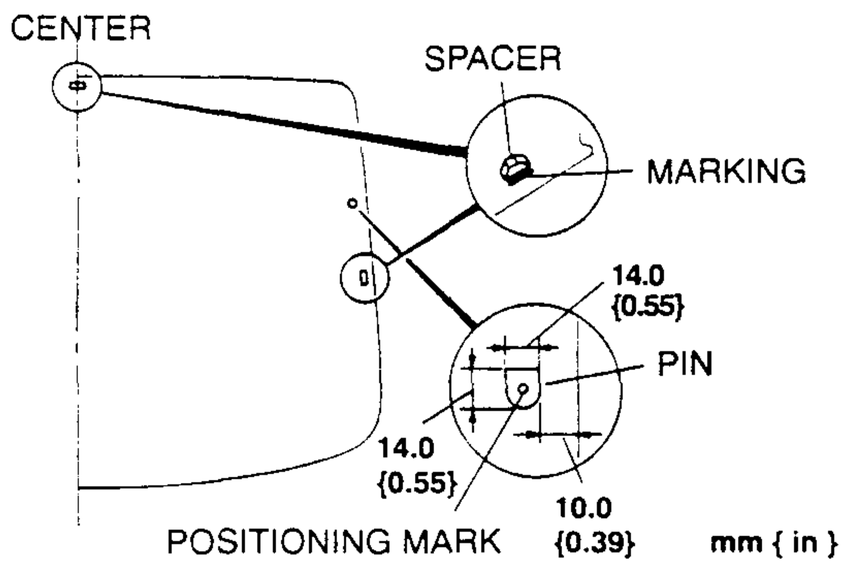
2. Clean and degrease an **approximately 50 mm {1.97 in }** wide strip around the circumference of the glass and the bonding area on the body.
3. Align the weld joint of the molding with the ceramic parting line on the glass. (①)
4. Install the lower, starting from the center and moving outward. (②)
5. Align the marking of the molding with the ceramic parting line on the glass. (③)
6. Install the sides and upper, starting from the lower edge and moving upward and inward, being careful to not pull out the corners. (④)



7. Securely bond a dam on the lower side of the glass **9.5 mm {0.37 in }** from the edge.



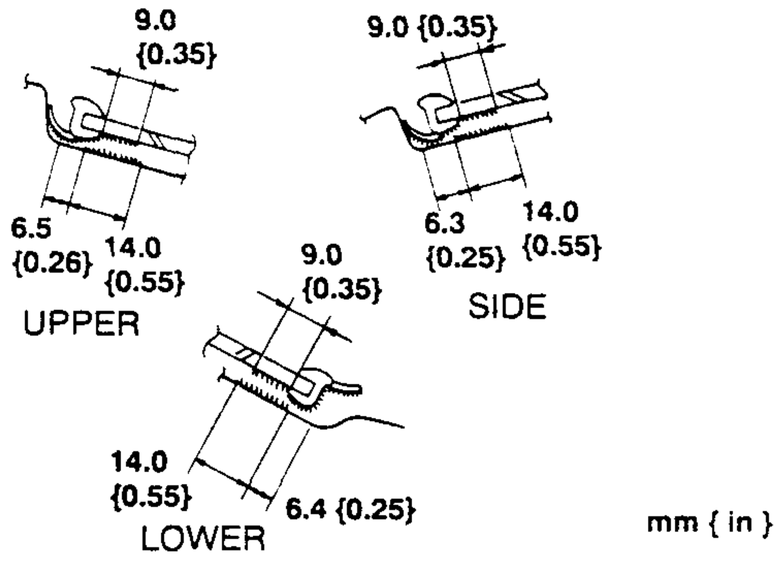
8. Install the pins and spacers onto the glass as shown.



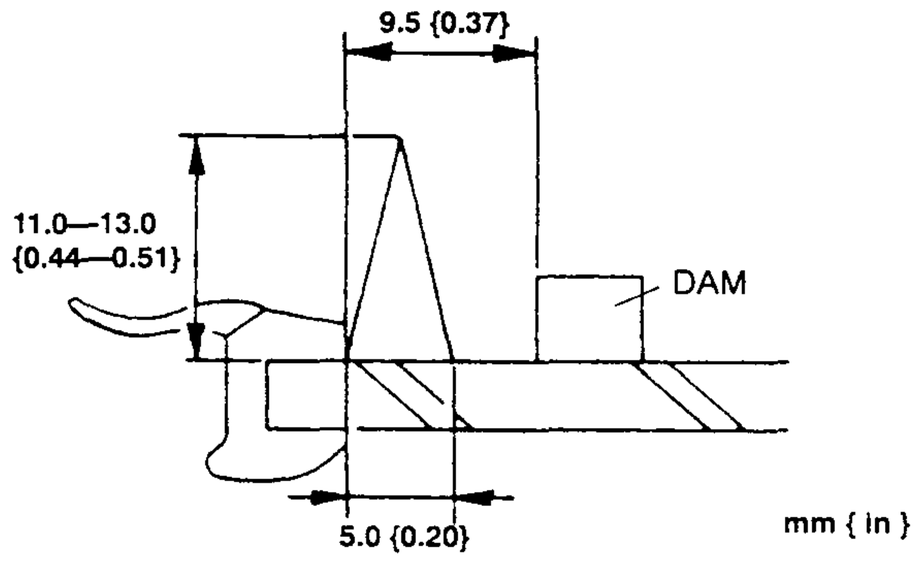
Caution

- **Keep the area free of dirt and grease, and do not touch the surface or the primer may not properly bond to the surface of the glass and body which may cause leaks to occur.**

9. Use a brush to apply primer to the bonding area of the glass and body within the region shown. Use only-glass primer on the glass and body primer on the body. Allow it to dry for **approximately 30 minutes**.



10. Once the primer is dry, apply sealant around the entire circumference to fill the gap between the dam and the edge of the glass with a **11—13 mm {0.44—0.51 in }** high **5 mm {0.20 in }** wide bead of sealant.



11. Align the pins and install the glass on the body.
12. Press firmly inward on the glass to compress the sealant.

Hardening time of sealant

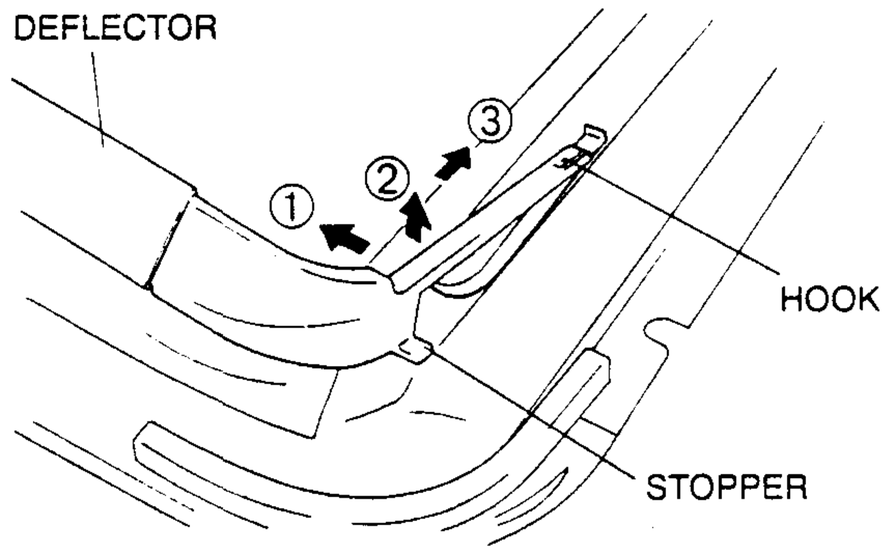
Temperature	Surface hardening time	Time required until car can be put into service
5 °C {41 °F }	Approx. 1.5 h	Approx. 12 h
20 °C {68 °F }	Approx. 1 h	Approx. 4 h
35 °C {95 °F }	Approx. 10 min	Approx. 2 h

13. Check for water leaks. If the leak is found, wipe the water off well and repeat the installation.
14. Install the seaming welt.
15. Install the rear wiper arm and blade. (Refer to section T, WIPER AND WASHER, REAR WIPER ARM AND BLADE REMOVAL/INSTALLATION.)
16. Install the liftgate lower trim. (Refer to TRIM, LIFTGATE LOWER TRIM REMOVAL/ INSTALLATION.)

SLIDING SUNROOF (SEDAN)

DEFLECTOR REMOVAL/INSTALLATION

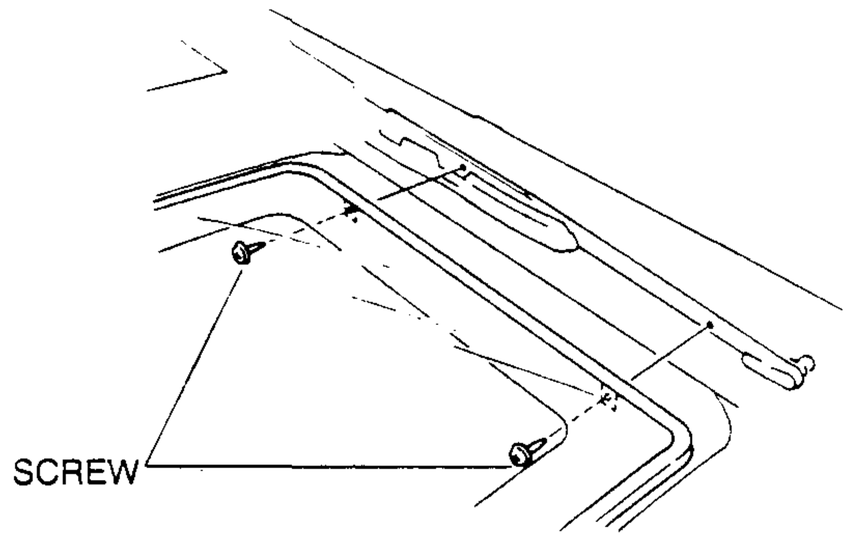
1. Fully open the glass panel.
2. Push the deflector inside (①) and pull it up to release the stopper.(②)
3. Slide the deflector to disengage from the hook.(③)
4. Remove the deflector.



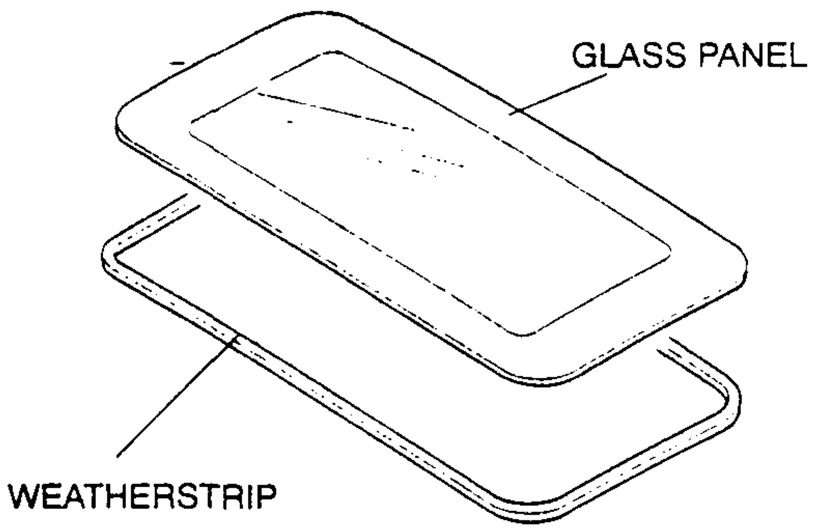
5. Install in the reverse order of removal.

GLASS PANEL REMOVAL/INSTALLATION

1. Fully open the sunshade.
2. Remove the screws, and remove the glass panel.



3. Peel the weatherstrip off the glass panel.

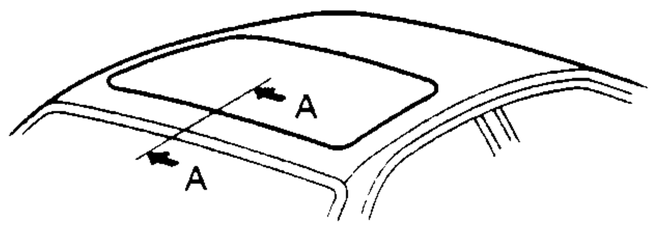


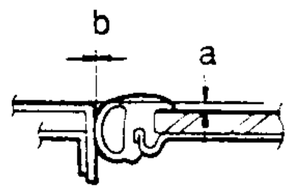
4. Install in the reverse order of removal.
5. Adjust the glass panel. (Refer to GLASS PANEL ADJUSTMENT.)

GLASS PANEL ADJUSTMENT

1. Fully close the glass panel.
2. Measure the gap and height between the glass panel and body.

Clear-ance	Standard mm { in }	Minimum mm { in }	Maximum mm { in }
a	0.7 {0.03}	0.2 {0.01}	2.2 {0.08}
b	0 {0}	0 {0}	0 {0}





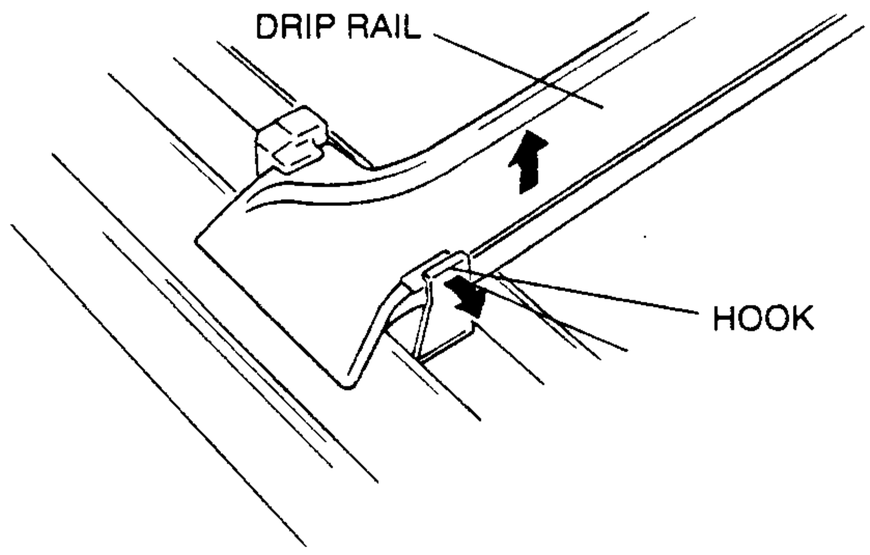
SEC. A–A

3. If not as specified, loosen the glass panel installation screws, and reposition the glass panel.
4. Tighten the glass panel installation screws.

Tightening torque
2.5—3.4N·m
{25—35 kgf·cm , 22—30 in·lbf }

DRIP RAIL REMOVAL/INSTALLATION

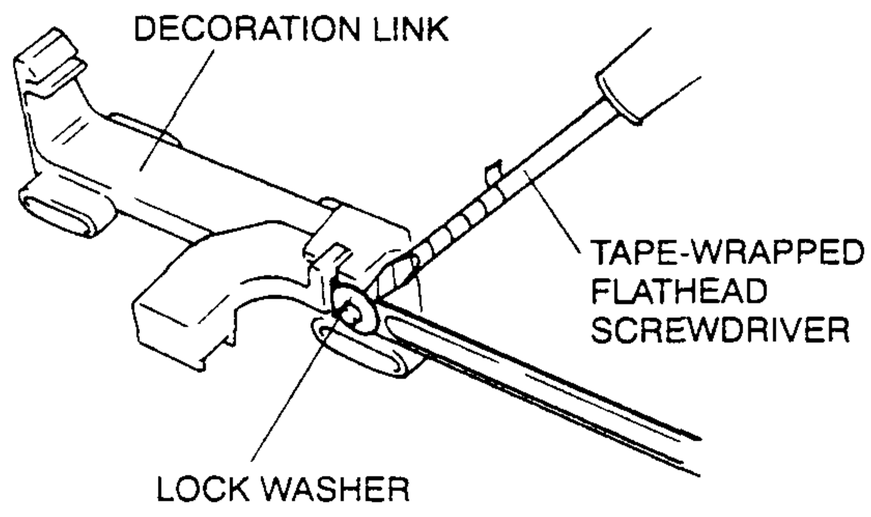
1. Remove the sunroof unit. (Refer to SUNROOF UNIT REMOVAL/INSTALLATION.)
2. Bend the hook of the decoration link backward to remove the drip rail.



3. Install in the reverse order of removal.

DECORATION LINK REMOVAL/INSTALLATION

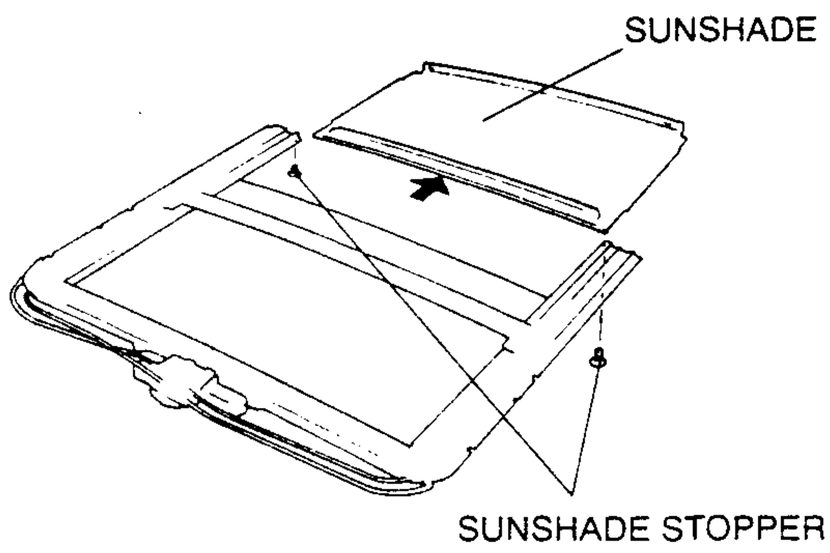
1. Remove the drip rail. (Refer to DRIP RAIL REMOVAL/INSTALLATION.)
2. Remove the guide stopper.(Refer to GUIDE STOPPER REMOVAL/INSTALLATION.)
3. Remove the sunroof motor.(Refer to SUNROOF MOTOR REMOVAL.) (Refer to SUNROOF MOTOR INSTALLATION.)
4. Remove the lock washer by using a tape-wrapped flathead screwdriver.
5. Slide the decoration link backward, and remove the decoration link.



6. Install in the reverse order of removal.

SUNSHADE REMOVAL/INSTALLATION

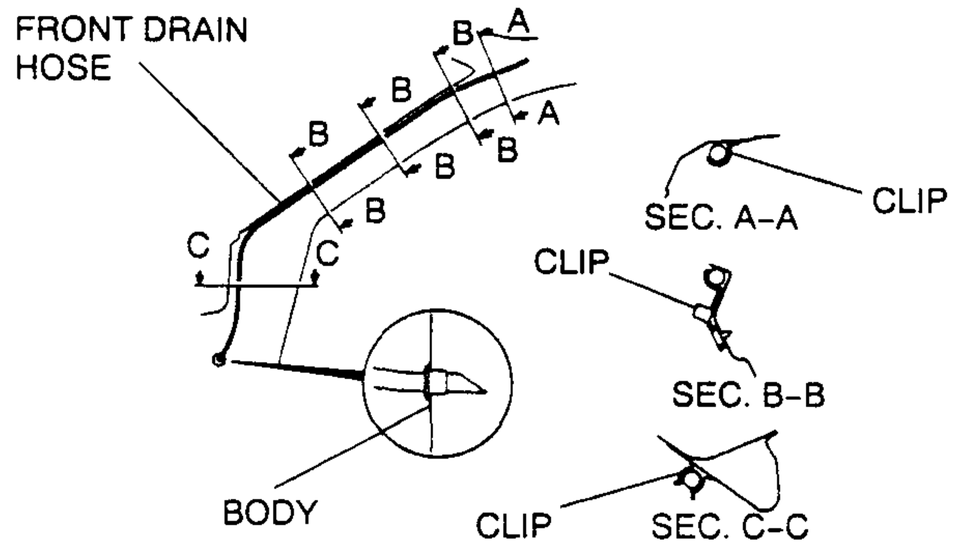
1. Remove the sunroof unit. (Refer to SUNROOF UNIT REMOVAL/INSTALLATION.)
2. Remove the sunshade stopper.
3. Slide the sunshade backward, and remove the sun shade.



4. Install in the reverse order of removal.

FRONT DRAIN HOSE REMOVAL

1. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
2. Remove the front drain hose from the clips.
3. Pull the front drain hose into the room side.
4. Remove the front drain hose.

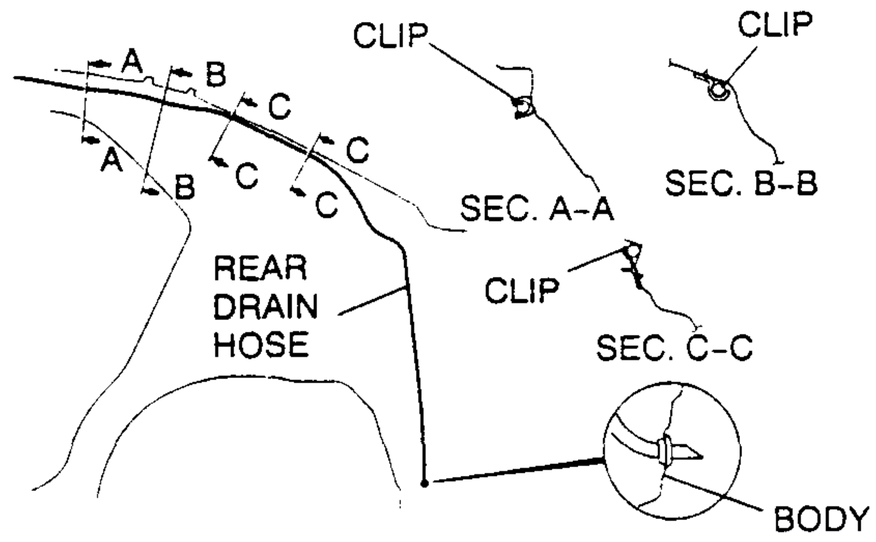


FRONT DRAIN HOSE INSTALLATION

1. Apply soapy water to the front drain hose inserting area.
2. Insert one end of the front drain hose into the sunroof frame, set the hose along the clips, and insert the front drain hose joint into the hinge pillar inner hole.
3. Install the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)

REAR DRAIN HOSE REMOVAL

1. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
2. Remove the rear drain hose from the clips.
3. Pull the rear drain hose into the room side.
4. Remove the rear drain hose.



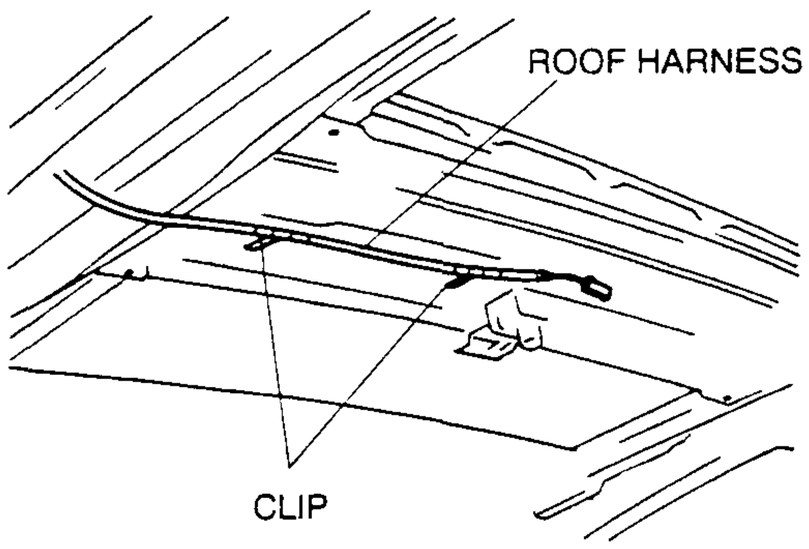
REAR DRAIN HOSE INSTALLATION

1. Apply soapy water to the rear drain hose inserting area.
2. Insert one end of the rear drain hose into the sunroof frame, set the hose along the clips, and insert the rear drain hose joint into the rear pillar inner hole.
3. Install the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)

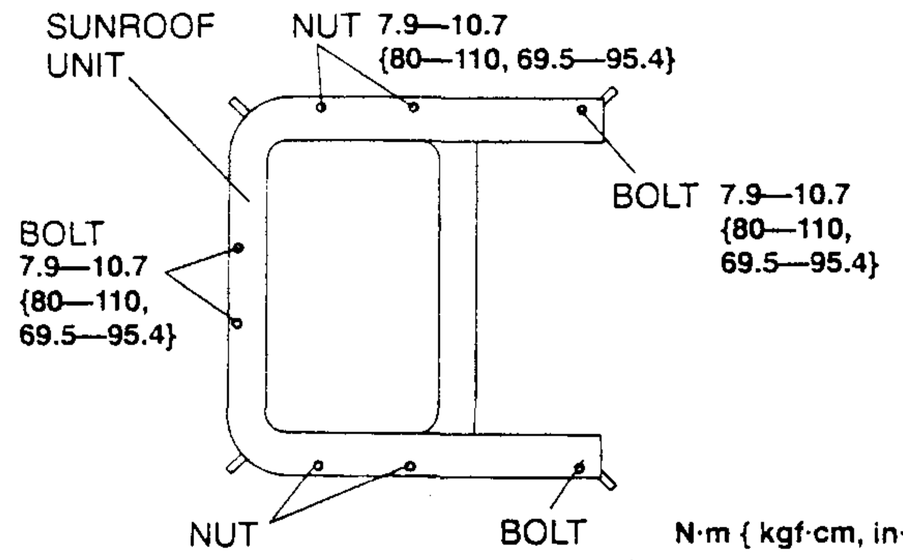
SLIDING SUNROOF (SEDAN)

SUNROOF UNIT REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
3. Remove the glass panel. (Refer to GLASS PANEL REMOVAL/INSTALLATION.)
4. Disconnect the front and rear drain hose from the sunroof unit.
5. Remove the roof harness from the sunroof unit.



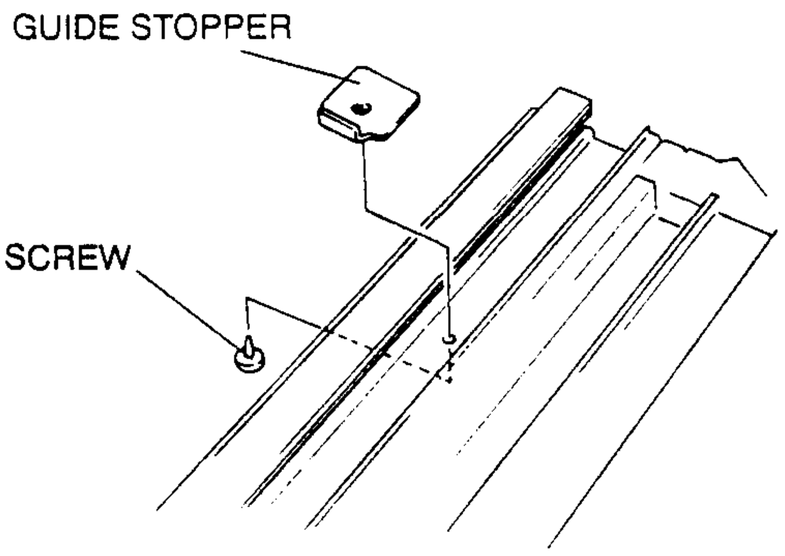
6. Remove the bolts and nut, and remove the sunroof unit.



7. Install in the reverse order of removal.
8. Adjust the glass panel. (Refer to GLASS PANEL ADJUSTMENT.)

GUIDE STOPPER REMOVAL/INSTALLATION

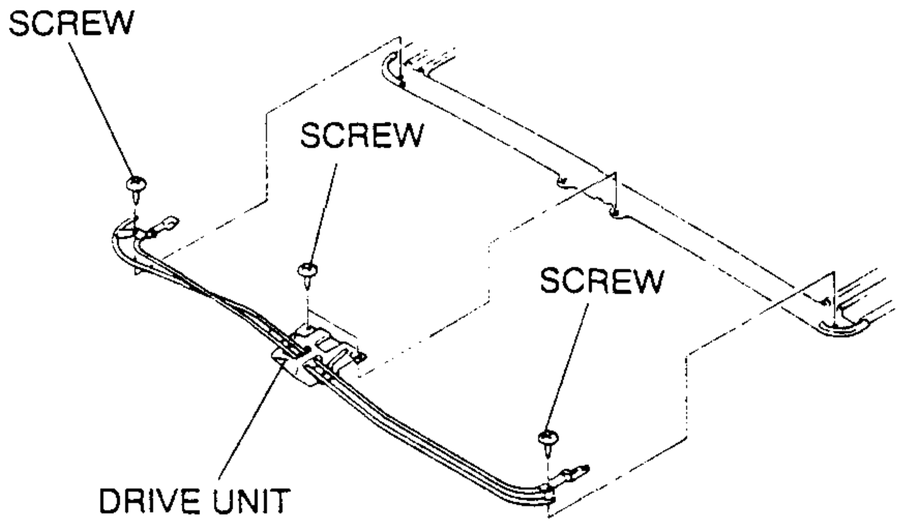
1. Remove the sunroof unit. (Refer to SUNROOF UNIT REMOVAL/INSTALLATION.)
2. Remove the screws, and remove the guide stopper.



3. Install in the reverse order of removal.
4. Adjust the glass panel. (Refer to GLASS PANEL ADJUSTMENT.)

DRIVE UNIT REMOVAL/INSTALLATION

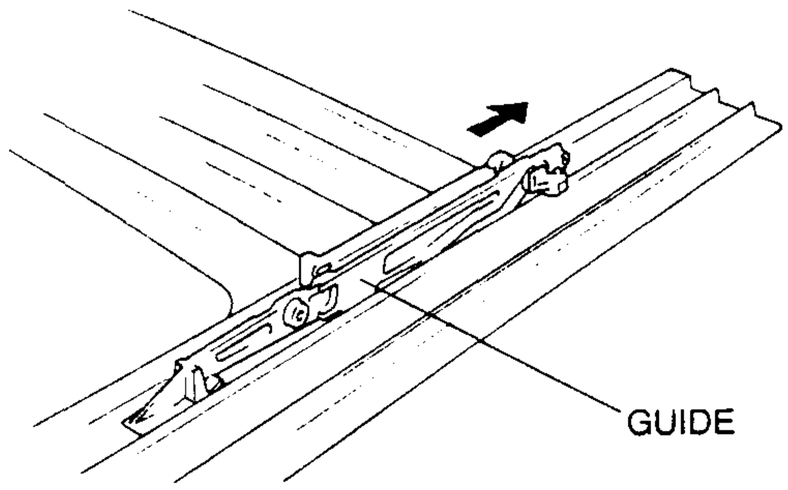
1. Remove the sunroof unit. (Refer to DRIVE UNIT REMOVAL/INSTALLATION.)
2. Remove the guide. (Refer to GUIDE REMOVAL/INSTALLATION.)
3. Remove the sunroof motor. (Refer to SUNROOF MOTOR REMOVAL.) (Refer to SUNROOF MOTOR INSTALLATION.)
4. Remove the screws.
5. Slide the drive unit forward, and remove drive unit.



6. Install in the reverse order of removal.
7. Adjust the glass panel. (Refer to GLASS ADJUSTMENT.)

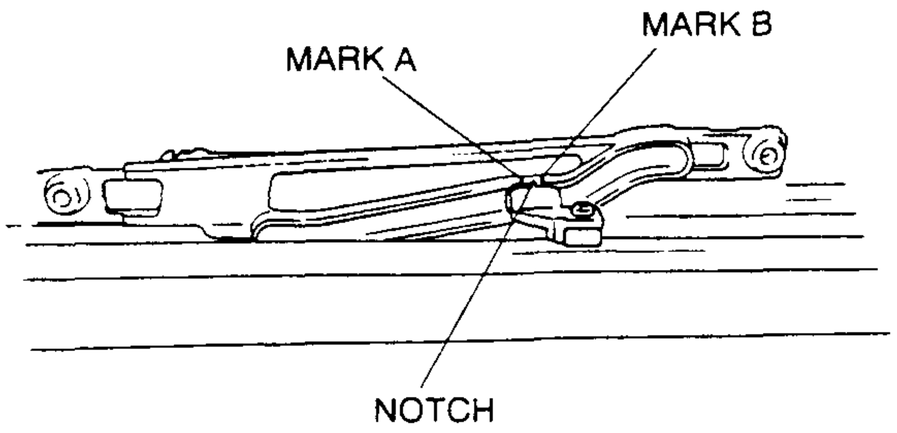
GUIDE REMOVAL

1. Remove the sunroof unit. (Refer to SUNROOF UNIT REMOVAL/INSTALLATION.)
2. Remove the decoration link. (Refer to DECORATION LINK REMOVAL/INSTALLATION.)
3. Remove the sunroof motor. (Refer to SUNROOF MOTOR REMOVAL.)
4. Slide the guide backward, and remove the guide from the sunroof frame.



GUIDE INSTALLATION

1. Slide the guide forward, and install the guide to the sunroof frame.
2. Move the guide by hand until notch comes between mark A and mark B.



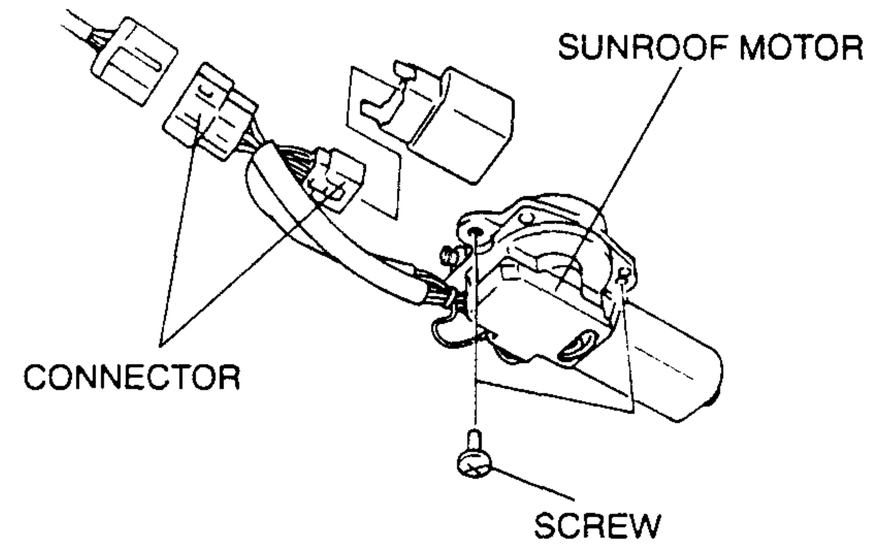
3. Install the sunroof motor. (Refer to SUNROOF MOTOR INSTALLATION.)
4. Install the decoration link. (Refer to DECORATION LINK REMOVAL/INSTALLATION.)
5. Install the sunroof unit. (Refer to SUNROOF UNIT REMOVAL/INSTALLATION.)
6. Adjust the glass panel. (Refer to GLASS PANEL ADJUSTMENT.)

SUNROOF FRAME REMOVAL/INSTALLATION

1. Remove the sunroof unit. (Refer to SUNROOF UNIT REMOVAL/INSTALLATION.)
2. Remove the deflector. (Refer to DEFLECTOR REMOVAL/INSTALLATION.)
3. Remove the sunshade. (Refer to SUNSHADE REMOVAL/INSTALLATION.)
4. Remove the guide. (Refer to GUIDE REMOVAL/INSTALLATION.)
5. Remove the drive unit. (Refer to DRIVE UNIT REMOVAL/INSTALLATION.)
6. Remove the sunroof relay. (Refer to SUNROOF RELAY REMOVAL/INSTALLATION.)
7. Install in the reverse order of removal.
8. Adjust the glass panel. (Refer to GLASS PANEL ADJUSTMENT.)

SUNROOF MOTOR REMOVAL

1. Disconnect the negative battery cable.
2. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
3. Disconnect the connector.
4. Remove the screws, and remove the sunroof motor.



SUNROOF MOTOR INSTALLATION

1. Connect the sunroof motor connector.
2. Connect the sunroof switch connector.
3. Connect the negative battery cable.
4. Turn the IG switch to ON.
5. Press the CLOSE side of the slide switch until the sunroof motor stops.
6. Disconnect the sunroof switch connector.
7. Install the screws, and install the sunroof motor.
8. Install the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)

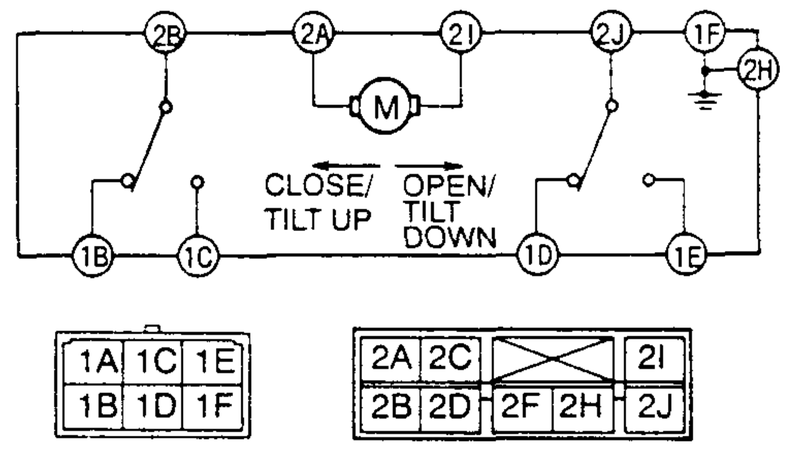
SUNROOF MOTOR INSPECTION

Motor

1. Remove the sunroof motor. (Refer to SUNROOF MOTOR REMOVAL.)
2. Apply battery positive voltage to the sunroof motor terminals and check the operation of the motor.

B+: Battery positive voltage

Connection		Motor operation
B+	GND	
2A	2I	Turn right (Open/Tilt down)
2I	2A	Turn left (Close/Tilt up)



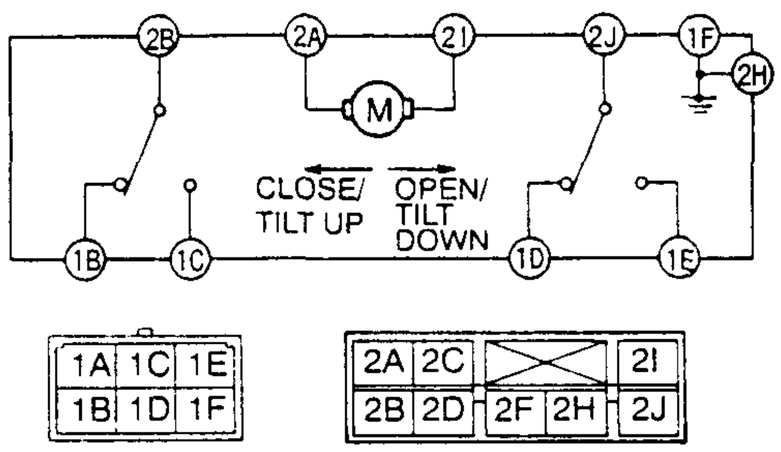
3. If not as specified, replace the sunroof motor.

Limit Switch

1. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
2. Disconnect the connector.
3. Check for continuity between the sunroof motor terminals by using an ohmmeter.

○—○ : Continuity

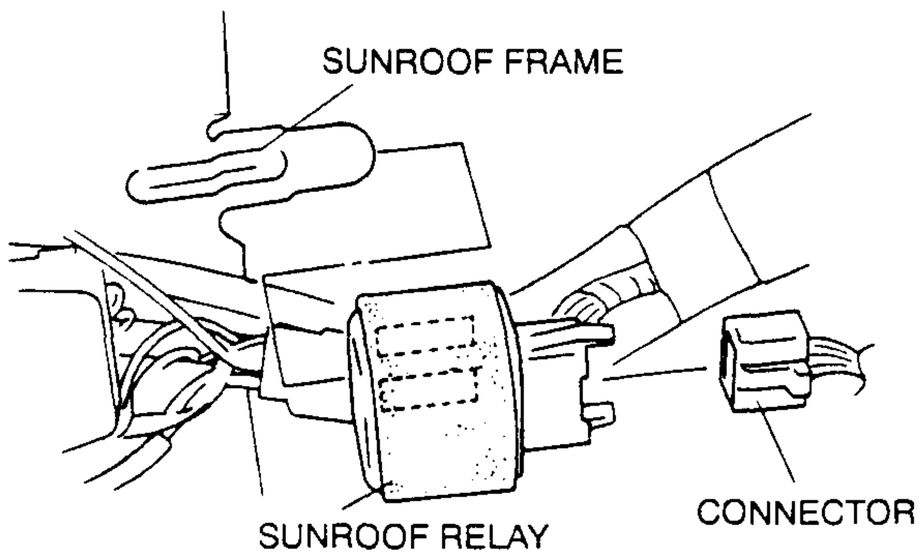
Glass panel position	Terminal							
	1B	1C	1D	1E	2B	2J	1F	2H
Open		○	○		○	○	○	○
Fully closed	○		○		○	○	○	○
Tilt up	○			○	○	○	○	○



4. If not as specified, replace the sunroof motor.

SUNROOF RELAY REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
3. Pull the sunroof relay from the sunroof frame.
4. Disconnect the connector, and remove the sunroof relay.



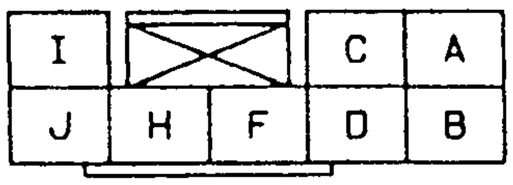
5. Install in the reverse order of removal.

SUNROOF RELAY INSPECTION

1. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
2. Connect the negative battery cable.
3. Measure the voltage at the sunroof relay terminals as indicated below.
4. Disconnect the sunroof relay connector before checking for continuity at terminal H.
5. If not as specified, inspect the parts listed under "Inspection area" and the related wiring harnesses.
6. If the parts and wiring harnesses are okay but the system still does not work properly, replace the sunroof relay.

Terminal Voltage List (Reference)

B+: Battery positive voltage



Terminal	Signal	Connection	Test condition	Voltage (V) / Continuity	Inspection area
A	Sunroof close / tilt-up	Sunroof motor	Sunroof opening / tilting down	0	• Sunroof switch • Sunroof motor
			Sunroof closing / tilting up	B+	
			Other	0	–
B	Sunroof close / tilt up	Sunroof motor (Limit switch)	Constant	0	• Sunroof switch • Sunroof motor
C	IG2	Sunroof switch	IG SW at ON	B+	Sunroof 15 A fuse
			Other	0	
D	–	Not used	–	–	–
F	IG2	Sunroof switch	IG SW at ON	B+	Sunroof switch
			Other	0	
H	Sunroof relay ground	GND	Constant : Check for continuity to ground	Yes	GND
I	Sunroof open / tilt down	Sunroof motor	Sunroof opening / tilting down	B+	• Sunroof switch • Sunroof motor
			Sunroof closing / tilting up	0	
			Other	0	
J	Sunroof open / tilt down	Sunroof motor (Limit switch)	Constant	0	• Sunroof switch • Sunroof motor

SUNROOF SWITCH REMOVAL/INSTALLATION

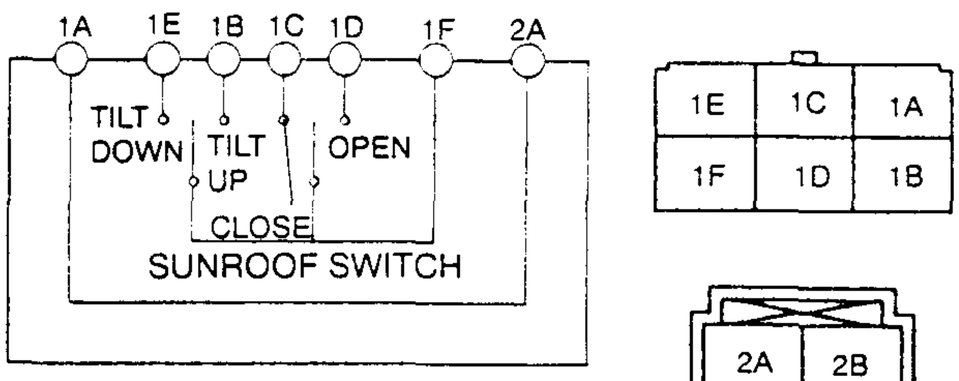
1. Disconnect the negative battery cable.
2. Remove the spot light.(Refer to section T,INTERIOR LIGHTING SYSTEM,SPOT LIGHT REMOVAL/INSTALLATION.)
3. Install in the reverse order of removal.

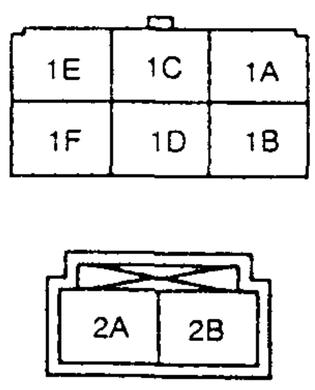
SUNROOF SWITCH INSPECTION

1. Remove the sunroof switch. (Refer to section T,INTERIOR LIGHTING SYSTEM,SPOT LIGHT REMOVAL/INSTALLATION.)
2. Check for continuity between the sunroof switch terminals by using an ohmmeter.

○—○ : Continuity

Switch position	Terminal						
	1B	1C	1D	1E	1F	1A	2A
Tilt up	○	—	—	—	○	○	○
Tilt down				○	○	○	○
Open			○	—	○	○	○
Close		○	—	—	○	○	○
Off						○	○



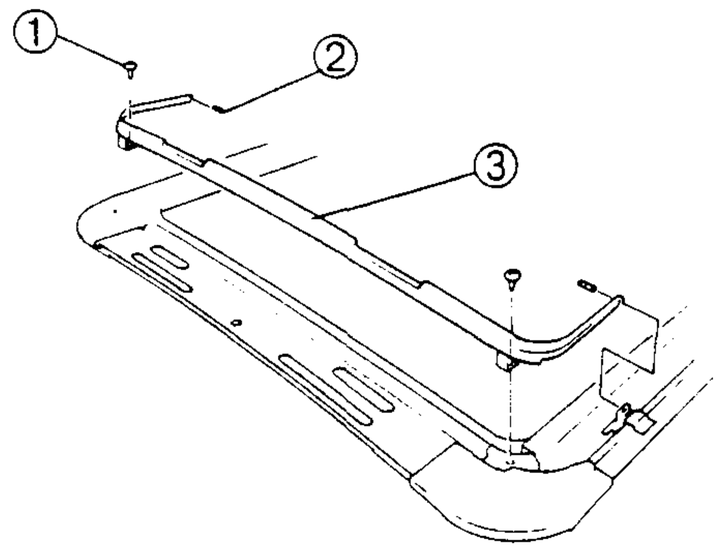


3. If not as specified, replace the sunroof switch.

SLIDING SUNROOF (5HB)

DEFLECTOR REMOVAL/INSTALLATION

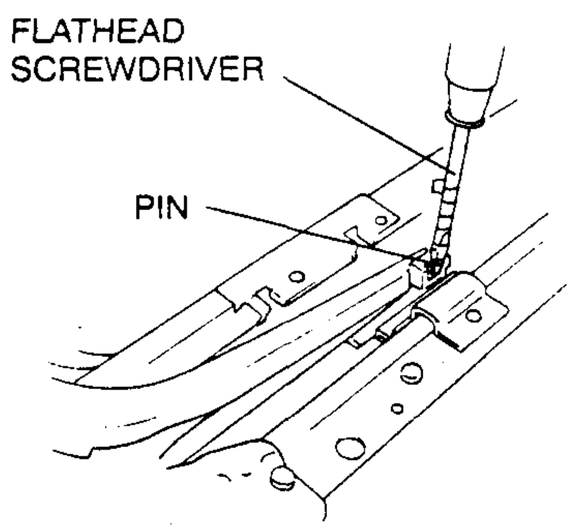
1. Fully open the glass panel.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Screw
2	Pin ☞ Removal Note
3	Deflector ☞ Removal Note

Pin Removal Note

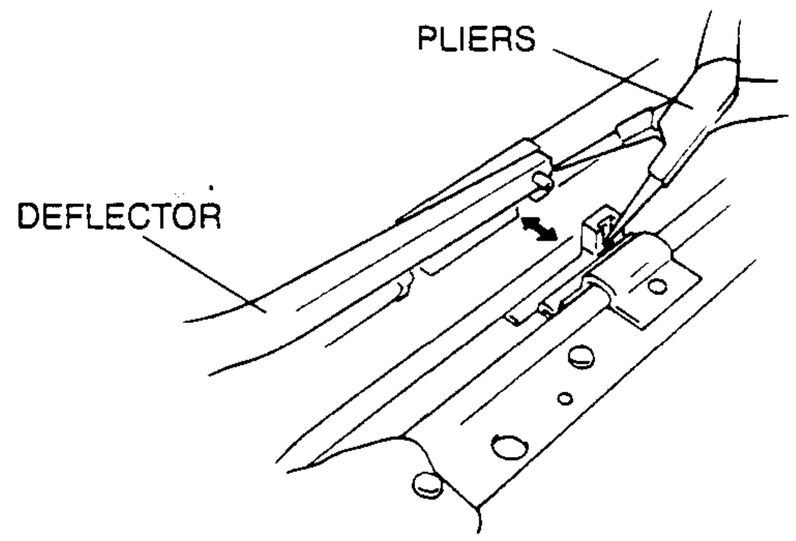
1. Push the pin by using a flathead screwdriver at the closed position of the deflector.



2. Remove the pin by using a pliers.

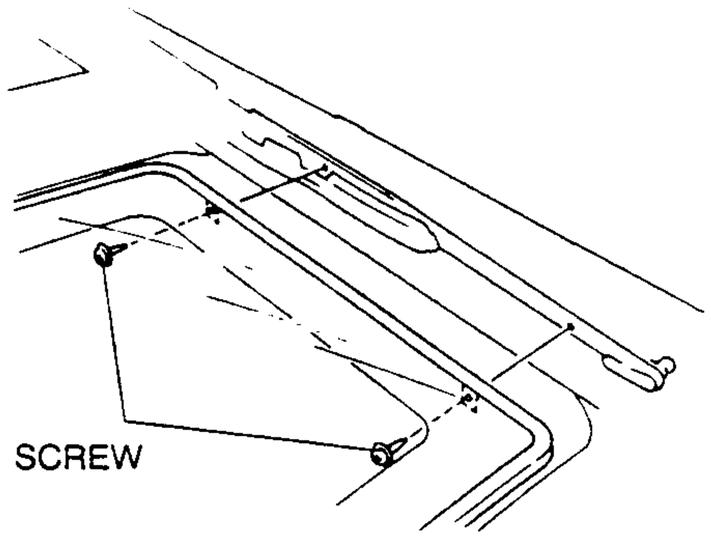
Deflector Removal Note

- Remove the deflector to disengage the linkage of the deflector by using a pliers.

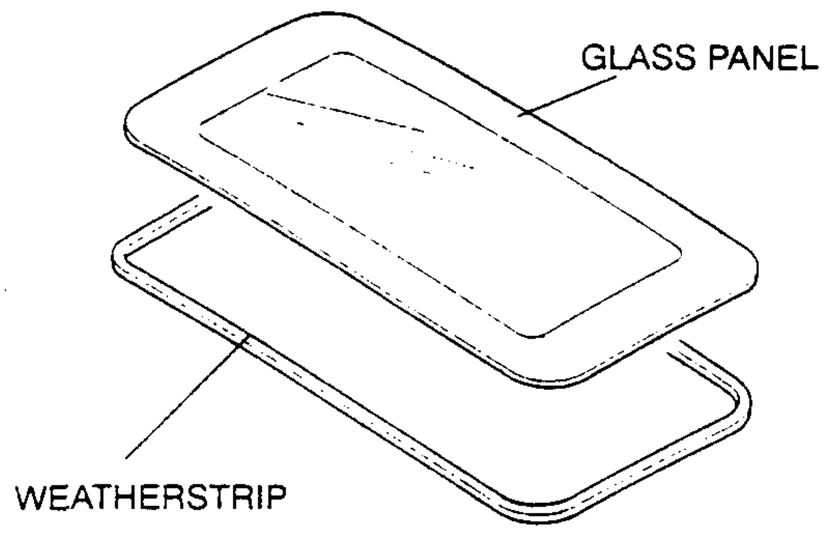


GLASS PANEL REMOVAL/INSTALLATION

1. Fully open the sunshade.
2. Remove the screws, and remove the glass panel.



3. Peel the weatherstrip off the glass panel.

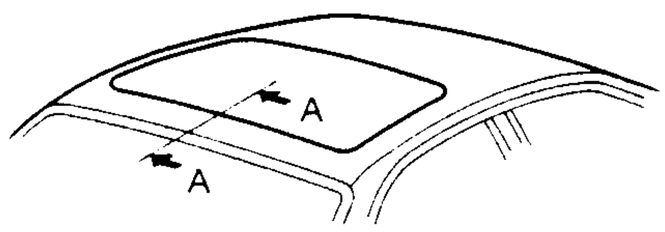


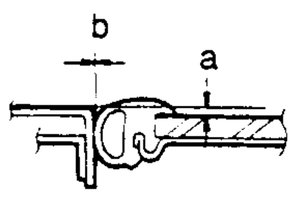
4. Install in the reverse order of removal.
5. Adjust the glass panel. (Refer to GLASS PANEL ADJUSTMENT.)

GLASS PANEL ADJUSTMENT

1. Fully close the glass panel.
2. Measure the gap and height between the glass panel and body.

Clear-ance	Standard mm { in }	Minimum mm { in }	Maximum mm { in }
a	0.7 {0.03}	0.2 {0.01}	2.2 {0.08}
b	0 {0}	0 {0}	0 {0}





SEC. A-A

3. If not as specified, loosen the glass panel installation screws, and reposition the glass panel.
4. Tighten the glass panel installation screws.

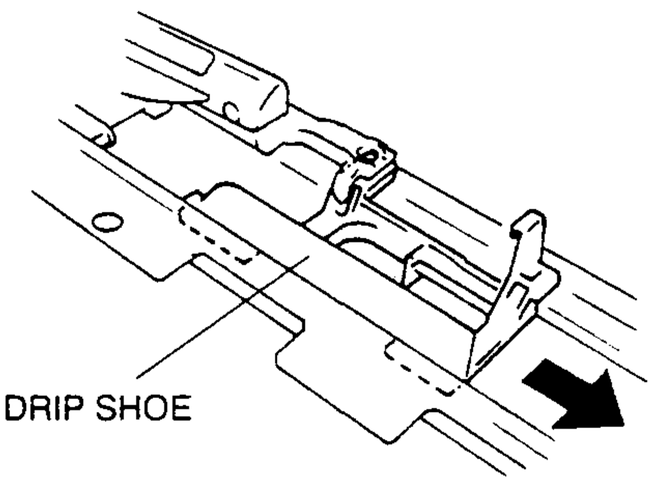
Tightening torque
2.5—3.4N·m
{25—35 kgf·cm , 22—30 in·lbf }

DRIP RAIL REMOVAL/INSTALLATION

1. Remove the screws, and remove the drip rail.
2. Install in the reverse order of removal.

DRIP SHOE REMOVAL/INSTALLATION

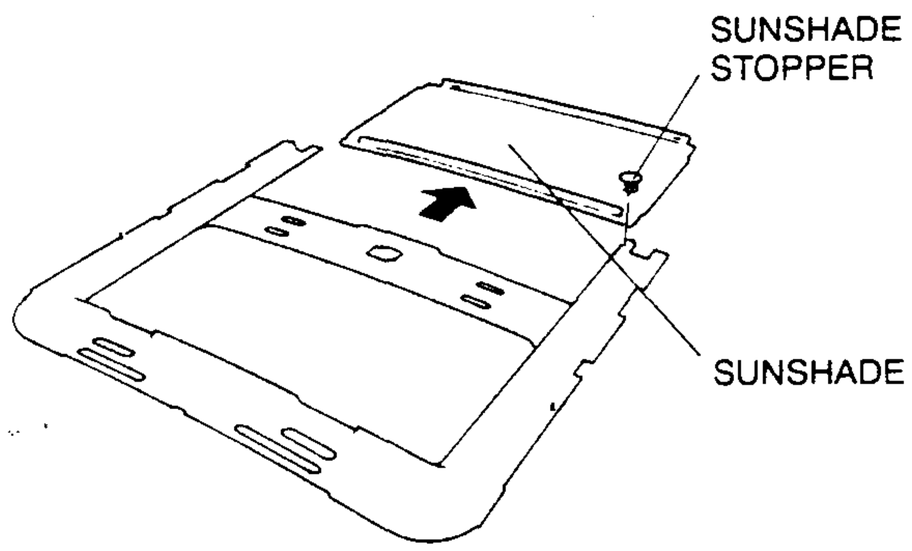
1. Remove the drip rail. (Refer to DRIP RAIL REMOVAL/INSTALLATION.)
2. Remove the rear drip.(Refer to REAR DRIP REMOVAL/INSTALLATION.)
3. Slide the drip shoe backward, and remove the drip shoe.



4. Install in the reverse order of removal.

SUNSHADE REMOVAL/INSTALLATION

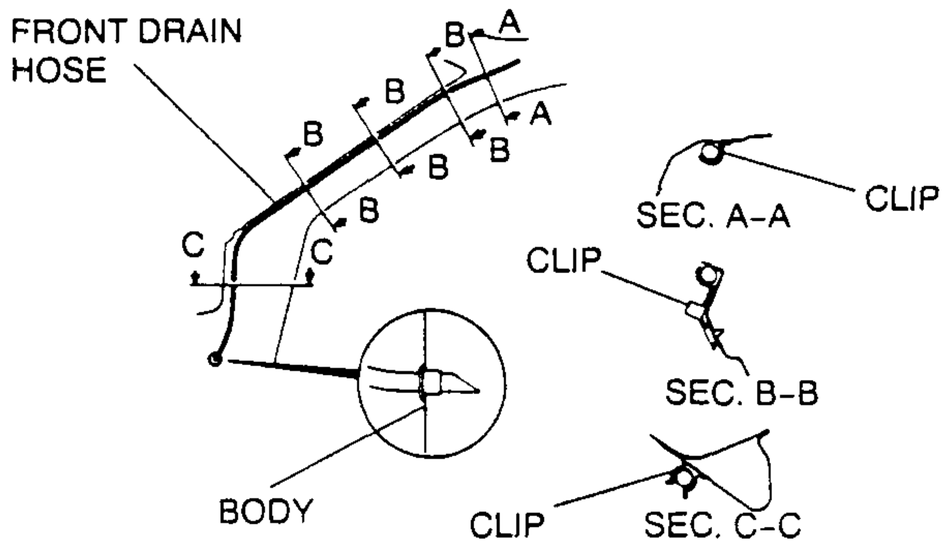
1. Remove the sunroof unit. (Refer to SUNROOF UNIT REMOVAL/INSTALLATION.)
2. Remove the sunshade stopper.
3. Slide the sunshade backward and remove the sun shade.

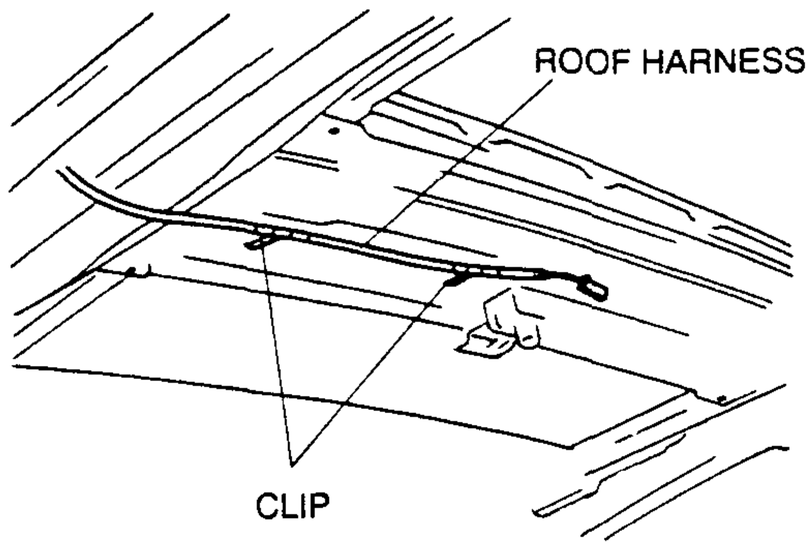


4. Install in the reverse order of removal.

FRONT DRAIN HOSE REMOVAL

1. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
2. Remove the front drain hose from the clips.
3. Pull the front drain hose into the room side.
4. Remove the front drain hose.



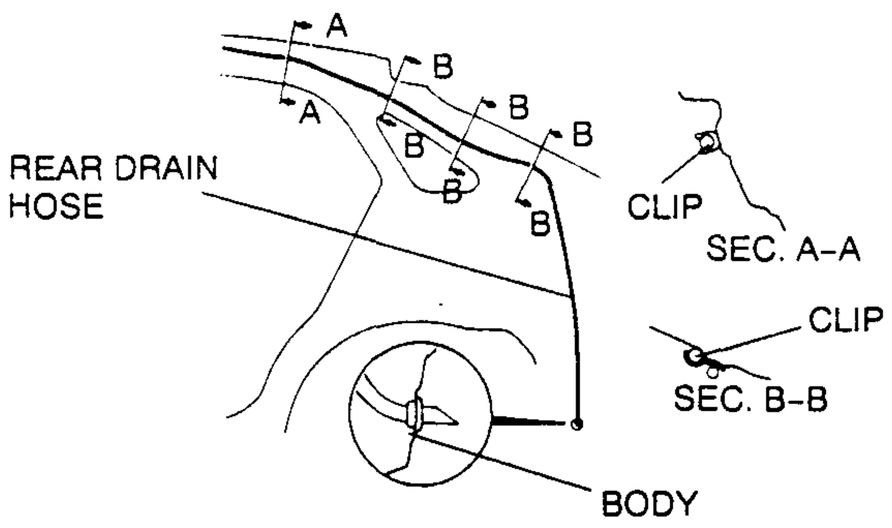


FRONT DRAIN HOSE INSTALLATION

1. Apply soapy water to the front drain hose inserting area.
2. Insert one end of the front drain hose into the sunroof frame, set the hose along the clips, and insert the front drain hose joint into the hinge pillar inner hole.
3. Install the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)

REAR DRAIN HOSE REMOVAL

1. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
2. Remove the rear drain hose from the clips.
3. Pull the rear drain hose into the room side.
4. Remove the rear drain hose.

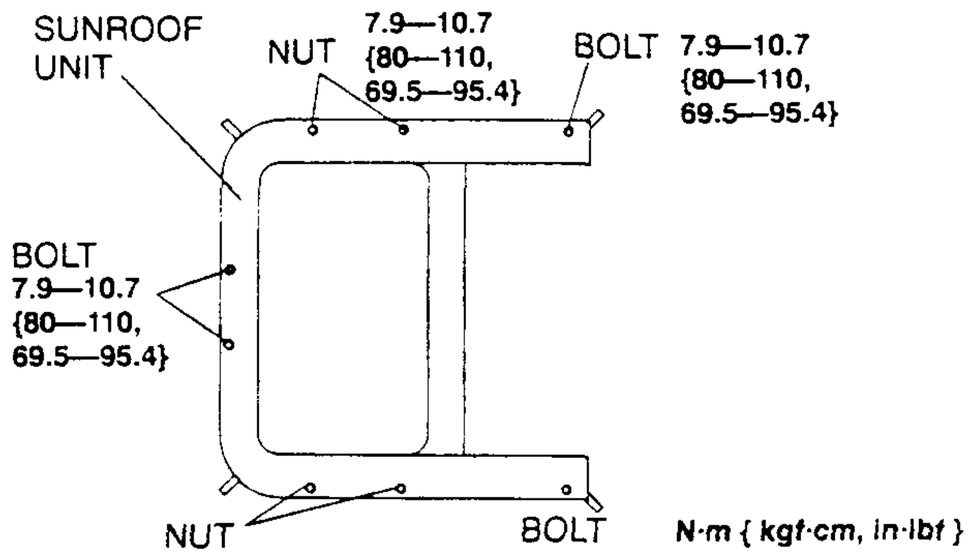


REAR DRAIN HOSE INSTALLATION

1. Apply soapy water to the rear drain hose inserting area.
2. Insert one end of the rear drain hose into the sunroof frame, set the hose along the clips, and insert the rear drain hose joint into the rear pillar inner hole.
3. Install the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)

SUNROOF UNIT REMOVAL/INSTALLATION

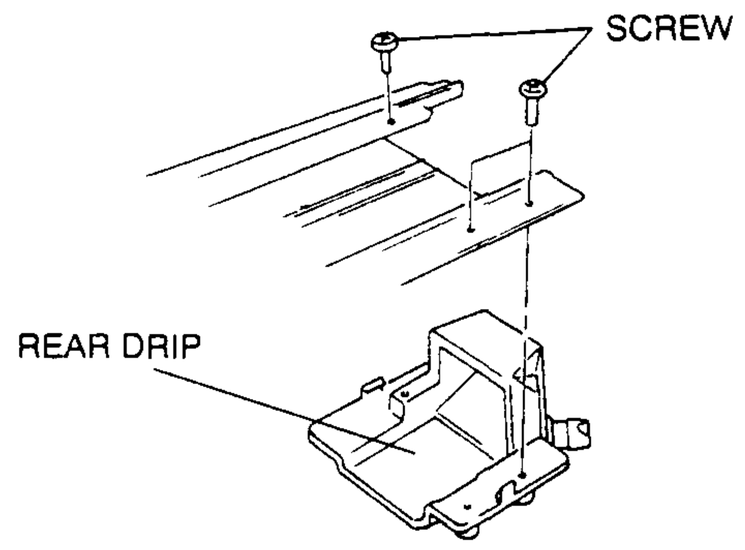
1. Disconnect the negative battery cable.
2. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
3. Remove the glass panel. (Refer to GLASS PANEL REMOVAL/INSTALLATION.)
4. Disconnect the front and rear drain hose from the sunroof unit.
5. Remove the room harness from the sunroof frame.
6. Remove the bolts and nuts, remove the sunroof unit.



7. Install in the reverse order of removal.
8. Adjust the glass panel. (Refer to GLASS PANEL ADJUSTMENT.)

REAR DRIP REMOVAL/INSTALLATION

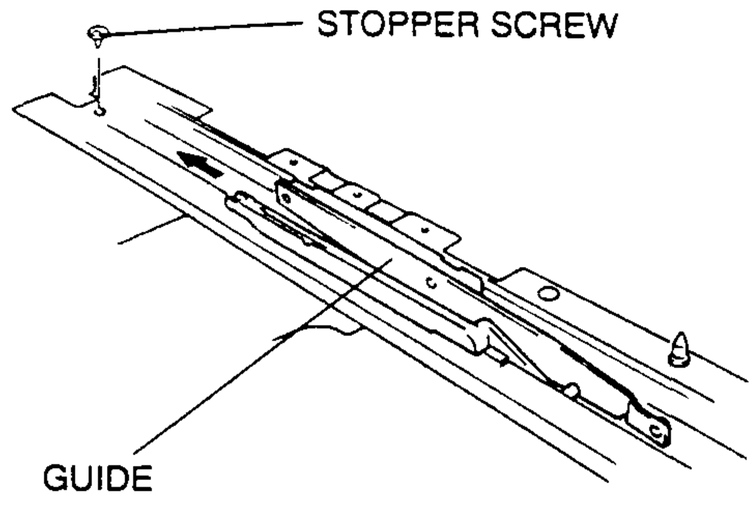
1. Remove the sunroof unit. (Refer to SUNROOF UNIT REMOVAL/INSTALLATION.)
2. Remove the rear drain hose from the rear drip.
3. Remove the screws, and remove the rear drip.



4. Apply sealant to contact surface of the rear drip.
5. Install in the reverse order of removal.
6. Adjust the glass panel. (Refer to GLASS PANEL ADJUSTMENT.)

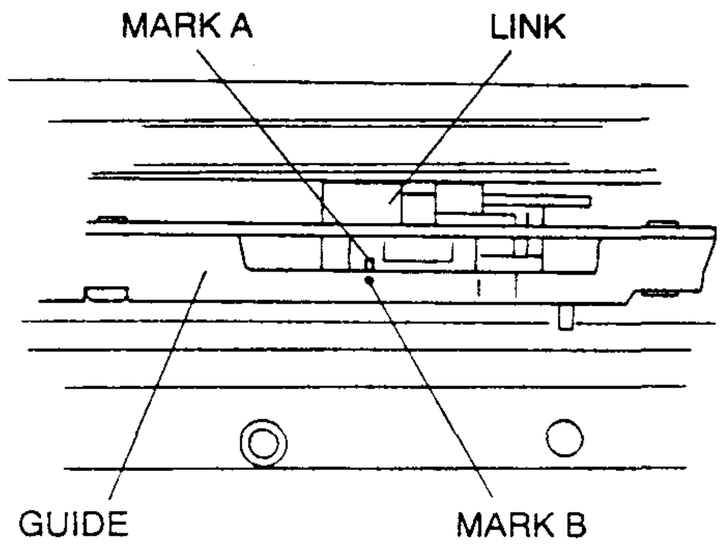
GUIDE REMOVAL

1. Remove the sunroof unit. (Refer to SUNROOF UNIT REMOVAL/INSTALLATION.)
2. Remove the drip shoe. (Refer to DRIP SHOE REMOVAL/INSTALLATION.)
3. Remove the sunroof motor. (Refer to SUNROOF MOTOR REMOVAL.)
4. Remove the stopper screw.
5. Slide the guide backward, and remove the guide from the sunroof frame.



GUIDE INSTALLATION

1. Slide the guide forward, and install the guide to the sunroof frame.
2. Move the guide by hand until tilt-up position.
3. Move the link built in guide by hand until is aligned with mark A is aligned with mark B.



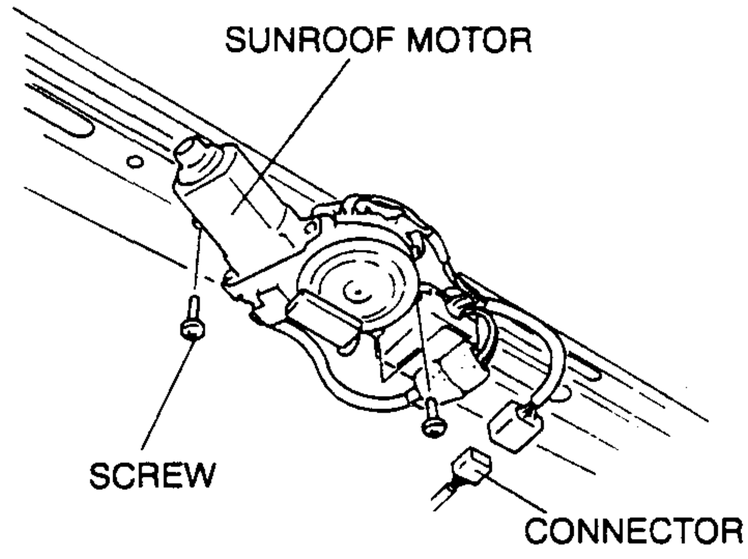
4. Install the sunroof motor. (Refer to SUNROOF MOTOR INSTALLATION.)
5. Install the drip shoe. (Refer to DRIP SHOE REMOVAL/INSTALLATION.)
6. Install the sunroof unit. (Refer to SUNROOF UNIT REMOVAL/INSTALLATION.)
7. Adjust the glass panel. (Refer to GLASS PANEL ADJUSTMENT.)

SUNROOF FRAME REMOVAL/INSTALLATION

1. Remove the sunroof unit. (Refer to SUNROOF UNIT REMOVAL/INSTALLATION.)
2. Remove the deflector.(Refer to DEFLECTOR REMOVAL/INSTALLATION.)
3. Remove the sunshade.(Refer to SUNSHADE REMOVAL/INSTALLATION.)
4. Remove the guide. (Refer to GUIDE REMOVAL/INSTALLATION.)
5. Install in the reverse order of removal.
6. Adjust the glass panel. (Refer to GLASS PANEL ADJUSTMENT.)

SUNROOF MOTOR REMOVAL

1. Disconnect the negative battery cable.
2. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
3. Disconnect the connector.
4. Remove the screws, and remove the sunroof motor.



SUNROOF MOTOR INSTALLATION

1. Connect the sunroof motor connector.
2. Connect the sunroof switch connector.
3. Connect the negative battery cable.
4. Turn the IG switch to ON.
5. Press the CLOSE side of the slide switch until the sunroof motor stops.
6. Disconnect the sunroof switch connector.
7. Install the screws, and install the sunroof motor.
8. Install the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)

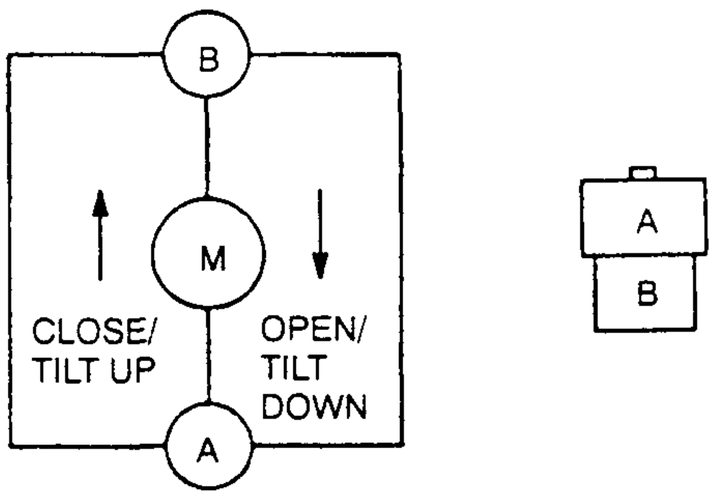
SUNROOF MOTOR INSPECTION

Motor

1. Remove the sunroof motor. (Refer to SUNROOF MOTOR REMOVAL.)
2. Apply battery positive voltage to the sunroof motor terminals and check the operation of the motor.

B+: Battery positive voltage

Connection		Motor operation
B+	GND	
B	A	Turn right (Open/Tilt down)
A	B	Turn left (Close/Tilt up)



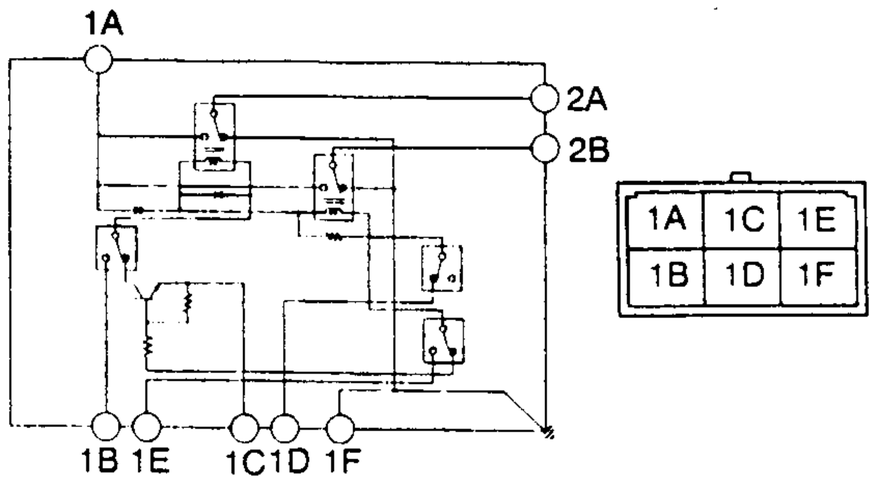
3. If not as specified, replace the sunroof motor.

Limit Switch

1. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
2. Disconnect the connector.
3. Check for continuity between the sunroof motor terminals by using an ohmmeter.

○—○ : Continuity

Glass panel position	Terminal						
	1A	1B	1C	1D	1E	1F	GND
Open	○		○			○	○
Fully closed	○	○		○		○	○
Tilt up	○	○		○	○	○	○



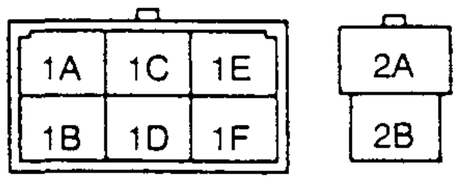
4. If not as specified, replace the sunroof motor.

Sunroof Relay

1. Remove the headliner. (Refer to HEADLINER, HEADLINER REMOVAL/INSTALLATION.)
2. Connect the negative battery cable.
3. Measure the voltage at the sunroof relay terminals as indicated below.
4. Disconnect the sunroof relay connector before checking for continuity at terminal 1F.
5. If not as specified, inspect the parts listed under "Inspection area" and the related wiring harnesses.
6. If the parts and wiring harnesses are okay but the system still does not work properly, replace the sunroof relay.

Terminal Voltage List (Reference)

B+: Battery positive voltage



Terminal	Signal	Connection	Test condition	Voltage (V) / Continuity	Inspection area
1A	IG2	Sunroof motor	IG SW at ON	B+	• Sunroof switch
			Other	0	
1B	Tilt up	Sunroof switch	Tilting up (Including position when fully closed)	B+	• Sunroof switch
			Other	0	
1C	Sunroof close	Sunroof switch	Sunroof closing (Including position when fully closed and open)	B+	• Sunroof switch
			Other	0	
1D	Sunroof open	Sunroof switch	Sunroof opening	B+	• Sunroof switch
			Other	0	
1E	Tilt down	Sunroof switch	Tilting down ((Including position when fully closed)	B+	• Sunroof switch
			Other	0	
1F	Sunroof relay ground	GND	Constant : Check for continuity to ground	Yes	• GND
2A	Sunroof close / tilt down	Sunroof motor	Sunroof opening/tilting down	0	• Sunroof switch • Sunroof motor
			Sunroof closing/tilting up	B+	
			Other	0	
2B	Sunroof open / tilt down	Sunroof motor	Sunroof opening/tilting down	B+	• Sunroof switch • Sunroof motor
			Sunroof closing/tilting up	0	
			Other	0	

SUNROOF SWITCH REMOVAL/INSTALLATION

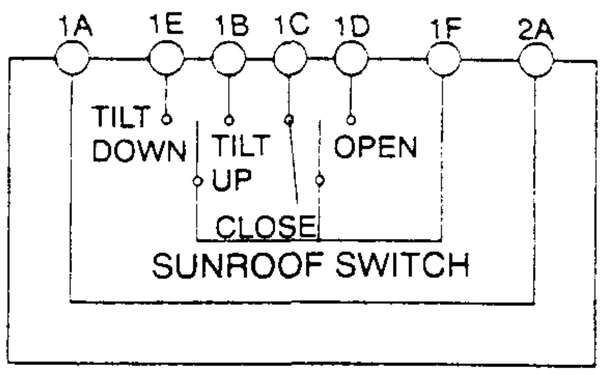
1. Disconnect the negative battery cable
2. Remove the spot light.(Refer to section T,INTERIOR LIGHTING SYSTEM,SPOT LIGHT REMOVAL/INSTALLATION.)
3. Install in the reverse order of removal.

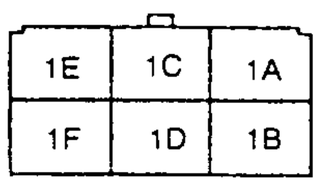
SUNROOF SWITCH INSPECTION

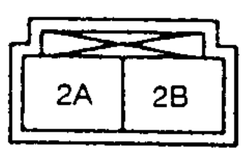
1. Remove the sunroof switch. (Refer to section T,INTERIOR LIGHTING SYSTEM,SPOT LIGHT REMOVAL/INSTALLATION.)
2. Check for continuity between the sunroof switch terminals by using an ohmmeter.

○—○ : Continuity

Switch position	Terminal						
	1B	1C	1D	1E	1F	1A	2A
Tilt up	○				○	○	○
Tilt down				○	○	○	○
Open			○		○	○	○
Close		○			○	○	○
Off						○	○





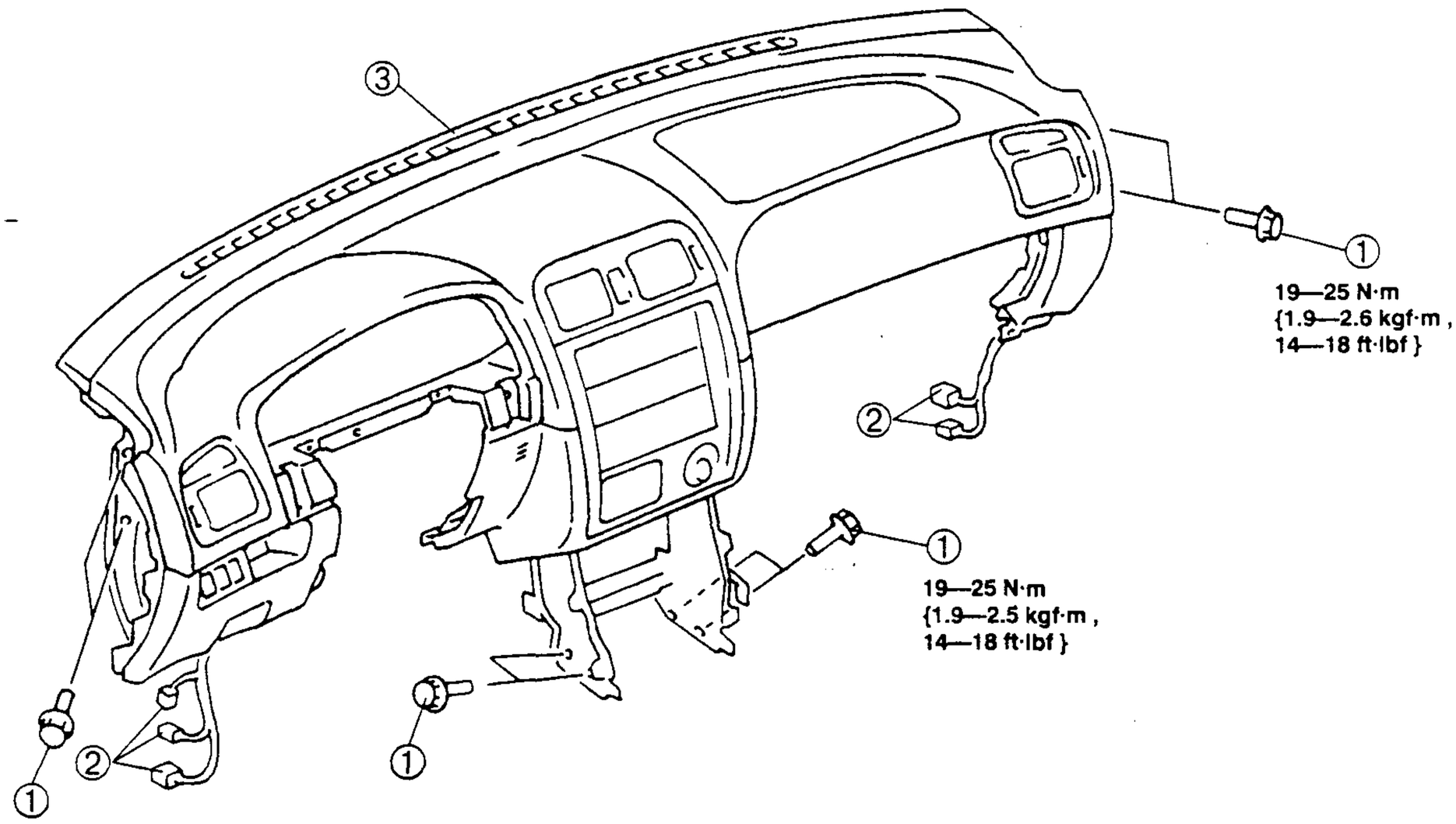


3. If not as specified, replace the sunroof switch.

DASHBOARD AND CONSOLE

DASHBOARD REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the driver-side air bag module. (Refer to section T, AIR BAG SYSTEM, DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
3. For the vihicle equipped with the passenger-side air bag module, remove the passenger-side air bag module. (Refer to section T, AIR BAG SYSTEM, PASSENGER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
4. Remove the steering wheel. (Refer to section N, ENGINE SPEED SENSING POWER STEERING, STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION.)
5. Remove the column cover.
6. Remove the installation bolts then shift the assembled steering shaft in the dashboard. (Refer to section N, ENGINE SPEED SENSING POWER STEERING, STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION.)
7. Remove the meter hood.
8. Remove the instrument cluster.
9. Remove the console.
10. Remove the glove compartment.
11. Remove the under cover.
12. Remove the lower panel.
13. Remove the bonnet release cable installation nut.
14. Remove the side wall.
15. Remove the A-pillar trim.
16. Remove the side panel.
17. For the vehicle equipped with the keyless entry system, remove the keyless unit. (Refer to POWER DOOR LOCK SYSTEM, KEYLESS UNIT REMOVAL/INSTALLATION.)
18. Disconnect the antenna jack.
19. For the vehicle equipped with the wire-type heater control unit, disconnect the wires for both the blower unit and the heater unit. (Refer to section U, CONTROL SYSTEM, HEATER CONTROL UNIT REMOVAL/INSTALLATION.)
20. Remove in the order indicated in the table.
21. Install in the reverse order of removal.
22. For the vehicle equipped with the wire-type heater control unit, adjust the wires. (Refer to section U, CONTROL SYSTEM, HEATER CONTROL UNIT ADJUSTMENT.)

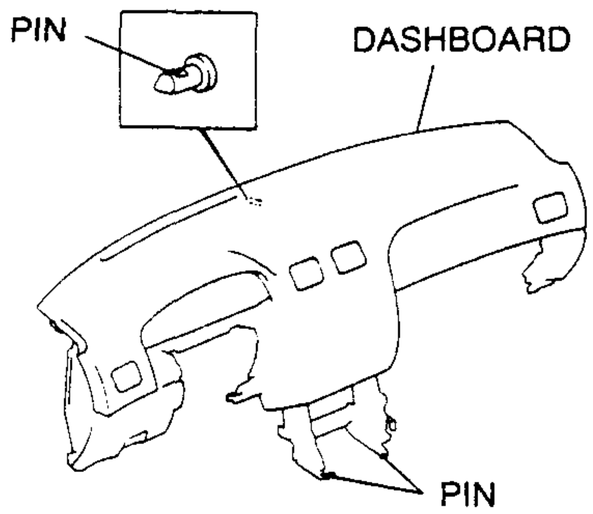


1	Bolt
2	Connector

3	Dashboard ☞ Removal Note

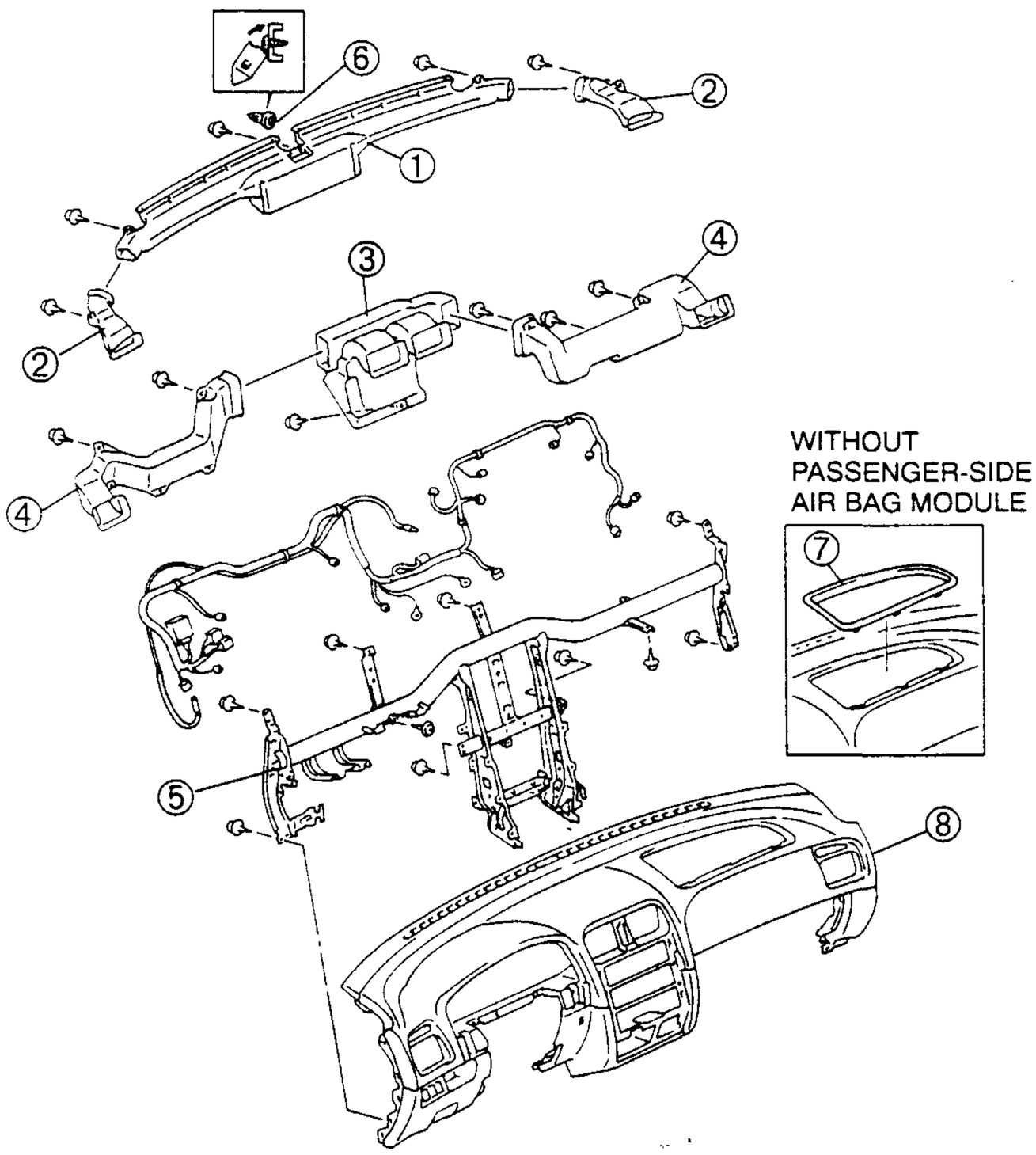
Dashboard Removal Note

- There are pins installed on the dashboard as shown in the figure. Remove the pins from the body.



DASHBOARD DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.

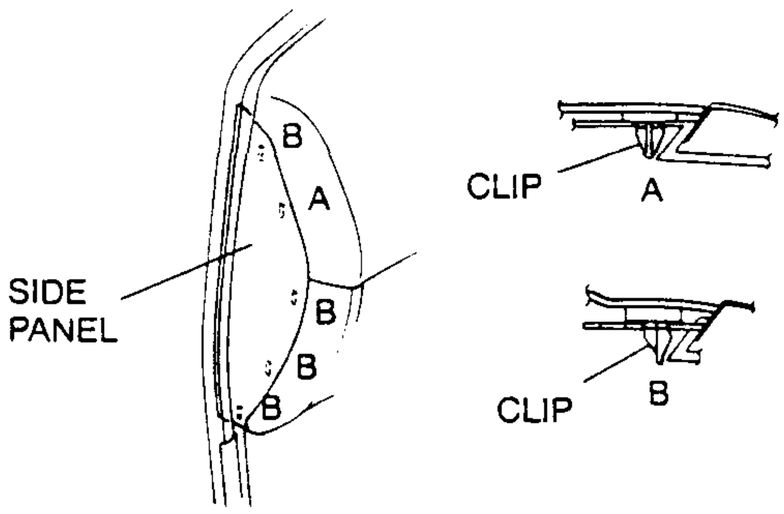


1	Defroster nozzle
2	Side demister duct
3	Center duct
4	Duct

5	Dashboard member
6	Pin
7	Cover
8	Dashboard crush pad

SIDE PANEL REMOVAL/INSTALLATION

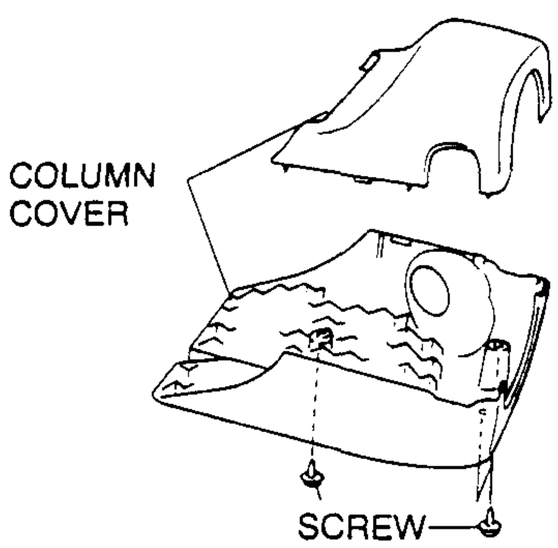
1. Remove clips A and B from the dashboard.



2. Install in the reverse order of removal.

COLUMN COVER REMOVAL/INSTALLATION

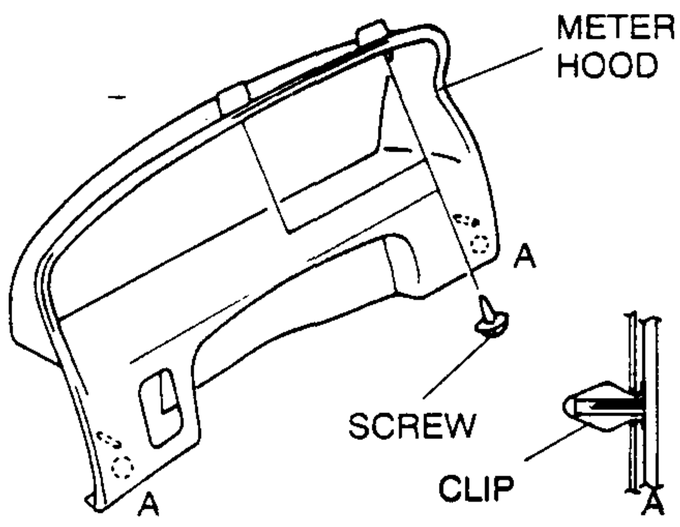
1. Remove the screws, and remove the column cover.



2. Install in the reverse order of removal.

METER HOOD REMOVAL/INSTALLATION

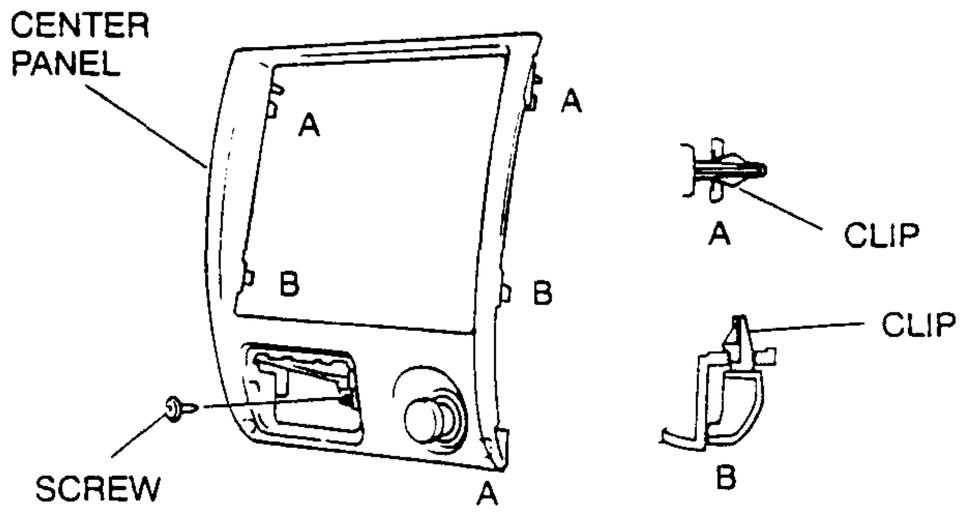
1. Remove the screws.
2. Pull the meter hood to remove clips A from the dashboard.



3. Install in the reverse order of removal.

CENTER PANEL REMOVAL/INSTALLATION

1. Remove the ashtray.
2. Remove the screw.
3. Pull the center panel to remove clips A and B from the dashboard.

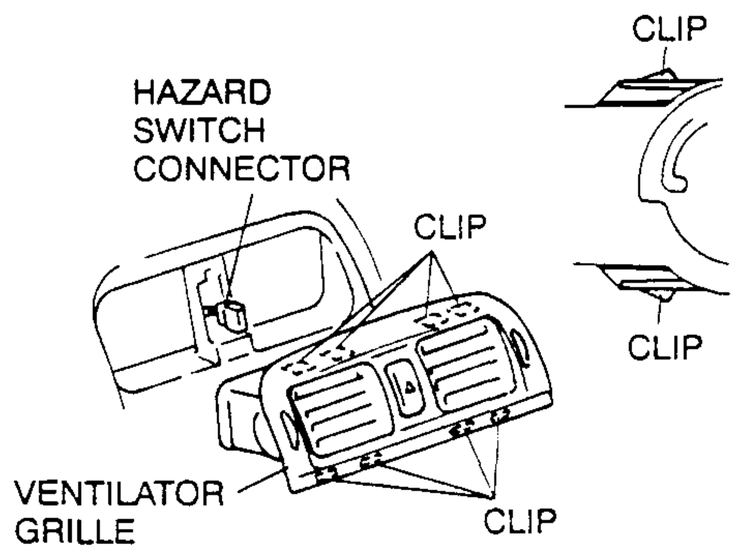


4. Install in the reverse order of removal.

VENTILATOR GRILLE REMOVAL/INSTALLATION

Center Side

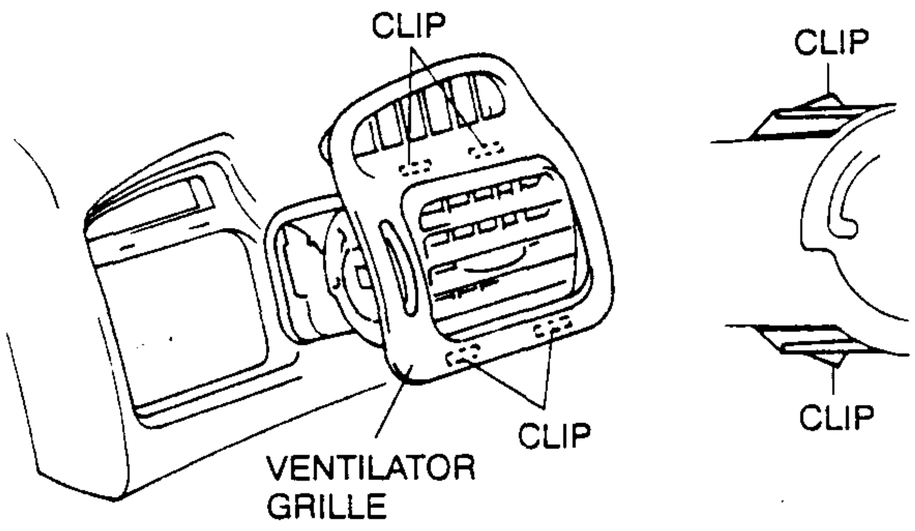
1. Disconnect the negative battery cable.
2. Remove the center panel.
3. Push the clips by using a tape-wrapped flathead screwdriver.
4. Disconnect the hazard switch connector, and remove the ventilator grille.



5. Install in the reverse order of removal.

Driver's Side, Passenger's Side

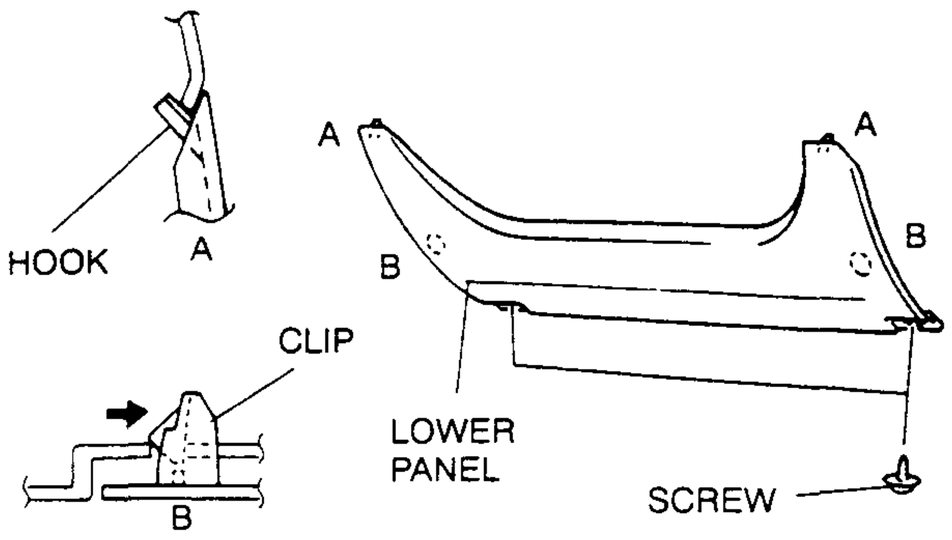
1. To remove the driver's side ventillator grille, remove the side panel.
2. To remove the passenger's side ventillator grille, remove the glove compartment.
3. Push the clips to remove the ventillator grille.



4. Install in the reverse order of removal.

LOWER PANEL REMOVAL/INSTALLATION

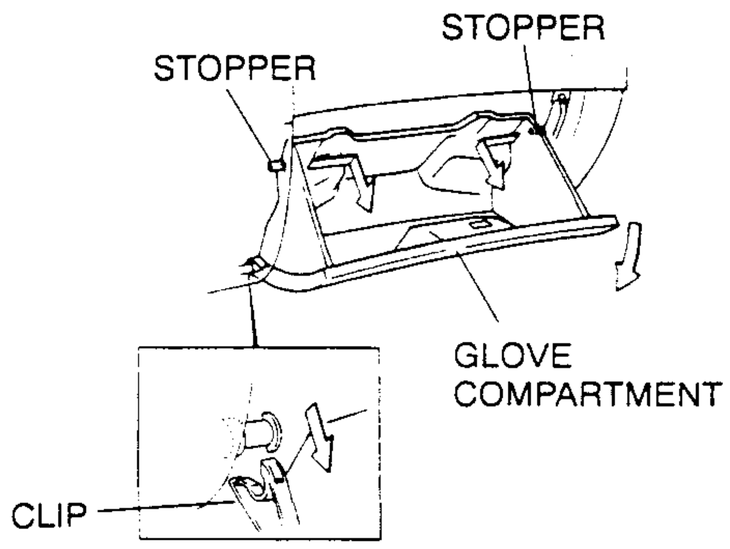
1. Remove the screws.
2. Push the clips B to remove it from the dashboard as shown in the figure.
3. Pull the lower panel downward to remove hooks A from the dashboard.



4. Install in the reverse order of removal.

GLOVE COMPARTMENT REMOVAL/INSTALLATION

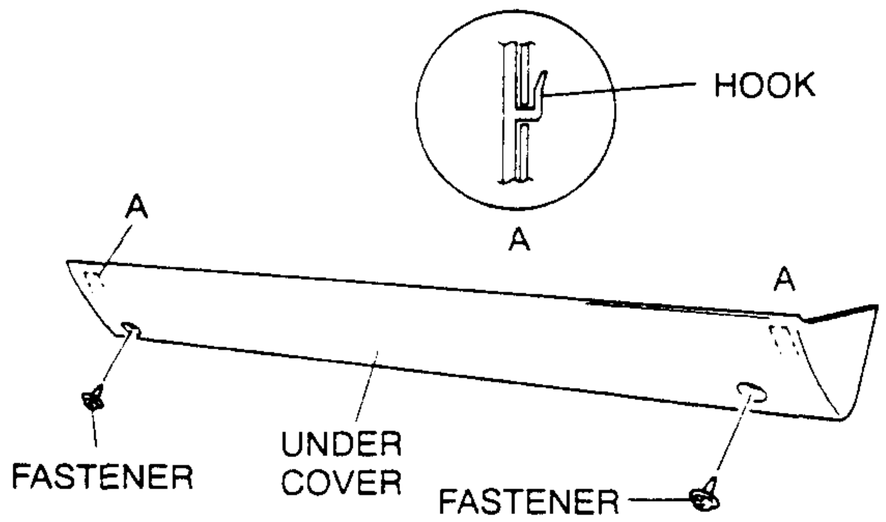
1. Bend the stoppers inward to remove.
2. Turn the glove compartment downward and pull the clips to remove it.



3. Install in the reverse order of removal.

UNDER COVER REMOVAL/INSTALLATION

1. Remove the glove compartment.
2. Remove the fasteners.
3. Pull the under cover downward to remove hooks from the dashboard.

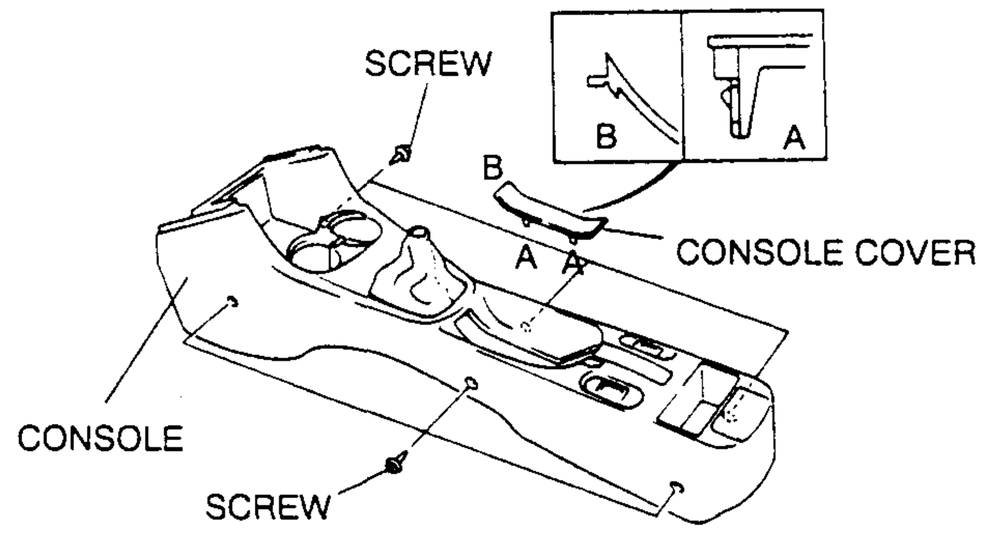


4. Install in the reverse order of removal.

CONSOLE REMOVAL/INSTALLATION

Note
- To remove the installation screws in the middle of the console, use a L-shape screwdriver.

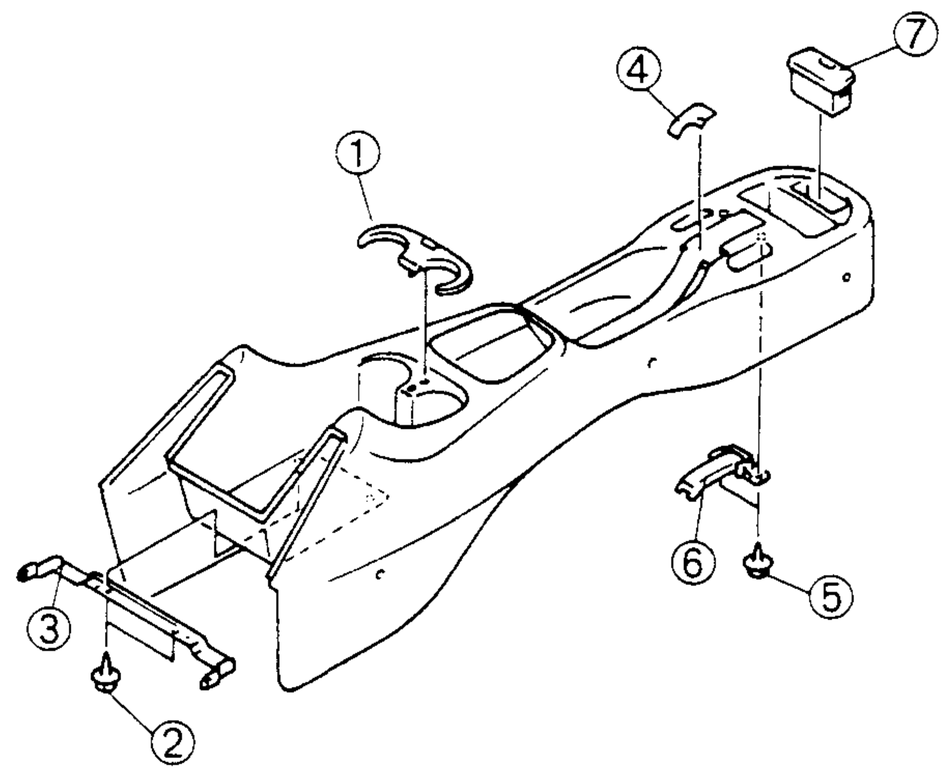
1. For manual transaxle vehicle, remove the shift lever knob.
2. Remove the console cover.
3. Remove the seat warmer switch. (Refer to SEAT, SEAT WARMER SWITCH REMOVAL/INSTALLATION.)
4. Remove the headlight cleaner switch. (Refer to section T, WIPER AND WASHER, HEADLIGHT CLEANER SWITCH REMOVAL/INSTALLATION.)
5. Remove the screws, and remove the console.



6. Install in the reverse order of removal.

CONSOLE DISASSEMBLY/ASSEMBLY

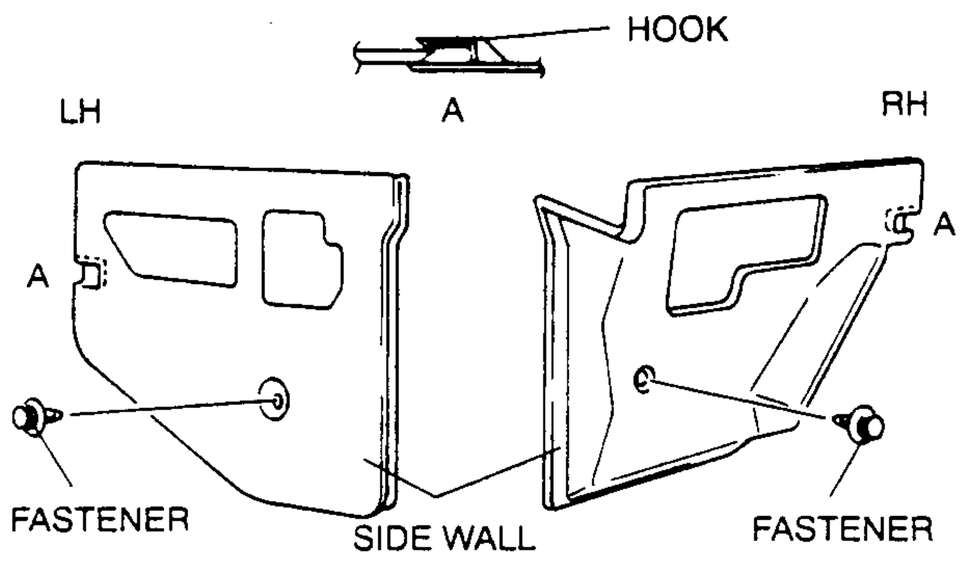
1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



1	Cup holder
2	Screw A
3	Bracket
4	Cover A
5	Screw B
6	Cover B
7	Ashtray

SIDE WALL REMOVAL/INSTALLATION

1. Remove the fastener.
2. Remove the hook, and remove the side wall.

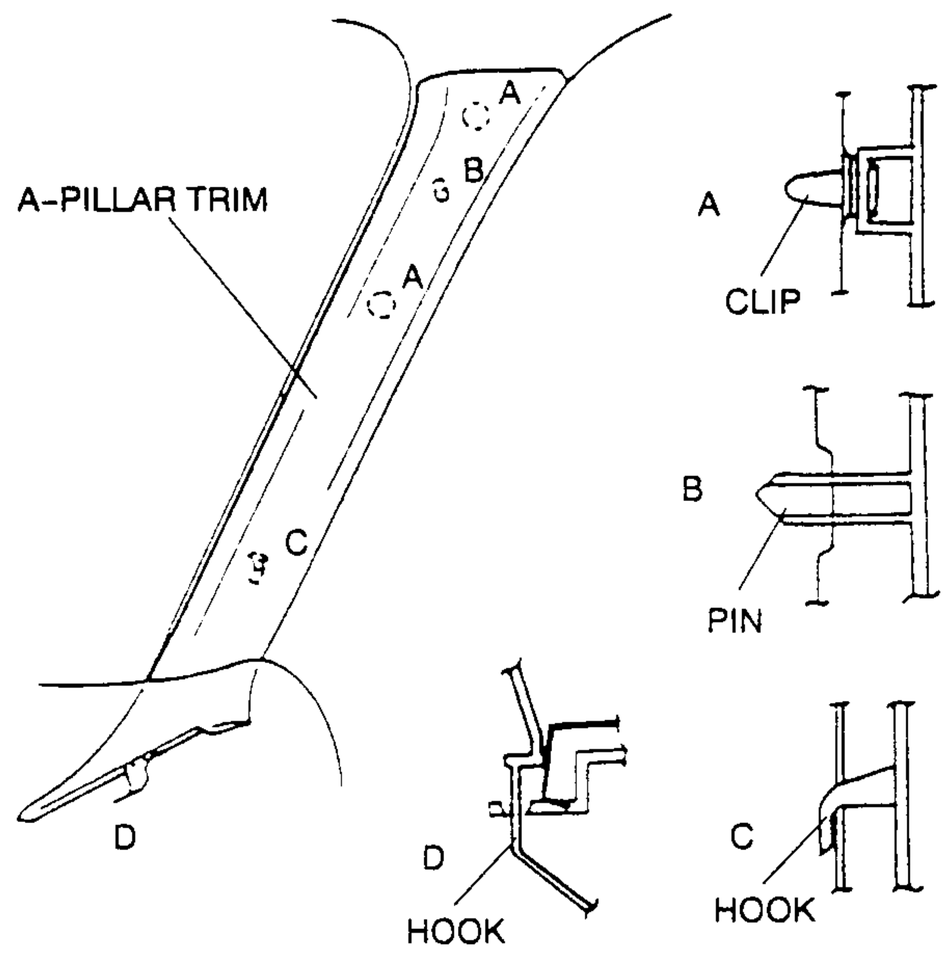


3. Install in the reverse order of removal.

TRIM

A-PILLAR TRIM REMOVAL/INSTALLATION

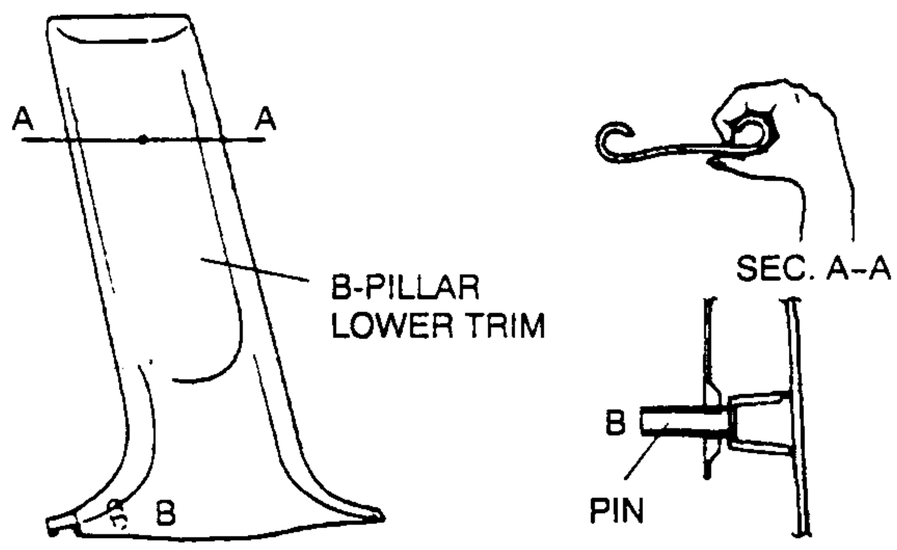
1. Turn over the seaming welt.
2. Pull the A-pillar trim forward to disengage clips A and pin B from the body.
3. Pull the A-pillar trim upward to disengage hook C from the body.
4. Pull the A-pillar trim upward to disengage hook D from the dashboard.



5. Install in the reverse order of removal.

B-PILLAR LOWER TRIM REMOVAL/INSTALLATION

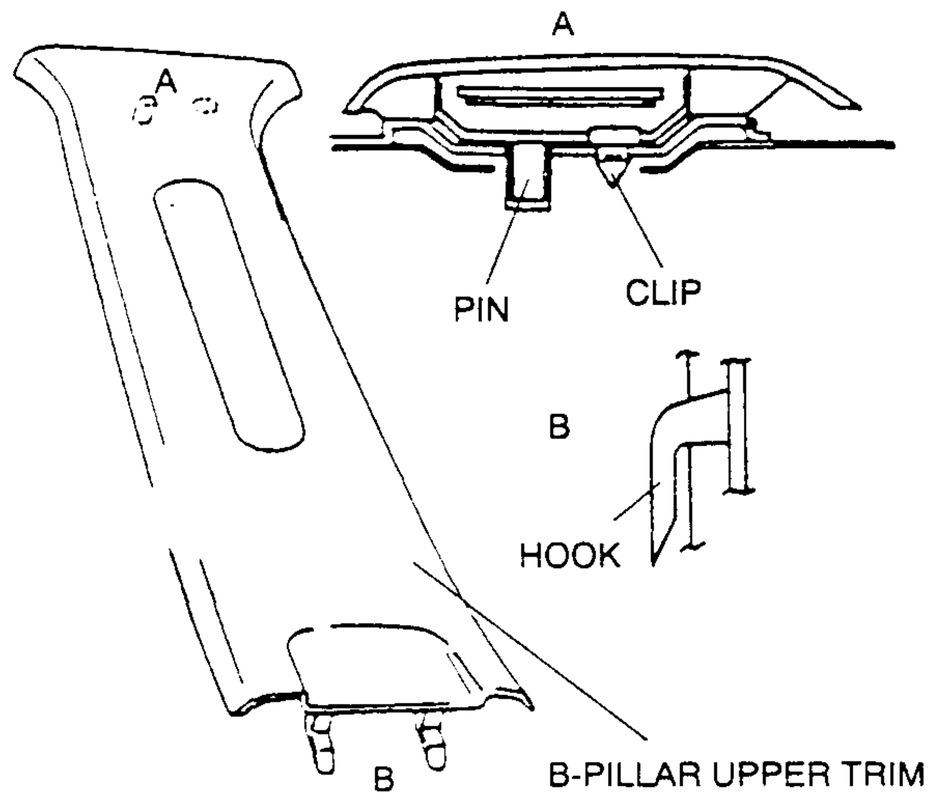
1. Remove the front scuff plate.
2. Remove the rear scuff plate.
3. Bend the sec. A-A to remove the one side of B-pillar lower trim.
4. Pull the B-pillar lower trim forward to disengage pin B from the body.



5. Install in the reverse order of removal.

B-PILLAR UPPER TRIM REMOVAL/INSTALLATION

1. Remove the upper anchor of the front seat belt. (Refer to SEAT BELT, FRONT SEAT BELT REMOVAL/INSTALLATION.)
2. Remove the B-pillar lower trim. (Refr to B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.)
3. Turn over the seaming welt.
4. Pull the B-pillar upper trim forward to disengage clip and pin from the body.
5. Pull the B-pillar upper trim upward to disengage hooks B from the body.

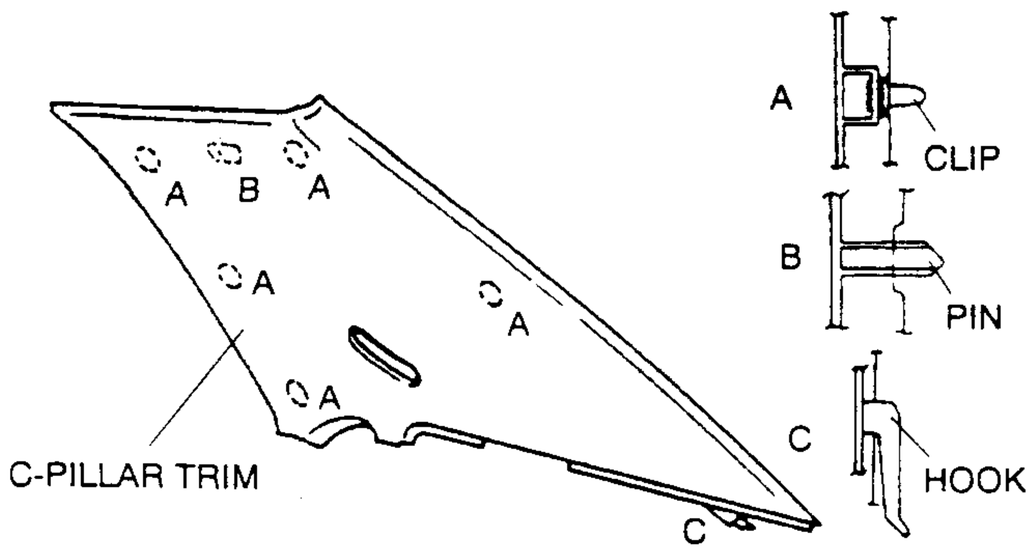


6. Install in the reverse order of removal.

C-PILLAR TRIM REMOVAL/INSTALLATION

Sedan

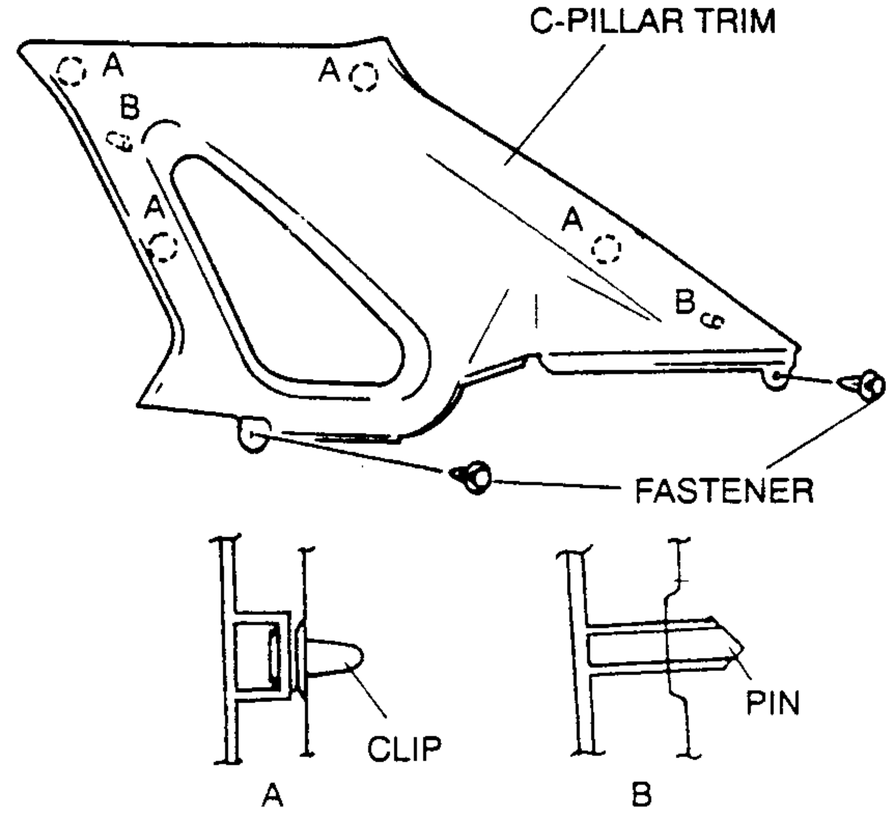
1. Turn over the seaming welt.
2. Remove the rear seat cushion and rear side seat.
3. Remove the lower anchor of the rear seat belt.
4. Pull the C-pillar trim forward to disengage clips A, pin B, and hook C from the body.



5. Install in the reverse order of removal.

5HB

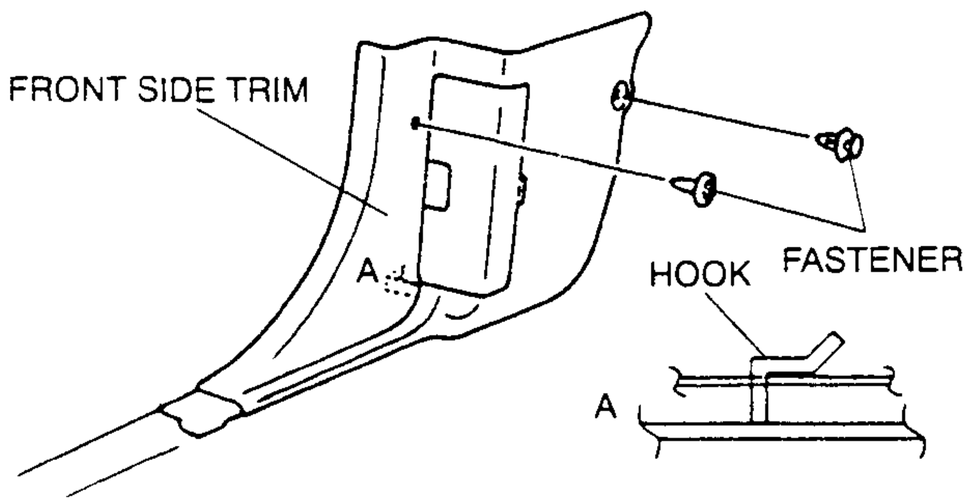
1. Remove the trunk side trim. (Refer to TRUNK SIDE TRIM REMOVAL/INSTALLATION.)
2. Remove the fasteners.
3. Pull the C-pillar trim to disengage clips A and pins B from the body.



4. Install in the reverse order of removal.

FRONT SIDE TRIM REMOVAL/INSTALLATION

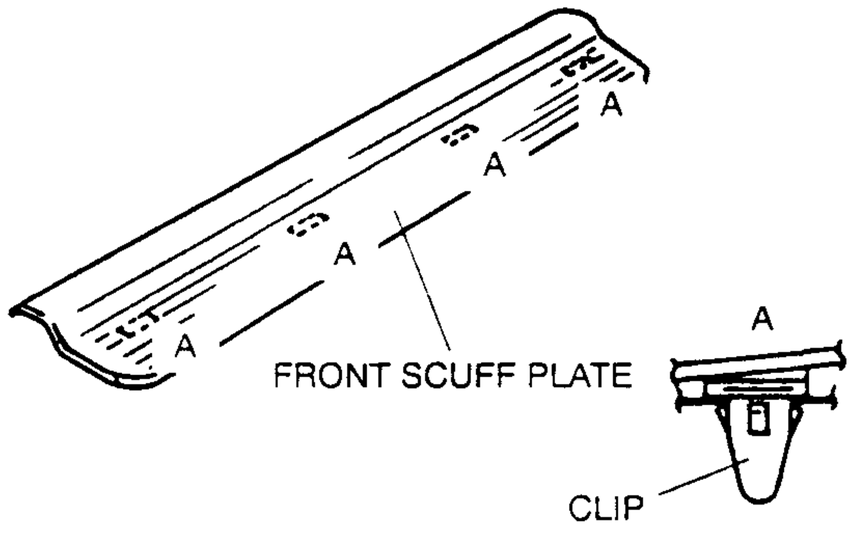
1. Remove the front scuff plate.
2. Turn over the seaming welt.
3. Remove the fasteners.
4. Pull the front side trim to disengage hook A from the body.



5. Install in the reverse order of removal.

FRONT SCUFF PLATE REMOVAL/INSTALLATION

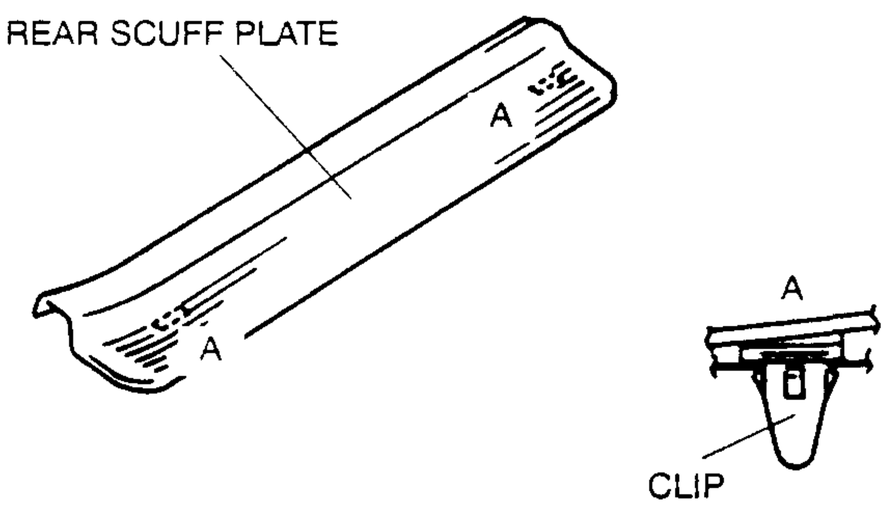
1. Pull the front scuff plate to disengage clips A from the body.



2. Install in the reverse order of removal.

REAR SCUFF PLATE REMOVAL/INSTALLATION

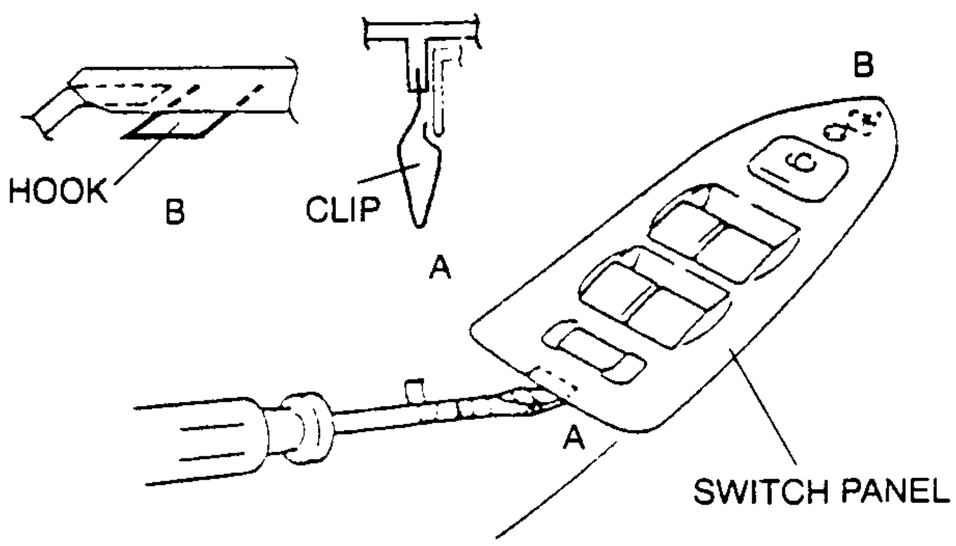
1. Pull the rear scuff plate to disengage clips A from the body.



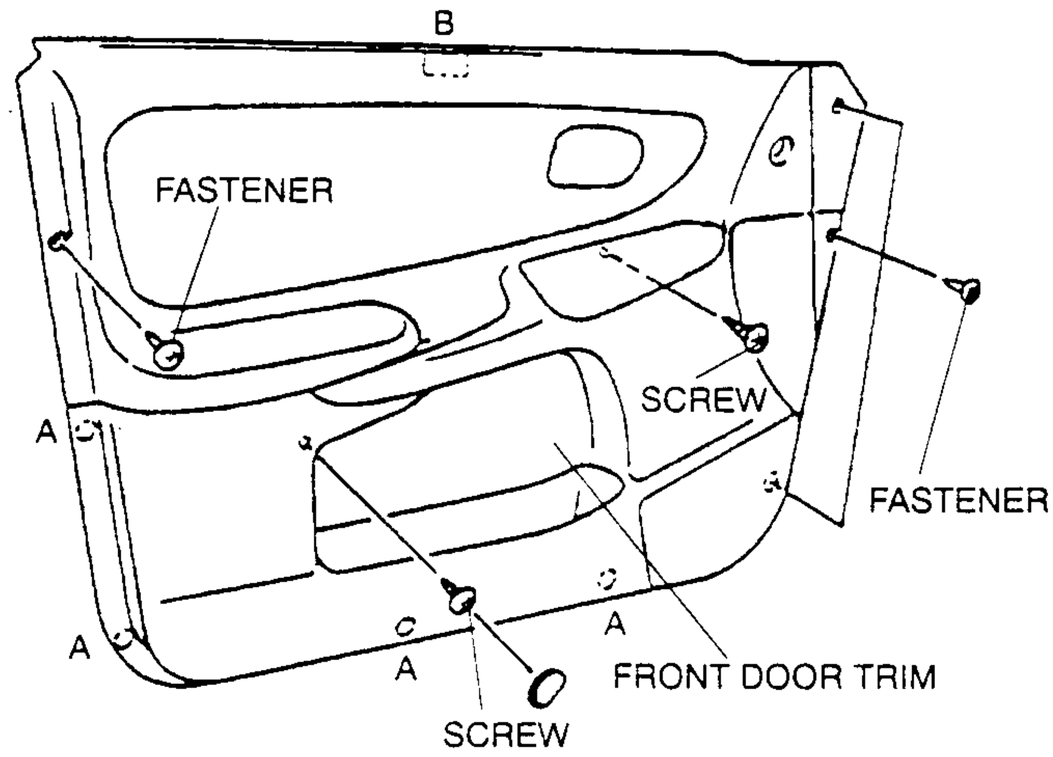
2. Install in the reverse order of removal.

FRONT DOOR TRIM REMOVAL/INSTALLATION

1. Disconnect the negative battery cable if equipped with a power window.
2. Remove the regulator handle if equipped with a manual window.
3. Remove the inner garnish.
4. Remove the inner handle cover.
5. Disengage the clip A by using a tape-wrapped flathead screwdriver as shown in the figure.
6. Pull the switch panel upward to disengage hook B from the front door trim.



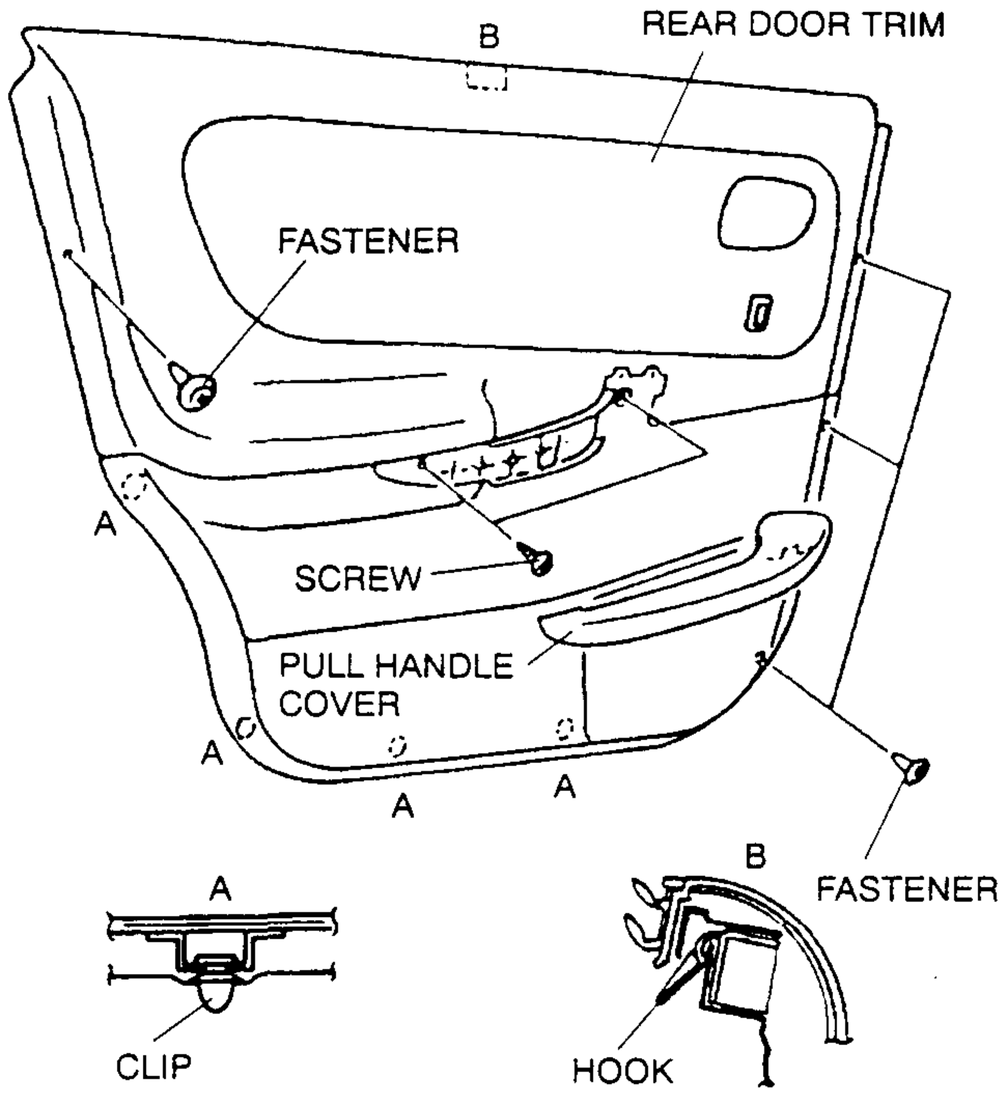
7. Disconnect the connector if equipped with a power window.
8. Remove the screws.
9. Remove the fasteners.
10. Pull the front door trim to disengage clips A from the body.
11. Pull the front door trim upward to disengage hook B from the body.



12. Install in the reverse order of removal.

REAR DOOR TRIM REMOVAL/INSTALLATION

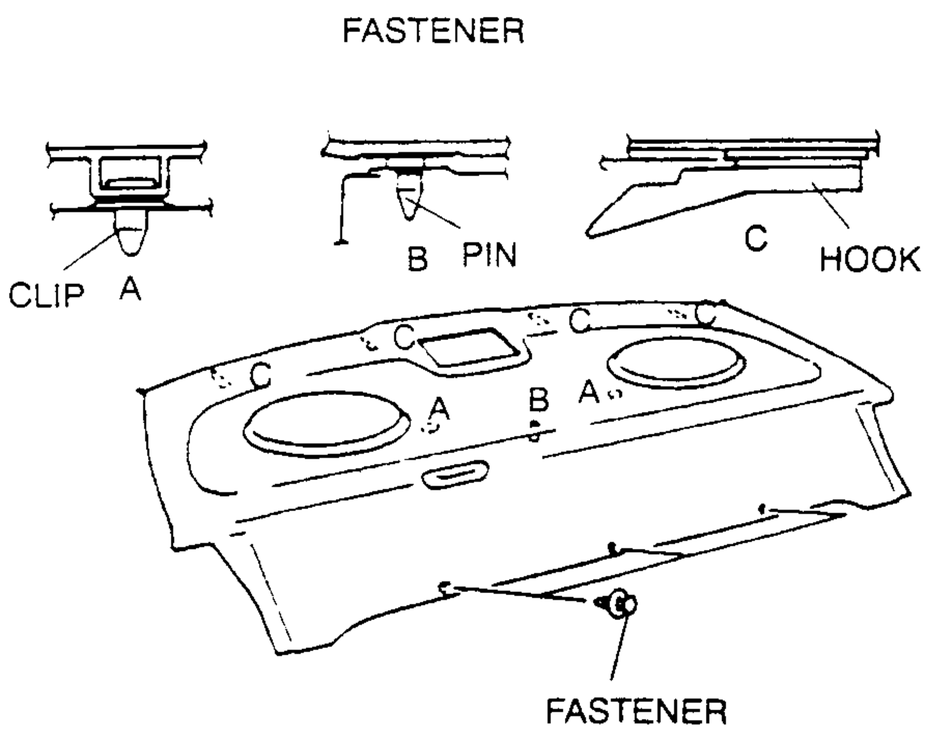
1. Disconnect the negative battery cable if equipped with a power window.
2. Remove the inner handle cover.
3. Remove the pull handle cover.
4. Remove the regulator handle if equipped with a manual window.
5. Remove the screws.
6. Remove the fasteners.
7. Pull the rear door trim to disengage clips A from the body.
8. Pull the rear door trim upward to disengage hook B from the body.
9. Disconnect the connector if equipped with a power window.



10. Install in the reverse order of removal.

REAR PACKAGE TRIM REMOVAL/INSTALLATION
Sedan

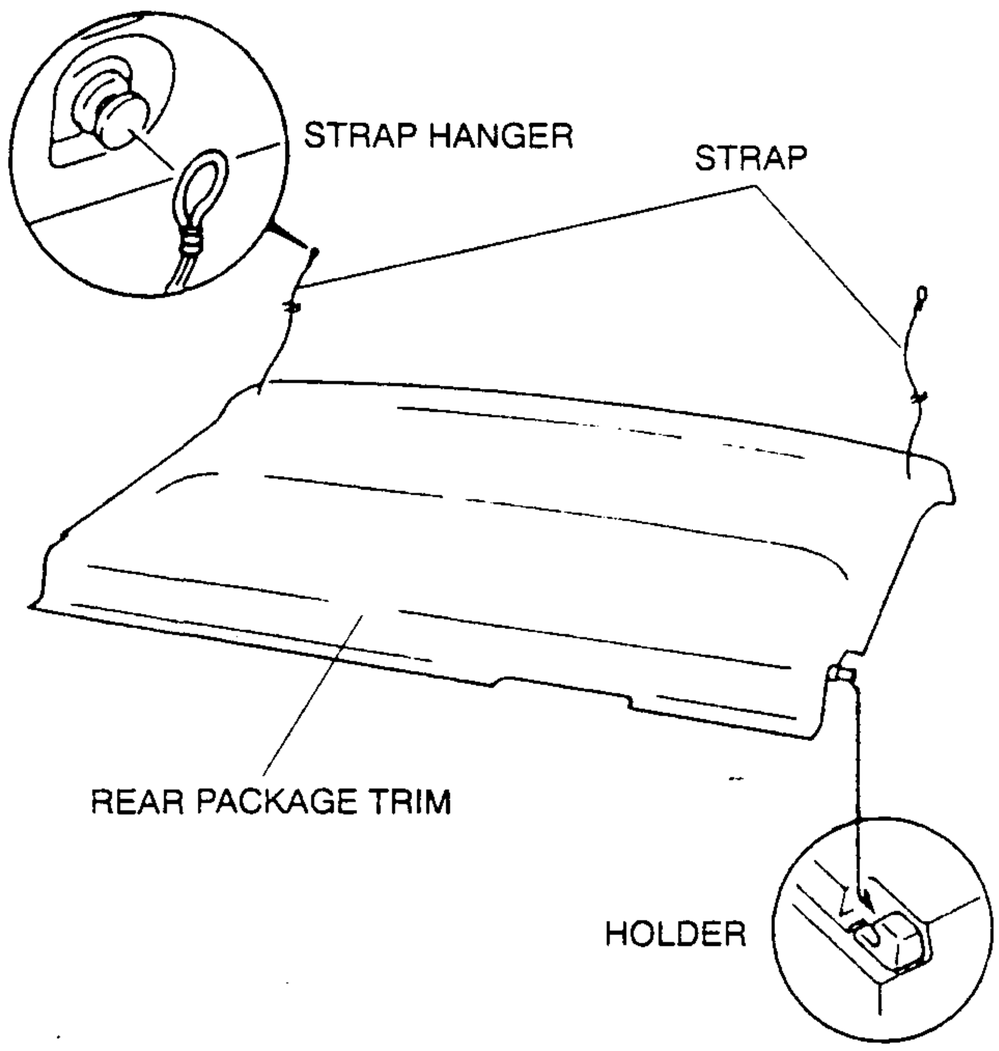
1. Disconnect the negative battery cable.
2. Remove the high-mount brake light.
3. Remove the fasteners.
4. Pull the rear package trim upward to disengage clips A and pin B from the body.
5. Pull the rear package trim to disengage hooks C from the body.



6. Install in the reverse order of removal.

5HB

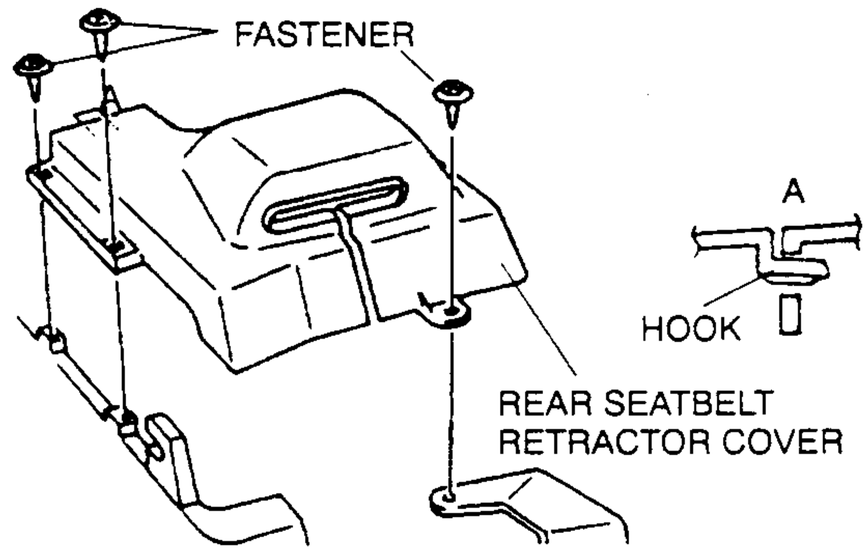
1. Remove the straps from the strap hangers.
2. Remove the rear package trim from the holder on trunk side trim.



3. Install in the reverse order of removal.

REAR SEAT BELT RETRACTOR COVER REMOVAL/INSTALLATION
5HB

1. Remove the rear side seat.
2. Remove the fasteners.
3. Pull the rear seat belt retractor cover upward to disengage hook A from the trunk side trim.

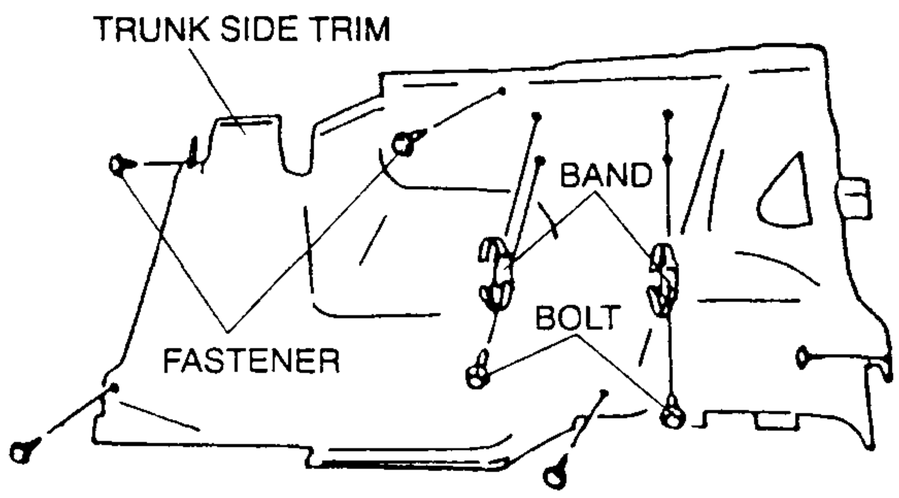


4. Install in the reverse order of removal.

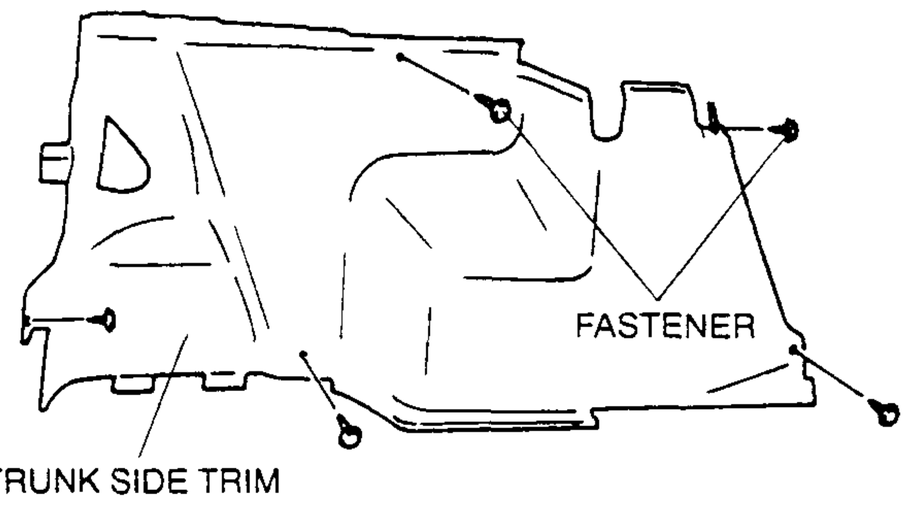
TRUNK SIDE TRIM REMOVAL/INSTALLATION
Sedan

1. Remove the trunk end trim.
2. Remove the rear seat cushion and rear side seat.
3. When removing the trunk side trim on the right side, remove the bolts to remove the bands.
4. Remove the fasteners to remove the trunk side trim.

Right side



Left side

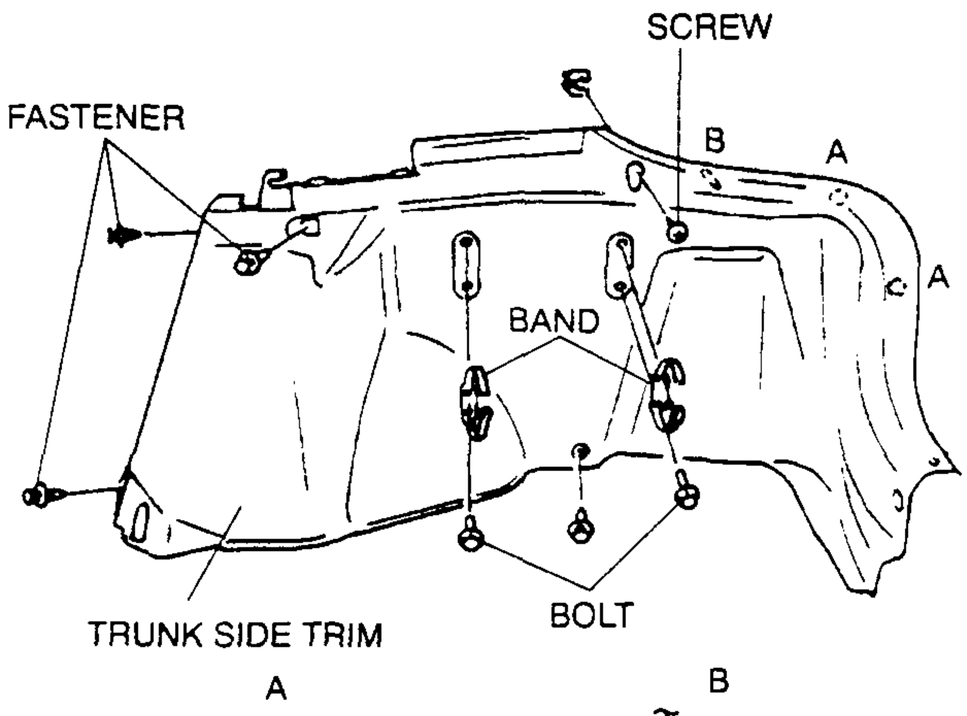


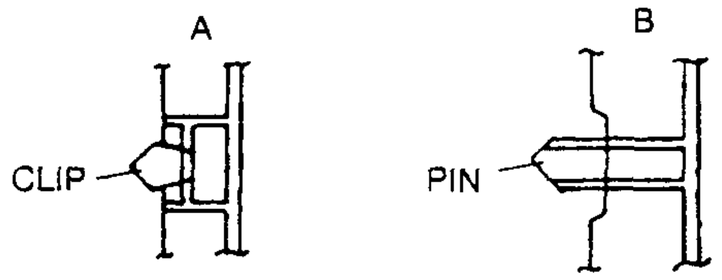
5. Install in the reverse order of removal

5HB

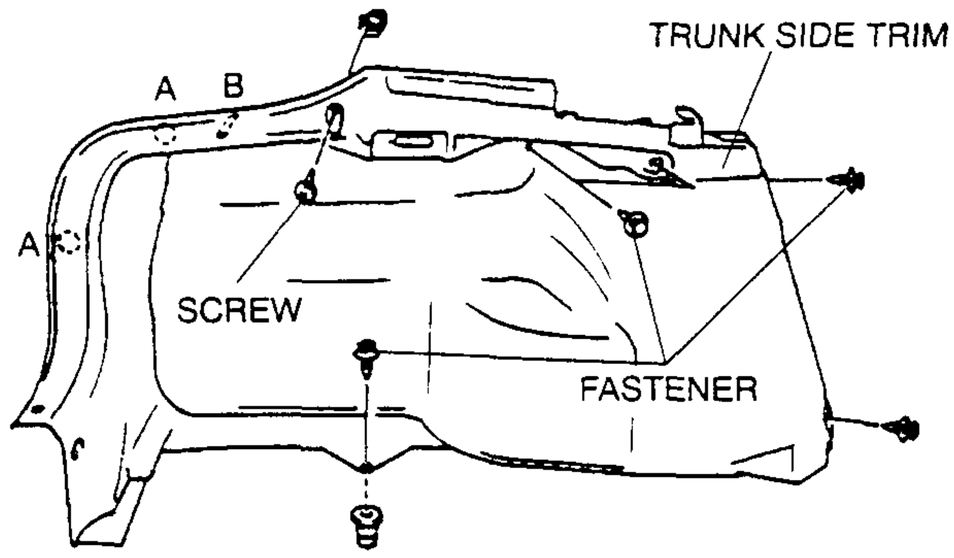
1. Disconnect the negative battery cable.
   (Only when removing the left side trunk side trim.)
2. Remove the trunk end trim.
3. Remove the rear seat belt retractor cover. (Refer to REAR SEAT BELT RETRACTOR COVER REMOVAL/INSTALLATION.)
4. When removing the trunk side trim on the right side, remove the bolts to remove the bands.
5. When removing the trunk side trim on the left side, remove the cargo compartment light. (Refer to section T, INTERIOR LIGHTING SYSTEM, CARGO COMPARTMENT LIGHT REMOVAL/ INSTALLATION.)
6. Remove the fasteners.
7. Remove the screw.
8. Pull the trunk side trim to disengage clips A and pin B from the body.

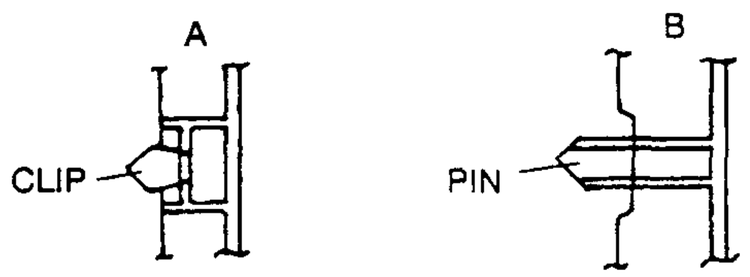
Right side





Left side



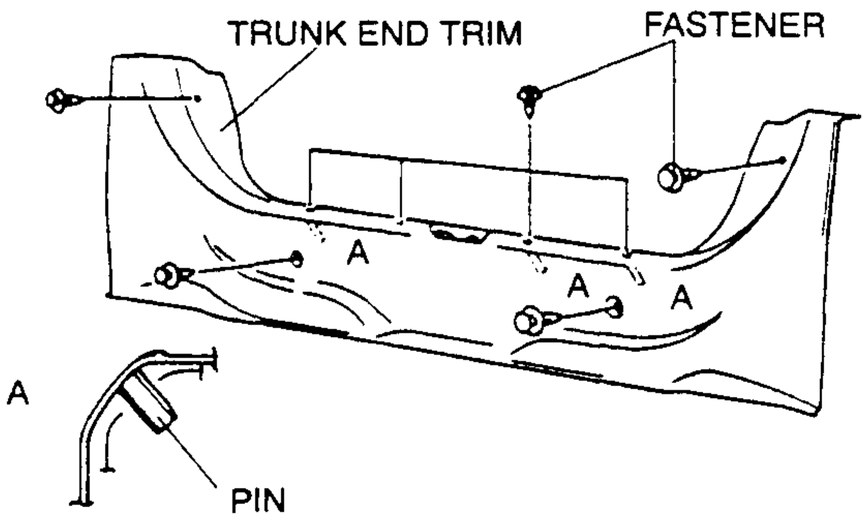


9. Install in the reverse order of removal.

TRUNK END TRIM REMOVAL/INSTALLATION

Sedan

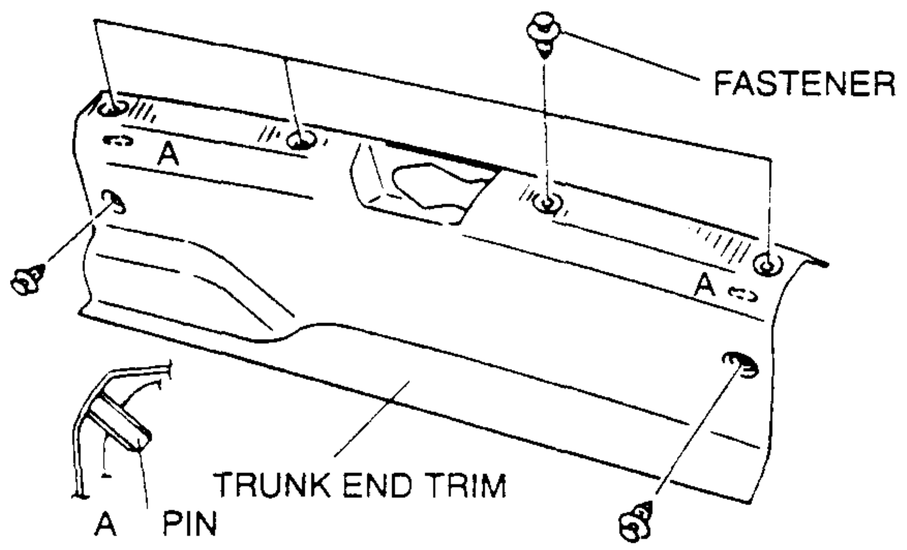
1. Remove the fasteners.
2. Pull the trunk end trim upward to disengage pins A from the body.



3. Install in the reverse order of removal.

5HB

1. Remove the fasteners.
2. Pull the trunk end trim upward to disengage pins A from the body.

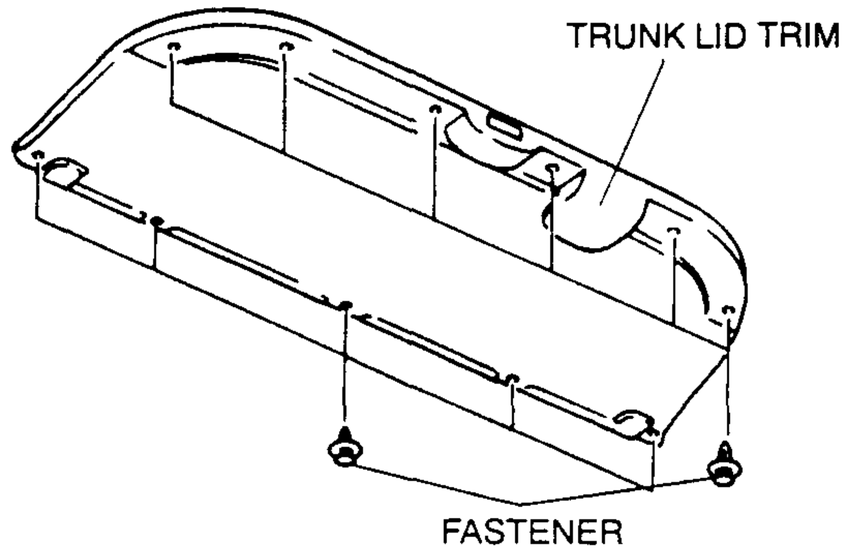


3. Install in the reverse order of removal.

TRUNK LID TRIM REMOVAL/INSTALLATION

Sedan

1. Remove the fasteners to remove the trunk lid trim.

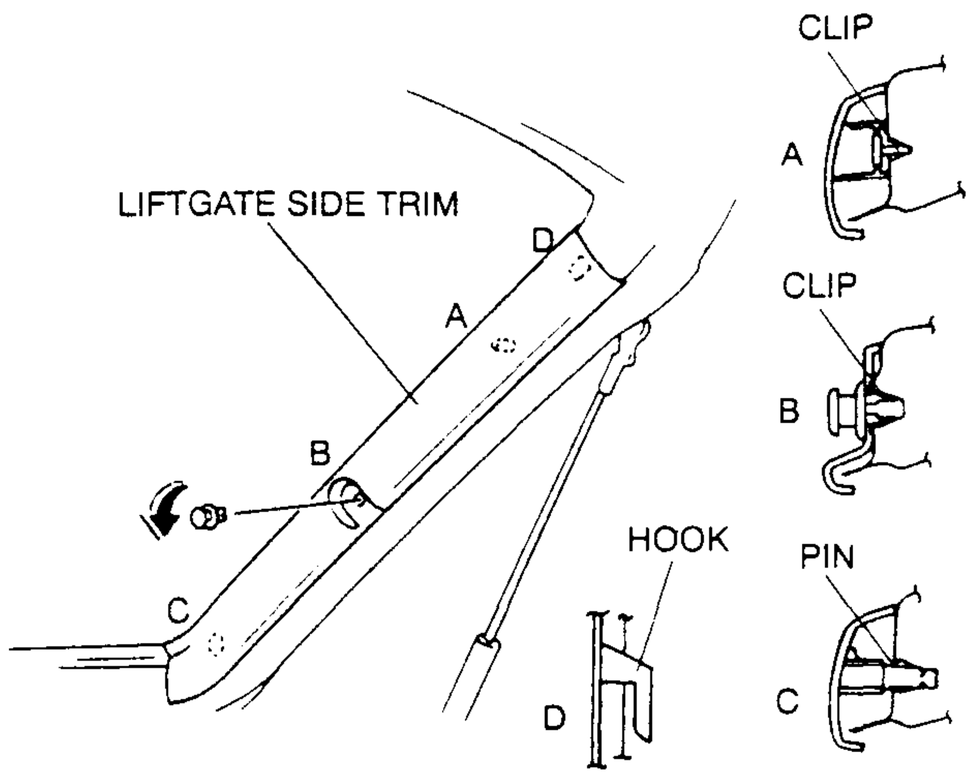


2. Install in the reverse order of removal.

LIFTGATE SIDE TRIM REMOVAL/INSTALLATION

5HB

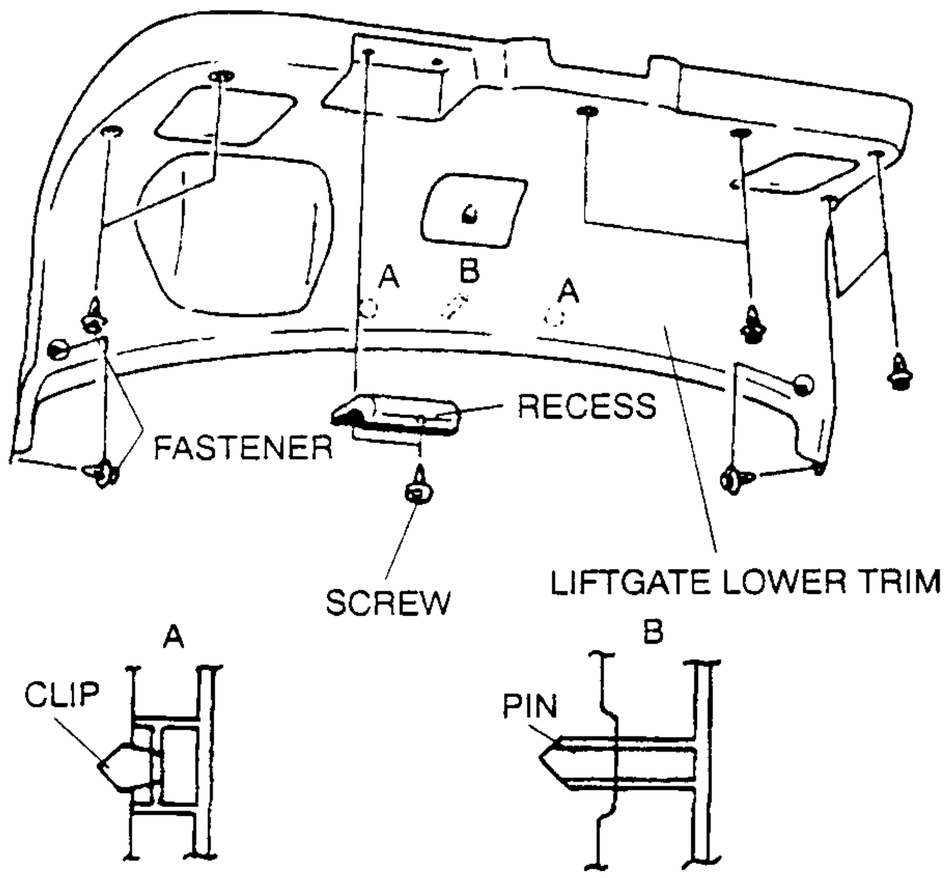
1. Remove the strap hanger.
2. Remove the clip A.
3. Turn the clip B indicated by the arrow to remove it.
4. Remove the pin C.
5. Pull the liftgate side trim upward to disengage hook D from the liftgate lower trim.



6. Install in the reverse order of removal.

LIFTGATE LOWER TRIM REMOVAL/INSTALLATION

1. Remove the liftgate side trim.
2. Remove the screws to remove the liftgate recess.
3. Remove the fasteners.
4. Pull the liftgate lower trim to disengage clips A and pin B from the body.

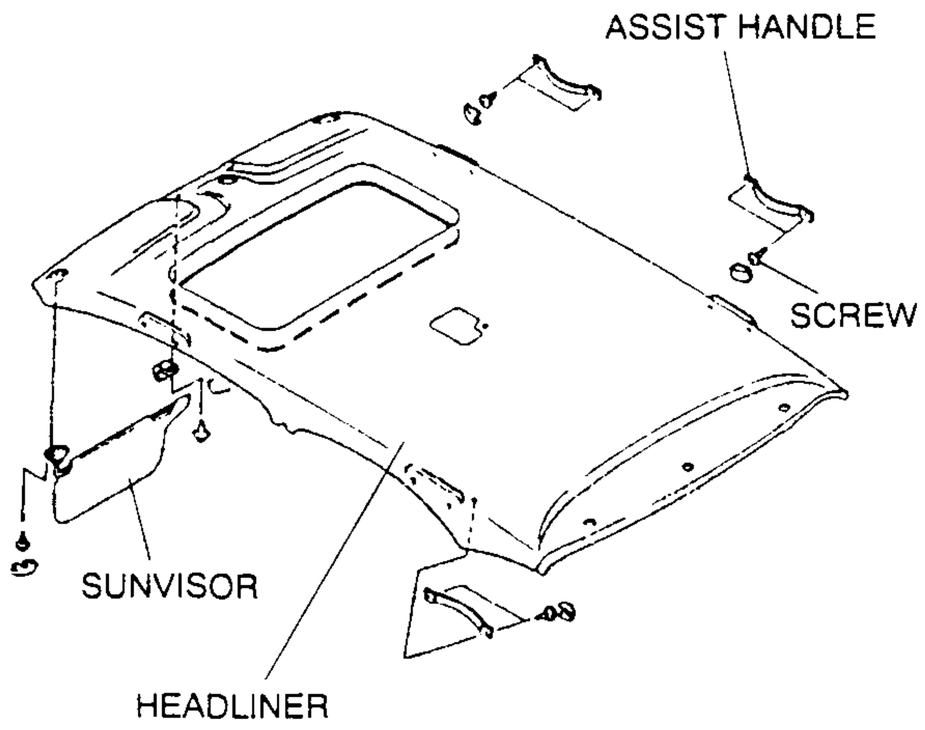


5. Install in the reverse order of removal.

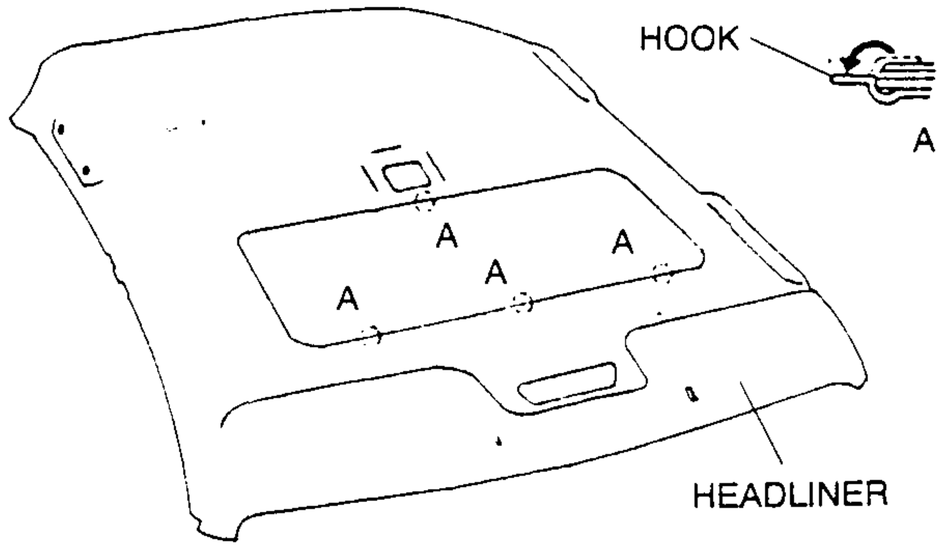
HEADLINER

HEADLINER REMOVAL/INSTALLATION

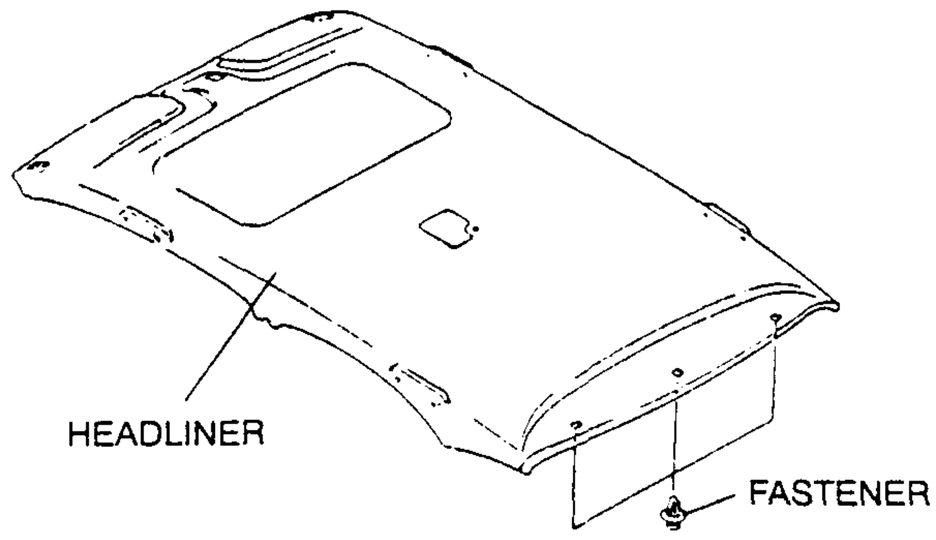
1. Disconnect the negative battery cable.
2. Remove the interior and spot light if not equipped with a sliding sunroof. (Refer to section T, INTERIOR LIGHTING SYSTEM, INTERIOR AND SPOT LIGHT REMOVAL/INSTALLATION.)
3. Remove the spot light and interior light if equipped with a sliding sunroof. (Refer to section T, INTERIOR LIGHTING SYSTEM, SPOT LIGHT REMOVAL/INSTALLATION.)(Refer to section T, INTERIOR LIGHTING SYSTEM, INTERIOR LIGHT REMOVAL/INSTALLATION.)
4. Remove the A-pillar trim.
5. Remove the B-pillar upper trim. (Refer to TRIM, B-PILLAR UPPER TRIM REMOVAL/ INSTALLATION.)
6. Remove the C-pillar trim. (Refer to TRIM, C-PILLAR TRIM REMOVAL/INSTALLATION.)
7. Remove the sunvisor.
8. Remove the assist handle.



9. Fold up the hooks A if equipped with a sliding sunroof.



10. Remove the fasteners to remove the headliner.

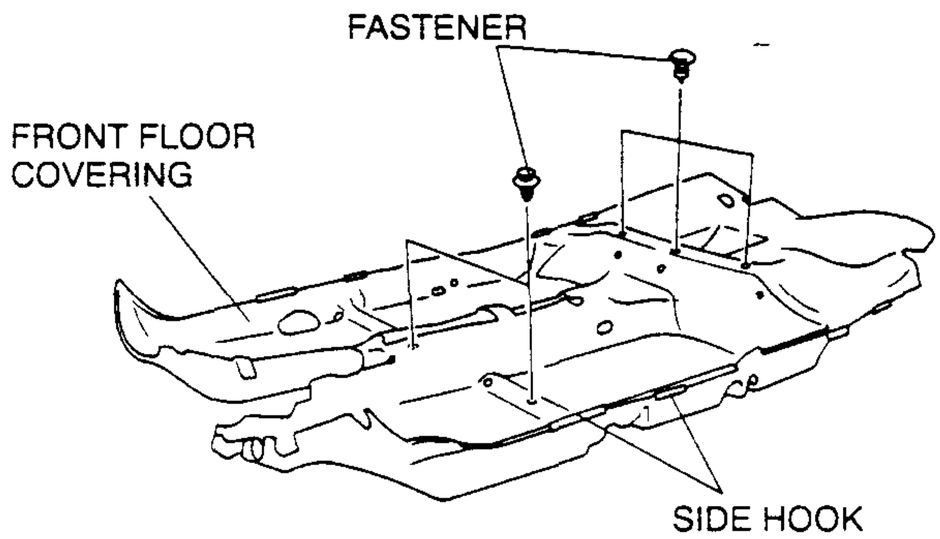


11. Install in the reverse order of removal.

FLOOR COVERING

FRONT FLOOR COVERING REMOVAL/ INSTALLATION

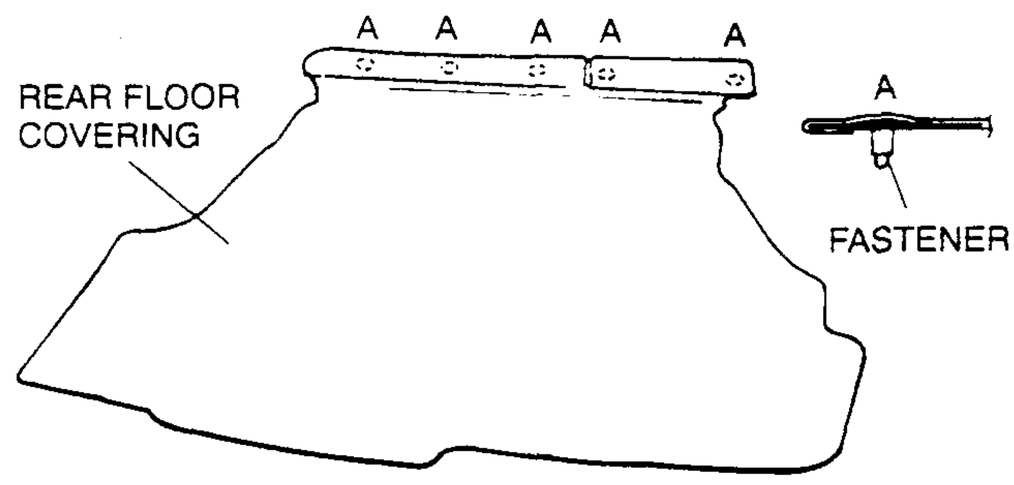
1. Disconnect the negative battery cable.
2. Remove the front seat. (Refer to SEAT, FRONT SEAT REMOVAL/INSTALLATION.)
3. Remove the dashboard. (Refer to DASHBOARD AND CONSOLE, DASHBOARD REMOVAL/INSTALLATION.)
4. Remove the rear seat cushion.
5. Remove the front side trim. (Refer to TRIM, FRONT SIDE TRIM REMOVAL/INSTALLATION.)
6. Remove the B-Pillar lower trim. (Refer to TRIM, B-PILLAR LOWER TRIM REMOVAL/ INSTALLATION.)
7. Remove the lower anchor of the front seat belt.
8. Remove the fasteners.
9. Disengage the side hooks to remove the front floor covering.



10. Install in the reverse order of removal.

REAR FLOOR COVERING REMOVAL/ INSTALLATION

1. Remove the fasteners A to remove the rear floor covering.



2. Install in the reverse order of removal.

SEAT BELT

FRONT SEAT BELT REMOVAL/INSTALLATION

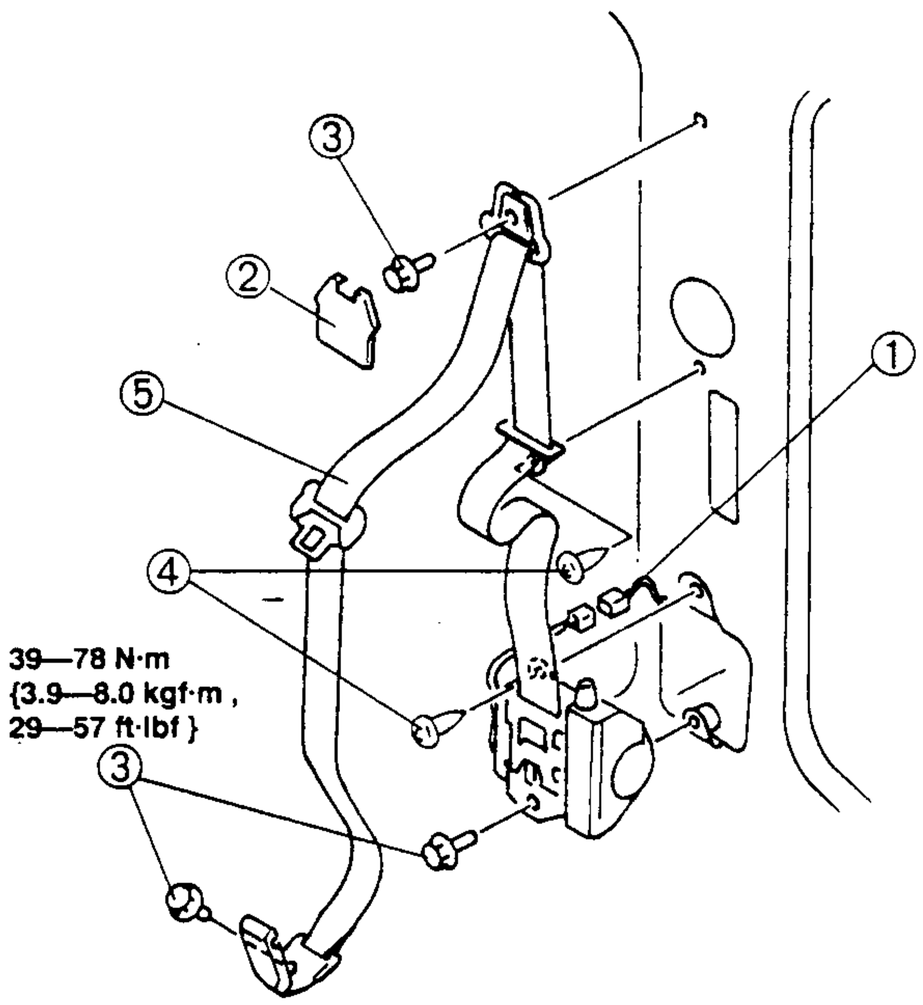
Warning

- **Handling the front seat belt (pre-tensioner seat belt) improperly can accidently deploy the pre-tensioner, which may seriously injure you. Read SERVICE WARNINGS before handling the front seat belt. (Refer to section T, AIR BAG SYSTEM, SERVICE WARNINGS.)**

Caution

- **The ELR has a spring that will unwind if the retractor's cover is removed. The spring cannot be rewound by hand. If this occurs, the ELR will not work properly. Therefore, do not disassemble the retractor.**

1. Turn the ignition switch to LOCK.
2. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply to deplete its stored power.
3. Remove the B-pillar lower trim.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.



1	Connector
2	Cover
3	Bolt
4	Screw
5	Front seat belt

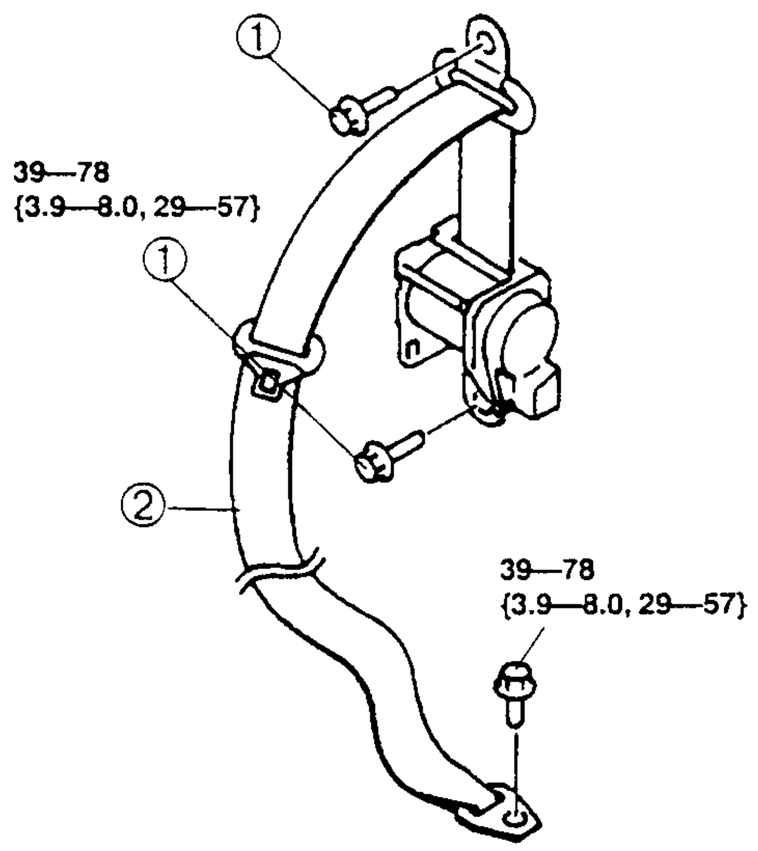
REAR SEAT BELT REMOVAL/INSTALLATION

Caution

- **The ELR has a spring that will unwind if the retractor's cover is removed. The spring cannot be rewound by hand. If this occurs, the ELR will not work properly. Therefore, do not disassemble the retractor.**

Sedan

1. Remove the C-pillar trim. (Refer to TRIM, C-PILLAR TRIM REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.

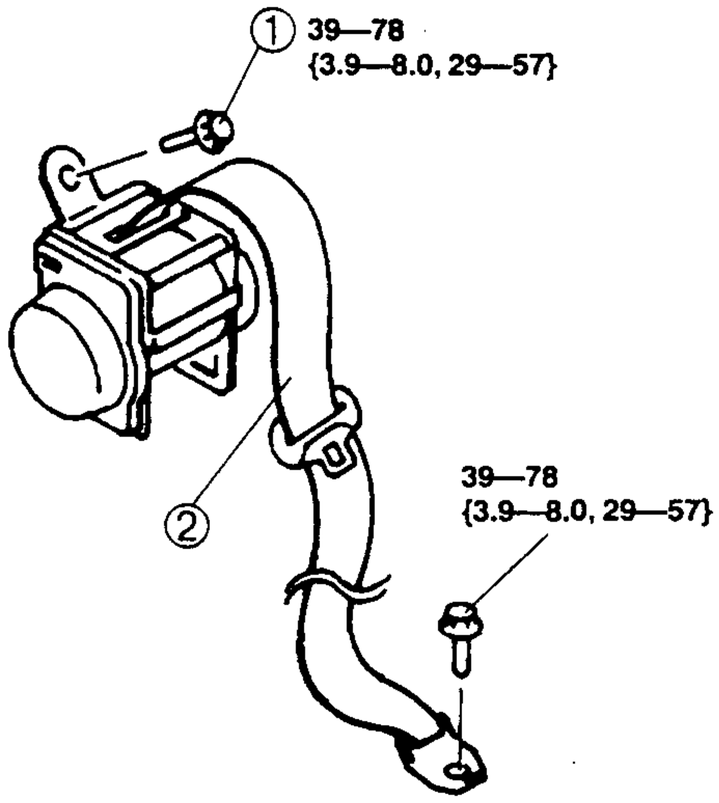


N·m { kgf·m , ft·lbf }

1	Bolt
2	Rear seat belt

5HB

1. Remove the rear seat belt retractor cover. (Refer to TRIM, REAR SEAT BELT RETRACTOR COVER REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



N·m { kgf·m , ft·lbf }

1	Bolt
2	Rear seat belt

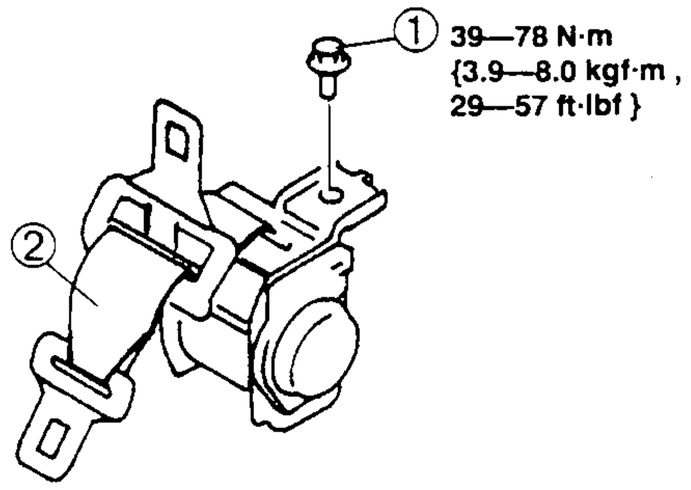
REAR CENTER SEAT BELT REMOVAL/ INSTALLATION

Caution

- **The ELR has a spring that will unwind if the retractor's cover is removed. The spring cannot be rewound by hand. If this occurs, the ELR will not work properly. Therefore, do not disassemble the retractor.**

Sedan

1. Remove the rear package trim. (Refer to TRIM, REAR PACKAGE TRIM REMOVAL/ INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



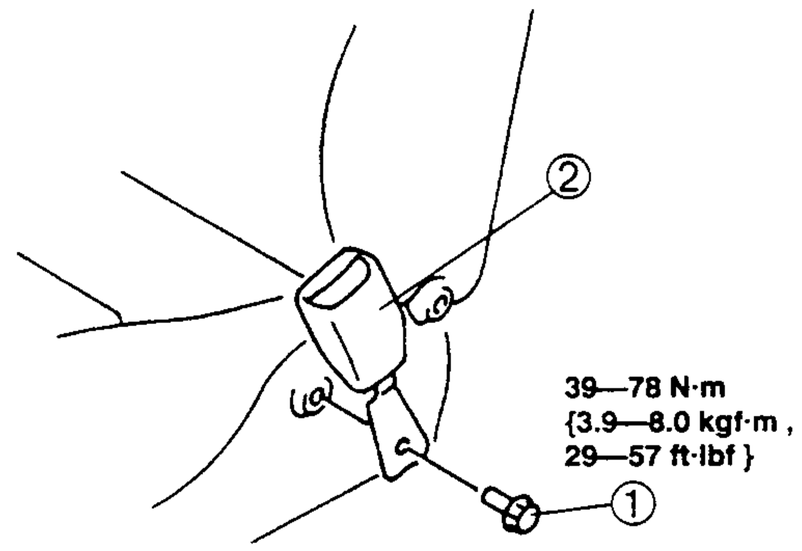
1	Bolt
2	Rear center seat belt

5HB

- Remove the rear center seat belt from rear seat. (Refer to SEAT, REAR SEAT DISASSEMBLY/ ASSEMBLY.)

FRONT BUCKLE REMOVAL/INSTALLATION

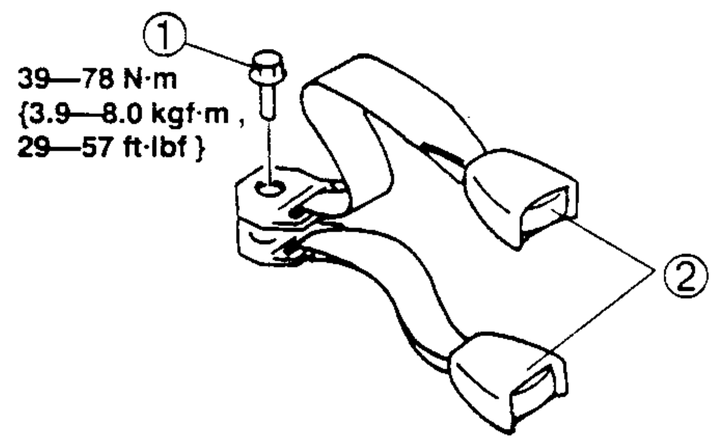
1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



1	Bolt
2	Front buckle

REAR BUCKLE REMOVAL/INSTALLATION

1. For sedan, remove the rear seat cushion. For 5HB, lift up the rear seat cushion.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



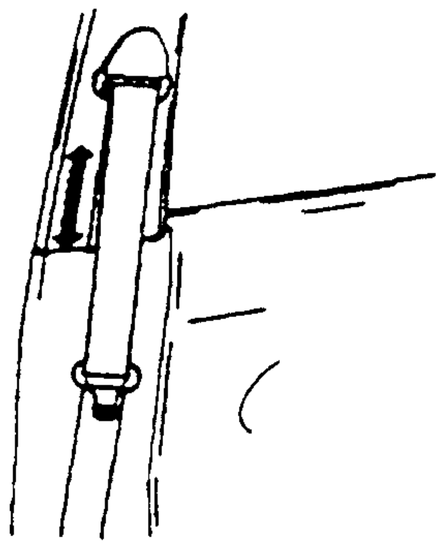
1	Bolt
2	Rear buckle

SEAT BELT INSPECTION

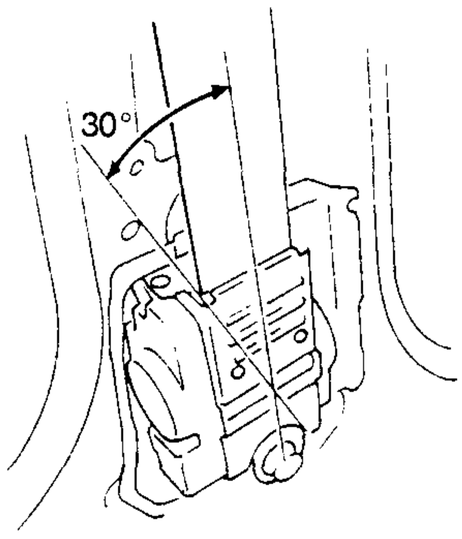
1. Inspect the webbing for scars, tears, and wear.
2. Inspect the fittings for deformation or damage.
3. If a problem is found, replace the seat belt.

ELR INSPECTION

1. Verify that the belt can be pulled out smoothly, and that it moves smoothly when worn.
2. Verify that the retractor locks when the belt is quickly pulled.



3. Remove the retractor.
4. Hold the retractor as it would be installed.
5. Slowly incline the retractor while pulling out the belt.
6. Verify that the retractor locks at **approximately 30 °** inclination.



7. If not as specified, replace the seat belt.

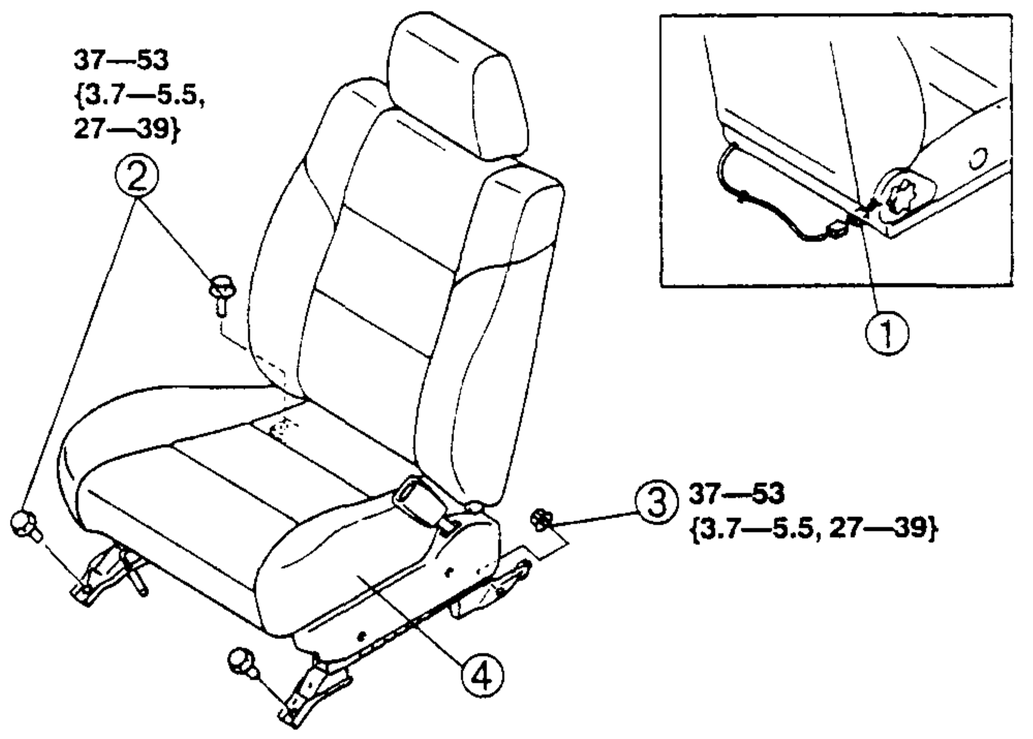
SEAT

FRONT SEAT REMOVAL/INSTALLATION

Warning

- **Handling the front seat (side air bag) improperly can accidently deploy the side air bag, which may seriously injure you. Read SERVICE WARNINGS before handling the front seat. (Refer to section T, AIR BAG SYSTEM, SERVICE WARNINGS.)**

1. Turn the ignition switch to LOCK.
2. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply to deplete its stored power.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



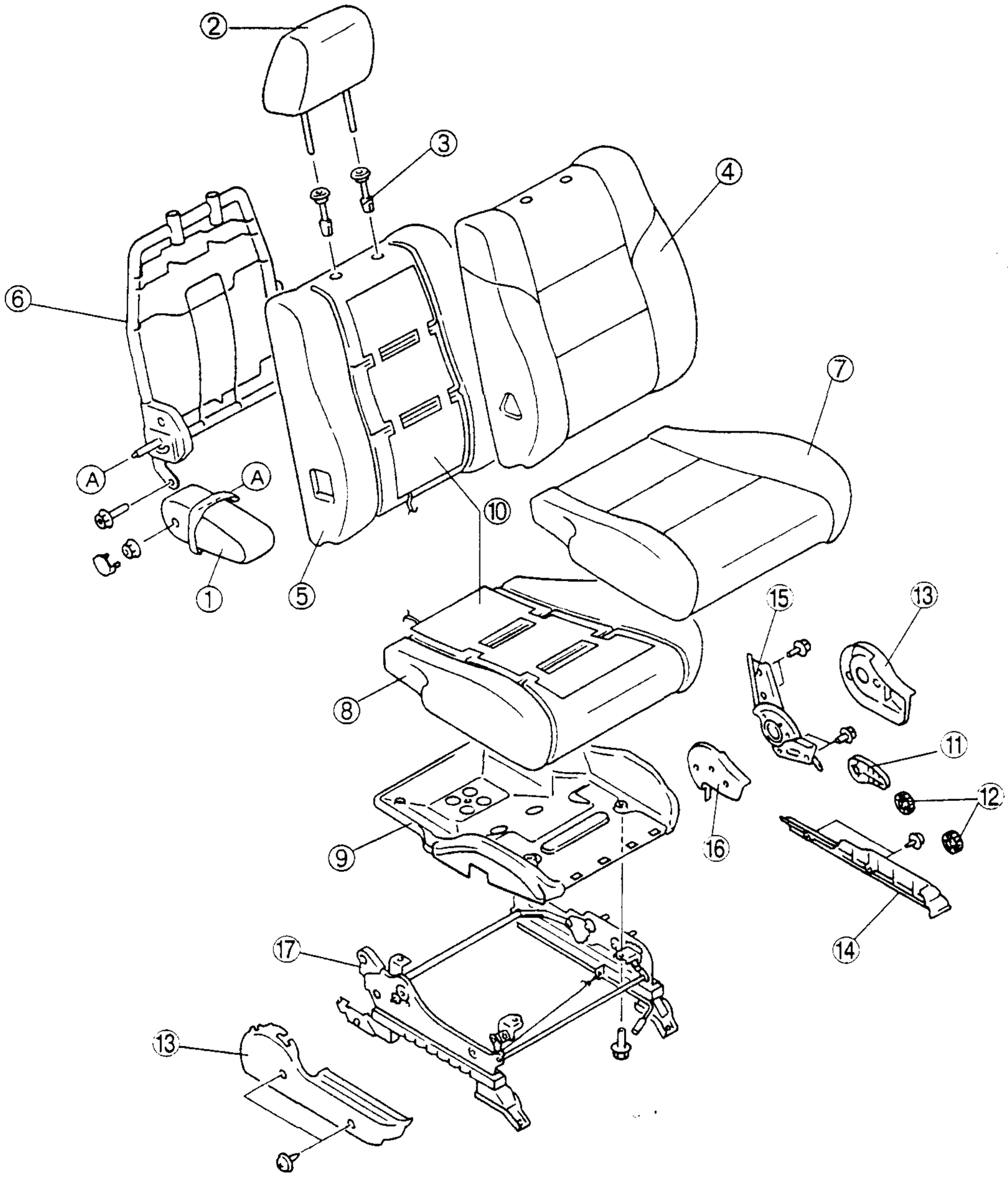
N·m { kgf·m , ft·lbf }

1	Connector
2	Bolt
3	Nut
4	Front seat

FRONT SEAT DISASSEMBLY/ASSEMBLY
Driver's Seat

Warning
- **Handling the front seat (side air bag) improperly can accidently deploy the side air bag, which may seriously injure you. Read SERVICE WARNINGS before handling the front seat. (Refer to section T, AIR BAG SYSTEM, SERVICE WARNINGS.)**

1. Remove the driver-side side air bag module. (Refer to section T, AIR BAG SYSTEM, SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly.



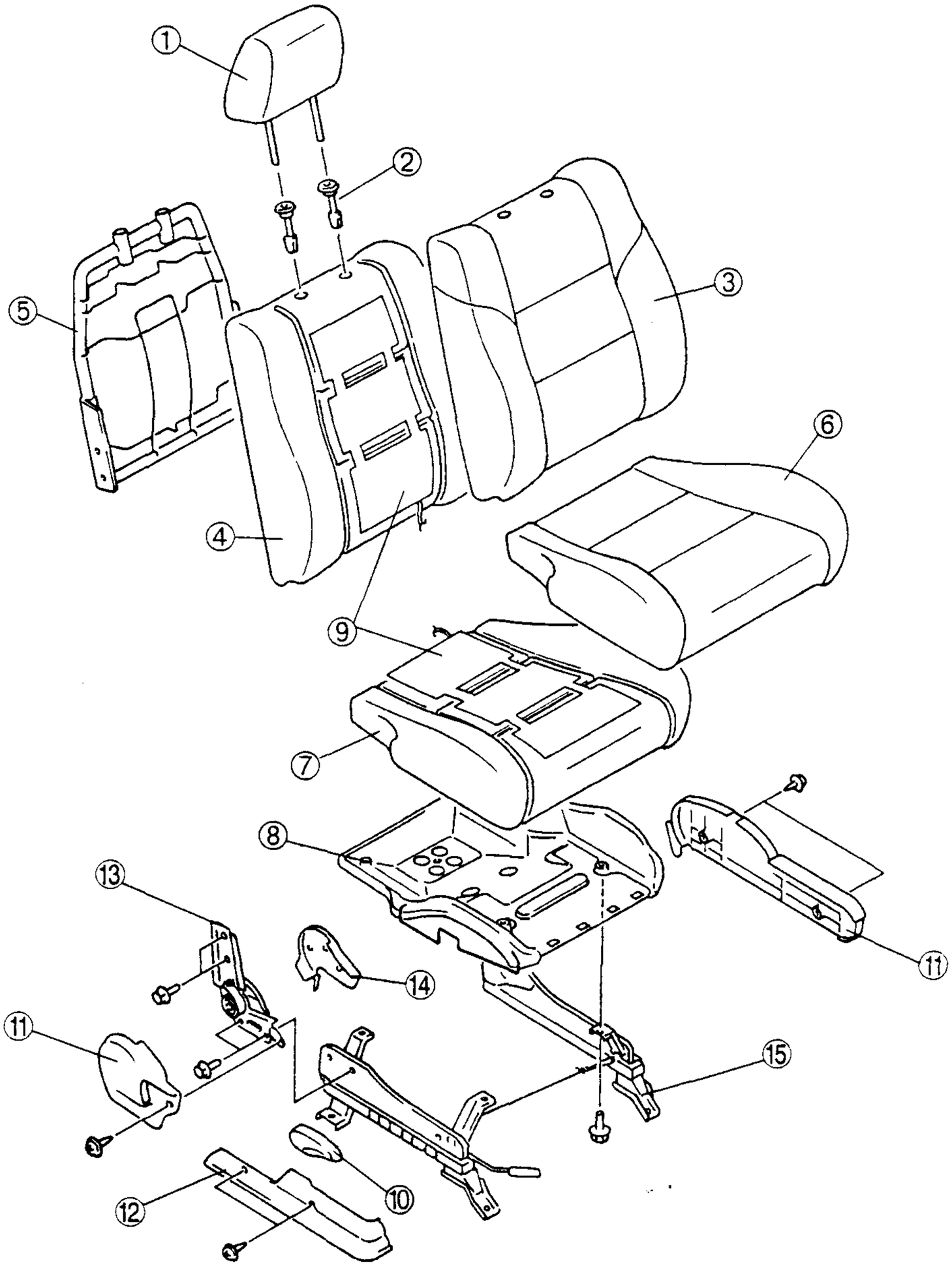
1	Armrest
2	Headrest
3	Pole guide
4	Seat back trim
5	Seat back pad
6	Seat back frame
7	Seat cushion trim
8	Seat cushion pad
9	Seat cushion frame

10	Seat warmer unit
11	Recliner lever
12	Tilt dial
13	Side cover
14	Lower cover
15	Recliner knuckle
16	Reverse cover
17	Slide adjuster

Passenger's Seat
Except back tray type

Warning
- **Handling the front seat (side air bag) improperly can accidently deploy the side air bag, which may seriously injure you. Read SERVICE WARNINGS before handling the front seat. (Refer to section T, AIR BAG SYSTEM, SERVICE WARNINGS.)**

1. Remove the passenger-side side air bag module. (Refer to section T, AIR BAG SYSTEM, SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly.



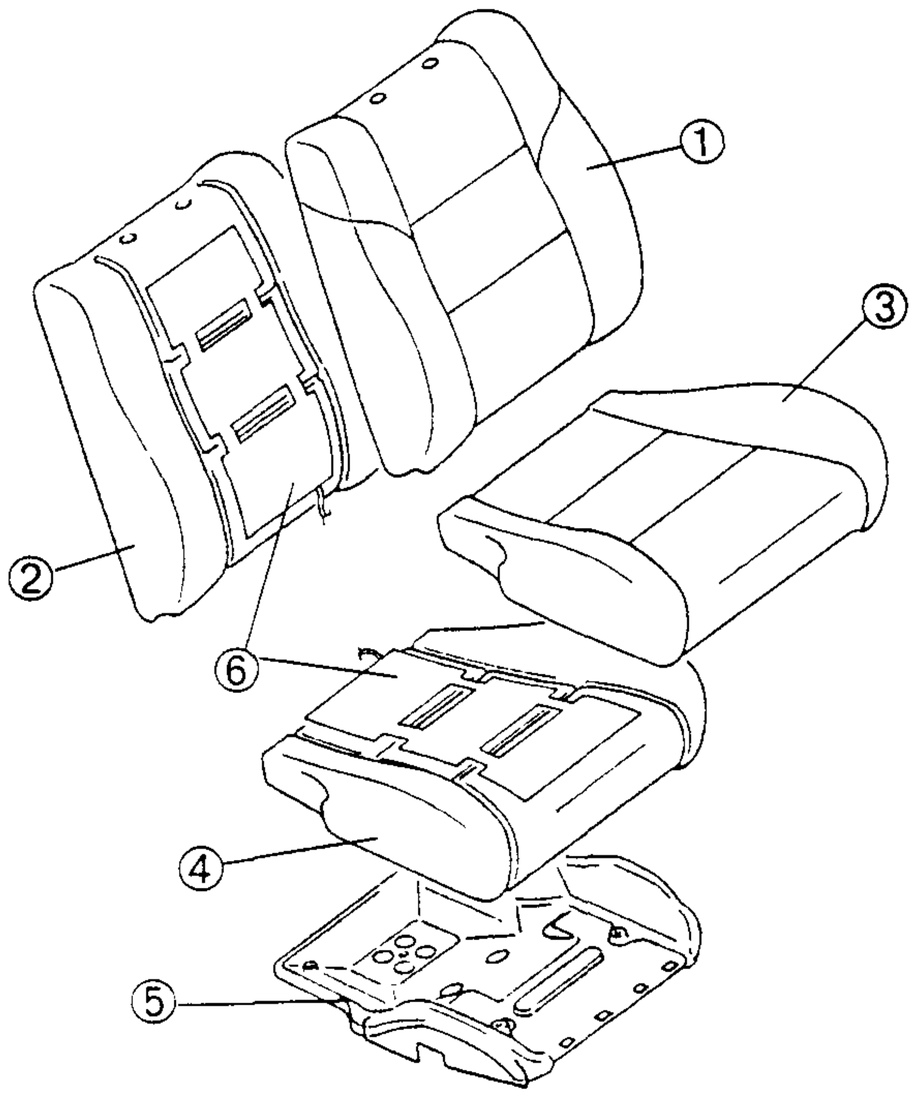
1	Headrest
2	Pole guide
3	Seat back trim
4	Seat back pad
5	Seat back frame
6	Seat cushion trim
7	Seat cushion pad
8	Seat cushion frame

9	Seat warmer unit
10	Recliner lever
11	Side cover
12	Lower cover
13	Recliner knuckle
14	Reverse cover
15	Slide adjuster

Back tray type

Warning
- **Handling the front seat (side air bag) improperly can accidently deploy the side air bag, which may seriously injure you. Read SERVICE WARNINGS before handling the front seat. (Refer to section T, AIR BAG SYSTEM, SERVICE WARNINGS.)**

1. Remove the passenger-side side air bag module. (Refer to section T, AIR BAG SYSTEM, SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly.

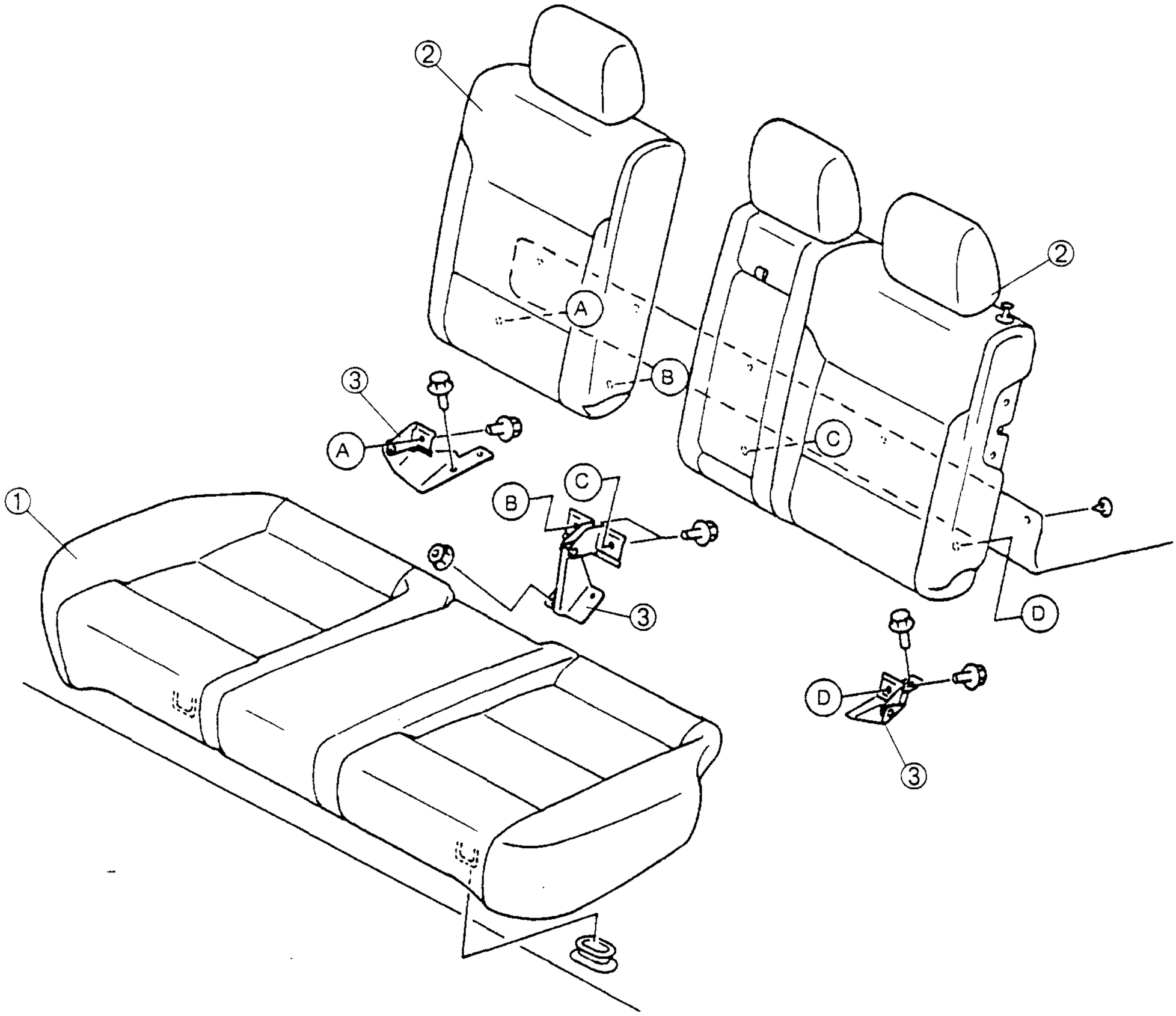


1	Seat back trim
2	Seat back pad
3	Seat cushion trim
4	Seat cushion pad
5	Seat cushion frame
6	Seat warmer unit

REAR SEAT REMOVAL/INSTALLATION

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.

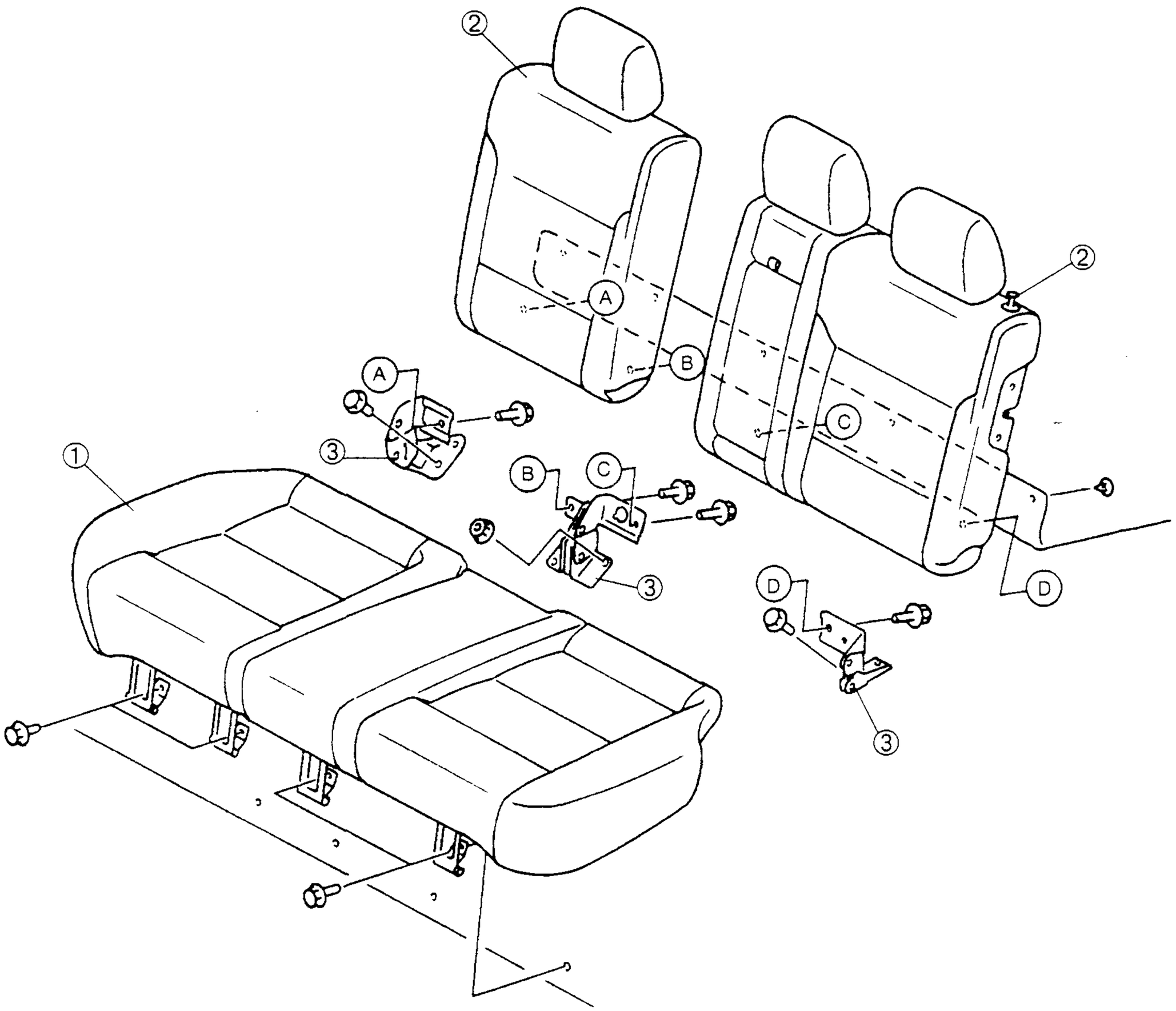
Sedan



1	Rear seat cushion
2	Rear seat back

3	Hinge

5HB



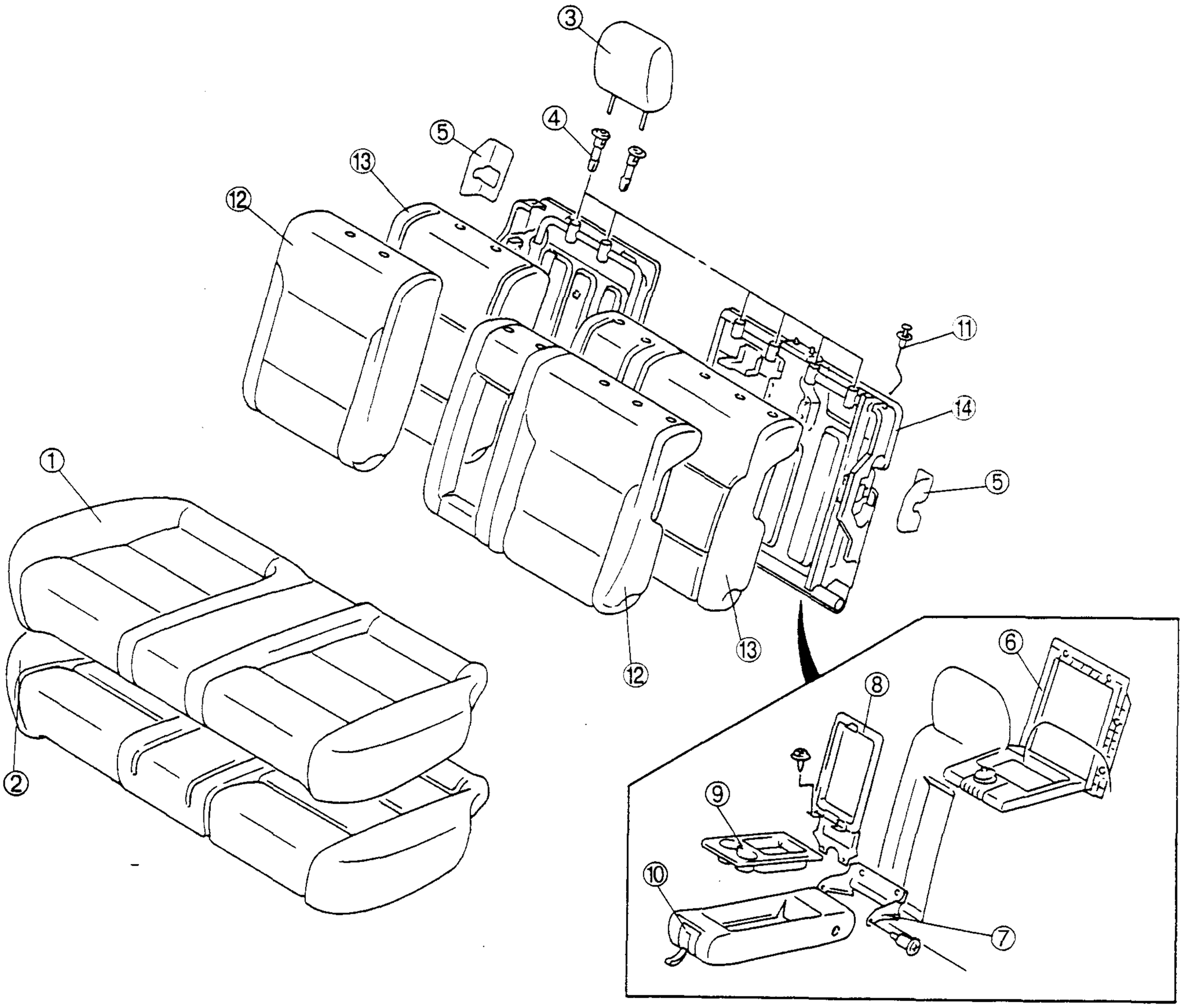
1	Rear seat cushion
2	Rear seat back

3	Hinge

REAR SEAT DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.

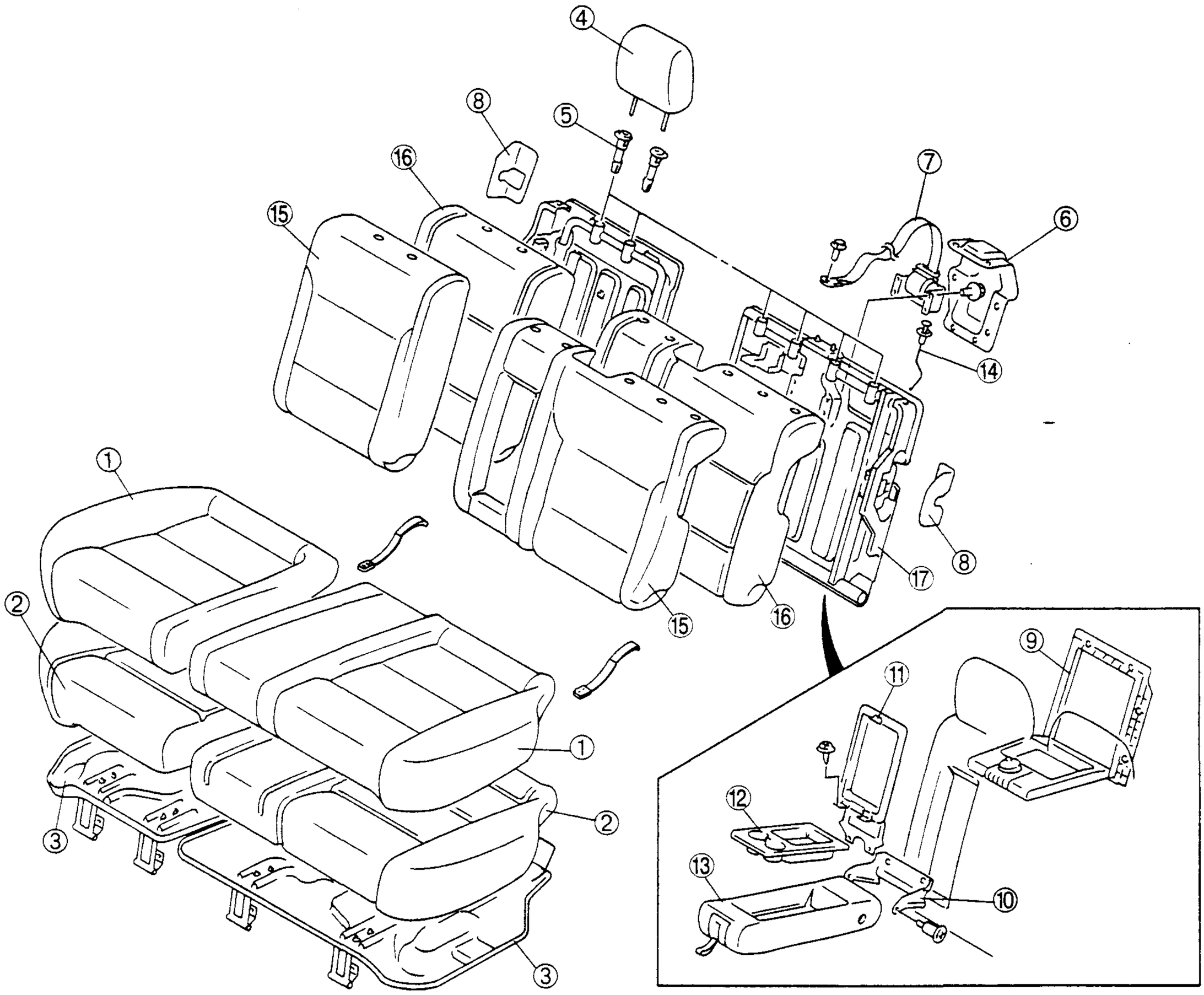
Sedan



1	Seat cushion trim
2	Sent cushion pad
3	Headrest
4	Pole guide
5	Catch cover
6	Armrest through
7	Armrest bracket

8	Lid cover
9	Armrest box
10	Armrest
11	Knob
12	Seat back trim
13	Seat back pad
14	Seat back frame

5HB

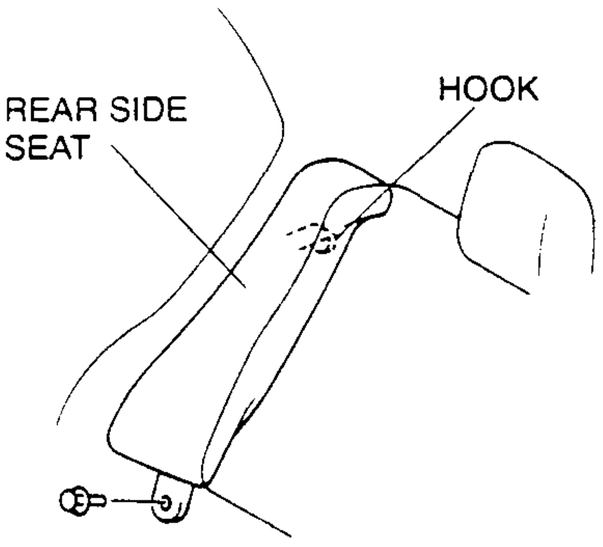


1	Seat cushion trim
2	Seat cushion pad
3	Seat cushion frame
4	Headrest
5	Pole guide
6	Rear center seat belt cover
7	Rear center seat belt
8	Catch cover
9	Armrest through

10	Armrest bracket
11	Lid cover
12	Armrest box
13	Armrest
14	Knob
15	Seat back trim
16	Seat back pad
17	Seat back frame

REAR SIDE SEAT REMOVAL/INSTALLATION

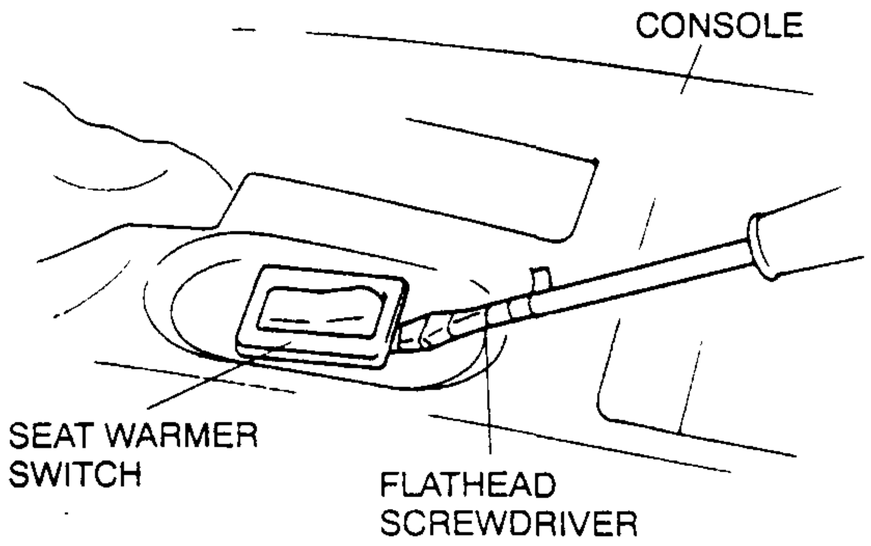
1. For sedan, remove the rear seat cushion. For 5HB, lift up the rear seat cushion.
2. Remove the bolt and pull the rear side seat upward to disengage hook from the body.



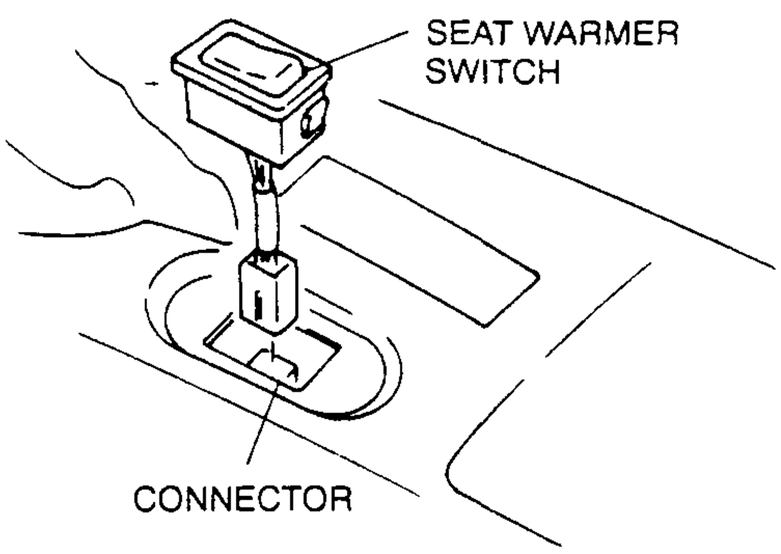
3. Install in the reverse order of removal.

SEAT WARMER SWITCH REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Insert a tape-wrapped, flathead screwdriver between the seat warmer switch and console.



3. Disconnect the seat warmer switch connector and remove the seat warmer switch.



4. Install in the reverse order of removal.

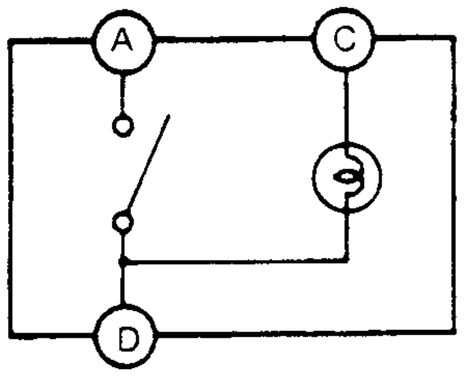
SEAT WARMER SWITCH INSPECTION

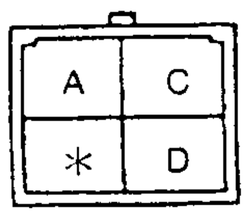
1. Remove the seat warmer switch. (Refer to SEAT WARMER SWITCH REMOVAL/INSTALLATION.)
2. Check for continuity between the seat warmer switch terminals by using an ohmmeter.

Driver-side

○—○ : Continuity ○-◎-○ : Bulb

Switch position	Terminal		
	A	D	C
On	○	○ ◎ ○	
Off		○ ◎ ○	

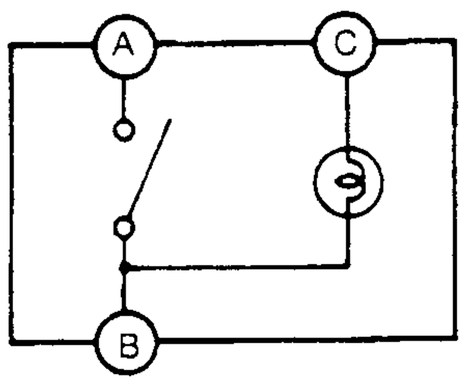


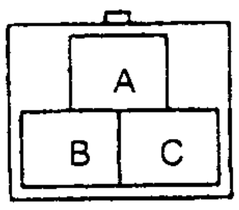


Passenger-side

○—○ : Continuity ○-◎-○ : Bulb

Switch position	Terminal		
	A	B	C
On	○	○ ◎ ○	
Off		○ ◎ ○	

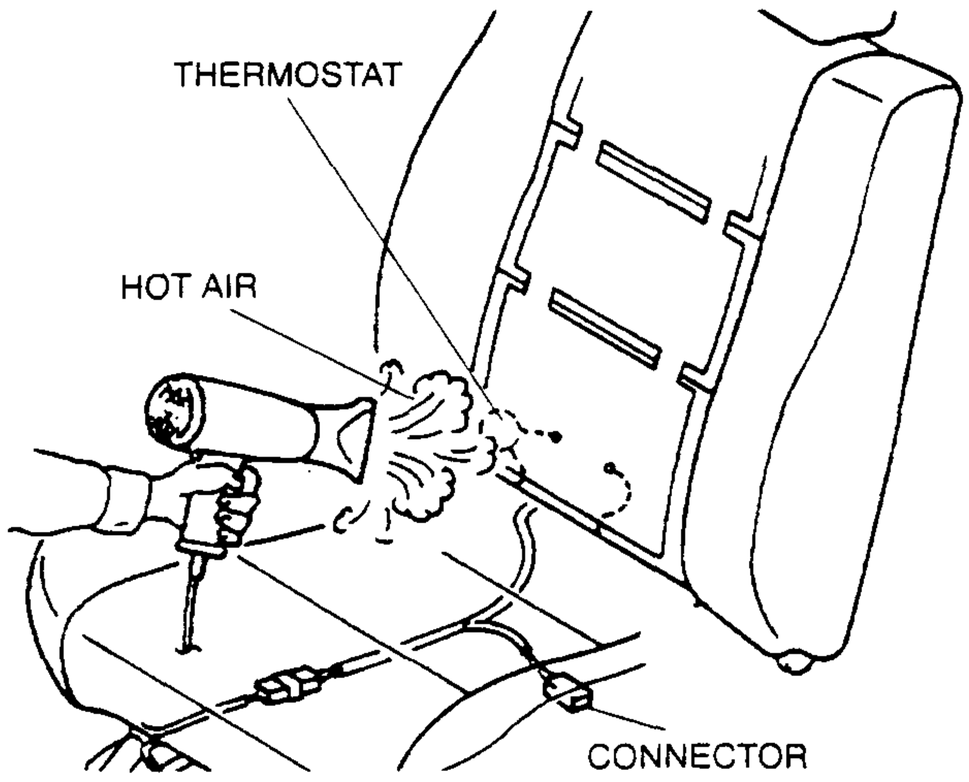




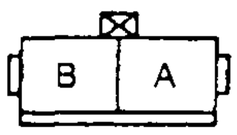
3. If not as specified, replace the seat warmer switch.

SEAT WARMER UNIT INSPECTION

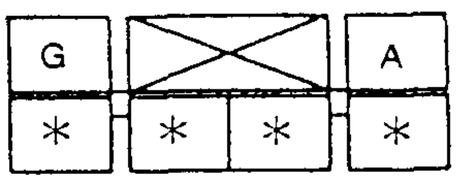
1. Remove the front seat. (Refer to FRONT SEAT REMOVAL/INSTALLATION.)
2. Remove the seat back trim. (Refer to FRONT SEAT DISASSEMBLY/ASSEMBLY.)
3. For driver's seat, while checking for continuity between the terminals A and B of the connector, use a dryer to warm the thermostat of the seat warmer unit on the seat back. For passenger's seat, while checking for continuity between the terminals A and G of the connector, use a dryer to warm the thermostat of the seat warmer unit on the seat back.



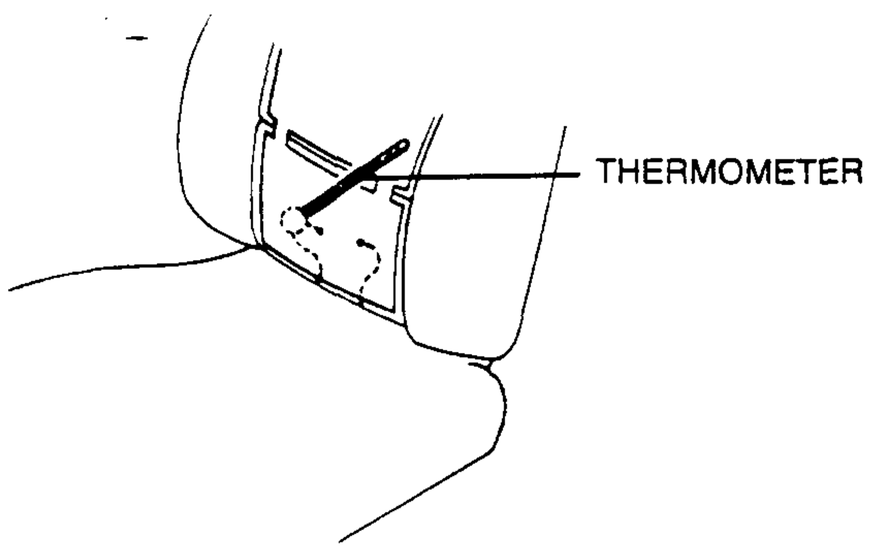
DRIVER'S SEAT CONNECTOR



PASSENGER'S SEAT CONNECTOR



4. When the indication on the ohmmeter is "∞" (no continuity), turn off the dryer, then use a thermometer to measure the temperature of the thermostat.

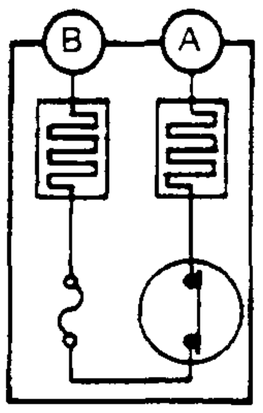


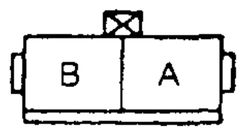
5. Verify that the temperature is **approximately 37 °C {99 °F }**.
6. Verify that there is continuity between the terminals of seat warmer unit's connector by using an ohmmeter when temperature drops to **approximately 30 °C {86 °F }**.

Driver's seat

○—○ : Continuity

Thermostat temperature	Terminal	
	A	B
More than approx. 37 °C {99 °F }		
Less than approx. 30 °C { 86 °F }	○	○

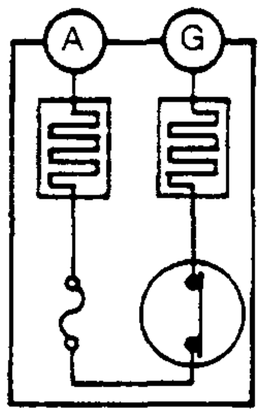


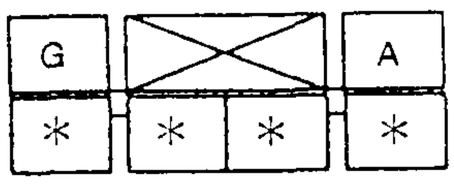


Passenger's seat

○—○ : Continuity

Thermostat temperature	Terminal	
	A	G
More than approx. 37 °C {99 °F }		
Less than approx. 30 °C { 86 °F }	○	○





7. If not as specified, replace the seat warmer unit.

BODY ELECTRICAL SYSTEM

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POWER SYSTEM

FUSE SERVICE CAUTION

Caution

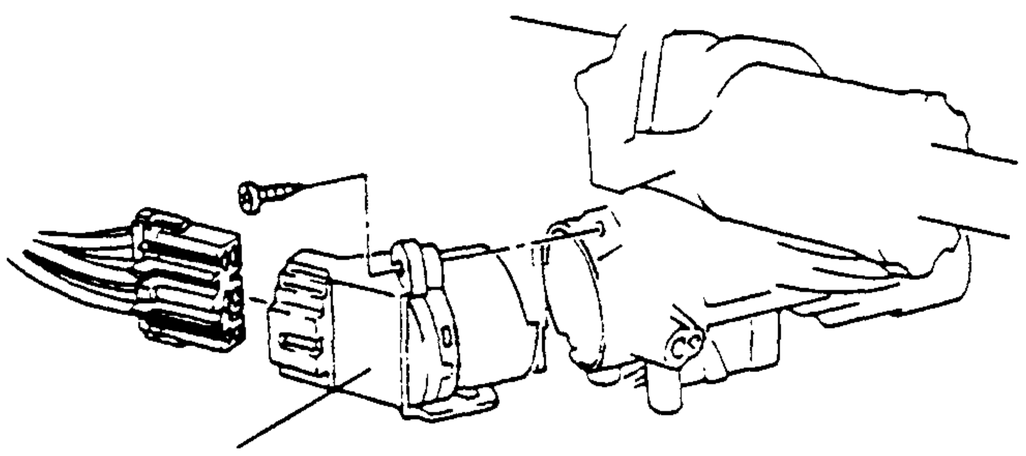
- **Determine and correct the cause of the burnt fuse before replacing it with the specified type. If the fuse is replaced before doing this, it may burn again.**

MAIN FUSE REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the main fuse block cover.
3. Remove the main fuse block mounting nuts.
4. Remove the MAIN fuse mounting bolt to remove the MAIN fuse.
5. Install in the reverse order of removal.

IGNITION SWITCH REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the column cover.
3. Disconnect the ignition switch connector.
4. Remove the screw to remove the ignition switch.



IGNITION SWITCH

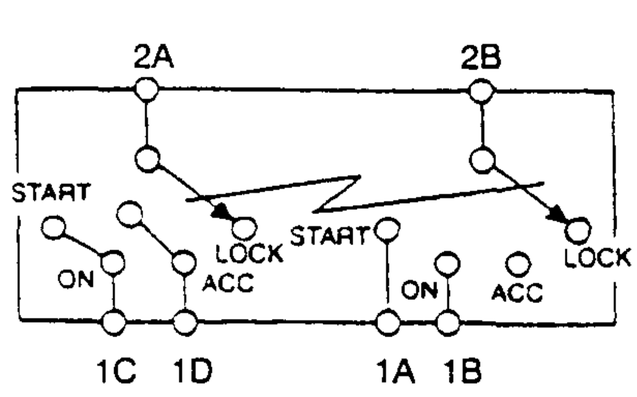
5. Install in the reverse order of removal.

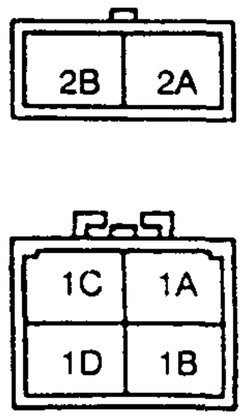
IGNITION SWITCH INSPECTION

1. Remove the column cover.
2. Disconnect the ignition switch connector.
3. Check for continuity between the ignition switch terminals by using an ohmmeter.

○—○ : Continuity

Ignition key position	Terminal					
	2A	2B	1D	1C	1B	1A
LOCK						
ACC	○	—	○			
ON	○	—	○	—	○	
		○	—	—	—	
START	○	—		○		
		○		—		○

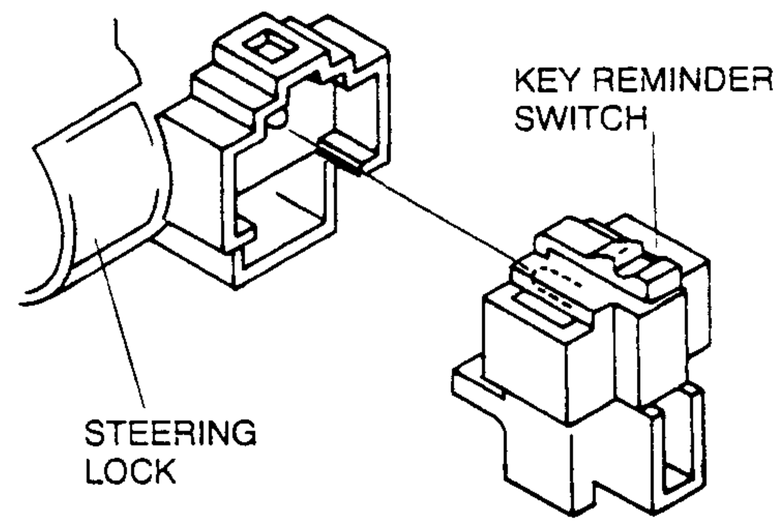




4. If not as specified, replace the ignition switch.

KEY REMINDER SWITCH REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the column cover.
3. Disconnect the key reminder switch connector.
4. Remove the key reminder switch.



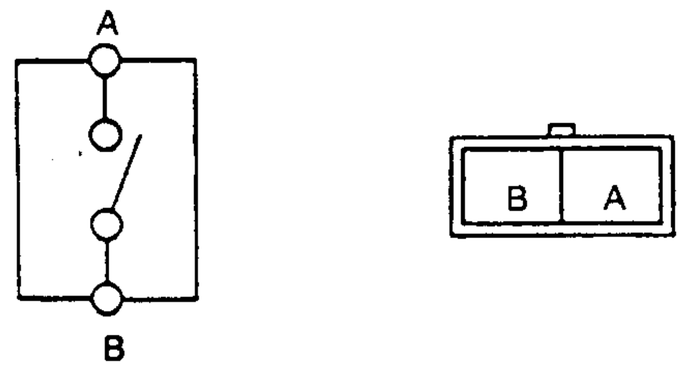
5. Install in the reverse order of removal.

KEY REMINDER SWITCH INSPECTION

1. Remove the column cover.
2. Disconnect the key reminder switch connector.
3. Check for continuity between the key reminder switch terminals by using an ohmmeter.

○—○ : Continuity

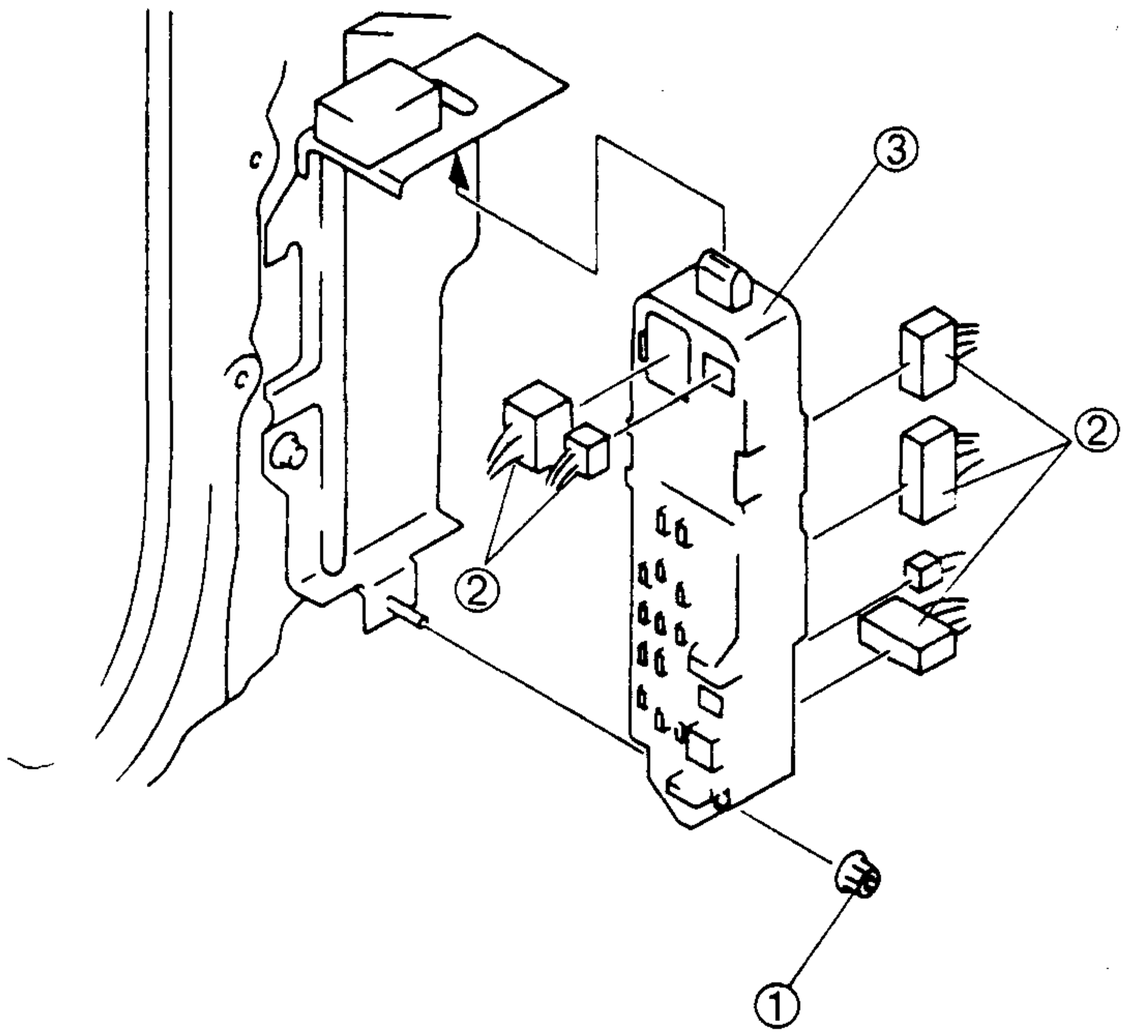
Key position	Terminal	
	A	B
key inserted	○	— ○
key removed		



4. If not as specified, replace the key reminder switch.

FUSE BLOCK REMOVAL/INSTALLATION

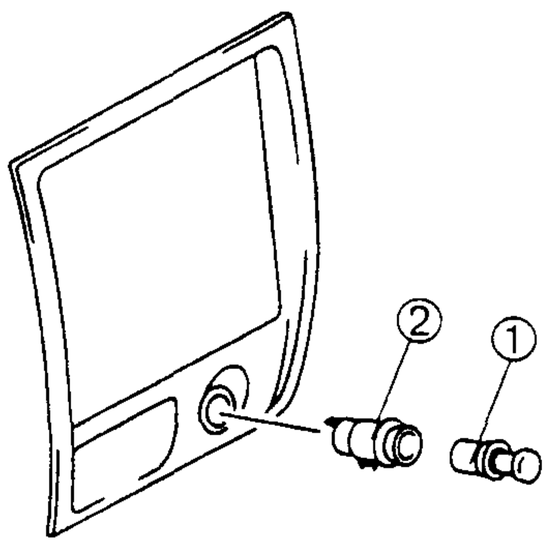
1. Disconnect the negative battery cable.
2. Remove the driver's side front side trim.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



1	Nut
2	Connector
3	Fuse block

CIGARETTE LIGHTER REMOVAL/INSTALLATION

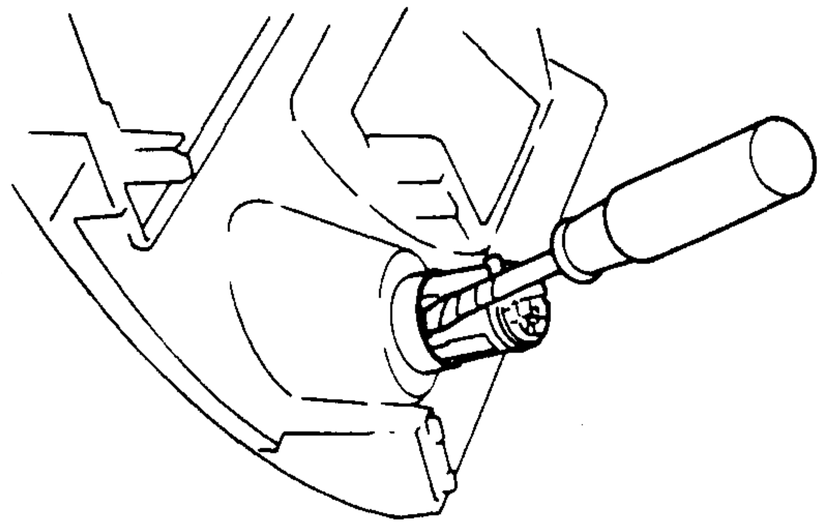
1. Disconnect the negative battery cable.
2. Remove the center panel.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



1	Cigarette lighter plug
2	Socket ☞ Removal Note

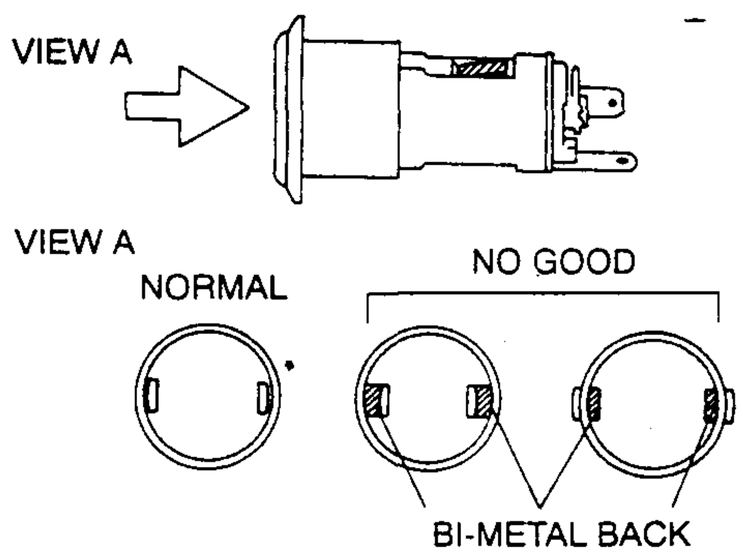
Socket Removal Note

1. Pry up the stopper with the protected screwdriver.
2. Pull the socket with keeping to pry up the stopper.



CIGARETTE LIGHTER INSPECTION

1. Remove the cigarette lighter plug.
2. Verify the bi-metals in the socket are not warped.
3. Check if the backs of the bi-metals can be seen from the inside or outside.

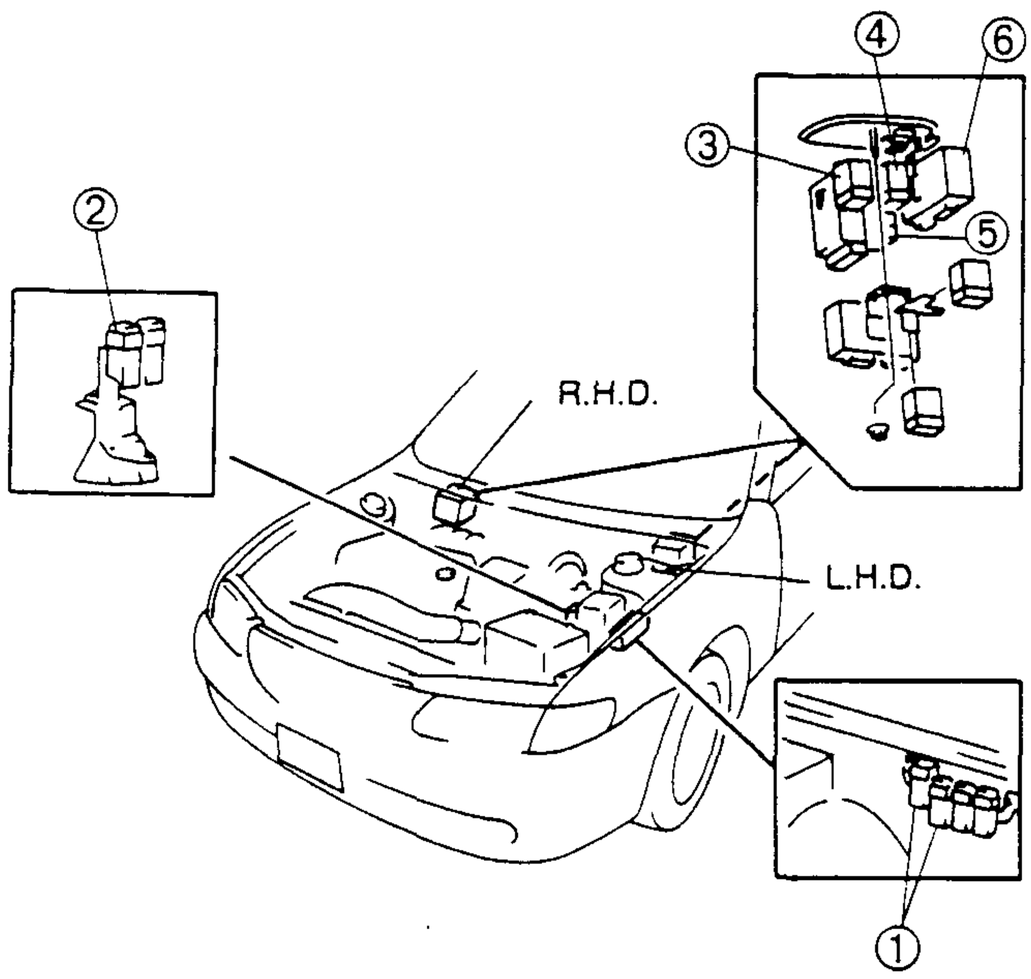


4. If the bi-metal backs can be seen from the inside or outside, replace the socket.

T

EXTERIOR LIGHTING SYSTEM

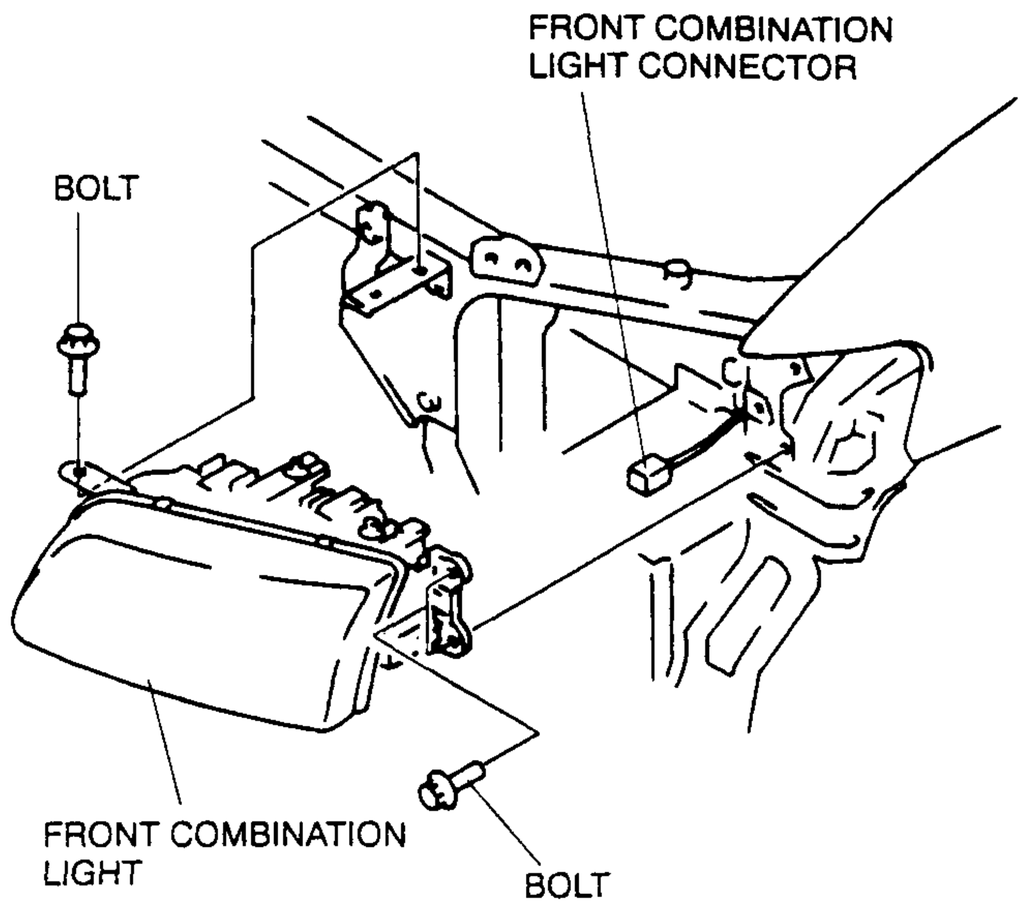
RELAY AND UNIT LOCATION



1	Headlight low relay, headlight high relay
2	Front fog light relay
3	Rear fog light relay
4	TNS relay
5	Flasher unit
6	Running light unit

FRONT COMBINATION LIGHT REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the front bumper. (Refer to section S, BUMPER, FRONT BUMPER REMOVAL/INSTALLATION.)
3. Disconnect the front combination light connector.
4. Remove the bolts.
5. Remove the front combination light.



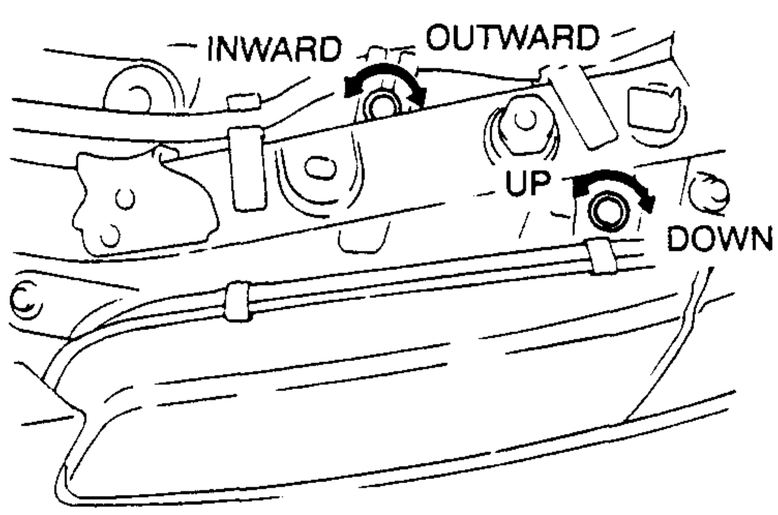
6. Install in the reverse order of removal.
7. Adjust the headlight aiming. (Refer to HEADLIGHT AIMING.)

HEADLIGHT AIMING

1. Adjust the tire air pressure to the specification.
2. Position the unloaded vehicle on a flat, level surface.
3. Seat one person in the driver's seat.
4. Set the headlight leveling switch to position **"0"**. (If equipped with headlight leveling)
5. Position the vehicle straight ahead and perpendicularly to a wall.
6. Set the distance between the headlights and the wall to **3 m {10 ft }**.
7. While adjusting one headlight, disconnect the connector of the other one.
8. Adjust the headlights by turning the adjusting screws as shown in the figure. Turn the screws in the loosening direction first, then tighten them.

Note

- If the adjusting screws are tightened first, then loosened, they will continue to loosen when the vehicle is in motion and may cause the headlights to become unaligned.

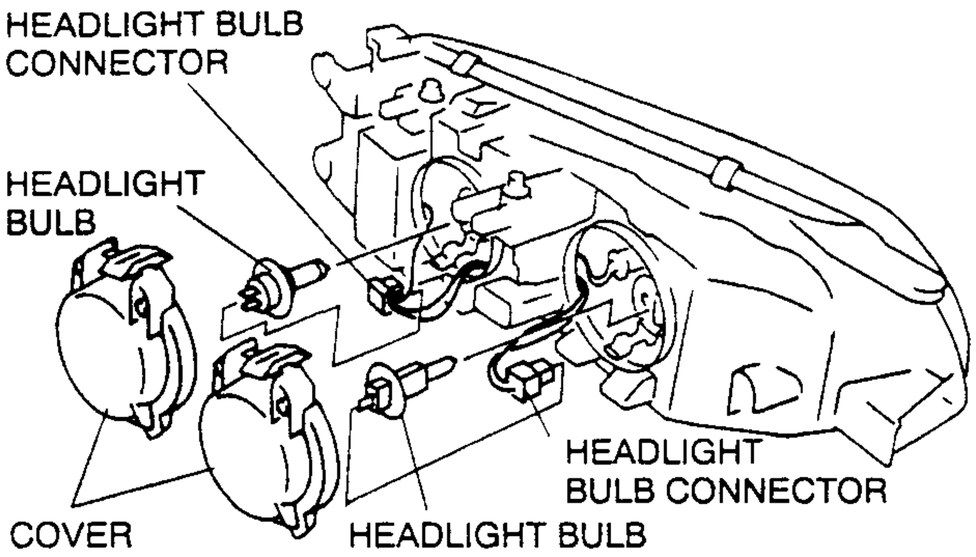


HEADLIGHT BULB REPLACEMENT

Caution

- **A halogen bulb generates extremely high heat when it is used. If the surface of the bulb is soiled, excessive heat will build up and the light's life will be shortened. When replacing the bulb, hold the metal flange, not the glass.**

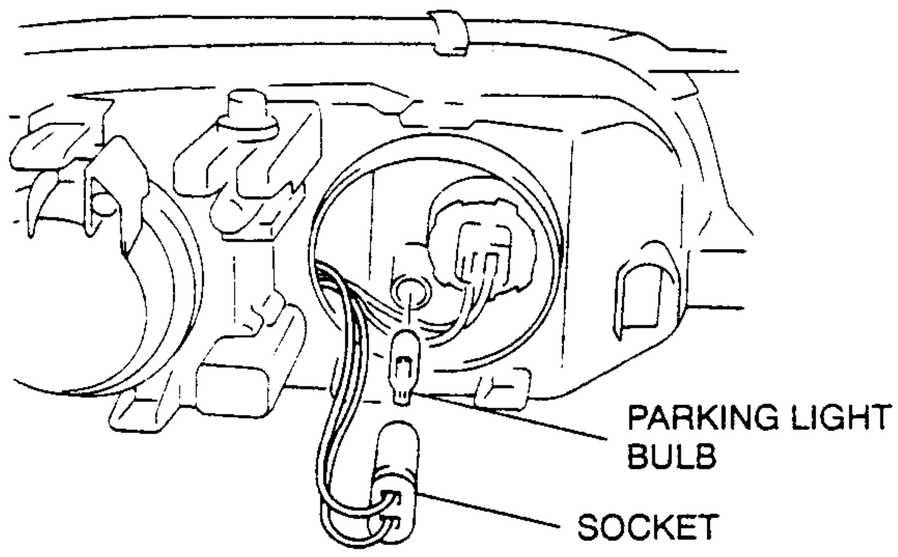
1. Disconnect the negative battery cable.
2. Remove the cover.
3. Disconnect the headlight bulb connector.
4. Release the clip to remove the headlight bulb.



5. Install in the reverse order of removal.

PARKING LIGHT BULB REPLACEMENT

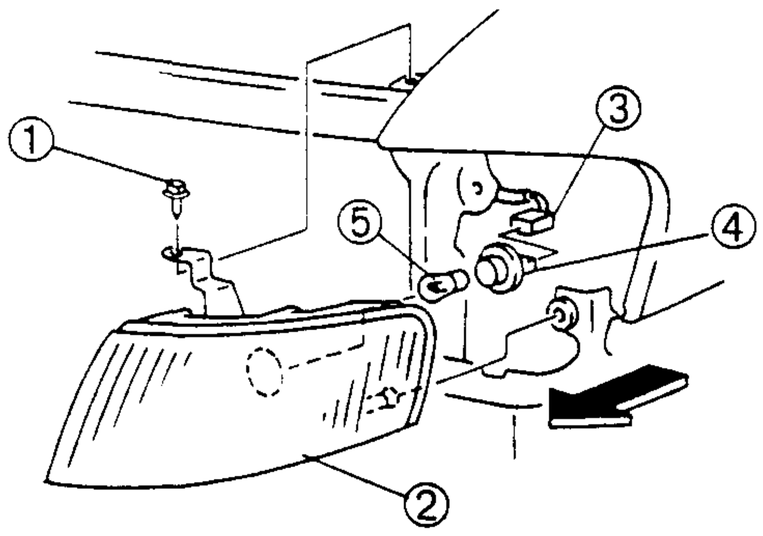
1. Disconnect the negative battery cable.
2. Remove the cover.
3. Pull the socket out to remove the parking light bulb.



4. Install in the reverse order of removal.

FRONT TURN LIGHT REMOVAL/INSTALLATION

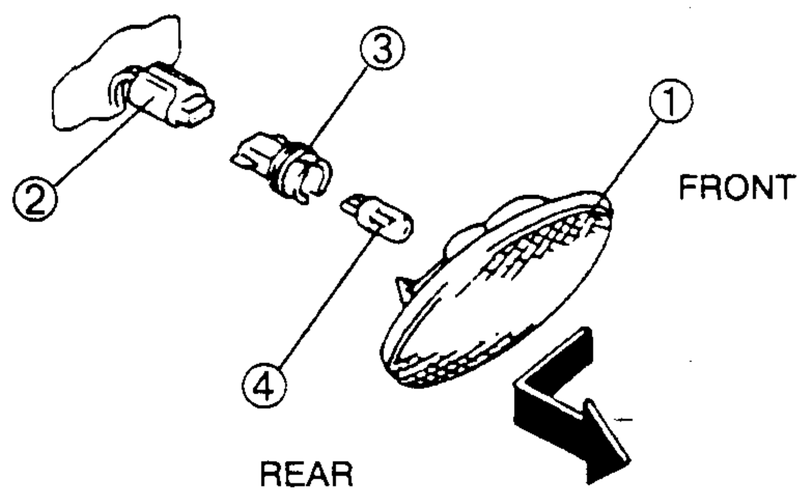
1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Screw
2	Front turn light
3	Connector
4	Socket
5	Front turn light bulb

FRONT SIDE TURN LIGHT REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



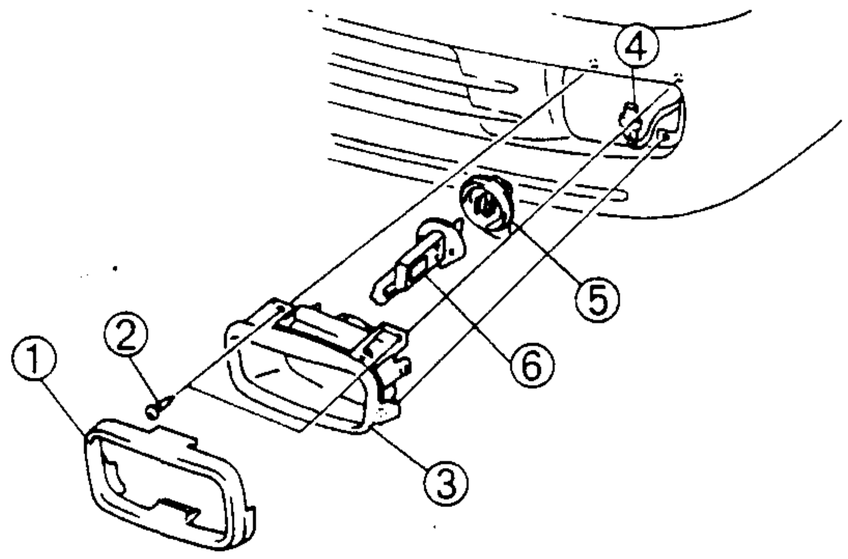
1	Front side turn light
2	Connector
3	Socket
4	Front side turn light bulb

FRONT FOG LIGHT REMOVAL/INSTALLATION

Caution

- **A halogen bulb generates extremely high heat when it is used. If the surface of the bulb is soiled, excessive heat will build up and the light's life will be shortened. When replacing the bulb, hold the metal flange, not the glass.**

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Adjust the front fog light aiming. (Refer to FRONT FOG LIGHT AIMING.)



1	Cover
2	Screw
3	Front fog light
4	Connector
5	Socket
6	Front fog light bulb

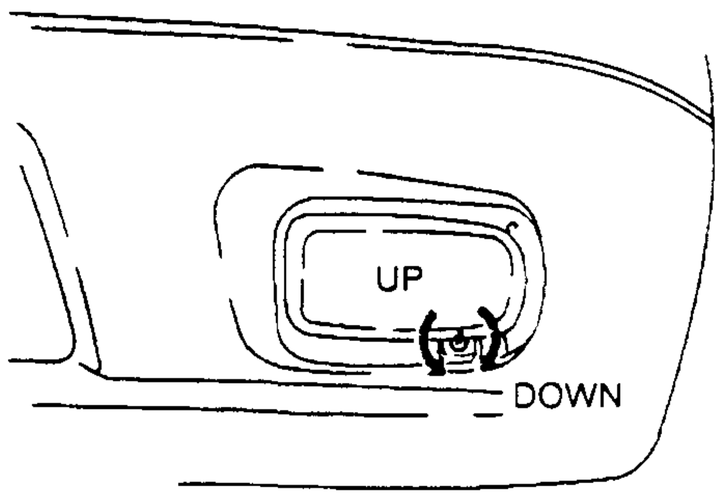
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FRONT FOG LIGHT AIMING

- Adjust the front fog light aiming by turning the adjusting screw as shown in the figure. Turn the adjusting screw in the loosening direction first, then tighten it.

Note

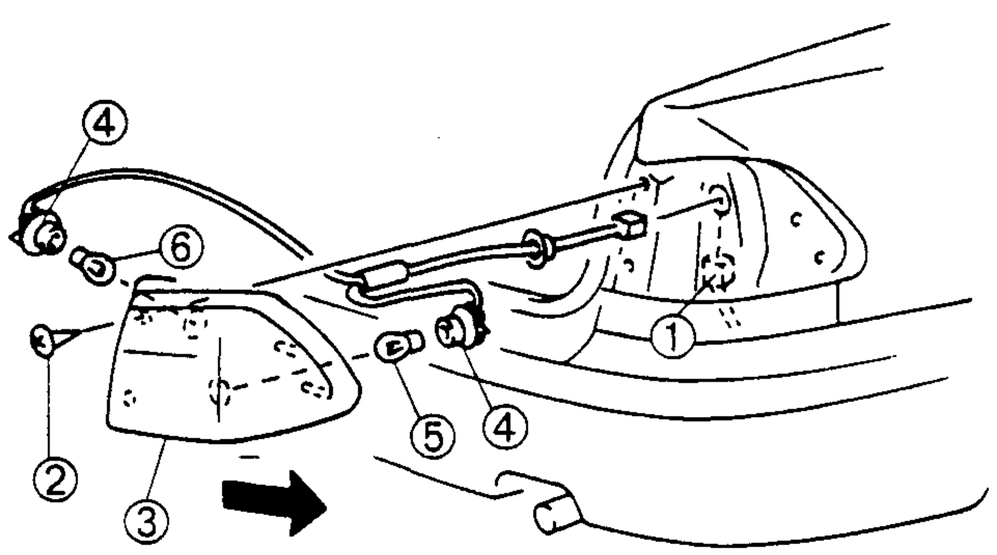
- If the adjusting screw is tightened first, then loosened, it may continue to loosen when the vehicle is in motion.



REAR COMBINATION LIGHT REMOVAL/INSTALLATION

Sedan

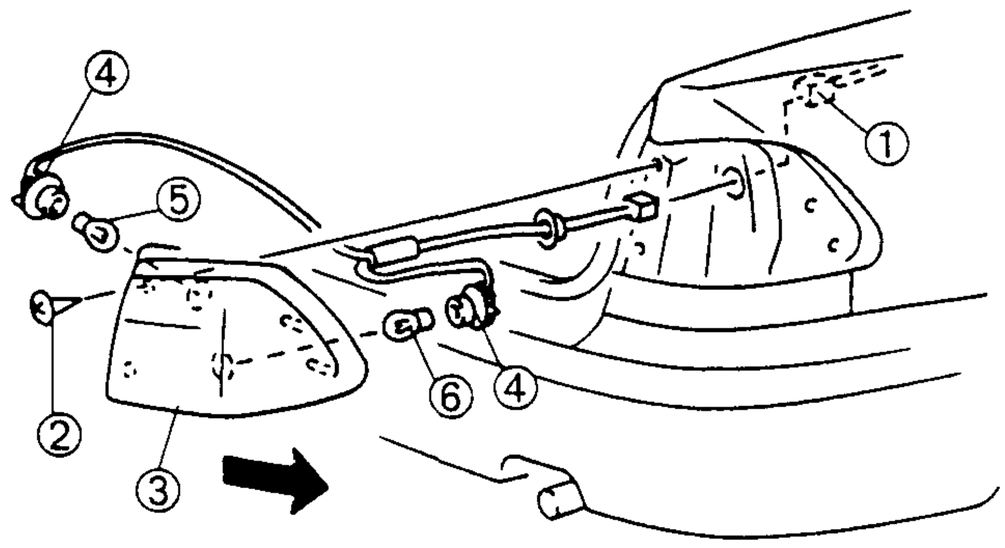
1. Disconnect the negative battery cable.
2. Remove the trunk side trim. (Refer to section S, TRIM, TRUNK SIDE TRIM REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



1	Connector
2	Screw
3	Rear combination light
4	Socket
5	Brake light/taillight bulb
6	Rear turn light bulb

5HB

1. Disconnect the negative battery cable.
2. Remove the trunk end trim.
3. Turn over the trunk side trim.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.

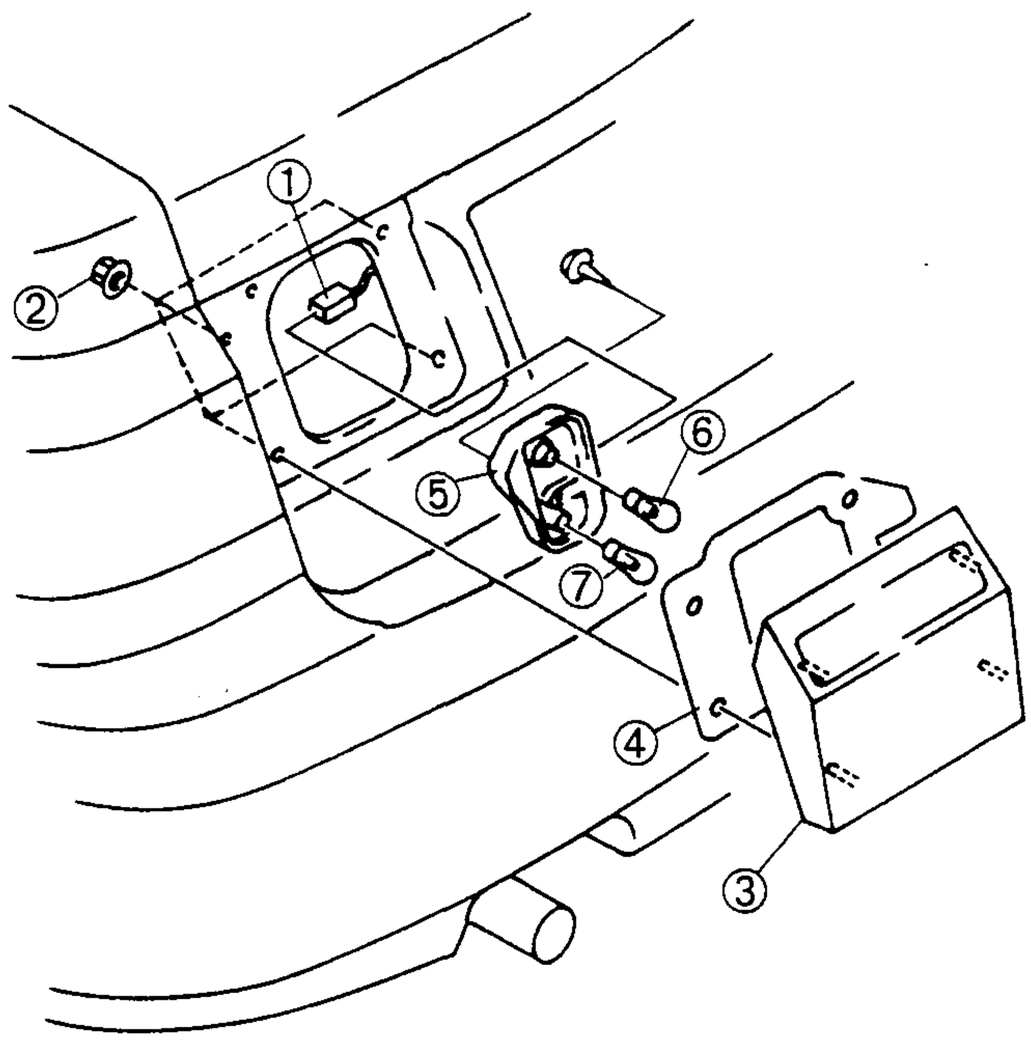


1	Connector
2	Screw
3	Rear combination light
4	Socket
5	Brake light/taillight bulb
6	Rear turn light bulb

INBOARD COMBINATION LIGHT REMOVAL/INSTALLATION

Sedan

1. Disconnect the negative battery cable.
2. Remove the trunk lid trim.
3. Remove the rear finisher.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.

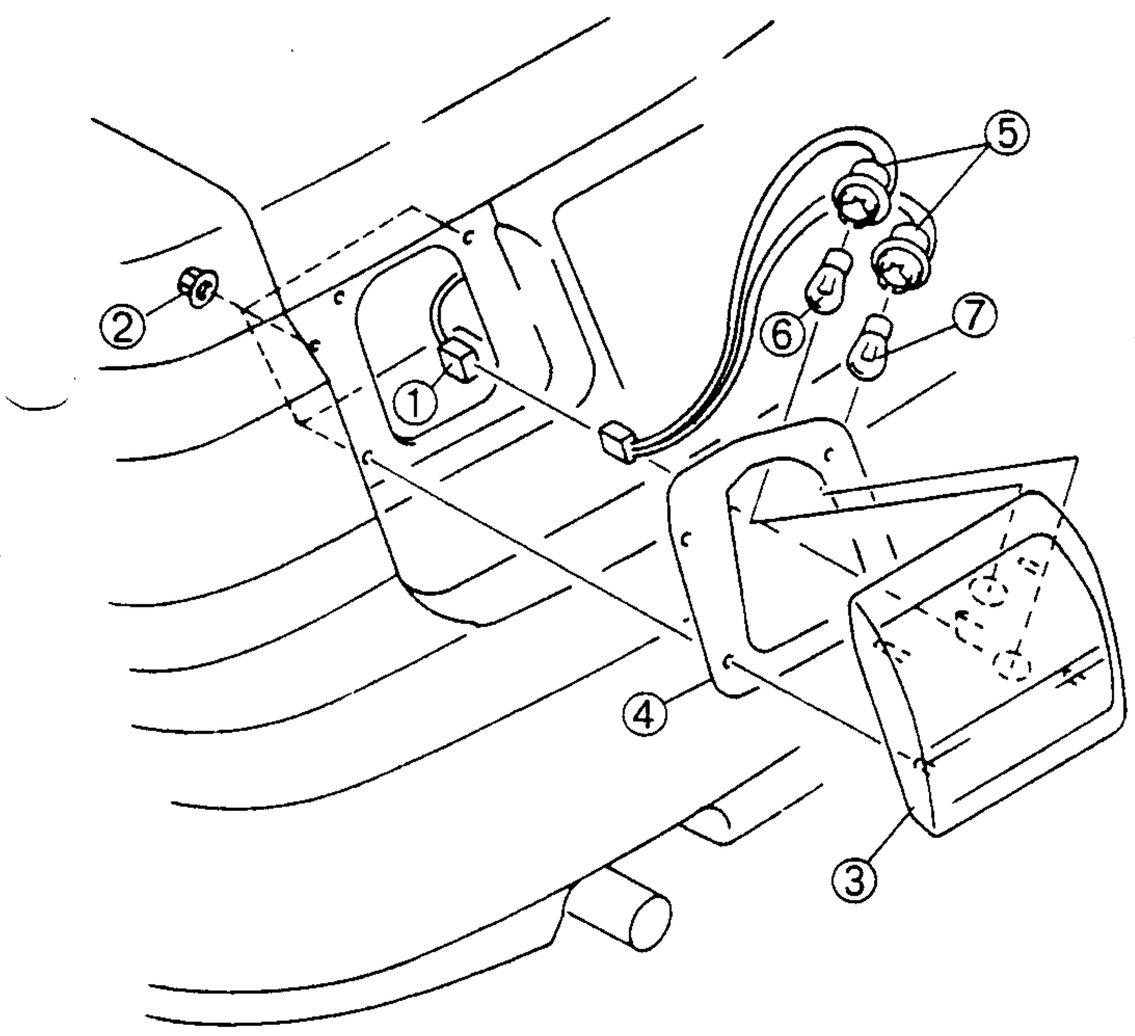


1	Connector
2	Nut
3	Inboard combination light
4	Gasket

5	Cover
6	Back-up light bulb
7	Rear fog light bulb

5HB

1. Disconnect the negative battery cable.
2. Remove the liftgate lower trim. (Refer to section S, TRIM, LIFTGATE LOWER TRIM REMOVAL/INSTALLATION.)
3. Remove the liftgate garnish.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.

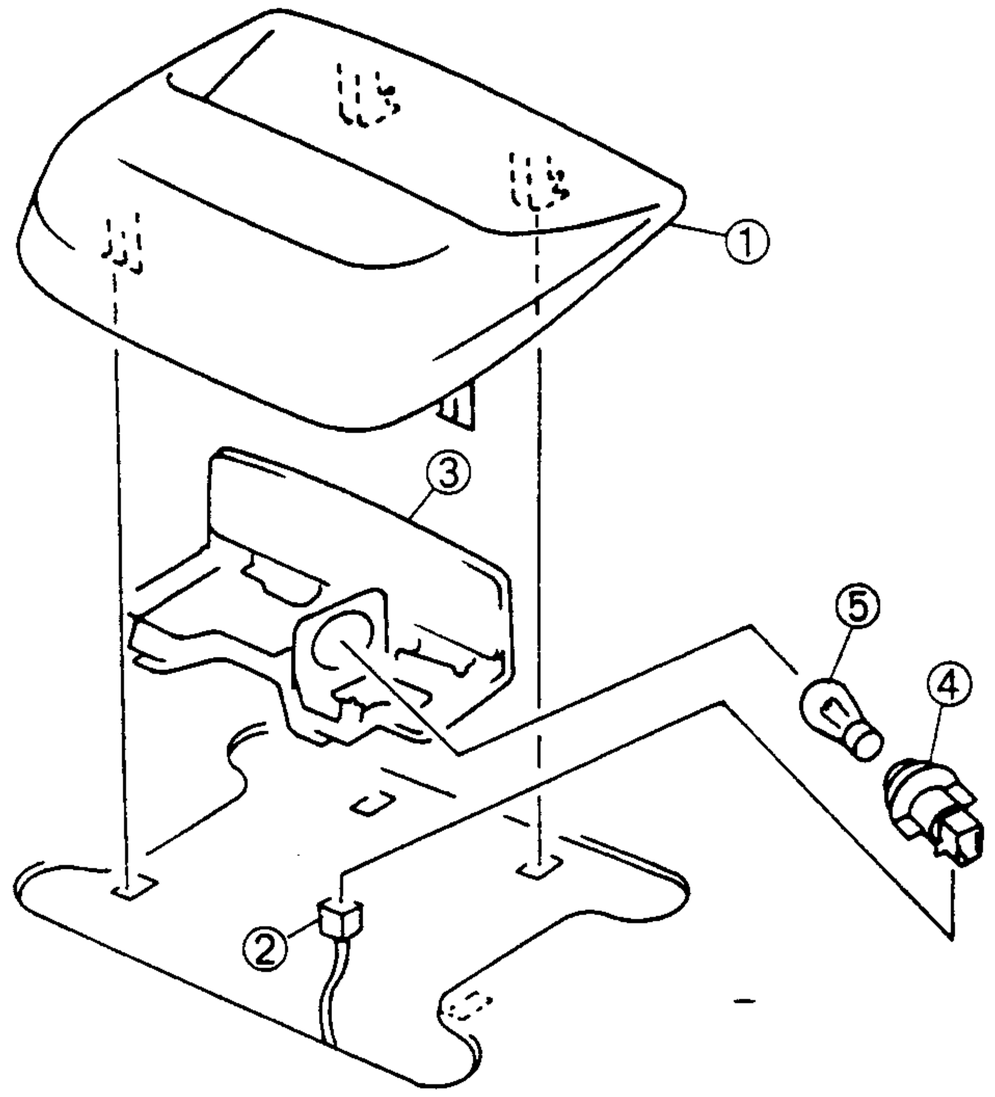


1	Connector
2	Nut
3	Inboard combination light
4	Gasket
5	Socket
6	Back-up light bulb
7	Rear fog light bulb

HIGH-MOUNT BRAKE LIGHT REMOVAL/ INSTALLATION

Sedan

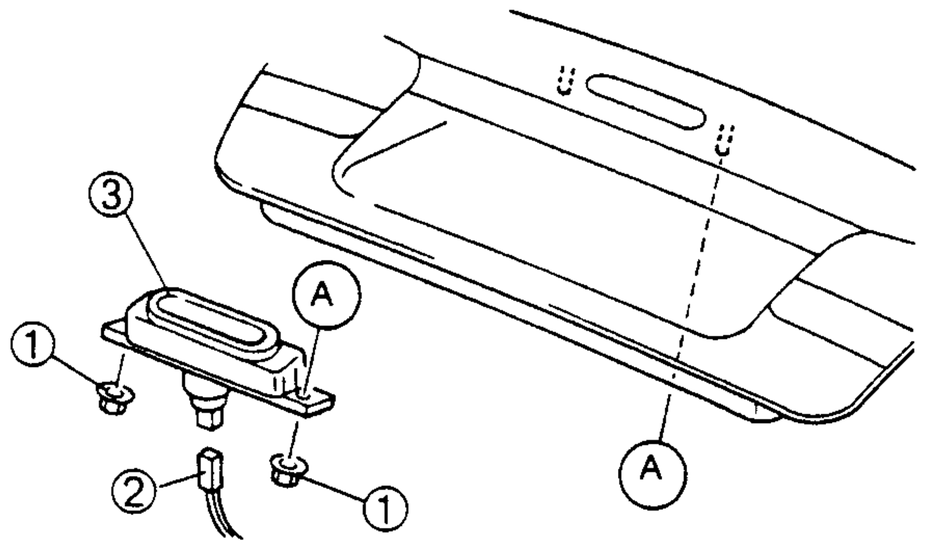
1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	High-mount brake light
2	Connector
3	Lens
4	Socket
5	High-mount brake light bulb

5HB

1. Disconnect the negative battery cable.
2. Remove the liftgate lower trim. (Refer to section S, TRIM, LIFTGATE LOWER TRIM REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.

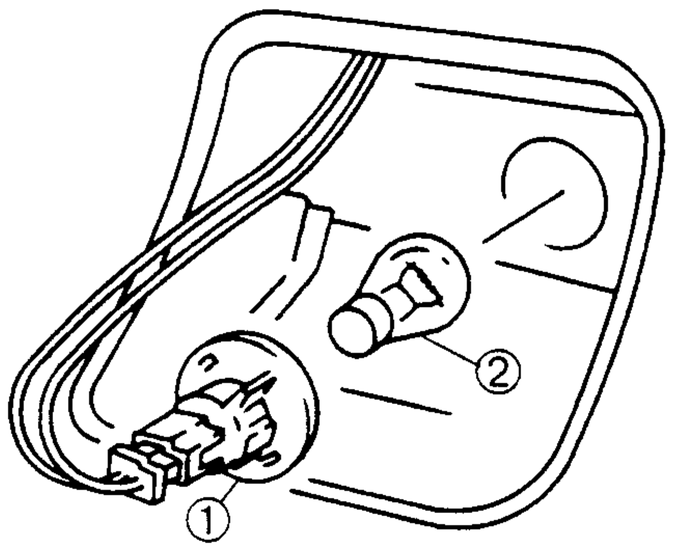


1	Nut
2	Connector
3	High-mount brake light

HIGH-MOUNT BRAKE LIGHT BULB REPLACEMENT

5HB

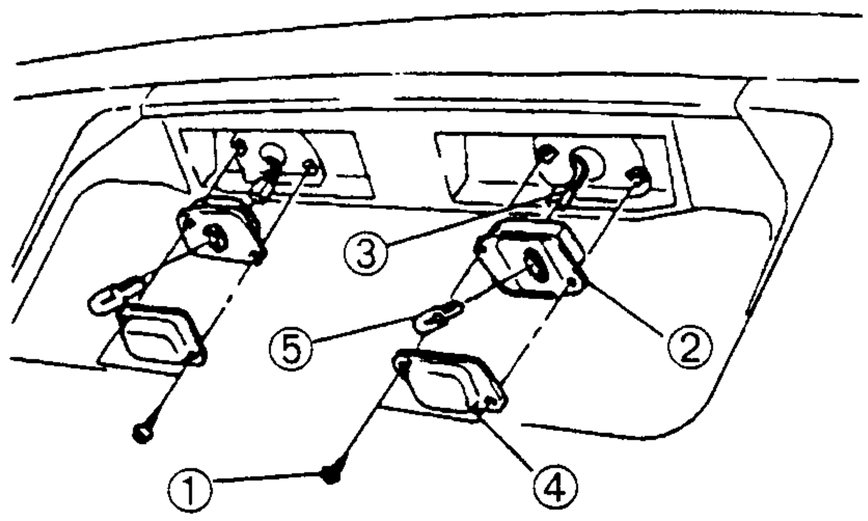
1. Remove the liftgate lower trim. (Refer to section S, TRIM, LIFTGATE LOWER TRIM REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Socket
2	High-mount brake light bulb

LICENSE PLATE LIGHT REMOVAL/INSTALLATION

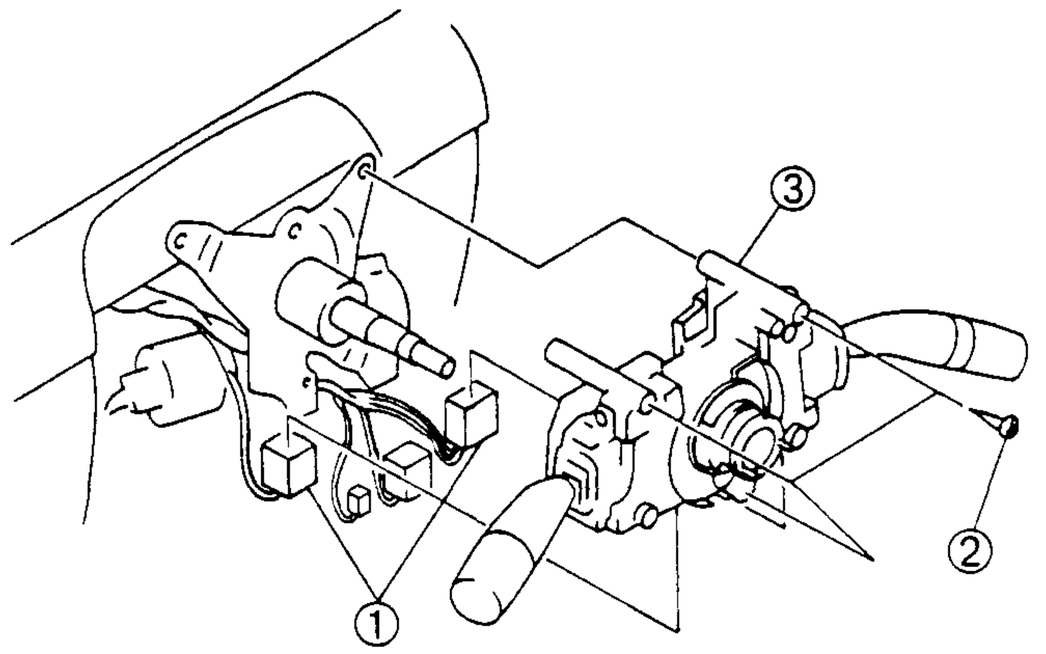
1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Screw
2	License plate light
3	Connector
4	Lens
5	License plate light bulb

COMBINATION SWITCH REMOVAL/INSTALLATION

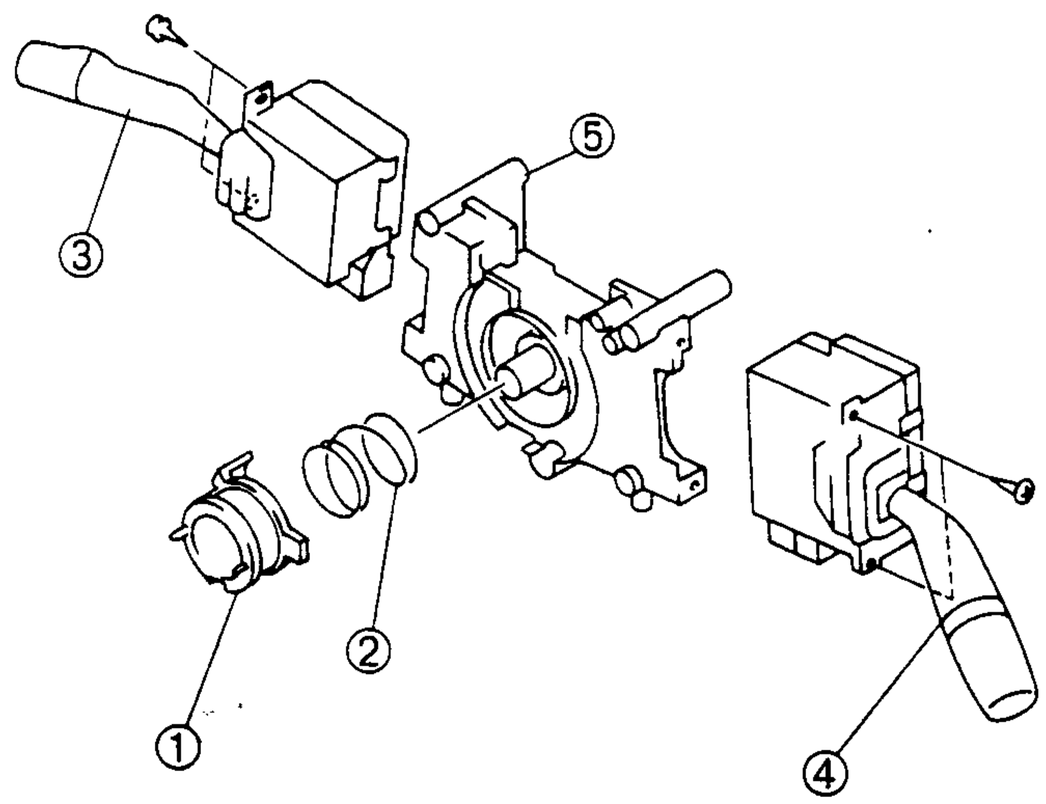
1. Disconnect the negative battery cable.
2. Remove the driver-side air bag module. (Refer to AIR BAG SYSTEM, DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
3. Remove the steering wheel. (Refer to section N, ENGINE SPEED SENSING POWER STEERING, STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION.)
4. Remove the column cover.
5. Remove the clock spring. (Refer to AIR BAG SYSTEM, CLOCK SPRING REMOVAL/INSTALLATION.)
6. Remove in the order indicated in the table.
7. Install in the reverse order of removal.



1	Connector
2	Screw
3	Combination switch

COMBINATION SWITCH DISASSEMBLY/ASSEMBLY

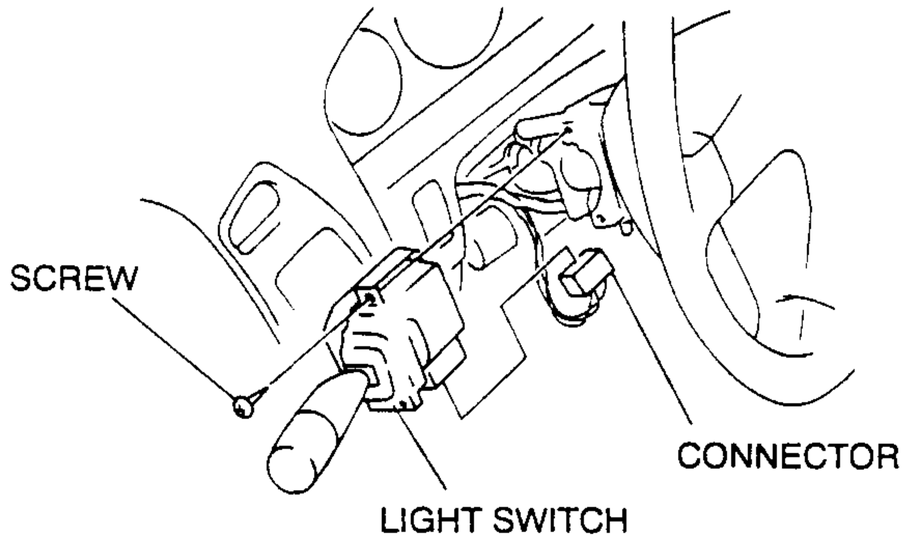
1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



1	Cancel cam
2	Spring
3	Light switch
4	Wiper and washer switch
5	Body

LIGHT SWITCH REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the column cover.
3. Disconnect the connector.
4. Remove the screws to remove the light switch.



5. Install in the reverse order of removal.

LIGHT SWITCH INSPECTION

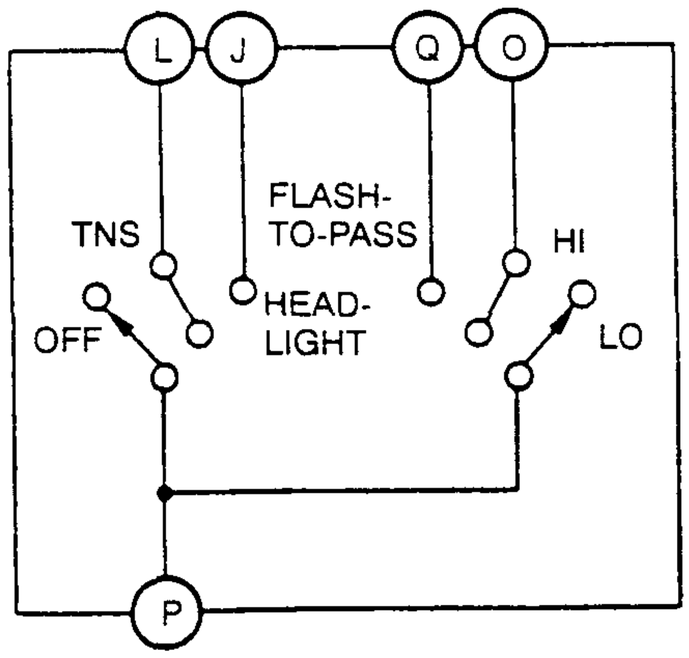
Light Switch Left Side

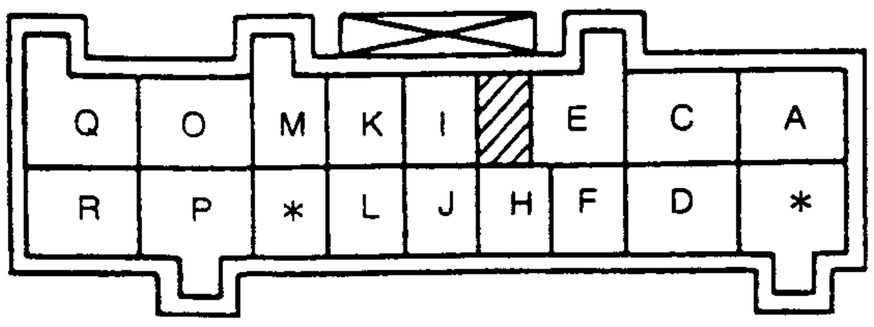
1. Remove the light switch. (Refer to LIGHT SWITCH REMOVAL/INSTALLATION.)
2. Check for continuity between the light switch terminals by using an ohmmeter.

Headlight switch

○—○ : Continuity

Switch position			Terminal				
Light	Dimmer	Flash-to-pass	J	L	P	O	Q
OFF	–	Off					
		On			○	○	○
TNS	–	Off		○	○		
		On		○	○	○	○
Head-light	LO	Off	○	○	○		
		On	○	○	○	○	○
	HI	–	○	○	○	○	

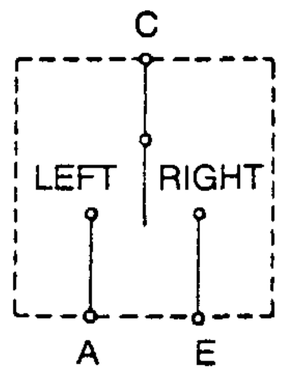


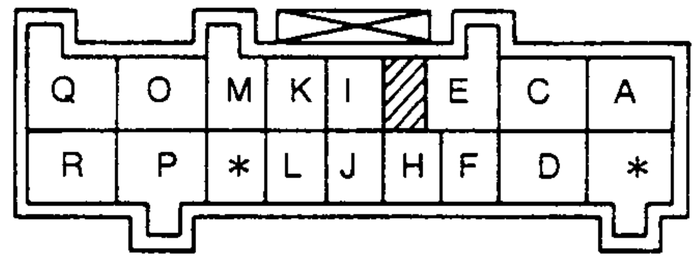


Turn switch

○—○ : Continuity

Switch position	Terminal		
	C	A	E
Left	○	○	
Off			
Right	○		○





3. If not as specified, replace the light switch.

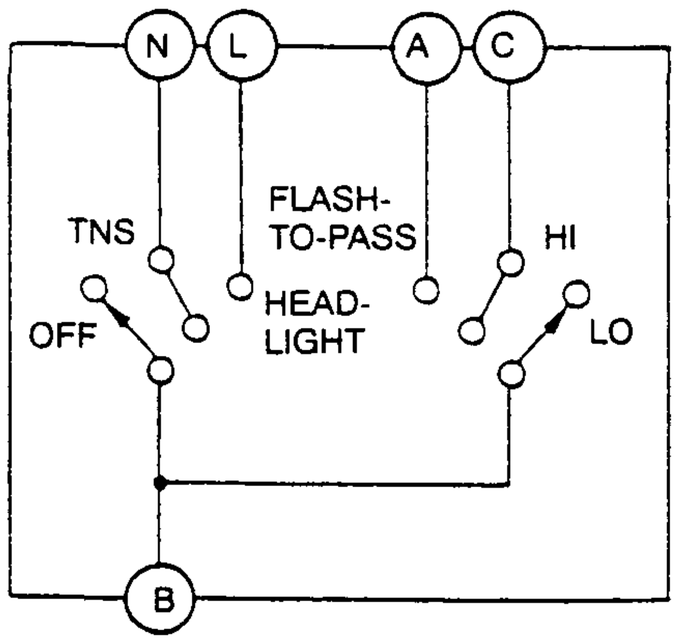
Light Switch Right Side

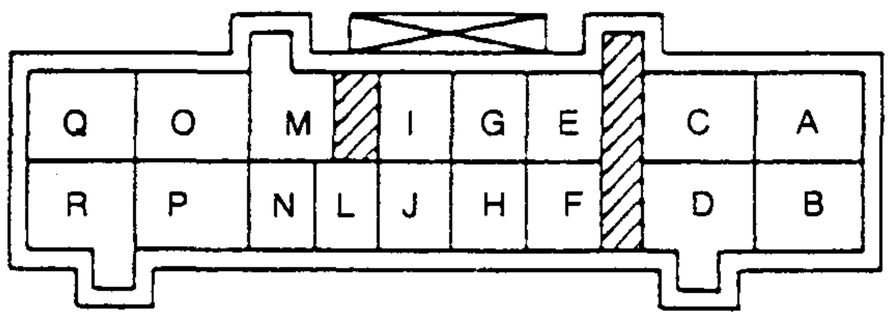
1. Remove the light switch. (Refer to LIGHT SWITCH REMOVAL/INSTALLATION.)
2. Check for continuity between the light switch terminals by using an ohmmeter.

Headlight switch

○—○ : Continuity

Switch position			Terminal				
Light	Dimmer	Flash-to-pass	L	N	B	C	A
OFF	–	Off					
		On			○	○	○
TNS	–	Off		○	○		
		On		○	○	○	○
Head-light	LO	Off	○	○	○		
		On	○	○	○	○	○
	HI	–	○	○	○	○	

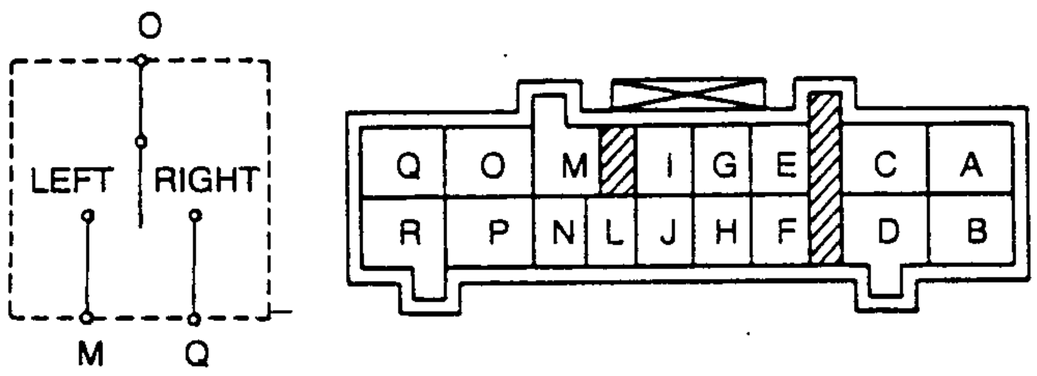




Turn switch

○—○ : Continuity

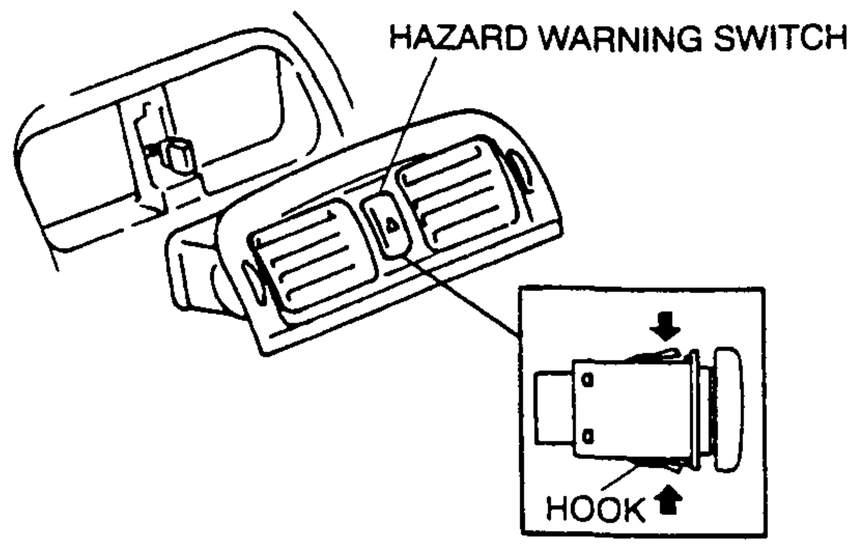
Switch position	Terminal		
	O	M	Q
Left	○	○	
Off			
Right	○		○



3. If not as specified, replace the light switch.

HAZARD WARNING SWITCH REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the ventilator grille. (Refer to section S, DASHBOARD AND CONSOLE, VENTILATOR GRILLE REMOVAL/INSTALLATION.)
3. Press the hooks of the hazard warning switch.
4. Pull the hazard warning switch out to remove it.



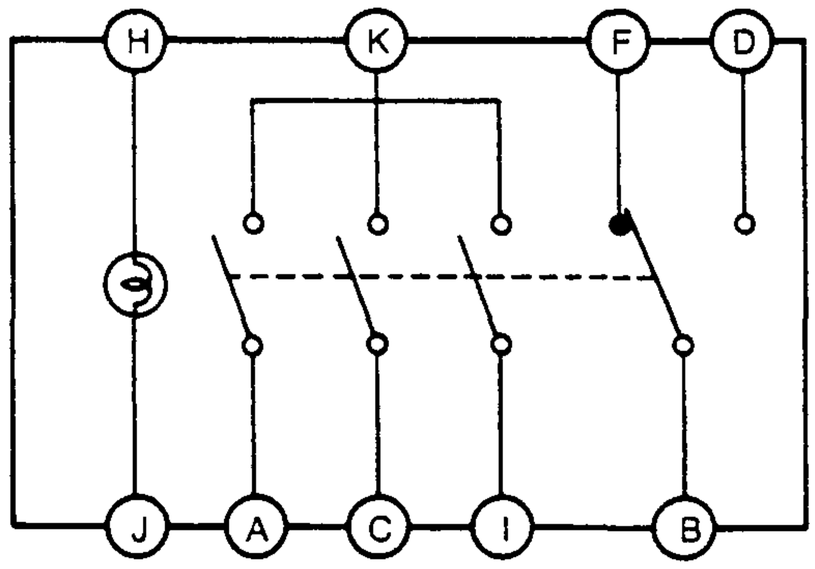
5. Install in the reverse order of removal.

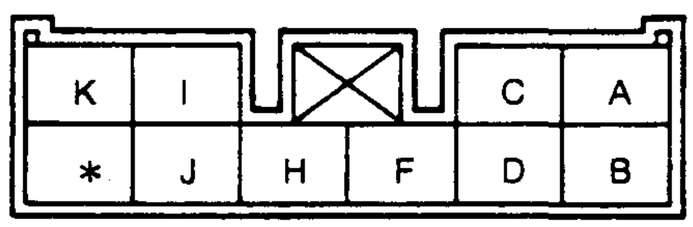
HAZARD WARNING SWITCH INSPECTION

1. Remove the ventilator grille. (Refer to section S, DASHBOARD AND CONSOLE, VENTILATOR GRILLE REMOVAL/INSTALLTION.)
2. Check for continuity between the hazard warning switch terminals by using an ohmmeter.

○—○ : Continuity ○-⊗-○ : Bulb

Switch position	Terminal								
	F	D	B	A	C	K	I	H	J
Off	○		○					○-⊗-○	
On		○	○	○	○	○	○	○-⊗-○	

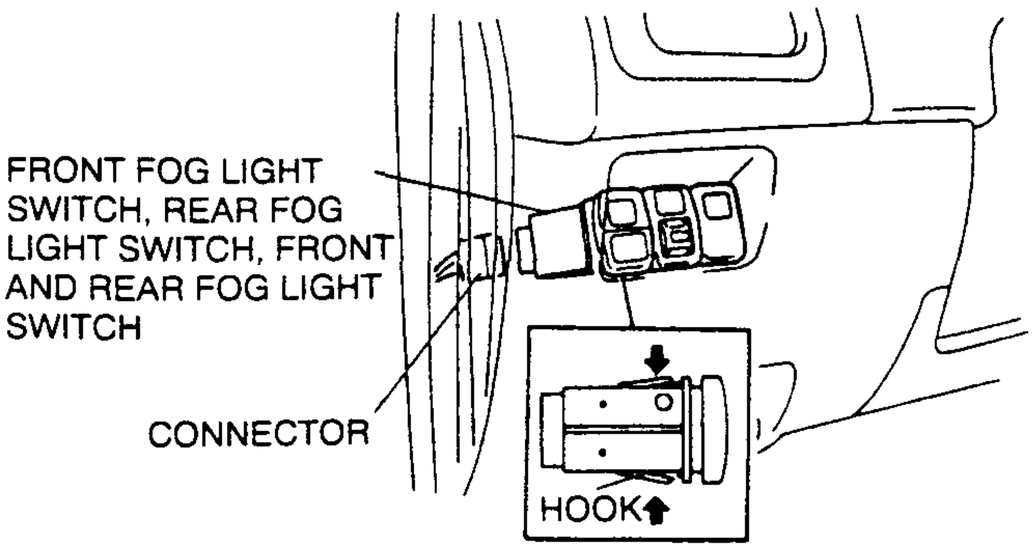




3. If not as specified, replace the hazard warning switch.

FRONT FOG LIGHT SWITCH, REAR FOG LIGHT SWITCH, FRONT AND REAR FOG LIGHT SWITCH REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the driver's side side panel.
3. Press the hooks of the front fog light switch, rear fog light switch or front and rear fog light switch and pull the switch out.
4. Disconnect the connector.
5. Remove the front fog light switch, rear fog light switch or front and rear fog light switch.



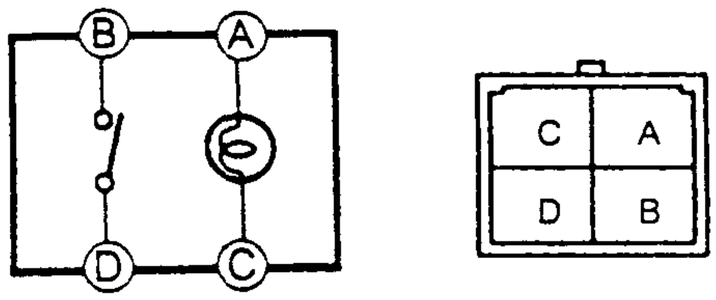
6. Install in the reverse order of removal.

FRONT FOG LIGHT SWITCH INSPECTION

1. Remove the front fog light switch. (Refer to FRONT FOG LIGHT SWITCH, REAR FOG LIGHT SWITCH, FRONT AND REAR FOG LIGHT SWITCH REMOVAL/INSTALLATION.)
2. Check for continuity between the front fog light switch terminals by using an ohmmeter.

○—○ : Continuity ○-◎-○ : Bulb

Switch position	Terminal			
	A	C	B	D
Off	○-◎-○			
On	○-◎-○		○—○	



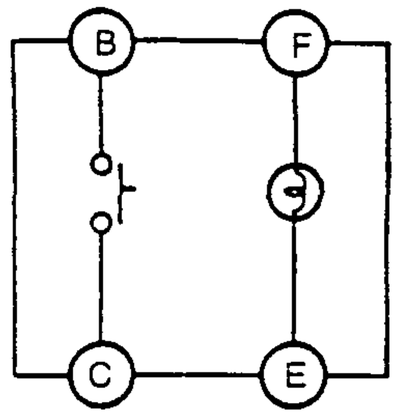
3. If not as specified, replace the front fog light switch.

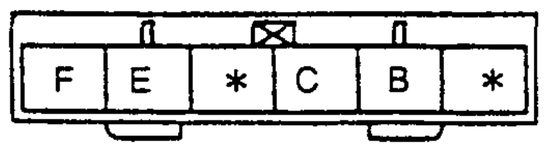
REAR FOG LIGHT SWITCH INSPECTION

1. Remove the rear fog light switch. (Refer to FRONT FOG LIGHT SWITCH, REAR FOG LIGHT SWITCH, FRONT AND REAR FOG LIGHT SWITCH REMOVAL/INSTALLATION.)
2. Check for continuity between the rear fog light switch terminals by using an ohmmeter.

○—○ : Continuity ○-◎-○ : Bulb

Switch position	Terminal			
	B	C	F	E
Pressed	○—○		○-◎-○	
Released			○-◎-○	





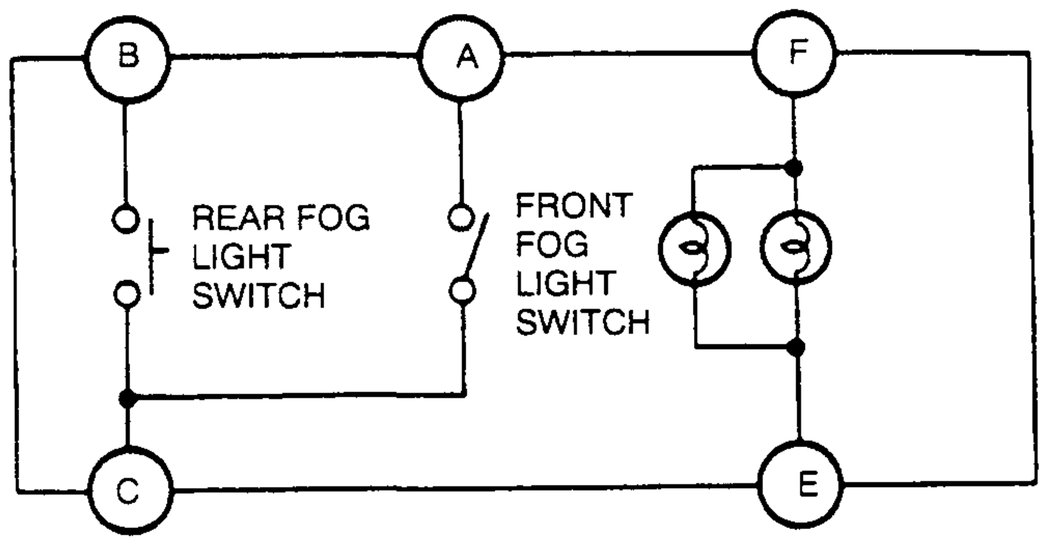
3. If not as specified, replace the rear fog light switch.

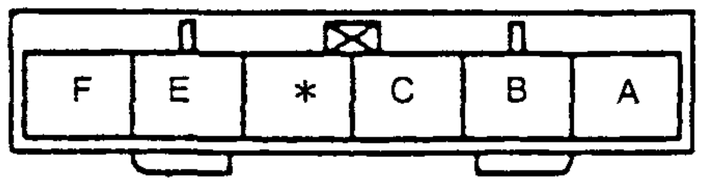
FRONT AND REAR FOG LIGHT SWITCH INSPECTION

1. Remove the front and rear fog light switch. (Refer to FRONT FOG LIGHT SWITCH, REAR FOG LIGHT SWITCH, FRONT AND REAR FOG LIGHT SWITCH REMOVAL/INSTALLATION.)
2. Check for continuity between the front and rear fog light switch terminals by using an ohmmeter.

○—○ : Continuity ○-◎-○ : Bulb

Switch	Switch position	Terminal				
		A	B	C	E	F
Front fog light switch	Off				○-◎-○	
	On	○—○			○-◎-○	
Rear fog light switch	Pressed		○—○		○-◎-○	
	Released				○-◎-○	





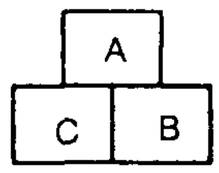
3. If not as specified, replace the front and rear fog light switch.

FLASHER UNIT INSPECTION

1. Measure the voltage at the flasher unit terminals as indicated below.
2. Disconnect the flasher unit connector before checking for continuity at terminal B.
3. If not as specified, inspect the parts listed under "Inspection area" and the related wiring harnesses.
4. If the parts and wiring harnesses are okay but the system still does not work properly, replace the flasher unit.

Terminal Voltage List (Reference)

B+: Battery positive voltage



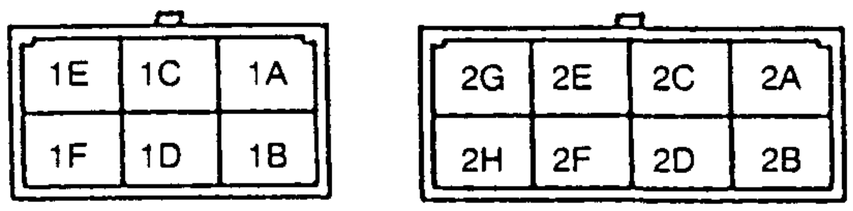
Terminal	Signal	Connection	Test condition		Voltage (V) /Continuity	Inspection area
A	Hazard warning on	Hazard warnig switch(Turn switch off)	Hazard warning switch on		Alternates 0 and B+	• Hazard warning switch • Turn switch • Turn signal light
			Hazard warning switch off	Ignition switch at ON	B+	
				Ignition switch at LOCK	0	
	Turn switch on/off	Turn switch (Hazard warning switch off)	Ignition switch at ON	Turn switch on	Alternates 0 and B+	
				Turn switch off	B+	
			Ignition switch at LOCK		0	
B	Flasher unit ground	GND	Constant:check for continuity to ground		Yes	GND
C	+B	Hazard warning switch	Hazard warning switch on		B+	• Hazard warning switch • Ignition switch
	IG1	Ignition switch	Hazard warning switch off	Ignition switch at ON	B+	
				Ignition switch at LOCK	0	

RUNNING LIGHT UNIT INSPECTION

1. Measure the voltage at the running light unit terminals as indicated below.
2. Disconnect the running light unit connector before checking for continuity at terminals 1C and 1D.
3. If not as specified, inspect the parts listed under "Inspection area" and the related wiring harnesses.
4. If the parts and wiring harnesses are okay but the system still does not work properly, replace the running light unit.

Terminal Voltage List (Reference)

B+: Battery positive voltage



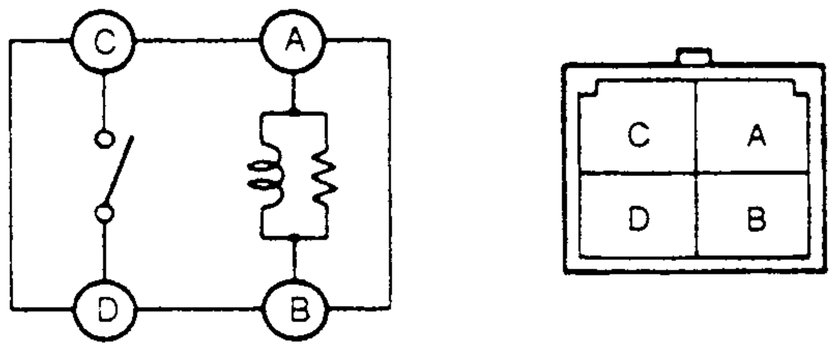
Terminal	Signal	Connection	Test condition		Voltage (V) /Continuity	Inspection area
1A	Headlight high relay operation	Headlight high relay	Ignition switch at ON	Headlight switch (light) at OFF	B+	• HEAD LOW 15 A fuse • Headlight low relay • Headlight high relay
				Headlight switch (light) at TNS	0	
				Flash-to-pass on	0	
1B	TNS operation	• Parking light • Taillight • License plate light	Ignition switch at ON		B+	-
			Ignition switch at LOCK or ACC	Headlight switch (light) at TNS or headlight	B+	
				Headlight switch (light) at OFF	0	
1C	Headlight (high beam) on/off	Headlight switch	Headlight switch (dimmer) at LO:check for continuity to ground		No	Headlight switch
			Headlight switch (dimmer) at HI:check for continuity to ground		Yes	
1D	Running light unit ground	GND	Constant:check for continuity to ground		Yes	GND
1E	-	Not used	-		-	-
1F	-	Not used	-		-	-
2A	+B	TAIL 10 A fuse	Constant		B+	TAIL 10 A fuse
2B	IG1	METER 15 A fuse	Ignition switch at ON		B+	METER 15 A fuse
			Ignition switch at LOCK or ACC		0	
2C	Headlight low relay operation	Headlight low relay	Ignition switch at ON	Headlight switch (light) at OFF	0	• HEAD LOW 15 A fuse • Headlight low relay
				Headlight switch (light) at TNS	B+	
				Flash-to-pass on	0	
2D	-	Not used	-		-	-
2E	-	Not used	-		-	-
2F	Flash-to-pass on/off	Headlight switch	Ignition switch at ON	Headlight switch (light) at OFF	0	Headlight switch
				Headlight switch (light) at TNS	B+	
				Flash-to-pass on	0	
2G	TNS relay on/off	TNS relay	Headlight switch (light) at TNS		B+	• TAIL 10 A Fuse • TNS relay
			Headlight switch (light) at OFF		0	
2H	-	Not used	-		-	-

TNS RELAY INSPECTION

1. Disconnect the negative battery cable.
2. Remove the TNS relay.
3. Check for continuity between the TNS relay terminals by using an ohmmeter.

○—○ : Continuity B+: Battery positive voltage

Step	Terminal			
	A	B	C	D
1	○—○			
2	B+	GND	○—○	



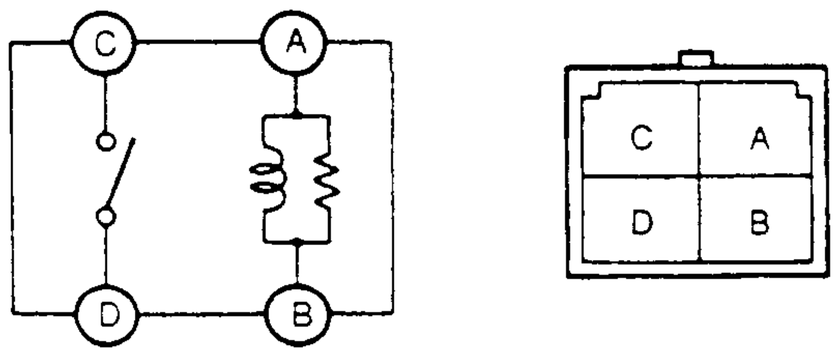
4. If not as specified, replace the TNS relay.

HEADLIGHT LOW RELAY/HEADLIGHT HIGH RELAY INSPECTION

1. Disconnect the negative battery cable.
2. Remove the headlight low relay and headlight high relay.
3. Check for continuity between the relay terminals by using an ohmmeter.

○—○ : Continuity B+: Battery positive voltage

Step	Terminal			
	A	B	C	D
1	○—○			
2	B+	GND	○—○	



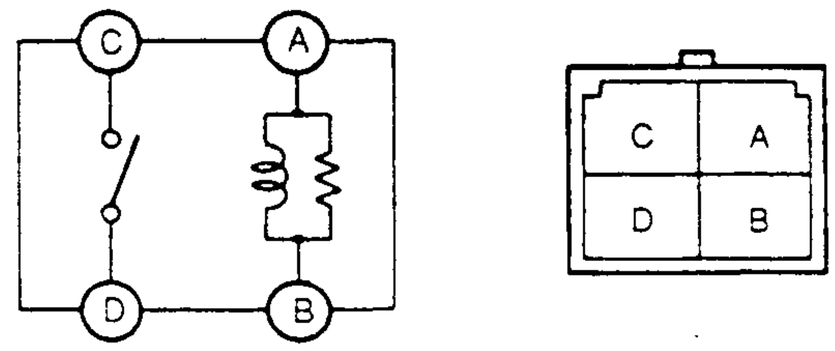
4. If not as specified, replace the necessary relay.

FRONT FOG LIGHT RELAY INSPECTION

1. Disconnect the negative battery cable.
2. Remove the front fog light relay.
3. Check for continuity between the front fog light relay terminals by using an ohmmeter.

○—○ : Continuity B+: Battery positive voltage

Step	Terminal			
	A	B	C	D
1	○—○			
2	B+	GND	○—○	



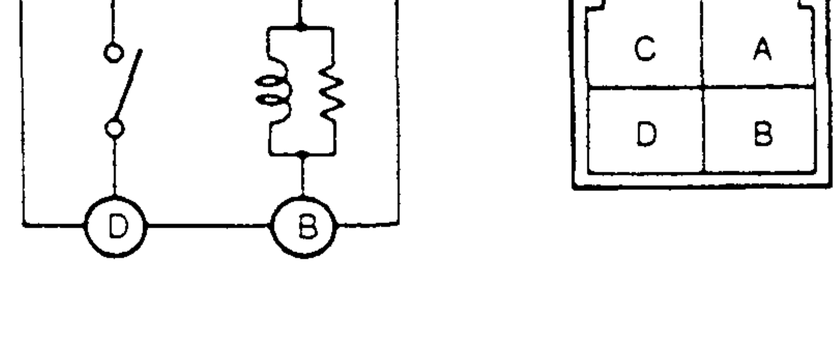
4. If not as specified, replace the front fog light relay.

REAR FOG LIGHT RELAY INSPECTION

1. Disconnect the negative battery cable.
2. Remove the rear fog light relay.
3. Check for continuity between the rear fog light relay terminals by using an ohmmeter.

○—○ : Continuity B+: Battery positive voltage

Step	Terminal			
	A	B	C	D
1	○—○			
2	B+	GND	○—○	

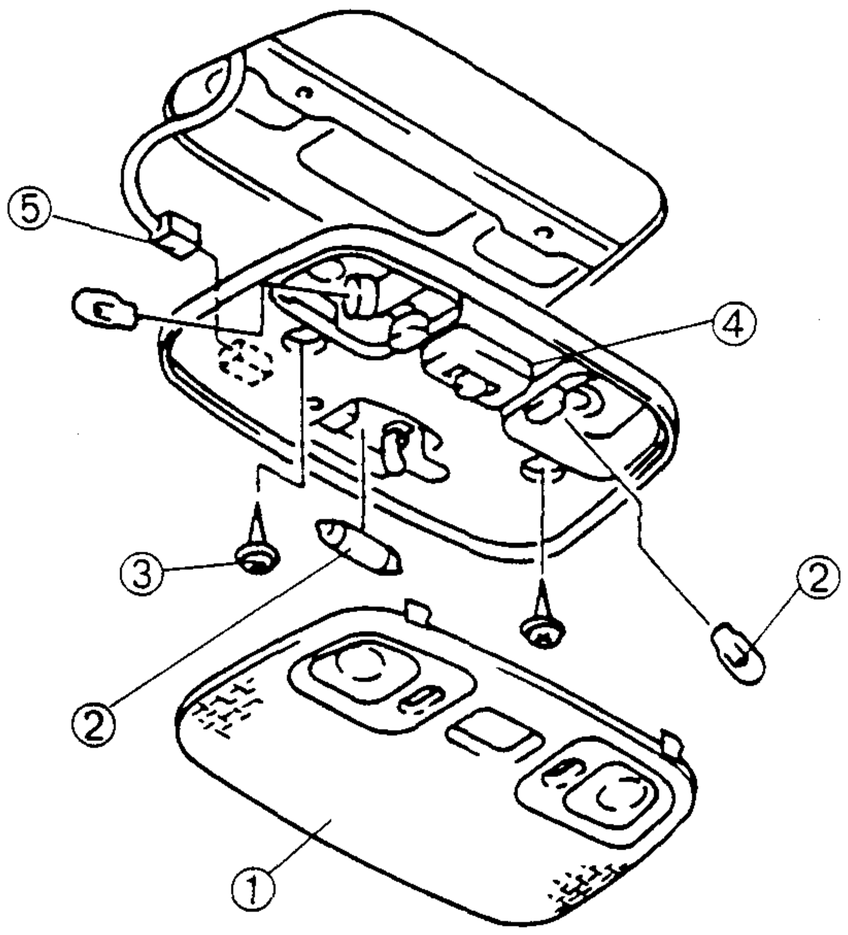


4. If not as specified, replace the rear fog light relay.

INTERIOR LIGHTING SYSTEM

INTERIOR AND SPOT LIGHT REMOVAL/ INSTALLATION

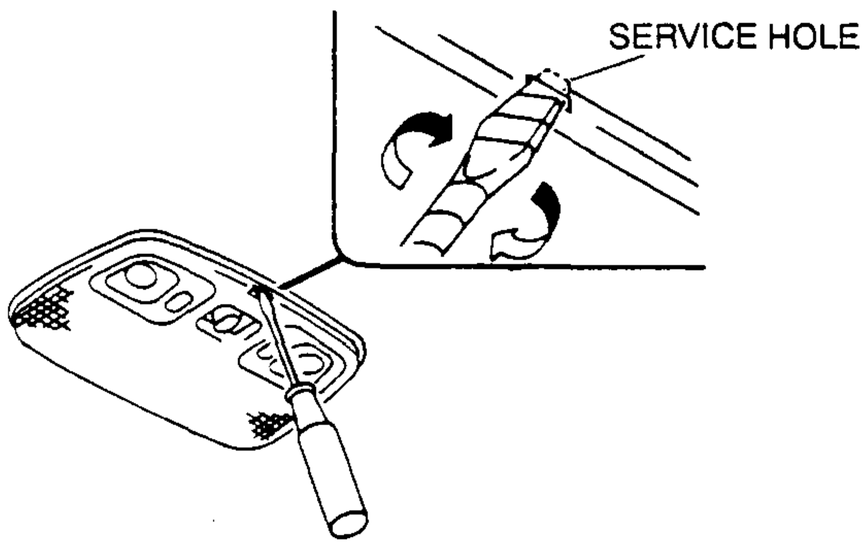
1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Lens ☞ Removal Note
2	Bulb
3	Screw
4	Interior and spot light
5	Connector

Lens Removal Note

1. Insert a tape-wrapped, flathead screwdriver into the service hole.
2. Twist the flathead screwdriver indicated by the arrow to remove the lens.

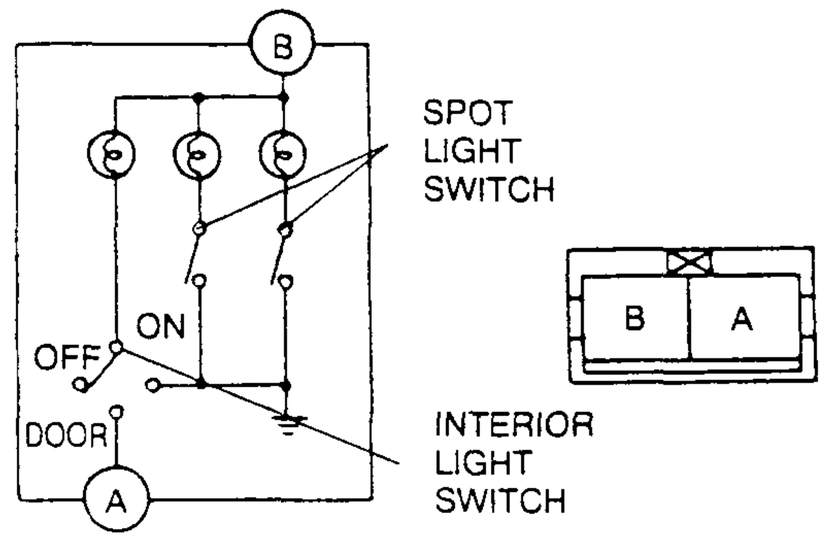


INTERIOR AND SPOT LIGHT INSPECTION

1. Remove the interior and spot light. (Refer to INTERIOR AND SPOT LIGHT REMOVAL/INSTALLATION.)
2. Check for continuity between the interior and spot light terminals by using an ohmmeter.

○-◎-○ : Bulb

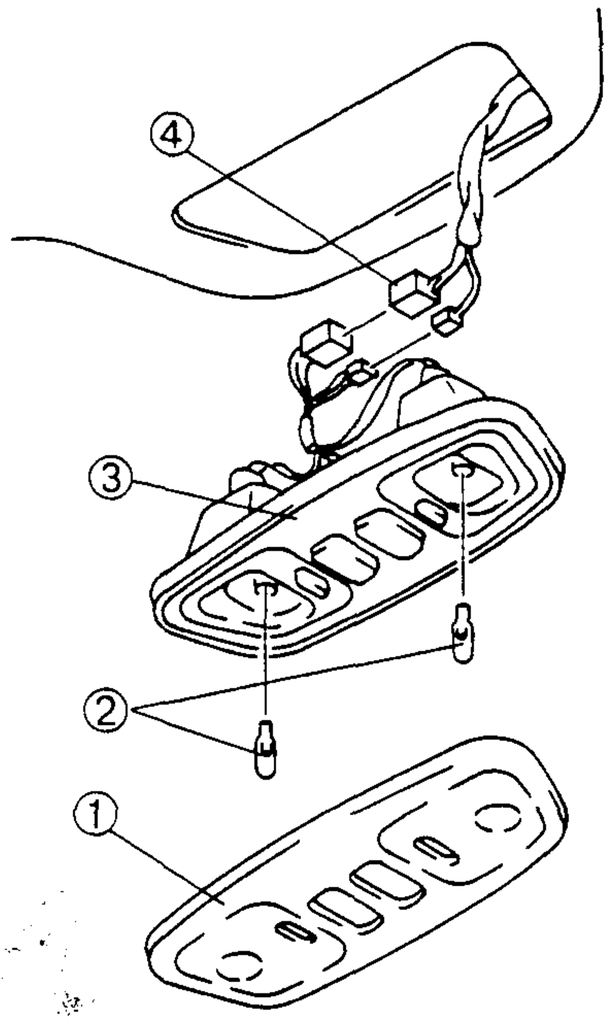
Switch position		Terminal A	Terminal B	Terminal Body GND
Spot light switch	ON		○-◎-○	
	OFF			
Interior light switch	ON		○-◎-○	
	DOOR	○-◎-○		
	OFF			



3. If not as specified, replace the interior and spot light.

SPOT LIGHT REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.

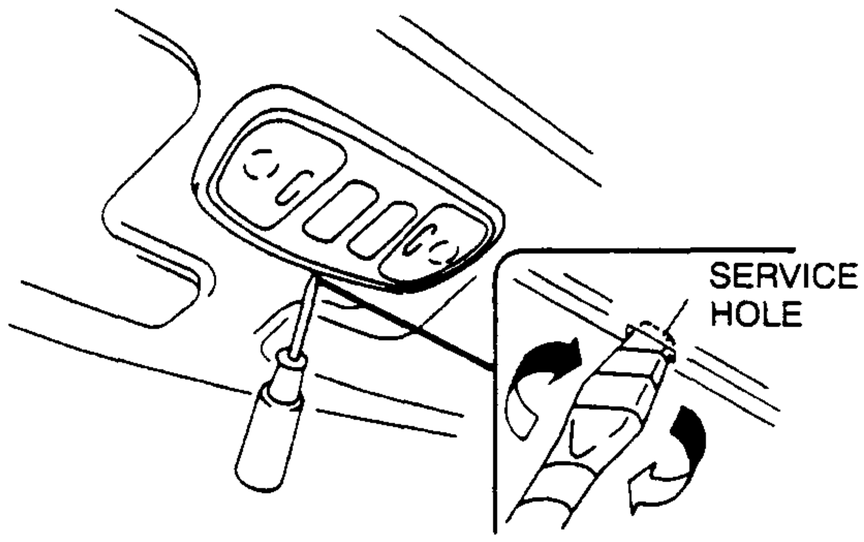


1	Lens ☞ Removal Note
2	Bulb
3	Spot light
4	Connector

Lens Removal Note

1. Insert a tape-wrapped, flathead screwdriver into the service hole.

2. Twist the flathead screwdriver indicated by the arrow to remove the lens.

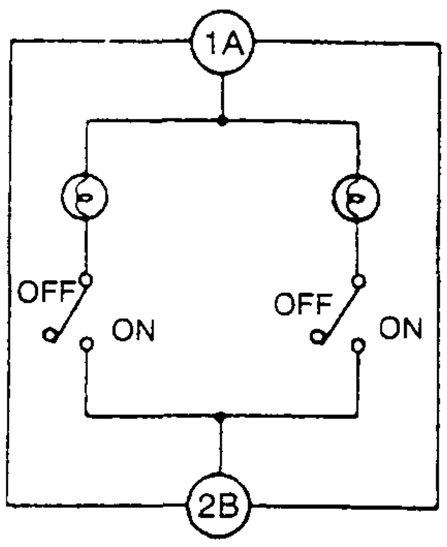


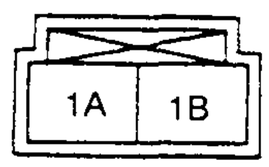
SPOT LIGHT INSPECTION

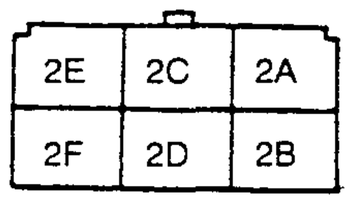
1. Remove the spot light.(Refer to SPOT LIGHT REMOVAL/INSTALLATION.)
2. Check for continuity between the spot light terminals by using an ohmmeter.

○—◎—○ : Bulb

Switch position	Terminal	
	1A	2B
ON	○—◎—○	
OFF		



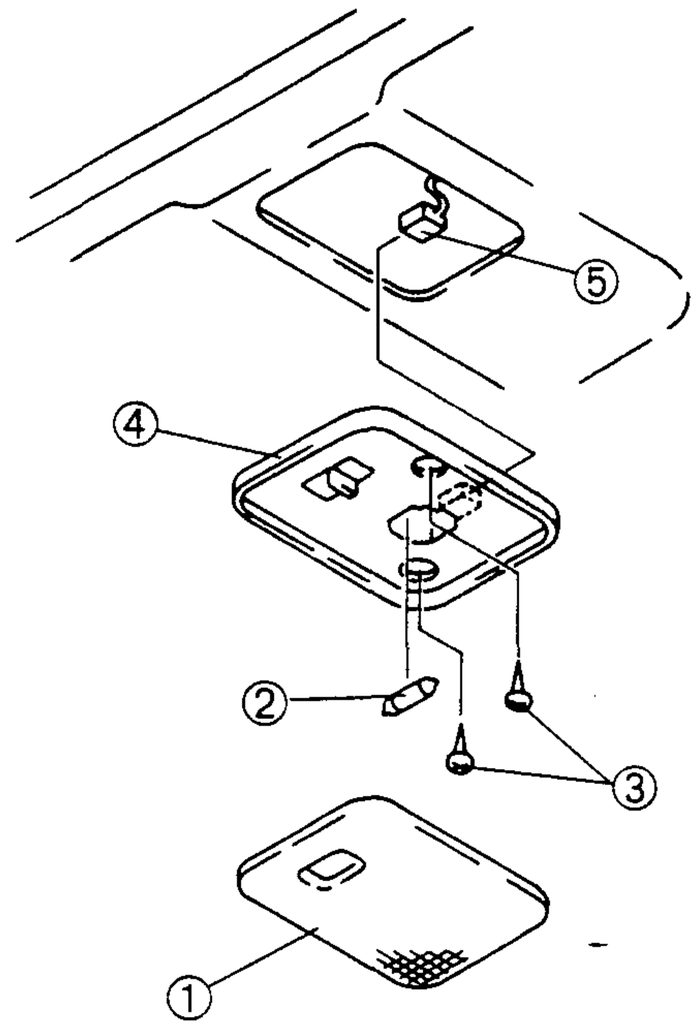




3. If not as specified, replace the spot light.

INTERIOR LIGHT REMOVAL/INSTALLATION

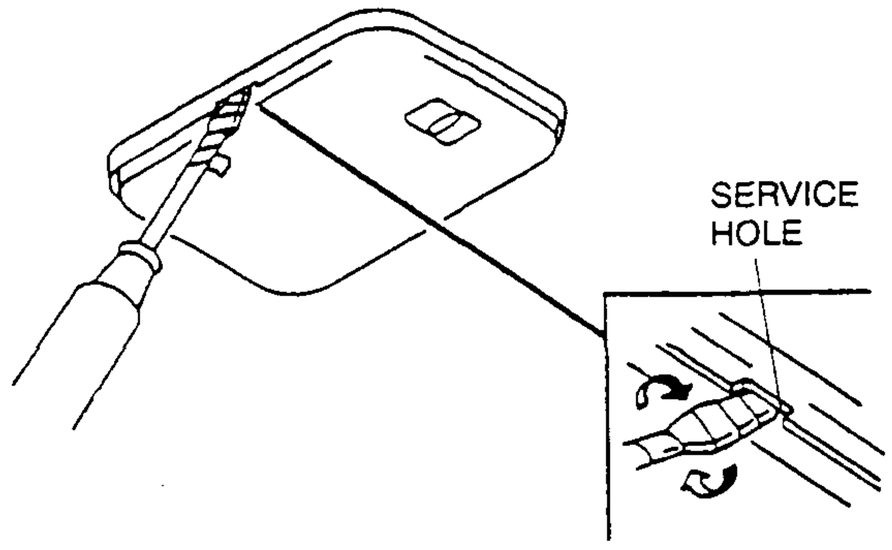
1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Lens ☞ Removal Note
2	Bulb
3	Screw
4	Interior light
5	Connector

Lens Removal Note

1. Insert a tape-wrapped, flathead screwdriver into the service hole.
2. Twist the flathead screwdriver indicated by the arrow to remove the lens.

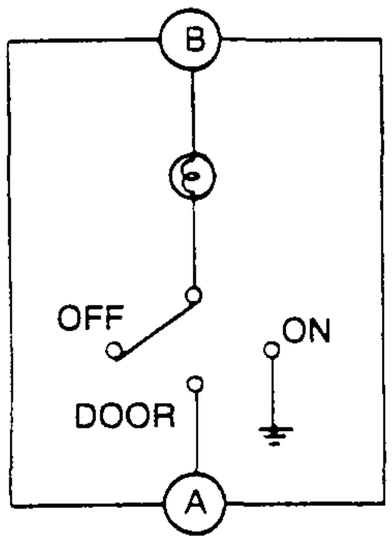


INTERIOR LIGHT INSPECTION

1. Remove the interior light. (Refer to INTERIOR LIGHT REMOVAL/INSTALLATION.)
2. Check for continuity between the interior light terminals by using an ohmmeter.

○—◎—○ : Bulb

Switch position	Terminal		
	A	B	Body GND
ON		○—◎—○	
DOOR	○—◎—○		
OFF			

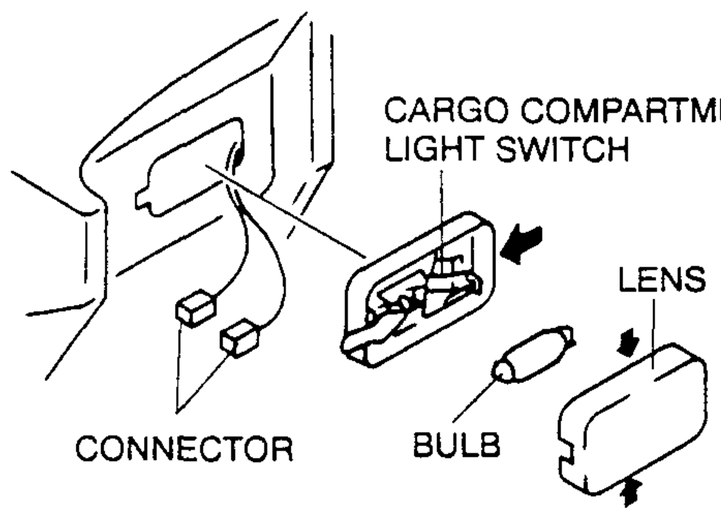




3. If not as specified, replace the interior light.

CARGO COMPARTMENT LIGHT REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Pinch the sides of the lens and pull to remove.
3. Remove the bulb.
4. Push the area indicated by the arrow and pull to remove the cargo compartment light.
5. Disconnect the connectors.



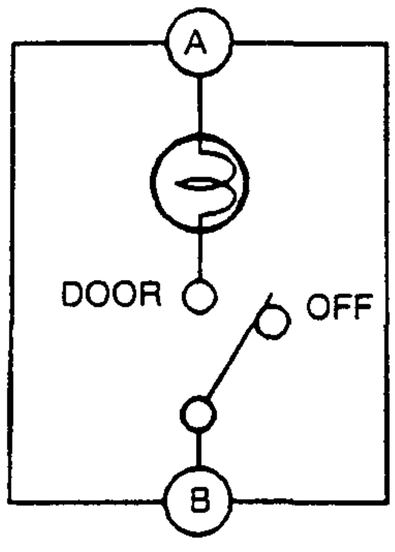
6. Install in the reverse order of removal.

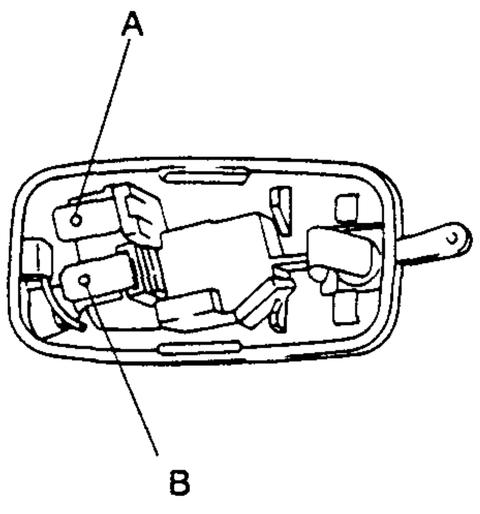
CARGO COMPARTMENT LIGHT INSPECTION

1. Remove the cargo compartment light. (Refer to CARGO COMPARTMENT LIGHT REMOVAL/ INSTALLATION.)
2. Check for continuity between the cargo compartment light terminals by using an ohmmeter.

○—◠—○ : Bulb

Switch position	Terminal	
	A	B
DOOR	○—◠—○	
OFF		





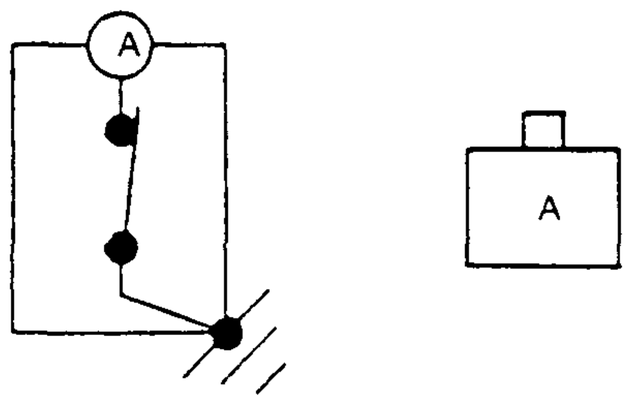
3. If not as specified, replace the cargo compartment light.

CARGO COMPARTMENT LIGHT SWITCH INSPECTION

1. Remove the liftgate lower trim. (Refer to section S, LIFTGATE LOWER TRIM REMOVAL/ INSTALLATION.)
2. Disconnect the cargo compartment light switch connector.
3. Check for continuity between the cargo compartment light switch terminal and a body ground by using an ohmmeter.

○—○ : Continuity

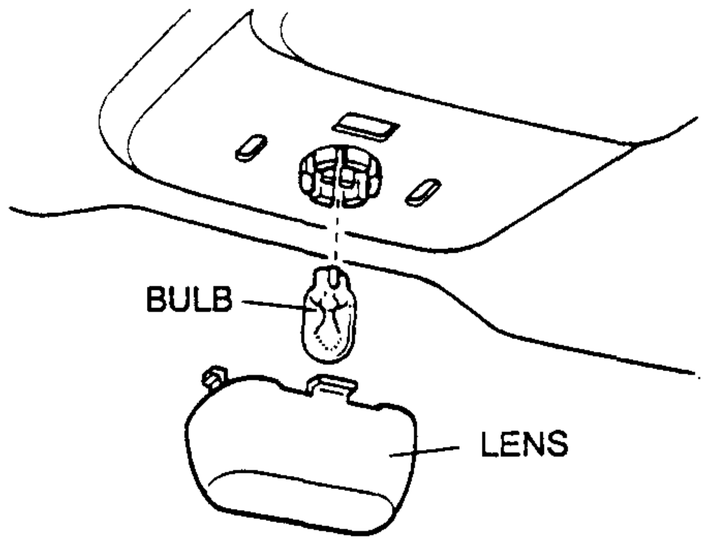
Switch position	Terminal	
	A	Body GND
Locked (liftgate closed)		
Unlocked (liftgate opened)	○	○



4. If not as specified, replace the liftgate lock.

TRUNK COMPARTMENT LIGHT BULB REPLACEMENT

1. Disconnect the negative battery cable.
2. Pinch the sides of the lens and pull to remove.
3. Remove the bulb.



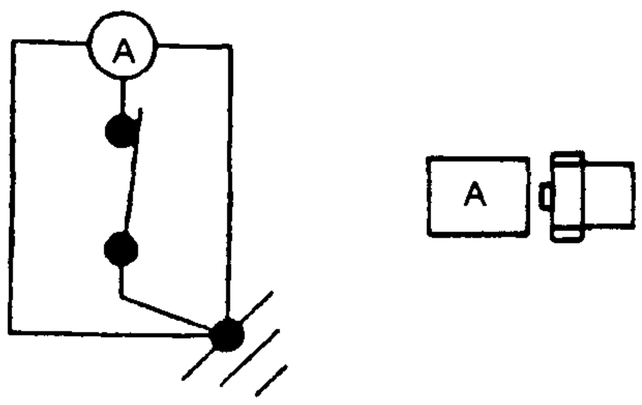
4. Install in the reverse order of removal.

TRUNK COMPARTMENT LIGHT SWITCH INSPECTION

1. Remove the trunk lid trim.
2. Disconnect the trunk compartment light switch connector.
3. Check for continuity between the trunk compartment light switch terminal and a body ground by using an ohmmeter.

○—○ : Continuity

Switch position	Terminal	
	A	Body GND
Locked (trunk lid closed)		
Unlocked (trunk lid opened)	○	○

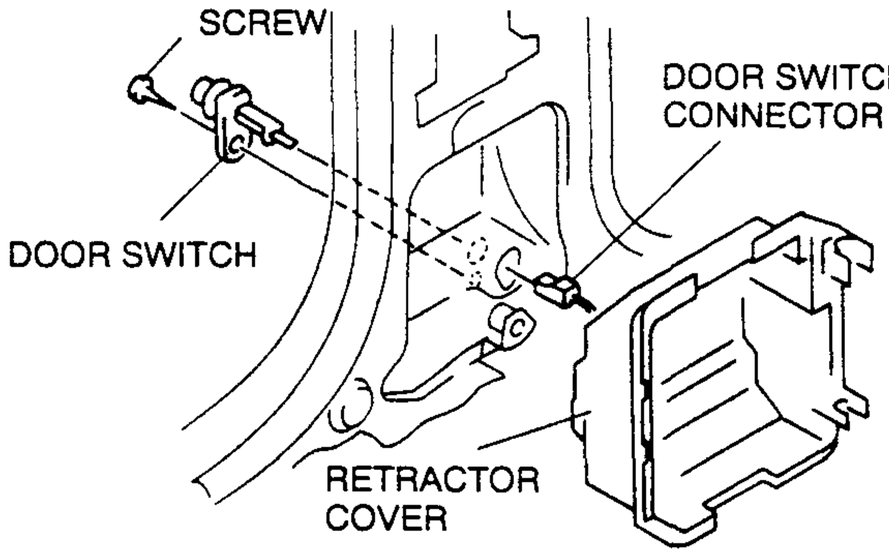


4. If not as specified, replace the trunk lid lock.

DOOR SWITCH REMOVAL/INSTALLATION

Front

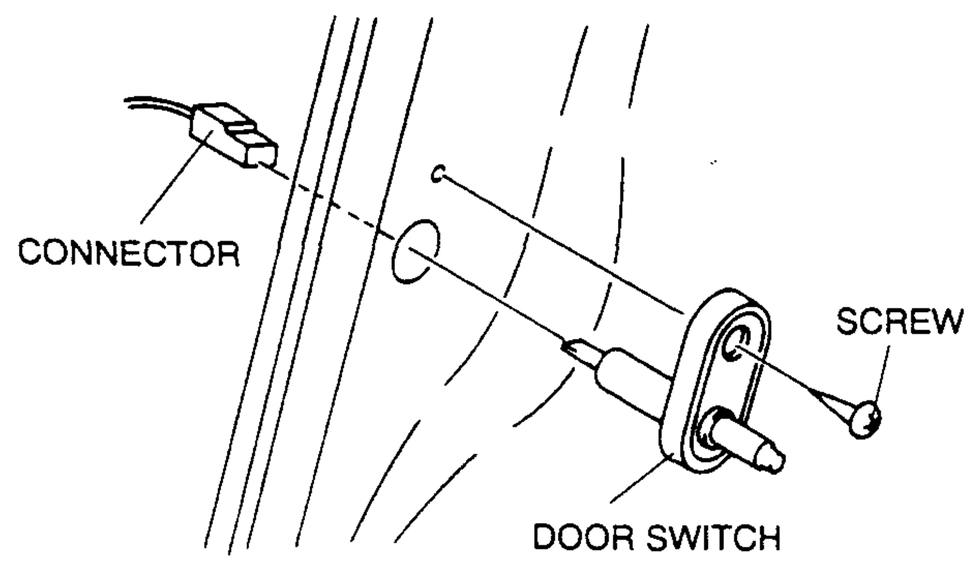
1. Disconnect the negative battery cable.
2. Remove the B-pillar lower trim. (Refer to section S, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.)
3. Remove the retractor cover in front seat belt. (Refer to section S, FRONT SEAT BELT REMOVAL/INSTALLATION.)
4. Disconnect the door switch connector.
5. Remove the screw to remove the door switch.



6. Install in the reverse order of removal.

Rear

1. Disconnect the negative battery cable.
2. Remove the rear seat cushion and rear side seat.
3. Disconnect the rear door switch connector.
4. Remove the screw to remove the door switch.



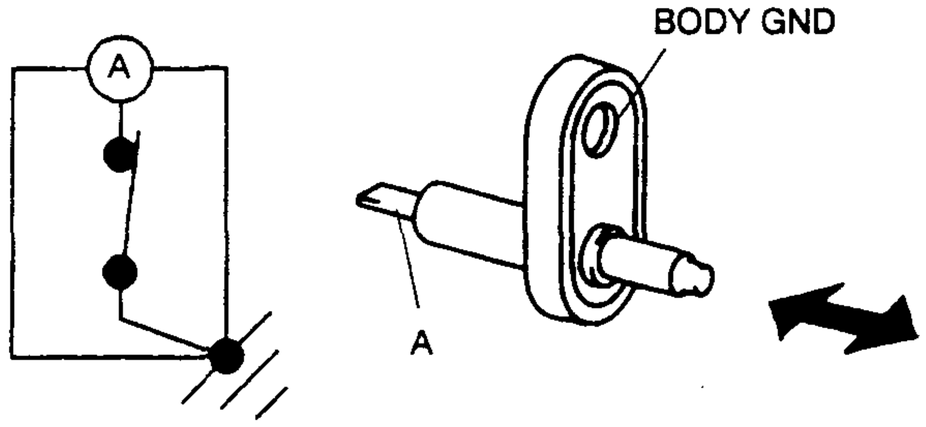
5. Install in the reverse order of removal.

DOOR SWITCH INSPECTION

1. Remove the door switch. (Refer to DOOR SWITCH REMOVAL/INSTALLATION.)
2. Check for continuity between the door switch terminal and a body ground by using an ohmmeter.

○—○ : Continuity

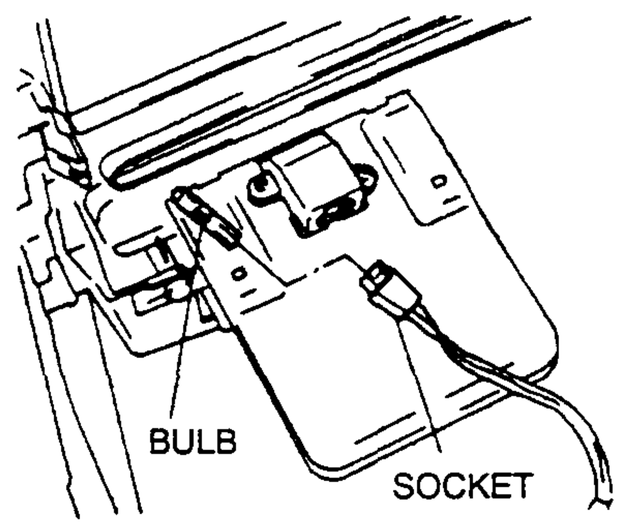
Switch position	Terminal	
	A	Body GND
Pressed		
Released	○	○



3. If not as specified, replace the door switch.

FRONT ASHTRAY ILLUMINATION BULB REPLACEMENT

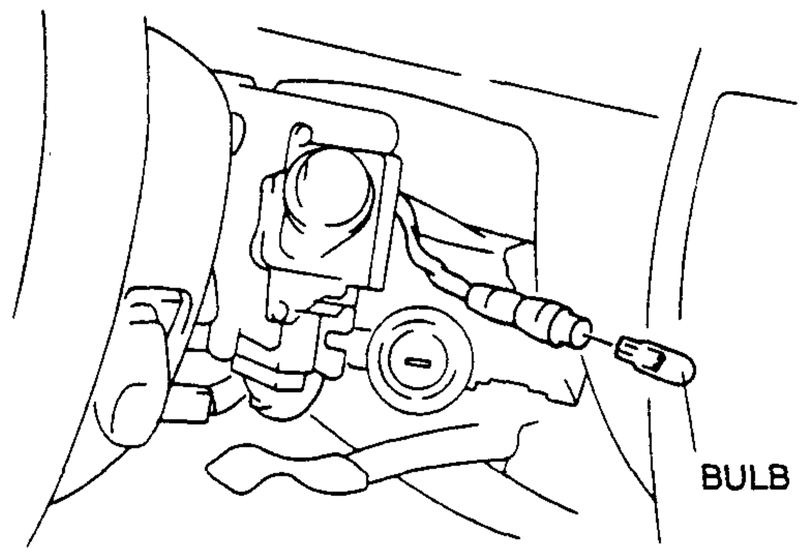
1. Disconnect the negative battery cable.
2. Remove the center panel.
3. Remove the socket and the front ashtray illumination bulb.



4. Install in the reverse order of removal.

IGNITION KEY ILLUMINATION BULB REPLACEMENT

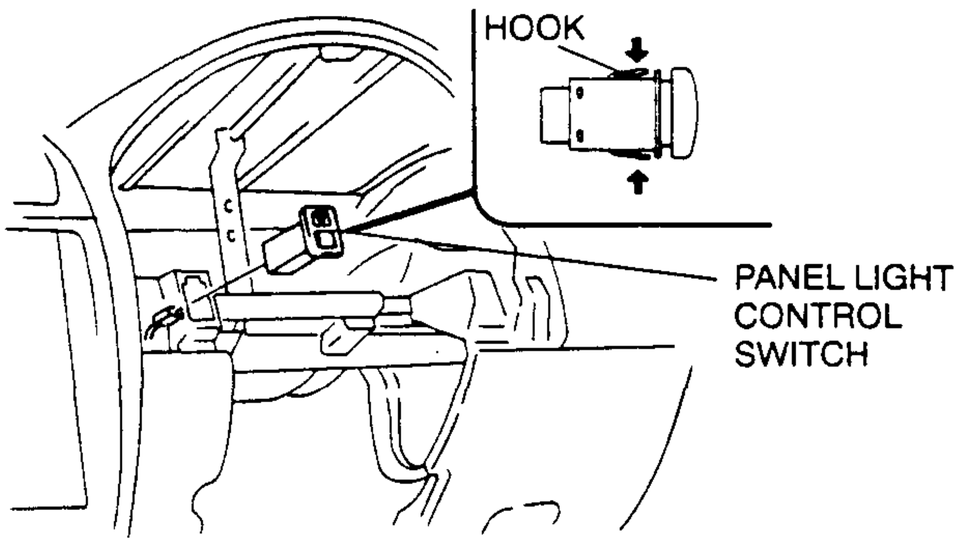
1. Disconnect the negative battery cable.
2. Remove the column cover. (Refer to section S, COLUMN COVER REMOVAL/INSTALLATION.)
3. Remove the ignition key illumination bulb.



4. Install in the reverse order of removal.

PANEL LIGHT CONTROL SWITCH REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the meter hood.
3. Remove the lower pannel.
4. Press the hooks of the panel light control switch and pull the switch out.
5. Disconnect the panel light control switch connector.



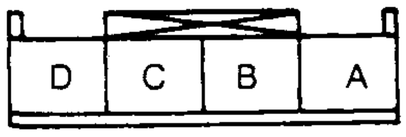
6. Install in the reverse order of removal.

PANEL LIGHT CONTROL SWITCH INSPECTION

1. Remove the panel light control switch. (Refer to PANEL LIGHT CONTROL SWITCH REMOVAL/ INSTALLATION.)
2. Connect the negative battery cable.
3. Connect the connector to the panel light control switch.
4. Measure the voltage at the panel light control switch as indicated below.
5. Disconnect the panel light control switch connector before checking for continuity at terminal D.
6. If not as specified, inspect the parts listed under "Inspection area" and the related wiring harnesses.
7. If the parts and wiring harnesses are okay but the system still does not work properly, replace the panel light control switch.

Terminal Voltage List (Reference)

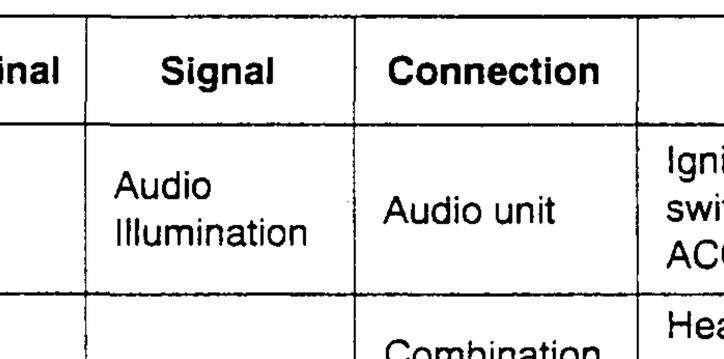
B+: Battery positive voltage



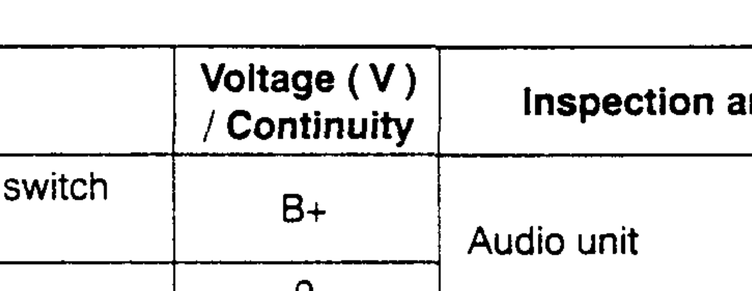
Terminal	Signal	Connection	Test condition		Voltage (V) / Continuity	Inspection area
A	Audio Illumination	Audio unit	Ignition switch at ACC or ON	Audio power switch is on	B+	Audio unit
				Other	0	
B	TNS	Combination switch	Headlight switch at first or second position		B+	• Combination switch • TAIL 15 A fuse
			Other		0	
C	Illumination	Each illumination	Inspect by using an oscilloscope ☞ terminal C inspection		–	Each illumination
D	Ground	GND	Constant: check for continuity to ground		Yes	GND

Terminal C inspection

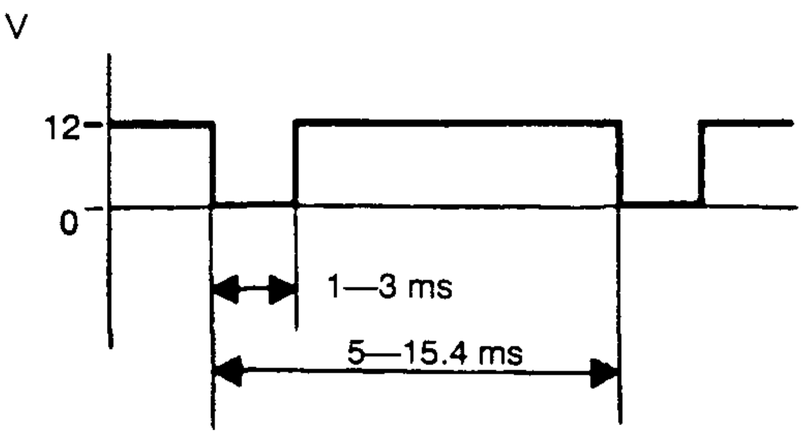
1. Measure the wave pattern of the C terminal on the panel light control switch by using an oscilloscope.



2. Set the headlight switch to either the first or second position.
3. Set the panel light control switch to the brightest position.
4. Verify that the pattern on the screen is as shown in the figure.



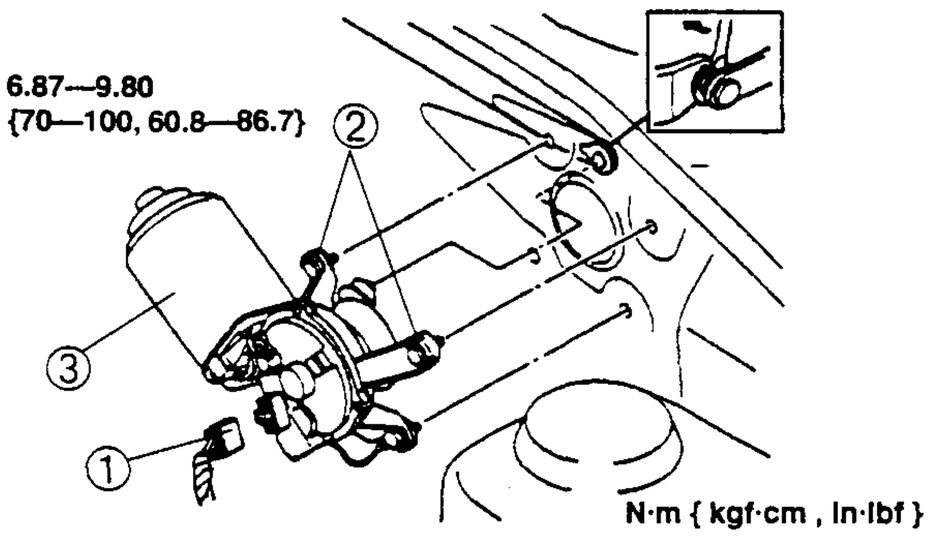
5. Verify that the pattern on the screen matches the pattern shown in the figure as the panel light control switch is gradually turned to the darkest position.



WIPER AND WASHER

WINDSHIELD WIPER MOTOR REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the windshield wiper arm and blade. (Refer to WINDSHIELD WIPER ARM AND BLADE REMOVAL/INSTALLATION, Windshield Wiper Arm Installation Note.)
3. Remove the cowl grille.
4. Pry off the connection between the windshield wiper motor and windshield wiper link.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.
7. Adjust he windshield wiper arm and blade. (Refer to WINDSHIELD WIPER ARM AND BLADE ADJUSTMENT.)



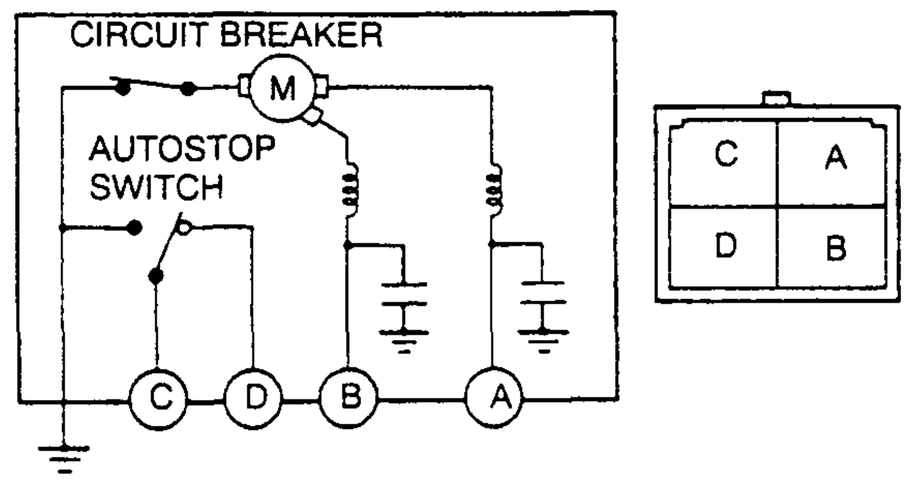
1	Connector
2	Bolt
3	Windshield wiper motor

WINDSHIELD WIPER MOTOR INSPECTION

1. Turn the ignition switch to LOCK while the windshield wiper is operating.
2. Verify that the windshield wiper does not stop in the park position.
3. Disconnect the windshield wiper motor connector.
4. Check for continuity between the windshield wiper motor terminals by using an ohmmeter.

○—○ : Continuity

Windshield wiper motor position	Terminal				
	A	B	C	D	Body GND
Except park position	○	○	○	○	○

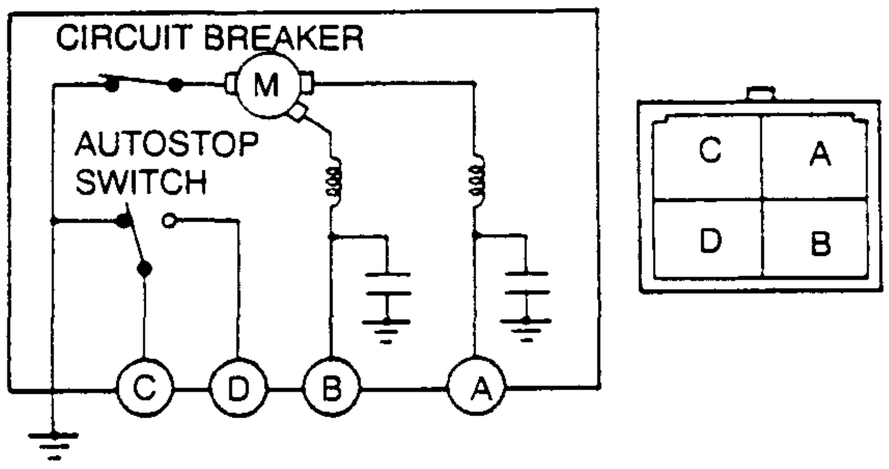


5. Connect the windshield wiper motor connector.
6. Turn the ignition switch to ON.

7. Turn the wiper switch off while the windshield wiper is operating.
8. Verify that the windshield wiper stops in the park position.
9. Disconnect the windshield wiper motor connector.
10. Check for continuity between the windshield wiper motor terminals by using an ohmmeter.

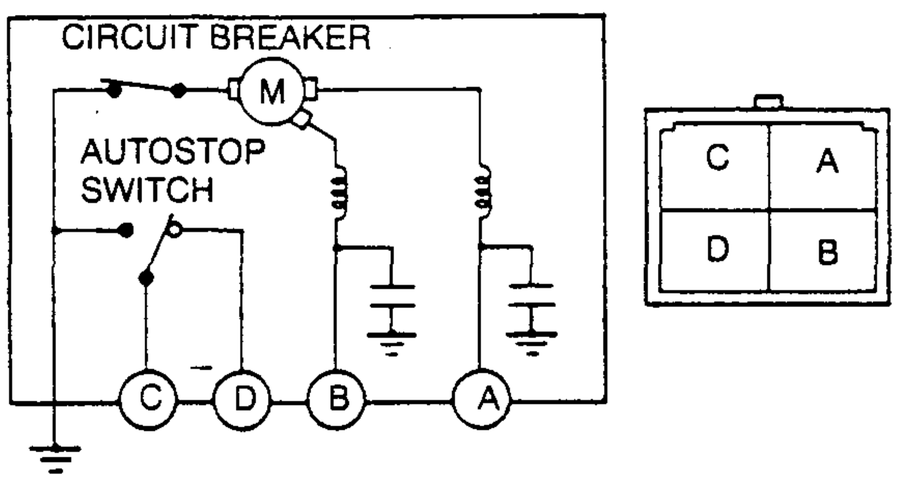
○—○ : Continuity

Windshield wiper motor position	Terminal			
	A	B	C	Body GND
Park position	○	○	○	○



11. Apply battery positive voltage and check the operation of the windshield wiper motor as indicated below.

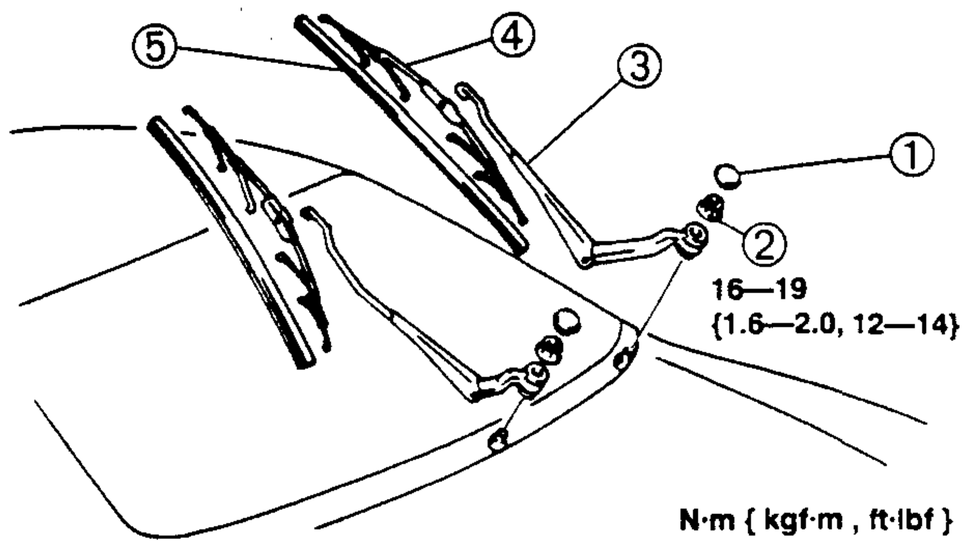
Terminal	Operation
B	High
A	Low



12. If not as specified, replace the windshield wiper motor.

WINDSHIELD WIPER ARM AND BLADE REMOVAL/INSTALLATION

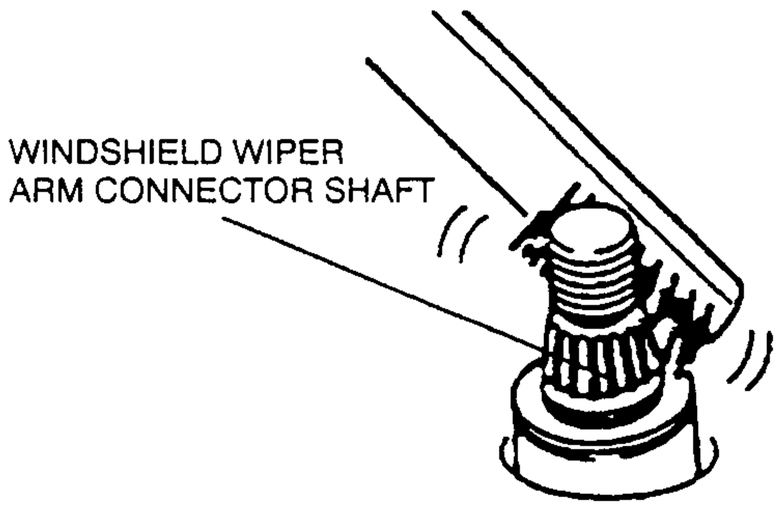
1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Adjust the windshield wiper arm and blade. (Refer to WINDSHIELD WIPER ARM AND BLADE ADJUSTMENT.)



1	Cap
2	Nut
3	Windshield wiper arm ☞ Installation Note
4	Windshield wiper blade
5	Rubber brush

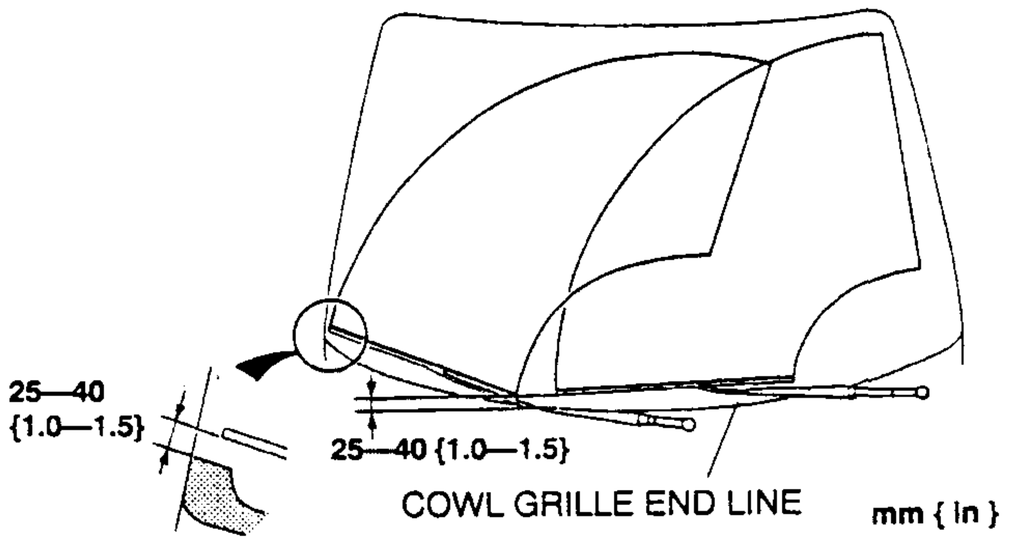
Windshield Wiper Arm Installation Note

- Clean the windshield wiper arm connector shafts by using a wire brush before installing the windshield wiper arms.



WINDSHIELD WIPER ARM AND BLADE ADJUSTMENT

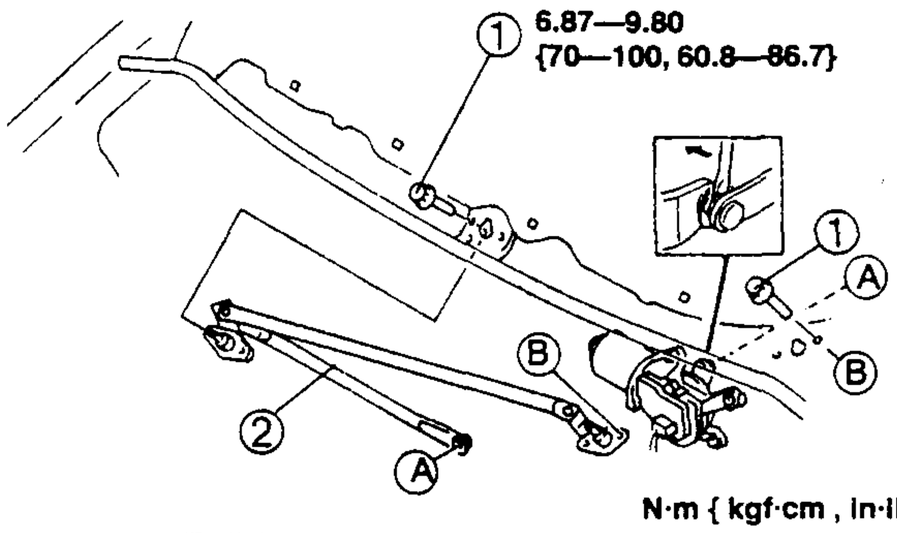
1. Operate the windshield wiper motor to set the wipers in the park position.
2. Set the windshield wiper arm height as shown.



WINDSHIELD WIPER LINK REMOVAL/INSTALLATION

1. Remove the windshield wiper arm and blade. (Refer to WINDSHIELD WIPER ARM AND BLADE REMOVAL/INSTALLATION, Windshield Wiper Arm Installation Note.)
2. Remove the cowl grille.
3. Pry off the connection between the windshield wiper motor and windshield wiper link.
4. Remove in the order indicated in the table.

5. Install in the reverse order of removal.
6. Adjust the windshield wiper arm and blade. (Refer to WINDSHIELD WIPER ARM AND BLADE ADJUSTMENT.)

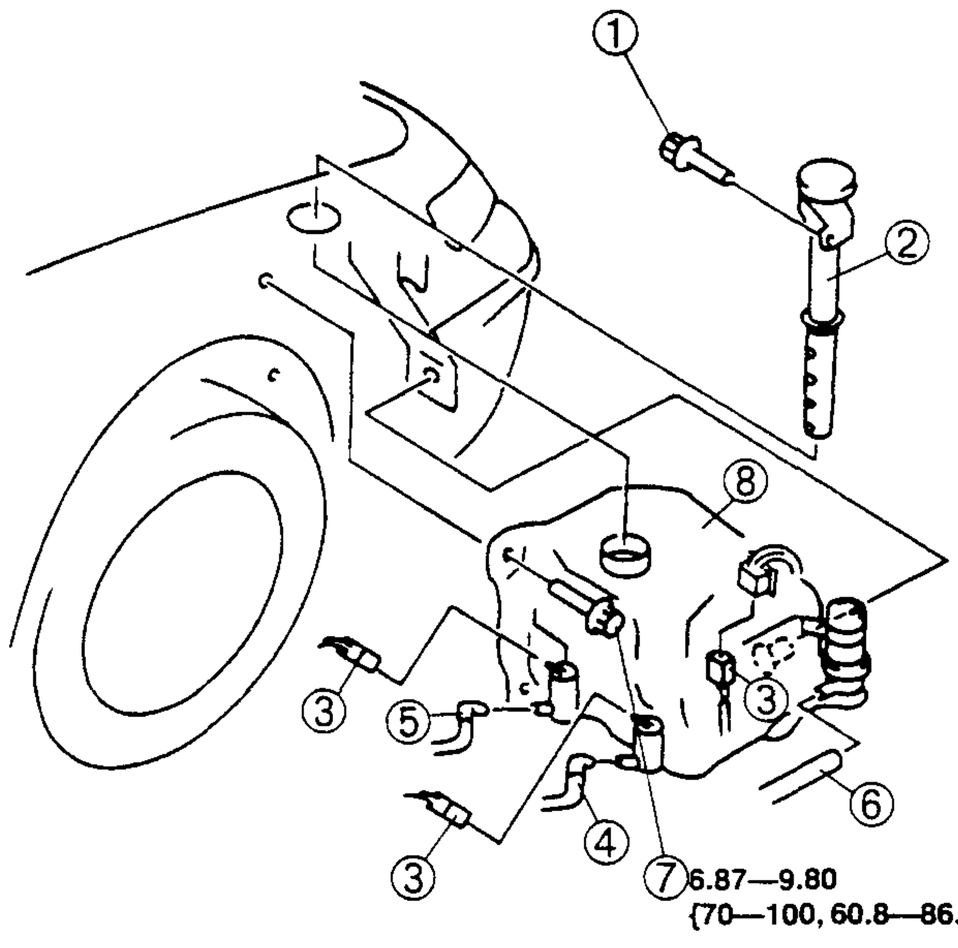


N·m { kgf·cm , in·lbf }

1	Bolt
2	Windshield wiper link

WASHER TANK REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the deflector.
3. Partially peel off the right side mud guard.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.

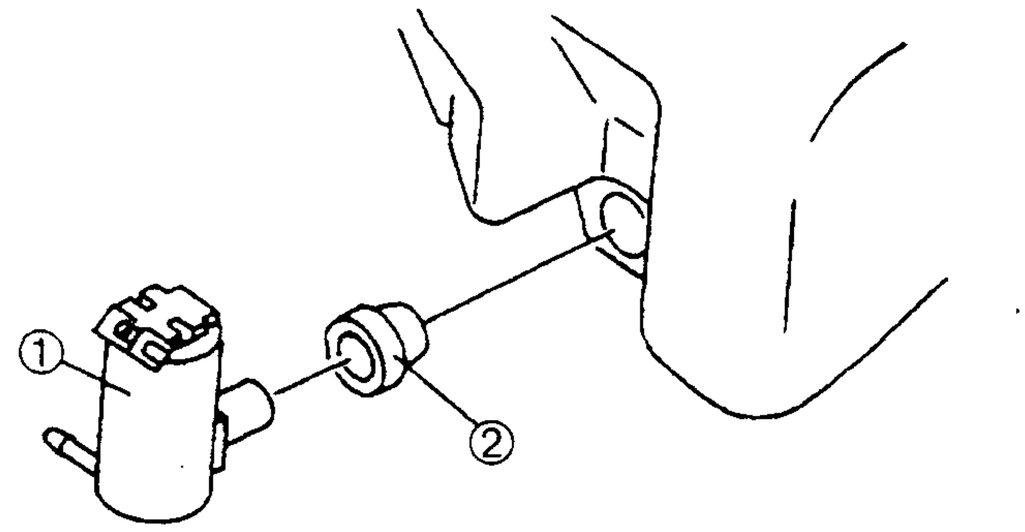


N·m { kgf·cm , in·lbf }

1	Bolt
2	Funnel
3	Connector
4	Windshield washer pipe
5	Rear washer pipe
6	Headlight cleaner pipe
7	Bolt
8	Washer tank

WINDSHIELD WASHER MOTOR REMOVAL/INSTALLATION

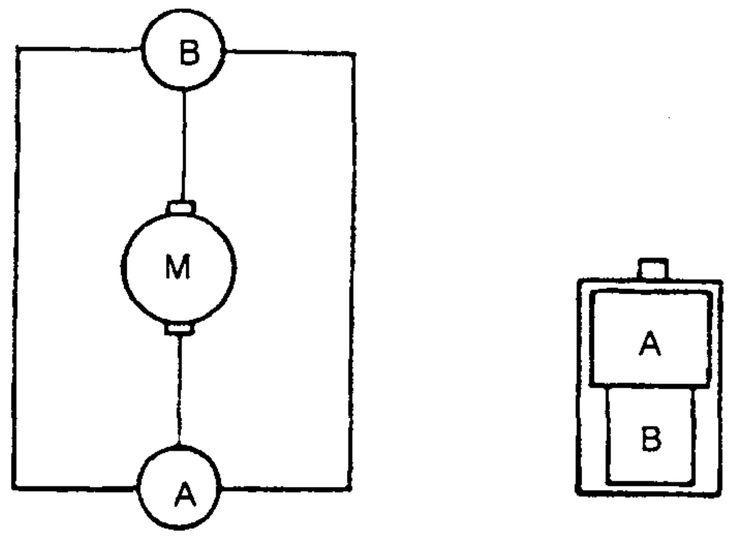
1. Disconnect the negative battery cable.
2. Remove the deflector.
3. Partially peel off the right side mud guard.
4. Remove the washer tank.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.



1	Windshield washer motor
2	Grommet

WINDSHIELD WASHER MOTOR INSPECTION

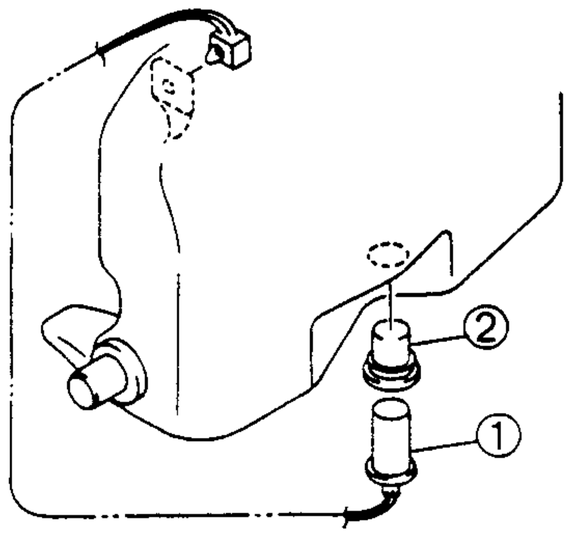
1. Remove the deflector.
2. Partially peel off the right side mud guard.
3. Remove the washer tank.
4. Connect battery positive voltage to the terminal B and ground to the terminal A of the motor.
5. Verify that the windshield washer motor operates.



6. If the motor does not operate, replace the windshield washer motor.

WASHER FLUID-LEVEL SENSOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the deflector.
3. Partially peel off the right side mud guard.
4. Remove the washer tank.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.



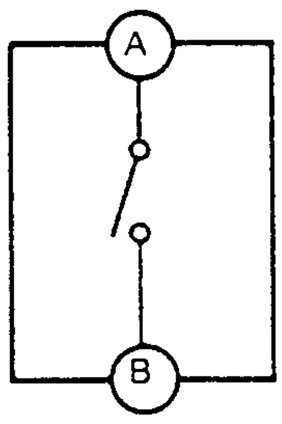
1	Washer fluid-level sensor
2	Grommet

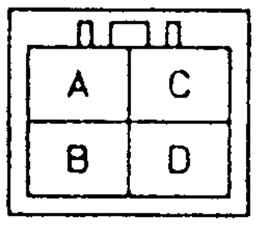
WASHER FLUID-LEVEL SENSOR INSPECTION

1. Remove the deflector.
2. Partially peel off the right side mud guard.
3. Remove the washer tank.
4. Check for continuity between the washer fluid-level sensor terminals by using an ohmmeter.

○—○ : Continuity

Fluid level	Terminal	
	A	B
Above Low		
Below Low	○	○

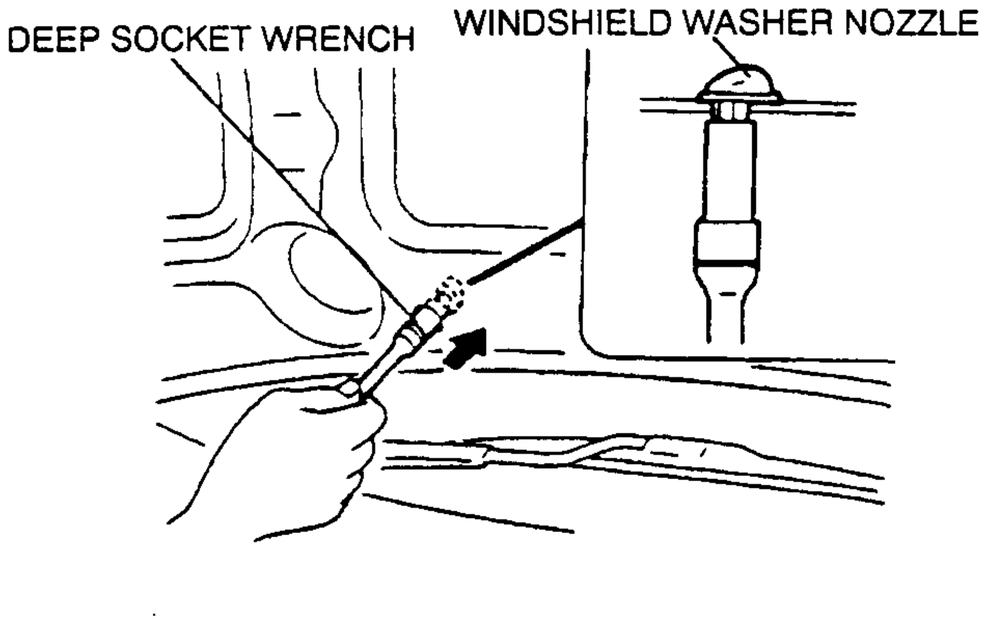




5. If not as specified, replace the washer fluid-level sensor.

WINDSHIELD WASHER NOZZLE REMOVAL

1. Remove the bonnet insulator.
2. Disconnect the windshield washer pipe to windshield washer nozzle.
3. Remove the windshield washer nozzle by using a **10 mm { 0.4 in }** deep socket wrench from underneath the bonnet.

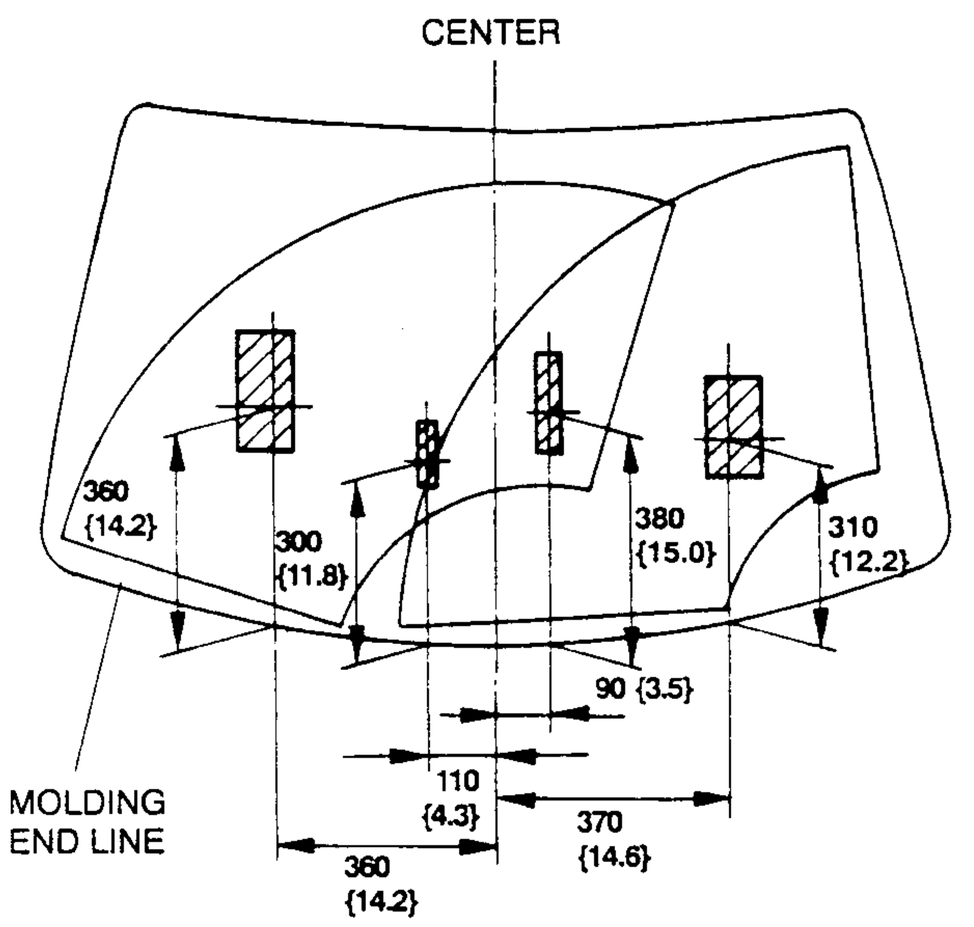


WINDSHIELD WASHER NOZZLE INSTALLATION

1. Connect the windshield washer pipe to windshield washer nozzle.
2. Push the windshield washer nozzle into the installation hole.
3. Adjust the windshield washer nozzle.
4. Install the bonnet insulator.

WINDSHIELD WASHER NOZZLE ADJUSTMENT

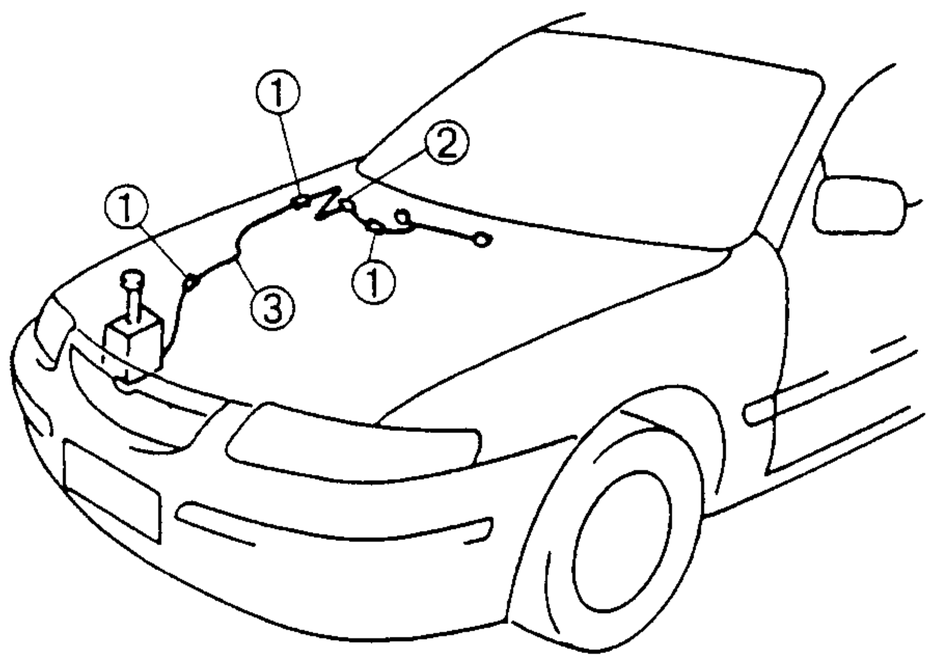
- Insert a needle or equivalent tool into the spray hole of the windshield washer nozzle and adjust the nozzle direction as shown.



mm { in }

WINDSHIELD WASHER PIPE REMOVAL/ INSTALLATION

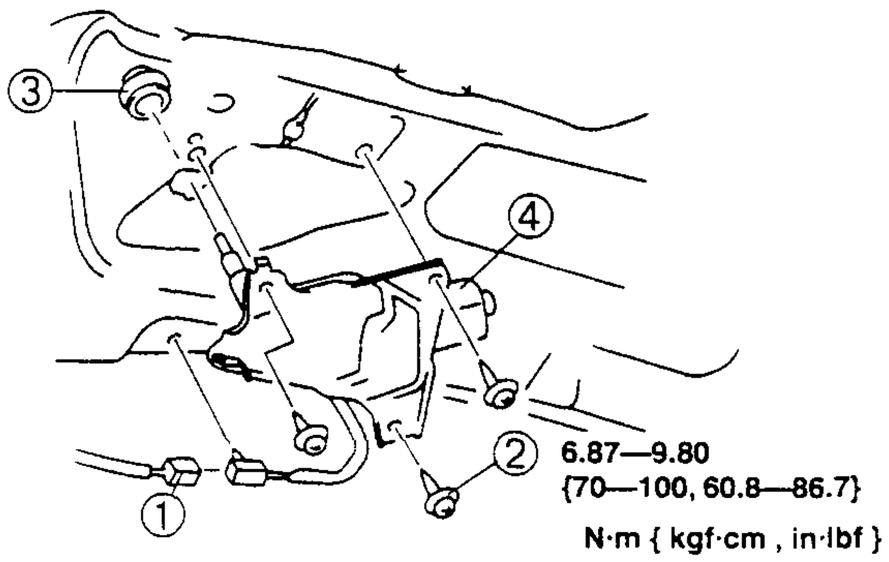
1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



1	Clip
2	Joint pipe
3	Windshield washer pipe

REAR WIPER MOTOR REMOVAL/INSTALLATION

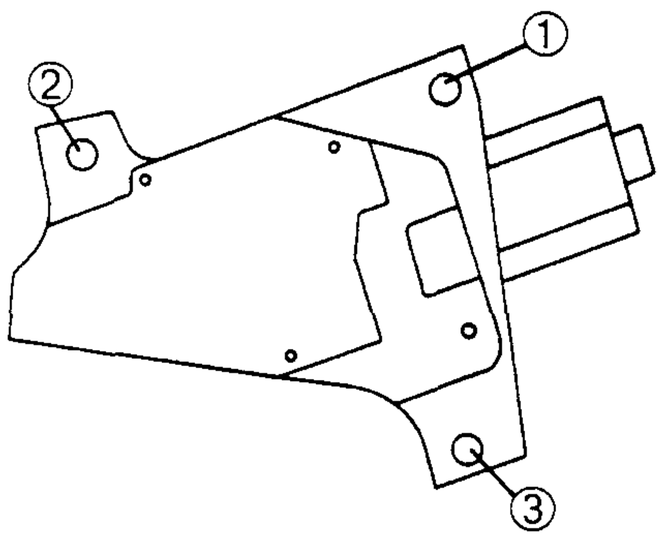
1. Disconnect the negative battery cable.
2. Remove the rear wiper arm and blade. (Refer to REAR WIPER ARM AND BLADE REMOVAL/ INSTALLATION, Rear Wiper Arm Installation Note.)
3. Remove the liftgate lower trim.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Adjust the rear wiper arm and blade. (Refer to REAR WIPER ARM AND BLADE ADJUSTMENT.)



1	Connector
2	Screw ☞ Installation Note
3	Outer bush
4	Rear wiper motor

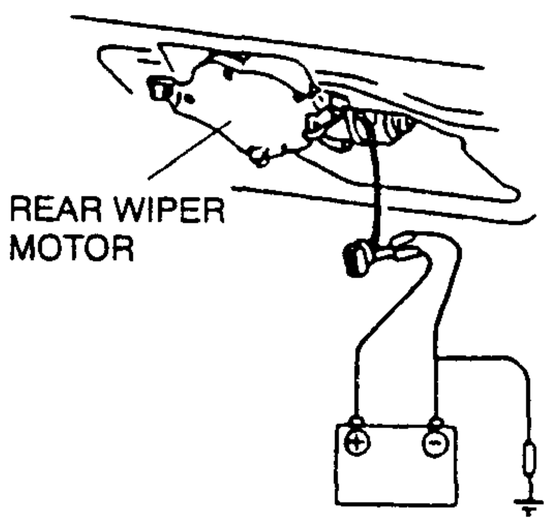
Screw Installation Note

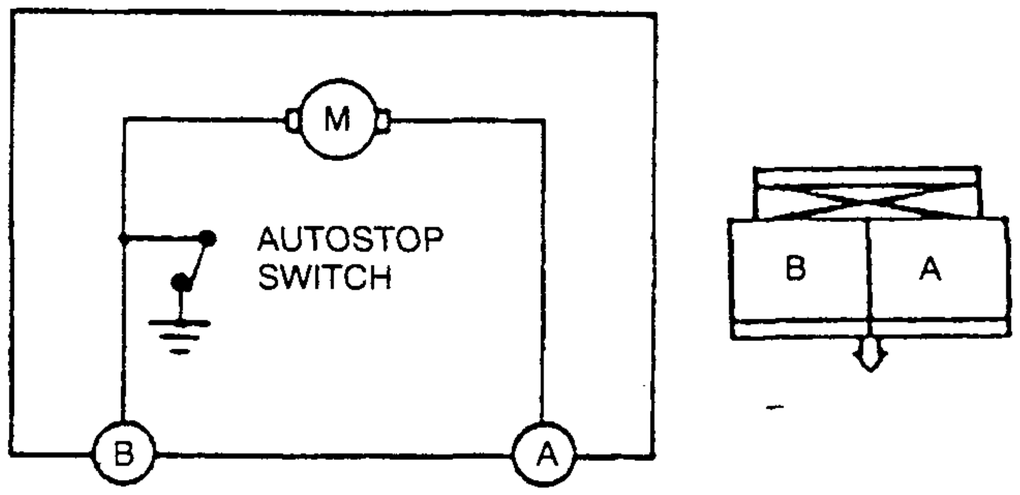
- Tighten the screws in the order shown in the figure.



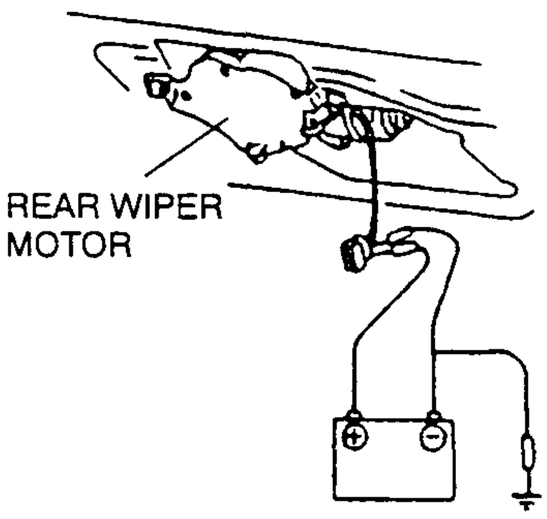
REAR WIPER MOTOR INSPECTION

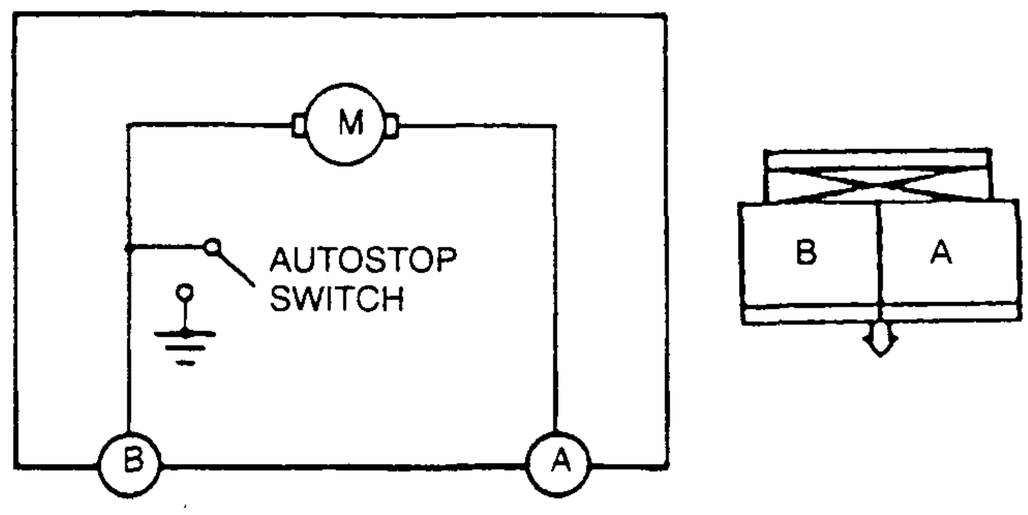
1. Remove the liftgate lower trim.
2. Disconnect the rear wiper motor connector.
3. Connect battery positive voltage to the terminal A of the rear wiper motor and the ground to a bare metal part of the vehicle and the terminal B of the rear wiper motor.
4. Verify that the rear wiper motor operates.





5. Disconnect the ground to the terminal B while the rear wiper is operating.
6. Verify that the rear wiper stops in the park position.

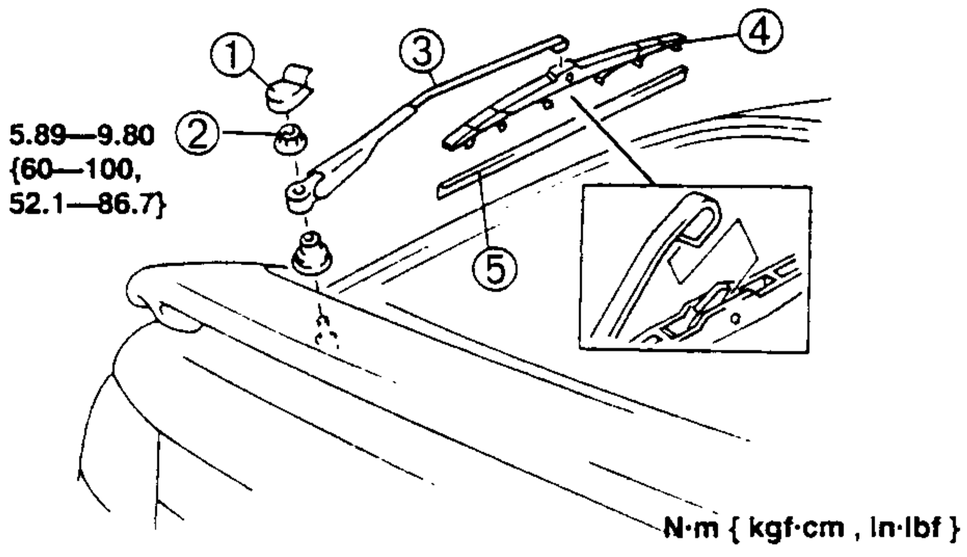




7. If not as specified, replace the rear wiper motor.

REAR WIPER ARM AND BLADE REMOVAL/ INSTALLATION

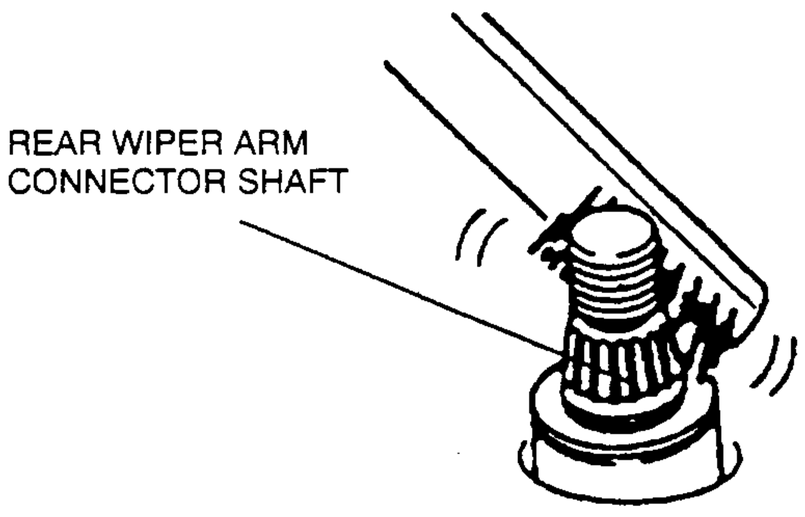
1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.
3. Adjust the rear wiper arm and blade. (Refer to REAR WIPER ARM AND BLADE ADJUSTMENT.)



1	Cover
2	Nut
3	Rear wiper arm ☞ Installation Note
4	Rear wiper blade
5	Rubber brush

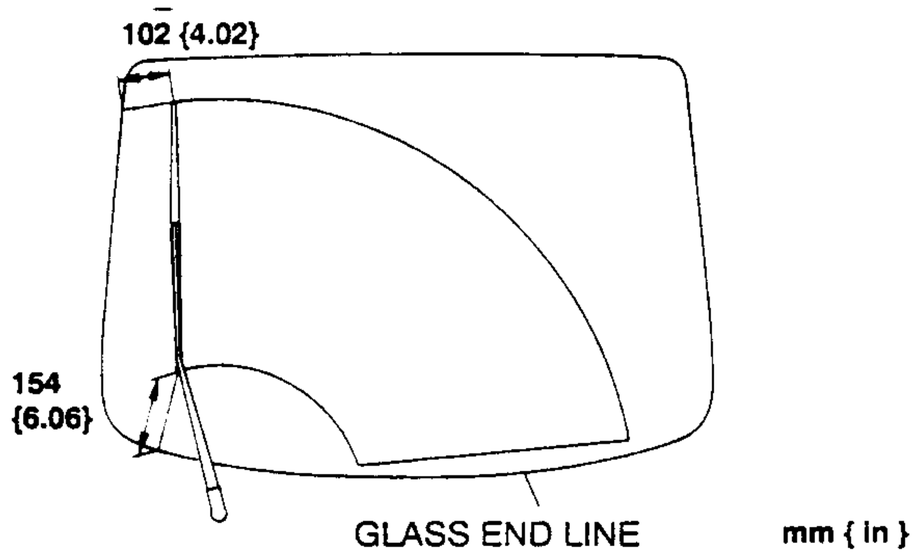
Rear Wiper Arm Installation Note

- Clean the rear wiper arm connector shaft by using a wire brush before installing the rear wiper arm.



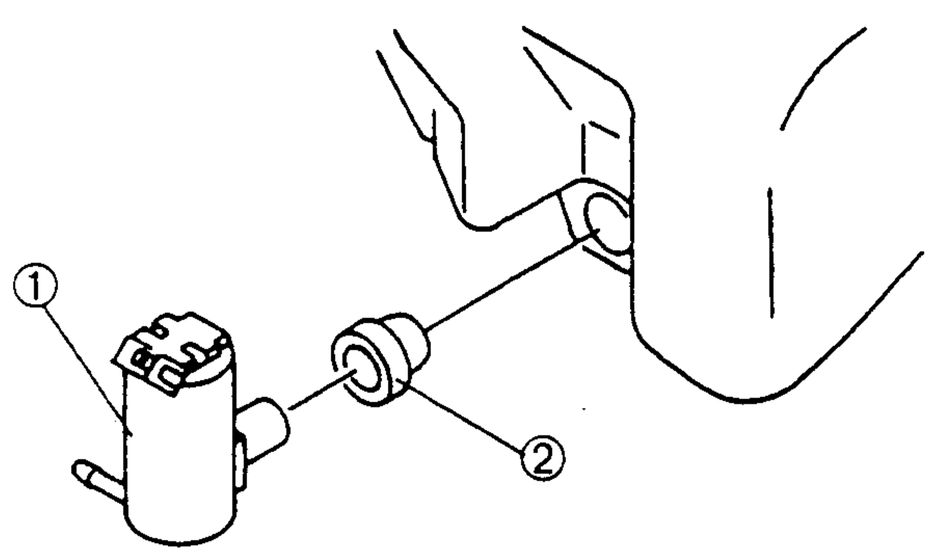
REAR WIPER ARM AND BLADE ADJUSTMENT

1. Operate the rear wiper motor to set the wiper in the park position.
2. Set the rear wiper arm height as shown.



REAR WASHER MOTOR REMOVAL/ INSTALLATION

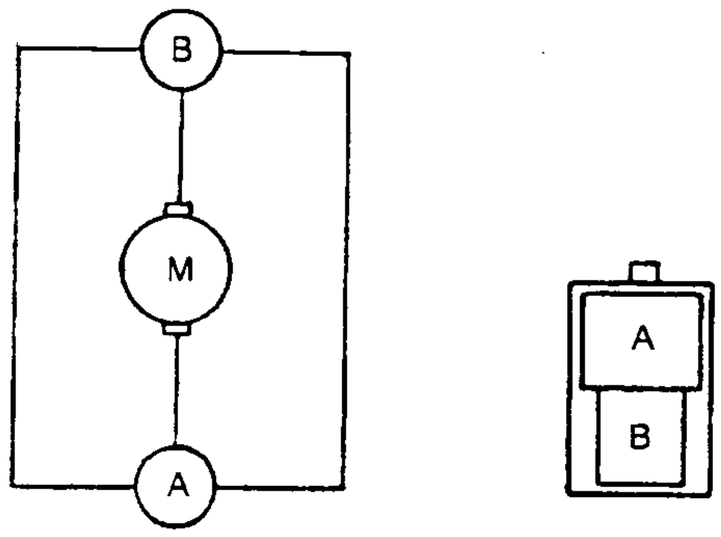
1. Disconnect the negative battery cable.
2. Remove the deflector.
3. Partially peel off the right side mud guard.
4. Remove the washer tank.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.



1	Rear washer motor
2	Grommet

REAR WASHER MOTOR INSPECTION

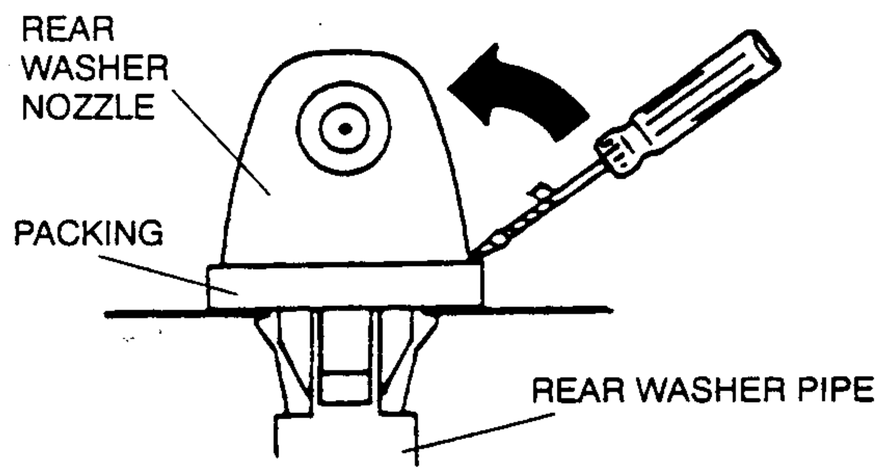
1. Remove the deflector.
2. Partially peel off the right side mud guard.
3. Remove the washer tank.
4. Connect battery positive voltage to the terminal B and ground to the terminal A of the motor.
5. Verify that the rear washer motor operates.



6. If the motor does not operate, replace the rear washer motor.

REAR WASHER NOZZLE REMOVAL

1. Insert a tape-wrapped, flathead screwdriver between the nozzle and packing.
2. Remove the packing.



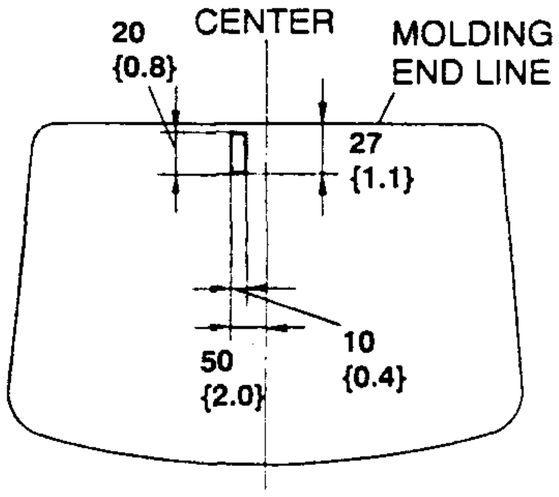
3. Pull the rear washer nozzle to disengage clip from the body.
4. Remove the rear washer pipe from the rear washer nozzle.

REAR WASHER NOZZLE INSTALLATION

1. Connect the rear washer pipe to the rear washer nozzle.
2. Push the rear washer nozzle into the installation hole.
3. Adjust the rear washer nozzle. (Refer to REAR WASHER NOZZLE ADJUSTMENT.)

REAR WASHER NOZZLE ADJUSTMENT

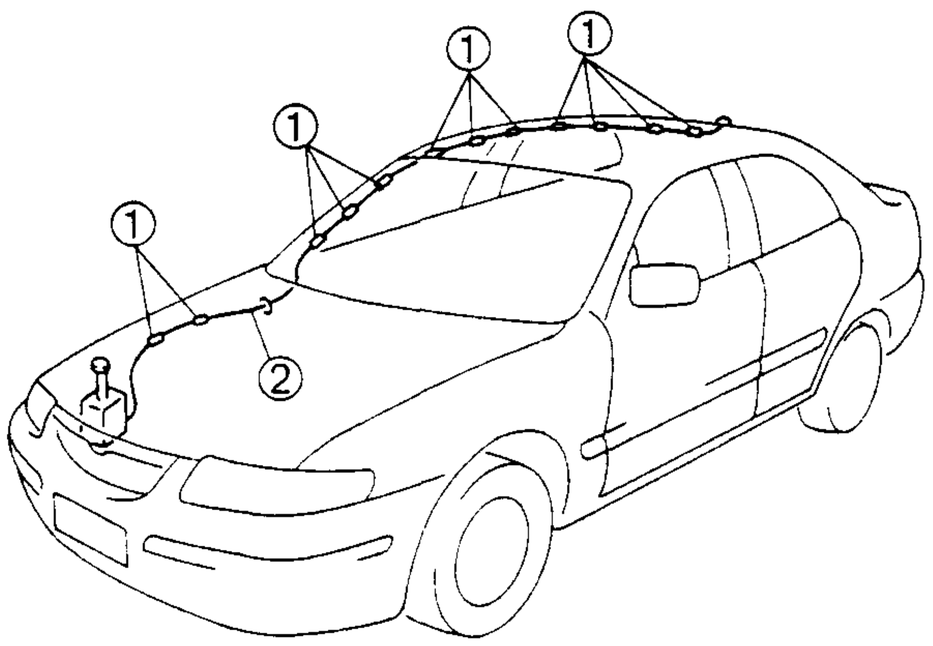
- Insert a needle or equivalent tool into the spray hole of the rear washer nozzle and adjust the nozzle direction as shown.



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REAR WASHER PIPE REMOVAL/INSTALLATION

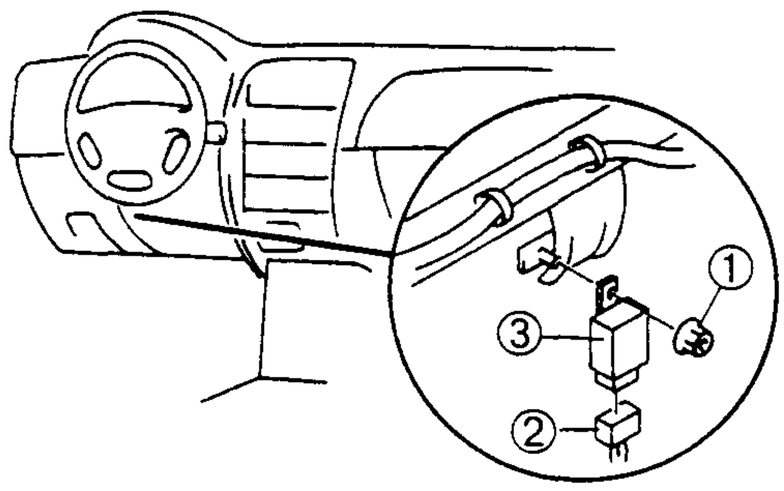
1. Remove the headliner. (Refer to section S, HEADLINER, HEADLINER REMOVAL/ INSTALLATION.)
2. Remove the deflector.
3. Partially peel off the right side mud guard.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.



1	Clip
2	Rear washer pipe

INTERMITTENT REAR WIPER RELAY REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



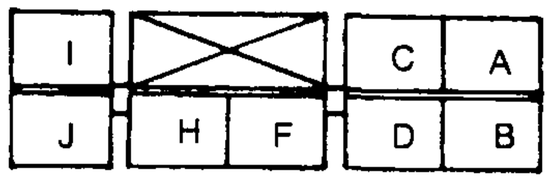
1	Nut
2	Connector
3	Intermittent rear wiper relay

INTERMITTENT REAR WIPER RELAY INSPECTION

1. Measure the voltage at the intermittent rear wiper relay terminals as indicated below.
2. Disconnect the intermittent rear wiper relay connector before checking for continuity at the terminal H.
3. If not as specified, inspect the parts listed under "Inspection area" and the related wiring harnesses.
4. If the parts and wiring harnesses are okay but the system still does not work properly, replace the intermittent rear wiper relay.

Terminal Voltage List (Reference)

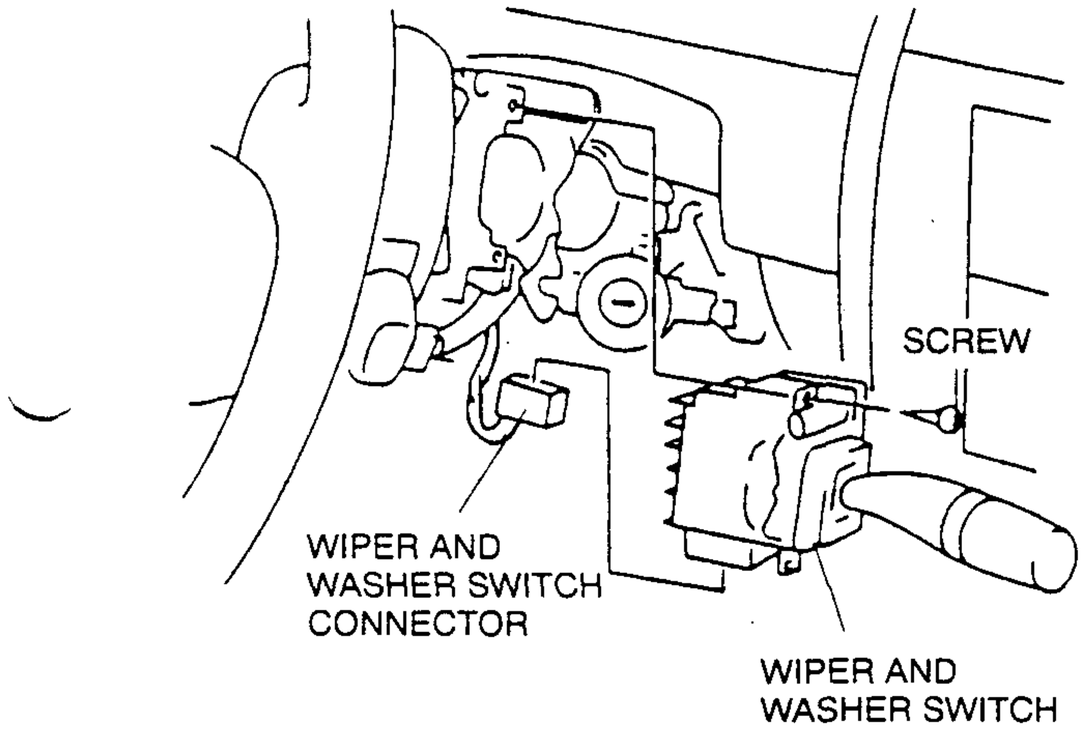
B+: Battery positive voltage



Terminal	Signal	Connection	Test condition		Voltage (V)/ Continuity	Inspection area
A	—	Not used	—		—	—
B	IG2	R. WIPER 10 A fuse	Ignition switch at ON		B+	R. WIPER 10 A fuse
			Other		0	
C	—	Not used	—		—	—
D	—	Not used	—		—	—
F	Rear wiper and washer switch on	Rear wiper and washer switch	Ignition switch at ON	Rear wiper and washer switch at on	0	• R. WIPER 10 A fuse • Wiper and washer switch
				Rear wiper and washer switch at Off	B+	
H	GND	GND	*Constant: check for continuity to ground*		Yes	—
I	—	Not used	—		—	—
J	Autostop	Rear wiper motor	Rear wiper operate		Alternates 0 and B+	• R. WIPER 10 A fuse • Wiper and washer switch • Rear wiper motor
			Other		0	

WIPER AND WASHER SWITCH REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the column cover.
3. Disconnect the wiper and washer switch connector.
4. Remove the screws.
5. Remove the wiper and washer switch.



6. Install in the reverse order of removal.

WIPER AND WASHER SWITCH INSPECTION

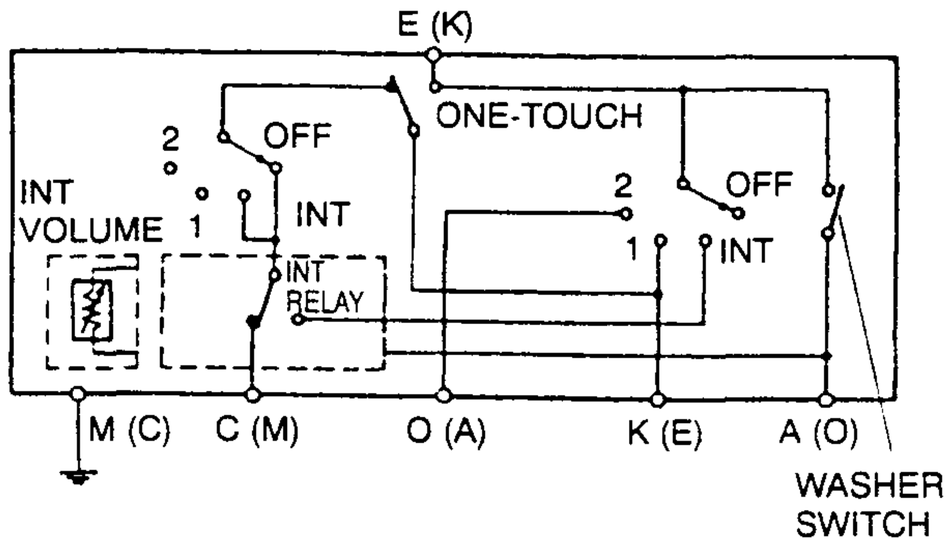
1. Remove the column cover.
2. Remove the wiper and washer switch.
3. Check for continuity between the wiper and washer switch terminals by using an ohmmeter.

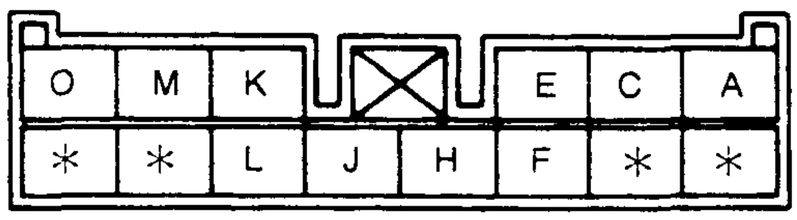
Windshield wiper and washer switch

○—○ : Continuity

Switch position		One-touch	Terminal A (O)	C (M)	E (K)	K (E)	O (A)
Wiper switch	OFF	OFF		○		○	
		ON			○	○	
	INT			○		○	
	1				○	○	
	2				○		○
Washer switch	ON		○		○		

( ): WIPER AND WASHER SWITCH LEFT SIDE





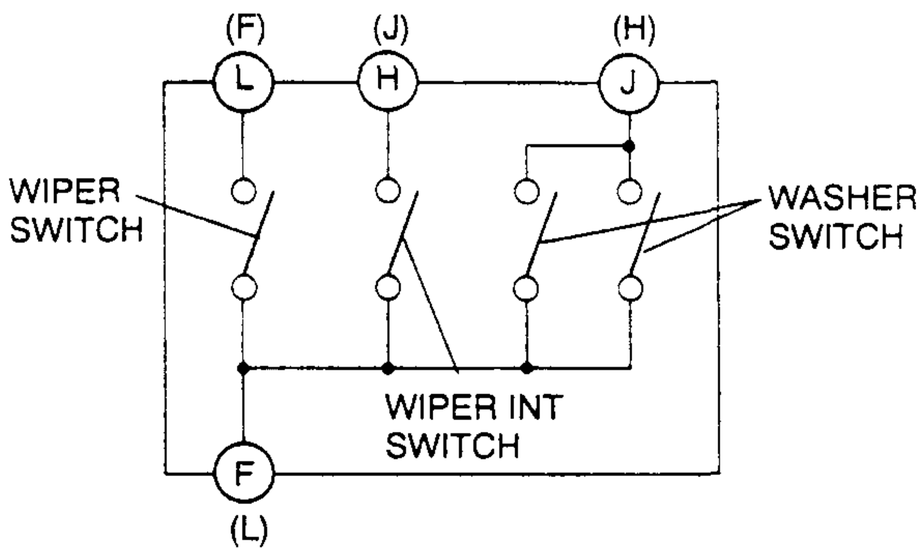
( ): WIPER AND WASHER SWITCH LEFT SIDE

Rear wiper and washer switch

○—○ : Continuity

Switch position	Terminal F (L)	J (H)	H (J)	L (F)
OFF				
Wiper	○			○
Washer	○	○		
Wiper and washer	○	○		○
Wiper INT	○		○	

( ): WIPER AND WASHER SWITCH LEFT SIDE

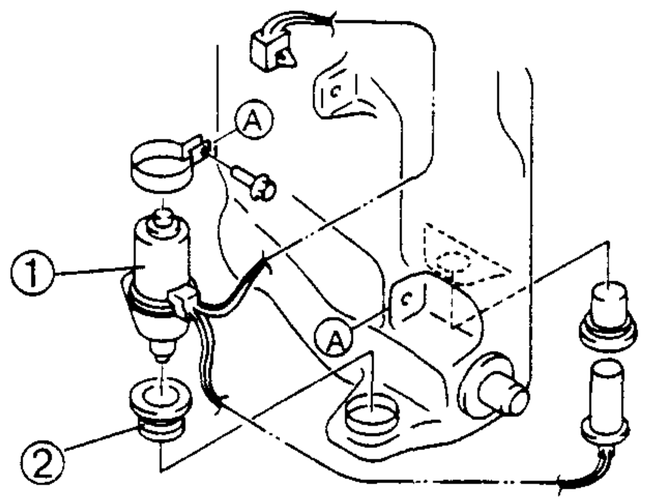


( ): WIPER AND WASHER SWITCH LEFT SIDE

4. If not as specified, replace the wiper and washer switch.

HEADLIGHT CLEANER MOTOR REMOVAL/ INSTALLATION

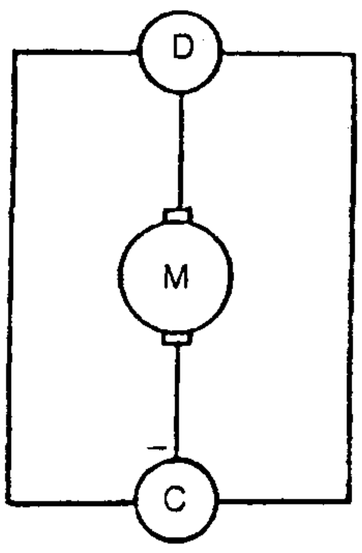
1. Disconnect the negative battery cable.
2. Remove the deflector.
3. Partially peel off the right side mud guard.
4. Remove the washer tank.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.

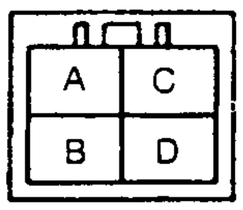


1	Headlight cleaner motor
2	Grommet

HEADLIGHT CLEANER MOTOR INSPECTION

1. Remove the deflector.
2. Partially peel off the right side mud guard.
3. Remove the washer tank.
4. Connect battery positive voltage to the terminal D and ground to the terminal C of the motor.
5. Verify that the headlight cleaner motor operates.





6. If the motor does not operate, replace the headlight cleaner motor.

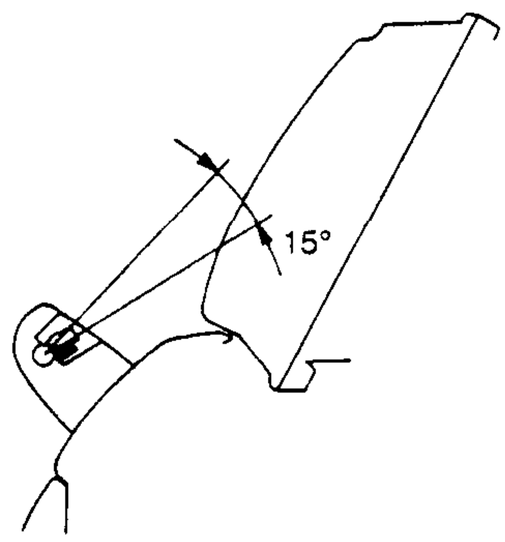
HEADLIGHT CLEANER NOZZLE REMOVAL/ INSTALLATION

1. Remove the front bumper.(Refer to section S, BUMPER, FRONT BUMPER REMOVAL/INSTALLATION.)
2. Disconnect the headlight cleaner pipe.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Adjust the headlight cleaner nozzle.

1	Screw
2	Spacer
3	Headlight cleaner nozzle

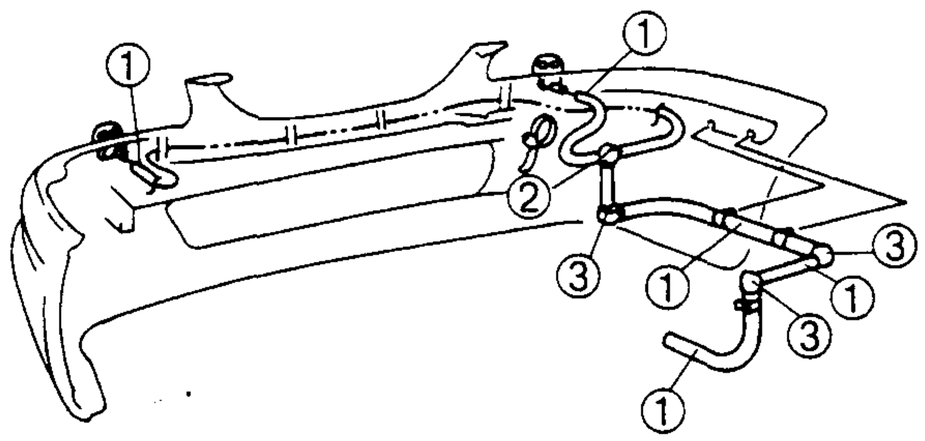
HEADLIGHT CLEANER NOZZLE ADJUSTMENT

- Adjust the headlight cleaner nozzle by using a flathead screwdriver so that the fluid properly sprays on the headlight.



HEADLIGHT CLEANER PIPE REMOVAL/ INSTALLATION

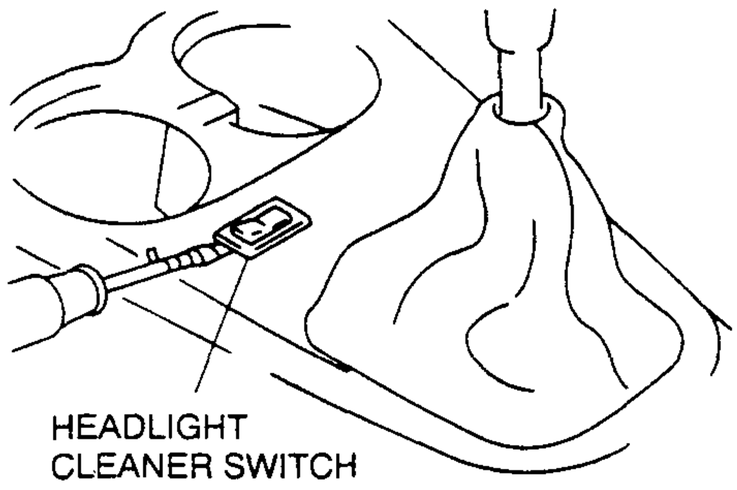
1. Remove the front bumper.(Refer to section S, BUMPER, FRONT BUMPER REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



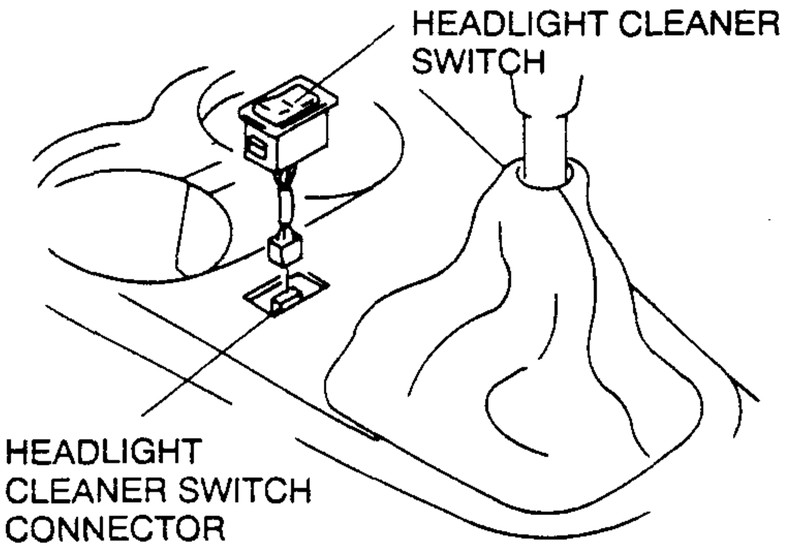
1	Headlight cleaner pipe
2	Check valve
3	Joint pipe

HEADLIGHT CLEANER SWITCH REMOVAL /INSTALLATION

1. Disconnect the negative battery cable.
2. Insert a tape-wrapped, flathead screwdriver between the headlight cleaner switch and console.



3. Disconnect the headlight cleaner switch connector and remove the headlight cleaner switch.



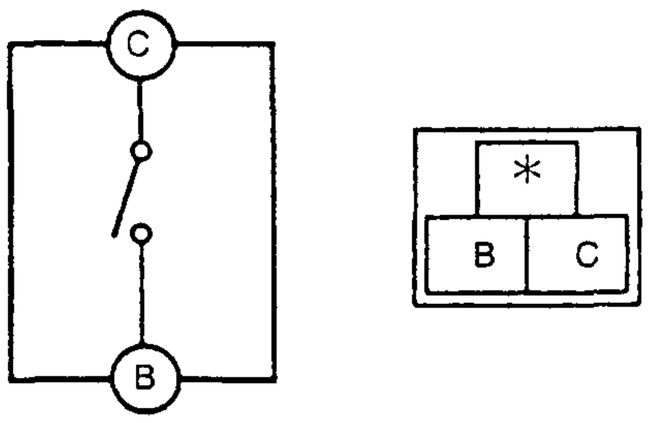
4. Install in the reverse order of removal.

HEADLIGHT CLEANER SWITCH INSPECTION

1. Remove the headlight cleaner switch.
2. Check for continuity between the headlight cleaner switch terminals by using an ohmmeter.

○—○ : Continuity

Switch position	Terminal	
	B	C
On	○——	——○
Off		

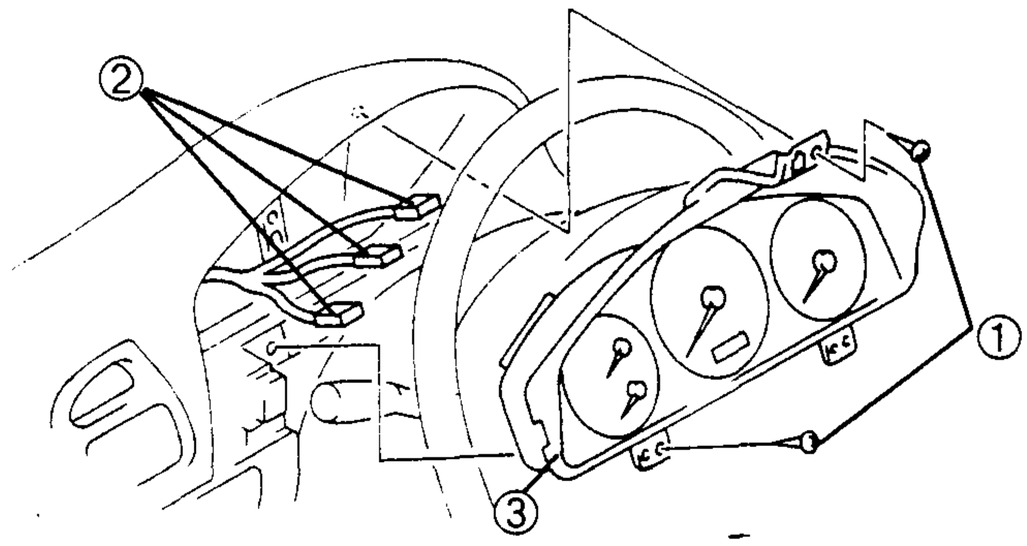


3. If not as specified, replace the headlight cleaner switch.

WARNING AND INDICATOR SYSTEM

INSTRUMENT CLUSTER REMOVAL/ INSTALLATION

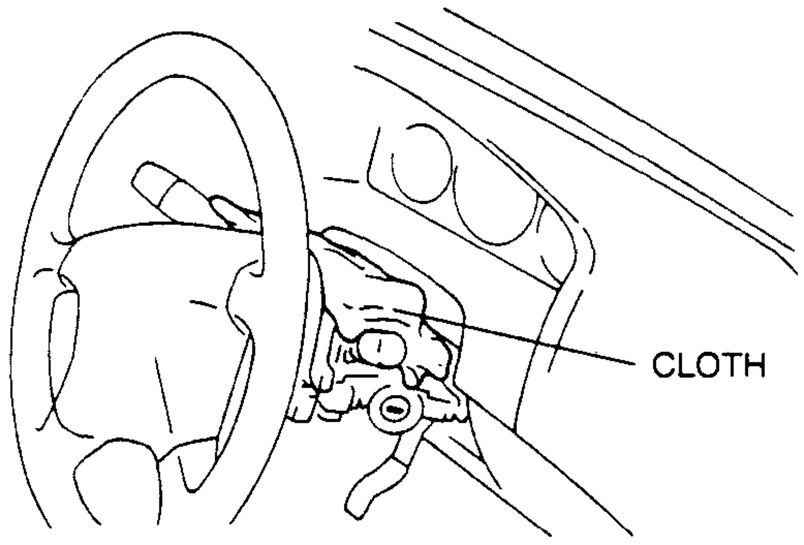
1. Disconnect the negative battery cable.
2. Remove the column cover.
3. Remove the meter hood.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.



1	Screw
2	Connector
3	Instrument cluster ☞ Removal Note

Instrument Cluster Removal Note

- When removing the instrument cluster, in order to prevent damage to the lens, cover the steering shaft with a cloth.

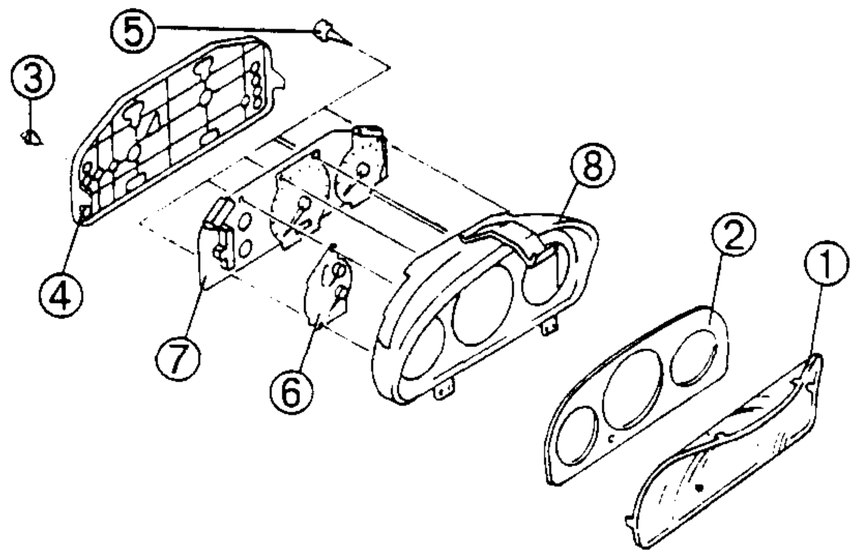


INSTRUMENT CLUSTER DISASSEMBLY/ ASSEMBLY

Caution

- **If the speedometer and tachometer is dropped or the print plate is damaged, the system will not operate properly and it may become the cause of trouble or malfunctions.**

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



1	Lens
2	Plate
3	Bulb
4	Cover
5	Screw
6	Fuel and water temperature gauges
7	Speedometer and tachometer
8	Case

INSTRUMENT CLUSTER INSPECTION

Speedometer

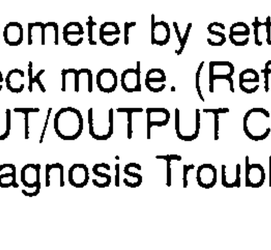
- Inspect the speedometer by setting it in the input/output check mode. (Refer to INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE, Inspection of Diagnosis Trouble Code, DTC 12.)

Tachometer

- Inspect the tachometer by setting it in the input/output check mode. (Refer to INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE, Inspection of Diagnosis Trouble Code, DTC 13.)

Fuel Gauge

1. Remove the rear seat cushion.
2. Turn over the front floor covering.
3. Disconnect the fuel pump connector.
4. Turn the ignition switch to ON and wait for more than **10 minutes** until the needle stops moving.
5. Verify that the needle indicates E.
6. Ground terminal D of the fuel gauge sender unit connector and wait for more than **10 minutes** until the needle stops moving.



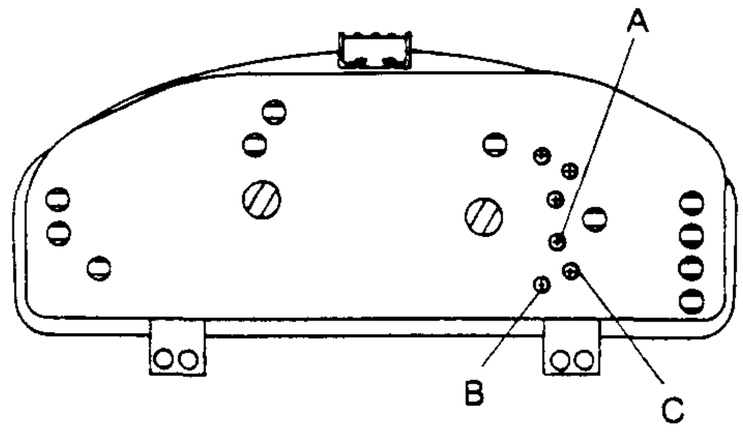
7. Verify that the needle indicates F.
8. If the needle of the fuel gauge does not move or if it moves irregularly, remove the instrument cluster. (Refer to INSTRUMENT CLUSTER REMOVAL/INSTALLATION.)

9. Measure the resistance between the fuel gauge terminals by using an ohmmeter.

○WW○ : Resistance

Step	Terminal			
	A	B	C	
1	○—WW—○			R_1
2		○—WW—○		R_2
3	○—	—WW—	—○	R_3

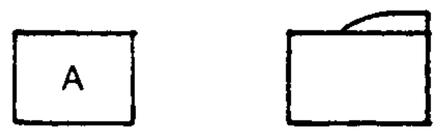
R_1: 24—31 Ω R_2: 81—100 Ω R_3: 90—110 Ω



10. If not as specified, replace the fuel and water temperature gauges. (Refer to INSTRUMENT CLUSTER DISASSEMBLY/ASSEMBLY.)

Water Temperature Gauge

1. Disconnect the water temperature sender unit connector.
2. Verify that the needle indicates C when the ignition switch is turned to ON.
3. Verify that the needle indicates H when terminal A on the water temperature sender unit connector is grounded.

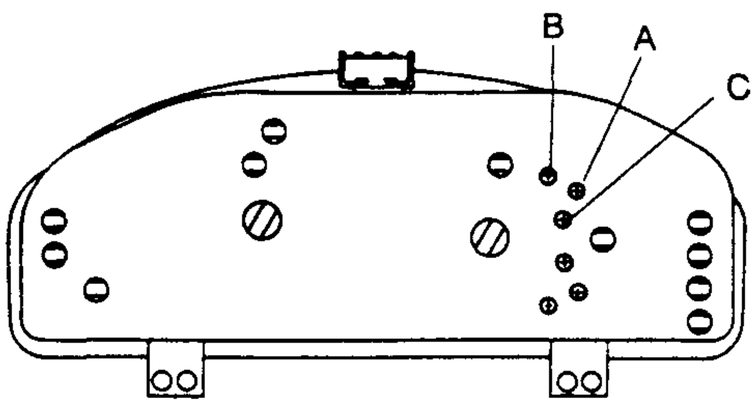


4. If the needle of the water temperature gauge does not move or if it moves irregularly, remove the instrument cluster. (Refer to INSTRUMENT CLUSTER REMOVAL/INSTALLATION.)
5. Measure the resistance between the water temperature gauge terminals by using an ohmmeter.

○WW○ : Resistance

Step	Terminal			
	A	B	C	
1	○—WW—○			R_1
2		○—WW—○		R_2
3	○—	—WW—	—○	R_3

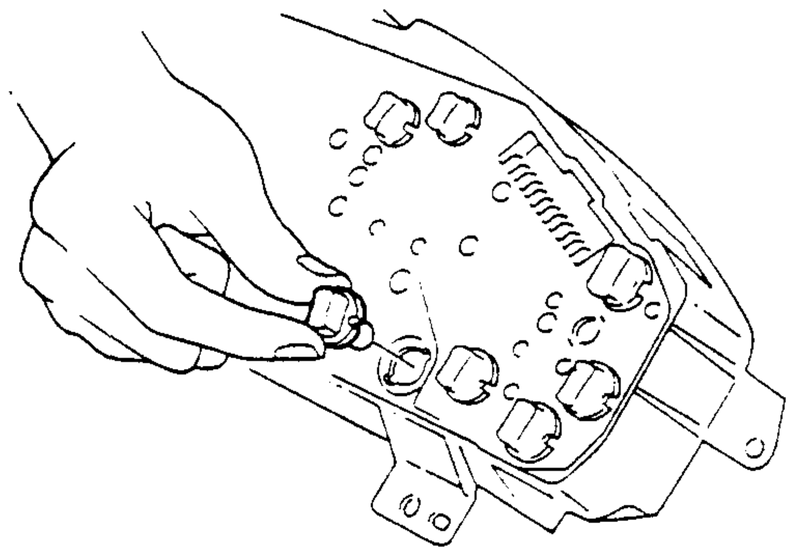
R_1: 46—57 Ω R_2: 142—177 Ω R_3: 96—120 Ω



6. If not as specified, replace the fuel and water temperature gauges. (Refer to INSTRUMENT CLUSTER DISASSEMBLY/ASSEMBLY.)

WARNING AND INDICATOR LIGHT BULB REPLACEMENT

1. Disconnect the negative battery cable.
2. Remove the meter hood.
3. Remove the instrument cluster. (Refer to INSTRUMENT CLUSTER REMOVAL/INSTALLATION.)
4. Turn the socket counterclockwise to remove the bulb as shown in the figure.

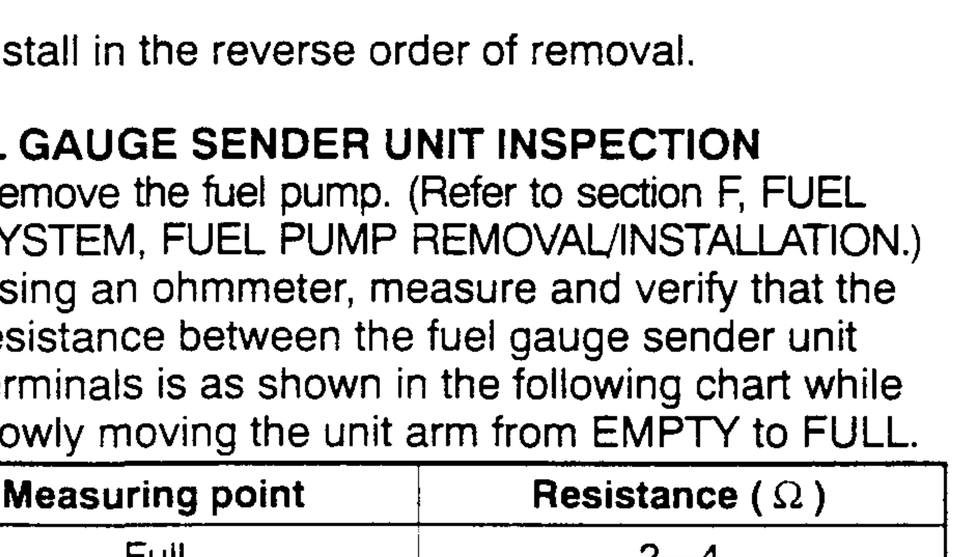


5. Install in the reverse order of removal.

FUEL GAUGE SENDER UNIT INSPECTION

1. Remove the fuel pump. (Refer to section F, FUEL SYSTEM, FUEL PUMP REMOVAL/INSTALLATION.)
2. Using an ohmmeter, measure and verify that the resistance between the fuel gauge sender unit terminals is as shown in the following chart while slowly moving the unit arm from EMPTY to FULL.

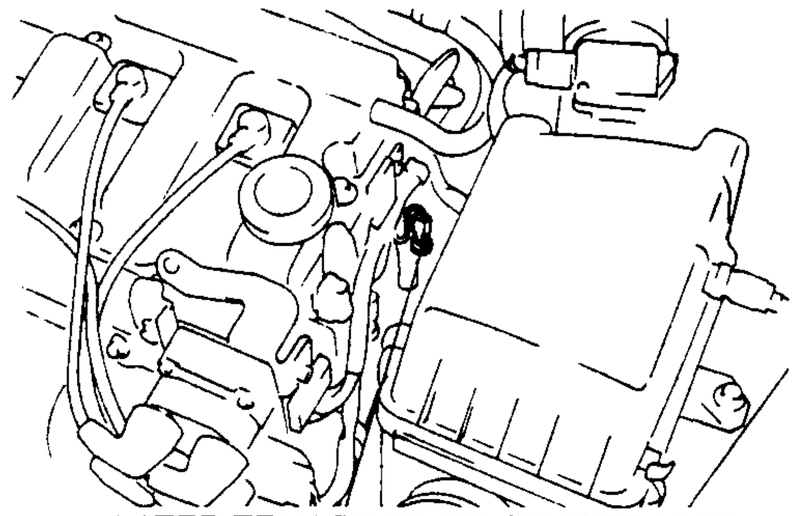
Measuring point	Resistance (Ω)
Full	2—4
1/2	31.5—33.5
Empty	109—111



3. If not as specified, replace the fuel gauge sender unit.

WATER TEMPERATURE SENDER UNIT REMOVAL

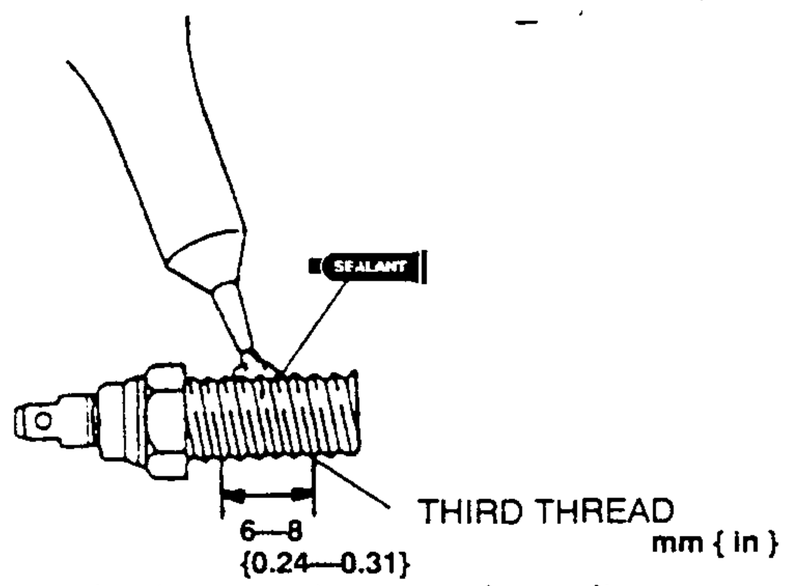
1. Disconnect the negative battery cable.
2. Disconnect the water temperature sender unit connector.
3. Remove the water temperature sender unit.



WATER TEMPERATURE SENDER UNIT

WATER TEMPERATURE SENDER UNIT INSTALLATION

1. Apply sealant from the third thread to the top thread.



2. Install the water temperature sender unit.

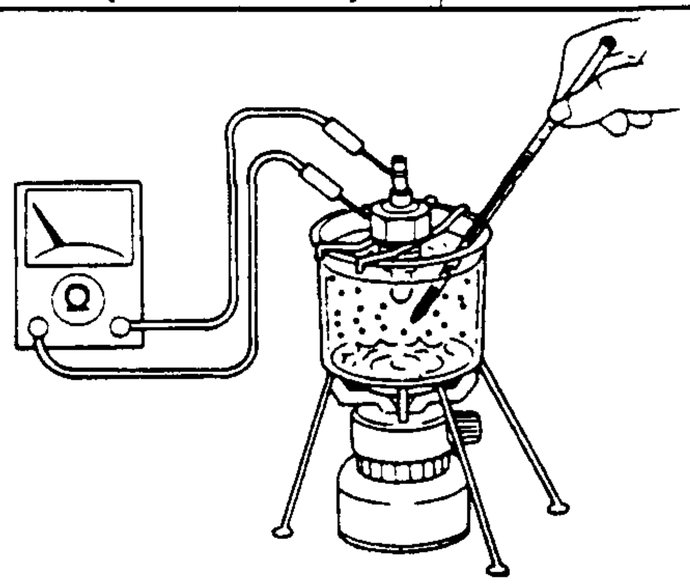
Tightening torque
11.8—17.6 N·m {120—180 kgf·cm , 105—156 in·lbf }

3. Connect the water temperature sender unit connector.
4. Connect the negative battery cable.

WATER TEMPERATURE SENDER UNIT INSPECTION

1. Remove the water temperature sender unit.
2. Place the sender unit in a container of water.
3. Heat the water gradually.
4. Using an ohmmeter, measure and verify that the resistance between terminal of the sender unit and the sender unit body is as shown below.

Water temperature (°C { °F })	Resistance (Ω)
49.8—50.2 {121.7—122.3}	189.4—259.6



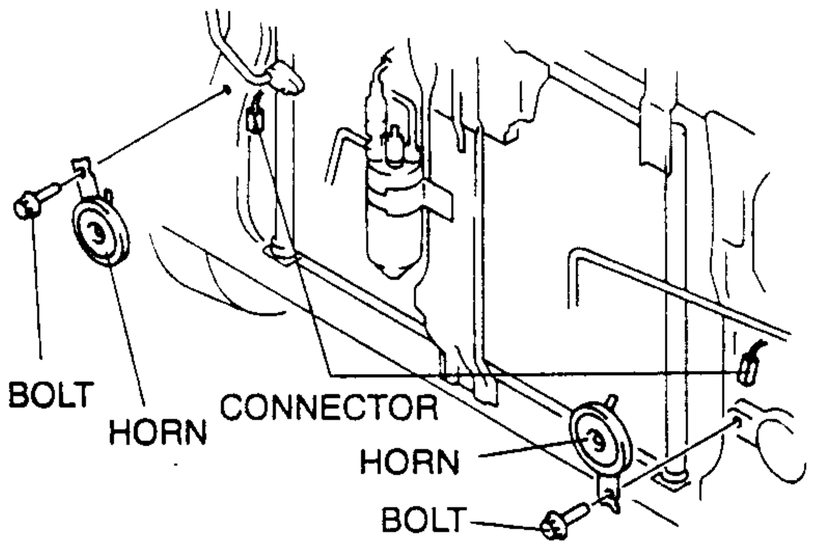
5. If not as specified, replace the water temperature sender unit.

OIL PRESSURE SWITCH INSPECTION

1. Verify that the oil pressure warning light illuminates when the ignition switch is turned to ON.
2. Verify that the oil pressure warning light goes off when the engine is started.
3. If the oil pressure warning light does not illuminate or remains illuminated, inspect the oil pressure warning light bulb and related wiring harness.
4. If the oil pressure warning light bulb and related wiring harness are normal, inspect the oil pressure. (Refer to section D, OIL PRESSURE INSPECTION.)
5. If the oil pressure is normal, replace the oil pressure switch.

HORN REMOVAL/INSTALLATION

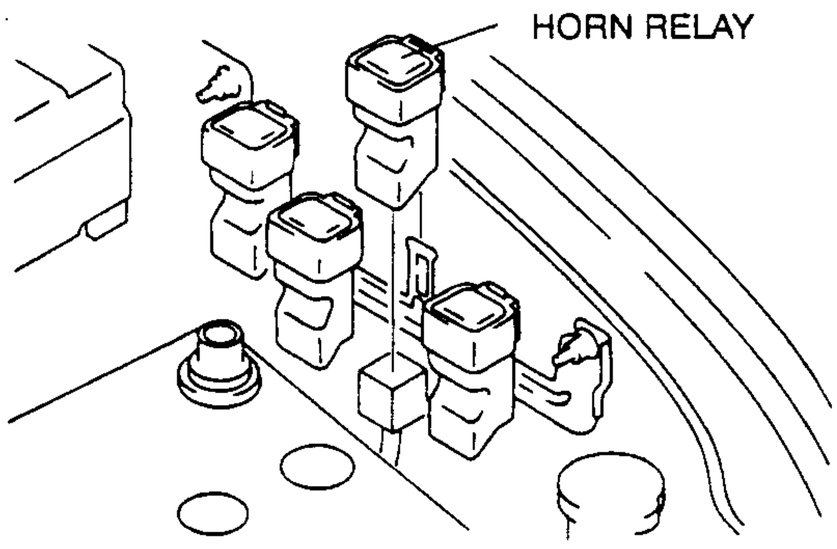
1. Disconnect the negative battery cable.
2. Remove the radiator grille. (Refer to section S, EXTERIOR ATTACHMENT, RADIATOR GRILLE REMOVAL/INSTALLATION.)
3. Disconnect the horn connector.
4. Remove the bolt.
5. Remove the horn.



6. Install in the reverse order of removal.

HORN RELAY REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Pull up and remove the horn relay



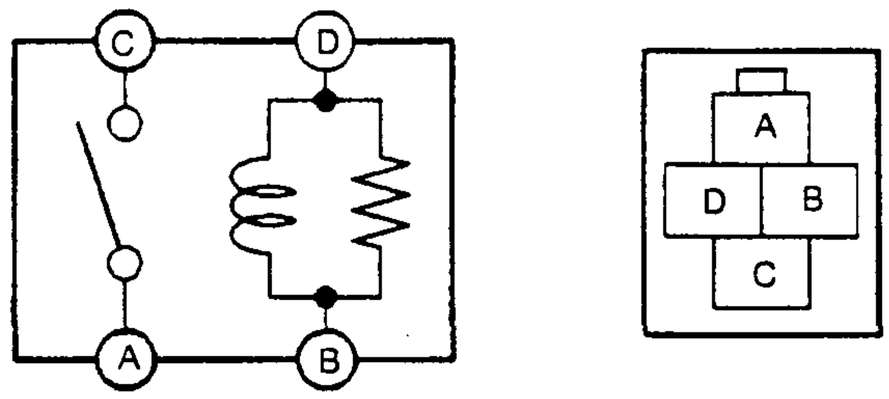
3. Install in the reverse order of removal.

HORN RELAY INSPECTION

1. Remove the horn relay.
2. Check for continuity between the horn relay terminals by using an ohmmeter.

○—○ : Continuity B+: Battery positive voltage

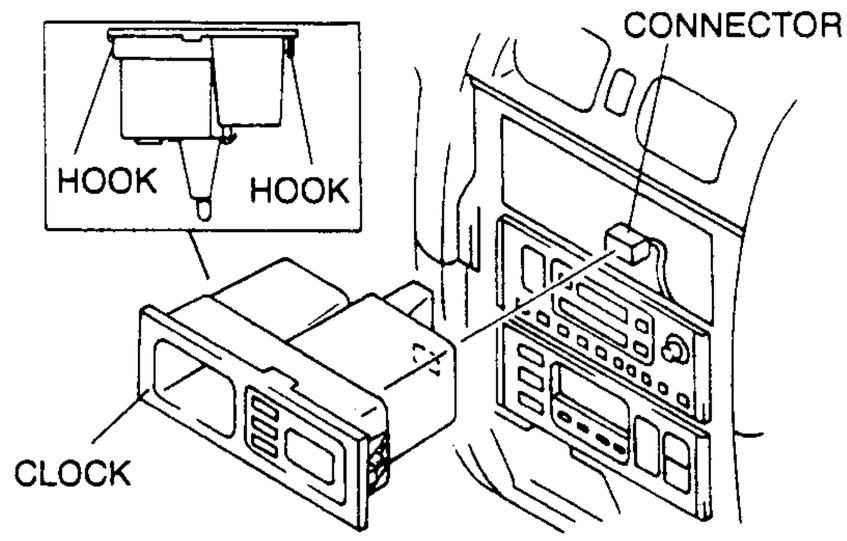
Step	Terminal			
	B	D	A	C
1	○—○			
2	B+	GND	○—○	



3. If not as specified, replace the horn relay.

CLOCK REMOVAL/INSTALLATION

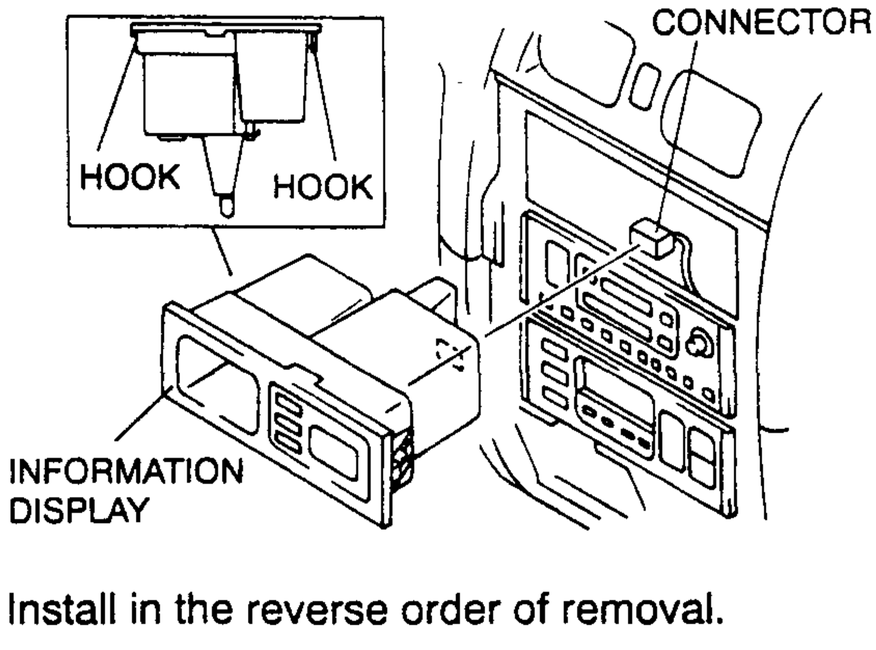
1. Disconnect the negative battery cable.
2. Remove the center panel.
3. Remove the glove compartment.
4. Press the hooks of the clock and pull the clock to remove it.
5. Disconnect the connector.



6. Install in the reverse order of removal.

INFORMATION DISPLAY REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the center panel.
3. Remove the glove compartment.
4. Press the hooks of the information display and pull the information display to remove it.
5. Disconnect the connector.



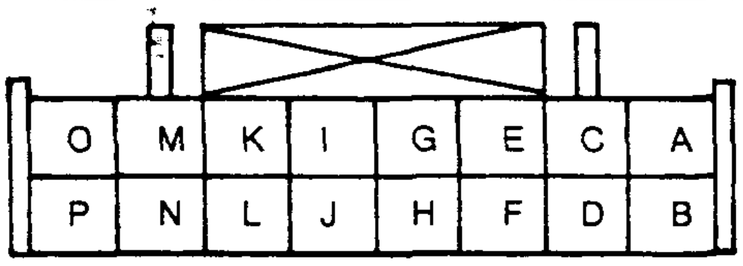
6. Install in the reverse order of removal.

INFORMATION DISPLAY INSPECTION

1. With the connector still connected, remove the information display. (Refer to INFORMATION DISPLAY REMOVAL/INSTALLATION.)
2. Measure the voltage at the information display terminals as indicated below.
3. Disconnect the information display connector before checking for continuity at terminals E and F.
4. If not as specified, inspect the parts listed under "Inspection area" and the related wiring harnesses.
5. If the parts and wiring harnesses are okay but the system still does not work properly, replace the information display.

Terminal Voltage List (Reference)

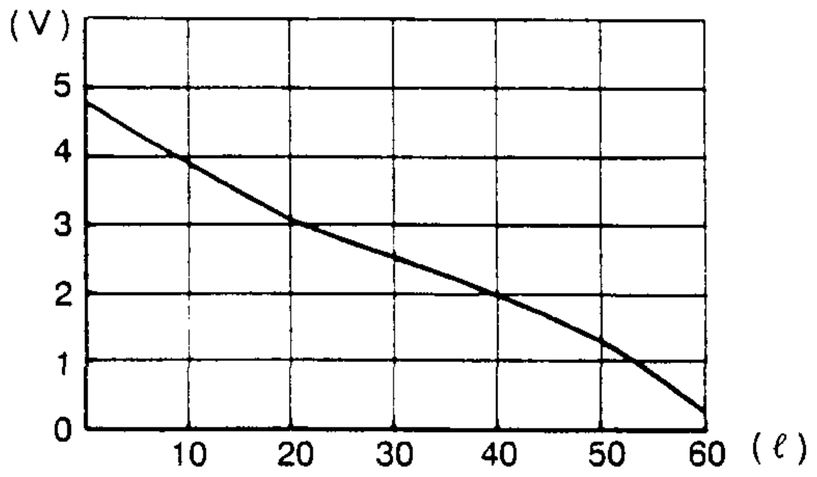
B+: Battery positive voltage



Terminal	Signal	Connection	Test condition	Voltage (V)/ Continuity	Inspection area
A	+B	ROOM 15 A fuse	Constant	B+	ROOM 15 A fuse
B	ACC	RADIO 15 A fuse	Ignition switch at ACC	B+	• RADIO 15 A fuse • Ignition switch
			Ignition switch at LOCK	0	
C	IG1	METER 10 A fuse	Ignition switch at ON	B+	• METER 10 A fuse • Ignition switch
			Ignition switch at LOCK or ACC	0	
D	Illumination (+)	Headlight switch	Headlight switch at TNS	B+	• TAIL 10 A fuse • Headlight switch
			Headlight switch at OFF	0	
E	Information display ground	GND	Constant: check for continuity to ground	Yes	GND
F	Fuel (–)	Fuel gauge sender unit	☞ F terminal inspection	—	Fuel gauge sender unit
G	Ambient temperature (–)	Ambient temperature sensor	☞ G terminal inspection	—	Ambient temperature sensor
H	Ambient temperature (+)	Ambient temperature sensor	Ignition switch at ACC	B+	Ambient temperature sensor
			Ignition switch at LOCK	0	
I	Fuel (+)	Fuel gauge sender unit	Ignition switch at ON	B+	Fuel gauge sender unit
			Ignition switch at LOCK or ACC	0	
J	—	Not used	—	—	—
K	Injection	ECM (PCM)	Ignition switch at ON	B+	ECM (PCM)
			Ignition switch at LOCK or ACC	0	
L	Vehicle speed	Instrument cluster	☞ L terminal inspection	—	Instrument cluster
M	—	Not used	—	—	—
N	—	Not used	—	—	—
O	Illumination (–)	Panel light control switch	☞ O terminal inspection	—	Panel light control switch
P	—	Not used	—	—	—

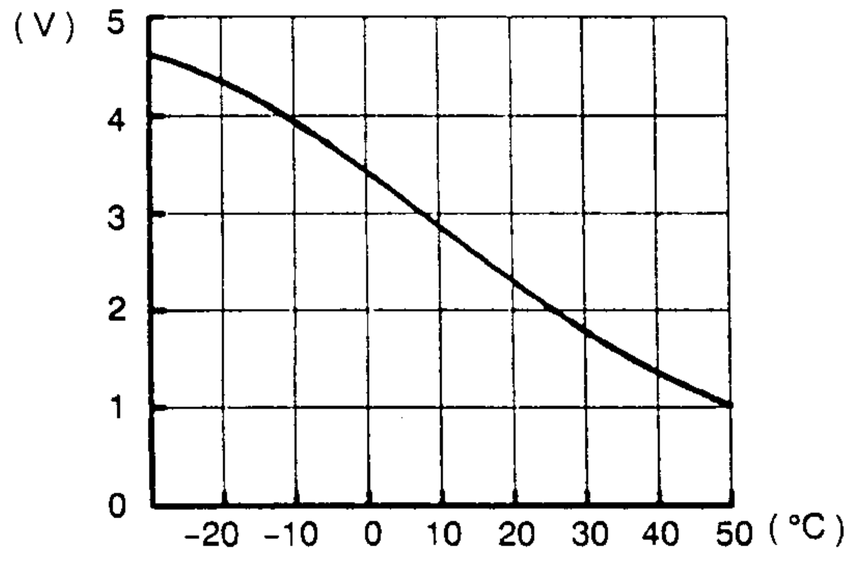
F terminal inspection

1. Ignition switch at ON.
2. Measure the fuel remaining.
3. Measure the voltage of the F terminal on the information display by using an ohmmeter.
4. Verify that the voltage is as shown in the graph.



G terminal inspection

1. Ignition switch at ACC.
2. Measure the temperature around the ambient temperature sensor.
3. Measure the voltage of the G terminal on the information display by using an ohmmeter.
4. Verify that the voltage is as shown in the graph.



L terminal inspection

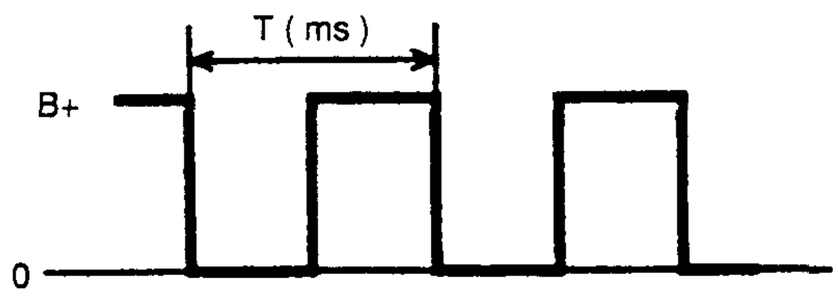
1. At a constant speed, rotate the drive wheels by using a chassis roller.
2. Measure the wave pattern of L terminal on the information display.
3. Apply the speed of the vehicle to the following calculation in order to calculate the cycle (T) and verify that the cycle (T) does not vary largely from the cycle on the screen of oscilloscope.

Calculation

$$T\,(ms) = \frac{1413}{V\,(km/h)}$$

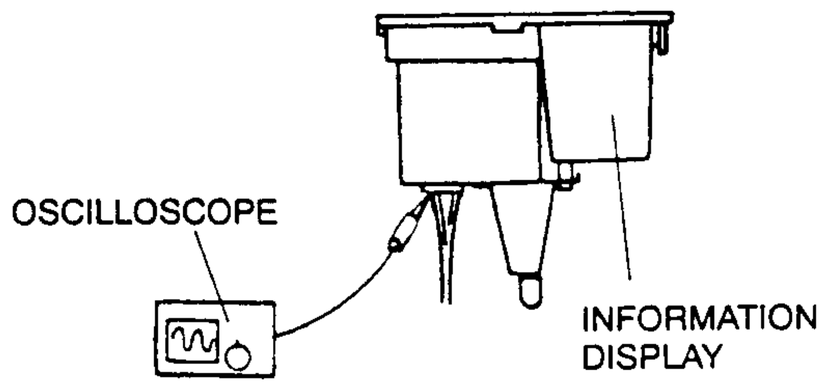
T: 1 cycle
V: speed

4. Verify that the wave pattern is continuous and output voltage is constant.

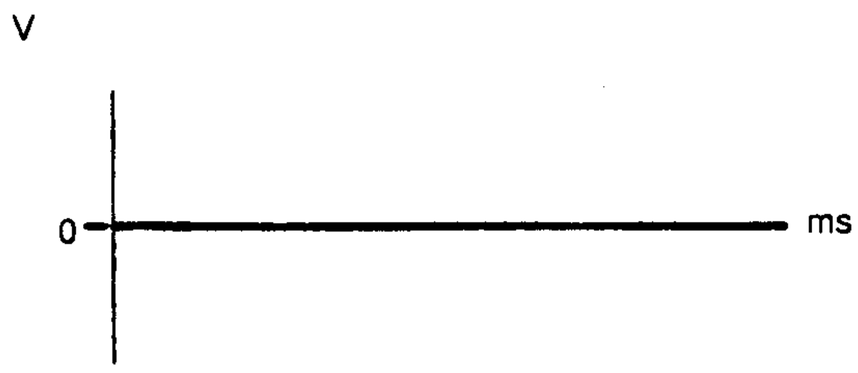


O terminal inspection

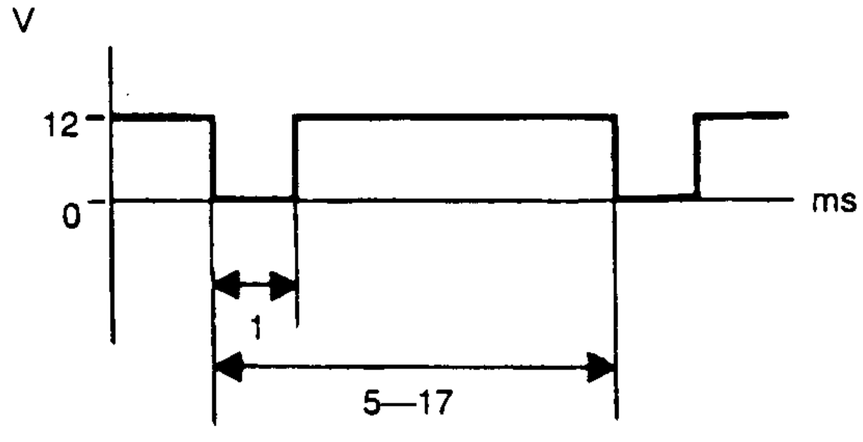
1. Measurer the wave pattern of the O terminal on the information display by using an oscilloscope.



2. Set the headlight switch to either the first or second position.
3. Set the panel light control switch to the brightest position.
4. Verify that the pattern on the screen is as shown in the figure.



5. Verify that the pattern on the screen matches the pattern shown in the figure as the panel light control switch is gradually turned to the darkest position.



INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE

Note

- In this mode, it is possible to check the item in the following chart.

Diagnostic Trouble Code Chart

DTC	Checking item	Related item
04	Door switch	• Ignition key illumination • Interior light control • Theft-deterrent system • Power door lock system • Lights-on reminder warning buzzer
05	Door lock-link switch	• Interior light control • Power door lock system • Theft-deterrent system
07	Rear window defroster switch (full-auto A /C type heater control unit: heater control unit)	Rear window defroster timer function
08	TNS relay	• Lights-on reminder warning buzzer • Each illumination
09	Headlight switch (headlight position)	• Headlight • Rear fog light control system
10	Vehicle speed signal	Speedometer
11	Engine speed signal	Tachometer
12	Speedometer	Speedometer
13	Tachometer	Tachometer
14	Buzzer	Lights-on reminder warning buzzer
15	Rear fog light indicator light	Rear fog light indicator light
16	Fuel-level warning light	Fuel-level warning light
17	Rear window defroster indicator light	Rear window defroster indicator light
18	Ignition key illumination	Ignition key illumination
20	Rear window defroster relay	Rear window defroster timer function
21	Door lock timer unit	• Theft-deterrent system • Power door lock system
26	LCD	LCD
27	Interior light	Interior light control
28	Circuit for interior light control on the speedometer and tachometer	Interior light control
29	Rear fog light relay	Rear fog light control system
31	Key reminder switch	• Interior light control • Keyless entry system • Theft-deterrent system
32	Circuit for interior light control on the speedometer and tachometer	Interior light control
40	Front fog light relay	Front fog light relay

Note

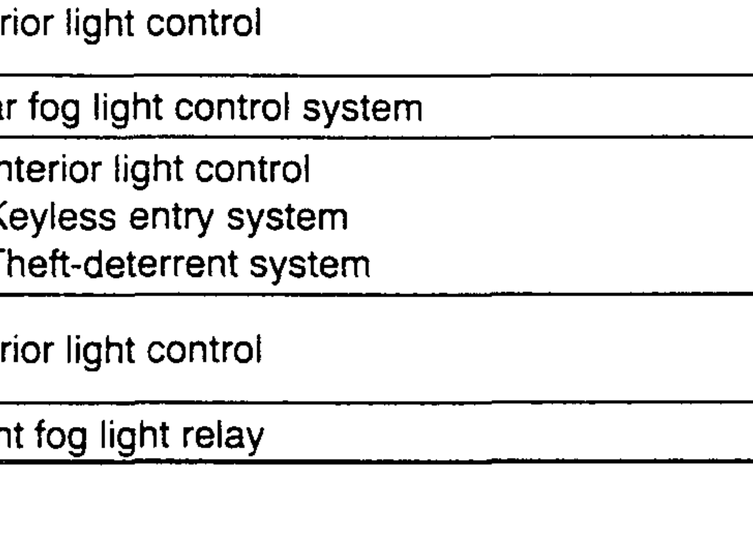
- Diagnostic trouble codes which are not listed may be indicated, but they cannot be inspected.

Operating Order

Note

- Connect the battery cable after **30 seconds** or more have passed after disconnecting the cable, then operate the input/output check mode again after terminating the input/output check mode.

1. Close the all doors.
2. Disconnect the negative battery cable
3. Open the driver's side door.
4. Connect the negative battery cable.
5. Turn the ignition switch to ON.
6. Push the door switch 3 times.
7. Push the odometer/tripmeter switch 3 times.



Checking Order

Note

- The diagnostic trouble codes are displayed in numerical order. (While performing the inspection, if you want to inspect a diagnostic trouble code of which the number is smaller that the code number you are currently inspecting, terminate the check mode then repeat the inspection from the beginning.)
- If rotate the wheels in the codes other than the DTC 10, cancel the input/output check mode.

Check code 00—29, 40

Note

- The diagnostic trouble codes can be fast forward by pushing and holding the odometer/tripmeter switch for **1 second or more**.

1. Push the odometer/tripmeter switch and select the diagnostic trouble code.
2. Inspect each diagnostic trouble code by following the related inspection procedures. (Refer to Inspection of Diagnostic Trouble Codes.)

Check code 30—39

1. Turn the ignition switch to ACC.
2. Push the odometer/tripmeter switch and select the diagnostic trouble code.
3. Inspect each diagnostic trouble code by following the related inspection procedures. (Refer to Inspection of Diagnostic Trouble Codes.)

Cancel order

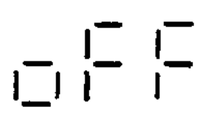
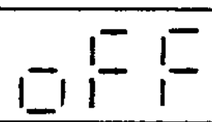
- Cancel the input/output check mode by turning the ignition switch to LOCK then back to ON.

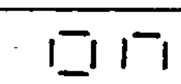
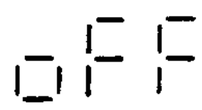
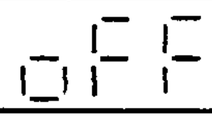
Note

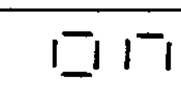
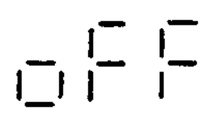
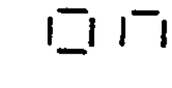
- Cancel the input/output check mode by leaving the instrument cluster in check mode for **approximately 45 minutes**.

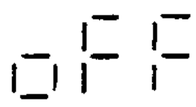
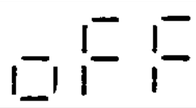
Inspection of Diagnostic Trouble Codes

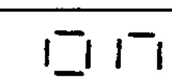
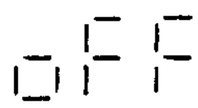
DTC 04	Door switch on/off signal		
STEP	**INSPECTION**	**INDICATION**	**ACTION**
1	Open the driver's side door. (Door switch on.)	01	Close the driver's side door, then go to next step.
		01 FF	• Check the door switch. • Check the wiring harness. (Instrument cluster — door switch)
2	Open the passenger's side door. (Door switch on.)	01	Close the passenger's side door, then go to next step.
		01 FF	• Check the door switch. • Check the wiring harness. (Instrument cluster — door switch)
3	Open rear door on the driver's side. (Door switch on.)	01	Close rear door on the driver's side, then go to next step.
		01 FF	• Check the door switch. • Check the wiring harness. (Instrument cluster — door switch)
4	Open rear door on the passenger's side. (Door switch on.)	01	Close rear door on the passenger's side, then go to next step.
		01 FF	• Check the door switch. • Check the wiring harness. (Instrument cluster — door switch)
5	Close all doors. (Door switch off.)	01	• Check the door switch. • Check the wiring harness. (Instrument cluster — door switch)
		01 FF	Input signal to instrument cluster is okay.

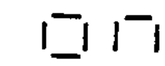
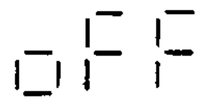
DTC 05	Door lock-link switch on/off signal		
STEP	**INSPECTION**	**INDICATION**	**ACTION**
1	Turn the driver's side door lock knob to lock position.(door lock-link switch to lock position.		Go to next step.
			• Check the door lock-link switch. • Check the wiring harness. (Instrument cluster — door lock-link switch — GND)
2	Turn the driver's side door lock knob to unlock position.(door lock-link switch to unlock position.		• Check the door lock-link switch. • Check the wiring harness. (Instrument cluster — door lock-link switch — GND)
			Input signal to instrument cluster is okay.

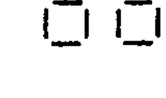
DTC 07	Rear window defroster switch on/off signal		
STEP	**INSPECTION**	**INDICATION**	**ACTION**
1	Turn the rear window defroster switch to on.		Go to next step.
			**Manual air conditioner** • Check the rear window defroster switch. • Check the wiring harness. (Battery — rear window defroster switch — instrument cluster) **Full-auto air conditioner** • Check the heater control unit. • Check the wiring harness. (Battery — heater control unit — instrument cluster)
2	Turn the rear window defroster switch to off.		**Manual air conditioner** • Check the rear window defroster switch. • Check the wiring harness. (Battery — rear window defroster switch — instrument cluster) **Full-auto air conditioner** • Check the heater control unit. • Check the wiring harness. (Battery — heater control unit — instrument cluster)
			Input signal to instrument cluster is okay.

DTC 08	TNS relay on/off signal		
STEP	**INSPECTION**	**INDICATION**	**ACTION**
1	Turn the headlight switch to TNS position. (TNS relay on.)		Go to next step.
			• Check the TNS relay. • Check the wiring harness. (Battery — TNS relay — instrument cluster)
2	Turn the headlight switch to OFF. (TNS relay off.)		• Check the TNS relay. • Check the wiring harness. (Battery — TNS relay — instrument cluster)
			Input signal to instrument cluster is okay.

DTC 09	Headlight switch on/off signal		
STEP	**INSPECTION**	**INDICATION**	**ACTION**
1	Turn the headlight switch to headlight position.		Go to next step.
			• Check the headlight switch. • Check the wiring harness. (Instrument cluster — headlight switch — GND)
2	Turn the headlight switch to OFF.		• Check the headlight switch. • Check the wiring harness. (Instrument cluster — headlight switch — GND)
			Input signal to instrument cluster is okay.

DTC 10	Vehicle speed input signal	
INSPECTION	**INDICATION**	**ACTION**
Rotate drive wheels by using chassis roller.		Input signal to instrument cluster is okay.
		**Without ABS** • Check the vehicle speedometer sensor. • Check the wiring harness. (Instrument cluster — vehicle speedometer sensor) **With ABS** • Check the ABS control module. • Check the wiring harness. (Instrument cluster — ABS control module) **With TCS** • Check the ABS/TCS control module. • Check the wiring harness. (Instrument cluster — ABS/TCS control module)

DTC 11	Engine speed input signal	
INSPECTION	**INDICATION**	**ACTION**
Start engine.		Input signal to instrument cluster is okay.
		**MTX** • Check the ECM. • Check the wiring harness. (Instrument cluster — ECM) **ATX** • Check the PCM. • Check the wiring harness. (instrument cluster — PCM)

DTC 12	Operation signal to the speedometer		
INSPECTION	**INDICATION**	**SITUATION**	**ACTION**
Wait for 2 seconds after selecting DTC 12.		Speedometer needle move full scale and indicated 60 km/h.	Speedometer is okay.
		Other than above stated.	Replace the speedometer and tachometer.
		—	

DTC 13	Operation signal to the tachometer		
INSPECTION	**INDICATION**	**SITUATION**	**ACTION**
Wait for 2 seconds after selecting DTC 13.	0 0	Tachometer needle move full scale and indicated 3000 rpm.	Tachometer is okay.
		Other than above stated.	Replace the speedometer and tachometer.
	9 9	—	

DTC 14	Operation signal to buzzer		
INSPECTION	**INDICATION**	**SITUATION**	**ACTION**
Wait for 2 seconds after selecting DTC 14.	1 1 (Fixed)	Buzzer continuously sounds.	Buzzer is okay.
		Buzzer does not continuously sound.	Replace the speedometer and tachometer.

DTC 15	Operation signal to the rear fog light indicator light		
INSPECTION	**INDICATION**	**SITUATION**	**ACTION**
Wait for 2 seconds after selecting DTC 15.	1 1 (Turns on and off)	Rear fog light indicator light turns on and off 3 times.	Rear fog light indicator light is okay.
		Other than above stated.	Check the rear fog light indicator light.

DTC 16	Operation signal to the fuel-level warning light		
INSPECTION	**INDICATION**	**SITUATION**	**ACTION**
Wait for 2 seconds after selecting DTC 16.	1 1 (Turns on and off)	Fuel-level warning light turns on and off 3 times.	Fuel-level warning light is okay.
		Other than above stated.	Check the fuel-level warning light.

DTC 17	Operation signal to the rear window defroster indicator light		
INSPECTION	**INDICATION**	**SITUATION**	**ACTION**
Wait for 2 seconds after selecting DTC 17.	1 1 (Turns on and off)	Rear window defroster indicator light turns on and off 3 times.	Rear window defroster indicator light is okay.
		Other than above stated.	Check the rear window defroster indicator light.

DTC 18	Operation signal to the ignition key illumination		
INSPECTION	**INDICATION**	**SITUATION**	**ACTION**
Wait for 2 seconds after selecting DTC 18.	1 1 (Turns on and off)	Ignition key illumination turns on and off 3 times.	Ignition key illumination is okay.
		Other than above stated.	• Check the ignition key illumination. • Check the wiring harness. (Battery — ignition key illumination — instrument cluster

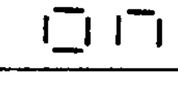
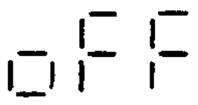
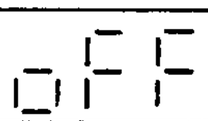
DTC 20	Operation signal to the rear window defroster relay		
INSPECTION	**INDICATION**	**SITUATION**	**ACTION**
Wait for 2 seconds after selecting DTC 20.	(Turns on and off)	Rear window defroster relay turns on and off 3 times.	Rear window defroster relay is okay.
		Other than above stated.	• Check the rear window defroster relay. • Check the wiring harness. (Battery — rear window defroster relay — instrument cluster)

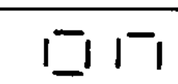
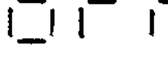
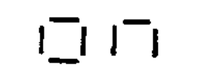
DTC 21	Operation signal to the door lock timer unit		
INSPECTION	**INDICATION**	**SITUATION**	**ACTION**
Wait for 2 seconds after selecting DTC 21.	(Turns on and off)	Door lock timer unit turns on and off 3 times.	Door lock timer unit is okay.
		Other than above stated.	• Check the door lock timer unit • Check the wiring harness. (Battery — door lock timer unit — instrument cluster)

DTC 26	LCD indication		
INSPECTION	**INDICATION**	**SITUATION**	**ACTION**
Wait for 2 seconds after selecting DTC 26.	(Fixed)	Indication is normal.	LCD is okay.
		Other than above stated.	Replace the speedometer and tachometer.

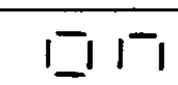
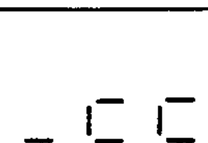
DTC 27	Operation signal to the interior light		
INSPECTION	**INDICATION**	**SITUATION**	**ACTION**
1. Turn the interior light switch at DOOR. 2. Wait for 2 seconds after selecting DTC 27.	(Turns on and off)	Interior light turns on and off 3 times.	Interior light is okay.
		Other than above stated.	• Check the interior light. • Check the wiring harness. (Battery — interior light — instrument cluster)

DTC 28	Operation signal to print plate from door lock-link switch	
INSPECTION	**INDICATION**	**ACTION**
Turn the driver's side door lock-knob to unlock position. (door lock-link switch to unlock position.)	(No indication)	• Check the door lock-link switch. • Check the wiring harness. (Instrument cluster — door lock — link switch)
		Print plate is okay.
		Replace the speedometer and tachometer.

DTC 29	Rear fog light relay on/off signal		
STEP	**INSPECTION**	**INDICATION**	**ACTION**
1	Turn the rear fog light switch to on. (rear fog light relay on.)		Go to next step.
			• Check the rear fog light relay. • Check the wiring harness. (Battery — rear fog light relay — instrument cluster)
2	Turn the rear fog light switch to off. (rear fog light relay off.)		• Check the rear fog light relay. • Check the wiring harness. (Battery — rear fog light relay — instrument cluster)
			Input signal to instrument cluster is okay.

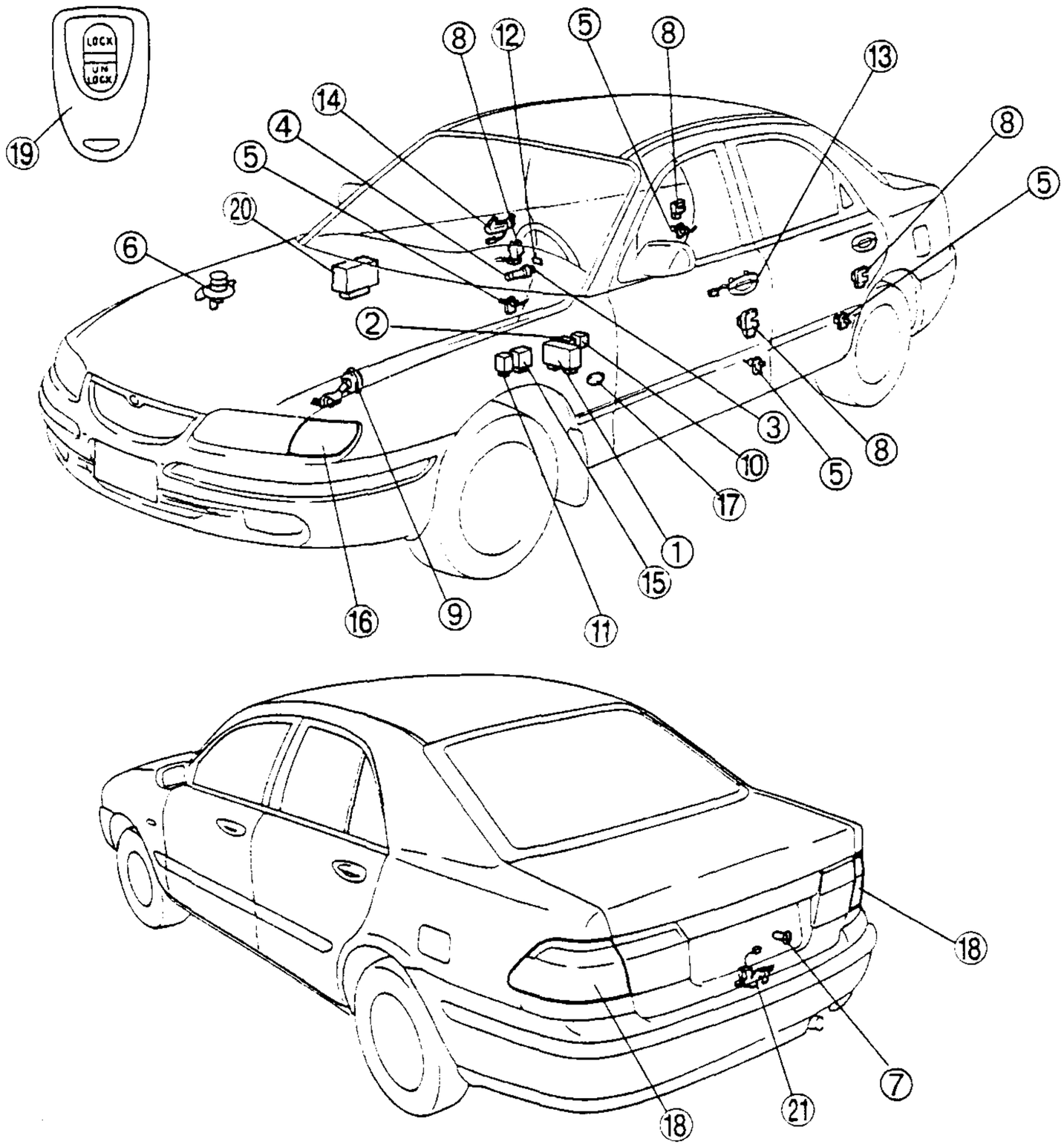
DTC 31	Key reminder switch on/off signal		
STEP	**INSPECTION**	**INDICATION**	**ACTION**
1	Insert the key into steering lock. (key reminder switch on.)		Go to next step.
			• Check the key reminder switch. • Check the wiring harness. (Battery — key reminder switch — instrument cluster)
2	Extract the key from steering lock. (key reminder switch off.)		• Check the key reminder switch. • Check the wiring harness. (Battery — key reminder switch — instrument cluster)
			Input signal to instrument cluster is okay.

DTC 32	Operation signal to print plate from key reminder switch	
INSPECTION	**INDICATION**	**ACTION**
Extract the key from steering lock. (key reminder switch off.)	(No indication)	• Check the key reminder switch. • Check the wiring harness. (Battery — key reminder switch — instrument cluster)
		Print plate is okay.
		Replace the speedometer and tachometer.

DTC 40	Front light relay on/off signal		
STEP	**INSPECTION**	**INDICATION**	**ACTION**
1	Turn the front fog light switch to on.		Go to next step.
			• Check the front fog light relay. • Check the front fog light switch. • Check the wiring harness. (Battery — front fog light relay — instrument cluster)
2	Turn the front fog light switch to off.		• Check the front fog light relay. • Check the front fog light switch. • Check the wiring harness. (Battery — front fog light relay — instrument cluster)
			Input signal to instrument cluster is okay.

THEFT-DETERRENT SYSTEM

STRUCTURAL VIEW



1	Theft-deterrent control module
2	Theft-deterrent relay
3	Key reminder switch
4	Ignition switch
5	Door switch
6	Bonnet switch
7	Trunk key cylinder switch
8	Door lock-link switch
9	Theft-deterrent horn
10	Theft-deterrent horn relay
11	Flasher unit

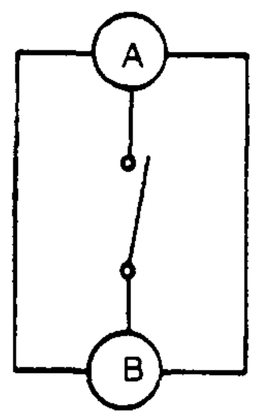
12	Security light
13	Driver's door key cylinder switch
14	Passenger's door key cylinder switch
15	Door lock timer unit
16	Front turn light
17	Front side turn light
18	Rear combination light
19	Transmitter
20	Keyless unit
21	Trunk compartment light switch (Cargo compartment light switch)

TRUNK KEY CYLINDER SWITCH INSPECTION

1. Remove the trunk lid trim (sedan) or the liftgate lower trim (5HB).
2. Disconnect the trunk key cylinder switch connector.
3. Check for continuity between the trunk key cylinder switch terminals by using an ohmmeter.

○—○ : Continuity

Switch position	Terminal	
	A	B
Locked		
Unlocked	○	○





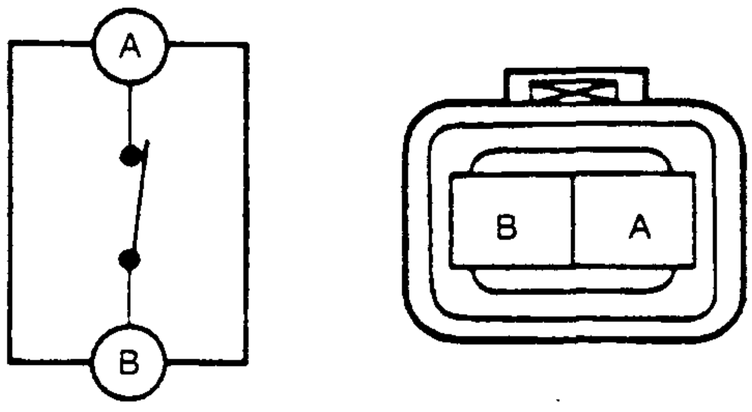
4. If not as specified, replace the trunk key cylinder.

BONNET SWITCH INSPECTION

1. Disconnect the bonnet switch connector.
2. Check for continuity between the bonnet switch terminals by using an ohmmeter.

○—○ : Continuity

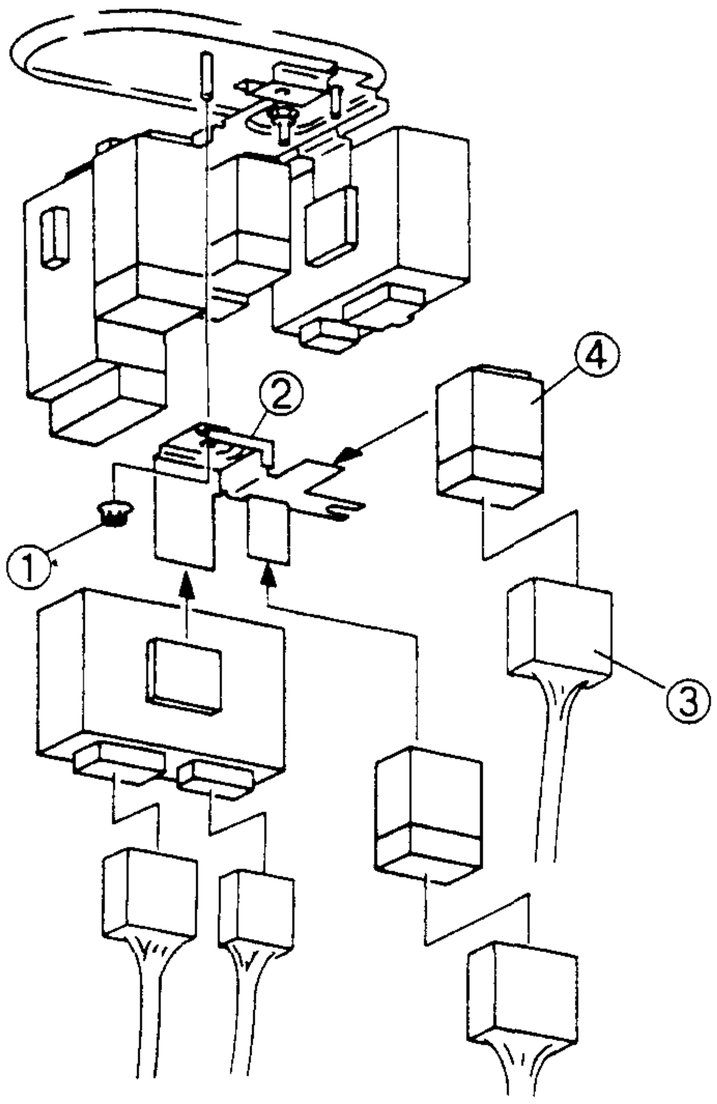
Switch position	Terminal	
	A	B
Closed		
Open	○	○



3. If not as specified, replace the bonnet switch.

THEFT-DETERRENT HORN RELAY REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the lower panel.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



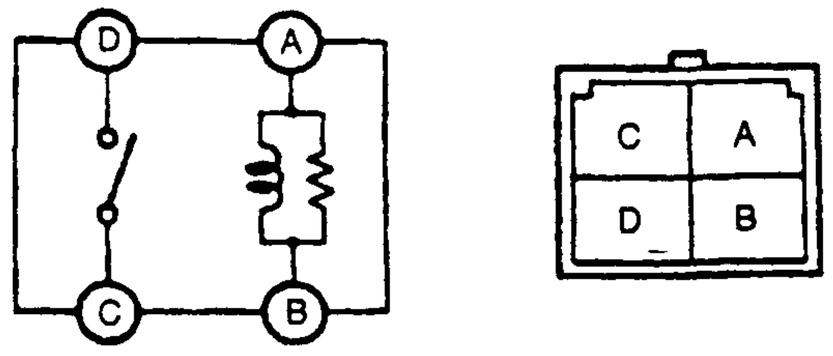
1	Nut
2	Bracket
3	Connector
4	Theft-deterrent horn relay

THEFT-DETERRENT HORN RELAY INSPECTION

1. Remove the lower panel.
2. Remove the theft-deterrent horn relay.
3. Apply battery positive voltage and check for continuity between the theft-deterrent horn relay terminals by using an ohmmeter.

○—○ : Continuity B+: Battery positive voltage

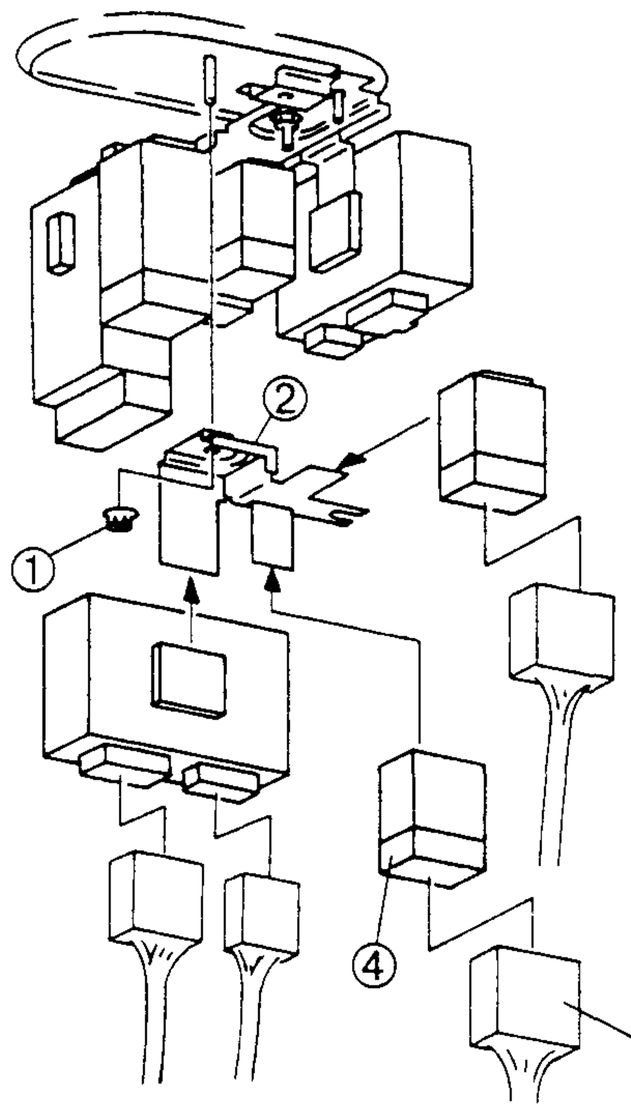
Step	Terminal			
	A	B	C	D
1	○	○		
2	B+	GND	○	○



4. If not as specified, replace the theft-deterrent horn relay.

THEFT-DETERRENT RELAY REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the lower panel.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



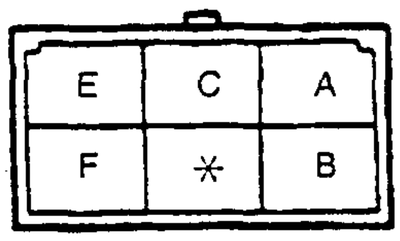
1	Nut
2	Bracket
3	Connector
4	Theft-deterrent relay

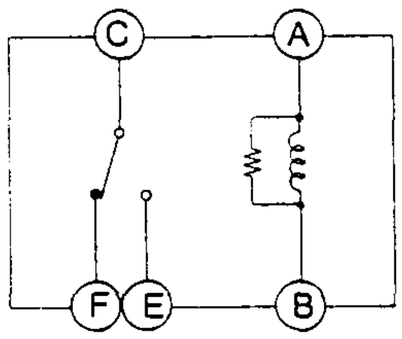
THEFT-DETERRENT RELAY INSPECTION

1. Remove the lower panel.
2. Remove the theft-deterrent relay.
3. Apply battery positive voltage and check for continuity between the theft-deterrent relay terminals by using an ohmmeter.

○—○ : Continuity B+: Battery positive voltage

Step	Terminal				
	A	B	C	F	E
1	○—○		○—○		
2	B+	GND	○		○

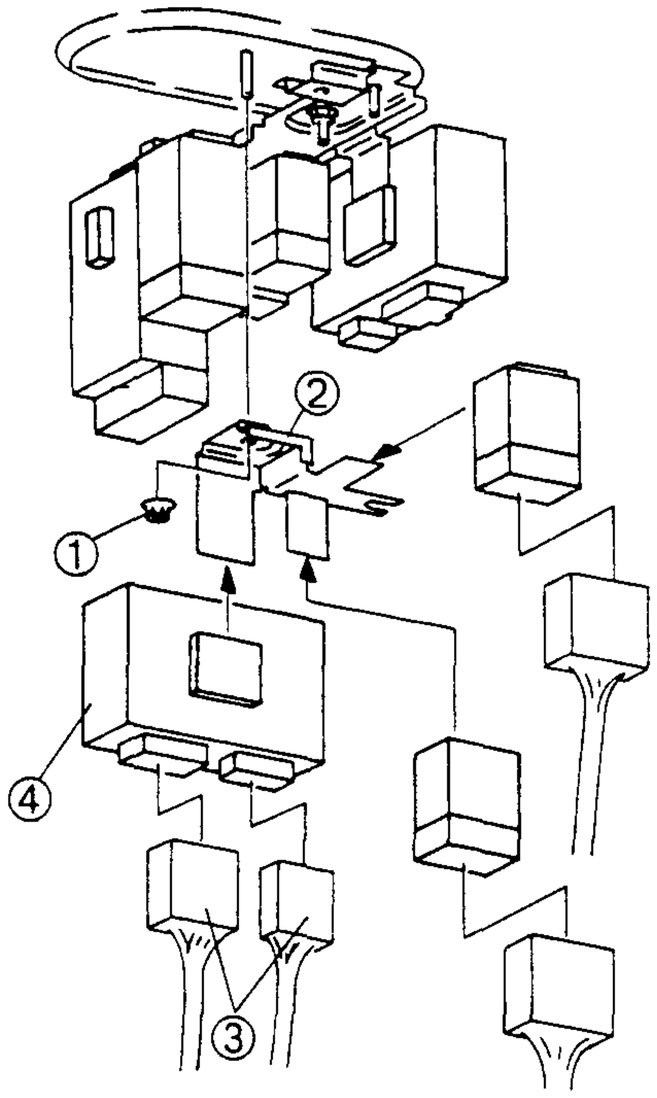




4. If not as specified, replace the theft-deterrent relay.

THEFT-DETERRENT CONTROL MODULE REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the lower panel.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



1	Nut
2	Bracket
3	Connector
4	Theft-deterrent control module

DOOR LOCK-LINK SWITCH INSPECTION

Driver and Passenger Side

Note

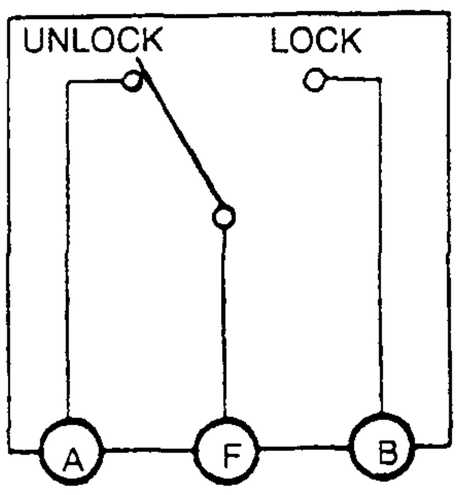
- The front door lock-link switch is together with the front door lock.

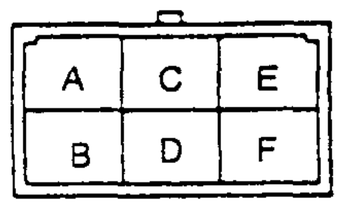
1. Disconnect the negative battery cable.
2. Remove the front door trim.
3. Remove the door screen.
4. Disconnect the front door lock-link switch connector.
5. Check for continuity between the front door lock-link switch terminals by using an ohmmeter.

Driver side

○—○ : Continuity

Lock knob position	Terminal		
	A	F	B
Lock		○—○	
Unlock	○	○	

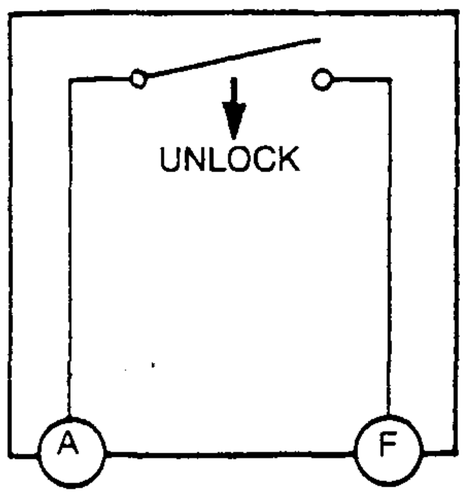


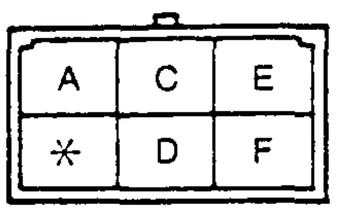


Passenger side

○—○ : Continuity

Lock knob position	Terminal	
	A	F
Lock		
Unlock	○	○





6. If not as specified, replace the front door lock.

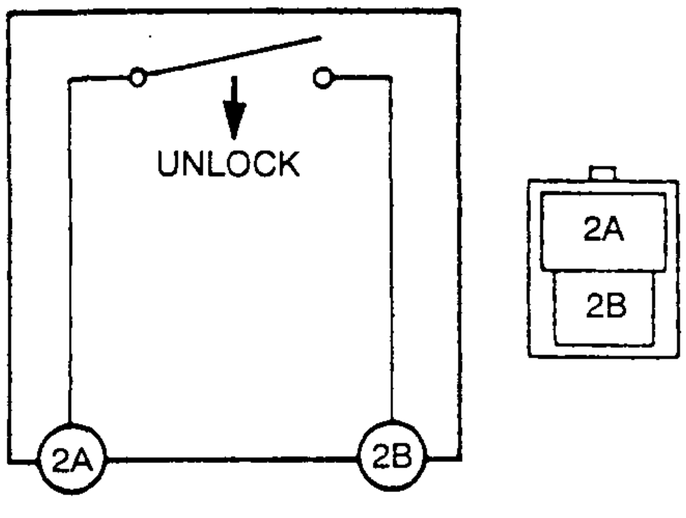
Rear Side

Note
- The rear door lock-link switch is together with the rear door lock.

1. Disconnect the negative battery cable.
2. Remove the rear door trim.
3. Remove the door screen.
4. Disconnect the rear door lock-link switch connector.
5. Check for continuity between the rear door lock-link switch terminals by using an ohmmeter.

○—○ : Continuity

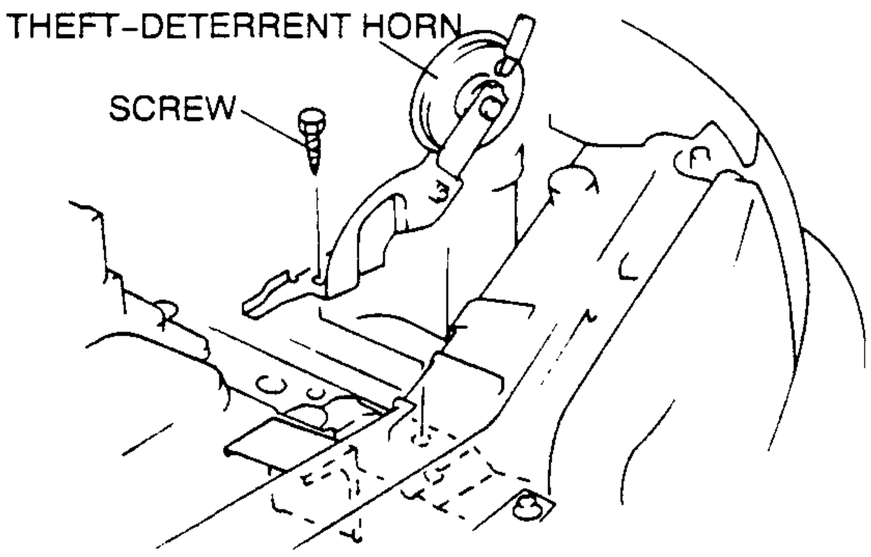
Lock knob position	Terminal	
	2A	2B
Lock		
Unlock	○	○



6. If not as specified, replace the rear door lock.

THEFT-DETERRENT HORN
REMOVAL/INSTALLATION

1. Remove the battery.
2. Disconnect the theft-deterrent horn connector.
3. Remove the screw to remove the theft-deterrent horn.



4. Install in the reverse order of removal.

THEFT-DETERRENT CONTROL MODULE INSPECTION

1. Remove the lower panel.
2. Remove the theft-deterrent control module without disconnecting the connector.
3. Measure the voltage at the theft-deterrent control module terminals as indicated below.
4. Disconnect the theft-deterrent control module connector before checking for continuity at terminals 1F, 2F, 2M, 2N and 2R.
5. If not as specified, inspect the parts listed under "inspection area" and related wiring harnesses.
6. If the parts and wiring harnesses are okay but the system still does not work properly, replace the theft-deterrent control module.

Terminal Voltage List (Reference)

B+: Battery positive voltage



Terminal	Signal	Connection	Test condition		Voltage (V) /Continuity	Inspection area
1A	IG1	ENGINE 10 A fuse	IG SW ON		B+	• Ignition switch • ENGINE 10 A fuse
			IG SW LOCK or ACC		0	
1B	+B	ROOM 10 A fuse	Constant		B+	ROOM 10 A fuse
1C	Flasher input	• Turn switch • *Hazard warning* switch • Flasher unit	IG SW ON	Turn switch on	Alternates 0 and B+	• Turn switch • *Hazard warning* switch • Flasher unit
				Turn switch off	0	
			Hazard warning switch on		Alternates 0 and B+	
			Hazard warning switch: Off		0	
			Theft-deterrent system alarm 1: Active		Alternates 0 and B+	
			Theft-deterrent system alarm 1: Other		0	
1D	Turn (LH)	Turn light (LH)	Theft-deterrent system alarm 1: Active		Alternates 0 and B+	Turn light (LH)
			Theft-deterrent system alarm 1: Other		0	
1E	Turn (RH)	Turn light (RH)	Theft-deterrent system alarm 1: Active		Alternates 0 and B+	Turn light (RH)
			Theft-deterrent system alarm 1: Other		0	
1F	Theft-deterrent control module ground	GND	Constant: check for continuity to ground		Yes	–
2A	–	Not used	–		–	–
2B	–	Not used	–		–	–
2C	Theft-deterrent horn on/off	Theft-deterrent horn relay	Theft-deterrent system alarm 1: Active		0	Theft-deterrent horn relay
			Theft-deterrent system alarm 1: Other		B+	
2D	Key reminder switch on/off	Key reminder switch	Key reminder switch on		B+	Key reminder switch
			Key reminder switch off		0	
2E	–	Not used	–		–	–

Terminal	Signal	Connection	Test condition	Voltage (V) /Continuity	Inspection area
2F	Trunk key cylinder switch on/off	Trunk key cylinder switch	Trunk key cylinder switch locked: check for continuity to ground	No	Trunk key cylinder switch
			Trunk key cylinder switch unlocked: check for continuity to ground	Yes	
2G	–	Not used	–	–	–
2H	–	Not used	–	–	–
2I	–	Not used	–	–	–
2J	–	Not used	–	–	–
2K	Lock/unlock	• Door lock timer unit • Driver's door lock-link switch	Driver's door lock-link switch locked	2.5	Driver's door lock-link switch
			Driver's door lock-link switch unlocked	0	
2L	–	Not used	–	–	–
2M	Lock/unlock	• Passenger's door lock-link switch • Rear door lock-link switch	Passenger's and rear door lock-link switch locked: check for continuity to ground	No	Passenger's or rear door lock-link switch
			Passenger's or door lock-link switch unlocked: check for continuity to ground	Yes	
2N	Bonnet open/closed	Bonnet switch	Bonnet switch on: check for continuity to ground	Yes	Bonnet switch
			Bonnet switch off: check for continuity to ground	No	
2O	Door key cylinder switch	• Driver's door key cylinder switch • Passenger's door key cylinder switch • Keyless unit • Instrument cluster • Door lock timer unit	Driver's or passenger's door locked with key or transmitter	2.5	• Driver's or passenger's door key cylinder switch • Keyless unit
			Driver's or passenger's door unlocked with key or transmitter	0	
			Other	5	
2P	Trunk compartment light switch (Cargo compartment light switch) on/off	Trunk compartment light switch (Cargo compartment light switch)	Trunk compartment light switch (Cargo compartment light switch) on	0	Trunk compartment light switch (Cargo compartment light switch)
			Trunk compartment light switch (Cargo compartment light switch) off	B+	
2Q	Security light on/off	Security light	Security light on	0	Security light
			Security light off	B+	
2R	Door open/closed	Door switch	Any door open: check for continuity to ground	Yes	Door switch
			All doors closed: check for continuity to ground	No	
2S	Theft-deterrent relay on/off	Theft-deterrent relay	Theft-deterrent system alarm 1: Active	0	Theft-deterrent relay
			Theft-deterrent system alarm 1: Other	B+	
2T	–	Not used	–	–	–

IMMOBILIZER SYSTEM

Caution

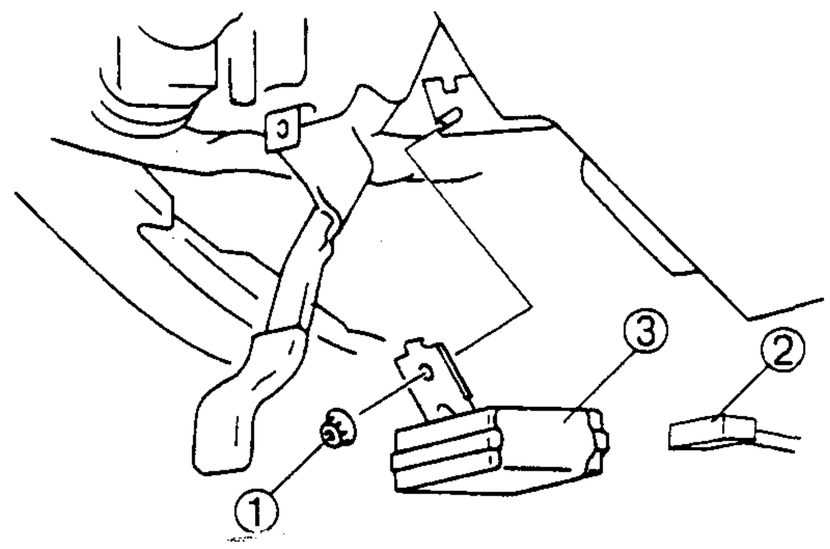
- **When an immobilizer system component (such as the ECM (PCM), immobilizer unit, coil or the key) has failed, it must be accurately determined according to the troubleshooting procedures or by the display of the diagnostic trouble codes prior to carrying out the service procedures. If a normal component is mistakenly replaced and the ID number and/or code word are input into the new component, then neither component can be reused on other vehicles.**

IMMOBILIZER UNIT REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the lower panel.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.

Caution

- **After replacing the immobilizer unit with a new one, the engine cannot be started without inputting the ID number of the keys and the code word of the new immobilizer unit. Input the ID number and code word.**



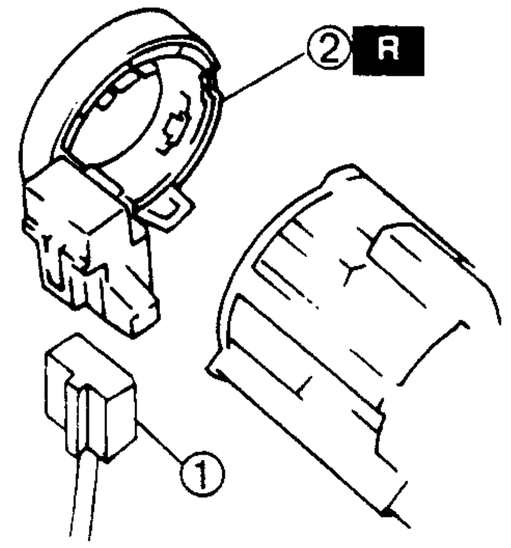
1	Nut
2	Connector
3	Immobilizer unit

COIL REMOVAL/INSTALLATION

Note

- Do not remove the coil unless you are replacing it.
- When the coil is replaced only, the key ID number input procedure does not need.

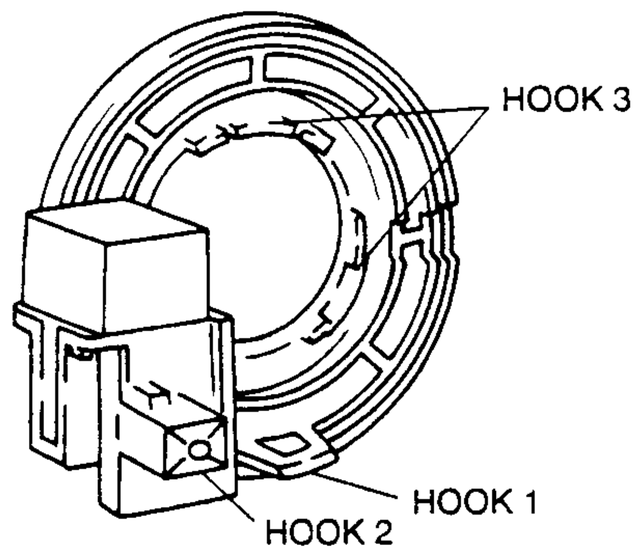
1. Disconnect the negative battery cable.
2. Remove the column cover.
3. Remove in the order indicated in table.
4. Install in the reverse order of removal.



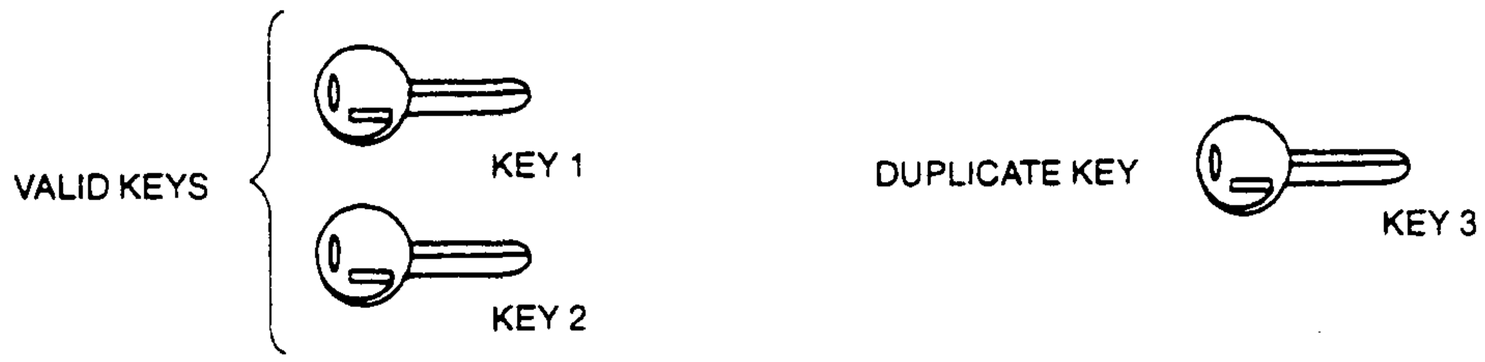
1	Connector
2	Coil ☞ Installation Note

Coil Installation Note

1. Install the hook 1 to the steering lock.
2. Install the hook 2 and the hook 3 to the steering lock.



KEY ID NUMBER INPUT PROCEDURE
Key Replacement or Duplicate Keys
When there are two or more valid keys



1. Cut a serrated edge on the duplicate key.
2. Turn the ignition switch from LOCK to ON five times by using Key 1 and stop it at the LOCK position.

   Note
   - The amount of time the ignition switch is turned to ON or LOCK should not exceed **1 second**.

3. Turn the ignition switch to ON by using Key 1 within **30 seconds** after carrying out step 2.
   →The security light illuminates.

4. Turn the ignition switch to LOCK and remove Key 1 within **60 seconds** after the security light illuminates.
   →The security light goes out.

5. Insert Key 2 and start the engine by using Key 2 within **30 seconds** after carrying out step 4.
   →The security light illuminates for **1–2 seconds**, then goes out.
   →The engine continues running.

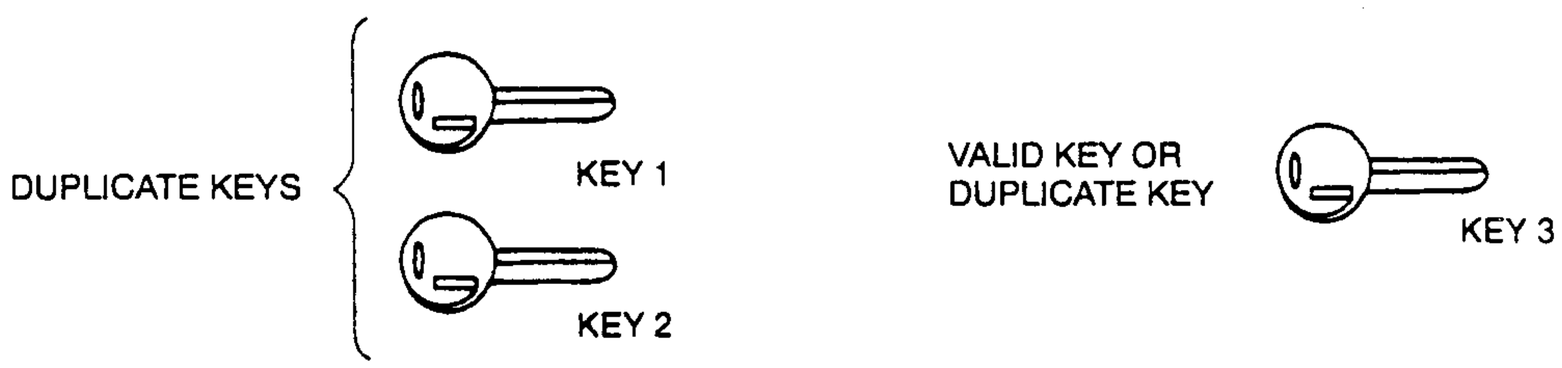
6. Turn the ignition switch to LOCK and remove Key 2.
7. Insert Key 1 and start the engine by using Key 1 within **30 seconds** after carrying out step 6.
   →The security light illuminates for **1–2 seconds**, then goes out.
   →The engine continues running.

8. Turn the ignition switch to LOCK and remove Key 1.
9. Insert Key 3 and start the engine by using Key 3 within **30 seconds** after carrying out step 8.
   →The security light illuminates for **1–2 seconds**, then goes out.
   →The engine continues running.

10. Turn the ignition switch to LOCK and remove Key 3.
11. Wait for **30 seconds** before carrying out any other procedure.

    Caution
    - **If there are 4–8 keys (valid keys or duplicate keys), repeat steps 9 to 10.**

When there is only one or no valid key



1. Cut a serrated edge on the duplicate keys.
2. Turn the ignition switch from LOCK to ON five times by using Key 1 and stop it at the LOCK position.

   Note
   - The amount of time the ignition switch is turned to ON or LOCK should not exceed **1 second**.

3. Turn the ignition switch to ON by using Key 1 within **30 seconds** after carrying out step 2.
   →The security light starts flashing.(on for **300 ms** , off for **300 ms**).

4. Turn the ignition switch to LOCK and wait for **5 minutes**.
5. After the security light flashes more slowly (on for **1.2 s** , off for **1.2 s**), input the code word.
   (Refer to CODE WORD INPUT PROCEDURE.)
   →If the code word is input correctly, the security light stops flashing and remains illuminated.

6. Start the engine by using Key 1 after the security light illuminates.
   →The security light illuminates for **1–2 seconds**, then goes out.
   →The engine continues running.

7. Turn the ignition switch to LOCK and remove Key 1.
8. Insert Key 2 and start the engine by using Key 2 within **30 seconds** after carrying out step 7.
   →The security light illuminates for **1–2 seconds**, then goes out.
   →The engine continues running.

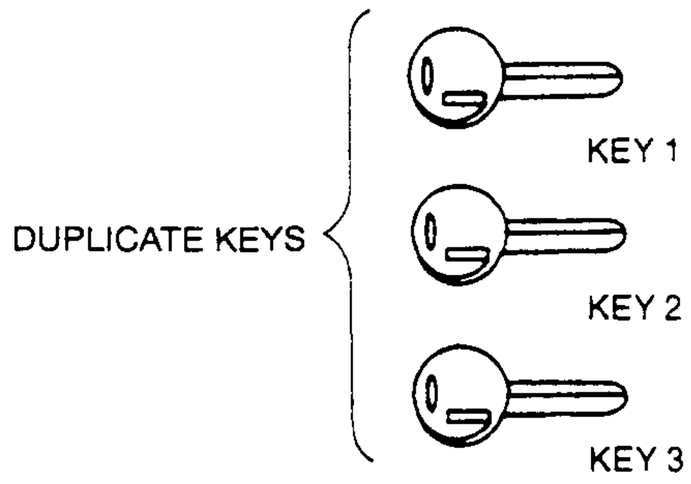
9. Turn the ignition switch to LOCK and remove Key 2.
10. Insert Key 3 and start the engine by using Key 3 within **30 seconds** after carrying out step 9.
    →The security light illuminates for **1–2 seconds**, then goes out.
    →The engine continues running.

11. Turn the ignition switch to LOCK and remove Key 3.
12. Wait for **30 seconds** before carrying out any other procedure.

    Caution
    - **If there are 4–8 more keys (valid keys or duplicate keys), repeat steps 10 to 11.**

Steering Lock Replacement
When there is only one or no valid key

Note
- When replacing the steering lock, also replace the coil.
- When replacing the coil, the key and therefore the ID number has changed. Carry out the key ID number input procedure after replacing the coil.



1. Cut a serrated edge on the duplicate keys.
2. Replace the steering lock.
3. Turn the ignition switch from LOCK to ON five times by using Key 1 and stop it at the LOCK position.

   Note
   - The amount of time the ignition switch is turned to ON or LOCK should not exceed **1 second**.

4. Turn the ignition switch to ON by using Key 1 within **30 seconds** after carrying out step 3.
   →The security light starts flashing. (on for **300 ms** , off for **300 ms**).

5. Turn the ignition switch to LOCK and wait for **5 minutes**.
6. After the security light flashes more slowly (on for **1.2 s** , off for **1.2 s**), input the code word. (Refer to CODE WORD INPUT PROCEDURE).
   →If the code word is input correctly, the security light stops flashing and remains illuminated.

7. Start the engine by using Key 1 after the security light illuminates.
   →The security light illuminates for **1–2 seconds**, then goes out.
   →The engine continues running.

8. Turn the ignition switch to LOCK and remove Key 1.
9. Insert Key 2 and start the engine by using Key 2 within **30 seconds** after carrying out step 8.
   →The security light illuminates for **1–2 seconds**, then goes out.
   →The engine continues running.

10. Turn the ignition switch to LOCK and remove Key 2.
11. Insert Key 3 and start the engine by using Key 3 within **30 seconds** after carrying out step 10.
    →The security light illuminates for **1–2 seconds**, then goes out.
    →The engine continues running.

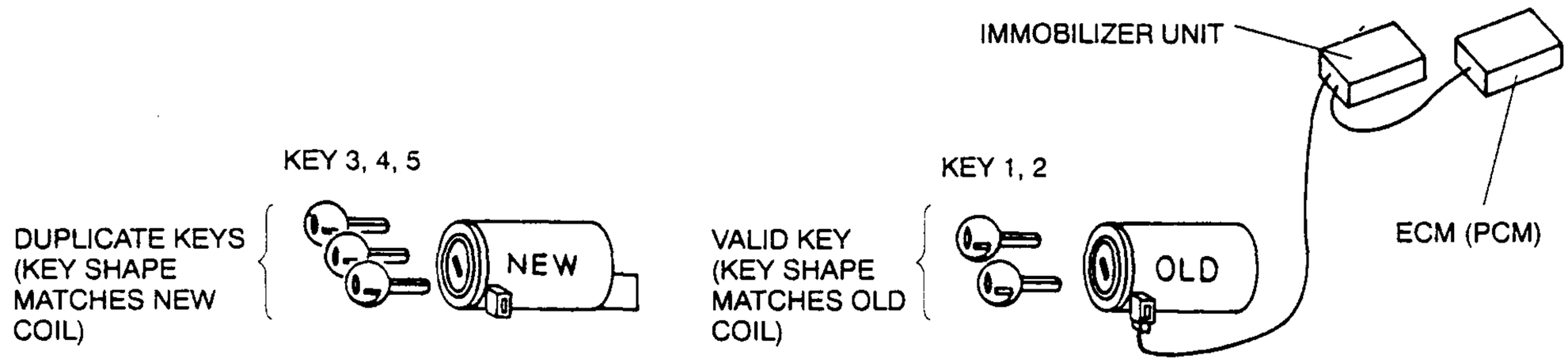
12. Turn the ignition switch to LOCK and remove Key 3.
13. Wait for **30 seconds** before carrying out any other procedure.

Caution
- **If there are 4–8 keys (valid keys or duplicate keys), repeat steps 11 to 12.**

Note
- After carrying out step13, destroy and dispose of the original key which was registered with the former ID number.

When there are two or more valid keys

Note
- When replacing the steering lock, also replace the coil .
- When replacing the coil, the key and therefore the ID number has changed. Carry out the key ID number input procedure after replacing the coil.
- When there are two or more original keys before the steering lock is replaced, use the two original keys when carrying out the key ID number input procedure to register new keys.



1. Cut a serrated edge on the duplicate keys.
2. Remove the steering lock.
3. Connect the new steering lock to the ignition switch connector.
4. Connect the coil connector to the old steering lock.
5. Insert Key 1 into the old steering lock.
6. Insert Key 3 into the new steering lock and turn the ignition switch from LOCK to ON five times and stop it at the LOCK position.

   Note
   - The amount of time the ignition switch is turned to ON or LOCK should not exceed 1 **second**.

7. Turn the ignition switch to ON by using Key 3 within **30 seconds** after carrying out step 6.
   →The security light illuminates.

8. Turn the ignition switch to LOCK by using Key 3 after the security light illuminates.
   →The security light goes out.

   Note
   - Operate the procedure step 9–10 within **30 seconds** after carrying out step 8.

9. Remove Key 1 from the old steering lock and insert Key 2 to the old steering lock.
10. Start the engine by using Key 3 into the new steering lock.
    →The security light illuminates for **1–2 seconds**, then goes out.
    →The engine continues running.

    Note
    - Operate the procedure step 11–12 within **30 seconds** after carrying out step 10.

11. Turn the ignition switch to LOCK by using Key 3.
12. Disconnect the coil connector from the old steering lock, and reconnect the coil connector to the new steering lock.
13. Insert Key 3 into the new steering lock and start the engine by using Key 3 into the new steering lock within **30 seconds** after carrying out step 11.
    →The security light illuminates for **1–2 seconds**, then goes out.
    →The engine continues running.

14. Turn the ignition switch to LOCK and remove Key 3 within **60 seconds** after carrying out step13.
15. Insert Key 4 into the new steering lock and start the engine by using Key 4 into the new steering lock within **30 seconds** after carrying out step 14.
    →The security light illuminates for **1–2 seconds**, then goes out.
    →The engine continues running.

16. Turn the ignition switch to LOCK and remove Key 4 within **60 seconds** after carrying out step15.

17. Insert Key 5 into the new steering lock and start the engine by using Key 5 into the new steering lock within **30 seconds** after carrying out step 16.
    →The security light illuminates for **1–2 seconds**, then goes out.
    →The engine continues running.

18. Wait for **30 seconds** before carrying out any other procedure.

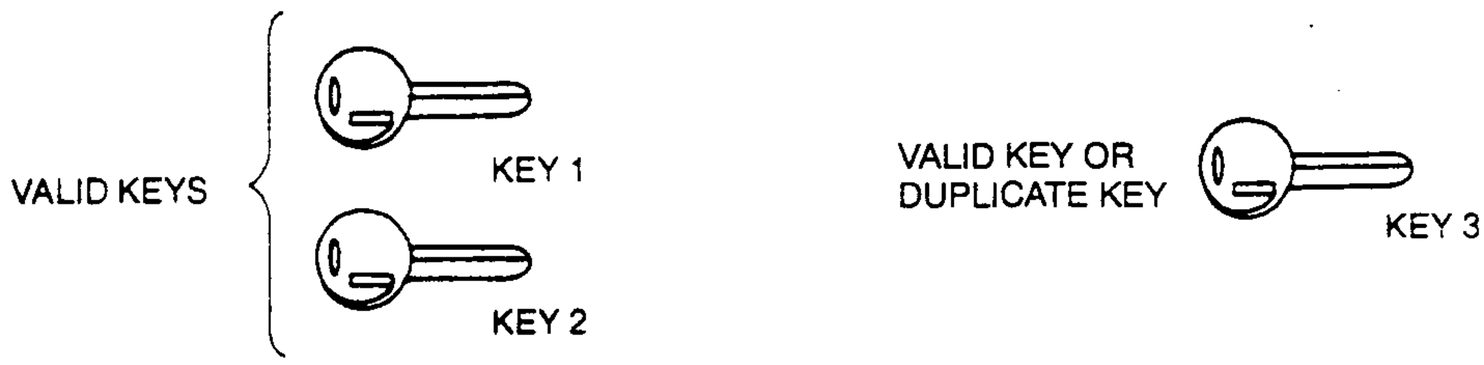
Note
- After carrying out step 18, destroy and dispose of Key 1 and Key 2. (The Key 1 and Key 2 ID number is registered to the immobilizer unit.)

ECM (PCM) Replacement
When there is no valid key

Note
- When there is not the valid key, you need to replace the immobilizer unit, too. In this case, perform the key ID number input procedure "Replacement of Both Immobilizer Unit and ECM (PCM)".

When there are two or more valid keys

Note
- When replacing the ECM (PCM), you need to register the ID number into the ECM (PCM).
- When replacing the immobilizer unit or the ECM (PCM), the immobilizer unit sends the ID number to the ECM (PCM) compares the ID number of the immobilizer unit with that of the ECM (PCM). Therefore carry out the key ID number input procedure.



1. Cut a serrated edge on the duplicate key.
2. Turn the ignition switch to LOCK and replace the ECM (PCM).
3. Turn the ignition switch to ON by using Key 1.
   →The security light goes out.

4. Turn the ignition switch to LOCK within **60 seconds** after carrying out step 3.
5. Turn the ignition switch from LOCK to ON six times by using Key 1 and stop it at the LOCK position.

Note
- The amount of time the ignition switch is turned to ON or LOCK should not exceed **1 second**. It is particularly important to ensure that the 6th turning is done within **1 second**.

6. Remove Key 1 and insert Key 2.
7. Turn the ignition switch to ON by using Key 2.
   →The security light illuminates for **1–2 seconds**, then goes out.

8. Turn the ignition switch to LOCK and remove Key 2.
9. Insert Key 1 again and start the engine by using Key 1 within **30 seconds** after carrying out step 8.
   →The security light illuminates for **1–2 seconds**, then goes out.
   →The engine continues running.

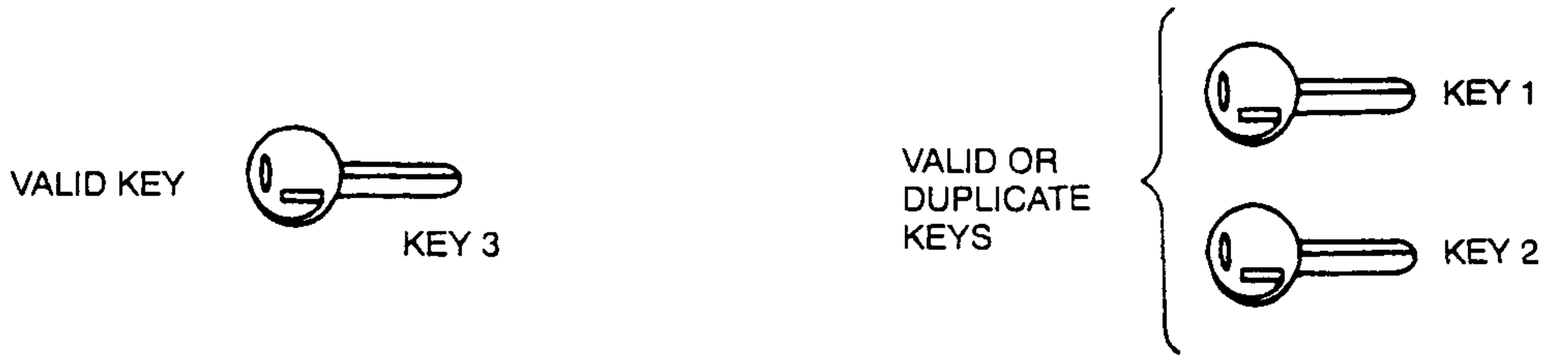
10. Turn the ignition switch to LOCK and remove Key 1.
11. Insert Key 3 and start the engine by using Key 3 within **30 seconds** after carrying out step 10.
    →The security light illuminates for **1–2 seconds**, then goes out.
    →The engine continues running.

12. Turn the ignition switch to LOCK and remove Key 3.
13. Wait for **30 seconds** before carrying out any other procedure.

Caution
- **If there are 4–8 keys (valid keys or duplicate keys), repeat steps 11 to 12.**

When there is at least one valid key

Note
- When replacing the ECM (PCM), you need to register the ID number into the ECM (PCM).
- When replacing the immobilizer unit or the ECM (PCM), the immobilizer unit sends the ID number to the ECM (PCM) and the ECM (PCM) compares the ID number of the immobilizer unit with that of the ECM (PCM). Therefore carry out the key ID number input procedure.



1. Cut a serrated edge on the duplicate keys.
2. Turn the ignition switch to LOCK and replace the ECM (PCM).
3. Turn the ignition switch to ON by using Key 3.
   →The security light illuminates for **1–2 seconds**, then goes out.

4. Turn the ignition switch to LOCK, remove Key 3 and insert Key 1.
5. Turn the ignition switch from LOCK to ON six times by using Key 1 and stop it at the LOCK position.
   →The security light starts flashing.(on for **300 ms** , off for **300 ms**).

Note
- The amount of time the ignition switch is turned to ON or LOCK should not exceed **1 second**. It is particularly important to ensure that the 6th turning is done within **1 second**.

6. Wait for **5 minutes**.
7. After the security light flashes more slowly (on for **1.2 s** , off for **1.2 s**), input the code word. (Refer to CODE WORD INPUT PROCEDURE.)
   →If the code word is input correctly, the security light stops flashing and remains illuminated.

8. Turn the ignition switch to ON by using Key 1.
   →The security light illuminates for **1–2 seconds**, then goes out.

9. Turn the ignition switch to LOCK and remove Key 1.
10. Insert Key 2 and start the engine by using Key 2 within **30 seconds** after carrying out step 9.
    →The security light illuminates for **1–2 seconds**, then goes out.
    →The engine continues running.

11. Turn the ignition switch to LOCK and remove Key 2.
12. Insert Key 3 and start the engine by using Key 3 within **30 seconds** after carrying out step 11.
    →The security light illuminates for **1–2 seconds**, then goes out.
    →The engine continues running.

13. Turn the ignition switch to LOCK and remove Key 3.
14. Wait for **30 seconds** before carrying out any other procedure.

Caution
- **If there are 4–8 keys (valid keys or duplicate keys), repeat steps 12 to 13.**

Immobilizer Unit Replacement

Note
- When there is not the valid key, you need to replace ECM (PCM), too. In this case, perform the key ID number input procedure "Replacement of Both Immobilizer Unit and ECM (PCM)".
- When there is the one valid key at least, perform this procedure.



1. Cut a serrated edge on the duplicate keys.
2. Replace the immobilizer unit.
3. Connect the negative battery cable.
4. Start the engine by using Key 1.
   →The security light illuminates for **1–2 seconds**, then goes out.
   →The engine continues running.

5. Turn the ignition switch to LOCK and remove Key 1.
6. Insert Key 2 and turn the ignition switch form LOCK to ON five times by using Key 2 and stop it at the LOCK position.

Note
- The amount of time the ignition switch is turned to ON or LOCK should not exceed **1 second**.

7. Turn the ignition switch to ON by using Key 2.
   →The security light starts flashing. (on for **300 ms** , off for **300 ms**)

8. Turn the ignition switch to LOCK and wait for **5 minutes**.
   →The security light continues flashing. (on for **300 ms** , off for **300 ms**)

9. After the security light flashes more slowly (on for **1.2 s** , off for **1.2 s**), input the code word. (Refer to CODE WORD INPUT PROCEDURE.)
   →If the code word is input correctly, the security light stops flashing and remains illuminated.

10. Start the engine by using Key 2 after the security light illuminates.
    →The security light illuminates for **1–2 seconds**, then goes out.
    →The engine continues running.

11. Turn the ignition switch to LOCK and remove Key 2.
12. Insert Key 1 again and start the engine by using Key 1 within **30 seconds** after carrying out step 11.
    →The security light illuminates for **1–2 seconds**, then goes out.
    →The engine continues running.

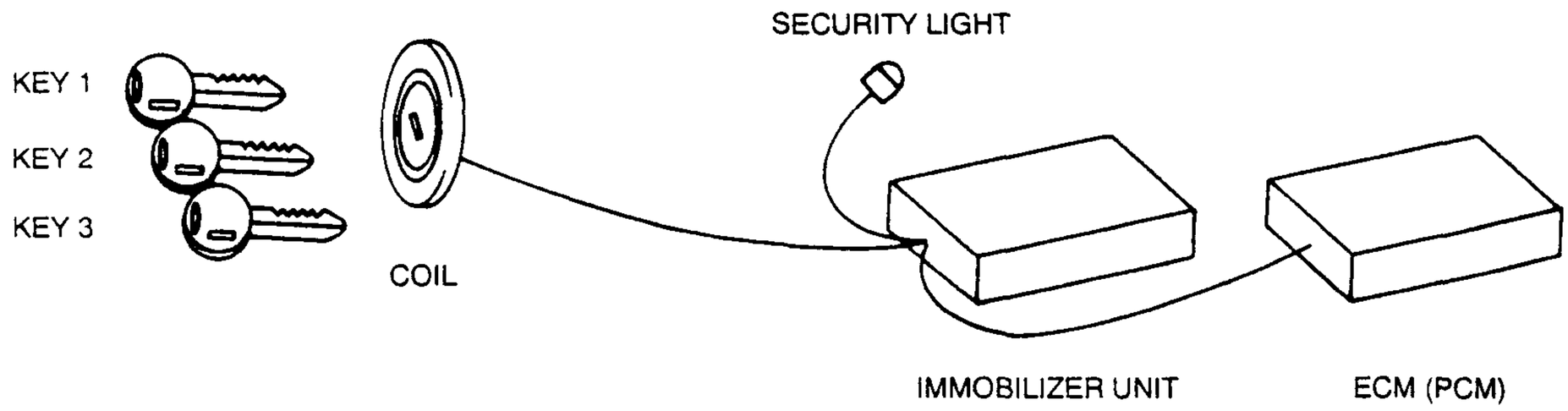
13. Turn the ignition switch to LOCK and remove Key 1.
14. Insert Key 3 and start the engine by using Key 3 within **30 seconds** after carrying out step 13.
    →The security light illuminates for **1–2 seconds**, then goes out.
    →The engine continues running.

15. Turn the ignition switch to LOCK and remove Key 3.
16. Wait for **30 seconds** before carrying out any other procedure.

Caution
- **If there are 4–8 keys (valid keys or duplicate keys), repeat steps 14 to 15.**

Replacement of Both Immobilizer Unit and ECM (PCM)

1. Prepare the new immobilizer unit and ECM (PCM).



2. Cut a serrated edge on the blank key.
3. Replace the immobilizer unit and ECM (PCM).
4. Insert Key 1 and turn the ignition switch to ON.
   →The security light illuminates, then goes out.

5. Turn the ignition switch to LOCK and remove Key 1 within **60 seconds** after carrying out step 4.
   →The security light flashes once repeatedly.

6. Insert Key 2 and turn the ignition switch to ON within **30 seconds** after carrying out step 5.
   →The security light illuminates, then goes out.

7. Turn the ignition switch to LOCK and remove Key 2 within **60 seconds** after carrying out step 6.
   →The security light flashes two times repeatedly.

8. Insert Key 3 and turn the ignition switch to ON within **30 seconds** after carrying out step 7.
   →The security light illuminates, then goes out.

9. Turn the ignition switch to LOCK and remove Key 3 within **60 seconds** after carrying out step 8.
   →The security light flashes three times repeatedly.

10. Wait for **30 seconds** before carrying out any other procedure.

Caution

- **If there are 4–8 keys (valid keys or duplicate keys), repeat steps 8 to 9.**

When error occurred during procedure

Note
- When an error occurred in steps 1-5 of the procedure for the replacement of both immobilizer unit and ECM (PCM), repeat the procedure from step 1.
- When an error occurred in steps 6-8 of the procedure for the replacement of both immobilizer unit and ECM (PCM), carry out the following steps 1-12.
- When an error occurred in steps 9-10 of the procedure for the replacement of both immobilizer unit and ECM (PCM), confirm to start the engine with each key. If not start the engine and carry out the following steps 1-12.

1. Insert key 1 and start the engine.
   →The security light illuminates, then goes out.
2. Turn the ignition switch to LOCK.
3. Turn the ignition switch form LOCK to ON five times with Key 1 and stop it at the LOCK position.

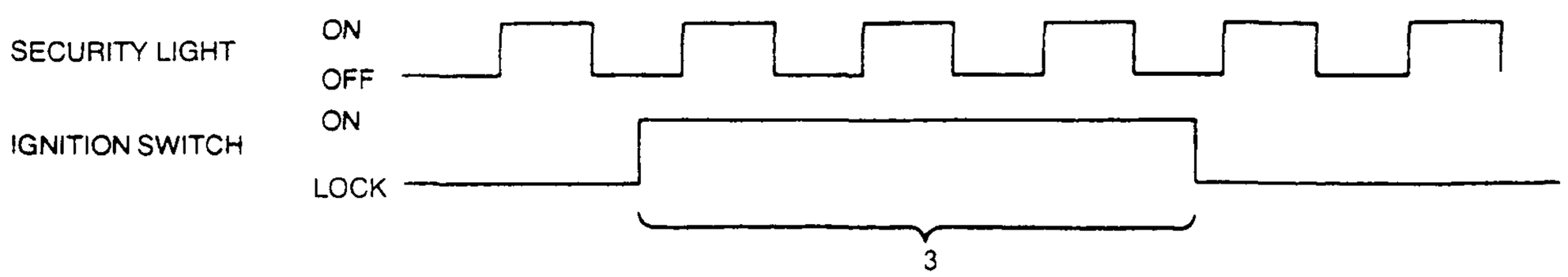
   Note
   - The amount of time the ignition switch is turned to ON or LOCK should not exceed **1 second**.

4. Turn the ignition switch to ON with Key 1 within **30 seconds** after carrying out step 3.
   →The security light illuminates.
5. Remove Key 1.
   →The security light goes out.
6. Insert Key 2 and start the engine.
   →The security light illuminates, then goes out.
7. Remove Key 2.
8. Insert Key 1 and start the engine.
   →The security illuminates, then goes out.
9. Remove Key 1.
10. Insert Key 3 and start the engine.
    →The security illuminates, then goes out.
11. Turn the ignition switch to LOCK.
12. Wait for **30 seconds** before carrying out any other procedure.

CODE WORD INPUT PROCEDURE

1. Wait until the security light flashes slowly.
   (on for **300ms**, off for **300ms** →on for **1.2 s** , off for **1.2 s**)
2. Input the code word as shown below.

INPUTTING THE CODE WORD "3"



Note

- The code word is composed of eight figures, using numerals 1–9.

3. The security light stops flashing and illuminates when the code word is input correctly.

Note

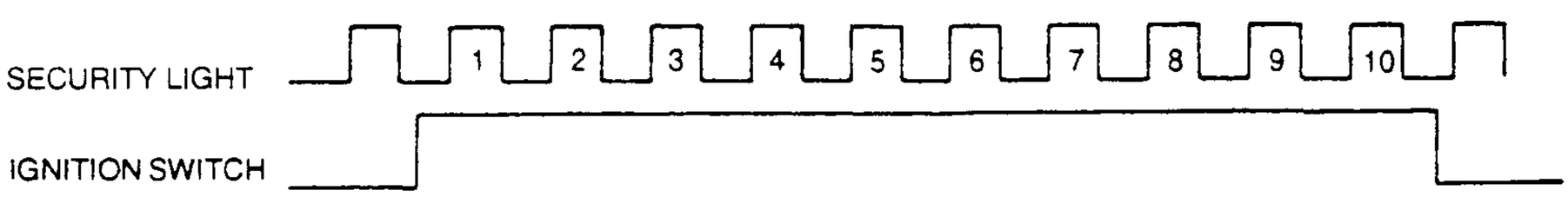
- In the examples below, the code word has not been input correctly because the security light has gone out. Turn the ignition switch from LOCK to ON five times (except ECM (PCM) replacement) or six times (ECM (PCM) replacement) and repeat the input procedure.

Examples of Incorrect Input of the Code Word

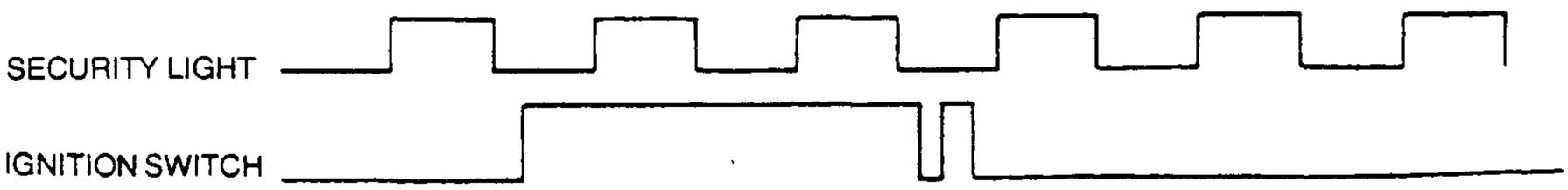
Note

- The security light must flash one or more times between the figures of the code word.
- If the code word is input incorrectly, the security light will not turn on. Turn the ignition switch from LOCK to ON five times (except ECM (PCM) replacement) or six times (ECM (PCM) replacement) and repeat the procedure to input the eighth figure for the code word.

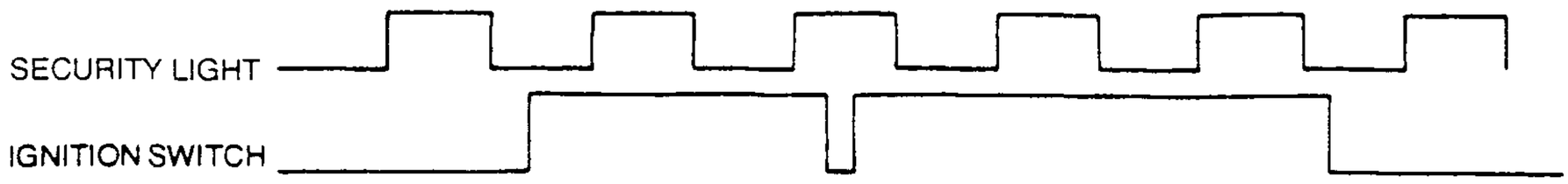
- The security light flashes ten or more times while the ignition switch is turned to ON.



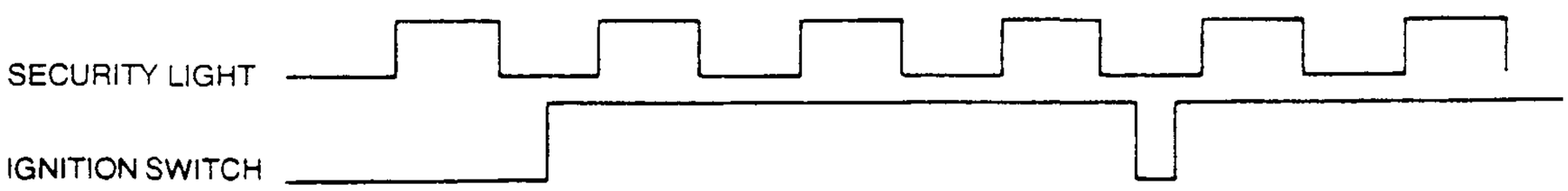
- The ignition switch is turned from LOCK to ON while the security light is off.



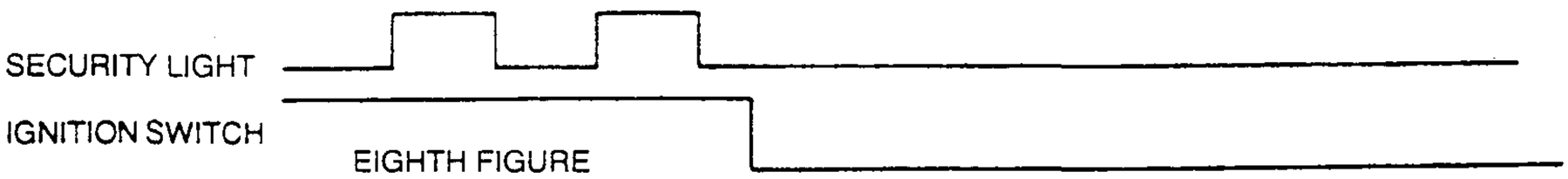
- The ignition switch is turned from LOCK to ON while the security light is on.



- The ignition switch is turned from LOCK to ON while the security light is off.



- There is a mistake in the code word.

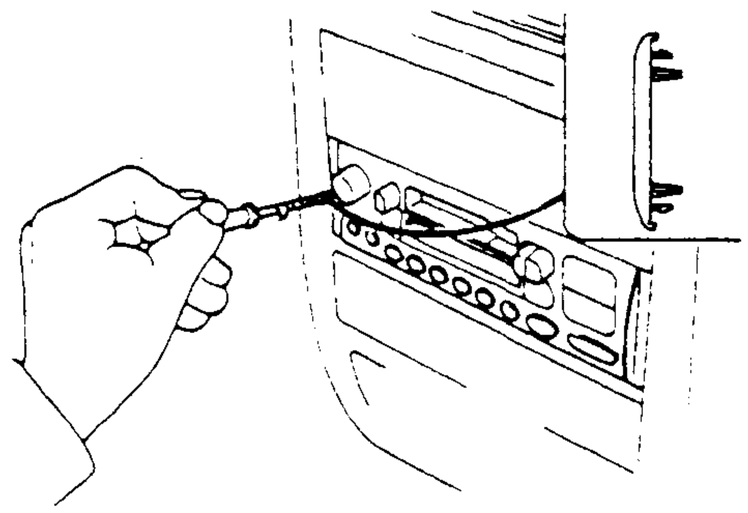


AUDIO

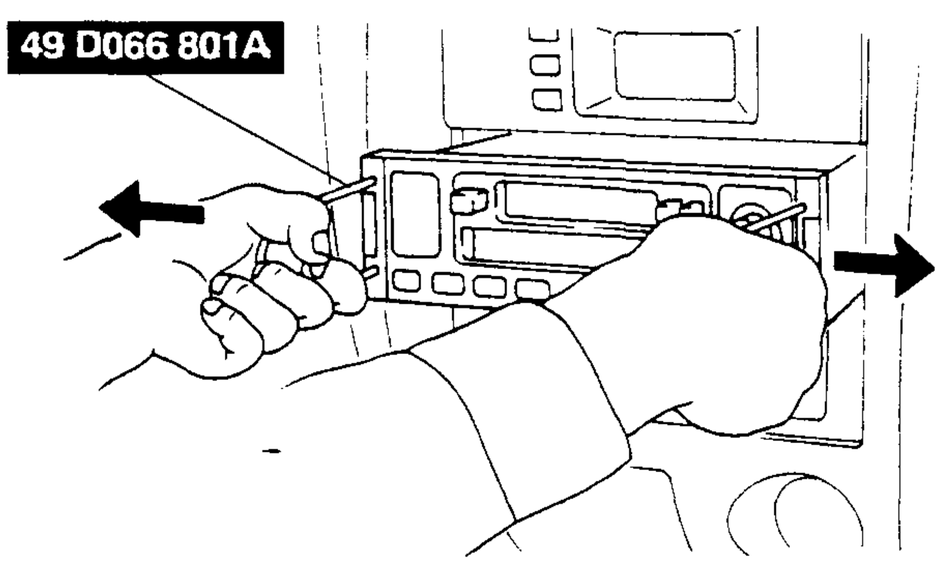
AUDIO UNIT REMOVAL

Note
- To deter would-be thieves, MW/U1/U2 radio with cassette player has a removable front panel without which the radio will not operate.

1. Disconnect the negative battery cable.
2. Remove the hole covers by inserting a small, tape-wrapped flathead screwdriver into the slot and carefully pry them off without scratching the center panel. Pry up and pull off the hole covers carefully to prevent the posts from breaking off.



3. With the beveled parts of the **SST** (Removing Tool) facing inward, insert them into the unit.
4. Pull the **SST** (Removing Tool) outward and rearward to slide out the unit.



5. Disconnect the connectors and antenna jack.

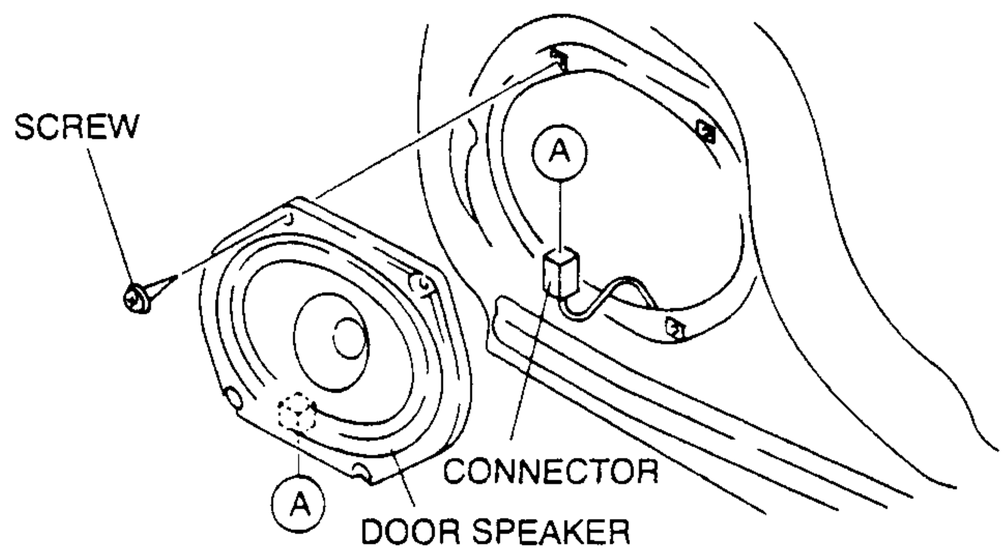
AUDIO UNIT INSTALLATION

Caution
- **Make certain that the wiring harness and antenna feeder are not caught between the unit and dashboard. If the harness or the antenna feeder is caught between the unit and dashboard, it may become the cause of trouble or malfunctions.**

1. Connect the connectors and antenna jack.
2. Insert the unit until each clip clicks.
3. Install the hole covers.
4. Connect the negative battery cable.

DOOR SPEAKER REMOVAL/INSTALLATION

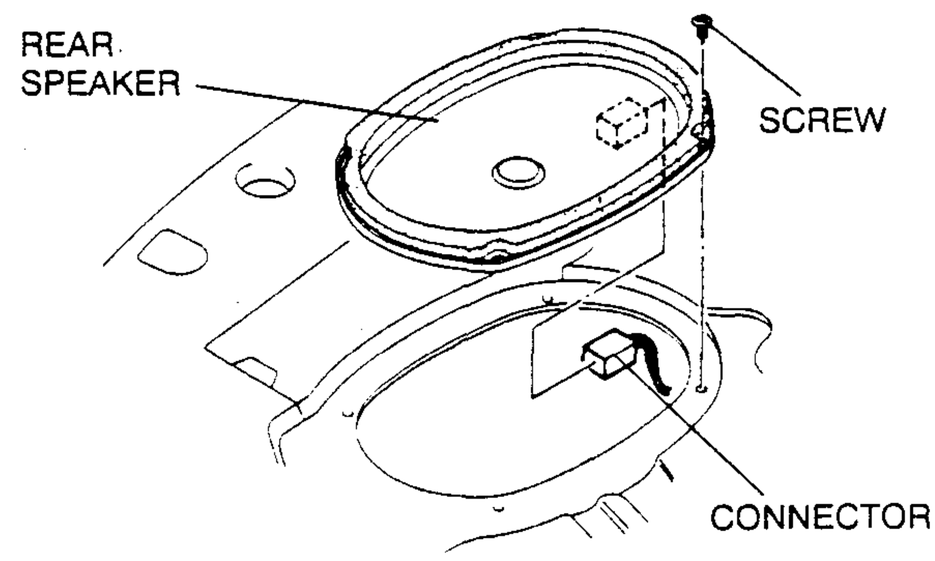
1. Disconnect the negative battery cable.
2. Remove the door trim. (Refer to section S, TRIM, FRONT DOOR TRIM REMOVAL/INSTALLATION.)(Refer to section S, TRIM, REAR DOOR TRIM REMOVAL/INSTALLATION.)
3. Remove the screws.
4. Disconnect the connector and remove the door speaker.



5. Position the door speaker so that the terminals face downward, and install in the reverse order of removal.

REAR SPEAKER REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the rear package trim. (Refer to section S, TRIM, REAR PACKAGE TRIM REMOVAL/INSTALLATION.)
3. Remove the screws.
4. Disconnect the connector and remove the rear speaker.



5. Install In the reverse order of removal.

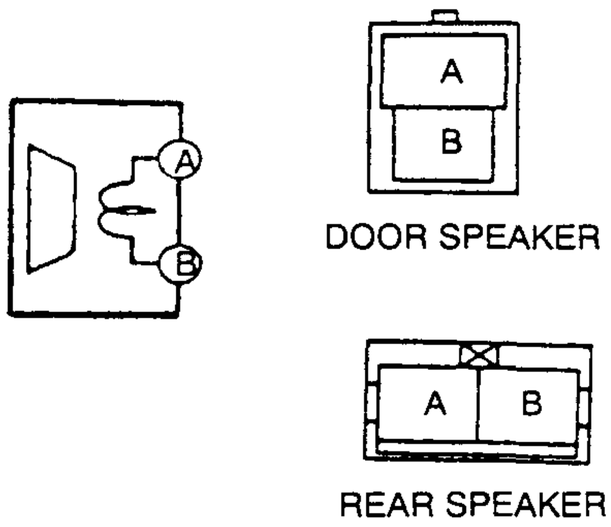
DOOR SPEAKER, REAR SPEAKER INSPECTION

1. Remove the appropriate speaker.
2. Check for resistance between the speaker terminals by using an ohmmeter.

○-W-○ : Resistance

Speaker	Terminal		
	A	B	
Door speaker	○—W—○		R_1
Rear speaker	○—W—○		R_2

R_1: 4 Ω R_2: 3.2—4.2 Ω



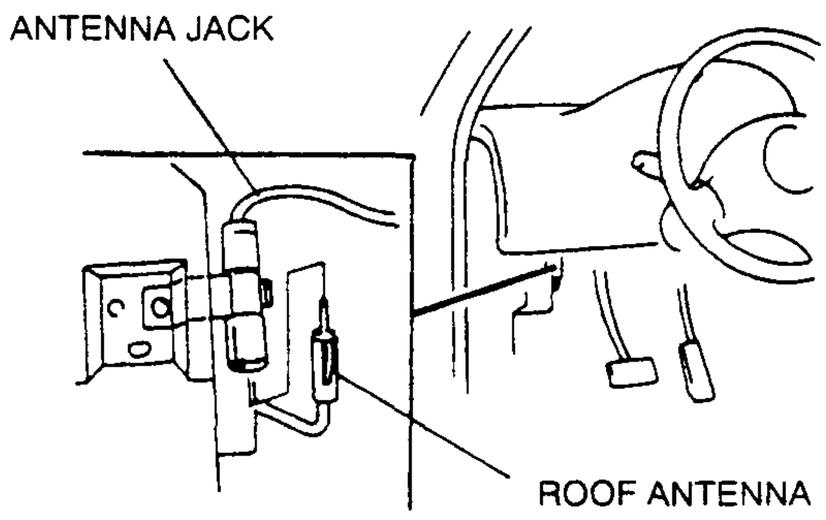
3. Touch the leads of an ohmmeter to the speaker terminals and verify that the speaker clicks.

Range
×1 Ω

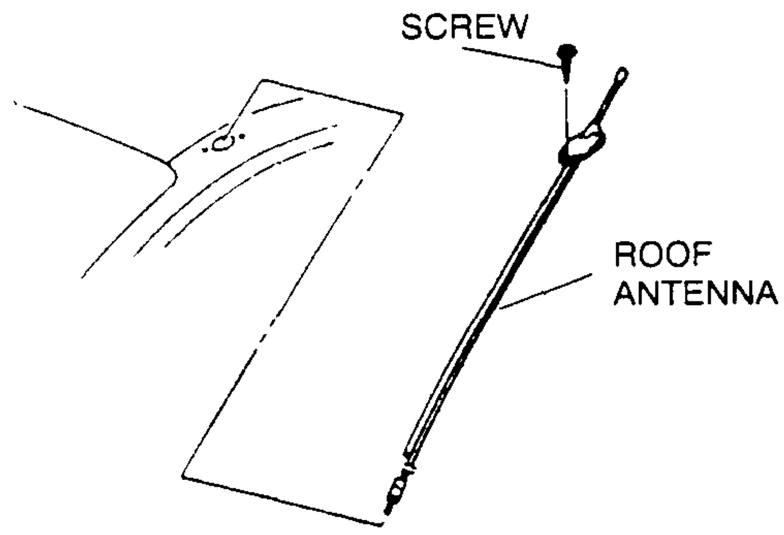
4. *If not as specified, replace the speaker.*

ROOF ANTENNA REMOVAL

1. Disconnect the negative battery cable.
2. Remove the driver's side front side trim. (Refer to section S, TRIM, FRONT SIDE TRIM REMOVAL/INSTALLATION.)
3. Disconnect the antenna jack.

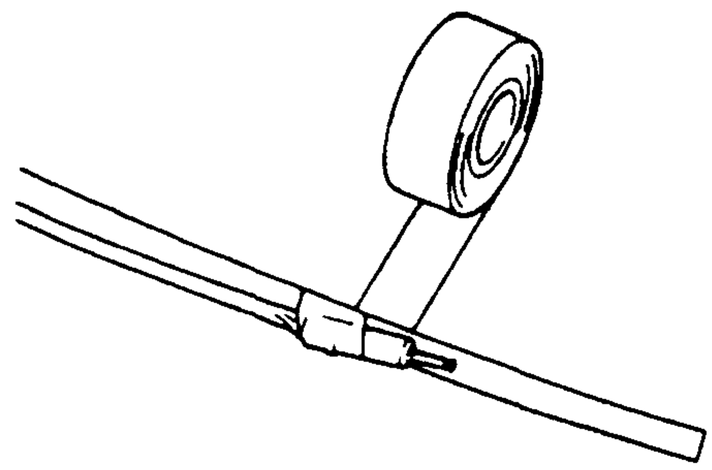


4. Remove the screw and pull out the roof antenna.



ROOF ANTENNA INSTALLATION

1. Tape the antenna jack to the antenna drain hose.



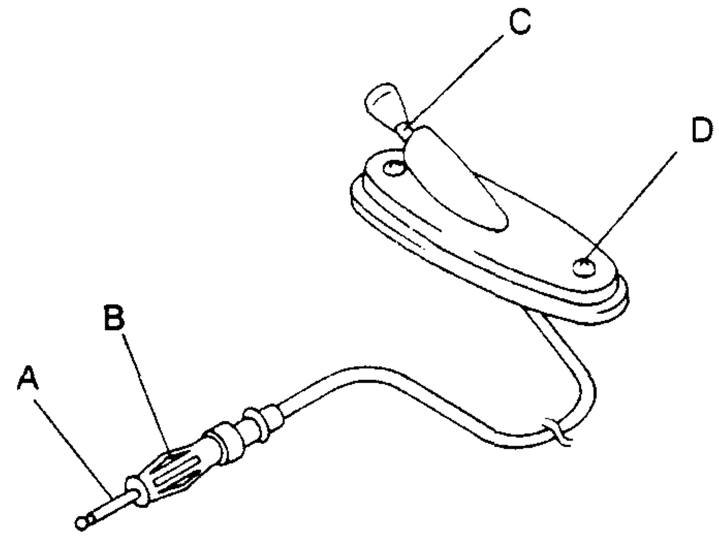
2. Pass the roof antenna and antenna drain hose through the A-pillar from the hole in the roof.
3. Install the screws and install the roof antenna.
4. Connect the antenna jack.
5. Install the driver's side front side trim. (Refer to section S, TRIM, FRONT SIDE TRIM REMOVAL/INSTALLATION.)
6. Connect the negative battery cable.

ROOF ANTENNA INSPECTION

1. Remove the driver's side front side trim. (Refer to section S, TRIM, FRONT SIDE TRIM REMOVAL/INSTALLATION.)
2. Disconnect the antenna jack.
3. Verify that there is no continuity between roof antenna terminal A and B by using an ohmmeter.
4. Check for continuity between the roof antenna terminals by using an ohmmeter.

○—○ : Continuity

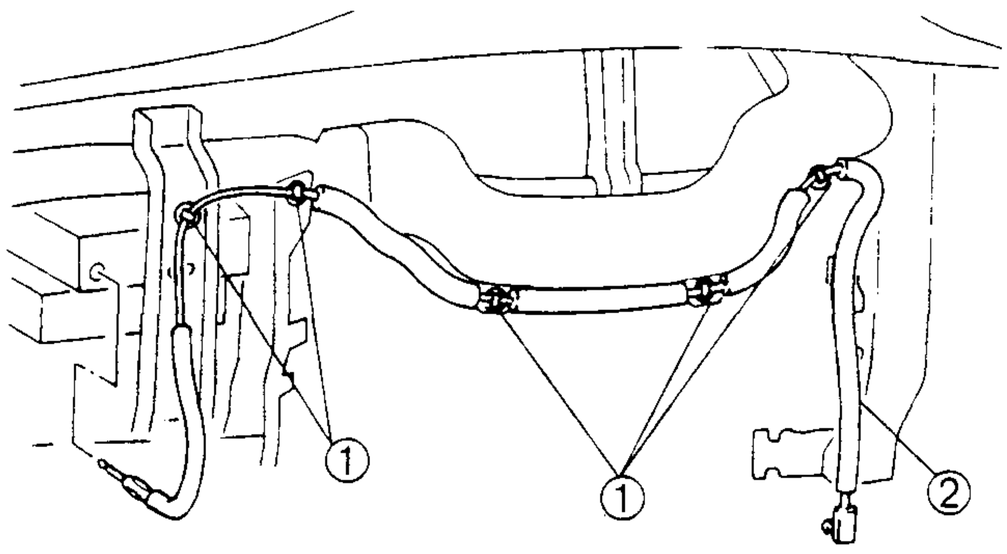
Step	Terminal			
	A	B	C	D
1	○		○	
2		○		○



5. If not as specified, replace the roof antenna.

ANTENNA FEEDER REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the driver's side front side trim. (Refer to section S, TRIM, FRONT SIDE TRIM REMOVAL/INSTALLATION.)
3. Disconnect the antenna jack.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.



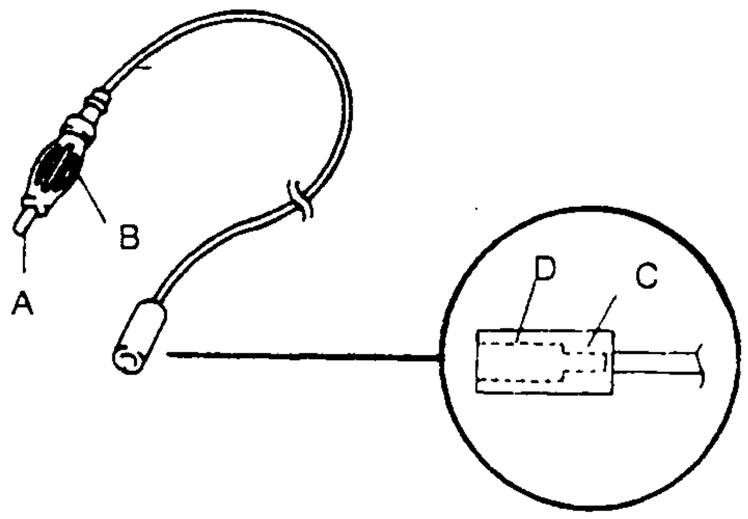
1	Clip
2	Antenna feeder

ANTENNA FEEDER INSPECTION

1. Remove the driver's side front side trim. (Refer to section S, TRIM, FRONT SIDE TRIM REMOVAL/INSTALLATION.)
2. Disconnect the antenna jack.
3. Verify that there is no continuity between antenna feeder terminal A and B by using an ohmmeter.
4. Check for continuity between the antenna feeder terminals by using an ohmmeter.

○—○ : Continuity

Step	Terminal			
	A	B	C	D
1	○——	——	——○	
2		○——	——	——○

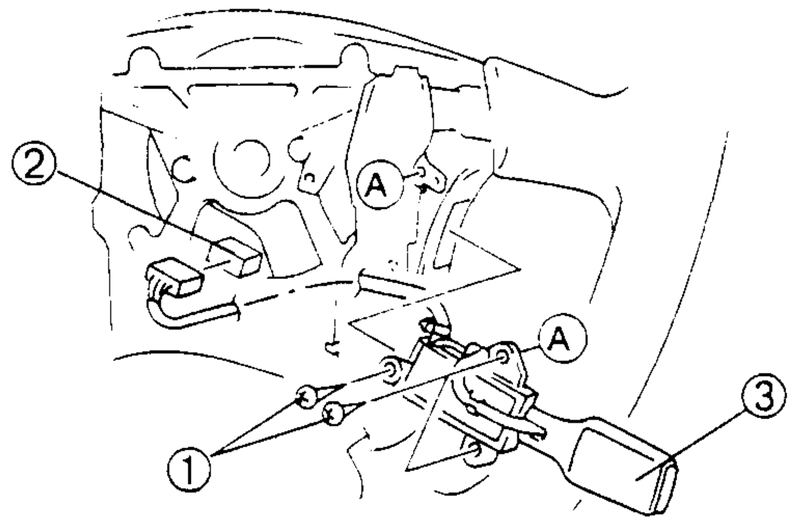


5. If not as specified, replace the antenna feeder.

CRUISE CONTROL SYSTEM

CRUISE CONTROL SWITCH REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the driver-side air bag module. (Refer to AIR BAG SYSTEM, DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.



1	Screw
2	Connector
3	Cruise control switch

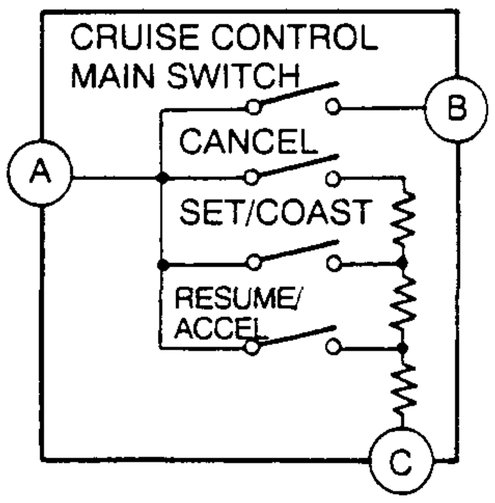
CRUISE CONTROL SWITCH INSPECTION

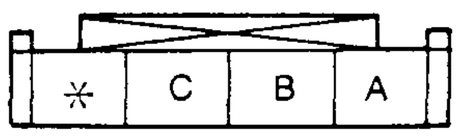
1. Disconnect the negative battery cable.
2. Remove the driver-side air bag module. (Refer to AIR BAG SYSTEM, DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
3. Disconnect the cruise control switch connector.
4. Measure the resistance and check for continuity between the cruise control switch terminals by using an ohmmeter.

○—○ : Continuity ○WW○ : Resistance

Switch position	Terminal		
	A	B	C
Cruise control main switch hold at on	○——	——○	
RESUME/ACCEL switch hold at on	○——	WW	——○ R_1
SET/COAST switch hold at on	○——	WW	——○ R_2
CANCEL switch hold at on	○——	WW	——○ R_3
Other			

R_1 : Approx. 68 Ω R_2: Approx. 198 Ω R_3: Approx. 418 Ω

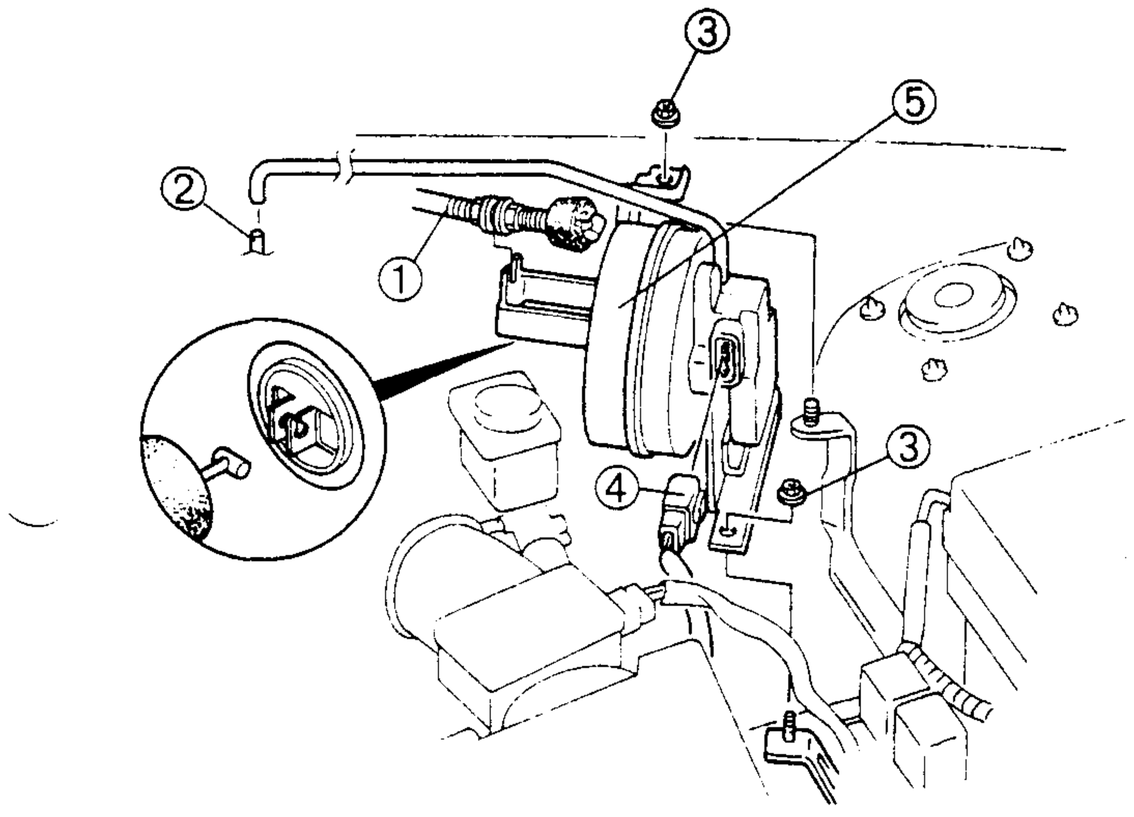




5. If not as specified, replace the cruise control switch.

CRUISE ACTUATOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Adjust the actuator cable.(Refer to ACTUATOR CABLE ADJUSTMENT.)



1	Actuator cable
2	Vacuum hose
3	Nut
4	Connector
5	Cruise actuator

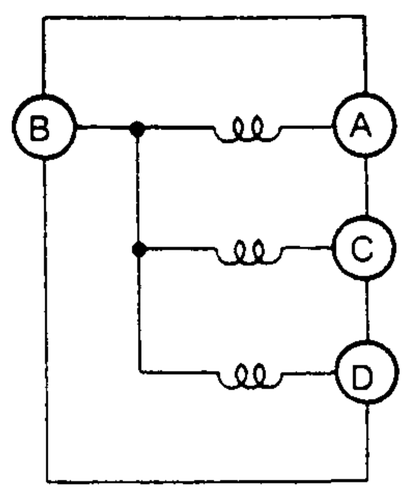
CRUISE ACTUATOR INSPECTION

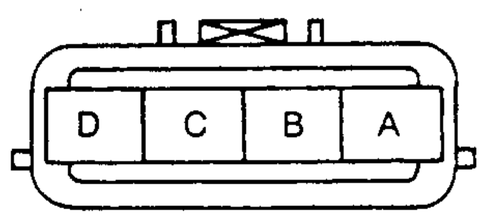
1. Disconnect the negative battery cable.
2. Disconnect the cruise actuator connector
3. Measure the resistance between the cruise actuator terminals by using an ohmmeter.

○-W-○ : Resistance

Step	Terminal			
	A	B	C	D
1	○-W-○			R_1
2		○-W-○		R_2
3		○-W-○		R_3

R_1: Approx. 55 Ω R_2: Approx. 21 Ω R_3: Approx. 55 Ω





4. Disconnect the actuator cable from the accelerator pedal.
5. Allow the engine to idle.
6. Connect battery positive voltage and a ground to the terminals as shown and confirm the operation of the actuator cable.

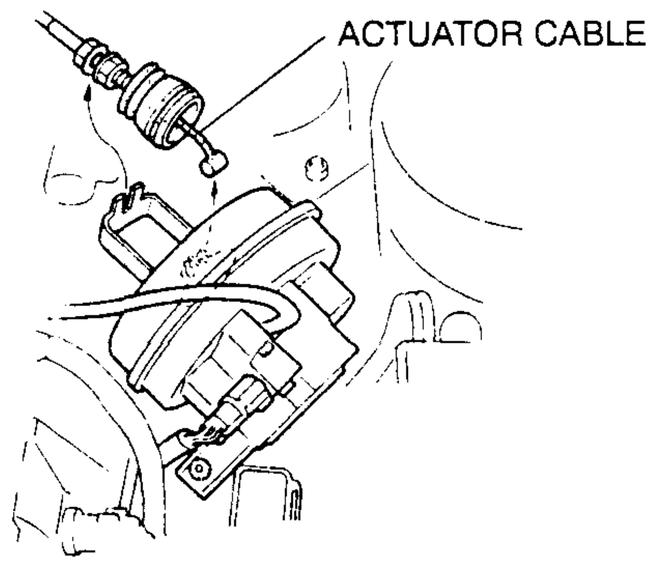
B+: Battery positive voltage

Step	Terminal connection				Operation of actuator cable
	A	B	C	D	
1	Ground	B+	Ground	Ground	Pull
2	Ground	B+	—	Ground	Hold
3	—	B+	—	Ground	Extend
4	—	—	—	—	Released

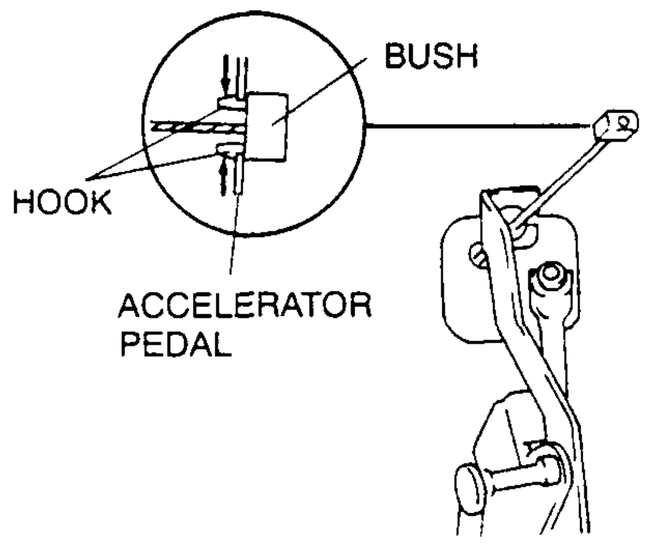
7. If not as specified, replace the cruise the actuator.

ACTUATOR CABLE REMOVAL/INSTALLATION

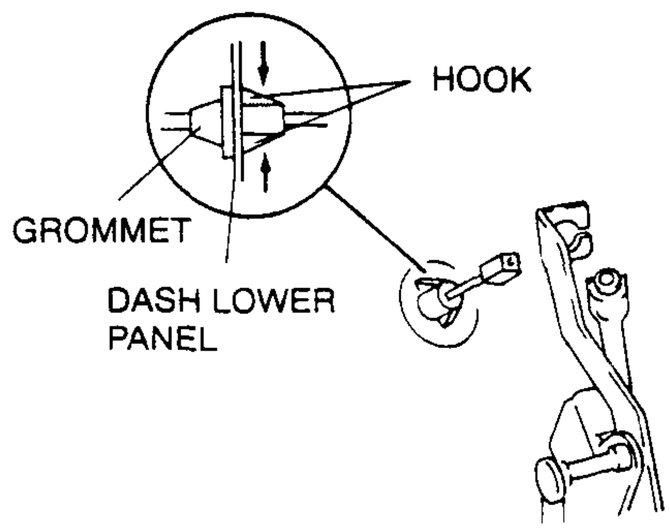
1. Disconnect the actuator cable from the cruise actuator.
2. Remove the clamps, and remove the actuator cable.



3. Press the hooks of the bush, and remove it from the accelerator pedal.



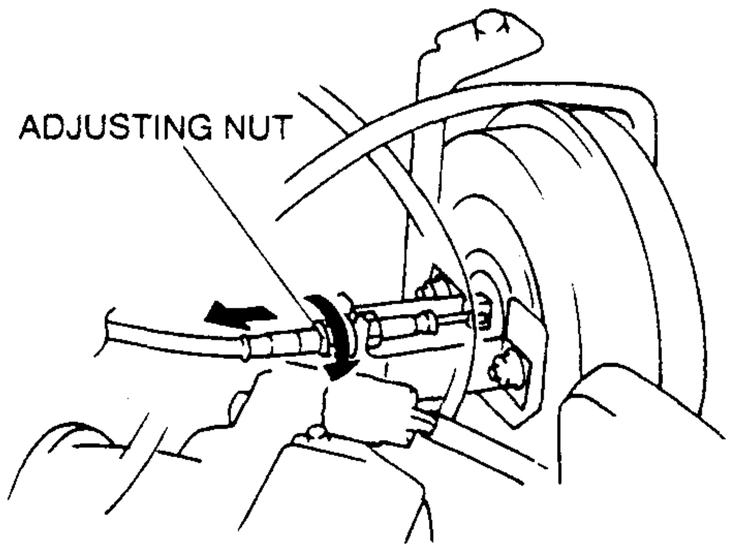
4. Press the hooks of the grommet, and remove it from the dash lower panel.



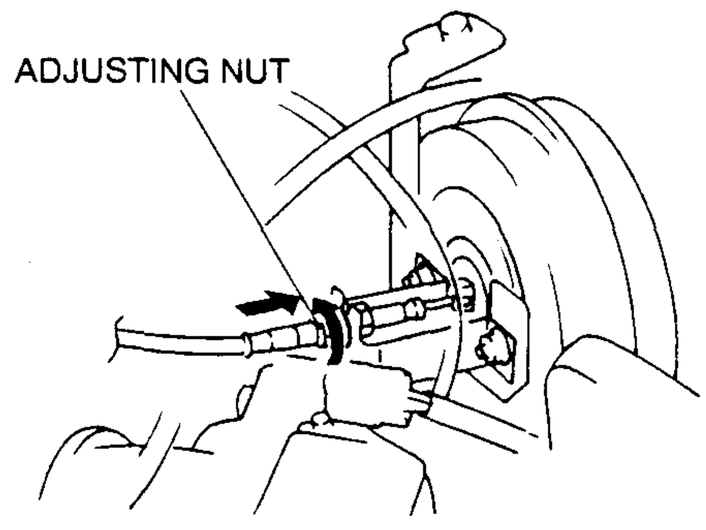
5. Push the actuator cable through the dash lower panel to remove it.
6. Install in the reverse order of removal.
7. Adjust the actuator cable.(Refer to ACTUATOR CABLE ADJUSTMENT.)

ACTUATOR CABLE ADJUSTMENT

1. Turn the adjusting nut until the throttle lever starts moving to eliminate the actuator cable play.



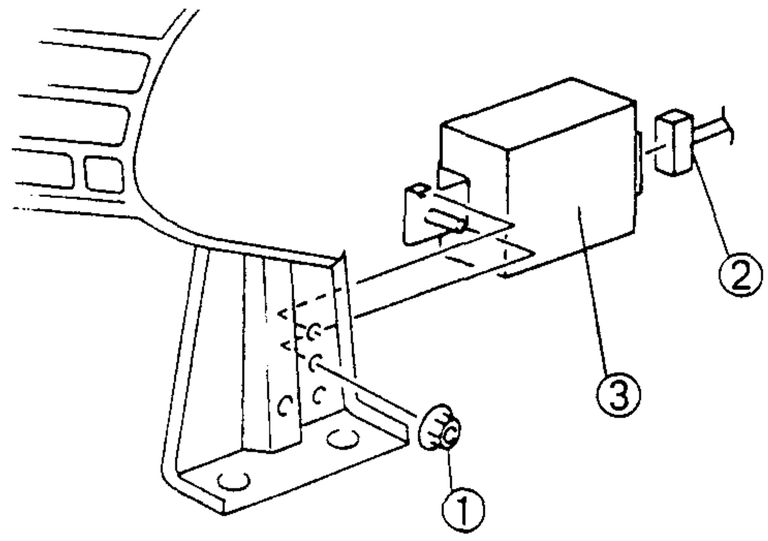
2. Then turn the adjusting nut in reverse twice (**approximately 1—5 mm {0.04—0.19 in }**) free play is obtained.



3. Tighten the nut.

CRUISE CONTROL MODULE REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the console.(Refer to section S, DASHBOARD AND CONSOLE, CONSOLE REMOVAL/INSTALLATION.)
3. Remove the passenger's side side wall.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.



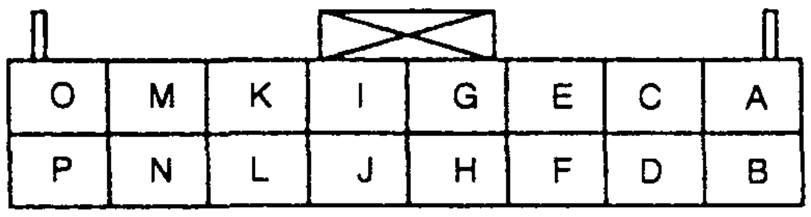
1	Nut
2	Connector
3	Cruise control module

CRUISE CONTROL MODULE INSPECTION

1. Remove the console.(Refer to section S, DASHBOARD AND CONSOLE, CONSOLE REMOVAL/INSTALLATION.)
2. Remove the passenger's side side wall.
3. Pull out the cruise control module with the cruise control module connector connected.
4. Measure the voltage at the cruise control module terminals as indicated below.
5. Disconnect the cruise control module connector before checking for continuity at terminal P.
6. If not as specified, inspect the parts listed under "Inspection area " and the related wiring harnesses.
7. If the parts and wiring harnesses are okay but the system still does not work properly, replace the cruise control module.

Terminal Voltage List (Reference)

B+: Battery positive voltage



Terminal	Signal	Connection	Test condition		Voltage (V)	Inspection area
A	Cruise actuator control	Cruise actuator (Vent 1)	Ignition switch at ON	Cruise control main switch hold at on	B+	• Brake switch • Cruise actuator
				Other	0	
B	Cruise actuator control	Cruise actuator (Vacuum)	Ignition switch at ON	Cruise control main switch hold at on	B+	• Brake switch • Cruise actuator
				Other	0	
C	Cruise actuator control	Cruise actuator (Vent 2)	Ignition switch at ON	Cruise control main switch hold at on	B+	• Brake switch • Cruise actuator
				Other	0	
D	Cruise set indicator light output	Cruise set indicator light	Ignition switch at ON		B+	• METER 10 A fuse • Instrument cluster
			Ignition switch at LOCK or ACC		0	
E	IG1	METER 10 A fuse	Ignition switch at ON		B+	METER 10 A fuse
			Ignition switch at LOCK or ACC		0	
F	Cruise main indicator light input	Cruise main indicator light	Ignition switch at ON	Cruise control main switch hold at on	B+	–
				Other	0	
G	O/D off	ECM (PCM)	Ignition switch at ON		B+	ECM (PCM)
			Ignition switch at LOCK or ACC		0	
H	Cruise actuator power supply	Brake switch	Ignition switch at ON	Cruise control main switch hold at on	B+	–
				Cruise control main switch off	0	
I	Test	Data link connector	–		–	–

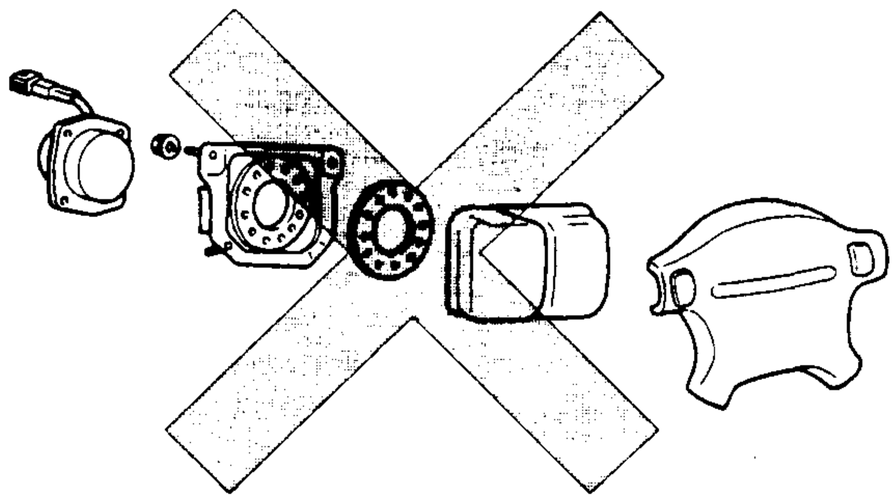
Terminal	Signal		Connection	Test condition		Voltage(V) /Continuity	Inspection area
J	ATX	Selector lever position	Transaxle range switch	Ignition switch at ON	Selector lever at N or P range	0	Transaxle range switch
					Other	B+	
	MTX	Clutch switch on/off	Clutch switch	Ignition switch at ON	Depress clutch pedal	0	Clutch switch
					Other	B+	
K	Brake switch on/off		Brake switch	Depress brake pedal		B+	Brake switch
				Release brake pedal		0	
L	Cruise control switch position		Cruise control switch	Ignition switch at ON and cruise control main switch hold at on	Cruise control main switch hold at on	Approx. 5.4	Cruise control switch
					SET/COAST switch hold at on	Approx. 2	
					RESUME/ACCEL switch hold at on	Approx. 1	
					CANCEL switch hold at on	Approx.3	
M	Brake switch on/off		Brake switch	Ignition switch at ON and cruise control main switch hold at on	Depress brake pedal	0	Brake switch
					Other	B+	
N	Vehicle speed		Vehicle speed sensor	Ignition switch at ON and cruise control main switch hold at on. Front tire rotating		Alternates 0 and 5	• METER 10 A fuse • Instrument cluster
O	Cruise control main switch input		Cruise control switch	Ignition switch at ON	Cruise control main switch hold at on	0	Cruise control switch
					Cruise control main switch off	B+	
P	Cruise control module ground		GND	Constant : check for continuity to ground		Yes	GND

AIR BAG SYSTEM

SERVICE WARNINGS

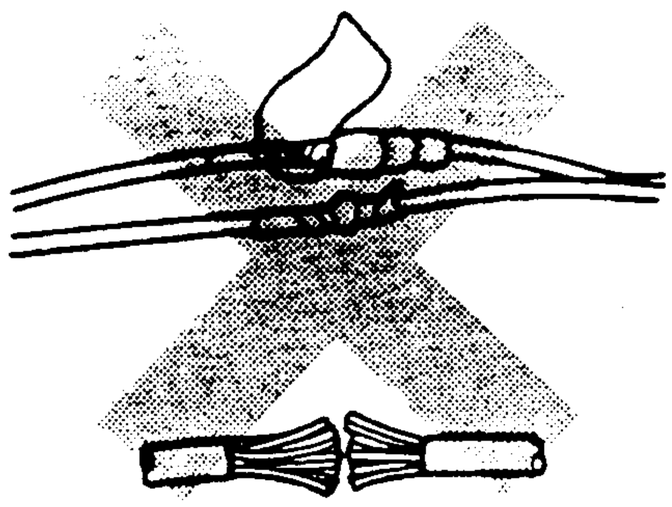
Component Disassembly

- **Disassembling and reassembling the components of the air bag system can render the system inoperative, which may result in serious injury or death in the event of an accident. Do not disassemble any air bag system component.**



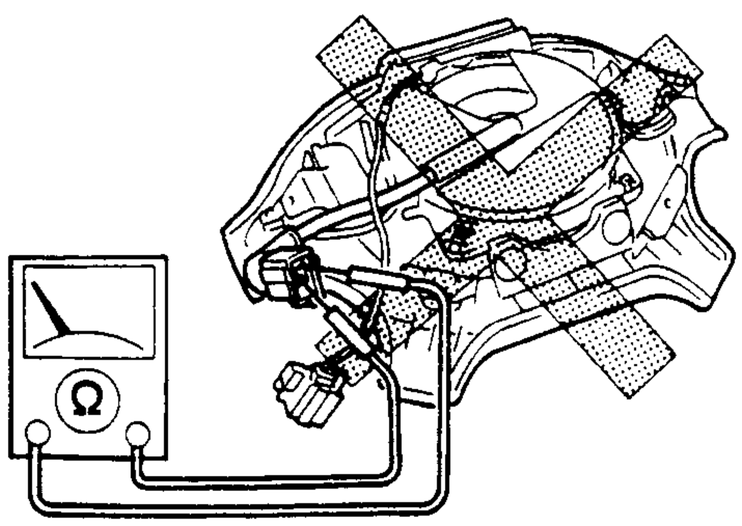
Wiring Harness Repair

- **Incorrectly repairing an air bag system wiring harness can accidently deploy the air bag module or pre-tensioner seat belt, which can cause serious injury. If a problem is found in the system wiring, replace the wiring harness. Do not try to repair it.**



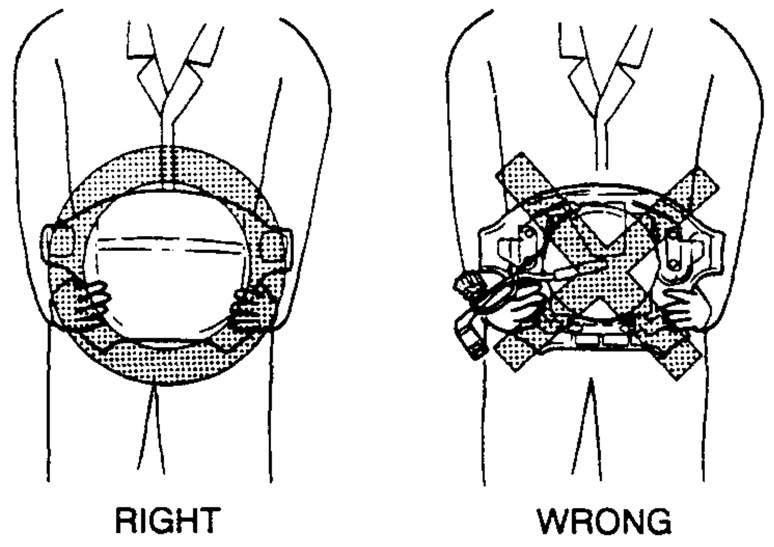
Air Bag Module Inspection

- **Inspecting the air bag module by using an ohmmeter can deploy the air bag module, which can cause serious injury. Do not use an ohmmeter to inspect the air bag module.**



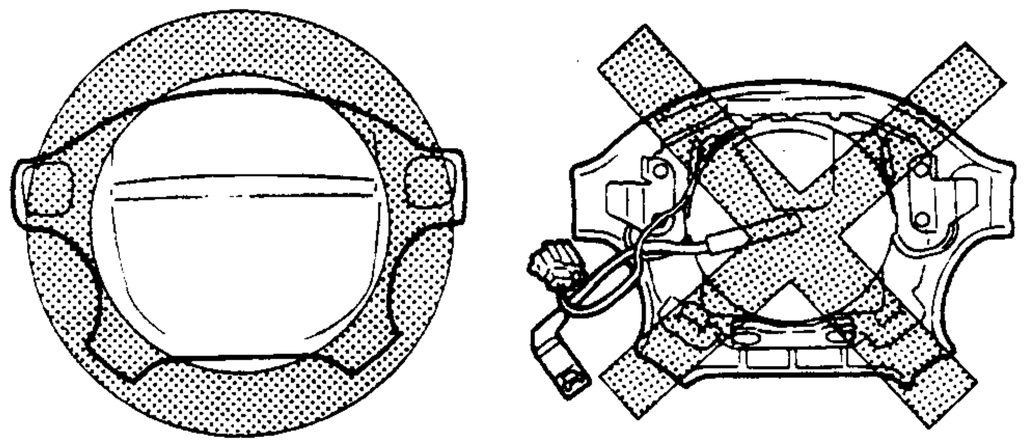
Air Bag Module Handling

- **A live (undeployed) air bag module may accidently deploy when it is handled and cause serious injury. When carrying a live air bag module, point the front surface away from your body to lessen the chance of injury in case it deploys.**



RIGHT WRONG

- **A live air bag module placed face down on a surface is dangerous. If the air bag module deploys, the motion of the module can cause serious injury. Always face the front surface up to reduce the motion of the module in case it accidently deploys.**



RIGHT WRONG

Side Air Bag Sensor Handling

- **Installing a connected side air bag sensor is dangerous. Movement generated during installation can cause the crash sensor inside the side air bag sensor to send an electrical signal to the side air bag module. This will deploy the side air bag module, which may result in serious injury. Therefore, before connecting the side air bag sensor, firmly mount the side air bag sensor to the vehicle.**
- **Disconnecting the side air bag sensor connector or removing the side air bag sensor with the ignition switch at ON can cause the side air bag module to deploy, which may seriously injure you. Before disconnecting the side air bag sensor connector or removing the side air bag sensor, turn the ignition switch to LOCK, then disconnect the negative battery cable and wait for more than 1 minute to allow the backup power supply of the side air bag sensors to deplete its stored power.**

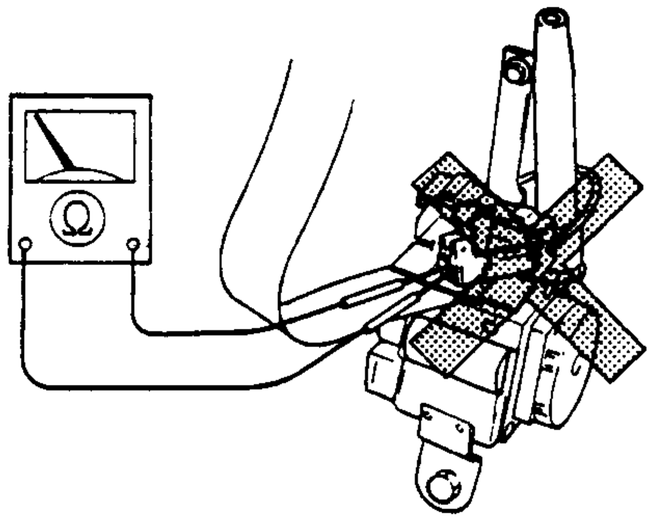
- **For this vehicle with single point sensor, once an air bag is deployed due to an accident or other causes, the side air bag sensor must be replaced with a new one even if the used one does not have any external signs of damage. The used side air bag sensor may have been damaged internally which may cause it not to operate properly, resulting in major injuries or even death. The used single point side air bag sensor cannot be bench checked or selfchecked.**

SAS Unit Handling

- **Installing a connected SAS unit is dangerous. Movement generated during installation can cause the crash sensor inside the unit to send an electrical signal to the air bag modules and pre-tensioner seat belts. This will deploy the air bag modules and pre-tensioner seat belts, which may result in serious injury. Therefore, before connecting the SAS unit, firmly mount the unit to the vehicle.**
- **Disconnecting the SAS unit connector or removing the SAS unit with the ignition switch at ON can cause the air bag modules and pre-tensioner seat belts to deploy, which may seriously injure you. Before disconnecting the SAS unit connector or removing the SAS unit, turn the ignition switch to LOCK, then disconnect the negative battery cable and wait for more than 1 minute to allow the backup power supply of the SAS unit to deplete its stored power.**
- **For this vehicle with single point sensor, once an air bag is deployed due to an accident or other causes, the SAS unit must be replaced with a new one even if the used one does not have any external signs of damage. The used SAS unit may have been damaged internally which may cause it not to operate properly, resulting in major injuries or even death. The used single point SAS unit cannot be bench checked or selfchecked.**

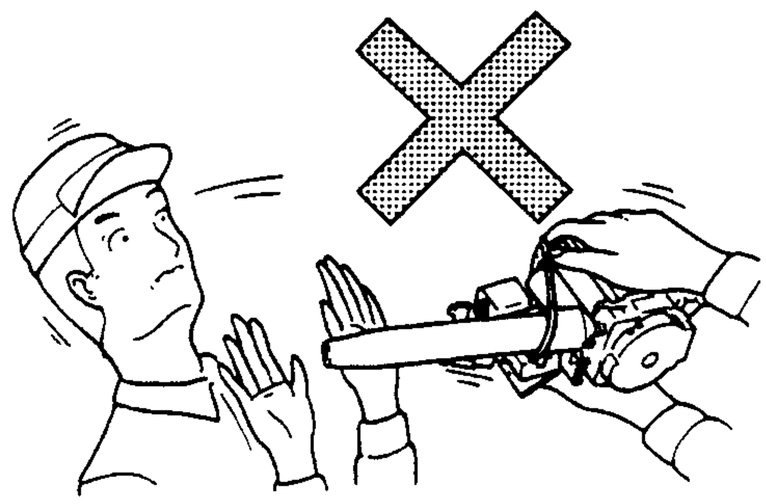
Pre-tensioner Seat Belt Inspection

- **Inspecting the pre-tensioner seat belt by using an ohmmeter can deploy the pre-tensioner seat belt, which can cause serious injury. Do not use an ohmmeter to inspect the pre-tensioner seat belt.**



Pre-tensioner Seat Belt Handling

- **A live (undeployed) pre-tensioner seat belt may accidently deploy when it is handled and cause serious injury. When carrying a live pre-tensioner seat belt, point the top of the cylinder downward to lessen the chance of injury in case it deploys.**

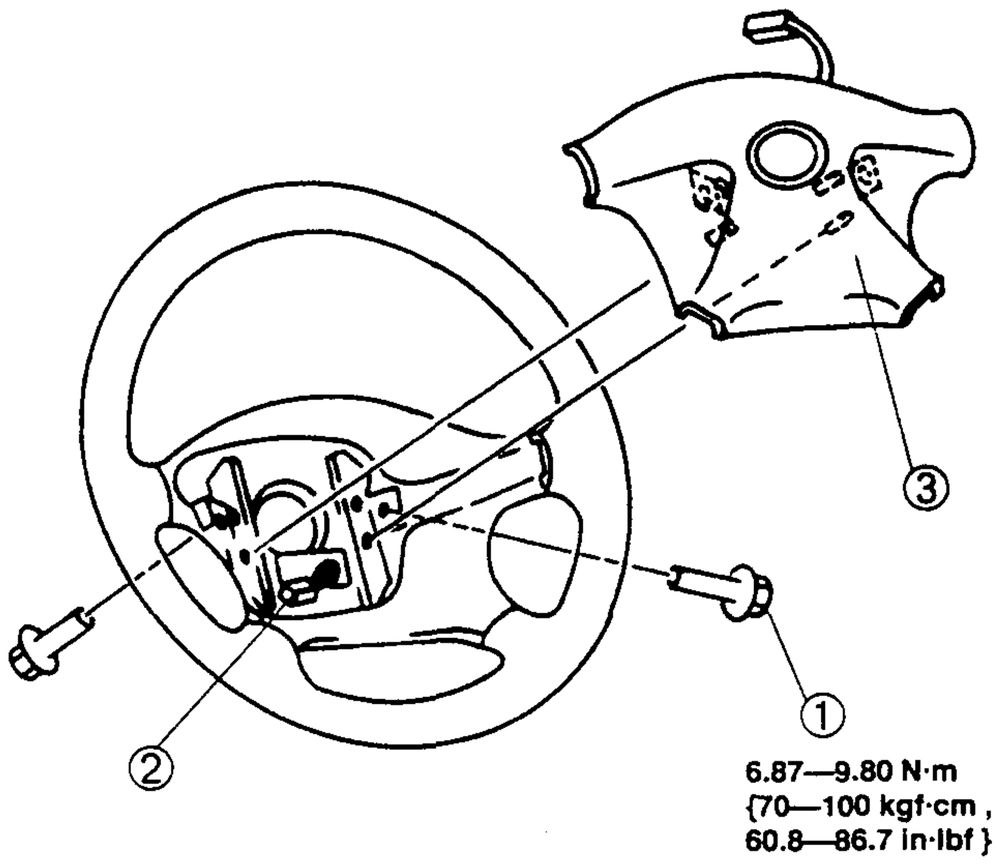


DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION

Warning

- **Handling the air bag module improperly can accidently deploy the air bag module, which may seriously injure you. Read SERVICE WARNINGS before handling the air bag module. (Refer to SERVICE WARNINGS.)**

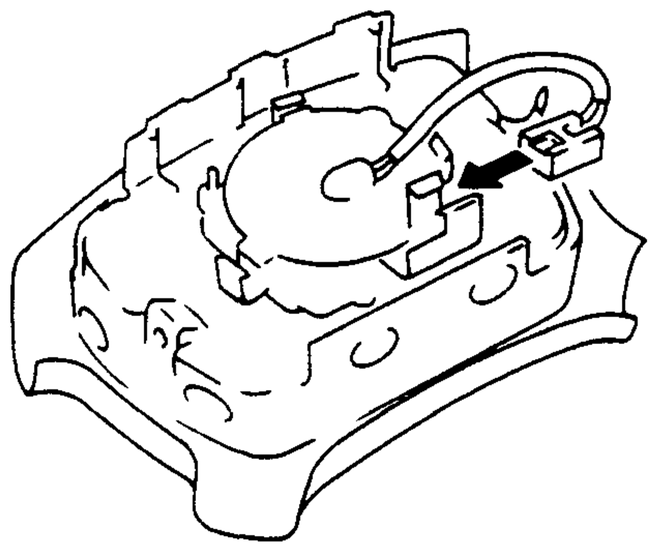
1. Turn the ignition switch to LOCK.
2. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit to deplete its stored power.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Turn the ignition switch to ON.
6. Verify that the air bag system warning light illuminates for **approximately 6 seconds** then goes off.
7. If the air bag system warning light remains on, off, or repeats flashing after servicing, there are malfunctions in the system. Carry out the inspection again. (Refer to ON-BOARD DIAGNOSTIC FUNCTION, AIR BAG SYSTEM.)



1	Bolt ☞ Installation Note
2	Connector ☞ Installation Note
3	Driver-side air bag module

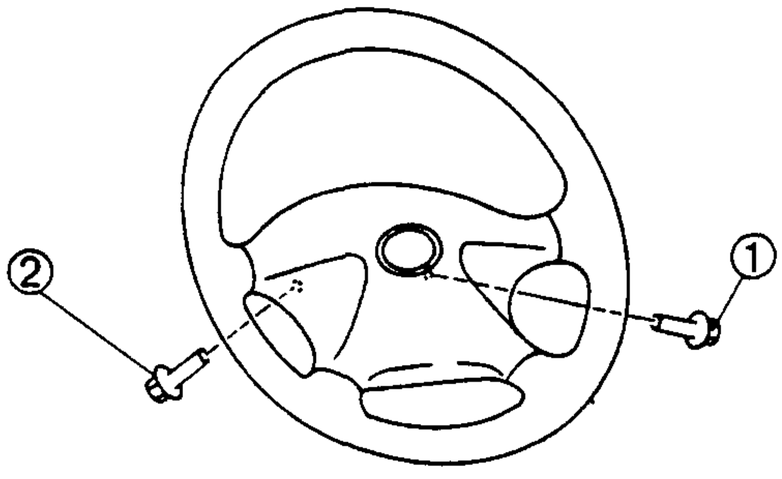
Connector Installation Note

- Install the connector as shown in the figure.



Bolt Installation Note

- Tighten the bolts in the order shown in the figure.

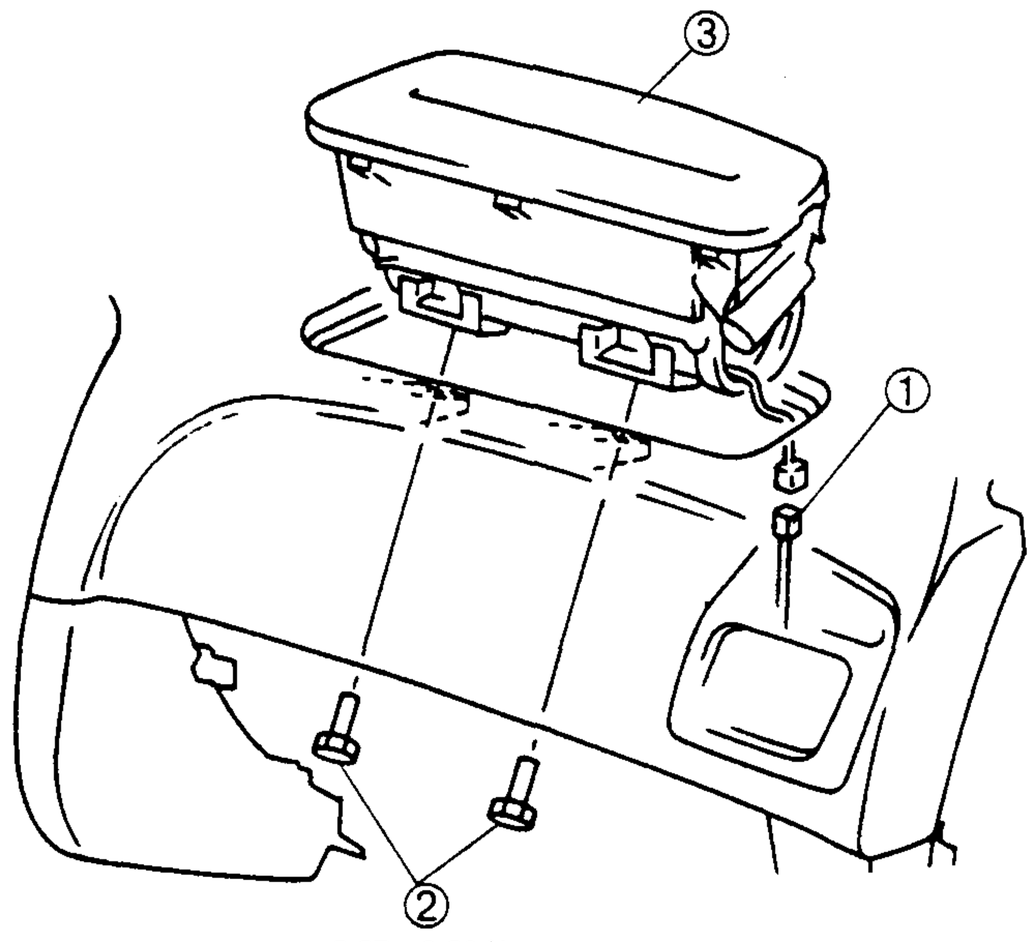


PASSENGER-SIDE AIR BAG MODULE REMOVAL/ INSTALLATION

Warning

- **Handling the air bag module improperly can accidently deploy the air bag module, which may seriously injure you. Read SERVICE WARNINGS before handling the air bag module. (Refer to SERVICE WARNINGS.)**

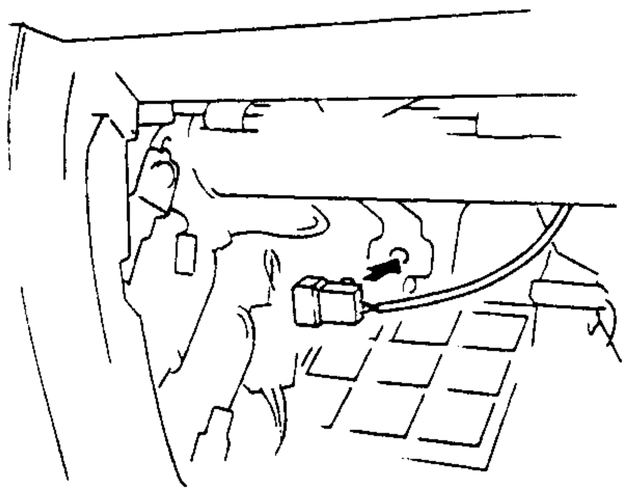
1. Turn the ignition switch to LOCK.
2. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit to deplete its stored power.
3. Remove the glove compartment.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Turn the ignition switch to ON.
7. Verify that the air bag system warning light illuminates for **approximately 6 seconds** then goes off.
8. If the air bag system warning light remains on, off, or repeats flashing after servicing, there are malfunctions in the system. Carry out the inspection again. (Refer to ON-BOARD DIAGNOSTIC FUNCTION, AIR BAG SYSTEM.)



1	Connector ☞ Installation Note
2	Bolt
3	Passenger-side air bag module

Connector Installation Note

- Install the connector as shown in the figure.



SIDE AIR BAG MODULE REMOVAL/INSTALLATION

Warning

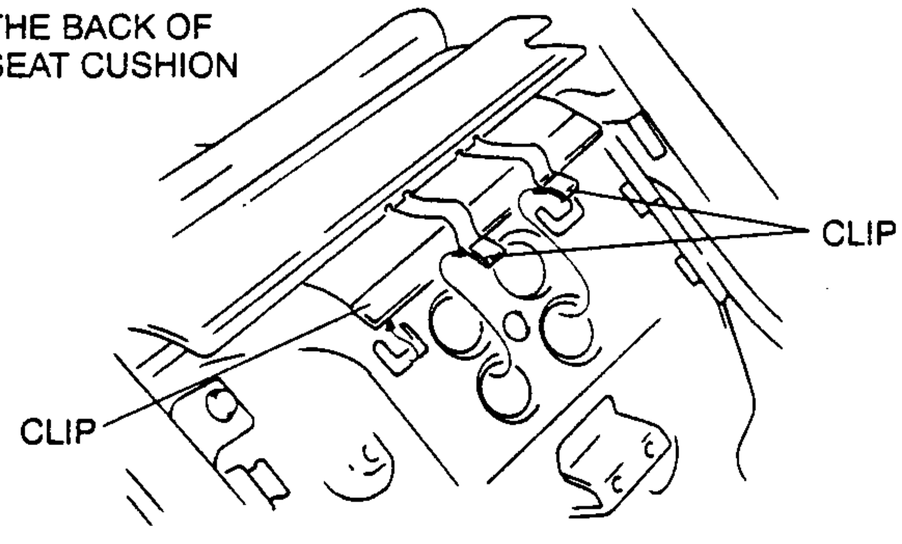
- **Handling the air bag module improperly can accidently deploy the air bag module, which may seriously injure you. Read SERVICE WARNINGS before handling the air bag module. (Refer to SERVICE WARNINGS.)**

Warning

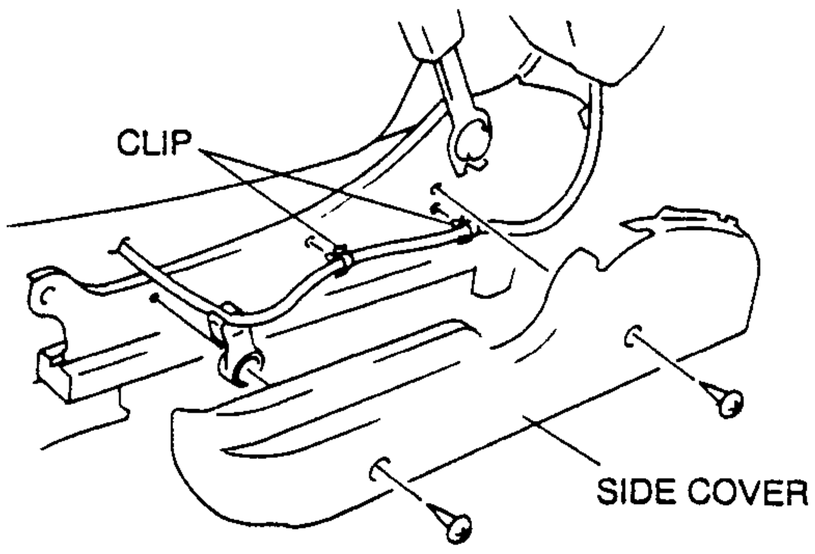
- **When the side air bag is installed, foreign body in the seat is dangerous. The foreign body is scattered when the side air bag module deploy, which may seriously injure. When the side air bag is installed, verify that there is no foreign body in the seat, install the side air bag module.**

Usual Type Seat

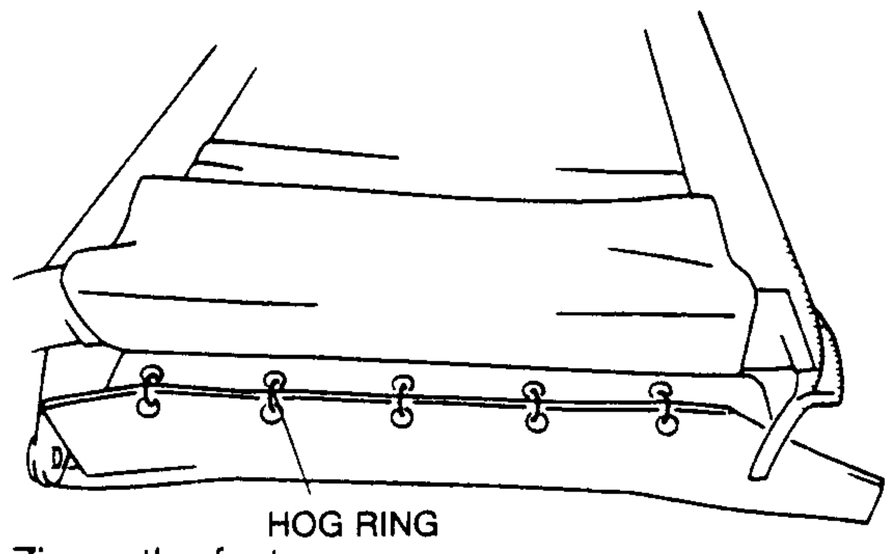
1. Remove the front seat. (Refer to section S, SEAT, FRONT SEAT REMOVAL/INSTALLATION.)
2. Remove the clips.



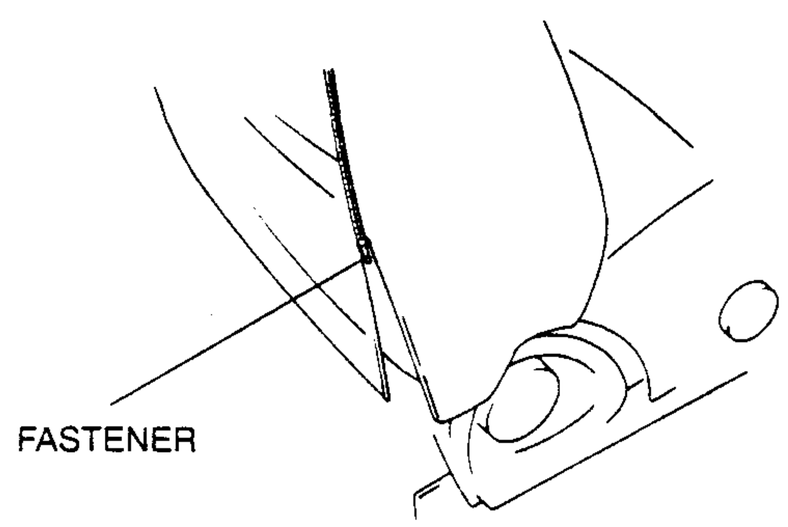
3. Remove the side cover, then harness clips.



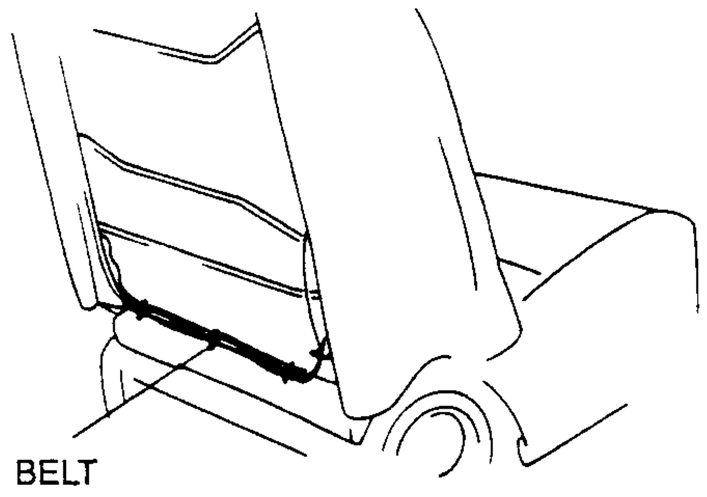
4. Remove the hog rings.



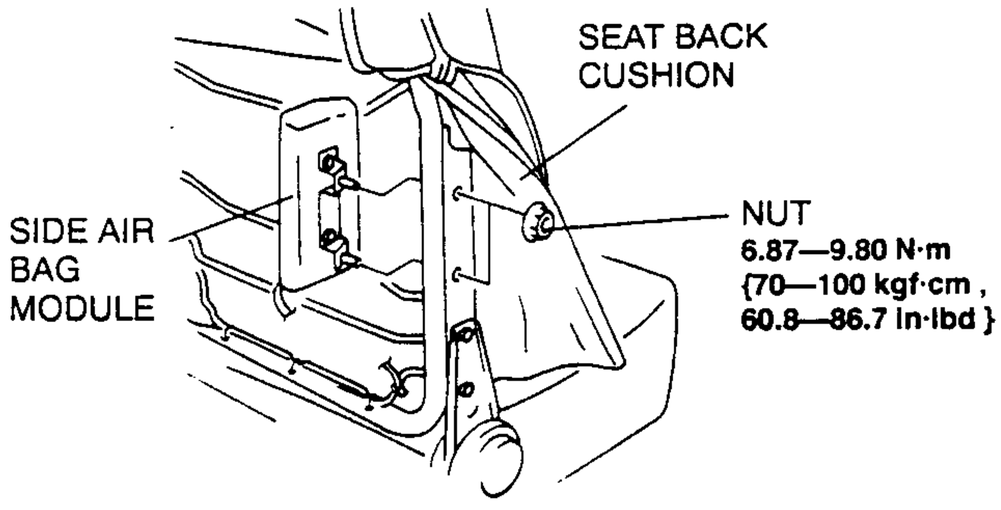
5. Zip up the fastener.



6. Remove the harness belt.



7. Partially peel off the seat back cushion. Remove the nuts, then the side air bag module.



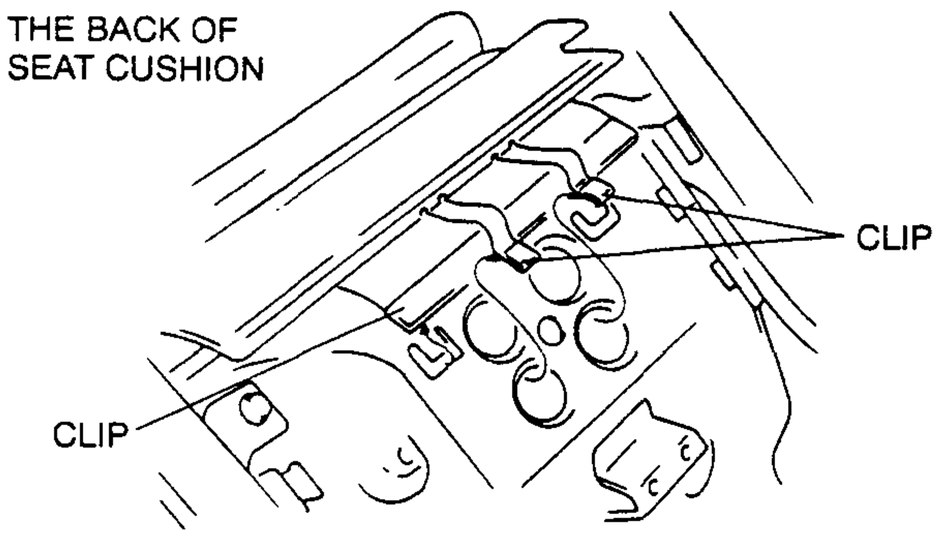
Warning

- **If the air bag harness is not secured at the marking point, side air bag module may accidently deploy and cause serious injury. Be sure to secure air bag harness at the marking point.**

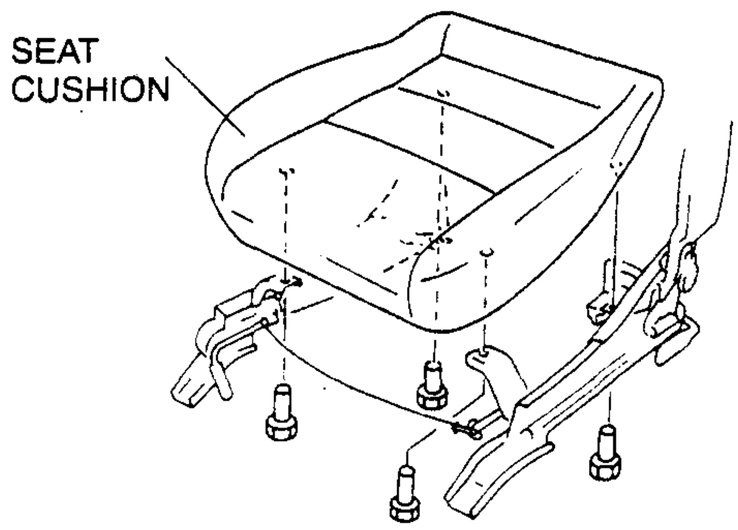
8. Install in the reverse order of removal.
9. Turn the ignition switch to ON.
10. Verify that the air bag system warning light illuminates for **approximately 6 seconds** then goes off.
11. If the air bag system warning light remains on, off, or repeats flashing after servicing, there are malfunctions in the system. Carry out the inspection again. (Refer to ON-BOARD DIAGNOSTIC FUNCTION, AIR BAG SYSTEM.)

Tray Type Seat

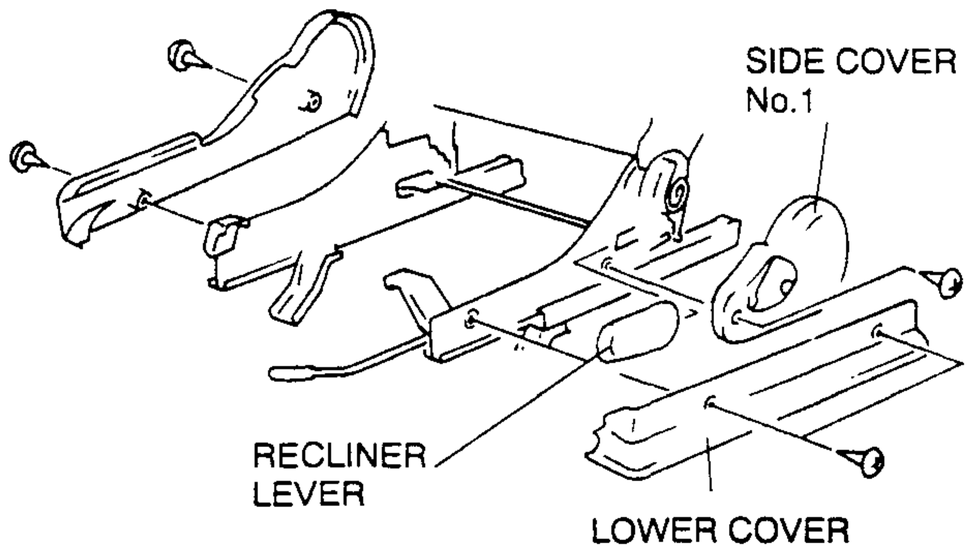
1. Remove the front seat. (Refer to section S, SEAT, FRONT SEAT REMOVAL/INSTALLATION.)
2. Remove the clips.



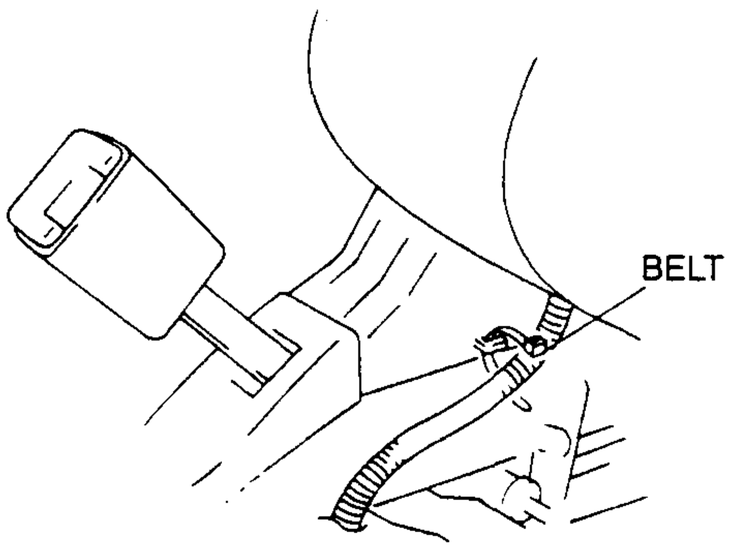
3. Remove the bolts, then the seat cushion.



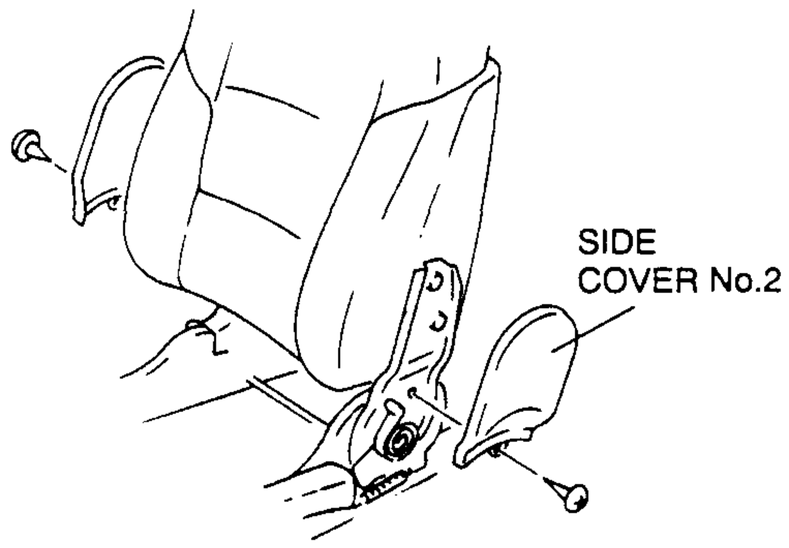
4. Remove the recliner lever.
5. Remove the side cover No.1 and lower cover.



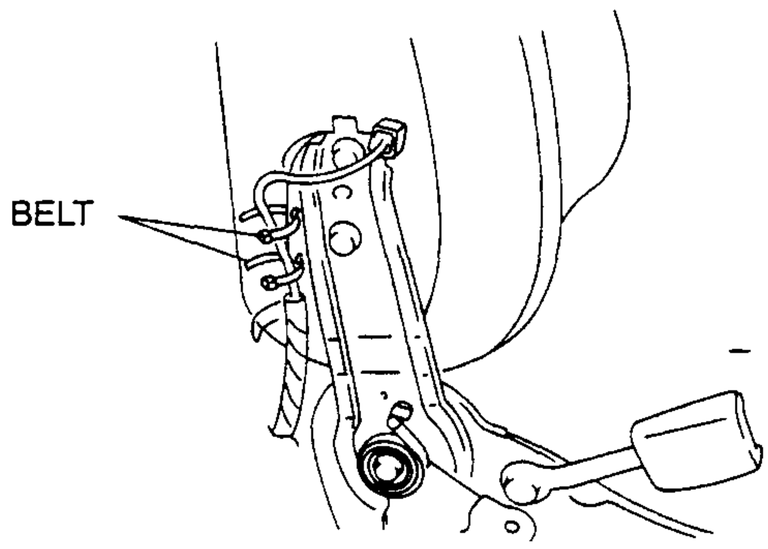
6. Remove the harness belt.



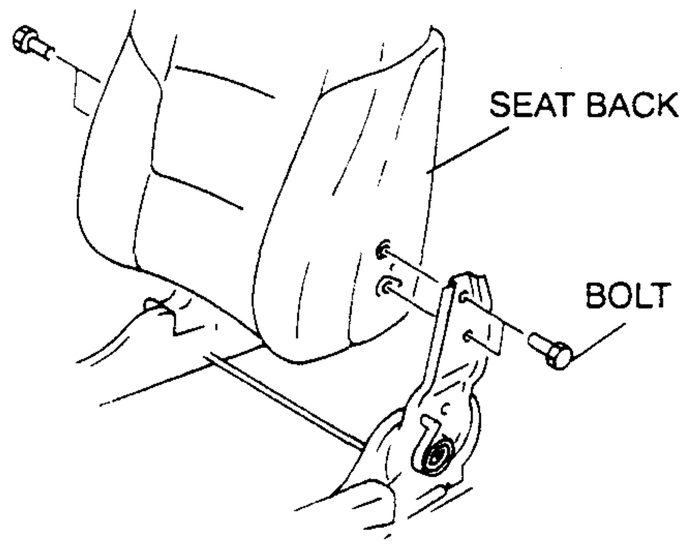
7. Remove the side cover No.2.



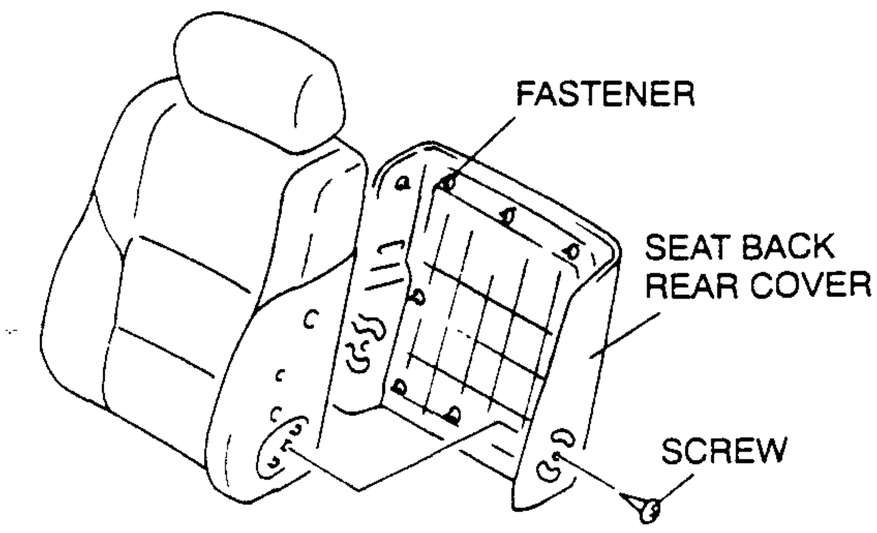
8. Remove the harness belt.



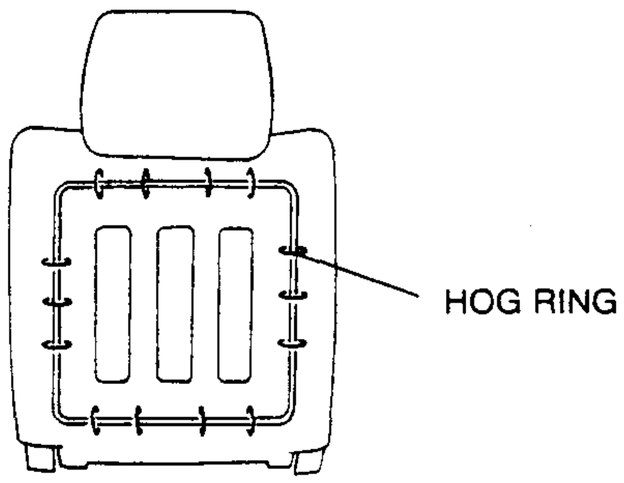
9. Remove the bolts, then the seat back from the seat cushion frame.



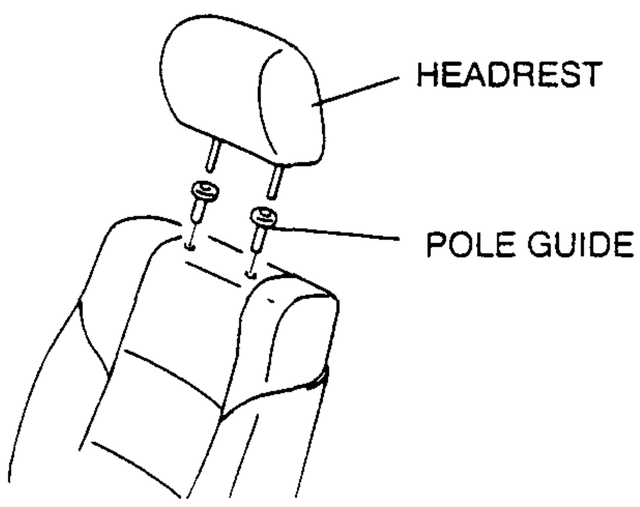
10. Remove the screws. Pull the seat back rear cover forward to disengage fasteners from the seat back frame.



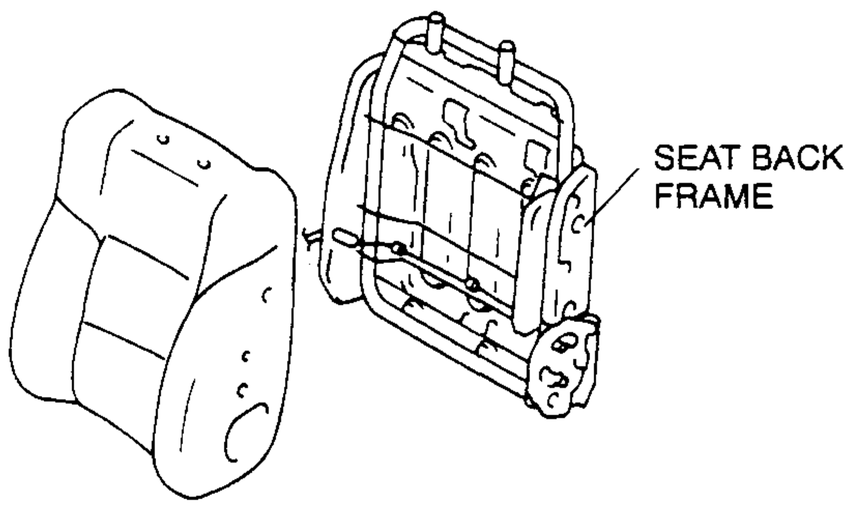
11. Remove the hog rings.



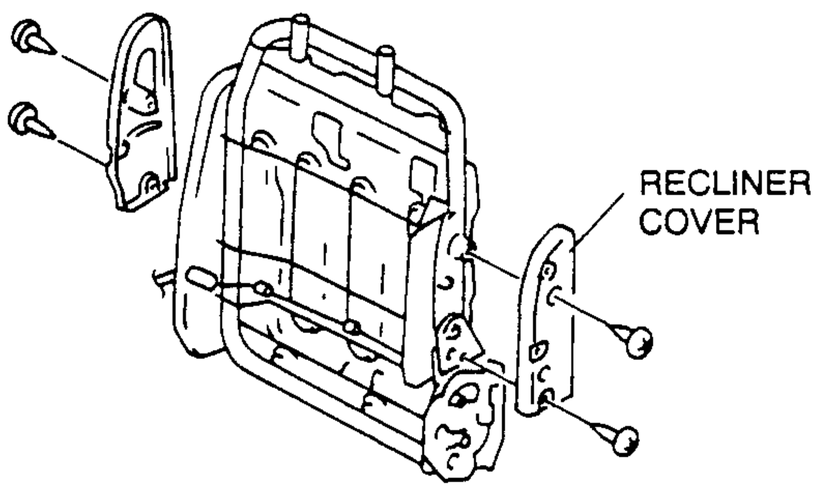
12. Remove the headrest, then the pole guide.



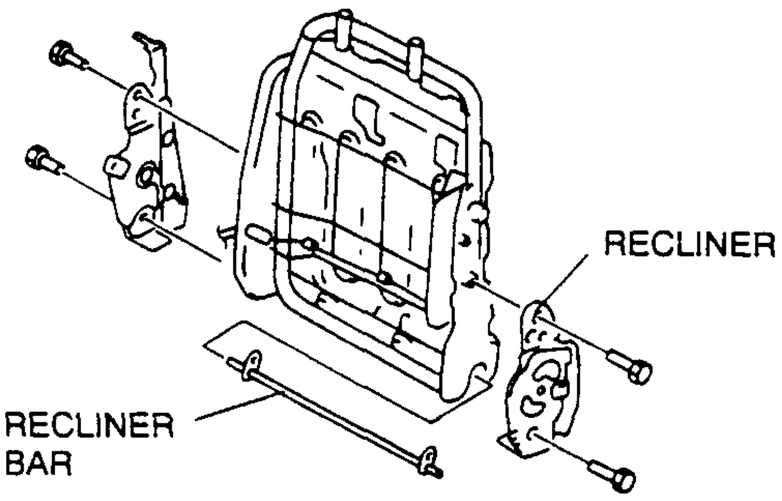
13. Remove the seat back trim and seat back cushion from the seat back frame.



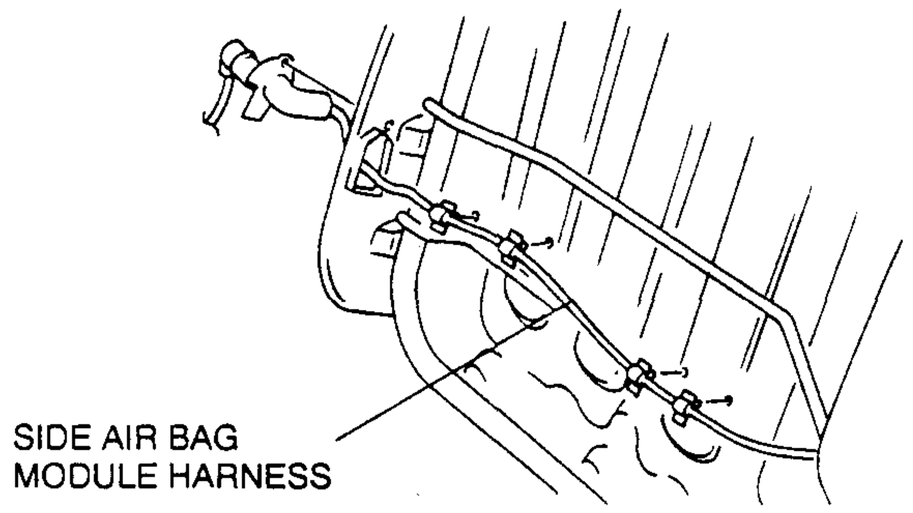
14. Remove the recliner cover.



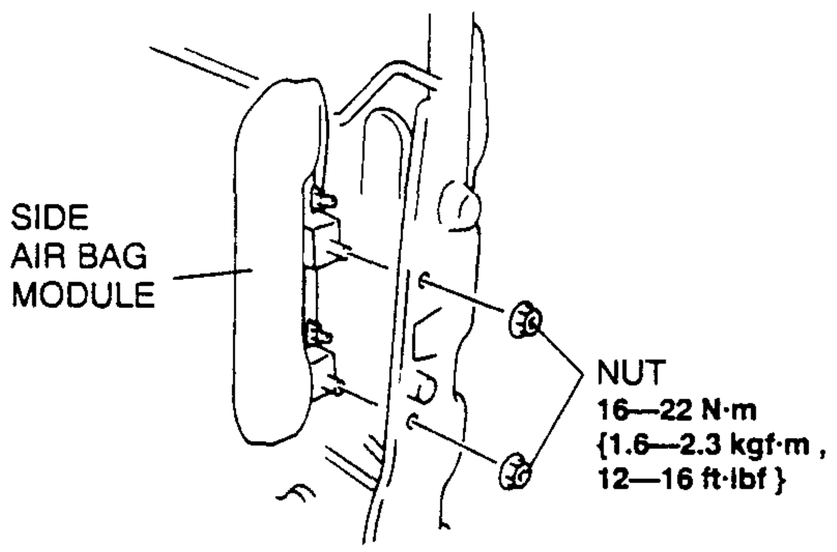
15. Remove the recliner, then the recliner bar.



16. Remove the side air bag module harness.



17. Remove the nuts, then the side air bag module.



Warning

- **If the air bag harness is not secured at the marking point, side air bag module may accidently deploy and cause serious injury. Be sure to secure air bag harness at the marking point.**

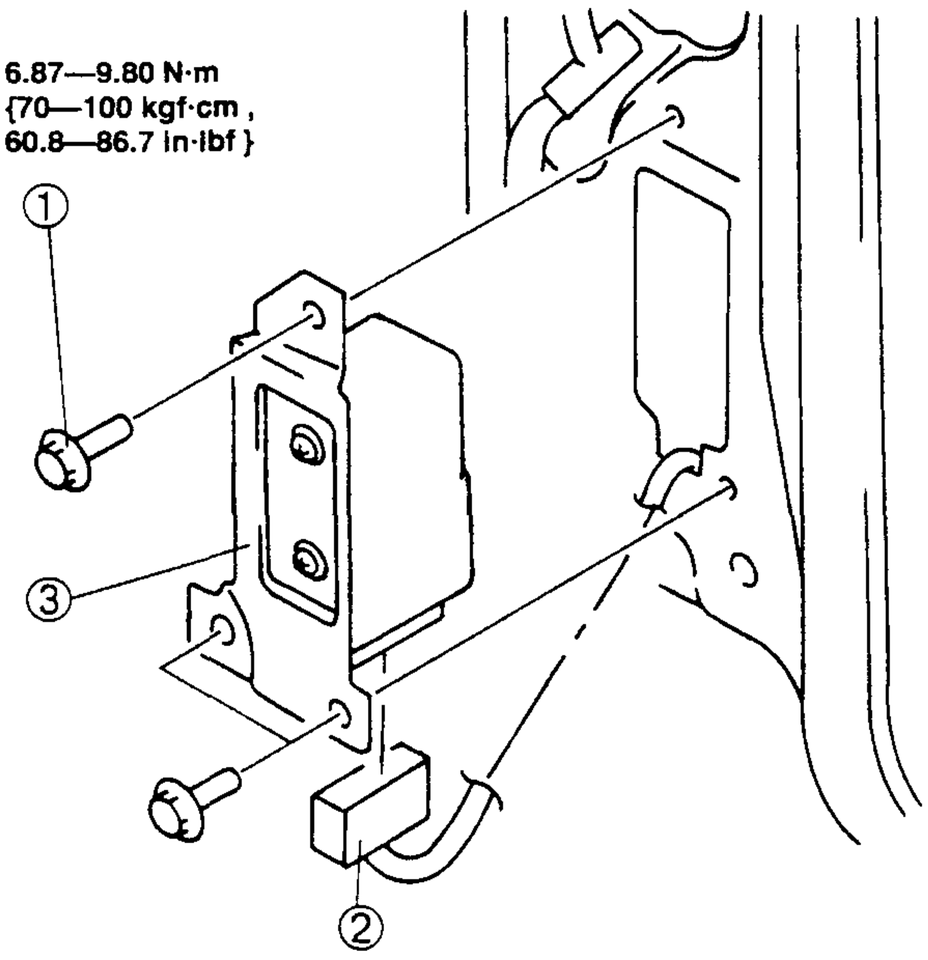
18. Install in the reverse order of removal.
19. Turn the ignition switch to ON.
20. Verify that the air bag system warning light illuminates for **approximately 6 seconds** then goes off.
21. If the air bag system warning light remains on, off, or repeats flashing after servicing, there are malfunctions in the system. Carry out the inspection again. (Refer to ON-BOARD DIAGNOSTIC FUNCTION, AIR BAG SYSTEM.)

SIDE AIR BAG SENSOR REMOVAL/INSTALLATION

Warning

- **Handling the side air bag sensor improperly can accidently deploy the side air bag module, which may seriously injure you. Read SERVICE WARNINGS Before handling the side air bag sensor. (Refer to SERVICE WARNINGS.)**

1. Turn the ignition switch to LOCK.
2. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the side air bag sensors to deplete its stored power.
3. Remove the B-pillar lower trim.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Turn the ignition switch to ON.
7. Verify that the air bag system warning light illuminates for **approximately 6 seconds** then goes off.
8. If the air bag system warning light remains on, off, or repeats flashing after servicing, there are malfunctions in the system. Carry out the inspection again. (Refer to ON-BOARD DIAGNOSTIC FUNCTION, AIR BAG SYSTEM.)



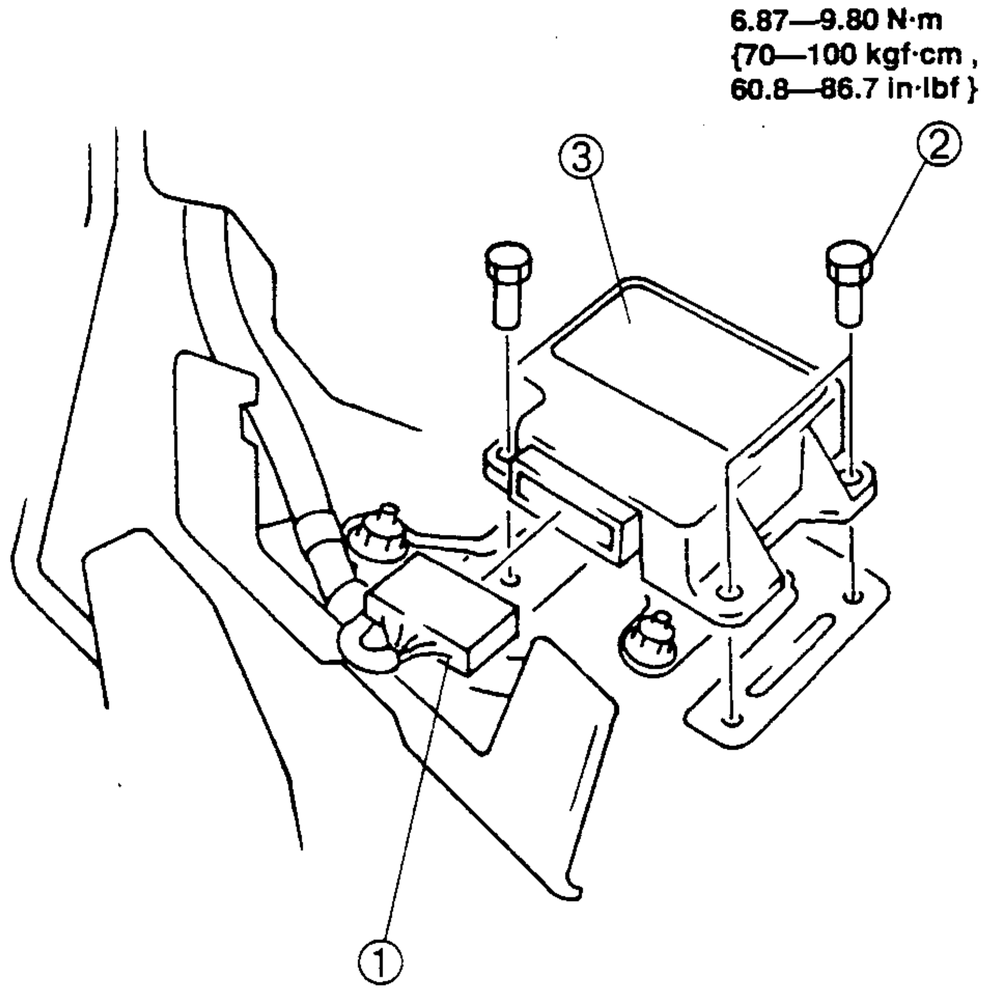
1	Bolt
2	Connector
3	Side air bag sensor

SAS UNIT REMOVAL/INSTALLATION

Warning

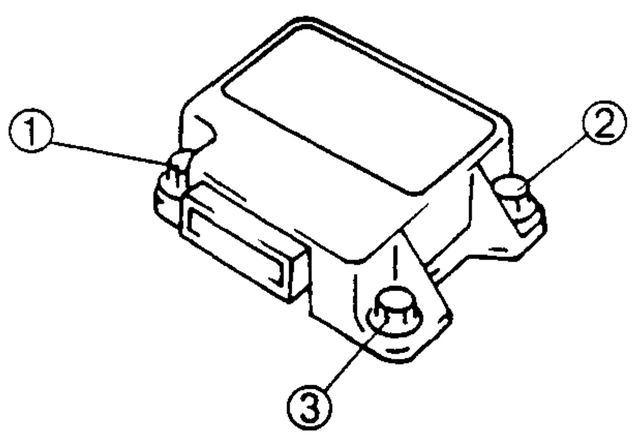
- **Handling the SAS unit improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS Before handling the SAS unit. (Refer to SERVICE WARNINGS.)**

1. Turn the ignition switch to LOCK.
2. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit to deplete its stored power.
3. Remove the side wall.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Turn the ignition switch to ON.
7. Verify that the air bag system warning light illuminates for **approximately 6 seconds** then goes off.
8. If the air bag system warning light remains on, off, or repeats flashing after servicing, there are malfunctions in the system. Carry out the inspection again. (Refer to ON-BOARD DIAGNOSTIC FUNCTION, AIR BAG SYSTEM.)

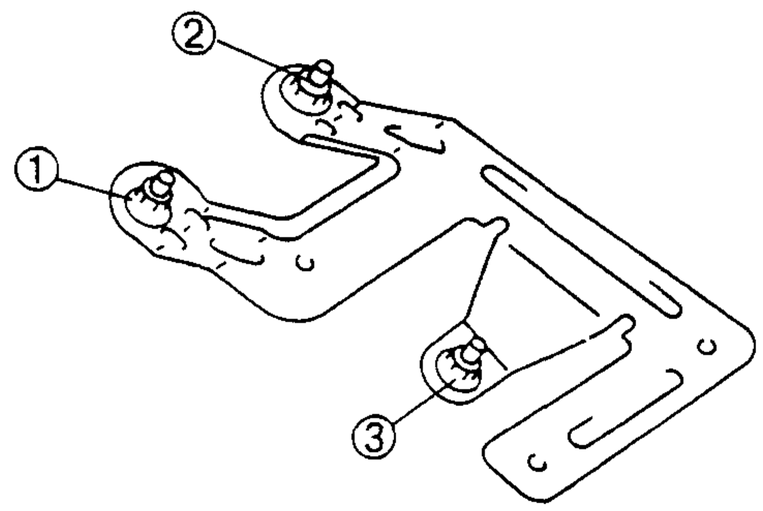


1	Connector
2	Bolt ☞ Installation Note
3	SAS unit

Bolt Installation Note
- Tighten the bolts in the order shown in the figure.



Nut Installation Note
- Tighten the nuts in the order shown in the figure.

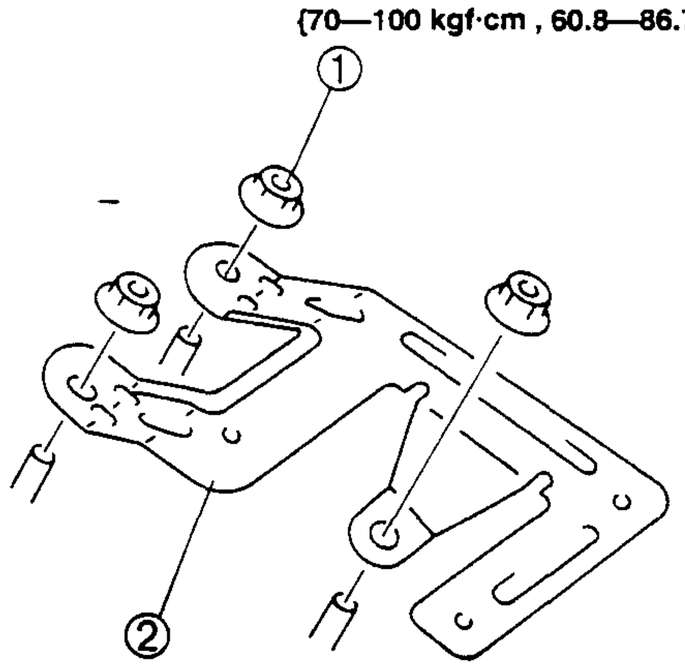


SAS UNIT BRACKET REMOVAL/INSTALLATION

Warning
- **Handling the SAS unit improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS Before handling the SAS unit. (Refer to SERVICE WARNINGS.)**

1. Remove the dashboard. (Refer to section S, DASHBOARD AND CONSOLE, DASHBOARD REMOVAL/INSTALLATION.)
2. Disconnect the SAS unit connector.
3. Remove the SAS unit. (Refer to SAS UNIT REMOVAL/INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.

6.87—9.80 N·m
{70—100 kgf·cm , 60.8—86.7 in·lbf }



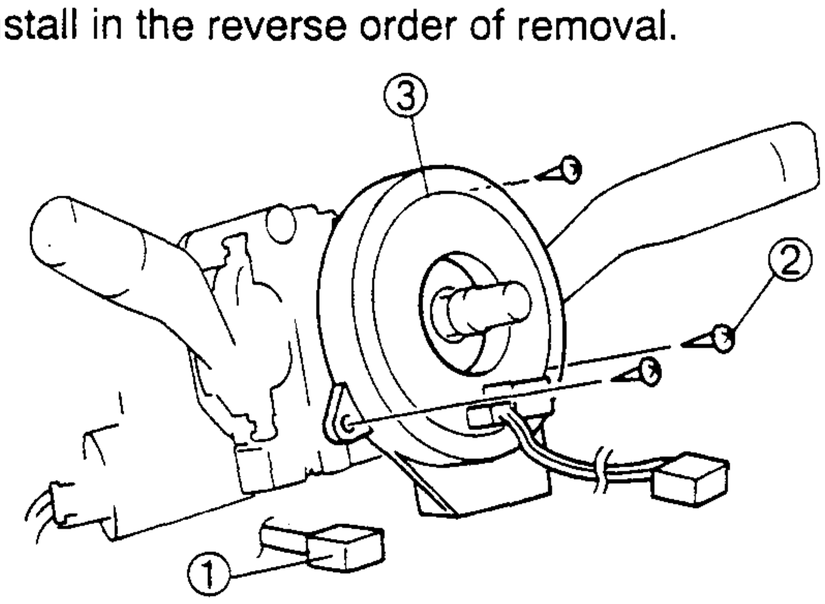
1	Nut ☞ Installation Note
2	SAS unit bracket

PRE-TENSIONER SEAT BELT REMOVAL/ INSTALLATION

(Refer to section S, SEAT BELT, FRONT SEAT BELT REMOVAL/INSTALLATION.)

CLOCK SPRING REMOVAL/INSTALLATION

1. Turn the ignition switch to LOCK.
2. Remove the column cover
3. Remove the driver-side air bag module. (Refer to DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
4. Remove the steering wheel. (Refer to section N, ENGINE SPEED SENSING POWER STEERING, STEERING WHEEL AND COLUMN REMOVAL/INSTALLATION.)
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.



1	Connector
2	Screw
3	Clock spring

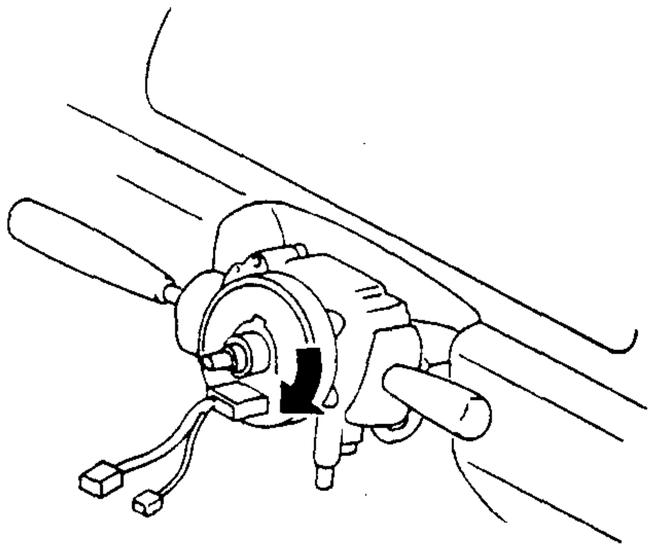
CLOCK SPRING ADJUSTMENT

1. Set the front wheels straight ahead.

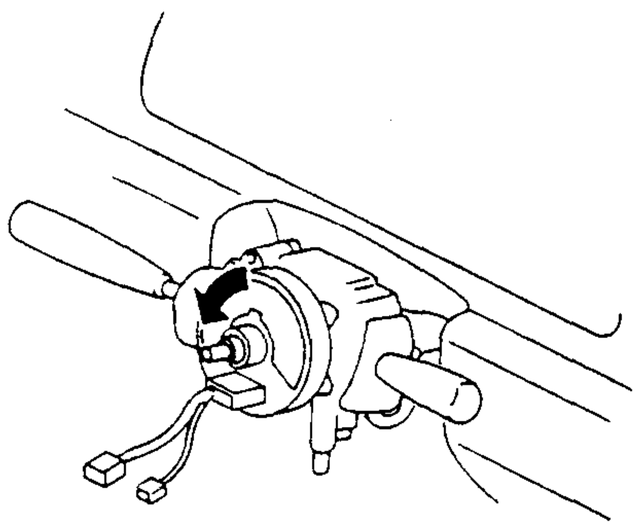
Caution

- **The clock spring will break if over-wound. Do not forcibly turn the clock spring when turning it.**

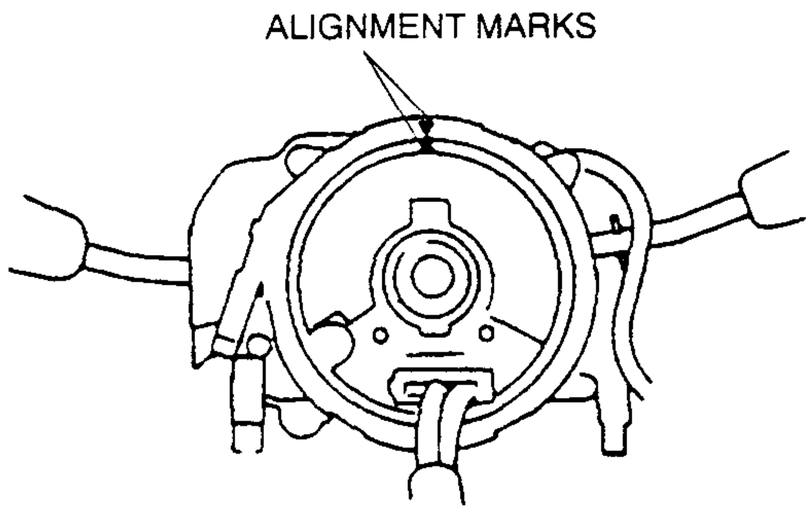
2. Turn the clock spring clockwise until it stops.



3. Turn the clock spring counterclockwise **2.75 turns**.



4. Align the mark on the clock spring with that on the outer housing.

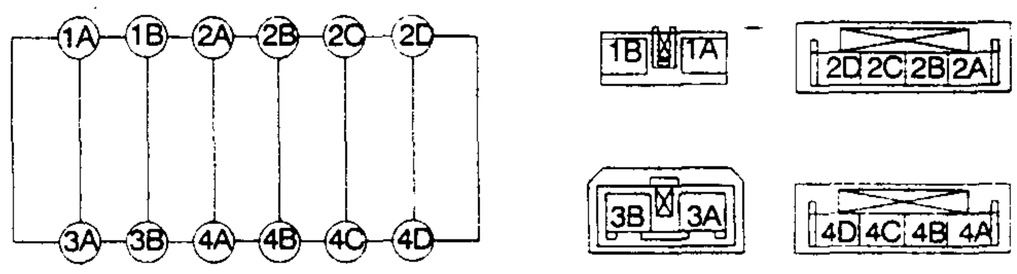


CLOCK SPRING INSPECTION

1. Remove the clock spring. (Refer to CLOCK SPRING REMOVAL/INSTALLATION.)
2. Check for continuity between the clock spring terminals by using an ohmmeter.
3. If not as specified, replace the necessary parts.

○—○ : Continuity

Step	Terminal											
	1A	1B	2A	2B	2C	2D	3A	3B	4A	4B	4C	4D
1	○						○					
2		○						○				
3			○						○			
4				○						○		
5					○						○	
6						○						○



Note

- When terminals 1A and 1B are disconnected from the vehicle's main harness, they are shorted to prevent unexpected air bag deployment.

4. If not as specified, replace the clock spring.

AIR BAG MODULES AND PRE-TENSIONER SEAT BELTS DEPLOYMENT AUTHORIZATION PROCEDURES

1. Install a new SAS unit or side air bag sensor, then verify that the air bag system warning light flashes **approximately 6 seconds**, after the ignition switch is turned to ON.
2. If a diagnostic trouble code is indicated, perform the appropriate ON-BOARD DIAGNOSTIC FUNCTION. (Refer to ON-BOARD DIAGNOSTIC FUNCTION, AIR BAG SYSTEM.)
3. Turn the ignition switch to LOCK then back to ON while the air bag system warning light is flashing continuously. If the procedures have been performed correctly, the air bag system warning light illuminates, then goes off **approximately 6 seconds**.
4. If it does not goes off, perform the deployment authorization procedure again.

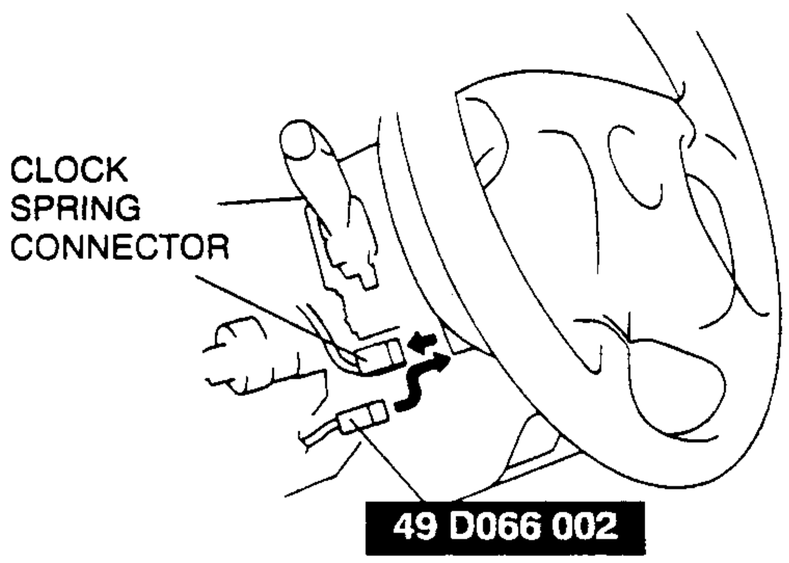
AIR BAG MODULES AND PRE-TENSIONER SEAT BELTS DEPLOYMENT PROCEDURES

Note
- If the **SSTs** (Deployment Tool and Harness Adapter) are not available, consult the nearest Mazda representative for assistance.

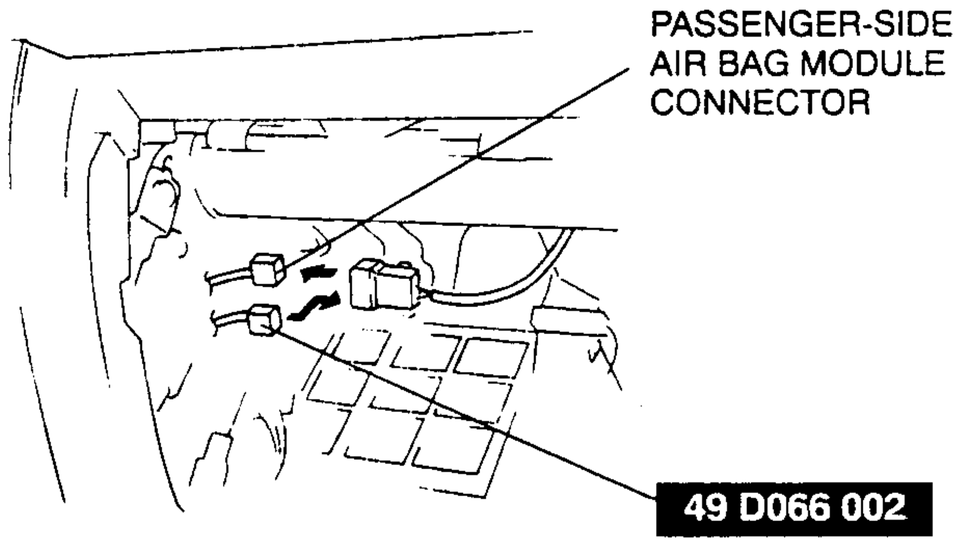
Deployment Procedures for Inside of Vehicle

1. Inspect the **SST** (Deployment Tool).
2. Move the vehicle to an open space, away from strong winds, and close all of the vehicle's doors and all door glasses.
3. Turn the ignition switch to LOCK.
4. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit and the side air bag sensors to deplete its stored power.
5. Follow the appropriate procedure for deploying the driver-side air bag module, passenger-side air bag module, side air bag module, or pre-tensioner seat belt.

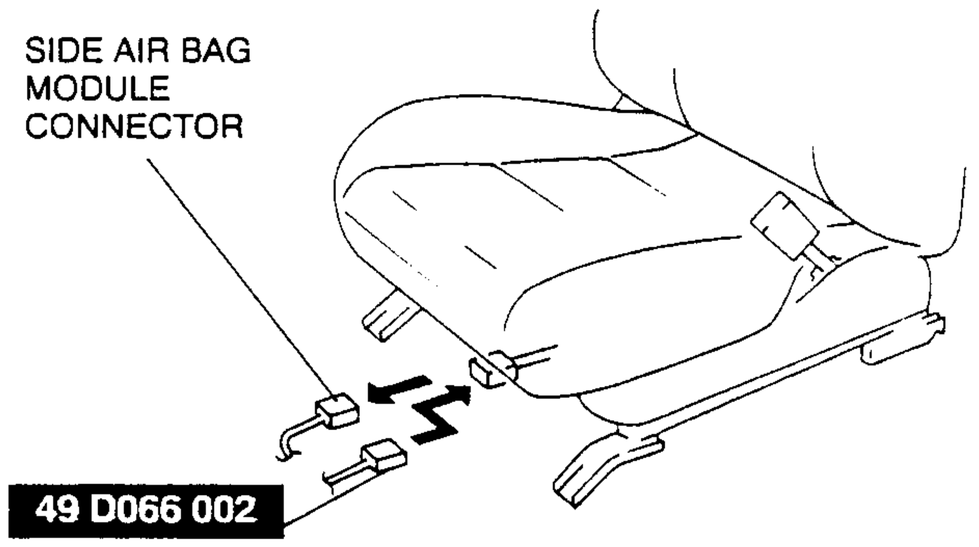
Driver-side air bag module
- Remove the column cover, disconnect the clock spring connector, and then connect the **SST** (Harness Adapter) to the clock spring as shown in the figure.



Passenger-side air bag module
- Remove the glove compartment, disconnect the passenger-side air bag module connector, and then connect the **SST** (Harness Adapter) to the passenger-side air bag module as shown in the figure.

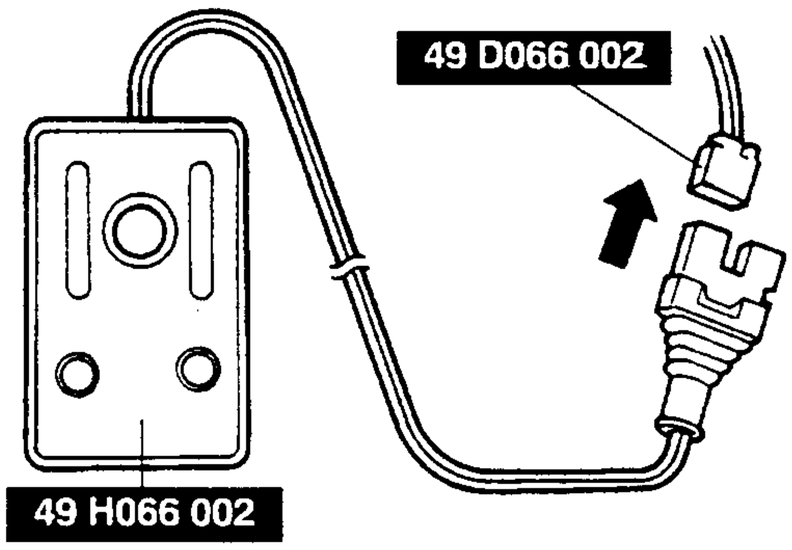


Side air bag module
- Remove the side cover, disconnect the side air bag module connector, and then connect the **SST** (Harness Adapter) to the side air bag module as shown in the figure.



Pre-tensioner seat belt
- Remove the B-pillar lower trim, disconnect the pre-tensioner seat belt connector, and then connect the **SST** (Harness Adapter) to the pre-tensioner seat belt as shown in the figure.

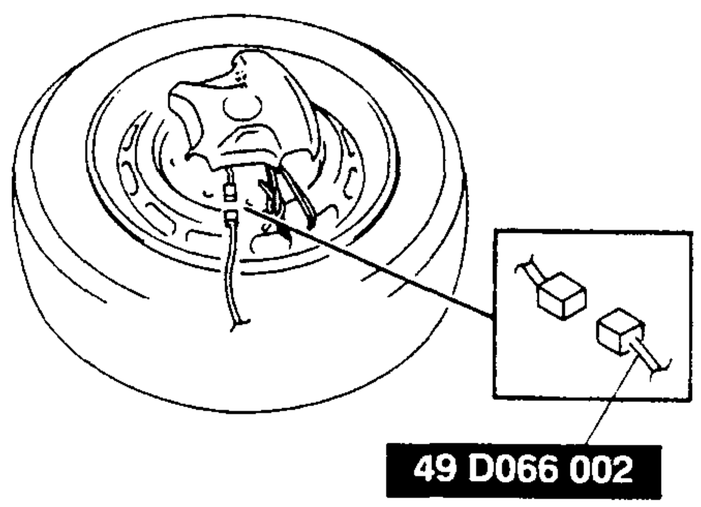
6. Connect the **SST** (Deployment Tool) to the **SST** (Harness Adapter).



7. Connect the red clip of the **SST** (Deployment Tool) to the positive battery terminal and the black clip to the negative battery terminal.
8. Verify that the red light on the **SST** (Deployment Tool) is illuminated.
9. Make sure all persons are standing at least **6 m { 20 ft }** from the vehicle.
10. Press the activation switch on the **SST** (Deployment Tool) to deploy the air bag module or pre-tensioner seat belt.

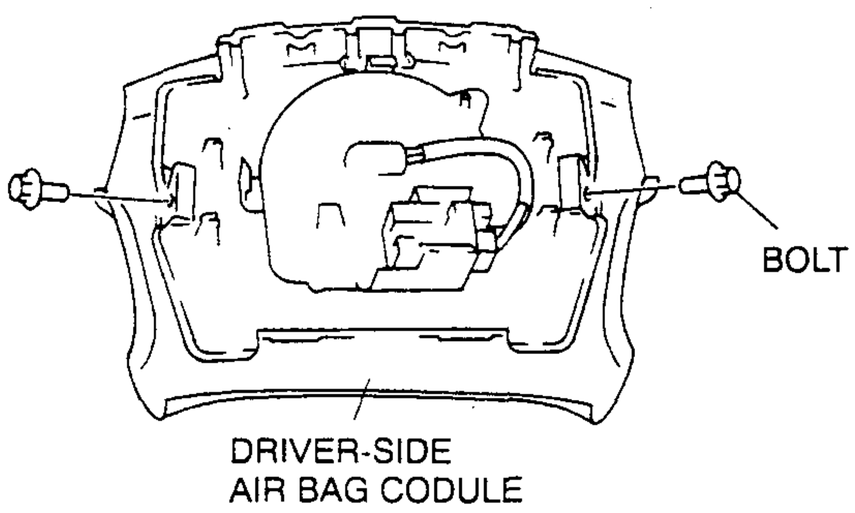
Deployment Procedures for Outside of Vehicle

1. Inspect the **SST** (Deployment Tool).
2. Turn the ignition switch to LOCK.
3. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit and the side air bag sensors to deplete its stored power.
4. Follow the appropriate procedure for deploying the driver-side air bag module, passenger-side air bag module, side air bag module, or pre-tensioner seat belt.



Driver-side air bag module

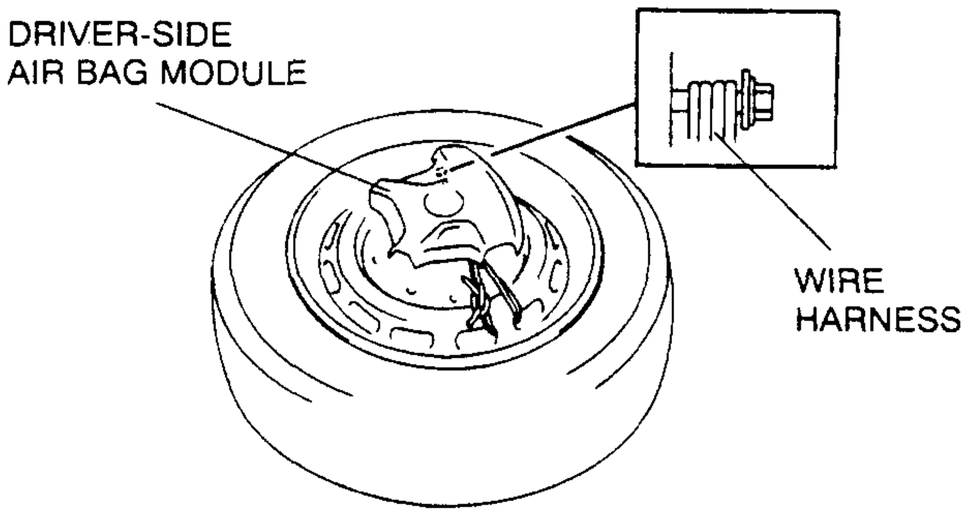
1. Remove the driver-side air bag module. (Refer to DRIVER-SIDE AIR BAG MODULE REMOVAL/ INSTALLATION.)
2. Install the bolts to the driver-side air bag module.



Warning

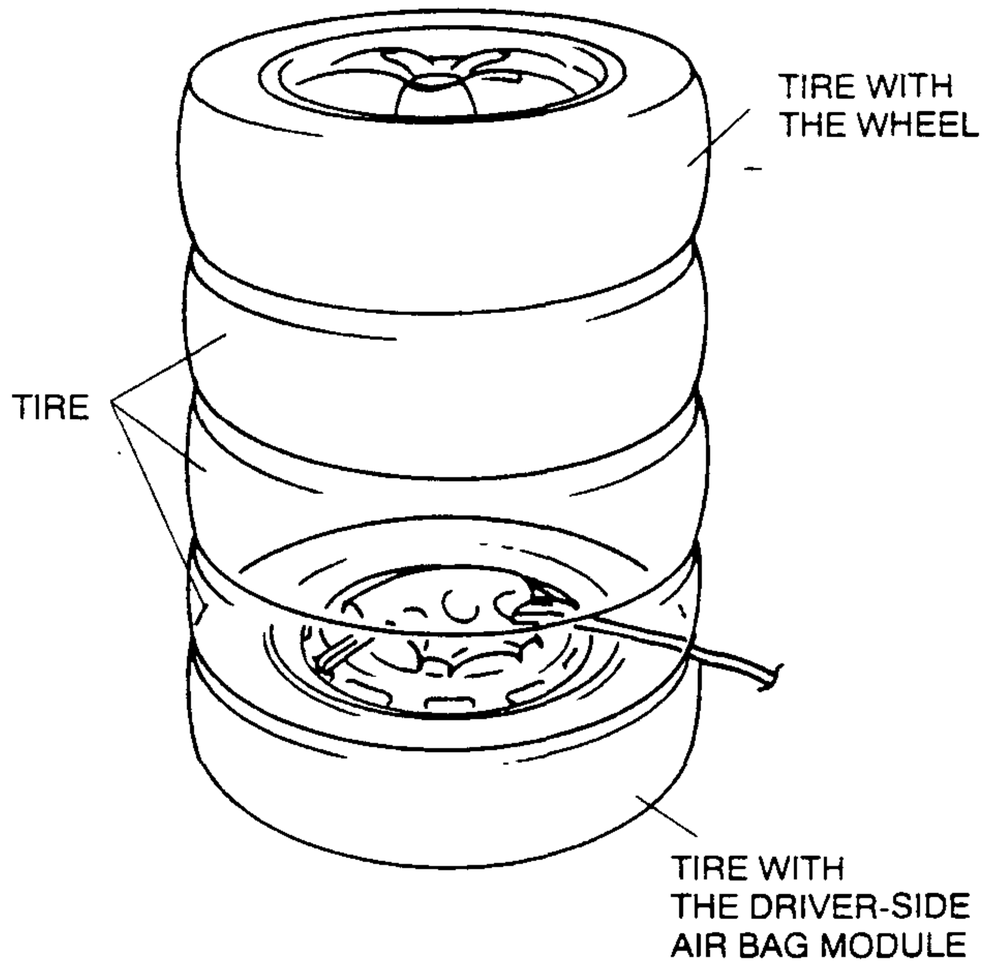
- **If the air bag module is not correctly fixed to the wheel of the tire, which can cause serious injury by impact in deployment. It is sure to fix so that face the front surface up.**

3. The wire harness for the car (**1.25 mm^2 {0.002 in^2 }** or more in wick line sectional area) is threefold made. The driver-side air bag module is fixed to the wheel of the tire with the wire harness.

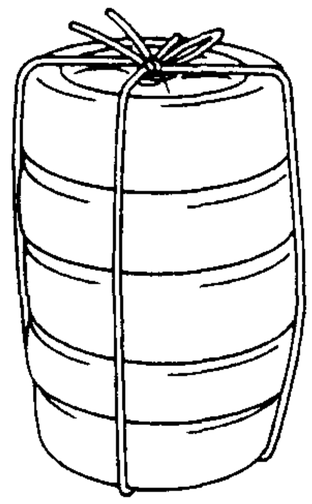


4. Connector the **SST** (Harness Adapter) to the driver-side air bag module as shown in the figure.

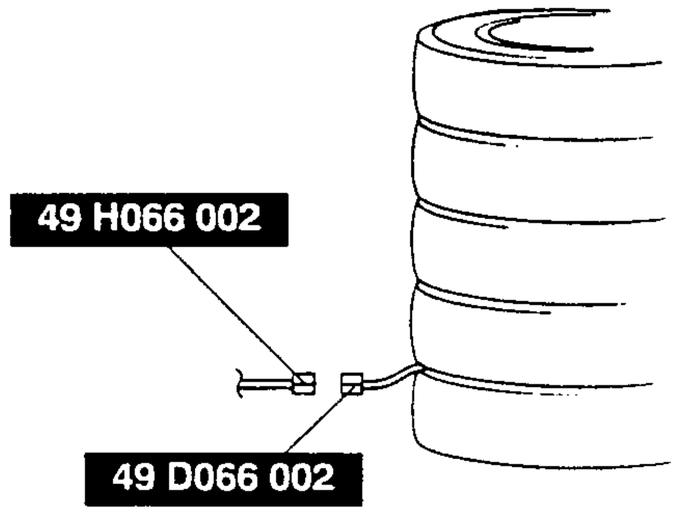
5. Three tires or more are piled up on the tire with the wheel which fixes the driver-side air bag module. The tire with the wheel is put most up.



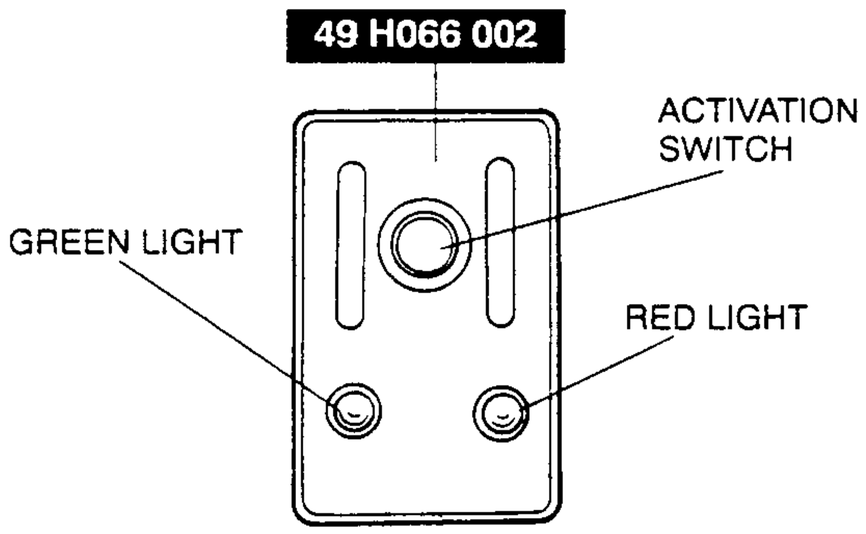
6. The entire tire is fixed with the wire harness and the string, etc.



7. Connect the **SST** (Deployment Tool) to the **SST** (Harness Adapter).



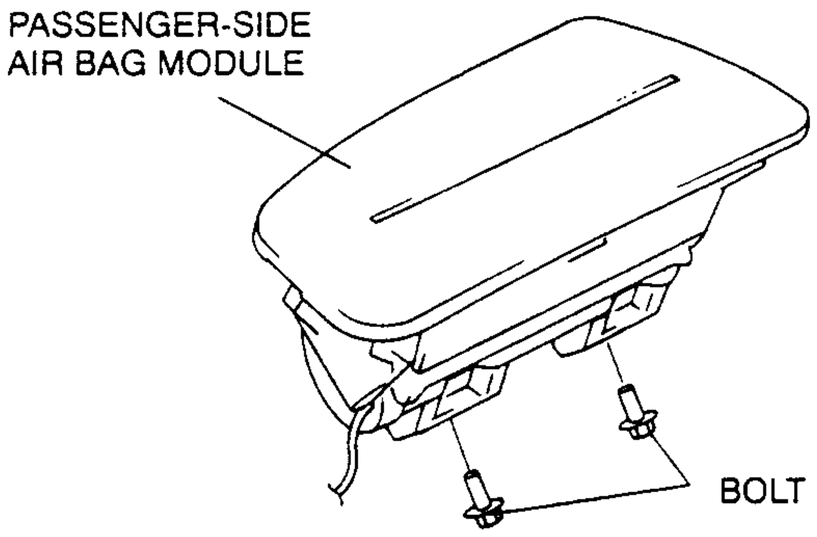
8. Connect the red clip of the **SST** (Deployment Tool) to the positive battery terminal and the black clip to the negative battery terminal.
9. Verify that the red light on the **SST** (Deployment Tool) is illuminated.



10. Make sure all persons are standing at least **6 m { 20 ft }** from the tire.
11. Press the activation switch on the **SST** (Deployment Tool) to deploy the air bag module.

Passenger-side air bag module

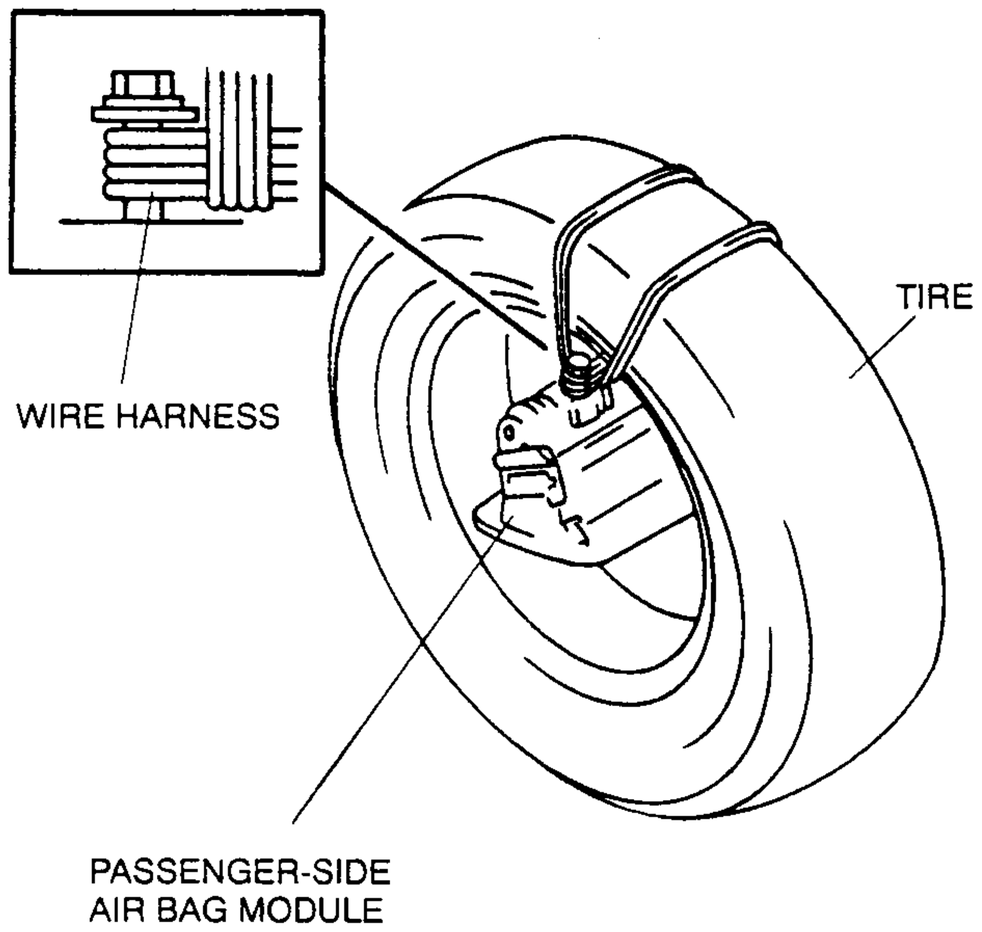
1. Remove the passenger-side air bag module. (Refer to PASSENGER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
2. Install the bolts to the passenger-side air bag module.



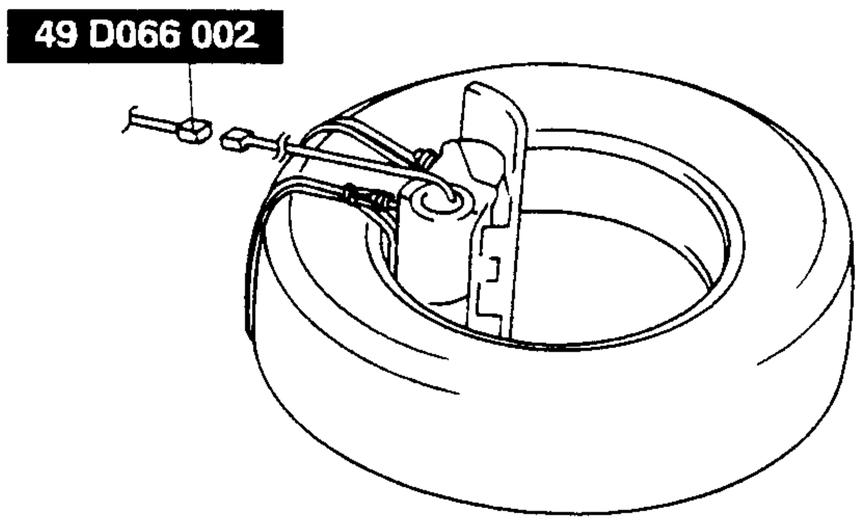
Warning

- **If the air bag module is not correctly fixed to the wheel of the tire, which can cause serious injury by impact in deployment. It is sure to fix so that face the front surface inside of tire.**

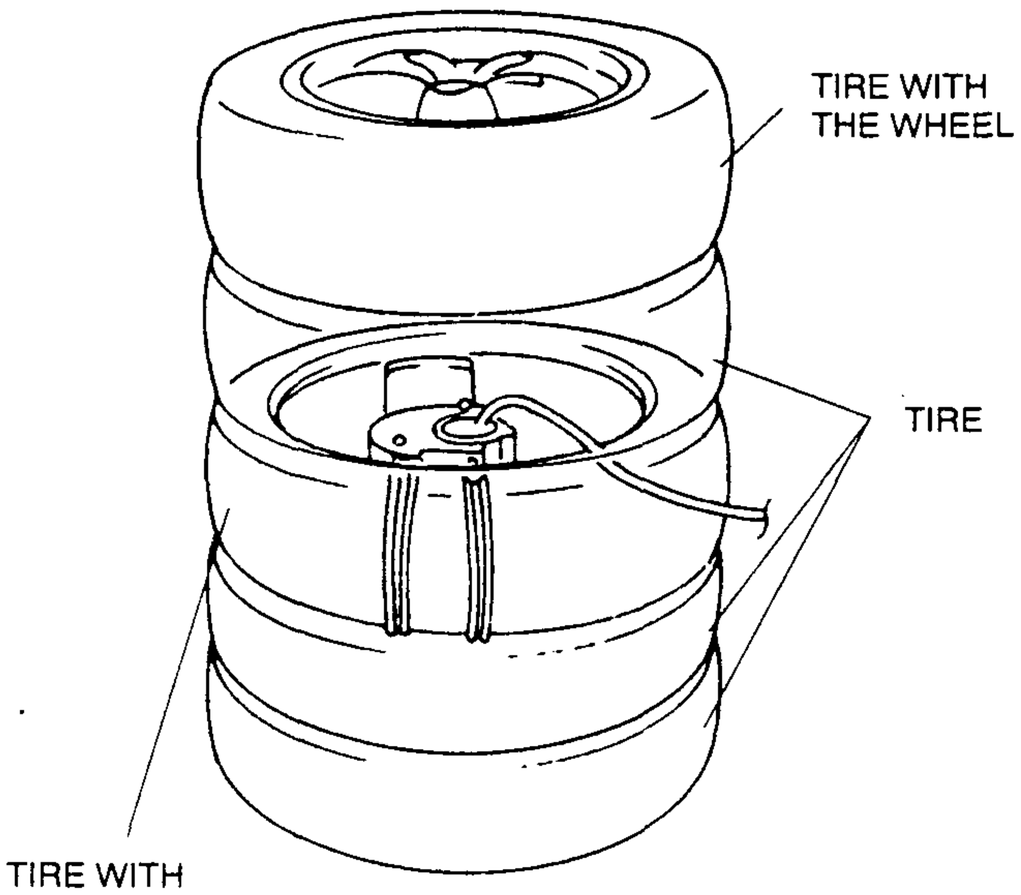
3. The wire harness for the car (**1.25 mm^2 {0.002 in^2 }** or more in wick line sectional area) is threefold made. The passenger-side air bag module is fixed to the tire with the wire harness.



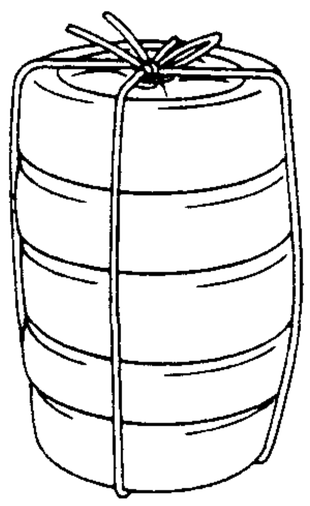
4. Connector the **SST** (Harness Adapter) to the passenger-side air bag module as shown in the figure.



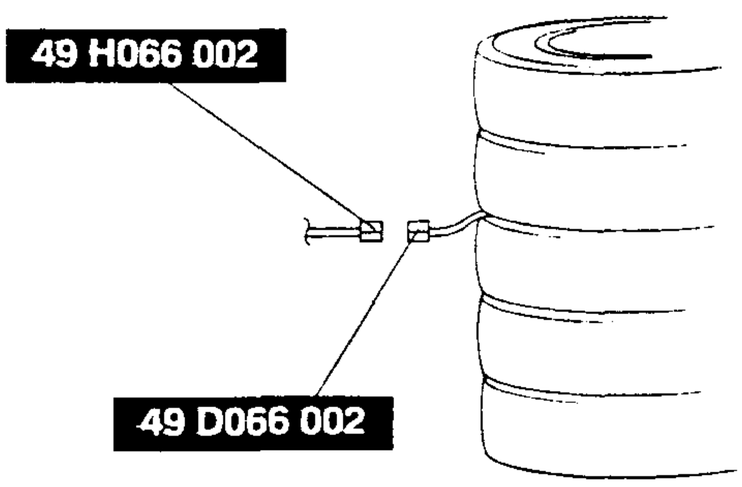
5. The tire which fixed the passenger-side air bag module after piling up two tires or more is piled up. One tire or more is piled up on the tire which fixes the passenger-side air bag module. The tire with the wheel is put most up.



6. The entire tire is fixed with the wire harness and the string, etc.



7. Connect the **SST** (Deployment Tool) to the **SST** (Harness Adapter).

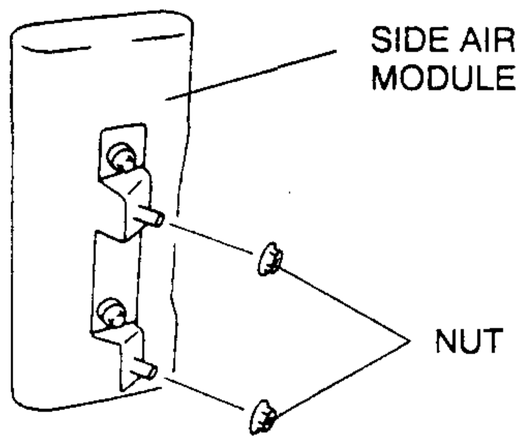


8. Connect the red clip of the **SST** (Deployment Tool) to the positive battery terminal and the black clip to the negative battery terminal.
9. Verify that the red light on the **SST** (Deployment Tool) is illuminated.

10. Make sure all persons are standing at least **6 m {20 ft}** from the vehicle.
11. Press the activation switch on the **SST** (Deployment Tool) to deploy the passenger-side air bag module.

Side air bag module

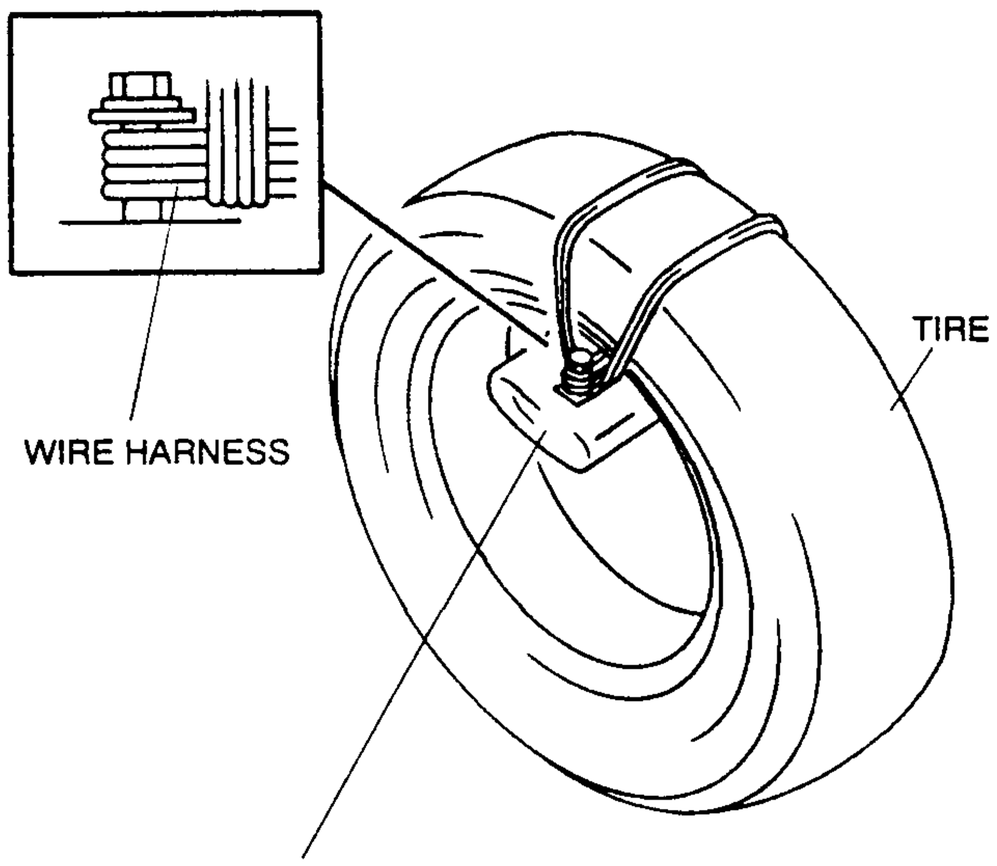
1. Remove the side air bag module. (Refer to SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
2. Install the nuts to the side air bag module.

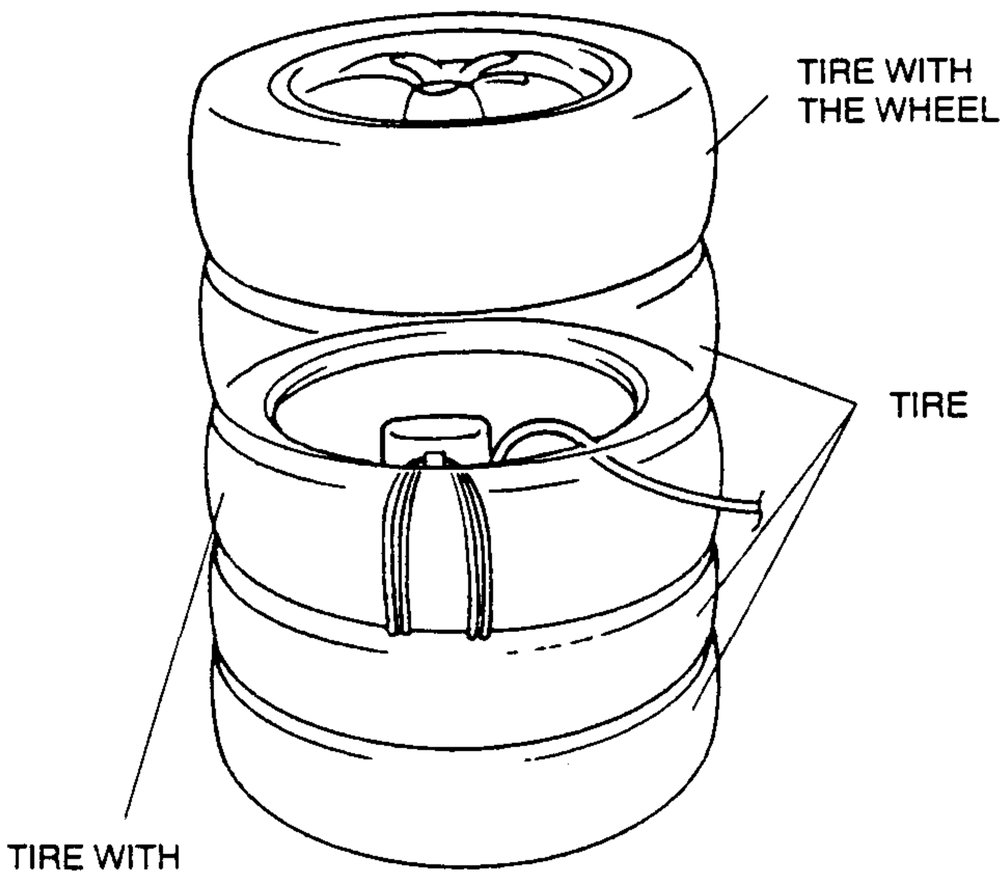


Warning

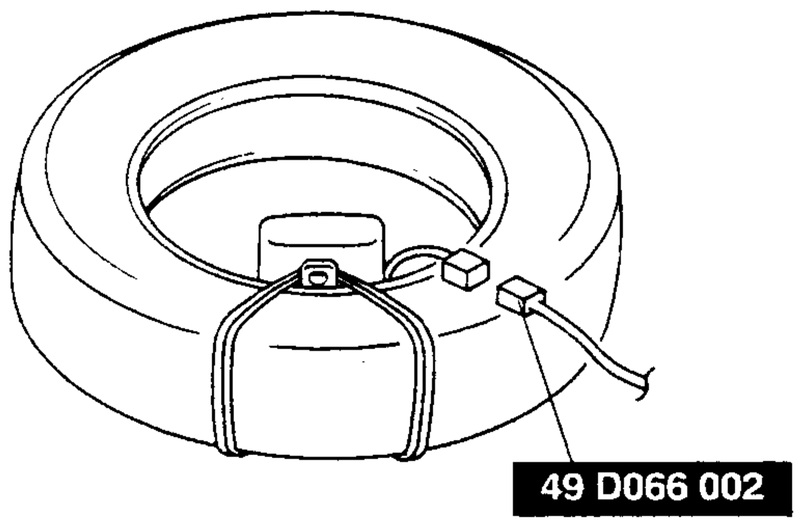
- **If the air bag module is not correctly fixed to the wheel of the tire, which can cause serious injury by impact in deployment. It is sure to fix so that face the front surface inside of tire.**

3. The wire harness for the car (**1.25 mm^2 {0.002 in^2}** or more in wick line sectional area) is threefold made. The side air bag module is fixed to the tire with the wire harness.



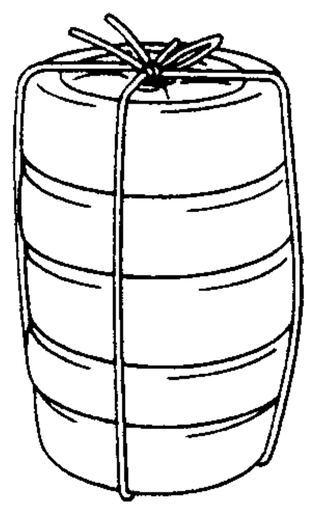


4. Connector the **SST** (Harness Adapter) to the side air bag module as shown in the figure.

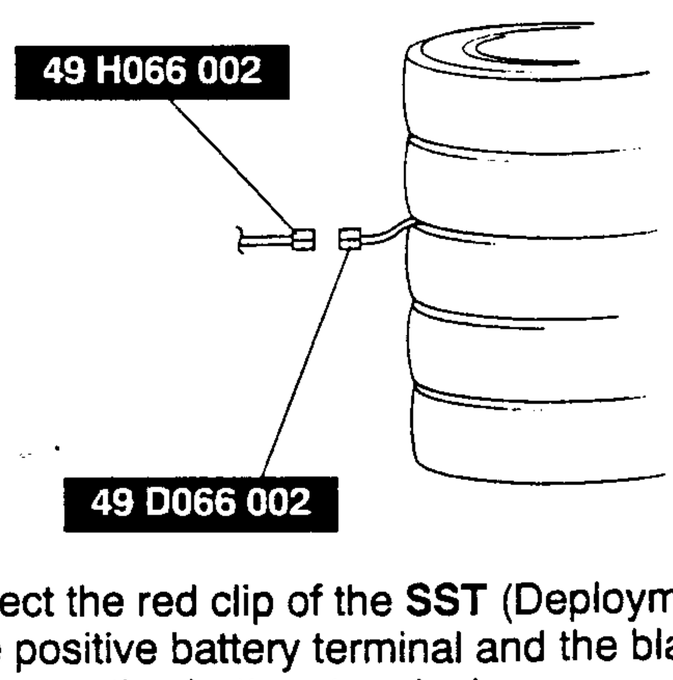


5. The tire which fixed the side air bag module after piling up two tires or more is piled up. One tire or more is piled up on the tire which fixes the side air bag module. The tire with the wheel is put most up.

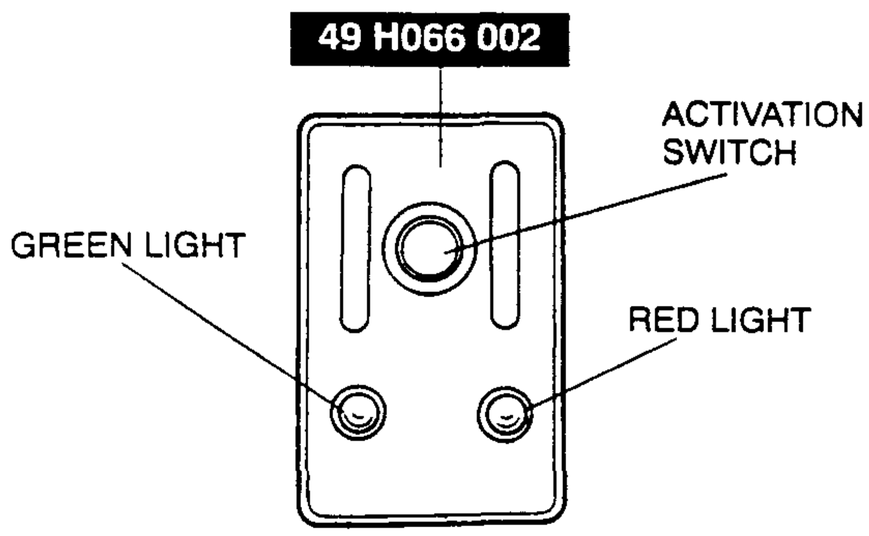
6. The entire tire is fixed with the wire harness and the string, etc.

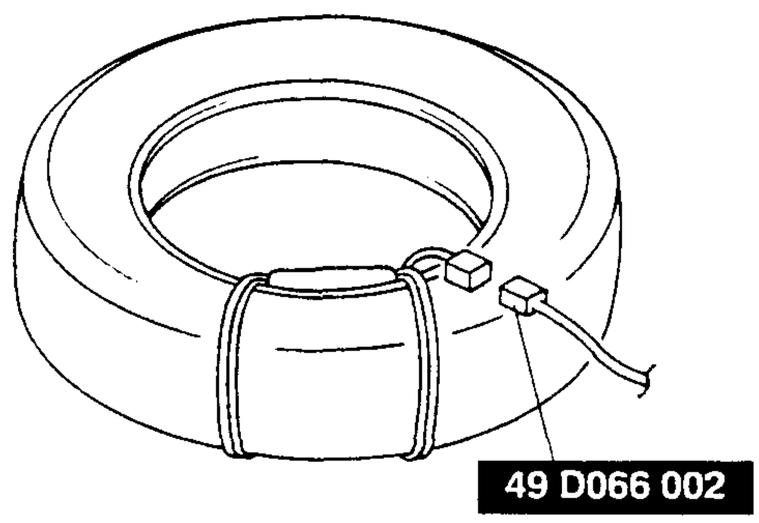


7. Connect the **SST** (Deployment Tool) to the **SST** (Harness Adapter).



8. Connect the red clip of the **SST** (Deployment Tool) to the positive battery terminal and the black clip to the negative battery terminal.
9. Verify that the red light on the **SST** (Deployment Tool) is illuminated.

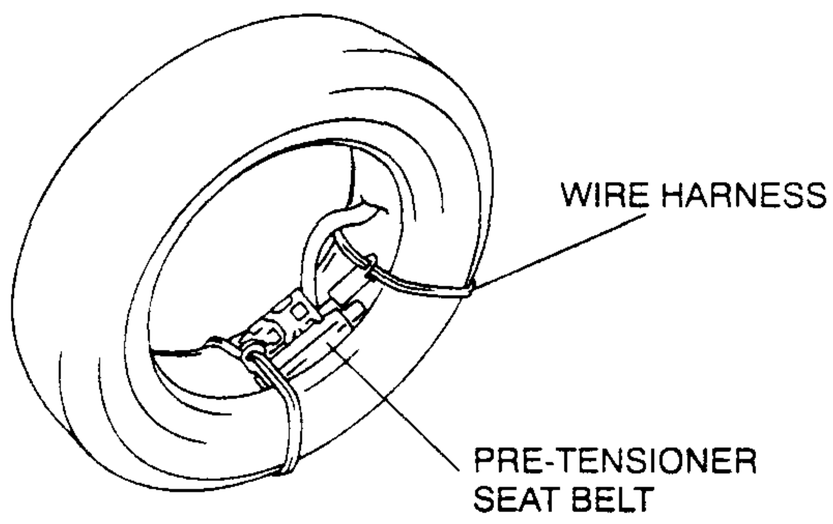




10. Make sure all persons are standing at least **6 m { 20 ft }** from the tire.
11. Press the activation switch on the **SST** (Deployment Tool) to deploy the side air bag module.

Pre-tensioner seat belt

1. Remove the pre-tensioner seat belt. (Refer to section S, SEAT BELT, FRONT SEAT BELT REMOVAL/INSTALLATION.)
2. The wire harness for the car (**1.25 mm^2 {0.002 in^2 }** or more in wick line sectional area) is threefold made. The pre-tensioner seat belt is fixed to the tire with the wire harness.

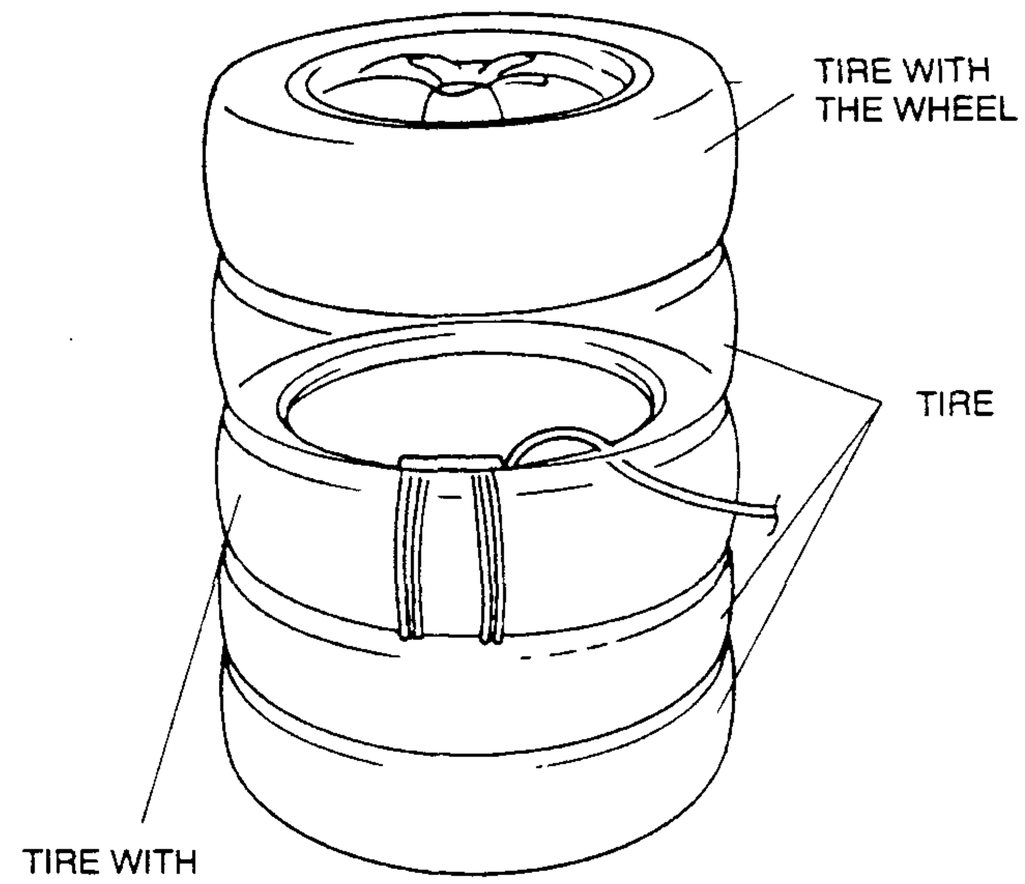


Warning

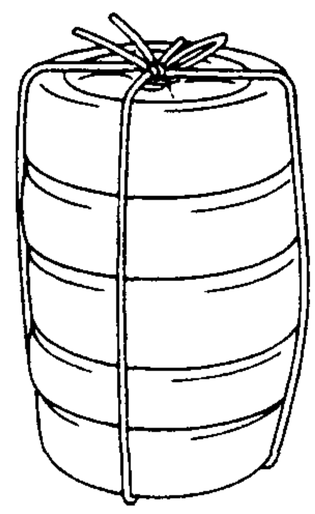
- **If the pre-tensioner seat belt is not correctly fixed to the wheel of the tire, which can cause serious injury by impact in deployment. It is sure to fix so that face the cylinder inside of tire.**

3. Connector the **SST** (Harness Adapter) to the pre-tensioner seat belt as shown in the figure.

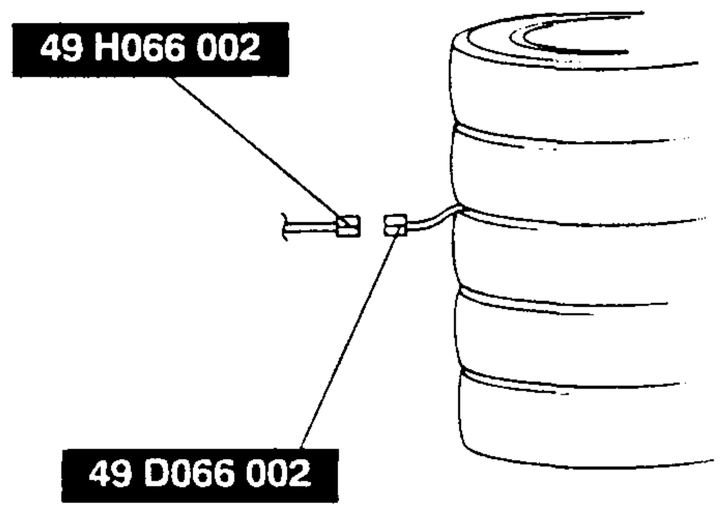
4. The tire which fixed the pre-tensioner seat belt after piling up two tires or more is piled up. One tire or more is piled up on the tire which fixes the pre-tensioner seat belt. The tire with the wheel is put most up.



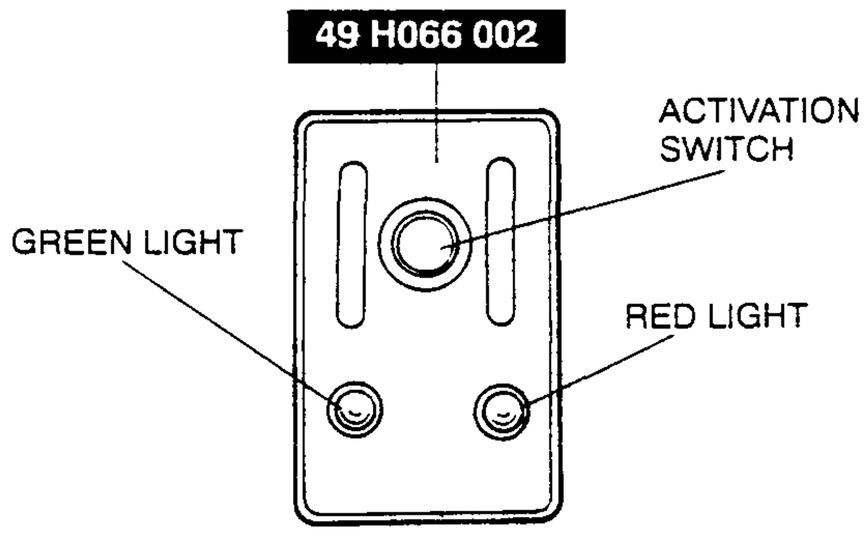
5. The entire tire is fixed with the wire harness and the string, etc.



6. Connect the **SST** (Deployment Tool) to the **SST** (Harness Adapter).



7. Connect the red clip of the **SST** (Deployment Tool) to the positive battery terminal and the black clip to the negative battery terminal.
8. Verify that the red light on the **SST** (Deployment Tool) is illuminated.



9. Make sure all persons are standing at least **6 m { 20 ft }** from the tire.
10. Press the activation switch on the **SST** (Deployment Tool) to deploy the pre-tensioner seat belt.

AIR BAG MODULES AND PRE-TENSIONER SEAT BELTS DISPOSAL PROCEDURES

Warning

- **Before scrapping a vehicle with an undeployed air bag module/pre-tensioner seat belt, deploy the air bag module/pre-tensioner seat belt. Never dispose of a live air bag module/pre-tensioner seat belt.**

Warning

- **The air bag/cylinder of pre-tensioner seat belt is very hot immediately after it deploys. You can get burned. Do not touch the air bag module/pre-tensioner seat belt for at least 15 minutes after deployment.**

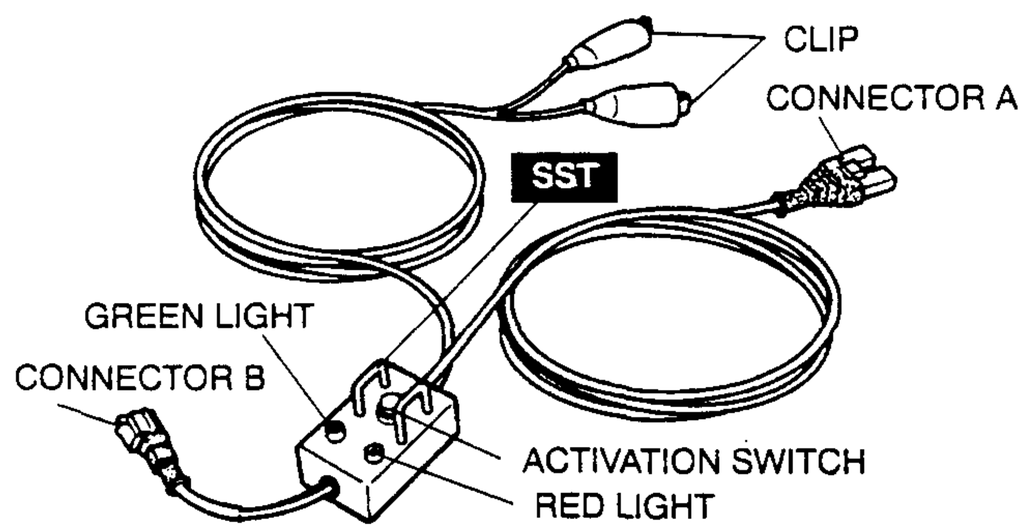
Warning

- **A deployed air bag module/pre-tensioner seat belt may contain deposits of sodium hydroxide, a caustic byproduct of the gas-generated combustion. If this substance gets into your eyes or on your hands, it can cause irritation and itching. When handling a deployed air bag module/pre-tensioner seat belt, wear gloves and safety glasses.**

1. Put on gloves and safety glasses.
2. Place the deployed air bag module/pre-tensioner seat belt in a plastic bag, seal it, and then dispose of it.
3. Wash your hands after removing your gloves.

INSPECTION OF SST (DEPLOYMENT TOOL)

- Use the **SST** (Deployment Tool) to deploy a live air bag module or pre-tensioner seat belt before disposing of it.
- Before connecting the **SST** (Deployment Tool) to the clock spring, passenger-side air bag module, side air bag module, or pre-tensioner seat belt, inspect the operation of the **SST** (Deployment Tool).



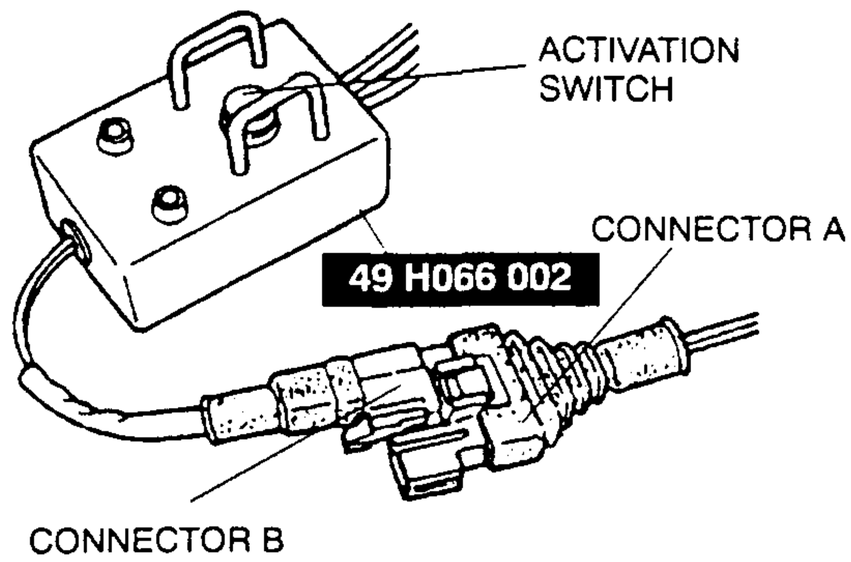
Inspection Procedure

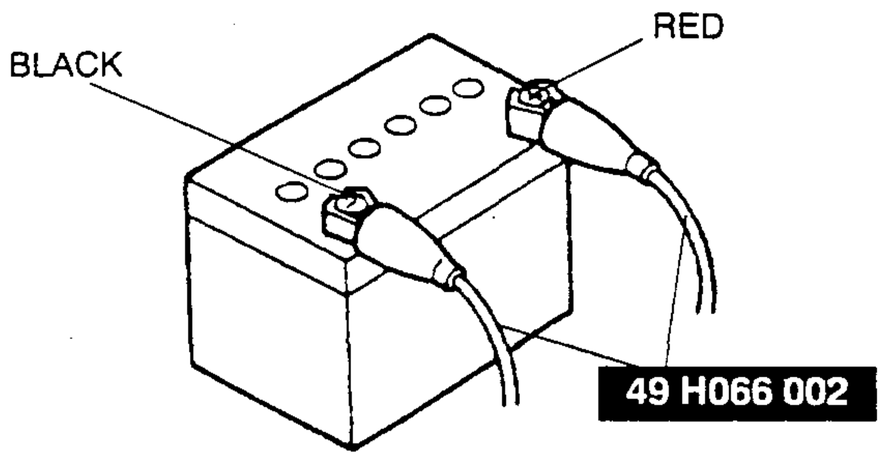
1. Follow the steps below to verify that the **SST** (Deployment Tool) is operating correctly.

Step	Inspection procedure	Light condition	
		Green	Red
1	Connect red clip to positive battery terminal and black clip to negative battery terminal.	On	Off
2	Connect connectors A and B of **SST** (Deployment Tool).	Off	On
3	Press activation switch.	On	Off

Warning

- **Pouring water on a deployed air bag/pre-tensioner is dangerous. The water will mix with the residual gasses to form a gas that can make breathing difficult. Do not pour water on the deployed air bag module/pre-tensioner seat belt.**





2. If not as specified, do not use the **SST** (Deployment Tool) because it may cause the air bag or pre-tensioner to unexpectedly deploy upon connection to the air bag module or pre-tensioner seat belt.

ON-BOARD DIAGNOSTIC FUNCTION

IMMOBILIZER SYSTEM

Diagnostic Trouble Code

1. Turn the ignition switch to ON.
2. Verify the security light condition.
3. If the security light indicates the diagnostic trouble code, go to troubleshooting referring to the diagnostic trouble code table.

Diagnostic Trouble Code Table

DTC	Output pattern	Diagnosed circuit
01	ON / OFF 	ID number unregistered
02	ON / OFF 	ID format error
03	ON / OFF 	No transponder
11	ON / OFF 	Coil is open
21	ON / OFF 	Code word/ID number reading error
24	ON / OFF 	Wiring harness between immobilizer unit and ECM (PCM) is open or shorted
30	ON / OFF 	Immobilizer unit-ECM (PCM) communication error

Diagnostic chart

DTC 01	ID number unregistered
POSSIBLE CAUSE	ID number is unregistered
ACTION	
Go to ID number input procedure. (Refer to IMMOBILIZER SYSTEM, ID NUMBER INPUT PROCEDURE, Key Replacement or Duplicate Keys.)	

DTC 02	ID format error
POSSIBLE CAUSE	Defective transponder
ACTION	
Dispose the defective key. (Refer to IMMOBILIZER SYSTEM, ID NUMBER INPUT PROCEDURE, Key Replacement or Duplicate Keys.)	

DTC 03	No transponder
POSSIBLE CAUSE	• No transponder • There is a transponder in the key, but ID number is not output • Defective coil • Defective wiring harness

STEP	INSPECTION		ACTION
1	Does engine start with other proper keys?	Yes	Dispose the defective key. (Refer to IMMOBILIZER SYSTEM, ID NUMBER INPUT PROCEDURE, Key Replacement or Duplicate Keys.)
		No	Go to next step.
2	Disconnect the coil connector. Is there short between the terminal A of the coil connector and ground, and the terminal of A and C coil connector?	Yes	Repair the wiring harness connected to terminal A and/or C of the coil.
		No	Replace the coil. (Refer to IMMOBILIZER SYSTEM, ID NUMBER INPUT PROCEDURE, Coil Replacement.)

DTC 11	Coil is open
POSSIBLE CAUSE	• Coil is open • Poor connection of coil connector • Poor connection of immobilizer unit • Defective wiring harness

STEP	INSPECTION		ACTION
1	Is connector of the coil or the immobilizer unit connected properly?	Yes	Go to next step.
		No	Connect the connector properly.
2	Is there continuity between the terminal A and C of the coil connector?	Yes	Go to next step.
		No	Replace the coil. (Refer to IMMOBILIZER SYSTEM, ID NUMBER INPUT PROCEDURE, Coil Replacement.)
3	Disconnect the coil connector and the immobilizer unit connector. Are there continuity between the terminal A of the coil connector and the terminal F of the immobilizer unit connector, the terminal C of the coil connector and the terminal D of the immobilizer unit connector?	Yes	Replace the immobilizer unit and input ID number to the immobilizer unit. (Refer to IMMOBILIZER SYSTEM, ID NUMBER INPUT PROCEDURE, Immobilizer Unit Replacement.)
		No	Repair the wiring harness connected to terminal A or/and C of the coil connector.

DTC 21	Code word/ID number reading error		
POSSIBLE CAUSE	Defective immobilizer unit		
ACTION			
Turn the IG switch to ON. Start the engine. Is the security light indicates diagnostic trouble code 21 again?		Yes	Replace the immobilizer unit and input ID number to the immobilizer unit. (Refer to IMMOBILIZER SYSTEM, ID NUMBER INPUT PROCEDURE, Immobilizer Unit Replacement.)
		No	Normal.

DTC 24	Wiring harness between immobilizer unit and ECM (PCM) is open or shorted.		
POSSIBLE CAUSE	• Defective ECM (PCM) • Poor connection of connector • Defective wiring harness		
STEP	INSPECTION		ACTION
1	Is both the immobilizer unit and ECM (PCM) connectors connected properly?	Yes	Go to next step.
		No	Connect the connectors properly.
2	Disconnect the immobilizer unit and ECM (PCM) unit connectors. Is there continuity between the terminal A of the immobilizer unit connector and the terminal 5 of ECM (PCM) connector?	Yes	Go to next step.
		No	Repair the wiring harness connected to terminal A of the immobilizer unit.
3	Is there continuity between terminal A of the immobilizer unit connector and ground?	Yes	Repair the wiring harness connected to terminal A of the immobilizer unit.
		No	Go to next step.
4	Connect ECM (PCM) connector. Turn the IG switch to ON. Check the voltage at the terminal A of the immobilizer unit. Is terminal voltage more than **10 V** ?	Yes	Replace the immobilizer unit and input ID number to the immobilizer unit. (Refer to IMMOBILIZER SYSTEM ID NUMBER INPUT PROCEDURE, Immobilizer Unit Replacement.)
		No	Replace ECM (PCM) and input ID NUMBER to ECM(PCM). (Refer to IMMOBILIZER SYSTEM ID NUMBER INPUT PROCEDURE, ECM (PCM) Replacement.)

Note

- Confirm that the voltage at the terminal L of the immobilizer unit connector is more than **10 V** when turning the ignition switch to ON after repairing the malfunction of DTC 24. If not specified, repair the wiring harness between ENGINE fuse and the immobilizer unit.

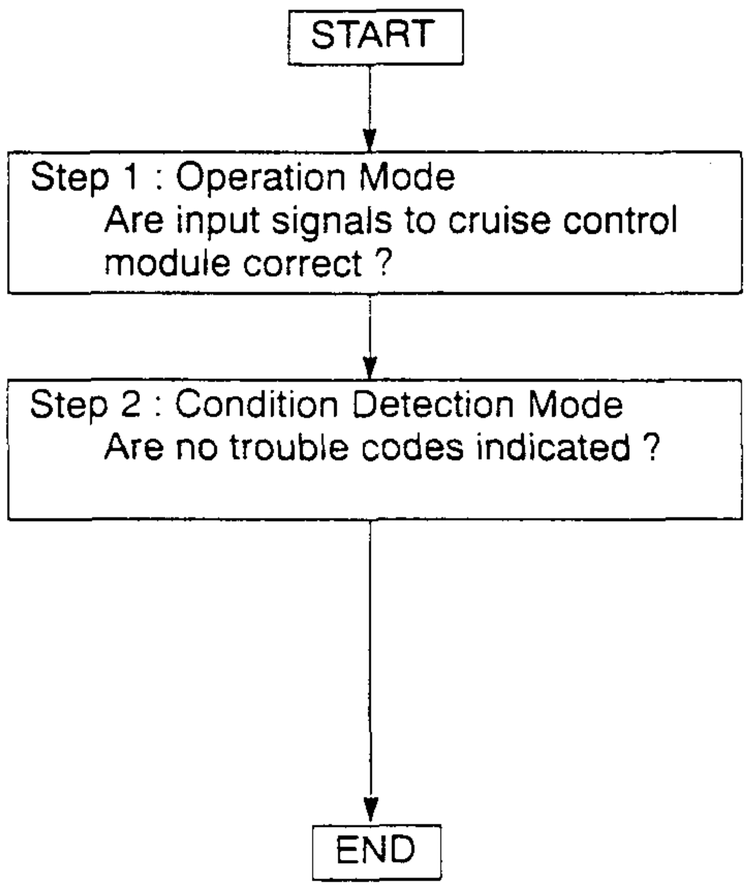
DTC 30	Immobilizer unit-ECM (PCM) communication error		
POSSIBLE CAUSE	• Defective immobilizer unit • Defective ECM (PCM)		
ACTION			
Replace the immobilizer unit and input ID number to the immobilizer unit. (Refer to IMMOBILIZER SYSTEM, ID NUMBER INPUT PROCEDURE, Immobilizer Unit Replacement.) Does engine start?		Yes	The immobilizer unit is defective.
		No	Reinstall the original immobilizer unit. Replace ECM (PCM) and input ID number to ECM (PCM). (Refer to IMMOBILIZER SYSTEM, ID NUMBER INPUT PROCEDURE, ECM (PCM) Replacement.)

CRUISE CONTROL SYSTEM

Outline

- There are two on-board diagnostic functions : Operation Mode, which checks for and indicates correct operation of the input signals to the control module, and Condition Detection Mode, which indicates troubles in the system
- The two functions can be done by using either of the following methods:
  (1) Checking the flashing pattern of the cruise set indicator light in the instrument cluster.
  (2) Checking the output of the data link connector by using the **SST** (NGS set, self-diagnosis checker).

Inspection Order



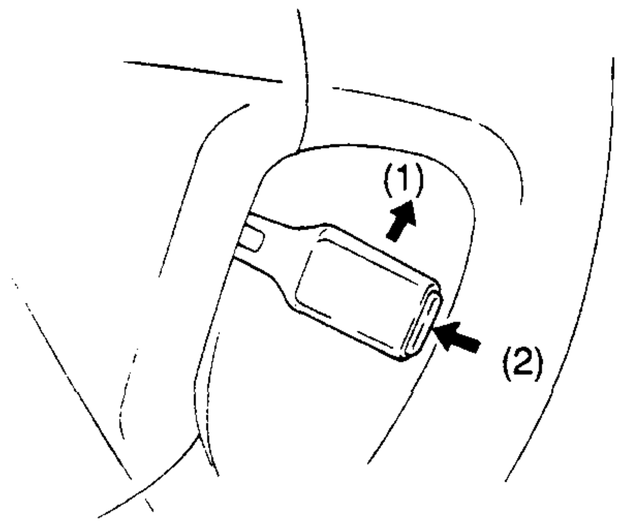
Inspection of Diagnostic Trouble Codes for Operation Mode

Note

- If an Operation Mode is not indicated, the following may be the cause of the malfunction.
  1. Cruise control switch (RESUME/ACCEL switch)
  2. Cruise control switch (Cruise control main switch)
  3. Cruise control module
  4. Open or short circuit in wiring harness

Using the cruise set indicator light

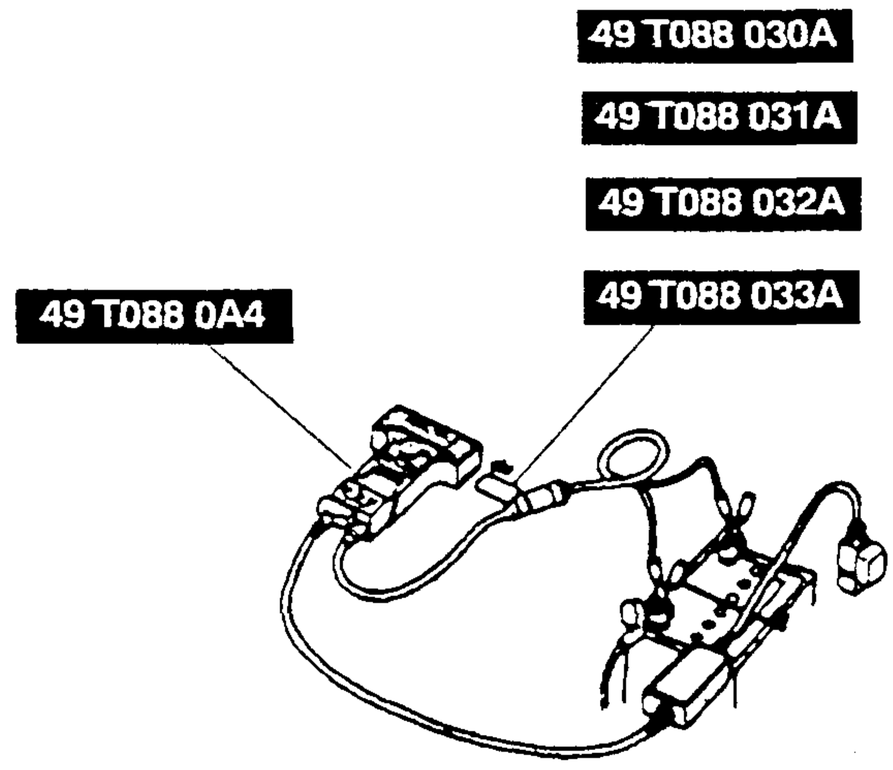
1. Turn the ignition switch to ON.
2. Verify that the cruise control main switch is off.
3. Turn and hold the RESUME/ACCEL switch (1) then turn the cruise control main switch (2) to activate system inspection. (The cruise set indicator light will illuminate for **3 seconds**.)



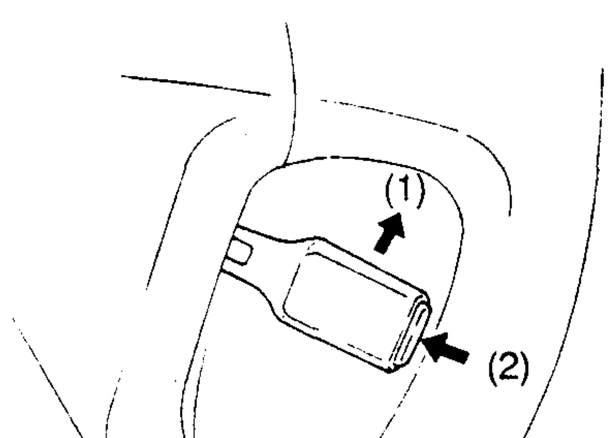
4. Operate each switch as described and note the operation code list pattern. If the cruise set indicator light does not flash, inspect the corresponding system area.
5. The operation mode is canceled by turning the ignition switch to LOCK or turn off the cruise control main switch.

Using the SST(NGS set)

1. Connect the **SST** (NGS set) to the data link connector and battery.



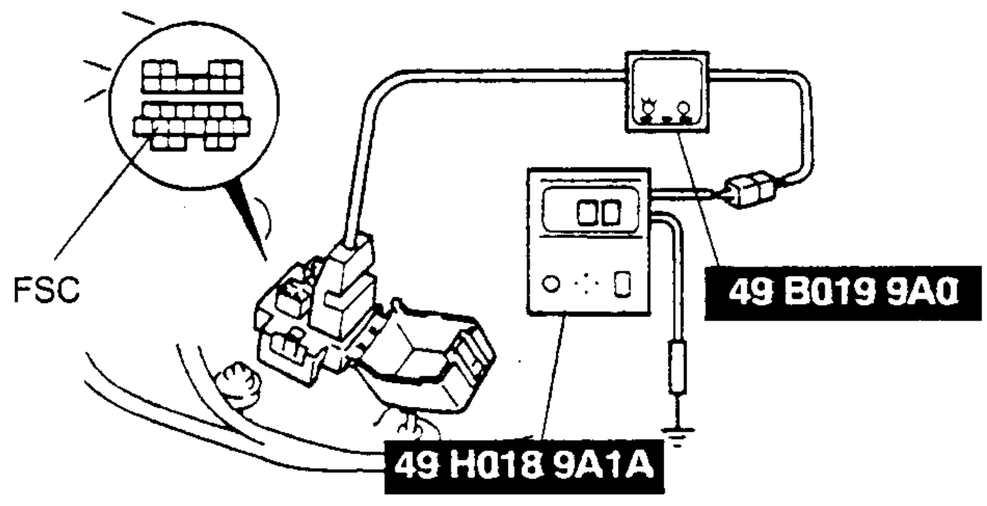
2. Turn the ignition switch to ON.
3. Verify that the cruise control main switch is off.
4. Turn and hold the RESUME/ACCEL switch (1) then turn the cruise control main switch (2) to activate system inspection.(The cruise set indicator light will illuminate for **3 seconds**.)



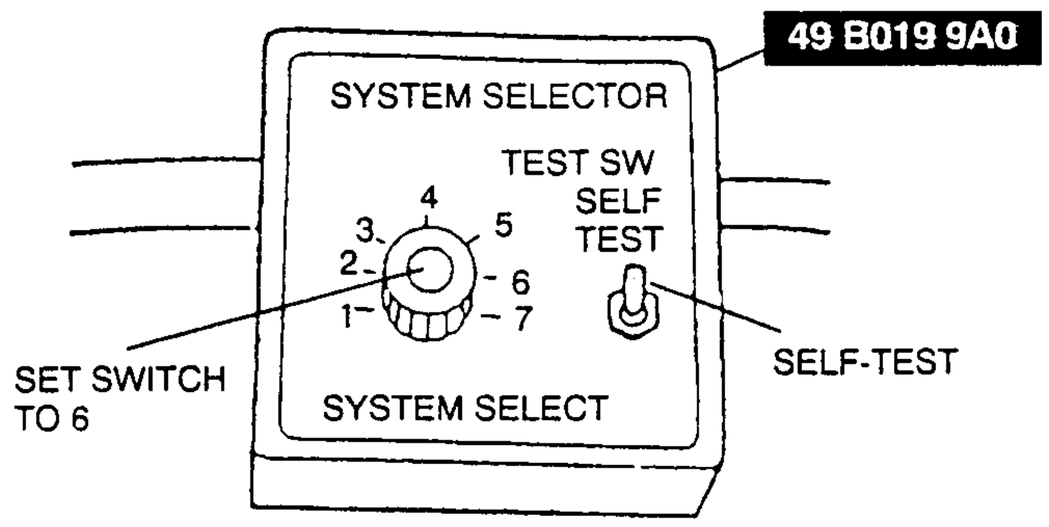
5. Select "VEHICLE & ENGINE SELECTION" and press TRIGGER.(Select the model and specifications of the vehicle you're testing.)
6. Select "DIAGNOSTIC DATA LINK" and press TRIGGER.
7. Select "CCM-CRUISE CONTROL MODULE" and press TRIGGER.
8. Select "DIAGNOSTIC TEST MODE" and press TRIGGER.
9. Select "CRUISE CONTROL INPUT SW SELF TEST" and press TRIGGER.
10. Press START.
11. Operate each switch as described and note the operation code list pattern. If a diagnostic trouble code is not indicated, inspect the corresponding system area.
12. Remove the **SST** (NGS set).
13. The operation mode is canceled by turning the ignition switch to LOCK or turn off the cruise control main switch.

Using SST (self-diagnosis checker)

1. Connect the **SST** (system selector) to the data link connector.
2. Connect the **SST** (self-diagnosis checker) to the **SST** (system selector) and ground the black clip to the vehicle.



3. Set the **SST** (self-diagnosis checker) switch to position **A**.
4. Set system selector switch to position **6**.
5. Set the test switch at **SELF-TEST**.

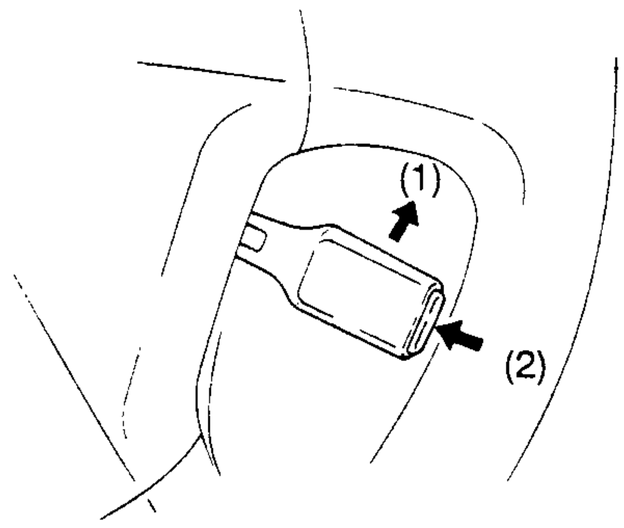


6. Turn the ignition switch to ON.
7. Verify that the **SST** (self-diagnosis checker) buzzer sounds and that diagnostic trouble code **88** flashes for **3 seconds**.

Note

- If **88** does not flash, check the power supply units and related wiring harnesses and connectors.
- If **88** flashes and the buzzer sounds continuously for more than **20 seconds**, check for a terminal and the data link connector terminal FSC. Replace the cruise control module if necessary and inspect again.

8. Turn and hold the RESUME/ACCEL switch (1) then turn the cruise control main switch (2) to activate system inspection.(The cruise set indicator light will illuminate for **3 seconds**.)



9. Operate each switch as described and note the operation code list pattern. If a diagnostic trouble code is not indicated, inspect the corresponding system area.
10. Remove the **SSTs**.
11. The operation mode is canceled by turning the ignition switch to LOCK or turn off the cruise control main switch.

Operation code list

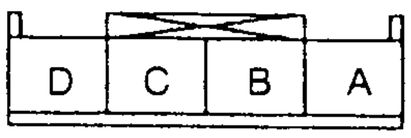
procedure		DTC	Output pattern	Display on the NGS	Diagnosed circuit	
Turn SET/COAST switch		21		SET/COAST SW-PRESS	Cruise control switch	
Turn RESUME/ACCEL switch		22		RESUME/ACCEL SW-PRESS	Cruise control switch	
Depress brake pedal		31		BRAKE PEDAL-DEPRESS	Brake switch	
ATX	Selector lever to P or N range	35		P OR N RANGE/NEUTRAL POSITION-SHIFT	ATX	Transaxle range switch
MTX	Depress clutch pedal				MTX	Clutch switch
Drive vehicle above 40 km/h {25 mph }		37		VEHICLE SPEED-ABOVE 40 KM/H (25 MPH)	Vehicle speed sensor	

Inspection of diagnostic trouble codes

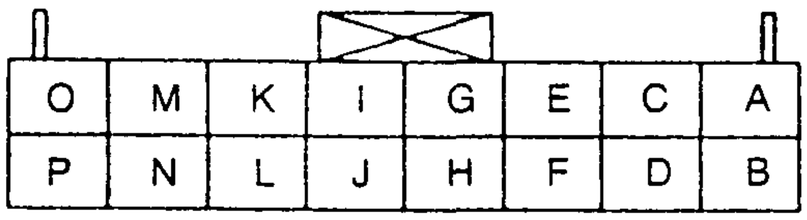
DTC 21	CRUISE CONTROL SWITCH
POSSIBLE CAUSE	• Damaged cruise control module • Damaged cruise control switch

INSPECTION		ACTION
Remove the driver-side air bag module. (Refer to AIR BAG SYSTEM, DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.) Turn ignition switch to ON. Turn cruise control main switch on. Turn SET/COAST switch on. Is voltage at terminal C of cruise control switch connector **approximately 2 V**?	Yes	Replace cruise control module.
	No	Replace cruise control switch.

CLOCK SPRING CONNECTOR, CRUISE CONTROL SWITCH CONNECTOR



CRUISE CONTROL MODULE CONNECTOR



DTC 22	CRUISE CONTROL SWITCH
POSSIBLE CAUSE	• Damaged cruise control module

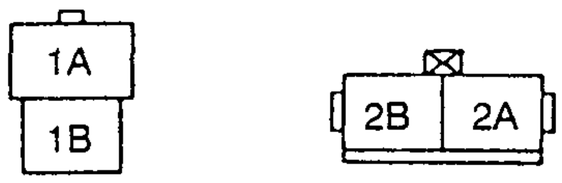
ACTION
Replace cruise control module.

DTC 31	BRAKE SWITCH
POSSIBLE CAUSE	• Burnt STOP 15 A fuse • Damaged cruise control module • Damaged brake switch • Open circuit in wiring harness • Poor connection of connector

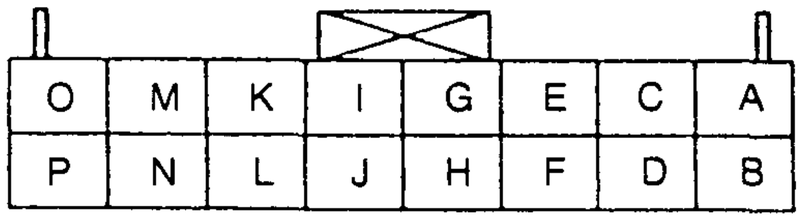
STEP	INSPECTION		ACTION
1	Does brake light illuminate when brake pedal depressed?	Yes	Go to step 6.
		No	Go to next step.

STEP	INSPECTION		ACTION
2	Is STOP 15 A fuse normal?	Yes	Go to next step.
		No	Replace fuse after checking and repairing wiring harness.
3	Depress brake pedal. Is voltage at terminal 1B of brake switch connector **approximately 12 V**?	Yes	Go to step 5.
		No	Go to next step.
4	Is voltage at terminal 1A of brake switch connector **approximately 12 V**?	Yes	Replace brake switch.
		No	Repair wiring harness. (STOP 15 A fuse-Brake switch)
5	Remove the console. (Refer to section S, DASHBOARD AND CONSOLE, CONSOLE REMOVAL/INSTALLATION.) Remove the passenger's side side wall. Depress brake pedal. Is voltage at terminal K of cruise control module connector **approximately 12 V**?	Yes	Replace cruise control module.
		No	Repair wiring harness. (*Cruise control module*-Brake switch)
6	Remove the console. (Refer to section S, DASHBOARD AND CONSOLE, CONSOLE REMOVAL/INSTALLATION.) Remove the passenger's side side wall. Depress brake pedal. Is voltage at terminal K of cruise control module connector **approximately 12 V**?	Yes	Go to next step.
		No	Repair wiring harness. (Cruise control module–Brake switch)
7	Turn ignition switch to ON. Turn cruise control main switch on. Depress brake pedal. Is voltage at terminal M of cruise control module connector **approximately 0 V**?	Yes	Replace cruise control module.
		No	Replace brake switch.

BRAKE SWITCH CONNECTOR



CRUISE CONTROL MODULE CONNECTOR

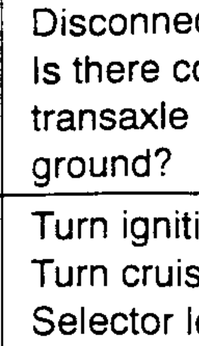


DTC 35	CLUTCH SWITCH (ATX: TRANSAXLE RANGE SWITCH)
POSSIBLE CAUSE	• Damaged cruise control module • Damaged clutch switch (ATX: transaxle range switch) • Open circuit in wiring harness • Poor connection of connector

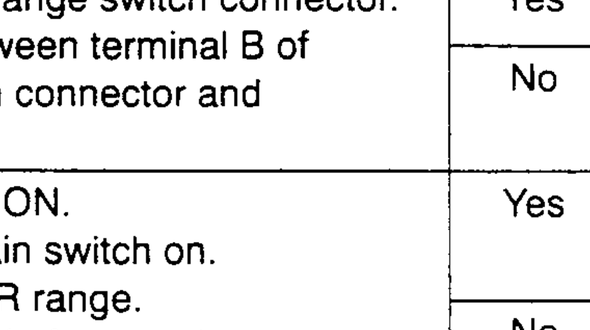
STEP	INSPECTION		ACTION
1	Does vehicle has MTX?	Yes	Go to next step.
		No	Go to step 6.
2	Is clutch switch okay?	Yes	Go to next step.
		No	Replace clutch switch.
3	Disconnect clutch switch connector. Is there continuity between terminal E of clutch switch connector and ground?	Yes	Go to next step.
		No	Repair wiring harness. (Clutch switch–GND)
4	Turn ignition switch to ON. Turn cruise control main switch on. Is voltage at terminal C of clutch switch connector **approximately 12 V**?	Yes	Replace cruise control module.
		No	Go to next step.

STEP	INSPECTION		ACTION
5	Remove the console. (Refer to section S, DASHBOARD AND CONSOLE, CONSOLE REMOVAL/INSTALLATION.) Remove the passenger's side side wall. Is voltage at terminal J of cruise control module connector **approximately 12 V**?	Yes	Repair wiring harness. (Cruise control module–Clutch switch)
		No	Replace cruise control module.
6	Is transaxle range switch okay?	Yes	Go to next step.
		No	Replace transaxle range switch.
7	Disconnect transaxle range switch connector. Is there continuity between terminal B of transaxle range switch connector and ground?	Yes	Go to next step.
		No	Repair wiring harness. (Transaxle range switch–GND)
8	Turn ignition switch to ON. Turn cruise control main switch on. Selector lever to D or R range. Is voltage at terminal H of transaxle range switch connector **approximately 12 V**?	Yes	Replace cruise control module.
		No	Go to next step.
9	Remove the console. (Refer to section S, DASHBOARD AND CONSOLE, CONSOLE REMOVAL/INSTALLATION.) Remove the passenger's side side wall. Is voltage at terminal J of cruise control module connector **approximately 12 V**?	Yes	Repair wiring harness. (Cruise control module–Transaxle range switch)
		No	Replace cruise control module.

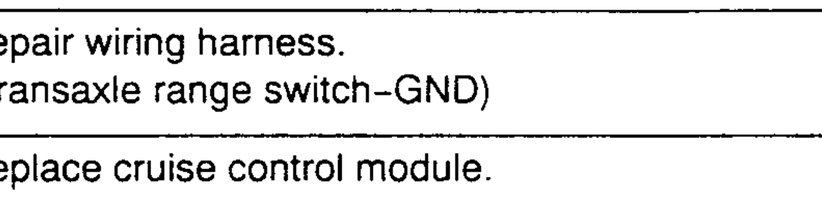
CLUTCH SWITCH CONNECTOR



TRANSAXLE RANGE SWITCH CONNECTOR



CRUISE CONTROL MODULE CONNECTOR



DTC 37	VEHICLE SPEED SENSOR
POSSIBLE CAUSE	• Damaged cruise control module • Damaged instrument cluster • Open circuit in wiring harness • Poor connection of connector

STEP	INSPECTION		ACTION
1	Turn ignition switch to ON. Turn cruise control main switch on. Rotate front tires. Does terminal voltage alternate between **0 V** and **5 V** at terminal 3T of instrument cluster connector.	Yes	Go to next step.
		No	Replace speedometer.

STEP	INSPECTION		ACTION
2	Disconnect instrument cluster connector. Remove the console. (Refer to section S, DASHBOARD AND CONSOLE, CONSOLE REMOVAL/INSTALLATION.) Remove the passenger's side side wall. Disconnect cruise control module connector. Is there continuity between terminal N of cruise control module connector and terminal 3T of instrument cluster connector?	Yes	Replace cruise control module.
		No	Repair wiring harness. (Cruise control module–Instrument cluster)

INSTRUMENT CLUSTER CONNECTOR

S	Q	O	M	K	I	G	E	C	A
T	R	P	N	L	J	H	F	D	B

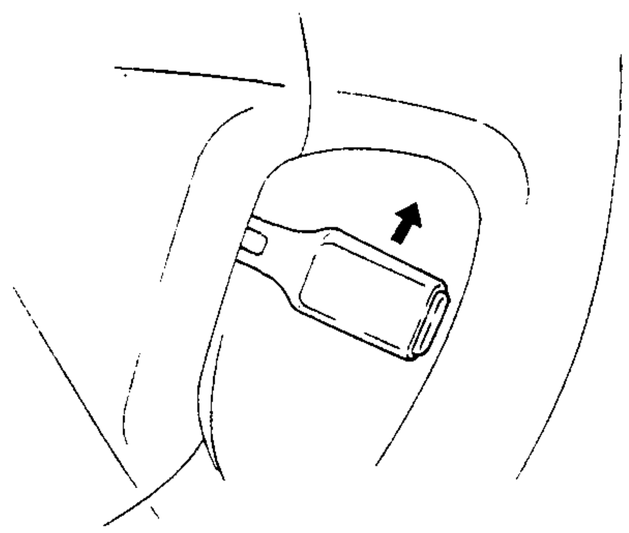
CRUISE CONTROL MODULE CONNECTOR

O	M	K	I	G	E	C	A
P	N	L	J	H	F	D	B

Inspection of Diagnostic Trouble Codes for *Condition Detection Mode*
Using the cruise set indicator light

Note
- If the RESUME/ACCEL switch on the cruise control switch is malfunctioning, the cruise set indicator light will not give a correct indication when you inspect the system. Use the **SST** (NGS set, self-diagnosis checker) to determine the cause of the malfunction.

1. Drive the vehicle.
2. Operate the cruise control system and verify that the deceleration, acceleration, coast, and cancel controls function by operating each of the control switches
3. Stop the vehicle and let it idle.
4. Turn and hold the RESUME/ACCEL switch for at least **3 seconds**. The cruise set indicator light will illuminate for **3 seconds**, and then go out for at least **2 seconds**.



5. If a diagnostic trouble code is indicated, inspect the corresponding system area.
6. The condition detection mode is canceled by turning the ignition switch to LOCK or turn off the cruise control main switch.

Using the SST(NGS set)
1. Drive the vehicle.
2. Operate the cruise control system and verify that the deceleration, acceleration, coast, and cancel controls function by operating each of the control switches
3. Stop the vehicle and let it idle.
4. Connect the **SST** (NGS set) to the data link connector and battery.

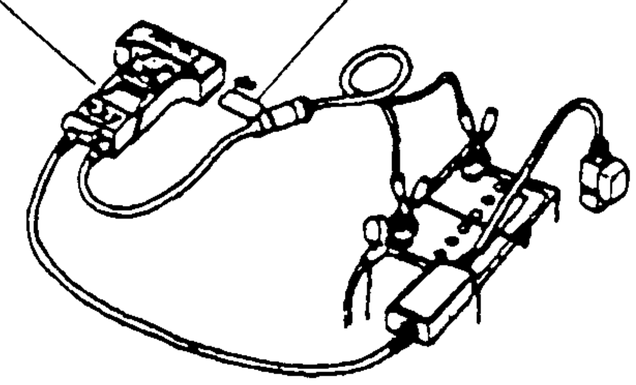
49 T088 030A

49 T088 031A

49 T088 032A

49 T088 033A

49 T088 0A4

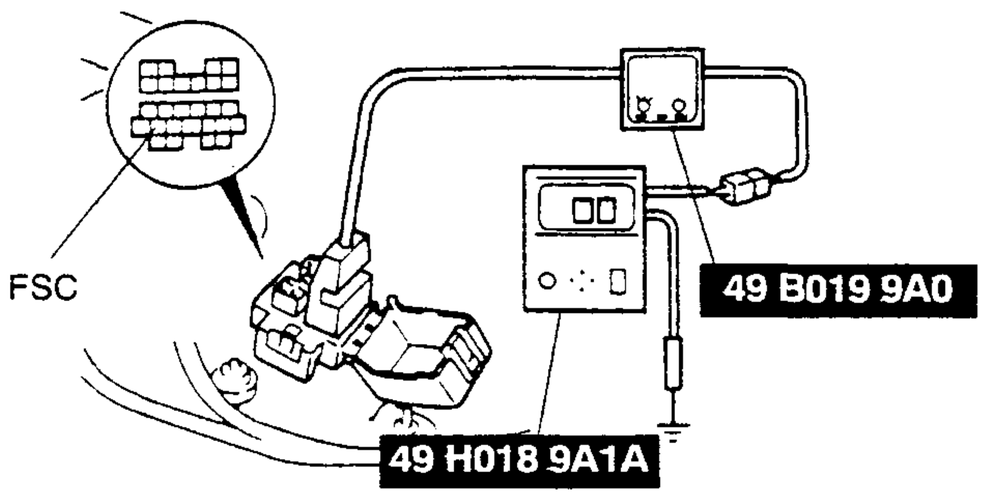


5. Select "VEHICLE & ENGINE SELECTION" and press TRIGGER. (Select the model and specifications of the vehicle you're testing.)
6. Select "DIAGNOSTIC DATA LINK" and press TRIGGER.
7. Select "CCM-CRUISE CONTROL MODULE" and press TRIGGER.
8. Select "DIAGNOSTIC TEST MODE" and press TRIGGER.
9. Press START.
10. If normal, "NO CODES RECEIVED" will be indicated.
11. If a diagnostic trouble code(s) is indicated, inspect the corresponding system area.
12. Remove the **SST** (NGS set).

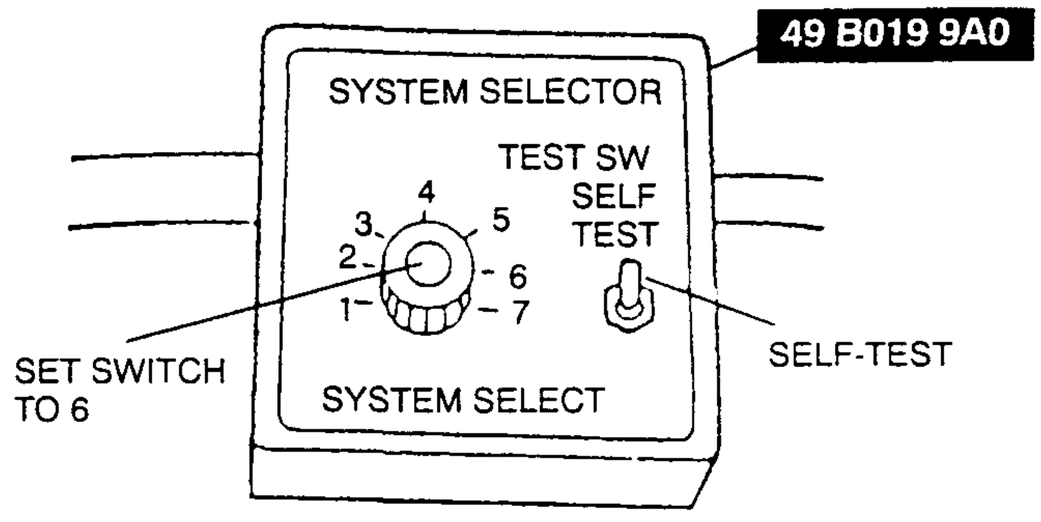
13. The condition detection mode is canceled by turning the ignition switch to LOCK or turn off the cruise control main switch.

Using SST(self-diagnosis checker)

1. Drive the vehicle.
2. Operate the cruise control system and verify that the deceleration, acceleration, coast, and cancel controls function by operating each of the control switches.
3. Stop the vehicle and let it idle.
4. Connect the **SST** (self-diagnosis checker) to the data link connector and battery.
5. Connect the **SST** (self-diagnosis checker) to the **SST** (system-selector) and ground the black clip to the vehicle.



6. Set the **SST** (self-diagnosis checker) switch to position **A**.
7. Set system selecting switch to position **6**.
8. Wet the test switch at **SELF-TEST**.



9. Verify that the **SST** (self-diagnosis checker) buzzer sounds and that diagnostic trouble code **88** flashes for **3 seconds**.
10. If diagnostic trouble code **00** is indicated, the system is operating normally.

Note

- If **88** does not flash, check the power supply units and related wiring harnesses and connectors.
- If **88** flashes and the buzzer sounds continuously for more than **20 seconds**, check for a terminal and the data link connector terminal FSC. Replace the cruise control module if necessary and inspect again.

11. If a diagnostic trouble code is indicated, inspect the corresponding system area.
12. Remove the **SSTs**.
13. The condition detection mode is canceled by turning the ignition switch to LOCK or turning off the cruise control main switch.

Condition code list

DTC	Output pattern	Display on the NGS	Diagnosed circuit
01		ACTUATOR OR STOPLIGHT SW-DEFECT	Cruise actuator
05		STOP FUSE OR WIRING-BLOWN, DEFECT	Brake switch
07		STOPLIGHT SWITCHES-DEFECT	Brake switch
11		SET/COAST SW-DEFECT(ALWAYS ON)	Cruise control switch
12		RESUME/ACCEL SW-DEFECT (ALWAYS ON)	Cruise control switch
13		SET/COAST SW OR RES/ACC SW DEFECT	Cruise control switch
15		CRUISE CONTROL MODULE-DEFECT	Cruise control module

Note

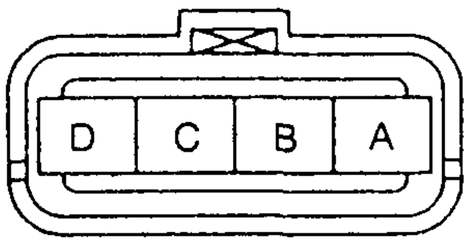
- When two or more service codes are indicated, inspected the malfunction with the smallest number first.

Inspection of diagnostic trouble codes

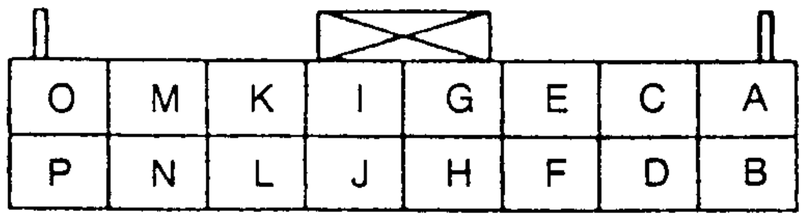
DTC 01	CRUISE ACTUATOR
POSSIBLE CAUSE	• Damaged cruise control module • Damaged cruise actuator • Open circuit in wiring harness • Poor connection of connector

STEP	INSPECTION		ACTION
1	*Are wiring harnesses between cruise control module and cruise actuator okay?*	Yes	*Go to next step.*
		No	Repair wiring harness. (Cruise control module–Cruise actuator)
2	Disconnect cruise actuator connector. Turn ignition switch to ON. Turn cruise control main switch on. Is voltage at terminal B of cruise actuator connector **approximately 12 V**?	Yes	Go to step 6.
		No	Go to next step.
3	Is voltage at terminal 2B of brake switch connector **approximately 12 V**?	Yes	Repair wiring harness. (Cruise actuator–Brake switch)
		No	Go to next step.
4	Is voltage at terminal 2A of brake switch connector **approximately 12 V**?	Yes	Replace brake switch.
		No	Go to next step.
5	Remove the console. (Refer to section S, DASHBOARD AND CONSOLE, CONSOLE REMOVAL/INSTALLATION.) Remove the passenger's side side wall. Is voltage at terminal H of cruise control module connector **approximately 12 V**?	Yes	Repair wiring harness. (Cruise control module–Brake switch)
		No	Replace cruise control module.
6	Connect cruise actuator connector. Turn ignition switch to ON. Turn cruise control main switch on. Is voltage at terminal D of cruise actuator connector **approximately 12 V**?	Yes	Go to next step.
		No	Replace cruise actuator.
7	Is voltage at terminal A of cruise actuator connector **approximately 12 V**?	Yes	Go to next step.
		No	Replace cruise actuator.
8	Is voltage at terminal C of cruise actuator connector **approximately 12 V**?	Yes	Replace cruise control module.
		No	Replace cruise actuator.

CRUISE ACTUATOR CONNECTOR



CRUISE CONTROL MODULE CONNECTOR



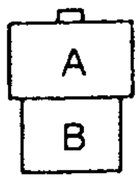
DTC 05	BRAKE SWITCH
POSSIBLE CAUSE	• Damaged cruise control module

INSPECTION		ACTION
Was operation mode performed?	Yes	Replace cruise control module.
	No	Perform operation mode.

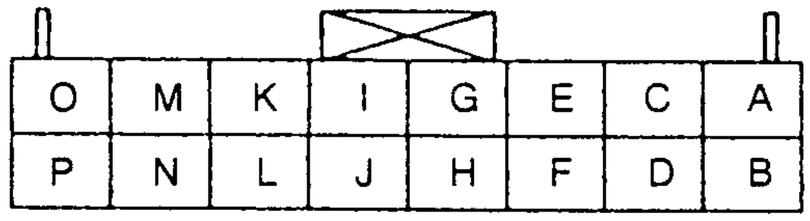
DTC 07	BRAKE SWITCH
POSSIBLE CAUSE	• Damaged cruise control module • Damaged brake switch • Open circuit in wiring harness

STEP	INSPECTION		ACTION
1	Disconnect brake switch connector. Is there continuity between terminal 1A and 1B of brake switch?	Yes	Replace brake switch.
		No	Go to next step.
2	Remove the console. (Refer to section S, DASHBOARD AND CONSOLE, CONSOLE REMOVAL/INSTALLATION.) Remove the passenger's side side wall. Turn ignition switch to ON. Turn cruise control main switch on. Is voltage at terminal M of cruise control module connector **approximately 12 V**?	Yes	Repair wiring harness. (Cruise control module–Brake switch)
		No	Replace cruise control module.

BRAKE SWITCH CONNECTOR



CRUISE CONTROL MODULE CONNECTOR



DTC 11	CRUISE CONTROL SWITCH		
POSSIBLE CAUSE	• Damaged cruise control module		
INSPECTION			**ACTION**
Was operation mode performed?		Yes	Replace cruise control module.
		No	Perform operation mode.

DTC 12	CRUISE CONTROL SWITCH		
POSSIBLE CAUSE	• Damaged cruise control module		
INSPECTION			**ACTION**
Was operation mode performed?		Yes	Replace cruise control module.
		No	Perform operation mode.

DTC 13	CRUISE CONTROL SWITCH		
POSSIBLE CAUSE	• Damaged cruise control module		
INSPECTION			**ACTION**
Was operation mode performed?		Yes	Replace cruise control module.
		No	Perform operation mode.

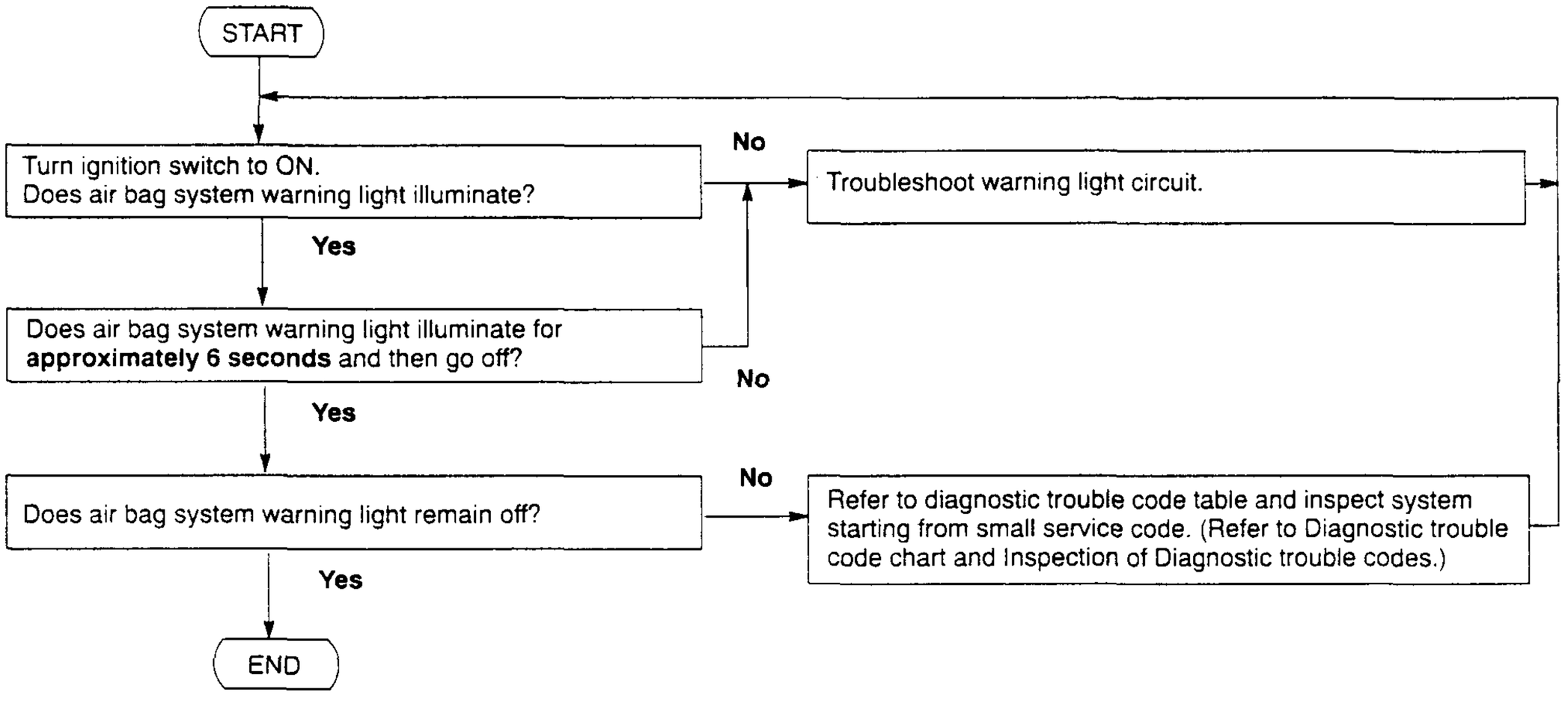
DTC 15	CRUISE CONTROL MODULE		
POSSIBLE CAUSE	• Damaged cruise control module		
INSPECTION			**ACTION**
Was operation mode performed?		Yes	Replace cruise control module.
		No	Perform operation mode.

AIR BAG SYSTEM

Diagnostic Trouble Code

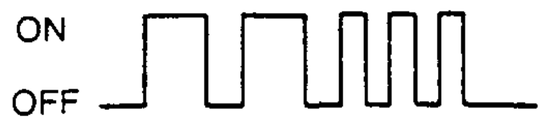
- The SAS unit has an on-board diagnostic function that flashes or illuminates the air bag system warning light to indicate trouble in the air bag system. The trouble can be determined by the warning light illumination or *flashing pattern.*

Flowchart



Diagnostic trouble code chart

DTC	Output signal	Malfunction location
1	ON / OFF	SAS unit connector poor connection
2	ON / OFF	SAS unit
3	ON / OFF	Battery
5	ON / OFF	Harness between SAS unit and side air bag sensor
6	ON / OFF	Driver-side air bag module
7	ON / OFF	Passenger-side air bag module
11	ON / OFF	Driver-side pre-tensioner seat belt
12	ON / OFF	Passenger-side pre-tensioner seat belt
21	ON / OFF	Driver-side side air bag sensor connector poor connection
22	ON / OFF	Driver-side side air bag sensor

DTC	Output signal	Malfunction location
23		Battery
25		Harness between SAS unit and driver-side side air bag sensor
26		Driver-side side air bag module
31		Passenger-side side air bag sensor connector poor connection
32		Passenger-side side air bag sensor
33		Battery
35		Harness between SAS unit and side air bag sensor
37		Passenger-side side air bag module
—	Continuously flashes	Deployment authorization standby code

Caution

- **When the output pattern continuously flashes (standby code),perform the deployment authorisation procedures. (Refer to AIR BAG SYSTEM, AIR BAG MODULES AND PRE-TENSIONER SEAT BELTS DEPLOYMENT AUTHORISATION PROCEDURES.)**

Inspection of diagnostic trouble codes

DTC 1	SAS UNIT CONNECTOR POOR CONNECTION
POSSIBLE CAUSE	• Open or short circuit in wiring harness • Poor connection of connector

STEP	INSPECTION		ACTION
1	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit to deplete its stored power. Remove passenger's side side wall. Is SAS unit connector securely connected?	Yes	Go to next step.
		No	Reconnect connector properly.
2	Disconnect SAS unit connector. Is SAS unit connector okay?	Yes	Replace SAS unit. (Refer to AIR BAG SYSTEM, SAS UNIT REMOVAL/INSTALLATION.)
		No	Replace wiring harness.

DTC 2	SAS UNIT
POSSIBLE CAUSE	• Damaged SAS unit

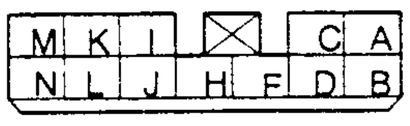
ACTION
Replace SAS unit. (Refer to AIR BAG SYSTEM, SAS UNIT REMOVAL/INSTALLATION.)

DTC 3	BATTERY
POSSIBLE CAUSE	**Note** • Diagnostic trouble code 3 is indicated when the voltage simultaneously drops in the harness of both of the following circuits. 1. Harness between B terminal of the fuse block connector (JB-03) and terminal AB of the SAS unit connector. 2. Harness between D terminal of the fuse block connector (JB-04) and terminal Z of the SAS unit connector. • Weak battery • Poor connection of connector

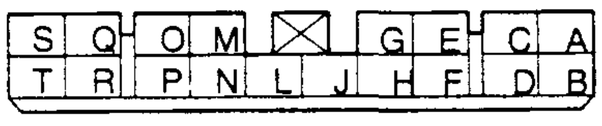
STEP	INSPECTION		ACTION
1	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Is battery to voltage **9 V or more**?	Yes	Go to next step.
		No	Battery is weak. Check charge/discharge system.

STEP	INSPECTION		ACTION
2	Remove driver's side front scuff plate. Remove driver's side front side trim. Remove fuse block without disconnecting connector. Turn ignition switch to ON. Is voltage at D (JB-01) or F (JB-02) terminal of fuse block connector **over 9 V**?	Yes	Go to next step.
		No	Repair wiring harness. (Battery-Fuse block)
3	Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit to deplete its stored power. Remove column cover. Disconnect clock spring connector. Remove glove compartment. Disconnect passenger-side air bag module connector. Remove driver's and passenger's side B-pillar lower trims. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side and passenger-side pre-tensioner seat belt connectors. Remove passenger's side side wall. Disconnect SAS unit connector. Turn ignition switch to ON. Is voltage at AB or Z terminal of SAS unit connector **over 9 V**?	Yes	Replace SAS unit. (Refer to AIR BAG SYSTEM, SAS UNIT REMOVAL/INSTALLATION.)
		No	Replace wiring harness.

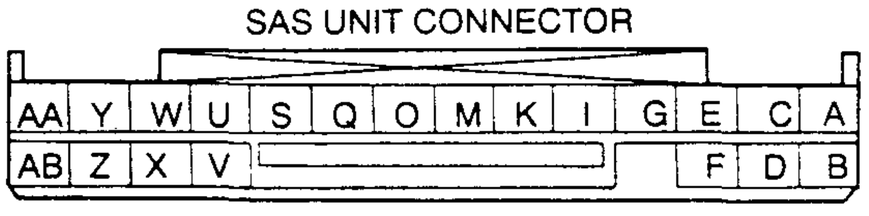
FUSE BLOCK CONNECTOR (JB-01)



FUSE BLOCK CONNECTOR (JB-02)



SAS UNIT CONNECTOR



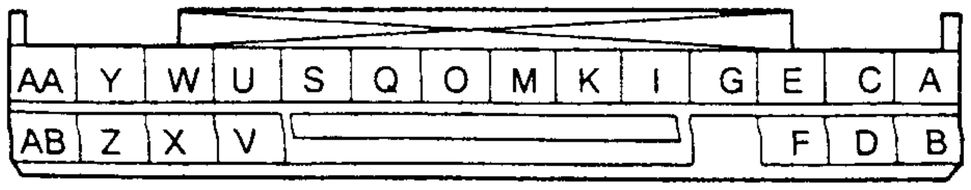
DTC 5	HARNESS BETWEEN SAS UNIT AND SIDE AIR BAG SENSOR
POSSIBLE CAUSE	• Damaged driver-side side air bag sensor • Damaged passenger-side side air bag sensor • Damaged SAS unit • Open or short circuit in wiring harness • Poor connection of connector

STEP	INSPECTION		ACTION
1	Is vehicle equipped with side air bag?	Yes	Go to next step.
		No	Go to step 8.

STEP	INSPECTION		ACTION
2	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit and side air bag sensor to deplete its stored power. Remove column cover. Disconnect clock spring connector. Remove glove compartment. Disconnect passenger-side air bag module connector. Remove driver's and passenger's side B-pillar lower trims. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side and passenger-side pre-tensioner seat belt connectors. Remove passenger's side side wall. Disconnect SAS unit connector. Disconnect driver-side side air bag module connector. Disconnect driver-side side air bag sensor connector. Check wiring harness between terminal V of SAS unit connector and terminal V of *driver-side side air bag sensor for following.* • Short to ground • Short to power supply • Open circuit Is wiring harness okay?	Yes	Go to next step.
		No	Replace wiring harness.
3	Disconnect passenger-side side air bag module connector. Disconnect passenger-side side air bag sensor connector. Is *there continuity between terminal Y of* driver-side side air bag sensor connector and terminal G of passenger-side side air bag sensor connector?	Yes	Go to next step.
		No	Replace wiring harness.
4	Connect passenger-side side air bag sensor connector. Connect negative battery cable. Turn ignition switch to ON. Is voltage terminal G of passenger-side side air bag sensor connector **approximately 5 V**?	Yes	Go to step 6.
		No	Go to next step.

STEP	INSPECTION		ACTION
5	Is voltage at Z or AB terminal of passenger-side side air bag sensor connector **over 8 V**?	Yes	Replace passenger-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	• Inspect wiring harness. (Battery–Passenger-side side air bag sensor) • Battery is weak. Check charge/discharge system.
6	Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the side air bag sensor to deplete its stored power. Disconnect passenger-side side air bag sensor connector. Connect driver-side side air bag sensor connector. Connect negative battery cable. Turn ignition switch to ON. Is voltage at V and Y terminal of driver-side side air bag sensor connector **approximately 5 V**?	Yes	Replace SAS unit. (Refer to AIR BAG SYSTEM, SAS UNIT REMOVAL/INSTALLATION.)
		No	Go to next step.
7	Is voltage at Z or AB terminal of driver-side side air bag sensor connector **over 8 V**?	Yes	Replace driver-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	• Inspect wiring harness. (Battery–Driver-side side air bag sensor) • Battery is weak. Check charge/discharge system.
8	Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit and side air bag sensor to deplete its stored power. Remove column cover. Disconnect clock spring connector. Remove glove compartment. Disconnect passenger-side air bag module connector. Remove driver's and passenger's side B-pillar lower trims. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side and passenger-side pre-tensioner seat belt connectors. Remove passenger's side side wall. Disconnect SAS unit connector. Check wiring harness between terminal Y of SAS unit connector and ground for the following. • Open circuit Is wiring harness okay?	Yes	Replace SAS unit. (Refer to AIR BAG SYSTEM, SAS UNIT REMOVAL/INSTALLATION.)
		No	Replace wiring harness.

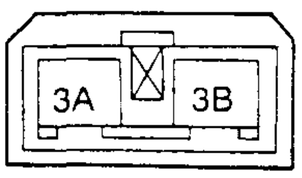
SAS UNIT CONNECTOR, DRIVER-SIDE SIDE AIR BAG SENSOR CONNECTOR, PASSENGER-SIDE SIDE AIR BAG SENSOR CONNECTOR



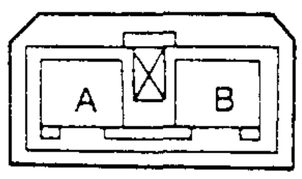
DTC 6	DRIVER-SIDE AIR BAG MODULE		
POSSIBLE CAUSE	• Damaged driver-side air bag module • Damaged clock spring • Open or short circuit in wiring harness		
STEP	**INSPECTION**		**ACTION**
1	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit to deplete its stored power. Remove driver-side air bag module. (Refer to AIR BAG SYSTEM, DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.) Is clock spring pin okay?	Yes	Go to next step.
		No	Replace clock spring. (Refer to AIR BAG SYSTEM, CLOCK SPRING REMOVAL/INSTALLATION.)
2	Connect leads of **SST** (Checker, Fuel And Thermometer) to terminals 3A and 3B of the clock spring. Set resistance of **SST** (Checker, Fuel And Thermometer) to **2 ohms**. Connect negative battery cable. If diagnostic trouble code 6 indicated when ignition switch is turned to ON?	Yes	Go to next step.
		No	Replace driver-side air bag module. (Refer to AIR BAG SYSTEM, DRIVER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
3	Turn ignition switch to LOCK. Disconnect negative battery cable and wait for more than 1 **minute** to allow backup power supply of the SAS unit to deplete its stored power. Remove column cover. Disconnect clock spring connector. Is clock spring connector pin okay?	Yes	Go to next step.
		No	Replace wiring harness.
4	Connect leads of **SST** (Checker, Fuel And Thermometer) to terminals A and B of the clock spring connector. Set resistance of **SST** (Checker, Fuel And Thermometer) to **2 ohms**. Connect negative battery cable. If diagnostic trouble code 6 indicated when ignition switch is turned to ON?	Yes	Go to next step.
		No	Replace clock spring. (Refer to AIR BAG SYSTEM, CLOCK SPRING REMOVAL/INSTALLATION.)

STEP	INSPECTION		ACTION
5	Turn ignition switch to LOCK. Disconnect negative battery cable and wait for more than **1 minute** to allow backup power supply of the SAS unit to deplete its stored power. Remove glove compartment. Disconnect passenger-side air bag module connector. Remove driver's and passenger's side B-pillar lower trims. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side and passenger-side pre-tensioner seat belt connectors. Remove passenger's side side wall. Disconnect SAS unit connector. Check wiring harness between terminal O of SAS unit connector and terminal A of clock spring connector, and between terminal M of SAS unit connector and terminal B of clock spring connector for following. • Short to ground • Short to power supply • Open circuit Is wiring harness okay?	Yes	Replace SAS unit. (Refer to AIR BAG SYSTEM, SAS UNIT REMOVAL/INSTALLATION.)
		No	Replace wiring harness.

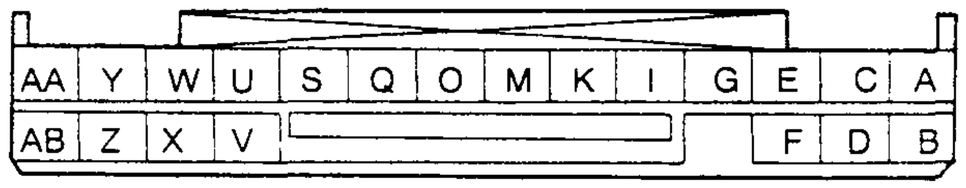
CLOCK SPRING



CLOCK SPRING CONNECTOR



SAS UNIT CONNECTOR

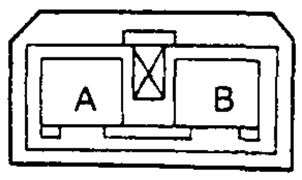


DTC 7	PASSENGER-SIDE AIR BAG MODULE
POSSIBLE CAUSE	• Damaged passenger-side air bag module • Damaged false resistance • Open or short circuit in wiring harness

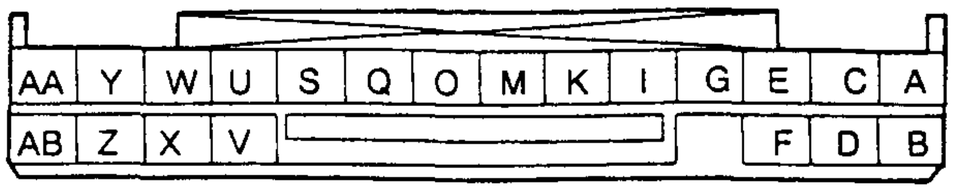
STEP	INSPECTION		ACTION
1	Is vehicle equipped with passenger-side air bag module?	Yes	Go to next step.
		No	Go to step 5.
2	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Turn ignition switch to LOCK. Disconnect negative battery cable and wait for more than **1 minute** to allow backup power supply of the SAS unit to deplete its stored power. Remove glove compartment. Disconnect passenger-side air bag module connector. Is passenger-side air bag module connector pin okay?	Yes	Go to next step.
		No	Replace wiring harness.

STEP	INSPECTION		ACTION
3	Connect leads of **SST** (Checker, Fuel And Thermometer) to terminals A and B of the passenger-side air bag module connector. Set resistance of **SST** (Checker, Fuel And Thermometer) to **2 ohms**. Connect negative battery cable. Is diagnostic trouble code 7 indicated when ignition switch is turned to ON?	Yes	Go to next step.
		No	Replace passenger-side air bag module. (Refer to AIR BAG SYSTEM, PASSENGER-SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
4	Turn ignition switch to LOCK. Disconnect negative battery cable and wait for more than **1 minute** to allow backup power supply of the SAS unit to deplete its stored power. Remove column cover. Disconnect clock spring connector. Remove driver's and passenger's side B-pillar lower trims. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side and passenger-side pre-tensioner seat belt connectors. Remove passenger's side side wall. Disconnect SAS unit connector. Check wiring harness between terminal K of SAS unit connector and terminal A of passenger-side air bag module connector, and between terminal I of SAS unit connector and terminal B of passenger-side air bag module connector for following. • Short to ground • Short to power supply • Open circuit Is wiring harness okay?	Yes	Replace SAS unit. (Refer to AIR BAG SYSTEM, SAS UNIT REMOVAL/INSTALLATION.)
		No	Replace wiring harness.
5	Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit to deplete its stored power. Remove column cover. Disconnect clock spring connector. Remove driver's and passenger's side B-pillar lower trims. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side and passenger-side pre-tensioner seat belt connectors. Remove passenger's side side wall. Disconnect SAS unit connector. Check wiring harness between terminal E of SAS unit connector and ground for the following. • Open circuit Is wiring harness okay?	Yes	Replace SAS unit. (Refer to AIR BAG SYSTEM, SAS UNIT REMOVAL/INSTALLATION.)
		No	Replace wiring harness.

PASSENGER-SIDE AIR BAG MODULE CONNECTOR



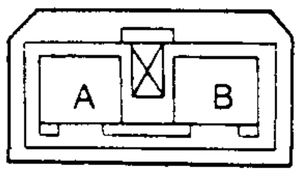
SAS UNIT CONNECTOR



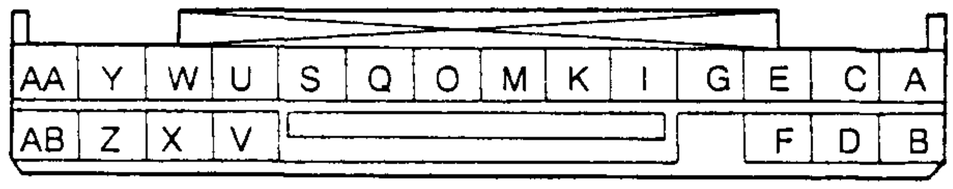
DTC 11	DRIVER-SIDE PRE-TENSIONER SEAT BELT		
POSSIBLE CAUSE	• Damaged driver-side pre-tensioner seat belt • Open or short circuit in wiring harness		
STEP	INSPECTION		ACTION
1	Is vehicle equipped with pre-tensioner seat belt?	Yes	Go to next step.
		No	Go to step 5.
2	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit to deplete its stored power. Remove driver's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side pre-tensioner seat belt connector. Is driver-side pre-tensioner seat belt connector pin okay?	Yes	Go to next step.
		No	Replace wiring harness.
3	Connect leads of **SST** (Checker, Fuel And Thermometer) to terminals A and B of the driver-side pre-tensioner seat belt connector. Set resistance of **SST** (Checker, Fuel And Thermometer) to **2 ohms**. Connect negative battery cable. If diagnostic trouble code 11 indicated when ignition switch is turned to ON?	Yes	Go to next step.
		No	Replace driver-side pre-tensioner seat belt. (Refer to AIR BAG SYSTEM, PRE-TENSIONER SEAT BELT REMOVAL/INSTALLATION.)
4	Turn ignition switch to LOCK. Disconnect negative battery cable and wait for more than **1 minute** to allow backup power supply of the SAS unit to deplete its stored power. Remove column cover. Disconnect clock spring connector. Remove glove compartment. Disconnect passenger-side air bag module connector. Remove passenger's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect passenger-side pre-tensioner seat belt connector. Remove passenger's side side wall. Disconnect SAS unit connector. Check wiring harness between terminal F of SAS unit connector and terminal A of driver-side pre-tensioner seat belt connector, and between terminal C of SAS unit connector and terminal B of driver-side pre-tensioner seat belt connector for following. • Short to ground • Short to power supply • Open circuit Is wiring harness okay?	Yes	Replace SAS unit. (Refer to AIR BAG SYSTEM, SAS UNIT REMOVAL/INSTALLATION.)
		No	Replace wiring harness.

STEP	INSPECTION		ACTION
5	Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit to deplete its stored power. Remove column cover. Disconnect clock spring connector. Remove glove compartment. Disconnect passenger-side air bag module connector. Remove passenger's side side wall. Disconnect SAS unit connector. Check wiring harness between terminal U of SAS unit connector and ground for the following. • Open circuit Is wiring harness okay?	Yes	Replace SAS unit. (Refer to AIR BAG SYSTEM, SAS UNIT REMOVAL/INSTALLATION.)
		No	Replace wiring harness.

DRIVER-SIDE PRE-TENSIONER SEAT BELT CONNECTOR



SAS UNIT CONNECTOR

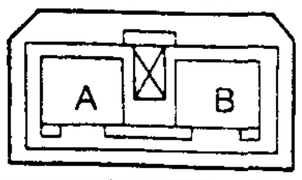


DTC 12	PASSENGER-SIDE PRE-TENSIONER SEAT BELT
POSSIBLE CAUSE	• Damaged passenger-side pre-tensioner seat belt • Open or short circuit in wiring harness

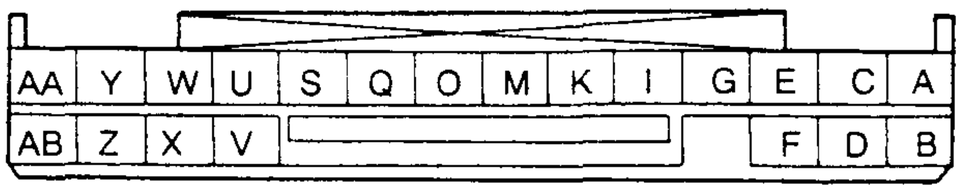
STEP	INSPECTION		ACTION
1	Is vehicle equipped with pre-tensioner seat belt?	Yes	Go to next step.
		No	Go to step 5.
2	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than 1 **minute** to allow the backup power supply of the SAS unit to deplete its stored power. Remove passenger's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect passenger-side pre-tensioner seat belt connector. Is passenger-side pre-tensioner seat belt connector pin okay?	Yes	Go to next step.
		No	Replace wiring harness.

STEP	INSPECTION		ACTION
3	Connect leads of **SST** (Checker, Fuel And Thermometer) to terminals A and B of the passenger-side pre-tensioner seat belt connector. Set resistance of **SST** (Checker, Fuel And Thermometer) to **2 ohms**. Connect negative battery cable. If diagnostic trouble code 12 indicated when ignition switch is turned to ON?	Yes	Go to next step.
		No	Replace passenger-side pre-tensioner seat belt. (Refer to AIR BAG SYSTEM, PRE-TENSIONER SEAT BELT REMOVAL/INSTALLATION.)
4	Turn ignition switch to LOCK. Disconnect negative battery cable and wait for more than **1 minute** to allow backup power supply of the SAS unit to deplete its stored power. Remove column cover. Disconnect clock spring connector. Remove glove compartment. Disconnect passenger-side air bag module connector. Remove driver's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side pre-tensioner seat belt connector. Remove passenger's side side wall. Disconnect SAS unit connector. Check wiring harness between terminal F of SAS unit connector and terminal A of passenger-side pre-tensioner seat belt connector, and between terminal C of SAS unit connector and terminal B of passenger-side pre-tensioner seat belt connector for following. • Short to ground • Short to power supply • Open circuit Is wiring harness okay?	Yes	Replace SAS unit. (Refer to AIR BAG SYSTEM, SAS UNIT REMOVAL/INSTALLATION.)
		No	Replace wiring harness.
5	Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit to deplete its stored power. Remove column cover. Disconnect clock spring connector. Remove glove compartment. Disconnect passenger-side air bag module connector. Remove passenger's side side wall. Disconnect SAS unit connector. Check wiring harness between terminal U of SAS unit connector and ground for the following. • Open circuit Is wiring harness okay?	Yes	Replace SAS unit. (Refer to AIR BAG SYSTEM, SAS UNIT REMOVAL/INSTALLATION.)
		No	Replace wiring harness.

PASSENBER-SIDE PRE-TENSIONER SEAT BELT CONNECTOR



SAS UNIT CONNECTOR



DTC 21	DRIVER-SIDE SIDE AIR BAG SENSOR CONNECTOR POOR CONNECTION
POSSIBLE CAUSE	• Open or short circuit in wiring harness • Poor connection of connector

STEP	INSPECTION		ACTION
1	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the side air bag sensor to deplete its stored power. Remove driver's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Is driver-side side air bag sensor connector securely connected?	Yes	Go to next step.
		No	Reconnect connector properly.
2	Disconnect driver-side side air bag sensor connector. Is driver-side air bag sensor connector okay?	Yes	Replace driver-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	Replace wiring harness.

DTC 22	DRIVER-SIDE SIDE AIR BAG SENSOR
POSSIBLE CAUSE	• Damaged driver-side side air bag sensor
ACTION	
Replace driver-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)	

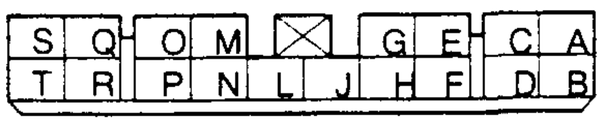
DTC 23	DRIVER-SIDE SIDE AIR BAG SENSOR
POSSIBLE CAUSE	**Note** • Diagnostic trouble code 3 is indicated when the voltage simultaneously drops in the harness of both of the following circuits. 1. Harness between B terminal of the fuse block connector (JB–03) and terminal AB of the driver-side side air bag sensor connector. 2. Harness between D terminal of the fuse block connector (JB–04) and terminal Z of the driver-side side air bag sensor connector. • Weak battery • Poor connection of connector

STEP	INSPECTION		ACTION
1	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Is battery to voltage **9V or more**?	Yes	Go to next step.
		No	Battery is weak. Check charge/discharge system.
2	Remove driver's side front scuff plate. Remove driver's side front side trim. Remove fuse block without disconnecting connector. Turn ignition switch to ON. Is voltage at D (JB–01) or F (JB–02) terminal of fuse block connector **over 9 V**?	Yes	Go to next step.
		No	Repair wiring harness. (Battery–Fuse block)
3	Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the side air bag sensor to deplete its stored power. Disconnect driver-side side air bag module connector. Remove driver's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side side air bag sensor connector. Connect negative battery cable. Turn ignition switch to ON. Is voltage at AB or Z terminal of driver-side side air bag sensor connector **over 9 V**?	Yes	Replace driver-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	Replace wiring harness. (Fuse block–Driver-side side air bag sensor)

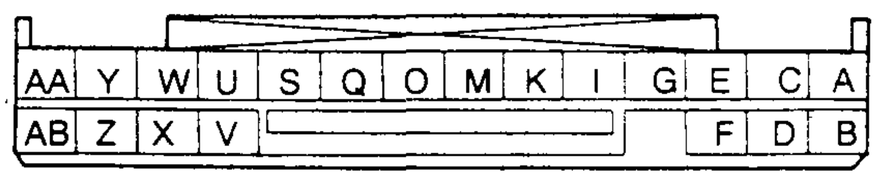
FUSE BLOCK CONNECTOR (JB–01)



FUSE BLOCK CONNECTOR (JB–02)

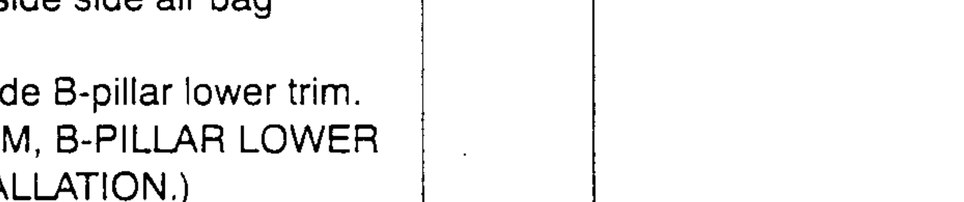


DRIVER-SIDE AIR BAG SENSOR CONNECTOR



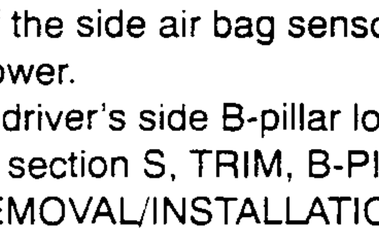
DTC 25	DRIVER-SIDE SIDE AIR BAG SENSOR		
POSSIBLE CAUSE	• Damaged driver-side side side air bag sensor • Open or short circuit in wiring harness		
STEP	**INSPECTION**		**ACTION**
1	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit and side air bag sensor to deplete its stored power. Remove column cover. Disconnect clock spring connector. Remove glove compartment. Disconnect passenger-side air bag module connector. Remove driver's and passenger's side B-pillar lower trims. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side and passenger-side pre-tensioner seat belt connectors. Remove passenger's side side wall. Disconnect SAS unit connector. Disconnect passenger-side side air bag module connector. Remove passenger's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect passenger-side side air bag sensor connector. Connect negative battery cable. Is voltage terminal V and Y of driver-side side air bag sensor connector **approximately 5 V**?	Yes	Replace driver-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	Go to next step.
2	Is voltage terminal Z or AB of driver-side side air bag sensor connector **over 5 V**?	Yes	Replace driver-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	• Inspect wiring harness. (Battery—Driver-side side air bag sensor) • Battery is weak. Check charge/discharge system.

SAS UNIT CONNECTOR
DRIVER-SIDE SIDE AIR BAG SENSOR CONNECTOR



DTC 26	DRIVER-SIDE SIDE AIR BAG MODULE		
POSSIBLE CAUSE	• Damaged driver-side side air bag module • Open or short circuit in wiring harness		
STEP	**INSPECTION**		**ACTION**
1	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the side air bag sensor to deplete its stored power. Disconnect driver-side side air bag module connector. Is driver-side side air bag module connector pin okay?	Yes	Go to next step.
		No	Replace wiring harness.
2	Connect leads of **SST** (Checker, Fuel And Thermometer) to terminals A and B of the driver-side side air bag module connector. Set resistance of **SST** (Checker, Fuel And Thermometer) to **2 ohms**. Connect negative battery cable. If diagnostic trouble code 26 indicated when ignition switch is turned to ON?	Yes	Go to next step.
		No	Replace driver-side side air bag module. (Refer to AIR BAG SYSTEM, SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
3	Turn ignition switch to LOCK. Disconnect negative battery cable and wait for more than **1 minute** to allow backup power supply of the side air bag sensor to deplete its stored power. Remove driver's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side side air bag sensor connector. Check wiring harness between terminal O of driver-side side air bag sensor connector and terminal A of driver-side side air bag module connector, and between terminal M of driver-side side air bag sensor connector and terminal B of driver-side side air bag module connector for following. • Short to ground • Short to power supply • Open circuit Is wiring harness okay?	Yes	Replace driver-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	Replace wiring harness.

DRIVER-SIDE SIDE AIR BAG MODULE CONNECTOR



DRIVER-SIDE SIDE AIR BAG SENSOR CONNECTOR



DTC 31	DRIVER-SIDE SIDE AIR BAG SENSOR CONNECTOR POOR CONNECTION
POSSIBLE CAUSE	• Open or short circuit in wiring harness • Poor connection of connector

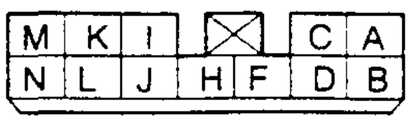
STEP	INSPECTION		ACTION
1	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the side air bag sensor to deplete its stored power. Remove passenger's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Is passenger-side side air bag sensor connector securely connected?	Yes	Go to next step.
		No	Reconnect connector properly.
2	Disconnect passenger-side side air bag sensor connector. Is passenger-side side air bag sensor connector okay?	Yes	Replace passenger-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	Replace wiring harness.

DTC 32	DRIVER-SIDE SIDE AIR BAG SENSOR
POSSIBLE CAUSE	• Damaged passenger-side side air bag sensor
ACTION	
Replace passenger-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)	

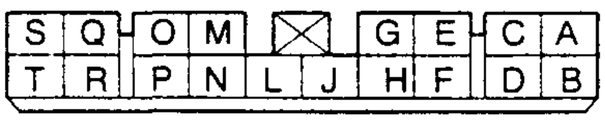
DTC 33	DRIVER-SIDE SIDE AIR BAG SENSOR
POSSIBLE CAUSE	**Note** • Diagnostic trouble code 3 is indicated when the voltage simultaneously drops in the harness of both of the following circuits. 1. Harness between B terminal of the fuse block connector (JB-03) and terminal AB of the passenger-side side air bag sensor connector. 2. Harness between D terminal of the fuse block connector (JB-04) and terminal Z of the passenger-side side air bag sensor connector. • Weak battery • Poor connection of connector

STEP	INSPECTION		ACTION
1	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Is battery to voltage **9 V or more**?	Yes	Go to next step.
		No	Battery is weak. Check charge/discharge system.
2	Remove driver's side front scuff plate. Remove driver's side front side trim. Remove fuse block without disconnecting connector. Turn ignition switch to ON. Is voltage at D (JB-01) or F (JB-02) terminal of fuse block connector **over 9 V**?	Yes	Replace passenger-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	Repair wiring harness. (Battery—Fuse block)
3	Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the side air bag sensor to deplete its stored power. Disconnect passenger-side side air bag module connector. Remove passenger's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect passenger-side side air bag sensor connector. Connect negative battery cable. Turn ignition switch to ON. Is voltage at AB or Z terminal of passenger-side side air bag sensor connector **over 9 V**?	Yes	Replace passenger-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	Replace wiring harness. (Fuse block—Passenger-side side air bag sensor)

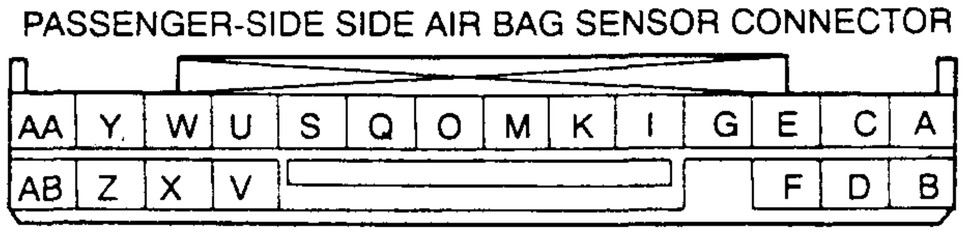
FUSE BLOCK CONNECTOR (JB-01)



FUSE BLOCK CONNECTOR (JB-02)

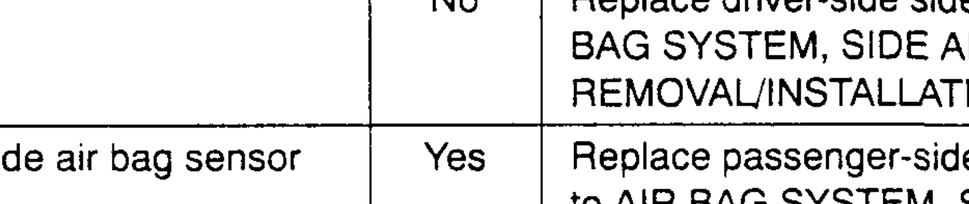


PASSENGER-SIDE SIDE AIR BAG SENSOR CONNECTOR



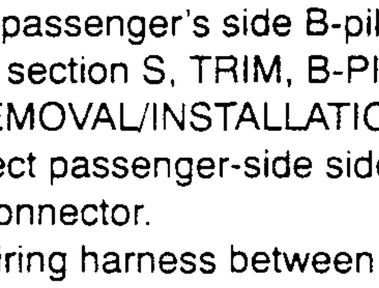
DTC 35	DRIVER-SIDE SIDE AIR BAG SENSOR		
POSSIBLE CAUSE	• Damaged passenger-side side air bag sensor • Open or short circuit in wiring harness		
STEP	**INSPECTION**		**ACTION**
1	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than 1 **minute** to allow the backup power supply of the side air bag sensor to deplete its stored power. Disconnect driver-side side air bag module connector. Disconnect passenger-side side air bag module connector. Remove driver's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side side air bag sensor connector. Remove passenger's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect passenger-side side air bag sensor connector. Is there continuity between terminal Y of driver-side side air bag sensor connector and terminal G of passenger-side side air bag sensor connector?	Yes	Go to next step.
		No	Replace wiring harness.
2	Is there continuity between terminal V and Y of driver-side side air bag sensor?	Yes	Go to next step.
		No	Replace driver-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
3	Connect passenger-side side air bag sensor connector. Connect negative battery cable. Turn ignition switch to ON. Is voltage terminal G of passenger-side side air bag sensor connector **approximately 5 V**?	Yes	Replace passenger-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	Go to next step.
4	Is voltage terminal Z or AB of passenger-side side air bag sensor connector **over 5 V**?	Yes	Replace passenger-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	• Inspect wiring harness. (Battery—Passenger-side side air bag sensor) • Battery is weak. Check charge/discharge system.

DRIVER-SIDE SIDE AIR BAG SENSOR CONNECTOR,
PASSENGER-SIDE SIDE AIR BAG SENSOR CONNECTOR



DTC 37	PASSENGER-SIDE SIDE AIR BAG MODULE		
POSSIBLE CAUSE	• Damaged passenger-side side air bag module • Open or short circuit in wiring harness		
STEP	**INSPECTION**		**ACTION**
1	**Warning** • **Handling the air bag system components improperly can accidently deploy the air bag modules and pre-tensioner seat belts, which may seriously injure you. Read SERVICE WARNINGS, before handling the air bag system components. (Refer to AIR BAG SYSTEM, SERVICE WARNINGS.)** Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than 1 **minute** to allow the backup power supply of the side air bag sensor to deplete its stored power. Disconnect passenger-side side air bag module connector. Is passenger-side side air bag module connector pin okay?	Yes	Go to next step.
		No	Replace wiring harness.
2	Connect leads of **SST** (Checker, Fuel And Thermometer) to terminals A and B of the passenger-side side air bag module connector. Set resistance of **SST** (Checker, Fuel And Thermometer) to **2 ohms**. Connect negative battery cable. Is diagnostic trouble code 37 indicated when ignition switch is turned to ON?	Yes	Go to next step.
		No	Replace passenger-side side air bag module. (Refer to AIR BAG SYSTEM, SIDE AIR BAG MODULE REMOVAL/INSTALLATION.)
3	Turn ignition switch to LOCK. Disconnect negative battery cable and wait for more than **1 minute** to allow backup power supply of the side air bag sensor to deplete its stored power. Remove passenger's side B-pillar lower trim. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect passenger-side side air bag sensor connector. Check wiring harness between terminal O of passenger-side side air bag sensor connector and terminal A of passenger-side side air bag module connector, and between terminal M of passenger-side side air bag sensor connector and terminal B of passenger-side side air bag module connector for following. • Short to ground • Short to power supply • Open circuit Is wiring harness okay?	Yes	Replace passenger-side side air bag sensor. (Refer to AIR BAG SYSTEM, SIDE AIR BAG SENSOR REMOVAL/INSTALLATION.)
		No	Replace wiring harness.

PASSENGER-SIDE SIDE AIR BAG MODULE CONNECTOR



PASSENGER-SIDE SIDE AIR BAG SENSOR CONNECTOR



TROUBLESHOOTING

AIR BAG SYSTEM

Foreword

- Refer to section GI and thoroughly read and understand the basic flow of troubleshooting in order to properly perform the procedures.
- For the steps which have an asterisk(*), shake the wiring harness which is connected to the connector while performing the inspection. (The cause of the malfunction may be a poor connection of the connector, terminal, or wiring harness.)

Troubleshooting Index

- Use the chart below to verify the symptoms of the trouble in order to diagnose the appropriate area.

No.	Malfunction symptom
1	Air bag system warning light does not illuminate when ignition switch is turned to ON
2	Air bag system warning light illuminates immediately after ignition switch turned to ON and remains illuminated

Symptom Troubleshooting

Note

- The following may be the case of trouble if the result of the following troubleshooting is normal.

1. **With side air bag system**
   - Poor contact at B terminal of short connector (15-pin) between instrument cluster and SAS unit.

   Without side air bag system
   - Poor contact at C terminal of short connector (10-pin) between instrument cluster and SAS unit.
2. Simultaneous poor contact at both terminals S and X of the SAS unit connector (21-pin).
3. Simultaneous poor contact at both terminals AB and Z of the SAS unit connector (21-pin).
4. Simultaneous poor contact in wiring harness between S terminal of the SAS unit connector (21-pin) and ground, X terminal of the SAS unit connector (21-pin) and ground.
5. Simultaneous poor contact in wiring harness between METER 10 A fuse and the SAS unit, ENGINE 10 A fuse and the SAS unit.

1	**Air bag system warning light does not illuminate when ignition switch is turned to ON**		
TROUBLESHOOTING HINTS Malfunction in SAS unit power supply/ground circuit ① Air bag system warning light does not illuminate • Damaged SAS unit • Damaged instrument cluster (print plate) • Damaged terminal 2G of instrument cluster connector (16-pin) • Damaged terminal Q of SAS unit connector (21-pin) • Damaged air bag system warning light bulb • Poor installation of air bag system warning light bulb • Poor connection at terminal 2G of instrument cluster connector (16-pin) • Poor connection at terminal Q of SAS unit connector (21-pin) • Poor contact of instrument cluster connector • Open or short circuit in wiring harness between instrument cluster and SAS unit			
STEP	**INSPECTION**		**ACTION**
1	Is instrument cluster connector (16, 18-pin) securely connected?	Yes	Go to next step.
		No	Reconnect connector properly, then go to step 10.
2	Is air bag system warning light warning light bulb securely installed?	Yes	Go to next step.
		No	Reinstall properly, then go to step 10.
3	Is air bag system warning light bulb okay?	Yes	Reinstall properly, then go to step 10.
		No	then go to step 10.
4	Is terminal 2G of instrument cluster connector (16-pin) securely connected with connector?	Yes	Go to next step.
		No	Reconnect properly, then go to step 10.
5	Is terminal 2G of instrument cluster connector (16-pin) damaged?	Yes	Repair or replace terminal, then go to step 10.
		No	Go to next step.
6	Is there continuity between terminal 1A and 2G of print plate of instrument cluster?	Yes	Go to next step.
		No	Replace print plate, then go to step 10.

STEP	INSPECTION		ACTION
7	Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than **1 minute** to allow the backup power supply of the SAS unit to deplete its stored power. Remove glove compartment. Disconnect clock spring connector. Remove grove compartment. Disconnect passenger-side air bag module connector. Remove driver's and passenger's side B-pillar lower trims. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side and passenger-side pre-tensioner seat belt connectors. Remove the passenger's side side wall. Disconnect SAS unit connector. Is terminal Q of SAS unit connector (21-pin) securely connected with connector?	Yes	Go to next step.
		No	Replace air bag harness, then go to step 10.
8	Is terminal Q of SAS unit connector (21-pin) damaged.	Yes	Replace air bag harness, then go to step 10.
		No	Go to next step.
9 *	Disconnect SAS unit connector (21-pin) and instrument cluster connector (16-pin). Is there consistent continuity between Q terminal of the SAS unit connector (21-pin) and 2G terminal of instrument cluster connector (16-pin)?	Yes	Replace SAS unit, then go to step 10.
		No	Replace or repair wiring harness between instrument cluster and SAS unit, then go to step 10.
10	Connect SAS unit connector. Connect driver-side and passenger-side pre-tensioner seat belt connectors. Connect passenger-side air bag module connector. Connect clock spring connector. Connect the instrument cluster connector. Connect the negative battery cable. When turning ignition switch to ON, does air bag system warning light operate properly?	Yes	Troubleshooting completed.
		No	Reconfirm symptoms of malfunction.

2	**Air bag system warning light illuminates immediately after ignition switch turned to ON and remains illuminated**

TROUBLESHOOTING HINTS

Malfunction in air bag system warning light circuit

① Air bag system warning light remains illuminated

- Damaged SAS unit
- Malfunction of short bar between Q terminal of SAS unit connector (21-pin) and S terminal of SAS unit connector (21-pin)
- Malfunction of battery does not charge
- Poor connection of SAS unit connector (21-pin)
- Open or short circuit in wiring harness between instrument cluster and SAS unit

STEP	INSPECTION		ACTION
1	Measure battery positive voltage. Is voltage **more than 9V**?	Yes	Go to next step.
		No	Inspect battery charge/discharge system.
2	Turn the ignition switch to LOCK. Disconnect the negative battery cable and wait for more than 1 **minute** to allow the backup power supply of the SAS unit to deplete its stored power. Remove glove compartment. Disconnect clock spring connector. Remove grove compartment. Disconnect passenger-side air bag module connector. Remove driver's and passenger's side B-pillar lower trims. (Refer to section S, TRIM, B-PILLAR LOWER TRIM REMOVAL/INSTALLATION.) Disconnect driver-side and passenger-side pre-tensioner seat belt connectors. Remove the passenger's side side wall. Disconnect SAS unit connector. Is terminal Q of SAS unit connector (21-pin) securely connected with connector?	Yes	Go to next step.
		No	Reconnect properly, then go to step 6.
3	Is short bar between Q terminal of SAS unit (21-pin) and S terminal of SAS unit (21-pin) bent?	Yes	Replace wiring harness, then go to step 6.
		No	Go to next step.
4	Is short bar hook of SAS unit okay?	Yes	Replace or repair wiring harness between SAS unit and instrument cluster, then go to next step.
		No	Replace SAS unit, then go to step 6.
5 *	Disconnect SAS unit connector (21-pin) and instrument cluster connector (16-pin). Insert insulative material between Q and S terminals of SAS unit connector (21-pin) so short bar cannot move. Is there continuity between Q terminal of SAS unit connector (21-pin) and ground?	Yes	Replace or repair wiring harness between instrument cluster and SAS unit, then go to next step.
		No	Replace SAS unit, then go to next step.
6	Connect SAS unit connector. Connect driver-side and passenger-side pre-tensioner seat belt connectors. Connect passenger-side air bag module connector. Connect clock spring connector. Connect instrument cluster connector. Connect the negative battery cable. When turning ignition switch to ON, does air bag system warning light operate properly?	Yes	Troubleshooting completed.
		No	Reconfirm symptoms of malfunction.

HEATER AND AIR CONDITIONER SYSTEMS

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SERVICE WARNINGS

HANDLING REFRIGERANT

- **Do not allow the refrigerant to leak near fire or any kind of heat. A poisonous gas maybe generated if the refrigerant gas contacts fire or heat such as from cigarettes and heaters. When carrying out any operation that can cause refrigerant leakage, extinguish or remove the above-mentioned heat sources and maintain adequate ventilation.**
- **Handling liquid refrigerant is dangerous. A drop of it on the skin can result in localized frostbite. When handling the refrigerant, wear gloves and safety goggles. If refrigerant splashes into the eyes, immediately wash them with clean water and consult a doctor.**

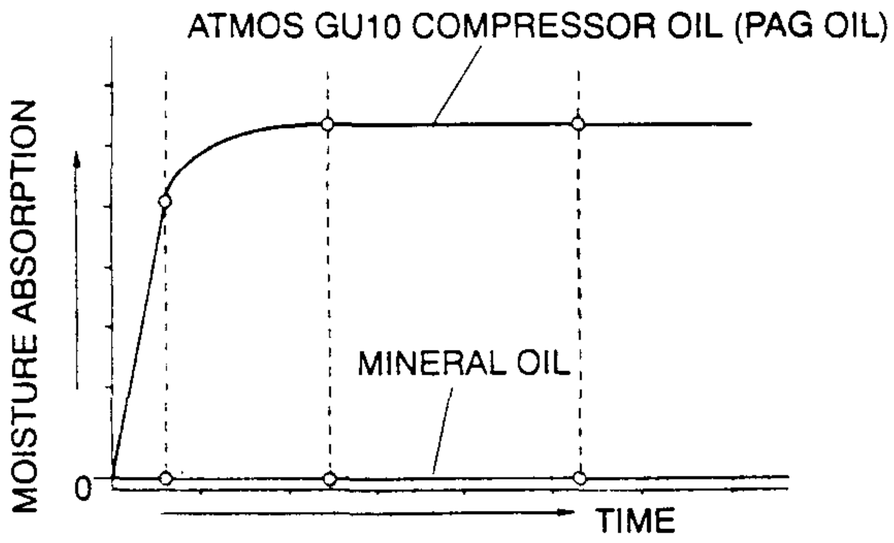
STORING REFRIGERANT

- **The refrigerant container is highly pressurized. If it is subjected to high heat, it could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Store the refrigerant at temperatures below 40 °C {104 °F }.**

SERVICE CAUTIONS

HANDLING COMPRESSOR OIL

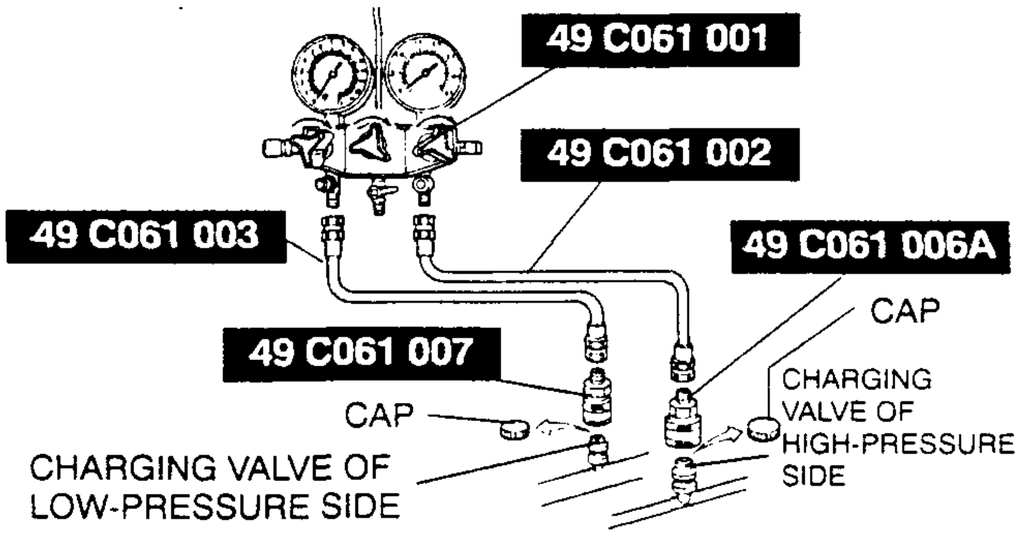
- **Use only ATMOS GU10 compressor oil for this vehicle. Using PAG oil other than ATMOS GU10 compressor oil can damage the A/C compressor.**
- **Do not spill ATMOS GU10 compressor oil on the vehicle. A drop of compressor oil on the vehicle surface can eat away at the paint. If oil gets on the vehicle, wipe it off immediately.**
- **ATMOS GU10 compressor oil (PAG oil) has a higher moisture absorption efficiency than the previously used mineral oil. If moisture mixes with the compressor oil, the refrigerant system could be damaged. Therefore, install caps immediately after using the compressor oil or removing refrigerant system parts to prevent moisture absorption.**



REFRIGERANT SYSTEM SERVICE PROCEDURES

MANIFOLD GAUGE SET INSTALLATION

1. Fully close the valves of the **SST** (49 C061 001).
2. Connect the **SSTs** (49 C061 002, 49 C061 003) to the high-and low-pressure side joints of the **SST** (49 C061 001).
3. Connect the **SSTs** (49 C061 006A, 49 C061 007) to the ends of the **SSTs** (49 C061 002, 49 C061 003).
4. Connect the **SSTs** (49 C061 006A, 49 C061 007) to the charging valves.



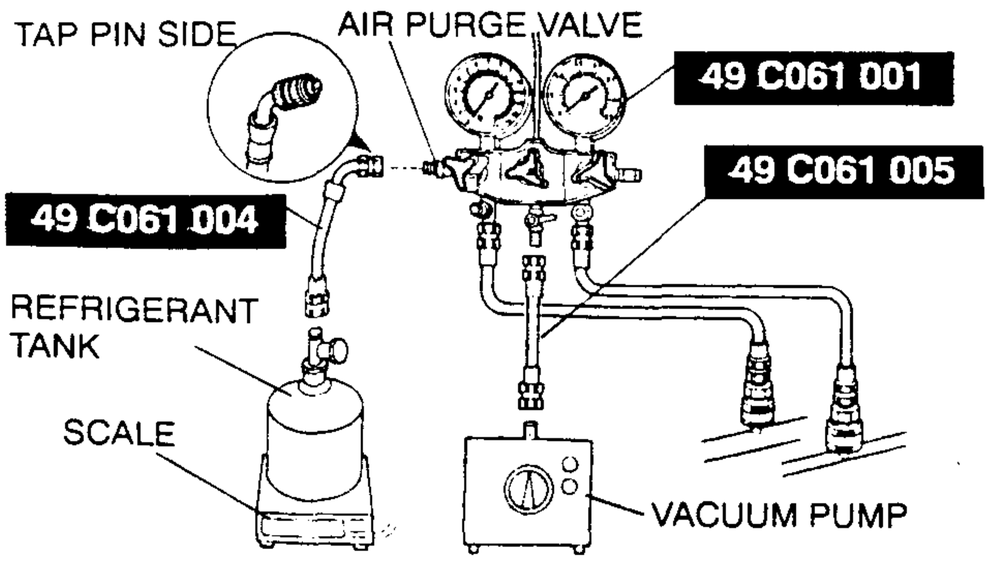
CHARGING

Caution

- **Do not exceed the specification when charging the system with refrigerant. Doing so will decrease the efficiency of the air conditioner or damage the refrigeration cycle parts.**

1. Install the **SSTs** (manifold gauge set). (Refer to MANIFOLD GAUGE SET INSTALLATION.)
2. Connect the tap pin side of the **SST** (49 C061 004) to the air purge valve of the **SST** (49 C061 001).
3. Connect the **SST** (49 C061 005) to the center joint of the **SST** (49 C061 001).
4. Connect the **SST** (49 C061 005) to the vacuum pump.
5. Connect the **SST** (49 C061 004) to the refrigerant tank.
6. Place the refrigerant tank on the scale.

Regular amount of refrigerant
700 g {24.7 oz }: condenser 32 lines
625 g {22.1 oz }: condenser 26 lines

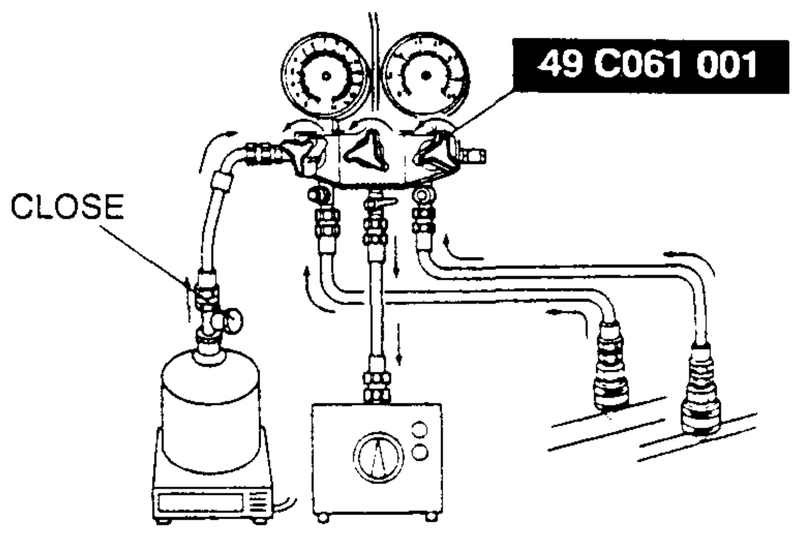


7. Open all the valves of the **SST** (49 C061 001).

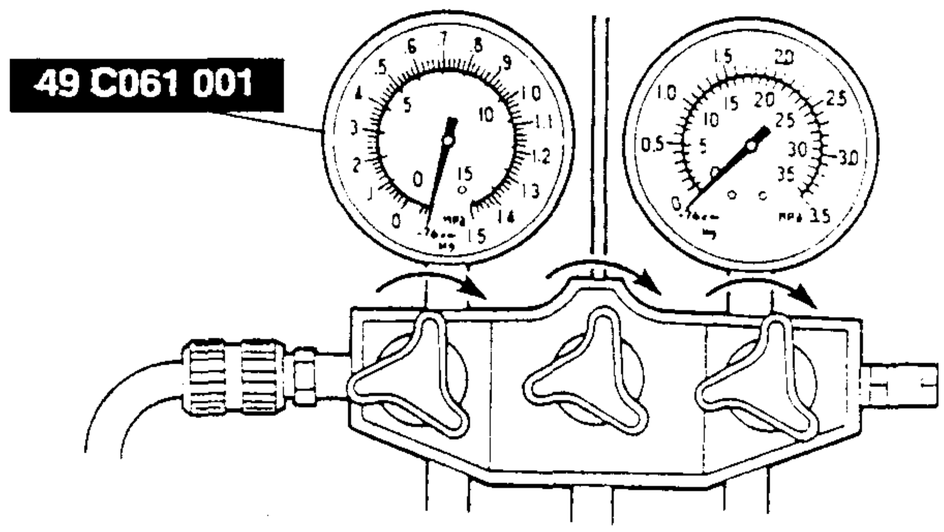
Caution

- **Close the SST (49 C061 001) valve immediately after stopping the vacuum pump. If the valve is left open, the vacuum pump oil will backflow into the refrigeration cycle and cause a decrease in the efficiency of the air conditioner.**

8. Start the vacuum pump and let it operate for **15 minutes**.



9. Verify that high-and low-pressure side readings of the **SST** (49 C061 001) are at **–101 kPa {–760 mmHg , –29.9 inHg }**. Close each valve of the **SST** (49 C061 001).



10. Stop the vacuum pump and wait for **5 minutes**.
11. Check the high-and low-pressure side readings of the **SST** (49 C061 001). If the reading has changed, check for leaks and then repeat from step 7. If the reading has not changed, go to step 12.
12. Open the valve of the refrigerant tank.
13. Weigh the refrigerant tank.

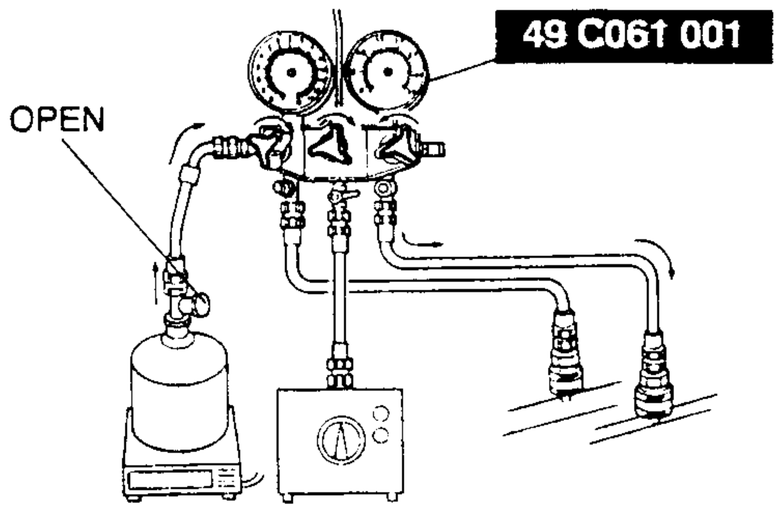
Warning

- **If the refrigerant system is charged with a large amount of refrigerant when checking for gas leakage, and if any leakage should occur, the refrigerant will be released into the atmosphere. In order to prevent the accidental release of refrigerant which can destroy the ozone layer in the stratosphere (causing the "greenhouse effect") , follow the proper procedures and charge with only a small amount of refrigerant when checking for gas leakage.**
- **If charging the system with refrigerant by service cans, running the engine with the high-pressure side valve open is**

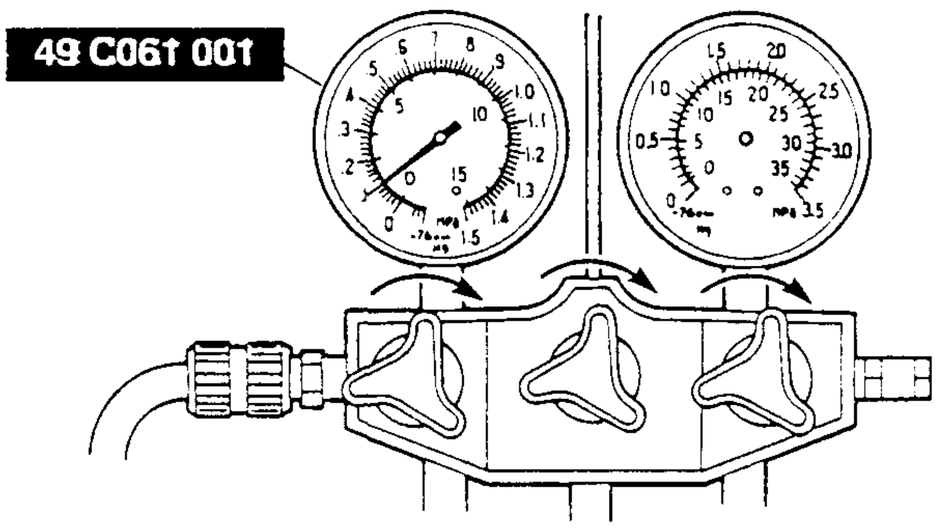
U

dangerous. Pressure within the service cans will increase and the cans could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Therefore, do not open the high-pressure side valve while the engine is running.

14. Open the high-pressure side valve of the **SST** (49 C061 001).



15. When the low-pressure side reading increases to **0.098 MPa {1.0 kgf/cm^2 , 14 psi }** , close the highpressure side valve of the **SST** (49 C061 001).

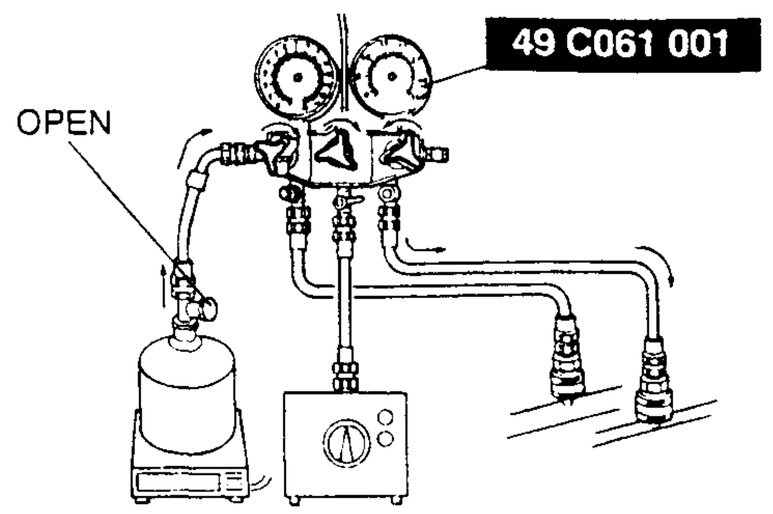


16. Check for leaks from the cooler pipe/hose connections by using the **SST** (gas leak tester). If there are no leaks, go to step 17. If a leak is found at a loose joint, tighten the joint and check for leaks again. If there is still a leak at the same joint, discharge the refrigerant and then repair the joint. Repeat the charging procedure from step 7. If there are no leaks after tightening the joint, go to step 17.

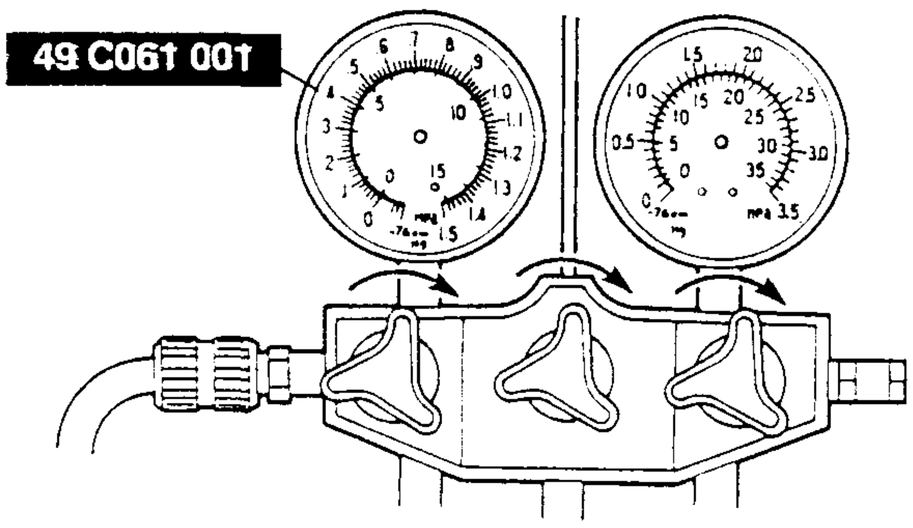
Warning

- **If charging the system with refrigerant by service cans, running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans will increase and the cans could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Therefore, do not open the high-pressure side valve while the engine is running.**

17. Open the high-pressure side valve of the **SST** (49 C061 001) and charge with refrigerant until the weight of refrigerant tank has decreased **300 g {10.6 oz }** from the amount in step 13.



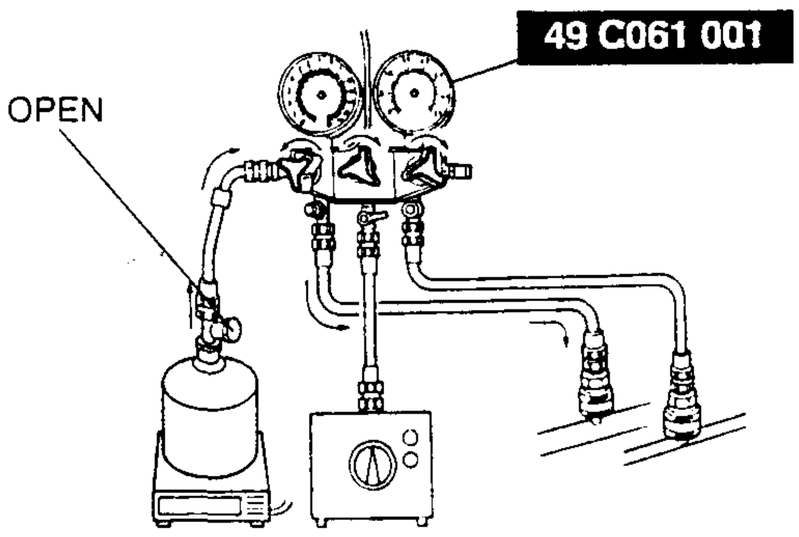
18. Close the high-pressure side valve of the **SST** (49 C061 001).



Warning

- **If charging the system with refrigerant by service cans, running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans will increase and the cans could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Therefore, do not open the high-pressure side valve while the engine is running.**

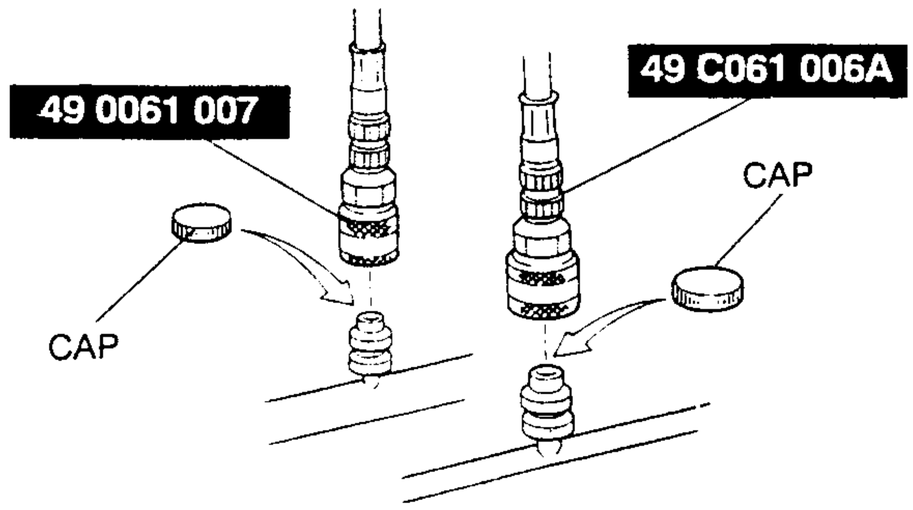
19. Start the engine and actuate the A/C compressor.
20. Open the low-pressure side valve of the **SST** (49 C061 001) and charge with refrigerant until the weight of the refrigerant tank has decreased regular amount from the amount in step 13.



21. Close the low-pressure side valve of the **SST** (49 C061 001) and the valve of the refrigerant tank.
22. Stop the engine and A/C compressor.
23. Check for leaks by using the **SST** (gas leak tester). If there are no leaks, go to step 24. If a leak is found at a loose joint, tighten the joint and check for leaks again. If there is still a leak at the same joint, discharge the refrigerant and then

repair the joint. Repeat the charging procedure from step 7. If there are no leaks after tightening the joint, go to step 24.

24. Disconnect the **SSTs** (49 C061 006A, 49 C061 007) from the charging valves.
25. Install the caps to the charging valves.

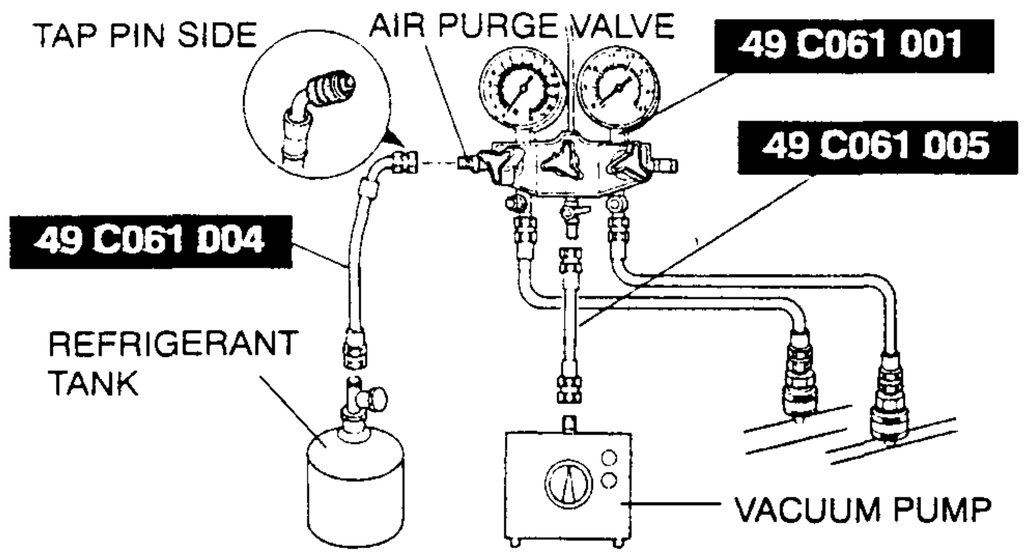


REFILLING

Caution

- **Do not exceed the specification when charging the system with refrigerant. Doing so will decrease the efficiency of the air conditioner or damage the refrigeration cycle parts.**

1. Install the **SSTs** (manifold gauge set). (Refer to MANIFOLD GAUGE SET INSTALLATION.)
2. Connect the tap pin side of the **SST** (49 C061 004) to the air purge valve of the **SST** (49 C061 001).
3. Connect the **SST** (49 C061 005) to the center joint of the **SST** (49 C061 001).
4. Connect the **SST** (49 C061 005) to the vacuum pump.
5. Connect the **SST** (49 C061 004) to the refrigerant tank.

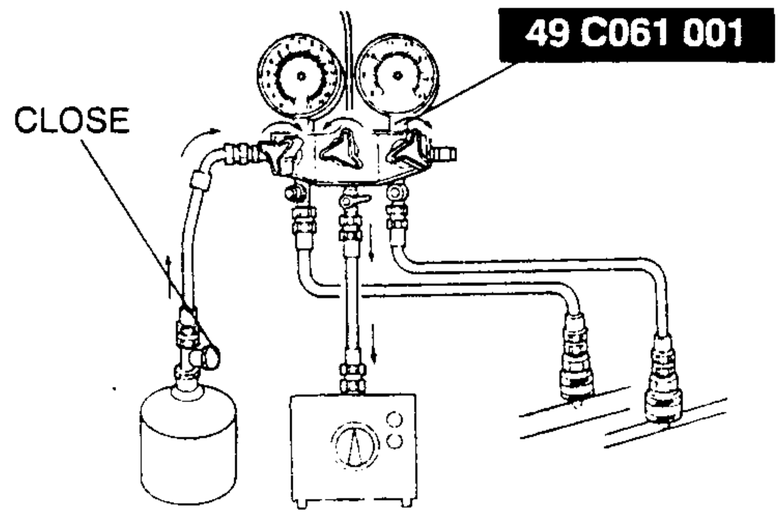


6. Open only the center valve of the **SST** (49 C061 001).

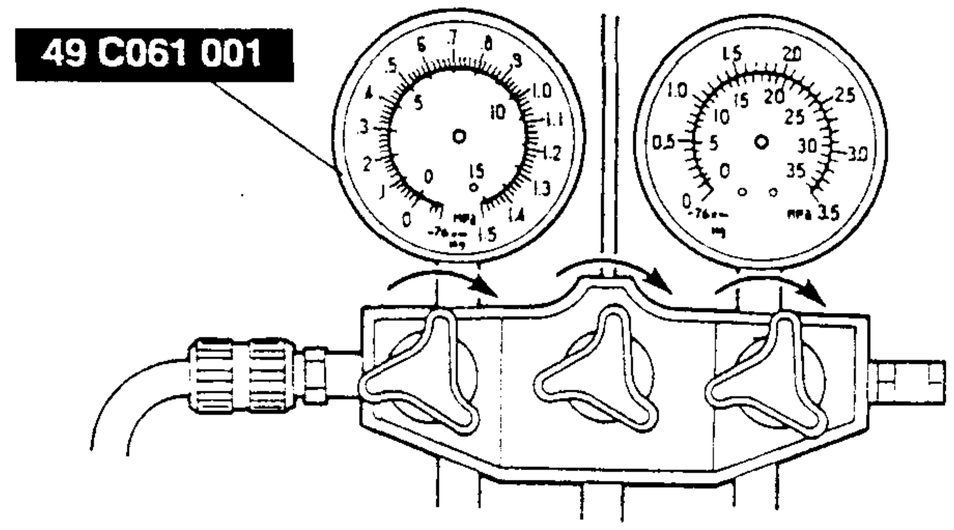
Caution

- **Close the SST (49 C061 001) valve immediately after stopping the vacuum pump. If the valve is left open, the vacuum pump oil will backflow into the refrigeration cycle and cause a decrease in the efficiency of the air conditioner.**

7. Start the vacuum pump and let it run for **1 minute**.



8. Close the center valve of the **SST** (49 C061 001).

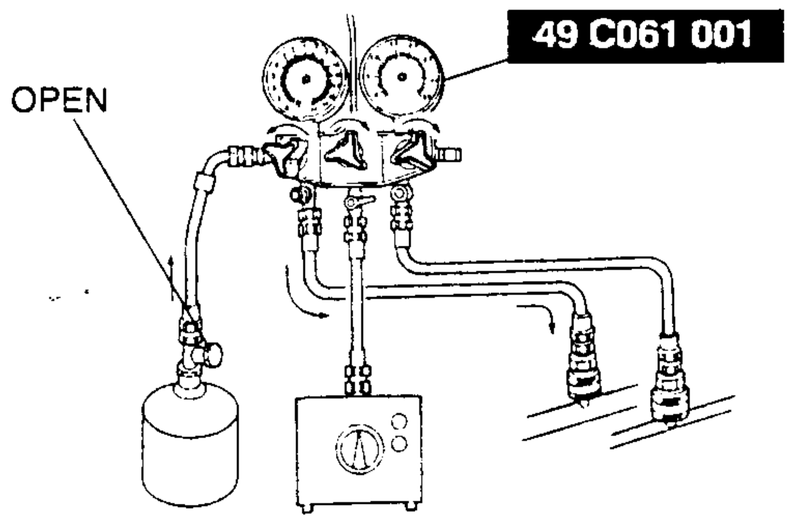


9. Stop the vacuum pump.
10. Open the valve of the refrigerant tank.

Warning

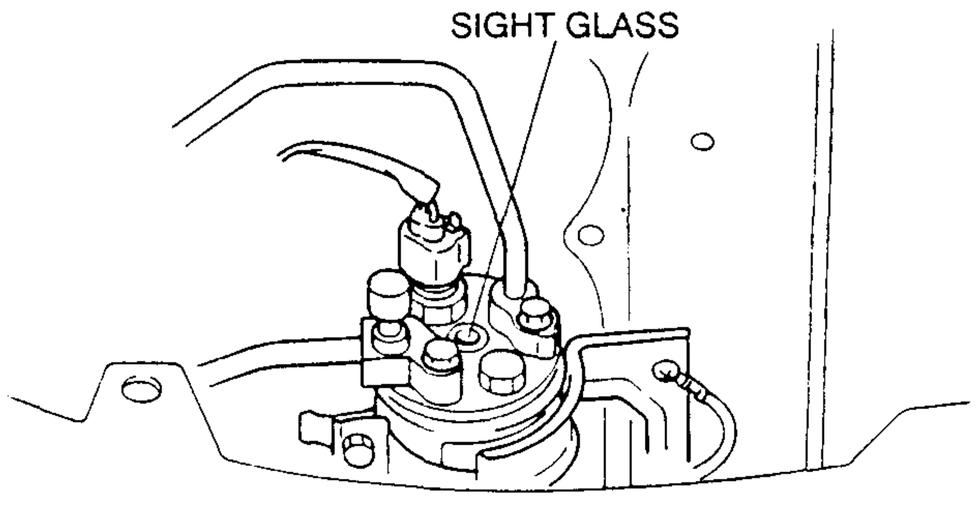
- **If charging the system with refrigerant by service cans, running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans will increase and the cans could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Therefore, do not open the high-pressure side valve while the engine is running.**

11. Start the engine and actuate the A/C compressor.
12. Open the low-pressure side valve of the **SST** (49 C061 001).

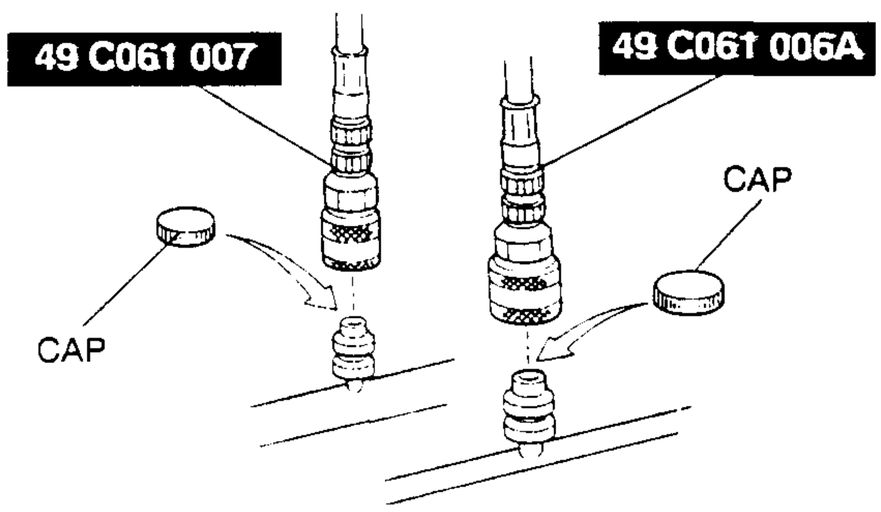


13. Refer to refrigerant charge check and refill with refrigerant.

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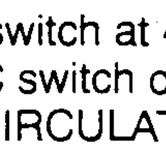
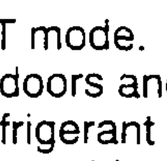


14. Close the low-pressure side valve of the **SST** (49 C061 001) and the valve of the refrigerant tank.
15. Stop the engine and the A/C compressor.
16. Disconnect the **SSTs** (49 C061 006A, 49 C061 007) from the charging valves.
17. Install the caps to the charging valves.



REFRIGERANT CHARGE CHECK

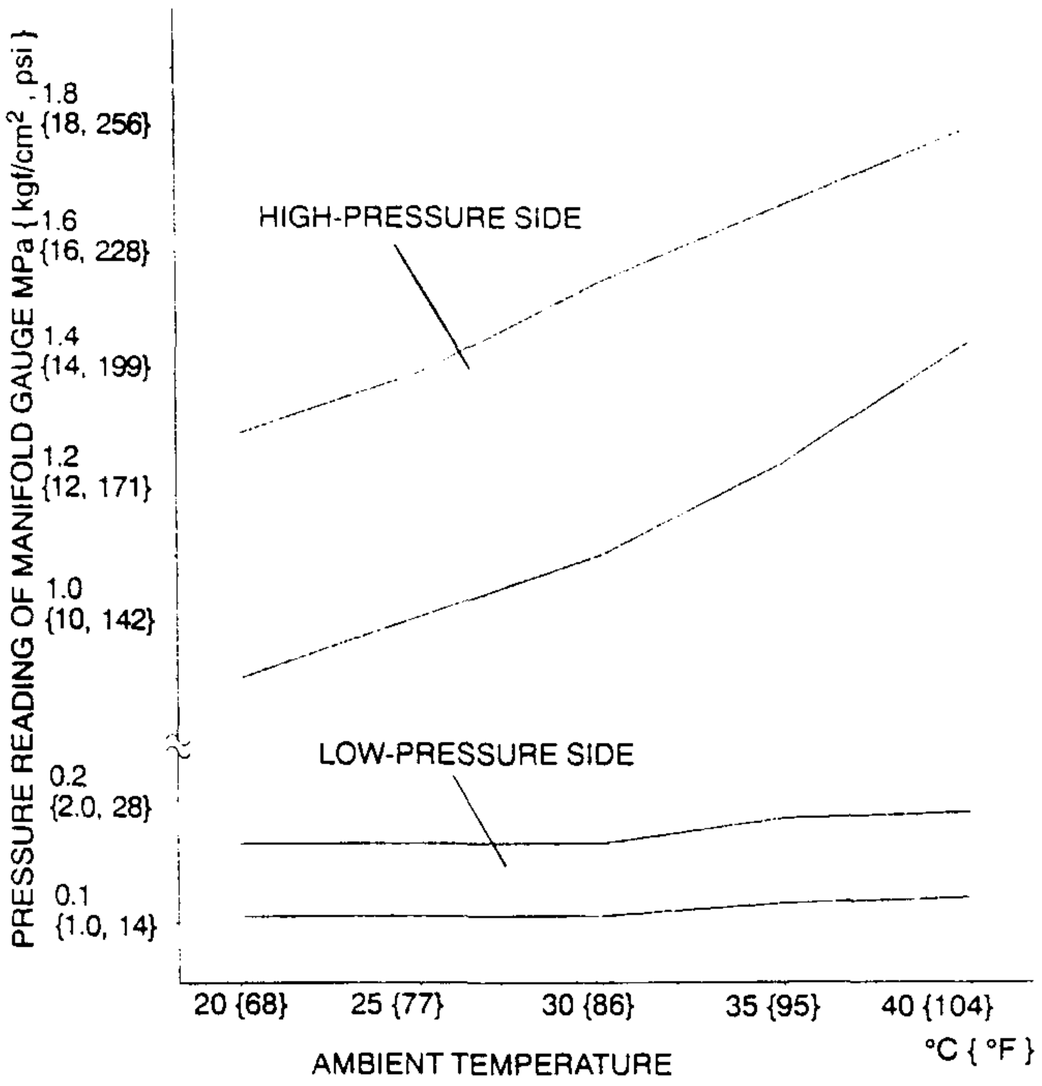
1. Warm up the engine and run it at a constant **1,500 rpm**.
2. Set the fan switch at 4th.
3. Turn the A/C switch on.
4. Set the RECIRCULATE mode.
5. Set the temperature control to MAX COLD (Manual air conditioner) or 15.0 (Full-auto air conditioner).
6. Set the VENT mode.
7. Open all the doors and windows.
8. Check the refrigerant amount condition according to the following table.

Amount	Condition of sight glass	Other conditions
Insufficient	 Bubbles	• High-pressure side cooler pipe is warm; low-pressure side cooler pipe is cool. • Air cooling ability is low.
Correct	 Clear or sometimes bubbles	• High-pressure side cooler pipe is hot; low-pressure side cooler pipe is cold.
Over	 Clear	• High-pressure side cooler pipe is hot; low-pressure side cooler pipe is cold. • Air cooling ability is low.

9. If not as specified, troubleshoot the refrigerant system. (Refer to TROUBLESHOOTING.)

REFRIGERANT PRESSURE CHECK

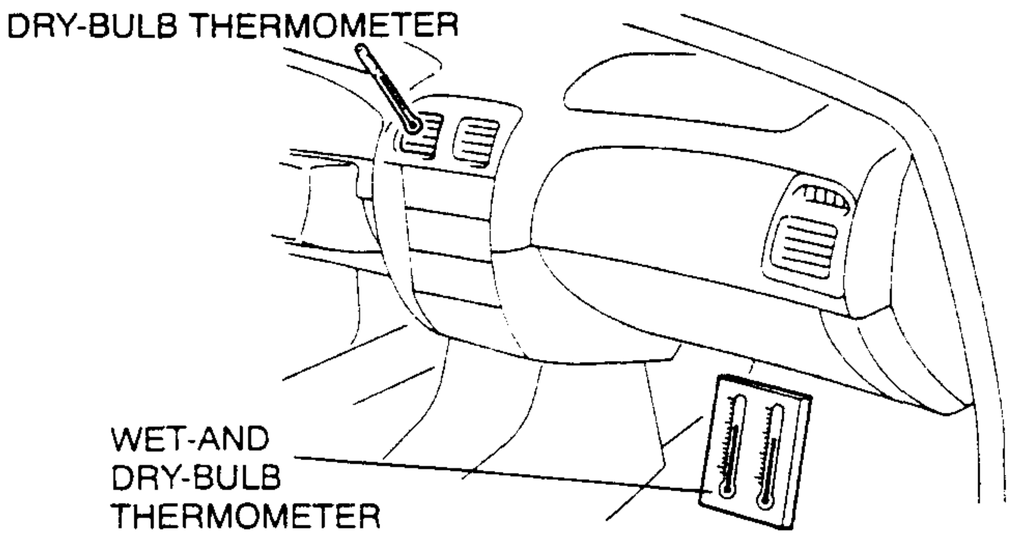
1. Install the **SSTs** (manifold gauge set). (Refer to MANIFOLD GAUGE SET INSTALLATION.)
2. Warm up the engine and run it at a constant **1,500 rpm**.
3. Set the fan switch at 4th.
4. Turn the A/C switch on.
5. Set the RECIRCULATE mode.
6. Set the temperature control to MAX COLD (Manual air conditioner) or 15.0 (Full-auto air conditioner).
7. Set the VENT mode.
8. Open all the doors and windows.
9. Measure the ambient temperature and the high-and low-pressure side reading of the **SST** (49 C061 001).
10. Verify that the intersection of the pressure reading of the **SST** (49 C061 001) and ambient temperature is in the shaded zone.



11. If not as specified, troubleshoot the refrigerant system. (Refer to TROUBLESHOOTING.)

PERFORMANCE TEST

1. Install the **SSTs** (manifold gauge set). (Refer to MANIFOLD GAUGE SET INSTALLATION.)
2. Place a dry-bulb thermometer in the center ventilator outlet.
3. Place a wet-and dry-bulb thermometer at the blower inlet.

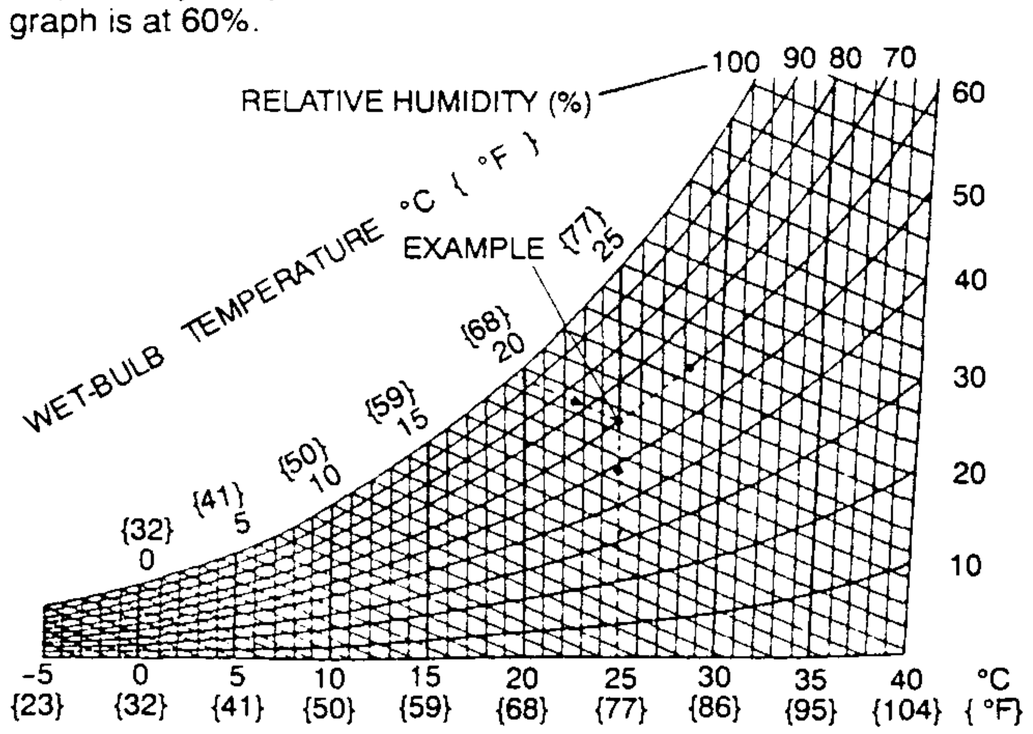


4. Warm up the engine and run it at a constant **1,500 rpm**.
5. Set the fan switch at 4th.
6. Turn the A/C switch on.
7. Set the RECIRCULATE mode.
8. Set the temperature control to MAX COLD (Manual air conditioner) or 15.0 (Full-auto air conditioner).
9. Set the VENT mode.
10. Open all the doors and windows.
11. Wait until the air conditioner output temperature stabilizes.

Stabilized condition
Blower inlet temperature
25—35 °C {77—95 °F }
High-pressure side reading
1.0–1.5 MPa {10.0—15.5 kgf/cm^2 , 143—220 psi }

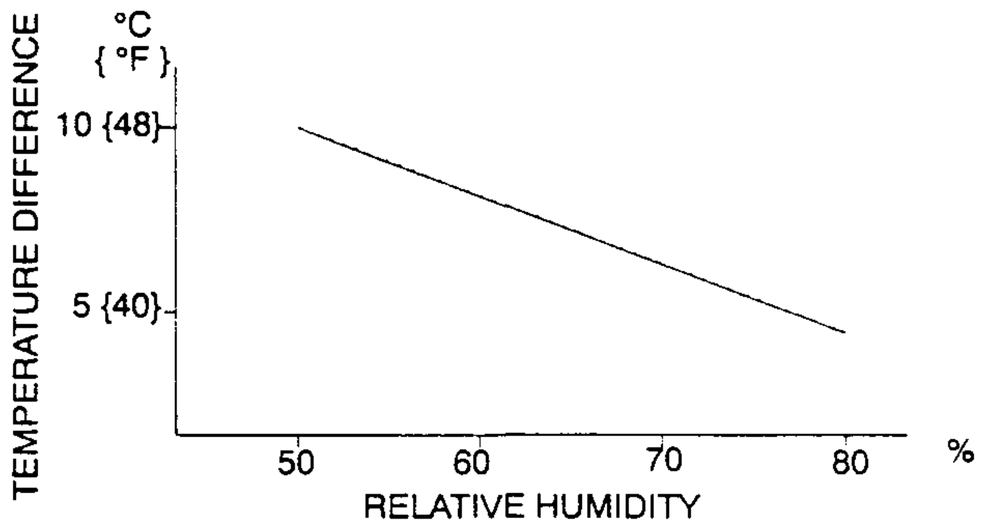
12. After the air conditioning stabilizes, read the wet-and dry-bulb thermometer, and then calculate the relative humidity by using the graph.

HOW TO READ THE GRAPH:
After measuring the temperature using a wet-and dry-bulb thermometer at the blower inlet, relative humidity (%) can be obtained.
Example: Supposing the dry-and wet-bulb temperatures at the evaporator air inlet are 25 °C {77 °F } and 19.5 °C {67.1 °F }, respectively, the point of intersection of the dotted lines in the graph is at 60%.



13. Read the dry-bulb thermometer at the center ventilator outlet, and calculate the temperature difference between the center ventilator outlet and the blower inlet.

14. Verify that the intersection of the temperature difference and the relative humidity is in the shaded zone.

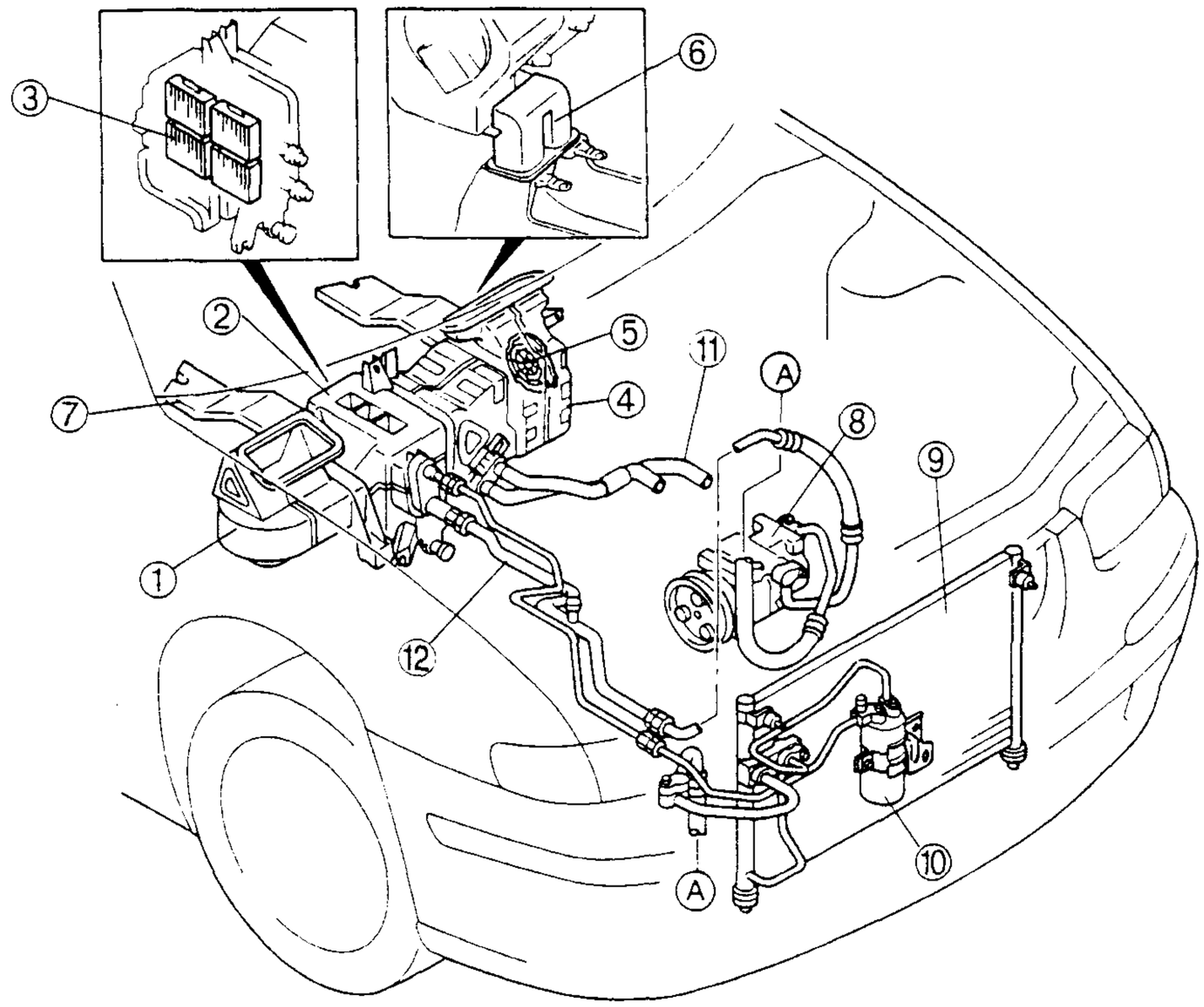


15. If not as specified, troubleshoot the refrigerant system. (Refer to TROUBLESHOOTING.)

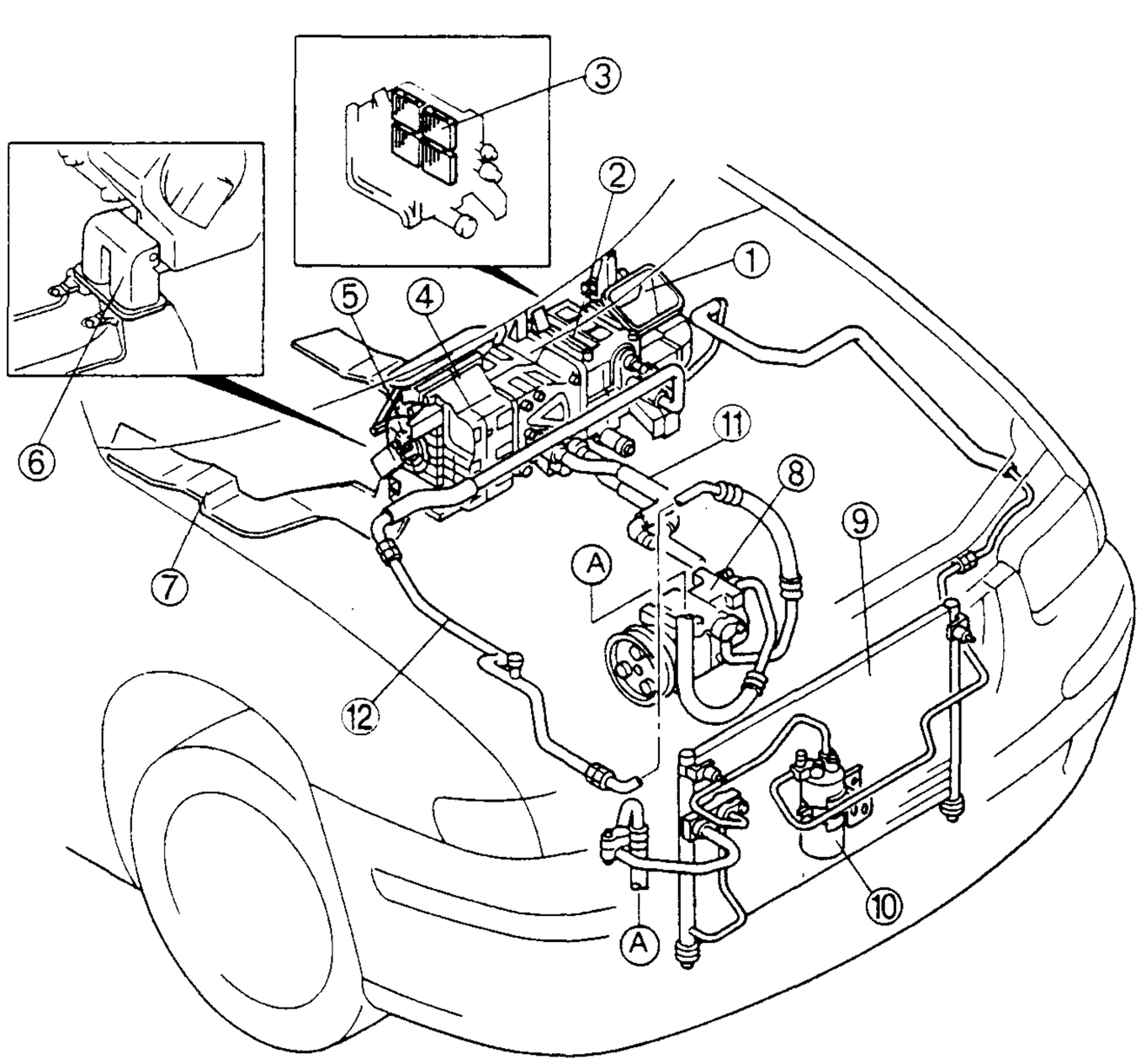
BASIC SYSTEM

STRUCTURAL VIEW

L.H.D.



R.H.D.

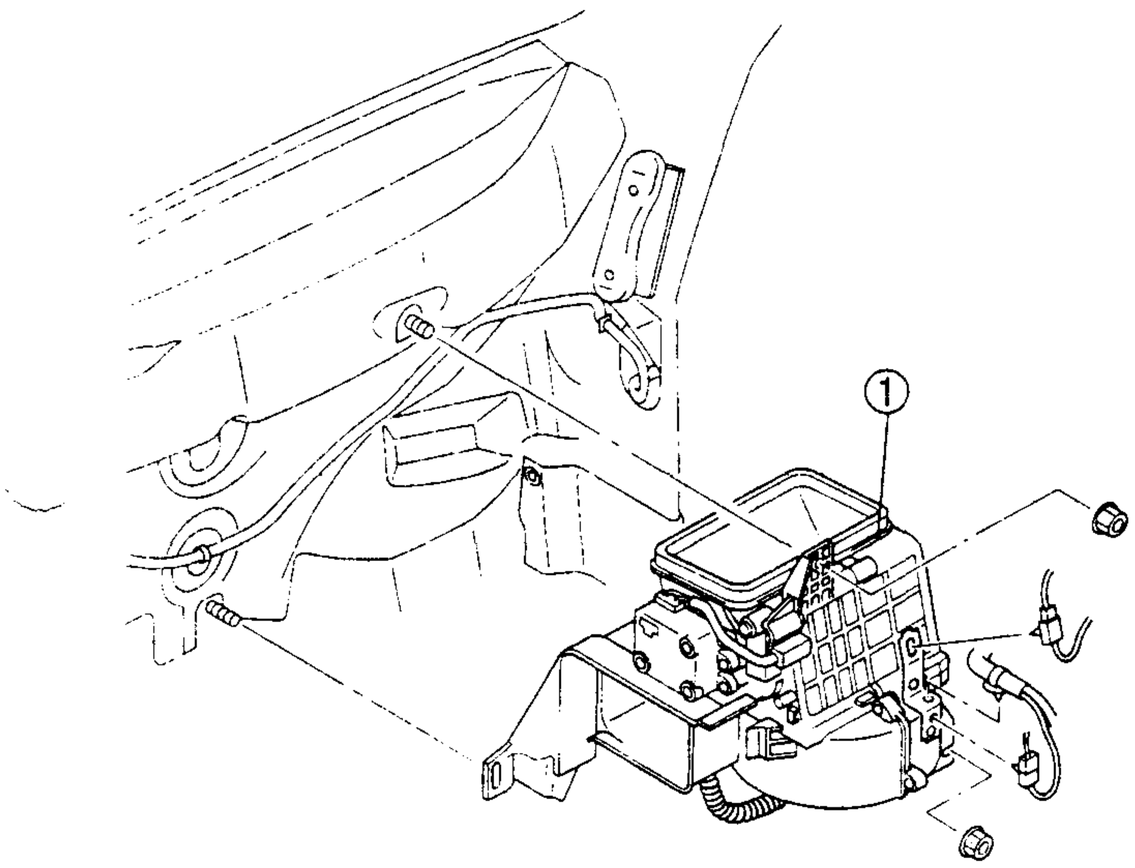


1	Blower unit
2	Cooling unit
3	Air filter
4	Heater unit
5	Airflow mode main link
6	Rear duct

7	Rear heat duct
8	A/C compressor
9	Condenser
10	Receiver/drier
11	Heater hose
12	Refrigerant lines

BLOWER UNIT REMOVAL/INSTALLATION

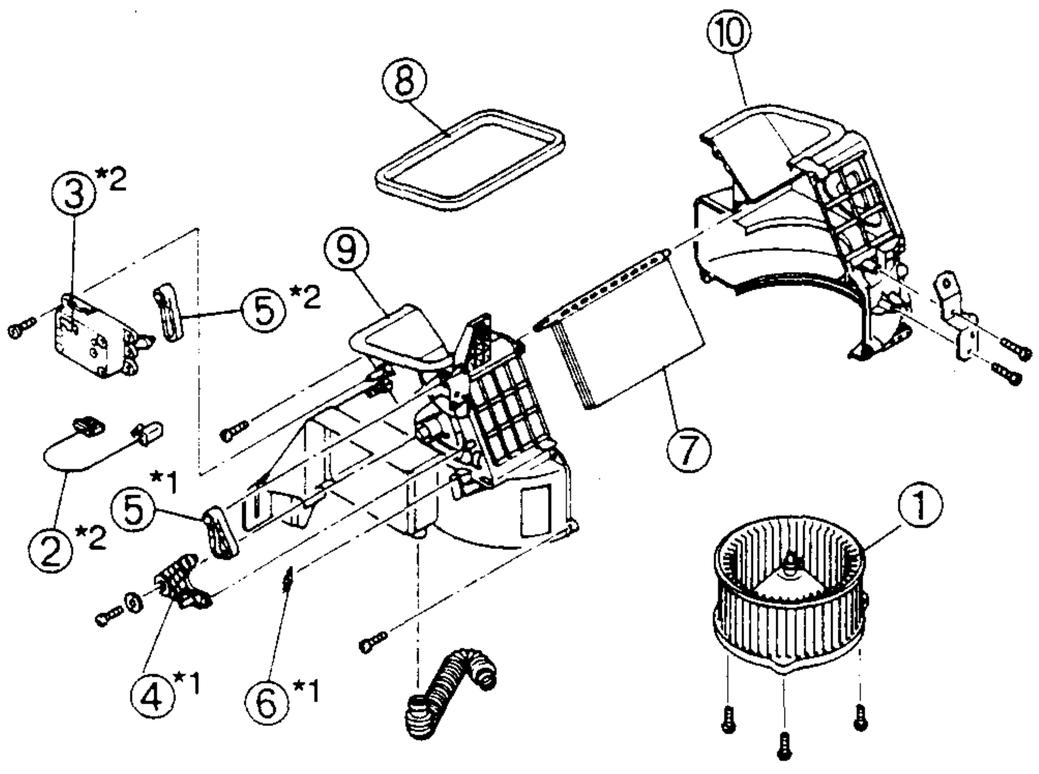
1. Disconnect the negative battery cable.
2. Remove the dashboard. (Refer to section S, DASHBOARD AND CONSOLE, DASHBOARD REMOVAL/INSTALLATION.)
3. Remove the cooling unit. (Refer to COOLING UNIT REMOVAL/INSTALLATION.)
4. Remove as indicated in the table.
5. Install in the reverse order of removal.



1	Blower unit

BLOWER UNIT DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



*1 Manual air conditioner only

*2 Full-auto air conditioner only

1	Blower motor
2	Blower harness
3	Air intake actuator
4	Air intake link
5	Air intake crank
6	Wire clamp
7	Air intake door
8	Polyurethane protector
9	Blower case (1)
10	Blower case (2)

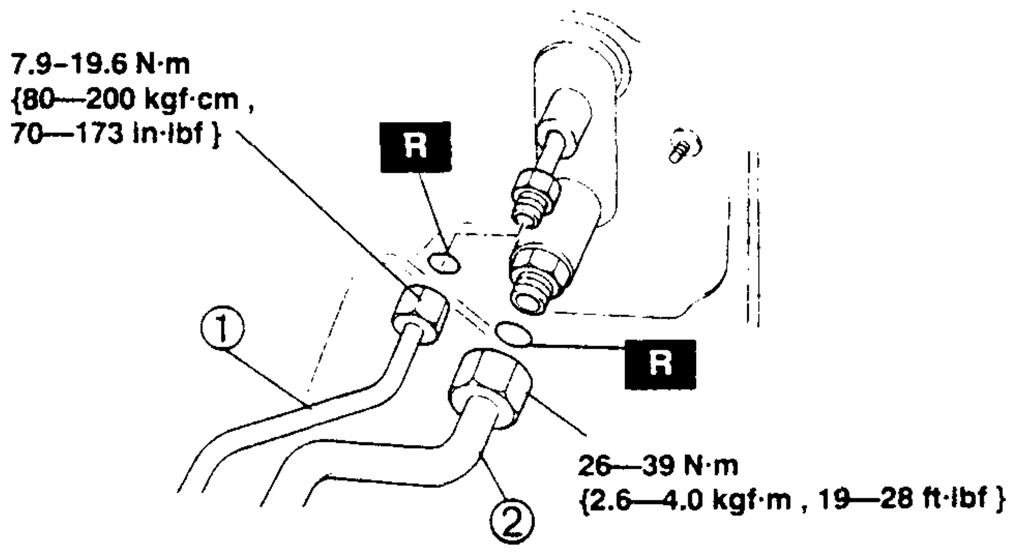
COOLING UNIT REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Discharge the refrigerant from the system. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, CHARGING.)
3. Remove the glove compartment and under cover.

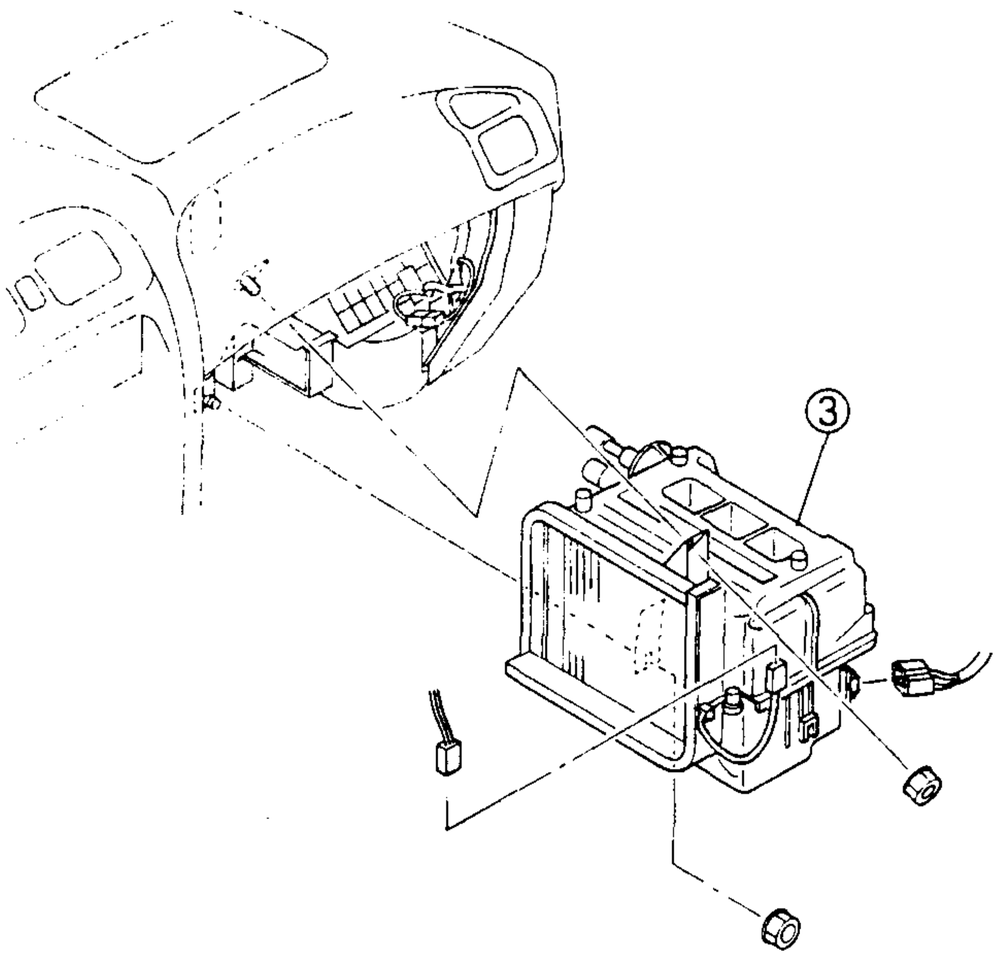
Caution

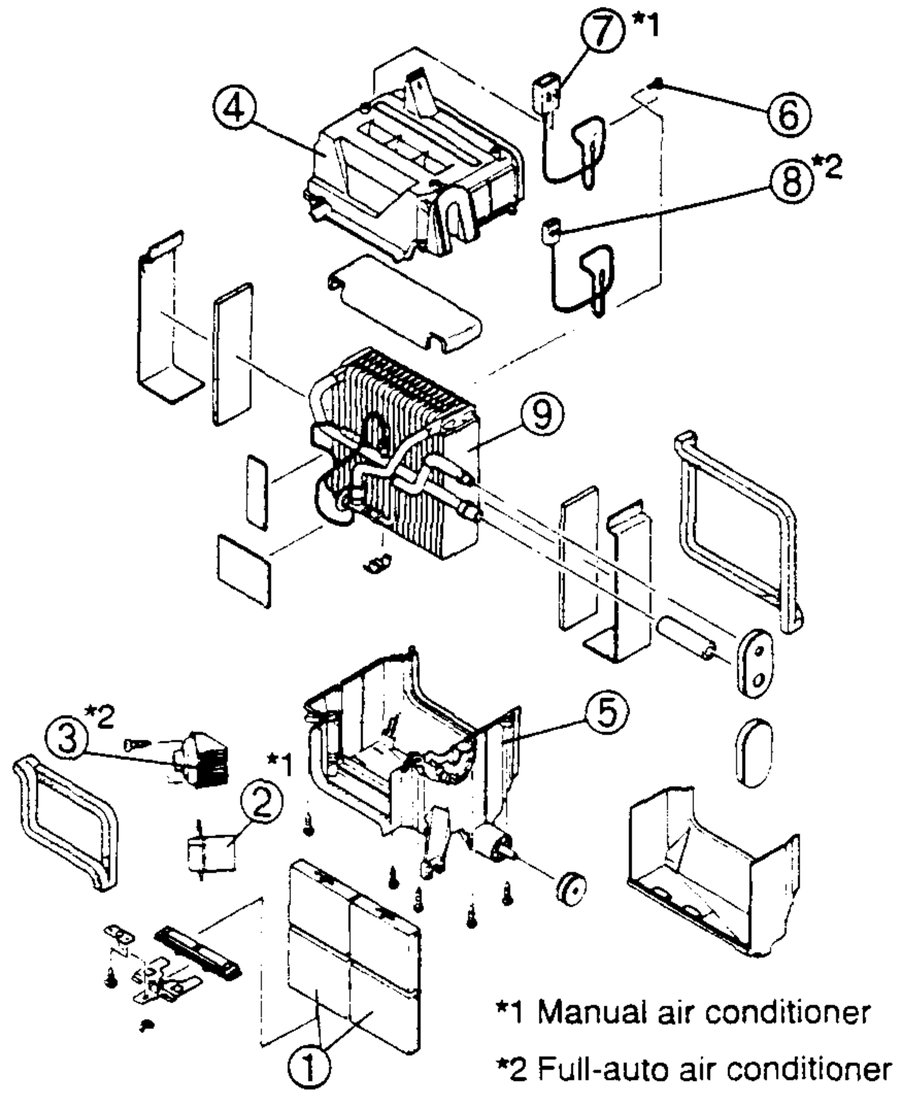
- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise will occur. Always immediately plug all open fittings after removing any refrigeration cycle parts to keep moisture or foreign material out of the cycle.**

4. Remove in the order indicated in the table. Do not allow compressor oil to spill.
5. Install in the reverse order of removal.
6. Carry out the refrigerant system performance test. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, PERFORMANCE TEST.)



U





*1 Manual air conditioner
*2 Full-auto air conditioner

1	Cooler pipe No.5 ☞ Refrigerant lines removal note ☞ Refrigerant lines installation note
2	Cooler pipe No.4 (L.H.D.) or No.2 (R.H.D.) ☞ Refrigerant lines removal note ☞ Refrigerant lines installation note
3	Cooling unit ☞ Installation note

1	Air filter
2	Resistor
3	Power MOS FET
4	Cooler case (1)
5	Cooler case (2)
6	Sensor clamp
7	A/C amplifier ☞ Evaporator temperature sensor assembly note
8	Evaporator temperature sensor ☞ Assembly note
9	Evaporator

Cooling Unit Installation Note

- When installing a new cooling unit (evaporator) , add ATMOS GU10 compressor oil into the refrigeration cycle.

Supplemental amount
50 ml {50 cc , 1.7 fl oz }

COOLING UNIT DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.

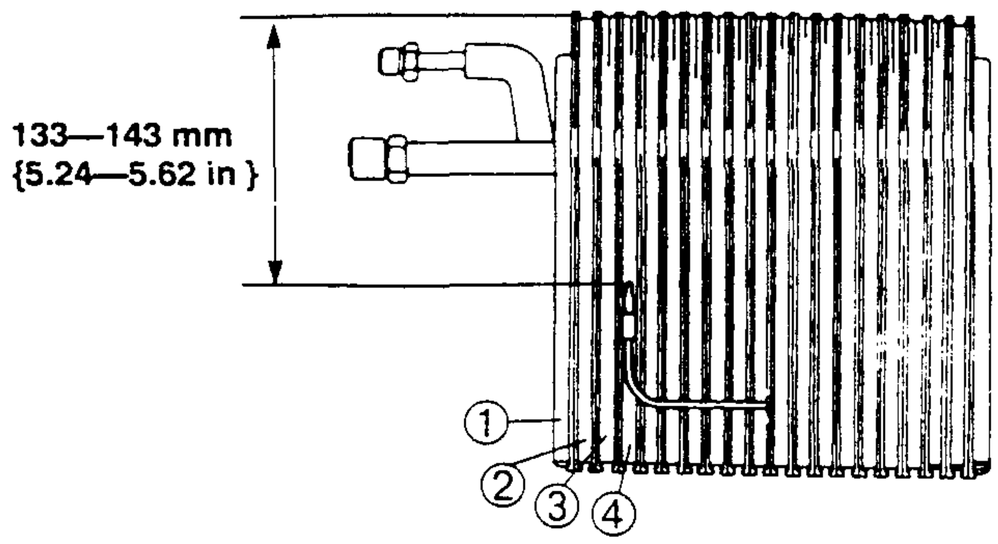
Caution

- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise will occur. Always immediately plug all open fittings after removing any refrigeration cycle parts to keep moisture or foreign material out of the cycle.**

2. Assemble in the reverse order of disassembly.

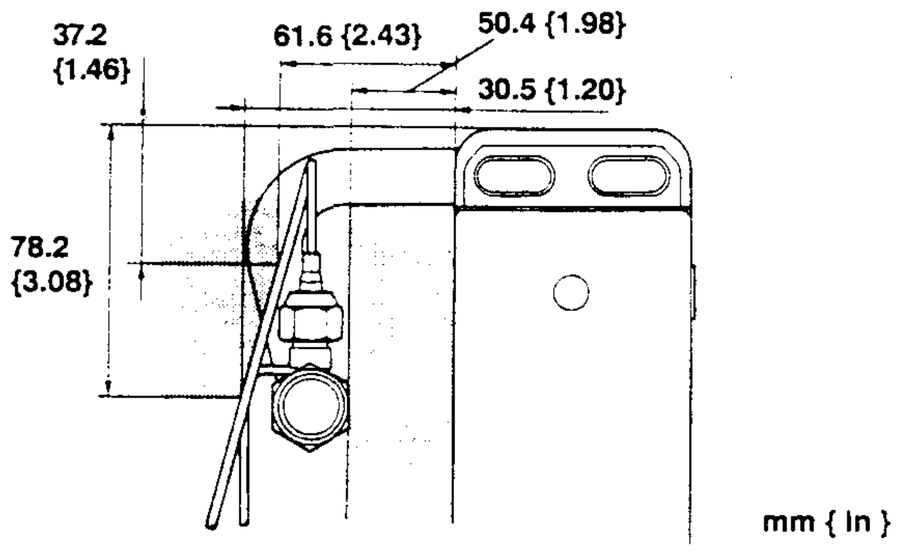
Evaporator Temperature Sensor Assembly Note

- Assemble the evaporator temperature sensor as shown in the figure.

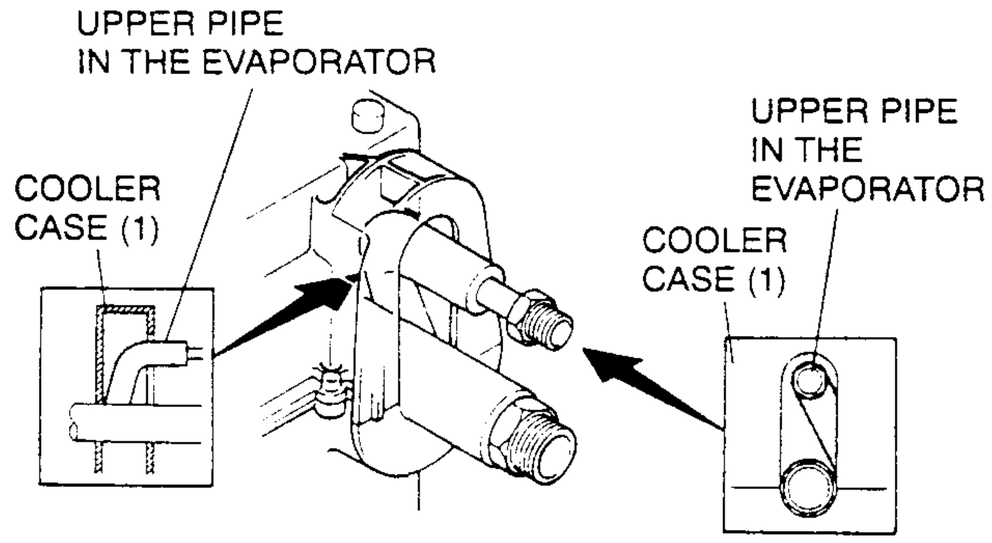


Evaporator Assembly Note

- Verify that the capillary tube is not in the shaded zone.



- Verify that the upper pipe in the evaporator and cooler case (1) does not interfere.



EVAPORATOR INSPECTION

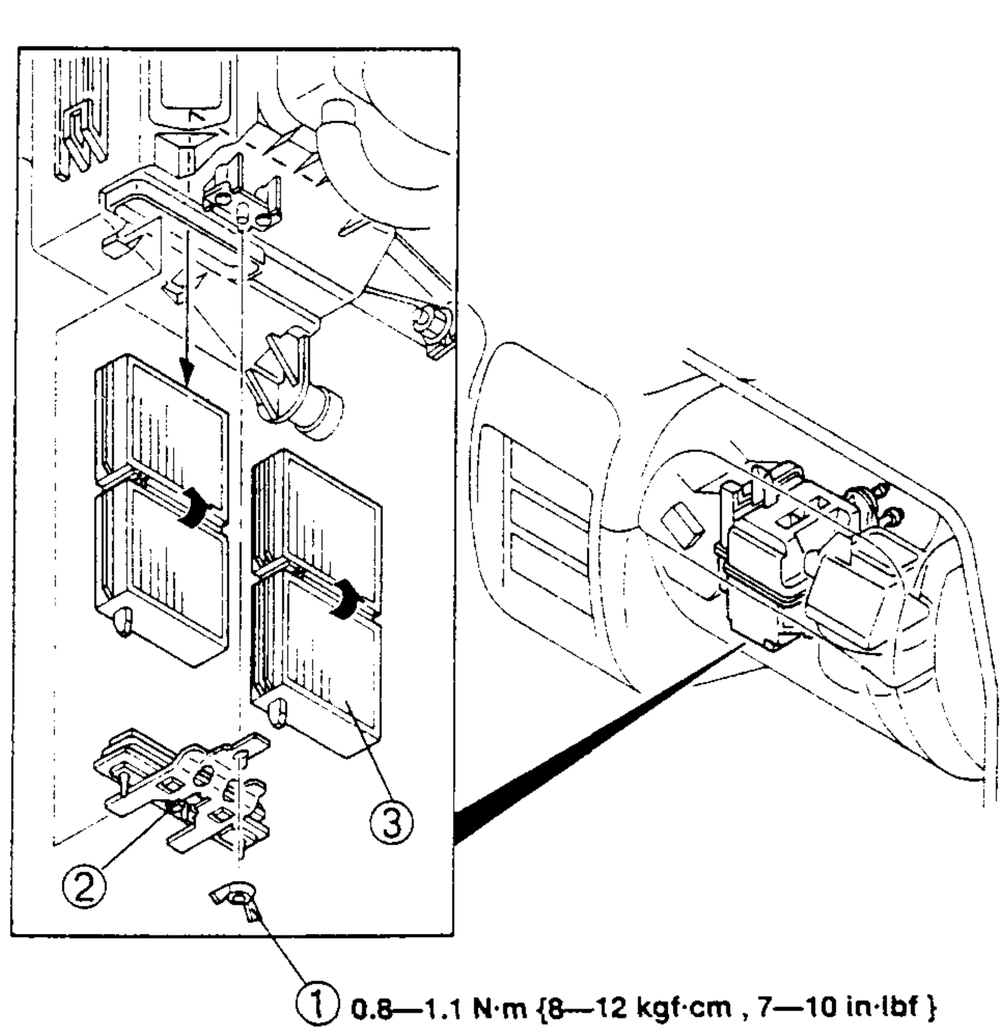
1. Remove the cooling unit. (Refer to COOLING UNIT REMOVAL/INSTALLATION.)
2. Remove the evaporator from the cooling unit.
3. Check for cracks, damage, and oil leakage. If any are found, replace the evaporator.
4. Check for bent fins. If any are bent, use a flathead screwdriver to straighten them.

AIR FILTER REMOVAL/INSTALLATION

Caution

- **The air filter is made of static electric fibers. If the filter is removed and exposed to air for a long time, dirt and dust will collect on the fibers, rendering the filter unusable. After removing the air filter, store it in a plastic bag.**

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal.



1	Wing nut
2	Rubber sheet
3	Air filter

AIR FILTER INSPECTION

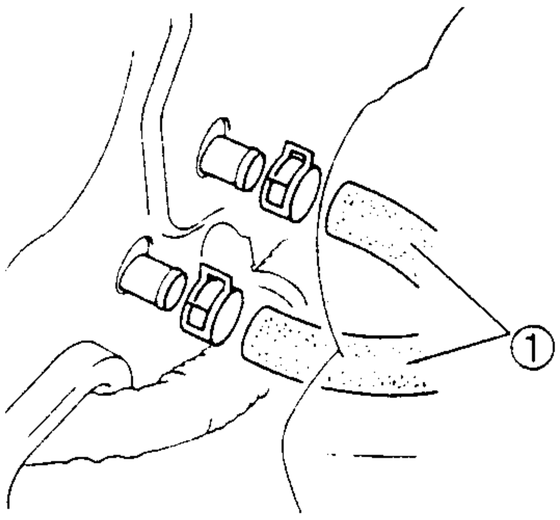
- Remove the air filter. If the air filter is damaged, excessively dirty, or foul smelling, replace it.

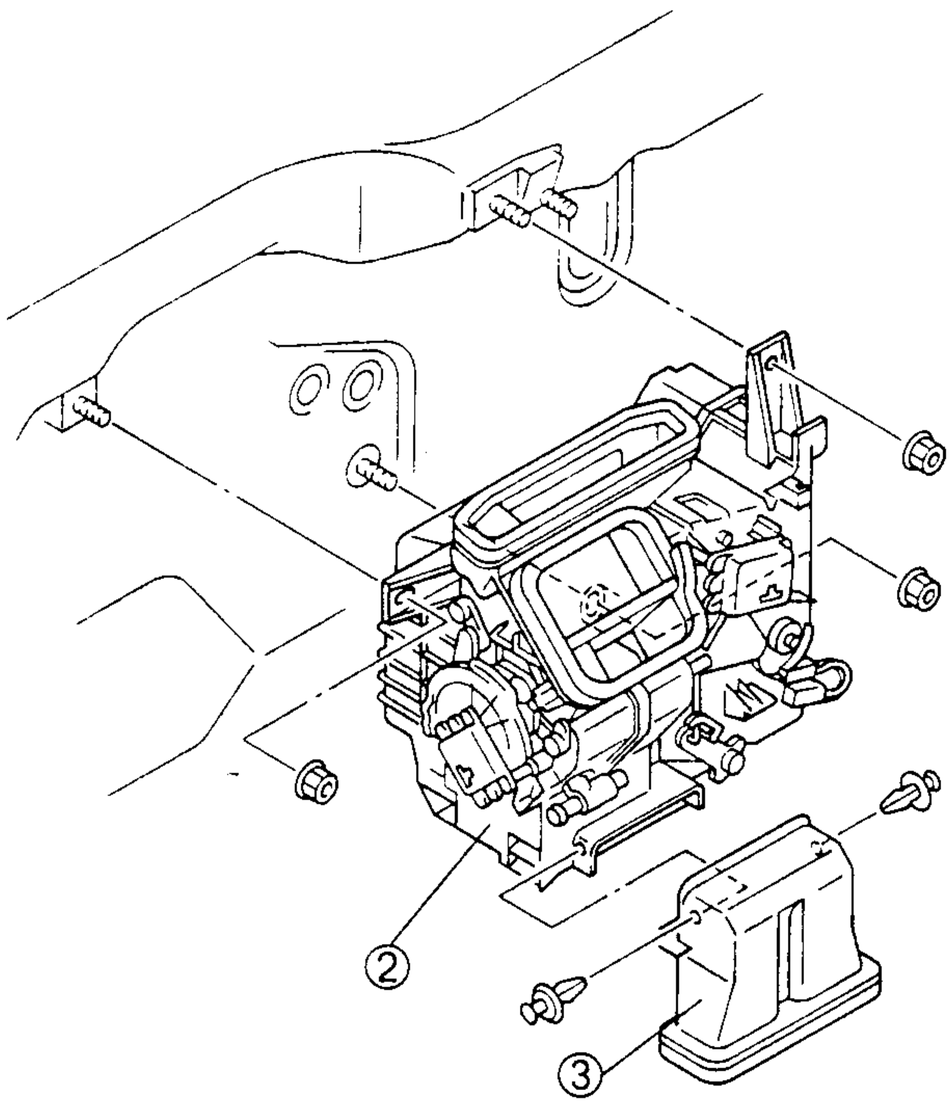
Note

- Replace the air filter once a year or after every 15,000 km {9,300 mile }, depending on operating conditions.
- The air filter cannot be reused by cleaning it with water or compressed air.

HEATER UNIT REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to section E, ENGINE COOLANT, ENGINE COOLANT REPLACEMENT.)
3. Remove the dashboard. (Refer to section S, DASHBOARD AND CONSOLE, DASHBOARD REMOVAL/INSTALLATION.)
4. Remove the cooling unit. (Refer to COOLING UNIT REMOVAL/INSTALLATION.)
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.

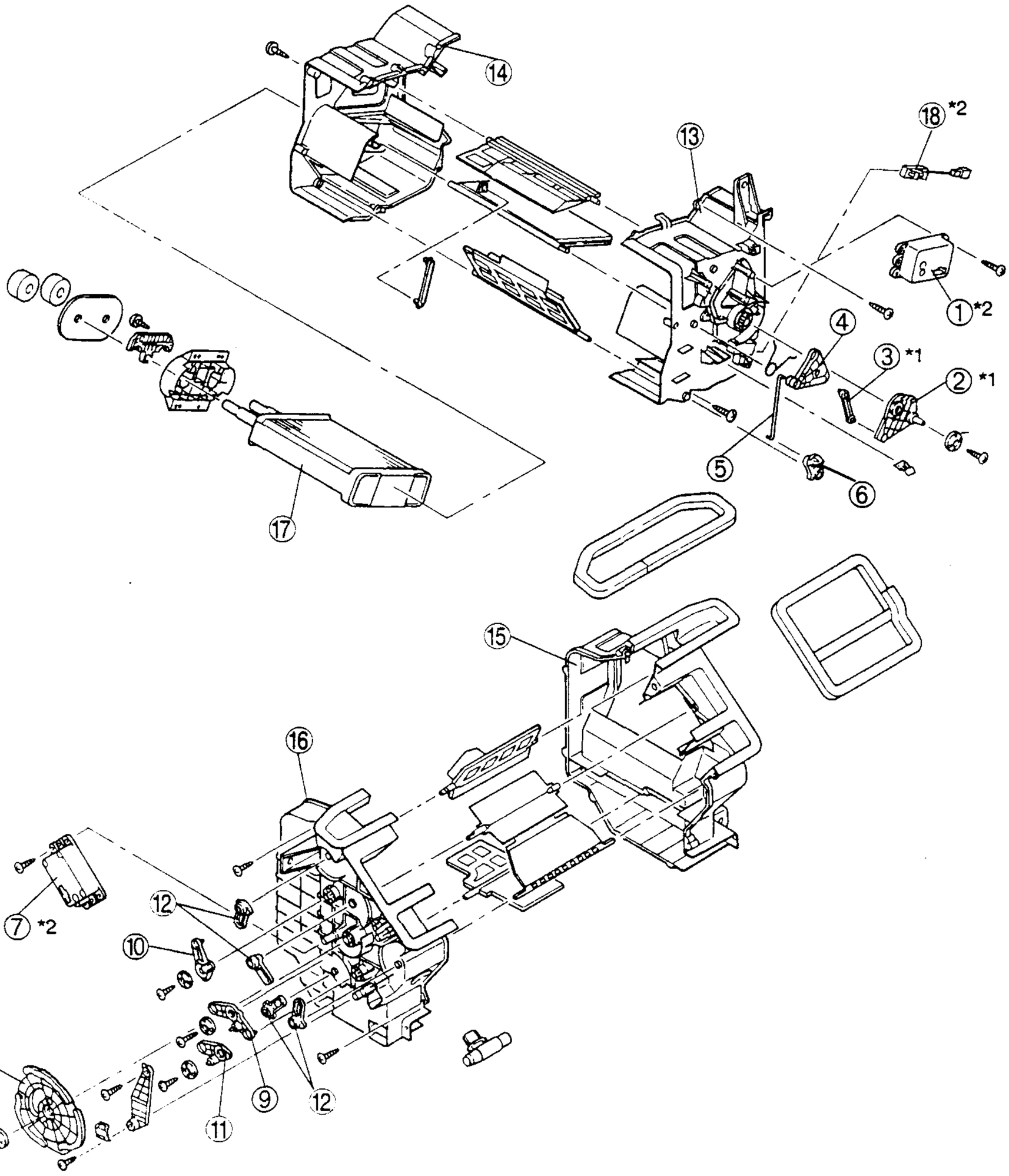




1	Heater hose
2	Heater unit
3	Rear duct

HEATER UNIT DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.



*1 Manual air conditioner only

*2 Full-auto air conditioner only

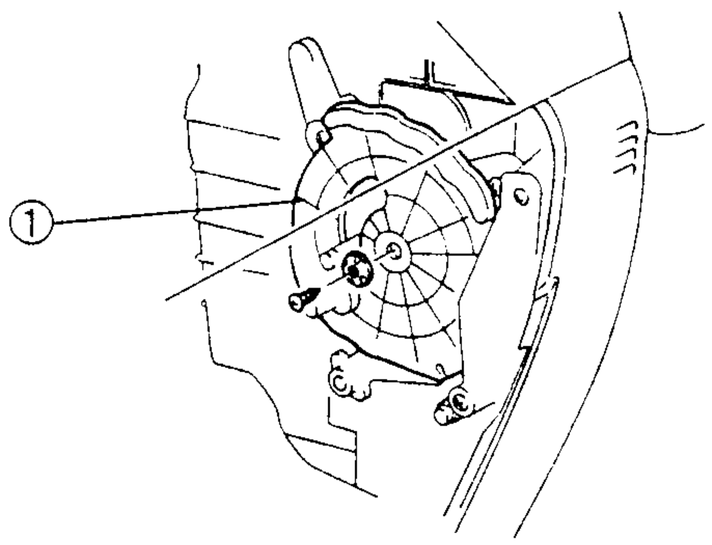
1	Air mix actuator
2	Air mix link
3	Air mix rod (2)
4	Air mix crank (1)
5	Air mix rod (1)
6	Air mix crank (2)
7	Airflow mode actuator
8	Airflow mode main link ☞ Airflow mode main link installation note
9	Airflow mode sub link (1)
10	Airflow mode sub link (2)
11	Airflow mode sub link (3)
12	Airflow mode crank
13	Heater case (1)
14	Heater case (2)
15	Heater case (3)
16	Heater case (4)
17	Heater core
18	Water temperature sensor

HEATER CORE INSPECTION

1. Remove the heater unit. (Refer to HEATER UNIT REMOVAL/INSTALLATION.)
2. Remove the heater core from the heater unit.
3. Check for cracks, damage, and coolant leakage. If any are found, replace the heater core.
4. Check for bent fins. If any are bent, use a flathead screwdriver to straighten them.
5. Verify that the heater core inlet and outlet are not distorted or damaged. Repair with pliers if necessary.

AIRFLOW MODE MAIN LINK REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the airflow mode wire (Manual air conditioner) or the airflow mode actuator (Full-auto air conditioner).
3. Remove as indicated in the table.
4. Install in the reverse order of removal.



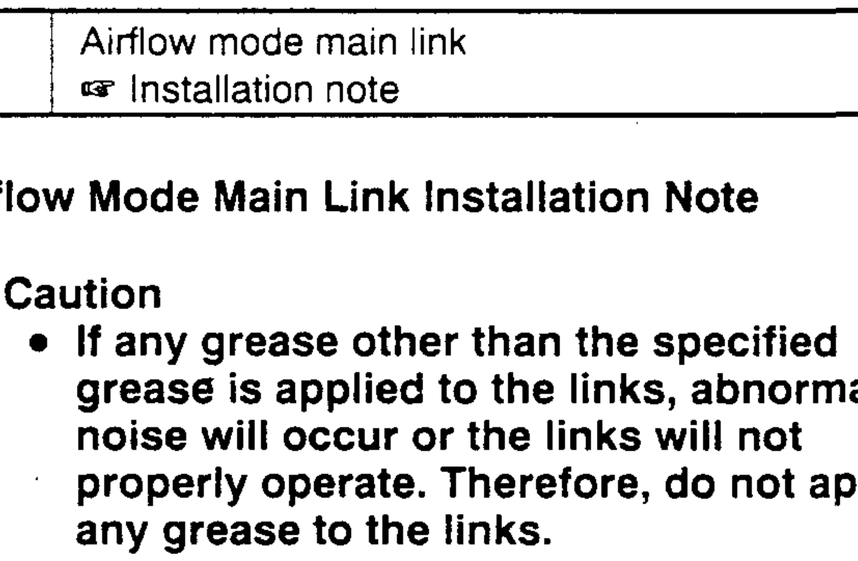
1	Airflow mode main link ☞ Installation note

Airflow Mode Main Link Installation Note

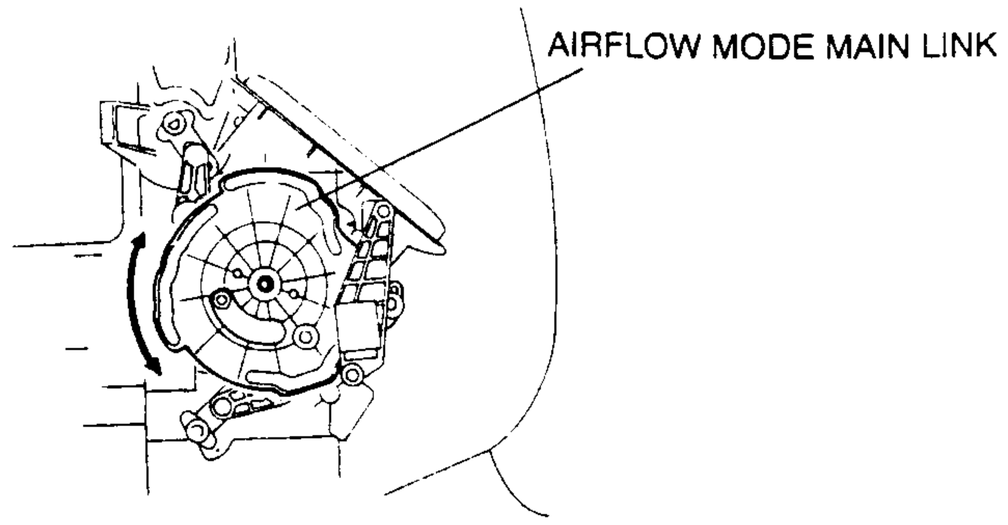
Caution

- **If any grease other than the specified grease is applied to the links, abnormal noise will occur or the links will not properly operate. Therefore, do not apply any grease to the links.**

1. Push and hold each airflow mode sub link in the direction of the arrow.

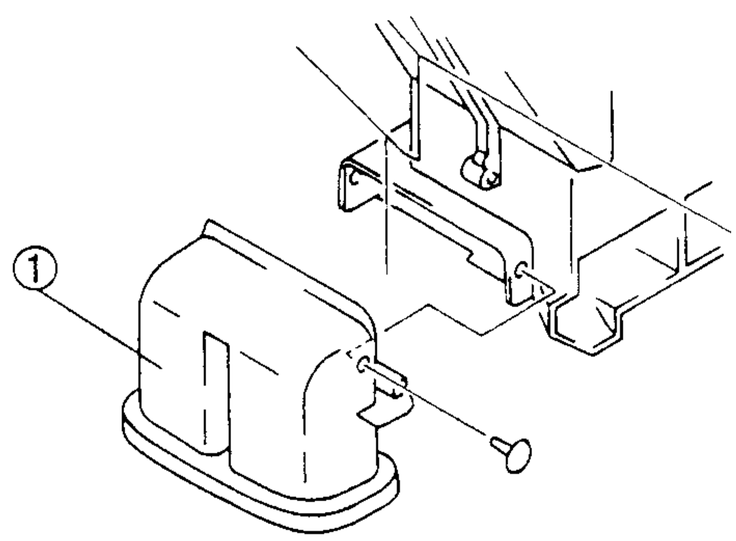


2. Set the airflow mode main link to the heater unit as shown in the figure.
3. Press the airflow mode main link lightly and rotate it in the direction of the arrow, then set the projections of each airflow mode sub link into the grooves of the airflow mode main link.
4. Rotate airflow mode main link and verify that each mode is accessed properly.



REAR DUCT REMOVAL/INSTALLATION

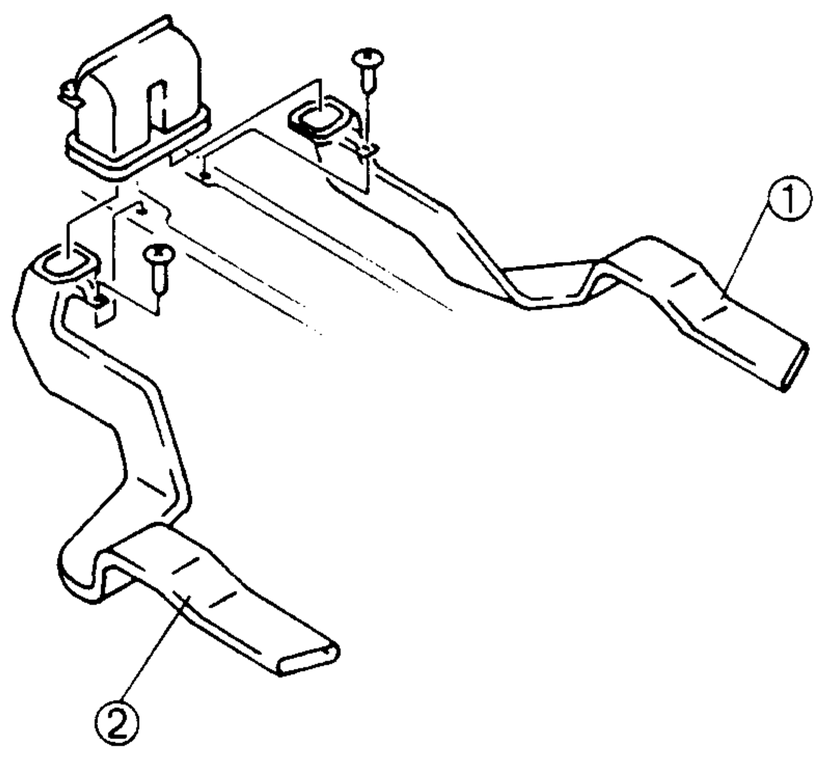
1. Remove the side wall.
2. Remove as indicated in the table.
3. Install in the reverse order of removal.



1	Rear duct

REAR HEAT DUCT REMOVAL/INSTALLATION

1. Turn over the front floor covering. (Refer to section S, FLOOR COVERING, FRONT FLOOR COVERING REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Rear heat duct (RH)
2	Rear heat duct (LH)

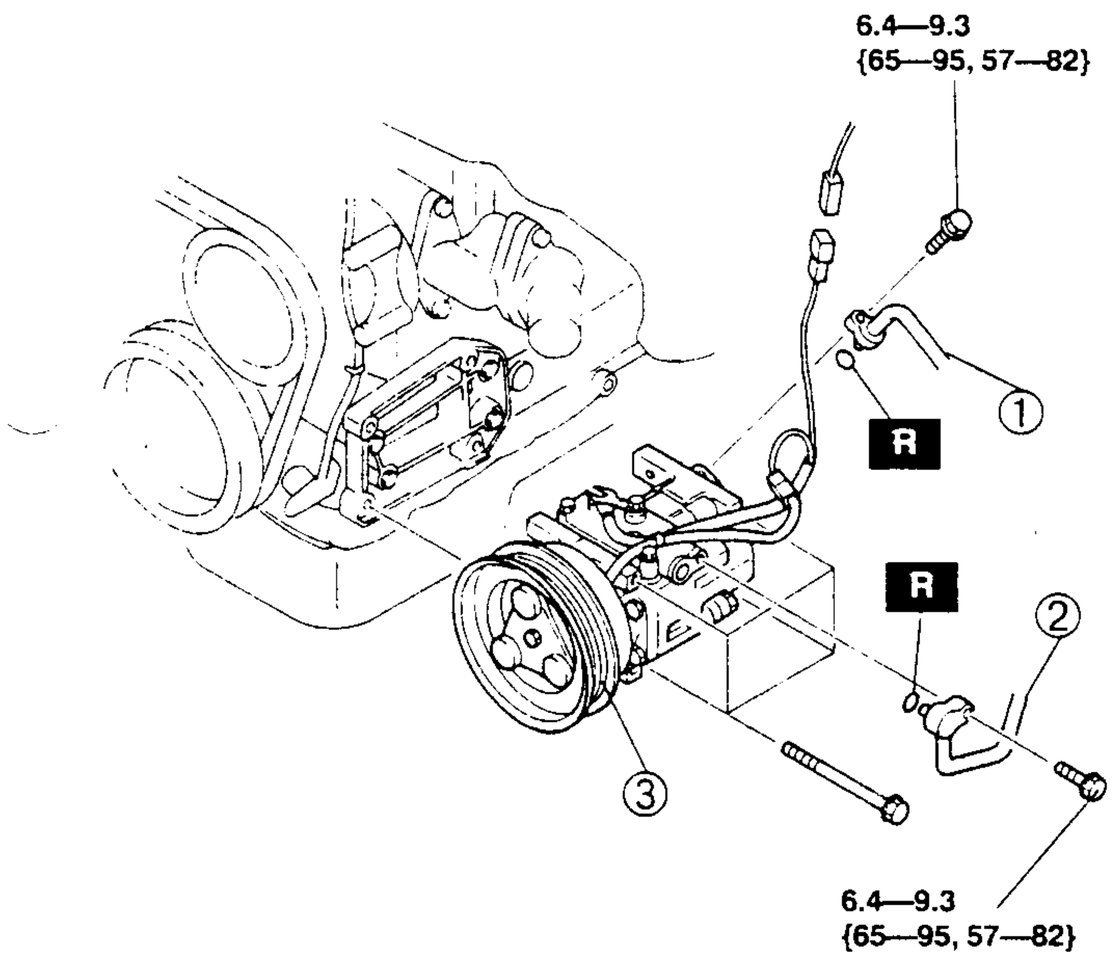
A/C COMPRESSOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Discharge the refrigerant from the system. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES,CHARGING.)
3. Remove the splash shield (RH).
4. Loosen the mounting bolts and the adjusting lock bolt of the power steering oil pump, then slide the pump towards the rear.
5. Remove the drive belt (P/S + A/C).

Caution

- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise will occur. Always immediately plug all open fittings after removing any refrigeration cycle parts to keep moisture or foreign material out of the cycle.**

6. Remove in the order indicated in the table. Do not allow compressor oil to spill.
7. Install in the reverse order of removal.
8. Adjust the drive belt (P/S + A/C). (Refer to section B, DRIVE BELT, DRIVE BELT ADJUSTMENT.)
9. Carry out the refrigerant system performance test. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, PERFORMANCE TEST.)



N·m { kgf·cm , in·lbf }

1	Cooler hose (high) ☞ Refrigerant lines installation note
2	Cooler hose (low) ☞ Refrigerant lines installation note
3	A/C compressor ☞ Installation note

A/C Compressor Installation Note

- Remove the following amount of compressor oil from the new A/C compressor when replacing the A/C compressor.

Compressor oil to be removed = 150 ml {150 cc , 5.07 fl oz } - [compressor oil from old A/C compressor + 15 ml {15 cc , 0.5 fl oz }]

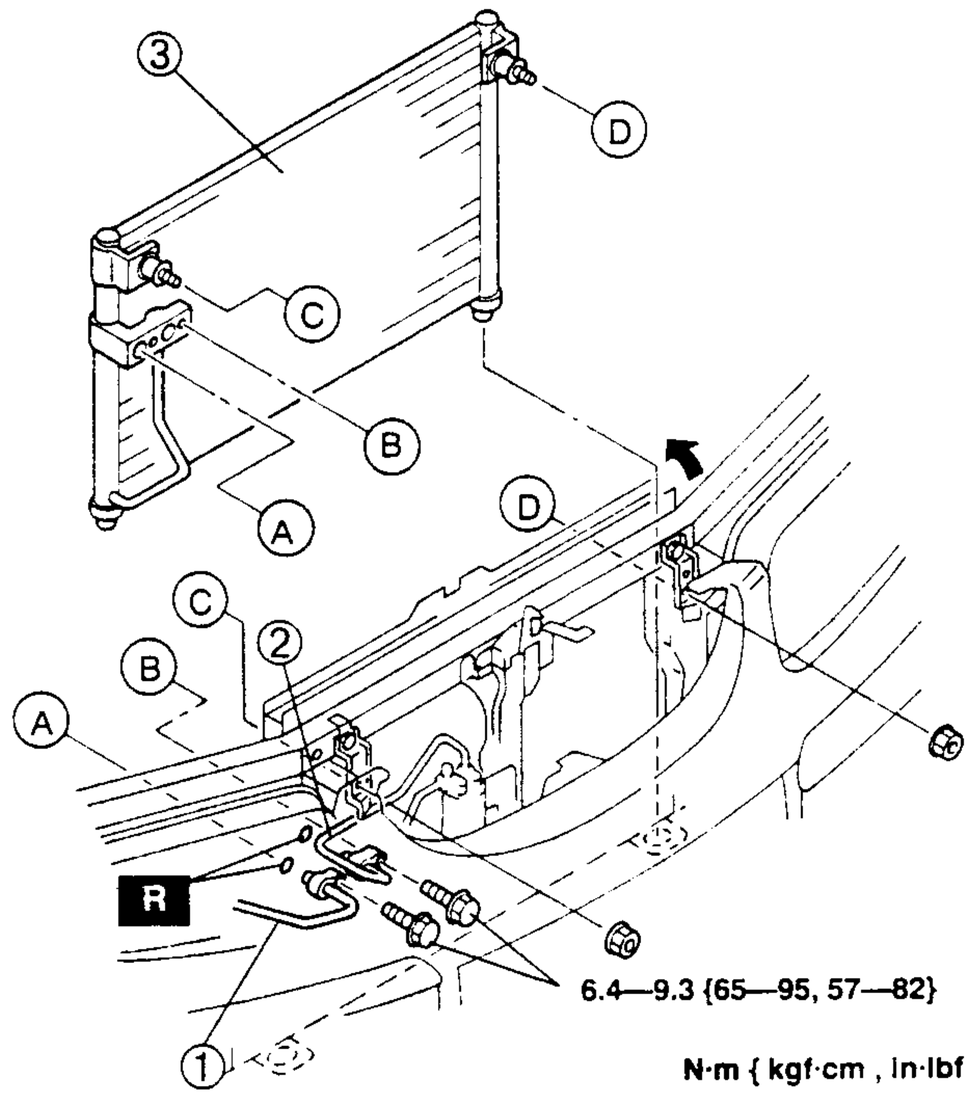
CONDENSER REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Discharge the refrigerant from the system. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, CHARGING.)
3. Remove the fresh air duct, radiator bracket, upper seal board, radiator grille, and horn (upper side).

Caution

- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise will occur. Always immediately plug all open fittings after removing any refrigeration cycle parts to keep moisture or foreign material out of the cycle.**

4. Remove in the order indicated in the table. Do not allow compressor oil to spill.
5. Install in the reverse order of removal.
6. Carry out the refrigerant system performance test. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, PERFORMANCE TEST.)



N·m { kgf·cm , in·lbf }

1	Cooler pipe No.6 ☞ Refrigerant lines installation note
2	Cooler pipe No.1 ☞ Refrigerant lines installation note
3	Condenser ☞ Installation note

Condenser Installation Note

- When installing a new condenser, add ATMOS GU10 compressor oil into the refrigeration cycle.

Supplemental amount
25 ml {25 cc , 0.8 fl oz }

CONDENSER INSPECTION

1. Check for cracks, damage, and oil leakage. If any are found, replace the condenser.
2. Check for fins clogged by dust. If any are clogged, remove the dust from the fins.
3. Check for bent fins. If any are bent, use a flathead screwdriver to straighten them.

RECEIVER/DRIER REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Discharge the refrigerant from the system. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, CHARGING.)
3. Remove the upper seal board and radiator grille.

Caution

- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise will occur. Always immediately plug all open fittings after removing any refrigeration cycle parts to keep moisture or foreign material out of the cycle.**

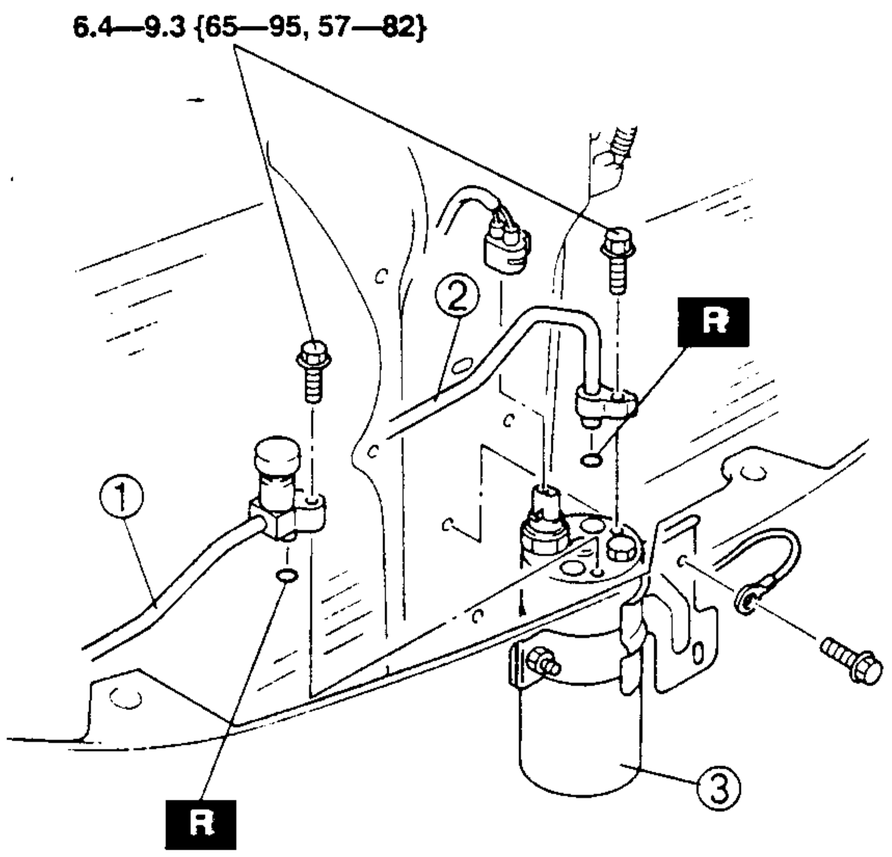
4. Remove in the order indicated in the table. Do not allow compressor oil to spill.
5. Install in the reverse order of removal.
6. Carry out the refrigerant system performance test. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, PERFORMANCE TEST.)

1	Cooler pipe No.3 ☞ Refrigerant lines installation note
2	Cooler pipe No.1 ☞ Refrigerant lines installation note
3	Receiver/drier ☞ Installation note

Receiver/drier Installation Note

- When installing a new receiver/drier, add ATMOS GU10 compressor oil into the refrigeration cycle.

Supplemental amount
5 ml {5 cc , 0.2 fl oz }



N·m { kgf·cm , in·lbf }

REFRIGERANT LINES REMOVAL/INSTALLATION

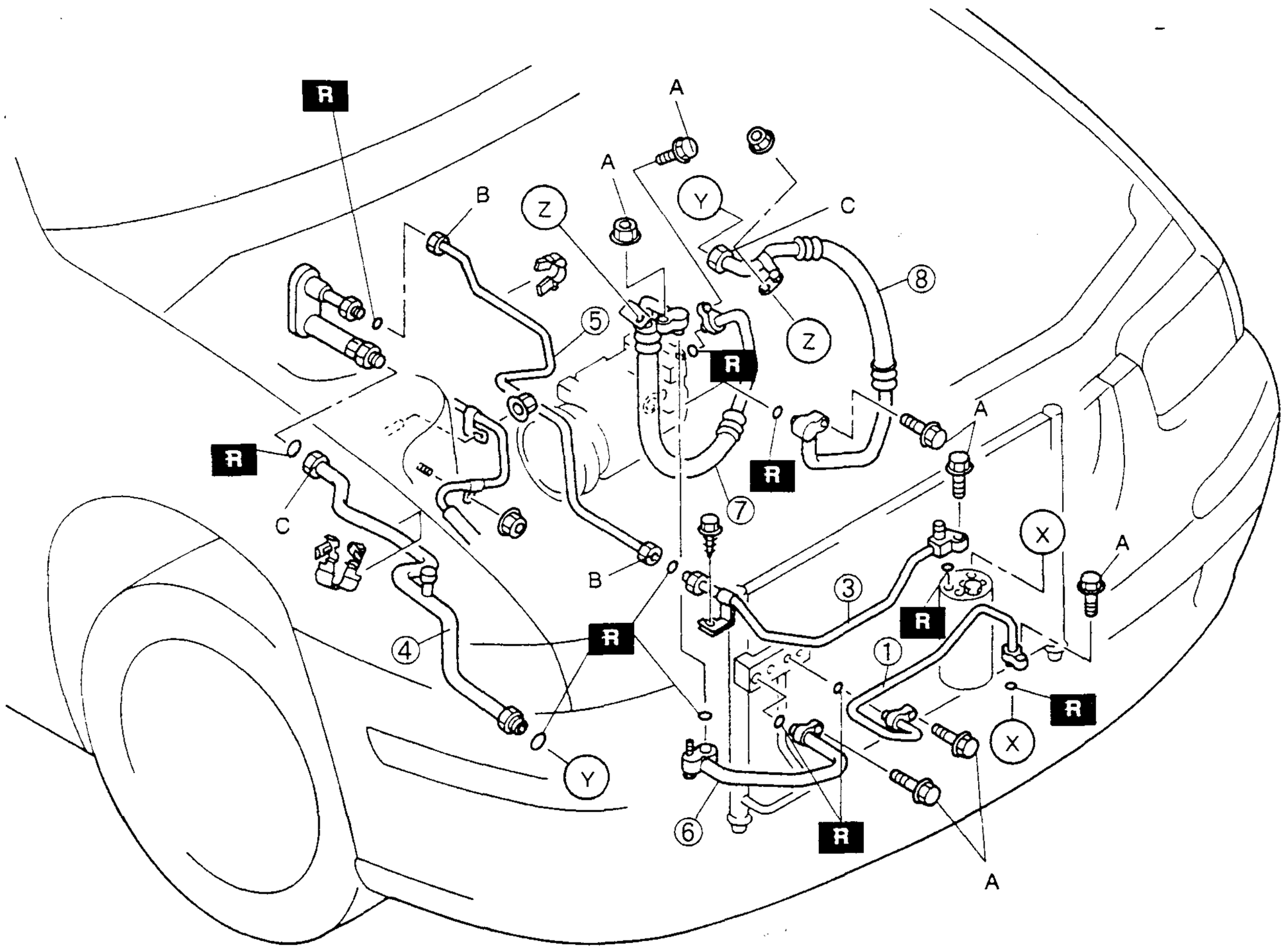
1. Disconnect the negative battery cable.
2. Discharge the refrigerant from the system. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, CHARGING.)

Caution

- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise will occur. Always immediately plug all open fittings after removing any refrigeration cycle parts to keep moisture or foreign material out of the cycle.**

3. Remove the horn (upper side).
4. Remove the theft-deterrent horn (R.H.D. only).
5. Remove as indicated in the table. Do not allow compressor oil to spill.
6. Install in the reverse order of removal.
7. Carry out the refrigerant system performance test. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, PERFORMANCE TEST.)

L.H.D.

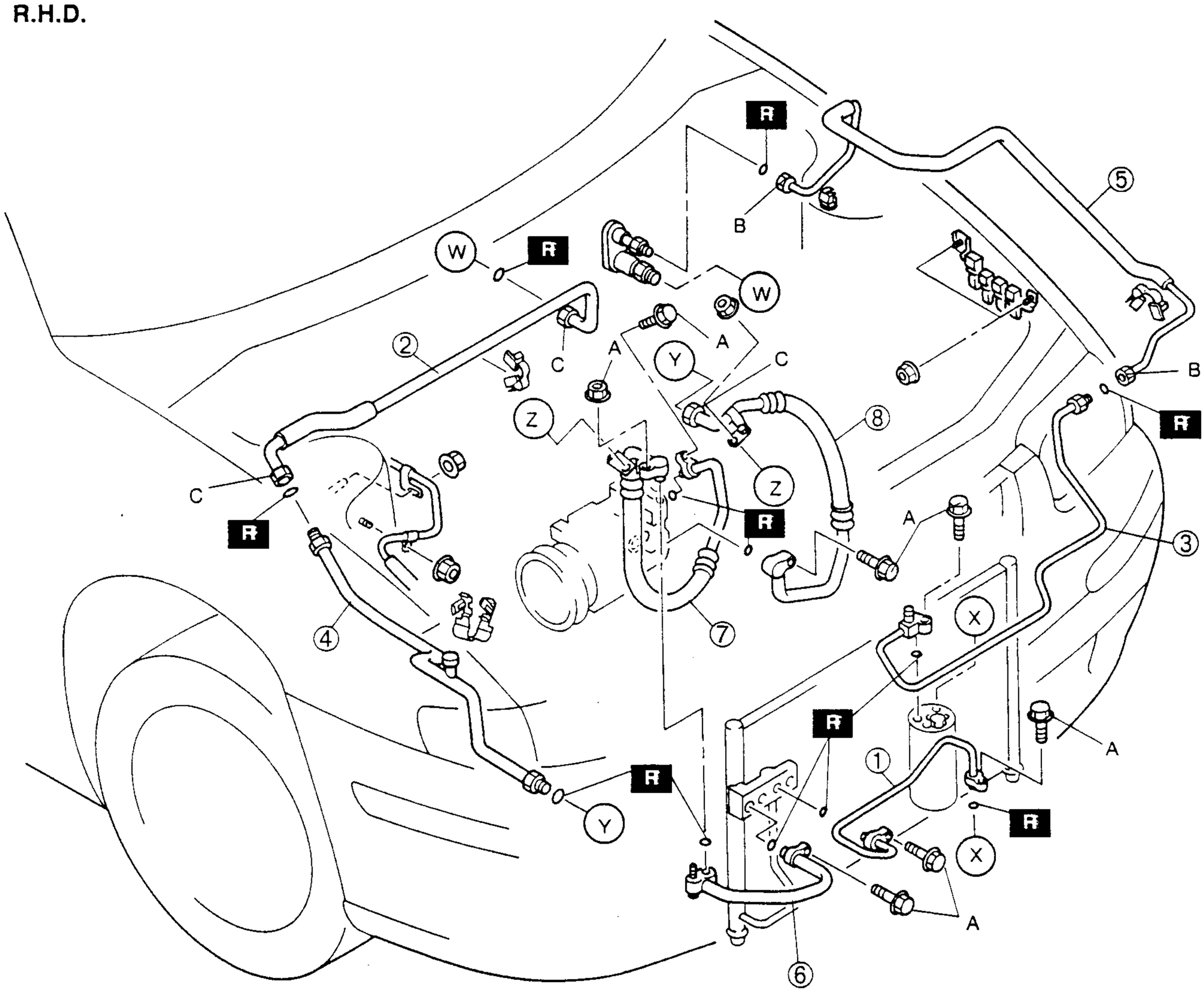


A: 6.4—9.3 N·m {65—95 kgf·cm , 57—82 in·lbf }

B: 7.9—19.6 N·m {80—200 kgf·cm , 70—173 in·lbf }

C: 26—39 N·m {2.6—4.0 kgf·m , 19—28 ft·lbf }

R.H.D.



A: 6.4—9.3 N·m {65—95 kgf·cm , 57—82 in·lbf }

B: 7.9—19.6 N·m {80—200 kgf·cm , 70—173 in·lbf }

C: 26—39 N·m {2.6—4.0 kgf·m , 19—28 ft·lbf }

1	Cooler pipe No.1 ☞ Refrigerant lines installation note
2	Cooler pipe No.2 ☞ Refrigerant lines removal note ☞ Refrigerant lines installation note
3	Cooler pipe No.3 ☞ Refrigerant lines removal note ☞ Refrigerant lines installation note
4	Cooler pipe No.4 ☞ Refrigerant lines removal note ☞ Refrigerant lines installation note
5	Cooler pipe No.5 ☞ Refrigerant lines removal note ☞ Refrigerant lines installation note
6	Cooler pipe No.6 ☞ Refrigerant lines installation note
7	Cooler hose (high) ☞ Refrigerant lines installation note
8	Cooler hose (low) ☞ Refrigerant lines removal note ☞ Refrigerant lines installation note

Refrigerant Lines Removal Note

- Loosen the nut by using 2 spanners, then remove the cooler pipe or hose.

Refrigerant Lines Installation Note

1. When installing a new cooler pipe or hose (except cooler pipe No.1, No.2, No.3, No.4)add ATMOS GU10 compressor oil into the refrigeration cycle.

   Supplemental amount
   5 ml {5 cc , 0.2 fl oz }

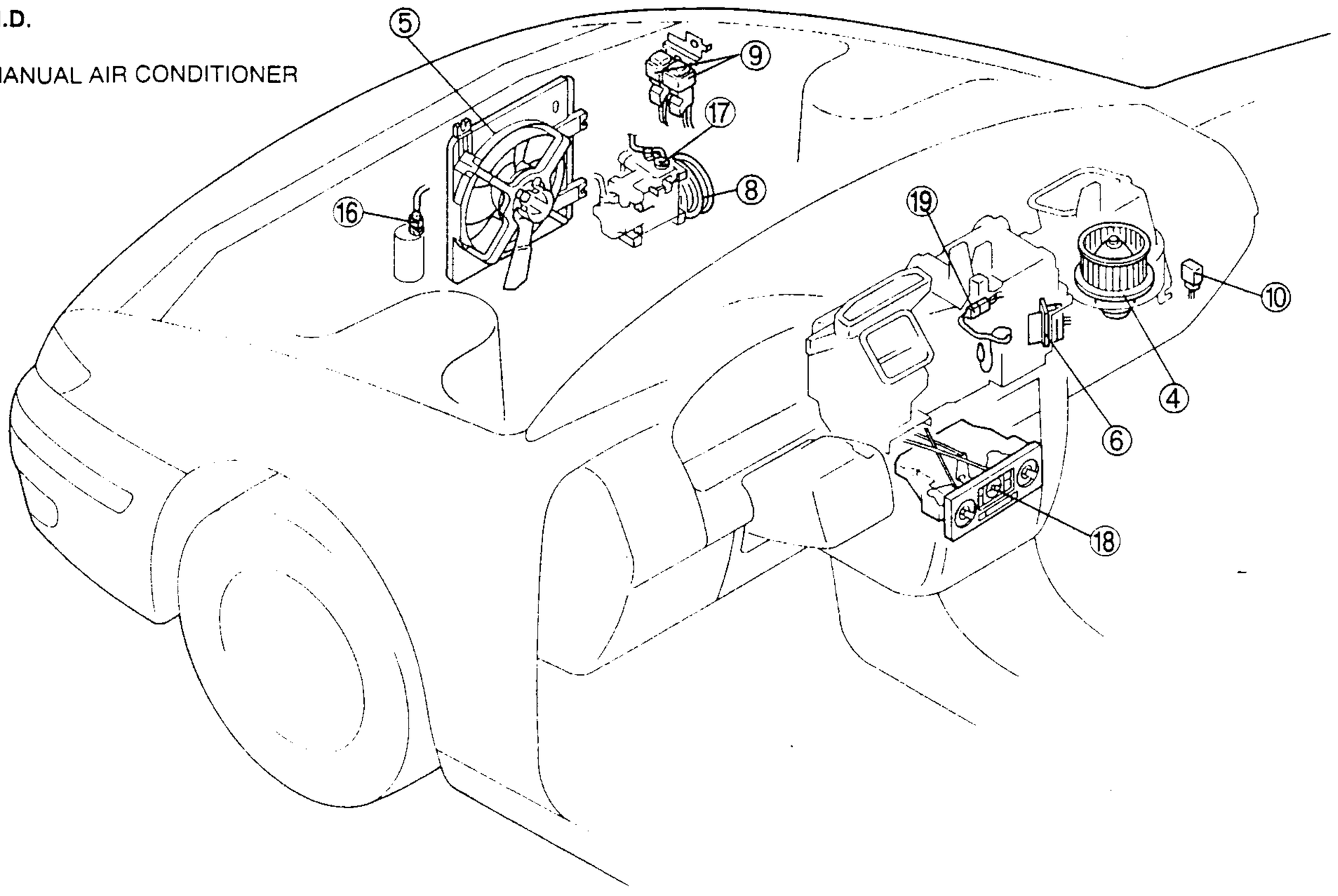
2. Apply compressor oil to the O-rings and connect the joints.
3. Tighten the joints.
   (1) Tighten the nut or bolt of the joint by hand.
   (2) Tighten the joint to the specified torque. If it is nut joint, tighten the nut by using a spanner and torque wrench.

CONTROL SYSTEM

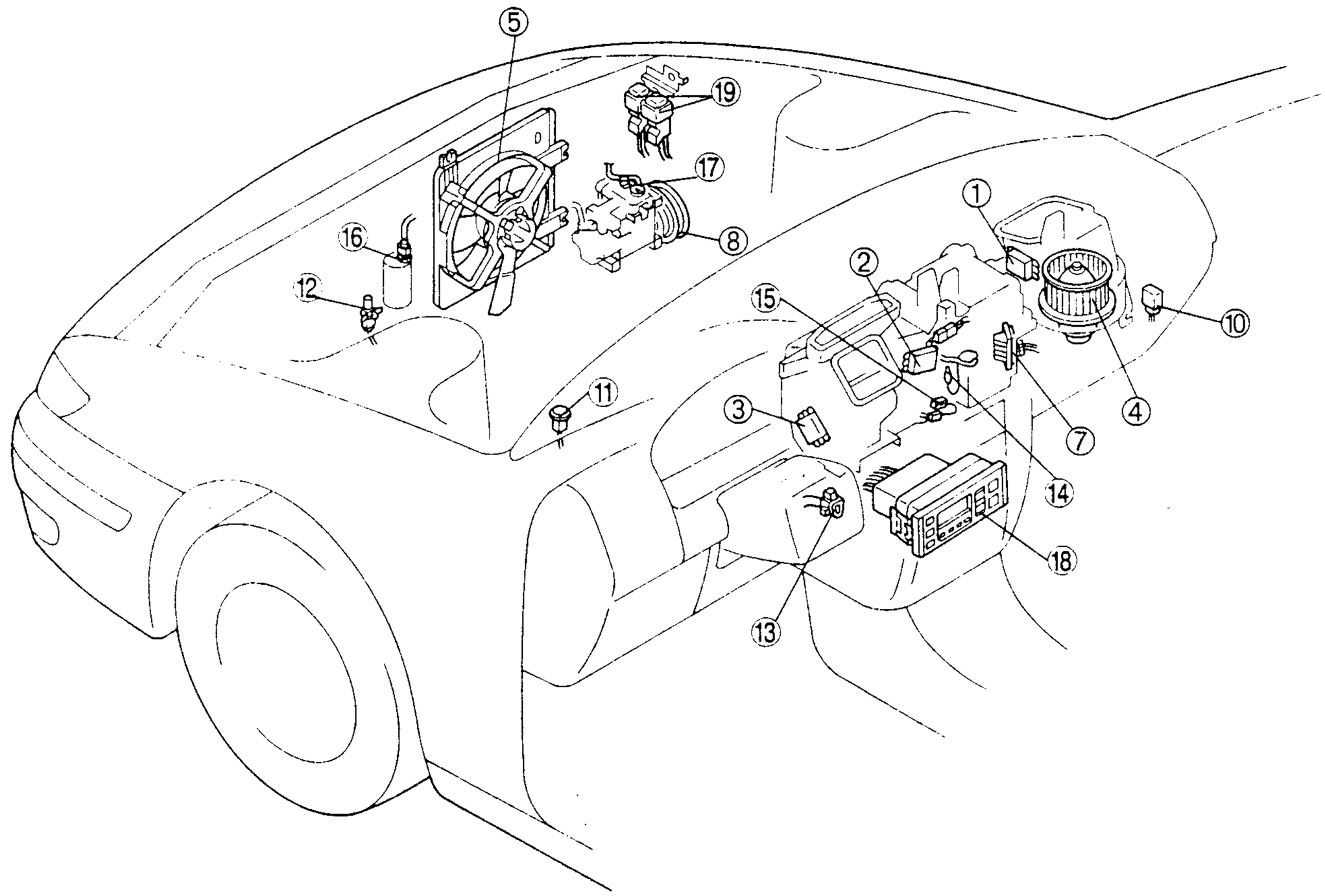
STRUCTURAL VIEW

L.H.D.

MANUAL AIR CONDITIONER

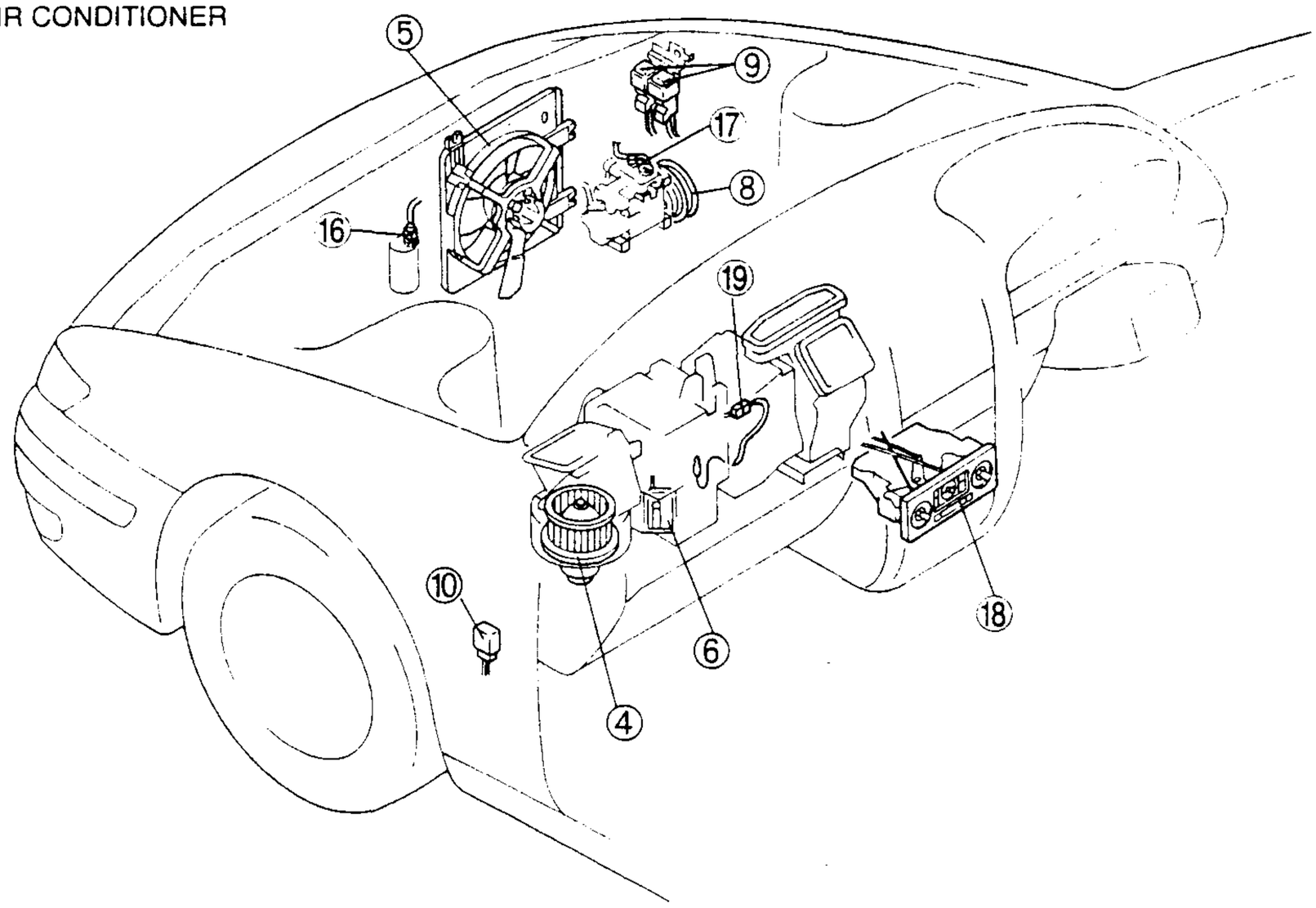


FULL-AUTO AIR CONDITIONER

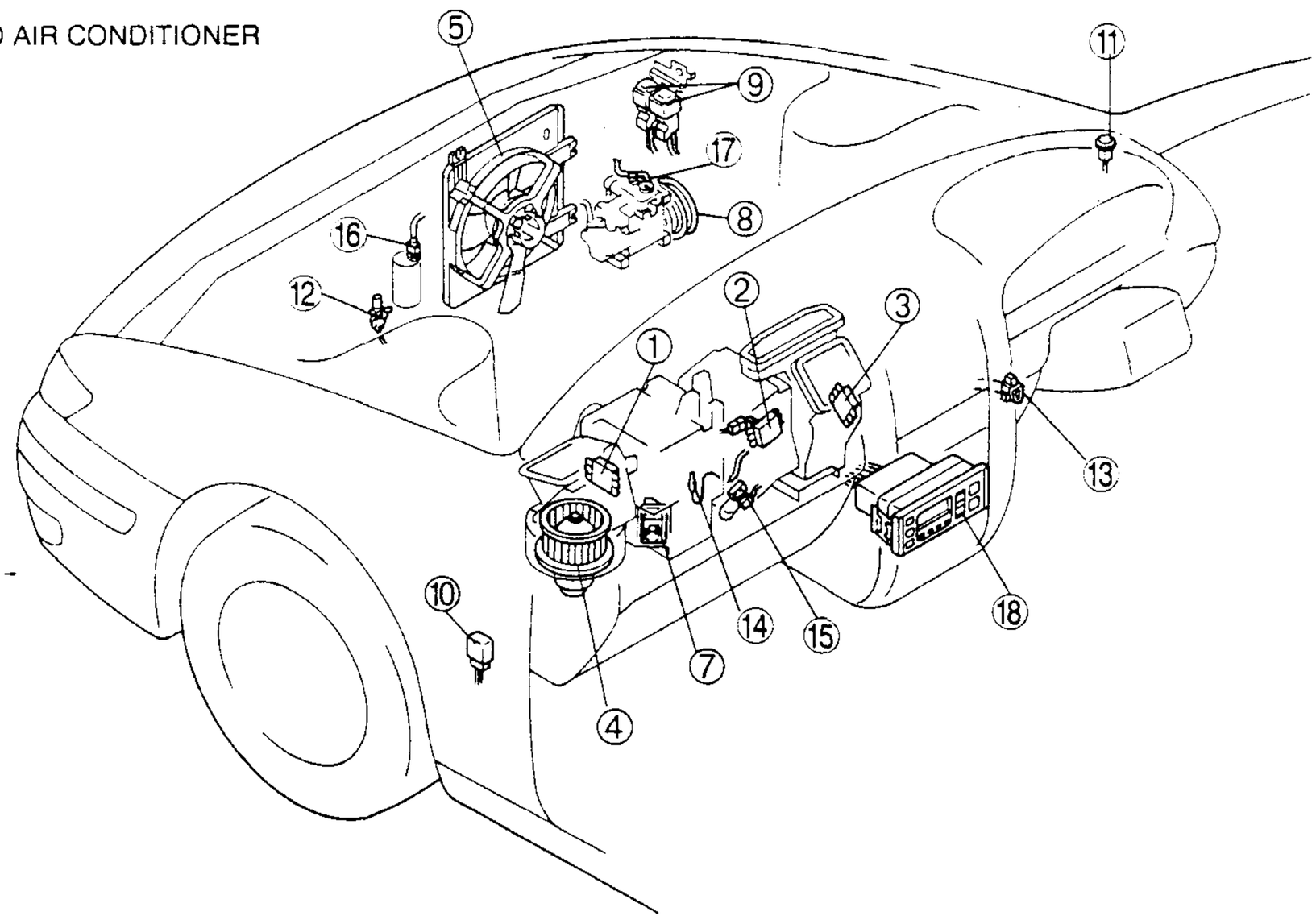


R.H.D.

MANUAL AIR CONDITIONER



FULL-AUTO AIR CONDITIONER

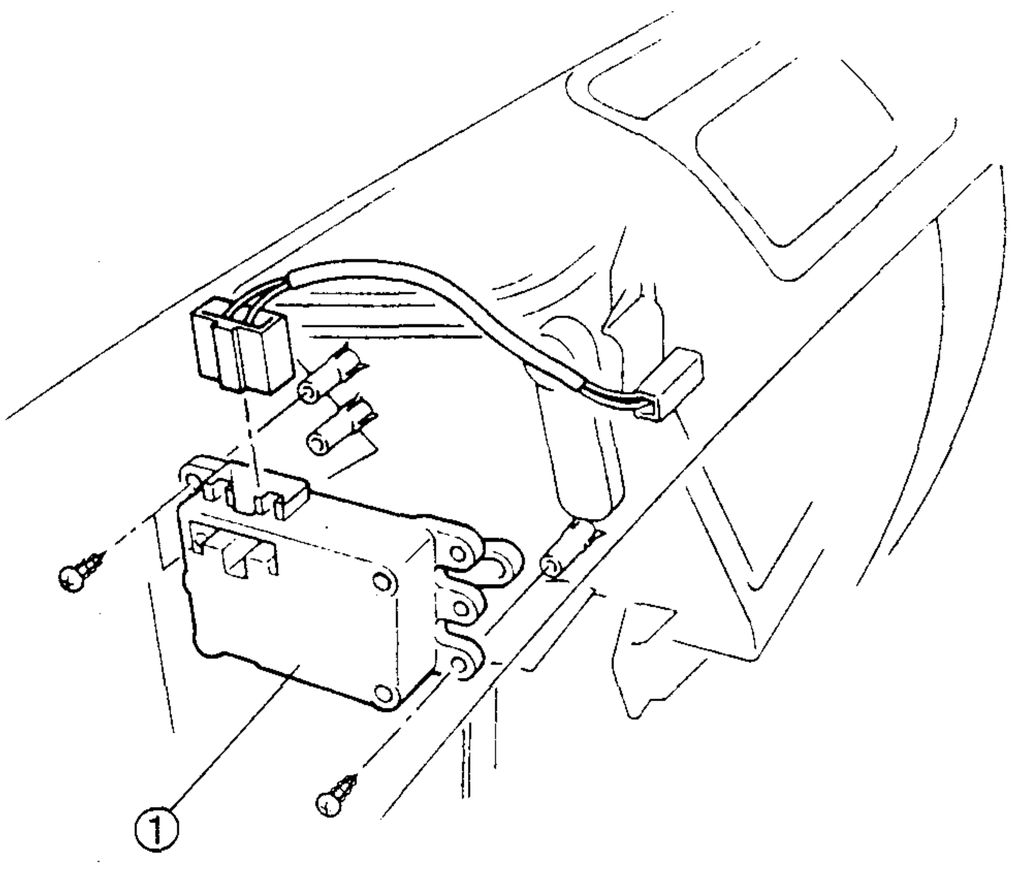


1	Air intake actuator
2	Air mix actuator
3	Airflow mode actuator
4	Blower motor
5	Condenser fan
6	Resistor
7	Power MOS FET
8	Magnetic clutch
9	A/C relay and condenser fan relay
10	Blower relay

11	Solar radiation sensor
12	Ambient temperature sensor
13	Cabin temperature sensor
14	Evaporator temperature sensor
15	Water temperature sensor
16	Refrigerant pressure switch
17	Thermal protector
18	Heater control unit
19	A/C amplifier

AIR INTAKE ACTUATOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the cooling unit. (Refer to COOLING UNIT REMOVAL/INSTALLATION.)
3. Remove as indicated in the table.
4. Install in the reverse order of removal.



1	Air intake actuator

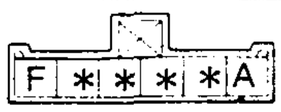
AIR INTAKE ACTUATOR INSPECTION

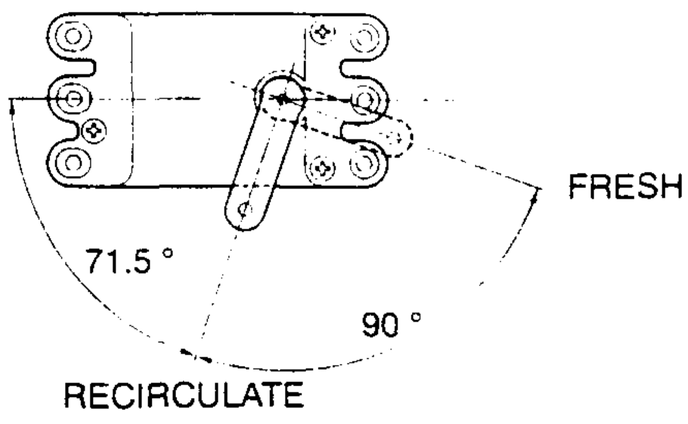
1. Remove the air intake actuator.
2. Connect battery positive voltage to terminal A or F and ground to terminal F or A of the air intake actuator.
3. Verify that the air intake actuator operates as shown below.

B+: Battery positive voltage

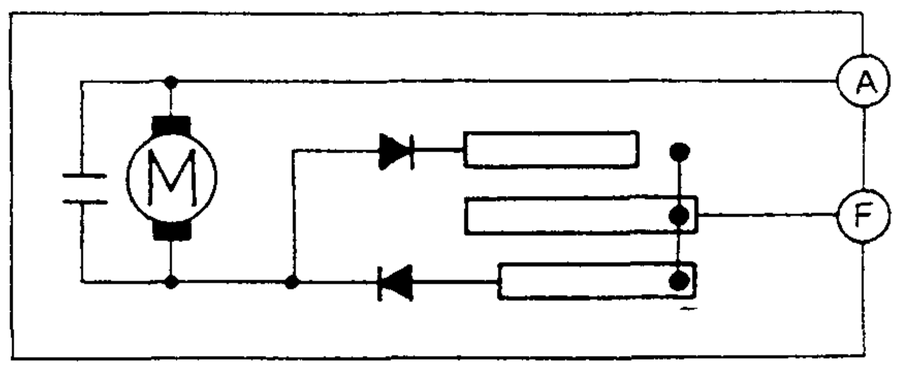
Connection				Movement
L.H.D.		R.H.D.		
B+	GND	B+	GND	
A	F	F	A	FRESH→RECIRCULATE
F	A	A	F	RECIRCULATE→FRESH

L.H.D.





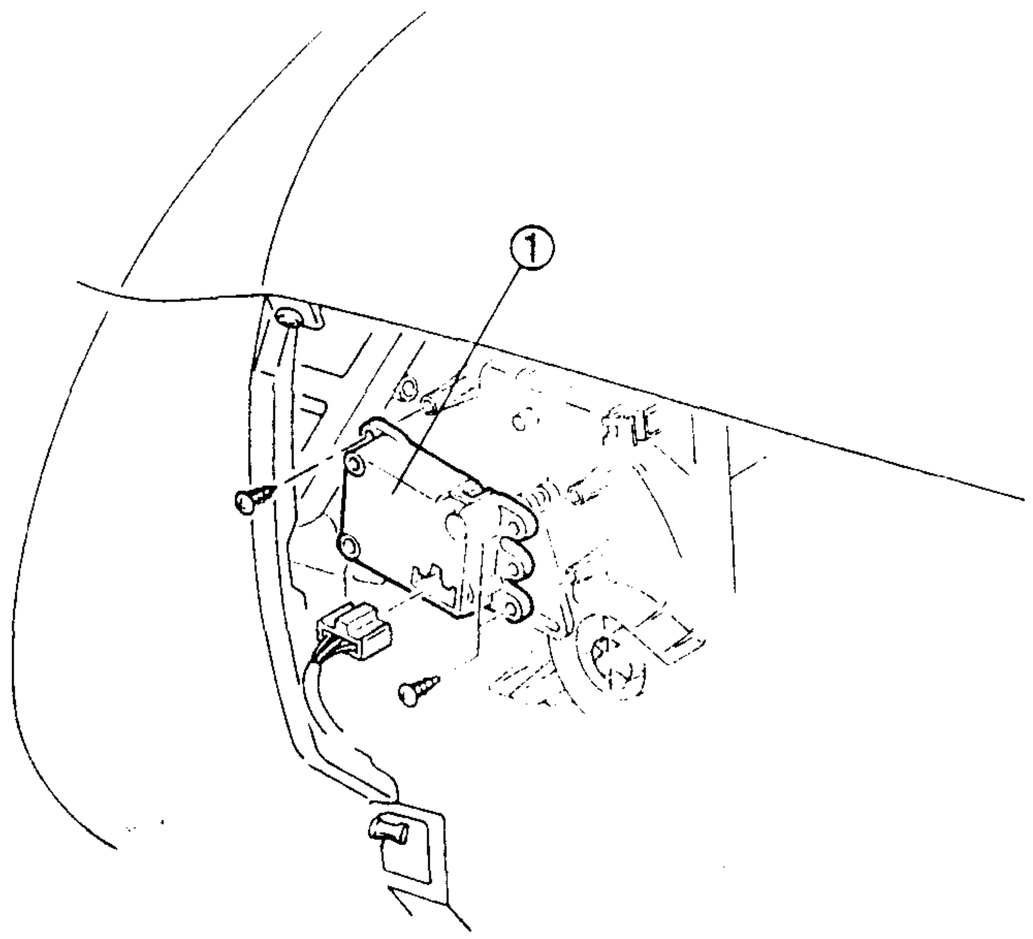
R.H.D.



4. If not as specified, replace the air intake actuator.

AIR MIX ACTUATOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the glove compartment and under cover.
3. Remove as indicated in the table.
4. Install in the reverse order of removal.



1	Air mix actuator

AIR MIX ACTUATOR INSPECTION

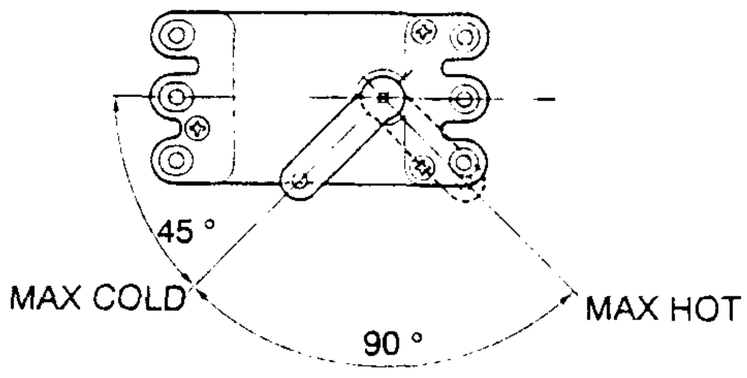
1. Remove the air mix actuator.
2. Connect battery positive voltage to terminal A or F and ground to terminal F or A of the air mix actuator.
3. Verify that the air mix actuator operates as shown below.

B+: Battery positive voltage

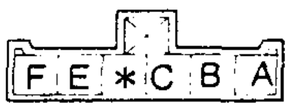
Connection				Movement
L.H.D.		R.H.D.		
B+	GND	B+	GND	
A	F	F	A	HOT→COLD
F	A	A	F	COLD→HOT

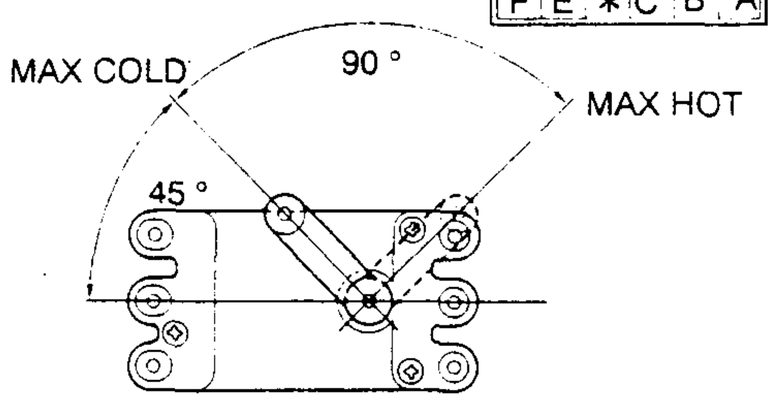
L.H.D.

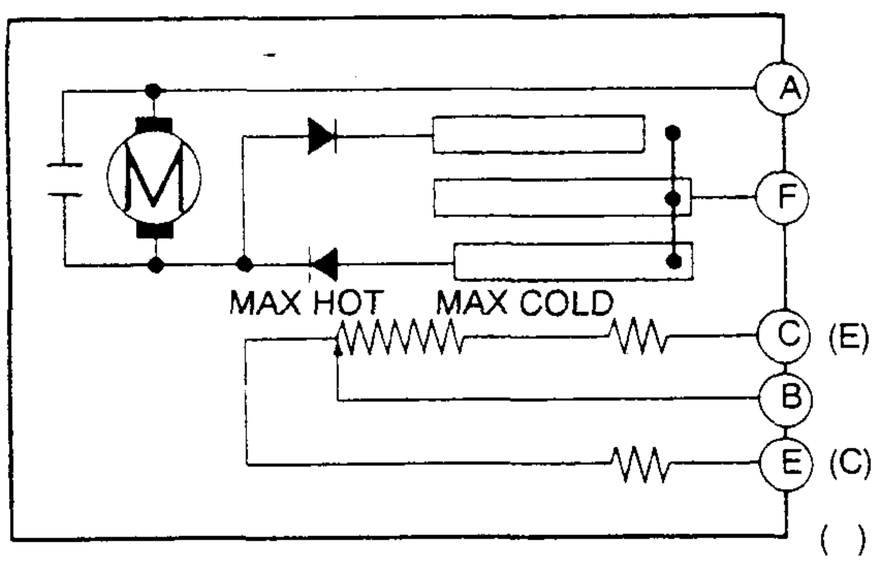




R.H.D.

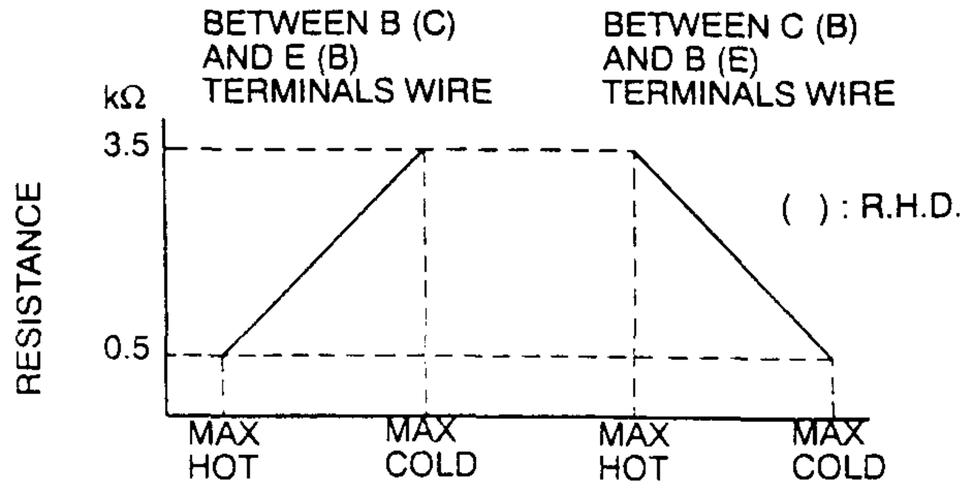






( ) : R.H.D.

4. Verify that the resistance between the terminals of the air mix actuator is as shown in the graph.

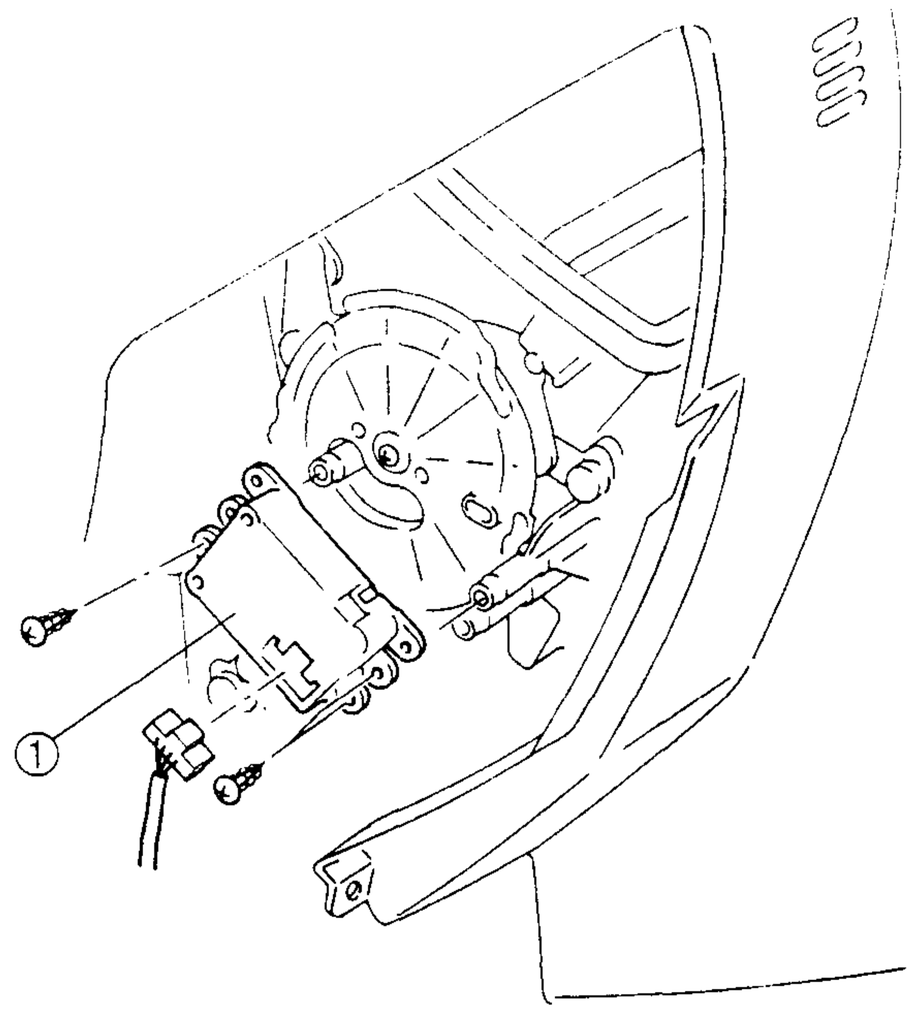


AIR MIX ACTUATOR POSITION

5. If not as specified, replace the air mix actuator.

AIRFLOW MODE ACTUATOR REMOVAL/ INSTALLATION

1. Disconnect the negative battery cable.
2. Remove as indicated in the table.
3. Install in the reverse order of removal.



1	Airflow mode actuator

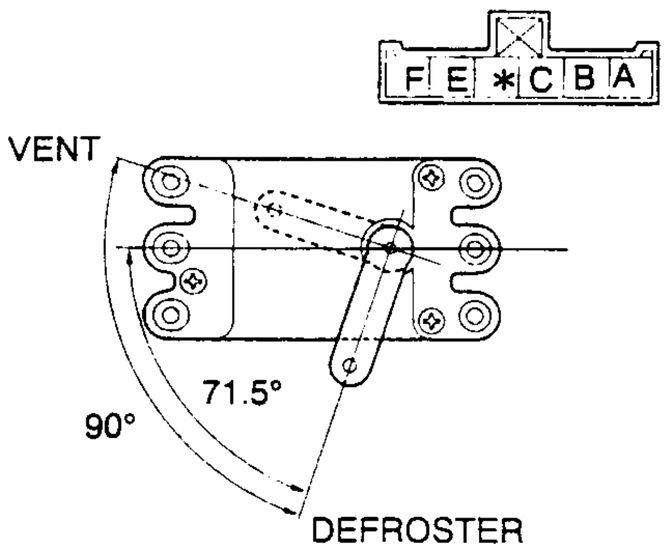
AIRFLOW MODE ACTUATOR INSPECTION

1. Remove the airflow mode actuator.
2. Connect battery positive voltage to terminal F or A and ground to terminal A or F of the airflow mode actuator.
3. Verify that the airflow mode actuator operates as shown below.

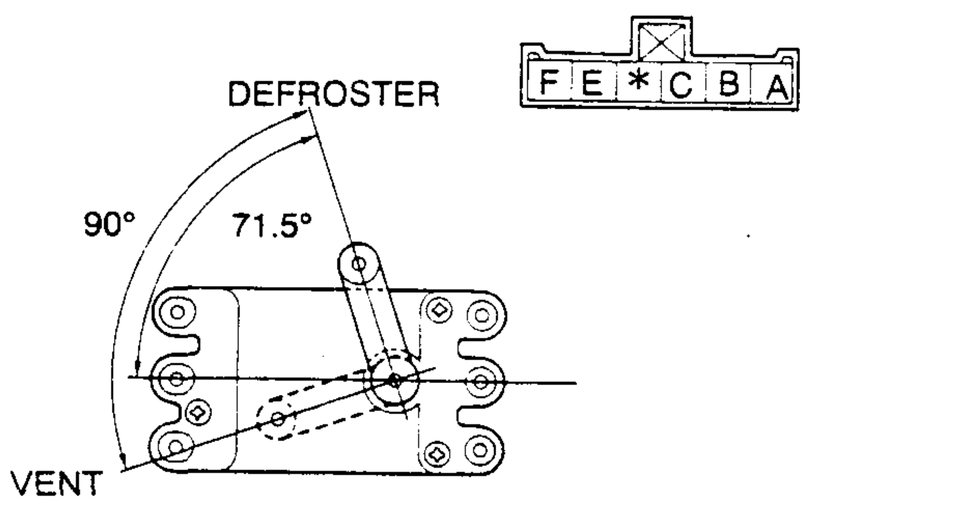
B+: Battery positive voltage

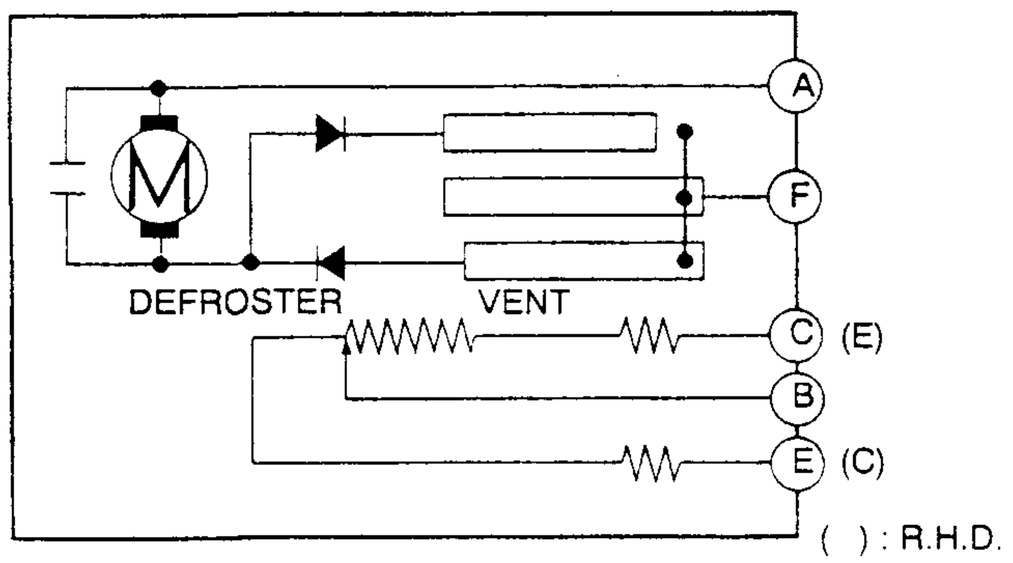
Connection				Movement
L.H.D.		R.H.D.		
B+	GND	B+	GND	
F	A	A	F	VENT→DEFROSTER
A	F	F	A	DEFROSTER→VENT

L.H.D.

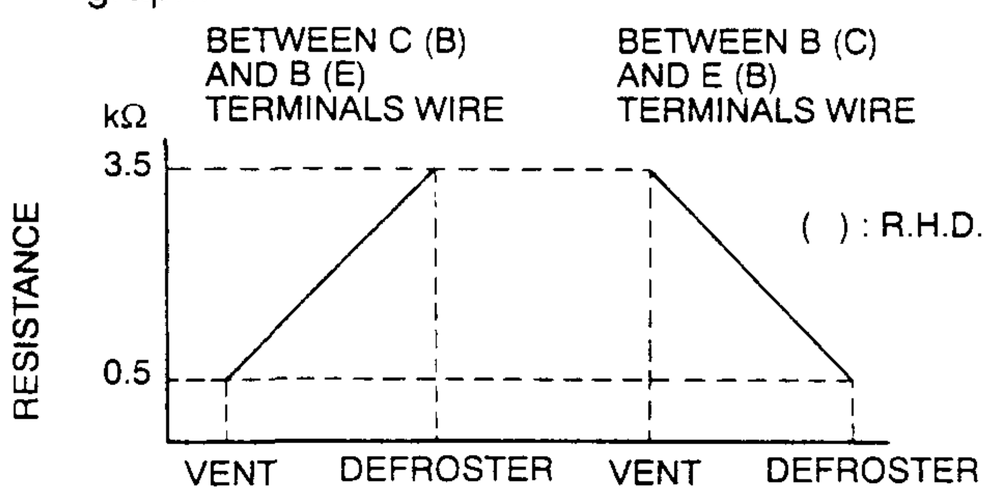


R.H.D.





4. Verify that the resistance between the terminals of the airflow mode actuator is as shown in the graph.

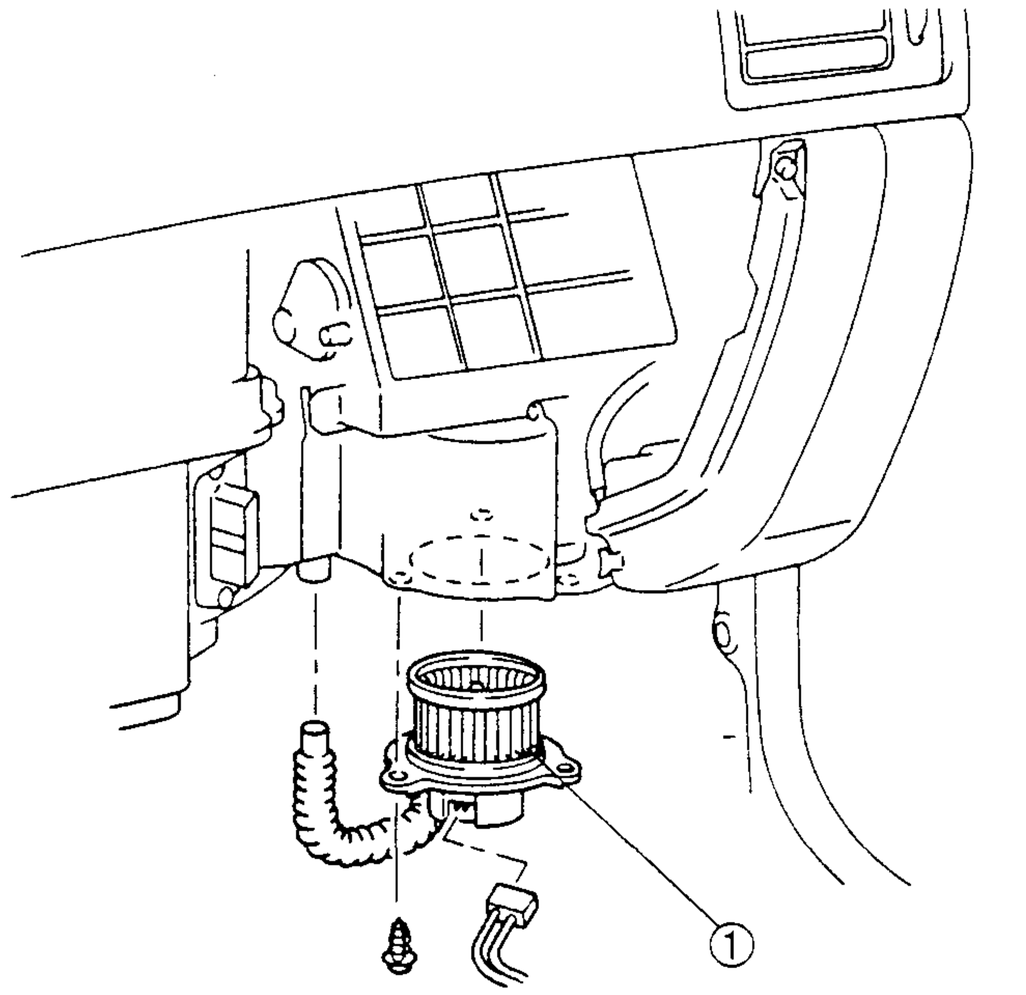


AIRFLOW MODE ACTUATOR POSITION

5. If not as specified, replace the airflow mode actuator.

BLOWER MOTOR REMOVAL/INSTALLATION

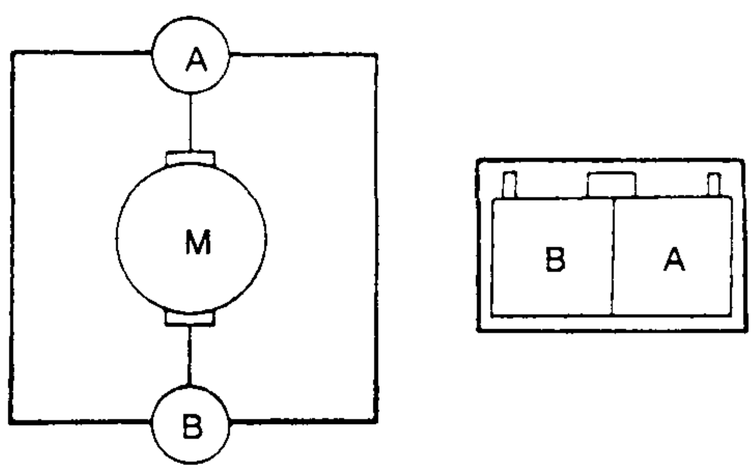
1. Disconnect the negative battery cable.
2. Remove the glove compartment and under cover.
3. Remove as indicated in the table.
4. Install in the reverse order of removal.



1	Blower motor

BLOWER MOTOR INSPECTION

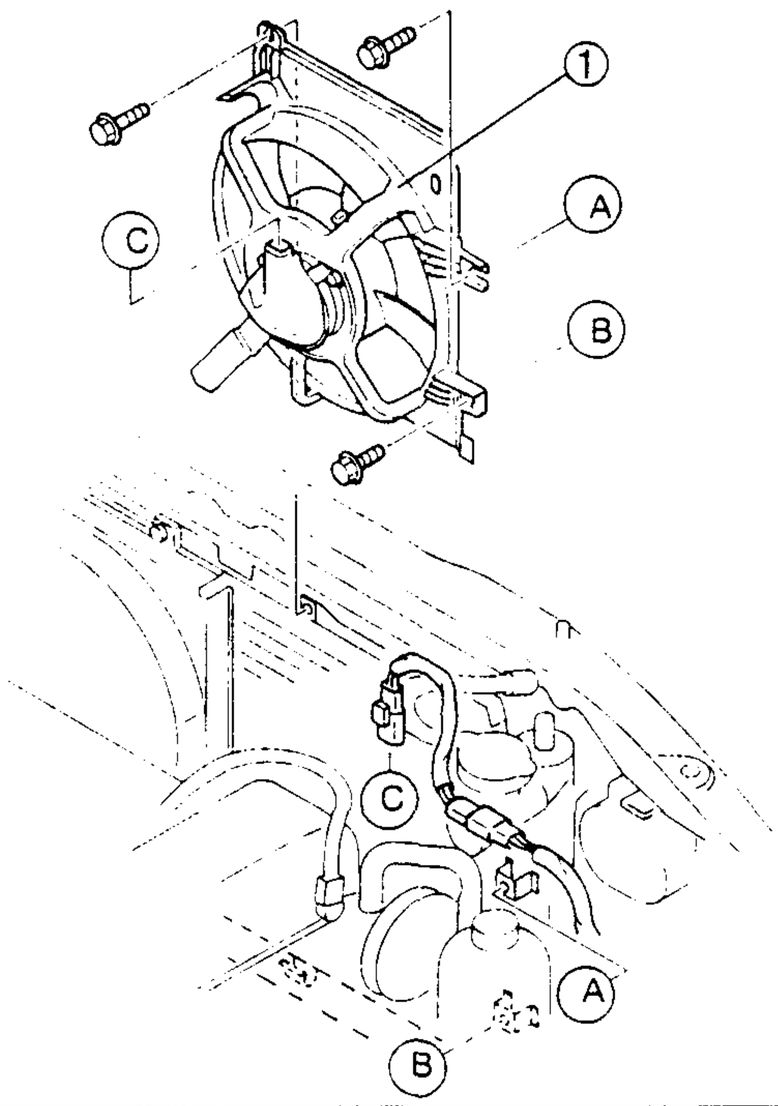
1. Remove the glove compartment and under cover.
2. Disconnect the blower motor connector.
3. Connect battery positive voltage to terminal A (L.H.D.) or B (R.H.D.) and ground to terminal B (L.H.D.) or A (R.H.D.) of the blower motor and verify its operation.



4. If not as specified, replace the blower motor.

CONDENSER FAN REMOVAL/INSTALLATION

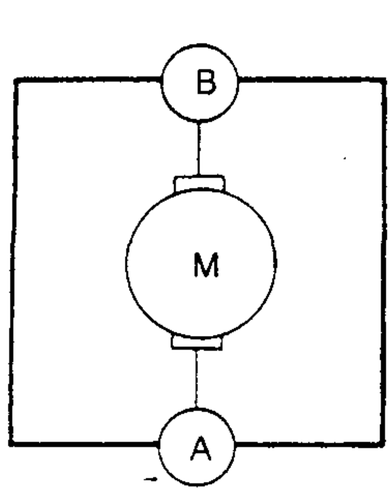
1. Disconnect the negative battery cable.
2. Remove the fresh air duct.
3. Remove as indicated in the table.
4. Install in the reverse order of removal.

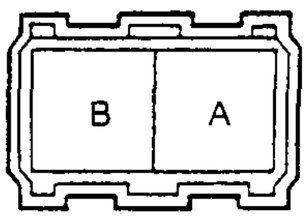


1	Condenser fan

CONDENSER FAN INSPECTION

1. Disconnect the condenser fan connector.
2. Connect battery positive voltage to terminal B and ground to terminal A of the condenser fan and verify its operation.

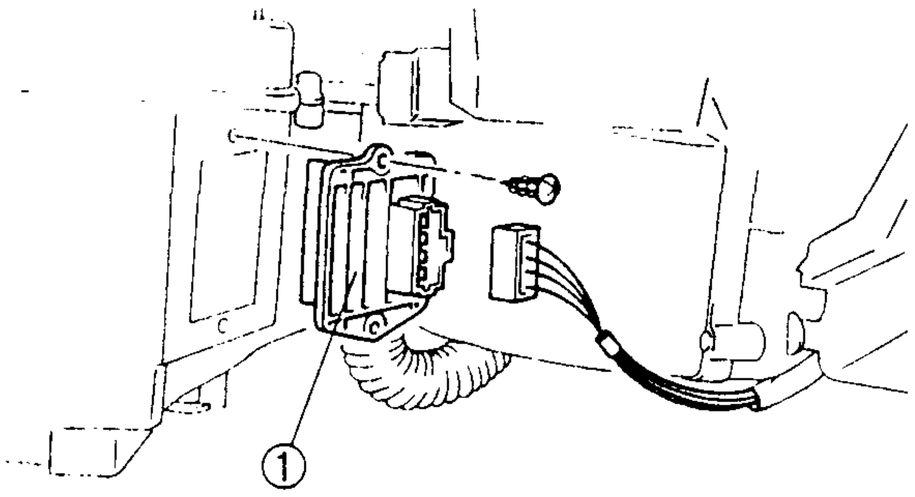




3. If not as specified, replace the condenser fan.

RESISTOR REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the glove compartment and under cover.
3. Remove as indicated in the table.
4. Install in the reverse order of removal.

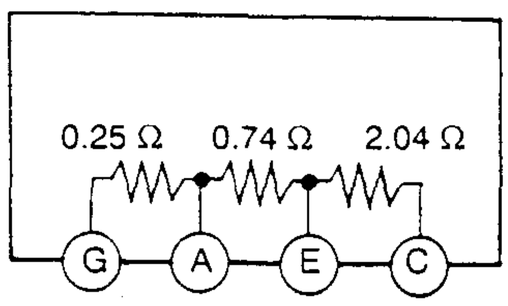


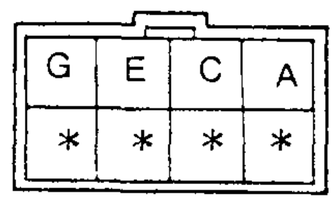
1	Resistor

RESISTOR INSPECTION

1. Disconnect the resistor connector.
2. Verify that the resistance between the terminals of the resistor is as shown in the table.

Terminal	Resistance (Ω)
G-A	0.24—0.27
G-E	0.93—1.07
G-C	2.85—3.27





3. If not as specified, replace the resistor.

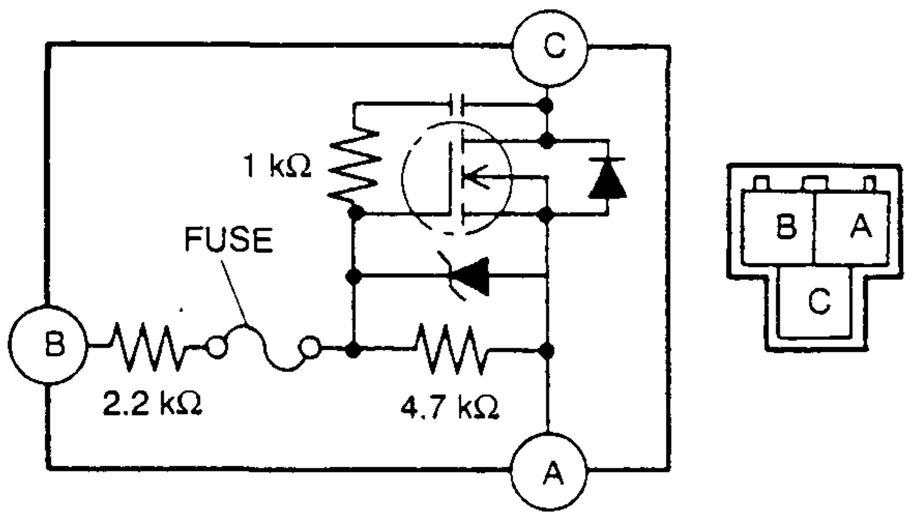
POWER MOS FET REMOVAL/INSTALLATION

(Refer to RESISTOR REMOVAL/INSTALLATION.)

POWER MOS FET INSPECTION

1. Disconnect the power MOS FET connector.
2. Verify that the resistance between the terminals of the power MOS FET is as shown in the table.

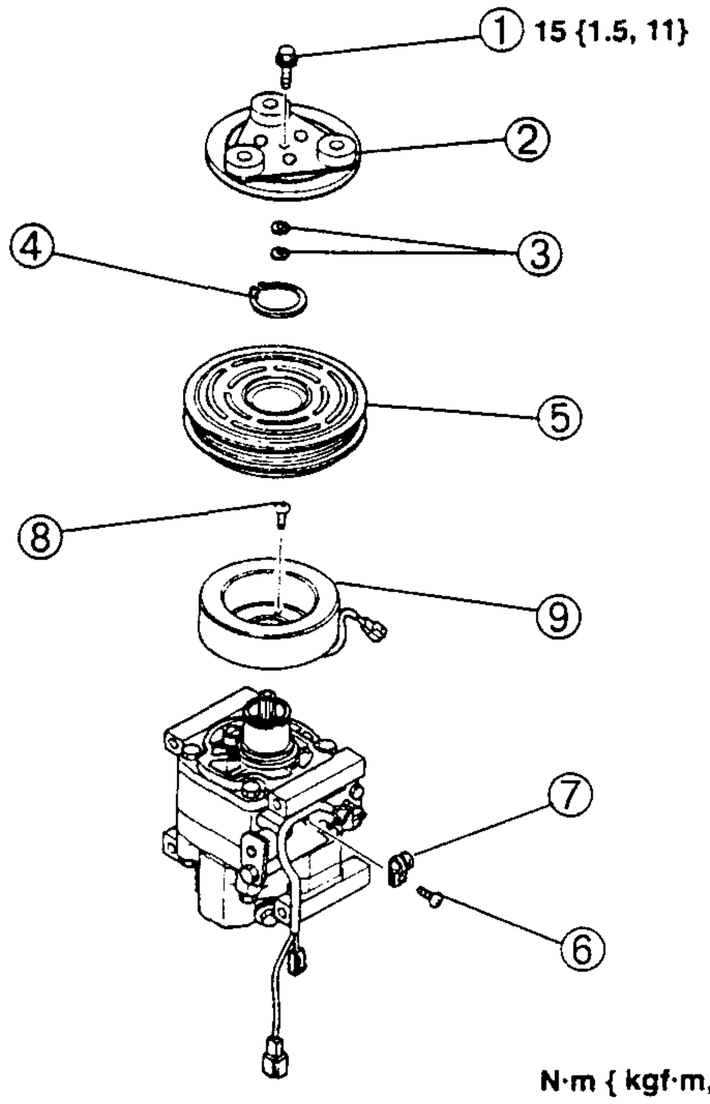
Ohmmeter lead		Resistance (kΩ)
+	-	
A	B	6.9
A	C	∞
B	A	6.9
B	C	∞
C	A	Continuity
C	B	∞



3. If not as specified, replace the power MOS FET.

MAGNETIC CLUTCH DISASSEMBLY/ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.
3. Adjust the magnetic clutch clearance. (Refer to MAGNETIC CLUTCH CLEARANCE ADJUSTMENT.)

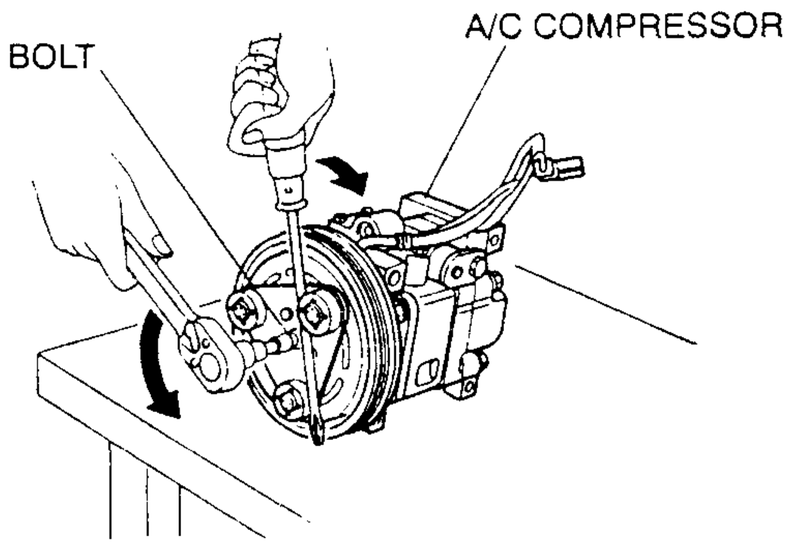


N·m { kgf·m, ft·lbf }

1	Bolt ☞ Removal/installation note
2	Pressure plate
3	Shim
4	Snap ring
5	A/C compressor pulley
6	Screw
7	Clip
8	Screw
9	Stator

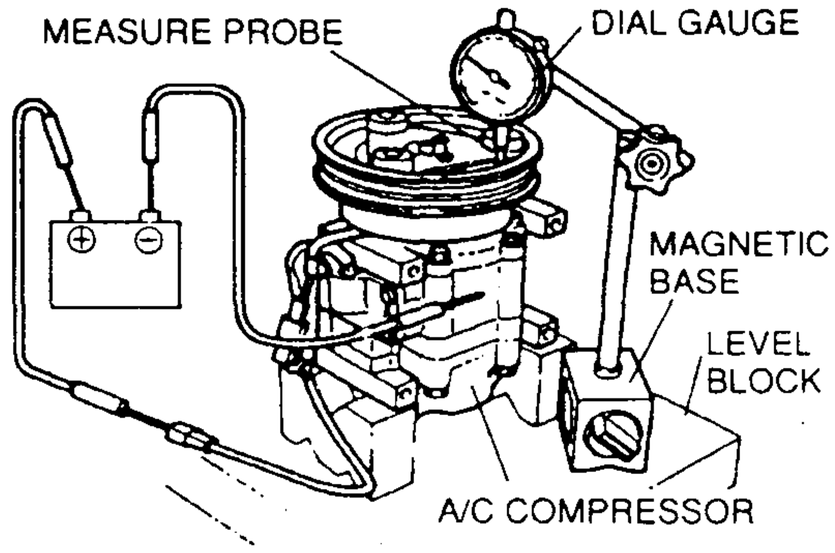
Bolt Removal/Installation Note

- When removing or installing the bolt, hold the pressure plate in place as shown in the figure.



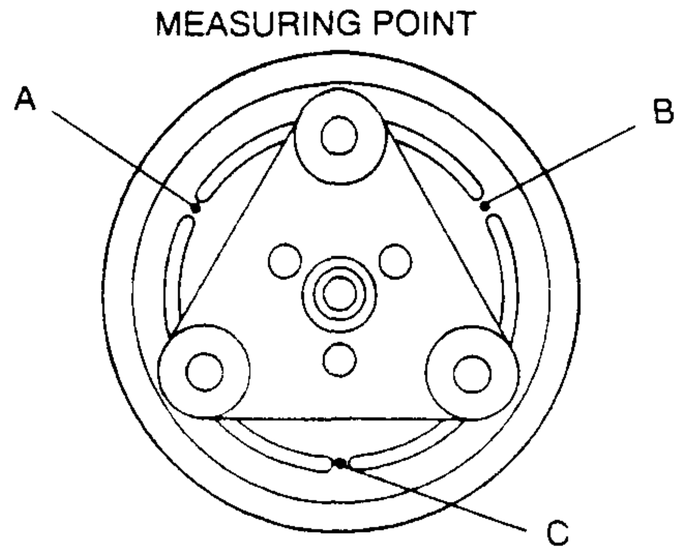
MAGNETIC CLUTCH CLEARANCE ADJUSTMENT

1. Set the A/C compressor on a level block.
2. Turn on the magnetic clutch by connecting the battery positive voltage to the magnetic clutch connector terminal and the ground to the A/C compressor body.
3. Fix a dial gauge on a magnetic base and set the measuring probe onto point A on the pressure plate surface.

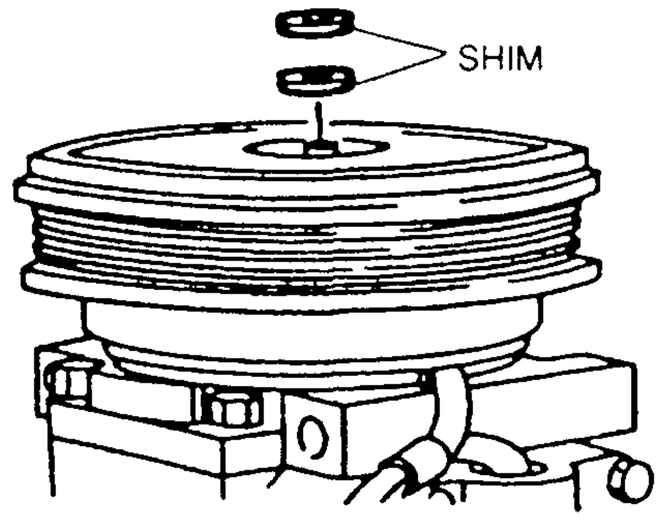


4. Turn off the magnetic clutch by disconnecting the ground from the A/C compressor body, then measure the dial gauge readings.
5. Measure the clearance for point B and C on the pressure plate surface by repeating the above steps 2 through 4.

Clearance
0.4—0.6 mm {0.016—0.023 in }

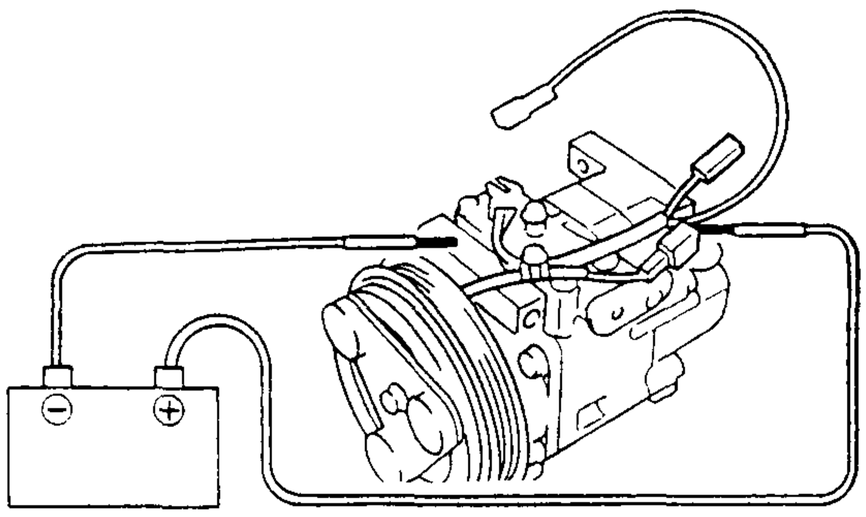


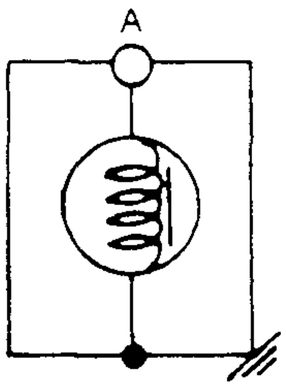
6. If not within the specification, remove the pressure plate and adjust the clearance by changing the shim (**0.2 mm {0.008 in } , 0.5 mm {0.02 in }**) or the number of shims.



MAGNETIC CLUTCH INSPECTION

1. Disconnect the magnetic clutch connector.
2. Connect battery positive voltage to terminal A of magnetic clutch and ground to the A/C compressor body.



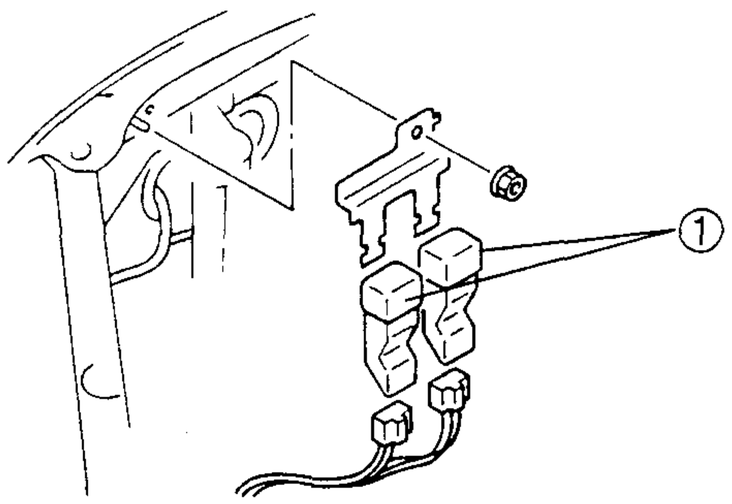




3. Verify that the magnetic clutch operates.
4. If not as specified, replace the stator.

A/C RELAY AND CONDENSER FAN RELAY REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove as indicated in the table.
3. Install in the reverse order of removal.



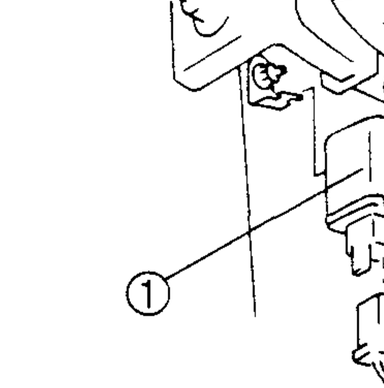
1	A/C relay and condenser fan relay

A/C RELAY AND CONDENSER FAN RELAY INSPECTION

1. Remove the relay.
2. Check for continuity between the relay terminals by using an ohmmeter.

○—○ : Continuity B+: Battery positive voltage

Step	Terminal			
	A	B	C	D
1	○	○		
2	B+	GND	○	○

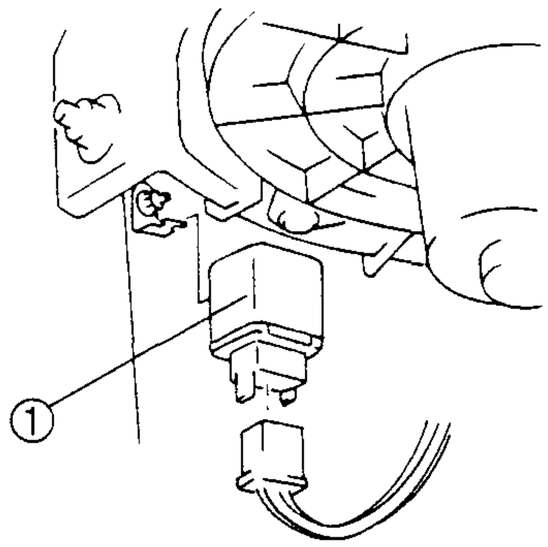




3. If not as specified, replace the relay.

BLOWER RELAY REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the passenger's front scuff plate and front side trim.
3. Remove as indicated in the table.
4. Install in the reverse order of removal.



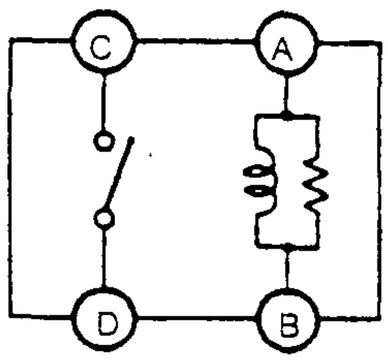
1	Blower relay

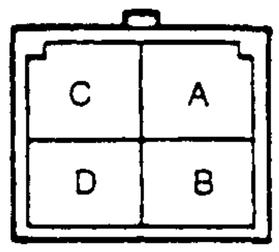
BLOWER RELAY INSPECTION

1. Remove the blower relay.
2. Check for continuity between the blower relay terminals by using an ohmmeter.

○—○ : Continuity B+: Battery positive voltage

Step	Terminal			
	A	B	C	D
1	○	○		
2	B+	GND	○	○

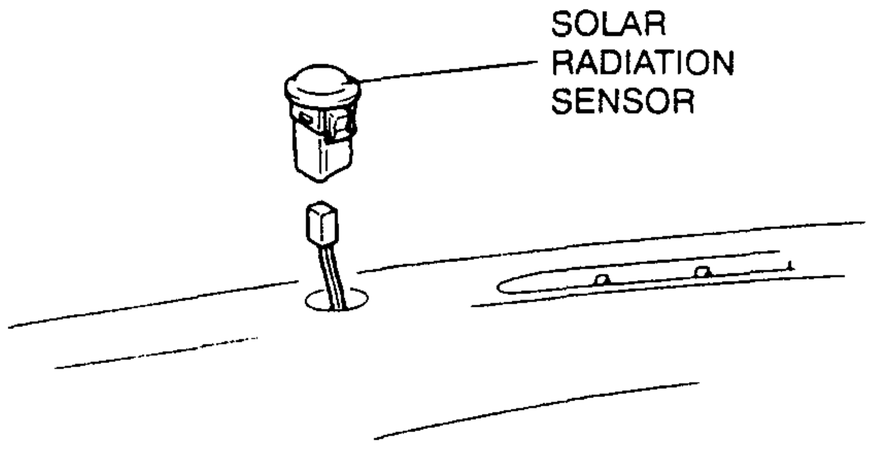




3. If not as specified, replace the blower relay.

SOLAR RADIATION SENSOR REMOVAL/ INSTALLATION

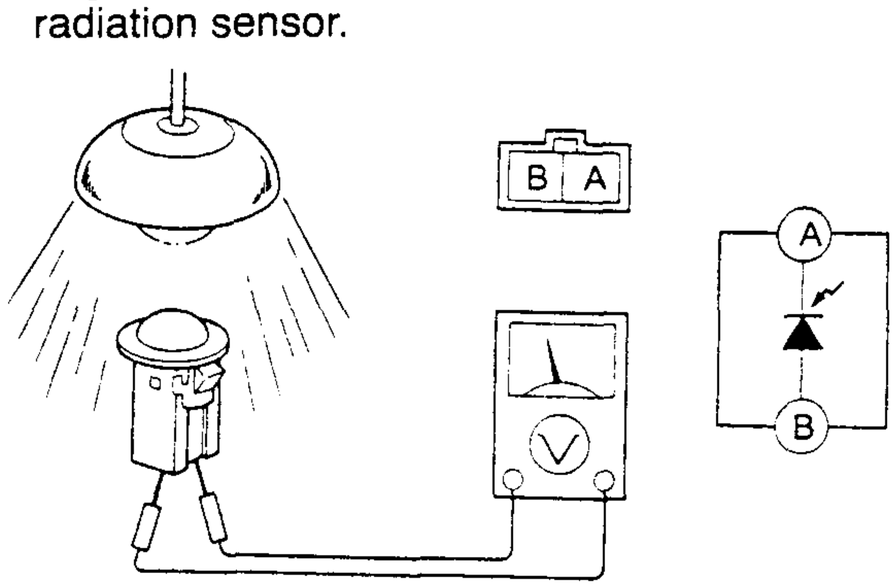
1. Disconnect the negative battery cable.
2. Remove the solar radiation sensor from the dashboard by using a flat-head screwdriver which has been wrapped in tape.



3. Install in the reverse order of removal.

SOLAR RADIATION SENSOR INSPECTION

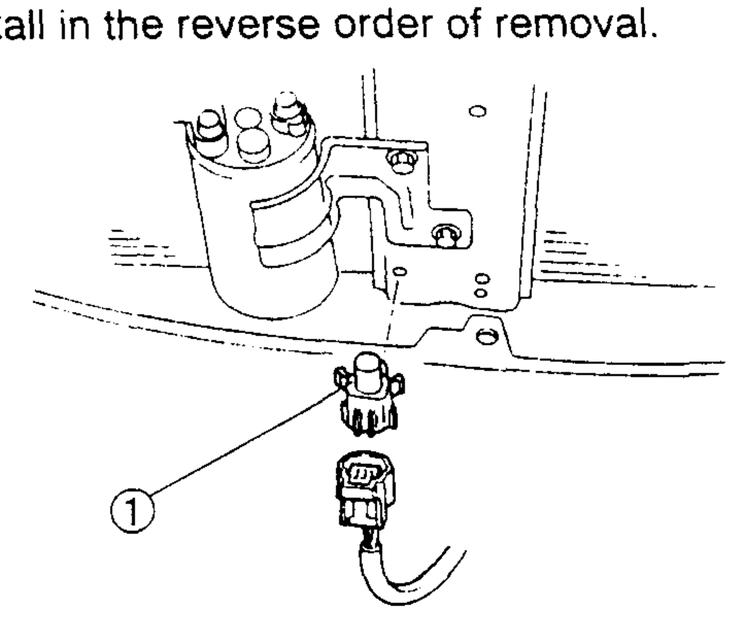
1. Remove the solar radiation sensor.
2. Shine an incandescent light (60 W) on the solar radiation sensor from a distance of approximately **100 mm {3.9 in}**.
3. Connect positive (+) lead to terminal A and negative (–) lead to terminal B of the solar radiation sensor.



4. If the output voltage is not above **0.45 V** , replace the solar radiation sensor.

AMBIENT TEMPERATURE SENSOR REMOVAL/ INSTALLATION

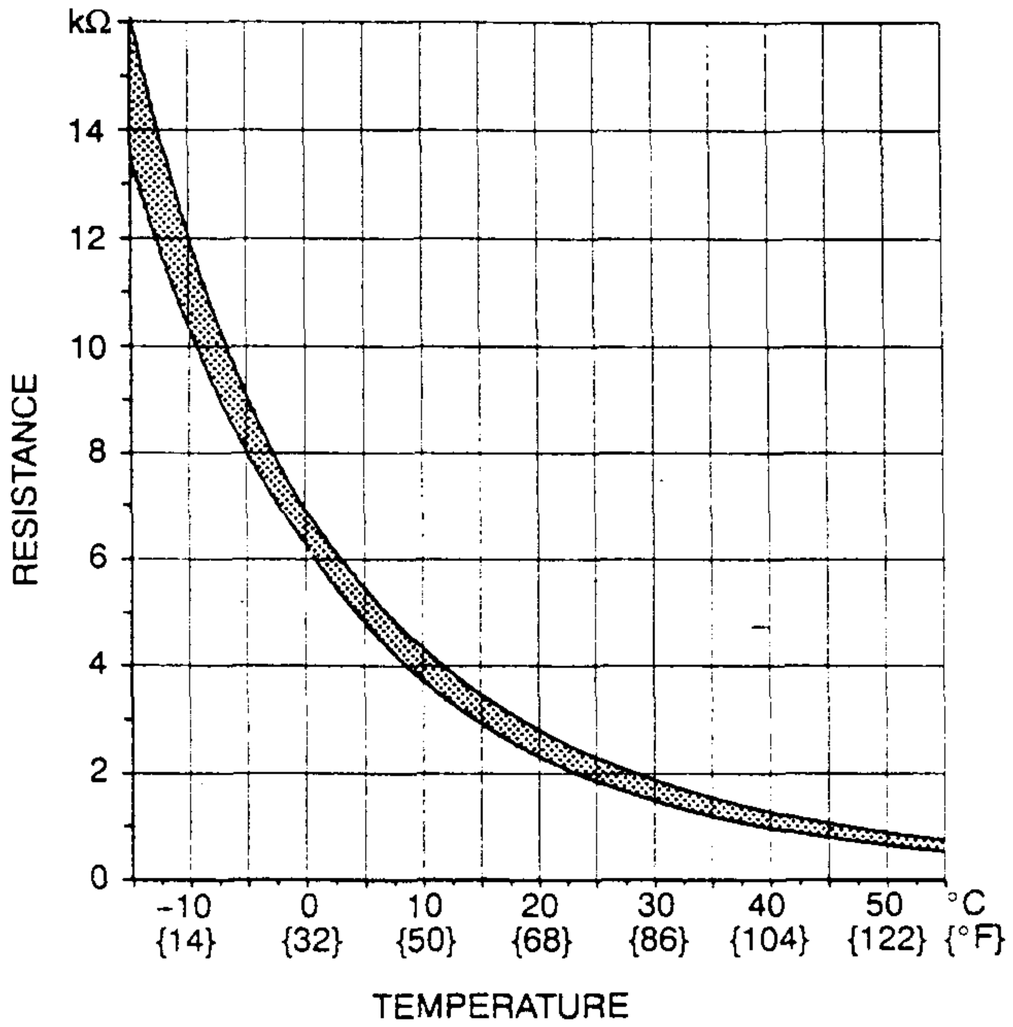
1. Disconnect the negative battery cable.
2. Remove the upper seal board.
3. Remove as indicated in the table.
4. Install in the reverse order of removal.



1	Ambient temperature sensor

AMBIENT TEMPERATURE SENSOR INSPECTION

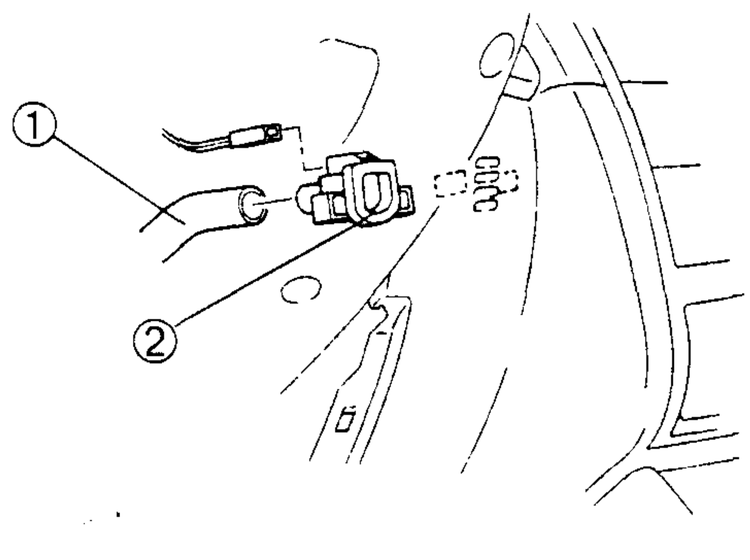
1. Disconnect the ambient temperature sensor connector.
2. Measure the temperature around the ambient temperature sensor.
3. Measure the resistance between the terminals of the ambient temperature sensor.



4. If the resistance is not as shown in the graph, replace the ambient temperature sensor.

CABIN TEMPERATURE SENSOR REMOVAL/ INSTALLATION

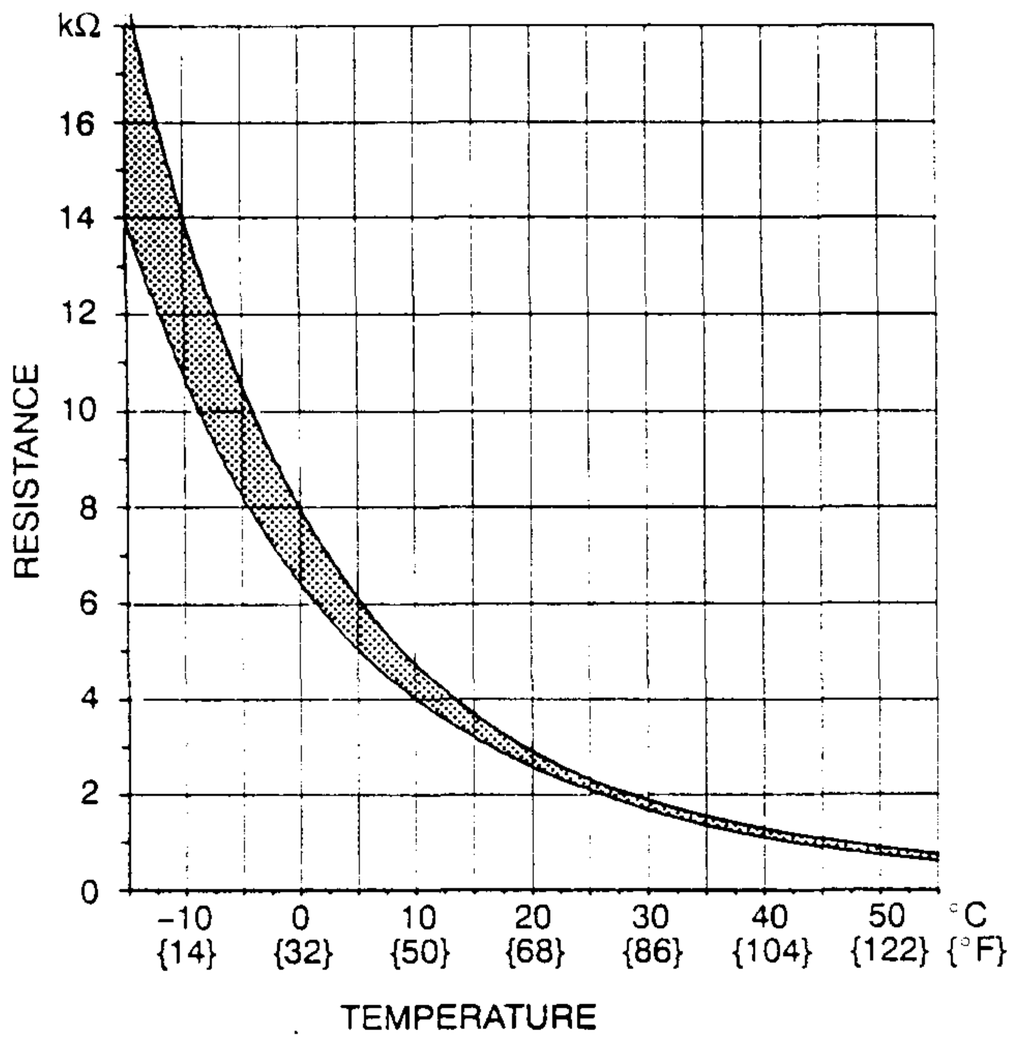
1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



1	Air hose
2	Cabin temperature sensor

CABIN TEMPERATURE SENSOR INSPECTION

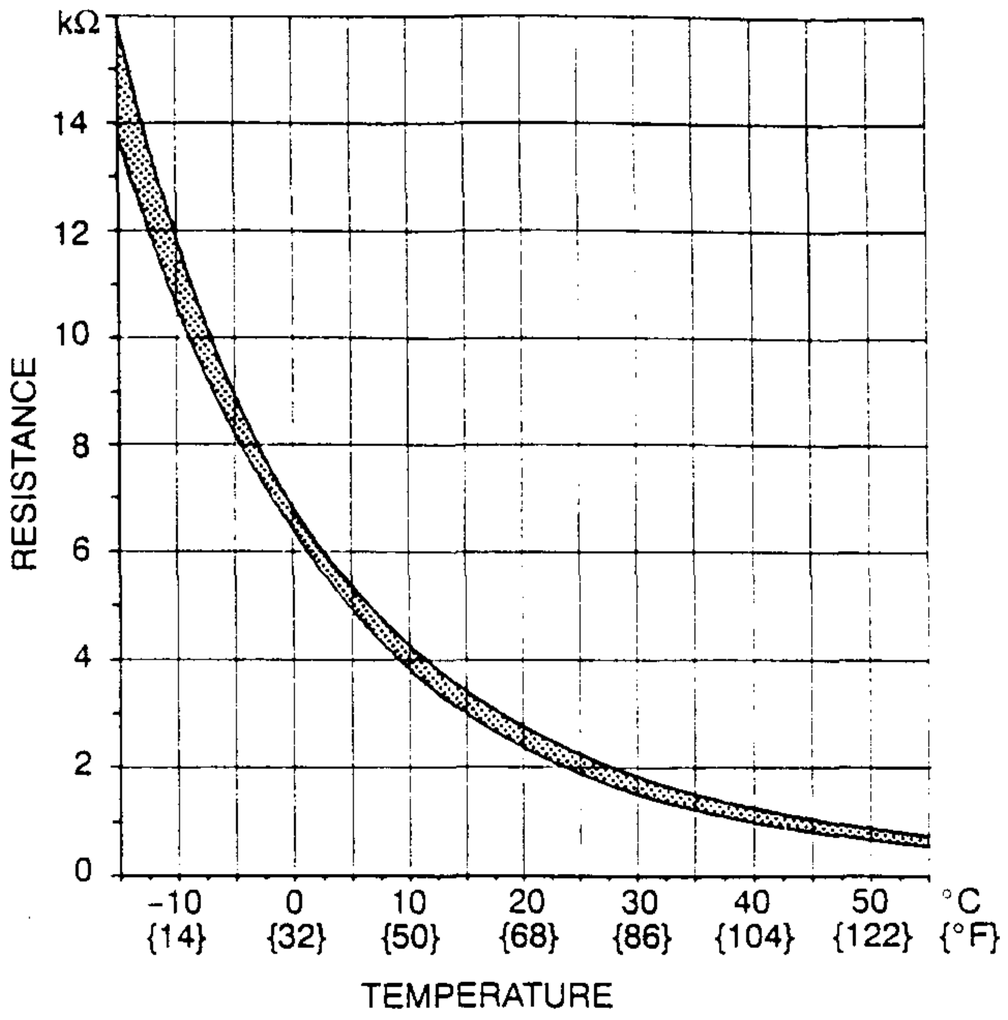
1. Remove the cabin temperature sensor.
2. Measure the temperature around the cabin temperature sensor.
3. Measure the resistance between the terminals of the cabin temperature sensor.



4. If the resistance is not as shown in the graph, replace the cabin temperature sensor.

EVAPORATOR TEMPERATURE SENSOR INSPECTION

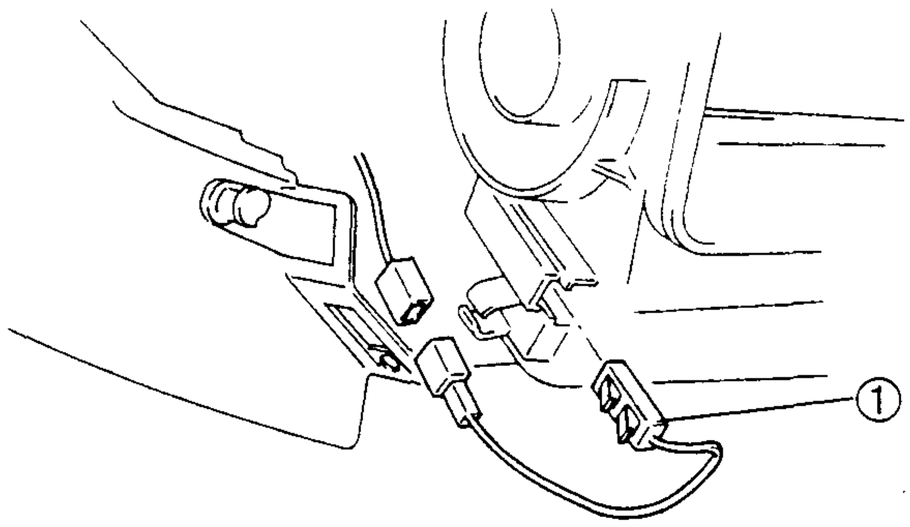
1. Turn the AUTO switch on.
2. Set the temperature at 15.0 by using the temperature setting switch.
3. Turn the A/C switch off.
4. Close all doors and windows.
5. Wait for **5 minutes**.
6. Remove the glove compartment.
7. Disconnect the evaporator temperature sensor connector.
8. Measure the temperature at the blower inlet.
9. Measure the resistance between the terminals of the evaporator temperature sensor.
10. Verify that the intersection of the temperature and resistance is in the shaded zone.



11. If not as specified, replace the evaporator temperature sensor.

WATER TEMPERATURE SENSOR REMOVAL/ INSTALLATION

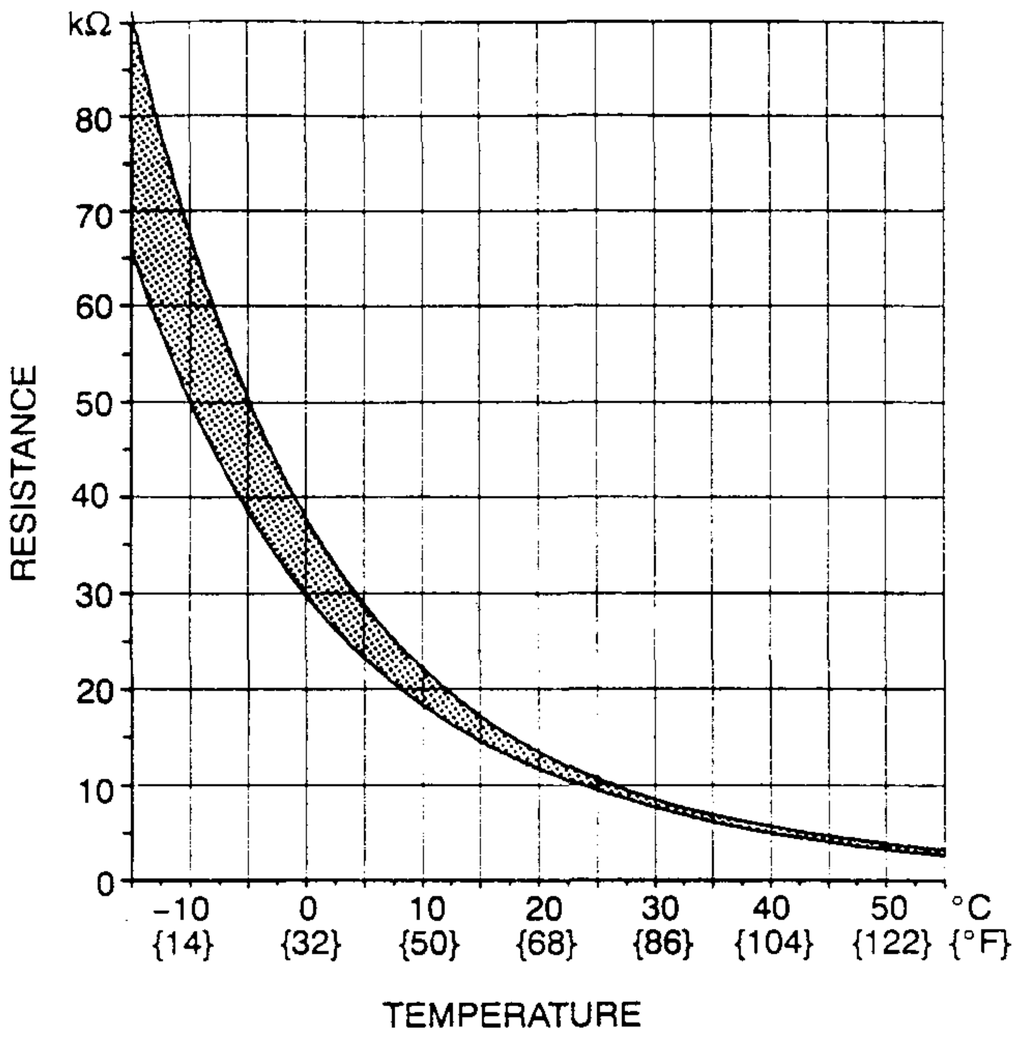
1. Disconnect the negative battery cable.
2. Remove the glove compartment and under cover.
3. Remove as indicated in the table.
4. Install in the reverse order of removal.



1	Water temperature sensor

WATER TEMPERATURE SENSOR INSPECTION

1. Remove the water temperature sensor.
2. Measure the temperature around the water temperature sensor.
3. Measure the resistance between the terminals of the water temperature sensor.



4. If the resistance is not as shown in the graph, replace the water temperature sensor.

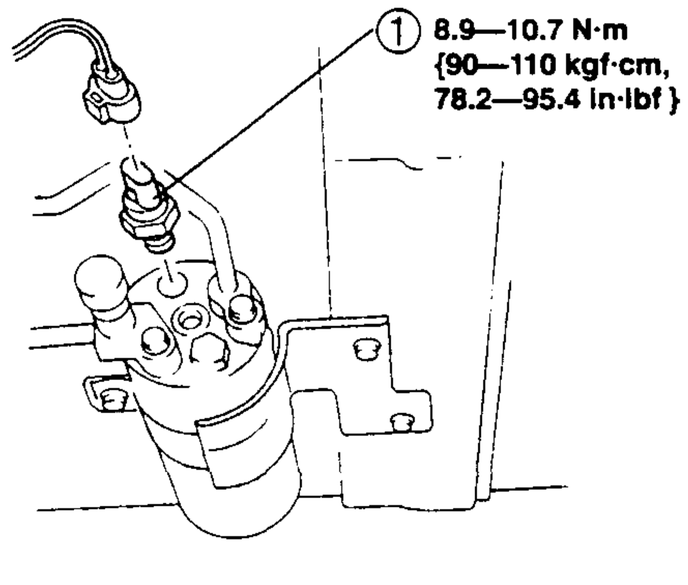
REFRIGERANT PRESSURE SWITCH REMOVAL/INSTALLATION

1. Disconnect the negative battery cable.
2. Discharge the refrigerant from the system. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, CHARGING.)
3. Remove the upper seal board and radiator grille.

Caution

- **If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise will occur. Always immediately plug all open fittings after removing any refrigeration cycle parts to keep moisture or foreign material out of the cycle.**

4. Remove as indicated in the table.
5. Install in the reverse order of removal.
6. Carry out the refrigerant system performance test. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, PERFORMANCE TEST.)



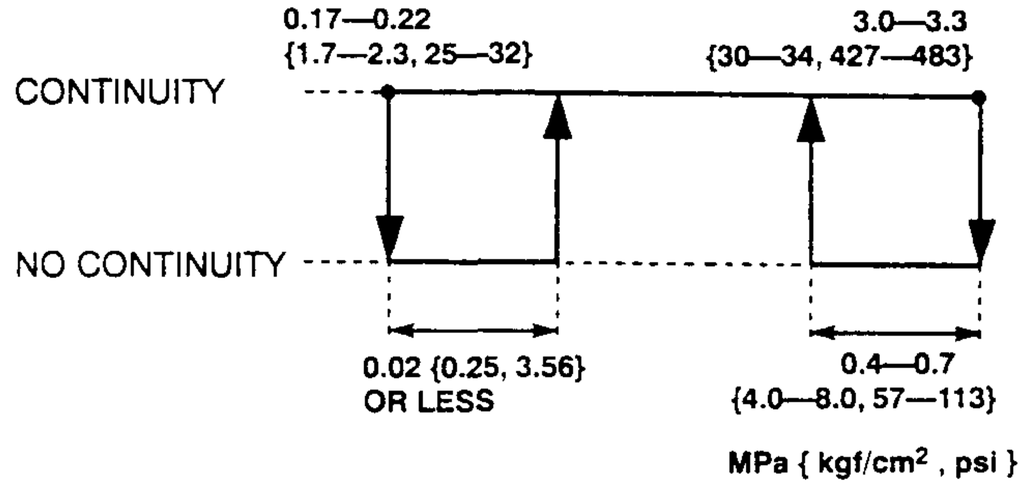
1	Refrigerant pressure switch ☞ Installation note

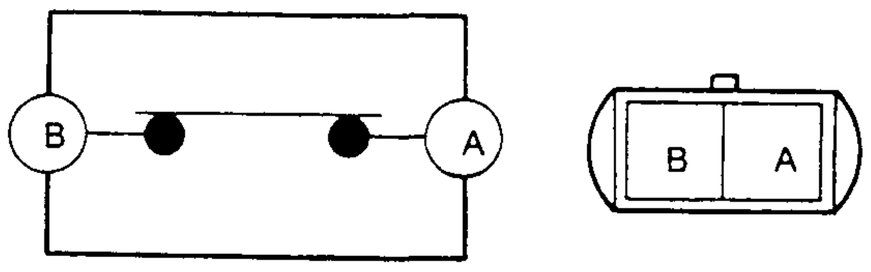
Refrigerant Pressure Switch Installation Note

- Apply compressor oil to the O-ring and connect the joint.

REFRIGERANT PRESSURE SWITCH INSPECTION

1. Install the **SSTs** (manifold gauge set). (Refer to MANIFOLD GAUGE SET INSTALLATION.)
2. Disconnect the refrigerant pressure switch connector.
3. Verify the high-pressure side reading of the **SST** (manifold gauge).
4. Check for continuity between the terminals of the refrigerant pressure switch.

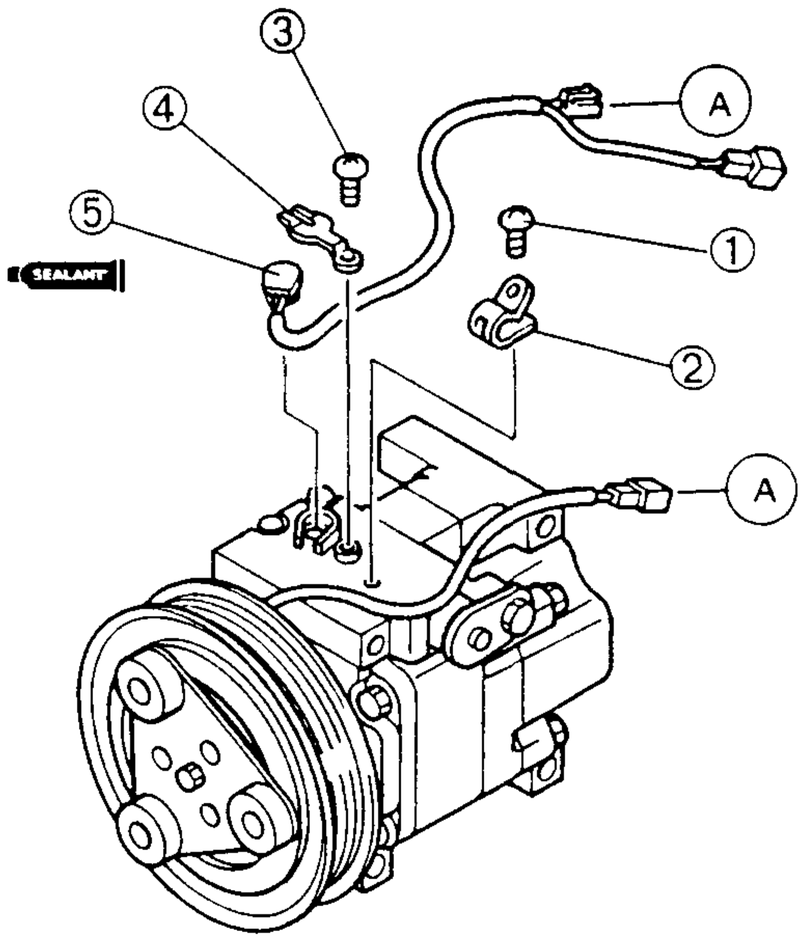




5. If not as specified, replace the refrigerant pressure switch.

THERMAL PROTECTOR REMOVAL/INSTALLATION

1. Remove the A/C compressor. (Refer to A/C COMPRESSOR REMOVAL/INSTALLATION.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.



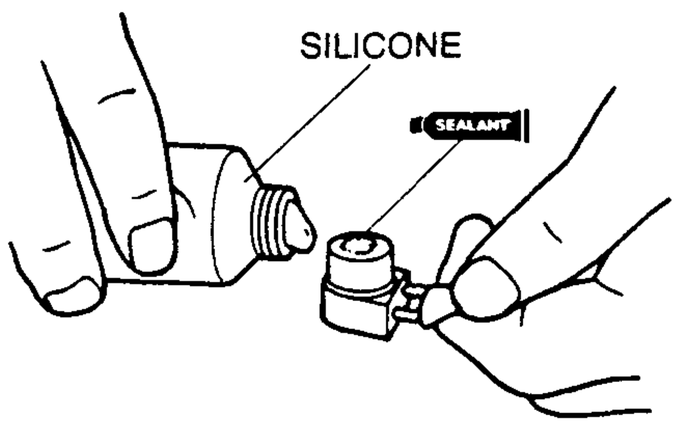
1	Screw
2	Clip
3	Screw
4	Clamp
5	Thermal protector ☞ Removal note ☞ Installation note

Thermal Protector Removal Note

- After removing the thermal protector, completely remove the silicone adhering to the A/C compressor side.

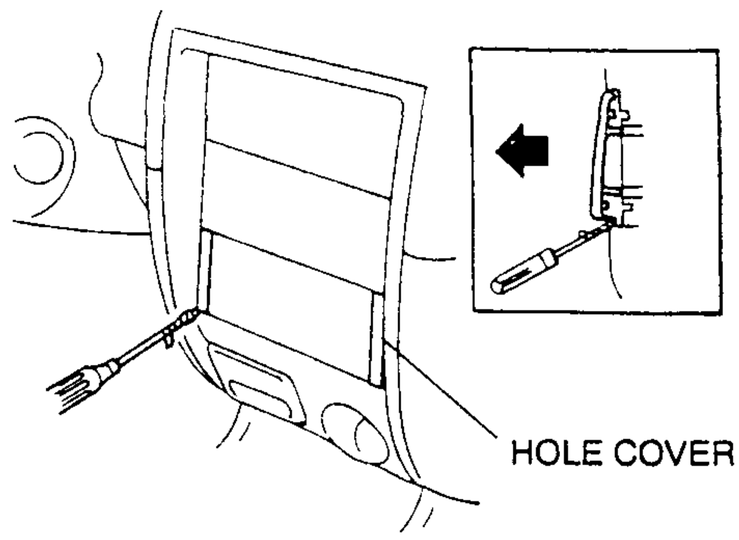
Thermal Protector Installation Note

- Apply **approximately 1 g {0.04 oz }** of silicone (Shin-Etsu Silicone KE-347W or similar) to the contact surface of the thermal protector, then thoroughly install in onto the A/C compressor, leaving no gaps.

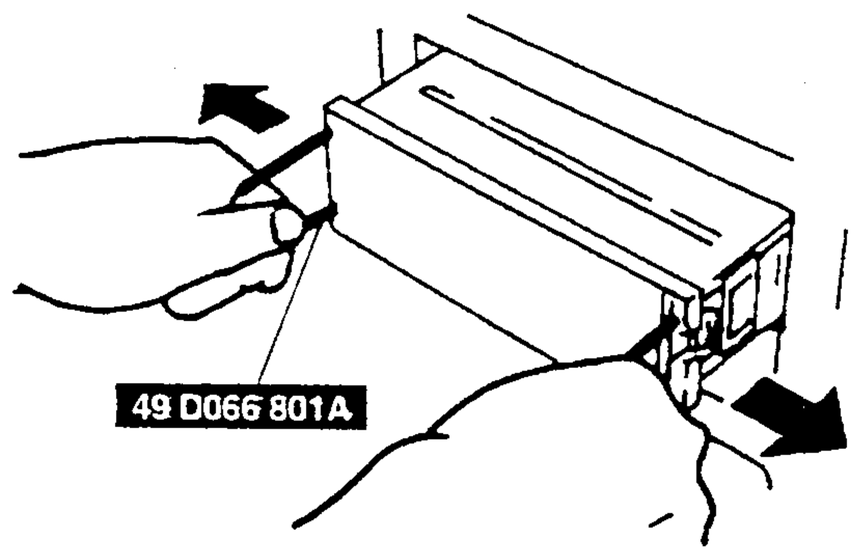


HEATER CONTROL UNIT REMOVAL

1. Disconnect the negative battery cable.
2. Remove the glove compartment. (manual air conditioner only.)
3. Disconnect the air intake, air mix, and airflow mode wires from each wire clamp and link. (manual air conditioner only.)
4. Remove the hole covers by inserting a small, tape-wrapped, flathead screwdriver into the slot, then carefully prying them off without scratching the center panel. Pry up and pull off the hole covers carefully to prevent the posts from breaking off.



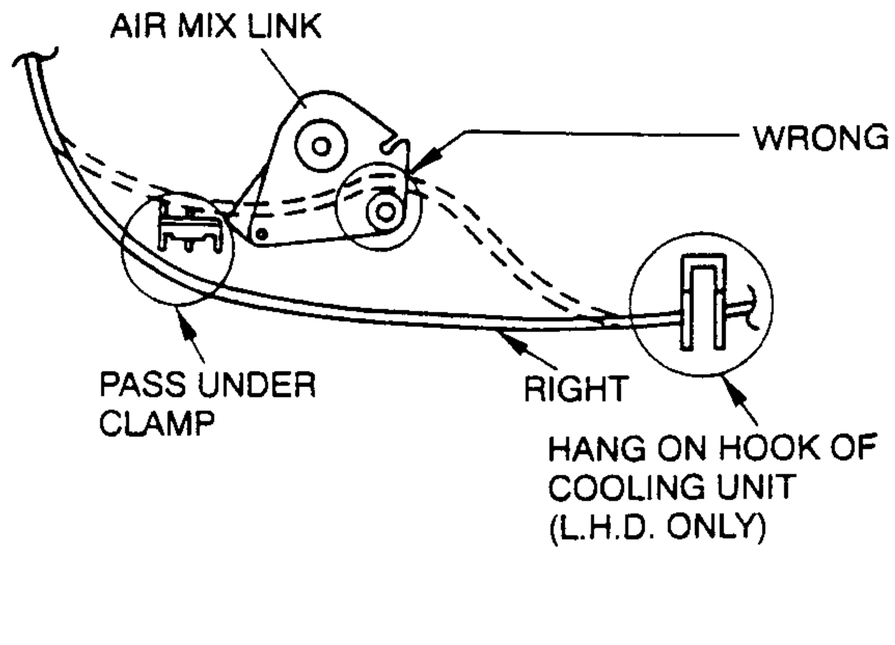
5. With the beveled parts of the **SST** facing inward, insert them into the heater control unit.
6. Pull the **SST** outward and rearward to slide out the heater control unit.

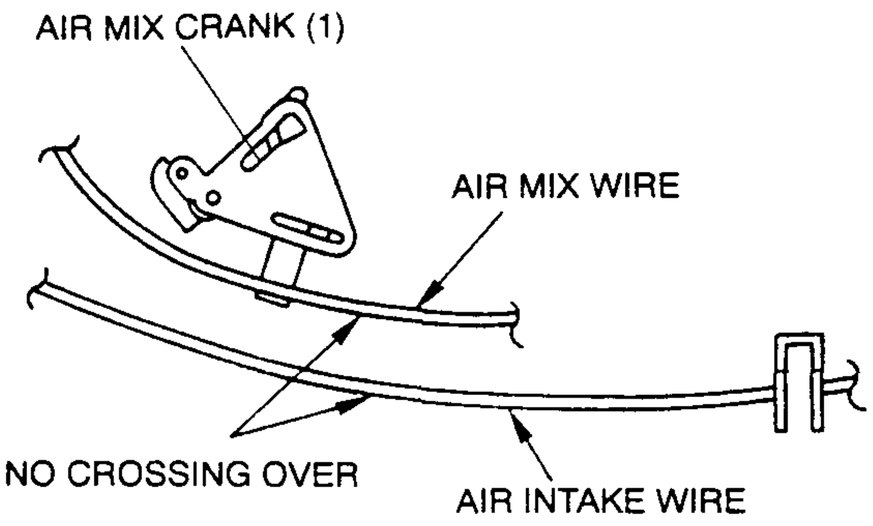


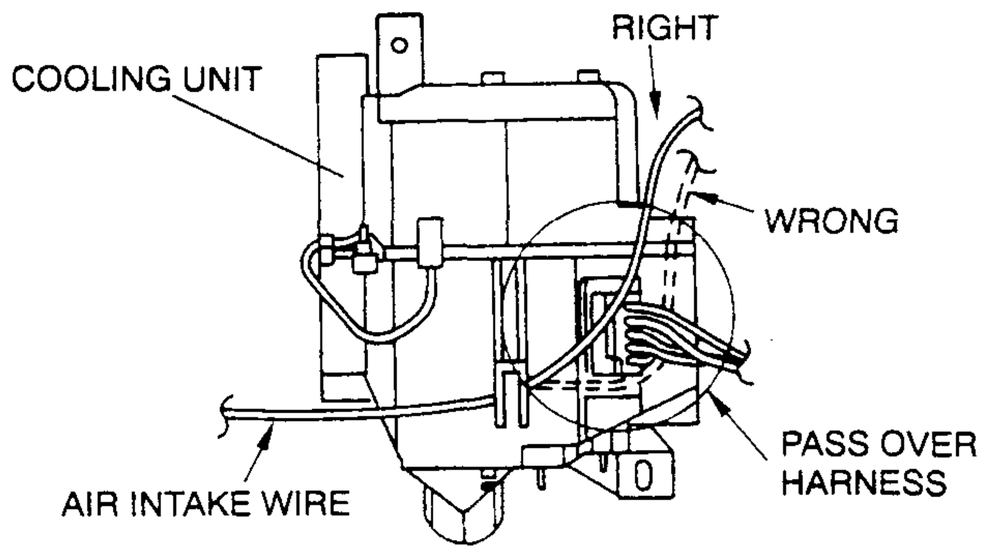
7. Disconnect the heater control unit connectors.

HEATER CONTROL UNIT INSTALLATION

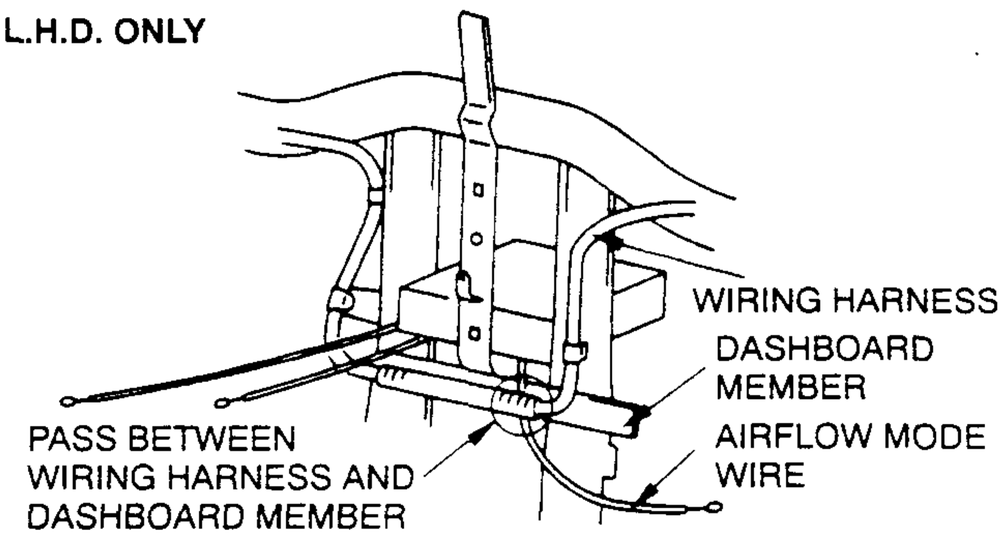
1. Pass the each wire through the following routes, then connect them to each unit. (manual air conditioner only.)



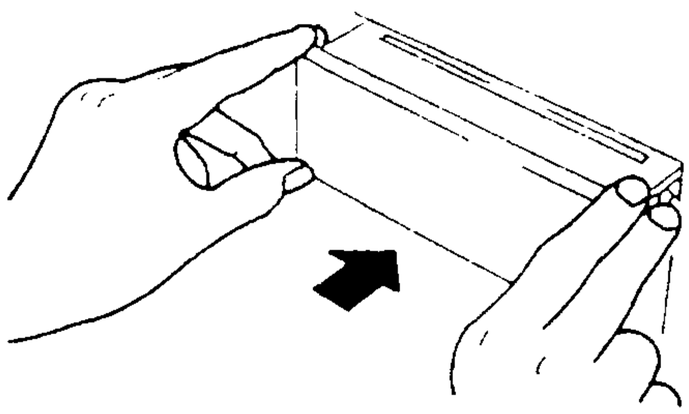




L.H.D. ONLY



2. Connect the heater control unit connectors.
3. Insert the heater control unit until each clip clicks.

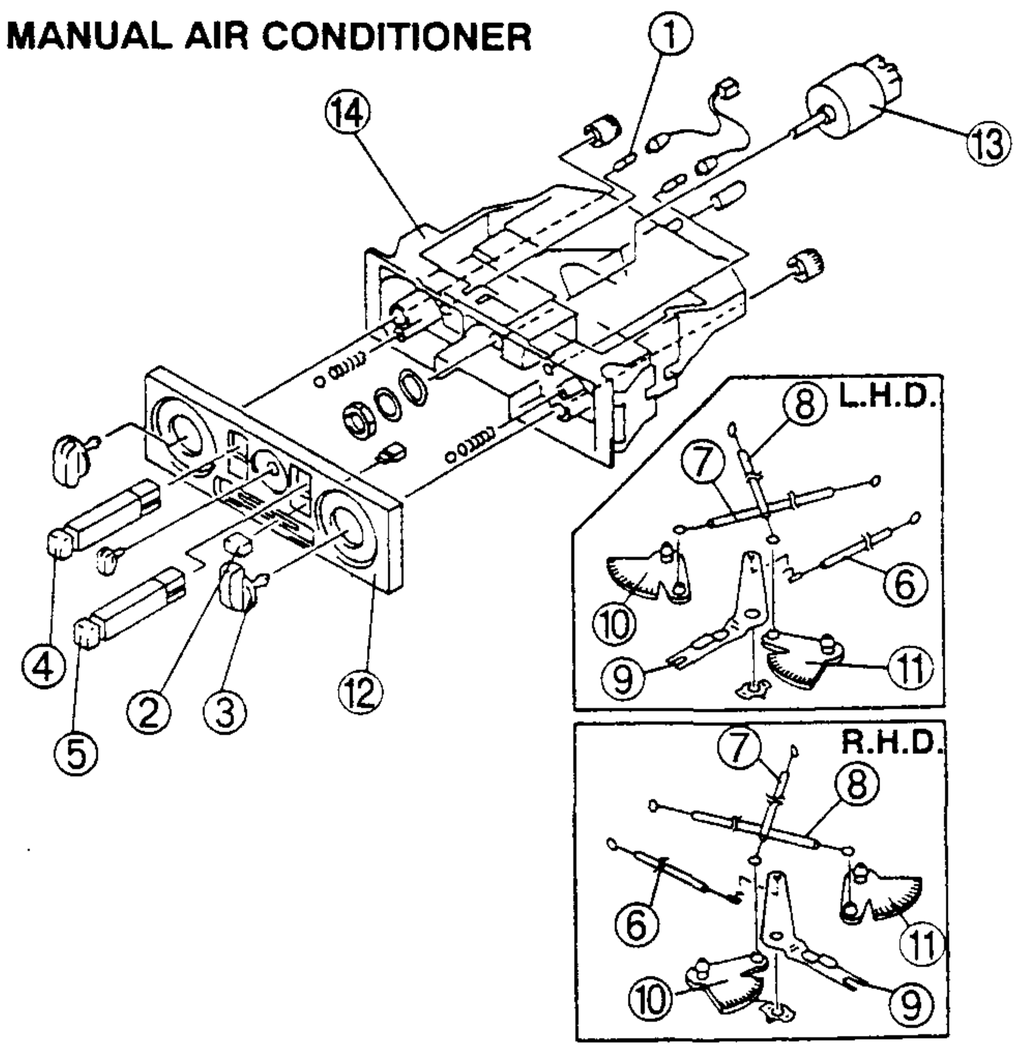


4. Install the hole covers carefully to prevent the posts from breaking off.
5. Adjust the heater control unit. (manual air conditioner only.) (Refer to HEATER CONTROL UNIT ADJUSTMENT.)
6. Install the glove compartment. (manual air conditioner only.)
7. Connect the negative battery cable.

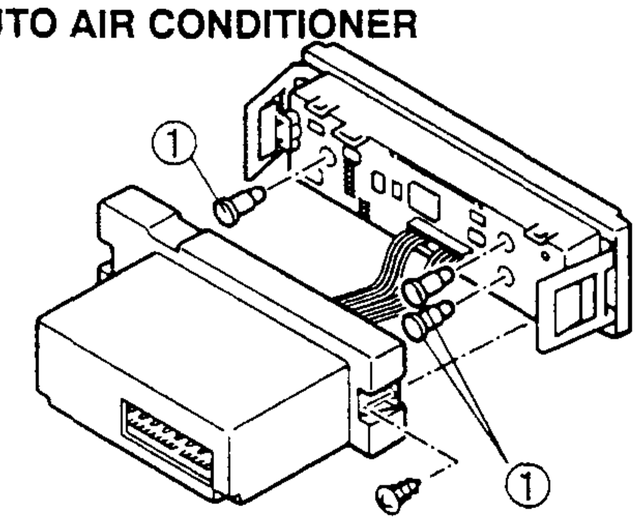
HEATER CONTROL UNIT DISASSEMBLY/ ASSEMBLY

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly.

MANUAL AIR CONDITIONER



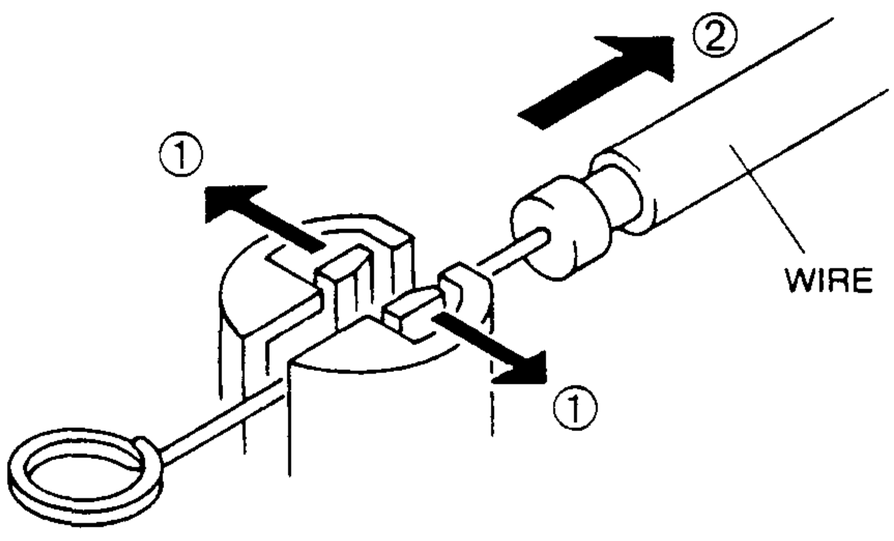
FULL-AUTO AIR CONDITIONER



1	Illumination bulb
2	Knob
3	Dial
4	A/C switch
5	Rear window defroster switch
6	Air intake wire ☞ Wire disassembly note ☞ Wire assembly note
7	Air mix wire ☞ Wire disassembly note ☞ Wire assembly note
8	Airflow mode wire ☞ Wire disassembly note ☞ Wire assembly note
9	REC/FRESH lever
10	Temperature control link
11	Airflow mode control link
12	Panel
13	Fan switch
14	Body

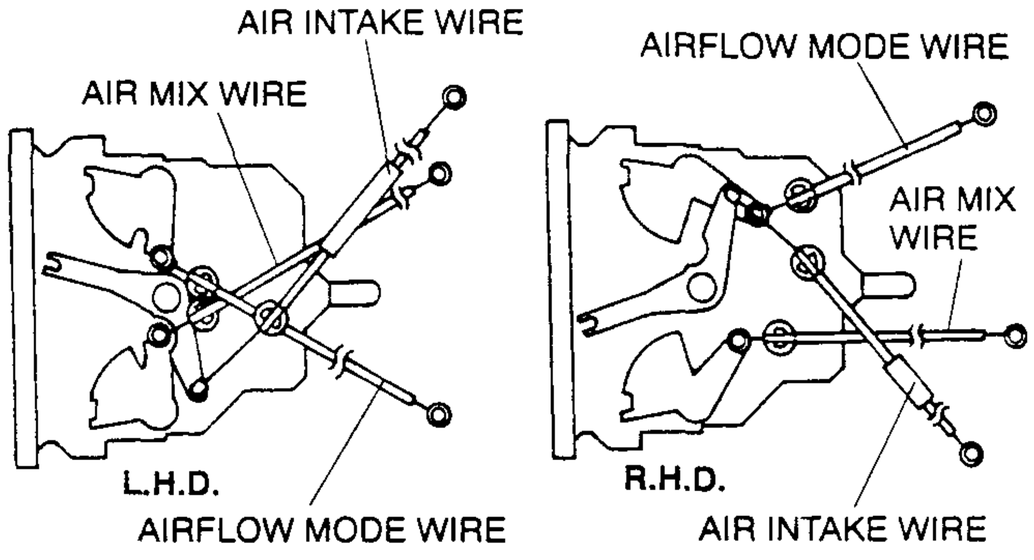
Wire Disassembly Note

- Disassemble the wires in the order shown in the figure.



Wire Assembly Note

- Assemble each wire to the position as shown in the figure.



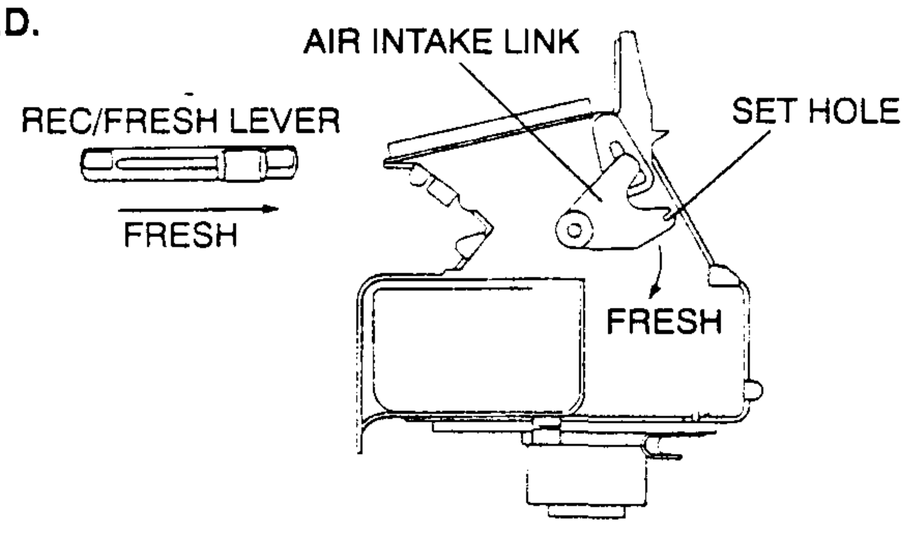
HEATER CONTROL UNIT WIRE ADJUSTMENT

Manual Air Conditioner

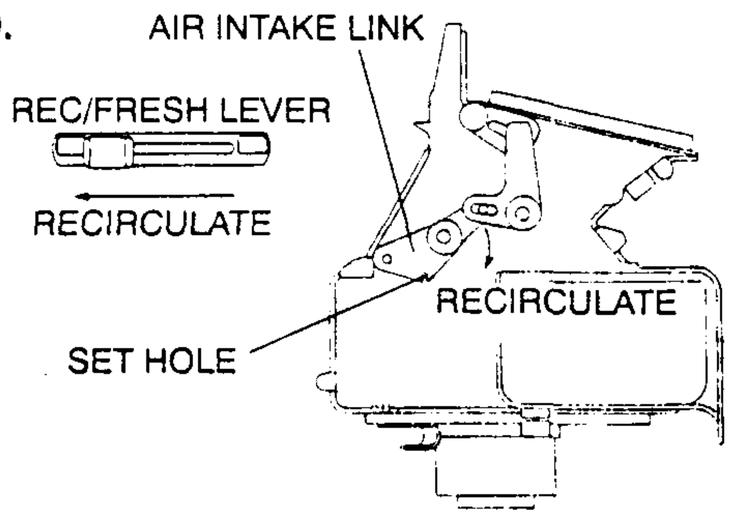
Air intake wire

1. Set the REC/FRESH lever at fresh (L.H.D.) or recirculate (R.H.D.).
2. Set the air intake link to fresh (L.H.D.) or recirculate (R.H.D.) in the direction of the arrow and insert a screwdriver at the set hole.

L.H.D.



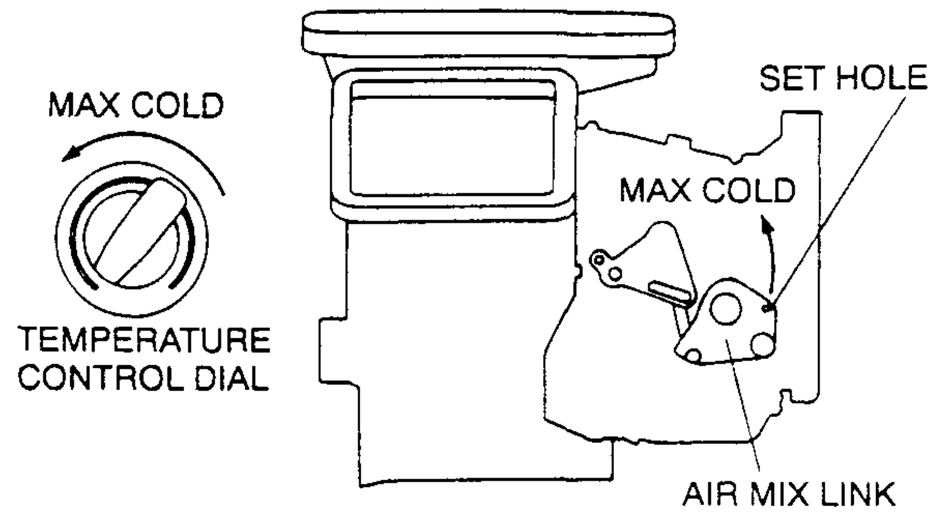
R.H.D.



3. Connect the air intake wire to air intake link.
4. Clamp the air intake wire to wire clamp.
5. Verify that the REC/FRESH lever moves its full stroke.

Air mix wire

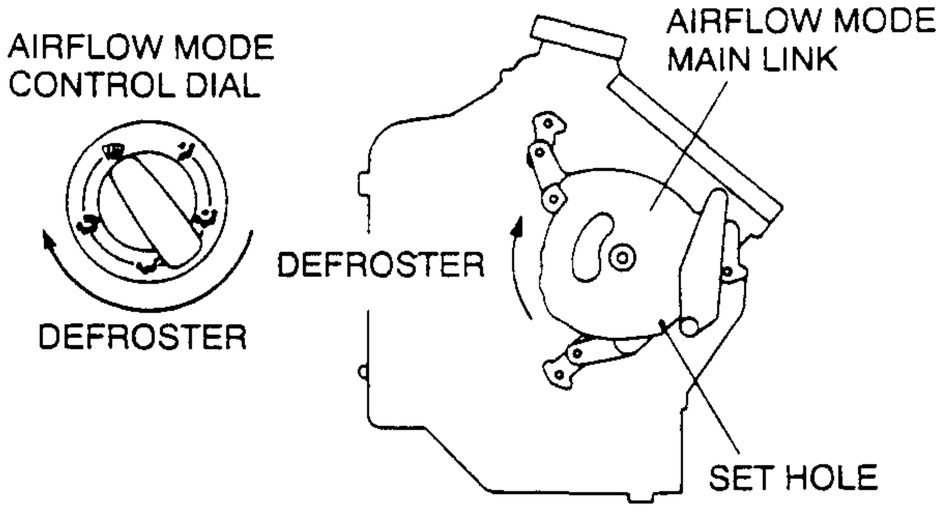
1. Set the temperature control dial at max cold.
2. Set the air mix link to max cold in the direction of the arrow and insert a screwdriver at the set hole.



3. Connect the air mix wire to air mix link.
4. Clamp the air mix wire to wire clamp.
5. Verify that the temperature control dial moves its full stroke.

Airflow mode wire

1. Set the airflow mode control dial at defroster.
2. Set the airflow mode main link to defroster in the direction of the arrow and insert a screwdriver at the set hole.



3. Connect the airflow mode wire to airflow mode main link.
4. Clamp the airflow mode wire to wire clamp.
5. Verify that the airflow mode control dial moves its full stroke.

HEATER CONTROL UNIT INSPECTION

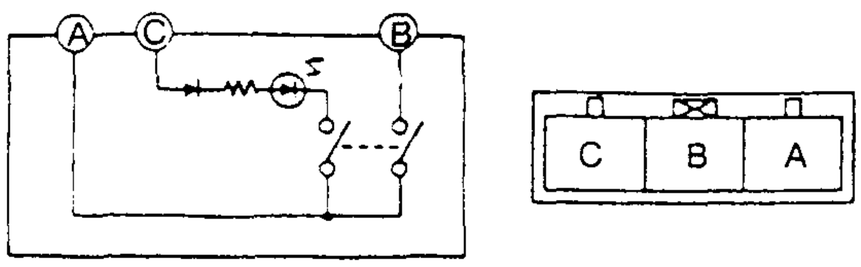
Manual Air Conditioner

A/C switch

1. Remove the heater control unit. (Refer to HEATER CONTROL UNIT REMOVAL.)
2. Check for continuity between the A/C switch terminals by using an ohmmeter.

○—○ : Continuity

Switch position	Terminal	
	A	B
OFF		
ON	○	○



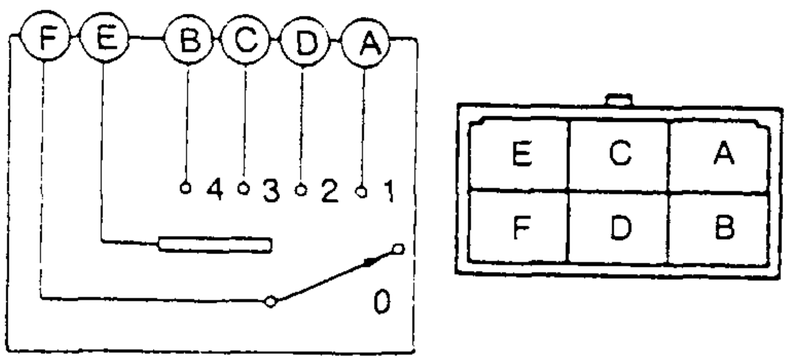
3. Connect battery positive voltage to terminal C and ground to the terminal A.
4. Turn the A/C switch on.
5. Verify that the LED illuminates.
6. If not as specified, replace the A/C switch.

Fan switch

1. Remove the heater control unit. (Refer to HEATER CONTROL UNIT REMOVAL.)
2. Check for continuity between the fan switch terminals by using an ohmmeter.

○—○ : Continuity

Switch position	Terminal					
	A	B	C	D	E	F
0						
1	○	—	—	—	—	○
2				○	—	○
3			○	—	○	○
4		○	—	—	○	○

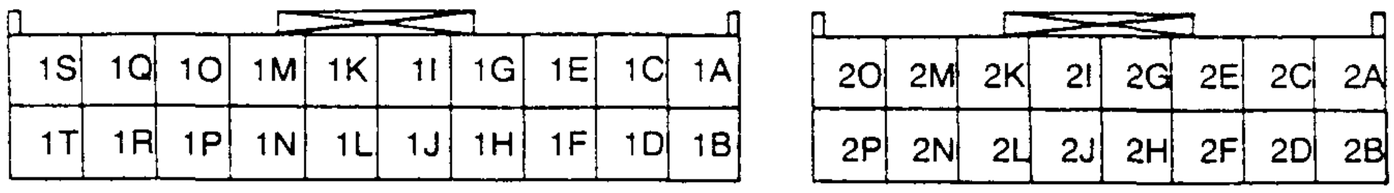


3. If not as specified, replace the fan switch.

Full-auto Air Conditioner

1. Slide out the heater control unit with the connectors still connected.
2. Turn the ignition switch to ON.
3. Measure the voltage at each heater control unit terminal and refer to the terminal voltage list.
4. If not as specified, inspect the appropriate area.
5. If the inspection area is OK, replace the heater control unit.

Terminal voltage list (reference)



Terminal	Signal	Connection	Test condition	Voltage (V)	Inspection area
1A (L.H.D.)	+5 V	• Air mix actuator • Airflow mode actuator • Solar radiation sensor	IG SW ON	5	• Short circuit (Heater control unit–Air mix actuator, Airflow mode actuator, Solar radiation sensor: 1A–E, E, A) • Air mix actuator • Airflow mode actuator • Terminal voltage of heater control unit (2A, 2O)
			IG SW LOCK	0	
1A (R.H.D.)	+5 V	• Air mix actuator • Airflow mode actuator • Solar radiation sensor	IG SW ON	5	• Short circuit (Heater control unit–Air mix actuator, Airflow mode actuator, Solar radiation sensor: 1A–C, C, A) • Air mix actuator • Airflow mode actuator • Terminal voltage of heater control unit (2A, 2O)
			IG SW LOCK	0	
1B	—	Not used	—	—	—
1C	A/C	Refrigerant pressure SW	Fan SW off	12	• Continuity or short circuit (Heater control unit–Refrigerant pressure switch: 1C–B) (Refrigerant pressure switch–ECM (PCM): A–41) • Refrigerant pressure switch • Terminal voltage of ECM (PCM) (41) (Refer to section F, CONTROL SYSTEM, ECM (PCM) INSPECTION)
			Fan SW and A/C SW on	0	Terminal voltage of heater control unit (2A, 2O)
1D	Rear window defroster indicator light	Instrument cluster	Rear window defroster off	5	• Short circuit (Heater control unit–Instrument cluster: 1D–1R) • Instrument cluster
			Rear window defroster on	0.3	• Continuity (Heater control unit–Instrument cluster: 1D–1R) • Instrument cluster
1E	—	Not used	—	—	—
1F	—	Not used	—	—	—
1G	—	Not used	—	—	—
1H	—	Not used	—	—	—

Terminal	Signal	Connection	Test condition	Voltage (V)	Inspection area
1I	On-board diagnosis	Data link connector (FAC terminal)	Not connected **SST** to data link connector	0	Short circuit (Heater control unit–Data link connector: 1I–FAC)
			• Turn the ignition switch to LOCK • Connect the **SSTs** (NGS set or self-diagnosis checker) to data link connector • Block the light to solar radiation sensor • Turn the ignition switch to ON	Refer to Figure 1	• Continuity or short circuit (Heater control unit–Data link connector: 1I–FAC) • Terminal voltage of heater control unit (1J)
1J	On-board diagnosis	Data link connector (TAC terminal)	Not connected **SST** to data link connector	5	• Short circuit (Heater control unit–Data link connector: 1J–TAC) • Terminal voltage of heater control unit (2A, 2O)
			Connect the **SSTs** (NGS set or self-diagnosis checker) to data link connector	0	Continuity (Heater control unit–Data link connector: 1J–TAC)
1K	—	Not used	—	—	—
1L	—	Not used	—	—	—
1M	Ambient temperature sensor input	Ambient temperature sensor	Depends on temperature surrounding sensor	Refer to Figure 3	• Continuity (Heater control unit–Ambient temperature sensor: 1M–B, 1N–A) • Short circuit (Heater control unit–Ambient temperature sensor: 1M–B) • Ambient temperature sensor • Terminal voltage of heater control unit (2A, 2O)
1N	GND	• Cabin temperature sensor • Water temperature sensor • Evaporator temperature sensor • Ambient temperature sensor • Air mix actuator • Airflow mode actuator	Constant	0	Terminal voltage of heater control unit (2O)
1O	Solar radiation sensor input	Solar radiation sensor	Incandescent-lamp **(60 W)** shining on solar radiation sensor from distance of **approx. 100 mm {3.9 in}**	4	• Continuity or short circuit (Heater control unit–Solar radiation sensor: 1O–B, 1A–A) • Terminal voltage of heater control unit (1A) • Solar radiation sensor
			Light to solar radiation sensor block	0	

B+: Battery positive voltage

Terminal	Signal	Connection	Test condition	Voltage (V)	Inspection area
1P	Cabin temperature sensor input	Cabin temperature sensor	Depends on temperature surrounding sensor	Refer to Figure 4	• Continuity (Heater control unit–Cabin temperature sensor: 1P–B, 1N–A) • Short circuit (Heater control unit–Cabin temperature sensor: 1P–B) • Cabin temperature sensor • Terminal voltage of heater control unit (2A, 2O)
1Q	Potentiometer input	Airflow mode actuator	VENT mode	4.3	• Continuity or short circuit (Heater control unit–Airflow mode actuator: 1Q–B) • Airflow mode actuator • Terminal voltage or heater control unit (1A)
			BI-LEVEL mode	3.4	
			HEAT mode	2.5	
			HEAT/DEF mode	1.6	
			DEFROSTER mode	0.7	
1R	Potentiometer input	Air mix actuator	Set temperature at 15.0	0.7	• Continuity or short circuit (Heater control unit–Air mix actuator: 1R–B) • Air mix actuator • Terminal voltage or heater control unit (1A)
			Set temperature at 29.0	4.3	
1S	Water temperature sensor input	Water temperature sensor	Depends on temperature surrounding sensor	Refer to Figure 5	• Continuity (Heater control unit–Water temperature sensor: 1S–B, 1N–A) • Short circuit (Heater control unit–Water temperature sensor: 1S–B) • Water temperature sensor • Terminal voltage of heater control unit (2A, 2O)
1T	Evaporator temperature sensor input	Evaporator temperature sensor	Depends on temperature surrounding sensor	Refer to Figure 2	• Continuity (Heater control unit–Evaporator temperature sensor: 1T–C, 1N–A) • Short circuit (Heater control unit–Evaporator temperature sensor: 1T–C) • Evaporator temperature sensor • Terminal voltage of heater control unit (2A, 2O)
2A	IG2	A/C 15 A fuse	IG SW ON	B+	• Continuity or short circuit (Heater control unit–Fuse: 2A–A/C 15 A fuse) • A/C 15 A fuse
			IG SW LOCK	0	Short circuit (Heater control unit–Fuse: 2A–A/C 15 A fuse)
2B (L.H.D.)	Motor drive	Air mix actuator	Moving to COLD	12	• Continuity or short circuit (Heater control unit–Air mix actuator: 2B–A) • Continuity (Heater control unit–Air mix actuator: 2D–F) • Air mix actuator
			Moving to HOT	0.5	
2B (R.H.D.)	Motor drive	Air mix actuator	Moving to COLD	12	• Continuity or short circuit (Heater control unit–Air mix actuator: 2B–F) • Continuity (Heater control unit–Air mix actuator: 2D–A) • Air mix actuator
			Moving to HOT	0.5	

B+: Battery positive voltage

Terminal	Signal	Connection	Test condition	Voltage (V)	Inspection area
2C	+B	ROOM 10 A fuse	Constant	B+	• Continuity or short circuit (Heater control unit–Fuse: 2C–ROOM 10 A fuse) • ROOM 10 A fuse
2D (L.H.D.)	Motor drive	Air mix actuator	Moving to HOT	12	• Continuity or short circuit (Heater control unit–Air mix actuator: 2D–F) • Continuity (Heater control unit–Air mix actuator: 2B–A) • Air mix actuator
			Moving to COLD	0.5	
2D (R.H.D.)	Motor drive	Air mix actuator	Moving to HOT	12	• Continuity or short circuit (Heater control unit–Air mix actuator: 2D–A) • Continuity (Heater control unit–Air mix actuator: 2B–F) • Air mix actuator
			Moving to COLD	0.5	
2E	Panel light control	Panel light control SW	Headlight SW on and panel light control SW at max. illumination	0.5	• Continuity (Heater control unit–Panel light control switch: 2E–C) (Panel light control switch–Ground: A–GND) • Panel light control switch
			Headlight SW on and panel light control SW at min. illumination	About 5	• Short circuit (Heater control unit–Panel light control switch: 2E–C) • Terminal voltage of heater control unit (2A, 2O)
2F (L.H.D.)	Motor drive	Airflow mode actuator	Moving to DEFROSTER	12	• Continuity or short circuit (Heater control unit–Airflow mode actuator: 2F–F) • Continuity (Heater control unit–Airflow mode actuator: 2H–A) • Airflow mode actuator
			Moving to VENT	0.5	
2F (R.H.D.)	Motor drive	Airflow mode actuator	Moving to DEFROSTER	12	• Continuity or short circuit (Heater control unit–Airflow mode actuator: 2F–A) • Continuity (Heater control unit–Airflow mode actuator: 2H–F) • Airflow mode actuator
			Moving to VENT	0.5	
2G	TNS	TNS relay	Headlight SW off	0	• Short circuit (Heater control unit–TNS relay: 2G–D) • TNS relay • Head light switch
			Headlight SW on	12	• Continuity or short circuit (Heater control unit–TNS relay: 2G–D) • TNS relay • Head light switch
2H (L.H.D.)	Motor drive	Airflow mode actuator	Moving to VENT	12	• Continuity or short circuit (Heater control unit–Airflow mode actuator: 2H–A) • Continuity (Heater control unit–Airflow mode actuator: 2F–F) • Airflow mode actuator
			Moving to DEFROSTER	0.5	

B+: Battery positive voltage

Terminal	Signal	Connection	Test condition	Voltage (V)	Inspection area
2H (R.H.D.)	Motor drive	Airflow mode actuator	Moving to VENT	12	• Continuity or short circuit (Heater control unit–Airflow mode actuator: 2H–F) • Continuity (Heater control unit–Airflow mode actuator: 2F–A) • Airflow mode actuator
			Moving to DEFROSTER	0.5	
2I (L.H.D.)	Blower motor feedback	• Blower motor • Power MOS FET	Fan SW off	B+	1. Continuity or short circuit (Heater control unit–Blower motor: 2I–B) (Heater control unit–Power MOS FET: 2I–A, 2K–C) (Blower motor–Blower relay: A–D) (Blower relay–Fuse: C–HEATER 40 A fuse) 2. Continuity (Power MOS FET–Ground: B–GND) 3. Power MOS FET 4. Blower motor 5. Blower relay 6. HEATER 40 A fuse 7. Replace the power MOS FET.
			Fan SW at 1st position	8.3	
			Fan SW at 2nd position	5.3	
			Fan SW at 3rd position	2.7	
			Fan SW at 4th position	0.5	
2I (R.H.D.)	Blower motor feedback	• Blower motor • Power MOS FET	Fan SW off	B+	1. Continuity or short circuit (Heater control unit–Blower motor: 2I–A) (Heater control unit–Power MOS FET: 2I–A, 2K–C) (Blower motor–Blower relay: B–D) (Blower relay–Fuse: C–HEATER 40 A fuse) 2. Continuity (Power MOS FET–Ground: B–GND) 3. Power MOS FET 4. Blower motor 5. Blower relay 6. HEATER 40 A fuse 7. Replace the power MOS FET.
			Fan SW at 1st position	8.3	
			Fan SW at 2nd position	5.3	
			Fan SW at 3rd position	2.7	
			Fan SW at 4th position	0.5	
2J (L.H.D.)	Motor drive	Air intake actuator	Moving to FRESH	12	• Continuity or short circuit (Heater control unit–Air intake actuator: 2J–F) • Continuity (Heater control unit–Air intake actuator: 2L–A) • Air intake actuator
			Moving to RECIRCULATE	0.5	
2J (R.H.D.)	Motor drive	Air intake actuator	Moving to FRESH	12	• Continuity or short circuit (Heater control unit–Air intake actuator: 2J–A) • Continuity (Heater control unit–Air intake actuator: 2L–F) • Air intake actuator
			Moving to RECIRCULATE	0.5	

B+: Battery positive voltage

Terminal	Signal	Connection	Test condition	Voltage (V) /Continuity	Inspection area
2K	Blower motor control	Power MOS FET	Fan SW off	0	Terminal voltage of heater control unit (2I)
			Fan SW at 1st position	4.9	
			Fan SW at 2nd position	5.3	
			Fan SW at 3rd position	5.6	
			Fan SW at 4th position	8.1	
2L (L.H.D.)	Motor drive	Air intake actuator	Moving to RECIRCULATE	12	• Continuity or short circuit (Heater control unit–Air intake actuator: 2L–A) • Continuity (Heater control unit–Air intake actuator: 2J–F) • Air intake actuator
			Moving to FRESH	0.5	
2L (R.H.D.)	Motor drive	Air intake actuator	Moving to RECIRCULATE	12	• Continuity or short circuit (Heater control unit–Air intake actuator: 2L–F) • Continuity (Heater control unit–Air intake actuator: 2J–A) • Air intake actuator
			Moving to FRESH	0.5	
2M	—	Not used	—	—	—
2N	—	Not used	—	—	—
2O	GND	Ground	• IG SW LOCK • Disconnect heater control unit connector • Constant: check for continuity to ground	Yes	Continuity (Heater control unit–Ground: 2O–GND)
2P	Rear window defroster SW	Instrument cluster	Rear window defroster SW on	0.5→5	• Continuity or short circuit (Heater control unit–Instrument cluster: 2P–2T) • Instrument cluster
			Rear window defroster SW off	5	

Figure 1 (On-board diagnosis)

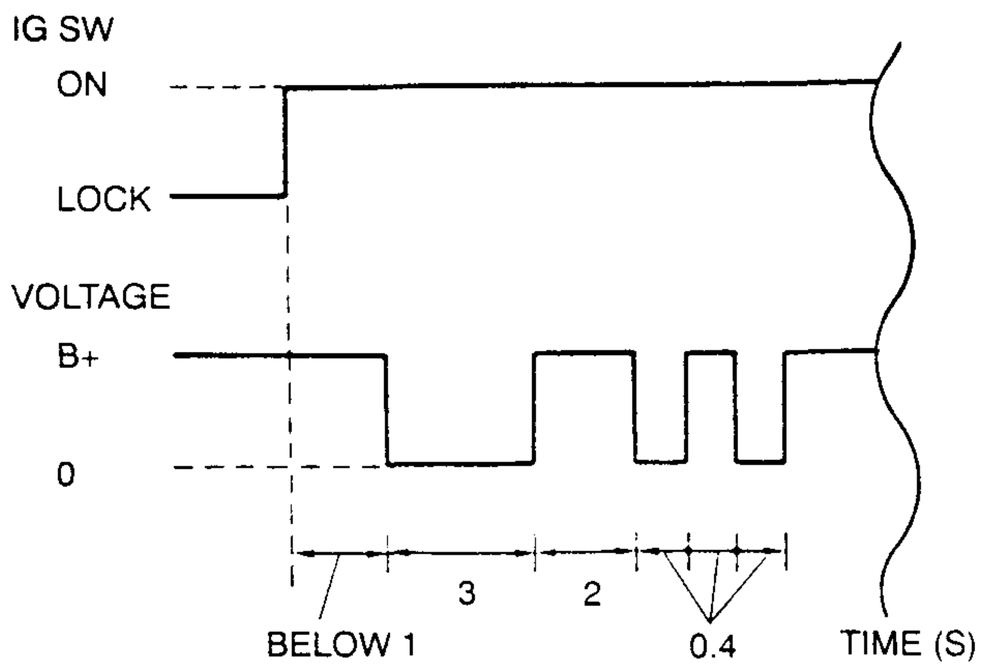


Figure 2 (Evaporator temperature sensor)

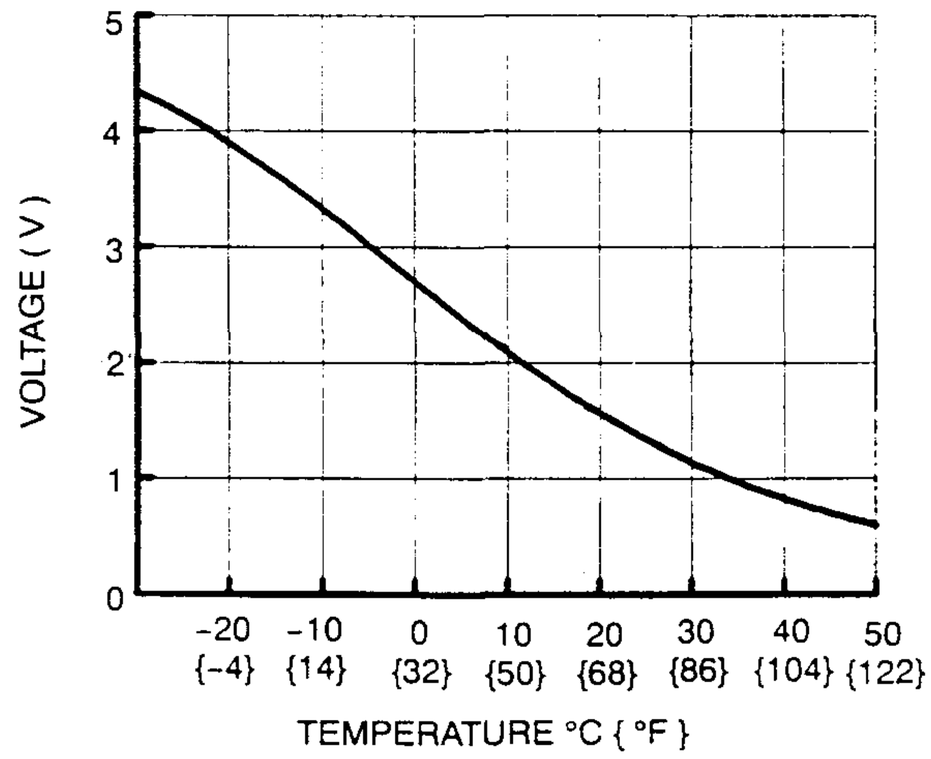


Figure 3 (Ambient temperature sensor)

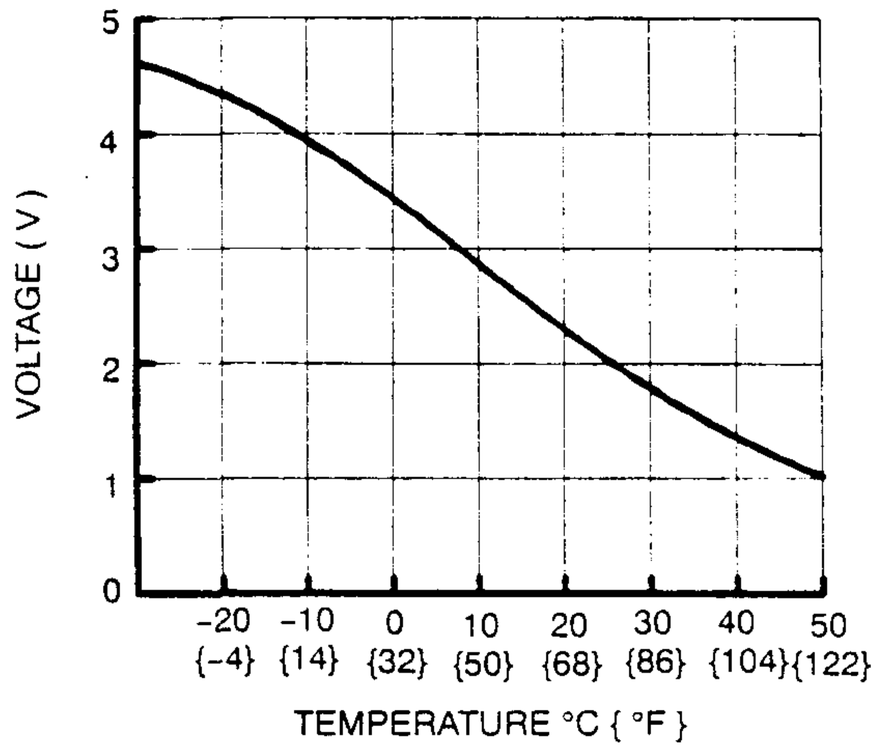


Figure 4 (Cabin temperature sensor)

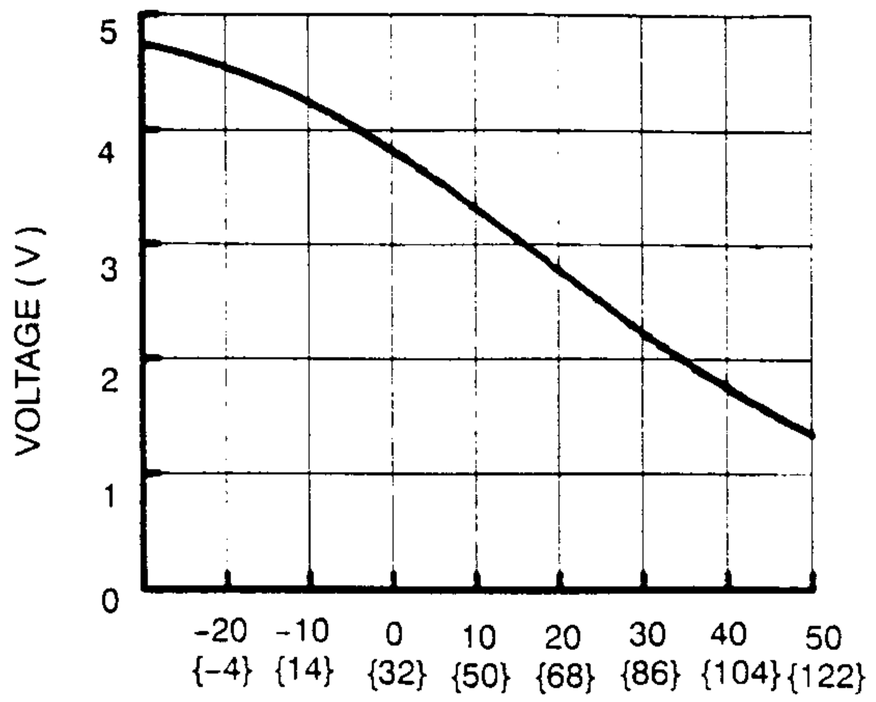
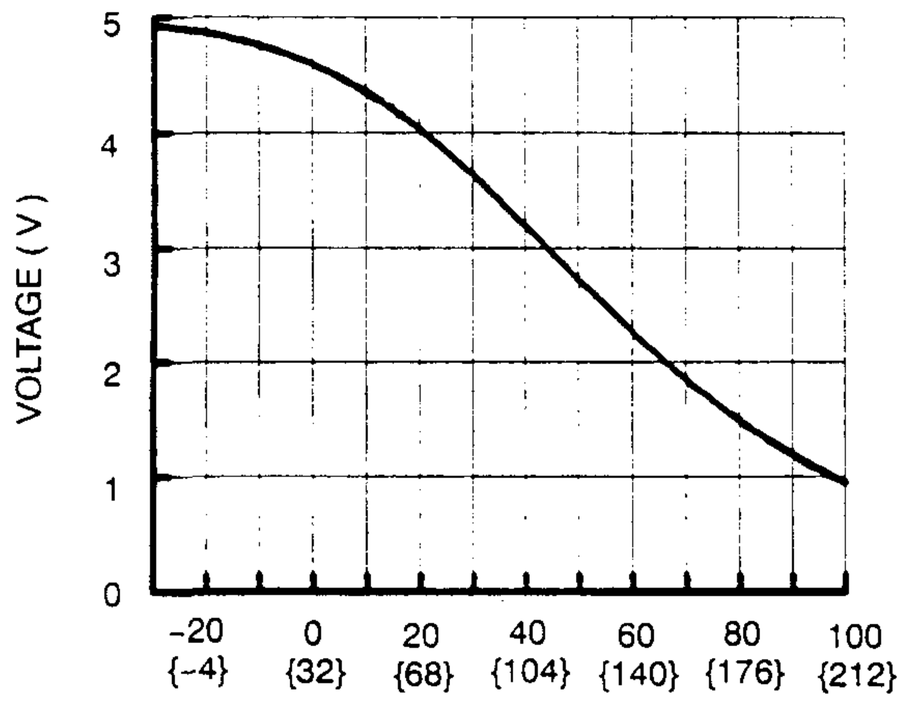


Figure 5 (Water temperature sensor)

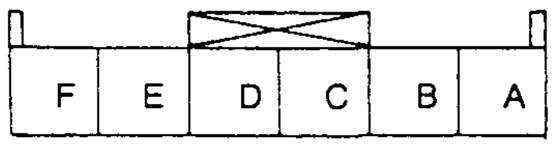


A/C AMPLIFIER INSPECTION

1. Remove the glove compartment.
2. Turn the ignition switch to ON.
3. Measure the voltage at each A/C amplifier terminal and refer to the termianl voltage list.
4. If not as specified, inspect the appropriate area.
5. If the inspection area is OK, replace the A/C amplifier.

Terminal Voltage List (Reference)

B+: Battery Positive voltage



Terminal	Signal	Connection	Test condition	Voltage (V)	Inspection area
A	IG2	A/C 15 A fuse	IG SW ON	B+	• Continuity (Fuse–A/C amplifier: A/C 15 A fuse–A) • A/C 15 A fuse
			IG SW LOCK	0	
B	A/C	Refrigerant pressure SW	• A/C SW on • Fan SW at 1st position	0.6	• Continuity (ECM (PCM) –Refrigerant pressure switch: 41–B) (Refrigerant pressure switch–A/C amplifier: A–B) • Terminal voltage of A/C amplifier (C) • Refrigerant pressure switch • Terminal voltage of ECM (PCM) (41) (Refer to Section F, CONTROL SYSTEM, ECM (PCM) INSPECTION.)
			Fan SW at 0	12	
C	A/C SW	A/C SW	Fan SW at 0	12	Terminal voltage of A/C amplifier (A)
			• A/C SW on • Fan SW at 1st position	0.6	• Continuity (A/C amplifier–A/C switch: C–B) (A/C switch–fan switch: A–A) • A/C switch • Fan switch
D	—	Not used	—	—	—
E	—	Not used	—	—	—
F	—	Not used	—	—	—

ON-BOARD DIAGNOSTIC FUNCTION

DIAGNOSTIC TROUBLE CODE NUMBER INSPECTION

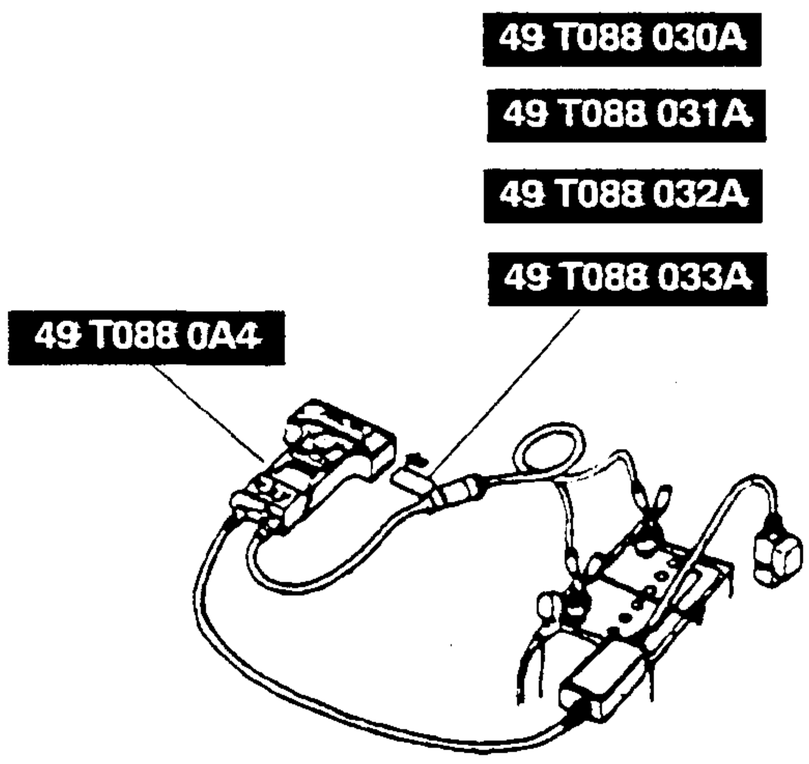
Using the SSTs (NGS set)

1. Shine a **60 W** incandescent light from a height of **approximately 100 mm {3.9 in }** onto the solar radiation sensor.

Note

- When incandescent light is not shining on the solar radiation sensor, the heater control unit determines a malfunction and indicates a diagnostic trouble code "02".

2. Connect the **SSTs** (NGS set and program card) to the data link connector and battery.



3. Refer to the manufacturer-provided instruction manual for the **SSTs** (NGS set) operation.
4. Select "DIAGNOSTIC TEST MODES" function and press TRIGGER.
5. Carry out the present diagnostic test mode and past diagnostic test mode.
6. When "NO CODES RECEIVED/SYSTEM PASSED" is displayed, all systems monitored are judged OK.
7. If any of the diagnostic trouble codes are displayed, carry out troubleshooting according to the code.
8. When "LINK MONITOR ERROR" is displayed, check the connection of the **SSTs** (NGS set).
9. After completion of repairs, erase all diagnostic trouble code(s) from memory.
   (Refer to ON-BOARD DIAGNOSTIC FUNCTION, DIAGNOSTIC TROUBLE CODE, Erasing Past Failure Memory.)
10. Remove the **SSTs** (NGS set and program card).

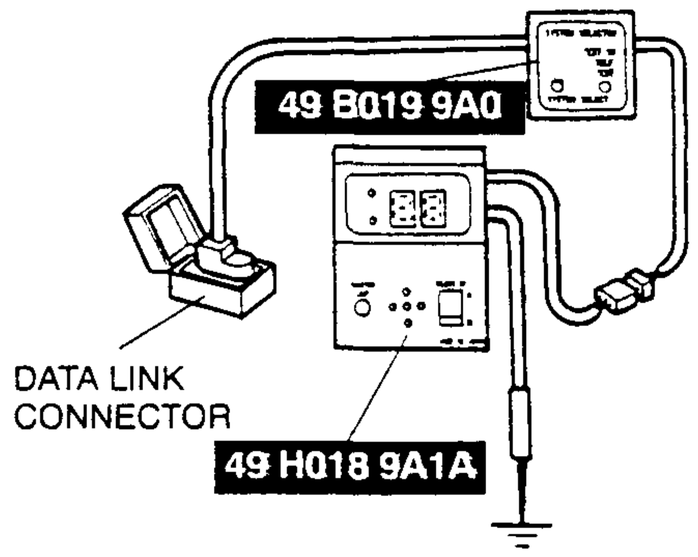
Using SSTs (self-diagnosis checker)

1. Shine a **60W** incandescent light from a height of **approximately 100 mm {3.9 in }** onto solar radiation sensor.

Note

- When incandescent light is not shining on solar radiation sensor, determines a malfunction and indicates a diagnostic trouble code "02".

2. Connect the **SSTs** to the data link connector and ground the black (negative) lead to the body.



3. Set the select switch on the **SST** (self-diagnosis checker).
4. Turn the dial switch on the **SST** (system selector) to 4, and the test switch to SELF-TEST.
5. Turn the ignition swicth to ON.
6. Verify that the buzzer sounds for approximately 3 seconds and code "88" flashes for 5 seconds after the engine started.

Note

- If "88" does not flash, inspect +B terminal of the data link connector, and the related wiring harness and connectors.
- If "88" flashes and the buzzer sounds more than 20 seconds, inspect the harness between the heater control unit 11 terminal and the data link connector. If the wiring harness is normal, replace the heater control unit and reinspect.

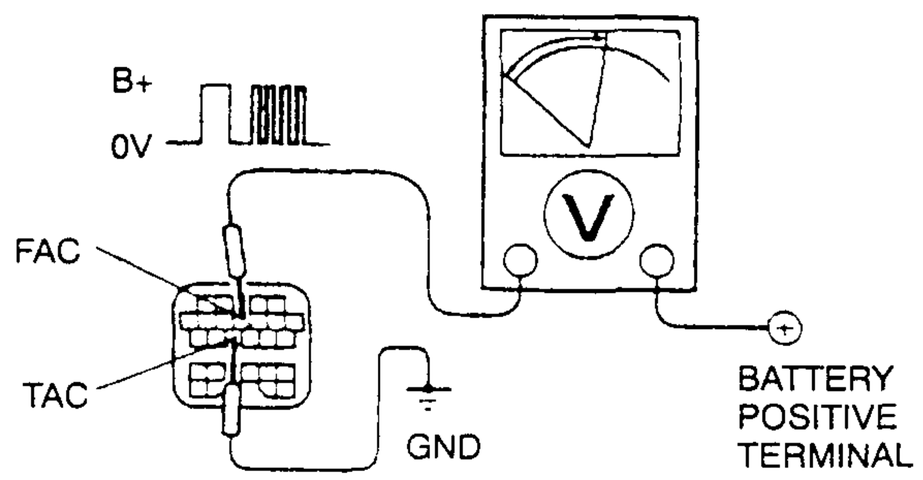
7. Carry out the present failure indication mode and the past failure indication mode.
8. When "00" is indicated, all systems monitored are judged OK.
9. When any of the diagnostic trouble code(s) is indicated, carry out troubleshooting according to the code.
10. After completion of repairers, erase all diagnostic trouble code(s) from memory.
    (Refer to DIAGNOSTIC TROUBLE CODE, Erasing Past Failure Memory.)
11. Remove the **SSTs** (self-diagnosis checker).

Using Voltmeter

1. Shine a **60 W** incandescent light from a height of **approximately 100 mm {3.9 in }** onto the solar radiation sensor.

   Note
   - When incandescent light is not shining on the solar radiation sensor, the heater control unit determines a malfunction and indicates a diagnostic trouble code "02".

2. Short the data link connector TAC terminal to the GND terminal by using a jumper wire.
3. Connect the negative lead of the voltmeter (20 V range) to the data link connector FAC terminal, and the positive lead to the battery's positive terminal.



B+: BATTERY POSITIVE VOLTAGE

4. Turn the ignition switch to ON and verify that the voltmeter indicates the battery's voltage for **approximatery 3 seconds**, then indicates **0V**.
5. Carry out the present failure indication mode and the past failure indication mode.
6. Read the diagnostic trouble codes indicated by the movement of the voltmeter's needle. If normal, the needle indicates the battery positive voltage.
7. If any of the diagnostic trouble codes are indicated, carry out troubleshooting according to the code.
8. After completion of repairs, erase all diagnostic trouble code(s) from memory.
   (Refer to ON-BOARD DIAGNOSTIC FUNCTION, DIAGNOSTIC TROUBLE CODE, Erasing Past Failure Memory.)
9. Remove the voltmeter and jumper wire.

Present Failure Indication Mode

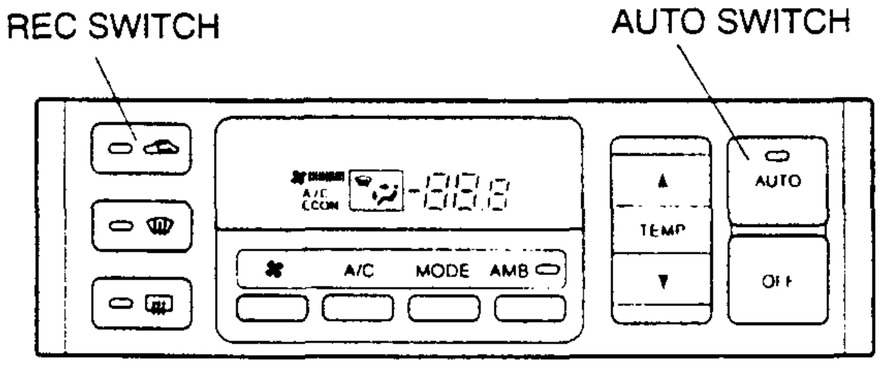
- Immediately after starting the on-board diagnostic function, present failures in the control circuit, such as disconnections or short circuits, are detected and indicated on the **SSTs** (NGS set or self-diagnosis checker) or voltmeter as diagnostic trouble codes.
  If a diagnostic trouble code is indicated, refer to the following diagnostic trouble code table and inspect the appropriate system.

Past Failure Indication Mode

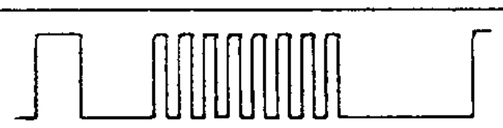
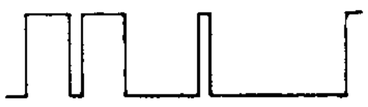
- When the A/C switch is pressed with the system in present failure indication mode, any past failures, such as disconnections or short circuits, detected and memorized by the heater control unit are indicated on the **SSTs** (NGS set or self-diagnosis checker) or voltmeter as diagnostic trouble codes.
  If a diagnostic trouble code is indicated, refer to the following diagnostic trouble code table and inspect the appropriate system.
  (Disconnections and short circuits are memorized in the same system even if either occurs only once.) If the A/C switch is pressed again while in past failure indication mode, the on-board diagnostic function will return to present failure indication mode.

Erasing Past Failure Memory

- Past failures are memorized and remain in the memory even after the failed systems are corrected. The next time the system is serviced, the past failure diagnostic trouble codes will appear again on the **SSTs** (NGS set or self-diagnosis checker) or voltmeter, even though there are actually no failures. Therefore, erase the past failure memory after correcting all failed systems. To erase the past failure memory, press the AUTO switch and REC switch on the heater control unit at the same time while in past failure indication mode.

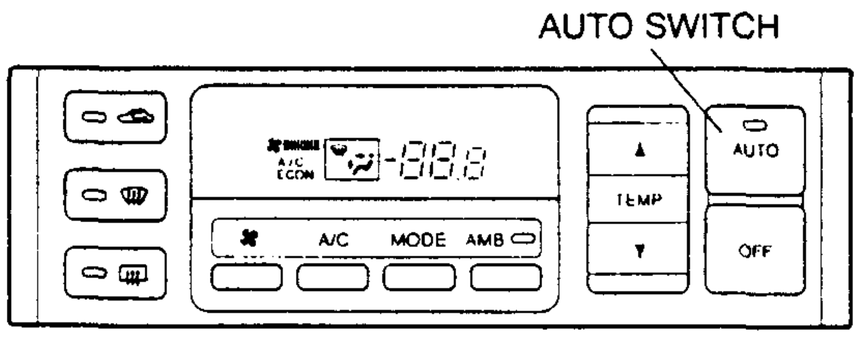


Diagnostic Trouble Code Table

No.	Indicator pattern	Diagnosed circuit
02	ON / OFF 	Solar radiation sensor (present)
06	ON / OFF 	Cabin temperature sensor (present)
07	ON / OFF 	Cabin temperature sensor (past)
10	ON / OFF 	Evaporator temperature sensor (present)
11	ON / OFF 	Evaporator temperature sensor (past)
12	ON / OFF 	Ambient temperature sensor (present)
13	ON / OFF 	Ambient temperature sensor (past)
14	ON / OFF 	Water temperature sensor (present)
15	ON / OFF 	Water temperature sensor (past)
18	ON / OFF 	Air mix actuator [potentiometer] (present)
19	ON / OFF 	Air mix actuator [potentiometer] (past)
21	ON / OFF 	Airflow mode actuator [potentiometer] (present)
22	ON / OFF 	Airflow mode actuator [potentiometer] (past)
58	ON / OFF 	Air mix actuator [motor lock] (past)
59	ON / OFF 	Airflow mode actuator [motor lock] (past)

Output Device Operation Check Mode Inspection

1. Warm up the engine.
2. Turn the ignition switch to LOCK.
3. Start up the on-board diagnostic function (present failure indication mode).
4. Press the AUTO switch.



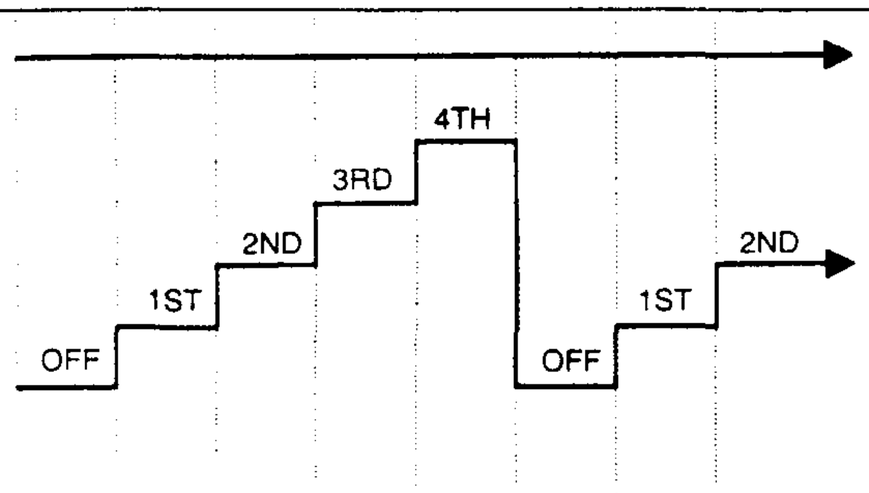
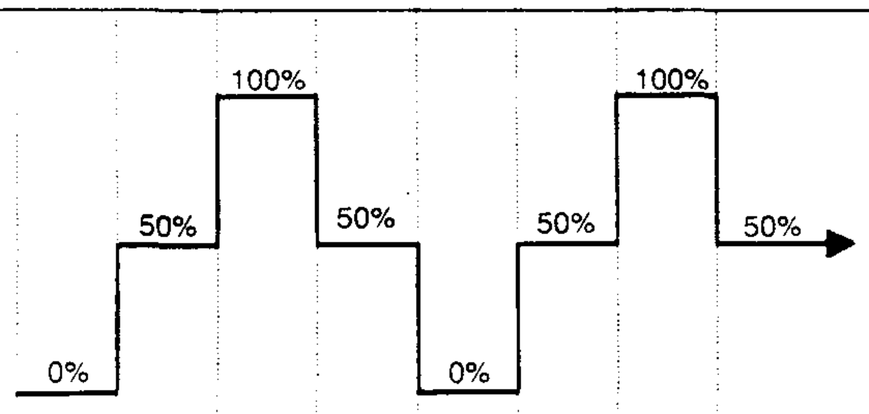
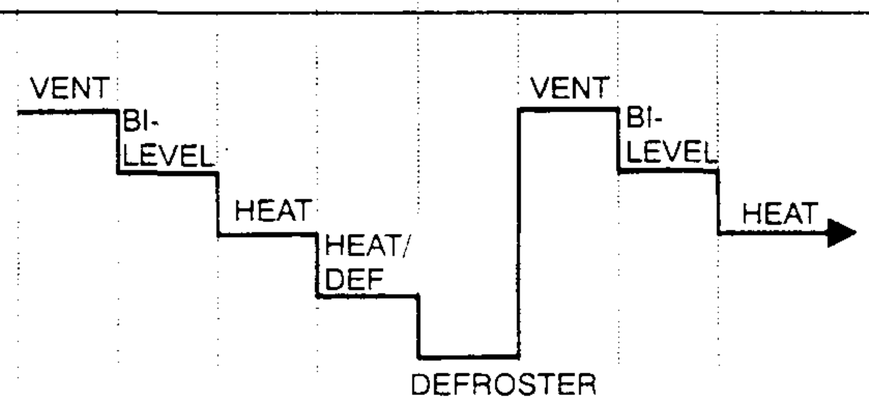
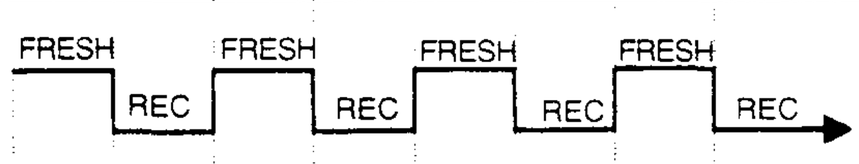
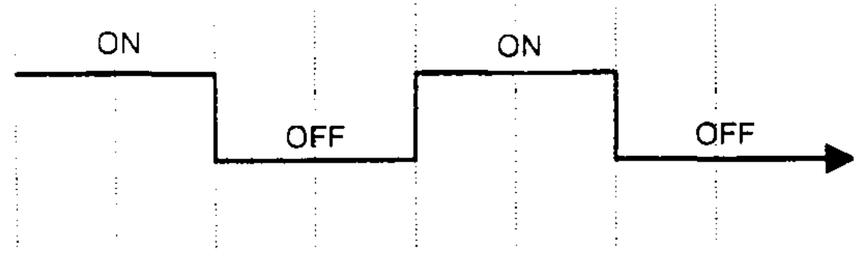
5. Verify that all the indicator lights of the heater control unit illuminate for **4 seconds**.
6. Verify the operation of the each output device when changing steps by pressing the REC switch, and referring to the output device operation check chart on the next page.
7. If not as specified, inspect the malfunctioning system.

Note

- If the AUTO switch is pressed again, the on-board diagnostic function will return to present failure indication mode.

8. Turn the ignition switch to LOCK to end the on-board diagnostic function.

Output device operation check table

Step	Operating device	Operating conditions	Monitor*1	Other device conditions
1	Blower motor speed		1	• Air mix actuator operation .. 50 % • Airflow mode actuator operation ..... VENT • Air intake actuator operation ..... FRESH • A/C compressor operation ... ON • Condenser fan operation .... ON • A/C compressor idle-up operation ..... ON
2	Air mix actuator operation		21.0 20.5 20.0	• Blower motor speed ..... 2nd • Airflow mode actuator operation ..... VENT • Air intake actuator operation ..... FRESH • A/C compressor operation ... ON • Condenser fan operation .... ON • A/C compressor idle-up operation ..... ON
3	Airflow mode actuator operation		3	• Blower motor speed ..... 2nd • Air mix actuator operation .. 50% • Air intake actuator operation ..... FRESH • A/C compressor operation ... ON • Condenser fan operation .... ON • A/C compressor idle-up operation ..... ON
4	Air intake actuator operation		4	• Blower motor speed ..... 2nd • Air mix actuator operation ... 0% • Airflow mode actuator operation ..... VENT
	A/C compressor operation A/C compressor idle-up operation Condenser fan operation			

*1: Shown on the heater control unit display according to the step.

INSPECTION OF DIAGNOSTIC TROUBLE CODES
Inspection of Present Failure

DTC 02	Solar radiation sensor system inspection
Possible cause	• Solar radiation sensor malfunction • Heater control unit malfunction • Open or short circuit between solar radiation sensor and heater control unit

STEP	INSPECTION		ACTION
1	Is solar radiation sensor normal?	Yes	Go to next step.
		No	Replace solar radiation sensor.
2	Disconnect heater control unit connector (20-pin) and solar radiation sensor connector. Is there continuity between following terminals of heater control unit connector (20-pin) and solar radiation sensor connector? • 1O-B • 1A-A	Yes	Go to next step.
		No	Repair wiring harness.
3	Is there short circuit to ground between terminal 1O of heater control unit connector (20-pin) and terminal B of solar radiation sensor connector?	Yes	Repair wiring harness.
		No	Replace heater control unit.

DTC 06	Cabin temperature sensor system inspection
Possible cause	• Cabin temperature sensor malfunction • Heater control unit malfunction • Open or short circuit between cabin temperature sensor and heater control unit

STEP	INSPECTION		ACTION
1	Is resistance between terminals 1P and 1N of heater control unit connector (20-pin) as indicated below? • **55.8 Ω —220 kΩ**	Yes	Replace heater control unit.
		No	Go to next step.
2	Is cabin temperature sensor normal?	Yes	Repair wiring harness.
		No	Replace cabin temperature sensor.

DTC 10	Evaporator temperature sensor system inspection
Possible cause	• Evaporator temperature sensor malfunction • Heater control unit malfunction • Open or short circuit between evaporator temperature sensor and heater control unit

STEP	INSPECTION		ACTION
1	Is resistance between terminals 1T and 1N of heater control unit connector (20-pin) as indicated below? • **186 Ω —179 kΩ**	Yes	Replace heater control unit.
		No	Go to next step.
2	Is evaporator temperature sensor normal?	Yes	Repair wiring harness.
		No	Replace evaporator temperature sensor.

DTC 12	Ambient temperature sensor system inspection
Possible cause	• Ambient temperature sensor malfunction • Heater control unit malfunction • Open or short circuit between water temperature sensor and heater control unit

STEP	INSPECTION		ACTION
1	Is resistance between terminals 1M and 1N of heater control unit connector (20-pin) as indicated below? • **186 Ω —179 kΩ**	Yes	Replace heater control unit.
		No	Go to next step.
2	Is ambient temperature sensor normal?	Yes	Repair wiring harness.
		No	Replace ambient temperature sensor.

DTC 14	Water temperature sensor system inspection		
Possible cause	• Water temperature sensor malfunction • Heater control unit malfunction • Open or short circuit between water temperature sensor and heater control unit		
STEP	**INSPECTION**		**ACTION**
1	Is resistance between terminals 1S and 1N of heater control unit connector (20-pin) as indicated below? • **265 Ω —1037 kΩ**	Yes	Replace heater control unit.
		No	Go to next step.
2	Is water temperature sensor normal?	Yes	Repair wiring harness.
		No	Replace water temperature sensor.

DTC 18	Air mix actuator (potentiometer) system inspection		
Possible cause	• Air mix actuator malfunction • Heater control unit malfunction • Open circuit between air mix actuator and heater control unit • Short circuit between air mix actuator (terminal B) and heater control unit (terminal 1R: 20-pin)		
STEP	**INSPECTION**		**ACTION**
1	Is air mix actuator normal?	Yes	Go to next step.
		No	Replace air mix actuator.
2	Disconnect airflow mode actuator connector. Is resistance between terminals 1R and 1N of heater control unit connector (20-pin) more than **384** Ω?	Yes	Go to next step.
		No	Repair wiring harness. (Short circuit)
3	Disconnect heater control unit connector (20-pin). Is resistance between terminals 1A and 1N of heater control unit connector (20-pin) less than **4.8 kΩ**?	Yes	Go to next step.
		No	Repair wiring harness. (Open circuit)
4	Is resistance between terminals 1A and 1R of heater control unit connector (20-pin) less than **4.2 kΩ**?	Yes	Replace heater control unit.
		No	Repair wiring harness. (Open circuit)

DTC 21	Airflow mode actuator (potentiometer) system inspection		
Possible cause	• Airflow mode actuator malfunction • Heater control unit malfunction • Open circuit between airflow mode actuator and heater control unit • Short circuit between airflow mode actuator (terminal B) and heater control unit (terminal 1Q: 20-pin)		
STEP	**INSPECTION**		**ACTION**
1	Is airflow mode actuator normal?	Yes	Go to next step.
		No	Replace airflow mode actuator.
2	Disconnect air mix actuator connector. Is resistance between terminals 1Q and 1N of heater control unit connector (20-pin) more than **384** Ω?	Yes	Go to next step.
		No	Repair wiring harness. (Short circuit)
3	Disconnect heater control unit connector (20-pin). Is resistance between terminals 1A and 1N of heater control unit connector (20-pin) less than **4.8 kΩ**?	Yes	Go to next step.
		No	Repair wiring harness. (Open circuit)
4	Is resistance between terminals 1A and 1Q of heater control unit connector (20-pin) less than **4.2 kΩ**?	Yes	Replace heater control unit.
		No	Repair wiring harness. (Open circuit)

DTC 58	Air mix actuator system inspection
Possible cause	• Air mix actuator malfunction • Heater unit (air mix link and/or air mix crank) malfunction • Heater control unit malfunction • Open or short circuit between air mix actuator and heater control unit

STEP	INSPECTION		ACTION
1	Disconnect air mix actuator connector. Connect battery positive voltage to terminal A (or terminal F) and ground to terminal F (or terminal A) of air mix actuator connector. Does air mix actuator operate?	Yes	Connect connector and go to step 3.
		No	Go to next step.
2	Remove air mix actuator. Operate air mix link by hand. Does air mix link operate smoothly?	Yes	Replace air mix actuator.
		No	Replace air mix link and/or air mix crank.
3	Disconnect heater control unit connector (16-pin). Connect battery positive voltage to terminal 2B (or terminal 2D) and ground to terminal 2D (or terminal 2B) of heater control unit connector (16-pin). Does air mix actuator operate?	Yes	Replace heater control unit.
		No	Repair wiring harness.

DTC 59	Airflow mode actuator system inspection
Possible cause	• Airflow mode actuator malfunction • Heater unit (airflow mode links and/or airflow mode cranks) malfunction • Heater control unit malfunction • Open or short circuit between airflow mode actuator and heater control unit

STEP	INSPECTION		ACTION
1	Disconnect airflow mode actuator connector. Connect battery positive voltage to terminal A (or terminal F) and ground to terminal F (or terminal A) of airflow mode actuator connector. Does airflow mode actuator operate?	Yes	Connect connector and go to step 3.
		No	Go to next step.
2	Remove airflow mode actuator. Operate airflow mode main link by hand. Does airflow mode main link operate smoothly?	Yes	Replace airflow mode actuator.
		No	Replace airflow mode links and/or airflow mode cranks.
3	Disconnect heater control unit connector (16-pin). Connect battery positive voltage to terminal 2H (or terminal 2F) and ground to terminal 2F (or terminal 2H) of heater control unit connector (16-pin). Does airflow mode actuator operate?	Yes	Replace heater control unit.
		No	Repair wiring harness.

When two or more DTCs indicated at same time

DTC 06, 10, 12, 14, 18, 21	Heater control unit (+5V power supply or sensor ground system) or sensor ground system inspection
Possible cause	• Heater control unit malfunction • Open circuit between heater control unit and each temperature sensor • Open circuit between heater control unit and air mix actuator • Open circuit between heater control unit and airflow mode actuator

STEP	INSPECTION		ACTION
1	Disconnect heater control unit connector (20-pin) and evaporator temperature sensor connector. Is there continuity between terminal 1N of heater control unit connector (20-pin) and terminal A of evaporator temperature sensor connector?	Yes	Replace heater control unit.
		No	Repair wiring harness.

( ) : R.H.D.

DTC 02, 18, 21	Heater control unit (+5V power supply) inspection
Possible cause	• Heater control unit malfunction • Short circuit between heater control unit and solar radiation sensor • Short circuit between heater control unit and air mix actuator • Short circuit between heater control unit and airflow mode actuator • Open circuit between heater control unit and solar radiation sensor • Open circuit between heater control unit and air mix actuator • Open circuit between heater control unit and airflow mode actuator

STEP	INSPECTION		ACTION
1	Disconnect heater control unit connector (20-pin) and airflow mode actuator connector. Is there continuity between terminal 1A of heater control unit connector (20-pin) and terminal E of airflow mode actuator connector?	Yes	Go to next step.
		No	Repair wiring harness.
2	Is there short circuit to ground between terminal 1A of heater control unit connector (20-pin) and terminal E (C) of airflow mode actuator connector?	Yes	Repair wiring harness.
		No	Go to next step.
3	Is there short circuit to ground between terminal 1A of heater control unit connector (20-pin) and terminal E (C) of air mix actuator connector?	Yes	Repair wiring harness.
		No	Go to next step.
4	Is there short circuit to ground between terminal 1A of heater control unit connector (20-pin) and terminal A of solar radiation sensor connector?	Yes	Repair wiring harness.
		No	Replace heater control unit.

Inspection of Past Failure

DTC 07	Cabin temperature sensor system inspection
Possible cause	• Cabin temperature sensor malfunction • Heater control unit malfunction • Open or short circuit between cabin temperature sensor and heater control unit

STEP	INSPECTION		ACTION
1	Is cabin temperature sensor normal?	Yes	Go to next step.
		No	Replace cabin temperature sensor.
2	Disconnect heater control unit connector (20-pin) and cabin temperature sensor connector. Is there somewhat open circuit between following terminals of heater control unit connector (20-pin) and cabin temperature sensor connector? • 1P-B • 1N-A	Yes	Repair wiring harness.
		No	Go to next step.
3	Is there somewhat short circuit to ground between terminal 1P of heater control unit connector (20-pin) and terminal B of cabin temperature sensor connector?	Yes	Repair wiring harness.
		No	Connect heater control unit connector and go to next step.
4	Turn IG SW to on. Is voltage at terminal 1P of heater control unit connector (20-pin) **about 5V**?	Yes	This system is normal at present. (Erase the past failure memory.)
		No	Replace heater control unit.

DTC 11	Evaporator temperature sensor system inspection
Possible cause	• Evaporator temperature sensor malfunction • Heater control unit malfunction • Open or short circuit between evaporator temperature sensor and heater control unit

STEP	INSPECTION		ACTION
1	Is evaporator temperature sensor normal?	Yes	Go to next step.
		No	Replace evaporator temperature sensor.
2	Disconnect heater control unit connector (20-pin) and evaporator temperature sensor connector. Is there somewhat open circuit between following terminals of heater control unit connector (20-pin) and evaporator temperature sensor connector? • 1T-C • 1N-A	Yes	Repair wiring harness.
		No	Go to next step.
3	Is there somewhat short circuit to ground between terminal 1T of heater control unit connector (20-pin) and terminal C of evaporator temperature sensor connector?	Yes	Repair wiring harness.
		No	Connect heater control unit connector and go to next step.
4	Turn IG SW to on. Is voltage at terminal 1T of heater control unit connector (20-pin) **about 5V**?	Yes	This system is normal at present.(Erase the past failure memory.)
		No	Replace heater control unit.

DTC 13	Ambient temperature sensor system inspection
Possible cause	• Ambient temperature sensor malfunction • Heater control unit malfunction • Open or short circuit between ambient temperature sensor and heater control unit

STEP	INSPECTION		ACTION
1	Is ambient temperature sensor normal?	Yes	Go to next step.
		No	Replace ambient temperature sensor.
2	Disconnect heater control unit connector (20-pin) and ambient temperature sensor connector. Is there somewhat open circuit between following terminals of heater control unit connector (20-pin) and ambient temperature sensor connector? • 1M-B • 1N-A	Yes	Repair wiring harness.
		No	Go to next step.
3	Is there somewhat short circuit to ground between terminal 1M of heater control unit connector (20-pin) and terminal B of ambient temperature sensor connector?	Yes	Repair wiring harness.
		No	Connect heater control unit connector and go to next step.
4	Turn IG SW to on. Is voltage at terminal 1M of heater control unit connector (20-pin) **about 5V**?	Yes	This system is normal at present. (Erase the past failure memory.)
		No	Replace heater control unit.

DTC 15	Water temperature sensor system inspection
Possible cause	• Water temperature sensor malfunction • Heater control unit malfunction • Open or short circuit between water temperature sensor and heater control unit

STEP	INSPECTION		ACTION
1	Is water temperature sensor normal?	Yes	Go to next step.
		No	Replace water temperature sensor.
2	Disconnect heater control unit connector (20-pin) and water temperature sensor connector. Is there somewhat open circuit between following terminals of heater control unit connector (20-pin) and water temperature sensor connector? • 1S-B • 1N-A	Yes	Repair wiring harness.
		No	Go to next step.
3	Is there somewhat short circuit to ground between terminal 1S of heater control unit connector (20-pin) and terminal B of water temperature sensor connector?	Yes	Repair wiring harness.
		No	Connect heater control unit connector and go to next step.
4	Turn IG SW to on. Is voltage at terminal 1S of heater control unit connector (20-pin) **about 5V**?	Yes	This system is normal at present. (Erase the past failure memory.)
		No	Replace heater control unit.

( ) : R.H.D.

DTC 19	Air mix actuator (potentiometer) system inspection
Possible cause	• Air mix actuator malfunction • Heater control unit malfunction • Open circuit between air mix actuator and heater control unit • Short circuit between air mix actuator (terminal B) and heater control unit (terminal 1R: 20-pin)

STEP	INSPECTION		ACTION
1	Is air mix actuator normal?	Yes	Go to next step.
		No	Replace air mix actuator.
2	Disconnect heater control unit connector (20-pin) and air mix actuator connector. Is there somewhat open circuit between following terminals of heater control unit connector (20-pin) and air mix actuator connector? • 1A-E (C) • 1R-B • 1N-C (E)	Yes	Repair wiring harness.
		No	Go to next step.
3	Is there somewhat short circuit to ground between terminal 1R of heater control unit connector (20-pin) and terminal B of air mix actuator connector?	Yes	Repair wiring harness.
		No	This system is normal at present. (Erase the past failure memory.)

( ) : R.H.D.

DTC 22	Airflow mode actuator (potentiometer) system inspection
Possible cause	• Airflow mode actuator malfunction • Heater control unit malfunction • Open circuit between airflow mode actuator and heater control unit • Short circuit between airflow mode actuator (terminal B) and heater control unit (terminal 1Q: 20-pin)

STEP	INSPECTION		ACTION
1	Is airflow mode actuator normal?	Yes	Go to next step.
		No	Replace airflow mode actuator.
2	Disconnect hater control unit connector (20-pin) and airflow mode actuator connector. Is there somewhat open circuit between following terminals of heater control unit connector (20-pin) and airflow mode actuator connector? • 1A-E (C) • 1Q-B • 1N-C (E)	Yes	Repair wiring harness.
		No	Go to next step.
3	Is there somewhat short circuit to ground between terminal 1Q of heater control unit connector (20-pin) and terminal B of airflow mode actuator connector?	Yes	Repair wiring harness.
		No	This system is normal at present. (Erase the past failure memory.)

When two or more DTCs indicated at same time

DTC 07, 11, 13, 15, 19, 22	Heater control unit (+5V power supply or sensor ground system) or sensor ground system inspection
Possible cause	• Heater control unit malfunction • Open circuit between heater control unit and each temperature sensor • Open circuit between heater control unit and air mix actuator • Open circuit between heater control unit and airflow mode actuator

STEP	INSPECTION		ACTION
1	Disconnect heater control unit connector (20-pin) and evaporator temperature sensor connector. Is there somewhat open circuit between terminal 1N of heater control unit connector (20-pin) and terminal A of evaporator temperature sensor connector?	Yes	Repair wiring harness.
		No	This system is normal at present. (Erase the past failure memory.)

( ) : R.H.D.

DTC 19, 22	Heater control unit (+5V power supply) inspection
Possible cause	• Heater control unit malfunction • Short circuit between heater control unit and solar radiation sensor • Short circuit between heater control unit and air mix actuator • Short circuit between heater control unit and airflow mode actuator • Open circuit between heater control unit and solar radiation sensor • Open circuit between heater control unit and air mix actuator • Open circuit between heater control unit and airflow mode actuator

STEP	INSPECTION		ACTION
1	Disconnect heater control unit connector (20-pin) and airflow mode actuator connector. Is there somewhat open circuit between terminal 1A of heater control unit connector (20-pin) and terminal E (C) of airflow mode actuator connector?	Yes	Repair wiring harness.
		No	Go to next step.
2	Is there somewhat short circuit to ground between terminal 1A of heater control unit connector (20-pin) and terminal E (C) of airflow mode actuator connector?	Yes	Repair wiring harness.
		No	Go to next step.

STEP	INSPECTION		ACTION
3	Is there somewhat short circuit to ground between terminal 1A of heater control unit connector (20-pin) and terminal E (C) of air mix actuator connector?	Yes	Repair wiring harness.
		No	Go to next step.
4	Is there somewhat short circuit to ground between terminal 1A of heater control unit connector (20-pin) and terminal A of solar radiation sensor connector?	Yes	Repair wiring harness.
		No	This system is normal at present. (Erase the past failure memory.)

TROUBLESHOOTING

FOREWORD

- Refer to section G1 and thoroughly read and understand the basic flow of troubleshooting in order to properly perform the procedures.

TROUBLESHOOTING INDEX

- For the steps which have an asterisk (*), inspect the connection of the connector with the terminal and for any damage. If the connection is poor, reconnect them, or repair or replace the appropriate parts if necessary.
- The areas for inspection (step) are noted according to the various circuit malfunction. Use the chart below to verify the symptoms of the trouble in order to diagnose the appropriate area.

No.	TYPE	SYMPTOM
1	Manual air conditioner, full-auto air conditioner	Depending on the mode, air does not discharge from vent.
2		Air cooling ability is low (Blower motor, A/C compressor, and condenser fan are okay).
3		Abnormal noise from A/C compressor.
4	Manual air conditioner	Regardless of the mode, air does not discharge. Airflow volume does not change when operating fan switch.
5		Air discharge does not change when operating airflow mode control dial.
6		Air intake mode does not change when operating REC/FRESH lever.
7		Temperature of discharged air does not change when operating temperature control dial.
8		Cool air does not discharge.
9	Full-auto air conditioner	None of air conditioning system's functions operate or heater control unit indicates nothing.
10		Heater control unit does not indicate some information or indication is incorrect.
11		Switches inoperative (No change occurs in heater control unit indication and air conditioning operation).
12		Blower motor does not operate properly according to fan switch position.
13		Air intake mode does not change (Airflow noise does not change when operating REC switch with fan switch set at 3rd or higher).
14		Cool air does not discharge.

SYMPTOM TROUBLESHOOTING

1	**Depending on the mode, air does not discharge from vent.**

TROUBLESHOOTING HINTS

① Malfunction in VENT mode system
Steps 4—7
② Malfunction in HEAT mode system
Step 8
③ Malfunction in DEFROSTER mode system
Steps 9—11

STEP	INSPECTION		ACTION
1	Is vehicle equipped with manual air conditioner?	Yes	Go to step 3.
		No	Go to next step (full-auto air conditioner).
2	Does airflow mode change when MODE switch is operated?	Yes	Go to step 4.
		No	Go to troubleshooting symptom No. 11.
3	When airflow mode control dial is operated, is appropriate resistance felt and can it be moved its full stroke?	Yes	Go to next step.
		No	Go to troubleshooting symptom No. 5.
4	Is air discharged when in VENT mode?	Yes	Go to step 8.
		No	Go to next step.
5	Are center and side vent dials at closed position?	Yes	Turn dial to open position, then go step 12.
		No	Go to next step.

STEP	INSPECTION		ACTION
6	Is vent clogged?	Yes	Remove obstruction, then go to step 12.
		No	Go to next step.
7	Is duct in dashboard properly installed and undamaged?	Yes	Check duct for clogging, deformity, and air leakage, then go to step 12.
		No	Securely and properly install duct, then go to step 12.
8	Is air discharged when in HEAT mode?	Yes	Go to next step.
		No	Check vent for clogging, then go to step 12.
9	Is air discharged when in DEFROSTER mode?	Yes	Operation is okay. Reconfirm malfunction symptoms.
		No	Go to next step.
10	Is vent clogged?	Yes	Remove obstruction, then go to step 12.
		No	Go to next step.
11	Is defroster duct properly installed and undamaged?	Yes	Check duct for clogging, deformity, and air leakage, then go to next step.
		No	Securely and properly install duct, then go to next step.
12	Is air discharged from vent?	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

2	**Air cooling ability is low (Blower motor, A/C compressor, and condenser fan are okay).**

TROUBLESHOOTING HINTS

① Defective drive belt
Step 3
② Malfunction in blower unit or condenser
Steps 5, 6
③ Malfunction in receiver/drier or expansion valve (valve closes too much)
Steps 9, 10
④ Malfunction in refrigerant lines
Steps 11, 12
⑤ A/C compressor system malfunction, insufficient compressor oil
Steps 14, 15
⑥ Over filling of compressor oil, malfunction in expansion valve or heater unit's air mix link system
Steps 16, 17, 18

STEP	INSPECTION		ACTION
1	Is ambient air temperature **0 °C {32 °F } or less**?	Yes	Operation is normal. (To prevent evaporation within cooling unit from freezing, A/C compressor stops right away when ambient air temperature is **0 °C {32 °F } or less**.
		No	Go to next step.
2	Carry out refrigerant system performance test. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, PERFORMANCE TEST.) Is operation normal?	Yes	Operation is normal. (Reconfirm malfunction symptoms.)
		No	Go to next step.
3	Inspect drive belt. (Refer to section B, DRIVE BELT, DRIVE BELT INSPECTION.) Is it okay?	Yes	Go to next step.
		No	Adjust or replace drive belt, then go to step 19. (Refer to section B, DRIVE BELT, DRIVE BELT ADJUSTMENT.)
4	Inspect refrigerant pressure. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURES, REFRIGERANT PRESSURE CHECK.) Are both the high-pressure side and low-pressure side values high?	Yes	Go to next step.
		No	Go to step 7.

STEP	INSPECTION		ACTION
5	Is inlet of blower unit clogged?	Yes	Remove obstruction, then go to step 19. (Within the cooling unit, if air does not reach evaporator, heat exchange does not occur and refrigerant pressure becomes high. Therefore, removal of obstruction is necessary.)
		No	Go to next step.
6	Inspect condenser. (Refer to BASIC SYSTEM, CONDENSER INSPECTION.) Is it okay?	Yes	Adjust refrigerant to specified amount, then go to step 19. (Excessive amount of refrigerant.)
		No	Replace condenser, or repair and clean condenser fins, then go to step 19.
7	Are the refrigerant pressure's high-pressure side and low-pressure side values low?	Yes	Go to next step.
		No	Go to step 13.
8	Immediately after A/C compressor operates, does the refrigerant pressure's high-pressure side momentarily rise to the correct value then fall and stay below it? (Is there negative pressure on low-pressure side?)	Yes	Go to next step.
		No	Go to step 11.
9	Turn A/C switch off and let air conditioner stop for **10 minutes**. Start engine. Turn both A/C switch and fan switch on. Does malfunction occur after A/C compressor turns on?	Yes	Go to next step.
		No	Replace receiver/drier, then go to step 19. (Since water has intermixed in receiver/drier, replacement is necessary.)
10	Is pressure bulb of expansion valve within cooling unit securely and properly installed in the correct position?	Yes	Replace expansion valve, then go to step 19. (Since valve closes too much, replacement is necessary.)
		No	Securely and properly install pressure bulb, then go to step 19.
11	Inspect refrigerant lines. • Is piping free of damage and cracks? • Are piping connections free of oil grime? (visual inspection) • Are piping connections free of gas leakage? (Inspect by gas leak tester.) Are above items okay?	Yes	Adjust both compressor oil and refrigerant to specified amount, then go to step 19.
		No	If piping is damaged or cracked, replace it, then go to step 19. If there is no damage, go to next step.
12	Are piping connections loose?	Yes	Tighten connections to specified torque, adjust both compressor oil and refrigerant to specified amount, then go to step 19.
		No	Replace O-ring on piping, adjust both compressor oil and refrigerant to specified amount, then go to step 19.
13	Does refrigerant pressure's high-pressure side hardly increase?	Yes	Go to next step. (Pressure hardly increases.)
		No	Go to step 16.
14	When engine is racing, does pressure on high-pressure side increase?	Yes	Return to step 4.
		No	Go to next step.
15	After compressor oil is replenished to specified amount, does pressure on high-pressure side increase?	Yes	Troubleshooting completed. (Explain to customer that the cause was insufficient compressor oil.)
		No	Replace A/C compressor, then go to step 19. (The cause is defective compression of A/C compressor.)
16	Is refrigerant pressure high on the low-pressure side only?	Yes	Go to step 18.
		No	Go to next step.

STEP	INSPECTION		ACTION
17	Are heater unit's air mix link, air mix crank, and air mix rod properly and securely installed in the correct position?	Yes	Adjust amount of A/C compressor oil to specified level, then go to step 19. (The cause is excessive amount of A/C compressor oil.)
		No	Repair or securely and properly install link, crank, and rod, then go to step 19.
18	Is heat-sensing tube of expansion valve within cooling unit securely and properly installed in the correct position?	Yes	Replace expansion valve, then go to next step. (Since valve opens too much, replacement is necessary.)
		No	Securely and properly install pressure bulb, then go to next step.
19	Is cool air discharged? (Are the results of refrigerant system performance test okay?)	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

3	**Abnormal noise from A/C compressor.**

TROUBLESHOOTING HINTS

① Magnetic clutch operation noise
Step 4
② A/C compressor vane noise
Steps 5—12
③ A/C compressor slippage noise
Steps 13—16
④ Hose or refrigerant lines interference noise
Step 17

STEP	INSPECTION		ACTION
1	Is there a jingling, popping, beeping, or buzzing sound (A/C compressor vane noise)?	Yes	Go to step 5.
		No	Go to next step.
2	Is there a squeaking or whirling sound (A/C compressor slippage noise)?	Yes	Go to step 13.
		No	Go to next step.
3	Is there a rattling or vibrating sound (interference noise)?	Yes	Go to step 17.
		No	Go to next step.
4	Is there a clicking sound (magnetic clutch operation noise)?	Yes	Adjust clearance between pressure plate of magnetic clutch and A/C compressor pulley, then go to step 18. (Refer to CONTROL SYSTEM, MAGNETIC CLUTCH CLEARANCE ADJUSTMENT.)
		No	Condition is normal. (Reconfirm malfunction symptoms.)
5	Is noise heard continuously for **more than 3 seconds** after A/C compressor turns on?	Yes	Go to next step.
		No	Condition is normal. (Noise occurs for **2—3 seconds** only after compressor turns on.)
6	Inspect the idling rotation. (Refer to section F, ENGINE TUNE-UP, IDLE SPEED ADJUSTMENT.) Is it okay?	Yes	Go to next step.
		No	Adjust idling rotation, then go to step 18.
7	Inspect refrigerant amount. (Refer to REFRIGERATION SYSTEM SERVICE PROCEDURES, REFRIGERANT CHARGE CHECK.) Is it okay?	Yes	Go to step 9.
		No	Go to next step.
8	Inspect refrigerant lines. • Is piping free of damage and cracks? • Are piping connections free of gas leakage? (Inspect by gas leak tester.) • Are piping connections tight and secure? Are above items okay?	Yes	Adjust refrigerant amount to specified level, then go to step 18.
		No	If piping is damaged or cracked, replace then go to step 18. If there is gas leakage, repair or replace connection and replace receiver/drier*, then go to step 18.

STEP	INSPECTION		ACTION
9	Add **20 cc {0.8 fl oz }** of compressor oil. Is noise heard when racing engine?	Yes	Go to next step.
		No	Troubleshooting completed. Explain repairs to customer.
10	Drain compressor oil. Is it turbid?	Yes	Go to next step.
		No	Replace A/C compressor, then go to step 18.
11	Is compressor oil whitish and turbid.	Yes	Replace entire A/C system (excluding heater), then go to step 18.
		No	Go to next step.
12	Is compressor oil dark and turbid, or are aluminum chips mixed in with it?	Yes	Replace A/C compressor, receiver/drier, then go to step 18. (Since A/C compressor may be worn and receiver/drier may be clogged, replacement of the receiver/drier is necessary.)
		No	Condition is normal. Reconfirm malfunction symptoms.
13	Is noise heard immediately after A/C compressor is stopped?	Yes	Replace A/C compressor, then go to step 18. (A/C compressor discharge valve left open)
		No	Go to next step.
14	Inspect drive belt. (Refer to section B, DRIVE BELT, DRIVE BELT INSPECTION.) Is it okay?	Yes	Go to next step.
		No	Adjust or replace drive belt, then go to step 18.
15	Is drive belt worn, have foreign material imbedded in it, or have oil on it?	Yes	Remove obstruction, remove oil, or replace drive belt, then go to step 18.
		No	Go to next step.
16	Inspect magnetic clutch. (Refer to CONTROL SYSTEM, MAGNETIC CLUTCH INSPECTION.) Is it okay?	Yes	Replace A/C compressor (excluding pressure plate, A/C compressor pulley, and stator), then go to step 18.
		No	Replace magnetic clutch, then go to step 18.
17	Is noise emitted from A/C compressor.	Yes	Visually inspect A/C compressor, replace appropriate parts if necessary, then go to next step.
		No	If noise is due to refrigerant lines, replace detached or missing clips, tighten loose bolts, then go to next step.
18	Has noise emitted from A/C compressor stopped?	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

* If there is gas leakage, ambient air enters into the A/C system, the desiccate within the receiver/drier absorbs the moisture from the ambient air and becomes saturated. If the A/C system is used in this condition, the inside of the A/C compressor will begin to rust due to this moisture, which may cause it to lock up or noise to occur. Therefore, replacement of the receiver/drier is necessary.

4	**Regardless of the mode, air does not discharge.** **Airflow volume does not change when operating fan switch.**

TROUBLESHOOTING HINTS

① Blower relay, blower motor, resistor, fan switch malfunction
Step 1

② Blower unit malfunction
Steps 2—4

STEP	INSPECTION		ACTION
1	Inspect the following systems, electrical parts. • Blower relay, blower motor, resistor, fan switch. Are they okay?	Yes	Go to next step.
		No	Repair or replace malfunctioning part, then go to step 5.
2	Turn ignition switch to ON. Recirculate air inside vehicle. Does fan in blower unit rotate smoothly?	Yes	Go to step 4.
		No	Go to next step.

STEP	INSPECTION		ACTION
3	Inspect fan in blower unit. • Is fan free of interference with blower unit case? • Is fan free of foreign material and obstructions? Is fan okay?	Yes	Go to next step.
		No	Remove obstruction, repair or replace fan and blower unit case, then go to step 5.
4	Is intake vent of blower unit clogged?	Yes	Remove obstruction, then go to next step.
		No	Check if there are any obstructions in passage between blower unit to heater unit, then go to next step.
5	Is air discharged?	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

5 Air discharge does not change when operating airflow mode control dial.

TROUBLESHOOTING HINTS

① Heater unit's airflow mode link, airflow mode crank, airflow mode wire, wire clamp malfunction
Steps 1, 2

② Heater control unit's rack-and-pinion, airflow mode wire malfunction
Step 3

③ Malfunction in system for heater unit's each door
Steps 4, 5

STEP	INSPECTION		ACTION
1	Inspect heater unit's airflow mode links, airflow mode cranks, and wire clamp. • Is there grease on links and clamp? • Are links and clamp securely and properly installed? • Is wire clamp free of deformation? Are above items okay?	Yes	Go to next step.
		No	Apply grease or properly and securely install links and clamp, repair or replace wire clamp, then go to step 6.
2	Is airflow mode wire securely and properly installed to heater unit's airflow mode links?	Yes	Go to next step.
		No	Adjust airflow mode wire or install in correct direction, then go to step 6.
3	Inspect heater control unit. • Is rack-and-pinion properly engaged? • Is airflow mode wire properly installed in the correct direction on the rack? Are above items okay?	Yes	Go to next step.
		No	Properly engage rack-and-pinion or install airflow mode wire in correct direction, then go to step 6.
4	Are there any obstructions in any of heater unit's doors?	Yes	Remove obstruction, then go to step 6.
		No	Go to next step.
5	Are all doors within heater unit securely and properly installed?	Yes	Check each door for cracks or damage, then go to next step.
		No	Install doors in proper position, then go to next step.
6	Does air discharge change when airflow mode control dial is operated?	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

6	Air intake mode does not change when operating REC/FRESH lever.

TROUBLESHOOTING HINTS

① Blower unit's air intake link, air intake crank, air intake wire, wire clamp malfunction
Steps 1, 2

② Heater control unit's air intake wire malfunction
Step 3

③ Blower unit's air intake door malfunction
Steps 4, 5

STEP	INSPECTION		ACTION
1	Inspect blower unit's air intake links, air intake cranks, and wire clamp. • Is there grease on links and cranks? • Are links and cranks securely and properly installed? • Is wire clamp free of deformation? Are above items okay?	Yes	Go to next step.
		No	Apply grease or properly and securely install links and cranks, repair or replace wire clamp, then go to step 6.
2	Is air intake wire properly installed in correct direction to blower unit's air intake links?	Yes	Go to next step.
		No	Adjust air intake wire or install in correct direction, then go to step 6.
3	Is air intake wire properly installed in correct direction to heater control unit's links?	Yes	Go to next step.
		No	Install air intake wire in correct position, then go to step 6.
4	Is there foreign material or obstruction in blower unit's air intake door?	Yes	Remove obstruction, then go to step 6.
		No	Go to next step.
5	Is blower unit's air intake door securely and properly installed?	Yes	Check air intake door for cracks or damage, then go to next step.
		No	Install air intake door properly, then go to next step.
6	Does air intake mode change smoothly from RECIRCULATE to FRESH air intake mode when lever is operated?	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

7	Temperature of discharged air does not change when operating temperature control dial.

TROUBLESHOOTING HINTS

① Heater unit's air mix wire sliding malfunction
Steps 1, 2

② Heater control unit's air mix wire sliding malfunction
Step 3

③ Heater unit's air mix door malfunction
Steps 4, 5

STEP	INSPECTION		ACTION
1	Is coolant sufficiently warmed up?	Yes	Go to next step.
		No	Warm engine for **approximately 10 minutes**, then go to step 7.
2	Inspect heater unit's air mix links, air mix cranks, air mix rods, and wire clamp. • Is there grease on links and cranks? • Are links, cranks, and rods securely and properly installed? • Is wire clamp free of deformation? Are above items okay?	Yes	Go to next step.
		No	Apply grease or properly and securely install links, cranks, and rods, repair or replace wire clamp, then go to step 7.
3	Is air mix wire securely and properly installed to heater unit's air mix links?	Yes	Go to next step.
		No	Adjust air mix wire or install in correct direction, then go to step 7.

STEP	INSPECTION		ACTION
4	Inspect heater control unit. • Is rack-and-pinion properly engaged? • Is air mix wire properly installed in correct direction to rack? Are above items okay?	Yes	Go to next step.
		No	Properly engage rack-and-pinion or install air mix wire in correct direction, then go to step 7.
5	Is there foreign material or obstruction in heater unit's air mix doors?	Yes	Remove obstruction, then go to step 7.
		No	Go to next step.
6	Are heater unit's air mix doors securely and properly installed?	Yes	Check air mix doors for cracks or damage, then go to next step.
		No	Install air mix doors properly, then go to next step.
7	Does temperature of discharged air change when temperature control dial is operated?	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

8	**Cool air does not discharge.**

TROUBLESHOOTING HINTS

① A/C switch indicator light malfunction
Steps 4—6
② Drive belt malfunction
Step 8
③ A/C amplifier, A/C switch malfunction
Steps 9—13
④ ECM (PCM) (A/C signal) system malfunction
Steps 14, 15
⑤ Refrigerant pressure switch, refrigerant system malfunction
Steps 16—18
⑥ ECM (PCM) (IG1 signal) system malfunction
Steps 19, 20
⑦ ECM (PCM) A/C cut control system malfunction
Step 21
⑧ A/C compressor system malfunction
Steps 22, 23
⑨ A/C relay system malfunction
Steps 24—26

STEP	INSPECTION		ACTION
1	Is air discharged?	Yes	Go to next step.
		No	Go to symptom troubleshooting No. 1, 4.
2	Start engine. Turn both A/C switch and fan switch on. Does A/C compressor operate?	Yes	Go to step 4.
		No	Go to next step.
3	Is ambient air temperature **0 °C {32 °F }** or less?	Yes	Operation is normal. (To prevent evaporation within cooling unit from freezing, A/C compressor stops right away when ambient air temperature is **0 °C {32 °F } or less**.)
		No	Go to symptom troubleshooting No. 2.
4	Does A/C switch indicator light illuminate?	Yes	Go to step 7.
		No	Go to next step.
5 *	Test voltage at the following terminal of A/C switch. • Terminal C (IG2 signal) Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Repair wiring harness between A/C 15 A fuse to A/C switch, then go to step 27.

STEP	INSPECTION		ACTION
6 *	Turn both A/C switch and fan switch off. Test voltage at the following terminal of A/C switch. • Terminal A (A/C signal) Is voltage **approximately 12 V**?	Yes	Inspect A/C switch, then go to step 27.
		No	Repair wiring harness between A/C switch to fan switch, then go to step 27.
7	Carry out refrigerant system performance test. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURE, PERFORMANCE TEST.) Is operation normal?	Yes	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.
		No	Go to next step.
8	Inspect drive belt. (Refer to section B, DRIVE BELT, DRIVE BELT INSPECTION.) Is it okay?	Yes	Go to next step.
		No	Adjust or replace drive belt, then go to step 27. (Refer to section B, DRIVE BELT, DRIVE BELT ADJUSTMENT.)
9 *	Disconnect refrigerant pressure switch connector. Set fan switch at first speed. Test voltage at the following terminal of refrigerant pressure switch (on wiring harness side). • Terminal B: (A/C signal) Is voltage **approximately 12 V** when A/C switch is off and **0 V** when on?	Yes	Go to step 14.
		No	Go to next step.
10 *	Test voltage at the following terminal of A/C amplifier. • Terminal A (IG2 signal) Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Repair wiring harness between A/C 15A fuse to A/C amplifier, then go to step 27.
11 *	Test voltage at the following terminal of A/C amplifier. • Terminal B (A/C signal) Is voltage **approximately 12 V** when A/C switch is off and **0 V** when on?	Yes	Repair wiring harness between refrigerant pressure switch to A/C switch, then go to step 27.
		No	Go to next step.
12 *	Disconnect A/C amplifier connector. Short terminals B and C of A/C amplifier connector (on wiring harness side). Test voltage at the following terminal of A/C amplifier connector (on wiring harness side). • Terminal B (A/C signal) Is voltage **approximately 12 V** when A/C switch is off and **0 V** when on?	Yes	Replace A/C amplifier, then go to step 27.
		No	Release short, then go to next step.
13 *	Turn A/C switch on. Turn fan switch off. Test voltage at the following terminal of A/C switch (on wiring harness side). • Terminal B (A/C signal) Is voltage **approximately 12 V**?	Yes	Repair wiring harness between A/C amplifier to A/C switch, then go to step 27.
		No	Inspect A/C switch, then go to step 27.
14 *	Test voltage at the following terminal of refrigerant pressure switch (on wiring harness side). • Terminal A: (A/C signal) Is voltage **approximately 12 V**?	Yes	Go to step 16.
		No	Go to next step.
15 *	Test voltage at the following terminal of ECM (PCM) (on wiring harness side). • Terminal 41 (A/C signal) Is voltage **approximately 12 V**?	Yes	Repair wiring harness between ECM (PCM) to refrigerant pressure switch, then go to step 27.
		No	ECM (PCM) inspection completed. Go to step 27.
16	When terminals A and B of refrigerant pressure switch connector (on wiring harness side) are shorted, is cool air discharged?	Yes	Go to next step.
		No	Release short, connect refrigerant pressure switch connector, then go to step 19.

STEP	INSPECTION		ACTION
17	Inspect refrigerant pressure. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURE, REFRIGERANT PRESSURE CHECK.) Is it okay?	Yes	Release short, connect refrigerant pressure switch connector, then go to step 19.
		No	Go to next step.
18	Inspect refrigerant amount. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURE, REFRIGERANT CHARGE CHECK.) Is it okay?	Yes	Inspect refrigerant pressure switch, then go to step 27.
		No	Adjust refrigerant to specified level, then go to step 27.
19	Is cool air discharged when Terminal B (IG1 signal) of A/C relay is grounded?	Yes	Release short, then go to next step.
		No	Go to step 22.
20 *	Turn A/C switch off. Test voltage at the following terminal of ECM (PCM) (on wiring harness side). • Terminal 69 (IG1 signal) Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Repair wiring harness between A/C relay to ECM (PCM) , then go to step 26.
21 *	Inspect input signal parts (power steering pressure switch, water temperature sensor, etc. excluding wiring harness) of ECM (PCM) (A/C cut control). Are they okay?	Yes	Replace ECM (PCM) , then go to step 27.
		No	Replace input signal parts, then go to step 27.
22 *	Test voltage at the following terminal of magnetic clutch's thermal protector. • Terminal A (A/C control signal) Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Go to step 24.
23	Inspect magnetic clutch. (Refer to CONTROL SYSTEM, MAGNETIC CLUTCH INSPECTION.) Is it okay?	Yes	Replace thermal protector, then go to step 27.
		No	Replace magnetic clutch stator, then go to step 27.
24	Check the following fuses. • METER 10 A fuse • COOLING FAN 30 A fuse Are they okay?	Yes	Go to next step.
		No	Replace fuse, then go to step 27. If fuse burns out right away, go to next step.
25 *	Test voltage at the following terminals of A/C relay. • Terminal A (IG1 signal) • Terminal C (A/C control signal) Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Repair wiring harness between METER 10 A fuse or COOLING FAN 30A fuse to A/C relay, then go to step 27.
26 *	Test voltage at the following terminal of A/C relay. • Terminal D (A/C control signal) Is voltage **approximately 12 V**?	Yes	Repair wiring harness between A/C relay to thermal protector, then go to next step.
		No	Replace A/C relay, then go to next step.
27	Is cool air discharged? (Is result of refrigerant system performance test correct?)	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

9	**None of air conditioning system's functions operate or heater control unit indicates nothing.**

TROUBLESHOOTING HINTS
① Heater control unit power system malfunction
Steps 1, 2
② Heater control unit GND system malfunction
Step 3

STEP	INSPECTION		ACTION
1	Check A/C 15A fuse. Is it okay?	Yes	Go to next step.
		No	Replace fuse, then go to step 4. If fuse burns out right away, go to next step.

STEP	INSPECTION		ACTION
2 *	Turn ignition switch to ON. Test voltage at the following terminal of heater control unit (Refer to CONTROL SYSTEM, HEATER CONTROL UNIT INSPECTION, Full-auto Air Conditioner.). • Terminal 2A (16-pin, IG2 signal)	Yes	Go to next step.
		No	Repair wiring harness between A/C 15A fuse to heater control unit, then go to step 4.
3 *	Test voltage at the following terminal of heater control unit (Refer to CONTROL SYSTEM, HEATER CONTROL UNIT INSPECTION, Full-auto Air Conditioner.). • Terminal 2O (16-pin, GND signal)	Yes	Replace heater control unit, then go to next step.
		No	Repair wiring harness between heater control unit to ground, then go to next step.
4	Does A/C system operate correctly?	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

10	**Heater control unit does not indicate some information or indication is incorrect.**

TROUBLESHOOTING HINTS

① Malfunction of entire indication of display (panel light control switch system malfunction)
Steps 1—6

② Malfunction of rear window defroster indication system (heater control unit, instrument cluster malfunction)
Steps 7, 8

③ Malfunction of ambient air temperature indication system (heater control unit, ambient temperature sensor malfunction)
Steps 9—11

④ Malfunction of A/C indication system (heater control unit, evaporator temperature sensor malfunction)
Steps 12—14

STEP	INSPECTION		ACTION
1	Does heater control unit's entire display indication malfunction when ignition switch is turned on?	Yes	Go to next step.
		No	Go to step 7.
2	Is entire display dark?	Yes	Go to next step.
		No	Go to step 5. (Entire display is bright.)
3 *	Disconnect heater control unit connector (16-pin). Test voltage at the following terminal (on wiring harness side). • Terminal 2E (16-pin, panel light control signal) Is voltage **0 V**?	Yes	Inspect heater control unit, then go to step 15. (Refer to CONTROL SYSTEM, HEATER CONTROL UNIT INSPECTION, Full-auto Air Conditioner.)
		No	Go to next step.
4 *	Disconnect panel light control switch connector. Test voltage at the following terminal (on wiring harness side). • Terminal C (panel light control signal) Is voltage **0 V**?	Yes	Inspect panel light control switch, then go to step 15. (Refer to section T, INTERIOR LIGHTING SYSTEM, PANEL LIGHT CONTROL SWITCH INSPECTION.)
		No	Repair wiring harness between heater control unit to panel light control switch, then go to step 15.
5 *	Disconnect heater control unit connector (16-pin). Turn headlight switch on. Test voltage at the following terminal. • Terminal 2E (16-pin, panel light control signal) Is voltage **0 V**?	Yes	Inspect heater control unit, then go to step 15. (Refer to CONTROL SYSTEM, HEATER CONTROL UNIT INSPECTION, Full-auto Air Conditioner.)
		No	Go to next step.

STEP	INSPECTION		ACTION
6 *	Disconnect panel light control switch connector. Test voltage at the following terminal (on wiring harness side). • Terminal C (panel light control signal) Is voltage as shown below? **Approximately 12 V** when switch is rotated to bright side. **Approximately 0 V** when switch is rotated to dim side.	Yes	Inspect panel light control switch, then go to step 15. (Refer to section T, INTERIOR LIGHTING SYSTEM, PANEL LIGHT CONTROL SWITCH INSPECTION.)
		No	Repair wiring harness between heater control unit to panel light control switch, then go to step 15.
7	Does LED of heater control unit's rear window defroster switch illuminate when switch is turned on?	Yes	Go to step 9.
		No	Go to next step.
8 *	Does rear window defroster switch's LED *illuminate when terminal 1D of heater control unit* connector (20-pin) is grounded?	Yes	Perform instrument cluster input/output check *mode, then go to step 15. (Refer to section T,* WARNING AND INDICATOR SYSTEM, INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE.)
		No	Replace heater control unit, then go to step 15.
9	Is heater control unit's ambient temperature indication correct?	Yes	Go to step 12.
		No	Go to next step.
10 *	Test voltage at the following terminal of heater control unit (Refer to CONTROL SYSTEM, HEATER CONTROL SYSTEM INSPECTION, Full-auto Air Conditioner.). • Terminal 1M (20-pin, ambient temperature sensor input signal) • Terminal 1N (20-pin, GND signal)	Yes	Replace heater control unit, then go to step 15.
		No	Go to next step.
11	Inspect ambient temperature sensor. (Refer to CONTROL SYSTEM, AMBIENT TEMPERATURE SENSOR INSPECTION.) Is it okay?	Yes	Repair wiring harness between heater control unit to ambient temperature sensor, then go to step 15.
		No	Replace ambient temperature sensor, then go to step 15.
12	Is A/C mark indicated on heater control unit's display when A/C is operating, or is A/C or A/C ECON mark indicated when A/C switch is operated?	Yes	Operation is normal. (Reconfirm malfunction symptoms.)
		No	Go to next step.
13 *	Test voltage at the following terminal of heater control unit (Refer to CONTROL SYSTEM, HEATER CONTROL SYSTEM INSPECTION, Full-auto Air Conditioner.). • Terminal 1T (20-pin, evaporator temperature sensor input signal)	Yes	Replace heater control unit, then go to step 15.
		No	Go to next step.
14	Inspect evaporator temperature sensor. (Refer to CONTROL SYSTEM, EVAPORATOR TEMPERATURE SENSOR INSPECTION.) Is it okay?	Yes	Repair wiring harness between heater control unit to evaporator temperature sensor, then go to next step.
		No	Replace evaporator temperature sensor, then go to next step.
15	Is indication of heater control unit operating correctly?	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

11	Switches inoperative (No change occurs in heater control unit indication and air conditioning operation).

TROUBLESHOOTING HINTS

① Malfunction in heater control unit operation
Step 3
② Malfunction in A/C operation
Steps 4, 5
③ Malfunction in rear window defroster operation
Step 6
④ Malfunction in fan switch operation
Steps 7—9

STEP	INSPECTION		ACTION
1	Is indication on heater control unit's display correct?	Yes	Go to step 3.
		No	Go to next step.
2	Is there no indication shown on heater control unit's display?	Yes	Go to troubleshooting symptom No. 9.
		No	Go to troubleshooting symptom No. 10. (One part of display shows no indication.)
3	Are any switch's operation accepted?	Yes	Replace heater control unit, then go to step 10.
		No	Go to next step.
4	Does A/C operate when AUTO switch is turned on?	Yes	Go to step 6.
		No	Go to next step.
5	Is ambient temperature **–5 °C {23 °F } or less**? (operate AMB switch to change over to ambient temperature indication.)	Yes	Operation is normal. (To prevent evaporation within cooling unit from freezing, A/C compressor stops right away when ambient temperature is **–5 °C {23 °F } or less**.)
		No	Replace heater control unit, then go to step 10.
6	Does rear window defroster operate when rear window defroster switch is turned on?	Yes	Go to next step.
		No	Perform instrument cluster input/output check mode, then go to step 10. (Refer to section T, WARNING AND INDICATOR SYSTEM, INSTRUMENT CLUSTER INPUT/OUTPUT CHECK MODE.)
7	Does airflow volume change when fan switch is operated?	Yes	Replace heater control unit, then go to step 10.
		No	Go to next step.
8 *	Disconnect heater control unit connector (16-pin). Turn ignition switch to ON. Test voltage at the following terminal (on wiring harness side). • Terminal 2I (blower motor feedback) Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Repair wiring harness between blower motor to heater control unit, then go to step 10.
9	Replace power MOS FET. Does airflow volume change when fan switch is operated?	Yes	Replace heater control unit, then go to step 10.
		No	Troubleshooting completed. Explain to customer regarding power MOS FET malfunction.
10	Is switch operation correctly accepted?	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

12	Blower motor does not operate properly according to fan switch position.

TROUBLESHOOTING HINTS

① Blower unit malfunction
Steps 3, 4, 12
② Blower motor malfunction
Steps 5—9
③ Power MOS FET system malfunction
Steps 10, 11, 13, 14
④ Heater control unit malfunction
Step 15

STEP	INSPECTION		ACTION
1	Is there no indication shown on heater control unit's display?	Yes	Go to troubleshooting symptom No. 9.
		No	Go to next step.
2	Inspect HEATER 40A fuse. Is it okay?	Yes	Go to next step.
		No	Replace fuse, then go to step 16. If fuse burns out right away, go to next step.
3	Turn ignition switch to ON. Recirculate air inside vehicle. Does blower unit's fan rotate smoothly?	Yes	Go to next step.
		No	Go to step 5.
4	Is intake vent of blower unit clogged?	Yes	Remove obstruction, then go to step 16.
		No	Check if there are any obstructions in passage between blower unit to heater unit, then go to step 16.
5 *	Turn ignition switch to ON. Test voltage at the following terminal of blower motor. • Terminal A (blower motor operation signal) Is voltage **approximately 12 V**?	Yes	Go to step 9.
		No	Go to next step.
6 *	Test voltage at the following terminals of blower relay. • Terminal A (IG2 signal) • Terminal C (+B signal) Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Repair wiring harness between blower relay to A/C 15A fuse and to HEATER 40A fuse, then go to step 16.
7 *	Test voltage at the following terminal of blower relay. • Terminal B (GND signal) Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Repair wiring harness between blower relay to ground, then go to step 16.
8 *	Test voltage at the following terminal of blower relay. • Terminal D (blower motor operation signal) Is voltage **approximately 12 V**?	Yes	Repair wiring harness between blower relay to blower motor, then go to step 16.
		No	Replace blower relay, then go to step 16.
9 *	Test voltage at the following terminal of blower motor. • Terminal B (blower motor feedback signal) Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Inspect blower motor, then go to step 16.
10 *	Test voltage at the following terminal of power MOS FET. • Terminal C (blower motor operation signal) Is voltage as shown below? Ignition switch ON: **approximately 12 V** Ignition switch ON and fan switch 1st position: **approximately 8 V** Ignition switch ON and fan switch 2nd position: **approximately 5 V** Ignition switch ON and fan switch 3rd position: **approximately 2.5 V** Ignition switch ON and fan switch 4th position: **approximately 0.3 V**	Yes	Go to next step.
		No	Repair wiring harness between blower motor to power MOS FET, then go to step 16.

STEP	INSPECTION		ACTION
11 *	Test voltage at the following terminal of power MOS FET. • Terminal A (GND signal) Is voltage **0 V**?	Yes	Go to next step.
		No	Repair wiring harness between power MOS FET to ground, then go to step 16.
12	Inspect fan in blower unit. • Is fan free of interference with blower unit case? • Is fan free of foreign material and obstructions? Is fan okay?	Yes	Go to next step.
		No	Remove obstruction, repair or replace fan and blower unit case, then go to step 16.
13 *	Disconnect power MOS FET connector. Test voltage at the following terminal (on wiring harness side). • Terminal B (blower motor control signal) Is voltage **approximately 10 V**?	Yes	Replace power MOS FET, then go to step 16.
		No	Go to next step.
14 *	Turn ignition switch to LOCK. Disconnect heater control unit connector. Check for continuity at the following terminals between power MOS FET to heater control unit (on wiring harness side). • Terminal B to terminal 2K (16-pin blower motor control signal)	Yes	Go to next step.
		No	Repair wiring harness between power MOS FET to heater control unit, then go to step 16.
15 *	Check for continuity at the following terminal between power MOS FET to ground (on wiring harness side). • Terminal B (blower motor control signal)	Yes	Repair wiring harness between power MOS FET to ground, then go to step 16.
		No	Replace heater control unit, then go to next step.
16	Is air discharged from vent?	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

13	**Air intake mode does not change (Airflow noise does not change when operating REC switch with fan switch set at 3rd or higher).**

TROUBLESHOOTING HINTS
① Air intake actuator malfunction
Steps 1—7
② Air intake door malfunction
Step 8

STEP	INSPECTION		ACTION
1	Inspect air intake actuator. (Refer to CONTROL SYSTEM, AIR INTAKE ACTUATOR INSPECTION.) Is it okay?	Yes	Go to next step.
		No	Replace air intake actuator, then go to step 9.
2 *	Turn ignition switch to ON. Test voltage at the following terminals of heater control unit (Refer to CONTROL SYSTEM, HEATER CONTROL UNIT INSPECTION, Full-auto Air Conditioner). • Terminal 2J (16-pin, FRESH motor drive signal) • Terminal 2L (16-pin, RECIRCULATE motor drive signal)	Yes	Go to next step.
		No	Go to step 4.

STEP	INSPECTION		ACTION
3 *	Test voltage at the following terminals of air intake actuator. • Terminal B: L.H.D., Terminal A: R.H.D. (2-pin, FRESH motor drive signal) • Terminal A: L.H.D., Terminal B: R.H.D. (2-pin, RECIRCULATE motor drive signal) Is voltage as shown below? FRESH motor drive signal: **approximately 0.5 V** during RECIRCULATE and **approximately 10 V** during FRESH RECIRCULATE motor drive signal: **approximately 10 V** during RECIRCULATE and **approximately 0.5 V** during FRESH	Yes	Replace air intake actuator, then go to step 9.
		No	Repair wiring harness between heater control unit to air intake actuator, then go to step 9.
4	Disconnect air intake actuator connector. Test voltage at the following terminals of heater control unit (Refer to CONTROL SYSTEM, HEATER CONTROL UNIT INSPECTION, Full-auto Air Conditioner). • Terminal 2J (16-pin, FRESH motor drive signal) • Terminal 2L (16-pin, RECIRCULATE motor drive signal)	Yes	Inspect air intake actuator, then go to step 9.
		No	Go to next step.
5	Disconnect heater control unit connector (16-pin). Test voltage at the following terminals (on wiring harness side). • Terminal 2J (16-pin, FRESH motor drive signal) • Terminal 2L (16-pin, RECIRCULATE motor drive signal) Is voltage **0 V**?	Yes	Go to next step.
		No	Repair wiring harness between heater control unit to air intake actuator, then go to step 9.
6	Turn ignition switch to LOCK. Check for continuity at the following terminals between heater control unit (on wiring harness side) to ground. • Terminal 2J (16-pin, FRESH motor drive signal) • Terminal 2L (16-pin, RECIRCULATE motor drive signal)	Yes	Repair wiring harness between heater control unit to air intake actuator, then go to step 9.
		No	Go to next step.
7	Inspect air intake links. • Is there grease on links? • Are links securely and properly installed? • Are links free of obstructions and hindrances? Are above items okay?	Yes	Go to next step.
		No	Apply grease to links. If any links are damaged, replace air intake actuator, then go to step 9.
8	Inspect blower unit's air intake door. • Is door free on obstructions, cracks, and damage? • Are doors securely and properly installed? Are above items okay?	Yes	Replace heater control unit, then go to next step.
		No	Remove obstruction, or install doors in proper position. If any doors are cracked or damaged, replace them then go to next step.
9	Does air intake mode change smoothly?	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

14	Cool air does not discharge.

TROUBLESHOOTING HINTS

① Drive belt malfunction
Step 7
② Heater control unit malfunction
Step 8
③ Refrigerant pressure switch malfunction
Steps 9, 11—14
④ ECM (PCM) (A/C signal) malfunction
Step 10
⑤ ECM (PCM) (IG1 signal) malfunction
Steps 15, 16
⑥ ECM (PCM) A/C cut control system malfunction
Step 17
⑦ A/C compressor malfunction
Steps 18, 19
⑧ A/C relay malfunction
Steps 20—22
⑨ Evaporator temperature sensor malfunction
Step 23

STEP	INSPECTION		ACTION
1	Is air discharged?	Yes	Go to next step.
		No	Go to troubleshooting symptom No. 1 or 12.
2	Start engine. Turn both AUTO switch and fan switch on. Does A/C compressor operate?	Yes	Go to next step.
		No	Go to step 4.
3	Is ambient temperature **0 °C {32 °F } or less**? (Operate AMB switch to change over to ambient temperature indication.)	Yes	Operation is normal. (To prevent evaporation within cooling unit from freezing, A/C compressor stops right away when ambient temperature is **0 °C {32 °F } or less**.)
		No	Go to troubleshooting symptom No. 2.
4	Does A/C indication on heater control unit illuminate when AUTO switch is turned on?	Yes	Go to step 6.
		No	Go to next step.
5	Is ambient air temperature **–5 °C {23 °F } or less**. (Operate AMB switch to change over to ambient air temperature indication.)	Yes	Operation is normal. (To prevent evaporation within cooling unit from freezing, A/C compressor stops right away when ambient temperature is **–5 °C {23 °F } or less**.)
		No	Go to troubleshooting symptom No. 10, step 13.
6	Carry out refrigerant system performance test. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURE, PERFORMANCE TEST.) Is operation normal?	Yes	Operation is normal. (Reconfirm malfunction symptoms.)
		No	Go to next step.
7	Inspect drive belt. (Refer to section B, DRIVE BELT, DRIVE BELT INSPECTION.) Is it okay?	Yes	Go to next step.
		No	Adjust or replace drive belt, then go to step 24. (Refer to section B, DRIVE BELT, DRIVE BELT ADJUSTMENT.)
8	Disconnect heater control unit connector (20-pin). Is cool air discharged when Terminal C of heater control unit connector (on wiring harness side, A/C signal) is grounded?	Yes	Replace heater control unit, then go to step 24.
		No	Release short, connect heater control connector, then go to next step.
9 * *	Disconnect refrigerant pressure switch connector. Test voltage at the following terminal of refrigerant pressure switch. • Terminal A: (A/C signal) Is voltage **approximately 12 V**?	Yes	Go to step 11.
		No	Go to next step.

STEP	INSPECTION		ACTION
10 *	Test voltage at the following terminal of ECM (PCM). • Terminal 41 (A/C signal) Is voltage **approximately 12 V**?	Yes	Repair wiring harness between ECM (PCM) to refrigerant pressure switch, then go to step 24.
		No	Inspect ECM (PCM), then go to step 24.
11	Is cool air discharged when terminals A and B of refrigerant pressure switch connector (on wiring harness side) are shorted?	Yes	Go to step 13.
		No	Go to next step.
12 *	Disconnect heater control unit connector (20-pin). Turn AUTO switch off. Test voltage at the following terminal of heater control unit. • Terminal 1C (20-pin, A/C signal) Is voltage **approximately 12 V**?	Yes	Go to step 15.
		No	Repair wiring harness between refrigerant pressure switch to heater control unit, then go to step 24.
13	Inspect refrigerant pressure. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURE, REFRIGERANT PRESSURE CHECK.) Is it okay?	Yes	Release short, connect pressure switch connector, then go to step 15.
		No	Go to next step.
14	Inspect refrigerant amount. (Refer to REFRIGERANT SYSTEM SERVICE PROCEDURE, REFRIGERANT CHARGE CHECK.) Is it okay?	Yes	Inspect refrigerant pressure switch, then go to step 24.
		No	Adjust refrigerant to specified level, then go to step 24.
15	Turn AUTO switch on. Is cool air discharged when terminal B of A/C relay connector (A/C control signal) is grounded?	Yes	Release short, then go to next step.
		No	Go to step 18.
16 *	Turn AUTO switch off. Test voltage at the following terminal of ECM (PCM) (Refer to section F, CONTROL SYSTEM, ECM (PCM) INSPECTION.). • Terminal 69 (A/C control signal)	Yes	Go to next step.
		No	Repair wiring harness between A/C relay to ECM (PCM) , then go to step 24.
17	Inspect input signal parts (power steering pressure switch, water temperature sensor, etc. excluding wiring harness) of ECM (PCM) (A/C cut control). Are they okay?	Yes	Replace ECM (PCM) , then go to step 24.
		No	Replace input signal parts, then go to step 24.
18 *	Test voltage at the following terminal of magnetic clutch's thermal protector. • Terminal A (magnetic clutch operation signal) Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Go to step 20.
19	Inspect magnetic clutch. (Refer to CONTROL SYSTEM, MAGNETIC CLUTCH INSPECTION.) Is it okay?	Yes	Replace thermal protector, then go to step 24.
		No	Replace stay of magnetic clutch, then go to step 24.
20	Inspect the following fuses. • METER 10A fuse • COOLING FAN 30A fuse Are they okay?	Yes	Go to next step.
		No	Replace fuse, then go to step 24. If fuse burns out right away, go to next step..
21	Test voltage at the following terminals of A/C relay. • Terminal A (IG1 signal) • Terminal C (+B signal) Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Repair wiring harness between METER 10 A fuse or COOLING FAN 30 A fuse to A/C relay, then go to step 24.
22	Test voltage at the following terminal of A/C relay. • Terminal D (magnetic clutch operation signal) Is voltage **approximately 12 V**?	Yes	Go to next step.
		No	Replace A/C relay, then go to step 24.

STEP	INSPECTION		ACTION
23	Is cooling unit's evaporator temperature sensor properly and securely installed in correct position?	Yes	Repair wiring harness between A/C relay to thermal protector, then go to next step.
		No	Install evaporator temperature sensor in correct position, then go to next step.
24	Is cool air discharged? (Are the results of refrigerant system performance test okay?)	Yes	Troubleshooting completed. Explain repairs to customer.
		No	Reconfirm malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

TECHNICAL DATA

TECHNICAL DATA ..... **TD- 1**
ENGINE ..... **TD- 1**
LUBRICATION SYSTEM ..... **TD- 2**
COOLING SYSTEM ..... **TD- 2**
FUEL AND EMISSION CONTROL SYSTEMS ..... **TD- 2**
ENGINE ELECTRICAL SYSTEM ..... **TD- 3**
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HEATER AND AIR CONDITIONER SYSTEM ..... **TD- 8**

TECHNICAL DATA

ENGINE

Item			Engine	
			FP	FS
Drive belt deflection (mm { in } /98 N {10 kgf })	Generator	New	6.5—7.0 {0.26—0.27}	
		Used	7.0—9.0 {0.28—0.35}	
		Limit	10.0 {0.39}	
	P/S, P/S + A/C	New	7.5—9.0 {0.30—0.35}	
		Used	8.0—9.5 {0.31—0.37}	
		Limit	11.0 {0.43}	
Drive belt tension (N { kgf , lbf })	Generator	New	736—833 {75—85, 165—187}	
		Used	491—686 {50—70, 110—154}	
		Limit	392 {40, 88}	
	P/S, P/S + A/C	New	589—784 {60—80, 132—176}	
		Used	491—686 {50—70, 110—154}	
		Limit	392 {40, 88}	
Valve clearance [Engine cold] (mm { in })	IN		0.225—0.295 {0.009—0.011} (0.26 ± 0.035 {0.010 ± 0.001})	
	EX		0.225—0.295 {0.009—0.011} (0.26 ± 0.035 {0.010 ± 0.001})	
Compression pressure (kPa { kgf/cm^2 , psi })	Standard		1471 {15.0, 213} [300 rpm]	
	Minimum		1030 {10.5, 149} [300 rpm]	
	Maximum difference between cylinders		196 kPa {2.0 kgf/cm^2, 28 psi }	
Tensioner spring free length (mm { in })			36.6 {1.44}	
Pushing distance of the camshaft oil seal (from the edge of the cylinder head) (mm { in })			0.3—0.7 {0.012—0.027}	
Pushing distance of the front oil seal (from the edge of the oil pump body) (mm { in })			0—0.5 {0—0.019}	
Pushing distance of the rear oil seal (from the edge of the rear cover) (mm { in })			0—0.5 {0—0.019}	
Cylinder head bolt length (mm { in })	Standard		104.2—104.8 {4.103—4.125}	
	Maximum		105.5 {4.154}	

LUBRICATION SYSTEM

Item		Engine	
		FP	FS
Oil pressure	(kPa { kgf/cm^2 , psi })	393—490 {4.0—5.0, 57—71} [3000 rpm]	
Oil capacity (L {US qt , Imp qt })	Oil replacement	3.3 {3.5, 2.9}	
	Oil and oil filter replacement	3.5 {3.7, 3.1}	
	Total (dry engine)	3.7 {3.9, 3.3}	
Engine oil		API service SG	
Viscosity	Above -25 °C {-13 °F }	SAE 10W-30	
	Below 0 °C {32 °F }	SAE 5W-30	

COOLING SYSTEM

Item		Engine	
		FP	FS
Coolant capacity	(L {USqt, Imp qt })	7.5 {7.9, 6.6}	
Radiator cap valve opening pressure	(kPa { kgf/cm^2, psi })	94—122 {0.95—1.25, 13.5—17.7}	
Thermostat	Initial-opening temperature (°C { °F })	80—84 {176—183}	
	Full-open temperature (°C { °F })	95 {203}	
	Full-open lift (mm { in })	8.5 {0.33} min.	
Cooling fan motor current	(A)	5.6—7.6	

FUEL AND EMISSION CONTROL SYSTEMS

Item		Engine	
		FP	FS
ENGINE TUNE-UP			
Idle speed	(rpm)	600—700	
Ignition timing	(BTDC °/rpm)	6—18/600—700	
Idle-up speed*1	E/L ON*2 (rpm)	600—700	
	A/C ON*3 (rpm)	600—700	
	P/S ON*4 (rpm)	600—700	
Idle mixture	HC concentration	Within the regulation	
	CO concentration	Within the regulation	
FUEL SYSTEM			
Fuel line hold pressure	(kPa { kgf/cm^2, psi })	More than 343 {3.5, 50}	
Fuel pump maximum pressure	(kPa { kgf/cm^2, psi })	500—630 {5.0—6.0, 64—92}	
Fuel injector	Leakage	Less than 1 drop/2 minutes	
	Volume (ml { cc, floz })	56—61 {56—61, 1.9—2.0}	
	Resistance (Ω)	12—16 [at 20 C° {68 °F }]	
Pressure regulator	PRC solenoid valve ON*5 (kPa { kgf/cm^2, psi })	260—310 {2.6—3.2, 37—45}	
	PRC solenoid valve OFF (kPa { kgf/cm^2, psi })	210—260 {2.1—2.6, 30—36}	

*1: Excludes temporary idle speed drop just after the loads (E/L, A/C, P/S) are turned ON.
*2: Headlight, fan switch (3rd or higher) and cooling fan are turned ON.
*3: A/C switch and fan switch are tuned ON.
*4: Steering wheel fully turned.
*5: Hot condition at the starting.

TECHNICAL DATA

ENGINE ELECTRICAL SYSTEM

Item					Engine	
					FP	FS
Battery	Electrolyte gravity				1.27—1.29	
	Dark current *1			(mA)	20	
	Test load chart (A)	Battery type		55D23L	180	
				75D26L *2	195	
	Slow charge (A)	Battery type (5 hours rate)		55D23L (48)	4.5—5.5	
				75D26L (52) *2	5.5—6.5	
	Quick charge (A/30 min)	Battery type (5 hours rate)		55D23L (48)	30	
				75D26L (52) *2	35	
Generator	Rotor resistance (Between slip rings)			(Ω)	2.5—2.9	
	Brush length	Standard		(mm { in })	18.5 {0.73}	
		Minimum		(mm { in })	5.0 {0.20}	
	Brush spring force	Standard		(N { kgf, lbf })	5.2 {0.53, 1.17}	
		Minimum		(N { kgf, lbf })	2.7 {0.28, 0.62}	
	Standard voltage (V)	Ignition switch ON	Terminal	B	B+	
				P	Below approx. 1	
				D	Approx. 0	
		idle [20 °C {68 °F }]	Terminal	B	13—15	
				P	Approx. 3—8	
				D	Approx. 0.7—2 V	
	Generated current (Reference) (A)	Terminal B current			Approx. 0—59 [1000 rpm]	
		Terminal B current			Approx. 0—77 [2000 rpm]	
Ignition coil	Resistance [20 °C {68 °F }]	Primary coil		(Ω)	0.45—0.55	
		Secondary coil		(kΩ)	11.5—15.5	
		Insulation resistance of case		(MΩ)	10	
Spark plug	Type		DENSO		PKJ16CR8*3, PKJ20CR8	
	Plug gap			(mm { in })	0.7—0.8 {0.028—0.031}	
	Resistance			(kΩ)	3.0—7.5	
	Tightening torque			(N·m { kgf·m , ft·lbf })	15—22 {1.5—2.3, 11—16}	
High-tension lead	Resistance			(kΩ /m) [20 °C {68 °F }]	16	
Starter	Commutator diameter	Standard		(mm { in })	29.4 {1.16}*4, 29.0 {1.14}*5	
		Minimum		(mm { in })	28.8 {1.14}*4, 27.3 {1.07}*5	
	Brush length	Standard		(mm { in })	12.3 {0.48}*4, 13.2 {0.52}*5	
		Minimum		(mm { in })	7.0 {0.28}	
	Brush spring force	Standard		(N { kgf, lbf })	17.7 {1.80, 3.96}*4, 15.0—18.6 {1.52—1.90, 3.34—4.18}*5	
		Minimum		(N { kgf, lbf })	5.88 {0.60, 1.32}*4	
	Pinion gap			(mm { in })	0.5—2.0 {0.020—0.078}	
	No load test	Voltage		(V)	11	
		Current		(A)	Below 90	

*1 Dark current is the constant flow of current present (for the audio unit, clock, ECM/PCM, etc.) when the ignition switch is OFF and with the ignition key removed.
*2 Cold area
*3 Standard plug
*4 MITSUBISHI
*5 Ford

TD

CLUTCH

Item		Engine	
		FP	FS
Manual transaxle type		G25M-R	
Clutch pedal			
Height	(mm { in })	LHD: 196—204 {7.72—8.03} (with carpet) RHD: 203—210 {8.00—8.27} (with set plate)	
Pedal free play	(mm { in })	1.0—3.0 {0.04—0.12}	
Total pedal free play	(mm { in })	5.0—14.0 {0.20—0.55}	
Clutch disc			
Run out limit	(mm { in })	0.700 {0.0286} max.	
Clutch fluid			
Type		SAE J1703, FMVSS116 DOT-3 or DOT-4	

MANUAL TRANSAXLE

Item		Manual transaxle type
		G25M-R
Transaxle oil		
Grade		API service GL-4 or GL-5
Viscosity	All-season	SAE 75W-90
	Above 10 °C {50 °F }	SAE 80W-90
Capacity	(L {US qt, Imp qt })	2.7 {2.9, 2.4}

AUTOMATIC TRANSAXLE

Item			Engine	
			FP	FS
Transaxle type			GF4A-EL	
Line pressure (kPa { kgf/cm^2, psi })	D, S, L range	Idle	412—539 {4.2—5.5, 60—78}	
		Stall	1099—1196 {11.2—12.0, 160—170}	
	R position	Idle	726—1010 {7.4—10.3, 106—146}	
		Stall	1903—2029 {19.4—20.7, 276—294}	
Engine stall speed (rpm)	D, S, L range		2440—2730	2090—2400
	R position		2440—2730	2090—2400
Time lag (sec)	N→D		0.9	
	N→R		1.1	
Transaxle fluid temperature sensor (kΩ)	20 °C {68 °F }		2.441—2.894	
	40 °C {104 °F }		1.193—1.374	
	60 °C {140 °F }		0.6284—0.7048	
	80 °C {176 °F }		0.3527—0.3865	
	100 °C {212 °F }		0.2091—0.2245	
	120 °C {248 °F }		0.1301—0.1372	
	130 °C {266 °F }		0.1044—0.1090	
Input/turbine speed sensor (Ω)	ATF temperature: -40 -160 °C {-40 -320 °F }		253—604	

Item		Engine	
		FP	FS
Solenoid valve (Ω)	Shift solenoid A	11—27	
	Shift solenoid B	11—27	
	Shift solenoid C	11—27	
	TCC control	11—27	
	3—2 timing	11—27	
	TCC	9—18	
	Pressure control	9—18	
Automatic transaxle fluid (ATF)	Type	M-III or equivalent (e.g.Dexron® II)	
	Capacity (L {US qt, Imp, qt })	8.0 {8.5, 7.0}	

FRONT AND REAR AXLES

Item		Engine			
		FP		FS	
Transaxle		**MTX**	**ATX**	**MTX**	**ATX**
Front axle					-
Bearing play (mm { in })		0.05 {0.002}			
Rear axle					
Bearing play (mm { in })		0.05 {0.002}			
Drive shaft					
Shaft length (Air in boot at atmospheric pressure) (mm { in })	Left side	641.0—651.0 {25.3—25.6}	640.3—650.3 {25.2—25.6}	641.0—651.0 {25.3—25.6}	639.2—649.2 {25.2—25.5}
	Right side	591.5—601.5 {23.3—23.6}	585.8—589.8 {23.1—23.2}	591.5—601.5 {23.3—23.6}	582.2—592.2 {23.0—23.3}

STEERING SYSTEM

Item		Specification
Steering wheel		
Steering wheel play	(mm { in })	0—30 {0—1.2}
Steering wheel effort	(N·m { kgf·cm, in·lbf })	7.8 {80, 69} max.
Steering shaft and joint		
Shaft length	(mm { in })	576.6 {22.7}
Steering gear		
Tie-rod end rotation torque (Pull scale reading)	(N·m {kgf·cm, ft·lbf }) (N {kgf, lbf })	0.3—2.9 {3—30, 2.6—26} (3—29 {0.3—3.0, 0.7—6.6})
Tie-rod swinging torque (Pull scale reading)	(N·m {kgf·m, ft·lbf }) (N {kgf, lbf })	0.1—3.4 {1—35, 0.9—30.3} (0.7—21.5 {0.07—2.20, 0.16—4.84})
Pinion height rotation torque(N·m { kgf·cm, ft·lbf }) (Pull scale reading) (N { kgf, lbf })	Center of rack ±90°	1.0—1.4 {10—14, 8.7—12.2} (9.9—13.7 {1.0—1.4, 2.2—3.0})
	At other positions	1.6 {17, 14} (16.7 {(1.7, 3.7})
Power steering system		
Power steering fluid	Type	ATF M-III or equivalent (e.g.Dexron® II)
	Capacity (L {US qt , Imp qt })	0.84 {0.89, 0.74}
Fluid pressure	(MPa {kgf/cm^2, psi})	7.20—7.69 {73.5—74.0, 1046—1052}

TD

BRAKING SYSTEM

Item			MTX		ATX	
			With ABS	Without ABS	With ABS	Without ABS
Brake pedal						
Brake pedal height (reference value)		(mm { in })	L.H.D. : 185 {7.28} , R.H.D. : 200 {7.87}			
Brake pedal play		(mm { in })	4—12 {0.16—0.47}			
Brake pedal-to-floor clearance		(mm { in })	L.H.D. : 80 {3.1} min., R.H.D. : 95 {3.7} min.			
Power brake unit						
Fluid pressure when pedal depressed at 196 N {20 kgf, 44 lbf} (kPa { kgf/cm^2, psi })	Power brake unit at 0 kPa {0 mmHg, 0 inHg }		790 {8, 114} min.			
	Power brake unit at 66.7 kPa {500 mmHg, 19.7 inHg }		7100 {72, 1100} min.		8820 {90, 1300} min.	
Dual proportioning valve						
Bend portion		(kPa { kgf/cm^2, psi })	2940 {30, 430} ±200 {2, 30}	2450 {25, 360} ±200 {2, 30}	2940 {30, 430} ±200 {2, 30}	3400 {35, 500} ±295 {3,43}
Rear wheel pressure when master clyinder pressure is 5880 kPa {60 kgf/cm^2, 850 psi } (kPa { kgf/cm^2, psi })			3830 {39, 550} ±295 {3, 43}	3480 {35, 500} ±295 {3, 43}	3830 {39, 550} ±295 {3, 43}	4410 {45, 640} ±390 {4, 60}
Front disc brake						
Disc pad	Minimum thickness	(mm { in })	2.0 {0.08}			
Disc plate	Minimum thickness	(mm { in })	22 {0.94}			
	Runout limit	(mm { in })	0.05 {0.002} min.			
Rear disc brake						
Disc pad	Minimum thickness	(mm { in })	2.0 {0.08}			
Disc plate	Minimum thickness	(mm { in })	8 {0.31}			
	Runout limit	(mm { in })	0.05 {0.002} min.			
Rear drum brake						
Maximum inner diameter		(mm { in })	230.1 {9.059}			
Lining	Minimum thickness	(mm { in })	1.0 {0.04}			
Clearance between shoe and drum			Auto adjuster			
Parking brake						
Parking brake lever stroke (When pulled at 98 N {10 kgf, 22 lbf })		(notches)	5—7			
Brake fluid						
Type			SAE J1703, FMVSS 116 DOT-3 or DOT 4			

SUSPENSION

Suspension

Item			Fuel gauge indication				
			Empty	1/4	1/2	3/4	Full
Front wheel alignment (unloaded)*1	Maximum steering angle	Inner	38° ±2°				
		Outer	32.5° ±2°				
	Total toe-in	(mm { in })	Rim inner: 2±4 {0.08±0.16} Tire: 3±4 {0.12±0.16}				
		Degree	0° 17' ±0° 23'				
	Camber angel*2		-0° 18' ±1°			-0° 20' ±1°	
	Caster angel*2		1° 43' ±1°	1° 45' ±1°	1° 48' ±1°	1° 50' ±1°	1° 52' ±1°
	SAI*3 (reference value)		12° 43'				
Rear wheel alignment (unloaded)*1	Total toe-in	(mm { in })	Rim inner: 0.5±4 {0.02±0.16} Tire: 1±4 {0.04±0.16}				
		Degree	0° 05' ±0° 23'		0° 06' ±0° 23'		
	Camber angel*2 (reference value)		-0° 41' ±1°	-0° 43' ±1°	-0° 44' ±1°	-0° 46' ±1°	-0° 47' ±1°
	Thrust angle (reference value)		0° ±0° 48'				
Lower arm ball joint rotation torque	Torque (N·m { kgf·cm, in·lbf })		1.0—4.9 {10—50, 8.6—43}				
	Pull scale reading (N {kgf, lbf })		9.8—49 {1.0—5.0, 2.2—11.0}				
Front and rear stabilizer control link rotation torque (N·m { kgf·cm , in·lbf })			0.2—1.5 {2.0—15.0, 1.7—13}				

*1 Engine coolant and engine oil at specified level; spare tire, jack, and tools in designated position. Adjust to the median when carrying out wheel alignment.
*2 Difference between left and right must not exceed 1.5°
*3 SAI: Steering axis inclination

Wheel and Tires

Item			Engine	
			FP and FS	FS (Hi-power)
Tire	Size		185/65 R14 86 H 185/65 R15 88 H 195/60 R15 88 V	195/60 R15 88V
	Air pressure (kPa { kgf/cm², psi })	Front Up to 4 persons	220 {2.2, 32}	
		Front ~ Full load	240 {2.4, 35}	
		Rear Up to 4 persons	220 {2.2, 32}	
		Rear ~ Full load	280 {2.8, 41}	
	Remaining tread	Standard tire (mm { in })	1.6 {0.063}	
		Snow tire	50 % of tread	
Wheel	Size		14×5 1/2J, 15×6JJ	15×6JJ
	Material		Steel or aluminum alloy	Aluminum alloy
	Offset (mm { in })		45 {1.77}	
	Pitch circle diameter (mm { in })		114.3 {4.450}	
Runout limit (mm { in })		Horizontal	Steel wheel: 2.5 {0.098} Aluminum wheel: 2.0 {0.79}	
		Vertical	1.5 {0.059}	
Unbalance limit (at rim edge) (g { oz })			14 inch wheel: 10 {0.35} max. 15 inch wheel: 9 {0.31} max.	9 {0.31} max.
Wheel nut tightening torque (N·m { kgf·m , ft·lbf })			87—117 {9—12, 66—86}	

- One balance weight; max. 60 g {2.1 oz } .
- If the total weight exceeds 100 g {3.5 oz } on one side, rebalance after moving the tire around on the rim.
- Do not use more than two balance weights on the inner or outer side of the wheel.

BODY ELECTRICAL SYSTEM

Item			Specifications (W) × number
Exterior lights	Headlight	High beam	55 × 2
		High/low *	55 × 2
	Parking light		5 × 2
	Front turn light		21 × 2
	Front side turn light		5 × 2
	Front fog light		55 × 2
	Brake light/taillight		21/5 × 2
	Rear turn light		21 × 2
	Back-up light		21 × 2
	Rear fog light		21 × 1
	License plate light		5 × 2
	High-mount brake light		21 × 1
Interior lights	Interior light		10 × 1
	Spot light		5 × 2
	Interior and spot light		10 × 1, 5 × 2
	Trunk compartment light		5 × 1
	Cargo compartment light		5 × 1
	Instrument cluster illumination		3.4 × 2, 1.4 × 2
Warning and indicator lights	ABS warning light		1.4 × 1
	Air bag system warning light		1.4 × 1
	Brake system warning light		1.4 × 1
	Cruise main indicator light		1.4 × 1
	Cruise set indicator light		1.4 × 1
	Door ajar warning light		1.4 × 1
	Front fog light indicator light		1.4 × 1
	Fuel-level warning light		1.4 × 1
	Generator warning light		1.4 × 1
	High beam indicator light		1.4 × 1
	HOLD indicator light		1.4 × 1
	Oil pressure warning light		1.4 × 1
	Rear fog light indicator light		1.4 × 1
	Security light		1.4 × 1
	TCS indicator light		1.4 × 1
	TCS OFF warning light		1.4 × 1
	Turn indicator light		1.4 × 2
	Washer fluid-level warning light		1.4 × 1

* Low beam, however also remains illuminated when high beam turned on

HEATER AND AIR CONDITIONER SYSTEMS

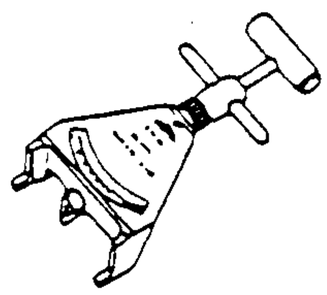
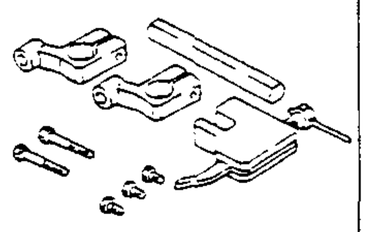
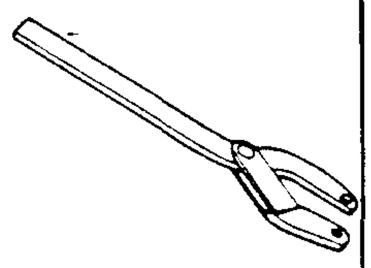
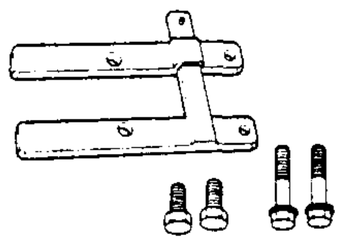
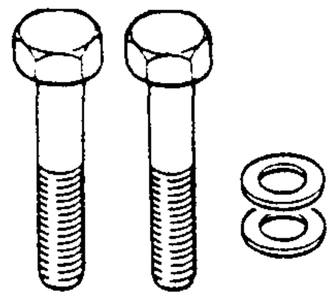
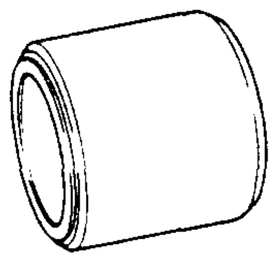
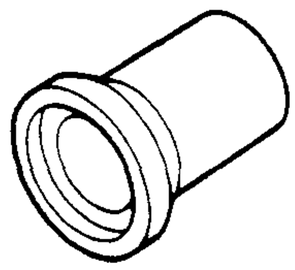
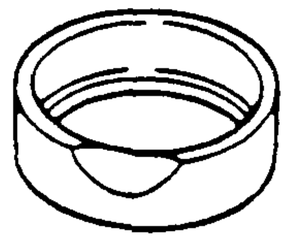
Item			Specification
Refrigerant	Type		R-134a
	Regular amount (g { oz })		700 {24.7} : condenser 32 lines 625 {22.1} : condenser 26 lines
A/C compressor	Lube oil	Type	ATMOS GU10
		Sealed volume (ml { cc, fl oz})	150 {150, 5.07}
	Magnetic clutch clearance (mm { in })		0.4—0.6 {0.016—0.023}

SPECIAL TOOLS

SPECIAL TOOLS **ST-1**
ENGINE **ST-1**
LUBRICATION SYSTEM **ST-1**
COOLING SYSTEM **ST-1**
FUEL AND EMISSION CONTROL SYSTEMS **ST-2**
CLUTCH **ST-2**
MANUAL TRANSAXLE **ST-2**
AUTOMATIC TRANSAXLE **ST-2**
FRONT AND REAR AXLES **ST-3**
STEERING SYSTEM **ST-4**
BRAKING SYSTEM **ST-5**
SUSPENSION **ST-6**
BODY **ST-7**
BODY ELECTRICAL SYSTEM **ST-7**
HEATER AND AIR CONDITIONER SYSTEMS **ST-7**

SPECIAL TOOLS

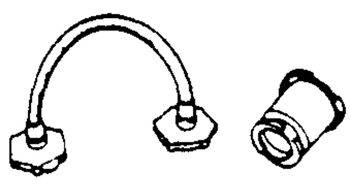
ENGINE

49 9200 020 V-ribbed belt Tension gauge 	49 T012 0A0A Tappet holder set 	49 S120 710 Coupling flange holder 
49 E011 1A1 Holder set 	49 G011 103 Bolts 	49 G017 5A0 Engine support 
49 B014 001 Oil seal installer 	49 H010 401 Oil seal installer 	49 G033 107A Dust cover installer 

LUBRICATION SYSTEM

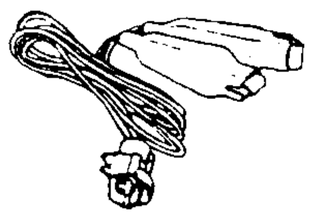
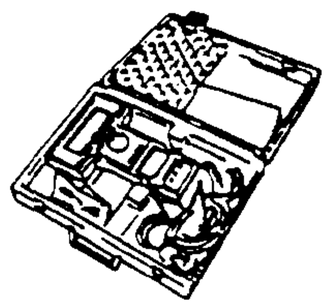
49 0187 280 Oil pressure gauge 	49 G014 001 Oil filter wrench	—

COOLING SYSTEM

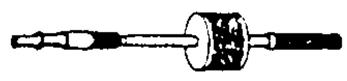
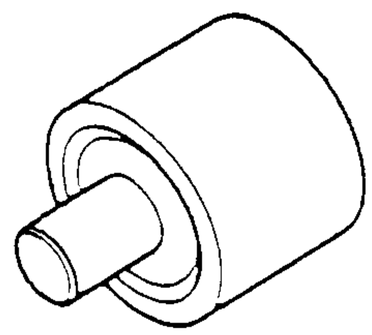
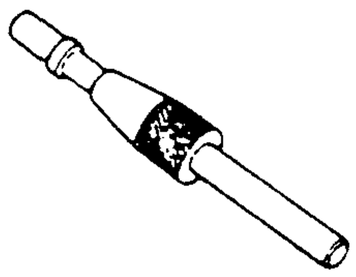
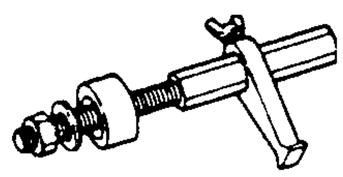
49 9200 145 Radiator cap tester adapter set 	—	—

SPECIAL TOOLS

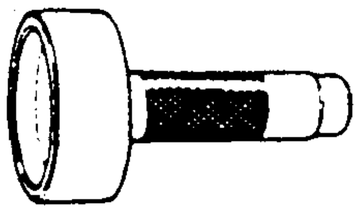
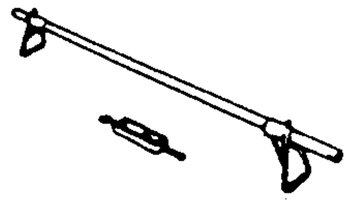
FUEL AND EMISSION CONTROL SYSTEMS

49 L018 901 Injector checker 	Program card 	SST No. for Program card varies with language • 49 T088 030A (English/French) • 49 T088 031A (English/German) • 49 T088 032A (English/Dutch) • 49 T088 033A (English/Swedish)
49 T088 0A4 NGS set 	—	—

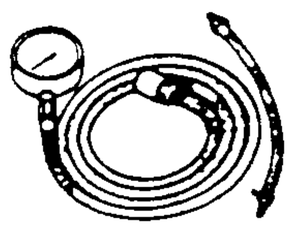
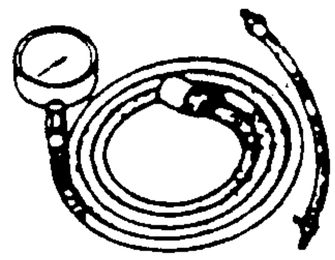
CLUTCH

49 0259 770B Flare nut wrench 	49 1285 071 Bearing puller 	49 F028 202 Bush installer 
49 SE01 310A Clutch disc centering tool 	49 E011 1A0 Ring gear brake set 	—

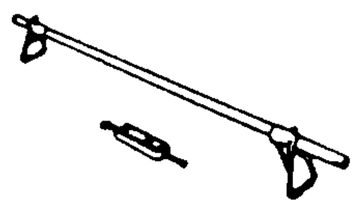
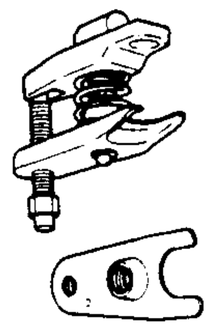
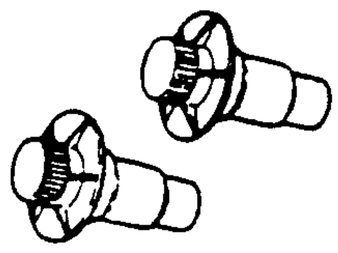
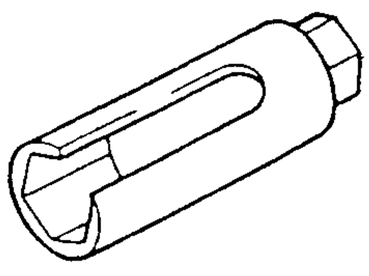
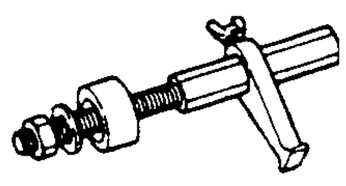
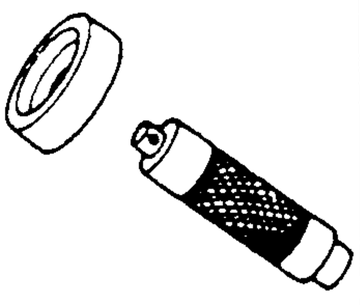
MANUAL TRANSAXLE

49 B001 795 Oil seal installer 	49 G017 5A0 Engine support 	—

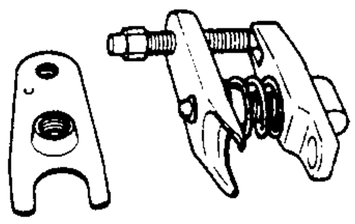
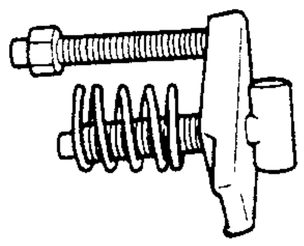
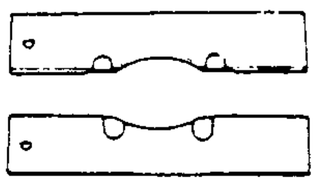
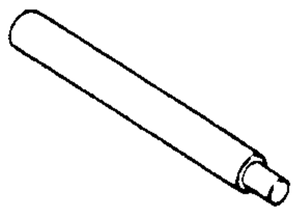
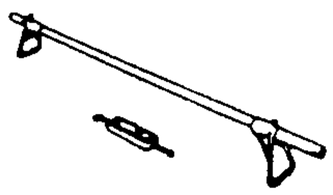
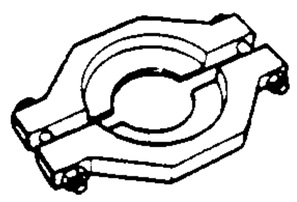
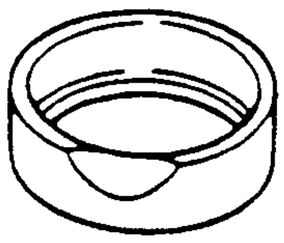
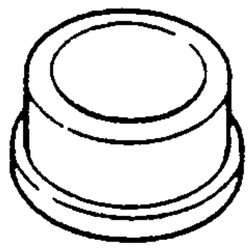
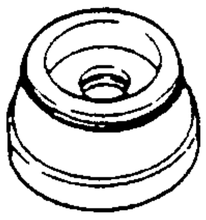
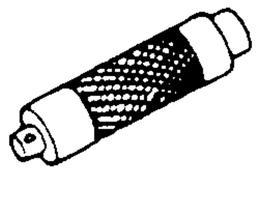
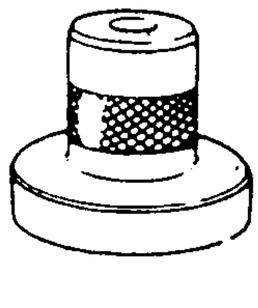
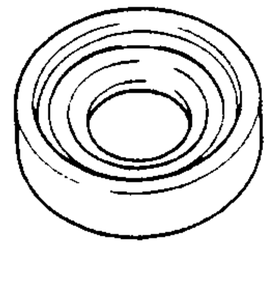
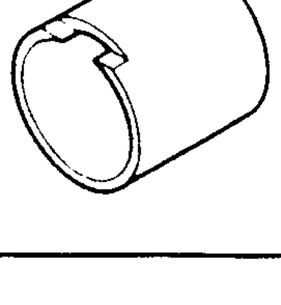
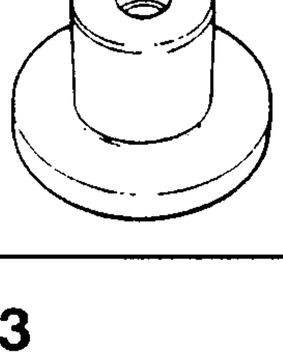
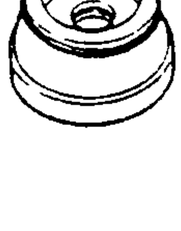
AUTOMATIC TRANSAXLE

49 0378 400B Oil pressure gauge set 	49 B019 9A2A Oil pressure gauge set 	49 H019 002 Adapter 

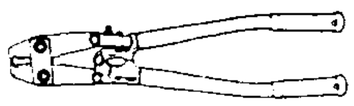
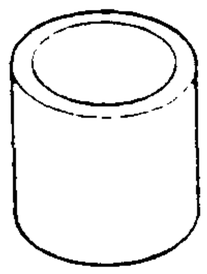
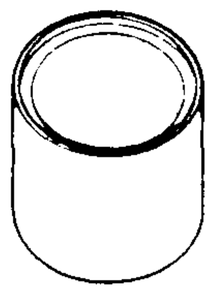
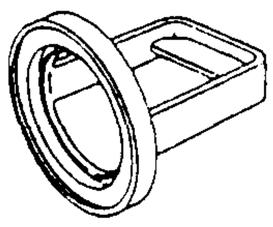
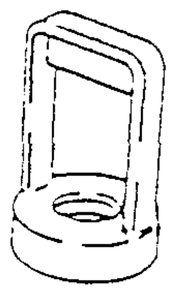
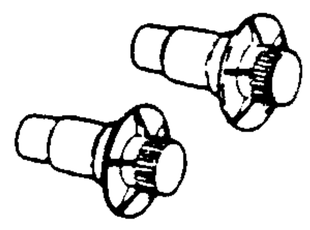
SPECIAL TOOLS

49 G017 5A0 Engine support 	49 T028 3A0 Ball joint puller set 	49 G030 455 Differential side gear holder 
49 G019 031 Wrench 	49 E011 1A0 Ring gear brake set 	49 G030 795 Oil seal installer 

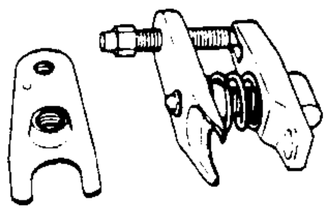
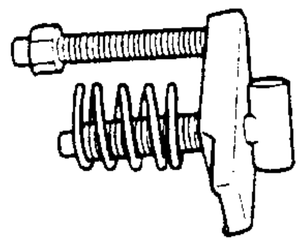
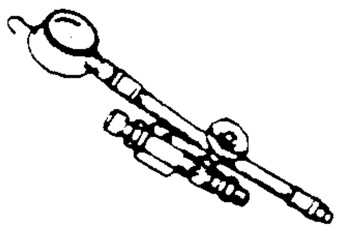
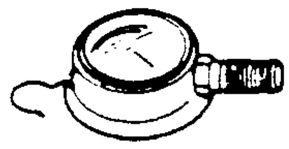
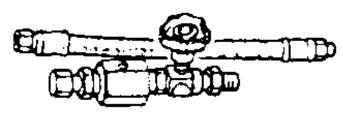
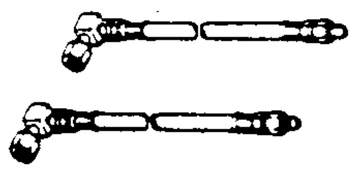
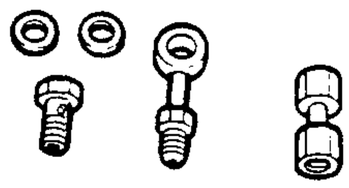
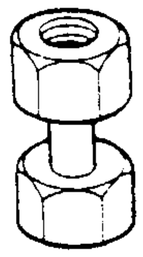
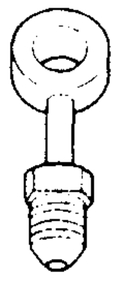
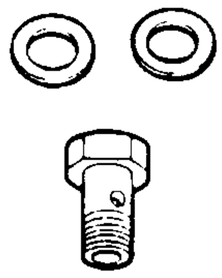
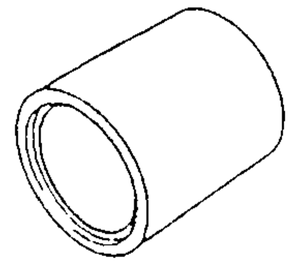
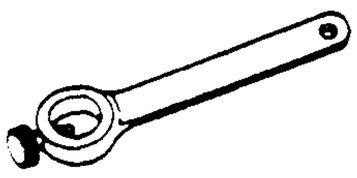
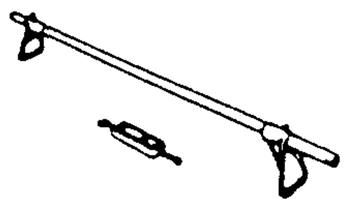
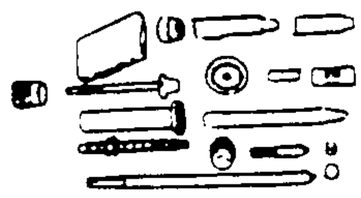
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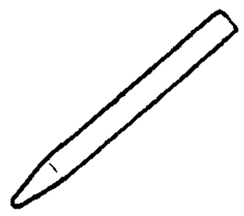
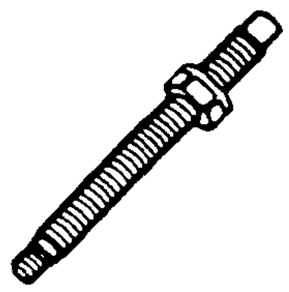
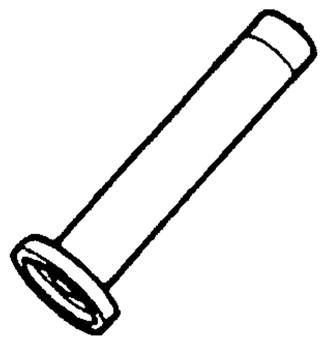
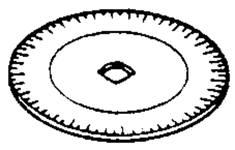
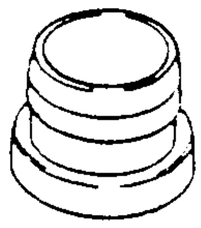
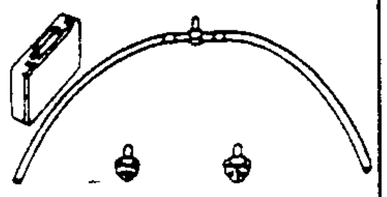
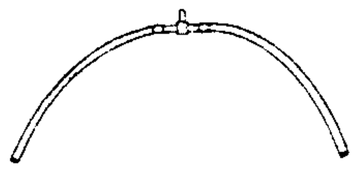
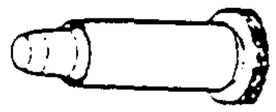
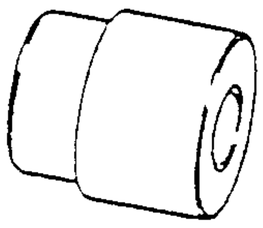
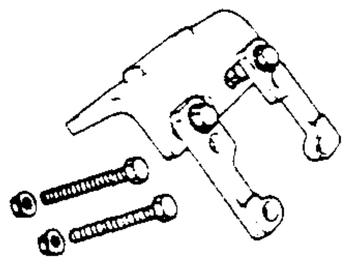
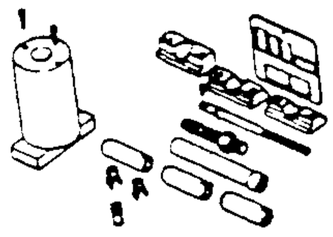
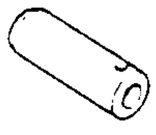
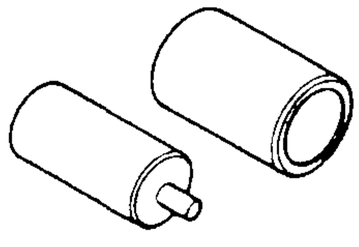
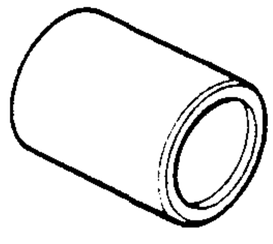
49 T028 3A0 Ball joint puller set 	49 T028 303 Body (Part of 49 T028 3A0) 	49 T028 305 Attachment (Part of 49 T028 3A0) 
49 F026 103 Wheel hub puller 	49 G033 102 Handle 	49 G033 105 Attachment 
49 G033 106 Attachment 	49 G017 5A0 Engine support 	49 H027 002 Bearing remover 
49 G033 107A Dust cover installer 	49 F027 009 Attachment ø 68 and 77 	49 F027 004 Attachment ø 80 
49 G030 797 Handle 	49 V001 795 Oil seal installer 	49 G026 105 Sensor rotor installer 
49 H034 201 Support block 	49 F026 102 Bearing installer 	49 F027 005 Attachment ø 62 

SPECIAL TOOLS

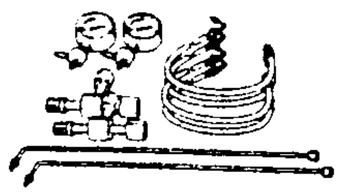
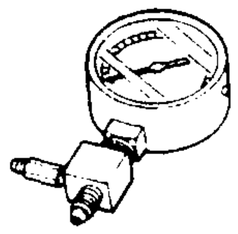
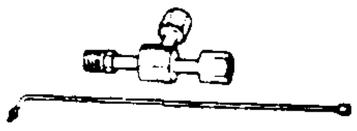
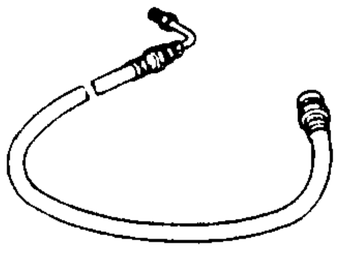
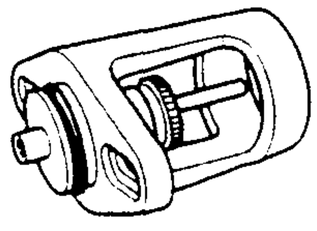
49 T025 001 Boot clamp crimpers 	49 W027 003 Bearing installer 	49 B025 004 Dust seal installer 
49 G025 001 Sensor rotor installer (ATX) 	49 B025 006A Sensor rotor installer (MTX) 	49 G030 455 Differential side gear holder 

STEERING SYSTEM

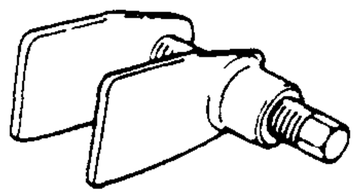
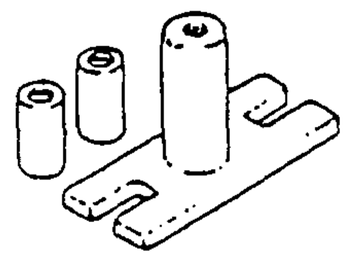
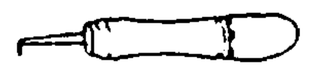
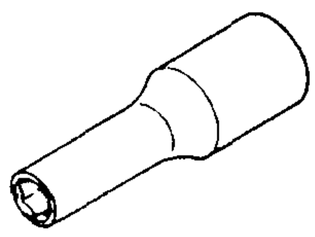
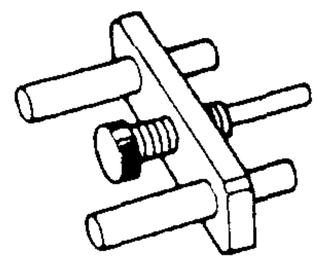
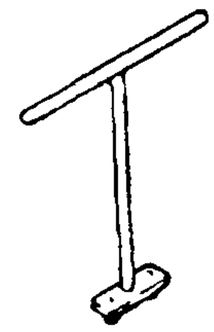
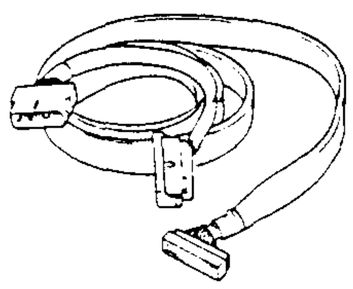
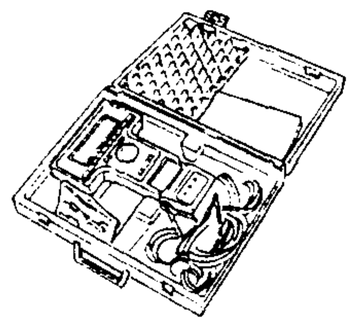
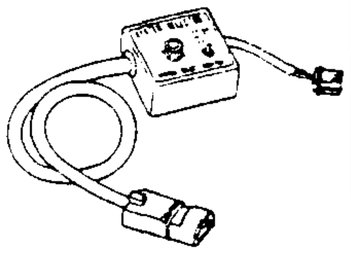
49 T028 3A0 Ball joint puller set 	49 T028 303 Body (Part of 49 T028 3A0) 	49 T028 305 Attachment (Part of 49 T028 3A0) 
49 1232 670A Power steering gauge set 	49 1232 672 Gauge (Part of 49 1232 670A) 	49 1232 673 Valve body (Part of 49 1232 670A) 
49 H002 671 Power steering gauge adapter 	49 G032 3A4 Power steering Gauge adapter set 	G032 351 Adapter (Part of 49 G032 3A4) 
G032 352 Adapter (Part of 49 G032 3A4) 	49 G032 353 Bolt (Part of 49 G032 3A4) 	49 8038 785A Dust boot installer 
49 0180 510B Preload measuring attachment 	49 G017 5A0 Engine support 	49 G032 3A0 Power steering repair set 
49 G032 301 Attachment (Part of 49 G032 3A0) 	49 G032 302 Attachment (Part of 49 G032 3A0) 	49 G032 303 Handle (Part of 49 G032 3A0) 

49 G032 304 Oil seal installer (Part of 49 G032 3A0) 	49 G032 305 Rack protector (Part of 49 G032 3A0) 	49 G032 306 Oil seal remover shaft (Part of 49 G032 3A0) 
49 G032 307 Oil seal remover body (Part of 49 G032 3A0) 	49 G032 308 Oil seal installer (Part of 49 G032 3A0) 	49 G032 312 Bearing installer (Part of 49 G032 3A0) 
49 D032 316 Protoractor (Part of 49 G032 3A0) 	49 G032 336 Pinion seal installer 	49 G032 3A1 Joint hose set 
49 G032 317 Hose (Part of 49 G032 3A1) 	49 G032 319 Adapter (Part of 49 G032 3A1) 	49 G032 334 Pinion seal installer 
49 S032 313 Attachment 	49 F032 301 Power steering pump hanger 	49 L011 0A0B Piston pin setting tool set 
49 L011 007 Guide (Part of 49 L011 0A0B) 	49 D034 2A0 Lower arm bush puller and installer set 	49 D034 202 Support block (Part of 49 D034 2A0) 

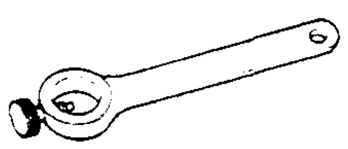
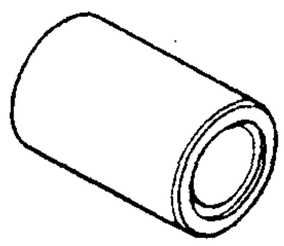
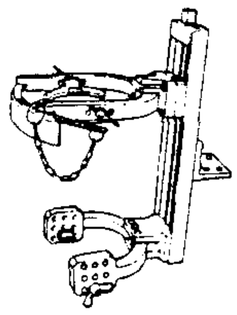
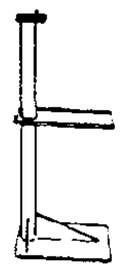
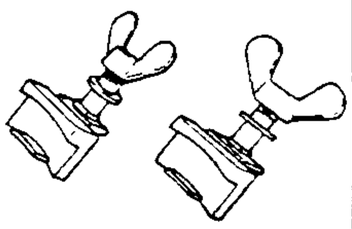
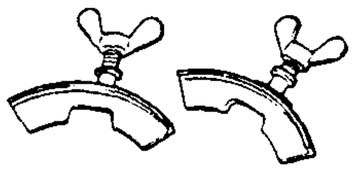
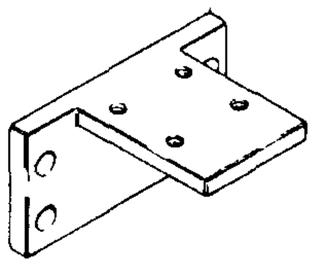
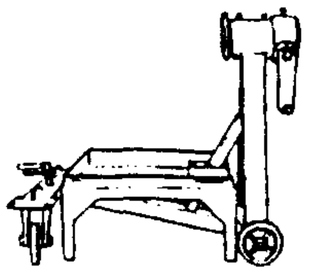
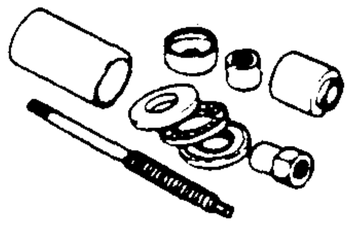
BRAKING SYSTEM

49 U043 0A0 Oil pressure gauge set 	49 U043 004 Oil pressure gauge (Part of 49 U043 0A0) 	49 U043 005 Joint (Part of 49 U043 0A0) 
49 U043 006 Hose (Part of 49 U043 0A0) 	49 0259 770B Flare nut wrench 	49 B043 001 Adjust gauge 

SPECIAL TOOLS

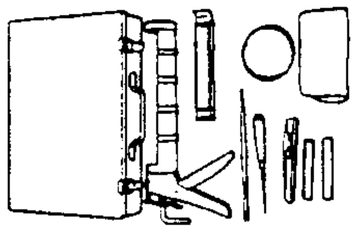
49 0221 600C Disc brake expand tool 	49 E043 003A Turning lock tool 	49 0208 701A Boot air out tool 
49 B043 004 Socket wrench 	49 F043 001 Adjust gauge 	49 FA18 602 Disc brake piston wrench 
49 G066 001 Harness adapter 	49 T088 0A4 NGS set 	49 H018 9A1A Self-diagnosis checker 
Program card 	SST No. for Program card varies with language • 49 T088 030A (English/French) • 49 T088 031A (English/German) • 49 T088 032A (English/Dutch) • 49 T088 033A (English/Swedish)	49 B019 9A0 System selector 

SUSPENSION

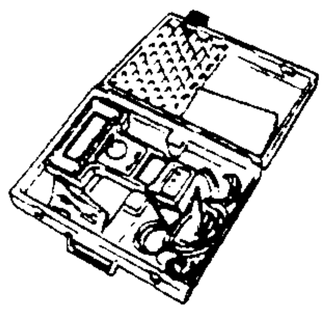
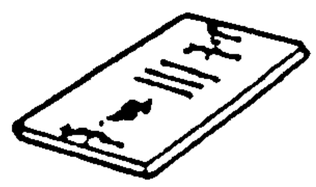
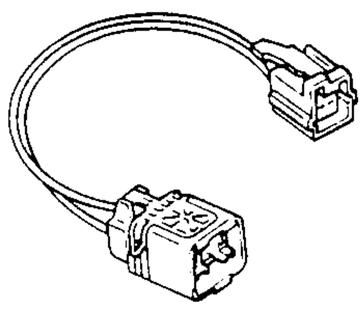
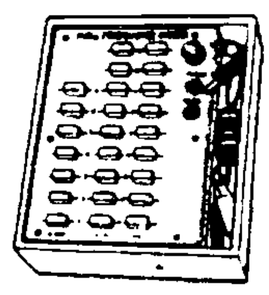
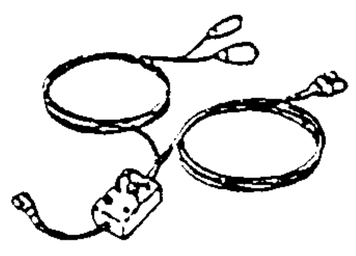
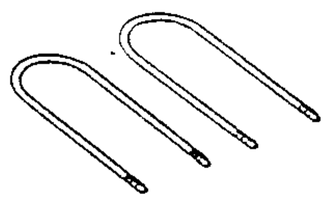
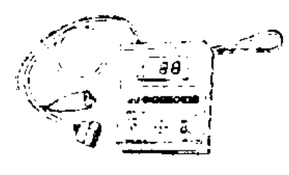
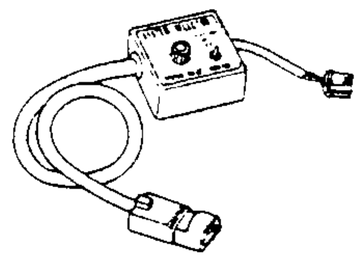
49 0180 510B Preload measuring attachment 	49 8038 785A Dust boot installer 	49 T034 1A0 Coil spring compressor set 
49 T034 101 Spring compressor (Part of 49 T034 1A0) 	49 T034 102 Stand (Part of 49 T034 1A0) 	49 T034 103 Hook (Part of 49 T034 1A0) 
49 T034 104 Support (Part of 49 T034 1A0) 	49 T034 105 Attachment 	49 0107 680A Engine stand 
49 B034 2A0B Rubber bush replacer set 	—	—

SPECIAL TOOLS

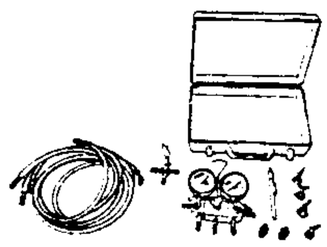
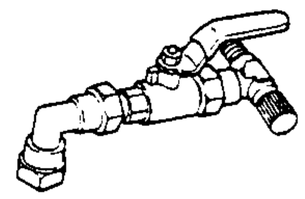
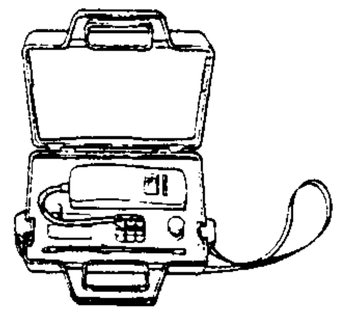
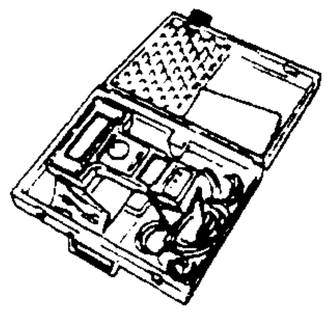
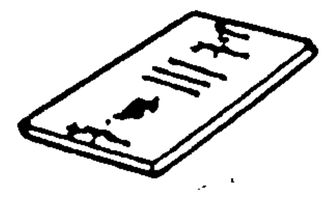
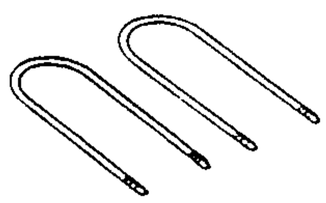
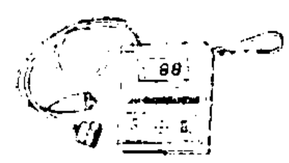
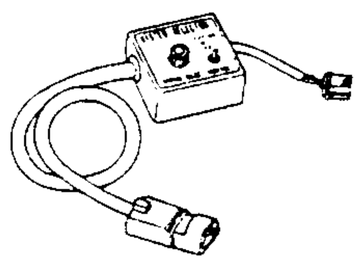
BODY

49 0305 870A Window tool set 	49 G050 1A0 Sealant remover 	—

BODY ELECTRICAL SYSTEM

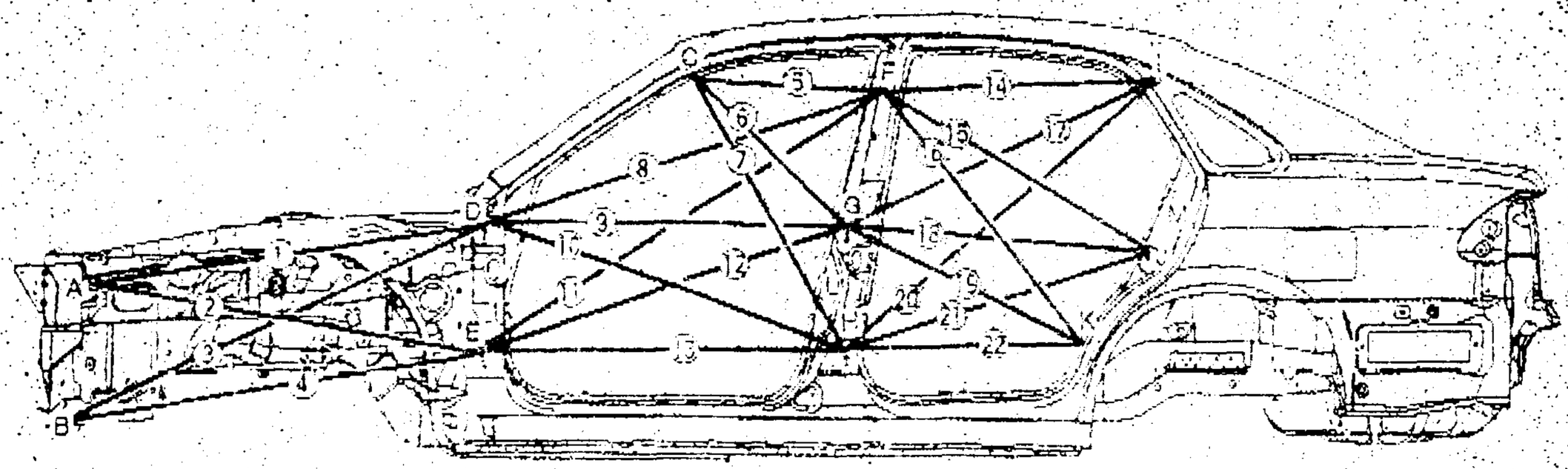
49 T088 0A4 NGS set 	Program card 	SST No. for Program card varies with language • 49 T088 030A (English/French) • 49 T088 031A (English/German) • 49 T088 032A (English/Dutch) • 49 T088 033A (English/Swedish)
49 D066 002 Harness adapter 	49 0839 285 Fuel and thermometer checker 	49 H066 002 Deployment tool 
49 D066 801A Removing tool 	49 H018 9A1A Self-diagnosis checker 	49 B019 9A0 System selector 

HEATER AND AIR CONDITIONER SYSTEMS

49 C061 0A0A Manifold gauge set (R-134a) 	49 C061 012 Anti-back flow valve (R-134a) 	49 C061 013 Gas leak tester (R-134a) 
49 T088 0A4 NGS set 	Program card 	SST No. for Program card varies with language • 49 T088 030A (English/French) • 49 T088 031A (English/German) • 49 T088 032A (English/Dutch) • 49 T088 033A (English/Swedish)
49 D066 801A Removing tool 	49 H018 9A1A Self-diagnosis checker 	49 B019 9A0 System selector 

ST

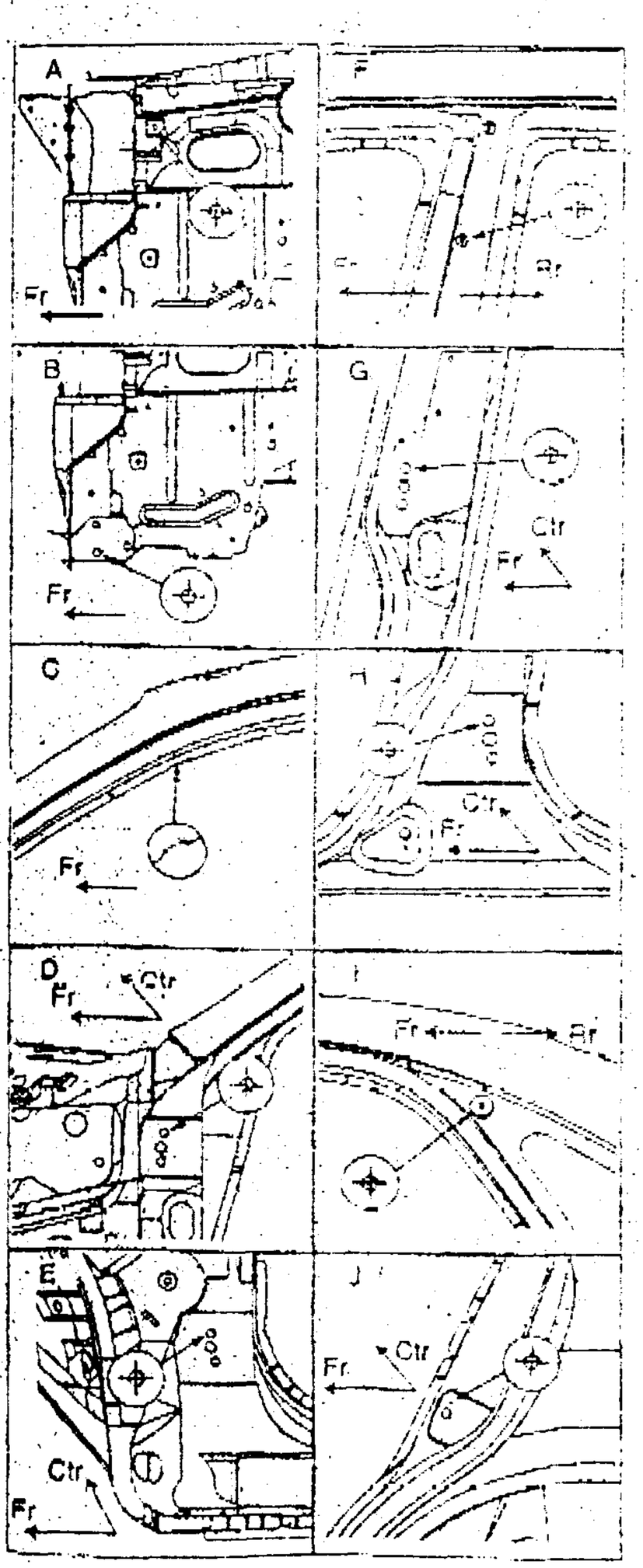
CABIN SIDE FRAME (HATCH BACK)

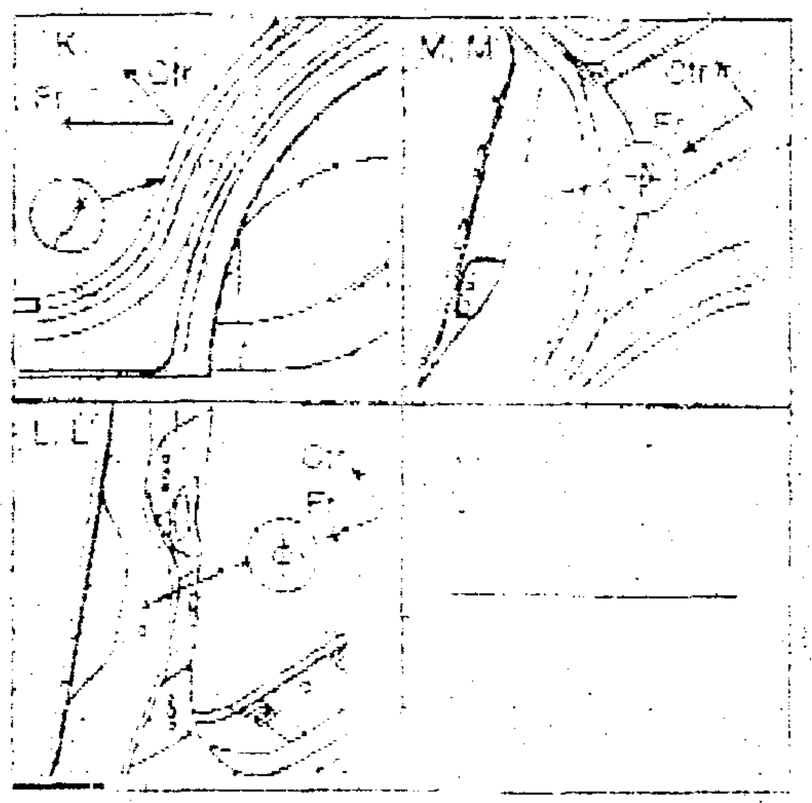


Width

L–L' : 1515

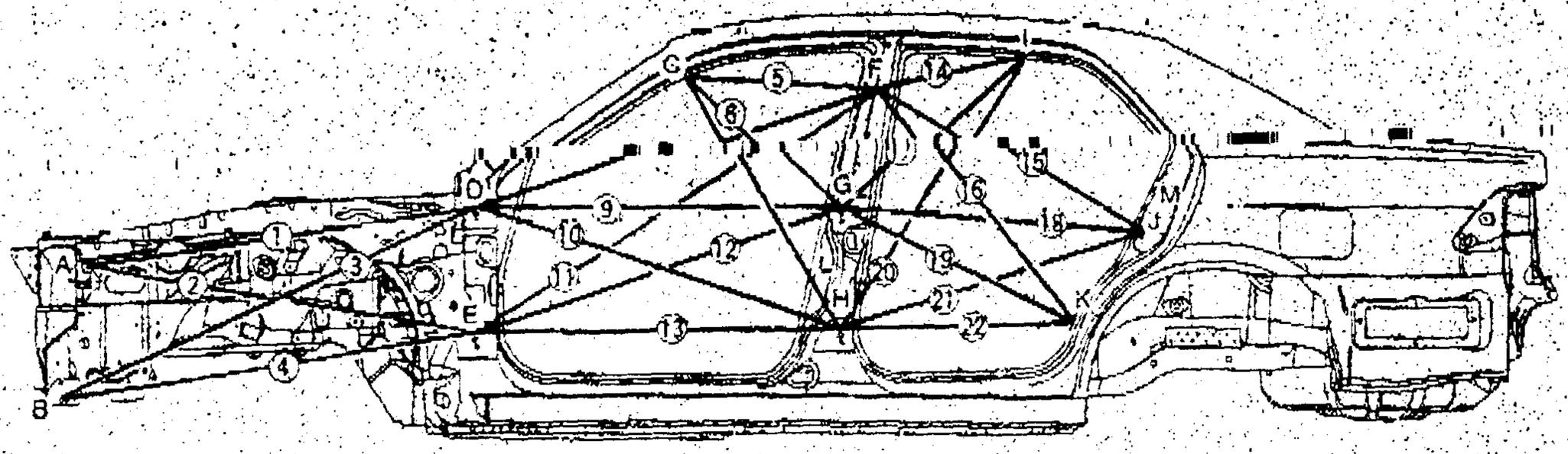
M–M' : 1470



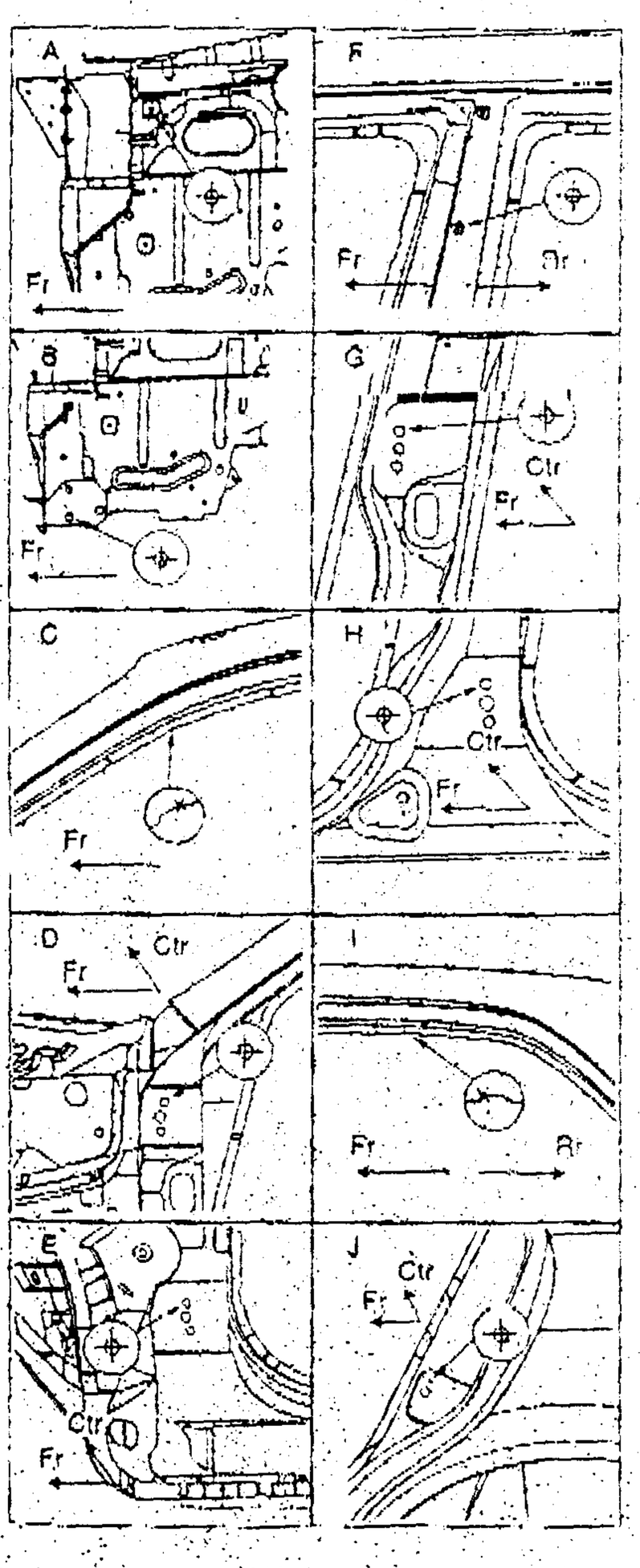


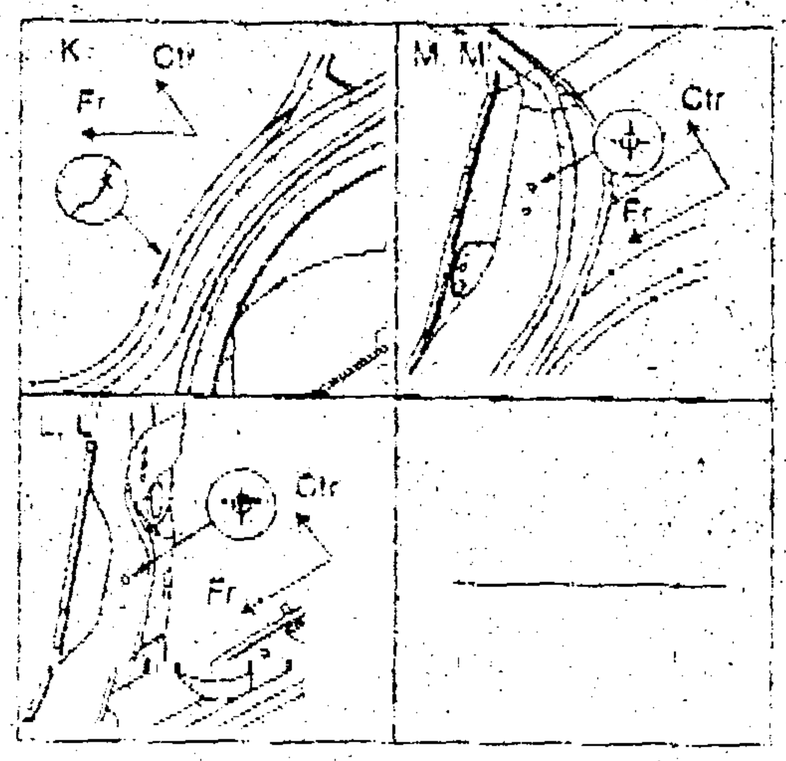
Measured location	Dimensions mm (in)
1	1082 (42.99)
2	1091 (42.95)
3	RH: 1293 (50.91) LH: 1295 (50.98)
4	RH: 1157 (46.73) LH: 1190 (46.85)
5	535 (21.06)
6	619 (24.37)
7	882 (34.72)
8	1184 (46.61)
9	1017 (40.04)
10	1070 (42.13)
11	1346 (52.99)
12	1081 (42.56)
13	1020 (40.16)
14	774 (30.47)
15	884 (34.80)
16	891 (35.08)
17	978 (38.50)
18	867 (34.13)
19	735 (28.94)
20	1169 (46.02)
21	911 (35.87)
22	671 (26.42)

CABIN SIDE FRAME (SEDAN)



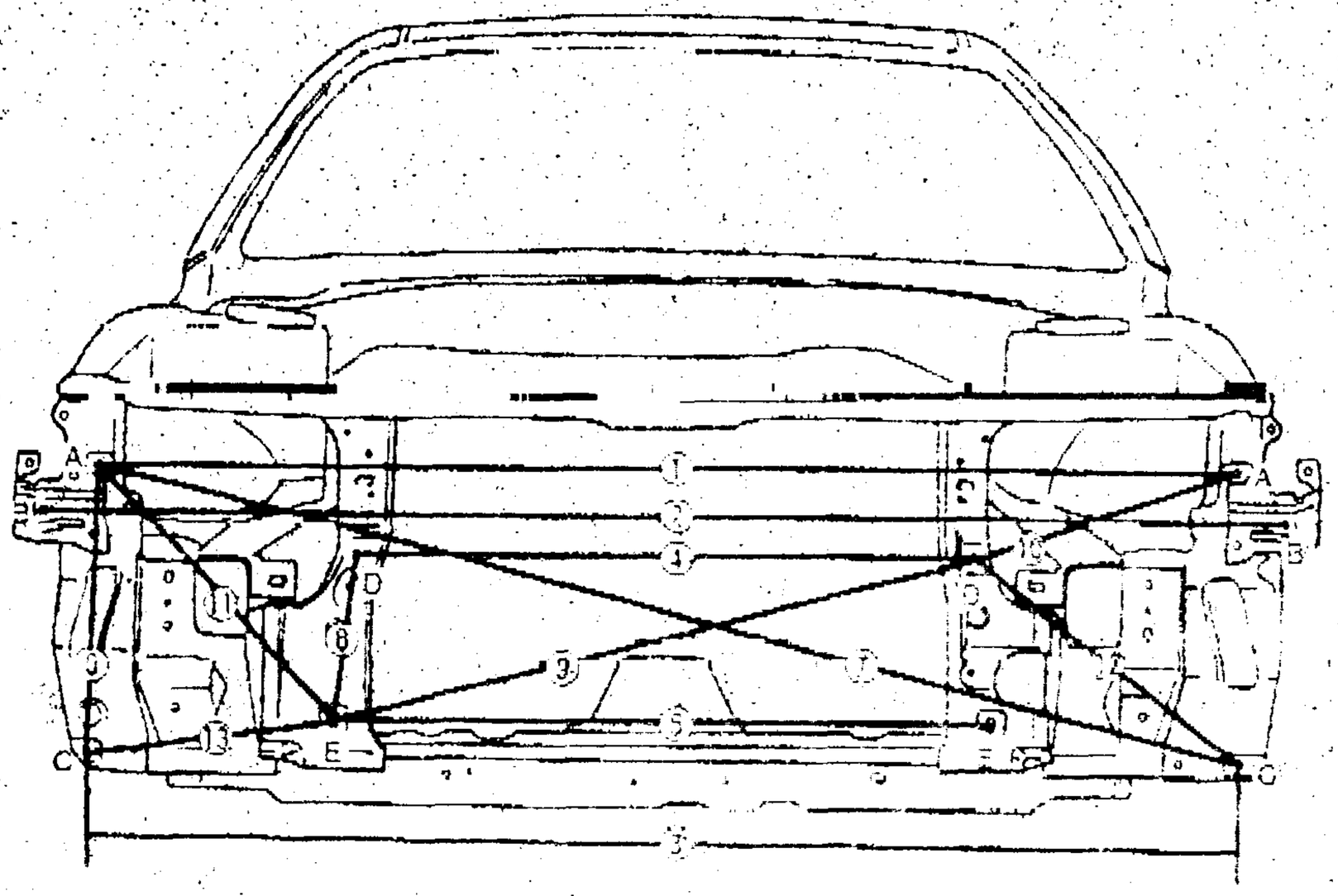
Width
L–L' : 1515
M–M' : 1470

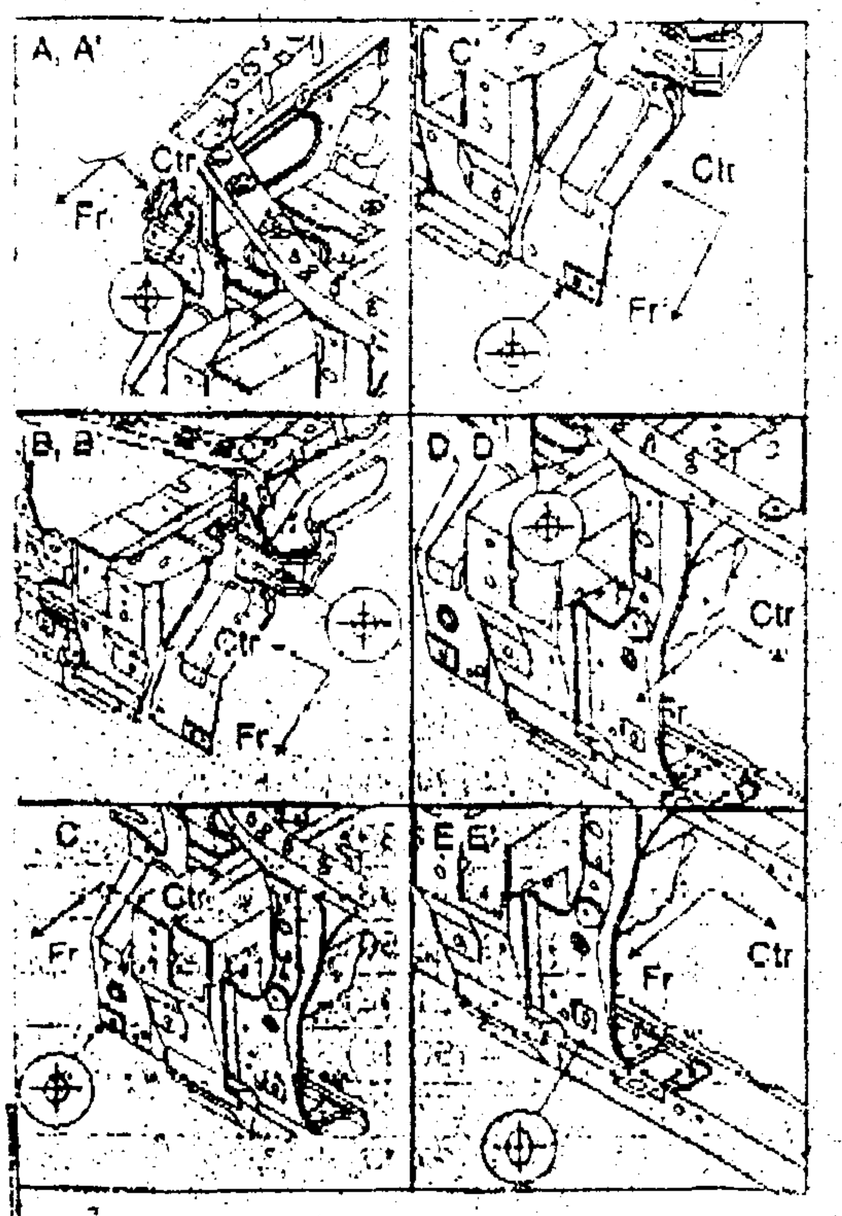




Measured location	Dimensions mm (in)
1	1092 (42.99)
2	1091 (42.95)
3	RH: 1293 (50.91) LH: 1295 (50.98)
4	RH: 1187 (46.73) LH: 1190 (46.85)
5	535 (21.06)
6	619 (24.37)
7	882 (34.72)
8	1184 (46.61)
9	1017 (40.04)
10	1070 (42.13)
11	1346 (52.99)
12	1081 (42.56)
13	1020 (40.16)
14	412 (16.22)
15	884 (34.80)
16	891 (35.08)
17	711 (27.99)
18	867 (34.13)
19	735 (28.94)
20	972 (38.27)
21	911 (35.87)
22	671 (26.42)

FRONT BODY (3) (ALL MODELS)
(STANDARD HOLES DIMENSIONS)





Measured location	Dimensions mm (in)
1	1330 (52.36)
2	1453 (57.32)
3	1308 (51.50)
4	696 (27.40)
5	750 (29.53)
6	344 (13.54)
7	1363 (53.66)
8	196 (7.72)
9	749 (29.49)
10	346 (13.62)
11	421 (16.57)
12	385 (15.16)
13	282 (11.10)