

1997 Mazda MX-5/Miata Workshop Manual

WARNING

Servicing a vehicle can be dangerous. If you have not received service-related training, the risks of injury, property damage, and failure of servicing increase. The recommended servicing procedures for the vehicle in this workshop manual were developed with Mazda-trained technicians in mind. This manual may be useful to non-Mazda trained technicians, but a technician with our service-related training and experience will be at less risk when performing service operations. However, all users of this manual are expected at least to know general safety procedures.

This manual contains “Warnings” and “Cautions” applicable to risks not normally encountered in a general technician’s experience. They should be followed to reduce the risk of injury and the risk that improper service or repair may damage the vehicle or render it unsafe. It is also important to understand that the “Warnings” and “Cautions” are not exhaustive. It is impossible to warn of all the hazardous consequences that might result from failure to follow the procedures.

The procedures recommended and described in this manual are effective methods of performing service and repair. Some require tools specifically designed for a specific purpose. Persons using procedures and tools which are not recommended by Mazda Motor Corporation must satisfy themselves thoroughly that neither personal safety nor safety of the vehicle will be jeopardized.

The contents of this manual, including drawings and specifications, are the latest available at the time of printing, and Mazda Motor Corporation reserves the right to change the vehicle designs and alter the contents of this manual without notice and without incurring obligation.

Parts should be replaced with genuine Mazda replacement parts or with parts which match the quality of genuine Mazda replacement parts. Persons using replacement parts of lesser quality than that of genuine Mazda replacement parts must satisfy themselves thoroughly that neither personal safety nor safety of the vehicle will be jeopardized.

Mazda Motor Corporation is not responsible for any problems which may arise from the use of this manual. The cause of such problems includes but is not limited to insufficient service-related training, use of improper tools, use of replacement parts of lesser quality than that of genuine Mazda replacement parts, or not being aware of any revision of this manual.

1997 Mazda MX-5 Miata Workshop Manual

FOREWORD

This manual contains on vehicle service and diagnosis procedures for the Mazda MX-5 Miata. A thorough familiarization with this manual is important for proper repair and maintenance. It should always be kept in a handy place for quick and easy reference.

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.

Mazda Motor Corporation reserves the right to alter the specifications and contents of this manual without obligation or advance notice.

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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)

JM1 NA353*V# 700001—

RELATED MATERIALS

1990 MX-5 Miata Service Highlights	3156-10-89C
1991 MX-5 Miata Service Highlights	3174-10-90G
1995 626/MX-6, 929, RX-7, MX-5, MX-3 Service Highlights .	3282-10-94H
1996 Protegé, MX-3, MX-5, 626/MX-6, 929, MPV, Millenia Service Highlights	3284-10-95H
1997 Protegé, MX-5, 626/MX-6, MPV, Millenia Service Highlights	3296-10-96G
1997 MX-5 Miata Wiring Diagram	5387-10-96G

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HOW TO USE THIS MANUAL

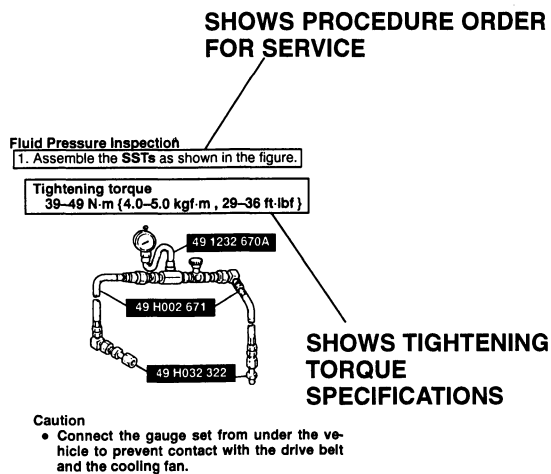
Range of Topics

- 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.

Service 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.



UXU00001

GENERAL INFORMATION

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.

SHOWS SERVICE
ITEM (S)

LOWER TRAILING LINK, UPPER TRAILING LINK REMOVAL/INSTALLATION

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.

SHOWS PROCEDURE ORDER
FOR SERVICE

SHOWS TIGHTENING
TORQUE
SPECIFICATIONS

SHOWS SPECIAL
SERVICE TOOL (SST)
FOR SERVICE OPERATION

SHOWS APPLICATION
POINTS OF GREASE, ETC.

SHOWS EXPENDABLE PARTS

SHOWS DETAILS

SHOWS TIGHTENING
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SHOWS THERE
ARE REFERRAL
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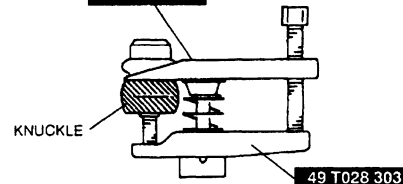
1	Split pin
2	Nut
3	Lower trailing link ball joint ☞ Removal Note
4	Bolt
5	Lower trailing link
6	Dust boot (lower trailing link) ☞ Removal Note
7	Split pin

	N·m { kgf·m , ft·lbf }
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.

49 T028 304 UPPER TRAILING LINK
49 T028 305 LOWER TRAILING LINK



SHOWS REFERRAL
NOTES FOR
SERVICE

UXU00002

GENERAL INFORMATION

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
 UXU00003	Apply oil	New engine oil or gear oil as appropriate
 UXU00004	Apply brake fluid	FMVSS116: DOT-3
 UXU00005	Apply automatic transaxle/transmission fluid	M-III or Dexron®II
 UXU00006	Apply grease	Appropriate grease
 UXU00007	Apply sealant	Appropriate sealant
 UXU00008	Apply petroleum jelly	Appropriate petroleum jelly
 UXU00009	Replace part	O-ring, gasket, etc.
 UXU00010	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

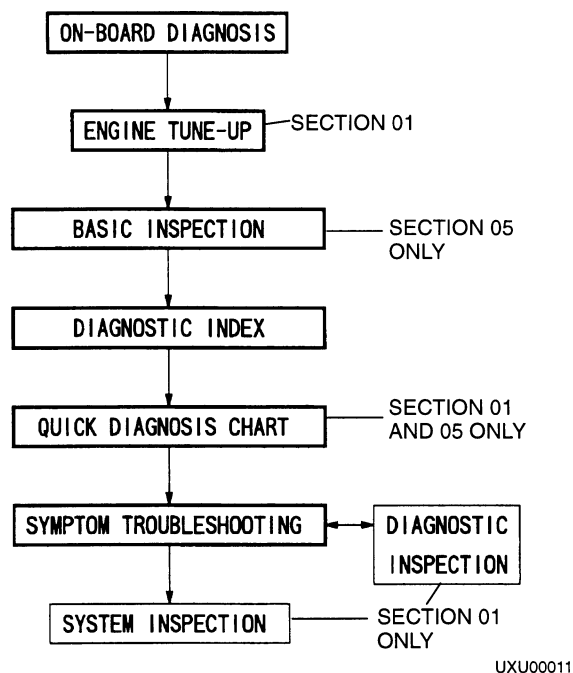
- The values indicates the allowable range when performing inspections or adjustments.

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

Engine tune-up (section 01)

- Any necessary adjustments are made after starting the engine.

Basic inspection (section 05)

- 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.

GENERAL INFORMATION

00

Diagnostic index

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

Symptom troubleshooting

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

Quick diagnosis chart (section 01 and 05)

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

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	Perform 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	

UXU00012

Using the diagnosis 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		Engine runs normally at idle but stalls or vibrates excessively during N-D shift

UXU00013

GENERAL INFORMATION

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.

		PARTS WHICH MAY BE THE SYMPTOM					PARTS WHICH MAY BE THE CAUSE OF PROBLEMS												
		Quick DIAGNOSIS CHART																	
① CHOOSE THE ACTUAL SYMPTOM	1	Discharged battery																	
	2	Will not crank or cranks slowly																	
	3	No combustion																	
	4	Combustion observed engine will not start																	
	5	Cranks normally but hard to start																	
	6	Low idle speed/Engine stalls or vibrates																	
	7	High idle speed																	
	8	Idle speed hard to lower																	
	9	Rough idle/Engine stalls when E/L, P/S or A/C ON																	
	10	Rough idle/Engine stalls during N-D shift																	
	11	Engine stalls when vehicle about to run																	
		13	Poor acceleration/Insufficient power surges while cruising/Hesitates																
		14	Runs rough during deceleration backfire																
		15	Knocking																
		16	Overheating																
		17	Poor fuel economy																
		18	Fuel odor																
				Intake-air system				Fuel system				Exhaust system				Emission control system		Control system	
		No. Item		Cause of trouble															
		Trouble symptom																	
		Inspection method																	
		Item Result																	
				Intake-air system components				Fuel pump				Fuel filter (High-pressure side)				Fuel injector			
				Leakage				Relief valve always ON				Pressure regulator inoperative				Exhaust system components			
				Clogs				Check valve inoperative				Leakage				Clogs			
				Throttle valve not close fully				Leakage				Clogs				No airflow at fuel tank side			
				AAS passage clogged				Clogs				Leakage				No airflow at charcoal canister side			
				No accelerator free play				Always open				Clogs				Leakage			
				Fuel line (Fuel pump-pressure tank)												Charcoal canister			
				Leakage												Clogs			
				Fuel line (Pressure regulator-fuel tank)												Always open			
				Clogs												Always closed			
																Not activated			
																No signal output			
																Erratic signal output			
③ DETERMINE THE CAUSE OF THE TROUBLE DETERMINED AT PROCEDURE ②, BASED ON THE RESULT OF THE MECHANICAL SYSTEM TEST	Spark plug condition inspection	Wet/carbon stuck on specific plug																	
		Grayish white with specific plug																	
		Wet/carbon stuck on all plugs																	
		Grayish white all plugs																	
	Cylinder balance test	Engine speed will not decrease																	
Diagnostic trouble code inspection	Diagnostic trouble code(s) output																		
Inspection using oscilloscope	Induction voltage not generated																		

THE PART CAUSING TROUBLE, AS DETERMINED FROM THE RE-
SULT OF THE MECHANICAL SYSTEM TEST.

UXU00014

Using the symptom troubleshooting

- 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

STEP shows the order of troubleshooting.

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

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

9 Engine stalls		
Troubleshooting hints		
• Constant application of torque converter clutch piston		
STEP	INSPECTION	ACTION
1	Does the vehicle shake at shift point as well as at other points when decelerating?	Yes Troubleshoot according to "Vehicle vibrates back and forth or engine stalls during deceleration".
		No Go to step 2.
2	Check the voltage at the following powertrain control module terminal. • Brake switch signal ➤ 01-40 POWERTRAIN CONTROL MODULE (PCM) INSPECTION	Yes Go to step 3.
		No Carry out the stall test. ➤ 05-17 MECHANICAL SYSTEM TEST, Stall Test, Stall test procedure
3	Does torque converter clutch solenoid valve voltage at powertrain control module terminal measure 0 V? ➤ 01-40 POWERTRAIN CONTROL MODULE (PCM) INSPECTION	Yes Go to step 4.
		No Check for poor connection of the connectors from powertrain control module to torque converter clutch solenoid valve.
4	Check if torque converter clutch solenoid valve is sticking. Is solenoid valve OK?	Yes Go to step 5.
		No Replace torque converter clutch solenoid valve.
5	Overhaul the ATX valve. Is operation of torque converter clutch OK?	Yes Go to step 6.
		No Repair or replace torque converter clutch control valve or control valve body. ➤ 01-40 POWERTRAIN CONTROL MODULE (PCM) INSPECTION

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

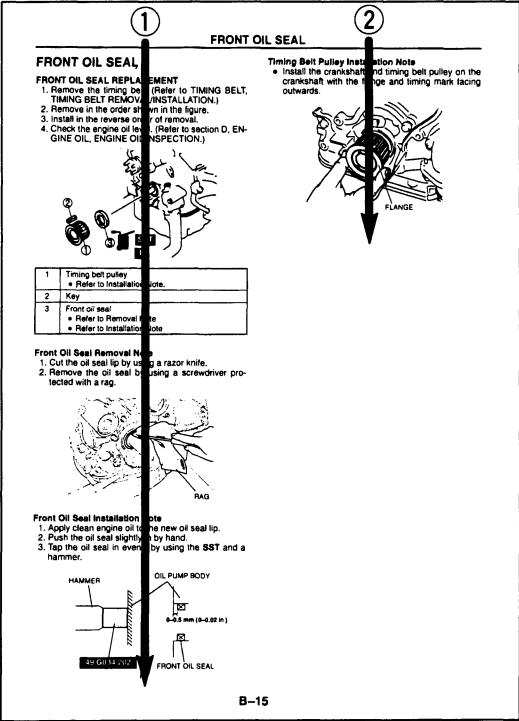
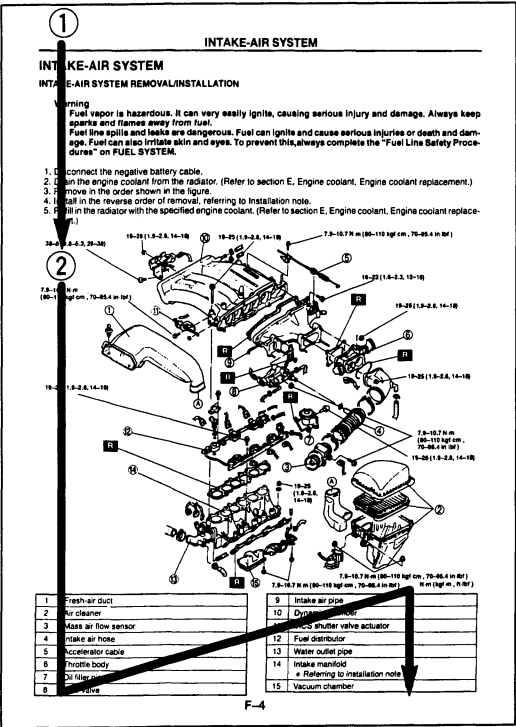
How to perform ACTION is described on the reference item(s) shown.

UXU00015

Text Sequence

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

Example:



UXU00016

GENERAL INFORMATION

UNITS

UXU000AF

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)
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 as 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/cm² in the following specifications:

210—260 kPa { 2.1—2.7 kgf/cm² , 30—38 psi }
270—310 kPa { 2.7—3.2 kgf/cm² , 39—45 psi }

- The actual converted values for 2.7 kgf/cm² 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.

SAE STANDARDS

UXU000AG

- In accordance with new regulations, SAE (Society of Automotive Engineers) standard names and abbreviations are now used in this manual. The table below lists the names and abbreviations that have been used in Mazda manuals up to now and their SAE equivalents.

Previous Standard		New Standard		
Abbr.	Name	Abbr.	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	

GENERAL INFORMATION

Previous Standard		New Standard		
Abbr.	Name	Abbr.	Name	Remark
—	Catalytic Converter	OC	Oxidation Catalytic Converter	
		TWC	Three Way Catalytic Converter	
		WU-TWC	Warm Up Three Way Catalytic Converter	Directly connected to exhaust manifold
—	Circuit Opening Relay	FPR	Fuel Pump Relay	In some models, there is a fuel pump relay that controls pump speed. That relay is now called the fuel pump relay (speed).
—	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	Controlled by the ECM (PCM)
ECU	Engine Control Unit	PCM	Powertrain Control Module	Device that controls engine and powertrain
		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	
—	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	

GENERAL INFORMATION

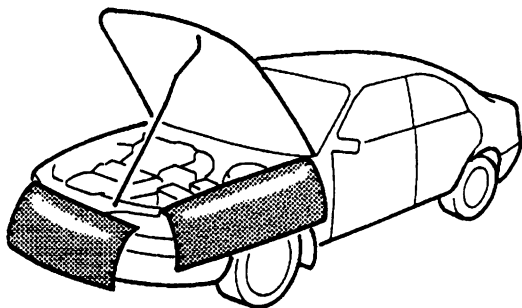
Previous Standard		New Standard		
Abbr.	Name	Abbr.	Name	Remark
—	Oxygen Sensor	HO2S	Heated Oxygen Sensor	With heater
		O2S	Oxygen Sensor	
—	Park/Neutral Range	PNP	Park/Neutral Position	
—	Power Steering Pressure	PSP	Power Steering Pressure	
—	Pulse Generator	—	Input/Turbine Speed Sensor	
—	Reed Valve	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	Diagnostic trouble codes depend on the diagnostic test mode
—	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 Solenoid A	
	Shift + A Solenoid Valve			
—	2-3 Shift Solenoid Valve	—	Shift Solenoid B	
	Shift + B Solenoid Valve			
—	3-4 Shift Solenoid Valve	—	Shift Solenoid C	
—	3rd Gear	3GR	Third Gear	
—	—	—	Incorrect Gear Ratio	

FUNDAMENTAL PROCEDURES

UXU000AH

Protection of the Vehicle

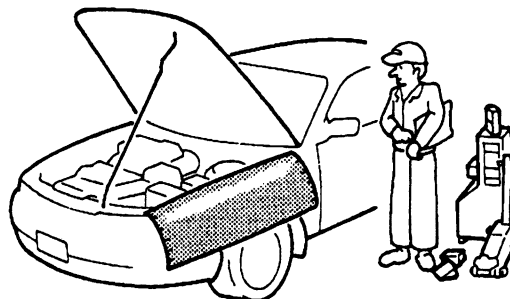
- Always be sure to cover fenders, seats, and floor areas before starting work.



UXU00017

Preparation of Tools and Measuring Equipment

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

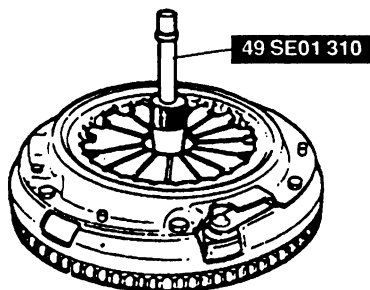


UXU00018

GENERAL INFORMATION

Special Tools

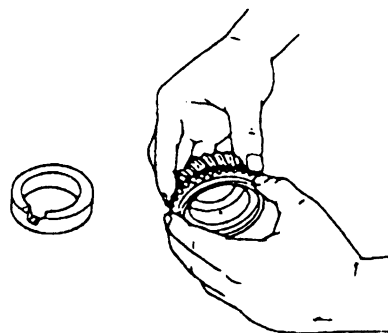
- Use special tools when they are required.



UXU00019

Inspection During Removal, Disassembly

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



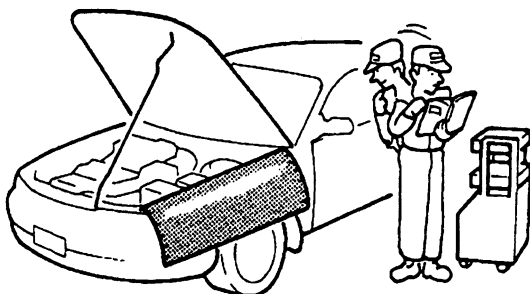
UXU00022

Disconnection of the Negative Battery Cable

- Before beginning any work under the hood, disconnect the negative (–) battery cable.

Removal of Parts

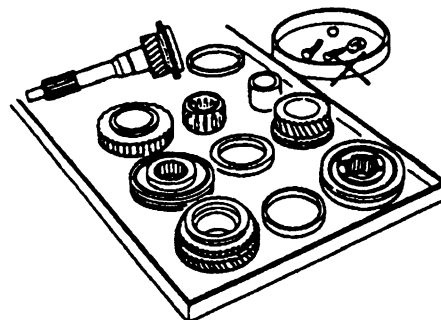
- While correcting a problem, try also to determine its cause. Begin work only after first learning which parts and subassemblies must be removed and disassembled for replacement or repair. After removing the part, plug all holes and ports to prevent foreign material from entering.



UXU00020

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.



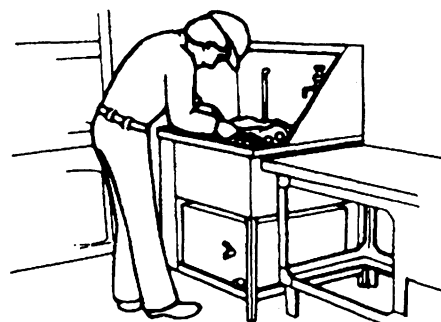
UXU00023

Cleaning of Parts

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

Warning

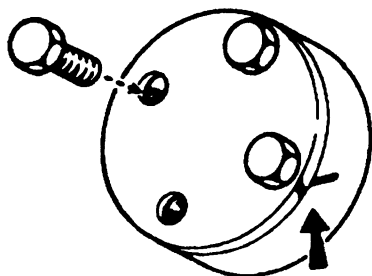
- Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eye wear whenever using compressed air.



UXU00024

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.



UXU00021

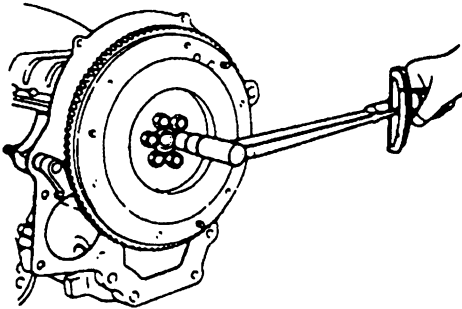
GENERAL INFORMATION

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:

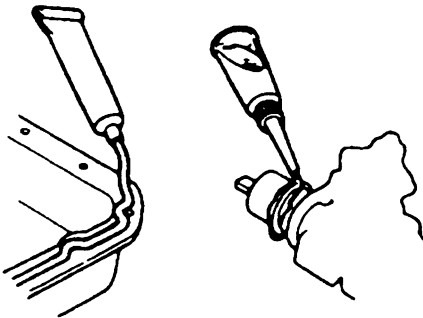
1	Oil seals	2	Gaskets
3	O-rings	4	Lockwashers
5	Cotter pins	6	Nylon nuts



UXU00025

Depending on location:

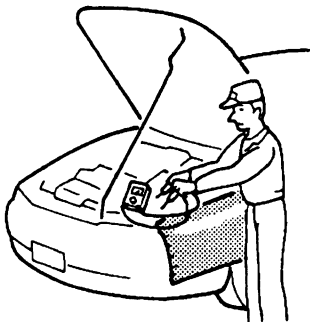
1. Sealant, gasket, or both should be applied to the specified locations. When sealant is applied, parts should be installed before sealant hardens. Hardened sealant causes leaks.
2. Oil should be applied to the moving components of parts.
3. Specified oil or grease should be applied at the prescribed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



UXU00026

Adjustments

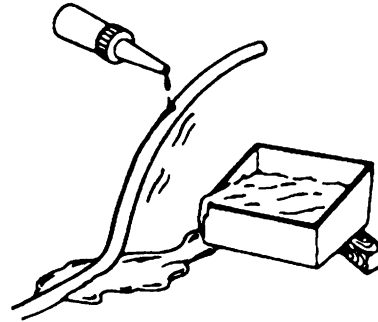
- Use suitable gauges and testers when making adjustments.



UXU00027

Rubber Parts and Tubing

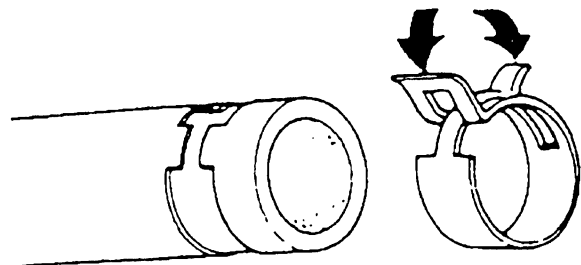
- Prevent gasoline or oil from getting on rubber parts or tubing.



UXU00028

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.



UXU00029

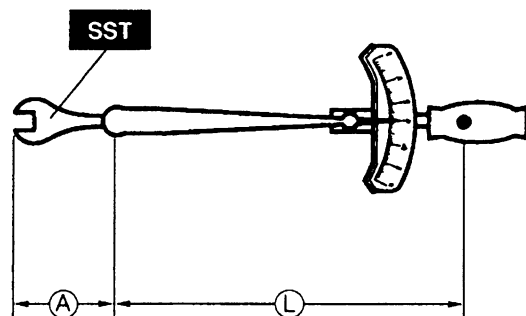
Torque Formulas

- 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
N·m	$N \cdot m \times [L / (L + A)]$
kgf·m	$kgf \cdot m \times [L / (L + A)]$
kgf·cm	$kgf \cdot cm \times [L / (L + A)]$
ft·lbf	$ft \cdot lbf \times [L / (L + A)]$
in·lbf	$in \cdot lbf \times [L / (L + A)]$

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

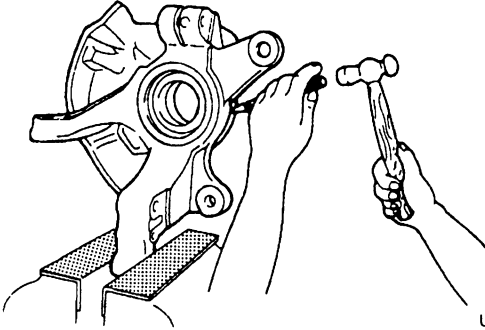
L : The length of the torque wrench.



UXU00030

Vise

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



UXU00031

INSTALLATION OF RADIO SYSTEM

If a radio system is installed improperly or if a high-powered type is used, the CIS and other systems may 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 module harnesses (**at least 30 cm {11.8 in }**).
3. Ensure that the antenna and feeder are properly adjusted.
4. Do not install a high-powered radio system.

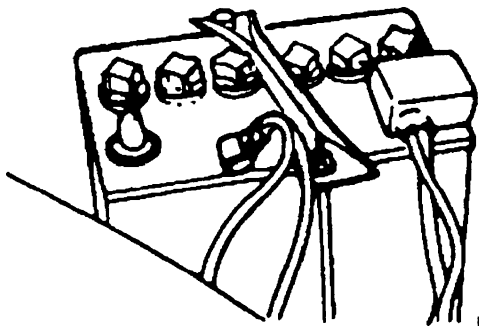
UXU000AJ

ELECTRICAL SYSTEM

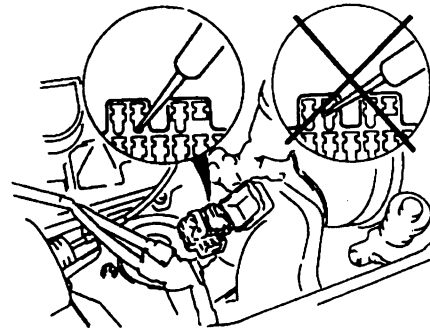
Electrical Parts

Battery cable

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



UXU00032

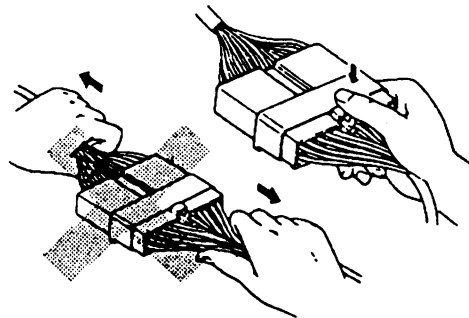


U5U000AK

UXU00033

Disconnecting connectors

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



UXU00034

Connectors

Data link connector

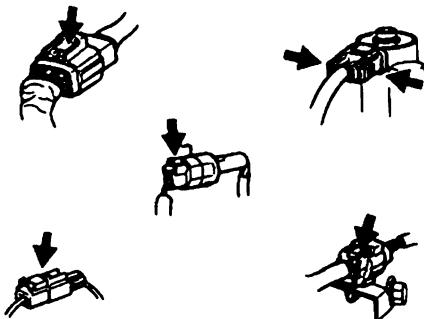
- Insert the probe into the service hole when connecting a jumper wire to the data link connector.

Caution

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

GENERAL INFORMATION

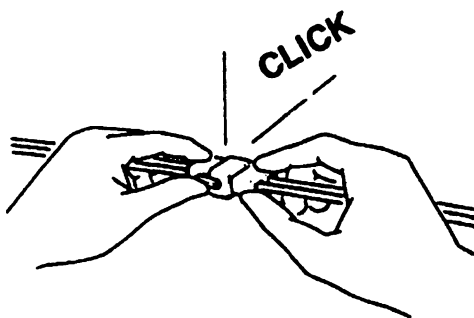
- Connectors can be disconnected by pressing or pulling the lock lever as shown.



UXU00035

Locking connector

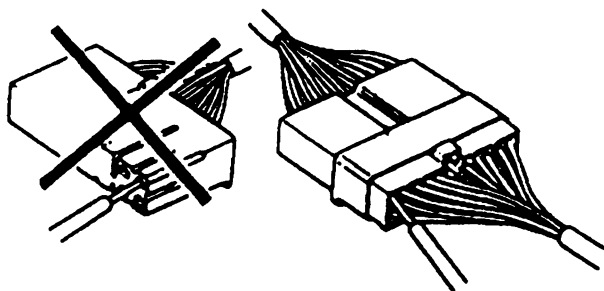
- When locking connectors, listen for a click that will indicate they are securely locked.



UXU00036

Inspection

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

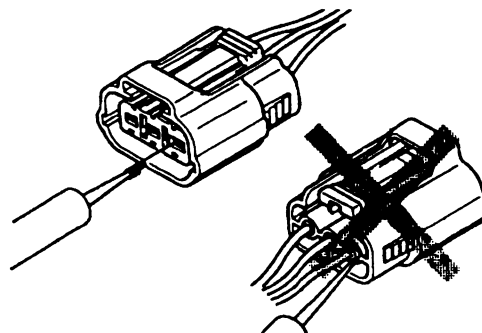


UXU00037

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

Caution

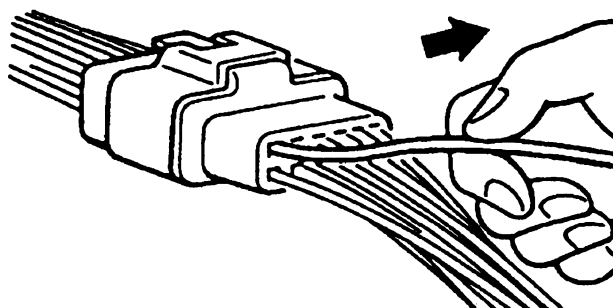
- To prevent damage to the terminal, wrap a thin wire around the lead before inserting it into the terminal.



UXU00038

Terminals Inspection

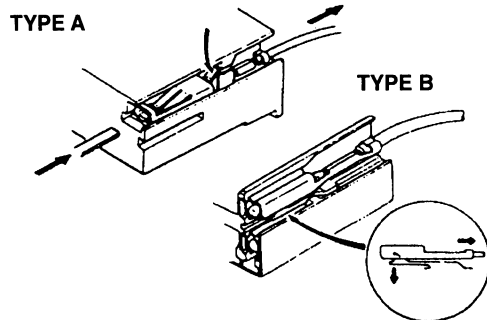
- Pull lightly on individual wires to check that they are secured in the terminal.



UXU00039

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.

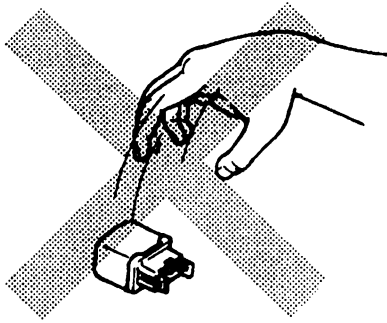


UXU00040

GENERAL INFORMATION

Sensors, Switches, and Relays

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



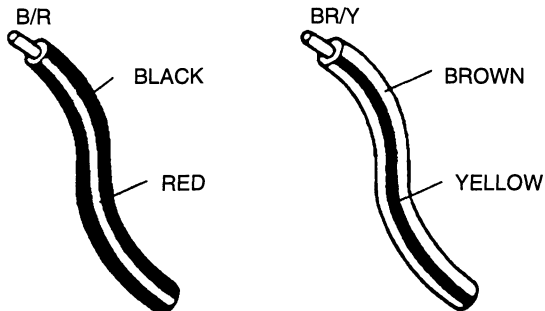
UXU00041

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			

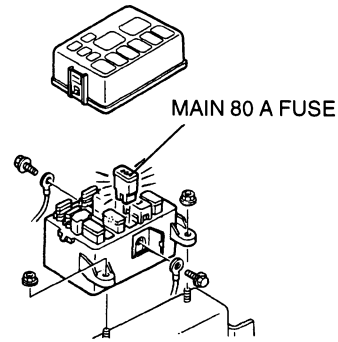


UXU00042

Fuse

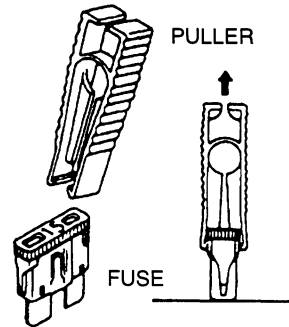
Replacement

- 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.
- Be sure the negative battery terminal is disconnected before replacing a main fuse.



U5U00016

- When replacing a pullout fuse, use the fuse puller supplied in the fuse box cover.



UXU00044

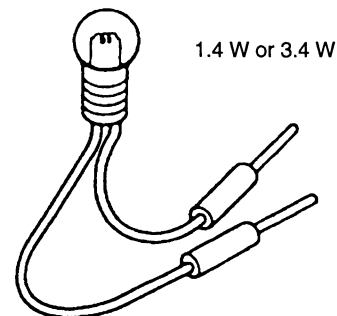
Electrical Troubleshooting Tools

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.



UXU00045

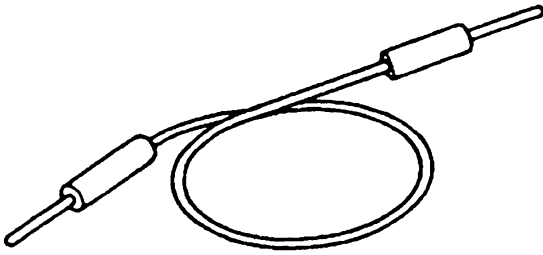
Jumper wire

- 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.

GENERAL INFORMATION



UXU00046

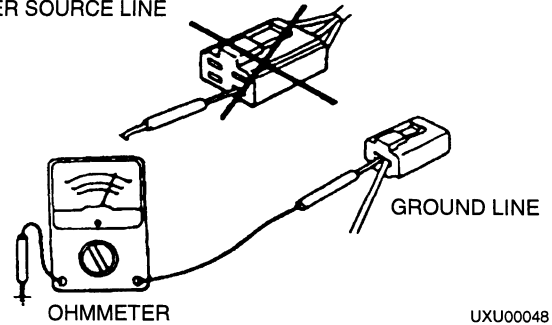
Ohmmeter

- 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.

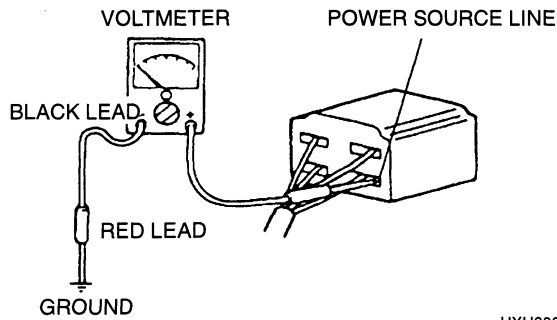
POWER SOURCE LINE



UXU00048

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.



UXU00047

JACKING POSITIONS

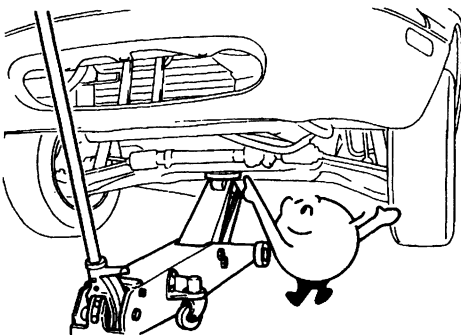
Warning

- 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

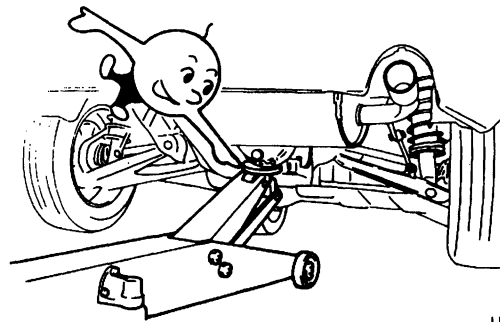
At the center of the crossmember



U5U00001

Rear

At the center of the differential



U5U00002

U5U000AM

GENERAL INFORMATION

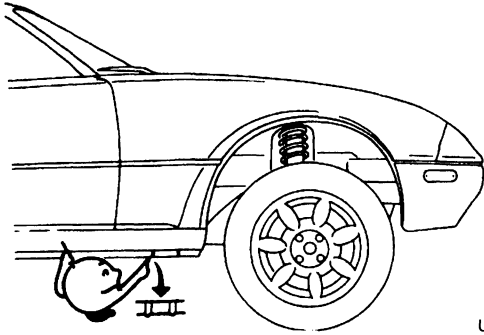
VEHICLE LIFT (2 SUPPORTS) AND SAFETY STAND (RIGID PACK) POSITION

U5U000AE

Vehicle Lift Positions

Front

Both sides of the vehicle, on side sills

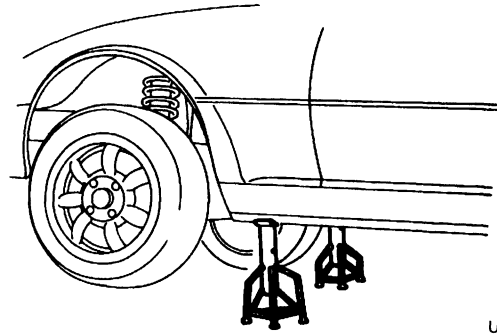


U5U00005

Safety Stand Positions

Front

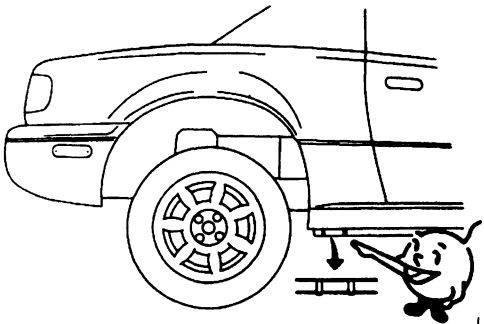
Both sides of the vehicle, on side sills



U5U00003

Rear

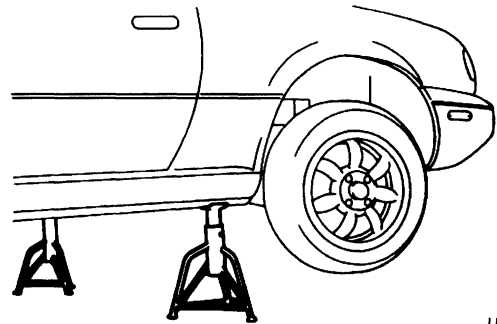
Both sides of the vehicle, on side sills



U5U00006

Rear

Both sides of the vehicle, on side sills



U5U00004

TOWING

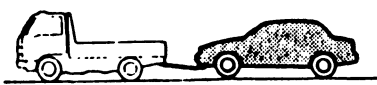
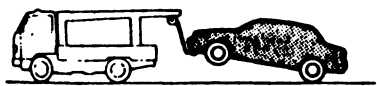
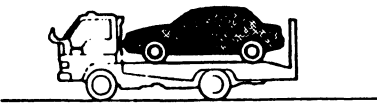
U5U000AF

- 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.

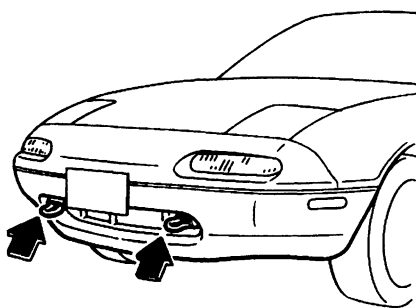
Caution

- **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.**

GENERAL INFORMATION

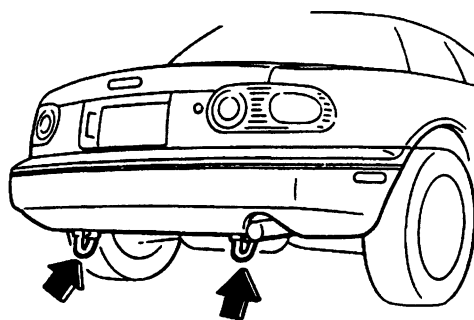
TOWING METHOD	PARKING BRAKE	TRANSAXLE/ TRANSMISSION SHIFT LEVER POSITION	REMARKS
Towing by using a rope  UXU00049	Released	Neutral	Set ignition switch in ACC or ON position.
Towing with the front or rear wheels off the ground  UXU00050	Released	Neutral	Remove the propeller shaft. (4-wheel drive vehicles)
Towing by using wheel dollies  UXU00051	Released	Neutral	Remove the propeller shaft. (4-wheel drive vehicles)
Towing by using flatbed equipment  UXU00052	Set	Any position	Secure vehicle so it does not move.

Tiedown Hook Front



U5U00009

Rear



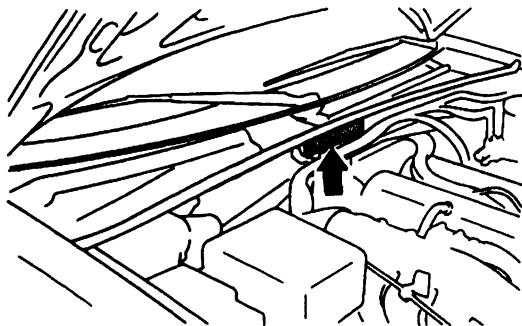
U5U00011

GENERAL INFORMATION

IDENTIFICATION NUMBER LOCATIONS

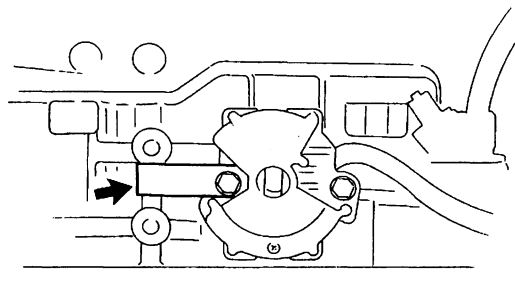
U5U000AG

Vehicle Identification Number (VIN)



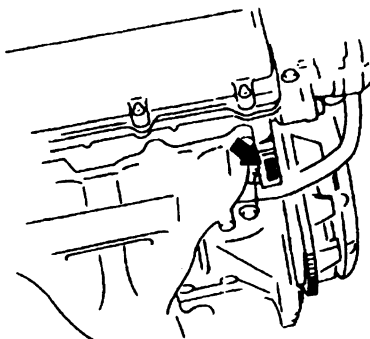
U5U00013

Automatic Transmission Number



U5U00015

Engine Identification Number



U5U00014

GENERAL INFORMATION

ABBREVIATIONS

USU000AL

Abbr.	Abbreviation
ABS	Antilock brake system
ATF	Automatic transmission fluid
AT	Automatic transmission
BAC	Bypass air control
BARO V	Barometric pressure signal voltage
BRK SW	Brake switch
BLR SW	Fan switch
BTDC	Before top dead center
CM	Control module
CTP SW	Closed throttle position switch
D	Drive
DEF SW	Rear window defroster switch
DRL	Daytime running light
EC-AT	Electronically controlled automatic transmission
ECT V	Engine coolant temperature signal voltage
EGRA	EGR air solenoid valve
EGRB	EGR boost
EGRBV	EGR boost sensor solenoid valve
EGRB V	EGR boost signal voltage
EGRP V	EGR valve position signal voltage
EGRVAC	EGR solenoid valve (vacuum) duty value
EGRVENT	EGR solenoid valve (vent) duty value
EGRV	EGR vacuum solenoid valve
EX	Exhaust
FANC	Coolant fan control
FANN	Condenser fan control
FHO2S	Heated oxygen sensor (front)
FHO2SH	Heated oxygen sensor heater (front)
HDL SW	Headlight switch
HU	ABS hydraulic unit
IACV	Idle air control valve
IAT V	Intake air temperature signal voltage
IG	Ignition
IGT	Ignition timing
IN	Intake
INJ	Fuel injection duration
INJ#1	Fuel injection (cylinder No.1)

INJ#2	Fuel injection (cylinder No.2)
INJ#3	Fuel injection (cylinder No.3)
INJ#4	Fuel injection (cylinder No.4)
INT	Intermittent
L	Low
LF	Left front
LH	Left hand
LO	Low
LR	Left rear
LSD	Limited slip differential
MAF V	Mass air flow signal voltage
MT	Manual transmission
N	Neutral
NL SW	Neutral/clutch switch
P	Park
PCV	Positive crankcase ventilation
PID	Parameter identification
PRC	Pressure regulator control
PRCV	PRC solenoid valve
PRGV	Purge solenoid valve duty value
P/S	Power steering
R	Reverse
RF	Right front
RH	Right hand
RHO2S	Heated oxygen sensor (rear)
RLY	Relay
RR	Right rear
RPM	Engine speed
S	Slope
SAS	Sophisticated air bag sensor
SST	Special service tool
SW	Switch
TAT	TAT terminal (data link connector)
TEN	TEN terminal (Data link connector)
TNS	Tail number side lights
TP V	Throttle position sensor signal voltage
VS	Vehicle speed

PRE-DELIVERY INSPECTION

U5U000AH

Pre-Delivery Inspection Table**Exterior**

INSPECT and **ADJUST**, if necessary, the following items to specification:

- ☐ Glass, exterior bright metal and paint for damage
- ☐ Convertible top and detachable hardtop (if equipped) for damage
- ☐ Wheel lug nuts
- ☐ All weatherstrips for damage or detachment
- ☐ Operation of hood release and lock
- ☐ Operation of fuel lid
- ☐ Door operation and alignment
- ☐ Headlight aiming

INSTALL the following parts:

- ☐ Wheel caps (if equipped)
- ☐ Mast antenna (if equipped)

Under hood—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 (if equipped)
- ☐ Brake and clutch master cylinder fluid level
- ☐ Windshield washer reservoir fluid level
- ☐ Radiator coolant level and specific gravity
- ☐ Tightness of battery terminals

Interior

CHECK the operation of the following items:

- ☐ Seat controls (sliding and reclining)
- ☐ Seat belts and warning system
- ☐ Air bag system using warning light
- ☐ Cruise control system (if equipped)
- ☐ Ignition switch and steering lock
- ☐ Starter interlock switch (clutch pedal)
- ☐ Power windows (if equipped)
- ☐ Door locks
- ☐ All lights including warning and indicator lights
- ☐ Anti-theft system
- ☐ Horn, wipers, and washers
- ☐ Wiper blades performance
Clean the wiper blades and windshield, if necessary
- ☐ Audio system
- ☐ Cigarette lighter
- ☐ Power outside mirrors (if equipped)
- ☐ Heater, defroster, and air conditioner at all mode selections (if equipped)

CHECK the following items:

- ☐ Presence of spare fuse
- ☐ Upholstery and interior finish

CHECK and **ADJUST**, if necessary, the following items:

- ☐ Pedal height and free play of brake and clutch pedal (Refer to Section 04 and 05)
- ☐ Parking brake (Refer to Section 04)

Under hood—engine running at operating temperature

CHECK the following items:

- ☐ Automatic transmission oil level

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 transmission oil level
- ☐ Differential oil level

Road test

CHECK the following items:

- ☐ Brake operation
- ☐ Clutch operation
- ☐ Steering control
- ☐ Operation of meters and gauges
- ☐ Squeaks, rattles, or unusual noises
- ☐ Overall engine performance
- ☐ Seat belt emergency locking retractors
- ☐ Cruise control system (if equipped)

After road test

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

The following items must be done just before delivery to your customer.

- ☐ Load test battery and charge if necessary (Load test result: Volts)
- ☐ Adjust tire pressure to specification
- ☐ Clean outside of vehicle
- ☐ Install fuses for accessories
- ☐ Remove seat and floor mat protective covers
- ☐ Vacuum and clean interior of vehicle
- ☐ Inspect installation of option parts with invoice

GENERAL INFORMATION

SCHEDULED MAINTENANCE

U5U000AJ

Scheduled Maintenance Table (Except Canada)

Schedule 1 (Normal driving conditions)

- The vehicle is mainly operated where none of the “unique driving conditions” apply.

Maintenance Item	Maintenance Interval (Number of months or miles { kilometers }, whichever comes first)									
	Months		6	12	18	24	30	36	42	48
	× 1000	Kilometers	12	24	36	48	60	72	84	96
		Miles	7.5	15	22.5	30	37.5	45	52.5	60

Engine

Engine oil	R	R	R	R	R	R	R	R	R
Oil filter	R	R	R	R	R	R	R	R	R
Tension of all drive belts				I					I
Engine timing belt ★	Replace every 60,000 miles { 96,000 km }								
Engine timing belt ○	*2Inspect at 60,000 miles { 96,000 km }, and again at 90,000 miles { 144,000 km }								
	Replace every 105,000 miles { 168,000 km }								
Hoses and tubes for emission									I*2

Air cleaner

Air cleaner element				R					R
---------------------	--	--	--	---	--	--	--	--	---

Ignition system

Spark plugs				R					R
-------------	--	--	--	---	--	--	--	--	---

Fuel system

Idle speed				I*2					I*1
Fuel filter									R*1
Fuel lines and hoses				I*2					I*1
Fuel hose ○	Inspect every 105,000 miles { 168,000 km }								

Cooling system

Cooling system				I					I
Engine coolant	Replace at first 45,000 miles { 72,000 km } or 36 months; after that, every 30,000 miles { 48,000 km } or 24 months.								

Chassis and body

Brake lines, hoses and connections				I					I
Disc brakes				I					I
Manual transmission oil									R
Differential oil									R
Steering operation and linkages				I					I
Front suspension ball joints				I					I
Drive shaft dust boots				I					I
Bolts and nuts on chassis and body				I					I
Exhaust system heat shields				I					I
All locks and hinges	L	L	L	L	L	L	L	L	L

Air conditioner system (if equipped)

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

Chart symbols

I : Inspect and repair, clean, or replace if necessary. (As for the air cleaner element, inspect, and if necessary replace.)

R : Replace

L : Lubricate

Remarks

- After 48 months or 60,000 miles { 96,000 km }, continue to follow the described maintenance at the recommended intervals.

GENERAL INFORMATION

- ^{*1} : This maintenance is not required for states of California and Massachusetts. However, we recommended that it also be performed on all vehicles.
- ^{*2} : This maintenance is recommended by Mazda. However, it is not necessary for emission warranty coverage, and your vehicle will still be covered by manufacturer recall liability.
- : For vehicle sold in California and Massachusetts
- ★ : For vehicle sold outside California and Massachusetts

Schedule 2 (Unique driving conditions)

- Repeated short-distance driving.
- Driving in dusty conditions.
- Driving with extended use of brakes.
- Driving in areas where salt or other corrosive materials are used.
- Driving on rough or muddy roads.
- Extended periods of idling or low-speed operation.
- Driving for long periods in cold temperatures or extremely humid climates.

Maintenance Item	Maintenance Interval (Number of months or miles { kilometers }, whichever comes first)													
	Months		4	8	12	16	20	24	28	32	36	40	44	48
	× 1000	Kilometers	8	16	24	32	40	48	56	64	72	80	88	96
		Miles	5	10	15	20	25	30	35	40	45	50	55	60

Engine

Engine oil	R	R	R	R	R	R	R	R	R	R	R	R	R
Engine oil (Puerto Rico)	Replace every 3,000 miles { 4,800 km } or 3 months												
Oil filter	R	R	R	R	R	R	R	R	R	R	R	R	R
Tension of all drive belts						I							I
Engine timing belt ★	Replace every 60,000 miles { 96,000 km }												
Engine timing belt ○	*2Inspect at 60,000 miles { 96,000 km }, and again at 90,000 miles { 144,000 km }												
	Replace every 105,000 miles { 168,000 km }												
Hoses and tubes for emission													I*2

Air cleaner

Air cleaner element			I ^{*2}			R			I ^{*2}				R
---------------------	--	--	-----------------	--	--	---	--	--	-----------------	--	--	--	---

Ignition system

Spark plugs						R							R
-------------	--	--	--	--	--	---	--	--	--	--	--	--	---

Cooling system

Cooling system						I							I
Engine coolant	Replace at first 45,000 miles { 72,000 km } or 36 months; after that, every 30,000 miles { 48,000 km } or 24 months												

Fuel system

Fuel filter													R*1
Fuel lines and hoses						I*2							I*1
Idle speed						I*2							I*1
Fuel hose ○	Inspect every 105,000 miles { 168,000 km }												

Chassis and body

Brake lines, hoses and connections						I							I
Disc brakes			I			I			I				I
Manual transmission oil						R							R
Differential oil						R							R
Steering operation and linkages						I							I
Front suspension ball joints						I							I
Drive shaft dust boots						I							I
Bolts and nuts on chassis and body			I			I			I				I
Exhaust system heat shields						I							I

GENERAL INFORMATION

Maintenance Item	Maintenance Interval (Number of months or miles { kilometers }, whichever comes first)													
	Months		4	8	12	16	20	24	28	32	36	40	44	48
	× 1000	Kilometers	8	16	24	32	40	48	56	64	72	80	88	96
		Miles	5	10	15	20	25	30	35	40	45	50	55	60
All locks and hinges			L	L	L	L	L	L	L	L	L	L	L	L

Air conditioner system (if equipped)

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

Chart symbols

I : Inspect and repair, clean, or replace if necessary. (As for the air cleaner element, inspect, and if necessary replace.)

R : Replace

L : Lubricate

Remarks

- After 48 months or 60,000 miles { 96,000 km }, continue to follow the described maintenance at the recommended intervals.
- *1 : This maintenance is not required for states of California and Massachusetts. However, we recommended that it also be performed on all vehicles.
- *2 : This maintenance is recommended by Mazda. However, it is not necessary for emission warranty coverage, and your vehicle will still be covered by manufacturer recall liability.
- : For vehicle sold in California and Massachusetts
- ★ : For vehicle sold outside California and Massachusetts

Scheduled Maintenance Table (Canada)

Maintenance Item	Maintenance Interval (Number of months or miles { kilometers }, whichever comes first)													
	Months		5	10	15	20	25	30	35	40	45	50	55	60
	× 1000	Kilometers	8	16	24	32	40	48	56	64	72	80	88	96
		Miles	5	10	15	20	25	30	35	40	45	50	55	60

Engine

Engine oil	R	R	R	R	R	R	R	R	R	R	R	R	R
Oil filter	R	R	R	R	R	R	R	R	R	R	R	R	R
Tension of all drive belts	I	I	I	I	I	I	I	I	I	I	I	I	I
Engine timing belt*1													R

Air cleaner

Air cleaner element			I			R			I				R
---------------------	--	--	---	--	--	---	--	--	---	--	--	--	---

Ignition system

Spark plugs						R							R
-------------	--	--	--	--	--	---	--	--	--	--	--	--	---

Cooling system

Engine coolant level and strength	I	I	I	I	I	I	I	I	I	I	I	I	I
Cooling system for leaks			I			I			I				I
Engine coolant	Replace at first 45,000 miles { 72,000 km } or 45 months; after that, every 30,000 miles { 48,000 km } or 30 months												

Fuel system

Idle speed			I			I			I				I
Fuel lines and hoses						I*2							I
Fuel filter						R							R
PCV valve*2													I
Emission hoses and tubes													I

Chassis and body

Automatic transmission fluid level	I	I	I	I	I	I	I	I	I	I	I	I	I
Transmission oil (MT and AT)						R							R
Differential oil	I	I	I	I	I	R	I	I	I	I	I	I	R
Drive shaft dust boots						I							I

GENERAL INFORMATION

Maintenance Item	Maintenance Interval (Number of months or miles { kilometers }, whichever comes first)													
	Months		5	10	15	20	25	30	35	40	45	50	55	60
	× 1000	Kilometers	8	16	24	32	40	48	56	64	72	80	88	96
		Miles	5	10	15	20	25	30	35	40	45	50	55	60
Brake lines and hoses								I						I
Brake and clutch fluid level			I	I	I	I	I	I	I	I	I	I	I	I
Brake fluid* ³								R						R
Disc brakes (front and rear)					I			I			I			I
Tire inflation pressure and tire wear			I	I	I	I	I	I	I	I	I	I	I	I
Tires					Rt			Rt			Rt			Rt
Power steering fluid level			I	I	I	I	I	I	I	I	I	I	I	I
Steering operation and linkages (Includes four wheel alignment)								I						I
Suspension components (front and rear)								I						I
All chassis and body nuts and bolts					I			I			I			I
Exhaust system heat shields								I						I
All locks and hinges			L	L	L	L	L	L	L	L	L	L	L	L
Washer fluid level			I	I	I	I	I	I	I	I	I	I	I	I
Function of all lights			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

Chart symbols

I : Inspect and repair, clean, or replace if necessary. (Inspect, and if necessary replace ... Air cleaner element only)

R : Replace

L : Lubricate

Rt : Rotate (tires)

Remarks

- After 60 months or 60,000 miles { 96,000 km }, continue to follow the described maintenance at the recommended intervals.
- Refer below for a description of items marked * in the maintenance chart.
- *¹ : Replacement of the timing belt is required every 60,000 miles { 96,000 km }. Failure to replace this belt may result in damage to the engine.
- *² : This maintenance is recommended by Mazda. However, it is not necessary for emission warranty coverage or manufacturer recall liability.
- *³ : This maintenance is recommended by Mazda.

ENGINE

01 SECTION

01

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01-01A TROUBLESHOOTING [ENGINE CONTROL]

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FOREWORD

Before proceeding with the following troubleshooting.

- Refer to section G1 to understand the basic troubleshooting procedure.
- Perform the diagnostic trouble code inspection.

U5U101BA

- If a diagnostic trouble code is displayed, proceed with inspection steps for the code.
- When the engine can be started, perform "ENGINE TUNE-UP".

ENGINE ON-BOARD DIAGNOSIS

U5U101BB

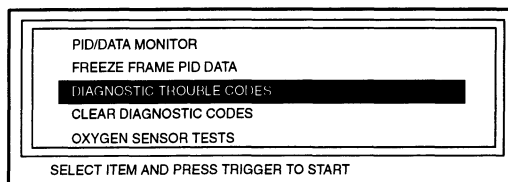
Diagnostic Trouble Code Inspection

1. Connect the **SST** (NGS) to the data link connector 2.
2. Refer to the manufacturer-provided instruction manual for the NGS operation.

Note

- Some DTCs are detected only when the engine is running. Before checking the DTCs, start the engine.

3. Start the engine.
4. Select "DIAGNOSTIC TROUBLE CODES" function and press TRIGGER.

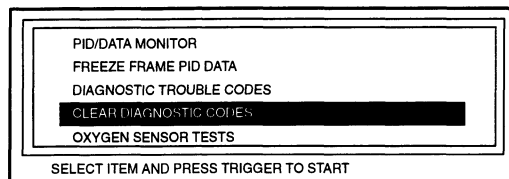


U5U10105

5. When "NO CODES RECEIVED/SYSTEM PASSED" is displayed, all systems monitored are judged OK.
6. When any of the diagnostic trouble codes is displayed, carry out troubleshooting according to the code.
7. When "LINK MONITOR ERROR" is displayed, check connection of the NGS.
8. After all problems have been repaired, carry out "After repair procedure."

After repair procedure

1. After repairs, connect the NGS to the data link connector 2.
2. Select "CLEAR DIAGNOSTIC CODES" function and erase diagnostic trouble codes from the NGS memory.



U5U10106

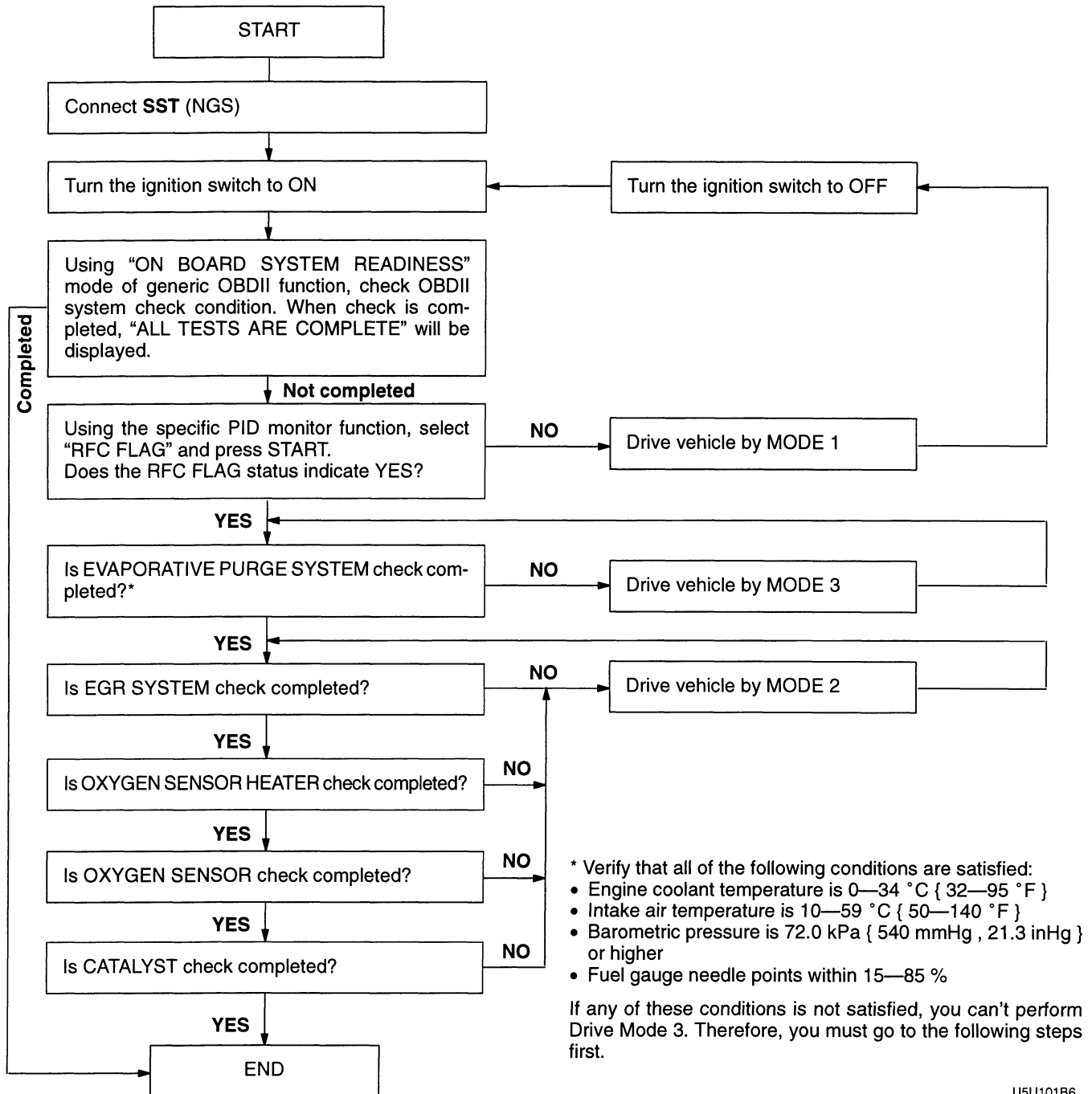
3. Carry out OBDII drive cycle procedure twice.
4. Start the engine.
5. Perform diagnostic trouble code inspection again and verify that no diagnostic trouble codes are displayed.

OBDII Drive Cycle Procedure

Note

- Disconnecting the battery will reset the memory. Do not disconnect the battery during and after this procedure.
- Vehicle speed and engine speed detected by the PCM may differ from that indicated by the speedometer and the tachometer. Check the vehicle speed and engine speed during driving mode by using the **SST** (NGS).
- If the OBDII system check is not completed while the drive cycle procedure is carried out, the following cause is guessed.
 1. The OBDII system detects the malfunction.
 2. The drive cycle procedure is not completed correctly.

01



U5U101B6

TROUBLESHOOTING [ENGINE CONTROL]

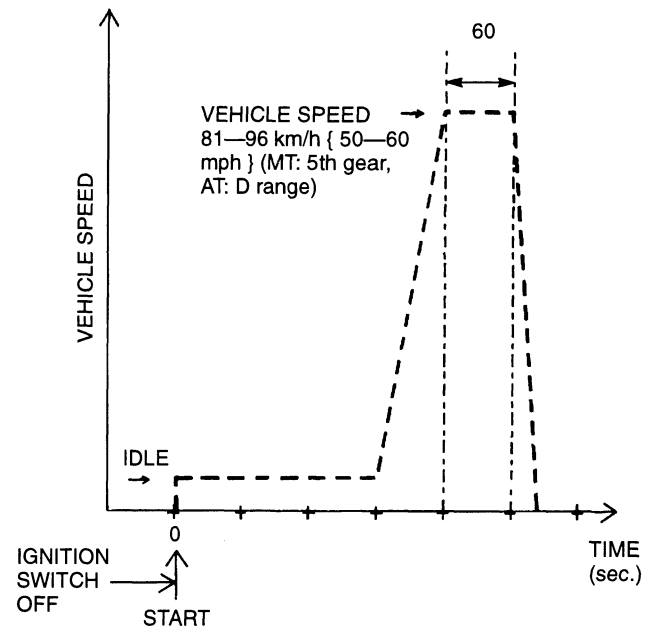
MODE 1

1. Start the engine and warm it up completely.
2. Verify that all electrical loads (headlight, blower motor and rear window defroster) and A/C loads are off.
3. Verify that the initial ignition timing and the initial idle speed are within the specification.
4. If not as specified, adjust the ignition timing and idle speed.
5. Verify that terminals TEN and GND of the data link connector are not connected.
6. Carry out no-load racing at the specified speed for each model. Race the engine for more than 15 seconds at each time. Refer to the following engine speed table for engine speed.

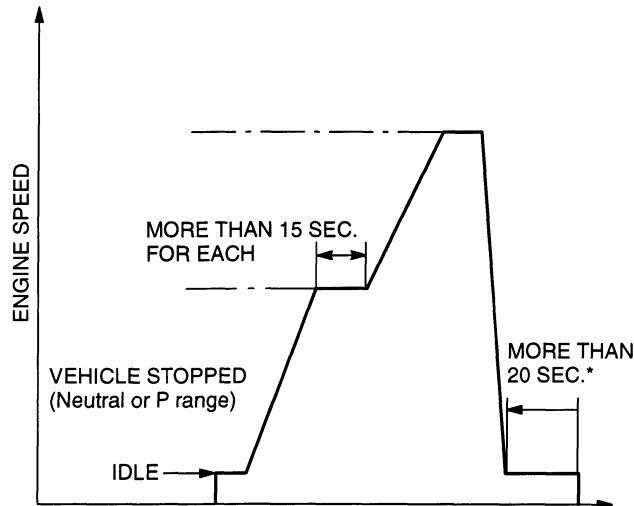
Engine speed table

N1 (rpm)	N2 (rpm)
1,800—2,200	3,800—4,200

7. Idle the engine for more than 20 seconds with the electric cooling fan stopped.



U5U101B8



* With electric cooling fan stopped.

U5U101B7

MODE 2

1. Start the engine and warm it up completely.
2. Verify that all electrical loads (headlight, blower motor and rear window defroster) and A/C load are off.

Note

- Driving mode before the constant speed driving is not specified.

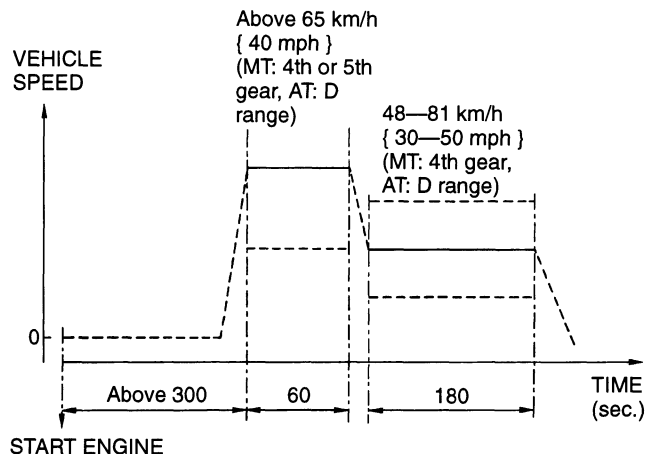
3. Drive the vehicle at the constant speed of 81—96 km/h { 50—60 mph } for 60 seconds. (MT: 5th gear, AT: D range)

MODE 3

1. Start the engine and warm it up completely.
2. Verify that all electrical loads (headlight, blower motor and rear window defroster) and A/C load are off.
3. Drive the vehicle at the constant speed of above 65 km/h { 40 mph } for 60 seconds after the above 300 seconds from engine start. (MT: 4th or 5th gear, AT: D range)
4. Drive the vehicle at the constant speed 48—81 km/h { 30—50 mph } for 180 seconds. (MT: 4th gear, AT: D range)

Note

- Driving mode before the constant speed driving is not specified.



U5U101B9

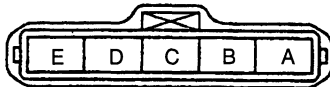
Diagnostic Trouble Code Table

DTC	Display on the NGS	Condition
P0100	MAF/VAF—CIRCUIT MALFUNCTION	Mass air flow circuit malfunction
P0110	IAT—CIRCUIT MALFUNCTION	Intake air temperature circuit malfunction
P0115	ECT—CIRCUIT MALFUNCTION	Engine coolant temperature circuit malfunction
P0120	TP—CIRCUIT MALFUNCTION	Throttle position circuit malfunction
P0125	EXCESSIVE TIME TO ENTER CLOSED LOOP	Excessive time to enter closed loop fuel control
P0130	O2S 11—CIRCUIT MALFUNCTION	O ₂ sensor circuit malfunction
P0134	O2S 11—CIRCUIT NO ACTIVITY DETECTED	O ₂ sensor circuit no activity detected
P0135	O2S 11—HEATER CIRCUIT MALFUNCTION	O ₂ sensor heater circuit malfunction
P0140	O2S 12—CIRCUIT NO ACTIVITY DETECTED	O ₂ sensor circuit no activity detected
P0141	O2S 12—HEATER CIRCUIT MALFUNCTION	O ₂ sensor heater circuit malfunction
P0170	BANK 1—FUEL TRIM MALFUNCTION	Fuel trim malfunction
P0300	RANDOM MISFIRE DETECTED	Random misfire detected
P0301	CYLINDER 1 MISFIRE DETECTED	Cylinder 1 misfire detected
P0302	CYLINDER 2 MISFIRE DETECTED	Cylinder 2 misfire detected
P0303	CYLINDER 3 MISFIRE DETECTED	Cylinder 3 misfire detected
P0304	CYLINDER 4 MISFIRE DETECTED	Cylinder 4 misfire detected
P0335	CRANKSHAFT POS SENSOR—CKT MALFUNCTION	Crankshaft position sensor circuit malfunction
P0340	CAMSHAFT POS SENSOR—CKT MALFUNCTION	Camshaft position sensor circuit malfunction
P0400	EGR—FLOW MALFUNCTION	Exhaust gas recirculation flow malfunction
P0404	EGR—RANGE/PERF PROBLEM	Exhaust gas recirculation circuit range performance
P0420	BANK 1 CAT EFFICIENCY BELOW LIMIT	Catalyst system efficiency below threshold
P0441	EVAP SYSTEM—MALFUNCTION	Evaporative emission control system malfunction
P0443	EVAP SYSTEM—PURGE CTRL VALVE CKT MALF	Evaporative emission control system purge control valve circuit malfunction
P0470	EXHAUST PRESSURE SENSOR—MALFUNCTION	Evaporative emission control system purge control valve circuit malfunction
P0500	VEHICLE SPEED SENSOR—MALFUNCTION	Vehicle speed sensor malfunction
P0505	IDLE CONTROL SYSTEM—MALFUNCTION	Idle control system malfunction
P0510	CLOSED THROTTLE POS SWITCH—MALFUNCTION	Closed throttle position switch malfunction
P0703	BRAKE SW—MALFUNCTION	Brake switch input malfunction
P1170	HO2S11—INVERSION	Heated oxygen sensor (Front) (Inversion)
P1195	EGRVS—OPEN OR SHORT	EGR boost sensor open or short
P1250	PRC—OPEN OR SHORT (AT)	PRC solenoid valve open or short (AT)
P1345	SGC SIGNAL—NO SGC SIGNAL	No SGC signal
P1402	EGRS—OPEN OR SHORT	EGR valve position sensor open or short
P1485	EGR (VACUUM)—OPEN OR SHORT	EGR solenoid valve (vacuum) open or short
P1486	EGR (VENT)—OPEN OR SHORT	EGR solenoid valve (vent) open or short
P1601	COMM LINE (AT)—COMM ERROR	ECM—TCM communication error (AT)
P1608	PCME (CPU)—MALFUNCTION	ECM (CPU) malfunction
P1794	BAT—BAT OR CIRCUIT FAIL	Battery or circuit malfunction
P1797	PNS—OPEN OR SHORT	P or N range or neutral/clutch switch open or short

TROUBLESHOOTING [ENGINE CONTROL]

Diagnostic Trouble Code Troubleshooting

DTC P0100		MAF/VAF—CIRCUIT MALFUNCTION		
DETECTION CONDITION	- Input voltage from mass air flow sensor is below 0.21 V or above 4.9 V when time from engine started is 3 seconds - Mass intake airflow amount is above 68.4 g/sec { 2.41 oz/sec } when engine speed is below 2,000 rpm and engine coolant temperature is over 80 °C { 170 °F } - Mass intake airflow amount is below 2.4 g/sec { 0.085 oz/sec } when throttle position sensor output voltage is above 1.5 V and engine is running			
	POSSIBLE CAUSE	- Mass air flow sensor malfunction - Open or short circuit in wiring from main relay terminal D to mass air flow sensor terminal A - Open or short circuit in wiring from ECM terminal 3B to mass air flow sensor terminal B - Open circuit in wiring from ECM terminal 4A to mass air flow sensor terminal E - Throttle position sensor malfunction		
STEP		INSPECTION	ACTION	
1	Does mass air flow sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector	
		No	Go to next step	
2	Is ECM terminal 3B voltage OK?	Yes	Go to step 6	
		No	Go to next step	
3	Disconnect mass air flow sensor connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step	
		No	Check for open or short circuit in wiring harness. (Main relay terminal D — Mass air flow sensor terminal A)	
4	Is there continuity between connector terminal E and ECM terminal 4A?	Yes	Go to next step	
		No	Repair or replace wiring harness	
5	Is there continuity between connector terminal B and ECM terminal 3B?	Yes	Replace mass air flow sensor	
		No	Repair or replace wiring harness	
6	Is mass air flow sensor OK?	Yes	Go to next step	
		No	Replace mass air flow sensor	
7	Is voltage increase linear according to the throttle valve opening angle?	Yes	Go to next step	
		No	Replace throttle position sensor	
8	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM	
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)	



HARNESS SIDE CONNECTOR
(VIEW FROM BEHIND OF CONNECTOR)

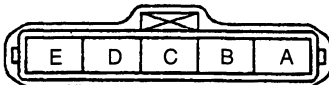
U5U101A1

U5U101A1

TROUBLESHOOTING [ENGINE CONTROL]

01

DTC P0110		IAT—CIRCUIT MALFUNCTION	
DETECTION CONDITION		- Input voltage from intake air temperature sensor is below 0.16 V or above 4.84 V when engine is started - Intake air temperature is higher than engine coolant temperature by 40 °C { 104 °F }	
POSSIBLE CAUSE		- Intake air temperature sensor malfunction - Open or short circuit in wiring from mass air flow sensor terminal C to ECM terminal 3K - Open or short circuit in wiring from mass air flow sensor terminal D to ECM terminal 3O	
STEP	INSPECTION		ACTION
1	Does mass air flow sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3K voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect mass air flow sensor connector. Turn ignition switch to ON. Is there 5 V at connector terminal C?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (ECM terminal 3K — Mass air flow sensor terminal C)
4	Is there continuity between connector terminal D and ECM terminal 3O?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is mass air flow sensor OK?	Yes	Go to next step
		No	Replace mass air flow sensor
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR
(VIEW FROM BEHIND OF CONNECTOR)

U5U101A1

U5U101A1

DTC P0115		ECT—CIRCUIT MALFUNCTION	
DETECTION CONDITION		Input voltage from engine coolant temperature sensor is below 0.2 V or above 4.9 V when ignition switch is turned ON	
POSSIBLE CAUSE		- Engine coolant temperature sensor malfunction - Open or short circuit in wiring from engine coolant temperature sensor terminal A to ECM terminal 3G - Open or short circuit in wiring from engine coolant temperature sensor terminal B to ECM terminal 3O	
STEP	INSPECTION	ACTION	
1	Does engine coolant temperature sensor or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3G voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect engine coolant temperature sensor connector. Turn ignition switch ON. Is there 5 V at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (ECM terminal 3G — Engine coolant temperature sensor terminal A)
4	Is there continuity between connector terminal B and ECM terminal 3O?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is engine coolant temperature sensor OK?	Yes	Go to next step
		No	Replace engine coolant temperature sensor

TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
6	Erase diagnostic trouble code from memory.	Yes	Replace ECM
	Is same code No. present after performing After re- pair procedure?	No	Intermittent poor connection of harness or connector (Repair connector and/or harness)
 HARNESS SIDE CONNECTOR (VIEW FROM BEHIND OF CONNECTOR)			

U5U101A2

DTC P0120		TP—CIRCUIT MALFUNCTION	
DETECTION CONDITION	- Input voltage from throttle position sensor is below 0.1 V or above 4.8 V when ignition switch is turned ON - Input voltage from throttle position sensor is below 0.37 V when engine coolant temperature is over 80 °C { 176 °F } and mass intake airflow amount is above 67.7 g/sec { 2.39 oz/sec } - Input voltage from throttle position sensor is above 1.48 V when engine speed is above 500 rpm and mass intake airflow is below 4.8 g/sec { 0.17 oz/sec }		
	POSSIBLE CAUSE - Throttle position sensor malfunction - Open or short circuit in wiring from throttle position sensor terminal A to ECM terminal 3O - Open or short circuit in wiring from throttle position sensor terminal B to ECM terminal 3L - Open or short circuit in wiring from throttle position sensor terminal C to ECM terminal 3F - Mass air flow sensor malfunction		
STEP	INSPECTION		ACTION
1	Does throttle position sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3F voltage OK?	Yes	Go to next step
		No	Go to step 4
3	Is voltage increase linear according to throttle valve opening angle?	Yes	Go to step 7
		No	Replace throttle position sensor
4	Disconnect throttle position sensor connector. Turn ignition switch to ON. Is there 5 V at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (ECM terminal 3O — Throttle position sensor terminal A)
5	Is there continuity between connector terminal B and ECM terminal 3L?	Yes	Go to next step
		No	Repair or replace wiring harness
6	Is there continuity between connector terminal A and ECM terminal 3O?	Yes	Replace throttle position sensor
		No	Repair or replace wiring harness
7	Is mass air flow sensor OK?	Yes	Go to next step
		No	Replace mass air flow sensor
8	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR
(VIEW FROM BEHIND OF CONNECTOR)

U5U10107

TROUBLESHOOTING [ENGINE CONTROL]

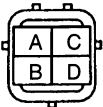
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DTC P0125		EXCESSIVE TIME TO ENTER CLOSED LOOP	
DETECTION CONDITION		Engine coolant temperature will not increase after engine is started and certain period of time is passed and when closed position switch is off condition	
POSSIBLE CAUSE		- Engine coolant temperature sensor malfunction - Thermostat malfunction - Engine coolant fan system malfunction - Water pump malfunction - Engine coolant passage clogged or leaks - Engine coolant, level and protection incorrect	
STEP	INSPECTION		ACTION
1	Is electrical fan control system OK? ☞ 01-01 ENGINE SYSTEM INSPECTION, Cooling Fan Control Inspection	Yes	Go to next step
		No	Repair or replace engine coolant fan system
2	Is engine coolant temperature sensor resistance OK?	Yes	Go to next step
		No	Replace engine coolant temperature sensor
3	Is cooling system OK?	Yes	Go to next step
		No	Repair or replace
4	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Temporary system malfunction

DTC P0130		O2S 11—CIRCUIT MALFUNCTION	
DETECTION CONDITION		- Heated oxygen sensor signal inverses at intervals of 2.67 sec. (MT), 2.90 sec. (AT) or longer while driving in following conditions: - Engine speed 750—3,090 rpm (MT), 810—3,090 rpm (AT) - Vehicle speed over 5.6 km/h { 3.5 mph } - Engine speed variation in 0.51 sec. is less than 670 rpm (MT), 580 rpm (AT) - Charging efficiency variation in 0.51 sec. is less than 50 % (MT), 16 % (AT) - Input voltage from throttle position sensor variation in 0.51 sec. is less than 0.31 V (MT), 0.16 V (AT)	
POSSIBLE CAUSE		- Heated oxygen sensor (Front) deterioration - Leakage in exhaust system	
STEP	INSPECTION		ACTION
1	Is heated oxygen sensor (Front) OK? ☞ 01-40 HEATED OXYGEN SENSOR INSPECTION	Yes	Go to next step
		No	Repair or replace heated oxygen sensor (Front)
2	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

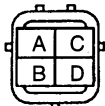
DTC P0134		O2S 11—CIRCUIT NO ACTIVITY DETECTED	
DETECTION CONDITION		When heated oxygen sensor (Front) signal does not exceed 0.45 V after engine is started, or stays below 0.45 V for 52.4 seconds after engine has reached normal operating temperature, closed throttle position switch is off condition and running at 1,500 rpm or over	
POSSIBLE CAUSE		- Low fuel - Heated oxygen sensor (Front) malfunction - Open or short circuit in wiring from heated oxygen sensor (Front) terminal A to ECM terminal 3C - Open circuit in wiring heated oxygen sensor (Front) terminal B to ECM terminal 3O - Intake-air system, fuel system, ignition system malfunction	
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Front) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3C voltage OK?	Yes	Go to step 6
		No	Go to next step

TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
3	Disconnect heated oxygen sensor (Front) connector. Is there continuity between connector terminal B and ECM terminal 3O?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is there continuity between connector terminal A and ECM terminal 3C?	Yes	Go to next step
		No	Repair or replace
5	Are following units OK? ● Fuel injector ● Pressure regulator ● Mass air flow sensor ● Engine coolant temperature sensor ● Spark plug ● Air suction (Air/Fuel ratio rich or lean)	Yes	Replace heated oxygen sensor (Front)
		No	Repair or replace
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)
 HARNESS SIDE CONNECTOR (VIEW FROM BEHIND OF CONNECTOR)			

U5U101A3

U5U101A3

DTC P0135		O2S 11—HEATER CIRCUIT MALFUNCTION	
DETECTION CONDITION		- PCM voltage is above 11.5 V when power is supplied to heated oxygen sensor heater (Front) - PCM voltage is below 5.8 V when no power is supplied (during 322—327 sec. after engine start) to heated oxygen sensor heater (Front)	
POSSIBLE CAUSE		- Heated oxygen sensor heater (Front) malfunction - Open or short circuit in wiring from heated oxygen sensor (Front) terminal C to ignition switch - Open or short circuit in wiring from heated oxygen sensor (Front) terminal D to PCM terminal 3M	
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Front) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3M voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect heated oxygen sensor (Front) connector and turn ignition switch to ON. Is there battery positive voltage at connector terminal C?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Ignition switch — Heated oxygen sensor (Front) terminal C)
4	Is there continuity between connector terminal D and ECM terminal 3M?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between connector terminals D and C?	Yes	Go to next step
		No	Replace heated oxygen sensor (Front)
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)
 HARNESS SIDE CONNECTOR (VIEW FROM BEHIND OF CONNECTOR)			

U5U101A3

U5U101A3

TROUBLESHOOTING [ENGINE CONTROL]

DTC P0140		O2S 12—CIRCUIT NO ACTIVITY DETECTED	
DETECTION CONDITION		• When heated oxygen sensor (Rear) signal does not exceed 0.45 V after engine is started, or stays below 0.45 V for 19 seconds after engine has reached normal operating temperature, closed throttle position switch is off condition, running at 1,500 rpm or over and power is supplied to heated oxygen sensor heater (Rear)	
POSSIBLE CAUSE		• Low fuel • Heated oxygen sensor (Rear) malfunction • Open or short circuit in wiring from (Rear) heated oxygen sensor (Rear) terminal A to ECM terminal 3D • Open circuit in wiring from heated oxygen sensor (Rear) terminal B to ECM terminal 3O. • Intake-air system, fuel system or ignition system malfunction	
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Rear) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3D voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect heated oxygen sensor (Rear) connector. Is there continuity between connector terminal B and ECM terminal 3O?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is there continuity between connector terminal A and ECM terminal 3D?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Are following units OK? • Fuel injector • Pressure regulator • Mass air flow sensor • Engine coolant temperature sensor • Spark plug • Air suction (Air/Fuel ratio rich)	Yes	Replace heated oxygen sensor (Rear)
		No	Repair or replace
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR
(VIEW FROM BEHIND OF CONNECTOR)

U5U101A

U5U101A4

TROUBLESHOOTING [ENGINE CONTROL]

DTC P0141		O2S 12—HEATER CIRCUIT MALFUNCTION	
DETECTION CONDITION	- ECM voltage is above 11.5 V when power is supplied to heated oxygen sensor heater (Rear) - ECM voltage is below 5.8 V when no power is supplied (during 322—327 sec. after engine start) to heated oxygen sensor heater (Rear)		
	POSSIBLE CAUSE	- Heated oxygen sensor heater (Rear) malfunction - Open or short circuit in wiring from heated oxygen sensor (Rear) terminal C to ignition switch - Open or short circuit in wiring from heated oxygen sensor (Rear) terminal D to ECM terminal 4Z	
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Rear) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 4Z voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect heated oxygen sensor (Rear) harness side connector and turn ignition switch to ON. Is there battery positive voltage at harness side connector terminal C?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. [Ignition switch — Heated oxygen sensor (Rear) terminal C]
4	Is there continuity between harness side connector terminal D and ECM terminal 4Z	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between harness side connector terminal D and C?	Yes	Go to next step
		No	Replace heated oxygen sensor (Rear)
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR
(VIEW FROM BEHIND OF CONNECTOR)

U5U101A

U5U101A4

TROUBLESHOOTING [ENGINE CONTROL]

DTC P0170		BANK 1—FUEL TRIM MALFUNCTION	
DETECTION CONDITION		● Fuel injection closed loop correction and learning correction are above the specified value because of system malfunction	
POSSIBLE CAUSE		● Low fuel ● Pressure regulator malfunction ● Fuel injector malfunction ● Fuel pump malfunction ● Engine coolant temperature sensor malfunction ● Mass air flow sensor malfunction ● Heated oxygen sensor malfunction ● Purge solenoid valve malfunction ● Leakage in intake-air system ● ECM malfunction ● Open or short circuit in wiring between ECM terminals 4U, 4V, 4W, 4X to fuel injector ● Intake air temperature sensor malfunction ● EGR boost sensor malfunction ● PCV valve malfunction	
STEP	INSPECTION		ACTION
1	Is there air leakage in intake-air system components?	Yes	Repair or replace intake-air system
		No	Go to next step
2	Is heated oxygen sensor (Front) OK?	Yes	Go to next step
		No	Replace heated oxygen sensor (Front)
3	Is fuel line pressure OK?	Yes	Go to step 6
		No	Go to next step
4	Is fuel pump maximum pressure OK?	Yes	Go to next step
		No	Repair or replace fuel pump
5	Is pressure regulator OK?	Yes	Go to next step
		No	Replace pressure regulator
6	Is fuel injector OK?	Yes	Go to next step
		No	Replace fuel injector
7	Is engine coolant temperature sensor OK?	Yes	Go to next step
		No	Replace engine coolant temperature sensor
8	Is mass air flow sensor OK?	Yes	Go to next step
		No	Replace mass air flow sensor
9	Is throttle position sensor OK?	Yes	Go to next step
		No	Adjust throttle position sensor
10	Is closed throttle position switch OK?	Yes	Go to next step
		No	Adjust throttle position sensor
11	Is intake air temperature sensor OK?	Yes	Go to next step
		No	Replace intake air temperatur sensor
12	Is EGR boost sensor OK?	Yes	Go to next step
		No	Replace EGR boost sensor
13	Is purge solenoid valve OK?	Yes	Go to next step
		No	Replace purge solenoid valve
14	Is PCV valve OK?	Yes	Go to next step
		No	Replace PCV valve
15	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Temporary system malfunction

TROUBLESHOOTING [ENGINE CONTROL]

DTC P0300		RANDOM MISFIRE DETECTED	
DETECTION CONDITION		ECM input signal from crankshaft position sensor signal is irregular	
POSSIBLE CAUSE		- Ignition system malfunction - Low fuel - Low battery positive voltage - Fuel system malfunction - Insufficient compression - Crankshaft position sensor air gap incorrect - Exhaust gas recirculation system malfunction	
STEP	INSPECTION		ACTION
1	Is ignition system OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is crankshaft position sensor air gap correct?	Yes	Go to next step
		No	Adjust crankshaft position sensor air gap
3	Is fuel system OK?	Yes	Go to next step
		No	Repair or replace as necessary
4	Is exhaust gas recirculation control system OK?	Yes	Go to next step
		No	Repair or replace as necessary
5	Is compression at all cylinders normal?	Yes	Go to next step
		No	Repair or replace as necessary
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Temporary system malfunction

DTC P0301		CYLINDER 1 MISFIRE DETECTED	
DETECTION CONDITION		ECM input signal from crankshaft position sensor signal for cylinder No.1 is irregular	
POSSIBLE CAUSE		- Ignition system of cylinder No.1 malfunction - Low fuel - Low battery positive voltage - Fuel system malfunction - Insufficient compression in cylinder No.1 - Crankshaft position sensor air gap incorrect - Exhaust gas recirculation system malfunction	
STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.1 OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Adjust crankshaft position sensor air gap
3	Is fuel injector at cylinder No.1 OK?	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.1
4	Is fuel system OK?	Yes	Go to next step
		No	Repair or replace as necessary
5	Is exhaust gas recirculation control system OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Is compression at cylinder No.1 normal?	Yes	Go to next step
		No	Repair or replace as necessary
7	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Temporary system malfunction

TROUBLESHOOTING [ENGINE CONTROL]

DTC P0302		CYLINDER 2 MISFIRE DETECTED	
DETECTION CONDITION		ECM input signal from crankshaft position sensor signal for cylinder No.2 is irregular	
POSSIBLE CAUSE		- Ignition system of cylinder No.2 malfunction - Low fuel - Low battery positive voltage - Fuel system malfunction - Insufficient compression in cylinder No.2 - Crankshaft position sensor air gap incorrect - Exhaust gas recirculation system malfunction	
STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.2 OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Adjust crankshaft position sensor air gap
3	Is fuel injector at cylinder No.2 OK?	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.2
4	Is fuel system OK?	Yes	Go to next step
		No	Repair or replace as necessary
5	Is exhaust gas recirculation control system OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Is compression at cylinder No.2 normal?	Yes	Go to next step
		No	Repair or replace as necessary
7	Erase diagnostic trouble code from memory. Is same code No. present after performing After re- pair procedure?	Yes	Replace ECM
		No	Temporary system malfunction

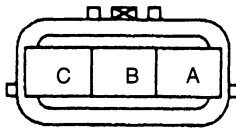
DTC P0303		CYLINDER 3 MISFIRE DETECTED	
DETECTION CONDITION		ECM input signal from crankshaft position sensor signal for cylinder No.3 is irregular	
POSSIBLE CAUSE		- Ignition system of cylinder No.3 malfunction - Low fuel - Low battery positive voltage - Fuel system malfunction - Insufficient compression in cylinder No.3 - Crankshaft position sensor air gap incorrect - Exhaust gas recirculation system malfunction	
STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.3 OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Adjust crankshaft position sensor air gap
3	Is fuel injector at cylinder No.3 OK?	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.3
4	Is fuel system OK?	Yes	Go to next step
		No	Repair or replace as necessary
5	Is exhaust gas recirculation control system OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Is compression at cylinder No.3 normal?	Yes	Go to next step
		No	Repair or replace as necessary
7	Erase diagnostic trouble code from memory. Is same code No. present after performing After re- pair procedure?	Yes	Replace ECM
		No	Temporary system malfunction

TROUBLESHOOTING [ENGINE CONTROL]

DTC P0304		CYLINDER 4 MISFIRE DETECTED	
DETECTION CONDITION		ECM input signal from crankshaft position sensor signal for cylinder No.4 is irregular	
POSSIBLE CAUSE		- Ignition system of cylinder No.4 malfunction - Low fuel - Low battery positive voltage - Fuel system malfunction - Insufficient compression in cylinder No.4 - Crankshaft position sensor air gap incorrect - Exhaust gas recirculation system malfunction	
STEP	INSPECTION		ACTION
1	Is ignition system of cylinder No.4 OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Adjust crankshaft position sensor air gap
3	Is fuel injector at cylinder No.4 OK?	Yes	Go to next step
		No	Repair or replace fuel injector at cylinder No.4
4	Is fuel system OK?	Yes	Go to next step
		No	Repair or replace as necessary
5	Is exhaust gas recirculation control system OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Is compression at cylinder No.4 normal?	Yes	Go to next step
		No	Repair or replace as necessary
7	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Temporary system malfunction

DTC P0335		CRANKSHAFT POS SENSOR—CKT MALFUNCTION	
DETECTION CONDITION		No NE signal input from crankshaft position sensor while engine is running	
POSSIBLE CAUSE		- Crankshaft position sensor malfunction - Crankshaft position sensor air gap incorrect - Open or short circuit in wiring from ECM terminal 4E to crankshaft position sensor terminal B - Open or short circuit in wiring from ECM terminal 4H to crankshaft position sensor terminal A	
STEP	INSPECTION		ACTION
1	Does crankshaft position sensor connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Disconnect crankshaft position sensor connector. Is there continuity between connector terminal B and ECM terminal 4E? Is there continuity between connector terminal A and ECM terminal 4H?	Yes	Go to next step
		No	Repair or replace wiring harness
3	Is crankshaft position sensor air gap OK?	Yes	Go to next step
		No	Adjust crankshaft position sensor air gap
4	Is crankshaft position sensor OK?	Yes	Go to next step
		No	Replace crankshaft position sensor

TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION	ACTION	
5	Erase diagnostic trouble code from memory. Is same code No. present after performing After re- pair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)
 HARNESS SIDE CONNECTOR (VIEW FROM BEHIND OF CONNECTOR)			
U5U10112			

DTC P0340		CAMSHAFT POS SENSOR—CKT MALFUNCTION	
DETECTION CONDITION		● No SGT signal input from camshaft position sensor for 4.2 seconds while engine cranking and input voltage from mass air flow sensor is above 1.3 V	
POSSIBLE CAUSE		● Camshaft position sensor malfunction ● Open or short circuit in wiring from ECM terminal 4F to distributor terminal C ● Open or short circuit in wiring from ECM terminal 4A to distributor terminal A	
STEP	INSPECTION		ACTION
1	Does distributor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Disconnect distributor connector. Is there continuity between connector terminal C and ECM terminal 4F? Is there continuity between connector terminal A and ECM terminal 4A?	Yes	Go to next step
		No	Repair or replace wiring harness
3	Is camshaft position sensor OK?	Yes	Go to next step
		No	Replace distributor
4	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)
 HARNESS SIDE CONNECTOR (VIEW FROM BEHIND OF CONNECTOR)			
U5U101A5			

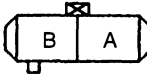
TROUBLESHOOTING [ENGINE CONTROL]

DTC P0400		EGR—FLOW MALFUNCTION	
DETECTION CONDITION	● Difference in intake manifold pressure when EGR is operated and when it is stopped is too large or too small		
POSSIBLE CAUSE	● EGR valve malfunction ● EGR boost sensor malfunction ● EGR boost sensor solenoid valve malfunction ● EGR valve position sensor malfunction ● EGR solenoid valve (vacuum, vent) malfunction ● Clogs or leakage in piping connecting following units ● EGR boost sensor, EGR boost sensor solenoid valve and intake manifold ● Air cleaner housing and EGR valve ● Intake manifold and EGR valve		
STEP	INSPECTION		ACTION
1	Is diagnostic trouble code for EGR solenoid valve (vacuum, vent), EGR boost sensor solenoid valve or EGR boost sensor displayed?	Yes	Carry out inspection as required according to diagnostic trouble code
		No	Go to next step
2	Is EGR valve position sensor OK?	Yes	Go to next step
		No	Repair or replace EGR valve
3	Check hose for damage. Is this OK? ● Intake manifold—EGR solenoid valve (vent) ● EGR solenoid valve (vent)—EGR solenoid valve (vacuum) ● EGR solenoid valve (vacuum)—EGR valve	Yes	Go to next step
		No	Repair or replace as necessary
4	EGR boost sensor OK?	Yes	Go to next step
		No	Replace EGR boost sensor
5	Check each hose for damage. Are they OK? ● EGR passage—EGR boost sensor solenoid valve ● EGR boost sensor—EGR boost sensor solenoid valve	Yes	Go to next step
		No	Repair or replace as necessary
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Temporary system malfunction

DTC P0404		EGR—RANGE/PERF PROBLEM	
DETECTION CONDITION		● EGR valve does not approach EGR target position when EGR solenoid valve (vacuum) is operated	
POSSIBLE CAUSE		● EGR solenoid valve (vent) malfunction ● Open or short circuit in wiring from EGR solenoid valve (vent) terminal B to ECM terminal 4P	
STEP	INSPECTION		ACTION
1	Does EGR solenoid valve (vent) or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 4P voltage OK?	Yes	Go to step 4
		No	Go to next step
3	Disconnect EGR solenoid valve (vent). Turn ignition switch to ON. Is there B+ at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness
4	Is EGR solenoid valve (vent) OK?	Yes	Go to next step
		No	Replace EGR solenoid valve (vent)

TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
5	Erase diagnostic trouble code from memory. Is same code No. present after performing After re- pair procedure?	Yes	Replace ECM
		No	Temporary system malfunction



HARNESS SIDE CONNECTOR
(VIEW FROM BEHIND OF CONNECTOR)

U5U10101

DTC P0420		BANK 1 CAT EFFICIENCY BELOW LIMIT	
DETECTION CONDITION	Number of heated oxygen sensor (Rear) inversion becomes closer to that of heated oxygen sensor (Front)		
POSSIBLE CAUSE	- Three way catalytic converter deterioration - Leakage in exhaust system		
STEP	INSPECTION		ACTION
1	Is heated oxygen sensor (Rear) OK?	Yes	Replace three way catalytic converter
		No	Replace heated oxygen sensor (Rear)

DTC P0441		EVAP SYSTEM—MALFUNCTION	
DETECTION CONDITION		● During purge execution in specified condition fuel injection feedback supplement value is less than specified value	
POSSIBLE CAUSE		● Purge solenoid valve malfunction ● Charcoal canister malfunction ● Check valve malfunction ● Fuel vapor valve malfunction ● Clogs or leakage in piping connecting following units ● Intake manifold and purge solenoid valve ● Purge solenoid valve and charcoal canister ● Charcoal canister, check valve, and fuel vapor valve	
STEP	INSPECTION		ACTION
1	Is ECM terminal 4T voltage OK?	Yes	Go to next step
		No	Inspect purge solenoid valve
2	Are evaporative emission control system-related hose free of clogs and leakage?	Yes	Go to next step
		No	Repair or replace as necessary
3	Is charcoal canister OK?	Yes	Go to next step
		No	Repair or replace as necessary
4	Is check valve OK?	Yes	Go to next step
		No	Repair or replace as necessary
5	Is rollover valve OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Temporary system malfunction

TROUBLESHOOTING [ENGINE CONTROL]

DTC P0443		EVAP SYSTEM—PURGE CTRL VALVE CKT MALF	
DETECTION CONDITION		- ECM voltage is above 11.5 V when power is supplied to purge solenoid valve - ECM voltage is below 5.8 V when no power is supplied to purge solenoid valve	
POSSIBLE CAUSE		- Purge solenoid valve malfunction - Open or short circuit in wiring from purge solenoid valve terminal A to main relay terminal D - Open or short circuit in wiring from purge solenoid valve terminal B to ECM terminal 4T	
STEP	INSPECTION		ACTION
1	Does purge solenoid valve connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is purge solenoid valve OK?	Yes	Go to next step
		No	Repair or replace as necessary
3	Verify that evaporative hose between purge solenoid valve and intake manifold damaged or clogged. Is evaporative hose OK?	Yes	Go to next step
		No	Repair or replace as necessary
4	Is ECM terminal 4T voltage OK?	Yes	Go to step 6
		No	Go to next step
5	Disconnect purge solenoid valve (High) connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal D — Purge solenoid valve terminal A)
6	Is there continuity between connector terminal B and ECM terminal 4T?	Yes	Go to next step
		No	Repair or replace wiring harness
7	Is there continuity between purge solenoid valve connector terminals A and B?	Yes	Go to next step
		No	Replace purge solenoid valve
8	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)
 HARNESS SIDE CONNECTOR (VIEW FROM BEHIND OF CONNECTOR)			

U5U10114

U5U10114

DTC P0470		EXHAUST PRESSURE SENSOR—MALFUNCTION	
DETECTION CONDITION		- Intake voltage from EGR boost sensor is below 0.098 V or above 4.883 V when engine is running and intake air temperature is above 10 °C { 50 °F } - Difference in intake manifold pressure and barometric pressure sensor is less than 4.45 kPa { 33.4 mmHg , 1.31 inHg } when idle air control valve is in feedback zone	
POSSIBLE CAUSE		- EGR boost sensor malfunction - EGR boost sensor vacuum hose loosed, damaged and clogged - Open or short circuit in wiring from ECM terminal 3I to EGR boost sensor terminal B - Open or short circuit in wiring from ECM terminal 3O to EGR boost sensor terminal C - Open circuit in wiring from ECM terminal 3N to EGR boost sensor terminal A	
STEP	INSPECTION	ACTION	
1	Verify that EGR boost sensor vacuum hose loose, damaged and clogged Is vacuum hose OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Is EGR boost sensor OK?	Yes	Go to next step
		No	Repair or replace as necessary
3	Does EGR boost sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step

TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
4	Is ECM terminal 3I voltage OK?	Yes	Go to step 7
		No	Go to next step
5	Disconnect EGR boost sensor connector. Turn ignition switch to ON. Is there 5 V at connector terminal C?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (ECM terminal 3O — EGR boost sensor terminal C)
6	Is there continuity between connector terminal A and ECM terminal 3N?	Yes	Replace EGR boost sensor
		No	Repair or replace wiring harness
7	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness.)



HARNESS SIDE CONNECTOR
(VIEW FROM BEHIND OF CONNECTOR)

U5U10118

DTC P0500		VEHICLE SPEED SENSOR—MALFUNCTION	
DETECTION CONDITION		- Vehicle speed signal is less than 3.77 km/h { 2.34 mph } for more than 33 sec. while driving in following condition: - Engine speed is over 2,000 rpm - Charging efficiency is over 20 % (MT), 40 % (AT)	
POSSIBLE CAUSE		- Speedometer sensor malfunction - Open or short circuit in wiring from ignition switch to speedometer sensor - Open or short circuit in wiring from speedometer sensor to GND - Open or short circuit in wiring from speedometer sensor to vehicle speed sensor - Open or short circuit in wiring from vehicle speed sensor to ECM terminal 1M	
STEP	INSPECTION		ACTION
1	Does vehicle speed sensor connector or PCM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 1M voltage OK?	Yes	Go to step 5
		No	Go to next step
3	Is there continuity between vehicle speed sensor terminal and ECM terminal 1M?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is there continuity between vehicle speed sensor and speedometer sensor terminals?	Yes	Go to next step
		No	Repair or replace speedometer sensor and wiring harness
5	Is vehicle speed sensor OK?	Yes	Go to next step
		No	Repair or replace as necessary
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

TROUBLESHOOTING [ENGINE CONTROL]

DTC P0505		IDLE CONTROL SYSTEM—MALFUNCTION	
DETECTION CONDITION		• Supply current in idle air control circuit is below 0.05 A or over 2.00 A • Actual engine speed excessively higher or lower than target speed preset in ECM for more than 14 sec.	
POSSIBLE CAUSE		• Idle air control valve malfunction • Leakage in intake-air system • Open or short circuit in wiring from idle air control valve terminal A to main relay terminal D • Open or short circuit in wiring from idle air control valve terminal B to ECM terminal 4Q	
STEP	INSPECTION		ACTION
1	Does idle air control valve connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 4Q voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect idle air control valve connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal D — Idle air control valve terminal A)
4	Is there continuity between connector terminal B and ECM terminal 4Q?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between idle air control valve connector terminals A and B?	Yes	Go to next step
		No	Replace BAC valve
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)
 HARNESS SIDE CONNECTOR (VIEW FROM BEHIND OF CONNECTOR)			

U5U1011A

U5U1011A

DTC P0510		CLOSED THROTTLE POS SWITCH—MALFUNCTION	
DETECTION CONDITION		● Closed throttle position switch never turns on/off after engine is started and accelerated/decelerated 0—30 km/h { 0—19 mph } repeatedly for more than 10 times	
POSSIBLE CAUSE		● Closed throttle position switch malfunction ● Open or short circuit in wiring from throttle position sensor terminal B to ECM terminal 3L	
STEP	INSPECTION		ACTION
1	Does throttle position sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3L voltage OK?	Yes	Go to step 5
		No	Go to next step
3	Is there continuity between harness side connector terminal and ECM terminal 3L?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is closed throttle position switch OK?	Yes	Go to next step
		No	Repair or replace throttle position sensor

TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
5	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector



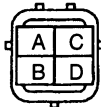
HARNESS SIDE CONNECTOR
(VIEW FROM BEHIND OF CONNECTOR)

U5U10102

DTC P0703		BRAKE SW—MALFUNCTION	
DETECTION CONDITION	● Brake switch never turns on/off after engine is started and accelerated/decelerated to 0—30 km/h { 0—19 mph } repeatedly for more than 10 times		
POSSIBLE CAUSE	● Brake switch malfunction ● Open or short circuit in wiring from ECM terminal 1Q to brake switch terminal ● Open or short circuit in wiring from brake switch terminal to battery terminal		
STEP	INSPECTION		ACTION
1	Does brake switch connector or ECM connector have poor connection?	Yes	Repair or replace
		No	Go to next step
2	Is ECM terminal 1Q voltage OK?	Yes	Go to step 4
		No	Go to next step
3	Is there continuity between brake switch terminal and ECM terminal 1Q?	Yes	Check for open or short circuit in wiring harness. (Battery — Brake switch) Check brake switch.
		No	Repair or replace wiring harness
4	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

DTC P1170		HO2S11—INVERSION	
DETECTION CONDITION		When heated oxygen sensor (Front) signal stays above 0.45 V for 42 seconds after the engine has reached normal operating temperature and running at 1,500 rpm or over when closed throttle position switch is off condition	
POSSIBLE CAUSE		- Low fuel - Heated oxygen sensor (Front) malfunction - Open or short circuit in wiring from heated oxygen sensor (Front) terminal A to ECM terminal 3C - Intake-air system, fuel system, ignition system malfunction	
STEP	INSPECTION		ACTION
1	Does heated oxygen sensor (Front) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3C voltage OK?	Yes	Go to step 5
		No	Go to next step
3	Disconnect heated oxygen sensor (Front) connector. Is there continuity between connector terminal A and ECM terminal 3C?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Are following units OK? - Fuel injector - Pressure regulator - Mass air flow sensor - Engine coolant temperature sensor - Spark plug - Air suction (Air/Fuel ratio rich or lean)	Yes	Replace heated oxygen sensor (Front)
		No	Repair or replace

TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
5	Erase diagnostic trouble code from memory. Is same code No. present after performing After re- pair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)
 HARNESS SIDE CONNECTOR (VIEW FROM BEHIND OF CONNECTOR)			
U5U101A3			

DTC P1195		EGRBS—OPEN OR SHORT	
DETECTION CONDITION		- Barometric pressure variation in specified condition is less than 0.49 kPa { 3.71 mmHg , 0.146 inHg } - Input voltage from EGR boost sensor is below 1.39 V or above 4.61 V	
POSSIBLE CAUSE		- EGR boost sensor malfunction - EGR boost sensor vacuum hose loosed, damaged and clogged - Open or short circuit in wiring from ECM terminal 3I to EGR boost sensor terminal B - Open or short circuit in wiring from ECM terminal 3O to EGR boost sensor terminal C - Open circuit in wiring from ECM terminal 3H to EGR boost sensor terminal D	
STEP	INSPECTION		ACTION
1	Is EGR boost sensor OK?	Yes	Go to next step
		No	Repair or replace as necessary
2	Does EGR boost sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
3	Is ECM terminal 3I voltage OK?	Yes	Go to step 6
		No	Go to next step
4	Disconnect EGR boost sensor connector. Turn ignition switch to ON. Is there 5V at connector terminal C?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (ECM terminal 3O — EGR boost sensor terminal C)
5	Is there continuity between connector terminal A and ECM terminal 3H?	Yes	Replace EGR boost sensor
		No	Repair or replace wiring harness.
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness.)



HARNESS SIDE CONNECTOR
(VIEW FROM BEHIND OF CONNECTOR)

U5U10118

TROUBLESHOOTING [ENGINE CONTROL]

DTC P1250		PRC—OPEN OR SHORT	
DETECTION CONDITION		● Open or short circuit is observed in PRC solenoid valve system when ignition switch is turned ON	
POSSIBLE CAUSE		● PRC solenoid valve malfunction ● Open or short circuit in wiring from PRC solenoid valve terminal A to main relay terminal D ● Open or short circuit in wiring from PRC solenoid valve terminal B to ECM terminal 4J	
STEP	INSPECTION		ACTION
1	Does PRC solenoid valve connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 4J voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect PRC solenoid valve connector. Turn ignition switch ON. Is there battery positive voltage at connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal D — PRC solenoid valve terminal A)
4	Is there continuity between connector terminal B and ECM terminal 4J?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between PRC solenoid valve terminals A and B?	Yes	Go to next step
		No	Replace PRC solenoid valve
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)
 HARNESS SIDE CONNECTOR (VIEW FROM BEHIND OF CONNECTOR)			

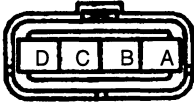
U5U1011

U5U10119

DTC P1345		SGC SIGNAL—NO SGC SIGNAL	
DETECTION CONDITION		No SGC signal input from camshaft position sensor while engine is running	
POSSIBLE CAUSE		- Camshaft position sensor malfunction - Open or short circuit in wiring from ECM terminal 4A to distributor terminal A - Open or short circuit in wiring from ECM terminal 4G to distributor terminal D	
STEP	INSPECTION		ACTION
1	Does camshaft position sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Disconnect distributor connector. Turn ignition switch to ON. Is there battery positive voltage at connector terminal B?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (Main relay terminal D — Distributor terminal B)
3	Is there continuity between connector terminal D and ECM terminal 4G?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Is ECM terminal 4G voltage OK?	Yes	Go to step 6
		No	Check for open or short circuit in wiring harness. (Camshaft position sensor terminal A — ECM terminal 4A) and go to next step
5	Is camshaft position sensor OK?	Yes	Go to next step
		No	Replace camshaft position sensor

TROUBLESHOOTING [ENGINE CONTROL]

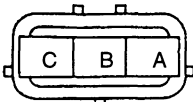
STEP	INSPECTION		ACTION
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After re-pair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR
(VIEW FROM BEHIND OF CONNECTOR)

U5U10118

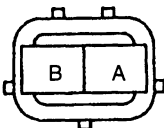
DTC P1402		EGRS—OPEN OR SHORT	
DETECTION CONDITION		● Throttle valve is at closed throttle position, engine speed below 1,400 rpm, and input voltage from EGR valve position sensor is below 0.2 V or above 4.75 V	
POSSIBLE CAUSE		● EGR valve position sensor malfunction ● Open or short circuit in wiring from EGR valve position sensor terminal B to ECM terminal 3I ● Open or short circuit in wiring from EGR valve position sensor terminal C to ECM terminal 3J ● Open or short circuit in wiring from EGR valve position sensor terminal A to ECM terminal 3O	
STEP	INSPECTION		ACTION
1	Does EGR valve position sensor connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 3J voltage OK?	Yes	Go to step 7
		No	Go to next step
3	Disconnect EGR valve position sensor connector. Turn ignition switch to ON. Is there 5 V at harness side connector terminal B?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. (ECM terminal 3I — EGR valve position sensor terminal B)
4	Is there continuity between harness side connector terminal C and ECM terminal 3J?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between harness side connector terminal A and ECM terminal 3O?	Yes	Go to next step
		No	Repair or replace wiring harness
6	Is resistance of EGR valve position sensor OK?	Yes	Go to next step
		No	Replace EGR valve
7	Erase diagnostic trouble code from memory. Is same code No. present after rechecking?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)



HARNESS SIDE CONNECTOR
(VIEW FROM BEHIND OF CONNECTOR)

U5U10103

TROUBLESHOOTING [ENGINE CONTROL]

DTC P1485		EGR (VACUUM)—OPEN OR SHORT	
DETECTION CONDITION		● Open or short circuit is observed in EGR solenoid valve (vacuum) system when ignition switch is turned ON	
POSSIBLE CAUSE		● EGR solenoid valve (vacuum) malfunction ● Open or short circuit in wiring from EGR solenoid valve (vacuum) terminal A to main relay terminal D ● Open or short circuit in wiring from EGR solenoid valve (vacuum) terminal B to ECM terminal 4P	
STEP	INSPECTION		ACTION
1	Does EGR solenoid valve (vacuum) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 4P voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect EGR solenoid valve connector. Turn ignition switch to ON. Is there battery positive voltage at harness side connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. [Main relay terminal D — EGR solenoid valve (vacuum) terminal A]
4	Is there continuity between harness side connector terminal B and ECM terminal 4P?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between EGR solenoid valve (vacuum) terminals A and B?	Yes	Go to next step
		No	Replace EGR solenoid valve (vacuum)
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)
 HARNESS SIDE CONNECTOR (VIEW FROM BEHIND OF CONNECTOR)			

U5U10104

U5U10104

DTC P1486		EGR (VENT)—OPEN OR SHORT	
DETECTION CONDITION	Open or short circuit is observed in EGR solenoid valve (vent) system when ignition switch is turned on		
POSSIBLE CAUSE	- EGR solenoid valve (vent) malfunction - Open or short circuit in wiring from EGR solenoid valve (vent) terminal A to main relay terminal D - Open or short circuit in wiring from EGR solenoid valve (vent) terminal B to ECM terminal 4O		
STEP	INSPECTION		ACTION
1	Does EGR solenoid valve (vent) connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 4O voltage OK?	Yes	Go to step 6
		No	Go to next step
3	Disconnect EGR solenoid valve (vent) connector. Turn ignition switch to ON. Is there battery positive voltage at harness side connector terminal A?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness. [Main relay terminal D — EGR solenoid valve (vent) terminal A]
4	Is there continuity between harness side connector terminal B and ECM terminal 4O?	Yes	Go to next step
		No	Repair or replace wiring harness
5	Is there continuity between EGR solenoid valve (vent) terminals A and B?	Yes	Go to next step
		No	Replace EGR solenoid valve (vent)

TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
6	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)
 HARNESS SIDE CONNECTOR (VIEW FROM BEHIND OF CONNECTOR)			
U5U10101			

DTC P1601		COMM LINE (AT)—COMM ERROR	
DETECTION CONDITION	Signal voltage from TCM to ECM is too high		
POSSIBLE CAUSE	- Open or short circuit in wiring from ECM terminal 1R to TCM terminal 1C - Open or short circuit in wiring ignition switch to TCM terminal 2O - Open circuit in wiring from TCM terminal 2P to ground		
STEP	INSPECTION		ACTION
1	Does TCM connector or ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	TCM terminal 2O and 2P voltage OK?	Yes	Go to next step
		No	Repair or replace wiring harness
3	Is there continuity between ECM terminal 1R and TCM terminal 1C?	Yes	Go to next step
		No	Repair or replace wiring harness
4	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Replace TCM

DTC P1608		PCME (CPU)—MALFUNCTION	
DETECTION CONDITION		• ECM does not read diagnostic trouble codes from output devices	
POSSIBLE CAUSE		• ECM malfunction	
STEP	INSPECTION		ACTION
—	—		Replace ECM

TROUBLESHOOTING [ENGINE CONTROL]

DTC P1794		BAT—BAT OR CIRCUIT FAIL	
DETECTION CONDITION		ECM terminal 4I voltage is below 1.4 V when other than engine start	
POSSIBLE CAUSE		- Battery malfunction - Open or short circuit in wiring from PCM terminal 4I to battery positive cable - Burnt MAIN fuse	
STEP	INSPECTION		ACTION
1	Is battery fully charged?	Yes	Go to next step
		No	Charge battery
2	Is MAIN fuse OK?	Yes	Go to next step
		No	Replace Main fuse
3	Does battery positive voltage present at PCM terminal 4I?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (PCM terminal 4I — Battery)
4	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

DTC P1797		PNS—OPEN OR SHORT	
DETECTION CONDITION		- Neutral/clutch switch (MT) never turns on/off after engine is started and accelerated/decelerated to 0—30 km/h { 0—19 mph } repeatedly for more than 10 times - Neutral/clutch switch (MT) never turns off when engine speed below 400 rpm - ECM detected that transmission range switch is N or P range when charging efficiency is above 39 %, engine speed is above 1,810 rpm and vehicle speed above 81.0 km/h { 50.2 mph }	
POSSIBLE CAUSE		- Transmission range switch malfunction - TCM malfunction - Neutral/clutch switch malfunction - ECM malfunction - Open or short circuit in wiring from TCM terminal 1D to ECM terminal 1L (AT) - Open or short circuit in wiring from neutral/clutch switch terminal to ECM terminal 1L (MT)	
STEP	INSPECTION		ACTION
1	Does ECM connector have poor connection?	Yes	Repair or replace connector
		No	Go to next step
2	Is ECM terminal 1L voltage OK?	Yes	Go to step 5
		No	Go to next step
3	Is there continuity between TCM terminal 1D (AT) or neutral/clutch switch (MT) terminal and ECM terminal 1L?	Yes	Go to next step
		No	Repair or replace wiring harness
4	(AT) Is transmission range switch OK? (MT) Is neutral/clutch switch OK?	Yes	Go to next step
		No	Repair or replace transaxle range switch or neutral/clutch switch
5	Erase diagnostic trouble code from memory. Is same code No. present after performing After repair procedure?	Yes	Replace ECM
		No	Intermittent poor connection of harness or connector (Repair connector and/or harness)

TROUBLESHOOTING [ENGINE CONTROL]

ENGINE SYMPTOM TROUBLESHOOTING

U5U101BC

Diagnostic Index

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

No.	TROUBLESHOOTING ITEM	DESCRIPTION
1	Discharged battery	—
2	Will not crank or cranks slowly	—
3	No combustion	Engine cranks at normal speed but shows no 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 normally but 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 excessively high and will not go down after warm-up
8	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	Rough idle/Engine stalls during N–D shift	Engine runs normally at idle but stalls or vibrates excessively during N–D shift
11	Engine stalls when vehicle about to run	—
12	Engine stalls on acceleration and while cruising	—
13	Poor acceleration/Insufficient power/Surges while cruising/Hesitates	—
14	Runs rough during deceleration/Backfire	Engine runs rough during deceleration, and abnormal combustion occurs in exhaust system
15	Knocking	—
16	Overheating	—
17	Poor fuel economy	Fuel consumption increased excessively though no sudden starting, acceleration, or braking carried out
18	Fuel odor	Fuel odor in passenger or engine compartment

TROUBLESHOOTING [ENGINE CONTROL]

Quick Diagnosis Chart

[illegible]

TROUBLESHOOTING [ENGINE CONTROL]

												Discharged battery	1
								○	○			Will not crank or cranks slowly	2
			○							○	○	No combustion	3
			○	○								Combustion observed but engine will not start	4
												Cranks normally but hard to start	5
○	○	○	○			○		○	○			Low idle speed/Engine stalls or vibrates	6
										○		High idle speed	7
												Idle speed hard to lower	8
									○			Rough idle/Engine stalls when E/L, P/S or A/C ON	9
								○				Rough idle/Engine stalls when during N-D shift	10
○	○		○				○	○				Engine stalls when vehicle about to run	11
												Engine stalls on acceleration and while cruising	12
○	○	○		○	○	○	○		○	○		Poor acceleration/Insufficient power/Surges while cruising/Hesitates	13
			○					○	○	○		Runs rough during deceleration/Backfire	14
				○								Knocking	15
												Overheating	16
				○								Poor fuel economy	17
												Fuel odor	18
Control device system												Item	No.
Cause of trouble Trouble symptom Inspection method													
												Result	Item
No signal output	Throttle position sensor											Wet/carbon stuck on specific plug	Spark plug condition inspection
Erratic signal output												Grayish white with specific plug	
Always ON	Closed throttle position switch											Wet/carbon stuck on all plugs	
Always OFF												Grayish white with all plugs	
No signal output	Engine coolant temperature sensor											Engine speed will not decrease	Cylinder balance test
Erratic signal output												Diagnostic trouble code(s) output	Diagnostic trouble code inspection
No signal output	Intake air temperature sensor											Induction voltage not generated	Inspection using oscilloscope
Erratic signal output													
Heater not operate													
No signal output	Heated oxygen sensor												
Erratic signal output													
Always ON	Brake switch												
Always OFF													
Always ON	Neutral and clutch switches												
Always OFF													
Always in no-load range	Transmission range switch												
Always in load range													
No signal output	A/C load signal												
Erratic signal output													
Open wiring in coil	Main relay												
Switch always ON													
Switch always OFF													

TROUBLESHOOTING [ENGINE CONTROL]

[illegible]

[illegible]

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TROUBLESHOOTING [ENGINE CONTROL]

Symptom Troubleshooting

1	Discharged battery		
TROUBLESHOOTING HINTS			
Charging/discharging device			
① Battery (Insufficient electrolyte, damaged electrode)			
② Generator (Insufficient power output-loose belt, faulty generator control, deterioration, damage)			
Electrical system			
① Excessive dark current (Especially of optional electrical device)			
STEP	INSPECTION		ACTION
1	Carry out battery inspection Is battery OK?	Yes	Go to next step
		No	Replace battery
2	Carry out dark current inspection Is dark current correct?	Yes	Carry out generator inspection
		No	Repair or replace

2	Will not crank or cranks slowly		
TROUBLESHOOTING HINTS Starting device ① Starter (Damaged wiring harness, insufficient electrode tightening, deterioration, damage) Discharging device ① Discharged battery			
STEP	INSPECTION		ACTION
1	Is battery discharged?	Yes	Go to symptom troubleshooting No. 1 “Discharged battery”
		No	Go to next step
2	Slightly move selector lever in P and N positions Does starter rotate? (AT)	Yes	Adjust transmission range switch
		No	Go to next step
3	Check ECM terminal voltage ● Load/no-load distinction signal Is voltage correct?	Yes	Go to next step
		No	Inspect and adjust transmission range switch
4	Carry out starter inspection Is starter OK?	Yes	Check engine for internal damage (Refer to engine work-shop manual)
		No	Repair or replace

3	No combustion		
TROUBLESHOOTING HINTS Spark not visible/weak at all cylinders ① Ignition coil (ignition control module) (connector disconnected, poor connection, internal damage) Fuel not distributed to combustion chamber ① Fuel pump relay (Poor connection, open circuit) ② Fuel pump (Poor connection, open circuit) Low compression pressure ECM not activated (Diagnostic trouble code inspection not available) ① ECM connector (Poor connection-especially battery positive voltage/ground terminals) ② Wiring harness and connectors between main relay and ECM battery positive voltage terminal			
STEP	INSPECTION		ACTION
1	Carry out main relay operation inspection Is main relay operation normal?	Yes	Go to next step
		No	Repair or replace
2	Are connectors of ECM ignition coil, and fuel pump normally connected?	Yes	Go to next step
		No	Repair or replace
3	Are intake-air system hoses free of disconnection and damage?	Yes	Go to next step
		No	Repair or replace
4	Carry out fuel pump control system inspection Is fuel pump operation normal?	Yes	Go to next step
		No	Repair or replace
5	Carry out spark test Is strong blue spark visible at all cylinders?	Yes	Go to next step
		No	Repair or replace

TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
6	Carry out fuel pump operation inspection Is fuel pump operation normal?	Yes	Go to next step
		No	Repair or replace
7	Carry out ignition timing control inspection Is ignition timing at cranking correct?	Yes	Go to next step
		No	Repair or replace
8	Carry out fuel injector operation inspection Is fuel injector operation sound heard (all cylinder)?	Yes	Go to next step
		No	Repair or replace
9	Carry out fuel pressure inspection Is fuel pressure correct?	Yes	Go to next step
		No	Repair or replace
10	Carry out compression inspection Is compression correct?	Yes	Replace fuel
		No	Repair or replace

4 Combustion observed but engine will not start			
TROUBLESHOOTING HINTS Spark weak at all cylinders/not visible at specific cylinder ① Spark weak at all cylinders-ignition coil (deterioration, damage) ② Spark not visible at specific cylinder-High-tension lead (damage, excessive internal resistance), spark plug (damage, deterioration, contamination) Air/fuel mixture too lean ① Fuel pump (Insufficient discharge pressure/volume-internal damage) ② Air sucked in from intake-air system ③ Pressure regulator (deteriorated/damaged diaphragm) Insufficient intake air amount ① BAC valve (stuck, clogged internal passage)			
STEP	INSPECTION		ACTION
1	Start engine while depressing accelerator pedal slightly Does engine start?	Yes	Go to next step
		No	Go to step 4
2	Carry out IAC valve inspection Is IAC valve OK?	Yes	Go to next step
		No	Replace BAC valve
3	Carry out air valve operation inspection Is air valve operation normal?	Yes	Check ECM terminal voltage • IAC valve control signal
		No	Replace BAC valve
4	Are intake-air system hoses free of disconnection and damage?	Yes	Go to next step
		No	Repair or replace
5	Carry out fuel injector operation inspection Is fuel injector operation sound heard?	Yes	Go to next step
		No	Repair or replace
6	Carry out ignition timing control inspection Is ignition timing at cranking correct?	Yes	Go to next step
		No	Repair or replace
7	Carry out fuel pressure inspection Is fuel pressure correct?	Yes	Go to next step
		No	Repair or replace
8	Remove all spark plugs and check their conditions Are they OK?	Yes	Replace fuel
		No	Repair or replace

TROUBLESHOOTING [ENGINE CONTROL]

5	Cranks normally but hard to start		
TROUBLESHOOTING HINTS Insufficient residual fuel pressure ① Fuel pump (Residual pressure not held-internal damage) Percolation ① Pressure regulator control does not operate			
STEP	INSPECTION		ACTION
1	Does starter rotate normally?	Yes	Go to next step
		No	Go to symptom troubleshooting No.2 “will not crank or cranks slowly”
2	Does symptom occur only at starting while engine is hot?	Yes	Carry out pressure regulator control inspection
		No	Go to next step
3	Carry out fuel pressure hold inspection Is fuel pressure hold correct?	Yes	Replace fuel
		No	Repair or replace

6	Low idle speed/Engine stalls or vibrates		
TROUBLESHOOTING HINTS For quick troubleshooting, first determine when (engine cold/hot/always) problem occurs, and then where (at all cylinders/ specific cylinder) it occurs. Problem occurs only when engine is cold ① Air valve (malfunction) ② Engine coolant temperature sensor (characteristics deviated-detects engine hot condition) Problem occurs only when engine is hot ① Pressure regulator control inoperative ② Improper fuel used (percolation) Problem occurs at any engine temperature ① Problem occurs at specific cylinder - Spark weak/not visible (high-tension lead-damaged, spark plug-contaminated, damaged, deteriorated) - Incorrect fuel injection amount (fuel injector-leaks, clogged, stuck) - Low compression pressure ② Problem occurs at all cylinders - Air leakage - Spark weak (ignition coil-deteriorated, damaged) - Incorrect fuel injection amount (pressure regulator-low fuel pressure, fuel pump-low discharge pressure/volume, mass air flow sensor-characteristics deviation) - Insufficient intake air amount (AAS-misadjusted, IAC valve-clogged passage, stuck valve)			
STEP	INSPECTION		ACTION
1	Does symptom occur only at starting while en- gine is cold	Yes	When rough idle, go to next step
			When rough stalls, go to step 3
		No	Go to step 4
2	Carry out BAC valve operation inspection Is air valve operation normal?	Yes	Check the ECM terminal voltage Engine coolant temperature signal
		No	Replace BAC valve
3	Carry out air valve operation inspection Is air valve operation normal?	Yes	Check the ECM terminal voltage Engine coolant temperature signal
		No	Replace BAC valve
4	Does symptom occur only at starting while en- gine is hot?	Yes	Go to next step
		No	When rough idle, go to step 6
			When engine stalls, go to step 10
5	Carry out pressure regulator control inspection Is PRC operation normal?	Yes	Replace fuel
		No	Repair or replace
6	Carry out intake manifold vacuum inspection Is there no air suction from intake-air system?	Yes	Go to next step
		No	Repair or replace
7	Carry out cylinder balance test Does engine speed drop equally with each cyl- inder inoperative?	Yes	Go to next step
		No	Remove spark plug from suspected faulty cylinder and check condition

TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
8	Carry out spark test Is a strong blue spark visible at high-tension lead of suspected faulty cylinder?	Yes	Go to next step
		No	Repair or replace
9	Disconnect IAC valve connector Does engine speed drop?	Yes	Go to step 13
		No	Carry out engine speed control inspection
10	Remove air cleaner and block air intake port to check air leakage in intake-air system. Is there no air leakage when cranking engine?	Yes	Go to next step
		No	Repair or replace
11	Carry out spark test Is a strong blue spark visible at high-tension lead of suspected faulty cylinder?	Yes	Go to next step
		No	Repair or replace
12	Carry out IAC valve inspection Is IAC valve OK?	Yes	Go to next step
		No	Replace BAC valve
13	Carry out fuel pressure inspection Is fuel pressure correct?	Yes	Go to next step
		No	Repair or replace
14	Check following ECM terminal voltages ● Closed throttle position signal ● Mass air flow sensor signal Are voltages correct?	Yes	Remove spark plugs from all cylinders and check condition
		No	Repair or replace

7	High idle speed		
TROUBLESHOOTING HINTS			
Intake air amount too much			
① Accelerator cable (misadjusted)			
② Air valve (stuck open)			
③ IAC valve (stuck)			
④ AAS (misadjusted)			
Idle speed control malfunction			
① Erratic A/C load, power steering signal input			
STEP	INSPECTION		ACTION
1	Is accelerator cable free play correct?	Yes	Go to next step
		No	Adjust
2	Disconnect IAC valve connector Does engine speed drop?	Yes	Go to next step
		No	Replace BAC valve
3	Check following ECM terminal voltages - A/C load signal - Power steering pressure signal Are voltages correct?	Yes	Replace BAC valve
		No	Repair or replace

8	Idle speed hard to lower		
TROUBLESHOOTING HINTS			
BAC valve			
① BAC valve (Malfunction-thermowax malfunction, clogged water hose)			
STEP	INSPECTION		ACTION
1	Check following ECM terminal voltage Engine coolant temperature signal Is voltage correct?	Yes	Go to next step
		No	Repair or replace
2	Carry out BAC valve operation inspection Is BAC valve operation normal?	Yes	Check throttle body
		No	Repair or replace

TROUBLESHOOTING [ENGINE CONTROL]

9-1	Rough idle/Engine stalls when E/L ON		
TROUBLESHOOTING HINTS			
● E/L operation signal not input to ECM (PCM)			
STEP	INSPECTION		ACTION
1	Check following ECM terminal voltage ● E/L signal (Blower switch ON at second or higher) Is voltage correct?	Yes	Recheck trouble symptom
		No	Repair or replace

9-2	Rough idle/Engine stalls when P/S ON		
TROUBLESHOOTING HINTS • P/S operation signal not input to ECM • P/S pump mechanical resistance high			
STEP	INSPECTION		ACTION
1	Check following ECM terminal voltage • Power steering pressure signal Is voltage correct?	Yes	Check P/S pump
		No	Repair or replace

9-3	Rough idle/Engine stall when A/C ON		
TROUBLESHOOTING HINTS No A/C operation signal input in ECM Excessive A/C compressor mechanical resistance			
STEP	INSPECTION		ACTION
1	Check following ECM terminal voltage ● A/C load signal Is voltage correct?	Yes	Check A/C compressor
		No	Repair or replace

9-4	Rough idle/Engine stalls regardless of load condition (E/L, P/S, A/C)		
TROUBLESHOOTING HINTS			
IAC valve (stuck)			
STEP	INSPECTION		ACTION
1	Disconnect IAC valve connector Does engine speed drop?	Yes	Check following ECM terminal voltage ● Idle air control signal
		No	Replace BAC valve

10	Rough idle/Engine stalls during N-D shift		
TROUBLESHOOTING HINTS Idle speed control inoperative ① Load signal not input to PCM ② IAC valve (stuck) False rough idle ① Improperly tightened engine mount and exhaust system components			
STEP	INSPECTION		ACTION
1	Turn loads (E/L, P/S, A/C) ON Does idle speed increase?	Yes	Go to next step
		No	Go to symptom troubleshooting No.9 “Rough idle/Engine stalls when E/L, P/S, or A/C ON”
2	Check following ECM terminal voltages ● Load/no-load distinction signal ● D-range signal Are voltages correct?	Yes	Go to symptom troubleshooting No.6 “Low idle speed/Engine stalls or vibrates”
		No	Repair or replace

TROUBLESHOOTING [ENGINE CONTROL]

11	Engine stalls when vehicle about to run		
TROUBLESHOOTING HINTS Insufficient fuel injection amount ① Pressure regulator (low fuel pressure) ② Fuel pump (low discharge pressure/volume) ③ Throttle position sensor (Closed throttle position switch) (misadjusted) ④ Fuel injector (excessive resistance, clogged)			
STEP	INSPECTION		ACTION
1	Does engine idle normally?	Yes	Go to next step
		No	Go to symptom troubleshooting No.6 “Low idle speed/Engine stalls or bivrates”
2	Carry out fuel pressure inspection Is fuel pressure correct?	Yes	Go to next step
		No	Repair or replace
3	Check following ECM and TCM terminal volt-ages ● Throttle position sensor signal ● Closed throttle position signal ● D range signal ● Clutch switch signal Are voltages correct?	Yes	Check fuel injector injection volume
		No	Repair or replace

12	Engine stalls on acceleration and while cruising		
TROUBLESHOOTING HINTS Blown fuse, open circuit in relay ① Fuse-EGI, IG KEY ② Relay-main relay Connectors improperly connected ① ECM, ignition coil, fuel pump			
STEP	INSPECTION		ACTION
1	Was engine overheated before it stalls?	Yes	Go to symptom troubleshooting No.16 “Overheating”
		No	Go to next step
2	Carry out main relay operation inspection Is main relay operation normal?	Yes	Go to next step
		No	Repair or replace
3	Are ECM, distributor, ignition control module, ignition coil, and fuel pump connectors properly connected?	Yes	Go to next step
		No	Repair or replace
4	Are intake-air system hoses free of disconnection and damage?	Yes	Go to next step
		No	Repair or replace
5	Carry out fuel pump control inspection Is fuel pump operation normal?	Yes	Go to next step
		No	Repair or replace
6	Carry out spark test Is a strong blue spark visible at high-tension lead of suspected faulty cylinder?	Yes	Go to next step
		No	Repair or replace
7	Carry out fuel pump operation inspection Is fuel pump operation normal?	Yes	Carry out compression inspection
		No	Repair or replace

TROUBLESHOOTING [ENGINE CONTROL]

13	Poor acceleration/Insufficient power/Surge while cruising/Hesitates		
TROUBLESHOOTING HINTS For quick troubleshooting, first determine when (engine cold/hot, A/C operating/not operating) and where (problem occurs at specific area/all areas), and then in which system (EGI/AT) it occurs. Problem occurs only when engine is cold ① Engine coolant temperature sensor (characteristics deviation-detects hot engine condition) Problem occurs only when A/C is operated ① A/C cut control inoperative Problem related to AT ① Incorrect shift point Misfire ① Ignition device system (If engine idles normally, inspect high-tension leads and spark plugs. If voltage demand is high, there will be misfire) Regular gasoline is used			
STEP	INSPECTION		ACTION
1	Are rough idle, overheating, or knocking observed?	Yes	Go to symptom troubleshooting No.6 "Low idle speed/Engine stalls or vibrates", No.15 "knocking", and No.16 "overheating"
		No	Go to next step
2	Does symptom occur only at starting while engine is cold?	Yes	Check following ECM terminal voltage ● Engine coolant temperature signal
		No	Go to next step
3	Does symptom occur only when A/C operating	Yes	Go to next step
		No	Go to step 5 (AT)/Go to step 6 (MT)
4	Carry out A/C cut OFF control inspection	Yes	Check A/C compressor
		No	Repair or replace
5	Is shift point correct? (AT)	Yes	Go to next step
		No	Go to automatic transmission symptom troubleshooting (Refer to 05-01, TROUBLESHOOTING)
6	Does engine race on acceleration?	Yes	Carry out clutch system inspection (MT)/Go to automatic transmission symptom troubleshooting (Refer to 05-01, TROUBLESHOOTING) (AT)
		No	Go to next step
7	Is air cleaner element free of clogs?	Yes	Go to next step
		No	Replace air cleaner element
8	Check following ECM terminal voltages ● Throttle position sensor signal ● D-range signal ● Mass air flow sensor signal Are voltages correct?	Yes	Go to next step
		No	Repair or replace
9	Carry out fuel pressure inspection Is fuel pressure correct?	Yes	Go to next step
		No	Repair or replace
10	Remove all spark plugs and check condition Are they OK?	Yes	Reinspect based on troubleshooting hints (MT)/Go to automatic transmission symptom troubleshooting (Refer to 05-01, TROUBLESHOOTING) (AT)
		No	Repair or replace

TROUBLESHOOTING [ENGINE CONTROL]

14	Runs rough during deceleration/Backfire		
TROUBLESHOOTING HINTS Fuel-cut not carried out during decelation ① Throttle position sensor (Closed throttle position switch) (misadjusted) ② Neutral and clutch switches (misadjusted) Low fuel recovery rpm during deceleration ① Throttle position sensor (Closed throttle position switch) (misadjusted) ② Neutral and clutch switches (misadjusted) ③ Load signal not input to ECM (PCM) ④ Engine coolant temperature sensor (Characteristics deviation-detects hot engine condition when engine is cold) Fuel distributed to combustion chamber during deceleration ① Fuel injector (leakage) ② Neutral and clutch switches (misadjusted)			
STEP	INSPECTION		ACTION
1	Does problem occur synchronized with down-shift?	Yes	Inspect neutral and clutch switches (MT)/Go to automatic transmission symptom troubleshooting (Refer to 05-01, TROUBLESHOOTING) (AT)
		No	Go to next step
2	Does symptom occur only at starting while engine is cold?	Yes	Check following ECM terminal voltage ● Engine coolant temperature signal
		No	Go to next step
3	Does engine idle normally?	Yes	Go to next step
		No	Go to symptom troubleshooting No.6 “Low idle speed/Engine stalls or vibrates”
4	Carry out fuel cut control inspection ● Is fuel-cut carried out during deceleration? ● Is fuel recovery rpm normal?	Yes	Check fuel injectors for leakage
		No	Repair or replace

15	Knocking		
TROUBLESHOOTING HINTS Air/fuel mixture too lean ① Pressure regulator (low fuel pressure) Incorrect ignition timing ① Ignition timing misadjusted ② Preignition occurs (spark plug of improper heating valve use, carbon accumulated in combustion chamber) Improper fuel used			
STEP	INSPECTION		ACTION
1	Was engine overheated before knocking occur?	Yes	Go to symptom troubleshooting No.16 “overheating”
		No	Go to next step
2	Does engine idle normally?	Yes	Go to next step
		No	Go to symptom troubleshooting No.6 “Low idle speed/Engine stalls or vibrates”
3	Is heating value of spark plug correct? Is spark plug electrode free of carbon accumulation?	Yes	Go to next step
		No	Clear or replace
4	Carry out fuel pressure inspection Is fuel pressure correct?	Yes	Go to next step
		No	Repair or replace
5	Replace fuel Is symptom improved?	Yes	Direct user to change fuel to another brand
		No	Eliminate carbon in cylinder head ● Use carbon cleaner ● Overhaul cylinder head (Refer to Engine Workshop Manual)

TROUBLESHOOTING [ENGINE CONTROL]

16	Overheating		
TROUBLESHOOTING HINTS			
Insufficient airflow amount			
① Cooling fan (inoperative-internal damage, loose drive belt)			
② Cooling fan control inoperative			
Engine coolant system-related problem			
① Insufficient engine coolant			
② Thermostat (not completely open-internal damage)			
③ Radiator (clogged)			
False overheat			
① Water temperature gauge (malfunction)			
STEP	INSPECTION		ACTION
1	Carry out cooling fan control inspection Is cooling fan control correct?	Yes	Go to next step
		No	Repair or replace
2	Is drive belt tension correct?	Yes	Go to next step
		No	Adjust
3	Is engine coolant level normal?	Yes	Go to next step
		No	Add coolant to specified level and check for leakage in coolant passage
4	Warning ● When engine and radiator are hot, touching radiator hose can cause burn. Cover radiator hose with rag when checking hose tension by hand. Warm up engine and check radiator hose tension. Is engine coolant circulated in hose?	Yes	Go to step 6
		No	Go to next step
5	Carry out thermostat inspection Is thermostat OK?	Yes	Check water pump
		No	Replace thermostat
6	Carry out radiator cap inspection Is radiator cap OK?	Yes	Go to next step
		No	Replace radiator cap
7	Carry out water temperature gauge inspection Is water temperature gauge OK?	Yes	Go to next step
		No	Repair or replace
8	Is radiator free of clogs?	Yes	Replace fuel
		No	Repair or replace

TROUBLESHOOTING [ENGINE CONTROL]

17	Poor fuel economy		
TROUBLESHOOTING HINTS Fuel economy varies with conditions of vehicle and how they are used. Before undertaking actual checks, take a few minutes to talk with customer to determine what is actual problem. Vehicle condition out of specification. ① Tires (oversize, low tire pressure) ② Intake/exhaust system components changed Operation condition out of ordinary ① Frequent acceleration/deceleration ② Frequent climbing hill Insufficient maintenance ① Engine oil. (contamination) ② Air cleaner, oil element (contamination, clogs) Air/fuel mixture too rich ① Mass air flow sensor, engine coolant temperature sensor (characteristics deviation) ② Fuel pressure too high Lockup mechanism inoperative Over cool ① Thermostat (Not completely closed when engine is cold-internal damage) ② Cooling fan (High-speed operation when engine is cold-internal damage)			
STEP	INSPECTION		ACTION
1	Check following ● Air cleaner element (clogs) ● Engine oil, (contamination, fluid level) ● Tire pressure Are they OK?	Yes	Go to next step
		No	Repair or replace
2	Check engine coolant temperature rise by using water temperature gauge Does engine coolant temperature rise normally (not slow)?	Yes	Remove all spark plugs and check conditions
		No	Go to next step
3	Does cooling fan operation speed increase as engine warms up?	Yes	Check thermostat
		No	Check cooling fan

18	Fuel odor		
TROUBLESHOOTING HINTS Fuel evaporative gas (fuel) leakage ① Leakage from fuel system piping ② Charcoal canister (damage, overflow) ③ Vacuum hoses connecting charcoal canister, purge solenoid valve, and intake manifold (disconnection, damage) Purge control malfunction ① Purge solenoid valve (stuck)			
STEP	INSPECTION		ACTION
1	Check vacuum hoses between charcoal canister and purge solenoid valve, and between purge solenoid valve and intake manifold Are they OK?	Yes	Go to next step
		No	Repair or replace
2	Check charcoal canister? Is free from overflowing?	Yes	Go to next step
		No	Repair or replace
3	Check fuel system piping (include fuel filter) Are they free of leakage?	Yes	Check purge control inspection
		No	Repair or replace

ENGINE DIAGNOSTIC INSPECTION

Cylinder Balance Test

Purpose

The purpose of the cylinder balance test is to find weak or non-contributing cylinders. In this test, the high-tension leads are disconnected one by one to shut off the ignition in each cylinder while the engine is running. By carrying out the cylinder balance test, a total judgement of the compression pressure, air/fuel mixture, and ignition is possible.

Warning

- **High voltage in ignition system can cause strong electrical shock. Avoid direct contact to the vehicle body during the cylinder balance test.**
- **High-voltage spark will negatively effect the engine control. To prevent this, ground the high-tension leads and keep away from sensors and harnesses.**

Caution

- **Cylinder balance test can overheat and damage the three way catalytic converter.**

Procedure

1. Connect a tachometer to data link connector IG—.
2. Start the engine and let it idle.
3. Disconnect each high-tension lead and measure the engine speed.

Trouble Judgement By Spark Plug Conditions

Purpose

By checking condition of the spark plugs, judgement whether problem is related to a specific cylinder or all cylinders is possible.

Procedure

1. Remove the spark plug.
2. Check condition of the spark plug.
3. Go to appropriate troubleshooting chart referring to the list below.

Spark plug condition	Troubleshooting chart
Only specific plug is wet or covered with carbon	1 "Wet/carbon stuck on specific plug"
Only specific plug looks grayish white	2 "Grayish white with specific plug"
All plugs are wet or covered with carbon	3 "Wet/carbon stuck on all plugs"
All plugs look grayish white	4 "Grayish white with all plugs"

1	Wet/carbon stuck on specific plug		
TROUBLESHOOTING HINTS			
① Spark—No spark visible or spark weak			
② Air/fuel mixture—Excessive fuel injection volume			
③ Compression—No compression, low compression			
Others			
① Faulty spark plug			
STEP	INSPECTION		ACTION
1	Is spark plug wet/covered with carbon by engine oil?	Yes	Check areas related to oil working up and down
		No	Go to next step
2	Check spark plug for following • Cracked insulator • Heating valve • Air gap • Worn electrode Are they OK?	Yes	Go to next step
		No	Replace spark plug
3	Carry out spark test at suspected faulty cylinder Is a strong blue spark visible? (Compare with normal cylinder)	Yes	Go to next step
		No	Repair or replace
4	Check compression pressure at suspected faulty cylinder Is compression pressure correct?	Yes	Go to next step
		No	Repair or replace
5	Check fuel injector resistance at suspected faulty cylinder Is resistance correct?	Yes	Go to next step
		No	Replace fuel injector

TROUBLESHOOTING [ENGINE CONTROL]

STEP	INSPECTION		ACTION
6	Check fuel injection control signal at suspected faulty cylinder Is terminal voltage correct? (Compare with normal cylinder)	Yes	Check fuel injector for followings • Leakage • Injection volume
		No	Repair or replace

2	Grayish white with specific plug		
TROUBLESHOOTING HINTS			
① Air/fuel mixture—Insufficient fuel injection volume			
Others			
① Faulty spark plug			
STEP	INSPECTION		ACTION
1	Check spark plug for following ● Heating value ● Air gap Are they OK?	Yes	Go to next step
		No	Replace spark plug
2	Check operation of fuel injector at suspected faulty cylinder Is operation sound heard?	Yes	Go to next step
		No	Repair or replace
3	Check fuel injector resistance at suspected faulty cylinder Is resistance correct?	Yes	Go to next step
		No	Replace fuel injector
4	Check fuel injector control signal at suspected faulty cylinder Is terminal voltage correct? (Compare with normal cylinder)	Yes	Check fuel injection volume at suspected faulty cylinder
		No	Repair or replace

3	Wet/carbon stuck on all plugs		
TROUBLESHOOTING HINTS			
① Spark—Spark weak			
② Air/fuel mixture—Too rich			
③ Compression—Low compression			
Others			
① Clogs in intake/exhaust system			
STEP	INSPECTION		ACTION
1	Is air cleaner element free of clogs?	Yes	Go to next step
		No	Replace air cleaner element
2	Carry out spark test Is a strong blue spark visible at each cylinder?	Yes	Go to next step
		No	Repair or replace
3	Carry out fuel pressure inspection Is fuel pressure correct?	Yes	Go to next step
		No	Repair or replace
4	Check following ECM terminal voltages • Mass air flow sensor signal • Engine coolant temperature signal • Heated oxygen sensor signal (When engine can be started) Are terminals OK?	Yes	Go to next step
		No	Repair or replace
5	Carry out purge control inspection (When engine can be started) Is purge control correct?	Yes	Go to next step
		No	Repair or replace
6	Carry out compression inspection Is compression correct?	Yes	Check clogs in exhaust system
		No	Repair or replace

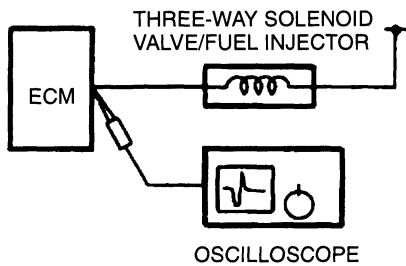
TROUBLESHOOTING [ENGINE CONTROL]

4	Grayish white with all plugs		
TROUBLESHOOTING HINTS			
① Air/fuel mixture—too lean			
STEP	INSPECTION		ACTION
1	When engine cannot be started, check intake-air system for air leakage When engine can be started, carry out intake manifold vacuum inspection Is air sucked in from intake-air system?	Yes	Repair or replace
		No	Go to next step
2	Carry out fuel pressure inspection Is fuel pressure correct?	Yes	Check following ECM terminal voltages • Mass air flow sensor signal • Engine coolant temperature signal • Heated oxygen sensor signal (When engine can be started) • Ground
		No	Repair or replace

Inspection Using an Oscilloscope (Reference)

Purpose

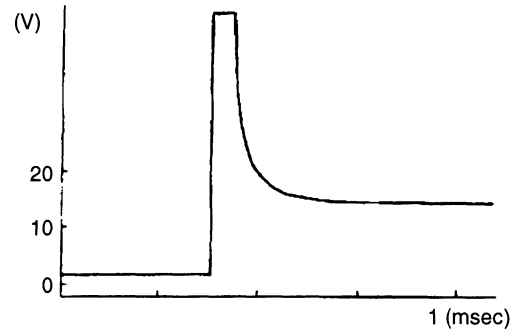
By using an oscilloscope, inspection such as a stuck solenoid valve is made possible without actually removing parts.



U5U10160

(2) When plunger stuck

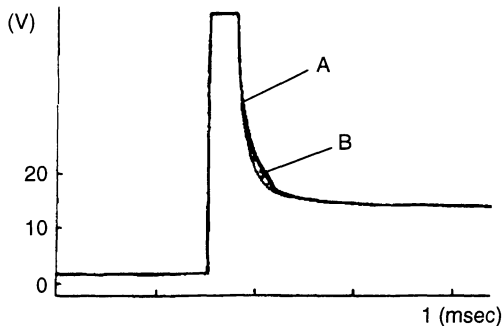
When the plunger is stuck, pulse convergence is smooth because no induced electromotive voltage B is generated.



U5U10162

(1) When normal

Counter electromotive voltage A, generated when the three-way solenoid valve or the fuel injector is turned off from on, shows irregular convergence because induced electromotive voltage B, generated by the plunger return operation, is added to it.



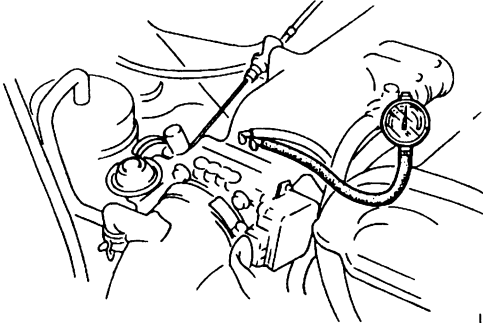
U5U10161

ENGINE SYSTEM INSPECTION

U5U101BE

Intake Manifold Vacuum Inspection

1. Verify that the intake-air hoses are installed properly.
2. Start the engine and let it idle.
3. Measure the intake manifold vacuum by using a vacuum gauge.



U5U10163

Specification

More than 60 kPa { 450 mmHg , 18 inHg }

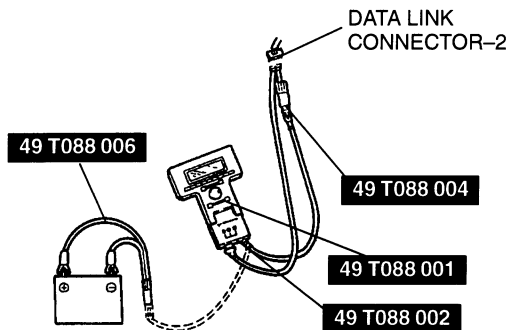
4. If not as specified, check following.
 - Air suction at:
 - Throttle body installation point
 - Intake manifold installation point
 - PCV valve installation point
 - Fuel injector insulator
 - Accelerator cable free play
 - Engine compression (Refer to section B, COMPRESSION INSPECTION)

Note

- Air suction can be located by engine speed change when lubricant is sprayed on the area where suction is occurring.

BAC Valve Operation Inspection

1. Connect the **SSTs** (NGS) to the data link connector-2.



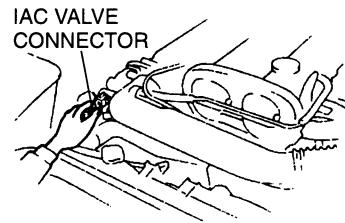
U5U10164

2. Select "PID/DATA MONITOR AND RECORD" and press TRIGGER.
3. Select "RPM" and press TRIGGER.
4. Verify that the engine is in cold condition, then start the engine.

5. Verify that the engine speed decreases as the engine warms up.
6. If the engine speed does not decrease or decreases slowly, check the water hose connected to the BAC valve for leakage and clogs.
7. If the water hose is okay, inspect the following.
 - Air valve
 - Idle air control valve

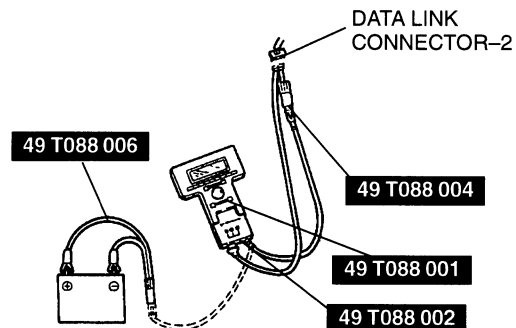
Idle Air Control Inspection

1. Start the engine and run it at idle.
2. Disconnect the IAC valve connector and verify that the engine rotation changes.



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3. If the engine condition does not change, do as follows.
 - (1) Connect the IAC valve connector.
 - (2) Connect the **SSTs** (NGS) to the data link connector-2.



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- (3) Verify that diagnostic trouble code No. 0505 is not displayed. If code No. 0505 is shown, carry out troubleshooting of the code No. 0505.
- (4) Select the "SIMULATION TEST" function on the NGS display. Change the duty value of the IAC valve to 100% by using the "IACV" and verify that the idle speed increases.
 - ① If the idle speed increases, replace the ECM.
 - ② If the idle speed does not change, replace the BAC valve.
4. Warm up the engine to normal operating temperature and run it at idle.
5. Turn the electrical loads ON and verify that the engine speed is within the specification by using "PID/DATA MONITOR AND RECORD" function.

TROUBLESHOOTING [ENGINE CONTROL]

Engine speed (rpm)

Load condition	Idle speed (rpm)	
	MT	AT
Fan switch ON at 2nd or higher	850*	800*
Headlight switch ON		
P/S ON		
A/C ON	1000*	

* : Neutral or P position

Note

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

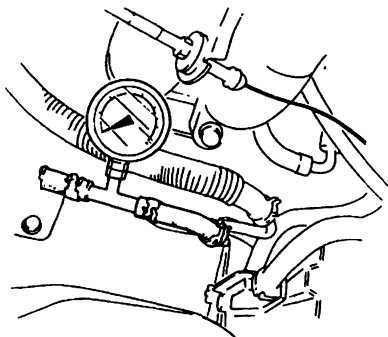
- If not as specified, check the related switches and wiring harnesses.

Fuel Line Pressure Inspection

Warning

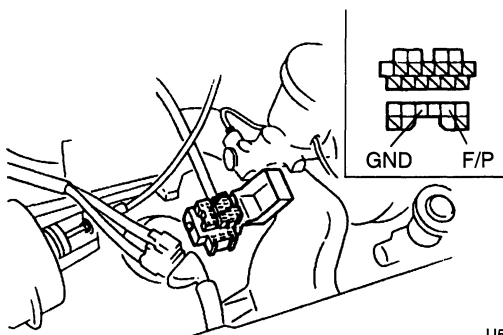
- Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and prevent. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures". (Refer to FUEL SYSTEM, PRECAUTION)**

- Disconnect the negative battery cable.
- Connect a fuel pressure gauge between the fuel main pipe fuel main hose (install clamps as shown).



U5U10166

- Connect the negative battery cable.
- Connect the data link connector terminals F/P and GND by using a jumper wire.



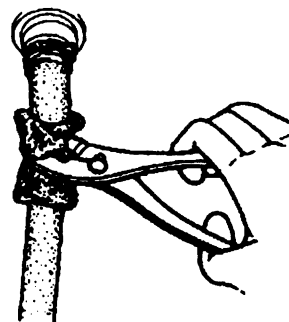
U5U10167

- Turn the ignition switch to ON and measure the fuel line pressure.

Specification

265—313 kPa { 2.7—3.2 kgf/cm² , 39—45 psi }

- Turn off the ignition switch and disconnect the jumper wire.
- If the pressure is higher than specified, check the fuel pump maximum pressure. If normal, check the pressure regulator or fuel return hose is clogged.
- If the pressure is lower than specified, measure the fuel line pressure with pinching the return hose.



U5U10168

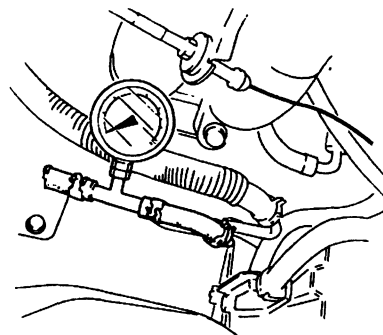
- If the fuel line pressure quickly increases, check the pressure regulator and PRC solenoid valve.
- If fuel line pressure gradually increases, check the fuel pump maximum pressure. If the fuel pump maximum pressure is normal, check the between fuel pump and pressure regulator for clog.

Fuel Pressure Hold Inspection

Warning

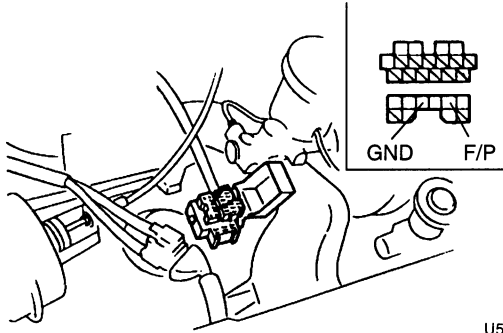
- Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures". (Refer to FUEL SYSTEM, PRECAUTION)**

- Disconnect the negative battery cable.
- Connect a fuel pressure gauge between the fuel main pipe (high pressure side) and fuel main hose (install clamp as shown).



U5U10166

- Connect the negative battery cable.
- Connect the data link connector terminals F/P and GND by using a jumper wire.



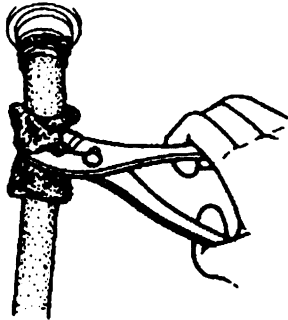
U5U10167

5. Turn the ignition switch to ON for approx. **10 sec.** to operate the fuel pump.
6. Turn off the ignition switch and disconnect the jumper wire.
7. Observe the fuel pressure after **5 min.**

Specification

More than 147 kPa { 1.5 kgf/cm² , 21 psi }

8. If the pressure is lower than specified, measure the fuel line pressure with pinching the return hose.

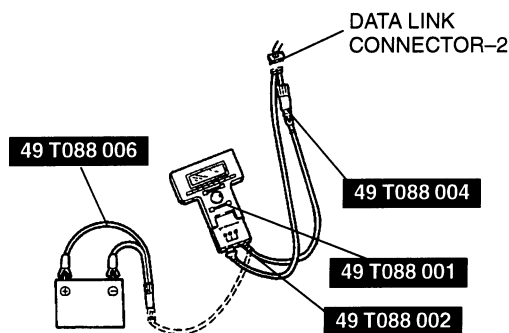


U5U10168

- If the fuel line pressure holds, replace the pressure regulator. (Refer to FUEL SYSTEM, FUEL INJECTOR REMOVAL / INSTALLATION.)
 - If the fuel line pressure does not hold, check the fuel pump fuel pressure hold. If the fuel pump fuel pressure hold is normal, check the fuel leaks from fuel line and fuel injector.
9. If the pressure is as specified, check the fuel leakage from fuel line and fuel injector.

Fuel Pump Operation Inspection

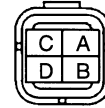
1. Connect the **SSTs** (NGS) to the data link connector-2.



U5U10164

2. Remove the fuel filler cap.
3. Turn the ignition switch to ON.

4. Select the "SIMULATION TEST" function on the NGS display. Turn the fuel pump relay from OFF to ON by using the "F/P RLY" and check if the operation sound is heard.
5. If no operation sound is heard, measure the voltage at harness side fuel pump connector terminal B.



U5U10169

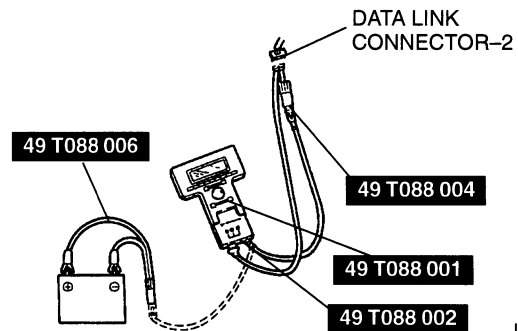
Specification

Battery positive voltage (Ignition switch ON)

6. If the voltage is as specified, check the following.
 - Fuel pump continuity.
7. If not as specified, check the following
 - Fuel pump relay.
 - Wiring harness and, connector.
 - Between ignition switch and fuel pump relay.
 - Between fuel pump relay and fuel pump resistor.
 - Between fuel pump resistor and fuel pump.

Fuel Pump Control Inspection

1. Connect the **SST** (NGS) to the data link connector-2.



U5U10164

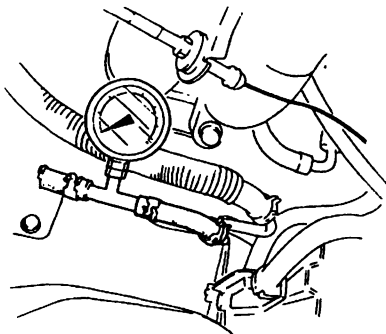
2. Turn the ignition switch to ON.
3. Select "SIMULATION TEST" and press TRIGGER.
4. Select "IG ON TEST" and press TRIGGER.
5. Select "FP RLY" and press TRIGGER.
6. Press START.
7. Turn the fuel pump relay from OFF to ON and check if operation sound of the fuel pump relay is heard.
8. If the operation sound is not heard, check the fuel pump relay.
9. If the fuel pump relay is normal, check the following.
 - Wiring harnesses and connectors {Main relay — fuel pump relay — ECM (PCM)}

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 "Fuel Line Safety Procedures". (Refer to FUEL SYSTEM, PRECAUTION)

- Disconnect the negative battery cable.
- Connect a pressure gauge between the fuel main pipe (high-pressure side) and the fuel main hose (install clamps as shown).



U5U10166

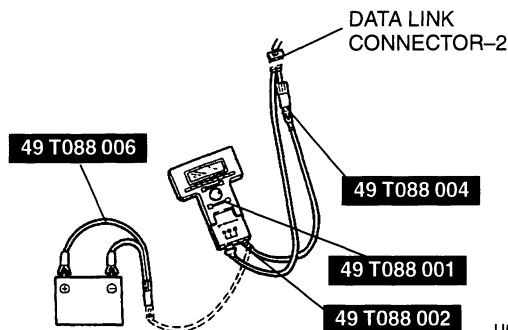
- Connect the negative battery cable.
- Measure the fuel line pressure under the following conditions.

Specifications

	Fuel pressure kPa { kgf/cm ² , psi }		
Idling	216—264 { 2.2—2.7 , 32—38 }		
During 150 sec. of hot start	More than 284 { 2.9 , 41.2 }	216—264 { 2.2—2.7 , 32—38 }	More than 284 { 2.9 , 41 }
After 150 sec. of hot start	216—264 { 2.2—2.7 , 32—38 }		
Judgement	Normal	Not Normal (Perform Inspection 1)	Not Normal (Perform Inspection 2)

Inspection 1

- Connect the **SST** (NGS) to the data link connector-2.



U5U10164

- Start the engine and let it idle.
- Select "SIMULATION TEST" and press TRIGGER.

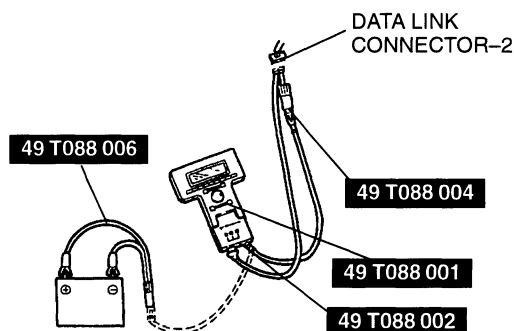
- Select "IDLING TEST" and press TRIGGER.
- Select "PRCV" and press TRIGGER.
- Press START.
- Turn the PRC solenoid valve from OFF to ON and check if the fuel pressure changes.
 - If the pressure changes more than 284 kPa { 2.9 kgf/cm² , 41 psi }, check the following.
 - ECM terminal 3G, 3K and 3L voltage (Refer to CONTROL SYSTEM, ENGINE CONTROL MODULE INSPECTION)
 - If the pressure does not change, do as follows.
 - Select "PRCV" and press TRIGGER.
 - Press START.
 - Turn the PRC solenoid valve from OFF to ON and check if the operation sound of the valve is heard.
 - If the operation sound is heard, check the pressure regulator.
 - If the operation sound is not heard, check the PRC solenoid valve.

Inspection 2

- Connect the **SSTs** to the data link connector-2.
- Turn the ignition switch to ON.
- Select "SIMULATION TEST" function on the NGS display.
- Turn the PRC solenoid valve from OFF to ON by using the "PRCV" and check if the operation sound is heard.
 - If the operation sound is heard, check the loose or damaged vacuum hose. (Pressure regulator — PRC solenoid valve — intake manifold)
 - If the operation sound is not heard, check the PRC solenoid valve.

Purge Control Inspection

- Start the engine.
- Disconnect the vacuum hose between the purge solenoid valve and the charcoal canister.
- Put a finger to the purge solenoid valve and verify that there is no vacuum applied when the engine is cold.
- If there is a vacuum, check the following.
 - ECM terminal 4T voltage (Refer to CONTROL SYSTEM, ENGINE CONTROL MODULE INSPECTION)
 - Purge solenoid valve
- Warm up the engine to the normal operating temperature.
- Stop the engine.
- Connect the **SSTs** to the data link connector-2.



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- Turn the ignition switch to ON.

9. Select "PID/DATA MONITOR AND RECORD" and press TRIGGER.
10. Select "ECT" and press TRIGGER, then verify that the engine coolant temperature is above 60 °C { 140 °F }.
11. Press START.
12. If the **SST** indicates below 60 °C { 140 °F }, inspect the engine coolant temperature sensor.
13. Select "SIMULATION TEST" and press TRIGGER.
14. Select "PRGV" and press TRIGGER.
15. Press START.
16. Increase the duty valve of the purge solenoid valve to 50 % and check if the operation sound of the valve is heard.
 - (1) If the operation sound is heard, check the loose or damaged vacuum hose. (Intake manifold—purge solenoid valve—charcoal canister)
 - (2) If the operation sound is not heard, check the purge solenoid valve.

Main Relay Operation Inspection

1. Verify that the main relay clicks when the ignition switch is turned to ON and OFF.
2. If there is no operation sound, inspect the following.
 - Main relay
 - Harness and connector between ignition switch and main relay.

Ignition Timing Control Inspection

1. Connect a timing light to the engine.
2. Crank the engine.
3. Verify that the timing mark (yellow) on the crankshaft pulley and the mark on the timing belt cover are aligned.

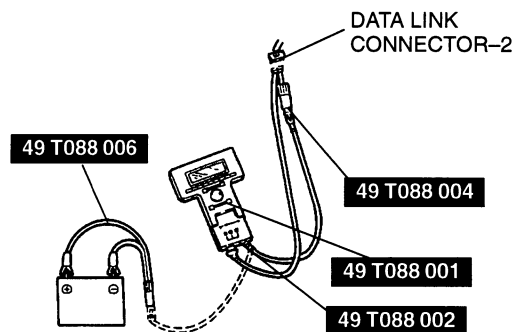
Specification

BTDC 9°—11° (10° ± 1°)

4. If the marks are not aligned, remove the ignition coil bracket and push the ignition coil aside for easy access. Then, loosen the camshaft position sensor lock bolts, and turn the camshaft position sensor to make the adjustment.
5. If adjustment by turning the camshaft position sensor is not possible, check the following.
 - Crankshaft position sensor
 - Ignition control module related wiring harnesses and connectors.

A/C Cut Control Inspection

1. Start the engine.
2. Turn the A/C switch and fan switch to ON.
3. Verify that the A/C compressor magnet clutch actuates.
4. If it does not actuate, go to troubleshooting of the A/C.
5. Fully open the throttle valve and verify that the A/C compressor magnet clutch does not actuate for 3—6 seconds.
6. If it actuates, check the following.
 - (1) Connect the **SSTs** to the data link connector-2.



U5U10164

- (2) Turn the A/C switch to OFF.
- (3) Turn the ignition switch to ON.
- (4) Select "SIMULATION TEST" and press TRIGGER.
- (5) Select "IG ON TEST" and press TRIGGER.
- (6) Select "A/C RLY" and press TRIGGER.
- (7) Press START.
- (8) Turn the A/C relay from OFF to ON and check if the operation sound of the relay is heard.
- (9) If the operation sound is heard, check the ECM terminal 1G voltage (Refer to CONTROL SYSTEM, ENGINE CONTROL MODULE INSPECTION)
- (10) If the operation sound is not heard, check the A/C relay.

TROUBLESHOOTING [ENGINE CONTROL]

Spark Test

1. Disconnect the negative battery cable.
2. Turn over the front cabin carpet.
3. Remove the protector cover.
4. Disconnect the fuel pump relay connector.
5. Verify that each high-tension lead and connector is connected properly.
6. Inspect the ignition system in the following procedure.

Warning

- **High voltage in the ignition system can cause strong electrical shock which can result in serious injury. Avoid direct contact to the vehicle body during the following spark test.**

STEP	INSPECTION		ACTION
1	Remove high-tension lead from spark plug. Hold high-tension lead with installed pliers 5—10 mm { 0.20—0.39 in } from ground. Turn ignition switch to START and verify that there is a strong blue spark. (Check each cylinder)	Yes	Ignition system OK
		No	If some cylinders no spark, go to step 2 If all cylinders no spark, go to step 3
2	Is high-tension lead resistance correct?	Yes	Check distributor cap, rotor, and rotor cap
		No	Replace the high-tension lead
3	Does ECM or distributor connector have poor connection?	Yes	Go to next step
		No	Repair or replace connector
4	Are distributor cap and rotor free from cracks or damage?	Yes	Go to next step
		No	Repair or replace
5	Is ignition coil winding resistance OK?	Yes	Go to next step
		No	Replace distributor
6	Is ignition control module correct?	Yes	Check the following • Crankshaft position sensor • ECM terminal voltage IGT control signal and related wiring harness and connectors
		No	Replace the ignition control module
7	Are following parts OK? • Crankshaft position sensor • ECM terminal voltage IGT control signal and related wiring harness and connectors	Yes	Go to next step
		No	Repair or replace
8	Are wiring harness and connectors of distributor OK? (Open or short)	Yes	Replace distributor
		No	Repair or replace

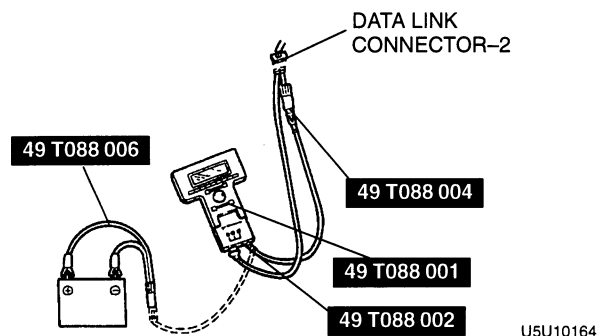
TROUBLESHOOTING [ENGINE CONTROL]

Fuel Injector Operation Inspection

STEP	INSPECTION		ACTION
1	While cranking engine, check for fuel injector operation sound at each cylinder by using a sound-scope Is operation sound heard?	Yes	Fuel injector operation OK
		No	If all cylinder no heard, go to step 2 If some cylinder no heard, go to step 3
2	Carry out main relay operation Is main relay operation normal?	Yes	Check following - Fuel injector power system related wiring harnesses and connectors - ECM connectors - ECM terminal voltage - Fuel injector ground and related wiring harness and connectors
		No	Repair or replace
3	Change fuel injector connector of not operating fuel injector and operating fuel injector Is operation sound heard?	Yes	Go to next step
		No	Replace the fuel injector
4	Are wiring harnesses and connectors of operating fuel injector OK? (Operating or not operating)	Yes	Repair or replace
		No	Check ECM terminal voltage fuel injector signal

Fuel Cut Control Inspection

- Warm up the engine and let it idle.
- Turn off the electrical loads and A/C switch.
- Connect the **SSTs** to the data link connector-2.



- Select "PID/DATA MONITOR AND RECORD" and press TRIGGER.
- Select "RPM" and press TRIGGER.
- Press START.
- Using a soundscope, listen for the fuel injector operation sound at all cylinders.
 - Open the throttle valve and increase the engine speed to 4,000 rpm.
 - Quickly close the throttle valve and verify that the fuel injector operation sound stops when the throttle valve is closed and starts again when the engine speed dropped below 1,000 rpm.

- If the operation sound does not stop at all cylinders, inspect the ECM terminal 3F voltage. (Refer to CONTROL SYSTEM, ENGINE CONTROL MODULE INSPECTION)
- If the operation sound does not stop at some cylinders, inspect the suspected faulty fuel injector and related wiring harness and connector.
- If the operation sound stops but the fuel injectors resume operation at an engine speed out of the specification, inspect the ECM terminal 3F, 3L voltage. (Refer to CONTROL SYSTEM, ENGINE CONTROL MODULE INSPECTION)

- Place the vehicle on a chassis roller.
- Shift into any gear and drive a car on a chassis roller.
 - Select "INJ" and press TRIGGER.
 - Press START.
 - Depress the accelerator pedal and increase the engine speed to 2,500 rpm.
 - Release the accelerator pedal (brake pedal not depressed) and check that the fuel injector duration time is 0 msec., and 2—5 msec. when the engine speed drops below 1,000 rpm.
 - If not, check the following.
 - ECM terminal 1L voltage (Refer to CONTROL SYSTEM, ENGINE CONTROL MODULE INSPECTION)

01-01C TROUBLESHOOTING [CRUISE CONTROL SYSTEM BP]

CRUISE CONTROL SYSTEM ON-BOARD

DIAGNOSIS	01-01C-1
Outline	01-01C-1
Inspection Order	01-01C-1

Inspection of Diagnostic Trouble Codes for Operation Mode	01-01C-1
Inspection of Diagnostic Trouble Codes for Condition Detection Mode	01-01C-7

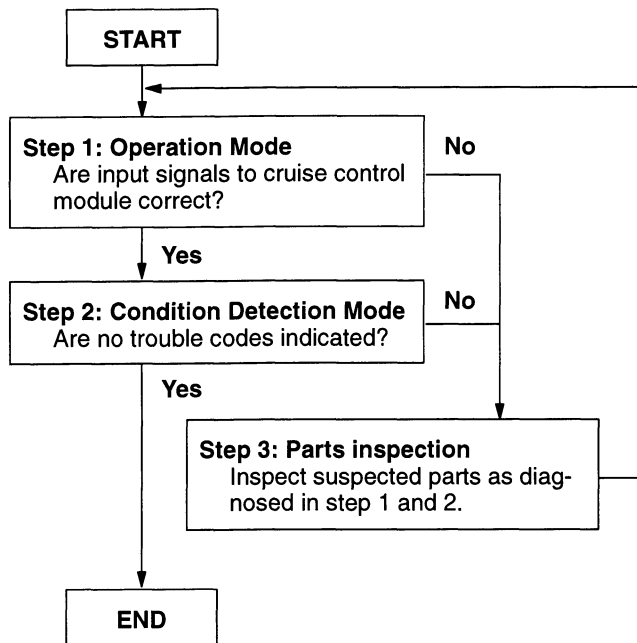
CRUISE CONTROL SYSTEM ON-BOARD DIAGNOSIS

U5U101CA

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).

Inspection Order



U5U101P0

Inspection of Diagnostic Trouble Codes for Operation Mode

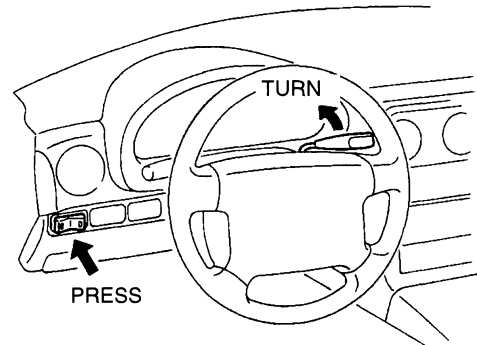
Using the cruise set indicator light

Note

- If an Operation Mode is not indicated, the following may be the cause of the malfunction.
 1. RESUME/ACCEL switch
 2. Cruise control main switch
 3. Cruise control module
 4. Open or short circuit in wiring harness

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 then press the cruise control main switch to activate system inspection. (The cruise set indicator light will illuminate.)

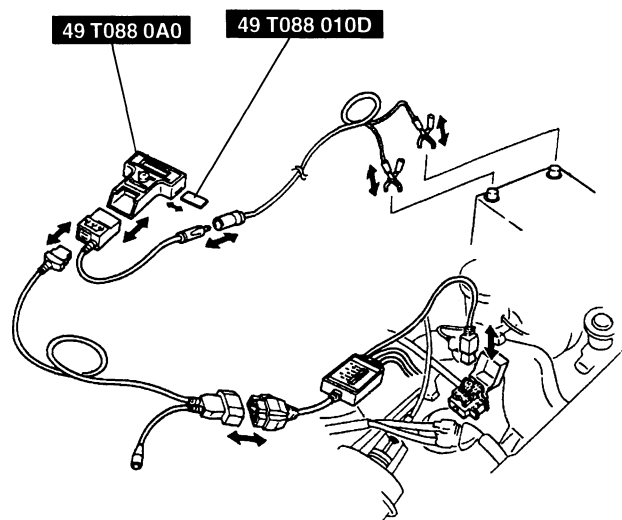


U5U101P1

4. Operate each switch as described and not 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 turning off the cruise control main switch.

Using the SST (NGS set)

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

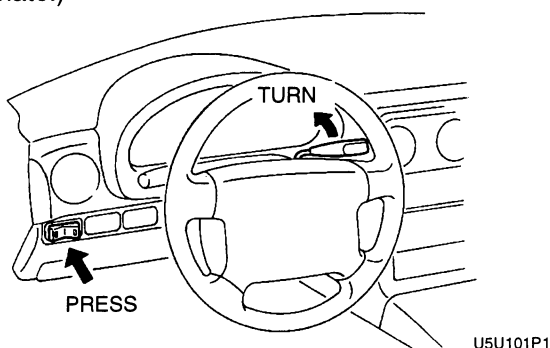


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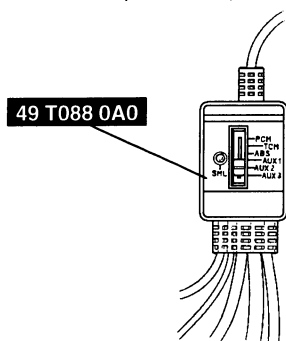
2. Turn the ignition switch to ON.

TROUBLESHOOTING [CRUISE CONTROL SYSTEM BP]

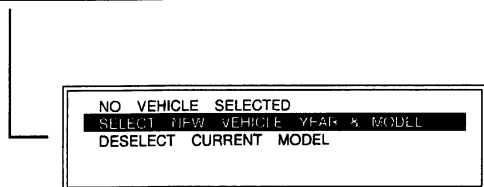
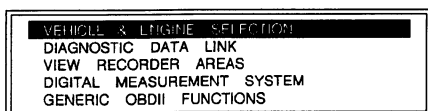
- Turn and hold the RESUME/ACCEL switch, then press the cruise control main switch to activate system inspection. (The cruise set indicator light will illuminate.)



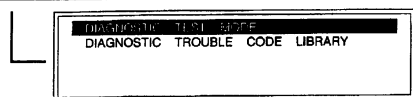
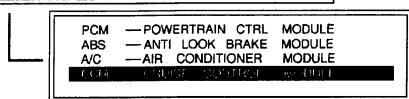
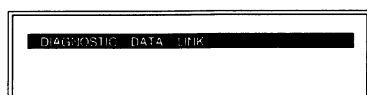
- Set the **SST** (NGS set) to AUX 2.



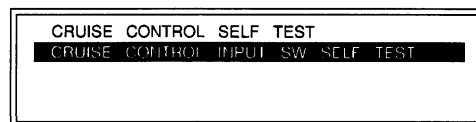
- Select "VEHICLE & ENGINE SELECTION" and press TRIGGER. (Select the model and specifications of the vehicle you're testing.)



- Select "DIAGNOSTIC DATA LINK" and press TRIGGER.
- Select "CCM – CRUISE CONTROL MODULE" and press TRIGGER.
- Select "DIAGNOSTIC TEST MODE" and press TRIGGER.



- Select "CRUISE CONTROL INPUT SW SELF TEST" and press TRIGGER.



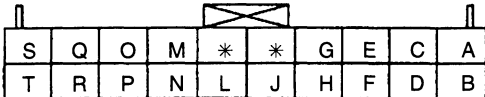
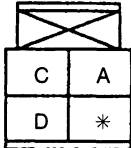
- Press START.
- Operate each switch as described and note the operation code list pattern. If a diagnostic trouble code is not indicated, inspect the corresponding system area.
- If normal "NO CODES RECEIVED" will then be indicated.
- Remove the **SST** (NGS set).
- The Operation Mode is canceled by turning the ignition switch to LOCK or turning off the cruise control main switch.

TROUBLESHOOTING [CRUISE CONTROL SYSTEM BP]

Operation code list

Procedure		DTC	Output pattern	Display on the NGS	Diagnosed circuit
Press SET/COAST switch		21	 U5U101P7	SET/COST SW — PRESS	Cruise control switch
Press RESUME/ACCEL switch		22	 U5U101P8	RESUME/ACCEL SW — PRESS	Cruise control switch
Depress brake pedal		31	 U5U101P9	BRAKE PEDAL — DEPRESS	Brake switch
AT	Set selector lever to P or N range	35	 U5U101Q0	P OR N RANGE (NEUTRAL POSITION) — SHIFT	AT Transmission range switch
MT	Depress clutch pedal				MT Clutch switch
Drive vehicle above 40 km/h { 25 mph }		37	 U5U101Q1	VEHICLE SPEED — ABOVE 40 KM/H { 25 MPH }	Vehicle speed sensor

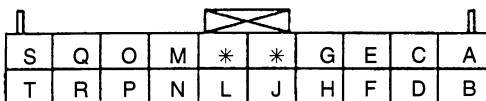
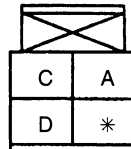
Inspection of diagnostic trouble codes

DTC 21		CRUISE CONTROL SWITCH	
POSSIBLE CAUSE		• Damaged cruise control module • Damaged cruise control switch • Open circuit in wiring harness • Poor connection of connector	
STEP	INSPECTION	ACTION	
1	Is code 22 indicated?	Yes	Go to step 5.
		No	Go to next step.
2	Remove lower panel. Disconnect combination switch connector. Is there continuity between terminal D of combination switch connector and ground?	Yes	Go to next step.
		No	Repair wiring harness. (Combination switch — GND)
3	Connect combination switch connector. Turn ignition switch to ON. Turn on cruise control main switch. Is voltage at terminal A of combination switch connector approximately 5 V ?	Yes	Go to step 5.
		No	Go to next step.
4	Remove right front side trim. Is voltage at terminal L of cruise control module connector approximately 5 V ?	Yes	Repair wiring harness. (Cruise control module — Combination switch)
		No	Replace cruise control module.
5	Turn SET/COAST switch on. Is voltage terminal A of combination switch connector approximately 3.1 V ?	Yes	Replace cruise control module.
		No	Replace wiper lever.
CRUISE CONTROL MODULE CONNECTOR		COMBINATION SWITCH CONNECTOR	
			

U5U101Q2

U5U101Q2

TROUBLESHOOTING [CRUISE CONTROL SYSTEM BP]

DTC 22		CRUISE CONTROL SWITCH	
POSSIBLE CAUSE		• Damaged cruise control module • Damaged cruise control switch • Open circuit in wiring harness • Poor connection of connector	
STEP	INSPECTION		ACTION
1	Is code 21 indicated?	Yes	Go to step 5.
		No	Go to next step.
2	Remove lower panel. Disconnect combination switch connector. Is there continuity between terminal D of combination switch connector and ground?	Yes	Go to next step.
		No	Repair wiring harness. (Combination switch — GND)
3	Connect combination switch connector. Turn ignition switch to ON. Turn on cruise control main switch. Is voltage at terminal C of combination switch connector approximately 5 V ?	Yes	Go to step 5.
		No	Go to next step.
4	Remove right front side trim. Is voltage at terminal N of cruise control module connector approximately 5 V ?	Yes	Repair wiring harness. (Cruise control module — Combination switch)
		No	Replace cruise control module.
5	Turn RESUME/ACCEL switch on. Is voltage terminal C of combination switch connector approximately 1.5 V ?	Yes	Replace cruise control module.
		No	Replace wiper lever.
CRUISE CONTROL MODULE CONNECTOR  COMBINATION SWITCH CONNECTOR 			

U5U101Q

U5U101Q2

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.
2	Is STOP 15 A fuse okay?	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	Release brake pedal, then go to step 5.
		No	Release brake pedal, then 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 right front side trim. Depress brake pedal. Is voltage at terminal M of cruise control module connector approximately 12 V ?	Yes	Replace cruise control module.
		No	Repair wiring harness. (Cruise control module — Brake switch)
6	Remove right front side trim. Depress brake pedal. Is voltage at terminal M of cruise control module connector approximately 12 V ?	Yes	Go to next step.
		No	Repair wiring harness. (Cruise control module — Brake switch)

TROUBLESHOOTING [CRUISE CONTROL SYSTEM BP]

STEP	INSPECTION	ACTION	
7	Disconnect brake switch connector. Turn ignition switch to ON. Turn on cruise control main switch. Is voltage at terminal 2B of brake switch connector approximately 12 V ?	Yes	Connect brake switch connector, then go to step 9.
		No	Connect brake switch connector, then go to next step.
8	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.
9	Is voltage at terminal 2A of brake switch connector approximately 12 V ? Depress brake pedal. Is voltage at terminal 2A of brake switch connector approximately 0 V ?	Yes	Release brake pedal, then go to next step.
		No	Replace brake switch.
10	Is voltage at terminal O of cruise control module connector approximately 12 V ? Depress brake pedal. Is voltage at terminal O of cruise control module connector approximately 0 V ?	Yes	Replace cruise control module.
		No	Repair wiring harness. (Cruise control module — Brake switch)

CRUISE CONTROL MODULE CONNECTOR

S	Q	O	M	*	*	G	E	C	A
T	R	P	N	L	J	H	F	D	B

BRAKE SWITCH CONNECTOR

1A

1B

2B

2A

U5U101Q4

U5U101Q4

DTC 35		AT TRANSMISSION RANGE SWITCH MT CLUTCH SWITCH	
POSSIBLE CAUSE		• Damaged cruise control module • Damaged transmission range switch (AT) • Damaged clutch switch (MT) • Open circuit in wiring harness • Poor connection of connector	
STEP	INSPECTION		ACTION
1	Is vehicle equipped with automatic transmission?	Yes	Go to next step.
		No	Go to step 6.
2	Is transmission range switch okay?	Yes	Go to next step.
		No	Replace transmission range switch.
3	Disconnect transmission range switch connector. Is there continuity between terminal B of transmission range switch connector and ground?	Yes	Go to next step.
		No	Repair wiring harness. (Transmission range switch — GND)
4	Connect transmission range switch connector. Turn ignition switch to ON. Turn on cruise control main switch. Selector lever to D or R range. Is voltage at terminal H of transmission range switch connector approximately 12 V ?	Yes	Replace cruise control module.
		No	Go to next step.
5	Remove right front side trim. Is voltage at terminal J of cruise control module connector approximately 12 V ?	Yes	Repair wiring harness. (Cruise control module — Transmission range switch)
		No	Replace cruise control module.
6	Is clutch switch okay?	Yes	Go to next step.
		No	Replace clutch switch.
7	Disconnect clutch switch connector. Is there continuity between terminal B of clutch switch connector and ground?	Yes	Go to next step.
		No	Repair wiring harness. (Clutch switch — GND)

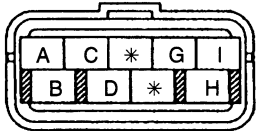
TROUBLESHOOTING [CRUISE CONTROL SYSTEM BP]

STEP	INSPECTION		ACTION
8	Connect clutch switch connector. Turn ignition switch to ON. Turn on cruise control main switch. Is voltage at terminal A of clutch switch connector approximately 12 V ?	Yes	Go to step 10.
		No	Go to next step.
9	Remove right front side trim. 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.
10	Depress clutch pedal. Is voltage at terminal A of clutch switch connector approximately 0 V ?	Yes	Replace cruise control module.
		No	Replace clutch switch.

CRUISE CONTROL MODULE CONNECTOR

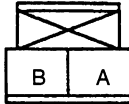
									
S	Q	O	M	*	*	G	E	C	A
T	R	P	N	L	J	H	F	D	B

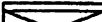
TRANSMISSION RANGE SWITCH



A	C	*	G	I
B	D	*	H	

CLUTCH SWITCH CONNECTOR



	
B	A

U5U101Q5

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	Remove meter hood. Is speedometer okay? (Refer to 09-22 INSTRUMENT CLUSTER INSPECTION, Speedometer.)	Yes	Go to next step.
		No	Replace speedometer.
2	Disconnect instrument cluster connector. Turn ignition switch to ON. Turn on cruise control main switch. Is voltage at terminal 2F of instrument cluster connector approximately 5 V ?	Yes	Turn ignition switch to LOCK, then go to step 4.
		No	Go to next step.
3	Remove right front side trim. Is voltage at terminal P of cruise control module approximately 5 V ?	Yes	Repair wiring harness. (Cruise control module — Instrument cluster)
		No	Replace cruise control module.
4	Is there continuity between terminal 2D of instrument cluster connector and ground?	Yes	Replace cruise control module.
		No	Repair wiring harness. (Instrument cluster — GND)

INSTRUMENT CLUSTER CONNECTOR

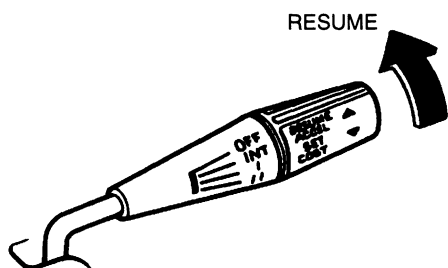
Inspection of Diagnostic Trouble Codes for Condition Detection Mode

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) to determine the cause of the malfunction.

1. Turn on the cruise control main switch.
2. Drive the vehicle.
3. Operate the cruise control system and verify that the deceleration, acceleration, coast, and cancel controls function by operating each of the cruise control switches.
4. Stop the vehicle and let it idle.
5. Press 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**.

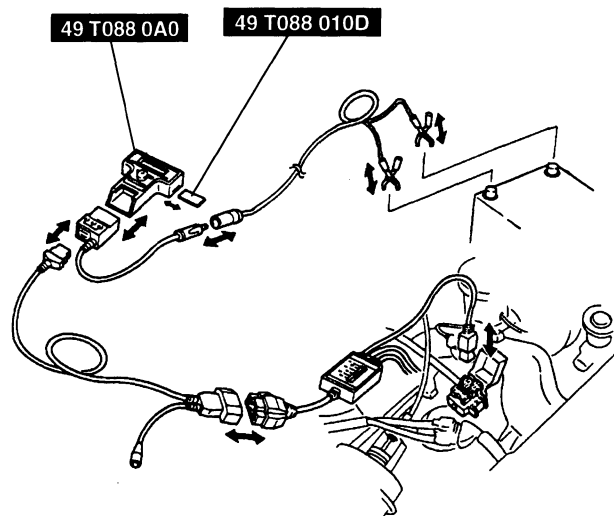


U5U101Q7

6. If a diagnostic trouble code is indicated, inspect the corresponding system area.
7. The Condition Detection Mode is canceled by turning off the cruise control main switch or driving the vehicle at over **16 km/h { 10 mile/h }**.

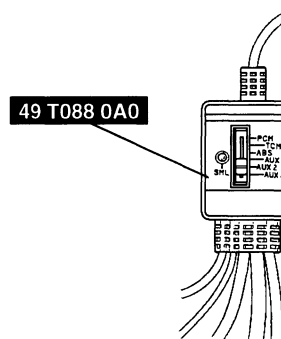
Using the SST (NGS set)

1. Turn on the cruise control main switch.
2. Drive the vehicle.
3. Operate the cruise control system and verify that the deceleration, acceleration, coast, and cancel controls function by operating each of the cruise control switches.
4. Stop the vehicle and let it idle.
5. Connect the **SST** (NGS set) to the data link connector and battery.



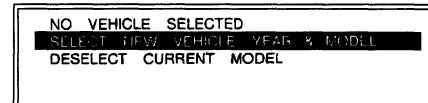
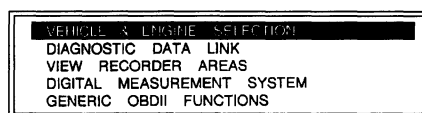
U5U101P2

6. Set the **SST** (NGS set) to AUX 2.



U5U101P3

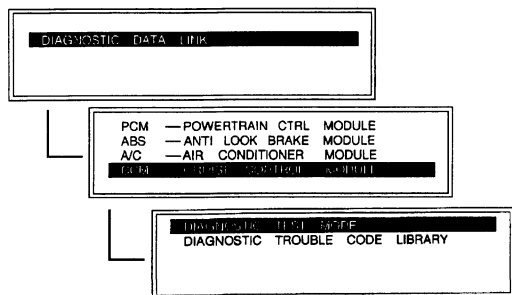
7. Select "VEHICLE & ENGINE SELECTION" and press TRIGGER. (Select the model and specifications of the vehicle you're testing.)



U5U101P4

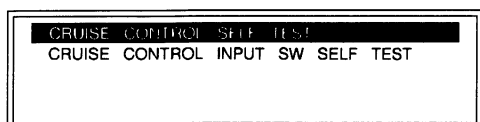
8. Select "DIAGNOSTIC DATA LINK" and press TRIGGER.
9. Select "CCM - CRUISE CONTROL MODULE" and press TRIGGER.
10. Select "DIAGNOSTIC TEST MODE" and press TRIGGER.

TROUBLESHOOTING [CRUISE CONTROL SYSTEM BP]



U5U101P5

11. Select "CRUISE CONTROL SELF TEST" and press TRIGGER.



U5U101Q8

Condition code list

DTC	Output pattern	Display on the NGS	Diagnosed circuit
01	 U5U101Q9	ACTUATOR OR STOPLIGHT SW — DEFECT	Cruise actuator
05	 U5U101R0	STOP FUSE OR WIRING — BLOWN, DEFECT	Brake switch
07	 U5U101R1	STOPLIGHT SWITCHES — DEFECT	Brake switch
11	 U5U101R2	SET/COAST SW — DEFECT (ALWAYS ON)	Cruise control switch
15	 U5U101R3	CRUISE CONTROL MODULE — DEFECT	Cruise control module

Note

- When two or more service codes are indicated, inspect the malfunction with the smallest number first.

TROUBLESHOOTING [CRUISE CONTROL SYSTEM BP]

Inspection of diagnostic trouble codes

DTC 01		CRUISE ACTUATOR	
DETECTION CONDITION		No voltage detected at terminals A, B or C of cruise control module.	
POSSIBLE CAUSE		• Damaged cruise control module • Damaged cruise actuator • Open or short circuit in wiring harness • Poor connection of connector	
STEP	INSPECTION		ACTION
1	Remove right front side trim. Is wiring harness 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 on cruise control main switch. Is voltage at terminal C of cruise actuator connector approximately 12 V ?	Yes	Turn ignition switch to LOCK, then go to step 6.
		No	Turn ignition switch to LOCK, then go to next step.
3	Is voltage at terminal 2A 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 2B of brake switch connector approximately 12 V ?	Yes	Replace brake switch.
		No	Go to next step.
5	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	Disconnect cruise control module connector. Is there continuity between terminal A of cruise control module connector and terminal D of cruise actuator connector?	Yes	Go to next step.
		No	Repair wiring harness. (Cruise control module — Cruise actuator)
7	Is there continuity between terminal B of cruise control module connector and terminal B of cruise actuator connector?	Yes	Go to next step.
		No	Repair wiring harness. (Cruise control module — Cruise actuator)
8	Is there continuity between terminal C of cruise control module connector and terminal A of cruise actuator connector?	Yes	Go to next step.
		No	Repair wiring harness. (Cruise control module — Cruise actuator)
9	Is cruise actuator okay? (Refer to CRUISE CONTROL SYSTEM, CRUISE ACTUATOR INSPECTION.)	Yes	Replace cruise control module.
		No	Replace cruise actuator.

CRUISE CONTROL MODULE CONNECTOR

CRUISE ACTUATOR CONNECTOR

BRAKE SWITCH CONNECTOR

S	Q	O	M	*	*	G	E	C	A
T	R	P	N	L	J	H	F	D	B

C	A
D	B

2B	2A
----	----

U5U101R

U5U101R4

DTC 05		BRAKE SWITCH
Perform operation mode.		

TROUBLESHOOTING [CRUISE CONTROL SYSTEM BP]

DTC 07		BRAKE SWITCH	
DETECTION CONDITION	Voltage between terminals M and O of cruise control module not normal.		
POSSIBLE CAUSE	• Damaged cruise contrl module • Damaged brake switch		
INSPECTION		ACTION	
Disconnect brake switch connector. Is there continuity between terminal 1A and 1B of brake switch?	Yes	Replace brake switch.	
	No	Replace cruise control module.	
BRAKE SWITCH 1A 1B			

U5U101R5

DTC 11	CRUISE CONTROL SWITCH
Perform operation mode.	

DTC 15	CRUISE CONTROL MODULE
Replace cruise control module.	

01-10 MECHANICAL

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DRIVE BELT INSPECTION

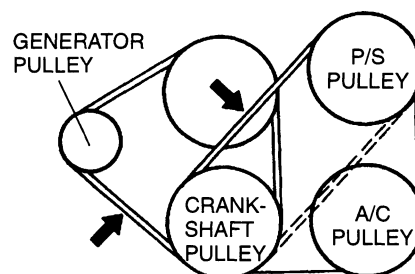
Deflection

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.

mm { in }			
Drive belt	New*	Used	Limit
Generator	5.5—7.0 { 0.22—0.27 }	6.0—7.5 { 0.24—0.29 }	8.0 { 0.31 }
P/S, P/S + A/C	8.0—9.0 { 0.32—0.35 }	9.0—10.0 { 0.36—0.39 }	11.5 { 0.45 }
A/C	8.0—9.0 { 0.32—0.35 }	9.0—10.0 { 0.36—0.39 }	11.5 { 0.45 }

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

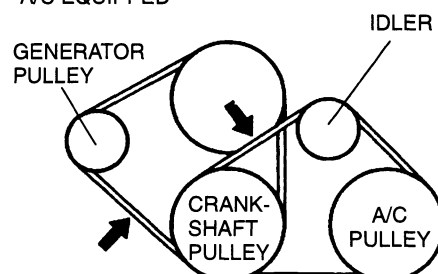
P/S OR P/S + A/C EQUIPPED



U5U110AA

U5U11001

A/C EQUIPPED



U5U11002

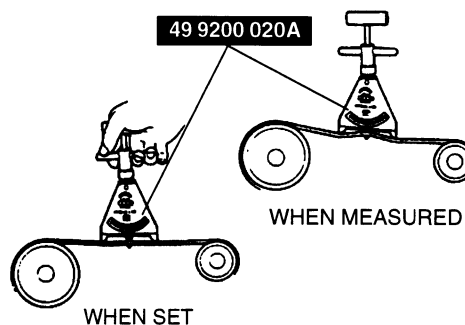
- If the deflection is not within the specification, adjust it.

Tension

- 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.

N { kgf , lbf }			
Drive belt	New*	Used	Limit
Generator	491—745 { 50—76 , 110—167 }	491—706 { 50—72 , 110—158 }	343 { 35 , 77 }
P/S, P/S + A/C	491—588 { 50—60 , 110—132 }	422—490 { 43—50 , 95—110 }	245 { 25 , 55 }
A/C	491—588 { 50—60 , 110—132 }	422—490 { 43—50 , 95—110 }	245 { 25 , 55 }

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



U5U11003

- If the tension is not within the specification, adjust it.

DRIVE BELT ADJUSTMENT

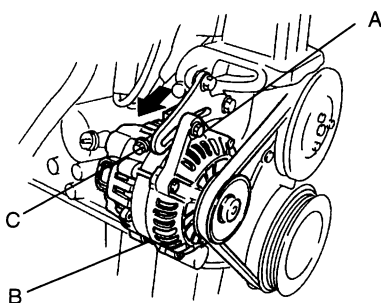
Generator Drive Belt

- Loosen generator bolts A and B and adjust the belt deflection by turning adjusting bolt C.

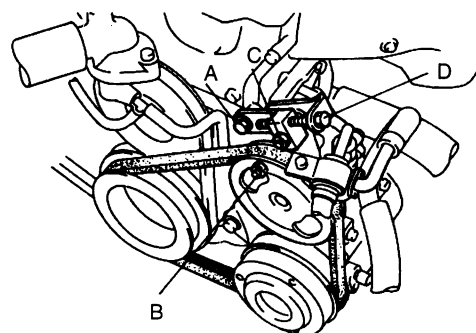
Tightening torque

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

B: 38—51 N·m { 3.8—5.3 kgf·m , 28—38 ft·lbf }



U5U11004



U5U110AB

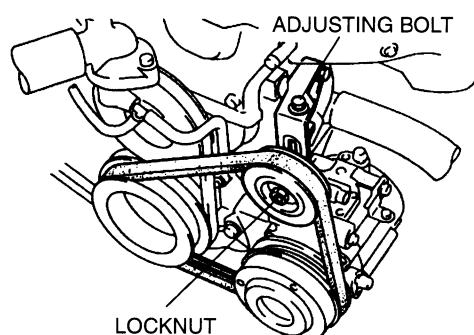
U5U11005

A/C Drive Belt

- If necessary, loosen the locknut and adjust the belt deflection by turning the adjusting bolt.

Tightening torque

38—51 N·m { 3.8—5.3 kgf·m , 28—38 ft·lbf }



U5U11006

P/S Drive Belt, P/S + A/C Drive Belt

- Loosen P/S oil pump bolt A and nuts B and C, and adjust the belt deflection by turning adjusting bolt D.

Tightening torque

A: 32—46 N·m { 3.2—4.7 kgf·m , 24—33 ft·lbf }

B: 37—53 N·m { 3.7—5.5 kgf·m , 27—39 ft·lbf }

C: 38—51 N·m { 3.8—5.3 kgf·m , 28—38 ft·lbf }

COMPRESSION INSPECTION

U5U110AC

1. Check that the battery is fully charged. Recharge it if necessary. (Refer to 01-17 BATTERY INSPECTION.)
2. Warm up the engine to the normal operating temperature.
3. Turn the engine off.
4. Remove all spark plugs.
5. Disconnect the ignition coil connector.
6. Install a compression gauge to the No.1 spark plug hole.
7. Fully depress the accelerator pedal and crank the engine.
8. Record the maximum gauge reading.
9. Check each cylinder as above.
10. If the compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder and recheck the compression.
 - (1) If the compression increases, the piston, piston rings, or cylinder wall may be worn.
 - (2) If the compression stays low, the valve may be stuck or improperly seated.
 - (3) If the compression in adjacent cylinders stays low, the cylinder head gasket may be defective or the cylinder head distorted.
11. Connect the ignition coil connector.
12. Install the spark plugs.

Tightening torque**15—22 N·m { 1.5—2.3 kgf·m , 11—16 ft·lbf }****Compression****Standard: 1,255 kPa { 12.8 kgf/cm² , 182 psi }—300 rpm****Minimum: 883 kPa { 9.0 kgf/cm² , 128 psi }—300 rpm****Differential limit between cylinders:****196 kPa { 2.0 kgf/cm² , 28 psi }**

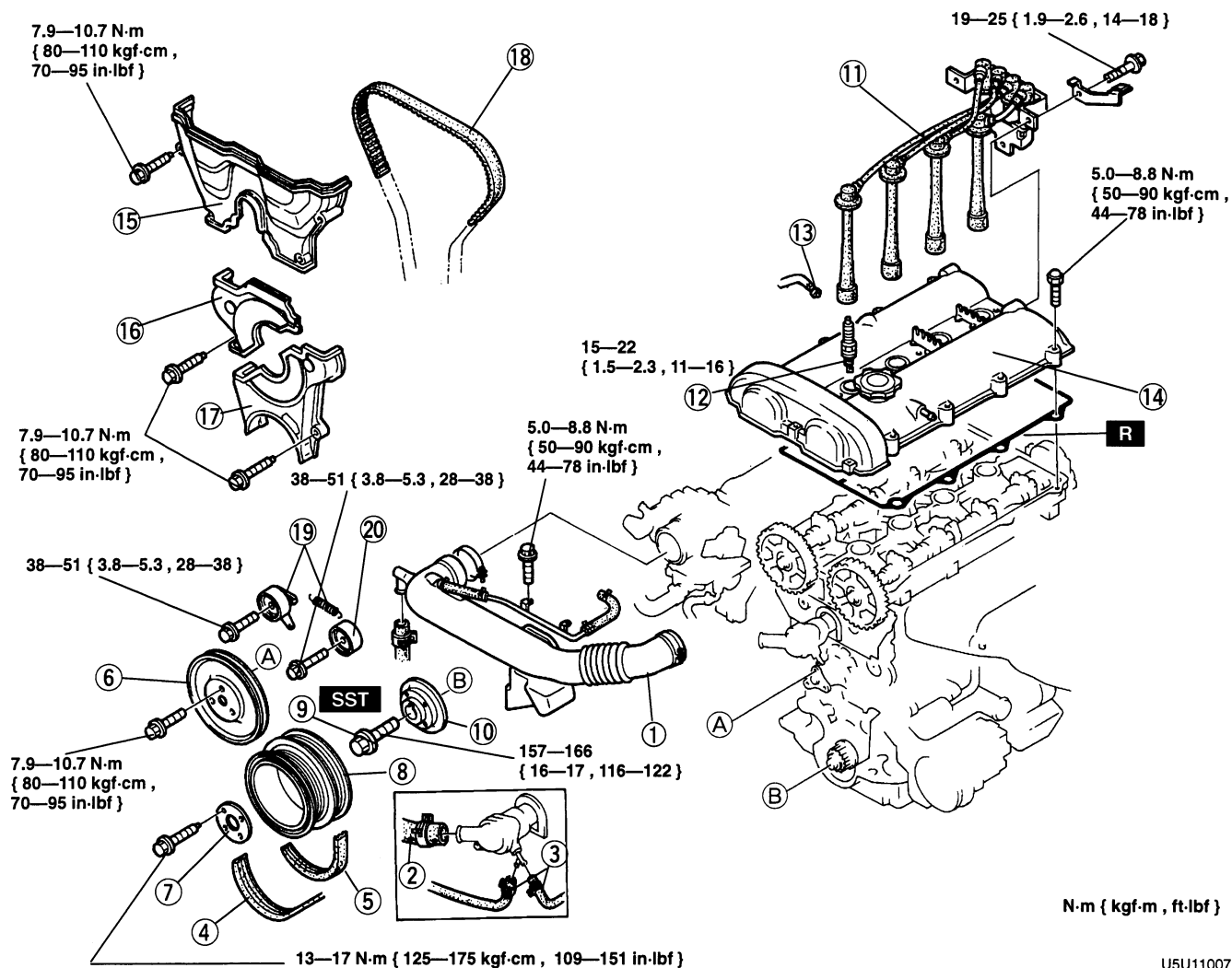
TIMING BELT REMOVAL / INSTALLATION

U5U110AD

Caution

- **The crankshaft position sensor rotor is on the rear of the crankshaft pulley, and can be damaged easily.**

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
3. Remove the splash shield.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal indicated in the table.
6. Fill the radiator with the specified amount and type of engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
7. Start the engine and
 - (1) check the engine coolant leakage.
 - (2) check the ignition timing and idle speed. (Refer to 01-10 ENGINE TUNE-UP.)
 - (3) check the operation of the emission control system.
8. Recheck the engine coolant level.

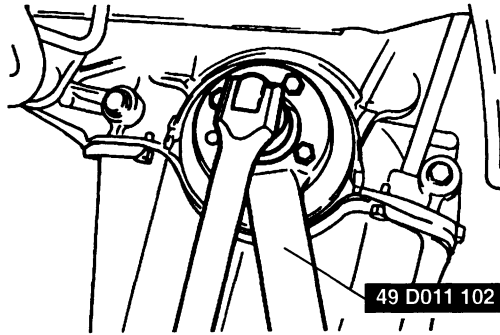


1	Air intake pipe
2	Upper radiator hose
3	Water hose (Connected to thermostat housing)
4	P/S and/or A/C drive belt ☞ 01-10 DRIVE BELT ADJUSTMENT
5	Generator drive belt ☞ 01-10 DRIVE BELT ADJUSTMENT
6	Water pump pulley
7	Plate
8	Crankshaft pulley
9	Pulley lock bolt ☞ Removal Note ☞ Installation Note
10	Pulley boss
11	Ignition coil and high-tension lead

12	Spark plug
13	PCV valve
14	Cylinder head cover ☞ 01-10 ENGINE DISASSEMBLY / ASSEMBLY, Timing Belt, Cylinder head cover assembly note
15	Upper timing belt cover
16	Middle timing belt cover
17	Lower timing belt cover
18	Timing belt ☞ Removal Note ☞ Installation Note
19	Tensioner, tensioner spring ☞ Installation Note
20	Idler

Pulley Lock Bolt Removal Note

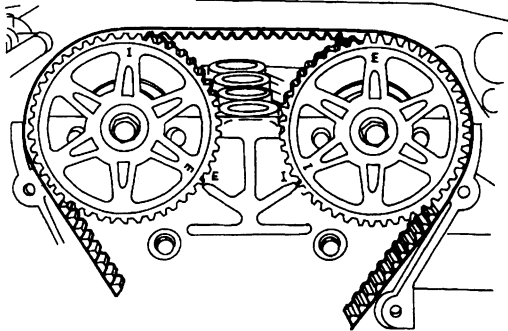
1. Hold the pulley boss by using the **SST**.
2. Using the **SST**, remove the pulley lock bolt.



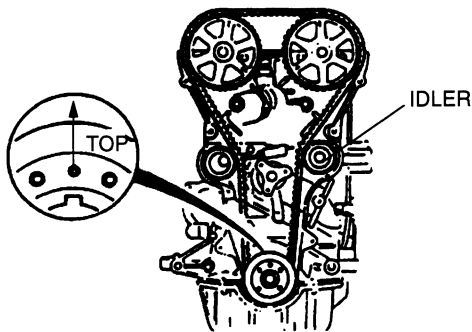
U5U11008

Timing Belt Removal Note

1. Install the pulley boss.
2. Install the pulley lock bolt.
3. Turn the crankshaft to align the timing marks.

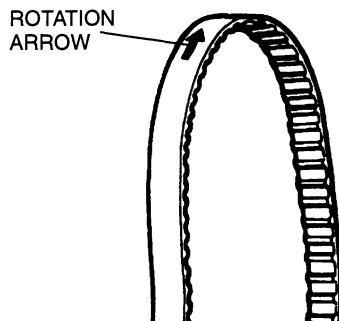


U5U11009



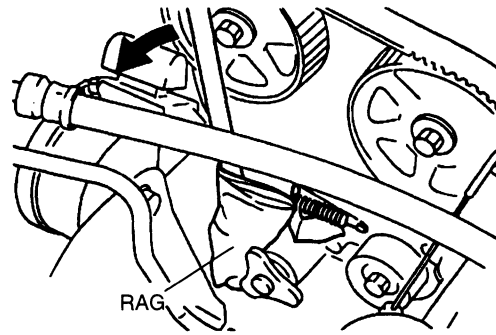
U5U11010

4. Do not turn the crankshaft after aligning the timing marks.
5. Remove the pulley lock bolt and pulley boss.
6. Mark the timing belt rotation for proper reinstallation.



U5U11011

7. Loosen the tensioner lock bolt.
8. Protect the tensioner with a rag. Pry the tensioner outward with a bar.



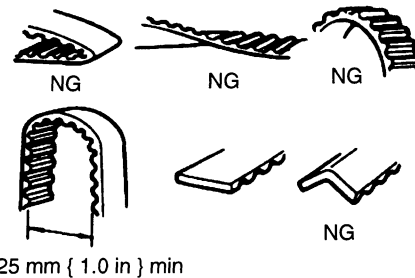
U5U11012

9. Tighten the lock bolt with the tensioner spring fully extended.
10. Remove the timing belt.

Tensioner, Tensioner Spring Installation Note

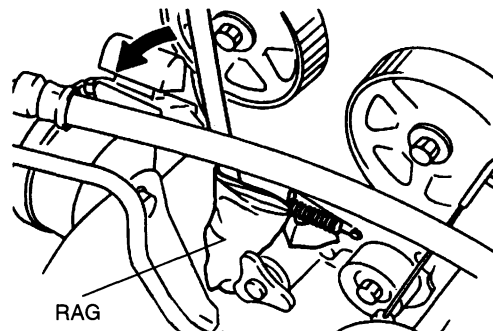
Caution

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



U5U110H2

1. Install the tensioner and the tensioner spring.
2. Protect the tensioner with a rag. Pry the tensioner outward by using a bar.

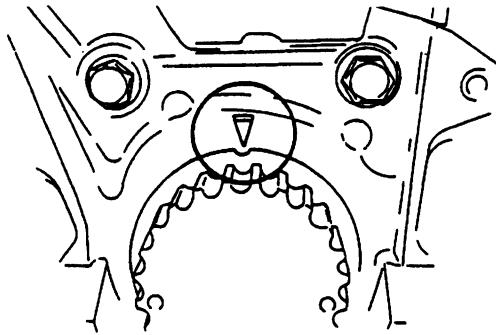


U5U11013

3. Temporarily tighten the tensioner lock bolt with the tensioner spring fully extended.

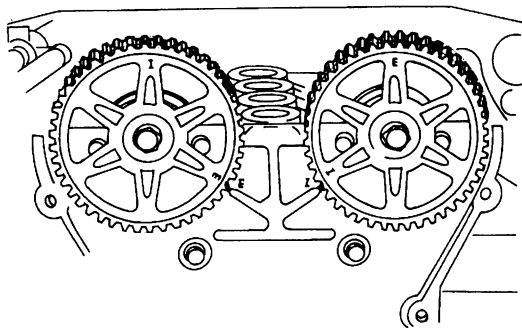
Timing Belt Installation Note

1. Verify that the timing belt pulley mark is aligned with the timing mark.



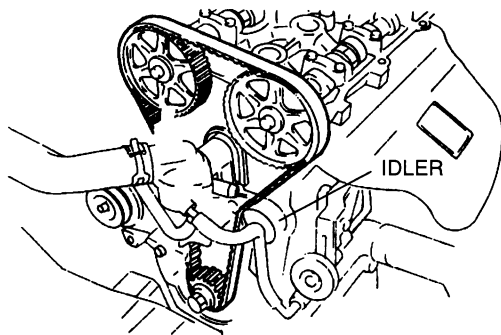
U5U11014

2. Verify that the camshaft pulley marks are aligned with the seal plate marks. E for intake side, and I for exhaust side.



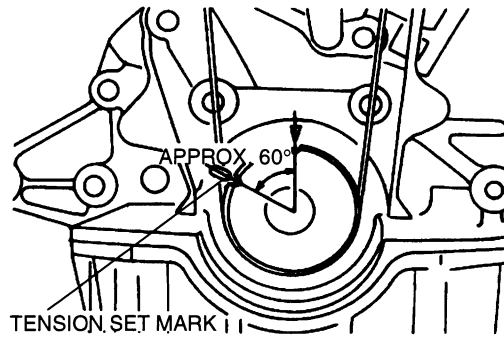
U5U11015

3. Install the timing belt so that there is no looseness at the idler side or between the camshaft pulleys.



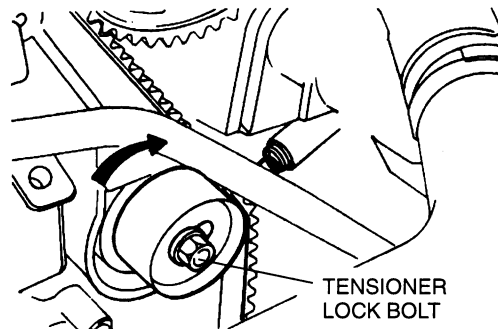
U5U11016

4. Install the pulley boss and pulley lock bolt.
5. Turn the crankshaft two turns clockwise and face the pin on the pulley boss straight up. Do not turn the crankshaft counterclockwise.
6. Verify that the camshaft pulley marks are again aligned with the seal plate marks. If not aligned, remove the timing belt and repeat from tensioner installation.
7. Turn the crankshaft 1 and 5/6 turns clockwise and align the timing belt pulley mark with the tension set mark for proper timing belt tension adjustment.



U5U11017

8. Using the **SST**, loosen the pulley lock bolt and remove the bolt and pulley boss. Do not turn the crankshaft.
9. Verify that the timing belt pulley mark is aligned with the tension set mark.
10. Loosen the tensioner lock bolt to apply spring tension to the timing belt. Be sure not to apply tension other than that of the tensioner spring.



U5U11018

11. Tighten the tensioner lock bolt.

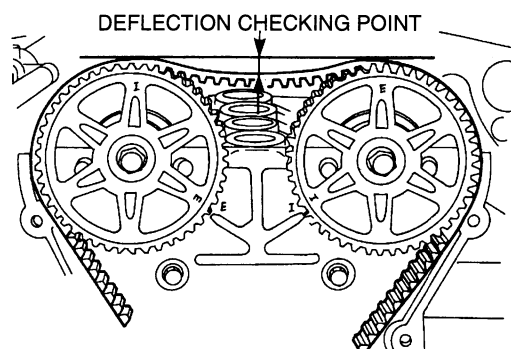
Tightening torque

38—51 N·m { 3.8—5.3 kgf·m , 28—38 ft·lbf }

12. Install the pulley boss and pulley lock bolt.
13. Turn the crankshaft 2 and 1/6 turns clockwise and verify that the timing marks are correctly aligned.
14. Measure the timing belt deflection by applying moderate pressure **98 N { 10 kgf , 22 lbf }** midway between the camshaft pulleys. If the deflection is not correct, repeat from step 10 above.

Deflection

9.0—11.5 mm { 0.36—0.45 in }



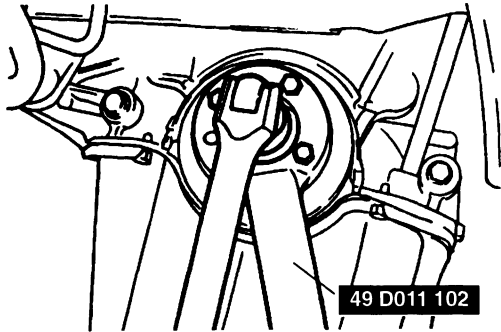
U5U11019

Pulley Lock Bolt Installation Note

- Hold the crankshaft by using the **SST** and tighten the pulley lock bolt.

Tightening torque

157—166 N·m { 16—17 kgf·m , 116—122 ft·lbf }



U5U11020

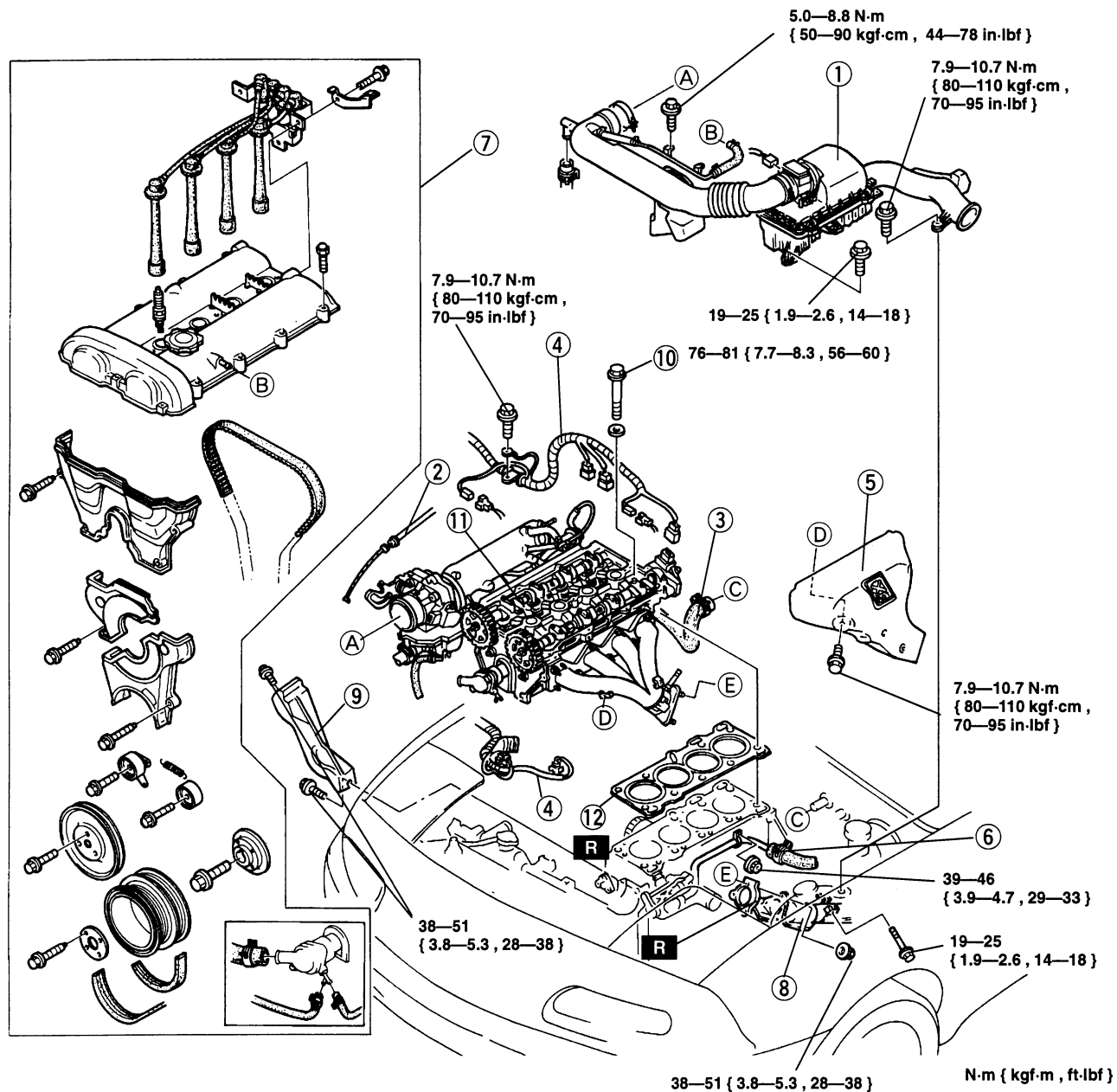
CYLINDER HEAD GASKET REPLACEMENT

U5U110AE

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 “Fuel Line Safety Procedures”. (Refer to 01–14 FUEL SYSTEM PRECAUTION.)
- Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to 01–12 ENGINE COOLANT REPLACEMENT.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Fill the radiator with the specified amount and type of engine coolant. (Refer to 01–12 ENGINE COOLANT REPLACEMENT.)
6. Start the engine and
 - (1) check the engine oil and engine coolant leakage.
 - (2) check the ignition timing and idle speed. (Refer to 01–10 ENGINE TUNE-UP.)
 - (3) check the operation of the emission control system.
7. Recheck the engine oil and engine coolant levels.

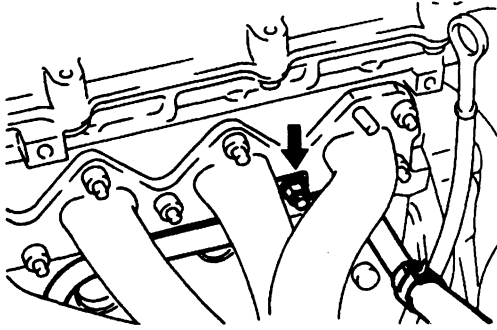


1	Air cleaner
2	Accelerator cable ☞ 01-13 ACCELERATOR CABLE INSPEC- TION / ADJUSTMENT
3	Hose
4	Harness
5	Exhaust manifold insulator
6	Water bypass pipe ☞ Removal Note

7	Timing belt ☞ 01-10 TIMING BELT REMOVAL / INSTALLA- TION
8	Front pipe
9	Manifold bracket
10	Cylinder head bolt ☞ Removal Note ☞ Installation Note
11	Cylinder head
12	Cylinder head gasket

Water Bypass Pipe Removal Note

1. Remove the exhaust manifold nut shown.

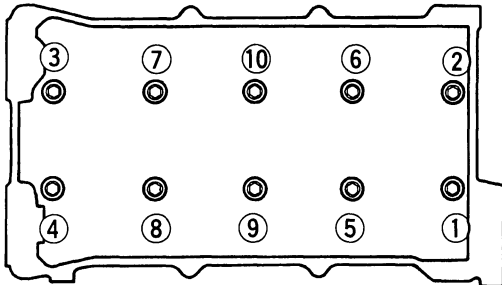


U5U11022

2. Remove the water bypass pipe from the cylinder head.

Cylinder Head Bolt Removal Note

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



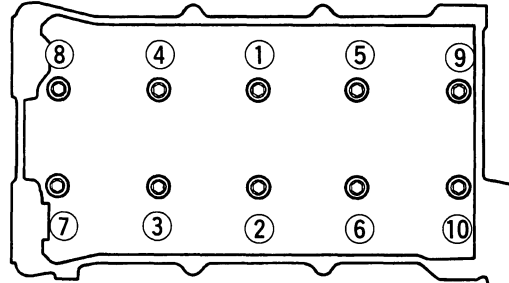
U5U11023

Cylinder Head Bolt Installation Note

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

Tightening torque

76—81 N·m { 7.7—8.3 kgf·m , 56—60 ft·lbf }



U5U11024

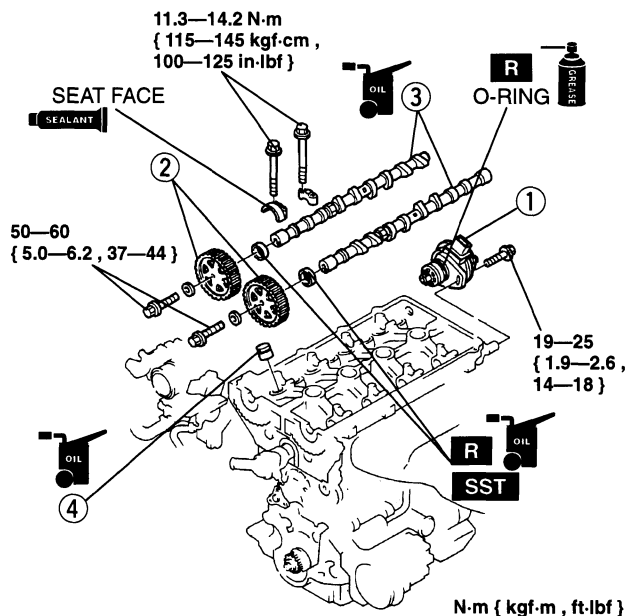
HLA REMOVAL / INSTALLATION

Caution

- Removal and installation of the HLA must be carried out only when the problem cannot be solved by the HLA troubleshooting. (Refer to 01-10 HLA TROUBLESHOOTING GUIDE.)

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
3. Remove the timing belt. (Refer to 01-10 TIMING BELT REMOVAL / INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal indicated in the table.
6. Install the timing belt. (Refer to 01-10 TIMING BELT REMOVAL / INSTALLATION.)
7. Fill the radiator with the specified amount and type of engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
8. Start the engine and
 - (1) check the engine oil and engine coolant leakage.
 - (2) check the ignition timing. (Refer to 01-10 ENGINE TUNE-UP, Ignition Timing.)
 - (3) check the operation of the emission control system.

- (4) check the HLA tappet noise. (Refer to 01-10 HLA TROUBLESHOOTING GUIDE.)
9. Recheck the engine oil and engine coolant levels.

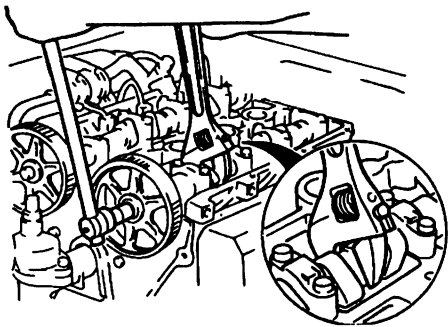


U5U11025

1	Camshaft position sensor
2	Camshaft pulley ☞ Removal Note ☞ Installation Note
3	Camshaft ☞ Removal Note ☞ Installation Note
4	HLA ☞ Removal Note ☞ Installation Note

Camshaft Pulley Removal Note

1. Hold the camshaft with a wrench at the cast hexagon.

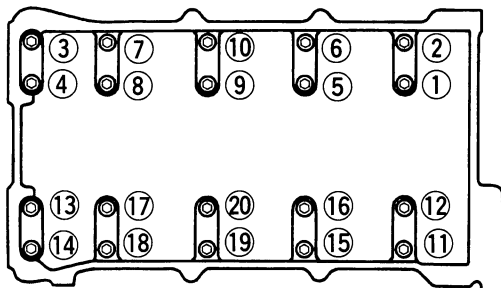


U5U11026

2. Remove the camshaft pulley lock bolts.
3. Remove the camshaft pulleys.

Camshaft Removal Note

1. Loosen the camshaft cap bolts in five or six steps in the order shown.



U5U11027

2. Remove the camshaft caps.
3. Remove the camshafts.
4. Remove the camshaft oil seals from the camshafts.

HLA Removal Note

Caution

- The HLA must be reinstalled in the same positions from which they were removed. If they are not, it can cause premature and uneven wear.

Note

- Mark the HLA to show their original positions.

1. Remove the HLA from the cylinder head.

2. Store the HLA upside down in an oil-filled container.

HLA Installation Note

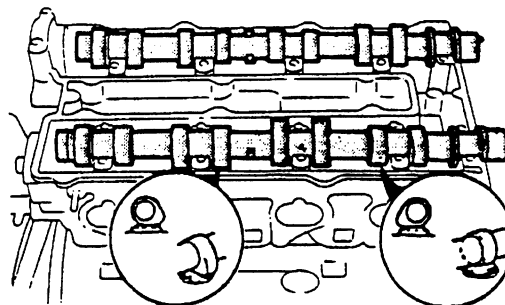
1. Apply clean engine oil to the friction surfaces.
2. If the HLA are being reused, install them in the position from which they were removed.
3. Verify that the HLA move smoothly in their bores.

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

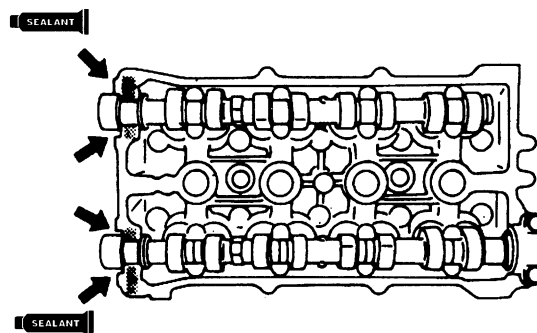


No.3 CYLINDER

No.1 CYLINDER

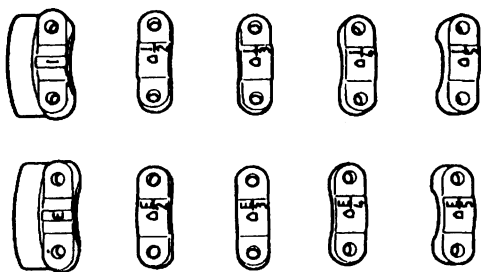
U5U11028

2. Apply silicone sealant to the shaded areas shown. Do not let any sealant get on the sliding surfaces.



U5U11029

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.



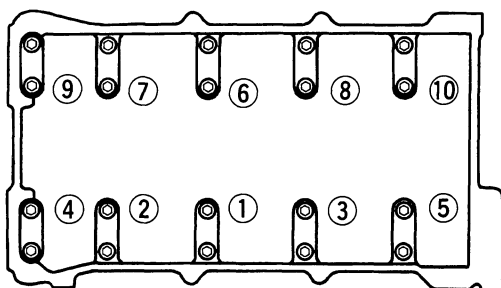
U5U11030

5. Tighten the camshaft cap bolts in two or three steps in the order shown.

Tightening torque

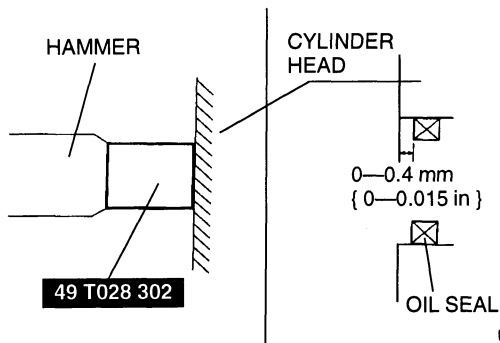
11.3—14.2 N·m

{ 115—145 kgf·cm , 100—125 in·lbf }



U5U11031

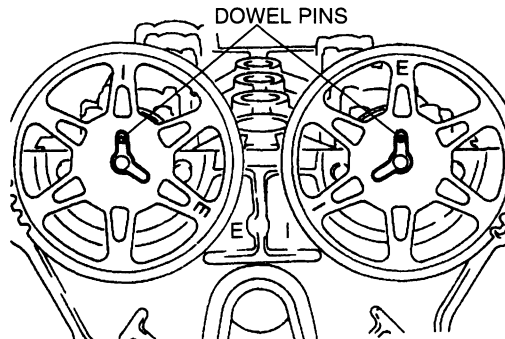
6. Verify that the camshaft settles horizontally when two camshaft cap bolts at No.3 journal are tightened.
7. Apply clean engine oil to the new camshaft oil seal.
8. Push the oil seal slightly in by hand.
9. Tap the oil seal in evenly by using the **SST** and a hammer.



U5U11032

Camshaft Pulley Installation Note

1. Turn the camshafts until the camshaft dowel pins face straight up.
2. Install the camshaft pulleys with the I mark (intake side) or the E mark (exhaust side) straight up.

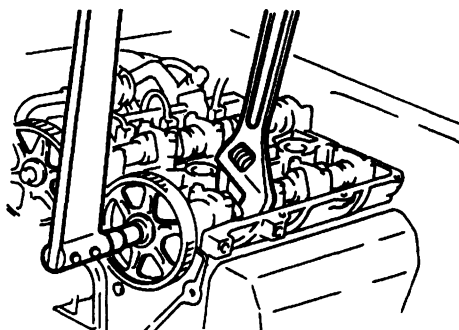


U5U11033

3. Install the camshaft pulley lock bolts.
4. Hold the camshaft by using a wrench at the cast hexagon.
5. Tighten the camshaft pulley lock bolt.

Tightening torque

50—60 N·m { 5.0—6.2 kgf·m , 37—44 ft·lbf }



U5U11034

HLA TROUBLESHOOTING GUIDE

U5U110AG

Problem	Possible Cause	Action
① Noise when engine is started immediately after oil is changed.	Oil leakage in oil passage or in HLA	Run engine at 2,000—3,000 rpm. If noise stops within 20 minutes*, HLA is normal. If not, replace HLA.
② Noise when engine is started after setting one day or more.		
③ Noise when engine is started after new HLA is installed.	Oil leakage in HLA	
④ Noise continues more than 10 minutes.	Insufficient oil pressure	Check oil pressure. If lower than specification, check for cause. (Refer to 01-11 OIL PRESSURE INSPECTION.)
	Faulty HLA	(Refer to 01-10 HLA REMOVAL / INSTALLATION.) Press down HLA by hand. If it does not move, HLA is normal. If it moves, replace HLA. Measure valve clearance. If more than 0.15 mm { 0.0059 in }, replace HLA.
⑤ Noise during idle after high speed running.	Incorrect oil amount	Check oil level. Drain or add oil as necessary.
	Deteriorated oil	Check oil quality. If deteriorated, replace with specified type and amount of oil.

* : Time required for engine oil to circulate within HLA includes tolerance for engine oil condition and ambient temperature.

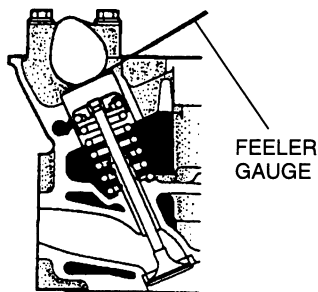
Valve Clearance Inspection

1. Remove the cylinder head cover. (Refer to 01-10 HLA REMOVAL / INSTALLATION.)
2. Measure valve clearance.

3. If valve clearance is more than **0.15 mm { 0.0059 in }**, replace HLA. (Refer to 01-10 HLA REMOVAL / INSTALLATION.)

Valve clearance

0.15 mm { 0.0059 in } max.

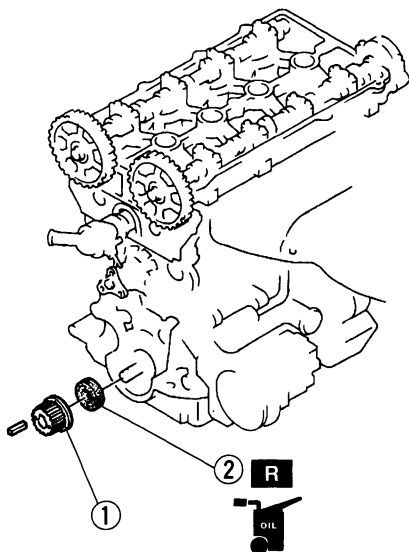


U5U11035

FRONT OIL SEAL REPLACEMENT

U5U110AH

1. Disconnect the negative battery cable.
2. Remove the timing belt. (Refer to 01-10 TIMING BELT REMOVAL / INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Install the timing belt. (Refer to 01-10 TIMING BELT REMOVAL / INSTALLATION.)
6. Fill the radiator with the specified amount and type of engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
7. Start the engine and
 - (1) check the engine coolant leakage.
 - (2) check the ignition timing. (Refer to 01-10 ENGINE TUNE-UP, Ignition Timing.)
8. Recheck the engine coolant level.



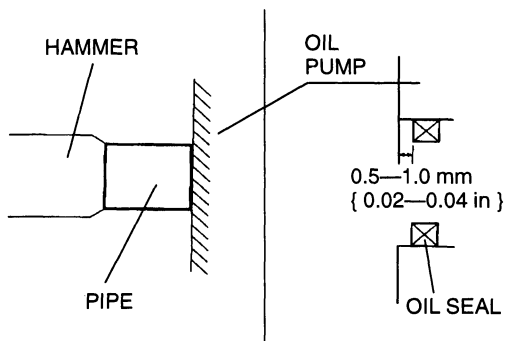
U5U11036

Oil Seal Installation Note

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

Note

- Oil seal outer diameter: 50.5 mm { 1.99 in }
- Oil seal inner diameter: 36.5 mm { 1.44 in }

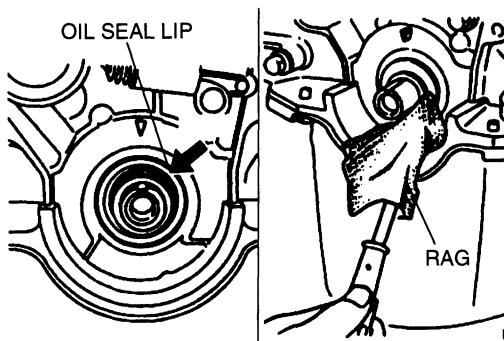


U5U11038

1	Timing belt pulley ☞ Installation Note
2	Oil seal ☞ Removal Note ☞ Installation Note

Oil Seal Removal Note

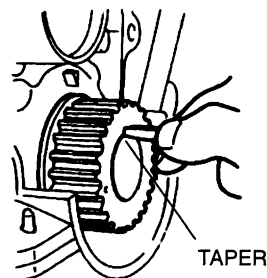
1. Cut the oil seal lip with a razor knife.
2. Remove the oil seal by using a screwdriver protected with a rag.



U5U11037

Timing Belt Pulley Installation Note

1. Install the timing belt pulley.
2. Install the pulley woodruff key with the tapered side toward the oil pump body.

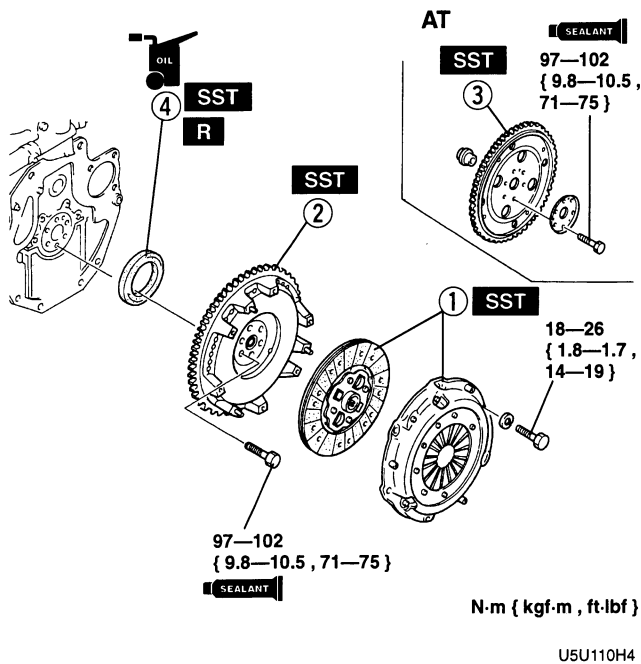


U5U11039

REAR OIL SEAL REPLACEMENT

1. Disconnect the negative battery cable.
2. Remove the transmission. (Refer to 05-11 TRANSMISSION REMOVAL / INSTALLATION.) (Refer to 05-13 TRANSMISSION REMOVAL / INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Install the transmission. (Refer to 05-11 TRANSMISSION REMOVAL / INSTALLATION.) (Refer to 05-13 TRANSMISSION REMOVAL / INSTALLATION.)
6. If the transmission oil was drained, fill with the specified amount and type of transmission oil. (Refer to 05-11 TRANSMISSION OIL REPLACEMENT.) (Refer to 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
7. Start the engine and check the transmission oil leakage.
8. Recheck the transmission oil level.

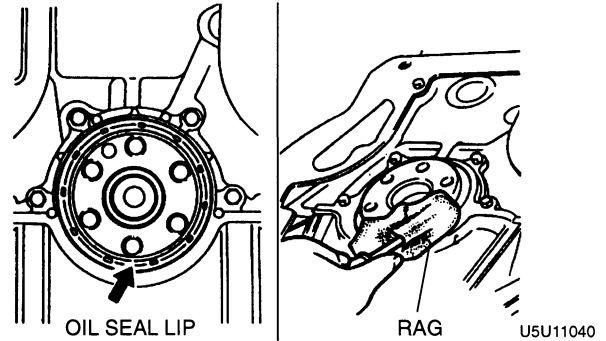
U5U110AJ



1	Clutch cover, clutch disc (MT) 05-10 CLUTCH UNIT REMOVAL / INSTALLATION
2	Flywheel (MT) 05-10 CLUTCH UNIT REMOVAL / INSTALLATION
3	Drive plate (AT) 05-13 DRIVE PLATE REMOVAL / INSTALLATION
4	Oil seal Removal Note Installation Note

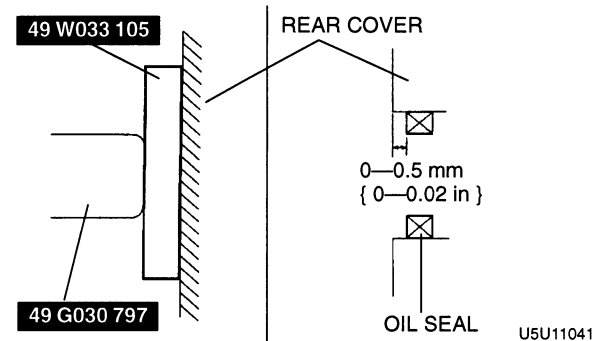
Oil Seal Removal Note

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



Oil Seal Installation Note

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



ENGINE REMOVAL / INSTALLATION

U5U110AN

Caution

- 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 01-14 FUEL SYSTEM PRECAUTION.)
- Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.

Caution

- Cover the fuel hoses with a rag because fuel will spray out when disconnected.

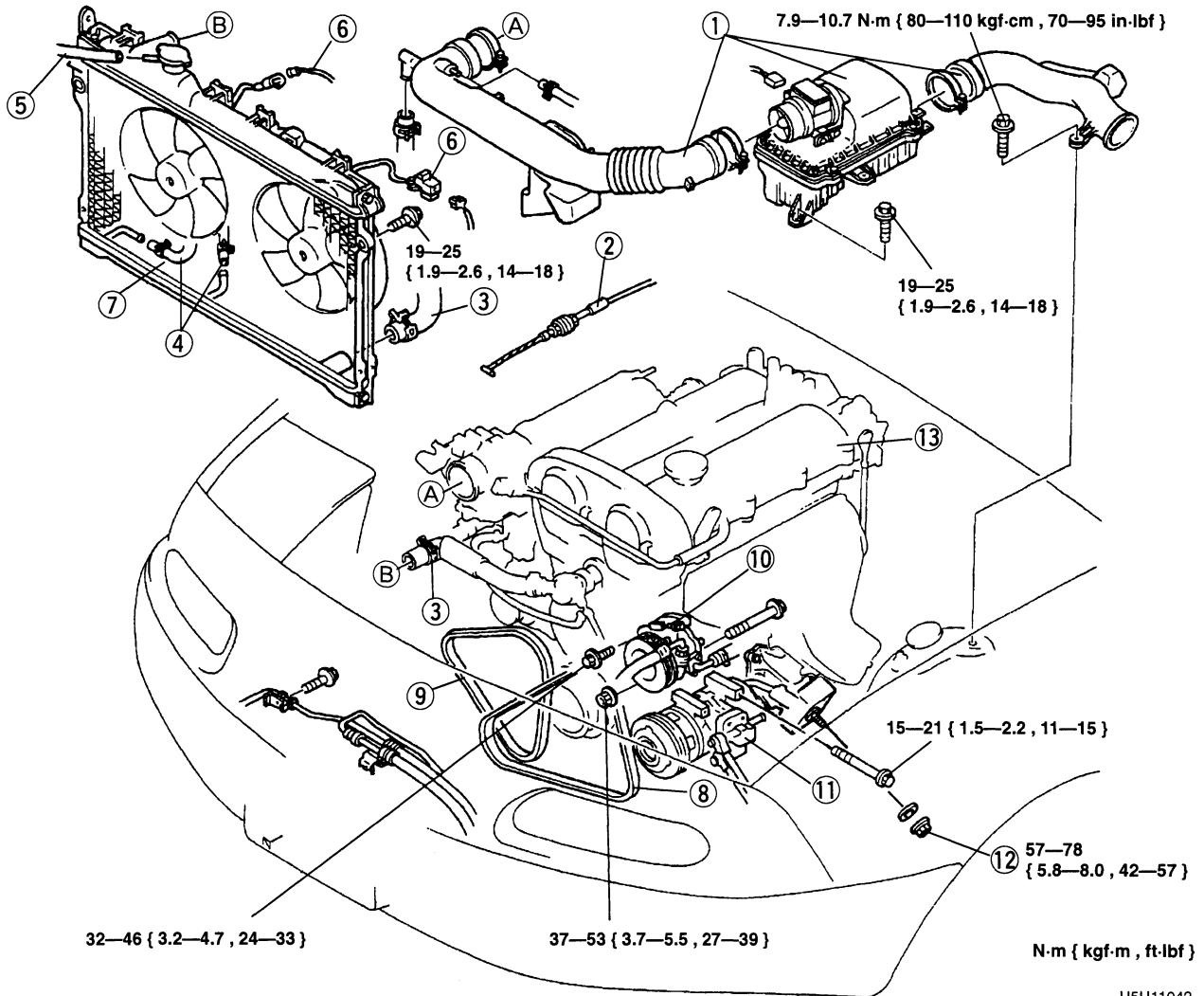
Note

- Plug the disconnected fuel hoses to prevent fuel leakage.

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
3. Remove the transmission. (Refer to 05-11 TRANSMISSION REMOVAL / INSTALLATION.) (Refer to 05-13 TRANSMISSION REMOVAL / INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal indicated in the table.
6. Install the transmission. (Refer to 05-11 TRANSMISSION REMOVAL / INSTALLATION.) (Refer to 05-13 TRANSMISSION REMOVAL / INSTALLATION.)

MECHANICAL

7. Install the splash shield.
8. If the engine oil was drained, fill with the specified amount and type of engine oil. (Refer to 01-11 ENGINE OIL REPLACEMENT.)
9. Fill the radiator with the specified amount and type of engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
10. If the transmission oil was drained, fill with the specified amount and type of transmission oil. (Refer to 05-11 TRANSMISSION OIL REPLACEMENT.) (Refer to 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
11. Connect the negative battery cable.
12. Start the engine and
 - (1) check the engine oil, transmission oil, and engine coolant leakage.
 - (2) check the ignition timing and idle speed. (Refer to 01-10 ENGINE TUNE-UP.)
 - (3) check the operation of the emission control system.
13. Perform a road test.
14. Recheck the engine oil and engine coolant levels.



U5U11042

1	Air cleaner
2	Accelerator cable ☞ 01-13 ACCELERATOR CABLE INSPECTION / ADJUSTMENT
3	Radiator hose
4	Oil cooler hose (AT)
5	Coolant reservoir hose
6	Fan connector
7	Radiator and cooling fan

8	P/S and/or A/C drive belt ☞ 01-10 DRIVE BELT ADJUSTMENT
9	Generator drive belt ☞ 01-10 DRIVE BELT ADJUSTMENT
10	P/S oil pump (If equipped) ☞ Removal Note
11	A/C compressor (If equipped) ☞ Removal Note
12	Engine mount nut
13	Engine

MECHANICAL

P/S Oil Pump Removal Note (If equipped)

1. Remove the P/S oil pump with the hoses still connected. (Refer to 06-10 POWER STEERING OIL PUMP REMOVAL / INSTALLATION.)
2. Position the pump away from the engine and affix it with wire.

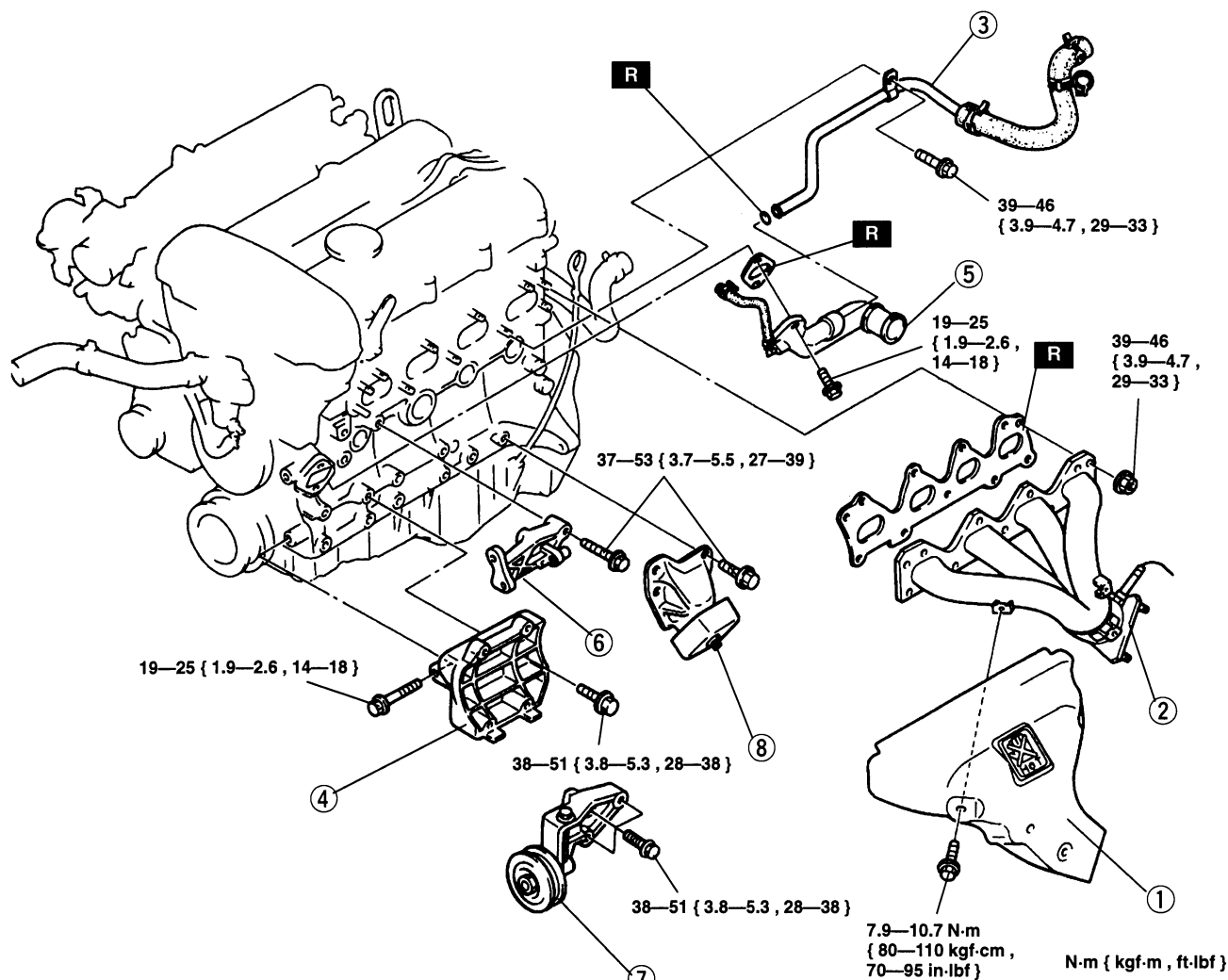
A/C Compressor Removal Note (If equipped)

1. Remove the A/C compressor with the hoses still connected. (Refer to 07-11 A/C COMPRESSOR REMOVAL / INSTALLATION.)
2. Position the compressor away from the engine and affix it with wire.

ENGINE STAND MOUNTING / DISMOUNTING

U5U110AP

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



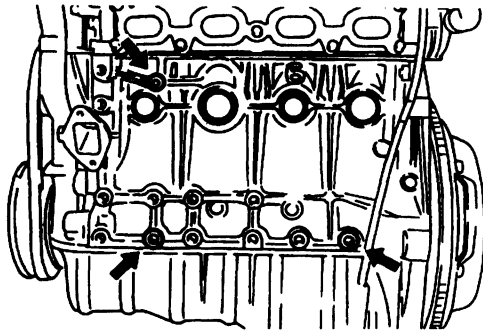
U5U11044

1	Exhaust manifold insulator
2	Exhaust manifold
3	Water bypass pipe
4	A/C compressor bracket (If equipped)

5	Water inlet pipe
6	P/S oil pump bracket (If equipped)
7	Idler pulley (A/C) (If equipped)
8	Left engine mount

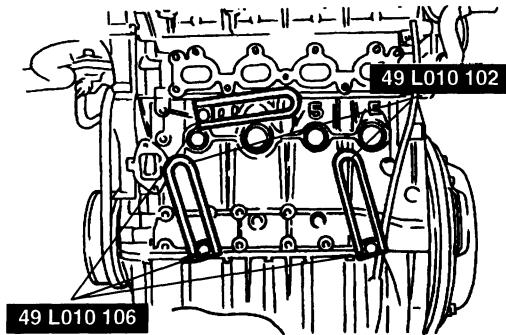
Mounting

1. Install the **SST** (engine hanger) using the holes shown in the figure.



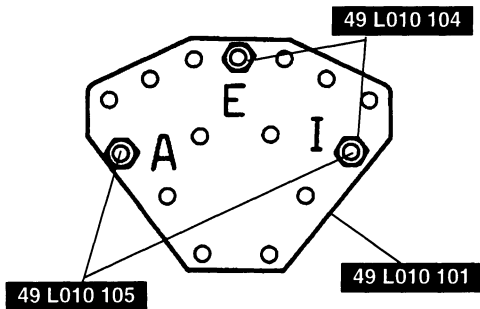
U5U11045

2. Install the **SST** (arms) to the holes as shown in the figure, and hand tighten the **SST** (bolts).



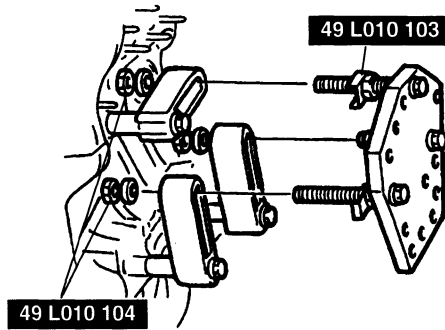
U5U11046

3. Assemble the **SST** (bolts and plate) in the specified position.



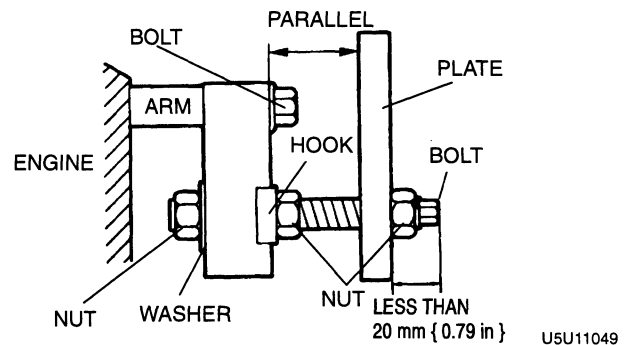
U5U11047

4. Assemble the **SST** (nuts, hooks, and bolts).
5. Install the **SST** to the respective arms.



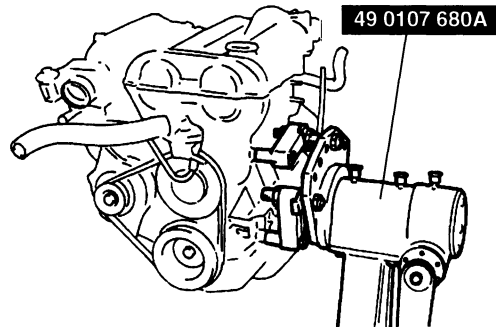
U5U11048

6. Adjust the **SST** (bolts) so that less than 20 mm { 0.79 in } of thread is exposed.
7. Make the **SST** (plate and arms) parallel by adjusting the **SST** (bolts and nuts).
8. Tighten the **SST** (bolts and nuts) to affix the **SST** firmly.



U5U11049

9. Mount the engine on the **SST** (engine stand).



U5U11050

Dismounting

- Dismount in the reverse order of mounting.

ENGINE DISASSEMBLY / ASSEMBLY

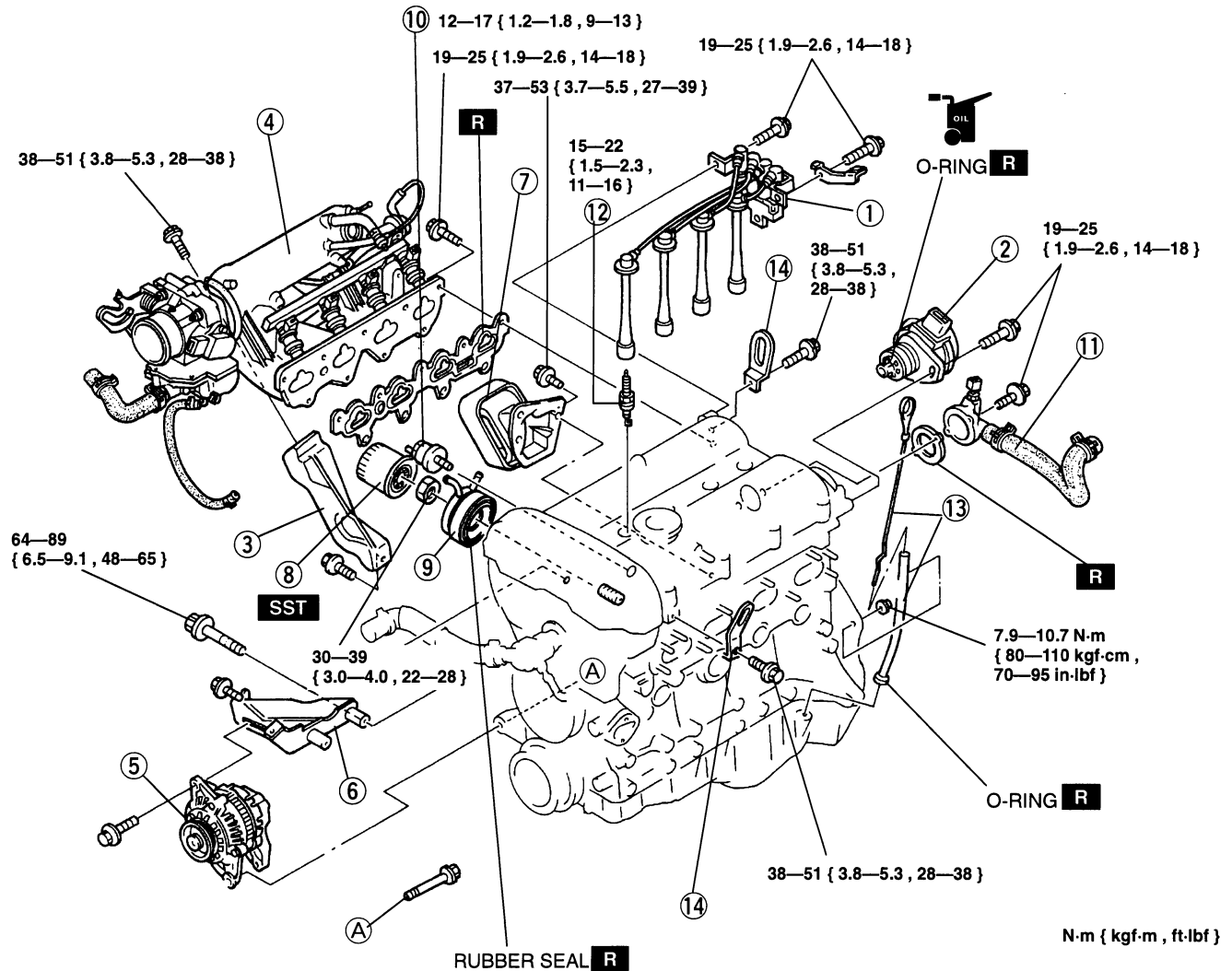
U5U110AK

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.

Auxiliary Parts

1. Drain the engine oil.
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly indicated in the table.
4. Fill with the specified amount and type of engine oil. (Refer to 01-11 ENGINE OIL REPLACEMENT.)



U5U11051

1	Ignition coil and high-tension lead
2	Camshaft position sensor
3	Manifold bracket
4	Intake manifold
5	Generator
6	Generator bracket
7	Right engine mount
8	Oil filter 01-11 OIL FILTER REPLACEMENT

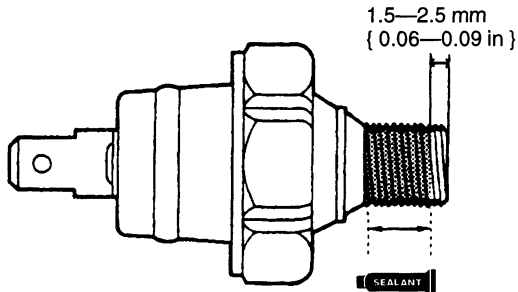
9	Oil cooler
10	Oil pressure switch Assembly note
11	Water outlet pipe
12	Spark plug
13	Dipstick and pipe
14	Engine hanger

Oil pressure switch assembly note

1. Apply silicone sealant to the oil pressure switch threads as shown.
2. Install the oil pressure switch.

Tightening torque

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

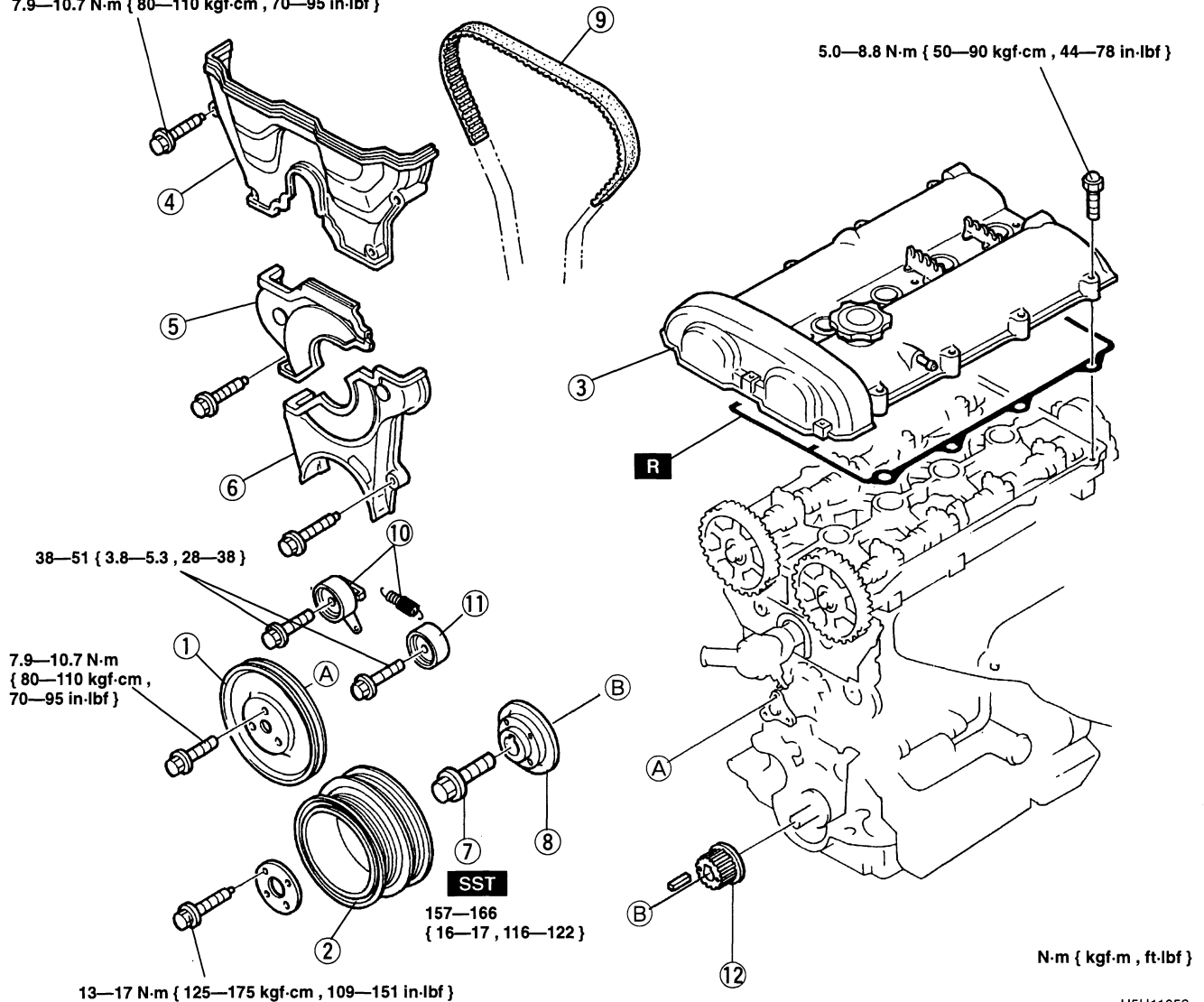


U5U11052

Timing Belt

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.

7.9—10.7 N·m { 80—110 kgf·cm , 70—95 in·lbf }



U5U11053

1	Water pump pulley
2	Crankshaft pulley ☞ Disassembly note ☞ Assembly note
3	Cylinder head cover ☞ Assembly note
4	Upper timing belt cover
5	Middle timing belt cover
6	Lower timing belt cover
7	Pulley lock bolt ☞ Disassembly note
8	Pulley boss
9	Timing belt ☞ Disassembly note ☞ Assembly note
10	Tensioner, tensioner spring ☞ Assembly note
11	Idler
12	Timing belt pulley ☞ Assembly note

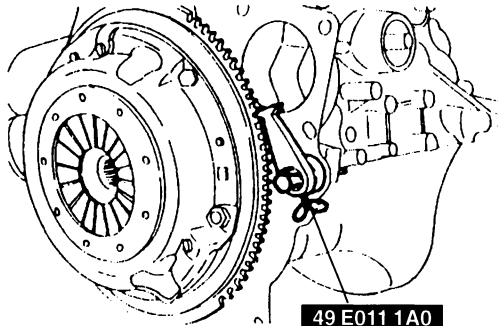
Crankshaft pulley disassembly note

Caution

- The crankshaft position sensor rotor is on the rear of the pulley, and can be damaged easily.

Pulley lock bolt disassembly note

1. Hold the flywheel (MT) or drive plate (AT) with the SST.



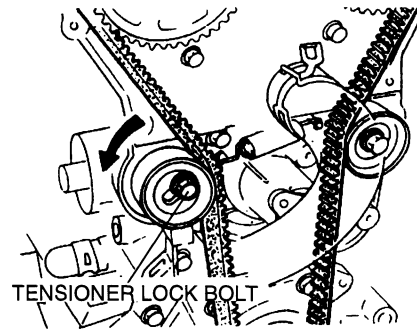
49 E011 1A0

U5U11054

2. Loosen the pulley lock bolt.
3. Remove the pulley lock bolt.

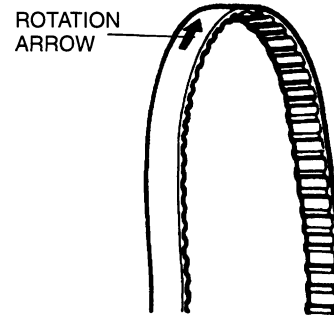
Timing belt disassembly note

1. Protect the tensioner with a rag.
2. Loosen the tensioner lock bolt. Pry the tensioner outward with a bar.
3. Tighten the lock bolt with the tensioner spring fully extended.



U5U11055

4. Mark the timing belt rotation for proper reinstallation.

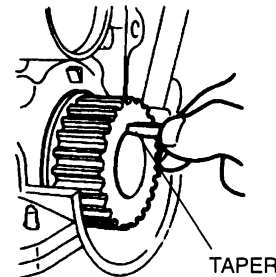


U5U11056

5. Remove the timing belt.

Timing belt pulley assembly note

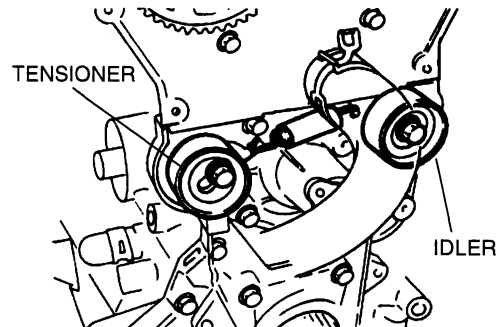
1. Install the timing belt pulley.
2. Install the pulley woodruff key with the tapered side toward the oil pump body.



U5U11057

Tensioner, tensioner spring assembly note

1. Install the tensioner and the tensioner spring.
2. Temporarily secure the tensioner with the spring fully extended.

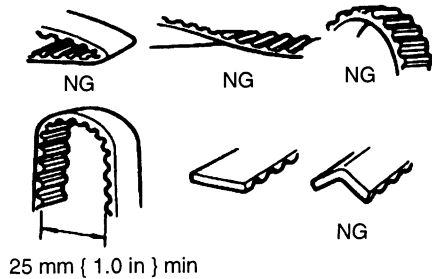


U5U11058

Timing belt assembly note

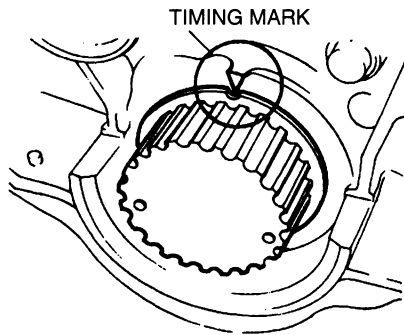
Caution

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



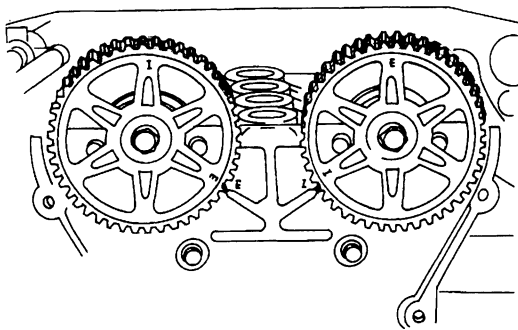
U5U110H2

- Turn the crankshaft and align the timing belt pulley mark with the timing mark. Do not turn the crankshaft counterclockwise.



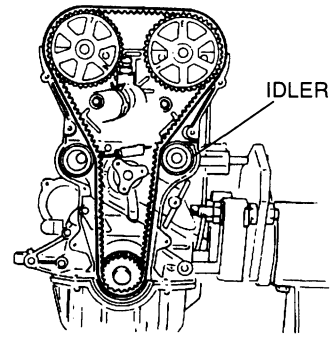
U5U11059

- Verify that the camshaft pulley marks are aligned with the seal plate marks. E for intake side and I for exhaust side.



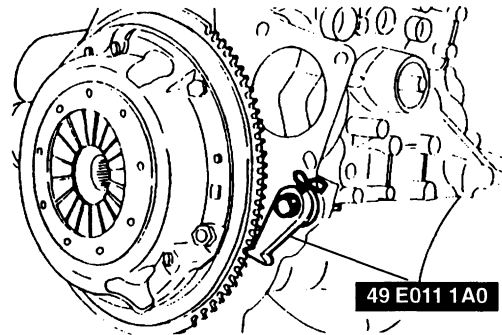
U5U11060

- Install the timing belt so that there is no looseness at the idler side or between the camshaft pulleys.



U5U11061

- Install the pulley boss and pulley lock bolt.
- Turn the crankshaft two turns clockwise, and align the timing belt pulley mark with the timing mark. Do not turn the crankshaft counterclockwise.
- Verify that the camshaft pulley marks are aligned with the seal plate marks. If not aligned, remove the timing belt and repeat from tensioner installation.
- Reverse the direction of the **SST** on the flywheel (MT) or drive plate (AT).



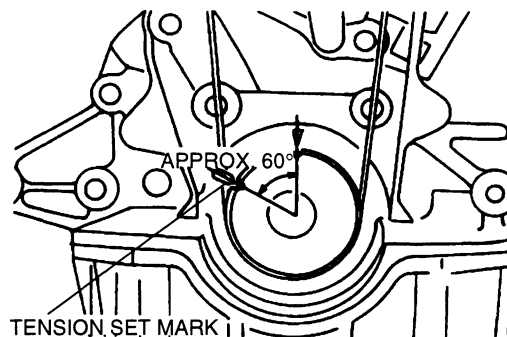
U5U11062

- Tighten the pulley lock bolt.

Tightening torque

157—166 N·m { 16—17 kgf·m , 116—122 ft·lbf }

- Turn the crankshaft 1 and 5/6 turns clockwise, and align the timing belt pulley mark with the tension set mark.

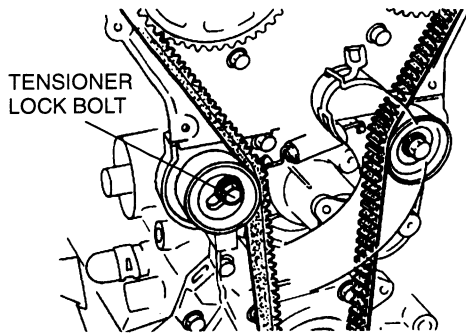


U5U11063

- Loosen the tensioner lock bolt to apply tension to the timing belt. Be sure not to apply tension other than that of the tensioner spring.
- Tighten the tensioner lock bolt.

Tightening torque

38—51 N·m { 3.8—5.3 kgf·m , 28—38 ft·lbf }

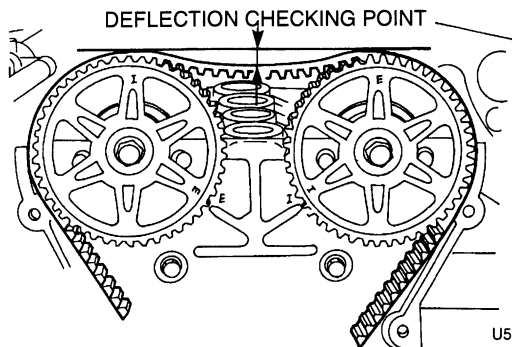


U5U11064

12. Turn the crankshaft 2 and 1/6 turns clockwise and verify that the timing marks are correctly aligned.
13. Measure the timing belt deflection by applying moderate pressure **98 N { 10 kgf , 22 lbf }** midway between the two camshaft pulleys. If the deflection is not correct, repeat from step 9 above.

Deflection

9.0—11.5 mm { 0.36—0.45 in }
at **98 N { 10 kgf , 22 lbf }**



U5U11065

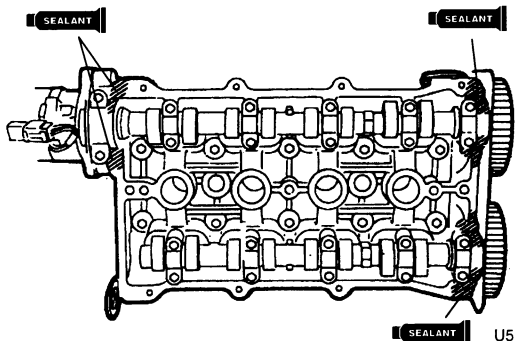
Cylinder head cover assembly note

1. Verify that the grooves on the cylinder head cover are free of oil, water and other foreign material.
2. Install the new cylinder head cover gasket into the cylinder head cover.

Caution

- **Silicone sealant hardens and causes oil leakage when it is left for an extended period of time. Therefore, install parts before sealant hardens.**

3. Apply silicone sealant to the shaded areas as shown.

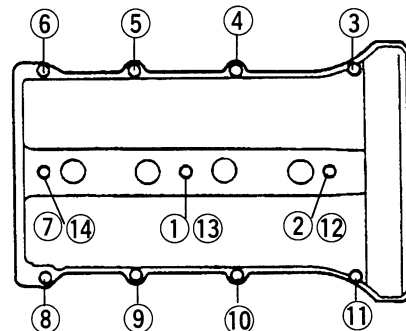


U5U11066

4. Install the cylinder head cover.
5. Tighten the cylinder head cover bolts in five or six steps in the order shown.

Tightening torque

5.0—8.8 N·m { 50—90 kgf·cm , 44—78 in·lbf }



U5U11067

Crankshaft pulley assembly note

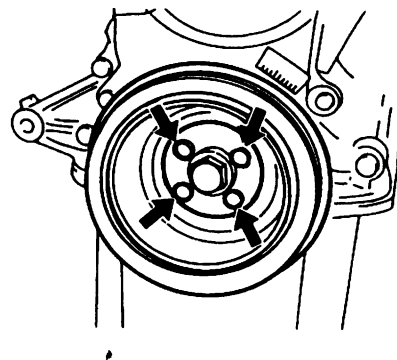
Caution

- **The crankshaft position sensor rotor is on the rear of the pulley, and can be damaged easily.**

1. Install the crankshaft pulley.
2. Install the plate.
3. Tighten the pulley bolts.

Tightening torque

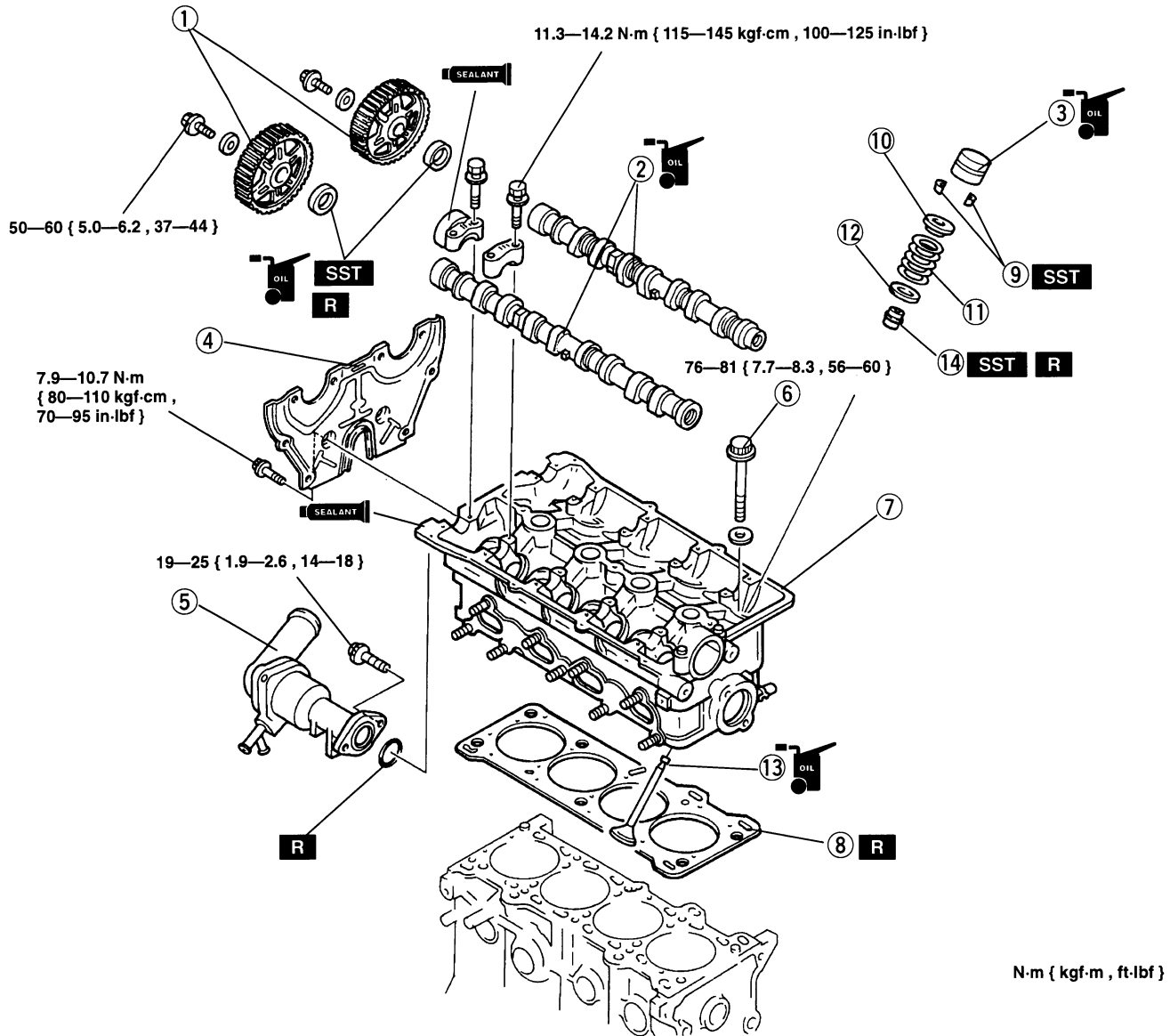
13—17 N·m { 125—175 kgf·cm , 109—151 in·lbf }



U5U11068

Cylinder Head

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



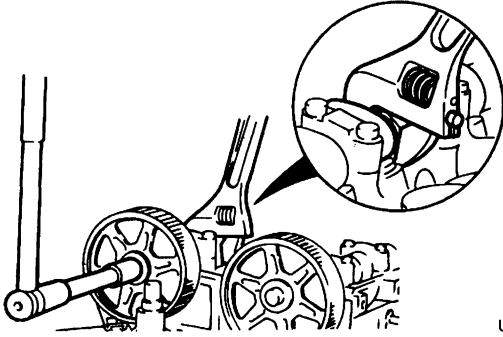
U5U11069

1	Camshaft pulley ☞ Disassembly note ☞ Assembly note
2	Camshaft ☞ Disassembly note ☞ Assembly note
3	HLA ☞ Disassembly note ☞ Assembly note
4	Seal plate
5	Thermostat housing
6	Cylinder head bolt ☞ Disassembly note ☞ Assembly note

7	Cylinder head
8	Cylinder head gasket
9	Valve keeper ☞ Disassembly note
10	Upper valve spring seat
11	Valve spring ☞ Assembly note
12	Lower valve spring seat
13	Valve
14	Valve seal ☞ Disassembly note ☞ Assembly note

Camshaft pulley disassembly note

1. Hold the camshaft with a wrench at the cast hexagon.

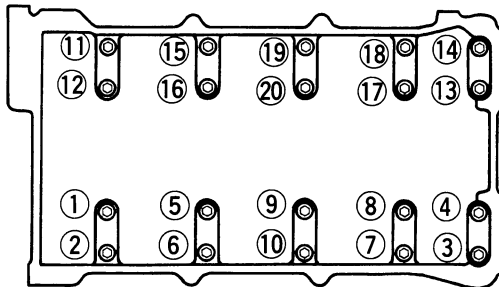


U5U11070

2. Remove the camshaft pulley lock bolts.
3. Remove the camshaft pulleys.

Camshaft disassembly note

1. Loosen the camshaft cap bolts in five or six steps in the order shown.



U5U11071

2. Remove the camshaft caps.
3. Remove the camshafts.
4. Remove the camshaft oil seals from the camshafts.

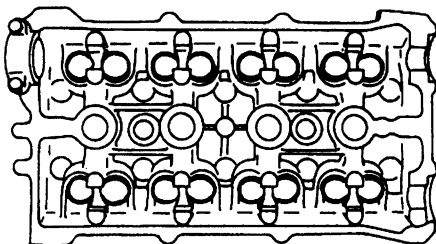
HLA disassembly note

Caution

- The HLA must be reinstalled in the same position from which they were removed. If they are not, it can cause premature and uneven wear.

Note

- Mark the HLA to show their original positions.



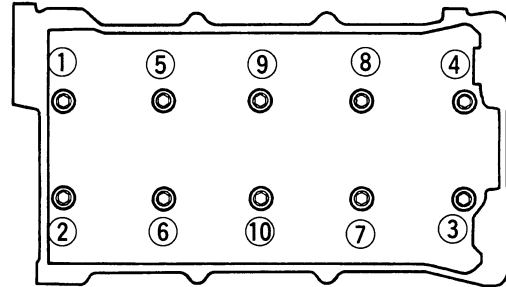
U5U11072

1. Remove the HLA from the cylinder head.

2. Store the HLA upside down in an oil-filled container.

Cylinder head bolt disassembly note

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

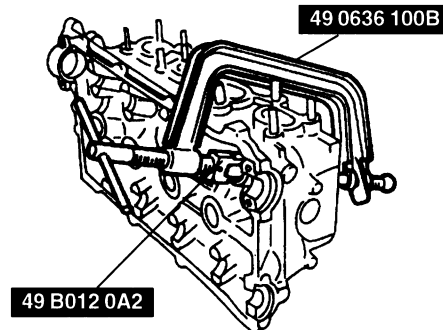


U5U11073

2. Remove the cylinder head bolts.

Valve keeper disassembly note

1. Set the SST against the upper valve spring seat as shown.

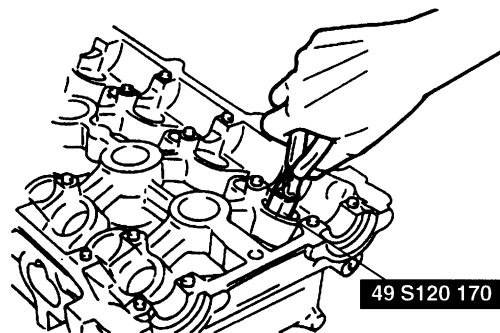


U5U11074

2. Compress the spring and remove the valve keepers.

Valve seal disassembly note

- Remove the valve seals by using the SST.



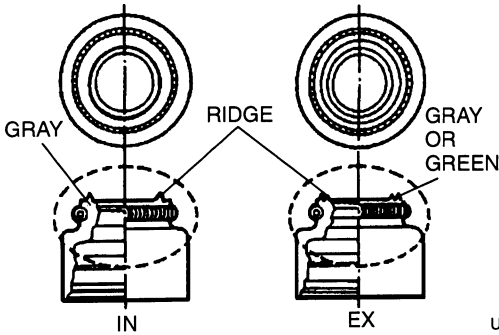
U5U11075

Valve seal assembly note

Note

- The intake and exhaust valve seals are different as shown.

Item	Ridge	Color
Intake	No or One	Gray
Exhaust	Two	Gray or Green

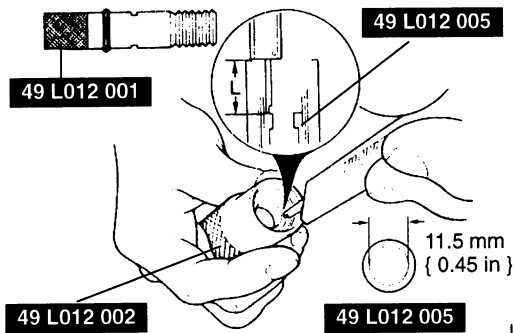


U5U11076

1. Assemble the **SSTs** so that depth **L** is as specified.

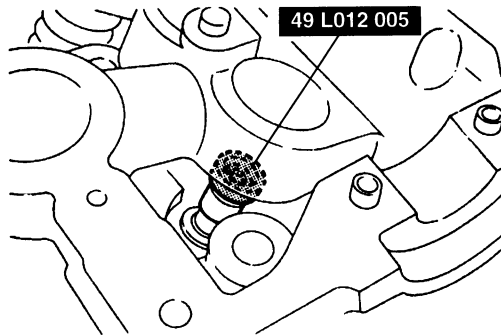
Depth L

18.3—18.9 mm { 0.721—0.744 in }



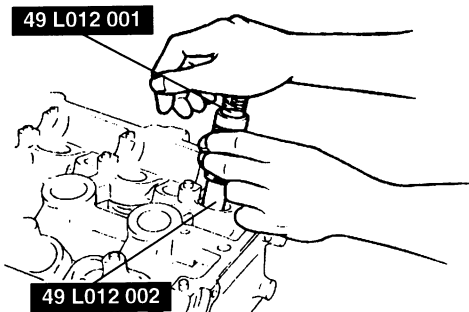
U5U11077

2. Slide the valve seal onto the valve guide.
3. Set the **SST** against the valve seal.



U5U11078

4. Press the valve seal in until the **SST** contacts the cylinder head.

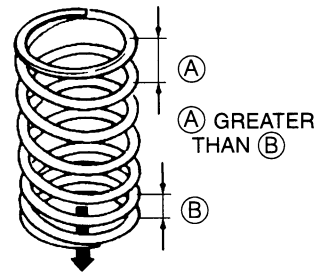


U5U11079

Valve spring assembly note

1. Install the lower spring seat.

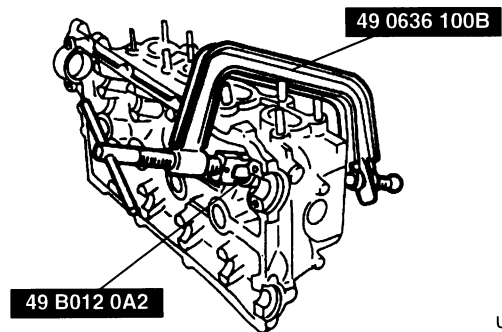
2. Install the valve.
3. Install the valve spring with the closer pitch toward the cylinder head.



CYLINDER HEAD SIDE

U5U11080

4. Install the upper spring seat.
5. Compress the valve spring with the **SST**, and install the valve keepers.



U5U11081

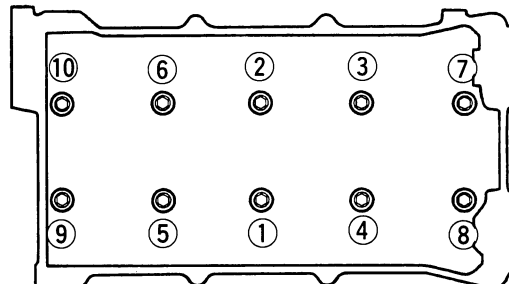
6. Remove the **SST**.
7. Tap the end of the valve stem lightly two or three times with a plastic hammer to verify that the keepers are all fully seated.

Cylinder head bolt assembly note

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

Tightening torque

76—81 N·m { 7.7—8.3 kgf·m , 56—60 ft·lbf }



U5U11082

HLA assembly note

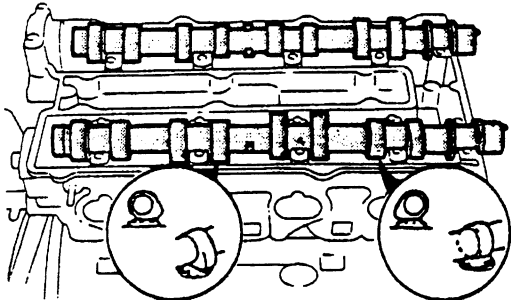
1. Apply clean engine oil to the friction surfaces.
2. If the HLA are being reused, install them in the position from which they were removed.
3. Verify that the HLA move smoothly in their bores.

Camshaft assembly note

Caution

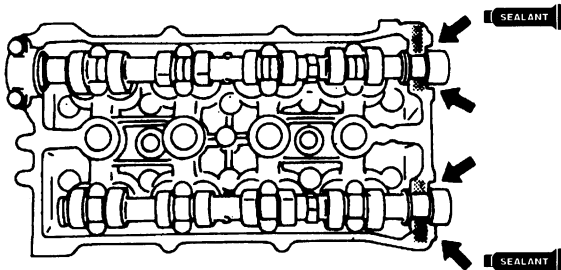
- Because there is little camshaft thrust clearance, the camshaft must be held horizontally while it is installed. Otherwise, excessive force will be applied to the thrust area, causing burr on the thrust receiving area of the cylinder head journal. To avoid this, the following procedure must be observed.

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



No.3 CYLINDER No.1 CYLINDER U5U11028

- Apply silicone sealant to the areas shown. Keep the camshaft sliding surface free of sealant to prevent engine damage.
- Apply engine oil to the camshaft and the cylinder head journals.
- Install the camshaft caps to the positions from which they were removed.



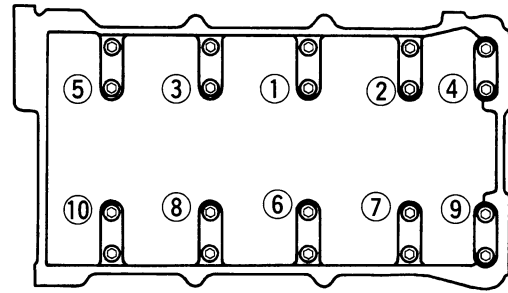
U5U11084

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

Tightening torque

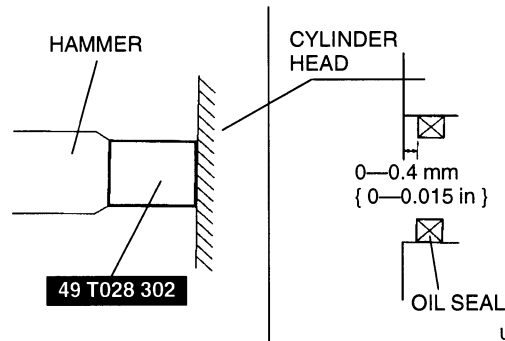
11.3—14.2 N·m
{ 115—145 kgf·cm , 100—125 in·lbf }

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



U5U11085

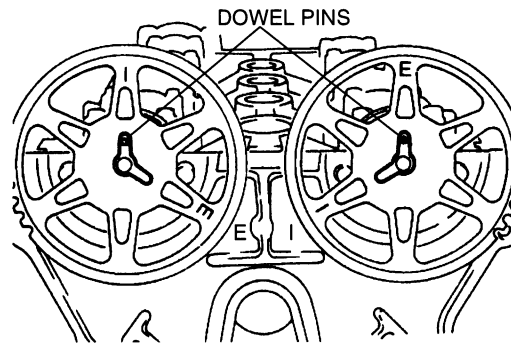
- Apply clean engine oil to the new camshaft oil seal.
- Push the oil seal slightly in by hand.
- Tap the oil seal in evenly by using the SST and a hammer.



U5U11086

Camshaft pulley assembly note

- Turn the camshafts until the camshaft dowel pins face straight up.
- Install the camshaft pulleys with the I mark (intake side) or the E mark (exhaust side) straight up.



U5U11087

- Install the camshaft pulley lock bolts.
- Hold the camshaft with a wrench.
- Tighten the camshaft pulley lock bolt.

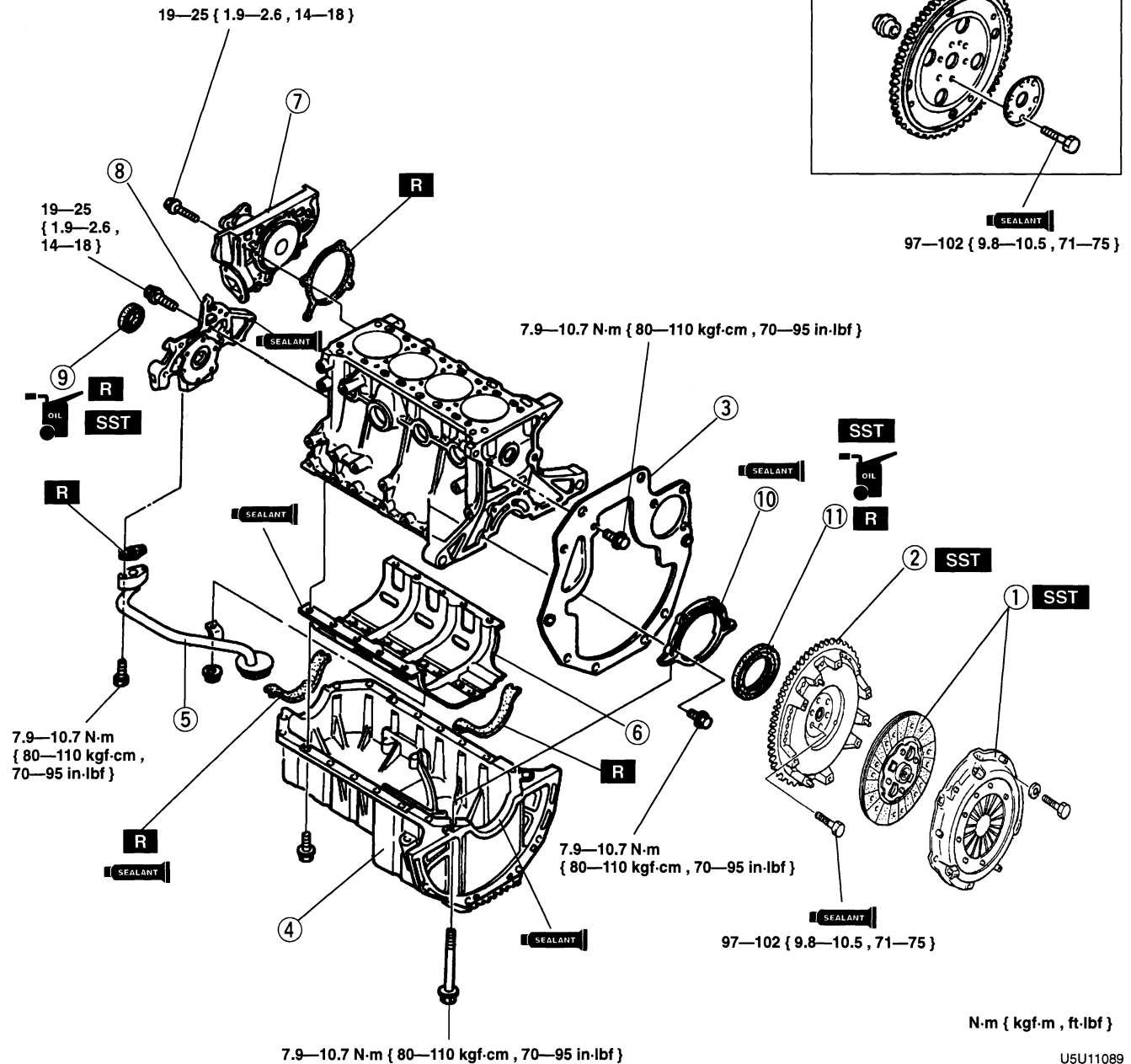
Tightening torque

50—60 N·m { 5.0—6.2 kgf·m , 37—44 ft·lbf }



Cylinder Block (External Parts)

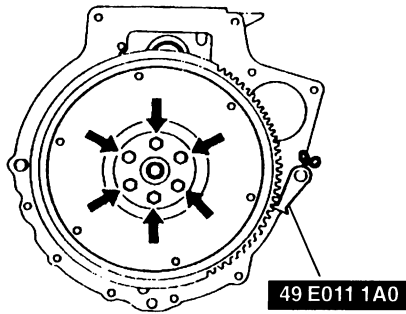
1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



1	Clutch cover, clutch disc (MT) ☞ 05–10 CLUTCH UNIT REMOVAL / INSTALLATION
2	Flywheel (MT), drive plate (AT) ☞ Disassembly note ☞ Assembly note
3	End plate
4	Oil pan ☞ Disassembly note ☞ Assembly note
5	Oil strainer
6	Oil baffle ☞ Disassembly note ☞ Assembly note
7	Water pump
8	Oil pump ☞ 01–11 OIL PUMP DISASSEMBLY / ASSEMBLY ☞ Assembly note
9	Front oil seal ☞ Disassembly note
10	Rear cover ☞ Assembly note
11	Rear oil seal ☞ Disassembly note

Flywheel (MT), drive plate (AT) disassembly note

1. Hold the flywheel by using the SST.



U5U11090

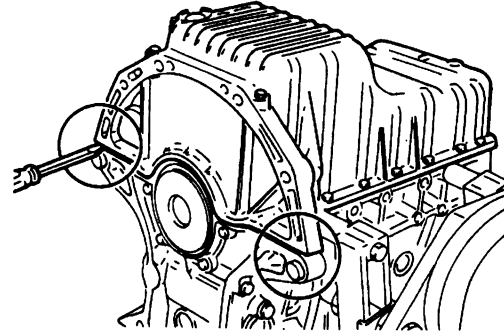
2. Remove the flywheel lock bolts.
3. Remove the flywheel.

Oil pan disassembly note

1. Remove the oil pan mounting bolts.

Caution

- Pry tools can easily scratch the cylinder block and oil pan contact surfaces.

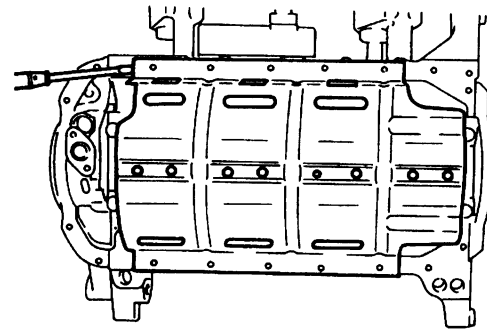


U5U11091

2. Insert a screwdriver only at the points shown.
3. Remove the oil pan.

Oil baffle disassembly note

1. Insert a screwdriver between the cylinder block and the oil baffle to separate them.

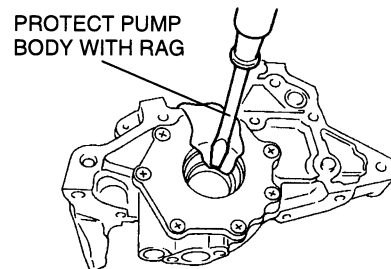


U5U11092

2. Remove the oil baffle.

Front oil seal disassembly note

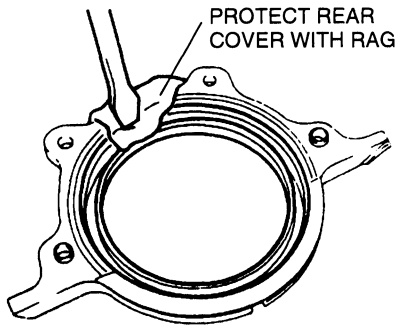
- Remove the oil seal by using a screwdriver protected with a rag.



U5U11093

Rear oil seal disassembly note

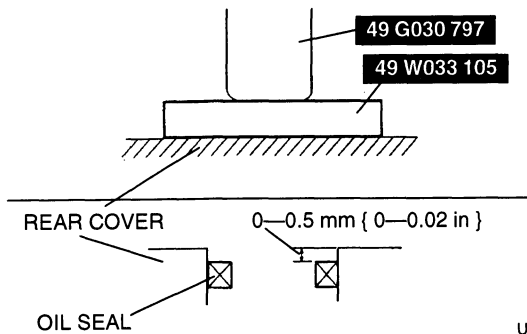
- Remove the oil seal by using a screwdriver protected with a rag.



U5U11094

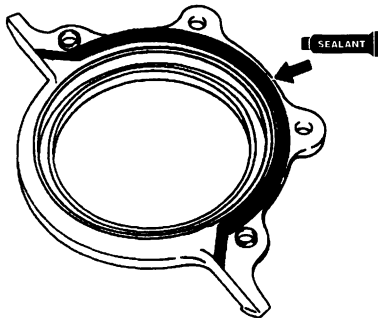
Rear cover assembly note

1. Apply clean engine oil to the new oil seal.
2. Install the oil seal into rear cover by hand.
3. Tap the oil seal in evenly by using the SST and a hammer.



U5U11095

4. Apply silicone sealant to the shaded area shown.



U5U11096

5. Install the rear cover.

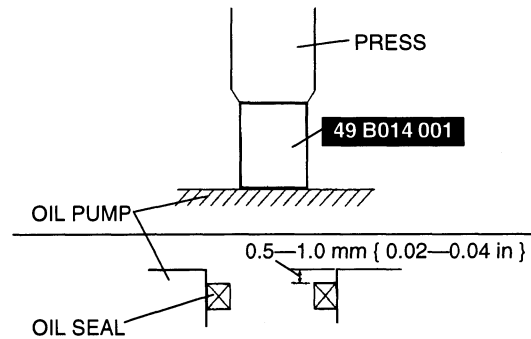
Tightening torque

7.9—10.7 N·m { 80—110 kgf·cm , 70—95 in·lbf }

6. Cut away the portion of the silicone sealant that project from the rear cover toward the oil pan side.

Oil pump assembly note

1. Apply clean engine oil to the new oil seal.
2. Install the oil seal into the oil pump body by hand.
3. Press the oil seal into the oil pump body by using the SST.

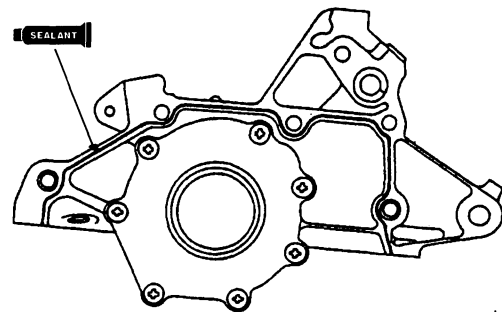


U5U11097

4. Apply silicone sealant to the oil pump as shown.

Thickness

φ1—2 mm { 0.040—0.078 in }



U5U11098

5. Install the oil pump within five minutes of applying the sealant.

Tightening torque

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

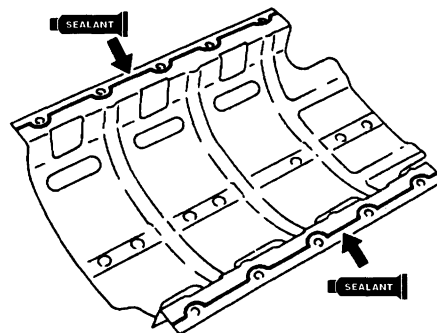
6. Cut away the portion of the silicone sealant that project from the body toward the oil pan side.

Oil baffle assembly note

1. Remove all foreign material from the contact surfaces.
2. Apply silicone sealant to the oil baffle along the inside of the bolt holes, and install within five minutes.

Thickness

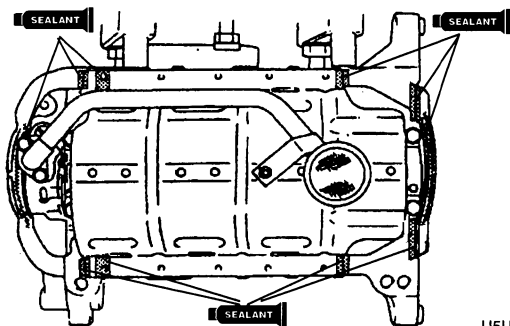
φ2.5—3.5 mm { 0.099—0.137 in }



U5U110A0

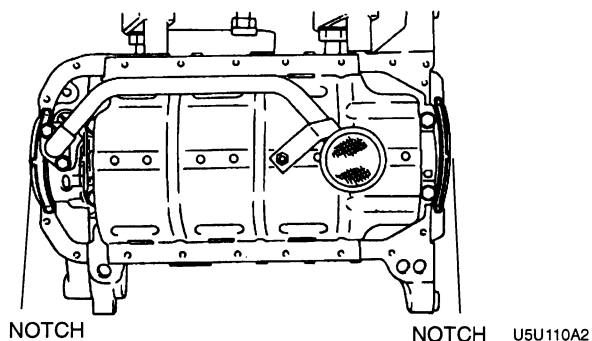
Oil pan assembly note

1. Remove all foreign material from the contact surfaces.
2. Apply silicone sealant to the areas indicated.



U5U110A1

3. Install new gaskets onto the oil pump body and the rear cover with their notches facing as shown.

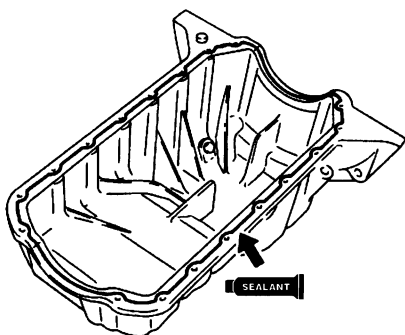


U5U110A2

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

Thickness

$\phi 2.5-3.5 \text{ mm } \{ 0.099-0.137 \text{ in } \}$



U5U110A3

5. Install the oil pan within five minutes of applying the sealant.

Tightening torque

$7.9-10.7 \text{ N}\cdot\text{m } \{ 80-110 \text{ kgf}\cdot\text{cm}, 70-95 \text{ in}\cdot\text{lbf} \}$

Flywheel (MT), drive plate (AT) assembly note

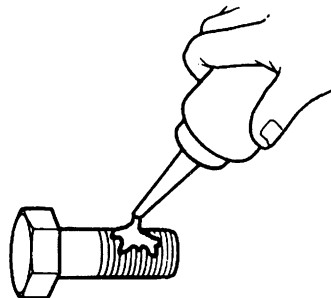
1. Remove the sealant from the bolt holes in the crankshaft and from the bolts.

Caution

- If all of the old thread locking sealant cannot be removed from the bolt, it will not torque properly. Replace the bolt.

Note

- If a new bolt is used, do not apply thread locking sealant. New Mazda bolts have sealant on them.

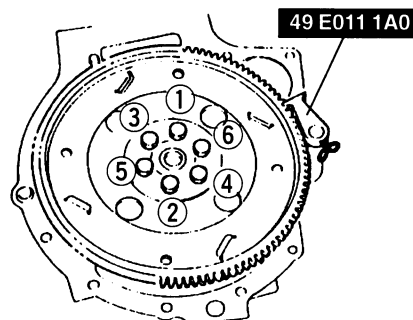


U5U110A4

2. Set the flywheel onto the crankshaft.
3. Apply sealant to the flywheel bolts and install them.
4. Hold the flywheel by using the SST.
5. Tighten the bolts in two or three steps in the order shown.

Tightening torque

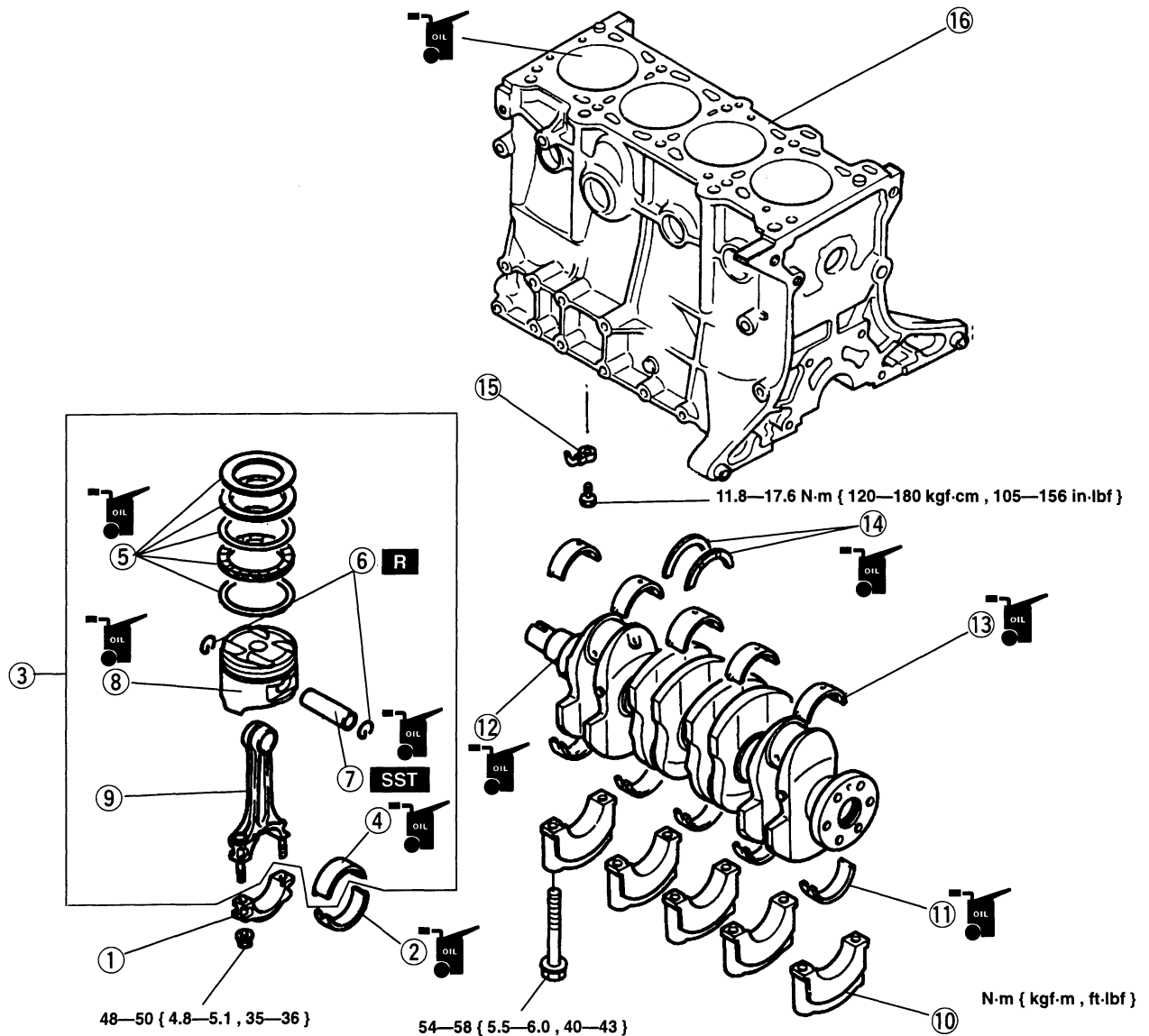
$97-102 \text{ N}\cdot\text{m } \{ 9.8-10.5 \text{ kgf}\cdot\text{m}, 71-75 \text{ ft}\cdot\text{lbf} \}$



U5U110A5

Cylinder Block (Internal Parts)

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



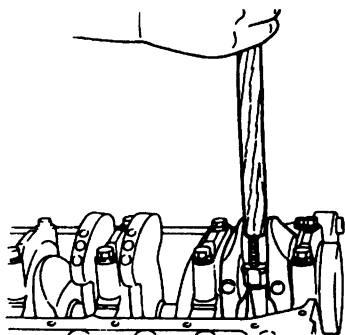
U5U110A6

1	Connecting rod cap ☞ Assembly note
2	Lower connecting rod bearing
3	Piston and connecting rod ☞ Disassembly note ☞ Assembly note
4	Upper connecting rod bearing
5	Piston ring
6	Piston pin clip
7	Piston pin
8	Piston

9	Connecting rod
10	Main bearing cap ☞ Disassembly note ☞ Assembly note
11	Lower main bearing
12	Crankshaft
13	Upper main bearing
14	Thrust bearing
15	Oil jet
16	Cylinder block

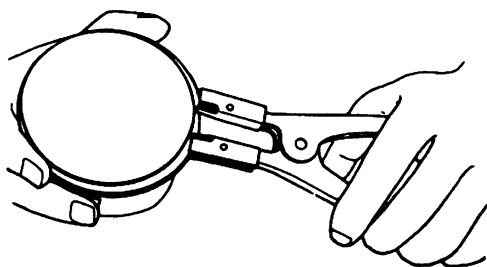
Piston and connecting rod disassembly note

1. Use the handle of a hammer to remove the piston and connecting rod assembly through the top of the cylinder block.



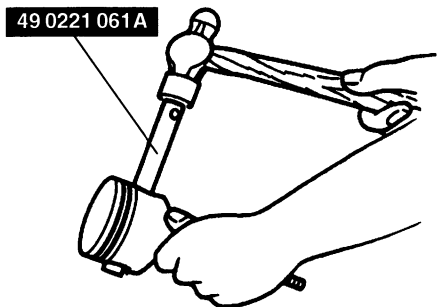
U5U110A7

2. Remove the piston rings by using a piston ring expander.



U5U110A8

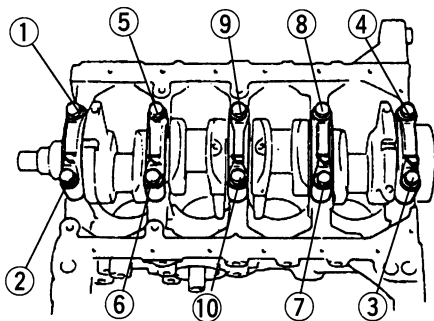
3. Remove the piston pin by using the SST.



U5U110A9

Main bearing cap disassembly note

1. Loosen the main bearing cap bolts in two or three steps in the order shown.

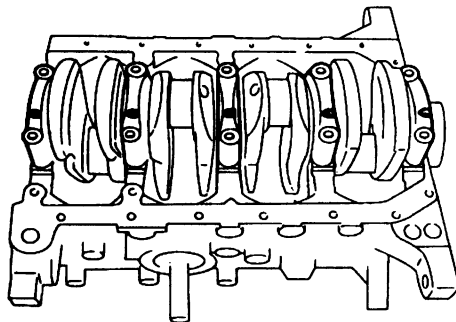


U5U110B0

2. Remove the main bearing caps.

Main bearing cap assembly note

1. Install the crankshaft and the main bearing caps according to the cap number and ← mark.

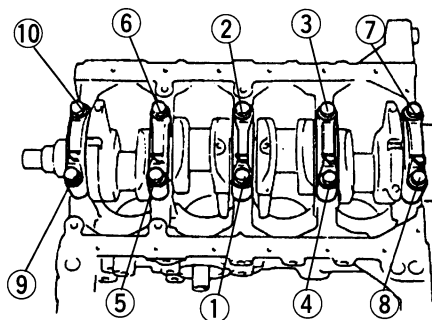


U5U110B7

2. Tighten the main bearing cap bolts in two or three steps in the order shown.

Tightening torque

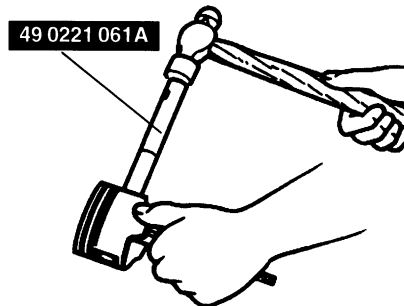
54—58 N·m { 5.5—6.0 kgf·m , 40—43 ft·lbf }



U5U110B8

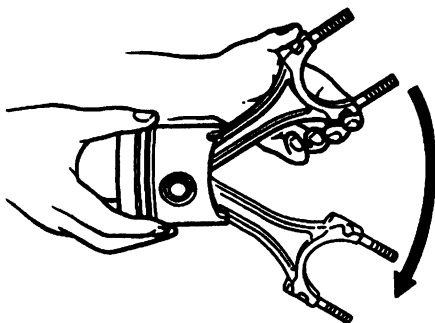
Piston and connecting rod assembly note

1. Install one piston pin clip into the clip groove in the piston.
2. Assemble the piston and the connecting rod.
3. Apply clean engine oil to the piston pin.
4. Install the piston pin from the side opposite the clip.
5. Tap the piston pin in with the SST until the pin contacts the clip. If the pin cannot be installed easily, replace the connecting rod.



U5U110B1

6. Install the second clip into the clip groove in the piston.
7. Check the oscillation torque of the connecting rod. If the large end does not drop by its own weight, replace the piston and/or piston pin.



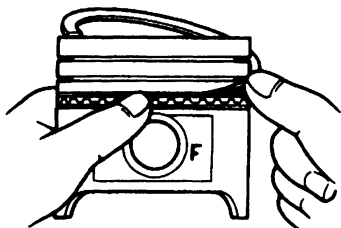
U5U110B2

8. Install the three-piece oil rings on the pistons.
 - (1) Apply clean engine oil to the oil ring spacer and rails.
 - (2) Install the oil ring spacer with the ends upward.

Note

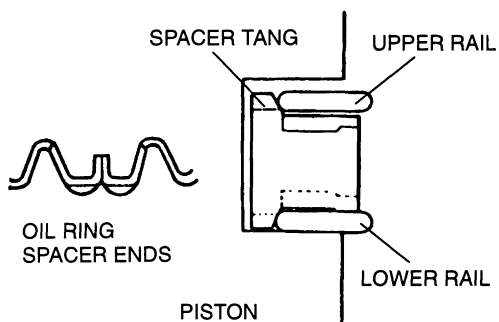
- The upper and lower rails are the same. They can be installed with either face upward.

- (3) Install the upper and lower rails.



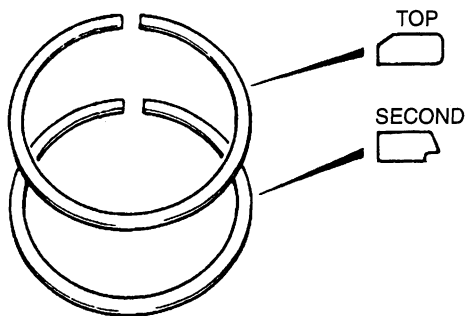
U5U110B3

9. Verify that the spacer tang separates the rails, and that the rails turn smoothly in both directions.



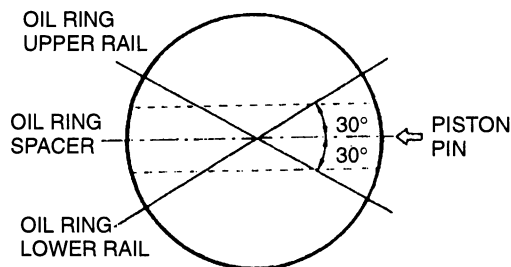
U5U110B4

10. Using a piston ring expander, install the second ring with the scraper face downward.



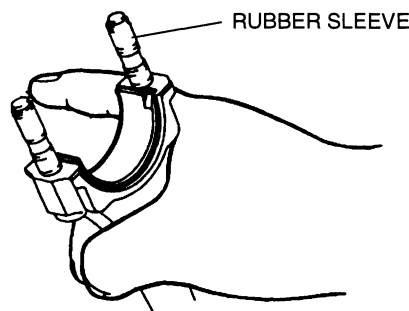
U5U110B5

11. Using a piston ring expander, install the top ring with the chamfer facing upward.
12. Apply clean engine oil to the top and second piston rings.
13. Position the end gaps of the rings as shown.



U5U110B6

14. Protect the connecting rod bolts with rubber sleeves.



U5U110B9

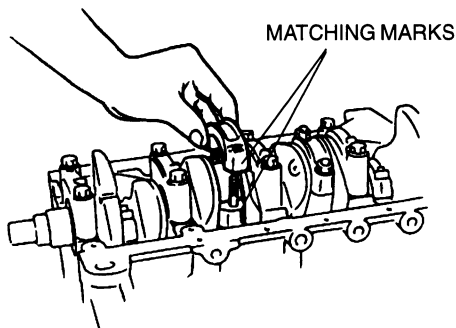
15. Apply clean engine oil to the cylinder walls, pistons, and piston rings.
16. Check the piston rings for correct end gap alignment.
17. Insert each piston assembly into the cylinder block with the **F** mark facing the front of the engine. Use a piston ring compressor.



U5U110C0

Connecting rod cap assembly note

1. Align the matching marks on the cap and the connecting rod and install the connecting rod cap.



U5U110C1

2. Measure the connecting rod bearing oil clearances using the same procedure as for the main bearing oil clearance.

Tightening torque

48—50 N·m { 4.8—5.1 kgf·m , 35—36 ft·lbf }

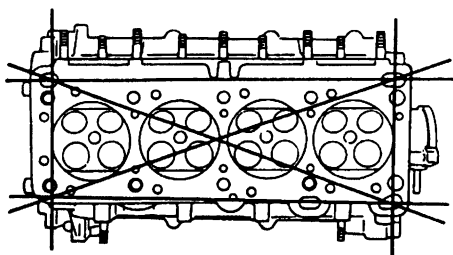
ENGINE INSPECTION / REPAIR

Cylinder Head

1. Inspect the cylinder head for damage, cracks, and leakage of water and oil. Replace the cylinder head if necessary.
2. Measure the cylinder head for distortion in the six directions as shown.

Distortion

0.10 mm { 0.004 in } max.



U5U110C2

3. Inspect the following and repair or replace the cylinder head as necessary.
 - (1) Sunken valve seats
 - (2) Damaged intake and exhaust manifold contact surfaces
 - (3) Excessive camshaft oil clearances and end play
4. If the cylinder head distortion exceeds the specification, grind the cylinder head surface.

Grinding

0.10 mm { 0.004 in } max.

5. If the cylinder head height is not within the specification, replace it.

Height

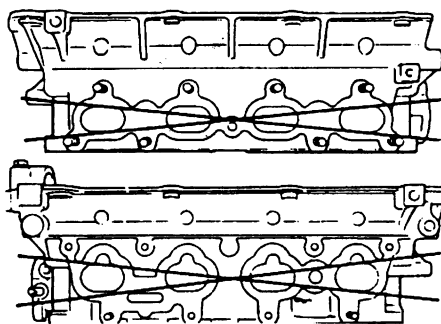
133.8—134.0 mm { 5.268—5.275 in }

6. Measure the manifold contact surface distortion in the four directions as shown.

Distortion

0.15 mm { 0.006 in } max.

U5U110AL



U5U110C4

7. If distortion exceeds the maximum, grind the surface or replace the cylinder head.

Grinding

0.20 mm { 0.008 in } max.

Valve Mechanism

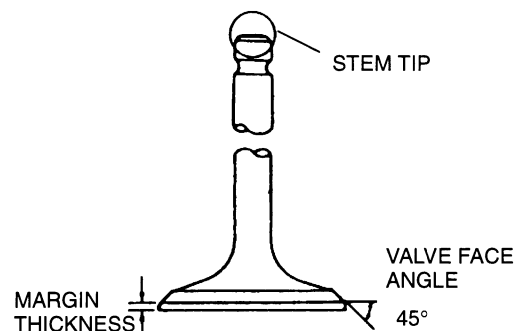
Valve and valve guide

1. Inspect each valve for the following. Replace or re-surface the valve if necessary.
 - (1) Damaged or bent stem
 - (2) Rough or damaged face
 - (3) Damaged or unevenly worn stem tip
2. Measure the valve head margin thickness of each valve. Replace the valve if necessary.

Margin thickness

IN: 0.9 mm { 0.035 in } min

EX: 1.0 mm { 0.039 in } min



U5U110C5

3. Measure the length. Replace the valve if necessary.

Standard length

IN: 101.89 mm { 4.0114 in }
EX: 101.99 mm { 4.0153 in }

Minimum length

IN: 100.39 mm { 3.9524 in }
EX: 100.49 mm { 3.9563 in }

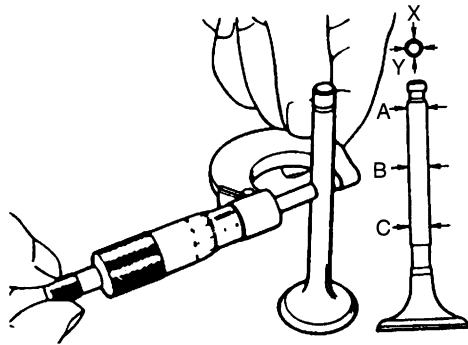
4. Measure the valve stem diameter in X and Y directions at three points (A, B and C) as shown. Replace the valve if necessary.

Diameter

IN: 5.970—5.985 mm { 0.2351—0.2356 in }
EX: 5.965—5.980 mm { 0.2349—0.2354 in }

Minimum

IN: 5.920 mm { 0.2331 in }
EX: 5.915 mm { 0.2329 in }

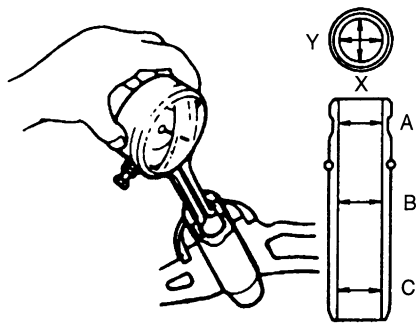


U5U110C6

5. Measure the valve guide inner diameter in X and Y directions at three points (A, B and C) as shown. Replace the valve guide if necessary.

Inner diameter

IN: 6.01—6.03 mm { 0.2367—0.2374 in }
EX: 6.01—6.03 mm { 0.2367—0.2374 in }



U5U110C7

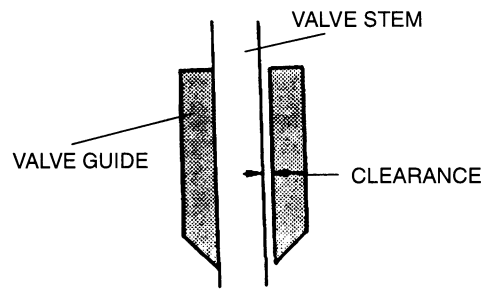
6. Calculate the valve stem-to-guide clearance. Subtract the outer diameter of the valve stem from the inner diameter of the corresponding valve guide.

Clearance

IN: 0.025—0.060 mm { 0.0010—0.0023 in }
EX: 0.030—0.065 mm { 0.0012—0.0025 in }

Maximum

0.20 mm { 0.008 in }

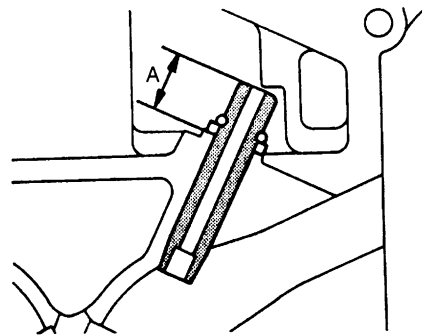


U5U110C8

7. If the clearance exceeds the maximum, replace the valve and/or valve guide.
8. Measure height A of each valve guide. Replace the valve guide if necessary.

Height A

18.3—18.9 mm { 0.721—0.744 in }

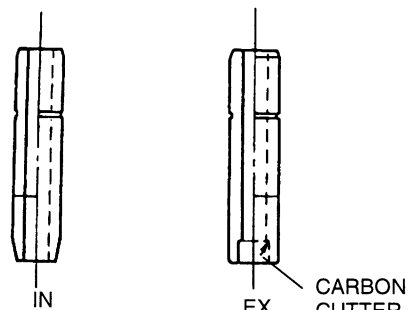


U5U110C9

Replacement of valve guide

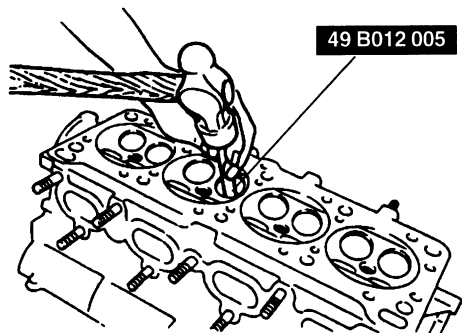
Note

- Although the intake and exhaust valve guides are different, use the exhaust valve guide to replace the intake valve guide.



U5U110D0

1. Remove the valve guide from the combustion chamber side by using the SST.

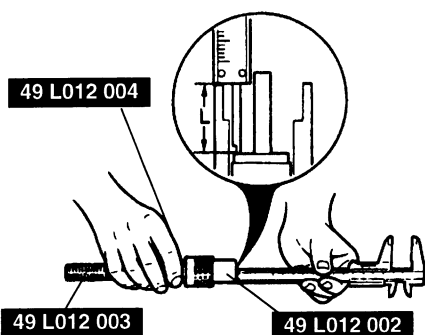


U5U110D1

2. Assemble the **SST** so that depth **L** is as specified.

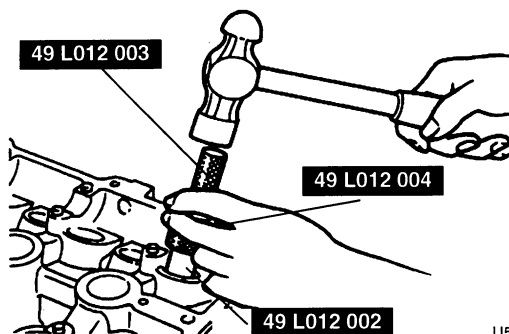
Depth L

18.3—18.9 mm { 0.721—0.744 in }



U5U110D2

3. Tighten the nut.
4. Tap the valve guide in from the side opposite the combustion chamber until the **SST** contacts the cylinder head.



U5U110D3

5. Verify that the valve guide height is within the specification.

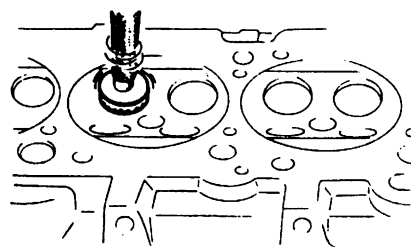
Height

18.3—18.9 mm { 0.721—0.744 in }

6. If not, repeat steps 2—5.

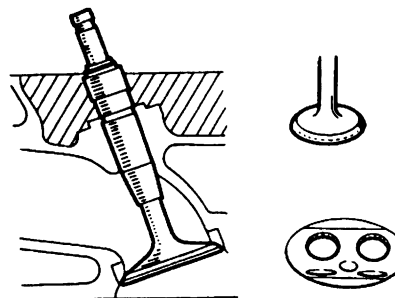
Valve seat

1. Inspect the contact surface of each valve seat and valve face for the following:
 - (1) Roughness
 - (2) Damage
2. If necessary, resurface the valve seat with a **45°** valve seat cutter and/or resurface the valve face.



U5U110D4

3. Apply a thin coat of Prussian blue to the valve face.

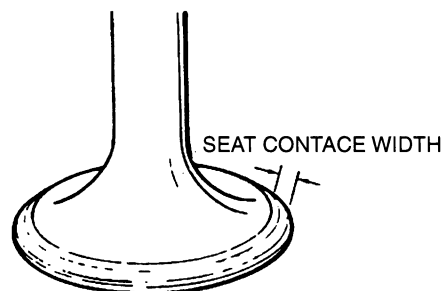


U5U110D5

4. Inspect the valve seating by pressing the valve against the seat.
If blue does not appear **360°** around the valve seat, resurface the seat.
5. Measure the seat contact width.

Width

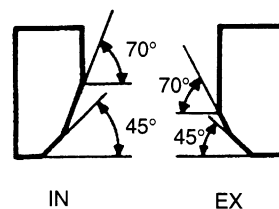
0.8—1.4 mm { 0.032—0.055 in }



U5U110D6

6. Verify that the valve seating position is at the center of the valve face.

- (1) If the seating position is too high, correct the valve seat with a **70°** cutter and a **45°** cutter.
- (2) If the seating position is too low, correct the valve seat with a **0°** cutter and a **45°** cutter.

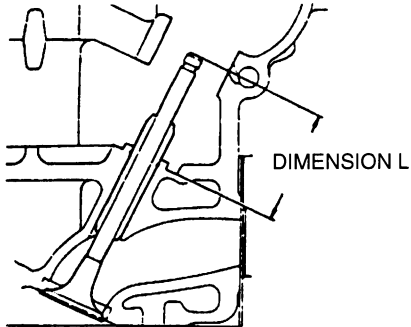


U5U110D7

7. Seat the valve to the valve seat with lapping compound.
8. Inspect the sinking of the valve seat. Measure the valve stem protruding length (dimension L).

Dimension L

45.0 mm { 1.772 in }



U5U110D8

9. If L is 45.5 mm { 1.791 in } or more, replace the cylinder head.

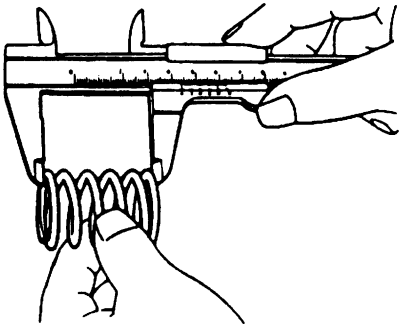
Valve spring

- Measure the free length and out-of-square. Replace the valve spring if necessary.

Free length

Standard: 46.26 mm { 1.821 in }

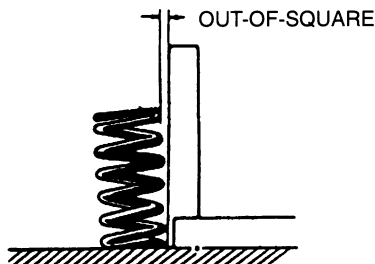
Minimum: 39.5 mm { 1.56 in } with a set load of 224—253 N { 22.8—25.8 kgf , 50.2—56.7 lbf }



U5U110D9

Out-of-square

1.62 mm { 0.0638 in } max.



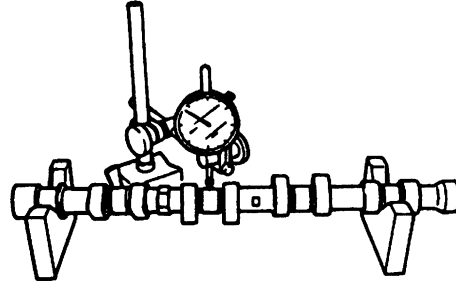
U5U110E0

Camshaft

1. Set the front and rear journals on V-blocks.
2. Measure the camshaft runout. Replace the camshaft if necessary.

Runout

0.03 mm { 0.0012 in } max.



U5U110E1

3. Measure the cam lobe heights at the two points as shown.

Standard height

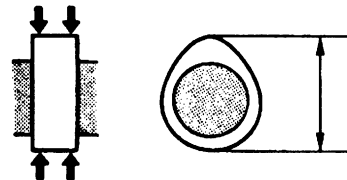
IN: 44.094 mm { 1.7360 in }

EX: 44.600 mm { 1.7559 in }

Minimum height

IN: 43.894 mm { 1.7281 in }

EX: 44.400 mm { 1.7480 in }



U5U110E2

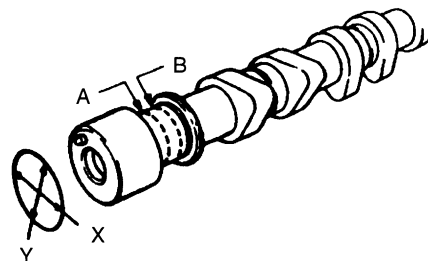
4. Measure the journal diameters in X and Y directions at the two points (A and B) as shown.

Diameter

25.940—25.965 mm { 1.0213—1.0222 in }

Out-of-round

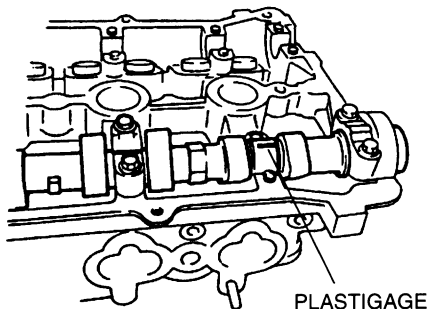
0.03 mm { 0.0012 in } max.



U5U110E3

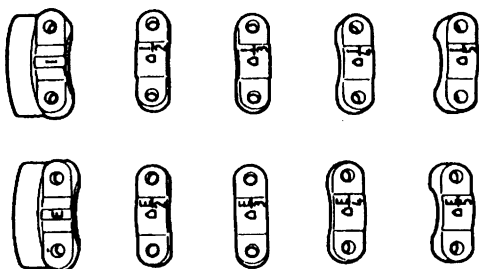
5. Measure the camshaft journal oil clearances.

- (1) Measure the camshaft journal oil clearance with the HLA removed.
- (2) Remove all foreign material and oil from the journals and bearing surfaces.
- (3) Set the camshaft onto the cylinder head.
- (4) Position Plastigage atop the journals in the axial direction.



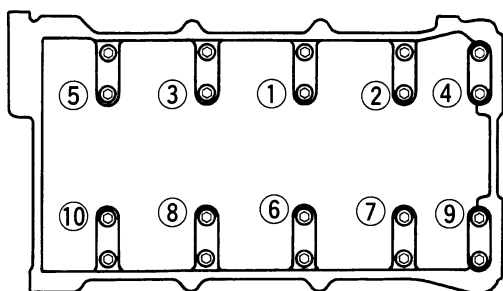
U5U110E4

- (5) Do not rotate the camshaft when measuring the oil clearance.
- (6) Install the camshaft caps according to the cap number and arrow mark.



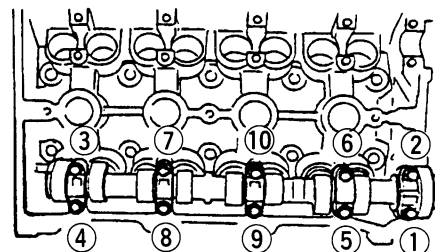
U5U110E5

- (7) Tighten the camshaft cap bolts in two or three steps. (Refer to 01-10 ENGINE DISASSEMBLY / ASSEMBLY, Cylinder Head, Camshaft assembly note.)



U5U110E8

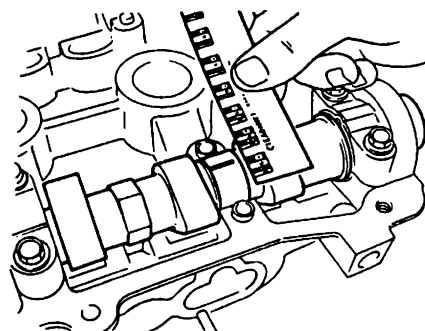
- (8) Loosen the camshaft cap bolts in five or six steps in the order shown.



U5U110E7

- (9) Remove the camshaft caps.
- (10) Measure the oil clearances.

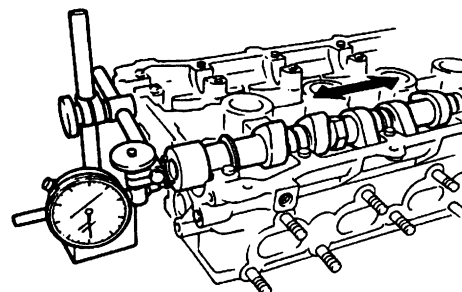
Oil clearance
0.035—0.081 mm { 0.0014—0.0031 in }
Maximum
0.15 mm { 0.006 in }



U5U110E8

- (11) If the oil clearance exceeds the maximum, replace the cylinder head.
6. Measure the camshaft end play. If the end play exceeds the maximum, replace the camshaft and/or the cylinder head.

End play
0.07—0.19 mm { 0.0028—0.0074 in }
Maximum
0.20 mm { 0.008 in }



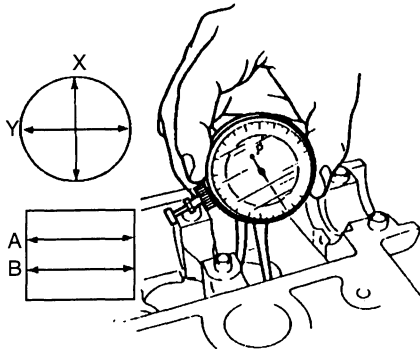
U5U110E9

HLA

1. Measure the HLA bores in X and Y directions at two points (A and B) as shown.

Distortion

30.000—30.025 mm { 1.1811—1.1820 in }

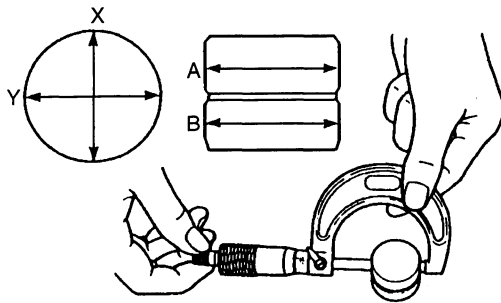


U5U110F0

2. Measure the HLA diameters in X and Y directions at two points (A and B) as shown.

Diameter

29.959—29.975 mm { 1.1795—1.1801 in }



U5U110F1

3. Calculate the clearance between the HLA diameter and the related HLA bore. Replace the HLA and/or cylinder head if necessary.

Clearance

0.025—0.066 mm { 0.00099—0.00259 in }

Maximum

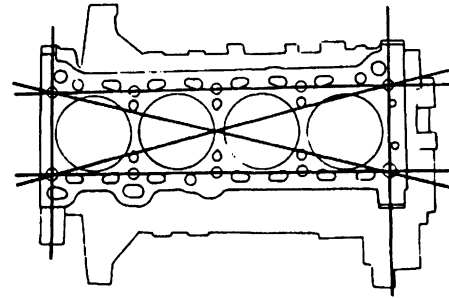
0.18 mm { 0.0071 in }

Cylinder Block

1. Inspect the cylinder block for the following. Repair or replace the cylinder block if necessary.
 - (1) Leakage damage
 - (2) Cracks
 - (3) Scoring of wall
2. Using a straightedge, measure the distortion of the top surface of the cylinder block in the six directions as shown.

Distortion

0.15 mm { 0.006 in } max.



U5U110F2

3. If the distortion exceeds the specification, repair by grinding or replace the cylinder block.

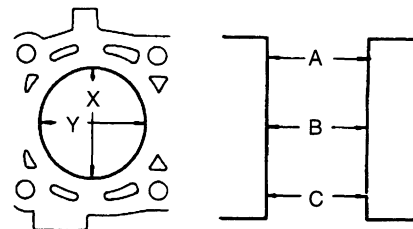
Height

221.5 mm { 8.720 in }

Grinding

0.20 mm { 0.008 in } max.

4. Measure the cylinder bores in X and Y directions at three points (A, B, and C) in each cylinder as shown.
5. Base the boring diameter on the diameter of an over-size piston. All cylinders must be the same diameter.



U5U110F4

Cylinder bore

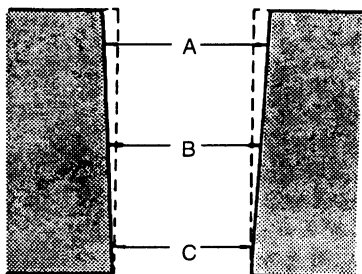
mm { in }

Bore size	Diameter
Standard	83.000—83.019 { 3.2678—3.2684 }
0.25 { 0.01 } oversize	83.256—83.263 { 3.2778—3.2780 }
0.50 { 0.02 } oversize	83.506—83.513 { 3.2877—3.2879 }

- (1) If the cylinder bore exceeds the maximum, rebore the cylinder to oversize.
- (2) If the difference between measurements A and C exceeds the maximum taper, rebore the cylinder to oversize.

Taper

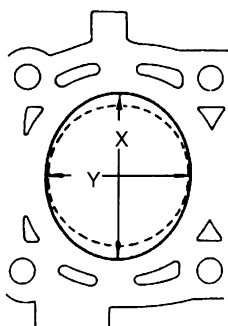
0.019 mm { 0.0007 in } max.



U5U110F5

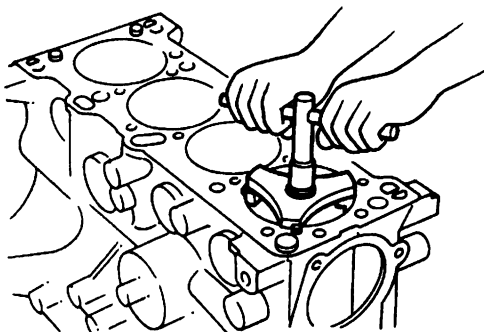
- (3) If the difference between measurements X and Y exceeds the maximum out-of-round, rebore the cylinder to oversize.

Out-of-round
0.019 mm { 0.0007 in } max.



U5U110F6

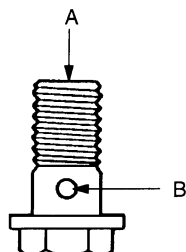
6. If the upper part of a cylinder wall shows uneven wear, remove the ridge with a ridge reamer.



U5U110F7

Oil Jet

1. Apply compressed air of **167—225 kPa { 1.7—2.3 kgf/cm², 25—32 psi }** to oil jet valve A and verify that air passes through oil jet valve B. If not, replace the oil jet.

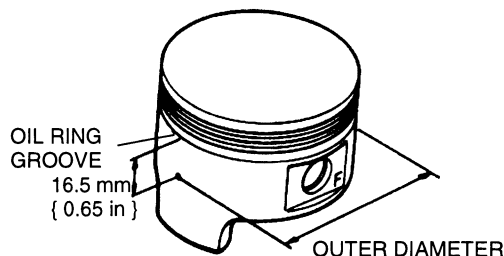


U5U110F8

2. Check the oil jet nozzles for clogs. Replace the nozzle if necessary.

Piston, Piston Ring and Piston Pin

1. Inspect the outer circumferences of all pistons for seizure or scoring. Replace the piston if necessary.
2. Measure the outer diameter of each piston at a right angle (90°) to the piston **16.5 mm { 0.65 in }** below the oil ring groove lower edge.



U5U110F9

Piston diameter

mm { in }

Piston size	Diameter
Standard	82.954—82.974 { 3.2659—3.2666 }
0.25 { 0.01 } oversize	83.211—83.217 { 3.2761—3.2762 }
0.50 { 0.02 } oversize	83.461—83.467 { 3.2859—3.2860 }

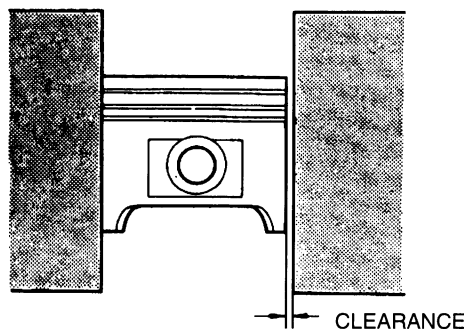
3. Measure the piston-to-cylinder clearance.

Clearance

0.032—0.059 mm { 0.0013—0.0023 in }

Maximum

0.15 mm { 0.006 in }



U5U110G0

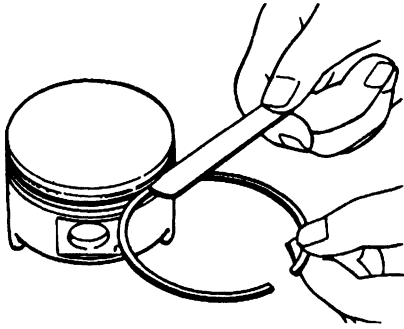
4. If the clearance exceeds the maximum, replace the piston or rebore the cylinders to fit oversize pistons.
5. If the piston is replaced, the piston rings must also be replaced.

Piston ring

1. Measure the piston ring-to-ring land clearance around the entire circumference by using a new piston ring.

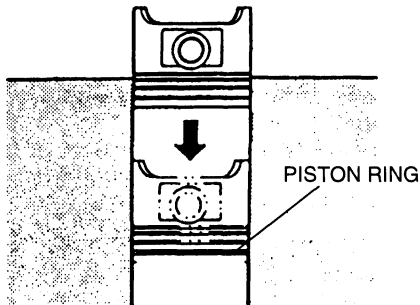
Clearance

Top: 0.03—0.065 mm { 0.0012—0.0025 in }
Second: 0.03—0.07 mm { 0.0012—0.0027 in }
Maximum: 0.15 mm { 0.006 in }



U5U110G1

2. If the clearance exceeds the maximum, replace the piston.
3. Inspect the piston rings for damage, abnormal wear, or breakage. Replace the piston rings if necessary.
4. Insert the piston ring into the cylinder by hand and use the piston to push it to the bottom of the ring travel.

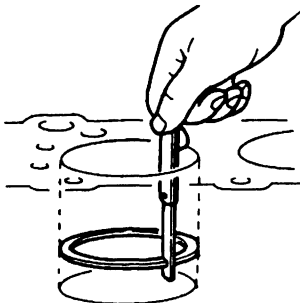


U5U110G2

5. Measure each piston ring end gap. Replace the piston ring if necessary.

End gap

Top: 0.15—0.30 mm { 0.006—0.011 in }
Second: 0.15—0.30 mm { 0.006—0.011 in }
Oil rail: 0.20—0.70 mm { 0.008—0.027 in }
Maximum: 1.0 mm { 0.039 in }



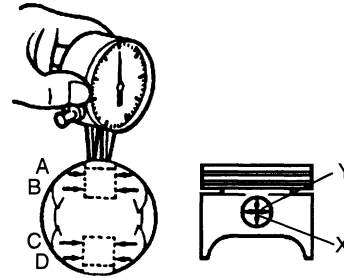
U5U110G3

Piston and piston pin

1. Measure each piston pin hole diameter in X and Y directions at four points (A, B, C and D) as shown.

Diameter

19.988—20.000 mm { 0.7870—0.7874 in }

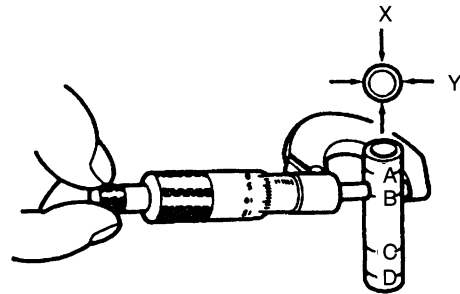


U5U110G4

2. Measure each piston pin diameter in X and Y directions at four points (A, B, C and D) as shown.

Diameter

19.987—19.993 mm { 0.7869—0.7871 in }



U5U110G5

3. Calculate the piston pin-to-piston clearance.

Clearance

−0.005—0.013 mm { −0.0002—0.0005 in }

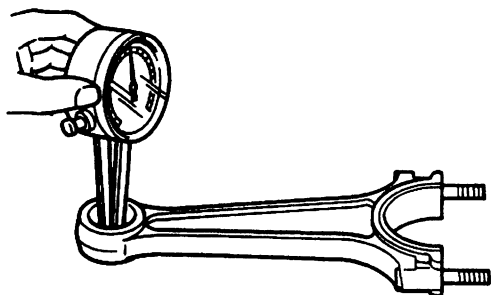
4. If the clearance exceeds the specification, replace the piston and/or piston pin.

Connecting Rod

1. Measure each connecting rod bushing inner diameter.

Diameter

20.003—20.014 mm { 0.7876—0.7879 in }



U5U110G6

- Calculate the clearance between the connecting rod bushing and piston pin.

Clearance

0.010—0.027 mm { 0.0004—0.0010 in }

- Check each connecting rod for bending. Replace the connecting rod if necessary. If the connecting rod is replaced, the connecting rod cap, bolts and nuts must also be replaced because they are a matched set.

Bending

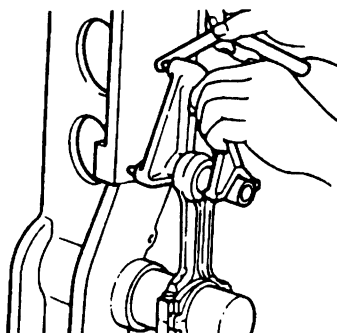
0.050 mm { 0.0020 in } max./50 mm { 1.97 in }

Distortion

0.070 mm { 0.0028 in } max./50 mm { 1.97 in }

Length (Center to center)

132.85—132.95 mm { 5.231—5.234 in }



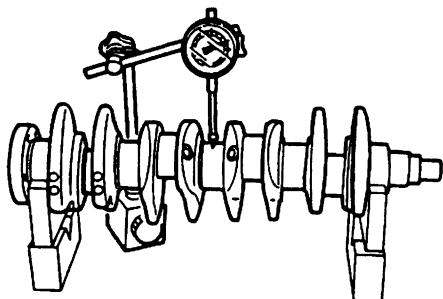
U5U110G7

Crankshaft

- Set the crankshaft on V-blocks.
- Measure the crankshaft runout at the center journal. Replace the crankshaft if necessary.

Runout

0.04 mm { 0.0016 in } max.



U5U110G8

- Measure each journal diameter in X and Y directions at two points (A and B) as shown.

Main journal

Diameter: 49.938—49.956 mm

{ 1.9661—1.9667 in }

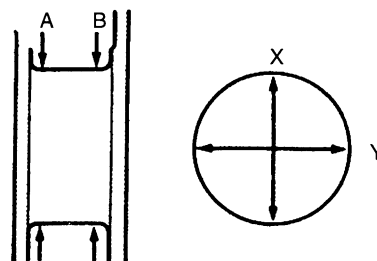
Out-of-round: 0.05 mm { 0.0020 in } max.

Crank pin journal

Diameter: 44.940—44.956 mm

{ 1.7693—1.7699 in }

Out-of-round: 0.05 mm { 0.0020 in } max.



U5U110G9

- If the diameter is less than the minimum, grind the journals to match an undersize bearing.

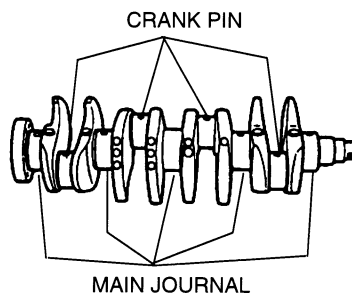
Undersize bearing

0.25 mm { 0.01 in }, 0.50 mm { 0.02 in },
0.75 mm { 0.03 in }

Main journal diameter undersize

mm { in }

Bearing size	Diameter
0.25 { 0.01 } undersize	49.704—49.708 { 1.9569—1.9570 }
0.50 { 0.02 } undersize	49.454—49.458 { 1.9470—1.9471 }
0.75 { 0.03 } undersize	49.204—49.208 { 1.9372—1.9373 }

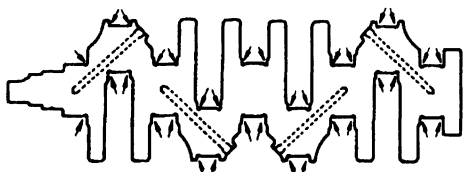


U5U110H0

Crank pin journal diameter undersize

mm { in }

Bearing size	Diameter
0.25 { 0.01 } undersize	44.690—44.706 { 1.7595—1.7600 }
0.50 { 0.02 } undersize	44.440—44.456 { 1.7497—1.7502 }
0.75 { 0.03 } undersize	44.190—44.206 { 1.7398—1.7403 }



DIMENSION R: 1.5 mm { 0.06 in }

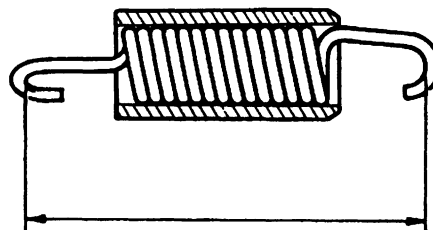
U5U110H1

Tensioner Spring

- Measure the free length of the tensioner spring. Replace the tensioner spring if necessary.

Free length

59.2 mm { 2.331 in }

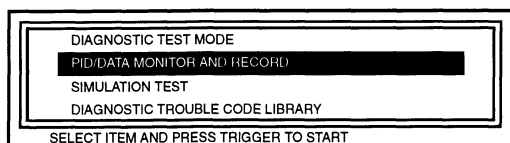


U5U110H3

ENGINE TUNE-UP

Preparation

- Warm up the engine to normal operating temperature.
- Turn all electrical loads off.
 - Headlight switch
 - Fan switch
 - Rear window defroster switch
- Connect the **SSTs** (NGS) to the data link connector-2 and select the PID/DATA MONITOR AND RECORD function.



U5U110H9

- Select "RPM" and press TRIGGER.
- Wait until the cooling fan stops.

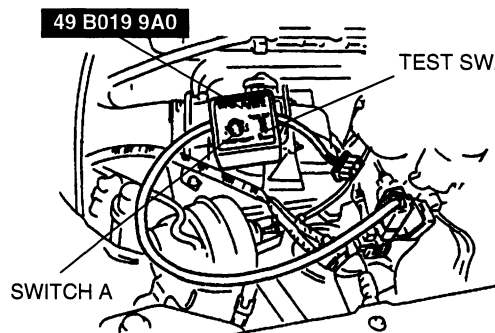
Ignition Timing

- Perform "Preparation". (Refer to Preparation.)
- Verify that the idle speed is within the specification. If not, adjust it.

Specification

(Neutral): 800—900 (850 $\pm$ 50) rpm [MT]
(P range): 750—850 (800 $\pm$ 50) rpm [AT]

- Connect a timing light to the high-tension lead No.1.
- Connect the **SST** (System Selector) to the data link connector.



U5U110H5

- Set switch A to position 1.
- Set the test switch to SELF TEST.
- Verify that the idle speed is within the specification.

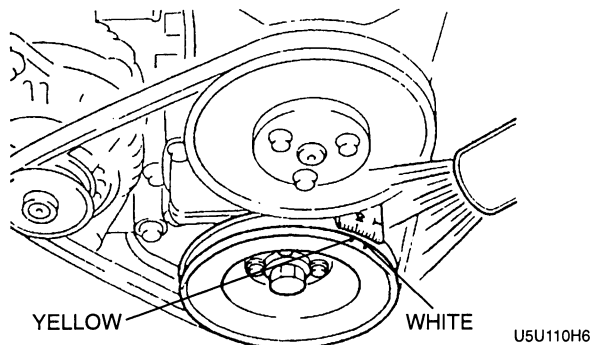
Specification

650—975 rpm

- Verify that the timing mark (white) on the crankshaft pulley and the T mark on the timing belt cover are aligned.

Ignition timing

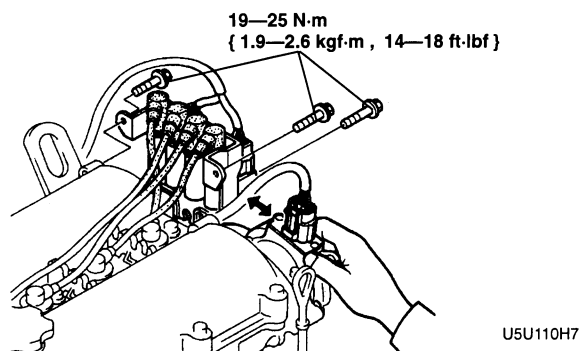
BTDC 9°—11° (10° $\pm$ 1°)
(TIMING MARK [YELLOW])



9. If the marks are not aligned, remove the ignition coil bracket and push the ignition coil aside for easy access. Then, loosen the camshaft position sensor lock bolts, and turn the camshaft position sensor to make the adjustment.
10. Tighten the camshaft position sensor lock bolts to the specified torque.

Tightening torque

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



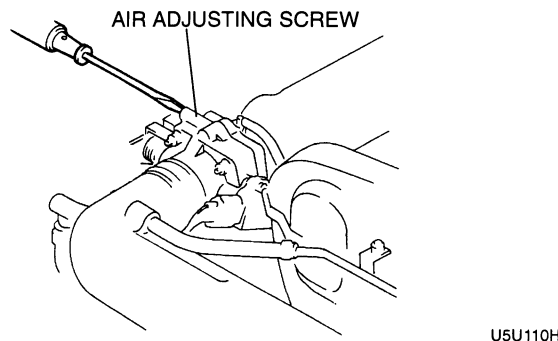
11. Disconnect the **SST** (System Selector).
12. Increase the engine speed and verify that the ignition timing advances.

Idle Speed

1. Perform "Preparation". (Refer to Preparation.)
2. Connect the **SST** (System Selector) to the data link connector.
3. Set switch A to position 1.
4. Set the test switch to SELF TEST.
5. With the cooling fan off, verify that the idle speed is within the specification.

Specification

(Neutral): 800—900 (850 ± 50) rpm [MT]
(P range): 750—850 (800 ± 50) rpm [AT]



6. If not within the specification, adjust the idle speed by turning the air adjusting screw.

Caution

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

7. Disconnect the **SST** (System Selector).

Idle Up Speed

1. Perform "Preparation". (Refer to Preparation.)
2. Verify that the cooling fan is stopped.
3. Verify that the idle speed is within the specification.

Specification

(Neutral): 800—900 (850 ± 50) rpm [MT]
(P range): 750—850 (800 ± 50) rpm [AT]

4. If not as specified, adjust the idle speed.
5. Check the idle speed with the following load conditions.

Load condition	Idle speed (rpm)	
	MT	AT
Fan switch ON at 2nd or higher	850*	800*
Headlight switch ON		
Rear window defroster switch ON		
P/S ON		
A/C ON	1000*	

* : Neutral or P position

Note

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

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

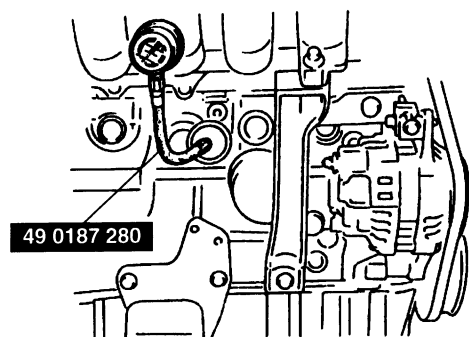
01-11 LUBRICATION

OIL PRESSURE INSPECTION	01-11-1
ENGINE OIL INSPECTION	01-11-1
ENGINE OIL REPLACEMENT	01-11-2
OIL FILTER REPLACEMENT	01-11-2
OIL COOLER	
REMOVAL / INSTALLATION	01-11-3
OIL PAN REMOVAL / INSTALLATION ..	01-11-4
Engine Mount Nut Removal Note	01-11-5
Crossmember Installation Bolt and Nut	
Removal Note	01-11-5
Oil Pan Removal Note	01-11-5
Oil Baffle Removal Note	01-11-5

Oil Baffle Installation Note	01-11-5
Oil Pan Installation Note	01-11-6
OIL PUMP	
DISASSEMBLY / ASSEMBLY	01-11-6
Oil Seal Disassembly Note	01-11-7
Inner Rotor and Outer Rotor	
Assembly Note	01-11-7
Oil Seal Assembly Note	01-11-7
OIL PUMP INSPECTION	01-11-7
Oil Pressure Spring	01-11-7
Rotor Clearance	01-11-7

OIL PRESSURE INSPECTION

1. Remove the oil pressure switch.
2. Screw the **SST** into the oil pressure switch installation hole.



U5U11102

3. Warm up the engine to normal operating temperature.
4. Run the engine at the specified speed and note the gauge reading.

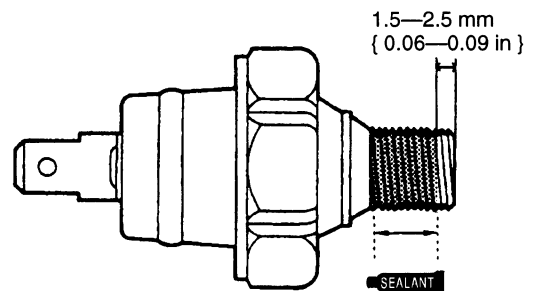
Note

- Oil pressure varies with oil viscosity and temperature.

Oil pressure

98—196 kPa
 { 1.0—2.0 kgf/cm² , 15—28 psi } —1,000 rpm
 295—392 kPa
 { 3.0—4.0 kgf/cm² , 43—56 psi } —3,000 rpm

5. If the pressure is not as specified, check for the cause and repair as necessary.
6. Apply silicone sealant to the oil pressure switch threads as shown.



U5U11103

7. Remove the **SST** and install the oil pressure switch.

Tightening torque

12—17 N·m { 1.2—1.8 kgf·m , 8.7—13 ft·lbf }

8. Start the engine and check for oil leaks.

ENGINE OIL INSPECTION

1. Be sure the vehicle is 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 the oil level and condition.
5. Add or replace oil if necessary.

Note

- The distance between the L and F marks on the dipstick represents 0.8 L { 0.85 US qt , 0.70 Imp qt }.

U5U111AB

ENGINE OIL REPLACEMENT

U5U111AC

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. Remove the oil filler cap and the oil drain plug.
2. Drain the oil into a container.
3. Install a new gasket and the drain plug.

Tightening torque

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

4. Refill the engine with the specified type and amount of engine oil.

Oil capacity

L { US qt , Imp qt }

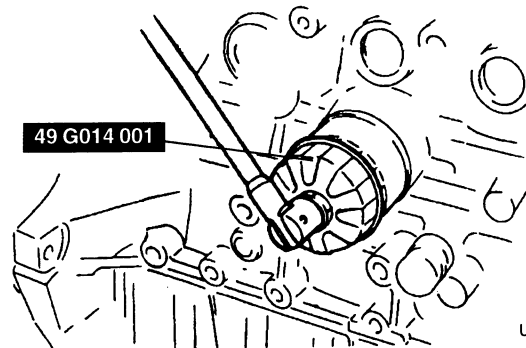
Total (dry engine)	4.0 { 4.2 , 3.5 }
Oil replacement	3.6 { 3.8 , 3.2 }
Oil and oil filter replacement	3.8 { 4.0 , 3.3 }

5. Refit the oil filler cap.
6. Run the engine and check for leaks.
7. Check the oil level and add oil if necessary.

OIL FILTER REPLACEMENT

U5U111AD

1. Remove the oil filter by using the SST.



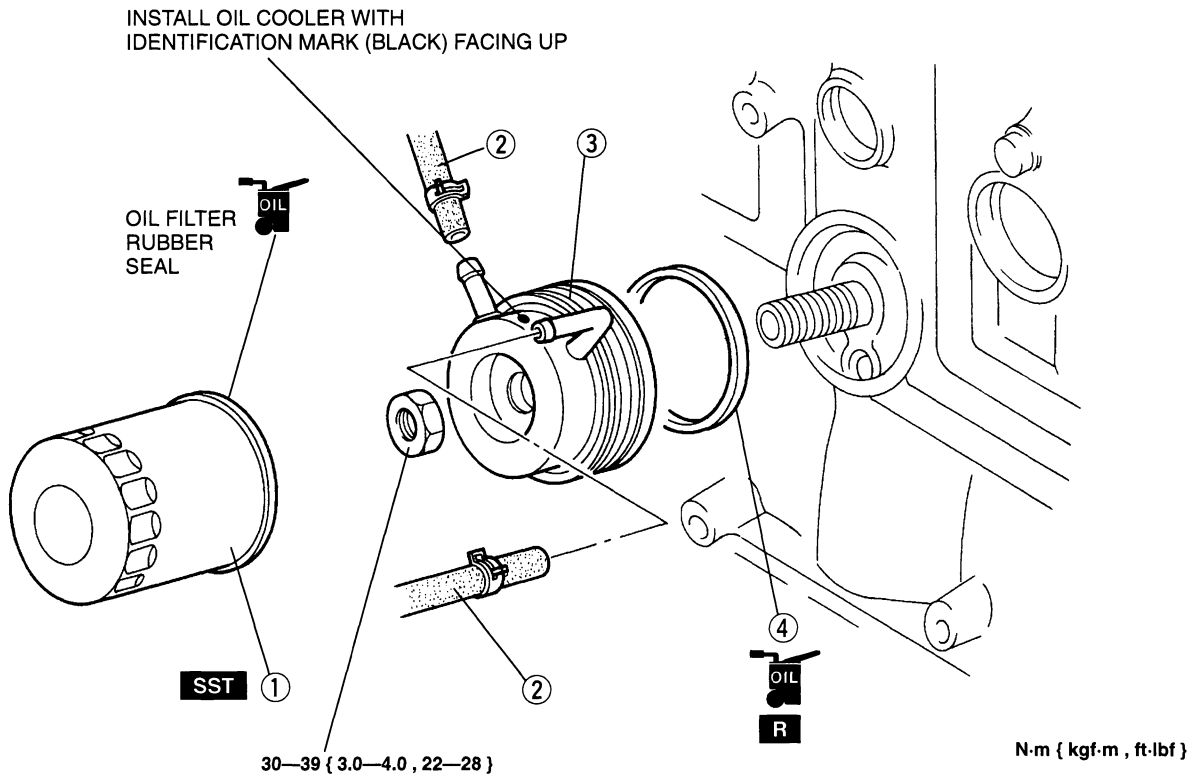
U5U11104

2. Use a clean rag to wipe off the mounting surface on the engine.
3. Tighten the filter according to the installation direction on the side of it by using the SST.
4. Start the engine and check for leaks.
5. Check the oil level and add oil if necessary.

OIL COOLER REMOVAL / INSTALLATION

U5U111AE

1. Disconnect the negative battery cable.
2. Drain the engine oil and engine coolant. (Refer to 01-11 ENGINE OIL REPLACEMENT.) (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Fill with the specified amount and type of engine oil and engine coolant. (Refer to 01-11 ENGINE OIL REPLACEMENT.) (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
6. Start the engine and
 - (1) check the engine oil and engine coolant leakage.
 - (2) check the oil level and add oil if necessary.
7. Recheck the engine oil and engine coolant levels.



U5U11105

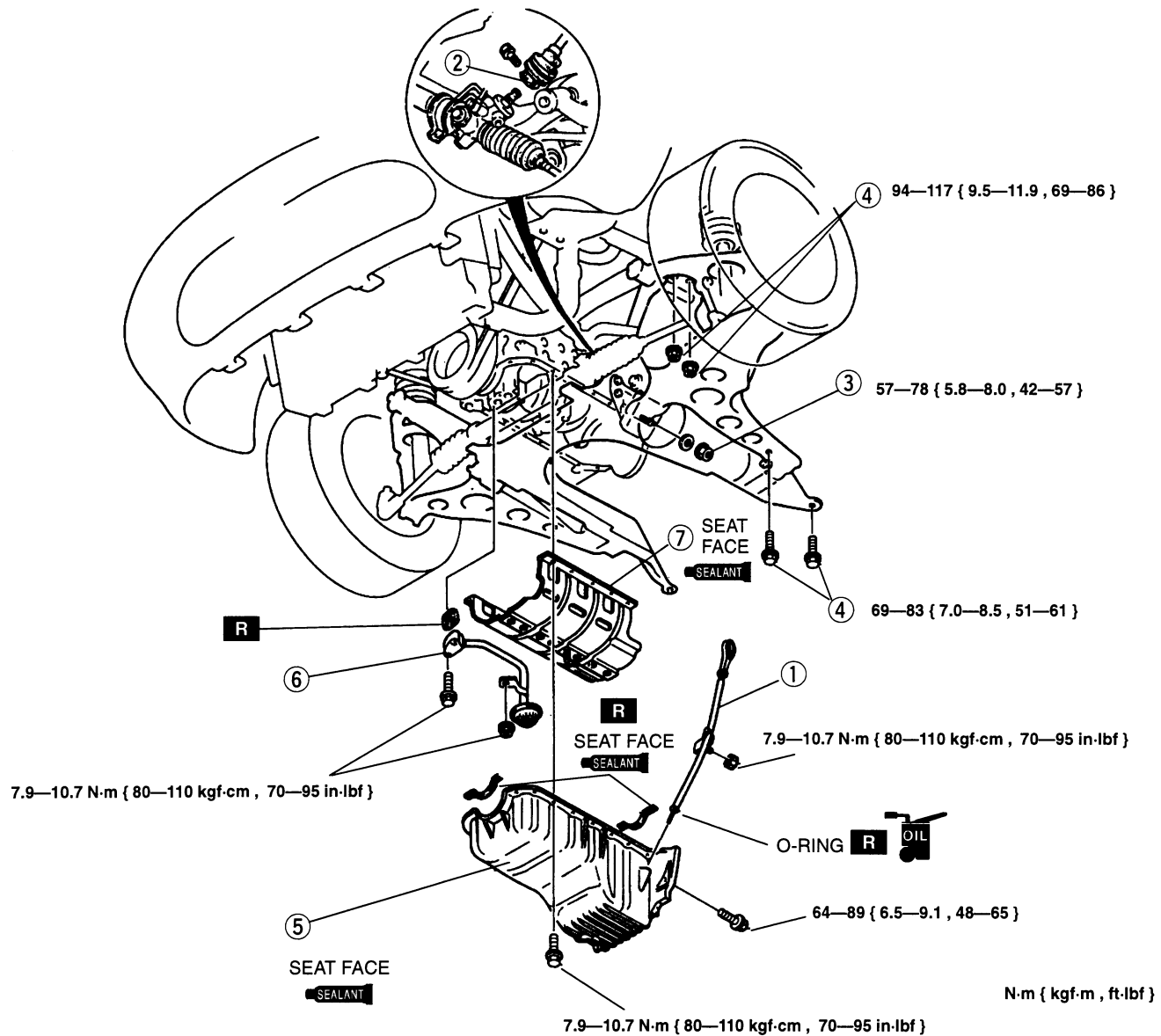
1	Oil filter 01-11 OIL FILTER REPLACEMENT
2	Water hose

3	Oil cooler
4	O-ring

OIL PAN REMOVAL / INSTALLATION

U5U111AF

1. Disconnect the negative battery cable.
2. Drain the engine oil. (Refer to 01-11 ENGINE OIL REPLACEMENT.)
3. Remove the splash shield.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal indicated in the table.
6. Install the splash shield.
7. Fill with the specified amount and type of engine oil. (Refer to 01-11 ENGINE OIL REPLACEMENT.)
8. Start the engine and
 - (1) check the engine oil leaks.
 - (2) check the oil level and add oil if necessary.
9. Recheck the engine oil levels.



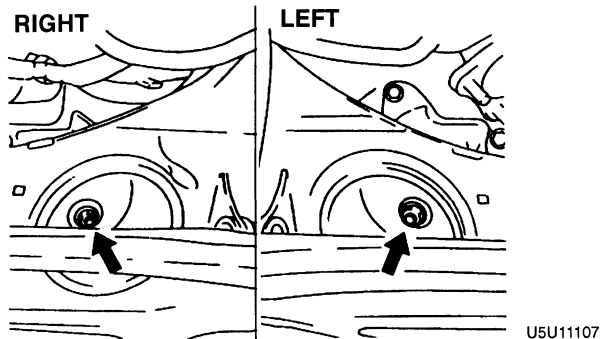
U5U11106

1	Dipstick and pipe
2	Intermediate shaft
3	Engine mount nut ☞ Removal Note
4	Crossmember installation bolt and nut ☞ Removal Note

5	Oil pan ☞ Removal Note ☞ Installation Note
6	Oil strainer
7	Oil baffle ☞ Removal Note ☞ Installation Note

Engine Mount Nut Removal Note

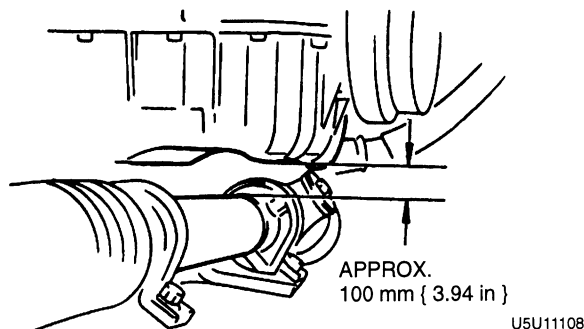
1. Loosen the oil pan mounting bolts.
2. Remove the engine mounting nuts.



3. Lift the engine slightly by using a hoist.

Crossmember Installation Bolt and Nut Removal Note

1. Support the crossmember by using a transmission jack.
2. Remove the crossmember installation bolts and nuts.
3. Separate the steering intermediate shaft from the pinion shaft.
4. Lower the crossmember until the clearance between the oil pan and the steering gear housing exceeds **approx. 100 mm { 3.94 in }**.



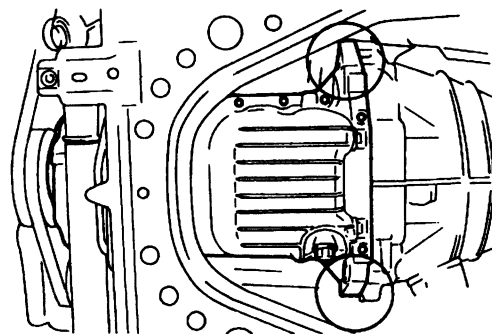
Oil Pan Removal Note

1. Remove the oil pan mounting bolts.

Caution

- Pry tools can easily scratch the cylinder block and the oil pan contact surfaces. Prying off the oil pan can also easily bend the oil pan flange. Refer to the following instructions before removing the oil pan.

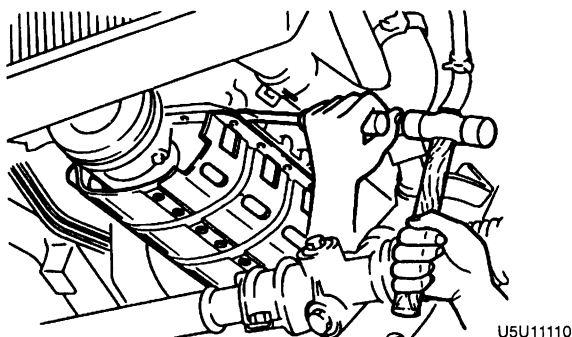
2. Insert a screwdriver only at the points shown in the figure.



3. Remove the oil pan.

Oil Baffle Removal Note

1. Insert a screwdriver between the cylinder block and the oil baffle to separate them.



2. Remove the oil baffle.

Oil Baffle Installation Note

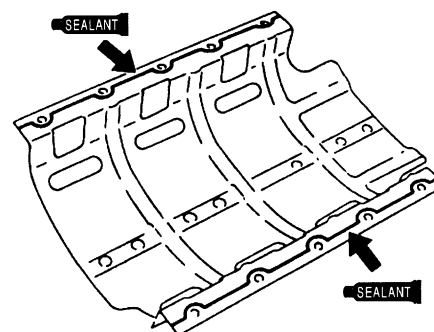
Caution

- 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.

1. Remove all foreign material from the contact surfaces.
2. Apply silicone sealant to the oil baffle along the inside of the bolt holes, and install within five minutes.

Thickness

$\phi 2.5-3.5 \text{ mm } \{ 0.099-0.137 \text{ in } \}$



01-11-6

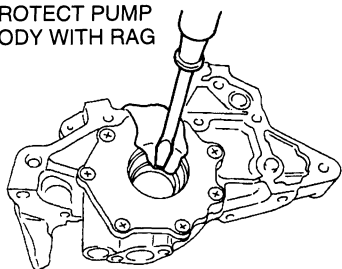
LUBRICATION

1	Oil seal  Disassembly Note  Assembly Note
2	Oil pump cover
3	Outer rotor  Assembly Note
4	Inner rotor  Assembly Note
5	Cotter pin
6	Oil pressure spring seat
7	Oil pressure spring
8	Oil control plunger
9	Oil pump body

Oil Seal Disassembly Note

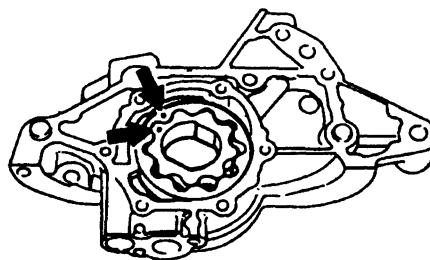
- Remove the oil seal by using a screwdriver protected with a rag.

PROTECT PUMP
BODY WITH RAG



U5U11117

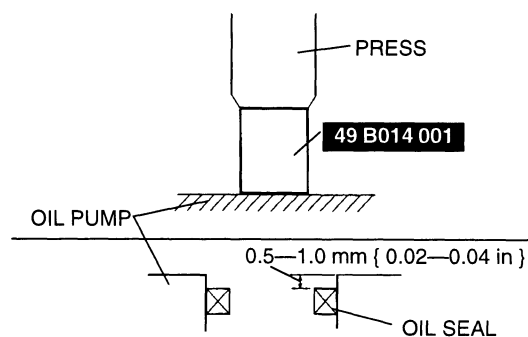
- Install the inner and outer rotors into the oil pump body with the marks aligned as shown.



U5U11118

Oil Seal Assembly Note

- Apply clean engine oil to the new oil seal.
- Install the oil seal into the oil pump body by hand.
- Press the oil seal into the oil pump body by using the SST.



U5U11119

Inner Rotor and Outer Rotor Assembly Note

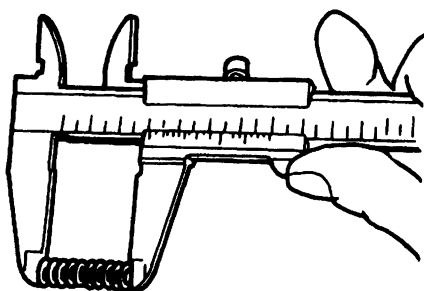
- Apply clean engine oil to the friction surface of the pump body and the rotors.

OIL PUMP INSPECTION

Oil Pressure Spring

- Inspect the spring for weakness and breakage.
- Measure the free length. Replace the spring if necessary.

Free length
45.94 mm { 1.809 in }



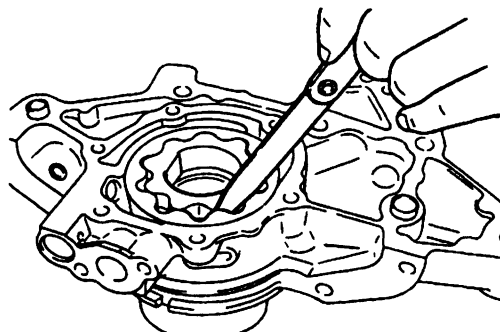
U5U11120

Rotor Clearance

Measure the following clearances. Replace the rotor or the pump body if necessary.

Tooth tip clearance

Standard: 0.02—0.18 mm { 0.0008—0.0070 in }
Maximum: 0.2 mm { 0.0079 in }

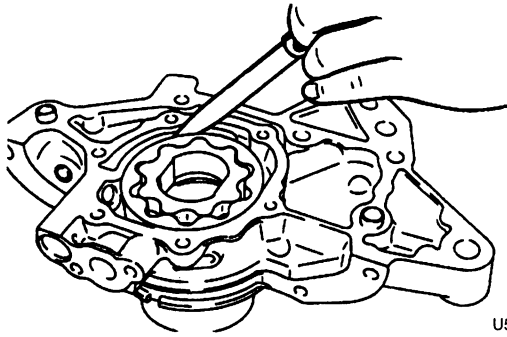


U5U11121

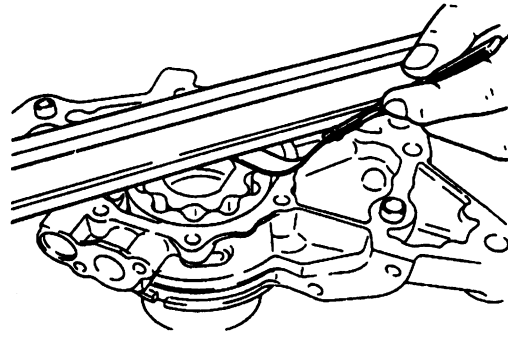
Outer rotor-to-pump body clearance

Standard: 0.09—0.18 mm { 0.0036—0.0070 in }
Maximum: 0.2 mm { 0.0079 in }

LUBRICATION



U5U11122



U5U11123

Side clearance

Standard: 0.03—0.12 mm { 0.0012—0.0047 in }

Maximum: 0.14 mm { 0.0055 in }

01-12 COOLING SYSTEM

COOLING SYSTEM SERVICE

WARNINGS	01-12-1
ENGINE COOLANT LEVEL	
INSPECTION	01-12-1
ENGINE COOLANT PROTECTION	01-12-1
ENGINE COOLANT REPLACEMENT ..	01-12-2
Draining	01-12-2
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ENGINE COOLANT LEAKAGE	
INSPECTION	01-12-2
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Radiator Cap Valve	01-12-3
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RADIATOR REMOVAL / INSTALLATION 01-12-4

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COOLING FAN MOTOR INSPECTION .	01-12-6
COOLING FAN MOTOR	
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COOLING SYSTEM SERVICE WARNINGS

U5U112AA

Warning

- Removing the radiator cap or the coolant 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.

ENGINE COOLANT LEVEL INSPECTION

U5U112AN

1. Verify that the coolant level is near the radiator filler neck.
2. Verify that the coolant level in the coolant reservoir is between the FULL and LOW marks. Add coolant if necessary.

Note

- The distance between the LOW and FULL marks on the coolant reservoir represents 0.45 L { 0.48 US qt , 0.40 Imp qt }.

ENGINE COOLANT PROTECTION

U5U112AB

Caution

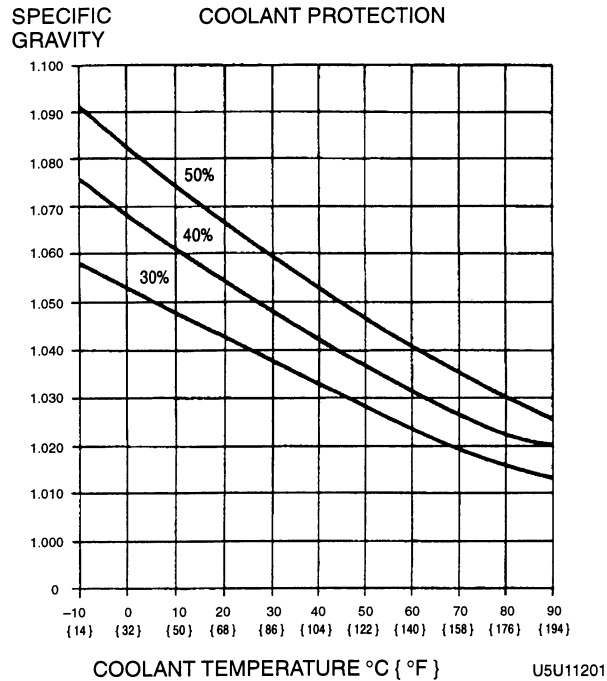
- The engine has aluminum parts that can be damaged by alcohol or methanol antifreeze. Do not use alcohol or methanol in the cooling system. Use only ethylene-glycol-based coolant.
 - Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will cut down on the coolant's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

2. Determine the coolant protection by referring to the graph shown. If the coolant protection is not proper, add water or coolant as necessary.

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

COOLING SYSTEM

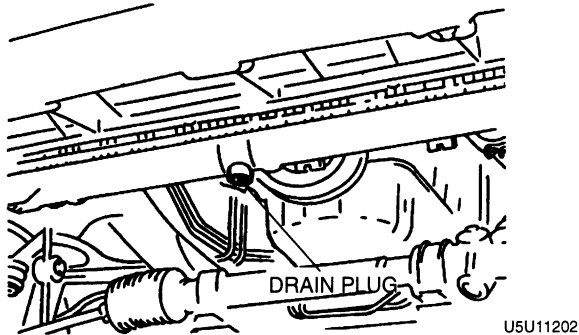


ENGINE COOLANT REPLACEMENT

U5U112AC

Draining

1. Remove the radiator cap and loosen the drain plug. (Refer to 01-12 COOLING SYSTEM SERVICE WARNINGS.)



2. Drain the coolant into a container.
3. Flush the cooling system with water until all traces of color are gone, then let the system drain completely.
4. Install the drain plug.

Refilling

Use the proper amount and mixture of ethylene-glycol based coolant. (Refer to 01-02 ENGINE COOLANT PROTECTION.)

1. 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

2. Fill the coolant reservoir up to the FULL level.
3. Fully install the radiator cap.
4. Start the engine and let it idle until it warms up.
5. If the temperature increases beyond normal, there is excessive air in the system. Stop the engine and allow it to cool; then repeat steps 1—3.
6. Run the engine at 2,200—2,800 rpm for five seconds; repeat several times.
7. Stop the engine and allow it to cool. (Refer to 01-12 COOLING SYSTEM SERVICE WARNINGS.)
8. Remove the radiator cap and check the coolant level. If the coolant level has dropped, repeat the procedure from step 1.

ENGINE COOLANT LEAKAGE INSPECTION

U5U112AD

1. Check the coolant level. (Refer to 01-12 COOLING SYSTEM SERVICE WARNINGS.)
2. Remove the radiator cap.
3. Connect a radiator cap tester and the SST to the radiator filler neck.

Caution

- Applying more than 103 kPa { 1.05 kgf/cm² , 14.9 psi } can damage the hoses, fittings, and other components, and cause leaks.

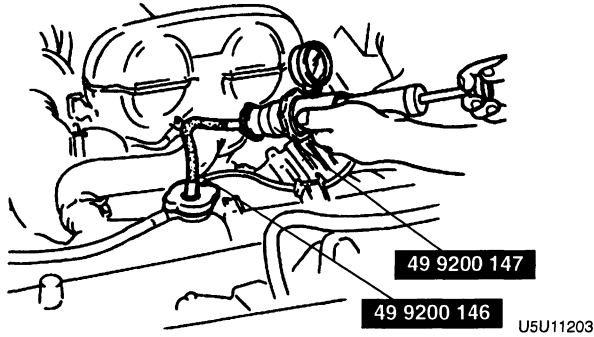
4. Apply pressure to the radiator.

COOLING SYSTEM

Pressure

103 kPa { 1.05 kgf/cm² , 14.9 psi }

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

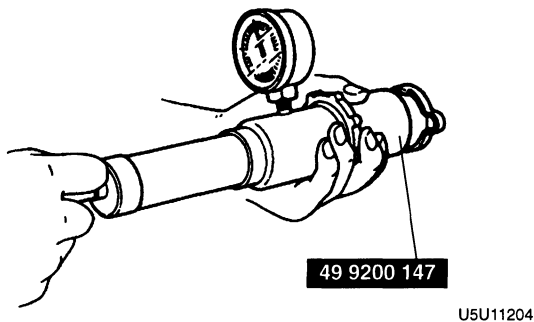


RADIATOR CAP INSPECTION

U5U112AE

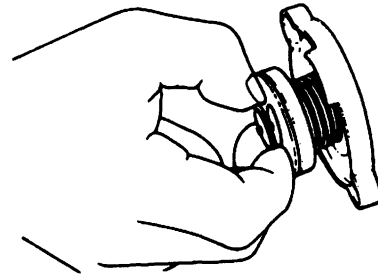
Radiator Cap Valve

1. Remove the radiator cap. (Refer to 01-12 COOLING SYSTEM SERVICE WARNINGS.)
2. Attach the radiator cap to a radiator cap tester by using the SST. Apply pressure gradually to 73.6—102 kPa { 0.75—1.05 kgf/cm² , 10.7—14.9 psi }.



Negative Pressure Valve

1. Pull the negative pressure valve to open it. Verify that it closes completely when released.



U5U11205

3. Verify that the pressure is held at least **10 seconds**.

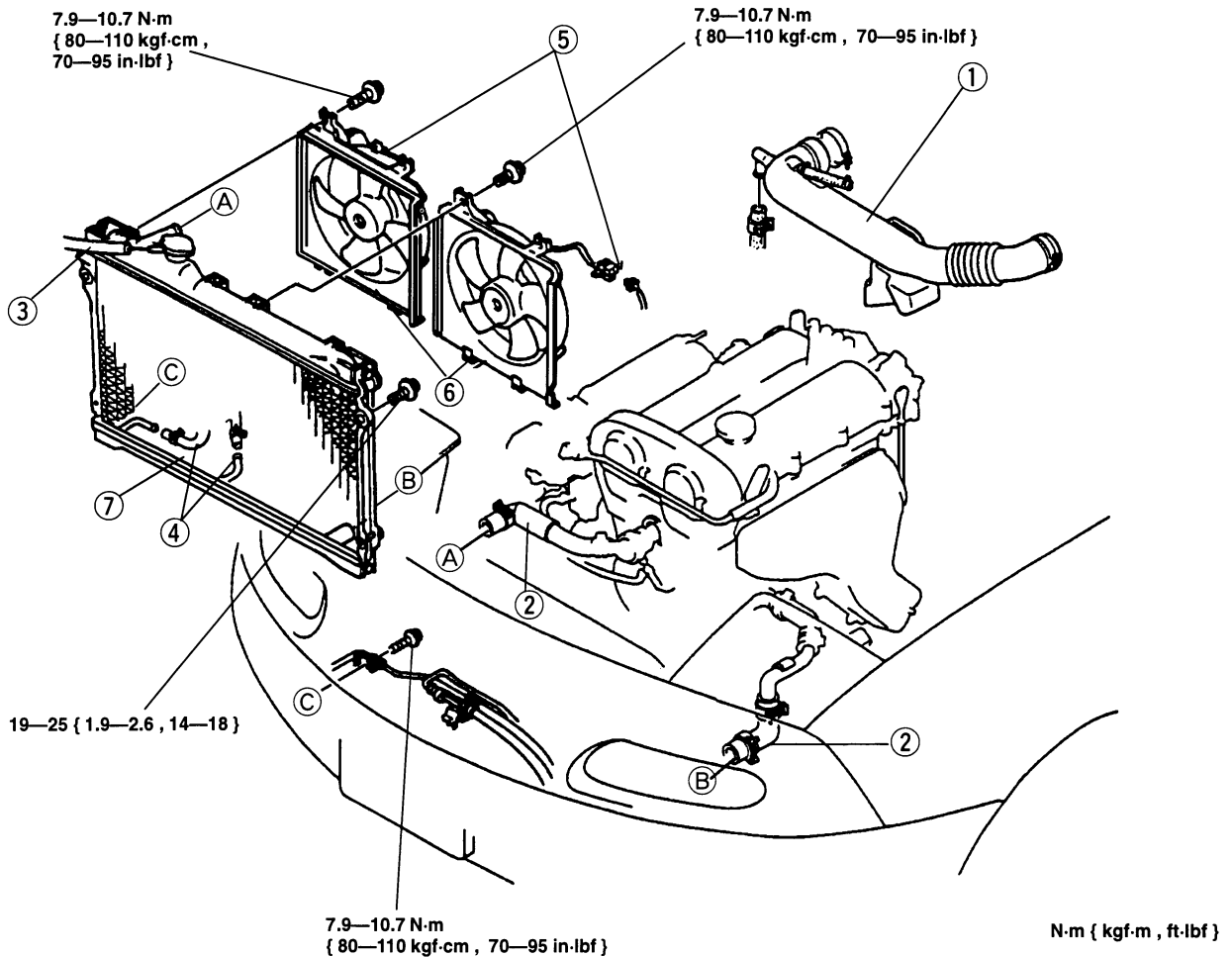
2. Check for damage on the contact surfaces and for cracked or deformed seal packing.
3. Replace the radiator cap if necessary.

COOLING SYSTEM

RADIATOR REMOVAL / INSTALLATION

U5U112AF

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
3. Remove the splash shield.
4. Remove in the order shown indicated in the table.
5. Install in the reverse order of removal indicated in the table.
6. Install the splash shield.
7. Fill the radiator with the specified amount and type of engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
8. Check for leaks.



U5U11206

1	Air intake pipe
2	Radiator hose
3	Coolant reservoir hose
4	Oil cooler hose (AT)

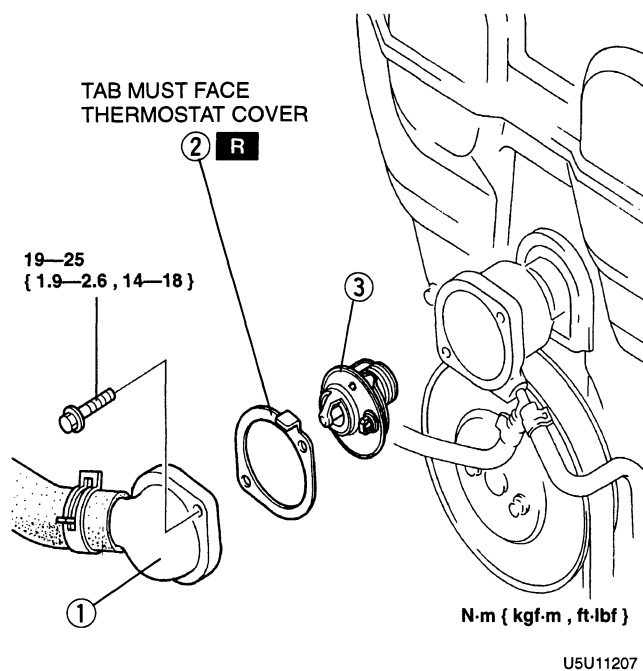
5	Cooling fan motor connector, condenser fan motor connector
6	Cooling fan, condenser fan
7	Radiator

THERMOSTAT REMOVAL / INSTALLATION

U5U112AG

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Connect the negative battery cable.
6. Fill the radiator with the specified amount and type of engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
7. Check for leaks.

COOLING SYSTEM



1	Thermostat cover
2	Thermostat cover gasket
3	Thermostat

THERMOSTAT INSPECTION

U5U112AM

1. Visually check that the thermostat valve is airtight.
2. Place the thermostat and a thermometer in water.
3. Heat the water and check the following:

Initial-opening temperature

Main: 86.5—89.5 °C { 188—193 °F }

Sub: 83.5—86.5 °C { 183—187 °F }

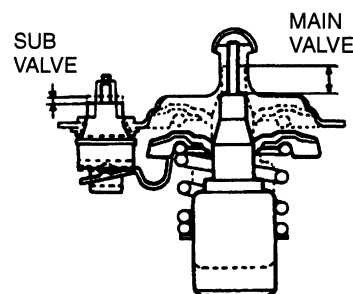
Full-open temperature

100 °C { 212 °F }

Full-open lift

Main: 8.0 mm { 0.31 in } min.

Sub: 1.5 mm { 0.06 in } min.



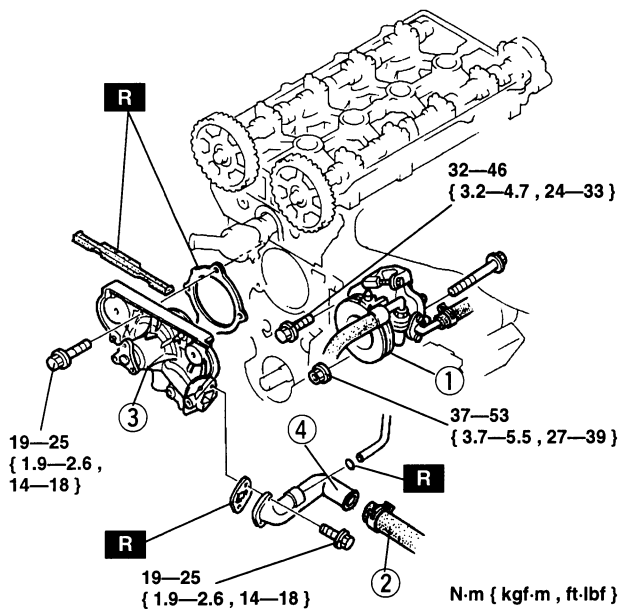
U5U11208

WATER PUMP REMOVAL / INSTALLATION

U5U112AH

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
3. Remove the timing belt. (Refer to 01-10 TIMING BELT REMOVAL / INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal indicated in the table.
6. Install the timing belt. (Refer to 01-10 TIMING BELT REMOVAL / INSTALLATION.)
7. Fill the radiator with the specified amount and type of engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT.)
8. Check for leaks.

COOLING SYSTEM



U5U11209

1	P/S oil pump ☞ Removal Note
2	Water hose
3	Water pump
4	Water inlet pipe

P/S Oil Pump Removal Note

1. Remove the P/S oil pump with the hoses still connected. (Refer to 06-10 POWER STEERING OIL PUMP REMOVAL / INSTALLATION.)
2. Position the pump away from the water pump and affix it with wire.

COOLING FAN MOTOR INSPECTION

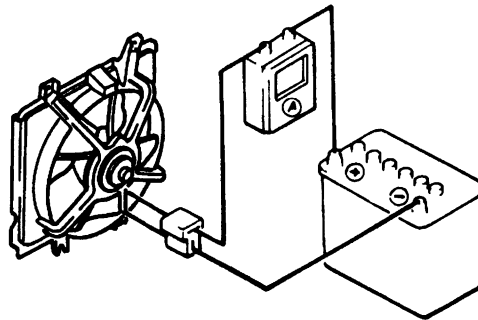
U5U112AJ

1. Check that the battery is fully charged.
2. Disconnect the cooling fan motor connector.
3. Connect the battery and an ammeter to the cooling fan motor connector.
4. Verify that current is as specified.

Current (A)

MT: 5.9 + 10% MAX

AT: 6.7 + 10% MAX



U5U11210

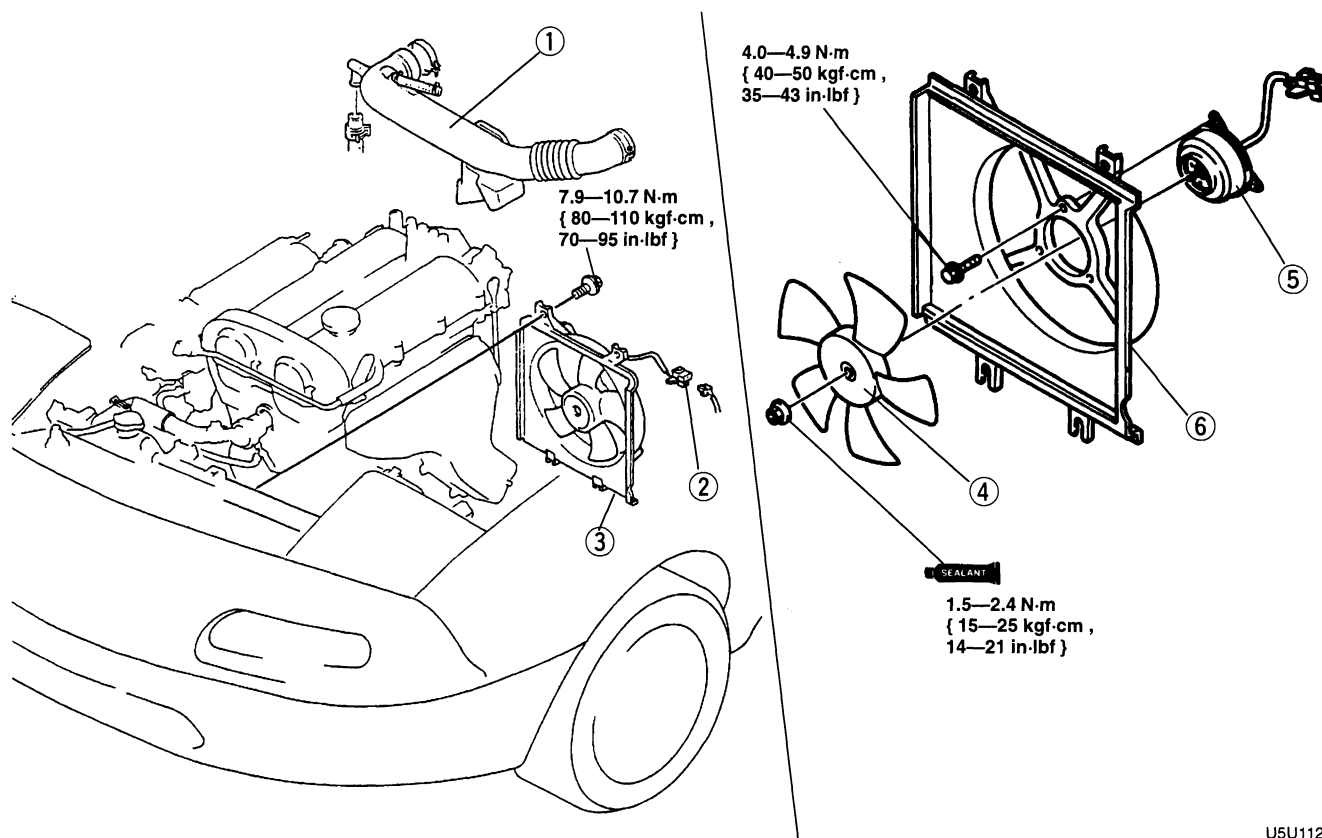
5. If current is not within the specification and/or the cooling fan does not turn smoothly, replace the cooling fan motor.

COOLING SYSTEM

COOLING FAN MOTOR REPLACEMENT

U5U112AK

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal indicated in the table.



U5U11211

1	Air intake pipe
2	Cooling fan motor connector
3	Cooling fan component

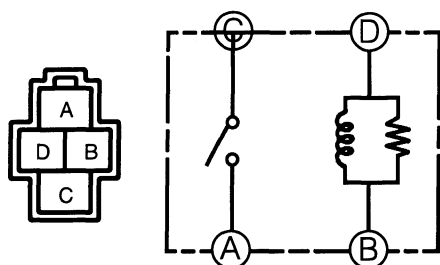
4	Cooling fan blade
5	Cooling fan motor
6	Cooling fan cowl

COOLING FAN RELAY INSPECTION

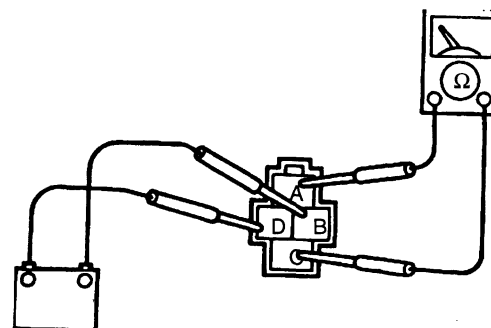
U5U112AL

1. Check continuity as shown by using an ohmmeter.
2. Apply battery positive voltage between terminals B and D. Check for continuity between terminals A and C.

Terminal	Continuity
A—C	No
B—D	Yes



U5U11212



U5U11213

3. If there is no continuity, replace the cooling fan relay.

01-13 INTAKE-AIR SYSTEM

INTAKE-AIR SYSTEM

REMOVAL / INSTALLATION	01-13-1
AIR VALVE INSPECTION	01-13-2
IDLE AIR CONTROL VALVE INSPECTION	01-13-2

ACCELERATOR PEDAL

REMOVAL / INSTALLATION	01-13-3
ACCELERATOR CABLE INSPECTION / ADJUSTMENT	01-13-3

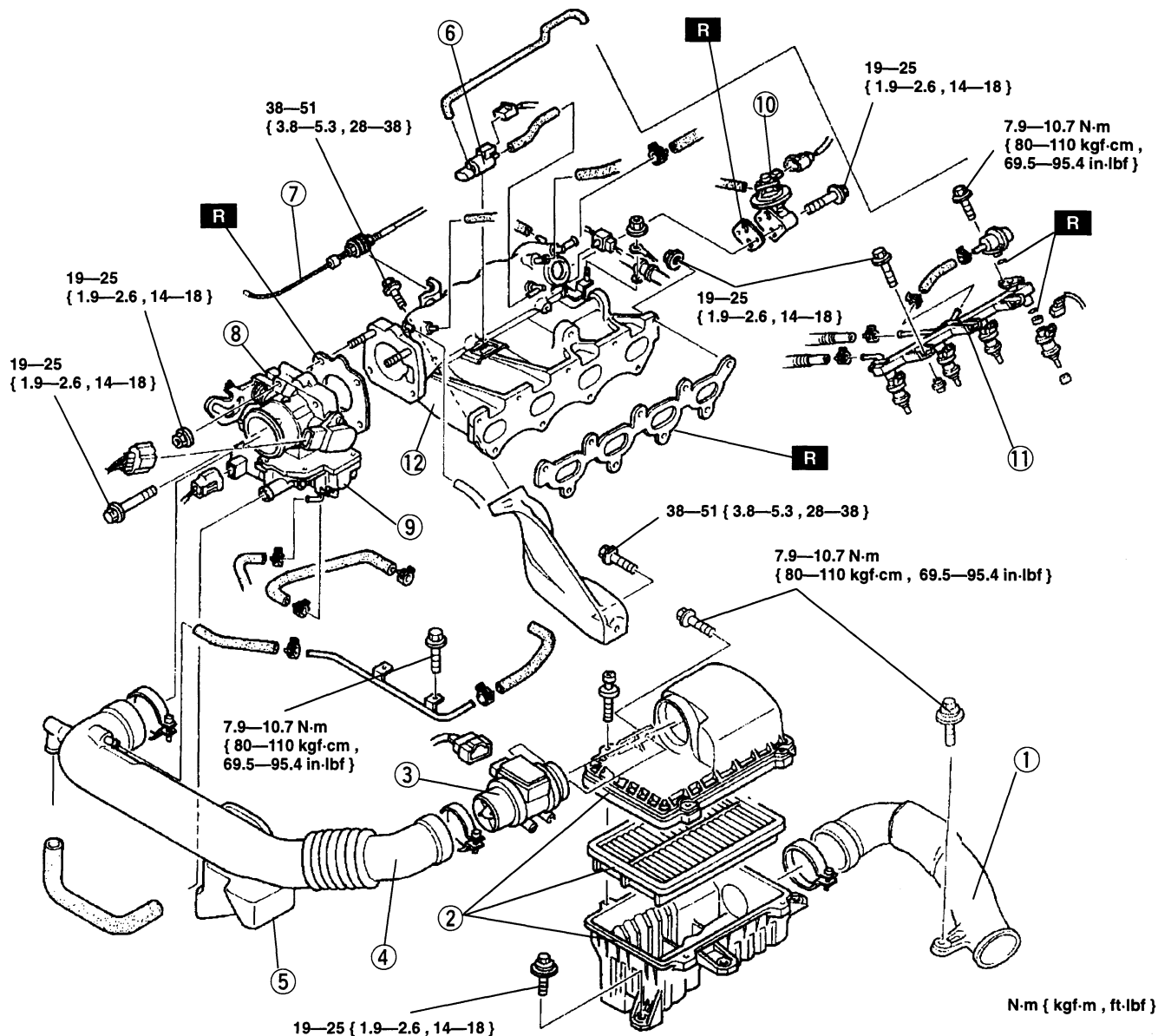
INTAKE-AIR SYSTEM REMOVAL / INSTALLATION

U5U113AA

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 01-14 FUEL SYSTEM PRECAUTION, Fuel Line Safety Procedures.)

- Drain the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT, Draining.)
- Remove in the order indicated in the table.
- Install in the reverse order of removal indicated in the table.
- Refill the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT, Refilling.)



INTAKE-AIR SYSTEM

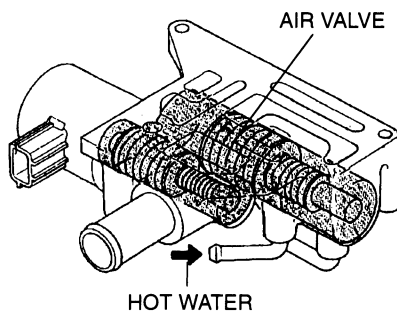
1	Fresh-air duct
2	Air cleaner
3	Mass air flow sensor
4	Air hose
5	Resonance chamber
6	PRC solenoid valve

7	Accelerator cable
8	Throttle body
9	BAC valve
10	EGR valve
11	Fuel distributor
12	Intake manifold

AIR VALVE INSPECTION

U5U113AB

1. Remove the BAC valve.
2. Circulate water in the BAC valve coolant passage to cool the air valve.
3. Circulate hot water in the BAC valve coolant passage and verify that the air valve operates.
4. If not, replace the BAC valve.



U5U11302

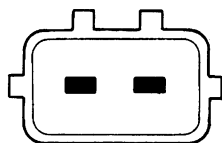
IDLE AIR CONTROL VALVE INSPECTION

U5U113AC

1. Disconnect the idle air control valve connector.
2. Connect an ohmmeter between the terminals of the idle air control valve and measure the resistance.

Resistance
10.7—12.3 Ω [20 °C { 68 °F }]

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



U5U11303

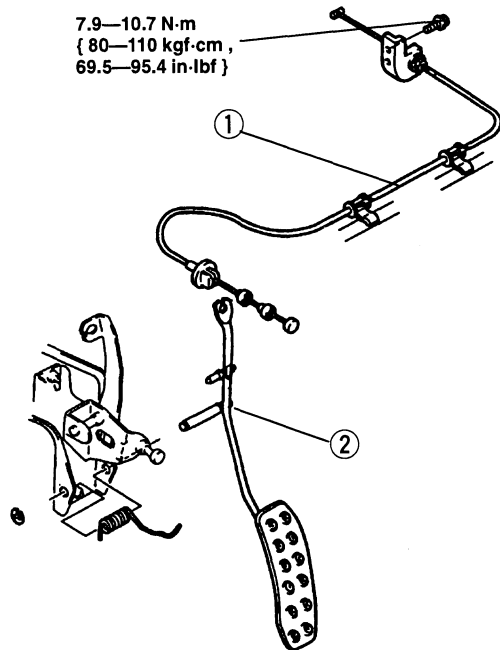
INTAKE-AIR SYSTEM

ACCELERATOR PEDAL REMOVAL / INSTALLATION

U5U113AD

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

1	Accelerator cable
2	Accelerator pedal



U5U11304

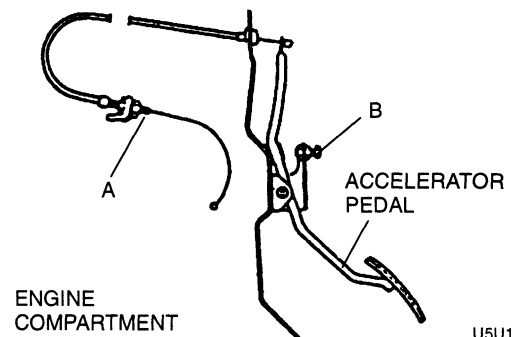
ACCELERATOR CABLE INSPECTION / ADJUSTMENT

U5U113AE

1. Depress the accelerator pedal to the floor and check that the throttle valve is fully opened. Adjust with bolt B, if necessary.
2. Measure the free play of the accelerator cable.

Free play
1—3 mm { 0.04—0.11 in }

3. If not as specified, adjust by turning locknut A.



U5U11305

01-14 FUEL SYSTEM

FUEL SYSTEM PRECAUTION	01-14-1
Fuel Pressure Release and Servicing	
Fuel System	01-14-1
Fuel Line Safety Procedures	01-14-1
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Fuel Pump Assembly Note	01-14-6
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REMOVAL / INSTALLATION	01-14-8
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PRESSURE REGULATOR	
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FUEL SYSTEM PRECAUTION

Fuel Pressure Release and Servicing Fuel System

Warning

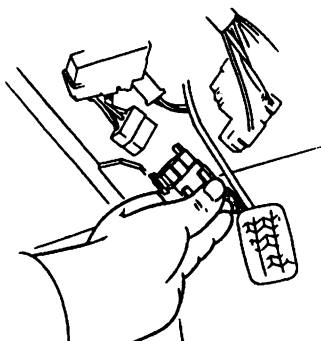
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**
- Fuel in the fuel system is under high pressure when the engine is not running.

Warning

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

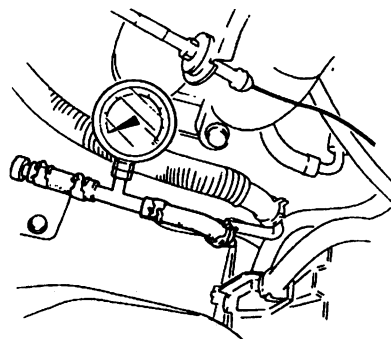
Fuel Line Safety Procedures

1. Release the fuel pressure before disconnecting a fuel line.
 - (1) Disconnect the fuel pump relay connector.



U5U11401

- (2) Start the engine.
- (3) After the engine stalls, turn the ignition switch to OFF.
- (4) Reconnect the fuel pump relay connector.
2. Avoid leakage.
 - (1) When disconnecting a fuel line hose, wrap a rag around it to protect against fuel leakage.
 - (2) Plug the hose after removal.
3. Install hose clamps to secure the fuel pressure gauge connections.



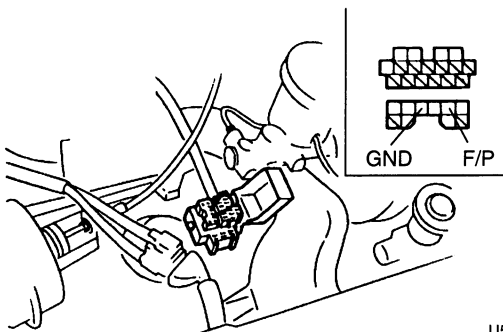
U5U11615

Priming Fuel System

After releasing the fuel system pressure for repairs or inspection, the system must be primed to avoid excessive cranking when first starting the engine. Follow the steps below.

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

FUEL SYSTEM



2. Turn the ignition switch to ON for **approx. 10 sec.** and check for fuel leaks.
3. Turn the ignition switch to OFF and remove the jumper wire.

SYSTEM INSPECTION

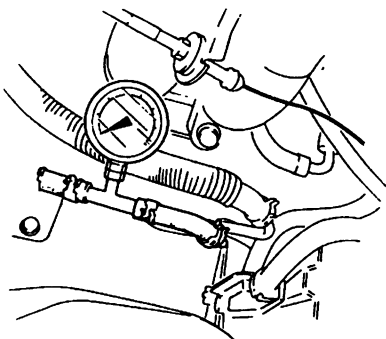
U5U114AN

Fuel Pressure Hold Inspection

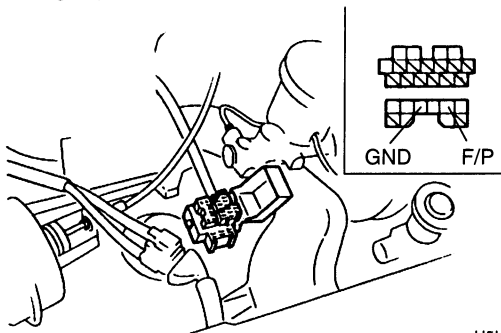
Warning

- **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 "Fuel Line Safety Procedures". (Refer to 01-14 FUEL SYSTEM PRECAUTION, Fuel Line Safety Procedures.)**

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



3. Connect the negative battery cable.
4. Connect data link connector terminals F/P and GND by using a jumper wire.



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

Fuel pressure

More than 147 kPa { 1.5 kgf/cm² , 21 psi }

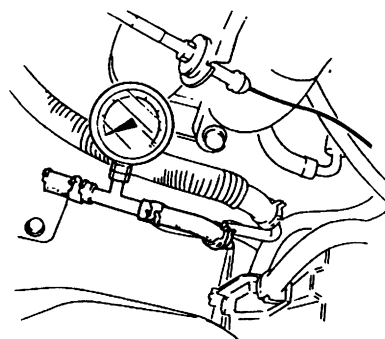
8. If not as specified, perform the following inspections.
 - Fuel pump hold pressure
 - Pressure regulator hold pressure
 - Fuel injector fuel leakage

Fuel Line Pressure Inspection

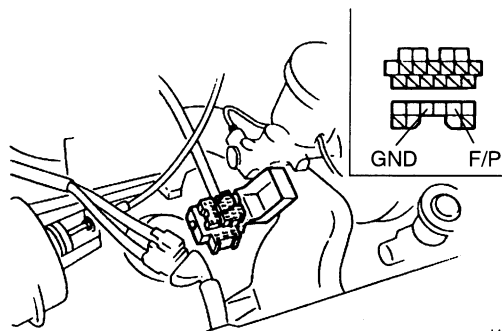
Warning

- **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 "Fuel Line Safety Procedures". (Refer to 01-14 FUEL SYSTEM PRECAUTION, Fuel Line Safety Procedures.)**

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



3. Connect the negative battery cable.
4. Connect data link connector terminals F/P and GND by using a jumper wire.



FUEL SYSTEM

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

Fuel line pressure

265—313 kPa { 2.7—3.2 kgf/cm² , 39—45 psi }

Condition	Action
Pressure low	Check fuel pump maximum pressure. If as specified, fuel line or fuel filter might be clogged or restricted.
Pressure high	Replace the pressure regulator

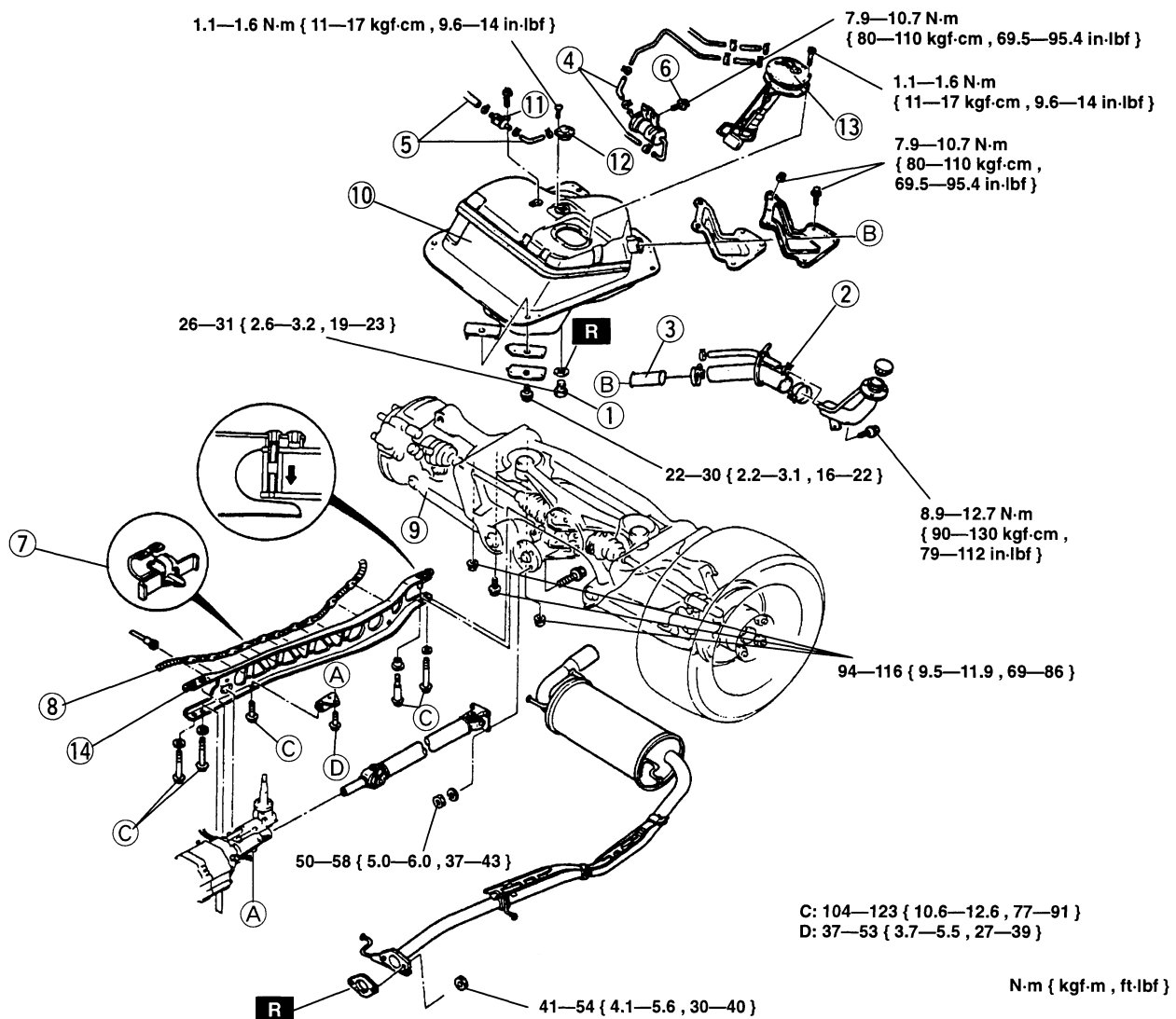
FUEL TANK REMOVAL / INSTALLATION

U5U114AB

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 the skin and eyes. To prevent this, always complete the “Fuel Line Safety Procedures”. (Refer to 01-14 FUEL SYSTEM PRECAUTION, Fuel Line Safety Procedure.)
- 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. Disconnect the negative battery cable.
2. Remove the main silencer.
3. Remove the power plant frame. (Refer to 05-11 TRANSMISSION REMOVAL / INSTALLATION.)
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal indicated in the table.



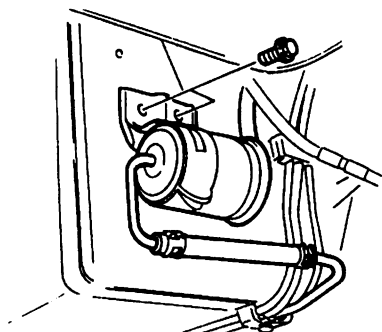
U5U11402

FUEL SYSTEM

1	Drain plug
2	Fuel filler hose ☞ Installation Note
3	Nonreturn valve ☞ Installation Note
4	Fuel hose ☞ Installation Note
5	Evaporative hose ☞ Installation Note
6	Fuel filter bolt ☞ Removal Note
7	Brake pipe joint ☞ Removal Note
8	Battery cable ☞ Removal Note
9	Rear crossmember component ☞ Removal Note
10	Fuel tank
11	Two-way check valve
12	Rollover valve
13	Fuel pump
14	Power plant frame ☞ 05-11 TRANSMISSION REMOVAL / INSTALLATION, Power Plant Frame Removal Note ☞ 05-11 TRANSMISSION REMOVAL / INSTALLATION, Power Plant Frame Installation Note

Fuel Filter Bolts Removal Note

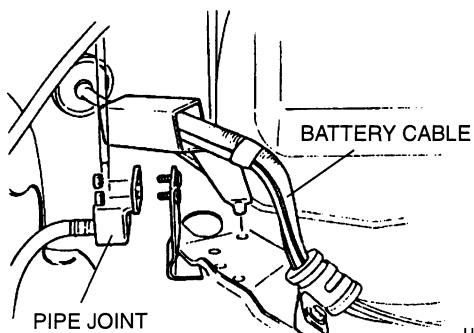
1. Remove the fuel filter cover.
2. Remove the fuel filter bolts.
3. Remove the fuel filter with the fuel hoses still connected.



U5U11403

Brake Pipe Joint Removal Note

1. Remove the brake pipe joint nuts.
2. Remove the brake pipe joint with the brake pipe and brake hose still connected.



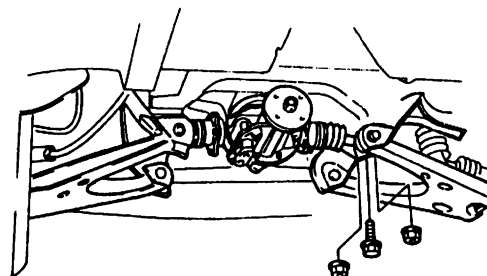
U5U11404

Battery Cable Removal Note

- Remove the battery cable clamp as shown in the figure.

Rear Crossmember Component Removal Note

1. Support the rear crossmember component by using a transmission jack.
2. Remove the rear crossmember mounting bolts and nuts.
3. Lower the rear crossmember component.



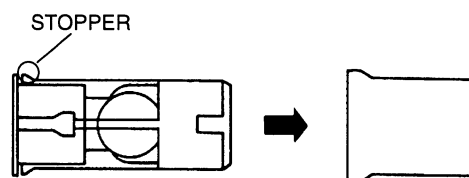
U5U11405

Evaporative Hoses, Fuel Hoses, Fuel Filler Hoses Installation Note

- Push the ends of the evaporative hoses onto the two-way check valve and rollover valve **at least 20 mm { 0.8 in }**.
- Push the ends of the main fuel hose, fuel return hose, breather hose onto the fuel tank fittings **at least 25 mm { 1.0 in }**.
- Push the fuel filler hose onto the fuel tank pipe and filler pipe **at least 35 mm { 1.4 in }**.

Nonreturn Valve Installation Note

- Insert the nonreturn valve into the fuel filler hose until its stopper completely fits the fuel filler hose.



U5U11427

FUEL SYSTEM

NONRETURN VALVE INSPECTION

U5U114AP

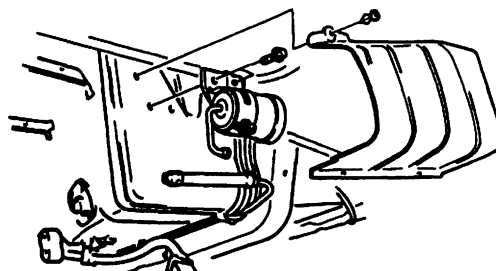
1. Tilt the nonreturn valve and verify that the ball inside moves smoothly under its own weight.
2. If not as specified, replace the nonreturn valve.

FUEL FILTER (HIGH PRESSURE SIDE) REMOVAL / INSTALLATION

U5U114AC

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 the skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures". (Refer to 01-14 FUEL SYSTEM PRECAUTION, Fuel Line Safety Procedures.)



U5U11406

1. Raise the rear of the vehicle and support it with safety stands.
2. Remove the fuel filter protector.
3. Disconnect the fuel hoses from the fuel filter.
4. Remove the fuel filter and bracket.
5. Install in the reverse order of removal.
6. Verify that the fuel hoses are pushed fully onto the fuel filter nipples.

Tightening torque

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

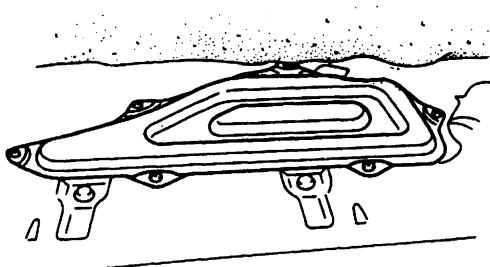
FUEL PUMP DISASSEMBLY / ASSEMBLY

U5U114AD

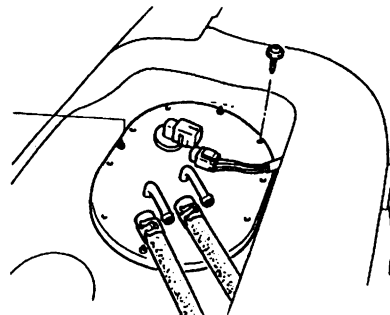
Warning

- Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate the skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures". (Refer to 01-14 FUEL SYSTEM PRECAUTION, Fuel Line Safety Procedures.)

1. Remove the rear package trim.
2. Remove the service hole cover.



U5U11619

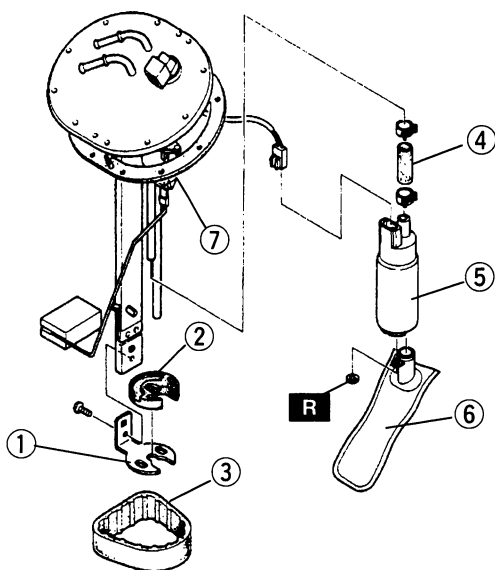


U5U11620

3. Remove the fuel pump cover.
4. Disconnect the fuel pump connector.
5. Disconnect the fuel hoses.

6. Disassemble the fuel pump in the order indicated in the table.
7. Assemble in the reverse order of disassembly.

FUEL SYSTEM

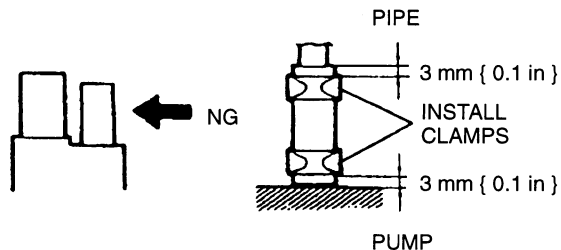


U5U11407

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

Fuel Hose Assembly Note

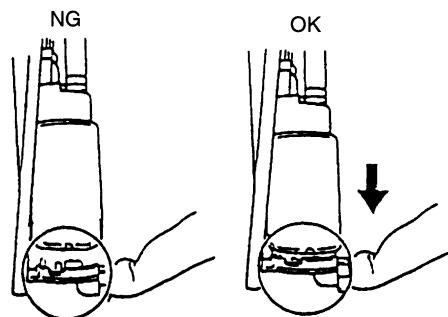
1. Do not apply excessive side force when pushing the fuel hose onto the fuel pump nipple.
2. Install the clamps as shown.



U5U11408

Fuel Pump Assembly Note

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



U5U11409

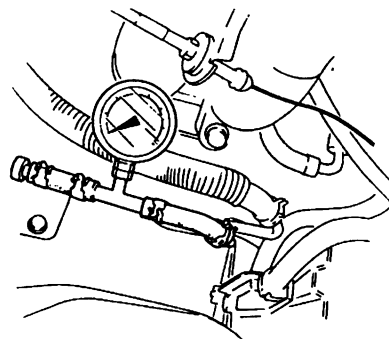
FUEL PUMP INSPECTION

Fuel Pump Maximum Pressure

Warning

- Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate the skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures". (Refer to 01-14 FUEL SYSTEM PRECAUTION, Fuel Line Safety Procedures.)

1. Disconnect the negative battery cable.
2. Connect a fuel pressure gauge to the fuel main pipe and plug the outlet of the fuel pressure gauge as shown. (Install clamps as shown.)

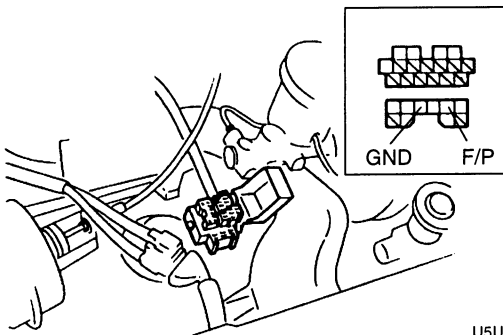


U5U114AE

U5U11410

3. Connect the negative battery cable.
4. Connect data link connector terminals F/P and GND by using a jumper wire.

FUEL SYSTEM



U5U11411

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

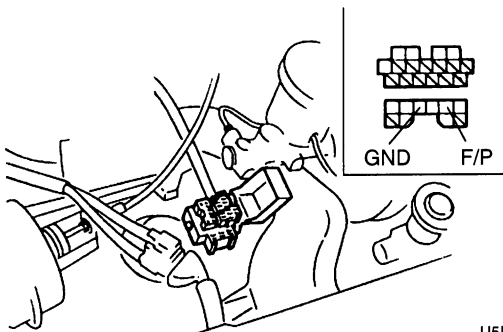
Fuel pump maximum pressure

481—657 kPa { 4.9—6.7 kgf/cm² , 70—95 psi }

7. Turn the ignition switch to OFF and disconnect the jumper wire.
8. If not as specified, replace the fuel pump.

Fuel Pump Operation

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

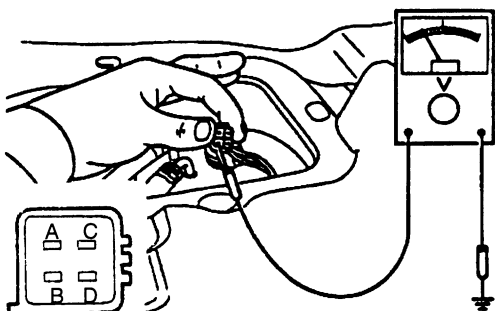


U5U11621

2. Remove the fuel filler cap.
3. Turn the ignition switch to ON.
4. Listen for operational sound of the fuel pump at the filler inlet.
5. Install the fuel filler cap.
6. If no sound was heard, measure the voltage between fuel pump harness side connector, terminal B and a ground.

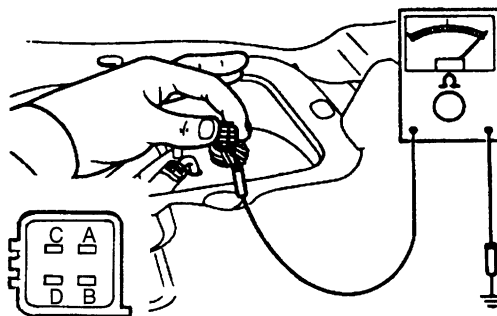
Voltage

Battery positive voltage



U5U11622

7. If not correct, check the fuel pump relay and its circuits.
8. If the voltage is normal, check for continuity between fuel pump connector terminal B and a ground.



U5U11623

9. If there is continuity, replace the fuel pump.
10. If no continuity, repair the ground circuit.

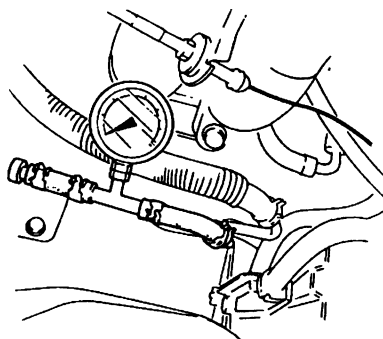
Hold Pressure

Perform this inspection if the fuel pressure hold inspection is not as specified.

Warning

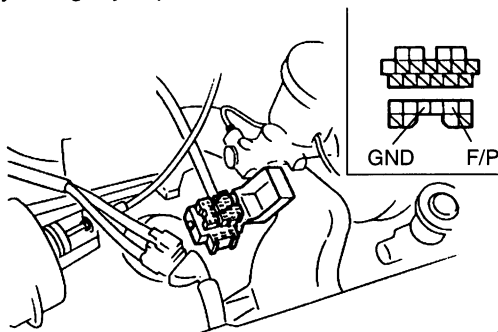
- **Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures". (Refer to 01-14 FUEL SYSTEM PRECAUTION, Fuel Line Safety Procedures.)**

1. Disconnect the negative battery cable.
2. Connect a fuel pressure gauge to the fuel main pipe and plug the outlet of the fuel pressure gauge as shown. (Install clamps as shown.)



U5U11624

3. Connect the negative battery cable.
4. Connect data link connector terminals F/P and GND by using a jumper wire.



U5U11625

FUEL SYSTEM

- Turn the ignition switch to ON for 10 sec. to operate the fuel pump.
- Turn the ignition switch to OFF and disconnect the jumper wire.
- Observe the fuel pressure after 5 min.

Fuel pressure

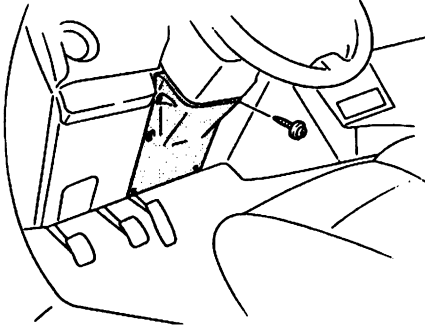
More than 343 kPa { 3.5 kgf/cm² , 50 psi }

- If not as specified, replace the fuel pump.

U5U114AF

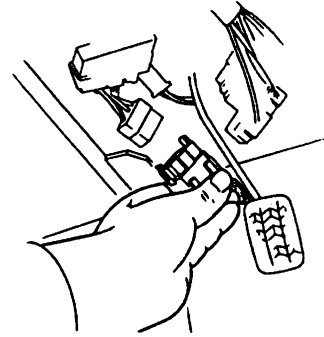
FUEL PUMP RELAY REMOVAL / INSTALLATION

- Remove the undercover.



U5U11412

- Remove the fuel pump relay.

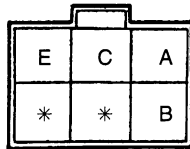
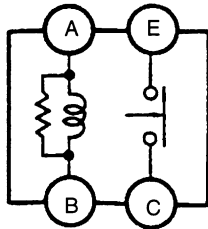


U5U11626

- Install in the reverse order of removal.

FUEL PUMP RELAY INSPECTION

- Check for continuity between the fuel pump relay terminals by using an ohmmeter.



U5U11413

U5U114AG

○—○ : Continuity

Step	A	B	C	E
1	○—○	○—○		
2	B+	Ground	○—○	○—○

U5U11414

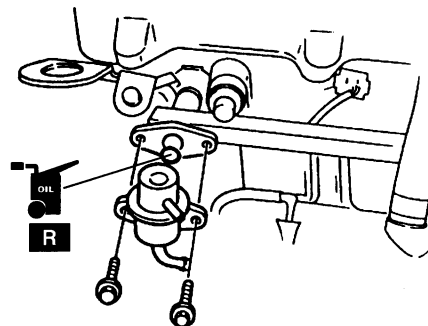
- If not as specified, replace the fuel pump relay.

PRESSURE REGULATOR REMOVAL / INSTALLATION

Warning

- Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate the skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures". (Refer to 01-14 FUEL SYSTEM PRECAUTION, Fuel Line Safety Procedures.)

- Disconnect the vacuum hose.
- Disconnect the fuel return hose.
- Remove the pressure regulator.
- Use new O-ring.



U5U114AH

U5U11415

- 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 SYSTEM

PRESSURE REGULATOR INSPECTION

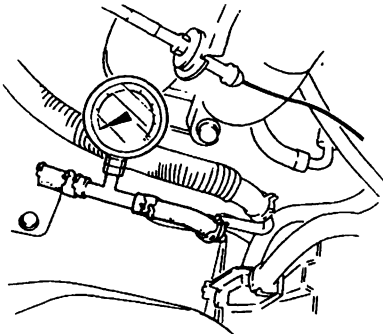
U5U114AJ

Fuel Line Pressure

Warning

- Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate the skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures". (Refer to 01-14 FUEL SYSTEM PRECAUTION, Fuel Line Safety Procedures.)

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



U5U11627

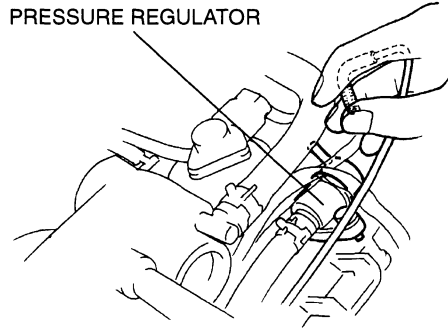
3. Connect the negative battery cable.
4. Start the engine and run it at idle.
5. Measure the fuel line pressure.

Fuel line pressure

197—245 kPa { 2.0—2.5 kgf/cm² , 29—35 psi }

6. If not as specified, carry out the fuel line pressure inspection (Refer to 01-14 SYSTEM INSPECTION, Fuel Line Pressure Inspection.) and inspect the PRC solenoid valve. (Refer to 01-14 PRC SOLENOID VALVE INSPECTION.)
7. Disconnect the vacuum hose from the pressure regulator.

PRESSURE REGULATOR



U5U11428

8. Measure the fuel line pressure.

Fuel line pressure

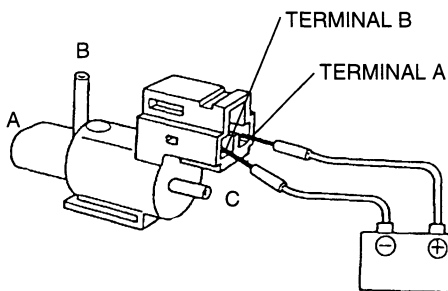
Approx. 284 kPa { 2.9 kgf/cm² , 41 psi }

9. If not as specified, replace the pressure regulator.

PRC SOLENOID VALVE INSPECTION

U5U114AK

1. Check for air flow between each port under the following conditions.



U5U11416

○—○ : Continuity ○—○ : Air flow

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

U5U11417

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

FUEL INJECTOR REMOVAL / INSTALLATION

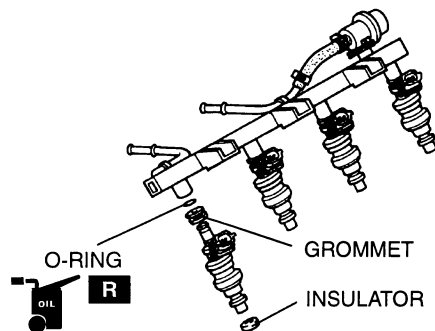
U5U114AL

Warning

- Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate the skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures". (Refer to 01-14 FUEL SYSTEM PRECAUTION, Fuel Line Safety Procedures.)

1. Disconnect the negative battery cable.
2. Disconnect the PCV hose.
3. Disconnect the vacuum hose.
4. Disconnect the fuel injector connectors.
5. Remove the fuel distributor and the pressure regulator.
6. Remove the grommets, fuel injectors, and insulators.

FUEL SYSTEM



U5U11418

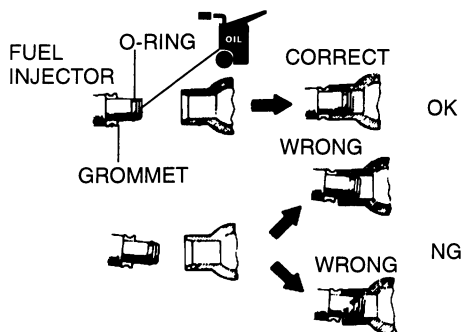
7. Install in the reverse order of removal, referring to installation note.

Tightening torque

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

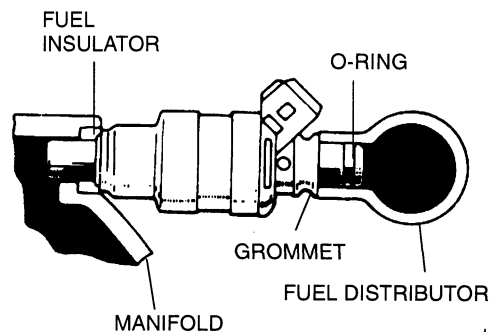
Fuel Injector Installation Note

1. Use new fuel injector O-rings.
2. Apply a small amount of clean engine oil to the O-rings before installing.



U5U11419

3. Install the fuel injectors.



U5U11420

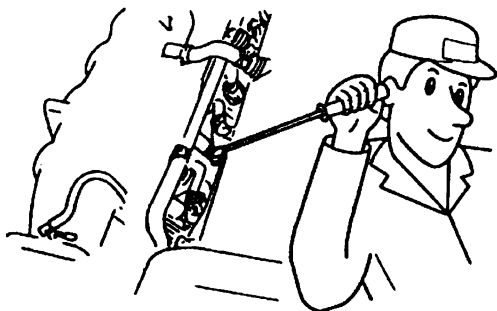
PCV Hose and Vacuum Hose Installation Note

- Push the ends of the PCV hose, vacuum hose onto the fuel injector fittings **at least 25 mm { 1.0 in }**.
- Install clamps leaving **at least 2—8 mm { 0.1—0.3 in }** from the hose ends.

FUEL INJECTOR INSPECTION

Operation Check

1. Warm up the engine and run it at idle.
2. Listen for operational sound of the fuel injector by using a screwdriver or a soundscope.

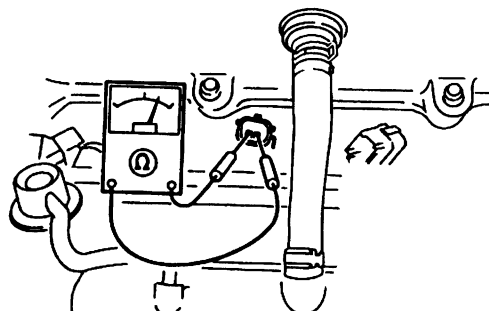


U5U11629

3. If not sound is heard, measure fuel injector resistance.
4. If the fuel injector resistance is OK, check wiring to the fuel injector and ECM terminals 4U, 4V, 4W and 4X voltage.

Fuel Injector Resistance Inspection

1. Disconnect the fuel injector harness.
2. Measure resistance of the fuel injector with an ohmmeter.



U5U11421

Resistance

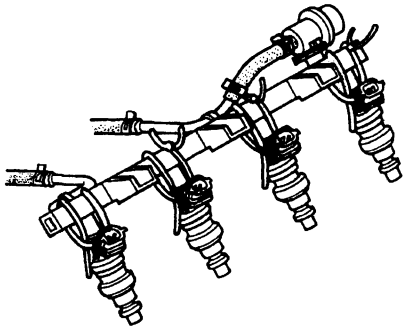
12—16 Ω [at 20 °C { 68 °F }]

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

FUEL SYSTEM

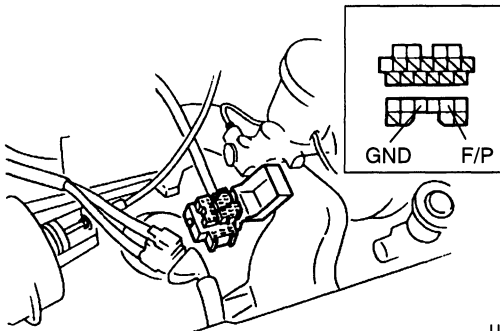
Fuel Leakage Test

1. Firmly affix the fuel injectors to the fuel distributor with wire.



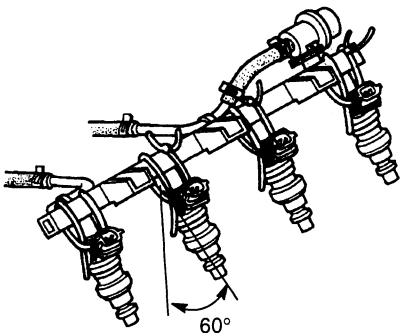
U5U11422

2. Disconnect the fuel injector connectors.
3. Remove the fuel distributor and fuel injectors together with the fuel hoses connected.
4. Connect data link connector terminals F/P and GND by using a jumper wire.



U5U11423

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.



U5U11424

7. If fuel leaks from the fuel injector, replace it.

Leakage specification
1 drop/2 minutes

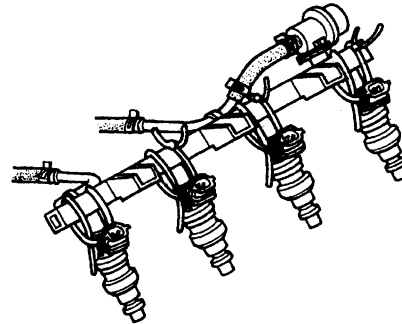
8. If not as specified, replace the fuel injectors.
9. Turn the ignition switch to OFF and remove the jumper wire.

Injection Volume Test

Warning

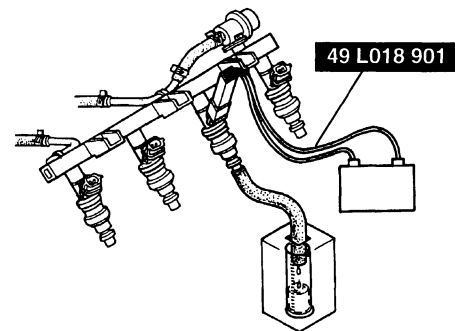
- **Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.**

1. Firmly affix the fuel injectors to the fuel distributor with wire.



U5U11425

2. Disconnect the fuel injector connectors.
3. Remove the fuel distributor and fuel injectors together with the fuel hoses connected.
4. Connect the **SST** to the battery and an fuel injector.



U5U11426

5. Check the injection volume by using a graduated container.

Injection volumes

59—76 ml { 59—76 cc , 2.0—2.5 fl oz }/15 sec.

6. If not as specified, replace the fuel injectors.

01-15 EXHAUST SYSTEM

EXHAUST SYSTEM INSPECTION 01-15-1

EXHAUST SYSTEM

REMOVAL / INSTALLATION 01-15-1

EXHAUST SYSTEM INSPECTION

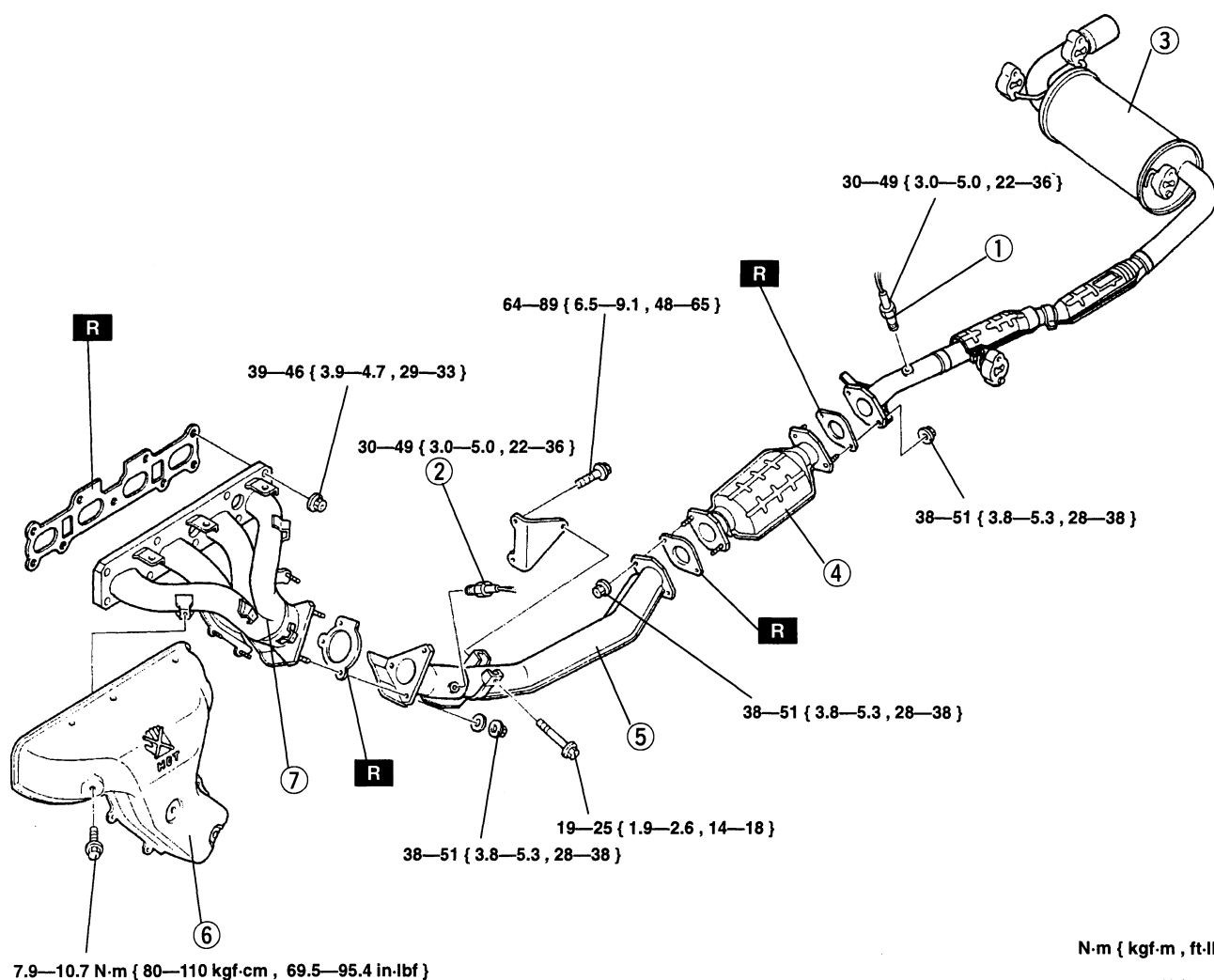
U5U115AA

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

U5U115AB

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



1	Heated oxygen sensor (Rear)
2	Heated oxygen sensor (Front)
3	Main silencer
4	Three way catalytic converter

5	Front exhaust pipe
6	Exhaust manifold insulator
7	Exhaust manifold

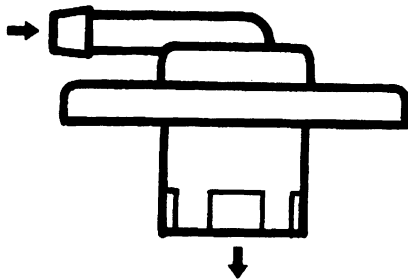
01-16 EMISSION SYSTEM

ROLLOVER VALVE INSPECTION	01-16-1
CHECK VALVE (TWO-WAY) INSPECTION	01-16-1
CHECK VALVE (THREE-WAY) INSPECTION	01-16-1
CHARCOAL CANISTER INSPECTION .	01-16-2
PCV VALVE INSPECTION	01-16-2

PURGE SOLENOID VALVE INSPECTION	01-16-2
EGR VALVE INSPECTION	01-16-3
EGR SOLENOID VALVE INSPECTION .	01-16-3
EGR Solenoid Valve (Vacuum)	01-16-3
EGR Solenoid Valve (Vent)	01-16-3

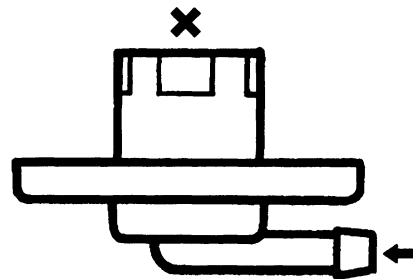
ROLLOVER VALVE INSPECTION

1. Remove the rollover valve.
2. Blow through the valve and verify that air flows in the direction shown.



U5U11601

3. Turn the valve over and blow through the valve. Verify that no air flows.
4. Replace the valve if necessary.



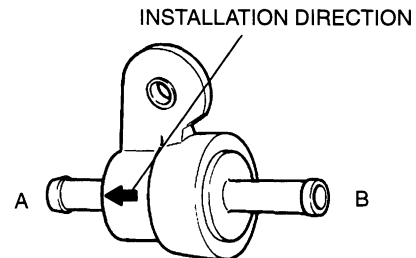
U5U11602

CHECK VALVE (TWO-WAY) INSPECTION

1. Remove the two-way check valve.
2. Check the operation of the valve by using a vacuum pump.

Specification

Apply approx. -2.0 kPa { -15 mmHg , -0.59 inHg } vacuum to port A	Air flow
Apply approx. -5.9 kPa { -44 mmHg , -1.7 inHg } vacuum to port B	Air flow



U5U116AB

U5U11603

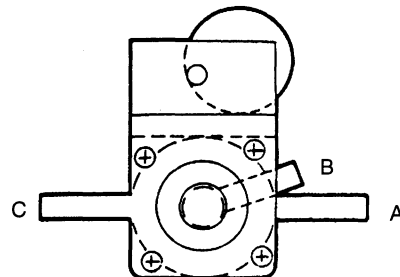
3. If not as specified, replace the two-way check valve.

CHECK VALVE (THREE-WAY) INSPECTION

1. Remove the three-way check valve and plug port C.
2. Check operation of the valve by using a vacuum pump.

Specification

Apply approx. -4.9 kPa { -37 mmHg , -1.5 inHg } vacuum to port A	Air flow
Apply approx. -9.3 kPa { -70 mmHg , -2.8 inHg } vacuum to port B	Air flow



U5U116AC

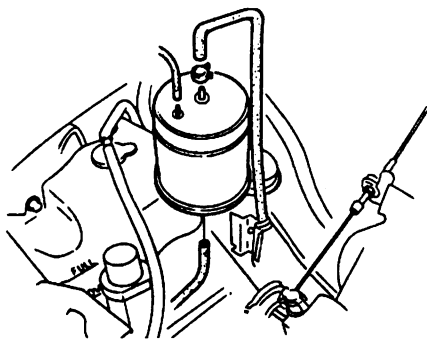
U5U11604

3. If not as specified, replace the three-way check valve.

CHARCOAL CANISTER INSPECTION

U5U116AD

- Visually check for damage and replace the charcoal canister if necessary.

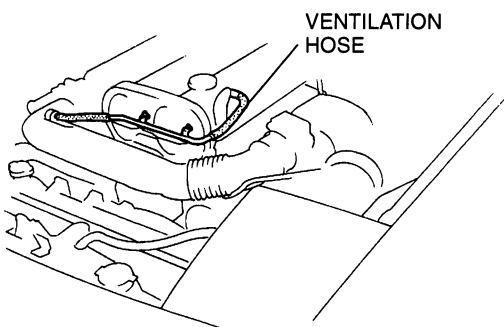


U5U11605

PCV VALVE INSPECTION

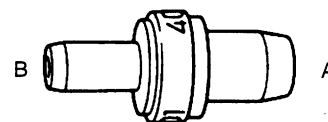
U5U116AE

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Disconnect the PCV valve together with the ventilation hose from the cylinder head cover.



U5U11606

5. Remove the PCV valve.
6. Blow through the valve from port A and verify that air comes out from port B.
7. Blow through the valve from port B and verify that no air comes out from port A.



U5U11607

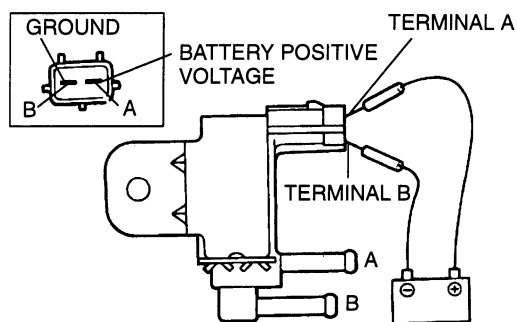
3. Block the PCV valve opening.
4. Verify that vacuum is felt.

8. Replace the PCV valve if necessary.

PURGE SOLENOID VALVE INSPECTION

U5U116AF

1. Remove the purge solenoid valve.
2. Check for air flow between ports of the solenoid valve.



U5U11608

○—○ : Continuity ○==○ : Air flow

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

U5U11609

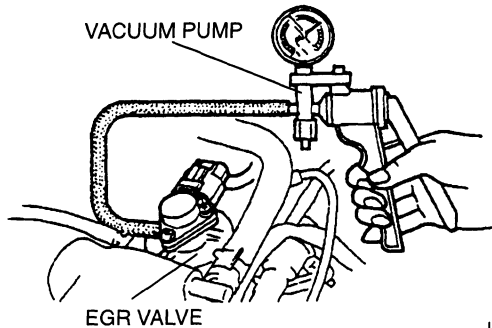
3. If not as specified, replace the purge solenoid valve.

EMISSION SYSTEM

EGR VALVE INSPECTION

U5U116AG

1. Start the engine and let it idle.
2. Connect a vacuum pump as shown and apply vacuum.
3. Verify that the engine runs roughly or stalls at more than the specified vacuum.



U5U11610

Specification

-8.7— -11 kPa

{ -65— -90 mmHg , -2.6— -3.5 inHg }

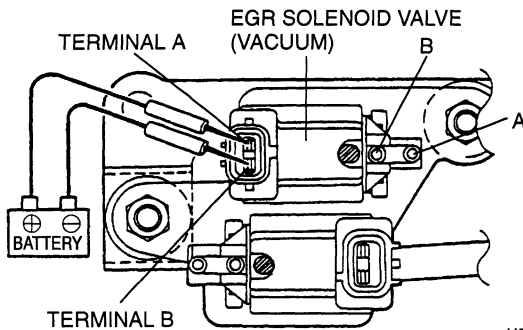
4. If not as specified, replace the EGR valve. (Refer to 01-13 INTAKE-AIR SYSTEM COMPONENTS REMOVAL / INSTALLATION.)

EGR SOLENOID VALVE INSPECTION

U5U116AH

EGR Solenoid Valve (Vacuum)

1. Remove the EGR solenoid valve (vacuum).
2. Check for air flow between ports of the solenoid valve.



U5U11611

○—○ : Continuity ○=○ : Air flow

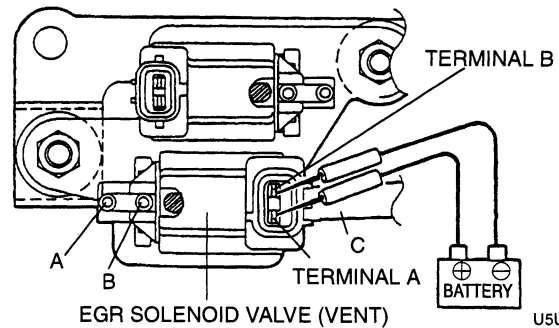
Step	Terminal		Port	
	A	B	A	B
1	○	○		
2	B+	Ground	○	○

U5U11612

3. If not as specified, replace the EGR solenoid valve (vacuum).

EGR Solenoid Valve (Vent)

1. Remove the EGR solenoid valve (vent).
2. Check for air flow between ports of the solenoid valve.



U5U11613

○—○ : Continuity ○=○ : Air flow

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

U5U11614

3. If not as specified, replace the EGR solenoid valve (vent).

01-17 CHARGING SYSTEM

BATTERY

REMOVAL / INSTALLATION 01-17-1

BATTERY INSPECTION 01-17-1

Voltage Inspection 01-17-2

Battery Discharge Test 01-17-2

Terminal and Cable Inspection 01-17-2

BATTERY RECHARGING 01-17-3

BATTERY REPLACEMENT 01-17-3

GENERATOR

REMOVAL / INSTALLATION 01-17-3

GENERATOR

DISASSEMBLY / ASSEMBLY 01-17-4

GENERATOR INSPECTION 01-17-5

Rotor 01-17-5

Stator 01-17-5

Brush 01-17-5

Brush Spring 01-17-6

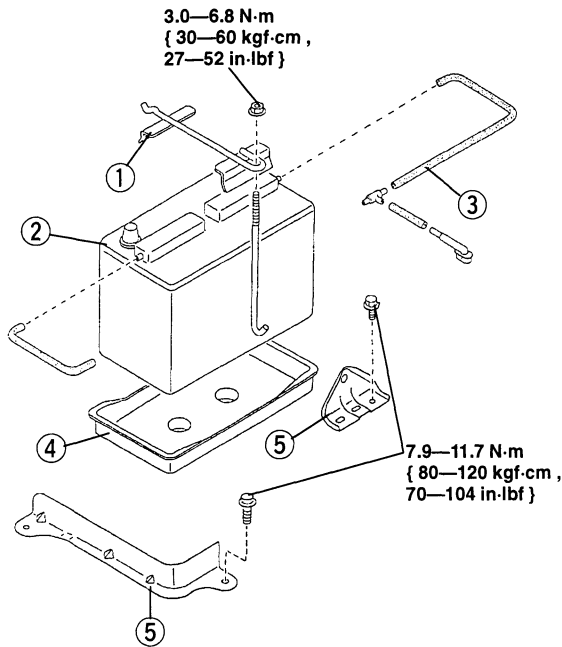
Rectifier 01-17-6

BATTERY REMOVAL / INSTALLATION

U5U117AG

1. Remove the battery cover.
2. Disconnect the battery cables.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.

1	Battery clamp
2	Battery
3	Battery vent hose
4	Battery tray
5	Battery bracket



U5U11715

BATTERY INSPECTION

U5U117AA

Warning

- Hydrogen gas is produced during normal battery operation. A battery-related explosion can cause serious injury. Keep all flames (including cigarettes), heat, and sparks away from the top and surrounding area of open battery cells.

Caution

- To prevent damage to electrical components or the battery, turn all accessories off and stop the engine before performing maintenance or recharging the battery.

- Obtain the code number and deactivate the audio anti-theft system before disconnecting the battery. (Refer to 09-20 ANTI-THEFT SYSTEM SETTING THE CODE NUMBER.)

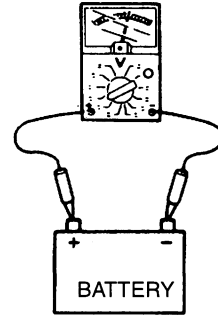
CHARGING SYSTEM

Voltage Inspection

Caution

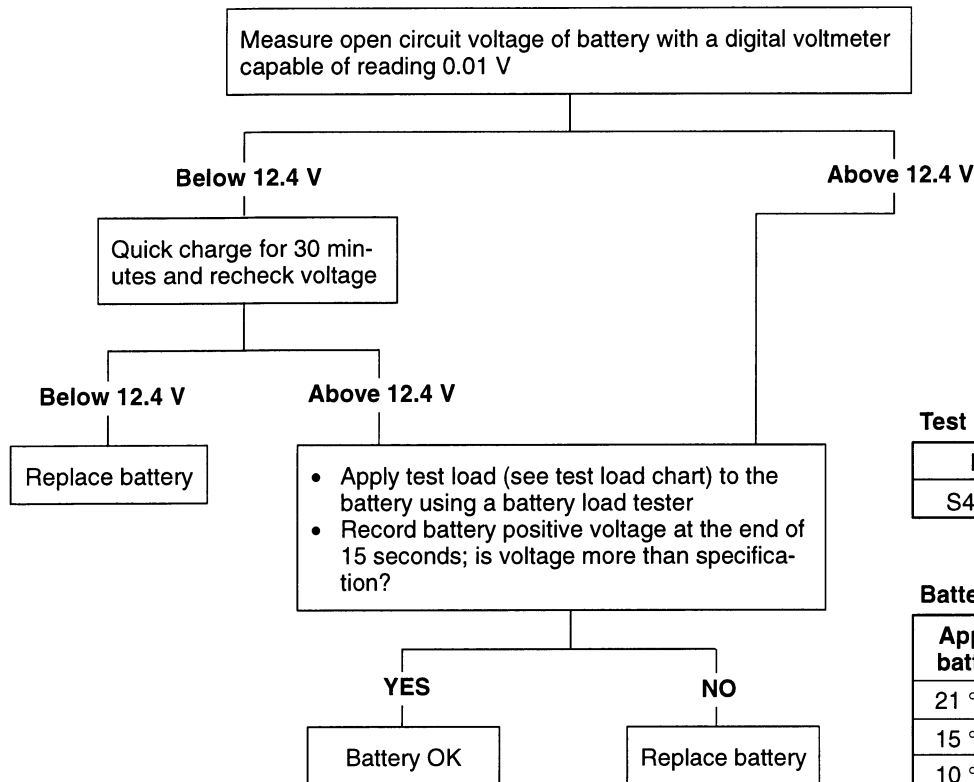
- When disconnecting the battery, remove the negative cable first and install it last to prevent damage to electrical components or the battery.

- Disconnect the battery cables from the battery.
- Connect a voltmeter to the battery.



U5U11701

Battery Discharge Test



Test load

Battery	Load (A)
S46A24L(S)	105

Battery 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

U5U11716

Terminal and Cable Inspection

- Clean and tighten the battery terminals and cables.
- Coat the terminals with grease.

- Inspect for corroded or frayed battery cables.
- Check the rubber protector on the positive terminal for proper coverage.

CHARGING SYSTEM

BATTERY RECHARGING

U5U117AB

Warning

- Hydrogen gas is produced during normal battery operation. A battery-related explosion can cause serious injury. Keep all flames (including cigarettes), heat, and sparks away from the top and surrounding area of open battery cells.

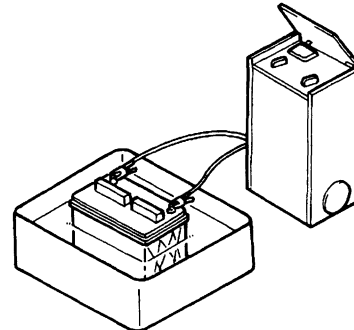
Caution

- Do not quick charge for over 30 minutes. It will damage the battery.

Battery	Slow charge (A)	Quick charge (A)
S46A24L(S)	Under 3	Max. 20

- Remove the battery cover.
- Disconnect the battery cables.

- Remove the battery from the vehicle.
- Place the 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.



U5U11702

- Charge the battery.

BATTERY REPLACEMENT

U5U117AF

Note

- When replacing the battery, replace it with the same type Mazda genuine battery (with vent hose).

GENERATOR REMOVAL / INSTALLATION

U5U117AC

Warning

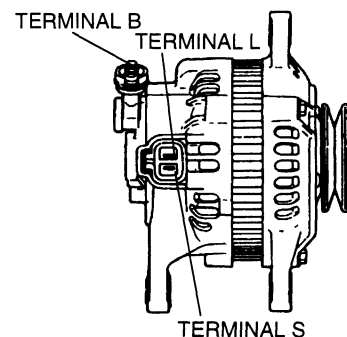
- When the battery cables are connected, touching the vehicle body with generator terminal B will generate sparks. This can cause personal injury, fire, and damage to the electrical components. Always disconnect the battery before performing the following operation.

Caution

- Reversing the battery connections or using high-voltage testers will damage the rectifier.
- Do not start the engine while the connector is disconnected from terminals L and S. It can damage the generator.

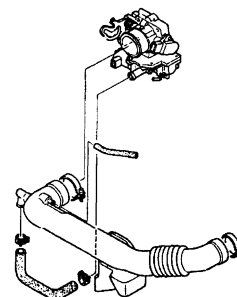
Note

- Battery positive voltage is always present at generator terminal B when the battery is connected.



U5U11703

- Disconnect the negative battery cable.
- Disconnect the power steering pressure switch connector.
- Disconnect the water thermost switch connector.
- Disconnect the IAC valve connector.
- Remove the intake air pipe.



U5U11704

CHARGING SYSTEM

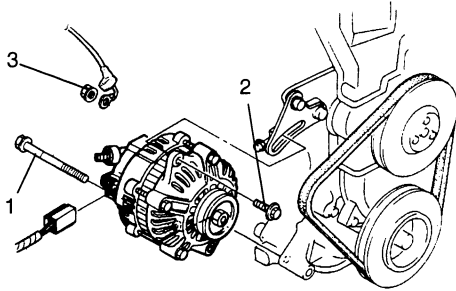
6. Disconnect the wire and connector from the generator.
7. Remove the generator bolts and nut.
8. Remove the generator.
9. Install in the reverse order of removal.

Tightening torque

Bolt 1: 38—51 N·m
 { 3.8—5.3 kgf·m , 28—38 ft·lbf }

Bolt 2: 19—25 N·m
 { 1.9—2.6 kgf·m , 14—18 ft·lbf }

Nut 3: 9.9—14.7 N·m
 { 100—150 kgf·cm , 87—130 in·lbf }

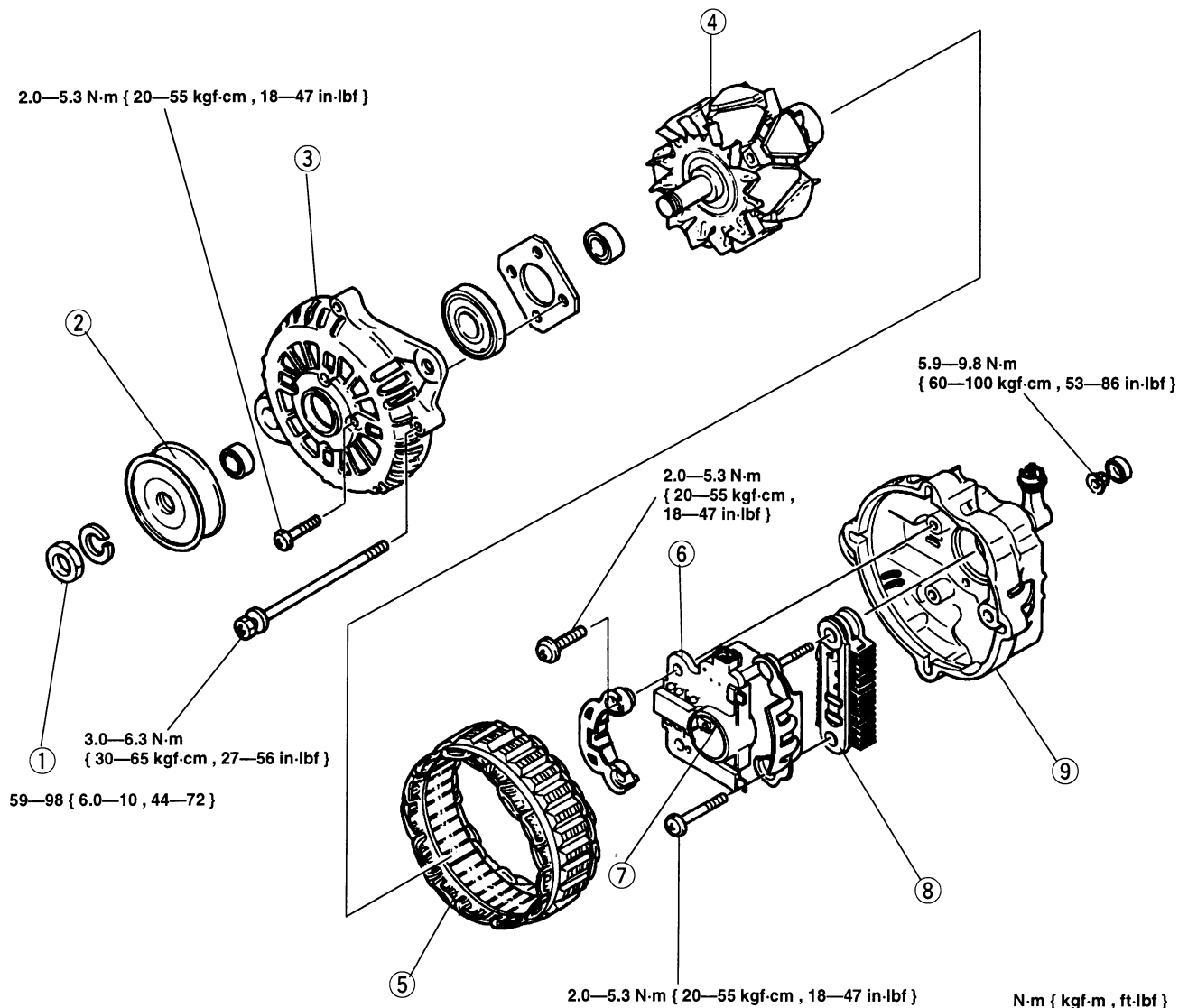


U5U11705

GENERATOR DISASSEMBLY / ASSEMBLY

U5U117AD

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



U5U11706

CHARGING SYSTEM

1	Pulley nut
2	Pulley
3	Front cover
4	Rotor
5	Stator

6	Brush holder
7	Brush
8	Rectifier
9	Rear cover

GENERATOR INSPECTION

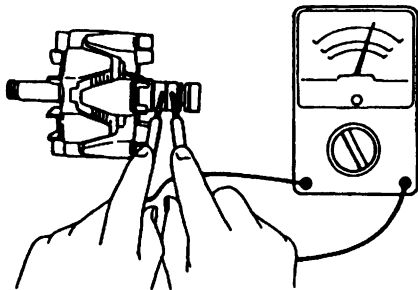
U5U117AE

Rotor

1. Wiring damage
 - (1) Check the resistance between the slip rings with an ohmmeter.

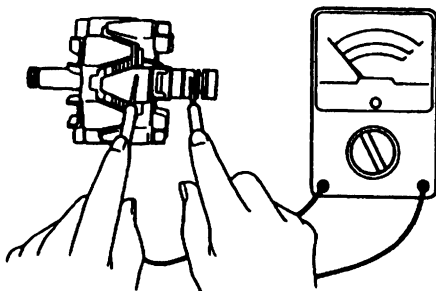
Specification

3.5—4.5 Ω [20 °C { 68 °F }]



U5U11707

- (2) If not within the specification, replace the rotor.
2. Ground of field coil
 - (1) Check for no continuity between each slip ring and the core with an ohmmeter.

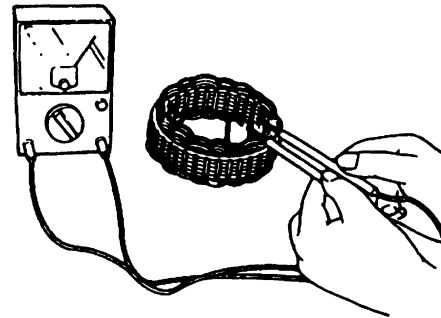


U5U11708

- (2) Replace the rotor if there is continuity.
3. Slip ring surface
 - If the slip ring surface is rough, use fine sandpaper to repair it.

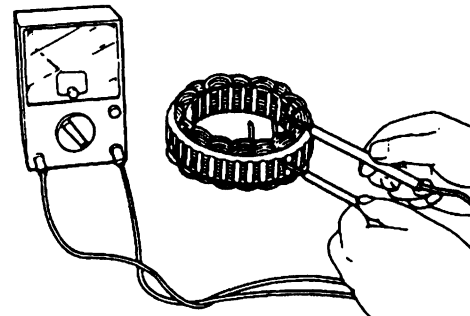
Stator

1. Wiring damage
 - (1) Check for continuity between the stator coil leads with an ohmmeter.



U5U11709

- (2) Replace the stator if there is no continuity.
2. Ground of stator coil
 - (1) Check for no continuity between the stator coil leads and the core with an ohmmeter.



U5U11710

- (2) Replace the stator if there is continuity.

Brush

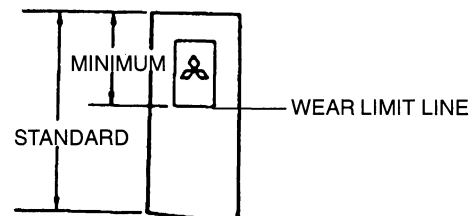
- If any brush is worn almost to or beyond the wear limit, replace all the brushes.

Standard

21.5 mm { 0.846 in }

Minimum

8.0 mm { 0.32 in }



U5U11711

Brush Spring

1. Measure the force of the brush spring with a spring pressure gauge.
2. Replace the spring if necessary.

Standard force

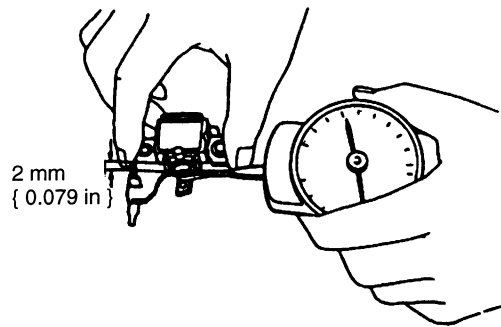
3.2—4.3 N { 0.32—0.44 kgf , 0.71—0.96 lbf }

Minimum

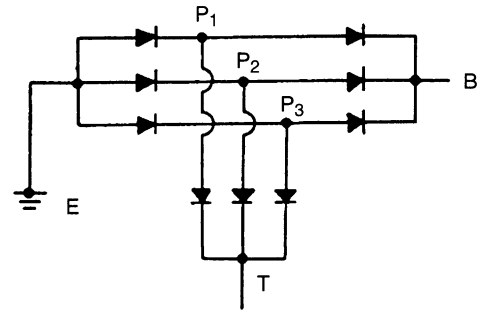
1.6—2.3 N { 0.16—0.24 kgf , 0.36—0.52 lbf }

Note

- Read the spring pressure gauge at a brush tip projection of 2 mm { 0.079 in }.

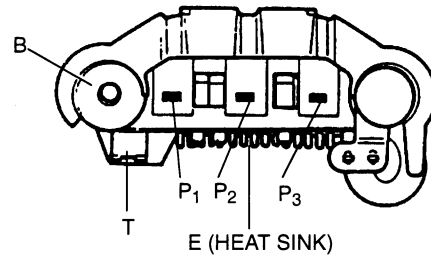


U5U11712



U5U11713

2. Replace the rectifier if necessary.



U5U11714

Rectifier

1. Check for continuity of the diodes with an ohmmeter.

Negative (Black)	Positive (Red)	Continuity
E	P ₁ , P ₂ , P ₃	Yes
B		No
T		No
P ₁ , P ₂ , P ₃	E	No
	B	Yes
	T	Yes

01-18 IGNITION SYSTEM

SPARK PLUG

REMOVAL / INSTALLATION	01-18-1
SPARK PLUG SPARK TEST	01-18-1
SPARK PLUG INSPECTION	01-18-1
IGNITION COIL INSPECTION	01-18-2
Secondary Coil Winding	01-18-2
Insulation Resistance of Case	01-18-2

IGNITION COIL REPLACEMENT	01-18-3
IGNITION CONTROL MODULE	
INSPECTION	01-18-3
HIGH-TENSION LEAD	
REMOVAL / INSTALLATION	01-18-3
HIGH-TENSION LEAD INSPECTION ...	01-18-3

SPARK PLUG REMOVAL / INSTALLATION

U5U118AA

Caution

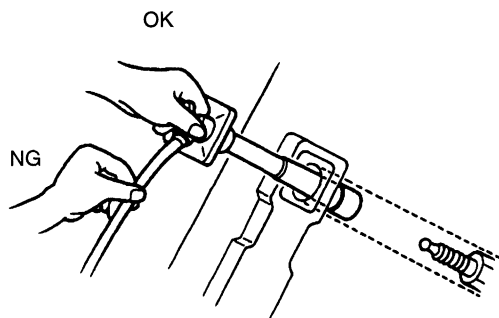
- Pulling on the wire part of the spark plug lead may break it. To remove the lead, pull only on the boot.
- To avoid breaking the spark plug, be sure to fit the socket squarely over it.

2. Remove the spark plug.
3. Install in the reverse order of removal.

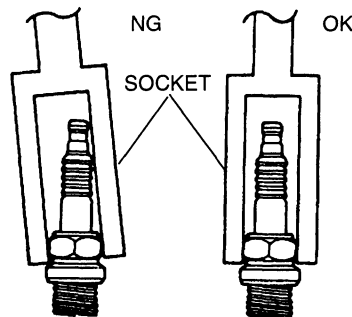
Tightening torque

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

1. Disconnect the high-tension lead.



U5U11801



U5U11802

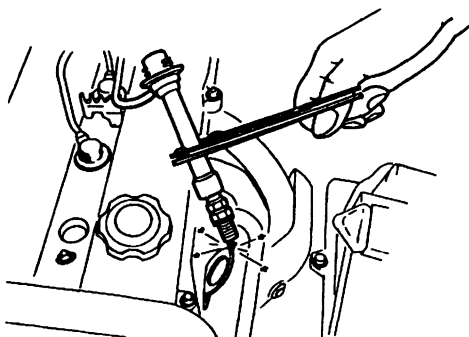
SPARK PLUG SPARK TEST

U5U118AB

1. Disconnect the high-tension lead from the spark plug.
2. Connect a new spark plug to the high-tension lead.
3. Hold the high-tension lead with insulated pliers approx. 5—10 mm { 0.20—0.39 in } from a ground.
4. Crank the engine and verify that a strong blue spark is visible. If not, replace the spark plug or high-tension lead as necessary.

Note

- If a timing light is used to check for spark, some lights will not illuminate at No.2 and No.4 cylinders even if the ignition system is normal.



U5U11803

SPARK PLUG INSPECTION

U5U118AC

Check the following and replace the spark plugs as necessary.

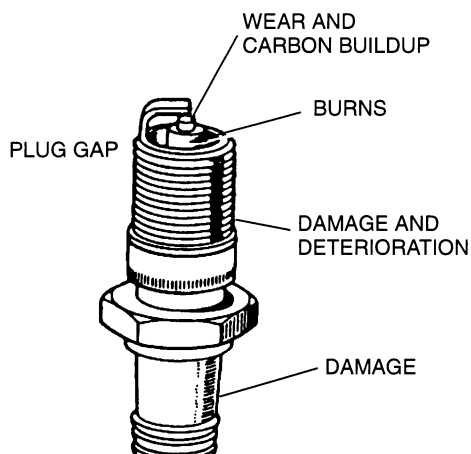
1. Damaged insulation
2. Worn electrodes

IGNITION SYSTEM

- Carbon deposits
If cleaning is necessary, use a plug cleaner or a wire brush. Wipe upper insulator.
- Damaged gasket

Plug gap

1.0—1.1 mm { 0.040—0.043 in }



U5U11804

IGNITION COIL INSPECTION

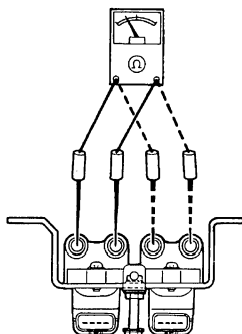
U5U118AD

Secondary Coil Winding

- Remove the high-tension leads.
- Measure resistance of the secondary coil winding of each coil with an ohmmeter.

Secondary coil winding resistance

8.7—12.9 k Ω [at 20 °C { 68 °F }]



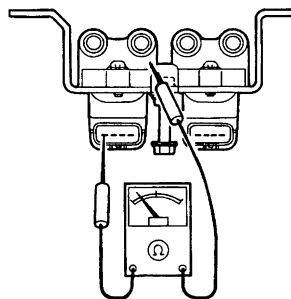
U5U11805

- If not within the specification, replace the ignition coil.

Insulation Resistance of Case

- Remove the high-tension leads and disconnect the connectors.
- Use a **500 V megger** tester to measure the insulation resistance between the primary terminal and the coil case.

Resistance
Above 10 M Ω



U5U11806

- If not as specified, replace the ignition coil.

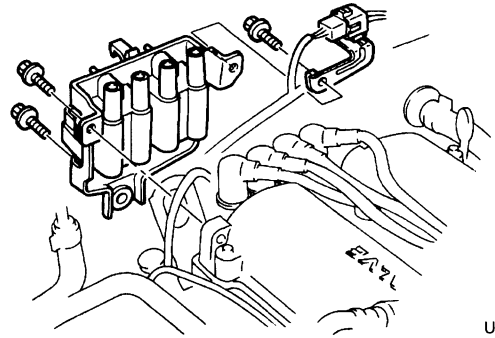
IGNITION SYSTEM

IGNITION COIL REPLACEMENT

1. Disconnect the high-tension leads and ignition coil connector.
2. Remove the mounting bolts and the ignition coil.
3. Install in the reverse order of removal.

Tightening torque

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



U5U118AE

U5U11807

IGNITION CONTROL MODULE INSPECTION

1. Check the poor connection of the ignition coil, high-tension leads and the ECM.
2. Check the ignition coil and the high-tension leads.
3. Measure the voltage at the following ECM terminals.
 - 4N ignition control module (No.1, 4)
4. If all are normal, but misfire still occurs, replace the ignition coil.

U5U118AF

HIGH-TENSION LEAD REMOVAL / INSTALLATION

Caution

- Reinstall the high-tension leads to their original positions. Incorrect installation can damage the leads and cause power loss,

and negatively effect electronic components.

U5U118AG

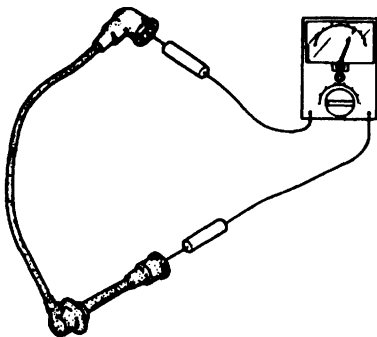
HIGH-TENSION LEAD INSPECTION

1. Use an ohmmeter to measure the resistance of each lead.
2. If not as specified, replace the high-tension lead.

U5U118AH

Resistance

16 k Ω per 1.00 m { 3.28 ft }



U5U11808

01-19 STARTING SYSTEM

STARTER

REMOVAL / INSTALLATION 01-19-1

STARTER INSPECTION 01-19-1

Pull-out Test 01-19-1

Pinion Gap Check 01-19-1

Return Test 01-19-1

No-load Test 01-19-2

STARTER

DISASSEMBLY / ASSEMBLY 01-19-3

ARMATURE INSPECTION 01-19-4

YOKE INSPECTION 01-19-5

MAGNETIC SWITCH INSPECTION 01-19-5

BRUSH AND BRUSH HOLDER

INSPECTION 01-19-5

Insulation of Brush Holder 01-19-5

Brush 01-19-5

STARTER INTERLOCK SWITCH

INSPECTION 01-19-6

STARTER REMOVAL / INSTALLATION

Caution

- Obtain the code number and deactivate the audio anti-theft system before disconnecting the battery. (Refer to 09-20 ANTI-THEFT SYSTEM SETTING THE CODE NUMBER.)

- Disconnect the negative battery cable.
- Disconnect the wiring from the starter.
- Remove the starter bracket. (MT)
- Raise the front of the vehicle and support it with safety stands.
- Remove the bolts and the starter.
- Install in the reverse order of removal.

Tightening torque

Nut 1: 9.9—11.7 N·m

{ 100—120 kgf·cm , 87—104 in·lbf }

Bolt, Nut 2: 38—51 N·m

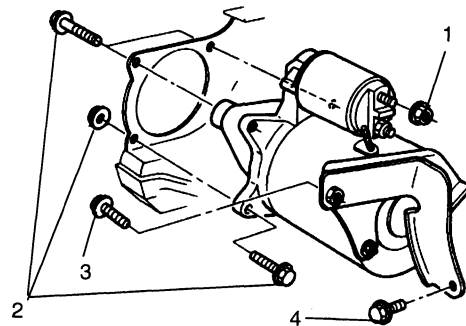
{ 3.8—5.3 kgf·m , 28—38 ft·lbf }

Bolt 3: 16—22 N·m

{ 1.6—2.3 kgf·m , 12—16 ft·lbf }

Bolt 4: 38—51 N·m

{ 3.8—5.3 kgf·m , 28—38 ft·lbf }



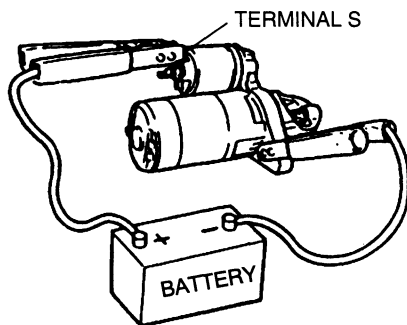
U5U119AA

U5U11901

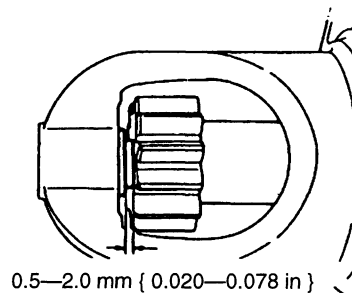
STARTER INSPECTION

Pull-out Test

- Verify that the pinion is pulled out with battery positive voltage connected to terminal S and the starter body grounded.



U5U11902



U5U11903

Pinion Gap Check

- Measure the pinion gap while the pinion is pulled out.

Specification

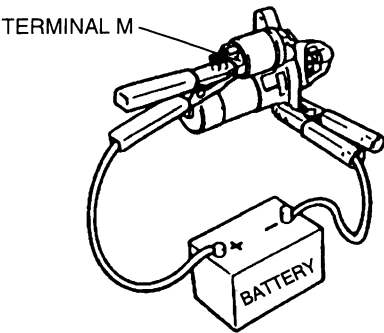
0.5—2.0 mm { 0.020—0.078 in }

- Adjust the pinion gap by increasing/decreasing the number of adjustment washers (between drive housing front cover and magnetic switch) if it is not within the specification.

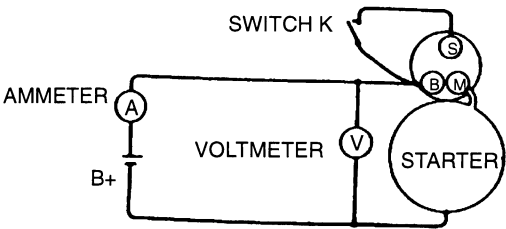
Return Test

- Disconnect the motor wire from terminal M.
- Connect battery positive voltage to terminal M and ground the body.

STARTING SYSTEM



U5U11904



U5U11905

3. Pull out the overrunning clutch with a screwdriver. Verify that it returns to its original position when released.

No-load Test

1. After adjusting the pinion gap, form a test circuit with a voltmeter and an ammeter.

Note

- Use heavy gauge wires and tighten each terminal fully.

2. Close switch K to run the starter.

3. Check for the following:

Item	MT	AT
Starter type kW	0.95	1.4
Voltage V	11.5	11
Current A	Max. 60	Max. 90
Gear shaft speed rpm	Min. 6,600	Min. 3,000

4. If not as specified, check for the cause by referring to Inspection.

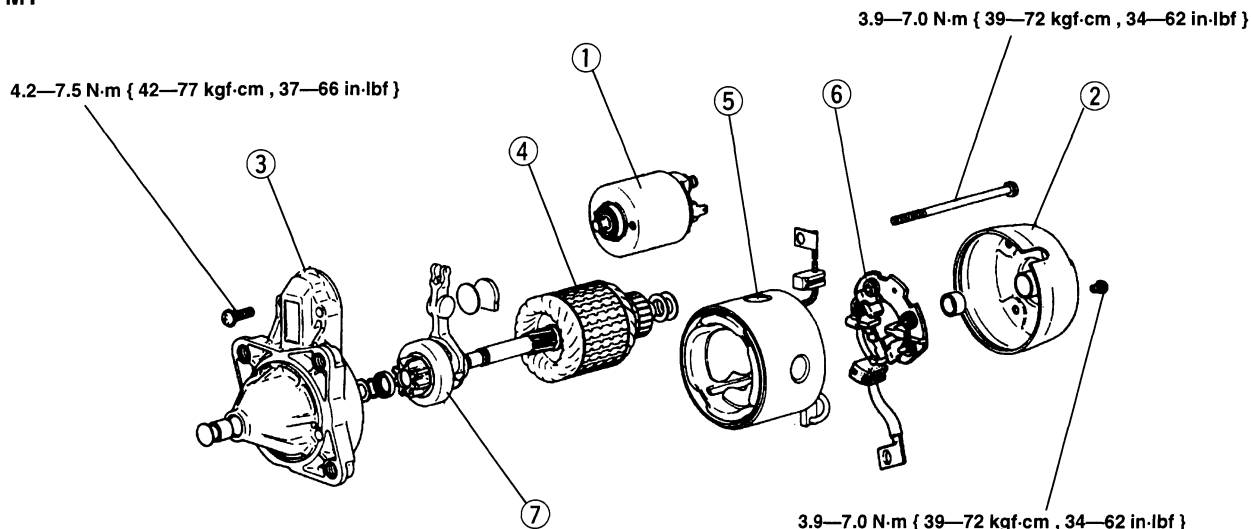
STARTING SYSTEM

STARTER DISASSEMBLY / ASSEMBLY

U5U119AC

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.

MT

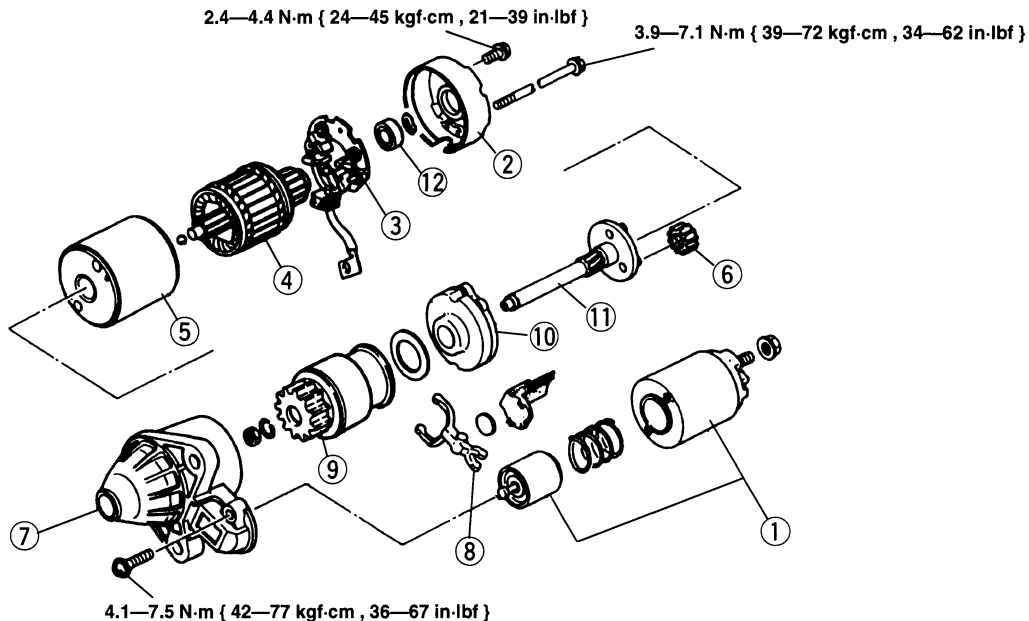


U5U11906

1	Magnetic switch
2	Rear housing
3	Front cover
4	Armature

5	Yoke
6	Brush and brush holder
7	Drive pinion

AT



U5U11907

1	Magnetic switch
2	Rear housing
3	Brush and brush holder
4	Armature
5	Yoke
6	Planetary gear

7	Front cover
8	Lever
9	Drive pinion
10	Internal gear
11	Gear shaft
12	Bearing

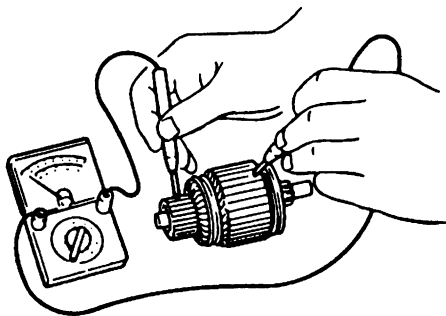
STARTING SYSTEM

ARMATURE INSPECTION

U5U119AD

1. Ground of armature coil

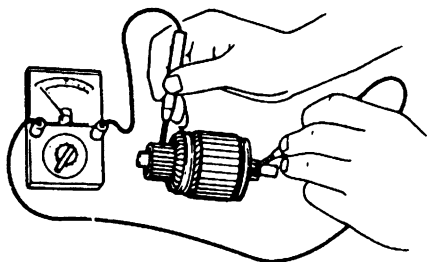
- Check for no continuity between the commutator and the core with an ohmmeter. Check the entire circumference of the commutator. Replace the armature if there is continuity.



U5U11908

2. Insulation of armature coil

- Check for no continuity between the commutator and the shaft with an ohmmeter. Check the entire circumference of the commutator. Replace the armature if there is continuity.



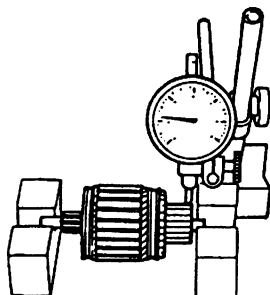
U5U11909

3. Runout of commutator

- Place the armature on V-blocks, and measure the runout with a dial indicator.
- Repair with a lathe if the runout exceeding the specification is small, or replace the armature if necessary.

Runout

0.03 mm { 0.001 in }



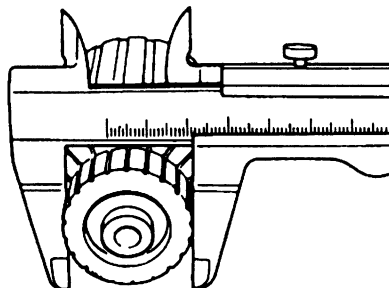
U5U11910

4. Outer diameter of commutator

- Replace the armature if the outer diameter of the commutator is at the grind limit or less.

Grind limit

30.8 mm { 1.21 in }



U5U11911

5. Roughness of commutator surface

- If the commutator surface is dirty, wipe it with a cloth; if it is rough, repair with a lathe or fine sandpaper.

6. Segment groove depth

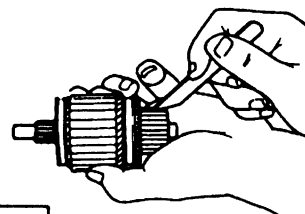
- If the depth of the molding between segments is at the depth limit or less, undercut the grooves to the standard depth.

Standard depth

0.5—0.8 mm { 0.02—0.03 in }

Depth limit

0.2 mm { 0.008 in }



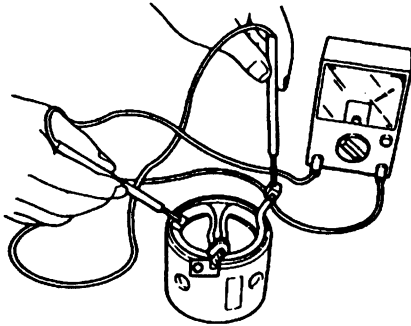
U5U11912

STARTING SYSTEM

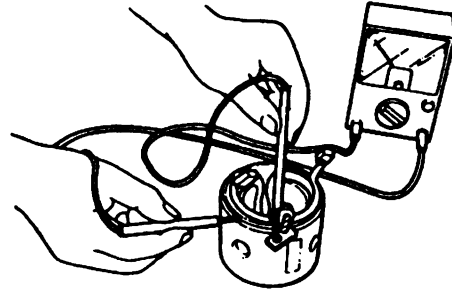
YOKE INSPECTION

U5U119AE

1. Wiring damage of field coil
 - (1) Check for continuity between the connector and the brushes with an ohmmeter.



U5U11913



U5U11914

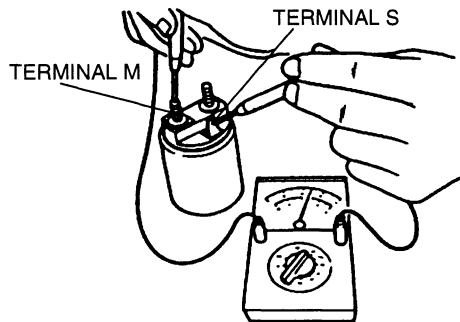
- (2) Replace the yoke if there is no continuity.
2. Ground of field coil
 - (1) Check for no continuity between the connector and the yoke with an ohmmeter.

- (2) Repair or replace the yoke if there is continuity.
3. Installation of field coil
 - Replace the yoke if the field coil is loose.

MAGNETIC SWITCH INSPECTION

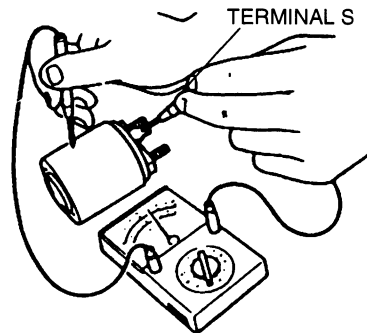
U5U119AF

1. Wiring damage (terminal S — terminal M)
 - Check for continuity between terminals S and M with an ohmmeter. Replace the magnetic switch if there is no continuity.



U5U11915

2. Wiring damage (terminal S — body)
 - Check for continuity between terminal S and the body with an ohmmeter. Replace the magnetic switch if there is no continuity.



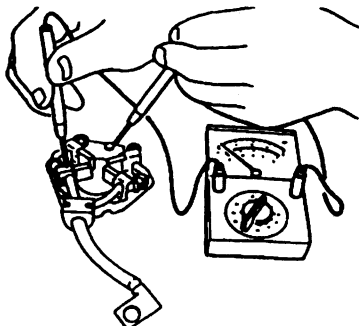
U5U11916

BRUSH AND BRUSH HOLDER INSPECTION

U5U119AG

Insulation of Brush Holder

- Check for no continuity between each insulated brush and the plate with an ohmmeter. Replace the brush holder if there is continuity.



U5U11917

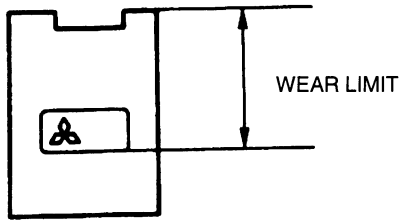
Brush

- If any brush is worn almost to or beyond the wear limit, replace all the brushes.

mm { in }

Item	MT	AT
Standard	17.0 { 0.67 }	17.5 { 0.69 }
Wear limit	11.5 { 0.46 }	12.0 { 0.47 }

STARTING SYSTEM

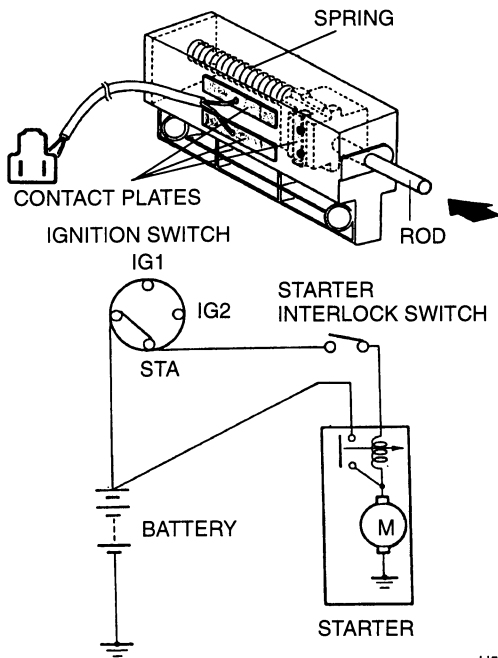


U5U11918

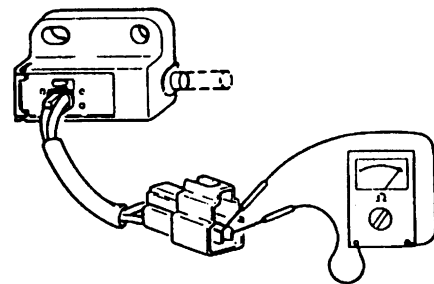
STARTER INTERLOCK SWITCH INSPECTION

U5U119AH

1. Disconnect the starter interlock switch connector.
2. Check continuity of the switch with an ohmmeter.



Pedal	Continuity
Depressed	Yes
Released	No



U5U11920

3. If not as specified, replace the starter interlock switch.

U5U11919

01-20 CRUISE CONTROL SYSTEM

CRUISE CONTROL MODULE	
REMOVAL / INSTALLATION	01-20-1
CRUISE CONTROL MODULE	
INSPECTION	01-20-1
Terminal Voltage List (Reference)	01-20-2
CRUISE ACTUATOR	
REMOVAL / INSTALLATION	01-20-3
CRUISE ACTUATOR INSPECTION	01-20-3
ACTUATOR CABLE	
REMOVAL / INSTALLATION	01-20-4

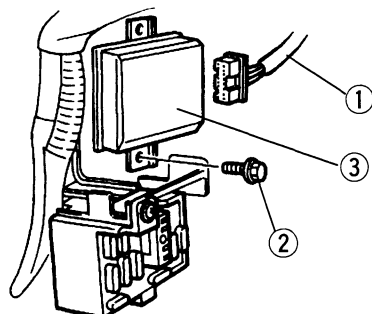
ACTUATOR CABLE ADJUSTMENT ...	01-20-4
CRUISE CONTROL MAIN SWITCH	
REMOVAL / INSTALLATION	01-20-5
CRUISE CONTROL MAIN SWITCH	
INSPECTION	01-20-5
CRUISE CONTROL SWITCH	
INSPECTION	01-20-5

CRUISE CONTROL MODULE REMOVAL / INSTALLATION

U5U120AA

1. Disconnect the negative battery cable.
2. Remove the passenger's side front side trim.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Install the passenger's side front side trim.
6. Connect the negative battery cable.

1	Connector
2	Bolt
3	Cruise control module



U5U12001

CRUISE CONTROL MODULE INSPECTION

U5U120AB

1. Remove the passenger's side front side trim.
2. Remove the cruise control module without disconnecting the connector.
3. Measure the voltage at the cruise control module terminals as indicated below.
4. Disconnect the cruise control module connector before checking for continuity at terminal T.
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 cruise control module.

CRUISE CONTROL SYSTEM

Terminal Voltage List (Reference)

S	Q	O	M			G	E	C	A
T	R	P	N	L	J	H	F	D	B

U5U12002

Terminal	Signal		Connection	Test condition		Voltage (V)/ Continuity	Inspection area
A	Cruise actuator control		Cruise actuaotr	Ignition switch at ON	Cruise control main switch on	B+	● Brake switch ● Cruise actuator
					Cruise control main switch off	0	
B	Cruise actuator control		Cruise actuator	Ignition switch at ON	Cruise control main switch on	B+	● Brake switch ● Cruise actuator
					Cruise control main switch off	0	
C	Cruise actuator control		Cruise actuator	Ignition switch at ON	Cruise control main switch on	B+	● Brake switch ● Cruise actuator
					Cruise control main switch off	0	
D	—		Not used	—		—	—
E	Cruise control main switch input		Cruise control main switch (N.C)	Ignition switch at ON	Press and hold OFF side of cruise control main switch	0	● METER 15 A fuse ● Cruise control main switch
					Other	B+	
F	Cruise control main switch input		Cruise control main switch (N.O)	Ignition switch at ON	Press and hold ON side of cruise control main switch	B+	● METER 15 A fuse ● Cruise control main switch
					Other	0	
G	HOLD switch off		TCM	Ignition switch at ON		B+	TCM
				Ignition switch at LOCK or ACC		0	
H	Cruise actuator power supply		Brake switch	Ignition switch at ON	Cruise control main switch on	B+	—
					Cruise control main switch off	0	
J	MT	Clutch switch input	Clutch switch	Ignition switch at ON and cruise control main switch on	Depress clutch pedal	0	Clutch switch
					Release clutch pedal	B+	
	AT	Selector lever position	Transmission range switch	Ignition switch at ON and cruise control main switch on	Selector lever at N or P range	0	Transmission range switch
					Other	B+	
L	Cruise control switch input		Cruise control switch	Ignition switch at ON and cruise control main switch on	Turn SET/ COAST switch	0	Cruise control switch
					Other	Approx. 5	
M	Brake switch input		Brake switch	Depress brake pedal		B+	● STOP 15 A fuse ● Brake switch
				Release brake pedal		0	
N	Cruise control switch input		Cruise control switch	Ignition switch at ON and cruise control main switch on	Turn RESUME/ ACCEL switch	0	Cruise control switch
					Other	Approx. 5	

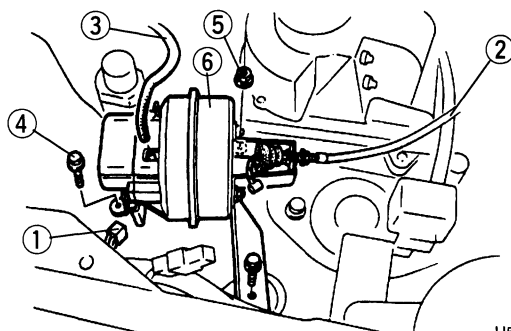
CRUISE CONTROL SYSTEM

Terminal	Signal	Connection	Test condition		Voltage (V)/ Continuity	Inspection area
O	Brake switch input	Brake switch	Ignition switch at ON and cruise control main switch on	Depress brake pedal	0	Brake switch
				Release brake pedal	B+	
P	Vehicle speed	Vehicle speed sensor	Ignition switch at ON, cruise control main switch on, and rear tires rotating		Alternates 0 and 5	- METER 15 A fuse - Instrument cluster
Q	—	Not used	—		—	—
R	—	Not used	—		—	—
S	+B	STOP 15 A fuse	Constant		B+	STOP 15 A fuse
T	Cruise control module ground	GND	Constant: Check for continuity to ground		Yes	GND

CRUISE ACTUATOR REMOVAL / INSTALLATION

U5U120AC

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.
5. Adjust the actuator cable.



U5U12003

1	Connector
2	Actuator cable
3	Vacuum hose
4	Bolt
5	Nut
6	Cruise actuator

CRUISE ACTUATOR INSPECTION

U5U120AD

1. Disconnect the cruise actuator connector.
2. Measure the resistance between the cruise actuator terminals by using an ohmmeter.

Terminal	Resistance (Ω)
C—A	25—35
C—B	
C—D	

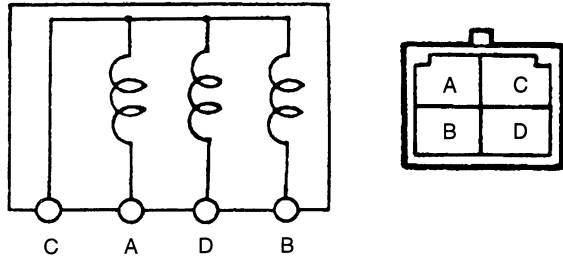
3. Disconnect the actuator cable from the accelerator pedal.
4. Allow the engine to idle.

5. Connect the battery positive voltage and a ground to the terminals as shown and confirm the operation of the actuator cable.

Step	Terminal connection				Operation of the actuator cable
	A	B	C	D	
1	GND	GND	B+	GND	Pull
2	GND	—	B+	GND	Hold
3	GND	—	B+	—	Extend
4	—	—	—	—	Release

CRUISE CONTROL SYSTEM

6. If not as specified, replace the cruise actuator.

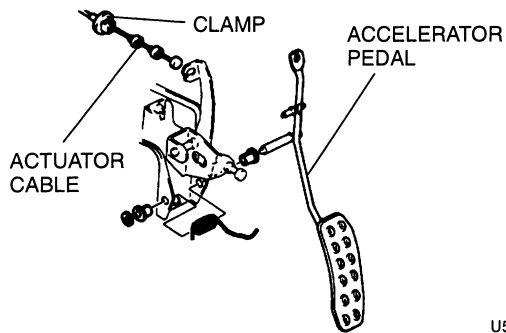


U5U12004

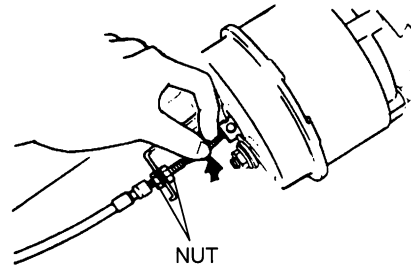
ACTUATOR CABLE REMOVAL / INSTALLATION

U5U120AE

1. Disconnect the actuator cable from the accelerator pedal.
2. Remove the clamp from the inside of the firewall.



U5U12005



U5U12006

3. Loosen the nut and remove the actuator cable from the cruise actuator.

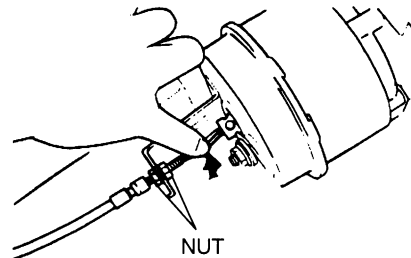
4. Install in the reverse order of removal.
5. Adjust the actuator cable.

ACTUATOR CABLE ADJUSTMENT

U5U120AF

- Adjust the nut so that the actuator cable free play is as specified when the actuator cable is pressed lightly.

Cable play on both the cruise actuator side and throttle body side
1.0—5.0 mm { 0.04—0.19 in }



U5U12007

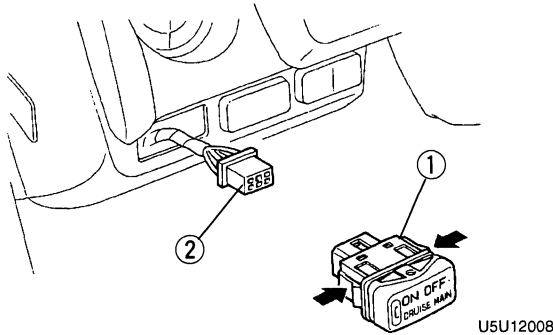
CRUISE CONTROL SYSTEM

CRUISE CONTROL MAIN SWITCH REMOVAL / INSTALLATION

U5U120AG

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.

1	Cruise control main switch
2	Connector



CRUISE CONTROL MAIN SWITCH INSPECTION

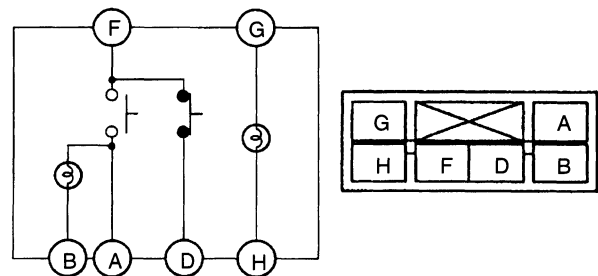
U5U120AH

1. Remove the cruise control main switch.
2. Check for continuity between the cruise control main switch terminals by using an ohmmeter.

○—○ : Continuity ○—(X)—○ : Bulb

Switch position	Terminal					
	A	B	D	F	G	H
Neutral	○—(X)—○		○—○		○—(X)—○	
OFF	○—(X)—○				○—(X)—○	
ON	○—(X)—○		○—○	○—○	○—(X)—○	

U5U12009



U5U12010

3. If not as specified, replace the cruise control main switch.

CRUISE CONTROL SWITCH INSPECTION

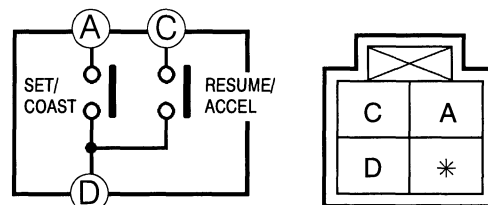
U5U120AJ

1. Disconnect the negative battery cable.
2. Remove the center lower panel.
3. Disconnect the combination switch connector.
4. Check for continuity between the cruise control switch terminals by using an ohmmeter.

○—○ : Continuity

Switch position	Terminal		
	A	C	D
SET/COAST	○—○		○—○
OFF			
RESUME/ACCEL		○—○	○—○

U5U12011



U5U12012

5. If not as specified, replace the wiper unit. (Refer to 09-18 COMBINATION SWITCH DISASSEMBLY / ASSEMBLY.)

01-40 CONTROL SYSTEM

CONTROL SYSTEM COMPONENT

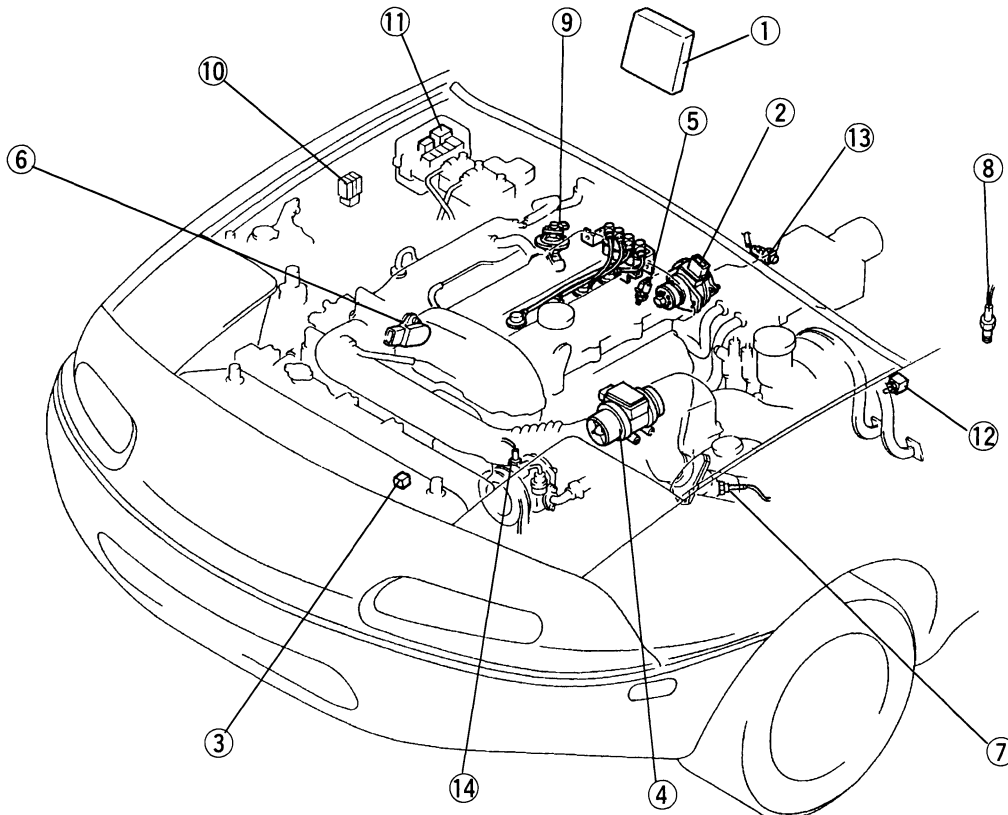
LOCATION	01-40-1
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CAMSHAFT POSITION SENSOR	
INSPECTION	01-40-10
CAMSHAFT POSITION SENSOR	
REPLACEMENT	01-40-11
CRANKSHAFT POSITION SENSOR	
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THROTTLE POSITION SENSOR	
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Closed Throttle Position Switch	01-40-12
Throttle Position Sensor	01-40-13

THROTTLE POSITION SENSOR

ADJUSTMENT	01-40-13
Closed Throttle Position Switch	01-40-13
Throttle Position Sensor	01-40-14
THROTTLE POSITION SENSOR	
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HEATED OXYGEN SENSOR	
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Installation Note	01-40-20

CONTROL SYSTEM COMPONENT LOCATION

U5U140AA



U5U14001

CONTROL SYSTEM

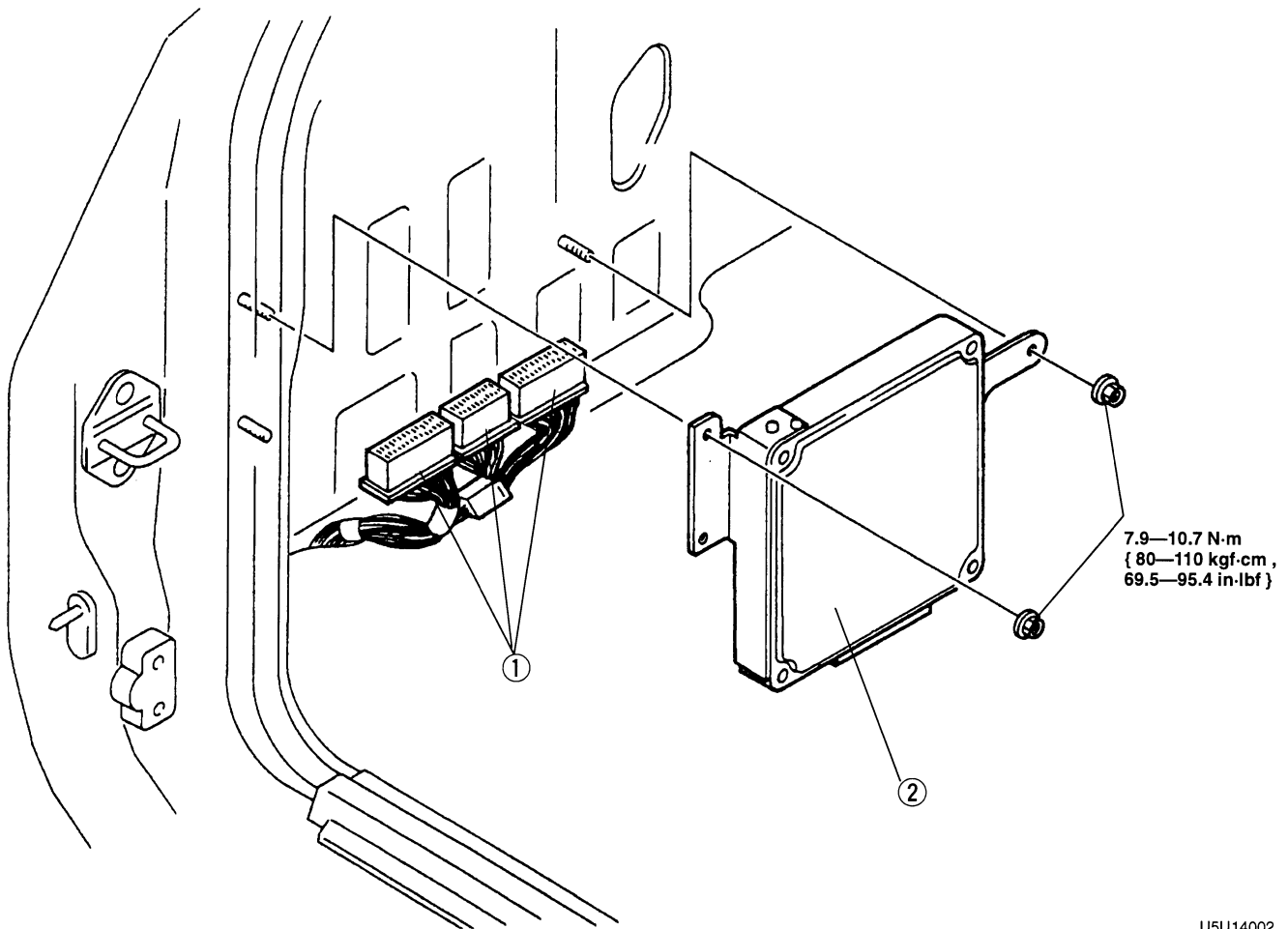
1	Engine control module
2	Camshaft position sensor
3	Crankshaft position sensor
4	Mass air flow sensor
5	Engine coolant temperature sensor
6	Throttle position sensor
7	Heated oxygen sensor (Front)

8	Heated oxygen sensor (Rear)
9	EGR valve position sensor
10	EGR boost sensor
11	Main relay
12	Clutch switch
13	Neutral switch
14	Power steering pressure switch

ENGINE CONTROL MODULE (ECM) REMOVAL / INSTALLATION

U5U140AB

1. Remove the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal indicated in the table.



U5U14002

1	ECM connector
---	---------------

2	ECM
---	-----

ENGINE CONTROL MODULE (ECM) INSPECTION

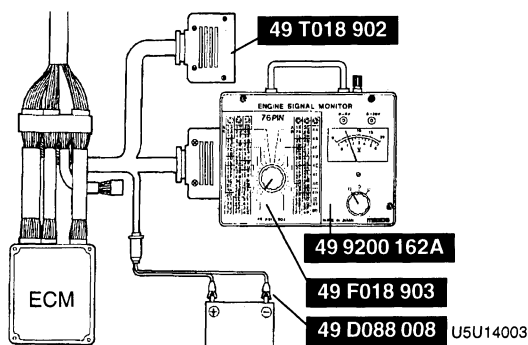
U5U140AC

Using SSTs (Engine Signal Monitor)

Caution

- The ECM terminal voltages vary with change in measuring conditions and vehicle conditions. Always carry out a total inspection of the input systems, output systems, and ECM to determine the cause of trouble. Otherwise, a wrong diagnosis will be made.

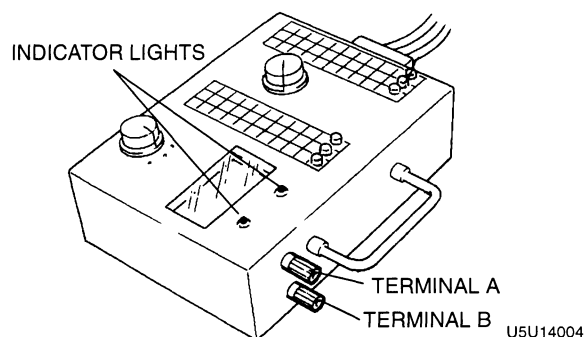
1. Disconnect the negative battery cable.
2. Remove the ECM.
3. Disconnect the ECM connector.
4. Connect the **SST** (Harness Adapter) to the ECM connector.
5. Connect the **SSTs** (Engine Signal Monitor and Harness adapter, power) to the **SST** (Harness Adapter). Use connector A of the harness adapter for ECM terminals 1A through 1V and 3A through 3P. Use connector B for ECM terminals 4A through 4Z.



6. Place the **SST** (Sheet) on the **SST** (Engine Signal Monitor).
7. Measure the voltage at each ECM terminal by switching the selector switch and the monitor switch.
8. If any incorrect voltage is detected, check related systems, wiring harnesses and connectors referring to the possible malfunction in the terminal voltage list.

Caution

- Disconnecting the connectors of the ECM and the **SST** (Harness Adapter) while the battery is connected can damage the ECM and the **SST** (Engine Signal Monitor). Disconnect the negative battery cable and the **SST** (Harness adapter, power) before disconnecting the connectors.
- Applying voltage to terminals A and B of the **SST** (Engine Signal Monitor) can damage the **SST** (Engine Signal Monitor).



Note

- The indicator lights of the **SST** (Engine Signal Monitor), provided for confirmation of the voltmeter range, is also used for detection of the pulse such as the fuel injector control signal, which is difficult to detect by using the voltmeter.
- Terminals A and B of the **SST** (Engine Signal Monitor) are for connection of an external instrument. By connecting an external instrument such as a circuit tester or an oscilloscope, various inspections in addition to the measurement of the ECM terminal voltages are made possible.
- If the tires are rotated by using a chassis roller with the ignition switch at ON, the ABS control module may memorize the action as a malfunction and the ABS warning light may illuminate. If the ignition switch is turned to LOCK and then to ON again, the ABS warning light will not illuminate, because the action will be considered a past malfunction.

CONTROL SYSTEM

Terminal Voltage (Reference)

4Y	4W	4U	4S	4Q	4O	4M	4K	4I	4G	4E	4C	4A	3O	3M	3K	3I	3G	3E	3C	3A							1U	1S	1Q	1O	1M	1K	1I	1G	1E	1C	1A
4Z	4X	4V	4T	4R	4P	4N	4L	4J	4H	4F	4D	4B	3P	3N	3L	3J	3H	3F	3D	3B							1V	1T	1R	1P	1N	1L	1J	1H	1F	1D	1B

U5U14007

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
1A	Cooling fan control	Cooling fan relay	Ignition switch ON	Cooling fan operating/Terminal TEN ground and throttle valve open	Below 1.0	● Cooling fan relay
				Cooling fan stop	B+	
1B	Condenser fan control	Condenser fan relay	Ignition switch ON	Condenser fan operating/Terminal TEN ground and throttle valve open	Below 1.0	● Condenser fan relay
				Condenser fan stop	B+	
1C	—	—	—		—	—
1D	Diagnostic trouble code output	Data link connector 2 terminal KLN	Carry out inspection according to diagnostic trouble code Diagnostic trouble code output is a part of serial communication Judgement by terminal voltage is not possible		—	● On-board diagnostic system
1E	MIL	Malfunction indicator lamp	Malfunction indicator lamp OFF		B+	● ECM terminal 1E — MIL
			Malfunction indicator lamp ON		Below 2.0	
1F	—	—	—		—	—
1G	A/C control	A/C relay	Ignition switch ON		B+	● A/C relay
			Idle	A/C operating	Below 2.0	
				A/C stop	B+	
1H	Headlight	Headlight switch	Headlight switch OFF		Below 1.0	● Headlight switch
			Headlight switch ON		B+	
1I	Diagnostic test mode	Data link connector (Terminal TEN)	Ignition switch ON	Open terminal *1TEN	B+	● ECM terminal 1I — *1TEN harness
				Short terminal *1TEN	Below 1.0	
1K	A/C	A/C switch	Idle	A/C switch and fan switch ON	Approx. 2.0	● A/C switch ● Refrigerant pressure switch ● A/C amplifier
				A/C switch OFF	B+	
1L	Load/No load distinction	Neutral/clutch switch (MT), Transaxle range switch (AT)	Ignition switch ON	MT Other than neutral position and clutch pedal released	B+	● Neutral switch ● Clutch switch ● Transaxle range switch
				AT Other than P or N position		
				MT Neutral position or clutch pedal depressed	Below 1.0	
				AT P or N position		

CONTROL SYSTEM

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
1M	Vehicle speed	Vehicle speed sensor	Ignition switch ON		Approx. 7.0 or Below 1.5	• Vehicle speed sensor
			Driving		Approx. 3.0	
1N	—	—	—		—	—
1O	MT/AT distinction	Ground (MT)	Ignition switch ON		Below 1.0	—
		Open (AT)	Ignition switch ON		B+	
1P	Blower	Fan switch	Ignition switch ON	Fan switch OFF or ON at 1st	B+	• Fan switch
				Fan switch ON at 2nd or higher	Below 1.0	
1Q	Brake	Brake switch	Brake pedal released		Below 1.0	• Brake switch
			Brake pedal depressed		B+	
*21R	TCM FAIL (From TCM)	TCM	TEST mode		B+	• TCM
			Other modes		Below 1.0 or repeat B+ and 0	
1S	—	—	—		—	—
*21T	TCM diagnostic test mode	TCM	Ignition switch ON		B+	• TCM
			TEST mode		Below 1.0 or repeat B+ and 0	
1U	Fuel pump control	Fuel pump relay	Ignition switch ON		B+	• Fuel pump relay
			Cranking		Below 1.0	
			Idle			
1V	—	—	—		—	—
3A	—	—	—		—	—
3B	Mass air flow sensor (VGP)	Mass air flow sensor	Ignition switch ON		0.5	• Mass air flow sensor
			Idle		1.0—2.0	
3C	Heated oxygen sensor (Front)	Heated oxygen sensor (Front)	Ignition switch ON		0—1.0	• Heated oxygen sensor (Front)
			Idle	After warm up	0—1.0	
			Acceleration		0.5—1.0	
			Deceleration		0—0.5	
3D	Heated oxygen sensor (Rear)	Heated oxygen sensor (Rear)	Ignition switch ON		0—1.0	• Heated oxygen sensor (Rear)
			Idle		0—1.0	
3E	—	—	—		—	—
3F	Throttle position (TVO)	Throttle position sensor	Ignition switch ON	Closed throttle position	0.1—1.1	• Throttle position sensor • ECM terminal 3I voltage
				Wide open throttle	3.0—4.6	
3G	Engine coolant temperature	Engine coolant temperature sensor	Ignition switch ON	Engine coolant temp. 20 °C { 68 °F }	3.0—3.1	• Engine coolant temperature sensor
				After warm up	0.2—1.0	
3H	Barometric pressure	EGR boost sensor	Ignition switch ON	Below 400 m { 0.25 mile } above sea level	3.9—4.0	• EGR boost sensor
3I	Constant voltage (Vref)	Throttle position sensor EGR valve position sensor	Ignition switch ON		Approx. 5.0	• ECM terminal 4B voltage

CONTROL SYSTEM

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
3J	EGR valve position	EGR valve position sensor	Ignition switch ON		0.7—0.8	- EGR valve position sensor - ECM terminal 3I voltage
			Idle			
3K	Intake air temperature	Intake air temperature sensor	Intake air temperature 20 °C { 68 °F }		2.3—2.4	Mass air flow sensor
3L	Closed throttle position	Closed throttle position switch	Ignition switch ON	Accelerator pedal released	Below 1.0	Throttle position sensor
				Accelerator pedal depressed	B+	
3M	Heated oxygen sensor heater	Heated oxygen sensor (Front)	Ignition switch ON		Below 2.0	Heated oxygen sensor (Front)
			Idle			
3N	EGR pressure	EGR boost sensor	Ignition switch ON		4.0	EGR boost sensor
			Idle		1.0—1.5	
3O	Analogue sensor ground	Ground	Constant		Below 1.0	ECM 3O terminal harness (Open)
3P	Power steering pressure	Power steering pressure switch	Ignition switch ON		B+	Power steering pressure switch
			Idle	P/S not operating		
				P/S operating	Below 1.0	
4A	ECM ground	Ground	Constant		Below 1.0	ECM 4A harness (Open)
4B	Power supply	Main relay (FUEL INJ relay)	Ignition switch	OFF	Below 1.0	Main relay
				ON	B+	
4C	Fuel injector ground	Ground	Constant		Below 1.0	ECM 4C terminal continuity harness (Open)
4D	Output device ground	Ground	Constant		Below 1.0	ECM 4D terminal continuity harness (Open)
4E	NE –	Crankshaft position sensor	Ignition switch ON		Below 1.0	Crankshaft position sensor
			Idle		Below 1.0	
4F	SGT	Camshaft position sensor (In distributor)	Ignition switch ON		0 or Approx. 5.0	Camshaft position sensor
			Idle		Approx. 2.0	
4G	SGC		Ignition switch ON		0 or Approx. 5.0	
			Idle		Approx. 1.5	
4H	NE +	Crankshaft position sensor	Ignition switch ON		Below 1.0	Crankshaft position sensor
			Idle		Below 1.0	
4I	Back-up power supply	Battery	Constant		B+	ECM terminal 4I — battery harness and connector
4J	Pressure regulator control	PRC solenoid valve	Idle (Approx. 149 sec after hot start)		Below 3.0	PRC solenoid valve
			Other		B+	
4K	—	—	—		—	—
4L	Engine speed	Tachometer	Ignition switch ON		0 or Approx. 11	- ECM terminal 4L — tachometer - ECM
			Idle		Approx. 6*3	
4M	—	—	—		—	—
4N	IGT1	Ignition coil (In distributor)	Ignition switch ON		Below 1.0	Ignition coil
			Idle		Approx. 0.2	

CONTROL SYSTEM

Terminal	Signal	Connected to	Test condition		Voltage (V)	Possible malfunction
4O	EGR control (Vent)	EGR solenoid valve (Vent)	Ignition switch ON		B+	● EGR solenoid valve (Vent)
			Idle			
4P	EGR control (Vacuum)	EGR solenoid valve (Vacuum)	Ignition switch ON		B+	● EGR solenoid valve (Vacuum)
			Idle			
4Q	Idle air control	Idle air control valve	Ignition switch ON		Approx. 10	● Idle air control valve
			Idle	After warm up (No load)	Approx. 4.8	
4R	IGT2	Ignition coil	Ignition switch ON		Below 1.0	● Ignition coil
			Idle		Approx. 0.2	
4S	—	—	—		—	—
4T	Purge control	Purge solenoid valve	Ignition switch ON		B+	● Purge solenoid valve
			Idle			
4U	Fuel injector control	Fuel injector No.1	Ignition switch ON		B+	● Fuel injector
4V		Fuel injector No.2	Ignition switch ON	Idle	B+*3	
4W		Fuel injector No.3				
4X		Fuel injector No.4				
*24Y	Engine coolant temperature (TCM)	TCM	Ignition switch ON	Engine coolant temperature below 50 °C { 122 °F }	Below 1.5	● Engine coolant temperature sensor ● ECM
				Engine coolant temperature above 60 °C { 140 °F }	Above 1.5	
4Z	Heated oxygen sensor heater	Heated oxygen sensor (Rear)	Ignition switch ON	Engine coolant temperature below 70 °C { 158 °F }	B+	● Heated oxygen sensor (Rear)
				Engine coolant temperature above 70 °C { 158 °F }	Below 2.0	

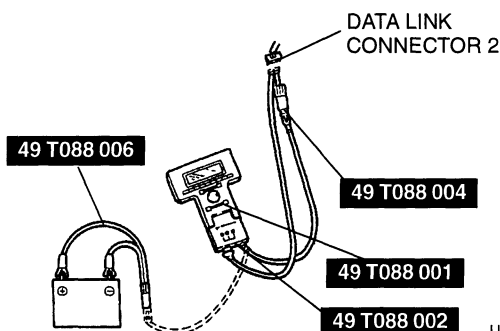
*1 : In data link connector

*2 : AT only

*3 : Engine Signal Monitor: Green and red lights flash

Using SSTs (NGS)

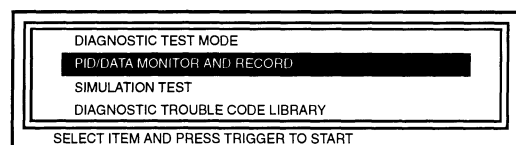
1. In the passenger compartment, connect the **SSTs** (NGS) to the data link connector 2. Located under the driver side dashboard.
2. Referring to the NGS instruction manual, select the PID/DATA MONITOR AND RECORD function.
3. Referring PID/DATA MONITOR table, inspect each ECM input/output signal.



U5U14005

Note

- The PID/DATA MONITOR AND RECORD function is to monitor the calculation value of input/output signals in the ECM. Deviation in the value does not always indicate malfunction in the related input/output devices.
- When normal output signal cannot be detected when all input signals are normal, replace the ECM.



U5U14006

CONTROL SYSTEM

PID/DATA MONITOR table

Display on the NGS	Monitor item	Unit/Condition		Reference Value/Condition
A/C RLY	A/C relay	ON/OFF		A/C operating at idle: ON Ignition switch ON: OFF
A/C SW	A/C switch	ON/OFF		A/C switch and fan switch ON: ON A/C switch OFF: OFF
B+	Battery positive voltage	V		Constant: B+
BARO	Barometric pressure	kPa	mmHg	Below 400 m { 0.25 mile } above sea level: 99—103 kPa { 743—772 mmHg }
BARO V	Barometric pressure signal voltage	V		Below 400 m { 0.25 mile } above sea level: 3.9—4.0 V
BLR SW	Fan switch	ON/OFF		Fan switch OFF or ON at 1st: OFF Fan switch ON at 2nd or higher: ON
BRK SW	Brake switch	ON/OFF		Brake switch ON: ON Brake switch OFF: OFF
CTP SW	Closed throttle position switch	ON/OFF		Accelerator pedal released: ON Accelerator pedal depressed: OFF
ECT	Engine coolant temperature	°C	°F	Engine coolant temperature 20 °C { 68 °F } : 20 °C { 68 °F } Engine coolant temperature 60 °C { 140 °F } : 60 °C { 140 °F }
ECT TCM	Engine coolant temperature signal (TCM)	ON/OFF		Engine coolant temperature above 60 °C { 140 °F } : OFF Engine coolant temperature below 50 °C { 122 °F } : ON
ECT V	Engine coolant temperature signal voltage	V		Engine coolant temperature 20 °C { 68 °F } : 3.0—3.1 V, After warms up: 0.2—1.0 V
EGRB	EGR boost	kPa	mmHg	Ignition switch ON: 0 kPa { 0 mmHg } Idle: -62—-75 kPa { -466—-562 mmHg }
EGRB V	EGR boost signal voltage	V		Ignition switch ON: 4.0 V Idle: 1.0—1.5 V
EGRP V	EGR valve position signal voltage	V		Ignition switch ON: 0.7—0.8 V Idle: 0.7—0.8 V Driving: 0.7—4.5 V
EGRVAC	EGR solenoid valve (vacuum) duty value	%		Ignition switch ON: 0 % Idle: 0 %
EGRVENT	EGR solenoid valve (vent) duty value	%		Ignition switch ON: 100 % Idle: 100 %
FANC	Cooling fan control	ON/OFF		Cooling fan operating (ECT above 97 °C { 207 °F }) or Terminal TEN ground and throttle valve open or A/C relay ON: ON, Others: OFF
FANN	Condenser fan control	ON/OFF		Condenser fan operating (ECT above 108 °C { 226 °F }) or Terminal TEN ground and throttle valve open or A/C relay ON: ON, Others: OFF
FAT	FAT terminal	ON/OFF		Ignition switch ON or idle: ON/OFF Diagnostic trouble code exist: ON
FHO2S	Heated oxygen sensor (Front)	V		Ignition switch ON: 0—1.0 V After warms up: 0—1.0 V Acceleration: 0.5—1.0 V Deceleration: 0—0.5 V
FHO2SH	Heated oxygen sensor heater (Front)	ON/OFF		Ignition switch ON: ON Idle: ON
FP RLY	Fuel pump relay	ON/OFF		Ignition switch ON: OFF, Idle: ON Cranking: ON
HDL SW	Headlight switch	ON/OFF		Headlight switch ON: ON Headlight switch OFF: OFF
IACV	Idle air control valve	ms		Ignition switch ON: 4.0 msec Idle: 1.2—2.7 msec Idle (Terminal TEN ground): 1.5 msec

CONTROL SYSTEM

Display on the NGS	Monitor item	Unit/Condition		Reference Value/Condition
IAT	Intake air temperature	°C	°F	Intake air temperature 20 °C { 68 °F }; 20 °C { 68 °F }
IAT V	Intake air temperature signal voltage	V		Intake air temperature 20 °C { 68 °F }; 2.3—2.4 V Intake air temperature 30 °C { 86 °F }; 1.8 V
IGT	Ignition timing	BTDC		Idle: BTDC 6—18° Idle (Terminal TEN ground): BTDC 9—11° Ignition switch ON: –20° Cranking: 3°
INJ	Fuel injection duration	ms		Ignition switch ON: 0 msec Idle: 2.0—4.0 msec
MAF V	Mass air flow signal voltage	V		Ignition switch ON: 0.5 V Idle: 1.0—2.0 V
MIL	Malfunction indicator light	ON/OFF		Ignition switch ON or Diagnostic trouble code exist: ON No diagnostic trouble code exist: OFF
MT/AT	MT/AT discrimination signal	ON/OFF		MT: ON AT: OFF
NL SW	Neutral/clutch switch	ON/OFF		Neutral position and clutch pedal released: ON Others: OFF
PRCV	PRC solenoid valve	ON/OFF		Ignition switch ON: OFF, Idle: OFF After hot start: ON
PRGV	Purge solenoid valve	%		Ignition switch ON: 0 % Idle: 0 %
PSP SW	P/S pressure switch	ON/OFF		P/S not operating: OFF P/S operating: ON
RHO2S	Heated oxygen sensor (Rear)	V		Ignition switch ON: 0—1.0 V Idle: 0—1.0 V Engine coolant temperature cold condition: 0—0.5 V Acceleration: 0.5—1.0 V Deceleration: 0—0.5 V
RHO2SH	Heated oxygen sensor heater (Rear)	ON/OFF		Engine coolant temperature below 70 °C { 158 °F }: OFF Engine coolant temperature above 70 °C { 158 °F }: ON
RFC FLAG	Readiness function code	ON/OFF		Readiness function code exist: ON No readiness function code exist: OFF
RPM	Engine speed	rpm		Idle: 800—900 (MT), 750—850 (AT)
TAT	TAT terminal	ON/OFF		Normal condition: OFF
TEN	TEN terminal	ON/OFF		Open terminal TEN: OFF Short terminal TEN: ON
TP V	Throttle position sensor signal voltage	V		Closed throttle position: 0.1—1.1 V Wide open throttle: 3.0—4.6 V
TR SW	Transmission range switch	ON/OFF		P or N position: ON Others: OFF
VS	Vehicle speed	km/h	MPH	Vehicle speed 20 km/h { 12 mph }; 20 km/h { 12 mph } Vehicle speed 40 km/h { 25 mph }; 40 km/h { 25 mph }

MASS AIR FLOW SENSOR INSPECTION

U5U140AD

Using SSTs (Engine Signal Monitor)

1. Check the mass air flow sensor for damage and cracks.
2. Connect the **SSTs** (Engine Signal Monitor) to the ECM. (Refer to 01-40 ENGINE CONTROL MODULE (ECM) INSPECTION, Using **SSTs** (Engine Signal Monitor).)
3. Measure the voltage at ECM terminal 3B.
4. Verify that the voltage is within the specification.

Specification

Measuring condition	ECM terminal 3B voltage (V)
Ignition switch ON	0.5
Idle	1.0—2.0

5. If not as specified, inspect the harness and connector between the mass air flow sensor and the ECM terminal.
6. If there is correct terminal voltage and harness continuity, replace the mass air flow sensor.

Using SSTs (NGS)

1. Check the mass air flow sensor for damage and cracks.
2. Connect the **SSTs** (NGS) to the data link connector 2.
3. Select the PID/DATA MONITOR AND RECORD function of the NGS.
4. Select "MAF V" on the NGS display. The NGS measures and shows the voltage.

Specification

Measuring condition	Mass air flow signal voltage (V)
Ignition switch ON	0.5
Idle	1.0—2.0

5. If not as specified, inspect the harness and connector between the mass air flow sensor and the ECM terminal.
6. If there is correct terminal voltage and harness continuity, replace the mass air flow sensor.

Note

- The scan tool shows the mass air flow rate and load value.

Specification

	Intake mass air flow (g/s)		Engine load calculated value (%)	
	MT	AT	MT	AT
Idle*1	2.2—3.1	2.3—3.4	15.0—18.8	17.1—21.0
Engine speed 2,500 rpm*2	6.8—7.3	7.9—8.5	14.0—17.0	16.0—19.0

*1 : 750—950 rpm [MT], 700—900 rpm [AT]

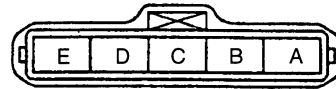
*2 : No load, neutral or P position

Intake Air Temperature Sensor

1. Disconnect the mass air flow sensor connector.
2. Measure the resistance between terminals C and D by using an ohmmeter.

Specification

2.21—2.69 kΩ [20 °C { 68 °F }]



U5U14008

3. If not as specified, replace the mass air flow sensor.

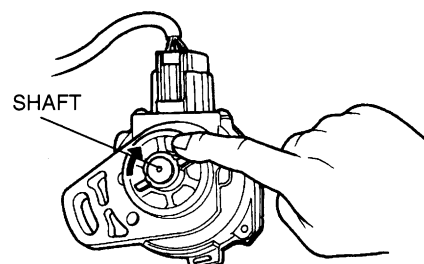
CAMSHAFT POSITION SENSOR INSPECTION

U5U140AE

1. Remove the camshaft position sensor.
2. Verify that the ignition control module connector is disconnected.
3. Connect the camshaft position sensor connector.
4. Disconnect the fuel injector connector.
5. Turn the ignition switch to ON.
6. Connect the **SSTs** (Engine Signal Monitor) to the ECM. (Refer to 01-40 ENGINE CONTROL MODULE (ECM) INSPECTION, Using **SSTs** (Engine Signal Monitor).)
7. Rotate the sensor drive by hand and measure the output voltage.

Specification

ECM terminal	Voltage
4F (SGT signal)	Approx. 5 V (4 pulses/rev)
4G (SGC signal)	Approx. 5 V (1 pulses/rev)



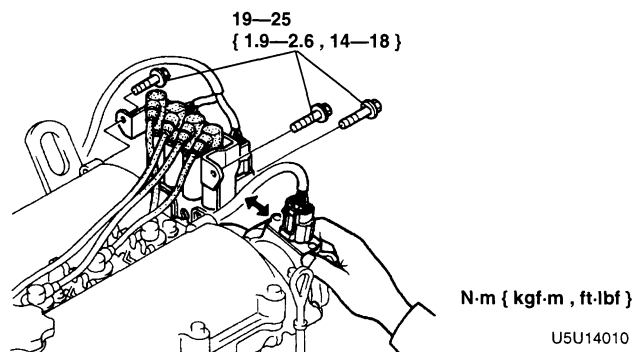
U5U14009

CONTROL SYSTEM

8. After the inspection, install the camshaft position sensor.
9. Start the engine and adjust the ignition timing. (Refer to 01-10 ENGINE TUNE-UP, Ignition Timing.)

Ignition timing
BTDC 9°—11° (10° ± 1°)

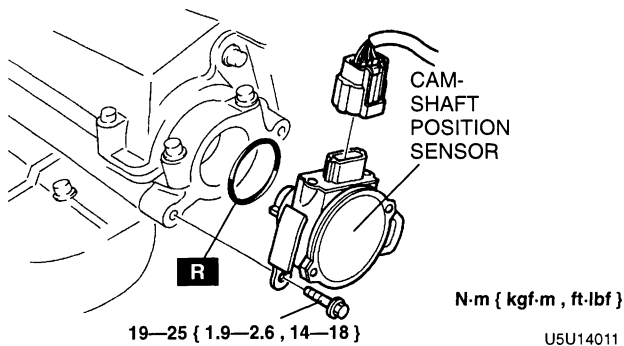
10. Tighten the camshaft position sensor lock bolt.



CAMSHAFT POSITION SENSOR REPLACEMENT

U5U140AF

1. Remove the ignition coil. (Refer to 01-18 IGNITION COIL REPLACEMENT.)
2. Remove the camshaft position sensor as shown in the figure.
3. Install in the reverse order of removal.

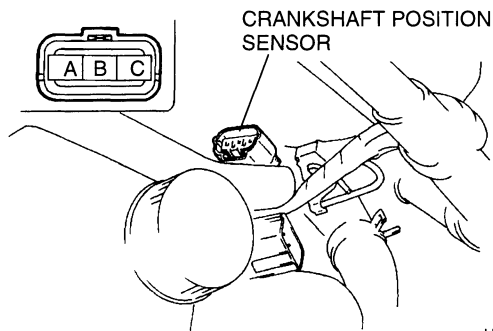


CRANKSHAFT POSITION SENSOR INSPECTION

U5U140AG

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

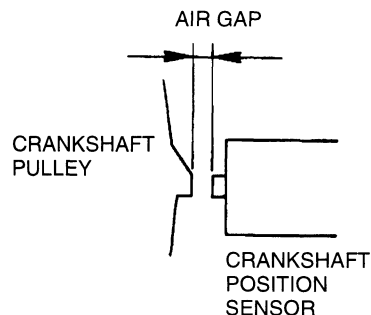
Specification
500—600 Ω [20 °C { 68 °F }]



3. If not as specified, replace the crankshaft position sensor.

4. Measure the air gap between the crankshaft pulley projection and the crankshaft position sensor by using a feeler gauge.

Specification
0.5—1.5 mm { 0.020—0.059 in }

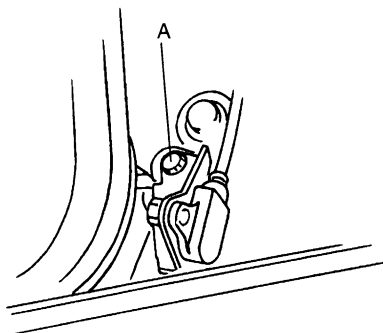


5. If not as specified, adjust the air gap.

CRANKSHAFT POSITION SENSOR ADJUSTMENT

U5U140AW

1. Loosen the bolt A.

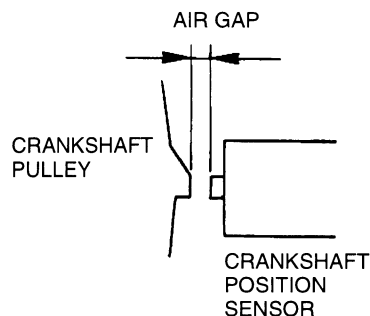


U5U14035

2. Adjust the air gap between the crankshaft projection and the crankshaft position sensor by using a feeler gauge.

Specification

0.5—1.5 mm { 0.020—0.059 in }



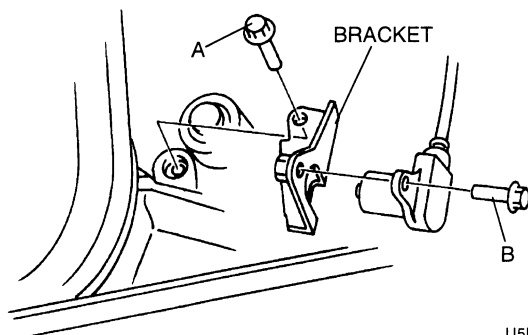
U5U14013

3. If not adjusted, replace the bracket and readjust the air gap.
4. If not adjusted, replace the crankshaft pulley or the crankshaft position sensor.

CRANKSHAFT POSITION SENSOR REPLACEMENT

U5U140AH

1. Remove the undercover.
2. Remove the bolt A.
3. Remove the bolt B and bracket.



U5U14036

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 }

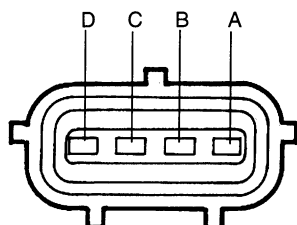
5. Adjust the air gap. (Refer to 01—40 CRANKSHAFT POSITION SENSOR REPLACEMENT.)

THROTTLE POSITION SENSOR INSPECTION

U5U140AJ

Closed Throttle Position Switch

1. Verify that the throttle valve is at the closed throttle position.
2. Disconnect the throttle position sensor connector.
3. Check continuity between throttle position sensor terminals A and B.

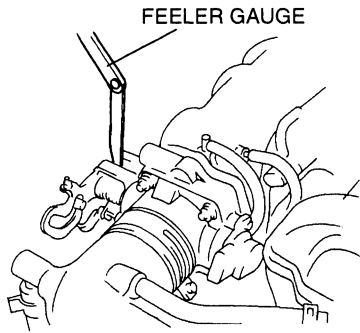


U5U14015

Specification

Terminals	Throttle valve fully closed
A—B	Continuity

4. If not as specified, adjust the throttle position sensor. (Refer to 01—40 THROTTLE POSITION SENSOR ADJUSTMENT.)
5. Insert a 0.4 mm { 0.016 in } feeler gauge between the stopper and the throttle lever.



6. Verify that there is no continuity between the throttle position sensor terminals A and B.
7. If there is continuity, adjust the throttle position sensor. (Refer to 01-40 THROTTLE POSITION SENSOR ADJUSTMENT.)

Throttle Position Sensor

Using SSTs (Engine signal monitor)

1. Connect the **SSTs** (Engine Signal Monitor) to the ECM. (Refer to 01-40 ENGINE CONTROL MODULE (ECM) INSPECTION, Using **SSTs** (Engine Signal Monitor).)
2. Verify that the throttle valve is at the closed throttle position.
3. Turn the ignition switch to ON.
4. Measure the voltage at ECM terminal 3F.

Specification

Closed throttle position: 0.1—1.1 V

Wide open throttle: 3.0—4.6 V

(Verify that the voltage increase is directly proportioned to the throttle valve opening angle.)

5. If not as specified, adjust the throttle position sensor. (Refer to 01-40 THROTTLE POSITION SENSOR ADJUSTMENT.)

Using SSTs (NGS)

1. Connect the **SSTs** (NGS) to the data link connector 2.
2. Verify that the throttle valve is at the closed throttle position.
3. Select the PID/DATA MONITOR AND RECORD function.
4. Select "TP V" on the NGS display. The NGS measures and shows the voltage.

Specification

Closed throttle position: 0.1—1.1 V

Wide open throttle: 3.0—4.6 V

(Verify that the voltage increase is directly proportioned to the throttle valve opening angle.)

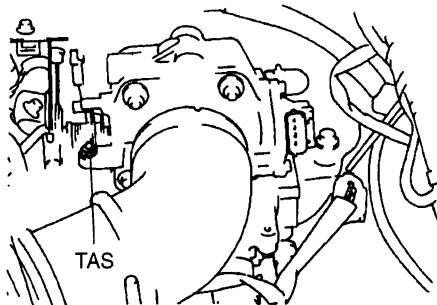
5. If not as specified, adjust the throttle position sensor.

THROTTLE POSITION SENSOR ADJUSTMENT

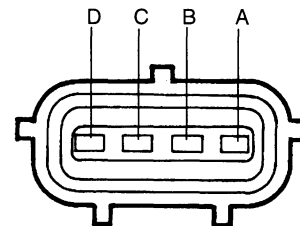
U5U140AK

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.



U5U14017



U5U14018

Specification

Clearance	Continuity
0.3 mm { 0.012 in }	Yes
0.4 mm { 0.016 in }	No

5. Tighten the throttle position sensor screws.

Tightening torque

1.6—2.3 N·m { 16—24 kgf·cm , 14—20 in·lbf }

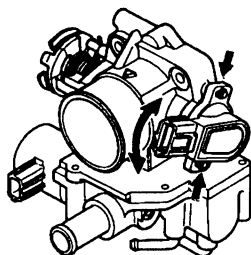
Closed Throttle Position Switch

1. The throttle valve to the closed throttle position.
2. Disconnect the throttle position sensor connector.
3. Loosen the throttle position sensor screws.
4. Rotate the throttle position sensor and adjust continuity between the sensor terminals A and B as shown.

Throttle Position Sensor

Using SSTs (Engine signal monitor)

1. Connect the **SSTs** (Engine Signal Monitor) to the ECM. (Refer to 01-40 ENGINE CONTROL MODULE (ECM) INSPECTION, Using **SSTs** (Engine Signal Monitor).)
2. Verify that the throttle valve is at the closed throttle position.
3. Loosen the attaching screws.
4. Turn the ignition switch to ON.
5. Adjust the throttle position sensor so that the ECM terminal 3F voltage is as specified.



U5U14019

Specification

Closed throttle position: 0.1—1.1 V

Wide open throttle: 3.0—4.6 V

(Verify that the voltage increase is directly proportioned to the throttle valve opening angle.)

6. Tighten the attaching screws.

Tightening torque

1.6—2.3 N·m { 16—24 kgf·cm , 14—20 in·lbf }

7. If not adjusted, inspect the throttle position sensor harness.
8. If the harness is OK, replace the throttle position sensor.

Using SSTs (NGS)

1. Connect the **SSTs** (NGS) to the data link connector 2.
2. Select the PID/DATA MONITOR AND RECORD function of the NGS.
3. Verify that the throttle valve is at the closed throttle position.
4. Loosen the attaching screws.
5. Select the "TP V" on the NGS display. The NGS measures and shows the voltage.

Specification

Closed throttle position: 0.1—1.1 V

Wide open throttle: 3.0—4.6 V

(Verify that the voltage increase is directly proportioned to the throttle valve opening angle.)

6. Tighten the attaching screws.

Tightening torque

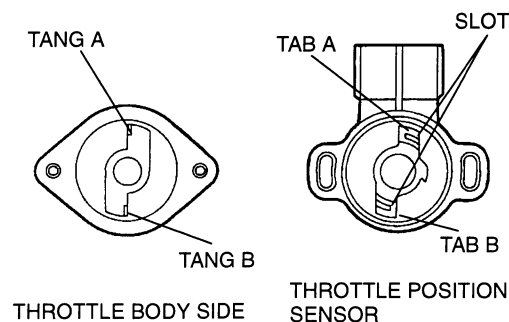
1.6—2.3 N·m { 16—24 kgf·cm , 14—20 in·lbf }

7. If not adjusted, inspect the throttle position sensor harness.
8. If the harness is OK, replace the throttle position sensor.

THROTTLE POSITION SENSOR REPLACEMENT

U5U140AL

1. Disconnect the throttle position sensor connector.
2. Remove the attaching screws.
3. Remove the throttle position sensor.
4. Verify that the throttle valve is fully closed.
5. Open the throttle valve slightly and catch the tang of the throttle body on the throttle position sensor plastic tabs. Align tang A on throttle body with tab A on throttle position sensor. Note tangs on the throttle body mate with the tabs on the throttle position sensor on the side of the tab without a slot.
6. Position the throttle position sensor on the throttle body so that the mounting holes align.
7. Install and hand tighten the attaching screws.
8. Release the throttle.
9. Adjust the throttle position sensor output voltage and closed throttle position switch. (Refer to 01-40 THROTTLE POSITION SENSOR ADJUSTMENT.)

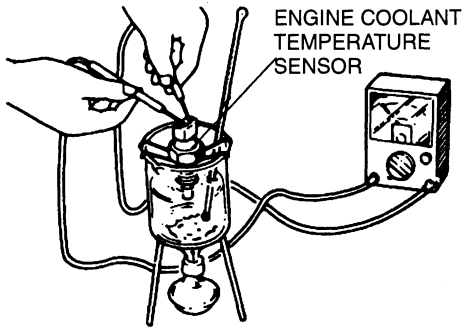


U5U14020

ENGINE COOLANT TEMPERATURE SENSOR INSPECTION

U5U140AM

1. Place the sensor in water with a thermometer and heat the water gradually.
2. Measure resistance of the sensor by using an ohmmeter.



U5U14021

Specification

Water temperature	Resistance k Ω
20 °C { 68 °F }	2.21—2.69
80 °C { 176 °F }	0.287—0.349

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

HEATED OXYGEN SENSOR INSPECTION

U5U140AN

Sensor

Using SSTs (Engine signal monitor)

1. Warm up the engine to normal operating temperature.
2. Connect the **SSTs** (Engine Signal Monitor) to the ECM. (Refer to 01-40 ENGINE CONTROL MODULE (ECM) INSPECTION, Using **SSTs** (Engine Signal Monitor).)
3. Measure the ECM terminal 3C and 3D voltages.

Specification

Engine condition	ECM terminal 3C	ECM terminal 3D
Idle	0—1.0 V	0—1.0 V
Acceleration	0.5—1.0 V	0—1.0 V
Deceleration	0—0.5 V	0—1.0 V

4. If not as specified, inspect the following.
 - Harness and connector between heated oxygen sensor and ECM.
 - On-board diagnostic system (Refer to 01-01 ENGINE ON-BOARD DIAGNOSIS.)
 - Intake manifold vacuum
 - Fuel line pressure (Refer to 01-01 SYSTEM INSPECTION, Fuel Line Pressure Inspection.)
5. If all the systems are OK, replace the heated oxygen sensor.

Using SSTs (NGS)

1. Connect the **SSTs** (NGS) to the data link connector
- 2.
2. Select the PID/DATA MONITOR AND RECORD function of the NGS.
3. Select "FHO2S", "RHO2S" on the NGS display. The NGS measures and shows the voltage.

Specification

Engine condition	Voltage (FHO2S)	Voltage (RHO2S)
Idle	0—1.0 V	0—1.0 V
Acceleration	0.5—1.0 V	0—1.0 V
Deceleration	0—0.5 V	0—1.0 V

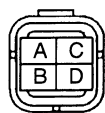
4. If not as specified, inspect the following.
 - Harness and connector between heated oxygen sensor and ECM.
 - On-board diagnostic system (Refer to 01-01 ENGINE ON-BOARD DIAGNOSIS.)
 - Intake manifold vacuum
 - Fuel line pressure (Refer to 01-01 SYSTEM INSPECTION, Fuel Line Pressure Inspection.)
5. If all the systems are OK, replace the heated oxygen sensor.

Heater

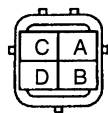
1. Disconnect the heated oxygen sensor connector.
2. Measure the resistance between heated oxygen sensor terminals D and C by using an ohmmeter.

Specification

Approx. $13\ \Omega$ [$20\ ^\circ\text{C}$ { $68\ ^\circ\text{F}$ }]



FRONT



REAR

U5U14022

3. If not as specified, replace the heated oxygen sensor.

EGR VALVE POSITION SENSOR INSPECTION

Using SSTs (Engine signal monitor)

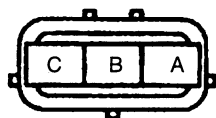
Note

- The following vacuum values are indicated by relative vacuum from atmospheric pressure.

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

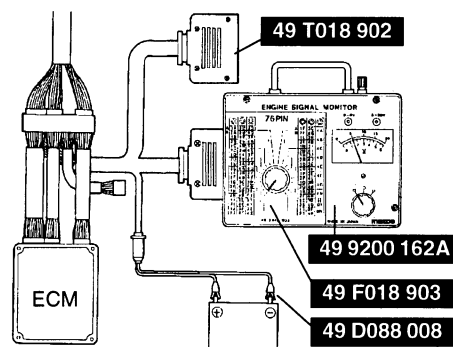
Specification

$2.7\ \text{k}\Omega$ (Outside temperature $20\ ^\circ\text{C}$ { $68\ ^\circ\text{F}$ })



U5U14023

3. If not as specified, replace the EGR valve.
4. Connect the EGR valve position sensor connector.
5. Connect the **SSTs** to the ECM as shown.



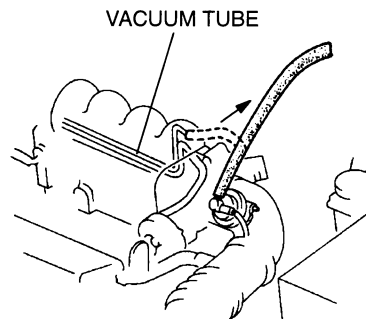
U5U140AP

U5U14003

Caution

- Do not apply a vacuum outside of the specified limits. Doing so will damage the EGR valve position sensor.

6. Apply a vacuum to the EGR valve position sensor according to the following procedure.



U5U14024

7. Increase the applied vacuum from $-101.3\ \text{kPa}$ { $-760\ \text{mmHg}$, $-29.9\ \text{inHg}$ } to $-117.9\ \text{kPa}$ { $-884\ \text{mmHg}$, $-34.8\ \text{inHg}$ } and verify that the ECM terminal 3J voltage decreases accordingly.

CONTROL SYSTEM

Reference data

Note

- The output voltage varies with to the measuring condition.

Measuring condition

- Input voltage — 5.0 V
- Atmospheric pressure — 101.3 kPa { 760 mmHg , 29.9 inHg }
- Outside temperature — 20 °C { 68 °F }

Applied vacuum	Output voltage (V)
– 101.3 kPa { – 760 mmHg , – 29.9 inHg }	0.630—0.770
– 110.0 kPa { – 825 mmHg , – 32.5 inHg }	0.630—0.770
– 117.9 kPa { – 884 mmHg , – 34.8 inHg }	4.275—5.255

- If not as specified, perform the following inspection.
 - Harness continuity
 - Between ECM terminal 3O and EGR boost sensor terminal A.
 - Between ECM terminal 3I and EGR boost sensor terminal B.
 - Between ECM terminal 3J and EGR boost sensor terminal C.
 - Terminal voltage
 - EGR boost sensor terminal A voltage: Ground (Below 1.0 V)
 - EGR boost sensor terminal B voltage: Constant voltage (4.5—5.5 V)
- If terminal voltage is correct and there is harness continuity, replace the EGR valve position sensor.

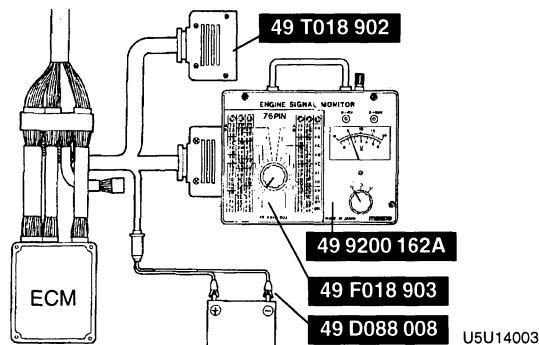
EGR BOOST SENSOR INSPECTION

Barometric Pressure Signal Side

Note

- The following vacuum and pressure values are indicated by relative pressure from atmospheric pressure.

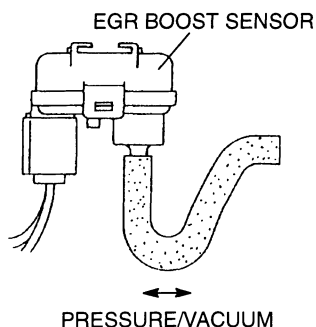
- Connect the SSTs to the ECM as shown.



Caution

- Do not apply a vacuum or pressure outside of the specified limits. Doing so will damage the EGR boost sensor.

- Apply pressure then a vacuum to the EGR boost sensor according to the following procedure.



- Decrease the applied pressure from +5.4 kPa { +41 mmHg , +1.6 inHg } to –54.6 kPa { –410 mmHg , –16.1 inHg } and verify that the ECM terminal 3H voltage decreases accordingly.

Reference data

Note

- The output voltage varies with to the measuring condition.

Measuring condition

- Input voltage — 5.0 V
- Atmospheric pressure — 101.3 kPa { 760 mmHg , 29.9 inHg }
- Outside temperature — 25 °C { 77 °F }

Applied pressure/vacuum	Output voltage (V)
+ 5.4 kPa { + 41 mmHg , + 1.6 inHg }	3.790—4.632
0 kPa { 0 mmHg , 0 inHg }	3.600—4.400
– 54.6 kPa { – 410 mmHg , – 16.1 inHg }	1.658—2.026

- If not as specified, perform the following inspection.
 - Harness continuity
 - Between ECM terminal 3I and EGR boost sensor terminal B.
 - Between ECM terminal 3O and EGR boost sensor terminal C.
 - Between ECM terminal 3H and EGR boost sensor terminal D.
 - Terminal voltage
 - EGR boost sensor terminal B voltage: Constant voltage (4.5—5.5 V)
 - EGR boost sensor terminal C voltage: Ground (Below 1.0 V)
- If terminal voltage is correct and there is harness continuity, replace the EGR boost sensor.

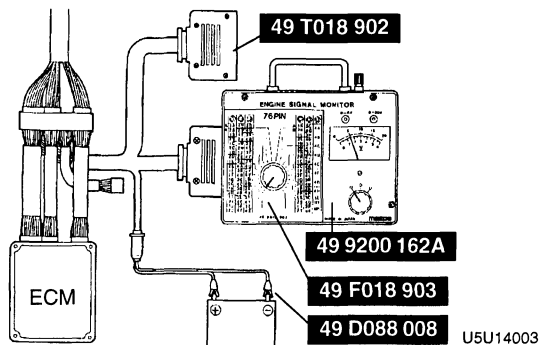
CONTROL SYSTEM

EGR Boost Signal Side

Note

- The following vacuum and pressure values are indicated by relative pressure from atmospheric pressure.

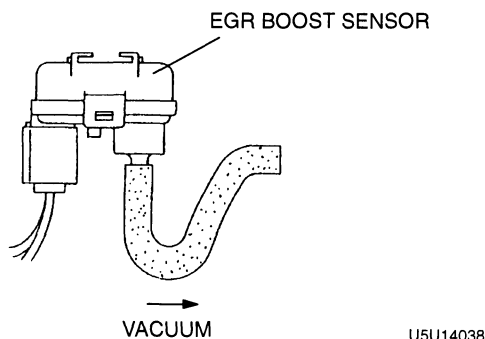
- Connect the **SSTs** to the ECM as shown.



Caution

- Do not apply a vacuum or pressure outside of the specified limits. Doing so will damage the EGR boost sensor.**

- Apply pressure then a vacuum to the EGR boost sensor according to the following procedure.



- Increase the applied vacuum from -6.7 kPa { -50 mmHg , -2.0 inHg } to -66.7 kPa { -500 mmHg , -19.7 inHg } and verify that the ECM terminal 3N voltage decreases accordingly.

Reference data

Note

- The output voltage varies with to the measuring condition.

Measuring condition

- Input voltage — 5.0 V
- Atmospheric pressure — 101.3 kPa { 760 mmHg , 29.9 inHg }
- Outside temperautre — 25°C { 77°F }

Applied vacuum	Output voltage (V)
-6.7 kPa { -50 mmHg , -2.0 inHg }	3.420—4.180
-36.7 kPa { -275 mmHg , -10.8 inHg }	2.204—2.693
-43.4 kPa { -326 mmHg , -12.8 inHg }	1.933—2.361
-66.7 kPa { -500 mmHg , -19.7 inHg }	0.990—1.210

- If not as specified, perform the following inspection.

(1) Harness continuity

- Between ECM terminal 3N and EGR boost sensor terminal A.
- Between ECM terminal 3I and EGR boost sensor terminal B.
- Between ECM terminal 3O and EGR boost sensor terminal C.

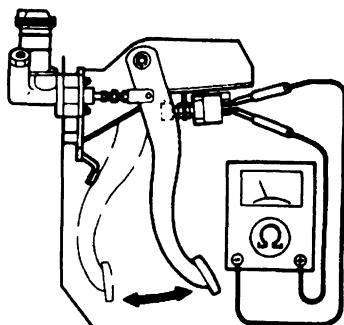
(2) Terminal voltage

- EGR boost sensor terminal B voltage: Constant voltage (4.5 — 5.5 V)
- EGR boost sensor terminal C voltage: Ground (Below 1.0 V)

- If terminal voltage is correct and there is harness continuity, replace the EGR boost sensor.

CLUTCH SWITCH INSPECTION

- Disconnect the clutch switch connector.
- Check for continuity between terminals of the clutch switch by using an ohmmeter.



U5U140AR

○—○ : Continuity

Condition	Terminal	
	A	B
Clutch pedal not depressed		
Clutch pedal depressed	○—○	○—○

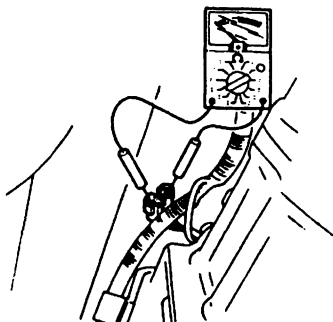
U5U14028

- If not as specified, replace the clutch switch.

CONTROL SYSTEM

NEUTRAL SWITCH INSPECTION

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



U5U14029

U5U140AS

○—○ : Continuity

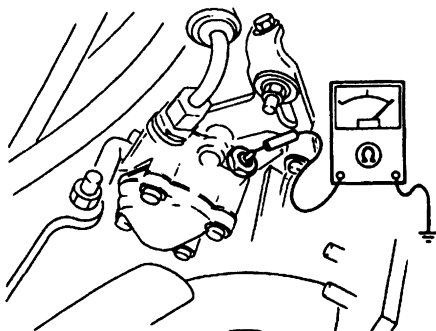
Condition	Terminal	
	A	B
Neutral position	○—○	○—○
Others		

U5U14030

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

POWER STEERING PRESSURE SWITCH INSPECTION

1. Disconnect the power steering pressure switch connector.
2. Start the engine.
3. Check for continuity between power steering pressure switch terminal and a ground by using an ohmmeter.



U5U14031

U5U140AT

○—○ : Continuity

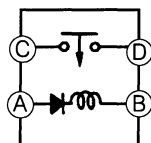
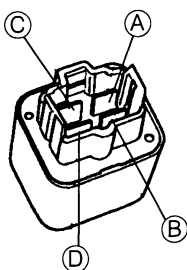
Condition	Terminal	
	A	B
Steering wheel not turned		
Steering wheel being turned	○—○	○—○

U5U14032

4. If not as specified, replace the power steering pressure switch.

MAIN RELAY INSPECTION

1. Remove the main relay.
2. Check for continuity between terminals of the relay by using an ohmmeter.



U5U14033

U5U140AU

○—○ : Continuity

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

U5U14034

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

ENGINE COOLANT TEMPERATURE SENSOR REMOVAL / INSTALLATION

U5U140AV

Engine Coolant Temperature Sensor Installation Note

1. Install the engine coolant temperature sensor and a new washer.

2. Connect the engine coolant temperature sensor connector.
3. Install the ignition coil assembly. (Refer to 01-18 IGNITION COIL REPLACEMENT.)

Tightening torque

25—29 N·m { 2.5—3.0 kgf·m , 19—21 ft·lbf }

TECHNICAL DATA

01-50 TECHNICAL DATA

01 ENGINE 01-50-1

01 ENGINE

U5U150AA

Item			BP Engine	
			MT	AT
MECHANICAL				
Type			Gasoline, 4-cycle	
Cylinder arrangement and number			In-line, 4 cylinders	
Combustion chamber			Pentroof	
Valve system			DOHC, belt-driven, 16 valves	
Displacement (ml { cc , cu in })			1,840 { 1,840 , 112 }	
Bore × stroke (mm { in })			83.0 × 85.0 { 3.27 × 3.35 }	
Compression ratio			9.0	
Compression pressure (kPa { kgf/cm ² , psi)–rpm)			1,255 { 12.8 , 182 }–300	
Valve timing	IN	Open (BTDC)	5°	
		Close (ABDC)	48°	
	EX	Open (BBDC)	56°	
		Close (ATDC)	14°	
Valve clearance		IN (mm { in })	0 { 0 } : Maintenance-free	
		EX (mm { in })	0 { 0 } : Maintenance-free	
Idle speed* ¹ (rpm)			800—900 (850 ± 50)	750—850 (800 ± 50)
Ignition timing* ¹ (BTDC)			9°—11° (10° ± 1°)	
Idle up speed (E/L) (rpm)			800—900	750—850
Idle up speed (P/S) (rpm)			800—900	750—850
Idle up speed (A/C) (rpm)			950—1,050	750—850
LUBRICATION SYSTEM				
Type			Force-fed type	
Oil pump	Type		Trochoid gear	
	Relief pressure (kPa { kgf/cm ² , psi })		344—441 { 3.5—4.5 , 50—63 }	
Oil filter	Type		Full-flow, paper element	
	Bypass pressure (kPa { kgf/cm ² , psi })		79—117 { 0.8—1.2 , 12—17 }	
Oil capacity	Total (dry engine) (L { US qt , Imp qt })		4.0 { 4.2 , 3.5 }	
	Oil replacement (L { US qt , Imp qt })		3.6 { 3.8 , 3.2 }	
	Oil and oil filter replacement (L { US qt , Imp qt })		3.8 { 4.0 , 3.3 }	
Engine oil			API Service SG, SH (ECII) ILSAC	
Viscosity number	Above – 25 °C { – 13 °F }		SAE 10W–30	
	Below 0 °C { 32 °F }		SAE 5W–30	
COOLING SYSTEM				
Type			Water-cooled, force circulation	
Coolant capacity (L { US qt , Imp qt })			6.0 { 6.3 , 5.3 }	
Water pump	Type		Centrifugal, V-ribbed belt-driven	

TECHNICAL DATA

Item			BP Engine	
			MT	AT
Thermostat	Type		Wax, two-stage	
	Opening temperature (°C { °F })		Main: 86.5—89.5 { 188—193 } Sub: 83.5—86.5 { 183—187 }	
	Full-open temperature (°C { °F })		100 { 212 }	
	Full-open lift (mm { in })		Main: 8.0 { 0.31 } min. Sub: 1.5 { 0.06 } min.	
Radiator	Type		Corrugated fin	
	Cap valve opening pressure (kPa { kgf/cm ² , psi })		73.6—102 { 0.75—1.05 , 10.7—14.9 }	
Cooling fan	Type		Electric	
	Blade	Outer diameter (mm { in })	320 { 12.6 }	
		Number	5	
	Motor	Capacity (W-V)	70-12	80-12
		Current (A)	5.9 + 10 % max	6.7 + 10 % max
CHARGING SYSTEM				
Battery	Voltage (V)		12	
	Type and capacity (5-hour rate) (A·h)		S46A24L (S) (32)	
	Electrolyte gravity		1.27—1.29 [20 °C { 68 °F }]	
	Dark current* ² (mA)		Max. 20	
Generator	Output (V-A)		12-65	12-70
	Regulated voltage (V)		14.3—14.9	
	Self-diagnosis function		Equipped	
	Rotor resistance (Between slip rings) (Ω)		3.5—4.5 [20 °C { 68 °F }]	
	Brush length	Standard (mm { in })	21.5 { 0.846 }	
		Minimum (mm { in })	8.0 { 0.32 }	
	Brush spring force	Standard (N { kgf , lbf })	3.2—4.3 { 0.32—0.44 , 0.71—0.96 }	
		Minimum (N { kgf , lbf })	1.6—2.3 { 0.16—0.24 , 0.36—0.52 }	
IGNITION SYSTEM				
Ignition control module	Type		Integrated in ignition coil	
Ignition coil	Type		Molded (with ignition control module)	
	Resistance	Primary coil (Ω)	—	
		Secondary coil (kΩ)	8.7—12.9 [20 °C { 68 °F }]	
Distributor	Type		—	
	Firing order		1—3—4—2	
High-tension lead	Resistance (kΩ/m)		16 [20 °C { 68 °F }]	
Spark advance			Electronic	
Spark plug	Type	NGK	BKR5E-11* ³ , BKR6E-11	
		NIPPONDENSO	K16PR-U11* ³ , K20PR-U11	
	Plug gap (mm { in })		1.0—1.1 { 0.040—0.043 }	
	Tightening torque (N·m { kgf·m , ft·lbf })		15—22 { 1.5—2.3 , 11—16 }	
STARTING SYSTEM				
Starter	Type		Direct	Coaxial reduction
	Output (kW)		0.95	1.4
	Brush length	Standard (mm { in })	17.0 { 0.67 }	17.5 { 0.69 }
		Minimum (mm { in })	11.5 { 0.46 }	12.0 { 0.47 }
	Pinion gap (mm { in })		0.5—2.0 { 0.020—0.078 }	

*1 : With System Selector (49 B019 9A0) test switch at SELF TEST.

*2 : Dark current is the constant flow of current present (for the audio unit, clock, ECM etc.) when the ignition switch is OFF and with the ignition key removed.

TECHNICAL DATA

*3 : Standard plug

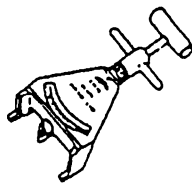
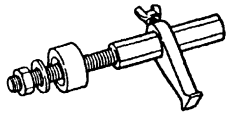
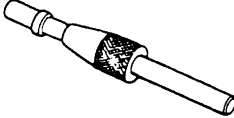
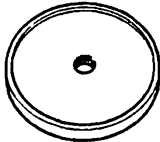
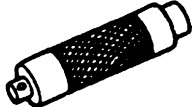
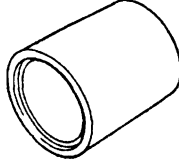
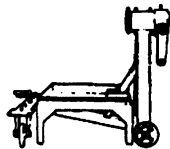
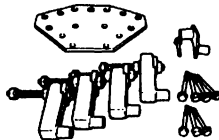
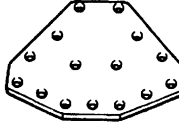
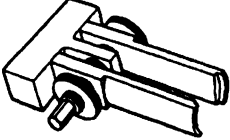
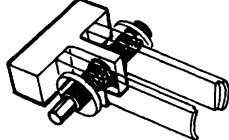
SERVICE TOOLS

01-60 SERVICE TOOLS

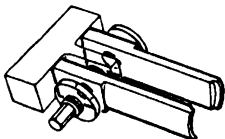
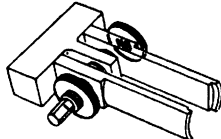
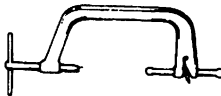
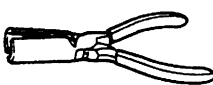
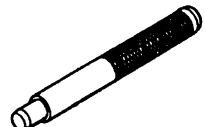
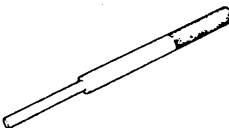
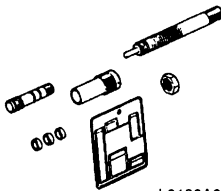
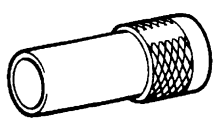
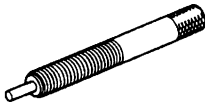
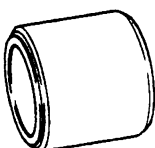
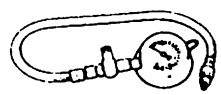
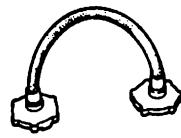
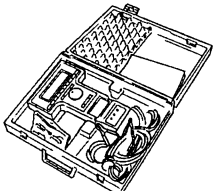
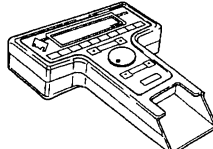
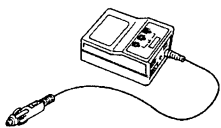
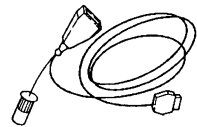
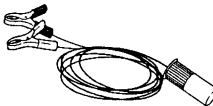
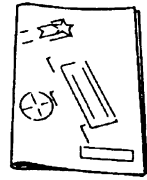
01 ENGINE SST 01-60-1

01 ENGINE SST

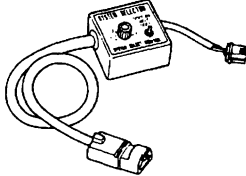
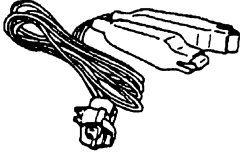
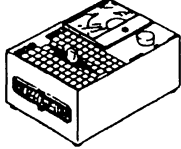
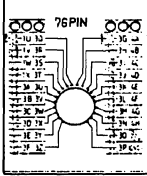
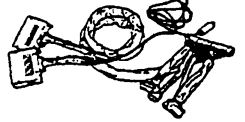
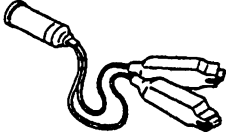
U5U160AA

49 9200 020A Tension gauge, V-ribbed belt  9200020A	49 D011 102 Lock tool, crankshaft  D011102X	49 E011 1A0 Brake set, ring gear  E0111A0X
49 E011 103 Shaft (Part of 49 E011 1A0)  E011103X	49 E011 104 Collar (Part of 49 E011 1A0)  E011104X	49 E011 105 Stopper (Part of 49 E011 1A0)  E011105X
49 SE01 310A Centering tool, clutch disc  SE01310A	49 W033 105 Installer, oil seal  W033105X	49 G030 795 Installer, oil seal  G030795X
49 G030 797 Handle (Part of 49 G030 795)  G030797X	49 T028 302 Installer, dust boot  T028302X	49 0107 680A Engine stand  0107680A
49 L010 1A0 Hanger set, engine stand  L0101A0X	49 L010 101 Plate (Part of 49 L010 1A0)  L010101X	49 L010 102 Arms (Part of 49 L010 1A0)  L010102X
49 L010 103 Hooks (Part of 49 L010 1A0)  L010103X	49 L010 104 Nuts (Part of 49 L010 1A0)  L010104X	49 L010 105 Bolts (Part of 49 L010 1A0)  L010105X
49 L010 106 Bolts (Part of 49 L010 1A0)  L010106X	49 B012 0A2 Pivot  B0120A2X	49 B012 012 Body (Part of 49 B012 0A2)  B012012X

SERVICE TOOLS

49 B012 013 Foot (Part of 49 B012 0A2)  B012013X	49 B012 014 Locknut (Part of 49 B012 0A2)  B012014X	49 0636 100B Arm, valve spring lifter  0636100B
49 S120 170 Remover, valve seal  S120170X	49 0221 061A Remover & installer, piston pin  0221061A	49 G014 001 Oil filter wrench  G014001X
49 B012 005 Remover & installer, valve guide  B012005X	49 L012 0A0A Installer set, valve seal & valve guide  L0120A0A	49 L012 001 Installer (Part of 49 L012 0A0A)  L012001X
49 L012 002 Body (Part of 49 L012 0A0A)  L012002X	49 L012 003 Installer (Part of 49 L012 0A0A)  L012003X	49 L012 004 Nut (Part of 49 L012 0A0A)  L012004X
49 L012 005 Spacer (Part of 49 L012 0A0A)  L012005X	49 B014 001 Installer, oil seal  B014001X	49 0187 280 Gauge, oil pressure  0187280X
49 9200 145 Adapter set, radiator cap tester  9200145X	49 9200 146 Adapter A (Part of 49 9200 145)  9200146X	49 9200 147 Adapter B (Part of 49 9200 145)  9200147X
49 T088 0A0 NGS set  T0880A0X	49 T088 001 Control Unit (Part of 49 T088 0A0)  T088001X	49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0)  T088002X
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0)  T088004X	49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0)  T088006X	49 T088 008A Instruction Manual  T088008A

SERVICE TOOLS

49 T088 010B Program Card  T088010B	49 B019 9A0 System Selector  B0199A0X	49 L018 901 Checker, injection  L018901X
49 9200 162A Engine Signal Monitor  9200162A	49 F018 903 Sheet  F018903X	49 T018 902 Adapter harness  T018902X
49 D088 008 Harness adapter power  D088008X	—	—

SUSPENSION

02 SECTION

02

GENERAL PROCEDURES	02-10	REAR SUSPENSION	02-14
WHEEL ALIGNMENT	02-11	TECHNICAL DATA	02-50
WHEEL AND TIRES	02-12	SERVICE TOOLS	02-60
FRONT SUSPENSION	02-13		

02-10 GENERAL PROCEDURES

PRECAUTION (SUSPENSION) 02-10-1

PRECAUTION (SUSPENSION)

U5U210AA

Wheels and tires removal / installation

- The removal and installation procedures for the wheels and tires are not mentioned in this section. If you must remove a wheel, 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.

Brake pipe flare nuts 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 00-00 FUNDAMENTAL PROCEDURES, Torque Formulas.)

Brake lines disconnection/connection

- If a brake line(s) has been disconnected anytime during the procedure, add brake fluid, bleed the brakes and inspect for leakage after the procedure has been completed.

Power steering components removal / installation

- If a power steering fluid line(s) has been disconnected anytime during the procedure add ATF (Dexron®II or M-III), bleed the fluid line(s), and inspect for leakage after the procedure has been completed.

02-11 WHEEL ALIGNMENT

WHEEL ALIGNMENT PREINSPECTION 02-11-1

FRONT WHEEL ALIGNMENT 02-11-2

Specifications 02-11-2

Maximum Steering Angle Adjustment . 02-11-2

Caster Adjustment 02-11-2

Camber Adjustment 02-11-3

Total Toe-in Adjustment 02-11-3

REAR WHEEL ALIGNMENT 02-11-4

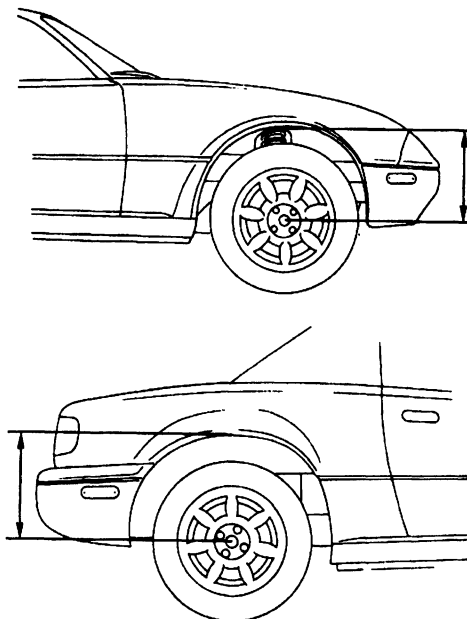
Specifications 02-11-4

Total Toe-in Adjustment 02-11-4

Camber Adjustment 02-11-4

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 if necessary.
3. Inspect the wheel and tire runouts.
4. Inspect the ball joints and steering linkage for excessive looseness.
5. The vehicle must be on level ground and carry no luggage or passengers.
6. Measure the height from the center of the wheel to the fender brim. The difference between left and right measurement must not exceed **10 mm { 0.39 in }**, and the rear measurement must be larger than the front measurement by **10—30 mm { 0.4—1.1 in }**.



U5U211AA

U5U21101

WHEEL ALIGNMENT

FRONT WHEEL ALIGNMENT

U5U211AB

Specifications

Item		Specifications (Unladen*1*2)
Total toe-in	(mm { in })	$3 \pm 4 \{ 0.12 \pm 0.15 \}$
	(Degree)	$0^{\circ}18' \pm 24'$
Maximum steering angle	Inner	$37^{\circ}23' \pm 2^{\circ}$
	Outer	$32^{\circ}32' \pm 2^{\circ}$
Steering axis inclination		$11^{\circ}20'$
Camber angle*3	Height from center of wheel to fender brim (mm { in })	328—337 { 12.9—13.3 }
		338—347 { 13.3—13.7 }
		348—357 { 13.7—14.1 }
		358—367 { 14.1—14.4 }
		368—377 { 14.4—14.8 }
Caster angle*3	Height from center of wheel to fender brim (mm { in })	328—337 { 12.9—13.3 }
		338—347 { 13.3—13.7 }
		348—357 { 13.7—14.1 }
		358—367 { 14.1—14.4 }
		368—377 { 14.4—14.8 }

*1 : Fuel tank full; engine coolant and engine oil at specified levels; spare tire, jack, and tool in designated positions

*2 : Adjust to the median when carrying out wheel alignment

*3 : Difference between left and right must not exceed 1.5°

Maximum Steering Angle Adjustment

1. Remove the steering gear boot clamp.
2. Loosen the tie rod locknut.
3. Turn the tie rod to provide the correct maximum steering angle.
4. After adjustment, tighten the locknut to the specified torque.

Tightening torque

$35\text{—}39 \text{ N}\cdot\text{m} \{ 3.5\text{—}4.0 \text{ kgf}\cdot\text{m}, 26\text{—}28 \text{ ft}\cdot\text{lbf} \}$

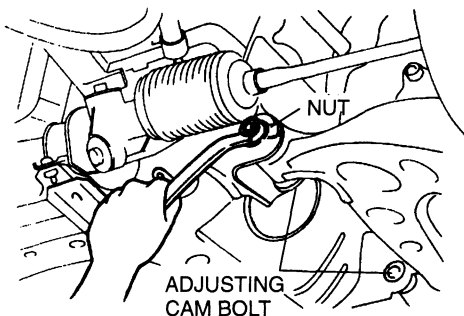
5. Adjust the toe-in.
6. Verify that the boot is not twisted, and install the boot clamp.

Caster Adjustment

Caution

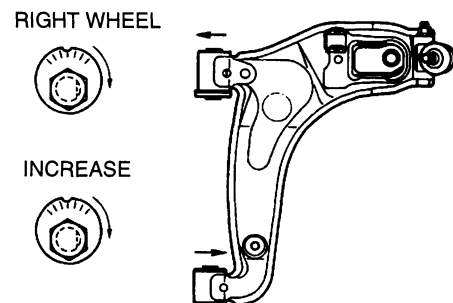
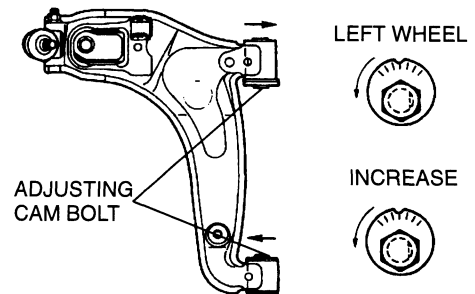
- Adjust the caster before adjusting the camber.

1. Loosen the front and/or rear cam nuts.



U5U21102

2. Turn the front and/or rear adjusting cam bolts to provide the correct caster angle.



U5U21103

WHEEL ALIGNMENT

02

Caster	Left wheel		Right wheel	
	Front cam	Rear cam	Front cam	Rear cam
Increase	Counter-clockwise	Counter-clockwise	Clock-wise	Clock-wise
Decrease	Clock-wise	Clock-wise	Counter-clockwise	Counter-clockwise

Note

- Turning the front cam one graduation on the scale changes the caster angle about **22'** and the camber about **25'**. Turning the rear cam one graduation changes the caster angle about **22'** and the camber about **2'**.

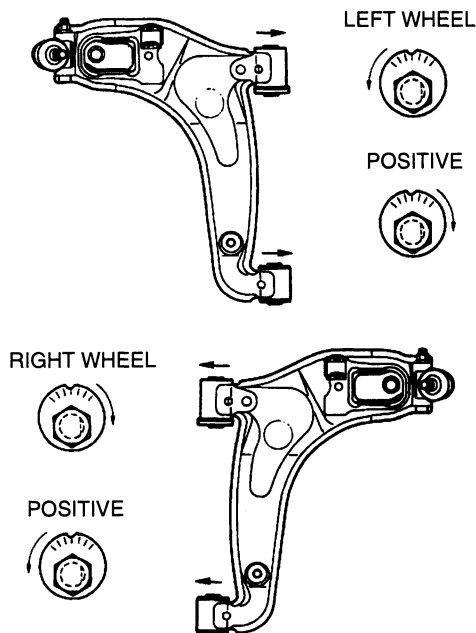
- Adjust the camber and the toe-in.

Camber Adjustment

Caution

- Adjust the camber after adjusting the caster.**

- Loosen the front and rear cam nuts.
- Turn the front and rear adjusting cam bolts the same amount in the opposite direction to provide the correct camber angle.



U5U21104

Camber	Left wheel		Right wheel	
	Front cam	Rear cam	Front cam	Rear cam
Positive	Counter-clockwise	Clock-wise	Clock-wise	Counter-clockwise
Negative	Clock-wise	Counter-clockwise	Counter-clockwise	Clock-wise

Note

- Turning the front cam one graduation changes the camber about **25'** and the caster about **22'**. Turning the rear cam one graduation changes the camber about **2'** and the caster about **22'**.

Note

- If the cam cannot be turned far enough to make the adjustment, begin again at adjustment of the caster using the other cam.

- Tighten the nuts.

Tightening torque

94—112 N·m { 9.5—11.5 kgf·m , 69—83 ft·lbf }

- Adjust the toe-in.

Total Toe-in Adjustment

- Remove the steering gear boot clamp.
- Loosen the left and right tie rod locknuts, and turn the tie rods by the same amount.
- 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 **7 mm { 0.28 in }**.

- Tighten the tie rod locknuts to the specified torque.

Tightening torque

35—39 N·m { 3.5—4.0 kgf·m , 26—28 ft·lbf }

- Verify that the boot is not twisted, and install the boot clamp.

WHEEL ALIGNMENT

REAR WHEEL ALIGNMENT

U5U211AC

Specifications

Item		Specifications (Unladen*1*2)
Total toe-in	(mm { in })	$3 \pm 4 \{ 0.12 \pm 0.15 \}$
	(Degree)	$0^{\circ}18' \pm 24'$
Camber angle	Height from center of wheel to fender brim (mm { in })	346—355 { 13.6—14.0 }
		356—365 { 14.0—14.4 }
		366—376 { 14.4—14.8 }
		376—385 { 14.8—15.2 }
		386—395 { 15.2—15.6 }
	Difference limit between left and right	
		Max $1^{\circ}30'$

*1 : Fuel tank full; engine coolant and engine oil at specified levels; spare tire, jack, and tool in designated positions

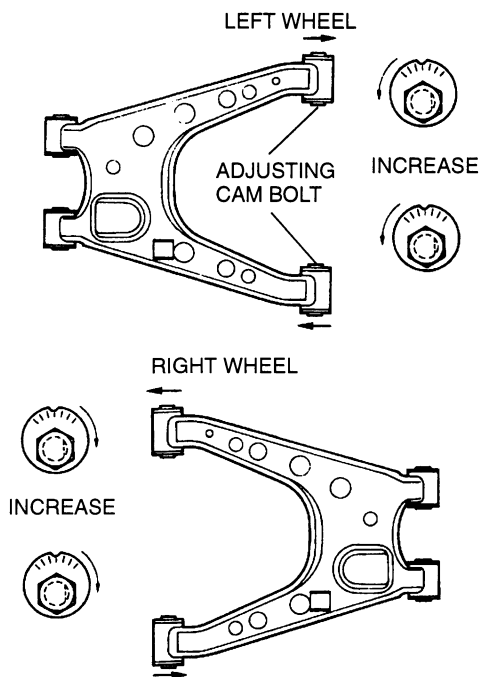
*2 : Adjust to the median when carrying out wheel alignment

Total Toe-in Adjustment

Caution

- Adjust the toe-in before adjusting the camber.

- Loosen the front and/or rear cam nuts.
- Turn the front and/or rear adjusting cam bolts to provide the correct toe-in.



U5U21105

Toe-in	Left wheel		Right wheel	
	Front cam	Rear cam	Front cam	Rear cam
Increase	Counter-clockwise	Counter-clockwise	Clock-wise	Clock-wise
Decrease	Clock-wise	Clock-wise	Counter-clockwise	Counter-clockwise

Note

- Turning the front cam one graduation changes the toe-in about $2.8 \text{ mm} \{ 0.11 \text{ in} \}$ and the camber about $15'$. Turning the rear cam one graduation changes the toe-in about $2.8 \text{ mm} \{ 0.11 \text{ in} \}$ and the camber about $6'$.

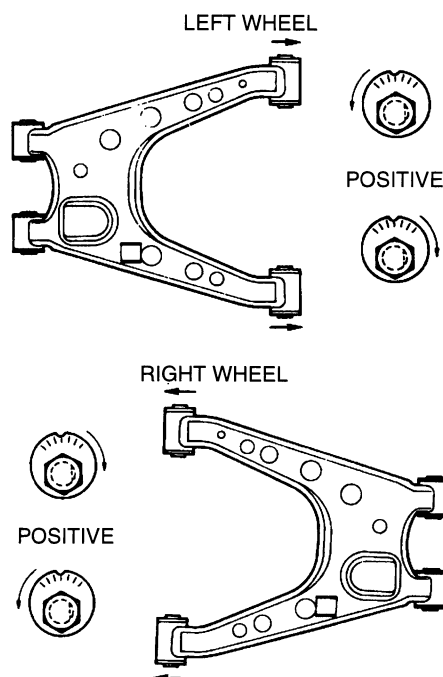
- Adjust the camber.

Camber Adjustment

Caution

- Adjust the camber after adjusting the toe-in.

- Loosen the front and rear cam nuts.
- Turn the front and rear adjusting cam bolts the same amount in the opposite direction to provide the correct camber angle.



U5U21106

WHEEL ALIGNMENT

Camber	Left wheel		Right wheel	
	Front cam	Rear cam	Front cam	Rear cam
Positive	Counter-clockwise	Clockwise	Clockwise	Counter-clockwise
Negative	Clockwise	Counter-clockwise	Counter-clockwise	Clockwise

3. Tighten the nuts.

Tightening torque

73—95 N·m { 7.4—9.7 kgf·m , 54—70 ft·lbf }

Note

- Turning the front cam one graduation changes the camber about **15'** and the toe-in about **2.8 mm { 0.11 in }**. Turning the rear cam one graduation changes the camber about **6'** and the toe-in about **2.8 mm { 0.11 in }**.
- If the cam cannot be turned far enough to make the adjustment, begin again at adjustment of the toe-in using the other cam.

02-12 WHEEL AND TIRES

WHEELS AND TIRES
SPECIFICATIONS 02-12-1

WHEELS AND TIRES SPECIFICATIONS

U5U212AA

02

Item			Type	
			Standard	Temporary spare
Wheel	Size		15 × 6JJ	14 × 5 1/2-JJ
	Offset	(mm { in })	45 { 1.77 }	
	Pitch circle diameter	(mm { in })	100 { 3.94 }	
	Material		Aluminum alloy	Steel
Tire	Size		195/50R15 81V	185/60R14 82H
	Air pressure	(kPa { kgf/cm ² , psi })	177 { 1.8 , 26 }	412 { 4.2 , 60 }
Wheel and tire	Runout limit (mm { in })	Radial	2.0 { 0.079 }	
		Lateral	1.5 { 0.059 }	
	Maximum unbalance (at rim edge) (g { oz })		10 { 0.35 }	

02-13 FRONT SUSPENSION

FRONT SHOCK ABSORBER AND COIL SPRING

REMOVAL / INSTALLATION 02-13-1

Front Shock Absorber and Coil Spring

Removal Note 02-13-2

Piston Rod Nut Removal Note 02-13-2

When using SST 49 T034 1A0 02-13-2

Coil Spring, Bound Stopper

Installation Note 02-13-2

FRONT SHOCK ABSORBER

INSPECTION 02-13-4

FRONT SHOCK ABSORBER

DISPOSAL 02-13-4

FRONT LOWER ARM

REMOVAL / INSTALLATION 02-13-5

Lower Arm Ball Joint Removal Note .. 02-13-6

Dust Boot Removal Note 02-13-6

Lower Arm Bushing (Front And Rear)

Removal Note 02-13-6

Lower Arm Bushing (Front And Rear)

Installation Note 02-13-6

Dust Boot Installation Note 02-13-6

FRONT LOWER ARM INSPECTION ... 02-13-7

FRONT UPPER ARM

REMOVAL / INSTALLATION 02-13-7

Upper Arm Ball Joint Removal Note .. 02-13-8

Dust Boot Removal Note 02-13-8

Upper Arm Bushing (Front And Rear)

Removal Note 02-13-8

Upper Arm Bushing (Front And Rear)

Installation Note 02-13-8

Dust Boot Installation Note 02-13-8

FRONT UPPER ARM INSPECTION ... 02-13-8

FRONT STABILIZER

REMOVAL / INSTALLATION 02-13-9

Stabilizer Bushing Installation Note ... 02-13-9

FRONT CROSSMEMBER

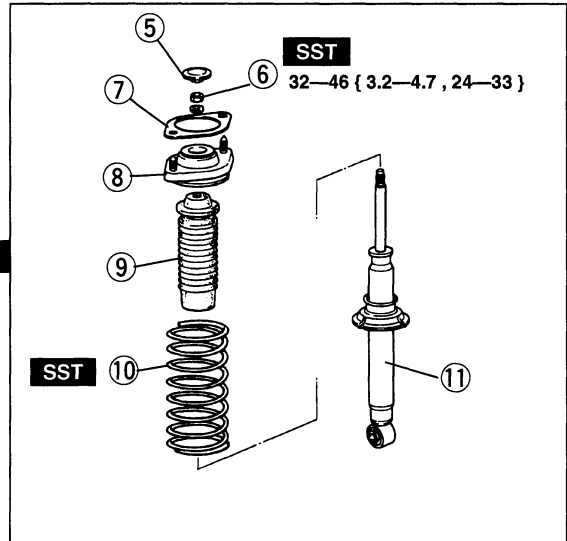
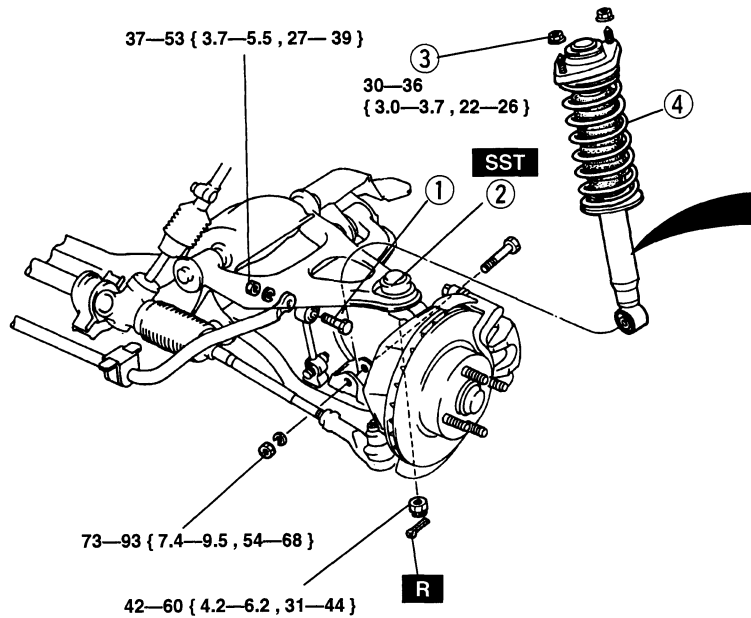
REMOVAL / INSTALLATION 02-13-10

02

FRONT SHOCK ABSORBER AND COIL SPRING REMOVAL / INSTALLATION

U5U213AA

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



N·m { kgf·m , ft·lbf }

U5U21301

1	Stabilizer control link bolt
2	Upper arm ball joint ☞ 02-13 FRONT UPPER ARM REMOVAL / INSTALLATION, Upper Arm Ball Joint Re- moval Note
3	Mounting plate nut
4	Front shock absorber and coil spring ☞ Removal Note
5	Cap

6	Piston rod nut ☞ Removal Note
7	Sheet
8	Mounting plate
9	Bound stopper ☞ Installation Note
10	Coil spring ☞ Installation Note
11	Shock absorber

FRONT SUSPENSION

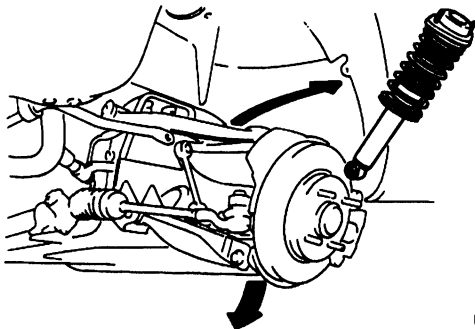
Front Shock Absorber and Coil Spring Removal

1. Loosen the lower arm bolts.

Caution

- Do not lower the arms excessively, which may damage the brake hose.

2. Lower the lower arm to remove the shock absorber.



U5U21302

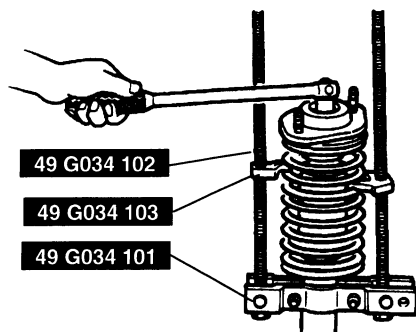
Piston Rod Nut Removal Note

When using SST 49 G034 1A0

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. Loosen the piston rod nut several turns, but do not remove the nut.
2. Assemble the SSTs.
3. Compress the coil spring by using the SSTs, and remove the upper nut.



U5U21303

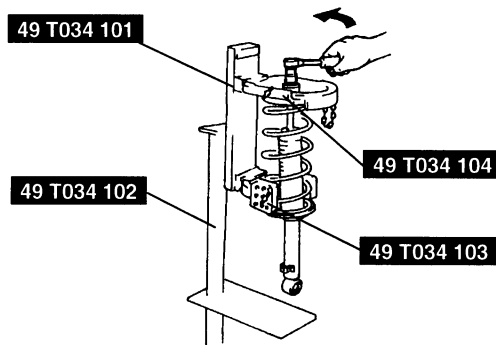
4. Remove the coil spring.

When using SST 49 T034 1A0

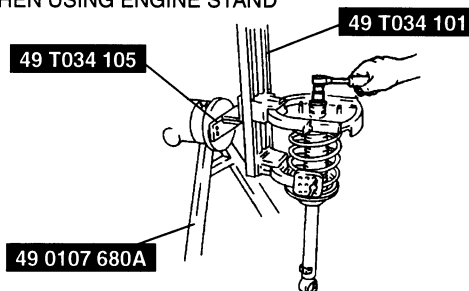
Warning

- 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. Loosen the piston rod nut several turns, but do not remove the nut.
2. Assemble the SSTs.
3. Secure the shock absorber in the SSTs.
4. Compress the coil spring by using the SSTs and remove the nut.



WHEN USING ENGINE STAND

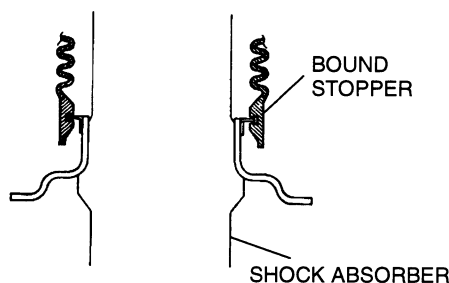


U5U21304

Coil Spring, Bound Stopper Installation Note

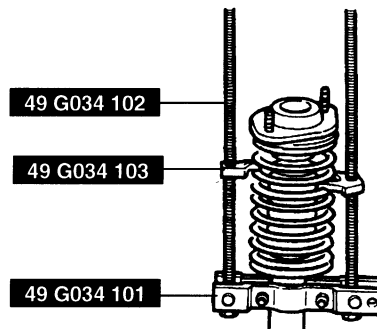
When using SST 49 G034 1A0

1. Set the shock absorber in a vise.
2. Install the bound stopper on the shock absorber as shown.



U5U21305

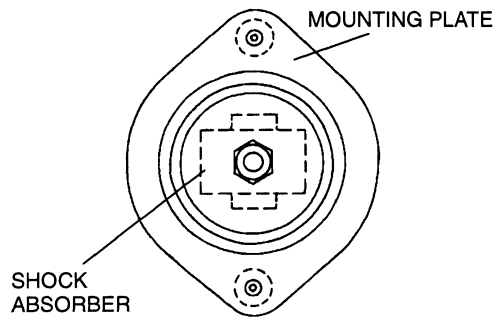
3. Install the compressed coil spring (compressed with SSTs).



U5U21306

FRONT SUSPENSION

4. Install the mounting plate as shown.



U5U21307

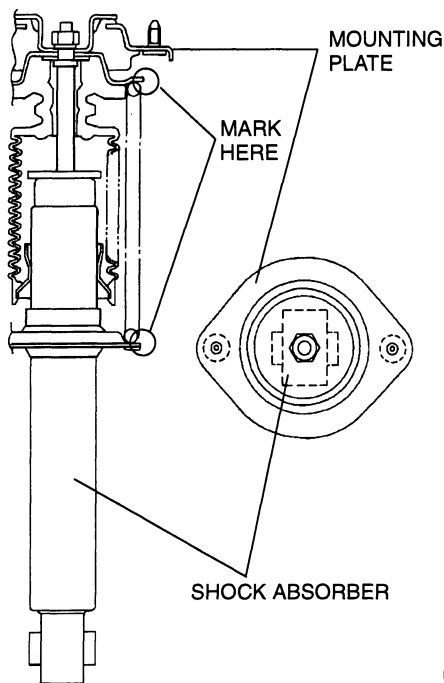
5. Tighten the nut several turns.
6. Remove the **SSTs**.
7. Secure the mounting plate in a vise.
8. Tighten the nut.

Tightening torque

32—46 N·m { 3.2—4.7 kgf·m , 24—33 ft·lbf }

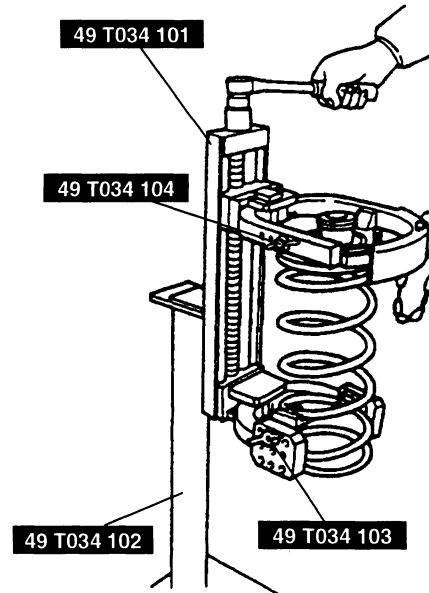
When using SST 49 T034 1A0

1. Temporarily assemble the mounting plate and coil spring to the shock absorber as shown.
2. Mark the mounting plate, shock absorber and coil spring for proper reassembly.



U5U21308

3. Align the marks of the mounting plate and coil spring. Protect the mounting plate and the coil spring with a piece of cloth; then assemble the **SSTs**.
4. Use the **SSTs** to compress the spring.



U5U21309

5. Install the bound stopper.
6. Install the shock absorber, making sure that the marks on the shock absorber and coil spring are aligned.
7. Tighten the nut several turns.
8. Remove the **SSTs**.
9. Secure the mounting rubber in a vise.
10. Tighten the nut.

Tightening torque

32—46 N·m { 3.2—4.7 kgf·m , 24—33 ft·lbf }

FRONT SUSPENSION

FRONT SHOCK ABSORBER INSPECTION

U5U213AB

Check the following and replace if necessary.

1. Inspect for damage and oil leakage.
 2. Inspect the rubber bushing for deterioration and wear.
 3. Compress and extend the shock piston at least three (3) 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.

FRONT SHOCK ABSORBER DISPOSAL

U5U213AC

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.

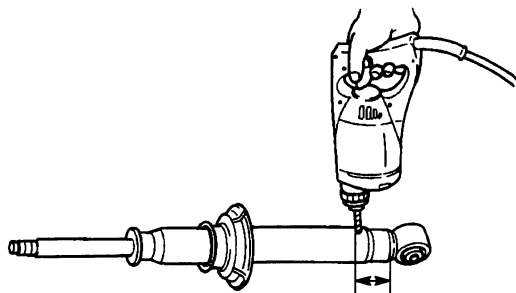
1. Clamp a shock absorber flat or with piston downwards.
2. Drill a 2—3 mm { 0.08—0.12 in } hole at a point 20—30 mm { 0.79—1.18 in } from the bottom of the tube so that the gas can escape.

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 the waste oil according to the waste disposal law.

Note

- Shock absorber gas is nitrogen gas.
- Shock absorber oil is mineral oil.



20—30 mm { 0.79—1.18 in }

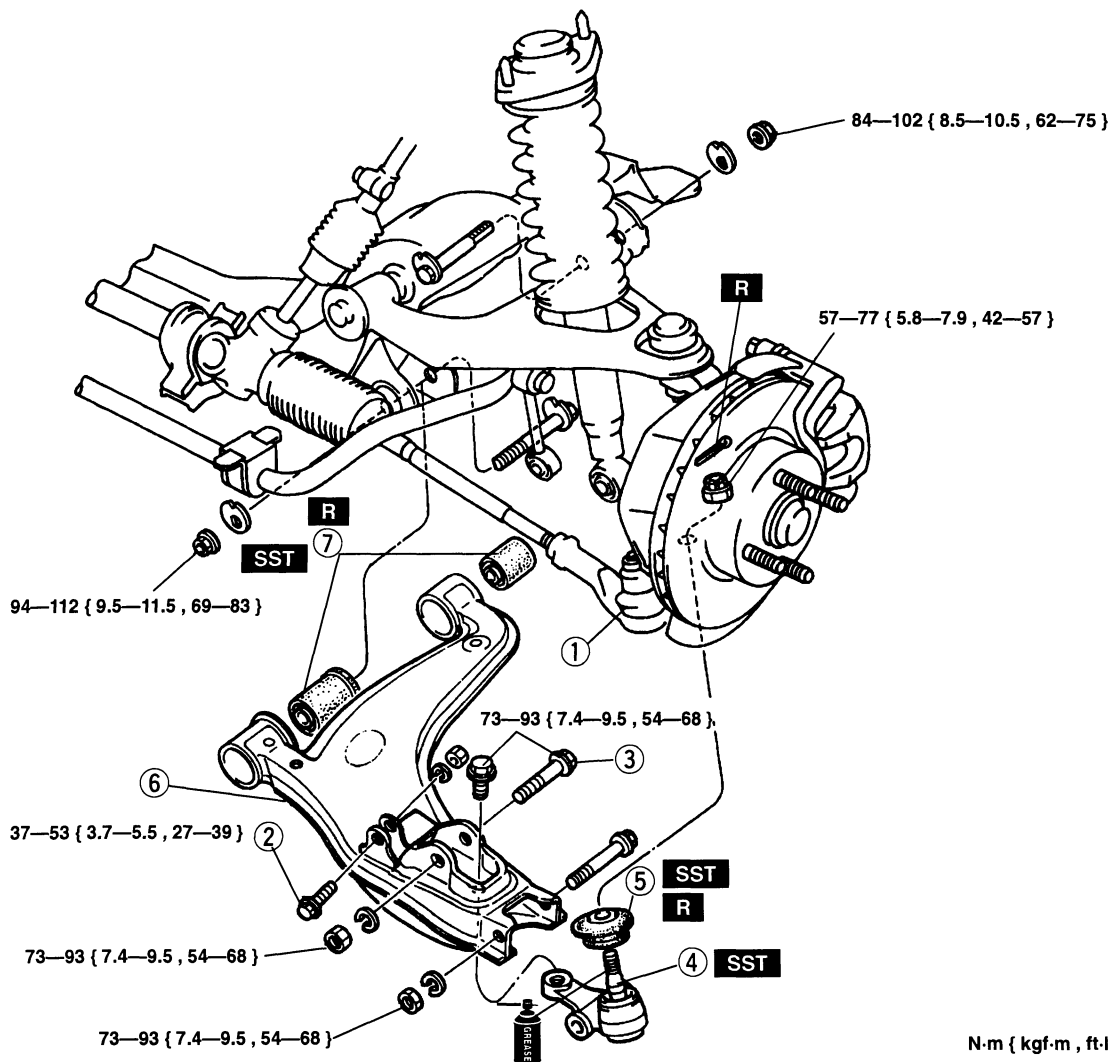
U5U21310

FRONT SUSPENSION

FRONT LOWER ARM REMOVAL / INSTALLATION

U5U213AD

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal indicated in the table.
3. Adjust the front wheel alignment.



N-m { kgf-m, ft-lbf }

U5U21311

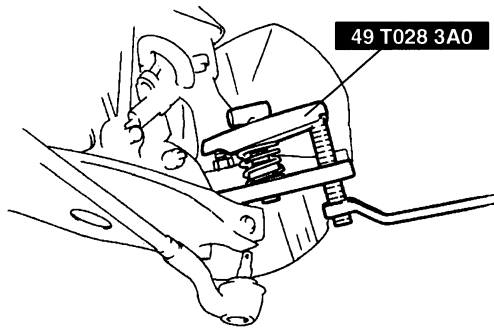
1	Tie-rod end ball joint ☞ 06-10 STEERING GEAR AND LINKAGE REMOVAL / INSTALLATION, Tie-rod End Ball Joint Removal Note
2	Stabilizer control link bolt
3	Shock absorber bolt
4	Lower arm ball joint ☞ Removal Note

5	Dust boot ☞ Removal Note ☞ Installation Note
6	Lower arm
7	Lower arm bushing (front and rear) ☞ Removal Note ☞ Installation Note

FRONT SUSPENSION

Lower Arm Ball Joint Removal Note

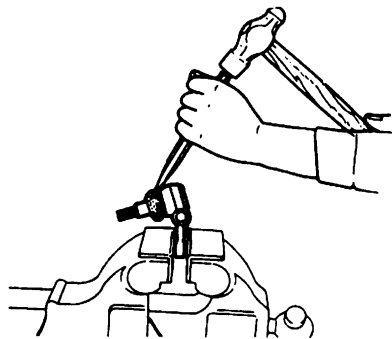
- Separate the ball joint from the knuckle by using the **SST**.



U5U21312

Dust Boot Removal Note

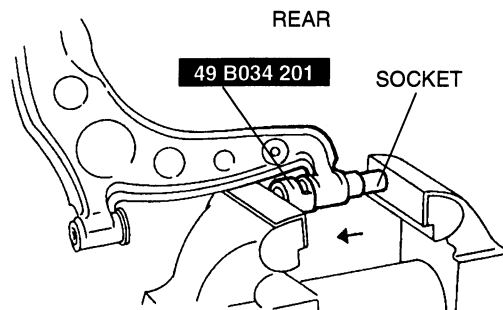
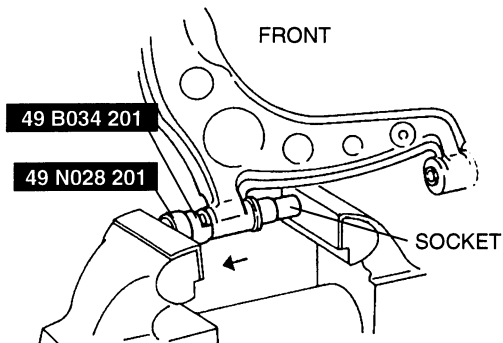
- Carefully remove the dust boot by using a chisel.



U5U21313

Lower Arm Bushing (Front And Rear) Removal Note

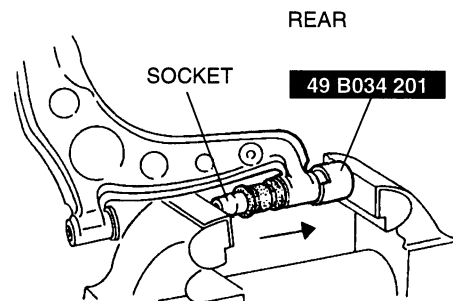
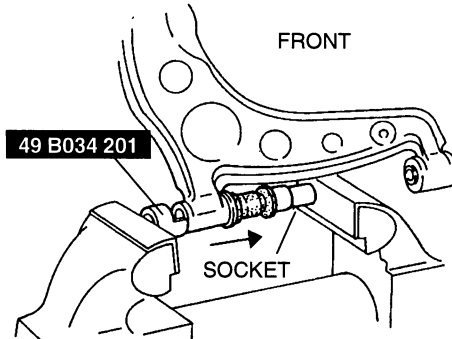
- Press the lower arm bushing out by using the **SST** and a socket as shown.



U5U21314

Lower Arm Bushing (Front And Rear) Installation Note

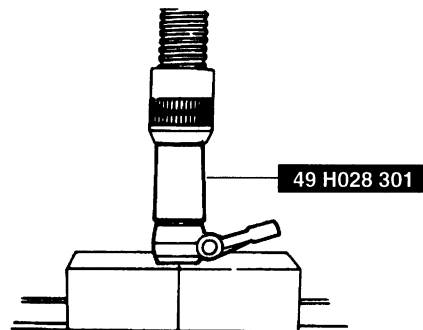
- Apply soapy water to the lower arm bushing.
- Press the bushing in by using the **SST** and socket in the direction of the arrow.



U5U21316

Dust Boot Installation Note

- Wipe away the grease on the ball joint.
- Liberaly coat the inside of the new dust boot with grease.
- Press the dust boot onto the ball joint by using the **SST**.
- Wipe away any grease that has been expelled from the dust boot.



U5U21315

FRONT SUSPENSION

FRONT LOWER ARM INSPECTION

U5U213AH

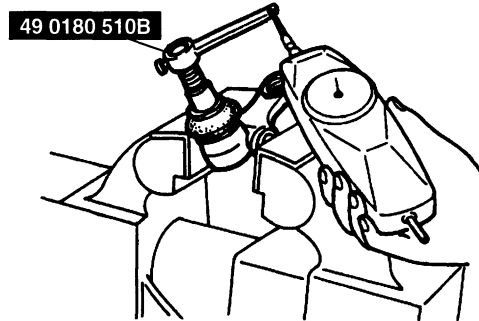
1. Shake the ball joint stud 5 times.
2. Connect the **SST** to the ball stud, and measure the rotation torque by using a pull scale.

Rotation torque

0.5—1.4 N·m { 5—15 kgf·cm , 4.4—13 in·lbf }

Pull scale reading

5.0—14.7 N { 0.5—1.5 kgf , 1.1—3.3 lbf }

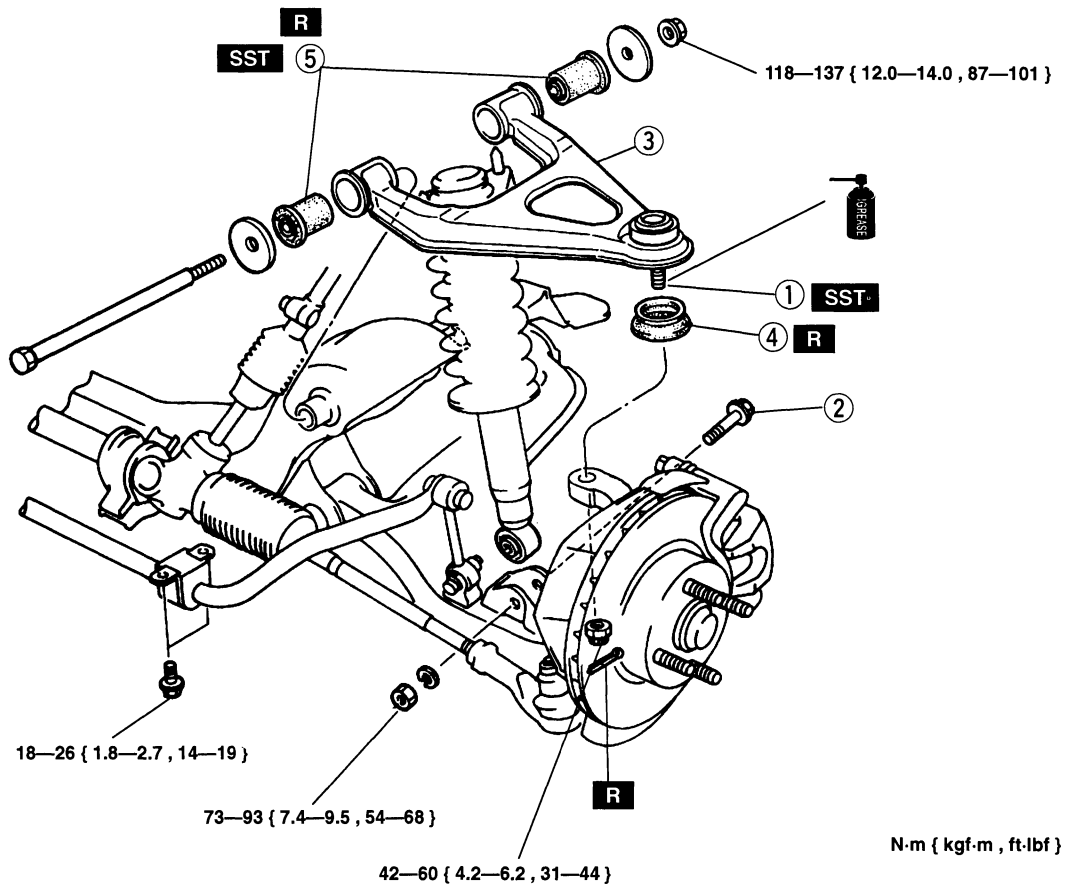


U5U21317

FRONT UPPER ARM REMOVAL / INSTALLATION

U5U213AE

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal indicated in the table.
3. Adjust the front wheel alignment.



N·m { kgf·m , ft·lbf }

U5U21318

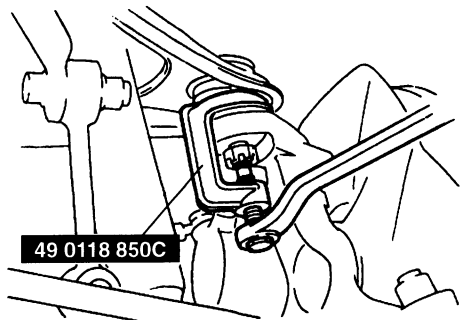
1	Upper arm ball joint ☞ Removal Note
2	Shock absorber bolt
3	Upper arm

4	Dust boot ☞ Removal Note ☞ Installation Note
5	Upper arm bushing (front and rear) ☞ Removal Note ☞ Installation Note

FRONT SUSPENSION

Upper Arm Ball Joint Removal Note

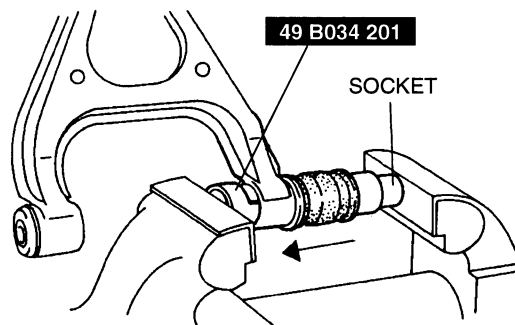
- Separate the upper arm ball joint from the knuckle by using the **SST**.



U5U21319

Upper Arm Bushing (Front And Rear) Installation Note

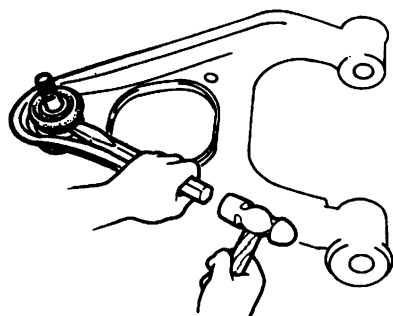
- Apply soapy water to the upper arm bushing.
- Press the bushing in by using the **SST** and a socket in the direction of the arrow.



U5U21323

Dust Boot Removal Note

- Carefully remove the dust boot by using a chisel.



U5U21320

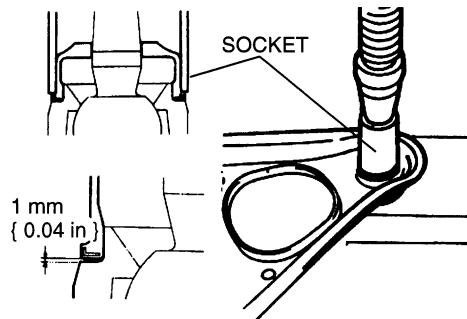
Dust Boot Installation Note

- Liberalily coat the inside of the new dust boot with grease.
- Press the dust boot on by using a 30 mm { 1 1/8 in } socket until the dust boot contacts the seat.

Caution

- Install the dust boot squarely and do not press excessively; the inner metal ring will be deformed if not done correctly.

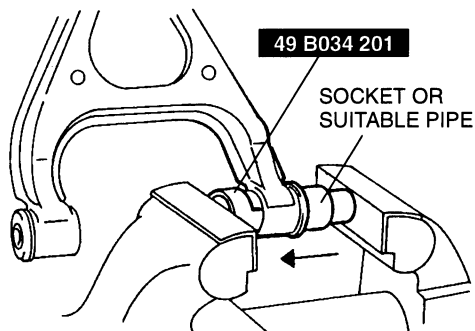
- Verify that the clearance between the boot and the seat is less than 1 mm { 0.04 in }.



U5U21322

Upper Arm Bushing (Front And Rear) Removal Note

- Press the upper arm bushing out by using the **SST** and a socket as shown.



U5U21321

FRONT UPPER ARM INSPECTION

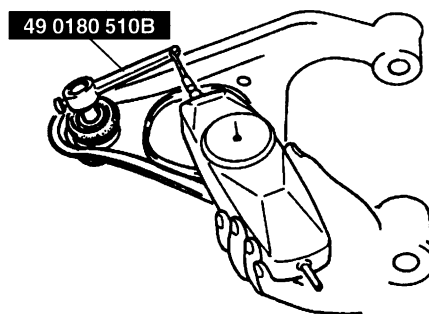
- Shake the ball joint stud 5 times.
- Connect the **SST** to the ball stud, and measure the rotation torque by using a pull scale.

Rotation torque

0.4—1.7 N·m { 4—18 kgf·cm , 3.5—15.6 in·lbf }

Pull scale reading

4.0—17.6 N { 0.4—1.8 kgf , 0.9—3.9 lbf }



U5U213AJ

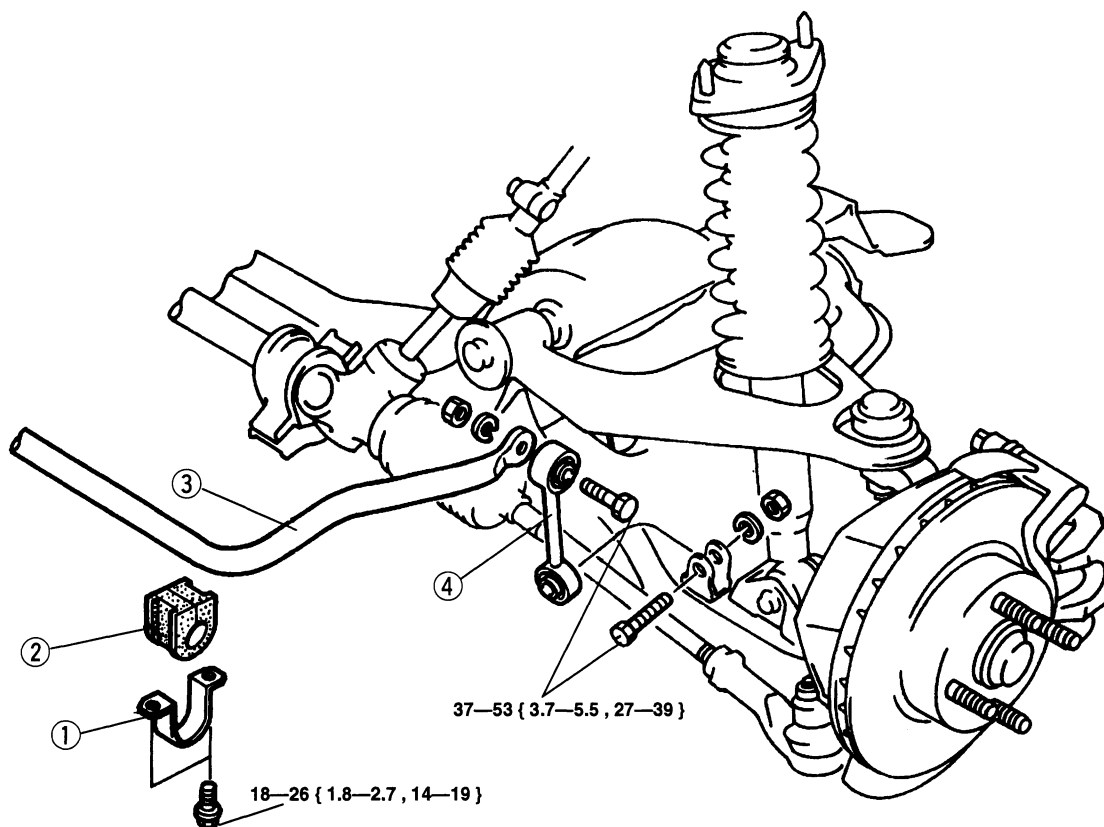
U5U21324

FRONT SUSPENSION

FRONT STABILIZER REMOVAL / INSTALLATION

U5U213AF

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



N·m { kgf·m , ft·lbf }

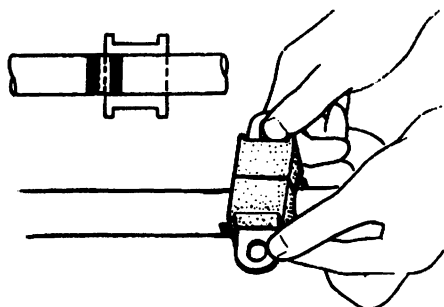
U5U21325

1	Stabilizer bracket
2	Stabilizer bushing Installation Note

3	Stabilizer bar
4	Stabilizer control link

Stabilizer Bushing Installation Note

- Align the bushing with the installation mark on the stabilizer.



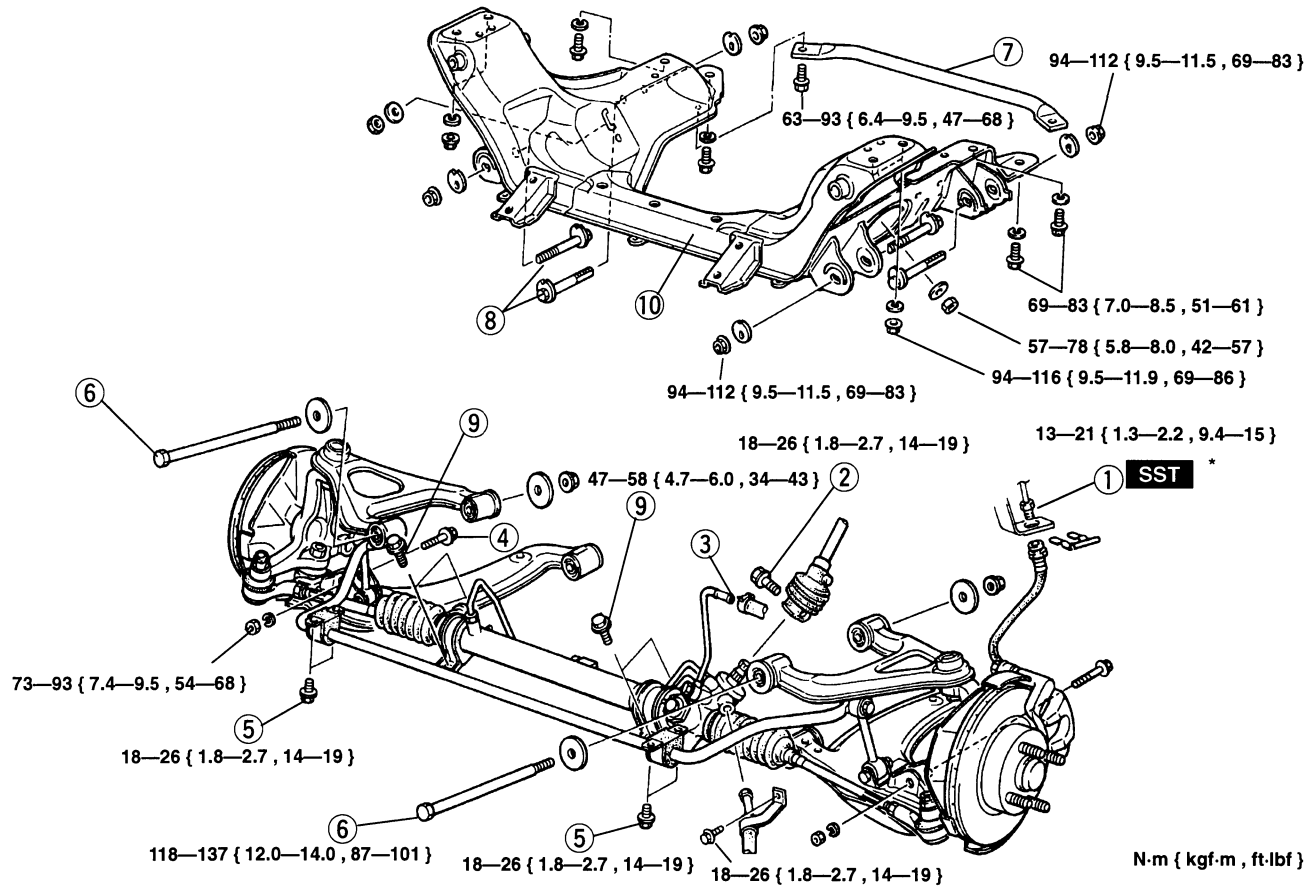
U5U21326

FRONT SUSPENSION

FRONT CROSSMEMBER REMOVAL / INSTALLATION

U5U213AG

1. Support the engine with a hoist.
2. Lower the crossmember and other suspension parts as an assembly, and then separate the parts.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.



* 49 0259 770B

U5U21327

1	Brake pipe
2	Pinion shaft bolt
3	Power steering pipe
4	Shock absorber bolt
5	Stabilizer bracket bolt

6	Upper arm bolt
7	Performance rod
8	Adjusting cam bolt
9	Steering gear bracket bolt
10	Front crossmember component

02-14 REAR SUSPENSION

REAR SHOCK ABSORBER AND COIL SPRING

REMOVAL / INSTALLATION 02-14-1

Rear Shock Absorber And Coil Spring

Removal Note 02-14-2

REAR SHOCK ABSORBER

INSPECTION 02-14-2

REAR SHOCK ABSORBER DISPOSAL 02-14-2

REAR LOWER ARM

REMOVAL / INSTALLATION 02-14-3

Lower Arm Bushing (Crossmember Side)

Removal Note 02-14-3

Lower Arm Bushing (Knuckle Side)

Removal Note 02-14-3

Lower Arm Bushing (Knuckle Side)

Installation Note 02-14-4

Lower Arm Bushing (Crossmember Side)

Installation Note 02-14-4

REAR UPPER ARM

REMOVAL / INSTALLATION 02-14-4

Upper Arm Bushing Removal Note ... 02-14-5

Upper Arm Bushing Installation Note . 02-14-5

REAR STABILIZER

REMOVAL / INSTALLATION 02-14-5

Stabilizer Bushing Installation Note ... 02-14-6

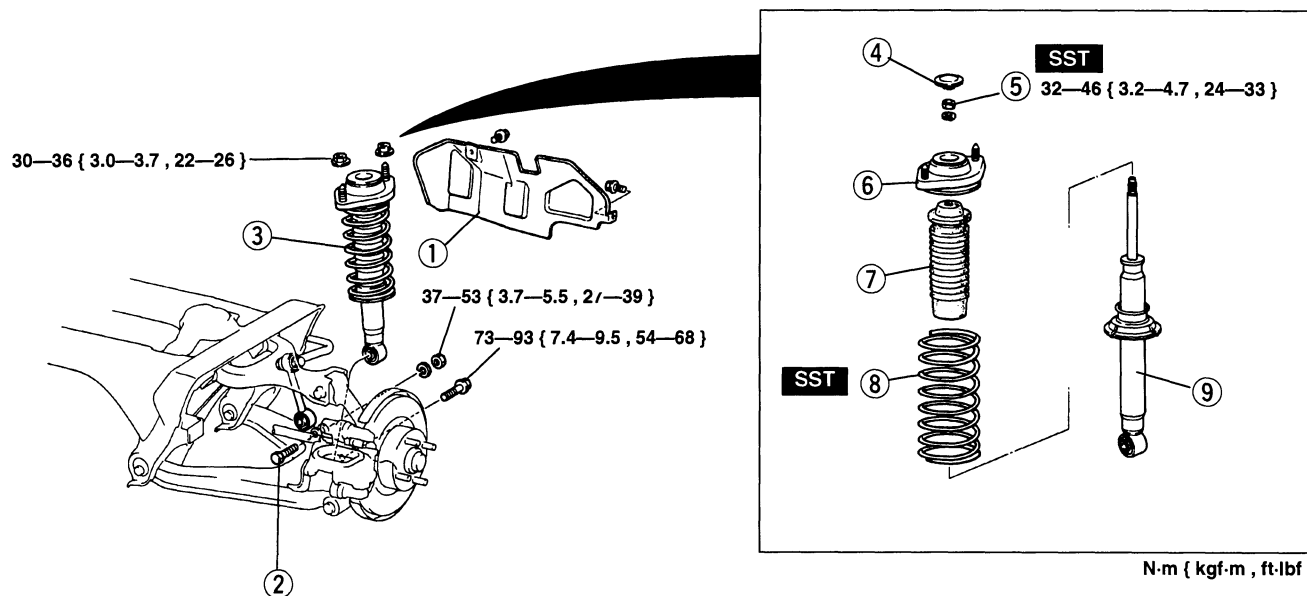
REAR CROSSMEMBER

REMOVAL / INSTALLATION 02-14-6

REAR SHOCK ABSORBER AND COIL SPRING REMOVAL / INSTALLATION

U5U214AA

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal indicated in the table.
3. Adjust the rear wheel alignment.



U5U21401

1	Filler pipe protector (left side)
2	Stabilizer control link bolt
3	Rear shock absorber and coil spring ☞ Removal Note
4	Cap
5	Piston rod nut ☞ 02-13 FRONT SHOCK ABSORBER AND COIL SPRING REMOVAL / INSTALLATION, Piston Rod Nut Removal Note

6	Mounting plate
7	Bound stopper ☞ 02-13 FRONT SHOCK ABSORBER AND COIL SPRING REMOVAL / INSTALLATION, Coil Spring, Bound Stopper Installation Note
8	Coil spring ☞ 02-13 FRONT SHOCK ABSORBER AND COIL SPRING REMOVAL / INSTALLATION, Coil Spring, Bound Stopper Installation Note
9	Rear shock absorber

REAR SUSPENSION

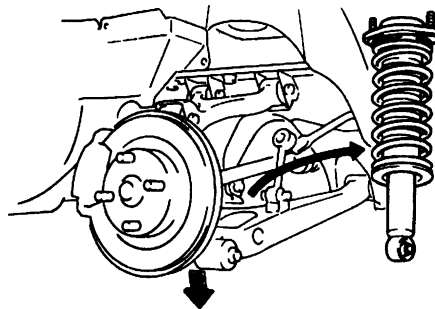
Rear Shock Absorber And Coil Spring Removal

Note

Caution

- Do not lower the arms excessively, which may damage the brake hose.

1. Loosen the upper arm and adjusting cam nuts.
2. Lower the upper and lower arms to remove the shock absorber and spring.



U5U21402

REAR SHOCK ABSORBER INSPECTION

U5U214AF

- Inspect the rear shock absorber in the same way as the front shock absorber. (Refer to 02-13 FRONT SHOCK ABSORBER INSPECTION.)

REAR SHOCK ABSORBER DISPOSAL

U5U214AG

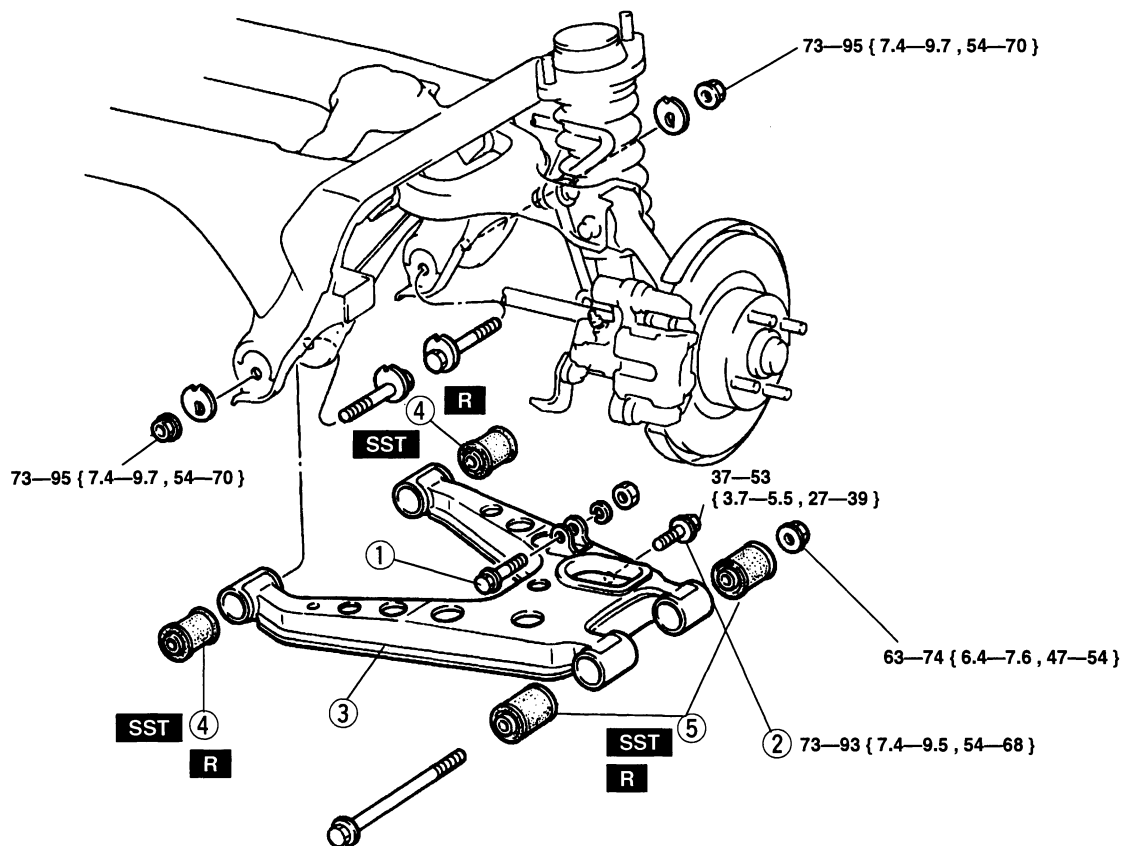
- Dispose the rear shock absorber in the same way as the front shock absorber. (Refer to 02-13 FRONT SHOCK ABSORBER DISPOSAL.)
-

REAR SUSPENSION

REAR LOWER ARM REMOVAL / INSTALLATION

U5U214AB

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal indicated in the table.
3. Adjust the rear wheel alignment.



N·m { kgf·m , ft·lbf }

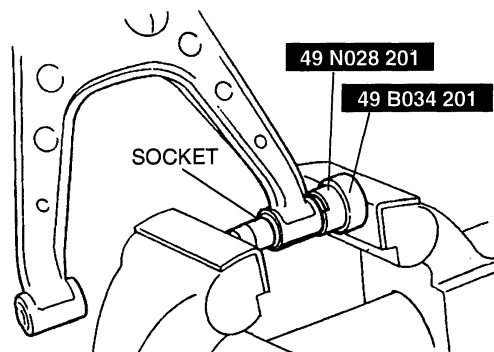
U5U21403

1	Stabilizer control link bolt
2	Shock absorber bolt
3	Rear lower arm

4	Lower arm bushing (crossmember side) ☞ Removal Note ☞ Installation Note
5	Lower arm bushing (knuckle side) ☞ Removal Note ☞ Installation Note

Lower Arm Bushing (Crossmember Side) Removal Note

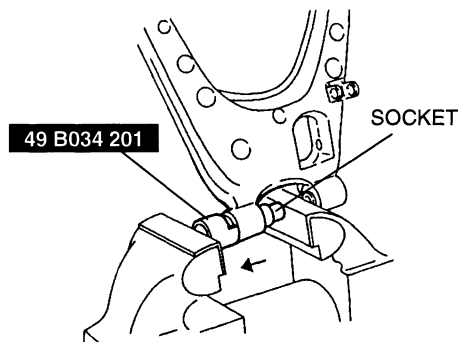
- Press the lower arm bushing out by using the SSTs and a socket as shown.



U5U21404

Lower Arm Bushing (Knuckle Side) Removal Note

- Press the lower arm bushing out by using the SST and a socket as shown.



U5U21405

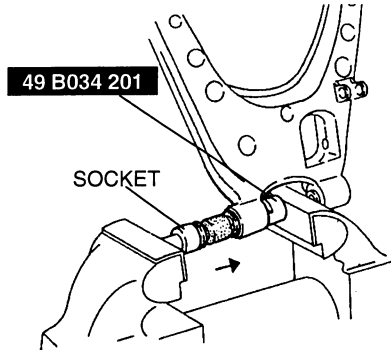
REAR SUSPENSION

Lower Arm Bushing (Knuckle Side) Installation Note

Caution

- Install the bushing with a white mark for the front side.

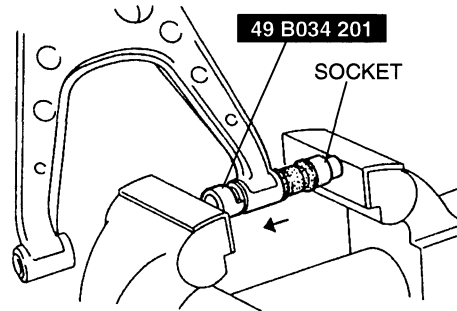
1. Apply soapy water to the lower arm bushing.
2. Press the bushing in by using the **SST** and a socket in the direction of the arrow.



U5U21406

Lower Arm Bushing (Crossmember Side) Installation Note

1. Apply soapy water to the lower arm bushing.
2. Press the bushing in by using the **SST** and a socket in the direction of the arrow.

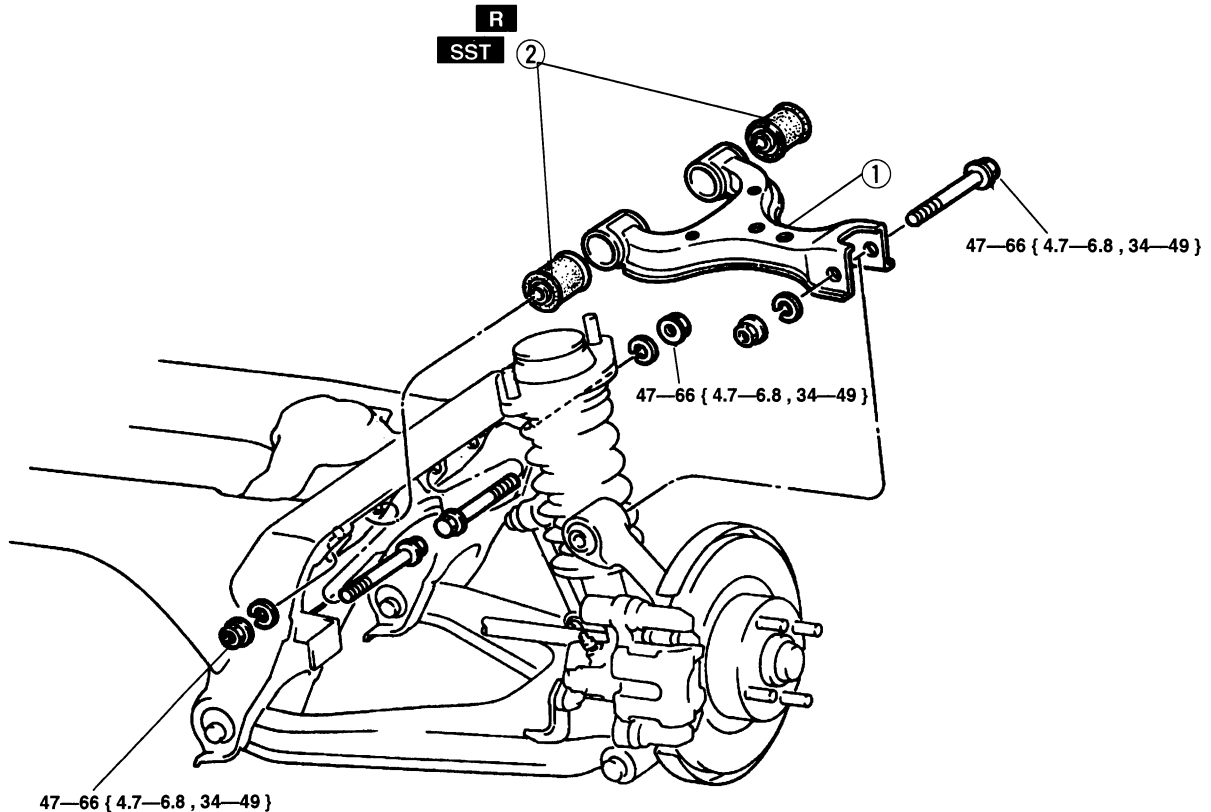


U5U21407

REAR UPPER ARM REMOVAL / INSTALLATION

U5U214AC

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal indicated in the table.
3. Adjust the rear wheel alignment.



N·m { kgf·m , ft·lbf }

U5U21408

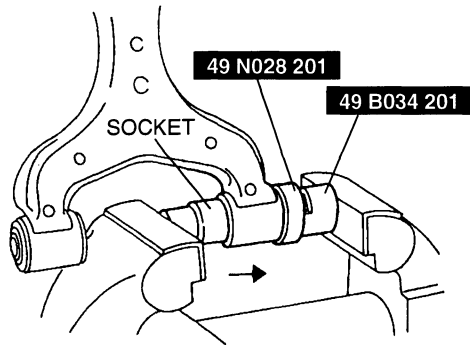
1	Rear upper arm
---	----------------

2	Upper arm bushing
	☐ Removal Note
	☐ Installation Note

REAR SUSPENSION

Upper Arm Bushing Removal Note

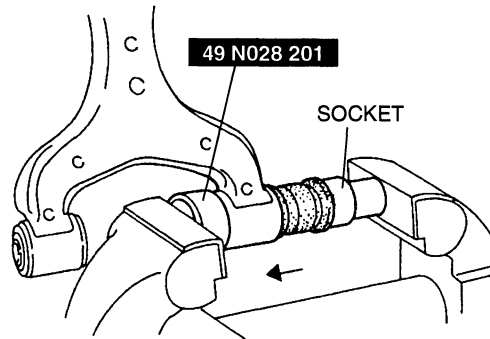
- Press the upper arm bushing out by using the **SSTs** and a socket as shown.



U5U21409

Upper Arm Bushing Installation Note

- Apply soapy water to the upper arm bushing.
- Press the bushing in by using the **SST** and a socket in the direction of the arrow.

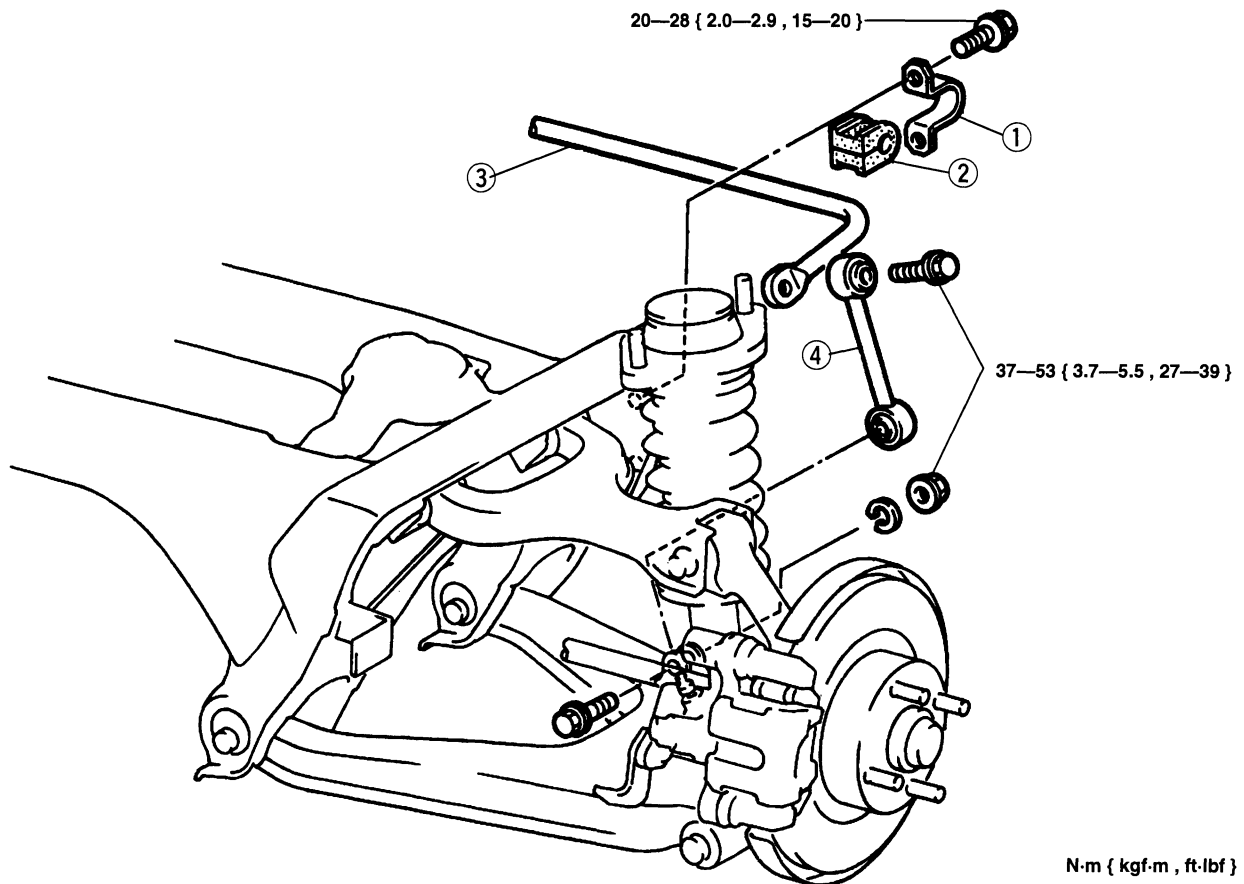


U5U21410

REAR STABILIZER REMOVAL / INSTALLATION

U5U214AD

- Remove in the order indicated in the table.
- Install in the reverse order of removal indicated in the table.



U5U21411

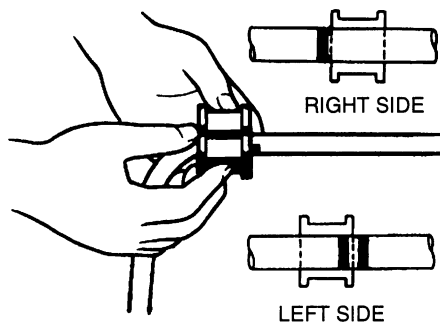
1	Stabilizer bracket
2	Stabilizer bushing ☞ Installation Note

3	Stabilizer bar
4	Control link

REAR SUSPENSION

Stabilizer Bushing Installation Note

- Align the bushing with the installation mark on the stabilizer.

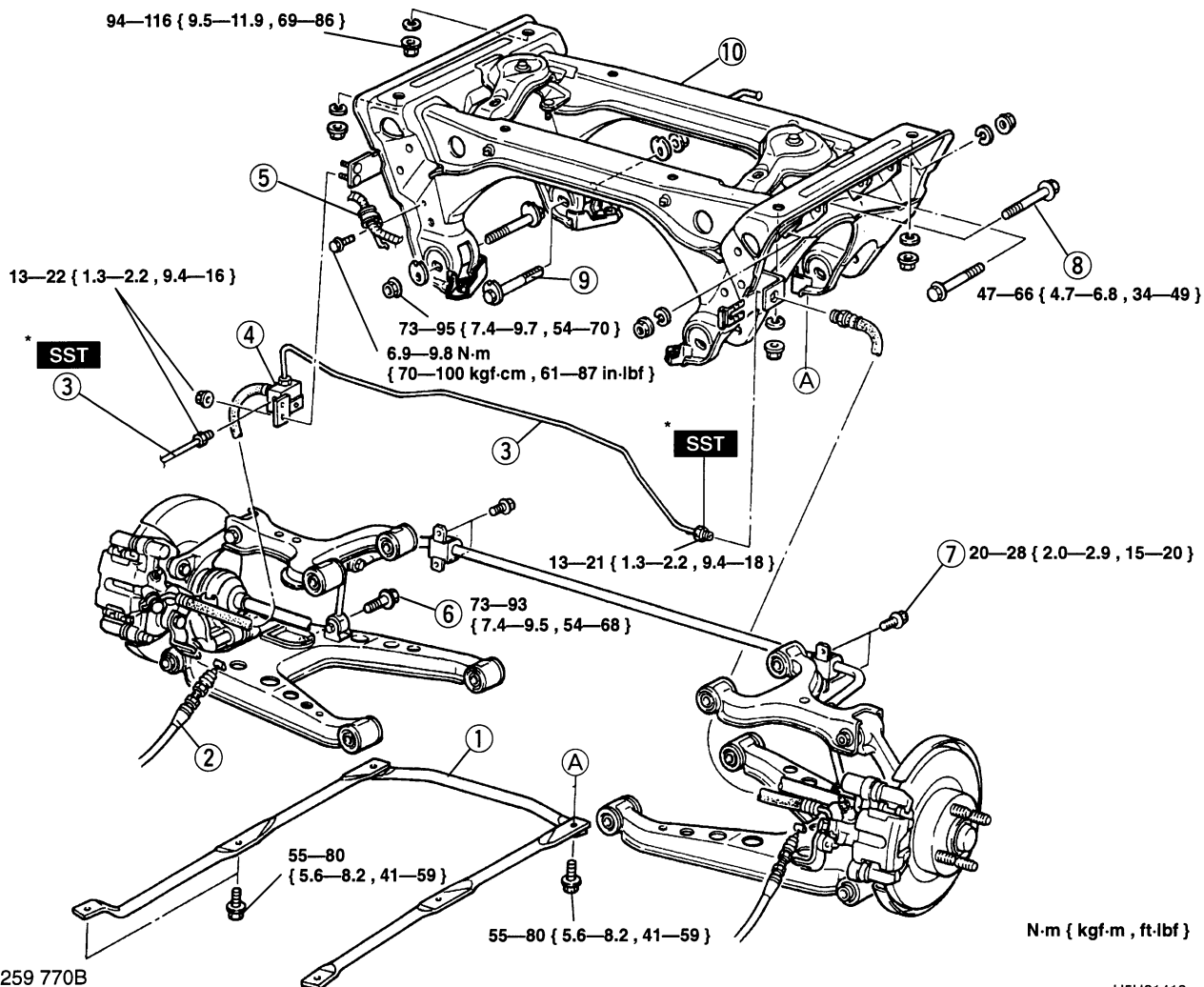


U5U21412

REAR CROSSMEMBER REMOVAL / INSTALLATION

U5U214AE

1. Remove the differential and the power plant frame. (Refer to 03-14 DIFFERENTIAL REMOVAL / INSTALLATION.)
2. Lower the crossmember and other suspension parts as an assembly, and then separate the parts.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Adjust the rear wheel alignment.
6. Bleed the air from the brake system.
7. Adjust the parking brake lever stroke.



* 49 0259 770B

U5U21413

REAR SUSPENSION

1	Differential mounting pipe
2	Parking brake cable
3	Brake pipe
4	Brake pipe joint
5	Battery cable bracket
6	Shock absorber bolt
7	Stabilizer bracket bolt
8	Upper arm bolt
9	Adjusting cam bolt
10	Rear crossmember component

02-50 TECHNICAL DATA

02 SUSPENSION 02-50-1

02 SUSPENSION

U5U250AA

Item			Specification	
WHEEL ALIGNMENT				
Front wheel alignment (Unladen)*1	Total toe-in		(mm { in })	3 ± 4 { 0.12 ± 0.15 }
			(Degree)	0°18' ± 24'
	Maximum steering angle		Inner	37°23' ± 2°
			Outer	32°32' ± 2°
	Steering axis inclination			11°20'
	Camber angle*2	Height from center of wheel to fender brim (mm { in })	328—337 { 12.9—13.3 }	−0°20' ± 1°
			338—347 { 13.3—13.7 }	0°03' ± 1°
			348—357 { 13.7—14.1 }	0°24' ± 1°
			358—367 { 14.1—14.4 }	0°44' ± 1°
			368—377 { 14.4—14.8 }	1°02' ± 1°
	Caster angle*2	Height from center of wheel to fender brim (mm { in })	328—337 { 12.9—13.3 }	5°16' ± 1°
			338—347 { 13.3—13.7 }	5°02' ± 1°
			348—357 { 13.7—14.1 }	4°49' ± 1°
			358—367 { 14.1—14.4 }	4°35' ± 1°
			368—377 { 14.4—14.8 }	4°21' ± 1°
Rear wheel alignment (Unladen)*1	Total toe-in		(mm { in })	3 ± 4 { 0.12 ± 0.15 }
			(Degree)	0°18' ± 24'
	Camber angle*2	Height from center of wheel to fender brim (mm { in })	346—355 { 13.6—14.0 }	−1°08' ± 1°
			356—365 { 14.0—14.4 }	−0°54' ± 1°
			366—375 { 14.4—14.8 }	−0°43' ± 1°
			376—385 { 14.8—15.2 }	−0°35' ± 1°
			386—395 { 15.2—15.6 }	−0°30' ± 1°
WHEELS AND TIRES				
Standard tire wheel	Size		15×6JJ	14×5 1/2JJ
	Offset (mm { in })		45 { 1.77 }	
	Pitch circle diameter (mm { in })		100 { 3.94 }	
	Material		Aluminum alloy	
Standard tire	Size		195/50R15 81V	185/60R14 82H
	Air pressure (kPa { kgf/cm ² , psi })		177 { 1.8 , 26 }	
	Remaining tread (mm { in })	Standard tire	1.6 { 0.063 } min.	
		Snow tire	50 % of tread	
Standard tire wheel and tire	Lug nut tightening torque (N·m { kgf·m , ft·lbf })		89—117 { 9—12 , 66—86 }	
	Wheel and tire runout (mm { in })	Radial direction	2.0 { 0.078 } max.	
		Lateral direction	1.5 { 0.059 } max.	
	Wheel imbalance*3 (g { oz })		10 { 0.35 } max.	
Temporary spare tire wheel	Size		14×4T	
	Offset (mm { in })		45 { 1.77 }	
	Pitch circle diameter (mm { in })		100 { 3.94 }	
	Material		Steel	
Temporary spare tire	Size		T115/70D14	
	Air pressure (kPa { kgf/cm ² , psi })		412 { 4.2 , 60 }	

TECHNICAL DATA

Item		Specification
FRONT SUSPENSION		
Suspension type		Double-wishbone
Stabilizer	Type	Torsion bar
	Diameter (mm { in })	19.0 { 0.75 }
Shock absorber		Cylindrical double acting, low-pressure-gas charged
REAR SUSPENSION		
Suspension type		Double-wishbone
Stabilizer	Type	Torsion bar
	Diameter (mm { in })	11.0 { 0.43 }
Shock absorber		Cylindrical double acting, low-pressure-gas charged

*1 : Fuel tank full; engine coolant and engine oil at specified levels; spare tire, jack, and tools in designated positions.

*2 : Difference between left and right must not exceed 1°30'.

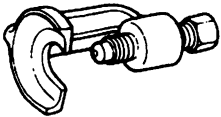
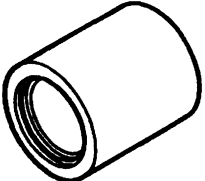
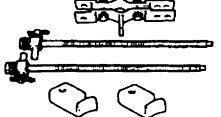
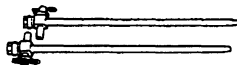
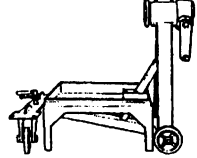
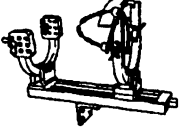
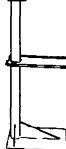
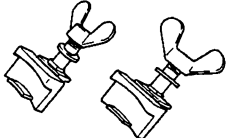
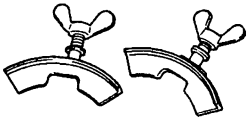
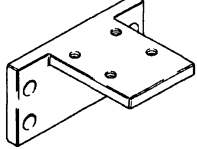
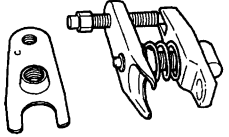
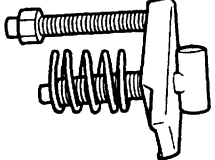
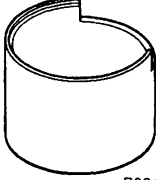
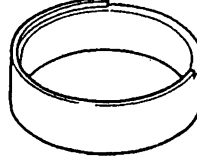
*3 : One balance weight; max. 60 g { 2.1 oz }. If the total weight exceeds 100 g { 3.5 oz } on one side, rebalance after moving the tire around on the rim. Do not use more than two balance weights on the inner or outer side of the wheel.

02-60 SERVICE TOOLS

02 SUSPENSION SST 02-60-1

02 SUSPENSION SST

U5U260AA

49 0118 850C Puller, ball joint  0118850C	49 0180 510B Attachment, steering worm bearing preload measuring  0180510B	49 H028 301 Installer, dust boot  H028301X
49 G034 1A0 Compressor, coil spring  G0341A0X	49 G034 101 Body (Part of 49 G034 1A0)  G034101X	49 G034 102 Screw (Part of 49 G034 1A0)  G034102X
49 G034 103 Arm (Part of 49 G034 1A0)  G034103X	49 0259 770B Wrench, flare nut  0259770B	49 0107 680A Engine stand  0107680A
49 T034 1A0 Compressor, coil spring  T0341A0X	49 T034 101 Compressor, spring (Part of 49 T034 1A0)  T034101X	49 T034 102 Stand (Part of 49 T034 1A0)  T034102X
49 T034 103 Hook (Part of 49 T034 1A0)  T034103X	49 T034 104 Support (Parts of 49 T034 1A0)  T034104X	49 T034 105 Attachment  T034105X
49 T028 3A0 Puller set, ball joint  T0283A0X	49 T028 303 Body (Part of 49 T028 3A0)  T028303X	49 T028 304 Attachment (Part of 49 T028 3A0)  T028304X
49 B034 201 Support block  B034201X	49 N028 201 Support block  N028201X	

DRIVELINE/AXLE

03
SECTION

03

GENERAL PROCEDURES	03-10	DIFFERENTIAL	03-14
FRONT AXLE	03-11	PROPELLER SHAFT	03-15
REAR AXLE	03-12	TECHNICAL DATA	03-50
DRIVE SHAFT	03-13	SERVICE TOOLS	03-60

03-10 GENERAL PROCEDURES

PRECAUTION (DRIVELINE/AXLE) 03-10-1

PRECAUTION (DRIVELINE/AXLE)

U5U310AA

Wheels and tires removal / installation

- The removal and installation procedures for the wheels and tires are not mentioned in this section. If you must remove a wheel, retighten it to **89—117 N·m { 9.0—12.0 kgf·m , 66—86 ft·lbf }**.

03-11 FRONT AXLE

WHEEL HUB, STEERING

KNUCKLE PREINSPECTION 03-11-1

Wheel Bearing Play 03-11-1

WHEEL HUB BOLT REPLACEMENT .. 03-11-1

WHEEL HUB, STEERING KNUCKLE

REMOVAL / INSTALLATION 03-11-2

ABS Sensor Rotor Removal Note 03-11-3

Hub Bolt Removal Note 03-11-3

Hub Bolt Installation Note 03-11-3

ABS Sensor Rotor Installation Note .. 03-11-3

Locknut Installation Note 03-11-3

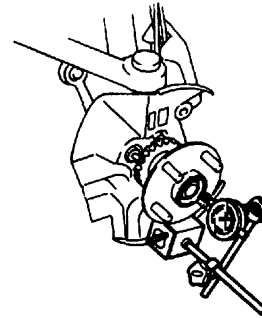
WHEEL HUB, STEERING KNUCKLE PREINSPECTION

U5U311AA

Wheel Bearing Play

1. Remove the brake caliper component and disc plate.
2. 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.
3. If the bearing play exceeds the specification, check and adjust the locknut torque or replace the wheel bearing if necessary.

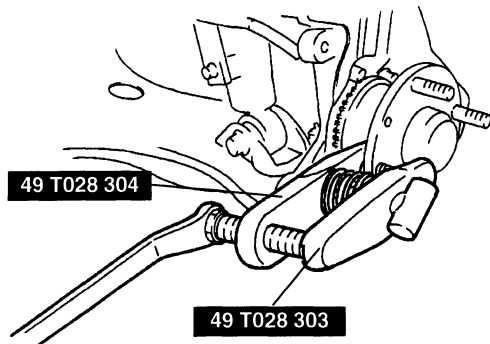
Maximum wheel bearing play
0.05 mm { 0.002 in }



U5U31101

WHEEL HUB BOLT REPLACEMENT

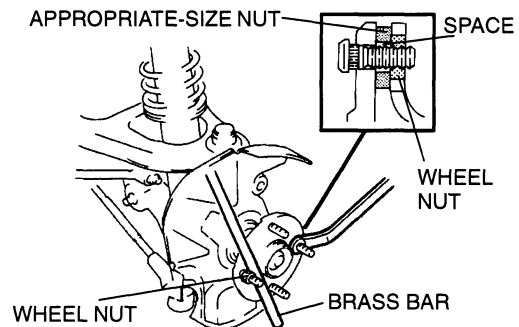
1. Remove the wheel hub bolt by using the SSTs.



U5U31102

2. As shown in the figure, install the wheel hub bolt into the wheel hub and set a washer and wheel hub nut in the wheel hub bolt.

3. Tighten the wheel hub nut while holding the wheel hub by using a brass bar.



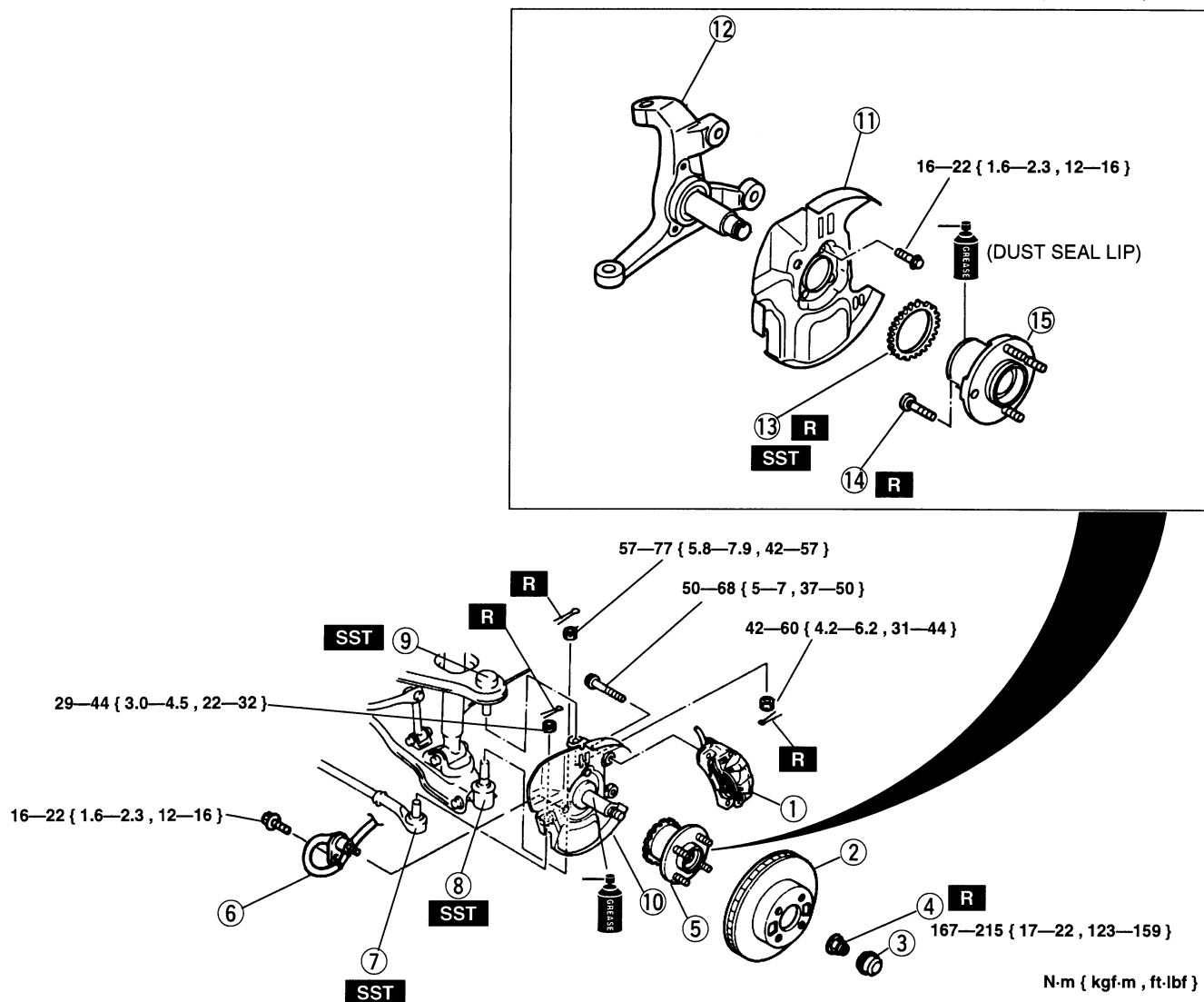
U5U31103

FRONT AXLE

WHEEL HUB, STEERING KNUCKLE REMOVAL / INSTALLATION

U5U311AC

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal indicated in the table.
3. After installation, adjust the total toe-in. (Refer to 02-11 WHEEL ALIGNMENT, Total Toe-in Adjustment.)



1	Brake caliper component
2	Disc plate 04-11 FRONT BRAKE (DISC) REMOVAL / INSTALLATION, Disc Plate Removal Note 04-11 FRONT BRAKE (DISC) REMOVAL / INSTALLATION, Disc Plate Installation Note
3	Hub cap
4	Locknut Installation Note
5	Front wheel hub component
6	ABS wheel-speed sensor (if equipped)
7	Tie-rod end ball joint 06-10 STEERING GEAR AND LINKAGE REMOVAL / INSTALLATION, Tie-rod End Ball Joint Removal Note
8	Front lower arm ball joint 02-13 FRONT LOWER ARM REMOVAL / INSTALLATION, Front Lower Arm Ball Joint Removal Note

9	Front upper arm ball joint 02-13 FRONT UPPER ARM REMOVAL / INSTALLATION, Front Upper Arm Removal Note
10	Dust cover and knuckle spindle
11	Dust cover
12	Knuckle spindle
13	ABS sensor rotor Removal Note Installation Note
14	Hub bolt Removal Note Installation Note
15	Front wheel hub

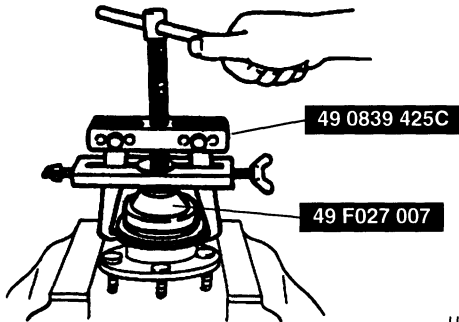
FRONT AXLE

ABS Sensor Rotor Removal Note

- Secure the front wheel hub in a vise and remove the sensor rotor by using the SSTs.

Note

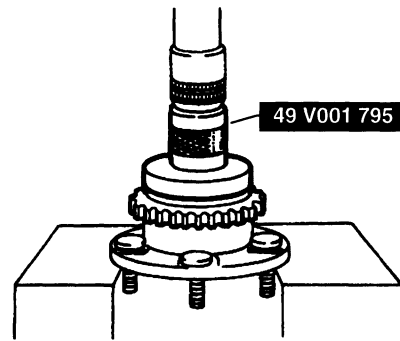
- The sensor rotor does not need to be removed unless you are replacing it.



U5U31105

ABS Sensor Rotor Installation Note

- Install a new sensor rotor by using the SST and a press.



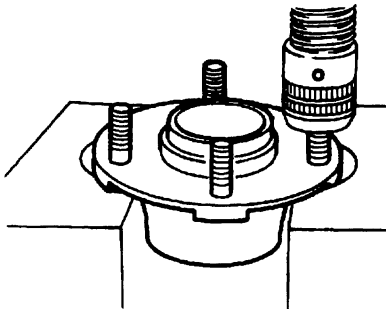
U5U31108

03

Hub Bolt Removal Note

Note

- The hub bolts do not need to be removed unless you are replacing them.
- Remove the hub bolts by using a press.



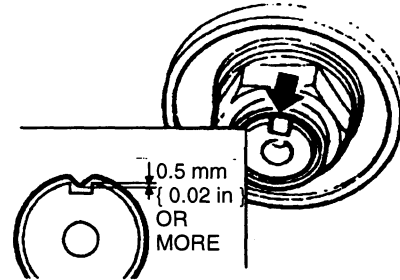
U5U31106

Locknut Installation Note

- Install a new locknut and stake it.

Tightening torque

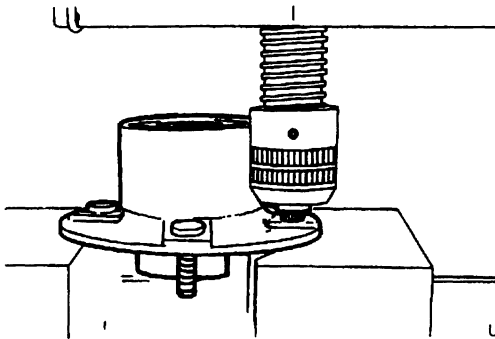
167—215 N·m { 17—22 kgf·m , 123—159 ft·lbf }



U5U31109

Hub Bolt Installation Note

- Install the new hub bolts by using a press.



U5U31107

03-12 REAR AXLE

WHEEL HUB, KNUCKLE

PREINSPECTION	03-12-1
Wheel Bearing Play	03-12-1

WHEEL HUB, KNUCKLE

REMOVAL / INSTALLATION	03-12-2
Rear Wheel Hub Removal Note	03-12-3
Wheel Bearing Removal Note	03-12-3
Dust Cover Removal Note	03-12-3

Bushing Removal Note	03-12-3
Bushing Installation Note	03-12-3
Dust Cover Installation Note	03-12-4
Wheel Bearing Installation Note	03-12-4
Rear Wheel Hub Installation Note	03-12-4
Oil Seal Installation Note	03-12-4
Locknut Installation Note	03-12-4

WHEEL HUB, KNUCKLE PREINSPECTION

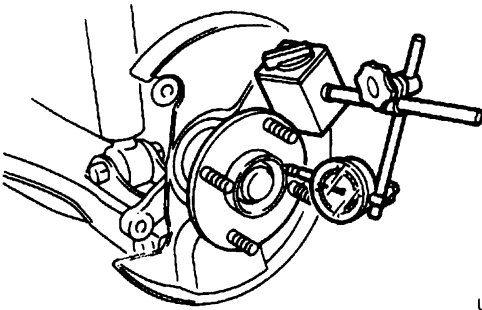
Wheel Bearing Play

1. Remove the wheel, brake caliper component, and disc plate.
2. 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. If the bearing play exceeds the specification, check and adjust the locknut torque or replace the wheel bearing if necessary.

Maximum wheel bearing play
0.05 mm { 0.002 in }

U5U312AA

03



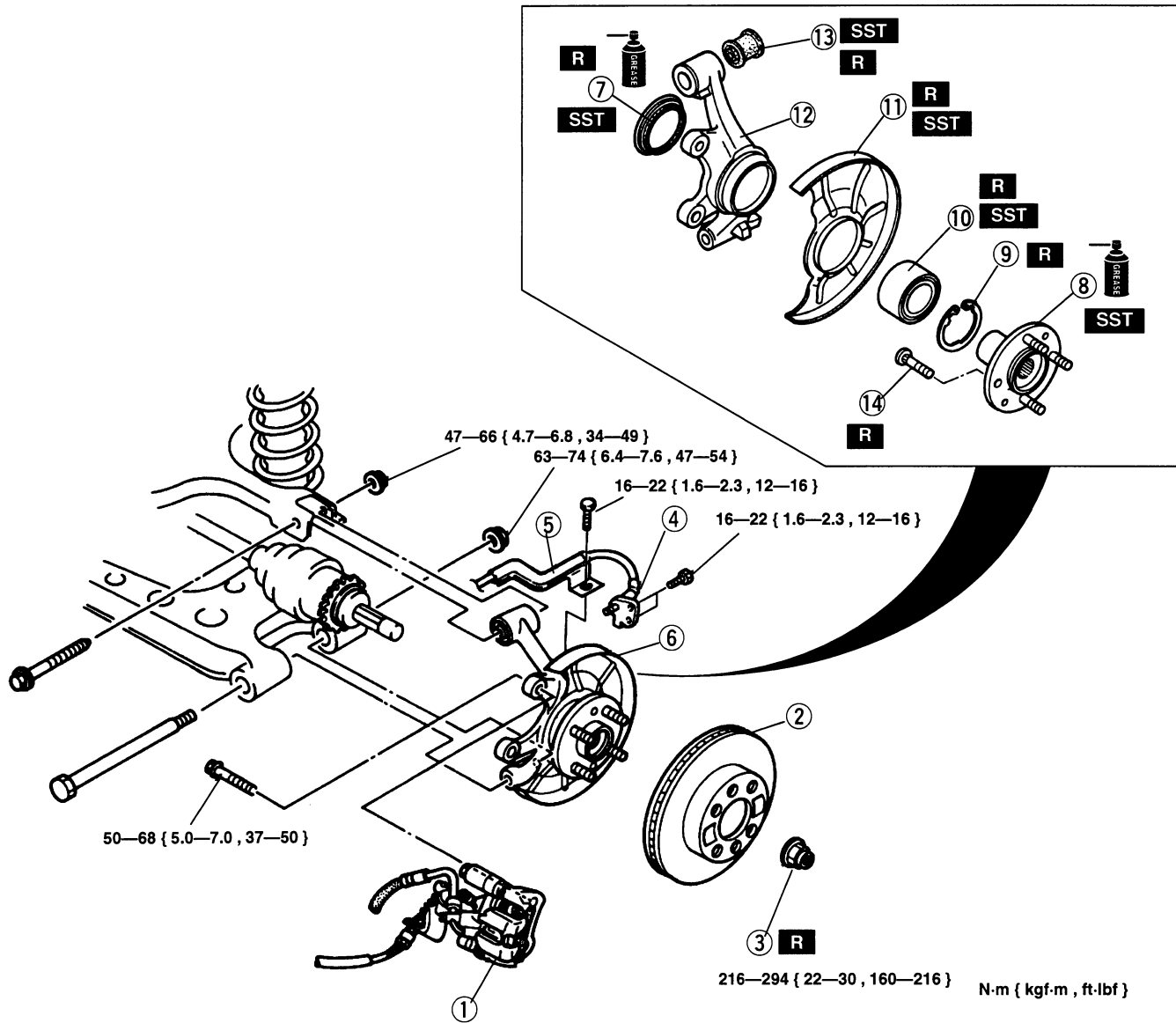
U5U31201

REAR AXLE

WHEEL HUB, KNUCKLE REMOVAL / INSTALLATION

U5U312AB

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



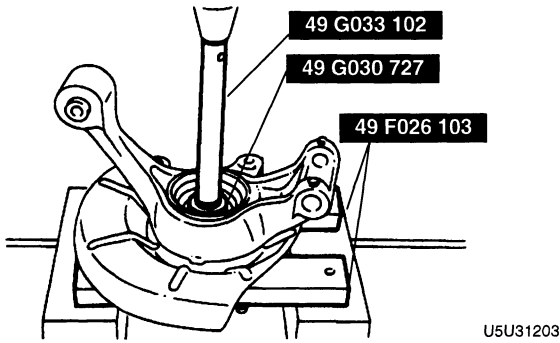
U5U31202

1	Brake caliper component
2	Disc plate ☞ 04-11 FRONT BRAKE (DISC) REMOVAL / INSTALLATION, Disc Plate Removal Note ☞ 04-11 FRONT BRAKE (DISC) REMOVAL / INSTALLATION, Disc Plate Installation Note
3	Locknut ☞ Installation Note
4	ABS wheel-speed sensor (if equipped)
5	Sensor bracket
6	Knuckle, wheel hub, and dust cover
7	Oil seal ☞ Installation Note
8	Rear wheel hub ☞ Removal Note ☞ Installation Note

9	Retaining ring
10	Wheel bearing ☞ Removal Note ☞ Installation Note
11	Dust cover ☞ Removal Note ☞ Installation Note
12	Knuckle
13	Bushing ☞ Removal Note ☞ Installation Note
14	Hub bolt ☞ 03-11 WHEEL HUB, STEERING KNUCKLE REMOVAL / INSTALLATION, Hub Bolt Removal Note

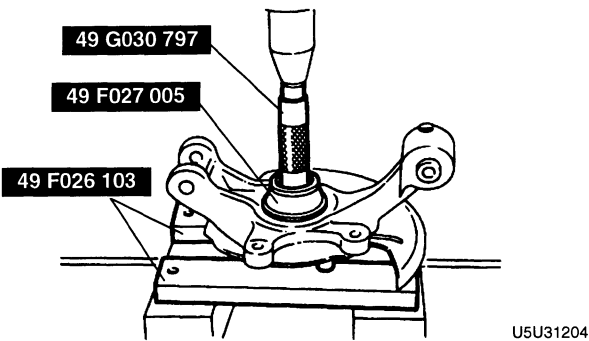
Rear Wheel Hub Removal Note

- Press out the rear wheel hub component by using the **SSTs**.

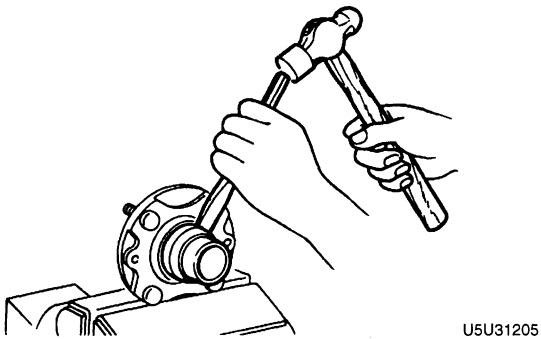


Wheel Bearing Removal Note

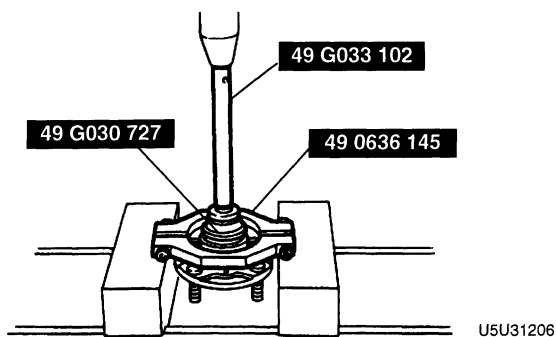
- Press out the wheel bearing by using the **SSTs**.



- Move the bearing inner race away from the rear wheel hub component by using a chisel.



- Press the bearing inner race off the wheel hub by using the **SSTs**.

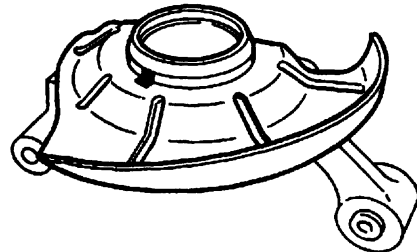


Dust Cover Removal Note

Note

- The dust cover does not need to be removed unless you are replacing it.

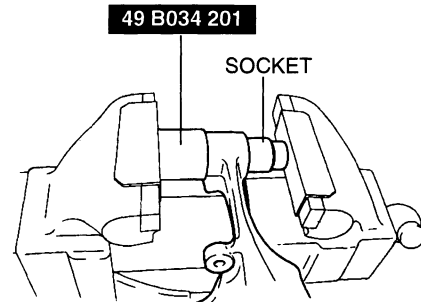
- Mark the dust cover and knuckle for proper reassembly.



- Remove the dust cover by using a chisel.

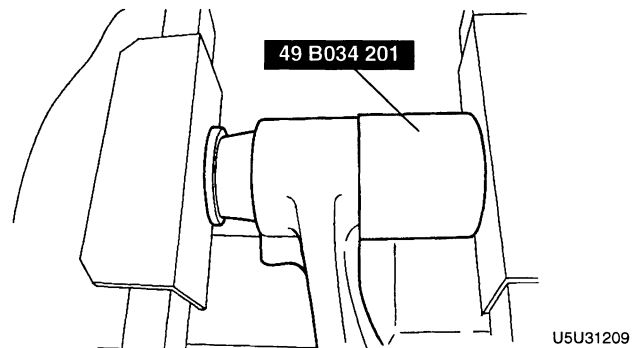
Bushing Removal Note

- Press out the bushing by using the **SST** and a socket.



Bushing Installation Note

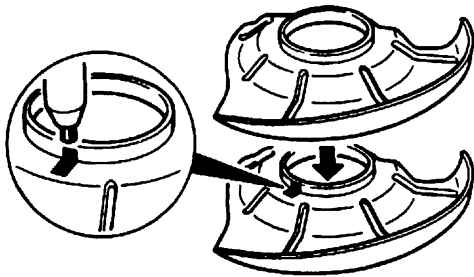
- Apply soapy water to the bushing, then press it into the knuckle by using the **SST**.



REAR AXLE

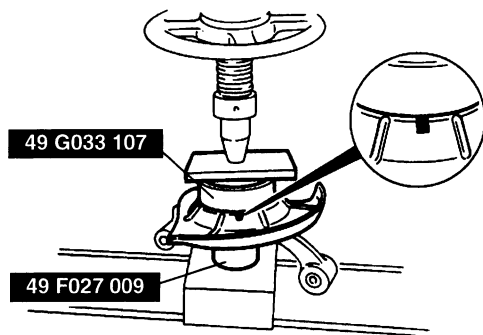
Dust Cover Installation Note

1. Mark the new dust cover the same as the one that was removed.



U5U31210

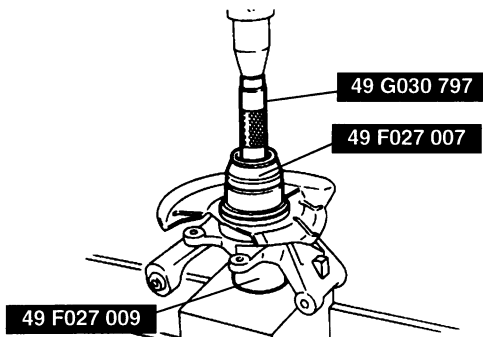
2. Align the marks of the new dust cover and the knuckle.
3. Install the new dust cover by using the SSTs.



U5U31211

Wheel Bearing Installation Note

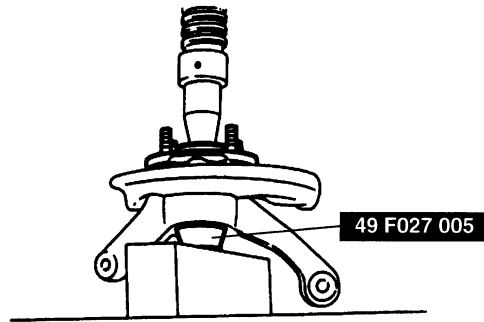
- Press the new wheel bearing into the knuckle by using the SSTs.



U5U31212

Rear Wheel Hub Installation Note

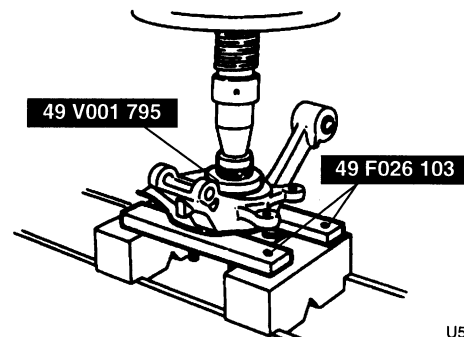
1. Apply grease to the wheel bearing inner race.
2. Press the rear wheel hub component in by using the SST.



U5U31213

Oil Seal Installation Note

1. Apply grease to the new oil seal lip.
2. Install the new oil seal by using the SSTs.



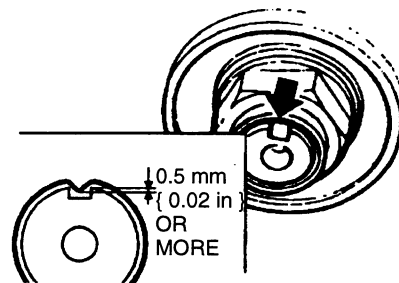
U5U31214

Locknut Installation Note

- Install a new locknut and stake it.

Tightening torque

216—294 N·m { 22—30 kgf·m , 160—216 ft·lbf }



U5U31215

03-13 DRIVE SHAFT

DRIVE SHAFT PREINSPECTION 03-13-1

DRIVE SHAFT

REMOVAL / INSTALLATION 03-13-2

Drive Shaft Removal Note 03-13-2

Drive Shaft Installation Note 03-13-2

DRIVE SHAFT

DISASSEMBLY / ASSEMBLY 03-13-3

Boot Bands Disassembly Note 03-13-4

Clip Disassembly Note 03-13-4

Snap Ring Disassembly Note 03-13-4

Balls, Inner Ring, Cage

Disassembly Note 03-13-4

Boots Disassembly Note 03-13-4

Boots Assembly Note 03-13-4

Cage, Inner Ring, Balls

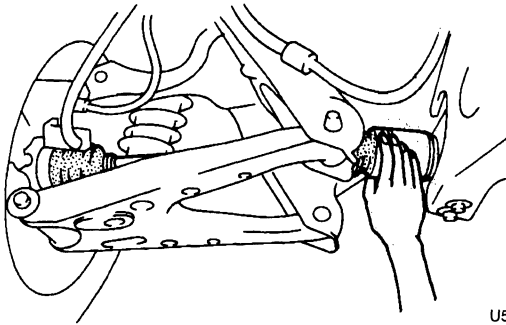
Assembly Note 03-13-5

Boot Bands Assembly Note 03-13-5

DRIVE SHAFT PREINSPECTION

U5U313AA

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 bending, cracks, and wear of the joints and splines.
3. Repair or replace the drive shaft if necessary.



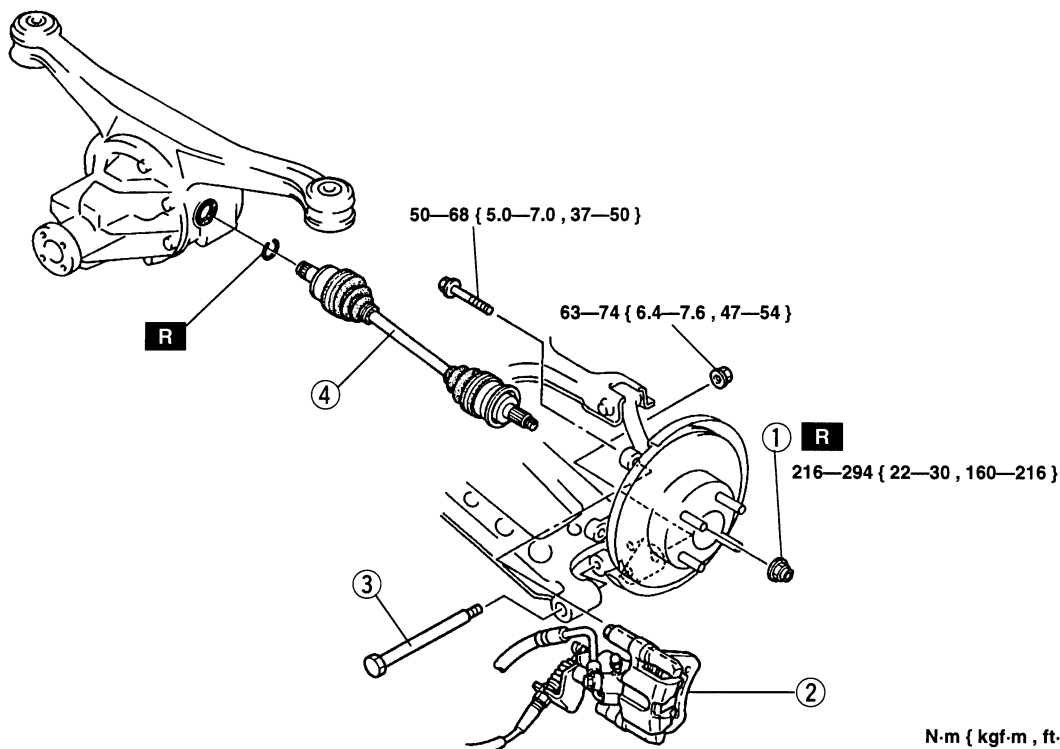
U5U31301

DRIVE SHAFT

DRIVE SHAFT REMOVAL / INSTALLATION

U5U313AB

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



U5U31302

1	Locknut 03-11 WHEEL HUB, KNUCKLE REMOVAL / INSTALLATION, Locknut Installation Note
2	Brake caliper component

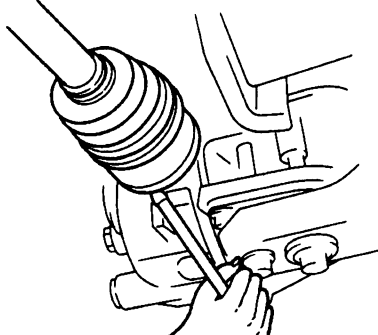
3	Bolt
4	Drive shaft Removal Note Installation Note

Drive Shaft Removal Note

Note

- If the drive shaft will not come out of the rear hub support easily, install a 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 wheel hub.

1. Pull the rear hub support from the drive shaft.
2. Remove the drive shaft from the differential by using a pry bar.



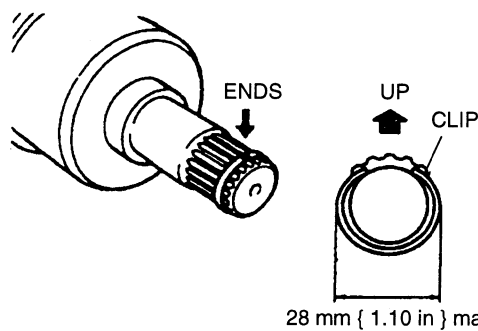
U5U31303

Drive Shaft Installation Note

1. Install a new clip onto the drive shaft.
2. Measure the outer diameter of the clip after installing, and replace the clip if it exceeds the specification.

Caution

- The sharp edges of the drive shaft snap ring can slice or puncture the oil seal. Be careful when installing the drive shaft to the transmission.



U5U31304

3. With the ends of the clip facing upward, push the drive shaft into the differential.

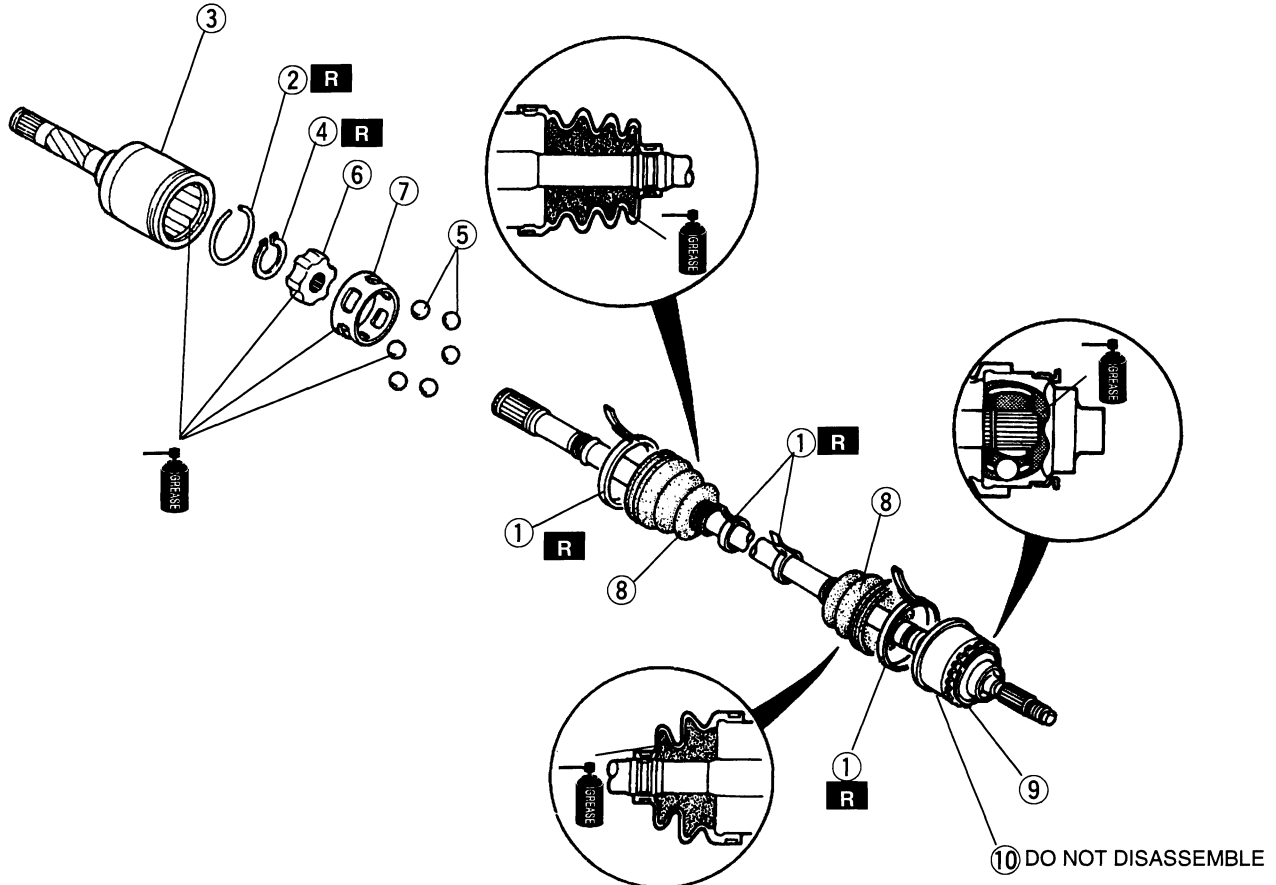
DRIVE SHAFT

- After installation, pull outward on the double offset joint outer ring and verify that the drive shaft is securely held by the clip.

DRIVE SHAFT DISASSEMBLY / ASSEMBLY

U5U313AC

- Disassemble in the order indicated in the table.
- Assemble in the reverse order of disassembly indicated in the table.



U5U31305

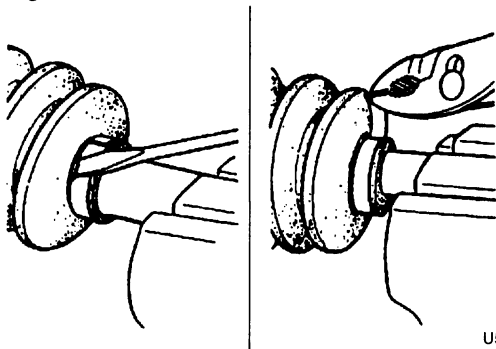
1	Boot bands ☐ Disassembly Note ☐ Assembly Note
2	Clip ☐ Disassembly Note
3	Outer ring
4	Snap ring ☐ Disassembly Note
5	Balls ☐ Disassembly Note ☐ Assembly Note

6	Inner ring ☐ Disassembly Note ☐ Assembly Note
7	Cage ☐ Disassembly Note ☐ Assembly Note
8	Boots ☐ Disassembly Note ☐ Assembly Note
9	ABS sensor rotor
10	Shaft and ball joint component

DRIVE SHAFT

Boot Bands Disassembly Note

- To remove the boot bands, pry up the locking clip by using a screwdriver, then raise the end of the band.



U5U31306

Balls, Inner Ring, Cage Disassembly Note

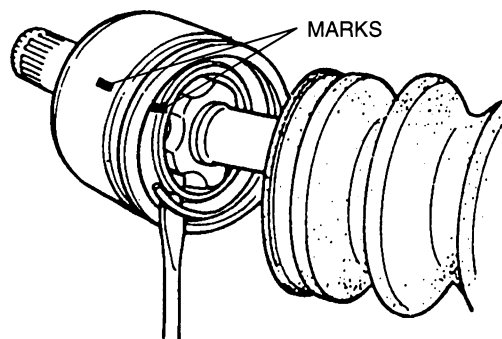
1. Insert a screwdriver between the inner ring and cage to remove the balls.



U5U31309

Clip Disassembly Note

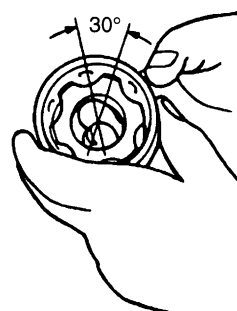
1. Mark the drive shaft and outer ring with paint as shown.
2. Remove the clip.



U5U31307

2. Mark the inner ring and cage with paint.

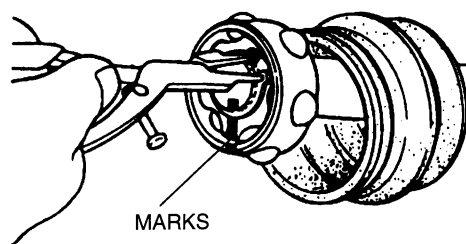
3. Turn the cage approximately 30°, then pull it away from the inner ring.



U5U31310

Snap Ring Disassembly Note

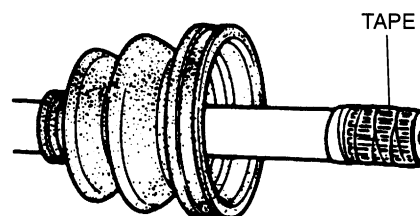
1. Mark the drive shaft end and inner ring with paint as shown.
2. Remove the snap ring by using snap ring pliers.



U5U31308

Boots Disassembly Note

1. Wrap the shaft splines with tape.

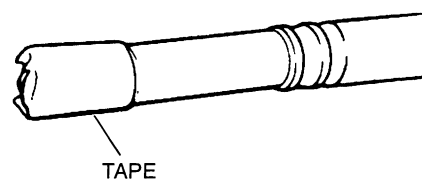


U5U31311

2. Remove the boot.

Boots Assembly Note

1. Before putting the boot onto the shaft, wrap the shaft splines with tape.



U5U31312

DRIVE SHAFT

Note

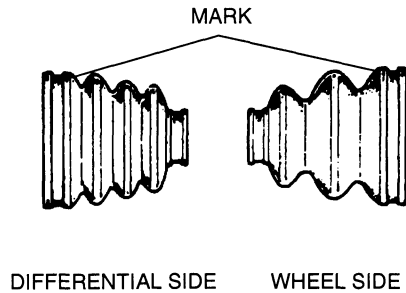
- The initials DOJ and BJ are stamped on the wheel-side and differential-side boots respectively.

2. Install the wheel-side and differential-side boots, noting the shape and size of each one in the figure.

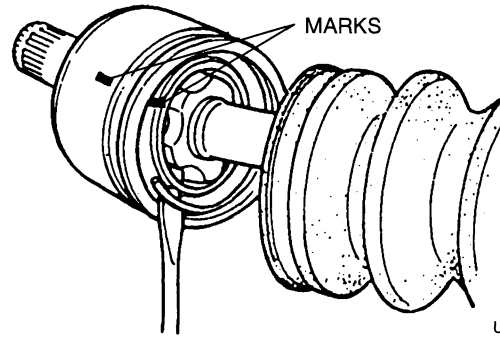
Outer diameter of large boot end

Differential side: 87.4 mm { 3.441 in }

Wheel side: 90.8 mm { 3.575 in }



U5U31313



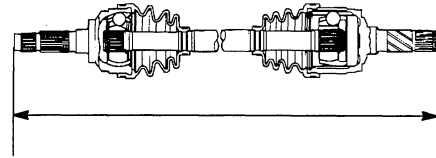
U5U31315

Boot Bands Assembly Note

1. Verify that the boots are not dented or twisted.
2. Set the drive shaft to the standard length.

Standard length

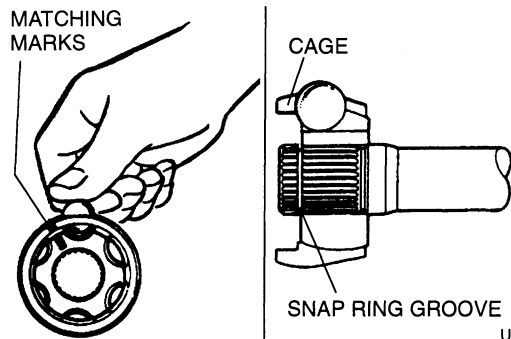
767.3—777.3 mm { 30.209—30.602 in }



U5U31316

Cage, Inner Ring, Balls Assembly Note

1. Align the marks and install the balls to the inner ring.
2. Install the cage, inner ring, and ball component to the drive shaft in the direction shown in the figure. The larger diameter of the cage should be facing the snap ring groove.
3. Install a new snap ring in the drive shaft snap ring groove.



U5U31314

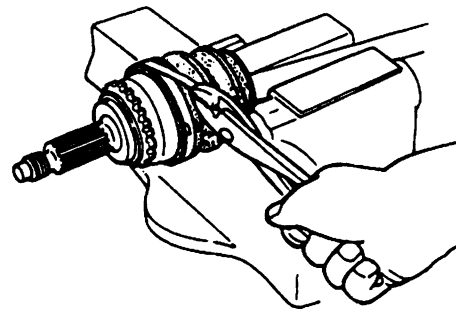
4. Apply the specified grease (supplied in the boot kit) to the joints and boots.

Total quantity

Differential side: 85—105 g { 3.00—3.71 oz }

Wheel side: 55—75 g { 1.94—2.65 oz }

5. Align the marks, then install a new clip.



U5U31317

03-14 DIFFERENTIAL

DIFFERENTIAL OIL INSPECTION	03-14-1
DIFFERENTIAL OIL REPLACEMENT ..	03-14-1
OIL SEAL REPLACEMENT	03-14-2
DIFFERENTIAL	
REMOVAL / INSTALLATION	03-14-3
Differential Removal Note	03-14-4
DIFFERENTIAL	
DISASSEMBLY / ASSEMBLY	03-14-5
Differential Case Disassembly Note ..	03-14-6
Differential Gear And Carrier	
Disassembly Note	03-14-6
Bearing Caps Disassembly Note	03-14-6
Adjusting Nuts Disassembly Note	03-14-6
Knock Pin Disassembly Note	03-14-6
Bearing Inner Races (Side Bearing)	
Disassembly Note	03-14-7
Locknut (Companion Flange)	
Disassembly Note	03-14-7
Companion Flange Disassembly Note	03-14-7

Drive Pinion Disassembly Note	03-14-7
Bearing Outer Races	
(Front And Rear Bearing)	
Disassembly Note	03-14-7
Bearing Inner Race (Rear Bearing)	
Disassembly Note	03-14-7
Differential Mount Disassembly Note ..	03-14-7
Differential Mount Assembly Note	03-14-8
Oil Seal Assembly Note	03-14-8
Bearing Outer Race (Front Bearing)	
Assembly Note	03-14-8
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Assembly Note	03-14-8
Bearing Inner Race (Rear Bearing),	
Bearing Inner Race (Front Bearing),	
Spacer Assembly Note	03-14-8
Thrust Washers (Standard)	
Assembly Note	03-14-10

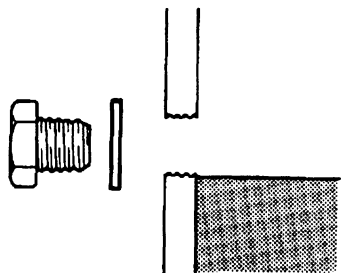
DIFFERENTIAL OIL INSPECTION

1. Remove the filler plug.
2. Verify that the oil is at the bottom of the filler plug hole. If it is low, add the specified oil.

3. Install the filler plug.

Tightening torque

39—53 N·m { 4.0—5.5 kgf·m , 29—39 ft·lbf }

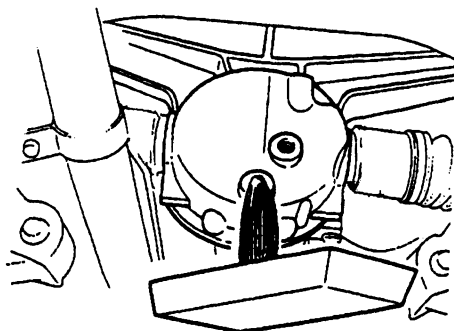


U5U31401

U5U314AA

DIFFERENTIAL OIL REPLACEMENT

1. Remove the filler and drain plugs.



U5U31444

2. Drain the differential oil into a container.

3. Wipe the plugs clean.
4. Install the drain plug and a new washer.

Tightening torque

39—54 N·m { 4.0—5.5 kgf·m , 29—39 ft·lbf }

5. Add the specified oil from the filler plug until the level reaches the bottom of the plug hole.

Specified oil

Type (API service GL-4, GL-5)

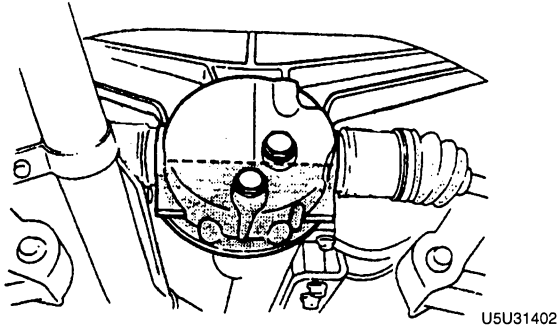
Above -18 °C { 0 °F } : SAE 90

Below -18 °C { 0 °F } : SAE 80

Capacity: 1.00 L { 1.06 US qt , 0.88 Imp qt }

U5U314AB

DIFFERENTIAL



6. Install the filler plug.

Tightening torque

39—53 N·m { 4.0—5.5 kgf·m , 29—39 ft·lbf }

OIL SEAL REPLACEMENT

1. On level ground, jack up the vehicle and support it on safety stands.
2. Drain the differential gear oil.

Note

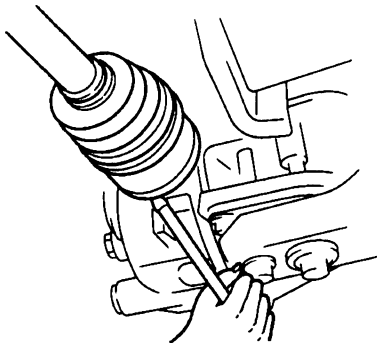
- For easier installation, do not depress the brake pedal after removing the brake caliper component.

3. Remove the brake caliper component, then suspend the brake caliper assembly by using a rope.
4. Remove the lower arm installation bolt and nut.

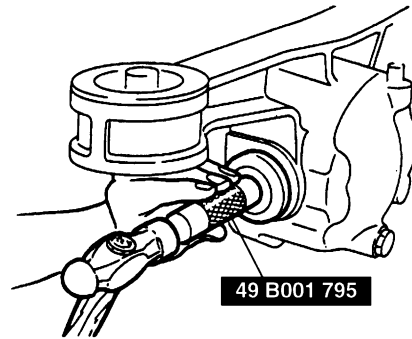
Note

- If the drive shaft will not come out of the rear hub support easily, install a 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 wheel hub.

5. Pull the rear hub support from the drive shaft.
6. Remove the drive shaft from the differential by using a pry bar.



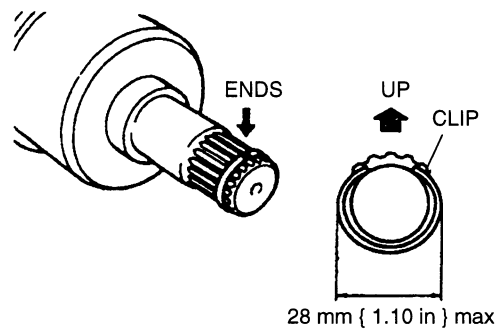
7. Remove the oil seal.
8. Apply lithium-based grease to the new oil seal lip and install it by using the SST.



9. Install a new clip onto the drive shaft.
10. Measure the outer diameter of the clip after installing, and replace the clip if it exceeds the specification.

Caution

- The sharp edges of the drive shaft snap ring can slice or puncture the oil seal. Be careful when installing the drive shaft to the transmission.



11. With the ends of the clip facing upward, push the drive shaft into the differential.
12. After installation, pull outward on the double offset joint outer ring and verify that the drive shaft is securely held by the clip.
13. Install the lower arm installation bolt and nut.

Tightening torque

47—66 N·m { 4.7—6.8 kgf·m , 34—49 ft·lbf }

DIFFERENTIAL

14. Install the brake caliper component.

15. Add the specified oil.

16. Adjust the rear wheel alignment.

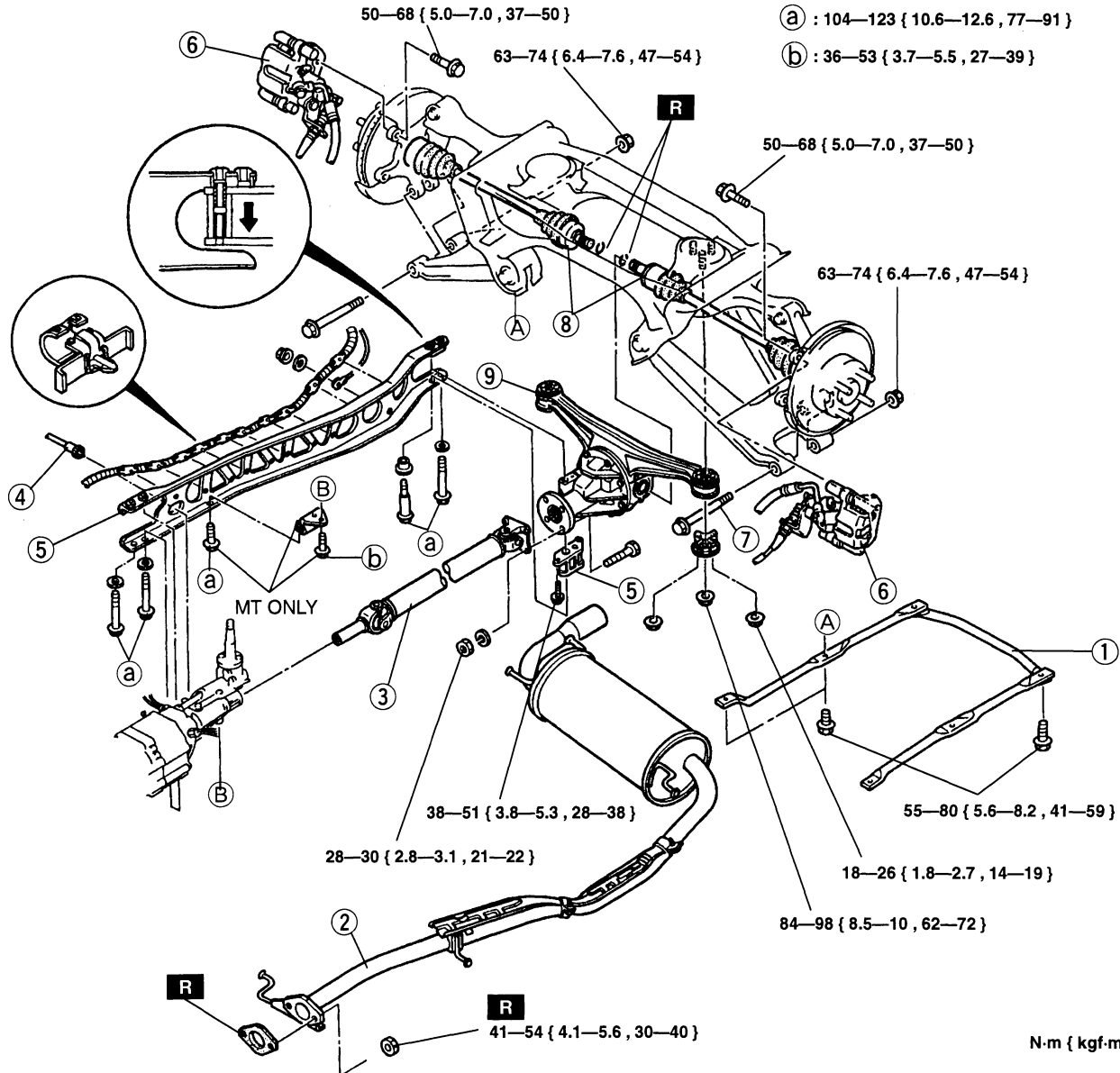
Tightening torque

50—68 N·m { 5.0—7.0 kgf·m , 37—50 ft·lbf }

DIFFERENTIAL REMOVAL / INSTALLATION

U5U314AD

1. Drain the differential oil.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal indicated in the table.
4. Add the specified oil to the specified level.



N·m { kgf·m , ft·lbf }

U5U31406

1	Differential mounting pipe (with LSD)
2	Exhaust pipe
3	Propeller shaft 03-14 PROPELLER SHAFT REMOVAL / INSTALLATION
4	Speedometer cable

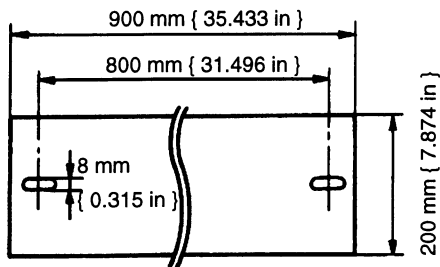
5	Power plant frame (PPF), Differential mounting spacer 05-11 MANUAL TRANSMISSION REMOVAL / INSTALLATION, Power Plant Frame (PPF) Removal Note 05-11 MANUAL TRANSMISSION REMOVAL / INSTALLATION, Power Plant Frame (PPF) Installation Note
6	Brake caliper component

DIFFERENTIAL

7	Bolt
8	Drive shafts 03-13 DRIVE SHAFT REMOVAL / INSTALLATION, Drive Shaft Removal Note 03-13 DRIVE SHAFT REMOVAL / INSTALLATION, Drive Shaft Installation Note
9	Differential Removal Note

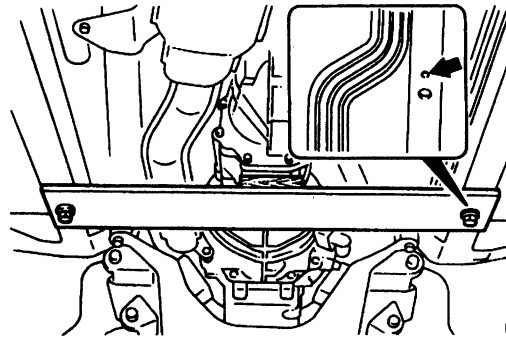
Differential Removal Note

1. Separate the driveshaft from the differential.
2. Support the differential by using a jack.
3. Lower the differential and move it forward.
4. To prevent damaging the fire wall, crank angle sensor, and engine mount, support the transmission as follows.
 - (1) Prepare a steel plate (as shown in the figure), a wooden block, bolts ($M8 \times 1.25$), and washers.



U5U31407

- (2) Install the parts as shown in the figure.



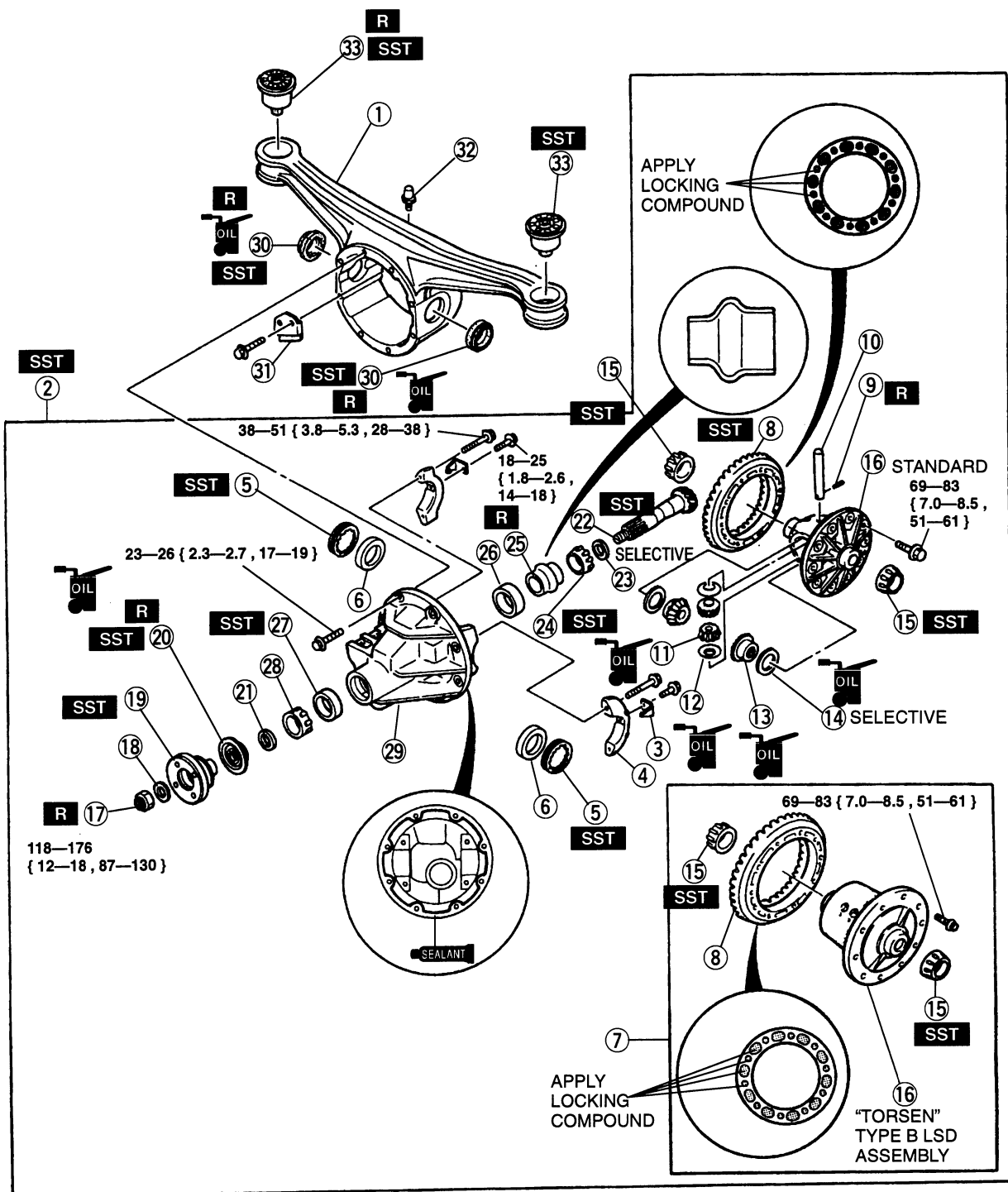
U5U31408

DIFFERENTIAL

DIFFERENTIAL DISASSEMBLY / ASSEMBLY

U5U314AE

1. Disassemble in the order shown in the figure indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



N·m { kgf·m , ft·lbf }

U5U31409

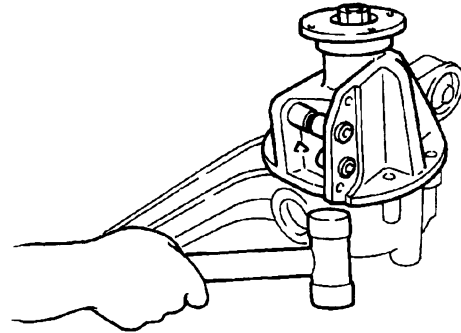
DIFFERENTIAL

1	Differential case ☞ Disassembly Note
2	Differential gear component ☞ Disassembly Note
3	Lock plates
4	Bearing caps ☞ Disassembly Note
5	Adjusting nuts ☞ Disassembly Note
6	Bearing outer races (side bearing)
7	Gear case component ("TORSEN" TYPE B LSD)
8	Ring gear
9	Knock pin (standard) ☞ Disassembly Note
10	Pinion shaft (standard)
11	Pinion gears (standard)
12	Thrust washers (standard)
13	Side gears (standard)
14	Thrust washers (standard) ☞ Assembly Note
15	Bearing inner races (side bearing) ☞ Disassembly Note
16	Gear case
17	Locknut (companion flange) ☞ Disassembly Note
18	Washer
19	Companion flange ☞ Disassembly Note
20	Oil seal (companion flange)
21	Washer
22	Drive pinion ☞ Disassembly Note
23	Spacer
24	Bearing inner race (rear bearing) ☞ Disassembly Note ☞ Assembly Note
25	Collapsible spacer
26	Bearing outer race (rear bearing) ☞ Disassembly Note ☞ Assembly Note
27	Bearing outer race (front bearing) ☞ Disassembly Note ☞ Assembly Note
28	Bearing inner race (front bearing) ☞ Disassembly Note ☞ Assembly Note
29	Differential carrier
30	Oil seal ☞ Assembly Note
31	Baffle
32	Breather
33	Differential mount ☞ Disassembly Note ☞ Assembly Note

Differential Case Disassembly Note

Caution

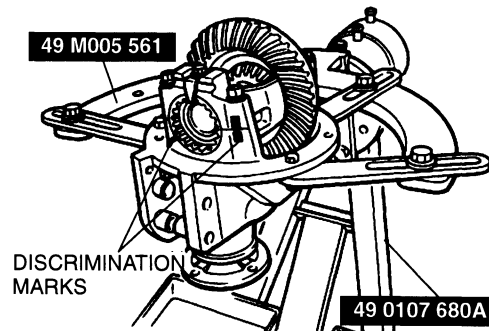
- The differential case is made of aluminum, and is therefore easily dented and scratched by metal tools. When separating the differential carrier from the case, use only a plastic hammer at the point shown in the figure.
- Strike the differential carrier with a plastic hammer to separate it from the case.



U5U31410

Differential Gear And Carrier Disassembly Note

- Mount the differential gear component on the SSTs.



U5U31411

Bearing Caps Disassembly Note

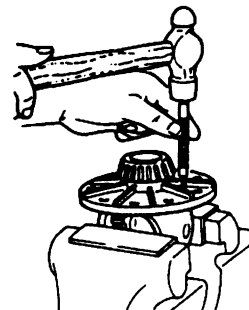
- Mark one bearing cap and the carrier.

Adjusting Nuts Disassembly Note

- Mark one adjusting nut and the carrier.

Knock Pin Disassembly Note

- Secure the gear case in a vise and tap out the knock pin toward the ring gear side.



U5U31412

DIFFERENTIAL

Bearing Inner Races (Side Bearing) Disassembly Note

Note

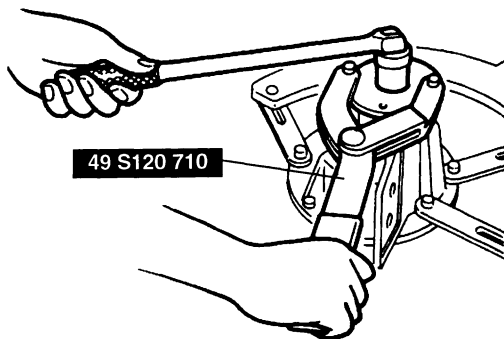
- Mark the bearings so that they can later be reinstalled in the same position.
- Remove the bearing inner races (side bearing) from the gear case by using the **SST**.



U5U31413

Locknut (Companion Flange) Disassembly Note

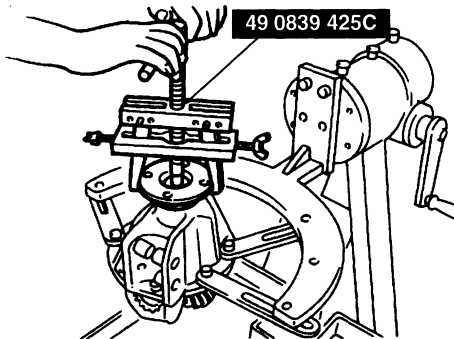
- Hold the companion flange by using the **SST** and remove the locknut.



U5U31414

Companion Flange Disassembly Note

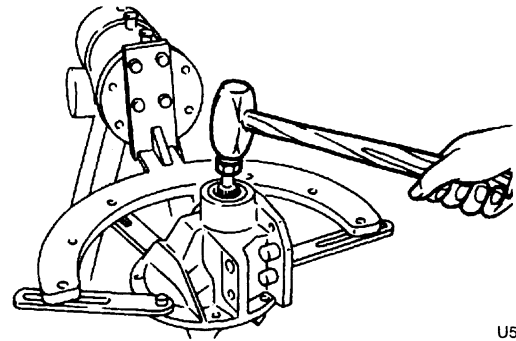
- Pull the companion flange off by using the **SST**.



U5U31415

Drive Pinion Disassembly Note

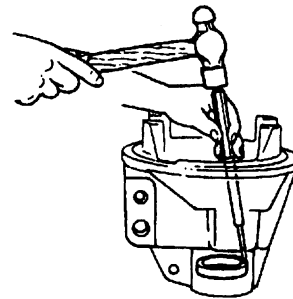
- Push out the drive pinion by attaching a miscellaneous locknut to the drive pinion, and tapping it with a copper hammer.



U5U31416

Bearing Outer Races (Front And Rear Bearing) Disassembly Note

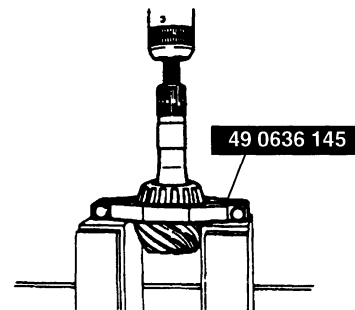
- Remove the bearing outer races using the two grooves in the carrier and alternately tapping the sides of the races.



U5U31417

Bearing Inner Race (Rear Bearing) Disassembly Note

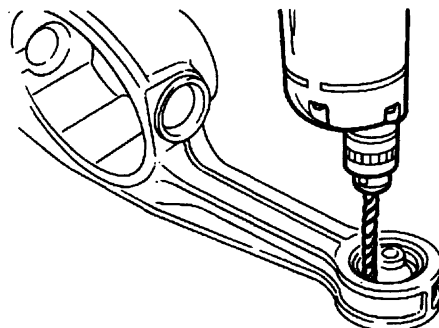
- While supporting the drive pinion to keep it from falling, remove the bearing inner race (rear bearing) by using the **SST**.



U5U31418

Differential Mount Disassembly Note

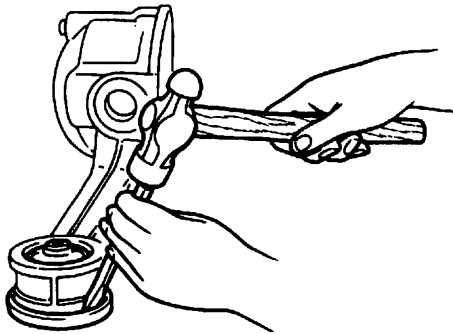
1. Drill holes around the differential mount.



U5U31419

DIFFERENTIAL

2. Hit the edge of the differential mount to remove it.

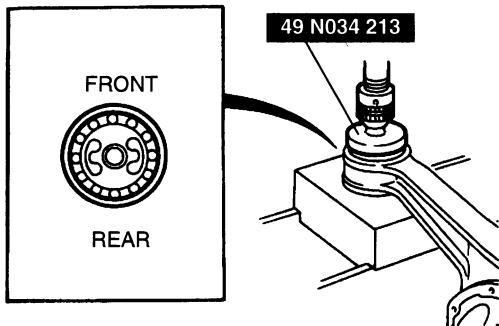


U5U31420

Differential Mount Assembly Note

1. Install the new differential mount with the voids facing front and rear.
2. Press in the differential mount by using the SST.

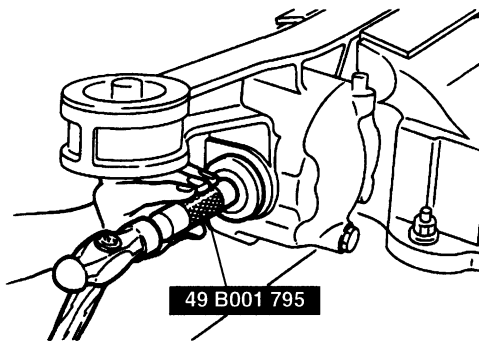
Press force
19,600 N { 2,000 kgf , 4,400 lbf }



U5U31421

Oil Seal Assembly Note

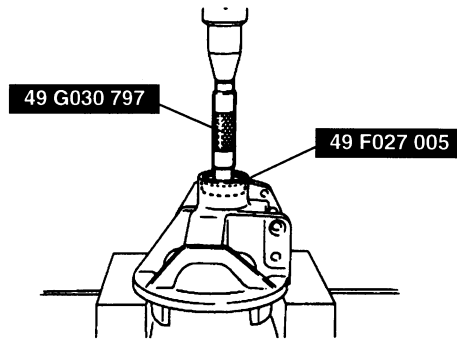
- Apply differential gear oil to the new oil seal lip and install it by using the SST.



U5U31422

Bearing Outer Race (Front Bearing) Assembly Note

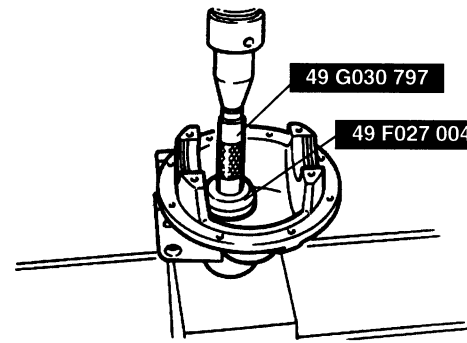
- Install the bearing outer race (front bearing) by using the SSTs.



U5U31423

Bearing Outer Race (Rear Bearing) Assembly Note

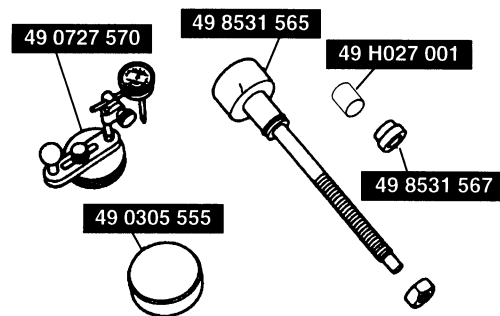
- Install the bearing outer race (rear bearing) by using the SSTs.



U5U31424

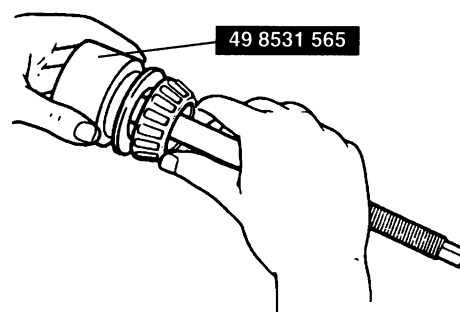
Bearing Inner Race (Rear Bearing), Bearing Inner Race (Front Bearing), Spacer Assembly Note

1. Adjust the drive pinion height as follows, by using the SSTs.



U5U31425

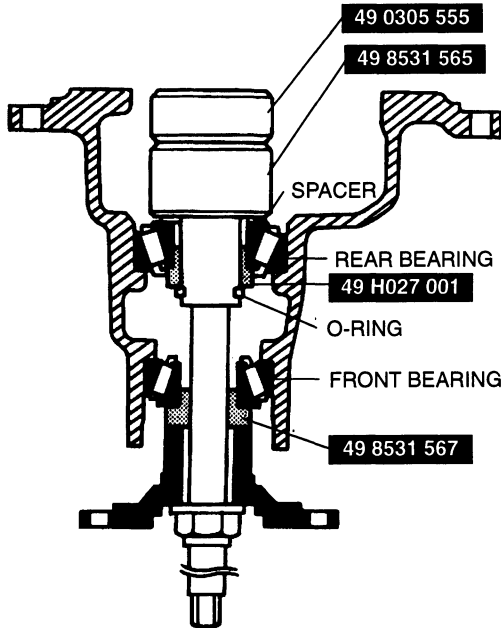
- (1) Install the previously-removed spacer onto the SST so that the beveled side of the spacer faces the drive pinion. Then install the rear bearing and O-ring onto the SST/spacer as shown in the figure.



U5U31426

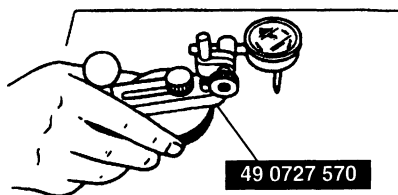
DIFFERENTIAL

- (2) Assemble the spacer, bearing inner race (rear bearing), and **SSTs**.
- (3) Secure the **SST** with the O-ring. Install this assembly in the carrier.
- (4) Install the bearing inner race (front bearing), the **SST**, companion flange, washer, and nut.
- (5) Tighten the nut just enough so that the companion flange can still be turned by hand.



U5U31427

- (6) Place the **SST** on the surface plate and set the dial indicator to "Zero".

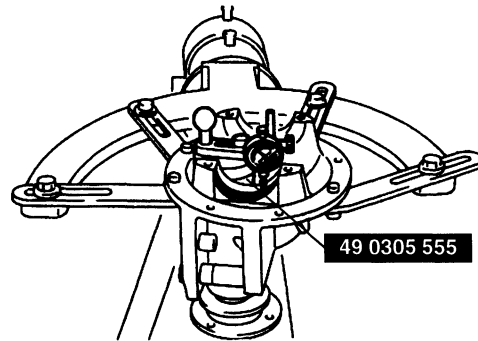


U5U31428

- (7) Place the **SST** atop the drive pinion model. Set the gauge body atop the gauge block.
- (8) Place the feeler of the dial indicator so that it contacts where the bearing inner race (side bearing) is installed in the carrier. Measure the lowest position on the left and right sides of the carrier.

Note

- The number is inscribed by an electric marking pen.



U5U31429

- (9) Add the two (left and right) values obtained step (8) and divide the total by 2.

Specification

0 mm { 0 in }

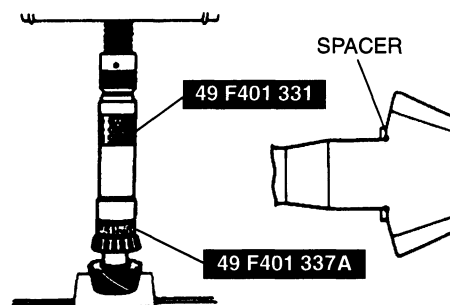
- (10) If not within specification, adjust the pinion height by using a spacer chosen from the table shown:

Mark	Thickness	Mark	Thickness
08	3.08 mm { 0.1213 in }	29	3.29 mm { 0.1295 in }
11	3.11 mm { 0.1224 in }	32	3.32 mm { 0.1307 in }
14	3.14 mm { 0.1234 in }	35	3.35 mm { 0.1319 in }
17	3.17 mm { 0.1248 in }	38	3.38 mm { 0.1331 in }
20	3.20 mm { 0.1260 in }	41	3.41 mm { 0.1343 in }
23	3.23 mm { 0.1271 in }	44	3.44 mm { 0.1354 in }
26	3.26 mm { 0.1283 in }	47	3.47 mm { 0.1366 in }

Note

- The identification number is indicated on the outer side of the washer.

2. Install the spacer, selected in the procedure above, with the beveled side facing the drive pinion.
3. Using the **SSTs**, press the bearing inner race (rear bearing) onto the drive pinion until the force required starts to increase sharply.



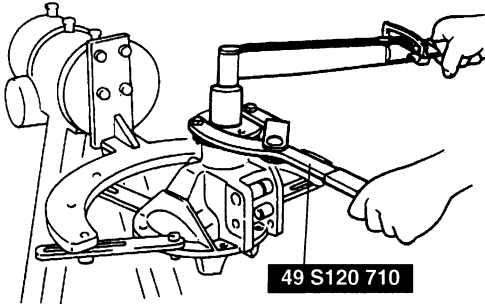
U5U31430

DIFFERENTIAL

4. Without installing the oil seal, install the drive pinion, spacer, new collapsible spacer, front bearing, washer, and companion flange to the carrier, and temporarily tighten the locknut by using the **SST**.

Tightening torque

128 N·m { 13.0 kgf·m , 94.0 ft·lbf }



U5U31431

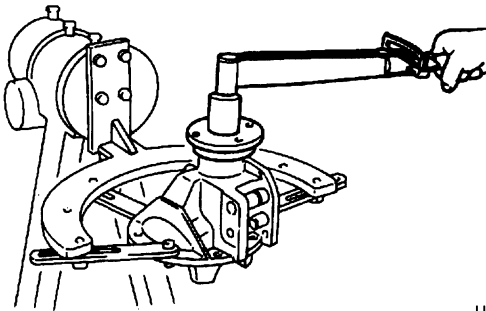
5. Turn the companion flange several turns by hand to seat the bearing.
6. Measure the drive pinion preload. Adjust the preload by tightening the locknut, and record the tightening torque.

Preload

0.9—1.3 N·m { 9—14 kgf·cm , 7.9—12.1 in·lbf }

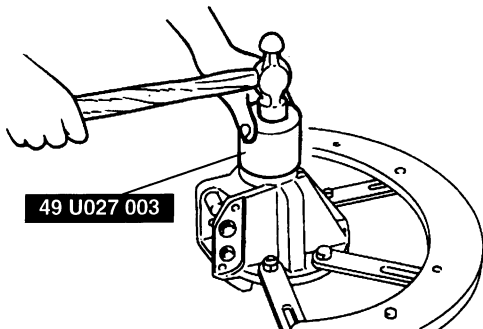
Tightening torque

128—284 N·m { 13.0—29.0 kgf·m , 94.1—209.7 ft·lbf }



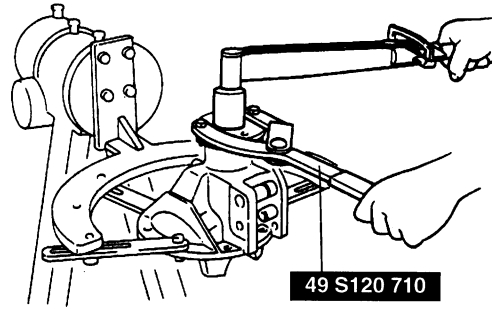
U5U31432

7. Remove the locknut, washer, and companion flange.
8. Tap a new oil seal into the differential carrier with the **SST**.



U5U31433

9. Install the companion flange and washer while holding the flange with the **SST**, and tighten a new locknut to the tightening torque recorded in step 6.



U5U31434

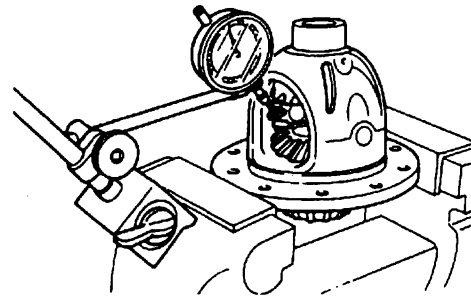
Thrust Washers (Standard) Assembly Note

1. Adjust the backlash of the side gears and pinion gear as follows.
 - (1) Set a dial gauge against the pinion gear as shown.
 - (2) Secure one of the side gears.
 - (3) Move the pinion gear, and measure the backlash at the end of it.

Standard backlash

0—0.1 mm { 0—0.0039 in }

- (4) If the backlash exceeds the standard, use the selectable thrust washers for adjustment.

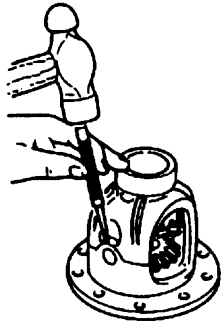


U5U31435

Thrust washer thickness

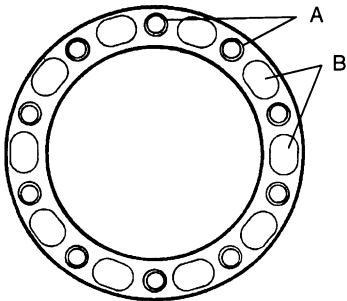
Identification mark	Thickness
0	2.00 mm { 0.0787 in }
0.5	2.05 mm { 0.0807 in }
1	2.10 mm { 0.0827 in }
1.5	2.15 mm { 0.0847 in }
2	2.20 mm { 0.0866 in }

2. Install the new knock pin to secure the pinion shaft. Stake the pin with a punch to prevent it from coming out of the case.



U5U31436

3. Apply thread-locking compound to bolt threads A and points B of the gear back face. Apply approximately 0.04 cm^3 { 0.04 cc , 0.0024 cu in } of thread-locking compound at each point and bolt thread.



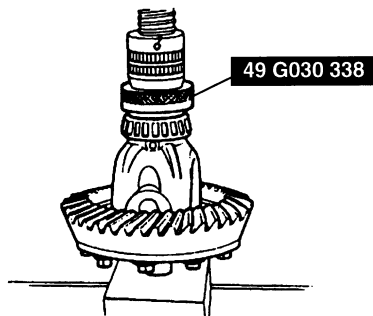
U5U31437

4. Install the ring gear onto the gear case.

Tightening torque

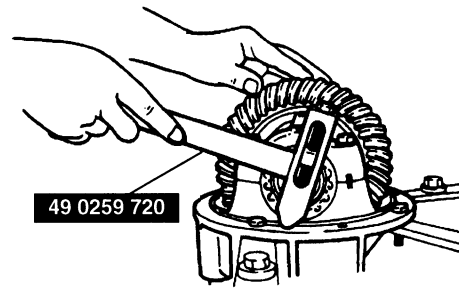
69—83 N·m { 7.0—8.5 kgf·m , 51—61 ft·lbf }

5. Press the bearing inner races (side bearing) on by using the SST.



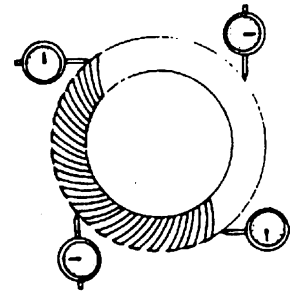
U5U31438

6. Install the differential gear component in the carrier.
7. Note the identification marks on the adjusting nuts, and install them on their respective sides.
8. Install the differential bearing caps, making sure that the identification mark on the cap corresponds with the one on the carrier, by using the SST. Then temporarily tighten the bolts.



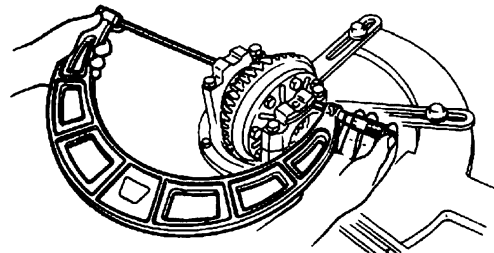
U5U31439

- (1) Mark the ring gear at four points at **approx. 90°** intervals. Mount a dial indicator to the carrier so that the feeler comes in contact at a right angle with one of the ring gear teeth.
- (2) Turn both bearing adjusters equally by using the SST until the backlash is **0.09—0.11 mm { 0.0035—0.0043 in }**.
- (3) Check the backlash at the three other marked points, and make sure the maximum backlash is less than **0.07 mm { 0.0028 in }**.



U5U31440

9. Tighten or loosen the adjusting nuts equally until the distance between the pilot sections on the bearing caps is **185.428—185.50 mm { 7.3003—7.3031 in }**.
10. Recheck the backlash.

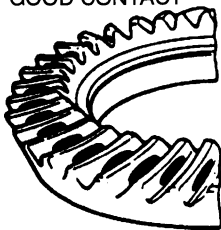


U5U31441

11. Inspect the teeth contact as follows.
 - (1) Coat both surfaces of 6—8 teeth of the ring gear with a thin coat of red lead.
 - (2) While moving the ring gear back and forth by hand, rotate the drive pinion several times and check the tooth contact.
 - (3) If the tooth contact is good, wipe off the red lead.
 - (4) If it is not good, adjust the pinion height, and then adjust the backlash.

DIFFERENTIAL

GOOD CONTACT

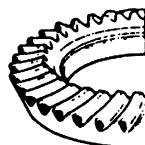


RED LEAD

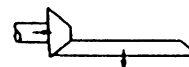
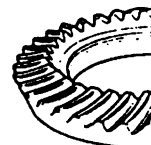


U5U31442

HEEL CONTACT



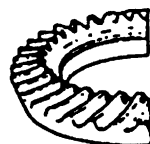
FACE CONTACT



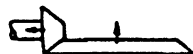
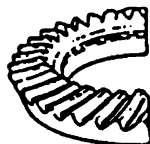
U5U31443

- ① Inspect the toe and flank contact by replacing the spacer with a thinner one to move the drive pinion outward.
- ② Inspect the heel and face contact by replacing the spacer with a thicker one to bring the drive pinion in.

TOE CONTACT



FLANK CONTACT



U5U31445

03-15 PROPELLER SHAFT

PROPELLER SHAFT

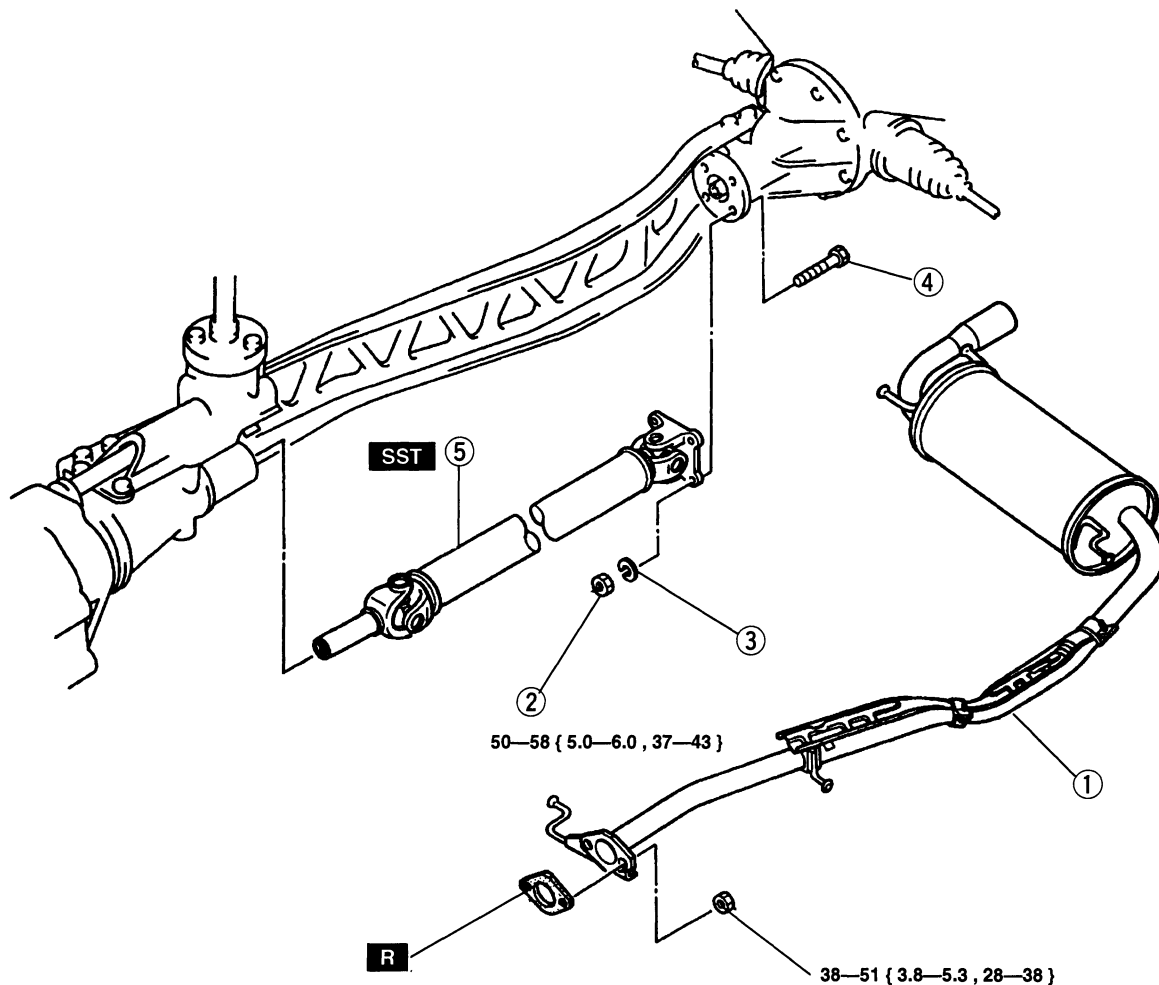
REMOVAL / INSTALLATION 03-15-1
 Propeller Shaft Removal Note 03-15-1

Propeller Shaft Installation Note 03-15-2
 PROPELLER SHAFT INSPECTION 03-15-2

PROPELLER SHAFT REMOVAL / INSTALLATION

U5U315AA

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



N-m { kgf-m , ft-lbf }

U5U31501

1	Exhaust pipe
2	Nut
3	Lock washer

4	Bolt
5	Propeller shaft
	☐ Removal Note
	☐ Installation Note

Propeller Shaft Removal Note

1. Before removing the propeller shaft, mark the flanges for correct installation.

2. Remove the propeller shaft from the extension housing, and immediately install the **SST** to prevent oil leakage.

PROPELLER SHAFT



U5U31502

Propeller Shaft Installation Note

1. Align the marks, and install the propeller shaft.

Tightening torque

50—58 N·m { 5.0—6.0 kgf·m , 37—43 ft·lbf }

2. Verify that there is no abnormal noise or vibration when driving the vehicle. If noise or vibration comes from the propeller shaft, replace the propeller shaft.

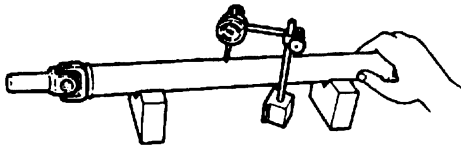
PROPELLER SHAFT INSPECTION

U5U315AB

Caution

- Cleaning sealed bearings with cleaning fluids or a steam cleaner can wash the grease out of the bearing.

1. Clean the propeller shaft (except for the universal joint) with a steam cleaner or solvent.
2. Measure the propeller shaft runout by using a dial indicator. Replace the propeller shaft if runout is excessive.

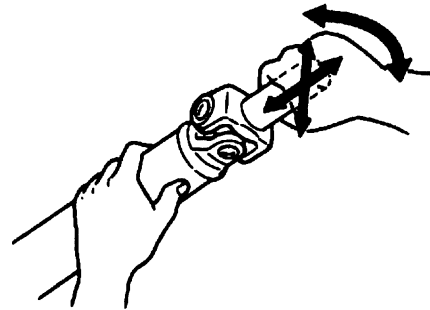


U5U31504

Maximum runout

0.4 mm { 0.016 in }

3. Move the universal joints in the directions shown, and check for universal joint looseness. If there is looseness, replace the propeller shaft.



U5U31505

4. Check operation of the universal joint. If the universal joint has excessive resistance, replace the propeller shaft.

03-50 TECHNICAL DATA

03 DRIVELINE/AXLE 03-50-1

03 DRIVELINE/AXLE

U5U350AA

Item		Specification
FRONT AXLE		
Bearing type		Angular ball bearing
Maximum wheel bearing play	(mm { in })	0.05 { 0.002 }
REAR AXLE		
Bearing type		Angular ball bearing
Maximum wheel bearing play	(mm { in })	0.05 { 0.002 }
DIFFERENTIAL		
Type		Standard or "TORSEN"* TYPE B LSD
Reduction gear		Hypoid gear
Reduction ratio		4.100 (AT), 4.300 (MT)
Differential gear		Straight-bevel gear
Ring gear size	(mm { in })	182.88 { 7.20 }
Oil	Grade	API service GL-4, GL-5
	Viscosity	Above - 18 °C { 0 °F } : SAE 90 Below - 18 °C { 0 °F } : SAE 80
	Capacity (L { US qt , Imp qt })	1.00 { 1.06 , 0.88 }
DRIVE SHAFT		
Type		Constant velocity (double offset) joint
Length	(mm { in })	767.6 { 30.220 }
PROPELLER SHAFT		
Length	(mm { in })	1,001 { 39.41 }
Length (between joint)	(mm { in })	816 { 32.1 }
Outer diameter	(mm { in })	60.5 { 2.38 }

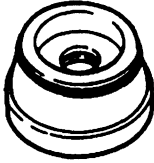
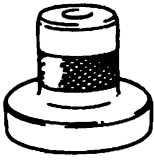
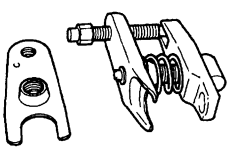
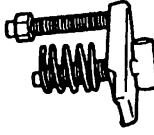
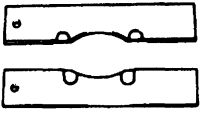
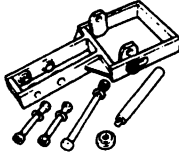
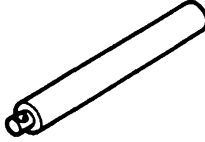
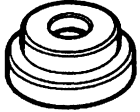
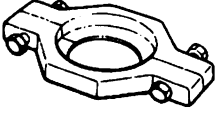
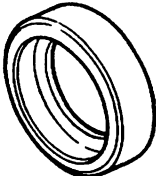
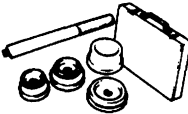
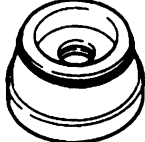
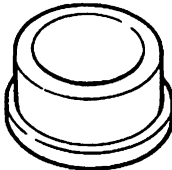
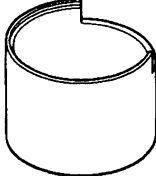
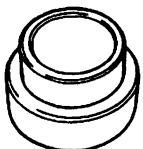
* : "TORSEN" is a registered trademark of ZEXEL.

03-60 SERVICE TOOLS

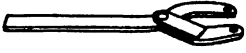
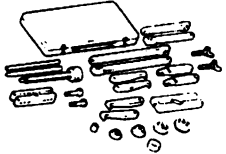
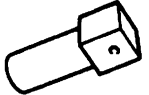
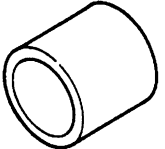
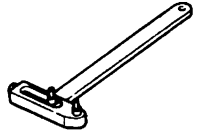
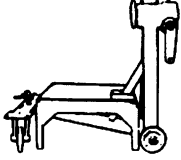
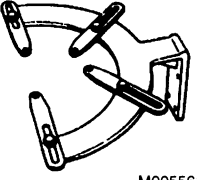
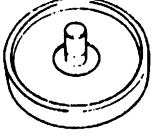
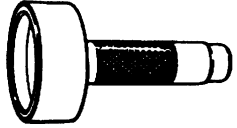
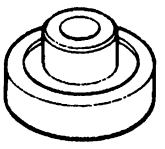
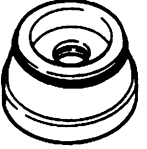
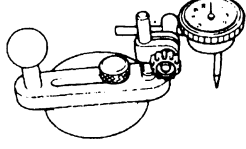
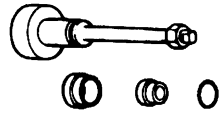
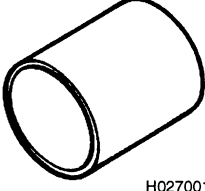
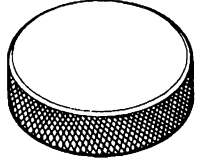
03 DRIVELINE/AXLE SST 03-60-1

03 DRIVELINE/AXLE SST

U5U360AA

49 F027 007 Attachment φ72  F027007X	49 V001 795 Installer, oil seal  V001795X	49 T028 3A0 Puller set, ball joint  T0283A0X
49 T028 303 Body (Part of 49 T028 3A0)  T028303X	49 T028 304 Attachment (Part of 49 T028 3A0)  T028304X	49 F026 103 Puller, wheel hub  F026103X
49 B026 1A0 Puller, wheel hub  B0261A0X	49 G033 102 Handle (Part of 49 B026 1A0)  G033102X	49 G030 727 Attachment A (Part of 49 B026 1A0)  G030727X
49 G030 795 Installer, oil seal  G030795X	49 G030 797 Handle (Part of 49 G030 795)  G030797X	49 0636 145 Puller, fan pulley boss  0636145X
49 G033 107 Installer, dust cover  G033107X	49 F027 0A1 Installer set, bearing  F0270A1X	49 F027 005 Attachment φ62 (Part of 49 F027 0A1)  F027005X
49 F027 009 Attachment φ68 & 77 (Part of 49 F027 0A1)  F027009X	49 B034 201 Support, block  B034201X	49 D017 2A1 Installer set, bearing  D0172A1X
49 F401 337A Attachment C (Part of 49 D017 2A1)  F401337A	49 F401 331 Body (Part of 49 D017 2A1)  F401331X	49 G030 338 Attachment E (Part of 49 D017 2A1)  G030338X

SERVICE TOOLS

49 S120 710 Holder, coupling flange  S120710X	49 0839 425C Puller set, bearing  0839425C	49 0259 440 Holder, main shaft  0259440X
49 U027 003 Installer, oil seal  U027003X	49 0259 720 Wrench, differential side bearing adjusting nut  0259720X	49 0107 680A Engine stand  0107680A
49 M005 561 Hanger, differential carrier  M005561X	49 N034 213 Installer, rubber bushing  N034213X	49 B001 795 Installer, oil seal  B001795X
49 F027 004 Attachment φ80  F027004X	49 F027 005 Attachment φ62 (Part of 49 F027 0A1)  F027005X	49 F027 0A0 Gauge set, pinion height adjustment  F0270A0X
49 0727 570 Gauge body, pinion height (Part of 49 F027 0A0)  0727570X	49 8531 565 Pinion model  8531565X	49 8531 567 Collar A (Part of 49 8531 565)  8531567X
49 H027 001 Collar  H027001X	49 0305 555 Gauge block  0305555X	—

BRAKES

04 SECTION

04

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SYSTEM	04-11	SERVICE TOOLS	04-60

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DIAGNOSTIC FUNCTION	04-01-2	Diagnostic Index	04-01-6
Diagnostic Trouble Code Inspection ..	04-01-2	Symptom Troubleshooting	04-01-7
Post Repair Procedures	04-01-3		

FOREWORD

U5U401AC

- Refer to 00-00 GENERAL INFORMATION, Troubleshooting Procedure and Procedures For Use and thoroughly read and understand the basic flow of troubleshooting in order to properly perform the procedures.

TROUBLESHOOTING NOTES

U5U401AD

The ABS is composed of electrical components, mechanical components (ABS hydraulic unit), and the components of the standard system.

Fundamentally, malfunction of the ABS electrical or mechanical components is judged by the on-board diagnostic function within the ABS control module. Malfunctions are indicated by the warning light in the instrument panel. The technicians can locate a malfunction by switching the system to the diagnostic test mode. The on-board diagnostic system must be used when diagnosing the ABS.

PRECAUTION

U5U401AE

Cautions That Are Not Malfunctions

1. Vibrations can sometimes be felt in the steering wheel, body, and/or brake pedal when the ABS is functioning; such vibrations are simply an indication that the ABS is functioning.

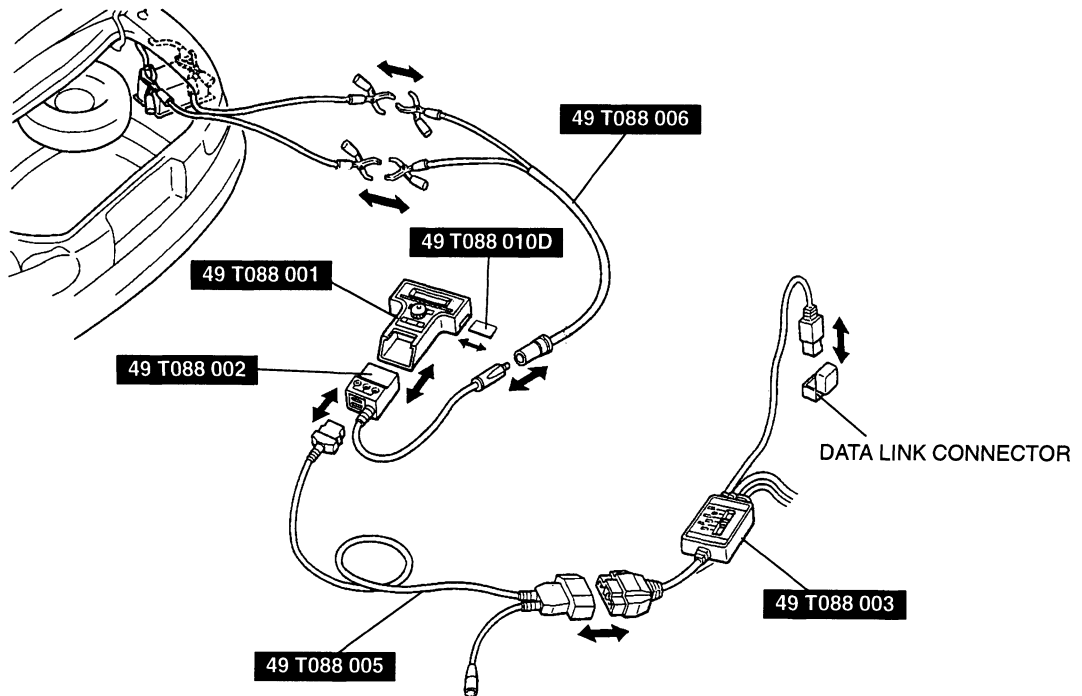
TROUBLESHOOTING

2. When (while the vehicle is jacked up, stuck, or on a chassis roller) the rear wheels only are spun for **20 seconds** or more, the ABS warning light may illuminate. In this condition, the warning light will not illuminate a second time when ignition switch is turned OFF then back ON. However, diagnostic trouble code 12 (front left wheel-speed sensor) may be memorized as a past failure. If this occurs, perform the following procedures.
 - (1) Activate the on-board diagnostic system and check for diagnostic trouble codes.
 - (2) If code 12 only is memorized, erase it. If code 12 and other codes are memorized, check for the causes by referring to the applicable diagnostic chart for the other codes.
3. When battery voltage is insufficient, the warning light will illuminate and the ABS will not work. In this condition, at the moment battery voltage increases to the specified level, the warning light will go off and the system will return to normal control. There will also be no diagnostic trouble code entries made to the control module memory.
4. The ABS warning light may illuminate under any of the following conditions:
 - When the vehicle is traveling on snow or ice with the parking brake activated or a brake dragging at one side.
 - When different size tires are used.
 - When tires of different gripping performance are used.

ANTILOCK BRAKE SYSTEM ON-BOARD DIAGNOSTIC FUNCTION

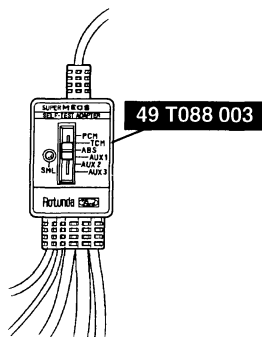
U5U401AB

Diagnostic Trouble Code Inspection Inspection using NGS

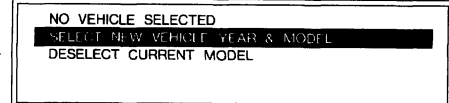
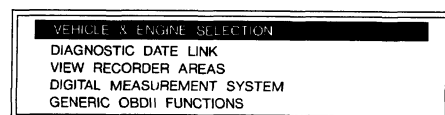


U5U40101

1. Connect the **SST** (NGS) to the data link connector and battery.
2. Set the **SST** (Cable for 17 Pin) to ABS.
3. Select "VEHICLE & ENGINE SELECTION" on the **SST** (Hand-held Control Unit) display, and then select the vehicle model, engine type, and model year.

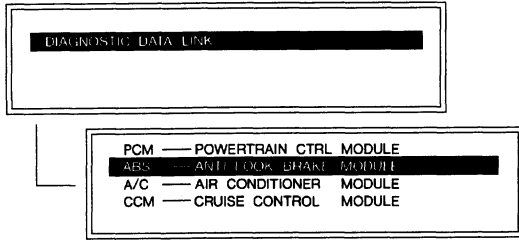


U5U40102



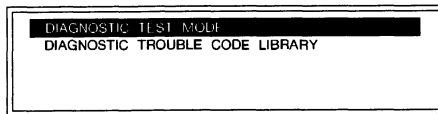
U5U40103

4. Select "DIAGNOSTIC DATA LINK" on the **SST** (Control Unit) display.
5. Select "ANTI LOCK BRAKE MODULE" on the **SST** (Control Unit) display.



U5U40104

6. Select "DIAGNOSTIC TEST MODE" on the **SST** (Control Unit) display.
7. If a diagnostic trouble code is displayed, refer to the Diagnostic trouble code table and inspect the appropriate system area.
8. If "NO CODES RECEIVED" is displayed, the system areas shown in the diagnostic trouble code table are okay. Inspect another system area.



U5U40105

Post Repair Procedures

Memory cancel

The ABS control module has a nonvolatile memory. Diagnostic trouble codes are not erased if the battery is disconnected. The memory should be cleared when servicing is finished.

Diagnostic trouble codes memorized in the ABS control module are canceled by performing the following steps.

1. Connect the TBS terminal to GND at the data link connector.
2. Turn the ignition switch 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.)**.

Diagnostic trouble codes cannot be canceled if the following occur.

- (1) If intervals of depressing the brake pedal exceed **one second (1 sec.)**
- (2) Brake switch has failed

Note

- While performing the memory cancel operation, the ABS warning light is not illuminated. When the memory cancel operation is completed, the ABS warning light comes on for **2—3 seconds**, then goes off. After the memory is canceled, the ABS control module performs on-board diagnosis.

04

Diagnostic Trouble Code Table

DTC	Display on the NGS	Possible cause
05	BRAKE SW, MONITOR LINE—OPEN OR SHORT	Harness between brake switch to ABS CM
11	WSS, SR (RH-FRONT)—OPEN OR SHORT, DEFECT	Right front wheel-speed sensor/sensor rotor
12	WSS, SR (LH-FRONT)—OPEN OR SHORT, DEFECT	Left front wheel-speed sensor/sensor rotor
13	WSS, SR (RH-REAR)—OPEN OR SHORT, DEFECT	Right rear wheel-speed sensor/sensor rotor
14	WSS, SR (LH-REAR)—OPEN OR SHORT, DEFECT	Left rear wheel-speed sensor/sensor rotor
15	WSS—OPEN OR SHORT	Wheel-speed sensor/sensor rotor
22	AV SOLV (RH-FRONT)—OPEN OR SHORT	Right front solenoid valve (pressure retention)
23	EV SOLV (RH-FRONT)—OPEN OR SHORT	Right front solenoid valve (pressure reduction)
24	AV SOLV (LH-FRONT)—OPEN OR SHORT	Left front solenoid valve (pressure retention)
25	EV SOLV (LH-FRONT)—OPEN OR SHORT	Left front solenoid valve (pressure reduction)
26	AV SOLV (REAR)—OPEN OR SHORT	Rear solenoid valve (pressure retention)
27	EV SOLV (REAR)—OPEN OR SHORT	Rear solenoid valve (pressure reduction)
51	FAIL SAFE RELAY—OPEN OR SHORT, DEFECT	Valve relay
53	MOTOR, MOTOR RELAY—OPEN OR SHORT, DEFECT	Motor relay Motor
61	ABS CONTROL UNIT—DEFECT	ABS control module

TROUBLESHOOTING

Diagnostic Trouble Code Troubleshooting

Caution

- When attaching the tester lead to the terminal of the ABS CM harness connector, the SST must be used. (Refer to 04-13 ABS HARNESS AND INPUT SIGNAL INSPECTION.)

DTC 05		Brake switch	
DETECTION CONDITION	When open circuit detected in following harnesses - Brake switch — ABS CM - ABS CM — brake light		
POSSIBLE CAUSE	Malfunction of related wiring harness		
STEP	INSPECTION		ACTION
1	Inspect harness between brake light and ABS CM. Open circuit Is harness normal?	Yes	Go to next step
		No	Repair harness
2	Erase diagnostic trouble code, and recheck for diagnostic trouble codes. Is diagnostic trouble code 05 obtained?	Yes	Replace ABS CM
		No	There was a temporarily poor contact in wiring harness or connector

DTC 11—14		ABS wheel-speed sensor (11: Right front 12: Left front 13: Right rear 14: Left rear)	
DETECTION CONDITION		When open circuit or short detected When speed signal is out of specification	
POSSIBLE CAUSE		- Malfunction of ABS wheel-speed sensor, sensor rotor, or ABS hydraulic unit - Malfunction of related wiring harness	
STEP	INSPECTION		ACTION
1	Is ABS CM connector connected properly?	Yes	Go to next step
		No	Correct as necessary
2	Is wiring harness between ABS CM and wheel-speed sensor OK?	Yes	Go to next step
		No	Correct as necessary
3	Is ABS wheel-speed sensor OK?	Yes	Go to next step
		No	Replace ABS wheel-speed sensor
4	Are there missing or damaged teeth on sensor rotor?	Yes	Replace sensor rotor
		No	Go to next step
5	Is brake line OK?	Yes	Go to next step
		No	Replace brake line
6	Is ABS hydraulic unit OK?	Yes	Go to next step
		No	Replace ABS hydraulic unit
7	Erase diagnostic trouble code, and recheck for diagnostic trouble codes after driving over 10 km/h { 6.2 mph }. Are diagnostic trouble codes 11—14 obtained?	Yes	Replace ABS CM
		No	There was a temporarily poor contact in wiring harness or connector

DTC 15		ABS wheel-speed sensor	
DETECTION CONDITION	When open circuit or short detected Wheel speed signal is out of specification		
POSSIBLE CAUSE	● Malfunction of ABS wheel-speed sensor, sensor rotor, or ABS hydraulic unit ● Malfunction of related wiring harness		
STEP	INSPECTION		ACTION
1	Refer to above chart for each of the four wheel-speed sensors.		

TROUBLESHOOTING

DTC 22—27		Solenoid valve (22: Right front AV 23: Right front EV 24: Left front AV 25: Left front EV 26: Rear AV 27: Rear EV)	
DETECTION CONDITION	Solenoid monitor signal does not track in response to solenoid ON/OFF command		
POSSIBLE CAUSE	● Malfunction of solenoid valve ● Malfunction of related wiring harness		
STEP	INSPECTION		ACTION
1	Is ABS CM connector connected properly?	Yes	Go to next step
		No	Correct as necessary
2	Inspect solenoid valve including valve relay. Is it OK?	Yes	Go to step 5
		No	Go to next step
3	Is solenoid valve OK?	Yes	Go to next step
		No	Replace ABS hydraulic unit
4	Is harness between solenoid valve and ABS CM OK?	Yes	Go to next step
		No	Repair harness
5	Erase diagnostic trouble code, and recheck for diagnostic trouble codes. Are diagnostic trouble codes 22—27 obtained?	Yes	Replace ABS CM
		No	There was a temporarily poor contact in wiring harness or connector

04

DTC 51		Valve relay	
DETECTION CONDITION		Four or more valve systems are detected to be faulty among six systems	
POSSIBLE CAUSE		• Malfunction of valve relay • Malfunction of related wiring harness	
STEP	INSPECTION		ACTION
1	Is BTN fuse (40 A) OK?	Yes	Go to next step
		No	Replace fuse
2	Inspect valve relay including harness. Is it OK?	Yes	Go to step 4
		No	Go to next step
3	Is valve relay OK?	Yes	Go to next step
		No	Replace valve relay
4	Erase diagnostic trouble code, and recheck for diagnostic trouble codes. Is diagnostic trouble code 51 obtained?	Yes	Replace ABS CM
		No	There was a temporarily poor contact in wiring harness or connector

TROUBLESHOOTING

DTC 53		ABS motor, motor relay	
DETECTION CONDITION		Motor monitor signal does not track in response to motor relay ON/OFF command	
POSSIBLE CAUSE		• Malfunction of ABS motor or motor relay • Malfunction of related wiring harness	
STEP	INSPECTION		ACTION
1	With IG SW OFF, is motor operating?	Yes	Replace motor relay
		No	Go to next step
2	Is ABS fuse (30 A) OK?	Yes	Go to next step
		No	Replace fuse
3	Inspect motor relay including harness. Is it OK?	Yes	Go to step 7
		No	Go to next step
4	Is motor relay OK?	Yes	Go to next step
		No	Replace motor relay
5	Inspect ABS motor, including harness. Is it OK?	Yes	Go to step 7
		No	Go to next step
6	Is ABS motor OK?	Yes	Correct harness as necessary
		No	Replace ABS hydraulic unit
7	Erase diagnostic trouble code, and recheck for diagnostic trouble codes. Is diagnostic trouble code 53 obtained?	Yes	Replace ABS CM
		No	There was a temporarily poor contact in wiring harness or connector

DTC 61		ABS control module	
DETECTION CONDITION		The on-board diagnostic program detects a malfunction	
POSSIBLE CAUSE		• Malfunction of ABS control module	
STEP	INSPECTION		ACTION
1	Erase diagnostic trouble code, and recheck for diagnostic trouble code. Is diagnostic trouble code 61 obtained?	Yes	Replace ABS CM
		No	There was a temporarily poor contact in wiring harness or connector

ANTILOCK BRAKE SYSTEM SYMPTOM TROUBLESHOOTING

U5U401AA

Diagnostic Index

- Use the chart below to verify the symptoms of the trouble in order to diagnose the appropriate area.

No.	TROUBLESHOOTING ITEMS	DESCRIPTION
1	ABS warning light not illuminated when IG SW turned ON	—
2	ABS warning light remains ON	—
3	ABS warning light flashes with vehicle stopped	ABS warning light goes off when vehicle started
4	ABS warning light illuminates during driving till IG SW turned OFF	If IG SW turned ON again, ABS warning light goes off after a few seconds illumination
5	ABS warning light illuminates/goes off with vehicle stopped and during driving	—
6	ABS warning light indicates normal, however ABS does not operates correctly	—

TROUBLESHOOTING

Symptom Troubleshooting

1	ABS WARNING LIGHT NOT ILLUMINATED WHEN IGNITION SWITCH TURNED ON		
TROUBLESHOOTING HINTS - Malfunction of meter - Failed warning light or open in related wiring harness			
STEP	INSPECTION		ACTION
1	With IG ON, do other indicators illuminate?	Yes	Check if failure(s) is memorized Note and check it later if necessary Go to next step
		No	Inspect meter
2	Disconnect ABS CM connector. Turn IG SW ON. Does ABS warning light illuminate?	Yes	Go to next step
		No	Go to step 5
3	Connect ABS CM connector. Turn IG SW ON. Does ABS warning light illuminate?	Yes	There was a temporarily poor contact in wiring harness or connector
		No	Go to next step
4	Is terminal AD of harness connector deformed?	Yes	Replace harness connector
		No	Replace ABS CM
5	With ABS CM connector disconnected, ground terminal AD of harness connector Does ABS warning light illuminate?	Yes	Go to next step
		No	Go to step 7
6	With ABS CM connector disconnected, is there continuity between following terminals: AB-body GND, AC-body GND, AM-body GND	Yes	Replace harness connector
		No	Repair harness
7	Is ABS warning light bulb burnt?	Yes	Replace bulb
		No	Go to next step
8	Is there continuity between AD of harness connector and 1K (C-01 connector) of meter?	Yes	Inspect meter
		No	Repair harness

04

Note

- If the above symptom has appeared in the past and it is normal at present, the possible cause is a temporarily poor contact in the wiring harness or connector. The ABS CM is normal.

2	ABS WARNING LIGHT REMAINS ON		
TROUBLESHOOTING HINTS • Low battery voltage at ABS CM • Malfunction of ABS warning light harness (short to ground) • Malfunction of meter • ABS CM detects a failure			
STEP	INSPECTION		ACTION
1	Is battery positive voltage as specified?	Yes	Check if failure(s) is memorized and note it if necessary Go to next step
		No	Charge or replace if necessary
2	Verify that ABS CM connector is correctly connected. Turn IG SW ON. Does ABS warning light go off?	Yes	There was a temporarily poor contact in wiring harness or connector
		No	Go to next step
3	Disconnect ABS CM connector. Is voltage between following terminals of harness connector at B+? A (voltage supply)–AM (GND), A–AB (GND), A–AC (GND)	Yes	Go to next step
		No	Repair voltage supply harness
4	Are there any codes in step 1?	Yes	Follow diagnostic trouble code troubleshooting
		No	Go to next step

TROUBLESHOOTING

STEP	INSPECTION		ACTION
5	Disconnect ABS CM connector. Connect the SST (49 F066 022) and turn IG SW ON. Does ABS warning light go off?	Yes	Replace ABS CM
		No	Repair short of ABS warning light drive harness or meter

Note

- If the voltage between terminal A (voltage supply) and GND at ABS CM is below approx. 10 V, the ABS warning light will illuminate.

3	ABS WARNING LIGHT FLASHES WITH VEHICLE STOPPED		
TROUBLESHOOTING HINTS			
- Terminal TBS at data link connector grounded - Low battery voltage at ABS CM			
STEP	INSPECTION		ACTION
1	Is battery voltage as specified?	Yes	Go to next step
		No	Charge or replace if necessary
2	Is there jumper wire between TBS and GND at data link connector?	Yes	Remove jumper wire
		No	Go to next step
3	Disconnect ABS CM connector. Is there continuity between terminal P of harness connector and GND?	Yes	Repair TBS harness
		No	Replace ABS CM

4	ABS WARNING LIGHT ILLUMINATES DURING DRIVING TILL IG SW TURNED OFF		
TROUBLESHOOTING HINTS			
STEP	INSPECTION		ACTION
1	Activate OBD system and check for DTC. Are there any?	Yes	Read DTC and follow diagnostic trouble code trouble-shooting
		No	Go to next step
2	Verify that ABS CM connector is correctly connected. Drive vehicle and recheck for symptom. Does it remain?	Yes	Replace ABS CM
		No	There was a temporarily poor contact in wiring harness or connector

5	ABS WARNING LIGHT ILLUMINATES/GOES OFF WITH VEHICLE STOPPED AND DURING DRIVING		
TROUBLESHOOTING HINTS • Low battery voltage at ABS CM • Malfunction of ground harness • Malfunction of ABS warning light harness (short to ground) • Malfunction of meter			
STEP	INSPECTION		ACTION
1	Check if failure(s) is memorized. Note and check it later if necessary. Disconnect ABS CM connector. Turn IG SW ON. Does ABS warning light illuminate?	Yes	Go to next step
		No	Repair ABS warning light harness or meter
2	Disconnect ABS CM connector. Is voltage between following terminals of harness connector at B+? A (voltage supply)–AM (GND), A–AB (GND), A–AC (GND)	Yes	Go to next step
		No	Repair voltage supply or ground harness
3	Connect ABS CM connector. Drive vehicle and recheck for symptom. Does it remain?	Yes	Replace ABS CM
		No	There was a temporarily poor contact in wiring harness or connector

TROUBLESHOOTING

6	ABS WARNING LIGHT INDICATES NORMAL, HOWEVER, ABS DOES NOT OPERATE CORRECTLY		
TROUBLESHOOTING HINTS			
● Malfunction of mechanical system			
STEP	INSPECTION		ACTION
1	Activate OBD system and check for DTC. Are there any?	Yes	Read DTC and follow diagnostic trouble code trouble-shooting
		No	Inspect mechanical system

04-10 GENERAL PROCEDURES

PRECAUTION (BRAKES) 04-10-1

PRECAUTION (BRAKES)

U5U410AA

Wheel and tires removal / installation

- The removal and installation procedures for the wheels and tires are not mentioned in this section. If you must remove a wheel, 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.**
- 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.
- If a brake line(s) has been disconnected anytime during the procedure, add brake fluid, bleed the brakes, and inspect for leakage after the procedure has been completed.

Connectors disconnection

- 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.

ABS component operations

- Make sure that there are no diagnostic trouble codes in the ABS memory after working on ABS components. If there are any codes in the memory, erase them.

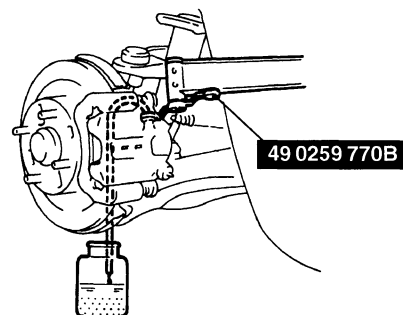
04-11 CONVENTIONAL BRAKE SYSTEM

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PROPORTIONING BYPASS VALVE			
INSPECTION	04-11-12		

AIR BLEEDING

The brake system 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 container.
4. One person should depress the brake pedal a few times, and then hold it in the depressed position.
5. A second person should loosen the bleeder screw, drain out the fluid, and close the screw by using the **SST**.



U5U411AA

U5U41101

6. Repeat steps 4 and 5 until only clean fluid is seen. The reservoir should be kept about 3/4 full during bleeding to prevent air from reentering the lines.
7. Modify the brake pipe tightening torque to allow for a torque wrench-**SST** combination. (Refer to 00-00 FUNDAMENTAL PROCEDURES, Torque Formulas.)
8. Tighten the brake pipe by using the **SST**.
9. Check for correct brake operation.
10. Verify that there is no fluid leakage. Clean away any spilled fluid with rags.
11. After bleeding the air, add brake fluid to the reservoir up to the specified level.

CONVENTIONAL BRAKE SYSTEM

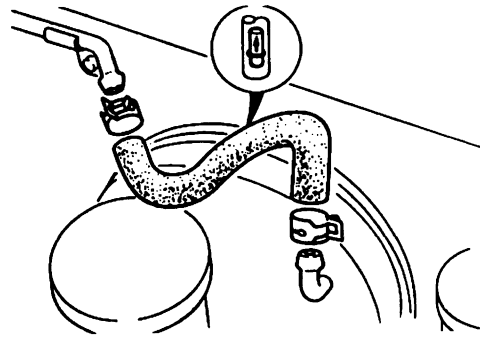
VACUUM LINE INSPECTION

U5U411AB

Note

- There is an arrow on the hose to indicate the direction of hose installation.

- Disconnect both ends of the vacuum hose.
- Apply suction and pressure to the hose from the engine side. Verify that air flows only toward the engine. If air passes in both directions or not at all, replace the vacuum hose (along with the check valve).



U5U41124

BRAKE PEDAL INSPECTION

U5U411AC

Brake Pedal Height Inspection

- Verify that the distance from the center of the upper surface of the pedal pad to the carpet is as specified.

Pedal height

171—181 mm { 6.73—7.13 in } (With carpet)

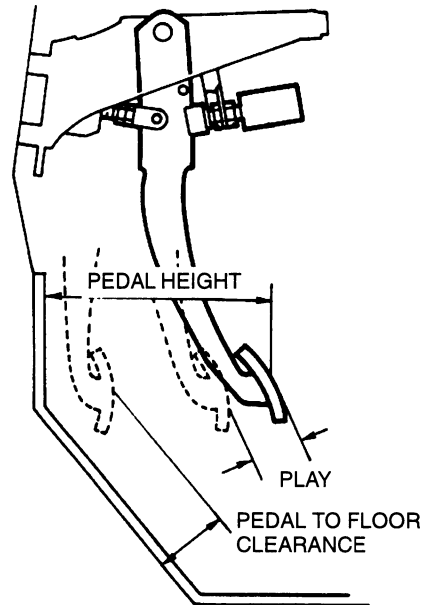
- If the distance is less than specified, inspect for air in the brake system.

Brake Pedal Play Inspection

- Depress the pedal a few times to eliminate the vacuum in the system.
- Lightly depress the pedal by hand until resistance is felt, and check the free play.

Free play

4—7 mm { 0.28 in }



U5U41102

Brake Pedal-To-Floor Clearance Inspection

- Verify that the distance from the floor panel to the center of the upper surface of the pedal pad is as specified when the pedal is depressed with a force of 589 N { 60 kgf , 132 lbf }.

Pedal-to-floor clearance

95 mm { 3.74 in } (Without carpet)

BRAKE PEDAL ADJUSTMENT

U5U411AD

Brake Pedal Height Adjustment

- Disconnect the brake switch connector.
- Loosen locknut B and turn switch A until it does not contact the pedal.
- Loosen locknuts D and turn rod C to adjust the height.
- Adjust the pedal free play and tighten operating rod locknuts D.

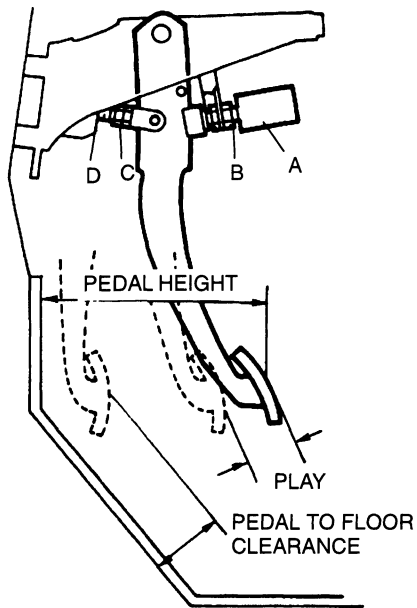
- Turn the brake switch until it contacts the pedal, then turn and additional 1/2 turn. Tighten the locknuts.

Tightening torque

14—18 N·m { 1.4—1.8 kgf·m , 11—13 ft·lbf }

- Connect the brake switch connector.
- Verify that the brake light operate correctly.

CONVENTIONAL BRAKE SYSTEM



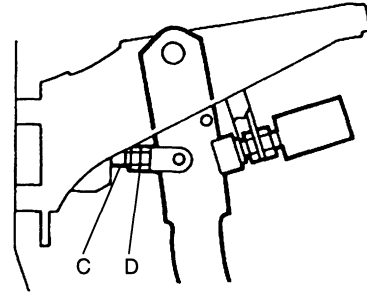
U5U41103

Brake Pedal Play Adjustment

1. Loosen locknuts D and turn rod C to adjust the free play.
2. Check the pedal height and verify that the brake switch operates correctly.

Tightening torque

24—34 N·m { 2.4—3.5 kgf·m , 17—25 ft·lbf }



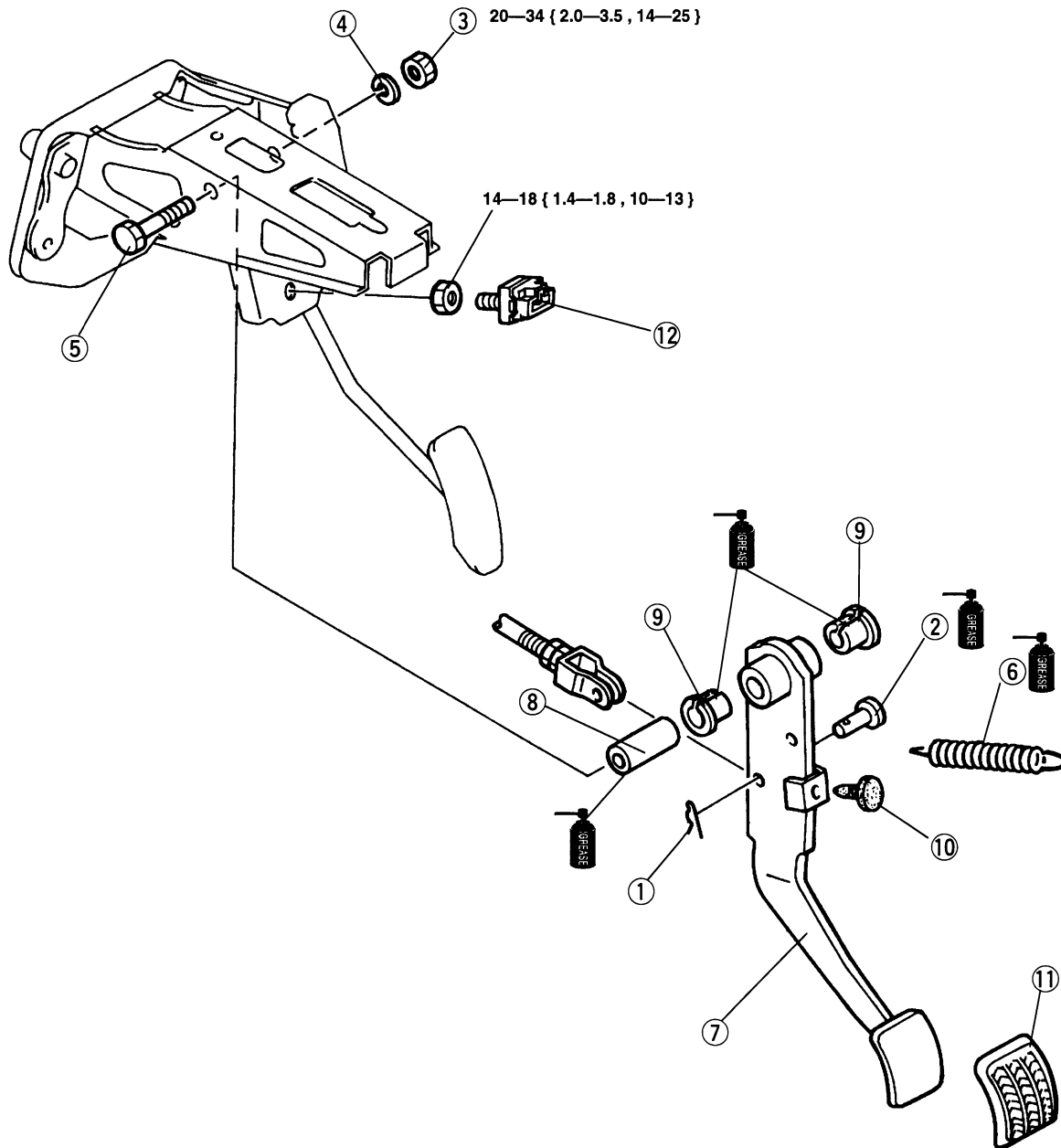
U5U41104

CONVENTIONAL BRAKE SYSTEM

BRAKE PEDAL REMOVAL / INSTALLATION

U5U411AE

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal indicated in the table.
3. After installation, check and adjust the pedal height and free play if necessary.



N·m { kgf·m , ft·lbf }

U5U41105

1	Spring clip
2	Clevis pin
3	Nut
4	Spring washer
5	Bolt
6	Return spring

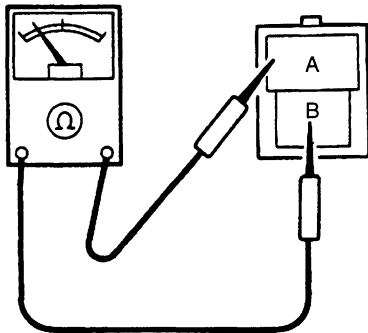
7	Brake pedal
8	Guide pipe
9	Bushing
10	Stopper
11	Pedal pad
12	Brake switch

CONVENTIONAL BRAKE SYSTEM

BRAKE SWITCH INSPECTION

U5U411AF

1. Disconnect the brake switch connector.
2. Connect an ohmmeter between the terminals A and B of the brake switch.
3. Confirm that there is continuity between the terminals when the brake pedal is depressed.
4. If not as specified, replace the brake switch.

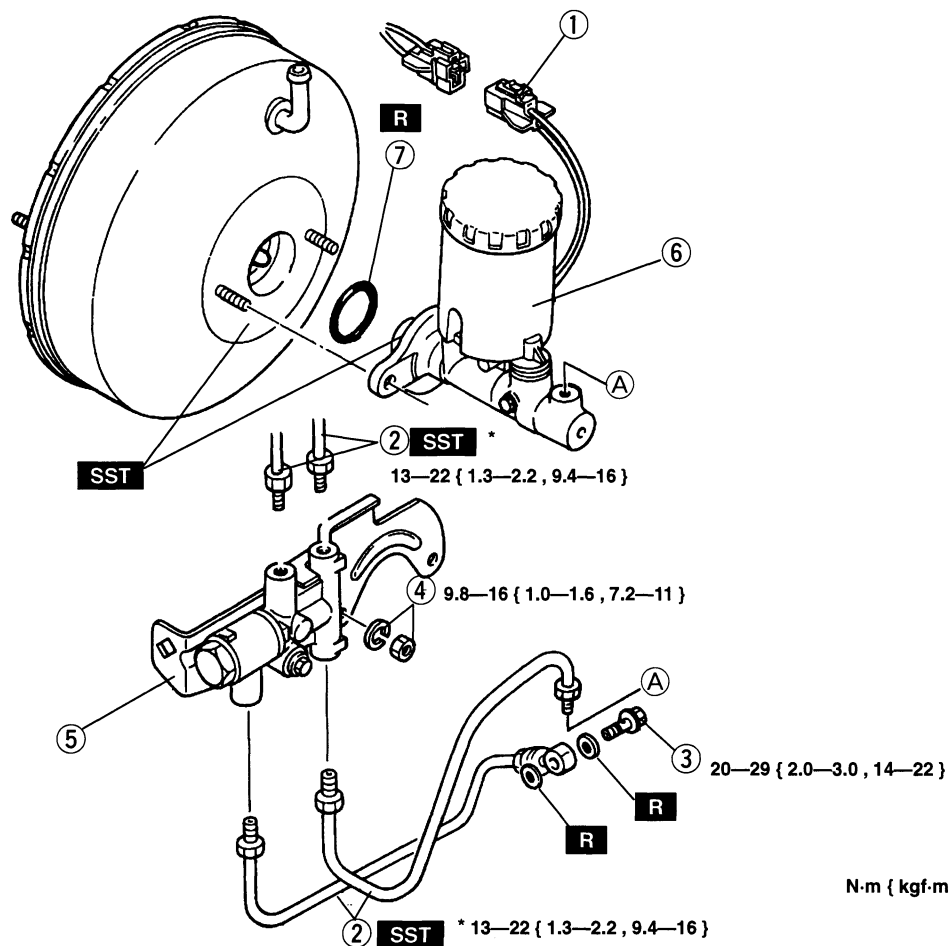


U5U41146

MASTER CYLINDER REMOVAL / INSTALLATION

U5U411AG

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



* 49 0259 770B

U5U41106

1	Fluid level sensor connector
2	Brake pipe
3	Connector bolt
4	Nut and washer

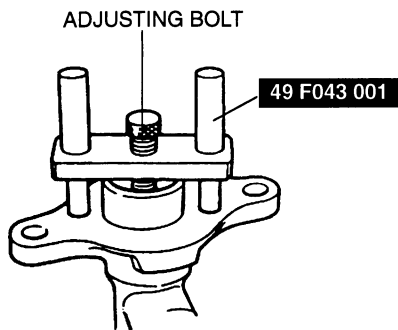
5	Proportioning bypass valve and bracket
6	Master cylinder Installation Note
7	O-ring (ABS model)

CONVENTIONAL BRAKE SYSTEM

Master Cylinder Installation Note

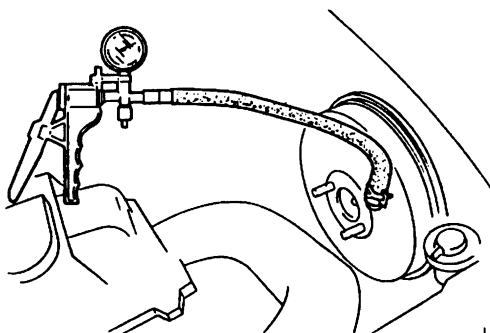
Non ABS model

1. Measure the clearance between the push rod of the power brake unit and the piston of the master cylinder.
- (1) Place the **SST** atop the master cylinder. Turn the adjusting bolt until it contacts the bottom of the piston.



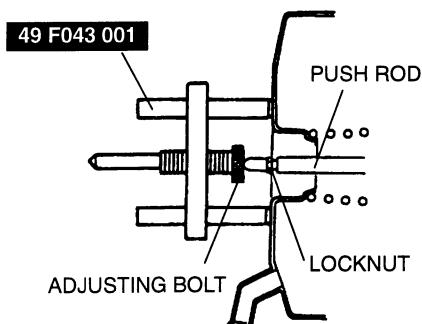
U5U41107

- (2) Apply a **66.7 kPa { 500 mmHg , 19.7 inHg }** vacuum to the power brake unit by using a vacuum pump.



U5U41108

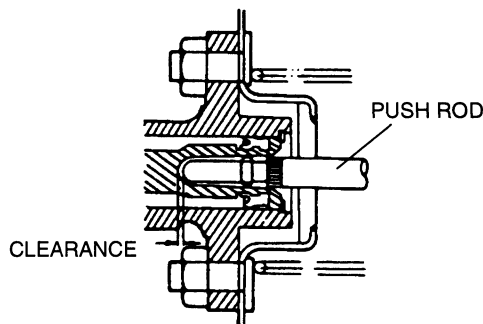
- (3) Invert the **SST** used in step 1, and place it on the power brake unit.
- (4) Measure the clearance between the end of the adjusting bolt and the push rod of the power brake unit. If it is not **0 mm { 0 in }**, loosen the push rod locknut and turn the push rod to make the adjustment.



U5U41109

2. By making the above adjustment, the clearance between the push rod and piston (after installation of the brake master cylinder and the power brake unit) will be as shown in the table below.

Condition	Clearance
When vacuum applied to unit is approx. 66.7 kPa { 500 mmHg , 19.7 inHg }	0.1—0.4 mm { 0.004—0.016 in }



U5U41110

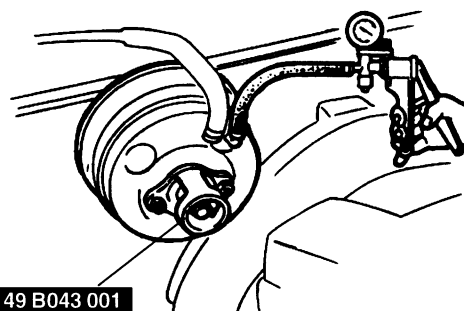
ABS model

1. Inspect the push rod clearance as follows.
 - (1) Turn the nut of the **SST** clockwise to fully retract the **SST** gauge rod. Attach the **SST** to the power brake unit.

Tightening torque

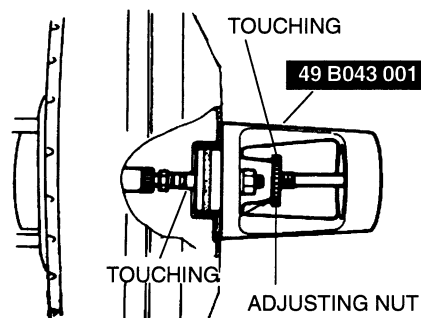
9.8—16 N·m { 1.0—1.6 kgf·m , 7.2—11 ft·lbf }

- (2) Apply a **66.7 kPa { 500 mmHg , 19.7 inHg }** vacuum by using a vacuum pump.



U5U41111

- (3) 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.



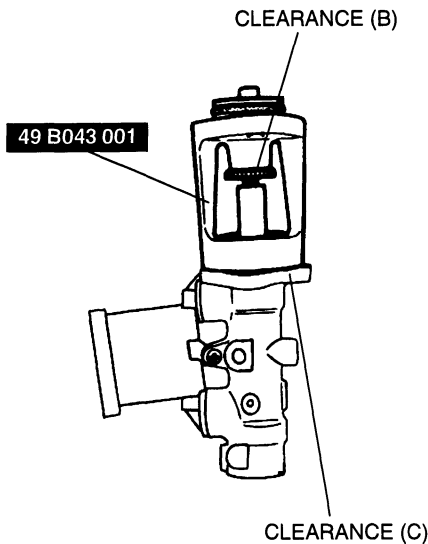
U5U41112

CONVENTIONAL BRAKE SYSTEM

- (4) 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.

Caution

- When pushing the **SST** gauge rod into the master cylinder piston, only use enough pressure to bottom the rod in the piston. If too much pressure is applied, a false reading will occur.
- (5) Push lightly on the end of the **SST** gauge rod to be sure it has contacted 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).



U5U41113

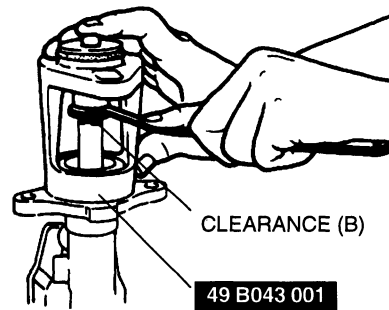
Measurement	Push rod
Clearance at (B)	Too short
Clearance at (C)	Too long
No clearance at (B) or (C)	OK

2. Adjust the push rod clearance at B.

Note

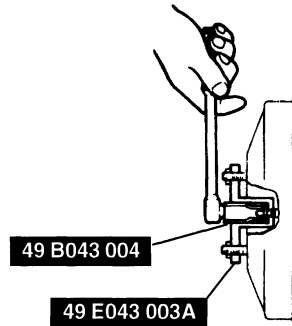
- The threads of the push rod are specially designed so that the bolt becomes harder to turn past a certain point. This is to prevent the bolt from coming loose. Turn the bolt only within this range when adjusting.

- (1) Push lightly on the end of the **SST** gauge rod, and measure the clearance between the adjusting nut and the **SST** body.



U5U41114

- (2) Using the **SST**, turn the nut to lengthen the power booster push rod an amount equal to the clearance measured at B.



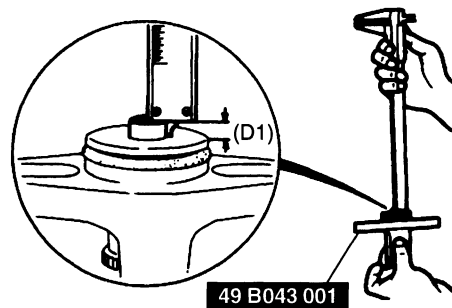
U5U41115

3. Adjust the push rod clearance at C.

Note

- The threads of the push rod are specially designed so that the bolt becomes harder to turn past a certain point. This is to prevent the bolt from coming loose. Turn the bolt only within this range when adjusting.

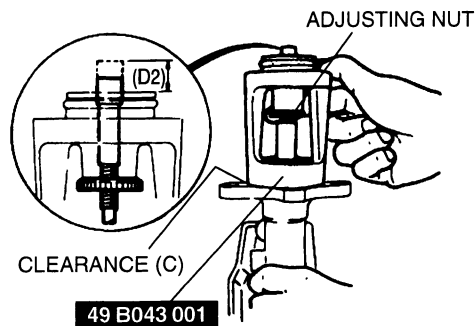
- (1) Measure and record height D1 of the gauge rod.



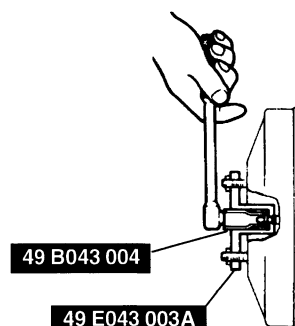
U5U41116

- (2) Turn the adjusting nut until the **SST** body sets squarely on the master cylinder. (Turn only enough for the body to touch.)
- (3) Measure and record height D2 of the gauge rod.

CONVENTIONAL BRAKE SYSTEM



U5U41117



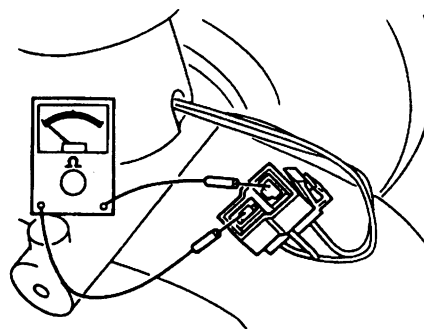
U5U41118

- (4) Subtract D1 from D2 and, by using the **SST**, turn the nut to shorten the power booster push rod an amount equal to the sum.

BRAKE FLUID LEVEL SENSOR INSPECTION

U5U411AH

1. Disconnect the sensor connector.
2. Connect an ohmmeter to the connector.
3. Starting with the fluid level above the MIN mark on the reservoir, verify that there is no continuity.
4. Remove the brake fluid and verify continuity when the level is below the MIN mark.
5. Replace the sensor if necessary.



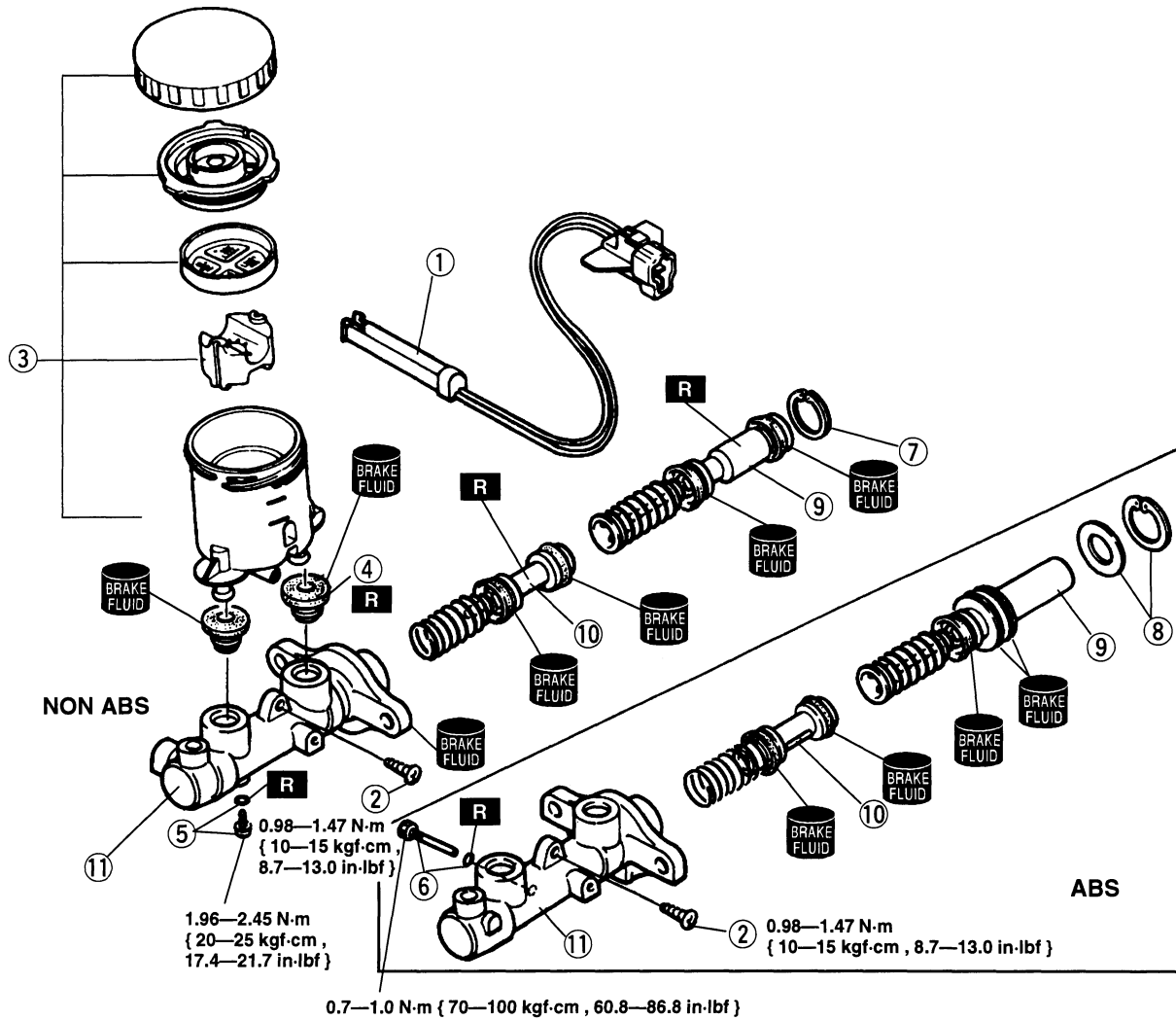
U5U41119

CONVENTIONAL BRAKE SYSTEM

MASTER CYLINDER DISASSEMBLY / ASSEMBLY

U5U411AJ

1. After removing the brake fluid, disassemble in the order indicated in the table.
2. Assemble in the reverse order of removal indicated in the table.



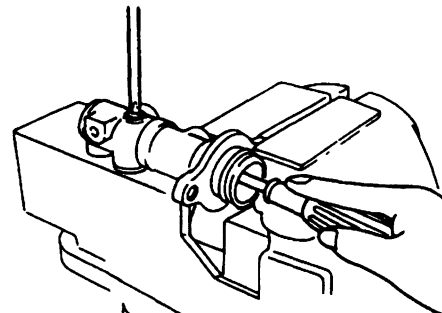
U5U41120

1	Fluid level sensor connector
2	Screw
3	Reservoir component
4	Bushings
5	Stop screw and O-ring (Non ABS model) ☞ Assembly Note
6	Stop pin and O-ring (ABS model) ☞ Assembly Note

7	Snap ring
8	Snap ring and spacer (ABS model)
9	Primary piston component
10	Secondary piston component
11	Master cylinder body

Stop Screw And O-Ring (Non ABS model) Assembly Note

1. Push the primary piston component in fully.
2. Install and tighten a new O-ring and the stop screw.
3. Push and release the piston to verify that it is held by the stop screw.

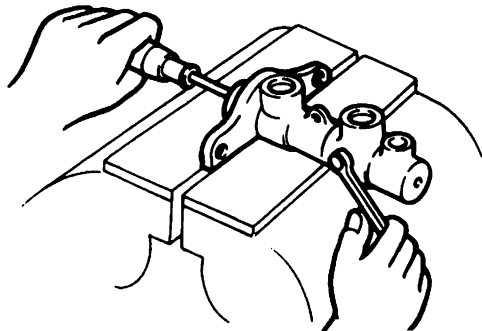


U5U41121

CONVENTIONAL BRAKE SYSTEM

Stop Pin And O-Ring (ABS model) Assembly Note

1. Install the secondary piston component with the piston hole facing the stop pin.
2. Install and tighten a new O-ring and the stop pin.
3. Push and release the piston to verify that it is held by the stop pin.



U5U41122

POWER BRAKE UNIT INSPECTION

Power Brake Unit Function Check (Simple Method)

Step 1

1. With the engine stopped, depress the pedal a few times.
2. With the pedal depressed, start the engine.
3. If immediately after the engine starts the pedal moves down slightly, the unit is operating.

Step 2

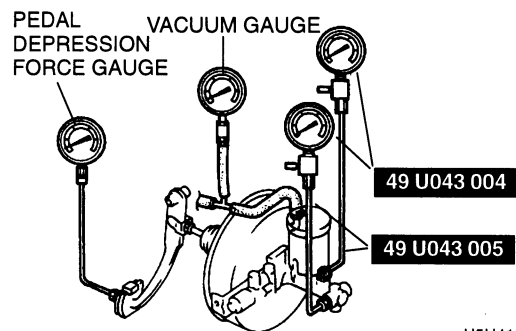
1. Start the engine and let it run **1 or 2 minutes**.
2. Stop the engine.
3. Depress the pedal with the usual force.
4. If the first pedal stroke is long and becomes shorter with subsequent strokes, the unit is operating.
5. If a problem is found, inspect for damage or improper connection of the check valve or vacuum hose. Repair if necessary and inspect it once again.

Step 3

1. Start the engine.
2. Depress the pedal with the usual force.
3. Stop the engine with the pedal depressed.
4. Hold the pedal down for about **30 seconds**.
5. If the pedal height does not change, the unit is operating.
6. If there is a problem, check for damage or improper connection of the check valve or vacuum hose. Repair if necessary and check once again.
7. If the nature of the problem is still not clear after following the 3 steps above, follow the more detailed check described in "Inspection using gauges," below.

Power Brake Unit Function Check (Inspection using gauges)

- Connect the **SST** gauges, a vacuum gauge, and a pedal depression gauge as shown. Bleed the air from the **SST** gauges before performing the following tests.



U5U411AK

U5U41123

Checking for vacuum loss (unloaded condition)

1. Start the engine.
2. Stop the engine when the vacuum gauge indicates **66.7 kPa { 500 mmHg , 19.7 inHg }**.
3. Observe the vacuum gauge for **15 seconds**. If the gauge indicates **63.4—66.6 kPa { 475—500 mmHg , 18.7—19.7 inHg }**, the unit is operating.

Checking for vacuum loss (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 indicates **66.7 kPa { 500 mmHg , 19.7 inHg }**.
4. Observe the vacuum gauge for **15 seconds**. If the gauge indicates **63.4—66.6 kPa { 475—500 mmHg , 18.7—19.7 inHg }**, the unit is operating.

Checking for hydraulic pressure

1. If with the engine stopped (**vacuum 0 kPa { 0 mmHg , 0 inHg }**) the fluid pressure is within specification, the unit is operating.

Pedal force	Fluid pressure
196 N { 20 kgf , 44 lbf }	1,079—1,177 kPa { 11—12 kgf/cm ² , 156—171 psi }

CONVENTIONAL BRAKE SYSTEM

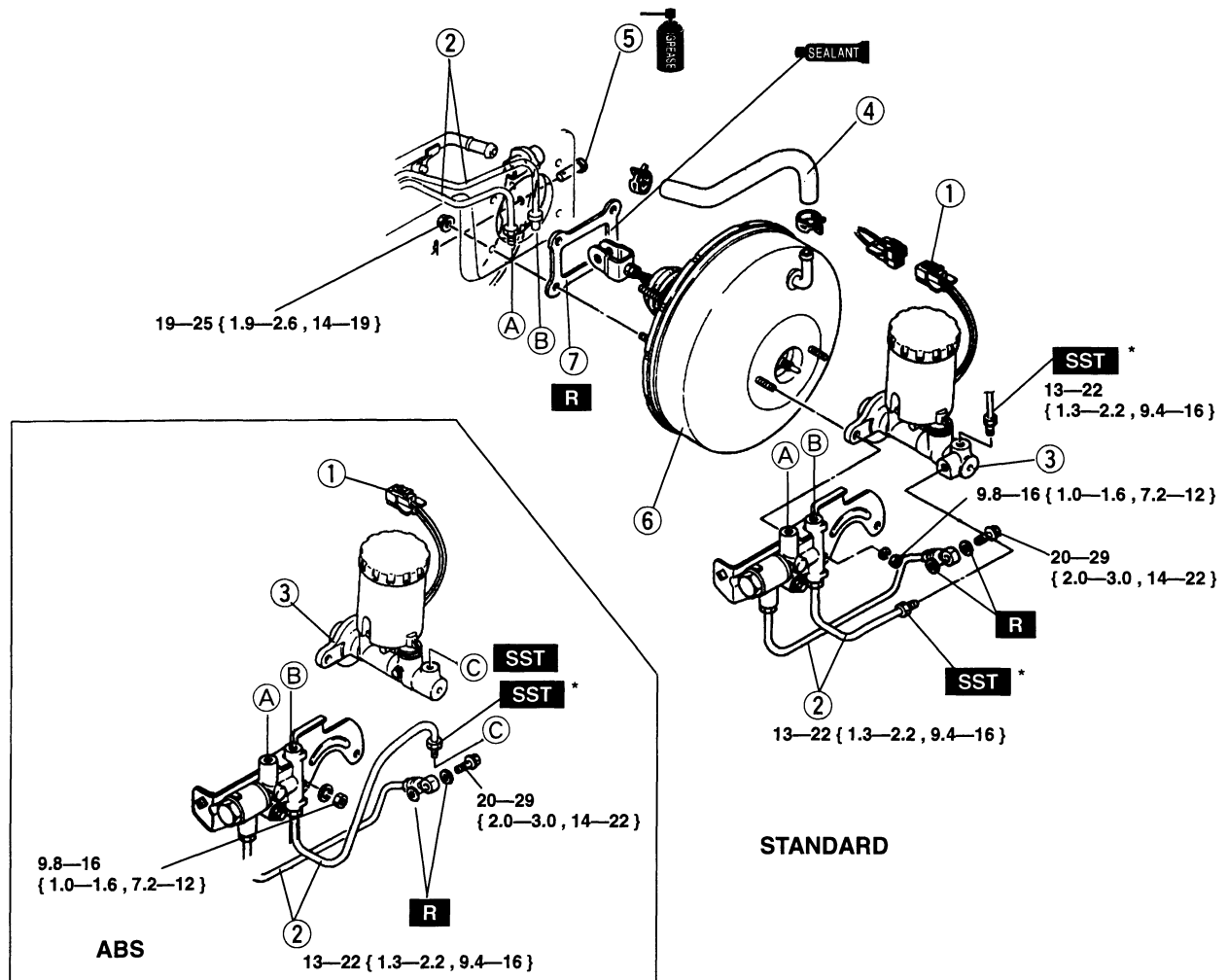
2. Start the engine. Depress the brake pedal when the vacuum reaches **66.7 kPa { 500 mmHg , 19.7 inHg }**. If the fluid pressure is within specification, the unit is operating.

Pedal force	Fluid pressure
196 N { 20 kgf , 44 lbf }	5,199—5,494 kPa { 53—56 kgf/cm ² , 754—796 psi }

POWER BRAKE UNIT REMOVAL / INSTALLATION

U5U411AL

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal indicated in the table.
3. Perform the following steps after installation:
 - (1) Check and adjust the brake pedal height and free play.
 - (2) Inspect the power brake unit function.
 - (3) Check that the vacuum hose does not contact other parts.



* 49 0259 770B

N·m { kgf·m , ft·lbf }

U5U41125

1	Fluid level sensor connector
2	Brake pipe and proportioning bypass valve
3	Master cylinder ☞ 04-11 MASTER CYLINDER REMOVAL / INSTALLATION

4	Vacuum hose with check valve
5	Clevis pin
6	Power brake unit
7	Gasket

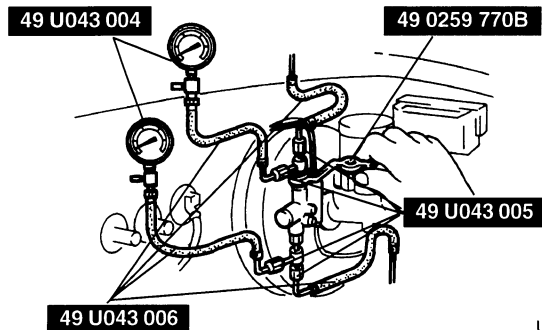
CONVENTIONAL BRAKE SYSTEM

PROPORTIONING BYPASS VALVE INSPECTION

U5U411AM

When disconnecting and connecting the brake pipes, do so by using the flare nut wrench **SST**.

1. Connect the **SSTs** and the adapters to the brake pipes as shown in the figure.

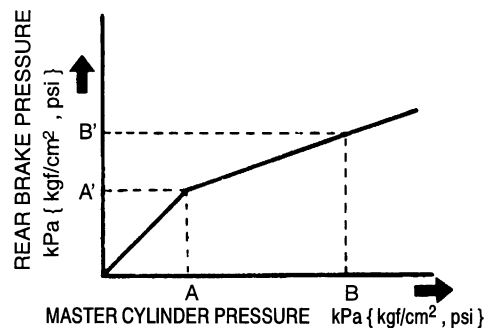


U5U41126

2. Bleed the air from the brake system.
3. Measure the fluid pressure from the master cylinder and to the rear brakes. If not as specified, replace the valve component.

Specification

Fluid pressure kPa { kgf/cm ² , psi }				
	A	A'	B	B'
NON ABS	2,943 { 30 , 427 }	2,943 { 30 , 427 } ± 294 { 3 , 43 }	5,884 { 60 , 850 }	4,120 { 42 , 597 } ± 392 { 4 , 57 }
ABS	3,923 { 40 , 569 }	3,923 { 40 , 569 } ± 294 { 3 , 43 }	5,884 { 60 , 850 }	4,707 { 48 , 683 } ± 392 { 4 , 57 }

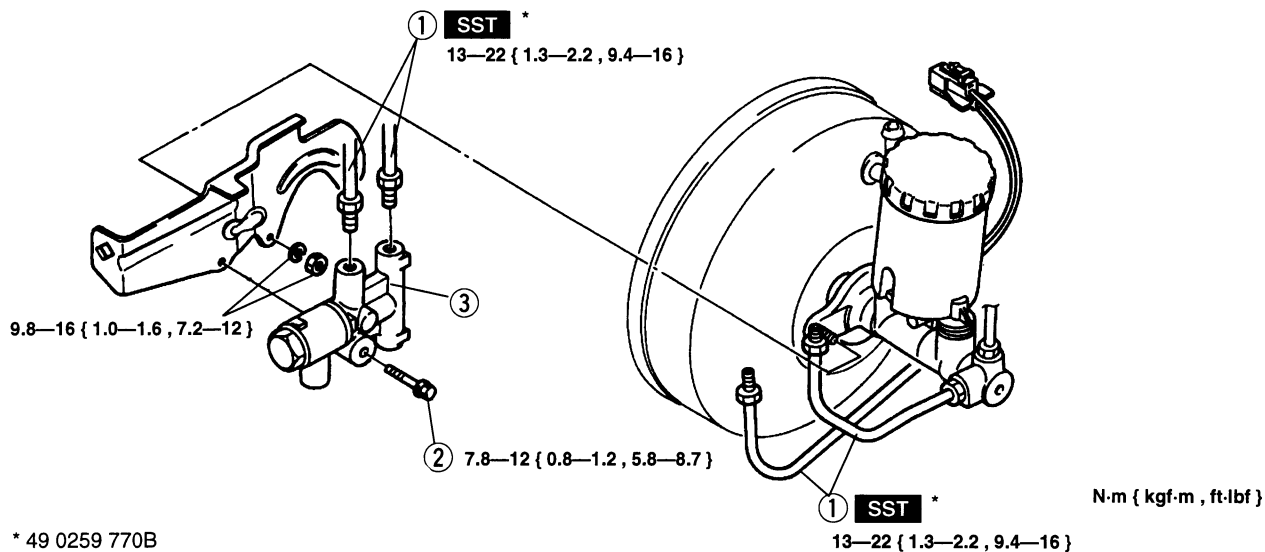


U5U41127

PROPORTIONING BYPASS VALVE REPLACEMENT

U5U411AN

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



* 49 0259 770B

U5U41128

1	Brake pipe
2	Bolt

3	Proportioning bypass valve
---	----------------------------

CONVENTIONAL BRAKE SYSTEM

FRONT BRAKE (DISC) INSPECTION

U5U411AP

Disc Pad Thickness Inspection

1. On level ground, jack up the front of the vehicle and support it with safety stands.
2. Remove the wheels.
3. Look through the caliper inspection hole and verify the remaining thickness of the pad.

Thickness

1.0 mm { 0.04 in } min.

Disc Plate Thickness Inspection

1. Measure the thickness of the disc plate.

Caution

- When it is necessary to machine the disc plate, if the disc plate is removed from the vehicle then machined, excessive runout may result. Machine the disc plate with it installed on the vehicle.

Standard

20.0 mm { 0.79 in }

Minimum

18.0 mm { 0.71 in }

Minimum thickness after machining by using a
brake lathe on-vehicle

18.8 mm { 0.74 in }

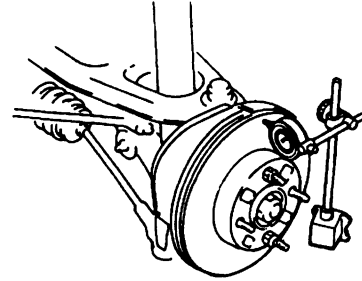
2. If the thickness is not within the specification, replace the disc plate.

Disc Plate Runout Inspection

- Tighten the disc plate to the wheel hub by using two wheel nuts. When measuring runout, measure at the outer edge of the disc plate surface.

Runout

0.05 mm { 0.002 in } max.



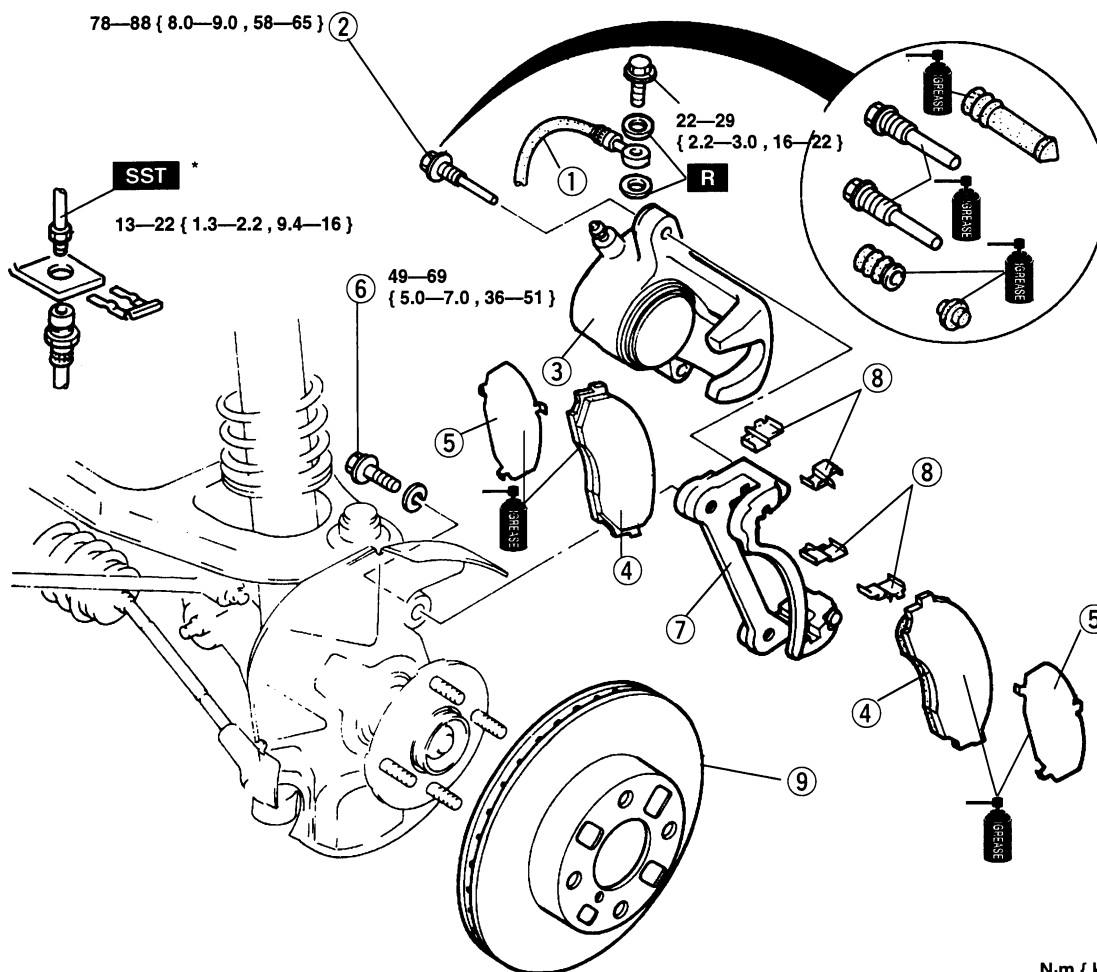
U5U41129

CONVENTIONAL BRAKE SYSTEM

FRONT BRAKE (DISC) REMOVAL / INSTALLATION

U5U411AQ

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



* 49 0259 770B

N·m { kgf·m , ft·lbf }

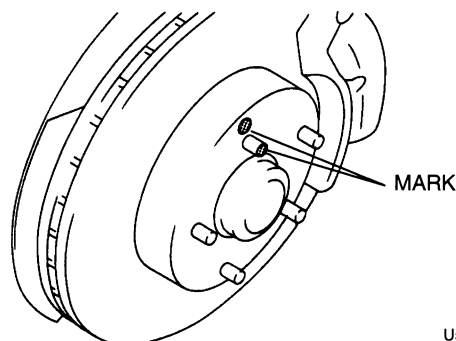
U5U41130

1	Brake hose
2	Connecting bolt
3	Caliper
4	Disc pad ☐ Installation Note
5	Shim

6	Bolt
7	Mounting support
8	Guide plate
9	Disc plate ☐ Removal Note ☐ Installation Note

Disc Plate Removal Note

- Mark the wheel hub bolt and disc plate before removal for reference during installation.



U5U41131

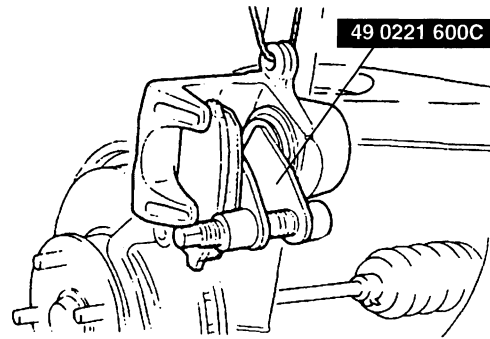
CONVENTIONAL BRAKE SYSTEM

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 made before removal.

Disc Pad Installation Note

1. Push the piston inward by using the **SST**.
2. Install the new pads in the mounting support.

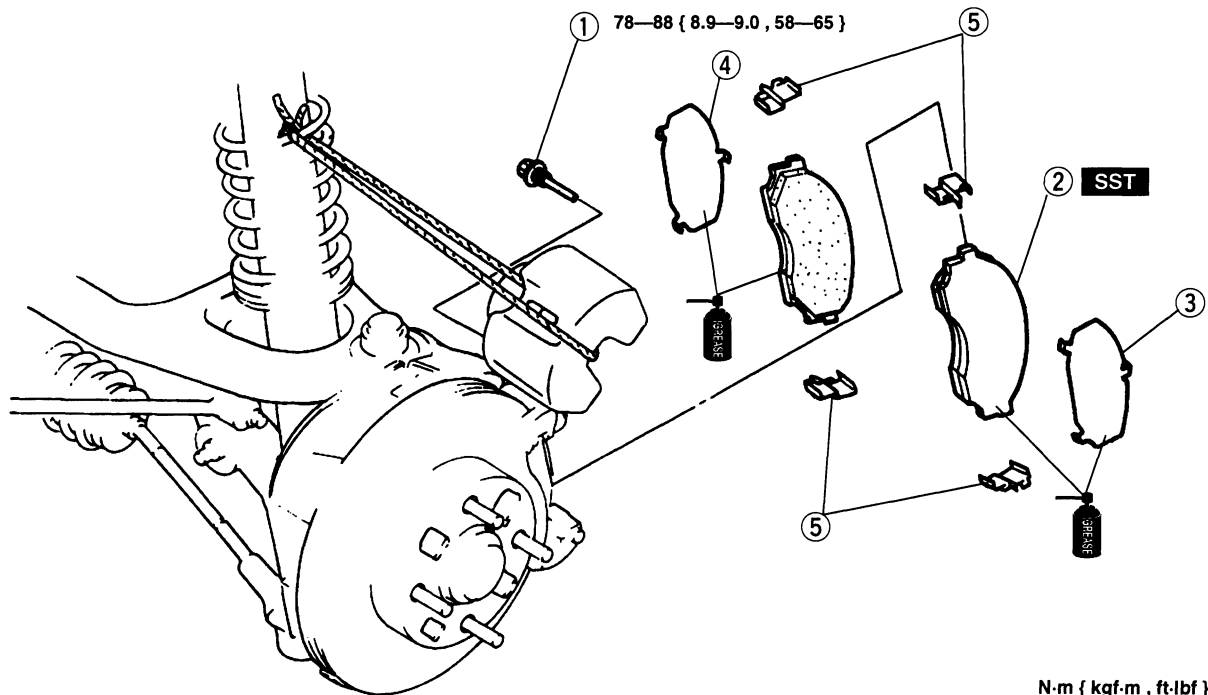


U5U41132

DISC PAD (FRONT) REPLACEMENT

U5U411AR

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



U5U41133

1	Lock bolt
2	Disc pad
3	Outer shim

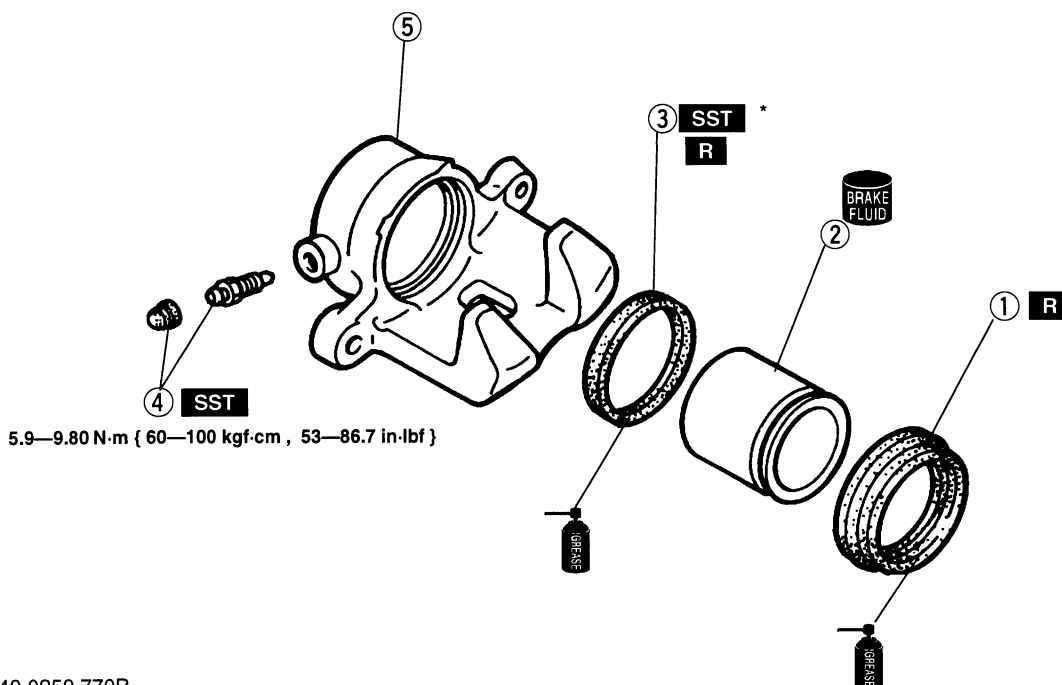
4	Inner shim
5	Guide plate

CONVENTIONAL BRAKE SYSTEM

CALIPER (FRONT) DISASSEMBLY / ASSEMBLY

U5U411AS

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



* 49 0259 770B

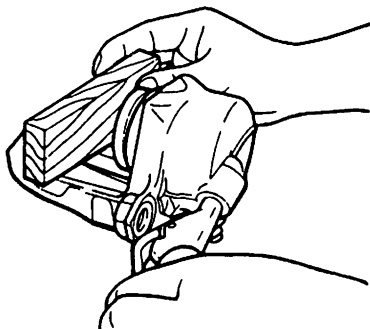
U5U41134

1	Dust seal
2	Piston ☞ Disassembly Note
3	Piston seal ☞ Disassembly Note

4	Bleeder screw and bleeder cap
5	Caliper body

Piston Disassembly Note

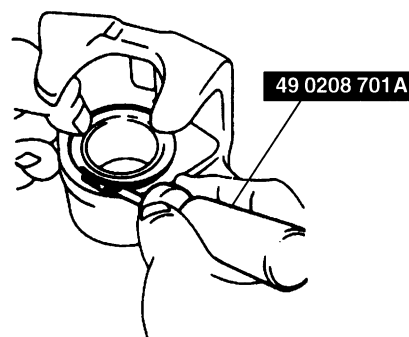
1. Place a piece of wood in the caliper.
2. Gently blow compressed air through the hole to force the piston out of the caliper.



U5U41135

Piston Seal Disassembly Note

- Remove the piston seal by using the SST.



U5U41136

REAR BRAKE (DISC) INSPECTION

U5U411AT

Disc Pad Thickness Inspection

1. On level ground, jack up the rear of the vehicle and support it with safety stands.
2. Remove the wheels.
3. Look through the caliper inspection hole and verify the remaining thickness of the pad.

Thickness
1.0 mm { 0.04 in } min.

CONVENTIONAL BRAKE SYSTEM

Disc Plate Thickness Inspection

1. Measure the thickness of the disc plate.

Caution

- When it is necessary to machine the disc plate, if the disc plate is removed from the vehicle then machined, excessive runout may result. Machine the disc plate with it installed on the vehicle.

Standard

9.0 mm { 0.35 in }

Minimum

8.0 mm { 0.31 in }

Minimum thickness after machining by using a brake lathe on-vehicle

8.4 mm { 0.33 in }

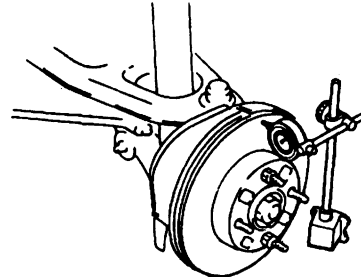
2. If the thickness is not within the specification, replace the disc plate.

Disc Plate Runout Inspection

- Tighten the disc plate to the wheel hub by using two wheel nuts. When measuring runout, measure at the outer edge of the disc plate surface.

Runout

0.05 mm { 0.002 in } max.

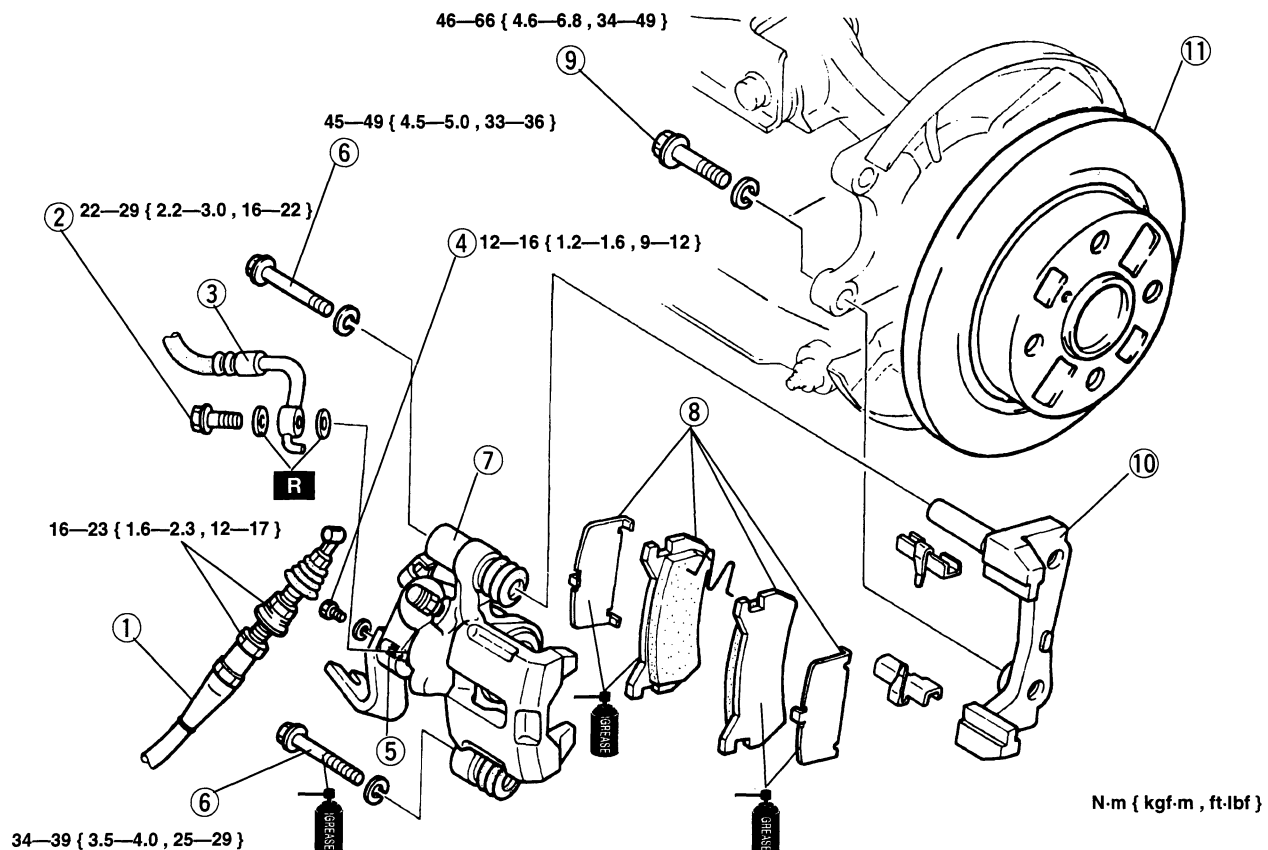


U5U41137

REAR BRAKE (DISC) REMOVAL / INSTALLATION

U5U411AU

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



U5U41138

1	Parking brake cable
2	Connecting bolt
3	Brake hose
4	Plug

5	Manual adjustment gear ☞ Removal Note ☞ Installation Note
6	Lock bolt

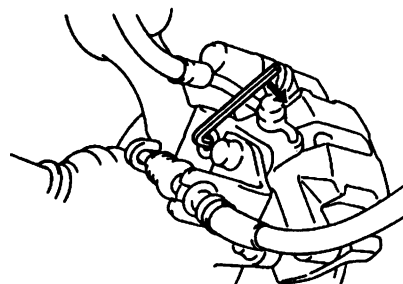
CONVENTIONAL BRAKE SYSTEM

7	Caliper
8	Disc pad and shim
9	Bolt
10	Mounting support
11	Disc plate 04-11 FRONT BRAKE (DISC) REMOVAL / INSTALLATION, Disc Plate Removal Note 04-11 FRONT BRAKE (DISC) REMOVAL / INSTALLATION, Disc Plate Installation Note

Manual Adjustment Gear Installation Note

1. Turn the manual adjustment gear clockwise until the brake pads just touch the disc plate.
2. Return the manual adjustment gear counterclockwise 1/3 turn.

ADJUSTING BRAKE PADS

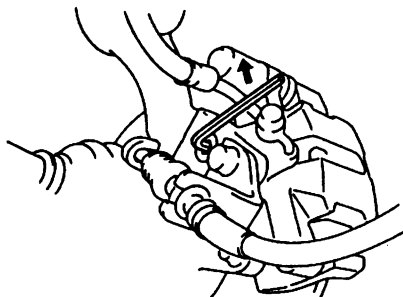


U5U41140

Manual Adjustment Gear Removal Note

- Turn the manual adjustment gear counterclockwise by using an Allen wrench to pull the brake caliper piston back.

RETRACTING BRAKE PADS

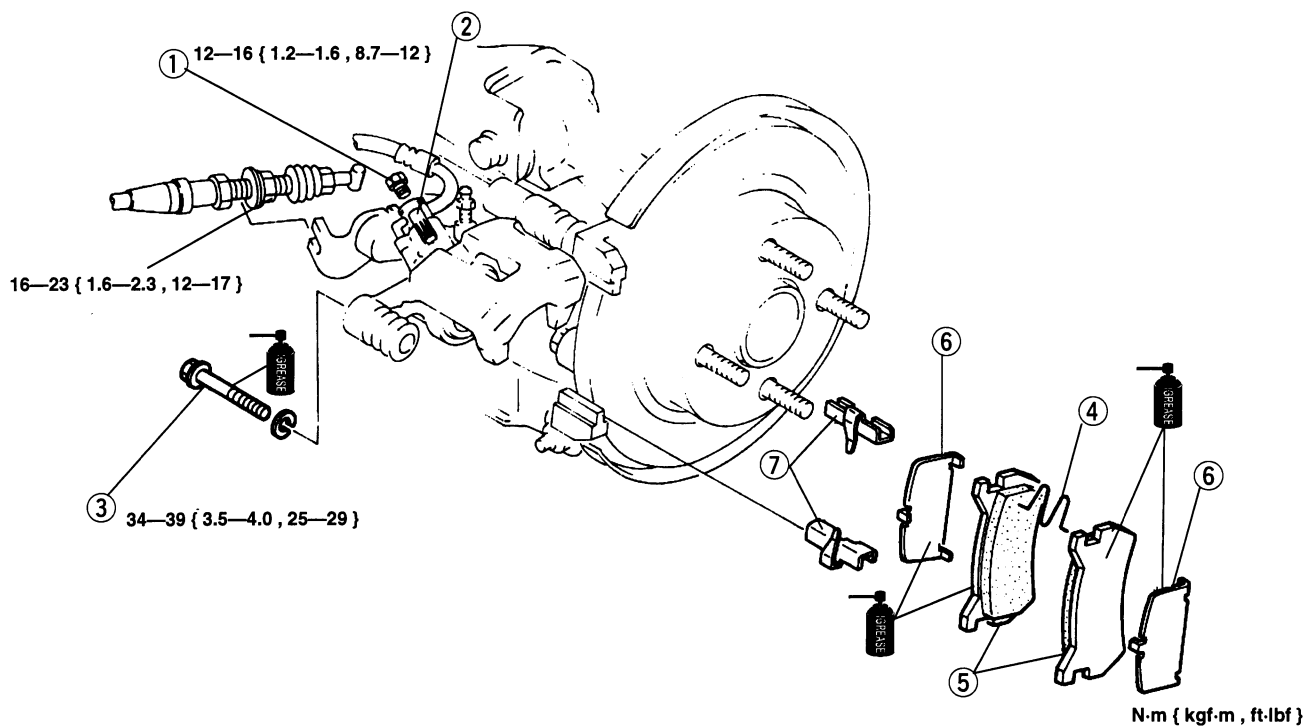


U5U41139

DISC PAD (REAR) REPLACEMENT

U5U411AV

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



U5U41141

CONVENTIONAL BRAKE SYSTEM

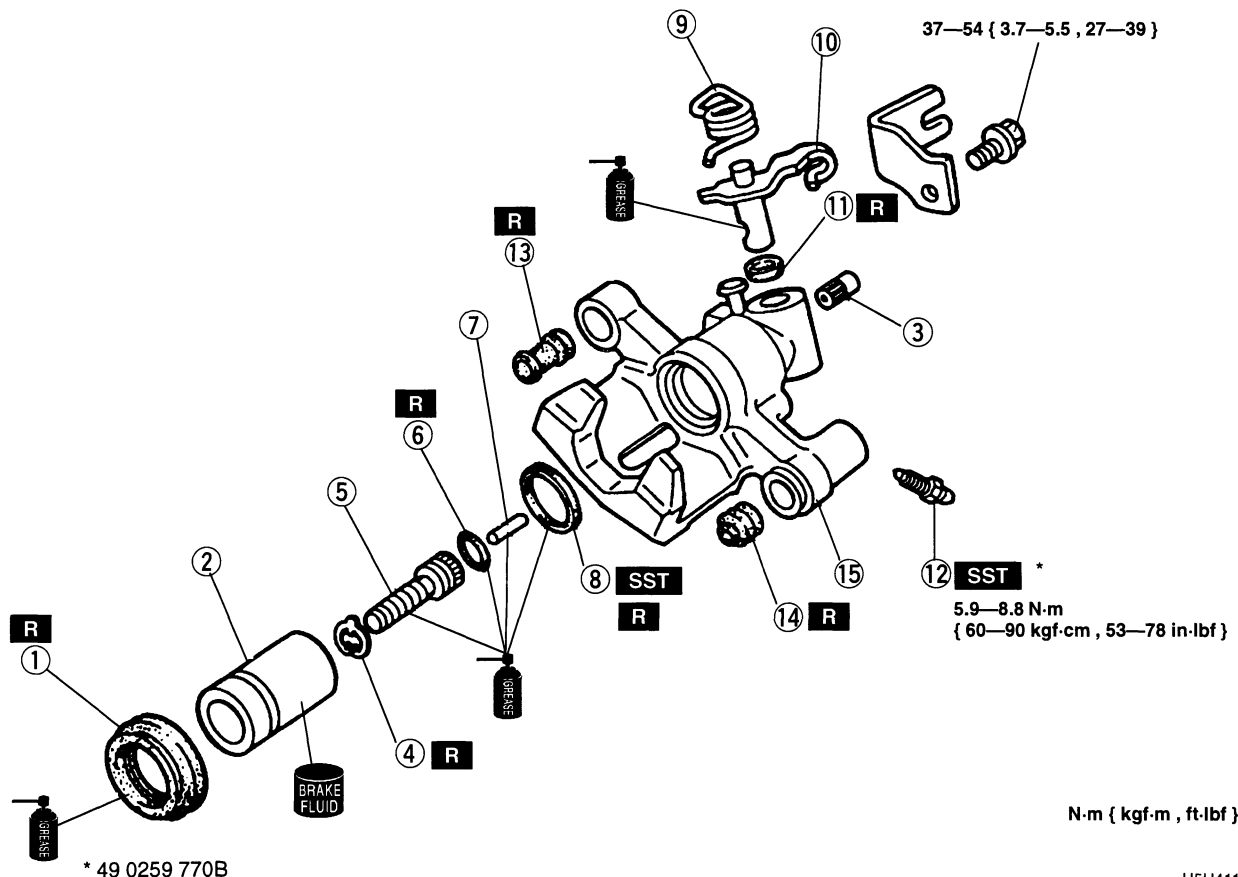
1	Plug
2	Manual adjustment gear  04-11 REAR BRAKE (DISC) REMOVAL / INSTALLATION, Manual Adjustment Gear Removal Note  04-11 REAR BRAKE (DISC) REMOVAL / INSTALLATION, Manual Adjustment Gear Installation Note

3	Lock bolt
4	M-spring
5	Disc pad
6	Shim
7	Guide plate

CALIPER (REAR) DISASSEMBLY / ASSEMBLY

U5U411AW

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



U5U41142

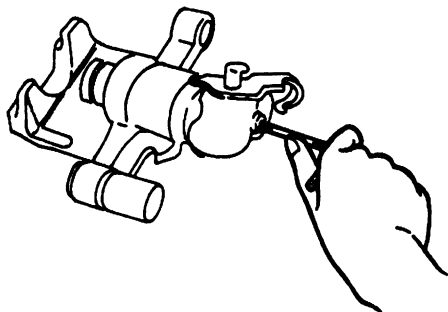
1	Dust seal
2	Piston  Disassembly Note  Assembly Note
3	Manual adjustment gear
4	Snap ring
5	Adjusting bolt
6	O-ring
7	Connecting link

8	Piston seal  04-11 CALIPER (FRONT) DISASSEMBLY / ASSEMBLY, Piston Seal Disassembly Note
9	Spring
10	Operating lever
11	Boot
12	Bleeder screw
13	Boot
14	Boot
15	Caliper body

CONVENTIONAL BRAKE SYSTEM

Piston Disassembly Note

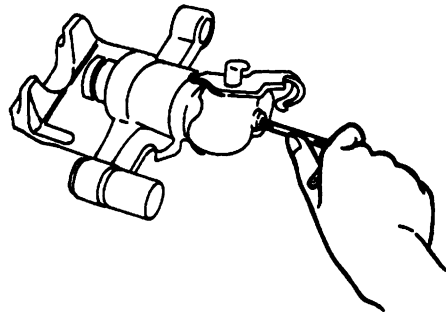
1. Turn the manual adjustment gear clockwise by using an Allen wrench. (Turn the manual adjustment gear until it turns easily.)
2. Remove the piston.



U5U41143

Piston Assembly Note

- Insert the piston into the caliper and turn the adjustment gear counterclockwise by using an Allen wrench to pull the piston in fully. (Turn the adjustment gear until it stops.)



U5U41144

04-12 PARKING BRAKE SYSTEM

PARKING BRAKE (LEVER TYPE)

INSPECTION	04-12-1
PARKING BRAKE (LEVER TYPE)	
ADJUSTMENT	04-12-1
PARKING BRAKE (LEVER TYPE)	
REMOVAL / INSTALLATION	04-12-1

Parking Brake Switch Installation Note	04-12-2
PARKING BRAKE CABLE (LEVER TYPE)	
REMOVAL / INSTALLATION	04-12-2

PARKING BRAKE (LEVER TYPE) INSPECTION

U5U412AA

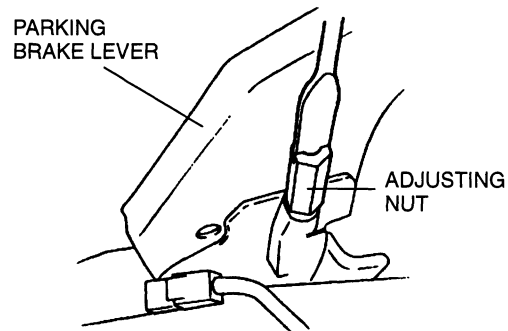
1. Depress the brake pedal several times.
2. Verify that the stroke is within specification when the parking brake lever is pulled with a force of **196 N** { **20 kgf** , **44 lbf** }.

Stroke
7—9 notches

PARKING BRAKE (LEVER TYPE) ADJUSTMENT

U5U412AB

1. On level ground, jack up the rear of the vehicle until the wheels are free to turn, and support it on safety stands.
2. Depress the brake pedal several times.
3. Remove the cover.
4. Turn the adjusting nut to adjust the lever stroke.
5. Depress the parking brake pedal one notch, and verify that the parking brake warning light comes on. Release the parking brake.
6. Turn the wheels by hand, and verify that the brakes do not drag.
7. Lower the vehicle.

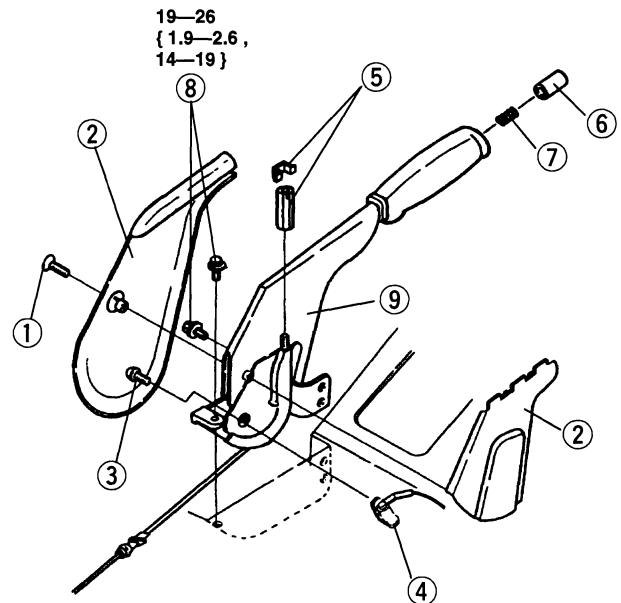


U5U41201

PARKING BRAKE (LEVER TYPE) REMOVAL / INSTALLATION

U5U412AC

1. Block the wheels firmly.
2. Release the parking brake.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. After installation, adjust the parking lever stroke.



U5U41202

PARKING BRAKE SYSTEM

1	Screw
2	Cover
3	Bolt
4	Parking brake switch ☞ Installation Note
5	Adjusting nut and clip
6	Release button
7	Spring
8	Bolt
9	Parking brake lever

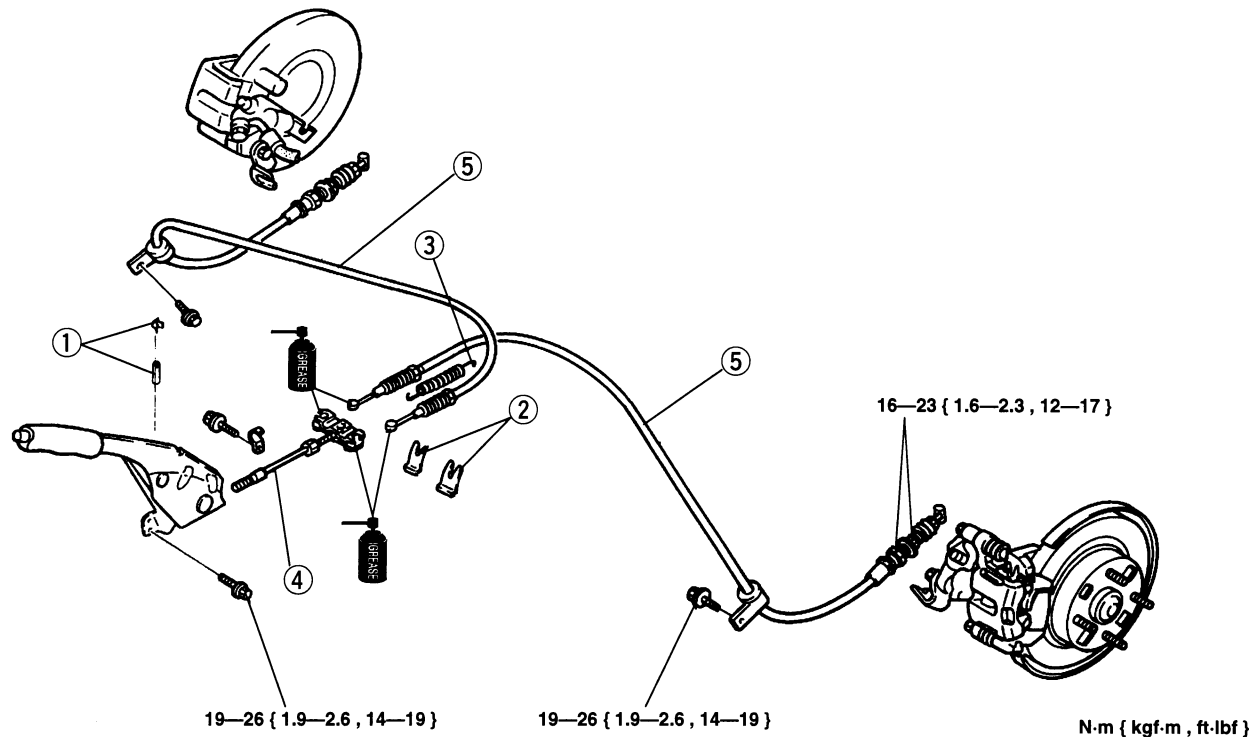
Parking Brake Switch Installation Note

1. Install the parking brake switch so that it contacts the parking brake lever when the lever is fully released.
2. Turn the ignition switch ON, and verify that the parking brake warning light illuminates with the lever pulled up one notch.

PARKING BRAKE CABLE (LEVER TYPE) REMOVAL / INSTALLATION

U5U412AD

1. Block the wheels firmly.
2. Release the parking brake.
3. Remove the parking brake lever.
4. On level ground, jack up the vehicle and support it evenly on safety stands.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal indicated in the table.
7. After installation:
 - (1) Adjust the parking brake lever stroke.
 - (2) Depress the brake pedal a few times.
 - (3) Verify that the rear brakes do not drag while the wheels are rotated by hand.



1	Adjusting nut and clip
2	Clip
3	Spring

4	Front cable
5	Rear cable

U5U41203

04-13 ANTILOCK BRAKE SYSTEM

ABS HYDRAULIC UNIT INSPECTION	04-13-1
System Inspection	04-13-1
ABS Motor Inspection (Including Harness To ABS Control Module)	04-13-1
ABS Motor Inspection	04-13-2
Solenoid Valve Inspection (Including The Harness Of ABS Control Module)	04-13-2
Solenoid Valve Inspection	04-13-2
ABS HYDRAULIC UNIT REMOVAL / INSTALLATION	04-13-3
ABS CONTROL MODULE REMOVAL / INSTALLATION	04-13-4
ABS HARNESS AND INPUT SIGNAL INSPECTION	04-13-4
ABS RELAY REMOVAL / INSTALLATION	04-13-6
ABS RELAY INSPECTION	04-13-7

Valve Relay Inspection (Including Harness To ABS Control Module)	04-13-7
Valve Relay Inspection	04-13-7
Motor Relay Inspection (Including Harness To ABS Control Module)	04-13-7
Motor Relay Inspection	04-13-7
ABS WHEEL-SPEED SENSOR (FRONT) REMOVAL / INSTALLATION	04-13-8
ABS WHEEL-SPEED SENSOR (FRONT) INSPECTION	04-13-9
Clearance Inspection	04-13-9
Resistance Inspection	04-13-9
Voltage Inspection	04-13-9
ABS WHEEL-SPEED SENSOR (REAR) REMOVAL / INSTALLATION	04-13-10
ABS WHEEL-SPEED SENSOR (REAR) INSPECTION	04-13-10

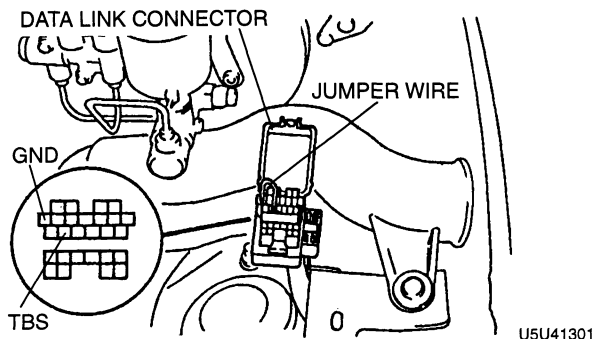
ABS HYDRAULIC UNIT INSPECTION

System Inspection

Note

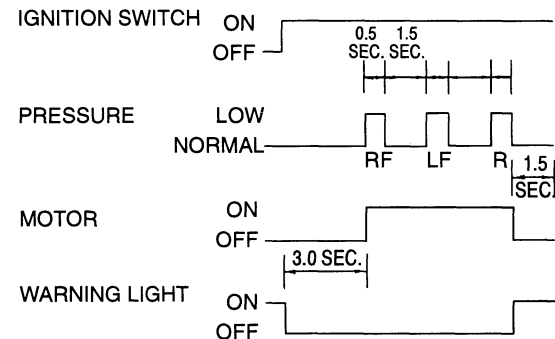
- If a past diagnostic trouble code(s) is memorized, the system inspection mode will not work. Make sure that there is no code(s) in the ABS memory before performing this inspection.

- Verify that the battery is fully charged. With the ignition switch ON, verify that the ABS warning light goes out after **2—4 seconds**.
- If the light stays ON after **2—4 seconds** the ABS control module detects a failure and will not activate the ABS hydraulic unit. Follow the troubleshooting procedures.
- Turn the ignition switch OFF.
- On level ground, jack up the vehicle and support it evenly on safety stands. Shift the transmission to neutral or N position.
- Release the parking brake.
- Rotate the wheels by hand, and inspect for brake drag.
- Using a jumper wire, connect the TBS and GND terminals of the data link connector.



- Depress the brake pedal, and have an assistant verify that the right front wheel will not turn.

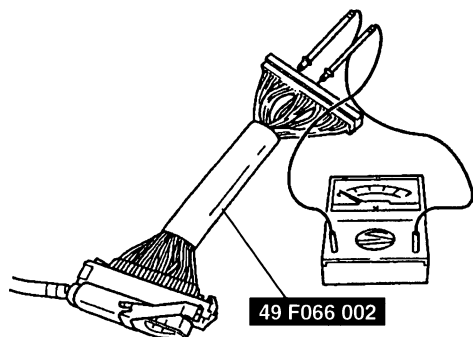
- With the brake pedal still depressed, turn the ignition switch ON and verify that the brake is released momentarily (approx. **0.5 sec.**) and that the wheel turns when pressure-reduction operates.
- Check operation of the remaining wheels in order: left front, right rear, left rear.



- If steps 9 and 10 show correct operation, the following systems are OK.
 - Brake piping to ABS hydraulic unit
 - Braking system, including ABS hydraulic unit
 - Electrical system in ABS hydraulic unit (solenoid, ABS motor, etc.)
 - ABS control module, its output system (solenoid, relay, etc.) and harness
- The following are not checked with the steps 11.
 - Input system and harness of ABS control module
 - Intermittent failure
 - Fluid leakage
- Replace the ABS hydraulic unit if necessary.

ABS Motor Inspection (Including Harness To ABS Control Module)

- Turn the ignition switch OFF, and disconnect the ABS control module connector.
- Connect the **SST** to the ABS control module connector.



U5U41303

3. Measure the resistance between X terminal of the control module connector and a ground.

Resistance
1 Ω max.

4. If not as specified, check the wiring harness between the ABS motor and the control module and check the ABS motor. (Refer to ABS Motor Inspection.)

ABS Motor Inspection

1. Turn the ignition switch OFF.
2. Disconnect the ABS hydraulic unit connector (2 pin).
3. Measure the resistance between terminal B of the ABS hydraulic unit connector and ground.



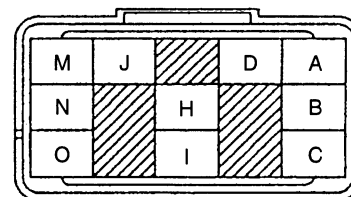
U5U41304

Resistance
1 Ω max.

4. Verify that the motor operates when applying 12 V to the connector (2 pin).
5. If not as specified, repair the harness or replace the ABS hydraulic unit if necessary.

Solenoid Valve Inspection (Including The Harness Of ABS Control Module)

1. Turn the ignition switch OFF.
2. Disconnect the ABS hydraulic unit connector (12 pin).
3. Apply 12 V between terminal A and D. Measure the resistance between terminal B and the following terminals at the ABS hydraulic unit connector (12 pin).



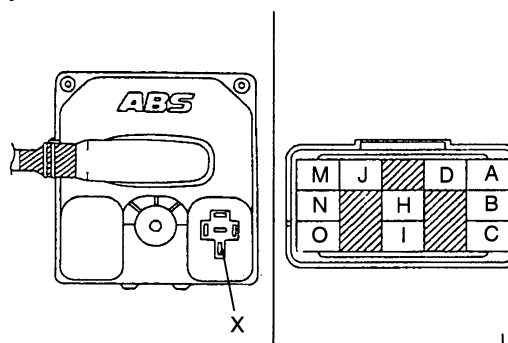
U5U41305

Terminal	H	I	J	M	N	O
Resistance (Ω)	4.25—4.75			8.5—9.5		

4. If not as specified, check the valve relay and solenoid valves.

Solenoid Valve Inspection

1. Remove the ABS hydraulic unit.
2. Remove the valve relay. Measure the resistance between terminal X at the ABS hydraulic unit valve relay terminal and the following terminals at the ABS hydraulic unit connector.



U5U41306

Terminal	H	I	J	M	N	O
Resistance (Ω)	4.25—4.75			8.5—9.5		

3. If not as specified, repair the harness or replace the ABS hydraulic unit if necessary.

04-50 TECHNICAL DATA

04 BRAKES 04-50-1

04 BRAKES

U5U450AA

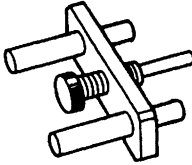
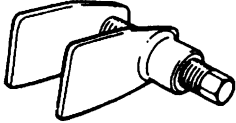
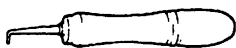
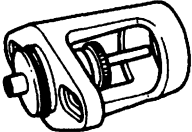
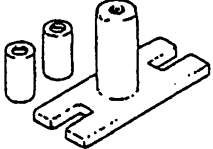
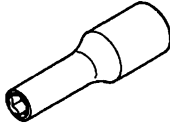
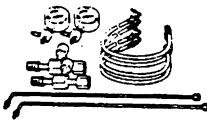
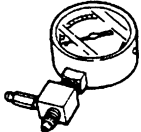
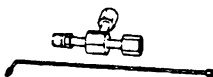
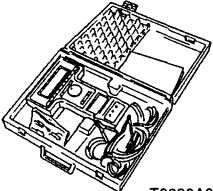
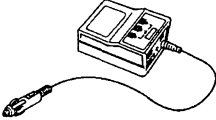
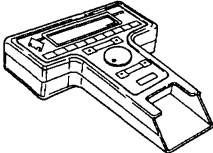
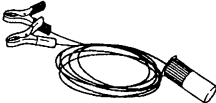
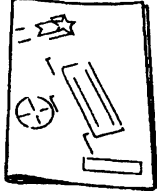
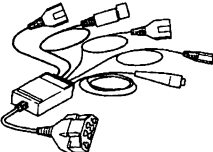
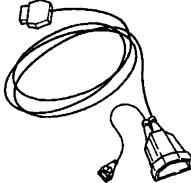
Item		Specification
CONVENTIONAL BRAKE SYSTEM		
Brake pedal	Type	Suspended
	Pedal level ratio	4.1 : 1
	Maximum stroke (mm { in })	120 { 4.72 }
Master cylinder	Type	Tandem (with level sensor)
	Bore (mm { in })	22.22 { 0.875 }
Front disc brake	Type	Disc (ventilated)
	Cylinder bore (mm { in })	51.1 { 2.01 }
	Pad dimensions (area × thickness) (mm ² × mm { in ² × in })	1,849 × 8.0 { 2.76 × 0.31 }
	Disc plate dimension (effective diameter × thickness) (mm { in })	255 × 20 { 10.04 × 0.79 }
Rear disc brake	Type	Disc (solid)
	Cylinder bore (mm { in })	31.75 { 1.25 }
	Pad dimensions (area × thickness) (mm ² × mm { in ² × in })	2,704 × 8.0 { 4.19 × 0.31 }
	Disc plate dimension (effective diameter × thickness) (mm { in })	251 × 9 { 9.88 × 0.35 }
Power brake unit	Type	Vacuum multiplier
	Size (mm { in })	214 { 8 }
Braking force control device	Type	Proportioning bypass valve (PBV)
Brake fluid type		SAE J1703 or FMVSS 116: DOT-3
PARKING BRAKE SYSTEM		
Type		Mechanical, two rear brakes
Operation system		Hand lever

04-60 SERVICE TOOLS

04 BRAKES SST 04-60-1

04 BRAKES SST

U5U460AA

49 0259 770B Wrench, flare nut  0259770B	49 F043 001 Adjust gauge  F043001X	49 0221 600C Expand tool, disc brake  0221600C
49 0208 701A Boot air out tool  0208701A	49 B043 001 Adjust gauge  B043001X	49 E043 003A Lock tool, turning  E043003A
49 B043 004 Wrench, socket  B043004X	49 U043 0A0 Gauge set, oil pressure  U0430A0X	49 U043 004 Gauge, oil pressure (Part of 49 U043 0A0)  U043004X
49 U043 005 Joint (Part of 49 U043 0A0)  U043005X	49 U043 006 Hose (Part of 49 U043 0A0)  U043006X	49 F066 002 Harness adapter  F066002X
49 T088 0A0 NGS set  T0880A0X	49 T088 010D Program Card  T088010D	49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0)  T088002X
49 T088 001 Control Unit (Part of 49 T088 0A0)  T088001X	49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0)  T088006X	49 T088 008A Instruction Manual  T088008A
49 T088 003 Super MECS Adapter (Part of 49 T088 0A0)  T088003X	49 T088 005 STAR/DCL Adapter (5 pin) (Part of 49 T088 0A0)  T088005X	

TRANSMISSION/TRANSAXLE

05

SECTION

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AUTOMATIC TRANSMISSION	
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05

05-01 TROUBLESHOOTING

AUTOMATIC TRANSMISSION ON-BOARD

DIAGNOSIS	05-01-1
Diagnostic Trouble Code Inspection ..	05-01-1
After-repair Procedure	05-01-1
Diagnostic Trouble Code Table	05-01-2
Diagnostic Trouble Code	
Troubleshooting	05-01-2

AUTOMATIC TRANSMISSION SYMPTOM

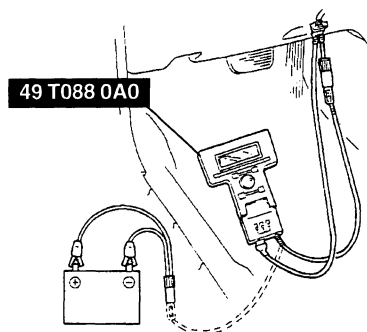
TROUBLESHOOTING	05-01-19
General Notes	05-01-19
Quick Diagnosis Chart	05-01-19

AUTOMATIC TRANSMISSION ON-BOARD DIAGNOSIS

U5U501AA

Diagnostic Trouble Code Inspection

1. Connect the **SST** (NGS) to the data link connector 2 and battery.



U5U50101

2. Turn the ignition switch to ON.
3. Check the diagnostic trouble code(s), referring to the **SST** (NGS) Instruction Manual.
4. If a diagnostic trouble code(s) is displayed, check for the cause according to the diagnostic trouble code table and repair as necessary.
5. After repair is made, do the After-repair Procedure to verify that there are no remaining codes.

After-repair Procedure

1. Cancel the diagnostic trouble code memory by using the **SST** (NGS). (Refer to Instruction Manual.)
2. Remove the **SST** (NGS) from the data link connector 2.



U5U50102

3. Drive the vehicle at 50 km/h { 31 mph }, and depress the accelerator pedal fully to activate kickdown. Stop the vehicle gradually.

DRIVE AT 50 km/h { 31 mph }

KICKDOWN

STOP VEHICLE

U5U50103

4. Connect the **SST** (NGS) to the data link connector 2 and battery.

TROUBLESHOOTING

5. Turn the ignition switch to ON.
6. Verify that no diagnostic trouble codes are displayed.
7. Remove the **SST** (NGS) from the data link connector 2.

Diagnostic Trouble Code Table

DTC	Display on the NGS	Diagnosed circuit
P0705	TRANS RANGE SENSOR — CKT MALFUNCTION	Transmission Range Switch
P0706	TRANS RANGE SENSOR — CKT RANGE/PERF	Transmission Range Switch
P0710	TRANS FLUID TEMP SENS — CKT MALFUNCTION	Transmission Fluid Temperature Sensor
P0711	TRANS FLUID TEMP SENS — CKT RANGE/PERF	Transmission Fluid Temperature Sensor
P0715	INPUT/TSS CIRCUIT MALFUNCTION	Input/Turbine Speed Sensor
P0725	ENGINE SPEED INPUT — CKT MALFUNCTION	Engine Speed Input Circuit
P0731	GEAR 1-INCORRECT RATIO	Gear 1 Incorrect Ratio
P0732	GEAR 2-INCORRECT RATIO	Gear 2 Incorrect Ratio
P0733	GEAR 3-INCORRECT RATIO	Gear 3 Incorrect Ratio
P0734	GEAR 4-INCORRECT RATIO	Gear 4 Incorrect Ratio
P0740	TORQUE CONV CLUTCH SYS — MALFUNCTION	Torque Converter Clutch System
P0750	SHIFT SOLENOID A — MALFUNCTION	Shift Solenoid A Malfunction
P0755	SHIFT SOLENOID B — MALFUNCTION	Shift Solenoid B Malfunction
P0760	SHIFT SOLENOID C — MALFUNCTION	Shift Solenoid C Malfunction
P1720	VSS 2 — NO VSS 2 SIGNAL	Vehicle Speed Sensor
P1743	SOLENOID TCC — OPEN OR SHORT	Torque Converter Clutch Control Solenoid Valve
P1765	3-2 TIMING SOL. V — OPEN OR SHORT	3-2 Timing Solenoid Valve
P1790	TPS — OPEN OR SHORT	Throttle Position Sensor
P1795	IDLE SW — OPEN OR SHORT	Closed Throttle Position Switch

Diagnostic Trouble Code Troubleshooting

- If a diagnostic trouble code is shown on the **SST**, check for the cause by referring to the related chart.

DTC		P0705 P0706	TRANS RANGE SENSOR—CKT MALFUNCTION TRANS RANGE SENSOR—CKT RANGE/PERF	
DETECTION CONDITION		● No input signal or input of two or more signals from transmission range switch		
POSSIBLE CAUSE		● Transmission range switch malfunction ● Damaged wiring or connectors between transmission range switch and transmission control module ● Transmission control module malfunction		
STEP	INSPECTION		ACTION	
1	Are transmission control module and transmission range switch connections at the connector and connector pins OK?		Yes	Go to next step
			No	Repair or replace connector(s) Inspection step 6 ● Yes: Go to next step ● No: End of flowchart
2	Check EC-AT tester display ● Connect the EC-AT tester to transmission control module ● Are transmission range switch range and EC-AT tester display correct? 📄 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table		Yes	Go to step 6
			No	Go to next step
3	Check for continuity between terminals of transmission range switch and transmission control module ● Disconnect negative battery cable ● Disconnect transmission range switch and transmission control module connectors ● Is there continuity between the terminals?		Yes	Go to next step
			No	Repair or replace connectors and wiring Go to step 2 ● When Yes, go to step 6 ● When No, go to next step

TROUBLESHOOTING

STEP	INSPECTION	ACTION
4	Check for continuity between terminals of the transmission range switch as follows • Disconnect negative battery cable • Disconnect transmission range switch connector • Is there continuity between the terminals?	Yes Go to next step
		No Repair or adjust the transmission range switch Go to step 2 • When Yes, go to step 6 • When No, go to next step
5	Check for continuity between terminals of transmission range switch and main relay • Disconnect negative battery cable • Disconnect transmission range switch and main relay • Is there continuity between the terminals?	Yes Go to next step
		No Repair or replace connectors and wiring
6	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes Replace the transmission control module
		No Problem is a temporary poor connection of wiring or connectors, and should be investigated further

DTC P0710 P0711		TRANS FLUID TEMP SENS—CKT MALFUNCTION TRANS FLUID TEMP SENS—CKT RANGE/PERF	
DETECTION CONDITION		● Transmission control module input voltage is less than 0.09 V or over 5.0 V	
POSSIBLE CAUSE		● Transmission fluid temperature sensor malfunction ● Damaged wiring or connectors between transmission fluid temperature sensor and transmission control module ● Transmission control module malfunction	
STEP	INSPECTION		ACTION
1	Are transmission control module and transmission fluid temperature sensor connections at the connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector Inspection step 5 ● Yes: Go to next step ● No: End of flowchart
2	Check EC-AT tester display ● Connect EC-AT tester to transmission control module ● Is transmission fluid temperature sensor voltage correct? ☞ 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of transmission fluid temperature sensor and transmission control module ● Disconnect negative battery cable ● Disconnect transmission fluid temperature sensor and transmission control module connectors ● Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 ● When Yes, go to step 5 ● When No, go to next step
4	Measure resistance between transmission fluid temperature sensor terminals ● Disconnect negative battery cable ● Disconnect transmission fluid temperature sensor connector ● Is resistance between terminals correct? ☞ 05-13 TRANSMISSION FLUID TEMPERATURE SENSOR INSPECTION	Yes	Go to next step
		No	Replace transmission fluid temperature sensor
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

05

TROUBLESHOOTING

DTC P0715		INPUT/TSS CIRCUIT MALFUNCTION	
DETECTION CONDITION		Signal from input/turbine speed sensor is not input to transmission control module when vehicle is moving	
POSSIBLE CAUSE		- Input/turbine speed sensor malfunction - Damaged harness or connectors between input/turbine speed sensor and transmission control module - Transmission control module malfunction	
STEP	INSPECTION	ACTION	
1	Are transmission 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 Inspection step 5 - Yes: Go to next step - No: End of flowchart
2	Check EC-AT tester display - Connect EC-AT tester to transmission control module - Is speed indicated on EC-AT tester after engine is started and vehicle is idling? ⓘ 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of input/turbine speed sensor and transmission control module - Disconnect negative battery cable - Disconnect input/turbine speed sensor and transmission control module connectors - Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 - When Yes, go to step 5 - When No, go to next step
4	Measure resistance between input/turbine speed sensor terminals - Disconnect negative battery cable - Disconnect input/turbine speed sensor connector - Is resistance between terminals correct? ⓘ 05-13 INPUT/TURBINE SPEED SENSOR INSPECTION	Yes	Go to next step
		No	Replace the input/turbine speed sensor
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

TROUBLESHOOTING

DTC P0725		ENGINE SPEED INPUT—CKT MALFUNCTION	
DETECTION CONDITION		Engine speed input signal is not input to the transmission control module	
POSSIBLE CAUSE		- Crank angle sensor-2 malfunction - Damaged wiring or connector between engine control module and transmission control module - Engine control module - Transmission control module	
STEP	INSPECTION	ACTION	
1	Is diagnostic trouble code P0335 indicated?	Yes	Refer to flowchart for diagnostic trouble code P0335, and perform troubleshooting
		No	Go to next step
2	Are transmission control module and engine speed input signal connection at the connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector Inspection step 6 - Yes: Go to next step - No: End of flowchart
3	Check EC-AT tester display - Connect EC-AT tester to transmission control module - Is speed indicated on EC-AT tester after engine is started and vehicle is idling? ⓘ 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 6
		No	Go to next step
4	Check for continuity between terminals of transmission control module and engine control module - Disconnect negative battery cable - Disconnect transmission control module and engine control module connectors - Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 - When Yes, go to step 6 - When No, go to next step
5	Measure voltage at terminal 4H of engine control module - Connect a circuit tester to terminal 4H of engine control module - Is voltage at terminal correct?	Yes	Go to next step
		No	Check for engine control module or crankshaft position sensor Go to step 2 - When Yes, go to step 6 - When No, go to next step
6	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

TROUBLESHOOTING

DTC P0731		GEAR 1-INCORRECT RATIO	
DETECTION CONDITION		Transmission control module outputs solenoid pattern of first gear when gear ratio is other than first gear	
POSSIBLE CAUSE		- ATF level low - Solenoid valve malfunction - Line pressure low - Control valve stuck - Transmission control module malfunction	
STEP	INSPECTION	ACTION	
1	Is diagnostic trouble code P0750, P0755, or P0760 indicated?	Yes	Refer to flowchart for diagnostic trouble code P0750, P0755, or P0760 and perform troubleshooting
		No	Go to next step
2	Are amount and condition (color) of ATF OK? Check for ATF leakage at transmission connection and gasket Color ① Transparent red: Normal ② Black: Defective part in transmission ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION, ATF Condition Inspection	Yes	Go to next step
		No	Adjust ATF amount or replace ATF if necessary - If ATF color is 2, measure line pressure at idle. When pressure is less than specification, go to step 3 - If ATF color is 3 or 4, replace ATF
3	Is turbine speed OK under following conditions? - EC-AT tester connected to transmission control module - Throttle is 2/8 open, and vehicle speed is 20 km/h {12 mph} in D range (except HOLD mode) - Turbine speed is approx. 1,900 rpm 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 8
		No	Above specification: Go to next step Below specification: Go to step 6
4	Check line pressure in D range (except HOLD mode) Is line pressure OK? 05-13 MECHANICAL SYSTEM TEST, Line Pressure Test	Yes	Go to next step
		No	Repair or replace any defective parts Line pressure is low only when in D or S range: ATF leakage in direct clutch circuit
5	Check stall speed in D range (except HOLD mode) Is stall speed OK? 05-13 MECHANICAL SYSTEM TEST, Stall Test	Yes	Go to next step
		No	Repair or replace any defective parts High in D range: Shifting of direct clutch, fourth gear one-way clutch, rear clutch, one-way clutch
6	Inspect operation of shift solenoid A, B, C - Disconnect negative battery cable - Disconnect solenoid connector - Is it operating OK?	Yes	Go to next step
		No	Replace shift solenoid A, B, or C Inspection step 8 - Yes: Go to next step - No: End of flowchart
7	Check operation of each valve and inspect return spring Is each valve operating OK and is return spring OK?	Yes	Go to next step
		No	Repair or replace control valve and replace return spring
8	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary slip of clutch, and should be investigated further

TROUBLESHOOTING

05

DTC P0732		GEAR 2-INCORRECT RATIO	
DETECTION CONDITION		Transmission control module outputs solenoid pattern of second gear when gear ratio is other than second gear	
POSSIBLE CAUSE		- ATF level low - Direct clutch slippage - Band servo slippage - Solenoid valve malfunction - Line pressure low 4GR one-way clutch slippage - Control valve stuck - Transmission control module malfunction	
STEP	INSPECTION	ACTION	
1	Is diagnostic trouble code P0750, P0755, or P0760 indicated?	Yes	Refer to flowchart for diagnostic trouble code P0750, P0755, or P0760 and perform troubleshooting
		No	Go to next step
2	Are amount and condition (color) of ATF OK? Check for ATF leakage at transmission connection and gasket Color ① Transparent red: Normal ② Black: Defective part in transmission ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION, ATF Condition Inspection	Yes	Go to next step
		No	Adjust ATF amount or replace ATF if necessary - If ATF color is 2, measure line pressure at idle. When pressure is less than specification, go to step 3 - If ATF color is 3 or 4, replace ATF
3	Is turbine speed OK under following conditions? - EC-AT tester connected to transmission control module - Throttle is 2/8 open, and vehicle speed is 20 km/h {12 mph} in S range - Turbine speed is approx. 1,150 rpm 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 8
		No	Above specification: Go to next step Below specification: Go to step 6
4	Check line pressure in D, S range - Is line pressure OK? 05-13 MECHANICAL SYSTEM TEST, Line Pressure Test	Yes	Go to next step
		No	Repair or replace any defective parts - ATF leakage in band servo circuit - ATF leakage in direct clutch circuit
5	Check stall speed in D, S range - Is stall speed OK? 05-13 MECHANICAL SYSTEM TEST, Stall Test	Yes	Go to next step
		No	Repair or replace any defective parts - Band servo slipping - Direct clutch slipping - Fourth gear one-way clutch - Low one-way clutch
6	Inspect operation of shift solenoid A, B, C - Disconnect negative battery cable - Disconnect solenoid connector - Is it operating OK?	Yes	Go to next step
		No	Replace shift solenoid A, B, or C Inspection step 8 - Yes: Go to next step - No: End of flowchart
7	Check operation of each valve and inspect return spring Is each valve operating OK and is return spring OK?	Yes	Go to next step
		No	Repair or replace control valve and replace return spring
8	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary slip of clutch, and should be investigated further

TROUBLESHOOTING

DTC P0733		GEAR 3-INCORRECT RATIO	
DETECTION CONDITION		● Transmission control module outputs solenoid pattern of third gear when gear ratio is other than third gear	
POSSIBLE CAUSE		● ATF level low ● Direct clutch slippage ● Front clutch slippage ● Solenoid valve malfunction ● Line pressure low ● 4GR one-way clutch slippage ● Control valve stuck ● Transmission control module malfunction	
STEP	INSPECTION		ACTION
1	Is diagnostic trouble code P0750, P0755, or P0760 indicated?	Yes	Refer to flowchart for diagnostic trouble code P0750, P0755, or P0760 and perform troubleshooting
		No	Go to next step
2	Are amount and condition (color) of ATF OK? Check for ATF leakage at transmission connection and gasket Color ① Transparent red: Normal ② Black: Defective part in transmission ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF ☞ 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION, ATF Condition Inspection	Yes	Go to next step
		No	Adjust ATF amount or replace ATF if necessary ● If ATF color is 2, measure line pressure at idle. When pressure is less than specification, go to step 3 ● If ATF color is 3 or 4, replace ATF
3	Is turbine speed OK under following conditions? ● Solenoid connector disconnected ● EC-AT tester connected to transmission control module ● Throttle is 2/8 open, and vehicle speed is 20 km/h { 12 mph } in third gear in D range ● Turbine speed is approx. 800 rpm ☞ 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 8
		No	Above specification: Go to next step Below specification: Go to step 6
4	Check line pressure when solenoid connector is disconnected ● Solenoid connector disconnected ● Is line pressure OK? ☞ 05-13 MECHANICAL SYSTEM TEST, Line Pressure Test	Yes	Go to next step
		No	Repair or replace any defective parts ● ATF leakage in front clutch
5	Check stall speed when solenoid connector is disconnected ● Solenoid connector disconnected ● Is stall speed OK? ☞ 05-13 MECHANICAL SYSTEM TEST, Stall Test	Yes	Go to next step
		No	Repair or replace any defective parts ● Front clutch slipping
6	Inspect operation of shift solenoid A, B, C ● Disconnect negative battery cable ● Disconnect solenoid connector ● Is it operating OK?	Yes	Go to next step
		No	Replace shift solenoid A, B, or C Inspection step 8 ● Yes: Go to next step ● No: End of flowchart
7	Check operation of each valve and inspect return spring ● Is each valve operating OK and is return spring OK?	Yes	Go to next step
		No	Repair or replace control valve and replace return spring
8	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary slip of clutch, and should be investigated further

TROUBLESHOOTING

DTC P0734		GEAR 4-INCORRECT RATIO	
DETECTION CONDITION		Transmission control module outputs solenoid pattern of fourth gear when gear ratio is other than fourth gear	
POSSIBLE CAUSE		- ATF level low - Band servo slippage - Control valve stuck - Transmission control module malfunction - Line pressure low - Front clutch slippage - Solenoid valve malfunction	
STEP	INSPECTION		ACTION
1	Is diagnostic trouble code P0750, P0755, or P0760 indicated?	Yes	Refer to flowchart for diagnostic trouble code P0750, P0755, or P0760 and perform troubleshooting
		No	Go to next step
2	Are amount and condition (color) of ATF OK? Check for ATF leakage at transmission connection and gasket Color ① Transparent red: Normal ② Black: Defective part in transmission ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION, ATF Condition Inspection	Yes	Go to next step
		No	Adjust ATF amount or replace ATF if necessary - If ATF color is 2, measure line pressure at idle. When pressure is less than specification, repair or replace any defective parts - If ATF color is 3 or 4, replace ATF
3	Is diagnostic trouble code P0732 (Gear 2 incorrect ratio) indicated?	Yes	Refer to flowchart for diagnostic trouble code P0732 (Gear 2 incorrect ratio), and perform troubleshooting
		No	Go to next step
4	Is diagnostic trouble code P0733 (Gear 3 incorrect ratio) indicated?	Yes	Refer to flowchart for diagnostic trouble code P0733 (Gear 3 incorrect ratio), and perform troubleshooting
		No	Go to next step
5	Inspect operation of shift solenoid A, B, C - Disconnect negative battery cable - Disconnect solenoid connector - Is it operating OK?	Yes	Go to next step
		No	Replace shift solenoid A, B, or C Inspection step 7 - Yes: Go to next step - No: End of flowchart
6	Check operation of each valve and inspect return spring Is each valve operating OK and is return spring OK?	Yes	Go to next step
		No	Repair or replace control valve and replace return spring
7	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary slip of clutch, and should be investigated further

TROUBLESHOOTING

DTC P0740		TORQUE CONV CLUTCH SYS—MALFUNCTION	
DETECTION CONDITION		Transmission control module outputs torque converter clutch signal, but no torque converter clutch obtained	
POSSIBLE CAUSE		- ATF level low - Torque converter clutch slippage - Transmission control module malfunction - Line pressure low - Control valve stuck - Torque converter clutch control solenoid valve malfunction	
STEP	INSPECTION	ACTION	
1	Are amount and condition (color) of ATF OK? Check for ATF leakage at transmission connection and gasket Color ① Transparent red: Normal ② Black: Defective part in transmission ③ Light red: Water mixed in fluid ④ Reddish brown: Deteriorated ATF 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION, ATF Condition Inspection	Yes	Go to next step
		No	Adjust ATF amount or replace ATF if necessary - If ATF color is 2, disassemble transmission and repair or replace any defective parts as necessary - If ATF color is 3 or 4, replace ATF
2	Check line pressure in D range (except HOLD) Is line pressure OK? 05-13 MECHANICAL SYSTEM TEST, Line Pressure Test	Yes	Go to next step
		No	Repair or replace any defective parts ATF leakage in transmission case, oil pump, control valve
3	Inspect operation of solenoid valve - Disconnect negative battery cable - Disconnect solenoid connector - Is it operating OK?	Yes	Go to next step
		No	Replace torque converter clutch solenoid valve or torque converter clutch control solenoid valve
4	Check operation of each valve and inspect return spring Is each valve operating OK and is return spring OK?	Yes	Go to next step
		No	Repair or replace control valve and replace return spring
5	Check difference between engine speed and turbine speed during torque converter clutch operation in fourth gear - Connect EC-AT tester to transmission control module - Check difference between engine speed and turbine speed during torque converter clutch operation in fourth gear Is there a difference between engine speed and turbine speed? 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Replace torque converter
		No	Go to next step
6	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary slip of clutch, and should be investigated further

TROUBLESHOOTING

DTC P0750		SHIFT SOLENOID A—MALFUNCTION	
DETECTION CONDITION		• Damaged wiring or connectors between shift solenoid A and transmission control module • Short or open circuit in shift solenoid A • Short or open circuit in transmission control module internal transistor	
POSSIBLE CAUSE		• Damaged wiring or connectors between shift solenoid A and transmission control module • Short or open circuit in shift solenoid A • Short or open circuit in transmission control module internal transistor	
STEP	INSPECTION	ACTION	
1	Are transmission control module and shift solenoid A connections at connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector(s) Inspection step 5 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to transmission control module • Is light for shift solenoid A normally off and illuminated when valve is on? 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of shift solenoid A and transmission control module • Disconnect negative battery cable • Disconnect solenoid connector and transmission control module connector • Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When Yes, go to step 5 • When No, go to next step
4	Measure resistance at shift solenoid A terminal • Disconnect negative battery cable • Disconnect solenoid connector • Is resistance correct? 05-13 SOLENOID VALVE INSPECTION, Shift Solenoid A, B, C, 3-2 Control Solenoid Valve Inspection	Yes	Go to next step
		No	Replace shift solenoid A
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

TROUBLESHOOTING

DTC P0755		SHIFT SOLENOID B—MALFUNCTION	
DETECTION CONDITION		• Damaged wiring or connectors between shift solenoid B and transmission control module • Short or open circuit in shift solenoid B • Short or open circuit in transmission control module internal transistors	
POSSIBLE CAUSE		• Damaged wiring or connectors between shift solenoid B and transmission control module • Short or open circuit in shift solenoid B • Short or open circuit in transmission control module internal transistors	
STEP	INSPECTION	ACTION	
1	Are transmission control module and shift solenoid B connections at connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector(s) Inspection step 5 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to transmission control module • Is light for shift solenoid B normally off and illuminated when valve is on? ⓘ 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of shift solenoid B and transmission control module • Disconnect negative battery cable • Disconnect solenoid connector and transmission control module connector • Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When Yes, go to step 5 • When No, go to next step
4	Measure resistance at shift solenoid B terminal • Disconnect negative battery cable • Disconnect solenoid connector • Is resistance correct? ⓘ 05-13 SOLENOID VALVE INSPECTION, Shift Solenoid A, B, C, 3-2 Control Solenoid Valve Inspection	Yes	Go to next step
		No	Replace shift solenoid B
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

TROUBLESHOOTING

DTC P0760		SHIFT SOLENOID C—MALFUNCTION	
DETECTION CONDITION		• Damaged wiring or connectors between shift solenoid C and transmission control module • Short or open circuit in shift solenoid C • Short or open circuit in transmission control module internal transistors	
POSSIBLE CAUSE		• Damaged wiring or connectors between shift solenoid C and transmission control module • Short or open circuit in shift solenoid C • Short or open circuit in transmission control module internal transistors	
STEP	INSPECTION	ACTION	
1	Are transmission control module and shift solenoid C connections at connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector(s) Inspection step 5 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to transmission control module • Is light for shift solenoid C normally off and illuminated when valve is on? ⓘ 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of shift solenoid C and transmission control module • Disconnect negative battery cable • Disconnect solenoid connector and transmission control module connector • Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When Yes, go to step 5 • When No, go to next step
4	Measure resistance at shift solenoid C terminal • Disconnect negative battery cable • Disconnect solenoid connector • Is resistance correct? ⓘ 05-13 SOLENOID VALVE INSPECTION, Shift Solenoid A, B, C, 3-2 Control Solenoid Valve Inspection	Yes	Go to next step
		No	Replace shift solenoid C
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

TROUBLESHOOTING

DTC P1720		VSS2—NO VSS 2 SIGNAL	
DETECTION CONDITION		Signal from vehicle speed sensor is not input to transmission control module when vehicle is moving	
POSSIBLE CAUSE		- Vehicle speed sensor malfunction - Vehicle speedometer sensor malfunction - Damaged wiring or connectors between vehicle speedometer sensor, vehicle speed sensor, and transmission control module	
STEP	INSPECTION	ACTION	
1	Are transmission control module, vehicle speed sensor, and vehicle speedometer sensor connectors at connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector(s) Inspection step 7 - Yes: Go to next step - No: End of flowchart
2	Check EC-AT tester display - Connect EC-AT tester to transmission control module - Is vehicle speed indicated on EC-AT tester when vehicle is being driving? 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 7
		No	Go to next step
3	Check for continuity between terminals of vehicle speed sensor and transmission control module - Disconnect negative battery cable - Remove dashboard - Is there continuity between terminal 2F of dashboard and terminal 1P of transmission control module?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 - When Yes, go to step 7 - When No, go to next step
4	Check for movement of circuit tester needle when circuit tester is connected to terminals of dashboard - Disconnect negative battery cable - Remove dashboard - Connect circuit tester to terminal 2D and 2F of dashboard - Does the circuit tester needle move when the front wheel is rotated slowly?	Yes	Replace vehicle speed sensor Go to step 2 - When Yes, go to step 7 - When No, go to next step
		No	Go to next step
5	Check for continuity in harness between vehicle speedometer sensor and vehicle speed sensor - Disconnect negative battery cable - Disconnect vehicle speedometer sensor and vehicle speed sensor connectors - Is there continuity in the harness?	Yes	Go to next step
		No	Repair or replace connector or wiring Go to step 2 - When Yes, go to step 7 - When No, go to next step
6	Check for movement of circuit tester needle when circuit tester is connected to terminals of vehicle speedometer sensor - Disconnect negative battery cable - Disconnect vehicle speedometer sensor - Connect circuit tester to vehicle speedometer sensor connector - Does the circuit tester needle move when the driven gear while rotating	Yes	Go to next step
		No	Replace vehicle speedometer sensor
7	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

TROUBLESHOOTING

DTC P1743		SOLENOID TCC—OPEN OR SHORT	
DETECTION CONDITION		• Damaged wiring or connectors between torque converter clutch control solenoid valve and transmission control module • Short or open circuit in torque converter clutch control solenoid valve • Short or open circuit in transmission control module internal transistors	
POSSIBLE CAUSE		• Damaged wiring or connectors between torque converter clutch control solenoid valve and transmission control module • Short or open circuit in torque converter clutch control solenoid valve • Short or open circuit in transmission control module internal transistor	
STEP	INSPECTION		ACTION
1	Are transmission control module and torque converter clutch control solenoid valve connections at connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector(s) Inspection step 5 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to transmission control module • Is light for torque converter clutch control solenoid valve normally off and illuminated when valve is on? ☞ 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of torque converter clutch control solenoid valve and transmission control module • Disconnect negative battery cable • Disconnect solenoid connector and transmission control module connector • Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When Yes, go to step 5 • When No, go to next step
4	Measure resistance at torque converter clutch control solenoid valve terminal • Disconnect negative battery cable • Disconnect solenoid connector • Is resistance correct? ☞ 05-13 SOLENOID VALVE INSPECTION, Torque Converter Clutch Control Solenoid Valve Inspection	Yes	Go to next step
		No	Replace torque converter clutch control solenoid valve
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

TROUBLESHOOTING

DTC P1765		3-2 TIMING SOL. V—OPEN OR SHORT	
DETECTION CONDITION		• Damaged wiring or connectors between 3-2 control solenoid valve and transmission control module • Short or open circuit in 3-2 control solenoid valve • Short or open circuit in transmission control module internal transistors	
POSSIBLE CAUSE		• Damaged wiring or connectors between 3-2 control solenoid valve and transmission control module • Short or open circuit in 3-2 control solenoid valve • Short or open circuit in transmission control module internal transistors	
STEP	INSPECTION		ACTION
1	Are transmission control module and 3-2 control solenoid valve connections at connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector(s) Inspection step 5 • Yes: Go to next step • No: End of flowchart
2	Check EC-AT tester display • Connect EC-AT tester to transmission control module • Is light for 3-2 control solenoid valve normally off and illuminated when valve is on?  05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 5
		No	Go to next step
3	Check for continuity between terminals of 3-2 control solenoid valve and transmission control module • Disconnect negative battery cable • Disconnect solenoid connector and transmission control module connector • Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 • When Yes, go to step 5 • When No, go to next step
4	Measure resistance at 3-2 control solenoid valve terminal • Disconnect negative battery cable • Disconnect solenoid connector • Is resistance correct?  05-13 SOLENOID VALVES INSPECTION, Shift Solenoid A, B, C, 3-2 Control Solenoid Valve Inspection	Yes	Go to next step
		No	Replace 3-2 control solenoid valve
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

TROUBLESHOOTING

DTC P1790		TPS—OPEN OR SHORT	
DETECTION CONDITION		● Closed throttle position switch is OFF and throttle position sensor voltage is less than 0.0977 V or greater than 4.9414 V	
POSSIBLE CAUSE		● Throttle position sensor malfunction ● Damaged wiring or connector between engine control module and throttle position sensor ● Damaged wiring or connector between transmission control module and throttle position sensor ● Engine control module and/or transmission control module malfunction	
STEP	INSPECTION		ACTION
1	Is P0725 diagnostic trouble code output?	Yes	Refer to flowchart for P0725 and perform diagnostic troubleshooting
		No	Go to next step
2	Are all connections at connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector(s)
3	Measure throttle position sensor output voltage ● Connect EC-AT tester to transmission control module ● Is throttle position sensor voltage OK? ☞ 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 7
		No	Go to next step
4	Measure voltage at terminal 2A of transmission control module Is voltage at the terminal OK? ☞ 05-13 TRANSMISSION CONTROL MODULE, Terminal Voltage Chart	Yes	Replace the transmission control module
		No	Repair or replace connectors and wiring
5	Check for continuity between terminals of transmission control module and throttle position sensor ● Disconnect negative battery cable ● Disconnect transmission control module and throttle position sensor connectors ● Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring
6	Measure resistance between terminals of throttle position sensor ● Disconnect negative battery cable ● Disconnect throttle position sensor connector ● Is resistance between terminals OK?	Yes	Go to next step
		No	Adjust or replace throttle position sensor
7	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

TROUBLESHOOTING

DTC P1795		IDL SW—OPEN OR SHORT	
DETECTION CONDITION		The closed throttle position switch is ON, throttle position sensor is closed throttle position	
POSSIBLE CAUSE		- Damaged wiring or connectors between closed throttle position switch and transmission control module - Closed throttle position switch malfunction - Transmission control module malfunction	
STEP	INSPECTION	ACTION	
1	Are transmission control module and closed throttle position switch at the connector and connector pins OK?	Yes	Go to next step
		No	Repair or replace connector(s) Go to step 5 - When Yes, go to next step - When No, end of flow chart
2	Check EC-AT tester display - Connect the EC-AT tester to transmission control module - Are closed throttle position switch and EC-AT tester display correct? 05-13 ELECTRICAL SIGNAL INSPECTION, Indication Table	Yes	Go to step 6
		No	Go to next step
3	Check for continuity between terminals of closed throttle position switch and transmission control module - Disconnect negative battery cable - Disconnect closed throttle position switch and transmission control module connectors - Is there continuity between terminals?	Yes	Go to next step
		No	Repair or replace connectors and wiring Go to step 2 - When Yes, go to step 5 - When No, go to next step
4	Check for continuity between terminal of the closed throttle position switch as follows - Disconnect negative battery cable - Disconnect throttle position sensor connector - Is there continuity between terminals?	Yes	Go to next step
		No	Replace or adjust the throttle position sensor
5	After diagnostic trouble code has been cleared, recheck if diagnostic trouble code is shown	Yes	Replace the transmission control module
		No	Problem is a temporary poor connection of wiring or connectors, and should be investigated further

AUTOMATIC TRANSMISSION SYMPTOM TROUBLESHOOTING

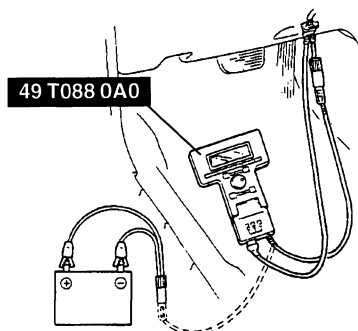
U5U501AB

General Notes

A problem with the EC-AT may be caused by the engine, the EC-AT powertrain, the hydraulic control system, or the electronic control system. When troubleshooting, therefore, begin from these points, which can be inspected quickly and easily. The recommended troubleshooting sequence is described below.

Step 1: On-board Diagnostic System Inspection

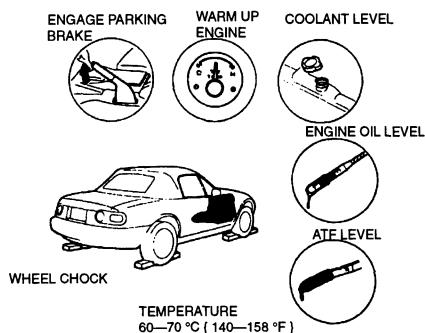
Check for diagnostic trouble code(s) memorized in the transmission control module with the NGS.



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Step 2: Mechanical System Test

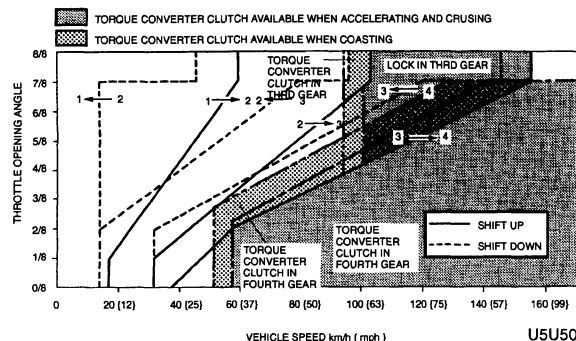
Check the engine stall speed, time lag, and line pressure.



U5U50105

Step 3: Road Test

Check the shift point, shift schedule, and shift shock.



U5U50106

After the above-mentioned 3 steps are followed, the cause of the problem should be located. Another guide to faster location of the causes of problems, the QUICK DIAGNOSIS CHART is available. In this chart, numbers are used to indicate the components that may be the cause of 22 possible problems. It is necessary to check only those components indicated by numbers during each step of the troubleshooting process to locate the cause of the problem quickly.

Quick Diagnosis Chart

The QUICK DIAGNOSIS CHART shown different problems and the relationship of components that might be the cause.

1. Components indicated in the "Adjustment" row indicate the possibility that the problem may result from an incorrect adjustment. Check the adjustment of each component, and readjust if necessary.
2. Components indicated in the "On-board Diagnostic" row are diagnosed by the transmission control module on-board diagnostic system.
3. Input and output signals of the transmission control module for components indicated in the "Tester" row can be easily checked with the EC-AT tester.
4. Components indicated in the "Mechanical System Test" row can be checked for malfunction by the results of oil pressure test.
5. Components indicated in the "Road Test" row can be checked for malfunction by the results of the road test.
6. The numbers in the chart indicate the order of inspection for detecting malfunctions.
7. Circled numbers indicate that the transmission must be removed from the vehicle.

TROUBLESHOOTING

		Possible Cause	Electronic control system							Preliminary	Hydraulic control system			Powertrain													
			Transmission range switch	HOLD switch	Cruise control switch	Vehicle speed sensor	Throttle position sensor (Full range)	Shift sol. and 3-2 control sol.	Input/turbine speed sensor		TCC control sol.	ATF level and condition	Selector lever	Idle speed & ignition timing	Vacuum diaphragm and rod	Control valve body	Accumulator	Oil pump	Torque converter	Direct clutch	Fourth gear brake band	Fourth gear one-way clutch	Front clutch	Second gear brake band	Rear clutch	Low and reverse brake	One-way clutch
Problem	On-board Diagnostic				○	○	○	○																			
	Adjustment	○								○	○	○	○													○	○
	Tester	○	○	○	○	○	○	○																			
	Stall Test																○				○		○	○	○		
	Time Lag Test														○						○		○	○	○		○
	Oil Pressure Test												○	○		○							○	○	○		
	Road Test										○			○	○			○	○	○	○	○	○	○	○	○	○
Accelerating	Vehicle does not move in D, S, L range, or R position									○	○		○		○	○	○			○		○	○	○	○		
	Vehicle moves in N position									○			○														
	Excessive creep										○					○											
	Not creep at all									○		○		○		○											
Shifting	No shift	○	○				○			○	○			○		○											
	Abnormal shift sequence	○	○	○		○	○	○		○	○			○				○		○	○					○	○
	Frequent shifting	○		○		○		○					○														
	Excessively high or low shift point	○	○			○	○	○			○			○													
	No TCC			○		○	○	○	○		○			○			○										
	No kickdown	○	○			○					○																
Slipping	Engine runaway or slip when starting vehicle	○								○			○	○		○		○				○	○	○	○		○
	Engine runaway or slip when up- or downshifting									○				○		○		○	○	○	○	○	○			○	○
Shift shock	Excessive N to D range or N to R position shift shock	○			○			○				○	○	○													
	Excessive shift shock when up-shifting or downshifting												○	○	○				○							○	○
	Excessive shift shock during change in range	○									○			○													○
Noise	Transmission noisy in N or P position									○			○	○				○									
	Transmission noisy in D, S, L range or R position												○				○										
Other	No engine braking						○			○	○			○		○	○	○			○	○	○	○		○	○
	Transmission overheats								○	○				○		○	○										
	White smoke discharged from exhaust									○			○	○													
	HOLD indicator flashes				○	○	○	○	○																		
	Engine will not start	○									○																

U5U50107

05-10 CLUTCH

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GENERAL PROCEDURES (CLUTCH)

Precaution Clutch pipe

- If a clutch pipe(s) has been disconnected anytime during the procedure, add brake fluid, bleed the air, and inspect for leakage after the procedure has been completed.

U5U510AA

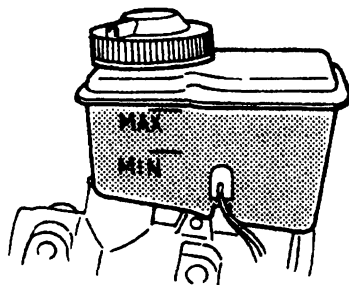
- If removing the clutch pipe, remove it by using the **SST** (49 0259 770B). If installing the clutch pipe, modify the clutch pipe tightening torque to allow for use of a torque wrench-**SST** (49 0259 770B) combination, and then tighten the clutch pipe by using the **SST** (49 0259 770B). (Refer to 00-00 FUNDAMENTAL PROCEDURES, Torque Formulas)

CLUTCH FLUID INSPECTION

U5U510AB

Note

- The fluid reservoir must be maintained between the MIN/MAX level during replacement.



U5U51001

CLUTCH

CLUTCH FLUID REPLACEMENT

U5U510AC

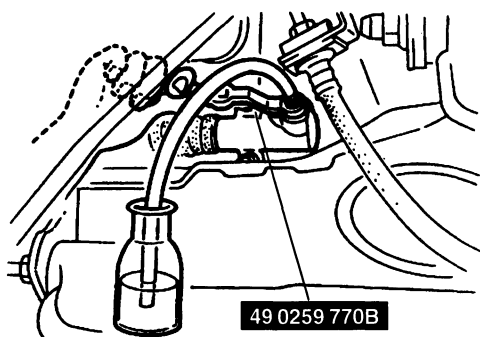
Caution

- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

Note

- Do not mix different brands of fluid.
- Do not reuse the clutch fluid that was drained.

1. Drain the fluid from the reservoir by using a suction pump. (Refer to 04-10 PRECAUTION (BRAKES).)
2. Remove the bleeder cap from the clutch release cylinder and attach a vinyl hose to the bleeder screw.
3. Insert the other end of the vinyl hose into a clear container.
4. Loosen the bleeder screw by using the **SST**.



U5U51002

5. With another person slowly pumping the clutch pedal, drain the fluid from the clutch system.
6. Repeat step 5 until all the fluid is drained.
7. Modify the bleeder screw tightening torque to allow for a torque wrench-**SST** combination. (Refer to 00-00 FUNDAMENTAL PROCEDURES, Torque Formulas.)
8. Tighten the bleeder screw by using the **SST**.

Tightening torque

5.9—8.8 N·m { 60—90 kgf·cm , 53—78 in·lbf }

9. Fill the reservoir to MAX with new fluid of the specified type.
10. Bleed the air from the clutch. (Refer to 05-10 CLUTCH FLUID AIR BLEEDING.)
11. Check for correct clutch operation.
12. Verify that there is no fluid leakage.

CLUTCH FLUID AIR BLEEDING

U5U510AD

Caution

- **Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.**

Note

- Do not mix different brands of fluid.
- Do not reuse the clutch fluid that was drained.

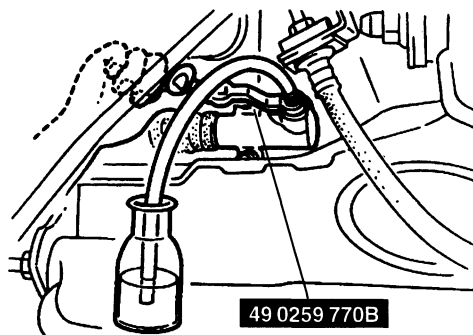
1. Remove the bleeder cap from the clutch release cylinder and attach a vinyl hose to the bleeder plug.
2. Place the other end of the vinyl hose in a clear container.
3. Slowly pump the clutch pedal several times.
4. With the clutch pedal depressed, loosen the bleeder screw by using the **SST** to let the fluid escape. Close the bleeder screw by using the **SST**.
5. Repeat Steps 3 and 4 until only clean fluid is seen.

6. Tighten the bleeder screw.

Tightening torque

5.9—8.8 N·m { 60—90 kgf·cm , 53—78 in·lbf }

7. Add fluid to the MAX mark.



U5U51004

CLUTCH PEDAL INSPECTION

U5U510AE

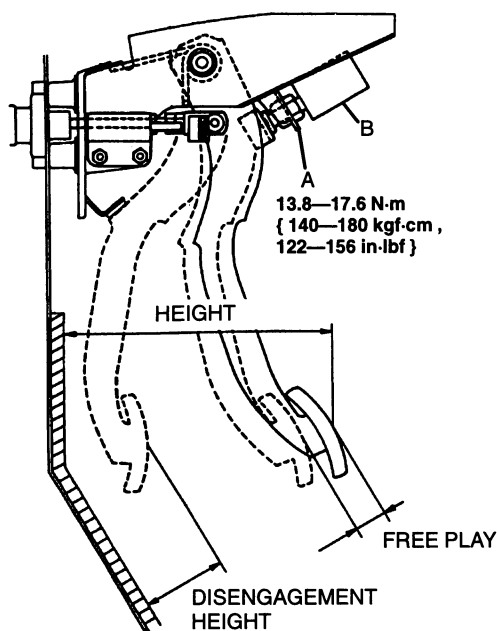
Clutch Pedal Height Inspection

1. Measure the distance from the upper surface of the pedal pad to the cabin carpet.

Pedal height

175—185 mm { 6.89—7.28 in } (With carpet)

CLUTCH



U5U51005

2. If necessary, adjust the height.

Clutch Pedal Free Play Inspection

1. Depress the clutch pedal by hand until clutch resistance is felt.

Free play

0.6—3.1 mm { 0.02—0.12 in }

Total free play

5—13 mm { 0.20—0.51 in }

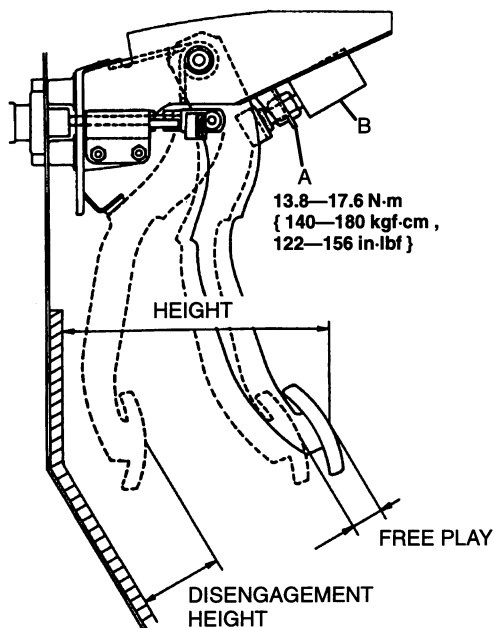
2. If necessary, adjust the free play.

CLUTCH PEDAL ADJUSTMENT

U5U510AF

Clutch Pedal Height Adjustment

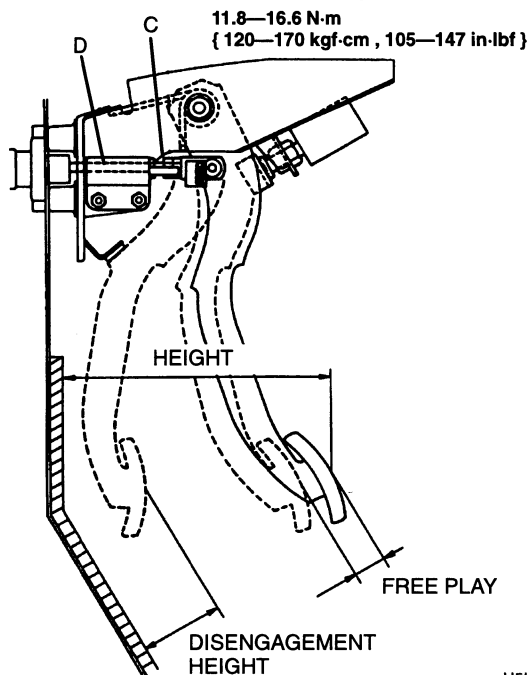
1. Disconnect the clutch switch connector.
2. Loosen locknut A and turn clutch switch B until the height is correct.
3. Tighten locknut A.



U5U51005

Clutch Pedal Free Play Adjustment

1. Loosen locknut C and turn push rod D until the free play is correct.
2. Verify that the disengagement height as measured from the upper surface of the pedal pad to the carpet is correct when the pedal is fully depressed.



U5U51006

Tightening torque

13.8—17.6 N·m
{ 140—180 kgf·cm, 122—156 in·lbf }

Minimum disengagement height
68 mm { 2.68 in } (With carpet)

4. After adjustment, inspect the free play.

3. Tighten locknut C.

CLUTCH

Tightening torque

11.8—16.6 N·m

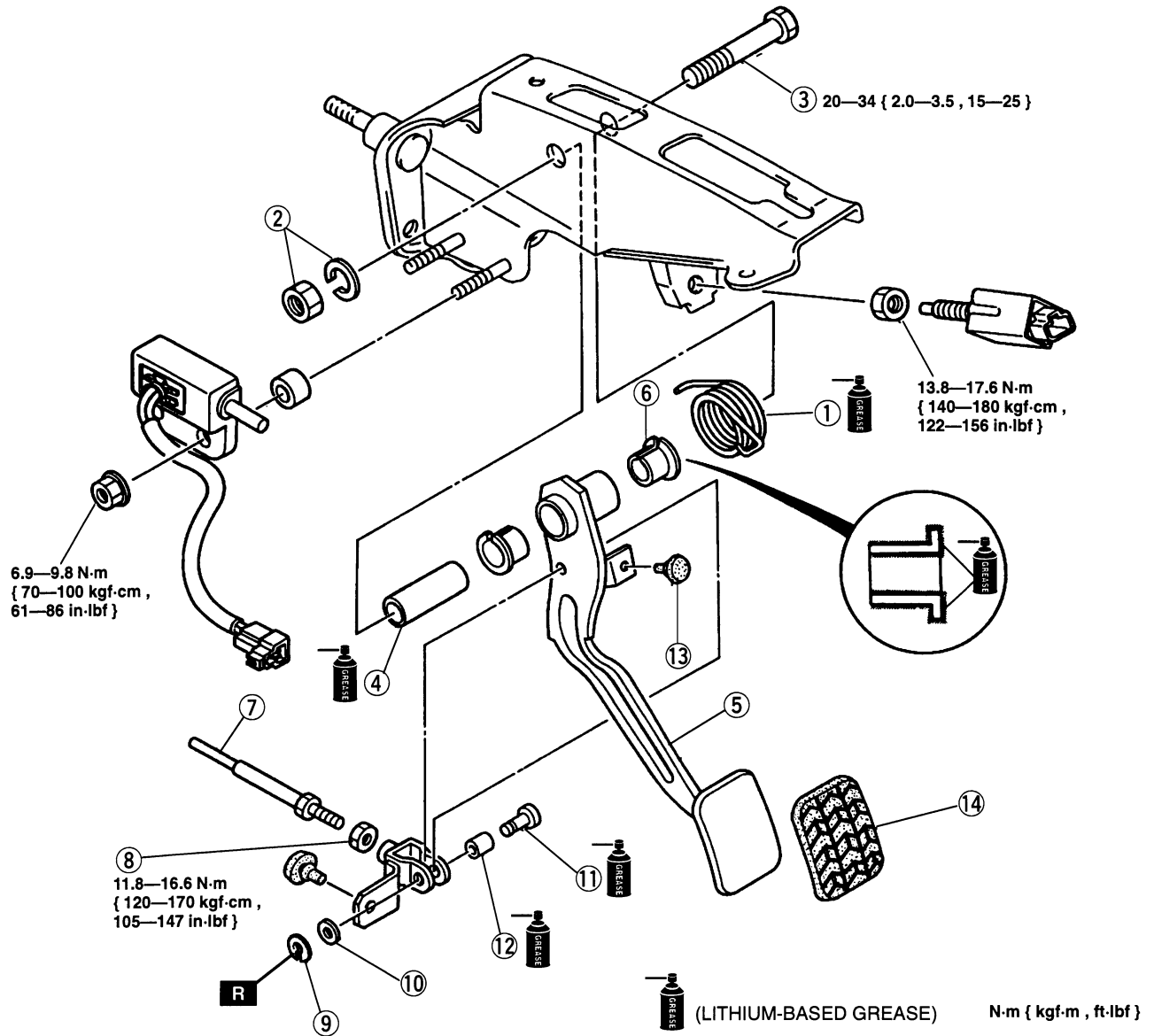
{ 120—170 kgf·cm , 105—147 in·lbf }

4. After adjustment, inspect the height.

U5U510AG

CLUTCH PEDAL REMOVAL / INSTALLATION

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



U5U51007

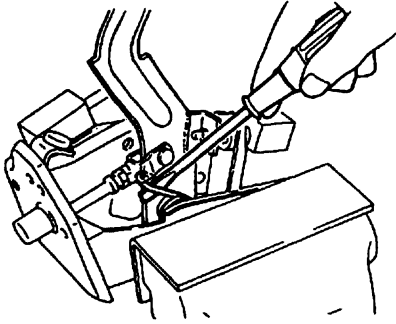
1	Spring ☞ Removal Note ☞ Installation Note
2	Nut and lock washer
3	Bolt
4	Spacer
5	Clutch pedal
6	Bushing
7	Push rod

8	Nut
9	Clip
10	Wave washer
11	Pin
12	Spacer
13	Stop
14	Pedal pad

CLUTCH

Spring Removal Note

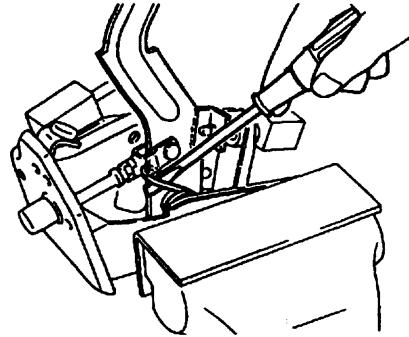
1. Place the clutch pedal component in a vise.
2. Pry the spring off the clutch pedal as shown in the figure.



U5U51008

Spring Installation Note

1. Place the clutch pedal component in a vise.
2. Install the spring onto the clutch pedal as shown in the figure.
3. Adjust the clutch pedal height and free play after installation.



U5U51009

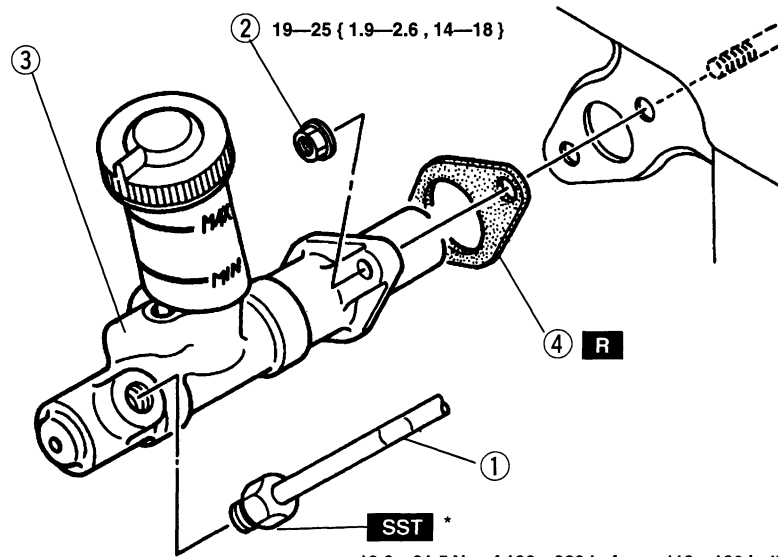
CLUTCH MASTER CYLINDER REMOVAL / INSTALLATION

U5U510AH

Caution

- Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal indicated in the table.
3. Inspect and adjust the clutch pedal height and free play.



* 49 0259 770B

12.8—21.5 N·m { 130—220 kgf·cm , 113—190 in·lbf }

N·m { kgf·m , ft·lbf }

U5U51010

1	Clutch pipe
2	Nut

3	Clutch master cylinder ☞ 05-10 CLUTCH MASTER CYLINDER DIS- ASSEMBLY / ASSEMBLY ☞ 05-10 CLUTCH FLUID AIR BLEEDING
4	Gasket

CLUTCH

CLUTCH MASTER CYLINDER DISASSEMBLY / ASSEMBLY

U5U510AR

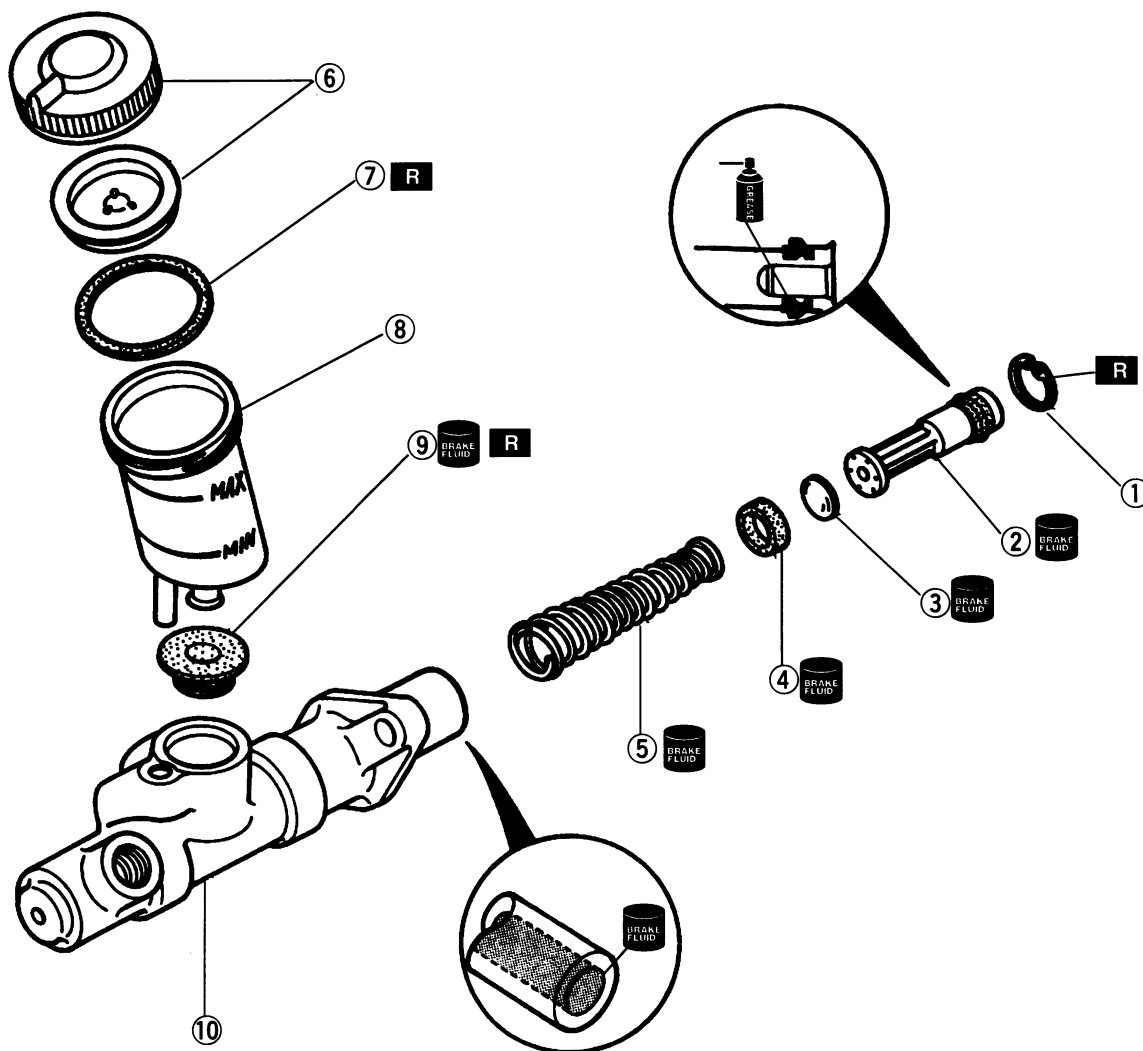
1. Disassemble in the order indicated in the table.

Warning

- Applying compressed air to the cylinder component can make the contents suddenly pop out, possibly causing injury. Hold a rag over the cylinder opening when using compressed air.

2. Wipe all parts, and use compressed air to clean all ports, passages, and inner parts.

3. Assemble in the reverse order of disassembly indicated in the table.



U5U51011

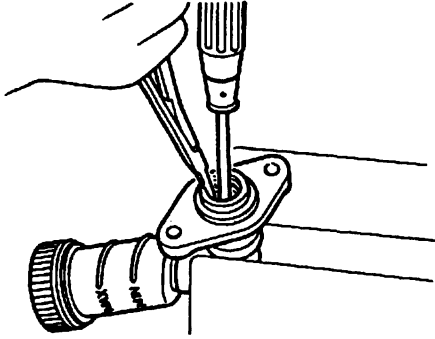
1	Snap ring ☞ Disassembly / Assembly Note
2	Piston and secondary cup component
3	Spacer
4	Primary cup
5	Return spring

6	Cap
7	Packing
8	Reservoir
9	Bushing
10	Master cylinder body

CLUTCH

Snap Ring Disassembly / Assembly Note

- While holding the piston down with a cloth-wrapped Phillips screwdriver, remove the snap ring.



U5U51012

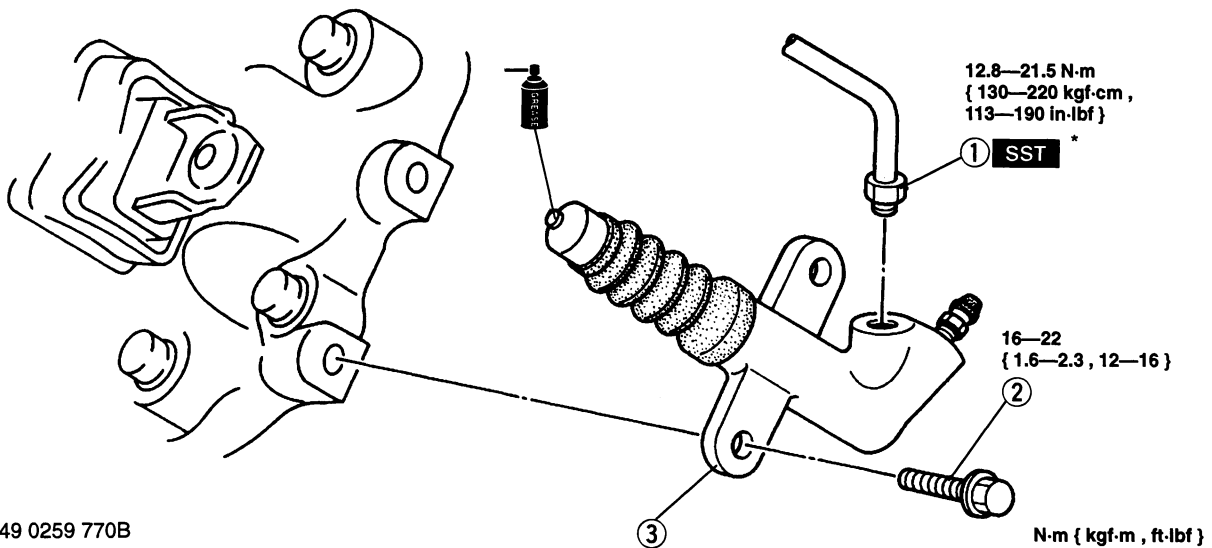
CLUTCH RELEASE CYLINDER REMOVAL / INSTALLATION

U5U510AJ

Caution

- Clutch fluid will damage painted surfaces. If clutch fluid does get on a painted surface, wipe it off immediately.

- Remove in the order indicated in the table.
- Install in the reverse order of removal indicated in the table.



U5U51013

1	Clutch pipe
2	Bolt

3	Clutch release cylinder ☞ 05–10 CLUTCH RELEASE CYLINDER DIS- ASSEMBLY / ASSEMBLY ☞ 05–10 CLUTCH FLUID AIR BLEEDING
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CLUTCH

CLUTCH RELEASE CYLINDER DISASSEMBLY / ASSEMBLY

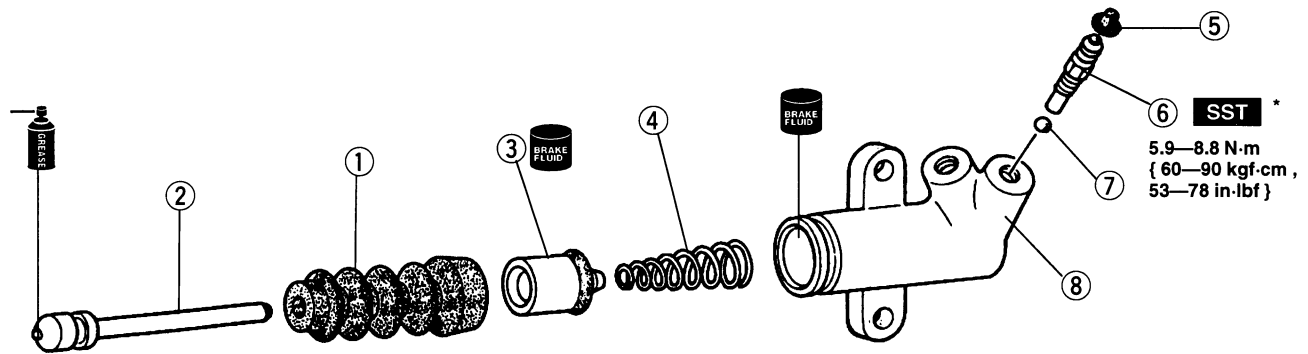
U5U510AK

1. Disassemble in the order indicated in the table.

Warning

- Applying compressed air to the cylinder component can make the contents suddenly pop out, possibly causing injury. Hold a rag over the cylinder opening when using compressed air.

2. Wipe all parts, and use compressed air to clean all ports, passages, and inner parts.
3. Assemble in the reverse order of disassembly indicated in the table.



* 49 0259 770B

U5U51014

1	Boot
2	Push rod
3	Piston and cup component
4	Spring

5	Bleeder cap
6	Bleeder screw
7	Steel ball
8	Release cylinder body

CLUTCH

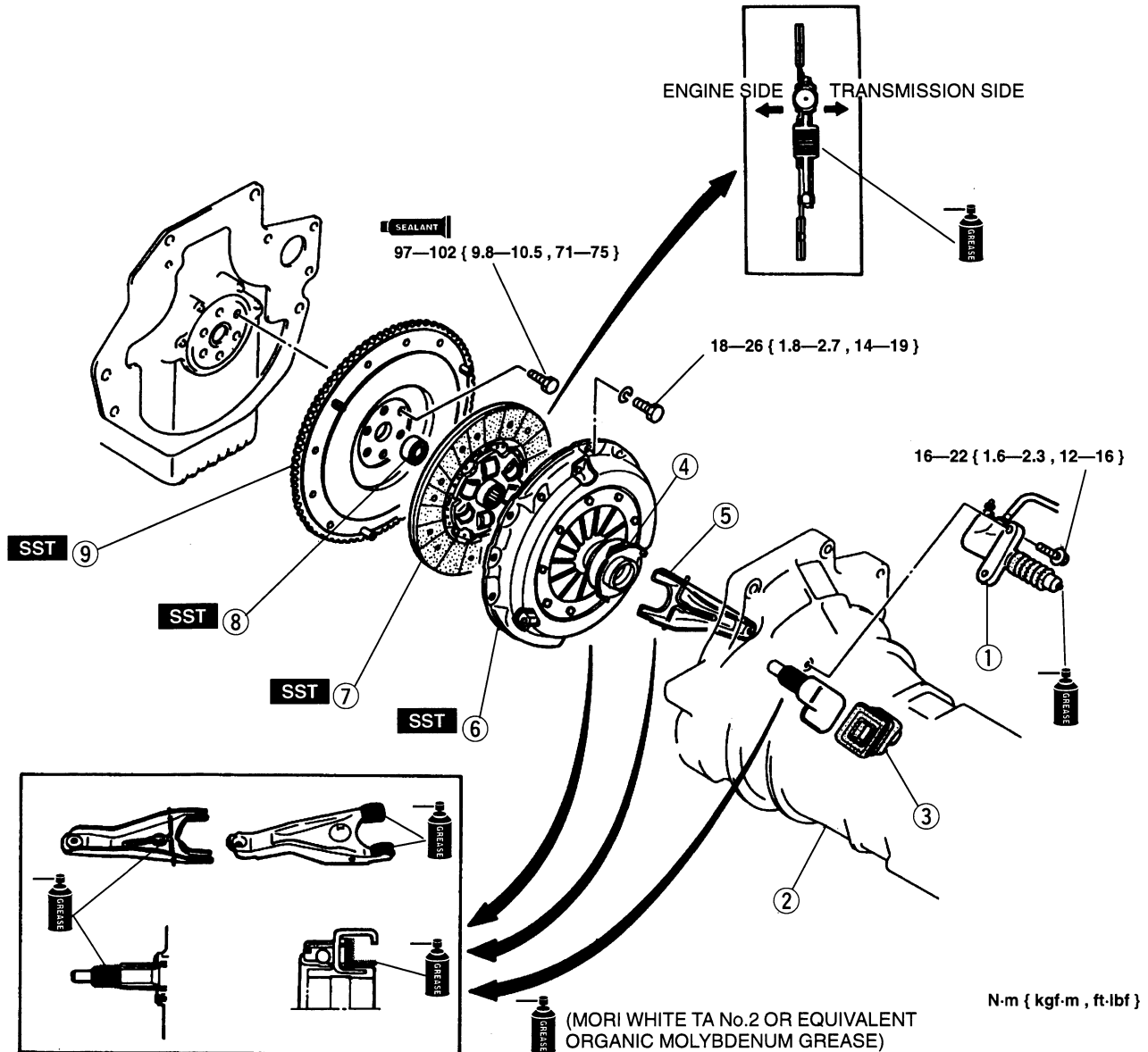
CLUTCH UNIT REMOVAL / INSTALLATION

U5U510AL

Note

- The clutch release cylinder can be removed from the transmission with the clutch pipe connected.

- Remove in the order indicated in the table.
- Install in the reverse order indicated in the table.



U5U51015

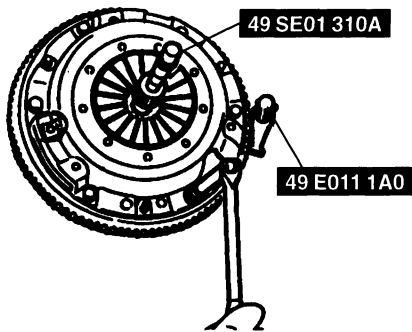
1	Clutch release cylinder
2	Transmission ☞ 05-11 MANUAL TRANSMISSION REMOVAL / INSTALLATION
3	Boot
4	Clutch release collar ☞ 05-10 CLUTCH RELEASE COLLAR INSPECTION
5	Clutch release fork
6	Clutch cover ☞ Removal Note ☞ 05-10 CLUTCH COVER INSPECTION ☞ Installation Note

7	Clutch disc ☞ Removal Note ☞ 05-10 CLUTCH DISC INSPECTION ☞ Installation Note
8	Pilot bearing ☞ Removal Note ☞ 05-10 PILOT BEARING INSPECTION ☞ Installation Note
9	Flywheel ☞ Removal Note ☞ 05-10 FLYWHEEL INSPECTION ☞ Installation Note

CLUTCH

Clutch Cover and Clutch Disc Removal Note

1. Install the **SST**.

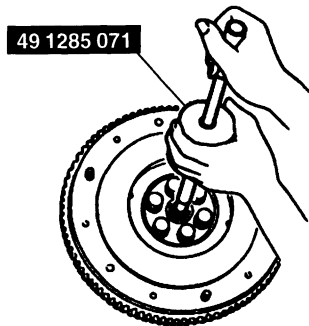


2. Hold the flywheel by using the **SST** or equivalent.
3. Loosen each bolt one turn at a time in a crisscross pattern until spring tension is released. Then remove the clutch cover and disc.

Pilot Bearing Removal Note

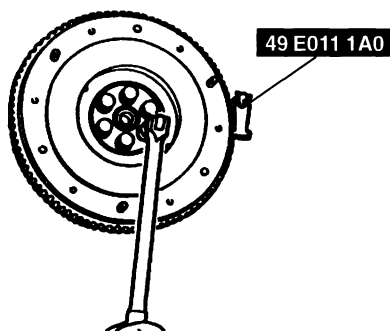
Note

- The pilot bearing does not need to be removed unless you are replacing it.
- Remove the pilot bearing by using the **SST**.



Flywheel Removal Note

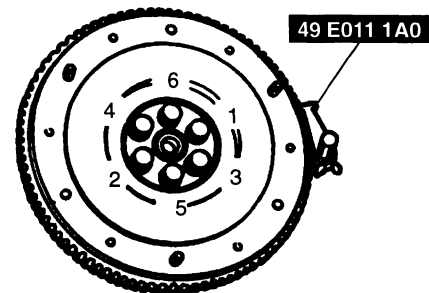
1. Hold the flywheel by using the **SST** or equivalent.



2. Remove the flywheel.
3. Inspect for oil leakage from the crankshaft rear oil seal. If there is any such leakage or if the oil seal is damaged, refer to section B and replace the crankshaft oil seal.

Flywheel Installation Note

1. Wipe the bolts clean, then apply sealant to the bolt threads.
2. Install the flywheel, and secure it by using the **SST** or equivalent.



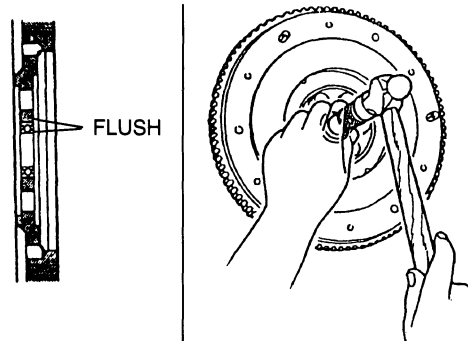
3. Tighten the bolts in the pattern shown.

Tightening torque

97—102 N·m { 9.8—10.5 kgf·m , 71—75 ft·lbf }

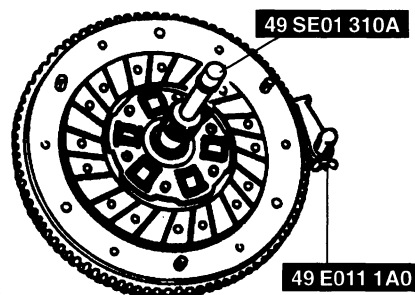
Pilot Bearing Installation Note

- Install a new pilot bearing flush with the flywheel by using a suitable pipe.



Clutch Disc Installation Note

1. Clean the clutch disc splines and main drive gear splines, and apply Mori White TA No.2 or equivalent organic molybdenum grease.
2. Hold the clutch disc in position by using the **SST** or equivalent.



Clutch Cover Installation Note

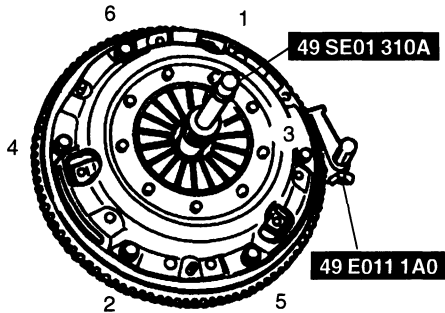
1. Hold the flywheel by using the **SST** or equivalent.
2. Align the dowel holes with the flywheel dowels.

CLUTCH

3. Tighten the bolts evenly and gradually in the pattern shown.

Tightening torque

18—26 N·m { 1.8—2.7 kgf·m , 14—19 ft·lbf }



U5U51022

CLUTCH COVER INSPECTION

U5U510AM

1. Inspect the contact surface for scoring, cracks, and burning. Repair or replace as necessary.
2. Remove minor scoring or burning by using emery paper. Repair if scoring or burning is major. Replace if cracked.
3. Inspect the tips of the diaphragm spring for wear and cracks.
4. If there is wear or cracks, replace the clutch cover.

CLUTCH DISC INSPECTION

U5U510AN

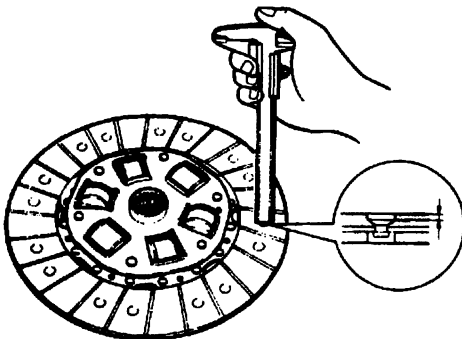
1. Inspect the lining surface for burning and oil contamination. Repair by using sandpaper if the trouble is minor. Replace the clutch disc if it is badly burned or oil soaked.
2. Inspect for loose facing rivets or torsion dampers. Replace the clutch disc if any are loose.
3. Measure the thickness of the lining at a rivet head on both sides by using vernier calipers. Replace the clutch disc if less than minimum.
4. Measure the clutch disc runout by using a dial indicator. Replace the clutch disc if runout is excessive.

Maximum runout

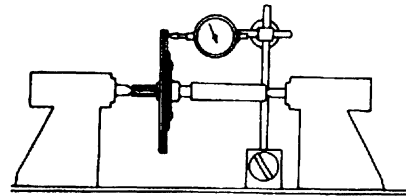
0.7 mm { 0.028 in }

Minimum thickness

0.3 mm { 0.012 in }



U5U51025



U5U51026

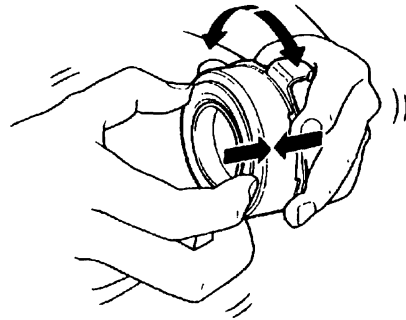
CLUTCH

CLUTCH RELEASE COLLAR INSPECTION

U5U510AS

Caution

- Cleaning the clutch release collar with cleaning fluids or a steam cleaner can wash the grease out of the sealed bearing.
- Turn the collar while applying force in the axial direction. If the collar sticks or has excessive resistance, replace it.

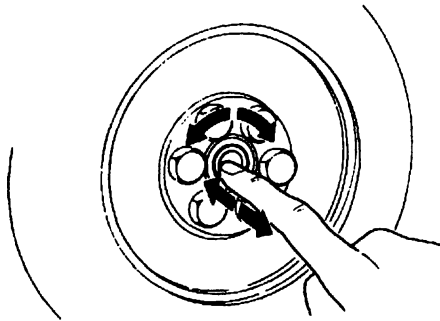


U5U51027

PILOT BEARING INSPECTION

U5U510AP

1. Turn the bearing while applying force in the axial direction.
2. If the bearing sticks or has excessive resistance, replace it.



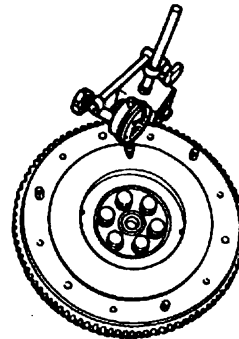
U5U51028

FLYWHEEL INSPECTION

U5U510AQ

1. Inspect the contact surface for scoring, cracks, and burning.
2. Remove minor scoring or burning by using emery paper. Repair if scoring or burning is major. Replace if cracked.
3. Inspect the ring gear teeth for wear or damage.
4. Measure the flywheel runout by using a dial indicator. Replace the flywheel if runout is excessive.

Maximum runout
0.2 mm { 0.008 in }



U5U51031

05-11 **MANUAL TRANSMISSION**

GENERAL PROCEDURES

(MANUAL TRANSMISSION)	05-11-2
Precaution	05-11-2

TRANSMISSION OIL INSPECTION	05-11-2
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TRANSMISSION OIL REPLACEMENT .	05-11-3
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OIL SEAL (REAR) REPLACEMENT ...	05-11-3
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MANUAL TRANSMISSION

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Power Plant Frame (PPF)	
Removal Note	05-11-5

Transmission Removal Note	05-11-5
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Transmission Installation Note	05-11-5
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Power Plant Frame (PPF)	
Installation Note	05-11-6

Shift Lever Installation Note	05-11-6
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HOUSING COMPONENTS

DISASSEMBLY	05-11-7
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Extension Housing Disassembly Note	05-11-8
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Transmission Case Disassembly Note	05-11-8
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HOUSING COMPONENTS ASSEMBLY	05-11-8
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Oil Seal Assembly Note	05-11-9
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Extension Housing Assembly Note ...	05-11-9
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Main Drive Gear Bearing	
Assembly Note	05-11-9

Countershaft Front Bearing	
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Assembly Note	05-11-9
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Adjustment Shim Assembly Note	05-11-9
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Clutch Release Fork And Clutch	
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Release Collar Assembly Note	05-11-10
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SHIFT FORK AND SHIFT ROD PARTS

DISASSEMBLY / ASSEMBLY	05-11-10
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Clip Disassembly Note	05-11-11
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Spring And Ball Assembly Note	05-11-11
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5th/Reverse Shift Fork And Rod	
Assembly Note	05-11-11

Interlock Pin Assembly Note	05-11-12
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1st/2nd And 3rd/4th Shift Fork And Rod,	
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Interlock Pin Assembly Note	05-11-12
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Spring, Clip Assembly Note	05-11-12
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Intermediate Housing Assembly Note .	05-11-13
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SHIFT FORK AND SHIFT ROD PARTS

INSPECTION	05-11-13
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Springs Inspection	05-11-13
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Intermediate Housing Inspection	05-11-13
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1st/2nd, 3rd/4th And 5th/Reverse Shift Fork	
Inspection	05-11-13

MAINSHAFT AND COUNTERSHAFT PARTS

DISASSEMBLY	05-11-14
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Mainshaft Rear Bearing	
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Disassembly Note	05-11-15
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Locknut (Countershaft)	
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Disassembly Note	05-11-15
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Countershaft Rear Bearing	
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Disassembly Note	05-11-16
------------------------	----------

Locknut (Mainshaft) Disassembly Note	05-11-16
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Main Drive Gear Bearing	
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Disassembly Note	05-11-16
------------------------	----------

Countershaft Front Bearing	
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Disassembly Note	05-11-16
------------------------	----------

Bearing Housing Component	
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Disassembly Note	05-11-16
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MAINSHAFT AND COUNTERSHAFT PARTS

ASSEMBLY	05-11-17
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Mainshaft And Countershaft Component

Assembly Note	05-11-18
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Locknut (Mainshaft) Assembly Note ..	05-11-18
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Thrust Lock Washer Assembly Note ..	05-11-18
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Mainshaft Rear Bearing Assembly Note	05-11-18
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Countershaft Rear Bearing

Assembly Note	05-11-19
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Locknut (Countershaft) Assembly Note	05-11-19
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MAINSHAFT AND COUNTERSHAFT PARTS

INSPECTION	05-11-19
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Bearing Inspection	05-11-19
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Each Gear And Main Drive Gear	
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Inspection	05-11-20
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Clutch Hub Component Inspection ...	05-11-20
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Synchronizer Ring Inspection	05-11-20
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Countershaft Inspection	05-11-20
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MAINSHAFT PARTS

DISASSEMBLY / ASSEMBLY	05-11-21
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3rd/4th Clutch Hub Component	
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Disassembly Note	05-11-22
------------------------	----------

1st/2nd Clutch Hub Component	
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Disassembly Note	05-11-22
------------------------	----------

Clutch Hub Component	
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Assembly Note	05-11-22
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MAINSHAFT PARTS INSPECTION	05-11-22
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Each Gear Inspection	05-11-22
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Synchronizer Ring Inspection	05-11-22
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Clutch Hub Component Inspection ...	05-11-23
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Synchronizer Component (2nd)	
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Inspection	05-11-23
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Mainshaft Inspection	05-11-23
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BEARING HOUSING COMPONENT

DISASSEMBLY / ASSEMBLY	05-11-24
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Reverse Idler Gear Shaft	
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Disassembly Note	05-11-25
------------------------	----------

Mainshaft Front Bearing	
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Disassembly Note	05-11-25
------------------------	----------

Countershaft Center Bearing	
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Disassembly Note	05-11-25
------------------------	----------

Countershaft Center Bearing Adjustment	
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Shim Assembly Note	05-11-25
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Countershaft Center Bearing	
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Assembly Note	05-11-25
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Mainshaft Front Bearing Adjustment Shim	
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Assembly Note	05-11-25
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Mainshaft Front Bearing	
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Assembly Note	05-11-25
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Reverse Idler Gear Shaft	
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Assembly Note	05-11-25
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Reverse Idler Gear Assembly Note ...	05-11-25
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BEARING HOUSING COMPONENT

INSPECTION	05-11-26
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Reverse Idler Gear And Shaft	
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Inspection	05-11-26
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Bearing Inspection	05-11-26
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EXTENSION HOUSING PARTS

DISASSEMBLY / ASSEMBLY	05-11-26
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Rod Cover Assembly Note	05-11-27
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Roll Pin Assembly Note	05-11-27
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Select-lock Spindle, Spring, And	
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Spring Cap Assembly Note	05-11-27
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GENERAL PROCEDURES (MANUAL TRANSMISSION)

Precaution

Transmission disassembly / assembly

- Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvent before disassembly.

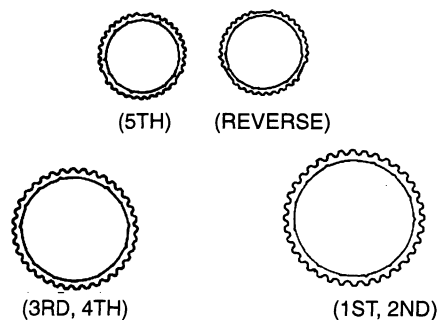
Warning

- **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.**
- Clean the removed parts (except sealed bearings) and all sealing surfaces with cleaning solvent, and dry with compressed air. Clean out all holes and passages with compressed air, and check that there are no obstructions.
- All O-rings and gaskets must be replaced with the new ones included in the overhaul kit.
- Before assembly, make sure all parts are completely clean.
- Assemble the parts within 10 minutes after applying sealant. Allow all sealant to cure at least 30 minutes after assembly before filling the transmission with transmission oil.

Clutch hub

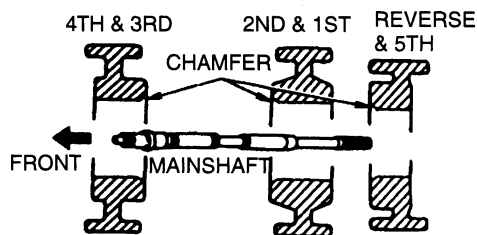
- For the synchronizer components, align the synchronizer ring grooves and synchronizer keys.
- The synchronizer rings can be distinguished as shown in the figure. The inner diameters of the 2nd synchronizer ring is larger than the 1st.

U5U511AA



U5U51101

- When installing the gears and clutch hub components in the following procedure, make sure that they are installed in the direction shown in the figure.

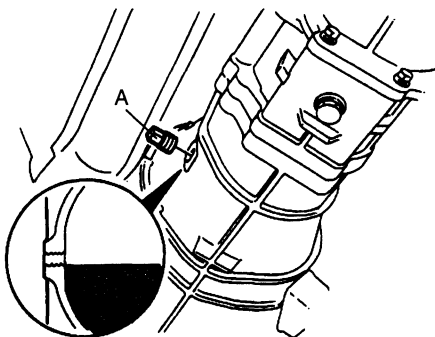


U5U51102

TRANSMISSION OIL INSPECTION

U5U511AB

1. Remove check plug A.



U5U51103

2. Verify that the oil is at the neck of the check plug hole as shown. If it is low, add the specified oil from check plug A.
3. Wipe the plug clean and apply sealant to the plug threads before installing.

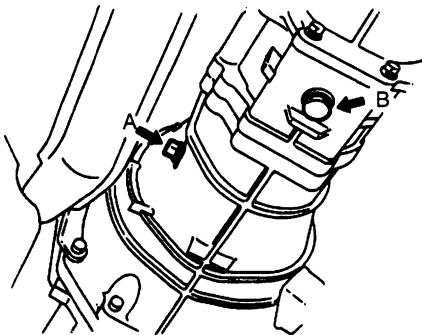
Tightening torque

A: 25—39 N·m { 2.5—4.0 kgf·m , 19—28 ft·lbf }

TRANSMISSION OIL REPLACEMENT

U5U511AC

1. Remove plugs B (with washer) and A.



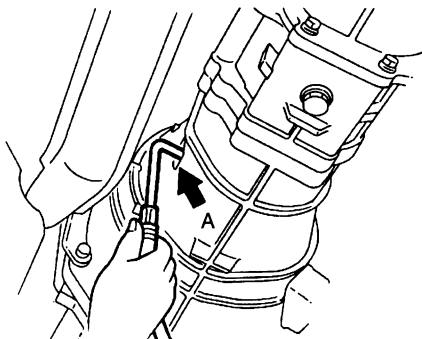
U5U51104

2. Drain the oil into a container.
3. Wipe all plugs clean.
4. Install drain plug B (with new washer).

Tightening torque

B: 40—58 N·m { 4.0—6.0 kgf·m , 29—43 ft·lbf }

5. Add the specified oil from check plug A port until the level reaches the neck of check plug hole.



U5U51105

Specified oil

API service GL-4 or GL-5

All-season: SAE 75W-90

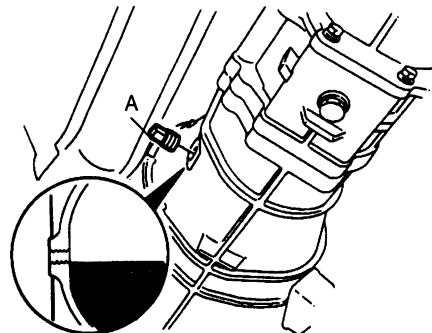
Above 10 °C { 50 °F } : SAE 80W-90

Capacity

2.0 L { 2.1 US qt , 1.8 Imp qt }

6. Apply sealant to threads of plug A.

7. Install plug A.



U5U51106

Tightening torque

A: 25—39 N·m { 2.5—4.0 kgf·m , 19—28 ft·lbf }

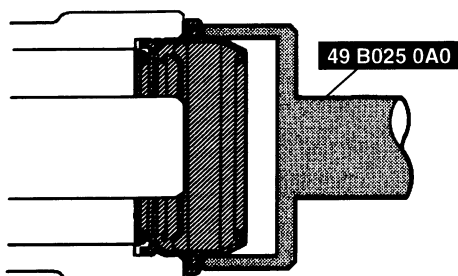
OIL SEAL (REAR) REPLACEMENT

U5U511AD

1. Raise the vehicle and support it with safety stands.
2. Remove the propeller shaft. (Refer to 03-15 PROPELLER SHAFT REMOVAL / INSTALLATION.)
3. Remove the oil seal from the extension housing.
4. Apply the specified oil to a new oil seal.
5. Install the new oil seal by using the SST.

6. Install the propeller shaft. (Refer to 03-15 PROPELLER SHAFT REMOVAL / INSTALLATION.)

7. Inspect the oil level. (Refer to 05-11 TRANSMISSION OIL INSPECTION.)



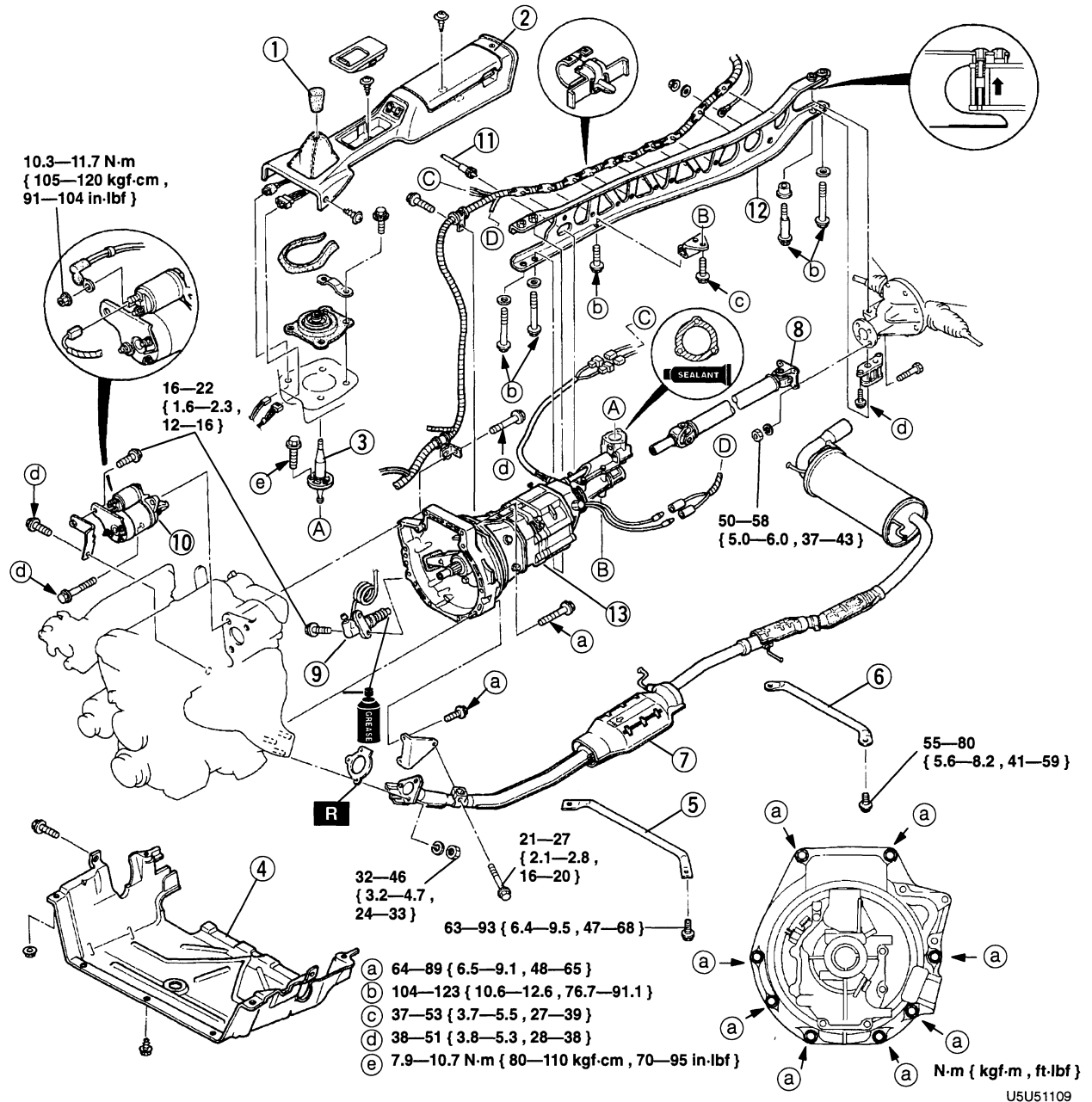
U5U51107

MANUAL TRANSMISSION

MANUAL TRANSMISSION REMOVAL / INSTALLATION

U5U511AE

1. Drain the transmission oil. (Refer to 05-11 TRANSMISSION OIL REPLACEMENT.)
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal indicated in the table.
4. Add the specified amount and type of transmission oil. (Refer to 05-11 TRANSMISSION OIL REPLACEMENT.)
5. Warm up the engine and transmission, inspect for oil leakage, and check transmission operation.



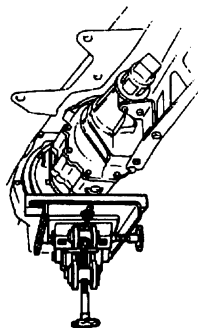
1	Shift lever knob
2	Rear console
3	Shift lever ☞ Installation Note
4	Undercover
5	Performance rod
6	Differential mounting pipe
7	Exhaust pipe
8	Propeller shaft ☞ 03-15 PROPELLER SHAFT REMOVAL / INSTALLATION

9	Clutch release cylinder
10	Starter
11	Speedometer cable
12	Power plant frame (PPF) ☞ Removal Note ☞ Installation Note
13	Transmission ☞ Removal Note ☞ Installation Note

MANUAL TRANSMISSION

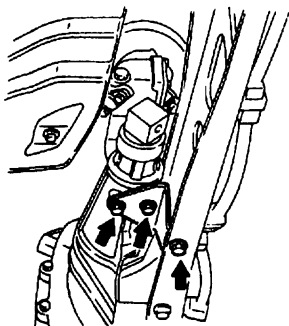
Power Plant Frame (PPF) Removal Note

1. Disconnect the wire harness from the PPF.
2. Support the transmission with a jack.



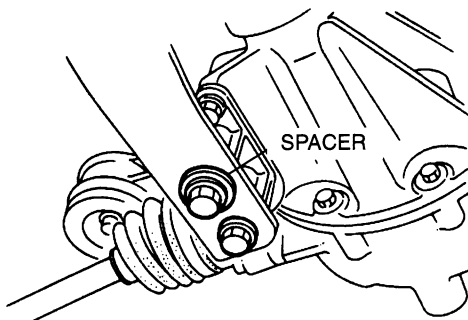
U5U51110

3. Remove the PPF bracket.



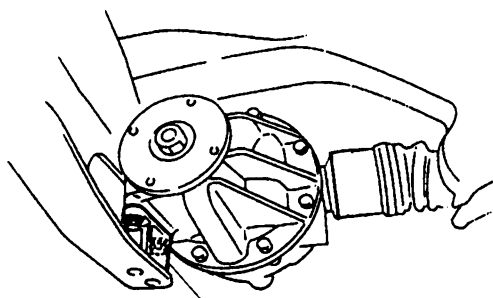
U5U51111

4. Remove the differential-side bolts, and pry out the spacer.



U5U51112

5. Remove the differential mounting spacer.



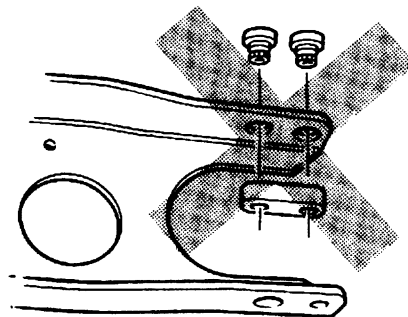
DIFFERENTIAL MOUNTING SPACER

U5U51113

Caution

- Removing the PPF spacers will reduce the performance of the PPF. If the spacers are removed, replace the PPF as an assembly.

6. Remove the transmission-side bolts, and remove the PPF.



U5U51114

Note

- If the sleeve can not be removed easily, tap the side of the sleeve with a plastic hammer.

7. Remove the sleeve.

Transmission Removal Note

1. Support the transmission with a transmission jack.
2. Loosen the transmission installation bolts.

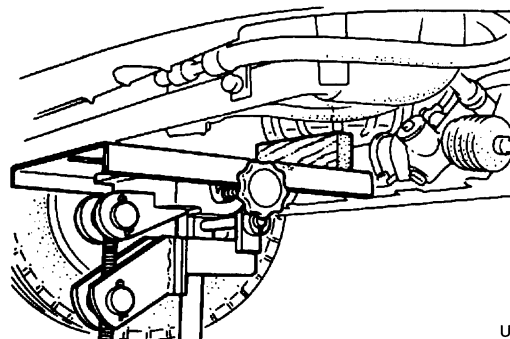
Caution

- Shaking the transmission could damage the crankshaft position sensor on the engine. When removing the transmission, do not shake it up and down or side to side.

3. Remove the transmission.

Transmission Installation Note

1. Tilt the engine by pushing up on the front of the oil pan with a wooden block and a transmission jack.
2. Support the transmission with a transmission jack.



U5U51115

3. Raise the transmission into place and install and tighten the installation bolts.

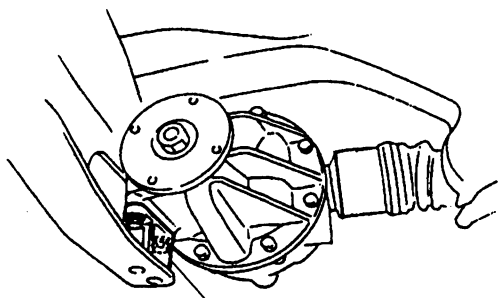
Tightening torque

64—89 N·m { 6.5—9.1 kgf·m , 48—65 ft·lbf }

MANUAL TRANSMISSION

Power Plant Frame (PPF) Installation Note

1. Install the differential mounting spacer.



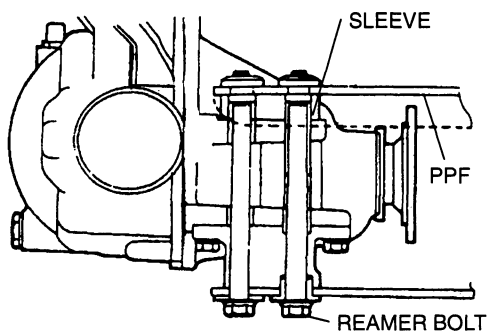
DIFFERENTIAL MOUNTING SPACER

U5U51116

Tightening torque

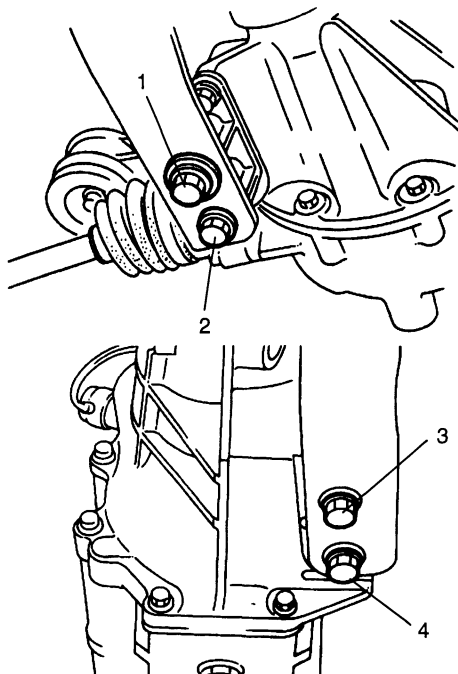
38—51 N·m { 3.8—5.3 kgf·m , 28—38 ft·lbf }

2. Support the transmission with a jack so that it is level.
3. Position the PPF and install the sleeve.



U5U51117

4. Install the spacer and bolts and snugly tighten the reamer bolt. The reamer bolt should be installed in the forward hole.
5. Tighten the outer bolts snugly.
6. Tighten the bolts to the specified torque in the order shown.

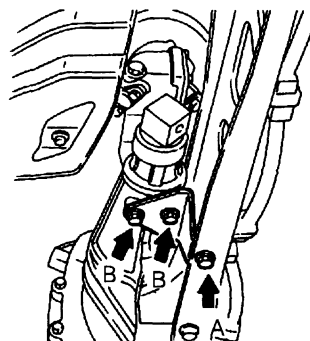


U5U51118

Tightening torque

104—123 N·m { 10.6—12.6 kgf·m , 77—91 ft·lbf }

7. Install the PPF bracket.



U5U51119

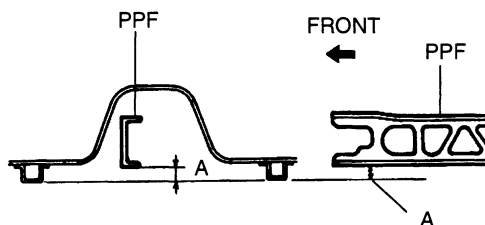
Tightening torque

A: 104—123 N·m

{ 10.6—12.6 kgf·m , 76.7—91.1 ft·lbf }

B: 37—53 N·m { 3.7—5.5 kgf·m , 27—39 ft·lbf }

8. Remove the jack, and connect the wire harness.
9. Measure distance A with a straightedge and vernier calipers.



U5U51120

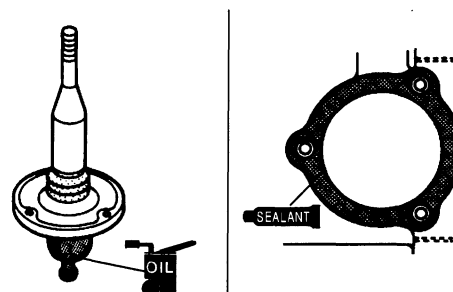
Distance

A: 66.0 ± 5 mm { 2.60 ± 0.197 in }

10. If the distance is not within the specification, reposition the PPF to the transmission.

Shift Lever Installation Note

1. Pour the specified amount of oil into the change control case. The change control case must also be filled with the specified amount of oil whenever the extension housing has been removed or the transmission has been overhauled.



U5U51121

MANUAL TRANSMISSION

Specified oil

Grade: API service GL-4 or GL-5

All season: SAE 75 W-90

Above 10 °C { 50 °F } : SAE 80 W-90

Specified amount: 80—95 cc { 4.9—5.8 cu in }

2. Apply oil to the shift lever as shown.

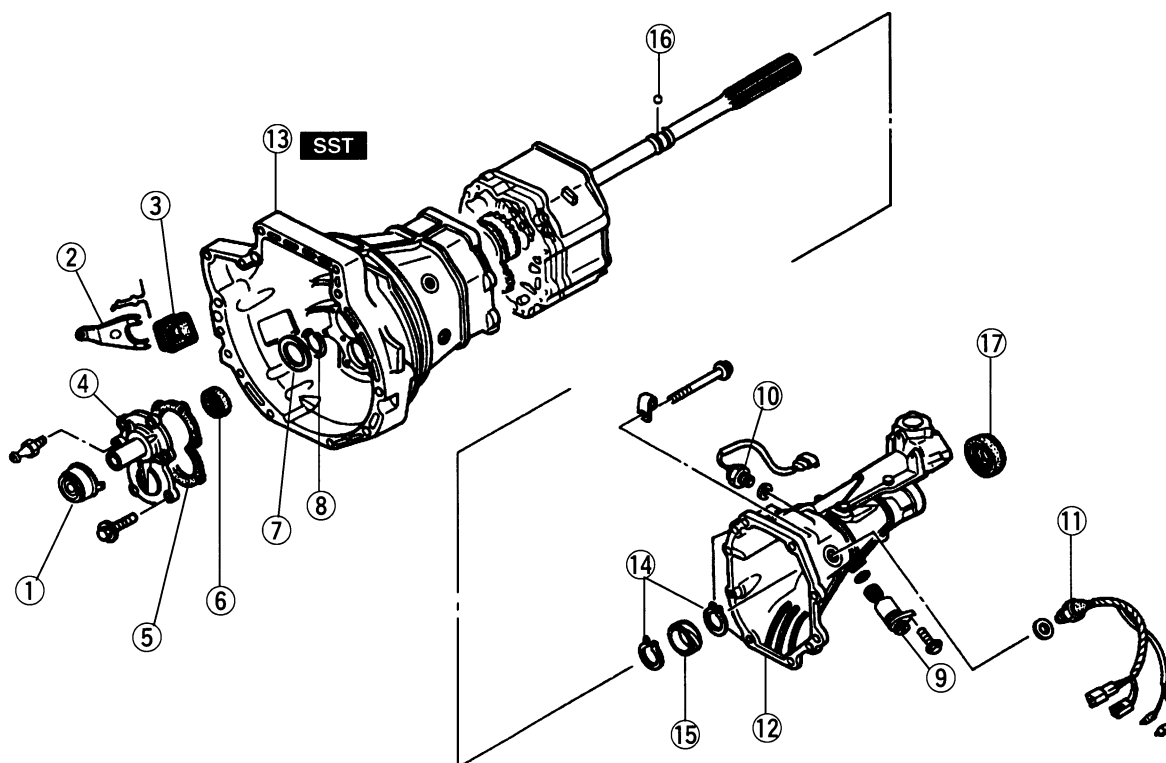
3. Apply sealant to the contact surfaces of the boot panel and the change control case.

HOUSING COMPONENTS DISASSEMBLY

U5U511AF

Note

- The front and rear oil seals do not need to be removed unless you are replacing them.
- Disassemble in the order indicated in the table.



U5U51122

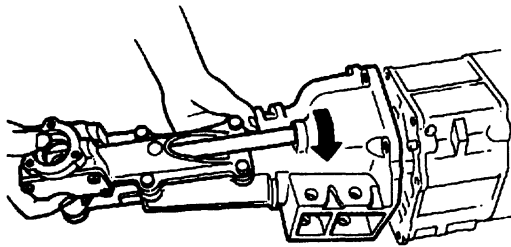
1	Clutch release coller
2	Clutch release fork
3	Boot
4	Front cover
5	Gasket
6	Oil seal (front)
7	Adjustment shim
8	Snap ring
9	Speedometer driven gear
10	Neutral switch

11	Back-up light switch
12	Extension housing ☞ Disassembly Note ☞ 05-11 EXTENSION HOUSING PARTS DIS- ASSEMBLY / ASSEMBLY
13	Transmission case ☞ Disassembly Note
14	Snap ring
15	Speedometer drive gear
16	Steel ball
17	Oil seal (rear)

MANUAL TRANSMISSION

Extension Housing Disassembly Note

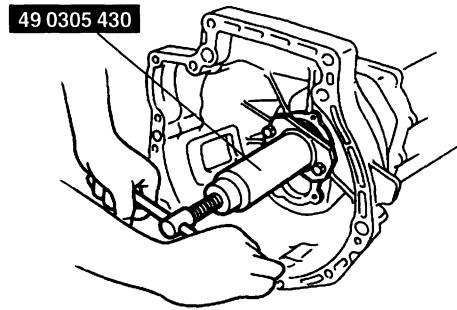
- Turn the extension housing to remove it.



U5U51123

Transmission Case Disassembly Note

- Remove the transmission case from the intermediate housing and gear component by using the **SST**.

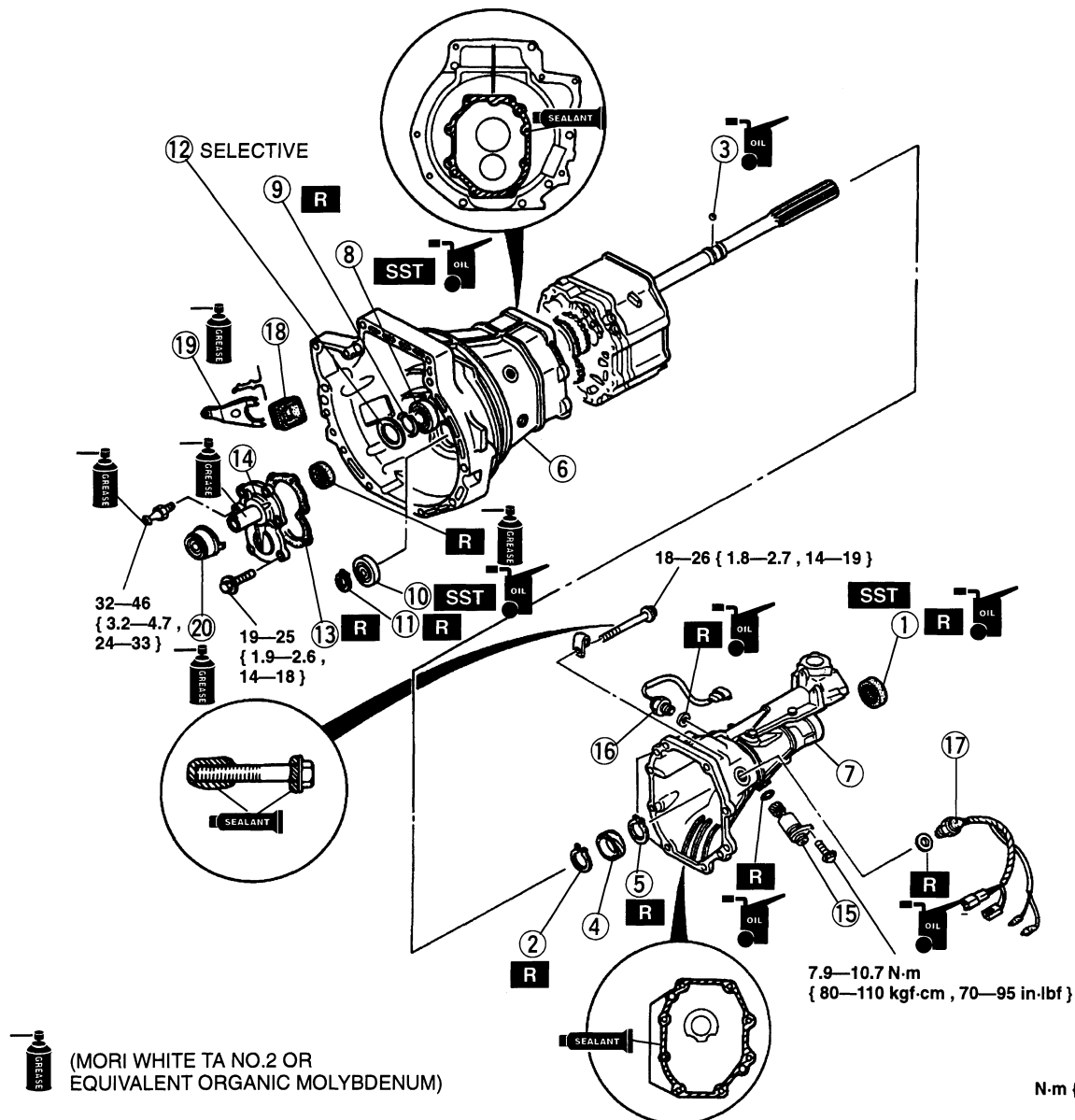


U5U51124

HOUSING COMPONENTS ASSEMBLY

1. Assemble in the order indicated in the table.
2. Check the gearshift lever operation.

U5U511AG



N·m { kgf·m , ft·lbf }

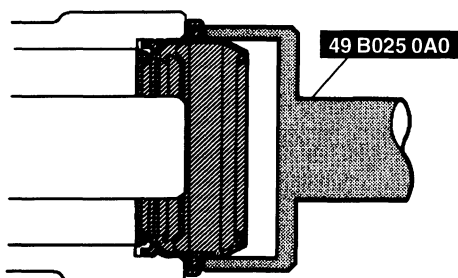
U5U51125

MANUAL TRANSMISSION

1	Oil seal ☞ Assembly Note
2	Snap ring
3	Steel ball
4	Speedometer drive gear
5	Snap ring
6	Transmission case
7	Extension housing ☞ Assembly Note
8	Main drive gear bearing ☞ Assembly Note
9	Snap ring
10	Countershaft front bearing ☞ Assembly Note
11	Snap ring
12	Adjustment shim ☞ Assembly Note
13	Gasket
14	Front cover
15	Speedometer driven gear
16	Neutral switch
17	Back-up light switch
18	Boot
19	Clutch release fork ☞ Assembly Note
20	Clutch release collar ☞ Assembly Note

Oil Seal Assembly Note

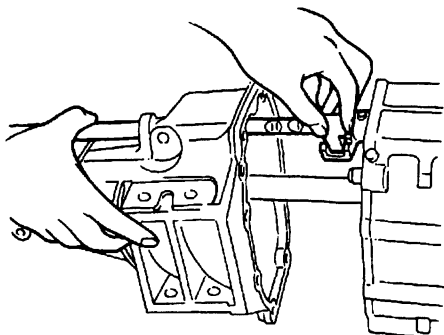
1. Apply transmission oil to the outer periphery.
2. Install a new oil seal with the SST.



U5U51126

Extension Housing Assembly Note

1. Apply sealant to the contact surfaces of the bearing housing and transmission case.



U5U51127

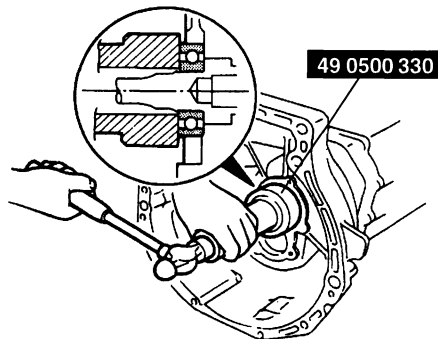
2. Align the inner shift lever and shift rod end groove, and install the extension housing.
3. Apply sealant to the bolt threads, and install the bolts.

Tightening torque

18—26 N·m { 1.8—2.7 kgf·m , 14—19 ft·lbf }

Main Drive Gear Bearing Assembly Note

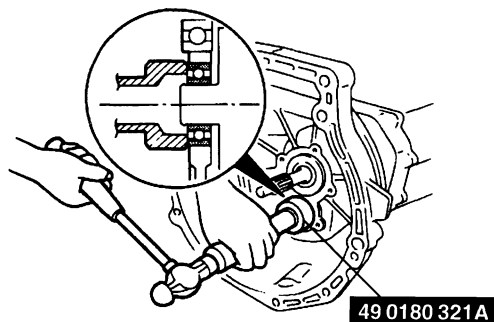
- Install the main drive gear bearing by using the SST, and secure it with a new snap ring.



U5U51128

Countershaft Front Bearing Assembly Note

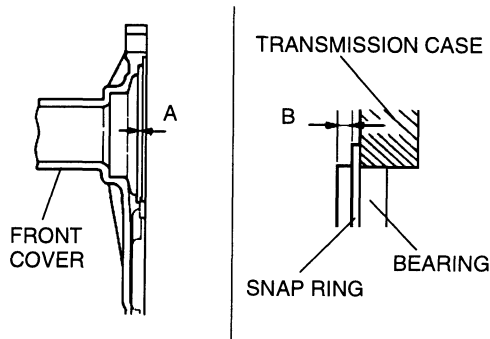
- Install the countershaft front bearing by using the SST, and secure it with a new snap ring.



U5U51129

Adjustment Shim Assembly Note

- After measuring dimensions A and B shown in the figure, use the adjustment shim(s) of the thickness corresponding to the value of A minus B, so that bearing end play will be within the specification.



U5U51130

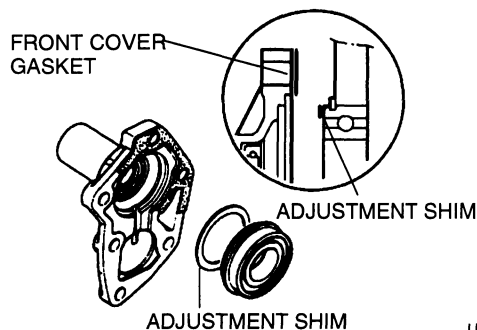
MANUAL TRANSMISSION

Bearing end play

0—0.1 mm { 0—0.004 in }

Adjustment shim thickness

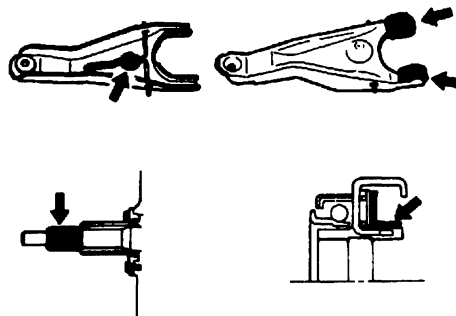
0.10 mm { 0.004 in }, 0.15 mm { 0.006 in }, 0.30 mm { 0.012 in }



U5U51131

Clutch Release Fork And Clutch Release Collar Assembly Note

1. Apply Mori White TA No.2 or equivalent organic molybdenum grease to the shaded areas of the clutch release collar and release fork.



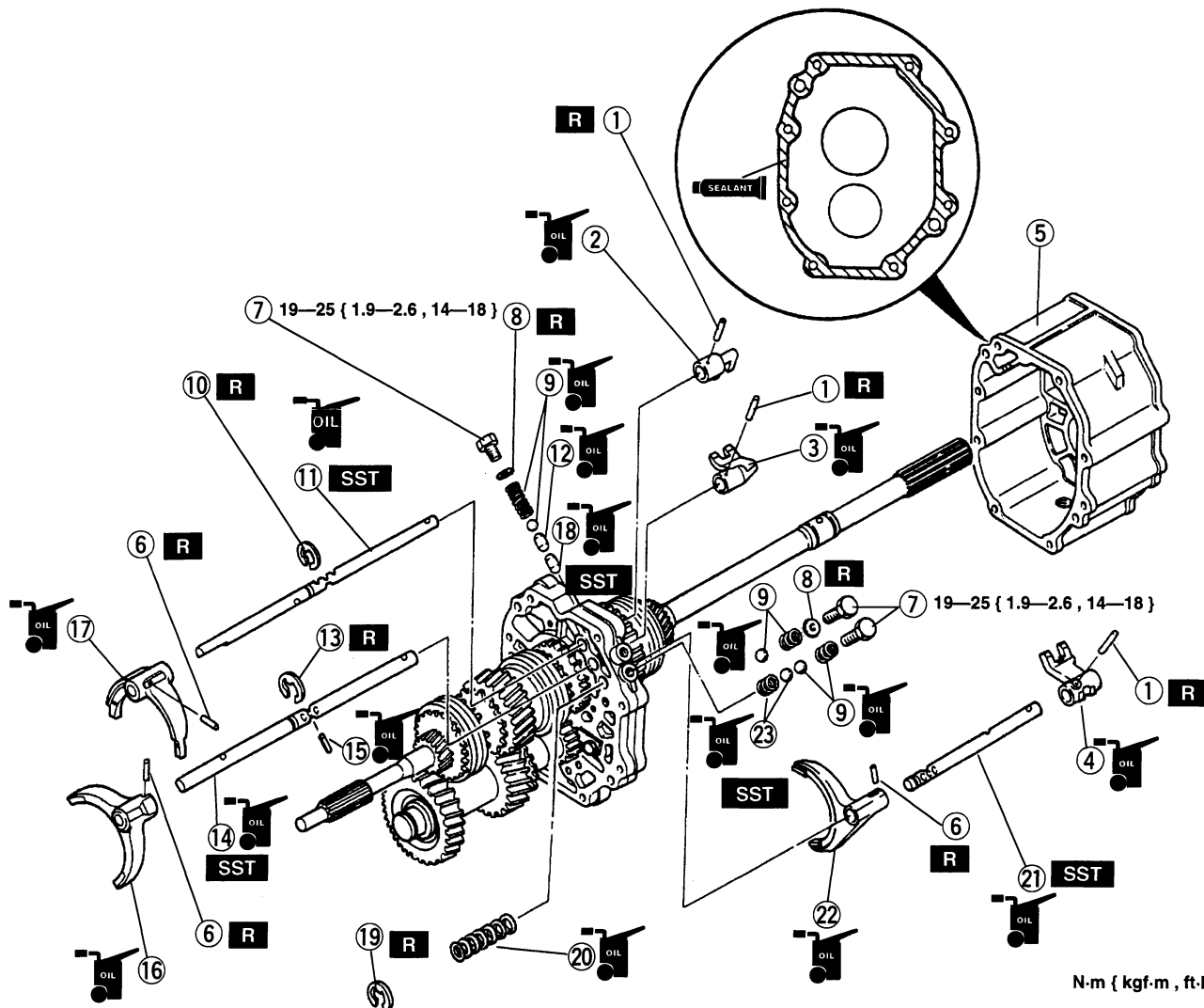
U5U51132

2. Install the clutch release collar and clutch release fork.

SHIFT FORK AND SHIFT ROD PARTS DISASSEMBLY / ASSEMBLY

U5U511AH

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.

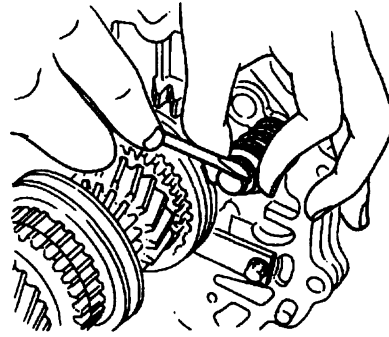


MANUAL TRANSMISSION

1	Roll pin ☞ Assembly Note
2	1st/2nd shift rod end
3	3rd/4th shift rod end
4	5th/Reverse shift rod end
5	Intermediate housing ☞ 05-11 SHIFT FORK AND SHIFT ROD PARTS INSPECTION, Intermediate Housing Inspection
6	Roll pin ☞ Assembly Note
7	Cap plug
8	Washer
9	Spring and ball ☞ 05-11 SHIFT FORK AND SHIFT ROD PARTS INSPECTION, Springs Inspection
10	Clip ☞ Assembly Note
11	1st/2nd shift rod ☞ Assembly Note
12	Interlock pin ☞ Assembly Note
13	Clip ☞ Assembly Note
14	3rd/4th shift rod ☞ Assembly Note
15	Interlock pin
16	3rd/4th shift fork ☞ 05-11 SHIFT FORK AND SHIFT ROD PARTS INSPECTION, 1st/2nd, 3rd/4th And 5th/Reverse Shift Fork Inspection ☞ Assembly Note
17	1st/2nd shift fork ☞ 05-11 SHIFT FORK AND SHIFT ROD PARTS INSPECTION, 1st/2nd, 3rd/4th And 5th/Reverse Shift Fork Inspection ☞ Assembly Note
18	Interlock pin ☞ Assembly Note
19	Clip ☞ Disassembly Note ☞ Assembly Note
20	Spring ☞ 05-11 SHIFT FORK AND SHIFT ROD PARTS INSPECTION, Springs Inspection ☞ Assembly Note
21	5th/Reverse shift rod ☞ Assembly Note
22	5th/Reverse shift fork ☞ 05-11 SHIFT FORK AND SHIFT ROD PARTS INSPECTION, 1st/2nd, 3rd/4th And 5th/Reverse Shift Fork Inspection ☞ Assembly Note
23	Spring and ball ☞ 05-11 SHIFT FORK AND SHIFT ROD PARTS INSPECTION, Springs Inspection ☞ Assembly Note

Clip Disassembly Note

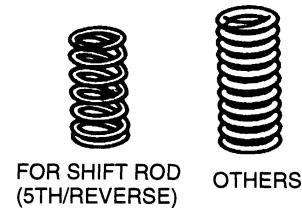
- Remove the clip, spacer, and spring from the 5th/Reverse shift rod.



U5U51134

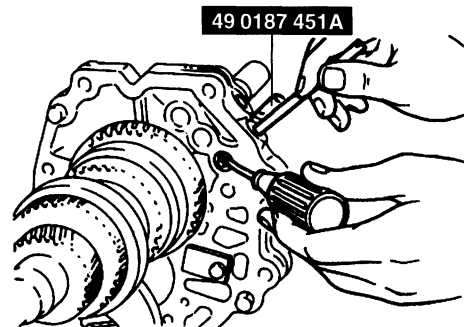
Spring And Ball Assembly Note

- Insert the spring and ball (5th/reverse) into the bearing housing.



U5U51135

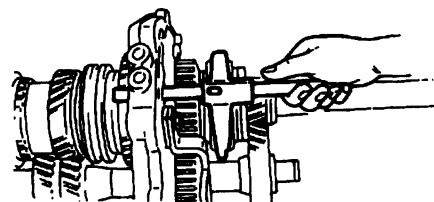
- Press down the spring and ball (5th/reverse) by using the **SST** and a screwdriver, and install the shift rod.



U5U51136

5th/Reverse Shift Fork And Rod Assembly Note

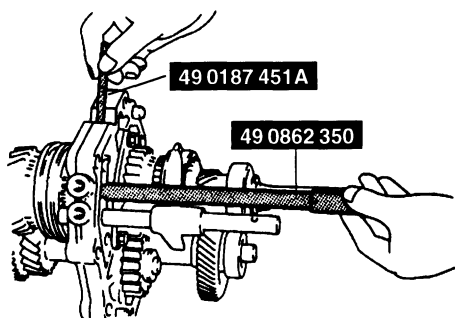
- Install the 5th/reverse shift fork and 5th/reverse shift rod into the bearing housing.



U5U51137

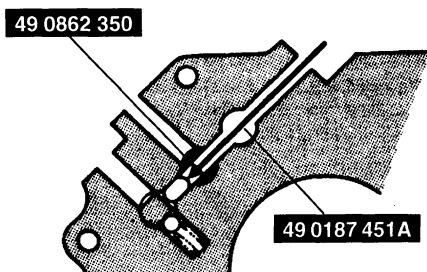
Interlock Pin Assembly Note

1. Position the interlock pin into the bearing housing by using the SSTs.



U5U51138

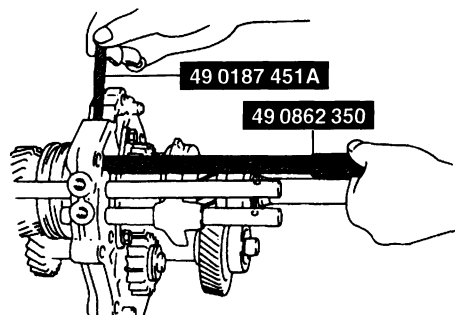
2. Verify that the interlock pin is correctly installed.



U5U51139

1st/2nd And 3rd/4th Shift Fork And Rod, Interlock Pin Assembly Note

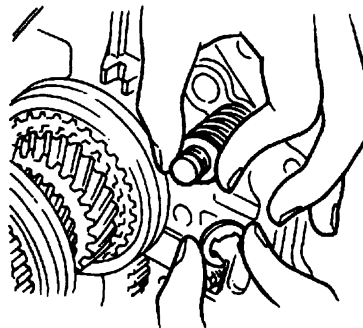
1. Set the 1st/2nd shift fork onto the 1st/2nd clutch hub component.
2. Install the 3rd/4th shift fork and 3rd/4th shift rod, and install the interlock pin into the bearing housing as described in the interlock pin assembly note. (Refer to Interlock Pin Assembly Note.)



U5U51140

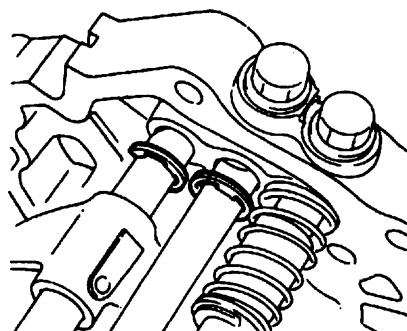
Spring, Clip Assembly Note

1. Slide the spring onto the 5th/Reverse shift rod. While pressing the spring, install a new clip.



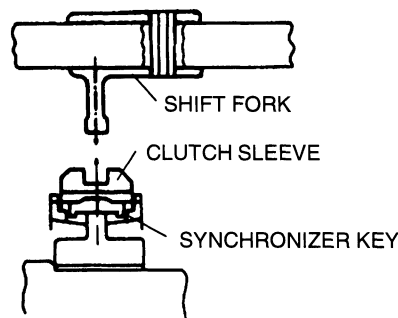
U5U51141

2. Install new clips to the 3rd/4th shift rod and 1st/2nd shift rod.



U5U51142

3. Verify that the centers of the shift fork and clutch hub sleeve are aligned properly. If they are not, select the proper washer to install between 1st gear and the mainshaft front bearing, and between reverse gear and the mainshaft front bearing.



U5U51143

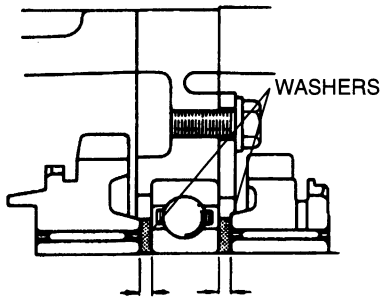
4. The following washer thicknesses are available. The total thickness of the front and rear washers should be following.

Total thickness

5.9—6.0 mm { 0.232—0.236 in }

Washer thickness

2.2 mm { 0.087 in }, 2.7 mm { 0.106 in },
3.0 mm { 0.118 in }, 3.2 mm { 0.126 in },
3.7 mm { 0.146 in }



U5U51144

Intermediate Housing Assembly Note

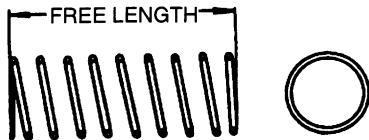
1. Apply sealant to the contact surfaces of the intermediate housing and bearing housing.
2. Mount the intermediate housing to the bearing housing by tapping it lightly with a plastic hammer.

SHIFT FORK AND SHIFT ROD PARTS INSPECTION

U5U511AR

Springs Inspection

- Measure the free length of the springs.



U5U51145

Standard free length

Shift rod (5th/Reverse) spring:

76.5 mm { 3.012 in }

Detent ball spring (1st/2nd, 3rd/4th):

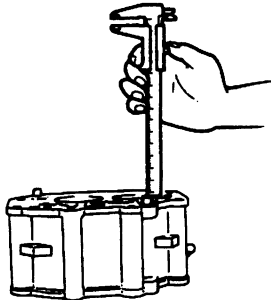
22.5 mm { 0.886 in }

Detent ball spring (5th/Reverse):

17.0 mm { 0.669 in }

Intermediate Housing Inspection

- Measure the intermediate housing pin height.



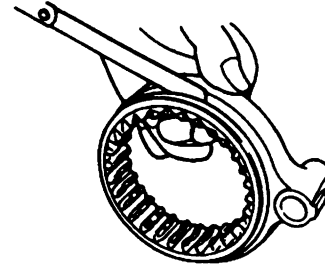
U5U51146

Standard height

9.0—10.0 mm { 0.354—0.394 in }

1st/2nd, 3rd/4th And 5th/Reverse Shift Fork Inspection

- Measure the clearance between the hub sleeve and shift fork.



U5U51147

Standard clearance

0.2—0.3 mm { 0.008—0.012 in }

Maximum

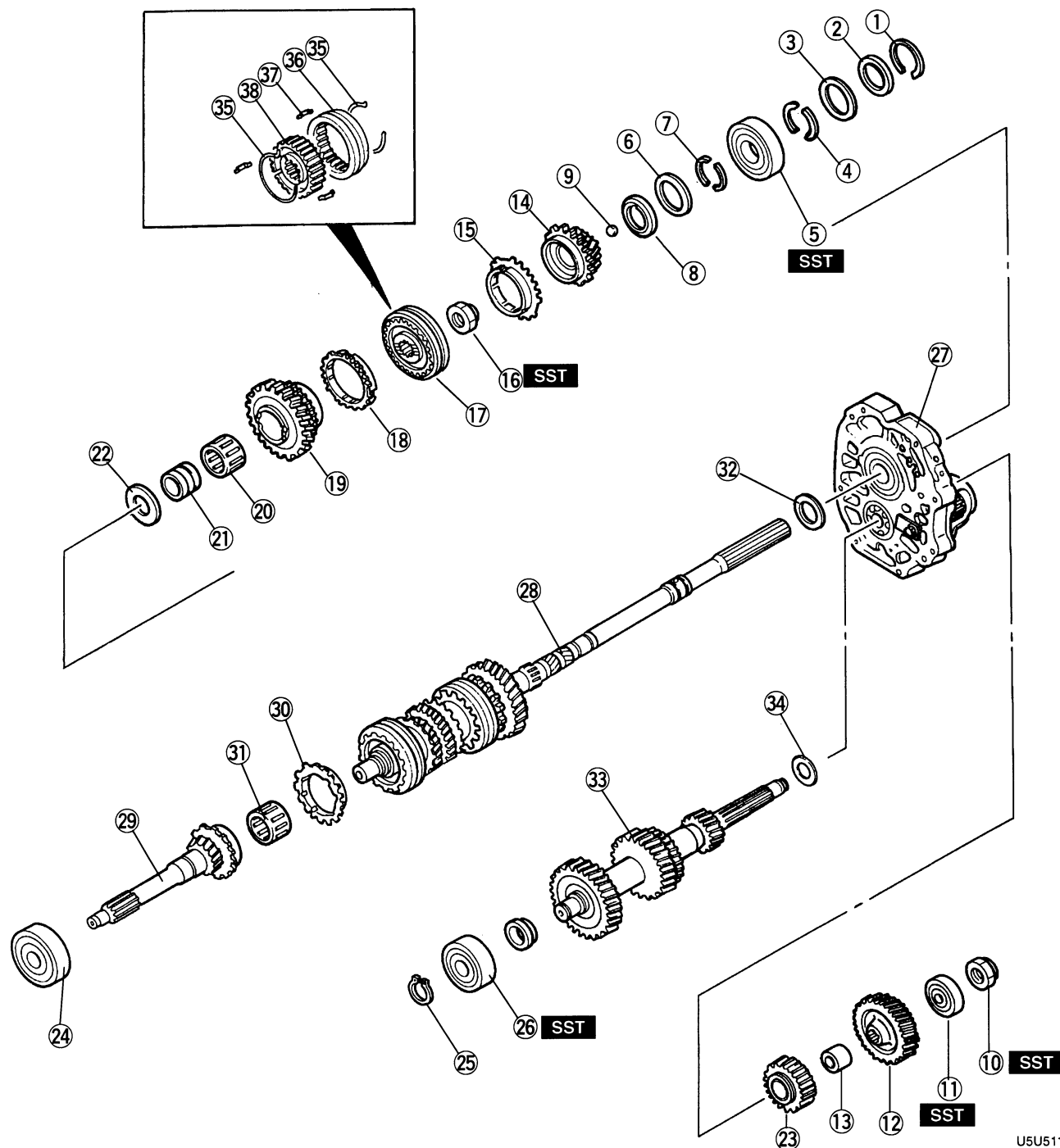
0.5 mm { 0.020 in }

MANUAL TRANSMISSION

MAINSHAFT AND COUNTERSHAFT PARTS DISASSEMBLY

U5U511AJ

- Disassemble in the order indicated in the table.



U5U51148

1	Snap rings
2	Washer
3	Retaining ring
4	C-washer
5	Mainshaft rear bearing ⚠ Disassembly Note ⚠ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Bearing Inspection
6	Retaining ring
7	C-washer

8	Thrust lock washer
9	Steel ball
10	Locknut (countershaft) ⚠ Disassembly Note
11	Countershaft rear bearing ⚠ Disassembly Note ⚠ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Bearing Inspection
12	Counter 5th gear ⚠ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Each Gear And Main Drive Gear Inspection

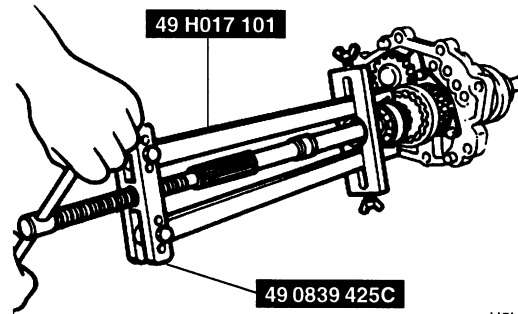
MANUAL TRANSMISSION

13	Spacer
14	5th gear ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Each Gear And Main Drive Gear Inspection
15	5th synchronizer ring ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Synchronizer Ring Inspection
16	Locknut (Mainshaft) ☞ Disassembly Note
17	Clutch hub component (5th/Reverse) ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Clutch Hub Component Inspection
18	Reverse synchronizer ring ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Synchronizer Ring Inspection
19	Reverse gear ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Each Gear And Main Drive Gear Inspection
20	Bearing ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Bearing Inspection
21	Bearing race
22	Washer
23	Counter reverse gear ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Each Gear And Main Drive Gear Inspection
24	Main drive gear bearing ☞ Disassembly Note ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Bearing Inspection
25	Snap ring
26	Countershaft front bearing ☞ Disassembly Note ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Bearing Inspection
27	Bearing housing component ☞ Disassembly Note ☞ 05-11 BEARING HOUSING COMPONENTS DISASSEMBLY / ASSEMBLY
28	Mainshaft gear component
29	Main drive gear ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Each Gear And Main Drive Gear Inspection
30	4th synchronizer ring ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Synchronizer ring
31	Bearing ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Bearing Inspection
32	Washer
33	Countershaft ☞ 05-11 MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION, Countershaft Inspection

34	Spacer
35	Synchronizer key sleeve
36	Clutch hub sleeve
37	Synchronizer key
38	Clutch hub

Mainshaft Rear Bearing Disassembly Note

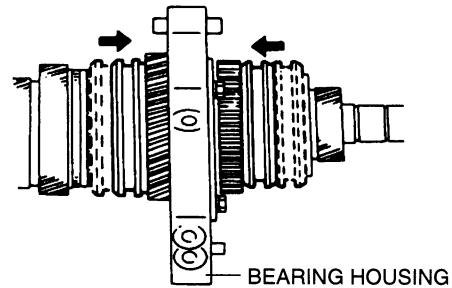
- Remove the mainshaft rear bearing by using the SSTs.



U5U51149

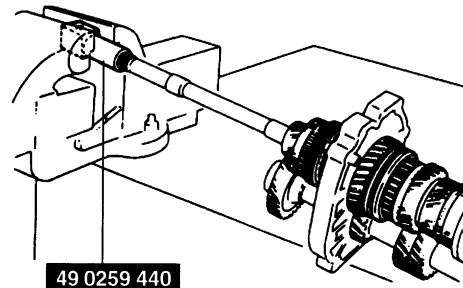
Locknut (Countershaft) Disassembly Note

- Shift the clutch hub sleeves into 1st and reverse gears to lock the rotation of the mainshaft.
- Use a suitable tool to uncrimp the tabs of the locknut.



U5U51150

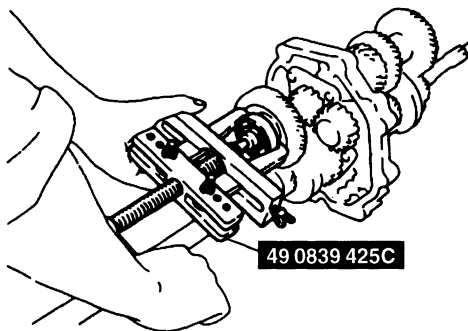
- Connect the SST to the mainshaft and secure it in a vise.
- Remove the locknut.



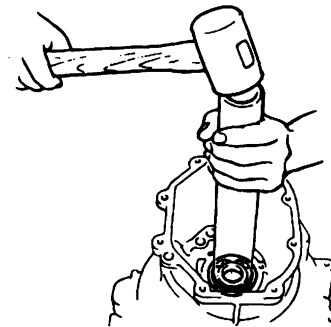
U5U51151

Countershaft Rear Bearing Disassembly Note

- Remove the countershaft rear bearing by using the SST.



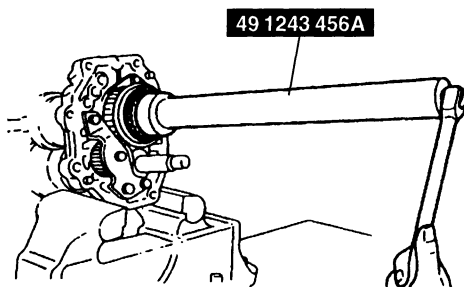
U5U51152



U5U51154

Locknut (Mainshaft) Disassembly Note

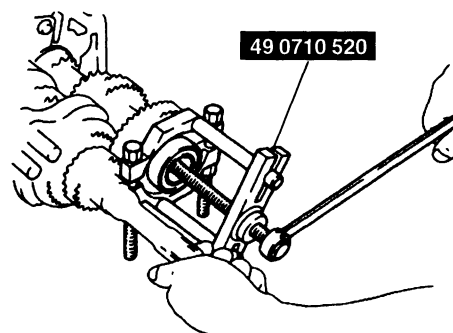
- Shift the clutch hub sleeves into 1st and reverse gears to lock the rotation of the mainshaft.
- Use a suitable tool to uncrimp the tabs of the locknut.
- Secure the bearing housing in a vise.
- Remove the locknut by using the SST.



U5U51153

Countershaft Front Bearing Disassembly Note

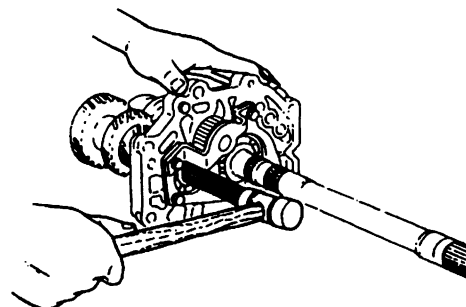
- Remove the countershaft front bearing by using the SST.



U5U51155

Bearing Housing Component Disassembly Note

- Remove the bearing housing by lightly tapping the countershaft with a copper hammer.



U5U51156

Main Drive Gear Bearing Disassembly Note

- Remove the main drive gear bearing with a pipe and a hammer.

Outer diameter of pipe
70.0 mm { 2.76 in }

U5U511AK

-  OIL APPLY SPECIFIED OIL TO INDIVIDUAL PARTS EXCEPT LOCKNUTS



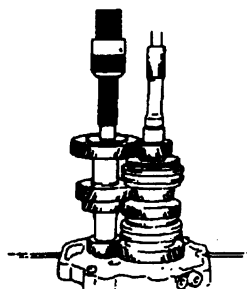
13	Counter reverse gear
14	Washer
15	Bearing race
16	Bearing
17	Reverse gear
18	Reverse synchronizer ring
19	Clutch hub component (5th/Reverse)
20	Locknut (Mainshaft)  Assembly Note
21	5th synchronizer ring
22	5th gear
23	Steel ball
24	Thrust lock washer  Assembly Note

MANUAL TRANSMISSION

25	C-washer
26	Retaining ring
27	Spacer
28	Counter 5th gear
29	Mainshaft rear bearing ☞ Assembly Note
30	C-washer
31	Retaining ring
32	Washer
33	Snap ring
34	Countershaft rear bearing ☞ Assembly Note
35	Locknut (Countershaft) ☞ Assembly Note

Mainshaft And Countershaft Component Assembly Note

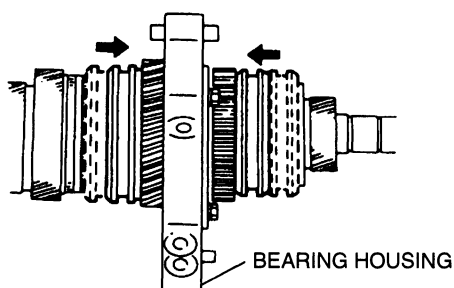
1. Place the mainshaft gear component and the countershaft on the bearing housing.
2. Use a bar to press in the countershaft.



U5U51158

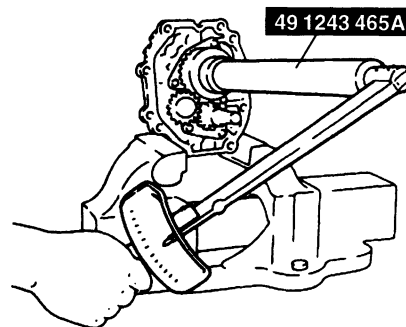
Locknut (Mainshaft) Assembly Note

1. Secure the bearing housing component in a vise.



U5U51159

2. Shift the clutch hub sleeves into 1st and reverse gears to lock the rotation of the mainshaft.
3. Install a new locknut and tighten it by using the SST.



U5U51160

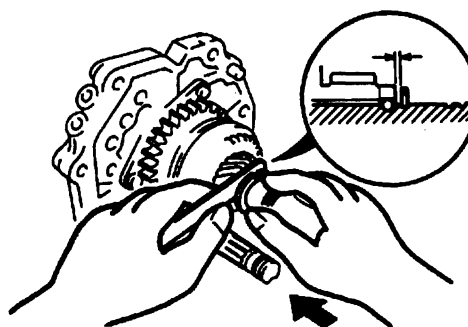
Tightening torque

128—235 N·m { 13—24 kgf·m , 95—173 ft·lbf }

4. Use a chisel to stake the locknut.

Thrust Lock Washer Assembly Note

1. Install the synchronizer ring and 5th gear.
2. Insert the steel ball and thrust lock washer.
3. Install two 3.0 mm { 0.118 in } thick C-washers in the front mainshaft groove.
4. Push the C-washers fully toward 5th gear and measure the clearance between the thrust lock washer and C-washers. If the clearance is not as specified, select the proper thrust lock washer.



U5U51161

Standard clearance

0.1—0.3 mm { 0.004—0.012 in }

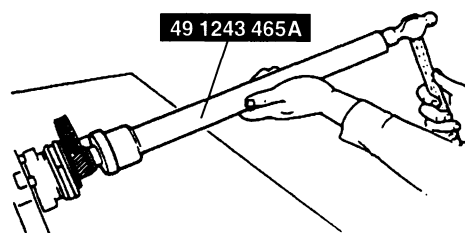
Thrust lock washer thickness

6.2 mm { 0.244 in } , 6.4 mm { 0.252 in } ,
6.5 mm { 0.256 in } , 6.6 mm { 0.260 in }

5. Install the retaining ring.

Mainshaft Rear Bearing Assembly Note

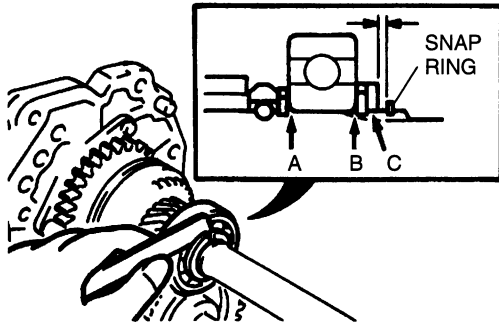
1. Install the mainshaft rear bearing by using the SST, and fully seat it against the front C-washers.



U5U51162

MANUAL TRANSMISSION

2. Install the original C-washers and hold them with the retaining ring.
3. Install the washer and new snap ring.
4. If the C-washers do not fit into the rear mainshaft groove, select the proper thickness C-washers.
5. Verify that C-washers installed at one position are of the same thickness.
6. With points A through C pressed tightly together, measure the clearance between the washer and snap ring. If the clearance is not as specified, select the proper C-washers.



U5U51163

Standard clearance

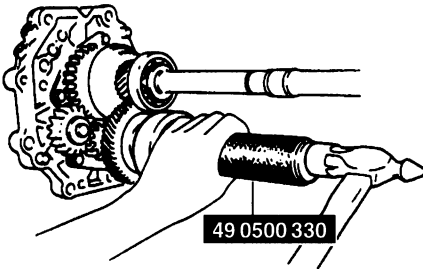
0—0.1 mm { 0—0.004 in }

C-washer thickness

2.9 mm { 0.114 in }, 3.0 mm { 0.118 in },
3.1 mm { 0.122 in }, 3.2 mm { 0.126 in }

Countershaft Rear Bearing Assembly Note

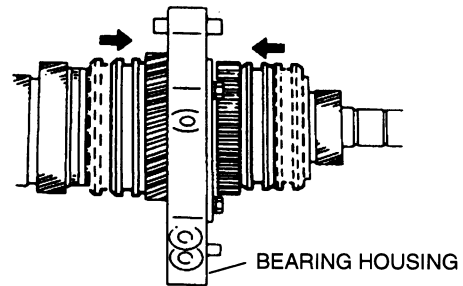
- Install the countershaft rear bearing onto the countershaft by using the SST.



U5U51164

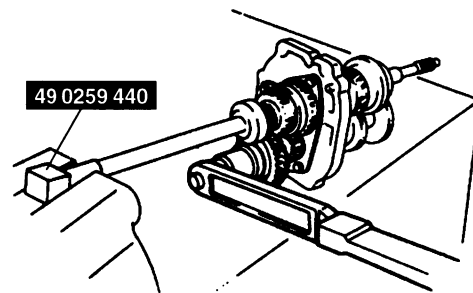
Locknut (Countershaft) Assembly Note

1. Shift the clutch hub sleeves into 1st and reverse gears to lock the rotation of the mainshaft.



U5U51165

2. Connect the SST to the mainshaft and secure it in a vise.
3. Install a new locknut and tighten it.



U5U51166

Tightening torque

128—196 N·m { 13—20 kgf·m , 95—144 ft·lbf }

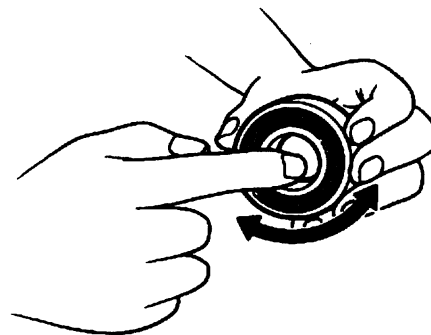
4. Use a chisel to stake the locknut.

MAINSHAFT AND COUNTERSHAFT PARTS INSPECTION

U5U511AL

Bearing Inspection

- Inspect for damage and rough rotation.



U5U51167

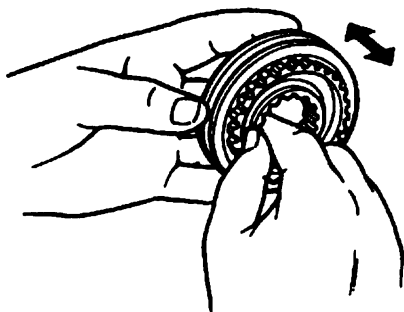
MANUAL TRANSMISSION

Each Gear And Main Drive Gear Inspection

1. Inspect synchronizer cones for wear.
2. Inspect individual gear teeth for damage, wear, and cracks.
3. Inspect synchronizer ring matching teeth for damage and wear.
4. Inspect main drive gear splines for damage and wear.

Clutch Hub Component Inspection

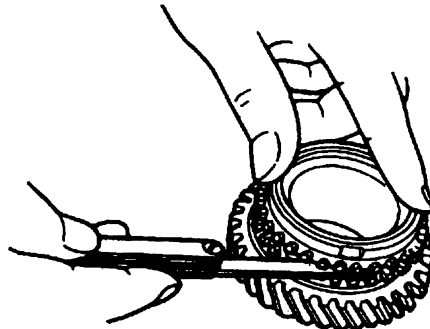
1. Inspect clutch hub sleeve and hub operation.
2. Inspect individual gear teeth for damage, wear, and cracks.
3. Inspect synchronizer keys for damage, wear, and cracks.



U5U51168

Synchronizer Ring Inspection

1. Inspect individual synchronizer ring teeth for wear and cracks.
2. Inspect the tapered surface for wear and cracks.
3. Set the synchronizer ring squarely in the gear.
4. Measure the clearance between the synchronizer ring and flank surface of gear all around the circumference.



U5U51169

Standard clearance
1.5 mm { 0.059 in }
Minimum
0.8 mm { 0.031 in }

Countershaft Inspection

1. Inspect gear teeth for damage, wear, and cracks.
2. Inspect splines for damage and wear.

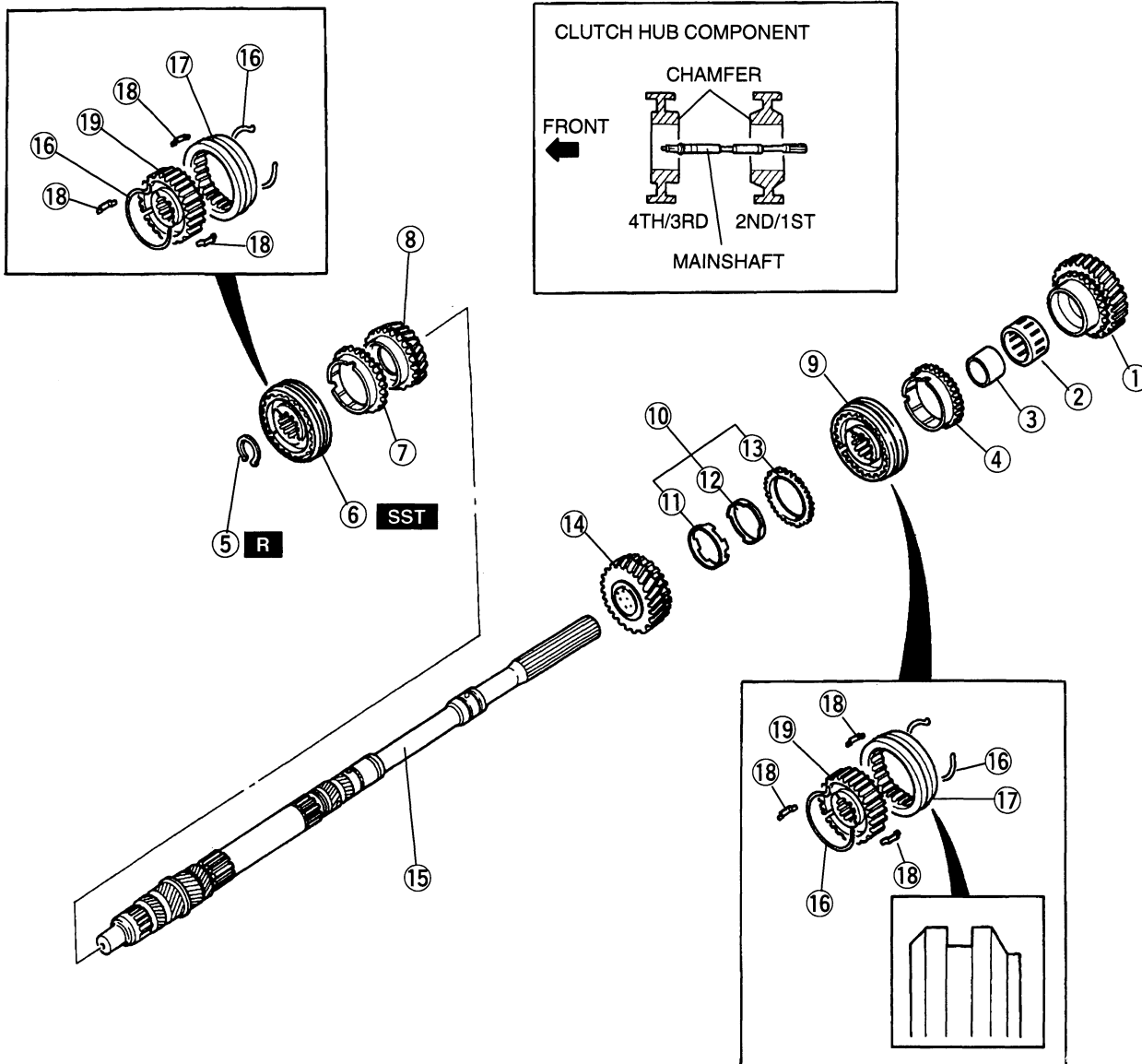
MAINSHAFT PARTS DISASSEMBLY / ASSEMBLY

U5U511AM

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



APPLY SPECIFIED OIL TO INDIVIDUAL PARTS



U5U51170

1	1st gear ☞ 05-11 MAINSHAFT PARTS INSPECTION, Each Gear Inspection
2	Bearing ☞ 05-11 MAINSHAFT PARTS INSPECTION, Bearing Inspection
3	Bearing race
4	1st synchronizer ring ☞ 05-11 MAINSHAFT PARTS INSPECTION, Synchronizer Ring Inspection
5	Snap ring

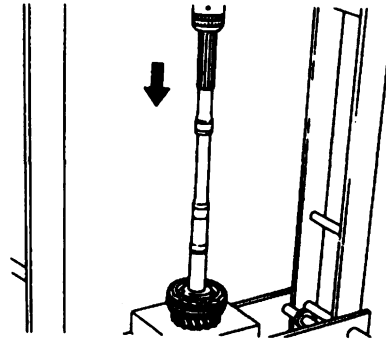
6	3rd/4th clutch hub component ☞ Disassembly Note ☞ 05-11 MAINSHAFT PARTS INSPECTION, Clutch Hub Component Inspection ☞ Assembly Note
7	3rd synchronizer ring ☞ 05-11 MAINSHAFT PARTS INSPECTION, Synchronizer Ring Inspection
8	3rd gear ☞ 05-11 MAINSHAFT PARTS INSPECTION, Each Gear Inspection

MANUAL TRANSMISSION

9	1st/2nd clutch hub component - Disassembly Note 05-11 MAINSHAFT PARTS INSPECTION, Clutch Hub Component Inspection
10	2nd synchronizer component 05-11 MAINSHAFT PARTS INSPECTION, Synchronizer Component (2nd) Inspection
11	Inner cone
12	Double cone
13	2nd synchronizer ring 05-11 MAINSHAFT PARTS INSPECTION, Synchronizer Ring Inspection
14	2nd gear 05-11 MAINSHAFT PARTS INSPECTION, Each Gear Inspection
15	Mainshaft 05-11 MAINSHAFT PARTS INSPECTION, Mainshaft Inspection
16	Synchronizer key springs
17	Clutch hub sleeve
18	Synchronizer key
19	Clutch hub

1st/2nd Clutch Hub Component Disassembly Note

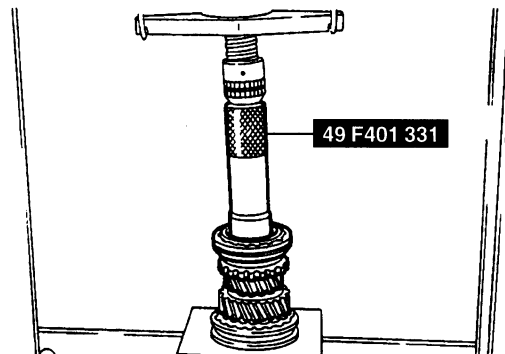
- Hold the mainshaft, and press the 1st/2nd clutch hub component, 2nd synchronizer component, and 2nd gear from the mainshaft.



U5U51172

Clutch Hub Component Assembly Note

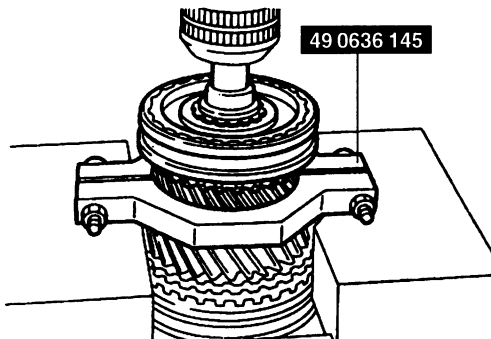
- Set the 2nd gear, 2nd synchronizer ring, and 1st/2nd clutch hub component on the mainshaft, then press in the mainshaft.
- Set the 3rd gear, 3rd synchronizer ring, and 3rd/4th clutch hub component on the mainshaft, then press them onto the mainshaft by using the SST.



U5U51173

3rd/4th Clutch Hub Component Disassembly Note

- Position the SST between 2nd and 3rd gears, and hold the mainshaft from underneath.



U5U51171

- Press the mainshaft out of the 3rd/4th clutch hub component and 3rd gear.

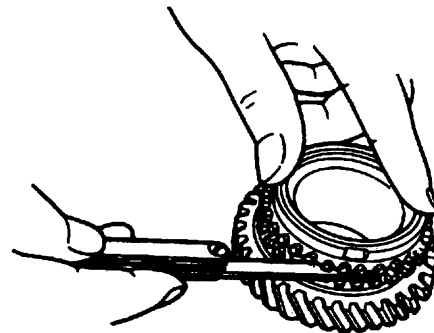
MAINSHAFT PARTS INSPECTION

Each Gear Inspection

- Inspect synchronizer cones for wear.
- Inspect individual gear teeth for damage, wear, and cracks.
- Inspect synchronizer ring matching teeth for damage and wear.
- Inspect main drive gear splines for damage and wear.

Synchronizer Ring Inspection

- Inspect individual synchronizer ring teeth for wear and cracks.
- Inspect the tapered surface for wear and cracks.
- Set the synchronizer ring squarely in the gear.
- Measure the clearance between the synchronizer ring and flank surface of gear all around the circumference.



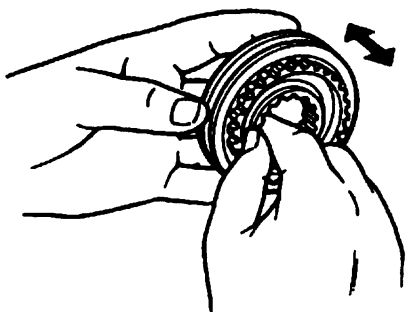
U5U511AN

U5U51174

Standard clearance
 1.5 mm { 0.059 in }
Minimum
 0.8 mm { 0.031 in }

Clutch Hub Component Inspection

1. Inspect clutch hub operation.
2. Inspect individual gear teeth for damage, wear, and cracks.



U5U51175

Synchronizer Component (2nd) Inspection

1. Inspect individual synchronizer ring gear teeth for damage, wear, and cracks. Replace the synchronizer component if any such damage is found.
2. Inspect for wear and damage to the tapered surfaces of the inner cone, double cone, and synchronizer ring. Replace the synchronizer component if any such damage is found.
3. Set the synchronizer ring squarely in the gear.
4. Measure the clearance between the synchronizer ring and the flank surface of gear all around the circumference.

Clearance

1.5 mm { 0.059 in }

Minimum

0.8 mm { 0.031 in }

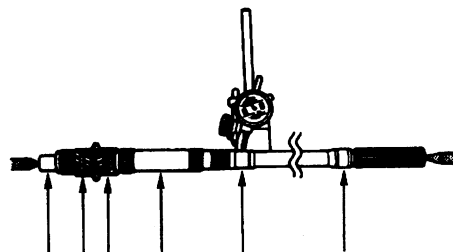
Mainshaft Inspection

1. Measure the mainshaft runout as shown.

Maximum runout

0.03 mm { 0.0012 in }

2. Inspect splines for damage or wear.



MEASUREMENT POINTS

U5U51176

3. Measure the clearance between mainshaft and gear (or bushing).

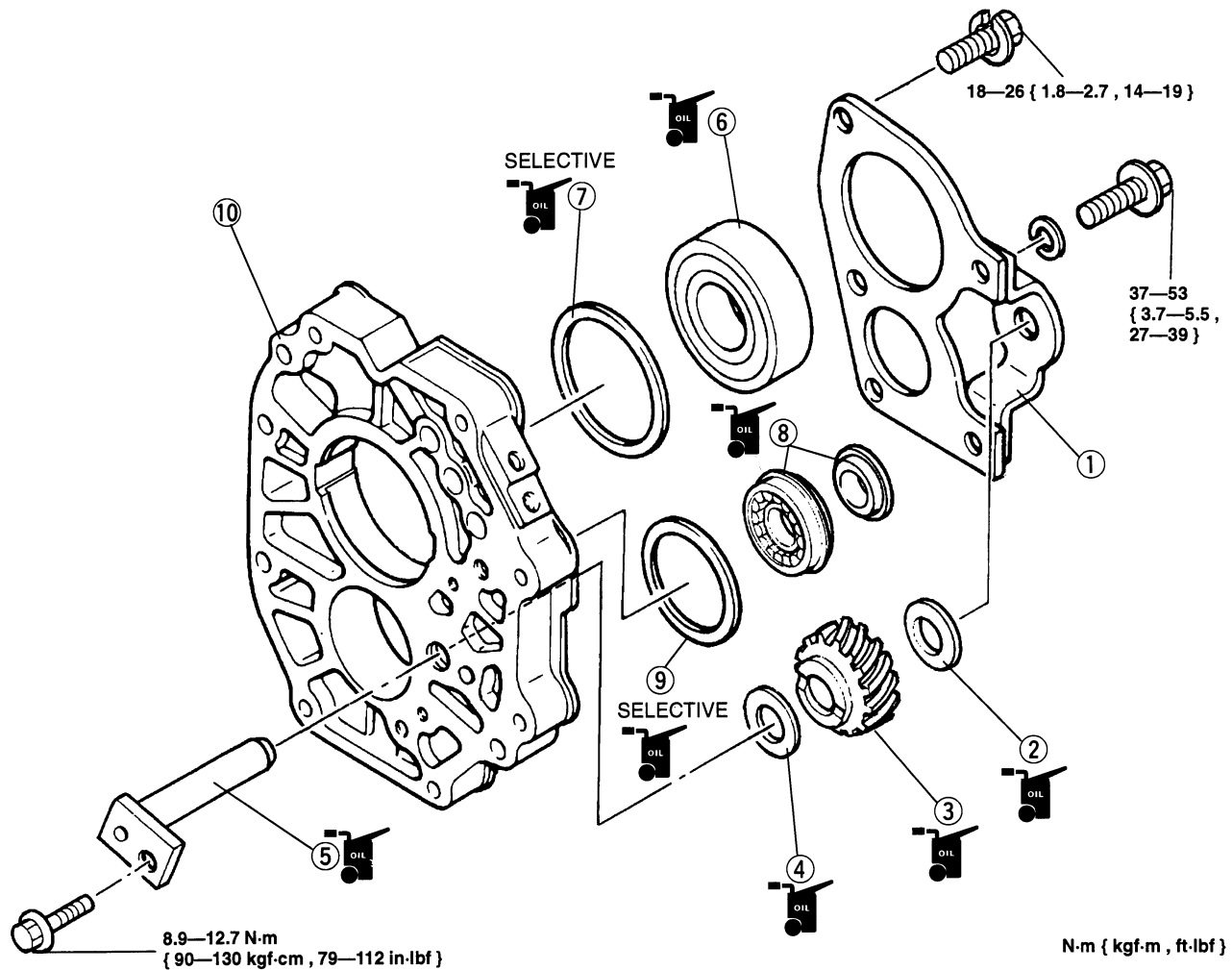
Maximum clearance

0.15 mm { 0.006 in }

BEARING HOUSING COMPONENT DISASSEMBLY / ASSEMBLY

U5U511AS

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



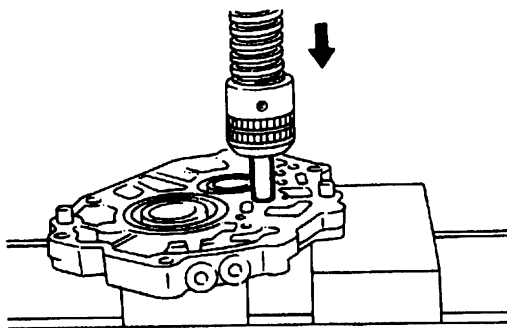
U5U51177

1	Bearing cover
2	Washer
3	Reverse idler gear - Disassembly Note 05-11 BEARING HOUSING COMPONENT INSPECTION, Reverse Idler Gear And Shaft Inspection - Assembly Note
4	Washer
5	Reverse idler gear shaft - Disassembly Note 05-11 BEARING HOUSING COMPONENT INSPECTION, Reverse Idler Gear And Shaft Inspection - Assembly Note

6	Mainshaft front bearing - Disassembly Note 05-11 BEARING HOUSING COMPONENT INSPECTION, Bearing Inspection - Assembly Note
7	Mainshaft front bearing adjustment shim Assembly Note
8	Countershaft center bearing - Disassembly Note 05-11 BEARING HOUSING COMPONENT INSPECTION, Bearing Inspection - Assembly Note
9	Countershaft center bearing adjustment shim Assembly Note
10	Bearing housing

Reverse Idler Gear Shaft Disassembly Note

1. Remove the reverse idler gear shaft installation bolt.
2. Support the reverse idler gear shaft, and press it out from the bearing housing.



U5U51178

Mainshaft Front Bearing Disassembly Note

- Support the mainshaft front bearing, and press it out from the bearing housing by using a pipe.

Outer diameter of pipe
70.0 mm { 2.76 in }

Countershaft Center Bearing Disassembly Note

Note

- If countershaft center bearing is replaced, replace the spacer also.
- Support the countershaft center bearing, and press it out from the bearing housing by using a pipe.

Outer diameter of pipe
50.0 mm { 1.97 in }

Countershaft Center Bearing Adjustment Shim Assembly Note

- Measure the clearance between the countershaft center bearing and the bearing housing. If not within the specification, adjust the clearance by installing the correct adjustment shim(s).

Standard clearance
0—0.1 mm { 0—0.004 in }

Adjustment shim
0.1 mm { 0.004 in }, 0.3 mm { 0.012 in }

Countershaft Center Bearing Assembly Note

- Press the countershaft center bearing into the bearing housing with pipe.

Outer diameter of pipe
50.0 mm { 1.97 in }

Mainshaft Front Bearing Adjustment Shim Assembly Note

- Measure the clearance between the mainshaft front bearing and the bearing housing. If not within the specification, adjust the clearance by installing the correct adjustment shim(s).

Standard clearance
0—0.1 mm { 0—0.004 in }

Adjustment shim
0.1 mm { 0.004 in }, 0.15 mm { 0.006 in },
0.3 mm { 0.012 in }

Mainshaft Front Bearing Assembly Note

- Press the mainshaft front bearing into the bearing housing with a pipe.

Outer diameter of pipe
70.0 mm { 2.76 in }

Reverse Idler Gear Shaft Assembly Note

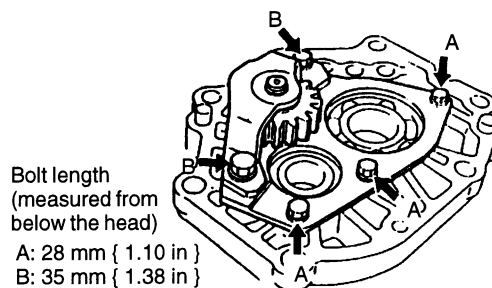
1. Press the reverse idler gear shaft into the bearing housing.
2. Install and tighten the reverse idler gear shaft installation bolt.

Tightening torque
8.9—12.7 N·m { 90—130 kgf·cm , 79—112 in·lbf }

Reverse Idler Gear Assembly Note

1. Install the reverse idler gear, end washer, and bearing cover.
2. Tighten the bearing cover installation bolts.

Tightening torque
A: 18—26 N·m { 1.8—2.7 kgf·m , 14—19 ft·lbf }
B: 37—53 N·m { 3.7—5.5 kgf·m , 27—39 ft·lbf }



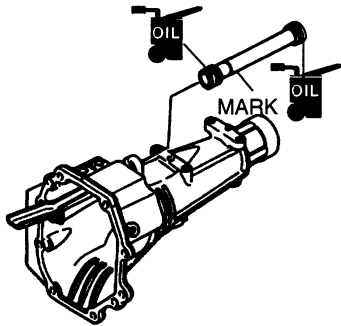
U5U51179

MANUAL TRANSMISSION

1	Oil seal
2	Select-lock spindle, spring, and spring cap ☞ Assembly Note
3	Plug, spring, and pushpin
4	Blind cover
5	Roll pin ☞ Assembly Note
6	Control rod
7	Control rod end
8	Change bushing
9	Wave washer
10	Change control case
11	Rod cover ☞ Assembly Note
12	Oil passage

Rod Cover Assembly Note

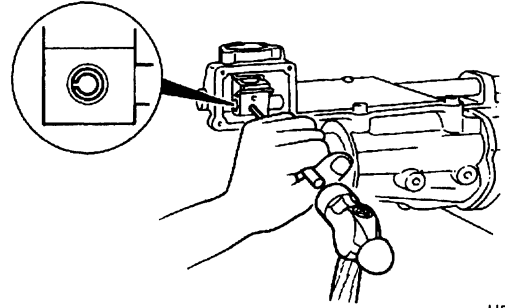
1. Apply transmission oil to the rubber bushings on the rod cover.
2. Install the rod cover with the mark facing forward.



U5U51182

Roll Pin Assembly Note

- Install a new roll pin into the control rod end. The split in the roll pin must be facing in the direction shown in the figure.



U5U51183

Select-lock Spindle, Spring, And Spring Cap Assembly Note

1. Install the select-lock spindle, spring, and spring cap.

Tightening torque

7.9—10.7 N·m { 80—110 kgf·cm , 70—95 in·lbf }

2. Push the select-lock spindle down by pushing on the control rod. This will ensure that the steel ball correctly engages the select-lock spindle.

AUTOMATIC TRANSMISSION

Snap Ring Disassembly Note	05-13-55	Control Valve Body Disassembly	05-13-73
Clutch Piston Disassembly Note	05-13-56	Upper Valve Body	
Assembly Procedure	05-13-56	Disassembly / Assembly	05-13-76
REAR CLUTCH		Lower Valve Body	
DISASSEMBLY / ASSEMBLY	05-13-58	Disassembly / Assembly	05-13-79
Snap Ring Disassembly Note	05-13-58	Control Valve Body Assembly	05-13-82
Clutch Piston Disassembly Note	05-13-59	AUTOMATIC TRANSMISSION	
Assembly Procedure	05-13-59	ASSEMBLY	05-13-88
CONNECTING SHELL AND		Precaution	05-13-88
FRONT PLANETARY GEAR UNIT		Assembly	05-13-88
DISASSEMBLY / ASSEMBLY	05-13-61	AUTOMATIC TRANSMISSION	
Assembly Procedure	05-13-61	INSPECTION	05-13-102
REAR PLANETARY GEAR UNIT		Torque Converter Inspection	05-13-102
DISASSEMBLY / ASSEMBLY	05-13-63	Direct Clutch Preinspection	05-13-102
Assembly Procedure	05-13-64	Fourth Gear Band Servo Preinspection	05-13-102
LOW AND REVERSE BRAKE		Second Gear Band Servo	
DISASSEMBLY / ASSEMBLY	05-13-66	Preinspection	05-13-103
One-way Clutch Inner Race		Front Clutch Preinspection	05-13-103
Disassembly Note	05-13-67	Rear Clutch Preinspection	05-13-104
Low And Reverse Brake Piston		Rear Planetary Gear Unit	
Disassembly Note	05-13-67	Preinspection	05-13-104
Assembly Procedure	05-13-67	Low And Reverse Brake Preinspection	05-13-104
EXTENSION HOUSING AND		OIL COOLER	
PARKING MECHANISM		REMOVAL / INSTALLATION	05-13-105
DISASSEMBLY / ASSEMBLY	05-13-70	Oil Hose Installation Note	05-13-106
Oil Seal Disassembly Note	05-13-71	DRIVE PLATE	
Assembly Procedure	05-13-71	REMOVAL / INSTALLATION	05-13-106
CONTROL VALVE BODY		Drive Plate Removal Note	05-13-106
DISASSEMBLY / ASSEMBLY	05-13-73	Drive Plate Installation Note	05-13-106

AUTOMATIC TRANSMISSION

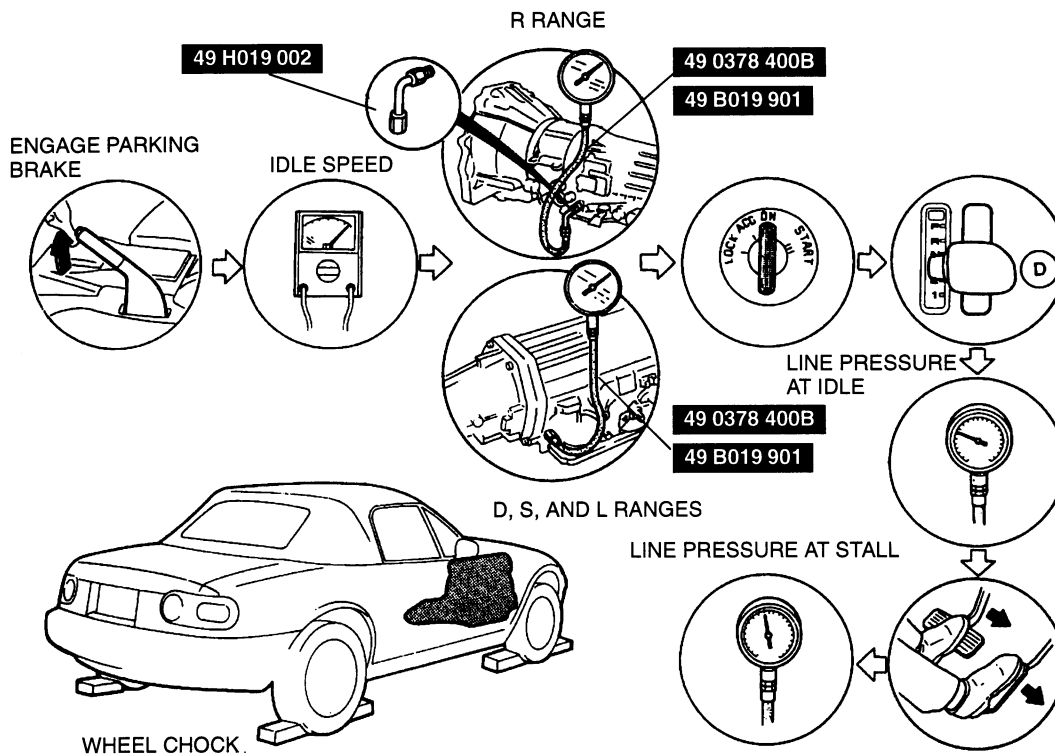
MECHANICAL SYSTEM TEST

U5U513AA

Mechanical System Test Preparation

1. Engage the parking brake and use wheel chocks at the front and rear of the wheels.
2. Check the engine coolant. (Refer to 01-12 ENGINE COOLANT LEVEL INSPECTION.)
3. Check the engine oil. (Refer to 01-11 ENGINE OIL INSPECTION.)
4. Check the ATF level. (Refer to 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION, ATF level inspection.)
5. Check the idle speed and ignition timing in P position. (Refer to 01-10 ENGINE TUNE-UP.)

Line Pressure Test



U5U51301

Warning

- Removing the plug when the ATF is hot is dangerous. Hot ATF can come out of the opening and badly burn. Before removing the plug, allow the ATF to cool.

1. Connect the SST to the line pressure inspection hole.
2. Shift the selector lever to D range and read the line pressure at idle.

Caution

- If the accelerator pedal is pressed for longer than 5 seconds while the brake pedal is pressed, the transmission could be damaged. Therefore, do steps 3 and 4 within 5 seconds of each other.

3. Depress the brake pedal firmly with the left foot and gradually depress the accelerator pedal with the right foot.
4. Read the line pressure as soon as the engine speed becomes constant, then release the accelerator pedal.
5. Shift the selector lever to N position and let the engine idle for one minute or more to cool the ATF.
6. Read the line pressure at idle and at the engine stall speed for each range in the same manner.

AUTOMATIC TRANSMISSION

Specified line pressure:

Position/Range	Pressure kPa { kgf/cm ² , psi }	
	Idle	Stall
D range	314—372 { 3.2—3.8 , 43—54 }	803—922 { 8.2—9.4 , 117—133 }
S range	785—921 { 8.0—9.4 , 114—133 }	785—921 { 8.0—9.4 , 114—133 }
L range	314—372 { 3.2—3.8 , 43—54 }	804—922 { 8.2—9.4 , 117—133 }
R position	392—490 { 4.0—5.0 , 57—71 }	1,884—2,069 { 19.2—21.1 , 273—300 }

7. Cool the transmission and reconnect the **SSTs** to the line pressure inspection hole.
8. Connect a vacuum pump to the vacuum diaphragm and place the pump inside the vehicle.
9. Shift the selector lever to R position.
10. Read the line pressure at idle as described below.

Specified line pressure:

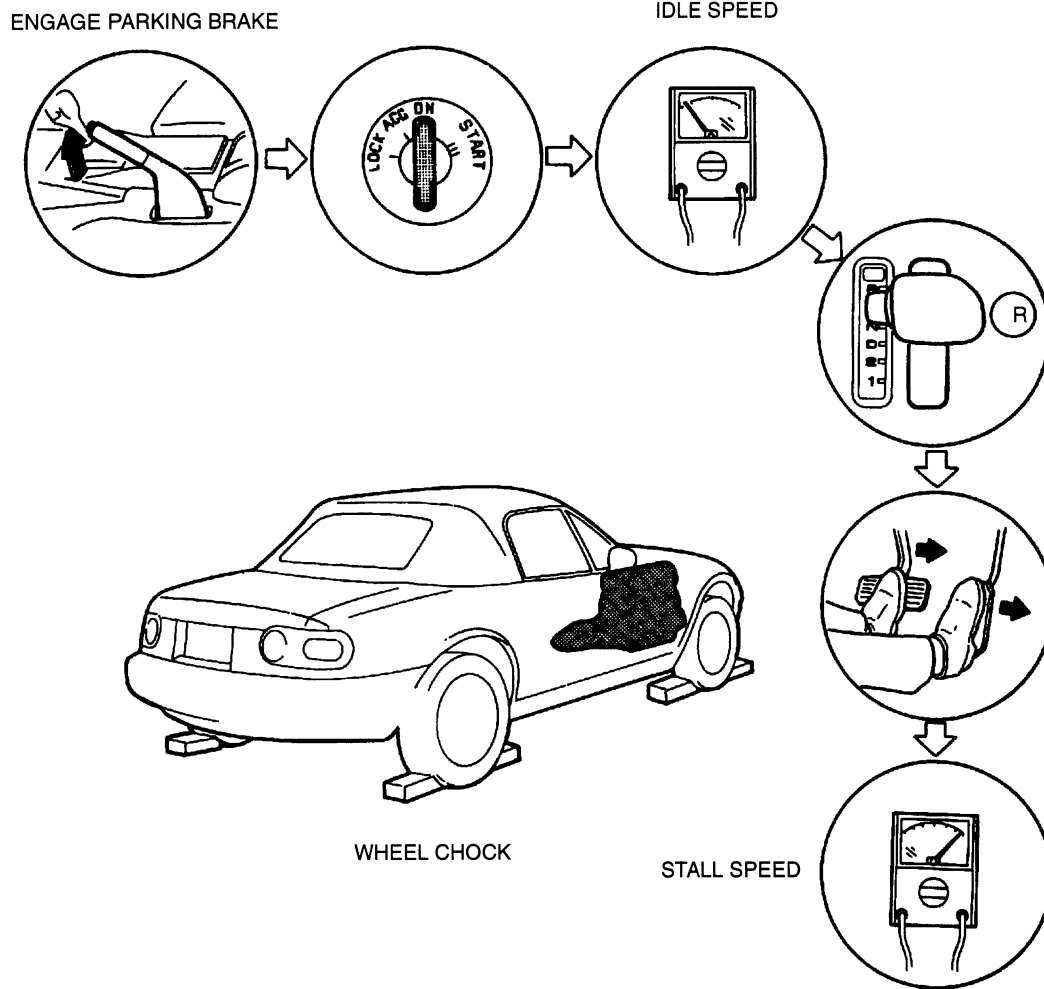
Vacuum	Line pressure kPa { kgf/cm ² , psi }
Barometric pressure	1,884—2,069 { 19.2—21.1 , 273—300 }
200 mmHg { 7.87 inHg }	1,226—1,324 { 12.5—13.5 , 178—192 }
400 mmHg { 15.7 inHg }	392—490 { 4.0—5.0 , 57—71 }

Evaluation of line pressure test

Condition		Possible Cause
Below specification	In R position and all ranges	Worn oil pump Fluid leakage from the oil pump, control valve body, and/or transmission case Stuck pressure regulator valve Fluid leakage from direct clutch and/or fourth gear band servo release side hydraulic circuit
	In D (NORMAL), S (Except HOLD), and L ranges	Fluid leakage from rear clutch hydraulic circuit Stuck pressure modifier valve
	In S (Except HOLD & HOLD) and L ranges	Fluid leakage from throttle backup valve hydraulic circuit
	In L range and R position	Fluid leakage from low and reverse hydraulic circuit
	In R position only	Fluid leakage from front clutch and/or second gear band servo release side hydraulic circuit
	In S range (HOLD)	Stuck throttle backup valve Stuck backup control valve Backup control function (electronic) not operating properly
Excessive line pressure		Stuck pressure modifier valve Stuck backup control valve
Below specification		Same as Line Pressure Test
Excessive pressure	In all positions and ranges	Leaking or disconnected vacuum hose Leaking vacuum diaphragm Diaphragm rod too long Stuck vacuum throttle valve Stuck pressure regulator valve
	In S range (HOLD)	Stuck pressure modifier valve
Incorrect line pressure with specified vacuum at vacuum diaphragm	No variation	Missing diaphragm rod
	Incorrect variation (Above or below specification)	Incorrect diaphragm rod length Stuck vacuum throttle valve Stuck pressure regulator valve Stuck pressure regulator plug

AUTOMATIC TRANSMISSION

Stall Test



1. 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 transmission could be damaged. Therefore, do steps 2 and 3 within 5 seconds of each other.

2. Firmly depress the foot brake with the left foot, and gently depress the accelerator pedal with the right.
3. When the engine speed no longer increases, quickly read the engine speed and release the accelerator.
4. Shift the selector lever to N position and let the engine idle for one minute or more to cool the ATF.
5. Perform the stall test for the following ranges in the same manner.
 - (1) D range
 - (2) S range
 - (3) L range

Engine stall speed
2,750—3,150 rpm

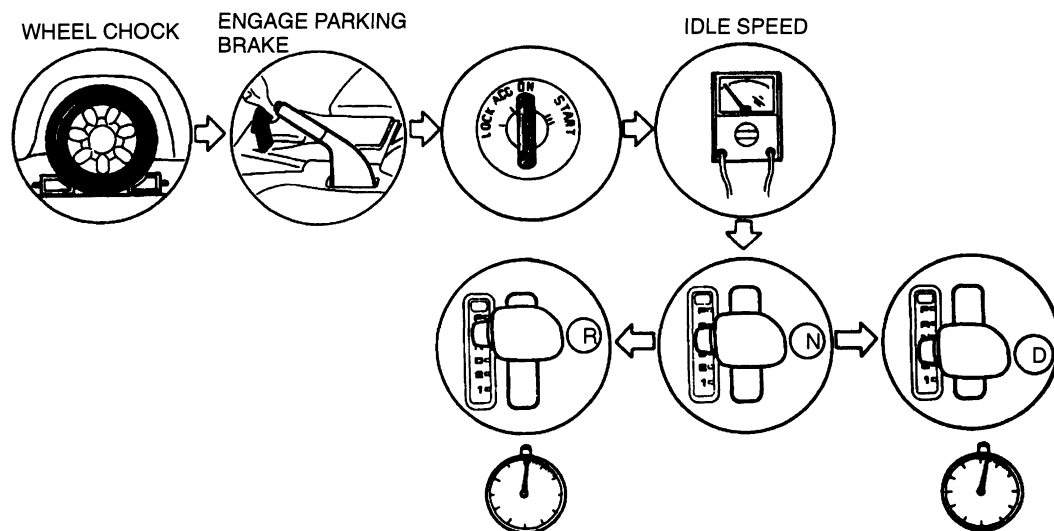
U5U51302

AUTOMATIC TRANSMISSION

Evaluation of stall test

Condition		Possible Cause	
Above specification	In R position and all ranges	Insufficient line pressure	Worn oil pump
			Oil leakage from oil pump, control valve, and/or transmission case
			Stuck pressure regulator valve
			Direct clutch and overdrive one-way clutch slipping
Above specification	In D (NORMAL) and L ranges	Rear clutch slipping	
	In D (NORMAL) range only	One-way clutch slipping	
	In R position only	Low and reverse brake slipping Front clutch slipping • Perform road test to determine if this is caused by low and reverse brake or front clutch as follows: a Effective engine braking in L range → Front clutch b No engine braking in L range → Low and reverse brake	
Within specification		All shift control elements within transmission are functioning normally	
Below specification		Engine out of tune	
		One-way clutch slipping within torque converter	

Time Lag Test



USU51303

1. Shift the selector lever from N position to D range.
2. Use a stopwatch to measure the time it takes from shifting until shock is felt.
3. Shift the selector lever to N position and let the engine idle for one minute or more to cool the ATF.
4. Do the time lag test for the following shifts in the same manner. Make three measurements for each test and average the results.
 - (1) N position→D range (NORMAL mode)
 - (2) N position→D range (HOLD mode)
 - (3) N position→R position

Specified time lag

N position→D range: 0.5—1.5 second

N position→R position: 0.7—1.7 second

AUTOMATIC TRANSMISSION

Evaluation of time lag test

Condition		Possible Cause
N→D (NORMAL) shifting	More than specification	Insufficient line pressure Rear clutch slipping One-way clutch slipping
	Less than specification	N-D accumulator not operating properly Excessive line pressure
N→D (HOLD) shifting	More than specification	Insufficient line pressure Rear clutch slipping 2GR brake band slipping
	Less than specification	1-2 accumulator not operating properly Excessive line pressure
N→R shifting	More than specification	Insufficient line pressure Low and reverse brake slipping Front clutch slipping
	Less than specification	N-R/2-3 accumulator not operating properly Excessive line pressure

ROAD TEST

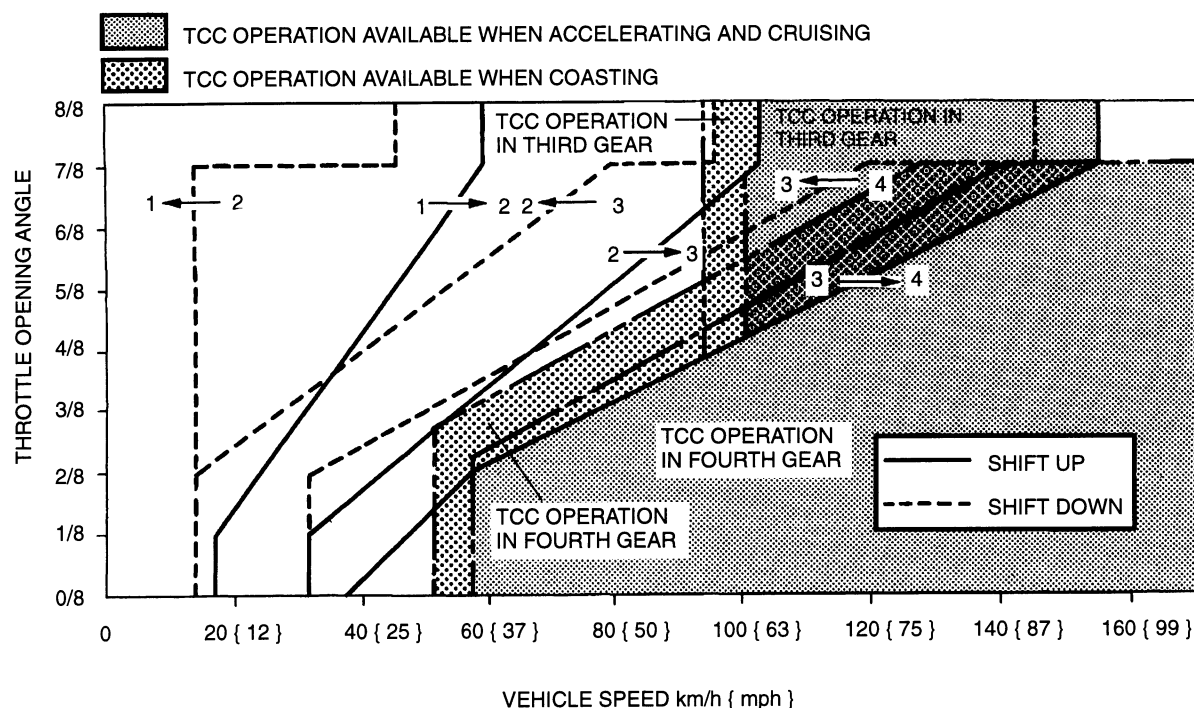
U5U513AB

Road Test Preparation

1. Check the engine coolant. (Refer to 01-12 ENGINE COOLANT LEVEL INSPECTION.)
2. Check the engine oil. (Refer to 01-11 ENGINE OIL INSPECTION.)
3. Check the ATF level. (Refer to page 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION, ATF level inspection.)
4. Check the idle speed and ignition timing in P position. (Refer to 01-10 ENGINE TUNE-UP.)

Shift Diagram

D RANGE (EXCEPT O/D OFF MODE)



U5U51304

D Range Test

D range (HOLD switch OFF)

Note

- The POWER mode and the NORMAL mode are automatically selected by the transmission control module.

1. Shift the selector lever to D range.
2. Accelerate the vehicle to half throttle and wide open throttle.
3. Verify that 1→2, 2→3, and 3→4 upshifts and downshifts are obtained. The shift points must be as shown in the table in the next page.
4. Drive the vehicle in fourth, third, and second gears and verify that kickdown occurs for 4→3, 4→2, 3→2, 3→1, 2→1, and that the shift points are as shown in the table in the following page.
5. Decelerate the vehicle and verify that engine braking effect is felt in fourth and third gears.

Note

- There is torque converter clutch non-operation in the following conditions.
 1. The ATF temperature is below 10 °C { 50 °F }.
 2. The accelerator pedal is at the closed throttle position (closed throttle position switch ON).
 3. The brake switch is ON.
6. Drive the vehicle and verify that torque converter clutch operation is obtained.

D range (HOLD switch ON)

1. Turn the HOLD switch from OFF to ON.
2. Accelerate the vehicle to half throttle and wide open throttle, and verify that 2→3 upshift and downshift are obtained. The shift points must be as shown in the table below.
3. Drive the vehicle in third and second gears and verify that kickdown occurs for 3→2, 3→1, 2→1, and that the shift points are as shown in the table in the following page.
4. Decelerate the vehicle and verify that engine braking effect is felt in third gear.
5. Drive the vehicle in fourth gear (torque converter clutch operation), fourth gear (torque converter clutch non-operation), and second gear (HOLD mode), and listen closely for any out of the ordinary noise or vibration. The torque converter, propeller shaft, and differential can be sources of abnormal noise and vibration if they are not functioning properly. Check these when searching for sources of noise and vibration.

AUTOMATIC TRANSMISSION

Vehicle speed at shift point table

Range	Mode	Throttle condition	Shift	Vehicle speed km/h { mph }	Turbine speed rpm
D	NORMAL	Wide open throttle	D ₁ →D ₂	58—64 { 36—39 }	5600—6150
			D ₂ →D ₃	100—108 { 62—66 }	5700—6150
			D ₃ TCC operation	98—106 { 61—65 }	3850—4150
			D ₃ →D ₄	152—162 { 95—100 }	5950—6350
		Half throttle	D ₁ →D ₂	33—46 { 21—28 }	3150—4400
			D ₂ →D ₃	58—76 { 36—47 }	3300—4300
			D ₃ →D ₄	82—110 { 51—68 }	3200—4300
			D ₄ TCC operation	74—100 { 46—62 }	2100—2800
		Closed throttle position	D ₄ →D ₃	28—34 { 17—21 }	800—950
			D ₃ →D ₁	11—17 { 7—10 }	430—650
		Kickdown (Wide open throttle)	D ₄ →D ₃	140—150 { 87—93 }	3950—4200
			D ₃ →D ₂	92—100 { 57—62 }	3600—3900
			D ₂ →D ₁	42—48 { 26—29 }	2400—2700
	POWER	Wide open throttle	D ₁ →D ₂	58—64 { 36—39 }	5600—6150
			D ₂ →D ₃	100—108 { 62—66 }	5700—6150
			D ₃ TCC operation	98—106 { 61—65 }	3850—4150
			D ₃ →D ₄	152—162 { 95—100 }	5950—6350
		Half throttle	D ₁ →D ₂	44—55 { 28—34 }	4250—5300
			D ₂ →D ₃	99—108 { 56—66 }	5650—6150
			D ₃ TCC operation	98—106 { 61—65 }	3850—4150
			D ₃ →D ₄	140—164 { 87—101 }	5500—6400
		Closed throttle position	D ₄ →D ₃	28—34 { 17—21 }	800—950
			D ₃ →D ₁	11—17 { 7—10 }	430—650
		Kickdown (Wide open throttle)	D ₄ →D ₃	140—150 { 87—93 }	3950—4200
			D ₃ →D ₂	92—100 { 57—62 }	3600—3900
			D ₂ →D ₁	42—48 { 26—29 }	2400—2700
	HOLD	All positions	D ₁ →D ₂	27—33 { 17—20 }	2600—3150
			D ₂ →D ₃	35—45 { 22—27 }	2000—2550
			D ₄ →D ₃	152—158 { 94—97 }	4300—4450
			D ₃ →D ₁	12—18 { 8—11 }	500—700
			D ₃ TCC operation	95—105 { 59—65 }	3700—4100

S Range Test

S range (HOLD switch OFF)

- Shift the selector lever to S range.
- Accelerate the vehicle to half throttle and wide open throttle.
- Verify that 1→2 and 2→3 upshifts and downshifts are obtained. The shift points must be as shown in the table below.
- Drive the vehicle in third and second gears and verify that kickdown occurs for 3→2, 3→1, 2→1, and that the shift points are as shown in the table below.
- Decelerate the vehicle and verify that engine braking effects is felt in third gear.

S range (HOLD switch ON)

- Turn the HOLD switch from OFF to ON.
- Accelerate the vehicle to half throttle and wide open throttle, and verify that second gear is held.
- Decelerate the vehicle and verify that engine braking effect is felt.
- Drive the vehicle in second gear and listen closely for any out of the ordinary noise or vibration. The torque converter, propeller shaft, and differential can be sources of abnormal noise and vibration if they are not functioning properly. Check these when searching for sources of noise and vibration.

AUTOMATIC TRANSMISSION

Vehicle speed at shift point table

Range	Mode	Throttle condition	Shift	Vehicle speed km/h { mph }	Turbine speed rpm
S	Except HOLD	Wide open throttle	S ₁ →S ₂	58—64 { 36—39 }	5600—6150
			S ₂ →S ₃	100—108 { 62—66 }	5700—6150
			S ₃ TCC operation	98—105 { 61—65 }	3850—4100
		Half throttle	S ₁ →S ₂	44—55 { 28—34 }	4250—5300
			S ₂ →S ₃	90—108 { 56—67 }	5150—6150
			S ₃ TCC operation	94—106 { 58—66 }	3700—4150
		Closed throttle position	S ₃ →S ₁	11—17 { 7—10 }	430—650
		Kickdown (Wide open throttle)	S ₃ →S ₂	92—100 { 57—62 }	3600—3900
			S ₂ →S ₁	42—48 { 26—29 }	2400—2700
	HOLD	All positions	S ₃ →S ₂	99—105 { 61—65 }	3900—4100
			S ₃ TCC operation	95—105 { 59—65 }	3700—4100

L Range Test

L range (HOLD switch OFF)

1. Shift the selector lever to L range.
2. Accelerate the vehicle to half throttle and wide open throttle.
3. Verify that 1–2 upshifts and downshifts are obtained. The shift points must be as shown in the table below.
4. Drive the vehicle in second gear and verify that kickdown occurs for 2→1, and that the shift point is low.
5. Decelerate the vehicle and verify that engine braking effect is felt in second gear.

1. Turn the HOLD switch from OFF to ON.
2. Accelerate the vehicle to half throttle and wide open throttle, and verify that first gear is held.
3. Decelerate the vehicle and verify that engine braking effect is felt.
4. Drive the vehicle in second gear and listen closely for any out of the ordinary noise or vibration. The torque converter, propeller shaft, and differential can be sources of abnormal noise and vibration if they are not functioning properly. Check these when searching for sources of noise and vibration.

L range (HOLD switch ON)

Vehicle speed at shift point table

Range	Mode	Throttle condition	Shift	Vehicle speed km/h { mph }	Turbine speed rpm
L	Except HOLD	Wide open throttle	L ₁ →L ₂	56—62 { 35—38 }	5400—5950
		Half throttle	L ₁ →L ₂	44—55 { 27—34 }	4250—5300
		Closed throttle position	L ₃ →L ₂	96—104 { 60—64 }	3750—4050
			L ₂ →L ₁	11—17 { 7—10 }	650—950
		Kickdown (Wide open throttle)	L ₃ →L ₂	99—105 { 61—65 }	3900—4100
			L ₂ →L ₁	42—48 { 26—29 }	2400—2700
	HOLD	All positions	L ₂ →L ₁	35—41 { 21—25 }	2000—2300
			L ₃ TCC operation	95—105 { 59—65 }	3700—4100

P Position Test

- Shift the selector lever into P position on a gentle slope, release the brake, and verify that the vehicle does not roll.

AUTOMATIC TRANSMISSION

AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION

U5U513AC

ATF Condition Inspection

One way of determining whether the transmission should be disassembled is by noting:

1. If the ATF is muddy or varnished.
2. If the ATF smells strange or unusual.

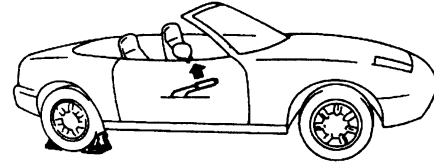
ATF condition

Color	Condition
Clear red	Normal
Dark	Powertrain components damaged
Light pink	Water in the ATF
Reddish-brown	Deterioration of the ATF

3. If ATF condition is not OK, 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

1. Park the vehicle on level ground.
2. Apply the parking brake and position wheel chocks securely to prevent the vehicle from rolling.



U5U51305

3. Warm up the engine until the ATF reaches **60—70 °C { 140—158 °F }**.
4. While the engine is idling, shift the selector lever from P position to L range and back again.
5. Let the engine idle.
6. Shift the selector lever to P position.
7. Ensure that the ATF level is between the notches on the transmission level gauge. Add ATF to specification if necessary.

ATF type

Dexron®II or M-III

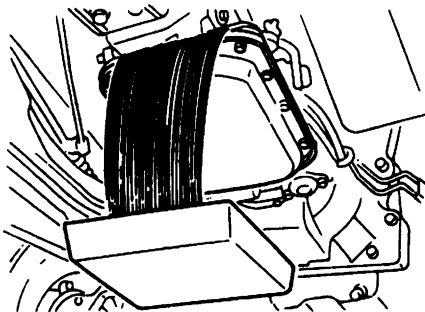
AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT

U5U513AD

Warning

- **When the transmission and ATF are hot, they can badly burn. Turn off the engine and wait until they are cool before changing the ATF.**

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Loosen the oil pan mounting bolts, and drain the ATF into a container.



U5U51306

3. Remove the oil pan and gasket.
4. Clean the oil pan and magnet.
5. Remove any old locking compound from the bolt holes.
6. Install the oil pan along with a new gasket.
7. Tighten new oil pan mounting bolts evenly and quickly.

Tightening torque

5.9—7.8 N·m { 60—80 kgf·cm , 53—69 in·lbf }

8. Lower the vehicle and add **approx. 4.0 L { 4.2 US qt , 3.5 Imp qt }** ATF.

ATF type

Dexron®II or M-III

9. Check the ATF level. (Refer to ATF level inspection.)

ELECTRICAL SIGNAL INSPECTION

U5U513AE

Note

- Do not connect the NGS to the data link Connector 2 when EC-AT tester is connected to the transmission control module. Doing so can cause incorrect test results.

When Using the EC-AT Tester (49 G019 901) and Adapter (49 H019 902)

1. Assemble the **SST**. (Refer to Assembly of SST.)
2. Set the **SST** (49 H019 902) vehicle switch to 929 position.
3. Turn the ignition switch and EC-AT tester main switch to ON.

AUTOMATIC TRANSMISSION

4. Check the indication of the respective light or digital display in each condition, referring to the indication table. (Refer to Indication Table.)

When Using the EC-AT Tester (49 G019 901B)

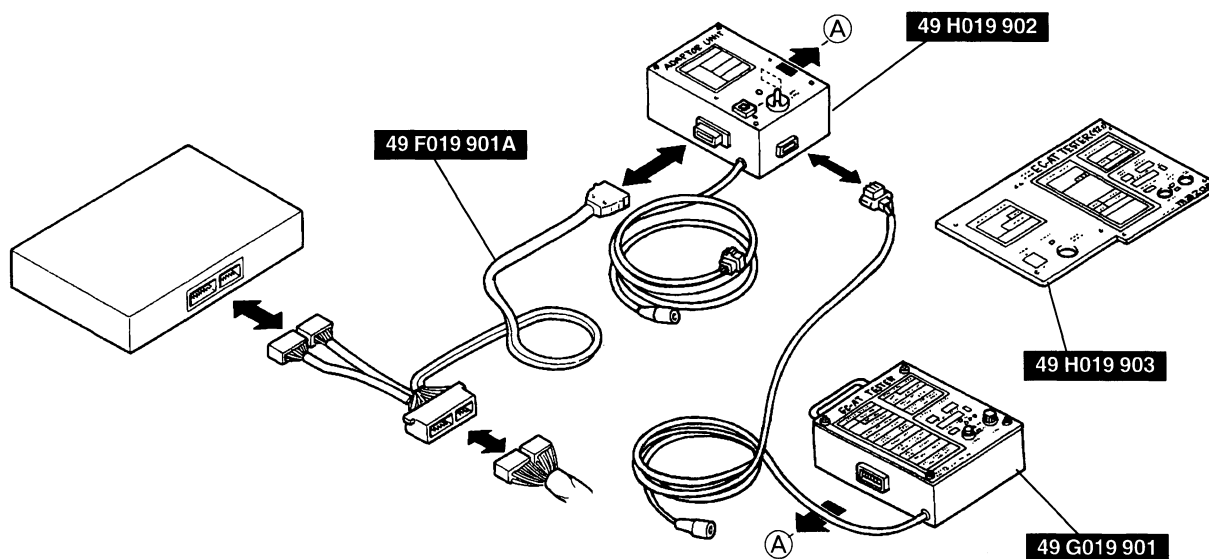
1. Assemble the **SST**. (Refer to Assembly of SST.)
2. Set the **SST** (49 G019 901B) vehicle switch to 929 position.
3. Turn the ignition switch and the EC-AT tester main switch to ON.
4. Check the indication of the respective light or digital display in each condition, referring to indication table. (Refer to Indication Table.)

When Using the EC-AT Tester (49 G019 901C)

1. Assemble the **SST**. (Refer to Assembly of SST.)
2. Turn the **SST** select switch to the ▲ mark on the panel.
3. Turn the ignition switch and the **SST** main switch to ON.
4. Check the indication of the respective light or digital display in each condition, referring to the indication table. (Refer to Indication Table.)

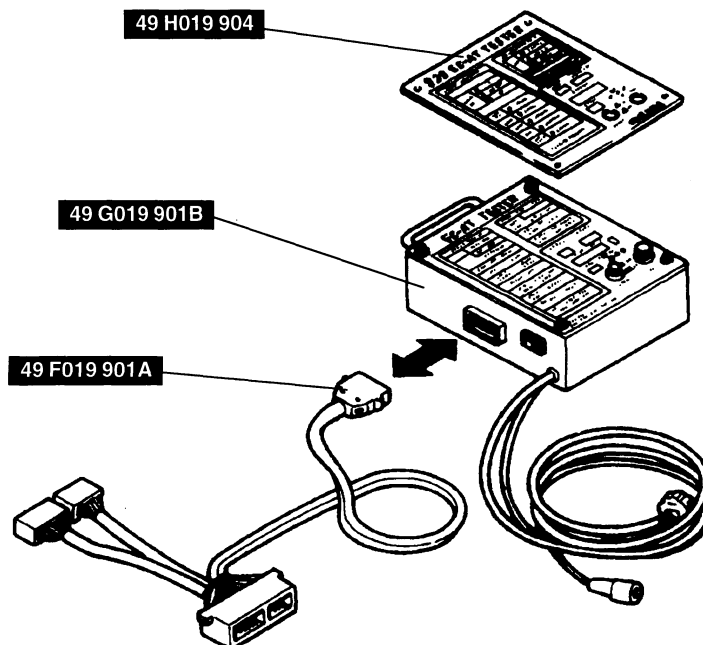
Assembly of SST

EC-AT tester (49 G019 901) and Adapter (49 H019 902)



U5U51309

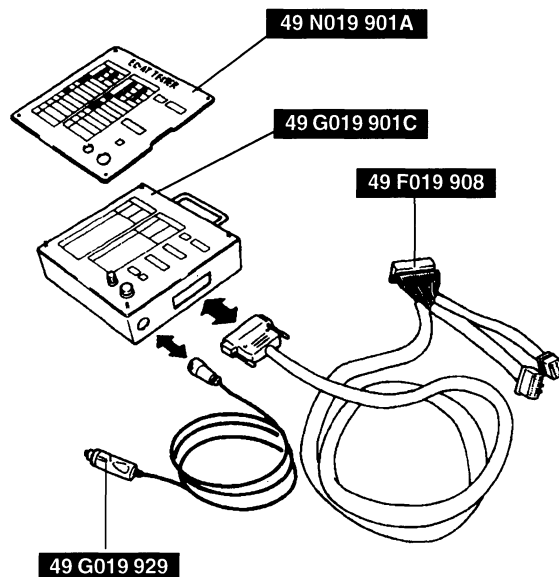
EC-AT tester (49 G019 901B)



U5U51310

AUTOMATIC TRANSMISSION

EC-AT tester (49 G019 901C)



U5U51311

Indication Table

EC-AT tester (49 G019 901 or 49 G019 901B)

Item		Indication	Condition	Possible Cause
Input (Light)				
Transmission range switch (INHIBITOR SW)	D	ON	D range	Transmission range switch or wiring
		OFF	Other ranges, all positions	
	S	ON	S range	
		OFF	Other ranges, all positions	
	L	ON	L range	
		OFF	Other ranges, all positions	
	P, N	ON	P, N position	
		OFF	Other ranges, all positions	
HOLD switch (HOLD SW)		ON	HOLD switch depressed	HOLD switch or wiring
		OFF	HOLD switch released	
Closed throttle position switch (IDLE SW)		ON	Throttle valve closed throttle position	Closed throttle position switch (in throttle position sensor) or wiring
		OFF	Throttle valve open	
MODE SW		Not used		
KICK-DOWN		Not used		
Stoplight switch (BRAKE LIGHT SW)		Not used		
Engine coolant temperature sensor (WATER TEMP SW)		Not used		
Auto speed control switch (CRUISE CONTROL SW)		ON	RESUME/ACCEL switch ON or vehicle speed 8 km/h { 5 mph } lower than preset speed	Auto speed control unit, switch or wiring
		OFF	RESUME/ACCEL switch OFF and vehicle speed kept at preset speed	
Input (Digital Display)				
Throttle position sensor (THROTTLE SENSOR)		TCM terminal voltage	Constant	Throttle position sensor or wiring

AUTOMATIC TRANSMISSION

Item		Indication	Condition	Possible Cause
VEHICLE SPEED		Vehicle speed	Vehicle moving	Vehicle speed sensor or wiring
TURBINE SPEED		Drum speed	Constant	Input/turbine speed sensor or wiring
Output (Light)				
SOLENOID VALVE	Shift solenoid A (1–2)	ON	1GR position	Transmission control module, shift solenoid A, or wiring
		OFF	2GR, 3GR, and 4GR position	
	Shift solenoid B (2–3)	ON	1GR and 2GR position	Transmission control module, shift solenoid B, or wiring
		OFF	3GR and 4GR position	
	Shift solenoid C (3–4)	ON	1GR, 2GR, and 3GR position	Transmission control module, shift solenoid C, or wiring
		OFF	4GR position	
	TCC (LOCK-UP)	Bright	TCC operation	Transmission control module, TCC solenoid valve, or wiring
		Dim	TCC non-operation	
	3–2 timing	ON	3–2 or 4–2 downshift	Transmission control module, 3–2 control solenoid valve, or wiring
		OFF	Other conditions	
HOLD indicator light		ON	HOLD mode	Transmission control module, HOLD switch, or wiring
		OFF	Except HOLD mode	
NO LOAD INDICATOR		ON	N or P position	Transmission control module, input/turbine speed sensor, transmission range switch, or wiring
		OFF	R position, all ranges	
HOLD INDICATOR		Not used		
Gear position	1GR (1st)	ON	1GR position	—
		OFF	Other gear positions	
	2GR (2nd)	ON	2GR position	
		OFF	Other gear positions	
	3GR (3rd)	ON	3GR positions	
		OFF	Other gear positions	
	4GR (O/D)	ON	4GR position	
		OFF	Other gear positions	

EC-AT tester (49 G019 901C)

Item		Indication	Condition	Possible Cause
Input (Light)				
TRANSMIS- SION RANGE SWITCH	P/N	ON	P or N position	Transmission range switch or wiring
		OFF	R position, all ranges	
	D	ON	D range	
		OFF	Other ranges, all positions	
	S	ON	S range	
		OFF	Other ranges, all positions	
	L	ON	L range	
		OFF	Other ranges, all positions	
HOLD/O/D OFF SWITCH		Bright	HOLD switch depressed	HOLD switch or wiring
		Dim	HOLD switch released	
CLOSED THROTTLE POSITION SWITCH		ON	Closed throttle position	Closed throttle position switch (in throttle position sensor) or wiring
		OFF	Other positions	
4GR INHIBIT SIGNAL		Bright	RESUME/ACCEL switch OFF and vehicle speed kept at preset speed	Cruise control module or wiring
		Dim	RESUME/ACCEL switch ON or vehicle speed 8 km/h { 5 mph } lower than preset speed	

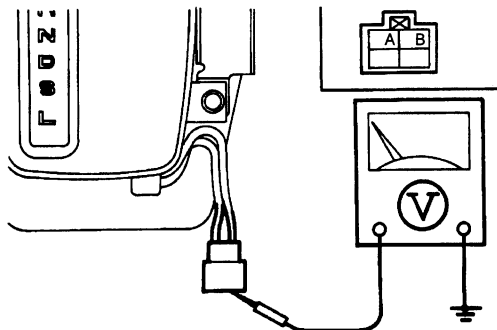
AUTOMATIC TRANSMISSION

Item		Indication	Condition	Possible Cause
ECT SIGNAL		Not used		
Input (Digital Display)				
THROTTLE POSITION SENSOR		TCM terminal voltage	Constant	Throttle position sensor or wiring
VEHICLE SPEED		Vehicle speed	Vehicle moving	Vehicle speedometer sensor, vehicle speed sensor, or wiring
TURBINE SPEED		Drum speed	All the time	Input/turbine speed sensor or wiring
TFT SENSOR		TCM terminal voltage	ATF temperature 10 °C { 50 °F } : 1.8 V ATF temperature 40 °C { 104 °F } : 1.1 V	Transmission fluid temperature sensor or wiring
Output (Light)				
SOLENOID VALVE	SHIFT A	ON	1GR position	Transmission control module, shift solenoid A, or wiring
		OFF	2GR, 3GR, and 4GR position	
	SHIFT B	ON	1GR and 2GR position	Transmission control module, shift solenoid B, or wiring
		OFF	3GR and 4GR position	
	SHIFT C	ON	1GR, 2GR, and 3GR position	Transmission control module, shift solenoid C, or wiring
		OFF	4GR position	
	TCC CONTROL	Bright	TCC operation	Transmission control module, TCC solenoid valve, or wiring
		Dim	TCC non-operation	
	3–2 CONTROL	ON	3–2 or 4–3 downshift	Transmission control module, 3–2 control solenoid valve, or wiring
		OFF	Other conditions	
HOLD/O/D OFF INDICATOR LIGHT		ON	HOLD mode	Transmission control module, HOLD switch, or wiring
		OFF	Except HOLD mode	
PARK/NEUTRAL POSITION SIGNAL		ON	All ranges and R position	Transmission control module, Input/turbine speed sensor, Transmission range switch, or wiring
		OFF	N or P position	
Output (Digital Display)				
GEAR POSITION		1	First gear	—
		2	Second gear	
		3	Third gear	
		4	Fourth gear	

HOLD SWITCH INSPECTION

1. Remove the front console.
2. Turn the ignition switch to ON.
3. Check the voltage at the HOLD switch connector.

Position	Connector terminal	
	A	B
Released	B+	0
Depressed	0	0



U5U513AF

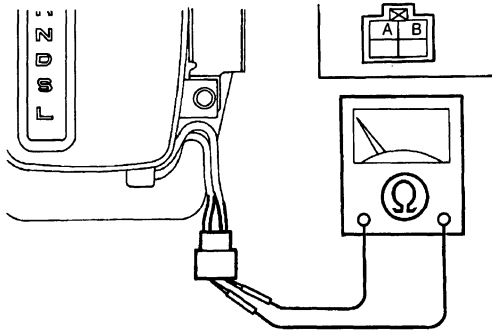
U5U51312

4. If not correct, check for continuity between terminals A and B of the HOLD switch.

AUTOMATIC TRANSMISSION

Terminal	Condition	
	Released	Depressed
A—B	No	Yes

- If not correct, replace the selector lever knob as an assembly.



U5U51313

HOLD SWITCH REMOVAL / INSTALLATION

U5U513AG

- Remove the selector lever knob.
- Install the selector lever knob.

TRANSMISSION RANGE SWITCH INSPECTION

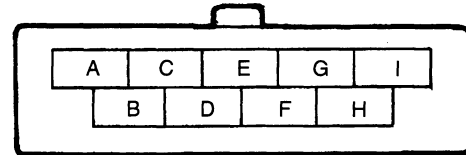
U5U513AH

- Remove the selector lever.
- Disconnect the transmission range switch connector.
- Check for continuity between the terminals.

○—○ : Continuity

Position	Connector								
	A	B	C	D	E	F	G	H	I
P		○			○			○	○
R							○		○
N		○		○				○	○
D			○						○
S						○			○
L	○								○

U5U51314



U5U51315

- If not correct, adjust the transmission range switch.
- Connect the transmission range switch connector.
- Install the selector cable.

TRANSMISSION RANGE SWITCH REMOVAL / INSTALLATION

U5U513AJ

- Remove the selector lever.
- Remove the transmission range switch.
- Install the transmission range switch.
- Adjust the transmission range switch. (Refer to 05-13 TRANSMISSION RANGE SWITCH ADJUSTMENT.)

- Install the selector lever.

Tightening torque

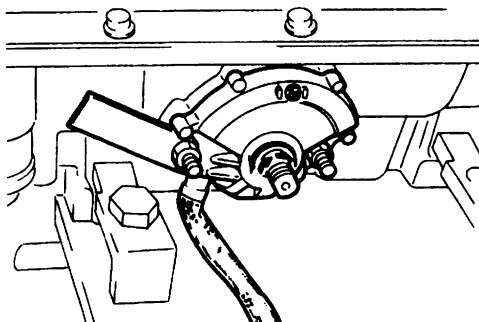
45—63 N·m { 4.5—6.5 kgf·m , 33—47 ft·lbf }

AUTOMATIC TRANSMISSION

TRANSMISSION RANGE SWITCH ADJUSTMENT

U5U513AK

1. Remove the selector lever.
2. Move the manual shaft to N position.
3. Loosen the transmission range switch mounting nuts.

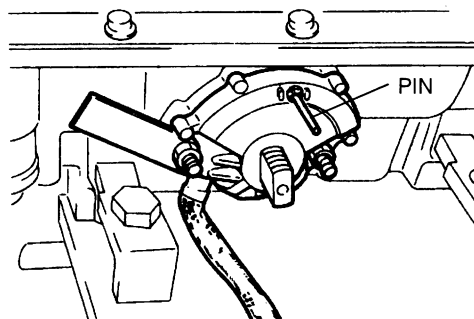


U5U51316

4. Align the holes of the transmission range switch and insert an **approx. 2.0 mm { 0.079 in }** outer diameter pin through the holes.
5. Tighten the mounting bolts, and remove the pin.

Tightening torque

5.0—6.8 N·m { 50—70 kgf·cm , 44—60 in·lbf }



U5U51317

6. Recheck the continuity of the transmission range switch.
7. If not correct, replace the transmission range switch. (Refer to 05-13 TRANSMISSION RANGE SWITCH REMOVAL / INSTALLATION.)
8. Install the selector lever.

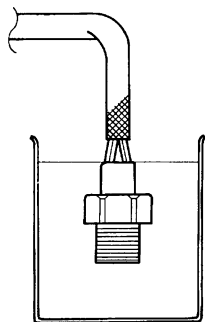
Tightening torque

45—63 N·m { 4.5—6.5 kgf·m , 33—47 ft·lbf }

TRANSMISSION FLUID TEMPERATURE SENSOR INSPECTION

U5U513AL

1. Remove the transmission fluid temperature sensor. (Refer to 05-13 TRANSMISSION FLUID TEMPERATURE SENSOR REMOVAL / INSTALLATION.)
2. Place the transmission fluid temperature sensor in water with a thermometer as shown and heat the water gradually.



U5U51318

3. Measure the resistance between the terminals.

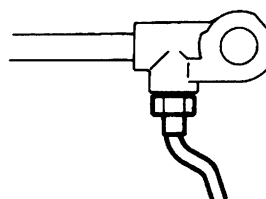
Water temperature	Resistance (kΩ)
20 °C { 68 °F }	Approx. 2.5
60 °C { 140 °F }	Approx. 0.6
80 °C { 176 °F }	Approx. 0.35

4. If not correct, replace the transmission fluid temperature sensor.

TRANSMISSION FLUID TEMPERATURE SENSOR REMOVAL / INSTALLATION

U5U513AM

1. Disconnect the transmission fluid temperature sensor connector.
2. Remove the transmission fluid temperature sensor.



U3U51319

AUTOMATIC TRANSMISSION

3. Install a new transmission fluid temperature sensor.

Tightening torque

7.9—10.7 N·m { 80—110 kgf·cm , 70—95 in·lbf }

4. Connect the transmission fluid temperature sensor connector.

INPUT/TURBINE SPEED SENSOR INSPECTION

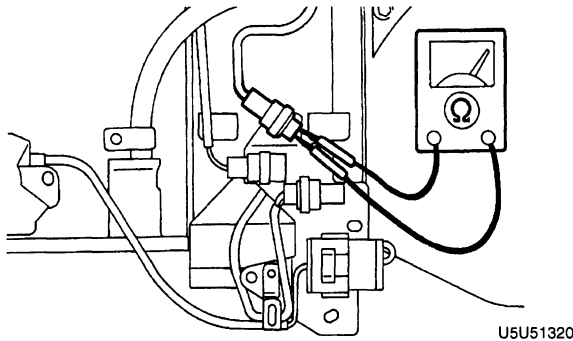
U5U513AN

1. Disconnect the input/turbine speed sensor connector.
2. Measure the resistance between the terminals of the input/turbine speed sensor.

3. If not correct, replace the input/turbine speed sensor. (Refer to 05-13 INPUT/TURBINE SPEED SENSOR REMOVAL / INSTALLATION.)
4. Connect the input/turbine speed sensor connector.

Resistance

245 Ω



INPUT/TURBINE SPEED SENSOR REMOVAL / INSTALLATION

U5U513AP

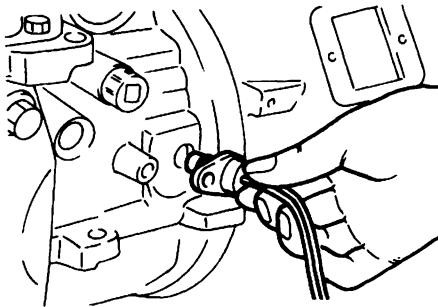
1. Disconnect the input/turbine speed sensor connector.
2. Remove the input/turbine speed sensor.

3. Apply ATF to a new O-ring and install it on the input/turbine speed sensor.
4. Install a new input/turbine speed sensor.

Tightening torque

7.9—10.7 N·m { 80—110 kgf·cm , 70—95 in·lbf }

5. Connect the input/turbine speed sensor connector.



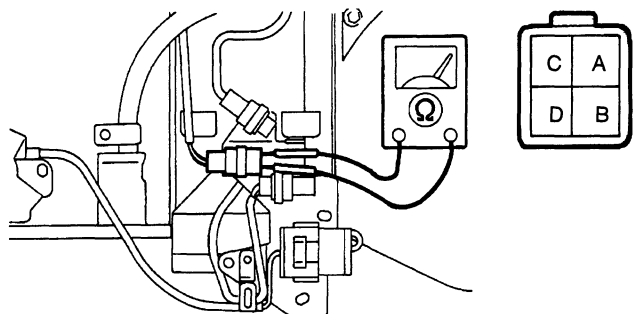
SOLENOID VALVES INSPECTION

U5U513AQ

Shift Solenoid A, B, C, 3-2 Control Solenoid Valve Inspection

1. Disconnect the solenoid valve connector.
2. Measure the resistance between each terminal and ground.

Terminal	Solenoid valves	Resistance (Ω)
C	Shift solenoid A	13—27
D	Shift solenoid B	13—27
A	Shift solenoid C	13—27
B	3-2 control	13—27

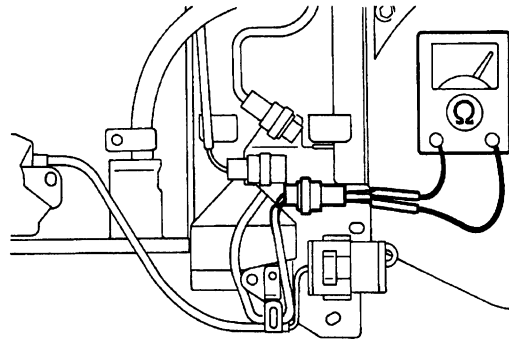


3. If not correct, replace the solenoid valve. (Refer to 05-13 SOLENOID VALVES REMOVAL / INSTALLATION.)
4. Connect the solenoid valve connector.

Torque Converter Clutch Control Solenoid Valve Inspection

1. Disconnect the solenoid valve connector.
2. Measure the resistance between the terminals.

Resistance
13—25 Ω



U5U51323

3. If not correct, replace the solenoid valve. (Refer to 05-13 SOLENOID VALVES REMOVAL / INSTALLATION.)
4. Connect the solenoid valve connector.

SOLENOID VALVES REMOVAL / INSTALLATION

U5U513AR

Shift Solenoid A, B, C, 3-2 Control Solenoid Valve Removal / Installation

1. Remove the control valve body. (Refer to 05-13 CONTROL VALVE BODY ON-VEHICLE REMOVAL / INSTALLATION.)
2. Remove the solenoid valve(s).
3. Apply ATF to a new O-ring(s) and install it on the solenoid valve(s).
4. Install the solenoid valve(s) to the control valve body.

Tightening torque
7.9—10.7 N·m { 80—110 kgf·cm , 70—95 in·lbf }

5. Install the control valve body. (Refer to 05-13 CONTROL VALVE BODY ON-VEHICLE REMOVAL / INSTALLATION.)

6. Carry out the line pressure test and time lag test. (Refer to 05-06 MECHANICAL SYSTEM TEST.)
7. Carry out the road test. (Refer to 05-13 ROAD TEST.)

Torque Converter Clutch Control Solenoid Valve Removal / Installation

1. Disconnect the solenoid valve connector.
2. Remove the solenoid valve.
3. Apply ATF to a new O-ring and install it on the solenoid valve.
4. Install the solenoid valve.

Tightening torque
7.9—10.7 N·m { 80—110 kgf·cm , 70—95 in·lbf }

TRANSMISSION CONTROL MODULE INSPECTION

U5U513AT

1. Turn the ignition switch to ON, and check the transmission control module terminal voltage, referring to the Terminal Voltage Chart.
2. If not correct, check or replace the component(s), wiring, and/or transmission control module.

Terminal Voltage Chart (Reference Data)

Note

- Use the ground of terminal 2P of the transmission control module when measuring terminal voltage, as an error may occur when the negative (—) lead of the circuit tester is connected to ground.

2S	2Q	2O	2M	2K	2I	2G	2E	2C	2A	1O	1M	1K	1I	1G	1E	1C	1A
2T	2R	2P	2N	2L	2J	2H	2F	2D	2B	1P	1N	1L	1J	1H	1F	1D	1B

U5U51328

AUTOMATIC TRANSMISSION

Terminal	Connected to	Voltmeter		Voltage	Condition
		+ terminal	– terminal		
1A	—	—	—	—	—
1B (Output)	HOLD indicator light	1B	Ground	B+	Except HOLD mode
				Below 1.5 V	HOLD mode
1C (Output)	FAIL signal	1C		B+	TEST mode
				Below 1.0 V or repeat B+ and 0 V	Other modes
1D (Output)	Engine control module (terminal R)	1D		Below 2.5 V	N or P position
				B+	All ranges, R position
				B+	Ignition switch ON
1E (Input)	TEST signal	1E	Ground	Below 1.0 V or repeat B+ and 0 V	TEST mode
1F	—	—		—	—
1G	Transmission fluid temperature sensor	1G	Ground	3.3 V	ATF temperature 25 °C { 77 °F }
1H (Input)	HOLD switch	1H		B+	Switch depressed
				0 V	Switch released
1I	—	—	—	—	—
1J	—	—	—	—	—
1K (Input)	Water temperature switch	1K	Ground	Below 1.5 V	Water temperature below 50 °C { 122 °F }
				B+	Water temperature above 60 °C { 140 °F }
1L	—	—	—	—	—
1M (Input)	Cruise control unit	1M	Ground	B+	Normal conditions
				Below 1.5 V	Set or Resume switch ON or vehicle speed 8 km/h { 5 MPH } lower than pre-set speed (Driving vehicle cruise control operation)
1N (Input)	Engine rpm signal (Ne signal)	1N		0 V or 4.5 V—5.5 V	Engine stopped (ignition switch ON)
				2.0 V—3.0 V	Engine running at idle
1O	Closed throttle position switch	1O		0 V	Accelerator pedal depressed
				B+	Accelerator pedal released
1P (Input)	Vehicle speed sensor	1P		Approx. 4 V	While driving
				Approx. 7—9 V or Below 1.5 V	Vehicle stopped
2A (Input)	Throttle position sensor	2A		Approx. 4.4—5.5 V	Ignition switch ON
				0 V	Ignition switch OFF
2B (Input)	Transmission range switch (N and P position)	2B		0 V	N or P position
				B+	All ranges, R position
2C	—	—	—	—	—

AUTOMATIC TRANSMISSION

Terminal	Connected to	Voltmeter		Voltage	Condition
		+ terminal	– terminal		
2D (Input)	Transmission range switch (D range)	2D	Ground	B+	D range
				0 V	Other ranges, all positions
2E (Output)	Shift solenoid A	2E		B+	Solenoid ON in following condition: • 1GR position
				0 V	Solenoid OFF in following condition: • 2GR, 3GR, and 4GR positions
2F (Input)	Transmission range switch (S range)	2F		B+	S range
				0 V	Other ranges, all positions
2G (Output)	Shift solenoid B	2G		B+	Solenoid ON in following condition: • 1GR and 2GR positions
				0 V	Solenoid OFF in following condition: • 3GR and 4GR positions
2H (Input)	Transmission range switch (L range)	2F		B+	L range
				0 V	Other ranges, all positions
2I (Output)	Shift solenoid C	2I		B+	Solenoid ON in following condition: • 1GR, 2GR, and 3GR positions
				0 V	Solenoid OFF in following condition: • 4GR position
2J (Input)*	Input/turbine speed sensor	2J	Ground	0—0.1 V (AC)	Engine running
				0 V (AC)	Engine stopped
2K (Output)	TCC control solenoid valve	2K		B+	Solenoid ON, TCC operation
				0 V	Solenoid OFF, TCC non-operation
2L (Ground)*	Input/turbine speed sensor	2L		Below 1.5 V	—
2M (Output)	3–2 control solenoid valve	2M		B+	3–2 or 4–3 downshift
				0 V	Other conditions
2N	—	—	—	—	—
2O (Memory power)	Battery	2O	Ground	B+	Constant
2P (Ground)	—	2P		0 V	—
2Q (Battery power)	Battery	2Q		B+	Ignition switch ON
				0 V	Ignition switch OFF
2R	—	—	—	—	—
2S	—	—	—	—	—
2T (Input)	Throttle position sensor	2T	Ground	Approx. 0.4—4.1 V	Closed throttle position to wide open throttle

* : Checked with AC range

TRANSMISSION CONTROL MODULE REMOVAL / INSTALLATION

U5U513AU

1. Disconnect the transmission control module connector.
2. Remove the transmission control module.
3. Install the transmission control module.

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

4. Connect the transmission control module connector.

AUTOMATIC TRANSMISSION

AUTOMATIC TRANSMISSION REMOVAL / INSTALLATION

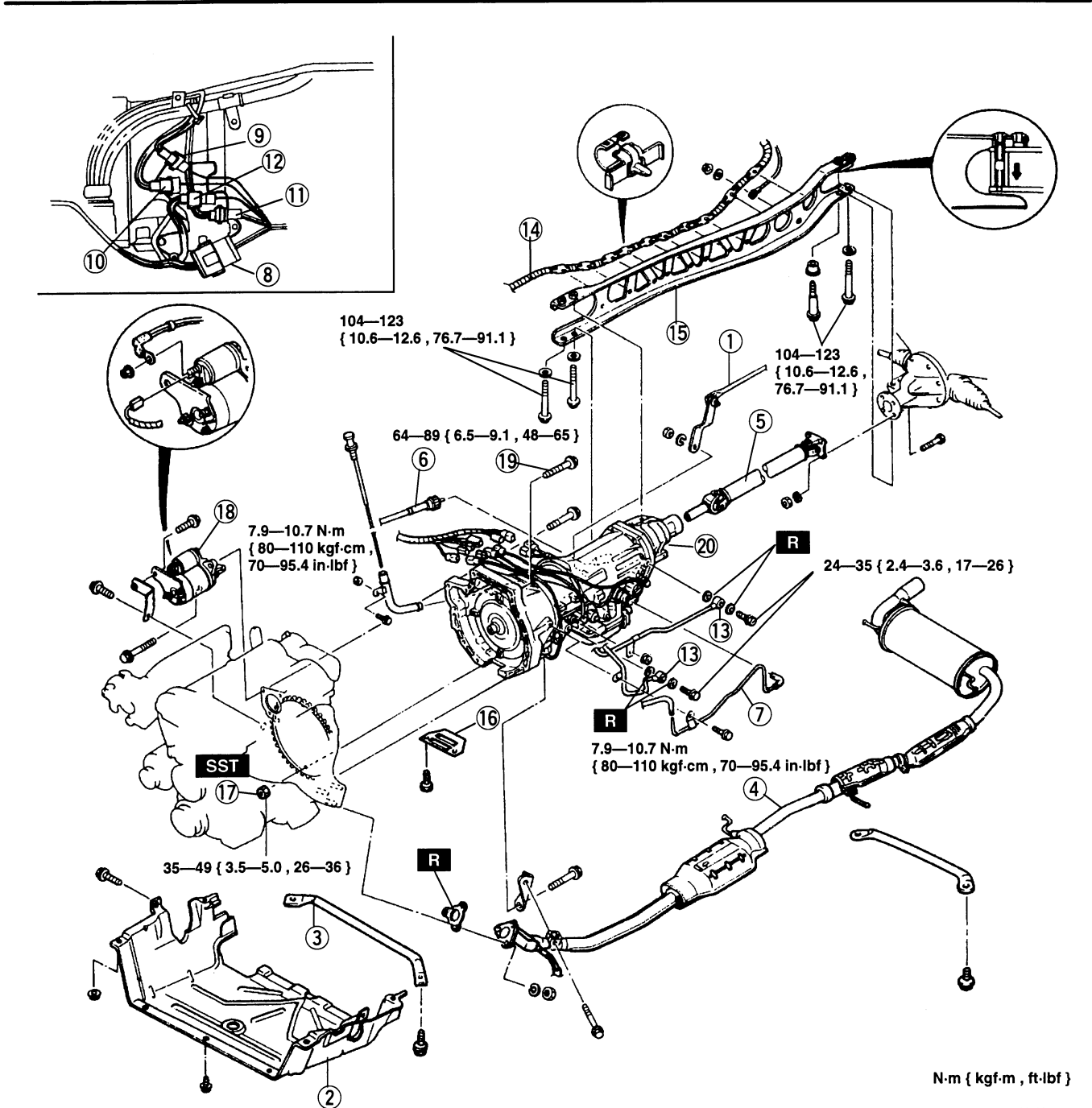
U5U513AV

- The oil pan could contain small chips, shavings, and other particles helpful in checking the condition of the transmission and diagnosing certain problems. To ensure that all foreign particles stay in the oil pan, make sure that the transmission is never tipped completely over while the oil pan is still installed.
1. Drain the ATF. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
 2. Remove the exhaust system. (Refer to 01–15 EXHAUST SYSTEM REMOVAL / INSTALLATION.)
 3. Remove the propeller shaft. (Refer to 03–15 PROPELLER SHAFT REMOVAL / INSTALLATION.)
 4. Remove in the order indicated in the table.
 5. Install in the reverse order of removal indicated in the table.
 6. Install the propeller shaft. (Refer to 03–15 PROPELLER SHAFT REMOVAL / INSTALLATION.)
 7. Install the exhaust system. (Refer to 01–15 EXHAUST SYSTEM REMOVAL / INSTALLATION.)
 8. Fill the transmission with the specified ATF after installation. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
 9. Check for leakage of ATF from all connecting points.
 10. Check the operation of the transmission range switch. (Refer to 05–13 TRANSMISSION RANGE SWITCH.)
 11. Check the operation of the selector lever. (Refer to 05–14 SELECTOR LEVER INSPECTION.)
 12. Carry out the mechanical system test. (Refer to 05–13 MECHANICAL SYSTEM TEST.)
- Warning**
- **Improperly jacking a transmission is dangerous. It can slip off the jack and cause serious injury.**

Service item	Test item		
	Line pressure test	Stall test	Time lag test
Automatic transmission replacement	○		
Automatic transmission overhaul	○	○	○
Torque converter replacement	○	○	
Oil pump replacement	○		
Clutch system replacement	○		

○ : Test to be performed after work

13. Carry out the road test. (Refer to 05–13 ROAD TEST.)



U5U51329

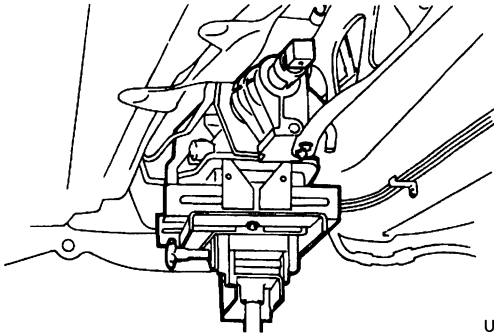
1	Shift rod
2	Undercover
3	Performance rod
4	Exhaust pipe
5	Propeller shaft
6	Speedometer cable
7	Vacuum hose
8	Transmission range switch connector
9	Input/turbine speed sensor connector
10	Solenoid connector
11	Transmission fluid temperature sensor connector
12	Torque converter clutch solenoid connector
13	Oil pipe

14	Harness
15	Power plant frame (PPF)  Removal note  Installation note
16	Undercover
17	Torque converter bolts  Installation note
18	Starter
19	Transmission mount bolt
20	Transmission  Removal note  Installation note  05-13 AUTOMATIC TRANSMISSION DIS-ASSEMBLY / ASSEMBLY

AUTOMATIC TRANSMISSION

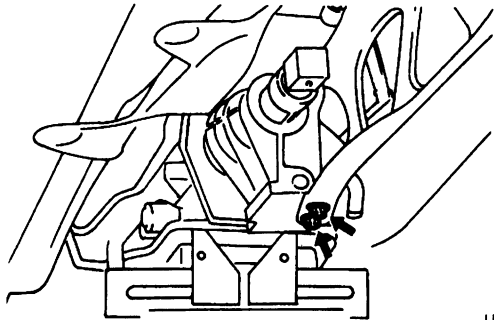
Power Plant Frame (PPF) Removal Note

1. Disconnect the wire harness from the power plant frame.
2. Support the transmission on a jack.



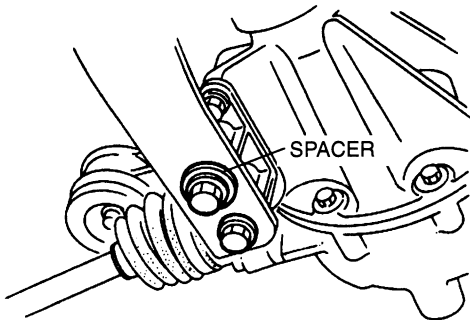
U5U51330

3. Remove the front bolts.



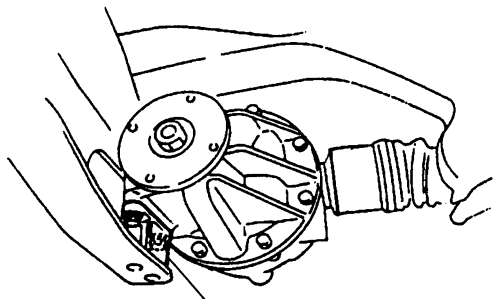
U5U51331

4. Remove the differential-side bolts, and pry out the bolt spacer.



U5U51332

5. Remove the differential mounting spacer.



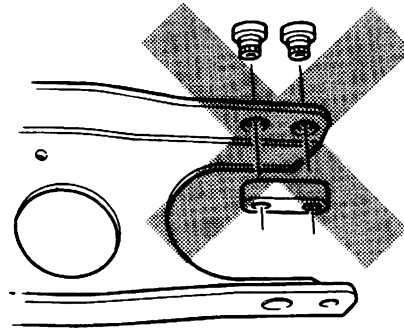
DIFFERENTIAL MOUNTING SPACER

U5U51333

6. Remove the transmission-side bolts, and remove the PPF. Do not remove the spacers from the PPF. If they are removed, replace the PPF as an assembly.

Note

- If the sleeve can not be removed easily, tap the side of the sleeve with a plastic hammer.

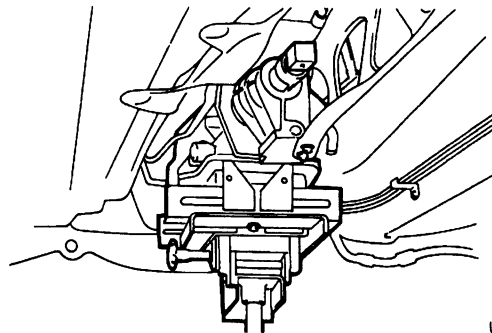


U5U51334

7. Remove the sleeve.

Transmission Removal Note

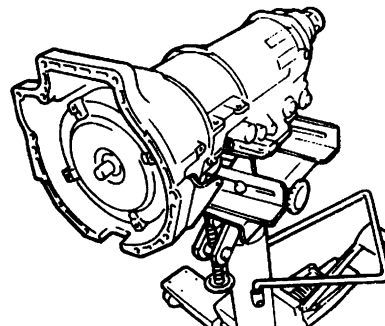
- Set the transmission onto the transmission jack, paying special attention not to damage the oil pipes. Make sure that the torque converter side of the transmission is tilted slightly upward during removal. Carefully lower the transmission from the vehicle.



U5U51335

Transmission Installation Note

- Set the transmission onto the transmission jack, paying special attention not to damage the oil pipes. Make sure that the torque converter side of the transmission is tilted slightly upward.



U5U51336

Torque Converter Bolts Installation Note

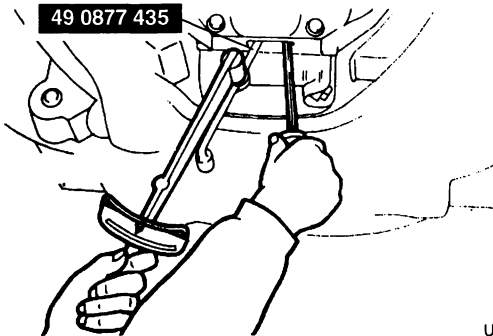
1. Align the holes by turning the torque converter.
2. Lock the drive plate by using a screwdriver.
3. Hand-tighten the torque converter mounting bolts in a crisscross pattern.

AUTOMATIC TRANSMISSION

4. Modify the torque converter mounting bolts' tightening torque to allow for a torque wrench-SST combination. (Refer to 00-00 FUNDAMENTAL PROCEDURES, Torque Formulas.)
5. Tighten the torque converter mounting bolts by using the SST.

Tightening torque

35—49 N·m { 3.5—5.0 kgf·m , 26—36 ft·lbf }



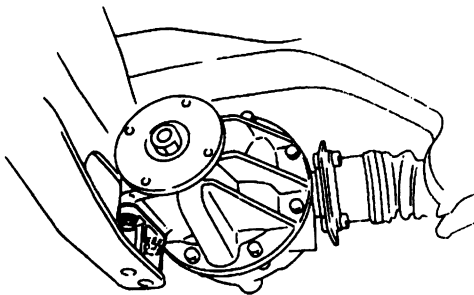
U5U51337

Power Plant Frame (PPF) Installation Note

1. Install the differential mounting spacer.

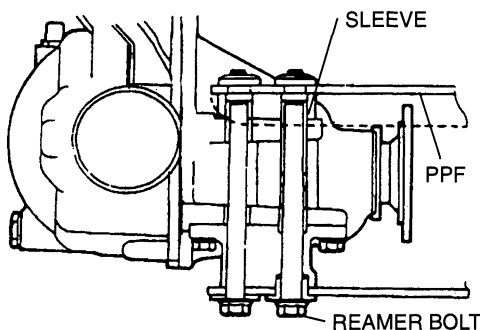
Tightening torque

38—51 N·m { 3.8—5.3 kgf·m , 28—38 ft·lbf }



U5U51338

2. Support the transmission on a jack so that it is level.
3. Position the PPF and install the sleeve.
4. Install the spacer and bolts, and snugly tighten the reamer bolt. The reamer bolt should be installed in the forward hole.
5. Tighten the outer bolts snugly.

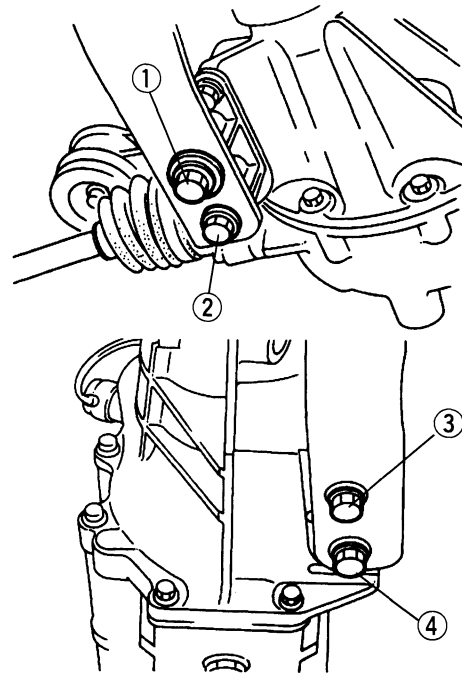


U5U51339

6. Tighten the bolts to the specified torque in the order shown.

Tightening torque

104—123 N·m { 10.6—12.6 kgf·m , 77—91 ft·lbf }

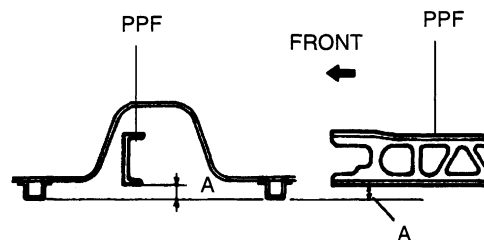


U5U51340

7. Remove the jack.
8. Measure distance A by using a straightedge and vernier calipers.

Distance A

51.5—61.5 mm { 2.023—2.417 in }



U5U51341

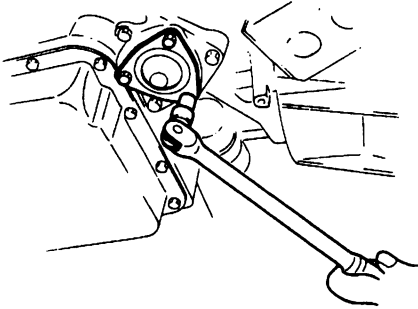
9. If the distance is not within the specification, reposition the power plant frame at the transmission.

AUTOMATIC TRANSMISSION

FOURTH GEAR BAND SERVO ON-VEHICLE ADJUSTMENT

U5U513AW

1. Remove the exhaust pipe. (Refer to 05-13 AUTOMATIC TRANSMISSION REMOVAL / INSTALLATION.)
2. Remove the fourth gear band servo cover and gasket.

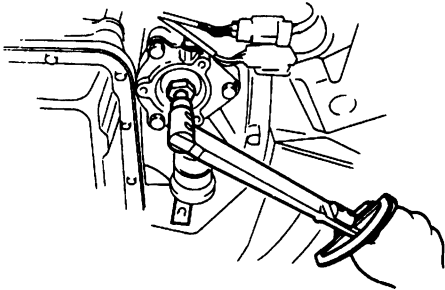


U5U51342

3. Loosen the locknut and tighten the piston stem.

Tightening torque

11.8—14.7 N·m
{ 120—150 kgf·cm , 105—130 in·lbf }



U5U51343

4. Loosen the stem the number of turns shown below.

Stem

2 turns

5. Hold the piston stem and tighten the locknut.

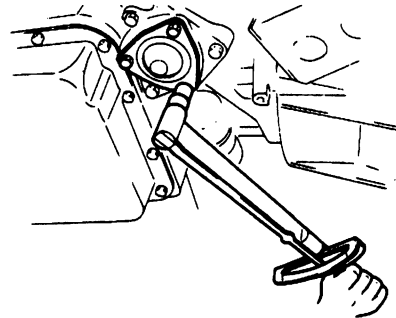
Tightening torque

15—39 N·m { 1.5—4.0 kgf·m , 11—28 ft·lbf }

6. Install a new gasket and the fourth gear band servo cover.

Tightening torque

5.0—6.8 N·m { 50—70 kgf·cm , 44—60 in·lbf }



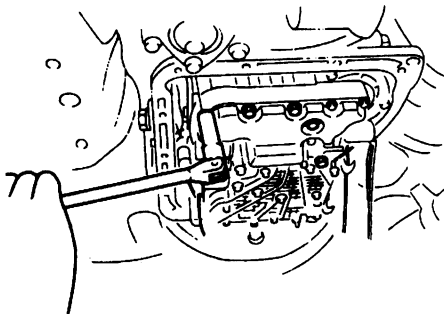
U5U51344

7. Install the exhaust pipe. (Refer to 05-13 AUTOMATIC TRANSMISSION REMOVAL / INSTALLATION.)

SECOND GEAR BAND SERVO ON-VEHICLE ADJUSTMENT

U5U513AX

1. Remove the exhaust pipe. (Refer to 05-13 AUTOMATIC TRANSMISSION REMOVAL / INSTALLATION.)
2. Remove the valve body component. (Refer to 05-13 CONTROL VALVE BODY ON-VEHICLE REMOVAL / INSTALLATION.)

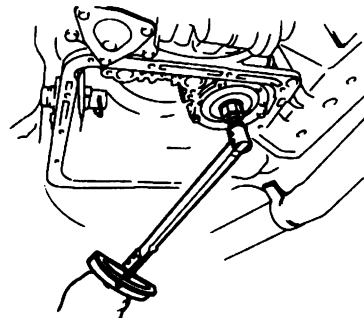


U5U51345

3. Loosen the locknut and tighten the piston stem.

Tightening torque

12.3—14.2 N·m
{ 125—145 kgf·cm , 109—125 in·lbf }



U5U51346

4. Loosen the stem the number of turns shown below.

Stem

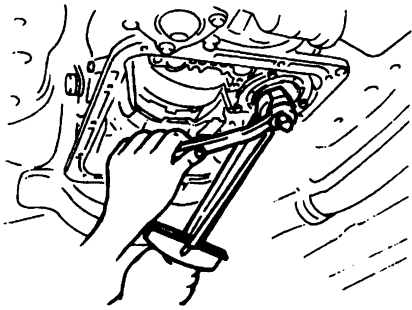
2 1/2 turns

5. Hold the piston stem and tighten the locknut.

AUTOMATIC TRANSMISSION

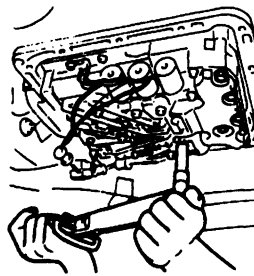
Tightening torque

15—39 N·m { 1.5—4.0 kgf·m , 11—28 ft·lbf }

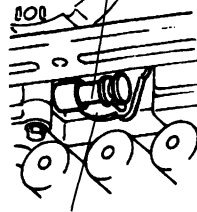


U5U51347

6. Install a new body component. (Refer to 05-13 CONTROL VALVE BODY ON-VEHICLE REMOVAL / INSTALLATION.)



MANUAL VALVE



MANUAL PLATE

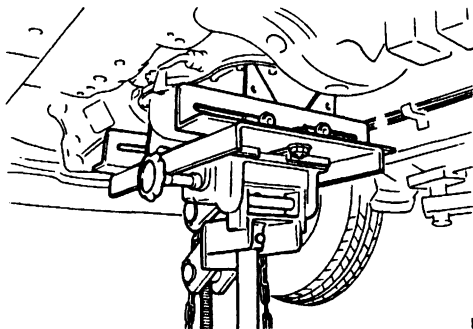
U5U51348

7. Install the exhaust pipe. (Refer to 05-13 AUTOMATIC TRANSMISSION REMOVAL / INSTALLATION.)

EXTENSION HOUSING AND PARKING MECHANISM ON-VEHICLE REMOVAL / INSTALLATION

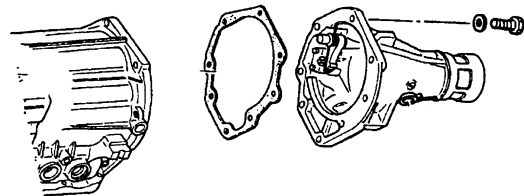
U5U5134Y

1. Clean the transmission exterior thoroughly by using a steam cleaner or cleaning solvent. (Refer to 05-13 AUTOMATIC TRANSMISSION CLEANING, Cleaning Note.)
2. Drain the ATF. (Refer to 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
3. Remove the exhaust system. (Refer to 01-15 EXHAUST SYSTEM REMOVAL / INSTALLATION.)
4. Remove the propeller shaft. (Refer to 03-15 PROPELLER SHAFT REMOVAL / INSTALLATION.)
5. Disconnect the speedometer cable.
6. Support the transmission on a jack.



U5U51349

7. Remove the power plant frame. (Refer to 05-13 AUTOMATIC TRANSMISSION REMOVAL / INSTALLATION.)
8. Remove the extension housing and gasket.



U5U51350

9. Install a new gasket and extension housing on the transmission case.

Tightening torque

20—24 N·m { 2.0—2.5 kgf·m , 15—18 ft·lbf }

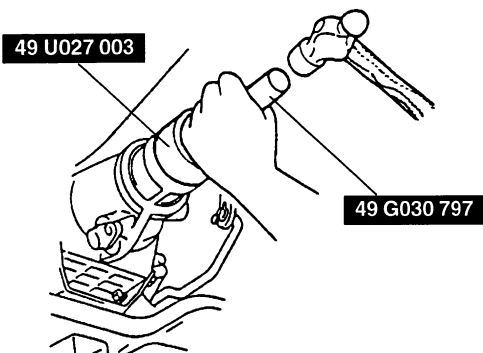
10. Install the power plant frame. (Refer to 05-13 AUTOMATIC TRANSMISSION REMOVAL / INSTALLATION.)
11. Connect the speedometer cable.
12. Install the propeller shaft. (Refer to 03-15 PROPELLER SHAFT REMOVAL / INSTALLATION.)
13. Install the exhaust system. (Refer to 01-15 EXHAUST SYSTEM REMOVAL / INSTALLATION.)
14. Add ATF to the specified level. (Refer to 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)

OIL SEAL (TRANSMISSION) ON-VEHICLE REPLACEMENT

U5U513AZ

1. Clean the transmission exterior thoroughly by using a steam cleaner or cleaning solvent. (Refer to 05-13 AUTOMATIC TRANSMISSION CLEANING, Cleaning Note.)
2. Drain the ATF. (Refer to 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
3. Remove the propeller shaft. (Refer to 03-15 PROPELLER SHAFT REMOVAL / INSTALLATION.)
4. Remove the oil seal from the extension housing. Being careful not to allow any metal tools scratch the extension housing or output shaft.
5. Apply ATF to the oil seal lip.
6. Install the new oil seal by using the SST.

AUTOMATIC TRANSMISSION



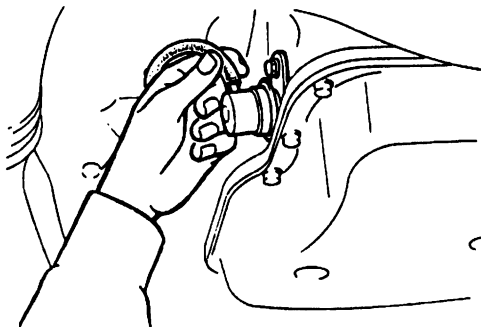
U5U51351

7. Install the propeller shaft. (Refer to 03–15 PROPELLER SHAFT REMOVAL / INSTALLATION.)
8. Add ATF to the specified level. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)

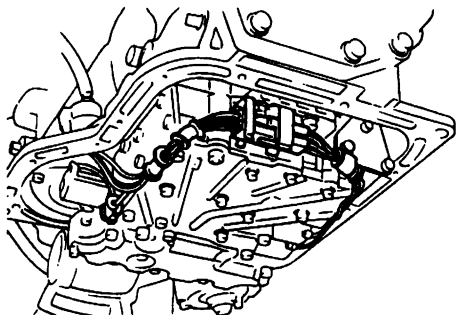
CONTROL VALVE BODY ON-VEHICLE REMOVAL / INSTALLATION

U5U513BA

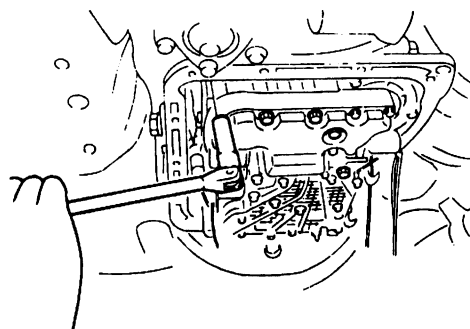
1. Clean the transmission exterior thoroughly with a steam cleaner or cleaning solvents. (Refer to 05–13 AUTOMATIC TRANSMISSION CLEANING, Cleaning Note.)
2. Drain the ATF. (Refer to 05–13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
3. Remove the exhaust system. (Refer to 01–15 EXHAUST SYSTEM REMOVAL / INSTALLATION.)
4. Disconnect the vacuum hose.
5. Remove the vacuum diaphragm, O-rings, and vacuum diaphragm rod. (Refer to 05–13 VACUUM DIAPHRAGM ON-VEHICLE REMOVAL / INSTALLATION.)
6. Remove the oil pan and gasket.



7. Disconnect the solenoid valve connector.
8. Remove the harness from the bracket.



9. Remove the control valve body component.

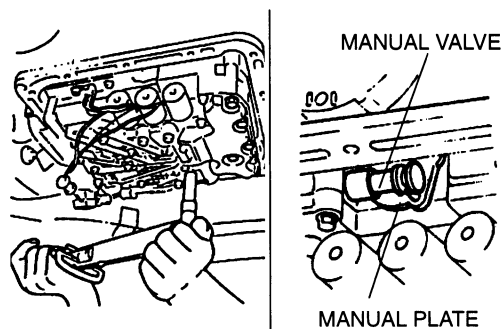


10. Set the control valve body component in position, and align the manual plate and manual valve.

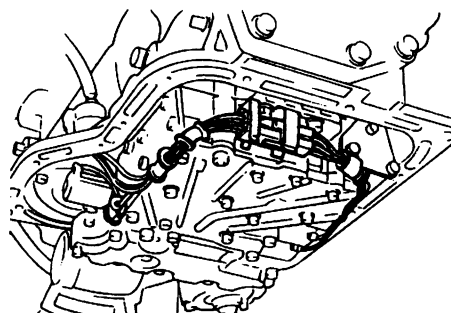
Tightening torque

10.8—14.7 N·m

{ 110—150 kgf·cm , 96—130 ft·lbf }



11. Connect the solenoid valve connector.
12. Install the harness.

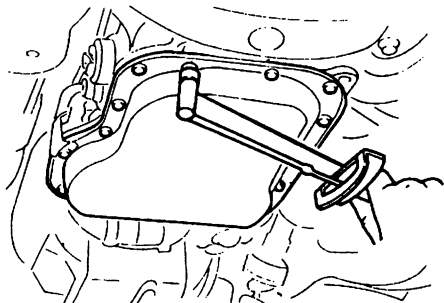


AUTOMATIC TRANSMISSION

13. Install the oil pan along with a new gasket.
14. Install the bolts.

Tightening torque

5.9—7.8 N·m { 60—80 kgf·cm , 53—69 in·lbf }



U5U51357

15. Install the vacuum diaphragm. (Refer to 05-13 VACUUM DIAPHRAGM ON-VEHICLE REMOVAL / INSTALLATION.)
16. Connect the vacuum hose.
17. Install the exhaust system. (Refer to 01-15 EXHAUST SYSTEM REMOVAL / INSTALLATION.)
18. Add ATF to the specified level. (Refer to 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)

VACUUM DIAPHRAGM ON-VEHICLE REMOVAL / INSTALLATION

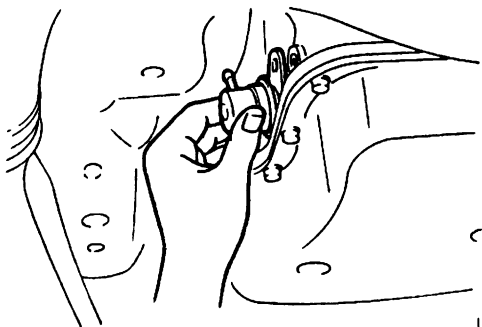
U5U513BB

1. Clean the transmission exterior thoroughly by using a steam cleaner or cleaning solvents. (Refer to 05-13 AUTOMATIC TRANSMISSION CLEANING, Cleaning Note.)
2. Drain the ATF. (Refer to 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
3. Remove the exhaust system. (Refer to 01-15 EXHAUST SYSTEM REMOVAL / INSTALLATION.)
4. Disconnect the vacuum hose.
5. Remove the vacuum diaphragm, O-rings, and vacuum diaphragm rod.

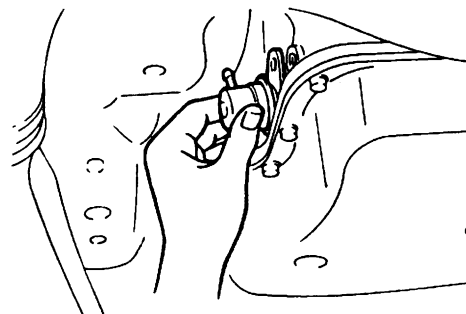
8. Apply ATF to the vacuum diaphragm rod and vacuum diaphragm, and install them into the transmission case.

Tightening torque

7.9—10.7 N·m { 80—110 kgf·cm , 70—95 in·lbf }

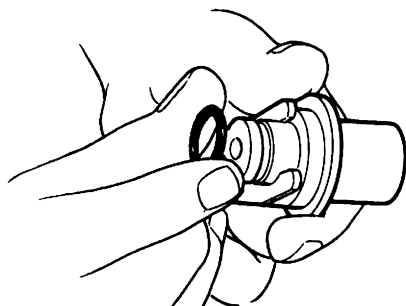


U5U51358



U5U51360

6. Apply ATF to a new O-ring, and install it onto the vacuum diaphragm.
7. Apply ATF to a new O-ring, and install it into the transmission case.



U5U51359

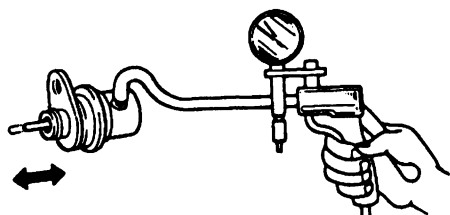
9. Connect the vacuum hose.
10. Install the exhaust system. (Refer to 01-15 EXHAUST SYSTEM REMOVAL / INSTALLATION.)
11. Add ATF to the specified level. (Refer to 05-13 AUTOMATIC TRANSMISSION FLUID (ATF) REPLACEMENT.)
12. Warm up the ATF to normal operating temperature (50—80 °C { 122—176 °F }), then check for the following.
 - (1) Fluid leakage
 - (2) Vacuum leakage

AUTOMATIC TRANSMISSION

VACUUM DIAPHRAGM INSPECTION

U5U513BC

1. Check that the vacuum diaphragm rod moves when vacuum is applied to the vacuum diaphragm.
2. If not correct, replace the vacuum diaphragm.

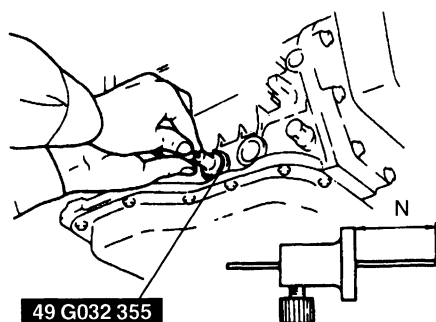


U5U51361

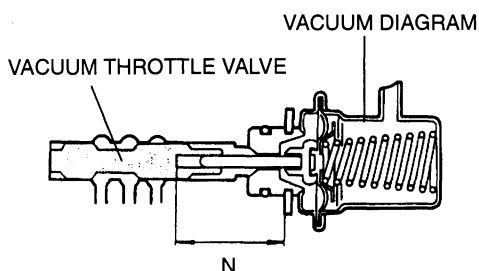
VACUUM DIAPHRAGM ON-VEHICLE ADJUSTMENT

U5U513BD

1. Remove the vacuum diaphragm, vacuum diaphragm rod, and O-ring from the transmission case. (Refer to 05-13 VACUUM DIAPHRAGM ON-VEHICLE REMOVAL / INSTALLATION.)
2. Measure dimension N indicated in the figure by using the **SST** and a scale.
3. Select the proper diaphragm rod from the table.



U5U51362



U5U51363

Dimension N	Applicable diaphragm rod
Below 25.65 mm { 1.0099 in }	29.0 mm { 1.14 in }
25.65—26.15 mm { 1.0099—1.0295 in }	29.5 mm { 1.16 in }
25.90—26.40 mm { 1.0197—1.0394 in }	29.75 mm { 1.17 in }
26.15—26.65 mm { 1.0295—1.0492 in }	30.0 mm { 1.18 in }
26.65—27.15 mm { 1.492—1.0689 in }	30.5 mm { 1.20 in }
27.15 mm { 1.0689 in } or over	31.0 mm { 1.22 in }

4. Install the correct vacuum diaphragm rod, O-rings, and vacuum diaphragm. (Refer to 05-13 VACUUM DIAPHRAGM ON-VEHICLE REMOVAL / INSTALLATION.)

AUTOMATIC TRANSMISSION CLEANING

U5U513BE

Cleaning Notes

1. Clean the transmission exterior thoroughly by using steam or cleaning solvents, or both, before disassembly.
2. Clean the removed parts by using cleaning solvent, and dry by using compressed air. Clean out all holes and passages by using compressed air, and verify that there are no obstructions.

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.

AUTOMATIC TRANSMISSION

AUTOMATIC TRANSMISSION DISASSEMBLY

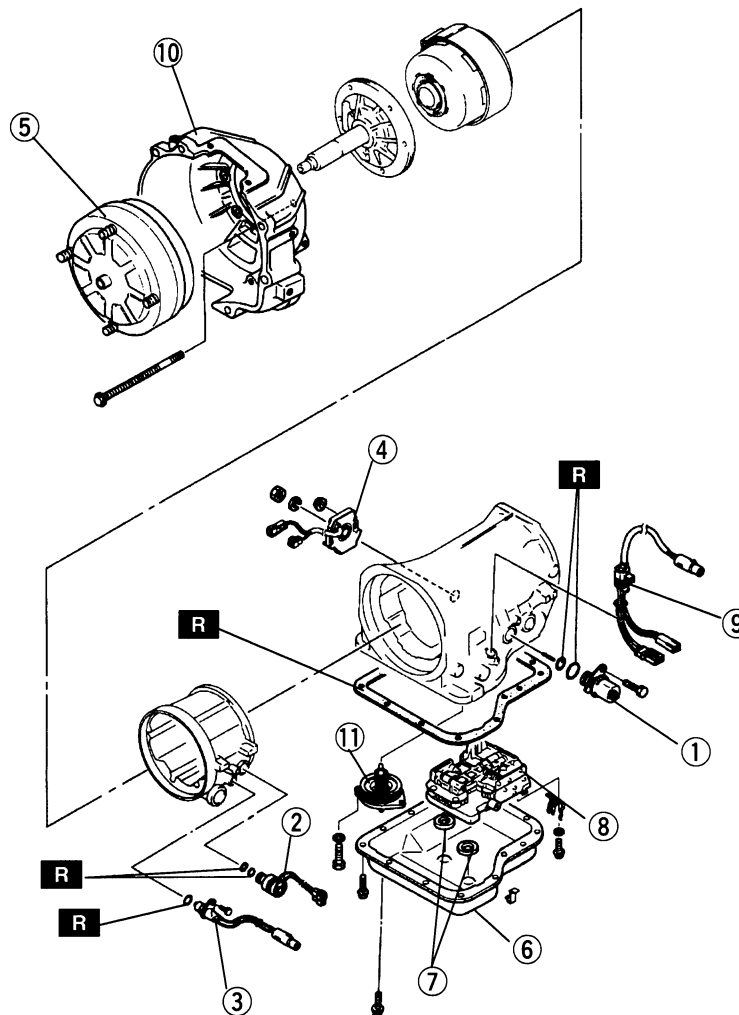
U5U513BF

Precaution

General notes

- The oil pan could contain small chips, shavings, and other particles helpful in checking the condition of the transmission and diagnosing certain problems. To ensure that all foreign particles stay in the oil pan, make sure that the transmission is never tipped completely over while the oil pan is still installed.
- (1) Disassemble the transmission in a clean area (dustproof work space) to prevent entry of dust into the mechanisms.
 - (2) Inspect the individual transmission components in accordance with the QUICK DIAGNOSIS CHART during disassembly.
 - (3) Use only plastic hammers when applying force to separate the light alloy case joints.
 - (4) Never use rags during disassembly; they may leave particles that can clog fluid passages.
 - (5) Several parts resemble one another; arrange them so that they do not get mixed up.
 - (6) Disassemble the control valve component and thoroughly clean it when the clutch or brake band has burned or when the ATF has degenerated.

Disassembly Component



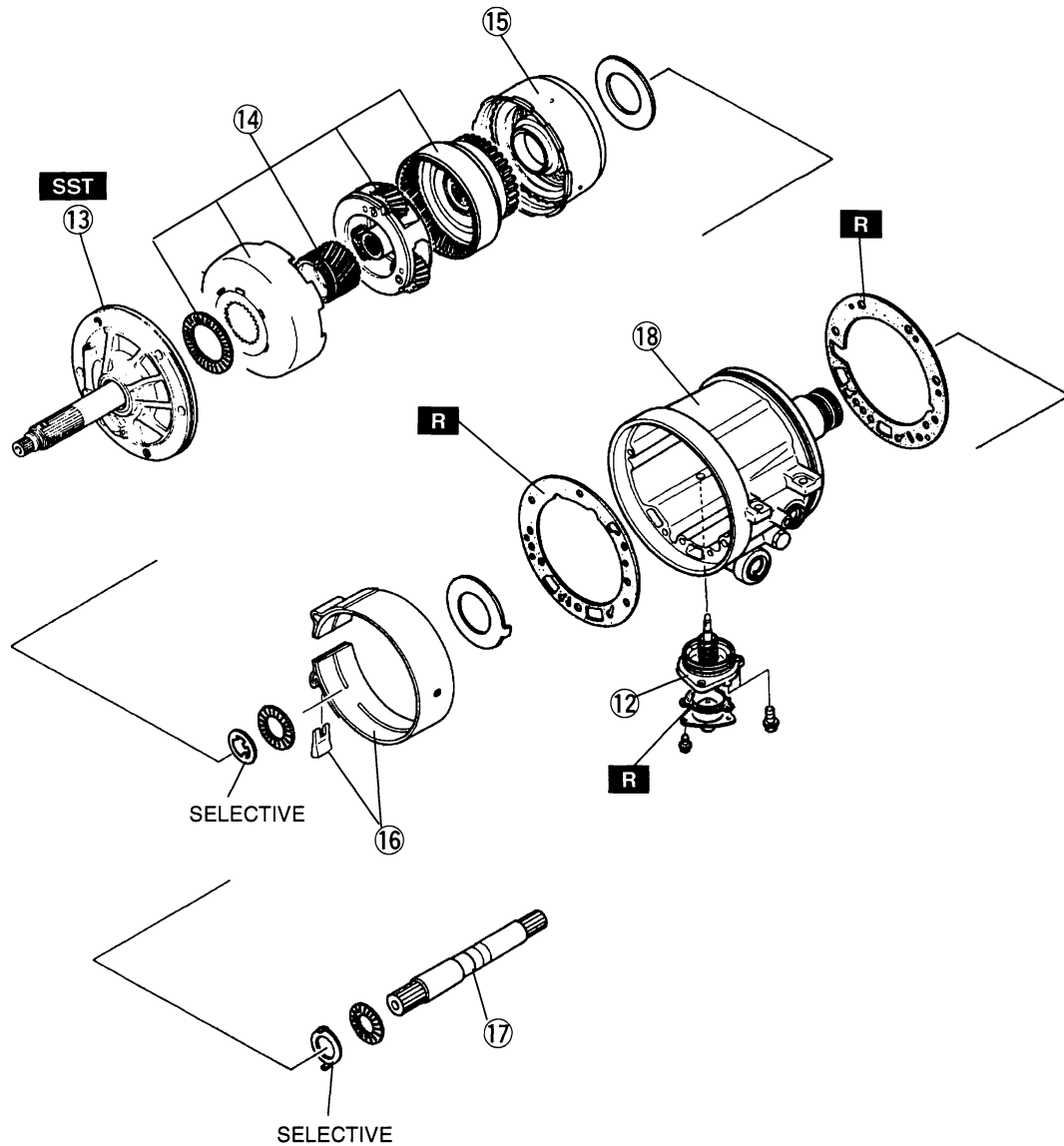
U5U51364

1	Vacuum diaphragm
2	Torque converter clutch control solenoid valve
3	Input/turbine speed sensor
4	Transmission range switch
5	Torque converter
6	Oil pan

7	Magnet
8	Control valve body
9	Solenoid valve connector
10	Converter housing
11	Second gear band servo

AUTOMATIC TRANSMISSION

Components (Cont'd)



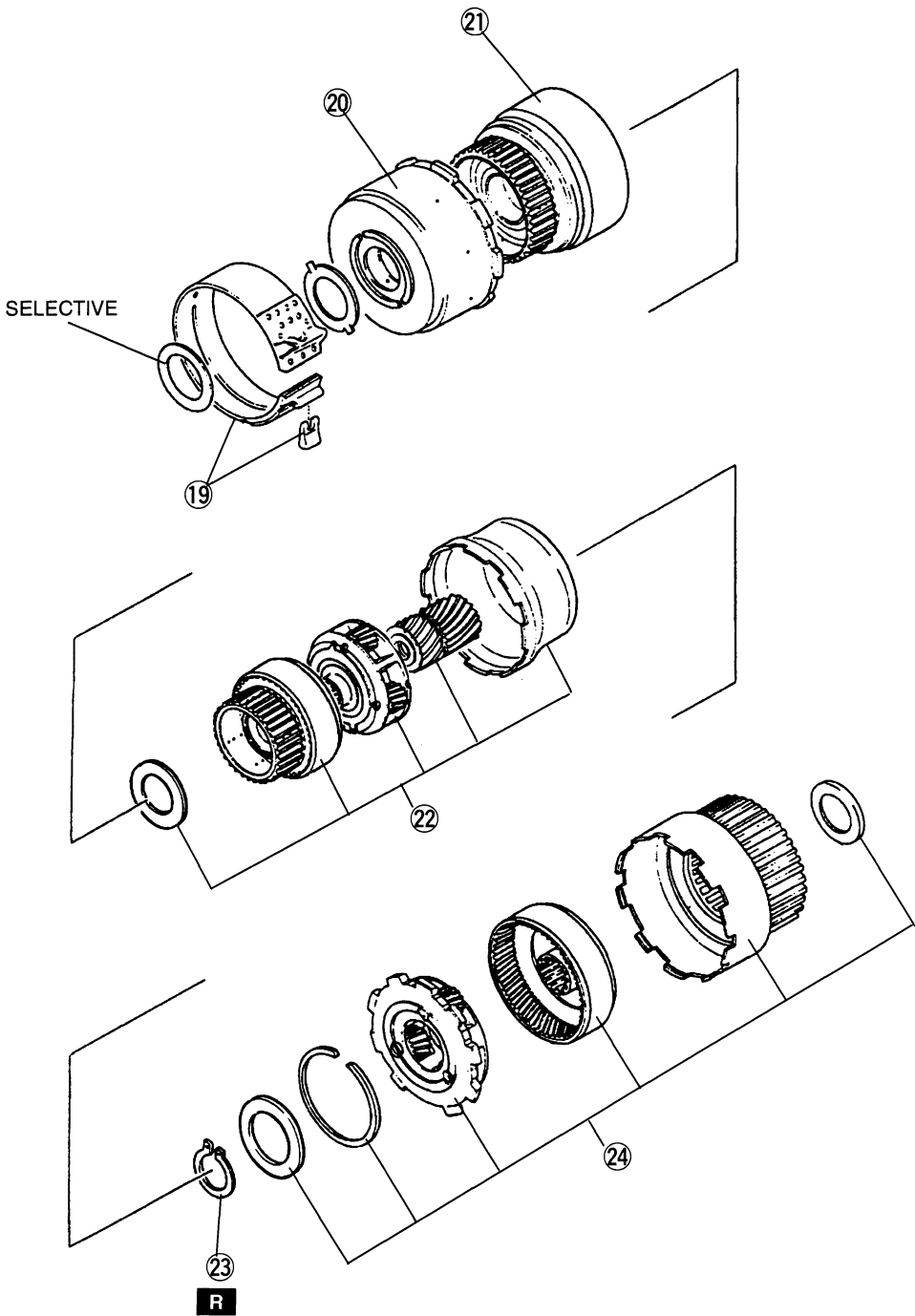
U5U51365

12	Fourth gear band servo
13	Oil pump
14	Fourth gear connecting shell and fourth gear planetary gear unit

15	Direct clutch
16	Fourth gear brake band and band strut
17	Intermediate shaft
18	Drum support, accumulator, and fourth gear case

AUTOMATIC TRANSMISSION

Components (Cont'd)



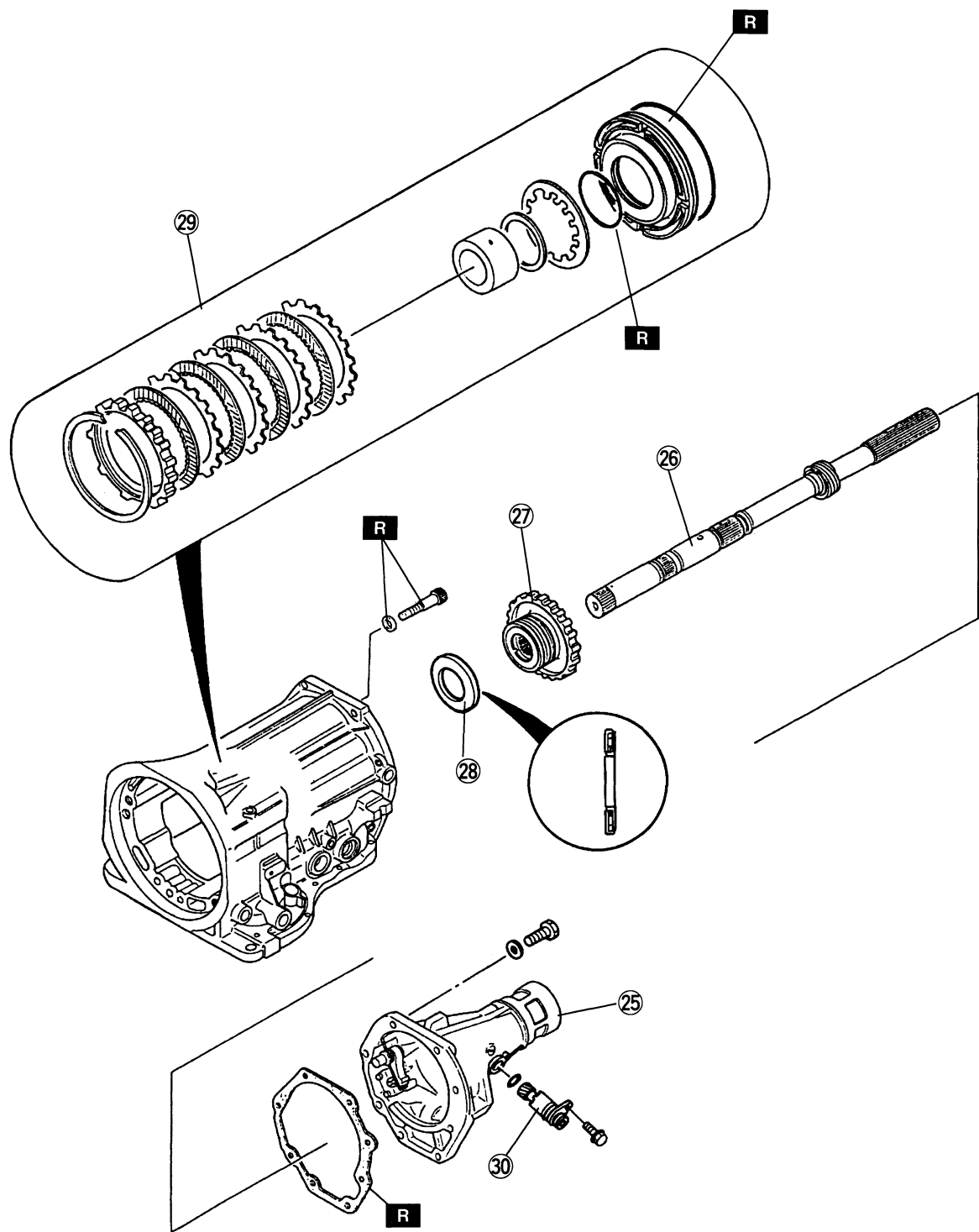
U5U51366

19	Second gear brake band and band strut
20	Front clutch
21	Rear clutch

22	Connecting shell and front planetary gear unit
23	Snap ring
24	Rear planetary gear unit

AUTOMATIC TRANSMISSION

Components (Cont'd)



U5U51367

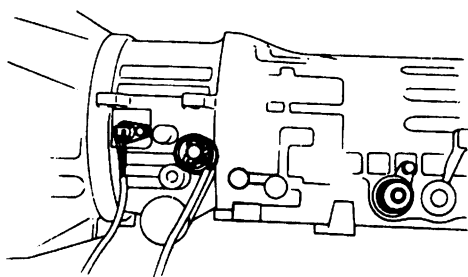
25	Extension housing
26	Output shaft
27	Oil distributor

28	Bearing
29	Low and reverse brake
30	Speedometer driven gear

AUTOMATIC TRANSMISSION

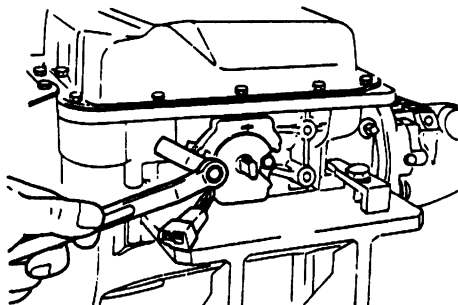
Disassembly procedure

1. Support the transmission by placing wooden blocks under the converter housing and the extension housing.
2. Remove the oil pan and gasket. Examine any material found in the pan or on the magnet to determine the condition of the transmission.
 - (1) Clutch facing material
 - Drive plate and brake band wear
 - (2) Steel (magnet)
 - Bearing, gear, and drivenplate wear
 - (3) Aluminum (nonmagnetic)
 - Bushings or cast aluminum parts wear
3. If large amounts of material are found, replace the torque converter and carefully check the transmission for the cause.
4. Install the oil pan with a few bolts to protect the valve body.
5. Remove the vacuum diaphragm, torque converter clutch control solenoid valve, input/turbine speed sensor, and O-rings.



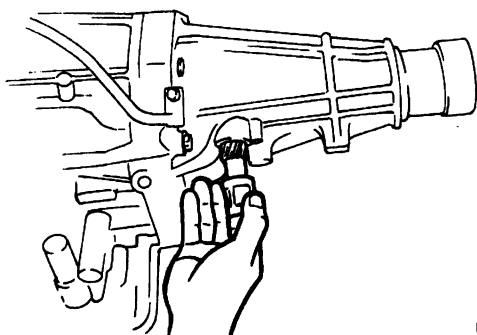
U5U51368

6. Remove the transmission range switch.



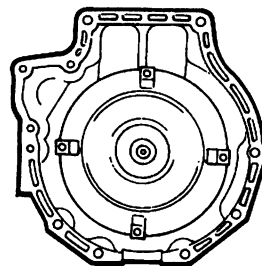
U5U51369

7. Remove the speedometer driven gear from the extension housing.
8. Remove the O-ring from the speedometer driven gear.



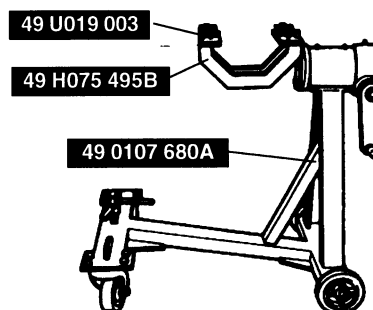
U5U51370

9. Remove the torque converter, and immediately turn it so that the hole faces upward. This will help to keep any remaining fluid from spilling.



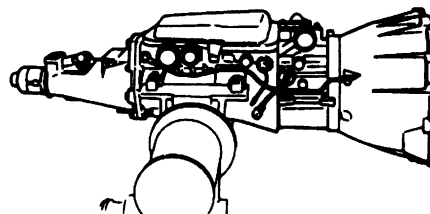
U5U51371

10. Assemble the SST as shown.



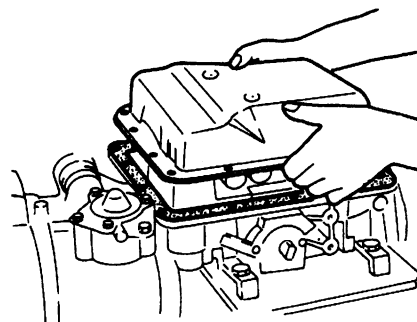
U5U51372

11. Mount the transmission onto the SST.



U5U51373

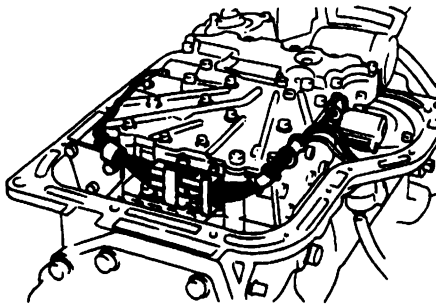
12. Remove the oil pan and gasket.
13. Remove the magnets.



U5U51374

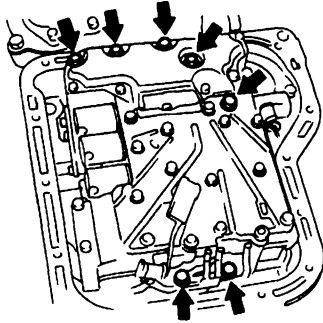
14. Disconnect the solenoid valve connectors.
15. Remove the harnesses from the bracket.

AUTOMATIC TRANSMISSION



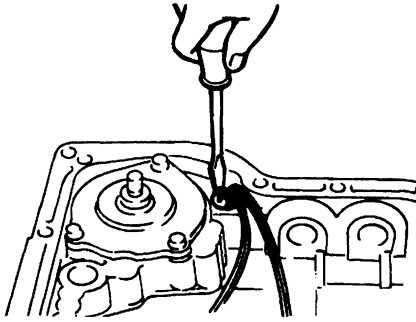
U5U51375

16. Remove the control valve body as shown in the figure.



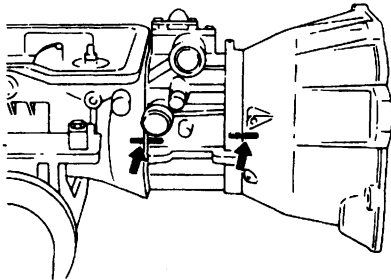
U5U51376

17. Remove the solenoid valve connector from the transmission case.



U5U51377

18. Mark the converter housing, fourth gear case, and transmission case for proper reassembly.



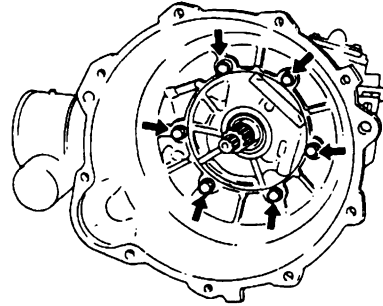
U5U51378

19. Remove the converter housing from the fourth gear case.

Caution

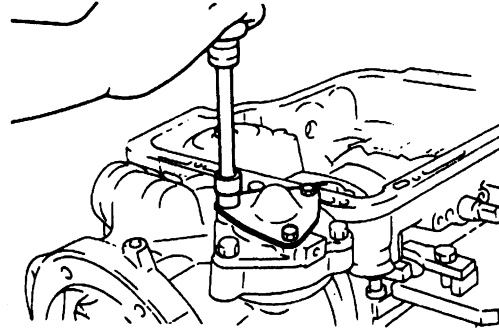
- The converter housing is made of aluminum, and is therefore easily dented and scratched by metal tools. When removing old sealant, do not gouge or strike the sealing surface of the converter housing.

20. Clean the sealing compound from the converter housing.



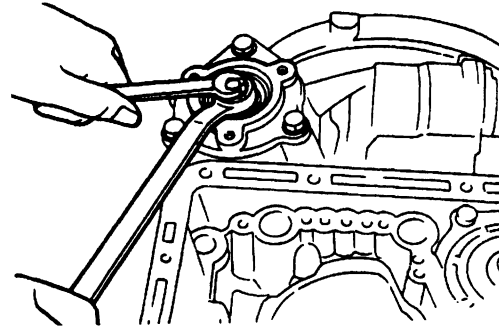
U5U51379

21. Remove the fourth gear band servo cover and gasket.



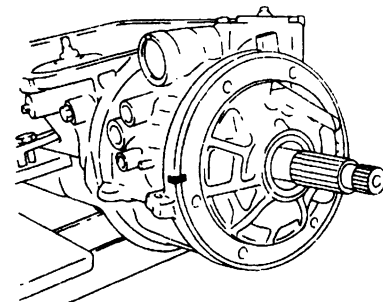
U5U51380

22. Loosen the fourth gear band servo locknut and tighten the piston stem.



U5U51381

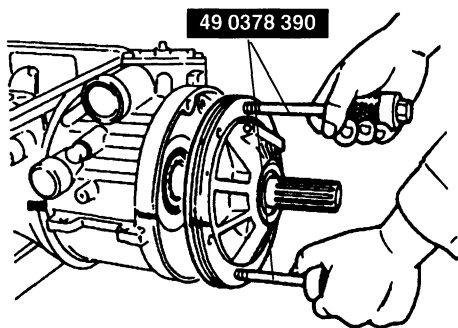
23. Mark the fourth gear case and oil pump for proper reassembly.



U5U51382

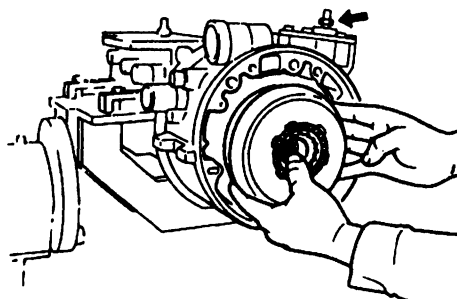
AUTOMATIC TRANSMISSION

24. Install the **SST** to the oil pump component.
25. Slowly remove the oil pump from the transmission case by evenly sliding the weights of the **SST**.
26. Remove the **SST** from the oil pump.



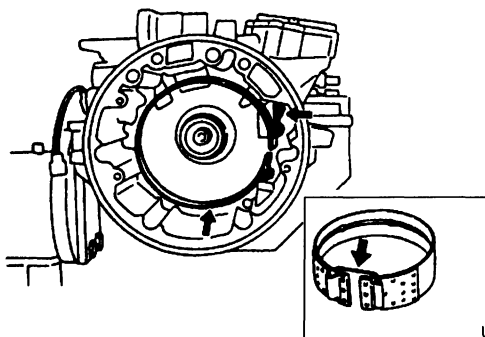
U5U51383

27. Loosen the piston stem of the fourth gear band servo. Remove the fourth gear connecting shell and fourth gear planetary gear unit (fourth gear sun gear, fourth gear planetary pinion carrier, fourth gear clutch hub), and direct clutch.



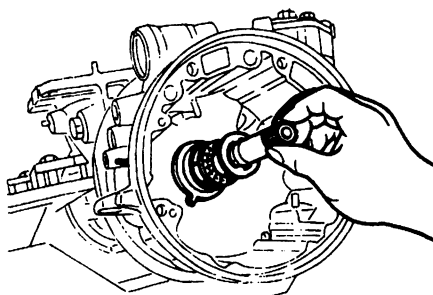
U5U51384

28. Remove the fourth gear brake band, and hold it together with a piece of wire as shown in the figure.
29. Remove the band strut.



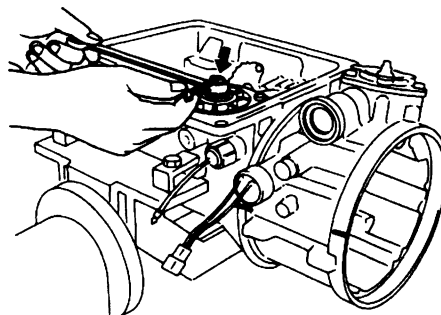
U5U51385

30. Remove the bearing races and bearing.
31. Remove the intermediate shaft.



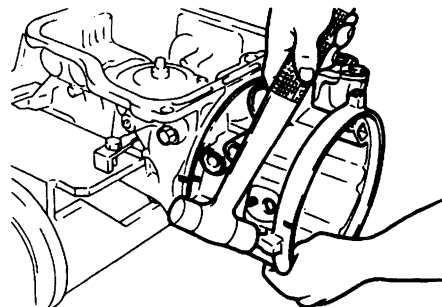
U5U51386

32. Loosen the second gear band servo locknut and tighten the piston stem.



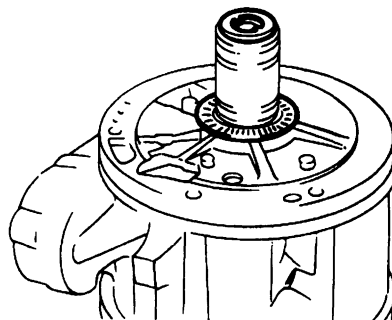
U5U51387

33. Separate the drum support, accumulator, and fourth gear case from the transmission case by tapping it lightly with a plastic hammer. Remove the gasket.



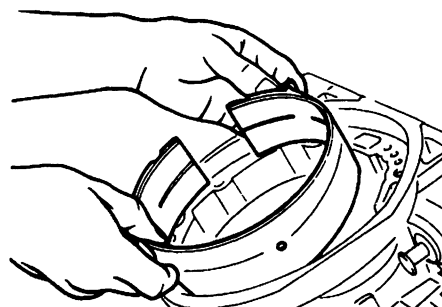
U5U51388

34. Remove the bearing races and bearing from the drum support, accumulator and fourth gear case. Remove the bearing from the front clutch hole.



U5U51389

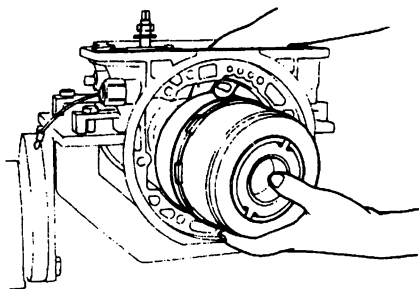
35. Loosen the second gear band servo piston stem and remove the second gear band strut. Hold the brake band together with a piece of wire as shown in the figure.
36. Remove the band strut.



U5U51390

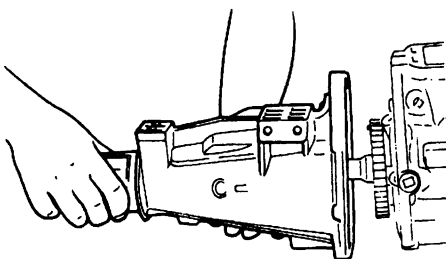
AUTOMATIC TRANSMISSION

37. Remove the bearing race, front clutch, rear clutch, connecting shell, and front planetary gear unit (rear clutch hub, front planetary pinion carrier, rear sun gear) as a unit.



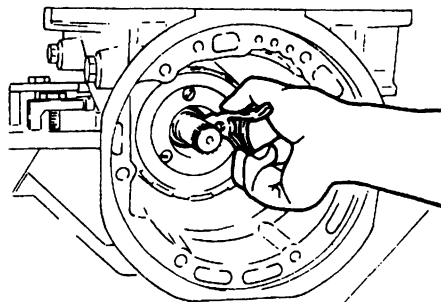
U5U51391

38. Remove the extension housing and gasket.



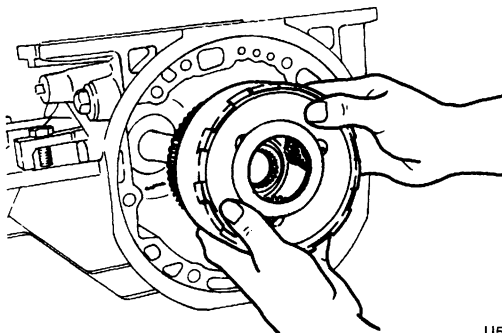
U5U51392

39. Remove the snap ring from the output shaft by using snap-ring pliers.



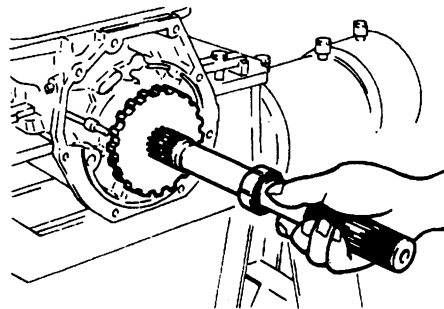
U5U51393

40. Remove the rear planetary gear unit (connecting drum, rear planetary pinion carrier, one-way clutch).



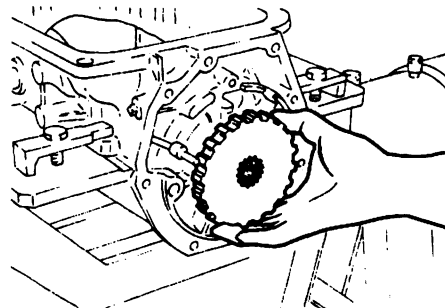
U5U51394

41. Pull out the output shaft.



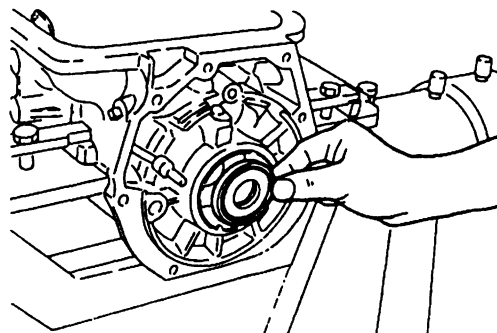
U5U51395

42. Remove the oil distributor.



U5U51396

43. Remove the bearing.



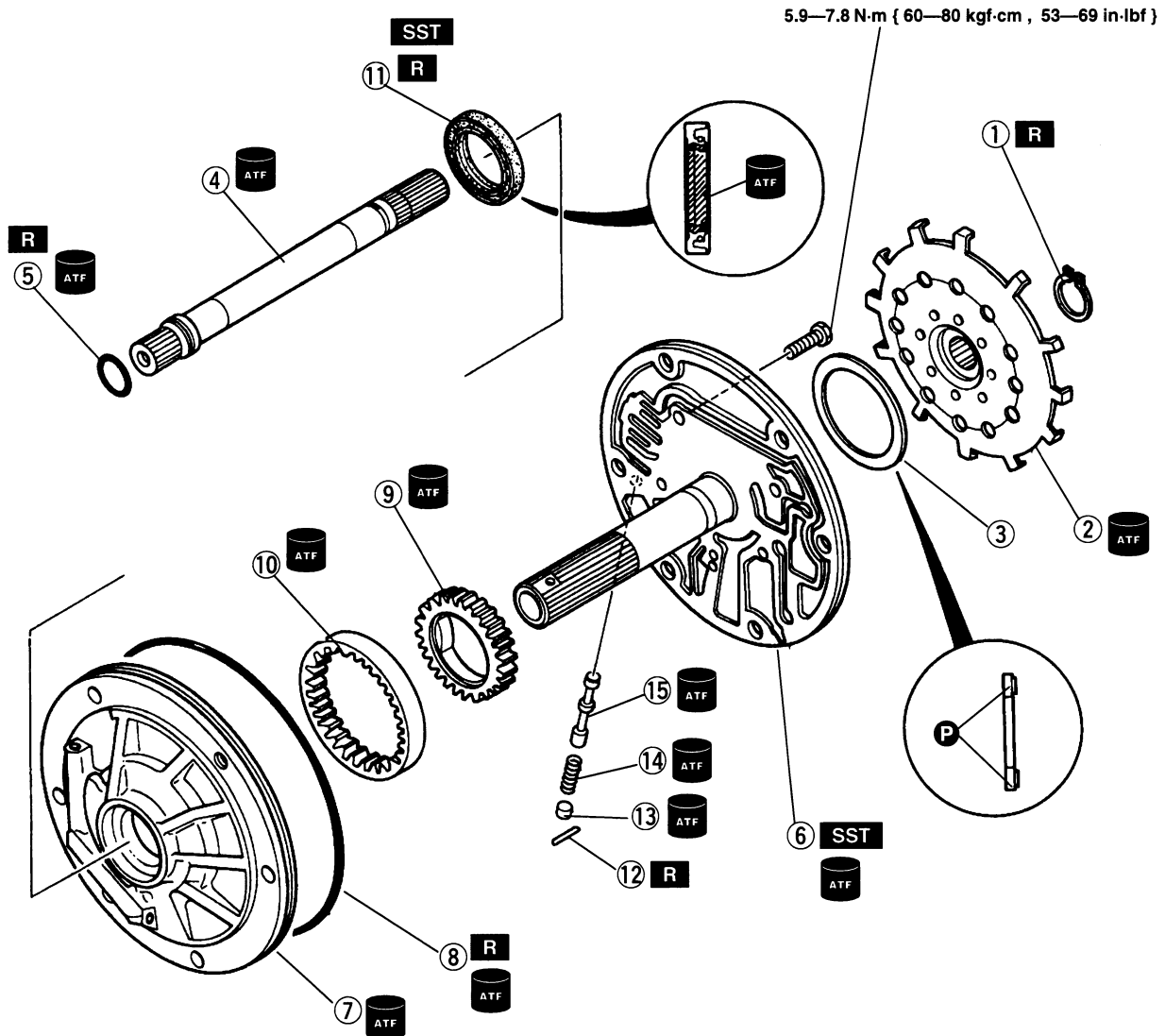
U5U51397

AUTOMATIC TRANSMISSION

OIL PUMP DISASSEMBLY / ASSEMBLY

U5U513BG

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



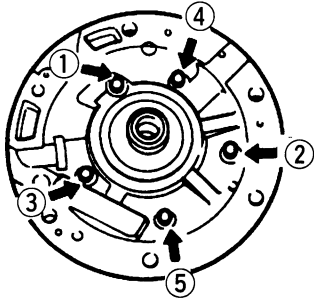
U5U51398

1	Snap ring
2	Sensing rotor
3	Bearing
4	Input shaft
5	O-ring
6	Oil pump cover
7	Oil pump housing
8	O-ring

9	Inner gear
10	Outer gear
11	Oil seal
12	Roll pin
13	Plug
14	Spring
15	Torque converter clutch control valve

Oil Pump Cover Disassembly Note

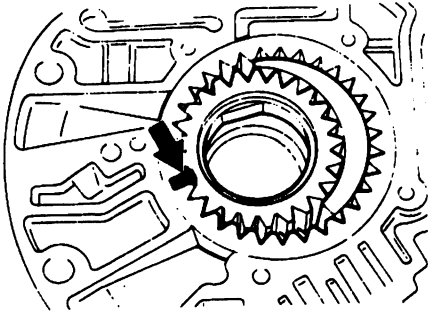
- Loosen the mounting bolts evenly in the pattern shown, and remove the oil pump cover from the oil pump housing.



U5U51399

Inner Gear And Outer Gear Disassembly Note

- Mark the inner and outer gear positions without scratching or denting the gears.



U5U513A1

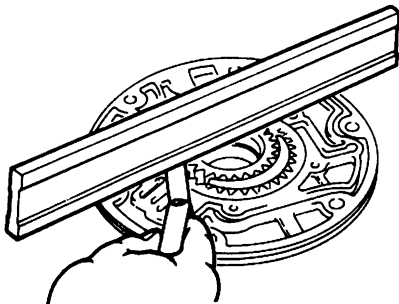
- Remove the gears from the housing.

Assembly Procedure

- Measure the clearance between the gears and the pump cover.

Standard clearance
0.02—0.04 mm { 0.0008—0.0015 in }

Maximum clearance
0.08 mm { 0.0031 in }

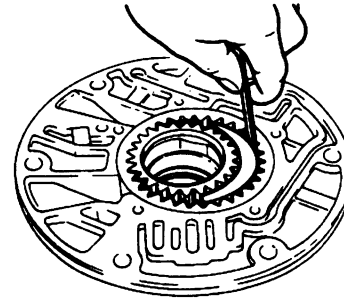


U5U513A2

- Measure the clearance between the outer gear teeth tip and the crescent.

Standard clearance
0.14—0.21 mm { 0.0056—0.0082 in }

Maximum clearance
0.25 mm { 0.0098 in }



U5U513A3

- Measure the side clearance between the outer gear and the housing.

Standard clearance
0.05—0.20 mm { 0.0020—0.0078 in }

Maximum clearance
0.25 mm { 0.0098 in }



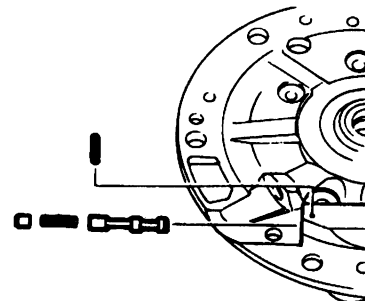
U5U513A4

- If not within the specification, replace the oil pump component.
- Measure the spring specifications.

Specifications

Outer dia. mm { in }	Free length mm { in }	No. of coils	Wire dia. mm { in }
5.45 { 0.215 }	25.7 { 1.012 }	16.5	0.65 { 0.026 }

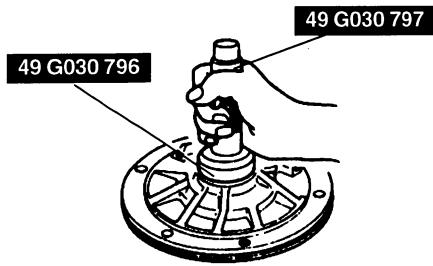
- If not correct, replace the spring.
- Apply ATF to the torque converter clutch control valve, spring, and plug, and install them into the oil pump housing.
- Tap in a new roll pin.



U5U513A5

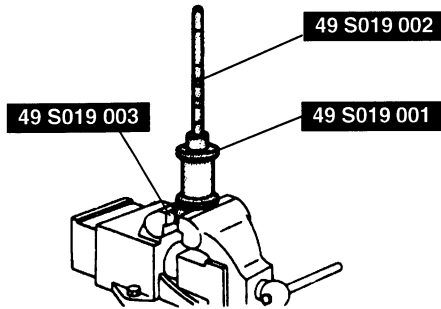
- Apply ATF to a new oil seal, and install it by using the SST.

AUTOMATIC TRANSMISSION



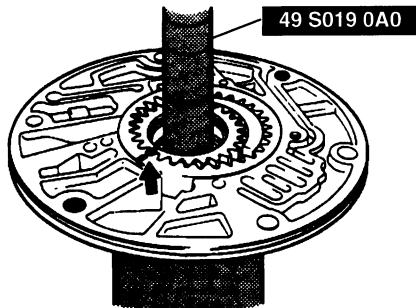
U5U513A6

10. Assemble the **SST** and secure it in a vise.



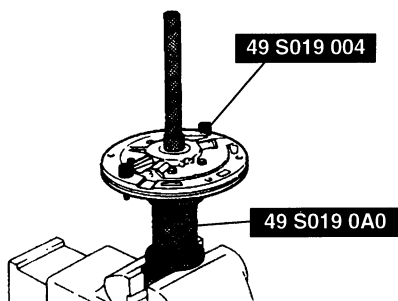
U5U513A7

11. Apply ATF to a new O-ring, and place it on the pump cover.
12. Set the pump housing on the **SST**.
13. Apply ATF to the inner and outer gears, and install them in the pump housing with their matching marks toward the pump cover.



U5U513A8

14. Carefully install the oil pump cover onto the oil pump housing.
15. Install the **SST** (pins) for alignment.

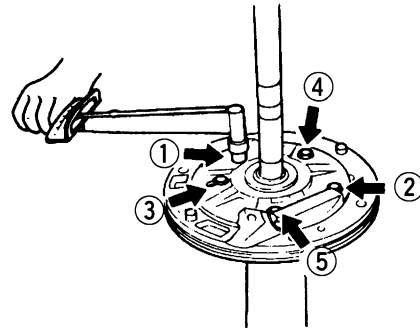


U5U513A9

16. Tighten the bolts evenly and gradually in the order shown.

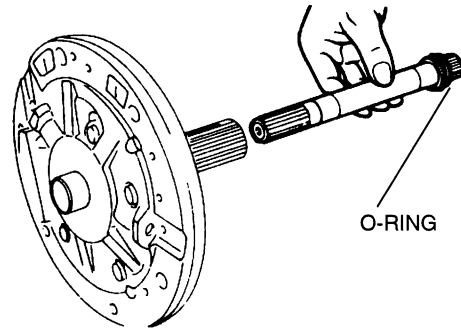
Tightening torque

5.9—7.8 N·m { 60—80 kgf·cm , 53—69 in·lbf }



U5U513B1

17. Remove the **SST** (pins).
18. Apply ATF to a new O-ring, and install it onto the input shaft.
19. Apply ATF to the input shaft, and install it into the oil pump.



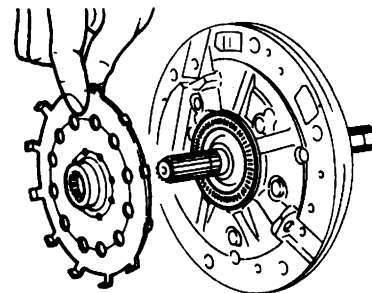
U5U513B2

20. Apply petroleum jelly to the bearing, and install it onto the oil pump.

Bearing race outer diameter

70.0 mm { 2.756 in }

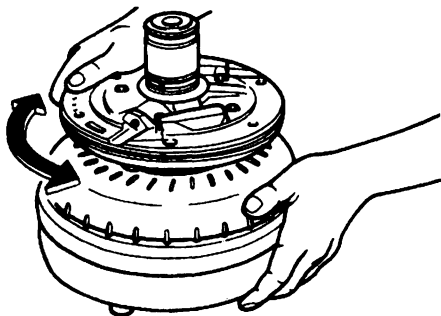
21. Apply ATF to the sensing rotor splines, and install the sensing rotor onto the input shaft.
22. Install the snap ring on the input shaft by using snap-ring pliers.



U5U513B3

23. Set the oil pump on the torque converter, and verify that the pump turns smoothly.

AUTOMATIC TRANSMISSION

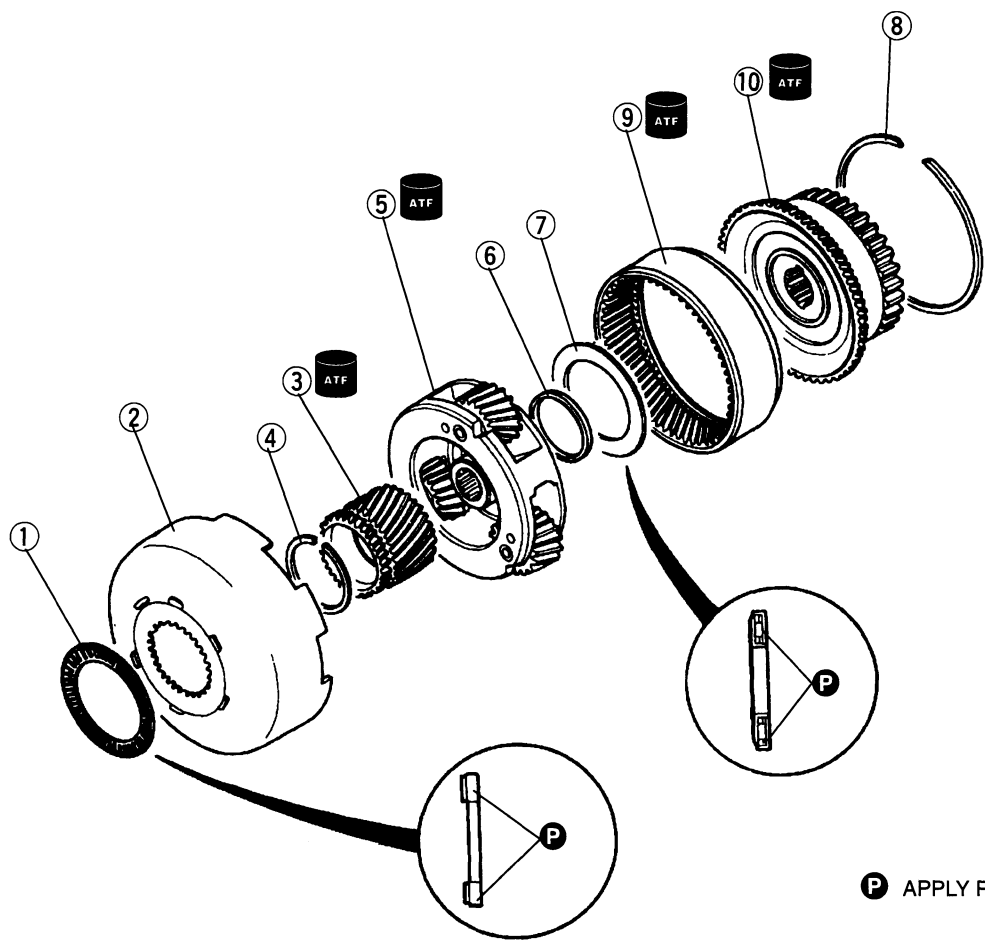


U5U513B4

FOURTH GEAR CONNECTING SHELL AND FOURTH GEAR PLANETARY GEAR UNIT DISASSEMBLY / ASSEMBLY

U5U513BH

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



P APPLY PETROLEUM JELLY

U5U513B5

1	Bearing
2	Fourth gear connecting shell
3	Sun gear
4	Snap ring
5	Fourth gear planetary pinion carrier

6	Seal sleeve
7	Bearing
8	Snap ring
9	Internal gear
10	Fourth gear clutch hub

AUTOMATIC TRANSMISSION

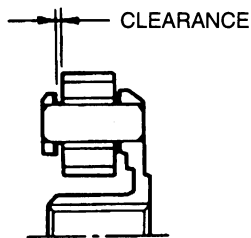
Assembly Procedure

1. Measure the clearance between the pinion washer and the planetary pinion carrier.

Clearance

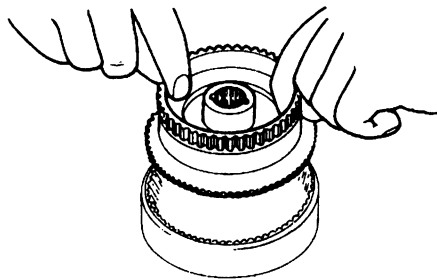
Standard: 0.2—0.7 mm { 0.008—0.027 in }

Maximum: 0.8 mm { 0.031 in }



U5U513B6

2. If not within the specification, replace the planetary pinion carrier.
3. Apply ATF to the fourth gear clutch hub and internal gear, and assemble them with the snap ring.



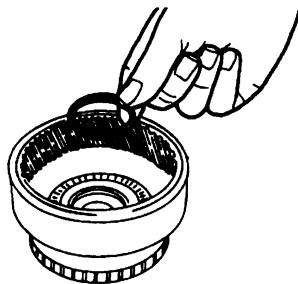
U5U513B7

4. Apply petroleum jelly to the bearing, and install it onto the fourth gear clutch hub with the black surface facing upward.

Bearing outer diameter

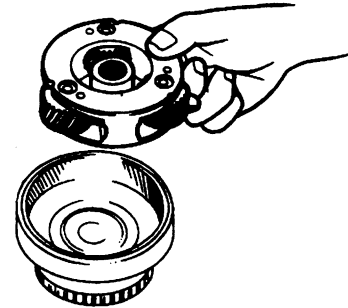
70.0 mm { 2.756 in }

5. Apply ATF to a new seal sleeve, and install it into the fourth gear clutch hub.



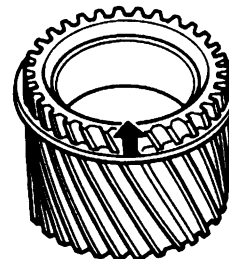
U5U513B8

6. Apply ATF to the fourth gear planetary pinion carrier, and install it into the internal gear.



U5U513B9

7. Apply ATF to the sun gear, and install it into the fourth gear planetary pinion carrier with the snap ring facing the front (arrow).

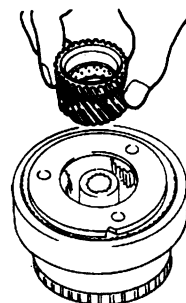


U5U513C1

8. Apply ATF to the sun gear, and install it into the fourth gear planetary pinion carrier.
9. Apply petroleum jelly to the bearing, and install it onto the fourth gear connecting shell.

Bearing outer diameter

70 mm { 2.756 in }



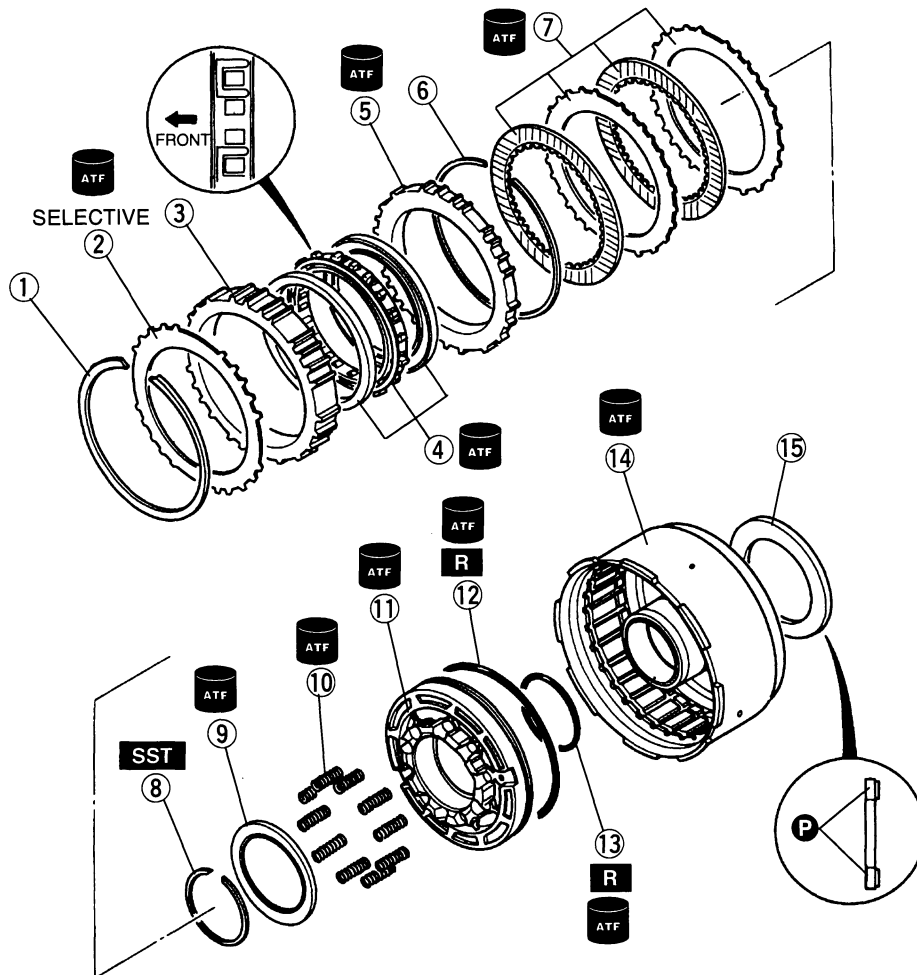
U5U513C2

AUTOMATIC TRANSMISSION

DIRECT CLUTCH DISASSEMBLY / ASSEMBLY

U5U513BJ

1. Carry out the preinspection before disassembly. (Refer to 05-13 AUTOMATIC TRANSMISSION INSPECTION, Direct Clutch Preinspection.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly indicated in the table.



U5U513C3

1	Snap ring
2	Side plate
3	Outer race
4	One-way clutch
5	Retaining plate
6	Snap ring
7	Drive plates and driven plates
8	Snap ring ⓘ Disassembly Note

9	Spring retainer
10	Return spring
11	Clutch piston ⓘ Disassembly Note
12	Seal ring
13	O-ring
14	Direct clutch drum
15	Bearing

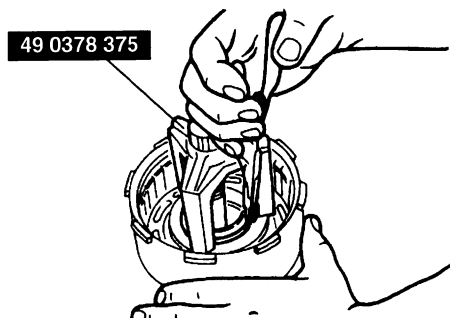
AUTOMATIC TRANSMISSION

Snap Ring Disassembly Note

Caution

- Depress the spring retainer only enough to remove the snap ring. Overpressing will damage the retainer component edges.

- Compress the spring by using the SSTs, then remove the snap ring by using snap-ring pliers.



U5U513C4

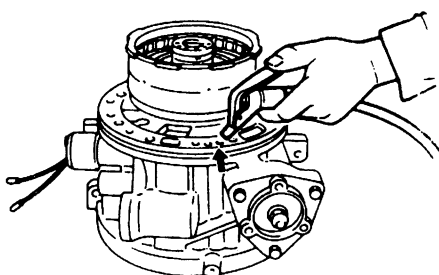
- Remove the spring retainer and spring.

Clutch Piston Disassembly Note

- Install the direct clutch onto the drum support along with the seal rings.
- Remove the piston by applying compressed air to the oil passage.

Air pressure

392 kPa { 4.0 kgf/cm² , 57 psi } max.



U5U513C5

Assembly Procedure

- Measure the facing thickness in three places, and determine the average of the three readings.

Standard thickness

1.6 mm { 0.063 in }

Minimum thickness

1.4 mm { 0.055 in }

- If it is less than the minimum, replace the drive plates.
- Measure the spring specifications.

Specification

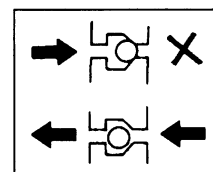
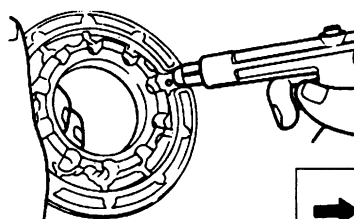
Outer dia. mm { in }	Free length mm { in }	No. of coil	Wire dia. mm { in }
8.0 { 0.315 }	30.5 { 1.201 }	14.5	13.0 { 0.051 }

- If not correct, replace the return spring.

- Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
- Verify that there is airflow when applying compressed air through the oil hole on the return spring side.

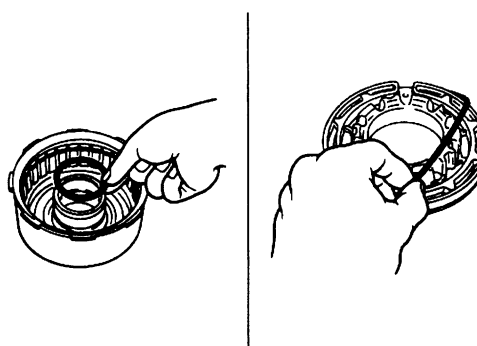
Air pressure

392 kPa { 4.0 kgf/cm² , 57 psi } max.



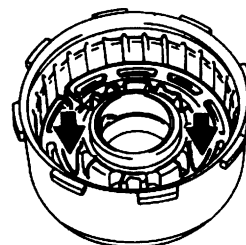
U5U513C6

- If not as specified, replace the clutch piston.
- Apply ATF to a new O-ring and install it into the direct clutch drum.
- Apply ATF to a new seal ring and install it onto the piston.



U5U513C7

- Apply ATF to the inner surface of the direct clutch drum.
- Apply even pressure to the perimeter of the clutch piston, and install it into the direct clutch drum by turning it evenly and gradually.
- Verify that the piston can be turned by hand. If it cannot, then remove it and check for damage to the seal ring.

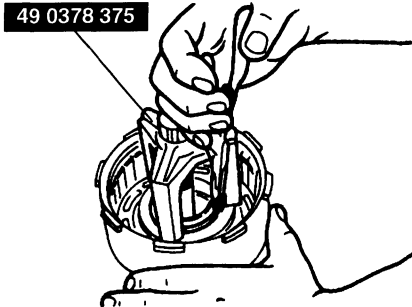


U5U513C8

Caution

- Depress the spring retainer only enough to install the snap ring. Overpressing will damage the retainer component edges.

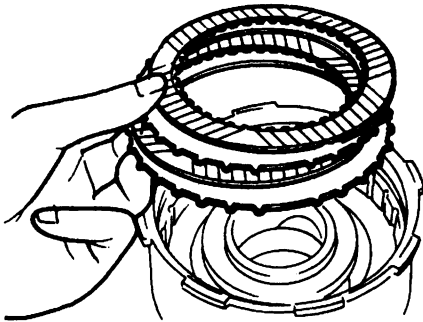
13. Install the springs and spring retainer while compressing them by using the SST.



U5U513C9

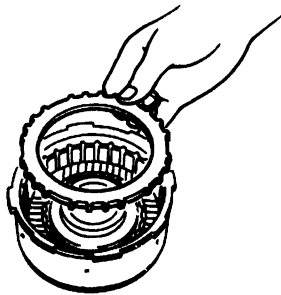
14. While holding the spring retainer down by using the SST, install the snap ring into the spring retainer stopper.
15. Soak new drive plates in ATF for at least two hours.
16. Apply ATF to the driven plates immediately before installation.
17. Install the drive and driven plates into the direct clutch drum in the following order.

Driven-Drive-Driven-Drive



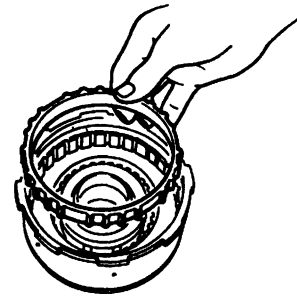
U5U513D1

18. Install the snap ring.



U5U513D2

19. Apply ATF to the outer race, and install the outer race so that the toothless area is in line with the lubrication hole in the direct clutch drum.



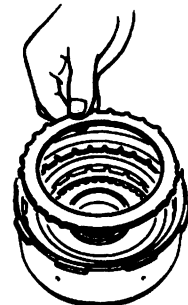
U5U513D3

20. Apply ATF to the one-way clutch, and install it into the outer race. Verify that the spring cage of the one-way clutch faces toward the direct clutch drum.



U5U513D4

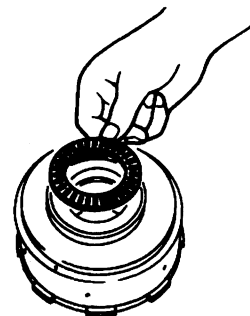
21. Apply ATF to the side plate, and install the side plate so that the toothless area is in line with the lubrication hole in the direct clutch drum.
22. Install the snap ring.



U5U513D5

23. Apply petroleum jelly to the bearing, and install it onto the direct clutch drum.

Bearing outer diameter
70.0 mm { 2.756 in }



U5U513D6

AUTOMATIC TRANSMISSION

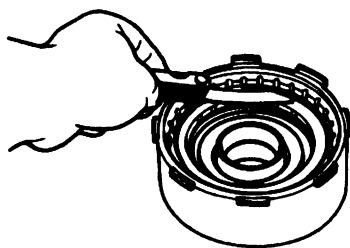
24. Measure the clearance between the side plate and the snap ring by using a feeler gauge. If not within specification, adjust the clearance by installing the correct side plate.

Clearance

Maximum: 0.2 mm { 0.008 in }

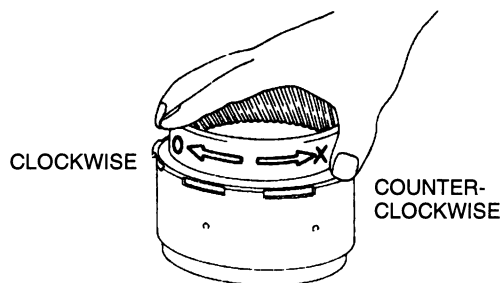
Side plate sizes

mm { in }		
0.4 { 0.016 }	0.6 { 0.024 }	0.8 { 0.031 }
1.0 { 0.039 }	1.2 { 0.047 }	—



U5U513D7

25. Insert the fourth gear clutch hub on the top of the direct clutch and verify that the fourth gear clutch hub rotates smoothly when turned clockwise and locks when turned counterclockwise. If it does not, then the one-way clutch is installed upside down.



U5U513D8

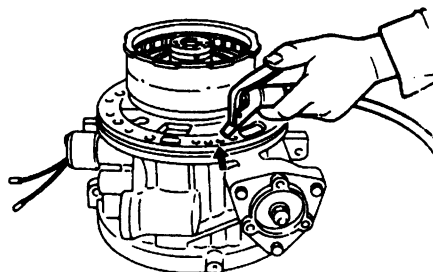
Caution

- Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal.

26. Install the direct clutch onto the drum support along with the seal rings. Apply compressed air to the oil passage and check the clutch operation.

Air pressure

392 kPa { 4.0 kg/cm² , 67 psi } max.



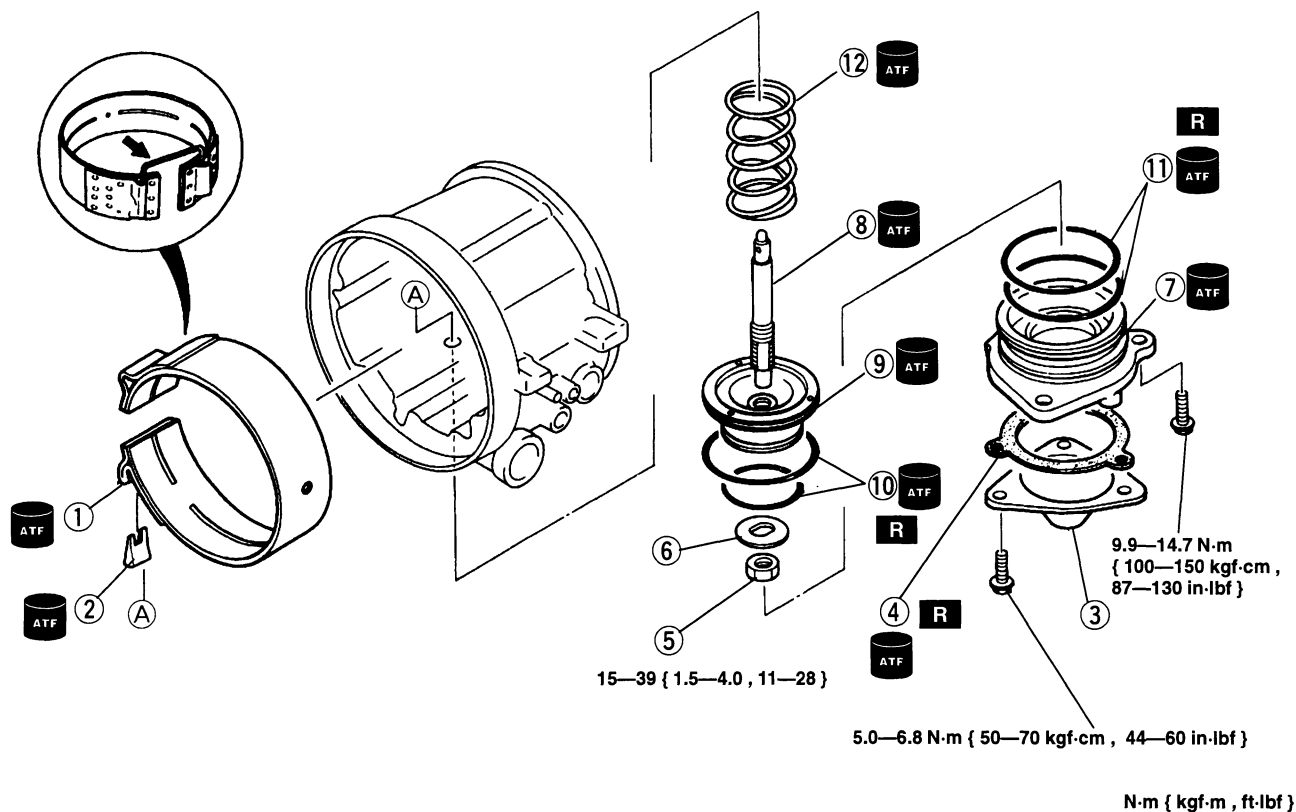
U5U513D9

AUTOMATIC TRANSMISSION

FOURTH GEAR BAND SERVO DISASSEMBLY / ASSEMBLY

U5U513BK

1. Carry out the preinspection before disassembly. (Refer to 05-13 AUTOMATIC TRANSMISSION INSPECTION, Fourth Gear Band Servo Preinspection.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly indicated in the table.



U5U513E1

1	Brake band
2	Band strut
3	Fourth gear band servo cover
4	Gasket
5	Nut
6	Washer
7	Body

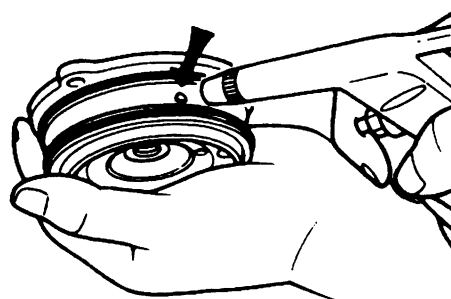
8	Piston stem
9	Piston components Disassembly Note
10	Seal ring
11	O-ring
12	Return spring

Piston Components Disassembly Note

- Remove the piston components from the body by applying compressed air through the oil passage hole.

Air pressure

392 kPa { 4.0 kgf/cm² , 57 psi } max



U5U513E2

AUTOMATIC TRANSMISSION

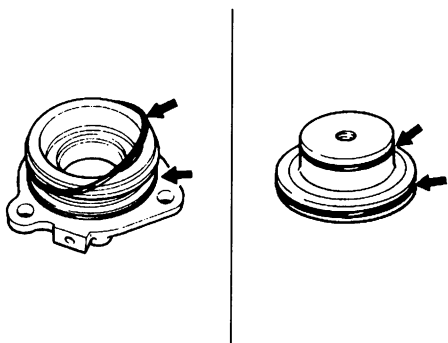
Assembly Procedure

1. Measure the spring specifications.

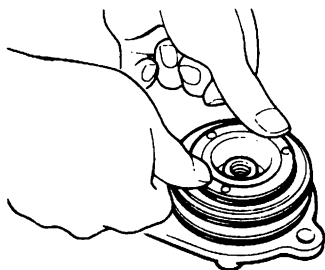
Specifications

Outer dia. mm { in }	Free length mm { in }	No. of coils	Wire dia. mm { in }
27.7 { 1.091 }	47.0 { 1.850 }	7.0	3.5 { 0.138 }

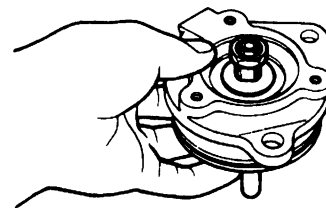
2. If not correct, replace the return spring.
3. Apply ATF to new seal rings, and install them onto the body.
4. Apply ATF to new O-rings, and install them onto the piston component.



5. Apply ATF to the piston component and body.
6. Apply even pressure to the perimeter of the piston, and install it into the body.

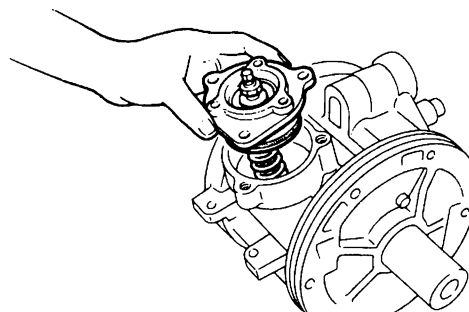


7. Verify that the piston can be turned by hand. If it cannot, then remove it and check for damage to the seal ring.
8. Apply ATF to the piston stem and washer, and install them into the body.
9. Hand-tighten the nut.



U5U513E5

10. Apply ATF to the return spring, and install it into the transmission case.
11. Apply even pressure to the perimeter of the body, and install it into the transmission case.
12. Install the piston component.



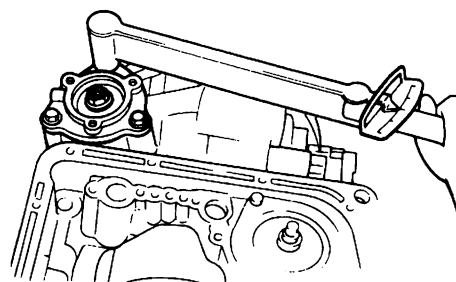
U5U513E6

13. Install and tighten the bolts.

Tightening torque

9.9—14.7 N·m

{ 100—150 kgf·cm , 87—130 in·lbf }



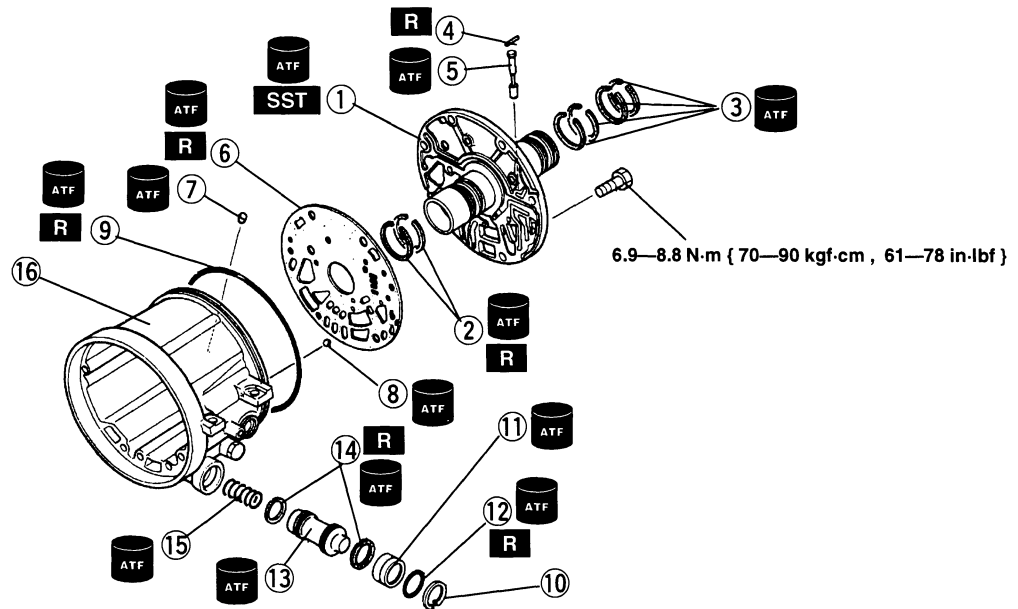
U5U513E7

AUTOMATIC TRANSMISSION

DRUM SUPPORT, ACCUMULATOR, AND FOURTH GEAR CASE DISASSEMBLY / ASSEMBLY

U5U513BL

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



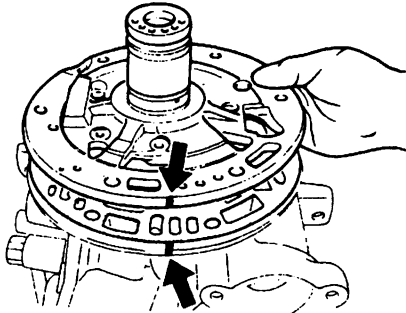
U5U513E8

1	Drum support ⚠ Disassembly Note
2	Seal ring
3	Seal ring
4	Roll pin
5	Plug
6	Gasket
7	One-way valve
8	Steel ball

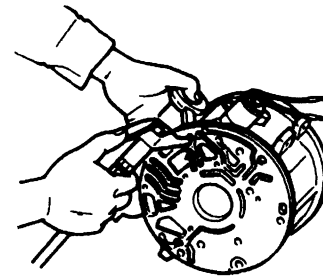
9	D-ring
10	Snap ring
11	Accumulator plug ⚠ Disassembly Note
12	O-ring
13	Accumulator piston
14	Seal ring
15	Spring
16	Fourth gear case

Drum Support Disassembly Note

- Mark the fourth gear case and the drum support for proper reassembly, then remove the drum support.



U5U513E9



U5U513F1

Accumulator Plug Disassembly Note

- Remove the accumulator plug, piston, and spring by applying compressed air through the oil passage.

Air pressure
392 kPa { 4.0 kg/cm², 57 psi } max.

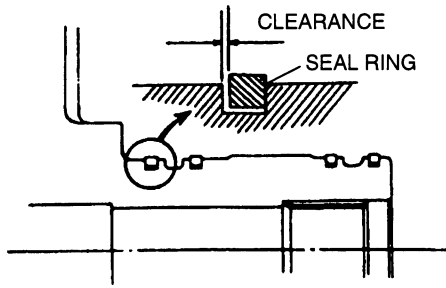
Assembly Procedure

1. Apply ATF to the new seal rings and install them into the seal ring grooves of the drum support.
2. Measure the clearance between the seal rings and the seal ring grooves.

Clearance

Standard: 0.04—0.16 mm { 0.0016—0.0062 in }
Maximum: 0.40 mm { 0.016 in }

AUTOMATIC TRANSMISSION



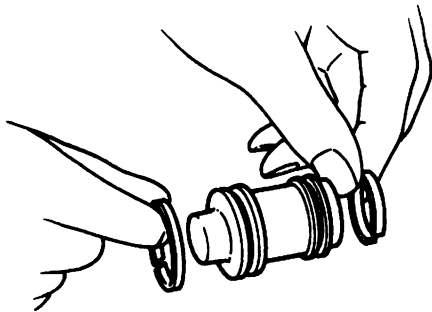
U5U513F2

3. If not within the specification, replace the drum support.
4. Measure the spring specifications.

Specifications

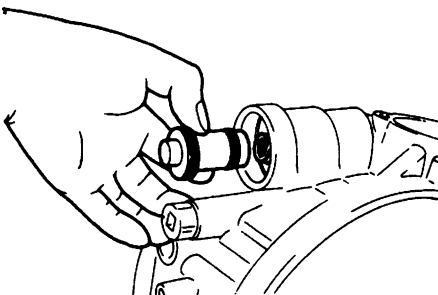
Outer dia. mm { in }	Free length mm { in }	No. of coils	Wire dia. mm { in }
16.0 { 0.630 }	40.4 { 1.590 }	9.8	2.6 { 0.102 }

5. If not correct, replace the return spring.
6. Apply ATF to the new seal rings, and install them onto the accumulator piston.



U5U513F3

7. Apply ATF to the spring and install it into the fourth gear case.
8. Apply ATF to the accumulator piston.
9. Apply even pressure to the perimeter of the piston, and install it into the fourth gear case.
10. Verify that the piston can be turned by hand. If it cannot, then remove it and check for damage to the seal ring.



U5U513F4

11. Apply ATF to a new O-ring, and install it on the accumulator plug.
12. Install the accumulator plug and snap ring.

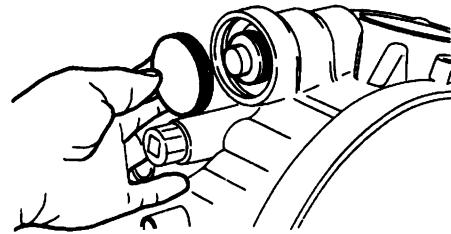
Caution

- Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal.

13. Check the accumulator operation by applying compressed air through the oil passage.

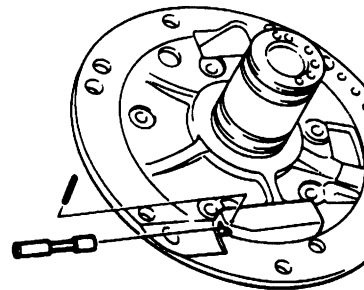
Air pressure

392 kPa { 4.0 kg/cm² , 57 psi } max.



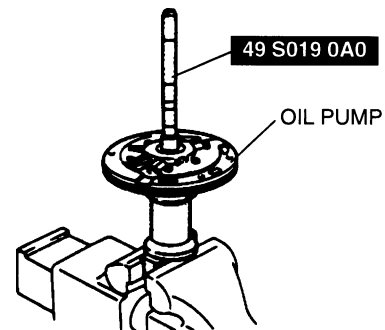
U5U513F5

14. Apply ATF to the plug, and install it into the drum support.
15. Tap in a new roll pin.



U5U513F6

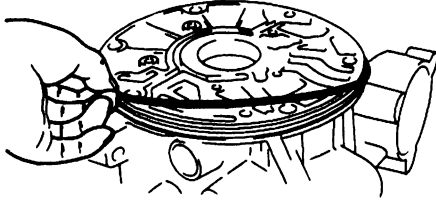
16. Set the oil pump onto the SST.



U5U513F7

17. Apply ATF to a new seal ring, and install it onto the drum support.

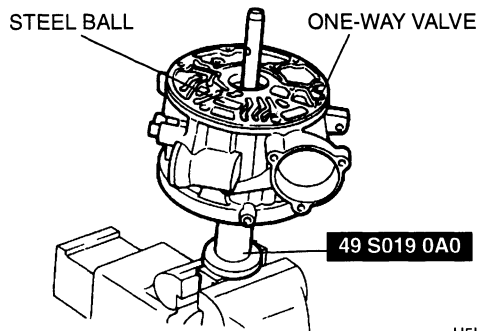
AUTOMATIC TRANSMISSION



U5U513F8

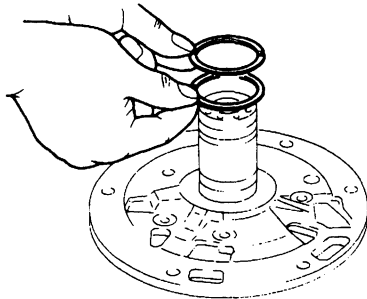
18. Apply ATF to the fourth gear case, and mount it onto the oil pump.

19. Install the steel ball and the one-way valve.



U5U513F9

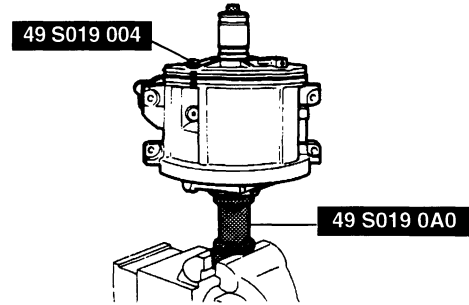
20. Apply ATF to new seal rings, and install them onto the drum support.



U5U513G1

21. Apply ATF to the drum support, and install the support and a new gasket onto the fourth gear case, aligning the marks.

22. Install the **SST** (pins).

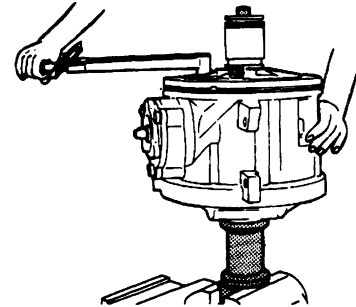


U5U513G2

23. Tighten the drum support mounting bolts.

Tightening torque

6.9—8.8 N·m { 70—90 kgf·cm , 61—78 in·lbf }



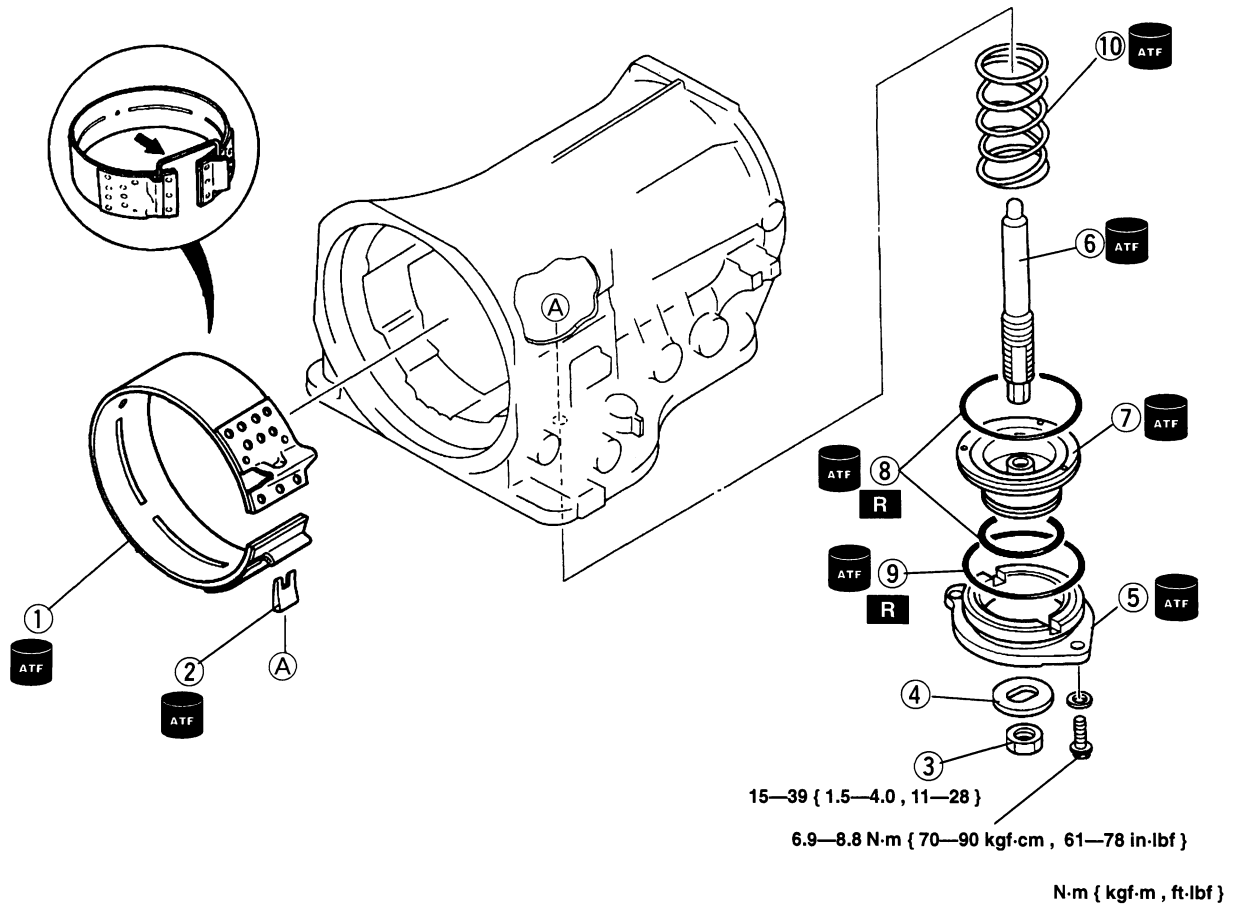
U5U513G3

AUTOMATIC TRANSMISSION

SECOND GEAR BAND SERVO DISASSEMBLY / ASSEMBLY

U5U513BM

1. Carry out the preinspection before disassembly. (Refer to 05-13 AUTOMATIC TRANSMISSION INSPECTION, Second Gear Band Servo Preinspection.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly indicated in the table.



N-m { kgf-m , ft-lbf }

U5U513G4

1	Brake band
2	Band strut
3	Nut
4	Washer
5	Body

6	Piston stem
7	Piston components
8	Seal ring
9	O-ring
10	Return spring

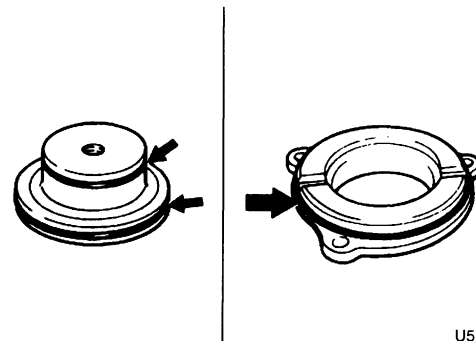
Assembly Procedure

1. Measure the spring specifications.

Specifications

Outer dia. mm { in }	Free length mm { in }	No. of coils	Wire dia. mm { in }
28.2 { 1.110 }	38.7 { 1.524 }	6.324	3.5 { 0.138 }

2. If not correct, replace the return spring.
3. Apply ATF to new seal rings, and install them onto the piston component.
4. Apply ATF to a new O-ring, and install it onto the piston component.

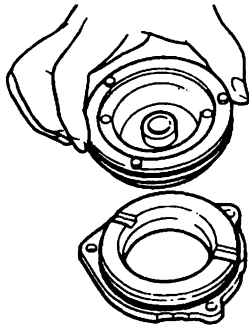


U5U513G5

5. Apply ATF to the piston component and body.
6. Apply even pressure to the perimeter of the piston, and install it into the body.

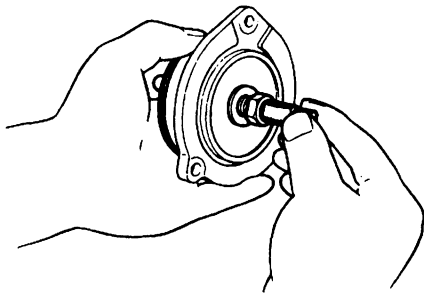
AUTOMATIC TRANSMISSION

7. Verify that the piston can be turned by hand. If it cannot, then remove it and check for damage to the seal ring.



U5U513G6

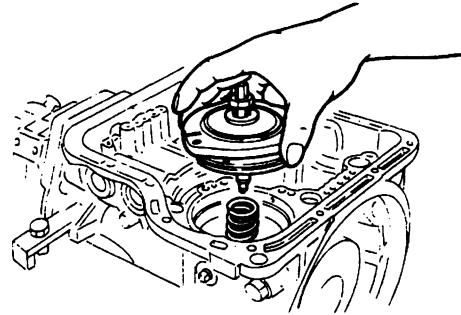
8. Apply ATF to the piston stem and washer, and install them into the body.
9. Hand-tighten the nut.



U5U513G7

10. Apply even pressure to the perimeter of the body, and install it into the transmission case.

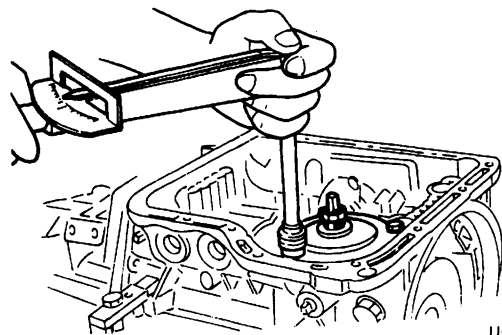
11. Install the piston component.



U5U513G8

12. Install and tighten the bolts.

Tightening torque
6.9—8.8 N·m { 70—90 kgf·cm , 61—78 in·lbf }



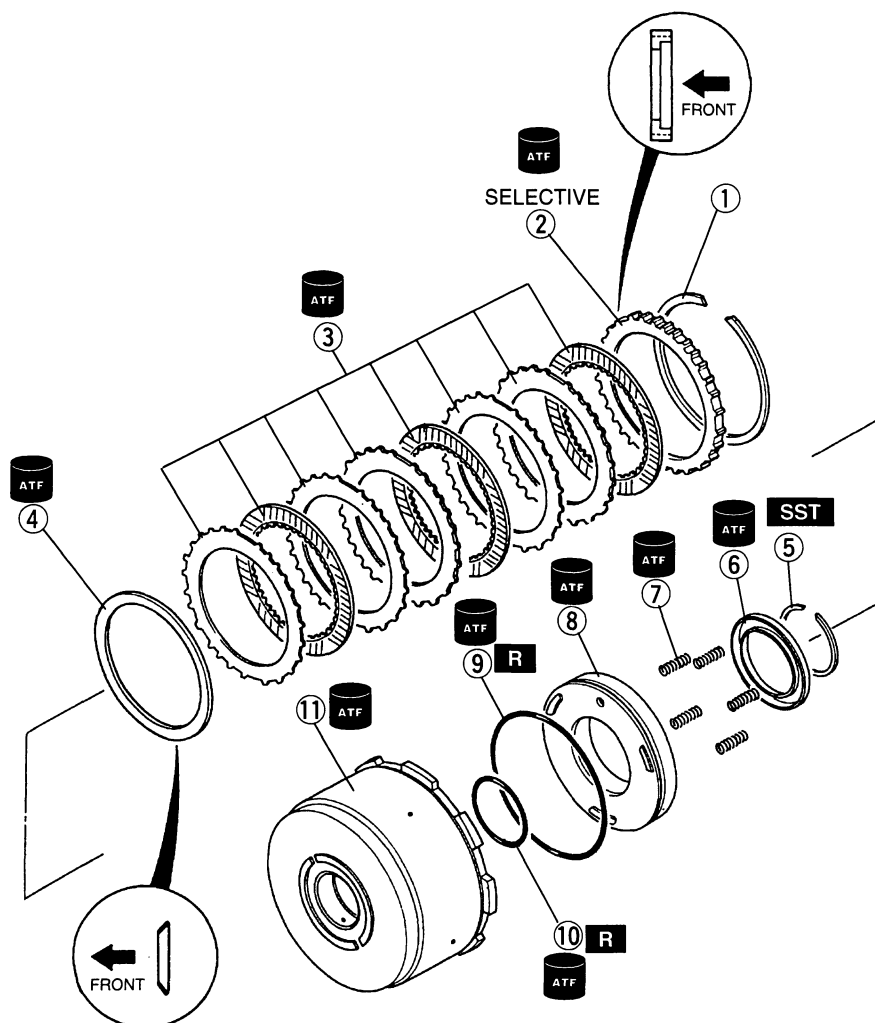
U5U513G9

AUTOMATIC TRANSMISSION

FRONT CLUTCH DISASSEMBLY / ASSEMBLY

U5U513BN

1. Carry out the preinspection before disassembly. (Refer to 05-13 AUTOMATIC TRANSMISSION INSPECTION, Front Clutch Preinspection.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly indicated in the table.



U5U513H1

1	Snap ring
2	Retaining plate
3	Drive plates and driven plates
4	Dished plate
5	Snap ring  Disassembly Note
6	Spring retainer

7	Return spring
8	Clutch piston  Disassembly Note
9	Seal ring
10	O-ring
11	Front clutch drum

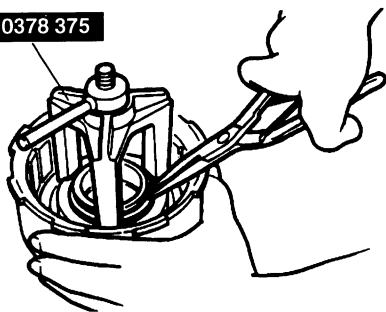
Snap Ring Disassembly Note

Caution

- Depress the spring retainer only enough to remove the snap ring. Overpressing will damage the retainer component edges.

1. Compress the spring by using the **SSTs**, then remove the snap ring by using snap-ring pliers.

49 0378 375



U5U513H2

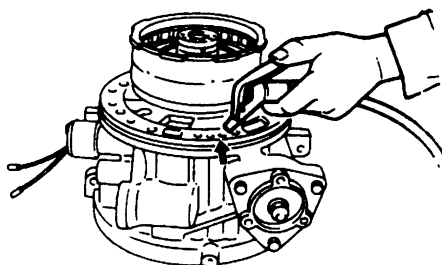
2. Remove the spring retainer and spring

Clutch Piston Disassembly Note

1. Install the front clutch onto the drum support along with the seal rings.
2. Remove the piston by applying compressed air to the oil passage.

Air pressure

392 kPa { 4.0 kgf/cm² , 57 psi } max.



U5U513H3

Assembly Procedure

1. Measure the facing thickness in three places, and determine the average of the three readings.

Standard thickness

1.6 mm { 0.063 in }

Minimum thickness

1.4 mm { 0.055 in }

2. If it is less than the minimum, replace the drive plates.
3. Measure the spring specifications.

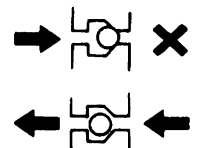
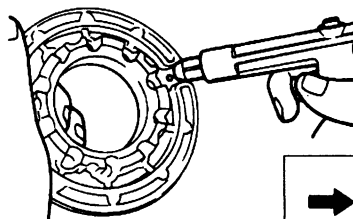
Specification

Outer dia. mm { in }	Free length mm { in }	No. of coil	Wire dia. mm { in }
8.0 { 0.315 }	30.5 { 1.201 }	14.5	1.3 { 0.051 }

4. If not correct, replace the return spring.
5. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
6. Verify that there is airflow when applying compressed air through the oil hole on the return spring side.

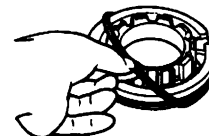
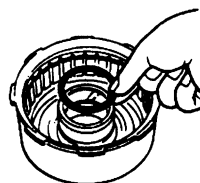
Air pressure

392 kPa { 4.0 kgf/cm² , 57 psi } max.



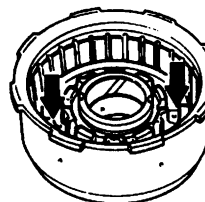
U5U513H4

7. If not as specified, replace the clutch piston.
8. Apply ATF to a new O-ring and install it onto the front clutch drum.
9. Apply ATF to a new seal ring and install it onto the piston.



U5U513H5

10. Apply ATF to the inner surface of the direct clutch drum.
11. Apply even pressure to the perimeter of the clutch piston, and install it into the front clutch drum by turning it evenly and gradually.
12. Verify that the piston can be turned by hand. If it cannot, then remove it and check for damage to the seal ring.



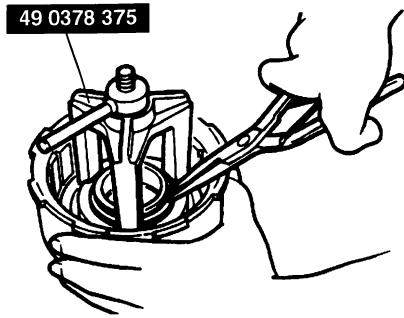
U5U513H6

Caution

- Depress the spring retainer only enough to install the snap ring. Overpressing will damage the retainer component edges.

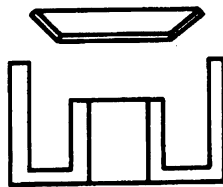
13. Install the springs and spring retainer while compressing them by using the SST.

AUTOMATIC TRANSMISSION



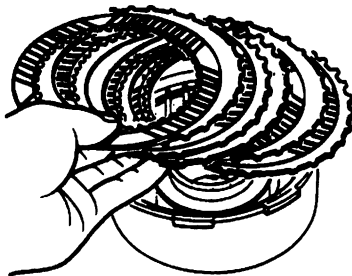
U5U513H7

14. While holding the spring retainer down by using the **SST**, install the snap ring into the spring retainer stopper.
15. Install the dished plate as shown.



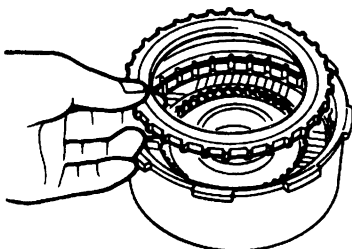
U5U513H8

16. Soak new drive plates in ATF for at least two hours.
17. Apply ATF to the driven plates immediately before installation.
18. Install the drive and driven plates into the direct clutch drum in the following order.
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive



U5U513H9

19. Install the snap ring.



U5U513J1

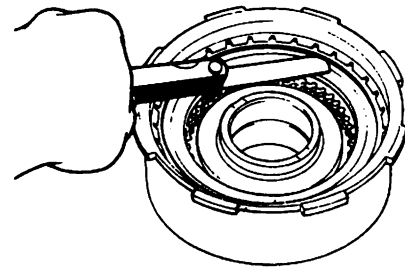
20. Measure the clearance between the retaining plate and snap ring by using a feeler gauge. If not within the specification, adjust the clearance by installing the correct retaining plate.

Clearance

0.9—1.1 mm { 0.036—0.043 in }

Retaining plate size

mm { in }		
5.8 { 0.228 }	6.0 { 0.236 }	6.2 { 0.244 }
6.4 { 0.252 }	6.6 { 0.260 }	6.8 { 0.268 }
7.0 { 0.276 }	—	—



U5U513J2

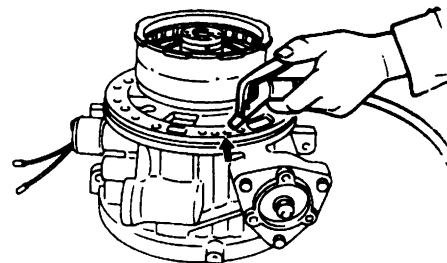
Caution

- Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal.

21. Install the front clutch onto the drum support along with the seal rings. Apply compressed air through the oil passage and check the clutch operation.

Air pressure

392 kPa { 4.0 kg/cm² , 57 psi } max.



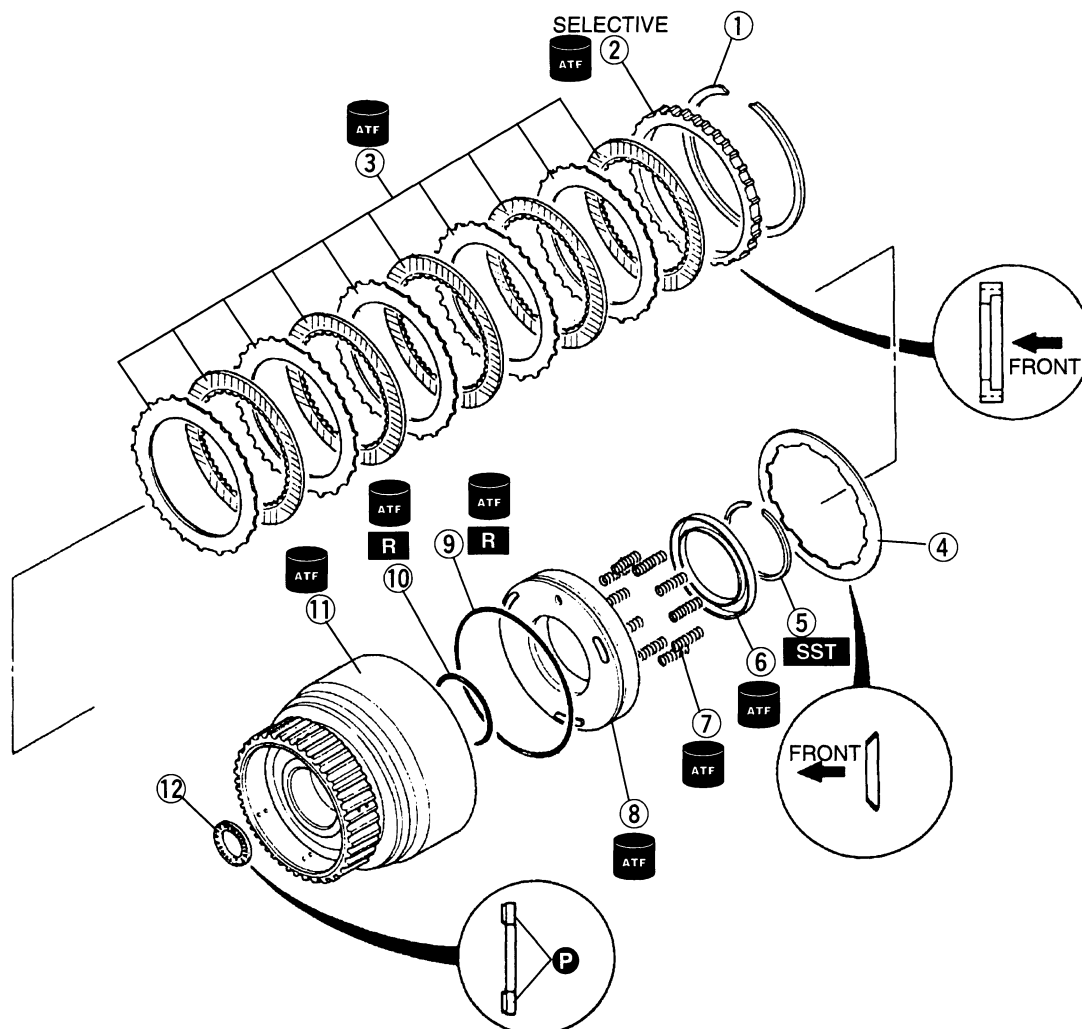
U5U513J3

AUTOMATIC TRANSMISSION

REAR CLUTCH DISASSEMBLY / ASSEMBLY

U5U513BP

1. Carry out the preinspection, before disassembly. (Refer to 05-13 AUTOMATIC TRANSMISSION INSPECTION, Rear Clutch Preinspection.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly indicated in the table.



U5U513J4

1	Snap ring
2	Retaining plate
3	Drive plates and driven plates
4	Dished plate
5	Snap ring Disassembly Note
6	Spring retainer

7	Return spring
8	Clutch piston Disassembly Note
9	Seal ring
10	O-ring
11	Rear clutch drum
12	Bearing

Snap Ring Disassembly Note

Caution

- Depress the spring retainer only enough to remove the snap ring. Overpressing will damage the retainer component edges.

1. Compress the spring by using the SSTs, then remove the snap ring by using snap-ring pliers.



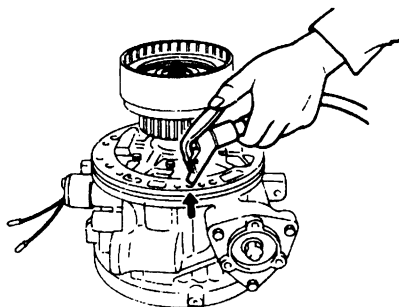
U5U513J5

2. Remove the spring retainer and spring.

Clutch Piston Disassembly Note

1. Install the rear clutch onto the drum support along with the seal rings.
2. Remove the piston by applying compressed air to the oil passage.

Air pressure
392 kPa { 4.0 kgf/cm² , 57 psi } max.



U5U513J6

Assembly Procedure

1. Measure the facing thickness in three places, and determine the average of the three readings.

Standard thickness
1.6 mm { 0.063 in }
Minimum thickness
1.4 mm { 0.055 in }

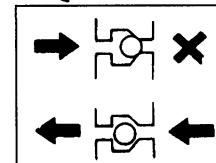
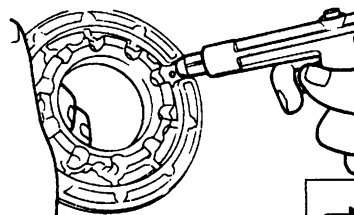
2. If it is less than the minimum, replace the drive plates.
3. Measure the spring specifications.

Specification

Outer dia. mm { in }	Free length mm { in }	No. of coil	Wire dia. mm { in }
8.0 { 0.315 }	30.5 { 1.201 }	14.5	1.3 { 0.051 }

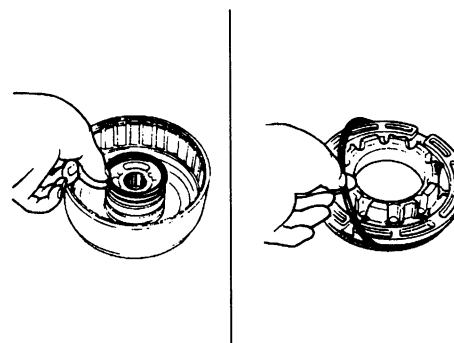
4. If not correct, replace the return spring.
5. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
6. Verify that there is airflow when applying compressed air through the oil hole on the return spring side.

Air pressure
392 kPa { 4.0 kgf/cm² , 57 psi } max.



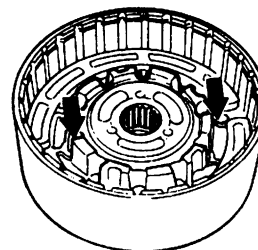
U5U513J7

7. If not as specified, replace the clutch piston.
8. Apply ATF to a new O-ring and install it onto the rear clutch drum.
9. Apply ATF to a new seal ring and install it onto the piston.



U5U513J8

10. Apply ATF to the inner surface of the rear clutch drum.
11. Apply even pressure to the perimeter of the clutch piston, and install it into the rear clutch drum by turning it evenly and gradually.
12. Verify that the piston can be turned by hand. If it cannot, then remove it and check for damage to the seal ring.

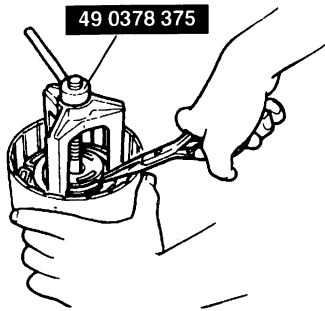


U5U513J9

Caution

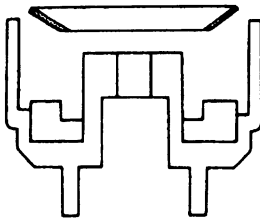
- Depress the spring retainer only enough to install the snap ring. Overpressing will damage the retainer component edges.

13. Install the springs and spring retainer while compressing them by using the SST.



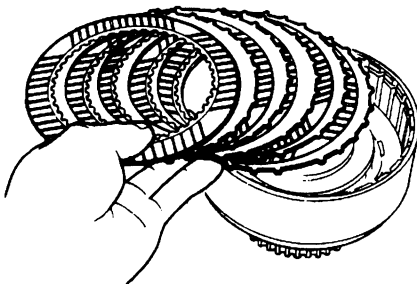
U5U513K1

14. While holding the spring retainer down by using the **SST**, install the snap ring into the spring retainer stopper.
15. Install the dished plate as shown.



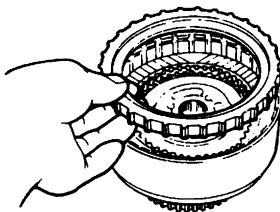
U5U513K2

16. Soak new drive plates in ATF for at least two hours.
17. Apply ATF to the driven plates immediately before installation.
18. Install the drive and driven plates into the direct clutch drum in the following order.
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive



U5U513K3

19. Install the snap ring.



U5U513K4

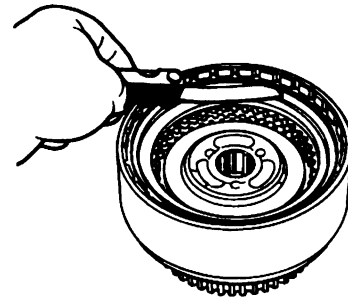
20. Measure the clearance between the retaining plate and snap ring by using a feeler gauge. If not within the specification, adjust the clearance by installing the correct retaining plate.

Clearance

0.8—1.0 mm { 0.032—0.039 in }

Retaining plate size

mm { in }		
9.4 { 0.370 }	9.6 { 0.378 }	9.8 { 0.386 }
10.0 { 0.394 }	10.2 { 0.402 }	10.4 { 0.409 }
10.6 { 0.417 }	—	—



U5U513K5

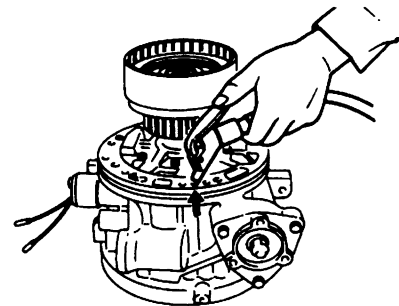
Caution

- Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal.

21. Install the rear clutch onto the drum support along with the seal rings. Apply compressed air through the oil passage and check the clutch operation.

Air pressure

392 kPa { 4.0 kg/cm² , 57 psi } max.



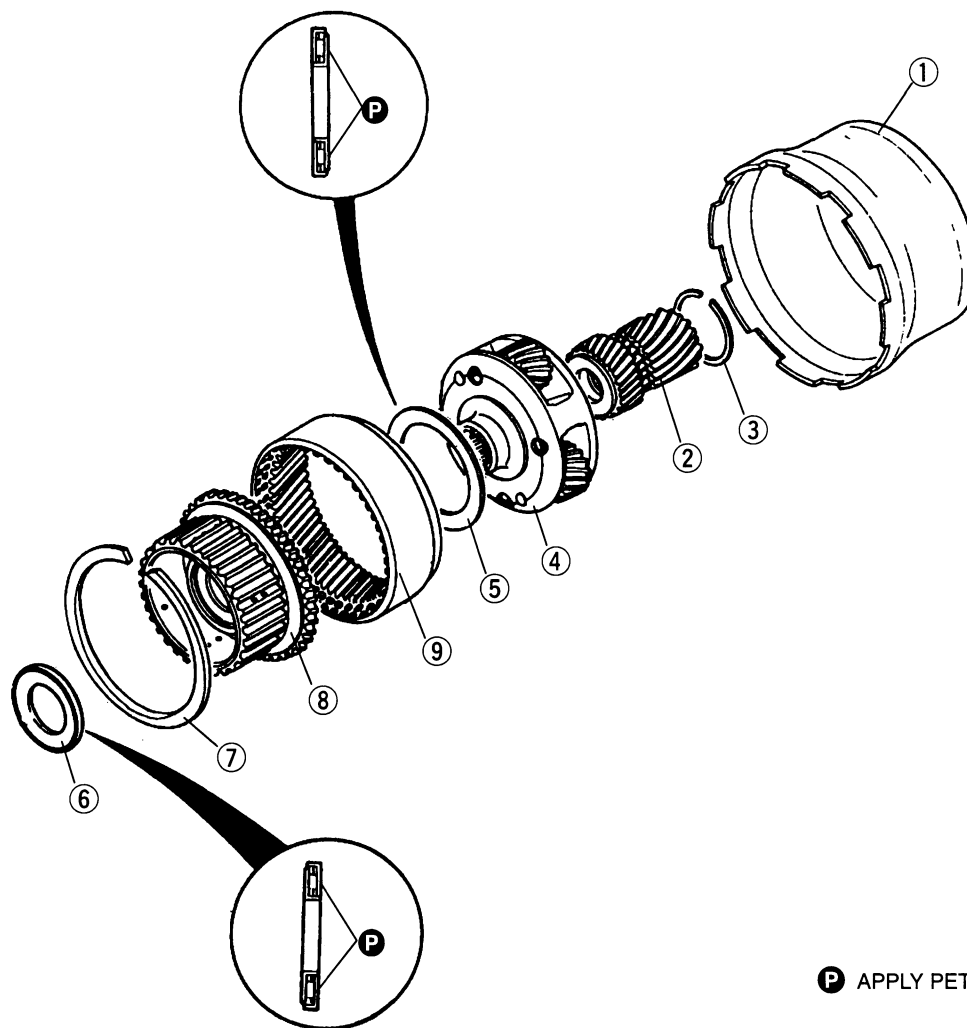
U5U513K6

AUTOMATIC TRANSMISSION

CONNECTING SHELL AND FRONT PLANETARY GEAR UNIT DISASSEMBLY / ASSEMBLY

U5U513BQ

1. Carry out the preinspection before disassembly.
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order disassembly indicated in the table.



P APPLY PETROLEUM JELLY

U5U513K7

1	Connecting shell
2	Front sun gear
3	Snap ring
4	Front planetary pinion carrier
5	Bearing

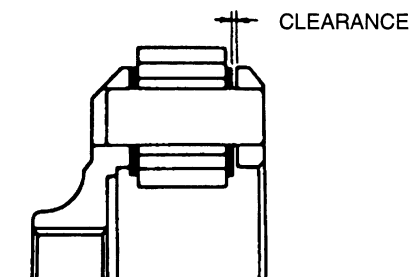
6	Bearing
7	Snap ring
8	Rear clutch hub
9	Internal gear

Assembly Procedure

1. Measure the clearance between the pinion washer and the planetary pinion carrier.

Clearance

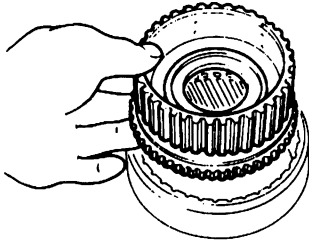
Standard: 0.2—0.7 mm { 0.008—0.027 in }
Maximum: 0.8 mm { 0.031 in }



U5U513K8

AUTOMATIC TRANSMISSION

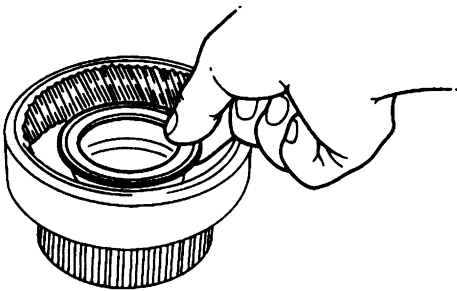
2. If not within the specification, replace the planetary pinion carrier.
3. Apply ATF to the rear clutch hub and internal gear, and assemble them with the snap ring.



U5U513K9

4. Apply petroleum jelly to the bearing, and install it onto the rear clutch hub with the black surface facing upward.

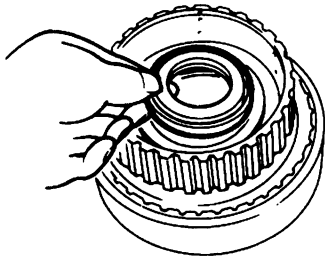
Bearing outer diameter
70.0 mm { 2.756 in }



U5U513L1

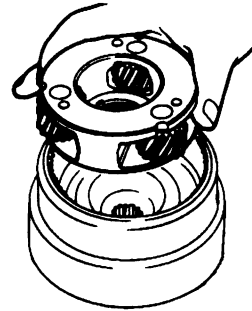
5. Apply petroleum jelly to the bearing, and install it onto the rear clutch hub with the black surface facing upward.

Bearing outer diameter
53.0 mm { 2.087 in }



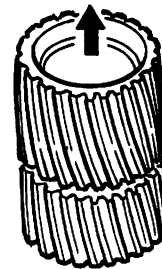
U5U513L2

6. Apply ATF to the front planetary pinion carrier, and install it into the internal gear.



U5U513L3

7. Apply ATF to the sun gear, and install it into the front planetary pinion carrier with the groove facing the front (arrow).



U5U513L4

8. Apply ATF to the sun gear, and install it into the front planetary pinion carrier.



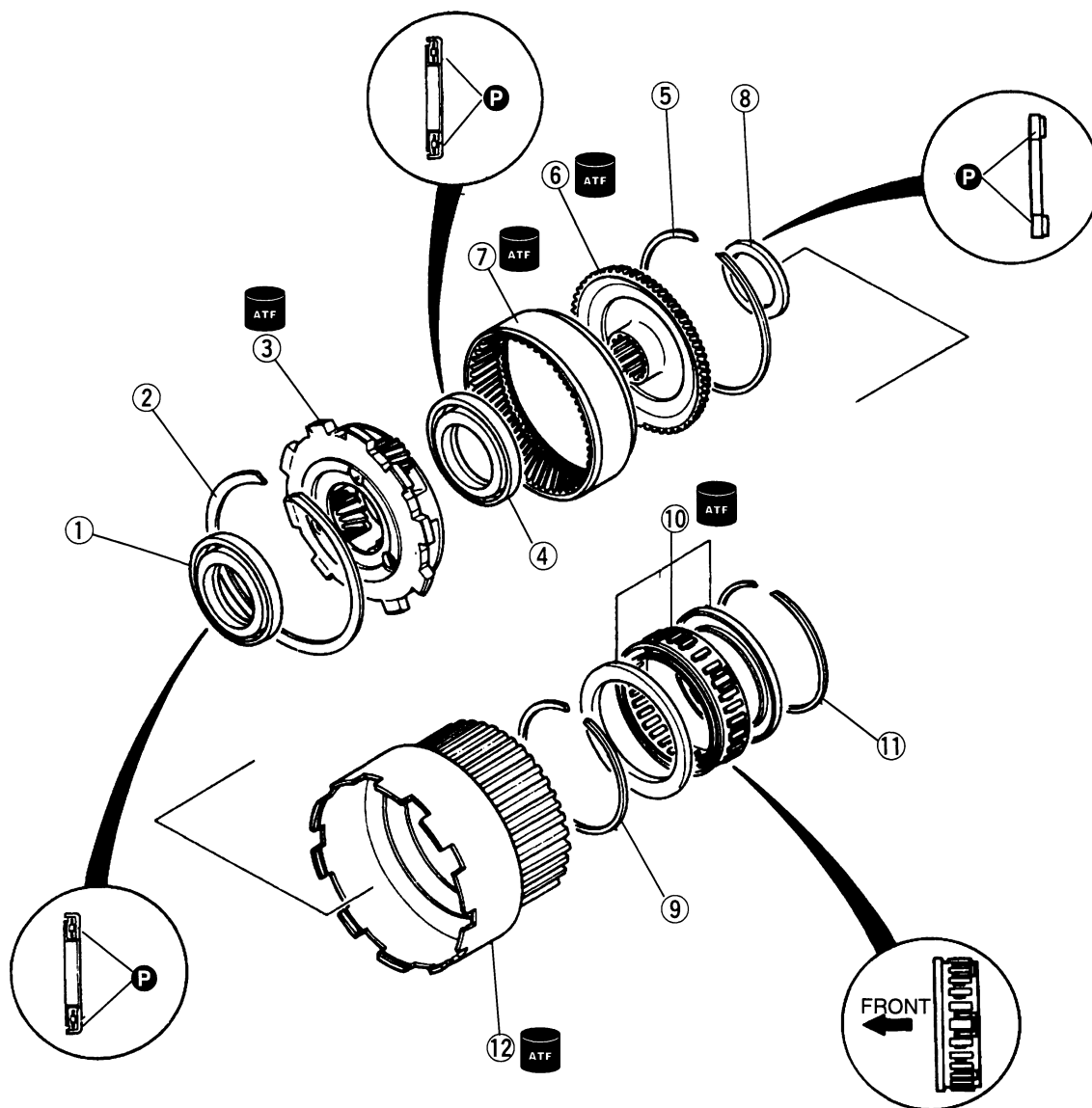
U5U513L5

AUTOMATIC TRANSMISSION

REAR PLANETARY GEAR UNIT DISASSEMBLY / ASSEMBLY

U5U513BR

1. Carry out the preinspection before disassembly. (Refer to 05-13 AUTOMATIC TRANSMISSION INSPECTION, Rear Planetary Gear Unit Preinspection.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly indicated in the table.



P APPLY PETROLEUM JELLY

U5U513L6

1	Bearing
2	Snap ring
3	Rear planetary pinion carrier
4	Bearing
5	Bearing
6	Snap ring

7	Drive flange
8	Internal gear
9	Snap ring
10	One-way clutch
11	Snap ring
12	Connecting drum

AUTOMATIC TRANSMISSION

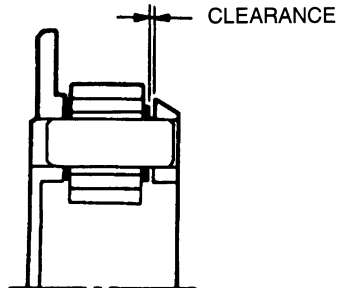
Assembly Procedure

1. Measure the clearance between the pinion washer and the planetary pinion carrier.

Clearance

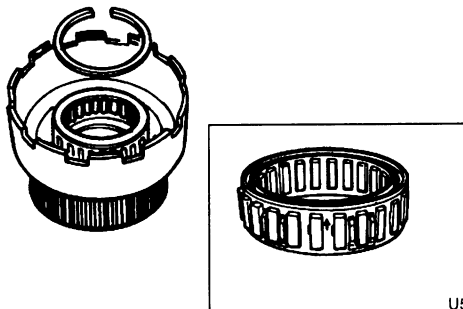
Standard: 0.2—0.7 mm { 0.008—0.027 in }

Maximum: 0.8 mm { 0.031 in }



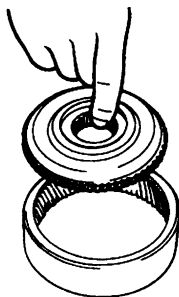
U5U513L7

2. If not within the specification, replace the planetary pinion carrier.
3. Install the snap ring into the connecting drum.
4. Apply ATF to the one-way clutch. Install it into the connecting drum with the arrow pointing toward the front.



U5U513L8

5. Apply ATF to the drive flange and internal gear, and install it into the internal gear.
6. Install the snap ring.

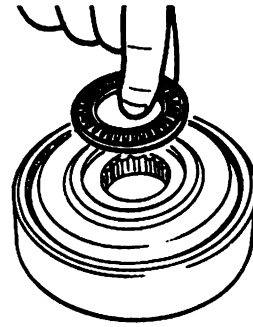


U5U513L9

7. Apply petroleum jelly to the bearing, and install it onto the drive flange.

Bearing outer diameter

47.0 mm { 1.850 in }

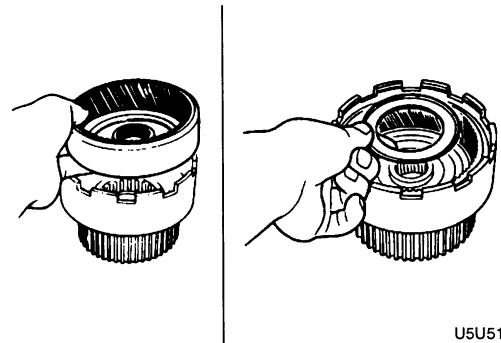


U5U513M1

8. Install the internal gear and the drive flange into the connecting drum.
9. Apply petroleum jelly to the bearing, and install it onto the drive flange with the black surface facing upward.

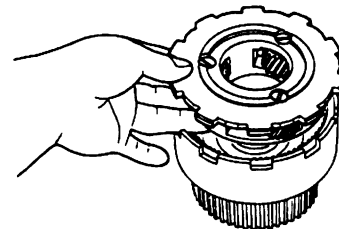
Bearing outer diameter

70.0 mm { 2.756 in }



U5U513M2

10. Apply ATF to the rear planetary pinion carrier, and install it into the connecting drum.
11. Install the snap ring.

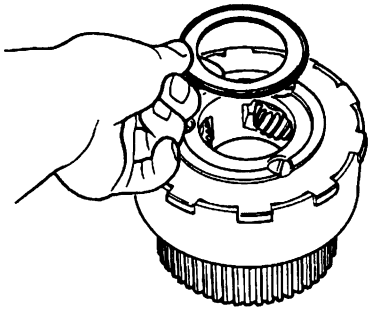


U5U513M3

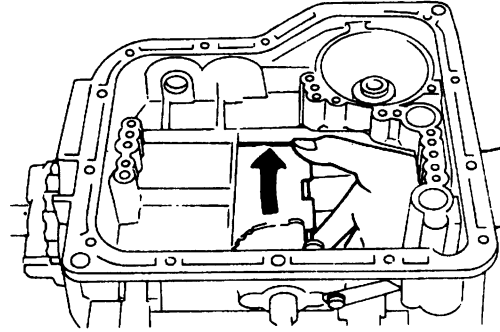
12. Apply petroleum jelly to the bearing, and install it onto the rear planetary pinion carrier with the black surface facing upward.

Bearing outer diameter

70.0 mm { 2.756 in }



U5U513M4



U5U513M5

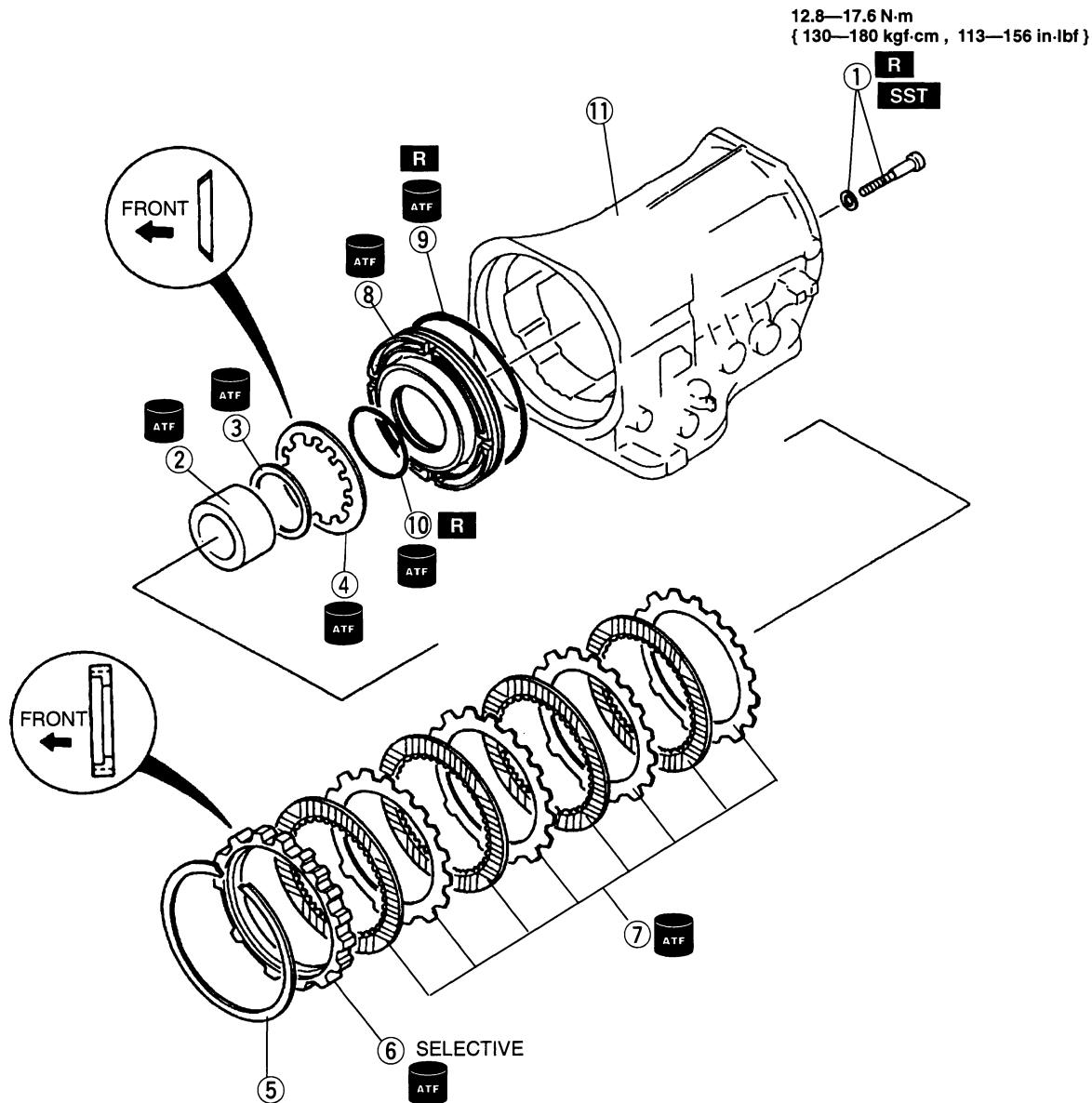
13. Insert the rear planetary gear unit into the transmission case, and verify that the one-way clutch turns counterclockwise. If it does not, then the one-way clutch is installed upside down.

AUTOMATIC TRANSMISSION

LOW AND REVERSE BRAKE DISASSEMBLY / ASSEMBLY

U5U513BS

1. Carry out the preinspection before disassembly. (Refer to 05-13 AUTOMATIC TRANSMISSION INSPECTION, Low And Reverse Brake Preinspection.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly indicated in the table.



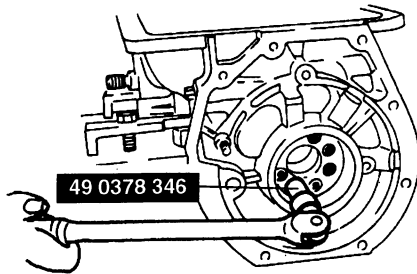
U5U513M6

1	Allen-head bolt and dished washer
2	One-way clutch inner race ⚠ Disassembly Note
3	Thrust washer
4	Return spring
5	Snap ring
6	Retaining plate

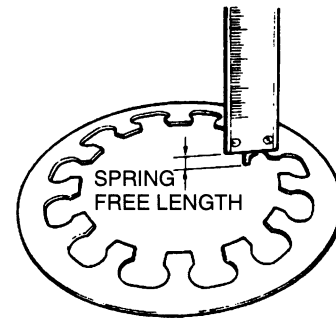
7	Drive plates and driven plates
8	Low and reverse brake piston ⚠ Disassembly Note
9	Seal ring
10	O-ring
11	Transmission case

One-way Clutch Inner Race Disassembly Note

1. Remove the allen-head bolts from the rear of the transmission case by using the **SST**.
2. Remove the one-way clutch inner race, thrust washer, and piston return spring.



U5U513M7



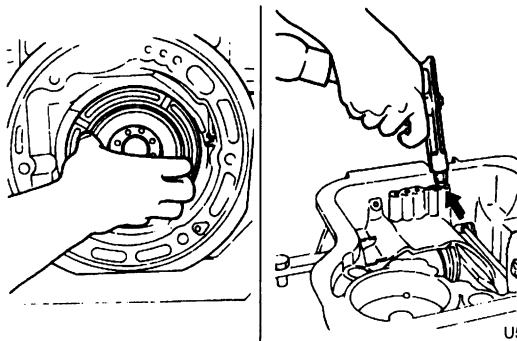
U5U513M9

Low And Reverse Brake Piston Disassembly Note

- Remove the piston by applying compressed air through the oil passage.

Air pressure

392 kPa { 4.0 kg/cm² , 57 psi } max.

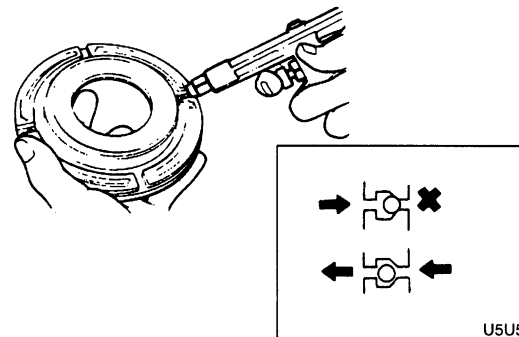


U5U513M8

4. If not within the specification, replace the return spring.
5. Verify that there is no air leakage when applying compressed air through the oil hole opposite the return spring.
6. Verify that there is airflow when applying compressed air through the oil hole on the return spring side.

Air pressure

392 kPa { 4.0 kg/cm² , 57 psi } max.



U5U513N1

Assembly Procedure

1. Measure the facing thickness in three places, and determine the average of the three readings.

Standard thickness

2.0 mm { 0.079 in }

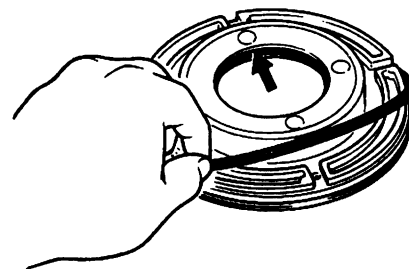
Minimum thickness

1.8 mm { 0.071 in }

2. If not within the specification, replace the drive plates.
3. Measure the return spring free length.

Spring free length

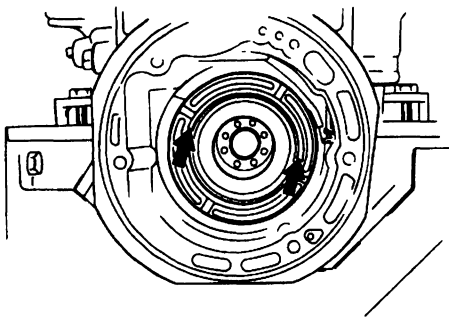
5.9—6.2 mm { 0.233—0.244 in }



U5U513N2

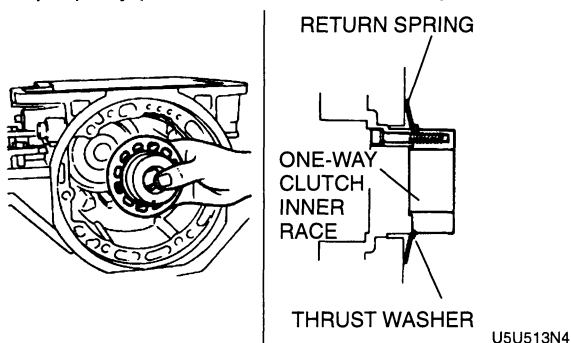
7. If not correct, replace the clutch piston.
8. Apply ATF to a new O-ring and install it onto the piston.
9. Apply ATF to a new seal ring and install it onto the piston.
10. Apply even pressure to the perimeter of the low and reverse brake piston, and install it into the transmission case.
11. Verify that the piston can be turned by hand. If it cannot, then remove it and check for damage to the seal ring and O-ring.

AUTOMATIC TRANSMISSION



U5U513N3

12. Apply ATF to the one-way clutch inner race, thrust washer, and return spring.
13. Assemble the one-way clutch inner race, thrust washer, and return spring, and install them in the transmission case.
14. Verify that the return spring, thrust washer, and rings are properly positioned before securing the bolts.



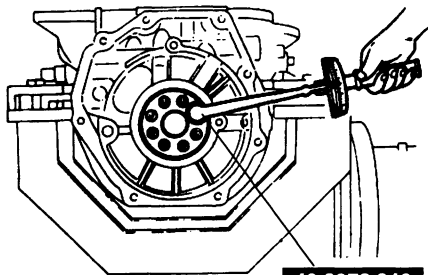
U5U513N4

15. Tighten the allen head bolts by using the SST.

Tightening torque

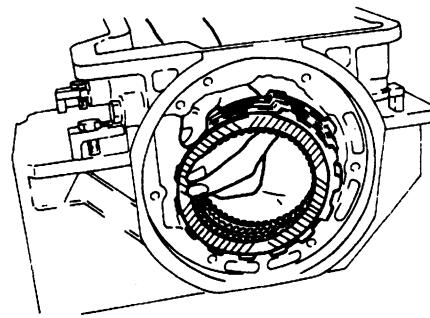
12.8—17.6 N·m

{ 130—180 kgf·cm , 113—156 in·lbf }



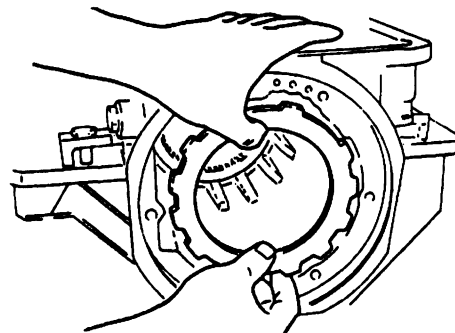
U5U513N5

16. Soak new drive plates in ATF for at least two hours.
17. Apply ATF to the driven plates immediately before installation.
18. Install the drive and driven plates into the transmission case in the following order:
Driven-Drive-Driven-Drive-Driven-Drive-Driven-Drive



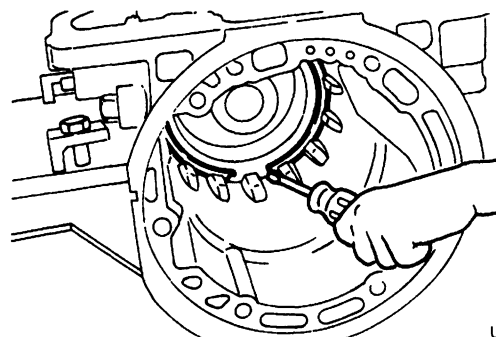
U5U513N6

19. Install the retaining plate.



U5U513N7

20. Install the snap ring by using a screwdriver.



U5U513N8

21. Measure the clearance between the snap ring and the retaining plate by using a feeler gauge. If not within the specification, adjust the clearance by installing the proper retaining plate.

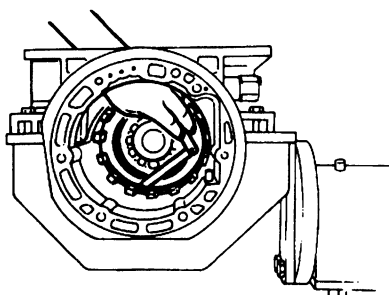
Clearance

0.8—1.05 mm { 0.032—0.041 in }

Retaining plate size

mm { in }		
11.8 { 0.465 }	12.0 { 0.472 }	12.2 { 0.480 }
12.4 { 0.488 }	12.6 { 0.496 }	12.8 { 0.504 }

AUTOMATIC TRANSMISSION



U5U513N9

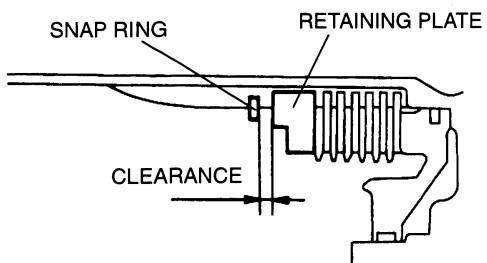
Caution

- Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal.

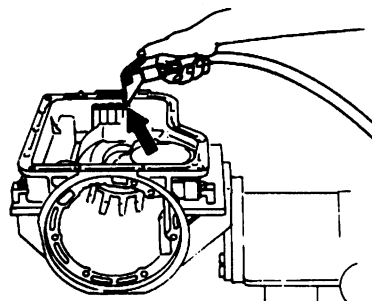
22. Check the operation of the piston by applying compressed air through the oil passage of the low and reverse brake.

Air pressure

392 kPa { 4.0 kg/cm² , 57 psi } max.



U5U513P1



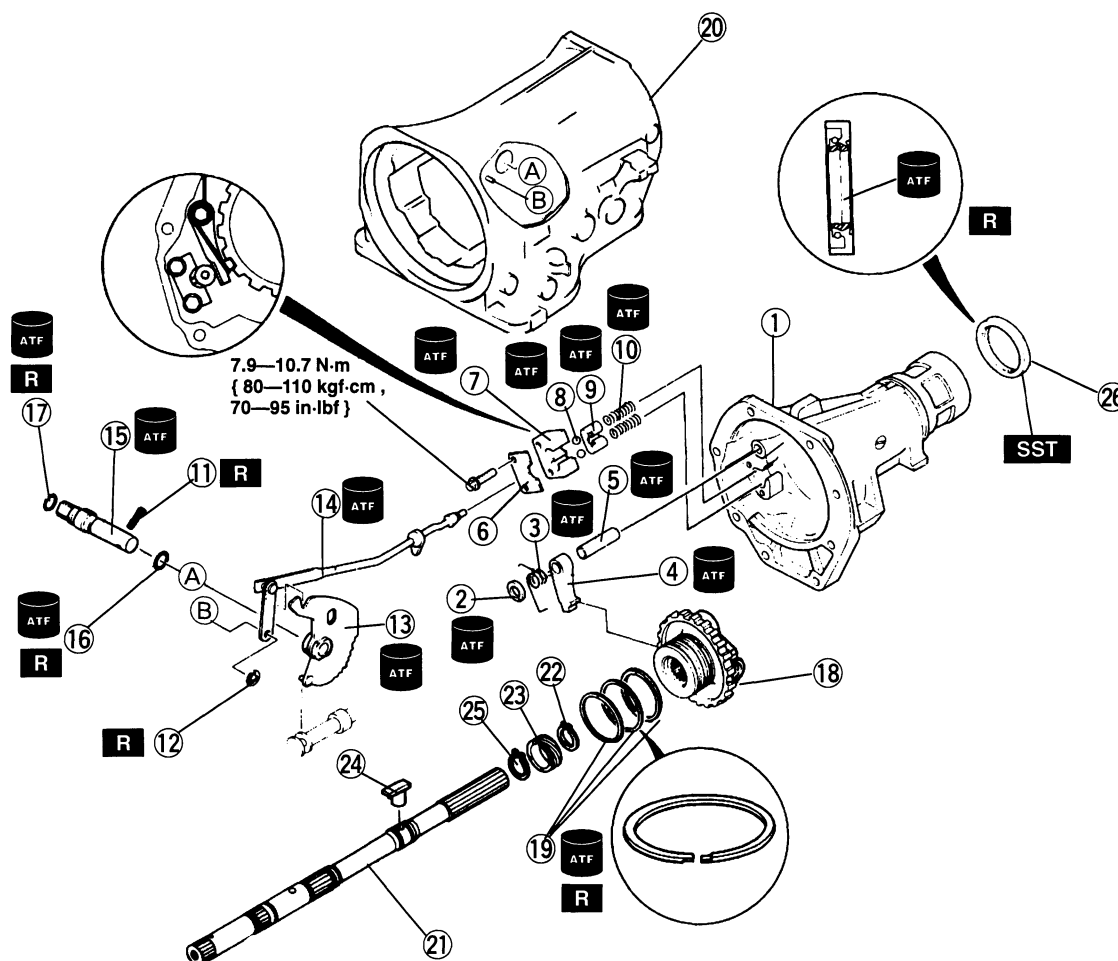
U5U513P2

AUTOMATIC TRANSMISSION

EXTENSION HOUSING AND PARKING MECHANISM DISASSEMBLY / ASSEMBLY

U5U513BT

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



U5U513P3

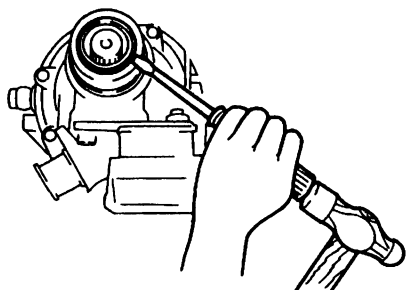
1	Extension housing
2	Dowel spacer
3	Return spring
4	Parking pawl
5	Pawl shaft
6	Retainer plate
7	Actuator support
8	Steel ball
9	Retainer
10	Spring
11	Spring pin
12	Retaining ring
13	Manual plate
14	Parking rod

15	Manual shaft
16	O-ring
17	O-ring
18	Oil distributor
19	Seal rings
20	Transmission case
21	Output shaft
22	Snap ring
23	Speedometer drive gear
24	Key
25	Snap ring
26	Oil seal
Disassembly Note	

AUTOMATIC TRANSMISSION

Oil Seal Disassembly Note

- Remove the oil seal by using a screwdriver.



U5U513P4

Assembly Procedure

1. Measure the spring specifications.

Specifications

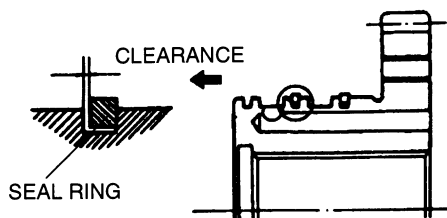
Outer dia. mm { in }	Free length mm { in }	No. of coils	Wire dia. mm { in }
7.2 { 0.283 }	32.0 { 1.260 }	14.0	0.7 { 0.028 }

2. If not within the specification, replace the spring.
3. Measure the clearance between the seal rings and the grooves.

Clearance

Standard: 0.04—0.16 mm { 0.002—0.006 in }

Maximum: 0.40 mm { 0.016 in }

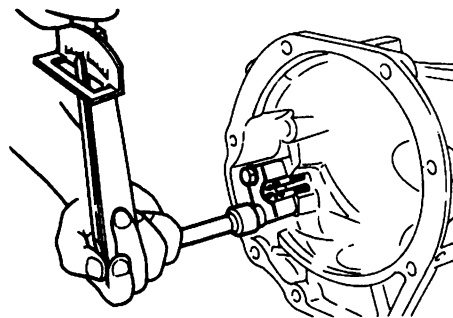


U5U513P5

4. If not within the specification, replace the oil distributor.
5. Apply ATF to a new oil seal, and install it into the extension housing.
6. Apply ATF to the springs and retainer, and install them into the extension housing.
7. Apply ATF to the steel balls and actuator support, and install them into the extension housing.
8. Apply ATF to the retainer plate, and install it into the extension housing.

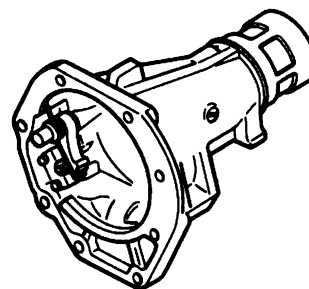
Tightening torque

7.9—10.7 N·m { 80—110 kgf·cm , 70—95 in·lbf }



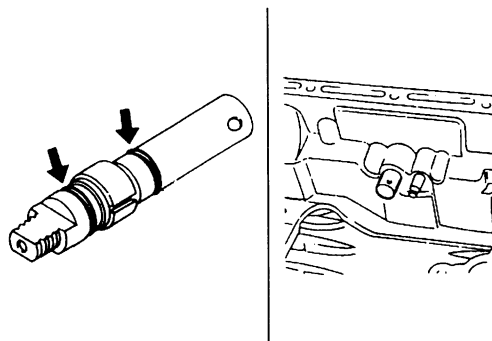
U5U513P6

9. Apply ATF to the pawl shaft, and install it into the extension housing.
10. Apply ATF to the parking pawl and return spring, and install it into the extension housing.
11. Apply ATF to the dowel spacer, and install it into the extension housing.



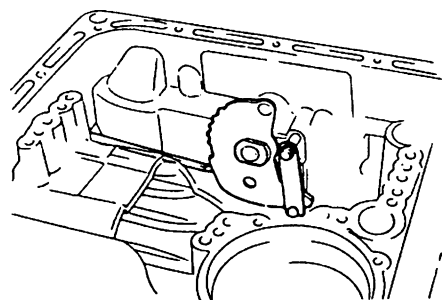
U5U513P7

12. Apply ATF to new O-rings, and install them onto the manual shaft.
13. Apply ATF to the manual shaft, and install it into the transmission case.



U5U513P8

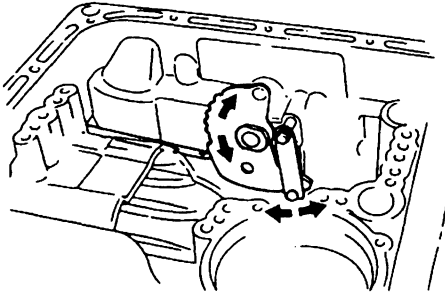
14. Install the parking rod and retaining ring.
15. Apply ATF to the manual plate, and install it onto the manual shaft.
16. Drive the spring pin.



U5U513P9

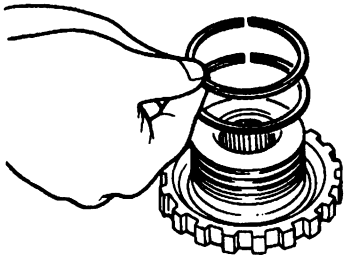
AUTOMATIC TRANSMISSION

17. Check the parking mechanism operation.



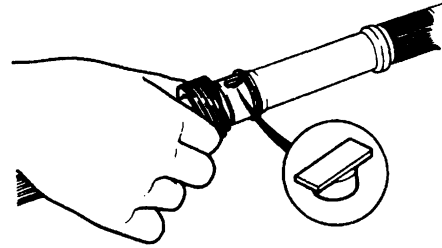
U5U513Q1

18. Apply ATF to new seal rings, and install them onto the oil distributor.



U5U513Q2

19. Install the snap ring, key, and speedometer drive gear onto the output shaft.
20. Secure the speedometer drive gear with the snap ring.



U5U513Q3

AUTOMATIC TRANSMISSION

CONTROL VALVE BODY DISASSEMBLY / ASSEMBLY

U5U513BU

Control Valve Body Disassembly

Caution

- Denting or scratching these precisely machined components will reduce the ability of the transmission to shift properly. When handling these components or the valve body that contains them, be careful not to drop or hit them.

1. Disassemble in the order indicated in the table.
2. Neatly arrange the removed parts to avoid confusing similar parts.
3. Inspect all parts and repair or replace as necessary.

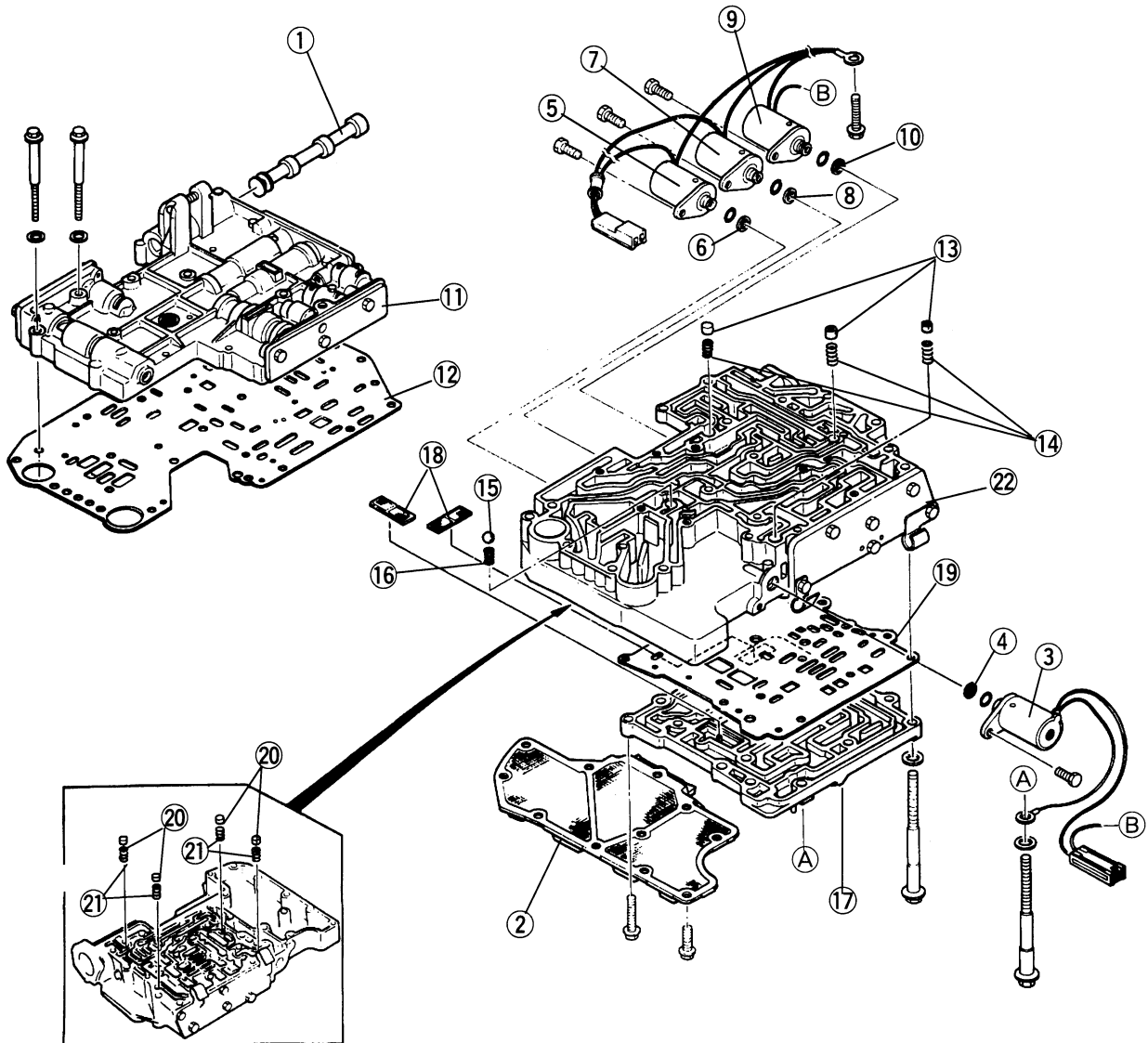
Warning

- 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.

4. Clean the removed parts by using cleaning solvent, and dry them by using compressed air. Clean out all holes and passages by using compressed air.
5. Apply ATF to all O-rings and gaskets.
6. Assemble in the reverse order of disassembly indicated in the table.



APPLY SPECIFIED ATF TO INDIVIDUAL PARTS



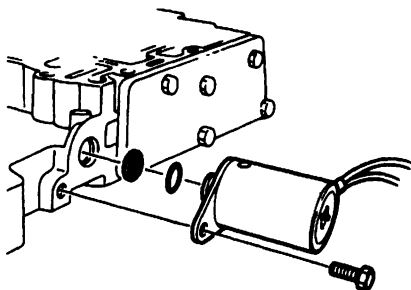
U5U513Q4

AUTOMATIC TRANSMISSION

1	Manual valve
2	Oil strainer
3	3-2 control solenoid valve ☞ SOLENOID VALVES INSPECTION
4	Oil strainer
5	Shift solenoid A ☞ SOLENOID VALVES INSPECTION
6	Oil strainer
7	Shift solenoid B ☞ SOLENOID VALVES INSPECTION
8	Oil strainer
9	Shift solenoid C ☞ SOLENOID VALVES INSPECTION
10	Oil strainer
11	Upper valve body ☞ Upper valve body Disassembly / Assembly
12	Separator plate
13	Orifice check valve
14	Orifice check spring
15	Throttle relief ball
16	Throttle relief spring
17	Valve body cover
18	Inner strainer
19	Separator plate
20	Orifice check valve
21	Orifice check spring
22	Lower valve body ☞ Lower valve body Disassembly / Assembly

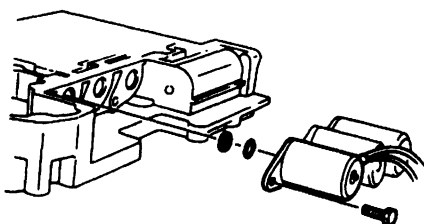
Disassembly procedure

1. Remove the 3-2 control solenoid valve.
2. Remove the oil strainer and O-ring.



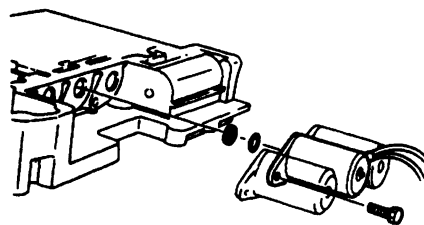
U5U513Q5

3. Remove the shift solenoid A.
4. Remove the oil strainer and O-ring.



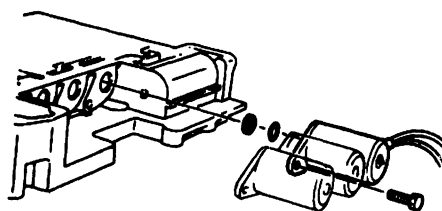
U5U513Q6

5. Remove the shift solenoid B.
6. Remove the oil strainer and O-ring.



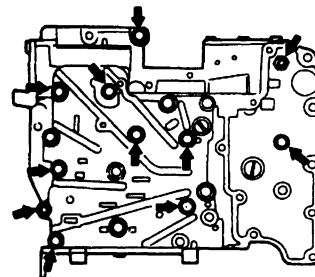
U5U513Q7

7. Remove the shift solenoid C.
8. Remove the oil strainer and O-ring.



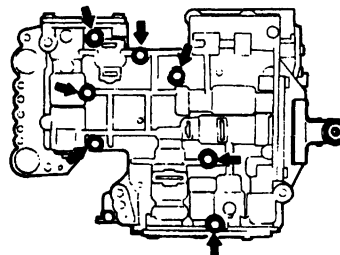
U5U513Q8

9. Remove the bolts and nuts shown in the figure.



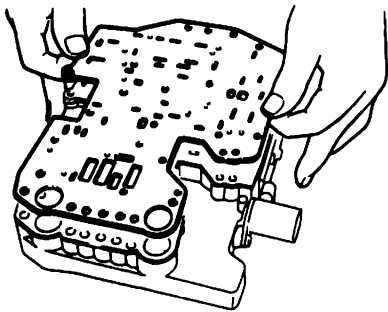
U5U513Q9

10. Hold the lower valve body and separator plate together by using a large clip.
11. Remove the upper valve body.



U5U513R1

12. Remove the clip.
13. Gently remove the separator plate.

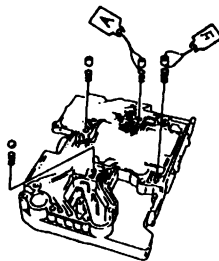


U5U513R2

Note

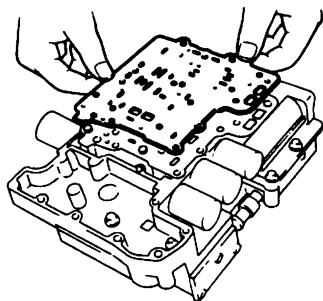
- Tag the orifice check valves for proper reassembly.

14. Remove the orifice check valves, throttle relief ball, and springs.



U5U513R3

15. Gently remove the separator plate.

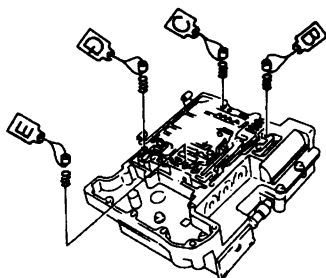


U5U513R4

Note

- Tag the orifice check valves for proper reassembly.

16. Remove the orifice check valves and springs.



U5U513R5

AUTOMATIC TRANSMISSION

Upper Valve Body Disassembly / Assembly

Caution

- Denting or scratching these precisely machined components will reduce the ability of the transmission to shift properly. When handling these components or the valve body that contains them, be careful not to drop or hit them.
- Using a magnet in this procedure could magnetize the valve body inner components, reducing the ability of the transmission to shift properly. Do not use magnets or magnetized tools when carrying out maintenance on these components.

Note

- If a valve does not slide out under its own weight, place the valve body open-side down and tap on the valve body lightly with a plastic hammer.

1. Disassemble in the order indicated in the table.
2. Inspect all parts and repair or replace as necessary.

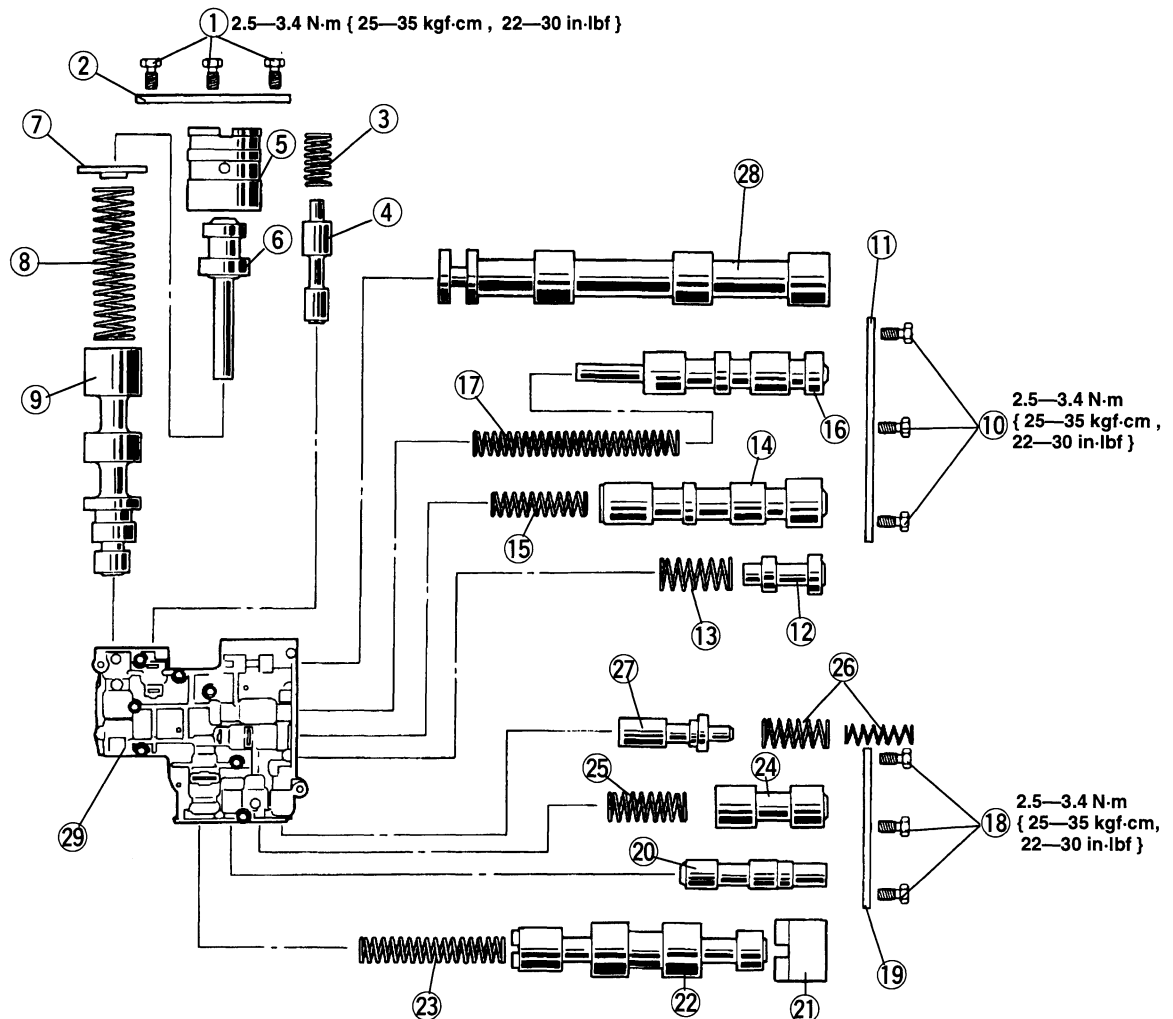
Warning

- 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.

3. Clean all parts and bores by using compressed air and apply ATF to them immediately before assembly.
4. Assemble in the reverse order of disassembly indicated in the table.



APPLY SPECIFIED ATF TO INDIVIDUAL PARTS



U5U513R6

AUTOMATIC TRANSMISSION

1	Bolt
2	Side plate
3	N-R reducing spring
4	N-R reducing valve
5	Pressure regulator sleeve
6	Pressure regulator plug
7	Spring seat
8	Pressure regulator spring
9	Pressure regulator valve
10	Bolts
11	Side plate
12	Pressure modifier valve
13	Pressure modifier spring
14	1-2 shift valve
15	1-2 shift spring
16	2-3 shift valve

17	2-3 shift spring
18	Bolt
19	Side plate
20	Vacuum throttle valve
21	3-4 shift sleeve
22	3-4 shift valve
23	3-4 shift spring
24	Backup control valve
25	Backup control spring
26	Throttle backup spring
27	Throttle backup valve
28	Manual valve
29	Upper valve body

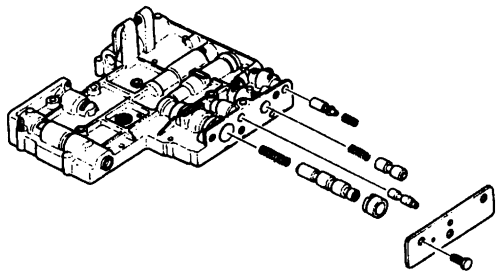
Assembly procedure

1. Measure the spring specifications.
2. If not within the specification, replace the spring(s).

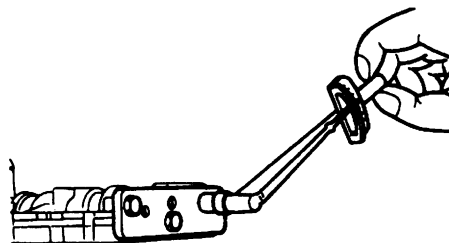
Specifications

Spring	Item			
	Outer dia. mm { in }	Free length mm { in }	No. of coils	Wire dia. mm { in }
Pressure regulator	11.7 { 0.461 }	43.0 { 1.693 }	13.0	1.2 { 0.047 }
1-2 shift	7.4 { 0.291 }	26.4 { 1.039 }	9.6	0.7 { 0.028 }
2-3 shift	10.0 { 0.394 }	50.0 { 1.969 }	13.7	1.0 { 0.039 }
3-4 shift	7.5 { 0.295 }	40.2 { 1.583 }	15.0	0.8 { 0.031 }
Pressure modifier	9.2 { 0.362 }	19.8 { 0.780 }	5.3	0.7 { 0.028 }
Throttle backup	9.0 { 0.354 }	17.5 { 0.689 }	5.2	0.9 { 0.035 }
N-R reducing	7.4 { 0.291 }	14.5 { 0.571 }	5.0	0.6 { 0.024 }
Backup control	8.5 { 0.335 }	21.3 { 0.839 }	7.3	0.9 { 0.035 }

3. Insert the throttle backup valve and spring.
4. Insert the backup control spring and valve.
5. Insert the 3-4 shift spring, valve, and sleeve.
6. Insert the vacuum throttle valve.
7. Install the side plate so that it does not contact the vacuum throttle valve.



U5U513R7



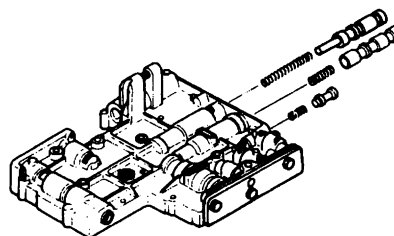
U5U513R8

9. Insert the 2-3 shift spring and valve.
10. Insert the 1-2 shift spring and valve.
11. Insert the pressure modifier spring and valve.

8. Tighten the installation bolts.

Tightening torque

2.5—3.4 N·m { 25—35 kgf·cm , 22—30 in·lbf }

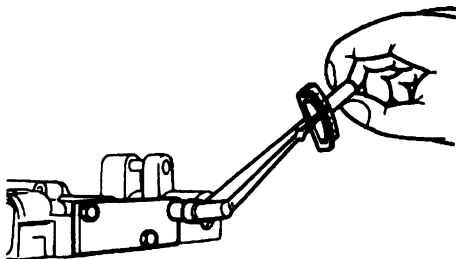


U5U513R9

12. Install the side plate.
13. Tighten the installation bolts.

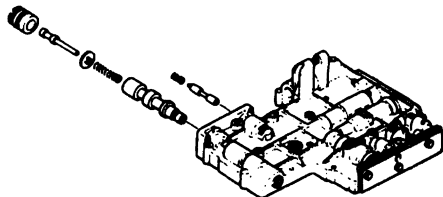
Tightening torque

2.5—3.4 N·m { 25—35 kgf·cm , 22—30 in·lbf }



U5U513S1

14. Insert the pressure regulator valve, spring, spring seat, plug, and sleeve.
15. Insert the N-R reducing valve and spring.

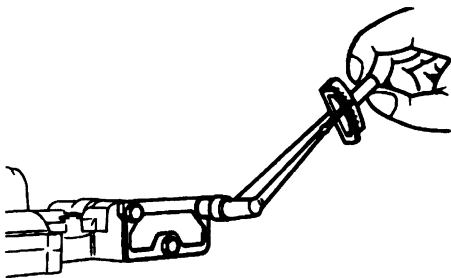


U5U513S2

16. Install the side plate.
17. Tighten the installation bolts.

Tightening torque

2.5—3.4 N·m { 25—35 kgf·cm , 22—30 in·lbf }



U5U513S3

AUTOMATIC TRANSMISSION

Lower Valve Body Disassembly / Assembly

Caution

- Denting or scratching these precisely machined components will reduce the ability of the transmission to shift properly. When handling these components or the valve body that contains them, be careful not to drop or hit them.
- Using a magnet in this procedure could magnetize the valve body inner components, reducing the ability of the transmission to shift properly. Do not use magnets or magnetized tools when carrying out maintenance on these components.

1. Disassemble in the order indicated in the table.
2. Inspect all parts, and repair or replace as necessary.

Note

- If a valve does not slide out under its own weight, place the valve body open-side down and tap on the valve body lightly with a plastic hammer.

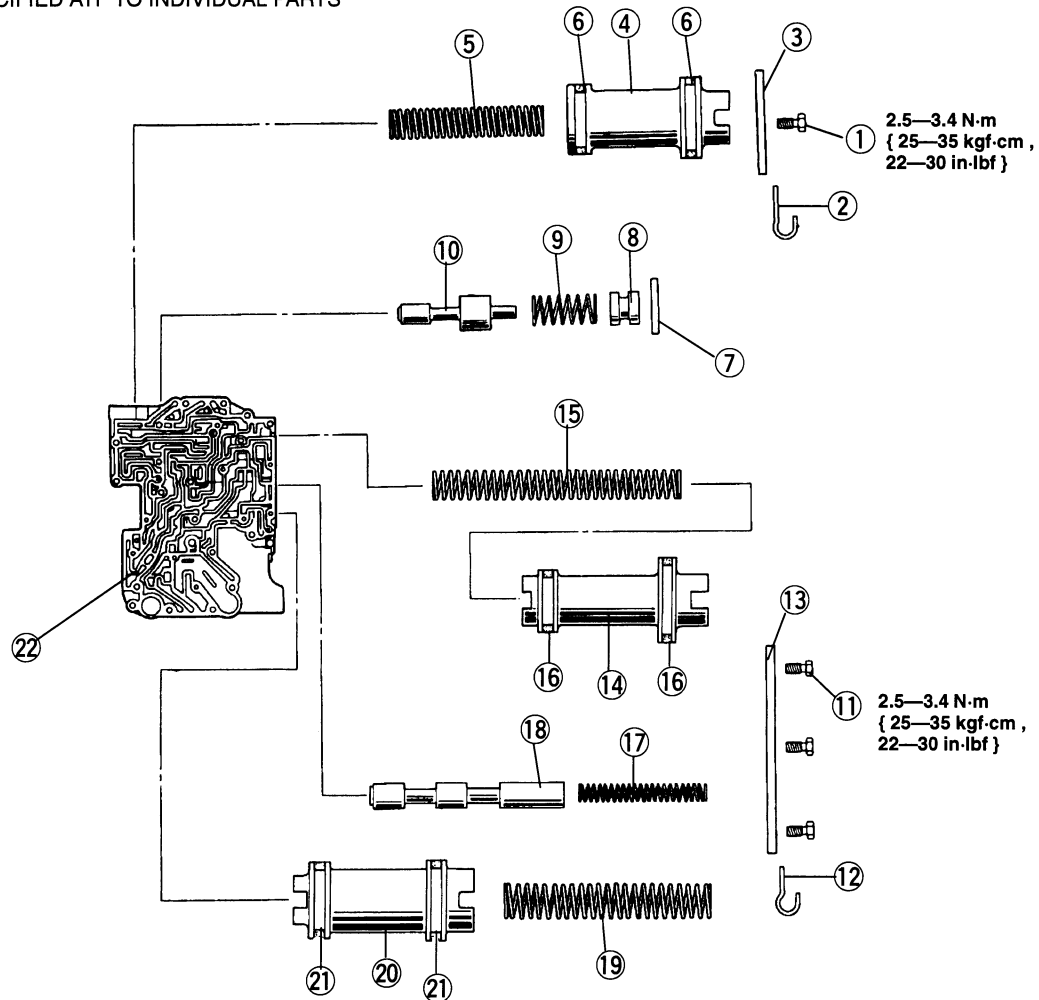
Warning

- 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.

3. Clean all parts and bores by using compressed air and apply ATF to them immediately before assembly.
4. Assemble in the reverse order of disassembly indicated in the table.



APPLY SPECIFIED ATF TO INDIVIDUAL PARTS



U5U513S4

1	Bolt
2	Clip

3	Side plate
4	N-D accumulator piston

AUTOMATIC TRANSMISSION

5	N-D accumulator spring
6	Seal ring
7	Pin
8	Stopper plug
9	1-2 reducing spring
10	1-2 reducing valve
11	Bolt
12	Clip
13	Side plate
14	N-R/2-3 accumulator piston
15	N-R/2-3 accumulator spring

16	Seal ring
17	3-2 control spring
18	3-2 control valve
19	1-2 accumulator spring
20	1-2 accumulator piston
21	Seal ring
22	Lower valve body

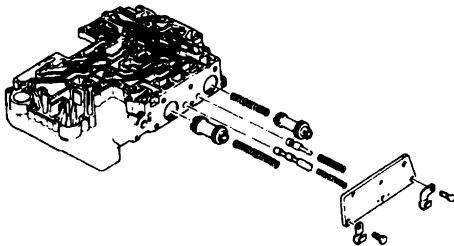
Assembly procedure

1. Measure the spring specifications.
2. If not within the specification, replace the spring(s).

Specifications

Spring	Item			
	Outer dia. mm { in }	Free length mm { in }	No. of coils	Wire dia. mm { in }
N-R/2-3 accumulator	8.9 { 0.350 }	82.5 { 3.248 }	29.7	1.1 { 0.043 }
N-D accumulator	9.3 { 0.366 }	43.4 { 1.709 }	22.0	1.4 { 0.055 }
1-2 reducing	9.4 { 0.370 }	19.5 { 0.768 }	5.0	0.8 { 0.031 }
3-2 control	5.5 { 0.217 }	39.5 { 1.555 }	22.4	0.65 { 0.026 }
1-2 accumulator	11.2 { 0.441 }	62.0 { 2.441 }	21.3	1.2 { 0.047 }

3. Apply ATF to the seal rings and install them onto the 1-2 accumulator piston.
4. Insert the 1-2 accumulator piston and spring.
5. Insert the 3-2 control valve and spring.
6. Insert the throttle relief valve and spring.
7. Apply ATF to the seal rings and install them onto the N-R/2-3 accumulator piston.
8. Insert the N-R/2-3 accumulator spring and valve.
9. Install the side plate.

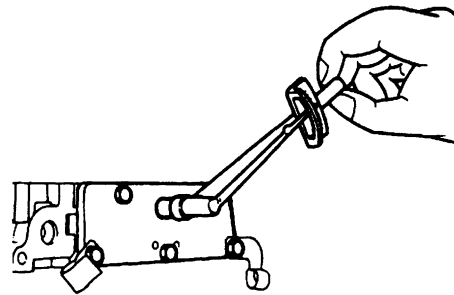


U5U513S5

10. Install the clip and bolts.

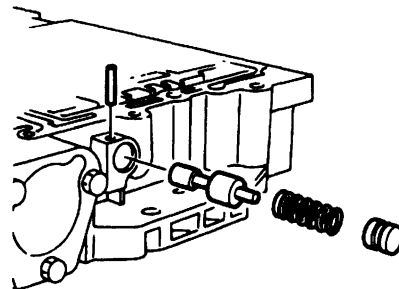
Tightening torque

2.5—3.4 N·m { 25—35 kgf·cm , 22—30 in·lbf }



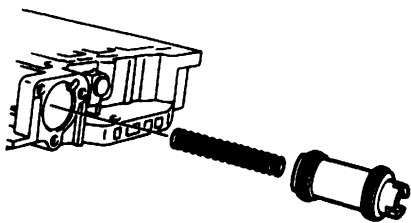
U5U513S6

11. Insert the 1-2 reducing valve, spring, and stopper plug.
12. Tap in the roll pin.



U5U513S7

13. Apply ATF to the seal rings and install them onto the N-D accumulator piston.
14. Insert the N-D accumulator spring and piston.

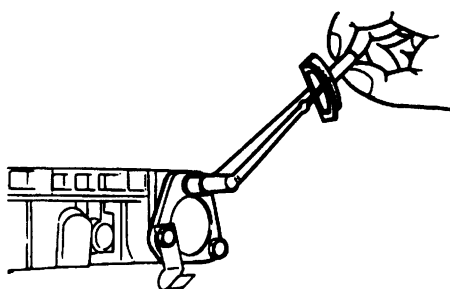


U5U513S8

15. Install the clip and bolts.

Tightening torque

2.5—3.4 N·m { 25—35 kgf·cm , 22—30 in·lbf }



U5U513S9

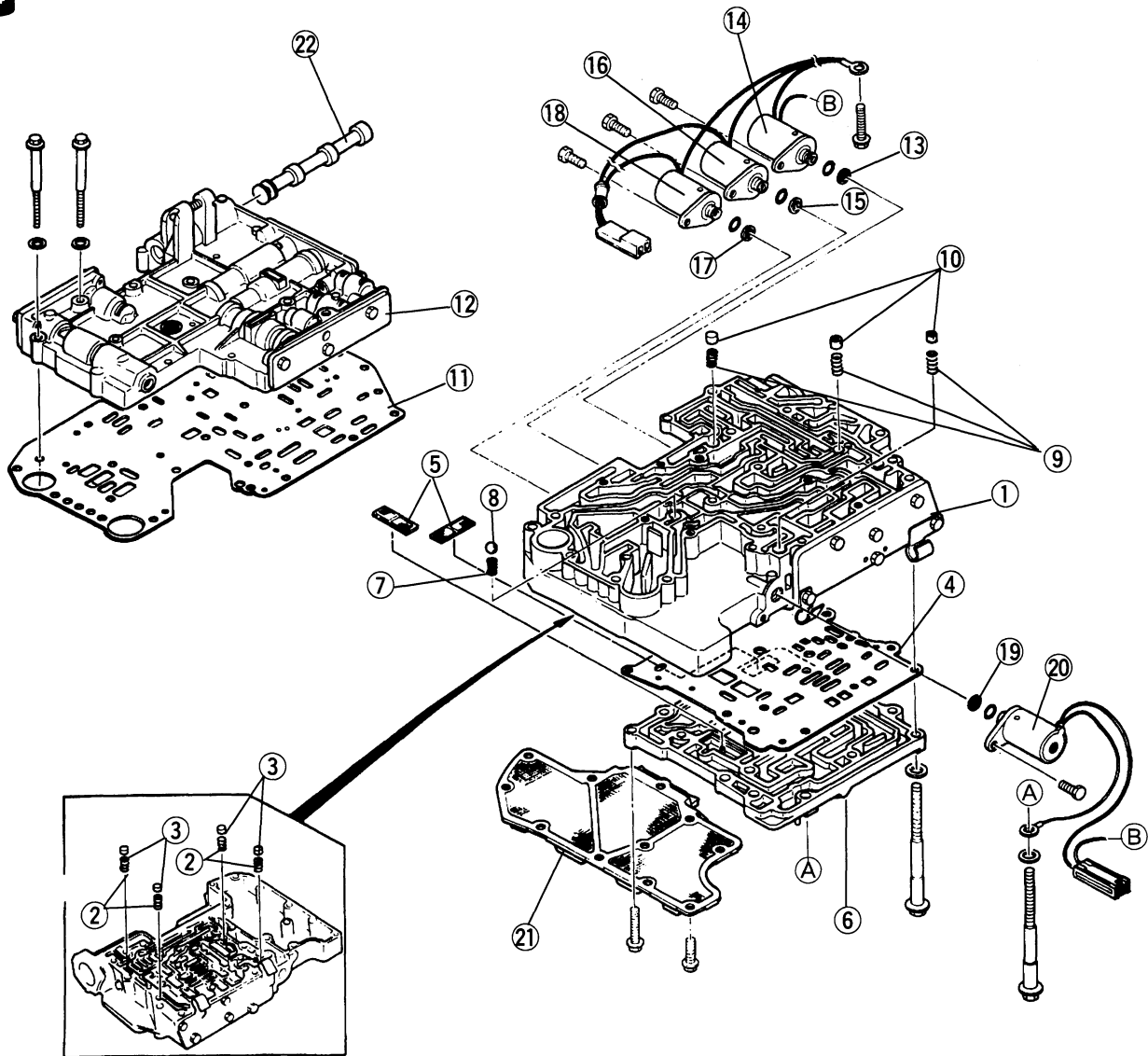
AUTOMATIC TRANSMISSION

Control Valve Body Assembly

1. Verify that all parts are clean and free of dust and other small particles.
2. Apply ATF to all O-rings and gaskets.
3. Assemble as shown in the figure, referring to Assembly procedure.



APPLY SPECIFIED ATF TO INDIVIDUAL PARTS

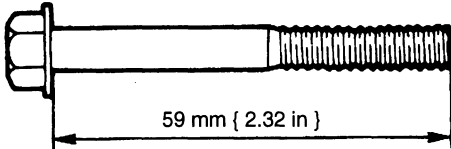
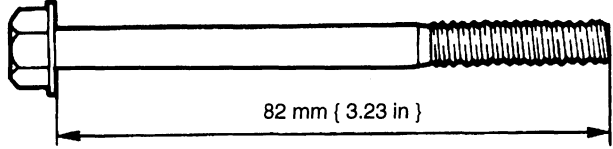


U5U513T1

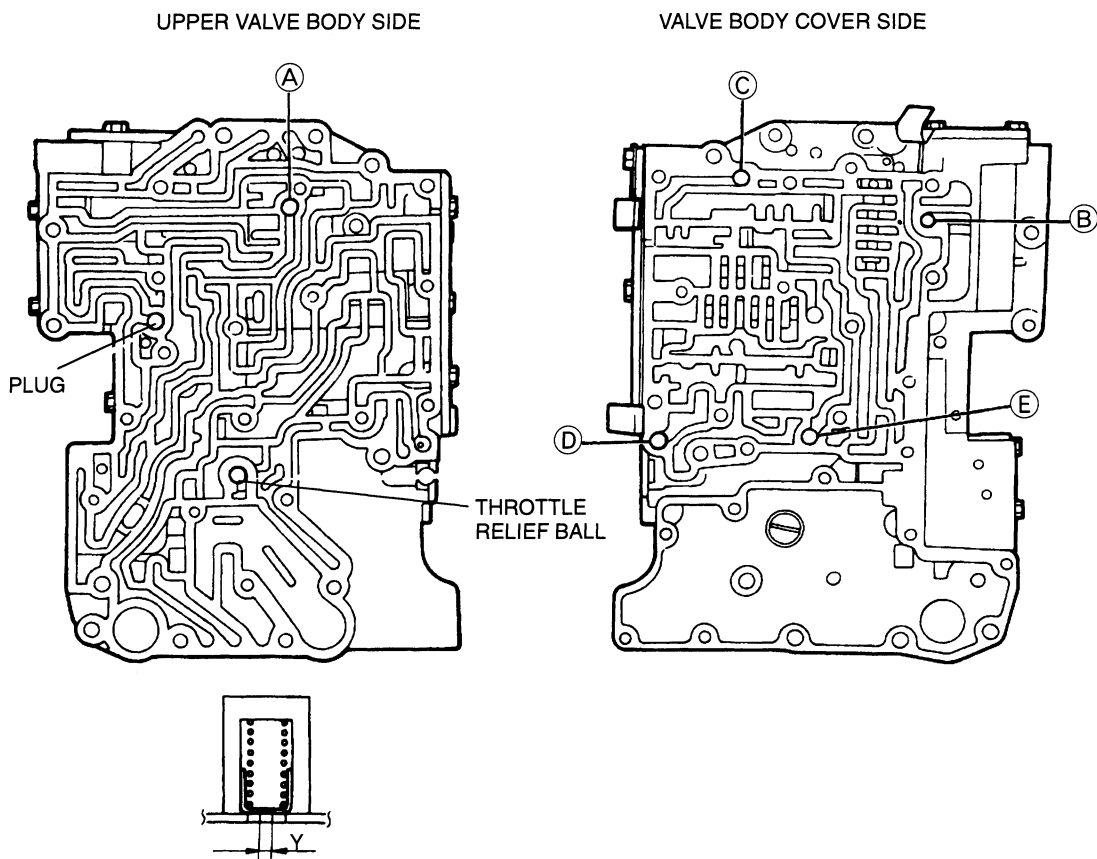
1	Lower valve body
2	Orifice shock spring
3	Orifice check valve
4	Separator plate
5	Inner strainer
6	Valve body cover
7	Throttle relief spring
8	Throttle relief ball
9	Orifice check spring
10	Orifice check valve
11	Separator plate

12	Upper valve body
13	Oil strainer
14	Shift solenoid C
15	Oil strainer
16	Shift solenoid B
17	Oil strainer
18	Shift solenoid A
19	Oil strainer
20	3-2 control solenoid valve
21	Oil strainer
22	Manual valve

AUTOMATIC TRANSMISSION

Identification letter	Bolts	Torque specification
10	 59 mm { 2.32 in }	10.8—14.7 N·m { 110—150 kgf·cm , 96—130 in·lbf }
10	 82 mm { 3.23 in }	

Orifice check valve installation positions



U5U513T3

Orifice check valve specification

		Y diameter
Upper valve body side mm { in }	A	$\phi 1.8$ { 0.071 }
Valve body cover side mm { in }	B	$\phi 2.2$ { 0.087 }
	C	$\phi 1.5$ { 0.059 }
	D	$\phi 1.2$ { 0.047 }
	E	$\phi 1.0$ { 0.039 }

AUTOMATIC TRANSMISSION

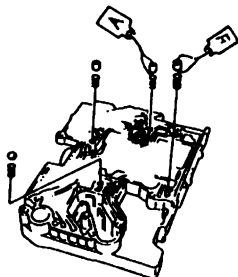
Assembly procedure

1. Measure the spring specifications.
2. If not within the specification, replace the spring(s).

Specifications

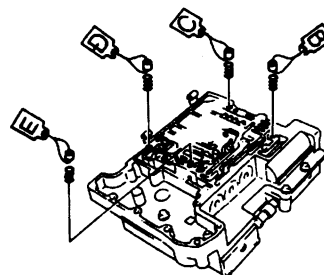
Spring	Item			
	Outer dia. mm { in }	Free length mm { in }	No. of coils	Wire dia. mm { in }
Orifice check	5.0 { 0.197 }	15.5 { 0.610 }	12.0	0.23 { 0.009 }
Throttle relief	6.5 { 0.256 }	26.8 { 1.055 }	14.0	0.9 { 0.035 }

3. Insert the orifice check valve, plug and springs, and the check ball and spring in the lower valve body.



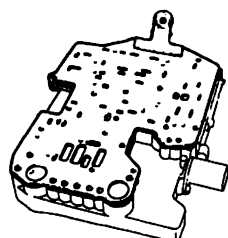
U5U513T4

7. Turn over the valve body assembly and insert the orifice check valves and springs in the lower valve body.



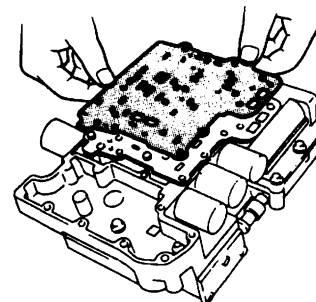
U5U513T7

4. Position the separator plate on the lower valve body. Align the plate and valve body and hold them together by using large clips.



U5U513T5

8. Install the separator plate.

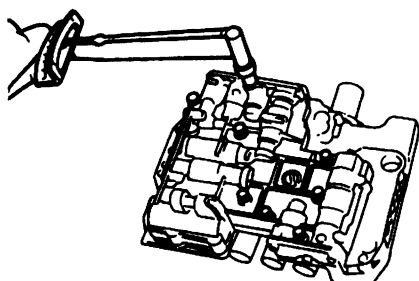


U5U513T8

5. Install the upper valve body on the separator plate.
6. Install the bolts. (Refer to Control Valve Body Assembly, Bolt installation positions.) Tighten the bolts to the specified torque.

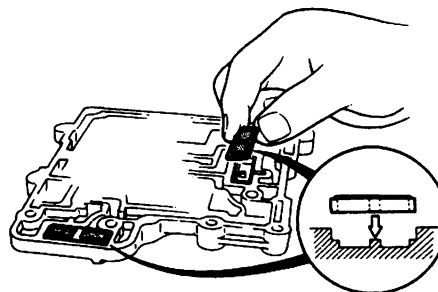
Tightening torque

6.5—7.8 N·m { 66—80 kgf·cm , 58—69 in·lbf }



U5U513T6

9. Install the inner strainer in the valve body cover.



U5U513T9

10. Install the valve body cover on the separator plate.
11. Install the bolts and nuts. (Refer to Control Valve Body Assembly, Bolt installation positions.) Tighten the bolts and nuts to the specified torque.

AUTOMATIC TRANSMISSION

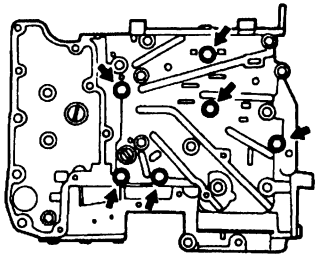
Tightening torque

Bolt: 6.5—7.8 N·m

{ 66—80 kgf·cm , 58—69 in·lbf }

Nut: 10.8—14.7 N·m

{ 110—150 kgf·cm , 96—130 in·lbf }

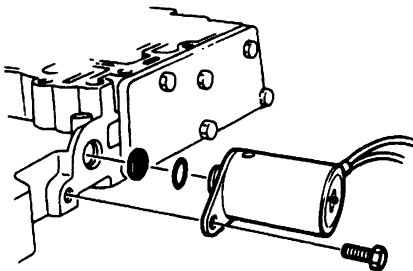


U5U513U1

12. Install the O-rings onto each solenoid valve.
13. Install the oil strainer in the lower valve body.
14. Install the 3-2 control solenoid valve.
15. Tighten the installation bolt.

Tightening torque

2.5—3.4 N·m { 25—35 kgf·cm , 22—30 in·lbf }

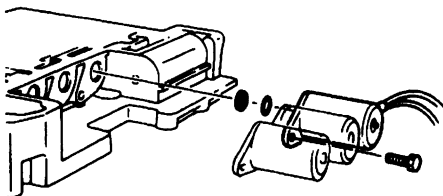


U5U513U2

16. Install the oil strainer in the lower valve body.
17. Install shift solenoid C.
18. Tighten the installation bolt.

Tightening torque

2.5—3.4 N·m { 25—35 kgf·cm , 22—30 in·lbf }

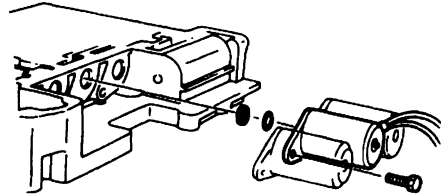


U5U513U3

19. Install the oil strainer in the lower valve body.
20. Install shift solenoid B.
21. Tighten the installation bolt.

Tightening torque

2.5—3.4 N·m { 25—35 kgf·cm , 22—30 in·lbf }

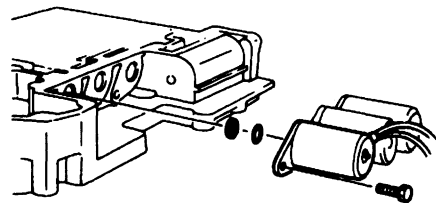


U5U513U4

22. Install the oil strainer in the lower valve body.
23. Install shift solenoid A.
24. Tighten the installation bolt.

Tightening torque

2.5—3.4 N·m { 25—35 kgf·cm , 22—30 in·lbf }

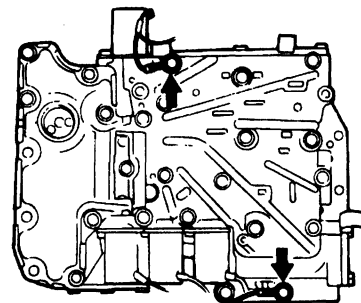


U5U513U5

25. Connect the ground terminals and install the bolts. (Refer to Control Valve Body, Bolt installation positions.)
26. Tighten the bolt.

Tightening torque

6.5—7.8 N·m { 66—80 kgf·cm , 58—69 in·lbf }



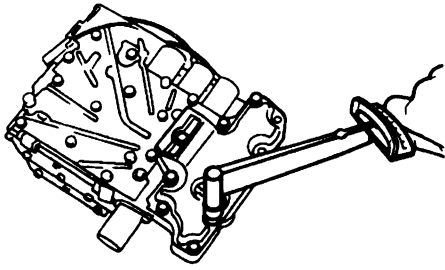
U5U513U6

27. Install the oil strainer.
28. Install the bolts. (Refer to Control Valve Body, Bolt installation positions.)

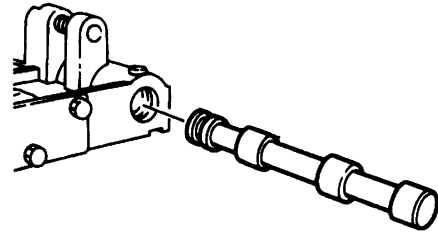
Tightening torque

6.5—7.8 N·m { 66—80 kgf·cm , 58—69 in·lbf }

AUTOMATIC TRANSMISSION



U5U513U7



U5U513U8

29. Install the manual valve.

AUTOMATIC TRANSMISSION

AUTOMATIC TRANSMISSION ASSEMBLY

U5U513BV

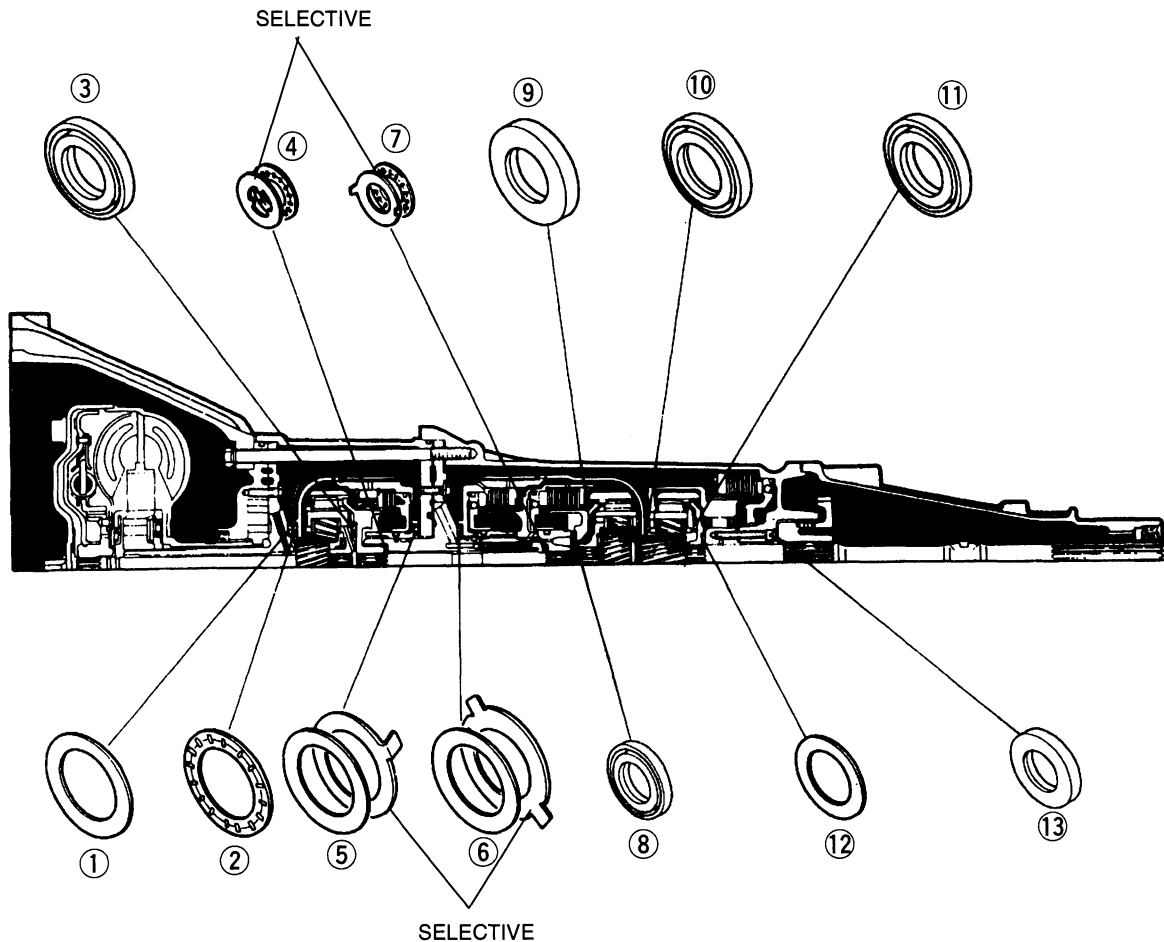
Precaution

General notes

1. If the drive plates or brake band are being replaced with new ones, soak them in ATF for at least 2 hours before installation.
2. Before assembly, apply ATF to all seal rings, rotating parts, O-rings, D-rings, and sliding parts.
3. All O-rings, seals, and gaskets must be replaced with new ones included in the overhaul kit.
4. Use petroleum jelly, not grease, during reassembly.
5. When it is necessary to replace a bushing, replace the subassembly that includes that bushing.
6. Assemble the housing with 10 minutes after applying sealant, and allow it to cure at least 30 minutes after assembly before filling the transmission with ATF.

Assembly

Thrust washer, bearing, and race locations



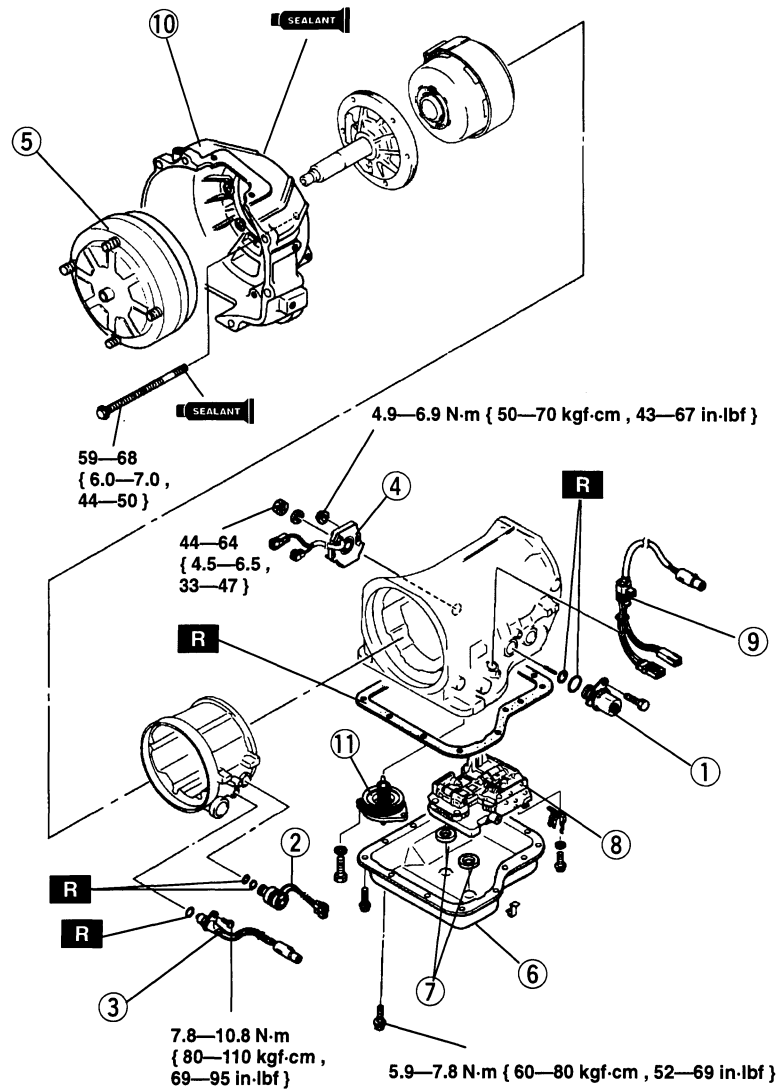
U5U513U9

	1	2	3	4	5	6	7
Bearing mm { in }	70.0 { 2.756 }	70.0 { 2.756 }	70.0 { 2.756 }	35.0 { 1.378 }	70.0 { 2.756 }	70.0 { 2.756 }	35.0 { 1.378 }
Race mm { in }	—	—	—	33.0 { 1.299 }	70.0 { 2.756 }	76.0 { 2.992 }	33.0 { 1.299 }

	8	9	10	11	12	13
Bearing mm { in }	53.0 { 2.087 }	70.0 { 2.756 }	70.0 { 2.756 }	70.0 { 2.756 }	47.0 { 1.850 }	53.0 { 2.087 }
Race mm { in }	—	—	—	—	—	—

AUTOMATIC TRANSMISSION

Components



N·m { kgf·m , ft·lbf }

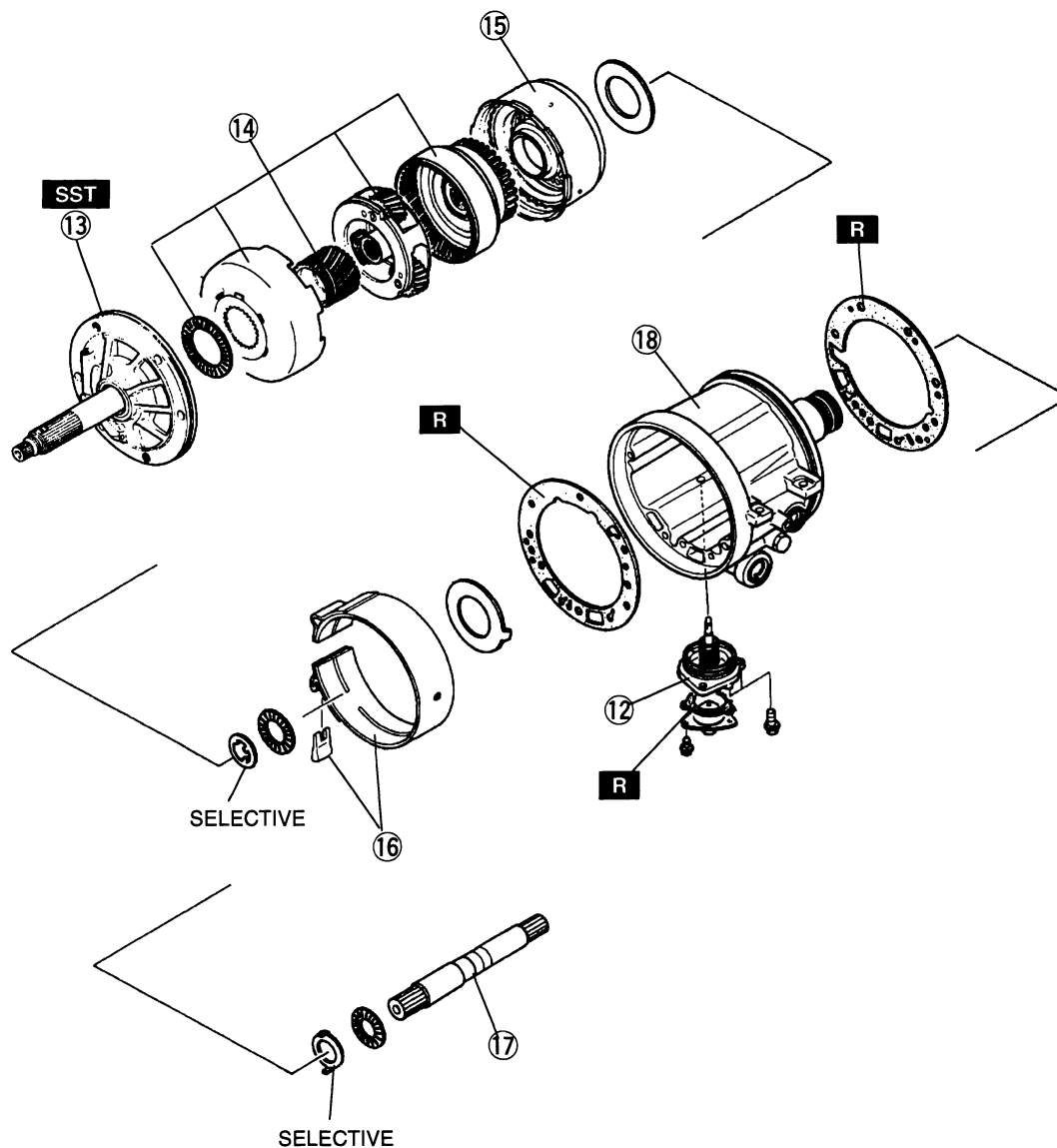
U5U513V1

1	Vacuum diaphragm
2	Torque converter clutch control solenoid valve
3	Input/turbine speed sensor
4	Transmission range switch
5	Torque converter
6	Oil pan

7	Magnet
8	Control valve body
9	Solenoid valve connector
10	Converter housing
11	Second gear band servo

AUTOMATIC TRANSMISSION

Components (Cont'd)



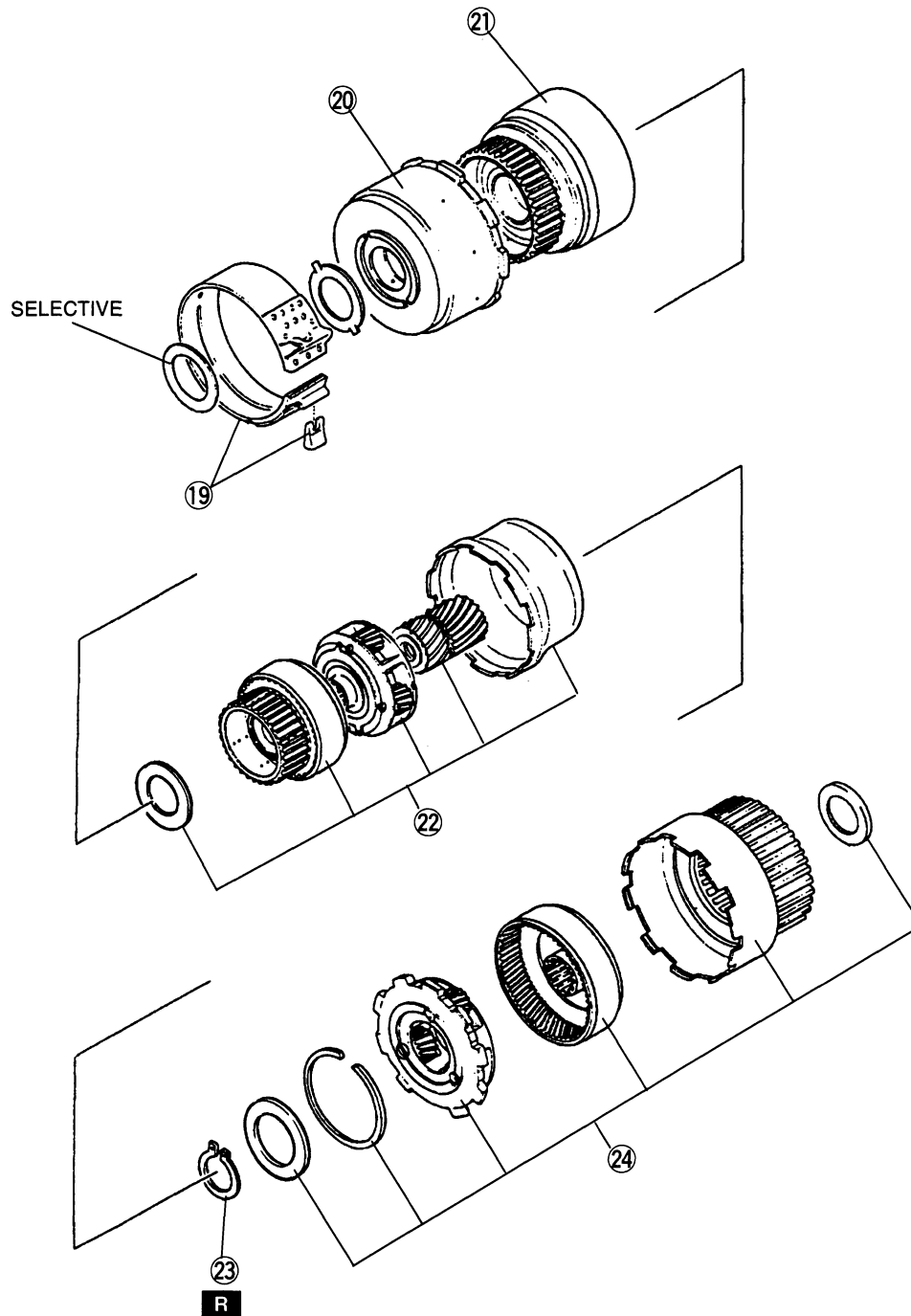
U5U513V2

12	Fourth gear band servo
13	Oil pump
14	Fourth gear connecting shell and fourth gear planetary gear unit

15	Direct clutch
16	Fourth gear brake band and band strut
17	Intermediate shaft
18	Drum support, accumulator, and fourth gear case

AUTOMATIC TRANSMISSION

Components (Cont'd)



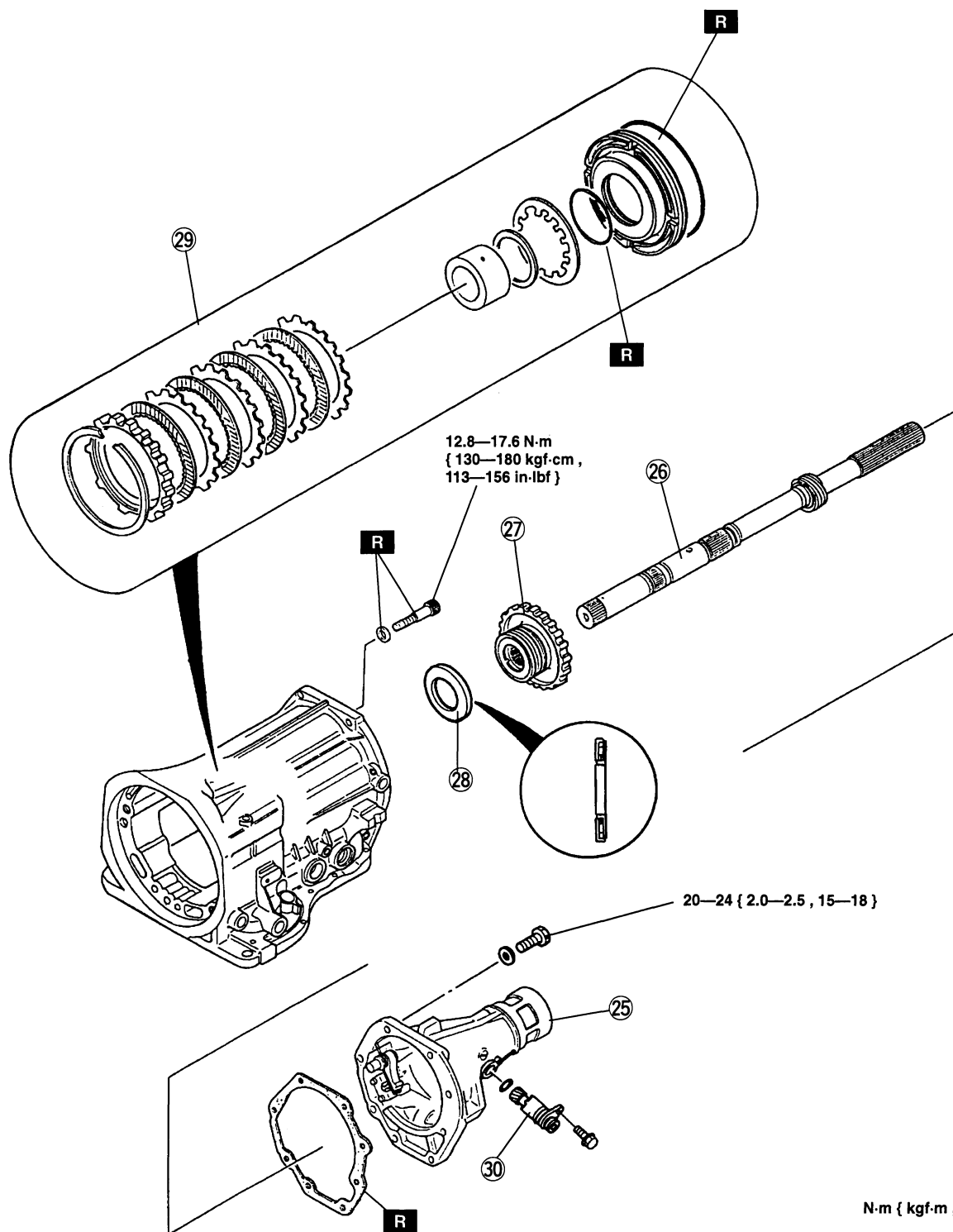
U5U513V3

19	Second gear brake band and band strut
20	Front clutch
21	Rear clutch

22	Connecting shell and front planetary gear unit
23	Snap ring
24	Rear planetary gear unit

AUTOMATIC TRANSMISSION

Components (Cont'd)



N·m { kgf·m , ft·lbf }

U5U513V4

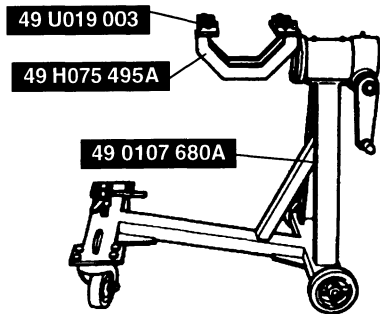
25	Extension housing
26	Output shaft
27	Oil distributor

28	Bearing
29	Low and reverse brake
30	Speedometer driven gear

AUTOMATIC TRANSMISSION

Assembly procedure

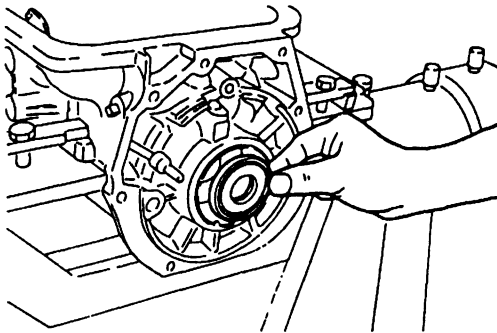
1. Assemble the **SST** as shown.
2. Mount the transmission case onto the **SST**.



U5U513V5

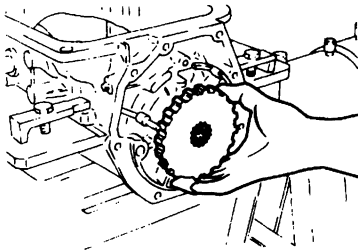
3. Apply petroleum jelly to the bearing, and install it into the rear of the transmission case with the black surface facing outward.

Bearing outer diameter
53.0 mm { 2.087 in }



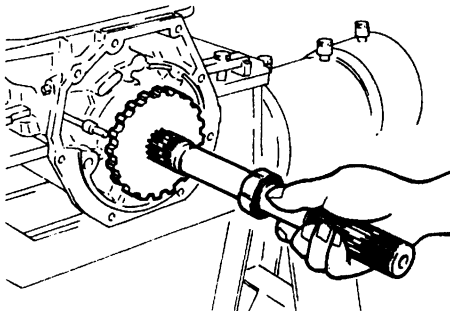
U5U513V6

4. Install the oil distributor in the transmission case.



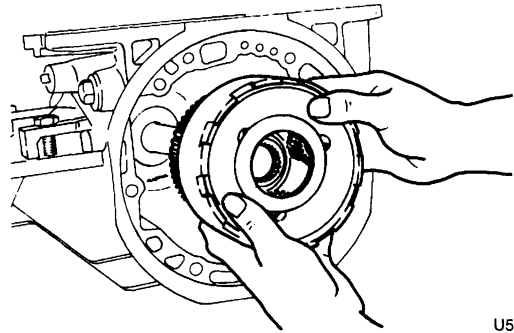
U5U513V7

5. Insert the output shaft.



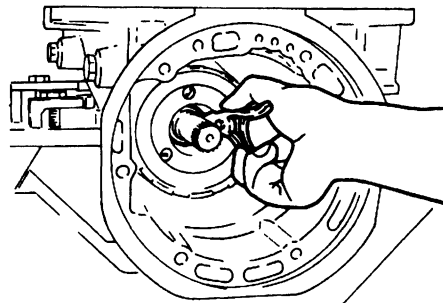
U5U513V8

6. Install the rear planetary gear unit (connecting drum, rear planetary pinion carrier, and one-way clutch) in the low and reverse brake side.



U5U513V9

7. Install a new snap ring onto the front of the output shaft.

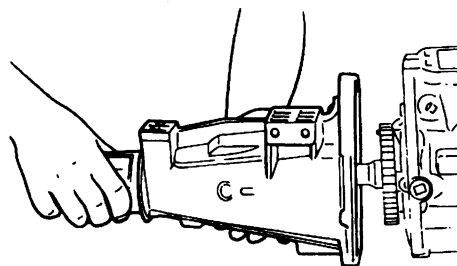


U5U513W1

8. Install the extension housing along with a new gasket.

Tightening torque
20—24 N·m { 2.0—2.5 kgf·m , 15—18 ft·lbf }

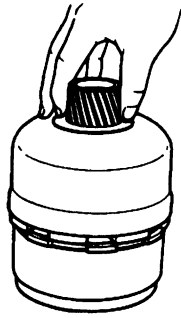
9. Verify that the output shaft is locked with the manual lever in P position.



U5U513W2

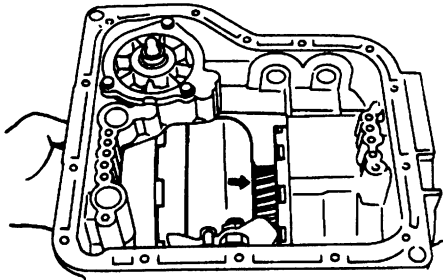
10. Set the rear clutch component on the top of the front clutch component.
11. Install the connecting shell and front planetary gear unit (rear clutch hub, front planetary pinion carrier, rear sun gear) onto the rear clutch component.

AUTOMATIC TRANSMISSION



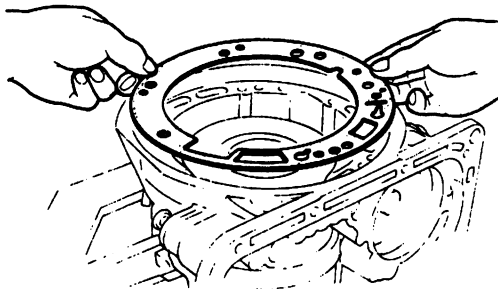
U5U513W3

12. Install the front clutch, rear clutch, rear clutch hub, front planetary pinion carrier, connecting shell, internal gear, sun gear, bearing, and bearing races as a unit into the transmission case.



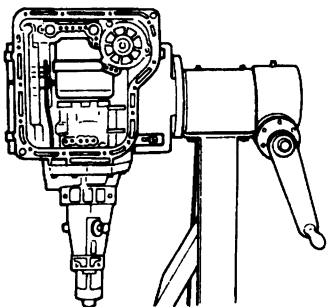
U5U513W4

13. Set a new gasket into the front of the case.



U5U513W5

14. Check and adjust the rear clutch total end play.
- (1) Position the front of the transmission case upward.
 - (2) Set the drum support bearing and race on the rear clutch.



U5U513W6

- (3) Measure distances A and B by using a straight-edge and vernier calipers.
- (4) Calculate the total end play by using the formula below.

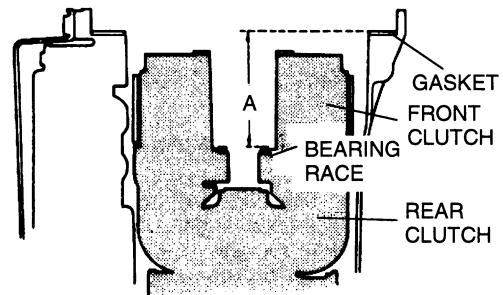
Formula

$$T = A - B - 0.1 \text{ mm } \{ 0.0039 \text{ in } \}$$

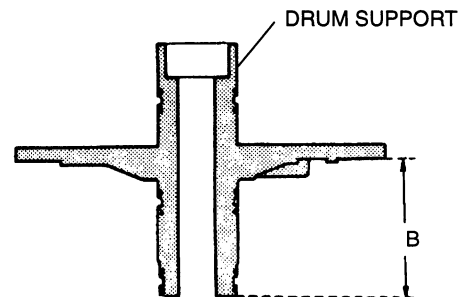
T	Total end play
A	The distance between the drum support mounting surface (including the drum support gasket) and the drum support bearing race surface on the rear clutch component.
B	The distance between the drum support bearing race contact surface and the drum support gasket contact surface.
0.1	The compression amount of a new gasket.

Total end play

$$0.25 - 0.50 \text{ mm } \{ 0.010 - 0.019 \text{ in } \}$$



U5U513W7



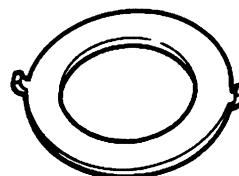
U5U513W8

- (5) Adjust the total end play by selecting the proper bearing race.

Bearing race sizes

mm { in }

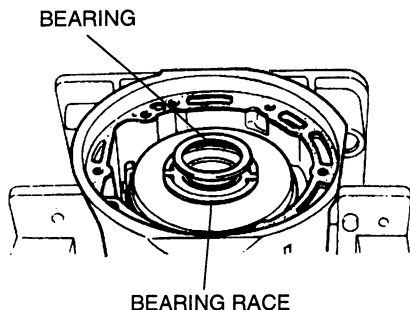
1.2 { 0.047 }	1.4 { 0.055 }	1.6 { 0.063 }
1.8 { 0.071 }	2.0 { 0.079 }	2.2 { 0.087 }



U5U513W9

AUTOMATIC TRANSMISSION

15. Check and adjust the front clutch end play.
 (1) Set the bearing race and bearing in position.



U5U513X1

- (2) Measure distances C and D by using a straight-edge and vernier calipers.
 (3) Calculate the front clutch end play by using the formula below.

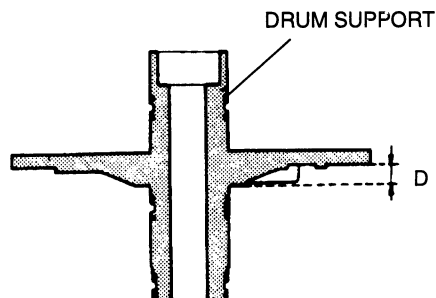
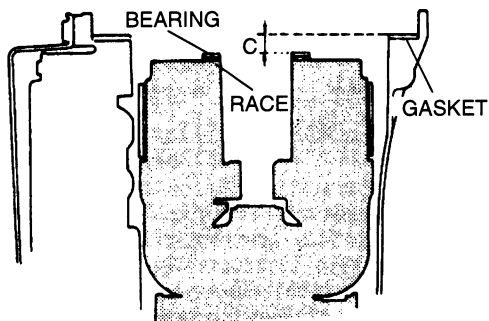
Formula

$$T = C - D - 0.1 \text{ mm } \{ 0.0039 \text{ in } \}$$

T	Front clutch end play.
C	The distance between the drum support mounting surface (including the drum support gasket) of the transmission case and the bearing surface on the front clutch component.
D	The distance between the sliding surface of the bearing and the drum support gasket contact surface.
0.1	The compression amount of a new gasket.

Front clutch end play

0.5—0.8 mm { 0.020—0.031 in }



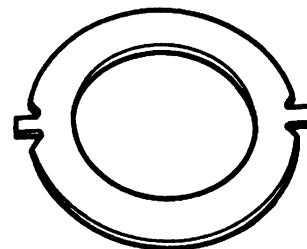
U5U513X2

- (4) Adjust the front clutch end play by selecting the proper bearing race.

Bearing race sizes

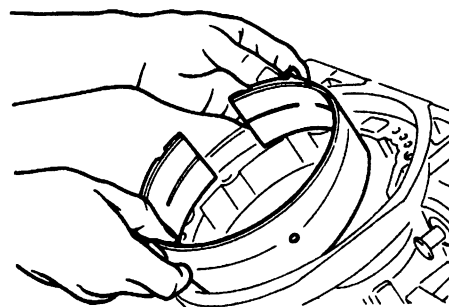
mm { in }

0.8 { 0.031 }	1.0 { 0.039 }	1.2 { 0.047 }
1.4 { 0.055 }	1.6 { 0.063 }	1.8 { 0.071 }
2.0 { 0.079 }	2.2 { 0.087 }	—



U5U513X3

16. Set the second gear brake band and strut in position.
 17. Tighten the piston stem lightly.



U5U513X4

18. Apply petroleum jelly to the bearings and bearing races, and install them as shown.

Bearing outer diameter

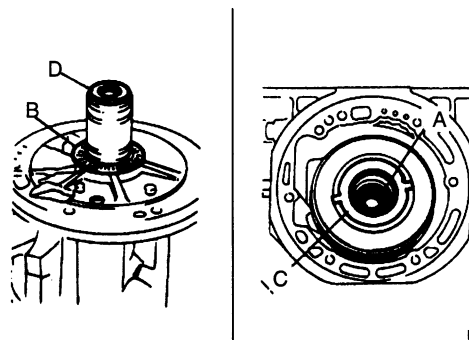
A: 35.0 mm { 1.38 in }

B: 70.0 mm { 2.76 in }

Bearing race outer diameter

C: 76.0 mm { 2.99 in }

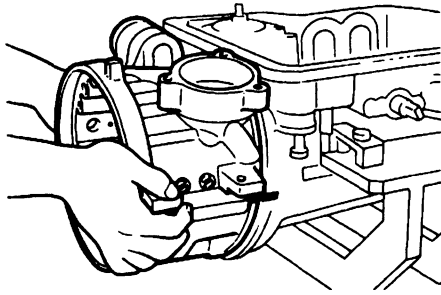
D: 33.0 mm { 1.30 in }



U5U513X5

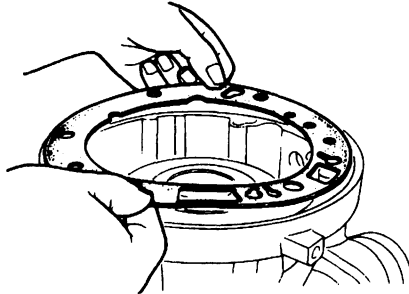
19. Align the marks of the transmission case and fourth gear case. Tap lightly with a plastic hammer to avoid damaging the seal rings when installing.

AUTOMATIC TRANSMISSION



U5U513X6

20. Set a new gasket in place.



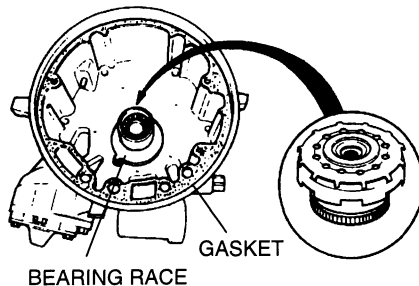
U5U513X7

Note

- The sensing rotor and bearing are part of the oil pump component.

21. Check and adjust the fourth gear planetary gear unit total end play. Do not install the direct clutch drum at this time.

- Position the fourth gear case upright.
- Install the bearing and race on the fourth gear case.
- Install the planetary carrier, sun gear, connecting shell, and bearing as unit in the fourth gear case.
- Install the sensing rotor and bearing on the connecting shell.
- Measure distances E and H by using a straight-edge and vernier calipers.
- Calculate the fourth gear train total end play by using the formula below.



U5U513X8

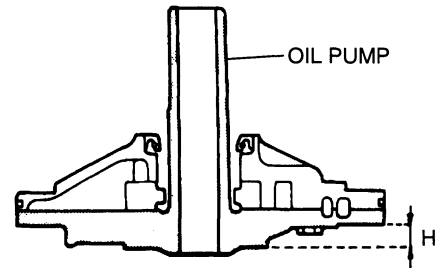
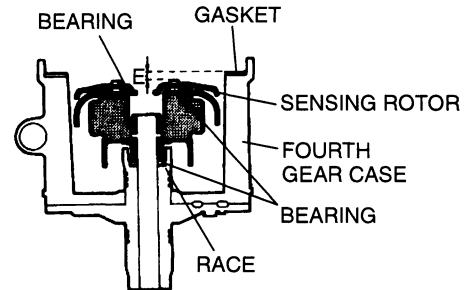
Formula

$$T = E - H - 0.1 \text{ mm } \{ 0.0039 \text{ in } \}$$

T	Total end play.
E	The distance between the oil pump mounting surface (including the oil pump gasket) and the sensing rotor bearing surface.
H	The distance between the oil pump side sensing rotor bearing contact surface and the oil pump gasket contact surface.
0.1	The compression amount of a new gasket.

Total end play

0.25—0.50 mm { 0.010—0.020 in }



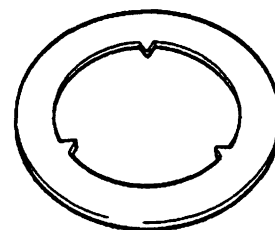
U5U513X9

- Adjust the total end play by selecting the proper bearing race.

Bearing race sizes

mm { in }

1.2 { 0.047 }	1.4 { 0.055 }	1.6 { 0.063 }
1.8 { 0.071 }	2.0 { 0.079 }	2.2 { 0.087 }



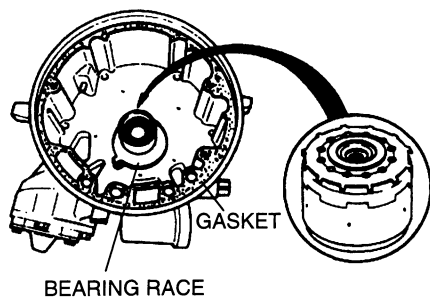
U5U513Y1

Note

- The sensing rotor and bearing are part of the oil pump component.

AUTOMATIC TRANSMISSION

22. Check and adjust the direct clutch end play. Do not install the planetary pinion carrier at this time.
- (1) Install the bearing race in the fourth gear case.
 - (2) Install the direct clutch, sun gear, connecting shell, and bearings in the fourth gear case.
 - (3) Install the sensing rotor and bearing on the connecting shell.
 - (4) Measure distances G and H by using a straight-edge and vernier calipers.
 - (5) Calculate the direct clutch end play by using the formula below.



U5U513Y2

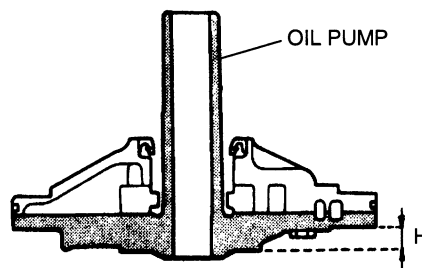
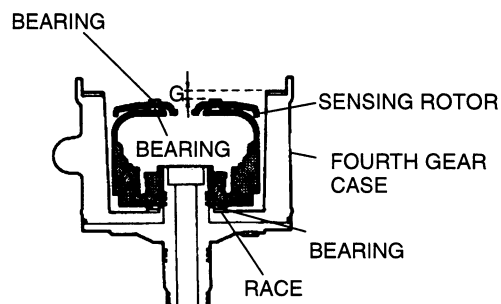
Formula

$$T = G - H - 0.1 \text{ mm } \{ 0.0039 \text{ in } \}$$

T	Total end play.
G	The distance between the oil pump mounting surface (including the oil pump gasket) and the sensing rotor bearing surface.
H	The distance between the oil pump side sensing rotor bearing contact surface and the oil pump gasket contact surface.
0.1	The compression amount of a new gasket.

Total end play

0.5—0.8 mm { 0.020—0.031 in }

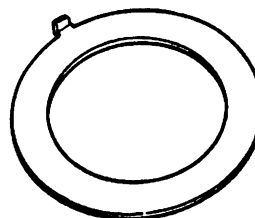


U5U513Y3

- (6) Adjust the direct clutch end play by selecting the proper bearing race.

Bearing race sizes

mm { in }		
0.8 { 0.031 }	1.0 { 0.039 }	1.2 { 0.047 }
1.4 { 0.055 }	1.6 { 0.063 }	1.8 { 0.071 }
2.0 { 0.079 }	2.2 { 0.087 }	—

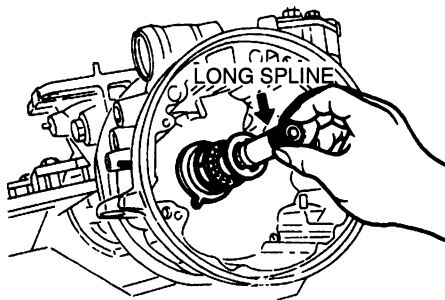


U5U513Y4

23. Insert the intermediate shaft. The end with the long splines should face front.
24. Apply petroleum jelly to the large bearing race and install it into the fourth gear case.

Bearing race outer diameter

70 mm { 2.756 in }

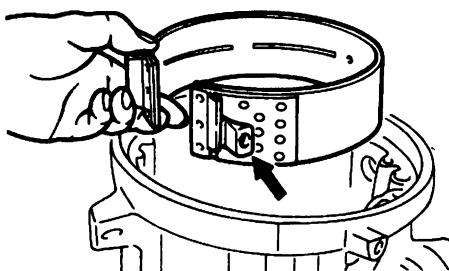


U5U513Y5

25. Apply petroleum jelly to the small bearing and small bearing race, and install them as shown.

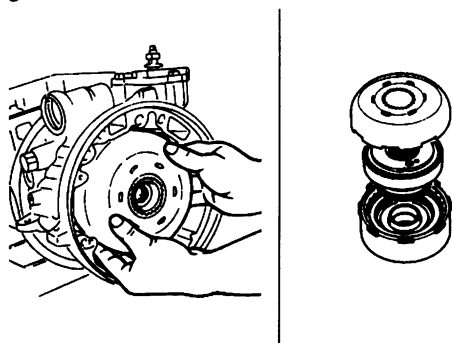
Bearing outer diameter
35.0 mm { 1.378 in }
Bearing race outer diameter
33.0 mm { 1.299 in }

26. Install the fourth gear brake band and band strut.



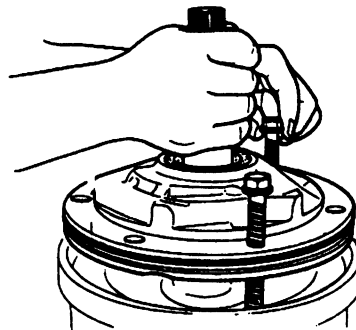
U5U513Y6

27. Install the fourth gear connecting shell and fourth gear planetary gear unit (fourth gear sun gear, fourth gear planetary pinion carrier, fourth gear clutch hub) onto the direct clutch.
28. Install the direct clutch component into the fourth gear case.



U5U513Y7

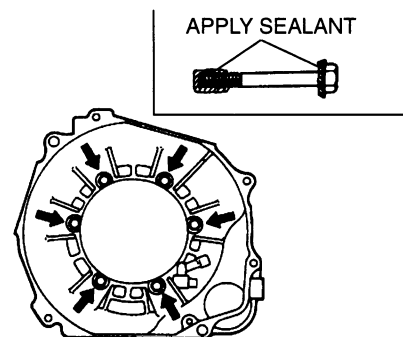
29. Install the oil pump component into the transmission case by hand only, using two converter housing bolts as guides. Measure the height difference between the top of the transmission case and the oil pump.



U5U513Y8

30. Remove the converter housing bolts. Apply sealant to the bolts.
31. Apply sealant to the contact surfaces of the converter housing and oil pump.
32. Install the converter housing onto the oil pump, and tighten the bolts evenly in a crisscross pattern.

Tightening torque
59—68 N·m { 6.0—7.0 kgf·m , 44—50 ft·lbf }



U5U513Y9

33. Apply ATF to the piston stem.
34. Adjust the second gear brake band.
- (1) Loosen the locknut and tighten the piston stem.

Tightening torque
12.3—14.2 N·m
{ 125—145 kgf·cm , 109—125 in·lbf }

- (2) Loosen the stem the number of turns shown below.

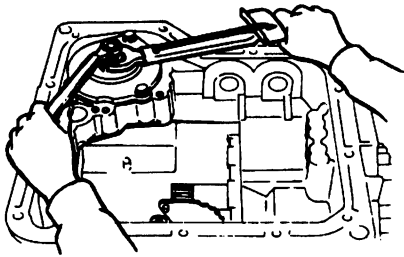
Stem
2 1/2 turns

- (3) Hold the stem and tighten the locknut.

Tightening torque
15—39 N·m { 1.5—4.0 kgf·m , 11—28 ft·lbf }

Caution

- Applying compressed air to the servo piston for longer than 3 seconds at a time will damage the seal.

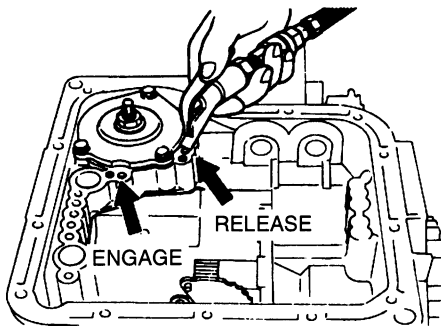


U5U513Z1

35. Check the servo piston operation by applying compressed air through the oil passages of the second gear band servo.

Air pressure

392 kPa { 4.0 kg/cm² , 57 psi } max.



U5U513Z2

36. Apply ATF to the piston stem. Adjust the fourth gear brake band.
(1) Loosen the locknut and tighten the piston stem.

Tightening torque

12—15 N·m { 1.2—1.5 kgf·m , 8.7—11 ft·lbf }

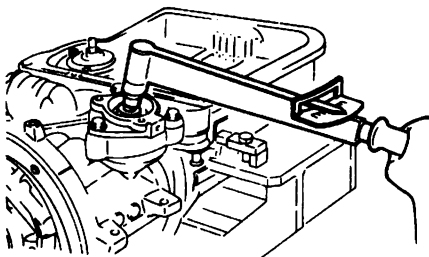
11.8—14.7 N·m

{ 120—150 kgf·cm , 105—130 in·lbf }

- (2) Loosen the stem the number of turns shown below.

Stem

2 turns



U5U513Z3

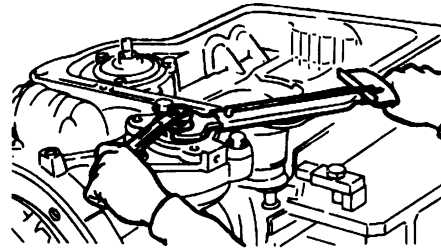
- (3) Hold the stem and tighten the locknut.

Tightening torque

15—39 N·m { 1.5—4.0 kgf·m , 11—28 ft·lbf }

Caution

- Applying compressed air to the servo piston for longer than 3 seconds at a time will damage the seal.



U5U513Z4

37. Check the servo piston operation by applying compressed air through the oil passage of the fourth gear band servo.

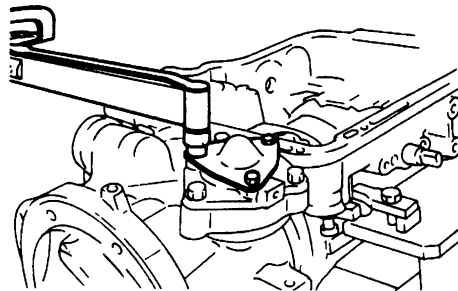
Air pressure

392 kPa { 4.0 kg/cm² , 57 psi } max.

38. Set a new gasket on the fourth gear band servo. Install the fourth gear band servo cover.

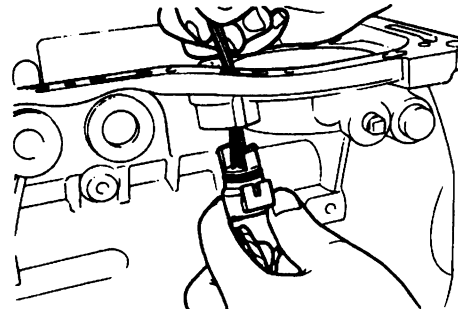
Tightening torque

5.0—6.8 N·m { 50—70 kgf·cm , 44—60 in·lbf }



U5U513Z5

39. Apply ATF to a new O-ring and install it onto the solenoid valve connector.
40. Install the solenoid valve connector in the transmission case.



U5U513Z6

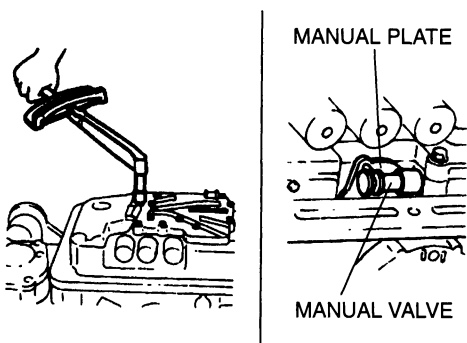
41. Set the valve body component in piston, and align the manual plate and manual valve.
42. Install the bolts.

AUTOMATIC TRANSMISSION

Tightening torque

10.8—14.7 N·m

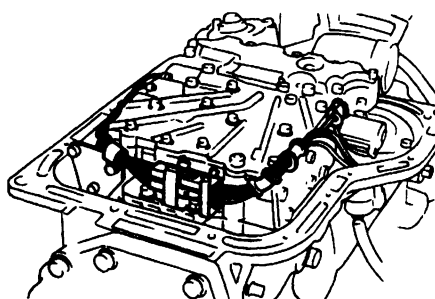
{ 110—150 kgf·cm , 96—130 in·lbf }



U5U513Z7

43. Connect the solenoid valve connectors.

44. Install the harnesses.



U5U513Z8

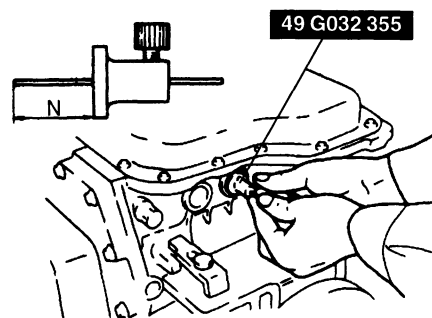
45. Apply ATF to a new O-ring, and install it onto the vacuum diaphragm.

46. Select the diaphragm rod.

(1) Measure dimension N by using the **SST** and a scale.

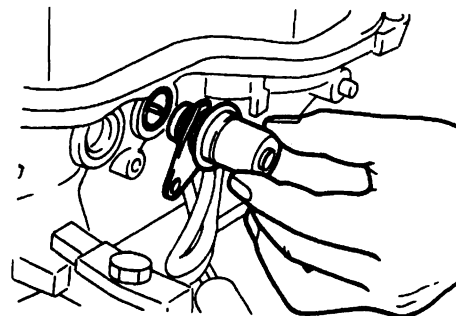
(2) Select the proper diaphragm rod in accordance with the table below.

Dimension N	Applicable diaphragm rod
Below 25.65 mm { 1.0099 in }	29.0 mm { 1.14 in }
25.65—26.15 mm { 1.0099—1.0295 in }	29.5 mm { 1.16 in }
25.90—26.40 mm { 1.0197—1.0394 in }	29.75 mm { 1.17 in }
26.15—26.65 mm { 1.0295—1.0492 in }	30.0 mm { 1.18 in }
26.65—27.15 mm { 1.0492—1.0689 in }	30.5 mm { 1.20 in }
27.15 mm { 1.0689 in } or over	31.0 mm { 1.22 in }



U5U513Z9

47. Apply ATF to a new O-ring, and install it into the transmission case.

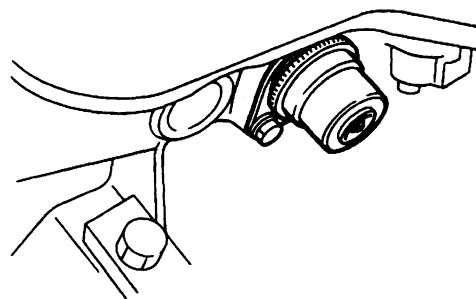


U5U5130A

48. Install the vacuum diaphragm to the transmission case.

Tightening torque

7.9—10.7 N·m { 80—110 kgf·cm , 70—95 in·lbf }



U5U5130B

49. Set the magnets in the oil pan.

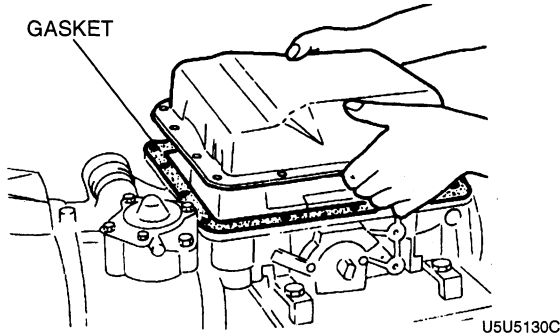
50. Install the oil pan along with a new gasket.

51. Install the oil pan mounting bolts.

Tightening torque

5.9—7.8 N·m { 60—80 kgf·cm , 53—69 in·lbf }

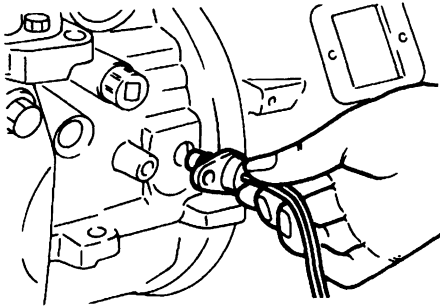
AUTOMATIC TRANSMISSION



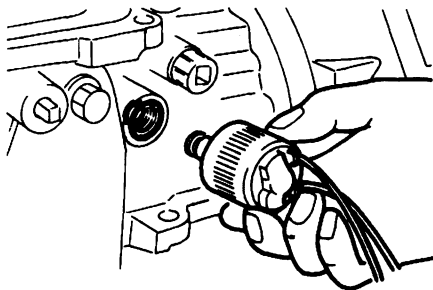
- 52. Apply ATF to a new O-ring and install it onto the input/turbine speed sensor.
- 53. Apply locking compound to the mounting bolt threads, then install the input/turbine speed sensor.

Tightening torque

7.9—10.7 N·m { 80—110 kgf·cm , 70—95 in·lbf }

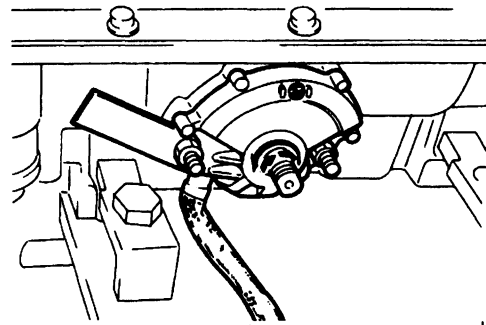


- 54. Apply ATF to new O-rings and install them into the transmission case.
- 55. Install the torque converter clutch control solenoid.



- 56. Rotate the manual shaft fully rearward, then return it two notches to the N position.
- 57. Hand-tighten the transmission range switch nuts.
- 58. Remove the screw on the switch body and move the transmission range switch so that the screw hole on the switch body is aligned with the small hole inside the switch. Check their alignment by inserting a 2.0 mm { 0.0079 in } diameter pin into the holes.

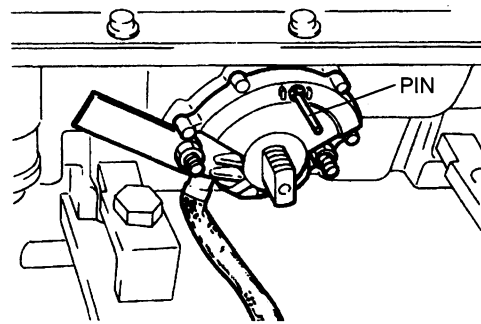
- 59. Tighten the switch attaching nuts.



- 60. Remove the pin, and tighten the screw into the hole.

Tightening torque

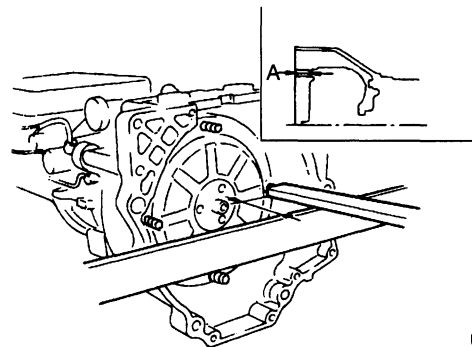
5.0—6.8 N·m { 50—70 kgf·cm , 44—60 in·lbf }



- 61. Ensure that the torque converter is installed correctly by measuring distance A between the end of the torque converter and the end of the converter housing.

Distance A

22.5 mm { 0.89 in }



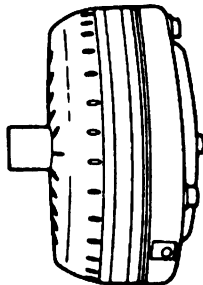
- 62. Remove the transmission from the engine stand.

AUTOMATIC TRANSMISSION INSPECTION

U5U513BW

Torque Converter Inspection

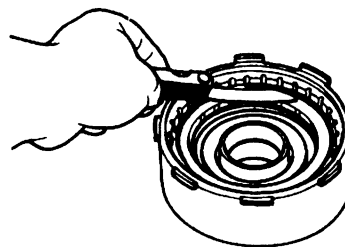
1. Check the outside of the converter for damage and cracks, and replace the torque converter if there is any problem.
2. Check for rust on the pilot hub on the boss, and remove it completely if there is any.



U5U5130J

Clearance

Maximum: 0.2 mm { 0.008 in }



U5U5130L

2. If not as specified, replace parts as necessary. (Refer to 05-13 DIRECT CLUTCH DISASSEMBLY / ASSEMBLY.)

Direct Clutch Preinspection

Direct clutch operation

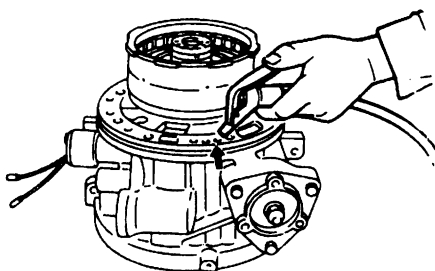
Caution

- Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal. Do not apply compressed air for more than the aforementioned time when testing the system.

1. Install the direct clutch onto the drum support along with the seal rings. Apply compressed air to the oil passage as shown.

Air pressure

392 kPa { 4.0 kgf/cm² , 57 psi } max.



U5U5130K

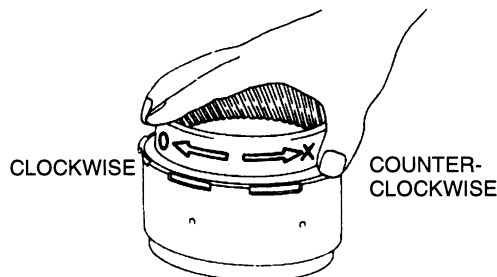
2. Verify that the side plate moves to the snap ring. If not, the O-ring or the oil seal may be damaged or fluid may be leaking at the piston check ball. Inspect them and replace when assembling.
3. If not as specified, replace parts as necessary. (Refer to 05-13 DIRECT CLUTCH DISASSEMBLY / ASSEMBLY.)

Clutch clearance

1. Measure the clearance between the side plate and the snap ring.

One-way clutch operation

- Insert the fourth gear clutch hub on the top of the direct clutch, and verify that the fourth gear clutch hub rotates smoothly when turned clockwise and locks when turned counterclockwise. If not, replace the one-way clutch.



U5U5130M

Fourth Gear Band Servo Preinspection

Band servo operation

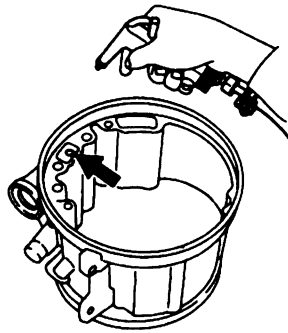
Caution

- Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal. Do not apply compressed air for more than the aforementioned time when testing the system.

1. Apply compressed air to the oil passage as shown.

Air pressure

392 kPa { 4.0 kgf/cm² , 57 psi } max.



U5U5130N

2. Verify that the piston stem moves to the brake band. If not, the seal rings or the oil seal may be damaged or fluid may be leaking at the piston component. Inspect them, and replace when assembling.
3. If not as specified, replace parts as necessary. (Refer to 05-13 FOURTH GEAR BAND SERVO DISASSEMBLY / ASSEMBLY.)

Second Gear Band Servo Preinspection Second gear band servo operation

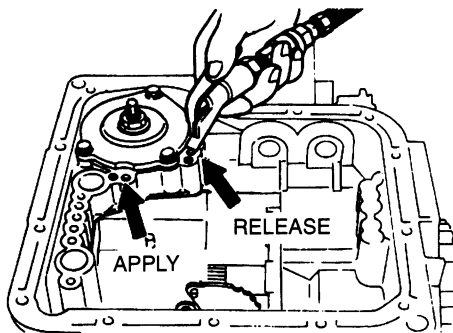
Caution

- Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal. Do not apply compressed air for more than the aforementioned time when testing the system.

1. Apply compressed air to the oil passage as shown.

Air pressure

392 kPa { 4.0 kgf/cm² , 57 psi } max.



U5U5130P

2. Verify that the piston stem moves to the brake band. If not, the seal rings or the oil seal may be damaged or fluid may be leaking at the piston component. Inspect them, and replace when assembling.
3. If not as specified, replace parts as necessary. (Refer to 05-13 SECOND GEAR BAND SERVO DISASSEMBLY / ASSEMBLY.)

Front Clutch Preinspection Front clutch operation

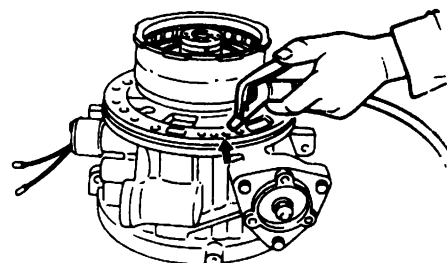
Caution

- Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal. Do not apply compressed air for more than the aforementioned time when testing the system.

1. Install the front clutch onto the drum support along with the seal rings. Apply compressed air to the oil passage as shown.

Air pressure

392 kPa { 4.0 kgf/cm² , 57 psi } max.



U5U5130Q

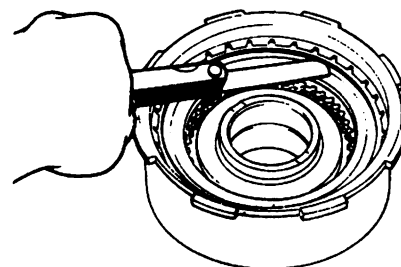
2. Verify that the retaining plate moves toward the snap ring. If not, the seal ring or O-ring may be damaged or fluid may be leaking at the piston check ball. Inspect them and replace when assembling.
3. If not as specified, replace parts as necessary. (Refer to 05-13 FRONT CLUTCH DISASSEMBLY / ASSEMBLY.)

Clutch clearance

1. Measure the clearance between the retaining plate and the snap ring.

Standard clearance

0.9—1.1 mm { 0.036—0.043 in }



U5U5130R

2. If not as specified, replace parts as necessary. (Refer to 05-13 FRONT CLUTCH DISASSEMBLY / ASSEMBLY.)

Rear Clutch Preinspection

Rear clutch operation

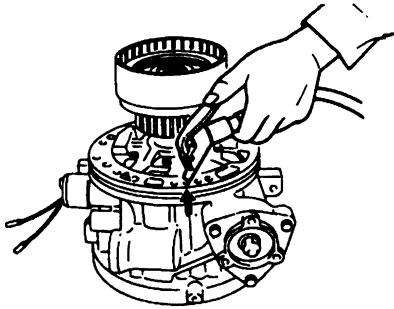
Caution

- Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal. Do not apply compressed air for more than the aforementioned time when testing the system.

1. Install the rear clutch onto the drum support along with the seal rings. Apply compressed air to the oil passage as shown.

Air pressure

392 kPa { 4.0 kgf/cm² , 57 psi } max.



U5U5130S

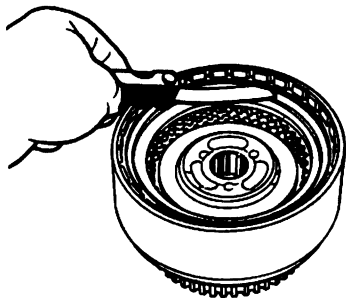
2. Verify that the retaining plate moves toward the snap ring. If not, the seal ring or O-ring may be damaged or fluid may be leaking at the piston check ball. Inspect them and replace when assembling.
3. If not as specified, replace parts as necessary. (Refer to 05-13 REAR CLUTCH DISASSEMBLY / ASSEMBLY.)

Clutch clearance

1. Measure the clearance between the retaining plate and the snap ring.

Standard clearance

0.8—1.0 mm { 0.032—0.039 in }



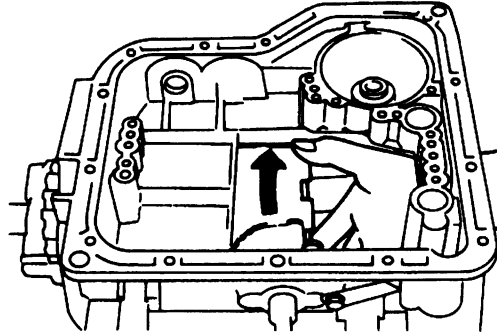
U5U5130T

2. If not as specified, replace parts as necessary. (Refer to 05-13 REAR CLUTCH DISASSEMBLY / ASSEMBLY.)

Rear Planetary Gear Unit Preinspection

One-way clutch operation

- Install the rear planetary gear unit and verify that the rear planetary gear unit rotates smoothly when turned clockwise and locks when turned counter-clockwise. If not, replace the one-way clutch.



U5U5130U

Low And Reverse Brake Preinspection

Low and reverse brake operation

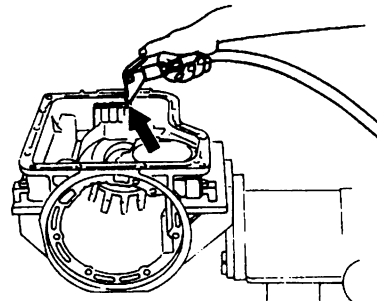
Caution

- Applying compressed air to the assembled clutch pack for longer than 3 seconds at a time will damage the seal. Do not apply compressed air for more than the aforementioned time when testing the system.

1. Apply compressed air through the oil passage as shown.

Air pressure

392 kPa { 4.0 kgf/cm² , 57 psi } max.



U5U5130V

2. Verify that the retaining plates move toward the snap ring. If not, the O-ring or the seal ring may be damaged or fluid may be leaking at the piston check ball. Inspect them, and replace when assembling.
3. If not as specified, replace parts as necessary. (Refer to 05-13 LOW AND REVERSE BRAKE DISASSEMBLY / ASSEMBLY.)

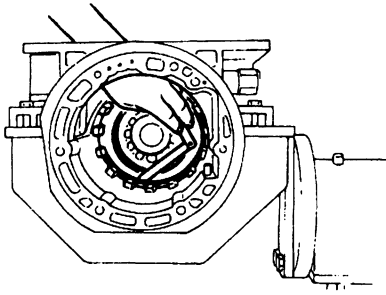
Clutch clearance

1. Measure the clearance between the retaining plate and the snap ring.

Standard clearance

0.8—1.05 mm { 0.032—0.041 in }

AUTOMATIC TRANSMISSION



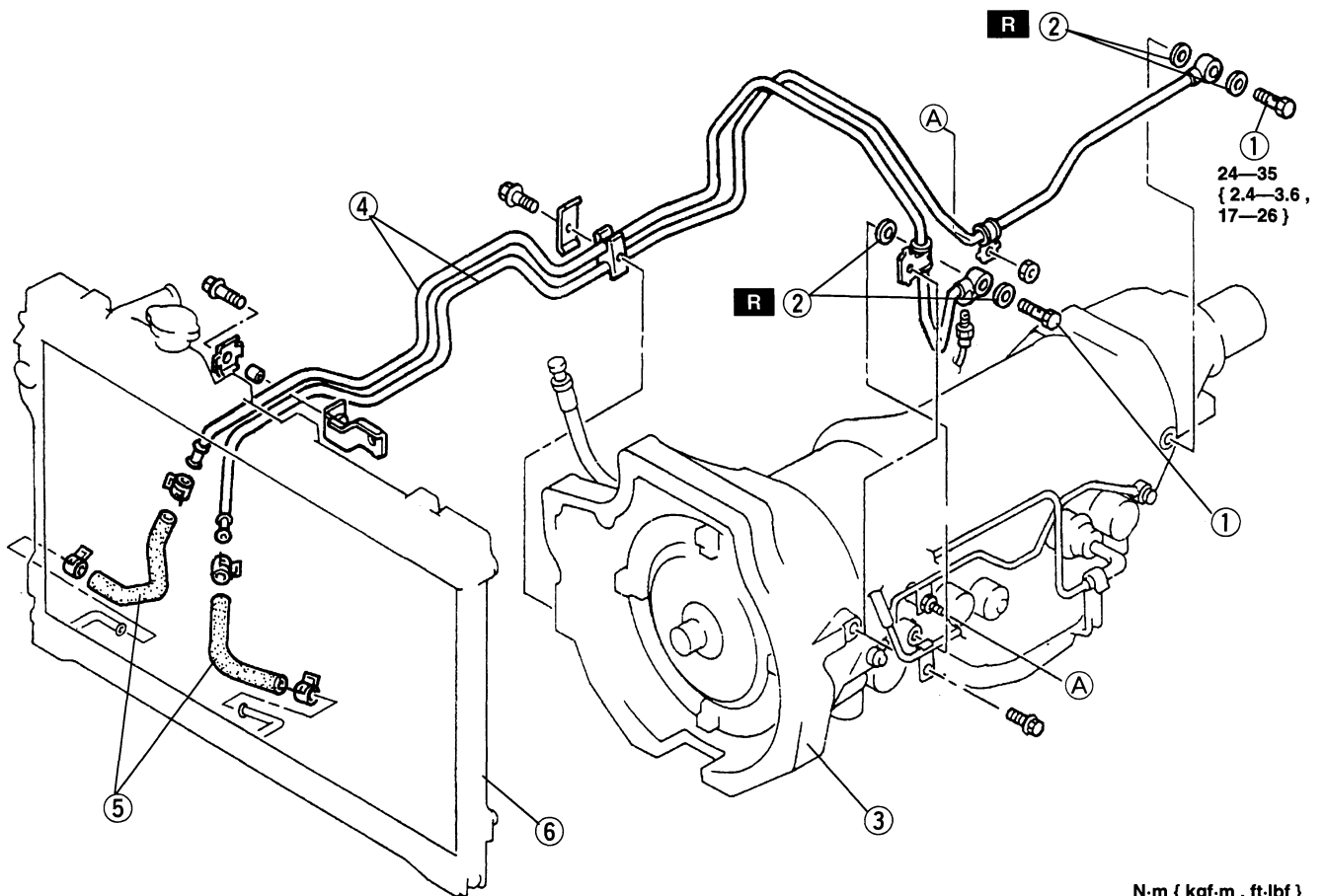
U5U5130W

2. If not as specified, replace parts as necessary. (Refer to 05-13 LOW AND REVERSE BRAKE DIS-ASSEMBLY / ASSEMBLY.)

OIL COOLER REMOVAL / INSTALLATION

U5U513BX

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



N·m { kgf·m , ft·lbf }

U5U5130X

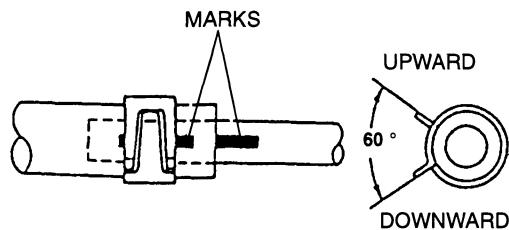
1	Connector bolts
2	Packing
3	Transmission
4	Oil pipe

5	Oil hose ☞ Installation Note
6	Radiator

AUTOMATIC TRANSMISSION

Oil Hose Installation Note

1. Align the marks, and slide the oil cooler hose onto the oil cooler pipe until it is fully seated against the ridge.
2. Install the hose clamp onto the hose at the center of the mark and at the angle shown.

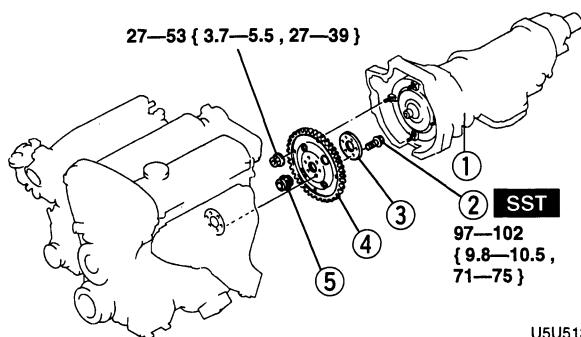


UMU513Z4

3. Verify that the hose clamp does not interfere with any other parts.

DRIVE PLATE REMOVAL / INSTALLATION

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

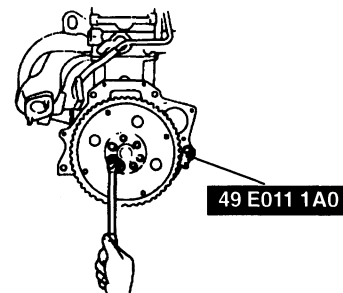


U5U5130Y

U5U513BY

Drive Plate Removal Note

- Remove the drive plate by using the SST.



U5U5130Z

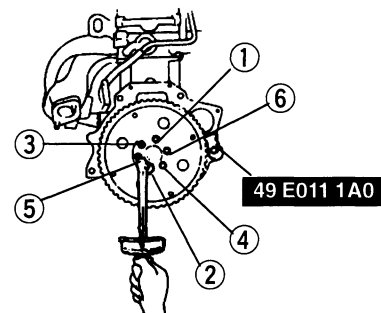
1	Transmission 05-13 AUTOMATIC TRANSMISSION REMOVAL / INSTALLATION
2	Bolts
3	Backing plate
4	Drive plate Removal note Installation note
5	Adapter

Drive Plate Installation Note

1. Assemble the adapter, drive plate, and backing plate.
2. Install the SST and tighten the bolts.

Tightening torque

97—102 N·m { 9.8—10.5 kgf·m , 71—75 ft·lbf }



U5U5131A

05-14 AUTOMATIC TRANSMISSION SHIFT MECHANISM

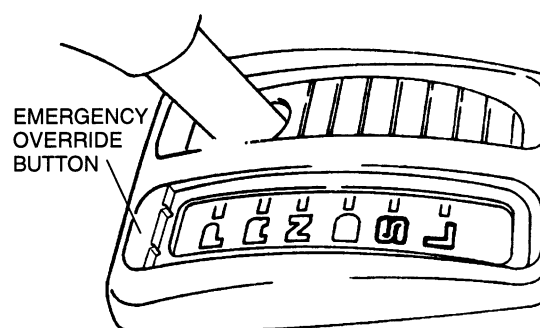
EMERGENCY OVERRIDE BUTTON

INSPECTION	05-14-1
KEY INTERLOCK SOLENOID	
INSPECTION	05-14-1
KEY INTERLOCK SOLENOID	
REMOVAL / INSTALLATION	05-14-1
KEY INTERLOCK UNIT INSPECTION ..	05-14-2
KEY INTERLOCK UNIT	
REMOVAL / INSTALLATION	05-14-2
P POSITION SWITCH INSPECTION ...	05-14-3
SHIFT-LOCK ACTUATOR INSPECTION	05-14-3
SHIFT-LOCK ACTUATOR	
REPLACEMENT	05-14-4

SELECTOR LEVER INSPECTION	05-14-4
SELECTOR LEVER ADJUSTMENT	05-14-5
Lever Position Adjustment	05-14-5
Indicator Panel Adjustment	05-14-5
SELECTOR LEVER	
REMOVAL / INSTALLATION	05-14-6
Spring Pin Removal Note	05-14-7
Spring Pin Installation Note	05-14-7
SELECTOR LEVER	
DISASSEMBLY / ASSEMBLY	05-14-8
Cam Assembly Note	05-14-9
Indicator Panel Installation Note	05-14-9

EMERGENCY OVERRIDE BUTTON INSPECTION

1. Verify that the selector lever is locked in P position.
2. Remove the indicator panel cover by using a screwdriver.
3. Insert the screwdriver into the emergency override hole, push down, and verify that the selector lever can be shifted from P position.
4. If not as specified, check or replace the shift-lock actuator.



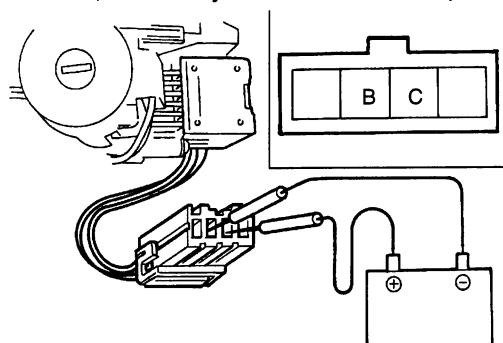
U5U514AA

U5U51401

KEY INTERLOCK SOLENOID INSPECTION

1. Remove the column cover.
2. Disconnect the key interlock solenoid connector.
3. Insert the ignition key in the key cylinder.
4. Apply battery positive voltage between terminals B and C, and verify that the solenoid operates.

5. If not as specified, replace the key interlock solenoid.



U5U51402

U5U514AB

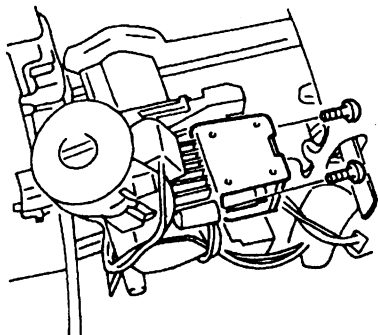
KEY INTERLOCK SOLENOID REMOVAL / INSTALLATION

1. Remove the column cover.
2. Disconnect the key interlock solenoid connector.
3. Remove the screws and the key interlock solenoid.
4. Install the key interlock solenoid and tighten the screws.

Tightening torque
6.9—13 N·m { 70—130 kgf·cm , 61—113 ft·lbf }

U5U514AC

AUTOMATIC TRANSMISSION SHIFT MECHANISM



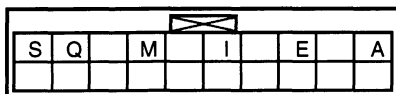
U5U51403

5. Verify that the key interlock solenoid operates.
6. Connect the key interlock solenoid connector.
7. Install the column cover.

KEY INTERLOCK UNIT INSPECTION

U5U514AD

1. Remove the column cover.
2. Turn the ignition switch to ON, and check terminal voltages, referring to the chart below.



U5U51404

Terminal	(-) terminal connected to	Condition	Correct measurement value
A	I	Within 2 seconds of turning P position switch ON, and either ACC or IG ON	0
		Except above conditions	B+
E	I	P position switch and ACC are ON, or IG is ON	0
		Except above condition	B+
I	Ground	Constant	0
M	I	P position switch ON	0
		P position switch OFF	B+
Q	I	Ignition switch ON	B+
		Ignition switch OFF	0
S	I	ACC switch ON	B+
		ACC switch OFF	0

3. If not as specified, repair the wiring harness and/or key interlock unit.

KEY INTERLOCK UNIT REMOVAL / INSTALLATION

U5U514AE

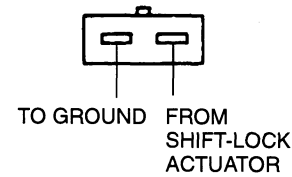
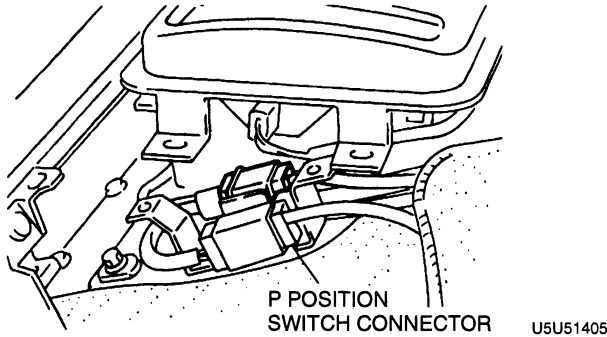
1. Disconnect the key interlock unit connector.
2. Remove the key interlock unit.
3. Install the new key interlock unit.
4. Connect the key interlock unit connector.

AUTOMATIC TRANSMISSION SHIFT MECHANISM

P POSITION SWITCH INSPECTION

U5U514AF

1. Remove the rear console.
2. Remove the screws and lift up the indicator panel.
3. Disconnect the P position switch connector.

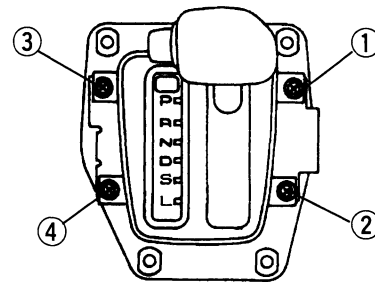


U5U51406

4. Check for continuity between the terminals.

Position/Range	Selector lever release button	Continuity
P	Released	Yes
	Depressed	No
R, N, D, S, L	—	No

5. If not as specified, replace the P position switch.
6. Connect the P position switch connector.
7. Adjust the indicator panel. Install the screws in the order shown in the figure.



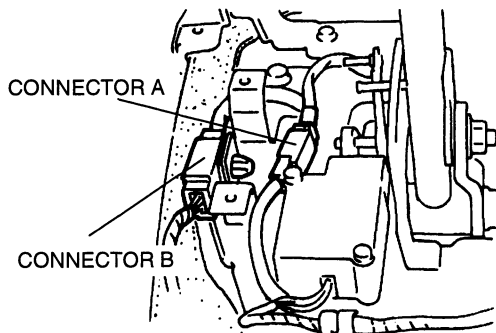
U5U51407

8. Install the rear console.

SHIFT-LOCK ACTUATOR INSPECTION

U5U514AG

1. Remove the rear console.
2. Remove the selector lever knob and indicator panel screws.
3. Lift up slightly on the selector lever, selector sleeve, and indicator panel, and disconnect the HOLD switch connector.
4. Shift the selector lever to P position.

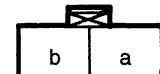
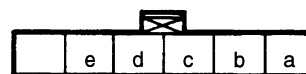


U5U51408

5. Turn the ignition switch to ON, and check for terminal voltages and continuity, referring to the chart below. Disconnect the shift-lock actuator connector to check continuity between terminal C (harness side) and ground.

CONNECTOR B

CONNECTOR A

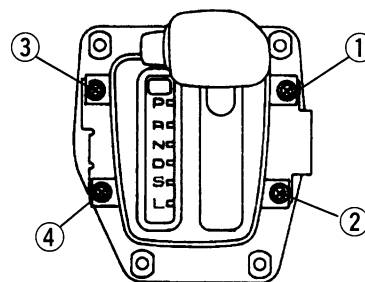


U5U51409

AUTOMATIC TRANSMISSION SHIFT MECHANISM

Connector	Terminal	(-) terminal connected to	Condition	Correct measurement value
A	a	B—C	P position, selector lever release button not depressed	0 Ω
A	b	B—C	Constant	0 Ω
B	a	B—C	Ignition switch OFF	B+
B	b	B—C	Ignition switch ON	B+
B	C (harness side)	Body	Constant	0 Ω
B	d	B—C	Brake pedal released → depressed	0 V → B+
B	e	B	P position, selector lever release button not depressed	0 V

- If not as specified, repair the wiring harness and/or shift-lock actuator.
- Grasp the HOLD switch wiring harness and pull it while pushing the selector lever knob down fully onto the selector lever.
- Connect the HOLD switch connector.
- Adjust the indicator panel. Install the screws in the order shown in the figure.
- Apply locking compound to the selector lever knob screw threads after the threads have been cleaned. Tighten the screws.



U5U51410

Tightening torque

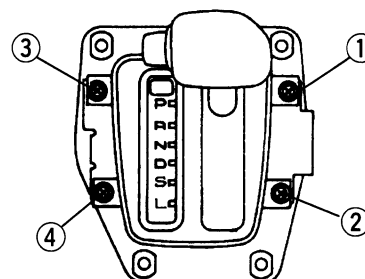
2.0—2.9 N·m { 20—30 kgf·cm , 18—26 in·lbf }

- Install the rear console.
- Verify correct operation of the shift-lock system.

SHIFT-LOCK ACTUATOR REPLACEMENT

U5U514AH

- Remove the rear console.
- Remove the indicator screws and lift up the indicator panel.
- Disconnect the shift-lock actuator connector.
- Disconnect the P position switch connector.
- Remove the shift-lock actuator.
- Install a new shift-lock actuator.
- Connect the P position switch connector.
- Connect the shift-lock actuator connector.
- Install and adjust the indicator panel.



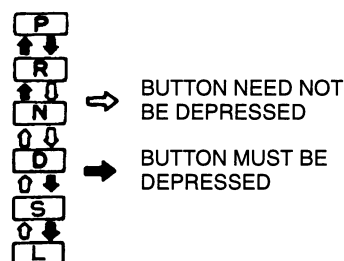
U5U51411

- Install the rear console.
- Verify correct operation of the shift-lock system.

SELECTOR LEVER INSPECTION

U5U514AJ

- Verify that the selector lever can be shifted only as shown in the figure.
- Make sure there is a click at each range when shifted from P position ⇔ L range.



U5U51412

AUTOMATIC TRANSMISSION SHIFT MECHANISM

3. Verify that the positions of the selector lever and the indicator are aligned.

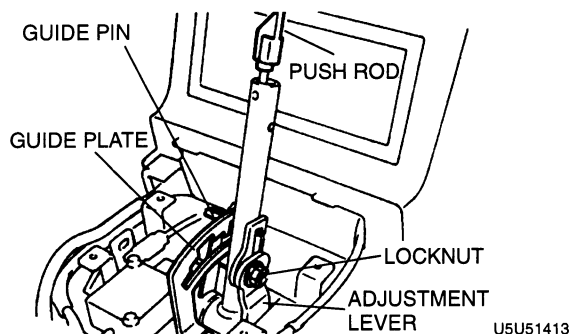
4. Verify that the selector lever moves smoothly.
5. If not correct, adjust or repair the selector lever.

SELECTOR LEVER ADJUSTMENT

U5U514AK

Lever Position Adjustment

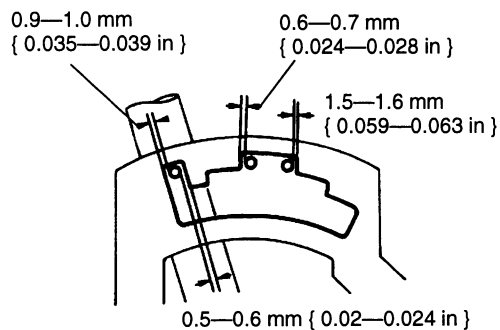
1. Remove the rear console, selector lever knob, selector sleeve, and indicator panel.
2. Loosen the locknut.
3. Shift the transmission to P position by pushing the adjustment lever forward.



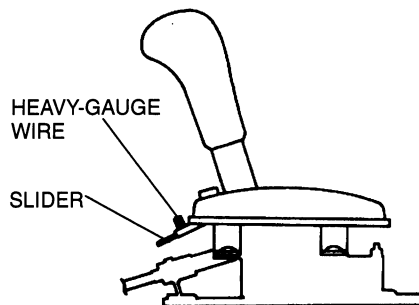
4. Adjust the lever so that the clearance between the guide plate and the guide pin in P position with the push rod lightly depressed is as shown.
5. Tighten the locknut.

Tightening torque

18—24 N·m { 1.8—2.5 kgf·m , 14—18 ft·lbf }



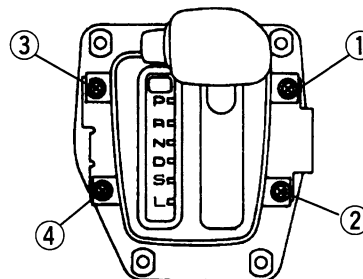
6. Move the selector lever to N position and D range and verify that there is the same clearance between the guide plate and guide pin.



7. If not as specified, readjust the lever.
8. Install the indicator panel, selector sleeve, selector lever knob, and rear console in the reverse order of removal.

Indicator Panel Adjustment

1. Shift the selector lever to P position.
2. Loosen the indicator screws.
3. Align the alignment hole in the slider with the hole in the indicator panel. Install suitable heavy-gauge wire to hold the slider.
4. Tighten the indicator mounting screws in the order shown in the figure.



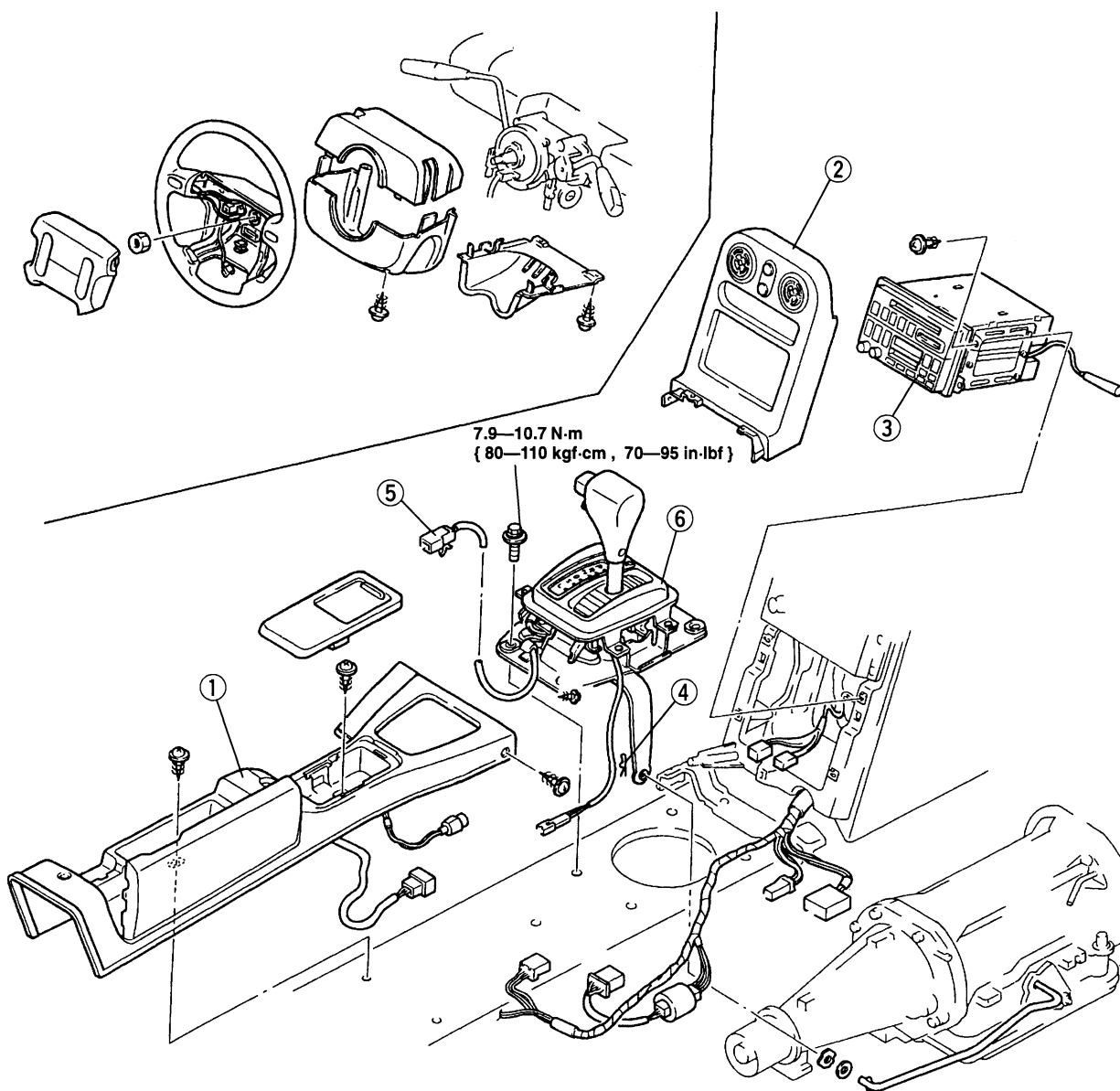
5. Remove the wire from the slider.
6. Verify that the selector lever properly aligns with the indicator in each range.
7. Verify correct operation of the emergency override button.

AUTOMATIC TRANSMISSION SHIFT MECHANISM

SELECTOR LEVER REMOVAL / INSTALLATION

U5U514AL

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



U5U51417

1	Rear console
2	Center panel
3	Audio unit
4	Spring pin ☞ Removal Note ☞ Installation Note

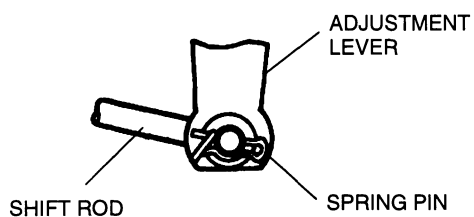
5	Shift-lock actuator connector
6	Selector lever

AUTOMATIC TRANSMISSION SHIFT MECHANISM

Spring Pin Removal Note

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Remove the spring pin.

FRONT OF VEHICLE
←

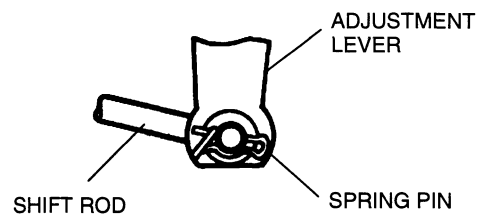


U5U51418

Spring Pin Installation Note

1. On level ground, jack up the vehicle and support it evenly on safety stands.
2. Install a new spring pin forward as shown in the figure.

FRONT OF VEHICLE
←



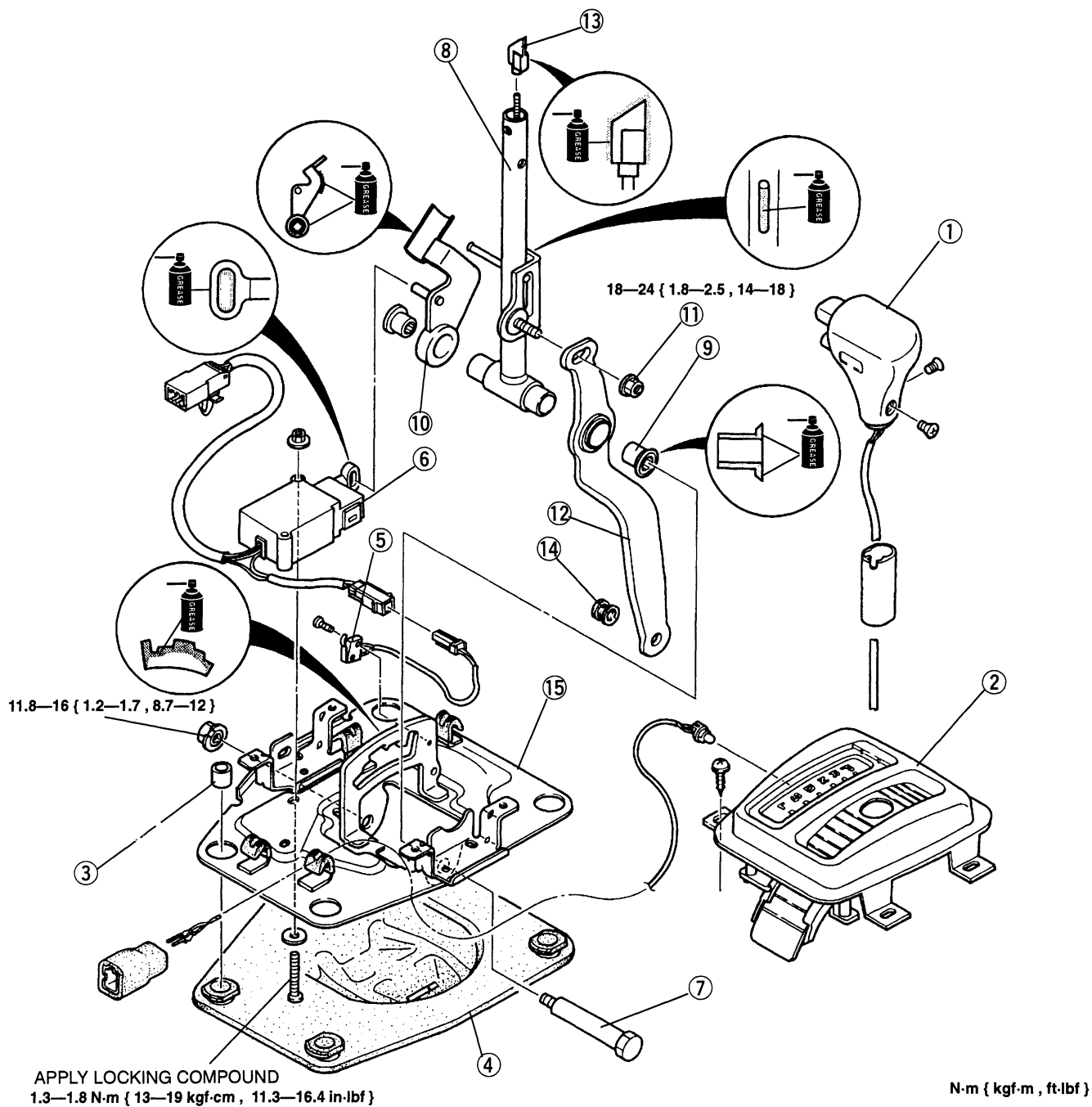
U5U51419

AUTOMATIC TRANSMISSION SHIFT MECHANISM

SELECTOR LEVER DISASSEMBLY / ASSEMBLY

U5U514AM

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



U5U51420

1	Selector lever knob
2	Indicator panel ☞ Installation Note
3	Spacer
4	Boot
5	P position switch
6	Shift-lock actuator
7	Spindle
8	Push rod component

9	Bushing
10	Lock lever
11	Locknut
12	Adjustment lever
13	Cam ☞ Installation Note
14	Bushing
15	Selector lever bracket

AUTOMATIC TRANSMISSION SHIFT MECHANISM

Cam Assembly Note

1. Temporarily install the cam to the push rod.

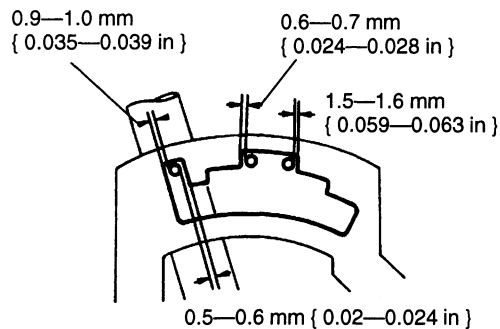


U5U51421

Note

- The clearance becomes smaller by turning the cam clockwise.

2. Adjust the clearance between the guide plate and the guide pin by turning the cam.

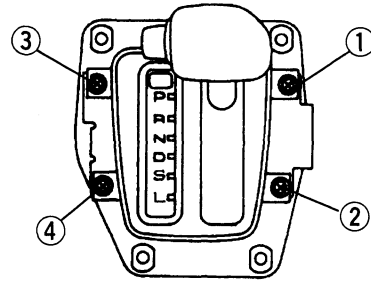


U5U51422

3. Install the selector lever knob and verify that the clearance is as specified.
4. If necessary, repeat from step 2.

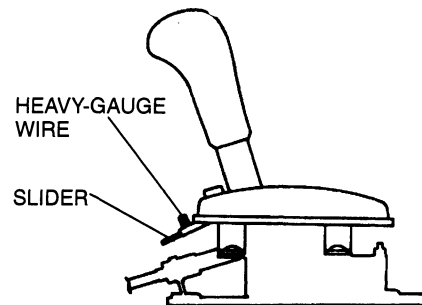
Indicator Panel Installation Note

1. Set the selector sleeve over the selector lever.
2. Grasp the HOLD switch wiring harness and pull it while pushing the selector lever knob down fully on the selector lever.
3. Connect the HOLD switch connector.
4. Shift the selector lever to P position.
5. Align the alignment hole in the slider with the hole in the indicator panel. Install suitable heavy-gauge wire to hold the slider.



U5U51423

6. Tighten the indicator mounting screws in the order shown in the figure.



U5U51424

7. Remove the wire from the slider.
8. Verify that the selector lever properly aligns with the indicator in each range.
9. Verify correct operation of the emergency override button.

05-50 TECHNICAL DATA

05 TRANSMISSION/TRANSAXLE 05-50-1

05 TRANSMISSION/TRANSAXLE

U5U550AA

Item		Engine
		BP
CLUTCH		
Clutch control		Hydraulic
Clutch cover	Spring type	Diaphragm spring
	Set load (N { kgf , lbf })	4,310 { 440 , 968 }
Clutch disc	Outer diameter (mm { in })	215 { 8.46 }
	Inner diameter (mm { in })	150 { 5.91 }
	Thickness of pressure plate side (mm { in })	3.8 { 0.15 }
	Thickness of flywheel side (mm { in })	3.5 { 0.14 }
Clutch pedal	Type	Suspended
	Pedal ratio	6.2
	Full stroke (mm { in })	153 { 6.02 }
	Height (less carpet) (mm { in })	189.5 { 7.46 }
Clutch master cylinder inner diameter (mm { in })		15.87 { 0.825 }
Clutch release cylinder inner diameter (mm { in })		19.05 { 0.75 }
Clutch fluid		SAE J1703, FMVSS116 DTO-3
MANUAL TRANSMISSION		
Transmission type		M15M-D
Transmission control		Floor shift
Operation system		Direct
Synchronization mechanism		Synchromesh
Gear ratio	1st	3.136
	2nd	1.888
	3rd	1.330
	4th	1.000
	5th	0.814
	Reverse	3.758
Oil	Grade	API Service GL-4 or GL-5
	Viscosity	All-season
		Above 10 °C { 50 °F }
	Capacity (L { US qt , Imp qt })	2.0 { 2.1 , 1.8 }
AUTOMATIC TRANSMISSION		
Transmission type		NC4A-EL
Torque converter stall torque ratio		1.900 : 1
Gear ratio	1GR	2.458
	2GR	1.458
	3GR	1.000
	4GR	0.720
	Reverse	2.182

TECHNICAL DATA

Item			Engine
			BP
Number of drive/driven plates	Direct clutch		2/2
	Front clutch		3/5
	Rear clutch		5/5
	Low and reverse brake		4/4
Servo diameter (Piston outer diameter/retainer inner diameter) (mm { in })	4GR gear band servo		56/36 { 2.205/1.417 }
	2GR band servo		72/50 { 2.835/1.969 }
Automatic transmission fluid (ATF)	Type		Dexron®II or M-III
	Capacity (L { US qt , Imp qt })	Total	6.7 { 7.1 , 5.9 }
		Oil pan	4.0 { 4.2 , 3.5 }

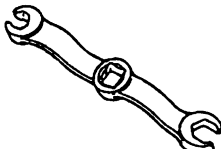
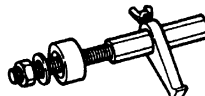
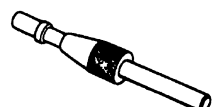
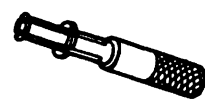
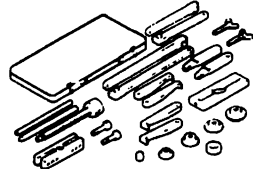
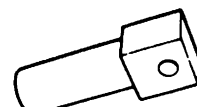
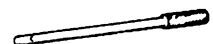
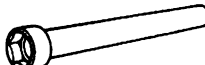
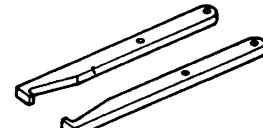
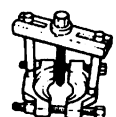
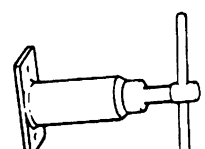
SERVICE TOOLS

05-60 SERVICE TOOLS

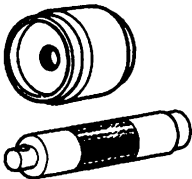
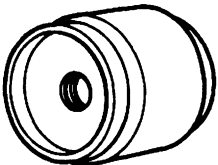
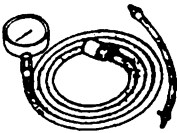
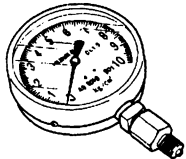
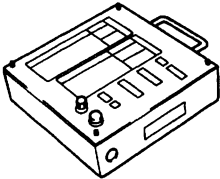
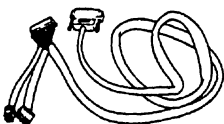
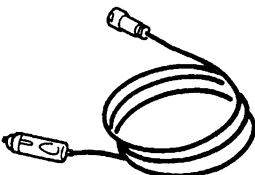
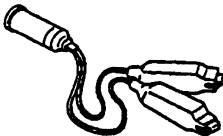
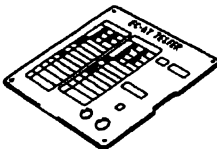
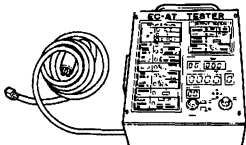
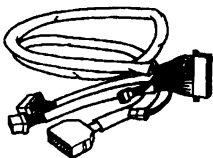
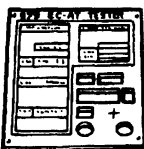
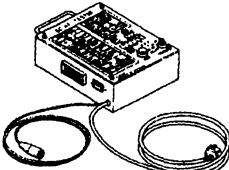
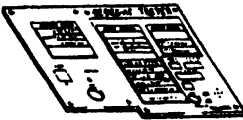
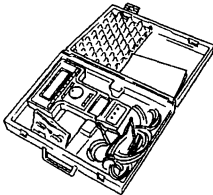
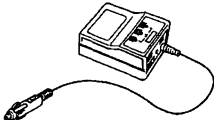
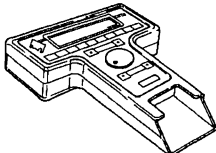
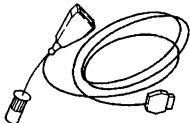
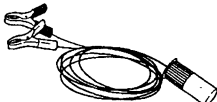
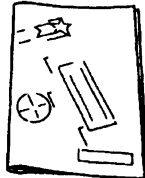
05 TRANSMISSION/TRANSAXLE SST . 05-60-1

05 TRANSMISSION/TRANSAXLE SST

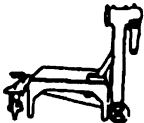
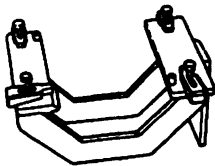
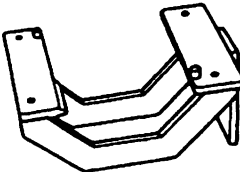
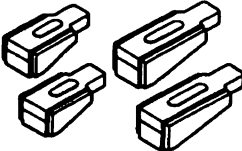
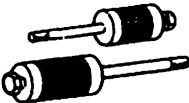
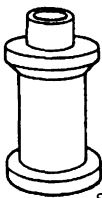
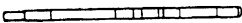
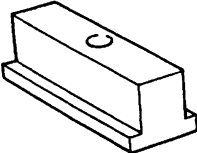
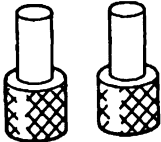
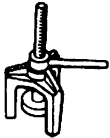
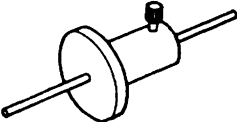
U5U560AA

49 0259 770B Wrench, flare nut  0259770B	49 E011 1A0 Brake set, ring gear  E0111A0X	49 E011 103 Shaft (Part of 49 E011 1A0)  E011103X
49 E011 104 Collar (Part of 49 E011 1A0)  E011104X	49 E011 105 Stopper (Part of 49 E011 1A0)  E011105X	49 SE01 310A Clutch disc centering tool  SE01310A
49 1285 071 Puller, bearing  1285071X	49 1285 073 Chuck (Part of 49 1285 071)  1285073X	49 0839 425C Puller set, bearing  0839425C
49 0500 330 Installer, bearing  0500330X	49 0636 145 Puller, fan pulley boss  0636145X	49 0259 440 Holder, mainshaft  0259440X
49 0862 350 Guide, shift fork  0862350X	49 1243 465A Wrench, mainshaft locknut  1243465A	49 H017 101 Hook  H017101X
49 0710 520 Puller, bearing  0710520X	49 0305 430 Pusher, main drive shaft  0305430X	49 0180 321A Installer, bearing  0180321A
49 0187 451A Guide, interlock pin  0187451A	49 F401 330B Installer set, bearing  F401330B	49 F401 331 Body (Part of 49 F401 330B)  F401331X

SERVICE TOOLS

49 B025 0A0 Installer, oil seal  B0250A0X	49 G030 797 Handle (Part of 49 B025 0A0)  G030797X	49 B025 001 Body (Part of 49 B025 0A0)  B025001X
49 0378 400B Gauge set, oil pressure  0378400B	49 H019 002 Adapter  H019002X	49 B019 901 Gauge, oil pressure  B019901X
49 G019 901C EC-AT Tester  G019901C	49 F019 908 Harness Adapter  F019908X	49 G019 929 Power Harness  G019929X
49 D088 008 Harness adapter power  D088008X	49 N019 901A Panel  N019901A	49 G019 901B EC-AT Tester  G019901B
49 F019 901A Harness Adapter  F019901A	49 H019 904 Panel  H019904X	49 G019 901 EC-AT Tester  G019901X
49 H019 902 Adapter  H019902X	49 H019 903 Panel  H019903X	49 T088 0A0 NGS set  T0880A0X
49 T088 010D Program Card  T088010D	49 T088 002 Vehicle Interface Module (Part of 49 T088 0A0)  T088002X	49 T088 001 Control Unit (Part of 49 T088 0A0)  T088001X
49 T088 004 NGS OBDII Adapter (Part of 49 T088 0A0)  T088004X	49 T088 006 Battery Hookup Adapter (Part of 49 T088 0A0)  T088006X	49 T088 008A Instruction Manual  T088008A

SERVICE TOOLS

49 0107 680A Engine stand  0107680A	49 U019 0A0A Hanger set, transmission  U0190A0A	49 H075 495B Body (Part of 49 U019 0A0A)  H075495B
49 U019 003 Holder (Part of 49 U019 0A0A)  U019003X	49 0378 390 Puller, oil pump  0378390X	49 S019 0A0 Set, centering tool  S0190A0X
49 S019 001 Holder (Part of 49 S019 0A0)  S019001X	49 S019 002 Shaft (Part of 49 S019 0A0)  S019002X	49 S019 003 Stand (Part of 49 S019 0A0)  S019003X
49 S019 004 Pin (Part of 49 S019 0A0)  S019004X	49 G030 795 Installer, oil seal  G030795X	49 G030 796 Body (Part of 49 G030 795)  G030796X
49 G030 797 Handle (Part of 49 G030 795)  G030797X	49 0378 375 Compressor, clutch spring  0378375X	49 0378 346 Hex head wrench  0378346X
49 G032 355 Adjustment gauge  G032355X	49 0877 435 Wrench  0877435X	—

STEERING

06 SECTION

GENERAL PROCEDURES 06-10
MANUAL STEERING 06-11
ENGINE SPEED SENSING
POWER STEERING 06-12

TECHNICAL DATA 06-50
SERVICE TOOLS 06-60

06-10 GENERAL PROCEDURES

06

PRECAUTION (STEERING) 06-10-1

PRECAUTION (STEERING)

U5U610AA

Wheels and tires removal / installation

- The removal and installation procedures for the wheels and tires are not mentioned in this section. If you must remove a wheel, retighten it to **89—117 N·m { 9.0—12.0 kgf·m , 66—86 ft·lbf }**.

Power steering components removal / installation

- If a power steering fluid line(s) has been disconnected anytime during the procedure, add ATF (Dexron®II or M-III), bleed the fluid line(s), and inspect for leakage after the procedure has been completed.

Connectors disconnection/connection

- Obtain the code number and deactivate the audio antitheft system before disconnecting the battery.
- 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.

06-11 MANUAL STEERING

STEERING WHEEL AND COLUMN

INSPECTION	06-11-1
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Steering Wheel Looseness Inspection	06-11-1
Steering Wheel Effort Inspection	06-11-1

STEERING WHEEL AND COLUMN

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STEERING SHAFT

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Steering Lock Mounting Bolts And Bracket Assembly Note	06-11-3

STEERING SHAFT INSPECTION

STEERING GEAR AND LINKAGE

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STEERING GEAR AND LINKAGE

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Oil Seal Disassembly Note	06-11-6
Steering Rack Disassembly Note	06-11-6
Lower Bearing Disassembly Note	06-11-6
Rack Bushing Disassembly Note	06-11-6
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STEERING GEAR AND LINKAGE

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06

STEERING WHEEL AND COLUMN INSPECTION

U5U611AA

Steering Wheel Play Inspection

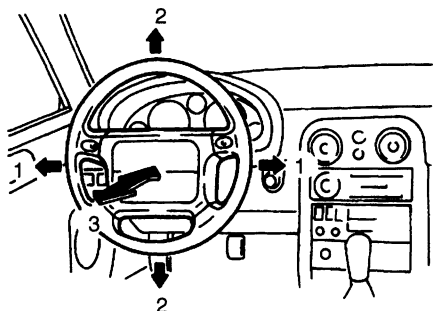
- If the play exceeds specification, either the steering joints are worn or the backlash of the steering gear is excessive. With the wheels in the straight-ahead position, gently turn the steering wheel to the left and right and verify that the play is within specification.

Play

0—30 mm { 0—1.18 in }

Steering Wheel Looseness Inspection

- Move the steering wheel in directions 1, 2, and 3 to check for column bearing wear, steering shaft joint play, steering wheel looseness, and column looseness.



U5U61101

Steering Wheel Effort Inspection

- On level ground, jack up the front of the vehicle and support it on safety stands.
- Turn the steering wheel fully to the left and right at least 5 times.
- Move the steering wheel to put the wheels in the straight ahead position.
- Attach a pull scale to the outermost point of the steering wheel spoke. Then, starting with the wheels in the straight-ahead position, measure the effort required to turn the steering wheel to the left and to the right.

Steering wheel effort

5.0—29 N { 0.5—3.0 kgf , 1.1—6.6 lbf } (during one turn of steering wheel)

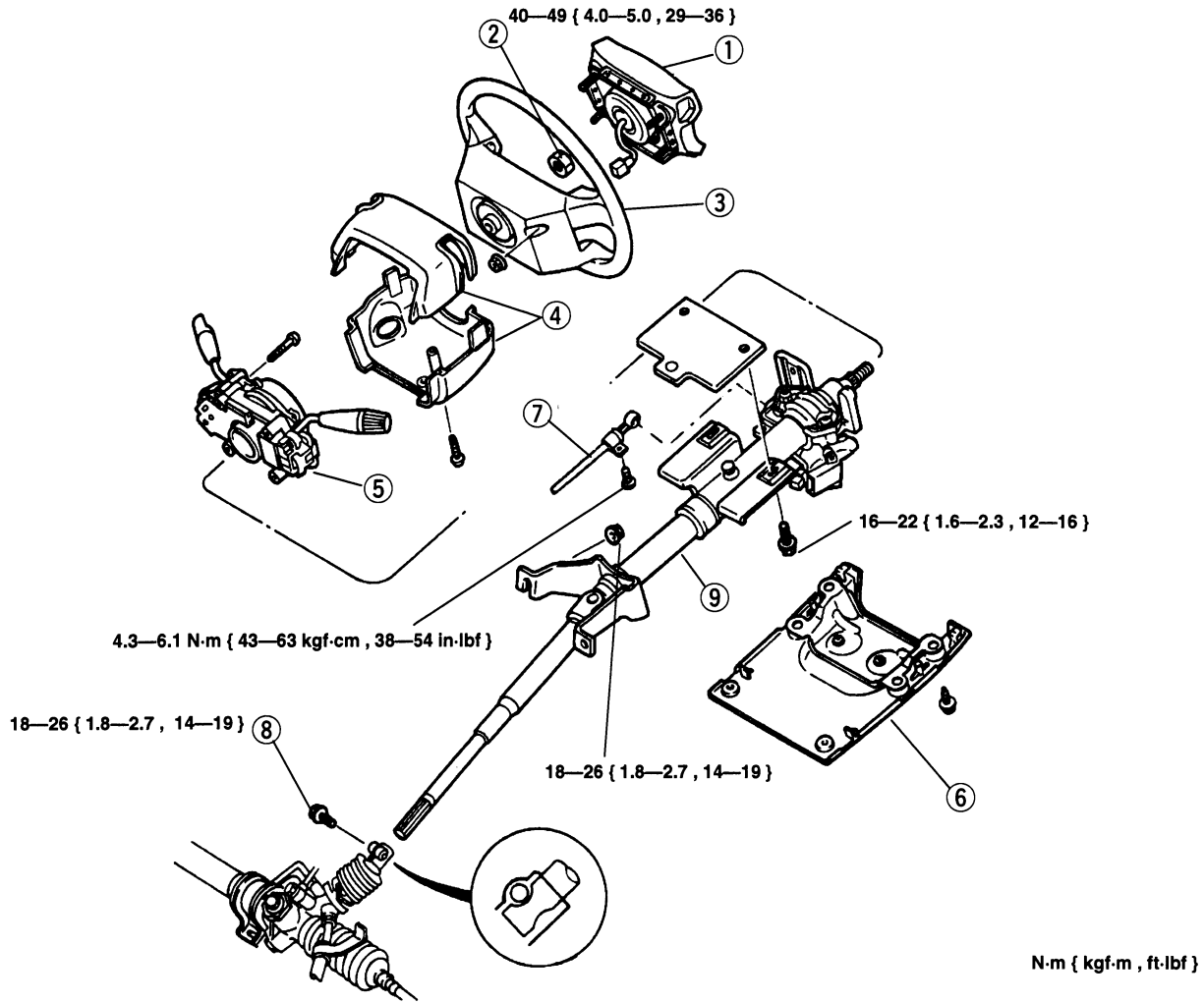
- If not within specification, check the following: rotation starting torque of pinion, rotation torque of each ball joint, and steering joints.

MANUAL STEERING

STEERING WHEEL AND COLUMN REMOVAL / INSTALLATION

U5U611AB

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal indicated in the table.
3. After installation, check that the horn sounds. If the horn does not sound, remove the air bag module and connect the module connectors.



U5U61102

1	Air bag module ☞ 08-10 DRIVER-SIDE AIR BAG MODULE REMOVAL / INSTALLATION
2	Locknut
3	Steering wheel ☞ Removal Note
4	Column cover

5	Combination switch
6	Lower panel
7	Key interlock cable (Automatic transmission)
8	Intermediate shaft bolt
9	Steering shaft

Steering Wheel Removal Note

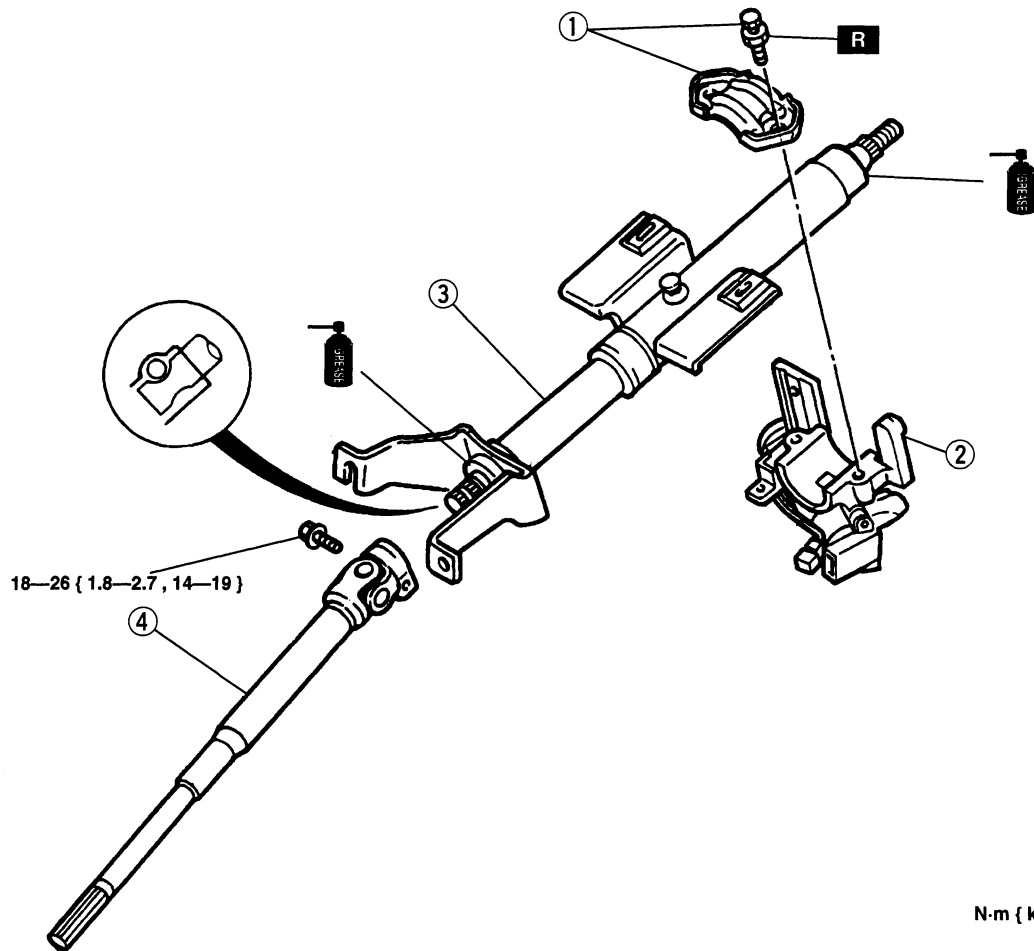
Caution

- Do not try to remove the steering wheel by hitting the shaft with a hammer. The column will collapse.
- Set the wheels in the straight-ahead position, remove the steering wheel by using a suitable puller.

STEERING SHAFT DISASSEMBLY / ASSEMBLY

U5U611AC

1. Disassemble in the order Indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



06

N-m { kgf-m , ft-lbf }

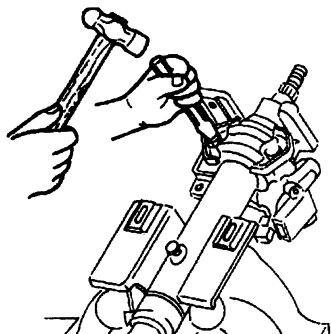
U5U61104

1	Steering lock mounting bolts and bracket ☞ Disassembly Note ☞ Assembly Note
2	Steering lock component

3	Steering shaft
4	Intermediate shaft

Steering Lock Mounting Bolts And Bracket Disassembly Note

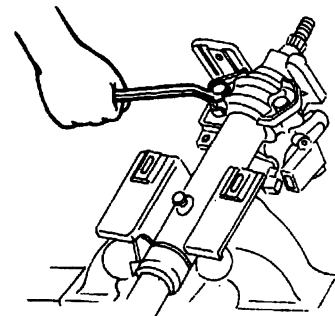
- Use a chisel to make a groove in the heads of the steering lock mounting bolts. Remove the bolts with a screwdriver. Remove the steering lock component.



U5U61105

Steering Lock Mounting Bolts And Bracket Assembly Note

- Install the steering lock component on the jacket. Install the new steering lock mounting bolts. Tighten the bolts until the heads break off.



U5U61106

MANUAL STEERING

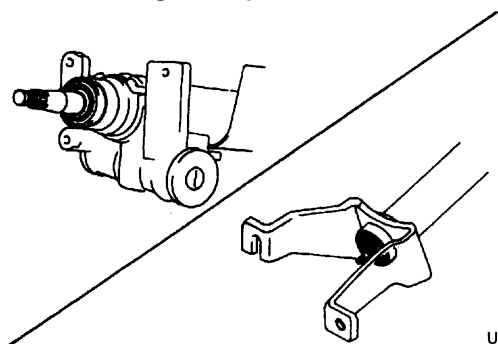
STEERING SHAFT INSPECTION

U5U611AD

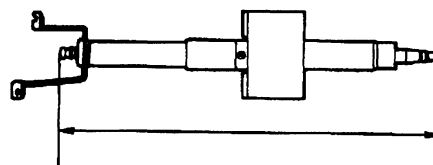
- Check the following, and replace the column component if necessary.
 - Column bearing damage.

Length

577.8—579.8 mm { 22.75—22.82 in }



U5U61107



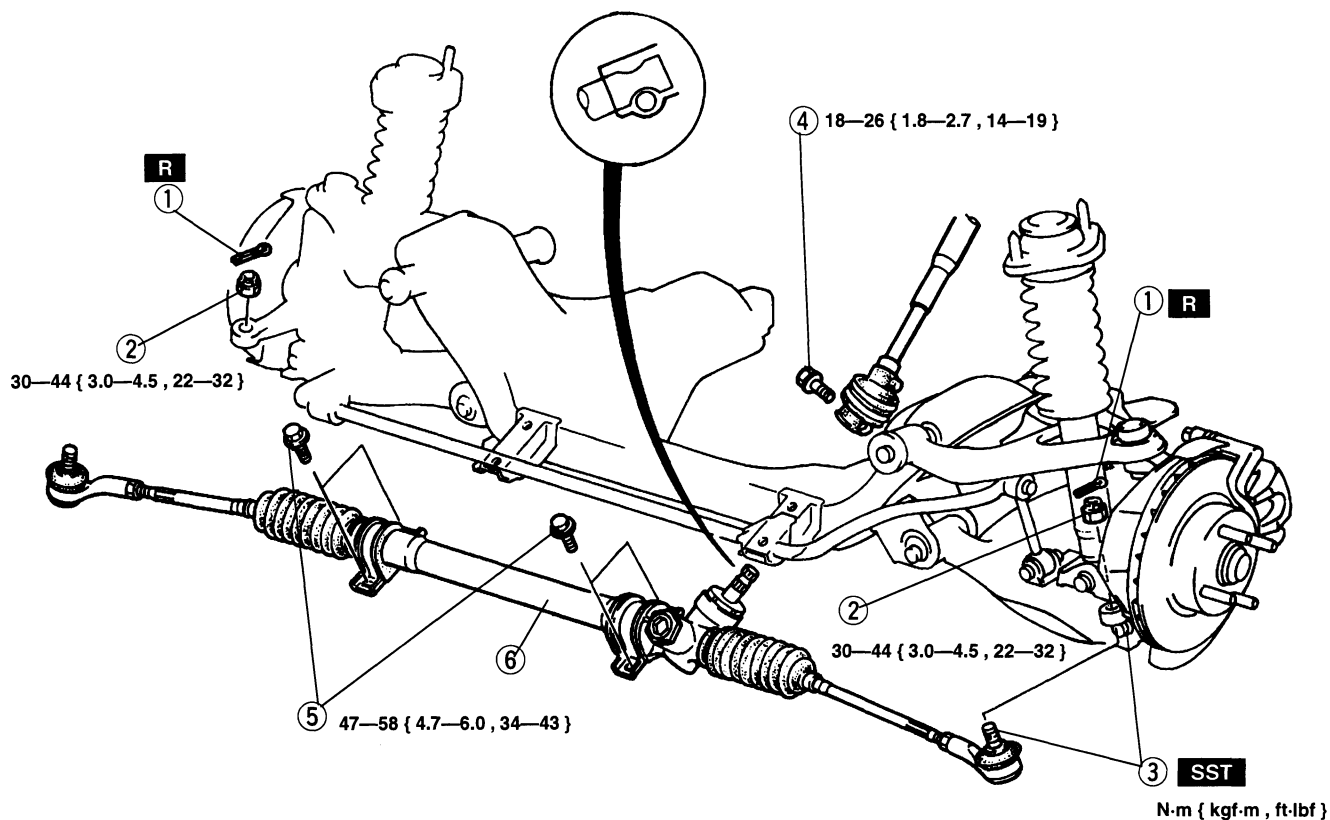
U5U61108

- Steering shaft length.

STEERING GEAR AND LINKAGE REMOVAL / INSTALLATION

U5U611AE

- With the wheels in the straight-ahead position, remove in the order indicated in the table.
- Install in the reverse order of removal indicated in the table.
- Adjust the total toe-in.



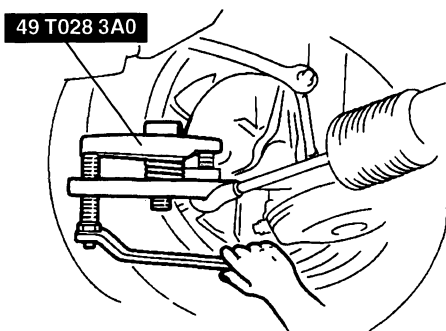
U5U61109

1	Cotter pin
2	Nut
3	Tie-rod end/ball joint
	☞ Removal Note

4	Intermediate shaft bolt
5	Mounting bracket bolt
6	Steering gear and linkage

Tie-rod End/Ball Joint Removal Note

- Separate the tie-rod end from the knuckle by using the SST.



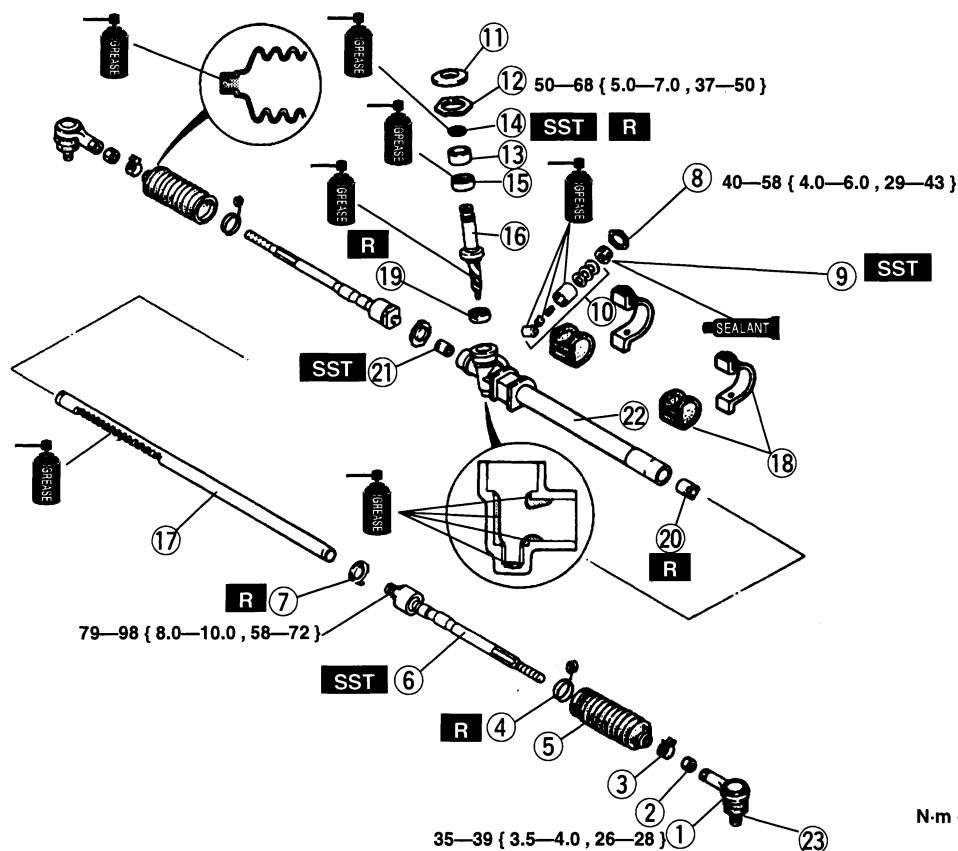
U5U61110

STEERING GEAR AND LINKAGE DISASSEMBLY / ASSEMBLY

U5U611AF

- Disassemble in the order indicated in the table.
- Assemble in the reverse order of disassembly indicated in the table.

06



N·m { kgf·m , ft·lbf }

U5U61111

1	Tie-rod end
2	Locknut (Tie-rod end)
3	Boot band
4	Boot wire
5	Boot
6	Tie rod ☞ Disassembly Note
7	Washer
8	Locknut (Adjusting cover)

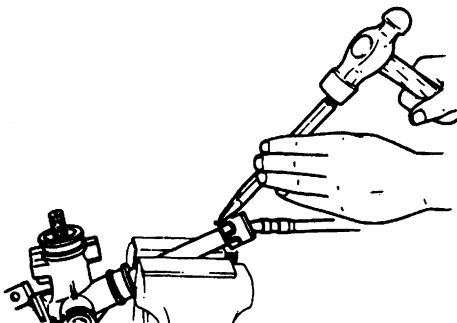
9	Adjusting cover ☞ Disassembly Note ☞ Assembly Note
10	Roller assembly
11	Dust cover
12	Locknut (Rear cover)
13	Rear cover ☞ Assembly Note
14	Oil seal ☞ Disassembly Note

MANUAL STEERING

15	Upper bearing
16	Pinion shaft ☞ Assembly Note
17	Steering rack ☞ Disassembly Note ☞ Assembly Note
18	Mounting bracket and mount
19	Lower bearing ☞ Disassembly Note ☞ Assembly Note
20	Rack bushing ☞ Disassembly Note ☞ Assembly Note
21	Bushing ☞ Disassembly Note ☞ Assembly Note
22	Gear housing
23	Tie-rod end boot ☞ Disassembly Note ☞ Assembly Note

Tie Rod Disassembly Note

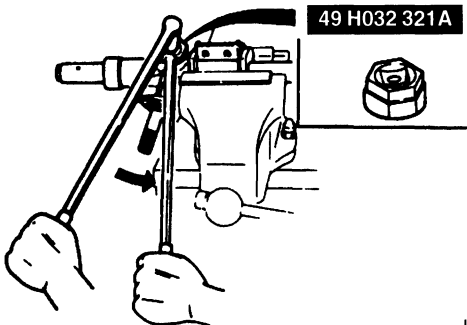
1. Uncrimp the washer.
2. Remove the tie rod.



U5U61112

Adjusting Cover Disassembly Note

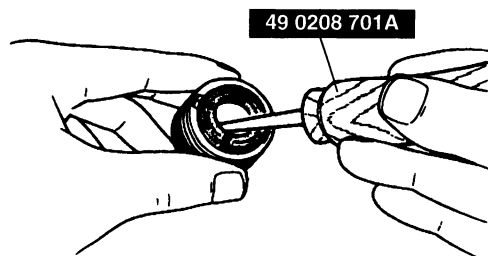
- Remove the adjusting cover by using the SST.



U5U61113

Oil Seal Disassembly Note

- Remove the oil seal by using the SST.

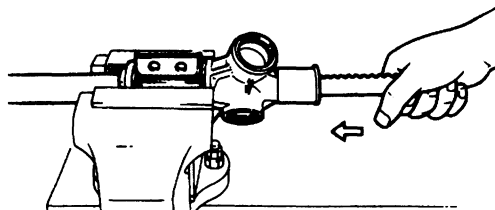


U5U61114

Steering Rack Disassembly Note

Caution

- Removing the rack from the tube side can damage the rack bushing by dragging the rack teeth across it. When removing the rack, remove it slowly and carefully.
- Remove the rack from the tube side.



U5U61115

Lower Bearing Disassembly Note

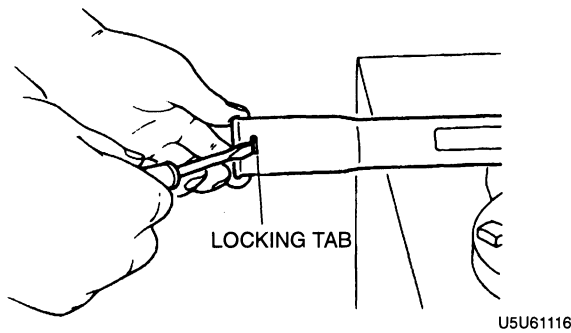
Note

- The lower bearing does not need to be removed unless you are replacing it.
1. Heat the gear housing in water to about 80 °C { 180 °F }.
 2. Tap the end of the housing with a plastic hammer to remove the lower bearing.

Rack Bushing Disassembly Note

Note

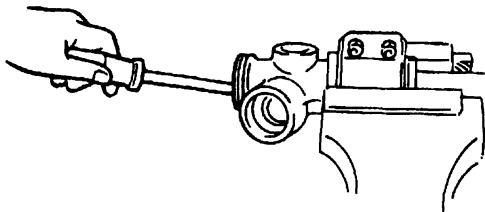
- The rack bushing does not need to be removed unless you are replacing it.
- Depress the locking tab, and carefully remove the rack bushing.



Bushing Disassembly Note

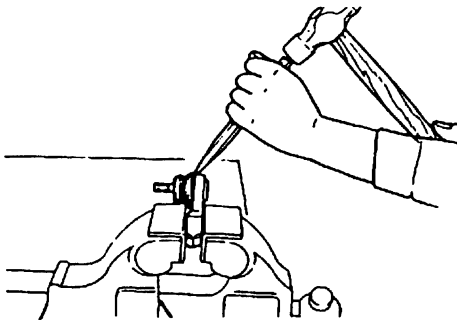
Note

- The bushing does not need to be removed unless you are replacing it.
- Carefully break the bushing to remove it.



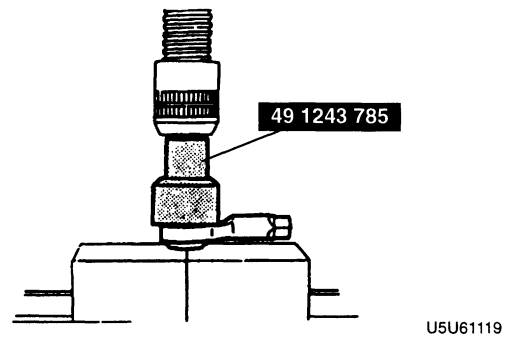
Tie-rod End Boot Disassembly Note

1. Secure the tie-rod end in a vise.
2. Place a chisel against the boot and hold it at the angle shown.
3. Remove the boot by tapping it with a hammer.



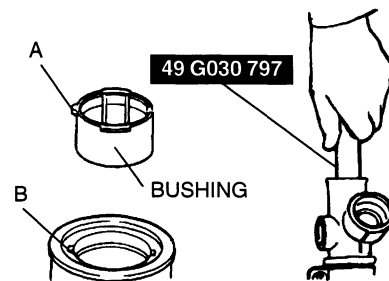
Tie-rod End Boot Assembly Note

1. Wipe the grease off the ball joint.
2. Put a small amount of lithium-based grease into a new dust boot.
3. Install the dust boot onto the tie-rod end by using the SST and a press.
4. Wipe away any excess grease.



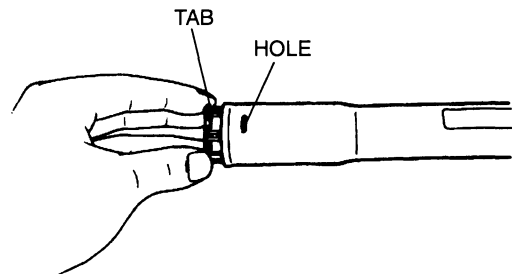
Bushing Assembly Note

- Align A and B and press a new bushing into the gear housing by using the SST until the bushing is fully seated.



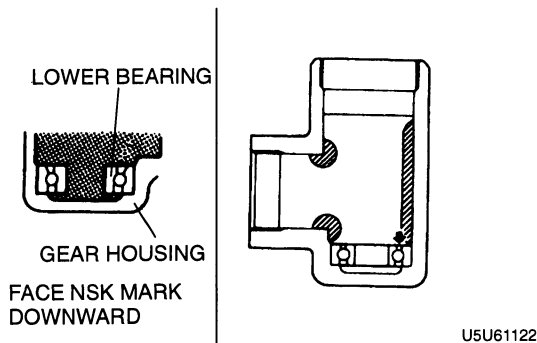
Rack Bushing Assembly Note

1. Align the tab of a new rack bushing with the hole in the column.
2. Push the rack bushing in until it is locked in place by the tab.



Lower Bearing Assembly Note

1. Apply grease to a new lower bearing.
2. Set the lower bearing onto the pinion shaft so that the NSK mark on the bearing faces downward.
3. Insert the pinion shaft together with the lower bearing.
4. Press the pinion shaft to seat the lower bearing.
5. Apply grease to the inside of the gear housing as shown.

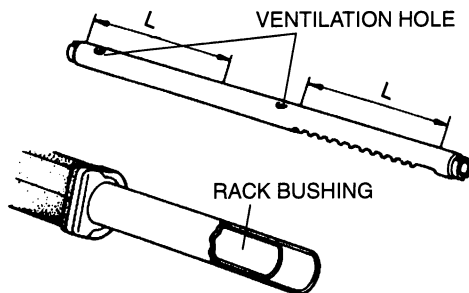


Steering Rack Assembly Note

1. Secure the mounting bracket in a vise.
2. Apply grease to the rack bushing.
3. Apply grease to the rack teeth and the sliding surface.

Caution

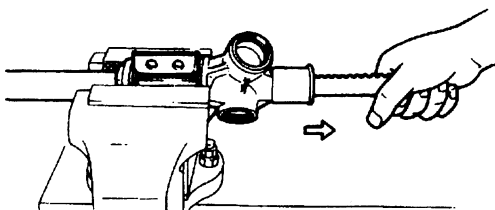
- Do not plug the ventilation holes with the grease.



Caution

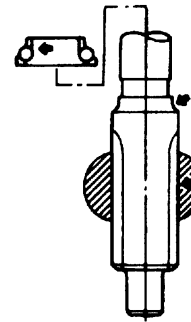
- Installing the rack from the tube side can damage the rack bushing by dragging the rack teeth across it. When installing the rack, install it slowly and carefully.

4. Slide the rack in from the tube side.

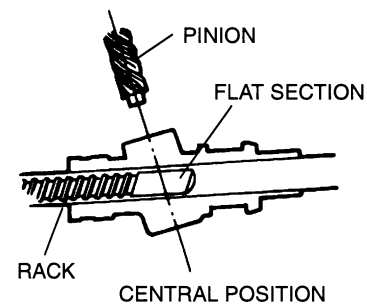


Pinion Shaft Assembly Note

1. Apply grease to the inner race of the upper bearing and install it to the pinion shaft.
2. Apply grease to the teeth of the pinion shaft.

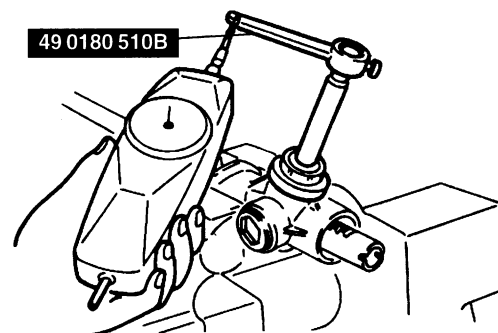


3. Turn the flat section of the rack toward the pinion, and insert the pinion.



Rear Cover Assembly Note

1. Apply grease to the outer race of the upper bearing and install it in the gear housing.
2. Install a new oil seal to the rear cover.
3. Apply sealant to the threads of the rear cover and install it into the gear housing.
4. Rotate the pinion to the left and right a few times to seat the bearing.
5. Tighten the rear cover so that the starting torque of the pinion is 2.0—3.4 N·m { 20—35 kgf·cm , 18—30 in·lbf } (Pull scale reading: 20—34 N { 2.0—3.5 kgf , 4.4—7.7 lbf }) as checked by using the SST and a pull scale.



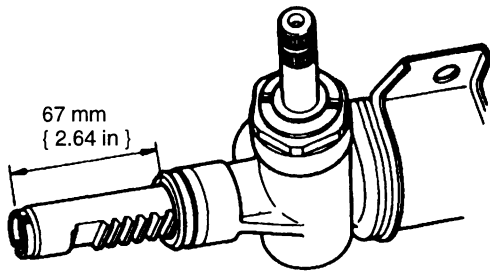
6. Tighten the locknut. Do not allow the rear cover to turn.

Tightening torque

50—68 N·m { 5.0—7.0 kgf·m , 37—50 ft·lbf }

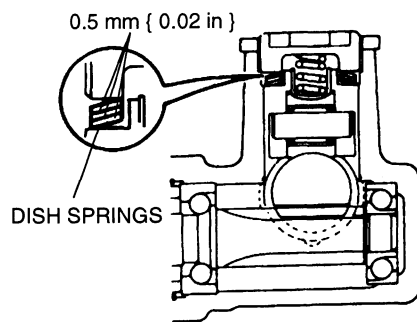
Adjusting Cover Assembly Note

1. Carefully move the rack so that the pinion is set to the center (neutral position) of the rack gear as shown.



U5U61128

2. Install the roller component, needle roller, holder, dish springs, friction block, and the spring as shown.

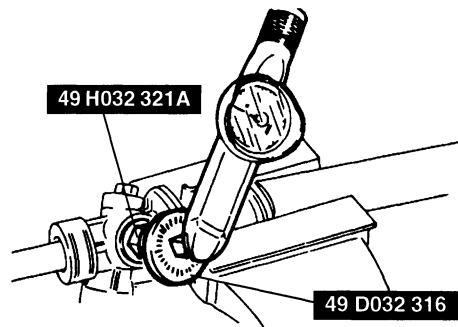


U5U61129

3. Torque the adjusting cover to **9.8 N·m { 100 kgf·cm , 87 in·lbf }**, then loosen it 25°—45°. Use the SSTs to secure the adjusting cover and the locknut.

Tightening torque

40—58 N·m { 4.0—6.0 kgf·m , 29—43 ft·lbf }



U5U61130

4. Measure the starting torque of the pinion by using the SST.

Pull scale reading

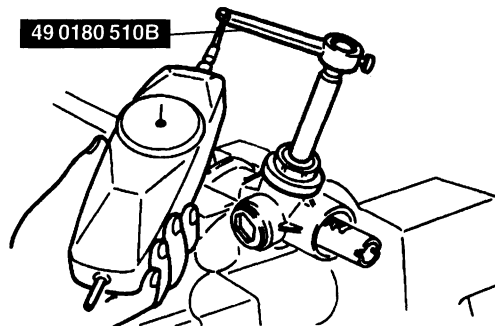
Center position ± 90°:

9.9—13.7 N { 1.0—1.4 kgf , 2.2—3.0 lbf }

Any other position:

less than 16.6 N { 1.7 kgf , 3.7 lbf }

5. If not within specification, repeat steps 2 and 3.



U5U61131

STEERING GEAR AND LINKAGE INSPECTION

U5U611AG

Tie-rod End Inspection

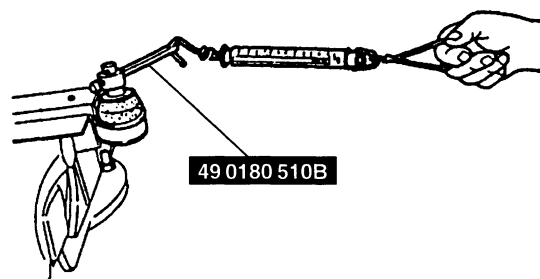
1. Inspect the tie-rod end for damage and boot cracks. Replace it if necessary.
2. Inspect the ball joint for looseness. Replace the tie-rod end if necessary.
3. Rotate the ball joint five times.
4. Measure the rotation torque of the ball joint by using the SST and pull scale.

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 }



U5U61132

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.

MANUAL STEERING

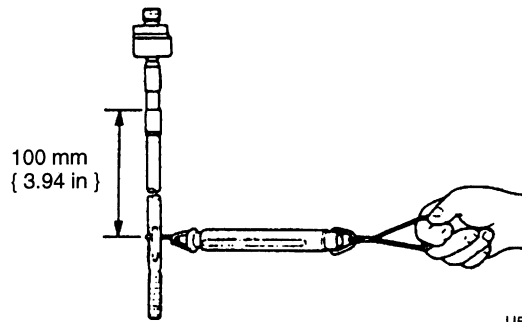
4. Measure the swing torque by using a pull scale.

Swinging torque

0.5—3.1 N·m { 5—32 kgf·cm , 4.4—27.7 in·lbf }

Pull scale reading

3.0—19.6 N { 0.3—0.2 kgf , 0.66—4.40 lbf }



U5U61133

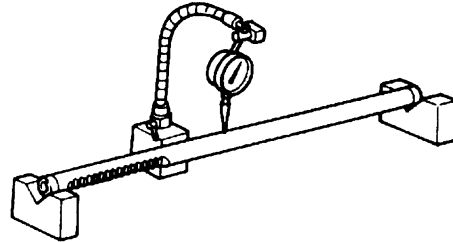
Steering Rack Inspection

1. Inspect for cracks, damage, and tooth wear. Replace if necessary.
2. Measure runout of the rack.

Runout

0.3 mm { 0.012 in } max.

3. If not within specification, replace the rack.



5. If not within the specification, replace the tie rod.

U5U61134

06-12 ENGINE SPEED SENSING POWER STEERING

AIR BLEEDING	06-12-1	Oil Seal (Inner), Back Up Ring	
POWER STEERING FLUID		Disassembly Note	06-12-8
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Fluid Level Inspection	06-12-1	Back Up Ring, Oil Seal (Inner)	
Fluid Leakage Inspection	06-12-2	Assembly Note	06-12-9
Fluid Pressure Inspection	06-12-2	Oil Seal (Outer) Assembly Note	06-12-9
STEERING WHEEL AND COLUMN		Steering Rack, Holder Assembly Note	06-12-9
INSPECTION	06-12-3	Oil Seal Assembly Note	06-12-10
Steering Wheel Play Inspection	06-12-3	Upper Bearing Assembly Note	06-12-11
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Steering Wheel Effort Inspection	06-12-3	Seal Ring, O-ring Assembly Note	06-12-11
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STEERING SHAFT		Pinion Shaft And Housing	
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Upper Bearing, Oil Seal		Power Steering Oil Pump	
Disassembly Note	06-12-8	Disassembly Note	06-12-16
Oil Seal (Outer), Steering Rack		Rotor Assembly Note	06-12-16
Disassembly Note	06-12-8	Cam Ring Assembly Note	06-12-16
		Blade Assembly Note	06-12-16

AIR BLEEDING

1. Check the fluid level.
2. Turn the steering wheel fully to the left and right several times with the engine not running.
3. Recheck the fluid level. If it has dropped, add fluid.
4. Repeat steps 2 and 3 until the fluid level stabilizes.
5. Start the engine and let it idle.
6. Turn the steering wheel fully to the left and right several times.
7. Verify that the fluid is not foamy and that the fluid level has not dropped.
8. Add fluid if necessary, and repeat steps 6 and 7.

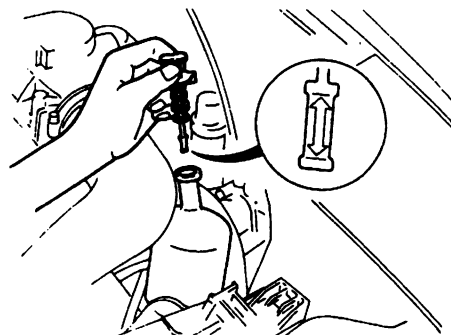
POWER STEERING FLUID INSPECTION

Fluid Level Inspection

1. Verify that the fluid level is between the H and L marks.
2. Add the specified power steering fluid if it is below the L mark. Remove the fluid if it is above the H mark.

Fluid specification

ATF Dexron®II or M-III



U5U612AA

U5U612AB

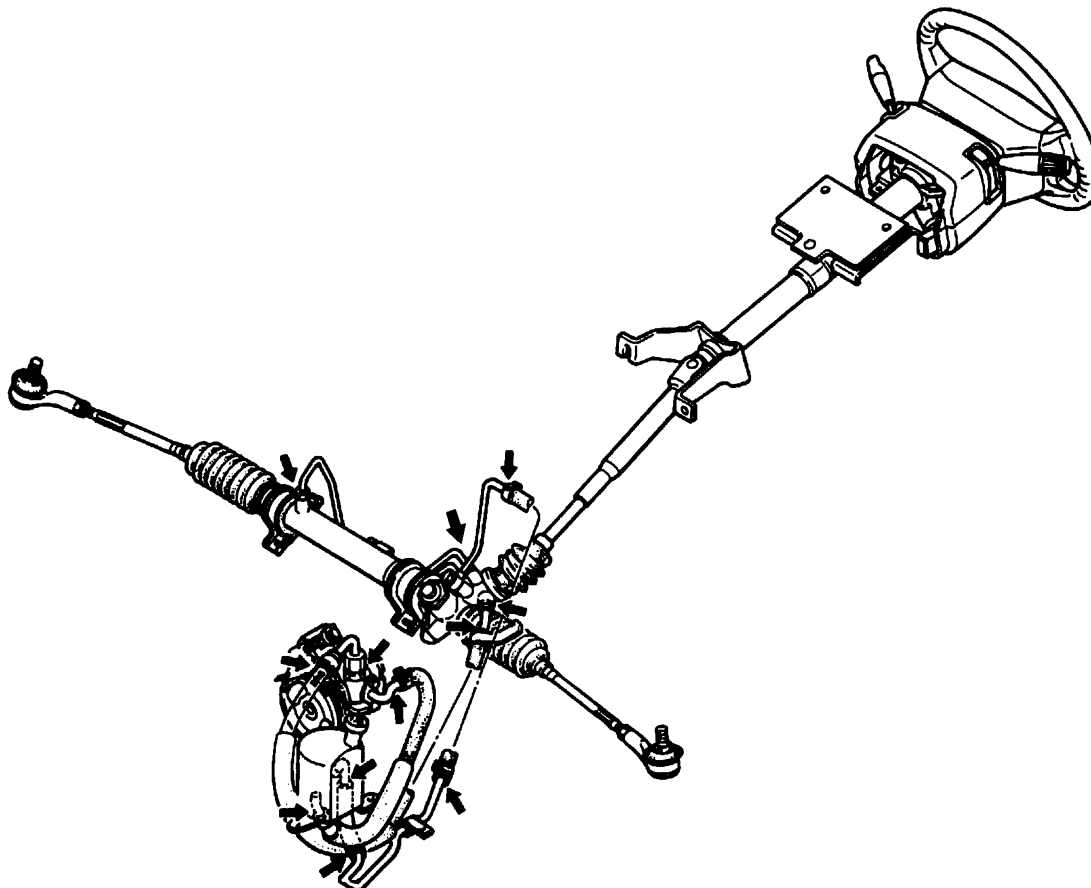
U5U61201

ENGINE SPEED SENSING POWER STEERING

Fluid Leakage Inspection

Caution

- Never hold the steering wheel to the extreme left or right for more than five seconds with the engine running. This could damage the power steering pump.
- Start the engine and let it idle. Turn the steering wheel fully left and fully right to apply fluid pressure. Inspect the points shown in the figure for fluid leakage.



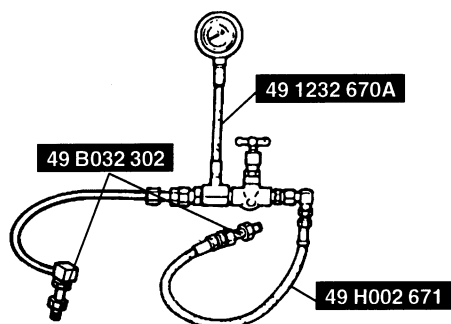
U5U61202

Fluid Pressure Inspection

1. Assemble the SSTs as shown in the figure.

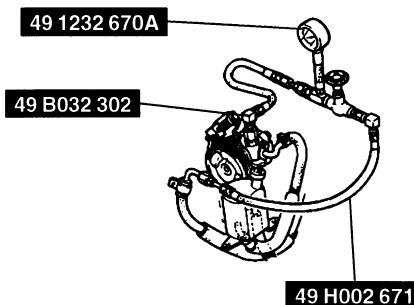
Tightening torque

40—49 N·m { 4.0—5.0 kgf·m , 29—36 ft·lbf }



U5U61203

2. Mark both hose connections to ensure that the hose is reinstalled in its original position.
3. Disconnect the pressure hose from the oil pump. Attach the SSTs.



U5U61204

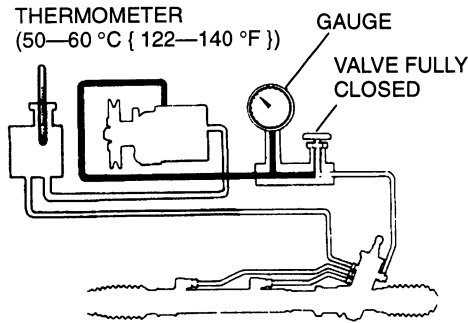
4. Bleed the air from the system.
5. Open the gauge valve fully. Start the engine and turn the steering wheel fully left and right to raise the fluid temperature to 50—60 °C { 122—140 °F }.

Caution

- Do not let the valve stay closed for more than 5 seconds. The increase in fluid temperature will damage the oil pump.

ENGINE SPEED SENSING POWER STEERING

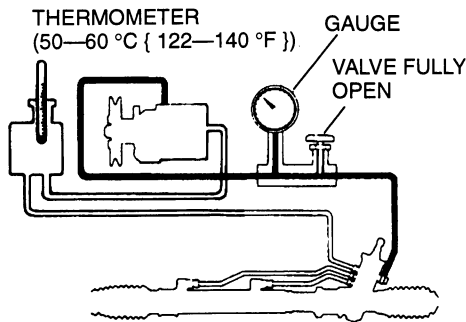
- Close the gauge valve completely. Increase the engine speed to **1,000—1,500 rpm** and measure the fluid pressure generated by the oil pump. If the pressure is not within specification, replace the oil pump component.



U5U61205

Oil pump fluid pressure
7,601—8,335 kPa { 77.5—85.0 kgf/cm² , 1,103—1,208 psi }

- Open the gauge valve fully and increase the engine speed to **1,000—1,500 rpm**.



U5U61206

Caution

- Never hold the steering wheel to the extreme left or right for more than five seconds with the engine running. This could damage the power steering pump.

- Turn the steering wheel fully to the left and right and measure the fluid pressure generated by the gear housing. If the pressure is not within specification, replace the gear housing component.

Gear housing fluid pressure

7,601—8,335 kPa { 77.5—85.0 kgf/cm² , 1,103—1,208 psi }

- Remove the gauge set. Install and tighten the pressure hose to the specified torque.

Tightening torque

32—47 N·m { 3.2—4.8 kgf·m , 24—34 ft·lbf }

- Bleed the air from the system.

STEERING WHEEL AND COLUMN INSPECTION

U5U612AC

Steering Wheel Play Inspection

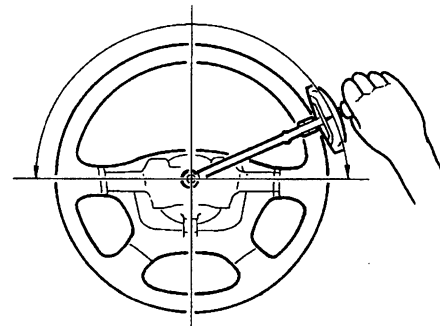
(Refer to 06—11 STEERING WHEEL AND COLUMN INSPECTION, Steering Wheel Play Inspection.)

Steering Wheel Looseness Inspection

(Refer to 06—11 STEERING WHEEL AND COLUMN INSPECTION, Steering Wheel Looseness Inspection.)

Steering Wheel Effort Inspection

- Check the following points:
 - Tire size and tire pressure
 - Fluid level
 - Drive belt deflection
- With the vehicle on a hard, level surface, put the wheels in the straight-ahead position.
- Start the engine and warm the power steering fluid to **50—60 °C { 122—140 °F }**.
- Remove the air bag module. (Refer to 08—10 DRIVER-SIDE AIR BAG MODULE REMOVAL / INSTALLATION.)
- Measure the steering wheel effort by using a torque wrench.



U5U61207

Steering wheel effort

7.8 N·m { 80 kgf·cm , 69 in·lbf } max.

ENGINE SPEED SENSING POWER STEERING

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

U5U612AD

(Refer to 06–11 STEERING WHEEL AND COLUMN REMOVAL / INSTALLATION.)

STEERING SHAFT DISASSEMBLY / ASSEMBLY

U5U612AE

(Refer to 06–11 STEERING SHAFT DISASSEMBLY / ASSEMBLY.)

STEERING SHAFT INSPECTION

U5U612AF

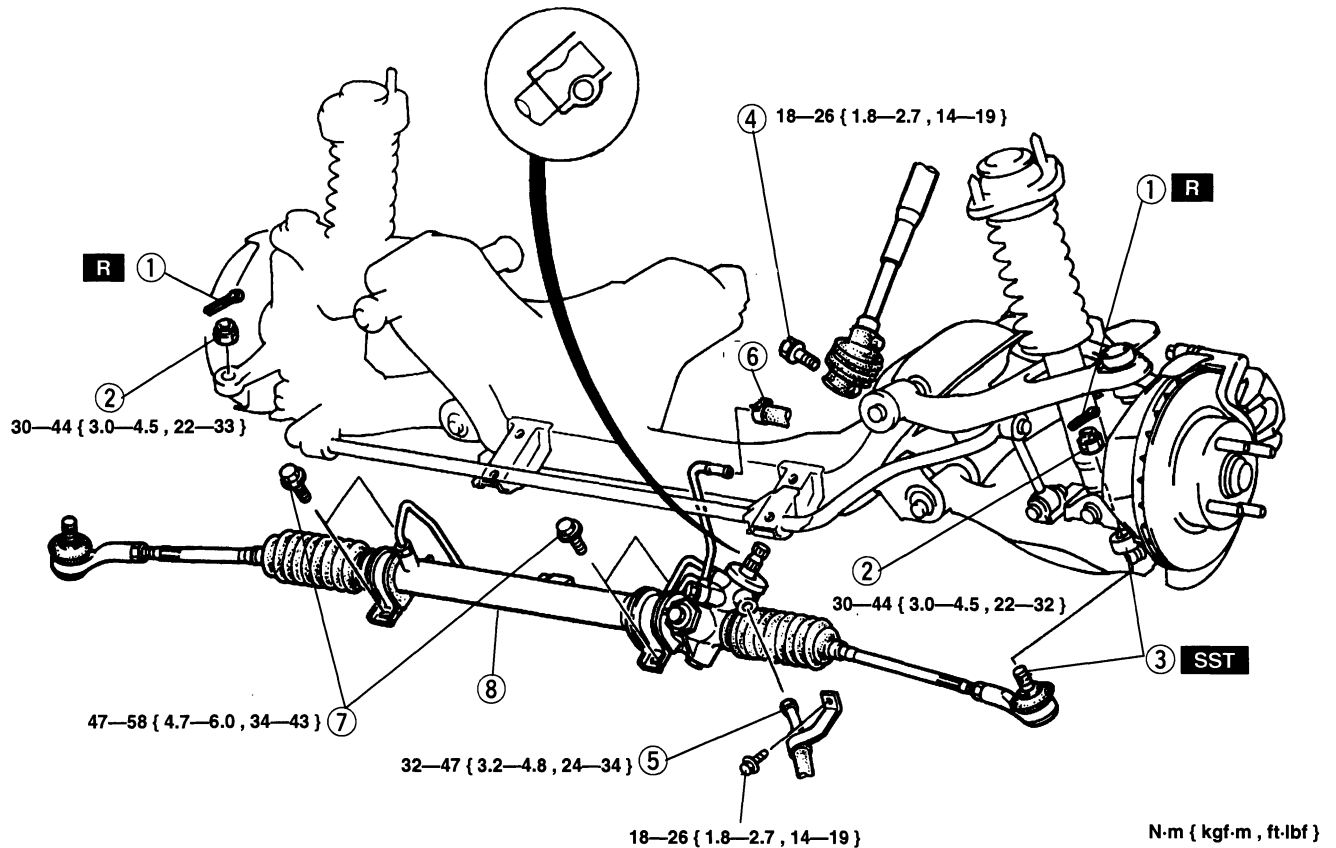
(Refer to 06–11 STEERING SHAFT INSPECTION.)

ENGINE SPEED SENSING POWER STEERING

STEERING GEAR AND LINKAGE REMOVAL / INSTALLATION

U5U612AG

1. Remove in the order indicated in the table.
2. With the wheels in the straight-ahead position, install in the reverse order of removal indicated in the table.
3. After installation, inspect the total toe-in and adjust it if necessary.



U5U61208

1	Cotter pin
2	Nut
3	Tie-rod end ball joint 06-10 STEERING GEAR AND LINKAGE REMOVAL / INSTALLATION, Tie-rod End Ball Joint Removal Note

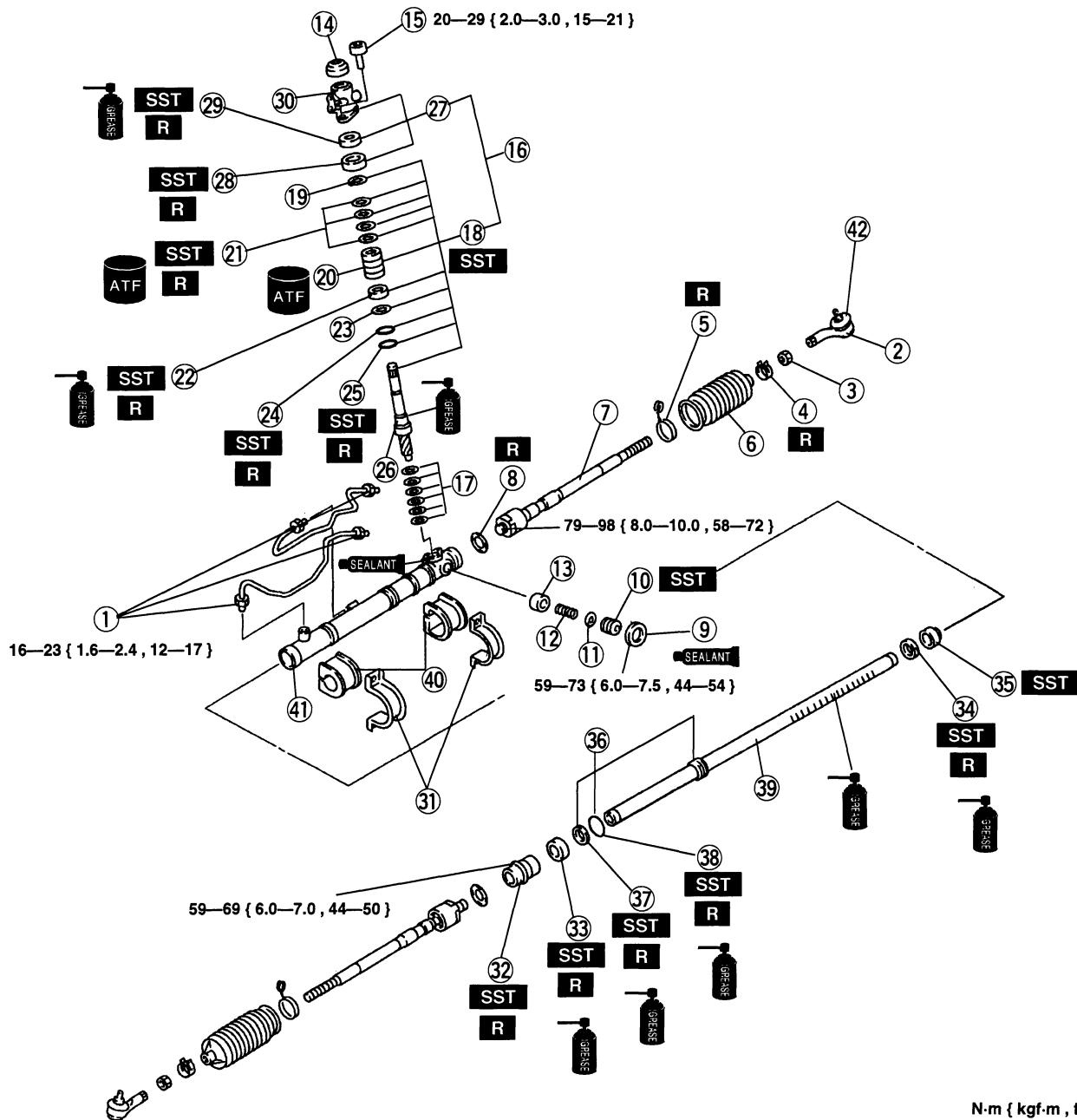
4	Bolt
5	Pressure pipe
6	Return hose
7	Mounting bracket bolt
8	Steering gear and linkage

ENGINE SPEED SENSING POWER STEERING

STEERING GEAR AND LINKAGE DISASSEMBLY / ASSEMBLY

U5U612AH

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



N·m { kgf·m , ft·lbf }

U5U61209

1	Oil pipe
2	Tie-rod end
3	Locknut (Tie-rod end)
4	Boot band
5	Boot wire
6	Boot
7	Tie rod ☞ 06-11 STEERING GEAR AND LINKAGE DISASSEMBLY / ASSEMBLY, Tie Rod Disas- sembly Note
8	Washer

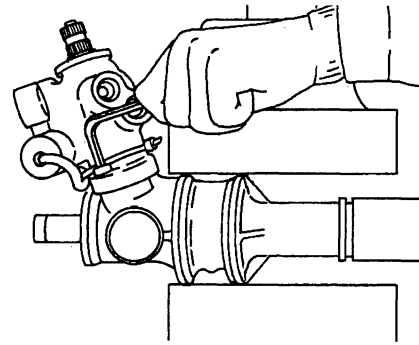
9	Locknut (Adjusting cover)
10	Adjusting cover ☞ Assembly Note
11	Plate
12	Yoke spring
13	Support yoke
14	Dust cover
15	Socket bolt
16	Pinion shaft and housing component ☞ Disassembly Note ☞ Assembly Note

ENGINE SPEED SENSING POWER STEERING

17	Shim
18	Pinion shaft component ☞ Disassembly Note ☞ Assembly Note
19	Snap ring ☞ Disassembly Note
20	Control valve
21	Seal ring ☞ Assembly Note
22	Oil seal ☞ Assembly Note
23	Spacer ☞ Assembly Note
24	Seal ring ☞ Disassembly Note ☞ Assembly Note
25	O-ring ☞ Disassembly Note ☞ Assembly Note
26	Pinion shaft
27	Valve housing component
28	Upper bearing ☞ Disassembly Note ☞ Assembly Note
29	Oil seal ☞ Disassembly Note ☞ Assembly Note
30	Valve housing
31	Mounting bracket
32	Holder ☞ Assembly Note
33	Oil seal (Outer) ☞ Disassembly Note ☞ Assembly Note
34	Oil seal (Inner) ☞ Disassembly Note ☞ Assembly Note
35	Back up ring ☞ Disassembly Note ☞ Assembly Note
36	Steering rack component ☞ Disassembly Note ☞ Assembly Note
37	Seal ring ☞ Disassembly Note
38	O-ring ☞ Disassembly Note
39	Steering rack
40	Mount
41	Gear housing
42	Tie-rod end boot ☞ 06-11 STEERING GEAR AND LINKAGE DISASSEMBLY / ASSEMBLY, Tie-rod End Boot Removal Note

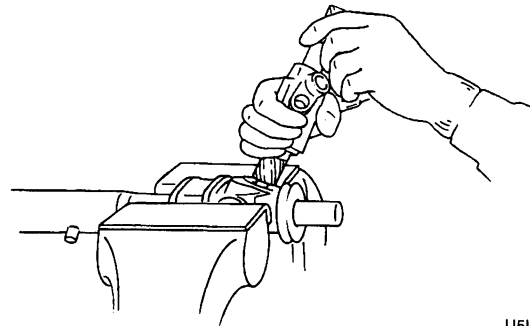
Pinion Shaft And Housing Disassembly Note

1. Remove the socket bolts (2 points) which fix the pinion shaft and housing.



U5U61210

2. Hold the pinion shaft as shown, and pull out the pinion shaft and housing component.

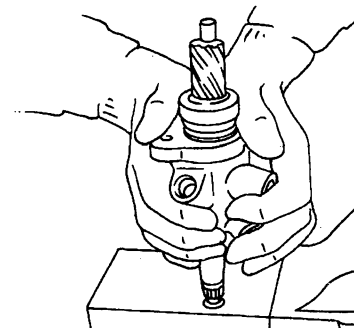


U5U61211

Pinion Shaft Disassembly Note

Note

- If the pinion shaft does not come out easily, remove it by using a press.
- Push out the pinion shaft component from the valve housing as shown.

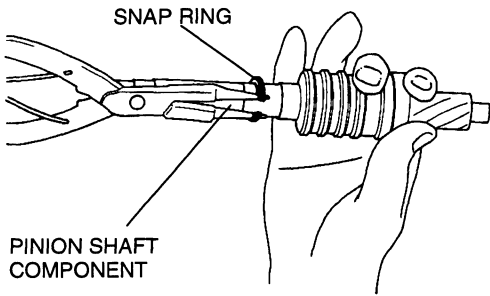


U5U61212

ENGINE SPEED SENSING POWER STEERING

Snap Ring Disassembly Note

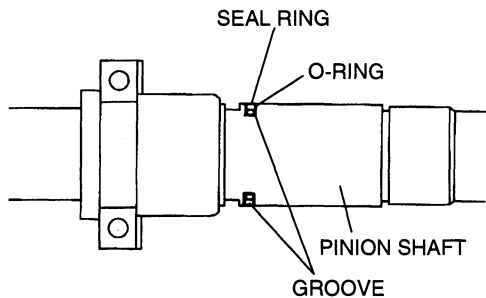
- Carefully remove the snap ring without damaging the pinion shaft component.



U5U61213

Seal Ring, O-ring Disassembly Note

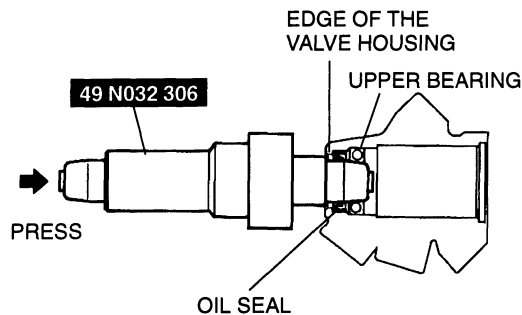
- Using a scratch awl, carefully remove the seal ring without damaging the pinion shaft or the groove.



U5U61214

Upper Bearing, Oil Seal Disassembly Note

- Set the SST as shown.
- Using a press, remove the oil seal and upper bearing without applying pressure to the edge of the valve housing.



U5U61215

Oil Seal (Outer), Steering Rack Disassembly Note

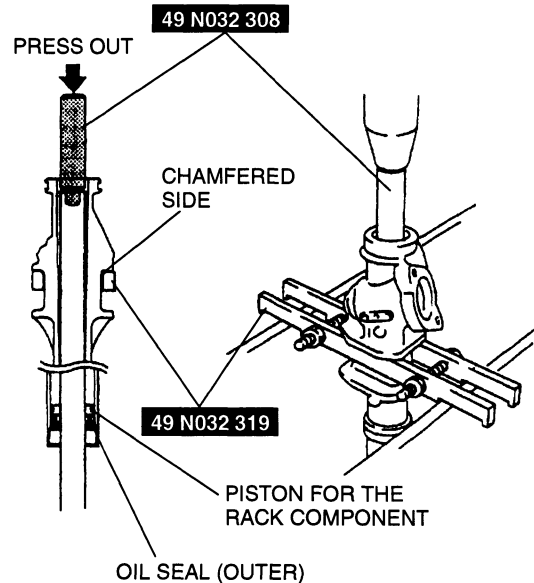
- Plug the hole of gear housing to prevent oil from splashing out when removing the oil seal.

Caution

- The interior of the cylinder is easily damaged by the rack, which may cause oil to leak. Do not let the rack contact the cylinder during removal.

- Install the SST (49 N032 319) to the gear housing facing the chamfered side to the housing as shown.

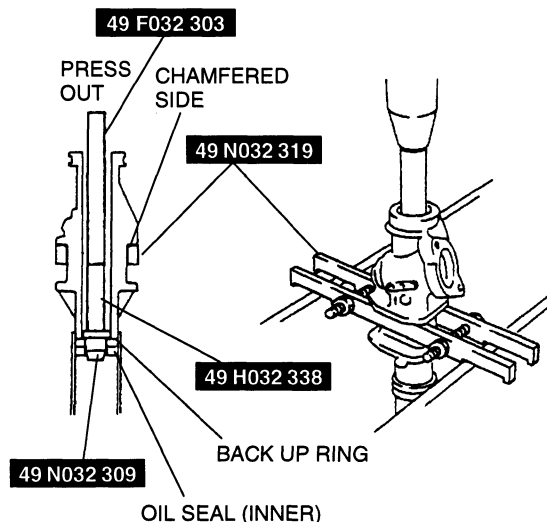
- Install the SST (49 N032 308) to the gear side of the steering rack component and press out the oil seal (outer) and steering rack component.



U5U61216

Oil Seal (Inner), Back Up Ring Disassembly Note

- Set the SSTs (49 F032 303, 49 H032 338, 49 N032 309) into the valve side.
- Install the SST (49 N032 319) to the gear housing facing the chamfered side to the housing as shown.
- Press out the oil seal (inner) and back up ring.



U5U61217

ENGINE SPEED SENSING POWER STEERING

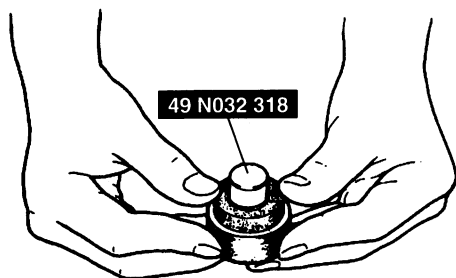
Seal Ring, O-ring Disassembly Note

Caution

- Do not damage the steering rack component or the groove. If they are scratched or damaged, the rings will not seal properly and the steering rack component will not operate smoothly.
- Remove the seal ring and O-ring by using a scratch awl.

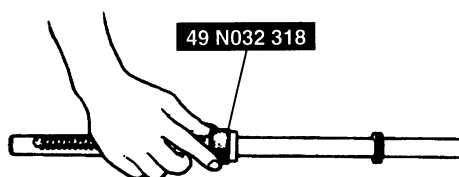
Back Up Ring, Oil Seal (Inner) Assembly Note

1. Apply grease to a new oil seal.
2. Install the oil seal to the **SST** with the groove facing up.



U5U61218

3. Slide the oil seal and the **SST** over the rack from the gear side to the piston. Remove the **SST**.
4. Install the back up ring.

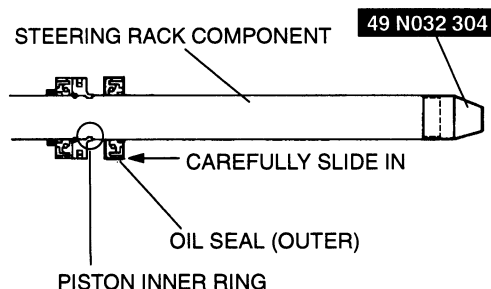


U5U61219

Oil Seal (Outer) Assembly Note

Caution

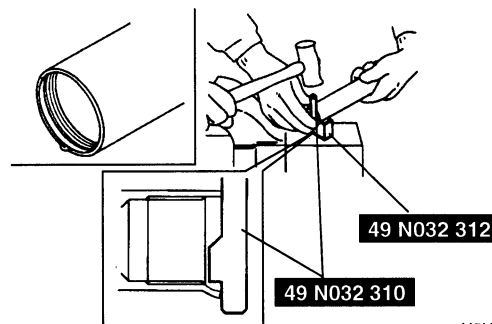
- Do not damage the lip for the oil seal on the piston inner ring. If they are scratched or damaged, the rings will not seal properly and the steering rack will not operate properly.
1. Install the **SST** to the steering rack component.
 2. Apply a thin coat of grease to the **SST** and steering rack component.
 3. Install the oil seal (outer) so that it faces the groove of the oil seal (inner) as shown.



U5U61220

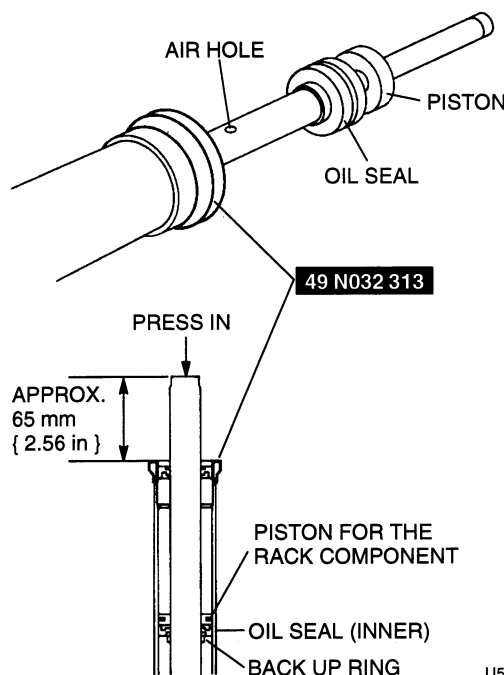
Steering Rack, Holder Assembly Note

1. If the cylinder rim is bent or kinked, repair it by using an oil stone.
2. Repair the cylinder rim by using the **SSTs** as shown.



U5U61221

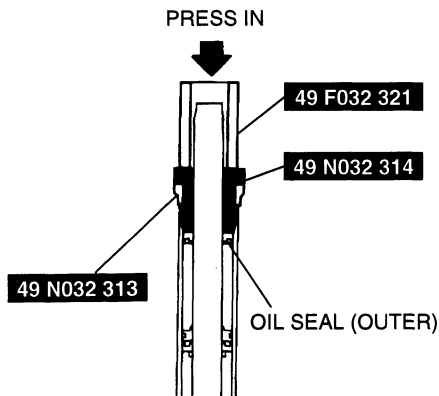
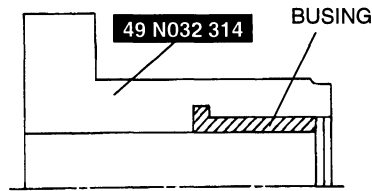
3. Assemble the **SST** onto the cylinder rim.
4. Carefully apply grease to the inner face of the **SST** and the piston seal face without plugging the air hole for the steering rack with grease.
5. Thoroughly apply grease to the steering rack teeth.
6. Insert the steering rack component from the gear housing cylinder side.



U5U61222

ENGINE SPEED SENSING POWER STEERING

7. Slowly press in the steering rack until approximately **65 mm { 2.56 in }** of the rack remains above the face of the **SST** as shown in the figure.
8. Remove the bushing from the holder which was dis-assembled, and insert it into the **SST**.
9. Assemble the **SSTs** as shown and install the oil seal (outer) by using a press.



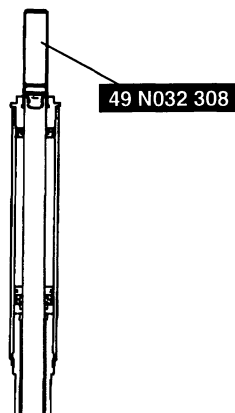
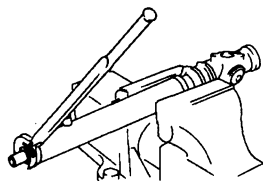
U5U61223

10. Install a new holder and tighten it to the specified torque.

Tightening torque

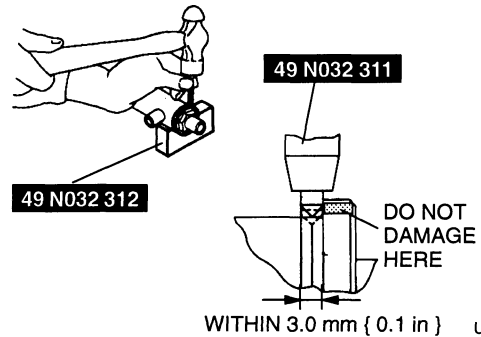
59—69 N·m { 6.0—7.0 kgf·m , 44—50 ft·lbf }

11. Set the **SST** to the end of the steering rack.
12. Press in the **SST** until the groove is aligned with the holder edge.



U5U61224

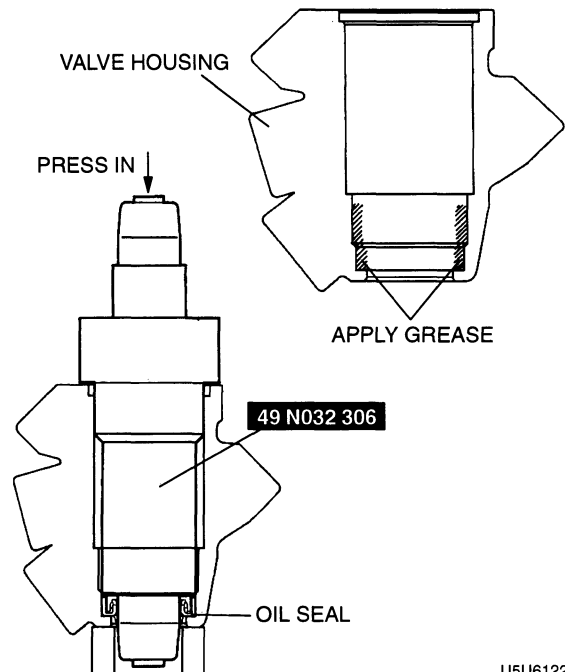
13. With the repaired section of the rim at the bottom, place the cylinder onto the **SST (49 N032 312)** so that the gear housing is level.
14. Place the **SST (49 N032 311)** as shown and stake the holder.



U5U61225

Oil Seal Assembly Note

1. Apply grease to the area indicated on the inner face of the valve component.
2. Apply grease to the exterior of a new oil seal.
3. Temporarily install the oil seal into the valve housing.
4. Apply grease to the oil seal, then set the **SST**.
5. Press on the oil seal.

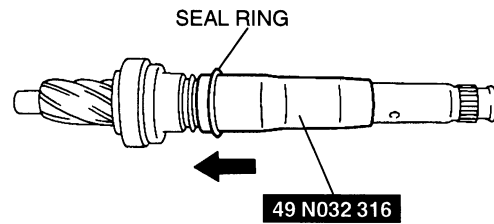
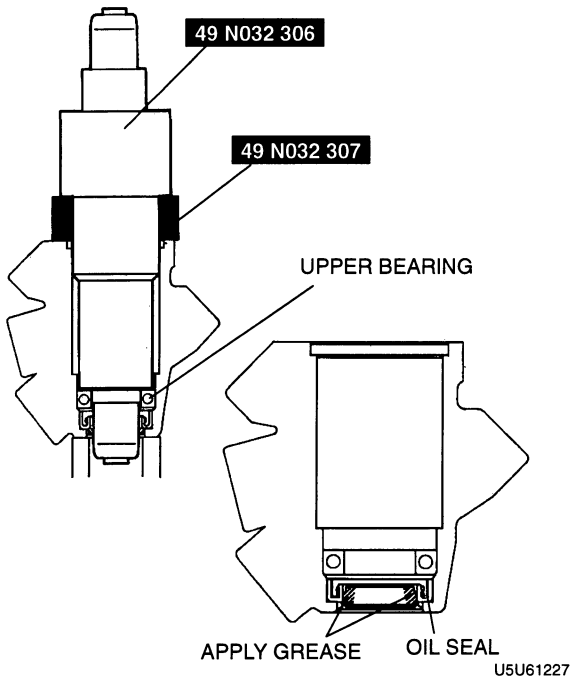


U5U61226

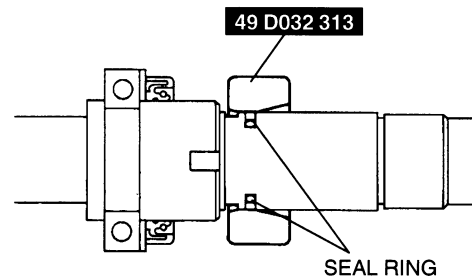
ENGINE SPEED SENSING POWER STEERING

Upper Bearing Assembly Note

1. Install the **SSTs** and upper bearing onto the valve housing component.
2. Press in the upper bearing.
3. Apply grease to the lip of the oil seal.

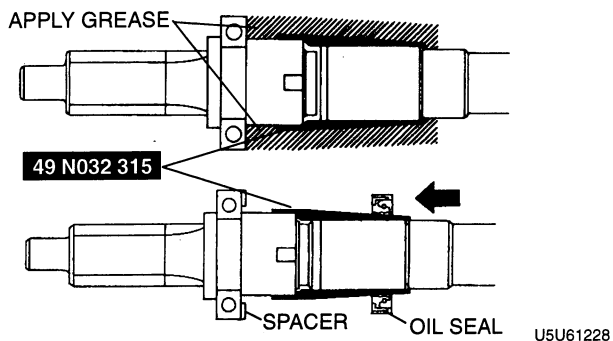


4. Thoroughly coat the inside of the **SST** with grease.
5. Fit the seal ring by using the larger end of the **SST**, then fit it by using the smaller end.
6. Fix the seal ring with the **SST** as shown, and leave it for **10 minutes** before carrying out any other procedure.



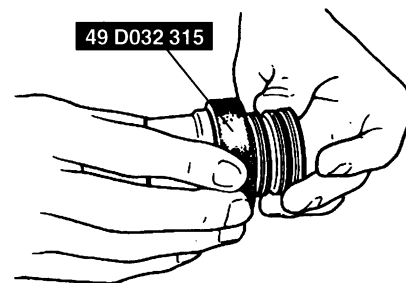
Oil Seal, Spacer Assembly Note

1. Assemble the **SST** onto the pinion shaft and apply grease to the area indicated.
2. Install the spacer.
3. Apply grease to the lip of a new oil seal, then install the oil seal in the direction shown.



Seal Ring Assembly Note

1. Install new seal rings onto the control valve, then fit them by using the **SST**.
2. Remove the **SST** from the pinion shaft and align the pin position of the control valve with the thread of the pinion shaft component. Install the control valve component.
3. Install the new snap ring to the pinion shaft component.
4. Apply ATF onto the control valve component.



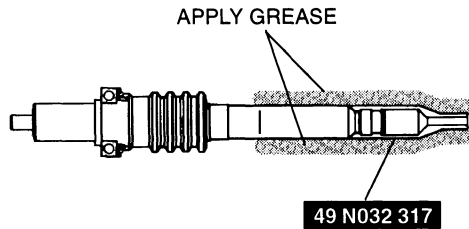
Seal Ring, O-ring Assembly Note

1. Assemble the **SST** as shown, then thoroughly coat the outside of the **SST** with grease.
2. Install a new O-ring.
3. Install a new seal ring. Do not stretch the seal ring more than necessary during installation.

ENGINE SPEED SENSING POWER STEERING

Pinion Shaft Assembly Note

1. Install the **SST** onto the pinion shaft.
2. Thoroughly coat the area indicated with grease.



U5U61232

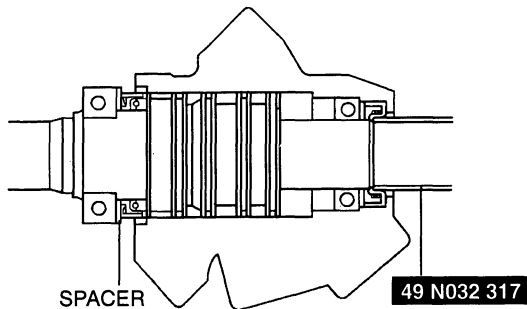
Caution

- Do not damage the lip for the oil seal.

Note

- If the spacer protrudes from the valve housing, the pinion shaft component can not be inserted.

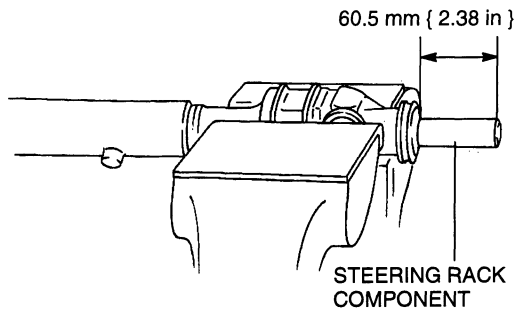
3. Insert the pinion shaft component until it contacts the end of the bearing contacts the edge of the valve housing.



U5U61233

Pinion Shaft And Housing Assembly Note

1. Pull out the steering rack component from the pinion side of the gear housing **60.5 mm { 2.38 in }**.



U5U61234

2. When reusing the gear housing, pinion shaft and housing.
 - Install onto the graduated area of the pinion housing the same number of shims as were removed during disassembly.

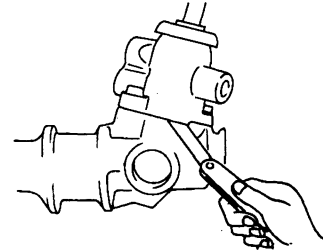
3. When replacing the gear housing and/or pinion shaft and housing component.

- (1) Install onto the threaded area of the pinion housing the same number of shims as were removed during disassembly.
- (2) Tighten the bolts to the specified torque.

Tightening torque

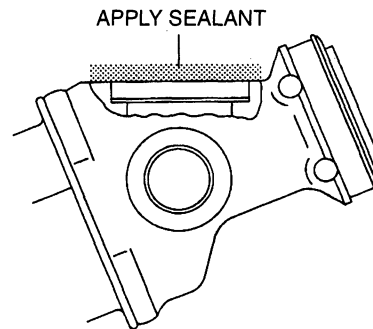
20—29 N·m { 2.0—3.0 kgf·m , 15—21 ft·lbf }

- (3) Measure the gap between the gear housing and the valve housing by using a thickness gauge.



U5U61235

- (4) Remove or add the necessary shims so that the gap is zero.
4. Apply sealant to the end of the pinion housing.



U5U61236

5. Coat the teeth of pinion gear and the ball bearing.
6. Insert the pinion shaft and housing component.
7. Install and hand-tighten the bolts fixing the pinion shaft and housing component.
8. Alternately tighten the bolts to the specified torque.

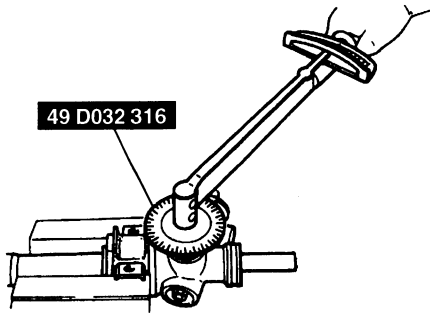
Tightening torque

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

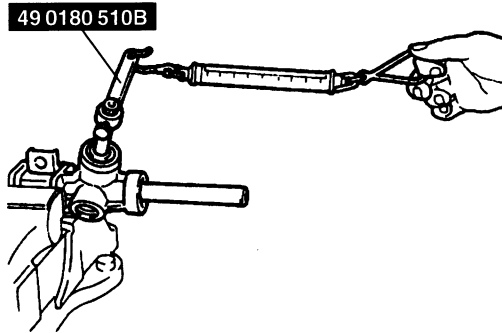
Adjusting Cover Assembly Note

1. Tighten the mounting bracket in a vise.
2. Set the rack to the center position.
3. Tighten the adjusting cover to **4.9 N·m { 50 kgf·cm , 43 in·lbf }** three times, then return it **25°** by using the **SST**.

ENGINE SPEED SENSING POWER STEERING



4. Apply sealant to the threads of the locknut.
5. Attach the locknut.
6. Measure the pinion torque by using the **SST** and a pull scale.



Standard

Center of rack $\pm 90^\circ$ 1.0—1.1 N·m { 10—12 kgf·cm , 8.7—10.4 in·lbf }

Scale reading 10—11 N { 1.0—1.2 kgf , 2.2—2.6 lbf }

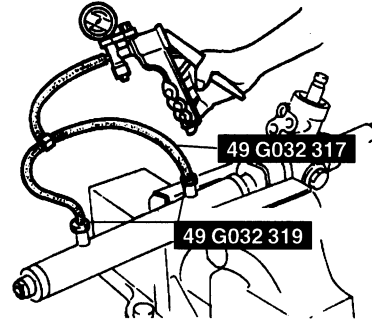
7. If not within the specification, repeat steps 3 through 6.
8. Install the locknut.

Tightening torque

59—74 N·m { 6.0—7.5 kgf·m , 44—54 ft·lbf }

Hermetic sealing inspection

1. Connect the **SSTs** to the power cylinder section of the gear housing.
2. Apply **53.3 kPa { 400 mmHg , 15.7 inHg }** vacuum with a vacuum pump and verify that it is held for at least **30 seconds**.
3. If the vacuum is not held, replace the oil seal.



STEERING GEAR AND LINKAGE INSPECTION

U5U612AL

Tie-rod End Inspection

(Refer to 06—11 STEERING GEAR AND LINKAGE INSPECTION, Tie-rod End Inspection.)

Tie Rod Inspection

(Refer to 06—11 STEERING GEAR AND LINKAGE INSPECTION, Tie Rod Inspection.)

Steering Rack Inspection

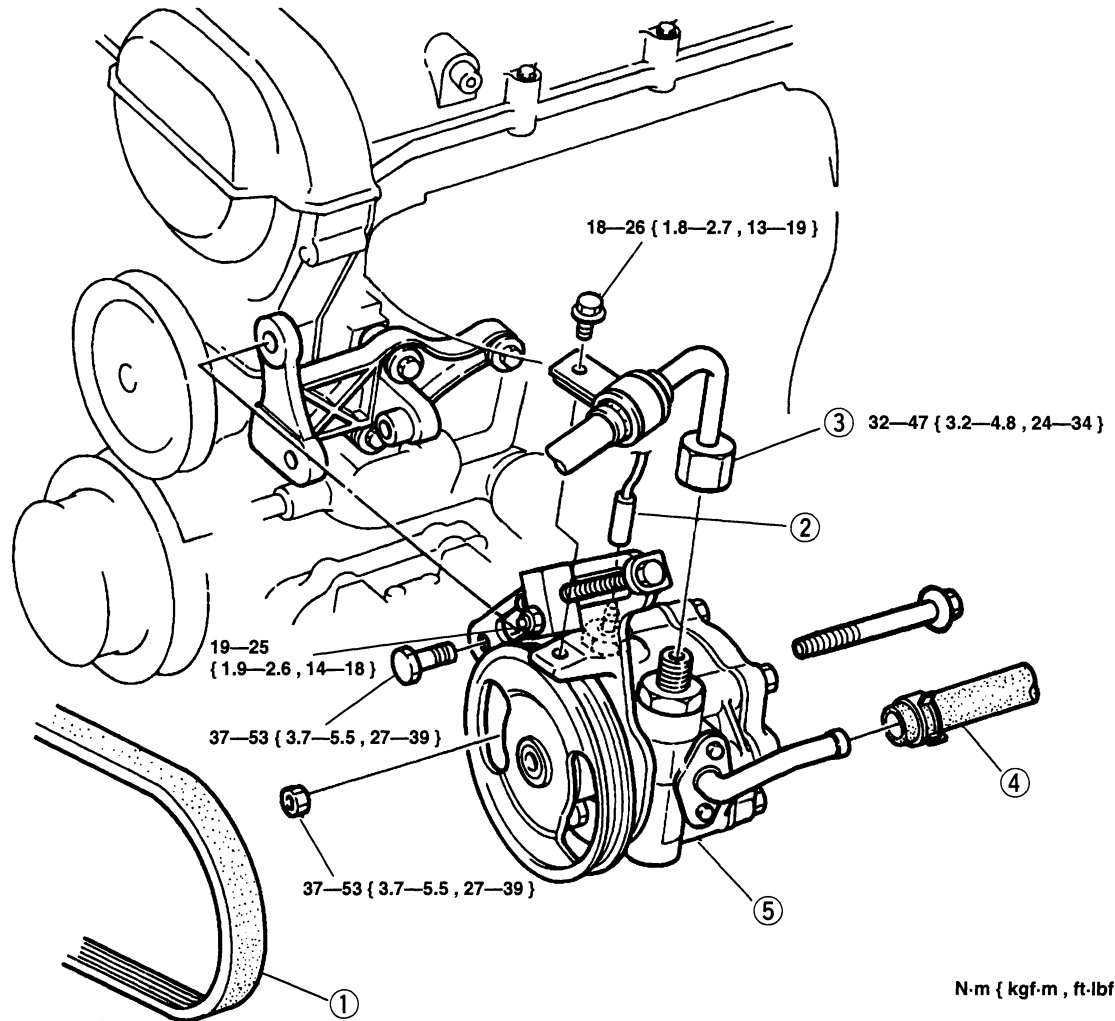
(Refer to 06—11 STEERING GEAR AND LINKAGE INSPECTION, Steering Rack Inspection.)

ENGINE SPEED SENSING POWER STEERING

POWER STEERING OIL PUMP REMOVAL / INSTALLATION

U5U612AJ

1. Remove in the order indicated in the table.
2. Install in the reverse order of removal indicated in the table.
3. Adjust the drive belt. (Refer to 01-10 DRIVE BELT ADJUSTMENT.)



U5U61240

1	Drive belt
2	Power steering pressure switch connector
3	Pressure pipe

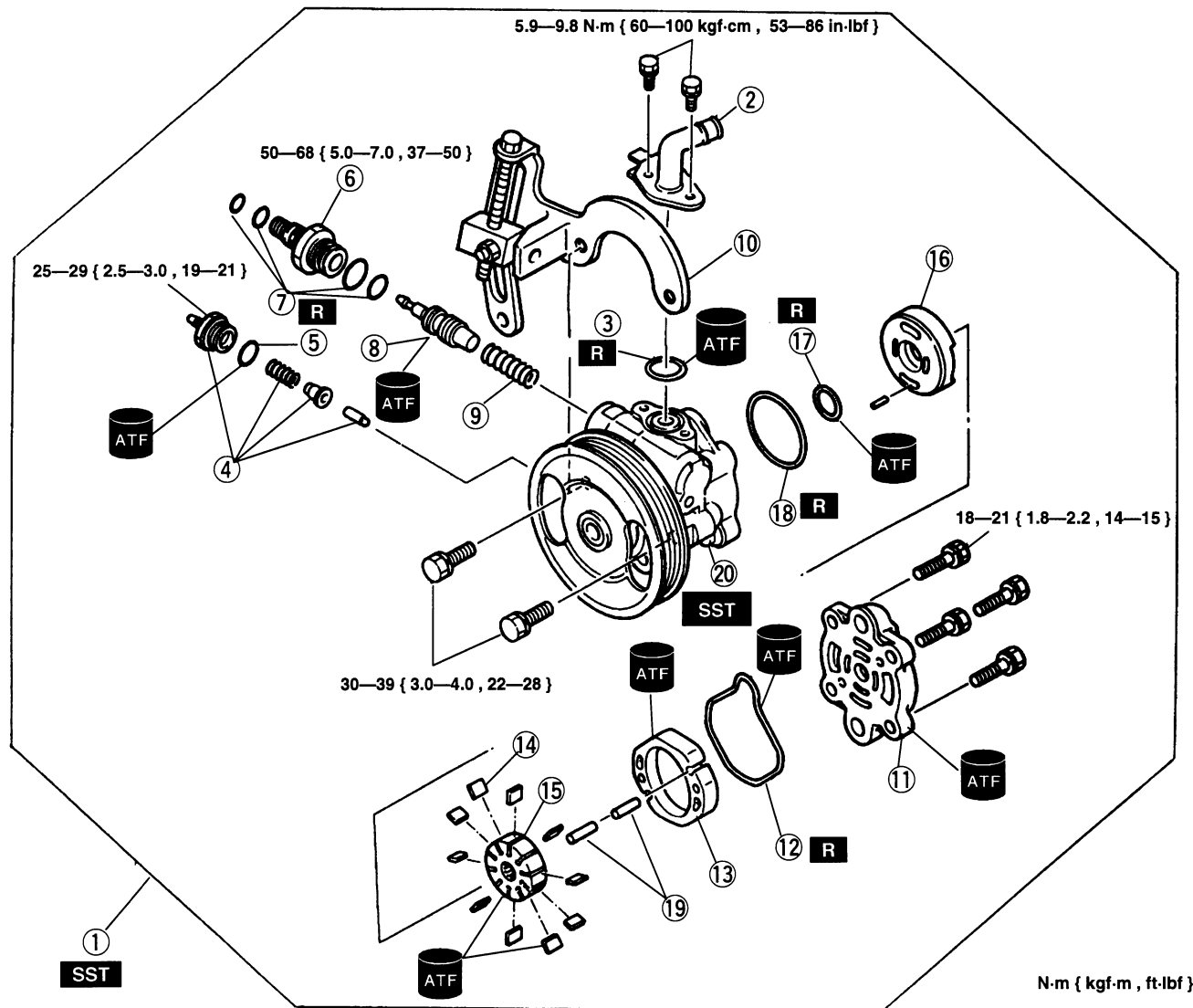
4	Return hose
5	Power steering oil pump

ENGINE SPEED SENSING POWER STEERING

POWER STEERING OIL PUMP DISASSEMBLY / ASSEMBLY

U5U612AK

1. The following procedure is for replacement of the O-rings only. Replace the pump component if other repairs are necessary.
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly indicated in the table.



U5U61241

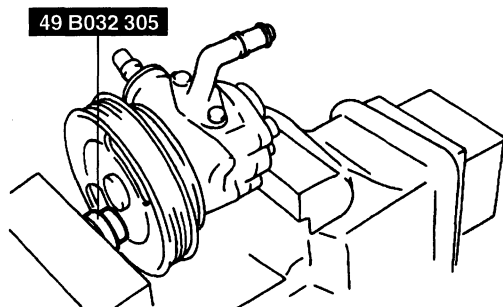
1	Oil pump ⚠ Disassembly Note
2	Suction pipe
3	O-ring
4	Power steering pressure switch component
5	O-ring
6	Connector
7	O-ring
8	Control valve
9	Spring
10	Bracket
11	Pump body rear

12	O-ring
13	Cam ring ⚠ Assembly Note
14	Blade ⚠ Assembly Note
15	Rotor ⚠ Assembly Note
16	Side plate
17	O-ring
18	O-ring
19	Pin
20	Pump body front

ENGINE SPEED SENSING POWER STEERING

Power Steering Oil Pump Disassembly Note

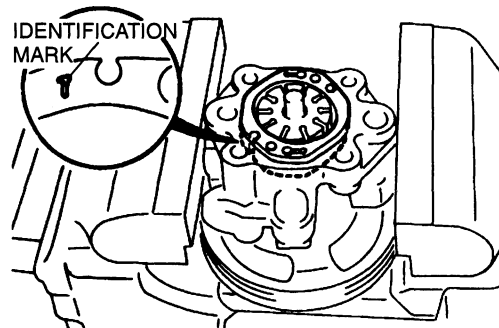
- Use the **SST** when securing the oil pump in a vise, so that force is not applied to the pulley or shaft.



U5U61242

Cam Ring Assembly Note

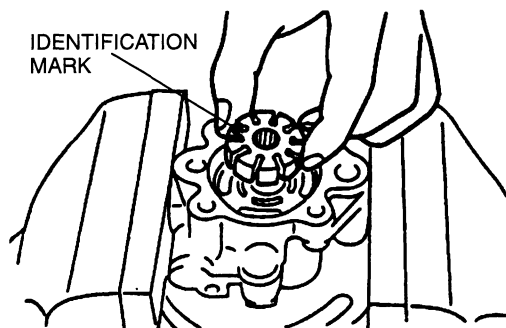
- Install the cam ring with the identification mark facing downward.



U5U61244

Rotor Assembly Note

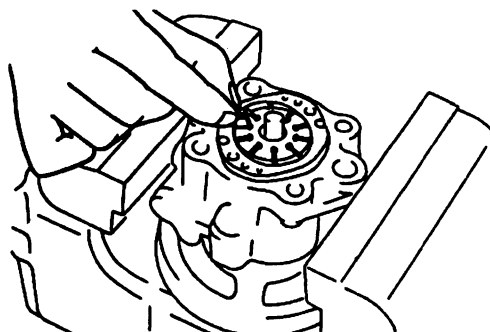
- Install the rotor with the identification mark facing upward.



U5U61243

Blade Assembly Note

- Install the blades into the rotor with the rounded edges facing outward.



U5U61245

06-50 TECHNICAL DATA

06 STEERING 06-50-1

06 STEERING

U5U650AA

Item		Specification
MANUAL STEERING		
Steering wheel	Outer diameter (mm { in })	370 { 14.6 }
	Lock-to-lock (turns)	3.36
Steering shaft and joint	Shaft	Collapsible, non-tilt
	Joint	2-cross joint
Steering gear	Gear type	Rack-and-pinion
	Total gear ratio	17.3
	Rack stroke (mm { in })	121.0 { 4.76 }
ENGINE SPEED SENSING POWER STEERING		
Steering wheel	Outer diameter (mm { in })	370 { 14.6 }
	Lock-to-lock (turns)	2.8
Steering shaft and joint	Shaft	Collapsible, non-tilt
	Joint	2-cross joint
Steering gear	Power assist type	Engine speed sensing
	Gear type	Rack-and-pinion
	Total gear ratio	14.4
	Rack stroke (mm { in })	121.0 { 4.76 }
	Power steering fluid	ATF Dexron®II or M-III
	Fluid capacity (L { US qt , Imp at })	0.8 { 0.85 , 0.70 }

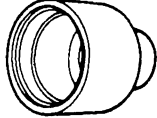
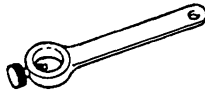
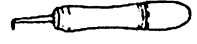
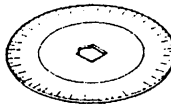
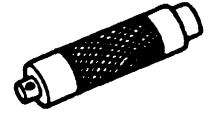
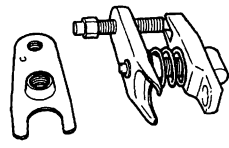
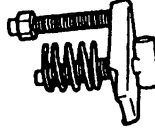
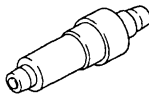
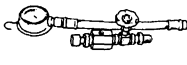
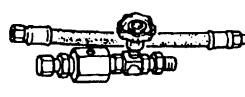
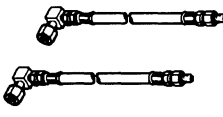
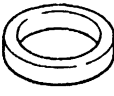
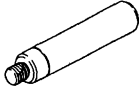
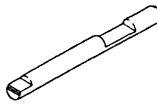
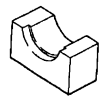
SERVICE TOOLS

06-60 SERVICE TOOLS

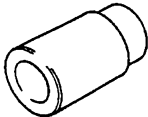
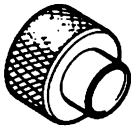
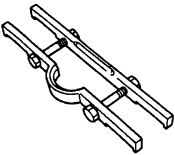
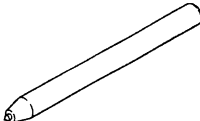
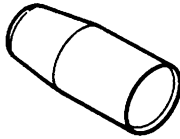
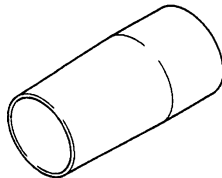
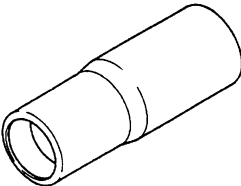
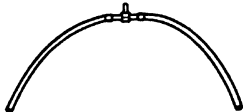
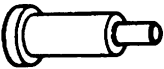
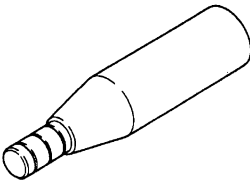
06 STEERING SST 06-60-1

06 STEERING SST

U5U660AA

49 1243 785 Installer, boot  1243785X	49 0180 510B Preload attachment  0180510B	49 0208 701A Boot air out tool  0208701A
49 H032 321A Hexagon wrench  H032321A	49 D032 316 Protractor  D032316X	49 G030 797 Handle  G030797X
49 T028 3A0 Puller set, ball joint  T0283A0X	49 T028 303 Body (Part of 49 T028 3A0)  T028303X	49 T028 304 Attachment (Part of 49 T028 3A0)  T028304X
49 N032 306 Replacer, oil seal and bearing  N032306X	49 1232 670A Gauge set, power steering  1232670A	49 1232 672 Gauge (Part of 49 1232 670A)  1232672X
49 1232 673 Valve body (Part of 49 1232 670A)  1232673X	49 H002 671 Adapter, power steering gauge  H002671X	49 B032 302 Adapter, power steering gauge  B032302X
49 N032 307 Spacer  N032307X	49 N032 308 Replacer, oil seal  N032308X	49 N032 309 Replacer, back up ring  N032309X
49 N032 310 Refacer  N032310X	49 N032 312 Holder  N032312X	49 N032 313 Guide  N032313X

SERVICE TOOLS

49 N032 314 Installer, oil seal  N032314X	49 F032 321 Installer, oil seal  F032321X	49 N032 318 Protector body, oil seal  N032318X
49 N032 319 Plate, support  N032319X	49 N032 311 Punch  N032311X	49 N032 304 Protector, oil seal  N032304X
49 D032 313 Seal ring former  D032313X	49 D032 315 Former and guide, seal ring  D032315X	49 N032 315 Protector  N032315X
49 N032 316 Protector  N032316X	49 G032 317 Hose  G032317X	49 G032 319 Adapter  G032319X
49 B032 305 Holder  B032305X	49 N032 317 Protector  N032317X	49 F032 303 Handle  F032303X
49 H032 338 Joint shaft  H032338X	—	—

HVAC

07 SECTION

TROUBLESHOOTING 07-01
REFRIGERANT SYSTEM 07-10
BASIC SYSTEM 07-11

CONTROL SYSTEM 07-40
TECHNICAL DATA 07-50
SERVICE TOOLS 07-60

07-01 TROUBLESHOOTING

FOREWORD 07-01-1
TROUBLESHOOTING INDEX 07-01-1

SYMPTOM TROUBLESHOOTING 07-01-2

07

FOREWORD

U5U701AA

- Refer to section GI and thoroughly read and understand the basic flow of troubleshooting in order to properly perform the procedures.

TROUBLESHOOTING INDEX

U5U701AB

- Use the chart below to verify the symptoms of the trouble in order to diagnose the appropriate area.

Note

- If multiple malfunctions simultaneously occur, diagnose the symptoms in numerical order, beginning with the smallest number first.

Note

- For the steps which have an asterisk (*), shake the wiring harness which is connected to the connector while performing the inspection. (Cause of the malfunction may be a poor connection of the connector, terminal, or wiring harness.)

NO.	SYMPTOM
1	Magnetic clutch does not operate
2	Condenser fan does not operate
3	Magnetic clutch and condenser fan do not operate
4	Insufficient cooling/No cooling/Intermittent cooling

TROUBLESHOOTING

SYMPTOM TROUBLESHOOTING

U5U701AC

1	Magnetic clutch does not operate		
TROUBLESHOOTING HINTS A/C relay ON signal system malfunction ① A/C relay does not turn on ● WIPER 20 A fuse malfunction ● A/C relay malfunction ● ECM malfunction ● Malfunction in wiring harness between WIPER 20 A fuse and A/C relay ● Malfunction in wiring harness between A/C relay and ECM Malfunction in power supply system of magnetic clutch ① Power supply is not inputted to magnetic clutch ● AD FAN 20 A fuse malfunction ● A/C relay malfunction ● Magnetic clutch malfunction ● Malfunction in wiring harness between AD FAN 20 A fuse and A/C relay ● Malfunction in wiring harness between A/C relay and magnetic clutch			
STEP	INSPECTION		ACTION
1	Are WIPER 20 A fuse and AD FAN 20 A fuse OK?	Yes	Go to next step.
		No	Repair wiring harness and replace fuse, then go to step 7.
2*	Start engine. Turn A/C switch and fan switch on. Is voltage at terminal A of magnetic clutch connector (1-pin) approximately 12 V?	Yes	Inspection magnetic clutch.
		No	Go to next step.
3*	Is voltage at terminal C of A/C relay connector (4-pin) approximately 12 V?	Yes	Go to next step.
		No	Repair wiring harness between AD FAM 20 A fuse and A/C relay, then go to step 7.
4*	Is voltage at terminal A of A/C relay connector (4-pin) approximately 12 V?	Yes	Go to next step.
		No	Repair wiring harness between WIPER 20 A fuse and A/C relay, then go to step 7.
5*	Is voltage at terminal D of A/C relay connector (4-pin) approximately 12 V?	Yes	Repair wiring harness between A/C relay and magnetic clutch, then go to step 7.
		No	Go to next step.
6*	Is voltage at terminal B of A/C relay connector (4-pin) approximately 12 V?	Yes	Inspect A/C relay.
		No	Check wiring harness (between A/C relay and ECM) and ECM.
7	Does magnetic clutch operate normally?	Yes	Troubleshooting completed.
		No	Recheck malfunction.

TROUBLESHOOTING

2	Condenser fan does not operate		
TROUBLESHOOTING HINTS Condenser fan relay ON signal system malfunction ① Condenser fan relay does not turn on - ENGINE 15 A fuse malfunction - Condenser fan relay malfunction - ECM malfunction - Malfunction in wiring harness between ENGINE 15 A fuse and condenser fan relay - Malfunction in wiring harness between condenser fan relay and ECM Malfunction in power supply system of condenser fan ① Power supply is not input to condenser fan - Condenser fan relay malfunction - Condenser fan malfunction - Malfunction in wiring harness between AD FAN 20 A fuse and condenser fan relay - Malfunction in wiring harness between condenser fan relay and condenser fan Ground system malfunction ① Condenser fan does not operate - Malfunction in wiring harness between condenser fan and ground			
STEP	INSPECTION		ACTION
1	Is ENGINE 15 A fuse OK?	Yes	Go to next step.
		No	Repair wiring harness and replace fuse, then go to step 7.
2*	Start engine. Turn A/C switch and fan switch on. Is voltage at terminal A of condenser fan connector (2-pin) approximately 12 V?	Yes	Go to next step.
		No	Go to step 3.
3*	Is voltage at terminal A of condenser fan relay connector (6-pin) approximately 12 V?	Yes	Go to next step.
		No	Repair wiring harness between ENGINE 15 A fuse and condenser fan relay, then go to step 7.
4*	Is voltage at terminal E of condenser fan relay connector (6-pin) approximately 12 V?	Yes	Go to next step.
		No	Repair wiring harness between AD FAN 20 A fuse and condenser fan relay, then go to step 7.
5*	Is voltage at terminal C of condenser fan relay connector (6-pin) approximately 12 V?	Yes	Repair wiring harness between condenser fan relay and condenser fan, then go to step 7.
		No	Go to next step.
6*	Is voltage at terminal B of condenser fan relay connector (6-pin) approximately 12 V?	Yes	Check wiring harness (between condenser fan relay and ECM) and ECM.
		No	Inspect condenser fan relay.
7	Does condenser fan operate OK?	Yes	Troubleshooting completed.
		No	Recheck malfunction.

TROUBLESHOOTING

3	Magnetic clutch and condenser fan do not operate		
TROUBLESHOOTING HINTS Malfunction in power supply system of fan switch ① Power supply is not input to fan switch ● ECM malfunction ● Thermoswitch malfunction ● Refrigerant pressure switch malfunction ● Fan switch malfunction ● Malfunction in wiring harness between ECM and refrigerant pressure switch ● Malfunction in wiring harness between refrigerant pressure switch and thermoswitch ● Malfunction in wiring harness between thermoswitch and heater control unit			
STEP	INSPECTION		ACTION
1*	Disconnect refrigerant pressure switch connector (2-pin). Turn IG SW to ON. Is voltage at terminal B of refrigerant pressure switch connector (2-pin) approximately 12 V?	Yes	Go to next step.
		No	Repair wiring harness between ECM and refrigerant pressure switch, then go to step 7.
2*	Turn IG SW to LOCK. Verify that refrigerant pressure is in normal range. Is there continuity between terminal A and B of refrigerant pressure switch connector (2-pin, switch-side)?	Yes	Reconnect refrigerant pressure switch connector (2-pin), then go to next step.
		No	Inspect refrigerant pressure switch.
3*	Trun IG SW to ON. Is voltage at terminal A of thermoswitch connector (1-pin, refrigerant pressure switch-side) approximately 12 V?	Yes	Go to next step.
		No	Repair wiring harness between refrigerant pressure switch and thermoswitch, then go to step 7.
4*	Is voltage at terminal A of thermoswitch connector (1-pin, heater control unit-side) approximately 12 V?	Yes	Go to next step.
		No	Inspect thermoswitch.
5*	Turn fan switch on. Is voltage at terminal F of heater control unit connector (8-pin) approximately 12 V while A/C switch is off?	Yes	Go to next step.
		No	Repair wiring harness between thermoswitch and heater control unit, then go to step 7.
6*	Is voltage at terminal F of heater control unit connector (8-pin) approximately 12 V while A/C switch is on?	Yes	Inspect ECM.
		No	Inspect fan switch.
7	Do magnetic clutch and condenser fan operate properly?	Yes	Troubleshooting completed.
		No	Recheck malfunction.

TROUBLESHOOTING

4	Insufficient cooling/No cooling/Intermittent cooling		
TROUBLESHOOTING HINTS Refrigerant pressure system malfunction ① High- and low-pressure side readings are higher than normal - Insufficient refrigerant in condenser - Too much refrigerant ② High- and low-pressure side readings are lower than normal - Insufficient charging of refrigerant ③ High-pressure side reading is a little lower than normal/low-pressure side reading is a little higher than normal - Expansion valve malfunction ④ High-pressure side reading rises to normal pressure range and then drops below range/low-pressure side reading is negative - Receiver/drier malfunction - Expansion valve malfunction ⑤ No difference between high- and low-pressure side readings - A/C compressor malfunction			
STEP	INSPECTION		ACTION
1	Are high- and low-pressure side readings higher than normal?	Yes	Go to step 6.
		No	Go to next step.
2	Are high- and low-pressure side readings lower than normal?	Yes	Go to step 7.
		No	Go to next step.
3	Is high-pressure side reading a little lower than normal?/Is low-pressure side reading a little higher than normal?	Yes	Replace expansion valve, then go to step 9.
		No	Go to next step.
4	Do high-pressure side reading rises to normal pressure range and then drops below range?/Is low-pressure side reading negative?	Yes	Go to step 8.
		No	Go to next step.
5	Is there no difference between high- and low-pressure side readings?	Yes	Replace A/C compressor, then go to step 9.
		No	Recheck malfunction.
6	Are any condenser fins clogged or damaged?	Yes	Clean or repair condenser fins, then go to step 9.
		No	Adjust refrigerant amount, then go to step 9.
7	Conduct gas leak test. Are there any oil stains or gas leaks?	Yes	Take the necessary measure, depending on the result of “gas leak test”.
		No	Regulate refrigerant amount, then go to step 9.
8	Turn fan switch off and wait for about 10 minutes. Set fan switch at 4th. Are pressure readings normal immediately after A/C compressor is turned on?	Yes	Replace reciver/drier, then go to next step.
		No	Replace expansion valve, then go to next step.
9	Does cool air discharge?	Yes	Troubleshooting completed.
		No	Recheck malfunction.

07-10 REFRIGERANT SYSTEM

REFRIGERANT SYSTEM SERVICE

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Storing Refrigerant	07-10-1
Handling Refrigerant	07-10-1
REFRIGERANT SYSTEM SERVICE	
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REFRIGERANT CHARGE CHECK	07-10-4
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PERFORMANCE TEST	07-10-5

REFRIGERANT SYSTEM SERVICE WARNINGS

U5U710AA

Using/Handling Unapproved Refrigerant

- Using a flammable refrigerant, such as OZ-12, in this vehicle is dangerous. In an accident, the refrigerant may catch fire, resulting in serious injury or death. When servicing this vehicle, use only R-134a.
- Checking for system leaks on a vehicle that has been serviced with flammable refrigerant, such as OZ-12, is dangerous. Conventional leak detectors use an electronically generated arc which can ignite the refrigerant, causing serious injury or death. If a flammable refrigerant may have been used to service the system, or if you suspect a flammable refrigerant has been used, contact the local fire marshal or EPA office for information on handling the refrigerant.

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 }.
- Do not allow the refrigerant to leak near fire or any kind of heat. A poisonous gas may be 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 Refrigerant

- 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.

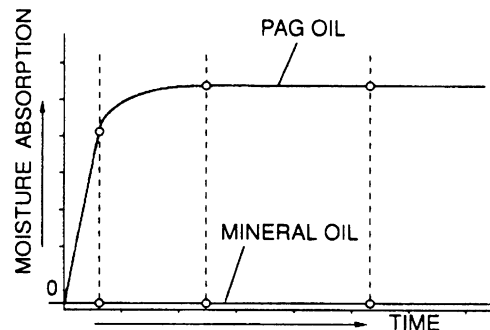
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REFRIGERANT SYSTEM SERVICE CAUTIONS

U5U710AB

Compressor Oil

- Use only ND-OIL9 compressor oil for this vehicle. Using PAG oil other than ND-OIL9 compressor oil can damage the A/C compressor.
- Do not spill ND-OIL9 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.
- 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.



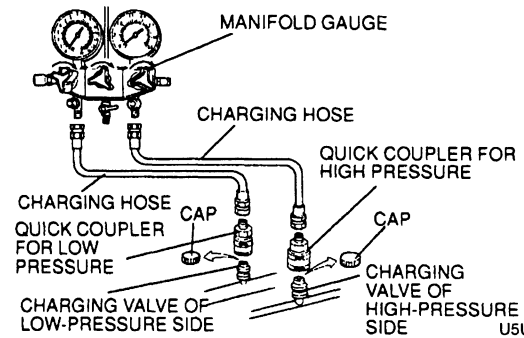
U5U71001

REFRIGERANT SYSTEM

MANIFOLD GAUGE SET INSTALLATION

U5U710AC

1. Fully close the valves of the manifold gauge.
2. Connect charging hoses to the high- and low-pressure side joints of the manifold gauge.
3. Connect quick couplers to the ends of the charging hoses.
4. Remove the caps from the high- and low-pressure side charging valves.
5. Connect the quick couplers to the charging valves.



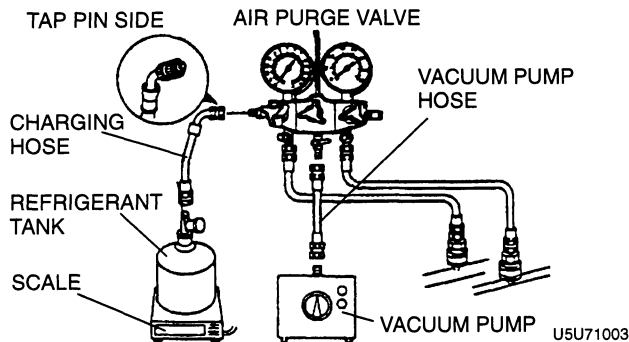
U5U71002

CHARGING

U5U710AD

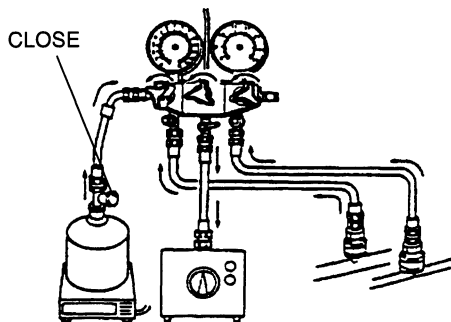
1. Install the manifold gauge set. (Refer to 07-10 MANIFOLD GAUGE SET INSTALLATION.)
2. Connect the tap pin side of the charging hose to the air purge valve of the manifold gauge.
3. Connect the vacuum pump hose to the center joint of the manifold gauge.
4. Connect the vacuum pump hose to the vacuum pump.
5. Connect the charging hose to the refrigerant tank.
6. Place the refrigerant tank on the scale.

Regular amount of refrigerant
600 g { 21.2 oz }



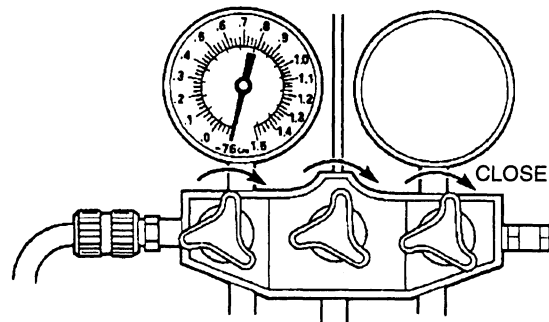
U5U71003

7. Open all the valves of the manifold gauge.
8. Start the vacuum pump and let it operate for **15 minutes**.



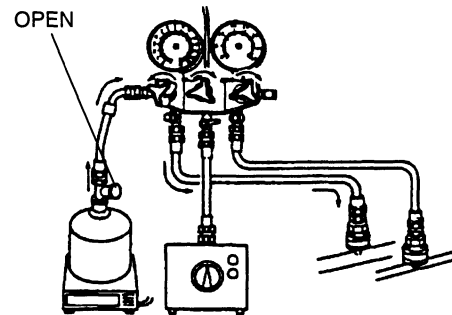
U5U71004

9. Verify that the high- and low-pressure side readings of the manifold gauge are at **-101 kPa { -760 mmHg , -29.9 inHg }**. Close each valve of the manifold gauge.



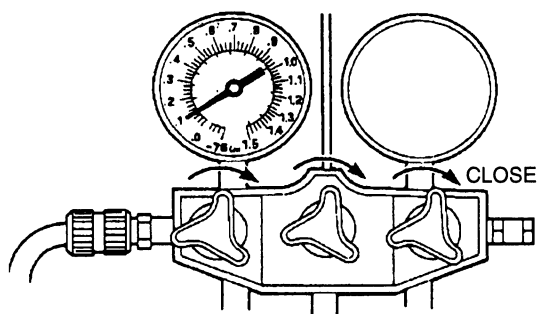
U5U71005

10. Stop the vacuum pump and wait for about **5 minutes**.
11. Check the low-pressure side reading of the manifold gauge. 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.
14. Open the low-pressure side valve of the manifold gauge.



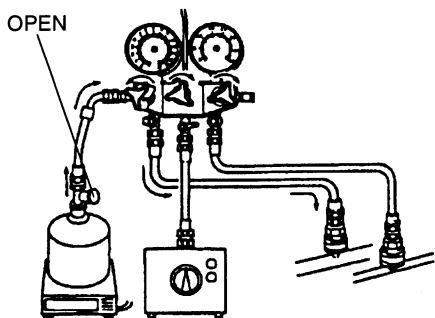
U5U71006

15. When the low-pressure side reading increases to **0.1 MPa { 1 kgf/cm² , 14 psi }**, close the low-pressure side valve of the manifold gauge.



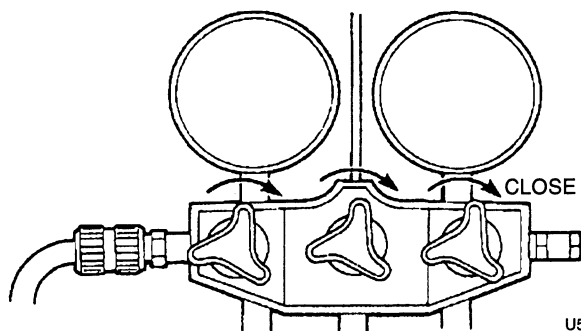
U5U71007

16. Check for leaks from the cooler pipe/hose connections by using a 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.
17. Open the low-pressure side valve of the manifold gauge and charge with refrigerant until the weight of the refrigerant tank has decreased 300 g { 10.6 oz } from the amount in step 13.



U5U71008

18. Close the low-pressure side valve of the manifold gauge.

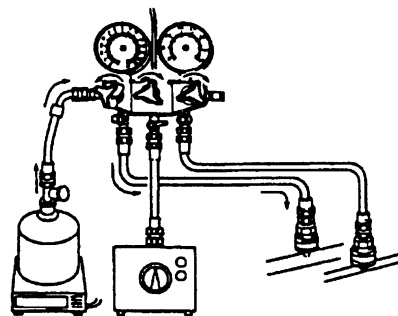


U5U71009

Warning

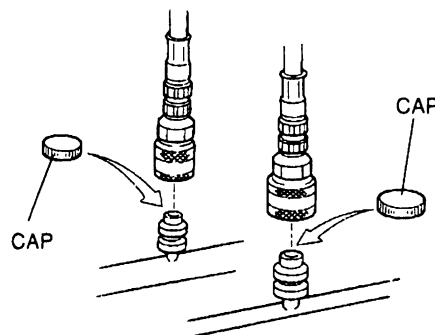
- Running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans will increase and the cans could explode, scattering metal fragments and liquid refrigerant that can seriously injure you. Therefore, do not open the high-pressure side valve while the engine is running.

19. Start the engine and actuate the A/C compressor.
20. Open the low-pressure side valve of the manifold gauge and charge with refrigerant until the weight of the refrigerant tank has decreased 600 g { 21.2 oz } from the amount in step 13.



U5U71010

21. Close the low-pressure side valve of the manifold gauge.
22. Stop the engine and A/C compressor.
23. Check for leaks by using a 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 high- and low-pressure side quick couplers from the charging valves.
25. Install the caps to the charging valves.



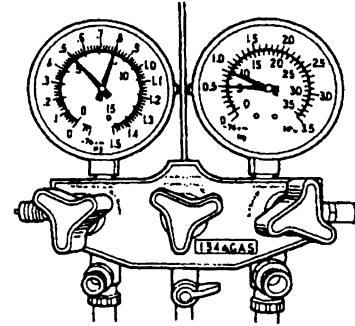
U5U71011

REFRIGERANT SYSTEM

REFRIGERANT CHARGE CHECK

U5U710AE

1. Install the manifold gauge set. (Refer to 07-10 MANIFOLD GAUGE SET INSTALLATION.)
2. Check the refrigerant pressure reading with the engine stopped.
3. Verify that the high- and low-pressure side readings of the manifold gauge are at **493—788 kPa { 5.02—8.04 kgf/cm² , 72—114 psi }**. If the pressure readings are lower than specified, recharge the refrigerant amount. (Refer to 07-10 CHARGING.) If the pressure readings are within the specification but there is insufficient cooling, go to the next step. If the pressure readings are within the specification and there are no leaks, the refrigerant amount is OK.
4. Start the engine and run it at a constant **2000 rpm**.
5. Turn the A/C switch on and set the fan switch at 4th.
6. Set the REC/FRESH lever to REC (wire type) or turn the REC switch on (logic type).
7. If the A/C compressor is short-cycling, note the low-pressure side reading at which the magnetic clutch kicks out.
8. If the pressure is **170 kPa { 1.7 kgf/cm² , 24 psi }** or lower, evacuate then recharge the refrigerant system with the proper amount of refrigerant. (Refer to 07-10 CHARGING.) If the pressure is **210 kPa { 2.1 kgf/cm² , 30 psi }** or higher, inspect the thermostatic switch. (Refer to 07-40 THERMOSWITCH INSPECTION.)

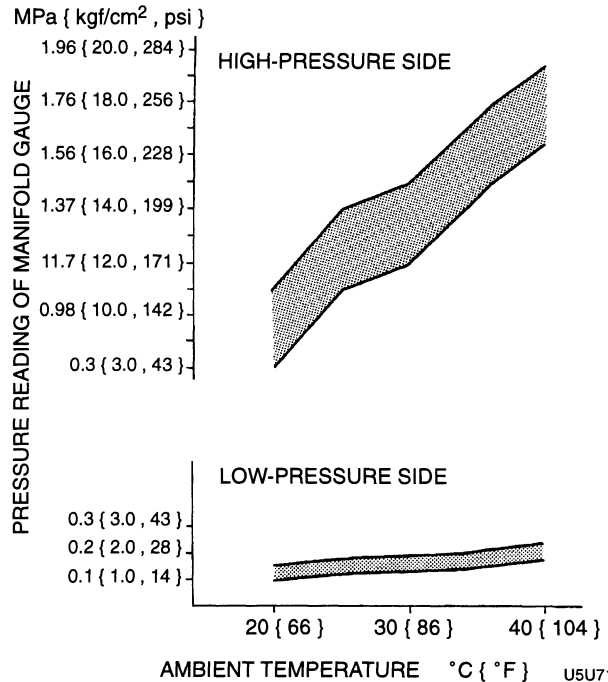


U5U71012

REFRIGERANT PRESSURE CHECK

U5U710AF

1. Install the manifold gauge set. (Refer to 07-10 MANIFOLD GAUGE SET INSTALLATION.)
2. Close all the doors and all the windows.
3. Warm up the engine and run it at a constant **1,500 rpm**.
4. Turn the A/C switch on.
5. Set the fan switch at 4th.
6. Set the REC/FRESH lever to REC. (wire type)
7. Turn the REC switch on. (logic type)
8. Set the mode lever to VENT. (wire type)
9. Turn the VENT switch on. (logic type)
10. Set the temperature control lever to MAX COLD.
11. Measure the high- and low-pressure side readings of the manifold gauge.
12. If the high- and low-pressure side readings are in the shaded zones shown in the figure, the refrigerant system is normal.



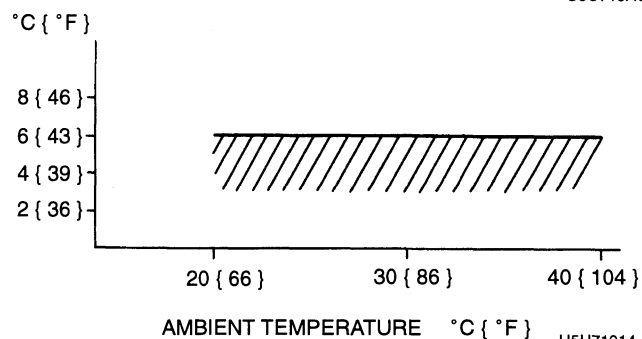
13. If the high- and low-pressure side readings are not as specified, troubleshoot the refrigerant system. (Refer to 07-01 TROUBLESHOOTING.)

REFRIGERANT SYSTEM

PERFORMANCE TEST

Note

- After servicing the refrigerant system, test its performance.
1. Install the manifold gauge set. (Refer to 07-10 MANIFOLD GAUGE SET INSTALLATION.)
 2. Close all the doors and all the windows.
 3. Warm up the engine and run it at a constant **1,500 rpm**.
 4. Turn the A/C switch on.
 5. Set the fan switch at 4th.
 6. Set the REC/FRESH lever to REC.
 7. Set the mode lever to VENT. (wire type)
 8. Set the temperature control lever to MAX COLD.



9. Record center ventilator right side temperature.
10. Determine and record ambient temperature.
11. Verify that the temperature reading is in the shaded zone.
12. If the performance is not within the shaded zone, troubleshoot the refrigerant system. (Refer to 07-01 TROUBLESHOOTING.)

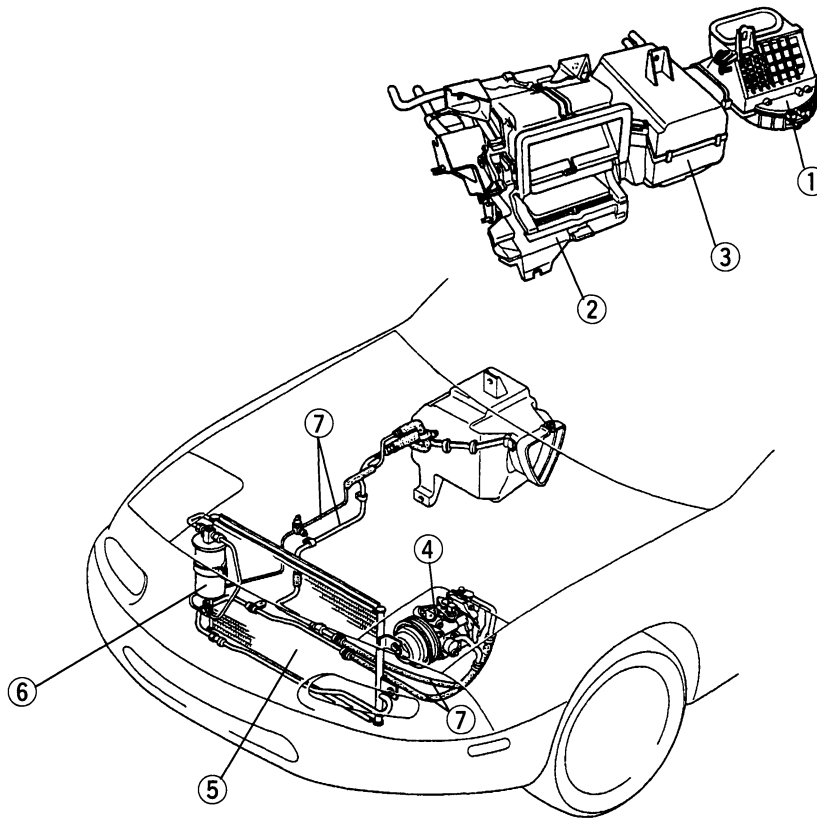
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BASIC SYSTEM STRUCTURAL VIEW

U5U711AA



U5U71101

1	Blower unit
2	Heater unit
3	Cooling unit
4	A/C compressor

5	Condenser
6	Receiver/drier
7	Refrigerant lines

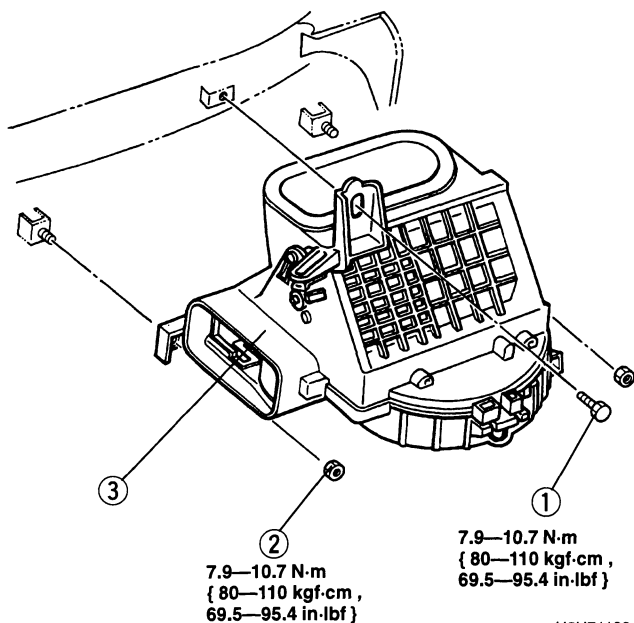
BASIC SYSTEM

BLOWER UNIT REMOVAL / INSTALLATION

U5U711AB

1. Disconnect the negative battery cable.
2. Remove the glove compartment.
3. Remove the seal plate.
4. Disconnect the air intake wire.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.
7. Adjust the air intake wire.

1	Bolt
2	Nut
3	Blower unit



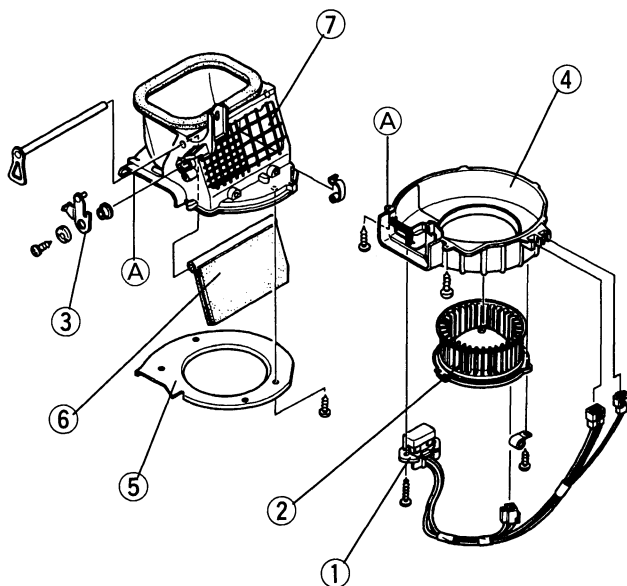
U5U71102

BLOWER UNIT DISASSEMBLY / ASSEMBLY

U5U711AC

1. Remove the blower unit. (Refer to 07–11 BLOWER UNIT REMOVAL / INSTALLATION.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly.

1	Resistor
2	Blower motor
3	Air intake link
4	Case (bottom)
5	Air guider
6	Air intake door
7	Case (top)



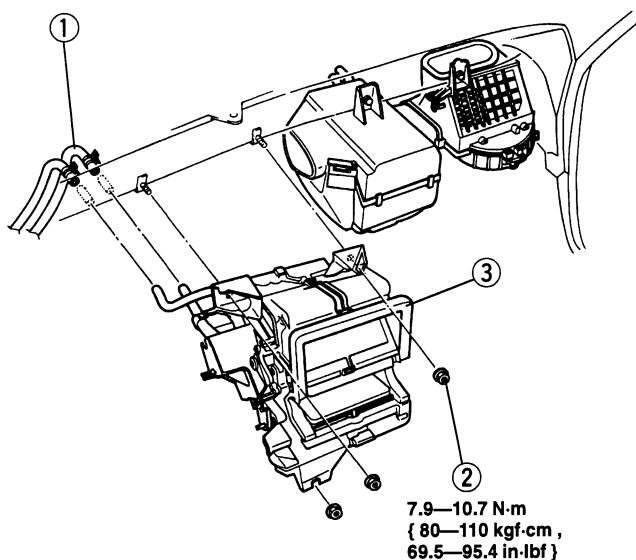
U5U71103

HEATER UNIT REMOVAL / INSTALLATION

U5U711AD

1. Drain the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT, Draining.)
2. Remove the dashboard. (Refer to 09-17 DASHBOARD REMOVAL / INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Refill the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT, Refilling.)

1	Heater hose
2	Nut
3	Heater unit

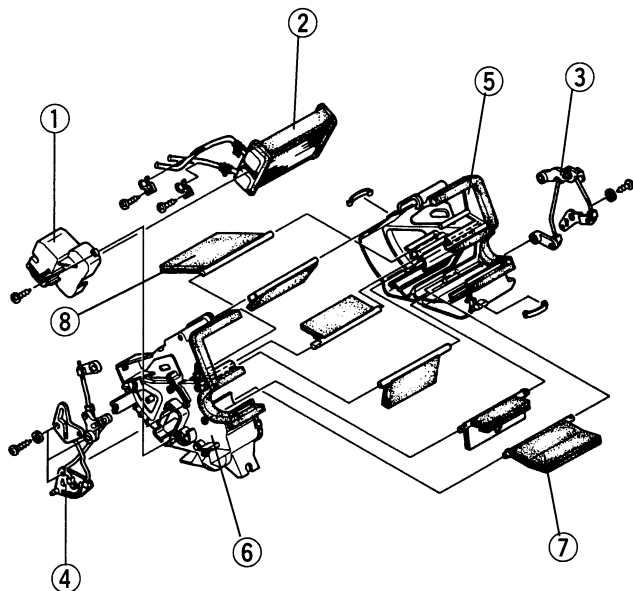


HEATER UNIT DISASSEMBLY / ASSEMBLY

U5U711AE

1. Remove the heater unit. (Refer to 07-11 HEATER UNIT REMOVAL / INSTALLATION.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly.

1	Cover
2	Heater core
3	Air mix link
4	Airflow mode link
5	Case (RH)
6	Case (LH)
7	Air mix door
8	Airflow mode door



U5U71105

BASIC SYSTEM

HEATER CORE INSPECTION

U5U711AF

1. Remove the heater core from the heater unit.
2. Check for cracks, damage, and coolant leakage. If any are found, replace the heater core.
3. Check for bent fins. If any are bent, use a flat-head screwdriver to straighten them.
4. Verify that the heater core inlet and outlet are not distorted or damaged. Repair with pliers if necessary.

COOLING UNIT REMOVAL / INSTALLATION

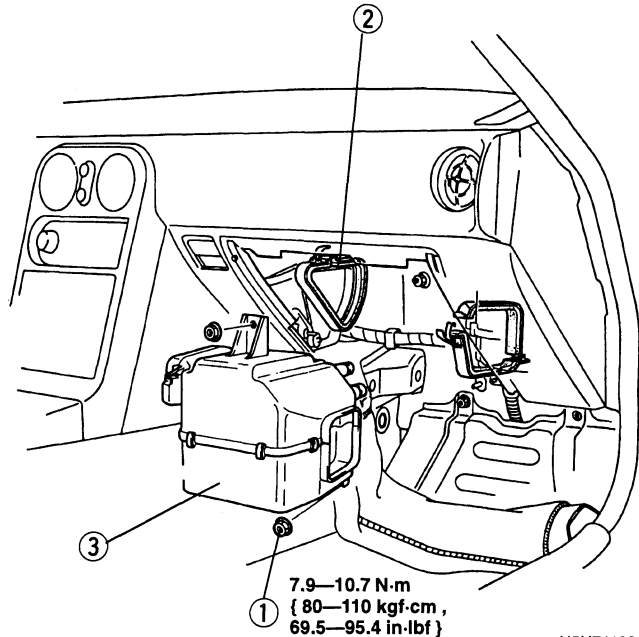
U5U711AG

1. Discharge the refrigerant from the system.
2. Disconnect the negative battery cable.
3. Remove the glove compartment.
4. Disconnect cooler pipe No.1 and No.2. (Refer to 07-11 REFRIGERANT LINES REMOVAL / INSTALLATION.)

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.

5. Remove in the order indicated in the table.
6. Install in the reverse order of removal indicated in the table.
7. Reconnect cooler pipe No.1 and No.2. (Refer to 07-11 REFRIGERANT LINES REMOVAL / INSTALLATION.)
8. Install the glove compartment.
9. Connect the negative battery cable.
10. Charge the system and test its performance. (Refer to 07-10 CHARGING.) (Refer to 07-10 PERFORMANCE TEST.)



U5U71106

1	Nut
2	Seal plate
3	Cooling unit 📄 Installation Note

Cooling Unit Installation Note

- When installing a new cooling unit, add ND-OIL9 compressor oil into the refrigeration cycle.

Supplemental amount

40 ml { 40 cc , 1.4 fl oz }

COOLING UNIT DISASSEMBLY / ASSEMBLY

U5U711AH

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.
- To prevent the pipe from breaking, loosen the joint by using two open-end wrenches.

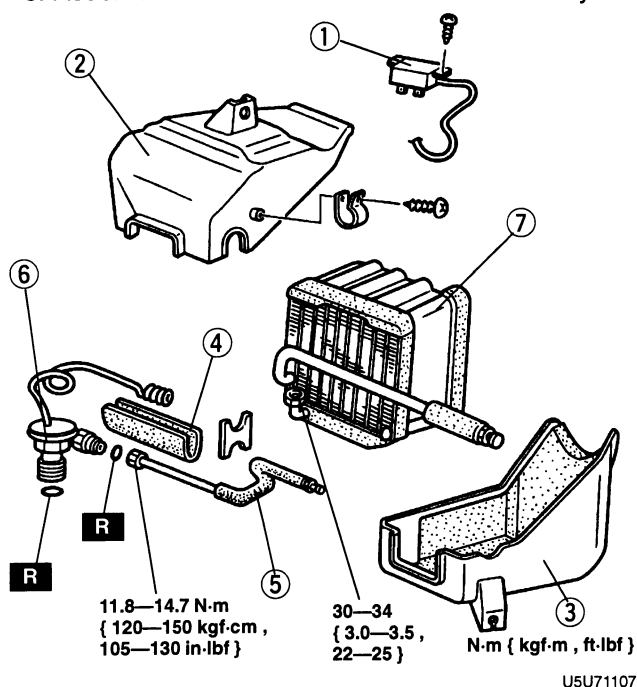
1. Remove the cooling unit. (Refer to 07-11 COOLING UNIT REMOVAL / INSTALLATION.)
2. Disassemble in the order indicated in the table.

Caution

- To prevent the pipe from breaking, tighten the joint by using an open-end wrench and a torque wrench.
- To prevent the O-ring from breaking, tighten the nut of the joint by hand.

BASIC SYSTEM

3. Assemble in the reverse order of disassembly.



1	Thermoswitch ☐ Assembly note
2	Case (top)
3	Case (bottom)
4	Sponge rubber
5	Pipe
6	Expansion valve ☐ Assembly Note
7	Evaporator ☐ Assembly Note

Evaporator Assembly Note

- When installing a new evaporator, add ND-OIL9 compressor oil into the refrigeration cycle.

Supplemental amount
40 ml { 40 cc , 1.4 fl oz }

Expansion Valve Assembly Note

- Apply compressor oil to the O-rings and connect the joints.
- Install the heat-sensing tube to its proper position.

Thermoswitch Assembly Note

- Install the thermoswitch to its proper position.

EVAPORATOR INSPECTION

- Remove the evaporator from the cooling unit.
- Check for cracks, damage, and oil leakage. If any are found, replace the evaporator.

- Check for bent fins. If any are bent, use a flathead screwdriver to straighten them.

U5U711AJ

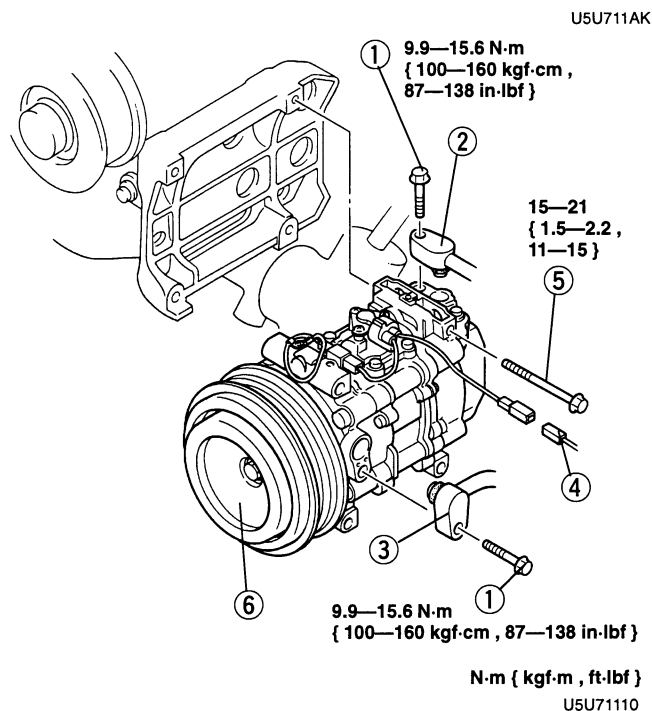
A/C COMPRESSOR REMOVAL / INSTALLATION

- Discharge the refrigerant from the system.
- Disconnect the negative battery cable.
- Remove the splash shield and air guide.
- Remove the A/C drive belt.

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.

- Remove in the order indicated in the table.
- Install in the reverse order of removal indicated in the table.
- Install and adjust the A/C drive belt. (Refer to 01–10 DRIVE BELT ADJUSTMENT.)
- Install the splash shield and air guide.
- Connect the negative battery cable.
- Charge the system and test its performance. (Refer to 07–10 CHARGING.) (Refer to 07–10 PERFORMANCE TEST.)



BASIC SYSTEM

1	Bolt
2	Flexible hose (HI) ☞ 07-11 REFRIGERANT LINES REMOVAL / INSTALLATION
3	Flexible hose (LO) ☞ 07-11 REFRIGERANT LINES REMOVAL / INSTALLATION
4	Connector
5	Bolt
6	A/C compressor ☞ Installation Note

A/C Compressor Installation Note

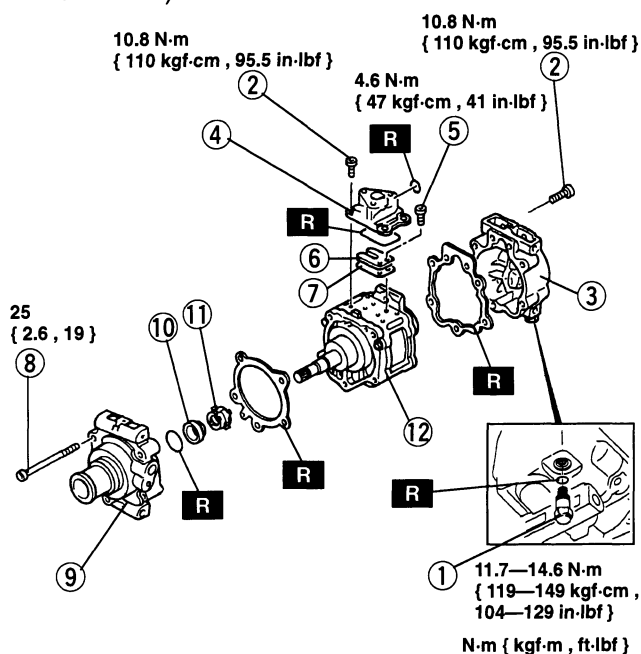
- Remove the following amount of compressor oil from the new A/C compressor when replacing the A/C compressor.

Compressor oil to be removed

= 200 ml { 200 cc , 6.76 fl oz } – [compressor oil from old A/C compressor + 15 ml { 15 cc , 0.5 fl oz }]

A/C COMPRESSOR DISASSEMBLY / ASSEMBLY

- Disassemble the magnetic clutch. (Refer to 07-40 MAGNETIC CLUTCH DISASSEMBLY / ASSEMBLY.)
- Disassemble in the order indicated in the table.
- Assemble in the reverse order of disassembly.
- Fill the A/C compressor with the same amount of ND-OIL9 compressor oil as was drained before disassembly.
- Assemble the magnetic clutch. (Refer to 07-40 MAGNETIC CLUTCH DISASSEMBLY / ASSEMBLY.)



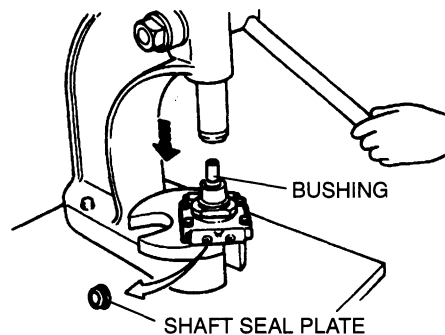
U5U71111

U5U711AL

1	Pressure relief valve
2	Bolt
3	Rear housing
4	Discharge valve body
5	Bolt
6	Discharge valve plate
7	Discharge valve
8	Bolt
9	Front housing
10	Shaft seal plate ☞ Disassembly Note ☞ Assembly Note
11	Shaft seal
12	Compressor body

Shaft Seal Plate Disassembly Note

- Remove the shaft seal plate by using a suitably sized bushing.

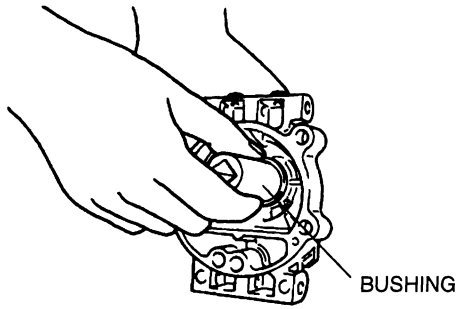


U5U71112

BASIC SYSTEM

Shaft Seal Plate Assembly Note

- Install the shaft seal plate by using a suitably sized bushing.



U5U71113

CONDENSER REMOVAL / INSTALLATION

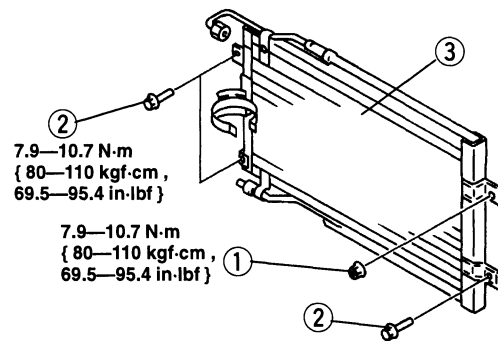
U5U711AM

1. Discharge the refrigerant from the system.
2. Remove the splash shield and air guider.
3. Remove the receiver/drier. (Refer to 07-11 RECEIVER/DRIER REMOVAL / INSTALLATION.)
4. Disconnect the flexible hose (HI). (Refer to 07-11 REFRIGERANT LINES REMOVAL / INSTALLATION.)

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.

5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.
7. Reconnect the flexible hose (HI). (Refer to 07-11 REFRIGERANT LINES REMOVAL / INSTALLATION.)
8. Install the receiver/drier. (Refer to 07-11 RECEIVER/DRIER REMOVAL / INSTALLATION.)
9. Install the splash shield and air guider.
10. Charge the system and test its performance. (Refer to 07-10 CHARGING.) (Refer to 07-10 PERFORMANCE TEST.)



U5U71114

1	Nut
2	Bolt
3	Condenser ☞ Installation Note

Condenser Installation Note

- When installing a new condenser, add ND-OIL9 compressor oil into the refrigeration cycle.

Supplemental amount

30 ml { 30 cc , 1.0 fl oz }

CONDENSER INSPECTION

U5U711AN

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.

BASIC SYSTEM

RECEIVER/DRIER REMOVAL / INSTALLATION

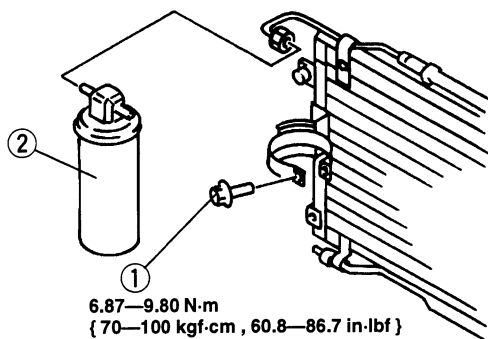
U5U711AP

1. Discharge the refrigerant from the system.
2. Remove cooler pipe No.3. (Refer to 07-11 REFRIGERANT LINES REMOVAL / INSTALLATION.)

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 in the order indicated in the table.
4. Install in the reverse order of removal.
5. Charge the system and test its performance. (Refer to 07-10 CHARGING.) (Refer to 07-10 PERFORMANCE TEST.)



U5U71115

1	Bolt
2	Receiver/drier ☞ Installation Note

Receiver/drier Installation Note

- When installing a new receiver/drier, add ND-OIL9 compressor oil into the refrigeration cycle.

Supplemental amount

10 ml { 10 cc , 0.3 fl oz }

REFRIGERANT LINES REMOVAL / INSTALLATION

U5U711AQ

1. Discharge the refrigerant from the system.
2. Disconnect the negative battery cable.

Caution

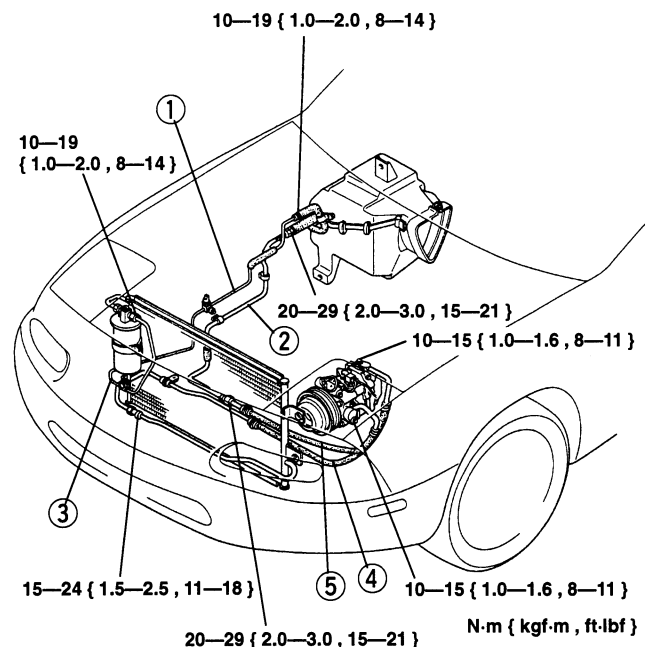
- If moisture or foreign material enters the refrigeration cycle, cooling ability will be lowered and abnormal noise will occur. Always immediately plug all open fittings after removing any refrigeration cycle parts to keep moisture or foreign material out of the cycle.
- To prevent the pipe from breaking, loosen the joint by using two open-end wrenches.

3. Remove the cooler hose or pipe as indicated in the table.

Caution

- To prevent the pipe from breaking, tighten the joint by using an open-end wrench and a torque wrench.
- To prevent the O-ring from breaking, tighten the nut or bolt of the joint by hand.

4. Install in the reverse order of removal.
5. Connect the negative battery cable.
6. Charge the system and test its performance. (Refer to 07-10 CHARGING.) (Refer to 07-10 PERFORMANCE TEST.)



U5U71116

BASIC SYSTEM

1	Cooler pipe No.1 ☞ Refrigerant Lines Installation Note
2	Cooler pipe No.2 ☞ Refrigerant Lines Installation Note
3	Cooler pipe No.3 ☞ Refrigerant Lines Installation Note
4	Flexible hose (HI) ☞ Refrigerant Lines Installation Note
5	Flexible hose (LO) ☞ Refrigerant Lines Installation Note

Refrigerant Lines Installation Note

1. Apply compressor oil to the O-rings and connect the joints.
2. When installing a new cooler hose or pipe add ND-OIL9 compressor oil into the refrigeration cycle.

Supplemental amount

10 ml { 10 cc , 0.3 fl oz }

07-40 CONTROL SYSTEM

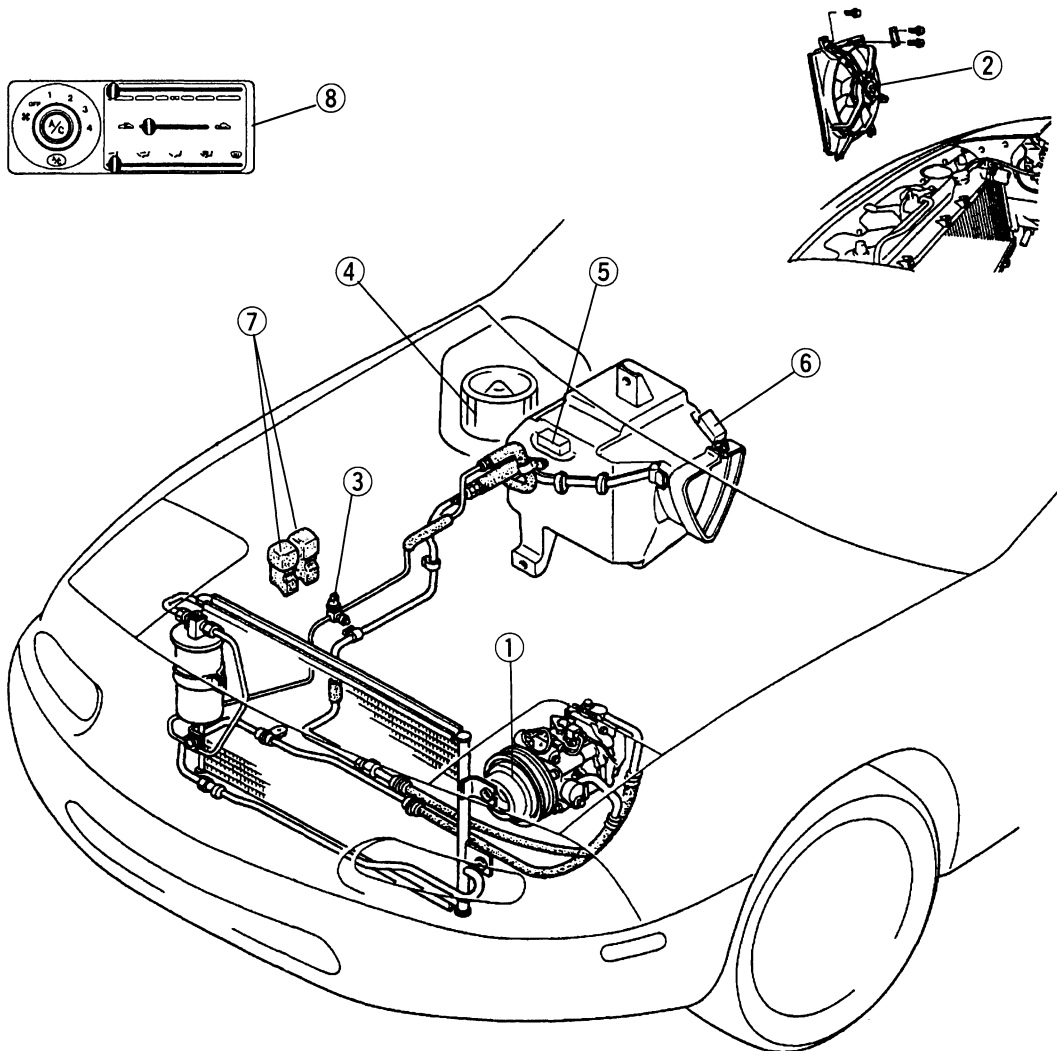
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CONTROL SYSTEM STRUCTURAL VIEW

U5U740AA



U5U74001

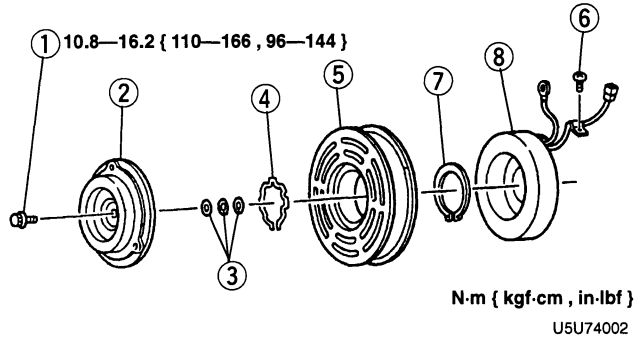
1	Magnetic clutch
2	Condenser fan
3	Refrigerant pressure switch
4	Blower motor

5	Resistor
6	Thermoswitch
7	A/C relay and condenser fan relay
8	Heater control unit

MAGNETIC CLUTCH DISASSEMBLY / ASSEMBLY

U5U740AB

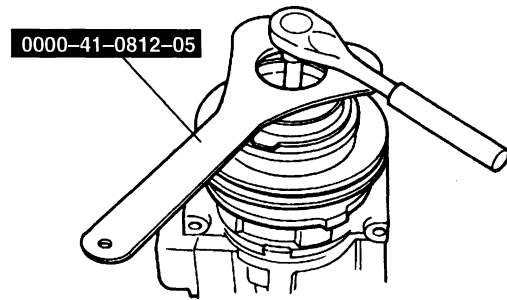
1. Remove the A/C compressor. (Refer to 07-11 A/C COMPRESSOR REMOVAL / INSTALLATION.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly indicated in the table.
4. Adjust the magnetic clutch.
5. Install the A/C compressor. (Refer to 07-11 A/C COMPRESSOR REMOVAL / INSTALLATION.)



1	Bolt ☞ Disassembly Note
2	Pressure plate ☞ Disassembly Note
3	Shim
4	Snap ring
5	A/C compressor pulley
6	Screw
7	Snap ring
8	Stator

Bolt Disassembly Note

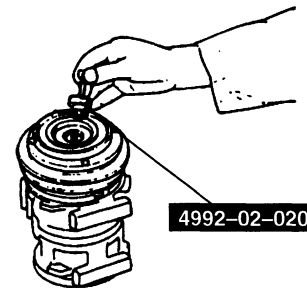
- Remove the bolt by using the SST.



U5U74003

Pressure Plate Disassembly Note

- Remove the pressure plate by using the SST.



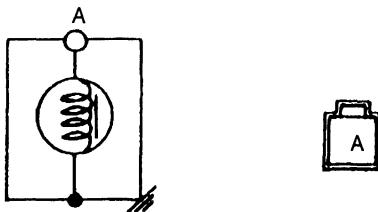
U5U74004

MAGNETIC CLUTCH INSPECTION

U5U740AC

1. Disconnect the magnetic clutch connector.
2. Connect battery positive voltage to terminal A of the magnetic clutch and ground to A/C compressor body.

3. Verify that the magnetic clutch operates.
4. If not as specified, replace the stator.



U5U74024

MAGNETIC CLUTCH ADJUSTMENT

U5U740AD

- Adjust the clearance by using shims if necessary. Adjusting shims are available in the following thicknesses.

Adjusting shim size

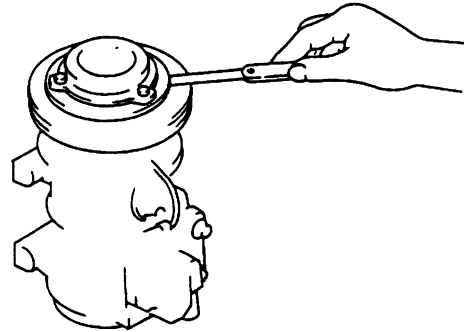
0.1 mm { 0.004 in }

0.3 mm { 0.012 in }

0.5 mm { 0.020 in }

Standard clearance

0.35—0.65 mm { 0.014—0.025 in }



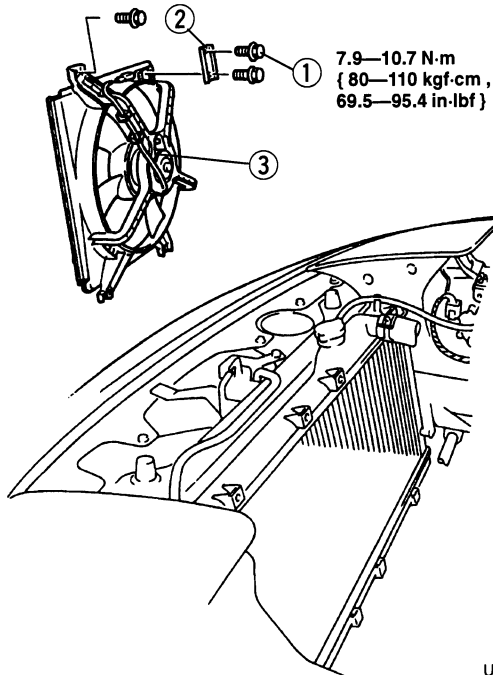
U5U74005

CONDENSER FAN REMOVAL / INSTALLATION

U5U740AE

1. Disconnect the negative battery cable.
2. Loosen the lower installation bolt of condenser fan.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Tighten the lower installation bolt of condenser fan.

1	Bolt
2	Bracket
3	Condenser fan

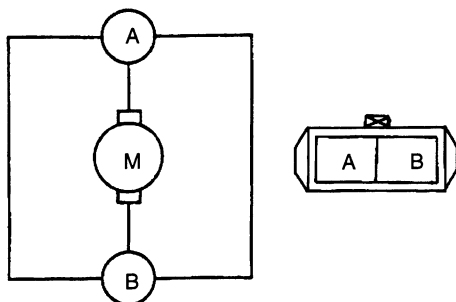


U5U74006

CONDENSER FAN INSPECTION

U5U740AF

1. Disconnect the condenser fan connector.
2. Connect battery positive voltage to terminal A and ground to terminal B of the condenser fan.
3. Verify that the condenser fan operates.
4. If the condenser fan does not operate, replace it.



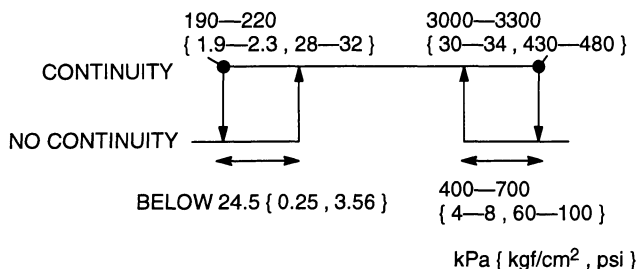
U5U74007

REFRIGERANT PRESSURE SWITCH INSPECTION

U5U740AG

1. Install the manifold gauge set.
2. Disconnect the refrigerant pressure switch connector.
3. Verify that the high-pressure side readings of the manifold gauge.
4. Check for continuity between both terminals of the refrigerant pressure switch.

5. If not as specified, replace the refrigerant pressure switch.



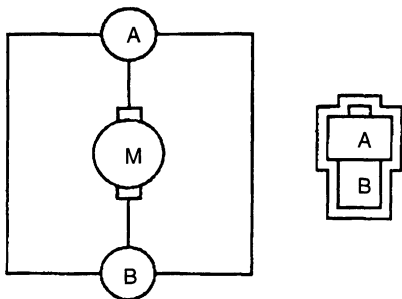
U5U74008

BLOWER MOTOR INSPECTION

U5U740AH

1. Disconnect the blower motor connector.
2. Connect battery positive voltage to terminal A and ground to terminal B of the blower motor.

3. Verify that the blower motor operates.
4. If the blower motor does not operate, replace it.



U5U74009

RESISTOR INSPECTION

U5U740AJ

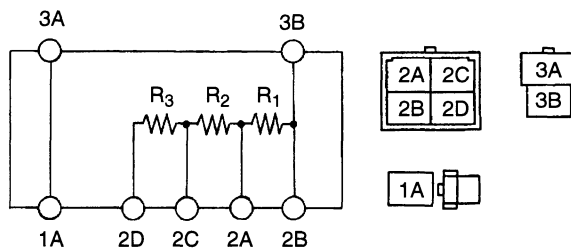
1. Disconnect the resistor connectors.
2. Check for continuity between the resistor terminals by using an ohmmeter.

○—○ : Continuity ○○ : Resistance

Test condition	Terminal						
	1A	3A	3B	2B	2A	2C	2D
Constant	○—○		○—○	○—○	○○	○○	○○
					R ₁	R ₂	R ₃

R₁: 1 Ω R₂: 2.6 Ω R₃: 2 Ω

U5U74010



U5U74011

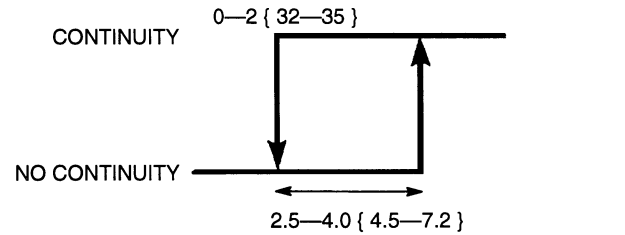
3. If not as specified, replace the resistor.

CONTROL SYSTEM

THERMOSWITCH INSPECTION

U5U740AK

1. Remove the glove compartment.
2. Disconnect the thermoswitch connector.
3. Release the seal plate between the cooling unit and the heater unit, then slide it to the heater unit side.
4. Insert a thermometer through the gap between the cooling unit and the heater unit, and measure the temperature of the evaporator.
5. Check for continuity between both terminals of the thermoswitch.



U5U74012

6. If not as specified, replace the thermoswitch.

A/C RELAY AND CONDENSER FAN RELAY INSPECTION

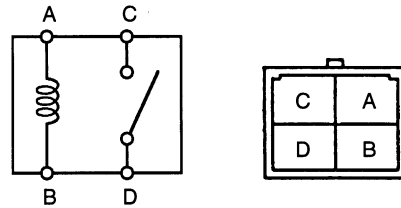
U5U740AL

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

○—○ : Continuity

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

U5U74013



U5U74014

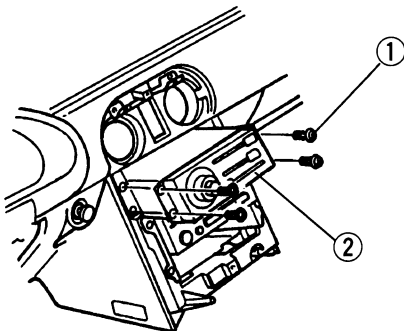
3. If not as specified, replace the relay.

HEATER CONTROL UNIT REMOVAL / INSTALLATION

U5U740AN

1. Disconnect the negative battery cable.
2. Remove the center panel. (Refer to 09-17 CENTER PANEL REMOVAL / INSTALLATION.)
3. Disconnect the air intake wire from the blower unit.
4. Disconnect the air mix wire and airflow mode wire from the heater unit.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.
7. Adjust the air intake, air mix, and airflow mode wire.

1	Screw
2	Heater control unit



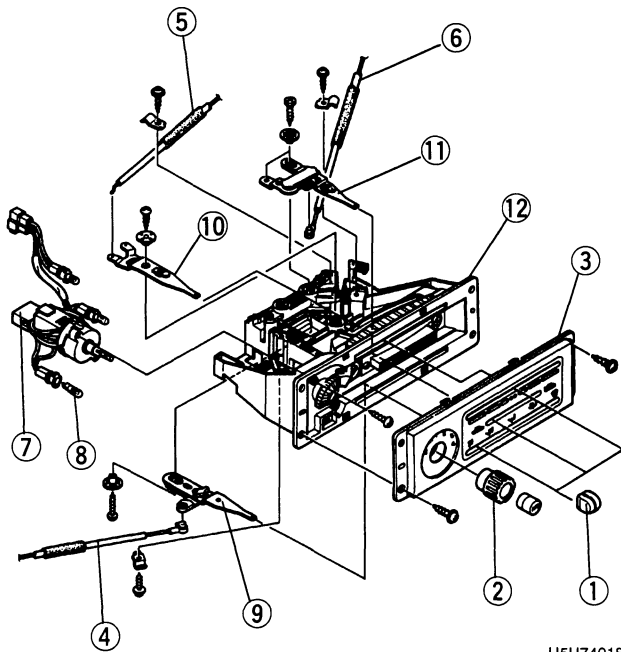
U5U74017

CONTROL SYSTEM

HEATER CONTROL UNIT DISASSEMBLY / ASSEMBLY

U5U740AP

1. Remove the heater control unit. (Refer to 07-40 HEATER CONTROL UNIT REMOVAL / INSTALLATION.)
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly.



U5U74018

1	Knob
2	Fan switch knob
3	Panel
4	Airflow mode wire
5	Air mix wire
6	Air intake wire
7	Fan and A/C switch
8	Bulb
9	Mode lever
10	Temperature control lever
11	REC/FRESH lever
12	Body

HEATER CONTROL UNIT INSPECTION

U5U740AQ

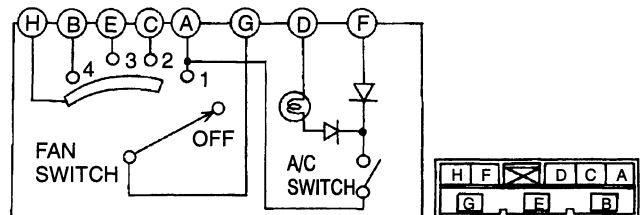
Fan and A/C Switch

1. Remove the heater control unit. (Refer to 07-40 HEATER CONTROL UNIT.)
2. Check for continuity between the fan and A/C switch terminals by using an ohmmeter.

○—○ : Continuity ○◀○ : Diode

Switch position		Terminal							
		A	B	C	D	E	F	G	H
Fan switch	OFF								
	1	○						○	
	2			○				○	○
	3					○		○	○
	4		○					○	○
A/C switch	OFF								
	ON	○	○	○	○				

U5U74019



U5U74020

3. If not as specified, replace the fan and A/C switch.

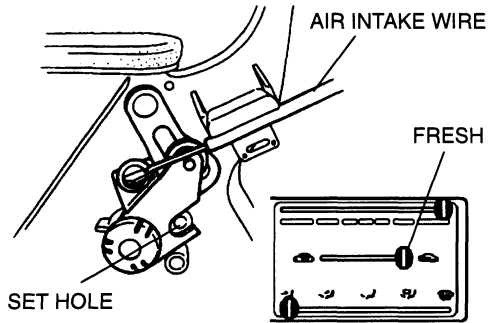
CONTROL SYSTEM

HEATER CONTROL UNIT WIRE ADJUSTMENT

U5U740AR

Air Intake Wire

1. Set the REC/FRESH lever at FRESH.
2. Connect the air intake wire to the air intake link.
3. Set the air intake link to FRESH and insert a screwdriver ($\phi 5$) at the set hole.
4. Clamp the air intake wire.

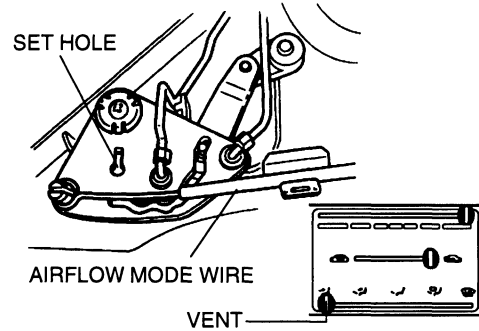


U5U74021

5. Verify that the REC/FRESH lever moves its full stroke.

Airflow Mode Wire

1. Set the mode lever at VENT.
2. Connect the airflow mode wire to the airflow mode link.
3. Set the airflow mode link to VENT and insert a screwdriver ($\phi 5$) at the set hole.
4. Clamp the airflow mode wire.

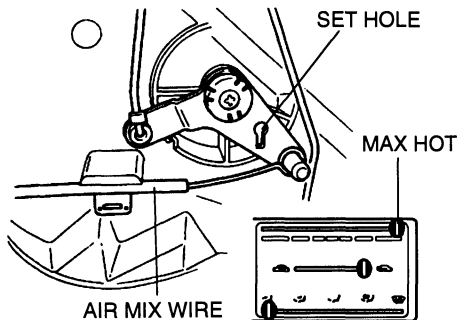


U5U74023

5. Verify that the mode lever moves its full stroke.

Air Mix Wire

1. Set the temperature control lever at MAX HOT.
2. Connect the air mix wire to the air mix link.
3. Set the air mix link to MAX HOT and insert a screwdriver ($\phi 5$) at the set hole.
4. Clamp the air mix wire.



U5U74022

5. Verify that the temperature control lever moves its full stroke.

TECHNICAL DATA

07-50 TECHNICAL DATA

07 HVAC 07-50-1

07 HVAC

U5U750AA

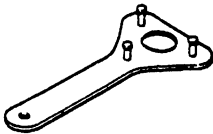
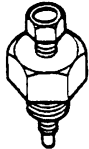
Item			Specification
Refrigerant	Type		R-134a
	Regular amount (g { oz })		600 { 21.2 }
A/C compressor	Lube oil	Type	ND-OIL9
		Sealed volume (ml { cc , fl oz })	150 { 150 , 5.07 }
	Magnetic clutch clearance (mm { in })		0.35—0.65 { 0.014—0.025 }

07-60 SERVICE TOOLS

07 HVAC SST 07-60-1

07 HVAC SST

U5U760AA

00007-10331 Stopper, magnetic clutch  0710331X	4992-02-020 Pressure plate remover  9202020X
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RESTRAINTS

08 SECTION

TROUBLESHOOTING 08-01
AIR BAG SYSTEM 08-10

SEAT BELT 08-11
SERVICE TOOLS 08-60

08-01 TROUBLESHOOTING

AIR BAG SYSTEM ON-BOARD

DIAGNOSIS 08-01-1
Diagnostic Trouble Code
Inspection 08-01-1

AIR BAG SYSTEM SYMPTOM

TROUBLESHOOTING 08-01-6
Foreword 08-01-6
Troubleshooting Index 08-01-6

08

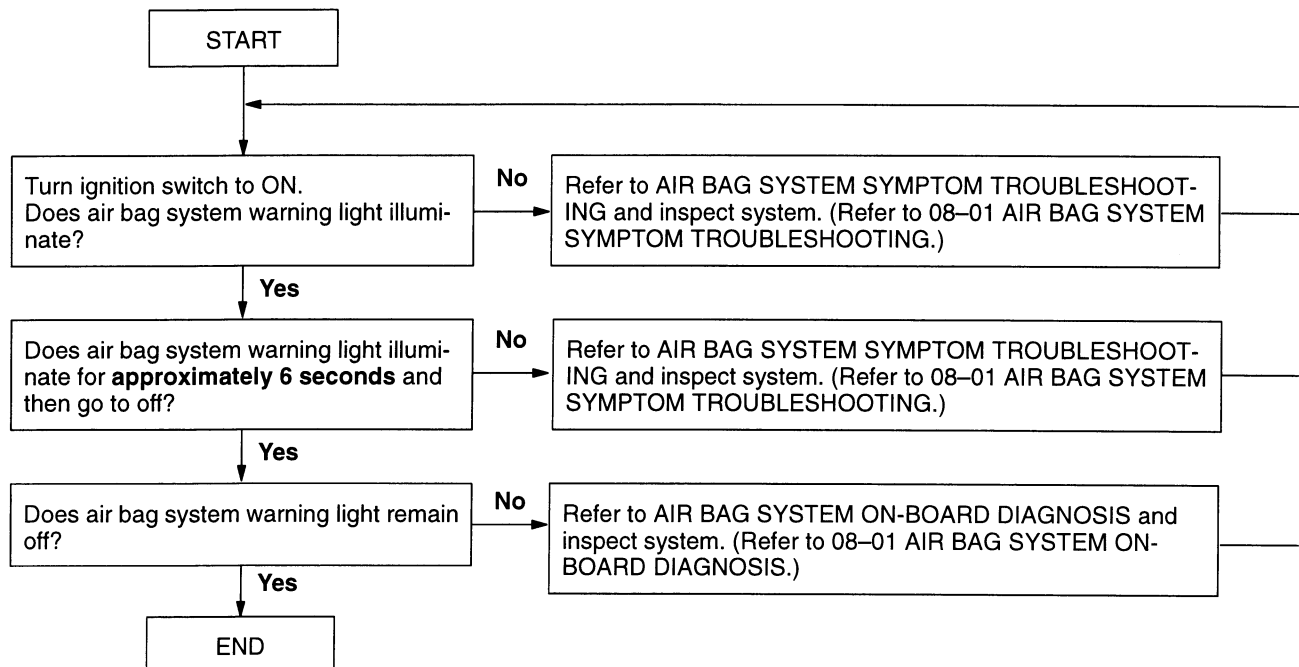
AIR BAG SYSTEM ON-BOARD DIAGNOSIS

U5U801AA

Diagnostic Trouble Code Inspection

- 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



U5U80101

TROUBLESHOOTING

Diagnostic trouble code table

DTC	Output pattern	Diagnosed circuit
0	Remains on	SAS unit
3	 U5U80102	Battery
6	 U5U80103	Driver-side air bag module
7	 U5U80104	Passenger-side air bag module

Note

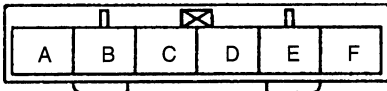
- If the air bag system warning light flashes continuously after the SAS unit is replaced, refer to the AIR BAG SYSTEM DEPLOYMENT AUTHORIZATION PROCEDURE. (Refer to 08–10 AIR BAG SYSTEM DEPLOYMENT AUTHORIZATION PROCEDURE.)

Inspection of diagnostic trouble codes

DTC 0		SAS UNIT	
DETECTION CONDITION		No continuity between terminals V–Y of SAS unit.	
POSSIBLE CAUSE		• Damaged SAS unit • Open or short circuit in wiring harness • Poor connection of connector	
STEP	INSPECTION		ACTION
1	Warning • Handling the SAS unit improperly can accidentally deploy the air bag modules, which may seriously injure you. Read AIR BAG SYSTEM SERVICE WARNINGS, before handling the SAS unit. (Refer to 08–10 AIR BAG SYSTEM SERVICE WARNINGS.) Carry out “Before Servicing” procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08–10 AIR BAG SYSTEM GENERAL PROCEDURE.) Remove dashboard. Remove heater unit. Is SAS unit connector securely connected?		Yes

U5U80105

TROUBLESHOOTING

DTC 3		BATTERY		
DETECTION CONDITION		Voltage supplied to SAS unit is less than 8 V.		
POSSIBLE CAUSE		• Weak battery • Open or short circuit in wiring harness • Poor connection of connector • Damaged SAS unit		
STEP	INSPECTION		ACTION	
1	Is battery to voltage 8 V or more ?		Yes	Go to next step.
			No	Battery is weak. Check charge/discharge system. (Refer to 01-01 ENGINE SYMPTOM TROUBLESHOOTING.)
2	Turn ignition switch to ON. Is voltage at A or E (X-33) terminal of joint connector over 8 V ?		Yes	Replace SAS unit. (Refer to 08-10 SAS UNIT REMOVAL / INSTALLATION.)
			No	Replace wiring harness. (Battery — Fuse block)
JOINT CONNECTOR 				

U5U80106

U5U80106

08

Note

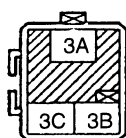
- Diagnostic trouble code 3 is indicated when the voltage simultaneously drops in the harness of both of the following circuits.
 - Harness between E terminal of the joint connector (X-33) and terminal AB of the SAS unit connector.
 - Harness between A terminal of the joint connector (X-33) and terminal Z of the SAS unit connector.

DTC 6		DRIVER-SIDE AIR BAG MODULE	
DETECTION CONDITION		Resistance detected between terminals M-O of SAS unit is other than 2 Ω .	
POSSIBLE CAUSE		- Damaged driver-side air bag module - Damaged clock spring - Damaged SAS unit - Open or short circuit in wiring harness - Poor connection of connector	
STEP	INSPECTION		ACTION
1	Warning Handling the air bag module and SAS unit improperly can accidentally deploy the air bag modules, which may seriously injure you. Read AIR BAG SYSTEM SERVICE WARNINGS, before handling the SAS unit. (Refer to 08-10 AIR BAG SYSTEM SERVICE WARNINGS.) Carry out "Before Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08-10 AIR BAG SYSTEM GENERAL PROCEDURE.) Remove driver-side air bag module. (Refer to 08-10 DRIVER-SIDE AIR BAG MODULE REMOVAL.) Is clock spring pin normal?	Yes	Go to next step.
		No	Replace clock spring. (Refer to 09-18 COMBINATION SWITCH DISASSEMBLY / ASSEMBLY.)

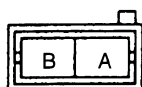
TROUBLESHOOTING

STEP	INSPECTION	ACTION	
2	Connect leads of SST (Checker, fuel & thermometer) to terminals 3B and 3C of the clock spring. Set resistance of SST (Checker, fuel & thermometer) to 2 ohms . Connect clock spring connector. 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 08–10 DRIVER-SIDE AIR BAG MODULE REMOVAL.)
3	Turn ignition switch to LOCK. Disconnect negative battery cable and wait for more than one minute to allow backup power supply to deplete its stored power. Disconnect clock spring connector. Is clock spring connector pin normal?	Yes	Go to next step.
		No	Replace wiring harness. (Clock spring — SAS unit)
4	Connect leads of SST (Checker, fuel & thermometer) to terminals A and B of the clock spring connector. Set resistance of SST (Checker, fuel & thermometer) to 2 ohms . Connect clock spring connector. 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 09–18 COMBINATION SWITCH DISASSEMBLY / ASSEMBLY.)
5	Turn ignition switch to LOCK. Disconnect negative battery cable and wait for more than one minute to allow backup power supply to deplete its stored power. Remove dashboard. Remove heater unit. 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 normal?	Yes	Replace SAS unit. (Refer to 08–10 SAS UNIT REMOVAL / INSTALLATION.)
		No	Replace wiring harness. (Clock spring — SAS unit)

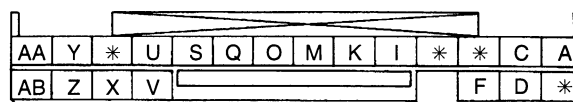
CLOCK SPRING



CLOCK SPRING CONNECTOR



SAS UNIT CONNECTOR



U5U80107

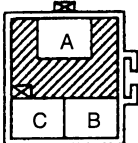
TROUBLESHOOTING

DTC 7		PASSENGER-SIDE AIR BAG MODULE	
DETECTION CONDITION		- Resistance detected between terminals I–K of SAS unit is other than 2 Ω. - No continuity between terminal E of SAS unit and ground.	
POSSIBLE CAUSE		- Damaged passenger-side air bag module - Damaged SAS unit - Open or short circuit in wiring harness - Poor connection of connector	
STEP	INSPECTION		ACTION
1	With passenger-side air bag module?	Yes	Go to next step.
		No	Go to step 5.
2	Warning Handling the air bag module and SAS unit improperly can accidentally deploy the air bag modules, which may seriously injure you. Read AIR BAG SYSTEM SERVICE WARNINGS, before handling the SAS unit. (Refer to 08–10 AIR BAG SYSTEM SERVICE WARNINGS.) Carry out “Before Servicing” procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08–10 AIR BAG SYSTEM GENERAL PROCEDURE.) Is passenger-side air bag module connector pin normal?	Yes	Go to next step.
		No	Replace wiring harness. (Passenger-side air bag module — SAS unit)
3	Connect leads of SST (Checker, fuel & thermometer) to terminals A and B of the passenger-side air bag module connector. Set resistance of SST (Checker, fuel & thermometer) to 2 ohms . Connect clock spring connector. Connect negative battery cable. If 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 08–10 PASSENGER-SIDE AIR BAG MODULE REMOVAL.)
4	Turn ignition switch to LOCK. Disconnect negative battery cable and wait for more than one minute to allow backup power supply to deplete its stored power. Disconnect clock spring connector. Remove dashboard. Remove heater unit. Disconnect SAS unit connector. Check wiring harness between terminal K of SAS unit connector and terminal C 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 normal?	Yes	Replace SAS unit. (Refer to 08–10 SAS UNIT REMOVAL / INSTALLATION.)
		No	Replace wiring harness. (Passenger-side air bag module — SAS unit)

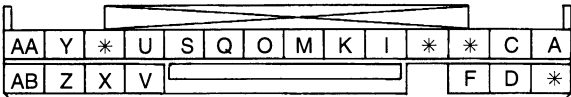
TROUBLESHOOTING

STEP	INSPECTION		ACTION
5	Carry out "Before Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08-10 AIR BAG SYSTEM GENERAL PROCEDURE.) Remove dashboard. Remove heater unit. Disconnect SAS unit connector. Check wiring harness between terminal E of SAS unit connector and ground for following. Open circuit Is wiring harness normal?	Yes	Replace SAS unit. (Refer to 08-10 SAS UNIT REMOVAL / INSTALLATION.)
		No	Replace wiring harness. (SAS unit — GND)

PASSENGER-SIDE
AIR BAG MODULE CONNECTOR



SAS UNIT CONNECTOR



U5U80108

AIR BAG SYSTEM SYMPTOM TROUBLESHOOTING

U5U801AB

Foreword

- Refer to 00-00 GENERAL INFORMATION and thoroughly read and understand the basic flow of troubleshooting in order to properly perform the procedures.

Troubleshooting Index

- Use the chart below to verify the symptoms of the trouble in order to diagnose the appropriate area.
- 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.)

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

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 1E of instrument cluster connector (12-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 1E of instrument cluster connector (12-pin) ● Poor connection at terminal Q of SAS unit connector (21-pin) ● Poor contact of instrument cluster connector (12-pin) ● Open or short circuit in wiring harness between instrument cluster and SAS unit			
STEP	INSPECTION		ACTION
1	Remove meter hood. Is instrument cluster connector (12-pin) securely connected?	Yes	Go to next step.
		No	Reconnect connector properly, then go to step 10.
2	Is air bag system warning light bulb securely installed?	Yes	Go to next step.
		No	Reinstall properly, then go to step 10.

TROUBLESHOOTING

STEP	INSPECTION	ACTION	
3	Is air bag system warning light bulb okay?	Yes	Reinstall properly, then go to next step.
		No	Replace air bag system warning light bulb, then go to step 10.
4	Is terminal 1E of instrument cluster connector (12-pin) securely connected with connector?	Yes	Go to next step.
		No	Reconnect properly, then go to step 10.
5	Is terminal 1E of instrument cluster connector (12-pin) damaged?	Yes	Repair or replace terminal, then go to step 10.
		No	Go to next step.
6	Is there continuity between terminal 1E and 2K of print plate of instrument cluster?	Yes	Go to next step.
		No	Replace print plate, then go to step 10.
7	Carry out "Before Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08-10 AIR BAG SYSTEM GENERAL PROCEDURE.) Remove dashboard. Remove heater unit. Is terminal Q of SAS unit connector (21-pin) securely connected?	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	Go to next step.
		No	Replace air bag harness, then go to step 10.
9*	Disconnect SAS unit connector (21-pin) and instrument cluster connector (12-pin). Is there continuity between Q terminal of SAS unit connector (21-pin) and 1E terminal of instrument cluster connector (12-pin)?	Yes	Replace SAS unit, then go to next step. (Refer to 08-10 AIR BAG SYSTEM, SAS UNIT REMOVAL / INSTALLATION.)
		No	Replace or repair wiring harness between instrument cluster and SAS unit, then go to next step.
10	Carry out "After Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08-10 AIR BAG SYSTEM GENERAL PROCEDURE.) When turning IG SW to ON, does air bag system warning light operate properly?	Yes	Troubleshooting completed.
		No	Reconfirm symptoms of malfunction.

08

Note

- The following may be the cause of trouble if the result of the following troubleshooting is normal.
 1. Poor contact at C terminal of short connector (6-pin) between instrument cluster and SAS unit.
 2. Poor contact at S terminal of short connector (20-pin) between instrument cluster and SAS unit.
 3. Simultaneous poor contact at both terminals S and X of the SAS unit connector (21-pin).
 4. Simultaneous poor contact at both terminals AB and Z of the SAS unit connector (21-pin).
 5. Simultaneous open 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.
 6. Simultaneous open or short ground in wiring harness between METER 15 A fuse and the SAS unit, ENGINE 15 A fuse and the SAS unit.

TROUBLESHOOTING

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 or 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 9 V?	Yes	Go to next step.
		No	Inspect battery charge/discharge system.
2	Carry out "Before Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08–10 AIR BAG SYSTEM GENERAL PROCEDURE.) Remove dashboard. Remove heater unit. Is SAS unit connector (21-pin) securely connected?	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	Go to next step.
		No	Replace SAS unit, then go to step 6.
5*	Disconnect SAS unit connector (21-pin) and instrument cluster connector (12-pin). Caution • Carefully insert the insulation without bending or damaging the short bar. If the short bar is bent or damaged, you will not be able to detect whether or not the connection of the SAS unit connector is poor. 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. (Refer to 08–10 AIR BAG SYSTEM, SAS UNIT REMOVAL / INSTALLATION.)
6	Carry out "After Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08–10 AIR BAG SYSTEM GENERAL PROCEDURE.) When turning IG SW to ON, does air bag system warning light operate properly?	Yes	Troubleshooting completed.
		No	Reconfirm symptoms of malfunction.

08-10 AIR BAG SYSTEM

AIR BAG SYSTEM SERVICE

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AIR BAG SYSTEM GENERAL

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DRIVER-SIDE AIR BAG MODULE

REMOVAL	08-10-3
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DRIVER-SIDE AIR BAG MODULE

INSTALLATION	08-10-4
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PASSENGER-SIDE AIR BAG MODULE

REMOVAL	08-10-5
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PASSENGER-SIDE AIR BAG MODULE

INSTALLATION	08-10-5
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SAS UNIT REMOVAL / INSTALLATION

Bracket Installation Note	08-10-7
SAS Unit Installation Note	08-10-7
Nut Installation Note	08-10-7

AIR BAG SYSTEM DEPLOYMENT

AUTHORIZATION PROCEDURE	08-10-7
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AIR BAG MODULE DISPOSAL

PROCEDURE	08-10-8
Air Bag Deployment	08-10-8
Air Bag Disposal	08-10-9

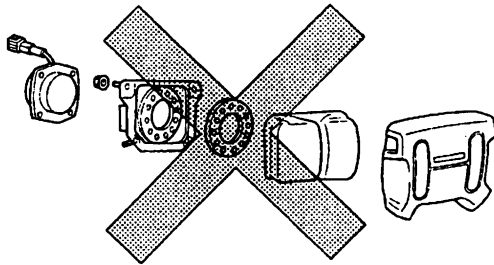
INSPECTION OF SST

(DEPLOYMENT TOOL)	08-10-9
Inspection Procedure	08-10-9

AIR BAG SYSTEM SERVICE WARNINGS

Component Disassembly

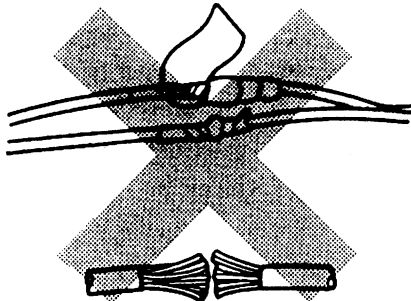
- Disassembling and reassembling the components of the air bag system can render the system inoperative, which may result in serious injury or death in the event of an accident. Do not disassemble any air bag system components.



U5U81001

Wiring Harness Repair

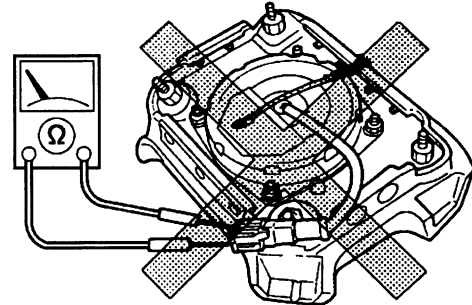
- Incorrectly repairing an air bag system wiring harness can accidentally deploy the air bag, which can cause serious injury. If a problem is found in the system wiring, replace the wiring harness. Do not try to repair it.



U5U81002

Air Bag Module Inspection

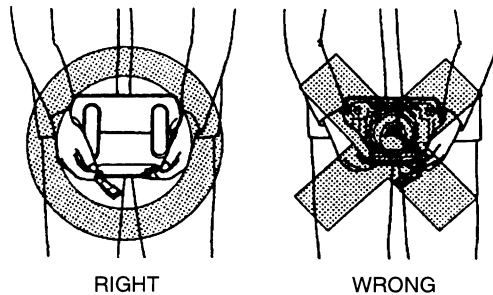
- Inspecting the air bag module by using an ohmmeter can deploy the air bag, which can cause serious injury. Do not use an ohmmeter to inspect the air bag module.



U5U81003

Air Bag Module Handling

- A live (undeployed) air bag may accidentally deploy when it is handled and cause serious injury. When carrying a live air bag module, point the trim cover away from your body to lessen the chance of injury in case it deploys.



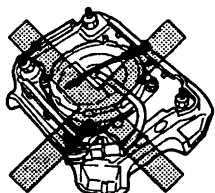
RIGHT

WRONG

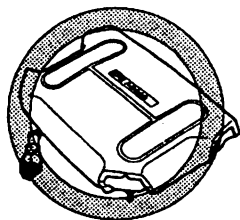
U5U81004

AIR BAG SYSTEM

- A live air bag placed face down on a surface is dangerous. If the air bag deploys, the motion of the module can cause serious injury. Always face the trim cover up to reduce the motion of the module in case it accidentally deploys.



WRONG

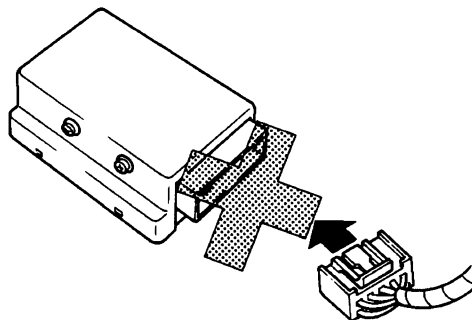


RIGHT

U5U81005

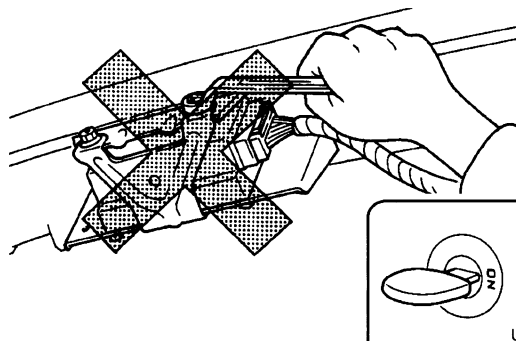
SAS Unit Handling

- 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. This will deploy the air bags, which may result in serious injury. Therefore, before connecting the SAS unit, firmly mount the unit to the vehicle.



U5U81006

- Disconnecting the SAS unit connector or removing the SAS unit with the ignition switch at ON can cause the air bags to deploy, which may seriously injure you. Before disconnecting the SAS unit connector or removing the SAS unit, perform the general procedures.

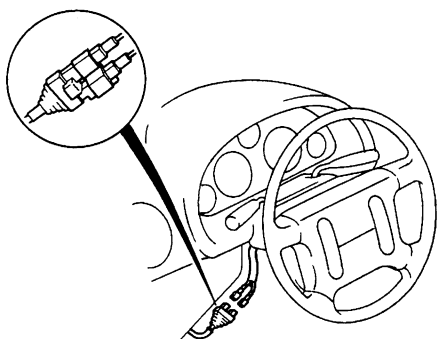


U5U81007

AIR BAG SYSTEM GENERAL PROCEDURE

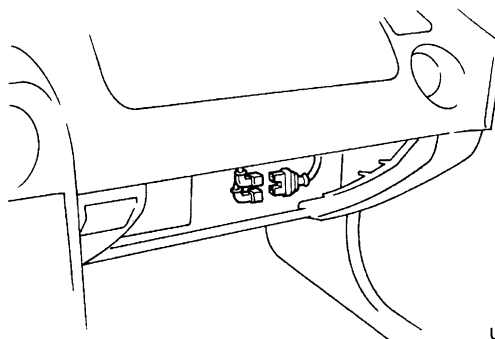
Before Servicing

1. Turn the ignition switch to LOCK.
2. Disconnect the negative battery cable and wait for more than **one minute** to allow the backup power supply to deplete its stored power.
3. Remove the center lower panel.
4. Disconnect the clock spring connector.



U5U81008

5. Remove the glove compartment.
6. Disconnect the passenger-side air bag module connector.



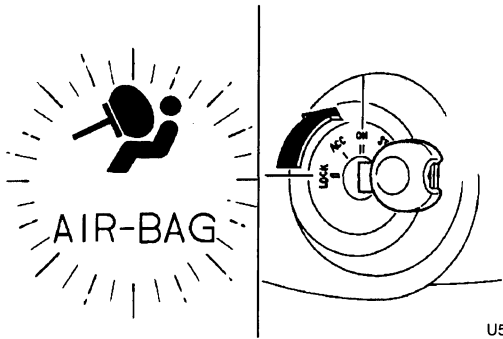
U5U81009

After Servicing

1. Connect the passenger-side air bag module connector.
2. Reinstall the glove compartment.
3. Connect the clock spring connector.
4. Reinstall the center lower panel.
5. Connect the negative battery cable.
6. Turn the ignition switch to ON.

AIR BAG SYSTEM

7. Verify that the air bag system warning light illuminates for **approximately 6 seconds** and then goes off.



U5U81010

8. If the air bag system warning light remains on, off, or repeats flashing after servicing, there are malfunctions in the system. Troubleshoot the system. (Refer to 08-01 AIR BAG SYSTEM ON-BOARD DIAGNOSIS.)

DRIVER-SIDE AIR BAG MODULE REMOVAL

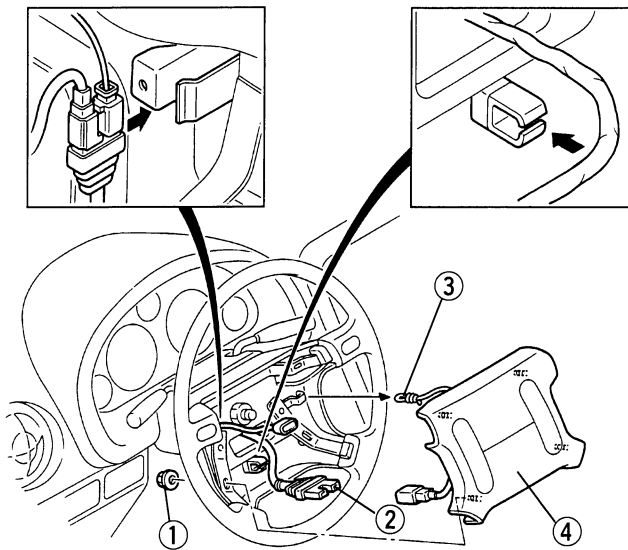
U5U810AC

Warning

- Handling the air bag module improperly can accidentally deploy the air bag, which may seriously injure you. Read AIR BAG SYSTEM SERVICE WARNINGS before handling the air bag module. (Refer to 08-10 AIR BAG SYSTEM SERVICE WARNINGS.)

1	Nut
2	Connector
3	Support rope
4	Driver-side air bag module

1. Carry out the "Before Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08-10 AIR BAG SYSTEM GENERAL PROCEDURE.)
2. Remove in the order indicated in the table.



U5U81011

AIR BAG SYSTEM

DRIVER-SIDE AIR BAG MODULE INSTALLATION

U5U810AD

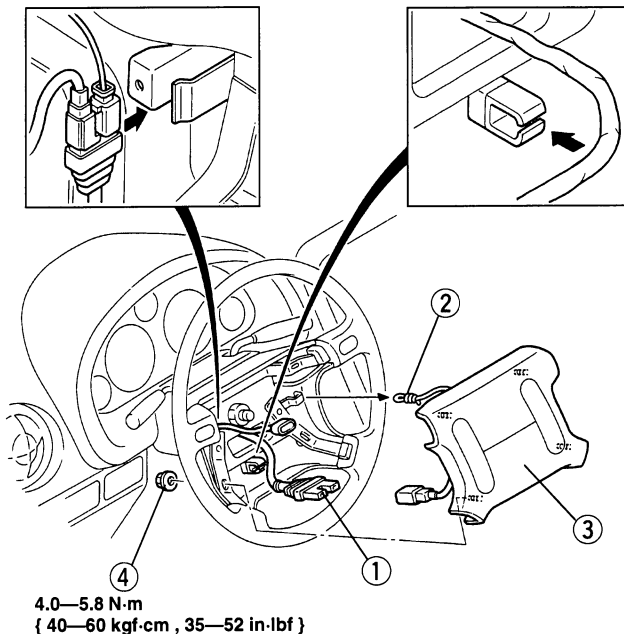
Warning

- Handling the air bag module improperly can accidentally deploy the air bag, which may seriously injure you. Read AIR BAG SYSTEM SERVICE WARNINGS before handling the air bag module. (Refer to 08-10 AIR BAG SYSTEM SERVICE WARNINGS.)

Warning

- Installing the driver-side air bag module when a diagnostic trouble code 6 is not indicated can accidentally deploy the air bag, which can cause serious injury. Carry out the proper troubleshooting procedures and verify that diagnostic trouble code 6 is indicated before installing the driver-side air bag module.

1. Connect the negative battery cable.
2. Turn the ignition switch to ON.
3. Verify that air bag system warning light illuminates for **approximately 6 seconds** and then goes off.
4. Verify that diagnostic trouble code 6 is set.
5. If another diagnostic trouble code is set, perform the appropriate AIR BAG SYSTEM ON-BOARD DIAGNOSIS. (Refer to 08-01 AIR BAG SYSTEM ON-BOARD DIAGNOSIS.)
6. If diagnostic trouble code 6 is set, turn the ignition switch to LOCK.
7. Disconnect the negative battery cable and wait for more then **one minute** to allow the backup power supply to deplete its stored power.
8. Install in the order indicated in the table.
9. Carry out the "After Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08-10 AIR BAG SYSTEM GENERAL PROCEDURE.)

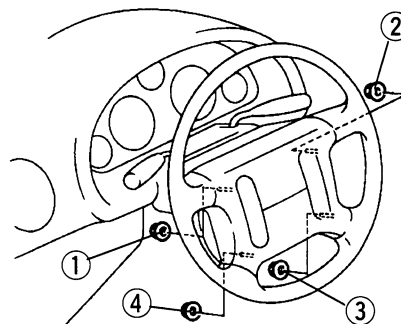


U5U81012

1	Connector
2	Support rope
3	Driver-side air bag module
4	Nut ☞ Installation Note

Bolt Installation Note

- Tighten the bolts in the order shown in the figure.



U5U81013

AIR BAG SYSTEM

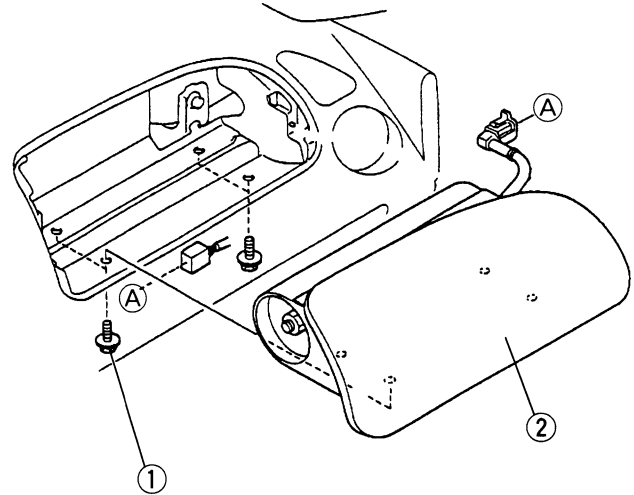
PASSENGER-SIDE AIR BAG MODULE REMOVAL

U5U810AE

Warning

- Handling the air bag module improperly can accidentally deploy the air bag, which may seriously injure you. Read **AIR BAG SYSTEM SERVICE WARNINGS** before handling the air bag module. (Refer to 08-10 AIR BAG SYSTEM SERVICE WARNINGS.)

- Carry out the "Before Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08-10 AIR BAG SYSTEM GENERAL PROCEDURE.)
- Remove in the order indicated in the table.



U5U81014

1	Bolt
2	Passenger-side air bag module

PASSENGER-SIDE AIR BAG MODULE INSTALLATION

U5U810AF

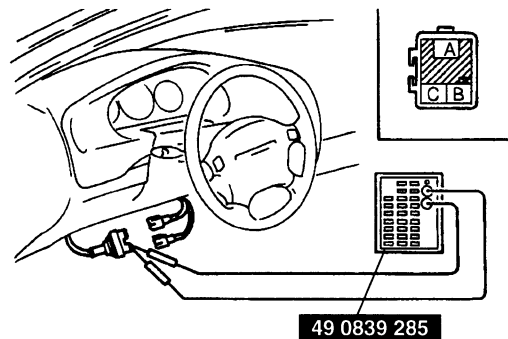
Warning

- Handling the air bag module improperly can accidentally deploy the air bag, which may seriously injure you. Read **AIR BAG SYSTEM SERVICE WARNINGS** before handling the air bag module. (Refer to 08-10 AIR BAG SYSTEM SERVICE WARNINGS.)

Warning

- Installing the passenger-side air bag module when a diagnostic trouble code 7 is not indicated can accidentally deploy the air bag, which can cause serious injury. Carry out the proper troubleshooting procedures and verify that diagnostic trouble code 7 is indicated before installing the passenger-side air bag module.

- Connect the leads of the **SST** to terminals B and C of the clock spring connector.
- Set the resistance of the **SST** to 2 ohms.

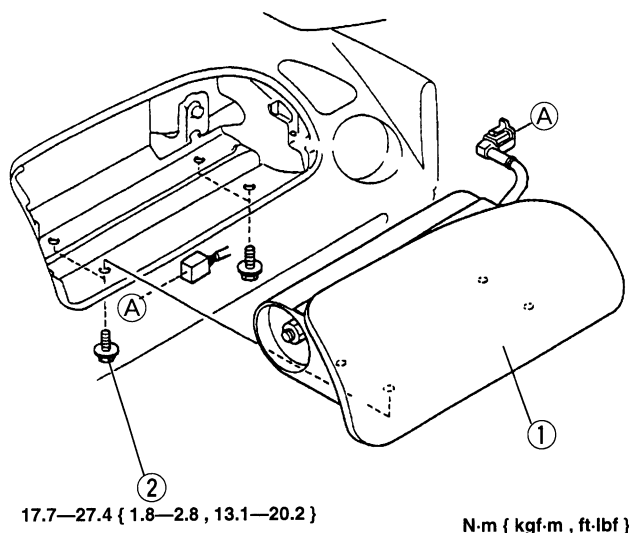


U5U81015

- Connect the negative battery cable.
- Turn the ignition switch to ON.
- Verify that air bag system warning light illuminates for **approximately 6 seconds** and then goes off.
- Verify that diagnostic trouble code 7 is set.
- If another diagnostic trouble code is set, perform the appropriate AIR BAG SYSTEM ON-BOARD DIAGNOSIS. (Refer to 08-01 AIR BAG SYSTEM ON-BOARD DIAGNOSIS.)
- If diagnostic trouble code 7 is set, turn the ignition switch to LOCK.
- Disconnect the negative battery cable and wait for more than **one minute** to allow the backup power supply to deplete its stored power.

AIR BAG SYSTEM

10. Install in the order indicated in the table.
11. Carry out the "After Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08-10 AIR BAG SYSTEM GENERAL PROCEDURE.)



U5U81016

1	Passenger-side air bag module
2	Bolt

SAS UNIT REMOVAL / INSTALLATION

U5U810AG

Warning

- Handling the SAS unit improperly can accidentally deploy the air bag, which may seriously injure you. Read AIR BAG SYSTEM SERVICE WARNINGS before handling the SAS unit. (Refer to 08-10 AIR BAG SYSTEM SERVICE WARNINGS.)

1. Carry out the "Before Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08-10 AIR BAG SYSTEM GENERAL PROCEDURE.)
2. Drain the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT, Draining.)
3. Remove the dashboard. (Refer to 09-17 DASHBOARD REMOVAL / INSTALLATION.)
4. Remove the heater unit.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.

Warning

- New SAS units are not input with a deployment approval signal in order to prevent accidental deployment of the air bag module during installation. Since the SAS unit is not yet input with the deployment approval signal, the air bag system will not operate in the event of an accident, which may result in serious injury or death. Follow the procedures for inputting the deployment approval signal into the SAS unit after replacement.

7. Install the heater unit.
8. Install the dashboard. (Refer to 09-17 DASHBOARD REMOVAL / INSTALLATION.)
9. Refill the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT, Refilling.)
10. Carry out the "After Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08-10 AIR BAG SYSTEM GENERAL PROCEDURE.)

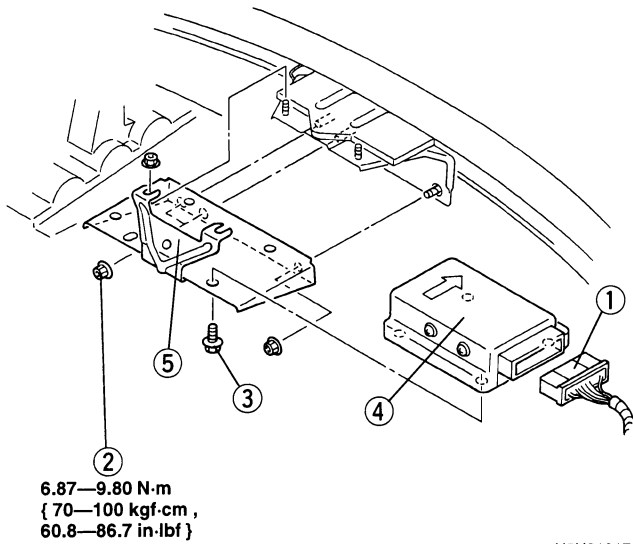
AIR BAG SYSTEM

Bracket Installation Note

- If the bracket mounting area is damaged, repair the area to its original shape.

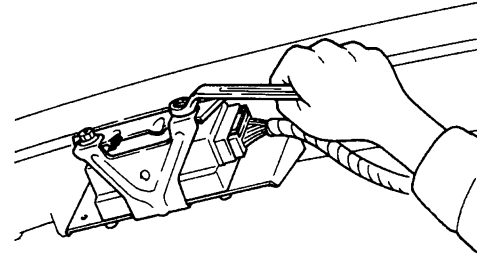
SAS Unit Installation Note

- Position the SAS unit and bracket with the arrow on the SAS unit facing toward the front of the vehicle.



U5U81017

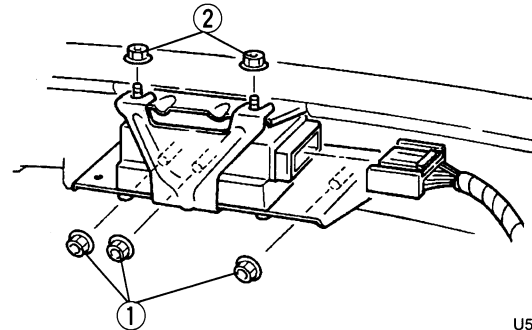
1	Connector
2	Nut ☞ Installation Note
3	Bolt
4	SAS unit ☞ Installation Note
5	Bracket ☞ Installation Note



U5U81018

Nut Installation Note

- Tighten the nuts in the order shown in the figure.



U5U81019

AIR BAG SYSTEM DEPLOYMENT AUTHORIZATION PROCEDURE

U5U810AH

1. Install a new SAS unit then verify that the air bag system warning light continuously flashes **approximately 6 seconds** after the ignition switch is turned to ON.
2. 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 out after **approximately 6 seconds**.
3. If it does not go out, perform the deployment authorization procedure again.

AIR BAG SYSTEM

AIR BAG MODULE DISPOSAL PROCEDURE

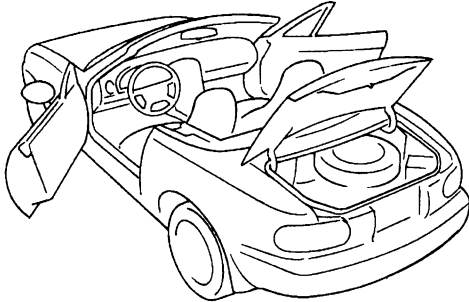
U5U810AJ

- Before scrapping a vehicle with an undeployed air bag module, deploy the air bag. Never dispose of a live air bag module. If the **SST** (deployment tool) is not available, consult the nearest Mazda representative for assistance.

Air Bag Deployment

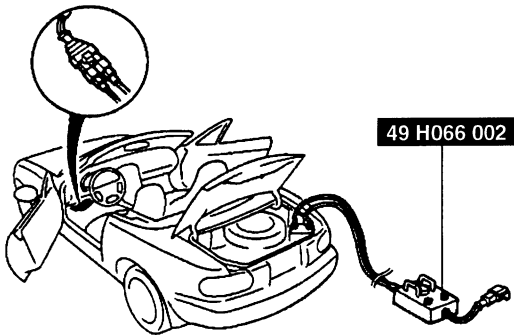
Driver-side air bag module

- Inspect the **SST**. (Refer to 08-10 INSPECTION OF SST (DEPLOYMENT TOOL).)
- Move the vehicle to an open space, away from strong winds, and open all of the vehicle's doors.



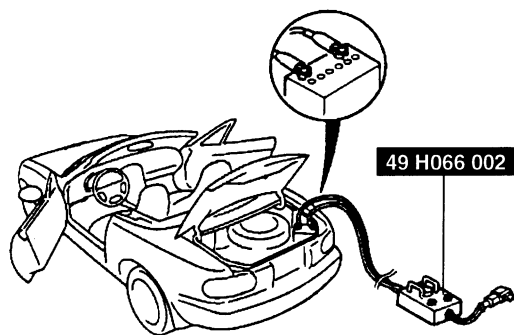
U5U81020

- Carry out the "Before Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08-10 AIR BAG SYSTEM GENERAL PROCEDURE.)
- Connect the **SST** to the clock spring as shown in the figure.



U5U81021

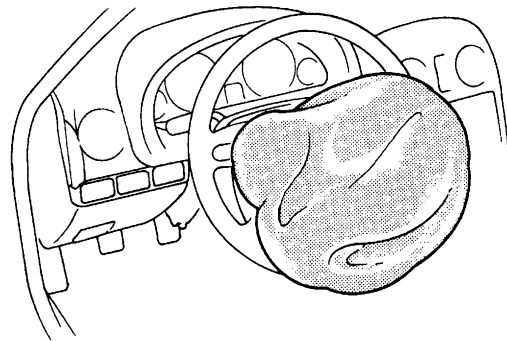
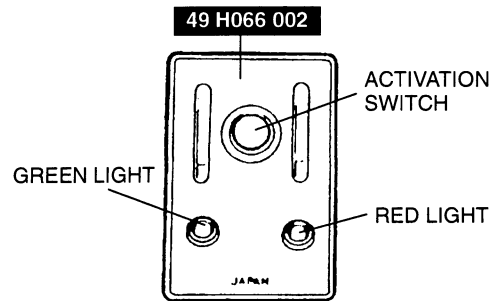
- Connect the red clip of the **SST** to the positive battery terminal and black clip to the negative battery terminal.



U5U81022

- Verify that the red light on the **SST** is illuminated.
- Make sure all persons are standing at least **6 m { 20 ft }** from the vehicle.

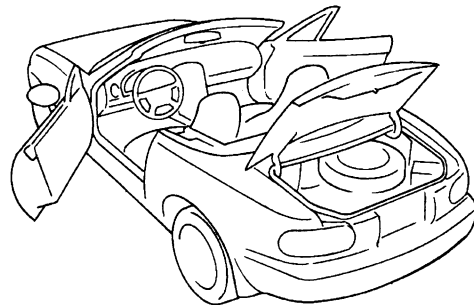
- Press the activation switch on the **SST** to deploy the air bag.



U5U81023

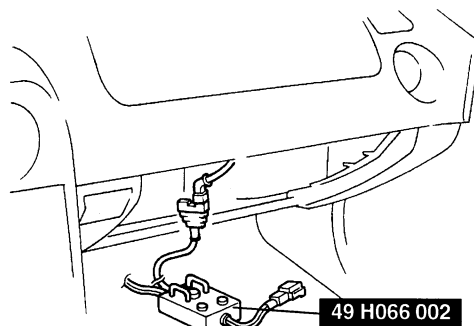
Passenger-side air bag module

- Inspect the **SST**. (Refer to 08-10 INSPECTION OF SST (DEPLOYMENT TOOL).)
- Move the vehicle to an open space, away from strong winds, and open all of the vehicle's doors.



U5U81020

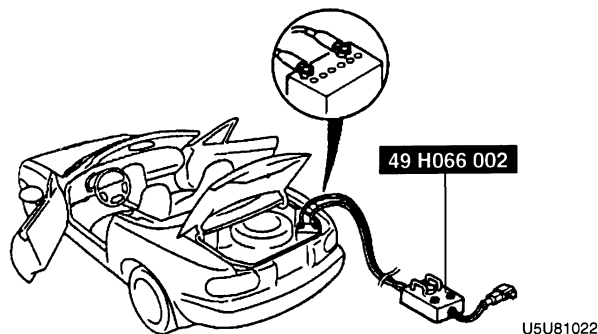
- Carry out the "Before Servicing" procedure under AIR BAG SYSTEM GENERAL PROCEDURE. (Refer to 08-10 AIR BAG SYSTEM GENERAL PROCEDURE.)
- Connect the **SST** to the passenger-side air bag module as shown in the figure.



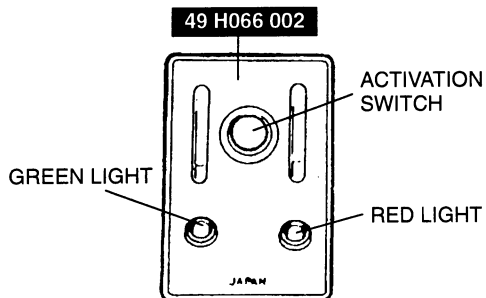
U5U81024

AIR BAG SYSTEM

- Connect the red clip of the **SST** to the positive battery terminal and black clip to the negative battery terminal.



- Verify that the red light on the **SST** is illuminated.
- Make sure all persons are standing at least **6 m { 20 ft }** from the vehicle.
- Press the activation switch on the **SST** to deploy the air bag.



Air Bag Disposal

Warning

- The air bag is very hot immediately after it deploys. You can be burned. Do not touch the air bag module for at least 15 minutes after deployment.

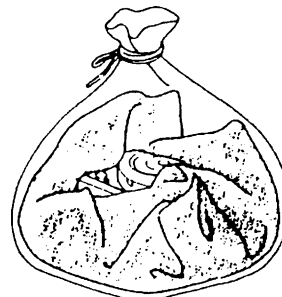
Warning

- Pouring water on a deployed air bag is dangerous. The water will mix with the residual gases to form a gas that can make breathing difficult if inhaled. Do not pour water on the deployed air bag module.

Warning

- A deployed air bag module may contain deposits of sodium hydroxide, a caustic by-product of the gas-generated combustion. If this substance gets in your eyes or on your hands, it can cause irritation and itching. When handling a deployed air bag module, wear gloves and safety glasses.

- Put on gloves and safety glasses.
- Place the deployed air bag module in a plastic bag, seal it, and then dispose of it.

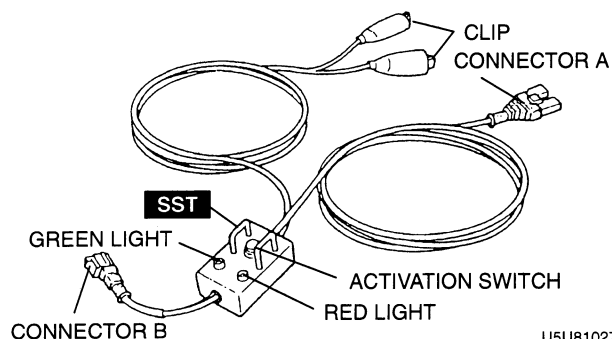


- Wash your hands after removing your gloves.

INSPECTION OF SST (DEPLOYMENT TOOL)

U5U810AK

- Use the **SST** (deployment tool) to deploy a live air bag module before disposing of it.
- Before connecting the **SST** to the clock spring or passenger-side air bag module, inspect the operation of the **SST**.



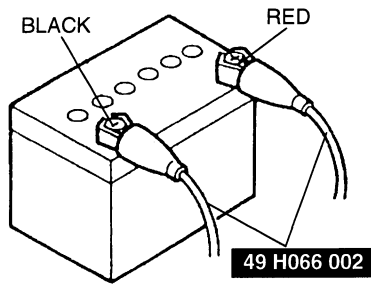
Inspection Procedure

- Follow the steps below to verify that the **SST** 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 .	OFF	ON
3	Press activation switch.	ON	OFF

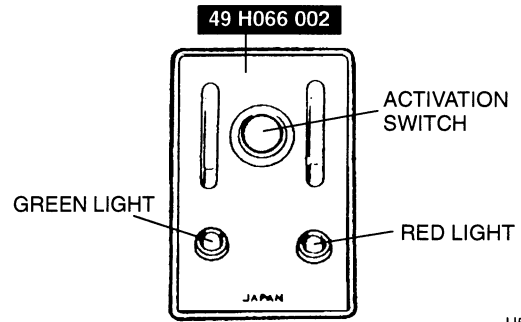
AIR BAG SYSTEM

Step 1



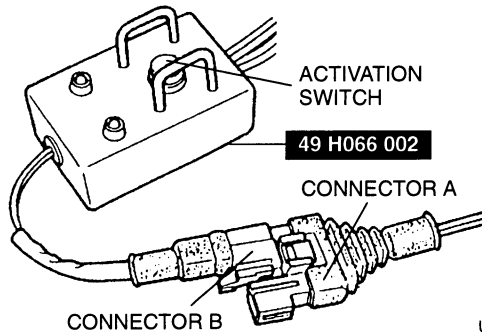
U5U81028

Step 3



U5U81030

Step 2



U5U81029

2. If not as specified, do not use the **SST** because it may cause the air bag to unexpectedly deploy upon connection to the module.

08-11 SEAT BELT

SEAT BELT	
REMOVAL / INSTALLATION	08-11-1
SEAT BELT INSPECTION	08-11-2

SEAT BELT ELR INSPECTION	08-11-2
BUCKLE REMOVAL / INSTALLATION	08-11-2
BUCKLE INSPECTION	08-11-2

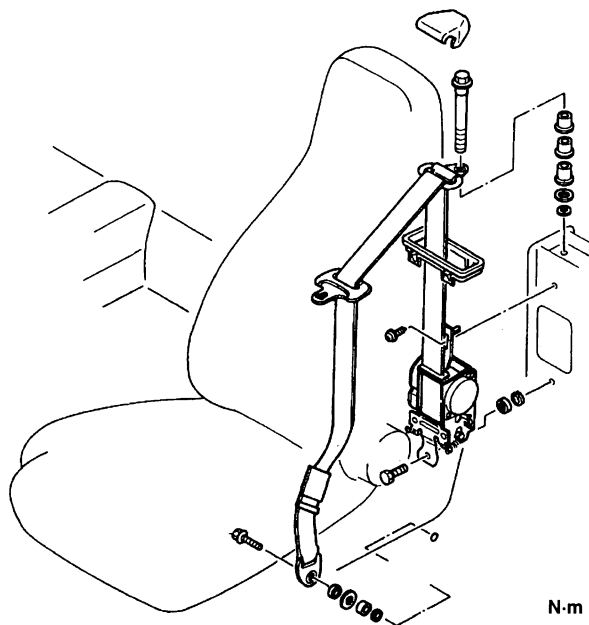
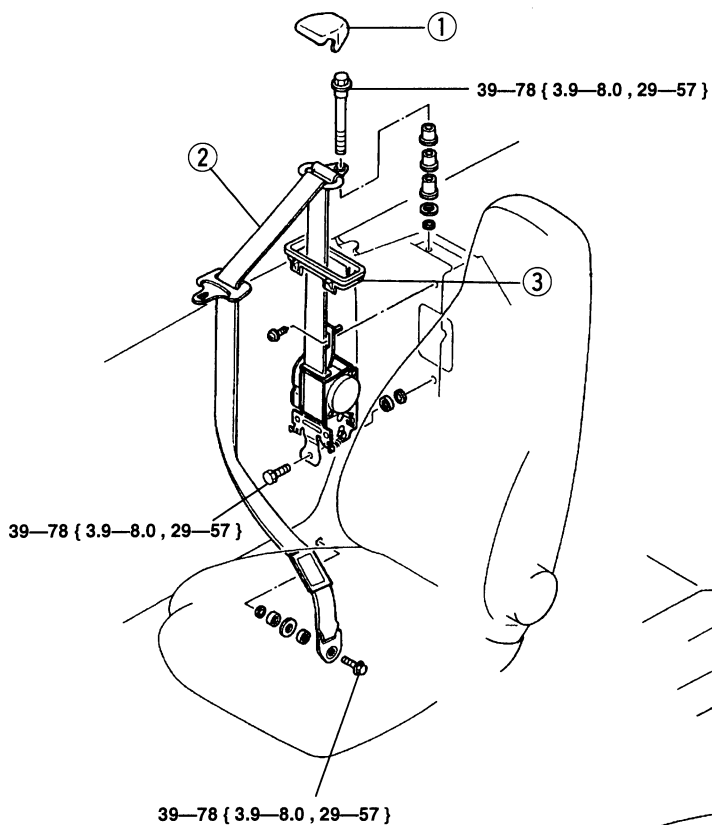
SEAT BELT REMOVAL / INSTALLATION

U5U811AA

Caution

- The ELR has a spring that will unwind if the retractor's cover is removed. The spring cannot be re-wound by hand. If this occurs, the ELR will not work properly. Therefore, do not disassemble the retractor.

1. Remove the brace bar.
2. Remove the quarter trim.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Install the quarter trim.
6. Install the brace bar.



N·m { kgf·m , ft·lbf }

U5U81101

1	Anchor cover
2	Seat belt

3	Bezel
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SEAT BELT

SEAT BELT INSPECTION

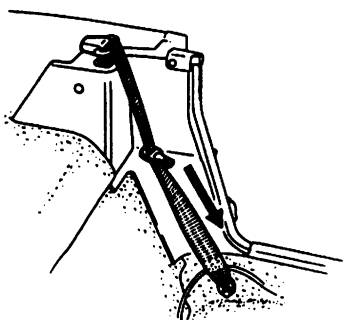
U5U811AB

1. Inspect the webbing for scars, tears, and wear.
2. Inspect the fittings for deformation and damage.
3. If a problem is found, replace the seat belt.

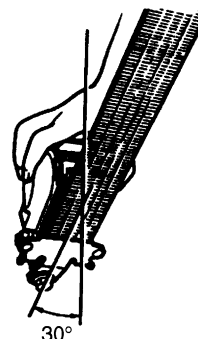
SEAT BELT ELR INSPECTION

U5U811AC

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.
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.



U5U81102



U5U81103

3. Remove the retractor. (Refer to 08-11 SEAT BELT REMOVAL / INSTALLATION.)

7. If not as specified, replace the seat belt.

BUCKLE REMOVAL / INSTALLATION

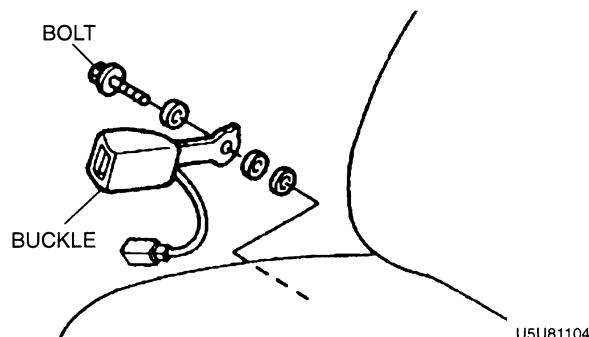
U5U811AD

1. Disconnect the negative battery cable.
2. Disconnect the buckle connector.
3. Remove the buckle installation bolt, and remove the buckle.

4. Install in the reverse order of removal.

Tightening torque

39—78 N·m { 3.9—8.0 kgf·m , 29—57 ft·lbf }



U5U81104

BUCKLE INSPECTION

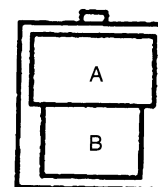
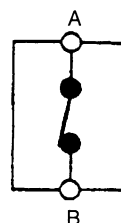
U5U811AE

1. Disconnect the buckle connector.
2. Check for continuity between the buckle terminals by using an ohmmeter.

○—○ : Continuity

Seat belt	Terminal (Driver)	
	A	B
Buckled		
Unbuckled	○—○	○—○

U5U81105



U5U81106

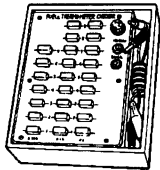
3. If not as specified, replace the buckle.

08-60 SERVICE TOOLS

08 RESTRAINTS SST 08-60-1

08 RESTRAINTS SST

U5U860AA

49 0839 285 Checker, fuel & thermometer  0839285X	49 H066 002 Deployment tool  H066002X
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BODY & ACCESSORIES

09 SECTION

BODY PANELS	09-10	WIPER/WASHER SYSTEMS ..	09-19
DOORS AND LIFTGATE	09-11	ENTERTAINMENT	09-20
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09-10 BODY PANELS

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FUEL-FILLER LID			
REMOVAL / INSTALLATION	09-10-6		

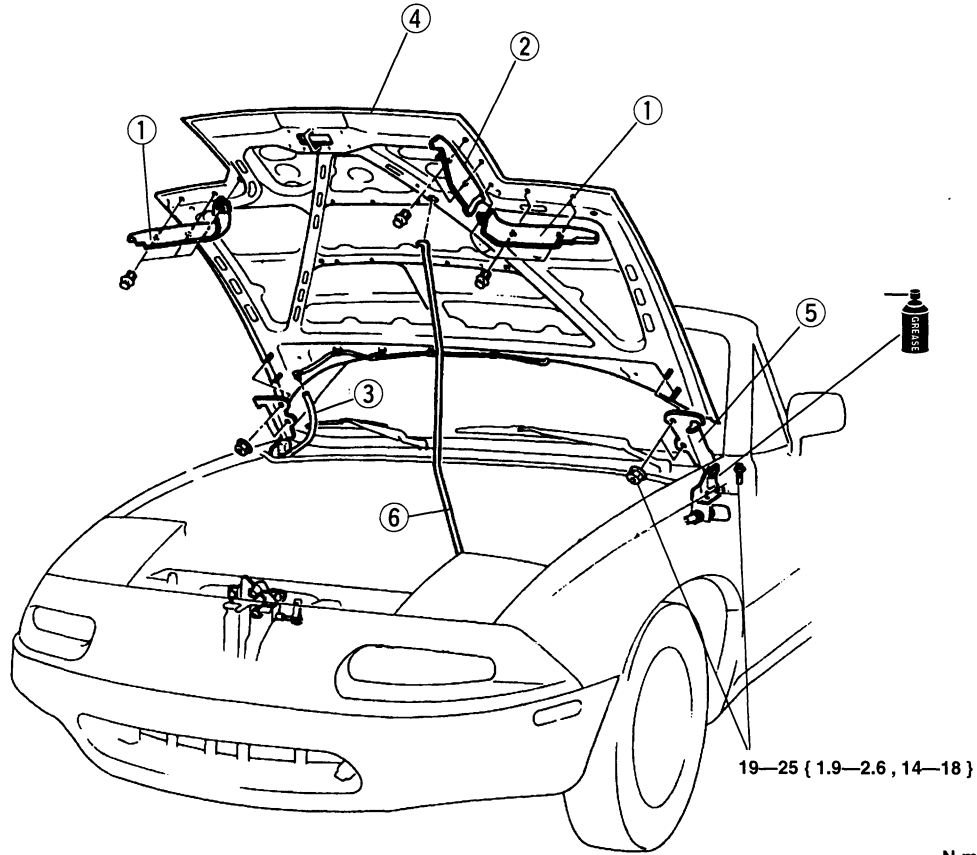
09

BODY PANELS

HOOD REMOVAL / INSTALLATION

U5U910AA

1. Disconnect the negative battery cable.
2. To remove the hood hinge, remove the front bumper and the front fender panel.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Install the front fender panel and the front bumper.



N·m { kgf·m , ft·lbf }

U5U91001

1	Headlight seal
2	Side headlight seal
3	Windshield washer pipe

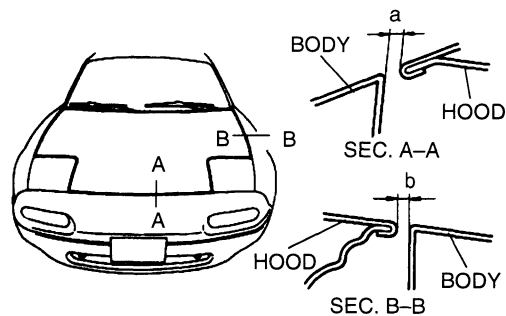
4	Hood ☞ 09-10 HOOD ADJUSTMENT
5	Hood hinge
6	Hood stay

HOOD ADJUSTMENT

U5U910AB

1. Measure the gap between the hood and the front fender panel.

	Nominate	Clearance mm { in }	
		Minimum	Maximum
a	5.0 { 0.2 }	3.5 { 0.14 }	6.5 { 0.25 }
b	5.0 { 0.2 }	4.0 { 0.16 }	6.0 { 0.23 }



U5U91002

2. If not as specified, adjust the gap.

BODY PANELS

3. Adjust the hood lock after the hood has been aligned. (Refer to 09-14 HOOD LOCK ADJUSTMENT.)

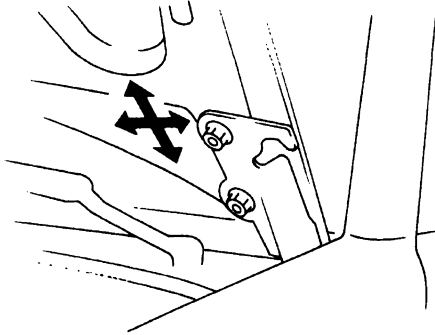
2. Tighten the hood installation nuts.

Tightening torque

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

Gap Adjustment

1. Loosen the hood installation nuts and reposition the hood.



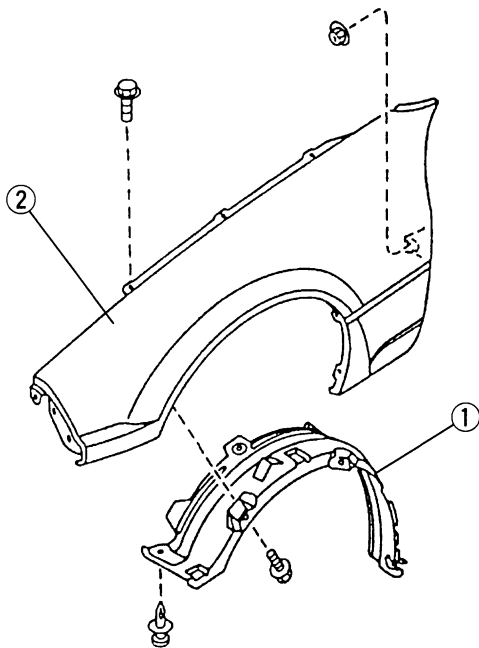
U5U91003

FRONT FENDER PANEL REMOVAL / INSTALLATION

U5U910AC

1. Disconnect the negative battery cable.
2. Remove the front bumper.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Install the front bumper.
6. Connect the negative battery cable.

1	Mud guard
2	Front fender panel



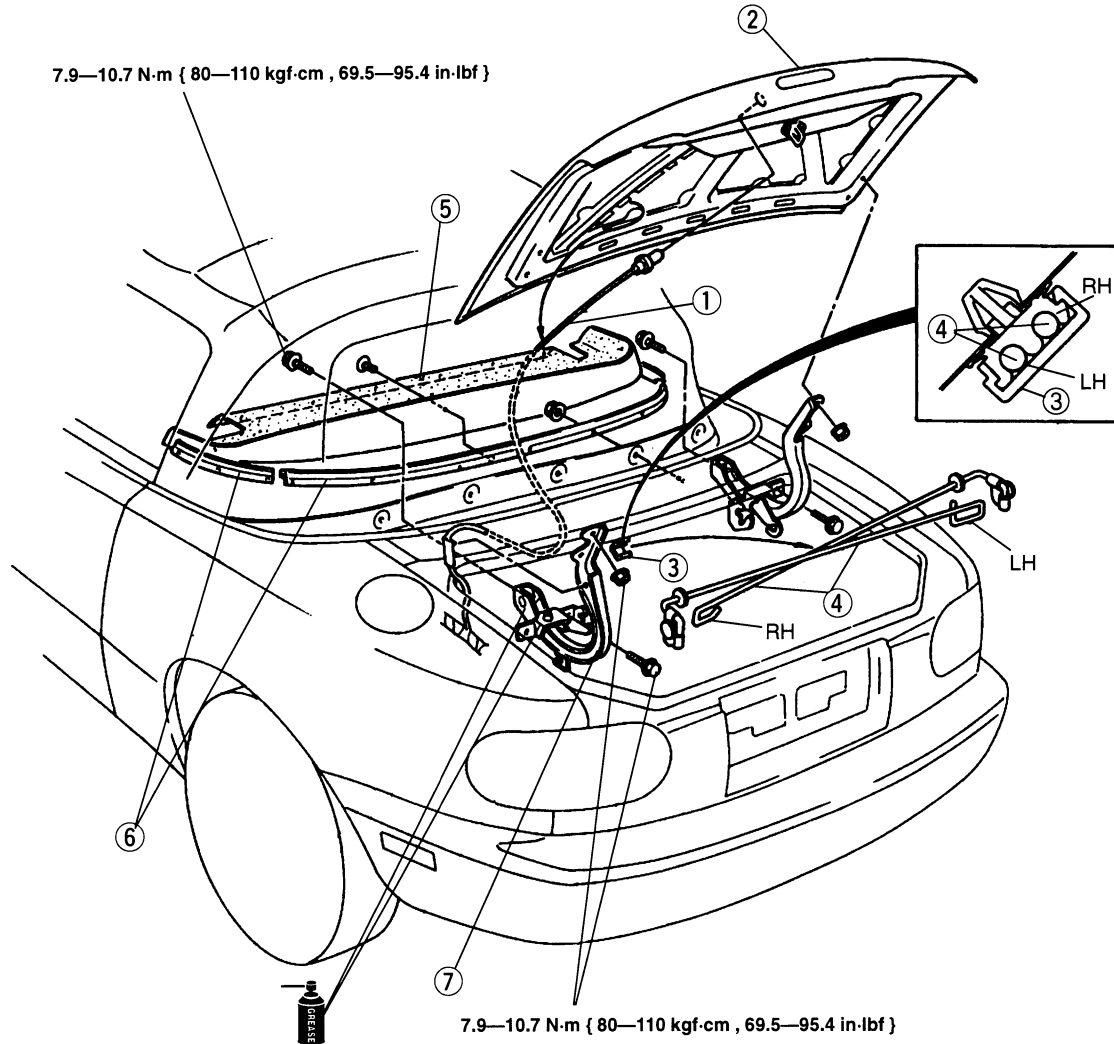
TRUNK LID REMOVAL / INSTALLATION

U5U910AD

Warning

- Removing the balance spring without removing the trunk lid can be dangerous. The trunk lid may fall and injure you. Remove the trunk lid before removing the balance spring.

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal indicated in the table.
4. Connect the negative battery cable.



U5U91005

1	Socket
2	Trunk lid ☞ 09-10 TRUNK LID ADJUSTMENT
3	Rod holder
4	Balance spring ☞ Removal Note ☞ 09-10 BALANCE SPRING ADJUSTMENT

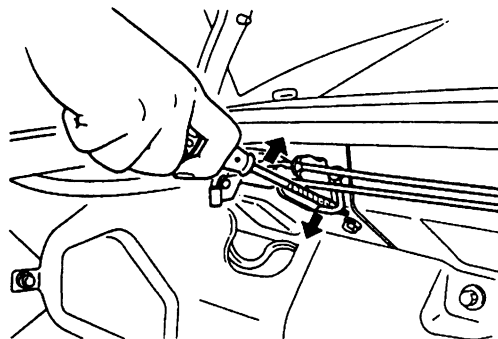
5	Rear package trim
6	Set plate
7	Trunk lid hinge

Balance Spring Removal Note

1. Carefully lift the balance spring by using a tape-wrapped screwdriver.
2. Remove the balance spring.

Note

- The balance springs are under high tension.



U5U91006

TRUNK LID ADJUSTMENT

U5U910AE

1. Measure the clearance between the trunk lid and the body panel.

	Nominate	Clearance mm { in }	
		Minimum	Maximum
a	5.0 { 0.2 }	3.5 { 0.14 }	6.5 { 0.25 }
b	5.0 { 0.2 }	4.0 { 0.16 }	6.0 { 0.23 }

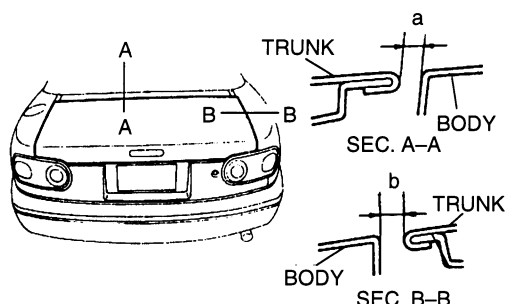
2. If not as specified, loosen the trunk lid installation nuts and reposition the trunk lid.
3. Tighten the trunk lid installation nuts.

Tightening torque

7.9—10.7 N·m

{ 80—110 kgf·cm , 69.5—95.4 in·lbf }

4. Adjust the trunk lid striker after the trunk lid has been aligned. (Refer to 09-14 TRUNK LID LOCK ADJUSTMENT.)



U5U91007

09

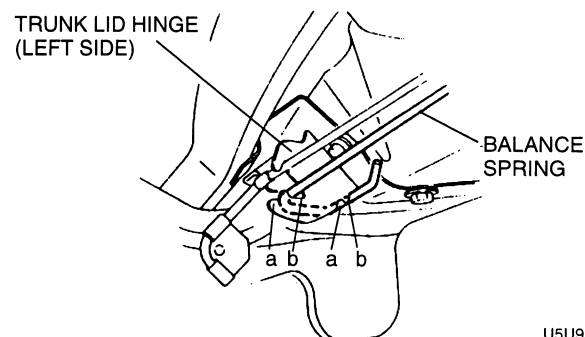
BALANCE SPRING ADJUSTMENT

U5U910AF

- Slide the balance spring to the desired position as described below by using a tape-wrapped screwdriver.

Note

- The trunk lid should raise 70—300 mm { 2.8—11.8 in } when the trunk lid is unlocked.



U5U91008

Tension	Hook bracket	Set position	
		a	b
Standard	Right side	○	
	Left side		○
Increase	Right side	○	
	Left side	○	
Decrease	Right side		○
	Left side		○

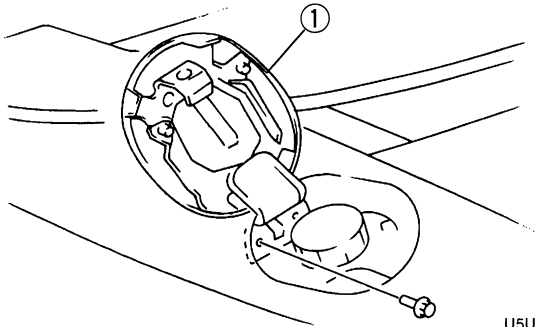
○ : Position

FUEL-FILLER LID REMOVAL / INSTALLATION

U5U910AG

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

1	Fuel-filler lid 09-10 FUEL-FILLER LID ADJUSTMENT
---	---



U5U91009

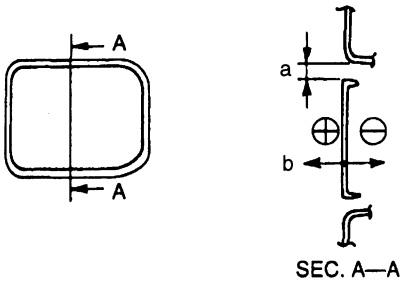
FUEL-FILLER LID ADJUSTMENT

U5U910AH

1. Measure the clearance between the fuel-filler lid and body panel.

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.

	Nominate	Clearance mm { in }	
		Minimum	Maximum
a	3.0 { 0.12 }	2.0 { 0.08 }	4.0 { 0.15 }
b	-0.5 { -0.02 }	-1 { -0.04 }	0.5 { 0.01 }

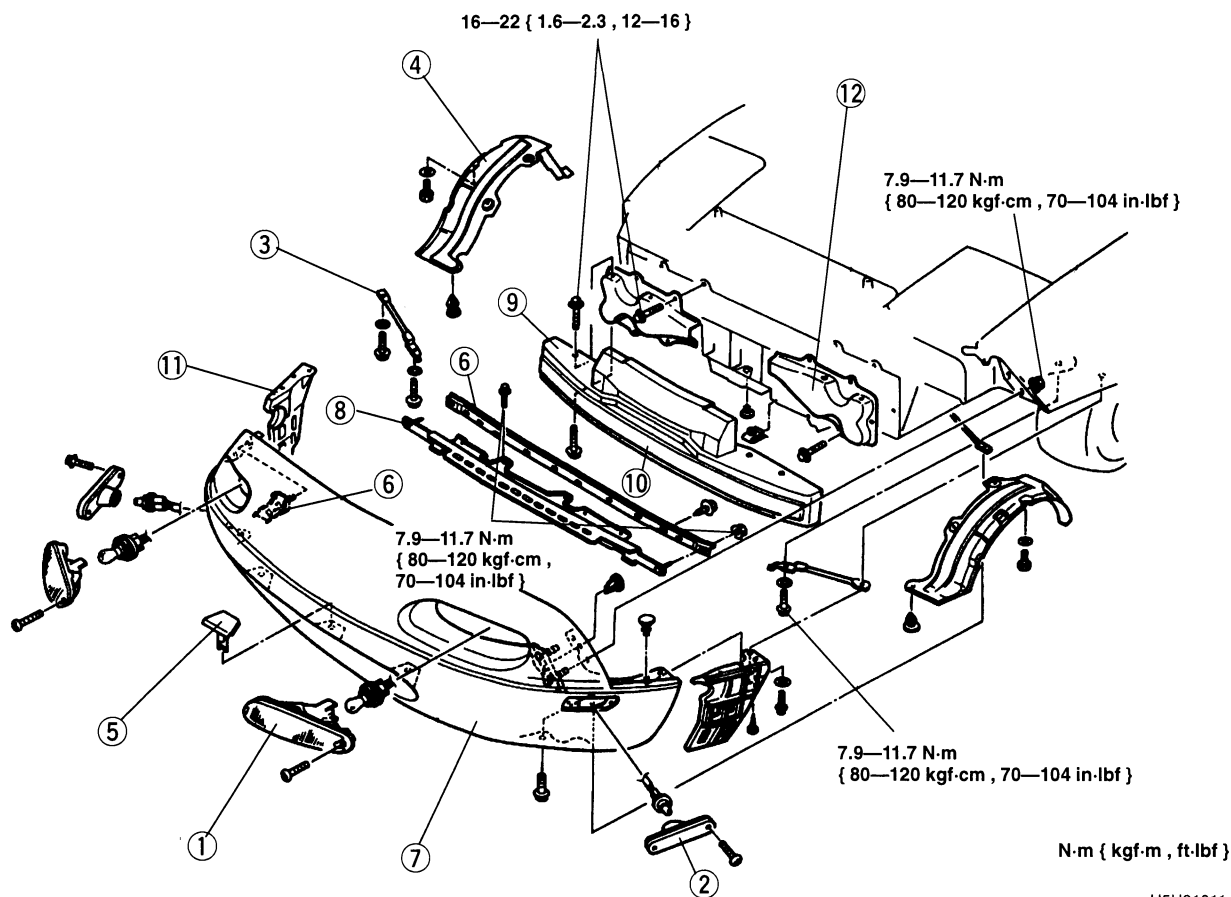


U5U91010

FRONT BUMPER REMOVAL / INSTALLATION

U5U910AJ

1. Raise the headlights.
2. Disconnect the negative battery cable.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Connect the negative battery cable.



09

U5U91011

1	Front combination light
2	Front side marker light
3	Fender bracket
4	Mud guard
5	Grille cover
6	Set plate

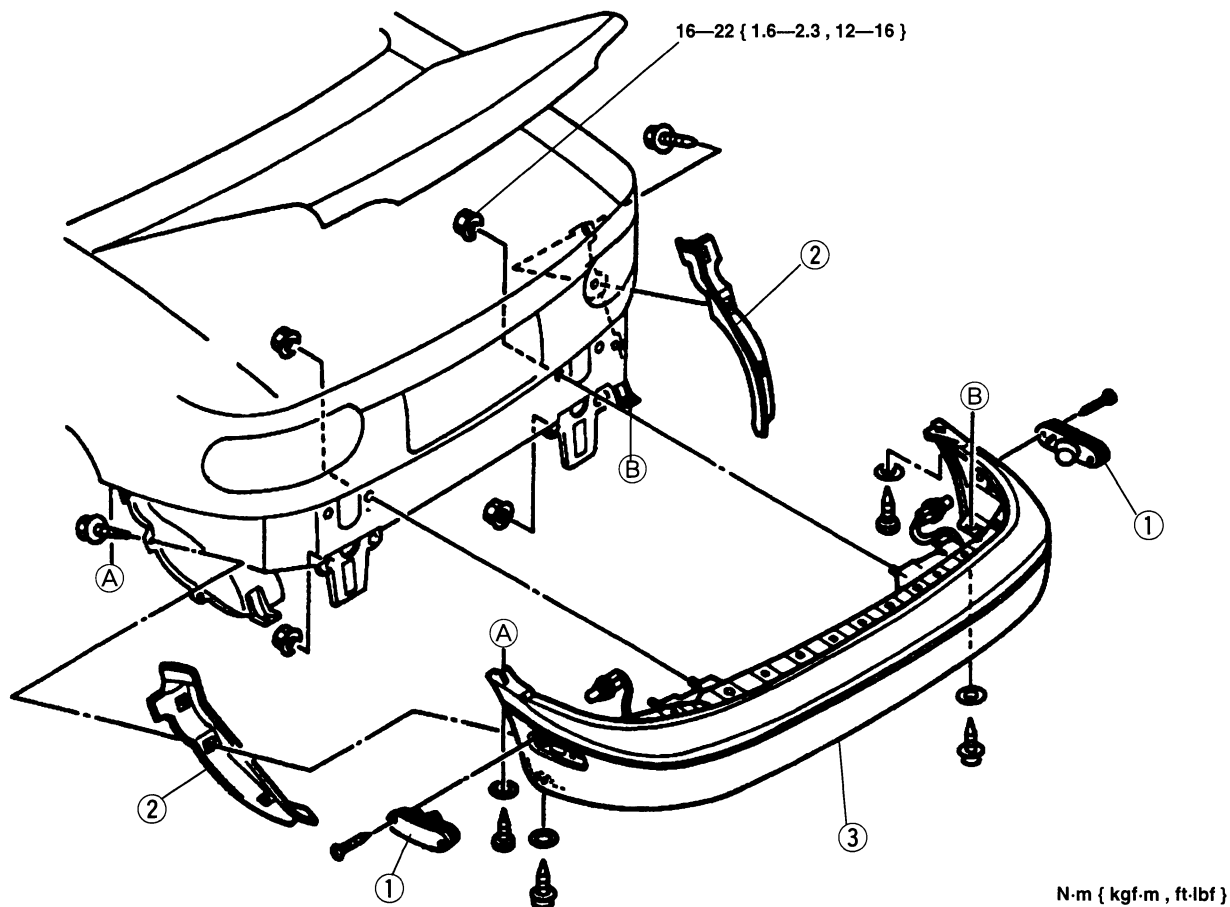
7	Front bumper fascia
8	Retainer
9	Bumper reinforcement
10	Spacer
11	Front bumper retainer
12	Front bumper bracket

BODY PANELS

REAR BUMPER REMOVAL / INSTALLATION

U5U910AK

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal indicated in the table.
4. Connect the negative battery cable.



U5U91012

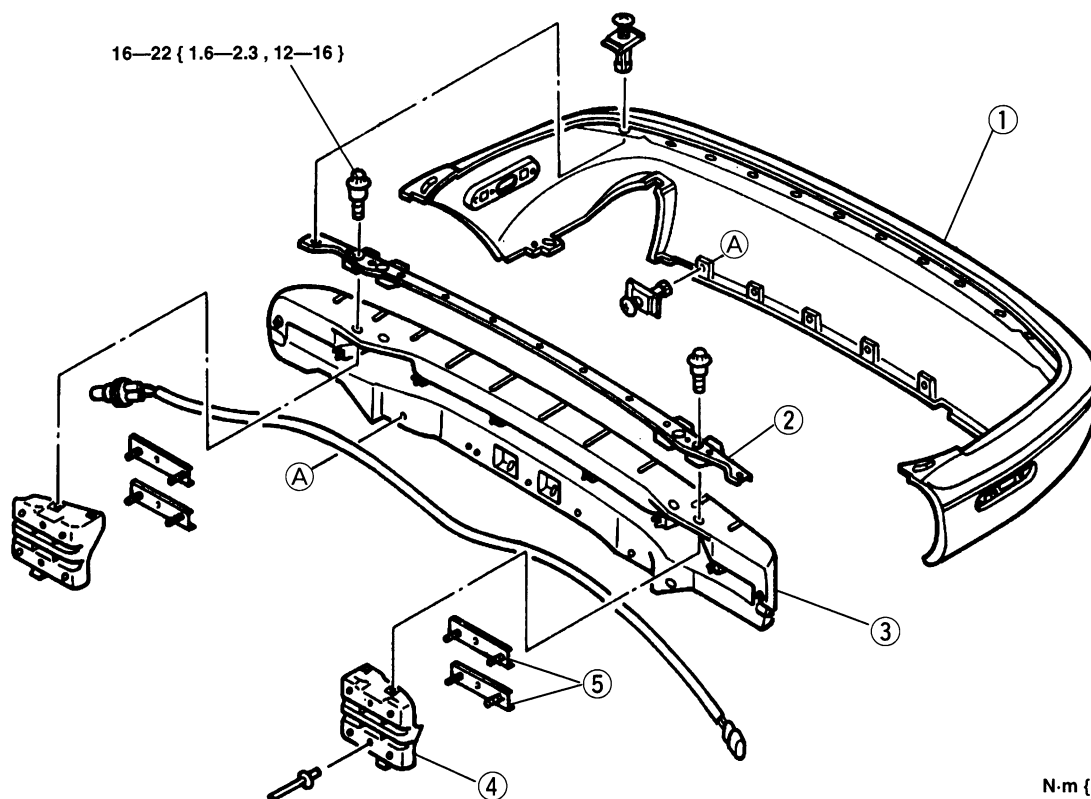
1	Rear side marker light
2	Splash shield

3	Rear bumper
---	-------------

REAR BUMPER DISASSEMBLY / ASSEMBLY

U5U910AL

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.



09

N·m { kgf·m , ft·lbf }
U5U91013

1	Rear bumper fascia
2	Retainer
3	Bumper reinforcement

4	Bumper stay ☐ Disassembly Note ☑ Assembly Note
5	Set plate

Bumper Stay Disassembly Note

- Remove the rivets from the bumper stay by using a cutting pliers.

Bumper Stay Assembly Note

- Rivet the bumper stay to the bumper reinforcement by using a hand riveter.

09-11 DOORS AND LIFTGATE

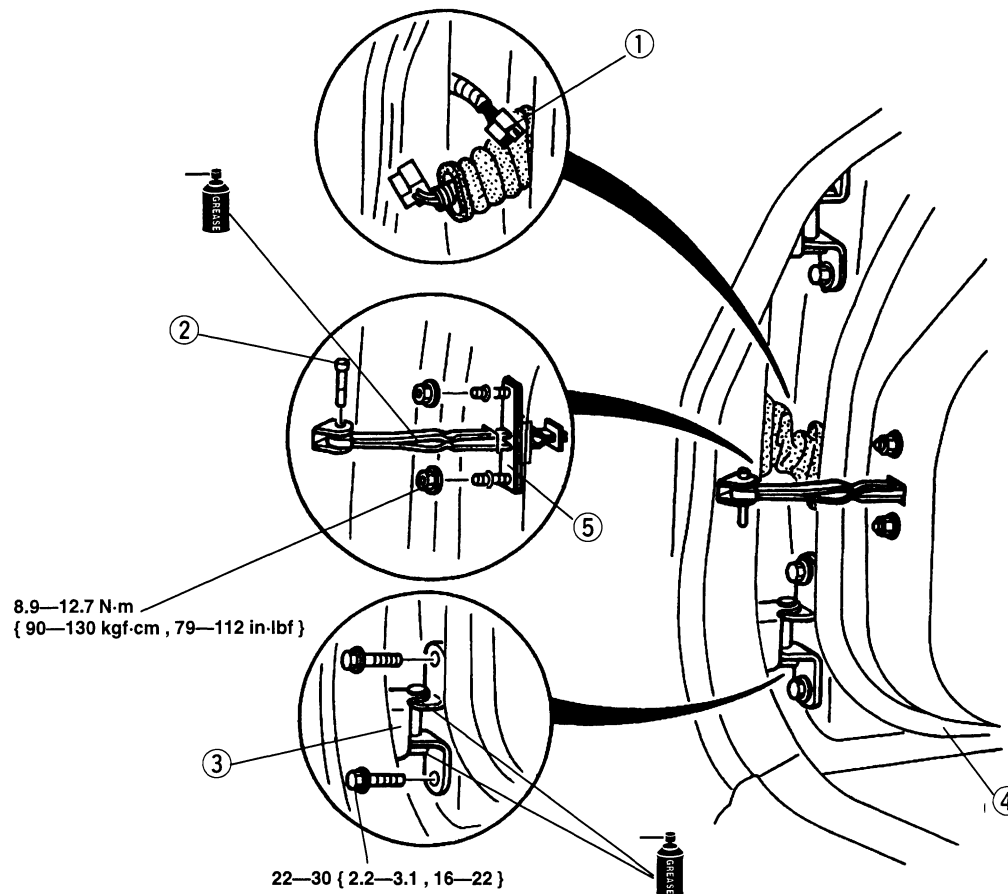
DOOR REMOVAL / INSTALLATION 09-11-1
DOOR ADJUSTMENT 09-11-2

DOOR WEDGE ADJUSTMENT 09-11-2

DOOR REMOVAL / INSTALLATION

U5U911AA

1. Disconnect the negative battery cable.
2. To remove the checker, remove the door trim and door screen.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Install the door screen and door trim.
6. Connect the negative battery cable.



U5U91101

1	Connector
2	Checker pin
3	Door hinge

4	Door ☞ 09-11 DOOR ADJUSTMENT
5	Checker

DOORS AND LIFTGATE

DOOR ADJUSTMENT

U5U911AB

1. Measure the clearance between the door and the body panel.

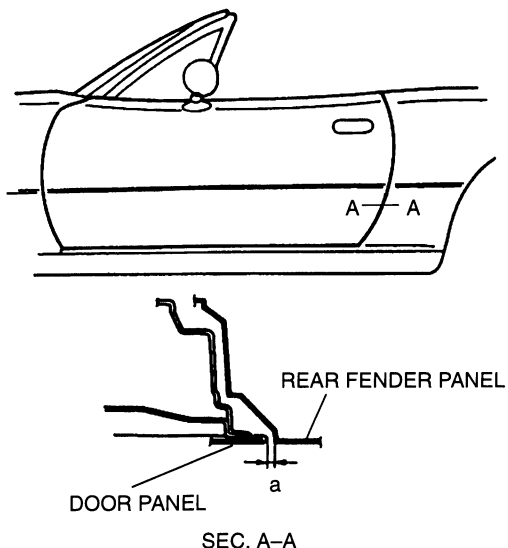
	Nominate mm { in }	Clearance mm { in }	
		Minimum	Maximum
a	5.0 { 0.2 }	4.0 { 0.16 }	6.0 { 0.23 }

2. If not as specified, loosen the door hinge installation bolts and reposition the door.
3. Tighten the door hinge installation bolts.

Tightening torque

22—30 N·m { 2.2—3.1 kgf·m , 16—22 ft·lbf }

4. Adjust the door lock striker to the door after the door has been aligned. (Refer to 09-14 DOOR LOCK STRIKER ADJUSTMENT.)



U5U91102

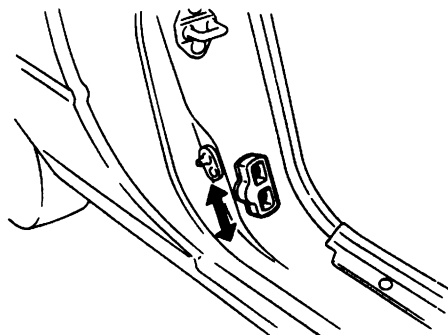
DOOR WEDGE ADJUSTMENT

U5U911AC

- Verify that the door wedge and dovetail are properly aligned. If necessary, move the door wedge vertically.

Tightening torque

4.3—6.1 N·m { 43—63 kgf·cm , 38—54 in·lbf }



U5U91103

09-12 GLASS/WINDOWS/MIRRORS

WINDOW REGULATOR, GLASS, AND GUIDE

STRUCTURAL VIEW 09-12-1

WINDOW REGULATOR, GLASS, AND GUIDE

REMOVAL / INSTALLATION 09-12-2

Regulator Handle Removal Note 09-12-3

Regulator Handle Installation Note ... 09-12-3

Vertical Adjustment 09-12-4

Forward/Backward Adjustment 09-12-5

Inward/Outward Adjustment 09-12-6

After Completion Of Adjustment 09-12-6

DOOR GLASS ADJUSTMENT 09-12-7

POWER WINDOW REGULATOR

INSPECTION 09-12-7

POWER WINDOW SWITCH

REMOVAL / INSTALLATION 09-12-7

POWER WINDOW SWITCH

INSPECTION 09-12-8

POWER OUTSIDE MIRROR

REMOVAL / INSTALLATION 09-12-8

MANUAL OUTSIDE MIRROR

REMOVAL / INSTALLATION 09-12-9

POWER OUTSIDE MIRROR

INSPECTION 09-12-9

POWER OUTSIDE MIRROR SWITCH

REMOVAL / INSTALLATION 09-12-10

POWER OUTSIDE MIRROR SWITCH

INSPECTION 09-12-10

REARVIEW MIRROR REMOVAL 09-12-11

REARVIEW MIRROR INSTALLATION .. 09-12-11

BASE REMOVAL 09-12-11

BASE INSTALLATION 09-12-11

REAR WINDOW DEFROSTER

STRUCTURAL VIEW 09-12-12

REAR WINDOW DEFROSTER SWITCH

REMOVAL / INSTALLATION 09-12-12

REAR WINDOW DEFROSTER SWITCH

INSPECTION 09-12-13

REAR WINDOW DEFROSTER RELAY

INSPECTION 09-12-13

FILAMENT INSPECTION

..... 09-12-13

FILAMENT REPAIR

..... 09-12-13

WINDSHIELD REMOVAL

..... 09-12-14

WINDSHIELD INSTALLATION

..... 09-12-15

REAR WINDOW REMOVAL

..... 09-12-17

Convertible Top 09-12-17

REAR WINDOW INSTALLATION

..... 09-12-18

Convertible Top 09-12-18

REAR WINDOW GLASS REMOVAL

..... 09-12-19

Detachable Hardtop 09-12-19

REAR WINDOW GLASS

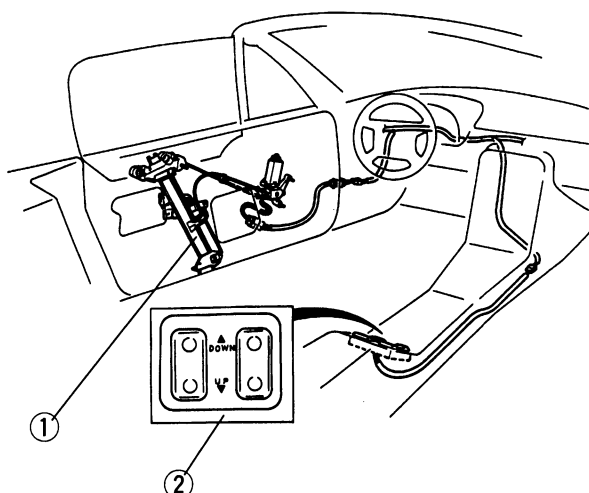
INSTALLATION 09-12-20

Detachable Hardtop 09-12-20

WINDOW REGULATOR, GLASS, AND GUIDE STRUCTURAL VIEW

U5U912AA

1	Power window regulator
2	Power window switch

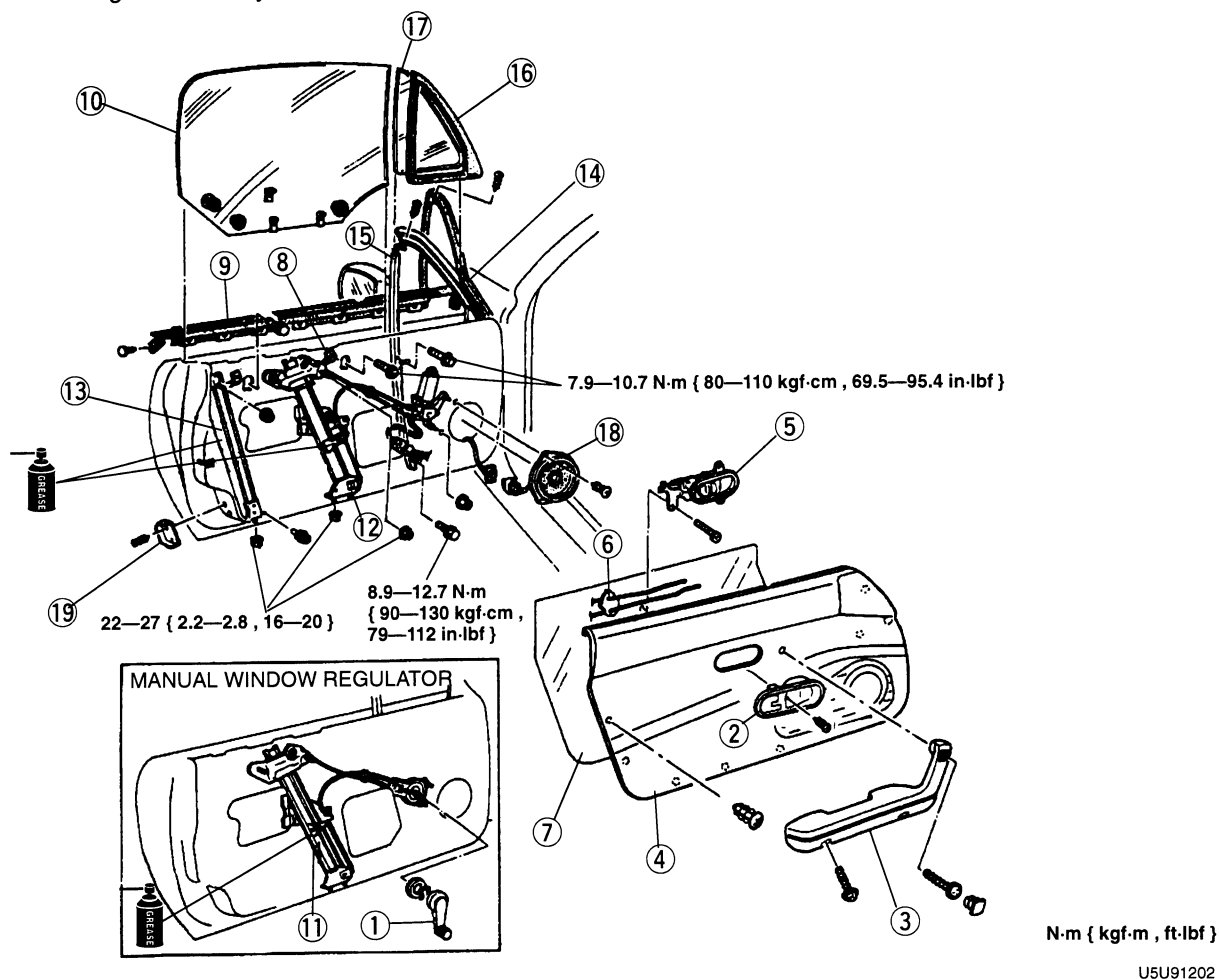


U5U91201

WINDOW REGULATOR, GLASS, AND GUIDE REMOVAL / INSTALLATION

U5U912AB

1. Raise the door glass about **190 mm { 7.5 in }** from the fully open position.
2. Disconnect the negative battery cable.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Connect the negative battery cable.



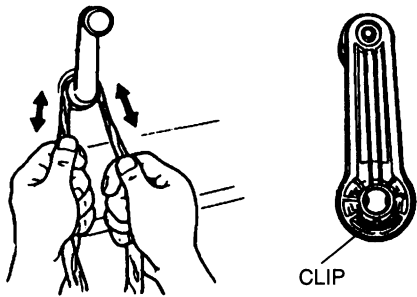
U5U91202

1	Regulator handle ☞ Removal note ☞ Installation note
2	Inner handle cover
3	Arm rest
4	Door trim
5	Inner handle
6	Sealing pad
7	Door screen
8	Upper glass stopper
9	Front beltline molding

10	Door glass ☞ 09-12 DOOR GLASS ADJUSTMENT
11	Manual window regulator
12	Power window regulator
13	Glass guide
14	Door weatherstrip
15	Division channel
16	Quarter glass weatherstrip
17	Quarter glass
18	Speaker
19	Dovetail

Regulator Handle Removal Note

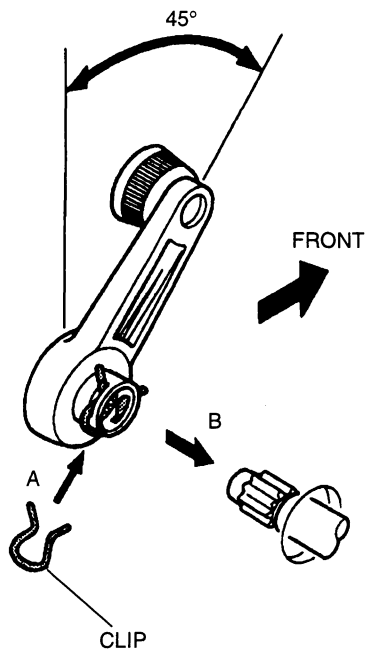
- Remove the regulator handle clip by using a rag as shown.



U5U91203

Regulator Handle Installation Note

1. Raise the door glass fully.
2. Install the clip in the regulator handle (A).
3. Push the regulator handle as shown (B).



U5U91204

Vertical Adjustment

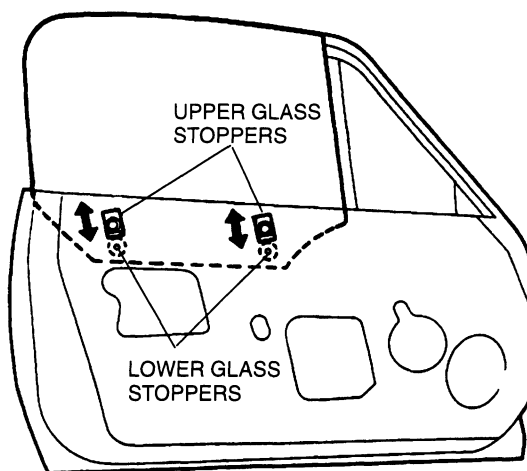
1. Check that the upper edge of the glass is in the correct position as shown.

Note

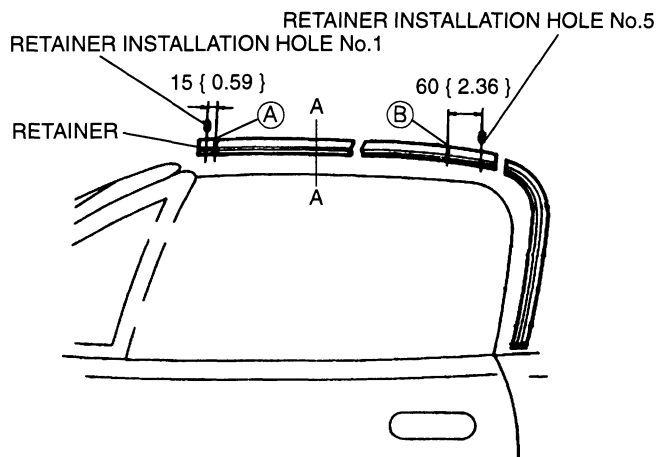
- When the front door glass is raised, both lower glass stoppers must simultaneously contact the upper glass stoppers.
2. If necessary, adjust the position by loosening the installation bolts for the two upper glass stoppers, lowering the door glass slightly, then moving the upper stoppers up or down.
 3. Tighten the upper stopper installation bolt.

Tightening torque

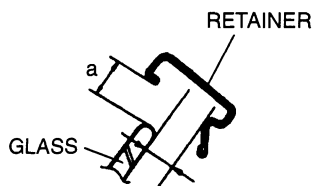
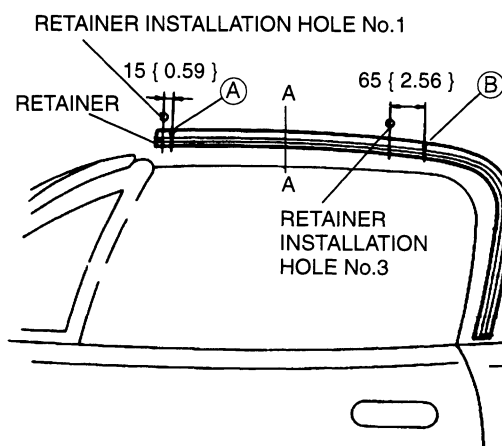
7.9—10.7 N·m { 80—110 kgf·cm , 69.5—95.4 in·lbf }



CONVERTIBLE TOP



DETACHABLE HARDTOP



SEC. A-A

	a
(A)	9.4 ± 2.0 { 0.37 ± 0.08 }
(B)	9.1 ± 2.0 { 0.36 ± 0.08 }

mm { in }

U5U91205

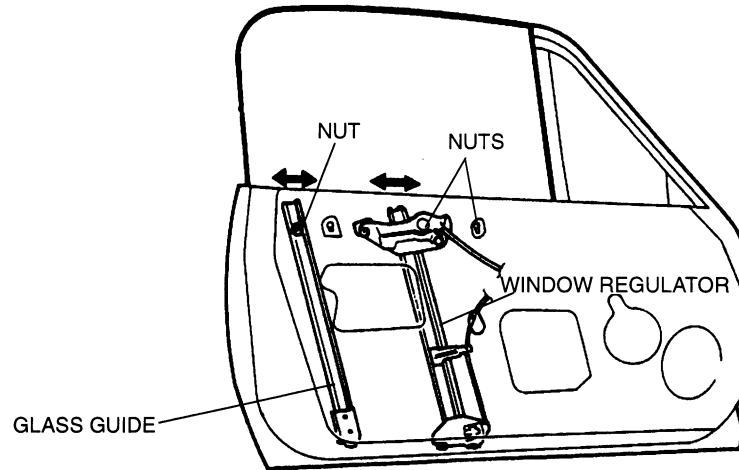
GLASS/WINDOWS/MIRRORS

Forward/Backward Adjustment

1. Check that the rear edge of the glass is in the correct position as shown.
2. If necessary, adjust the position by loosening the installation nuts for the window regulator upper and for the glass guide upper, then moving the window regulator and glass guide fore or aft equally.
3. Tighten the window regulator and glass guide installation nuts.

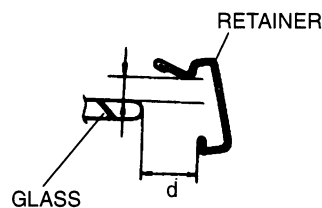
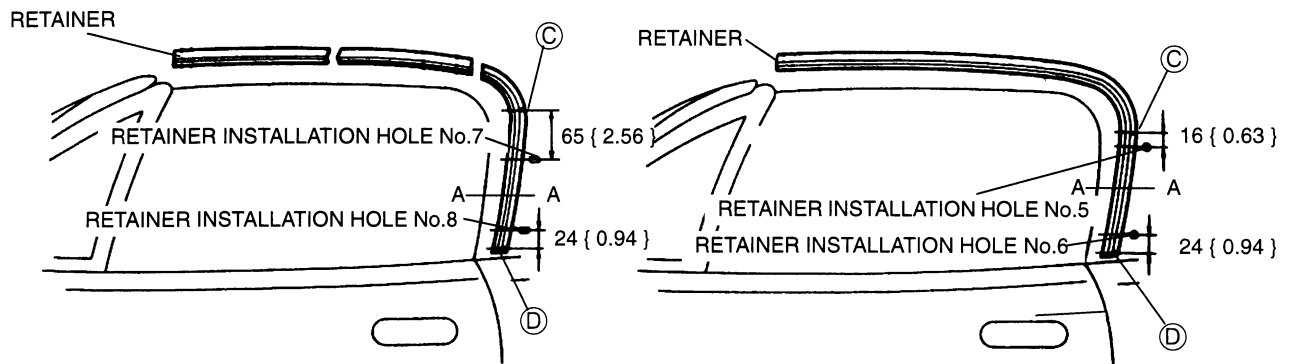
Tightening torque

22—27 N·m { 2.2—2.8 kgf·m , 16—20 ft·lbf }



CONVERTIBLE TOP

DETACHABLE HARDTOPI



	d
Ⓒ	12.5 ± 2.0 { 0.49 ± 0.08 }
Ⓓ	12.0 ± 2.0 { 0.47 ± 0.08 }

mm { in }

U5U91206

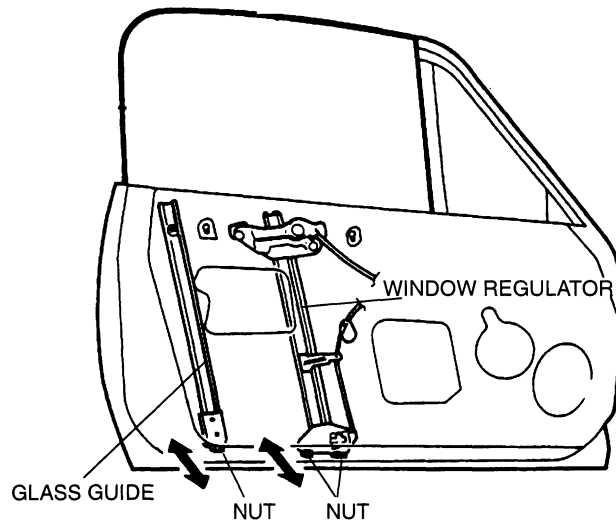
GLASS/WINDOWS/MIRRORS

Inward/Outward Adjustment

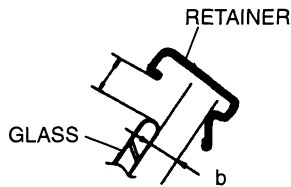
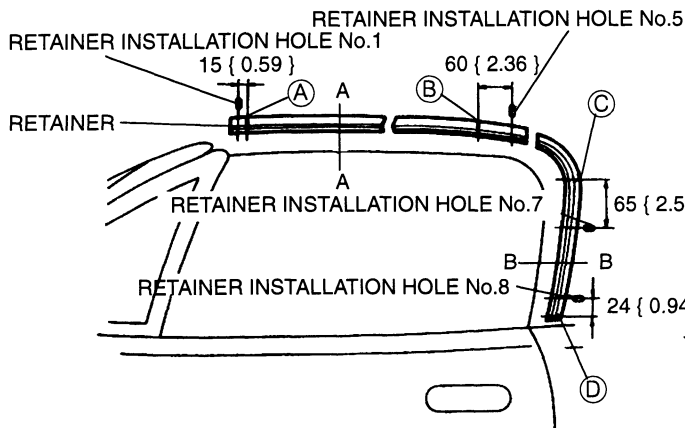
1. Check that the upper and rear edge of the glass is in the correct position as shown.
2. If necessary, adjust the position by loosening the installation nuts for the window regulator lower and for the glass guide lower, then moving the window regulator and glass guide inward or outward equally.
3. Tighten the window regulator and glass guide installation nuts.

Tightening torque

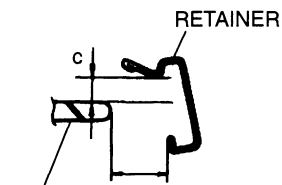
22—27 N·m { 2.2—2.8 kgf·m , 16—20 ft·lbf }



CONVERTIBLE TOP

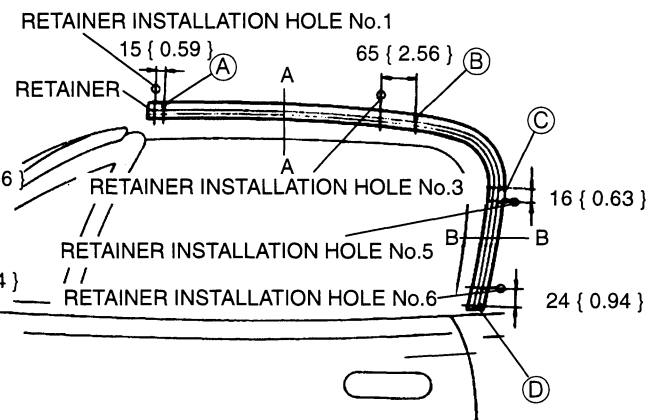


SEC. A-A



SEC. B-B

DETACHABLE HARDTOP



	b
(A)	$9.3 \pm 2.0 \{ 0.37 \pm 0.08 \}$
(B)	$7.4 \pm 2.0 \{ 0.29 \pm 0.08 \}$

	c
(C)	$5.8 \pm 2.0 \{ 0.23 \pm 0.08 \}$
(D)	$11.1 \pm 2.0 \{ 0.44 \pm 0.08 \}$

mm { in }

U5U91207

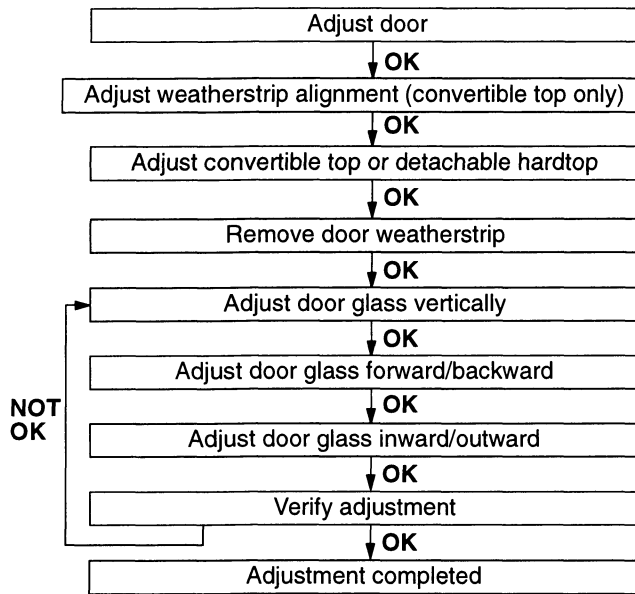
After Completion Of Adjustment

1. Verify the following with the door weatherstrip removed.
 - (1) The door glass is in the correct position when fully closed.
 - (2) When the door glass is raised, the lower glass stoppers contact the upper glass stoppers simultaneously.
2. Verify the following with the door weatherstrip installed.
 - (1) The door weatherstrip installation is correct.
 - (2) The door glass raises and lowers smoothly with the door closed.

DOOR GLASS ADJUSTMENT

U5U912AC

- Adjust the door glass as follows.



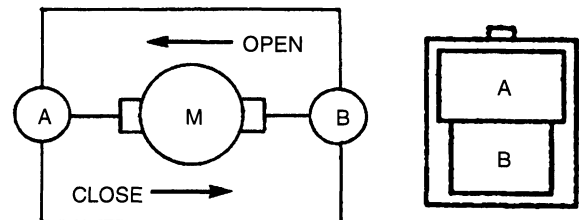
U5U91267

POWER WINDOW REGULATOR INSPECTION

U5U912AD

- Remove the power window regulator. (Refer to 09-12 WINDOW REGULATOR, GLASS AND GUIDE REMOVAL / INSTALLATION.)
- Apply battery positive voltage to the power window regulator connector terminals and check the operation of the regulator.

Connection		Regulator operation
B+	GND	
A	B	CLOSE
B	A	OPEN



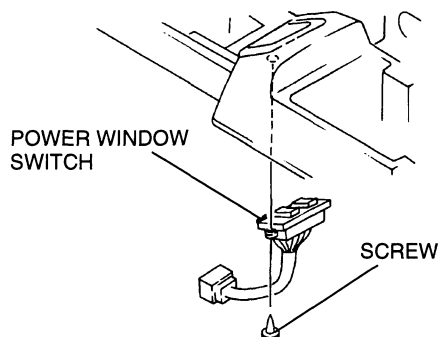
U5U91208

- If not as specified, replace the power window regulator.

POWER WINDOW SWITCH REMOVAL / INSTALLATION

U5U912AE

- Disconnect the negative battery cable.
- Remove the rear console.
- Remove the power window switch installation screws, and remove the power window switch.
- Install in the reverse order of removal.



POWER WINDOW SWITCH INSPECTION

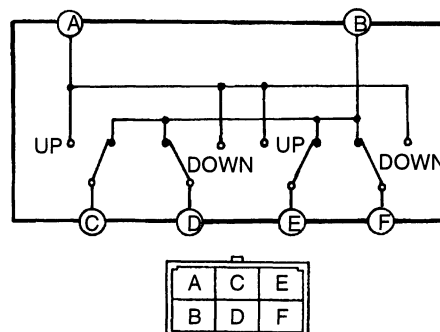
U5U912AF

1. Remove the power window switch.
2. Check for continuity between the power window switch terminals by using an ohmmeter.

○—○ : Continuity

Switch position	Terminal							
	Driver side				Passenger side			
	A	B	C	D	A	B	E	F
UP	○		○		○		○	
OFF		○	○	○		○	○	○
DOWN	○		○	○	○		○	○

U5U91209



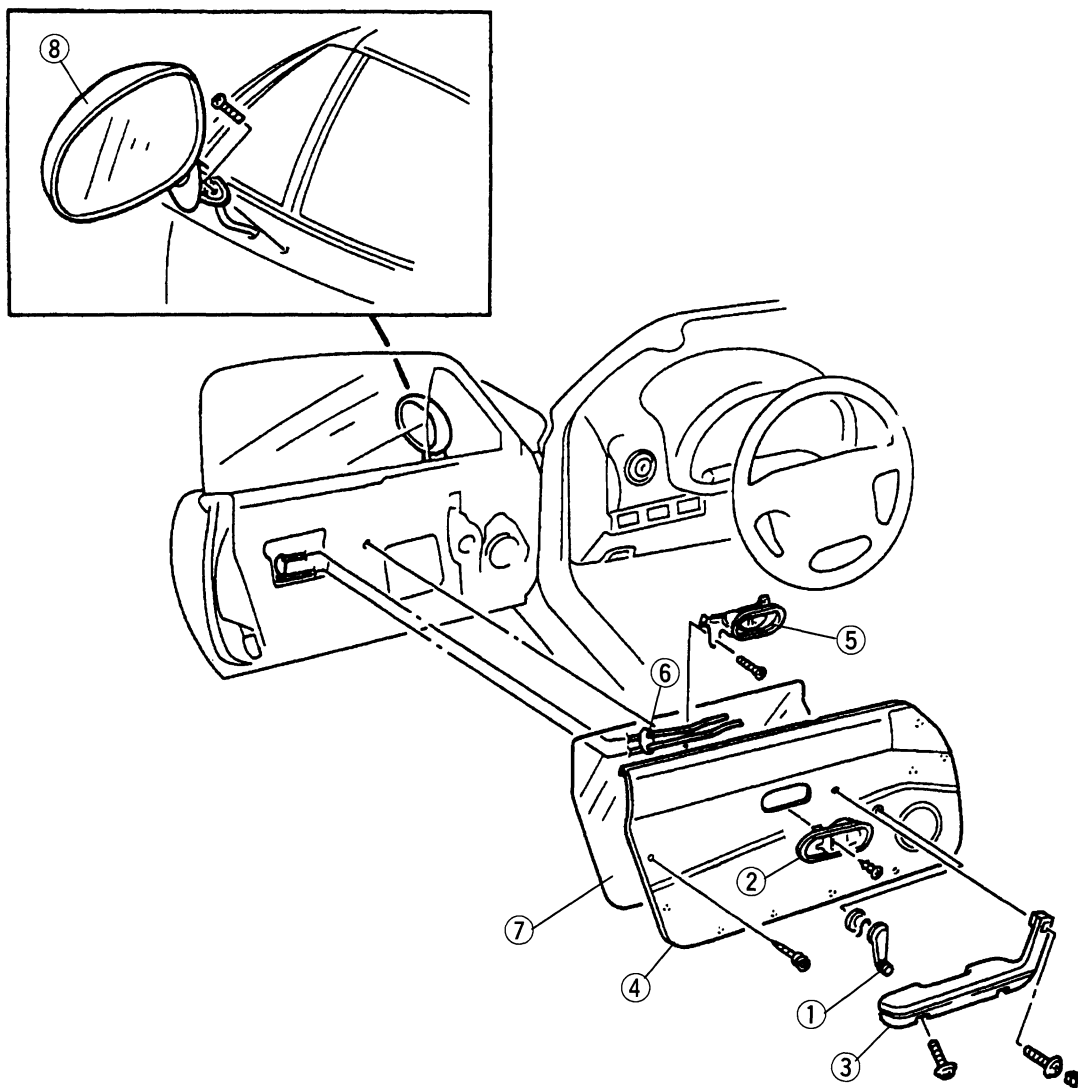
U5U91210

3. If not as specified, replace the power window switch.

POWER OUTSIDE MIRROR REMOVAL / INSTALLATION

U5U912AG

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal indicated in the table.
4. Connect the negative battery cable.



U5U91211

GLASS/WINDOWS/MIRRORS

1	Regulator handle 09-12 WINDOW REGULATOR, GLASS AND GUIDE REMOVAL / INSTALLATION, Regulator Handle Removal Note 09-12 WINDOW REGULATOR, GLASS AND GUIDE REMOVAL / INSTALLATION, Regulator Handle Installation Note
2	Inner handle cover

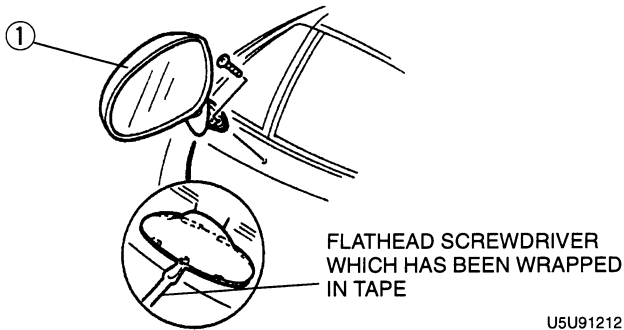
3	Arm rest
4	Door trim
5	Inner handle
6	Sealing pad
7	Door screen
8	Power outside mirror

MANUAL OUTSIDE MIRROR REMOVAL / INSTALLATION

U5U912AH

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

1	Manual outside mirror
---	-----------------------

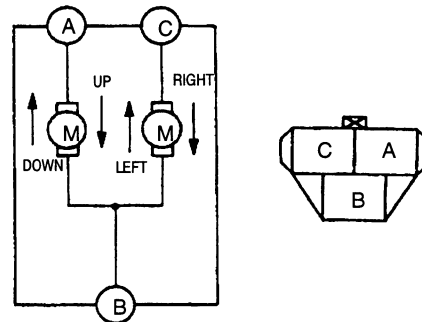


POWER OUTSIDE MIRROR INSPECTION

U5U912AJ

1. Remove the power outside mirror.
2. Apply battery positive voltage and check the operation of the power outside mirror.

Connection		Mirror operation
B+	GND	
A	B	UP
B	A	DOWN
B	C	LEFT
C	B	RIGHT

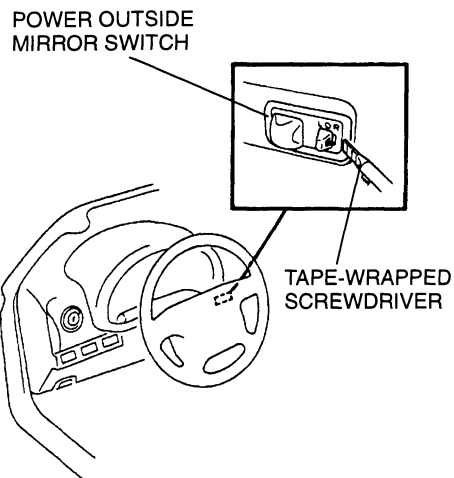


3. If not as specified, replace the power outside mirror.

POWER OUTSIDE MIRROR SWITCH REMOVAL / INSTALLATION

U5U912AK

1. Disconnect the negative battery cable.
2. Insert a flathead screwdriver which has been wrapped in tape as shown in the figure.
3. Install in the reverse order of removal.



POWER OUTSIDE MIRROR SWITCH INSPECTION

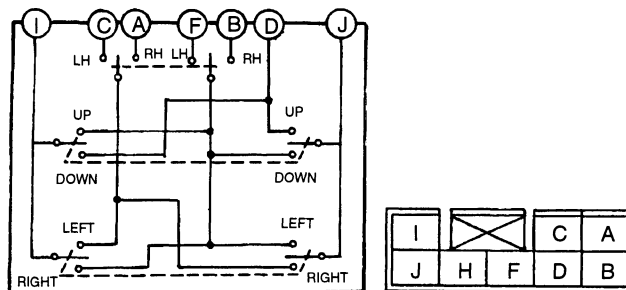
U5U912AL

1. Remove the power outside mirror switch.
2. Check for continuity between the power outside mirror switch terminals by using an ohmmeter.

○—○ : Continuity

Switch position		Terminal						
		A	B	C	D	F	I	J
Left	UP				○	○	○	○
	DOWN				○	○	○	○
	LEFT			○		○	○	○
	RIGHT			○		○	○	○
Right	UP		○		○		○	○
	DOWN		○		○		○	○
	LEFT	○	○				○	○
	RIGHT	○	○				○	○

U5U91214



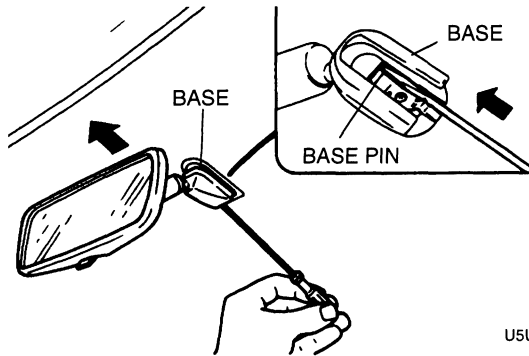
U5U91215

3. If not as specified, replace the power outside mirror switch.

REARVIEW MIRROR REMOVAL

U5U912AM

1. Insert a flathead screwdriver between the mirror and the base.
2. Push the base pin to remove the mirror.



REARVIEW MIRROR INSTALLATION

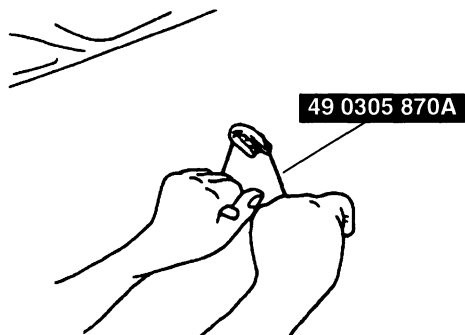
U5U912AT

- Install the rearview mirror onto the base.

BASE REMOVAL

U5U912AN

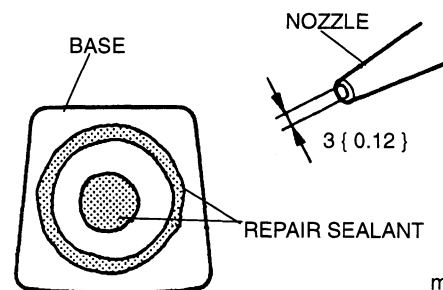
1. Wind each end of a wire around a bar.
2. Saw through the sealant, using a long sawing action to spread the work over the whole length of wire to prevent it from breaking.



BASE INSTALLATION

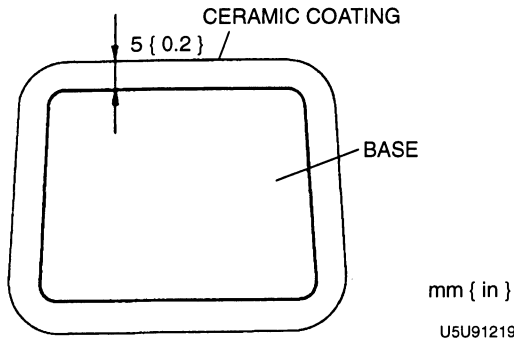
U5U912AP

1. Cut away all of the original sealant by using a razor knife.
2. Clean and degrease the glass.
3. Apply primer onto the bonding area of the glass and the base by using a brush. Use only glass primer on the glass and body primer on the base. Keep the bonding area free of dirt and grease, and do not touch the surface. Allow the primer to dry for approximately **30 minutes**.
4. Apply a **3 mm { 0.12 in }** bead of repair sealant to the base.



GLASS/WINDOWS/MIRRORS

5. Center the base in the ceramic coating and press it onto the glass. Use white gasoline to remove any excess repair sealant.

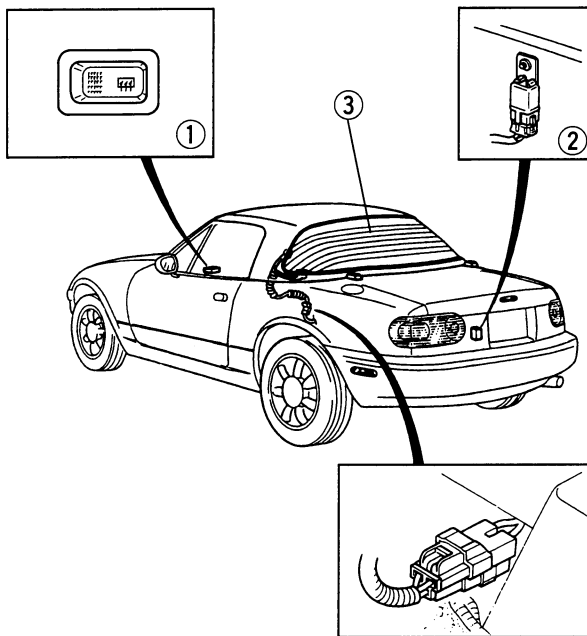


Hardening time of repair sealant

Temperature	Surface hardening time	Time required until car can be put into service
5 °C { 41 °F }	Approx. 1.5 hr	12 hr
20 °C { 68 °F }	Approx. 1 hr	4 hr
35 °C { 95 °F }	Approx. 10 min	2 hr

REAR WINDOW DEFROSTER STRUCTURAL VIEW

U5U912AQ



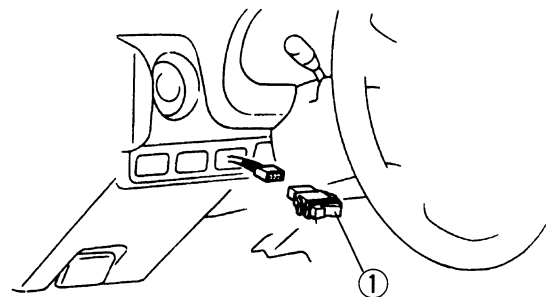
1	Rear window defroster switch
2	Rear window defroster relay
3	Filament

U5U91220

REAR WINDOW DEFROSTER SWITCH REMOVAL / INSTALLATION

U5U912AR

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal indicated in the table.
4. Connect the negative battery cable.



U5U91221

1	Rear window defroster switch
---	------------------------------

REAR WINDOW DEFROSTER SWITCH INSPECTION

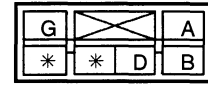
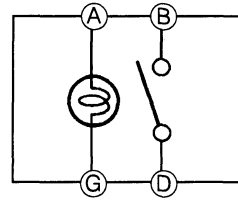
U5U912AS

1. Remove the rear window defroster switch.
2. Check for continuity between the rear window defroster switch terminals by using an ohmmeter.

○—○ : Continuity ○—⊗—○ : Bulb

Switch position	Terminal			
	A	G	B	D
OFF	○—⊗—○			
ON	○—⊗—○		○—○	○—○

U5U91222



U5U91223

3. If not as specified, replace the rear window defroster switch.

REAR WINDOW DEFROSTER RELAY INSPECTION

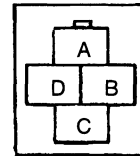
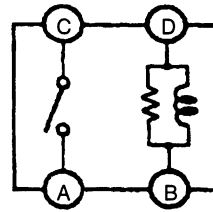
U5U912AU

1. Remove the rear window defroster relay.
2. Check for continuity between the relay terminals by using an ohmmeter.

○—○ : Continuity

Connection		A	B	C	D
B+	GND				
—	—		○—○		○—○
B	D	○—○		○—○	

U5U91224



U5U91225

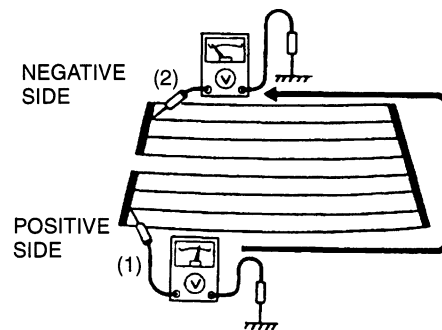
3. If not as specified, replace the rear window defroster relay.

FILAMENT INSPECTION

U5U912AV

1. Turn the ignition switch to ON.
2. Turn the rear window defroster switch on.
3. Connect the positive (+) lead of the voltmeter to the positive side of each filament and the negative (−) lead to a ground.
4. Gradually, slide the positive (+) lead from the positive side to the negative side and measure the voltage. Verify that the voltage decreases accordingly.

	(1)	→	(2)
Voltage	Approx. 12 V	→	Approx. 0 V (Reference value)



U5U91226

5. If the voltage is not as specified or it changes rapidly, the filament is faulty. Repair the filament.

FILAMENT REPAIR

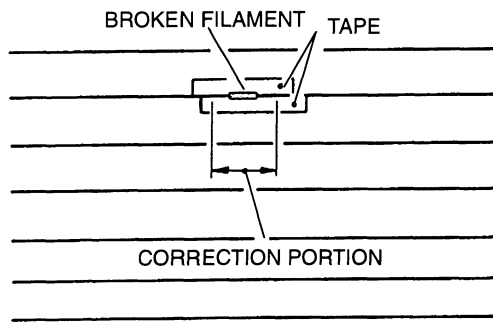
U5U912AW

Caution

- Use only white gasoline for cleaning. Other solvents can damage the surrounding filament.

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.

GLASS/WINDOWS/MIRRORS



U5U91227

3. Using a small brush or marking pen, repair the filament with silver paint or equivalent.
4. 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. Do not use the defroster until the paint is dry.

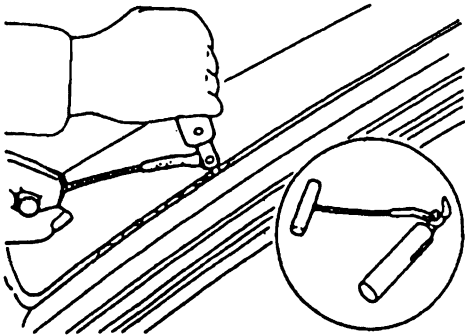
WINDSHIELD REMOVAL

U5U912AX

1. Remove the rearview mirror.
2. Remove the cowl grille.
3. Remove the windshield molding.
4. Remove the striker.
5. Remove the sunvisor.
6. Remove the front header trim.
7. Remove the weatherstrip.
8. Remove the A-pillar trim.
9. Apply protective tape along the edge of the body to protect it from damage.
10. Apply protective tape along the dashboard to protect it from damage.

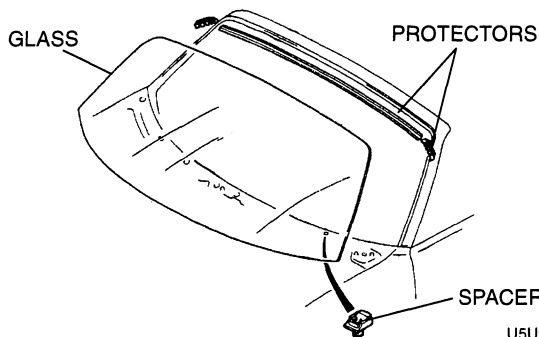
If The Glass Will Not Be Reused

1. Using a tool like that shown in the figure, insert the blade into the sealant and cut it around the edge of the glass.



U5U91228

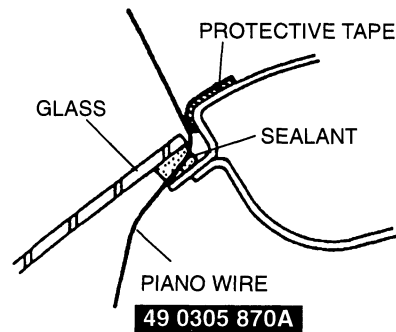
2. Remove the glass.
3. Remove the protectors.
4. Remove the spacers.



U5U91229

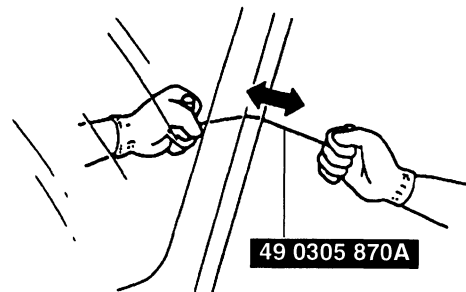
If The Glass Will Be Reused

1. Make a hole through the sealant from the inside of the vehicle by using an awl.
2. Pass piano wire through the hole.



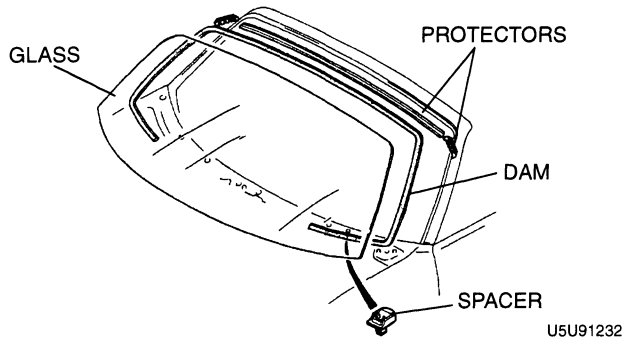
U5U91230

3. Wind each end of the wire around a bar.
4. Working with another person, saw through the sealant around the edge of the glass. Use a long sawing action to spread the work over the whole length of wire to prevent it from breaking. Make sure the wire does not rub on the body or the dashboard.



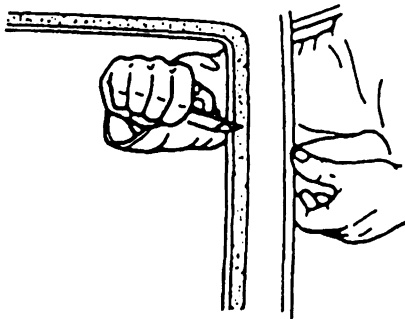
U5U91231

5. Remove the glass.
6. Remove the dam.
7. Remove the protectors.
8. Remove the spacers.

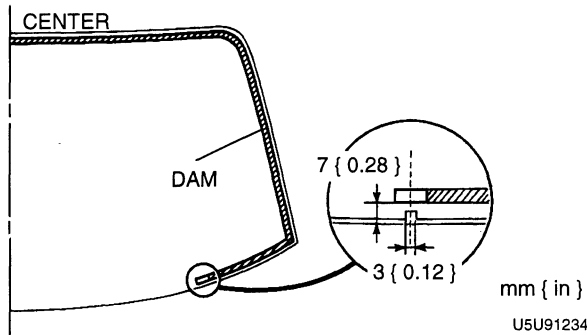


WINDSHIELD INSTALLATION

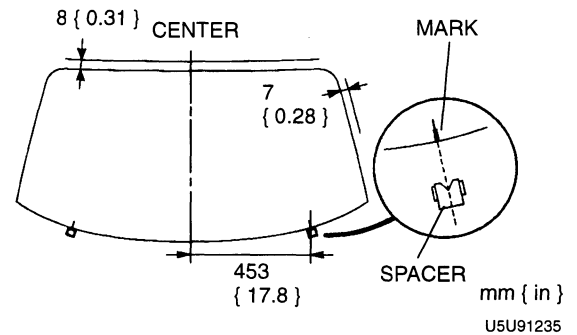
1. Cut away the old sealant by using a razor knife so that **1—2 mm { 0.04—0.08 in }** thickness of sealant remains around the circumference of the frame. If all the sealant has come off in any one place, apply some primer after degreasing, and allow it **30 minutes** to dry. Then apply new sealant to create a **2 mm { 0.08 in }** layer.
2. Carefully clean an area **50 mm { 2.0 in }** wide around the circumference of the glass and clean the bonding area on the body.



3. Securely bond a new dam onto the glass **7 mm { 0.28 in }** from the edge of the upper and the side portions as shown. Allow it to dry completely.



4. Install spacers. If a spacer is damaged, replace it.
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. Remove the glass.

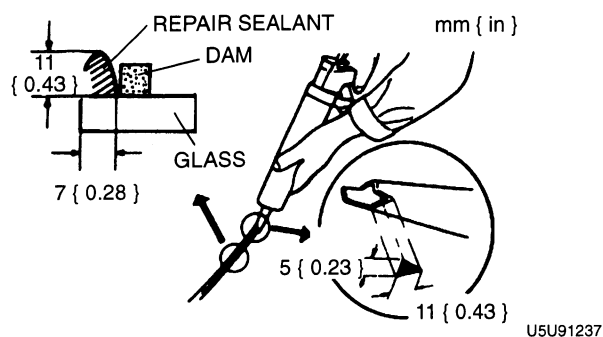


8. Apply primer onto the bonding area of the glass and body by using a brush. Use only glass primer on the glass and body primer on the body. Keep the area free of dirt and grease, and do not touch the surface. Allow the primer to dry for approximately **30 minutes**.

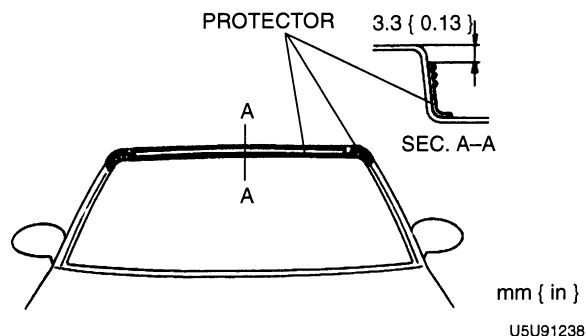


9. Apply an **11 mm { 0.43 in }** high bead of repair sealant around the circumference of the glass as shown. Keep the bead of sealant smooth and even, reshaping it by using a spatula where necessary. If the windshield is being reused, apply new repair sealant over the original.

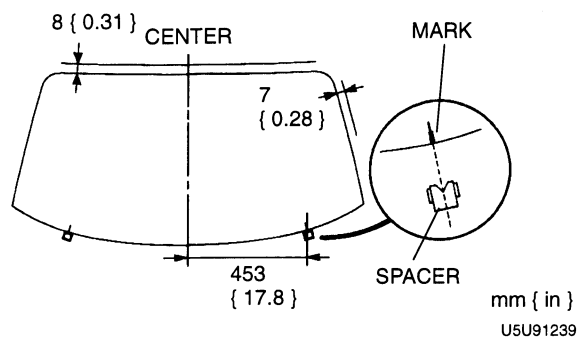
GLASS/WINDOWS/MIRRORS



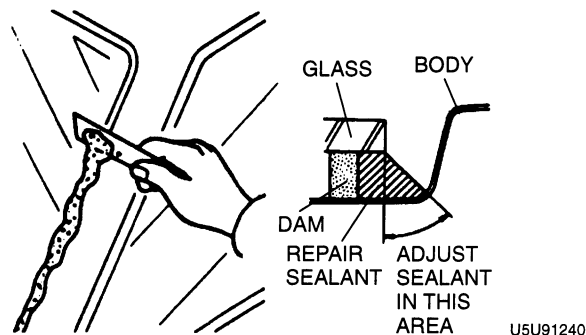
10. Securely bond a new one onto the body as shown. Allow it to dry completely.



11. Align the glass marks with the V-notches of spacers and install the glass onto the body.
12. Press firmly on the glass to compress the sealant. Verify that the body-to-glass clearance is as shown.

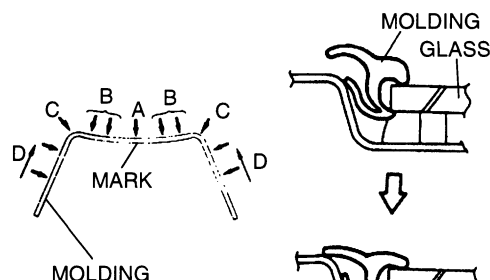


13. Use a scraper to smooth away any sealant that oozes out. Add more sealant to any points of poor contact. Adjust the upper and side sealant as shown, if necessary.



14. Install the windshield molding before the sealant hardens.

- (1) Align the center mark on the molding with the glass mark (A).
- (2) Install the upper part of the molding (B).
- (3) Install the corners of the molding (C).
- (4) Install the sides of the molding, starting from the bottom and working toward the top (D).



15. To prevent the glass from being pushed out by air pressure if a door is closed, open all of the windows until the repair sealant has hardened.

Hardening time of repair sealant

Temperature	Surface hardening time	Time required until car can be put into service
5 °C { 41 °F }	Approx. 1.5 hr	12 hr
20 °C { 68 °F }	Approx. 1 hr	4 hr
35 °C { 95 °F }	Approx. 10 min	2 hr

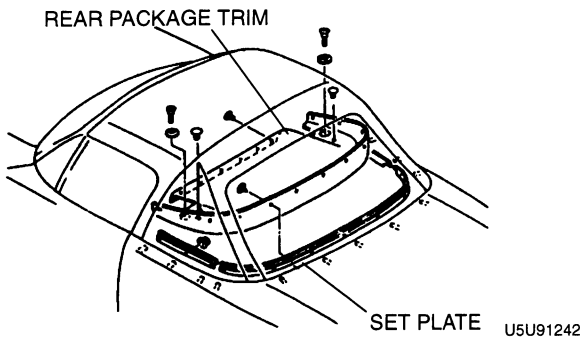
16. Check for water leaks.
17. If a leak is found, wipe the water off well and reinstall the windshield.
18. Install the A-pillar trim.
19. Install the weatherstrip.
20. Install the front header trim.
21. Install the sunvisor.
22. Install the striker.
23. Install the cowl grille.
24. Install the rearview mirror

REAR WINDOW REMOVAL

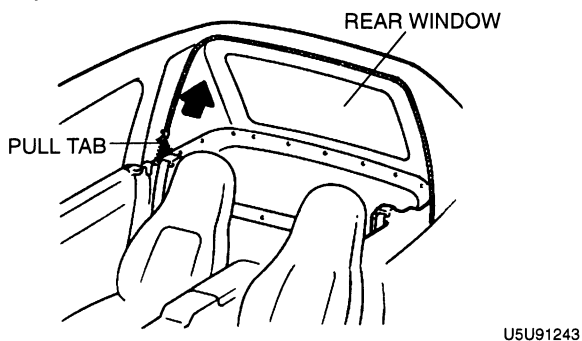
U5U912AZ

Convertible Top

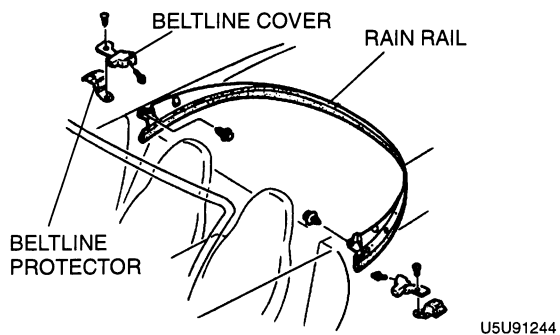
1. Remove the rear package trim.
2. Remove the set plates.



3. Unzip the rear window, and lower the convertible top fully.



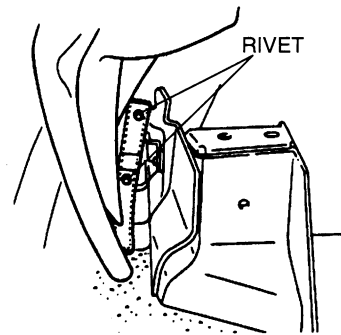
4. Remove the beltline covers.
5. Remove the beltline protectors.
6. Remove the rain rail installation fasteners from the body.



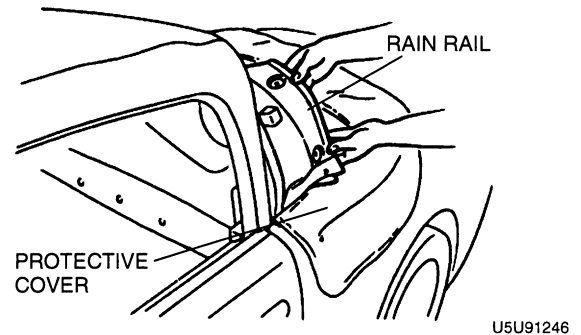
7. Leave the top latch in the unlocked position. Raise the convertible top completely.
8. Remove the rain rail from the studs.
9. Remove the rivets from the link by using a drill.

Drill size

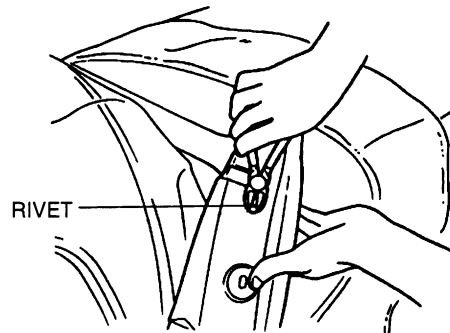
$\phi 4.0 \text{ mm}$ { $\phi 0.16 \text{ in}$ }



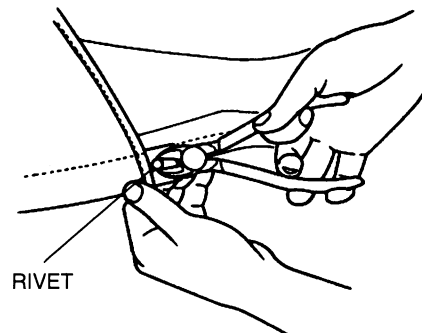
10. Remove the rain rail from the body.



11. Remove the rivets from the rain rail by using cutting pliers, and remove the rain rail from the convertible top.



12. Remove the rivets from the rear window by using cutting pliers.

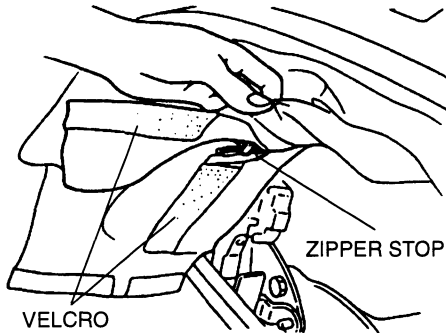


13. Peel apart the Velcro.

Note

- Save the zipper stops for reuse.

14. Carefully remove the zipper stops from the rear window and top fabric, and remove the rear window.



U5U91249

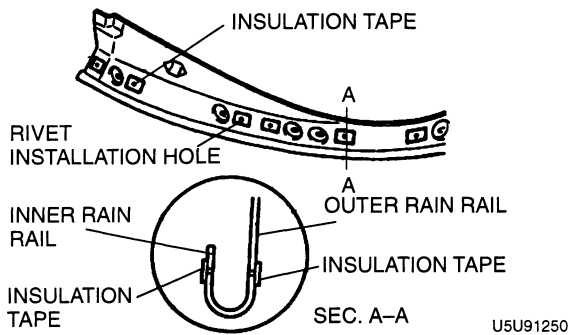
REAR WINDOW INSTALLATION

Convertible Top

1. Degrease the rain rail by using ethyl alcohol.
2. Install insulation tape to the rivet installation holes of the rain rail.

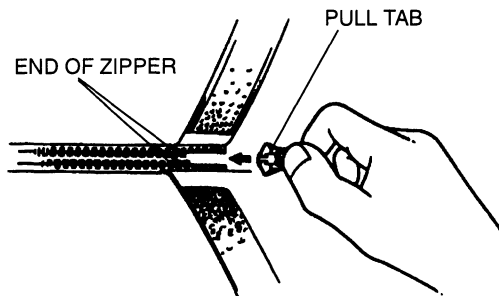
Insulation tape

Width: 20 mm { 0.8 in }
Height: 15 mm { 0.6 in }
Thickness: 3 mm { 0.12 in }



U5U91250

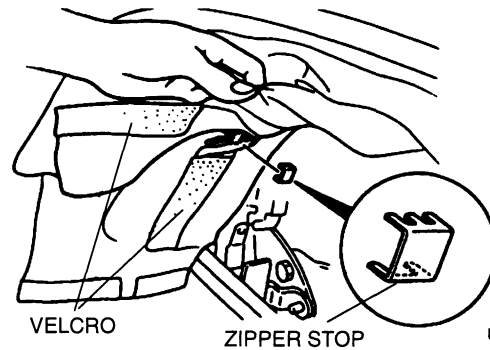
3. Align the ends of the zipper, and install the zipper pull tab.
4. Zip the rear window into place.



U5U91251

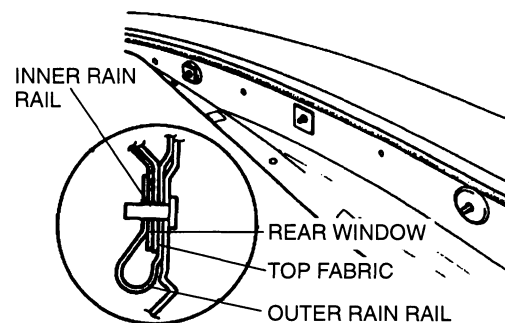
5. Install the zipper stops to the rear window and the top fabric.
6. Affix the rear window to the top fabric with the Velcro.

U5U912BA



U5U91252

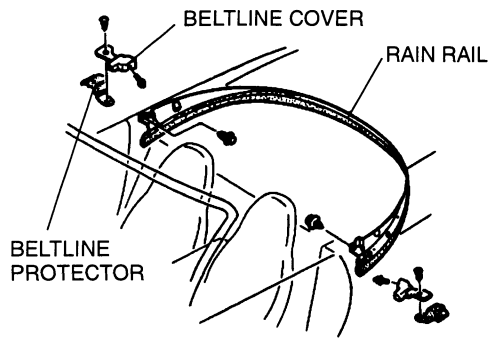
7. Mount the outer rain rail to the studs.
8. Mount the top fabric to the studs.
9. Mount the rear window to the studs.
10. Mount the inner rain rail to the studs.
11. Loosely install the set plates, beginning at the left side.



U5U91253

12. Unzip the rear window, and lower the convertible top fully.
13. Install the rain rail with the fasteners.
14. Install the beltline protectors.
15. Install the beltline cover.

GLASS/WINDOWS/MIRRORS



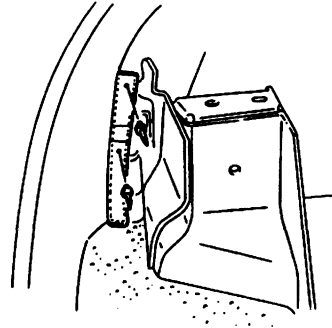
U5U91254

16. Raise the convertible top completely, and lock the top latch.
17. Zip the rear window into place.
18. Tighten the set plate installation nuts.

Tightening torque

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

19. Rivet the top fabric to the link.



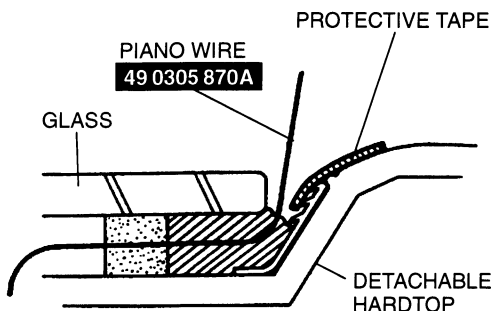
U5U91255

20. Install the rear package trim.
21. If there is any sagging of the top fabric, remove the pull tab and realign the zipper.

REAR WINDOW GLASS REMOVAL

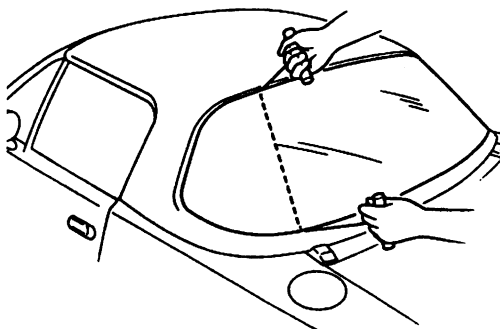
Detachable Hardtop

1. Remove the rear window molding.
2. Apply protective tape along the edge of the body to protect it from damage.
3. Remove the glass installation nuts.
4. Make a hole through the sealant from the inside of the vehicle by using an awl.
5. Pass piano wire through the hole.



U5U91256

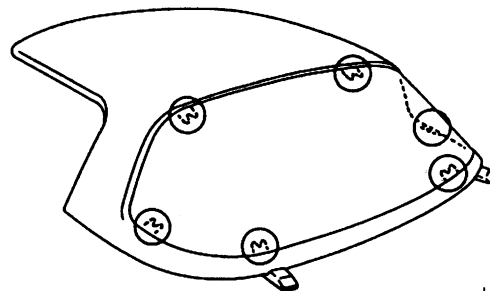
6. Wind each end of the wire around a bar.
7. Working with another person, saw through the sealant around the edge of the glass. Use a long sawing action to spread the work over the whole length of wire to prevent it from breaking. Make sure the wire does not rub on the body.



U5U91257

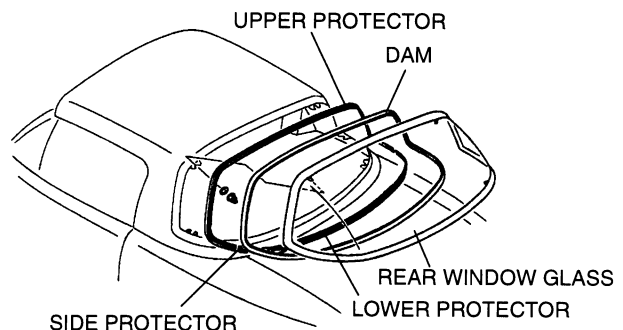
8. Use a razor knife to cut where the piano wire will not cut.

○...PLACES PIANO WIRE WILL NOT CUT



U5U91258

9. Remove the rear window glass.
10. Remove the dam.
11. Remove the upper protector.
12. Remove the side protector.
13. Remove the lower protector.

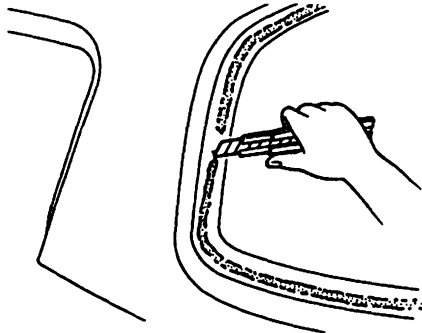


U5U91259

REAR WINDOW GLASS INSTALLATION

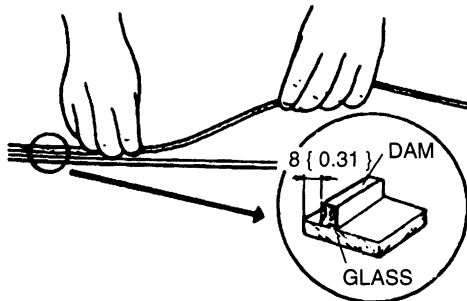
Detachable Hardtop

1. Cut away the old sealant by using a razor knife so that **1—2 mm { 0.04—0.08 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 apply new sealant to create a **2 mm { 0.08 in }** layer.
2. Carefully clean an area **50 mm { 2.0 in }** wide around the circumference of the glass and clean the bonding area on the body.



U5U91260

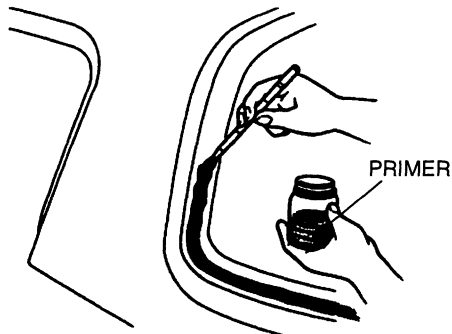
3. Securely bond the dam around the circumference of the glass **8 mm { 0.31 in }** from the edge. Allow the new dam to dry completely.



mm { in }

U5U91261

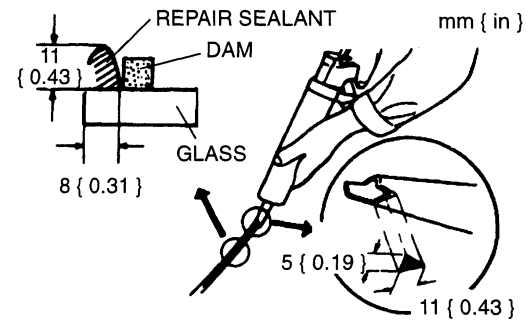
4. Apply primer onto the bonding area of the molding, glass, and body by using a brush. Use only glass primer on the glass and body primer on the body and molding. Keep the area free of dirt and grease, and do not touch the surface. Allow the primer to dry for approximately **30 minutes**.



U5U91262

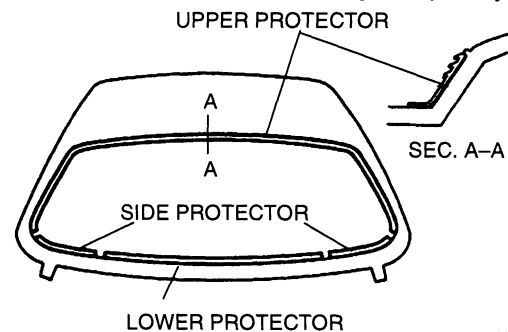
5. Apply an **11 mm { 0.43 in }** high bead of repair sealant around the circumference of the glass as shown. Keep the bead of sealant smooth and even, reshaping it by using a spatula where necessary. If the rear

U5U912BC
window glass is being reused, apply new repair sealant over the original.



U5U91263

6. Securely bond a new protector onto the detachable hardtop as shown. Allow it to dry completely.

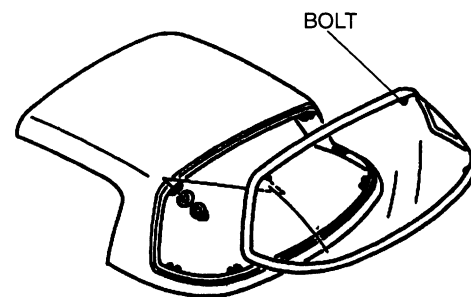


U5U91264

7. Align the bolts and install the glass onto the detachable hardtop.
8. Press firmly on the glass to compress the sealant.
9. Install the nuts onto the bolts.

Tightening torque

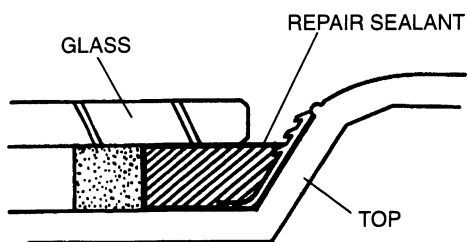
2.4—3.3 N·m { 24—34 kgf·cm , 21—29 in·lbf }



U5U91265

10. Use a scraper to smooth away any sealant that oozes out. Add more sealant to any points of poor contact.

GLASS/WINDOWS/MIRRORS



U5U91266

Hardening time of repair sealant

Temperature	Surface hardening time	Time required until car can be put into service
5 °C { 41 °F }	Approx. 1.5 hr	12 hr
20 °C { 68 °F }	Approx. 1 hr	4 hr
35 °C { 95 °F }	Approx. 10 min	2 hr

13. Check for water leaks.

14. If a leak is found, wipe the water off well and add sealant where needed.

11. Install the rear window molding.

12. To prevent the glass from being pushed out by air pressure if a door is closed, open all of the windows until the repair sealant has hardened.

09-13 SEATS

SEAT REMOVAL / INSTALLATION 09-13-1

SEAT DISASSEMBLY / ASSEMBLY ... 09-13-1

SEAT REMOVAL / INSTALLATION

U5U913AA

1. Disconnect the negative battery cable.
2. Remove the seat installation bolts.
3. Disconnect the seat connector.
4. Remove the seat.
5. Install in the reverse order of removal.

Tightening torque

39—50 N·m { 3.9—5.2 kgf·m, 29—37 ft·lbf }

SEAT DISASSEMBLY / ASSEMBLY

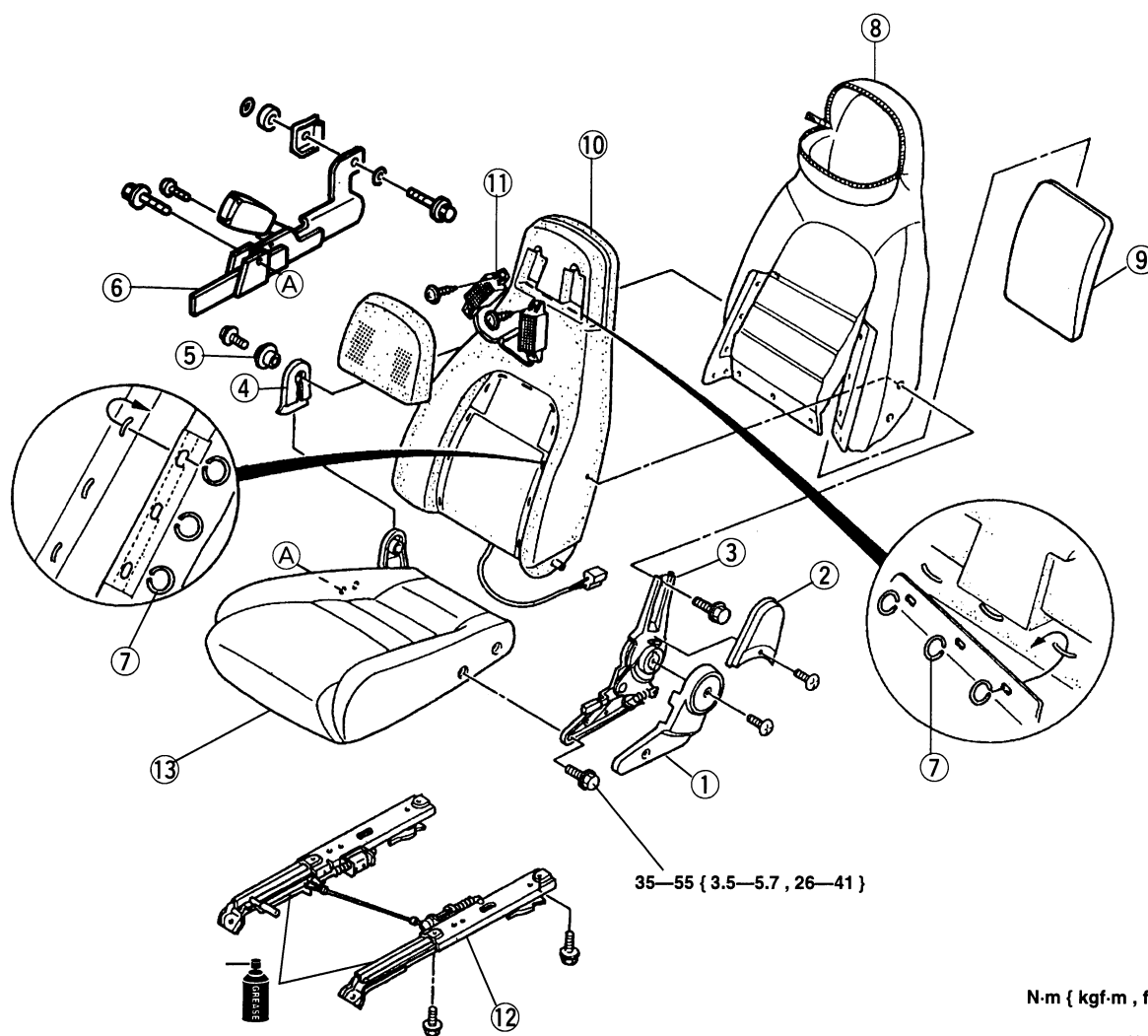
U5U913AB

1. Disassemble in the order indicated in the table.

Note

- Refer to 09-20 BODYSONIC REMOVAL / INSTALLATION for the bodysonic seat disassembly / assembly procedures.
- There are two types of headrest speakers. Refer to 09-20 HEADREST SPEAKER REMOVAL / INSTALLATION for the headrest speaker removal / installation procedures.

2. Assemble in the reverse order of disassembly.



N·m { kgf·m , ft·lbf }

U5U91301

SEATS

1	Recliner knuckle cover
2	Side cover
3	Recliner knuckle
4	Hinge cover
5	Bushing
6	Belt anchor unit
7	Hog ring

8	Seat back trim
9	Pad
10	Seat back frame
11	Headrest speaker (if equipped)
12	Seat slide
13	Seat cushion

09-14 SECURITY AND LOCKS

HOOD LOCK AND OPENER

REMOVAL / INSTALLATION 09-14-1

HOOD LOCK ADJUSTMENT 09-14-1

DOOR LOCK AND OPENER

REMOVAL / INSTALLATION 09-14-2

DOOR LOCK STRIKER ADJUSTMENT 09-14-3

TRUNK LID LOCK AND OPENER

REMOVAL / INSTALLATION 09-14-3

TRUNK LID LOCK ADJUSTMENT 09-14-4

TRUNK LID LOCK INSPECTION 09-14-4

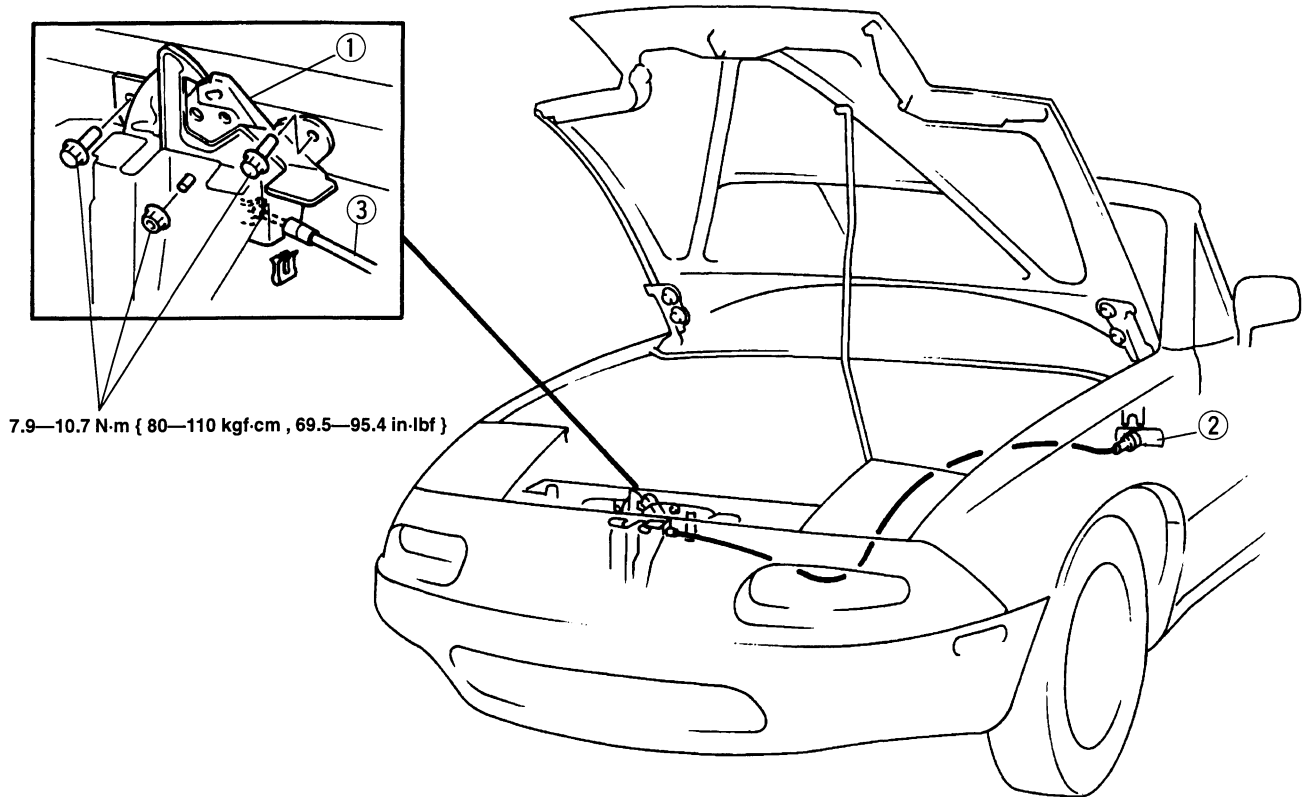
FUEL-FILLER LID OPENER

REMOVAL / INSTALLATION 09-14-5

HOOD LOCK AND OPENER REMOVAL / INSTALLATION

U5U914AA

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



U5U91401

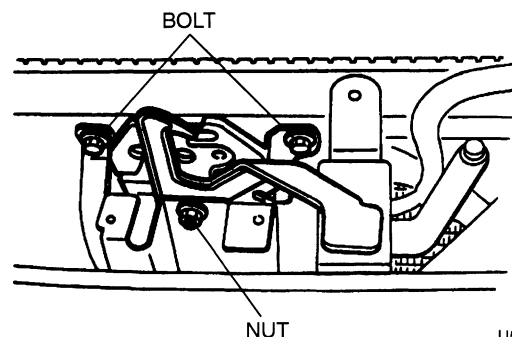
1	Hood lock ☐ 09-14 HOOD LOCK ADJUSTMENT
---	---

2	Hood release lever
3	Hood release cable

HOOD LOCK ADJUSTMENT

U5U914AB

1. Verify that the hood can be closed easily and that there is no looseness.
2. If not correct, loosen the hood lock installation bolts and nut, and align the hood lock with the striker on the hood.



U5U91402

SECURITY AND LOCKS

3. Tighten the hood lock installation bolts and nut.

Tightening torque

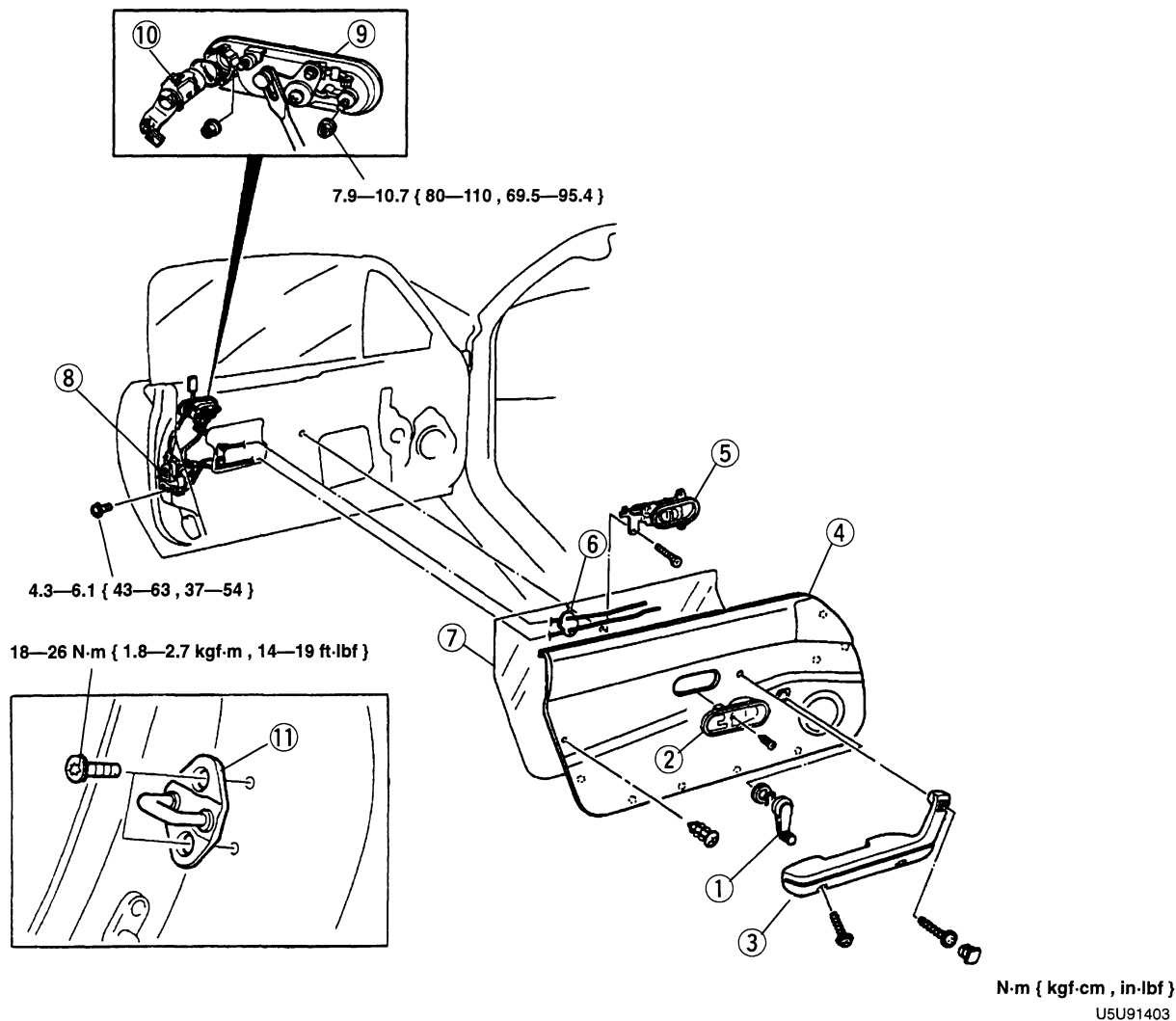
7.9—10.7 N·m

{ 80—110 kgf·cm , 69.5—95.4 in·lbf }

DOOR LOCK AND OPENER REMOVAL / INSTALLATION

U5U914AC

1. Disconnect the negative battery cable.
2. Raise the door glass fully.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Connect the negative battery cable.



1	Regulator handle ☞ 09-12 WINDOW REGULATOR, GLASS AND GUIDE REMOVAL / INSTALLATION, Regulator Handle Removal Note ☞ 09-12 WINDOW REGULATOR, GLASS AND GUIDE REMOVAL / INSTALLATION, Regulator Handle Installation Note
2	Inner handle cover
3	Arm rest
4	Door trim

5	Inner handle
6	Sealing pad
7	Door screen
8	Door lock
9	Outer handle
10	Key cylinder
11	Door lock striker ☞ 09-14 DOOR LOCK STRIKER ADJUSTMENT

SECURITY AND LOCKS

DOOR LOCK STRIKER ADJUSTMENT

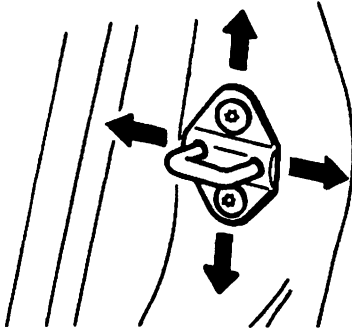
U5U914AD

1. Verify that the door can be closed easily and that there is no looseness.
2. If not correct, loosen the door lock striker installation screws and move the door lock striker horizontally or vertically.

3. Tighten the door lock striker installation bolts.

Tightening torque

18—26 N·m { 1.8—2.7 kgf·m , 14—19 ft·lbf }

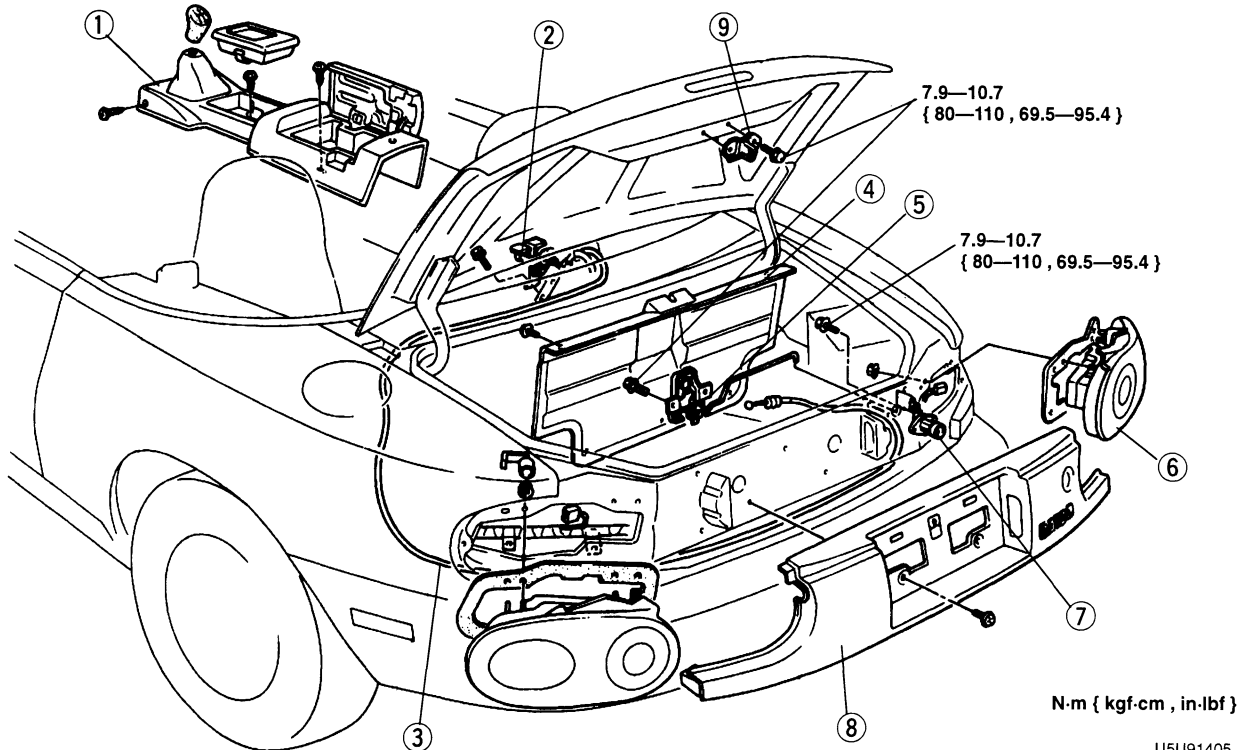


U5U91404

TRUNK LID LOCK AND OPENER REMOVAL / INSTALLATION

U5U914AE

1. Disconnect the negative battery cable.
2. To remove the trunk lid opener cable, remove the rear end mat, trunk side trim and trunk end trim.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Install the rear end mat, trunk side trim, and trunk end trim.



U5U91405

1	Rear console
2	Trunk lid opener lever
3	Trunk lid opener cable
4	Trunk end trim
5	Trunk lid lock

09—14 TRUNK LID LOCK ADJUSTMENT

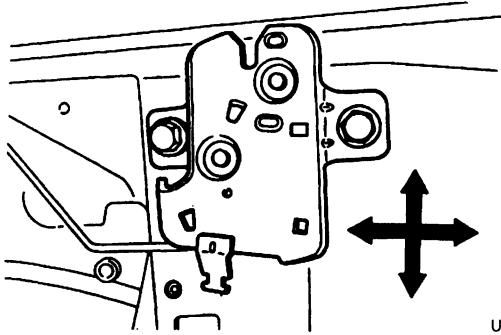
6	Rear combination light
7	Key cylinder
8	Rear finisher
9	Trunk lid striker

SECURITY AND LOCKS

TRUNK LID LOCK ADJUSTMENT

U5U914AF

1. Verify that the trunk lid can be closed easily and that there is no looseness.
2. If not correct, loosen the trunk lid lock installation bolts and move the lock horizontally or vertically.



U5U91406

3. Tighten the trunk lid lock installation bolts.

Tightening torque

7.9—10.7 N·m

{ 80—110 kgf·cm , 69.5—95.4 in·lbf }

TRUNK LID LOCK INSPECTION

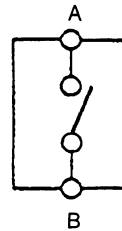
U5U914AG

1. Disconnect the negative battery cable.
2. Remove the trunk lid lock.
3. Check for continuity between terminals A and B of the trunk lid lock connector.

○—○ : Continuity

Switch condition	Terminal	
	A	B
Pressed		
Released	○—○	○—○

U5U91409



U5U91407

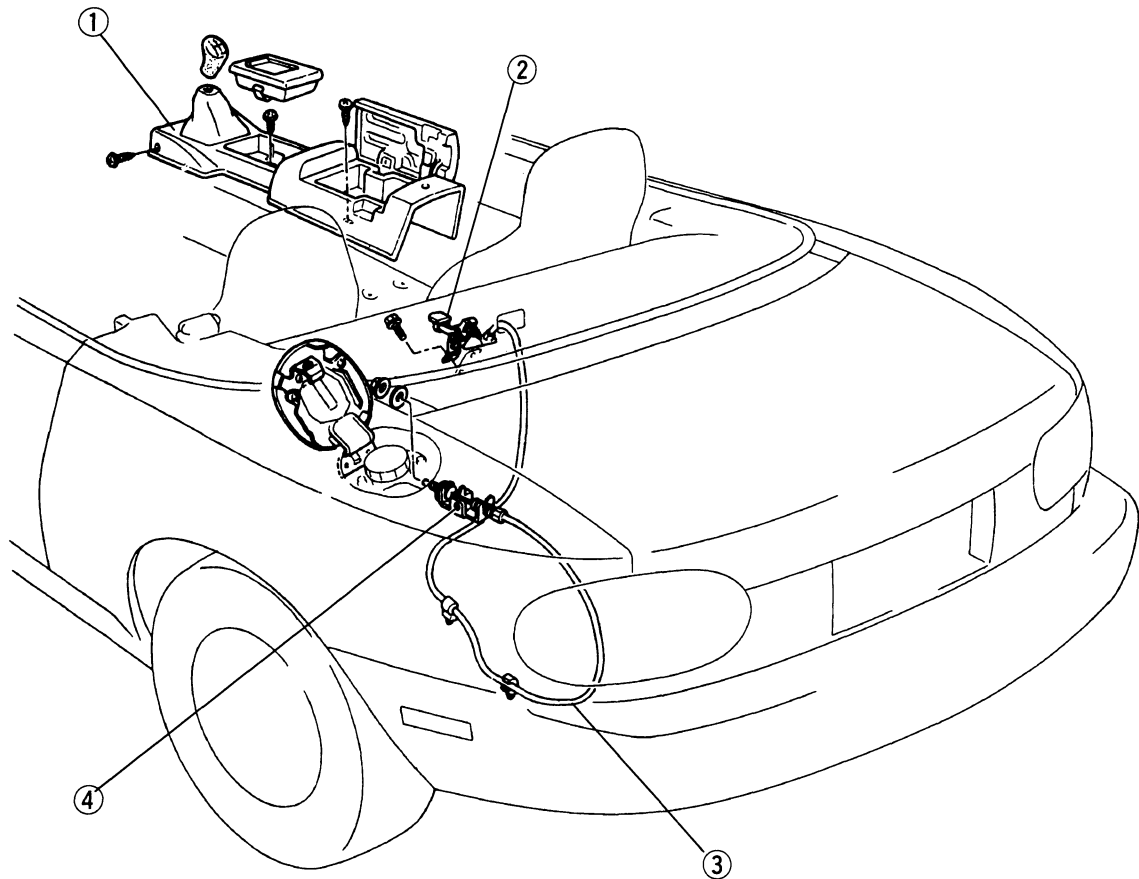
4. If there is no continuity, replace the trunk lid lock.

SECURITY AND LOCKS

FUEL-FILLER LID OPENER REMOVAL / INSTALLATION

U5U914AH

1. To remove the fuel-filler lid opener cable, remove the rear package trim, rear end mat, and trunk side trim.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal indicated in the table.
4. Install the rear package trim, rear end trim, and trunk side trim.



U5U91408

1	Rear console
2	Fuel-filler lid opener lever

3	Fuel-filler lid opener cable
4	Fuel-filler lid opener

09-16 EXTERIOR TRIM

REAR FINISHER

REMOVAL / INSTALLATION 09-16-1

WINDSHIELD MOLDING REMOVAL ... 09-16-1

WINDSHIELD MOLDING

INSTALLATION 09-16-2

REAR WINDOW MOLDING REMOVAL . 09-16-3

Detachable Hardtop 09-16-3

REAR WINDOW MOLDING

INSTALLATION 09-16-3

Detachable Hardtop 09-16-3

FRONT BELTLINE MOLDING

REMOVAL / INSTALLATION 09-16-5

BELTLINE MOLDING

REMOVAL / INSTALLATION 09-16-5

COWL GRILLE

REMOVAL / INSTALLATION 09-16-5

CONVERTIBLE TOP

REMOVAL / INSTALLATION 09-16-6

Convertible Top Removal Note 09-16-6

Convertible Top Installation Note 09-16-7

CONVERTIBLE TOP

DISASSEMBLY / ASSEMBLY 09-16-7

Top Fabric Disassembly Note 09-16-8

Top Fabric Assembly Note 09-16-9

TOP FABRIC

REMOVAL / INSTALLATION 09-16-11

Weatherstrip Removal Note 09-16-11

Retainer Removal Note 09-16-11

Top Fabric Removal Note 09-16-12

Rain Rail Removal Note 09-16-12

Rain Rail Installation Note 09-16-12

Top Fabric Installation Note 09-16-13

TOP LOCK ADJUSTMENT 09-16-14

WEATHERSTRIP ADJUSTMENT 09-16-15

TOP FABRIC REPAIR 09-16-15

Holes 09-16-15

Tears 09-16-16

DETACHABLE HARDTOP

DISASSEMBLY / ASSEMBLY 09-16-17

TOP LOCK ADJUSTMENT 09-16-18

SIDE LOCK ADJUSTMENT 09-16-18

REAR DECK LOCK ADJUSTMENT 09-16-18

BRACE BAR

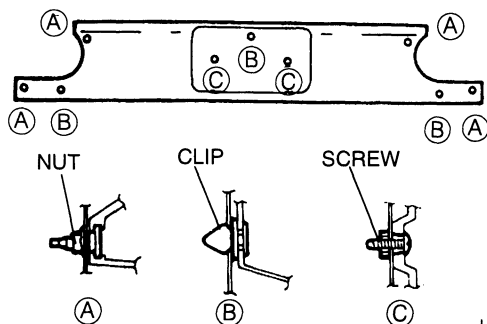
REMOVAL / INSTALLATION 09-16-19

REAR FINISHER REMOVAL / INSTALLATION

U5U916AA

1. Remove the rear combination light.
2. Remove the rear finisher installation nuts and screws.
3. Pull the rear finisher forward to disengage the clips from the body, and remove the rear finisher.

4. Install in the reverse order of removal.

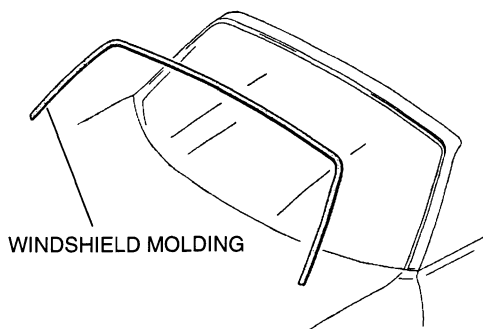


U5U91601

WINDSHIELD MOLDING REMOVAL

U5U916AB

- Pull the windshield molding forward to remove it.

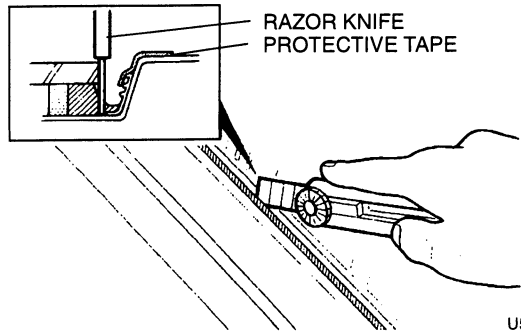


U5U91680

EXTERIOR TRIM

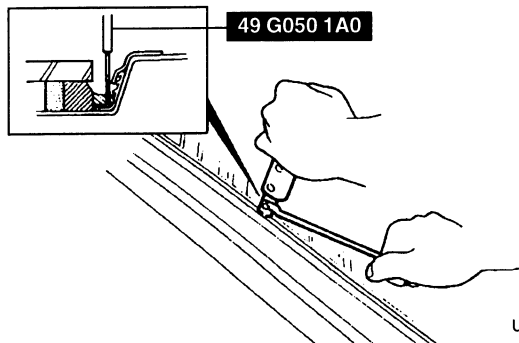
WINDSHIELD MOLDING INSTALLATION

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.



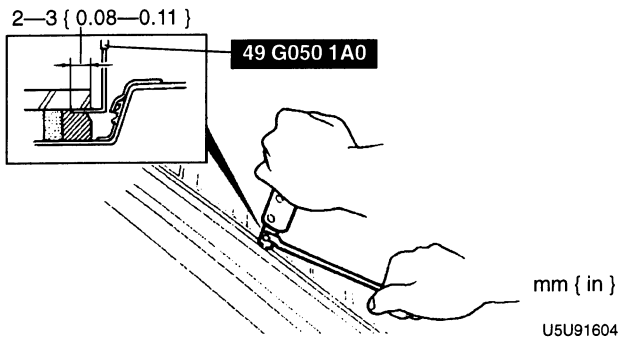
U5U91602

3. Insert the blade of the **SST** into the sealant, and pull on the bar to cut the sealant near the body as shown.



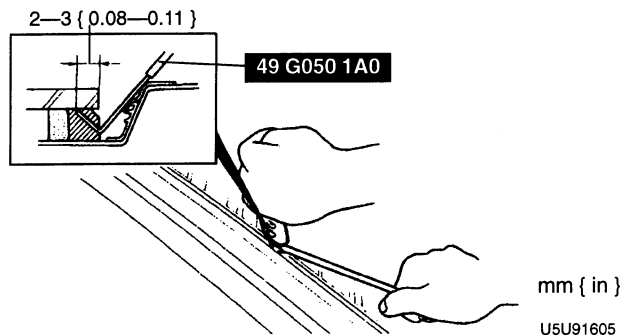
U5U91603

4. Insert the blade of the **SST** into the sealant, and pull on the bar to cut the sealant near the glass as shown.



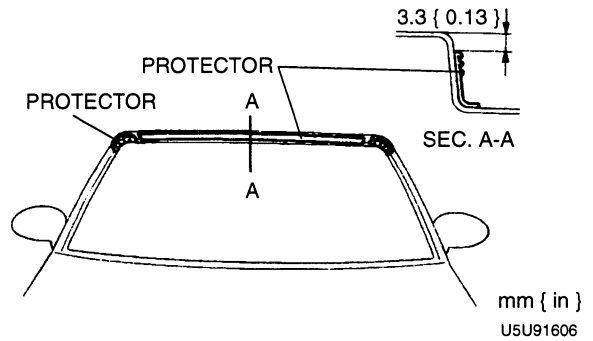
U5U91604

5. Remove as much sealant as possible from between the body and the glass.
6. Carefully clean around the edge of the glass and the adhesion surface of the body.



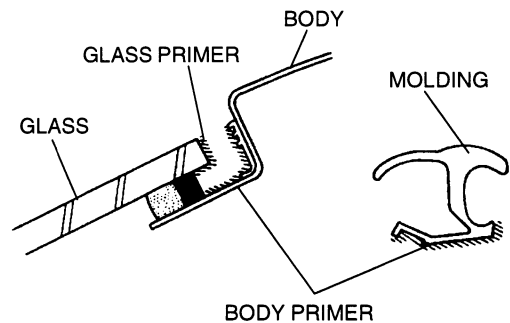
U5U91605

7. If the protector is damaged, replace it with a new one.



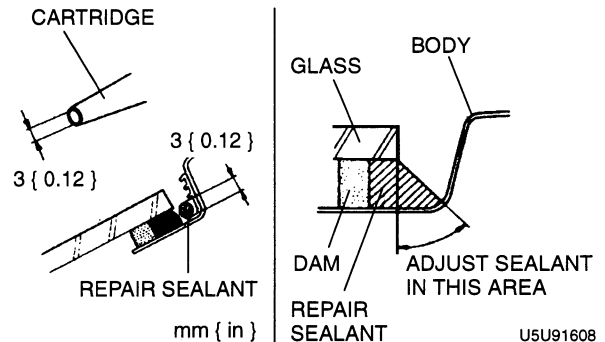
U5U91606

8. Apply primer onto the bonding area of the glass, body, and new windshield molding by using a brush. Use only glass primer on the glass and body primer on the body and molding. Keep the area free of dirt and grease, and do not touch the surface. Allow the primer to dry for approximately **30 minutes**.



U5U91607

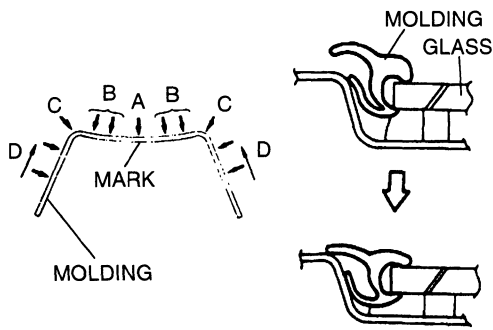
9. Apply a **3 mm { 0.12 in }** bead of repair sealant between the glass and the body.
10. Reshape the repair sealant as shown if necessary.



U5U91608

11. Install the windshield molding before the sealant has hardened.
 - (1) Align the center mark in the molding with the glass mark (A).
 - (2) Install the upper portions of the molding into the body (B).
 - (3) Push the corners of the molding onto the body (C).
 - (4) Push the sides of the molding onto the body, beginning from the bottom (D).

EXTERIOR TRIM



U5U91609

Hardening time of repair sealant

Temperature	Surface hardening time	Time required until car can be put into service
5 °C { 41 °F }	Approx. 1.5 hr	12 hr
20 °C { 68 °F }	Approx. 1 hr	4 hr
35 °C { 95 °F }	Approx. 10 min	2 hr

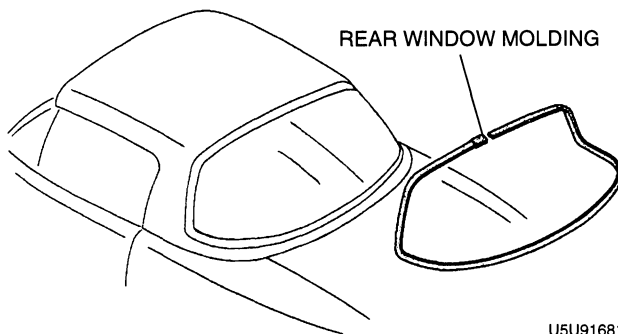
- Check for water leaks. If a leak is found, wipe the water off well and repeat the installation.

REAR WINDOW MOLDING REMOVAL

U5U916AD

Detachable Hardtop

- Pull the rear window molding forward to remove it.



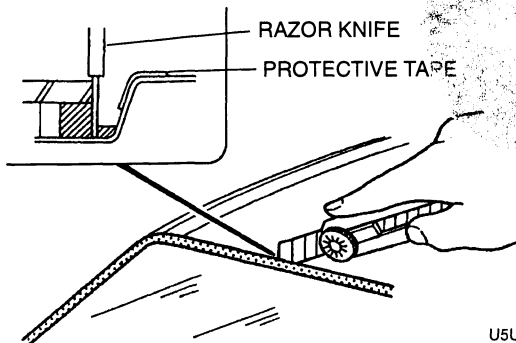
U5U91681

REAR WINDOW MOLDING INSTALLATION

U5U916AE

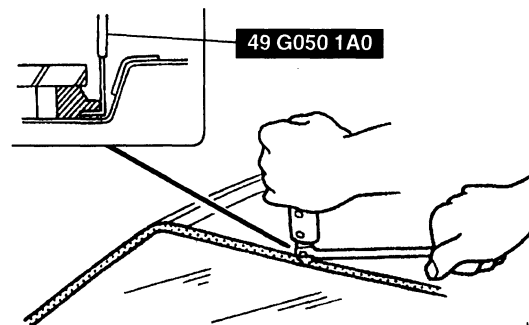
Detachable Hardtop

- Apply protective tape along the edge of the body to protect it from damage.
- Cut the sealant by using a razor knife as shown.



U5U91610

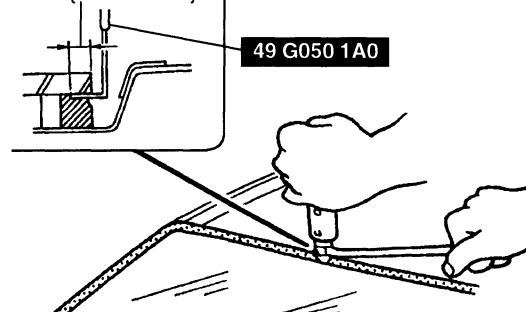
- Insert the blade of the **SST** into the sealant, and pull on the bar to cut the sealant near the body as shown.



U5U91611

- Insert the blade of the **SST** into the sealant, and pull on the bar to cut the sealant near the glass as shown.

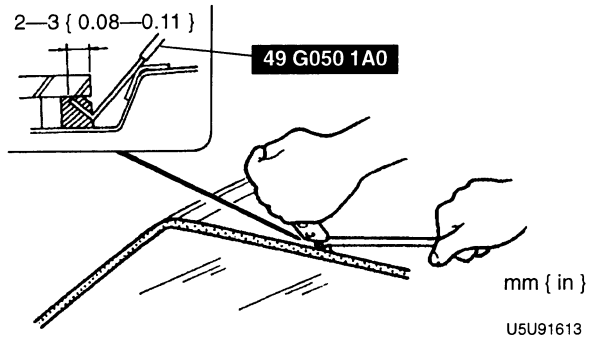
2-3 { 0.08-0.11 }



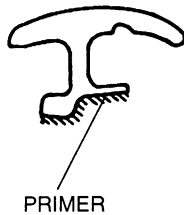
mm { in }
U5U91612

EXTERIOR TRIM

5. Remove as much sealant as possible from between the body and the glass.
6. Carefully clean around the edge of the glass and the adhesion surface of the body.

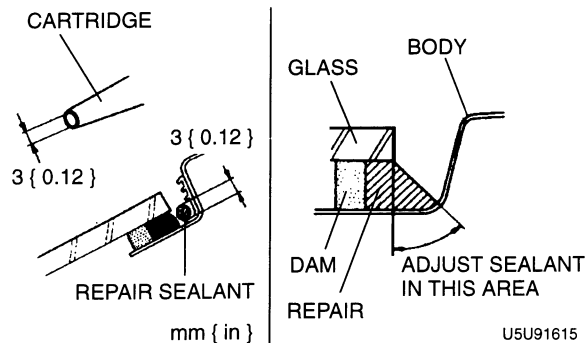


7. Apply primer onto the bonding area of the new rear window molding by using a brush. Keep the area free of dirt and grease, and do not touch the surface. Allow the primer to dry for approximately **30 minutes**.

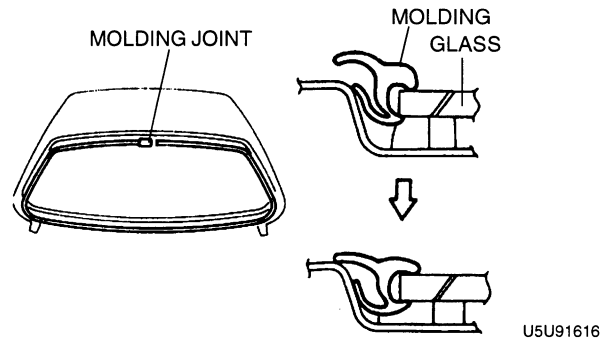


U5U91614

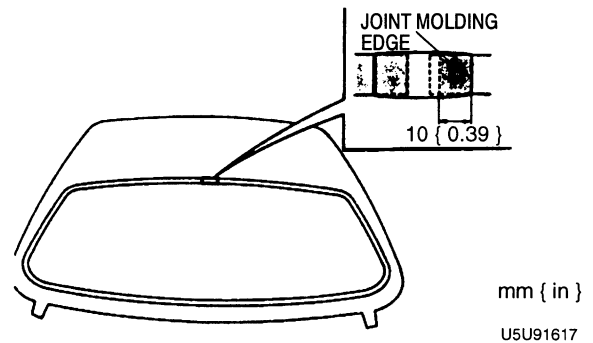
8. Apply a **3 mm { 0.12 in }** bead of repair sealant between the glass and the body.
9. Reshape the repair sealant as shown if necessary.



10. Install the rear window molding with the molding joint at the top.



11. If the molding is too long, cut the excess molding **10 mm { 0.39 in }** inside the molding joint edge.



Hardening time of repair sealant

Temperature	Surface hardening time	Time required until car can be put into service
5 °C { 41 °F }	Approx. 1.5 hr	12 hr
20 °C { 68 °F }	Approx. 1 hr	4 hr
35 °C { 95 °F }	Approx. 10 min	2 hr

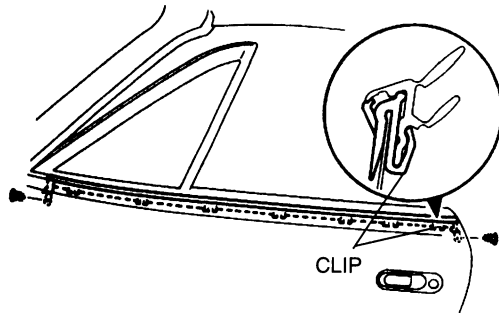
12. Check for water leaks. If a leak is found, wipe the water off well and repeat the installation.

EXTERIOR TRIM

FRONT BELTLINE MOLDING REMOVAL / INSTALLATION

U5U916AF

1. Remove the outside mirror.
2. Remove the installation screw.
3. Pull the front beltline molding upward to disengage the clips from the body and remove the front beltline molding.
4. Install in the reverse order of removal.

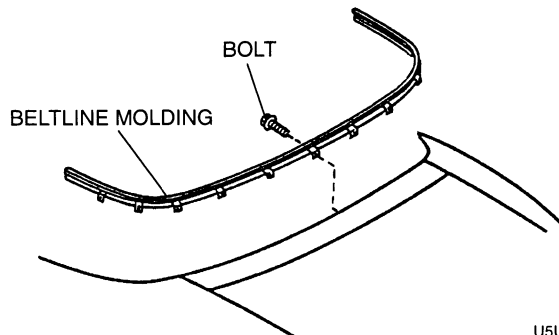


U5U91618

BELTLINE MOLDING REMOVAL / INSTALLATION

U5U916AG

1. Remove the rear package trim.
2. Remove the set plate.
3. Remove the top fabric studs.
4. Remove the beltline molding installation bolts.
5. Remove the beltline molding.
6. Install in the reverse order of removal.



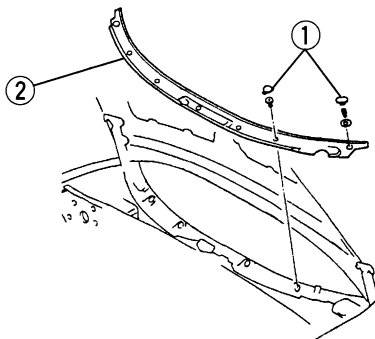
U5U91682

COWL GRILLE REMOVAL / INSTALLATION

U5U916AH

1. Remove the windshield wiper arm and blade.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal indicated in the table.
4. Install the windshield wiper arms. (Refer to 09-19 WINDSHIELD WIPER ARM AND BLADE REMOVAL / INSTALLATION.)

1	Cowl cap
2	Cowl grille

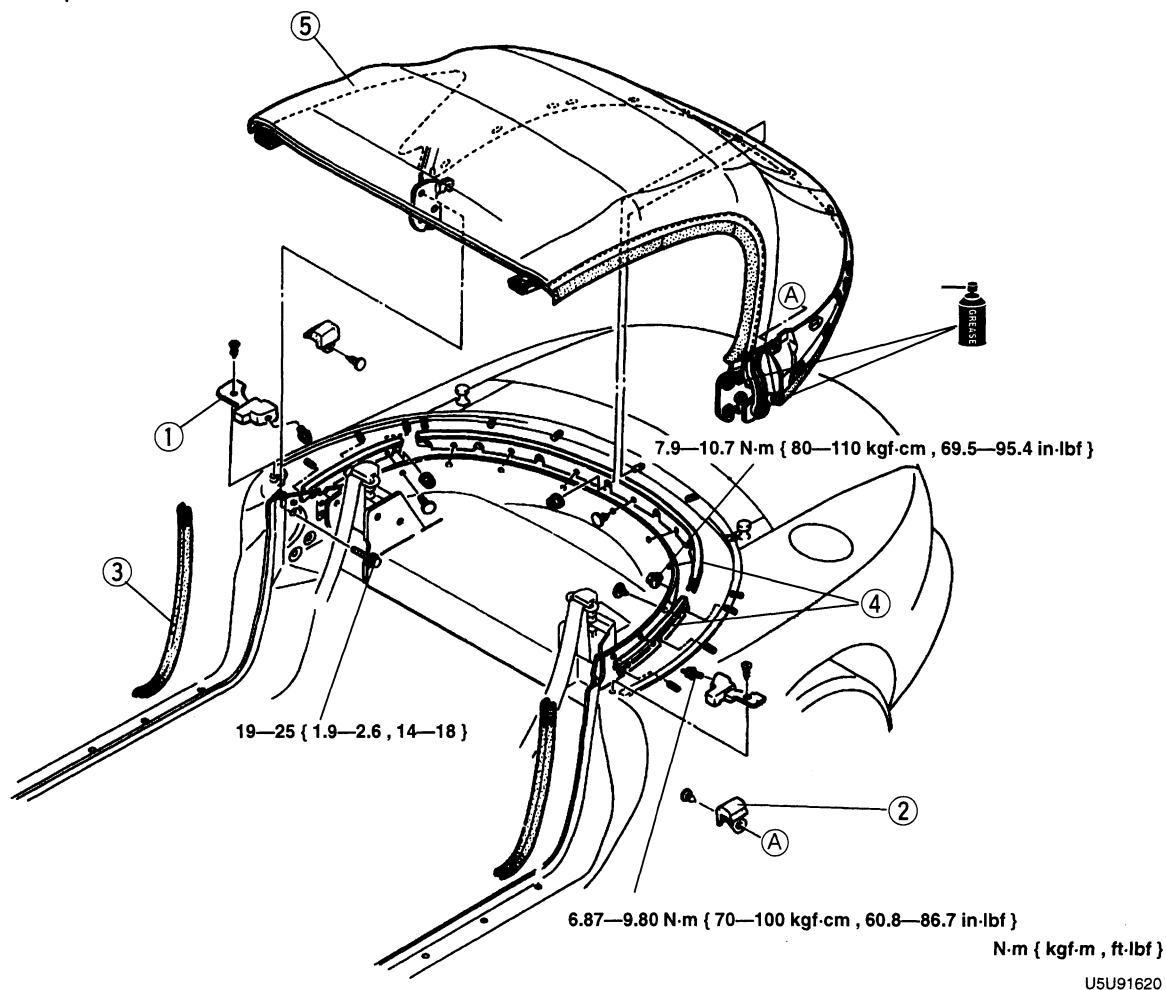


U5U91619

CONVERTIBLE TOP REMOVAL / INSTALLATION

U5U916AJ

1. Cover both sides of the rear window with thick cloth to protect the window.
2. Remove the scuff plate.
3. Remove the quarter trim.
4. Remove the rear package trim.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal indicated in the table.
7. Install the rear package trim.
8. Install the quarter trim.
9. Install the scuff plate.



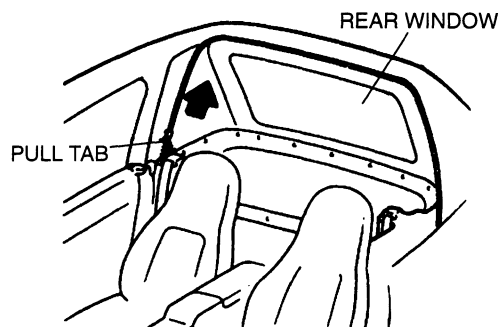
U5U91620

1	Beltline cover
2	Beltline protector
3	Seaming welt

4	Set plate
5	Convertible top
	☞ Removal Note
	☞ Installation Note

Convertible Top Removal Note

1. Unlock the top lock.
2. Unzip the rear window, and lower the convertible top fully.

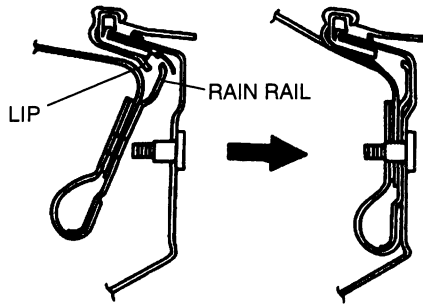


U5U91621

EXTERIOR TRIM

Convertible Top Installation Note

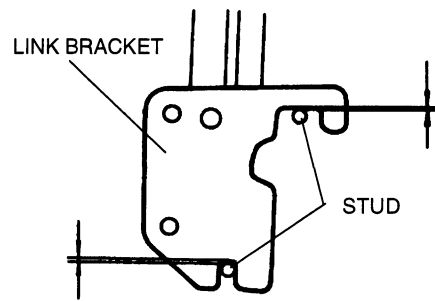
1. Insert the rain rail into the beltline molding lip, and install it over the studs.



U5U91622

Tightening torque

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



U5U91623

2. Align and install the link bracket over the studs with no clearance between the studs and the bracket.
3. Tighten the installation bolts.

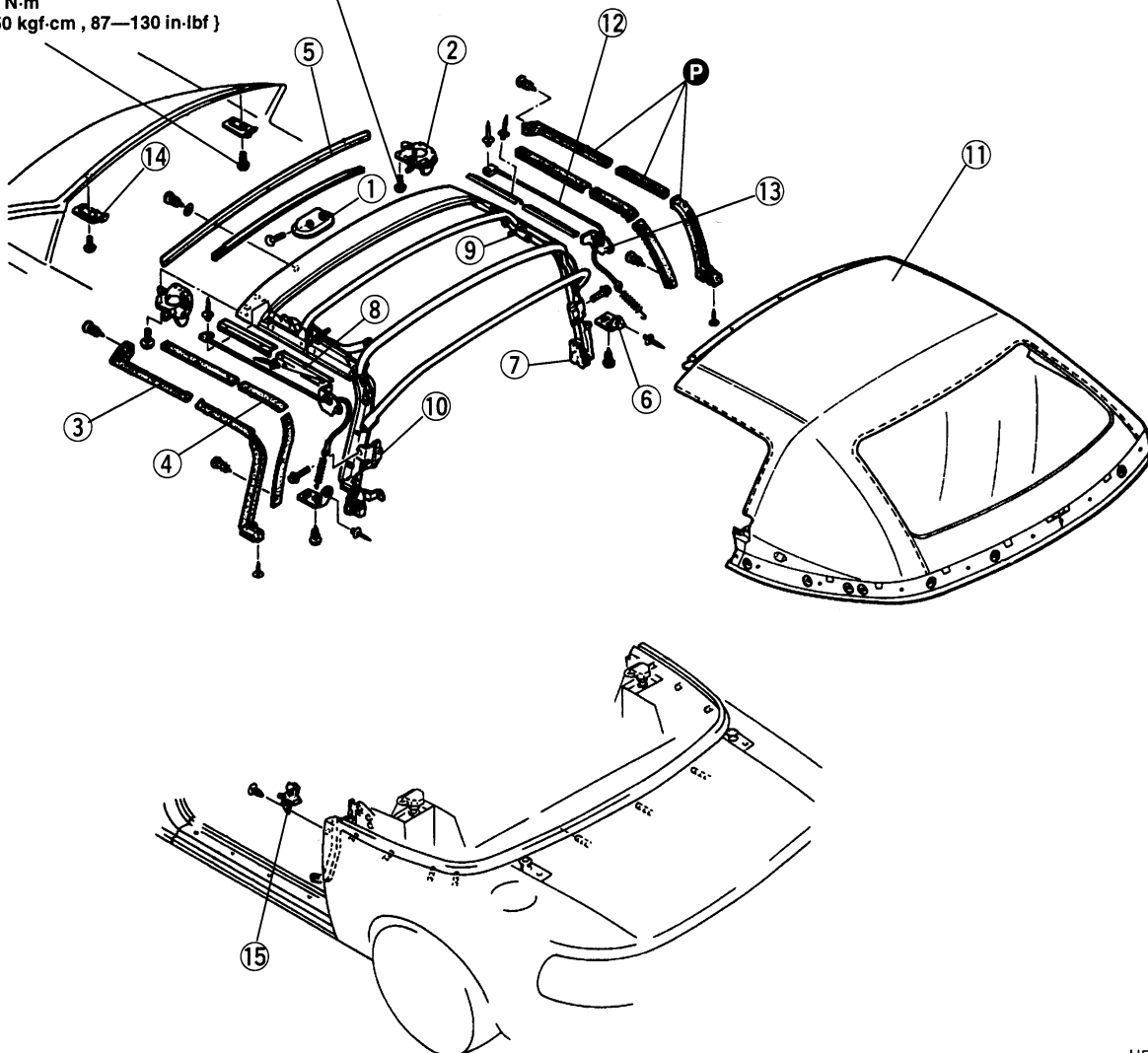
CONVERTIBLE TOP DISASSEMBLY / ASSEMBLY

U5U916AK

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.

4.3—6.1 N·m { 43—63 kgf·cm , 38—54 in·lbf }

9.9—14.7 N·m
{ 100—150 kgf·cm , 87—130 in·lbf }



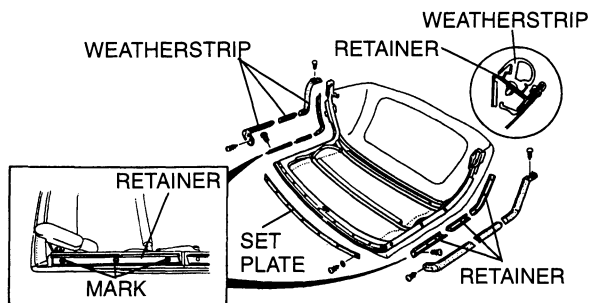
U5U91624

EXTERIOR TRIM

1	Top handle
2	Top lock
3	Weatherstrip
4	Retainer
5	Set plate
6	End plate
7	Link
8	Protector
9	Link stopper
10	Open stopper
11	Top fabric Disassembly Note Assembly Note
12	Cable
13	Cable guide
14	Striker
15	Cab-side weatherstrip

Top Fabric Disassembly Note

1. Set the convertible top upside down on a workbench covered with clean, thick cloth.
2. Mark around the retainer installation screws with paint before removing them.
3. Remove the set plate, weatherstrip, and retainers.



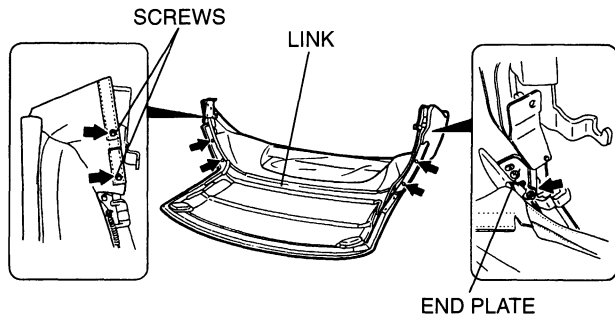
U5U91625

4. Remove the rivets (10 pieces) from the link by using a drill.

Drill size

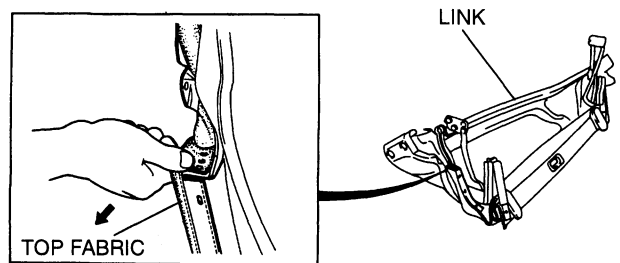
$\phi 4.0 \text{ mm}$ { $\phi 0.16 \text{ in}$ }

5. Remove the screws and remove the end plates from the link.



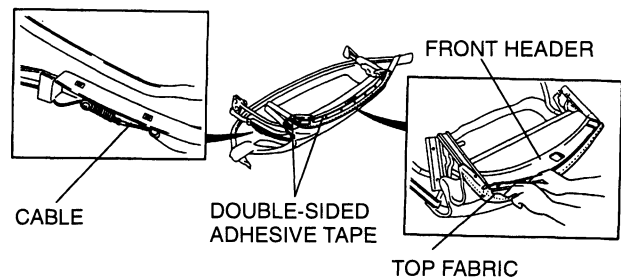
U5U91626

6. Unzip the rear window, and fold the convertible top.
7. Remove the top fabric from the link.



U5U91627

8. Peel back the top fabric from the front header.
9. Remove the screws and disconnect the cables from the rear of the link.

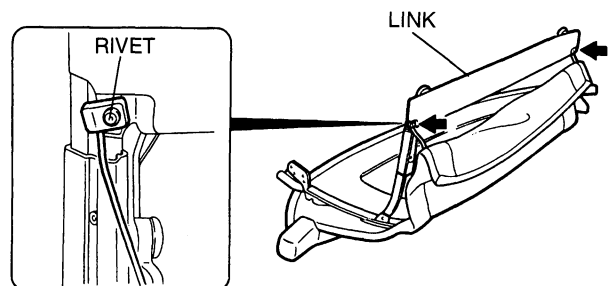


U5U91628

10. Unfold the convertible top and set it upright.
11. Remove the rivets from the link by using a drill.

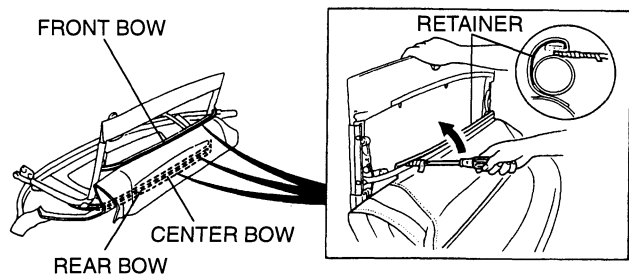
Drill size

$\phi 4.0 \text{ mm}$ { $\phi 0.16 \text{ in}$ }



U5U91629

12. Peel off the Velcro at the rear bow.
13. Pry back the bow retainers by using a screwdriver which has been wrapped in tape.
14. Remove the top fabric from the bow retainer.

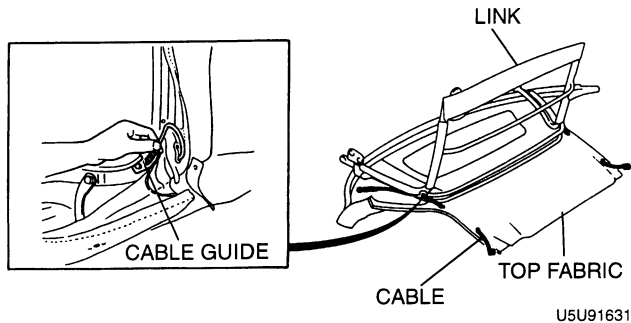


U5U91630

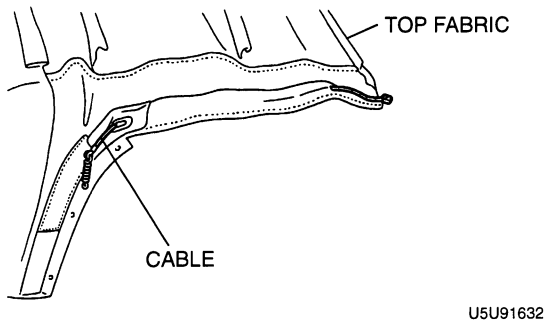
15. Remove the cables from the cable guide.

EXTERIOR TRIM

16. Remove the top fabric and cables from the link.

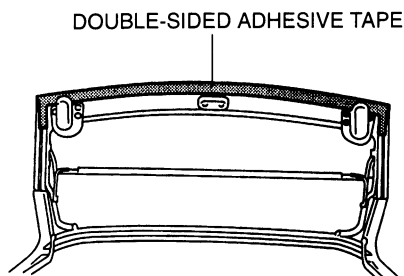


17. Remove the cables from the top fabric.

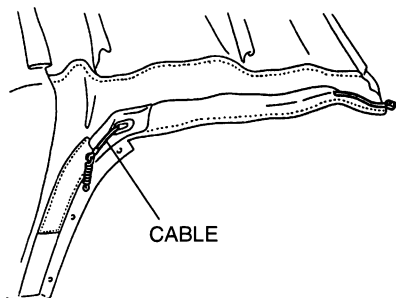


Top Fabric Assembly Note

1. Cover the workbench with thick cloth to prevent damaging the top fabric and rear window.
2. Remove the original double-sided adhesive tape from the front header.
3. Degrease the front header by using ethyl alcohol.
4. Install new double-sided adhesive tape onto the front header.

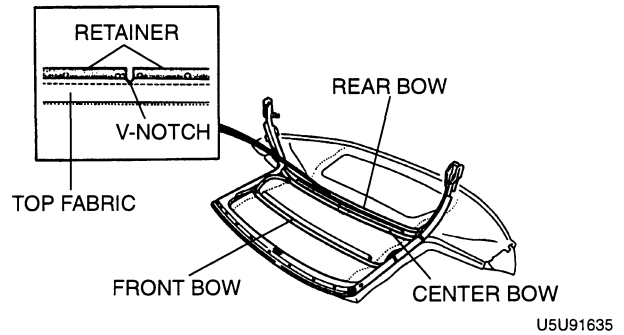


5. Thread the cable into the top fabric.

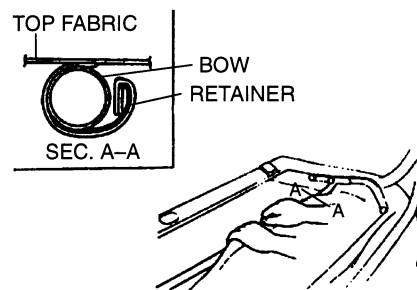


6. Place the link onto the top fabric.

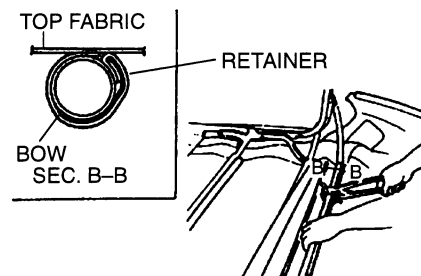
7. Install the top fabric to the bows, beginning from the rear bow.
8. Align the center of the retainer and the V-notch in the top fabric, and roll the top fabric over the bow retainer.



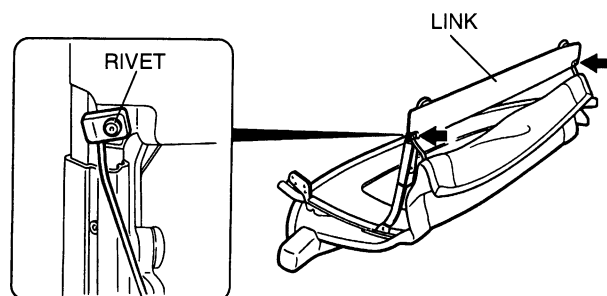
9. Hang the end of the top fabric on the bow retainer.



10. Clamp the top fabric to the bow by using water pump pliers which have been wrapped in tape. Pull the top fabric by hand to verify that it is held securely.
11. Affix the top fabric to the rear bow by using the Velcro.



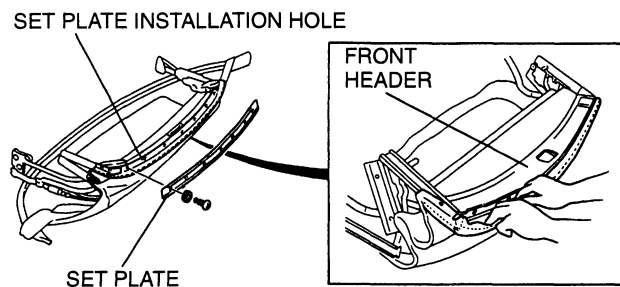
12. Set the convertible top upright.
13. Rivet the cables to the front of the link.



14. Turn the convertible top over and fold it.

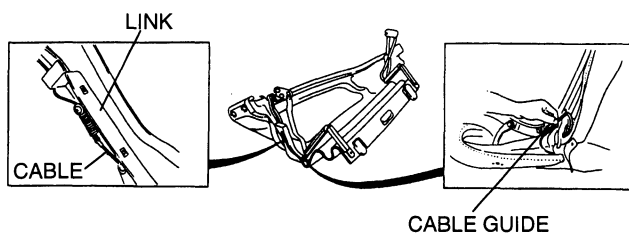
EXTERIOR TRIM

15. Install the front of the top fabric to the front header.
16. Align the set plate and top fabric with the set plate installation holes.
17. Install the set plate to the link.



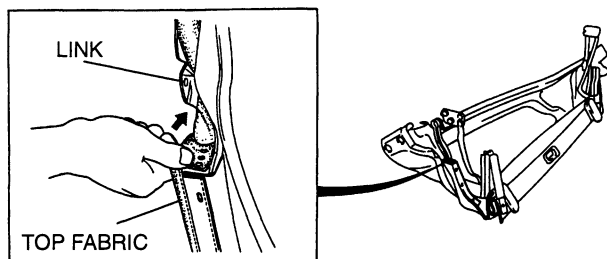
U5U91639

18. Unfold the convertible top half-way.
19. Pass the cables through the cable guides.
20. Install the cables to the rear of the link.



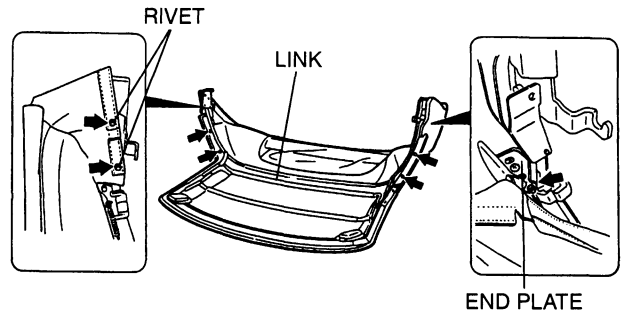
U5U91640

21. Fold the convertible top.
22. Install the top fabric to the link.



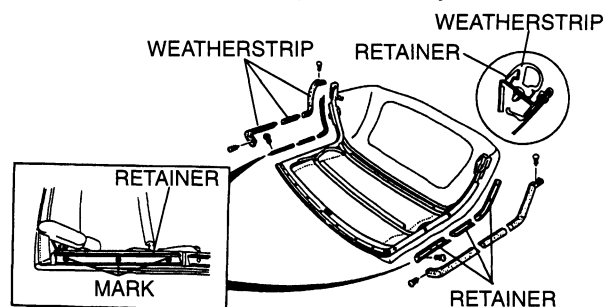
U5U91641

23. Unfold the convertible top.
24. Install the end plates to the link.
25. Rivet the top fabric and the end plates to the link.



U5U91642

26. Install the retainers to the link, aligning the retainer marks with the retainer installation screws.
27. Install the weatherstrips to the link.
28. Install the convertible top to the body.



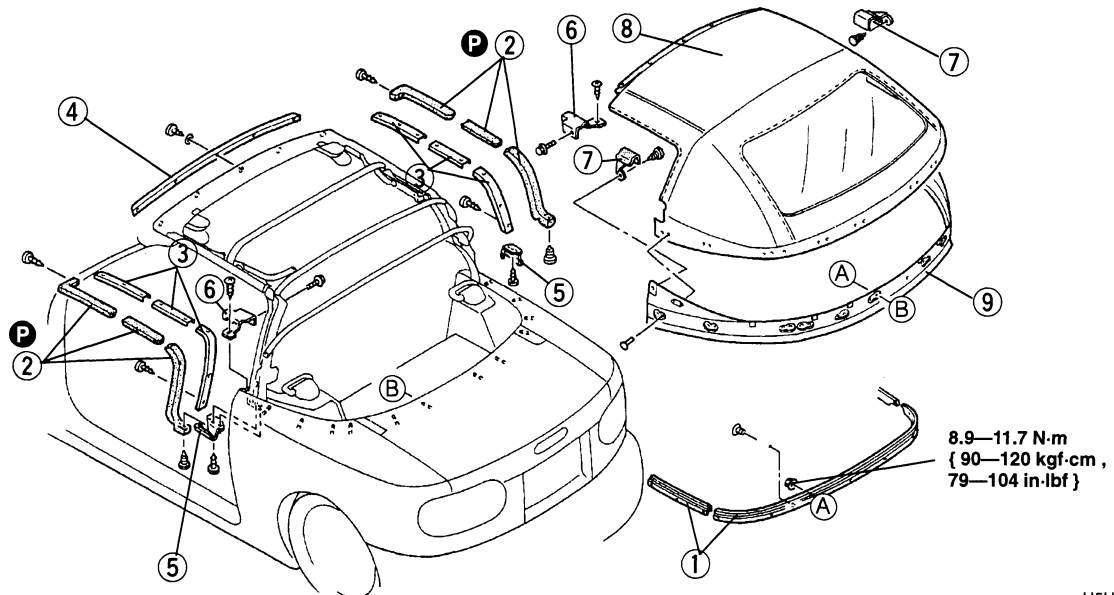
U5U91643

EXTERIOR TRIM

TOP FABRIC REMOVAL / INSTALLATION

U5U916AL

1. Cover over the rear deck area by using a protective rag.
2. Remove the rear package trim.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal indicated in the table.
5. Install the rear package trim.



U5U91644

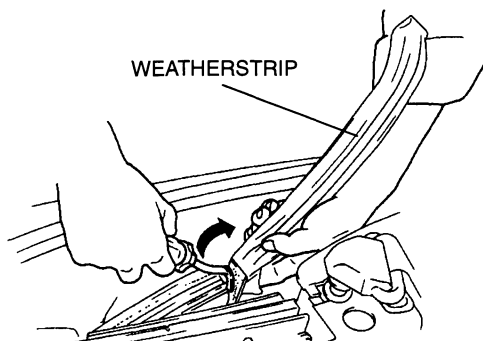
1	Set plate
2	Weatherstrip ☞ Removal Note
3	Retainer ☞ Removal Note
4	Set plate
5	End plate

6	Beltline cover
7	Beltline protector
8	Top fabric ☞ Removal Note ☞ Installation Note
9	Rain rail ☞ Removal Note ☞ Installation Note

Weatherstrip Removal Note

Vertical section

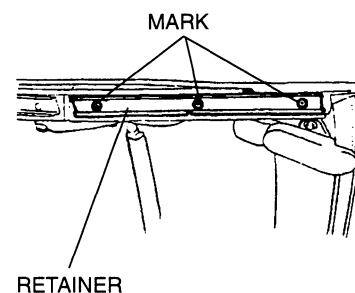
1. Lower the convertible top fully.
2. Remove the fastener as shown in the figure by using a fastener remover.



U5U91645

Retainer Removal Note

- Mark around the retainer installation screws with paint before removing them.



U5U91646

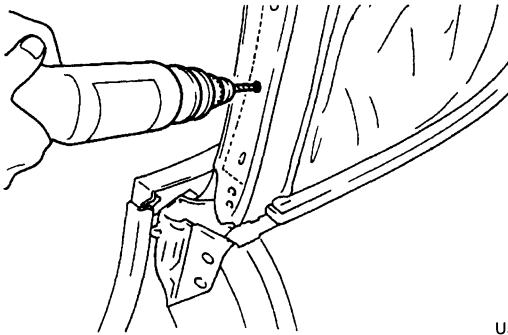
EXTERIOR TRIM

Top Fabric Removal Note

1. Remove the rivets from the link with a drill.

Drill size

$\phi 4.0 \text{ mm}$ { $\phi 0.16 \text{ in}$ }

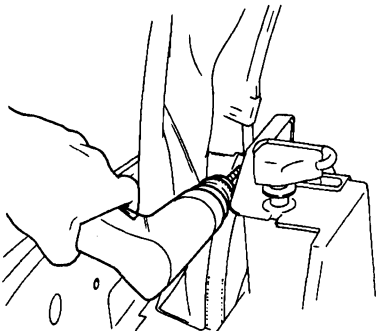


U5U91647

2. Peel the top fabric end.
3. Remove the rivets from the link by using a drill.

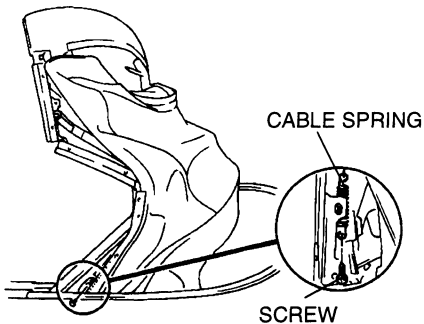
Drill size

$\phi 4.0 \text{ mm}$ { $\phi 0.16 \text{ in}$ }



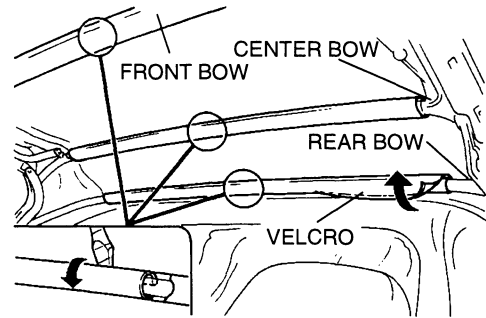
U5U91648

4. Lower the convertible top to release the cable spring tension, and unhook the spring.
5. Remove the cable from the top fabric.



U5U91649

6. Peel off the Velcro at the rear bow.
7. Pry back the bow retainers by using a flathead screwdriver which has been wrapped in tape.
8. Remove the top fabric from the bow retainer.



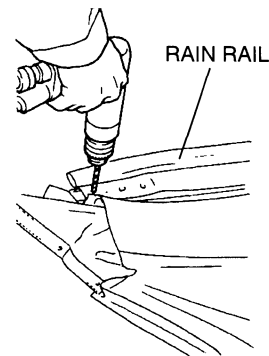
U5U91650

Rain Rail Removal Note

- Remove the rivets from the top fabric by using a drill.

Drill size

$\phi 4.0 \text{ mm}$ { $\phi 0.16 \text{ in}$ }



U5U91651

Rain Rail Installation Note If the rivets will not be used

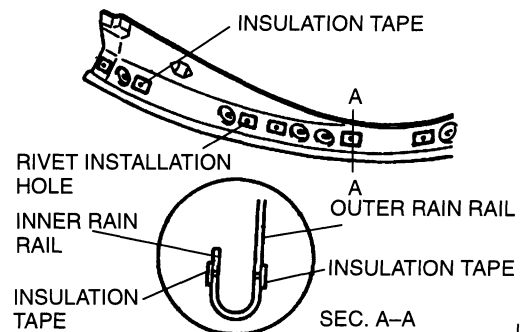
1. Degrease the rain rail by using ethyl alcohol.
2. Install insulation tape to the rivet installation holes of the rain rail.

Insulation tape

Width: 20 mm { 0.8 in }

Height: 15 mm { 0.6 in }

Thickness: 3 mm { 0.12 in }

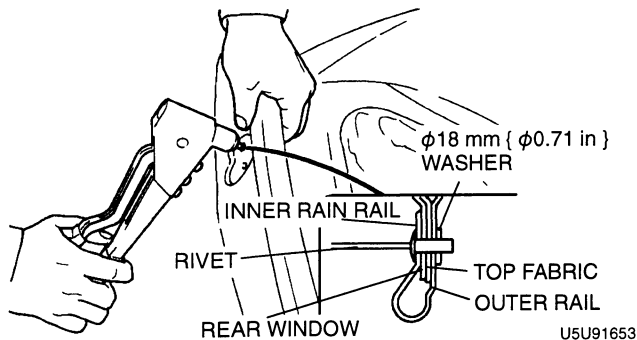


U5U91652

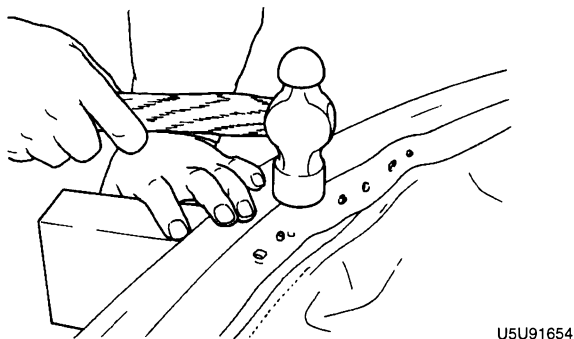
EXTERIOR TRIM

If the rivets will be used

1. Rivet the rain rail to the top fabric.

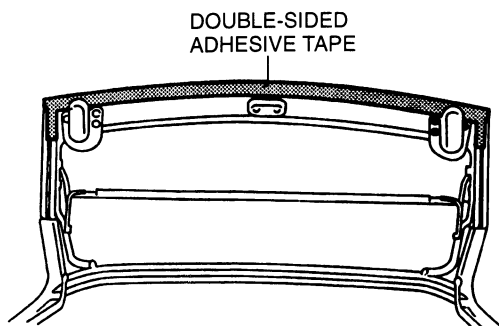


2. Flatten the stem by using a hammer.

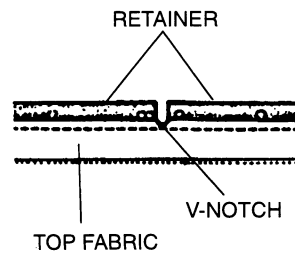


Top Fabric Installation Note

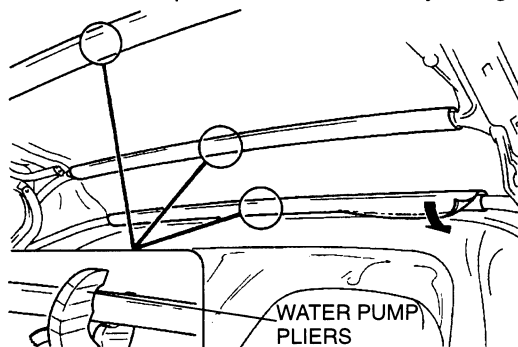
1. Remove the double-sided adhesive tape from the front header.
2. Degrease the front header by using ethyl alcohol.
3. Install new double-sided adhesive tape onto the front header.



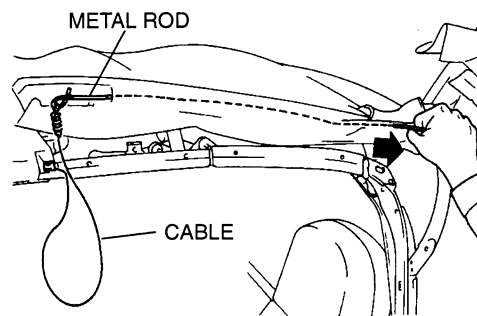
4. Place the top fabric onto the link.
5. Install the top fabric to the bows, beginning from the rear bow.
6. Align the center of the retainer and V-notch in the top fabric, and roll the top fabric over the bow retainer.



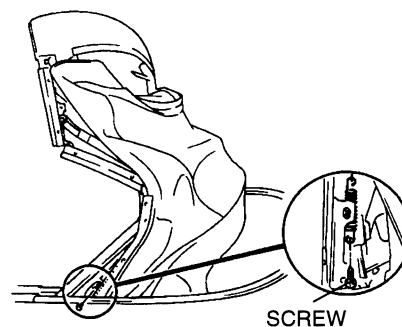
7. Hang the end of the top fabric on the bow retainer.
8. Clamp the top fabric to the bow by using water pump pliers which have been wrapped in tape.
9. Pull the top fabric by hand to verify that it is held securely.
10. Affix the top fabric to rear bow by using the Velcro.



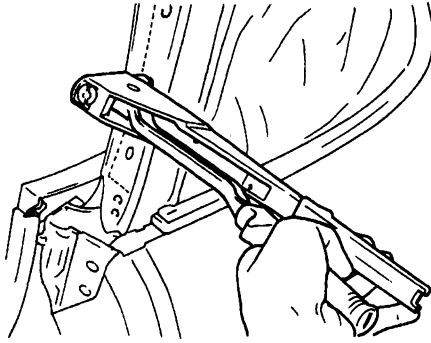
11. Inset a metal rod into the fabric as shown, tie the cable around the rod, and pull the cable through the fabric.



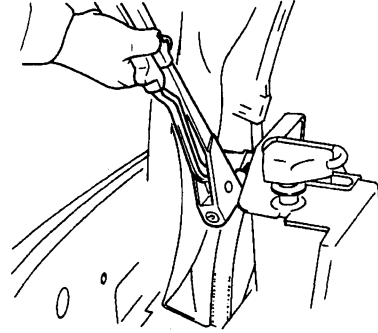
12. Raise the convertible top as shown in the figure.
13. Install the screw.



14. Rivet the top fabric upper side to the link.



U5U91660



U5U91661

15. Peel the top fabric end.
16. Rivet the top fabric lower side to the link.

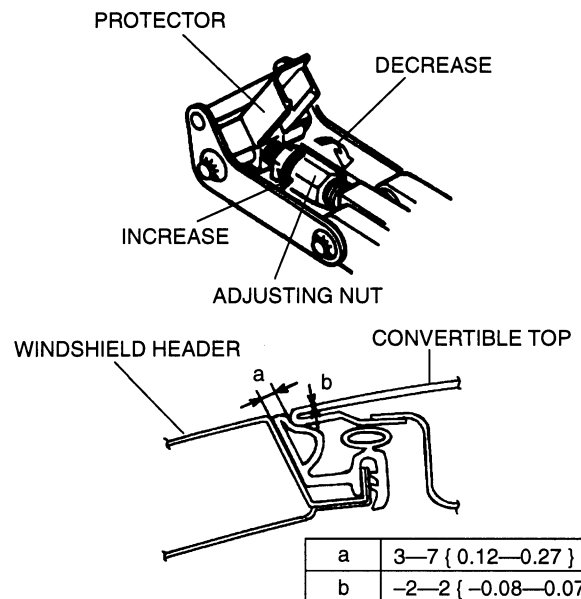
Note

- If lower side rivet is difficult to install to the link, install the top fabric by using a tinnerman clip and a screw.

TOP LOCK ADJUSTMENT

U5U916AM

1. Lift the protector away from the top lock adjusting nut.
2. Turn the adjusting nut clockwise to decrease clearance A and height B; turn the nut counterclockwise to increase them.
3. Secure the adjusting nut with the protector.



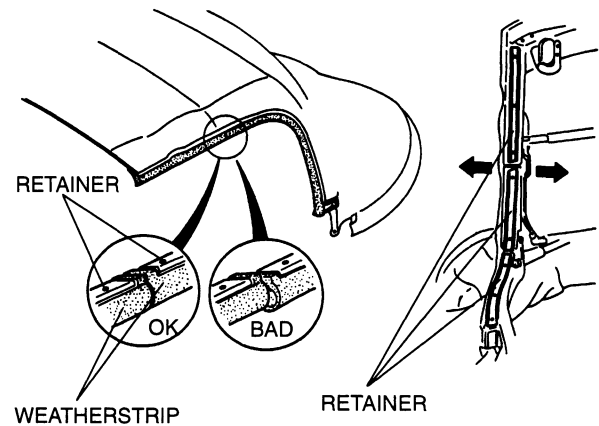
mm { in }

U5U91662

WEATHERSTRIP ADJUSTMENT

U5U916AN

1. Remove the weatherstrip.
2. Loosen the retainer screws and adjust the retainer as necessary.
3. Tighten the screws and reinstall the weatherstrip.



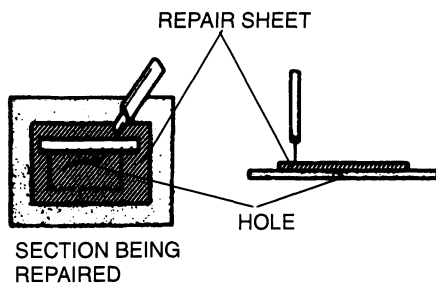
U5U91663

TOP FABRIC REPAIR

U5U916AP

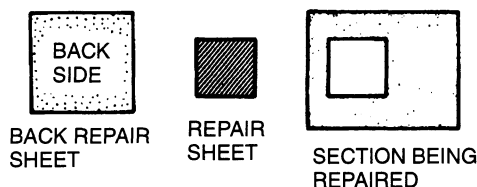
Holes

1. Place the repair sheet (NAY1 R1 211) over the damaged section. Cut both the top fabric and the repair sheet by using a razor knife and a straightedge.



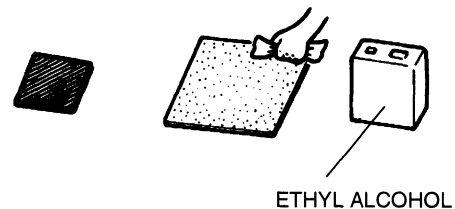
U5U91664

2. Cut another piece of repair sheet larger than the first for use as a back repair sheet.
3. Trim the top fabric and the repair sheets by using scissors.



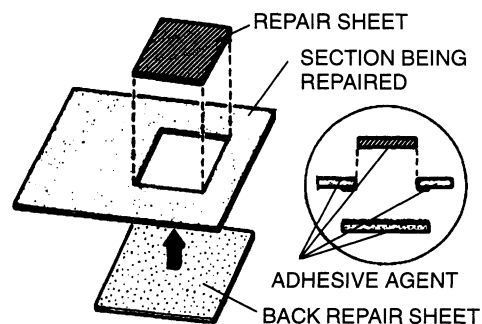
U5U91665

4. Degrease the repair sheets by using ethyl alcohol.



U5U91666

5. Apply a generous amount of adhesive agent (K180 W0 313) or equivalent to the section being repaired, the repair sheet, and the back repair sheet. Let stand for a few minutes.

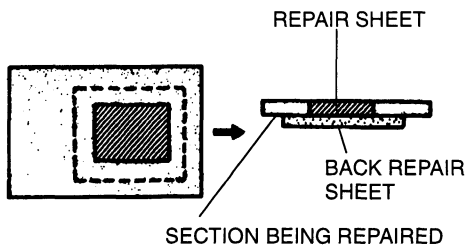


U5U91667

6. Insert the repair sheet squarely into the section of the top fabric being repaired. Then install the back repair sheet from the underside of the top.
7. Press the repair sheets firmly together.

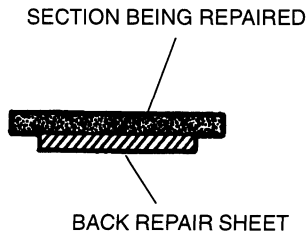
EXTERIOR TRIM

- Let the top fabric stand until the adhesive agent is fully dry.



U5U91668

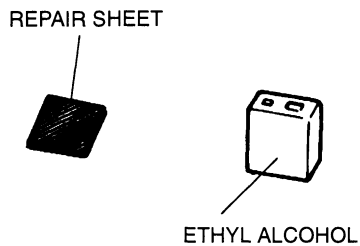
- Apply a generous amount of adhesive agent (K180 W0 313) or equivalent to the section being repaired and the back repair sheet. Let stand for a few minutes.
- Install the back repair sheet from the underside of the top.
- Press the repair sections firmly together.
- Let the top fabric stand until the adhesive agent is fully dry.



U5U91670

Tears

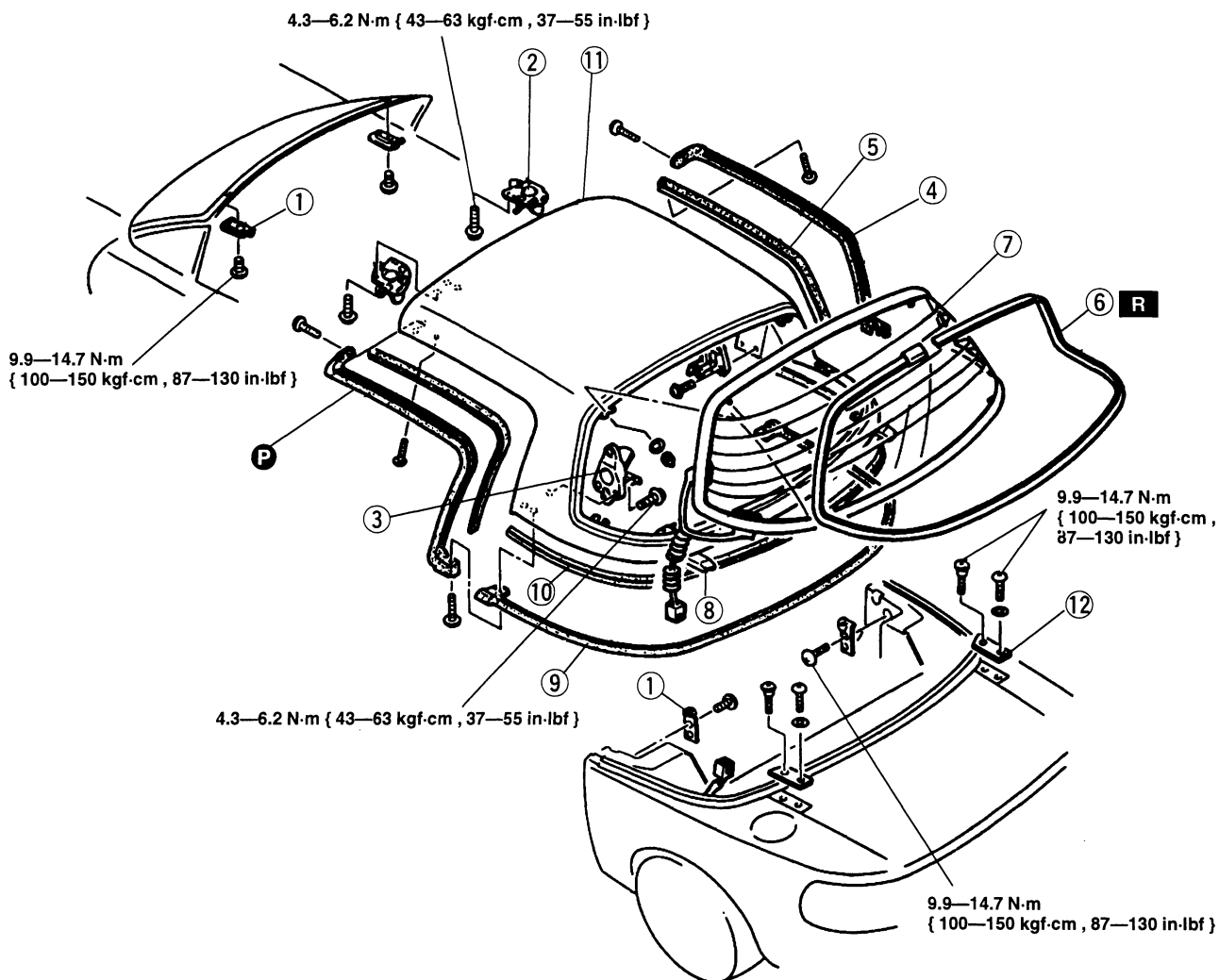
- Cut a piece of repair sheet (NAY1 R1 211) larger than the damaged section for use as a back repair sheet.
- Degrease the repair sheet by using ethyl alcohol.



U5U91669

DETACHABLE HARDTOP DISASSEMBLY / ASSEMBLY

1. Disconnect the negative battery cable.
2. Disassemble in the order indicated in the table.
3. Assemble in the reverse order of disassembly indicated in the table.



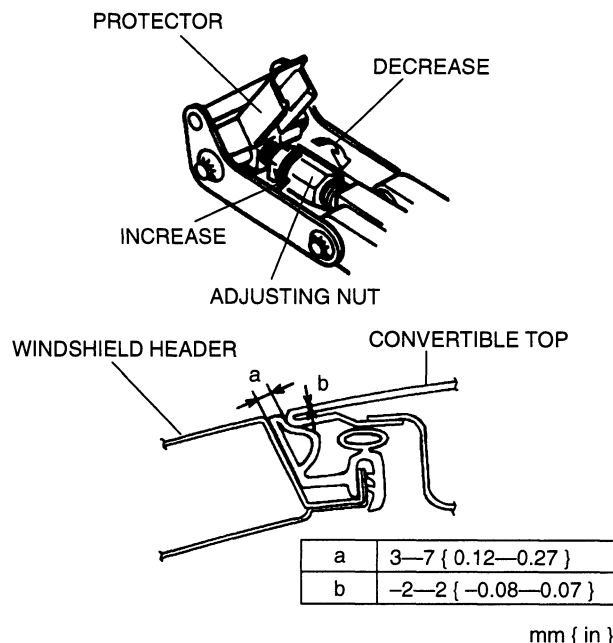
1	Striker
2	Top lock
3	Side lock
4	Weatherstrip
5	Retainer
6	Rear window molding

7	Rear window glass
8	Rear deck lock
9	Rear weatherstrip
10	Edge protector
11	Detachable hardtop
12	Rear deck plate

TOP LOCK ADJUSTMENT

U5U916AR

1. Lift the protector away from the top lock adjusting nut.
2. Turn the adjusting nut clockwise to decrease clearance A and height B; turn the nut counterclockwise to increase them.
3. Secure the adjusting nut with the protector.

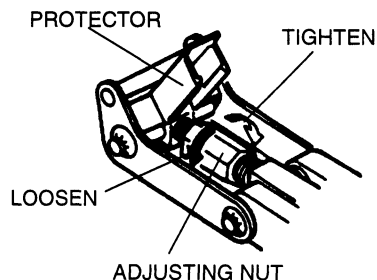


U5U91672

SIDE LOCK ADJUSTMENT

U5U916AS

1. Lift the protector away from the side lock adjusting nut.
2. Turn the adjusting nut clockwise to tighten the striker and side lock engagement; turn the nut counterclockwise to loosen the engagement.
3. Secure the adjusting nut by using the protector.

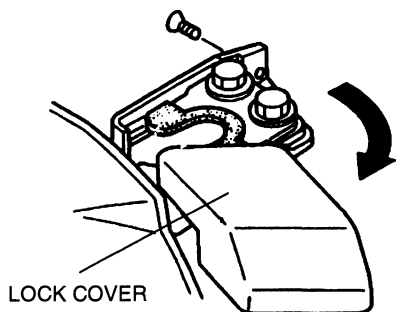


U5U91673

REAR DECK LOCK ADJUSTMENT

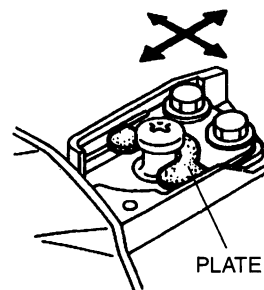
U5U916AT

1. Remove the screw and open the lock cover.



U5U91674

2. Loosen the plate installation bolts.
3. Install the detachable hardtop to the body.
4. Move the plate right, left, fore, or aft until it is tight.



U5U91675

5. Tighten the plate installation bolts.

Tightening torque

18—26 N·m { 1.8—2.7 kgf·m , 14—19 ft·lbf }

6. Close the lock cover and install the screw.

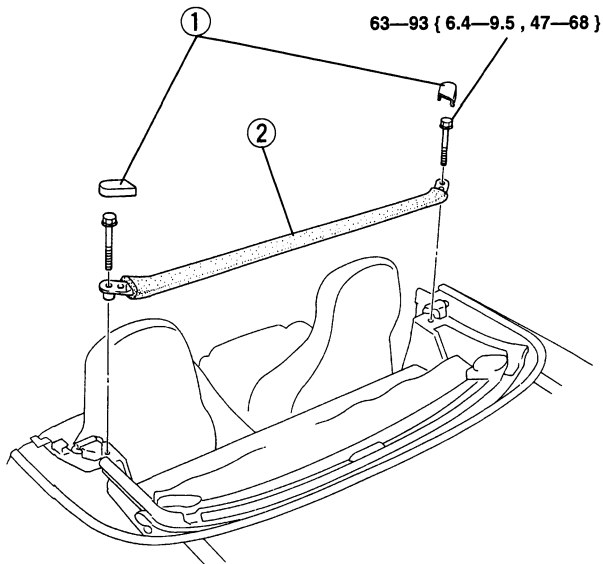
EXTERIOR TRIM

BRACE BAR REMOVAL / INSTALLATION

U5U916AV

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

1	Cover
2	Brace bar



N·m { kgf·m , ft·lbf }

U5U91677

09-17 INTERIOR TRIM

DASHBOARD

REMOVAL / INSTALLATION 09-17-1

GLOVE COMPARTMENT

REMOVAL / INSTALLATION 09-17-2

REAR CONSOLE

REMOVAL / INSTALLATION 09-17-3

REAR CONSOLE

DISASSEMBLY / ASSEMBLY 09-17-3

CENTER LOWER PANEL

REMOVAL / INSTALLATION 09-17-4

METER HOOD

REMOVAL / INSTALLATION 09-17-4

CENTER PANEL

REMOVAL / INSTALLATION 09-17-4

CENTER LOUVER

REMOVAL / INSTALLATION 09-17-5

FRONT HEADER TRIM

REMOVAL / INSTALLATION 09-17-5

A-PILLAR TRIM

REMOVAL / INSTALLATION 09-17-6

FRONT SIDE TRIM

REMOVAL / INSTALLATION 09-17-6

SCUFF PLATE

REMOVAL / INSTALLATION 09-17-6

DOOR TRIM

REMOVAL / INSTALLATION 09-17-7

QUARTER TRIM

REMOVAL / INSTALLATION 09-17-7

REAR PACKAGE TRIM

REMOVAL / INSTALLATION 09-17-8

TRUNK END TRIM

REMOVAL / INSTALLATION 09-17-8

TRUNK SIDE TRIM

REMOVAL / INSTALLATION 09-17-8

CABIN CARPET

REMOVAL / INSTALLATION 09-17-9

DASHBOARD REMOVAL / INSTALLATION

Warning

- Handling the air bag module improperly can accidentally deploy the air bag, which may seriously injure you. Read **SERVICE WARNINGS** before handling the air bag module. (Refer to 08-10 AIR BAG SYSTEM SERVICE WARNING.)

1. Disconnect the negative battery cable.
2. Remove the front header trim.
3. Remove the A-pillar trim.
4. Remove the rear console.
5. Remove the center lower panel.
6. Remove the meter hood.
7. Disconnect the speedometer cable.
8. Remove the instrument cluster.
9. Remove the center louver.
10. Remove the center panel.
11. Remove the globe compartment.
12. Remove the passenger-side air bag module. (Refer to 08-10 PASSENGER-SIDE AIR BAG MODULE REMOVAL / INSTALLATION.)
13. Remove the hood release lever.
14. Remove the control wires of the heater unit and blower unit.
15. Remove the installation bolts and nuts fixing the steering shaft to the dashboard, and pull down the steering shaft.
16. Remove in the order indicated in the table.

U5U917AA

17. Install in the reverse order of removal indicated in the table.
18. Lift up the steering shaft and install the installation bolts and nuts fixing the steering shaft to the dashboard.

Tightening torque

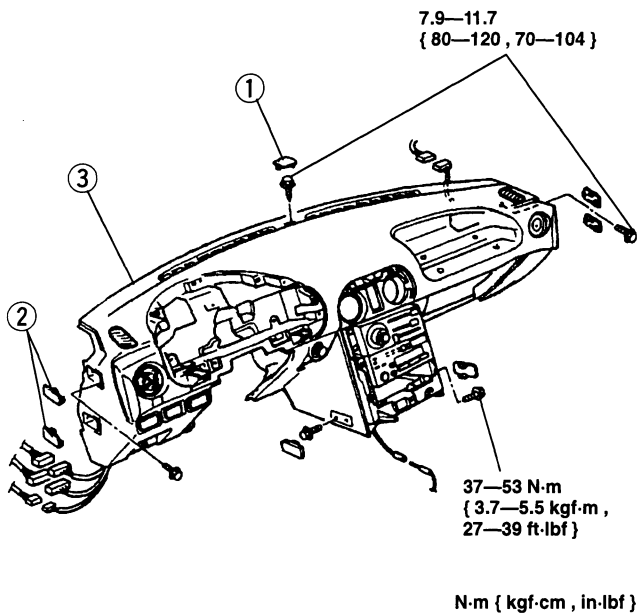
BOLT: 16—22 N·m

{ 1.6—2.3 kgf·m , 12—16 ft·lbf }

NUT: 18—26 N·m { 1.8—2.7 kgf·m , 14—19 ft·lbf }

19. Install the control wires of the heater unit and blower unit. (Refer to 07-40 HEATER CONTROL UNIT REMOVAL / INSTALLATION.)
20. Install the hood release lever.
21. Install the passenger-side air bag module. (Refer to 08-10 PASSENGER-SIDE AIR BAG MODULE REMOVAL / INSTALLATION.)
22. Install the glove compartment.
23. Install the center panel.
24. Install the center louver.
25. Install the instrument cluster.
26. Install the speedometer cable.
27. Install the meter hood.
28. Install the center lower panel.
29. Install the rear console.
30. Install the A-pillar trim.
31. Install the front header trim.
32. Connect the negative battery cable.

INTERIOR TRIM



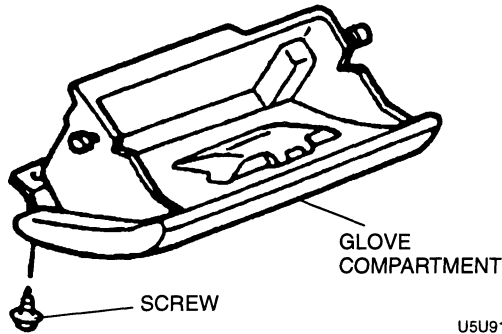
1	Center hole cover
2	Side cover
3	Dashboard

U5U91701

GLOVE COMPARTMENT REMOVAL / INSTALLATION

U5U917AB

1. Open the glove compartment.
2. Remove the glove compartment hinge installation screws, and remove the glove compartment.
3. Install in the reverse order of removal.



U5U91703

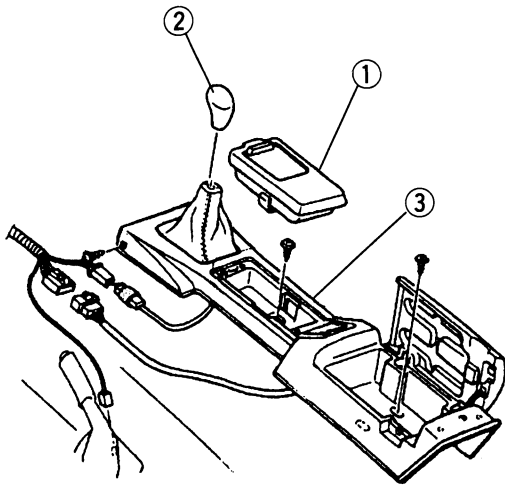
INTERIOR TRIM

REAR CONSOLE REMOVAL / INSTALLATION

U5U917AC

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

1	Ashtray
2	Change lever knob
3	Rear console



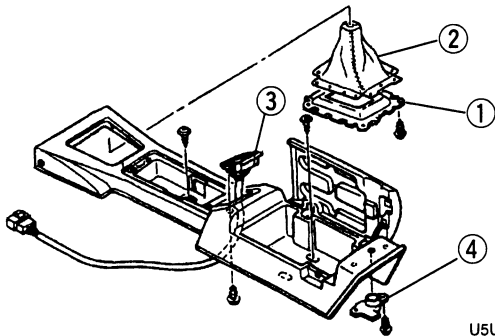
U5U91704

REAR CONSOLE DISASSEMBLY / ASSEMBLY

U5U917AD

1. Disassemble in the order indicated in the table.
2. Assemble in the reverse order of disassembly indicated in the table.

1	Back plate
2	Shift lever boot
3	Power window switch
4	Console lock



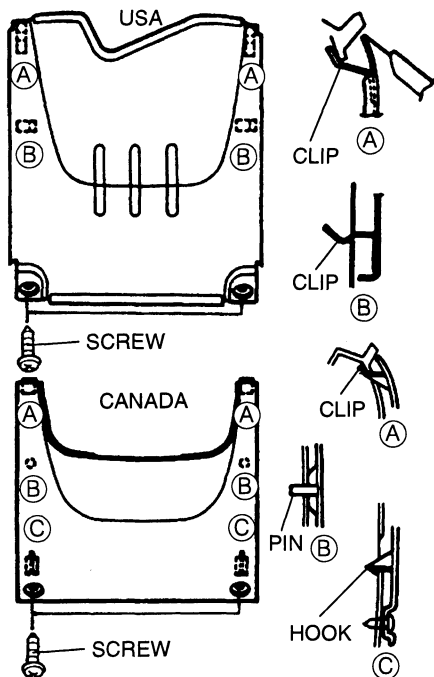
U5U91705

INTERIOR TRIM

CENTER LOWER PANEL REMOVAL / INSTALLATION

U5U917AE

1. Remove the center lower panel installation screws.
2. Pull the center lower panel forward to disengage the clips from the body, and remove the center lower panel.
3. Install in the reverse order of removal.

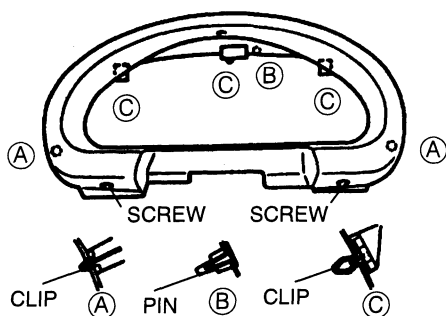


U5U91706

METER HOOD REMOVAL / INSTALLATION

U5U917AF

1. Remove the meter hood installation screws.
2. Pull the meter hood forward to disengage the clips from the body, and remove the meter hood.
3. Install in the reverse order of removal.

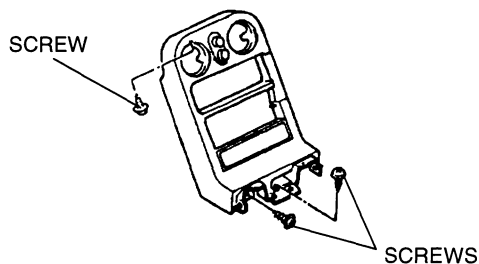


U5U91707

CENTER PANEL REMOVAL / INSTALLATION

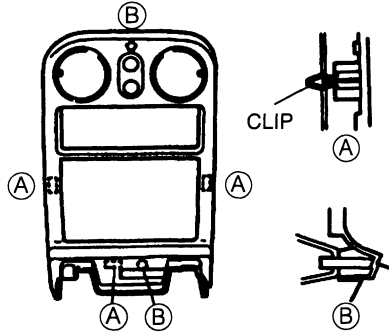
U5U917AG

1. Remove the rear console.
2. Remove the center louver. (Refer to CENTER LOUVER REMOVAL / INSTALLATION.)
3. Remove the center panel installation screws.



INTERIOR TRIM

4. Pull the center panel forward to disengage the clips from the body, and remove the center panel.

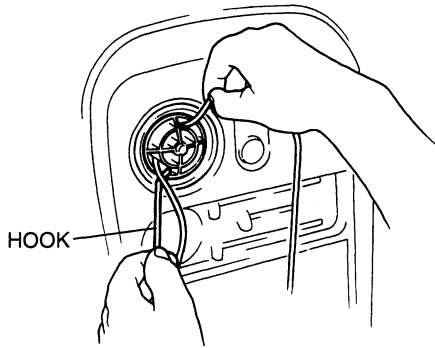


U5U91708

5. Install in the reverse order of removal.

CENTER LOUVER REMOVAL / INSTALLATION

1. Thread a piece of string through the center louver by using a small metal hook.

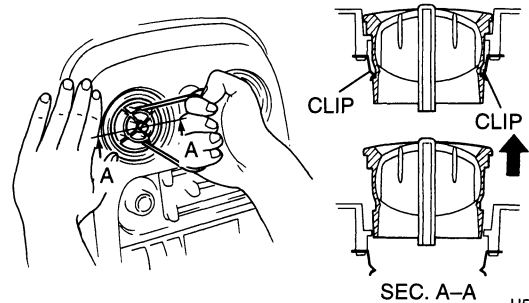


U5U91709

2. Pull the string straight out while holding onto the center panel, and remove the center louver.

Note

- The center louver is held in place by clips. Pull strongly on the string when removing the center louver.



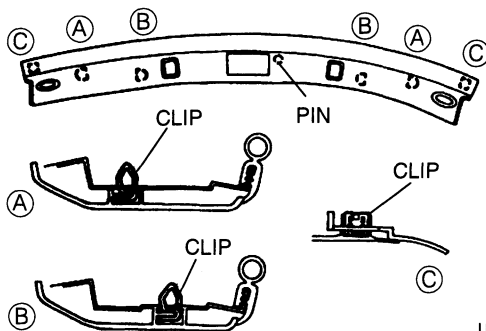
U5U917AH

U5U91710

3. Install in the reverse order of removal.

FRONT HEADER TRIM REMOVAL / INSTALLATION

1. Remove the striker.
2. Remove the sunvisor and adapter.
3. Pull the front header trim forward to disengage the clips from the body, and remove the front header trim.



U5U91711

4. Install in the reverse order of removal.

U5U917AJ

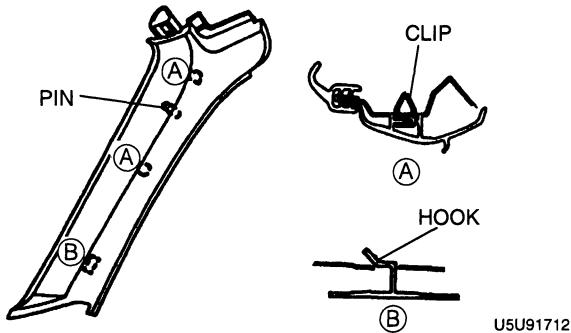
INTERIOR TRIM

A-PILLAR TRIM REMOVAL / INSTALLATION

U5U917AK

1. Remove the front header trim.
2. Pull the A-pillar trim forward to disengage the clips and pin from the body.
3. Pull the A-pillar trim upward to disengage the hook from the body, and remove the A-pillar trim.

4. Install in the reverse order of removal.

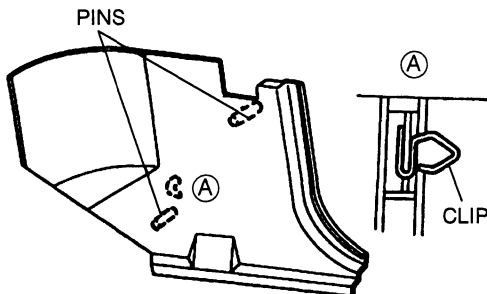


FRONT SIDE TRIM REMOVAL / INSTALLATION

U5U917AL

1. Pull the front side trim forward to disengage the clip and pins from the body, and remove the front side trim.

2. Install in the reverse order of removal.

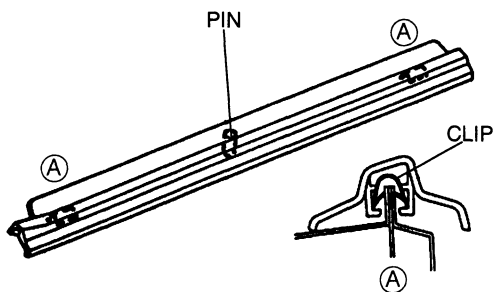


SCUFF PLATE REMOVAL / INSTALLATION

U5U917AM

1. Remove the scuff plate installation screws.
2. Pull the scuff plate upward to disengage the clips and pin from the body, and remove the scuff plate.

3. Install in the reverse order of removal.

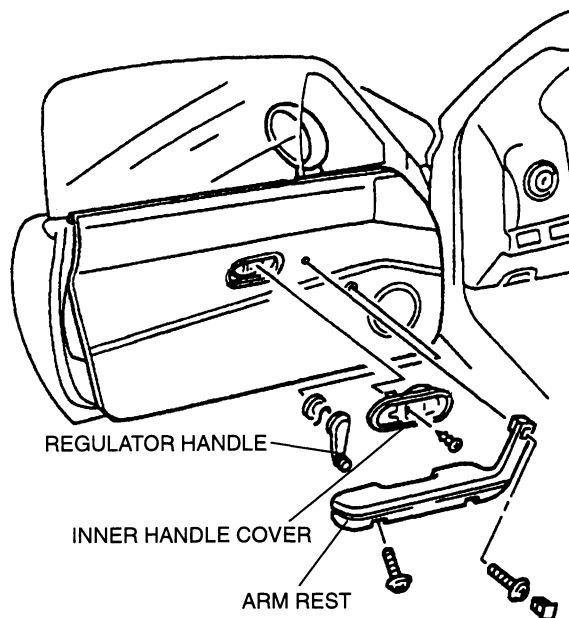


INTERIOR TRIM

DOOR TRIM REMOVAL / INSTALLATION

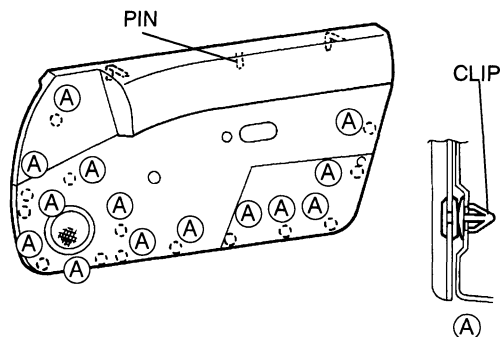
U5U917AN

1. Remove the regulator handle. (Refer to WINDOW REGULATOR, GLASS AND GUIDE REMOVAL / INSTALLATION.)
2. Remove the inner handle cover.
3. Remove the arm rest.



U5U91715

4. Pull the door trim forward to disengage the clips from the body.
5. Lift the door trim to remove it.



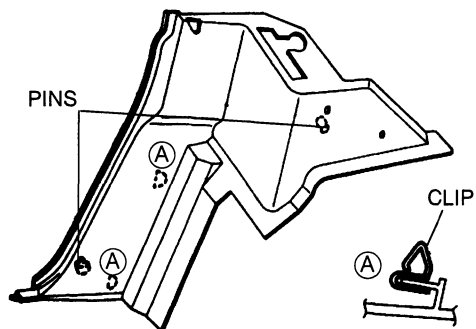
U5U91716

6. Install in the reverse order of removal.

QUARTER TRIM REMOVAL / INSTALLATION

U5U917AP

1. Remove the scuff plate.
2. Remove the brace bar.
3. Pull the quarter trim forward to disengage the clips from the body.



U5U91717

4. Install in the reverse order of removal.

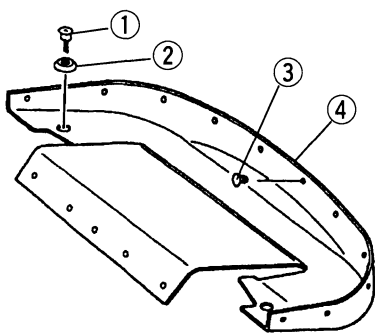
INTERIOR TRIM

REAR PACKAGE TRIM REMOVAL / INSTALLATION

U5U917AQ

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

1	Detachable hardtop stopper bolt
2	Detachable hardtop stopper
3	Fastener
4	Rear package trim

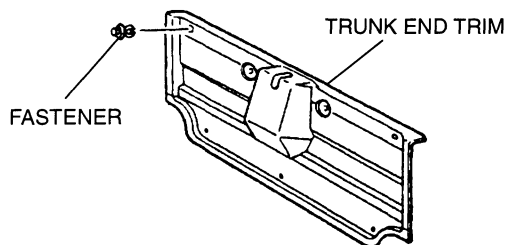


U5U91718

TRUNK END TRIM REMOVAL / INSTALLATION

U5U917AR

1. Remove the trunk end trim installation fasteners.
2. Remove the trunk end trim installation fasteners, and remove the trunk end trim.
3. Install in the reverse order of removal.

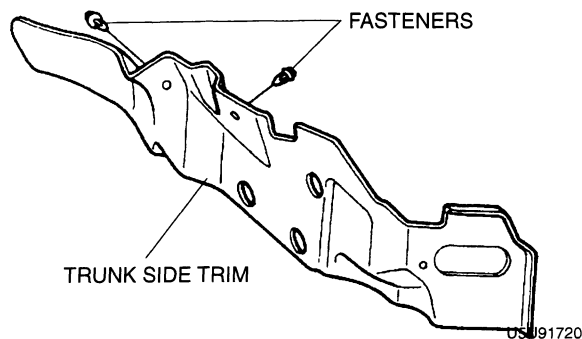


U5U91719

TRUNK SIDE TRIM REMOVAL / INSTALLATION

U5U917AS

1. Remove the trunk side trim installation fasteners, and remove the trunk side trim.
2. Install in the reverse order of removal.



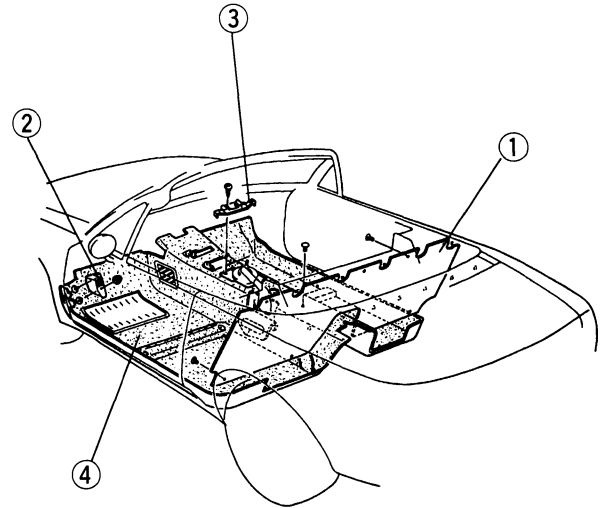
U5U91720

INTERIOR TRIM

CABIN CARPET REMOVAL / INSTALLATION

U5U917AT

1. Disconnect the negative battery cable.
2. Remove the dashboard. (Refer to 09–17 DASH-BOARD REMOVAL / INSTALLATION.)
3. Remove the seat.
4. Remove the heater unit.
5. Remove the front side trim.
6. Remove the scuff plates.
7. Remove the quarter trim.
8. Remove the rear package trim.
9. Remove the seat belt. (Refer to 08–11 SEAT BELT REMOVAL / INSTALLATION.)
10. Remove in the order indicated in the table.
11. Install in the reverse order of removal indicated in the table.
12. Install the seat belt. (Refer to 08–11 SEAT BELT REMOVAL / INSTALLATION.)
13. Install the rear package trim.
14. Install the quarter trim.
15. Install the scuff plates.
16. Install the front side trim.
17. Install the heater unit.
18. Install the seat.
19. Install the dashboard. (Refer to 09–17 DASH-BOARD REMOVAL / INSTALLATION.)
20. Connect the negative battery cable.



U5U91721

1	Rear end mat
2	Footrest
3	Bracket
4	Cabin carpet

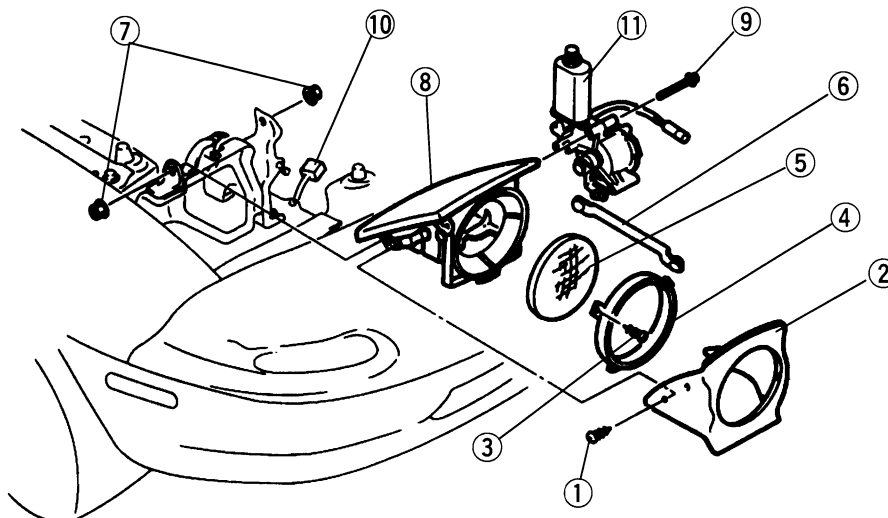
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HEADLIGHT REMOVAL / INSTALLATION

U5U918AA

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.
5. Adjust the headlight aiming. (Refer to 09-18 HEADLIGHT AIMING.)



U5U91801

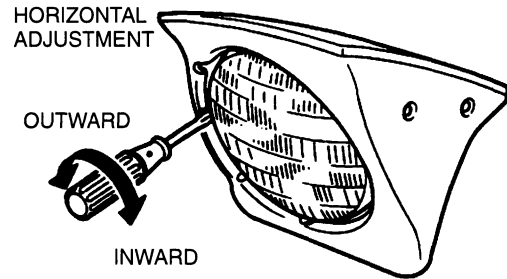
LIGHTING SYSTEMS

1	Screw
2	Bezel
3	Screw
4	Headlight housing
5	Headlight
6	Motor link

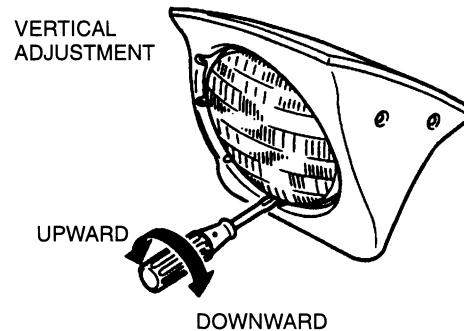
7	Nut
8	Retractable hinge
9	Bolt
10	Connector
11	Retractable headlight actuator

HEADLIGHT AIMING

1. Adjust the retractable hinge. (Refer to 09-18 RETRACTABLE HINGE ADJUSTMENT.)
2. Adjust the tire air pressure to the specification.
3. Turn the retractor switch on to raise the retractable headlight.
4. Position the unloaded vehicle on a flat, level surface.
5. Turn the adjusting screws as shown in the figure to adjust the headlights. Use a "HOPPY" brand aimer or equivalent to aim the headlights to specification numbers 0H0V (found on the headlight lens).



U5U918AB



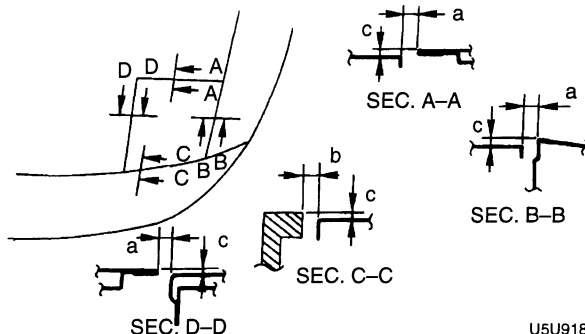
U5U91802

RETRACTABLE HINGE ADJUSTMENT

1. Fully retract the headlights.
2. Measure the gap and height between the headlight lid, hood, front fender panel and front bumper.

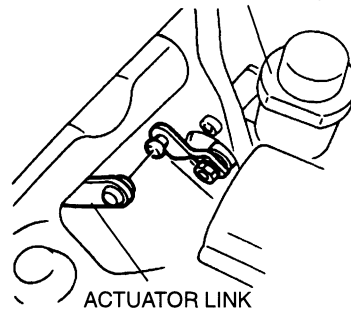
Clearance

- a: $5.0 \pm 1.0 \text{ mm} \{ 0.2 \pm 0.04 \text{ in} \}$
- b: $3.0 \pm 1.0 \text{ mm} \{ 0.12 \pm 0.04 \text{ in} \}$
- c: $0 \pm 1.0 \text{ mm} \{ 0 \pm 0.04 \text{ in} \}$



U5U91803

RETRACTABLE HEADLIGHT ACTUATOR



U5U918AC

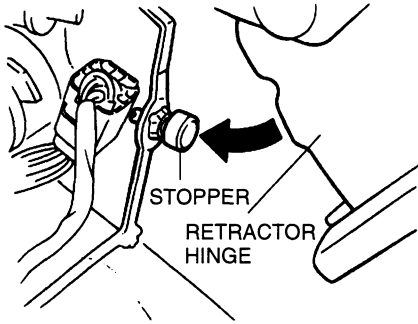
U5U91804

5. Turn the stopper to adjust the retractable hinge.

3. If not as specified, adjust the retractable hinge according to the procedures below.
4. Pry off the actuator link.

LIGHTING SYSTEMS

6. Install the actuator link.



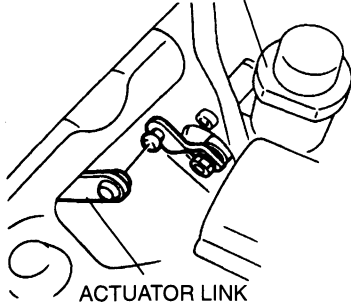
U5U91805

RETRACTABLE HEADLIGHT ACTUATOR INSPECTION

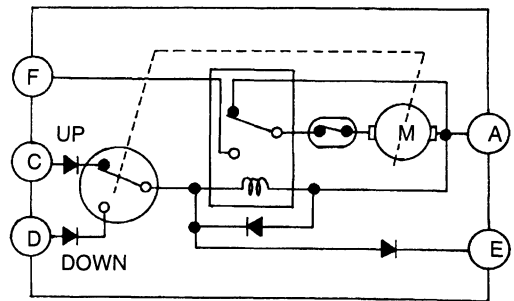
U5U918AD

1. Pry off the actuator link.

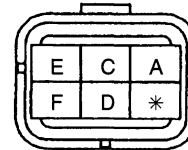
RETRACTABLE HEADLIGHT ACTUATOR



U5U91806



2. Disconnect the retractable headlight actuator connector.
3. Connect battery positive voltage to terminal F and ground to terminal A of the retractable headlight actuator.
4. Verify that the retractable headlight actuator operation is as shown when connecting battery positive voltage to terminals A and B of the retractable headlight actuator.



U5U91807

Terminal	Retractable headlight actuator operation
C	Raise
D	Retract

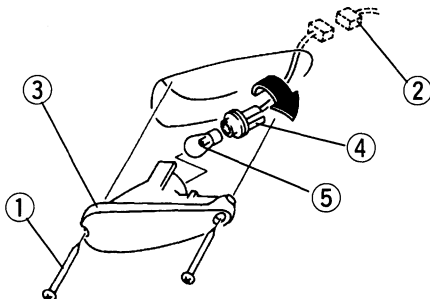
5. If not as specified, replace the retractable headlight actuator.

FRONT COMBINATION LIGHT REMOVAL / INSTALLATION

U5U918AE

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.

1	Screw
2	Connector
3	Front combination light
4	Socket
5	Bulb



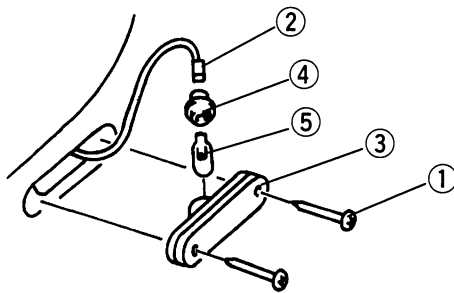
U5U91808

FRONT SIDE MARKER LIGHT REMOVAL / INSTALLATION

U5U918AF

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.

1	Screw
2	Connector
3	Front side marker light
4	Socket
5	Bulb



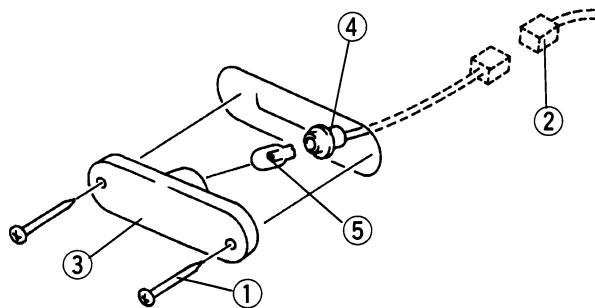
U5U91809

REAR SIDE MARKER LIGHT REMOVAL / INSTALLATION

U5U918AG

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.

1	Screw
2	Connector
3	Rear side marker light
4	Socket
5	Bulb



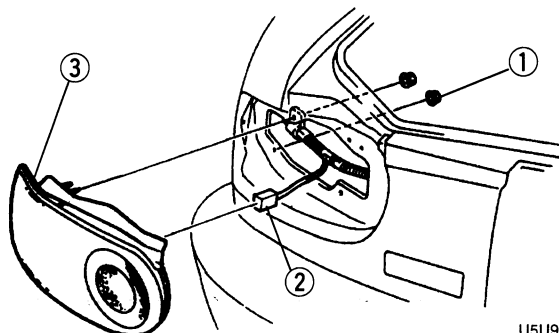
U5U91810

REAR COMBINATION LIGHT REMOVAL / INSTALLATION

U5U918AH

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.

1	Nut
2	Connector
3	Rear combination light



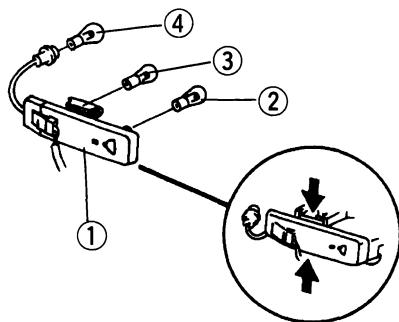
U5U91811

LIGHTING SYSTEMS

REAR COMBINATION LIGHT BULB REPLACEMENT

U5U918AJ

1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



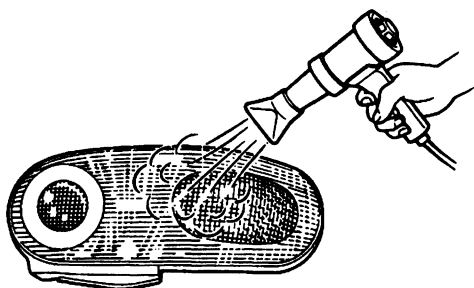
U5U91812

1	Socket cover
2	Bulb (back-up light)
3	Bulb (brake light/taillight)
4	Bulb (rear turn light)

REAR COMBINATION LIGHT DISASSEMBLY

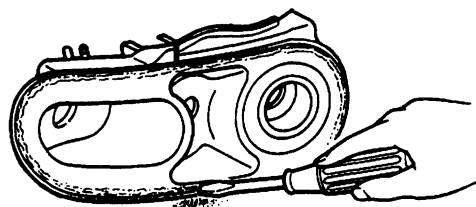
U5U918AK

1. Use a hot-air blower to soften the "hot melt" (bonding agent) around the lens.



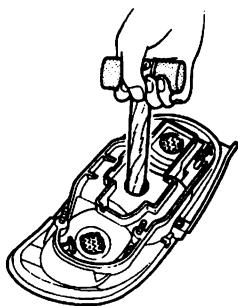
U5U91813

3. Remove the old hot melt from the light housing.



U5U91815

2. Remove the lens from the light housing by pushing the rear of the lens with a hammer handle or round bar.



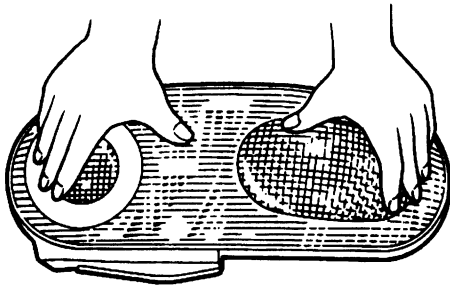
U5U91814

REAR COMBINATION LIGHT ASSEMBLY

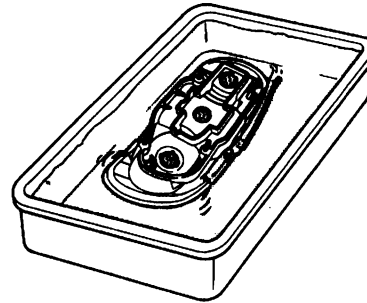
U5U918AL

1. If new hot melt is used, put sealant adhesive in the light housing groove.
2. Fit the new lens onto the light housing. Press the lens firmly so that it will adhere.

3. Allow sealer to dry for **about one hour**.
4. Immerse the combination light in water to check for leaks.



U5U91816



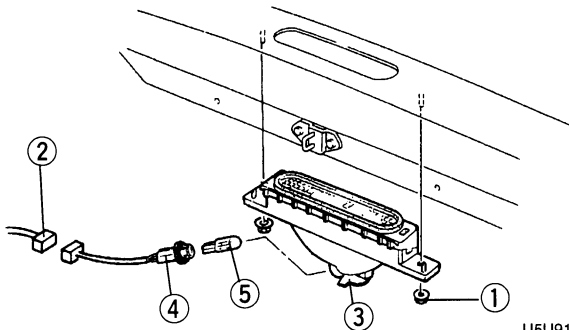
U5U91817

HIGH-MOUNT BRAKE LIGHT REMOVAL / INSTALLATION

U5U918AM

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.

1	Nut
2	Connector
3	High-mount brake light
4	Socket
5	Bulb



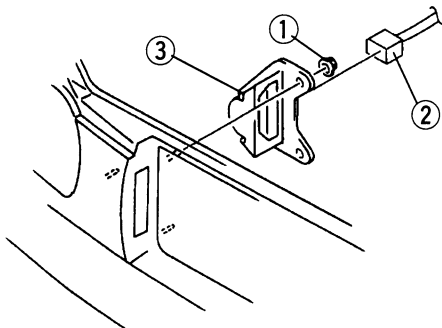
U5U91818

LICENCE PLATE LIGHT REMOVAL / INSTALLATION

U5U918AN

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.

1	Nut
2	Connector
3	Licence plate light

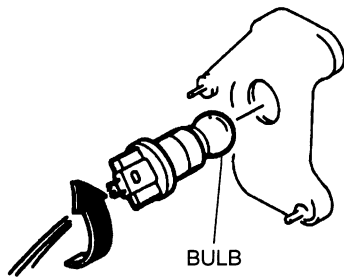


U5U91819

LICENCE PLATE LIGHT BULB REPLACEMENT

U5U918AP

1. Remove the bulb.
2. Install in the reverse order of removal.

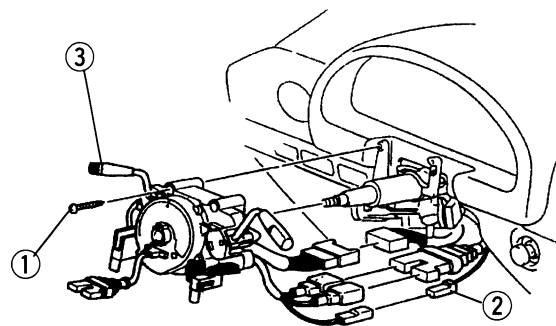


U5U91820

COMBINATION SWITCH REMOVAL / INSTALLATION

U5U918AQ

1. Disconnect the negative battery cable.
2. Remove the driver-side air bag module. (Refer to 08–10 DRIVER-SIDE AIR BAG MODULE REMOVAL.)
3. Remove the steering wheel. (Refer to 06–10 STEERING WHEEL AND COLUMN REMOVAL / INSTALLATION.)
4. Remove the column cover.
5. Remove in the order indicated in the table.
6. Install in the reverse order of removal.
7. Install the column cover.
8. Install the steering wheel. (Refer to 06–10 STEERING WHEEL AND COLUMN REMOVAL / INSTALLATION.)
9. Install the driver-side air bag module. (Refer to 08–10 DRIVER-SIDE AIR BAG MODULE INSTALLATION.)
10. Connect the negative battery cable.



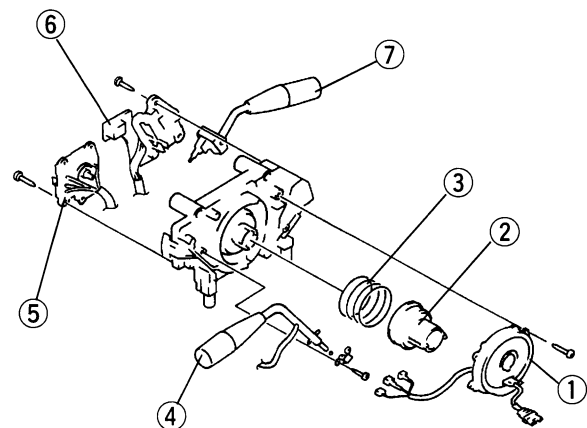
U5U91821

1	Screw
2	Connector
3	Combination switch

COMBINATION SWITCH DISASSEMBLY / ASSEMBLY

U5U918AR

1. Disconnect the negative battery cable.
2. Remove the driver-side air bag module. (Refer to 08–10 DRIVER-SIDE AIR BAG MODULE REMOVAL.)
3. Remove the steering wheel. (Refer to 06–10 STEERING WHEEL AND COLUMN REMOVAL / INSTALLATION.)
4. Remove the column cover.
5. Remove the combination switch.
6. Disassemble in the order indicated in the table.
7. Assemble in the reverse order of disassembly.
8. Install the combination switch.
9. Install the column cover.
10. Install the steering wheel. (Refer to 06–10 STEERING WHEEL AND COLUMN REMOVAL / INSTALLATION.)
11. Install the driver-side air bag module. (Refer to 08–10 DRIVER-SIDE AIR BAG MODULE INSTALLATION.)
12. Connect the negative battery cable.



U5U91822

LIGHTING SYSTEMS

1	Clock Spring
2	Cancel cam
3	Spring
4	Light lever

5	Light unit
6	Wiper unit
7	Wiper lever

COMBINATION SWITCH INSPECTION

1. Remove the column cover.
2. Disconnect the combination switch connectors.
3. Check for continuity between the combination switch terminals by using an ohmmeter.

U5U918AS

Headlight switch

○—○ : Continuity

Switch position	Flash to pass	Terminal							
		D	E	F	G	H	I	J	
OFF	Off								
	On				○—○				
TNS	Off	○—○							
	On	○—○			○—○				
Head-light	Low	○—○	○—○	○—○				○—○	
	On	○—○	○—○	○—○	○—○	○—○	○—○	○—○	
	High	○—○	○—○	○—○	○—○				○—○

U5U91856

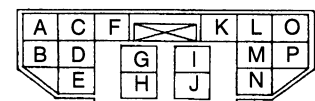
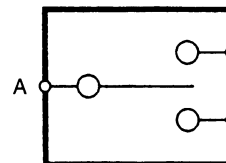
Turn switch

○—○ : Continuity

Switch position	Terminal		
	A	C	B
Left	○—○	○—○	
Off			
Right	○—○		○—○

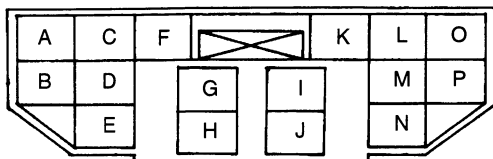
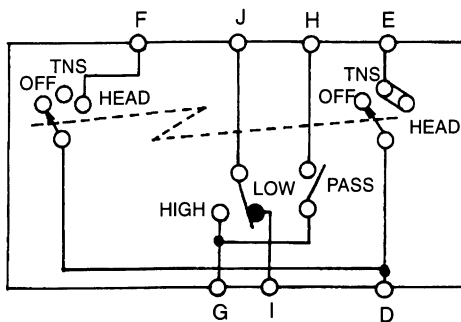
U5U91824

LEFT



RIGHT

U5U91825



U5U91823

Windshield wiper and washer switch

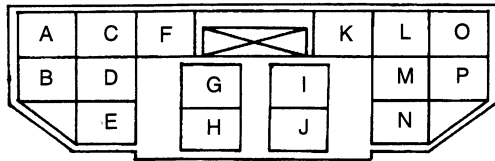
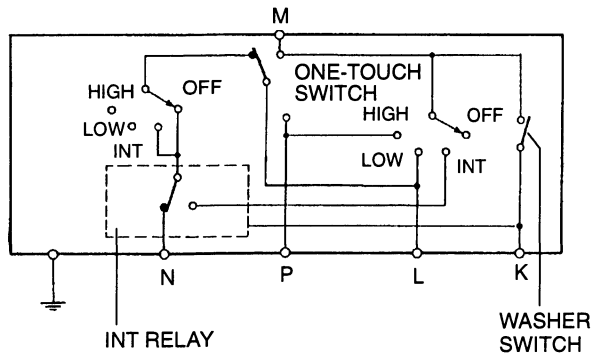
○—○ : Continuity

Switch position	One-touch switch	Terminal				
		K	L	M	N	P
Wiper	OFF	Off	○—○		○—○	
		On	○—○	○—○		
	INT	—	○—○		○—○	
	I (Low)	—	○—○	○—○		
	II (High)	—		○—○		○—○
Washer	ON	—	○—○	○—○		

U5U91826

LIGHTING SYSTEMS

4. If not as specified, replace the necessary parts.



U5U91827

CLOCK SPRING INSPECTION

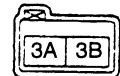
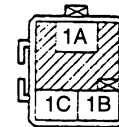
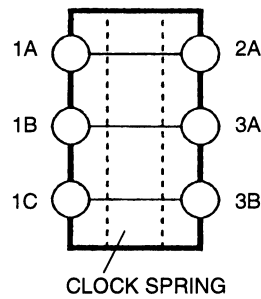
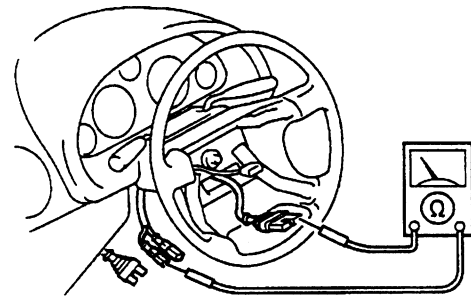
U5U918AT

1. Remove the lower panel.
2. Remove the driver-side air bag module. (Refer to 08-10 DRIVER-SIDE AIR BAG MODULE REMOVAL.)
3. Check for continuity between the clock spring terminals by using an ohmmeter.

○—○ : Continuity

Step	Terminal					
	1A	1B	1C	2A	3A	3B
1	○			○		
2		○			○	
3			○			○

U5U91828



U5U91829

Note

- When terminals 3A and 3B 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.

CLOCK SPRING ADJUSTMENT

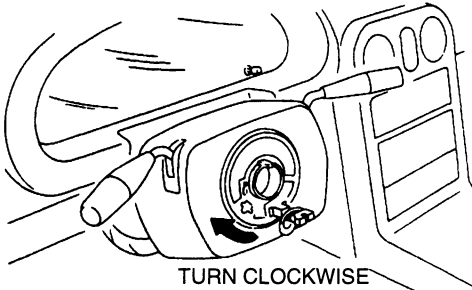
U5U918AU

Caution

- The clock spring will break if it is over wound. Do not force the clock spring when turning it.

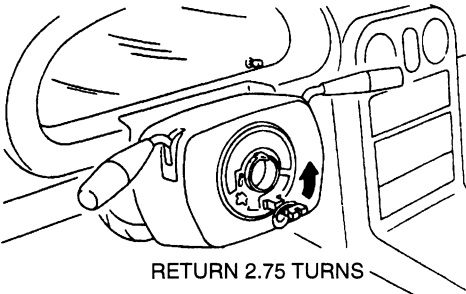
3. Align the marks on the clock spring connector with that on the outer housing.

1. Turn the clock spring clockwise until it stops.



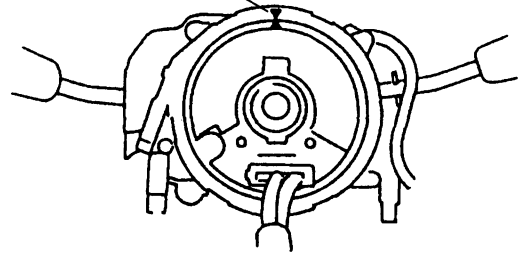
U5U91830

2. Turn the clock spring counterclockwise **2.75 turns**.



U5U91831

ALIGNMENT MARKS



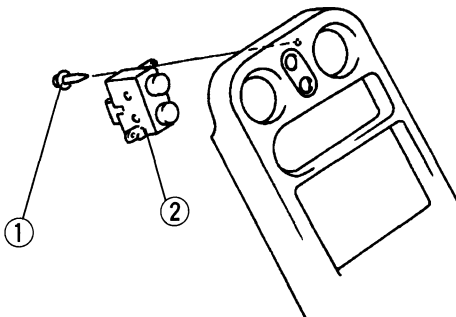
U5U91832

RETRACTOR AND HAZARD WARNING SWITCH REMOVAL / INSTALLATION

U5U918AV

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.
5. Install the center panel.
6. Connect the negative battery cable.

1	Screw
2	Retractor and hazard warning switch



U5U91833

LIGHTING SYSTEMS

RETRACTOR AND HAZARD WARNING SWITCH INSPECTION

U5U918AW

Retractor Switch

1. Remove the retractor and hazard warning switch.
2. Check for continuity between the retractor and hazard warning switch terminals by using an ohmmeter.

○—○ : Continuity ○—⊗—○ : Bulb

Switch position	Terminal				
	A	B	C	D	F
OFF	○	⊗	○		○
ON	○	⊗	○	○	○

U5U91834

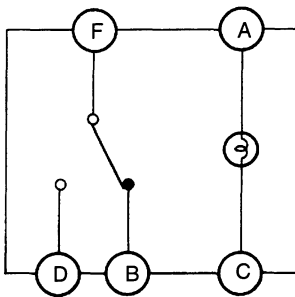
Hazard Warning Switch

1. Remove the retractor and hazard warning switch.
2. Check for continuity between the retractor and hazard warning switch terminals by using an ohmmeter.

○—○ : Continuity ○—⊗—○ : Bulb

Switch position	Terminal			
	A	C	G	H
OFF	○	⊗		
ON	○	⊗	○	○

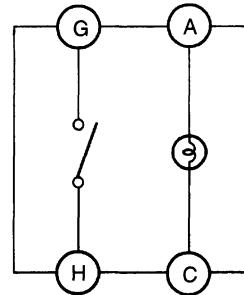
U5U91836



G	*	C	A
H	F	D	B

U5U91835

3. If not as specified, replace the retractor and hazard warning switch.



G	*	C	A
H	F	D	B

U5U91837

3. If not as specified, replace the retractor and hazard warning switch.

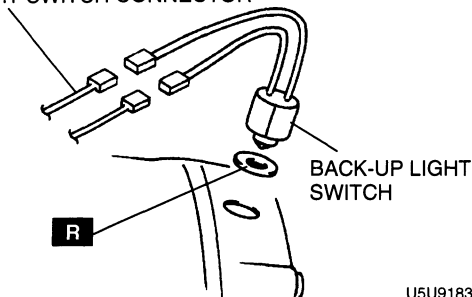
BACK-UP LIGHT SWITCH REMOVAL / INSTALLATION

U5U918AX

1. Disconnect the negative battery cable.
2. Disconnect the back-up light switch connector.
3. Remove the back-up light switch.

4. Install in the reverse order of removal.

BACK-UP LIGHT SWITCH CONNECTOR



U5U91838

BACK-UP LIGHT SWITCH INSPECTION

U5U918AY

1. Disconnect the back-up light switch connector.
2. Check for continuity between the back-up light switch terminals by using an ohmmeter.

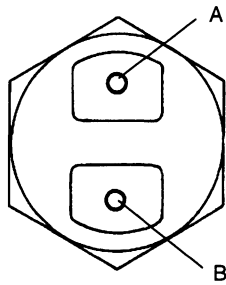
○—○ : Continuity

Shift lever position	Terminal	
	A	B
Reverse	○	○
Other		

U5U91839

LIGHTING SYSTEMS

3. If not as specified, replace the back-up light switch.



U5U91840

FLASHER UNIT INSPECTION

U5U918AZ

1. Measure the voltage at the flasher unit terminals as indicated below.
2. Disconnect the flasher unit connector before checking for continuity at terminal A.
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)

G	E	C	A
H	F	D	B

U5U91841

Terminal	Signal	Connection	Test condition		Voltage (V)/ Continuity	Inspection area
A	Flasher unit ground	GND	Constant: Check for continuity to ground		Yes	GND
B	—	Not used	—		—	—
C	Hazard warn- ing input	Hazard warn- ing switch	Hazard warning switch on		0	Hazard warning switch
			Hazard warning switch off		B+	
D	Turn operation output (LH)	Turn signal lights (LH)	Ignition switch at ON	Turn switch (LH) on	Alternates 0 and B+	Turn signal lights (LH)
				Turn switch (RH) on or turn switch off	0	
			Hazard warning switch on		Alternates 0 and B+	
			Hazard warning switch off		0	
E	Turn operation input (RH)	Turn switch	Ignition switch at ON	Turn switch (RH) on	B+	• METER 15 A fuse • Combination switch
				Turn switch (LH) on or turn switch off	0	
F	Turn operation input (LH)	Turn switch	Ignition switch at ON	Turn switch (LH) on	B+	• METER 15 A fuse • Combination switch
				Turn switch (RH) on or turn switch off	0	
G	Turn operation output (RH)	Turn signal lights (RH)	Ignition switch at ON	Turn switch (RH) on	Alternates 0 and B+	Turn signal lights (RH)
				Turn switch (LH) on or turn switch off	0	
			Hazard warning switch on		Alternates 0 and B+	
			Hazard warning switch off		0	
H	+B	HAZARD 15 A fuse	Constant		B+	HAZARD 15 A fuse

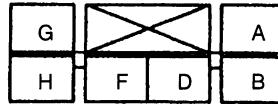
LIGHTING SYSTEMS

RETRACTABLE HEADLIGHT RELAY INSPECTION

U5U918BA

1. Measure the voltage at the retractable headlight relay terminals as indicated below.
2. Disconnect the retractable headlight relay connector before checking for continuity at terminal D.
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 retractable headlight relay.

Terminal Voltage List (Reference)



U5U91842

Terminal	Signal	Connection	Test condition	Voltage (V)/Continuity	Inspection area
A	+B	HEAD 30 A fuse	Constant	B+	HEAD 30 A fuse
B	Headlight switch on/off	Headlight switch	Headlight switch at 2nd position	B+	Combination switch
			Headlight switch at OFF or 1st position	0	
D	Retractable headlight relay ground	GND	Constant: Check for continuity to ground	Yes	GND
F	Passing switch on/off	Passing switch	Passing switch on	B+	Combination switch
			Passing switch off	0	
G	Retractable headlight operation output	Retractable headlight actuator	Headlight switch at 2nd position	B+	—
			Passing switch on	B+	
			Other	0	
H	Retractor switch on/off	Retractor switch	Headlight switch at 2nd position	0	—
			Passing switch on	0	
			Other	B+	

HEADLIGHT RELAY INSPECTION

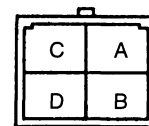
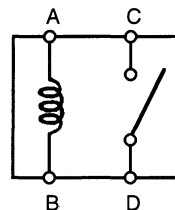
U5U918BB

1. Remove the headlight relay.
2. Check for continuity between the headlight relay terminals by using an ohmmeter.

○—○ : Continuity

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

U5U91843



U5U91844

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

LIGHTING SYSTEMS

TNS RELAY INSPECTION

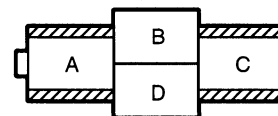
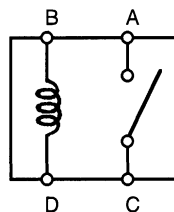
U5U918BC

1. Remove the TNS relay.
2. Check for continuity between the TNS relay terminals by using an ohmmeter.

○—○ : Continuity

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

U5U91845



U5U91846

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

DRL CONTROL MODULE INSPECTION

U5U918BD

1. Measure the voltage at the DRL control module terminals as indicated below.
2. Disconnect the DRL control module connector before checking for continuity at terminal I.
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 DRL control module.

Terminal Voltage List (Reference)

K	I		C	A
L	J	H	F	D

U5U91847

Terminal	Signal	Connection	Test condition		Voltage (V)/Continuity	Inspection area
A	Brake warning input	- Instrument cluster - Brake fluid level sensor	Ignition switch at ON	Parking brake switch on	0	- Instrument cluster - Parking brake switch
				Parking brake switch off	B+	
B	Parking brake switch on/off	Parking brake switch	Ignition switch at ON	Parking brake switch on	0	Parking brake switch
				Parking brake switch off	B+	
C	Headlight operation input	Headlight relay	Headlight switch at 2nd position		B+	Headlight relay
			Headlight switch at OFF or 1st position		0	
D	Turn operation output (LH)	Turn signal lights (LH)	Ignition switch at ON	Turn switch (LH) on	Alternates 0 and B+	Turn signal lights (LH)
				Turn switch (RH) on or turn switch off	0	
			Hazard warning switch on		Alternates 0 and B+	
			Hazard warning switch off		0	
F	Turn operation input (LH)	Flasher unit	Ignition switch at ON	Turn switch (LH) on	Alternates 0 and B+	Turn signal lights (LH)
				Turn switch (RH) on or turn switch off	0	
H	Turn operation input (RH)	Flasher unit	Ignition switch at ON	Turn switch (RH) on	Alternates 0 and B+	Turn signal lights (RH)
				Turn switch (LH) on or turn switch off	0	

LIGHTING SYSTEMS

Terminal	Signal	Connection	Test condition		Voltage (V)/Continuity	Inspection area
I	DRL control module ground	GND	Constant: Check for continuity to ground		Yes	GND
J	IG2	WIPER 20 A fuse	Ignition switch at ON		B+	WIPER 20 A fuse
			Ignition switch at OFF		0	
K	Turn operation output (RH)	Turn signal lights (RH)	Ignition switch at ON	Turn switch (RH) on	Alternates 0 and B+	Turn signal lights (RH)
				Turn switch (LH) on or turn switch off	0	
			Hazard warning switch on		Alternates 0 and B+	
			Hazard warning switch off		0	
L	—	Not used	—		—	—

INTERIOR LIGHT REMOVAL / INSTALLATION

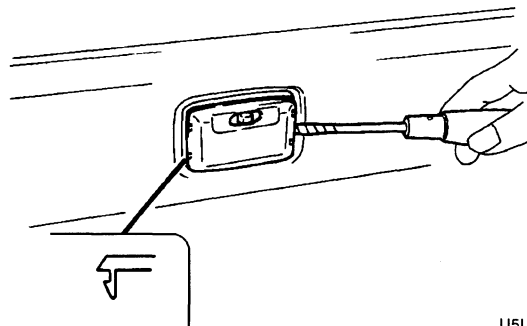
U5U918BE

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.

1	Interior light lens 🔧 Removal Note
2	Screw
3	Connector
4	Housing
5	Bulb

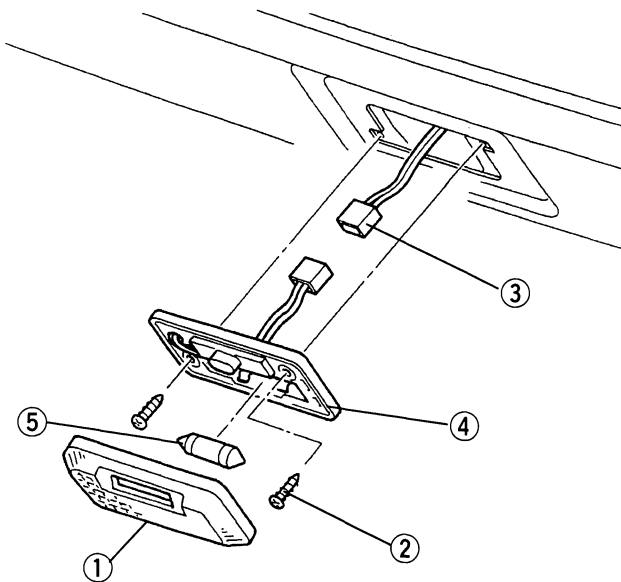
Interior Light Lens Removal Note

1. Insert a flathead screwdriver which has been wrapped in tape as shown in the figure.



U5U91849

2. Twist the screwdriver to remove the lens.



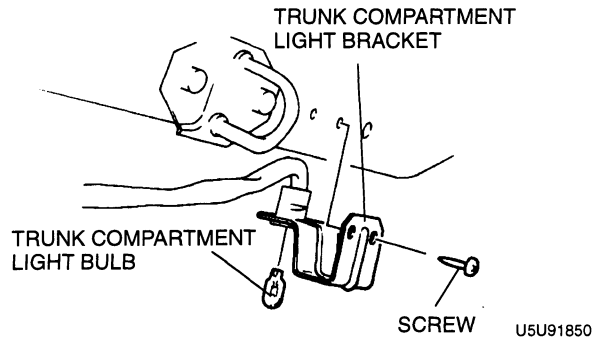
U5U91848

LIGHTING SYSTEMS

TRUNK COMPARTMENT LIGHT REMOVAL / INSTALLATION

U5U918BF

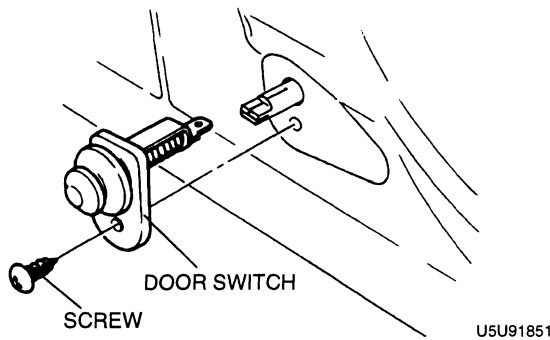
1. Disconnect the negative battery cable.
2. Remove the screw.
3. Remove the trunk compartment light bracket.
4. Remove the trunk compartment light bulb.
5. Install in the reverse order of removal.



DOOR SWITCH REMOVAL / INSTALLATION

U5U918BG

1. Disconnect the negative battery cable.
2. Remove the screw.
3. Disconnect the connector to remove the door switch.
4. Install in the reverse order of removal.



DOOR SWITCH INSPECTION

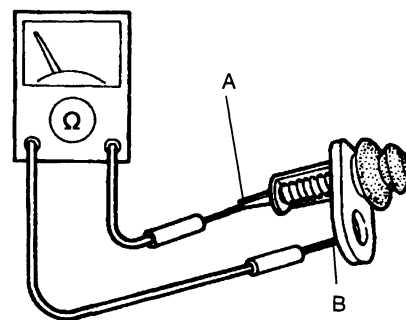
U5U918BH

1. Remove the door switch.
2. Check for continuity between the door switch terminals by using an ohmmeter.

○ — ○ : Continuity

Switch condition	Terminal	
	A	B
Pressed		
Released	○ — ○	○ — ○

U5U91852



U5U91853

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

TRUNK COMPARTMENT LIGHT SWITCH INSPECTION

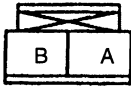
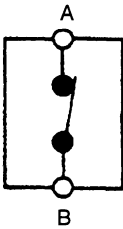
U5U918BJ

- 1. Remove the trunk end trim.
- 2. Disconnect the trunk compartment light switch connector.
- 3. Check for continuity between the trunk compartment light switch terminals by using an ohmmeter.

○ — ○ : Continuity

Switch condition	Terminal	
	A	B
Pressed (trunk lid closed)		
Released (trunk lid opened)	○ — ○	○ — ○

U5U91854



U5U91855

- 4. If not as specified, replace the trunk lid lock.

09-19 WIPER/WASHER SYSTEMS

WINDSHIELD WIPER MOTOR

REMOVAL / INSTALLATION 09-19-1

WINDSHIELD WIPER MOTOR

DISASSEMBLY / ASSEMBLY 09-19-1

WINDSHIELD WIPER MOTOR

INSPECTION 09-19-2

WINDSHIELD WIPER ARM AND BLADE

REMOVAL / INSTALLATION 09-19-3

Windshield Wiper Arm Installation Note 09-19-3

WINDSHIELD WIPER ARM AND BLADE

ADJUSTMENT 09-19-3

WINDSHIELD WIPER LINK

REMOVAL / INSTALLATION 09-19-3

WINDSHIELD WASHER TANK

REMOVAL / INSTALLATION 09-19-4

Without ABS 09-19-4

With ABS 09-19-4

WINDSHIELD WASHER MOTOR

REMOVAL / INSTALLATION 09-19-5

WINDSHIELD WASHER MOTOR

INSPECTION 09-19-5

WINDSHIELD WASHER NOZZLE

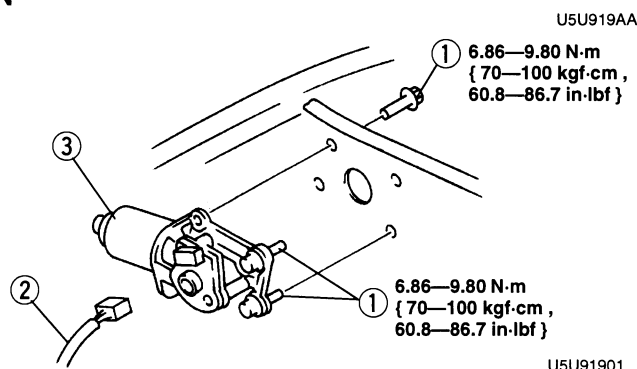
REMOVAL 09-19-5

WINDSHIELD WASHER NOZZLE

ADJUSTMENT 09-19-6

WINDSHIELD WIPER MOTOR REMOVAL / INSTALLATION

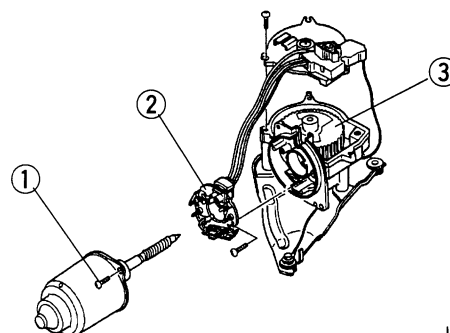
1. Disconnect the negative battery cable.
2. Disconnect the windshield wiper motor connector.
3. Remove the main fuse block to an area where it will not interfere with the removal of other parts.
4. Remove the baffle cover.
5. Pry off the connection between the windshield wiper motor and windshield wiper link.
6. Remove in the order indicated in the table.
7. Install in the reverse order of removal.
8. Connect the windshield wiper link to the windshield wiper motor.
9. Install the baffle cover.
10. Install the main fuse block to an area where it will not interfere with the installation of other parts.
11. Connect the windshield wiper motor connector.
12. Connect the negative battery cable.



1	Bolt
2	Connector
3	Windshield wiper motor

WINDSHIELD WIPER MOTOR DISASSEMBLY / ASSEMBLY

1. Disconnect the negative battery cable.
2. Disconnect the windshield wiper motor connector.
3. Remove the main fuse block to an area where it will not interfere with the removal of other parts.
4. Remove the baffle cover.
5. Pry off the connection between the windshield wiper motor and windshield wiper link.
6. Remove the windshield wiper motor.
7. Disassemble in the order indicated in the table.
8. Assemble in the reverse order of disassembly.
9. Install the windshield wiper motor.
10. Connect the windshield wiper link to the windshield wiper motor.
11. Install the baffle cover.
12. Install the main fuse block to an area where it will not interfere with the installation of other parts.
13. Connect the windshield wiper motor connector.
14. Connect the negative battery cable.



1	Screw
2	Brush plate holder
3	Motor gear shaft

WIPER/WASHER SYSTEMS

WINDSHIELD WIPER MOTOR INSPECTION

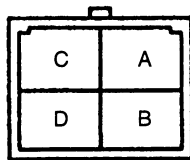
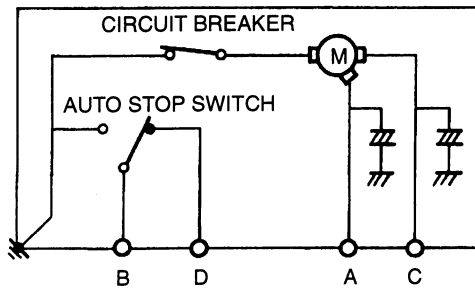
1. Turn the ignition switch to LOCK while the windshield wiper is operating. Verify that the windshield wiper does not stop in the proper park position.
2. Disconnect the windshield wiper motor connector.
3. Check for continuity between the windshield wiper motor terminals by using an ohmmeter.

○—○ : Continuity

Windshield wiper motor position	Terminal				
	A	B	C	D	Body GND
Except park position	○	○	○	○	○

U5U91903

EXCEPT PARK POSITION



U5U91904

4. Connect the windshield wiper motor connector.
5. Turn the ignition switch to ON.
6. Turn the windshield wiper switch off while the windshield wiper is operating. Verify that the windshield wiper stops in the park position.

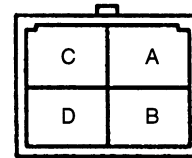
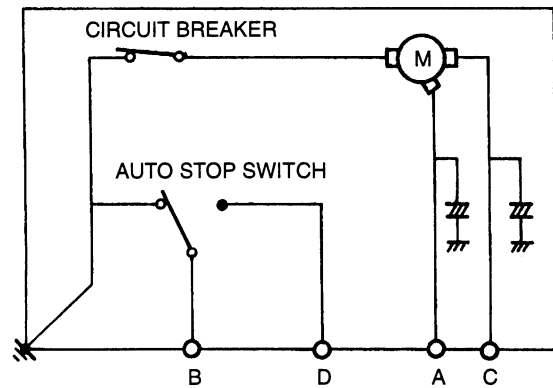
7. Disconnect the windshield wiper motor connector.
8. Check for continuity between the windshield wiper motor terminals by using an ohmmeter.

○—○ : Continuity

Windshield wiper motor position	Terminal			
	A	B	C	Body GND
Park position	○	○	○	○

U5U91905

PARK POSITION



U5U91906

9. Apply battery positive voltage and check the operation of the windshield wiper motor as indicated below.

Terminal	Operation speed
C	Low
A	High

10. If not as specified, replace the necessary parts.

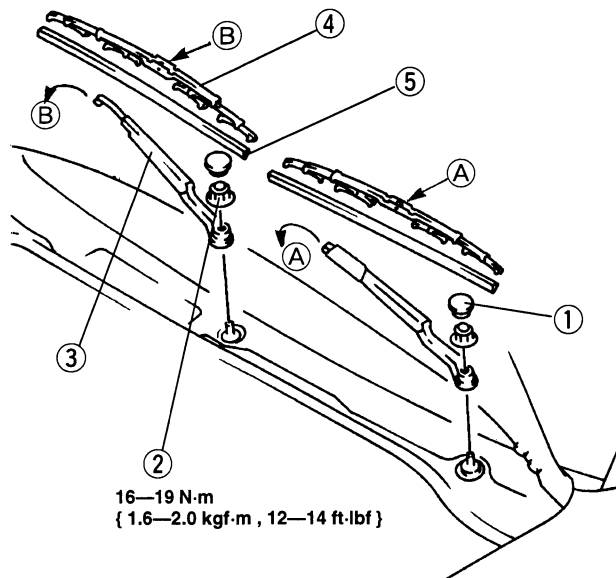
WIPER/WASHER SYSTEMS

WINDSHIELD WIPER ARM AND BLADE REMOVAL / INSTALLATION

U5U919AD

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.

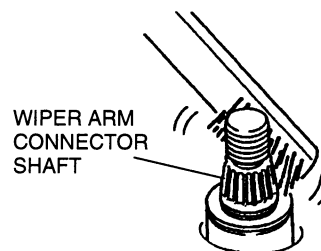
1	Cap
2	Nut
3	Windshield wiper arm ☞ Installation Note
4	Windshield wiper blade
5	Rubber brush



U5U91907

Windshield Wiper Arm Installation Note

- Clean the windshield wiper arm connector shafts by using a wire brush before installing the windshield wiper arms.

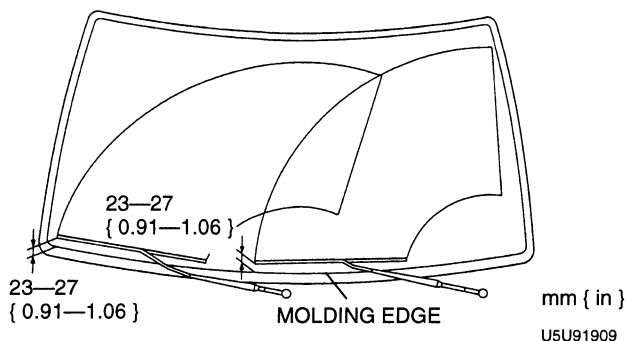


U5U91908

WINDSHIELD WIPER ARM AND BLADE ADJUSTMENT

U5U919AE

1. Operate the windshield wiper motor to set the wipers in the park position.
2. Set the windshield wiper arm height as shown.



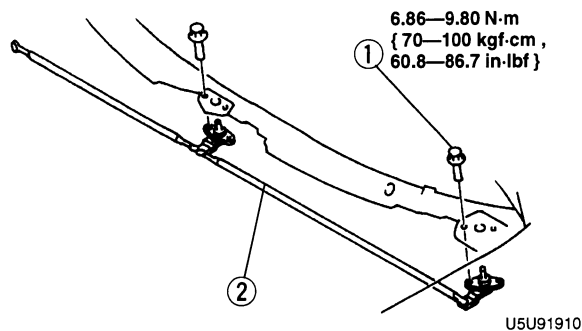
U5U91909

WINDSHIELD WIPER LINK REMOVAL / INSTALLATION

U5U919AF

1. Disconnect the negative battery cable.
2. Remove the windshield wiper arm and blade.
3. Remove the cowl grille.
4. Remove the baffle cover.
5. Pry off the connection between the windshield wiper motor and windshield wiper link.
6. Remove in the order indicated in the table.
7. Install in the reverse order of removal.
8. Connect the windshield wiper link to the windshield wiper motor.
9. Install the baffle cover.
10. Install the cowl grille.
11. Install the windshield wiper arm and blade. (Refer to WINDSHIELD WIPER ARM AND BLADE REMOVAL / INSTALLATION.)
12. Connect the negative battery cable.
13. Adjust the windshield wiper arm and blade.

WIPER/WASHER SYSTEMS



1	Bolt
2	Windshield wiper link

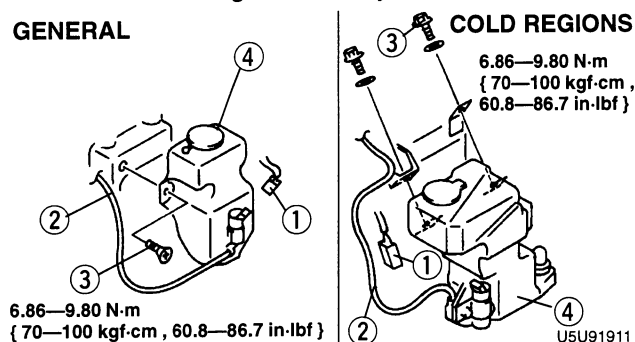
WINDSHIELD WASHER TANK REMOVAL / INSTALLATION

U5U919AG

Without ABS

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.

GENERAL



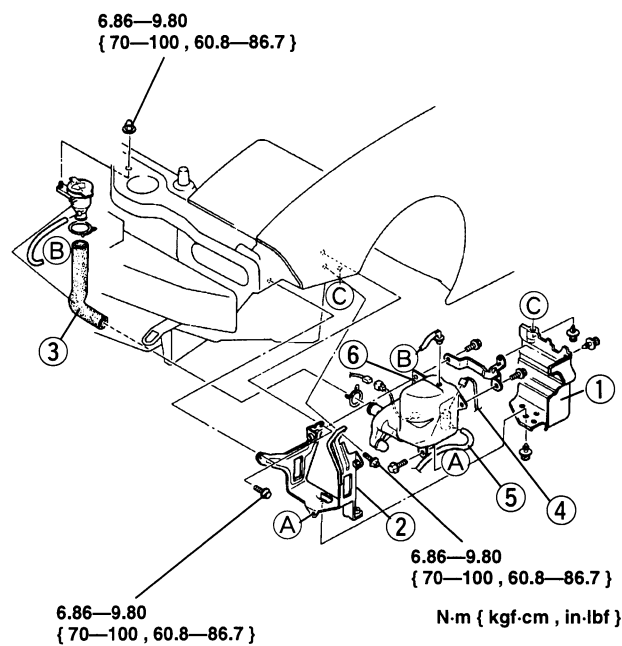
COLD REGIONS

6.86—9.80 N·m
{ 70—100 kgf·cm, 60.8—86.7 in·lbf }

1	Connector
2	Windshield washer pipe
3	Bolt
4	Windshield washer tank

With ABS

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



1	Windshield washer tank cover
2	Windshield washer tank bracket
3	Windshield washer tank hose
4	Connector
5	Windshield washer pipe
6	Windshield washer tank

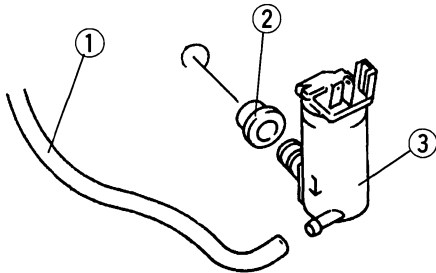
WIPER/WASHER SYSTEMS

WINDSHIELD WASHER MOTOR REMOVAL / INSTALLATION

U5U919AH

1. Disconnect the negative battery cable.
2. Remove the windshield washer tank.
3. Extract the washer fluid.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Install the windshield washer tank.
7. Pour the washer fluid.
8. Connect the negative battery cable.

1	Windshield washer pipe
2	Pump grommet
3	Windshield wahser motor

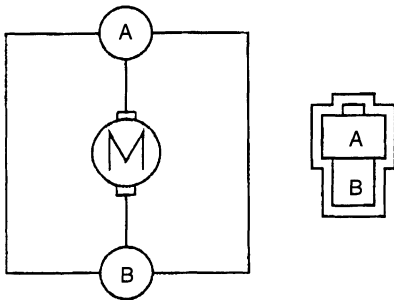


U5U91913

WINDSHIELD WASHER MOTOR INSPECTION

U5U919AJ

1. Disconnect the windshield washer motor connector.
2. Connect battery positive voltage to terminal B and ground to terminal A of the windshield washer motor.
3. Verify that the windshield washer motor operates.
4. If the windshield washer motor does not operate, replace it.



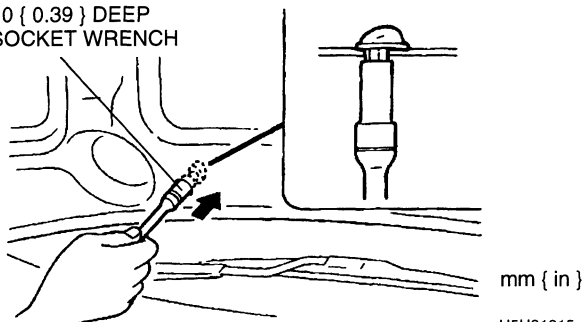
U5U91914

WINDSHIELD WASHER NOZZLE REMOVAL

U5U919AK

1. Disconnect the windshield washer pipe.
2. Remove the windshield washer nozzle by using a **10 mm { 0.39 in }** deep socket wrench from underneath the hood.

10 { 0.39 } DEEP
SOCKET WRENCH

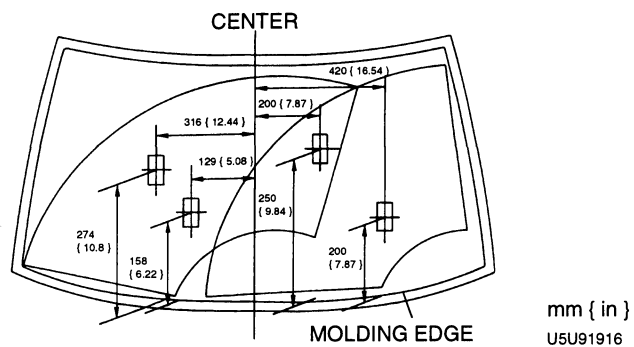


U5U91915

WINDSHIELD WASHER NOZZLE ADJUSTMENT

U5U919AL

- Adjust the windshield washer nozzle direction as shown in the figure by using a needle or equivalent tool.



09-20 ENTERTAINMENT

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ANTI-THEFT SYSTEM

U5U920AA

Alarm Conditions

- If the anti-theft system protection has been activated, any one of the following conditions will trigger the system:
 - (1) Disconnected battery cable
 - (2) Discharged battery
 - (3) Disconnected audio unit connectors
- If the system is triggered, the audio unit will then be inoperative when it is reconnected to a power source, and "CODE" will flash on the display until the preselected code number is input. If the anti-theft system is triggered, follow the procedures in "Canceling Anti-theft operation" to reset the unit.

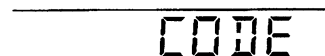
Operation	Reference
Input code number to activate anti-theft system	Setting the Code Number
Delete previous code number and set new number	Canceling the Code Number
Resume audio unit operation after anti-theft system is triggered	Canceling Anti-theft Operation

Setting the Code Number

- Complete each step (steps 1—3) within **10 seconds** or the setting procedure will be canceled.

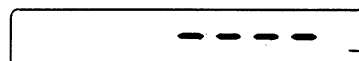
Type 1

1. Turn the ignition switch to ACC and then turn off the audio unit.
2. Press and hold the AUTO-M and SCAN buttons simultaneously for **approximately 1.5 seconds** until "CODE" appears on the display.



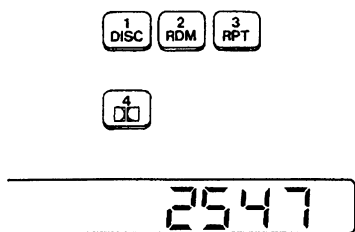
U5U92001

3. Press the AUTO-M and SCAN buttons again until bars appear on the display.
4. Select a personal code number and record it before inputting it. If the number is input and then forgotten, it cannot be canceled, and if the unit is disconnected again, the audio unit will be inoperative.



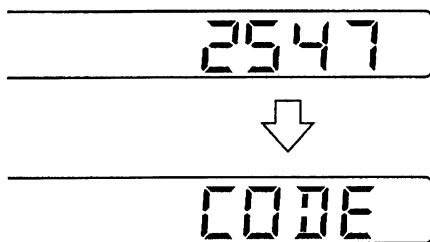
U5U92002

- Use channel buttons 1—4 to input the selected code number. Press button 1 for the first digit, 2 for the seconds, 3 for the third, and 4 for the last digit. Input the number within **10 seconds**. If the display is deleted, repeat the procedure from step 1.



U5U92003

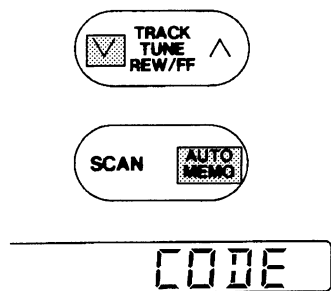
- With the code number displayed, press and hold the AUTO-M and SCAN buttons for **approximately 1.5 seconds** until a beep is heard. "CODE" will flash for **approximately 5 seconds**. After it disappears, the code number is set.
- If "Err" (error) appears on the display, repeat the procedure from step 1. If input error is repeated three times, turn the ignition switch to LOCK and repeat the procedure from step 1.



U5U92004

Type 2

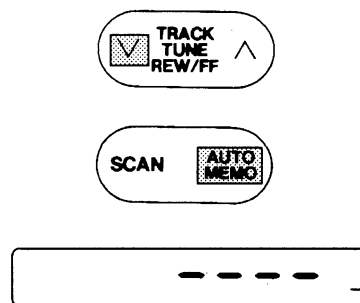
- Turn the ignition switch to ACC and then turn off the audio unit.
- Press and hold the TRACK ∇ and AUTO MEMO buttons simultaneously for **approximately 1.5 seconds** until "CODE" appears on the display.



U5U92005

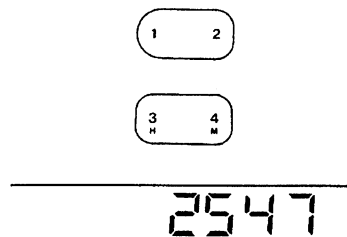
- Press the TRACK ∇ and AUTO MEMO buttons again until bars appear on the display.

- Select a personal code number and record it before inputting it. If the number is input and then forgotten, it cannot be canceled, and if the unit is disconnected again, the audio unit will be inoperative.



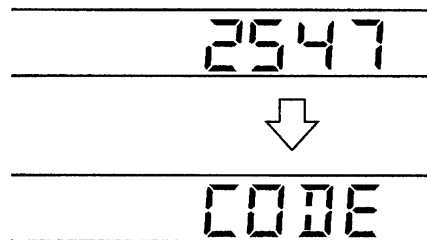
U5U92006

- Use channel buttons 1—4 to input the selected code number. Press button 1 for the first digit, 2 for the second, 3 for the third, and 4 for the last digit. Input the number within **10 seconds**. If the display is deleted, repeat the procedure from step 1.



U5U92007

- With the code number displayed, press and hold the TRACK ∇ and AUTO MEMO buttons for **approximately 1.5 seconds** until a beep is heard. "CODE" will flash for **approximately 5 seconds**. After it disappears, the code number is set.
- If "Err" (error) appears on the display, repeat the procedure from step 1. If input error is repeated three times, turn the ignition switch to LOCK and repeat the procedure from step 1.



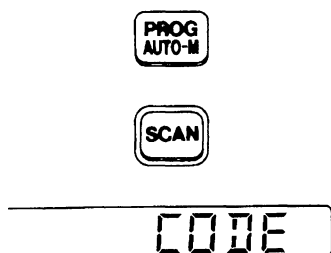
U5U92008

Canceling the Code Number

- Complete each step (steps 1—3) within **10 seconds** or the canceling procedure will be canceled.

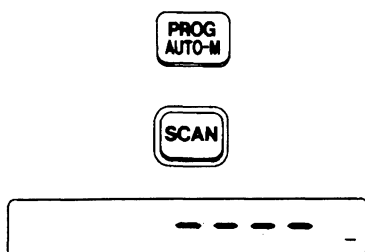
Type 1

1. Turn the ignition switch to ACC and then turn off the audio unit.
2. Press and hold the AUTO-M and SCAN buttons simultaneously for **approximately 1.5 seconds** until "CODE" flashes on the display.



U5U92009

3. Press the AUTO-M and SCAN buttons again until bars appear on the display.

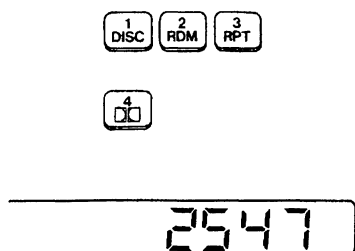


U5U92010

Caution

- Three consecutive errors, including turning the ignition switch to LOCK and disconnecting the audio unit, will activate the anti-theft system and render the audio unit completely inoperative. If this occur, contact your Mazda dealer.

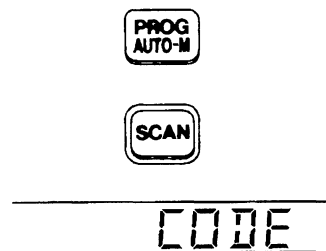
4. Use channel buttons 1—4 to input the current code number. Press button 1 for the first digit, 2 for the second, 3 for the third, and 4 for the last digit. Input the number within **10 seconds**. If the display is deleted, repeat the procedure from step 1.



U5U92011

5. With the code number displayed, press and hold the AUTO-M and SCAN buttons for **approximately 1.5 seconds** until a beep is heard. "CODE" will flash for **approximately 5 seconds**. After it disappears, the code number is canceled.

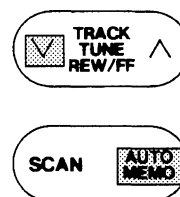
6. If "CODE" appears on the display, the code number is not canceled. Repeat the procedure from step 3. If "Err" (error) appears on the display, repeat the procedure from step 1.



U5U92012

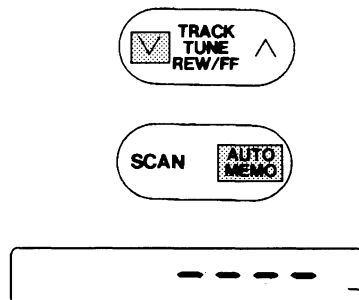
Type 2

1. Turn the ignition switch to ACC and then turn off the audio unit.
2. Press and hold the TRACK V and AUTO MEMO buttons simultaneously for **approximately 1.5 seconds** until "CODE" flashes on the display.



U5U92013

3. Press the TRACK V and AUTO MEMO buttons again until bars appear on the display.

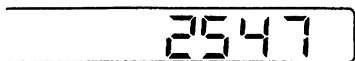
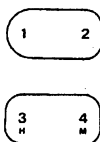


U5U92014

Caution

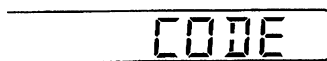
- Three consecutive errors, including turning the ignition switch to LOCK and disconnecting the audio unit, will activate the anti-theft system and render the audio unit completely inoperative. If this occur, contact your Mazda dealer

4. Use channel buttons 1—4 to input the current code number. Press button 1 for the first digit, 2 for the second, 3 for the third, and 4 for the last digit. Input the number within **10 seconds**. If the display is deleted, repeat the procedure from step 1.



U5U92015

5. With the code number displayed, press and hold the TRACK and AUTO MEMO buttons for **approximately 1.5 seconds** until a beep is heard. "CODE" will flash for **approximately 5 seconds**. After it disappears, the code number is canceled.
6. If "CODE" appears on the display, the code number is not canceled. Repeat the procedure from step 3. If "Err" (error) appears on the display, repeat the procedure from step 1.



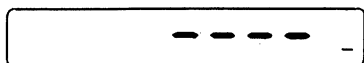
U5U92016

Canceling Anti-theft Operation

- Properly input the selected code number to deactivate the anti-theft system and resume normal audio operation.

Type 1

1. Turn the ignition switch to ACC. ("CODE" will flash on the display.)
2. Press and hold the AUTO-M and SCAN buttons simultaneously until bars appears on the display.



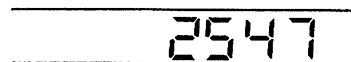
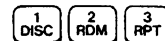
U5U92017

3. Select a personal code number and record it before inputting it. If the number is input and then forgotten, it cannot be canceled, and if the unit is disconnected again, the audio unit will be inoperative.

Caution

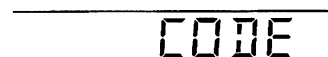
- Three consecutive errors, including turning the ignition switch to LOCK and disconnecting the audio unit, will activate the anti-theft system and render the audio unit completely inoperative. If this occurs, contact your Mazda dealer.

4. Use channel buttons 1—4 to input the selected code number. Press button 1 for the first digit, 2 for the second, 3 for the third, and 4 for the last digit. Input the number within **10 seconds**. If the display is deleted, repeat the procedure from step 1.



U5U92018

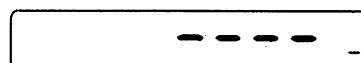
5. With the code number displayed, press and hold the AUTO-M and SCAN buttons for **approximately 1.5 seconds** until a beep is heard. "CODE" will flash for **approximately 15 seconds**. After it disappears, the new code number is set.
6. If "Err" (error) appears on the display, repeat the procedure from step 1.



U5U92019

Type 2

1. Turn the ignition switch to ACC. ("CODE" will flash on the display.)
2. Press and hold the TRACK and AUTO MEMO buttons simultaneously until bars appears on the display.



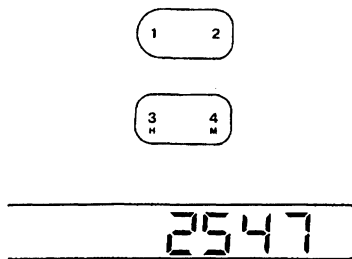
U5U92020

3. Select a personal code number and record it before inputting it. If the number is input and then forgotten, it cannot be canceled, and if the unit is disconnected again, the audio unit will be inoperative.

Caution

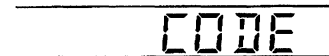
- **Three consecutive errors, including turning the ignition switch to LOCK and disconnecting the audio unit, will activate the anti-theft system and render the audio unit completely inoperative. If this occurs, contact your Mazda dealer.**

4. Use channel buttons 1—4 to input the selected code number. Press button 1 for the first digit, 2 for the second, 3 for the third, and 4 for the last digit. Input the number within **10 seconds**. If the display is deleted, repeat the procedure from step 1.



U5U92021

5. With the code number displayed, press and hold the TRACK V and AUTO MEMO buttons for **approximately 1.5 seconds** until a beep is heard. "CODE" will flash for **approximately 15 seconds**. After it disappears, the new code number is set.
6. If "Err" (error) appears on the display, repeat the procedure from step 1.



U5U92022

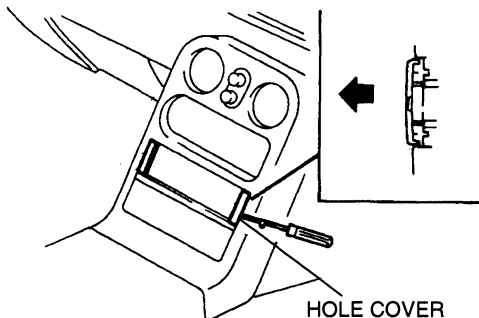
AUDIO UNIT REMOVAL

Type 1

Caution

- **If the anti-theft system has been activated, the audio unit will be inoperative until the preselected code number is input. Select and record a personal code number before removing the audio unit, then cancel the code number after reconnecting it to a power source.**

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 lower panel. Pry up and pull off the hole covers carefully to prevent the posts from breaking off.

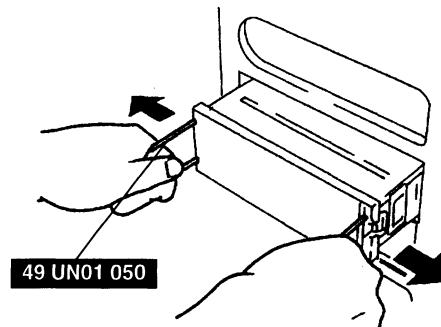


HOLE COVER

U5U92023

3. With the beveled parts of the SST facing inward, insert them into the audio unit.

4. Pull the SST outward and rearward to slide out the audio unit.



U5U92024

5. Disconnect the audio unit connectors and antenna jack to remove the audio unit.

Type 2

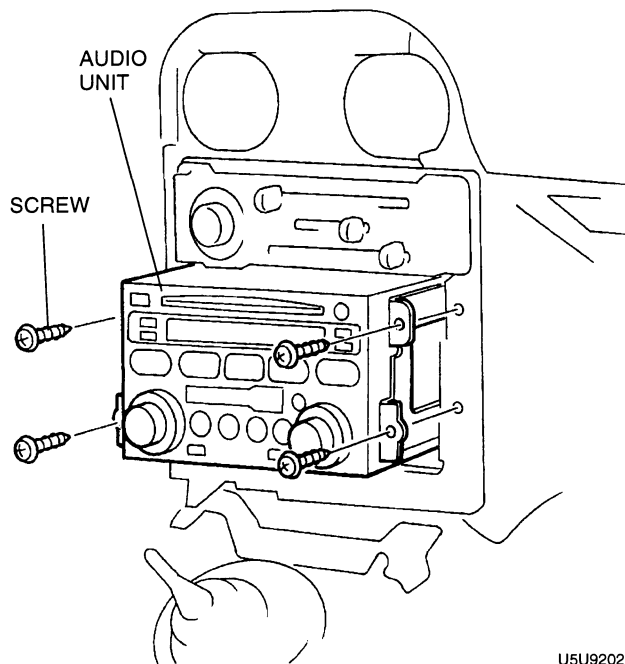
Caution

- **If the anti-theft system has been activated, the audio unit will be inoperative until the preselected code number is input. Select and record a personal code number before removing the audio unit, then cancel the code number after reconnecting it to a power source.**

1. Disconnect the negative battery cable.
2. Remove the rear console.
3. Remove the center louver.

4. Remove the center panel. (Refer to 09–17 CENTER PANEL REMOVAL / INSTALLATION.)
5. Remove the screws to pull out the audio unit.

6. Disconnect the audio unit connectors and antenna jack to remove the audio unit.



U5U92025

AUDIO UNIT INSTALLATION

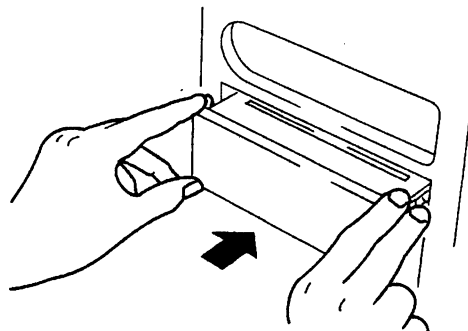
U5U920AC

Type 1

Caution

- Make certain that the wiring harness and antenna feeder are not caught between the audio unit and center panel. If the harness or antenna feeder is caught between the audio unit and center panel, it may become the cause of trouble or malfunctions.

1. Connect the audio unit connectors and antenna jack.
2. Insert the audio unit until each clip clicks.
3. Insert the hole covers.



U5U92026

4. Connect the negative battery cable.

Type 2

Caution

- Make certain that the wiring harness and antenna feeder are not caught between the audio unit and center panel. If the harness or antenna feeder is caught between the audio unit and center panel, it may become the cause of trouble or malfunctions.

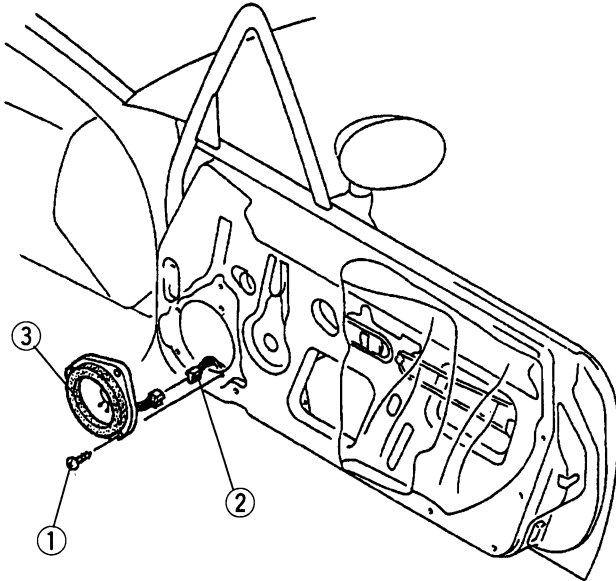
1. Connect the audio unit connectors and antenna jack.
2. Install the screws to install the audio unit.
3. Install the center panel.
4. Install the center louver.
5. Install the rear console.
6. Connect the negative battery cable.

DOOR SPEAKER REMOVAL / INSTALLATION

U5U920AD

Type 1

1. Disconnect the negative battery cable.
2. Remove the door trim.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Install the door trim.
6. Connect the negative battery cable.

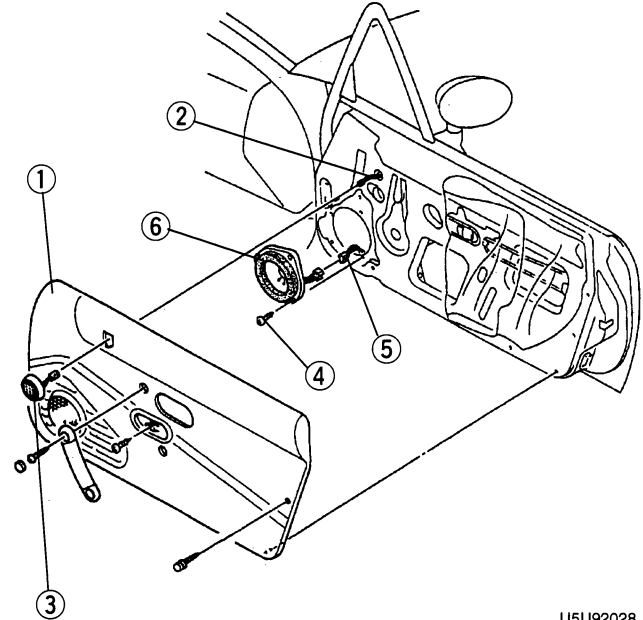


U5U92027

1	Screw
2	Connector
3	Door speaker

Type 2

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.



U5U92028

1	Door trim
2	Connector (tweeter)
3	Door speaker (tweeter)
4	Screw
5	Connector (woofer)
6	Door speaker (woofer)

DOOR SPEAKER INSPECTION

U5U920AE

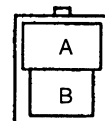
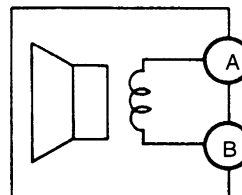
Type 1

1. Remove the door trim.
2. Remove the door speaker.
3. Measure the resistance between the door speaker terminals by using an ohmmeter.

Ω : Resistance

Test condition	Terminal	
	A	B
Constant	○	○ R

R: 2 Ω
U5U92029



U5U92030

4. Touch the leads of an ohmmeter to the speaker terminals and verify that the speaker clicks.

Range
× 1 Ω

5. If not as specified, replace the door speaker.

Type 2

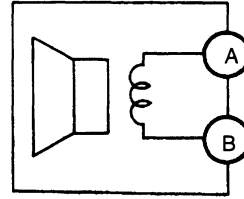
1. Remove the door speaker.
2. Measure the resistance between the door speaker terminals by using an ohmmeter.

○—W—○ : Resistance

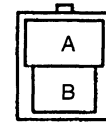
Speaker	Terminal	
	A	B
Tweeter	○—W—○	R ₁
Woofer	○—W—○	R ₂

R₁: 4 Ω R₂: 4 Ω

U5U92031



WOOFER



TWEETER



U5U92032

3. Touch the leads of an ohmmeter to the speaker terminals and verify that the speaker clicks.

Range

× 1 Ω

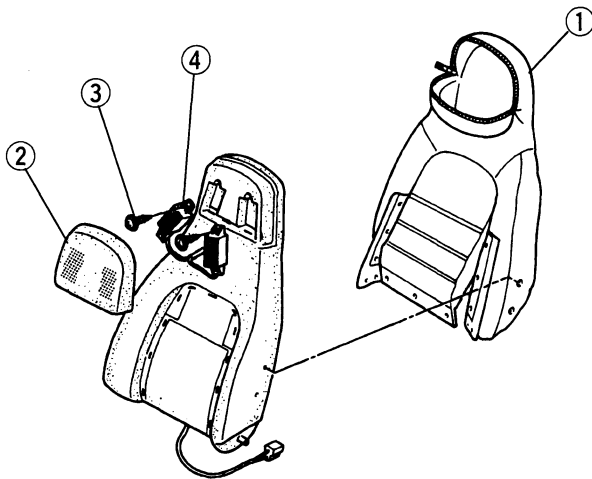
4. If not as specified, replace the door speaker.

HEADREST SPEAKER REMOVAL / INSTALLATION

U5U920AF

Type 1

1. Disconnect the negative battery cable.
2. Remove the seat.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Install the seat.
6. Connect the negative battery cable.

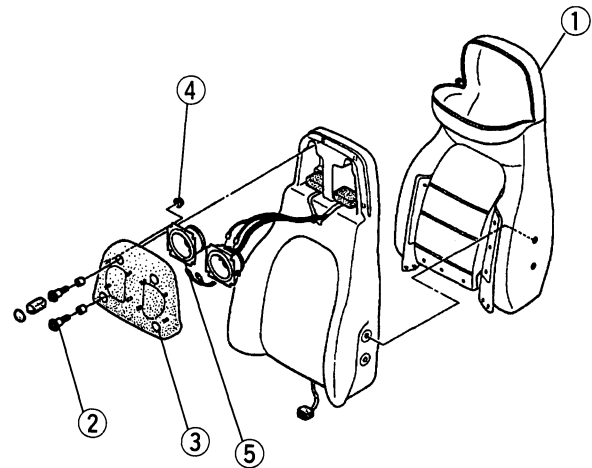


U5U92033

1	Seat back trim
2	Headrest cover
3	Screw
4	Headrest speaker

Type 2

1. Disconnect the negative battery cable.
2. Remove the seat.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Install the seat.
6. Connect the negative battery cable.



U5U92034

1	Seat back trim
2	Screw
3	Headrest cover
4	Nut
5	Headrest speaker

HEADREST SPEAKER INSPECTION

U5U920AG

Type 1

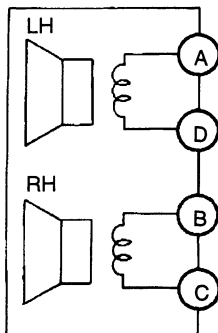
1. Remove the seat.
2. Remove the headrest speaker.
3. Measure the resistance between the headrest speaker terminals by using an ohmmeter.

○—W—○ : Resistance

Speaker	Terminal			
	A	D	B	C
LH	○—W—○			R ₁
RH			○—W—○	R ₂

R₁: 8 Ω R₂: 8 Ω

U5U92035



U5U92036

4. Touch the leads of an ohmmeter to the speaker terminals and verify that the speaker clicks.

Range

×1 Ω

5. If not as specified, replace the headrest speaker.

Type 2

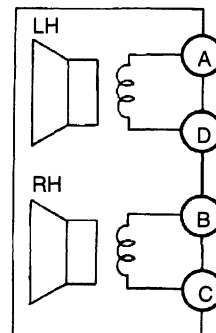
1. Remove the seat.
2. Remove the headrest speaker.
3. Measure the resistance between the headrest speaker terminals by using an ohmmeter.

○—W—○ : Resistance

Speaker	Terminal			
	A	D	B	C
LH	○—W—○			R ₁
RH			○—W—○	R ₂

R₁: 4 Ω R₂: 4 Ω

U5U92037



U5U92038

4. Touch the leads of an ohmmeter to the speaker terminals and verify that the speaker clicks.

Range

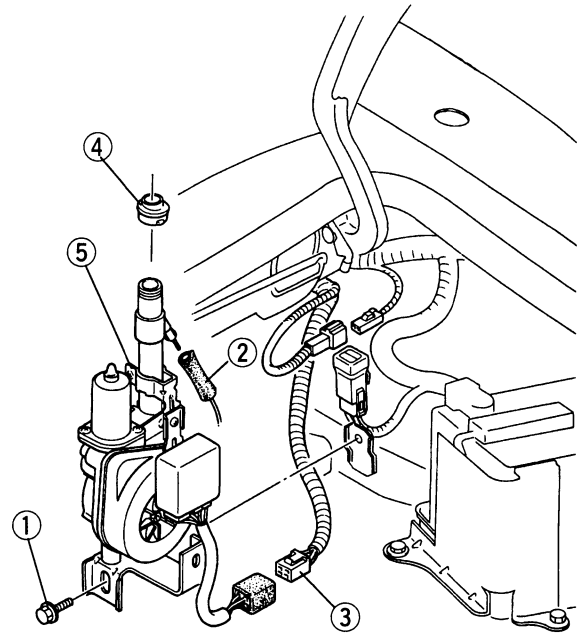
×1 Ω

5. If not as specified, replace the headrest speaker.

POWER ANTENNA REMOVAL / INSTALLATION

U5U920AH

1. Remove the antenna mast. (Refer to 09-20 ANTENNA MAST REMOVAL.)
2. Disconnect the negative battery cable.
3. Remove the trunk side trim.
4. Remove in the order indicated in the table.
5. Install in the reverse order of removal.
6. Install the trunk side trim.
7. Connect the negative battery cable.
8. Install the antenna mast. (Refer to 09-20 ANTENNA MAST INSTALLATION.)



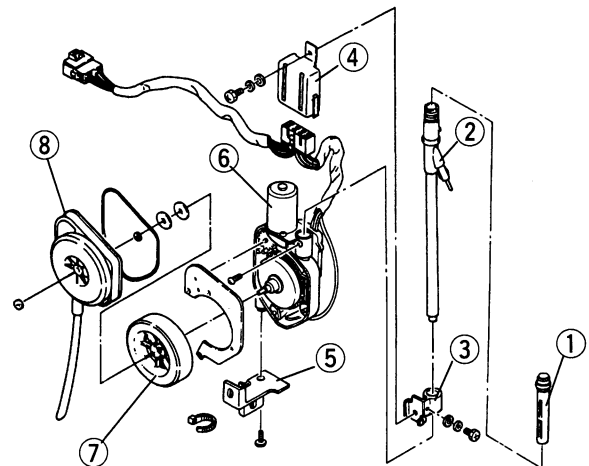
U5U92039

1	Bolt
2	Antenna jack
3	Connector
4	Ground plate
5	Power antenna

POWER ANTENNA DISASSEMBLY / ASSEMBLY

U5U920AJ

1. Remove the antenna mast. (Refer to 09-20 ANTENNA MAST REMOVAL.)
2. Disconnect the negative battery cable.
3. Remove the trunk side trim.
4. Remove the power antenna.
5. Disassemble in the order indicated in the table.
6. Assemble in the reverse order of disassembly.
7. Install the power antenna.
8. Install the trunk side trim.
9. Connect the negative battery cable.
10. Install the antenna mast. (Refer to 09-20 ANTENNA MAST INSTALLATION.)



U5U92040

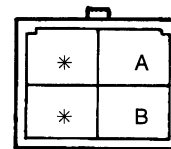
1	Rod insulator
2	Mast assembly
3	Relay bracket
4	Antenna relay
5	Bracket
6	Antenna motor
7	Drive mechanism
8	Drive mechanism cover

POWER ANTENNA INSPECTION

U5U920AK

1. Remove the trunk side trim.
2. Disconnect the power antenna connector.
3. Verify that the power antenna operation is as shown when connecting battery positive voltage to terminals A and B of the power antenna connector and the negative battery cable grounded to the body.

Terminal		Power antenna operation
A	B	
—	B+	Down
B+	B+	Up



U5U92041

4. If not as specified, replace the power antenna.

ANTENNA MAST REMOVAL

U5U920AL

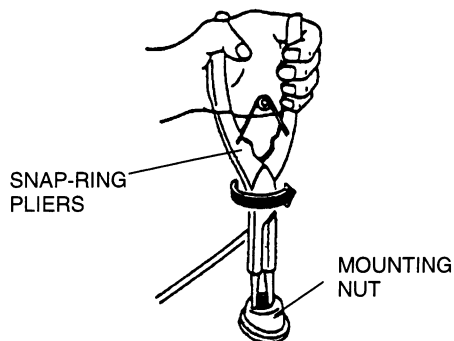
Vehicles Equipped with the Power Antenna

Caution

- Always remove the antenna mast with the power antenna installed in the vehicle. Removing the antenna mast from the removed power antenna may damage the power antenna or antenna mast.

2. Turn the ignition switch to ACC or ON.
3. Turn the audio unit radio switch on.
4. Pull out the antenna mast after it fully extends.

1. Remove the mounting nut by using snap-ring pliers.



U5U92042

ANTENNA MAST INSTALLATION

U5U920AM

Vehicles Equipped with the Power Antenna

1. Turn the ignition switch to ACC or ON.
2. Turn the audio unit radio switch on.
3. Wait until the power antenna operation noise stops, and then insert the antenna mast into the power antenna.
4. Verify that the antenna mast rack fits with the internal gear of the power antenna.
5. Turn the ignition switch to LOCK. The power antenna will operate and retract the antenna mast.

6. After the antenna mast is fully retracted, tighten the mounting nut to the specification.

Tightening torque

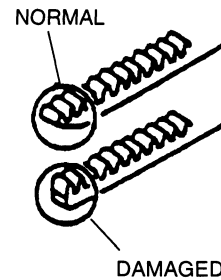
2.5—2.9 N·m { 25—30 kgf·cm , 22—26 in·lbf }

ANTENNA MAST INSPECTION

U5U920AN

Vehicles Equipped with the Power Antenna

1. Remove the antenna mast. (Refer to 09-20 ANTENNA MAST REMOVAL.)
2. Check the rack end for damage or kinks.
3. If the rack end is extremely kinked or damaged, the broken piece may be inside the power antenna. In such a case, replace the power antenna as well as the antenna mast.



U5U92043

MANUAL ANTENNA REMOVAL / INSTALLATION

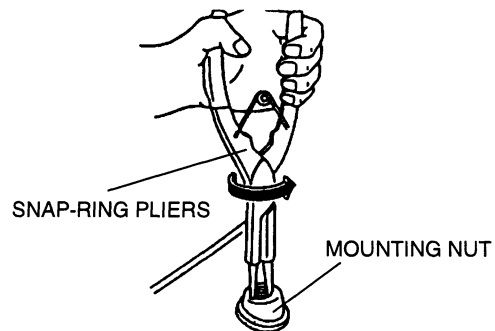
U5U920AP

1. Disconnect the negative battery cable.
2. Remove the trunk side trim.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Install the trunk side trim.
6. Connect the negative battery cable.

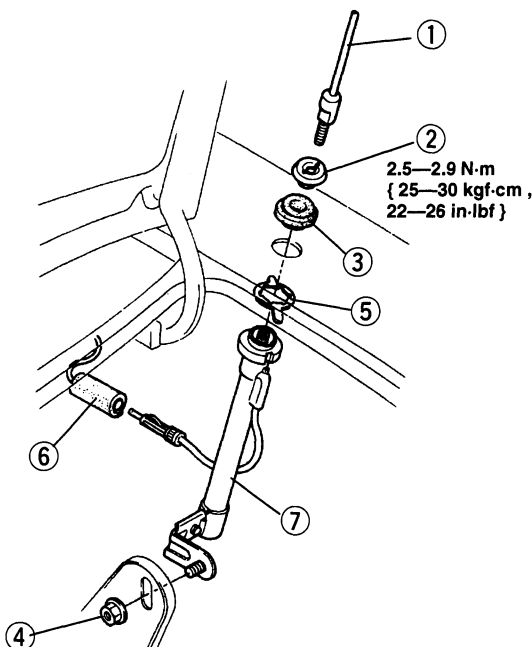
1	Antenna mast
2	Mounting nut ☞ Removal Note
3	Spacer
4	Nut
5	Ground plate
6	Antenna jack
7	Manual antenna

Mounting Nut Removal Note

- Use snap-ring pliers to remove the mounting nut.



U5U92045



U5U92044

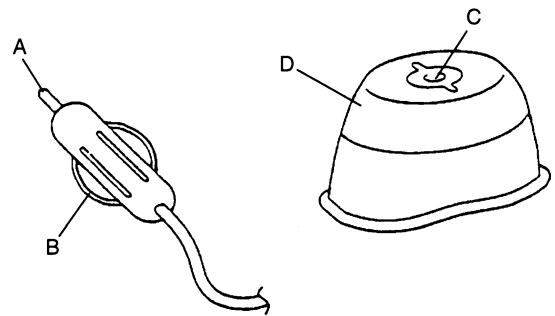
MANUAL ANTENNA INSPECTION

1. Remove the trunk side trim.
2. Disconnect the antenna jack.
3. Verify that there is no continuity between the manual antenna terminals A and B.
4. Check for continuity between the manual antenna terminals by using an ohmmeter.

○—○ : Continuity

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

U5U92046



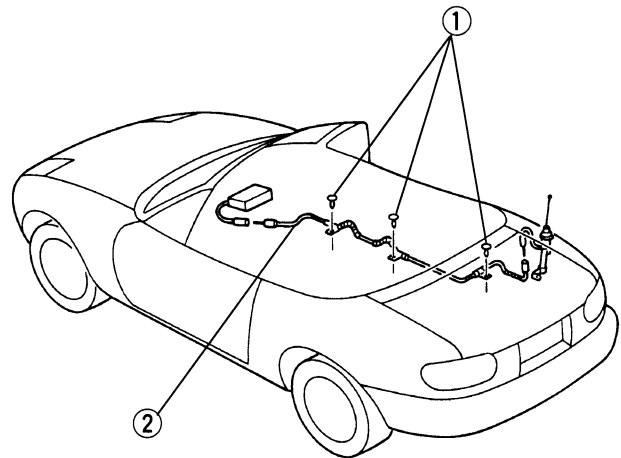
U5U920AQ

U5U92047

5. If not as specified, replace the manual antenna. (Refer to 09-20 MANUAL ANTENNA REMOVAL / INSTALLATION.)

ANTENNA FEEDER REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT, Draining.)
3. Remove the seats.
4. Remove the dashboard. (Refer to 09-17 DASHBOARD REMOVAL / INSTALLATION.)
5. Remove the heater unit.
6. Remove the scuff plates, front side trims, quarter trims, and rear package trim.
7. Remove the seat belts. (Refer to 08-11 SEAT BELT REMOVAL / INSTALLATION.)
8. Remove the cabin carpet.
9. Remove in the order indicated in the table.
10. Install in the reverse order of removal.
11. Install the cabin carpet.
12. Install the seat belts. (Refer to 08-11 SEAT BELT REMOVAL / INSTALLATION.)
13. Install the rear package trim, quarter trims, front side trims, and scuff plates.
14. Install the heater unit.
15. Install the dashboard. (Refer to 09-17 DASHBOARD REMOVAL / INSTALLATION.)
16. Install the seats.
17. Refill the engine coolant. (Refer to 01-12 ENGINE COOLANT REPLACEMENT, Refilling.)
18. Connect the negative battery cable.



U5U920AR

U5U92048

1	Clip
2	Antenna feeder

ANTENNA FEEDER INSPECTION

1. Remove the audio unit. (Refer to AUDIO UNIT REMOVAL.)
2. Remove trunk side trim.
3. Disconnect the antenna jack both side.
4. Verify that there is no continuity between the antenna feeder terminals A and B.
5. Check for continuity between the antenna feeder terminals by using an ohmmeter.

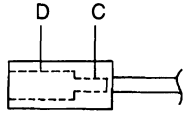
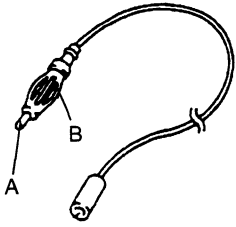
○—○ : Continuity

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

U5U92049

ENTERTAINMENT

6. If not as specified, replace the antenna feeder. (Refer to 09-20 ANTENNA FEEDER REMOVAL / INSTALLATION.)



U5U92050

09-21 POWER SYSTEMS

FUSE SERVICE CAUTION	09-21-1
MAIN FUSE	
REMOVAL / INSTALLATION	09-21-1
ROOM FUSE INSTALLATION	09-21-1

IGNITION SWITCH	
REMOVAL / INSTALLATION	09-21-2
IGNITION SWITCH INSPECTION	09-21-2
KEY REMINDER SWITCH INSPECTION	09-21-2

FUSE SERVICE CAUTION

U5U921AA

Caution

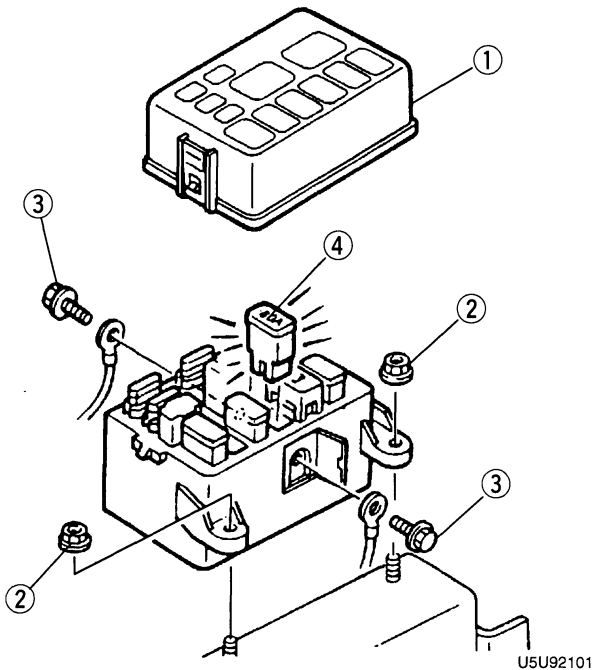
- Determine and correct the cause of the burnt fuse before replacing it. If the fuse is replaced before doing this, it may burn again.

MAIN FUSE REMOVAL / INSTALLATION

U5U921AB

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.

1	Main fuse block cover
2	Nut
3	Bolt
4	MAIN fuse



ROOM FUSE INSTALLATION

U5U921AC

Note

- When the ROOM fuse is burnt or removed, the malfunction indicator lamp illuminates. If the ROOM fuse is replaced or installed with the ignition switch at ON, the malfunction indicator lamp will continue to illuminate.

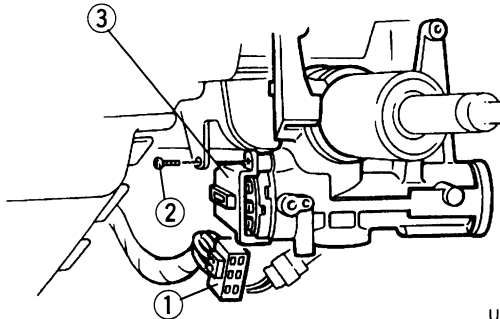
1. Turn the ignition switch to LOCK.
2. Install the ROOM fuse.

IGNITION SWITCH REMOVAL / INSTALLATION

U5U921AD

1. Disconnect the negative battery cable.
2. Remove the column cover.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Install the column cover.
6. Connect the negative battery cable.

1	Connector
2	Screw
3	Ignition switch



U5U92102

IGNITION SWITCH INSPECTION

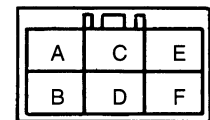
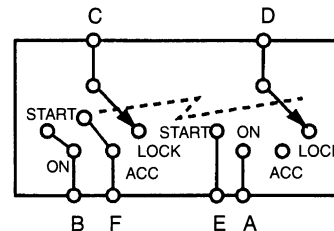
U5U921AE

1. Remove the column cover.
2. Remove the ignition switch.
3. Check for continuity between the ignition switch terminals by using an ohmmeter.

○—○ : Continuity

Key position	Terminal					
	A	B	C	D	E	F
LOCK						
ACC			○—○			○—○
ON	○—○	○—○	○—○	○—○		○—○
START		○—○	○—○	○—○	○—○	

U5U92103



U5U92104

4. If not as specified, replace the ignition switch.

KEY REMINDER SWITCH INSPECTION

U5U921AF

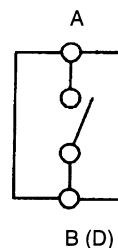
1. Remove the column cover.
2. Disconnect the key reminder switch connector.
3. Check for continuity between the key reminder switch terminals by using an ohmmeter.

○—○ : Continuity

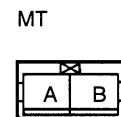
Key condition	Terminal	
	A	B (D)
Key inserted	○—○	○—○
Key removed		

(): AT

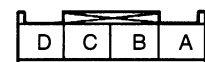
U5U92105



(): AT



AT



U5U92106

4. If not as specified, replace the steering lock. (Refer to 06-10 STEERING WHEEL AND COLUMN REMOVAL / INSTALLATION.)

09-22 INSTRUMENTATION/DRIVER INFO.

INSTRUMENT CLUSTER

REMOVAL / INSTALLATION 09-22-1

INSTRUMENT CLUSTER

DISASSEMBLY / ASSEMBLY 09-22-2

INSTRUMENT CLUSTER INSPECTION . 09-22-2

Speedometer 09-22-2

Tachometer 09-22-3

Vehicle Speed Sensor 09-22-3

Fuel Gauge 09-22-3

Water Temperature Gauge 09-22-4

Oil Pressure Gauge 09-22-4

WARNING AND INDICATOR LIGHT BULB

REPLACEMENT 09-22-5

FUEL GAUGE SENDER UNIT

INSPECTION 09-22-5

WATER TEMPERATURE SENDER UNIT

LOCATION 09-22-6

WATER TEMPERATURE SENDER UNIT

REMOVAL 09-22-6

WATER TEMPERATURE SENDER UNIT

INSTALLATION 09-22-6

WATER TEMPERATURE SENDER UNIT

INSPECTION 09-22-7

OIL PRESSURE SWITCH LOCATION .. 09-22-7

OIL PRESSURE SWITCH INSPECTION 09-22-7

HORN REMOVAL / INSTALLATION 09-22-7

HORN RELAY LOCATION 09-22-8

HORN RELAY INSPECTION 09-22-8

WASHER FLUID-LEVEL SENSOR

REMOVAL / INSTALLATION 09-22-8

WASHER FLUID-LEVEL SENSOR

INSPECTION 09-22-9

WARNING UNIT LOCATION 09-22-9

WARNING UNIT

REMOVAL / INSTALLATION 09-22-9

WARNING UNIT INSPECTION 09-22-10

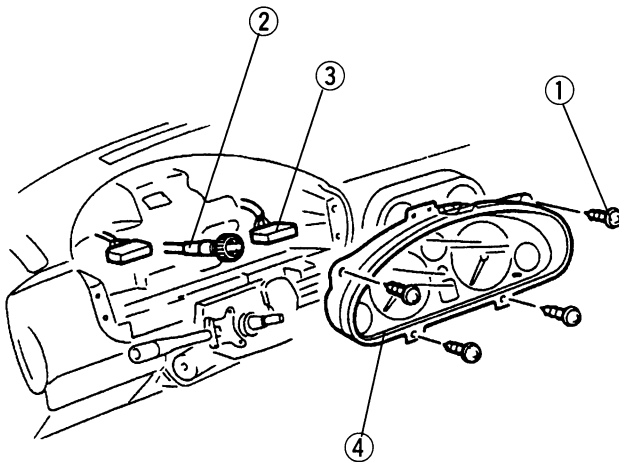
Terminal Voltage List (Reference) 09-22-10

INSTRUMENT CLUSTER REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Remove the meter hood.
3. Remove in the order indicated in the table.
4. Install in the reverse order of removal.
5. Install the meter hood.
6. Connect the negative battery cable.

U5U922AA

1	Screw
2	Speedometer cable
3	Connector
4	Instrument cluster

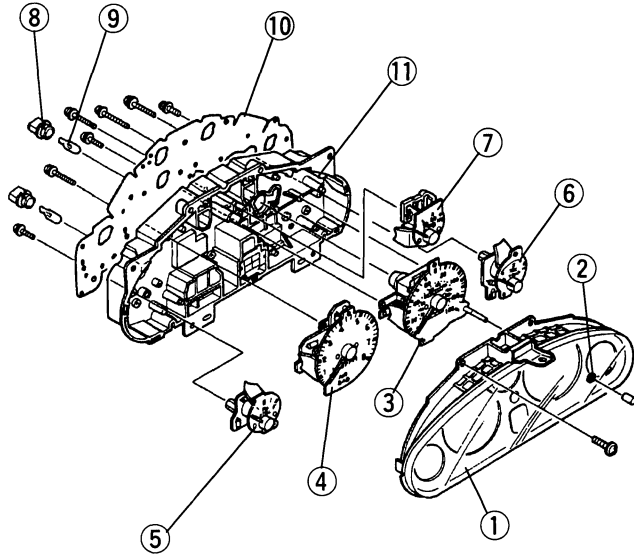


U5U92201

INSTRUMENT CLUSTER DISASSEMBLY / ASSEMBLY

U5U922AB

1. Disconnect the negative battery cable.
2. Remove the meter hood.
3. Remove the instrument cluster.
4. Disassemble in the order indicated in the table.
5. Assemble in the reverse order of disassembly.
6. Install the instrument cluster.
7. Install the meter hood.
8. Connect the negative battery cable.



1	Window plate
2	Knob grommet
3	Speedometer
4	Tachometer
5	Fuel gauge
6	Water temperature gauge
7	Oil pressure gauge
8	Socket
9	Bulb
10	Print plate
11	Case

U5U92202

INSTRUMENT CLUSTER INSPECTION

U5U922AC

Speedometer

1. Adjust the tire air pressure to the specification.
2. Using a speedometer tester, verify that the speedometer indication is within the allowable range shown below.

Indicated for km/h

Speedometer tester indication (km/h)	Allowable range (km/h)
20	18—23
40	36—46
60	54—69
80	72—92
100	90—115
120	108—138
140	126—161
160	144—184
180	162—207

Indicated for mile/h

Speedometer tester indication (mile/h)	Allowable range (mile/h)
20	18—23
30	27—35
40	36—46
50	45—58
60	54—69
70	63—81
80	72—92
90	81—104
100	90—115
110	99—127

3. Verify that fluctuation of the speedometer needle is within the allowable range.

Needle fluctuation allowable range
Within 3.0 km/h { 1.0 mile/h }

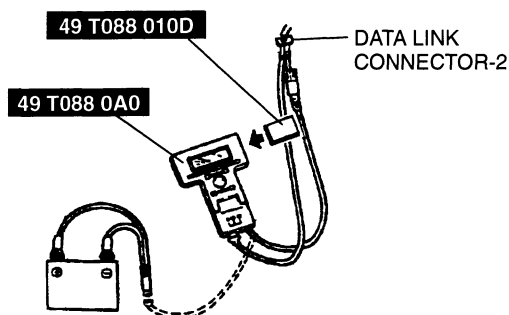
4. If the speedometer needle does not move or if the indication is outside of the allowable range, inspect the speedometer cable, the speedometer driven gear, and the related wiring harness.
5. If the speedometer cable, the speedometer driven gear, and related wiring harness are normal, replace the speedometer.

Tachometer

Caution

- If the engine speed exceeds the allowable range, the engine could be damaged. Therefore, when inspecting the tachometer, do not allow the engine speed to exceed the allowable range indication on the tachometer.

1. Connect the **SSTs** (NGS set) to the data link connector-2, located under the dashboard on the driver's side, and to the battery.



U5U92231

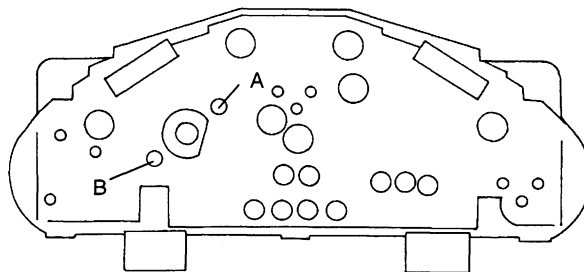
2. Select "VEHICLE & ENGINE SELECTION" and press TRIGGER. (Select the model and specifications of the vehicle you are testing.)
3. Select "PID/DATA MONITOR AND RECORD" and press TRIGGER.
4. Select "PCM—POWERTRAIN CTRL MODULE" and press TRIGGER.
5. Select "RPM" and press TRIGGER.
6. Press START.
7. Verify that the tachometer indication is within the allowable range as shown below.

Tester indication (rpm)	Allowable range (rpm)
1,000	880—1,060
2,000	1,970—2,150
3,000	3,000—3,180
4,000	4,000—4,240
5,000	5,000—5,300
6,000	6,000—6,360

8. If the tachometer needle does not move or if the indication is outside of the allowable range, inspect the engine speed signal transmitter (ECM) and the related wiring harness.
9. If the engine speed signal transmitter (ECM) and the related wiring harness are normal, replace the tachometer.

Vehicle Speed Sensor

1. Remove the meter hood.
2. Remove the instrument cluster.
3. Loosen the screws for the A and B terminals.



U5U92230

Note

- If the screw is loosened excessively, it will disengage from the speedometer, and you will not be able to measure the resistance properly.

4. Connect an ohmmeter between terminals A and B of the speedometer.
5. Verify that the ohmmeter needle pulsates while rotating the speedometer shaft with a screwdriver.

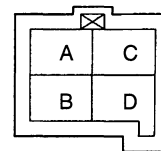
Pulsation

4/shaft rotation

6. If not as specified, replace the speedometer.

Fuel Gauge

1. Remove the rear seat cushion.
2. Remove the fuel pump cover.
3. Disconnect the fuel gauge sender unit connector.
4. Turn the ignition switch to ON and wait for **4 minutes**.
5. Verify that the needle indicates E.
6. Ground the terminal A of the fuel gauge sender unit's vehicle side connector and wait for **4 minutes**.



U5U92203

7. Verify that the needle indicates F.
8. If the fuel gauge needle does not move or moves unusually, remove the instrument cluster.
9. Loosen the screws for the A, B, and C terminals.

Note

- If the screw is loosened excessively, it will disengage from the fuel gauge, and you will not be able to measure the resistance properly.

INSTRUMENTATION/DRIVER INFO.

10. Measure the resistance between the fuel gauge terminals by using an ohmmeter.

○—Ω—○ : Resistance

Step	Terminal		
	A	B	C
1	○—Ω—○ : R ₁		
2		○—Ω—○ : R ₂	
3	○—Ω—○ : R ₃		

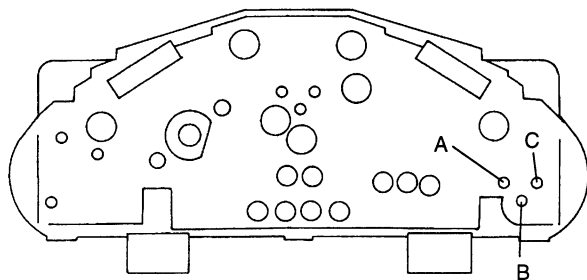
General

R₁: 105—129 Ω R₂: 95—116 Ω R₃: 59—72 Ω

Cold regions

R₁: 58—71 Ω R₂: 73—90 Ω R₃: 53—65 Ω

U5U92204

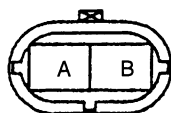


U5U92205

11. If not as specified, replace the fuel gauge.

Water Temperature Gauge

1. Disconnect the engine coolant temperature sensor connector.
2. Verify that the needle indicates L when the ignition switch is turned to ON.
3. Verify that the needle indicates H when the terminal B of the engine coolant temperature sensor's vehicle side connector is grounded.



U5U92206

4. If the water temperature gauge needle does not move or moves unusually, remove the instrument cluster.
5. Loosen the screws for the A, B, and C terminals.

Note

- If the screw is loosened excessively, it will disengage from the water temperature gauge, and you will not be able to measure the resistance properly.

6. Measure the resistance between the water temperature gauge terminals by using an ohmmeter.

○—Ω—○ : Resistance

Step	Terminal		
	A	B	C
1	○—Ω—○ : R ₁		
2		○—Ω—○ : R ₂	
3	○—Ω—○ : R ₃		

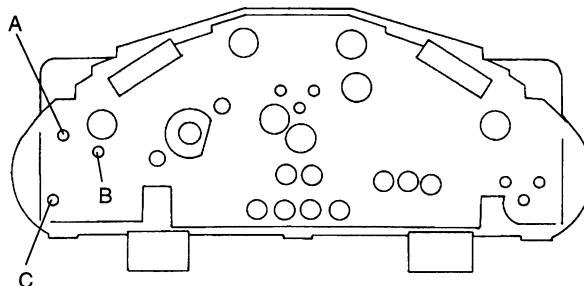
General

R₁: 105—129 Ω R₂: 179—219 Ω R₃: 78—86 Ω

Cold regions

R₁: 58—71 Ω R₂: 132—161 Ω R₃: 78—86 Ω

U5U92207



U5U92208

7. If not as specified, replace the water temperature gauge.

Oil Pressure Gauge

1. Disconnect the oil pressure switch connector.
2. Verify that the needle indicates L when the ignition switch is turned to ON.
3. Verify that the needle indicates H when the oil pressure switch vehicle side connector is grounded.
4. If the oil pressure gauge needle does not move or moves unusually, remove the instrument cluster.
5. Loosen the screws for the A, B, and C terminals.

Note

- If the screw is loosened excessively, it will disengage from the oil pressure gauge, and you will not be able to measure the resistance properly.

6. Measure the resistance between the oil pressure gauge terminals by using an ohmmeter.

○—Ω—○ : Resistance

Step	Terminal		
	A	B	C
1	○—Ω—○ : R ₁		
2		○—Ω—○ : R ₂	
3	○—Ω—○ : R ₃		

General

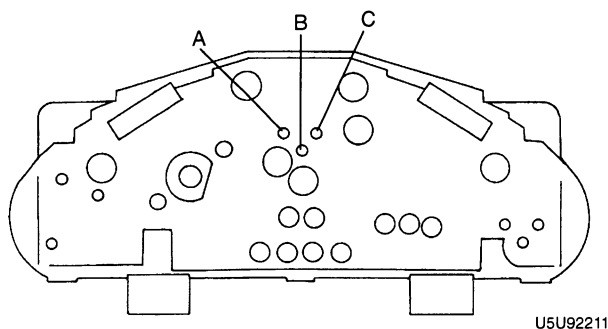
R₁: 105—129 Ω R₂: 69—85 Ω R₃: 86—105 Ω

Cold regions

R₁: 58—71 Ω R₂: 61—74 Ω R₃: 70—86 Ω

U5U92210

7. If not as specified, replace the oil pressure gauge.

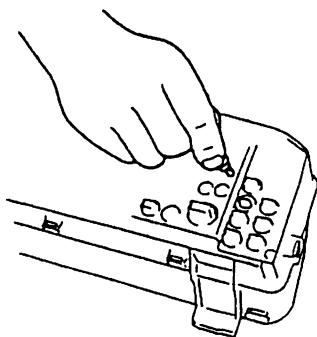


WARNING AND INDICATOR LIGHT BULB REPLACEMENT

U5U922AD

1. Disconnect the negative battery cable.
2. Remove the meter hood.
3. Remove the instrument cluster.
4. Turn the socket counterclockwise to remove the bulb as shown in the figure.

5. Install in the reverse order of removal.

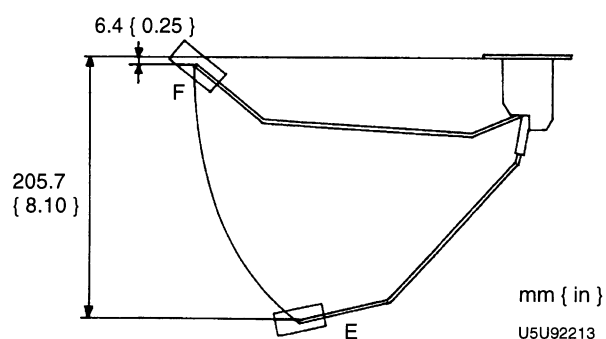


FUEL GAUGE SENDER UNIT INSPECTION

U5U922AE

1. Remove the rear pump cover.
2. Remove the service hole cover.
3. Remove the fuel pump. (Refer to 01-14 FUEL TANK REMOVAL / INSTALLATION.)
4. Using an ohmmeter, measure and verify that the resistance between the unit terminals is as shown in the following chart while slowly moving the unit arm from point E to point F.

Measuring point	Resistance (Ω)
F	3
E	110

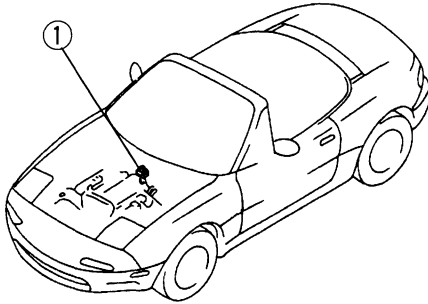


5. If not as specified, replace the fuel gauge sender unit. (Refer to 01-14 FUEL PUMP DISASSEMBLY / ASSEMBLY.)

INSTRUMENTATION/DRIVER INFO.

WATER TEMPERATURE SENDER UNIT LOCATION

U5U922AF



U5U92214

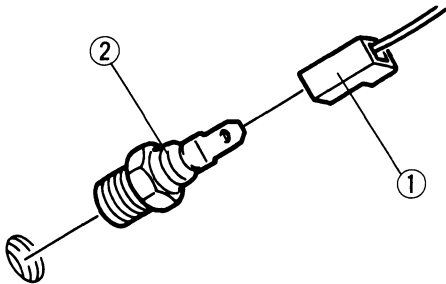
1	Water temperature sender unit
---	-------------------------------

WATER TEMPERATURE SENDER UNIT REMOVAL

U5U922AG

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.

1	Connector
2	Water temperature sender unit

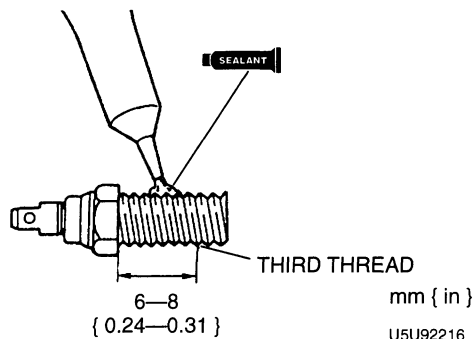


U5U92215

WATER TEMPERATURE SENDER UNIT INSTALLATION

U5U922AH

1. Apply sealant from the third thread to the top thread.
2. Install the water temperature sender unit.



U5U92216

Tightening torque

6.3—9.3 N·m { 64—95 kgf·cm , 56—82 in·lbf }

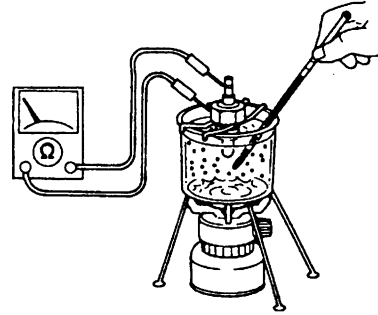
3. Connect the water temperature sender unit connector.
4. Connect the negative battery cable.

WATER TEMPERATURE SENDER UNIT INSPECTION

U5U922AJ

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 the terminal of the sender unit and the sender unit body is as shown below.

Water temperature °C { °F }	Resistance (Ω)
50 { 122 }	189—260

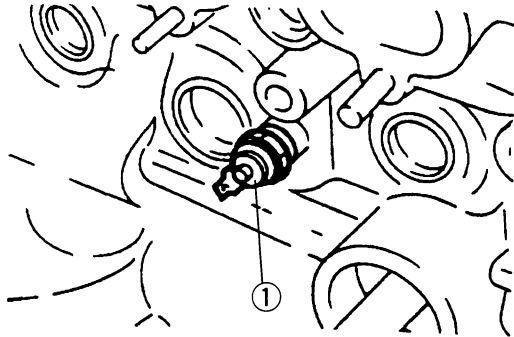


U5U92217

5. If not as specified, replace the water temperature sender unit.

OIL PRESSURE SWITCH LOCATION

U5U922AK



U5U92218

1	Oil pressure switch
---	---------------------

OIL PRESSURE SWITCH INSPECTION

U5U922AL

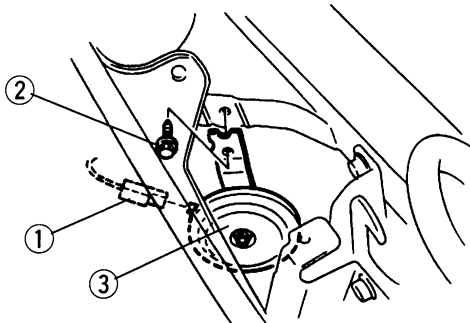
1. Verify that the oil pressure warning light illuminates when the ignition switch is turned to ON.
2. If the oil pressure warning light does not illuminate, inspect the oil pressure warning light bulb and related wiring harness.
3. If the oil pressure warning light bulb and related wiring harness are normal, replace the oil pressure switch.
4. Verify that the oil pressure warning light goes off when the engine is started.
5. If the oil pressure warning light remains illuminated, inspect the oil pressure and related wiring harness. (Refer to 01-11 OIL PRESSURE INSPECTION.)
6. If the oil pressure and related wiring harness are normal, replace the oil pressure switch.

HORN REMOVAL / INSTALLATION

U5U922AM

1. Disconnect the negative battery cable.
2. Remove in the order indicated in the table.
3. Install in the reverse order of removal.
4. Connect the negative battery cable.

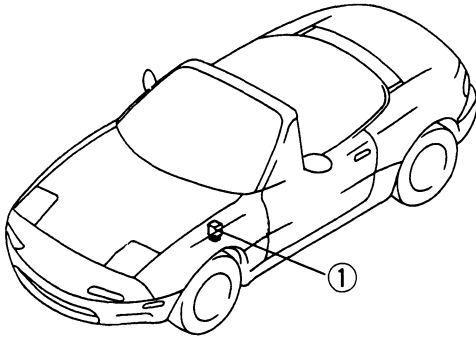
1	Connector
2	Bolt
3	Horn



U5U92220

HORN RELAY LOCATION

U5U922AN



U5U92219

1	Horn relay
---	------------

HORN RELAY INSPECTION

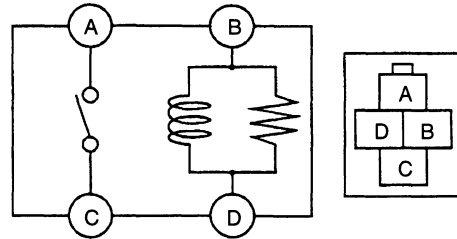
U5U922AP

1. Remove the passenger's side front scuff plate.
2. Remove the passenger's side front side trim.
3. Remove the horn relay.
4. Check for continuity between the horn relay terminals by using an ohmmeter.

○—○ : Continuity

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

U5U92221



U5U92222

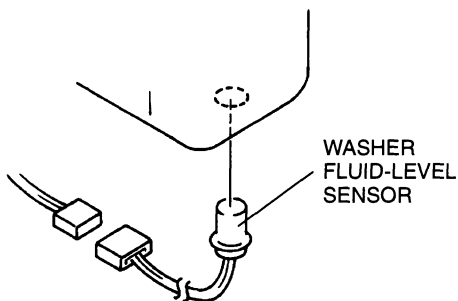
5. If not as specified, replace the horn relay.

WASHER FLUID-LEVEL SENSOR REMOVAL / INSTALLATION

U5U922AQ

1. Disconnect the negative battery cable.
2. Remove the windshield washer tank.
3. Disconnect the washer fluid-level sensor connector.
4. Remove the washer fluid-level sensor.

5. Install in the reverse order of removal.



U5U92223

WASHER FLUID-LEVEL SENSOR INSPECTION

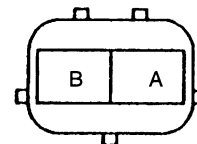
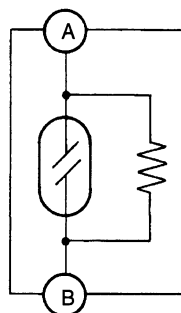
U5U922AR

1. Disconnect the washer fluid-level sensor connector.
2. Check for continuity between the washer fluid-level sensor terminals by using an ohmmeter.

○—○ : Continuity

Float level	Terminal	
	A	B
Below MIN	○—○	○—○
Above MIN		

U5U92224

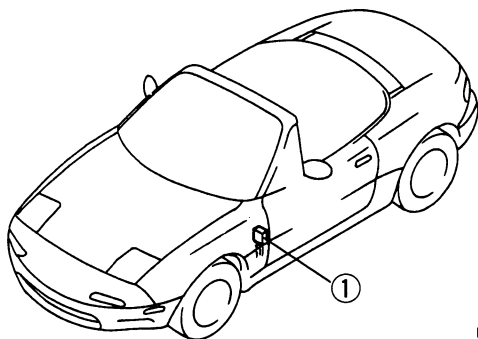


U5U9225

3. If not as specified, replace the washer fluid-level sensor.

WARNING UNIT LOCATION

U5U922AU



U5U92232

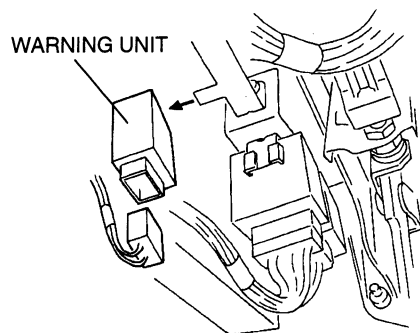
1	Warning unit
---	--------------

WARNING UNIT REMOVAL / INSTALLATION

U5U922AS

1. Disconnect the negative battery cable.
2. Disconnect the warning unit connector.
3. Remove the warning unit.

4. Install in the reverse order of removal.



U5U9226

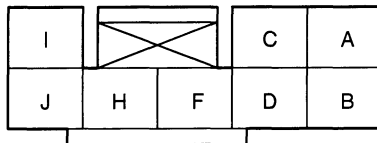
INSTRUMENTATION/DRIVER INFO.

WARNING UNIT INSPECTION

U5U922AT

1. Measure the voltage at the warning unit terminals as indicated below.
2. Disconnect the warning unit connector before checking for continuity at terminal C and J.
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 warning unit.

Terminal Voltage List (Reference)



U5U9227

Terminal	Signal	Connection	Test condition		Voltage (V)/ Continuity	Inspection area
A	—	Not used	—		—	—
B	—	Not used	—		—	—
C	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	
D	Seat belt warning input	Buckle switch	Ignition switch at ON	Seat belt buckled	B+	Buckle switch
				Other	0	
F	Seat belt warning output	Instrument cluster (seat belt warning light)	Ignition switch at ON	Seat belt buckled	B+	Instrument cluster
				Other	0	
H	Key inserted	Key reminder switch	Ignition key inserted		B+	Key reminder switch
I	IG1	METER 15 A fuse	Ignition switch at ON		B+	Ignition switch
J	GND	GND	Constant: Check for continuity to ground		Yes	Wiring harness (Warning unit — GND)

09-50 TECHNICAL DATA

09 BODY & ACCESSORIES 09-50-1

09 BODY & ACCESSORIES

U5U950AA

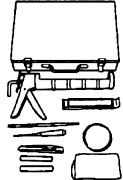
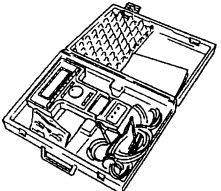
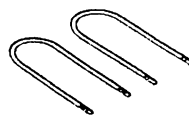
Item		Specification (W) × number
LIGHTING SYSTEMS		
Exterior lights	Headlight	60/40 × 2
	Front turn light/parking light	27/8 × 2
	Front side marker light	3.8 × 2
	Rear side marker light	3.8 × 2
	Rear turn light	27 × 2
	Brake light/taillight	27/8 × 2
	Back-up light	27 × 2
	High-mount brake light	18.4 × 1
	Licence plate light	7.5 × 2
Interior lights	Interior light	8 × 1
	Trunk compartment light	3.8 × 1
	Instrument cluster illumination	3.4 × 4
INSTRUMENTATION/DRIVER INFO.		
Warning and indicator lights	ABS warning light	1.4 × 1
	Air bag system warning light	2 × 1
	Brake system warning light	1.4 × 1
	Generator warning light	1.4 × 1
	High beam indicator light	3.4 × 1
	HOLD indicator light	1.4 × 1
	Malfunction indicator lamp	1.4 × 1
	Rear window defroster indicator light	1.4 × 1
	Retractor indicator light	1.4 × 1
	Seat belt warning light	1.4 × 1
	Turn indicator light	3.4 × 2
	Washer fluid-level warning light	1.4 × 1

09-60 SERVICE TOOLS

09 BODY & ACCESSORIES SST 09-60-1

09 BODY & ACCESSORIES SST

U5U960AA

49 0305 870A Tool set, window  0305870A	49 G050 1A0 Remover, sealant  G0501A0X	49 T088 0A0 NGS set  T0880A0X
49 T088 010D Program Card  T088010D	49 UN01 050 Removing tool  UN01050X	

