

GENERAL INFORMATION

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SECTION

00-00

GENERAL INFORMATION . . . 00-00

00-00 GENERAL INFORMATION

HOW TO USE THIS MANUAL	00-00-1	Dynamometer	00-00-16
Range of Topics	00-00-1	INSTALLATION OF RADIO SYSTEM	00-00-16
Service Procedure	00-00-2	ELECTRICAL SYSTEM	00-00-16
Symbols	00-00-3	Electrical Parts	00-00-16
Advisory Messages	00-00-4	Wiring Harness	00-00-17
Troubleshooting Procedure	00-00-5	Connectors	00-00-17
Procedures for Use	00-00-6	Terminals	00-00-18
UNITS	00-00-11	Sensors, Switches, and Relays	00-00-19
Conversion to SI Units (Système International d'Unités)	00-00-11	Wiring Harness	00-00-19
Rounding Off	00-00-11	Fuse	00-00-19
Upper and Lower Limits	00-00-11	Electrical Troubleshooting Tools	00-00-20
FUNDAMENTAL PROCEDURES	00-00-11	Precautions Before Welding	00-00-20
Protection of the Vehicle	00-00-11	JACKING POSITIONS	00-00-21
Preparation of Tools and Measuring Equipment	00-00-12	Front	00-00-21
Special Service Tools	00-00-12	Rear	00-00-21
Oil Leakage Inspection	00-00-12	VEHICLE LIFT (2 SUPPORTS) AND SAFETY	
Disconnection of the Negative Battery Cable	00-00-13	STAND (RIGID RACK) POSITION	00-00-22
Removal of Parts	00-00-13	Vehicle Lift Positions	00-00-22
Disassembly	00-00-13	Safety Stand Positions	00-00-22
Inspection During Removal, Disassembly	00-00-13	TOWING	00-00-22
Arrangement of Parts	00-00-14	Tiedown Hooks	00-00-23
Cleaning of Parts	00-00-14	IDENTIFICATION NUMBER LOCATIONS 00-00-24	
Reassembly	00-00-14	Vehicle Identification Number (VIN)	00-00-24
Adjustment	00-00-15	Chassis Number	00-00-24
Rubber Parts and Tubing	00-00-15	Engine Identification Number	00-00-24
Hose Clamps	00-00-15	SAE STANDARDS	00-00-25
Torque Formulas	00-00-15	ABBREVIATIONS	00-00-26
Vise	00-00-16	PRE-DELIVERY INSPECTION	00-00-27
		Pre-Delivery Inspection Table	00-00-27
		SCHEDULED MAINTENANCE	00-00-29
		Scheduled Maintenance Table	00-00-29

HOW TO USE THIS MANUAL

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Range of Topics

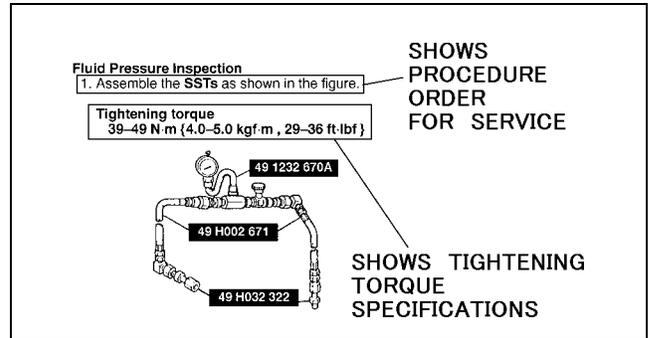
- This manual contains procedures for performing all required service operations. The procedures are divided into the following five basic operations:
 - Removal/Installation
 - Disassembly/Assembly
 - Replacement
 - Inspection
 - Adjustment
- Simple operations which can be performed easily just by looking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

GENERAL INFORMATION

Service Procedure

Inspection, adjustment

- Inspection and adjustment procedures are divided into steps. Important points regarding the location and contents of the procedures are explained in detail and shown in the illustrations.



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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 removal/installation procedures that 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 requiring the use of special service tools or equivalent are also shown.
3. Procedure steps 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 additional information concerning a procedure. Refer to this information when servicing the related part.

SHOWS SERVICE ITEM(S)

Procedure

FRONT UPPER LINK, FRONT UPPER LEADING LINK REMOVAL/INSTALLATION

"Removal/Installation" Portion

1. Jack up the front of the vehicle and support it with safety stands.
2. Remove the splash shield(s).
(See 09-11-11 SPLASH SHIELD INSTALLATION.)
3. Remove in the order indicated in the table.
4. Install reverse order of removal.

"Inspection After Installation" Portion

5. Inspect the front wheel alignment and adjust it if necessary.

INDICATES RELEVANT REFERENCES THAT NEED TO BE FOLLOWED DURING INSTALLATION

SHOWS SPECIAL SERVICE TOOL (SST) FOR SERVICE OPERATION

SHOWS APPLICATION POINTS OF GREASE, ETC.

SHOWS EXPENDABLE PARTS

SHOWS DETAILS

SHOWS TIGHTENING TORQUE SPECIFICATIONS

INSTALL THE PARTS BY PERFORMING STEPS 1-3 IN REVERSE ORDER

SHOWS PROCEDURE ORDER FOR SERVICE

SHOWS REFERRAL NOTES FOR SERVICE

1	Split pin	5	Adjust cam bolt
2	Nut	6	Upper lateral link
3	Upper lateral link ball joint	7	Dust boot, clip (upper lateral link)
(See 02-13-6 Upper Lateral Link Ball Joint Removal Note)		8	Split pin
4	Cam nut, cam plate	9	Nut
		10	Upper leading link ball joint
		11	Upper leading link
		12	Dust boot (upper leading link)

SHOWS REFERRAL NOTES FOR SERVICE

Upper Lateral Link Ball Joint Removal Note

- Remove the ball joint using the SSTs.

SHOWS SPECIAL SERVICE TOOL (SST) NO.

49 T028 303

49 T028 304 UPPER LEADING LINK

49 T028 305 UPPER LATERAL LINK

SHOWS TIGHTENING TORQUE UNITS

N·m (kgf·m, ft·lbf)

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Symbols

- There are eight symbols indicating oil, grease, fluids, sealant, and the use of **SST** or equivalent. use. These symbols show application points or use of these materials during service.

Symbol	Meaning	Kind
	Apply oil	New appropriate engine oil or gear oil

GENERAL INFORMATION

Symbol	Meaning	Kind
	Apply brake fluid	New appropriate brake fluid
	Apply automatic transaxle/ transmission fluid	New appropriate automatic transaxle/ transmission fluid
	Apply grease	Appropriate grease
	Apply sealant	Appropriate sealant
	Apply petroleum jelly	Appropriate petroleum jelly
	Replace part	O-ring, gasket, etc.
	Use SST or equivalent	Appropriate tools

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 or parts 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 indicate the allowable range when performing inspections or adjustments.

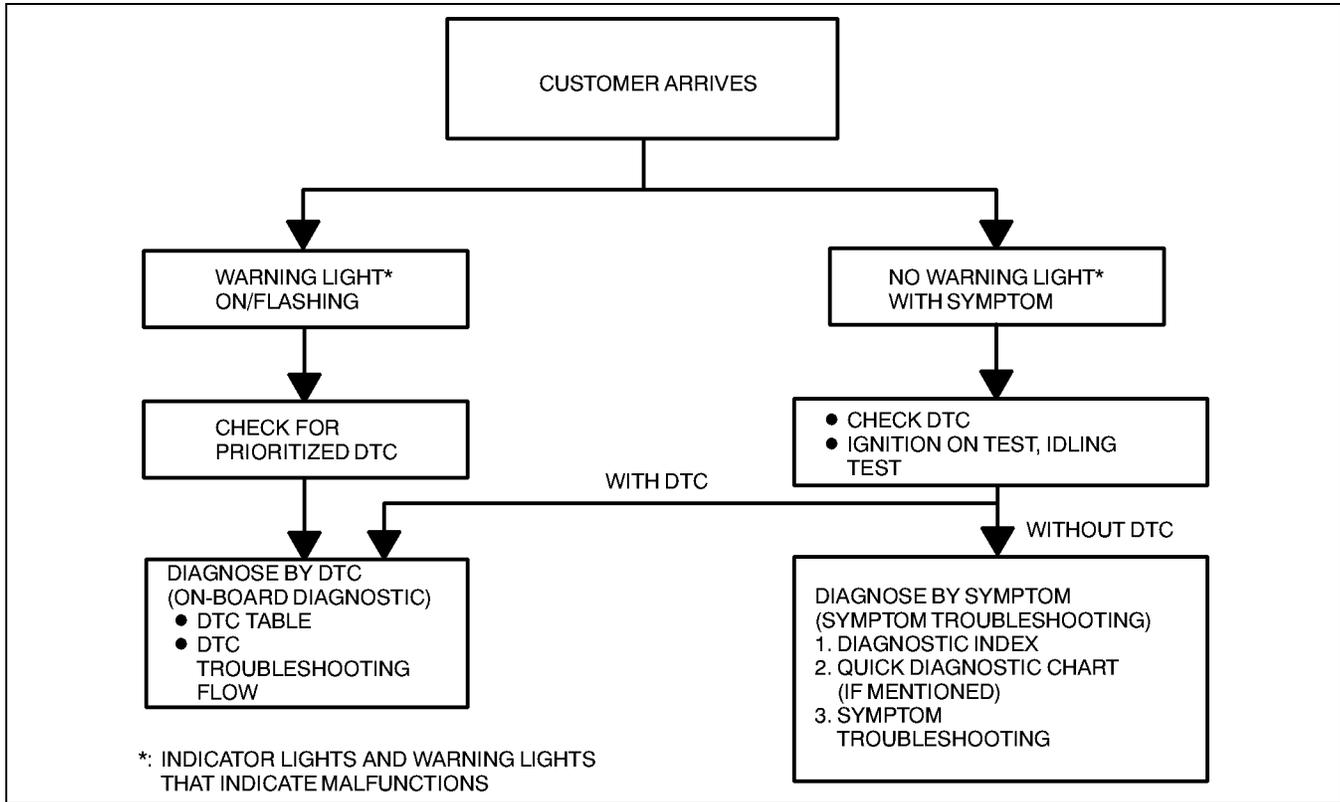
Upper and lower limits

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

GENERAL INFORMATION

Troubleshooting Procedure Basic flow of troubleshooting

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DTC troubleshooting flow (on-board diagnostic)

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

Diagnostic index

- The diagnostic index lists the symptoms of specific malfunctions. Select the symptoms related or most closely relating to the malfunction.

Quick diagnosis chart (If mentioned)

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

Symptom troubleshooting

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

GENERAL INFORMATION

Procedures for Use

Using the basic inspection (section 05)

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

	SHOWS INSPECTION ORDER	SHOWS ITEM NAMES FOR DETAILED PROCEDURES	SHOW POINTS REQUIRING ATTENTION BASED ON INSPECTION RESULTS				
	AUTOMATIC TRANSAXLE BASIC INSPECTION						
REFERENCE COLUMN	STEP	INSPECTION	ACTION				
	1	<ul style="list-style-type: none"> • Turn ignition switch to ON position. • Does O/D OFF indicator light (illuminate/go out) correspond to O/D OFF switch position (on/off)? 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">Yes</td> <td>Go to next step.</td> </tr> <tr> <td style="width: 10%; text-align: center;">No</td> <td>Perform symptom troubleshooting No.26 "O/D OFF indicator light does not illuminate when O/D OFF switch is turned to on", or No.27 "O/D OFF indicator light illuminates when O/D OFF switch is not turned to on".</td> </tr> </table>	Yes	Go to next step.	No	Perform symptom troubleshooting No.26 "O/D OFF indicator light does not illuminate when O/D OFF switch is turned to on", or No.27 "O/D OFF indicator light illuminates when O/D OFF switch is not turned to on".
Yes	Go to next step.						
No	Perform symptom troubleshooting No.26 "O/D OFF indicator light does not illuminate when O/D OFF switch is turned to on", or No.27 "O/D OFF indicator light illuminates when O/D OFF switch is not turned to on".						
	2	<ul style="list-style-type: none"> • Turn ignition switch to ON position. • When selector lever is moved, are selector lever position and indicator aligned? Also, when other ranges are selected from N or P during idling, does vehicle creep within 1 to 2 seconds? 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">Yes</td> <td>Go to next step.</td> </tr> <tr> <td style="width: 10%; text-align: center;">No</td> <td>Inspect selector lever. Repair or replace defective areas.</td> </tr> </table>	Yes	Go to next step.	No	Inspect selector lever. Repair or replace defective areas.
Yes	Go to next step.						
No	Inspect selector lever. Repair or replace defective areas.						
	3	<ul style="list-style-type: none"> • Inspect the ATF color condition. (See 05-17-8 Automatic Transaxle Fluid (ATF) Condition Inspection) • Are ATF color and odor normal? 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">Yes</td> <td>Go to next step.</td> </tr> <tr> <td style="width: 10%; text-align: center;">No</td> <td>Repair or replace any defective parts according to inspection result. Flush ATX and cooler line as necessary.</td> </tr> </table>	Yes	Go to next step.	No	Repair or replace any defective parts according to inspection result. Flush ATX and cooler line as necessary.
Yes	Go to next step.						
No	Repair or replace any defective parts according to inspection result. Flush ATX and cooler line as necessary.						
	4	<ul style="list-style-type: none"> • Perform line pressure test. (See 05-17-2 Line Pressure Test) • Is line pressure okay? 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">Yes</td> <td>Go to next step.</td> </tr> <tr> <td style="width: 10%; text-align: center;">No</td> <td>Adjust accelerator cable as necessary. Repair or replace any defective parts according to inspection result.</td> </tr> </table>	Yes	Go to next step.	No	Adjust accelerator cable as necessary. Repair or replace any defective parts according to inspection result.
Yes	Go to next step.						
No	Adjust accelerator cable as necessary. Repair or replace any defective parts according to inspection result.						
	5	<ul style="list-style-type: none"> • Perform stall test. • Is stall speed is okay? 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">Yes</td> <td>Go to next step.</td> </tr> <tr> <td style="width: 10%; text-align: center;">No</td> <td>Repair or replace defective parts according to inspection result.</td> </tr> </table>	Yes	Go to next step.	No	Repair or replace defective parts according to inspection result.
Yes	Go to next step.						
No	Repair or replace defective parts according to inspection result.						

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GENERAL INFORMATION

Using the diagnostic index

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

NO.	TROUBLESHOOTING ITEM	DESCRIPTION	PAGE
1	Melts main or other fuse		(See 01-03-6 MELT NO.1 MAIN OR OTHER FUSE)
2	MIL comes on	MIL is illuminated incorrectly.	(See 01-03-7 NO.2 MIL COMES ON)
3	Will not crank	Starter does not work.	(See 01-03-8 NO.3 WILL NOT CRANK)
4	Hard start/long crank/erratic crank	Starter cranks engine at normal speed but engine requires excessive cranking time before starting.	(See 01-03-9 NO.4 HARD START/LONG CRANK/ERRATIC CRANK)
5	Engine stalls After start/at idle	Engine stops unexpectedly at idel and/or after start.	(See 01-03-11 NO.5 ENGINE STALLS-AFTER START/AT IDLE)
6	Cranks normally but will not start	Starter cranks engine at normal speed but engine will not run.	(See 01-03-15 NO.5 CRANKS NORMALLY BUT WILL NOT START)
7	Slow rerun to idle	Engine takes more time than normal to return to idle speed.	(See 01-03-19 NO.7 SLOW RERUN TO IDLE)
8	Engine runs rough/rolling idle	Engine speed fluctuates between specified idle speed and lower speed and engine shakes excessively.	(See 01-03-20 NO.8 ENGINE RUNS ROUGH/ROLLING IDLE)
9	Fast idle/runs on	Engine speed continues at fast idle after warm-up. Engine runs after ignition switch is turned off.	(See 01-03-23 NO.9 FAST IDLE/RUNS ON)
10	Low idle/stalls during deceleration	Engine stops unexpectedly at beginning of deceleration or recovery from deceleration.	(01-03-24 NO.10 LOW IDLE/STALLS DURING DECELERATION)

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GENERAL INFORMATION

Using the quick diagnosis chart

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

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② PARTS WHICH MAY BE THE CAUSE OF PROBLEMS

SYMPTOM QUICK DIAGNOSTIC CHART

Troubleshooting item		Possible factor																					
		Starter motor malfunction (Mechanical or electrical)	Starter circuit including ignition switch open	Improper engine oil level	Low or dead battery	Charging system malfunction	Improper engine compression	Improper valve timing	Hydrolocked engine	Improper engine oil viscosity	Improper dipstick	Base engine malfunction	Drive plate or flywheel seized	Improper tension or damaged drive belts	Improper engine coolant level	Water and anti-freeze mixture improperly	Cooling system malfunction (Radiator, hoses, overflow system, thermostat, etc.)	Cooling fan system malfunction	Engine or transaxle mounts improperly installed	Cooling fan or condenser fan seat improperly	Accelerator cable free play mis-adjustment	Fuel quality	
1	Melts main or other fuse																						
2	MIL comes on																						
3	Will not crank	x	x		x	x																	
4	Hard start / long crank / erratic start / erratic crank																						x
5	Engine stalls																						x
6	Cranks normally but will not start																						x
7	Slow return to idle																						x
8	Engine runs rough / rolling idle																						x
9	Fast idle / runs on																						x
10	Low idle / stalls during deceleration																						
11	Engine stalls / quits																						x
	Engine runs rough																						x
	Misses																						x
	Buck / jerk																						x
	Hesitation / stumble																						x
12	Lack / loss of power																						x
13	Knocking / pinging																						x
14	Poor fuel economy																						x
15	Emissions compliance																						
16	High oil consumption/leakage																						
17	Cooling system concerns																						
18	Cooling system concerns																						
19	Exhaust smoke																						
20	Fuel odor (in engine compartment)																						
21	Engine noise																						
22	Vibration concerns (engine)																						
23	A/C does not work sufficiently																						
24	A/C always on / A/C compressor runs continuously																						
25	A/C does not cut off under wide open throttle conditions																						
26	Exhaust sulphur smell																						x
27	Fuel refill concerns																						
28	Fuel filling shut off issues																						
29	Intermittent concerns																						
30	Constant voltage																						
31	Spark plug condition																						
32	Automatic transaxle concerns																						

① CHOOSE THE ACTUAL SYMPTOM

(See 05-01 AUTOMATIC TRANSAXLE SYMPTOM TROUBLESHOOTING)

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GENERAL INFORMATION

Using the symptom troubleshooting

- Symptom troubleshooting shows diagnostic procedures, inspection methods, and proper action to take for each trouble symptom.

<p>DESCRIPTION describes what kind of TROUBLE SYMPTOM.</p>	<p>14</p>	<p>TROUBLE SYMPTOM</p>					
<p>POSSIBLE CAUSE describes possible point of malfunction.</p>	<p>DESCRIPTION</p>	<p>Engine flares up or slips when upshifting or down shifting</p> <ul style="list-style-type: none"> • When accelerator pedal is depressed for driveway, engine speed increase but vehicle speed increase slowly. • When accelerator is depressed while driving, engine speed increases but vehicle not. • There is clutch slip because clutch is stuck or line pressure is low. <ul style="list-style-type: none"> — Clutch stuck, slippage (forward clutch, 3-4 clutch, 2-4 brake band, one-way clutch 1, one-way clutch 2) <ul style="list-style-type: none"> • Line pressure low • Malfunction or mis-adjustment of TP sensor • Malfunction of VSS • Malfunction of input/turbine speed sensor • Malfunction of sensor ground • Malfunction of shift solenoid A, B or C • Malfunction of TCC solenoid valve • Malfunction of body ground • Malfunction of throttle cable • Malfunction of throttle valve body — Poor operating of mechanical pressure <ul style="list-style-type: none"> • Selector lever position disparity • TR switch position disparity <p>Note</p> <ul style="list-style-type: none"> • Before following troubleshooting steps, make sure that Automatic Transaxle On-board Diagnostic and Automatic Transaxle Basic Inspection are conducted. 					
<p>STEP shows the order of troubleshooting.</p>	<p>Diagnostic procedure</p>						
<p>Reference item(s) for additional information to perform INSPECTION</p>	<p>STEP</p>	<p>INSPECTION</p>	<p>ACTION</p>				
<p>INSPECTION describes the method to quickly determine the failed part.</p>	<p>1</p>	<ul style="list-style-type: none"> • Is line pressure okay? 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">Yes</td> <td>Go to next step.</td> </tr> <tr> <td style="width: 5%; text-align: center;">No</td> <td>Repair or replace any defective parts according to inspection results.</td> </tr> </table>	Yes	Go to next step.	No	Repair or replace any defective parts according to inspection results.
Yes	Go to next step.						
No	Repair or replace any defective parts according to inspection results.						
<p>How to perform ACTION is described in the relative material shown.</p>	<p>2</p>	<ul style="list-style-type: none"> • Is shift point okay? (See 05-17-5 ROAD TEST) 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">Yes</td> <td>Go to next step.</td> </tr> <tr> <td style="width: 5%; text-align: center;">No</td> <td>Go to symptom troubleshooting No.9 "Abnormal shift".</td> </tr> </table>	Yes	Go to next step.	No	Go to symptom troubleshooting No.9 "Abnormal shift".
Yes	Go to next step.						
No	Go to symptom troubleshooting No.9 "Abnormal shift".						
<p>Reference item(s) to perform ACTION</p>	<p>3</p>	<ul style="list-style-type: none"> • Stop engine and turn ignition switch on. • Connect NGS tester to DLC-2. • Simulate SHIFT A, SHIFT B and SHIFT C PIDs for ON. • Is operating sound of shift solenoids heard? 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">Yes</td> <td> <ul style="list-style-type: none"> • Overhaul control valve body and repair or replace any defective parts. (See ATX Workshop Manual GF4A-EL (9999-95-GF4A-00)) • If problem remains, replace or overhaul transaxle and repair or replace defective parts. (See 05-17-15 AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION) </td> </tr> <tr> <td style="width: 5%; text-align: center;">No</td> <td> <ul style="list-style-type: none"> • Inspect for bend, damage, corrosion or loose connection if shift solenoid A, B, or C terminal on ATX. • Inspect for shift solenoid mechanical stuck. (See 05-17-14 Inspection of Operation) • If shift solenoids are okay, inspect for open or short circuit between PCM connector terminal A, B or C. </td> </tr> </table>	Yes	<ul style="list-style-type: none"> • Overhaul control valve body and repair or replace any defective parts. (See ATX Workshop Manual GF4A-EL (9999-95-GF4A-00)) • If problem remains, replace or overhaul transaxle and repair or replace defective parts. (See 05-17-15 AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION) 	No	<ul style="list-style-type: none"> • Inspect for bend, damage, corrosion or loose connection if shift solenoid A, B, or C terminal on ATX. • Inspect for shift solenoid mechanical stuck. (See 05-17-14 Inspection of Operation) • If shift solenoids are okay, inspect for open or short circuit between PCM connector terminal A, B or C.
Yes	<ul style="list-style-type: none"> • Overhaul control valve body and repair or replace any defective parts. (See ATX Workshop Manual GF4A-EL (9999-95-GF4A-00)) • If problem remains, replace or overhaul transaxle and repair or replace defective parts. (See 05-17-15 AUTOMATIC TRANSAXLE REMOVAL/INSTALLATION) 						
No	<ul style="list-style-type: none"> • Inspect for bend, damage, corrosion or loose connection if shift solenoid A, B, or C terminal on ATX. • Inspect for shift solenoid mechanical stuck. (See 05-17-14 Inspection of Operation) • If shift solenoids are okay, inspect for open or short circuit between PCM connector terminal A, B or C. 						
<p>Reference item(s) to perform ACTION</p>	<p>4</p>	<ul style="list-style-type: none"> • Verify test results. <ul style="list-style-type: none"> — If okay, return to diagnostic index to service any additional symptoms. — If malfunction remains, inspect related Service Bulletins and/or On-line Repair Information and perform repair or diagnosis. — If vehicle is repaired, troubleshooting completed. — If vehicle is not repaired or additional diagnostic information is not available, replace or reprogram PCM. 					

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GENERAL INFORMATION

UNITS

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Electric current	A (ampere)
Electric power	W (watt)
Electric resistance	Ω (ohm)
Electric voltage	V (volt)
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)
Number of revolutions	rpm (revolutions per minute)

Torque	N·m (Newton meter)
	kgf·m (kilogram force meter)
	kgf·cm (kilogram force centimeter)
	ft·lbf (foot pound force)
	in·lbf (inch pound force)
Volume	L (liter)
	US qt (U.S. quart)
	Imp qt (Imperial quart)
	ml (milliliter)
	cc (cubic centimeter)
	cu in (cubic inch)
Weight	fl oz (fluid ounce)
	g (gram)
	oz (ounce)

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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}

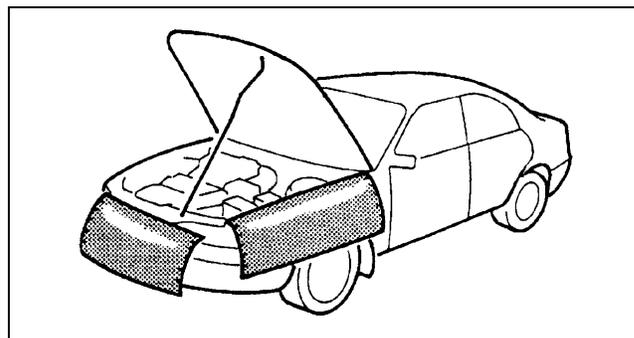
- The actual converted values for 2.7 kgf/cm² are 264 kPa and 38.4 psi. In the first specification, 2.7 is used as an upper limit, so the converted values are rounded down to 260 and 38. In the second specification, 2.7 is used as a lower limit, so the converted values are rounded up to 270 and 39.

FUNDAMENTAL PROCEDURES

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Protection of the Vehicle

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

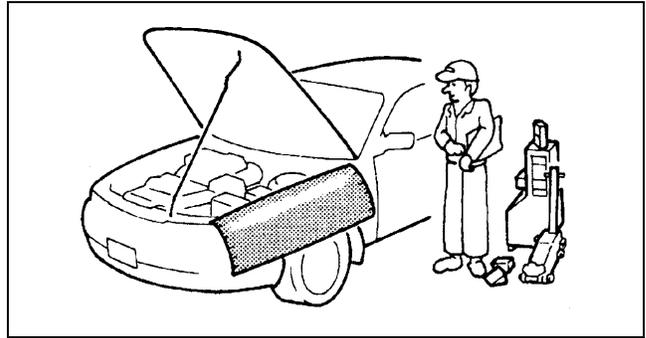


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GENERAL INFORMATION

Preparation of Tools and Measuring Equipment

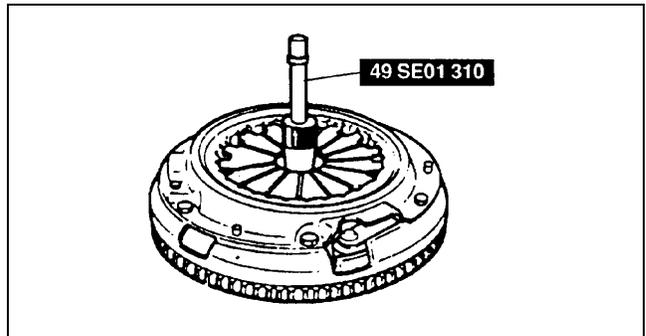
- Be sure that all necessary tools and measuring equipment are available before starting any work.



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Special Service Tools

- Use special service tools or equivalent when they are required.



X3U000WAJ

Oil Leakage Inspection

- Use either of the following procedures to identify the type of oil that is leaking:

Using UV light (black light)

1. Remove any oil on the engine or transaxle.

Note

- Referring to the fluorescent dye instruction manual, mix the specified amount of dye into the engine oil or ATF (or transaxle oil).

2. Pour the fluorescent dye into the engine oil or ATF (or transaxle oil).
3. Allow the engine to run for 30 minutes.
4. Inspect for dye leakage by irradiating with UV light (black light), and identify the type of oil that is leaking.
 - If no dye leakage is found, allow the engine to run for another 30 minutes or drive the vehicle then reinspect.
5. Find where the oil is leaking from, then make necessary repairs.

Note

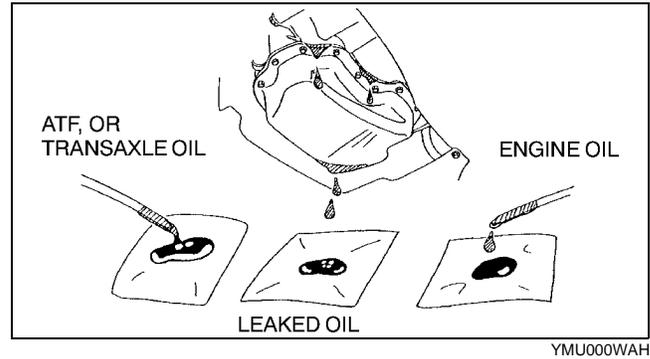
- To determine whether it is necessary to replace the oil after adding the fluorescent dye, refer to the fluorescent dye instruction manual.

Not using UV light (black light)

1. Gather some of the leaking oil using an absorbent white tissue.
2. Take samples of engine oil and ATF (or transaxle oil), both from the dipstick, and place them next to the leaked oil already gathered on the tissue.

GENERAL INFORMATION

3. Compare the appearance and smell, and identify the type of oil that is leaking.
4. Remove any oil on the engine or transaxle.
5. Allow the engine to run for 30 minutes.
6. Check the area where the oil is leaking, then make necessary repairs.



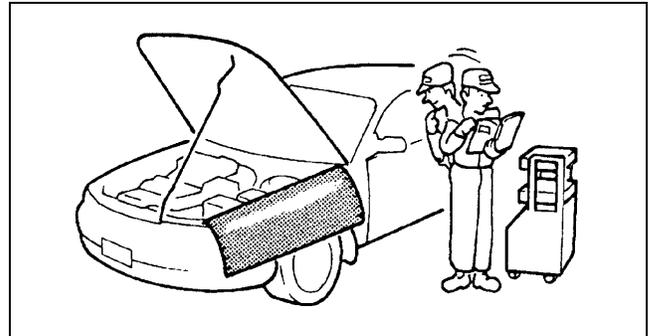
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Disconnection of the Negative Battery Cable

- Before beginning any work, turn the ignition switch to LOCK position, then disconnect the negative battery cable and wait for more than 1 minute to allow the backup power supply of the SAS control module to deplete its stored power. Disconnecting the battery cable will delete the memories of the clock, audio, and DTCs, etc. Therefore, it is necessary to verify those memories before disconnecting the cable.

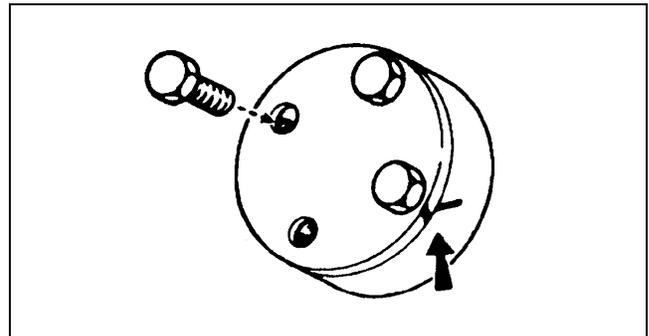
Removal of Parts

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



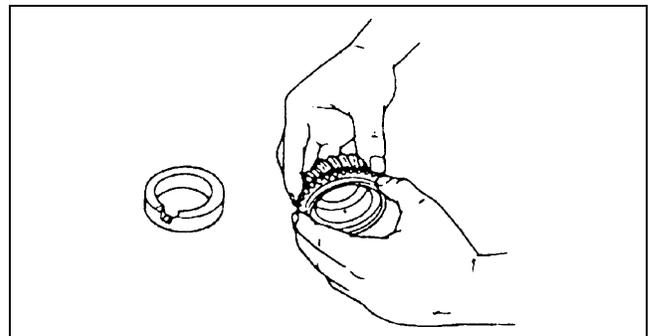
Disassembly

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



Inspection During Removal, Disassembly

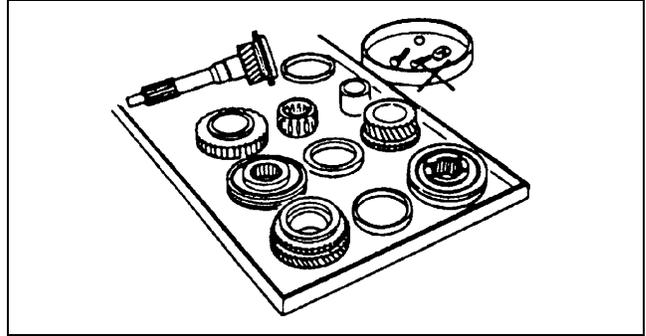
- When removed, each part should be carefully inspected for malfunction, deformation, damage, and other problems.



GENERAL INFORMATION

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.



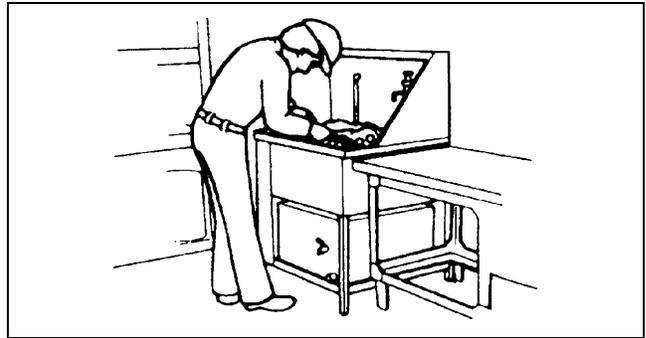
X3U000WAN

Cleaning of Parts

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

Warning

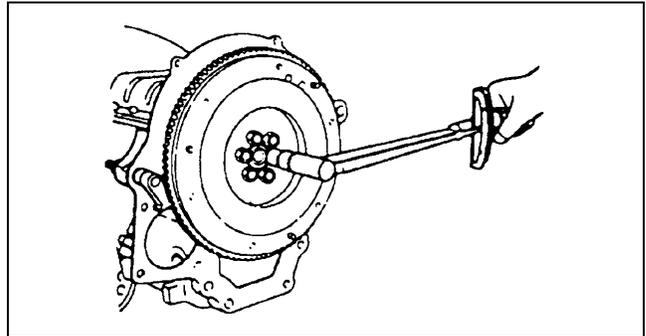
- **Using compressed air can cause dirt and other particles to fly out causing injury to the eyes. Wear protective eye wear whenever using compressed air.**



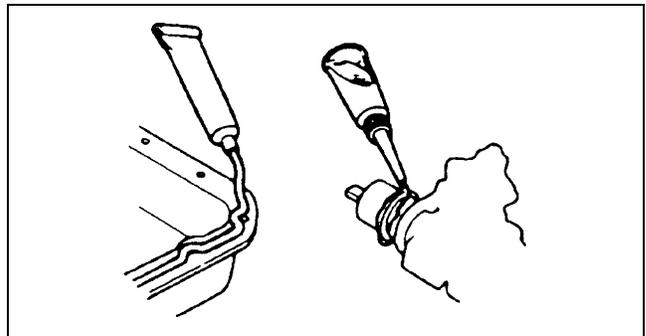
X3U000WAP

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:
 - Oil seals
 - Gaskets
 - O-rings
 - Lockwashers
 - Cotter pins
 - Nylon nuts
- Depending on location:
 - Sealant and gaskets, or both, should be applied to specified locations. When sealant is applied, parts should be installed before sealant hardens to prevent leakage.
 - Oil should be applied to the moving components of parts.
 - Specified oil or grease should be applied at the prescribed locations (such as oil seals) before reassembly.



X3U000WAQ

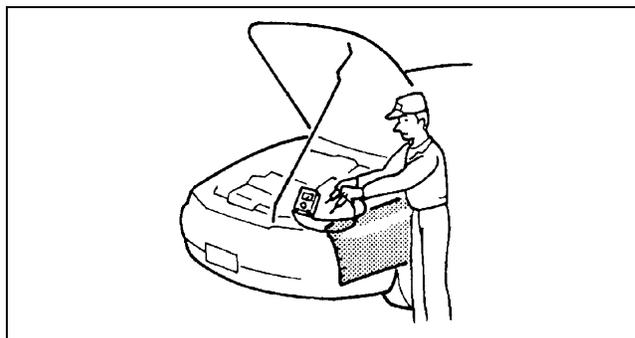


X3U000WAR

GENERAL INFORMATION

Adjustment

- Use suitable gauges and/or testers when making adjustments.

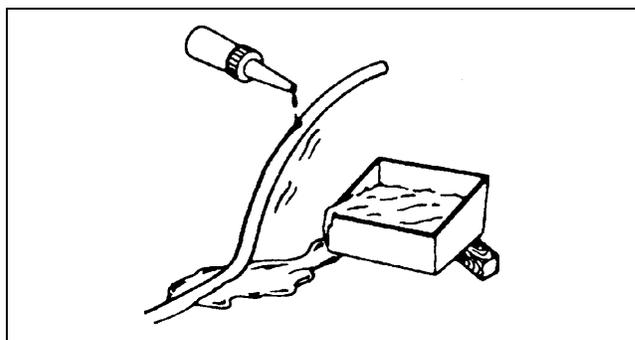


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Rubber Parts and Tubing

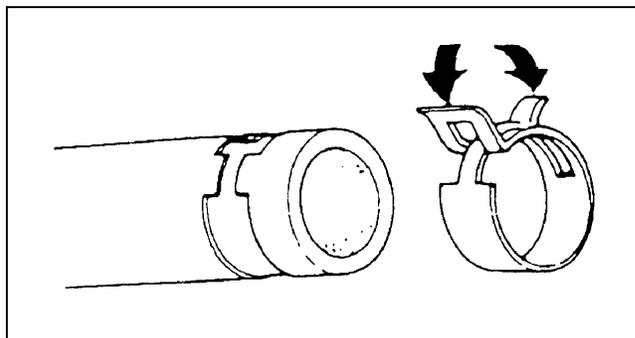
- Prevent gasoline or oil from getting on rubber parts or tubing.



X3U000WAT

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.

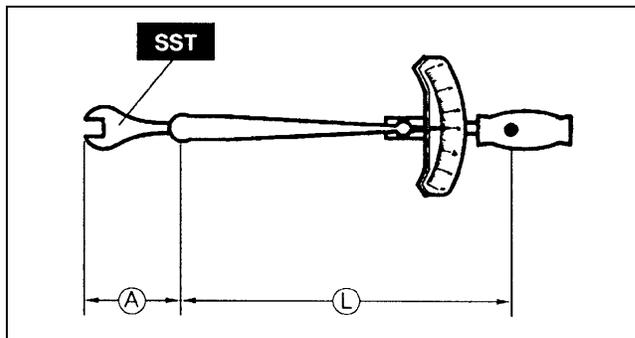


X3U000WAW

Torque Formulas

- When using a torque wrench-SST or equivalent combination, the written torque must be recalculated due to the extra length that the SST or equivalent adds to the torque wrench. Recalculate the torque 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	$in \cdot lbf \times [L / (L + A)]$



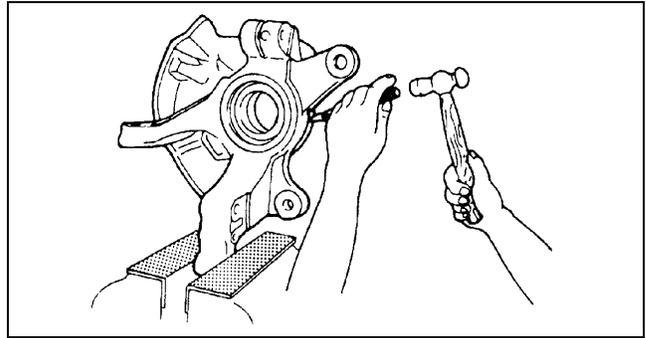
X3U000WAW

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

GENERAL INFORMATION

Vise

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



X3U000WAW

Dynamometer

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

Note

- When the vehicle is on a chassis roller and only the front wheels rotate, the ABS warning light may illuminate. (Refer to 04-10-1 PRECAUTION (BRAKES) to turn off the warning light.)

INSTALLATION OF RADIO SYSTEM

A3U00000005W01

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:

- Install the antenna at the farthest point from control modules.
- Install the antenna feeder as far as possible from the control module harnesses.
- Ensure that the antenna and feeder are properly adjusted.
- Do not install a high-powered radio system.

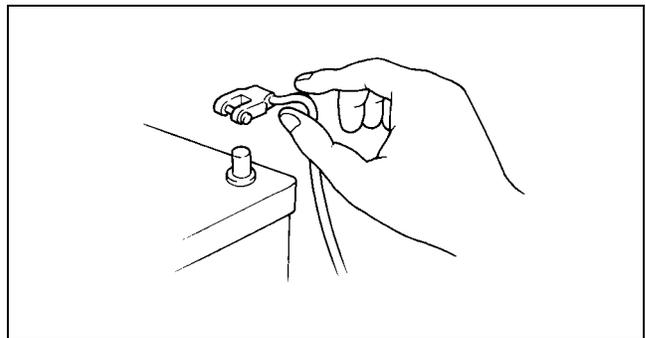
ELECTRICAL SYSTEM

A3U00000006W01

Electrical Parts

Battery cable

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

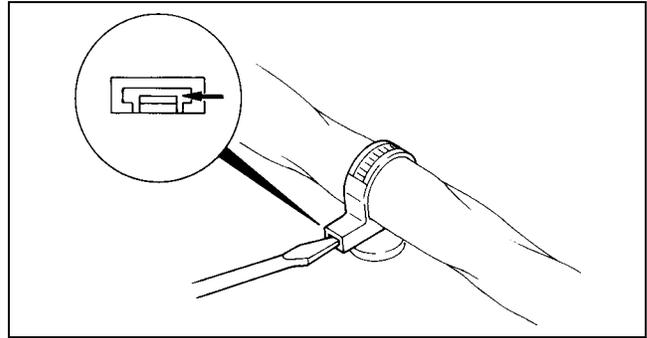


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GENERAL INFORMATION

Wiring Harness

- To remove the wiring harness from the clip in the engine room, pry up the hook of the clip using a flathead screwdriver.



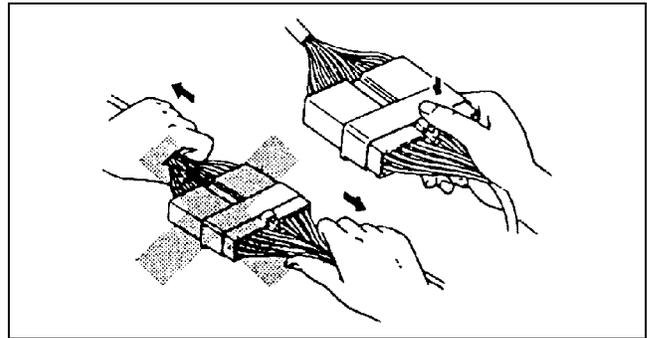
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Connectors

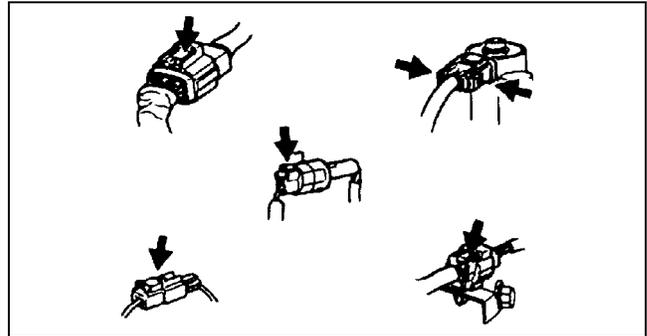
Disconnecting connectors

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



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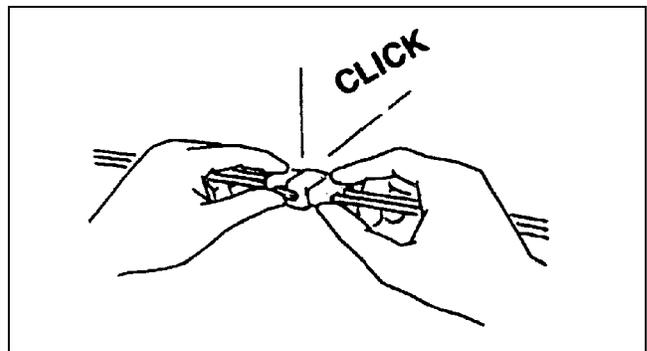
- Connectors can be disconnected by pressing or pulling the lock lever as shown.



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Locking connector

- When locking connectors, listen for a click indicating they are securely locked.

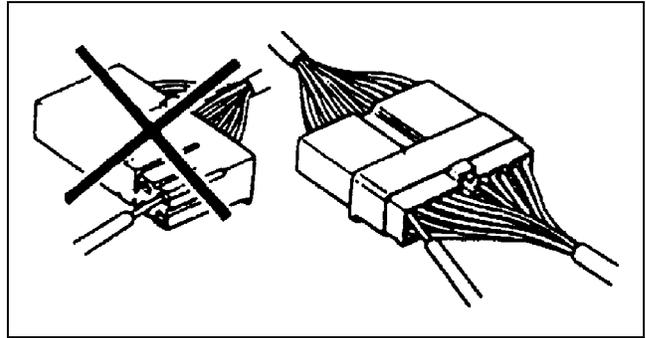


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GENERAL INFORMATION

Inspection

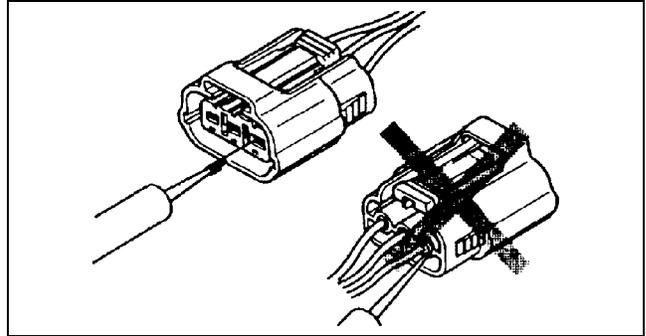
- When a tester is used to inspect for continuity or measuring voltage, insert the tester probe from the wiring harness side.
- Inspect the terminals of waterproof connectors from the connector side since they cannot be accessed from the wiring harness side.



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Caution

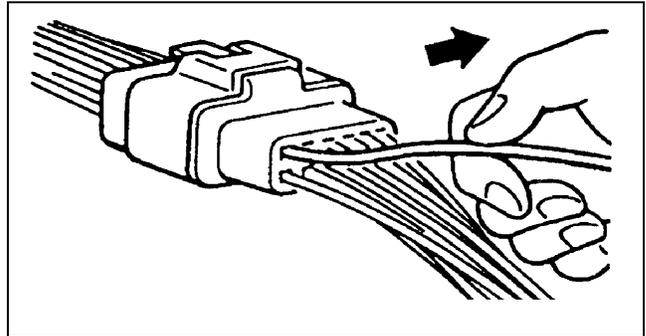
- To prevent damage to the terminal, wrap a thin wire around the tester probe before inserting into terminal.



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Terminals Inspection

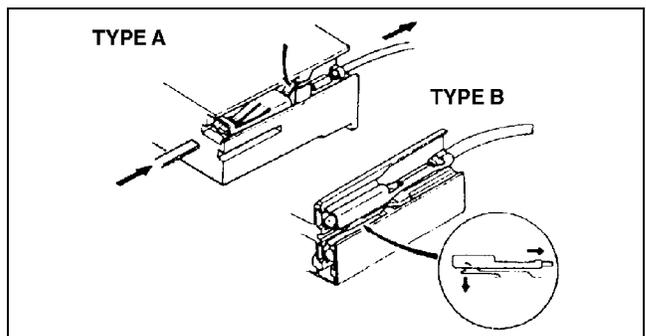
- Pull lightly on individual wires to verify that they are secured in the terminal.



X3U000WB4

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 with the terminal locking tab pressed down, pull the terminal out from the connector.

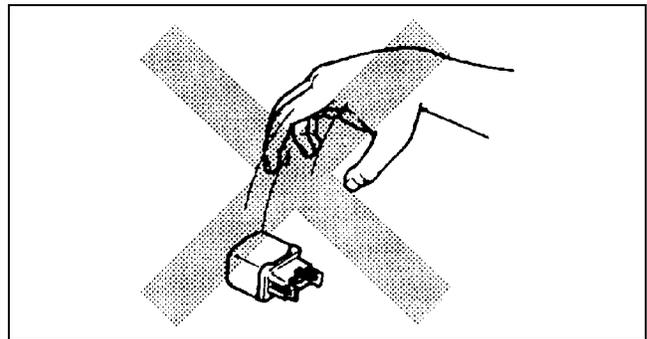


WGIWXX0046E

GENERAL INFORMATION

Sensors, Switches, and Relays

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



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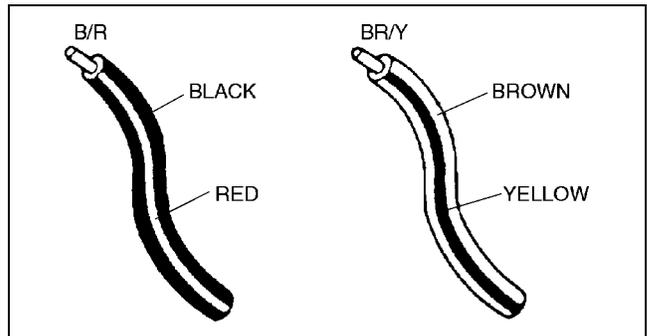
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Wiring Harness

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		

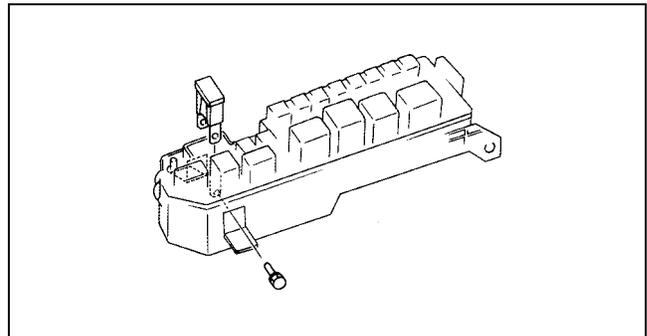


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Fuse

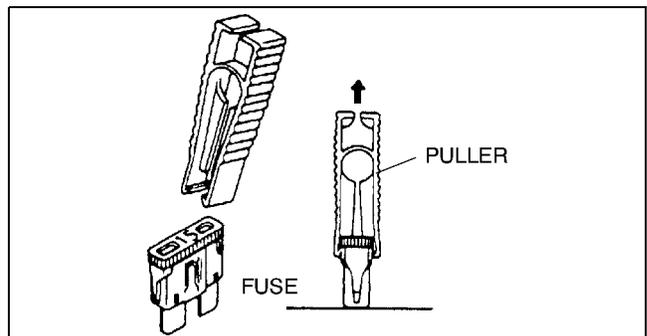
Replacement

- When replacing a fuse, be sure to replace it with one of the same capacity. If a fuse fails again, the circuit probably has a short and the wiring should be inspected.
- Be sure the negative battery terminal is disconnected before replacing a main fuse.



WGIWXX0049E

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



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GENERAL INFORMATION

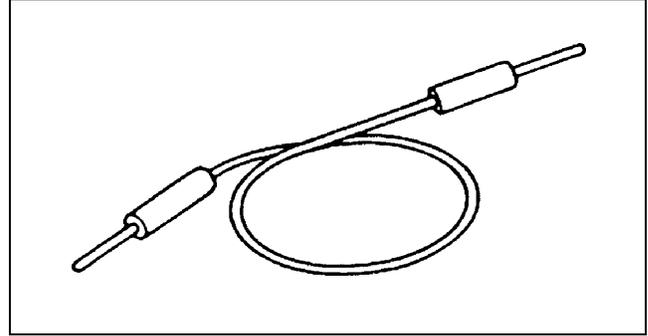
Electrical Troubleshooting Tools

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

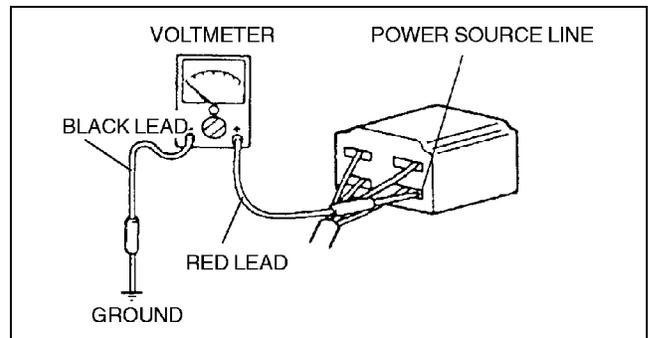
- **Do not connect a jumper wire from the power source line to a body ground. This may cause burning or other damage to wiring harnesses or electronic components.**



X3U000WBB

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 will be measured and the negative (-) probe (black lead wire) to a body ground.



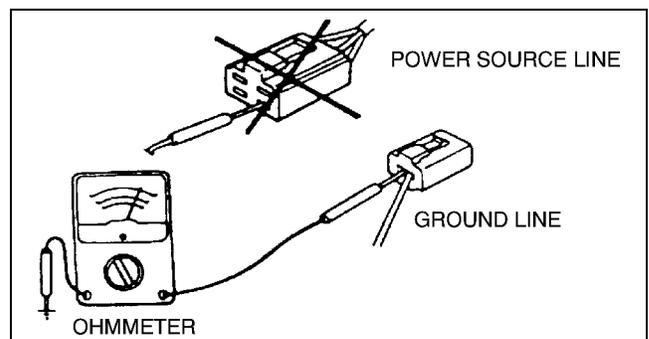
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Ohmmeter

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

Caution

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



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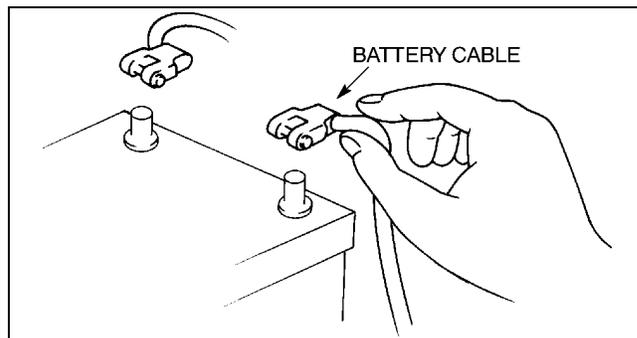
Precautions Before Welding

A vehicle has various electrical parts. To protect the parts from excessive current generated when welding, be sure to perform the following procedure.

1. Turn the ignition switch to the LOCK position.

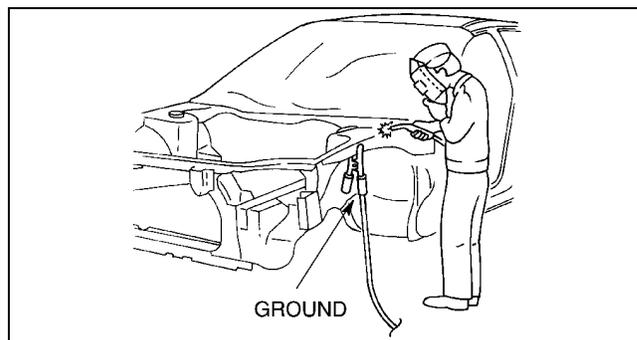
GENERAL INFORMATION

2. Disconnect the battery cables.



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3. Securely connect the welding machine ground near the welding area.
4. Cover the peripheral parts of the welding area to protect them from weld spatter.



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JACKING POSITIONS

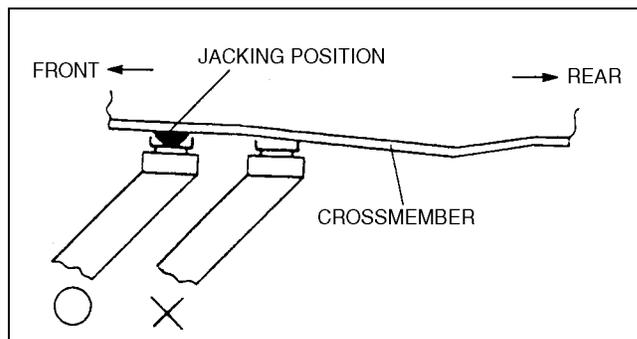
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Warning

- **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

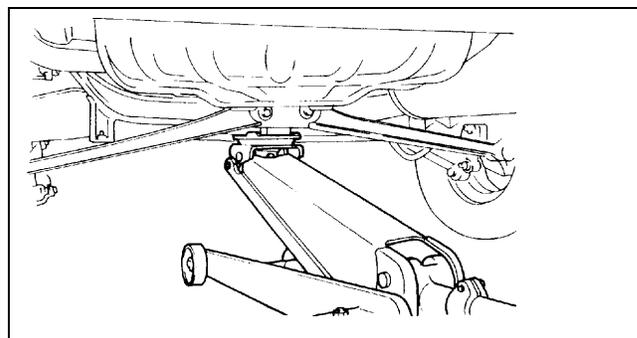
- At the center of the crossmember



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Rear

- At the center of the crossmember



X3U000WBF

GENERAL INFORMATION

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

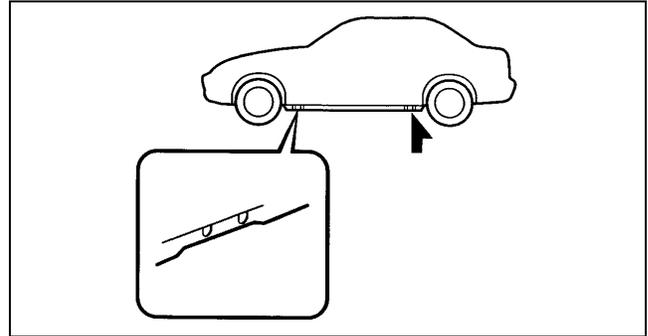
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Vehicle Lift Positions

Front and rear

Warning

- Unstably lifting a vehicle is dangerous. The vehicle can slip off the lift and cause serious injury and/or vehicle damage. Make sure that the vehicle is on the lift horizontally by adjusting the height of support at the end of the arm of the lift.

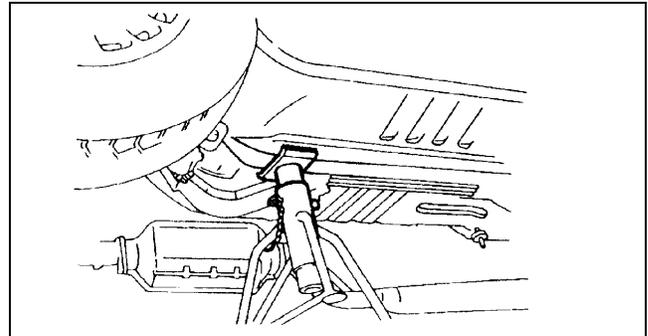


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Safety Stand Positions

Front

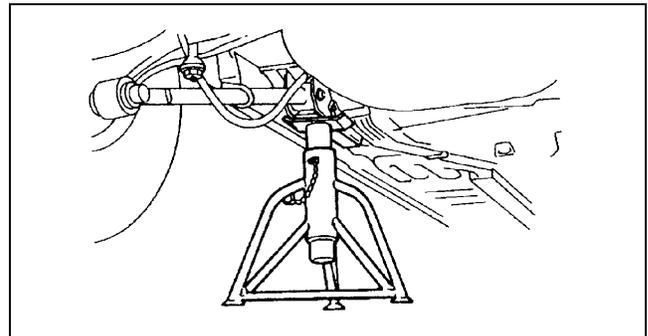
- Both sides of the vehicle, on side sills.



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Rear

- Both sides of the vehicle, on side sills.



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TOWING

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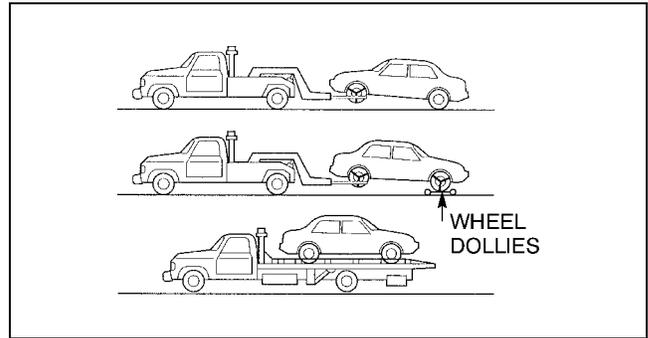
- Proper lifting and towing are necessary to prevent damage to the vehicle. State and local laws must be followed.
- A towed vehicle usually should have its front wheels off the ground. If excessive damage or other conditions prevent this, use wheel dollies.

GENERAL INFORMATION

- When towing with the rear wheels on the ground, release the parking brake.

Caution

- Do not tow with sling-type equipment. This could damage your vehicle. Use wheel-lift or flatbed equipment.

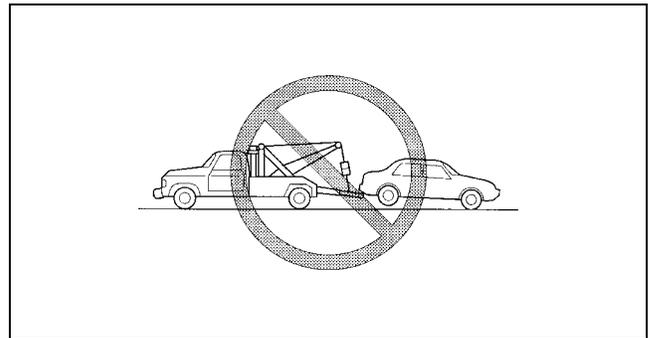


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Caution

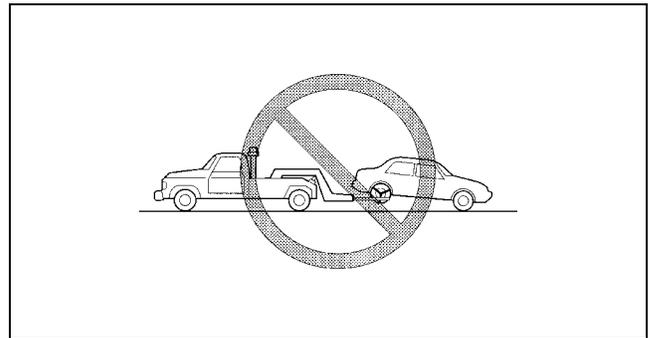
- Do not tow the vehicle backward with driving wheels on the ground. This may cause internal damage to the transaxle.



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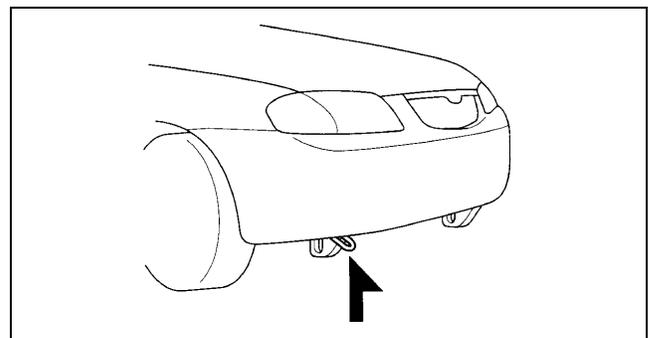
Caution

- Do not use the hook loops under the front and rear for towing. They are designed ONLY for tying down the vehicle when it is being transported. Using them for towing will damage the bumper.



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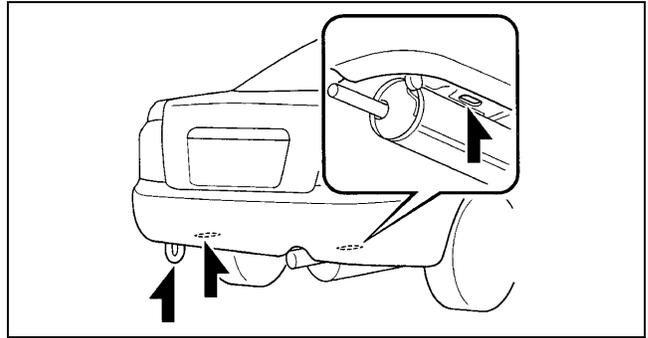
Tiedown Hooks Front



X3U000WBP

GENERAL INFORMATION

Rear

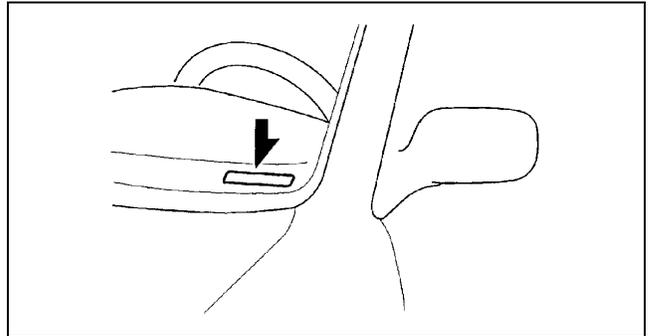


X3U000WBQ

IDENTIFICATION NUMBER LOCATIONS

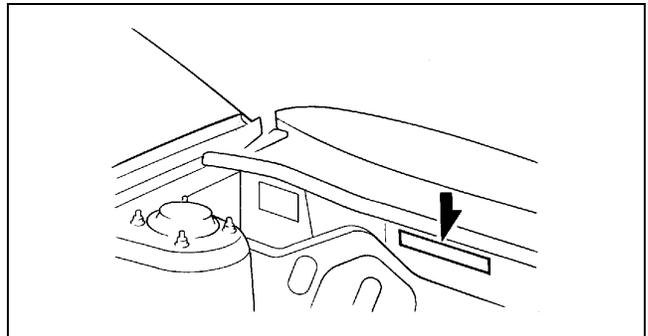
Vehicle Identification Number (VIN)

A3U000000010W01



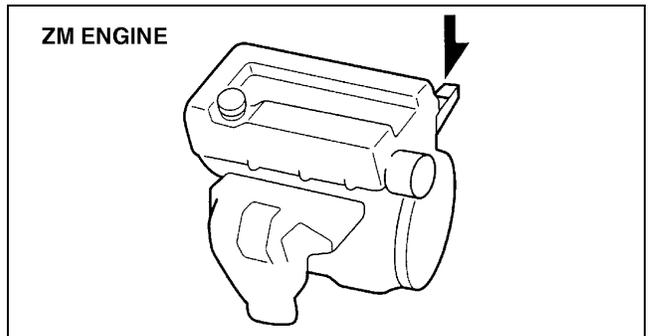
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Chassis Number



X3U000WBR

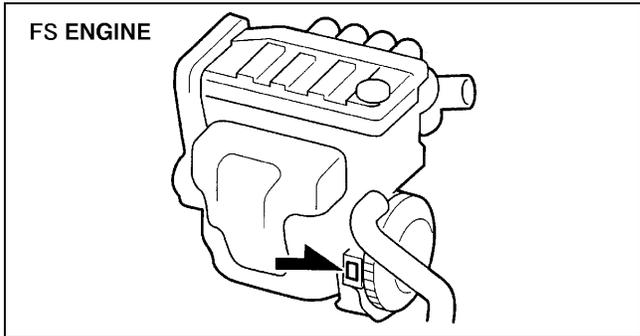
Engine Identification Number



X3U000WBS

GENERAL INFORMATION

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X3U000WBT

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SAE STANDARDS

- 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.

SAE Standard		Remark
Abbreviation	Name	
AP	Accelerator Pedal	
ACL	Air Cleaner	
A/C	Air Conditioning	
BARO	Barometric Pressure	
B+	Battery Positive Voltage	
CMP sensor	Camshaft Position Sensor	
CAC	Charge Air Cooler	
CLS	Closed Loop System	
CTP	Closed Throttle Position	
CPP	Clutch Pedal Position	
CIS	Continuous Fuel Injection System	
CKP sensor	Crankshaft Position Sensor	
DLC	Data Link Connector	
DTM	Diagnostic Test Mode	#1
DTC	Diagnostic Trouble Code(s)	
DI	Distributor Ignition	
EI	Electronic Ignition	#2
ECT	Engine Coolant Temperature	
EM	Engine Modification	
EVAP	Evaporative Emission	
EGR	Exhaust Gas Recirculation	
FC	Fan Control	
FF	Flexible Fuel	
4GR	Fourth Gear	
GEN	Generator	
GND	Ground	
HO2S	Heated Oxygen Sensor	With heater
IAC	Idle Air control	
IAT	Intake Air Temperature	
KS	Knock Sensor	
MIL	Malfunction Indicator Lamp	

SAE Standard		Remark
Abbreviation	Name	
MAP	Manifold Absolute Pressure	
MAF sensor	Mass Air Flow Sensor	
MFI	Multiport Fuel Injection	
OBD	On-Board Diagnostic	
OL	Open Loop	
OC	Oxidation Catalytic Converter	
O2S	Oxygen Sensor	
PNP	Park/Neutral Position	
PSP	Power Steering Pressure	
PCM	Powertrain Control Module	#3
PAIR	Pulsed Secondary Air Injection	Pulsed injection
AIR	Secondary Air Injection	Injection with air pump
SAPV	Secondary Air Pulse Valve	
SFI	Sequential Multipoint Fuel Injection	
3GR	Third Gear	
TWC	Three Way Catalytic Converter	
TB	Throttle Body	
TP sensor	Throttle Position Sensor	
TCC	Torque Converter Clutch	
TCM	Transmission (Transaxle) Control Module	
TR	Transmission (Transaxle) Range	
TC	Turbocharger	
VSS	Vehicle Speed Sensor	
VR	Voltage Regulator	
VAF sensor	Volume Air Flow Sensor	
WUTWC	Warm Up Three Way Catalytic Converter	#4
WOT	Wide Open Throttle	

- #1 : Diagnostic trouble codes depend on the diagnostic test mode
- #2 : Controlled by the PCM
- #3 : Device that controls engine and powertrain
- #4 : Directly connected to exhaust manifold

GENERAL INFORMATION

A3U000000011W01

ABBREVIATIONS

AAS	Air adjusting screw
ABS	Antilock brake system
ACC	Accessories
ATF	Automatic transaxle fluid
ATX	Automatic transaxle
BDC	Bottom dead center
BTDC	Before top dead center
CDCV	Canister drain cut valve
CCM	Comprehensive component monitor
CM	Control module
DC	Drive cycle
DRL	Daytime running light
E/L	Electric load
ELR	Emergency locking retractor
EX	Exhaust
HI	High
HU	ABS hydraulic unit
HVAC	Heater, ventilation, and air conditioning
IG	Ignition
IN	Intake
INT	Intermittent
LF	Left front
LH	Left hand
LO	Low
LR	Left rear
M	Motor
MAX	Maximum
MTX	Manual transaxle
O/D	Overdrive
OFF	Switch off
ON	Switch on
PCV	Positive crankcase ventilation
PRC	Pressure regulator control
P/S	Power steering
RF	Right front
RH	Right hand
RR	Right rear
SST	Special service tool
SW	Switch
TAS	Throttle adjusting screw
TDC	Top dead center
TNS	Tail number side lights
TR	Transmission range
VICS	Variable inertia charging system
VTCS	Variable tumble control system
1GR	First gear
2GR	Second gear
4SD	4 door sedan
5HB	5 door hatchback

PRE-DELIVERY INSPECTION

Pre-Delivery Inspection Table

Exterior

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

- Glass, exterior bright metal and paint for damage
- Wheel lug nuts
- All weatherstrips for damage or detachment
- Operation of hood release and lock
- Operation of trunk lid and fuel lid opener
- Door operation and alignment
- Headlight aiming

INSTALL the following parts:

- Wheel caps

Under hood—engine off

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

- Fuel, engine coolant, and hydraulic lines, fittings, connections, and components for leaks
- Engine oil level
- Power steering fluid level
- Brake and clutch fluid level
- Windshield washer reservoir fluid level
- Radiator coolant level and specific gravity
- Tightness of water hose clamps
- Tightness of battery terminals, electrolyte level and specific gravity
- Drive belt(s) tension
- Accelerator cable and linkage for free movement **CLEAN** the spark plugs

Interior

INSPECT the operations of the following items:

- Seat controls (slide and recline) and headrests
 - Folding rear seat (if equipped)
 - Door locks, including childproof door locks (if equipped)
 - Seat belts and warning system
 - Ignition switch and steering lock
 - Air bag system using warning light
 - Cruise control system (if equipped)
 - Shift-lock system (if equipped)
 - Starter interlock
 - All lights including warning, and indicator lights
 - Sound warning system
 - Horn, wipers, and washers
 - Wiper blades performance
- Clean** wiper blades and windshield, if necessary
- Antenna
 - Audio system (if equipped)
 - Cigarette lighter and clock
 - Power windows (if equipped)
 - Heater, defroster, and air conditioner at various mode selections (if equipped)

INSPECT the following items:

- Presence of spare fuse
- Upholstery and interior finish

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

- Operation and fit of windows
- Pedal height and free play of clutch pedal
- Parking brake

Under hood—engine running at operating temperature

INSPECT the following items:

- Automatic transaxle fluid level
- Operation of idle-up system for electrical load, air conditioner or power steering (if equipped)
- Ignition timing
- Idle speed

GENERAL INFORMATION

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INSPECT the following items:

- Manual transaxle oil level
- 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

Road test

INSPECT the following items:

- Brake operation
- Clutch operation
- Steering control
- Operation of gauges
- Squeaks, rattles, and unusual noises
- Engine general performance
- Emergency locking retractors and automatic locking retractors
- Cruise control system (if equipped)

After road test

INSPECT for necessary 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 (Specified tire pressure is indicated on the door label.)
- Clean outside of vehicle
- Install fuses for accessories
- Remove seat and cabin carpet protective covers
- Vacuum inside of vehicle

GENERAL INFORMATION

SCHEDULED MAINTENANCE

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Scheduled Maintenance Table

Schedule 1 : (Normal driving conditions) U.S.A.

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

Maintenance Item	Maintenance Interval (Number of months or kilometers(miles), whichever comes first)								
	Months	6	12	18	24	30	36	42	48
	× 1000 km	12	24	36	48	60	72	84	96
	(× 1000 Miles)	(7.5)	(15)	(22.5)	(30)	(37.5)	(45)	(52.5)	(60)
ENGINE									
Engine valve clearance									I
Engine timing belt	Inspect at 96,000 km (60,000 miles). Replace every 168,000 km (105,000 miles).								
Drive belts (tension)				I					I
Engine oil	R	R	R	R	R	R	R	R	R
Oil filter	R	R	R	R	R	R	R	R	R
COOLING SYSTEM									
Cooling system				I					I
Engine coolant	Replace at first 72,000 km (45,000 miles) or 36 months; after that, every 48,000 km (30,000 miles) or 24 months.								
FUEL SYSTEM									
Idle speed				I					I
Air cleaner element				R					R
Fuel lines & hoses	*1			I					I
Hoses & tubes for emission	*1								I
IGNITION SYSTEM									
Spark plugs				R					R
CHASSIS & BODY									
Brake lines, hoses & connections				I					I
Disc brakes				I					I
Drum brakes				I					I
Steering operation & linkages				I					I
Front suspension ball joints				I					I
Drive shaft dust boots				I					I
Bolts & nuts on chassis & body				I					I
Exhaust system heat shields				I					I
All locks & hinges	L	L	L	L	L	L	L	L	L
AIR CONDITIONER SYSTEM (if installed)									
Refrigerant amount		I		I		I		I	
Compressor operation		I		I		I		I	

Chart symbols

- I** : Inspect and repair, clean, adjust, or replace if necessary. (Oil-permeated air cleaner elements cannot be cleaned using the air-blow method.)
- R** : Replace
- L** : Lubricate

Remarks

- After the described period, continue to follow the described maintenance at the recommended intervals.
 - Refer below for a description of items marked in the maintenance chart.
- *1 : According to state and federal regulations, failure to perform maintenance on these items will not void your emissions warranties. However, Mazda recommends that all maintenance services be performed at the recommended time or mileage period to ensure long-term reliability.

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GENERAL INFORMATION

Schedule 2 : Canada, Puerto Rico and (Unique driving conditions) U.S.A.

Unique driving conditions consist of :

- 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 kilometers (miles), whichever comes first)												
	Months	4	8	12	16	20	24	28	32	36	40	44	48
	× 1000 km	8	16	24	32	40	48	56	64	72	80	88	96
	(× 1000 Miles)	(5)	(10)	(15)	(20)	(25)	(30)	(35)	(40)	(45)	(50)	(55)	(60)
ENGINE													
Engine valve clearance													I
Engine timing belt	*2	Inspect at 96,000 km (60,000 miles). Replace every 168,000 km (105,000 miles).											
Drive belts (tension)							I						I
Engine oil	except for Puerto Rico	R	R	R	R	R	R	R	R	R	R	R	R
	for Puerto Rico	Replace every 5,000 km (3,000 miles) (or 3 months)											
Oil filter		R	R	R	R	R	R	R	R	R	R	R	R
COOLING SYSTEM													
Cooling system							I						I
Engine coolant		Replace at first 72,000 km (45,000 miles) or 36 months; after that, every 48,000 km (30,000 miles) or 24 months.											
Engine coolant level		I	I	I	I	I	I	I	I	I	I	I	I
FUEL SYSTEM													
Idle speed							I						I
Air cleaner element			I*1				R			I*1			R
Fuel lines & hoses	*1						I						I
Hoses & tubes for emission	*1												I
IGNITION SYSTEM													
Spark plugs							R						R
ELECTRICAL SYSTEM													
Function of all lights		I	I	I	I	I	I	I	I	I	I	I	I
CHASSIS & BODY													
Brake lines, hoses & connections							I						I
Brake & clutch fluid level		I	I	I	I	I	I	I	I	I	I	I	I
Disc brakes			I				I			I			I
Drum brakes							I						I
Tire inflation pressure & tire wear		I	I	I	I	I	I	I	I	I	I	I	I
Steering operation & linkages							I						I
Power steering fluid level		I	I	I	I	I	I	I	I	I	I	I	I
Front suspension ball joints							I						I
Driveshaft dust boots							I						I
Bolts & nuts on chassis & body			I				I			I			I
Exhaust system heat shields							I						I
All locks & 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
AIR CONDITIONER SYSTEM (if installed)													
Refrigerant amount				I			I			I			I
Compressor operation				I			I			I			I

GENERAL INFORMATION

Chart symbols

- I : Inspect and repair, clean, adjust, or replace if necessary. (Oil-permeated air cleaner elements cannot be cleaned using the air-blow method.)
R : Replace
L : Lubricate

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Remarks

- After the described period, continue to follow the described maintenance at the recommended intervals.
 - Refer below for a description of items marked * in the maintenance chart.
- *1 : According to state and federal regulations, failure to perform maintenance on these items will not void your emissions warranties. However, Mazda recommends that all maintenance services be performed at the recommended time or mileage period to ensure long-term reliability.
- *2 : If vehicle is operated in cold districts **{below -18 °C (0 °F)}**, replace the timing belt at 96,000 km **(60,000 miles)**.