

# 1996 Mazda MPV Workshop Manual

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## **WARNING**

Servicing a vehicle can be dangerous. If you have not received service-related training, the risks of injury and property damage 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 servicing operations. However, all users of this manual are expected 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. Nonrecommended procedures and tools should include consideration for safety of the technician and continued safe operation of the vehicle.

Parts should be replaced with genuine Mazda replacement parts, not parts of lesser quality. Use of a nonrecommended replacement part should include consideration for safety of the technician and continued safe operation of the vehicle.

# 1996 Mazda MPV Workshop Manual

## FOREWORD

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

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

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) shown on the following page.

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## VEHICLE IDENTIFICATION NUMBERS (VIN)

2WD WAGON  
JM3 LV522\*T0 800001—

4WD WAGON  
JM3 LV523\*T0 800001—

# GENERAL INFORMATION

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## SAFETY INFORMATION

### LUBRICANTS

Avoid prolonged and repeated contact with petroleum-based oils. Used oil may irritate the skin, and can cause skin cancer and other skin disorders.

Wash thoroughly after working with oil. We recommend water-soluble hand cleaners. Do not use kerosene, gasoline, or any other solvent to remove oil from your skin.

If repeated or prolonged contact with oil is necessary, wear protective clothing. Soiled clothing, particularly those soiled with used oils and greases containing lead, should be cleaned at regular intervals.

### JACKING POSITIONS

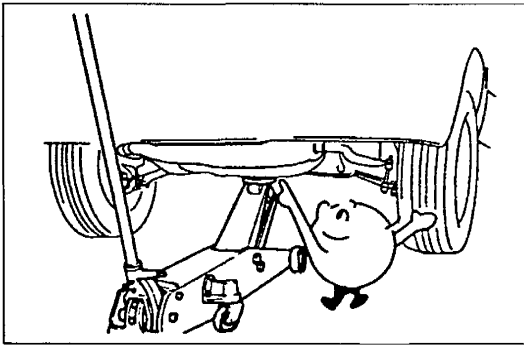
#### Warning

- **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.

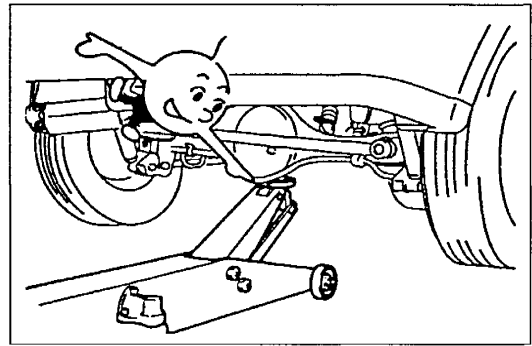
#### Front

At the center of the crossmember



#### Rear

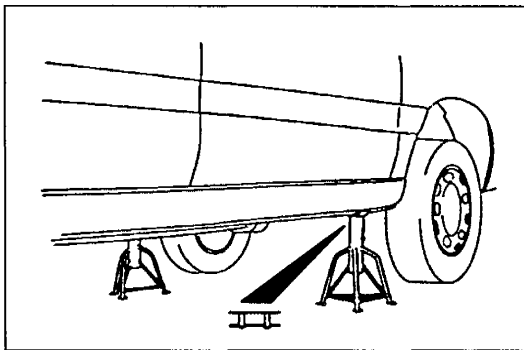
At the center of the crossmember



### SAFETY STAND AND VEHICLE LIFT POSITIONS

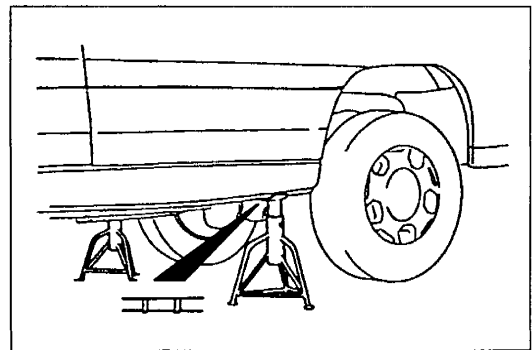
#### Front

Both sides of the vehicle



#### Rear

Both sides of the vehicle



**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.

**COMPRESSED AIR**

When using compressed air to clean or remove parts:

- Wear protective eye wear.
- Hold a rag over the opening to prevent parts from shooting out.
- Take precautions so that people around you are not struck by flying debris.

**HOW TO USE THIS MANUAL****ADVISORY MESSAGES**

You'll find several **Warnings**, **Cautions**, and **Notes** in this manual.

**Warning**

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

**Caution**

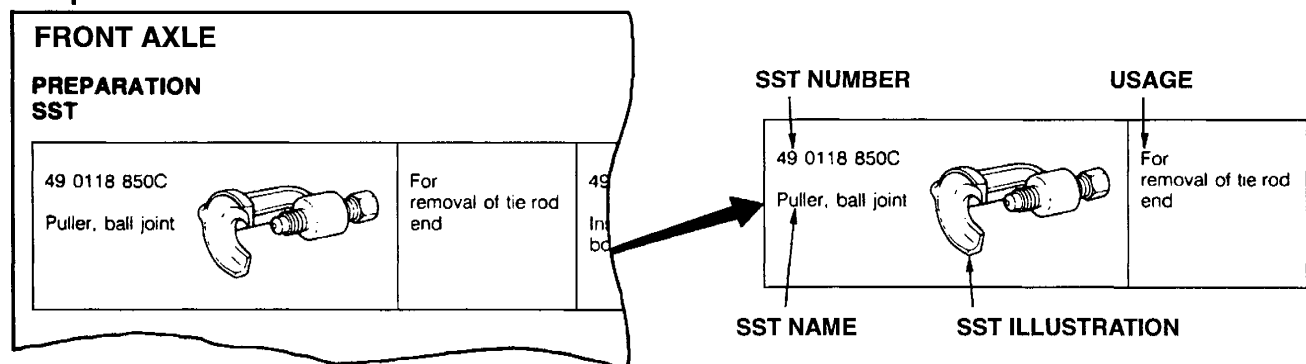
- A **Caution** indicates a situation in which damage to the vehicle could result if the caution is ignored.

**Note**

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

**PREPARATION**

This points out the needed **SSTs** for the service operation. It is best to gather all necessary **SSTs** before beginning work.

**Example:****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. If a damaged or worn part is found, repair or replace it as necessary.
2. Expendable parts, tightening torques, and symbols for oil, grease, and sealant are shown in the overview illustration.
3. Pages related to service procedures are shown under the illustration. Refer to this information when servicing the related part.

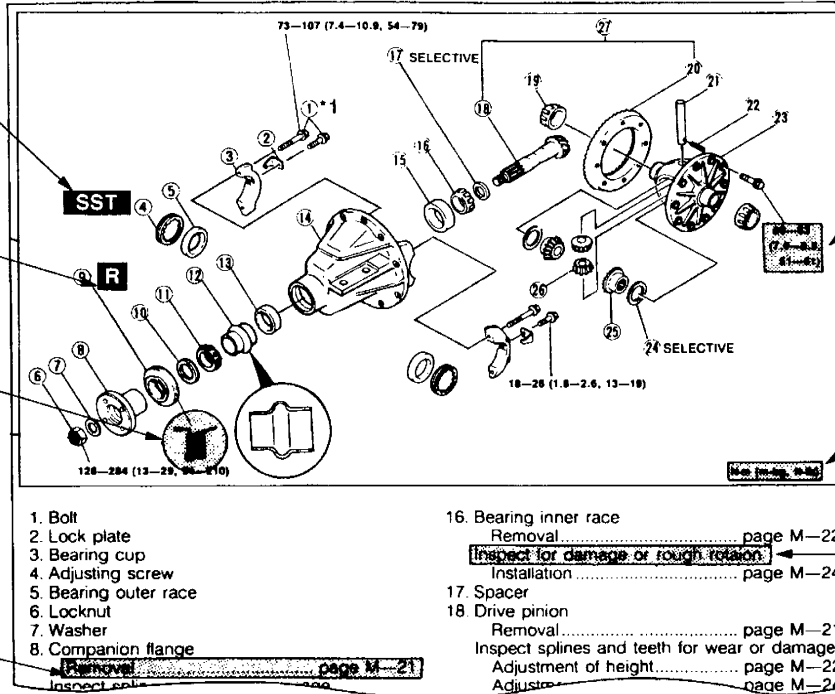
### Example:

SHOWS SPECIAL SERVICE TOOL (SST) FOR THE SERVICE OPERATION

SHOWS EXPENDABLE PARTS

SHOWS APPLICATION POINT OF OIL, ETC.

SHOWS RELATED PAGE FOR SERVICE



SHOWS TIGHTENING TORQUE SPECIFICATIONS

SHOWS TIGHTENING TORQUE UNITS

SHOWS VISUAL INSPECTION INFORMATION

\*1: The numbers (①, etc.) refer to part identification and servicing procedures.

### SYMBOLS

There are six symbols indicating oil, grease, and sealant. These symbols show the points of applying such materials during service.

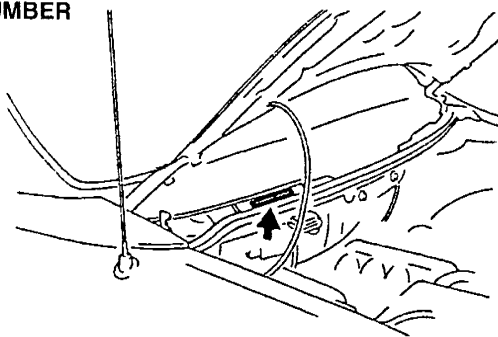
Symbol	Meaning	Kind
	Apply oil	New engine oil or gear oil as appropriate
	Apply brake fluid	FMVSS116: DOT-3
	Apply automatic transaxle fluid	M-III or Dexron®II
	Apply grease	Appropriate grease
	Apply sealant	Appropriate sealant
	Apply petroleum jelly	Appropriate petroleum jelly



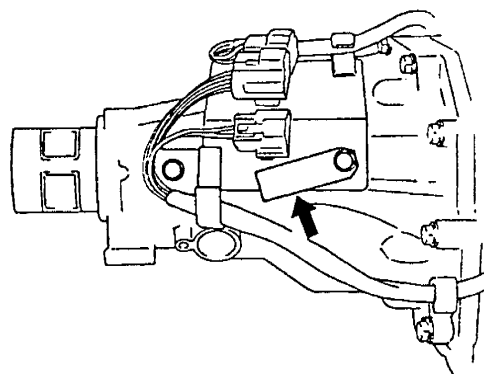
IDENTIFICATION NUMBER LOCATIONS

GI

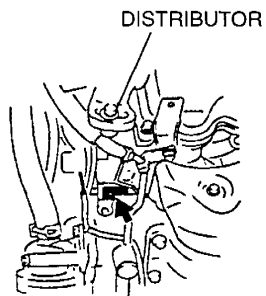
VEHICLE IDENTIFICATION NUMBER



AUTOMATIC TRANSMISSION MODEL AND NUMBER



ENGINE MODEL AND NUMBER



## UNITS

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

**Conversion to SI Units (Système International d'Unités)**

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

**Rounding off**

Converted values are rounded off to the same number of places 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/cm<sup>2</sup> in the following specifications:

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

The actual converted values for 2.7 kgf/cm<sup>2</sup> 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.

**ABBREVIATIONS**

ABDC	After bottom dead center
ABS	Antilock brake system
ACC	Accessories
AFW	Automatic freewheel
ALL	Automatic load leveling
AT	Automatic transmission
ATDC	After top dead center
ATF	Automatic transmission fluid
BAC	Bypass air control
BARO V	Barometric pressure signal voltage
BAROTCM	Barometric pressure signal (TCM)
BBDC	Before bottom dead center
B/L	Bi-level
BRK SW	Brake switch
BTDC	Before top dead center
CDCV	Canister drain cut valve
CM	Control module
CPU	Central processing unit
D	Drive
DEF	Defrost
DRL	Daytime running lights
EC-AT	Electronically controlled automatic transmission
ECT V	Engine coolant temperature signal voltage
E/L	Electrical load
EX	Exhaust
FAT	FAT terminal (data link connector)
FHO2S	Heated oxygen sensor (front)
FHO2SH	Heated oxygen sensor heater (front)
FTL V	Fuel tank level signal voltage
FTP	Fuel tank pressure
FTP V	Fuel tank pressure signal voltage
H/D	Heat/Def
HEAT	Heater
HI	High
HLA	Hydraulic lash adjuster
HU	ABS hydraulic unit
IACV	Idle air control valve
IAT V	Intake air temperature signal voltage
IATDC	Intake air temperature (dynamic chamber)
IATDC V	Intake air temperature signal voltage (dynamic chamber)
IC	Integrated circuit
IGN	Ignition
IG SW	Ignition switch
IGT	Ignition timing
IN	Intake
INJ	Fuel injection duration
INJ#1	Fuel injector (cylinder No.1)
INT	Intermittent
LH	Left hand
LO	Low
M	Motor
N	Neutral
OFF	Switch off
ON	Switch on
P	Park
PCV	Positive crankcase ventilation
PRC	Pressure regulator control
PRCV	PRC solenoid valve
PRGV	Purge solenoid valve
P/S	Power steering
R	Reverse
RABS	Rear-wheel antilock brake system
REC	Recirculate
RH	Right hand
RHO2S	Heated oxygen sensor (rear)
RLY	relay
RPM	Engine speed
SAS	Sophisticated air bag sensor
SST	Special service tool

ST	Start
SW	Switch
TAT	TAT terminal (data link connector)
TEN	TEN terminal (data link connector)
TDC	Top dead center
TNS	Tail-, parking, and license plate lights
TPCV	Tank pressure control valve
TP V	Throttle position sensor signal voltage
TR SW	Transmission range switch
VAF V	Volume air flow signal voltage
VRIS	Variable resonance induction system
VRISV1	VRIS solenoid valve No.1
VS	Vehicle speed
2WD	2-wheel drive
4WD	4-wheel drive

## 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.

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

#1: Directly connected to exhaust manifold.

#2: In some models, there is a fuel pump relay that controls pump speed. That relay is now called the fuel pump relay (speed).

#3: Controlled by the ECM (PCM).

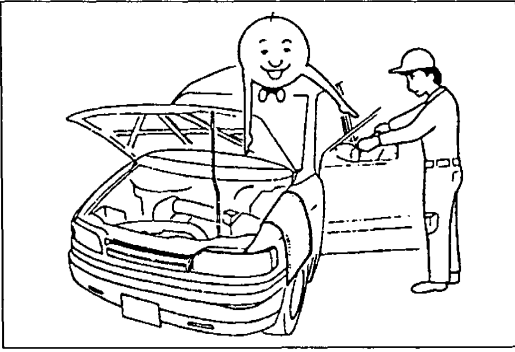
#4: Device that controls engine and powertrain.

Previous Standard		SAE Standard		
Abbreviation	Name	Abbreviation	Name	Remark
—	IC Regulator	VR	Voltage Regulator	
—	Idle Speed Control	IAC	Idle Air Control	
—	Idle Switch	—	Closed Throttle Position Switch	
—	Igniter	ICM	Ignition Control Module	
—	Inhibitor Position	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 Position	TCC	Torque Converter Clutch	
—	Malfunction Indicator Light	MIL	Malfunction Indicator Lamp	
—	Multipoint Fuel Injection	MFI	Multipoint Fuel Injection	
—	Open Loop	OL	Open Loop	
—	Overdrive	4GR	Fourth Gear	
—	Oxygen Sensor	HO2S	Heated Oxygen Sensor	With heater
		O2S	Oxygen Sensor	
—	Park/Neutral Range	PNP	Park/Neutral Position	
—	Power Steering Pressure	PSP	Power Steering Pressure	
—	Pulse Generator	—	Input/Turbine Speed Sensor	
—	Reed Valve	SAPV	Secondary Air Pulse Valve	
—	Secondary Air Injection System	PAIR	Pulsed Secondary Air Injection	Pulsed injection
		AIR	Secondary Air Injection	Inject with compressor
		SFI	Sequential Multipoint Fuel Injection	
—	Sequential Fuel Injection	SFI	Sequential Multipoint Fuel Injection	
—	Service Code(s)	DTC	Diagnostic Trouble Code(s)	
—	Spark Ignition	DI	Distributor Ignition	
—	Stoplight Switch	—	Brake Switch	
—	Test Mode	DTM	Diagnostic Test Mode	#5
—	Throttle Body	TB	Throttle Body	
—	Throttle Sensor	TP	Throttle Position Sensor	
—	Turbocharger	TC	Turbocharger	
—	Vehicle Speed Sensor	VSS	Vehicle Speed Sensor	
—	Vehicle Speed Sensor 1	—	Output Speed Sensor	
—	Water Thermo	ECT	Engine Coolant Temperature	
—	1-2 Shift Solenoid Valve	—	Shift 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	

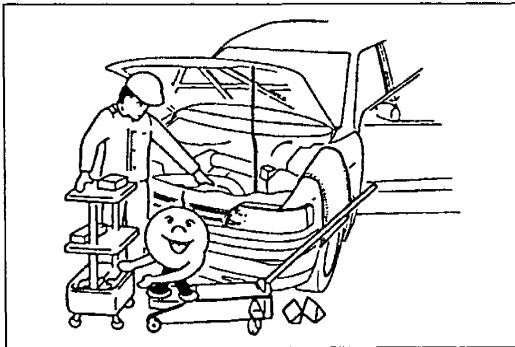
#5: Diagnostic trouble codes depend on the diagnostic test mode.

**FUNDAMENTAL PROCEDURES****PROTECTION OF THE VEHICLE**

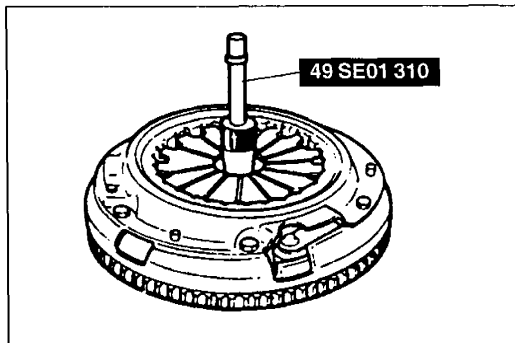
Always be sure to cover fenders, seats, and floor areas before starting work.

**PREPARATION OF TOOLS AND MEASURING EQUIPMENT**

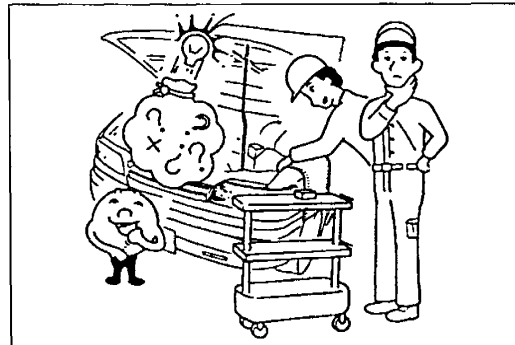
Be sure that all necessary tools and measuring equipment are available before starting any work.

**SPECIAL TOOLS**

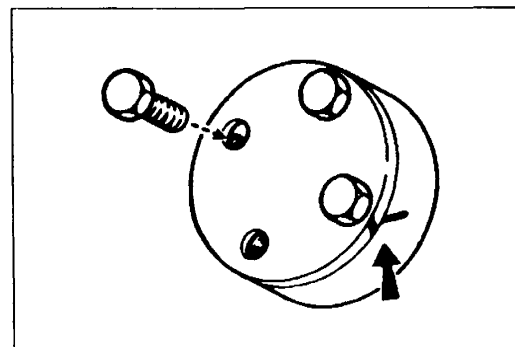
Use special tools when they are required.

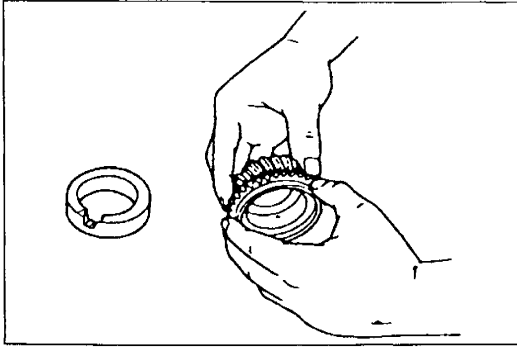
**REMOVAL OF PARTS**

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

**DISASSEMBLY**

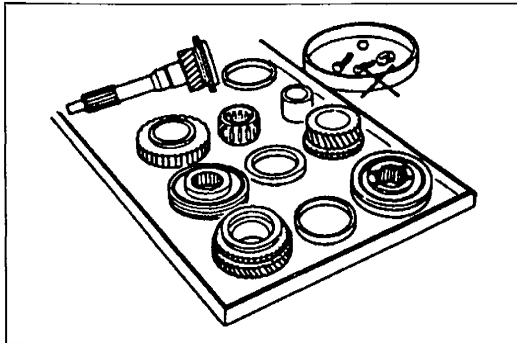
If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be disassembled in a way that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.





**1. Inspection of parts**

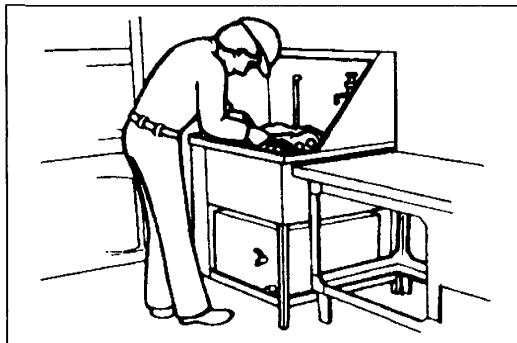
When removed, each part should be carefully inspected for malfunctioning, deformation, damage, and other problems.



**2. 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.

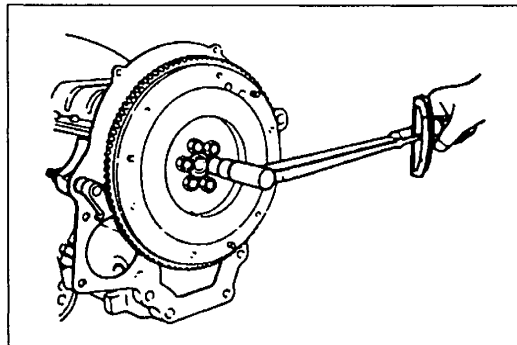


**3. Cleaning parts for reuse**

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

**Warning**

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



**REASSEMBLY**

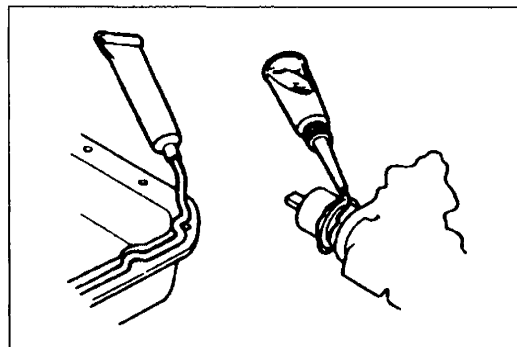
Standard values, such as torques and certain adjustments, must be strictly observed in the reassembly of all parts.

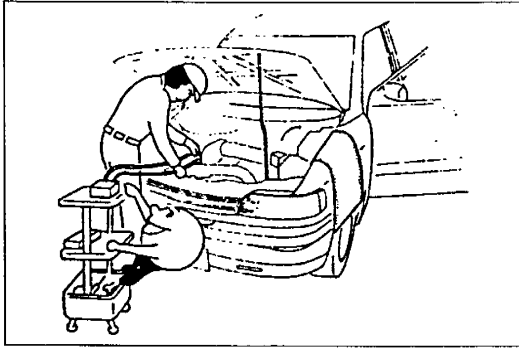
If removed, these parts should be replaced with new ones:

- |                |                 |
|----------------|-----------------|
| 1. Oil seals   | 2. Gaskets      |
| 3. O-rings     | 4. Lock washers |
| 5. Cotter pins | 6. Nylon nuts   |

Depending on location:

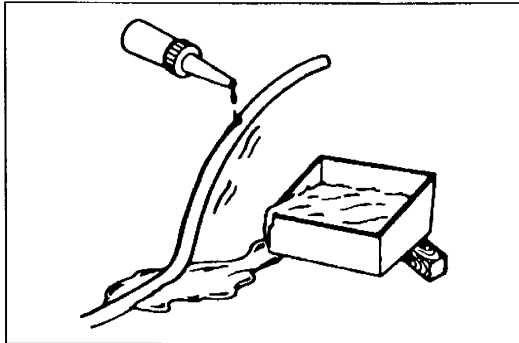
1. Sealant should be applied to gaskets.
2. Oil should be applied to the moving components of parts.
3. Specified oil or grease should be applied at the prescribed locations (such as oil seals) before reassembly.





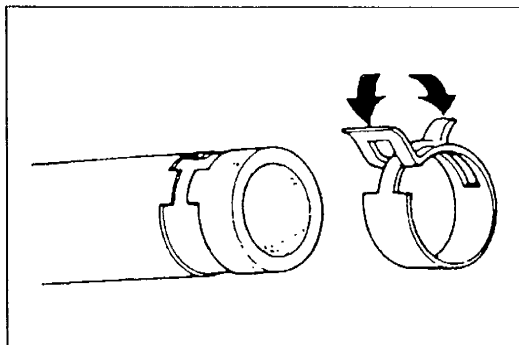
### ADJUSTMENTS

Use suitable gauges and testers when making adjustments.



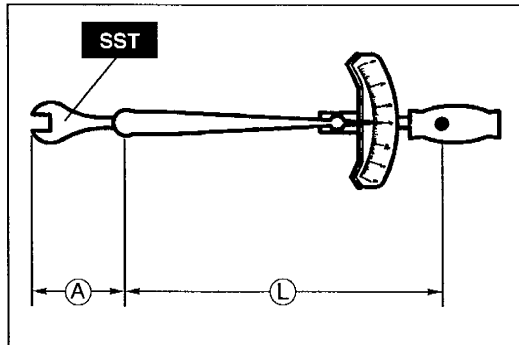
### RUBBER PARTS AND TUBING

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



### HOSE CLAMPS

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



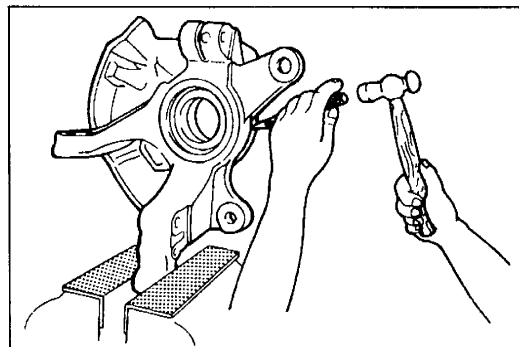
### TORQUE FORMULAS

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

Torque Unit	Formula
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.

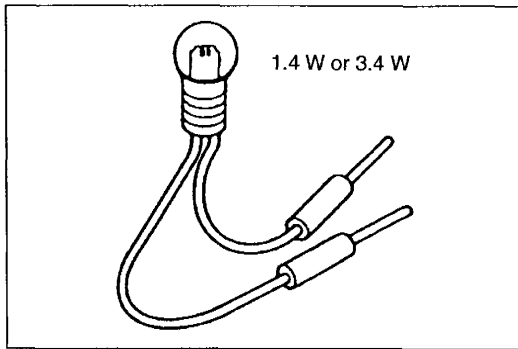
L = The length of the torque wrench.



### WISE

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





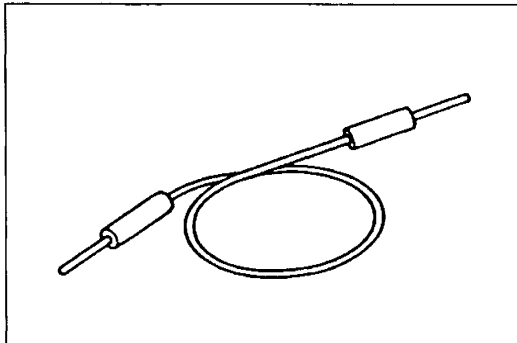
## ELECTRICAL TROUBLESHOOTING TOOLS

### 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 module may damage the control module.

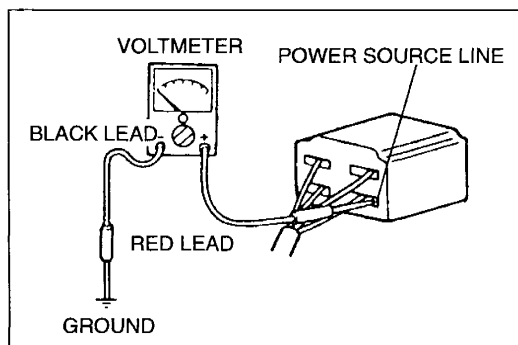


### JUMPER WIRE

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

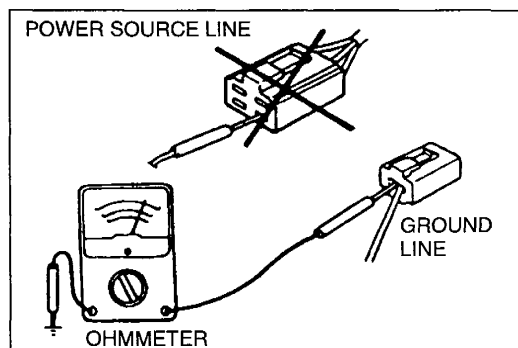
#### Caution

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



### VOLTMETER

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

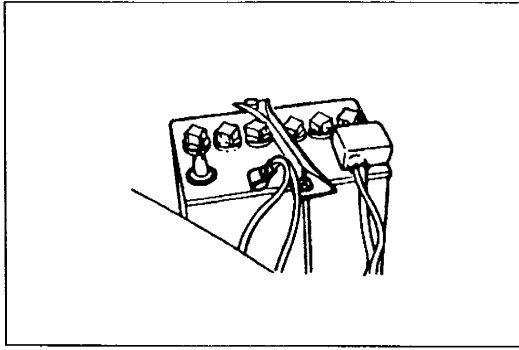


### OHMMETER

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

#### Caution

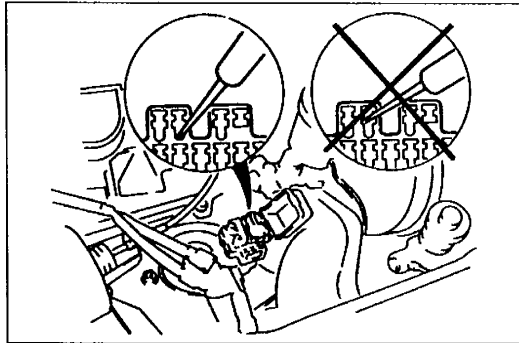
- Do not connect the ohmmeter to any circuit to which voltage is applied. This will damage the ohmmeter.



**ELECTRICAL PARTS**

**BATTERY CABLE**

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



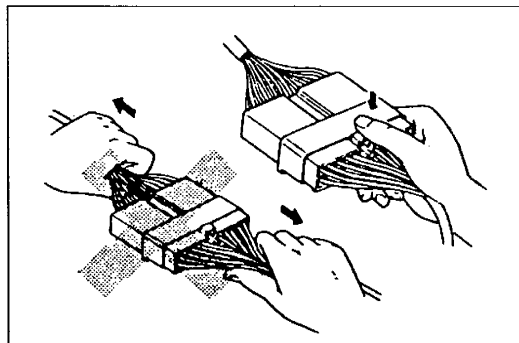
**CONNECTORS**

**Data Link Connector**

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

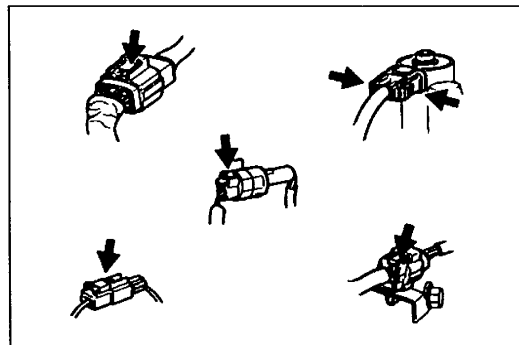
**Caution**

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

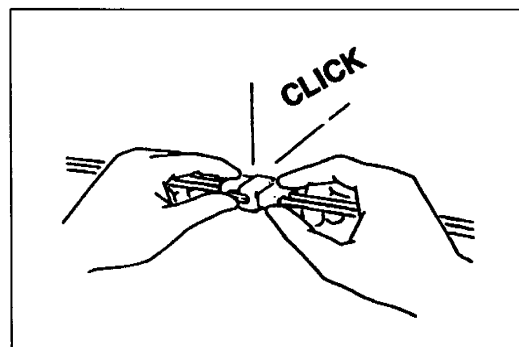


**Disconnecting Connectors**

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

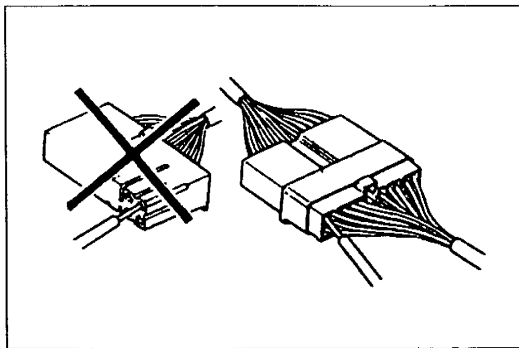


Connectors can be disconnected by pressing or pulling the lock lever as shown.

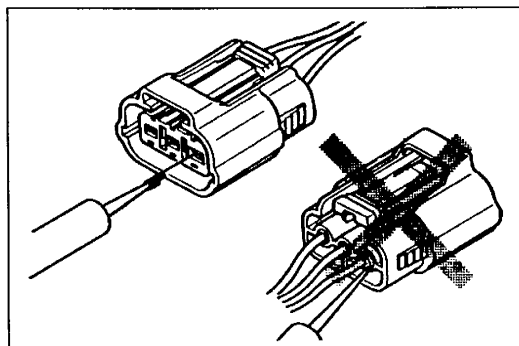


**Locking Connector**

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

**Inspection**

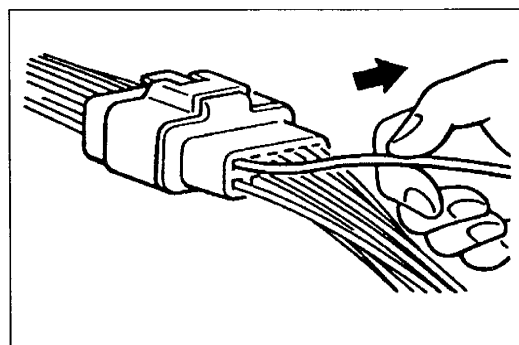
1. When a tester is used to check for continuity or to measure voltage, insert the tester probe from the wiring harness side.



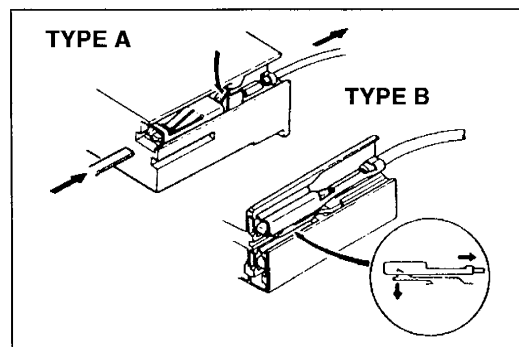
2. Check the terminals of waterproof connectors from the connector side, as they cannot be accessed from the wiring harness side.

**Caution**

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

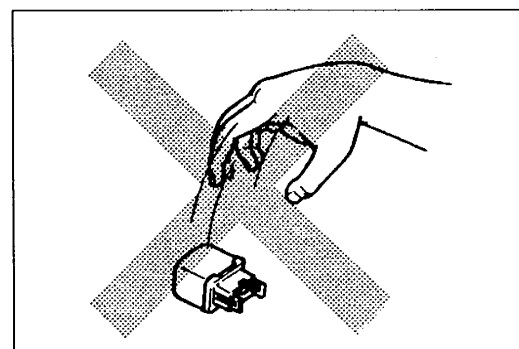
**TERMINALS****Inspection**

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

**Replacement**

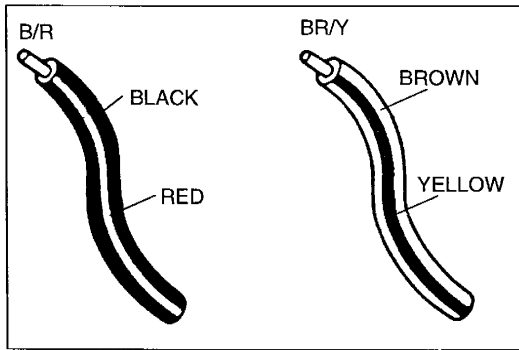
Use the appropriate tools to remove a terminal as shown. When installing a terminal, be sure to insert it until it locks securely.

Insert a thin piece of metal from the terminal side of the connector, and then, with the terminal locking tab pressed down, pull the terminal out from the connector.

**SENSORS, SWITCHES, AND RELAYS**

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

## ELECTRICAL PARTS



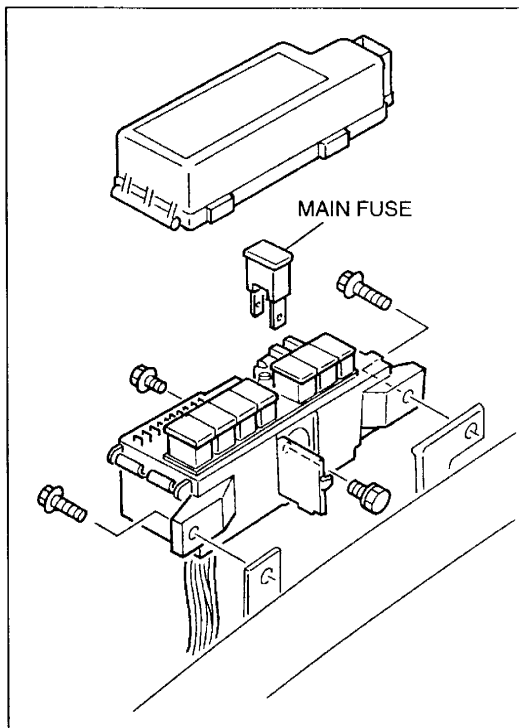
### WIRING HARNESS

#### 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	—	—



### MAIN FUSE

#### Removal / Installation

1. Disconnect the negative battery cable.
2. Remove the main fuse block cover.
3. Remove the main fuse block mounting nuts.
4. Remove the main fuse mounting bolts.
5. Remove the MAIN fuse.
6. Install in the reverse order of removal.