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ORIGINAL HARDCOPY VERSION.

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THIS MANUAL. THIS MANUAL IS FOR EXPERIENCED MECHANICS
AND IS TO BE USED AT YOUR OWN RISK!



1993 Mazda RX-7 Workshop Manual

FOREWORD

This workshop manual is intended for use by service technicians of Authorized Mazda Dealers to help them service Mazda vehicles. It can also be useful to owners and operators of Mazda vehicles in diagnosing some problems and performing limited repair and maintenance on Mazda vehicles.

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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**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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* Refer to the 1993 RX-7 Body Electrical Troubleshooting manual (form No. 1312-10-91L) for servicing of the body electrical components.

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VEHICLE IDENTIFICATION NUMBERS (VIN)

JM1FD 331*PO 200001 ~

JM1FD 332*PO 200001 ~

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IMPORTANT INFORMATION**BASIC ASSUMPTIONS**

This workshop manual assumes that you have certain special tools that are necessary for the safe and efficient performance of service operations on Mazda vehicles and that you know how to use them properly. It also assumes that you are familiar with automobile systems and basic service and repair procedures. You should not attempt to use this manual unless these assumptions are correct and you understand the consequences described below.

SAFETY RISK

This manual contains certain notes, warnings, and other precautionary information that you should carefully read and follow to reduce the risk of personal injury to yourself or others and the risk of improper service that may damage the vehicle or render it unsafe. If there is no such information in regard to any specific service method, this does not mean there is no possibility that personal safety or vehicle safety will be jeopardized by the use of incorrect methods or tools.

POSSIBLE LOSS OF 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.

WARNING ON LUBRICANTS AND GREASES

Avoid all prolonged and repeated contact with mineral oils, especially used oils. Used oils contaminated during service (e.g., engine sump oils) are more irritating and more likely to cause serious effects, including skin cancer, in the event of gross and prolonged skin contact.

Wash skin thoroughly after work involving oil.

Protective hand cleaners may be of value provided they can be removed from the skin with water. Do not use gasoline, paraffin, or other solvents to remove oil from the skin.

Lubricants and greases may be slightly irritating to the eyes.

Repeated or prolonged skin contact should be avoided by wearing protective clothing if necessary. Particular care should be taken with used oils and greases containing lead. Do not allow work clothing to be contaminated with oil. Dry clean or launder such clothing at regular intervals.

9MUGIX-002

HOW TO USE THIS MANUAL



PREPARATION

PREPARATION points out the needed SST for the service operation that follows. It is best to gather all necessary SST before beginning work.

Example:

N ENGINE SPEED SENSING POWER STEERING
ENGINE SPEED SENSING POWER STEERING


PREPARATION

49 0118 850C Puller, ball joint		49 H028 301 Installer, boot	
------------------------------------	---	--------------------------------	---

9MAJDNX-030

SST NUMBER
49 H028 301

SST NAME
Installer, boot

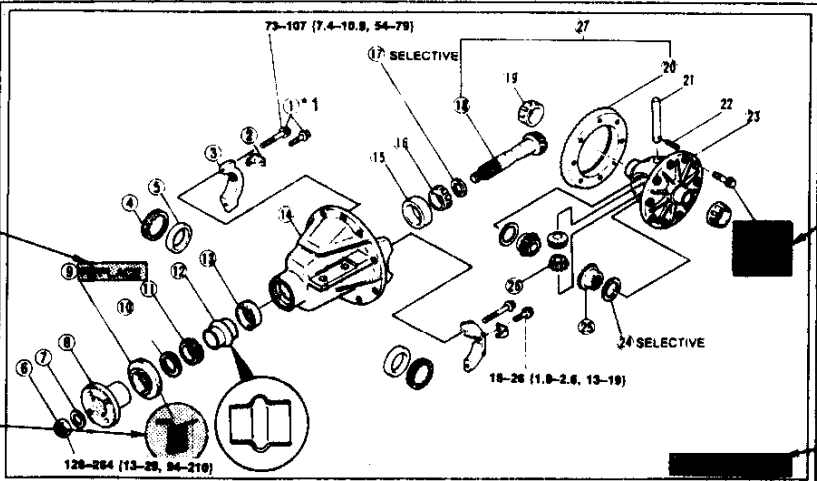
SST ILLUSTRATION


9MUGIX-033

REPAIR PROCEDURE

1. Most repair operations begin with an overview illustration. It identifies the components, shows how the parts fit together, and describes visual parts inspections. 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 EXPENDABLE PARTS

SHOWS TIGHTENING TORQUE SPECIFICATION *2

SHOWS APPLICATION POINT OF OIL, ETC.

SHOWS TIGHTENING TORQUE UNIT

SHOWS VISUAL INSPECTION INFORMATION







SHOWS RELATED PAGE FOR SERVICE

1. Bolt	16. Bearing inner race	Removal..... page M-22
2. Lock plate	Installation for damage or wear.....	page M-24
3. Bearing cup	17. Spacer	Installation..... page M-24
4. Adjusting screw	18. Drive pinion	Removal..... page M-21
5. Bearing outer race	Inspect splines and teeth for wear or damage	Adjustment of height..... page M-22
6. Locknut	Adjustment.....	page M-24
7. Washer		
8. Companion flange		

* 1: The numbers (① ex.) refer to parts identification and where necessary servicing procedure.
 * 2: Units are in N·m {kgf·m, ft·lb} unless otherwise specified.

SYMBOLS

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

Symbol	Meaning	Kind
	Apply oil	New engine oil or gear oil as appropriate
	Apply brake fluid	Only brake fluid
	Apply automatic transmission fluid	Only ATF
	Apply grease	Appropriate grease
	Apply sealant	Appropriate sealant
	Apply petroleum jelly	Petroleum jelly

07UGIX-002

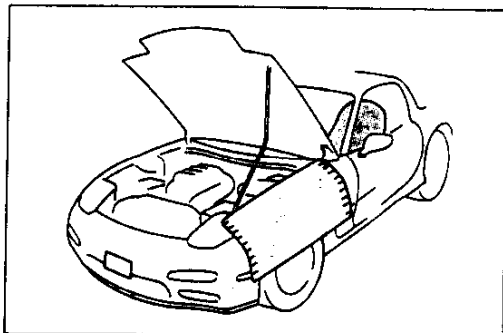
Note

- When specific oil or grease is needed, this is shown in the illustration.

NOTES, CAUTIONS, AND WARNINGS

As you read through the procedures, you will come across NOTES, CAUTIONS, and WARNINGS. Each one is there for a specific purpose. **NOTES** give you **added information** that will help you to complete a particular procedure. **CAUTIONS** are given to prevent you from making an error that could **damage the vehicle**. **WARNINGS** remind you to be especially careful in those areas where carelessness can cause **personal injury**. The following list contains some general **WARNINGS** you should follow when you work on a vehicle.

9MUGIX-036

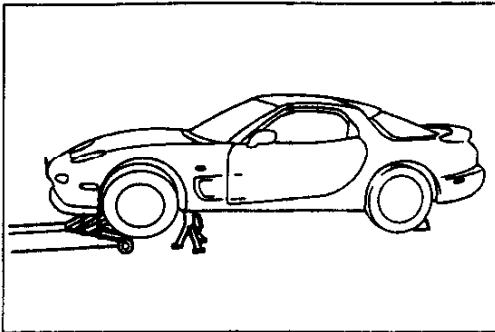


9MUGIX-037

FUNDAMENTAL PROCEDURES

PROTECTION OF THE VEHICLE

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



9MUGIX-003

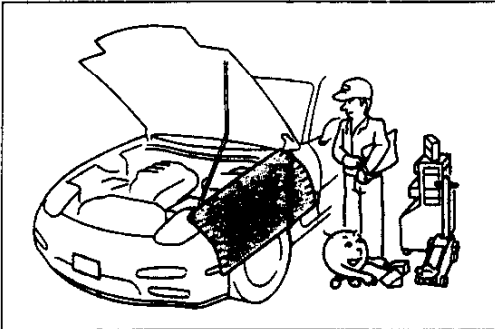
A WORD ABOUT SAFETY

The following precautions must be followed when jacking up the vehicle.

1. Block the wheels.
2. Use only the specified jacking positions.
3. Support the vehicle with safety stands.



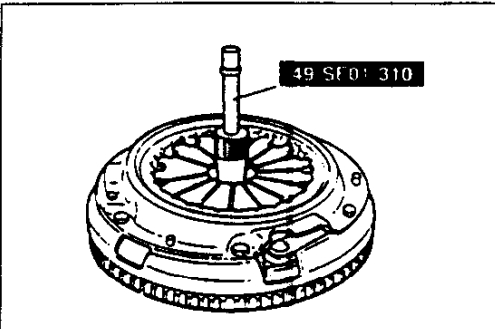
Start the engine only after making certain the engine compartment is clear of tools and people.



9MUGIX-038

PREPARATION OF TOOLS AND MEASURING EQUIPMENT

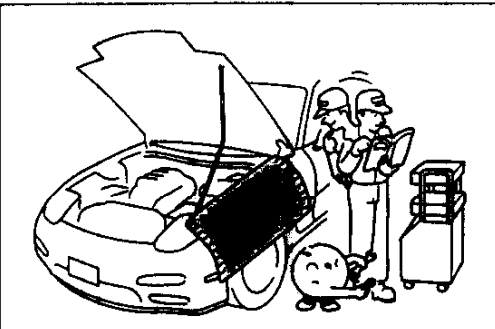
Be sure that all necessary tools and measuring equipment are available before starting any work.



9MUGIX-003

SPECIAL TOOLS

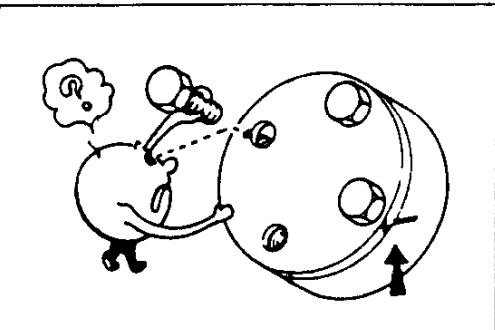
Use Special Service Tools (**SST**) when they are required.



47UGIX-006

REMOVAL OF PARTS

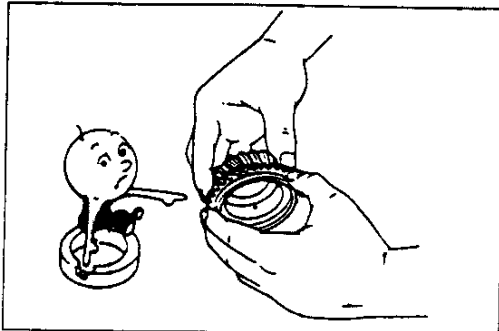
While correcting a problem, try also to determine its cause. Begin work only after first learning which parts and subassemblies must be removed and disassembled for replacement or repair.



9MUGIX-039

DISASSEMBLY

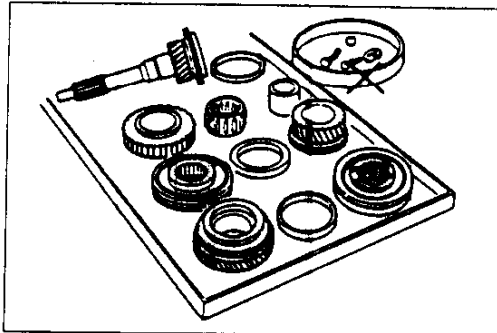
If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be disassembled in a way that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



9MUGIX-040

1. Inspection of parts

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

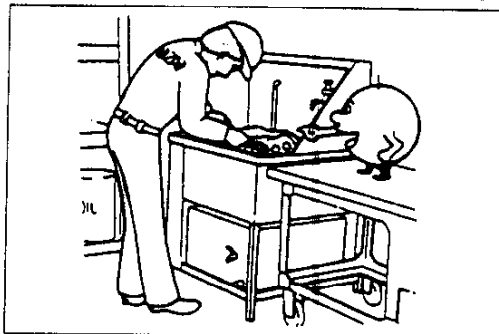


9MUGIX-041

2. Arrangement of parts

All disassembled parts should be carefully arranged for reassembly.

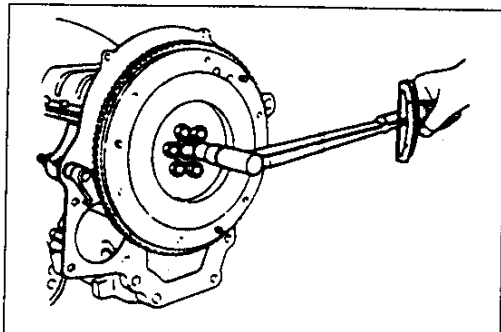
Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.



47U0GX-010

3. Cleaning parts for reuse

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



9MUGIX-004

REASSEMBLY

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

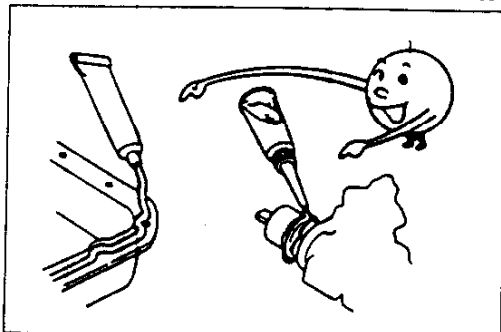
Refer to STANDARD BOLT AND NUT TIGHTENING TORQUE in Section TD for tightening torques not mentioned in the main text.

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

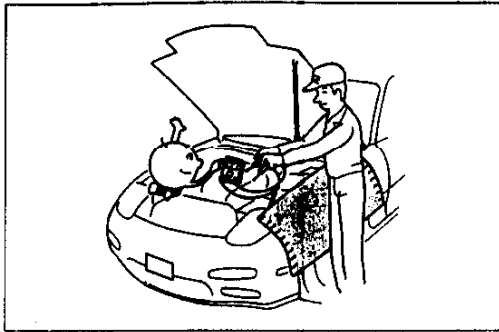
- | | |
|----------------|-----------------|
| 1. Oil seals | 2. Gaskets |
| 3. O-rings | 4. Lock washers |
| 5. Cotter pins | 6. Nylon nuts |

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.



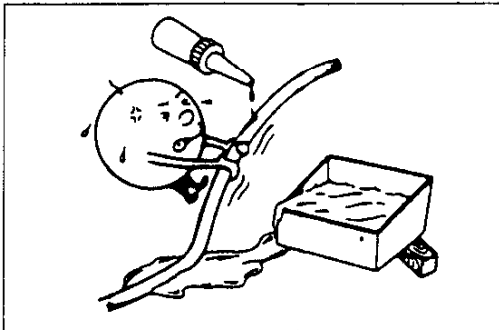
9MUGIX-042



67UGIX-002

ADJUSTMENTS

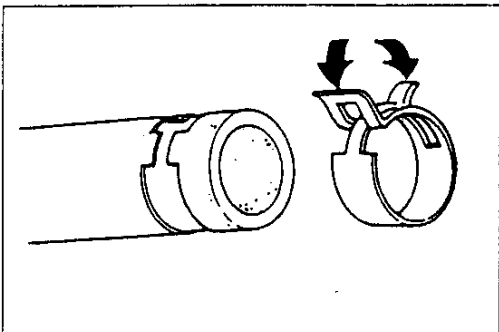
Use suitable gauges and/or testers when making adjustments.



9MUGIX-005

RUBBER PARTS AND TUBING

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



19GGIX-008

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.

CAUTIONS ON USE OF CHASSIS ROLLER

Observe the following when test-running a vehicle on a dynamometer.

- Place a cooling fan with adequate capacity in front of the vehicle.
(A vehicle speed proportional type is desirable.)
- Connect an exhaust gas ventilation unit.
- Cool around the exhaust pipes with a cooling fan.
Exhaust heat could cause thermal deformation in the rear bumper fascia.
Bumper surface temperature: 70°C {158°F} max.
- Allow adequate space in front and rear of the vehicle.
Do not let heat built up around the vehicle.
- Pay attention to the water temperature gauge readings.
Do not allow the engine to overheat.
- Avoid excessively loaded running.
Run the vehicle at a constant speed.

19GGIX-009

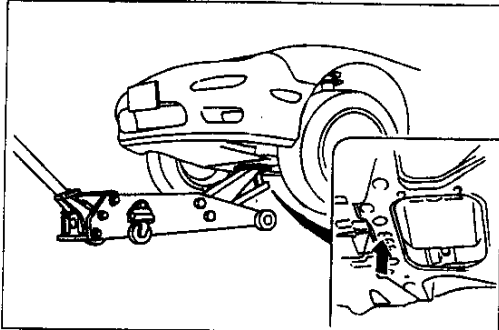
GI JACK AND SAFETY STAND POSITIONS/VEHICLE LIFT (2-SUPPORT TYPE) POSITIONS

JACK AND SAFETY STAND POSITIONS

FRONT

Jack position:

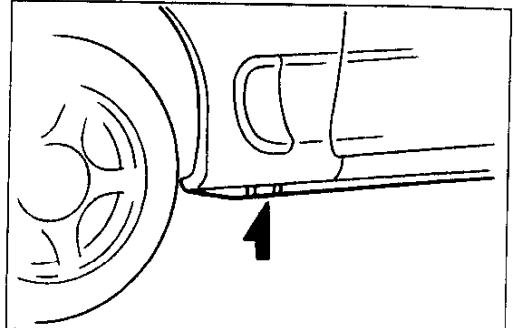
At center of crossmember



07UGIX-004

Safety stand positions:

At both sides of body frame

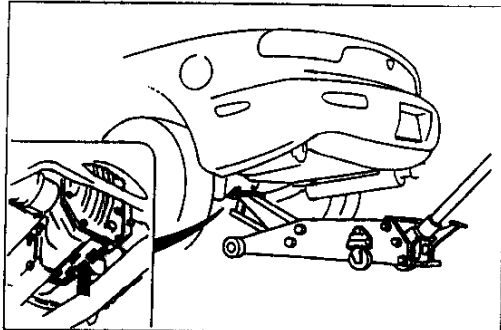


07UGIX-005

REAR

Jack position:

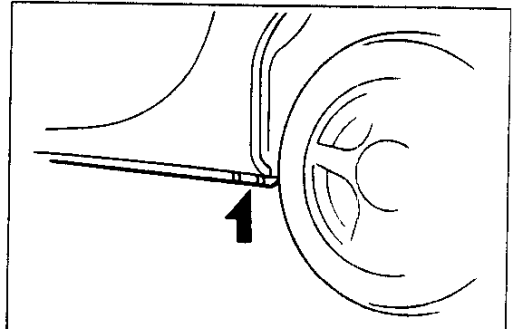
At the center of the differential



07UGIX-006

Safety stand positions:

At both sides of body frame



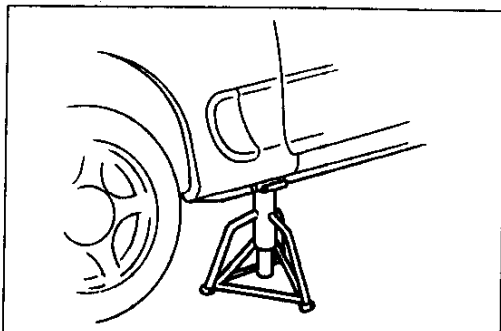
07UGIX-007

VEHICLE LIFT (2-SUPPORT TYPE) POSITIONS

FRONT END

Frame

Side sills

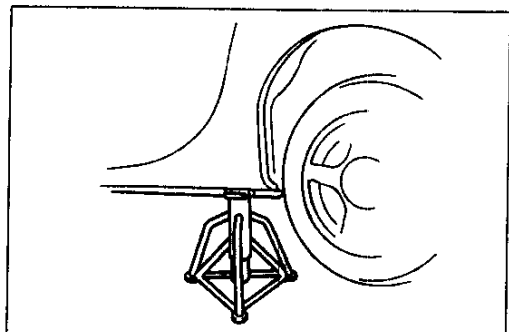


9MUGIX-010

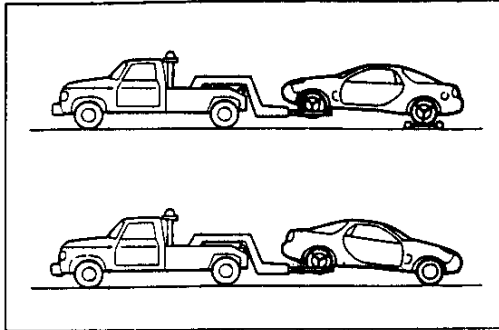
REAR END

Frame

Side sills



9MUGIX-011



07UGIX-008

TOWING

Proper towing equipment is necessary to prevent damage to the vehicle during any towing operation.

Laws and regulations applicable to vehicles in tow must always be observed.

Release the parking brake, place the shift lever/selector lever in neutral, and set the ignition switch in the ACC position. As a rule, towed vehicles should be pulled with the driving wheels raised off the ground or on a towing dolly.

WITH MANUAL TRANSMISSION

If the transmission, rear axle, and steering system are not damaged, the vehicle may be towed on all wheels if necessary. If any of these components are damaged, use a towing dolly.

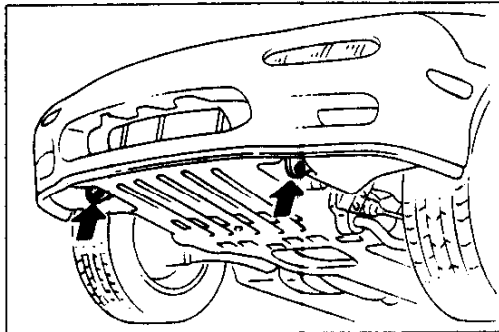
WITH AUTOMATIC TRANSMISSION

If the vehicle is towed with all wheels on the ground, it may be towed only forward. In this case, do not exceed 56 km/h {35 mph} or a distance of 56 km {35 miles} or transmission damage could result.

If towing speed will exceed 56 km/h {35 mph}, or if towing distance will exceed 56 km {35 miles}, one of these methods must be used:

1. Place the rear wheels on a dolly.
2. Tow with the rear wheels off the ground.
3. Disconnect the propeller shaft.

If the transmission or rear axle is inoperative, tow the vehicle with its rear wheels off the ground or disconnect the propeller shaft.



Caution

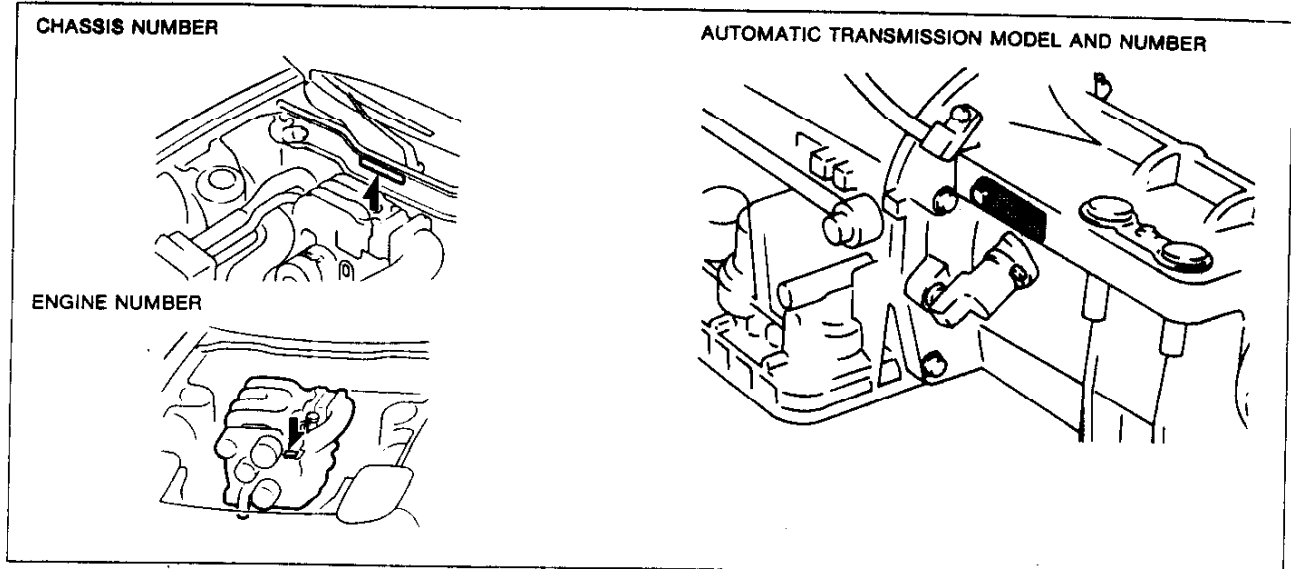
- The following points are important when the vehicle is towed with all wheels on the ground. The transmission must be in **NEUTRAL**, the ignition switch in "ACC" position, and the parking brake released. Remember that the power assist for the brakes and the steering will not be available when the engine is inoperative.

The towing hook should be used only in an emergency situation, (e.g., to pull the vehicle out of a ditch, snow bank, or mud).

When the towing hook is used, always pull on the cable or chain in a straight direction with respect to the hook. Do not apply side force to the hook. To prevent damage, do not take up slack in the cable or chain too quickly.

GI IDENTIFICATION NUMBER LOCATIONS/UNITS/ABBREVIATIONS

IDENTIFICATION NUMBER LOCATIONS



9MUGIX-015

UNITS

N·m {kgf·m or kgf·cm,	
ft·lbf or in·lbf}	Torque
rpm	Revolution per minute
A	Ampere(s)
V	Volt(s)
Ω	Ohm(s) (resistance)
kPa {kgf/cm ² , psi} ...	Pressure
	(usually positive)
kPa {mmHg, inHg} ...	Pressure
	(usually negative)
W	Watt
L {US qt, Imp qt} ...	Volume
mm {in}	Length

16EGIX-030

ABBREVIATIONS

AAS	Auto adjusting suspension
ABDC	After bottom dead center
ABS	Anti-lock braking system
A/C	Air conditioner
ACC	Accessories
ACV	Air control valve
ASV	Air supply valve
A/T	Automatic transmission
ATDC	After top dead center
ATF	Automatic transmission fluid
AWS	Accelerated warm-up system
BAC	Bypass air control
BBDC	Before bottom dead center
BTDC	Before top dead center
EC-AT	Electronically controlled Automatic Transmission
ECPS	Electronically controlled power steering

ECU	Engine control unit
EGI	Electronic gasoline injection
E/L	Electrical load
ESA	Electronic spark advance
ESPS	Engine speed sensing power steering
EX	Exhaust
IC	Integrated circuit
IGN	Ignition
IN	Intake
INT	Intermittent
ISC	Idle speed control
LH	Left hand
LSD	Limited slip differential
M	Motor
MIL	Malfunction indicator lamp
MOP	Metering oil pump
M/T	Manual transmission
OD	Overdrive
OFF	Switch off
ON	Switch on
PBV	Proportioning bypass valve
PCV	Positive crankcase ventilation
PRC	Pressure regulator control
P/S	Power steering
P/W	Power window
RH	Right hand
SST	Special service tool
ST	Start
SW	Switch
TDC	Top dead center
VDI	Variable dynamic effect intake
VRIS	Variable resonance induction system

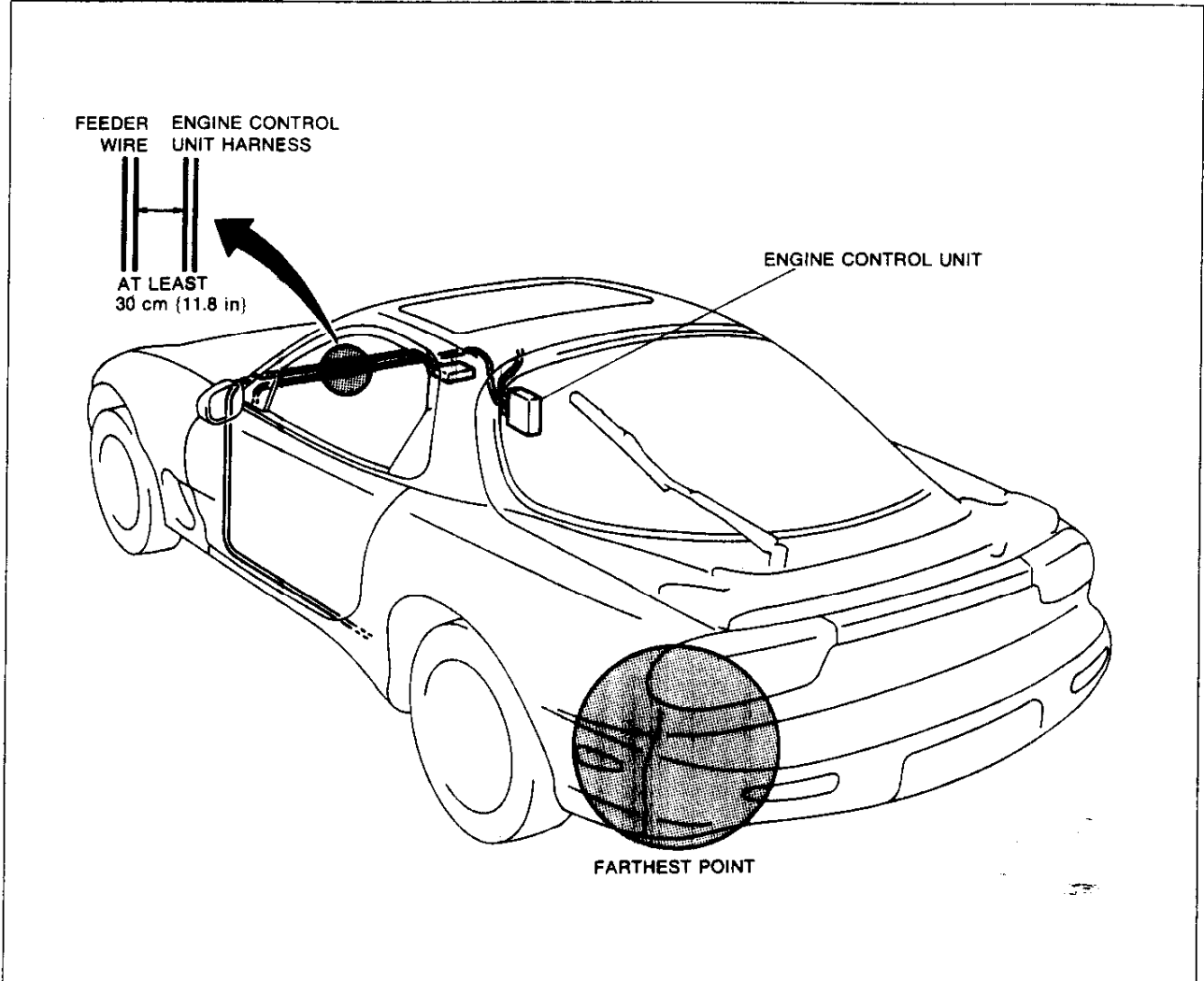
17UGIX-001

CAUTION**INSTALLATION OF MOBILE TWO-WAY RADIO SYSTEM**

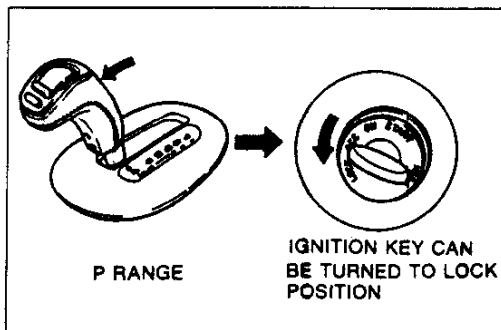
If a mobile two-way radio system is installed improperly or if a high-powered type is used, the EGI system and other systems may be affected.

When the vehicle is to be equipped with a mobile two-way radio, observe the following precautions:

1. Install the antenna at the farthest point from control units.
2. Install the antenna feeder as far as possible from the control unit harnesses (**at least 30 cm {11.8 in}**).
3. Ensure that the antenna and feeder are properly adjusted.
4. Do not install a high- powered mobile two-way radio system.



05UGIX-013

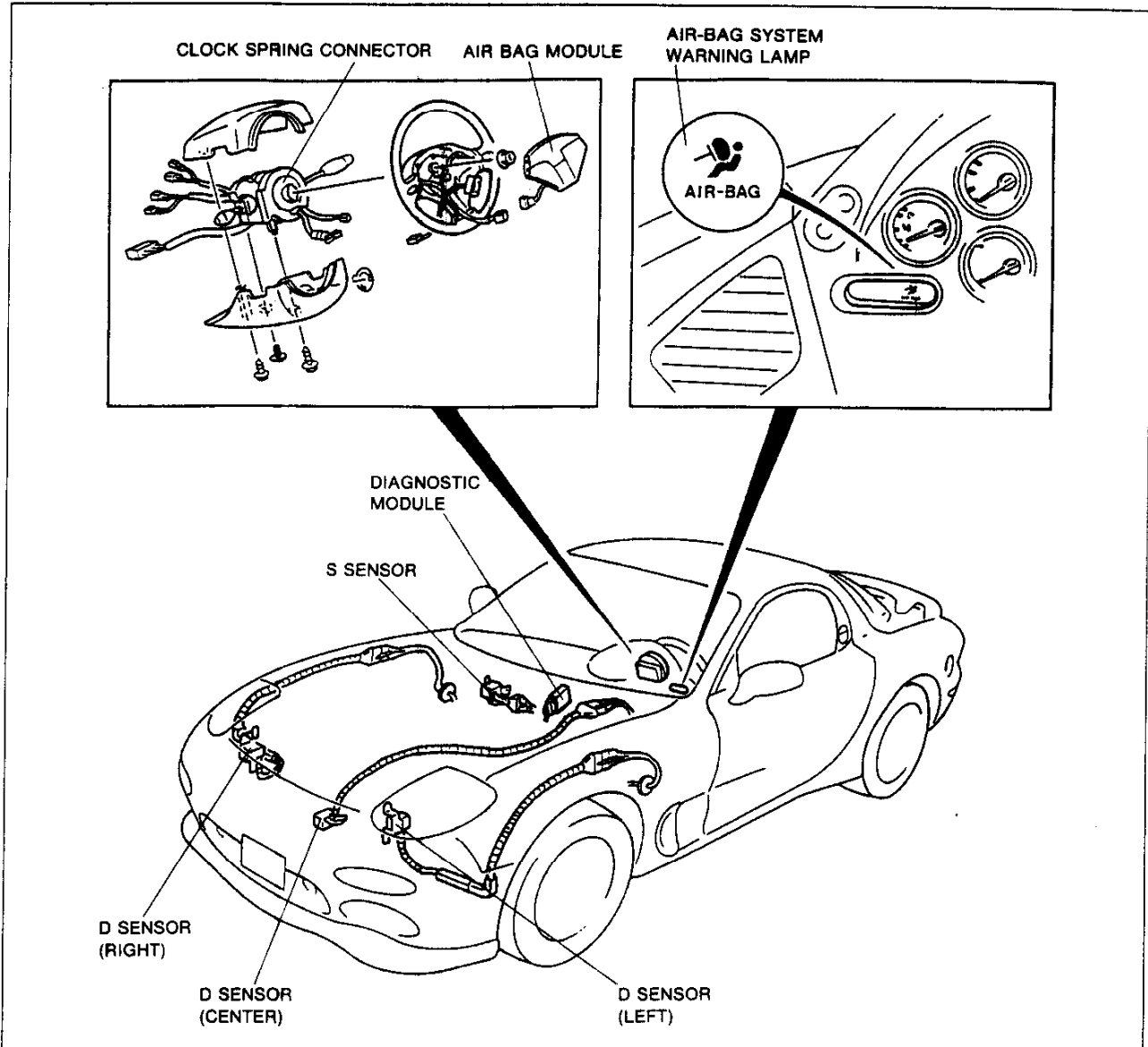


9MUGIX-018

REMOVAL OF IGNITION KEY ON AUTOMATIC TRANSMISSION MODEL

The selector lever must be in P (PARK) to turn the ignition key to the OFF position. If the switch seems to be off but the key cannot be removed, the switch may still be in the ACC position, or the selector lever may not be in P (PARK). Shift the selector lever to P (PARK), and turn the ignition key to the LOCK position. The key should now be free for removal.

SERVICE PRECAUTIONS CONCERNING AIR BAG SYSTEM



07UGIX-009

Before Replacing any Components

Before replacing of any air bag system components, or before disconnecting any connectors of the system, first disconnect the negative battery cable. Then remove the air bag module from the vehicle even if it has not failed.

Prohibition of Component Disassembly and Wiring Harness Repair

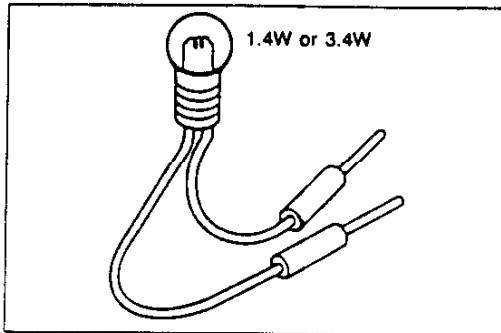
The components of the air bag system are not intended to be disassembled for service.

If a component failure is indicated by the diagnostic module, replace the suspected component after verifying the condition of the connections and the wiring harness. **Do not disassemble any components.**

If an open circuit is found by a continuity test, replace the wiring harness. **Do not attempt to repair the wiring.**

Handling of Air Bag Module

1. Do not use an ohmmeter for inspection of the air bag module; it may cause an accidental deployment.
2. When carrying a live air bag module, make sure the trim cover is pointed away from your body to prevent injury in the event of an accidental deployment.



05UGIX-019

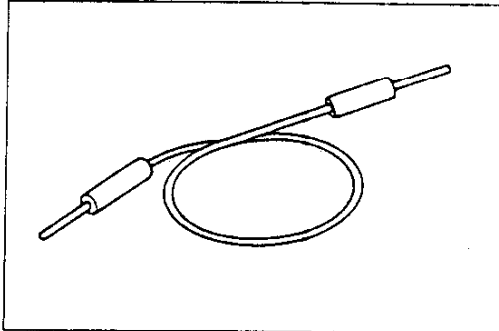
ELECTRICAL TROUBLESHOOTING TOOLS

Test Light

The test light, as shown in the figure, uses a 12V 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

- When checking a control unit, never use a bulb over 3.4W.



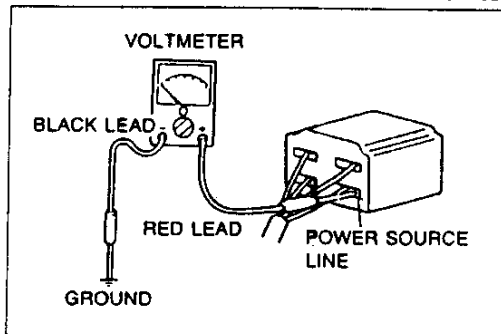
9MUGIX-020

Jumper Wire

The jumper wire is used for testing by shorting across switch terminals and ground connections.

Caution

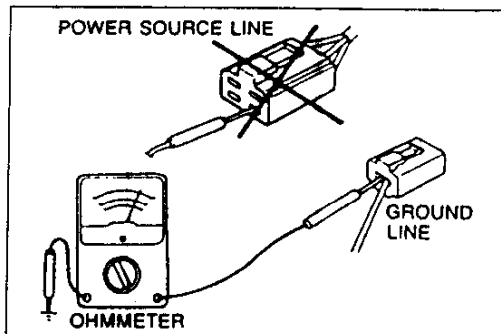
- Do not connect a jumper wire from the power source line to a body ground; this may cause burning or other damage to harnesses or electronic components.



05UGIX-020

Voltmeter

The DC voltmeter is used to measure circuit voltage. A voltmeter with a range of 15V 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.



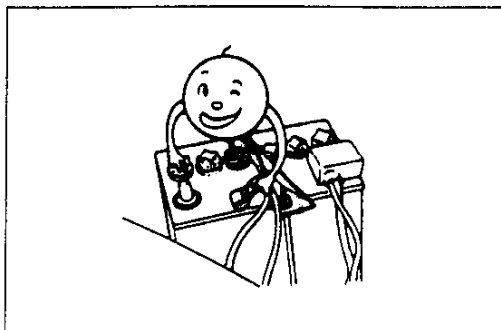
05UGIX-022

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 attempt to connect the ohmmeter to any circuit to which voltage is applied; this may burn or otherwise damage the ohmmeter.

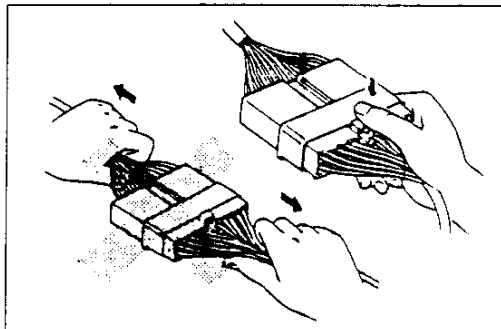


05UGIX-023

CAUTION WITH ELECTRICAL PARTS

Battery Cable

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

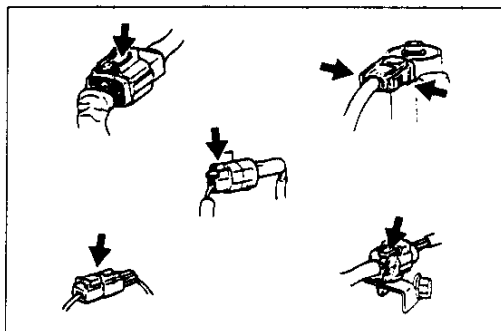


07UGIX-011

Connectors

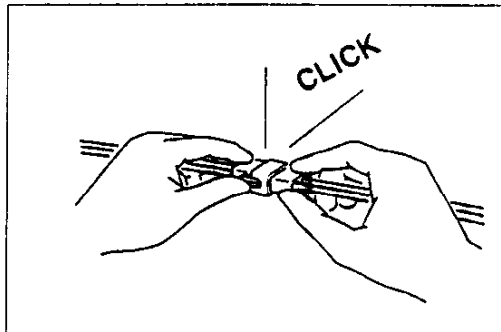
Disconnecting connectors

Never pull on wiring harness when disconnecting connectors.



05UGIX-025

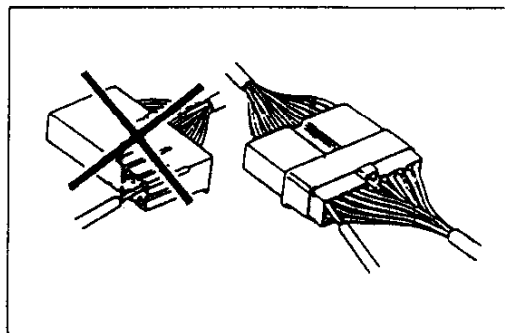
Connectors can be disconnected by pressing or pulling the lock lever as shown.



05UGIX-026

Locking connectors

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

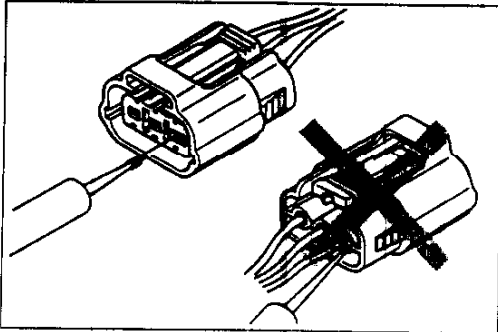


07UGIX-012

Inspection

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

CAUTION

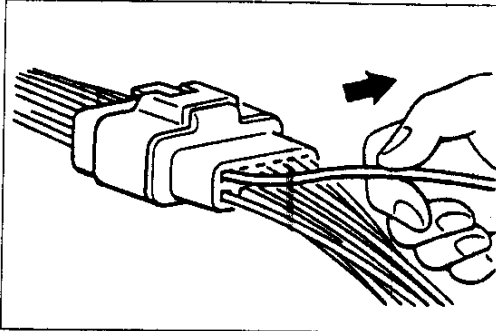


07UGIX-013

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

Caution

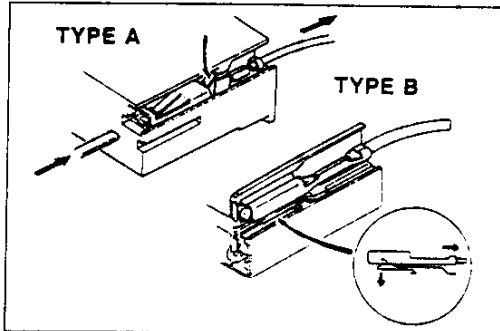
- Use fine wire to prevent damage to the terminal.
- Do not damage the terminal when inserting the tester lead.



9MUGIX-027

Terminals Inspection

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



9MUGIX-028

Replacement of terminals

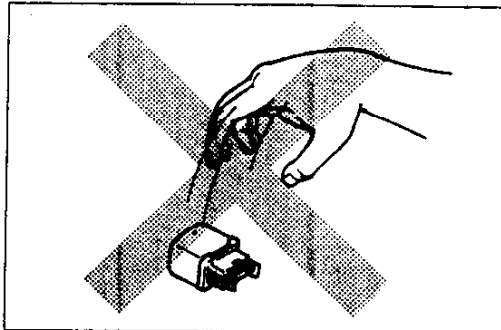
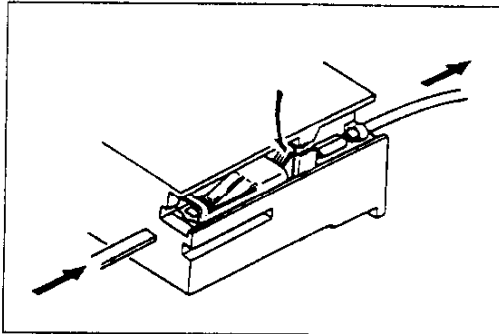
Use the appropriate tools to remove the terminal as shown. When installing the terminal, be sure to insert it until it locks securely.

< Female >

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.

< Male >

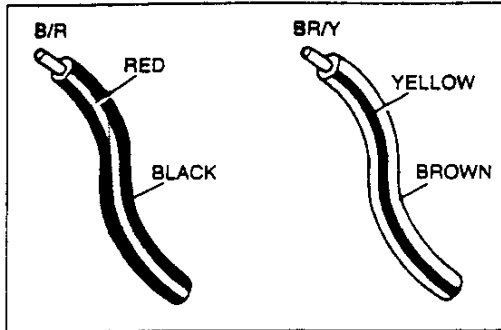
Same as the female type.



05UGIX-029

Sensors, Switches, and Relays

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

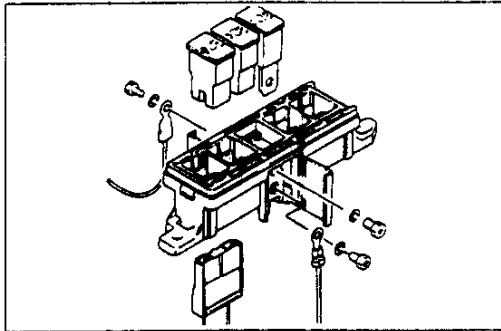


07UGIX-014

**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.

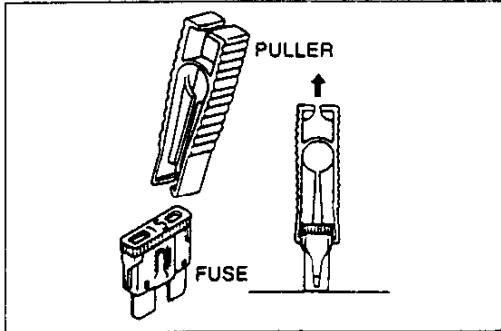
CODE	COLOR	CODE	COLOR
B	Black	O	Orange
BR	Brown	P	Pink
G	Green	R	Red
GY	Gray	V	Violet
L	Blue	W	White
LB	Light Blue	Y	Yellow
LG	Light Green	-	-



07UGIX-015

**Fuse
Replacement**

1. When replacing a fuse, be sure to replace it with one of the specified capacity.
If a fuse again fails after it has been replaced, the circuit probably has a short and the wiring should be checked.
2. Be sure the negative battery terminal is disconnected before replacing the main fuse (80A).
3. When replacing a pullout fuse, use the fuse puller supplied in the fuse box cover.



9MUGIX-032

