

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.

Mazda MX-5 Workshop Manual Supplement

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.

All rights reserved. No part of this book may be reproduced or used in any form or by any means, electronic or mechanical—including photocopying and recording and the use of any kind of information storage and retrieval system—without permission in writing.

WARRANTY

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

**Mazda Motor Corporation
HIROSHIMA, JAPAN**

APPLICATION:

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

CONTENTS

Title	Section
General Information	GI
Pre-Delivery Inspection and Scheduled Maintenance	A
Engine	B
Lubrication System	D
Cooling System	E
Fuel and Emission Control Systems	F
Engine Electrical System	G
Clutch	H
Manual Transmission	J
Propeller Shaft	L
Front and Rear Axles	M
Steering System	N
Braking System	P
Wheels and Tires	Q
Suspension	R
Body	S
Body Electrical System	T
Heater and Air Conditioner Systems	U
Technical Data	TD
Special Tools	ST

There are explanations given only for the sections marked with shadow (■).

© 1993 Mazda Motor Corporation
PRINTED IN JAPAN, SEP. '93 ®
1372-10-93I

VEHICLE IDENTIFICATION NUMBERS (VIN)

JMZ NA18P20# 100001—

RELATED MATERIALS

MX-5 Workshop Manual	1221-10-89I
MX-5 Training Manual	3165-10-89I
MX-5 Workshop Manual Supplement	1246-10-90G
MX-5 Wiring Diagram (Europe)	5269-10-93I
MX-5 Wiring Diagram (UK)	5270-10-93I

GENERAL INFORMATION

SAFETY INFORMATION GI- 2
LUBRICANTS GI- 2
JACKING POSITIONS GI- 2
SAFETY STAND POSITIONS GI- 2

VEHICLE LIFT POSITIONS GI- 3
DYNAMOMETER GI- 3
COMPRESSED AIR GI- 3
HOW TO USE THIS MANUAL GI- 4
ADVISORY MESSAGES GI- 4
PREPARATION GI- 4
REPAIR PROCEDURE GI- 4

..... GI- 5
 GI- 6
 GI- 6
 GI- 7
 GI- 8
 GI- 8
INSURING
 GI- 8
 GI- 8
 GI- 8
 GI- 8
 GI- 9
 GI-10
 GI-10
 GI-10
 GI-10
TOOLS GI-11
 GI-11
 GI-11
 GI-11
 GI-11
 GI-11
 GI-12
 GI-12
 GI-13
 GI-14
 GI-14
 GI-14

RADIO
 GI-15
 GI-16

.....
SYMBOLS
IDENTIFICATION NUMBER LOCATIONS
UNITS
ABBREVIATIONS
FUNDAMENTAL PROCEDURES
 PROTECTION OF THE VEHICLE
 PREPARATION OF TOOLS AND MEASURING EQUIPMENT
 SPECIAL TOOLS
 REMOVAL OF PARTS
 DISASSEMBLY
 REASSEMBLY
 ADJUSTMENTS
 RUBBER PARTS AND TUBING
 HOSE CLAMPS
 TORQUE FORMULAS
 VISE
ELECTRICAL TROUBLESHOOTING TOOLS
 TEST LIGHT
 JUMPER WIRE
 VOLTMETER
 OHMMETER
ELECTRICAL PARTS
 BATTERY
 BATTERY CABLE
 CONNECTORS
 TERMINALS
 SENSORS, SWITCHES, AND RELAYS
 WIRING HARNESS
 FUSE
INSTALLATION OF MOBILE TWO-WAY RADIO SYSTEM
TOWING

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.

46UGIX-002

JACKING POSITIONS

Warning

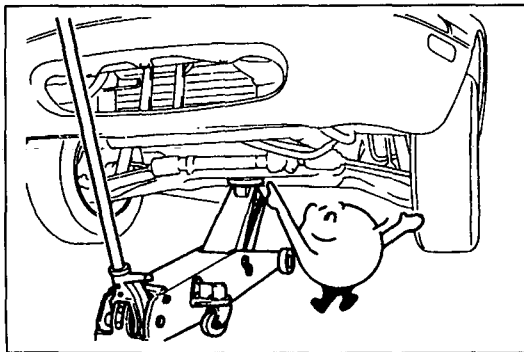
- **Improperly jacking a vehicle is dangerous. The vehicle can slip off the jack and cause serious injury. Use only the correct front and rear jacking positions and block the wheels.**

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

46UGIX-003

Front

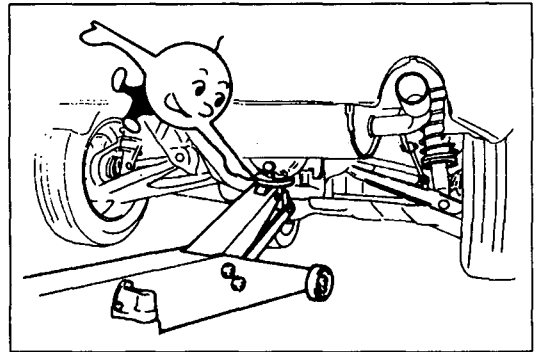
At the center of the crossmember



46UGIX-004

Rear

At the center of the differential

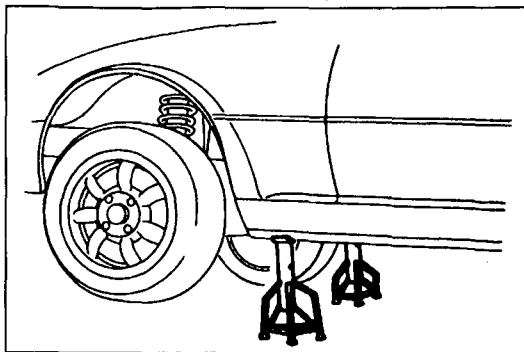


46UGIX-002

SAFETY STAND POSITIONS

Front

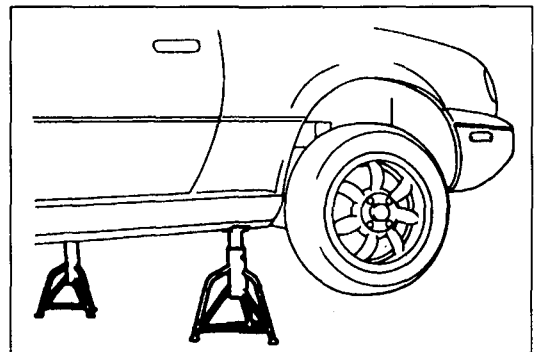
Both sides of the vehicle, on side sills



45UGIX-003

Rear

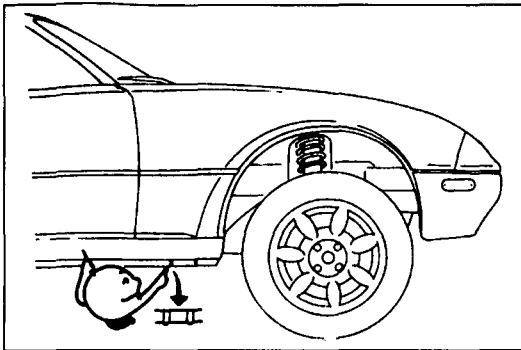
Both sides of the vehicle, on side sills



45UGIX-004

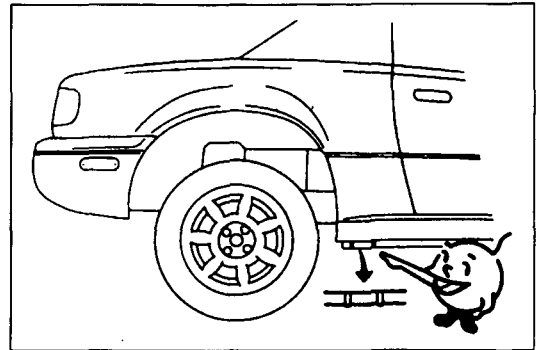
VEHICLE LIFT POSITIONS

Front



46UGIX-008

Rear



46UGIX-009

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.

46UGIX-010

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.

35AGIX-002

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 routine is ignored.

Note



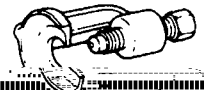
- A **Note** provides added information that will help you to complete a particular procedure.

46UGIX-012

PREPARATION

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

Example:

MANUAL STEERING		SST NUMBER	USAGE
PREPARATION SST		49 0118 850C	For removal of tie rod end
		SST NAME Puller, ball joint	
			SST ILLUSTRATION

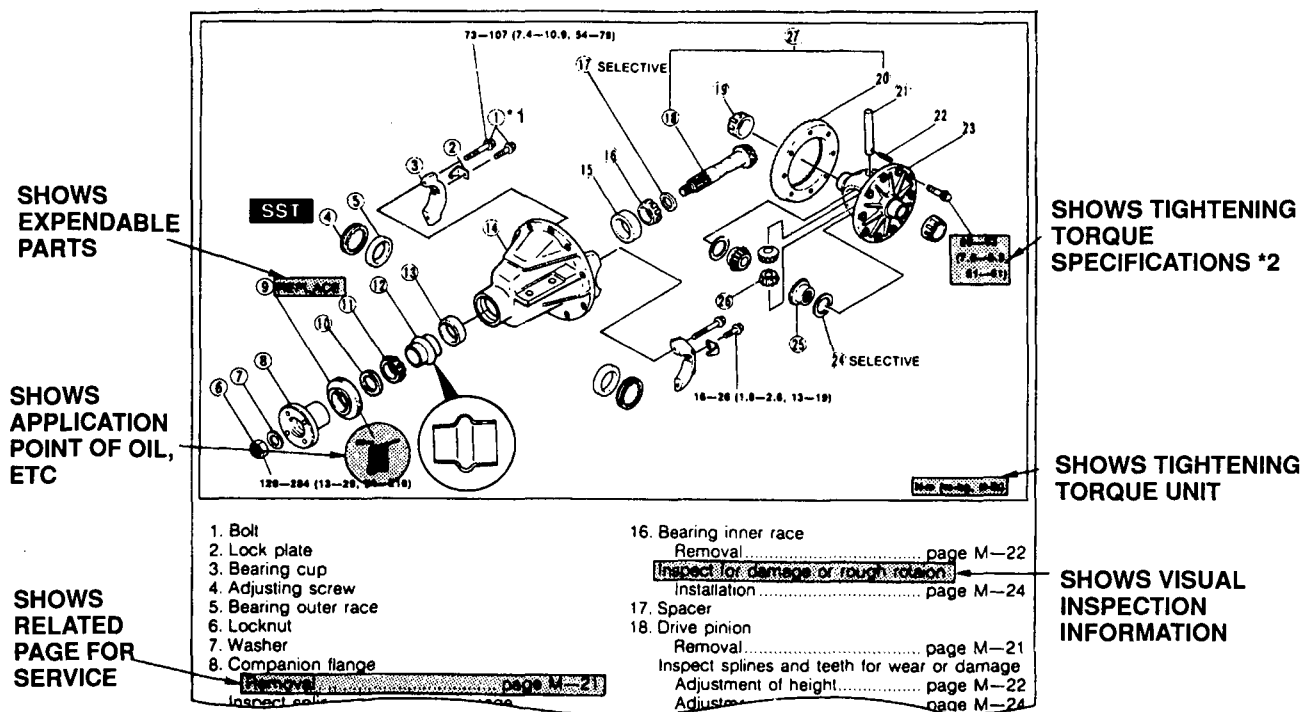
46UGIX-013

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.

46UGIX-014

Example:



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

*2: Units are in N·m {kgf·m, ft·lbf} unless otherwise specified.

46UGIX-015

SYMBOLS

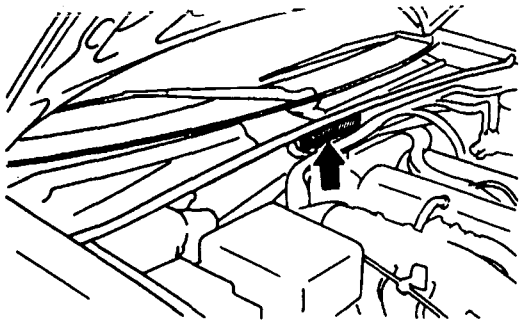
There are six symbols indicating oil, grease, and sealant. These symbols show the points of applying such materials during service.

Symbol	Meaning	Kind
	Apply oil	New engine oil or gear oil as appropriate
	Apply brake fluid	FMVSS116: DOT-3 or SAE J1703
	Apply automatic transmission fluid	Dexron®II or M-III
	Apply grease	Appropriate grease
	Apply sealant	Appropriate sealant
	Apply petroleum jelly	Appropriate petroleum jelly

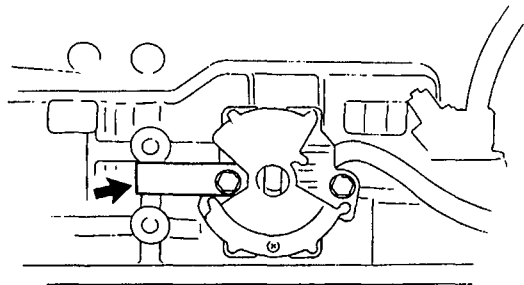
35AGIX-003

IDENTIFICATION NUMBER LOCATIONS

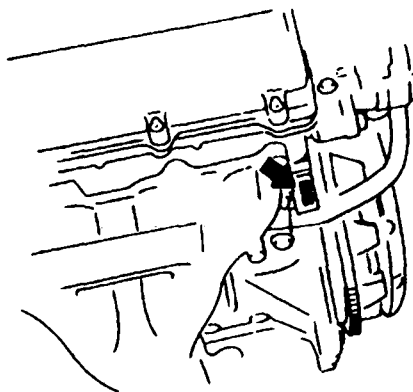
VEHICLE IDENTIFICATION NUMBER (VIN)



AUTOMATIC TRANSMISSION MODEL AND NUMBER



ENGINE MODEL AND NUMBER



46UGIX-017

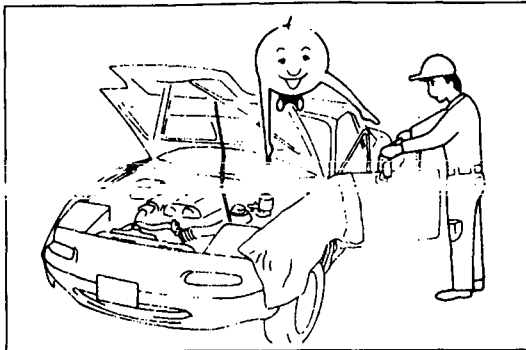
UNITS

Electrical current	A (ampere)
Electric potential	V (volt)
Electric power	W (watt)
Length	mm (millimeter) in (inches)
Negative pressure	kPa (kilo Pascal) mmHg (millimeter of mercury) inHg (inches of mercury)
Positive pressure	kPa (kilo Pascal) kgf/cm ² (kilogram force per square centimeter) psi (pounds per square inch)
Resistance	Ω (ohm)
Torque	N·m (Newton meter) kgf·m (kilogram force per meter) kgf·cm (kilogram force per centimeter) ft·lbf (foot pounds) in·lbf (inch pounds)
Volume	L (liter) US qt (U.S. quart) Imp qt (Imperial quart)

45UGIX-013

ABBREVIATIONS

ABDC	After bottom dead center
ABS	Antilock brake system
A/C	Air conditioner
ACC	Accessory
ATDC	After top dead center
BAC	Bypass air control
BBDC	Before bottom dead center
BTDC	Before top dead center
CID	Cylinder identification display
CU	Control unit
DOHC	Double overhead camshaft
DTM	Diagnostic test mode
ECU	Engine control unit
ELR	Emergency locking retractor
ESP	Electronic stability program

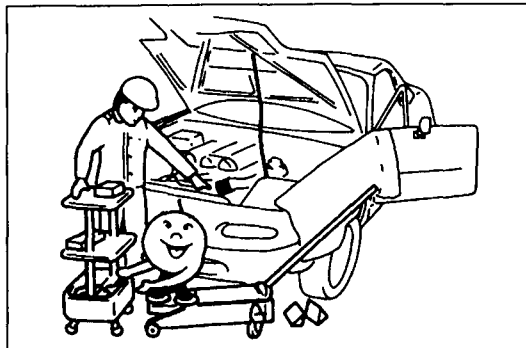


46UGIX-020

FUNDAMENTAL PROCEDURES

PROTECTION OF THE VEHICLE

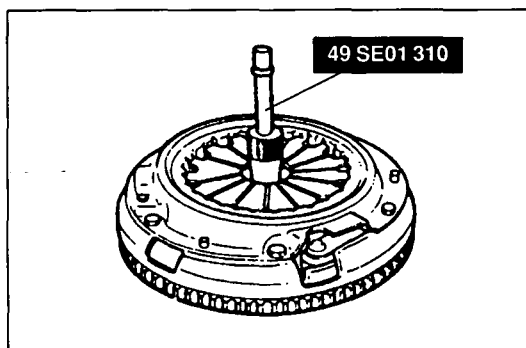
Always be sure to cover fenders, seats, and floor areas before starting work.



16EGIX-009

PREPARATION OF TOOLS AND MEASURING EQUIPMENT

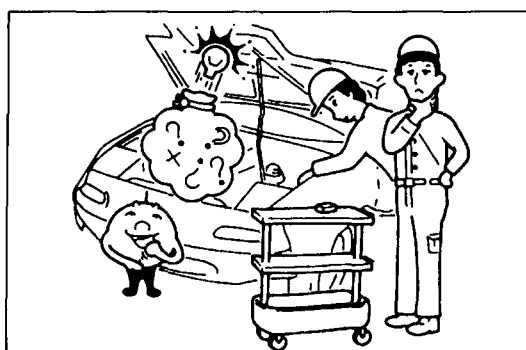
Be sure that all necessary tools and measuring equipment are available before starting any work.



16EGIX-010

SPECIAL TOOLS

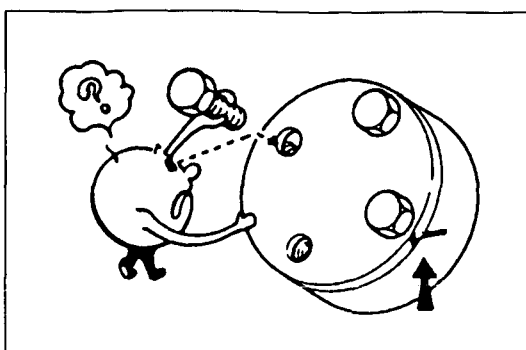
Use special tools when they are required.



46UGIX-021

REMOVAL OF PARTS

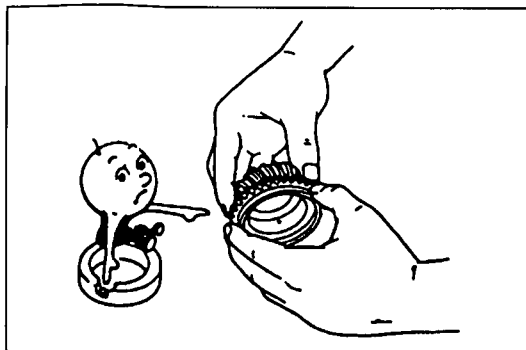
While correcting a problem, try also to determine its cause. Begin work only after first learning which parts and subassemblies must be removed and disassembled for replacement or repair. After removing the part, plug all holes and ports to prevent foreign material from entering.



16EGIX-012

DISASSEMBLY

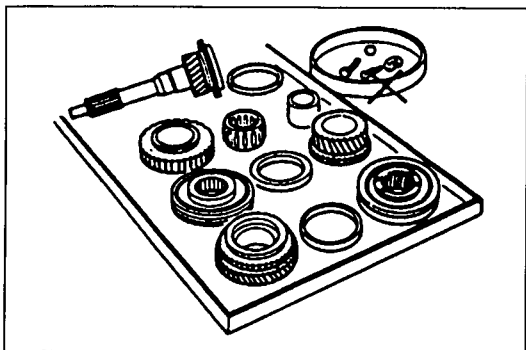
If the disassembly procedure is complex, requiring many parts to be disassembled, all parts should be disassembled in a way that will not affect their performance or external appearance and identified so that reassembly can be performed easily and efficiently.



16EGIX-013

1. Inspection of parts

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

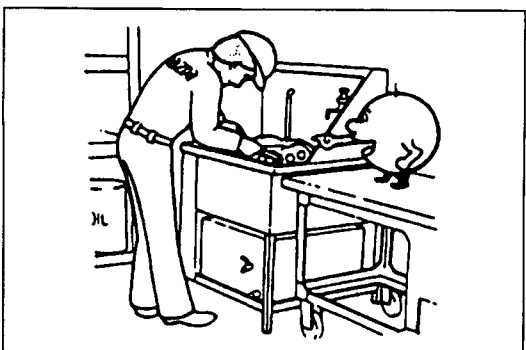


16EGIX-014

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.



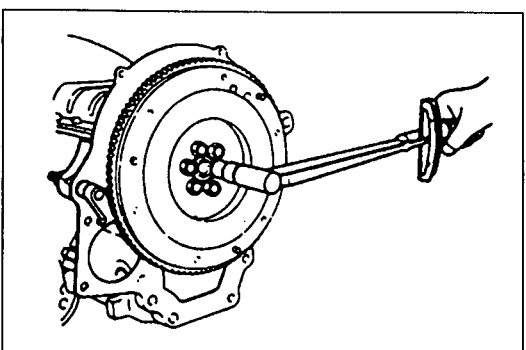
46UGIX-022

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.



45UGIX-014

REASSEMBLY

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

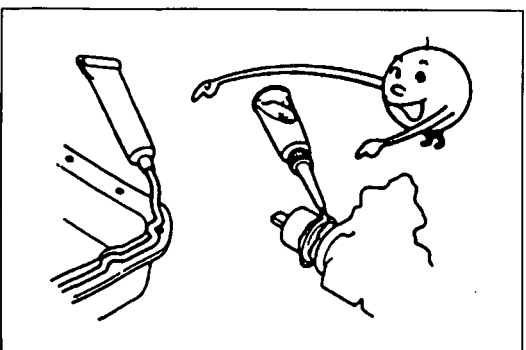
Refer to STANDARD BOLT AND NUT TIGHTENING TORQUE in section TD for tightening torques not mentioned in the main text.

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

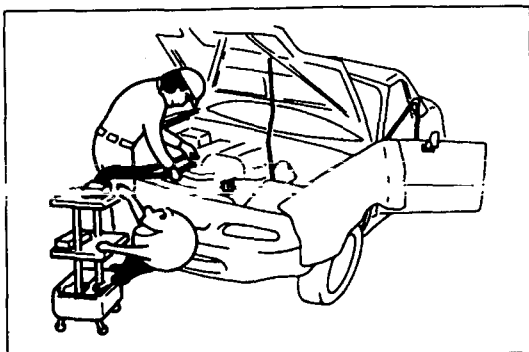
- | | |
|----------------|-----------------|
| 1. Oil seals | 4. Gaskets |
| 2. O-rings | 5. Lock washers |
| 3. Cotter pins | 6. Nylon nuts |

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.



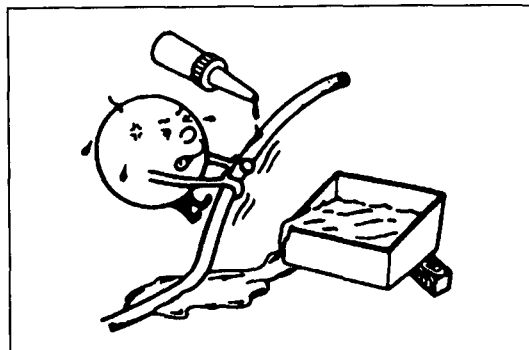
16EGIX-017



46UGIX-023

ADJUSTMENTS

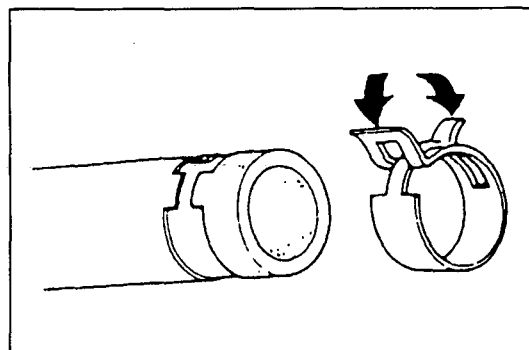
Use suitable gauges and testers when making adjustments.



9MUGIX-005

RUBBER PARTS AND TUBING

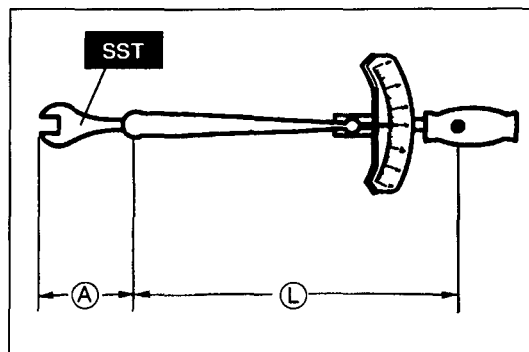
Prevent gasoline or oil from getting on rubber parts or tubing.



46UGIX-024

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.



45UGIX-015

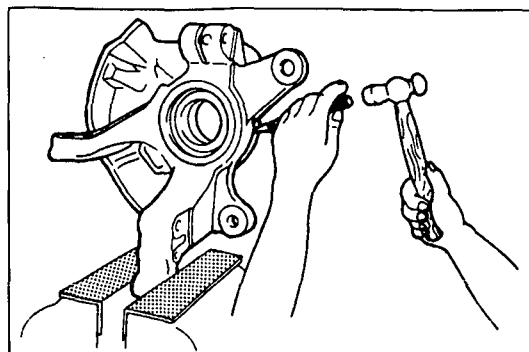
TORQUE FORMULAS

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

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

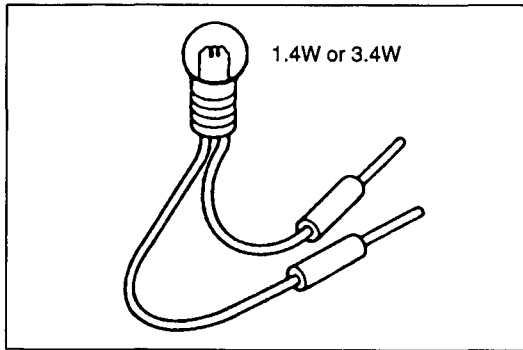
L = The length of the torque wrench.



46UGIX-026

WISE

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



46UGIX-027

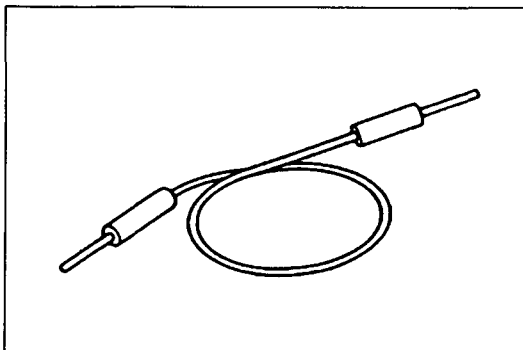
ELECTRICAL TROUBLESHOOTING TOOLS

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

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



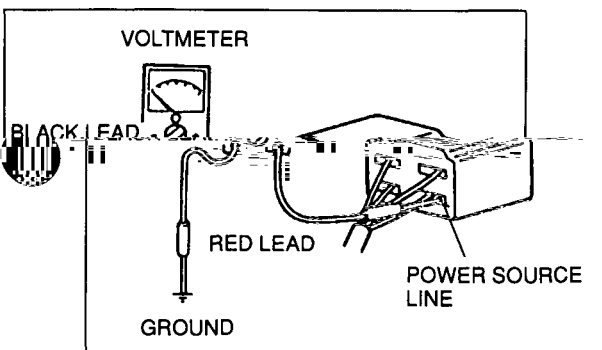
46UGIX-028

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

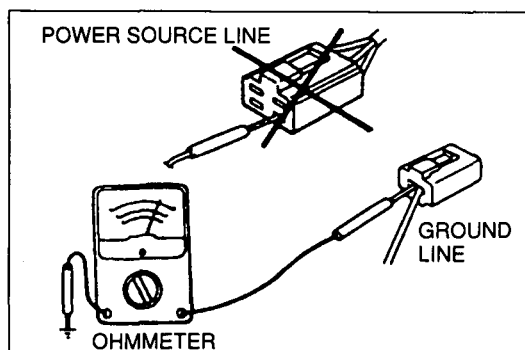
- Do not connect a jumper wire from the power source line to a body ground; this may cause burning or other damage to harnesses or electronic components.



46UGIX-029

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.



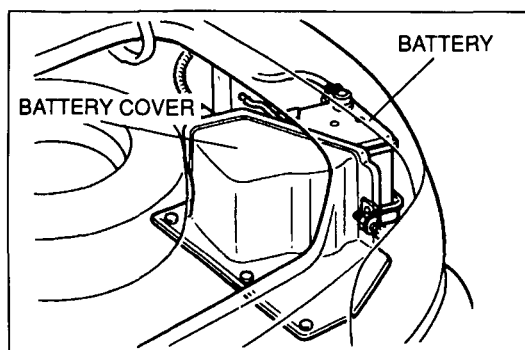
46UGIX-030

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.

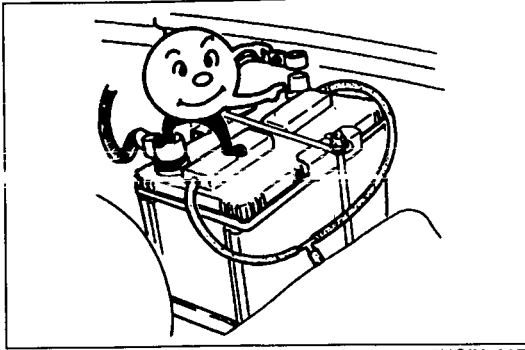


45UGIX-006

ELECTRICAL PARTS

BATTERY

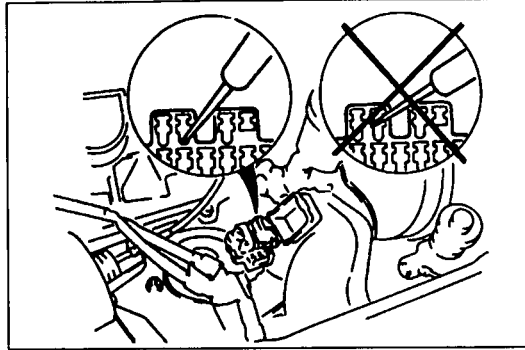
The battery installed in the right rear of the trunk is unique. When a replacement battery is installed, install it with a genuine Mazda battery replacement kit or equivalent. (Refer to section G.)



45UGIX-007

BATTERY CABLE

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



35AGIX-005

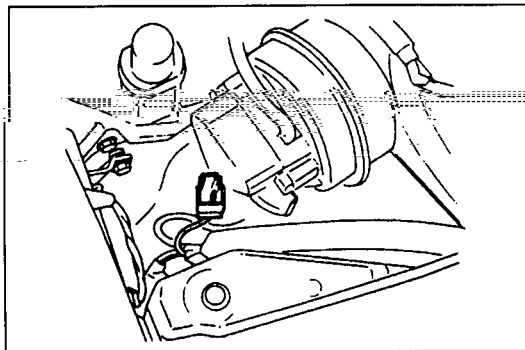
CONNECTORS

Diagnosis Connector

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

Caution

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



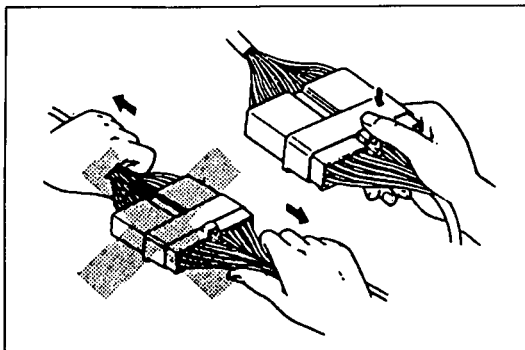
35AGIX-006

Power Connector

The special power connector in the engine compartment (Blue: 1-pin) supplies battery voltage for externally powered test equipment.

Caution

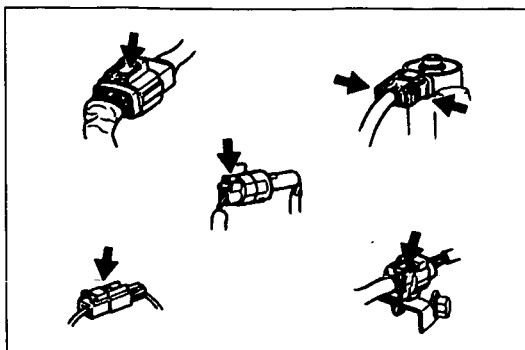
- Do not ground the power connector terminal; the 20A wiper fuse will be burned.



46UGIX-033

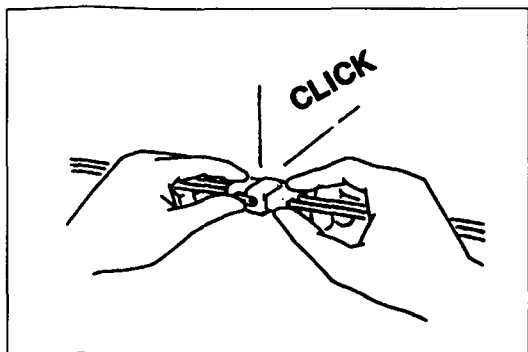
Disconnecting Connectors

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



46UGIX-034

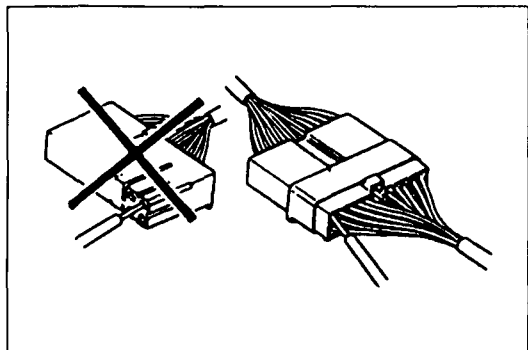
Connectors can be disconnected by pressing or pulling the lock lever as shown.



45UGIX-009

Locking Connectors

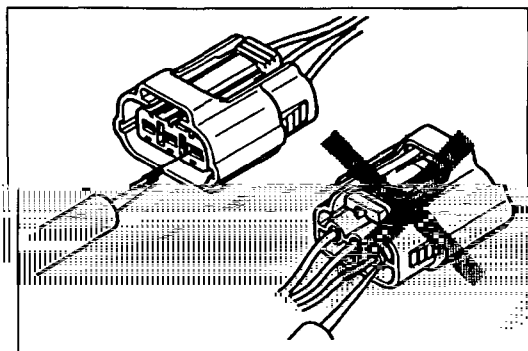
When locking connectors, listen for a click that will indicate they are securely locked.



46UGIX-036

Inspection

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

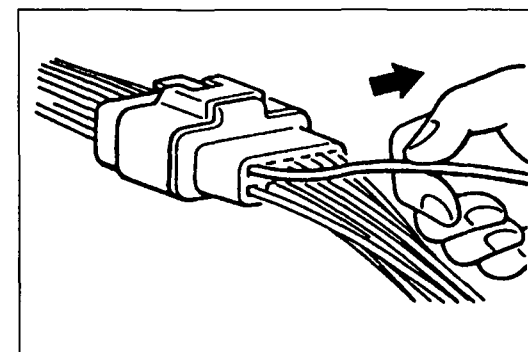


46UGIX-037

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.

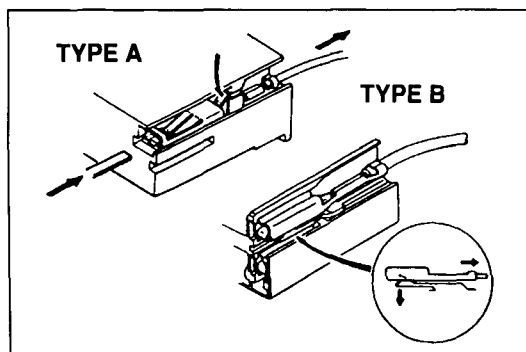


46UGIX-038

TERMINALS

Inspection

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

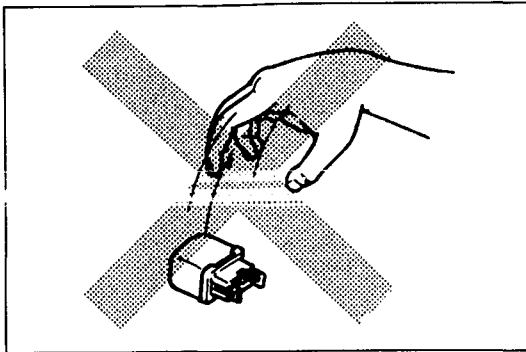


46UGIX-039

Replacement

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

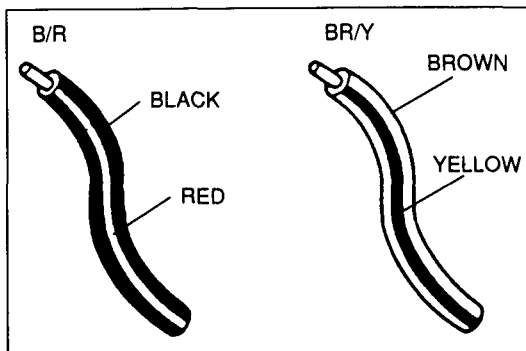
Insert a thin piece of metal from the terminal side of the connector, and then, with the terminal locking tab pressed down, pull the terminal out from the connector.



46UGIX-040

SENSORS, SWITCHES, AND RELAYS

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



46UGIX-041

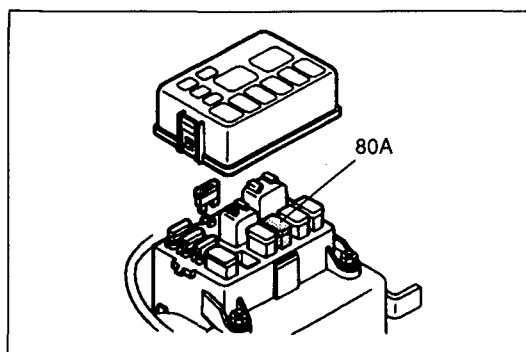
WIRING HARNESS

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	—	—



46UGIX-042

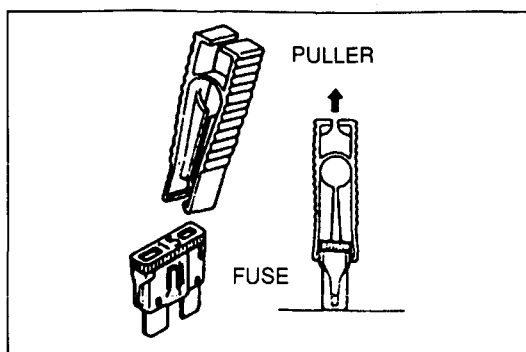
FUSE

Replacement

1. When replacing a fuse, be sure to replace it with one of the specified capacity.

If a fuse again fails after it has been replaced, the circuit probably has a short and the wiring should be checked.

2. Be sure the negative battery terminal is disconnected before replacing a main fuse (80A).



9MUGIX-032

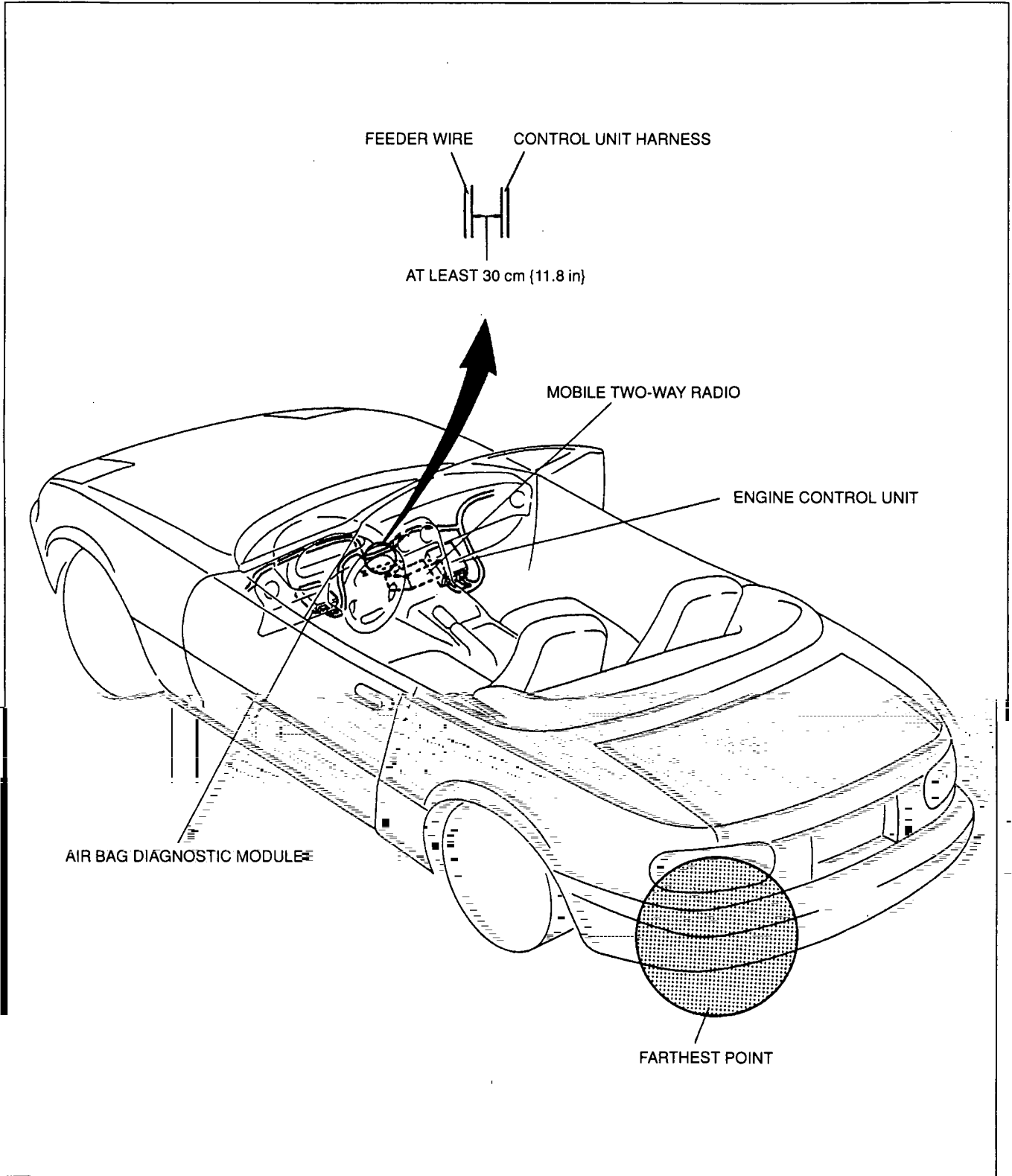
3. When replacing a pullout fuse, use the fuse puller supplied in the fuse box cover.

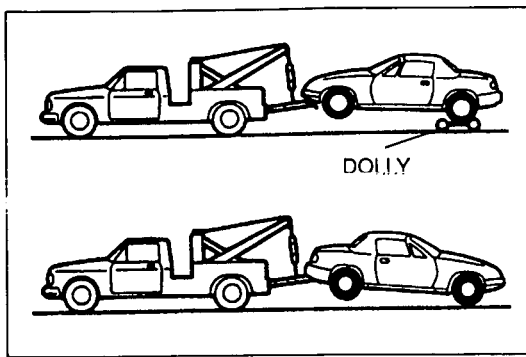
INSTALLATION OF MOBILE TWO-WAY RADIO SYSTEM

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

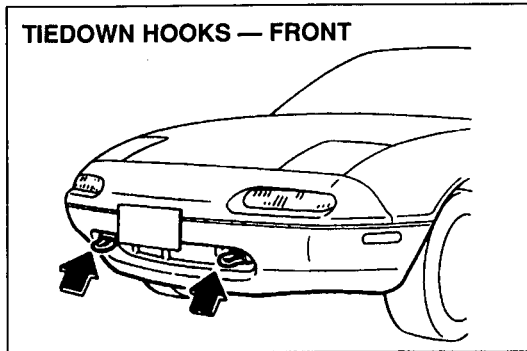
When the vehicle is to be equipped with a mobile two-way radio, observe the following precautions:

- 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.





35EGIX-002

**Caution**

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

TOWING

Proper towing equipment is necessary to prevent damage to the vehicle.

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

As a general rule, towed vehicles should be pulled with the driving wheels off the ground. If excessive damage or other conditions prevent towing the vehicle with the driving wheels off the ground, use wheel dollies.

With manual transmission.

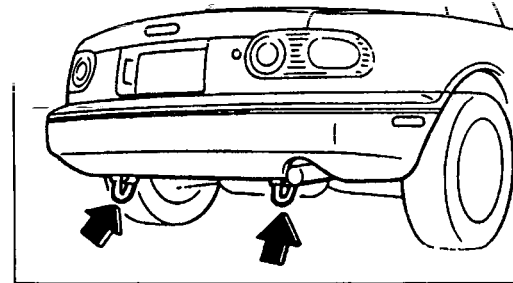
1. Set the ignition switch in the ACC position;
2. Place the shift lever in Neutral;
3. Release the parking brake.

With manual transmission

If the transmission, rear axle, and steering system are not damaged, the vehicle may be towed on all four wheels. If any of these components are damaged, use wheel dollies.

Caution

- Don't tow with sling-type equipment. This could damage your vehicle. Use wheel-lift or flatbed equipment.



PRE-DELIVERY INSPECTION AND SCHEDULED MAINTENANCE

PRE-DELIVERY INSPECTION A- 2
PRE-DELIVERY INSPECTION TABLE A- 2
SCHEDULED MAINTENANCE A- 3
SCHEDULE A- 3

35E0AX-001

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
- Convertible top and detachable hardtop (if equipped) for damage
- Wheel lug nuts
89—117 N·m {9—12 kgf·m, 66—86 ft·lbf}
- Tire pressure (Refer to section TD)
- All weatherstrips for damage or detachment
- Operation of bonnet release and lock
- Operation of fuel and trunk lids
- Door operation and alignment
- Headlight aiming

INSTALL the following parts:

- Wheel caps
- Outside mirrors
- Mast antenna (if equipped)

UNDER BONNET—ENGINE OFF

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

- Fuel, coolant, and hydraulic lines, fittings, connections, and components for leaks
- Engine oil level
- Power steering fluid level (if equipped)
- Brake and clutch master cylinder fluid level
- Windshield washer reservoir fluid level
- Radiator coolant level and specific gravity

Protection °C {°F}	Specific gravity at 20°C {68°F}
-16 {3}	1.054
-26 {-15}	1.066
-40 {-40}	1.078

- Tightness of water hose clamps (including heater hoses)
- Tightness of battery terminals
- Drive belt tensions (Refer to section B)
- Accelerator cable and linkage for free movement

CLEAN spark plugs

INTERIOR

INSTALL the following parts:

- Fuse for accessories

CHECK operation of the following items:

- Seat controls (sliding and reclining)
- Door locks
- Seat belts and warning system
- Air bag system using indicator light (if equipped)
(Refer to section T)
- Ignition switch and steering lock
- Starter interlock switch (clutch pedal)
- All lights, including warning, and indicator lights
- Audible warning system
- Horn, wipers, and washers
- Cigarette lighter

- Power outside mirrors (if equipped)
- Power windows (if equipped)
- Heater, defroster, and air conditioner at all mode selections (if equipped)

CHECK the following items:

- Presence of spare fuses
- Upholstery and interior finish

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

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

	Pedal height mm {in}	Free play mm {in}
Clutch pedal	175—185 {6.89—7.28} (with carpet)	0.6—3.1 {0.02—0.12}
Brake pedal	171—181 {6.73—7.13} (with carpet)	4—7 {0.16—0.28}

- Parking brake
7—9 notches/196 N {20 kgf, 44 lbf}

UNDER BONNET—ENGINE RUNNING AT OPERATING TEMPERATURE

CHECK the following items:

- Initial ignition timing
10° ± 1° BTDC* (Refer to section F)
- Idle speed
850 ± 50 rpm* (Refer to section F)
*...with diagnosis connector TEN and GND terminals connected

ON HOIST

CHECK the following items:

- Underside fuel, coolant, and hydraulic lines, fittings, connections, and components for leaks
- Tires for cuts or bruises
- Steering linkage, suspension, exhaust system, and all underside hardware for looseness or damage
- Manual transmission oil level
- Rear axle oil level

ROAD TEST

CHECK the following items:

- Brake operation
- Clutch operation
- Steering control
- Operation of meters and gauges
- Squeaks, rattles and unusual noises
- Overall engine performance
- Seat belt emergency locking retractors

AFTER ROAD TEST

REMOVE seat and floor mat protective covers

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

35E0AX-002

SCHEDULED MAINTENANCE**SCHEDULE****Chart symbols:**

- I : Inspect, and repair, clean, or replace if necessary
- A : Adjust
- R : Replace
- T : Tighten

Remarks:

- After 80,000 km {48,000 miles} or 48 months, continue to follow the described maintenance at the recommended intervals.
 - *1 Major service interval at 12 months/20,000 km {12,000 miles}.
Lubrication service based on distance only 10,000 km {6,000 miles} not time.
 - *2 Adjust or inspect alternator and water pump drive belt, and power steering and air conditioner drive belt if equipped.
 - *3 Replacement of the timing belt is required at every 100,000 km {60,000 miles}. Failure to replace the timing belt may result in damage to the engine.
 - *4 If the vehicle is operated under any of the following conditions, it is suggested that the engine oil and oil filter be changed more often than the recommended intervals.
 - a) Driving in dusty conditions.
 - b) Extended periods of idling or low speed operation.
 - c) Driving for a prolonged periods in cold temperatures or driving only short distances regularly.
 - *5 If the vehicle is operated in very dusty or sandy areas, inspect and, if necessary, replace more often than at usual recommended intervals.
 - *6 This is a full function check of all electrical systems, i.e, all lights, washers (including condition of blades) power windows, sunroof, horn etc.
 - *7 Replace every two years.
If there has been continuous hard driving, mountain driving, or if the brakes are used extensively or the vehicle is operated in extremely humid climates, the brake fluid should be changed annually.

Emission Control and Related Systems

The ignition and fuel systems are vitally important to the proper operation of the emission control and related systems, as well as for efficient engine operation. It is strongly recommended that all servicing related to these systems be done by your Authorised Mazda Dealer.

35E0AX-003

SCHEDULED MAINTENANCE

	24	36	48
	30,000	40,000	50,000
	60,000	70,000	80,000
	18,000	24,000	30,000
	36,000	42,000	48,000
	A		A
every 100,000 km (60,000 miles)			
R	R	R	R
R	R	R	R
	I		I
	I		I
Replace every 2 years			
A		A	
R			R
R			R
	I		I
	I		I
A		A	
every 50,000 km (30,000 miles)			
A		A	
every 80,000 km (48,000 miles)			
I		I	
every 80,000 km (48,000 miles)			
I		I	
	I		I
	I		I
	I		I
	I		I
	I		I
	R		R
	A		A
	I		I
	I		I
	I		I
	I		I
	I		I
	I		I
	I		I
	I		I
	A		R
	R		R
	I		I
	I		I
	I		I
	T		T
Inspect annually			
	I		I
	I		I
	A		A
	I		I
	I		I
	I		I

35E0AX-004

Maintenance Item	Months ¹	In number of months	
	Kilometers	1,000	10,000
	Miles	600	6,000
Drive belts ²		A	A
Engine timing belt ³			Replace
Engine oil ⁴		R	R
Oil filter ⁴			R
Cooling system (including coolant level adjustment)			I
Engine coolant			
Idle speed			A
Air cleaner element ⁵			
Fuel filter			
Fuel lines and hoses			
Initial ignition timing			
Spark plugs			A
Spark plugs (only for sweden)			Adjust
Throttle sensor			A
Throttle sensor (only for sweden)			Adjust
Evaporative system			I
Evaporative system (only for sweden)			Inspect
All electrical system ⁶			I
Headlight alignment			A
Clutch pedal			I
Clutch fluid			I
Brake lines, hoses and connections			I
Brake pedal			I
Brake fluid ⁷			I
Parking brake			A
Power brake unit and hoses			I
Disc brakes			I
Power steering fluid			I
Power steering system and hoses			I
Steering and front suspension			I
Manual transmission oil			
Rear axle oil			
Drive shaft dust boots			
Rear suspension ball joints			
Bolts, nuts on chassis and body		T	T
Body condition (for rust, condition and perforation)			
Exhaust system and heat shields		I	
Tires (including spare tire) with inflation pressure adjustment			I
Hinges and catches			A
Underside of vehicle			I
Seat belts			I
Road test			I

Before beginning any service procedure, refer to section T of this manual for air bag system service warnings.

ENGINE

INDEX B- 2

FEATURES

OUTLINE B- 3
 OUTLINE OF CONSTRUCTION B- 3
 FEATURES B- 3
 STRUCTURAL VIEW B- 3
 SPECIFICATIONS B- 4
 CYLINDER HEAD GASKET B- 4
 CRANKSHAFT PULLEY B- 5
 CAMSHAFT B- 5
 VALVE SEAL B- 6

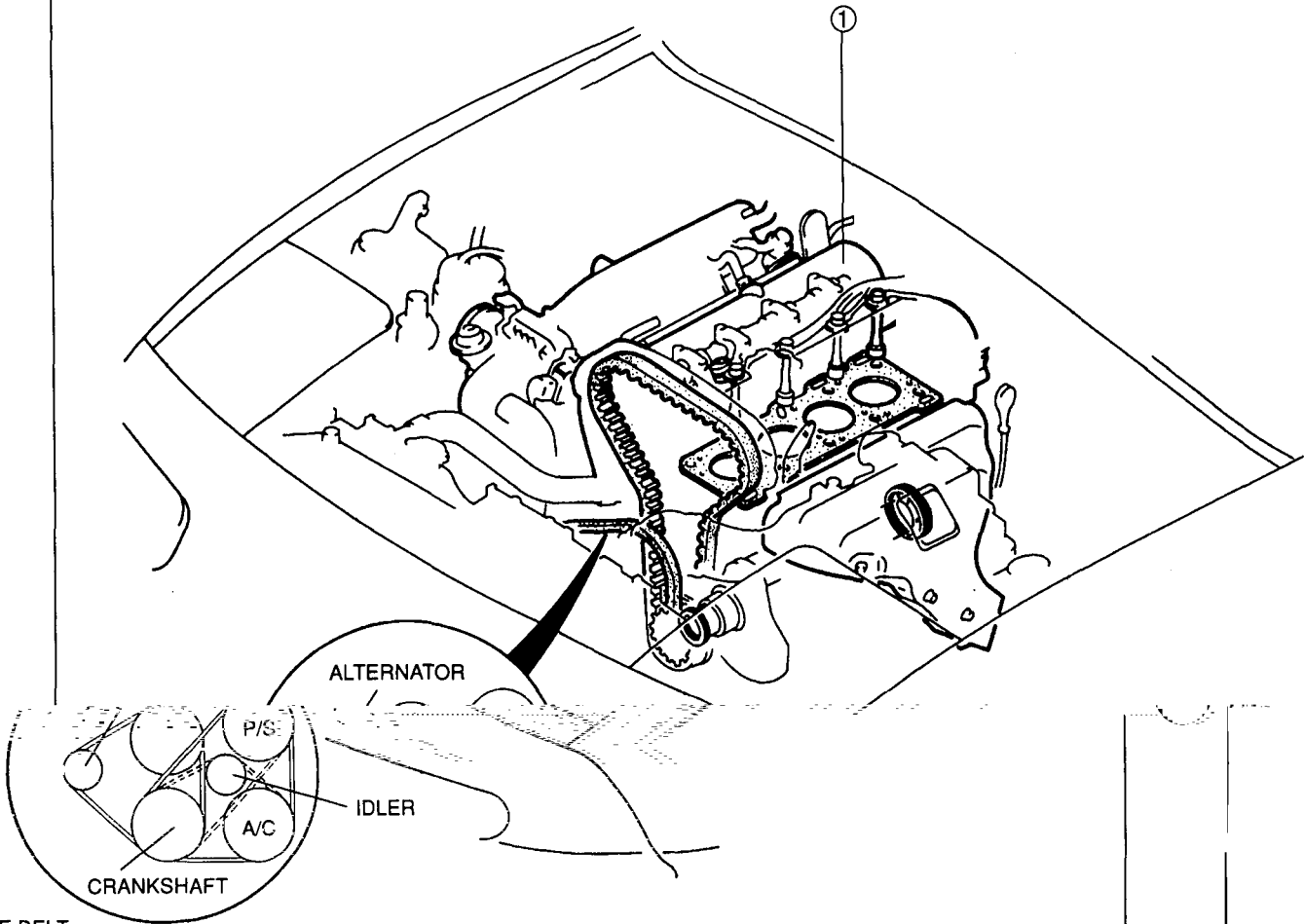
SERVICE

SUPPLEMENTAL SERVICE INFORMATION B- 7
ENGINE TUNE-UP B- 7
 PREPARATION B- 7

REMOVAL
 PROCEDURE
INSPECTION/REPAIR
 INSPECTION DATA
INSTALLATION
 PROCEDURE

..... B- 7
 B- 9
 B- 9
 B-12
 B-12
 B-13
 B-13

INDEX



DRIVE BELT
ADJUSTMENT, PAGE B-8

BELT	NEW	USED	LIMIT
OR	5.5—7.0 {0.22—0.27}	6.0—7.5 {0.24—0.29}	8.0 {0.31}
A/C, A/C	8.0—9.0 {0.32—0.35}	9.0—10.0 {0.36—0.39}	11.5 {0.45}

mm (in)

45U0BX-002

Removal	page B- 9
Inspection / Repair	page B-12
Installation	page B-13

DEFLECTI
DRIVE
ALTERNAT
P/S, P/S +

1. Engine
Re
Ins
Ins

OUTLINE

OUTLINE OF CONSTRUCTION

The MX-5 is equipped with a BP DOHC 1.8 liter engine, which is designed based on the MX-5 B6 DOHC 1.6 liter engine.

The major design changes are as follows.

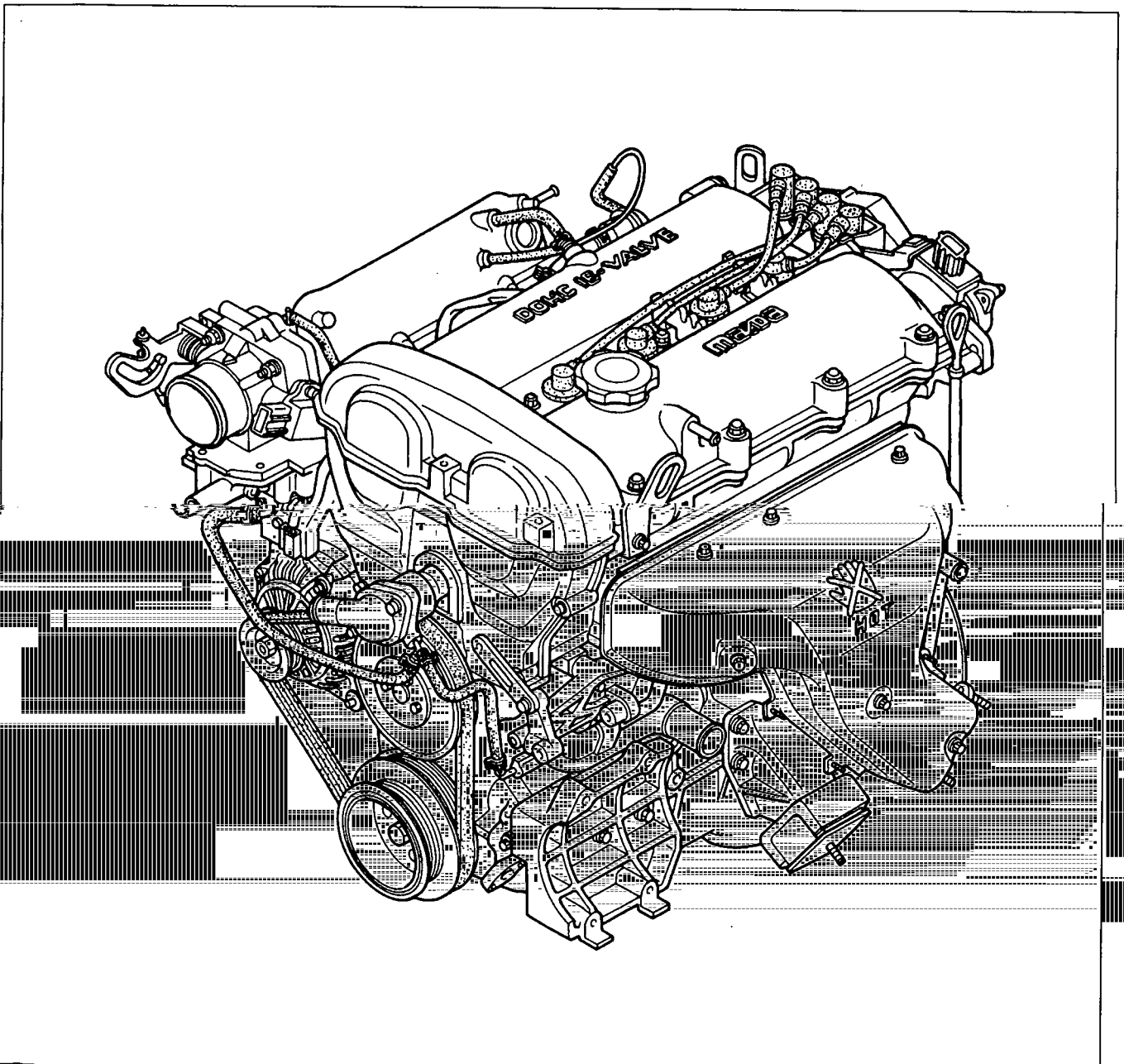
- The cylinder head gasket material has been changed.
- The crankshaft pulley has been made double structure.
- The camshafts are hollowed.
- The intake side and exhaust side valve seals are different.

FEATURES

Weight reduction ————— Hollowed camshafts

45U0BX-701

STRUCTURAL VIEW



45U0BX-702

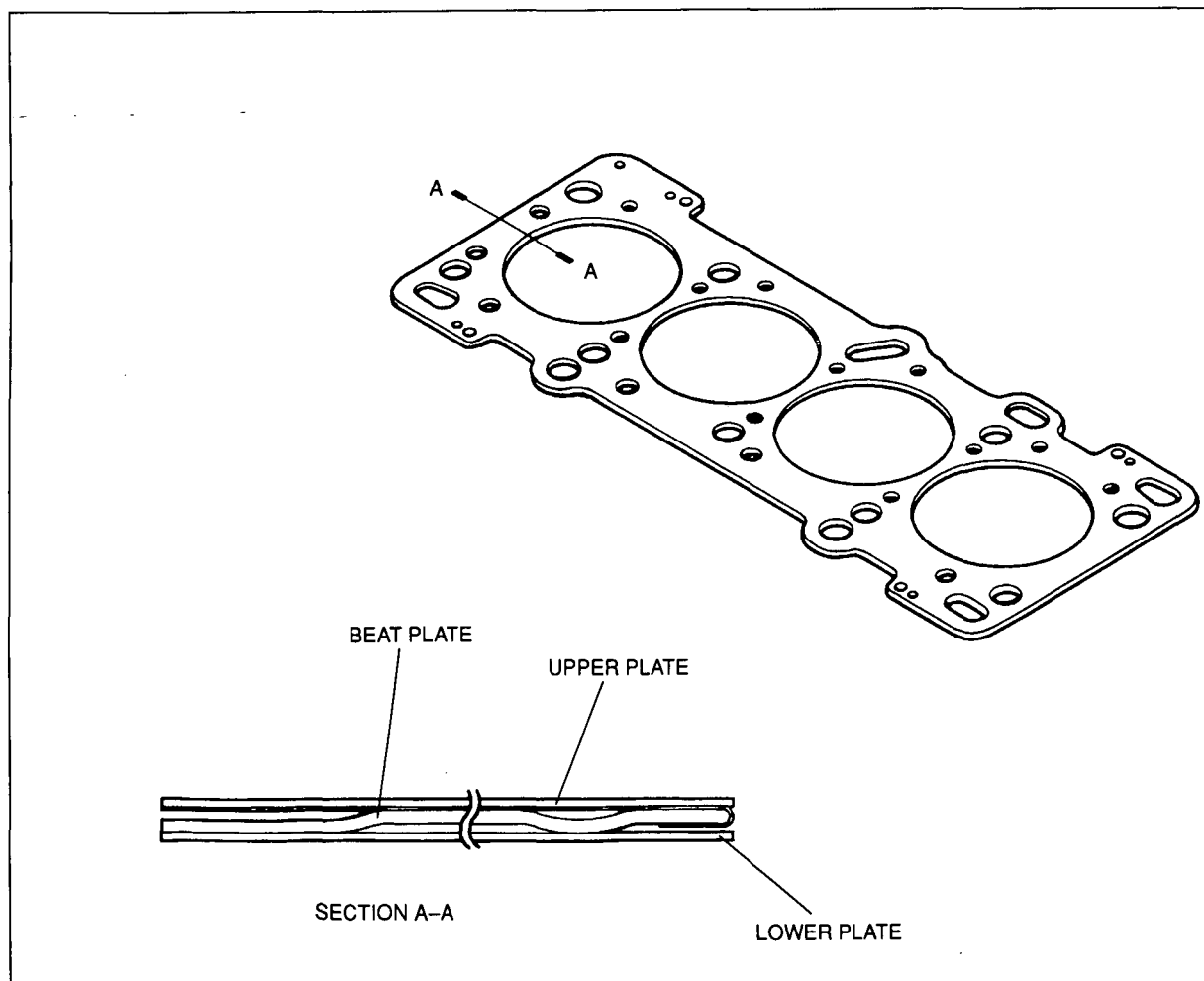
SPECIFICATIONS

Engine		BP DOHC
Item		
Type		Gasoline, 4-cycle
Cylinder arrangement and number		In-line, 4-cylinders
Combustion chamber		Pentroof
Valve system		DOHC, belt-driven
Displacement	ml {cc, cu in}	1,840 (1,840, 112)
Bore x Stroke	mm {in}	83.0 x 85.0 (3.27 x 3.35)

Compression ratio				9.0
Compression pressure		kPa (kgf/cm ² , psi)-rpm		1,255 (12.8, 182)-300
Valve timing	IN	Open (BTDC°)	5	
		Close (ABDC°)	48	
	EX	Open (BBDC°)	56	
		Close (ATDC°)	14	
Valve clearance		IN mm {in}	0: Maintenance-free	
		EX mm {in}	0: Maintenance-free	

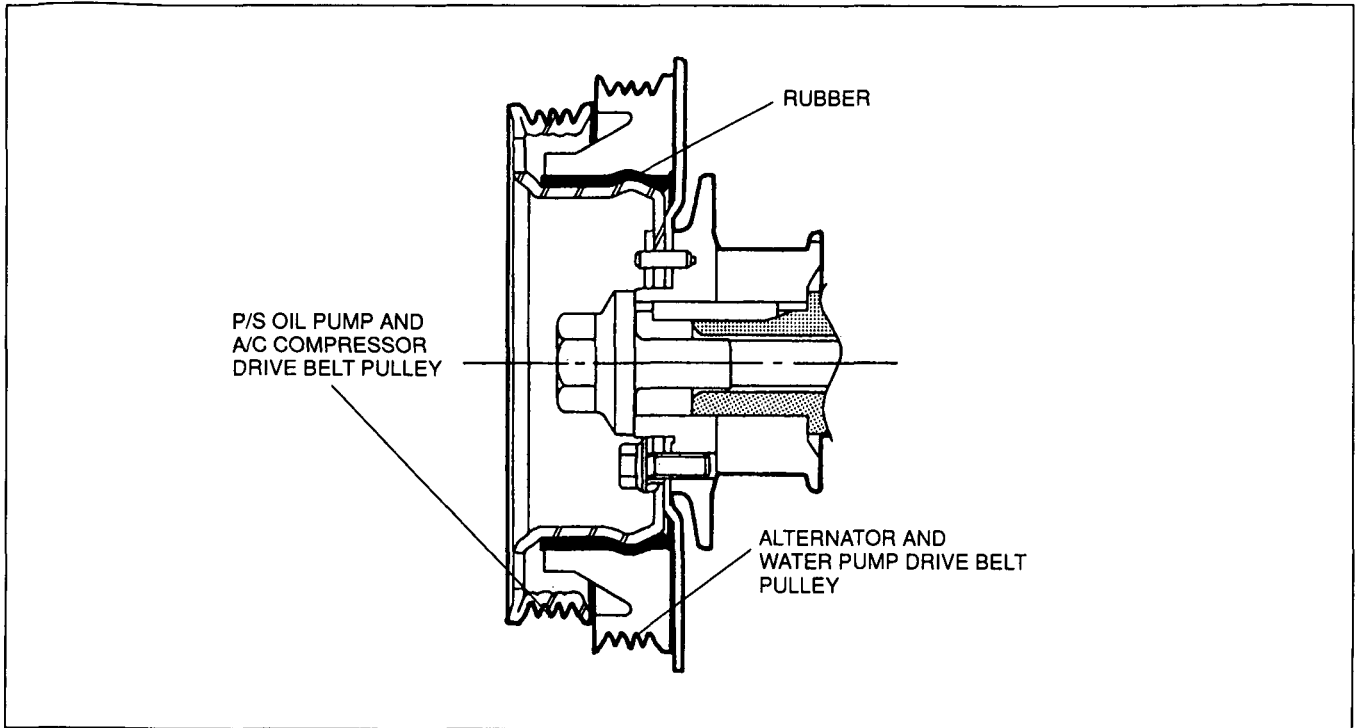
- Shows data peculiar to this model.
 Other data are the same as that of the MX-5 B6 DOHC model.

CYLINDER HEAD GASKET



- A highly durable metal gasket is used.

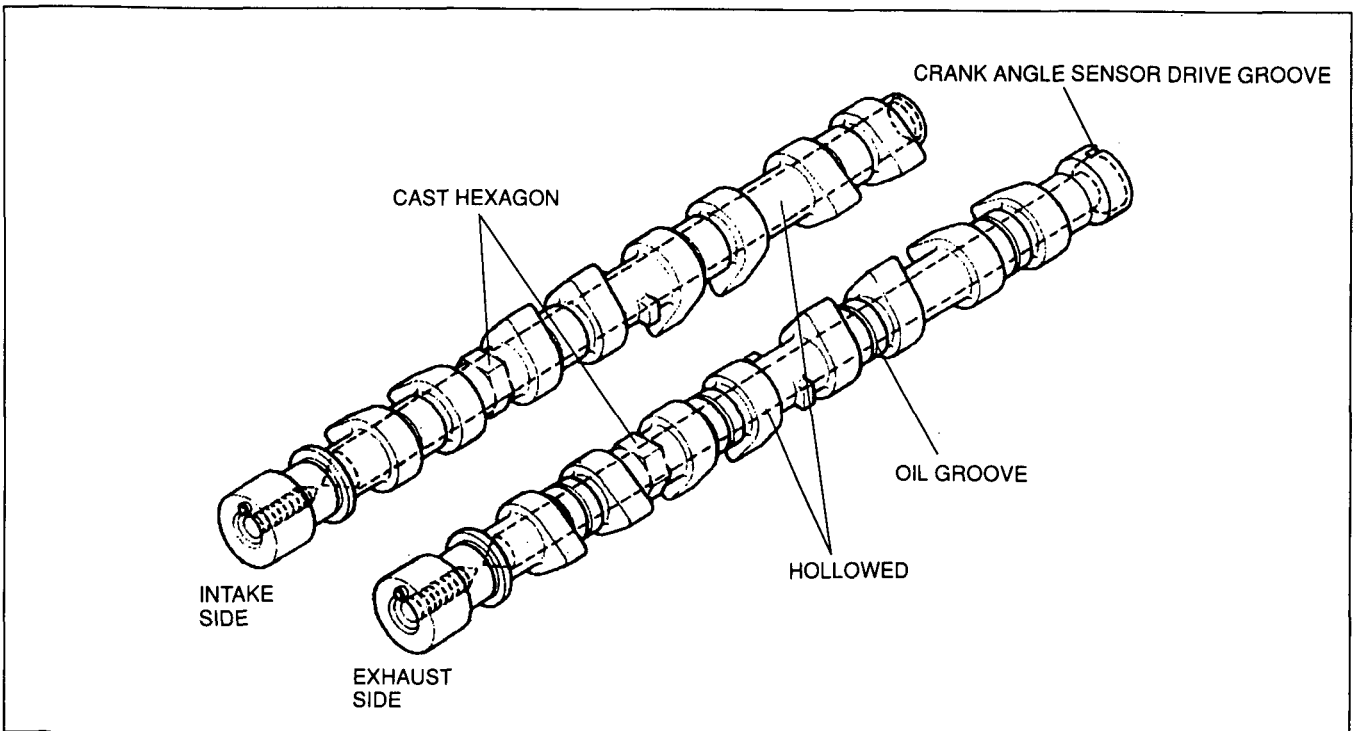
CRANKSHAFT PULLEY



45U0BX-705

- A torsional damper pulley with rubber is used for the crankshaft pulley to reduce the torsional vibration during high speed rotation of the crankshaft.
- The crankshaft pulley is one-piece type, double structure and drives the V-ribbed belts.
- The alternator drive belt deflection specification is changed according to the use of the V-ribbed belt.

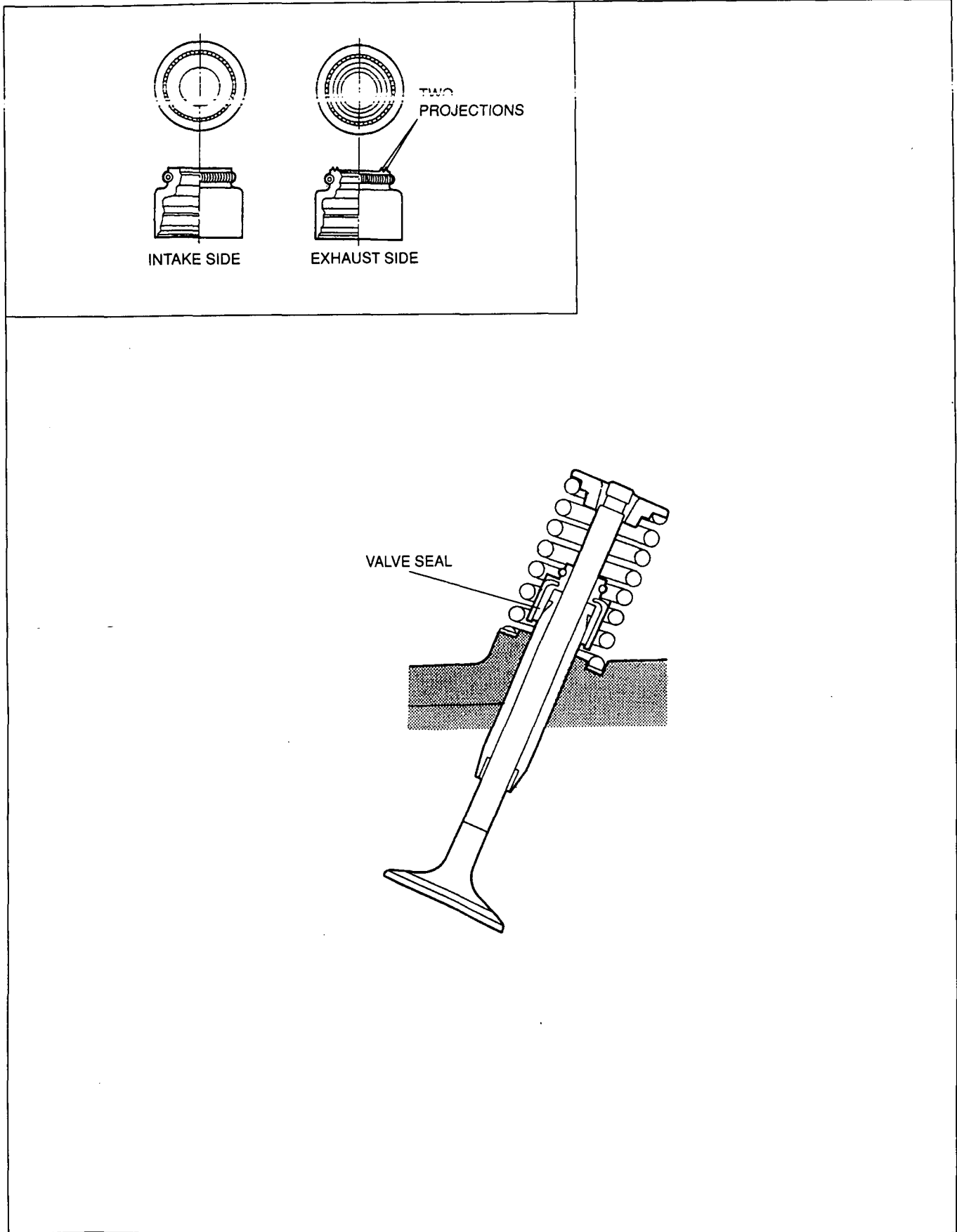
CAMSHAFT



45U0BX-706

- A crank angle sensor drive groove is on the rear end of the exhaust side camshaft.
- A cast hexagon for service is located in the middle of the both intake and exhaust side camshafts.
- The intake side camshaft journal has no oil groove for reduced rotation noise.
- The camshafts are hollowed for reduced weight.

VALVE SEAL



45U0BX-707

- The intake side and exhaust side valve seals are different. For identification, the exhaust side valve seal has two projections.

SUPPLEMENTAL SERVICE INFORMATION

The following points in this section are changed comparison with the Mazda MX-5 Workshop Manual 9/89 (1221-10-89I)

Engine tune-up

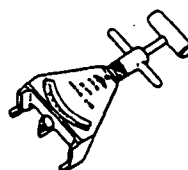
• Drive belt

**Removal
Inspection / Repair
Installation**

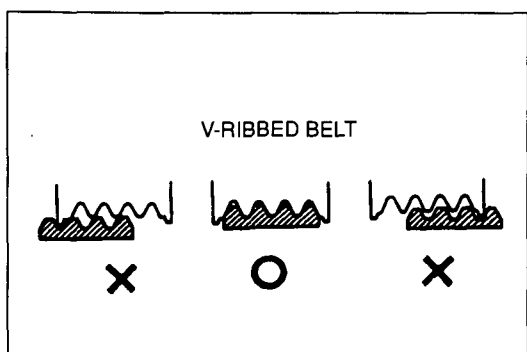
ENGINE TUNE-UP

PREPARATION

SST

<p>49 9200 020</p> <p>Tension gauge, V-ribbed belt</p> 	<p>For inspection of drive belt tension</p>
----------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------

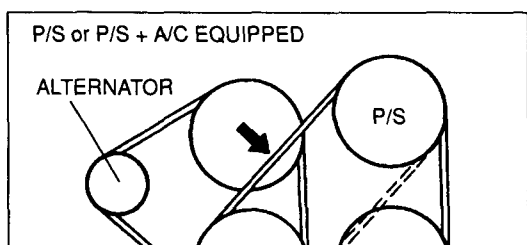
45U0BX-005

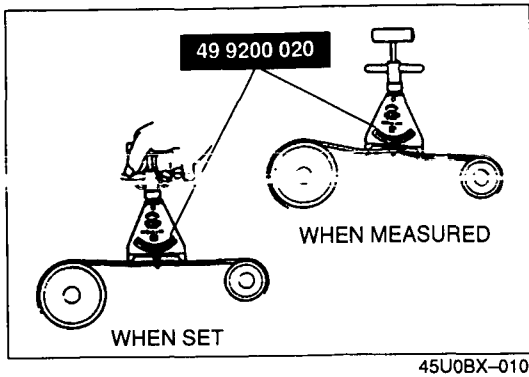


05U0BX-009

**DRIVE BELT
Inspection**

1. Remove the air intake pipe.
2. Check the drive belts for wear, cracks, and fraying. Replace if necessary.
3. Verify that the drive belts are correctly mounted on the pulleys.
4. Check the drive belt deflection when the engine is cold, or at least 30 minutes after the engine has stopped. Apply moderate pressure **98 N {10 kgf, 22 lbf}** midway between the specified pulleys.





45U0BX-010

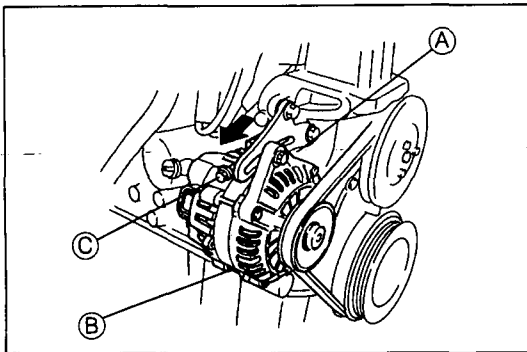
Drive belt tension check

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

Tension

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

* A belt that has been on a running engine for less than five minutes.
45U0BX-011



45U0BX-012

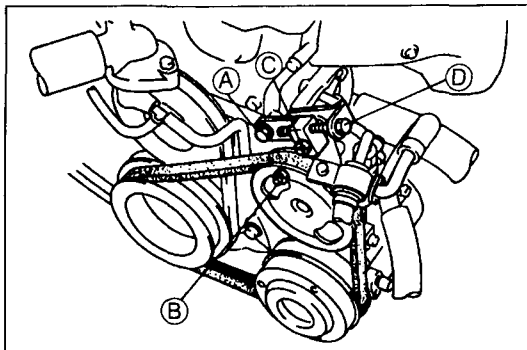
Adjustment

(1) Alternator belt

Loosen the alternator bolts (A) and (B) and adjust the belt deflection by turning the adjusting bolt (C).

Tightening torque

- (A): 19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}
- (B): 38—51 N·m {3.8—5.3 kgf·m, 28—38 ft·lbf}



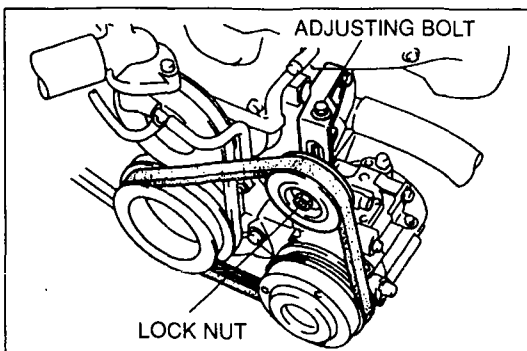
45U0BX-013

(2) P/S belt, P/S + A/C belt

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

Tightening torque

- (A): 32—46 N·m {3.2—4.7 kgf·m, 24—33 ft·lbf}
- (B): 37—53 N·m {3.7—5.5 kgf·m, 27—39 ft·lbf}
- (C): 19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}



35U0BX-004

(3) A/C belt

Loosen the locknut and adjust the belt deflection by turning the adjusting bolt.

Tightening torque:

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

REMOVAL

Caution

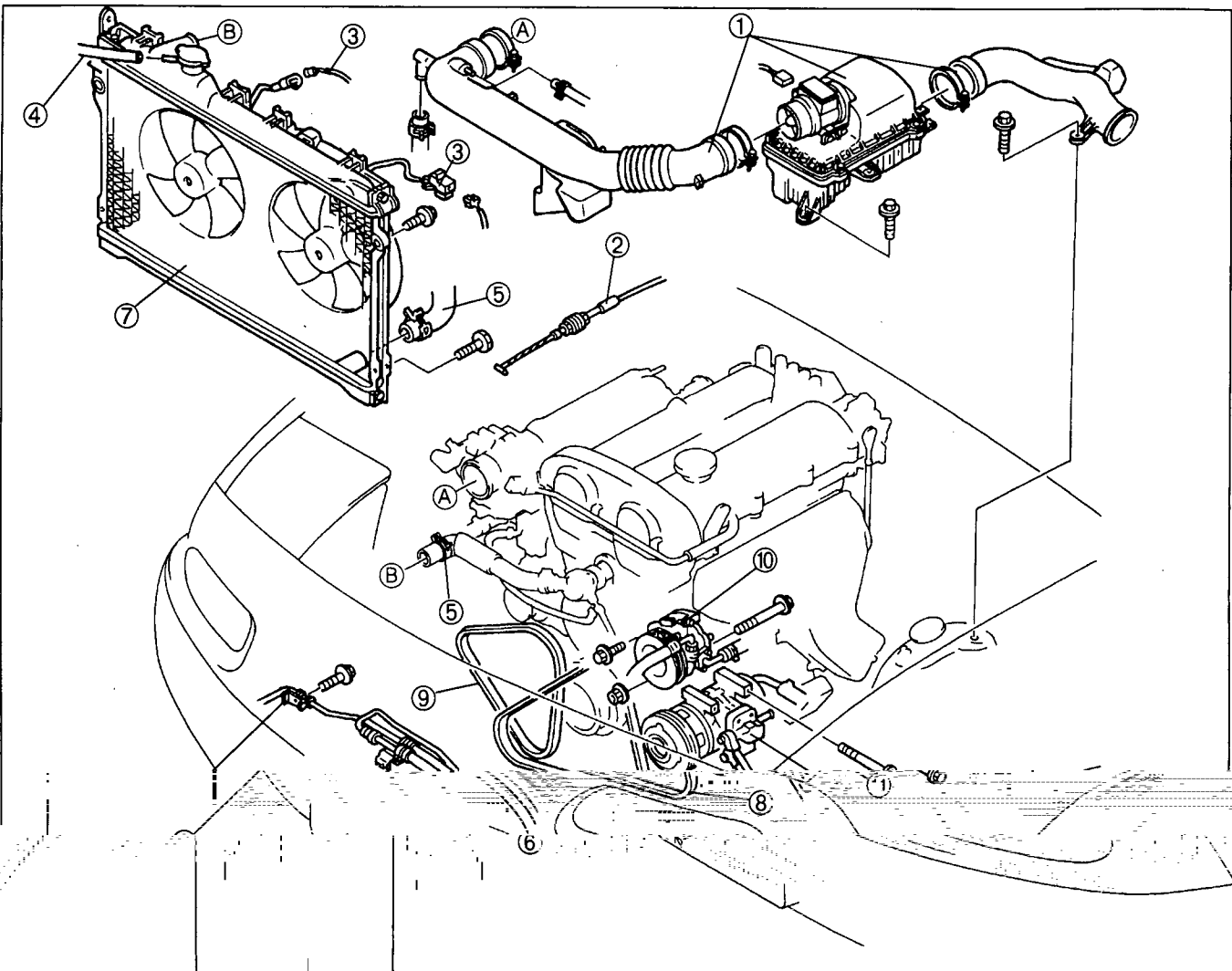
- Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the "Fuel Line Safety Procedures" on section F.

B

PROCEDURE

1. Disconnect the negative battery cable.
2. Drain the engine coolant.
3. Remove the splash shield.
4. Remove the transmission.
5. Remove in the order shown in the figure, referring to **Removal Note**.

Step 1



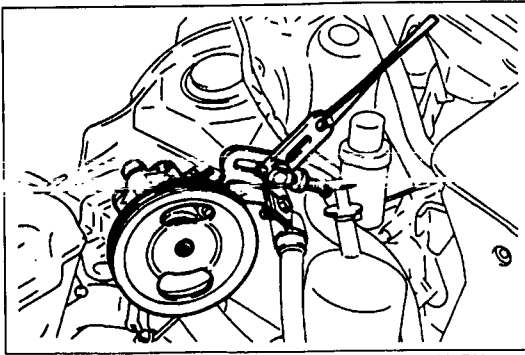
45U0BX-050

belt
 page B- 7
 page B- 7
 (ped)
 page B-10
 (equipped)
 page B-10

1. Air intake pipe and air cleaner housing assembly
2. Accelerator cable
3. Fan connector
4. Coolant reservoir hose
5. Radiator hose
6. A/C pipe bracket
7. Radiator and fan assembly
8. P/S and/or A/C drive belt
Removal
9. Alternator drive belt
Removal
10. P/S oil pump (If equipped)
Removal Note ...
11. A/C compressor (If equipped)
Removal Note ...

B

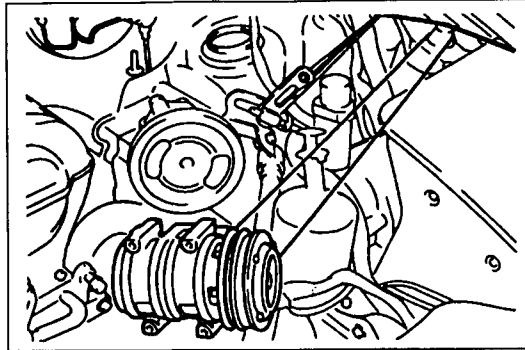
REMOVAL



45U0BX-051

Removal Note P/S oil pump (If equipped)

1. Remove the P/S oil pump with the hoses still connected.
2. Position the pump away from the engine and affix it with wire.



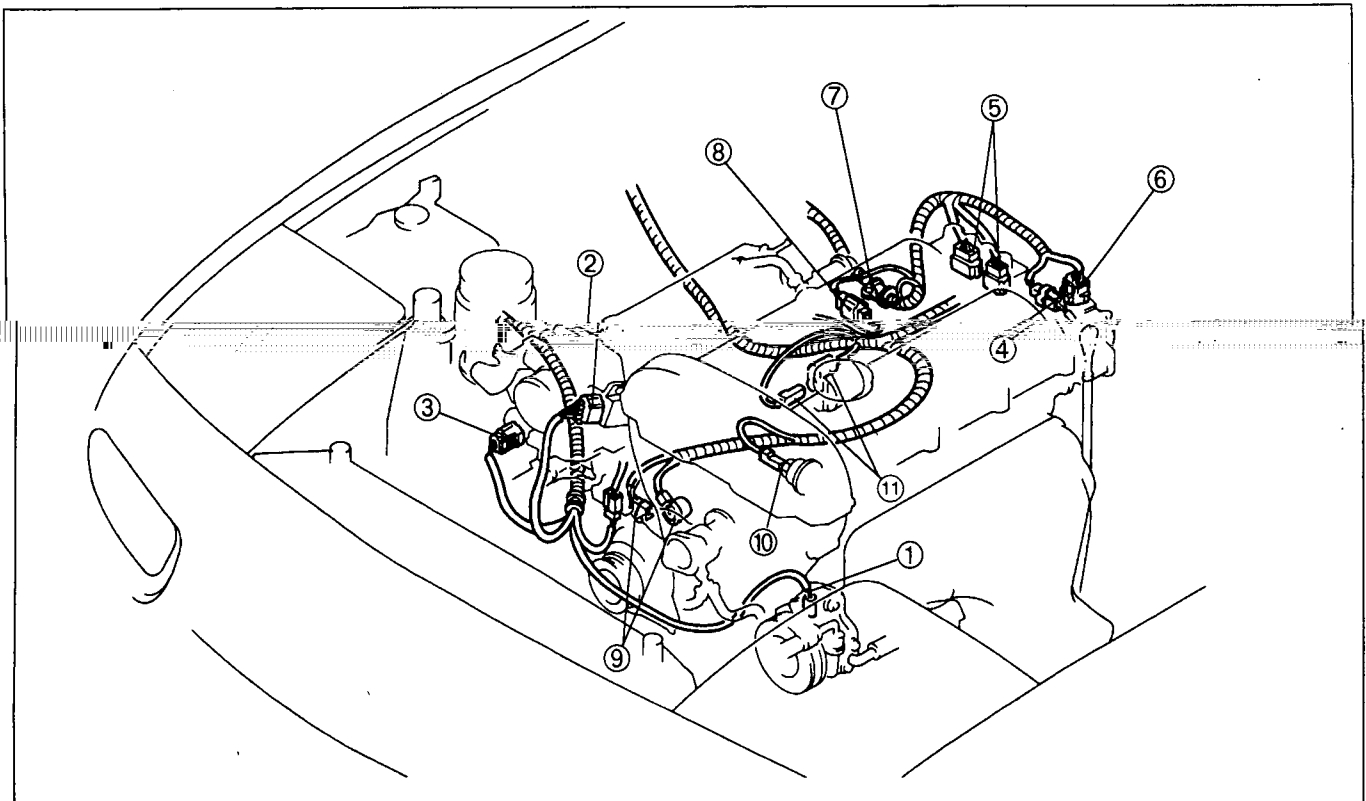
45U0BX-052

A/C compressor (If equipped)

1. Remove the A/C compressor with the hoses still connected.
2. Position the compressor away from the engine and affix it with wire.

Step 2

Disconnect the harness connectors shown in the figure.



45U0BX-053

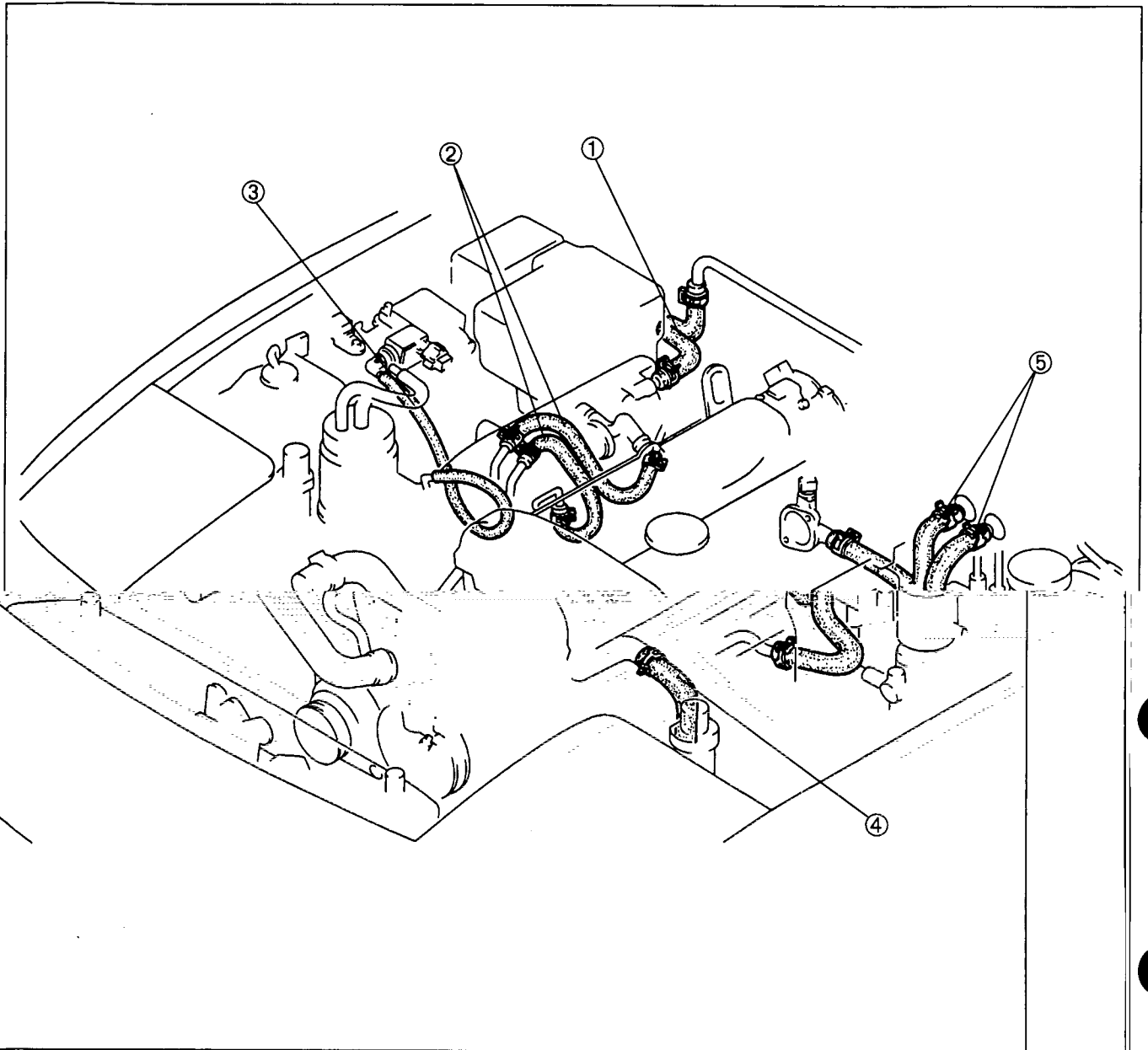
- | | |
|------------------------|------------------------|
| 1. P/S pressure switch | 7. Ground |
| 2. Throttle sensor | 8. Fuel injector |
| 3. ISC solenoid valve | 9. Alternator |
| 4. Oxygen sensor | 10. Oil pressure gauge |
| 5. Ignition coil | 11. Starter |
| 6. Crank angle sensor | |

REMOVAL

B

Step 3

Disconnect the hoses shown in the figure.



45U0BX-054

Brake vacuum hose

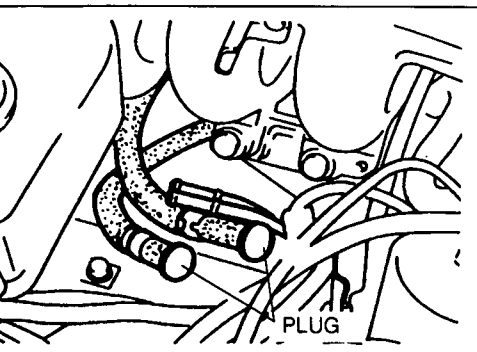
Fuel hose

Removal Note below

3. Vacuum hose (Purge control)

4. Water inlet hose

5. Heater hose



45U0BX-055

Removal Note

Fuel hose

Warning

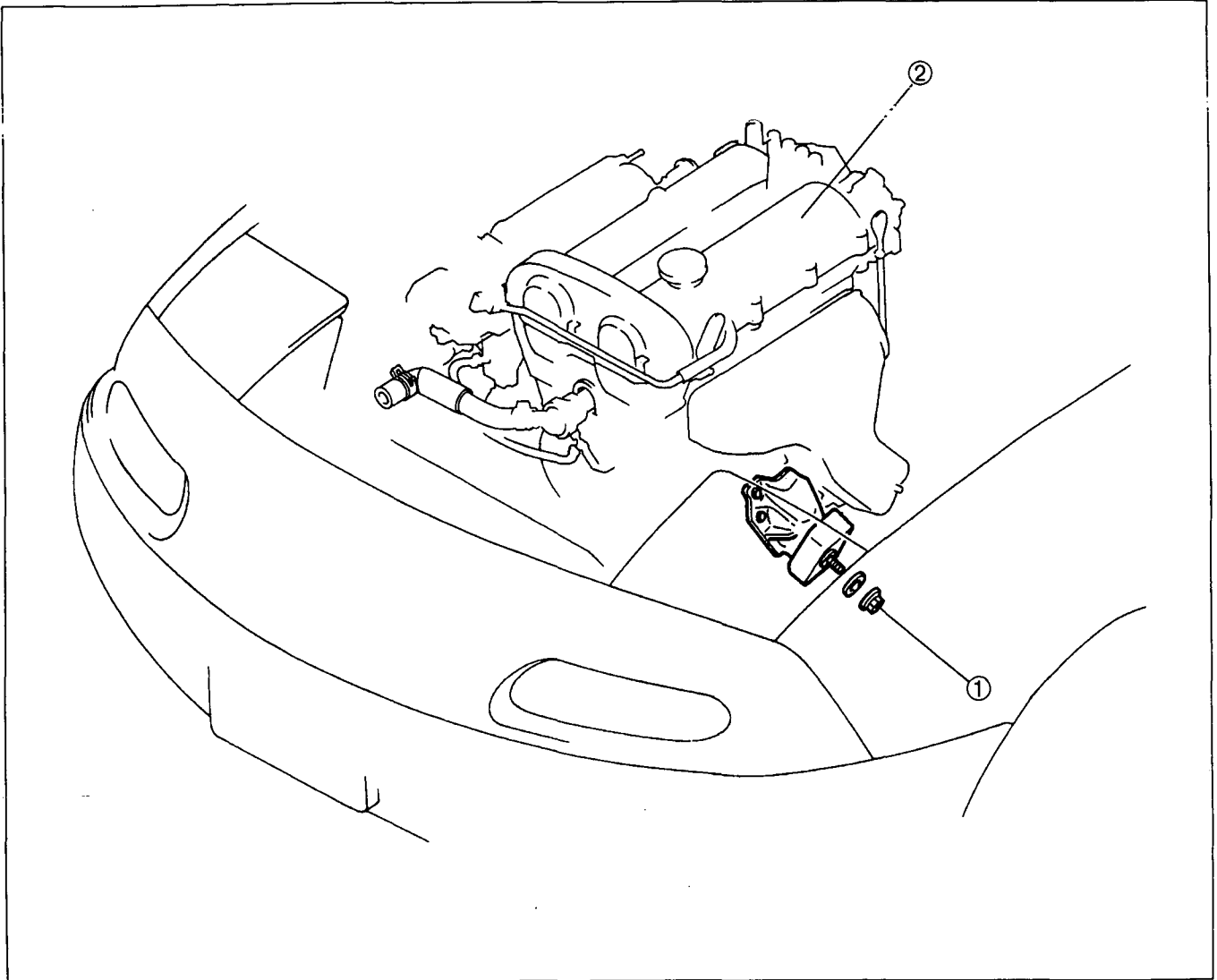
- Fuel vapor is hazardous. It can very easily ignite, causing serious injury and damage. Always keep sparks and flames away from fuel.

Disconnect the fuel hoses.

B

REMOVAL, INSPECTION/REPAIR

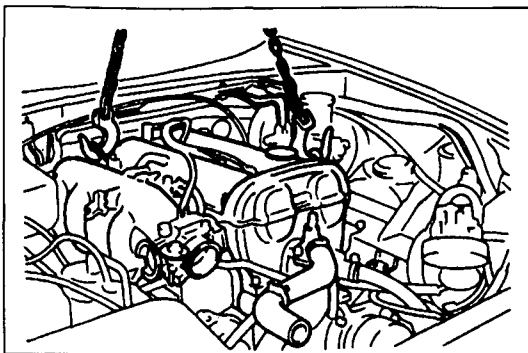
Step 4



45U0BX-056

1. Engine mount nut

2. Engine assembly



45U0BX-057

Removal Note Engine assembly

Slowly lift the engine assembly as a unit. Keep the engine from swinging or bumping into components in the engine compartment.

INSPECTION/REPAIR

- The engine inspection/repair procedure is the same as of the previous MX-5 B6-DOHC engine.

INSPECTION DATA

Refer to section TD.

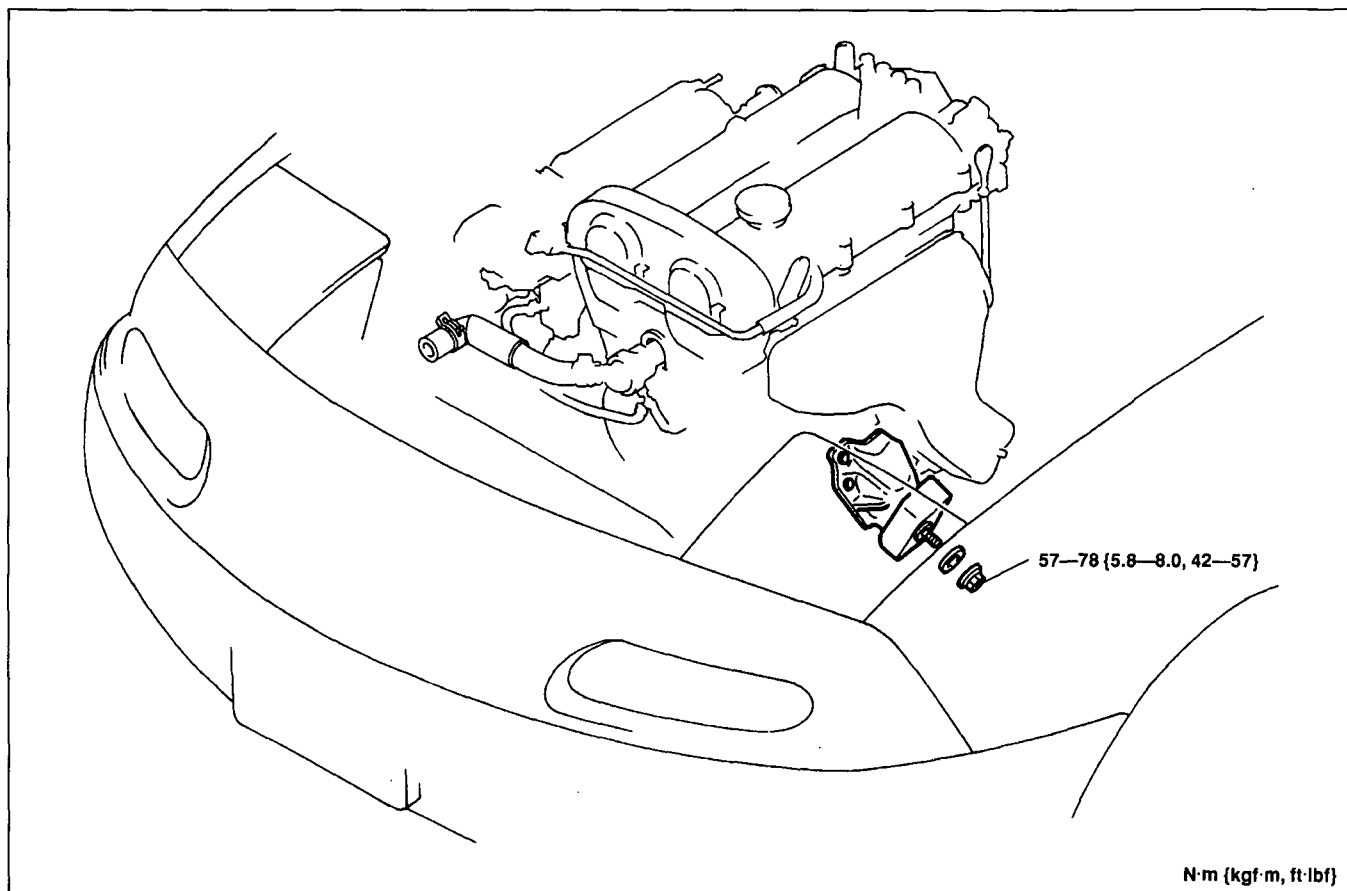
INSTALLATION

PROCEDURE

Tighten all bolts and nuts to the specified torques.

Step 1

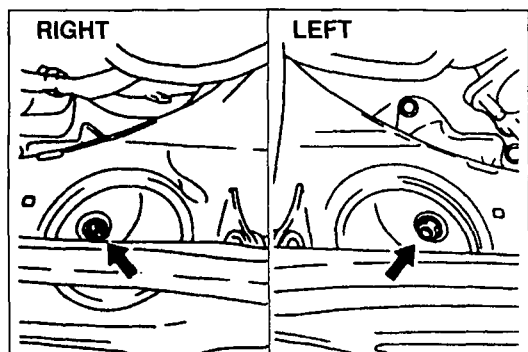
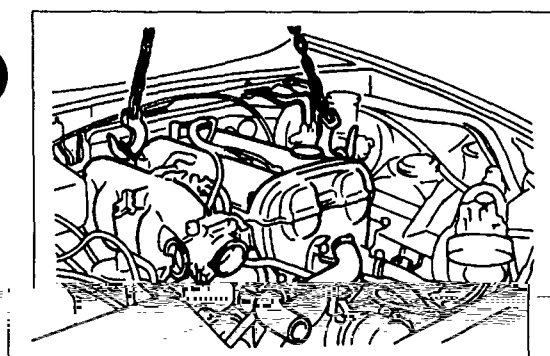
Torque Specifications



05U0BX-258

Engine assembly

1. Suspend the engine assembly.
Slowly lower the engine assembly as a unit. Keep the engine from swinging or bumping into components in the engine compartment.
2. Install the engine tilting downward.
3. Align the engine mounts with the crossmember mounting holes.
4. Install the engine mount nuts and hand tighten them.



Engine mount nut

Tighten the engine mount nuts.

Tightening torque:

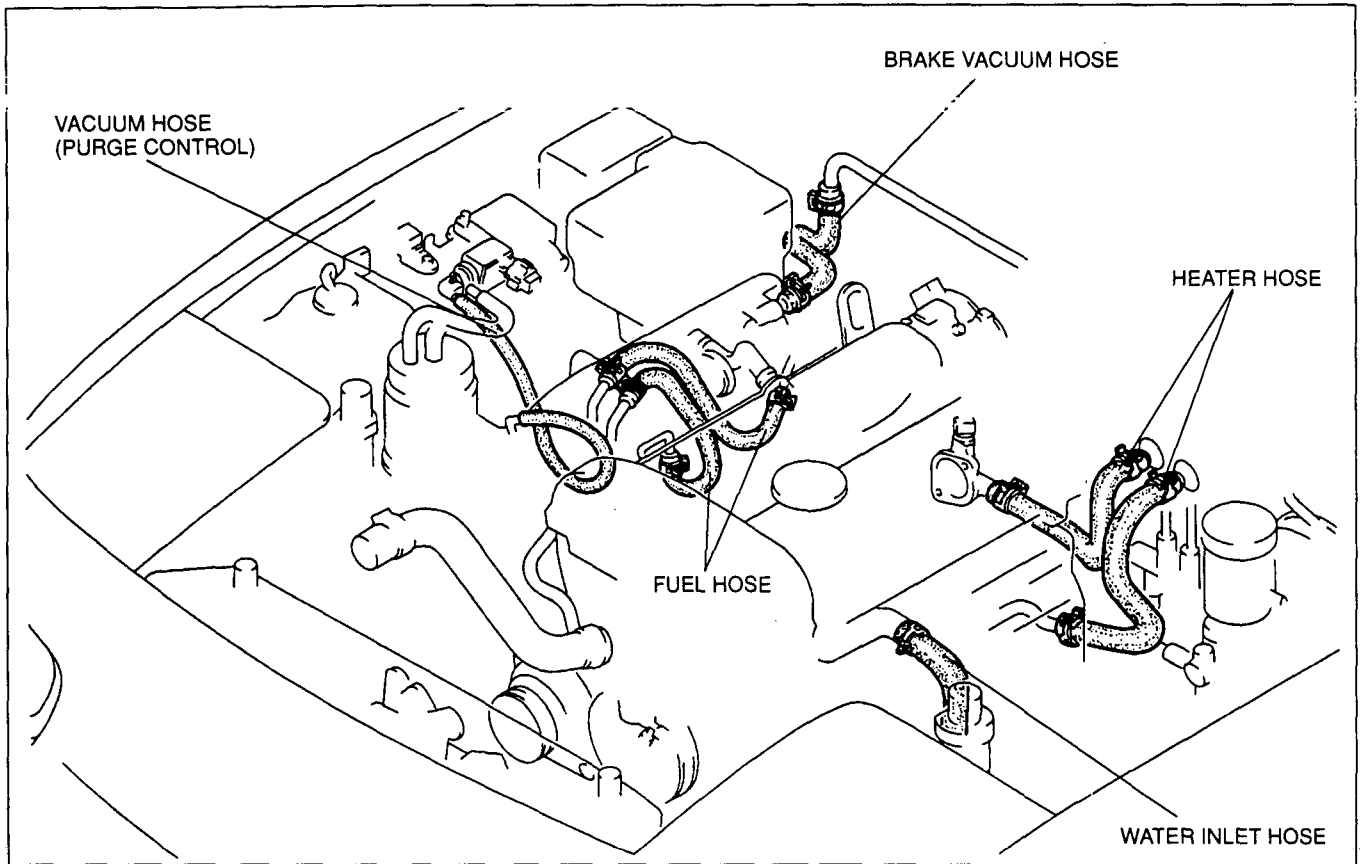
57—78 N·m {5.8—8.0 kgf·m, 42—57 ft·lbf}

B

INSTALLATION

Step 2

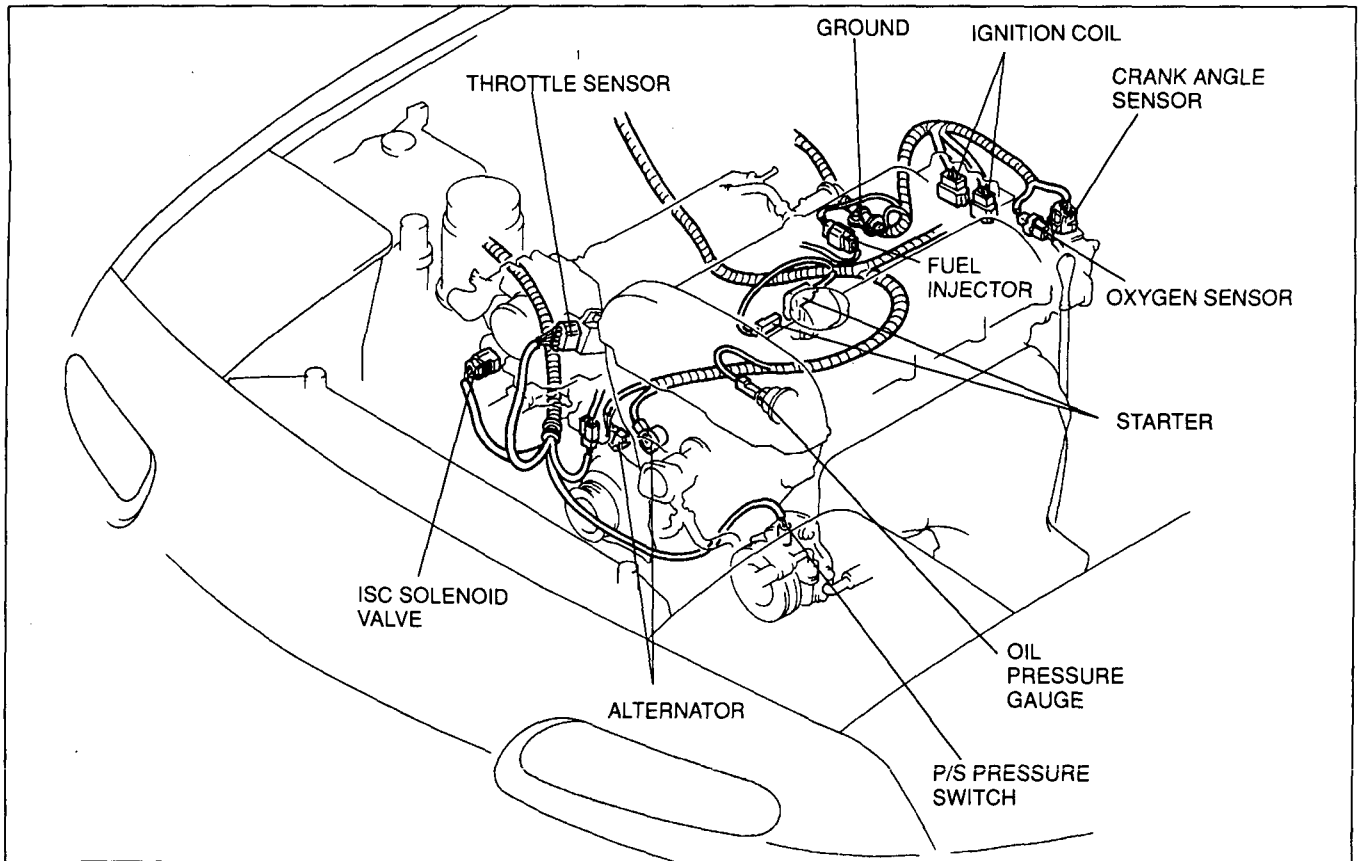
Connect the hoses shown in the figure.



45U0BX-174

Step 3

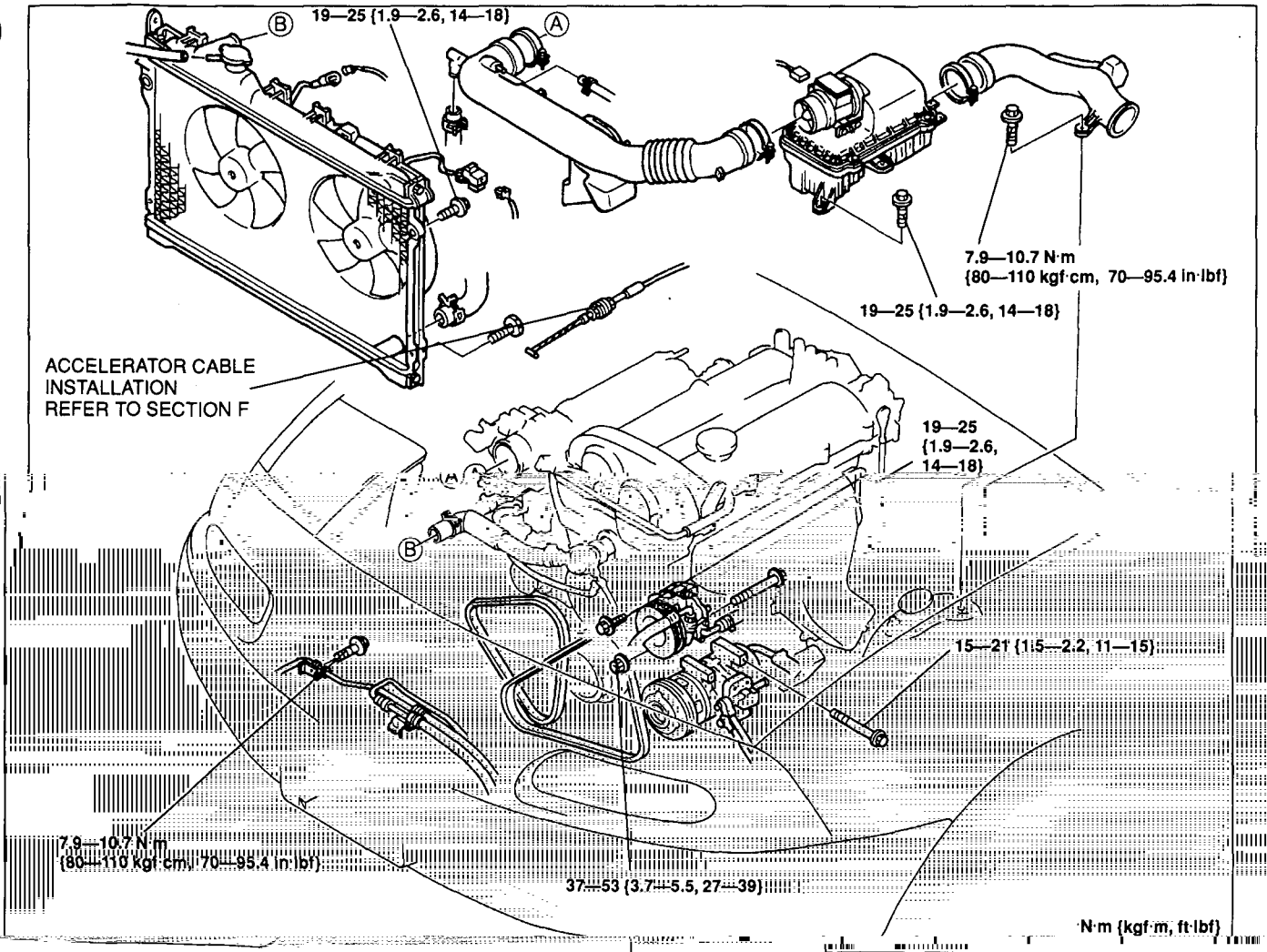
Connect the harness connectors shown in the figure.



45U0BX-175



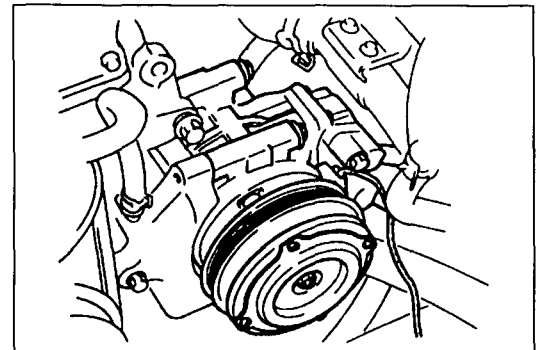
Step 4 Torque Specifications



05U0BX-269

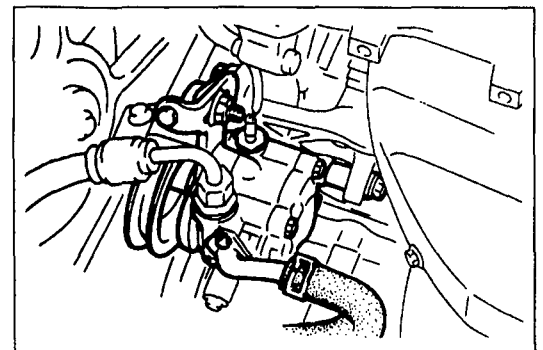
A/C compressor (If equipped)
Install the A/C compressor.

Tightening torque:
15-21 N·m (1.5-2.2 kgf·m, 11-15 ft·lbf)



35U0BX-106

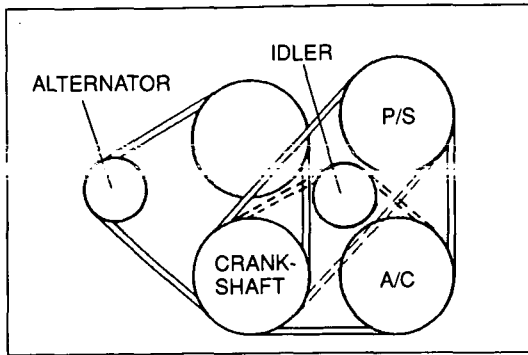
P/S oil pump (If equipped)
Install the P/S oil pump and hand tighten the mounting bolts.



05U0BX-271

B

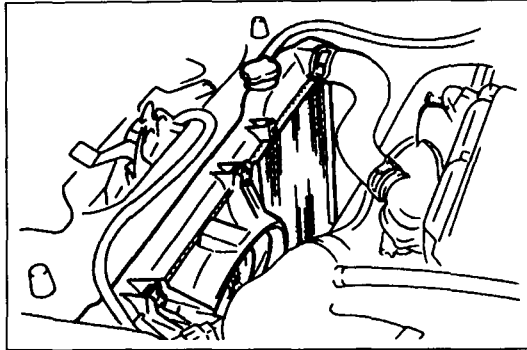
INSTALLATION



45U0BX-176

Drive belt

1. Install the alternator drive belt.
2. Install the P/S and/or A/C drive belt.
3. Adjust the drive belt deflection, and tighten the alternator and P/S mounting bolts and nuts.
(Refer to page B-7.)



45U0BX-177

Radiator and cooling fan assembly

1. Install the radiator and cooling fan assembly.

Tightening torque:

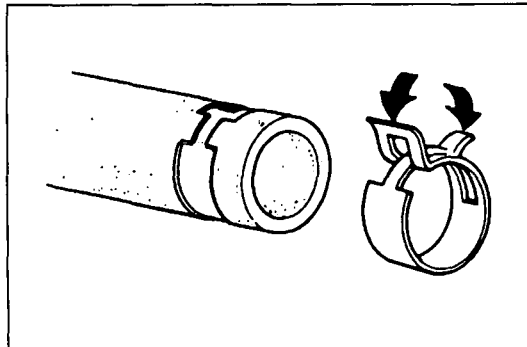
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

2. Install the A/C pipe bracket to the radiator.

Tightening torque:

7.9—10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

3. Connect the upper and lower radiator hoses.
4. Connect the coolant reservoir hose.
5. Connect the cooling fan motor connector.



45U0BX-178

Accelerator cable

(Refer to section F)

Air intake pipe and air cleaner housing assembly

1. Install the air cleaner housing assembly.

Tightening torque:

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

2. Install the air intake pipe.

the specified amount and type of engine oil.
amount and type of engine coolant.
with the specified amount and type of transmission oil.
ng.

engine coolant leakage

am
e belt deflection. (Refer to page B-7)

plant levels.

Steps After Installation

1. Install the transmission.
2. Install the splash shield.
3. If the engine oil was drained, fill with the specified amount and type of engine oil.
4. Fill the radiator with the specified amount and type of engine coolant.
5. If the transmission oil was drained, fill with the specified amount and type of transmission oil.
6. Start the engine and check the following:
 - (1) Engine oil, transmission oil, and engine coolant levels.
 - (2) Ignition timing, idle speed
 - (3) Operation of emission control system
7. Turn off the engine and check the drive belt deflection.
8. Perform a road test.
9. Recheck the engine oil and engine coolant levels.

Before beginning any service procedure, refer to section T of this manual for air bag system service warnings.

LUBRICATION SYSTEM

INDEX D- 2

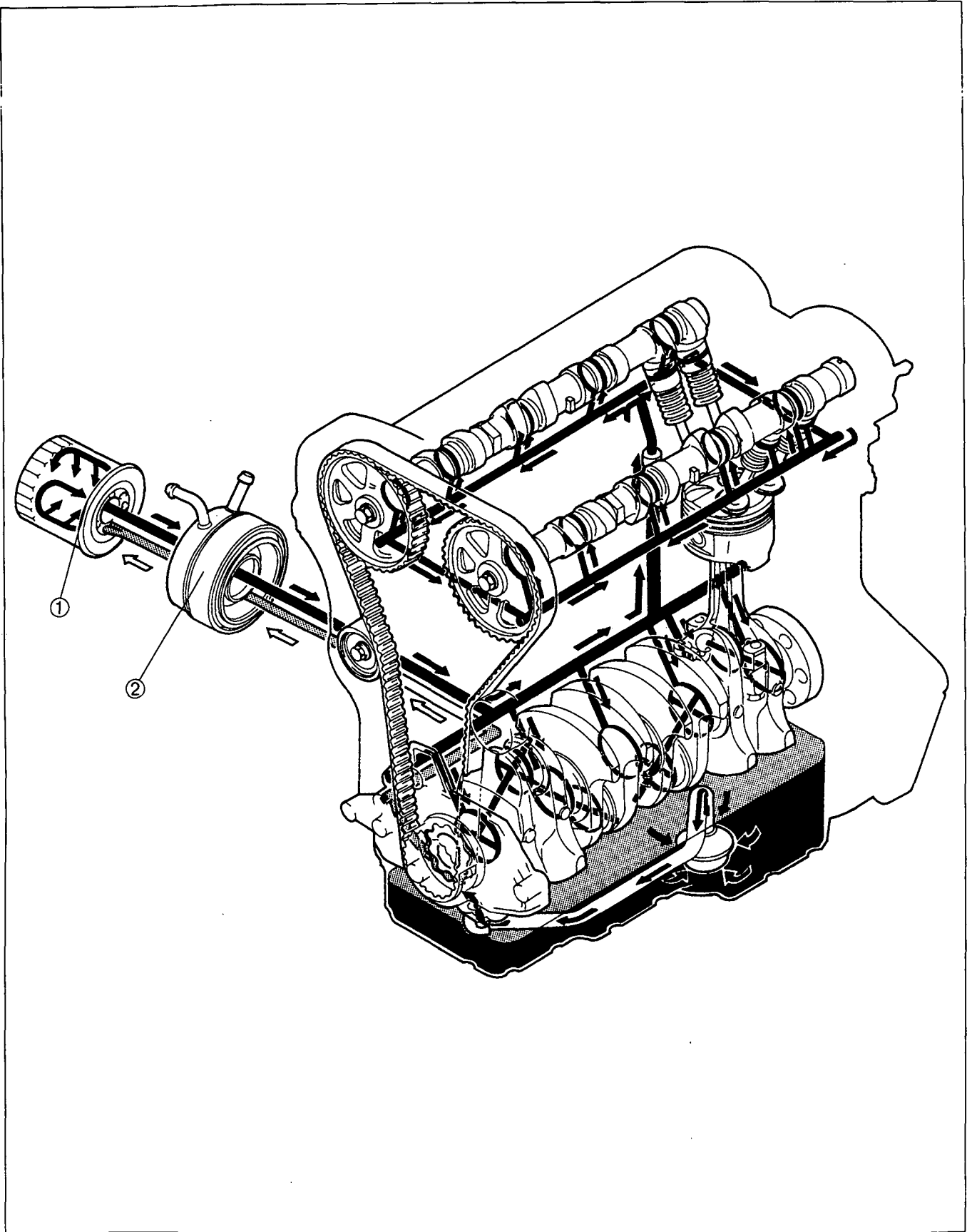
FEATURES

OUTLINE D- 3
OUTLINE OF CONSTRUCTION D- 3
FEATURES D- 3
SPECIFICATIONS D- 3
OIL COOLER D- 4

SERVICE

SUPPLEMENTAL SERVICE INFORMATION D- 5
OIL FILTER D- 5
PREPARATION D- 5
REPLACEMENT D- 5
OIL COOLER D- 6
PREPARATION D- 6
REMOVAL / INSTALLATION D- 6

INDEX



35A0DX-002

1. Oil filter
Replacement page D-5

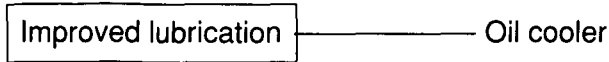
2. Oil cooler
Removal / Installation page D-6

OUTLINE

OUTLINE OF CONSTRUCTION

The lubrication system is basically the same as that of the MX-5 B6 DOHC engine.

FEATURES



D

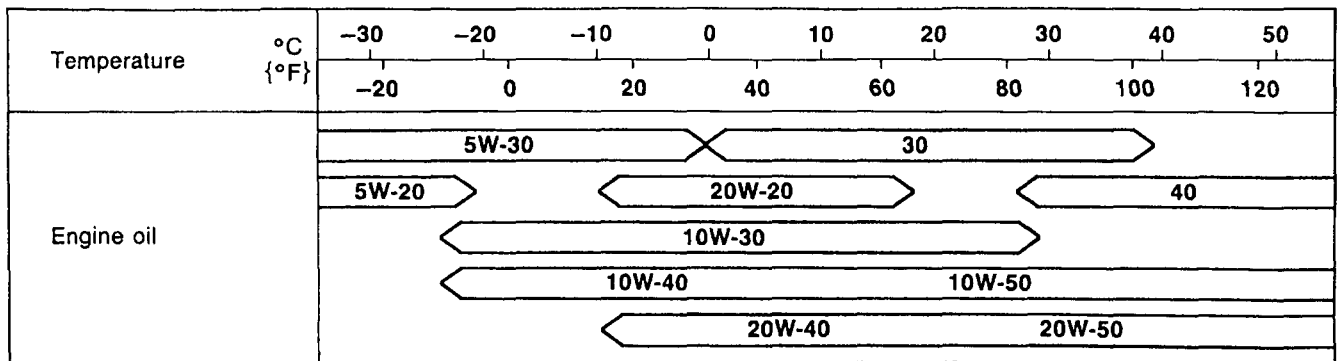
SPECIFICATIONS

Item		Engine	BP DOHC
Lubrication system			Force-fed
Oil pump	Type		Trochoid gear
	Relief pressure	kPa {kgf/cm ² , psi}	344—441 {3.5—4.5, 50—63}
Oil filter	Type		Full-flow, paper element
	Relief pressure differential	kPa {kgf/cm ² , psi}	79—117 {0.8—1.2, 12—17}
Oil capacity	Total (dry engine)	L {US qt, Imp qt}	4.0 {4.2, 3.5}
	Oil replacement	L {US qt, Imp qt}	3.6 {3.8, 3.2}
	Oil and oil filter replacement	L {US qt, Imp qt}	3.8 {4.0, 3.3}
Engine oil			API service SD, SE, or SF

- Shows data peculiar to this model.
Other data are the same as that of MX-5 B6 DOHC model.

35A0DX-003

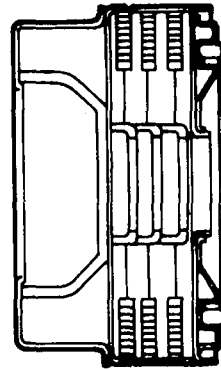
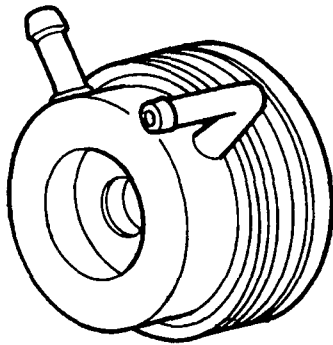
Recommended SAE Viscosity



Anticipated ambient temperature range before succeeding oil change, °C {°F}.

35A0DX-004

OIL COOLER



SECTIONAL VIEW

35A0DX-005

- A water-cooled oil cooler prevents engine oil premature deterioration caused by improved engine performance.

SUPPLEMENTAL SERVICE INFORMATION

The following points in this section are changed comparison with the Mazda MX-5 Workshop Manual 9/89 (1221-10-89I).

Oil filter

- Replacement

Oil cooler

- Removal / Installation

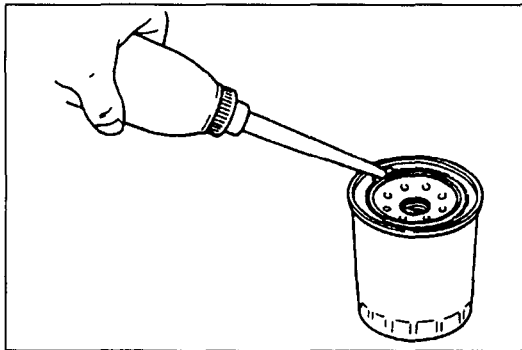
D

35A0DX-006

OIL FILTER

**PREPARATION
SST**

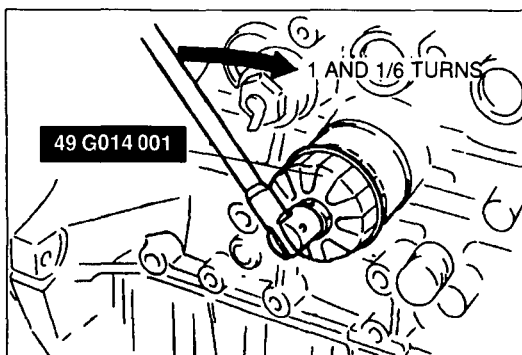
<p>49 G014 001</p> <p>Oil filter wrench</p>		<p>For removal and installation of oil filter</p>
---------------------------------------------	-----------------------------------------------------------------------------------	---------------------------------------------------



35A0DX-007

REPLACEMENT

1. Remove the oil filter with the **SST**.
2. Use a clean rag to wipe off the mounting surface on the oil cooler base.
3. Apply a small amount of clean engine oil to the O-ring of the new oil filter.



4. Install the oil filter and tighten it by hand until the O-ring contacts the oil cooler base.
5. Tighten the oil filter 1 and 1/6 turns with the **SST**.

Tightening torque:


14—17 N·m {1.4—1.8 kgf·m, 11—13 ft·lbf}

6. Start the engine and check for leaks.
7. Check the oil level and add oil if necessary.

OIL COOLER

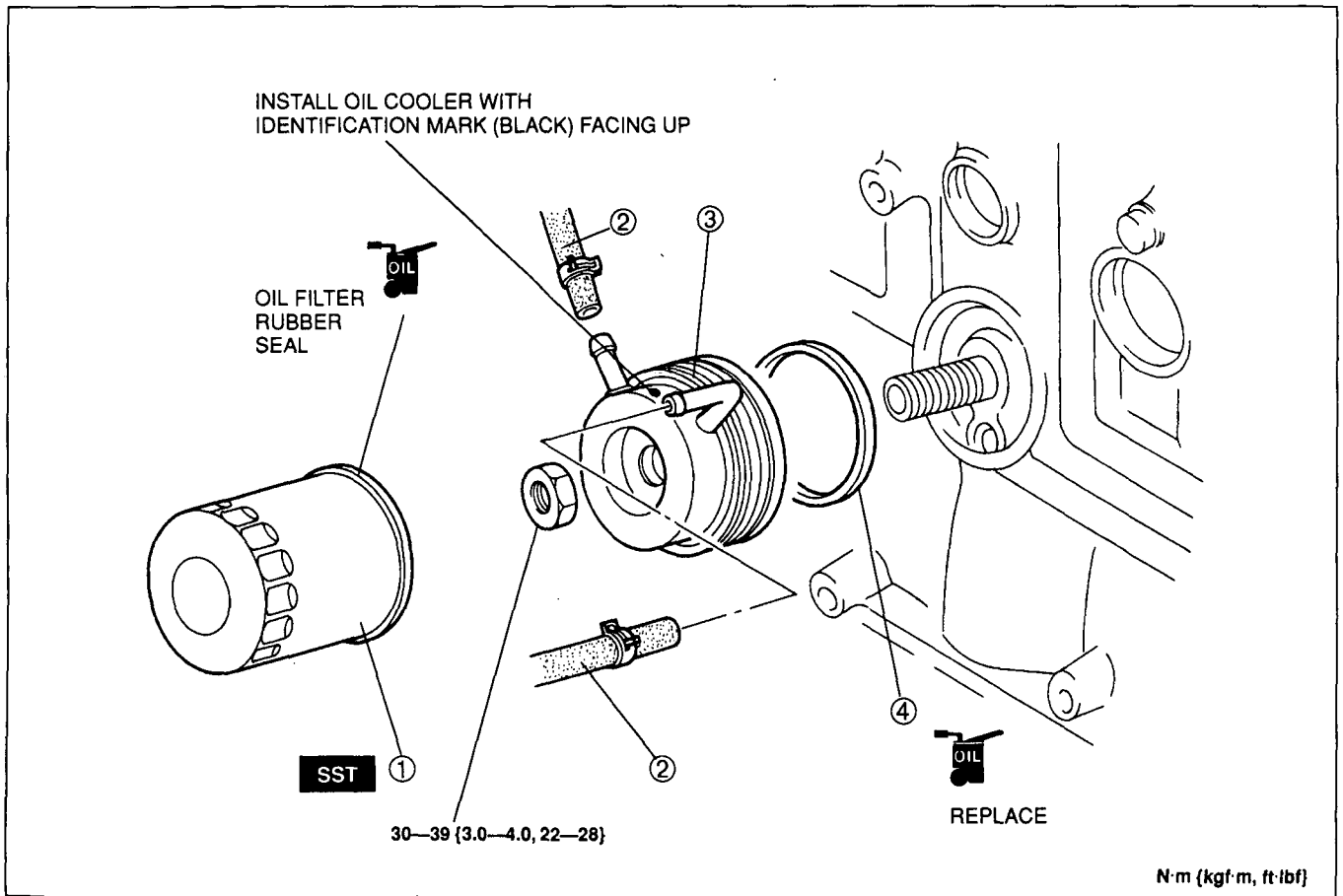
PREPARATION

SST

49 G014 001		For removal and installation of oil filter
Oil filter wrench		

REMOVAL / INSTALLATION

1. Disconnect the negative battery cable.
2. Drain the engine oil and engine coolant.
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.



35A0DX-008

- | | |
|----------------------------|---------------|
| 1. Oil filter | 3. Oil cooler |
| Replacement page D-5 | 4. O-ring |
| 2. Water hose | |

Steps After Installation

1. Connect the negative battery cable.
2. Fill with the specified amount and type of engine oil and engine coolant.
3. Start the engine and check for leaks.
4. Check the oil level and add oil if necessary.
5. Recheck the engine coolant levels.

35A0DX-009

Before beginning any service procedure, refer to section T of this manual for air bag system service warnings.

COOLING SYSTEM

INDEX E- 2

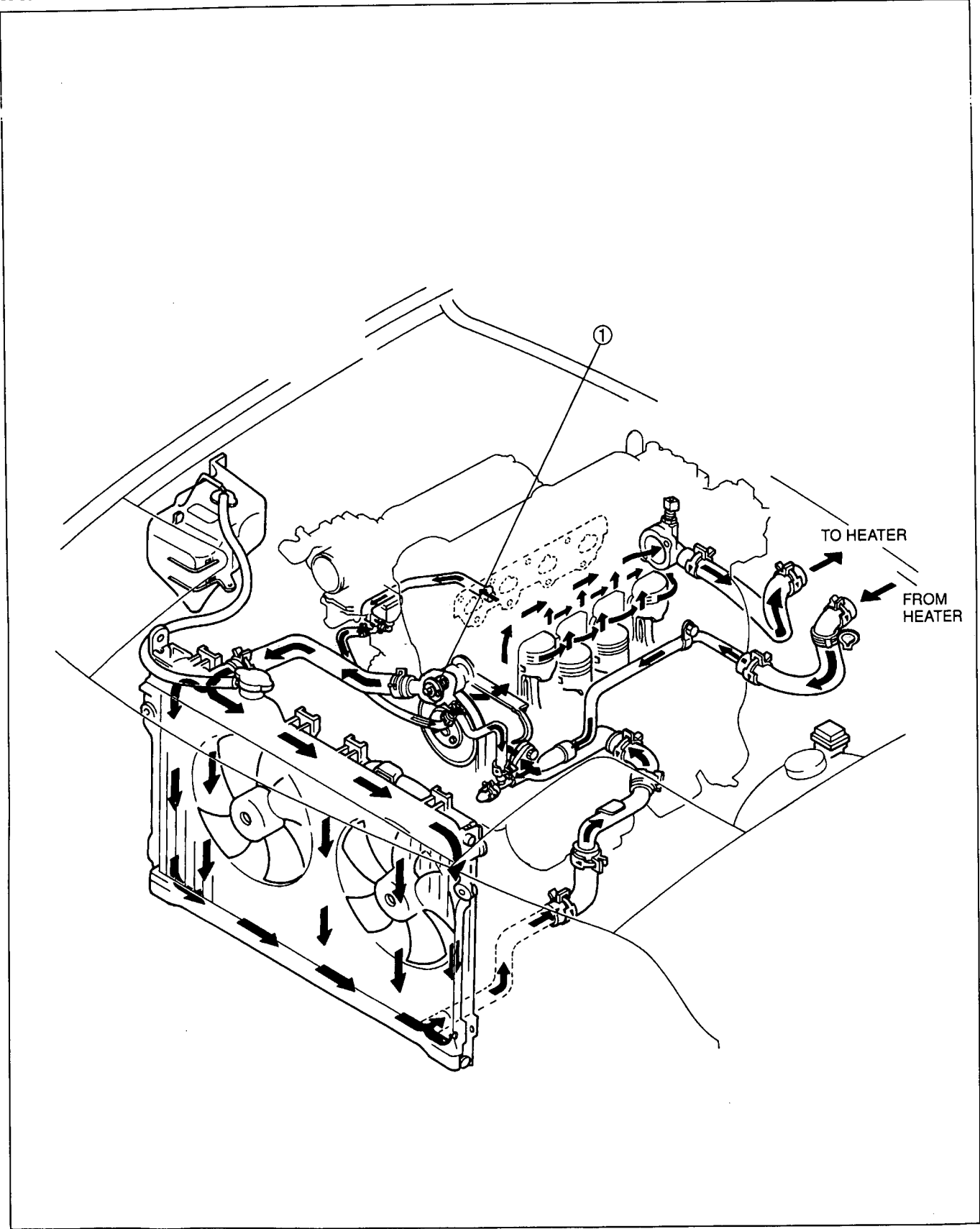
FEATURES

OUTLINE E- 3
OUTLINE OF CONSTRUCTION E- 3
SPECIFICATIONS E- 3

SERVICE

SUPPLEMENTAL SERVICE INFORMATION E- 3
THERMOSTAT E- 4
REMOVAL / INSTALLATION E- 4
INSPECTION E- 4

INDEX



35A0EX-002

- 1. Thermostat
Removal / Installation page E-4
Inspection page E-4

OUTLINE

OUTLINE OF CONSTRUCTION

The cooling system is basically the same as that of the MX-5 B6 DOHC engine.

The major design change is as follows.

- The water pump pulley is driven by the V-ribbed belt.

45U0EX-701

SPECIFICATIONS

Item		Engine	BP DOHC
Cooling system			Water-cooled, forced circulation
Coolant capacity		L {US qt, Imp qt}	6.0 {6.3, 5.3}
Water pump	Type		Centrifugal, V-ribbed belt driven
	Water seal		Unified mechanical seal
Thermostat	Type		Wax, two-stage
	Opening temperature	°C (°F)	Main: 86.5—89.5 (188—193) Sub: 83.5—86.5 (183—187)
Radiator	Full-open temperature	°C (°F)	100 (212)
	Full-open lift	mm (in)	Main: 8.0 (0.31) min. Sub: 1.5 (0.06) min.
Cooling fan	Type		Corrugated fin
	Cap valve opening pressure	kPa (kgf/cm ² , psi)	73.6—102 (0.75—1.05; 10.7—14.9)
Cooling fan	Type		Electric
	Blade	Outer diameter	mm (in)
		Number	
	Motor	Capacity	W·V
Current		A	

E

* Shows data peculiar to this mode. Other data are the same as of that of the MX-5 B6 DOHC mode. 35A0EX-003

SUPPLEMENTAL SERVICE INFORMATION

The following points in this section are changed comparison with the Mazda MX-5 Workshop Manual 9/89 (1221-10-89I).

Thermostat

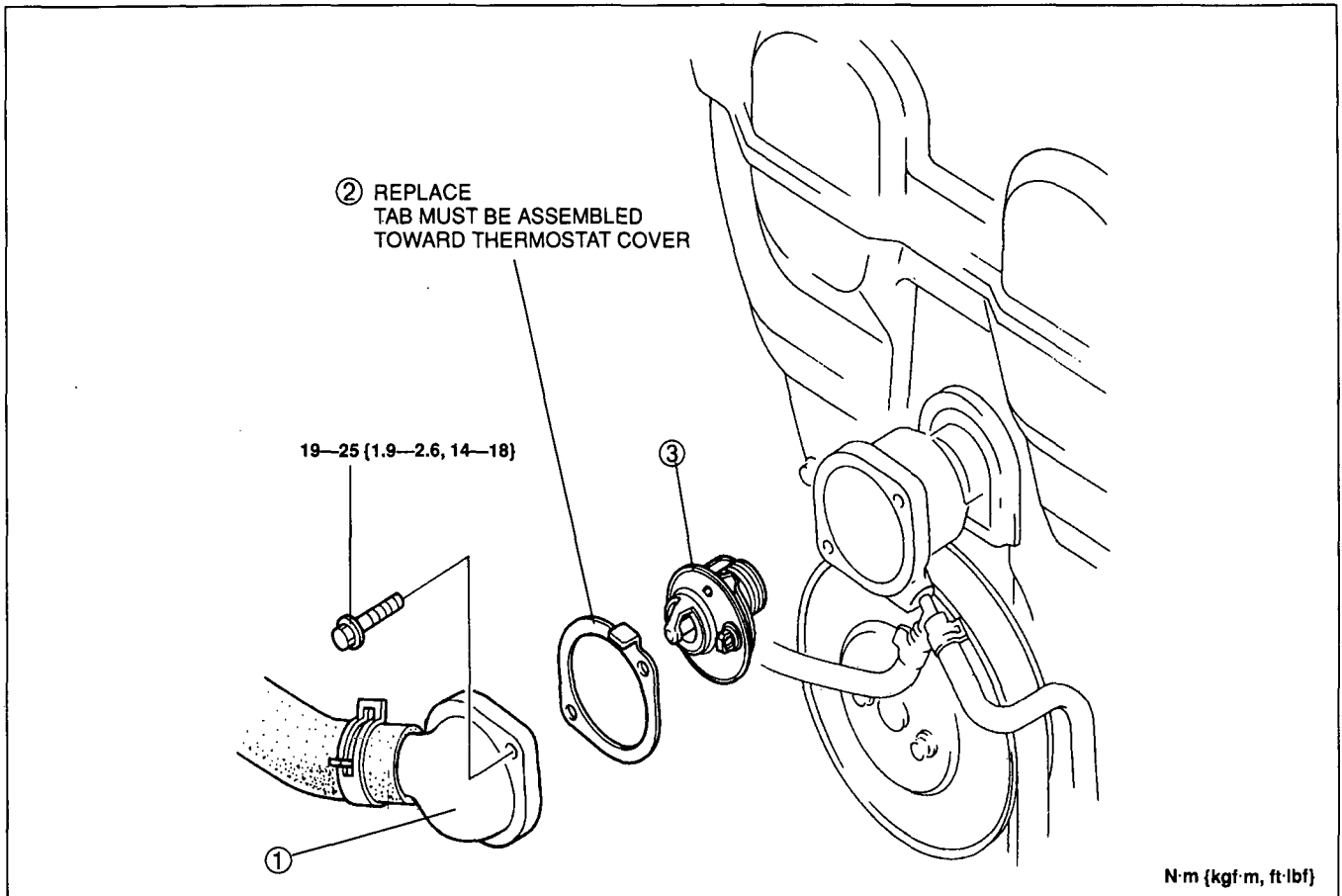
- Removal / Installation
- Inspection

35A0EX-004

THERMOSTAT

REMOVAL / INSTALLATION

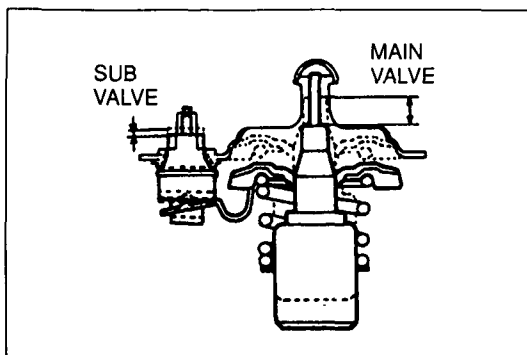
1. Disconnect the negative battery cable.
2. Drain the engine coolant.
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.



35A0EX-005

1. Thermostat cover
2. Thermostat cover gasket

3. Thermostat
Inspection below



35U0EX-005

INSPECTION

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

Initial-opening temperature

Main: 86.5—89.5°C {188—193°F}

Sub: 83.5—86.5°C {183—187°F}

Full-open temperature: 100°C {212°F}

Full-open lift

Main: 8.0mm {0.31 in} min.

Sub: 1.5mm {0.06 in} min.

Steps After Installation

1. Connect the negative battery cable.
2. Fill the radiator with coolant.

35A0EX-006

Before beginning any service procedure, refer to section T of this manual for air bag system service warnings.

FUEL AND EMISSION CONTROL SYSTEMS

INDEX F- 2

FEATURES

OUTLINE F- 5
 OUTLINE OF CONSTRUCTION F- 5
 DESCRIPTION F- 6
 FEATURES F- 6
 SYSTEM DIAGRAM F- 7
 WIRING DIAGRAM F- 8
 VACUUM HOSE ROUTING DIAGRAM F- 9
 SPECIFICATIONS F- 10
 COMPONENT DESCRIPTIONS F- 11
INTAKE AIR SYSTEM F- 13
 OUTLINE F- 13
 THROTTLE BODY F- 14
 AIRFLOW SENSOR (HOT-WIRE TYPE) F- 15
 INTAKE AIR THERMOSENSOR F- 15
FUEL SYSTEM F- 16
 OUTLINE F- 16
PRESSURE REGULATOR CONTROL SYSTEM F- 17
 DESCRIPTION F- 17

TROUBLESHOOTING GUIDE F- 37

ENGINE CONTROL OPERATION CHART F- 37
 RELATIONSHIP CHART F- 38
 USING THIS SECTION F- 39
 DIAGNOSTIC INDEX F- 41
 PRECAUTION F- 42
 SYMPTOM TROUBLESHOOTING F- 43
ENGINE TUNE-UP F- 99
 PREPARATION F- 99
 BASIC INSPECTION F- 99
 ADJUSTMENT F-100
SELF-DIAGNOSIS FUNCTION F-102
 PREPARATION F-102
 SERVICE CODE NUMBER F-102
 SWITCH MONITOR FUNCTION F-118
INTAKE AIR SYSTEM F-121
 COMPONENTS F-121
IDLE SPEED CONTROL (ISC) SYSTEM F-123
 PREPARATION F-123
 BAC VALVE F-123
 ISC SOLENOID VALVE F-124
FUEL SYSTEM F-125
 PREPARATION F-125

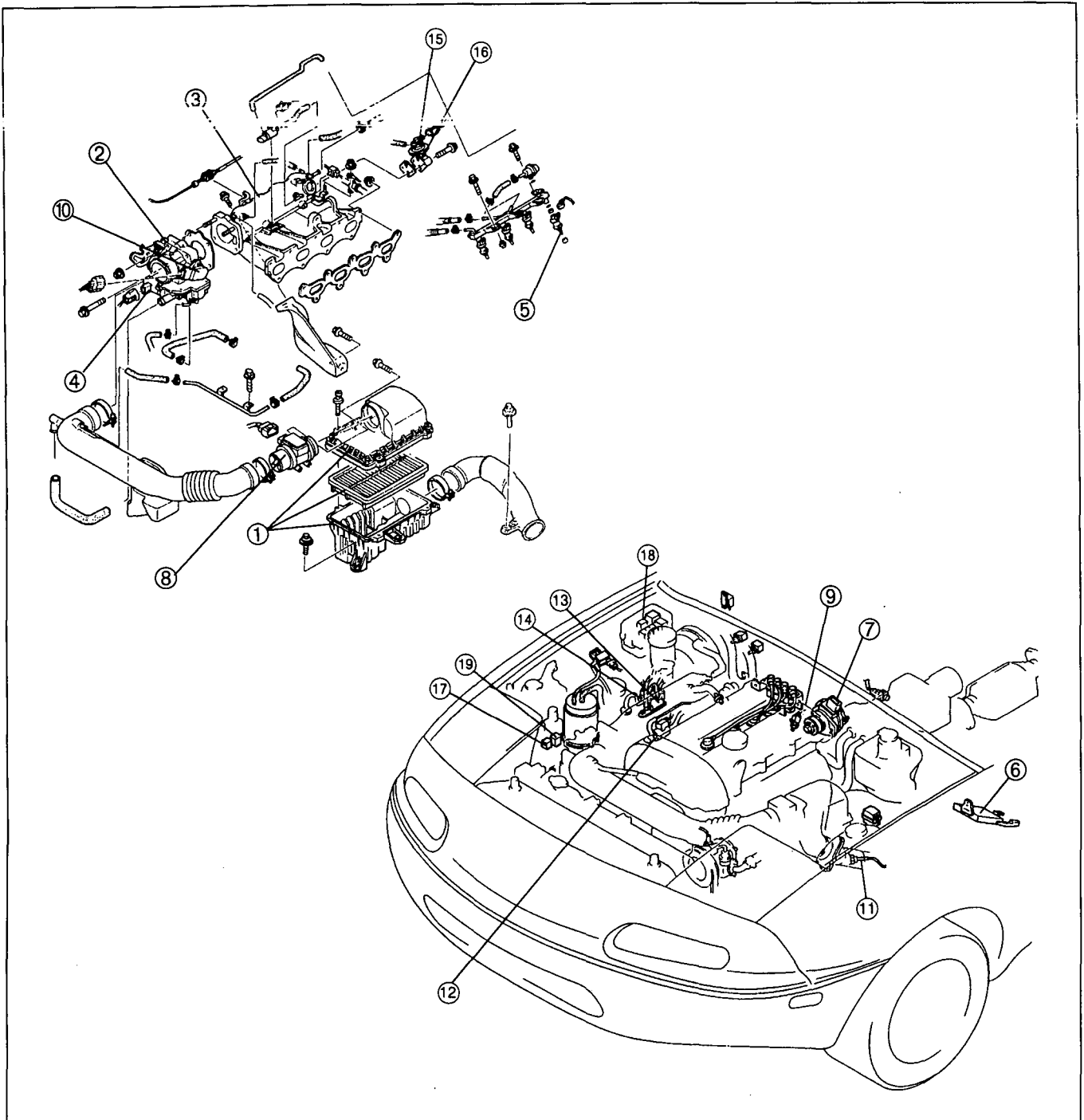
F

CONDITION F- 17
CONTROL SYSTEM F- 18
 DESCRIPTION F- 18
CONTROL F- 19
 F- 19
 ON TIMING F- 20
 ON AMOUNT F- 21
MARK ADVANCE (ESA) CONTROL F- 23
 F- 23
STEM F- 23
DISTRIBUTION SYSTEM F- 24
CONTROL (ISC) F- 25
 F- 25
CONTROL (BAC) VALVE F- 26
STEM F- 27
RECIRCULATION (EGR) CONTROL F- 28
 F- 28
CONTROL SYSTEM F- 29
 F- 29
FAN F- 30
CONTROL SYSTEM F- 31
 F- 31
EM F- 32

CIRCUIT OPENING RELAY F- 126
PRESSURE REGULATOR CONTROL SYSTEM F- 126
 PRC SOLENOID VALVE F- 127
EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM F- 131
 PREPARATION F- 131
 SYSTEM OPERATION F- 131
 EGR SOLENOID VALVE (VACUUM) F- 131
 EGR SOLENOID VALVE (VENT) F- 132
 EGR POSITION SENSOR F- 132
 EGR CONTROL VALVE F- 133
EXHAUST SYSTEM F- 134
 COMPONENTS F- 134
EVAPORATIVE EMISSION CONTROL SYSTEM F- 135
 TWO-WAY CHECK VALVE F- 135
 THREE-WAY CHECK VALVE F- 135
COOLING FAN CONTROL SYSTEM F- 136
 PREPARATION F- 136
 SYSTEM INSPECTION F- 136
 COOLING FAN RELAY F- 136
 CONDENSER FAN RELAY F- 136
A/C CUT-OFF CONTROL SYSTEM F- 137
 SYSTEM INSPECTION F- 137
 A/C RELAY F- 137

OPERATING F- 125
FUEL PUMP CONTROL SYSTEM F- 125
 DESCRIPTION F- 125
 OPERATION F- 125
FUEL INJECTION SYSTEM F- 125
 OUTLINE F- 125
 FUEL INJECTION F- 125
 FUEL INJECTION F- 125
ELECTRONIC SPARK CONTROL SYSTEM F- 125
 OUTLINE F- 125
 CONTROL SYSTEM F- 125
 ELECTRIC DISCHARGE F- 125
IDLE SPEED CONTROL SYSTEM F- 123
 OUTLINE F- 123
 BYPASS AIR CONTROL SYSTEM F- 123
EXHAUST GAS RECIRCULATION SYSTEM F- 131
 OUTLINE F- 131
COOLING FAN CONTROL SYSTEM F- 136
 OUTLINE F- 136
 COOLING FAN RELAY F- 136
 CONDENSER FAN RELAY F- 136
A/C CUT-OFF CONTROL SYSTEM F- 137
 DESCRIPTION F- 137
 CONTROL SYSTEM F- 137

INDEX

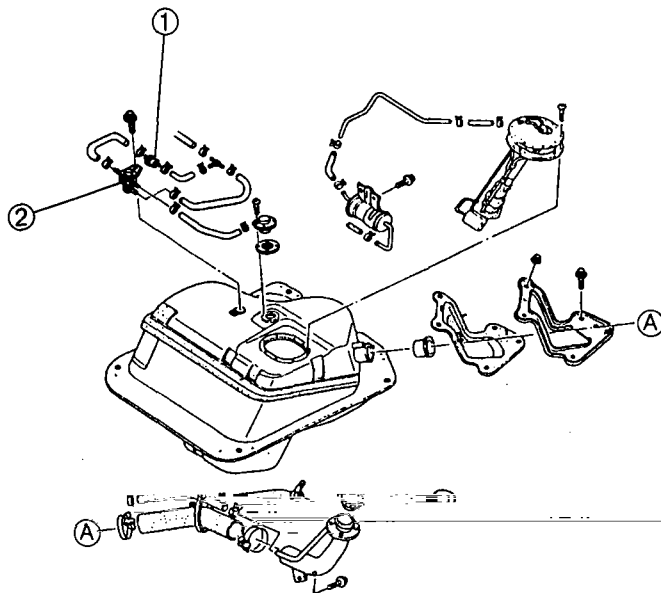


35A0FX-002

- | | | | | | |
|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------|------------|------------|------------|
| 1. Air cleaner assembly
Removal / Inspection /
Installation | 5. Fuel injector
Inspection
Removal
Installation | page F-122 | page F-127 | page F-127 | page F-129 |
| 2. Throttle body
Removal / Inspection /
Installation | 6. Engine control unit (ECU)
Inspection | page F-122 | page F-140 | | |
| 3. Intake manifold
Removal / Inspection /
Installation | 7. Crank angle sensor
Inspection
Replacement | page F-122 | page F-149 | page F-149 | |
| 4. BAC valve
System operation
Removal / Installation | 8. Airflow sensor
Inspection | page F-123 | page F-148 | | |

9. Water thermosensor		14. EGR solenoid valve (Vent)	
Removal	page F-150	Inspection	page F-132
Inspection	page F-150	15. EGR position sensor	
Installation	page F-150	Inspection	page F-132
10. Throttle position sensor		16. Ford air control valve	
Inspection	page F-150	Inspection	page F-133
Adjustment	page F-151	Replacement	page F-133
Replacement	page F-152	17. A/C relay	
11. Oxygen sensor		Inspection	page F-137
Inspection	page F-152	18. Cooling fan relay	
Replacement	page F-152	Inspection	page F-136
12. PRC solenoid valve		19. Condenser fan relay	
Inspection (On-vehicle)	page F-130	Inspection	page F-136
Inspection	page F-130		
13. EGR solenoid valve (Vacuum)			
Inspection	page F-131		

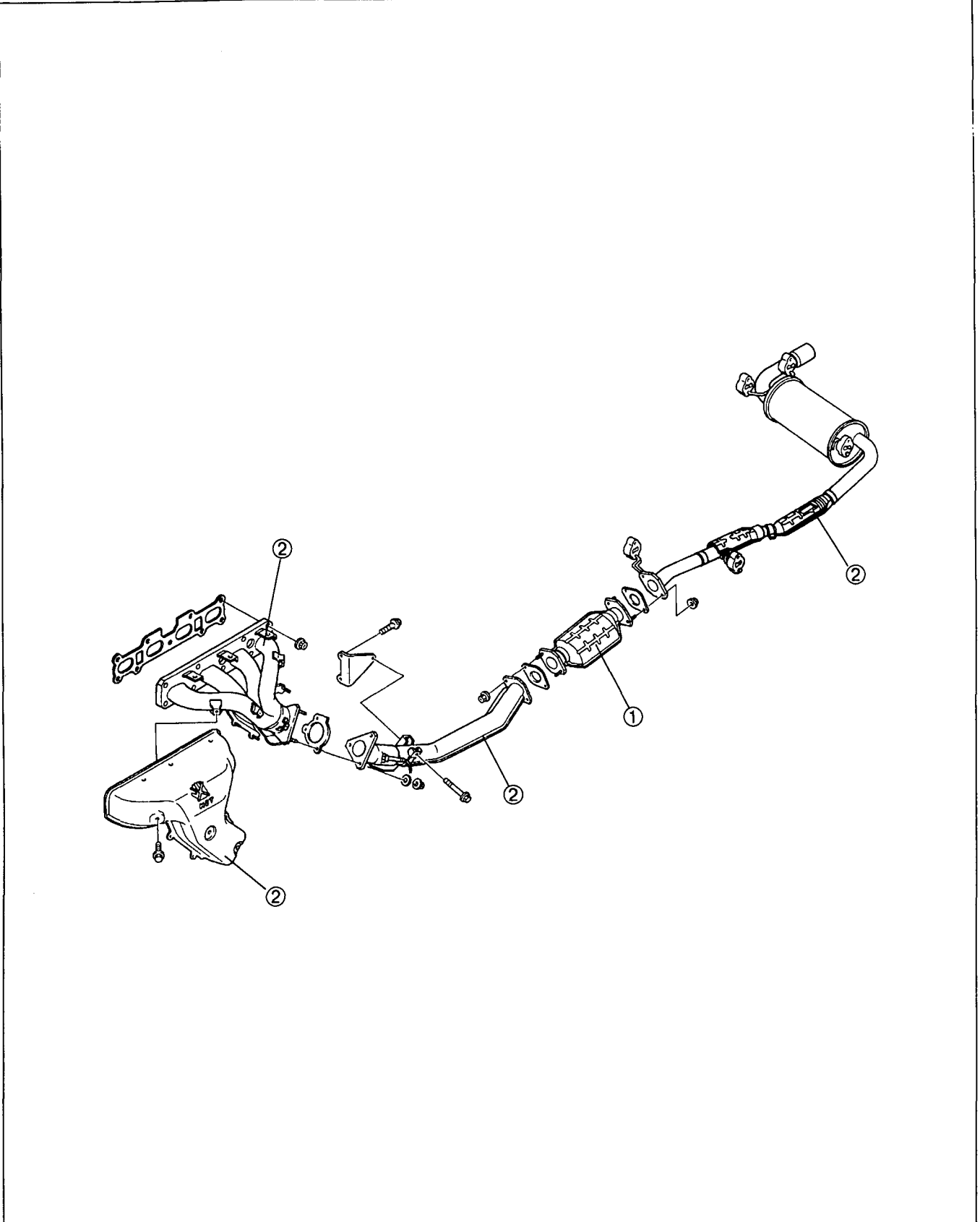
F



1. Two-way check valve	
Inspection	page F-135

2. Three-way check valve	
Inspection	page F-135

35A0FX-003



35A0FX-004

1. Catalytic converter
Removal / Inspection /
Installation page F-134

2. Exhaust components
Removal / Inspection /
Installation page F-134

OUTLINE

OUTLINE OF CONSTRUCTION

This section explains the fuel and emission control system of the new MX-5. A comparison of major parts for the new MX-5 and previous model is as follows:

Item		Application		Interchangeability
		New model	Previous model	
INTAKE AIR SYSTEM	Air cleaner housing	○	○	×
	Air cleaner element	○	○	○
	Air pipe	○	○	×
	Throttle body	○	○	×
	Air valve	×	○	—
	ISC solenoid valve	○	○	×
	BAC valve	○	×	—
	Resonance chamber	×	○	—
	Airflow meter	×	○	—
	Airflow sensor	○	×	—
	Intake manifold assembly	○	○	×
	Air hose	○	○	×
FUEL SYSTEM	Fuel tank	○	○	×
	Delivery pipe	○	○	×
	Fuel pump relay	○	○	×
	Fuel injector	○	○	×
EXHAUST SYSTEM	Exhaust manifold	○	○	×
	Exhaust manifold insulator	○	○	×
CONTROL SYSTEM	Engine control unit (ECU)	○	○	×
	Airflow meter	×	Vane type	—
	Airflow sensor	Hot-wire type	×	
	Water thermosensor	○	○	×

F

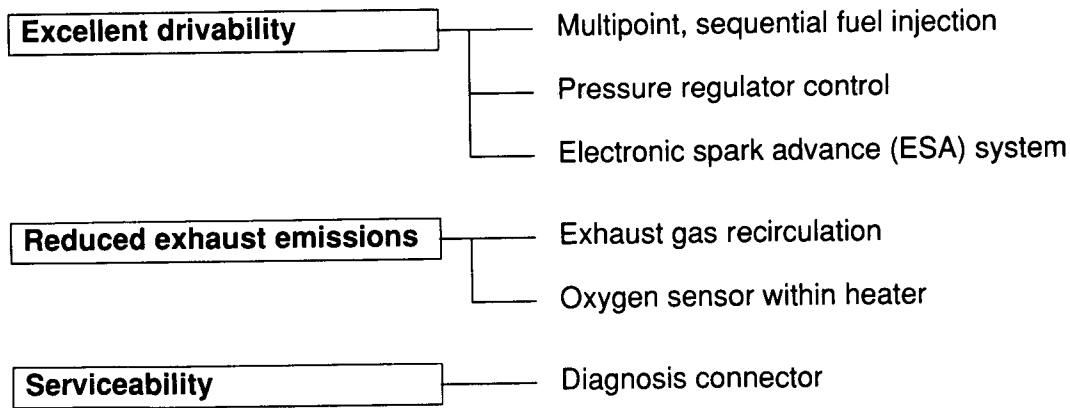
DESCRIPTION

- The two-way check valve is equipped to all models.
- The NOx emission is reduced by the EGR control.
- The fuel pressure to each fuel injector is regulated by the PRC control.
- The resonance chamber No.2 and the air pipe are unified.
- The ISC solenoid valve and the air valve are unified into the BAC valve.
- The air valve installation point is eliminated accordingly.
- The dashpot is eliminated.
- A linear type throttle sensor for all models.
- The configuration of the exhaust manifold is modified.
- The sequential fuel injection method is used instead of the group injection method.
- The linear type idle speed control is used, changed from the rotary type.
- The crank angle sensor is installed on the exhaust side camshaft, changed from the intake side.
- A hot-wire type airflow sensor is used, changed from the vane type.
- The fuel pump control and the circuit opening relay are changed accordingly.
- A oxygen sensor is changed to within heater type.
- The cooling fan and condenser fan are controlled by the ECU. According to this change, the water thermometer with higher accuracy at high coolant temperature is adopted. Also, the TFA terminal in the diagnosis connector is eliminated.
- The service codes are partially changed.

35E0FX-002

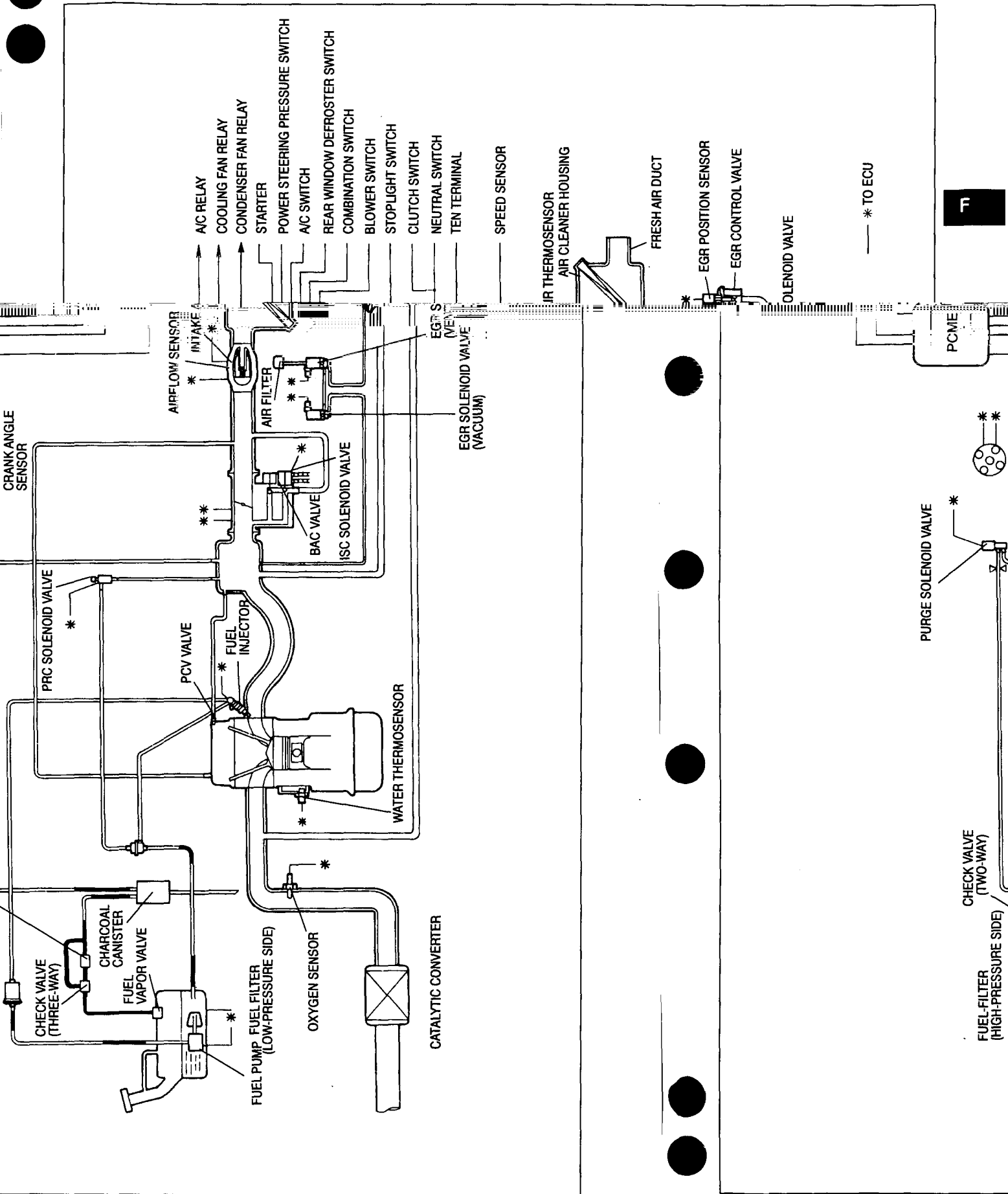
FEATURES

The main features of the fuel and emission control system of the MX-5 BP DOHC is as follows:

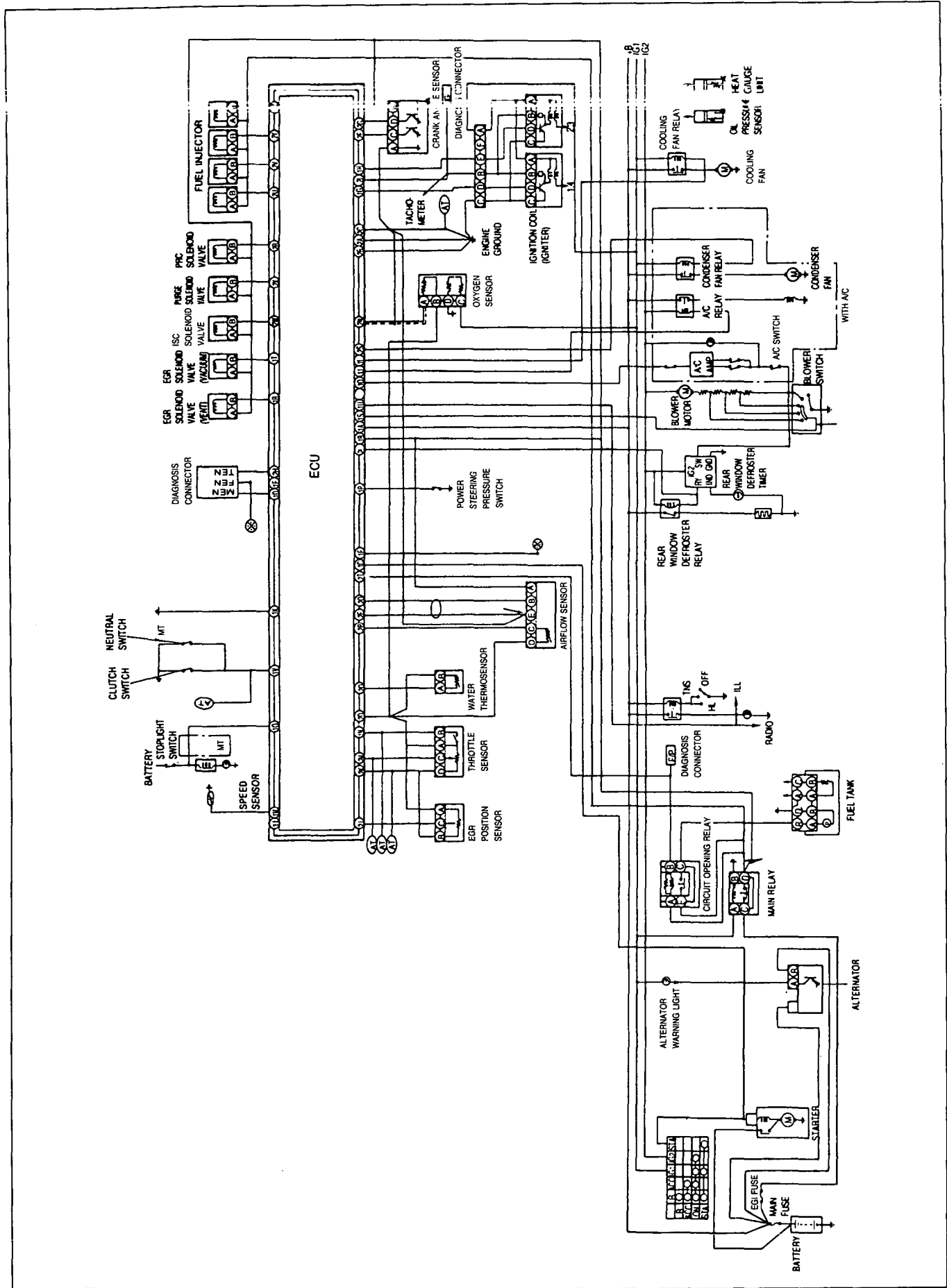


35E0FX-003

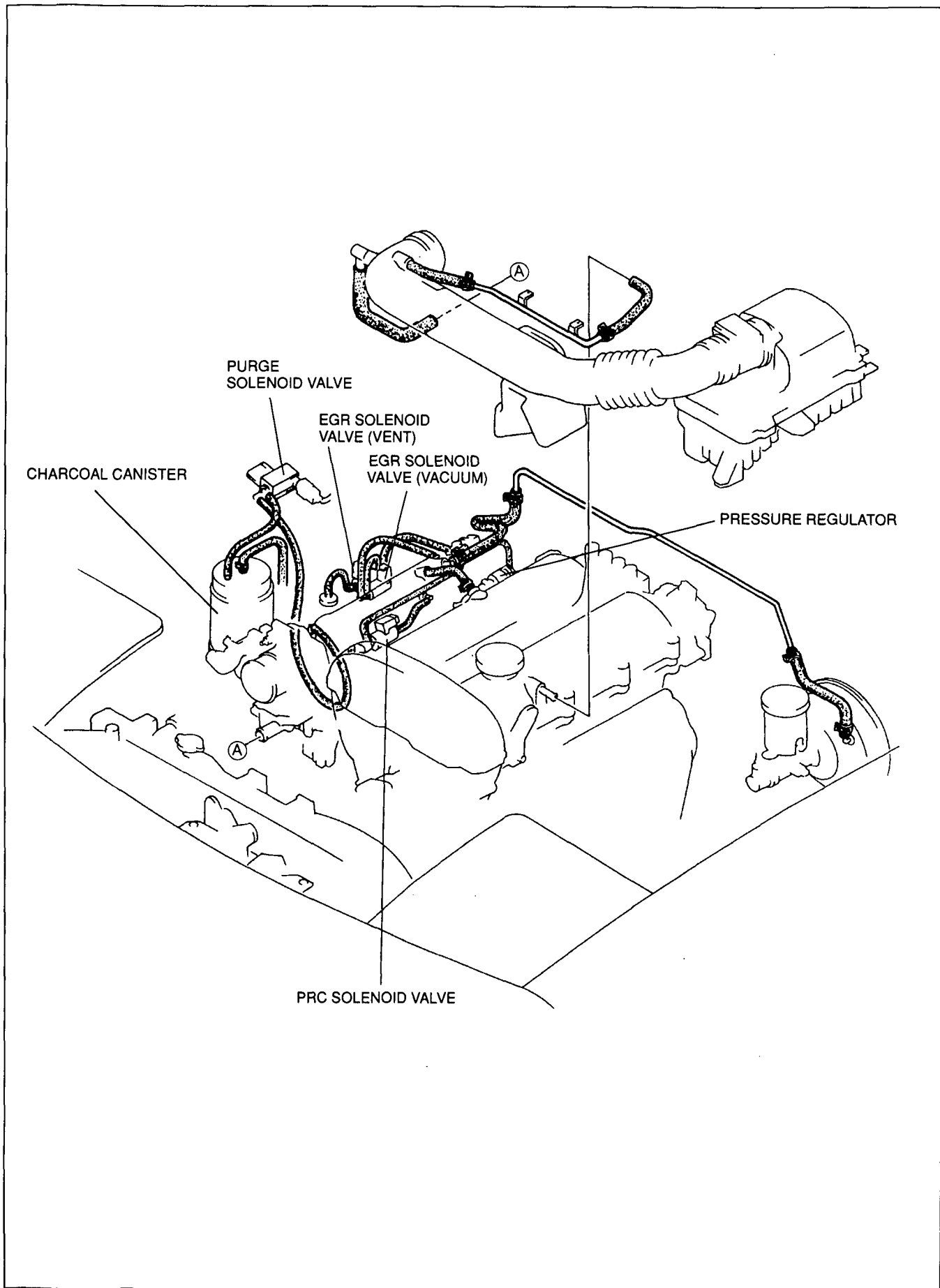
SYSTEM DIAGRAM



WIRING DIAGRAM



VACUUM HOSE ROUTING DIAGRAM



F

SPECIFICATIONS

Item	Specification
Idle speed rpm	800—900 (850 ± 50)*
Ignition timing BTDC	9°—11° (10° ± 1°)*
Throttle body	
Type	Horizontal draft
Throat diameter mm (in)	55 {2.2}
Fuel pump	
Type	Impeller (in-take)
Output pressure kPa {kgf/cm ² , psi}	480—657 {4.9—6.7, 69—95}

Fuel filter			
Type	Low-pressure side	Nylon element	
	High-pressure side	Paper element	
Pressure regulator			
Type	Diaphragm		
Regulating pressure	kPa {kgf/cm ² , psi}	265—314 {2.7—3.2, 38.4—45.5}	
Fuel injector			
Type	High-ohmic		
Type of drive	Voltage		
Resistance	Ω	12—16 (at 20°C {68°F})	
Bypass air control valve	ISC solenoid valve		
	Solenoid resistance	Ω	10.7—12.3 (at 20°C {68°F})
	Air valve		
	Opening temperature	Below 40°C {104°F}	
Purge solenoid valve			
Solenoid resistance	Ω	23—27 (at 20°C {68°F})	
Crank angle sensor			
Type	Hall effect		

Resistance	Ω	23—26
Resistance	Ω	0.3—0.4
L {US gal, Imp gal}	48 {12.7, 10.5}	
Oil permeated		
mm (in)	1—3 {0.039—0.118}	
Unleaded regular (RON 90 or higher)		

Water thermosensor	
Resistance	kΩ
Fuel tank	
Capacity	
Air cleaner assembly	
Element type	
Accelerator cable	
Free play	
Fuel	
Specification	

st switch at SELF TEST.

35E0FX-007

*... With System Selector (49 B019 9A0) te
 Indicates changed items.

COMPONENT DESCRIPTIONS

Component	Function	Remark
Air cleaner housing	Filters air entering throttle body	
Airflow sensor	Detects amount of intake air; sends signal to engine control unit (ECU)	<ul style="list-style-type: none"> Intake air thermosensor included
Air valve	When cold, supplies bypass air into dynamic chamber	<ul style="list-style-type: none"> Engine speed increased to shorten warm-up period Thermowax type
Atmospheric pressure sensor	Detects atmospheric pressure; sends signal to engine control unit (ECU)	ECU included
Catalytic converter	Reduces HC, CO, and NOx by chemical reaction	Monolith type
Charcoal canister	Stores gas tank fumes while engine stopped	—
Circuit opening relay	Voltage for fuel pump while engine running	—
Clutch switch	Detects in-gear condition; sends signal to engine control unit (ECU)	Switch OFF when clutch pedal released
Crank angle sensor SGC-signal	Detects No.1 cylinder TDC; sends signal to engine control unit (ECU)	—
SGT-signal	Detects crank angle at 180° intervals; sends signal to engine control unit (ECU)	
Diagnosis connector	Concentrated service connector Concentrated terminals are: 1. EGI self-diagnosis terminal 2. Initial set terminal 3. Fuel pump check terminal	21-pin (Black)
Dynamic chamber	Interconnects all cylinders	—
EGR control valve	Recirculates portion of exhaust gas	—
Position sensor	Detects EGR control valve position	Installed on EGR control valve
Solenoid valve (vacuum side)	Controls vacuum to EGR control valve (vacuum side)	<ul style="list-style-type: none"> Controlled by duty signal from ECU
Solenoid valve (vent side)	Controls vacuum to EGR control valve (vent side)	<ul style="list-style-type: none"> Controlled by duty signal from ECU
Engine control unit	<p>Detects the following:</p> <ol style="list-style-type: none"> A/C operation Air/fuel ratio (Oxygen concentration) Atmospheric pressure Braking signal Cranking signal E/L operation Engine coolant temperature Engine speed In-gear condition Intake air amount Intake air temperature No.1 piston TDC P/S operation Initial set signal Throttle valve position <p>Controls operation of the following:</p> <ol style="list-style-type: none"> A/C (Cut off) Fail-safe function Fuel injection system 	<ol style="list-style-type: none"> A/C switch Oxygen sensor Atmospheric pressure sensor Stoptlight switch Ignition switch (START position) Cooling fan relay Headlight Blower motor switch Water thermosensor Crank angle sensor (SGT-signal) Neutral and clutch switches Airflow sensor Intake air thermosensor Crank angle sensor (SGC-signal) Power steering pressure switch Diagnosis connector Throttle sensor <ol style="list-style-type: none"> A/C relay Self-diagnosis checker Fuel injector

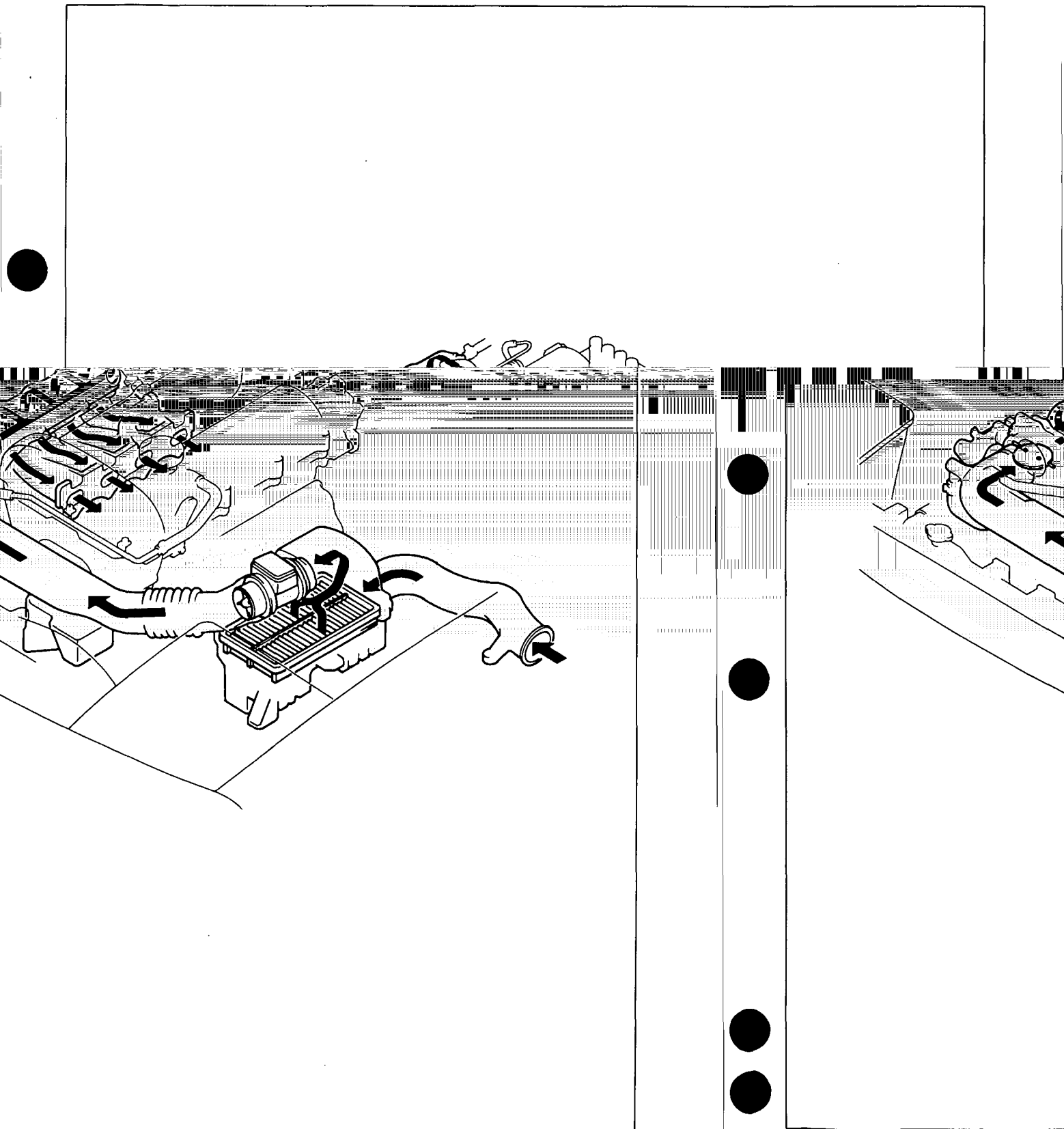
Component	Function	Remark
Engine control unit (ECU)	4. Idle speed control 5. Ignition timing control system 6. Monitor function 7. Purge control system	4. ISC solenoid valve 5. Igniter 6. Monitor lamp (Self-diagnosis checker) 7. Purge solenoid valve
Fuel filter	Filters particles from fuel	—
Fuel injector	Injects fuel into intake port	<ul style="list-style-type: none"> Controlled by signals from engine control unit (ECU) High-ohmic injector Dual port injector nozzle
Fuel pump	Provides fuel to fuel injectors	<ul style="list-style-type: none"> Operates while engine running Installed in fuel tank
Fuel vapor valve	Prevents fuel from entering canister during vehicle roll over	—
Idle switch	Detects idle condition; sends signal to engine control unit (ECU)	<ul style="list-style-type: none"> Installed in throttle sensor
Igniter	Receives spark signal from engine control unit (ECU) and generates high voltage in ignition coil Detects high voltage ignition; sends substitute ignition signal to engine control unit (ECU)	<ul style="list-style-type: none"> Installed in ignition coil
Ignition switch (START position)	Sends engine cranking signal to engine control unit (ECU)	—
Intake air thermosensor	Detects intake air temperature; sends signal to engine control unit (ECU)	Installed in airflow sensor
ISC solenoid valve	Controls bypass air amount	<ul style="list-style-type: none"> Controlled by duty signal from engine control unit (ECU) Controls idle-up
Main relay	Supplies electric current to fuel injectors, engine control unit (ECU), etc.	—
Neutral switch	Detects in-gear concentration; sends signal to engine control unit (ECU)	<ul style="list-style-type: none"> Switch ON when in neutral
Oxygen sensor	Detects oxygen concentration; sends signal to engine control unit (ECU)	<ul style="list-style-type: none"> Zirconia ceramic and platinum coating With heater
PCV valve	Controls blow by gas amount introduced into engine	—
Power steering pressure switch	Detects P/S operation; sends signal to engine control unit (ECU)	<ul style="list-style-type: none"> P/S: ON when steering wheel turned
PRC solenoid valve	Controls vacuum to pressure regulator	—
Pressure regulator	Adjusts fuel pressure supplied to fuel injectors	—
Purge solenoid valve	Controls evaporative fumes from canister to intake manifold	<ul style="list-style-type: none"> Controlled by duty signal from engine control unit (ECU)
Resonance chamber	Improves mid-range torque characteristics	—
Stoplight switch	Detects braking operation (deceleration); sends signal to engine control unit (ECU)	—
Three-way check valve	Controls pressure in fuel tank	—
Throttle body	Controls intake air quantity	<ul style="list-style-type: none"> Integrated throttle sensor, BAC valve
Throttle sensor	Detects the throttle valve opening angle; sends signal to engine control unit (ECU)	—
Two-way check valve	Controls pressure in fuel tank	—
Water thermosensor	Detects coolant temperature; sends signal to engine control unit (ECU)	—

INTAKE AIR SYSTEM

OUTLINE

This system supplies and controls the amount of air required for engine operation. It consists of the fresh air duct (including resonance chamber), air cleaner housing, airflow sensor (Hot wire type), throttle body, and intake manifold.

The airflow sensor is employed the hot wire type.

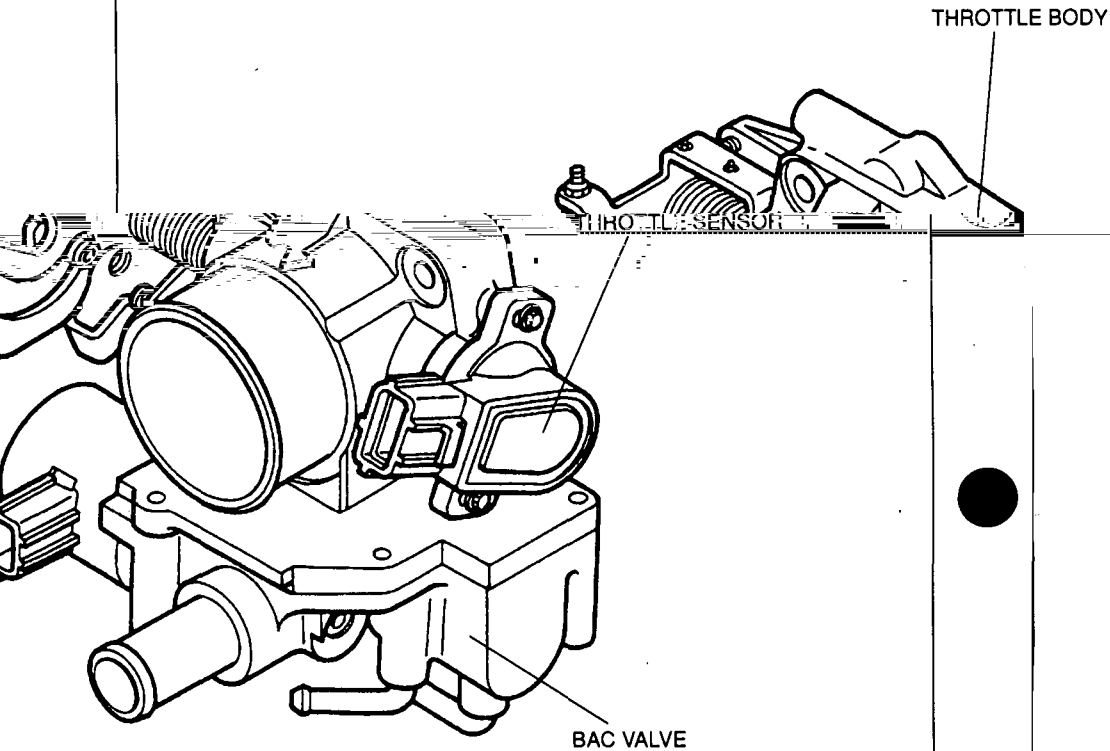


35A0FX-013

THROTTLE BODY

The throttle body controls the intake air amount. It consists of the throttle valve, throttle sensor (idle switch) and bypass air control (BAC) valve.

The dashpot is abolished in order to reduce weight. The function of the dashpot is now covered by the ISC solenoid valve.



35A0FX-014

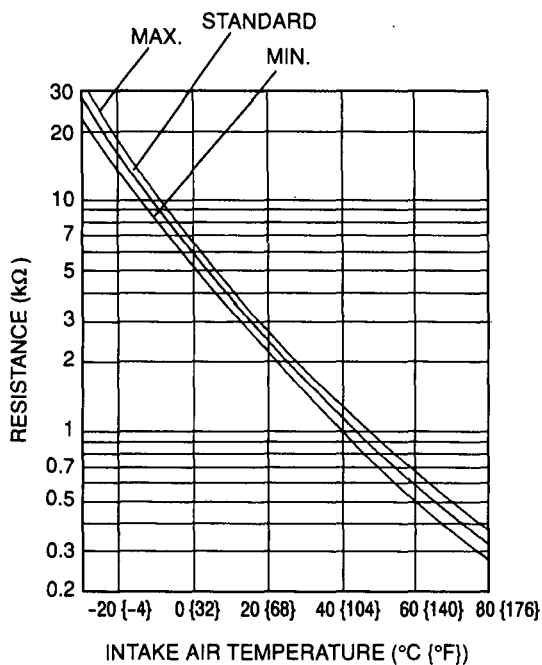
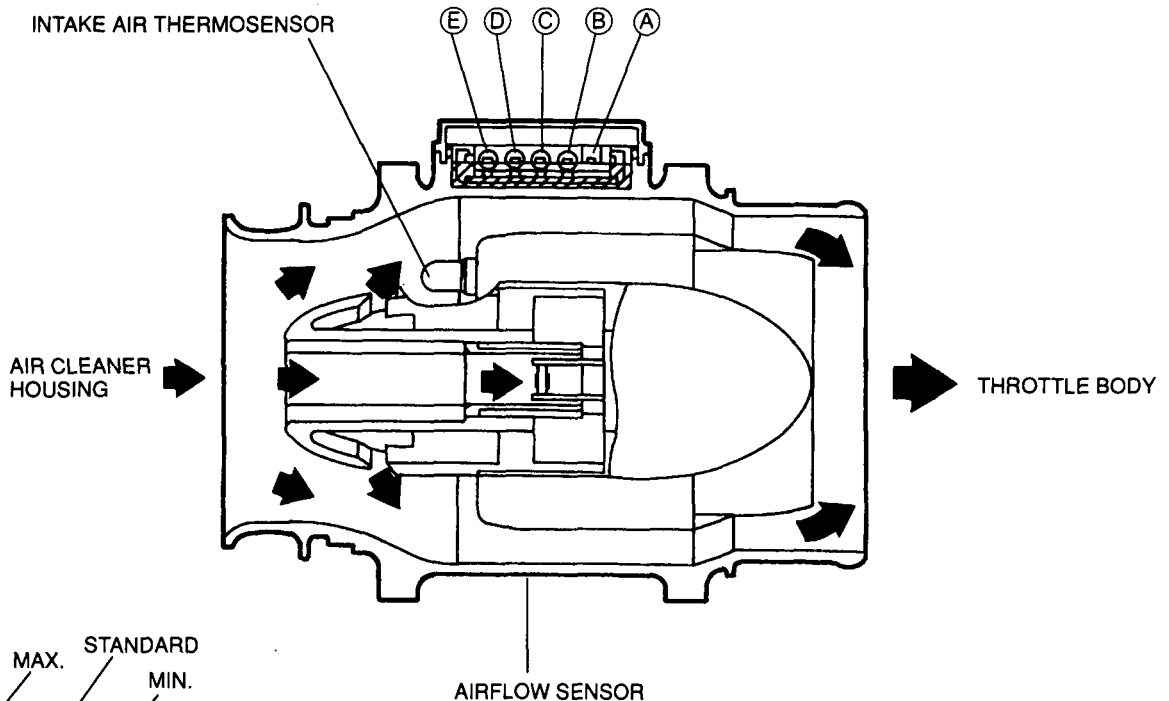
AIRFLOW SENSOR (HOT-WIRE TYPE)

- A hot-wire type airflow sensor reduces the intake air resistance.
- The wire in the sensor detects voltage corresponding to the intake airflow volume.

INTAKE AIR THERMOSENSOR

- The intake air thermosensor is incorporated in the airflow sensor.
- The sensor detects the intake air temperature as variation in the resistance of the thermistor.

AIRFLOW SENSOR TERMINAL	ECU TERMINAL
A: BATTERY VOLTAGE	1B
B: AIRFLOW SENSOR SIGNAL (+)	2O
C: INTAKE AIR TEMPERATURE SIGNAL	2P
D: GROUND	2D
E: AIRFLOW SENSOR SIGNAL (-)	2F



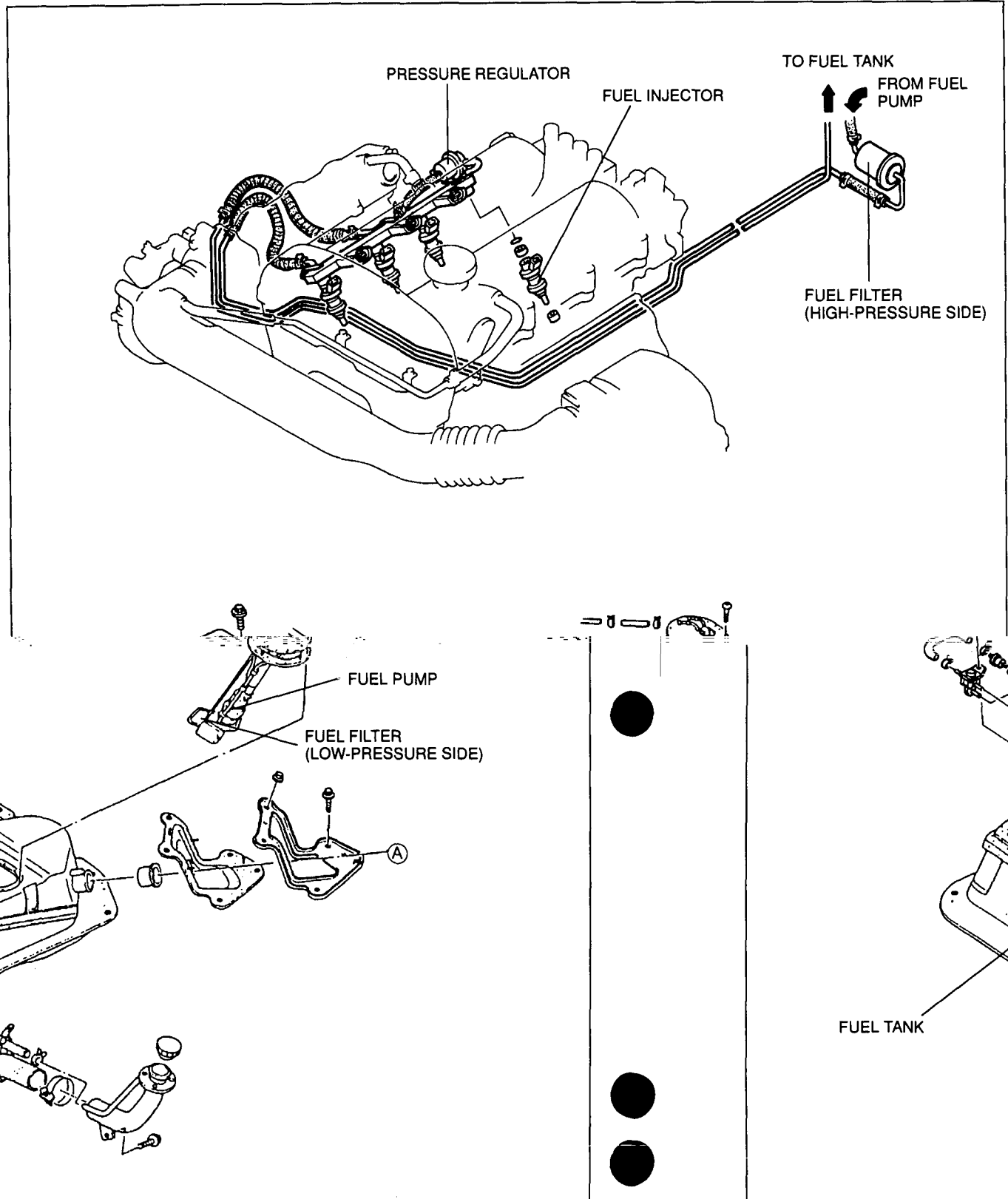
FUEL SYSTEM

OUTLINE

This system supplies fuel to the fuel injectors at a constant pressure.

Fuel is metered and injected into the intake manifold according to the injection control signals from the ECU.

This system consists of the fuel tank, fuel pump, fuel filters, pressure regulator, PRC solenoid valve and fuel injectors.

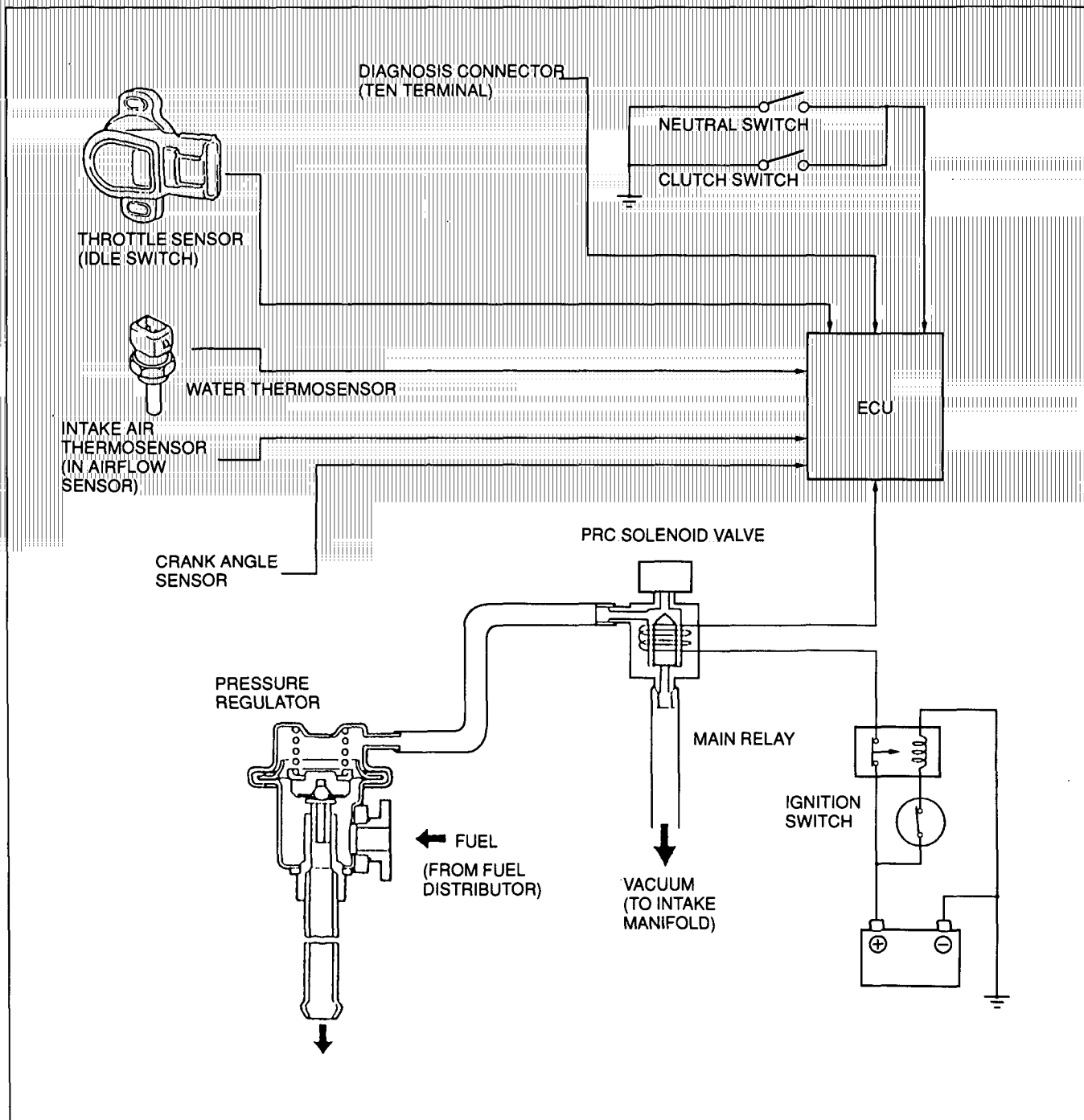


35A0FX-016

PRESSURE REGULATOR CONTROL SYSTEM

DESCRIPTION

To prevent vapor lock during hot restart idle, vacuum to the pressure regulator is momentarily cut, and fuel injection pressure is increased to 265—314 kPa {2.7—3.2 kgf/cm², 38.4—45.5 psi}. Pressure in the fuel line at idle is approx. 230 kPa (2.3 kgf/cm², 33 psi). (This operation is canceled when the TEN terminal is grounded.)



35A0FX-017

OPERATING CONDITION

Coolant temperature	Intake air temperature	Engine condition	Operating time
Above 90°C {194°F}	Above 65°C {149°F}	Engine speed less than 1,500 rpm and throttle valve not fully open, or no-load condition	Approx. 149 sec.

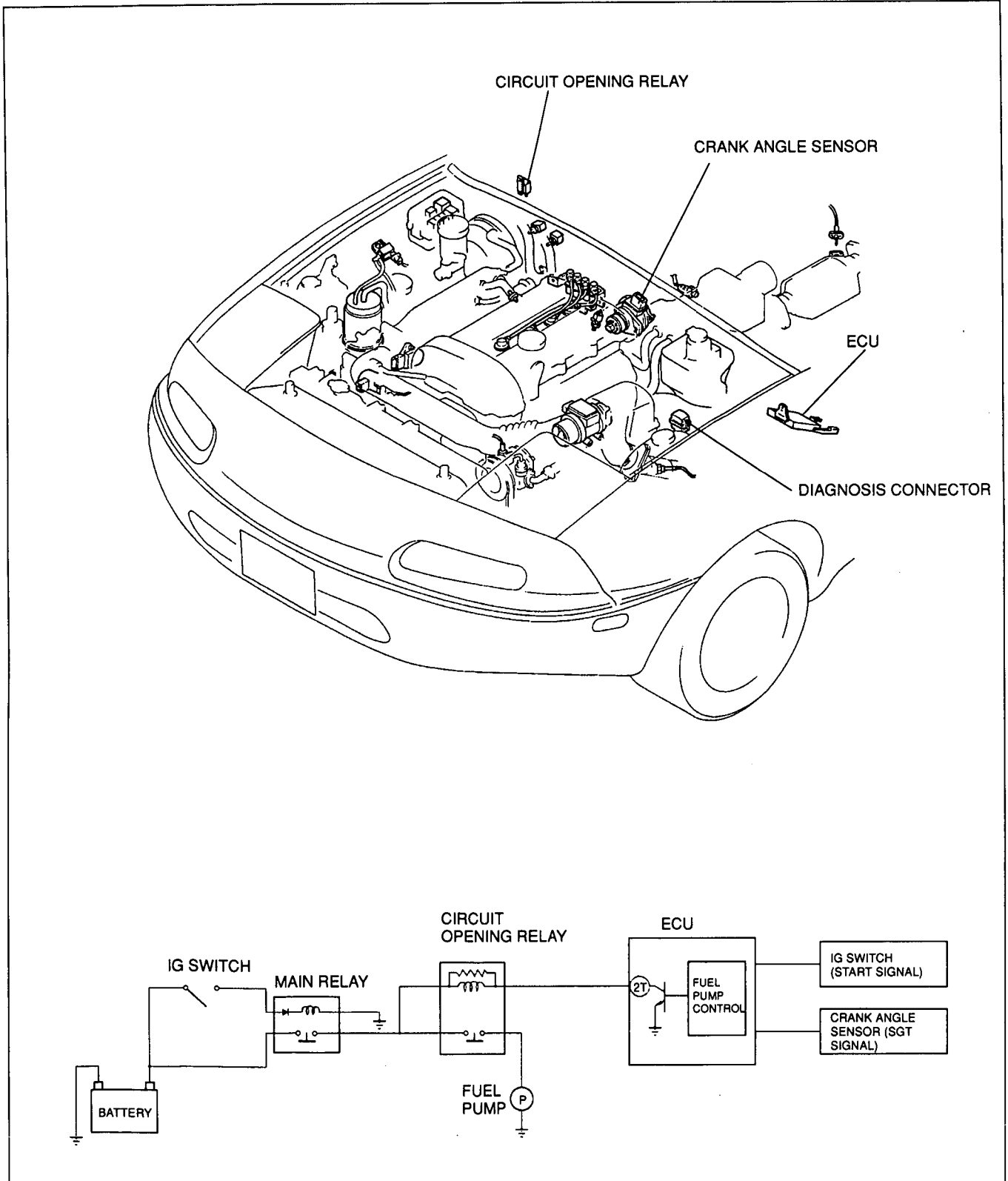
FUEL PUMP CONTROL SYSTEM

DESCRIPTION

For safety, the fuel pump operates only when the engine is being started and running. The fuel pump is controlled by the ECU.

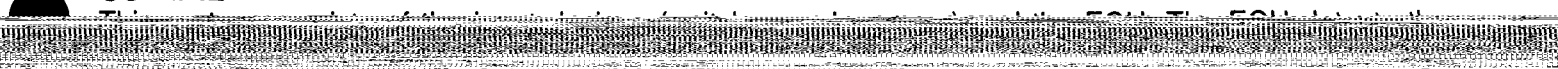
OPERATION

When a SGT signal is sent to the ECU, the fuel pump terminal of ECU is activated, causing the circuit opening relay to start the pump.

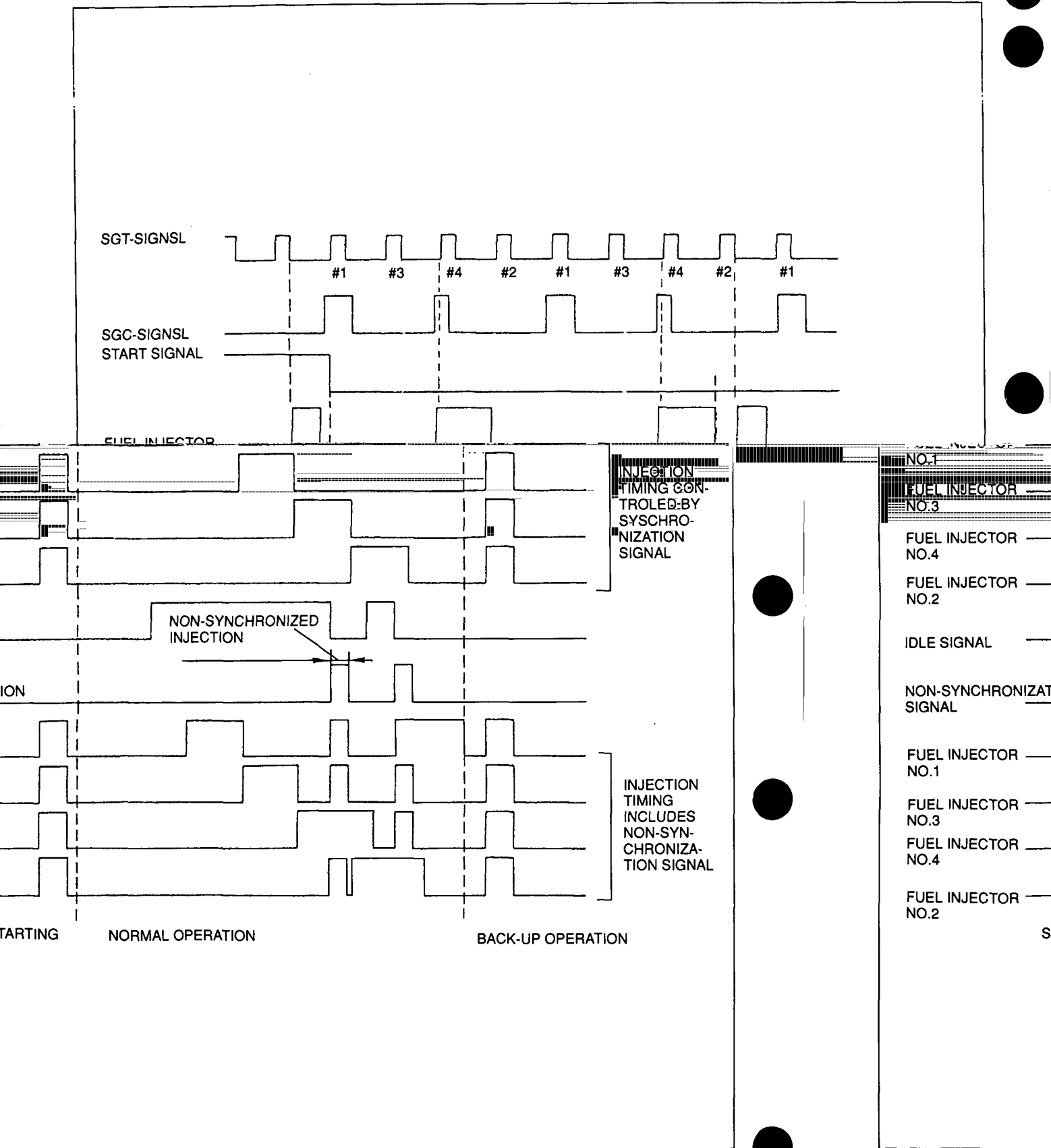


● FUEL INJECTION CONTROL SYSTEM

● OUTLINE



FUEL INJECTION TIMING



35A0FX-020

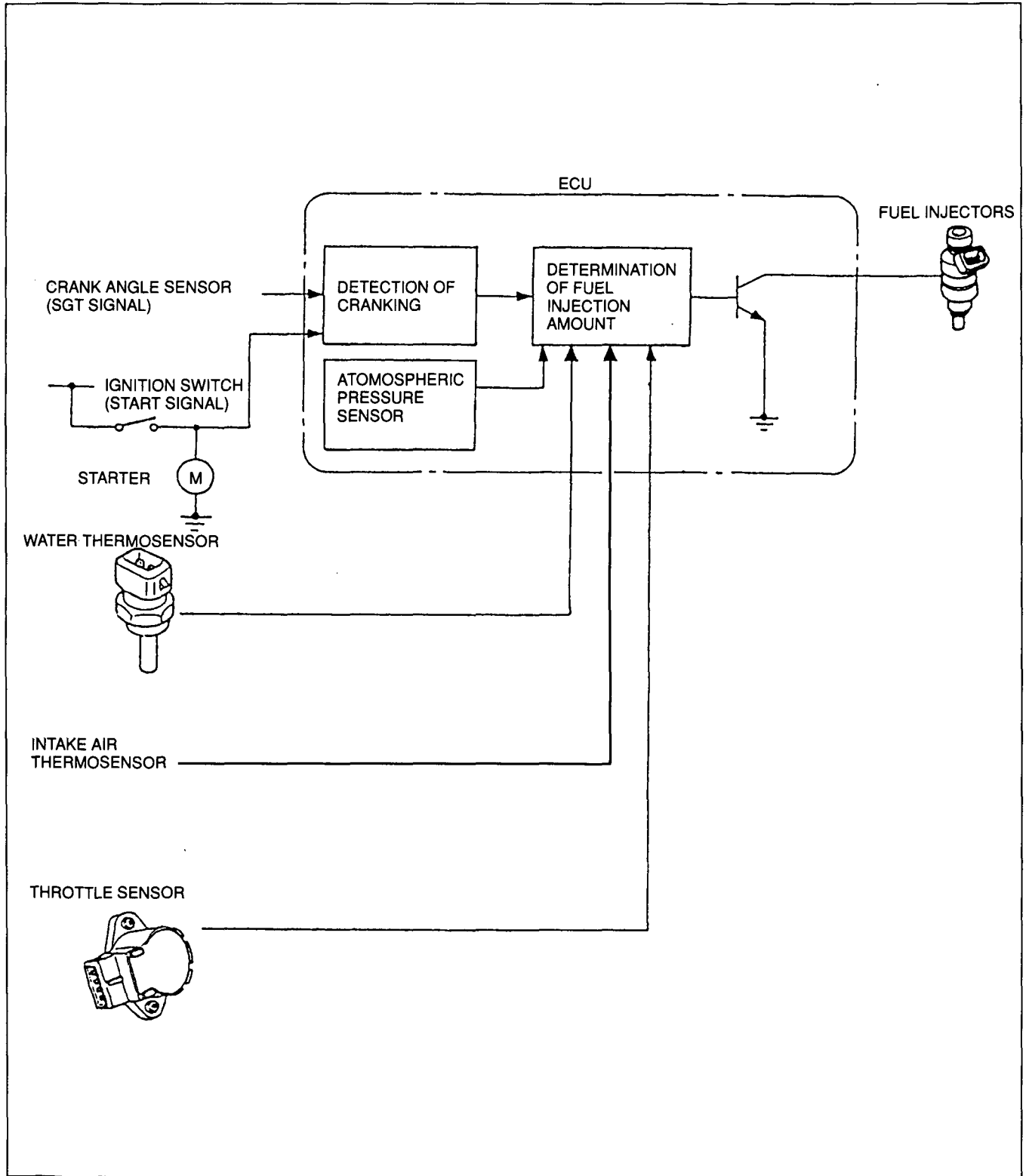
...ntly injected into each cylinder by giving one injection per two crankshaft rotations (one ...). Fuel injection into the intake manifold runner for each cylinder takes place during ... e. If the ECU malfunctions or the battery voltage becomes abnormally low, fuel injection ... l cylinders simultaneously every two rotations of the crankshaft.

Fuel is independ... injection per cycle... its exhaust stroke... takes place for a...

FUEL INJECTION AMOUNT

Injection characteristics are broadly classified into two groups, "cranking" and "running" (including idle).

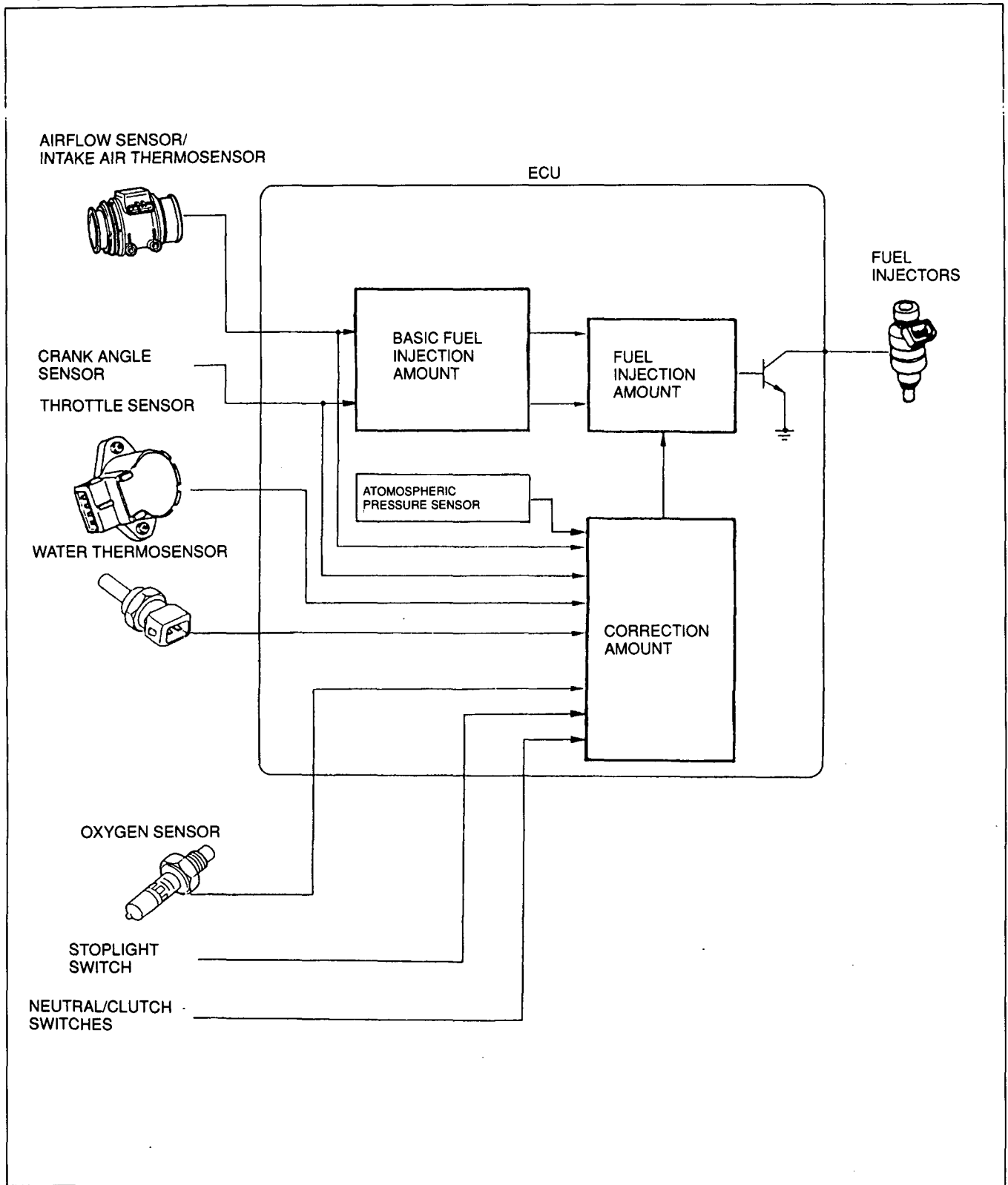
Engine Cranking



35A0FX-021

The ECU controls the fuel injection amount based on the cranking signal, engine coolant temperature signal, engine speed signal, intake air temperature signal, and atmospheric pressure signal. When the ignition switch is at the START position and the engine speed is **below 500 rpm**, the ECU judges that the engine is in the cranking condition, and fuel is injected at a preset injection amount according to the engine coolant temperature, intake air temperature, and atmospheric pressure.

Engine Running



35E0FX-009

A controlled fuel injection amount for an air/fuel ratio of 14.7:1 is supplied to the engine in response to the engine speed signal and the airflow sensor signal (intake air amount).

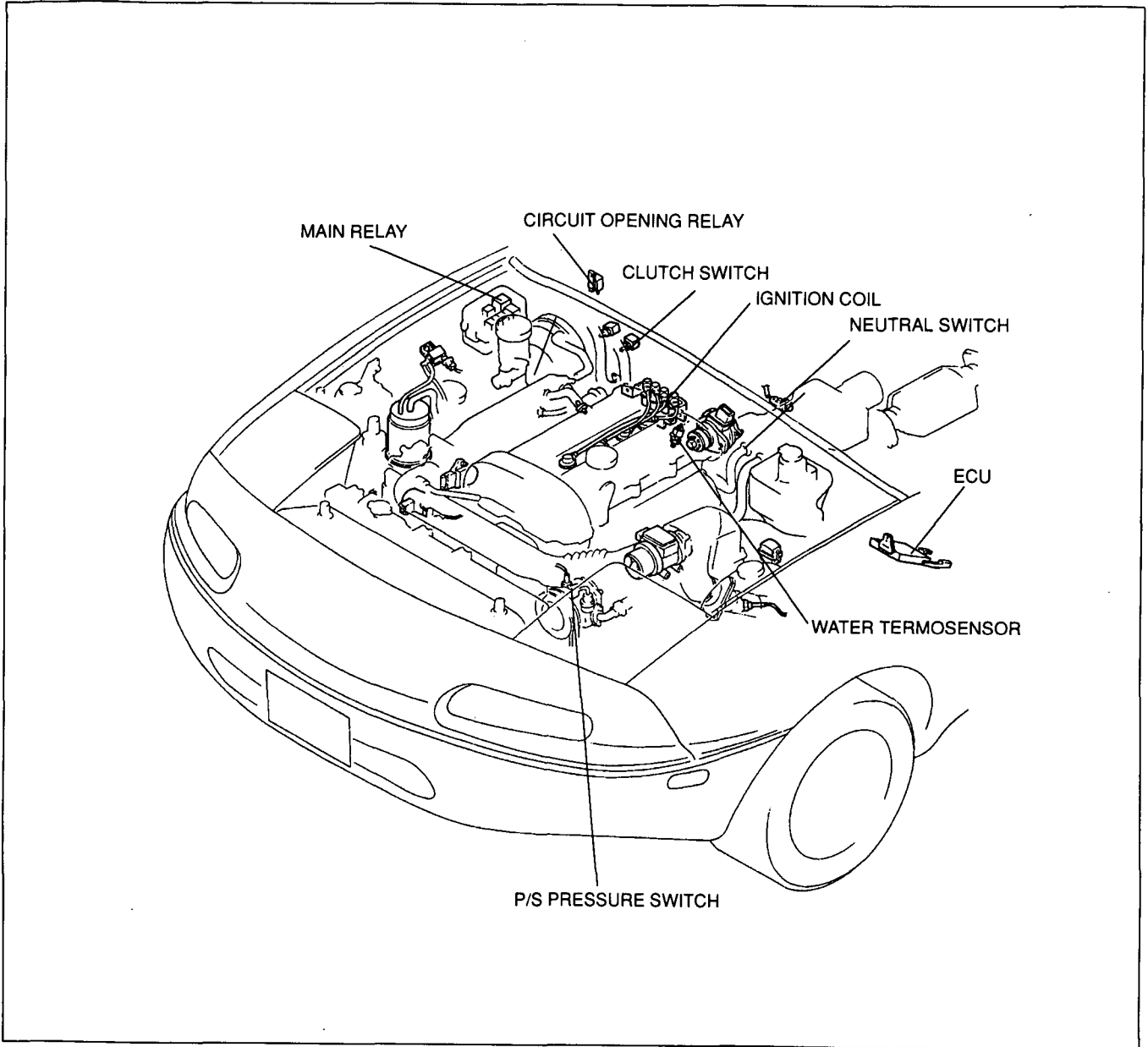
Injection corrections are required to the basic injection amount to provide the optimum fuel injection amount for specific engine and driving conditions.

Whether to increase or decrease the fuel injection amount is determined within the ECU by signals received from the sensors and switches shown in the figure. The rate at which the air/fuel ratio is changed is preset in the ECU.

ELECTRONIC SPARK ADVANCE (ESA) CONTROL SYSTEM

OUTLINE

The ignition timing is determined and set within the ECU based on signals from various sensors and switches to obtain the best engine performance.



35E0FX-010

CONTROL SYSTEM

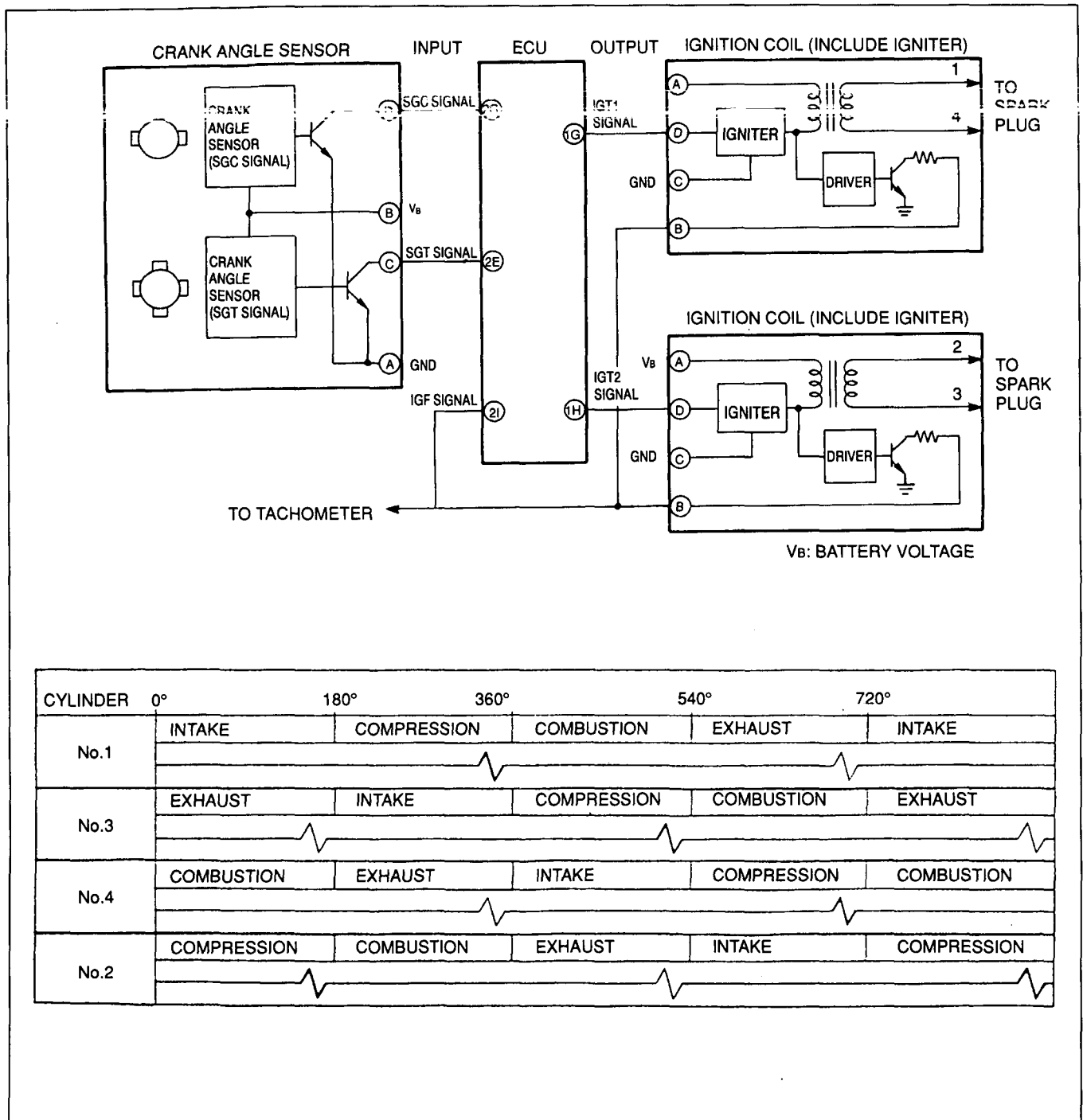
The ECU provides the most suitable ignition timing according to the data sent from various sensors and switches.

Ignition Timing

Engine condition	Ignition timing (BTDC)	Remark
Cranking	7°	—
Backup		Airflow sensor malfunction, ECU malfunction
Idle	9—11°	TEN terminal of diagnosis connector grounded
Running	Ignition timing changes according to engine speed, intake air amount, coolant temperature.	—

45U0FX-723

ELECTRIC DISTRIBUTION SYSTEM



35A0FX-024

With conventional ignition systems, high voltage energy is output from the coil four times per **each two revolutions (720°)** of the crankshaft. This is then sent to the distributor where it is distributed to the spark plugs for firing of the cylinders.

With the MX-5 electronic distribution system, two individual coils are used to send spark to cylinders 1 and 4 and to cylinders 2 and 3 respectively. Each coil outputs voltage at both the negative (-) and positive (+) side of the secondary winding to fire two spark plugs at the same time.

The coils are alternately activated each **180° of crankshaft revolution**. There are two firing periods at each cylinder for each **720° of crankshaft rotation (one cycle)**.

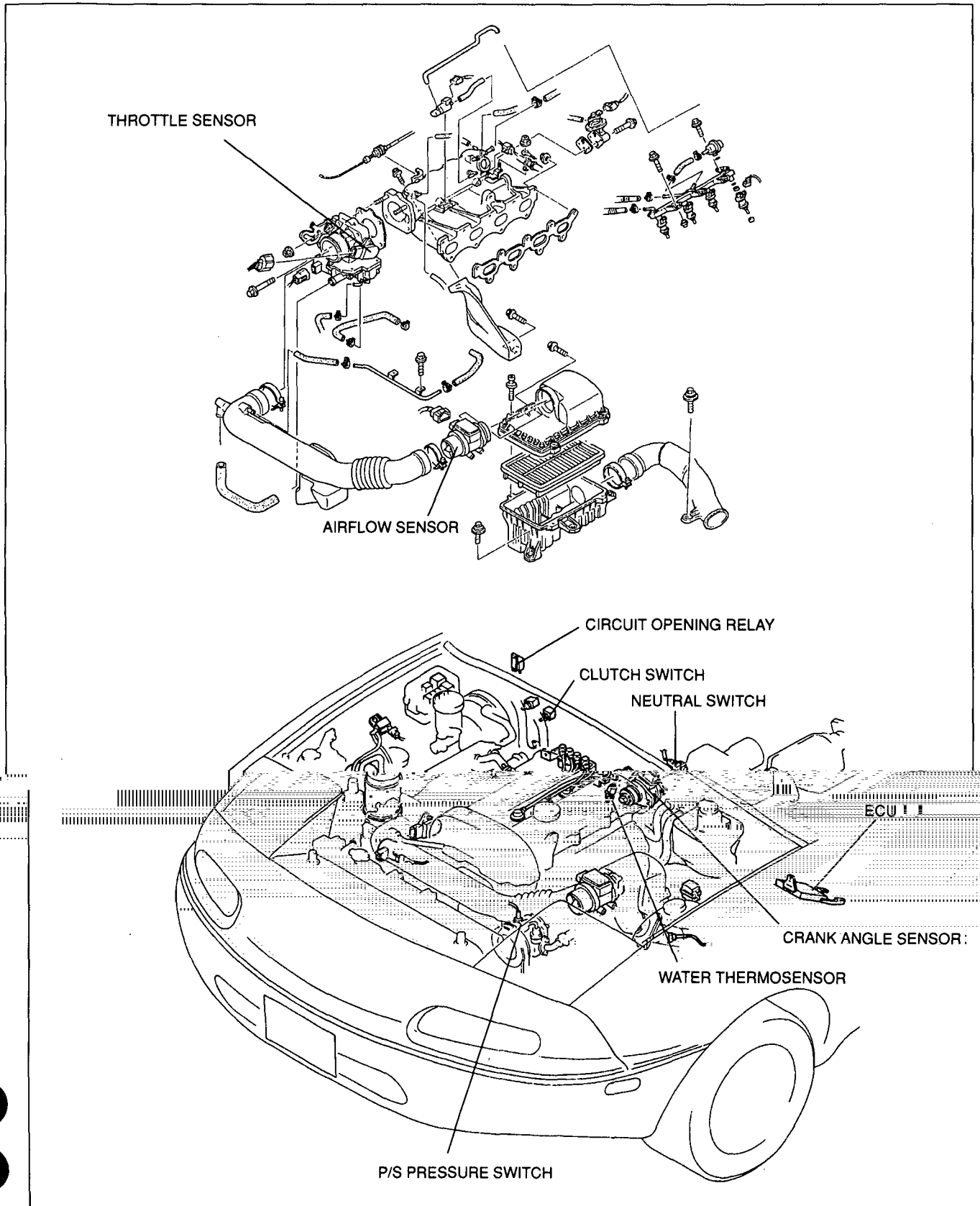
Tachometer Signal

In conjunction with the adoption of two ignition coils, the tachometer signal is now produced by the signal processor in the igniter. The signal processor picks up the primary ignition pulses of the two coils, mixes them together, and sends its signal to the tachometer and the diagnosis connector. (IG-).

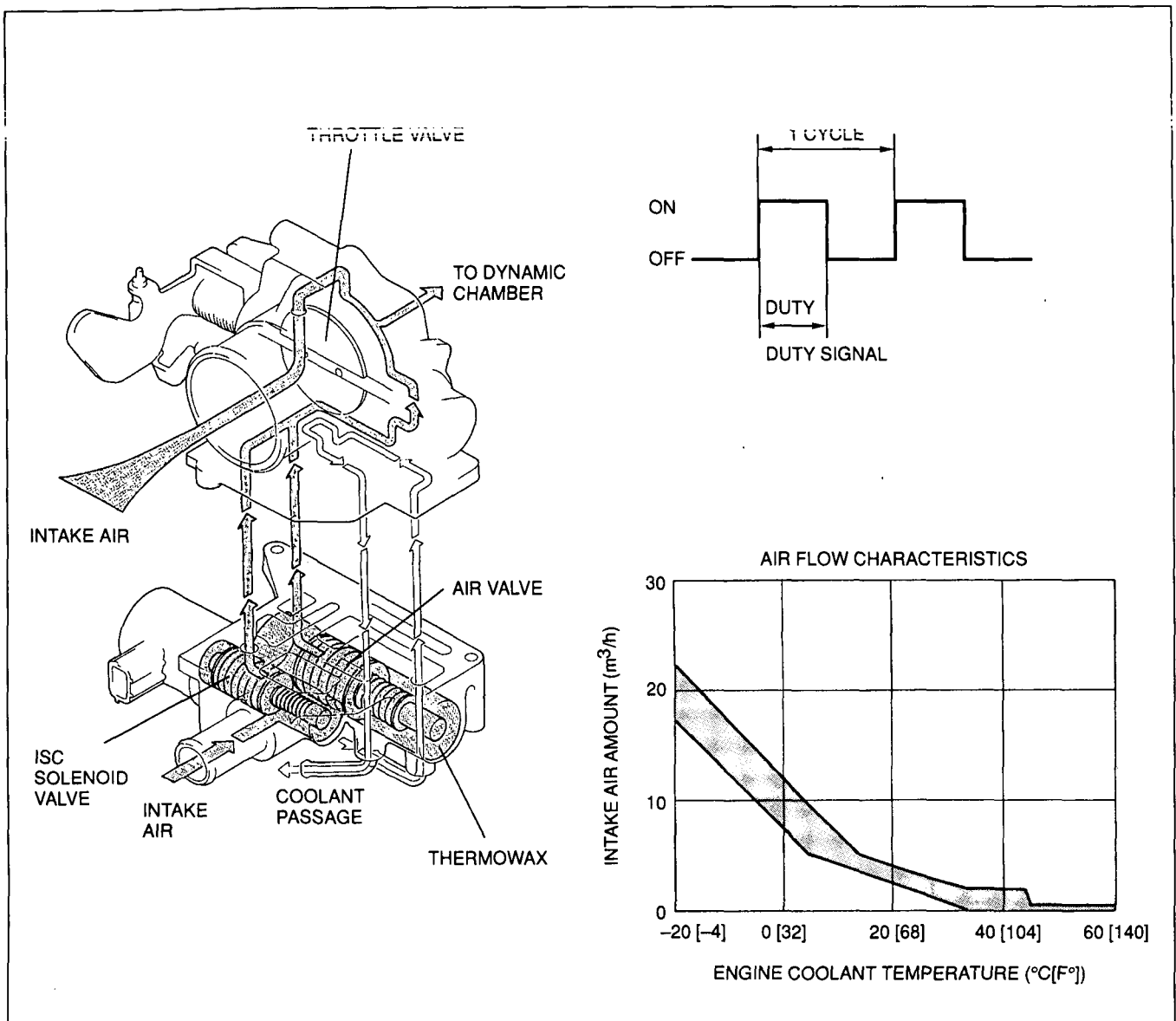
● IDLE SPEED CONTROL (ISC) SYSTEM

● OUTLINE

The idle speed control (ISC) system controls the bypass air amount that passes through the throttle body to improve startability, quicken warm-up, improve idle stability, and provide better drivability. The ISC system also takes the place of a conventional dashpot to control deceleration.



BYPASS AIR CONTROL (BAC) VALVE



35A0FX-026

The BAC valve consists of the air valve, which functions only during cold engine conditions, and the ISC solenoid valve, which functions throughout the entire engine conditions.

Air Valve

This valve increases idle speed to quickly warm up the engine when it is cold. The air valve consists of the thermowax and the valve. Engine coolant is directed around the thermowax and heated.

Operation

Cold engine: below 40°C {104°F}

The thermowax is shrunk and the air valve is open. As the engine gradually warms up, the thermowax expands and the valve is made to close. The air amount that passes through the valve gradually decreases, and engine speed gradually drops from fast idle speed to normal idle.

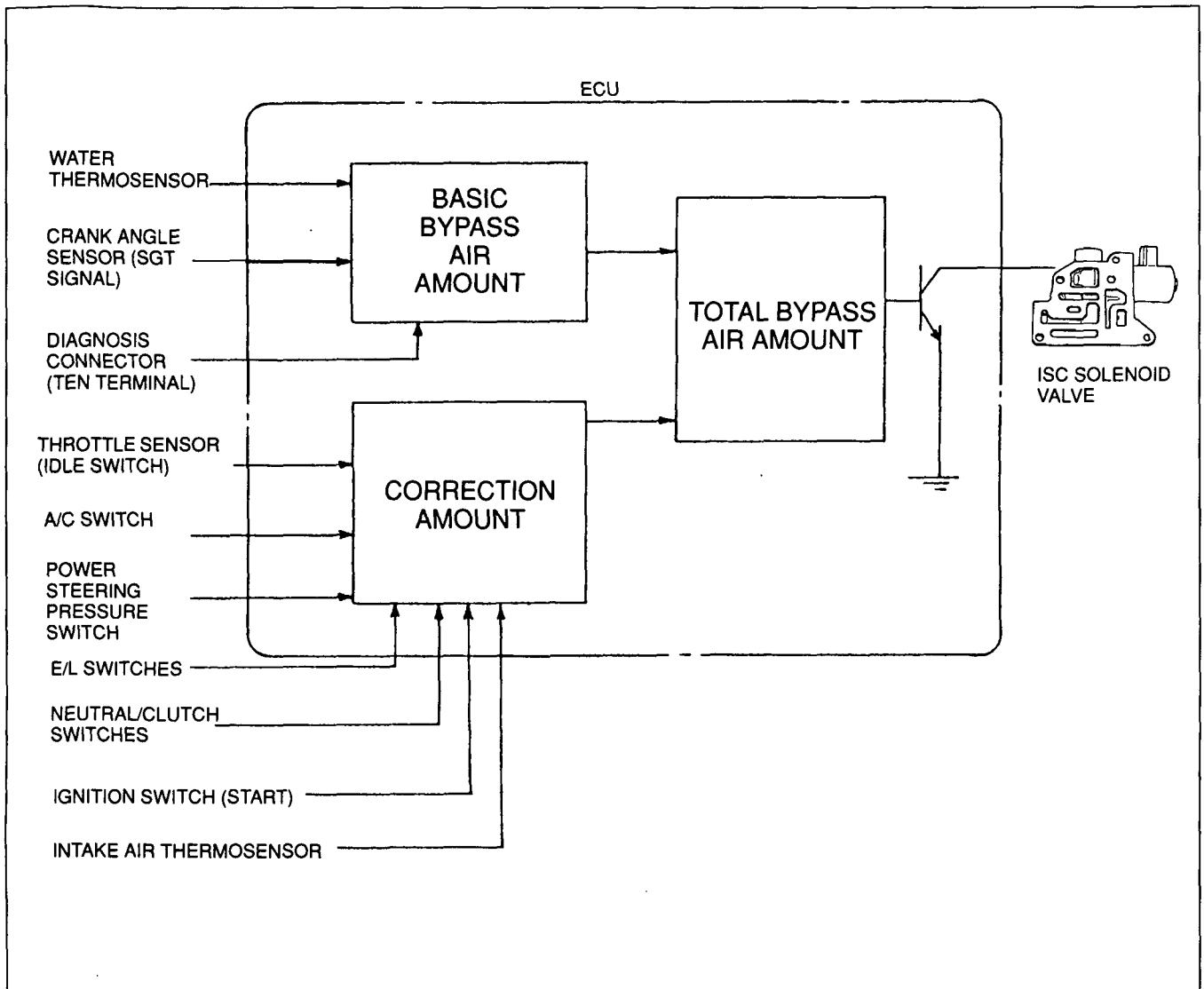
Warm engine: above 40°C {104°F}

The air valve is fully closed by the thermowax.

ISC Solenoid Valve

The ISC solenoid valve employs a linear solenoid valve that is controlled by duty signals. As the ON time of this signal increases, the internal valve opens, increasing the bypass air amount. As the ON time of the signal decreases, the internal valve closes reducing the bypass air amount.

CONTROL SYSTEM



35E0FX-012

The control system consists of input devices (switches and sensors) and the engine control unit (ECU). The ECU contains preset values for the basic air amount that correspond to the engine's operating conditions.

It also contains corrections to the basic bypass air amount for engine warm up and for when A/C and other electrical loads are applied.

Engine Speed Feedback System

In order to achieve the target idle speed and idle smoothness, engine-speed closed loop control takes place within the ECU. The basic bypass air amount is increased or decreased to adjust the engine speed to the target idle speed.

The target idle speeds are as follows:

Engine condition		MT
During warm up		Set according to coolant temperature
After warm up	No load E/L ON	800—900 (850 ± 50)
	A/C ON	950—1050 (1000 ± 50)
	P/S ON	800—900 (850 ± 50)

Note

- Ground the TEN terminal of the data link connector for the base idle speed adjustment.

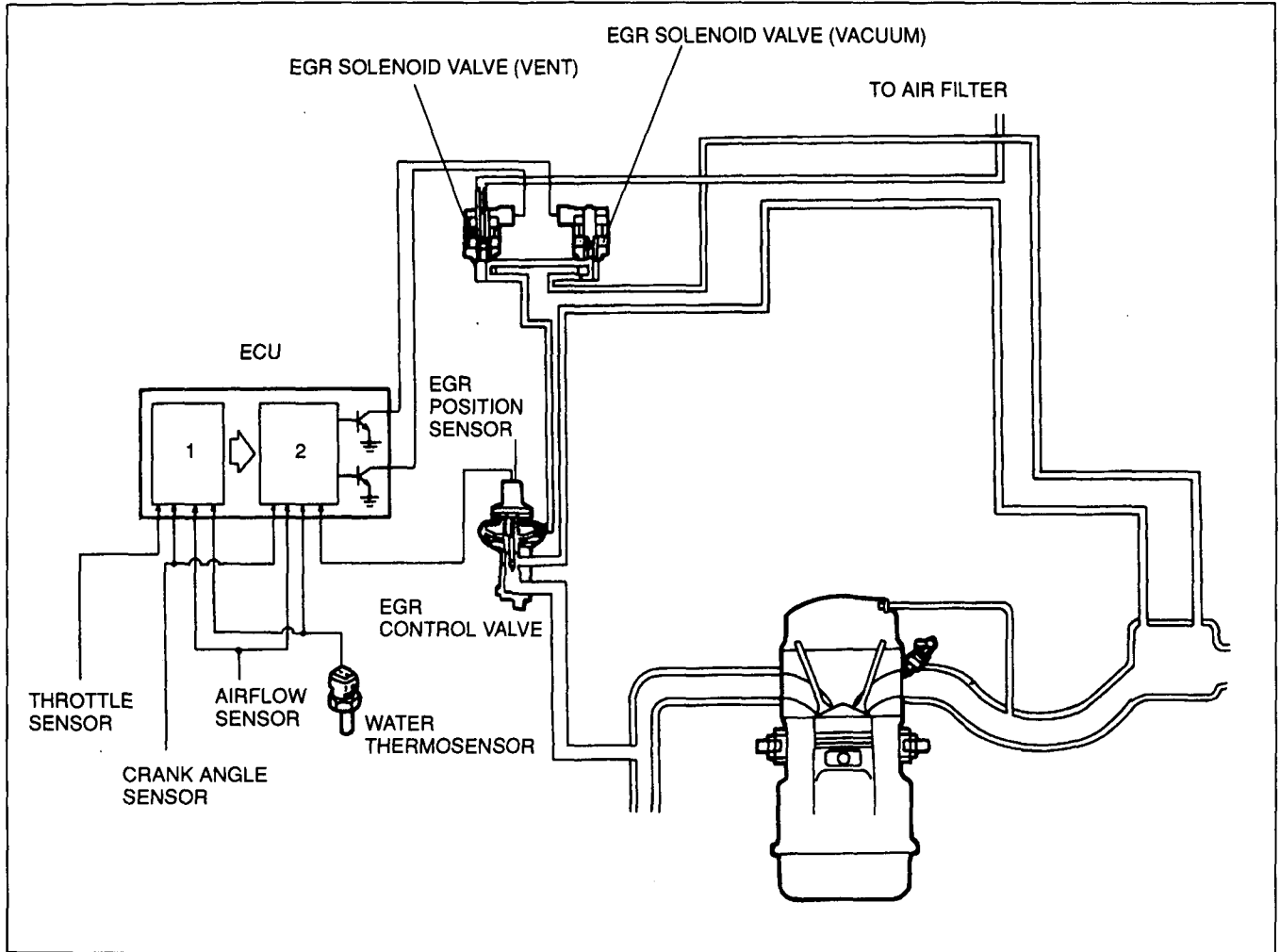
F EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM

EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM

OUTLINE

This system recirculates a small amount of exhaust gas into the intake manifold to reduce combustion temperature and NOx emissions.

This system consists of the EGR control valve, the EGR position sensor, two duty-solenoid valves, the ECU, and input devices.



35E0FX-013

Operation

Cold engine (coolant temperature below 55°C {131°F})

EGR operation is stopped to improve drivability when the engine is cold.

Warm engine

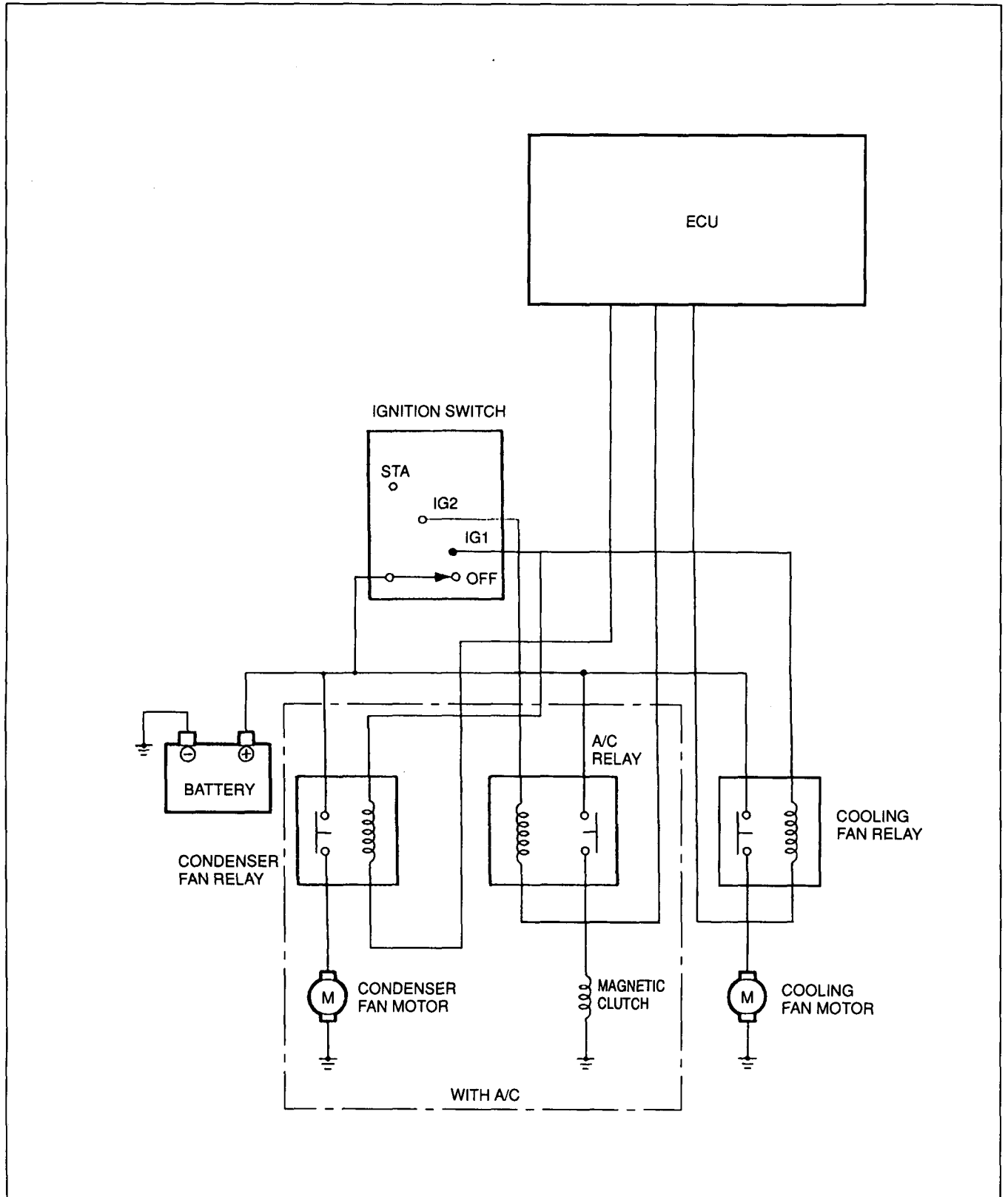
The ECU controls the solenoid valves (vacuum side and vent side) to supply EGR gases as described below.

Operating condition	EGR operation	Remark
Idle		Idle switch : ON
Deceleration		
Stopped	Above 3,125 rpm	High speed
	—	Heavy load
	—	Acceleration
Reduced EGR gas amount	Coolant temperature between 55°C {131°F} and 60°C {140°F}	Warming up
Increased EGR gas amount by using signals from the throttle position sensor	—	Others
		Controls supplied from the EGR valve

COOLING FAN CONTROL SYSTEM

OUTLINE

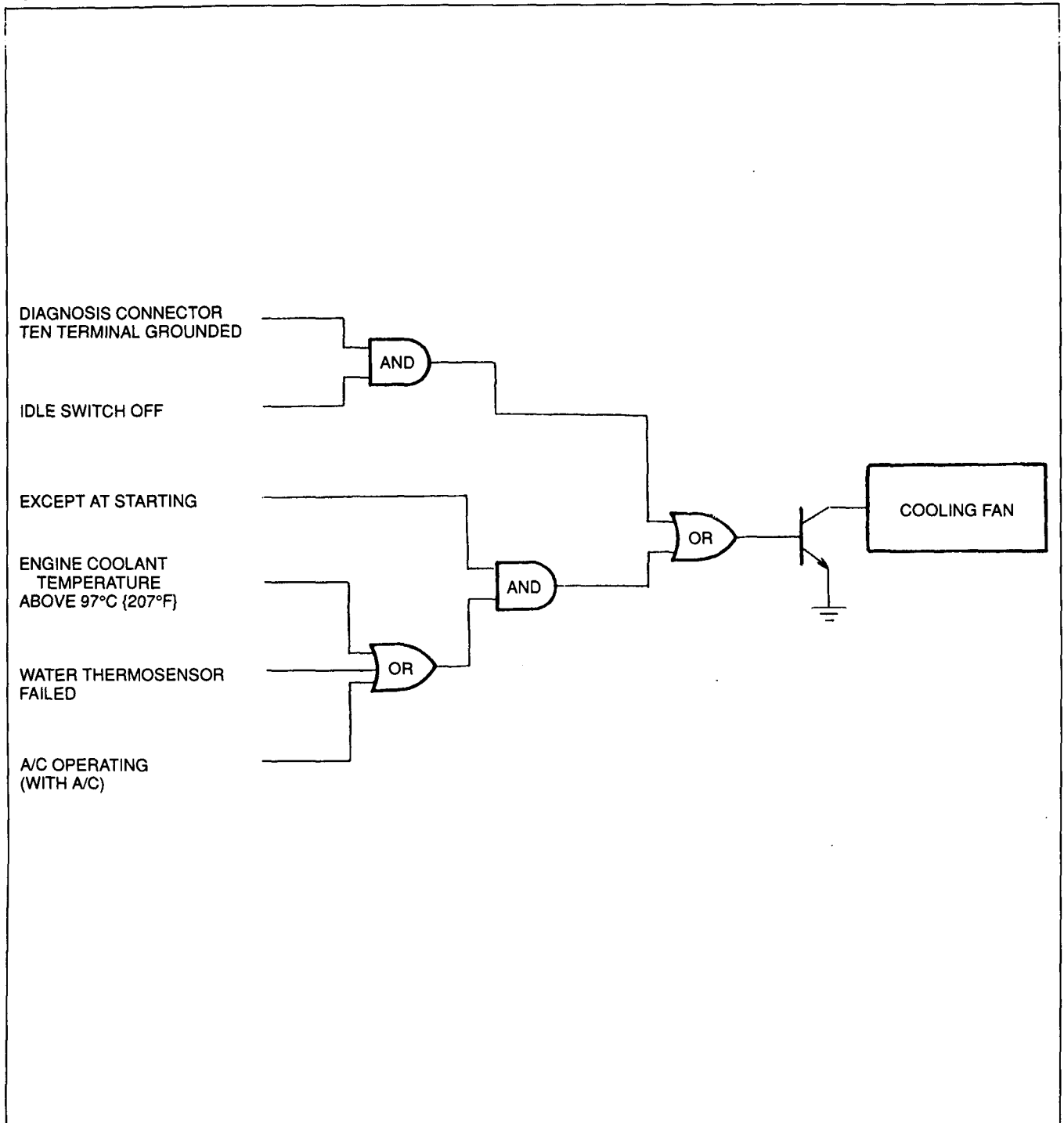
- The ECU controls the cooling fan and the condenser fan to provide more efficient fan control. This improves the performance reliability and stability during idling of an engine.
- The cooling fan is normal when it start to operate with the diagnosis connector TEN terminal grounded and the accerelator pedal is depressed (Idle switch OFF). The TFA terminal of the diagnosis connector (for cooling fan test) is eliminated.



COOLING FAN

The cooling fan rotates at a constant velocity.

Operation Condition



35A0FX-015

CONDENSER FAN

- The condenser fan is operated by ECU.
- The condenser fan rotates at a constant velocity.

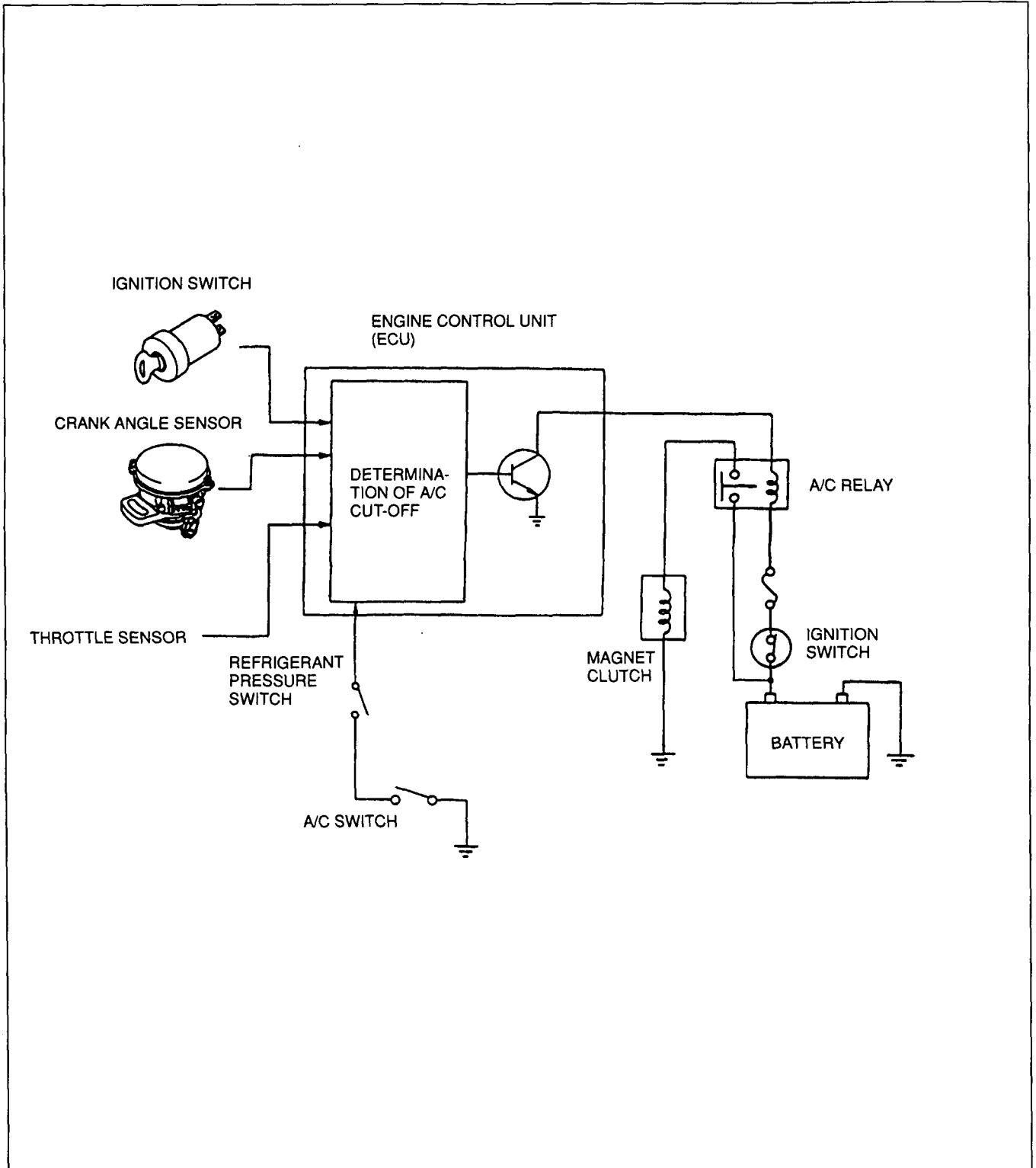
Operation Condition

- Air conditioner is operating.
 - Engine coolant temperature is above 108°C {226°F}.
- The condenser fan operates when one condition is satisfied.
- TEN terminal grounded and idle switch off.

A/C CUT-OFF CONTROL SYSTEM (WITH A/C)

DESCRIPTION

An A/C cut-off system is used to improve idle smoothness after just starting the engine and to improve acceleration performance.



35E0FX-016

After engine has been started

The A/C is cut-off for **2 sec.** just after the engine is started.

Acceleration

The A/C is cut-off upon wide-open-throttle acceleration for **approx. 5 sec.**

CONTROL SYSTEM

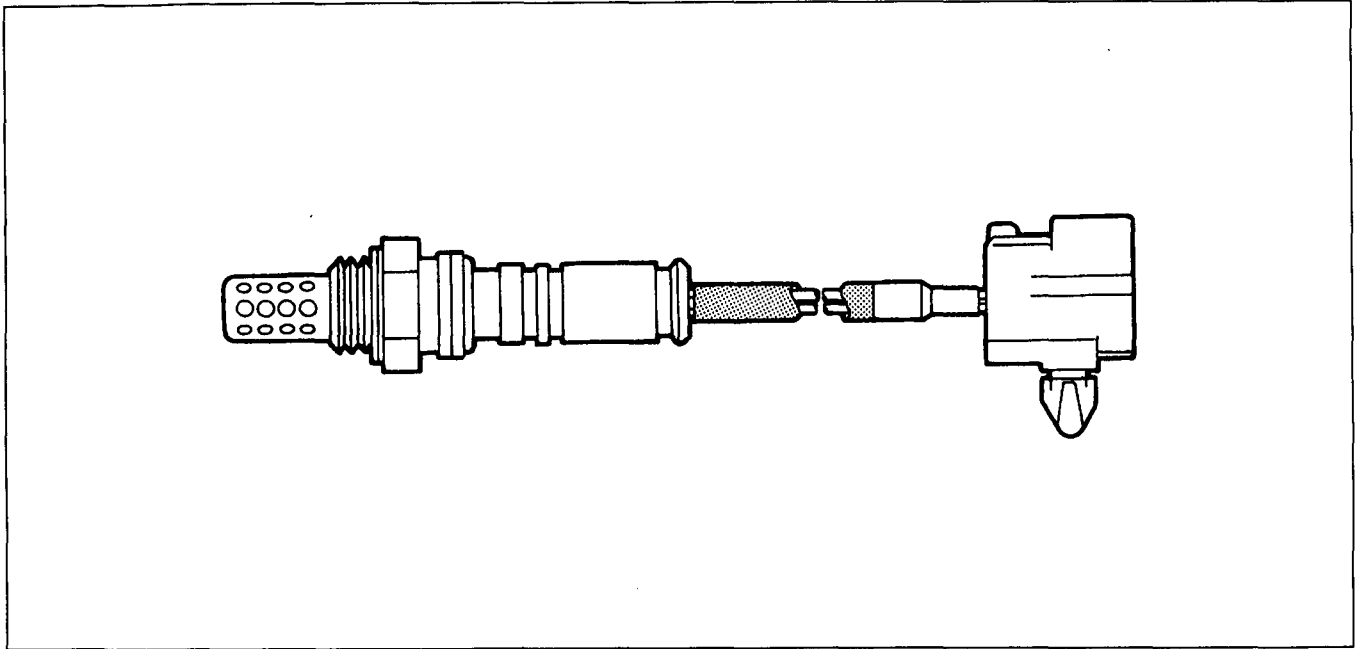
OUTLINE

- A oxygen sensor provides constant oxygen density detection when the exhaust temperature is low.
- The water thermosensor is used for both cooling fan and EGI.

OXYGEN SENSOR

There is an oxygen sensor installed in the exhaust manifold. The oxygen sensor has a built-in heater to reduce the warm-up time of the sensor in order to start the feedback operation immediately after engine start up.

The heater has PTC (positive temperature coefficient) characteristics and its temperature is kept about 350°C {662°F}.

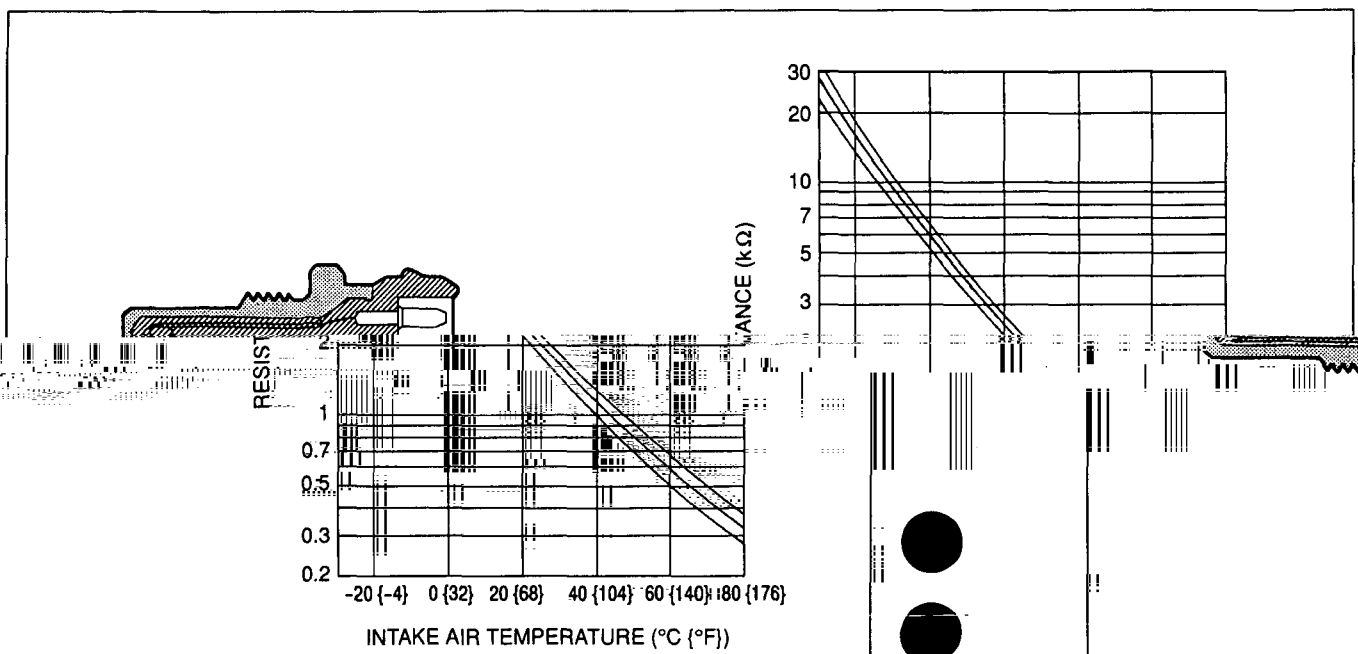


35A0FX-032

WATER THERMOSENSOR

The previous MX-5 used water thermosensor for EGI.

The new MX-5 use water thermosensor for EGI and fan control, therefore the characteristic is changed.



35A0FX-033

SELF-DIAGNOSIS FUNCTION

SERVICE CODE













- The following code numbers are changed and added.

Changed

- Code No.02 NE signal → Code No.04 SGT signal
- Code No.03 G signal → Code No.03 SGC signal

Added

- Code No.16 EGR function sensor
- Code No.25 PRC solenoid valve
- Code No.28 EGR solenoid valve (Vacuum)
- Code No.29 EGR solenoid valve (Vent)

No	Indicator flashing pattern	Diagnosed circuit	Condition	Fail safe	Memorized
03	ON  OFF 	SGC signal, crank angle sensor	No SGC signal	Cancels fuel injection	Yes
04	ON  OFF 	SGT signal, crank angle sensor	No SGT signal	—	Yes
16	ON  OFF 	EGR position sensor	Open or short circuit	Maintains constant command of EGR valve fully open	Yes
25	ON  OFF 	PRC solenoid valve	Open or short circuit	—	No
28	ON  OFF 	EGR solenoid valve (vacuum)		—	No
29	ON  OFF 	EGR solenoid valve (vent)		—	No

35A0FX-034

F

SELF-DIAGNOSIS FUNCTION

BACKUP FUNCTION

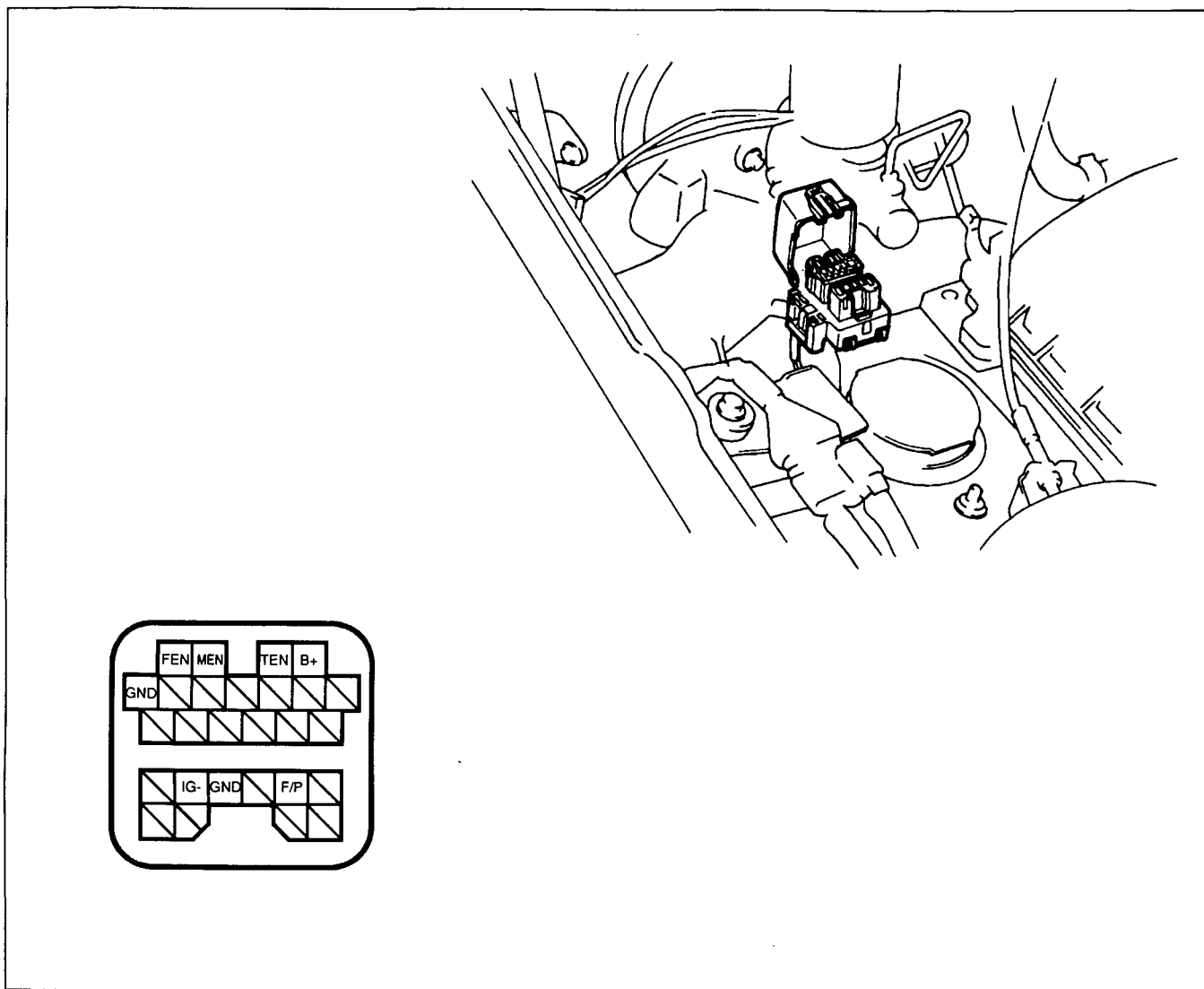
The backup function assures vehicle drivability by switching to preset controls in the event of either ECU failure or an abnormal drop in battery voltage.

Terminal	Connected to	Backup operation	function
1D	MEN terminal	ON	
1E	FEN terminal	ON	
1G	Igniter No.1	OFF	Igniter ignites at BTDC 7°
1H	Igniter No.2	OFF	
1J	A/C relay (with A/C)	OFF	Stops A/C operation
1L	Cooling fan relay	ON	Cooling fan operates
1T	EGR solenoid valve (vacuum)	OFF	Prohibits EGR operation
1R	EGR solenoid valve (vent)	OFF	
2R	PRC solenoid valve	OFF	Prohibits pressure regulator control
2S	Condenser fan relay (with A/C)	OFF	Stops condenser fan operation
2W	ISC solenoid valve	OFF	ISC solenoid valve completely closes
2X	Purge solenoid valve	OFF	Purge solenoid valve completely closes
2U	Fuel injector No.1	Injects predetermined quantity fuel simultaneously to all cylinders (once per one crankshaft rotations) during start, idle, and cruise conditions.	
2V	Fuel injector No.2		
2Y	Fuel injector No.3		
2Z	Fuel injector No.4		

35E0FX-017

DIAGNOSIS CONNECTOR

The various connectors formerly provided for servicing purposes have been grouped into one new connector, the diagnosis connector.



35A0FX-036

The diagnosis connector consists of a 17-terminal connector (for connection to the System Selector) and a 10-terminal connector (for various uses).

Terminal	Function	Remark
FEN	For service code number signal from ECU to Self-Diagnosis Checker	Provides connection for System Selector and Self-Diagnosis Checker
MEN	For monitor switch signal from ECU to Self-Diagnosis Checker	
TEN	For diagnostic test-mode signal to ECU	
B+	For battery voltage to Self-Diagnosis Checker	
GND	Ground	Provides connection for tachometer
IG-	For primary ignition pulse	
GND	Ground	—
F/P	For fuel pump checking	Terminal grounded : Fuel pump operates

35A0FX-037

Caution

- Never ground the B+ terminal.
- If grounded, the INJECTOR FUSE (30A) in the main fuse box will be blown.

SUPPLEMENTAL SERVICE INFORMATION

The following points in this section are changed comparison with the Mazda MX-5 Workshop Manual 9/89 (1221-10-89I) and Mazda MX-5 Workshop Manual Supplement 7/90 (1246-10-90G).

35E0FX-018

Troubleshooting guide

- Engine control operation chart
- Relationship chart
- Symptom troubleshooting

Engine tune-up

- Basic inspection
- Adjustment

Self-diagnosis function

- Service code number
- Switch monitor function

Intake air system

- Components
- Removal / Inspection / Installation

BAC valve

- System operation
- Removal / Installation

ISC solenoid valve

- Inspection

Circuit opening relay

- Inspection

Pressure regulator

- Inspection

Fuel injector

- Inspection

PRC solenoid valve

- Inspection (On-vehicle)

Exhaust gas recirculation (EGR) control system

- System operation

Exhaust system

- Components
- Removal / Inspection / Installation

Two-way check valve

- Inspection

Cooling fan control system

- System inspection

Cooling fan relay

- Inspection

Condenser fan relay (with A/C)

- Inspection

A/C cut-off control system

- System inspection

A/C relay

- Inspection

Engine control unit (ECU)

- Inspection

Airflow sensor

- System inspection

Intake air thermosensor

- Inspection

Crank angle sensor

- Inspection
- Replacement

Water thermosensor

- Removal
- Inspection

Throttle sensor

- Inspection
- Adjustment
- Replacement

Oxygen sensor

- Inspection
- Replacement

EGR solenoid valve (vacuum)

- Inspection

EGR solenoid valve (vent)

- Inspection

EGR position sensor

- Inspection

EGR control valve

- Inspection
- Replacement

TROUBLESHOOTING GUIDE

ENGINE CONTROL OPERATION CHART

Output Devices and Engine Conditions

ENGINE CONDITION \ OUTPUT DEVICE		CRANKING (COLD ENGINE)	WARMING UP (DURING IDLE)	MEDIUM LOAD		ACCELERATION	HEAVY LOAD	DECELERATION	IDLE	IG: ON (ENGINE NOT RUNNING)
				COLD	WARM					
FUEL INJECTOR	FUEL INJECTION AMOUNT	Rich		Normal		Rich		Fuel cut	Normal	No Injection
CIRCUIT OPENING RELAY		ON								OFF
IGNITER		Fixed at BTDC 7°	Depends on engine condition							
PURGE SOLENOID VALVE		OFF		ON (Purge)			OFF			
BAC VALVE	ISC SOLENOID VALVE	ON (Fixed duty)	ON (Feedback duty)	ON (Fixed duty)				ON (Feedback duty)	OFF	
	AIR VALVE	OPEN			CLOSED				—	
A/C RELAY		OFF (A/C cut)	ON			OFF (A/C cut)	ON		OFF	
PRC SOLENOID VALVE		OFF (Vacuum to pressure regulator)							ON (During hot start only)	OFF
EGR SOLENOID VALVE	VENT	OFF		ON (System operates: amount of EGR changes)			OFF			
	VACUUM	OFF		ON (System operates: amount of EGR changes)			OFF			

35A0FX-039

RELATIONSHIP CHART

Input Devices		Output Devices												
		Fuel Injection Inhibit	Fuel Injection Timing	ISC	Solenoid Valve	Large Solenoid Valve	A/C Relay (A/C Cut-Off)	Igniter (Ignition Timing Control)	ECM	RR Solenoid Valve (Vacuum)	FR Solenoid Valve (Vent)	PR Solenoid Valve	Blowing fan relay	Condenser fan relay
TEN Terminal (Diagnosis connector)		x	x	o	x	x	o	o	x	x	o	o	o	o
Ignition Switch (Start Position)		o	o	o	x	o	o	x	x	o	o	o	o	o
Power Steering Pressure Switch		x	x	o	x	o	x	x	x	x	x	x	x	x
Blower Switch		x	x	o	x	x	x	x	x	x	x	x	x	x
Headlight Switch		x	x	o	x	x	x	x	x	x	x	x	x	x
Stoplight Switch		o	x	o	x	x	x	x	x	x	x	x	x	x
Neutral and Clutch Switches		o	x	o	o	o	o	x	x	x	x	x	x	x
A/C Switch		x	x	o	x	o	x	x	x	x	o	o	o	o
Throttle Sensor	Idle Switch (IDL)	o	x	o	o	o	o	o	o	x	o	o	o	o
	Sensor (TVO)	o	x	o	o	o	o	o	o	o	x	o	o	o
Atmospheric Pressure Sensor		o	x	o	o	x	x	x	x	x	x	x	x	x
IGF Signal		o	x	x	x	x	o	x	x	x	x	x	x	x
Oxygen Sensor		o	x	x	o	x	x	x	x	x	x	x	x	x
Water Thermosensor		o	x	o	o	o	o	o	o	o	o	o	o	o
Airflow sensor	Sensor	o	x	x	o	x	o	o	o	x	x	x	x	x
	Intake Air Thermosensor	o	x	o	o	x	o	o	o	o	x	x	x	x
Crank Angle Sensor	SGT-Signal	o	o	o	o	o	o	o	o	o	x	x	x	x
	SGC-Signal	x	o	x	x	x	o	x	x	x	x	x	x	x

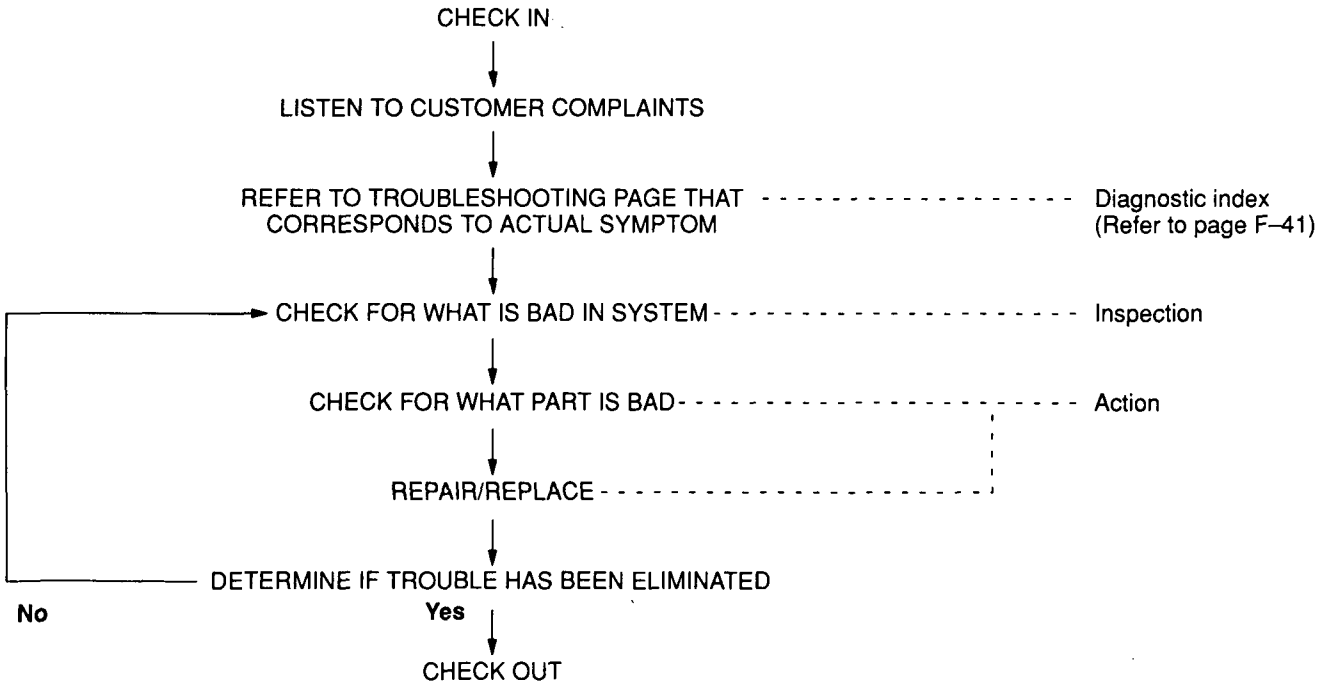
35E0FX-019

USING THIS SECTION

Introduction

Most of the fuel and emission control system is electrically controlled, often making it difficult to diagnose problems in the system, especially intermittent problems. Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer is often a good source of information on such problems, especially intermittent ones. Through talks with the customer, one can find out what the symptoms are and under what conditions they occur.

Work flow



35A0FX-041

Diagnostic index

TROUBLESHOOTING GUIDE			
DIAGNOSTIC INDEX			
TROUBLESHOOTING ITEM		DESCRIPTION	PAGE
No.	TROUBLE		

No.: Each troubleshooting item is assigned a number.

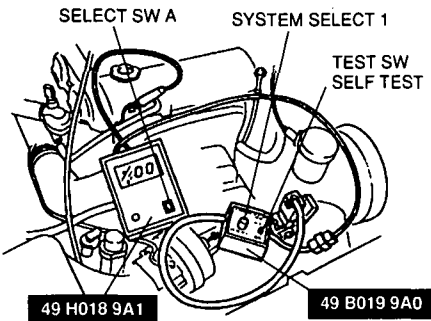
TROUBLESHOOTING ITEM: There are 32 troubleshooting items. Choose the item that most closely corresponds to the actual symptom.

DESCRIPTION: Describes each troubleshooting item.

PAGE: Shows the reference page.

Troubleshooting chart

TROUBLESHOOTING GUIDE

7			CRANKS NORMALLY BUT HARD TO START — AFTER WARM-UP		
DESCRIPTION		<ul style="list-style-type: none"> • Engine cranks at normal speed but requires excessive cranking time (more than 5 sec.) before starting after running and hot soaked • Battery in normal condition • Engine starts normally when cold 			
[TROUBLESHOOTING HINTS]					
① Air/Fuel mixture too rich		② Vapor lock			
<ul style="list-style-type: none"> • Fuel injection control malfunction • Fuel injector fuel leakage 		<ul style="list-style-type: none"> • Fuel pressure not held in fuel line after engine stops • High RVP (winter) fuel used in warm weather 			
STEP	INSPECTION			ACTION	
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON page F-102 	Yes		Go to next step	
		No		Service Code No. displayed Check for cause (Refer to specified check sequence) page F-104 "88" flashes Check ECU terminal 1E voltage page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker	
2	Check if ECU terminal voltages are OK (2D, 2R and 2Q) page F-142	Yes		Go to next step	
		No		Check for cause (Refer to "Check Point for Each Terminal") page F-142	
		is	Yes		Go to next step

35A0FX-042

DESCRIPTION:

Further describes the symptom. Confirm that the chart addresses the actual symptom before beginning troubleshooting.

TROUBLESHOOTING HINTS:

This describes the possible point of malfunction.

STEP:

This shows the order of troubleshooting. Proceed with troubleshooting as indicated.

INSPECTION:

This describes an inspection to quickly determine the malfunction of parts. If a detailed procedure is necessary to perform the INSPECTION, refer to the page shown by the "🔍" mark.

ACTION:

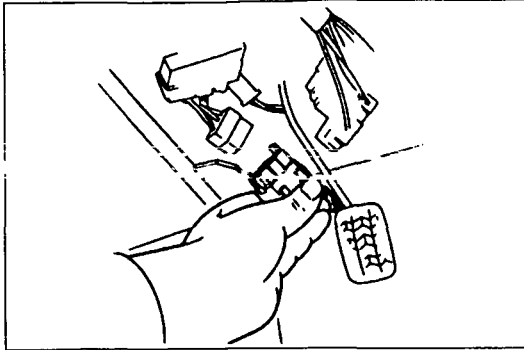
This recommends the appropriate action to take as a result (Yes/No) of the INSPECTION. How to perform the action is described on the reference page shown by the "🔍" mark.

TROUBLESHOOTING GUIDE

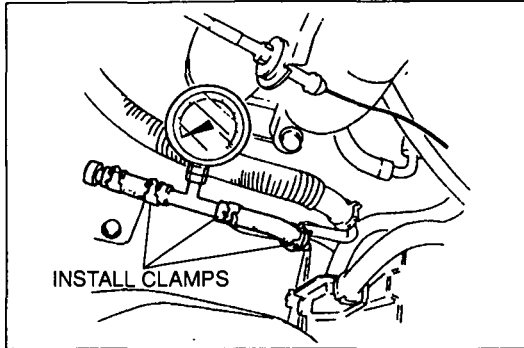
F

DIAGNOSTIC INDEX

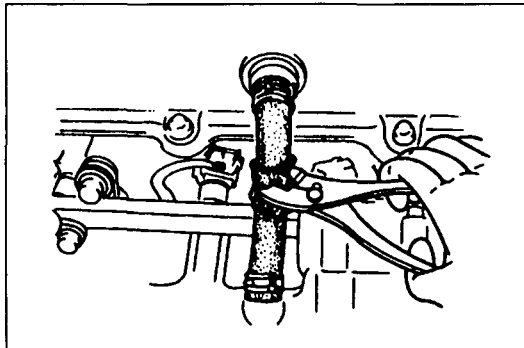
No.	TROUBLESHOOTING ITEM	DESCRIPTION	PAGE
1	Will not crank or cranks slowly	Refer to Engine Electrical System	SECTION G
2	Cranks normally but will not start (No combustion)	Engine cranks at normal speed but shows no sign of "firing"	F-43
3	Cranks normally but will not start (Partial combustion) — When engine is cold	Engine cranks at normal speed but shows partial combustion and will not continue to run	F-45
4	Cranks normally but will not start (Partial combustion) — After warm-up	Engine cranks at normal speed but shows partial combustion and will not continue to run after running and hot soaked	F-47
5	Cranks normally but hard to start — Always	Engine cranks at normal speed but requires excessive cranking time (more than 5 sec.) before starting	F-49
6	Cranks normally but hard to start — When engine is cold	Same condition as No.5 when engine is cold Restarts OK after warm-up	F-51
7	Cranks normally but hard to start — After warm-up	Same condition as No.5 after running and hot soaked Starts normally when cold	F-52
8	Rough idle — Always	Engine vibrates excessively at idle in every condition	F-53
9	Low idle speed/Rough idle — Before warm-up	Engine speed low or engine vibrates excessively at idle during warm-up	F-55
10	Low idle speed/Rough idle — After warm-up	Engine runs normally at idle during warm-up but vibrates excessively after warm-up	F-57
11	High idle speed — After warm-up	Engine idle excessive for operation mode	F-60
12	Low idle speed — When A/C, P/S, or E/L ON	Engine speed decreases at idle when A/C, P/S, or E/L is ON	F-62
13	Rough idle just after starting	Engine starts normally but vibrates excessively only just after starting	F-63
14	Idle moves up and down	Engine speed up and down periodically at idle	F-64
15	Engine stalls at idle — Always	Engine starts normally but vibrates excessively and stalls at idle in every condition	F-66
16	Engine stalls at idle — Before warm-up	Engine starts normally but vibrates excessively and stalls at idle before warm-up	F-68
17	Engine stalls at idle — After warm-up	Engine runs normally at idle during warm-up but becomes rough and stalls after warm-up	F-70
18	Engine stalls during start-up	Engine unexpectedly stops running while starting	F-71
19	Engine stalls on deceleration	Engine unexpectedly stops running while decelerating or after deceleration	F-73
20	Engine stalls at idle — When A/C, P/S, or E/L ON	Engine unexpectedly stops running at idle when A/C, P/S, or E/L is ON	F-75
21	Engine stalls suddenly (Intermittent)	Engine intermittently stops running	F-77
22	Hesitates/Stumbles on acceleration	Flat spot occurs just after accelerator is depressed or mild jerking occurs during acceleration	F-78
23	Surges while cruising	Unexpected, usually repetitive change in engine speed	F-80
24	Lack of power	Performance is poor under load Maximum speed reduced	F-82
25	Poor acceleration	Performance is poor while accelerating	F-86
26	Runs rough on deceleration/Afterburn	Engine runs rough while decelerating and abnormal combustion in exhaust system	F-90
27	Knocking	Abnormal combustion accompanied by audible "pinging" noise	F-92
28	Fuel odor	Gasoline odor in cabin	F-94
29	Exhaust sulfur smell	Exhaust gas smells abnormal (rotten egg smell)	F-95
30	High oil consumption	Oil consumption excessive	F-95
31	Poor fuel economy	Fuel economy unsatisfactory	F-96
32	A/C does not work	Blower fan operates but no cool air is discharged	F-98



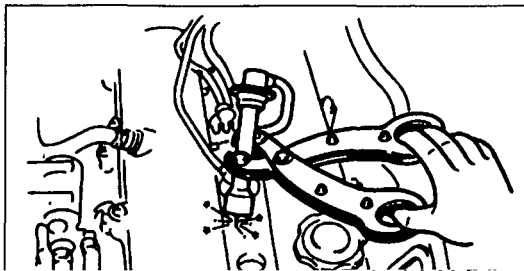
35A0FX-044



35A0FX-045



35A0FX-046



35A0FX-047

PRECAUTION

Warning

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

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

Warning

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

Fuel Line Safety Procedures

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

Pinching Hose

When pinching an air hose or fuel hose with pliers, wrap the hose with a rag to prevent damage.

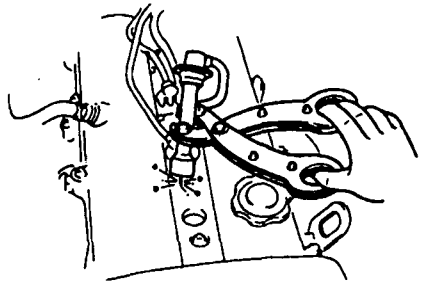
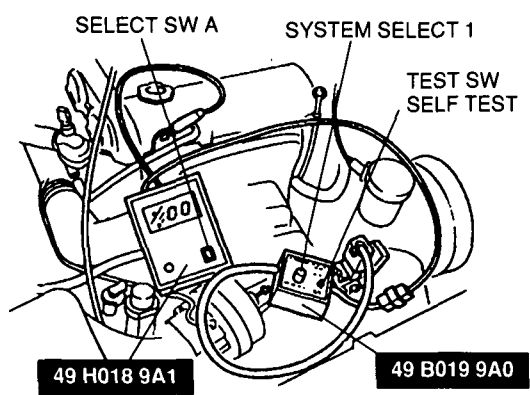
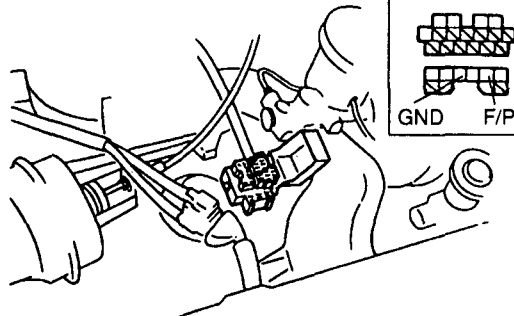
Checking ignition spark

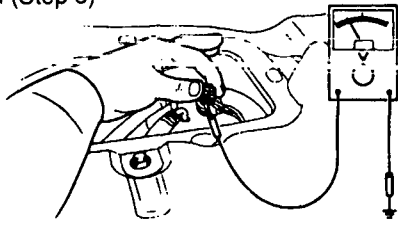
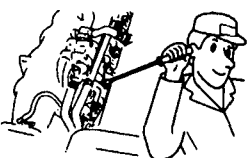
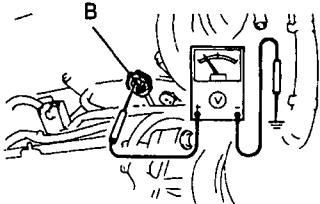
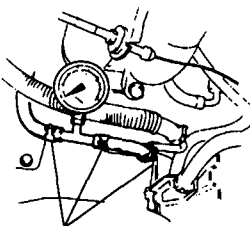
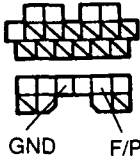

When checking ignition spark condition, hold the high-tension lead with insulated pliers.

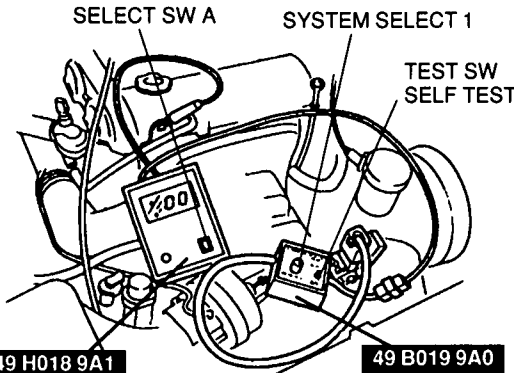
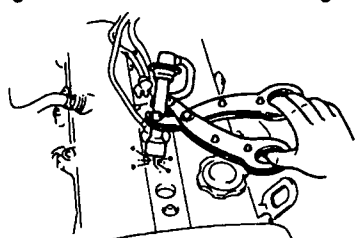
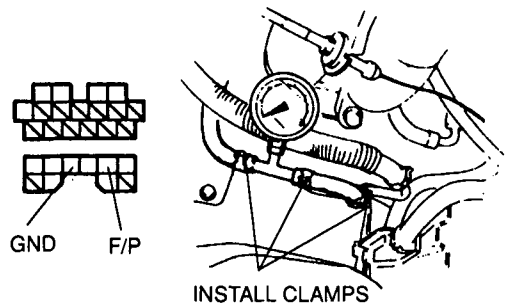
Note

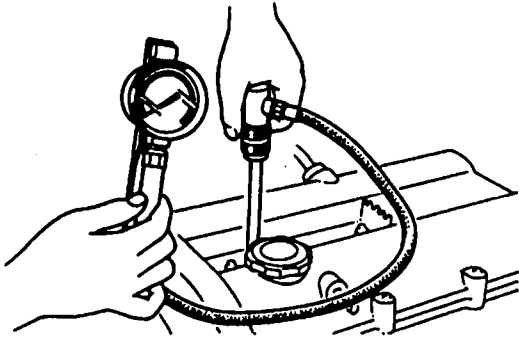
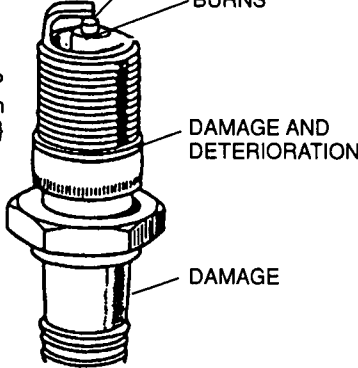
- If a timing light is used to check for spark, some lights do not light at the number 2 and 4 cylinders even if the ignition system is normal.

SYMPTOM TROUBLESHOOTING

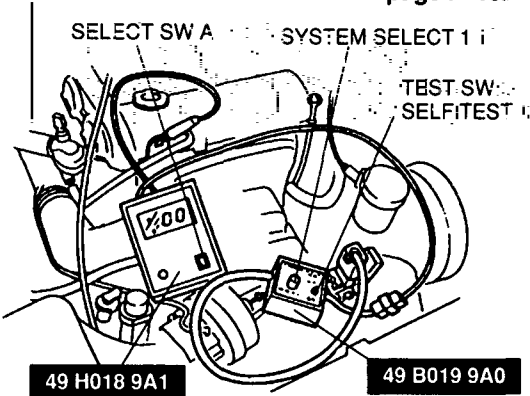
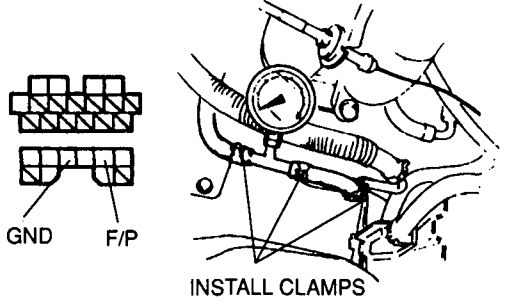
2	CRANKS NORMALLY BUT WILL NOT START (NO COMBUSTION)		
DESCRIPTION	<ul style="list-style-type: none"> • Engine cranks at normal speed but shows no sign of "firing" • Battery in normal condition • Throttle valve not held fully open while cranking • Fuel in tank 		
[TROUBLESHOOTING HINTS]			
Because of no combustion, possibly no fuel is injected to engine or no ignition at all cylinders			
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>① No spark</p> <ul style="list-style-type: none"> • Ignition control malfunction • Ignition system component malfunction <p>② No fuel injection</p> <ul style="list-style-type: none"> • Fuel pump does not operate • Fuel injector does not operate </div> <div style="width: 45%;"> <p>③ Low fuel line pressure</p> <p>④ Low engine compression</p> </div> </div>			
STEP	INSPECTION		ACTION
1	Check if strong blue spark is visible at disconnected high-tension lead while cranking engine	Yes	Go to Step 3
		No	Go to next step
2	Check if "00" is displayed on Self Diagnosis Checker with ignition switch ON ⇨ page F-102	Yes	Check ignition system (Refer to Troubleshooting "Misfire") ⇨ Section G
		No	<p>Service Code No. displayed Check for cause (Refer to specified check sequence) ⇨ page F-104</p> <p>"88" flashes Check ECU terminal 1E voltage ⇨ page F-141</p> <p>Specification: Battery voltage (Ignition switch ON)</p> <p>⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker</p>
	Connect diagnosis connector terminals F/P and GND with jumper wire and check for fuel pump operating sound with ignition switch ON	Yes	Check if engine starts in this condition ⇨ If starts, check circuit opening relay ⇨ page F-126 ⇨ If does not start, go to Step 5
	No	Go to next step	

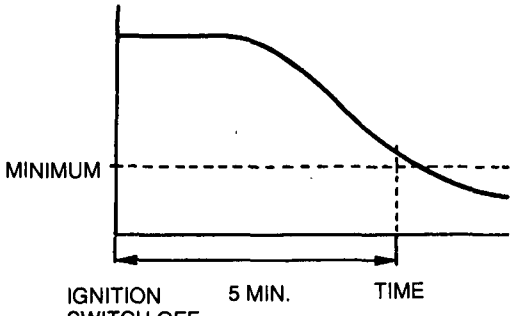
STEP	INSPECTION	ACTION	
4	Check if battery voltage exists at fuel pump connector fuel pump positive terminal with jumper wire connected (Step 3) 	Yes	Check continuity of fuel pump
		No	Check circuit opening relay ☞ page F-126
5	Check for fuel injector operating sound while cranking engine 	Yes	Go to Step 7
		No	Go to next step
6	Check if battery voltage exists at fuel injector connector B terminal wire with ignition switch ON 	Yes	Check ECU terminals 2A, 2U, 2V, 2Y and 2Z voltages ☞ page F-142, 143
		No	Check for open circuit in wiring between main relay and fuel injector
7	Connect diagnosis connector terminals F/P and GND with jumper wire and check for correct fuel line pressure with ignition switch ON Fuel Line pressure: 265—314 kPa {2.7—3.2 kgf/cm², 38—46 psi}   INSTALL CLAMPS	Yes	Go to next step
		No	Low pressure Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure
8	Check for correct engine compression ☞ Section B Engine compression: 1,255—883 kPa {12.8—9.0 kgf/cm², 182—128 psi}—300 rpm	Yes	Go to next step
		No	Check engine condition ☞ Section B <ul style="list-style-type: none"> • Worn piston, piston rings or cylinder wall • Defective cylinder head gasket • Distorted cylinder head • Improper valve seating • Valve sticking in guide
9	Check if spark plugs are OK WEAR AND CARBON BUILDUP PLUG GAP 1.0—1.1 mm {0.040—0.043 in} 	Yes	Go to next step
		No	Repair, clean, or replace ☞ Section G
10	Try known good ECU and check if condition improves		

3	CRANKS NORMALLY BUT WILL NOT START (PARTIAL COMBUSTION) — WHEN ENGINE IS COLD	
DESCRIPTION	<ul style="list-style-type: none"> • Engine cranks at normal speed but shows partial combustion and will not continue to run • Battery in normal condition • Fuel in tank 	
[TROUBLESHOOTING HINTS]		
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>① Air/Fuel mixture too rich</p> <ul style="list-style-type: none"> • Air cleaner element clogged <p>② Air/Fuel mixture too lean</p> <ul style="list-style-type: none"> • Fuel injection control malfunction (Correction for coolant temperature) • Low fuel line pressure • Air leakage of intake air system </div> <div style="width: 45%;"> <p>③ Low engine compression</p> </div> </div>		
STEP	INSPECTION	ACTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON <div style="text-align: right; margin-right: 20px;">☞ page F-102</div> 	Yes: Go to next step No: Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F-104 "88" flashes Check ECU terminal 1E voltage ☞ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Check if strong blue spark is visible at each disconnected high-tension lead while cranking engine 	Yes: Go to next step No: Check ignition system (Refer to Troubleshooting "Misfire") ☞ Section G
3	Connect diagnosis connector terminals F/P and GND with jumper wire and check for correct fuel line pressure with ignition switch ON Fuel Line pressure: 265—314 kPa (2.7—3.2 kgf/cm ² , 38—46 psi) 	Yes: Go to next step No: Low pressure Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure High pressure Check if fuel return hose is clogged or restricted ⇨ If OK, replace pressure regulator ⇨ If not OK, repair or replace

STEP	INSPECTION	ACTION	
4	Check if ECU terminal voltages are OK (1C, 1R, 1T, 2D, 2O and 2Q) ☞ page F-141, 142	Yes	Go to next step
		No	Check for cause (Refer to "Check Point for Each Terminal") ☞ page F-144
5	Check for air leakage of intake air system malfunction ☞ page F-121	Yes	Repair or replace
		No	Go to next step
6	Check for EGR system malfunction ☞ page F-131	Yes	Repair or replace
		No	Go to next step
7	Check if airflow sensor ☞ page F-148	Yes	Go to next step
		No	Repair or replace ☞ page F-121
8	Check for correct engine compression ☞ Section B Engine compression: 1,255—883 kPa {12.8—9.0 kgf/cm ² , 182—128 psi}—300 rpm 	Yes	Go to next step
		No	Check engine condition ☞ Section B <ul style="list-style-type: none"> • Worn piston, piston rings or cylinder wall • Defective cylinder head gasket • Distorted cylinder head • Improper valve seating • Valve sticking in guide
9	Check if spark plugs are OK WEAR AND CARBON BUILDUP BURNS DAMAGE AND DETERIORATION DAMAGE PLUG GAP 1.0—1.1mm {0.040—0.043 in} 	Yes	Go to next step
		No	Repair, clean, or replace ☞ Section G
10	Try known good ECU and check if condition improves		

35A0FX-049

4	CRANKS NORMALLY BUT WILL NOT START (PARTIAL COMBUSTION) — AFTER WARM-UP	
DESCRIPTION	<ul style="list-style-type: none"> Engine cranks at normal speed but shows partial combustion and will not continue to run after running and hot soaks Battery in normal condition Engine starts normally when cold 	
[TROUBLESHOOTING HINTS]	<ul style="list-style-type: none"> ① Air/Fuel mixture too rich <ul style="list-style-type: none"> Fuel injection control malfunction (Correction for coolant temperature) Fuel injector fuel leakage ② Vapor lock <ul style="list-style-type: none"> Fuel pressure not held in fuel line after engine stops High RVP (winter) fuel used in warm weather 	
STEP	INSPECTION	ACTION
1	<p>Check if "EC" is displayed on Self-Diagnosis Checker with ignition switch ON</p> <p style="text-align: right;">page F-102</p> 	<p>Yes: Go to next step</p> <p>No: Service Code No. displayed Check for cause (Refer to specified check sequence) page F-104</p> <p>"88" flashes Check ECU terminal 1E voltage page F-141</p> <p>Specification: Battery voltage (Ignition switch ON)</p> <ul style="list-style-type: none"> ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	<p>Check if ECU terminal voltages are OK (2D and 2Q)</p> <p style="text-align: right;">page F-142</p>	<p>Yes: Go to next step</p> <p>No: Check for cause (Refer to "Check Point for Each Terminal") page F-144</p>
3	<p>Connect diagnosis connector terminals F/P and GND with jumper wire and check for correct fuel line pressure with ignition switch ON</p> <p>Fuel Line pressure: 265—314 kPa {2.7—3.2 kgf/cm², 38—46 psi}</p> 	<p>Yes: Go to next step</p> <p>No: Low pressure Check fuel line pressure while pinching fuel return hose</p> <ul style="list-style-type: none"> ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check fuel line and filter for clogging If not clogged, check fuel pump maximum pressure <p>High pressure Check if fuel return hose is clogged or restricted</p> <ul style="list-style-type: none"> ⇨ If OK, replace pressure regulator ⇨ If not OK, repair or replace

STEP	INSPECTION		ACTION
4	<p>With condition of step 3, check if fuel line pressure is held after ignition switch is turned OFF</p> <p>Fuel line pressure: More than 147 kPa {1.5 kgf/cm², 21 psi} for 5 min.</p> <p>PRESSURE</p>  <p>IGNITION SWITCH OFF 5 MIN. TIME</p>	Yes	Go to Step 6
		No	Go to next step
5	<p>Check if fuel line pressure is held after ignition switch is turned OFF and blocking outlet of pressure regulator</p> <p>Fuel line pressure: More than 147 kPa {1.5 kgf/cm², 21 psi} for 5 min.</p>	Yes	Replace pressure regulator
		No	Check fuel pump hold pressure ⇨ If OK, check fuel injector for fuel leakage ⇨ If not OK, replace fuel pump
6	<p>Try known good ECU and check if condition</p>	Yes	Replace ECU
		No	Change fuel to another brand

35A0FX-050

TROUBLESHOOTING GUIDE

F

5 CRANKS NORMALLY BUT HARD TO START — ALWAYS

DESCRIPTION

- Engine cranks at normal speed but requires excessive cranking time (more than 5 sec.) before starting
- Battery in normal condition

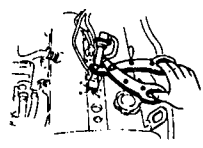
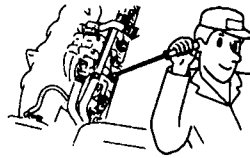
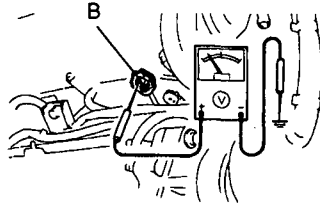
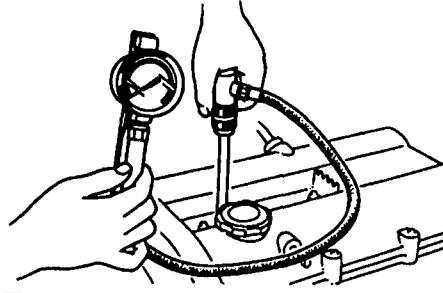
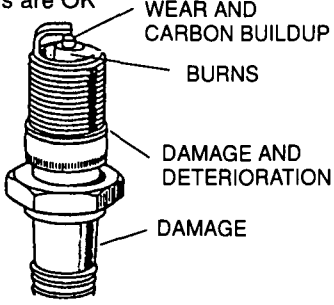
[TROUBLESHOOTING HINTS]

- ① Air/Fuel mixture too lean
 - Fuel injection control malfunction (Correction for coolant temperature)
 - Low fuel line pressure
 - Air leakage
- ② Air/Fuel mixture too rich
 - Air cleaner element clogged
- ③ Poor ignition spark

STEP	INSPECTION	ACTION
------	------------	--------

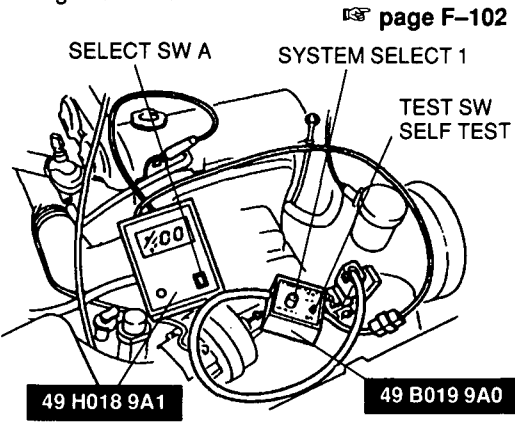
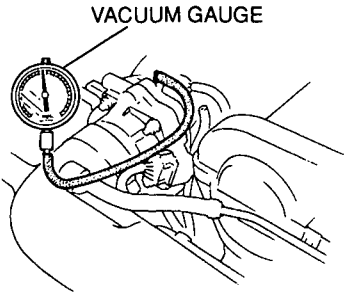
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON. <div style="text-align: center; margin-top: 10px;"> </div>	Yes: Go to next step. page F-102 No: Service Code No. displayed. Check for cause. (Refer to specified check sequence) page F-104 "88" flashes. Check ECU terminal 1E voltage. page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Check for correct intake manifold vacuum at idle Vacuum: More than 450 mmHg (17.7 inHg) VACUUM GAUGE <div style="text-align: center; margin-top: 10px;"> </div>	Yes: Go to next step. No: Check for air leakage of intake air system components. page F-121
3	Check if air cleaner element is clean. page F-100	Yes: Go to next step. No: Replace air cleaner element. page F-121

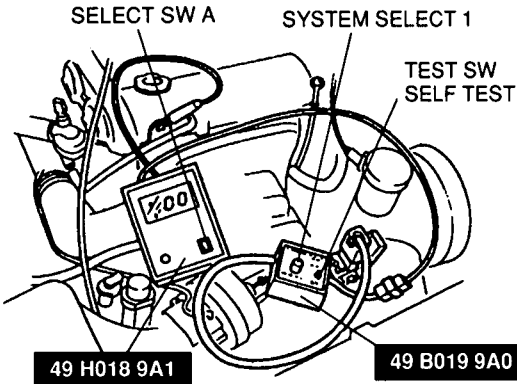
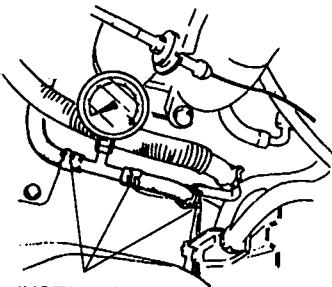
	Fuel line pressure at idle 7—3.2 kgf/cm², 38—46 psi pressure regulator disconnected	Yes: Go to next step. No: Low pressure Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure
4	Check for correct fuel line pressure Fuel line pressure: 265—314 kPa (2.6—3.1 kgf/cm²) (Vacuum hose to be connected)	<div style="text-align: center; margin-top: 10px;"> </div> <p style="text-align: center;">INSTALL CLAMPS</p>

STEP	INSPECTION	ACTION	
5	Check if ECU terminal voltages are OK (1R, 1T, 2D, 2O and 2Q) ☞ page F-142	Yes	Go to next step
		No	Check for cause (Refer to "Check Point for Each Terminal") ☞ page F-144
6	Check if strong blue spark is visible at each disconnected high-tension lead while cranking engine 	Yes	Go to next step
		No	Check ignition system (Refer to Troubleshooting "Misfire") ☞ Section G
7	Check for EGR system malfunction ☞ page F-131	Yes	Repair or replace
		No	Go to next step
8	Check for fuel injector operating sound at each injector at idle 	Yes	Go to Step 10
		No	Go to next step
9	Check if battery voltage exists at fuel injector connector B terminal with ignition switch ON 	Yes	Check if fuel injector resistance is OK ☞ page F-127 Resistance: 12—16Ω ⇨ If OK, check wiring between injector and ECU ⇨ If not OK, replace injector ☞ page F-127
		No	Check wiring between main relay and fuel injector
10	Check for correct engine compression ☞ Section B Engine compression: 1,255—883 kPa (12.8—9.0 kgf/cm², 182—128 psi)—300 rpm 	Yes	Go to next step
		No	Check engine condition ☞ Section B <ul style="list-style-type: none"> • Worn piston, piston rings or cylinder wall • Defective cylinder head gasket • Distorted cylinder head • Improper valve seating • Valve sticking in guide
11	Check if spark plugs are OK 	Yes	Go to next step
		No	Repair, clean, or replace ☞ Section G
12	Try known good ECU and check if condition improves		

TROUBLESHOOTING GUIDE

F

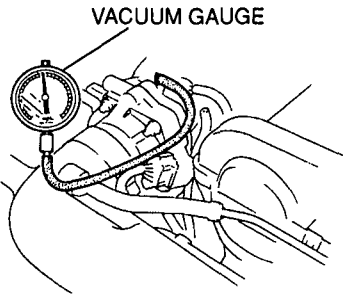
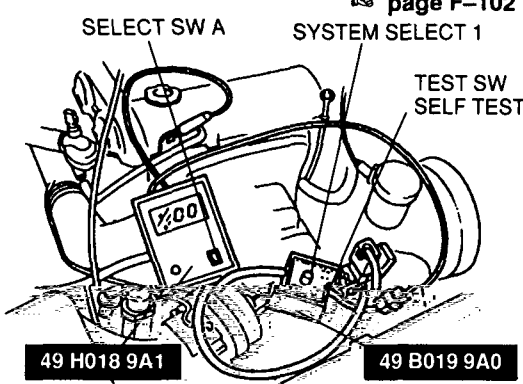
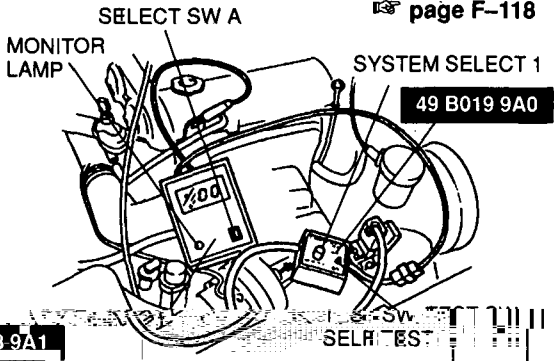
6	CRANKS NORMALLY BUT HARD TO START — WHEN ENGINE IS COLD	
DESCRIPTION	<ul style="list-style-type: none"> • Engine cranks at normal speed but requires excessive cranking time before starting • Battery in normal condition • Restarts OK after warm-up 	
[TROUBLESHOOTING HINTS]		
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>① Air/Fuel mixture too rich</p> <ul style="list-style-type: none"> • Air cleaner element clogged • Idle speed control malfunction </div> <div style="width: 45%;"> <p>② Air/Fuel mixture too lean</p> <ul style="list-style-type: none"> • Fuel injection control malfunction (Correction for coolant temperature) <p>③ Poor atomization of fuel</p> <ul style="list-style-type: none"> • Low RVP (summer) fuel used in cold weather </div> </div>		
STEP	INSPECTION	ACTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON 	Yes Go to next step
	No Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F-104	"88" flashes Check ECU terminal 1E voltage ☞ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
	☞ page F-102	☞ page F-141
2	Check if ECU terminal voltages are OK (1C, 2D, 2O and 2Q) ☞ page F-141, 142	Yes Go to next step
	No	Check for cause (Refer to "Check Point for Each Terminal") ☞ page F-144
3	Check if engine starts easily when depressing accelerator while cranking	Yes Check if ISC solenoid valve is OK ☞ page F-124 ⇨ If OK, check air valve ☞ page F-123 ⇨ If not OK, replace ISC solenoid valve
	No	Go to next step
4	Check for correct intake manifold vacuum at idle Vacuum: More than 450 mmHg {17.7 inHg} 	Yes Go to next step
	No	Check for air leakage of intake air system components ☞ page F-121
5	Check if air cleaner element is clean ☞ page F-100	Yes Go to next step
	No	Replace air cleaner element ☞ page F-121
6	Try known good ECU and check if condition	Yes Replace ECU
	No	Change fuel to another brand

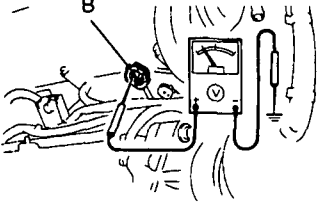


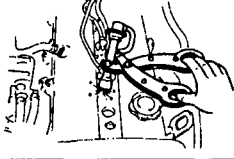

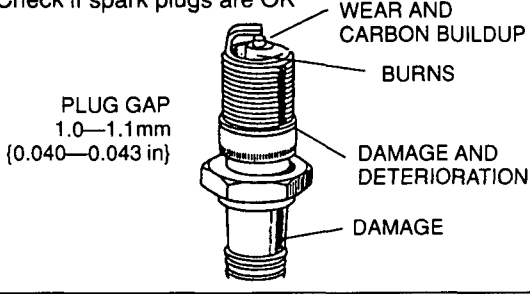









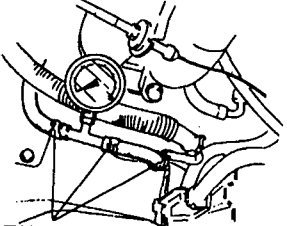
7	CRANKS NORMALLY BUT HARD TO START — AFTER WARM-UP	
DESCRIPTION	<ul style="list-style-type: none"> • Engine cranks at normal speed but requires excessive cranking time (more than 5 sec.) before starting after running and hot soaked • Battery in normal condition • Engine starts normally when cold 	
[TROUBLESHOOTING HINTS] ① Air/Fuel mixture too rich <ul style="list-style-type: none"> • Fuel injection control malfunction • Fuel injector fuel leakage ② Vapor lock <ul style="list-style-type: none"> • Fuel pressure not held in fuel line after engine stops • High RVP (winter) fuel used in warm weather 		
STEP	INSPECTION	ACTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON  ☞ page F-102	Yes: Go to next step No: Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F-104 "88" flashes Check ECU terminal 1E voltage ☞ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Check if ECU terminal voltages are OK (2D, 2R and 2Q) ☞ page F-142	Yes: Go to next step No: Check for cause (Refer to "Check Point for Each Terminal") ☞ page F-144
3	Run engine at idle and check if fuel line pressure is held after ignition switch turned OFF Fuel line pressure: More than 147 kPa {1.5 kgf/cm², 21 psi} for 5 min.  INSTALL CLAMPS	Yes: Go to next step No: Block outlet of pressure regulator and check if fuel line pressure is held after ignition switch is turned OFF ⇨ If OK, replace pressure regulator ⇨ If not OK, check fuel pump hold pressure If fuel pump is OK, check fuel injector for fuel leakage ☞ page F-128
4	Try known good ECU and check if condition improves	Yes: Replace ECU No: Change fuel to another brand

35A0FX-053

TROUBLESHOOTING GUIDE

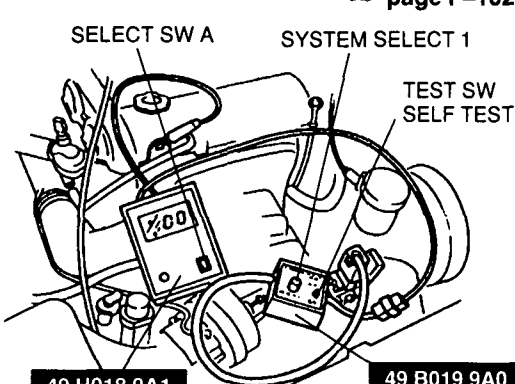
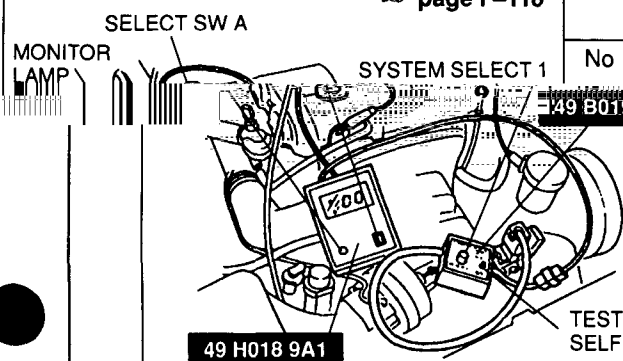
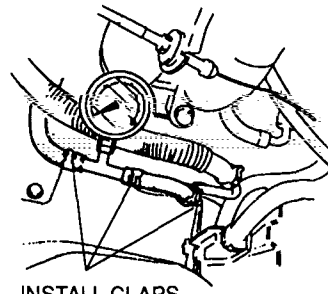
F

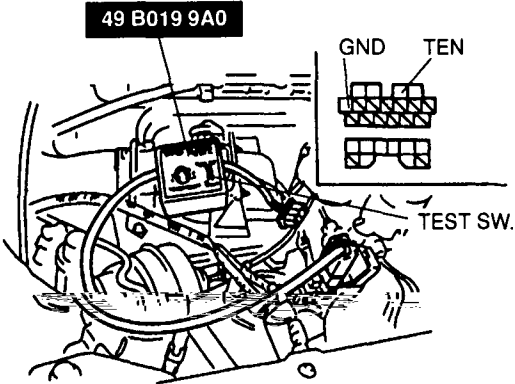
8	ROUGH IDLE — ALWAYS		
DESCRIPTION • Engine vibrates excessively at idle in every condition			
[TROUBLESHOOTING HINTS]			
① Air/Fuel mixture too lean <ul style="list-style-type: none"> • Air leakage • Fuel injection control malfunction • Low fuel line pressure 		② One or more injectors not operating or clogged ③ One or more spark plugs not sparking ④ Injection timing misadjustment ⑤ Low engine compression	
STEP	INSPECTION		ACTION
1	Check for correct intake manifold vacuum at idle Vacuum: More than 450 mmHg (17.7 inHg) 	Yes	Go to next step
		No	Check for air leakage of intake air system components ☞ page F-121
2	Check if air cleaner element is clean ☞ page F-100	Yes	Go to next step
		No	Replace air cleaner element ☞ page F-121
3	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ☞ page F-102 	Yes	Go to next step
		No	Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F-104
		No	"88" flashes Check ECU terminal 1E voltage ☞ page F-141 Specification: Battery voltage (Ignition switch ON) ☞ OK: replace ECU ☞ If not OK: check wiring between ECU and Self-Diagnosis Checker
4	Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON ☞ page F-118 	Yes	Go to next step
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ page F-119
		No	Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
5	Check if ECU terminal voltages are OK (1R, 1T, 2D, 2O and 2Q) ☞ page F-142	Yes	Go to next step
		No	Check for cause (Refer to "Check Point for Each Terminal") ☞ page F-144

STEP	INSPECTION	ACTION	
6	Check for fuel injector operating sound at idle with sound scope or screwdriver	Yes	Go to Step 8
		No	Go to next step
7	Check if battery voltage exists at fuel injector connector B terminal 	Yes	Check if fuel injector resistance is OK  page F-127 Resistance: 12—16Ω ⇨ If OK, check wiring between ECU and fuel injector ⇨ If not OK, replace fuel injector  page F-127
		No	Check wiring between ECU and fuel injector
8	Disconnect each high-tension lead at idle and check if engine speed decreases equally each time 	Yes	Disconnect each fuel injector connector at idle and check if engine speed decreases equally each time ⇨ If OK, go to Step 10 ⇨ If not OK, check fuel injector for fuel leakage  page F-128
		No	Go to next step
9	Check if spark plugs are OK 	Yes	Check for correct engine compression  Section B ⇨ If OK, replace fuel injector  page F-127 ⇨ If not OK, check for cause (Refer to Section B)  Section B
		No	Repair, clean, or replace  Section G
10	Check for correct ignition timing at idle  page F-100 Ignition timing: BTDC 9°—11° (10° ± 1°)	Yes	Check for correct idle speed  page F-101 Idle speed: 800—900 (850 ± 50) rpm ⇨ If OK, go to next step ⇨ If not OK, adjust idle speed  page F-101
		No	Adjust ignition timing  page F-100
11	Check for EGR system malfunction  page F-131	Yes	Repair or replace
		No	Go to next step
12	Check for correct fuel line pressure at idle Fuel line pressure: 265—314 kPa (2.7—3.2 kgf/cm², 38—46 psi) (Vacuum hose to pressure regulator disconnected)  INSTALL CLAPS	Yes	Go to next step
		No	Low pressure Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure
13	Try known good ECU and check if condition improves		

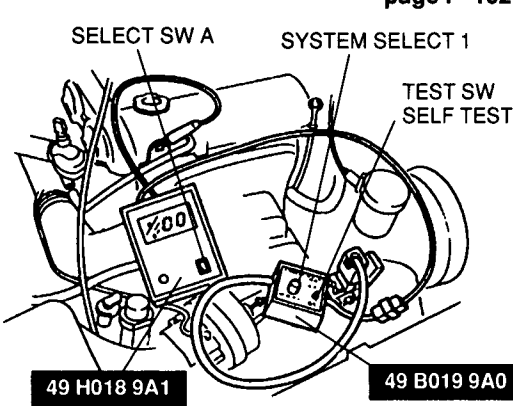
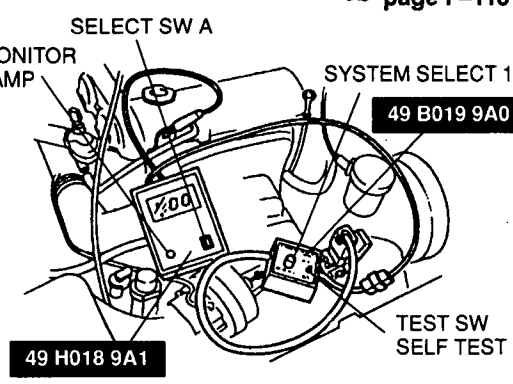
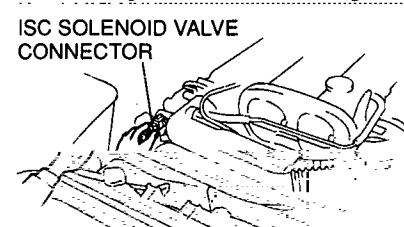
TROUBLESHOOTING GUIDE

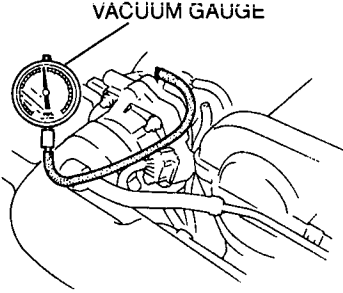
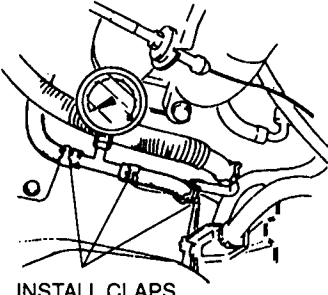
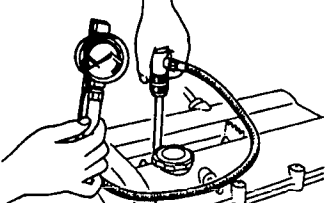
F

9	LOW IDLE SPEED/ROUGH IDLE — BEFORE WARM-UP		
DESCRIPTION • Engine speed low or engine vibrates excessively at idle during warm-up			
[TROUBLESHOOTING HINTS]			
① Low intake air amount <ul style="list-style-type: none"> • Air cleaner element clogged • Idle speed control [Air valve Correction for coolant temperature]		② Low fuel injection amount <ul style="list-style-type: none"> • Fuel injection control malfunction (Correction for coolant temperature) ③ Poor atomization of fuel <ul style="list-style-type: none"> • Low RVP (summer) fuel used in cold weather 	
STEP	INSPECTION	ACTION	
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON 	Yes	Go to next step
		No	Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F-104 "88" flashes Check ECU terminal 1E voltage ☞ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON 	Yes	Go to next step
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ page F-115 Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
3	Check if ECU terminal voltages are OK (2D, 2O and 2Q) ☞ page F-142	Yes	Go to next step
		No	Check for cause (Refer to "Check Point for Each Terminal") ☞ page F-14
4	Check for correct intake manifold vacuum at idle Vacuum: More than 450 mmHg {17.7 inHg} 	Yes	Go to next step
		No	Check for air leakage of intake air system components... ☞ page F-121

STEP	INSPECTION	ACTION	
5	Check if air cleaner element is clean ☞ page F-100	Yes	Go to next step
		No	Replace air cleaner element ☞ page F-121
6	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" when engine is cold Check if engine speed decreases as engine warms up 	Yes	Go to next step
		No	Check air valve ☞ page F-123
7	With condition of Step 5 check for correct ignition timing at idle after warm-up ☞ page F-100 Ignition timing: BTDC 9°—11° (10° ± 1°)	Yes	Go to next step
		No	Adjust ignition timing ☞ page F-100
8	Try known good ECU and check if condition improves	Yes	Replace ECU
		No	Change fuel to another brand


35A0FX-055

10	LOW IDLE SPEED/ROUGH IDLE — AFTER WARM-UP		
DESCRIPTION • Engine runs normally at idle during warm-up but vibrates excessively after warm-up			
[TROUBLESHOOTING HINTS]			
<ul style="list-style-type: none"> ① Idle speed control malfunction ② Air/Fuel mixture too lean <ul style="list-style-type: none"> • Air leakage of intake air system • Low fuel line pressure ③ Air/Fuel mixture too rich <ul style="list-style-type: none"> • Fuel injection control malfunction (Correction for coolant temperature) ④ Poor ignition spark ⑤ Low engine compression 			
STEP	INSPECTION	Yes	ACTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ➤ page F-102 	Yes	Go to next step
		No	Service Code No. displayed Check for cause (Refer to specified check sequence) ➤ page F-104 "88" flashes Check ECU terminal 1E voltage ➤ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ➤ page F-119 Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
2	Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON ➤ page F-118 	Yes	Go to next step
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ➤ page F-119 Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
3	Disconnect ISC solenoid valve connector at idle and check if engine condition is changed 	Yes	Go to next step
		No	Check ISC solenoid valve ➤ page F-

STEP	INSPECTION	ACTION	
4	Check for correct intake manifold vacuum at idle Vacuum: More than 450 mmHg {17.7 inHg} 	Yes	Go to next step
		No	Low vacuum Check for air leakage of intake air system components ↳ page F-121
5	Check if ECU terminal voltages are OK (2D, 2O and 2Q) ↳ page F-142	Yes	Go to next step
		No	Check for cause (Refer to "Check Point for Each Terminal") ↳ page F-144
6	Check for correct ignition timing at idle ↳ page F-100 Ignition timing: BTDC 9°—11° (10° ± 1°)	Yes	Check for correct idle speed ↳ page F-101 Idle speed: 800—900 (850 ± 50) rpm ⇨ If OK, go to next step ⇨ If not OK, adjust idle speed ↳ page F-101
		No	Adjust ignition timing ↳ page F-100
7	Check for correct fuel line pressure at idle Fuel line pressure: 265—314 kPa {2.7—3.2 kgf/cm², 38—46 psi} (Vacuum hose to pressure regulator disconnected) 	Yes	Go to next step
		No	Low pressure Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure
8	Check if strong blue spark is visible at each disconnected high-tension lead while cranking engine	Yes	Go to next step
		No	Check ignition system (Refer to Troubleshooting "Misfire") ↳ Section G
9	Check for correct engine compression ↳ Section B Engine compression: 1,255—883 kPa {12.8—9.0 kgf/cm², 182—128 psi}—300 rpm 	Yes	Go to next step
		No	Check engine condition ↳ Section B <ul style="list-style-type: none"> • Worn piston, piston rings or cylinder wall • Defective cylinder head gasket • Distorted cylinder head • Improper valve seating • Valve sticking in guide

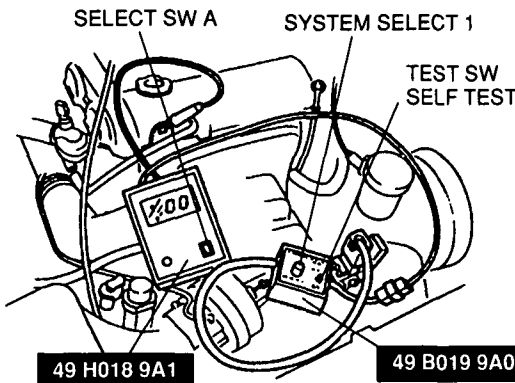
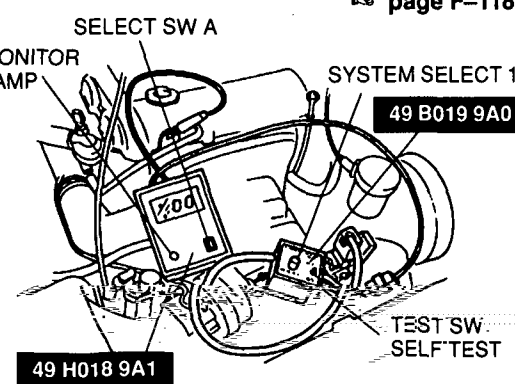
TROUBLESHOOTING GUIDE

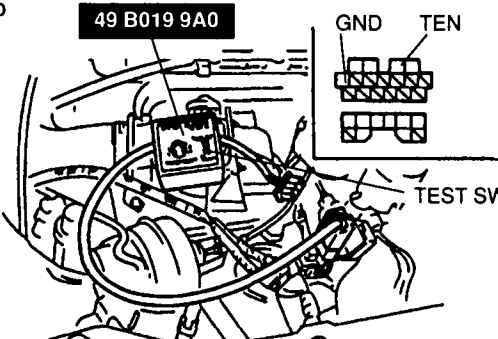
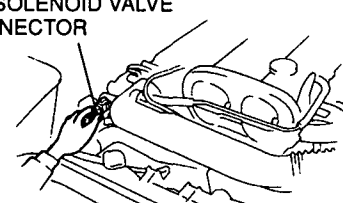
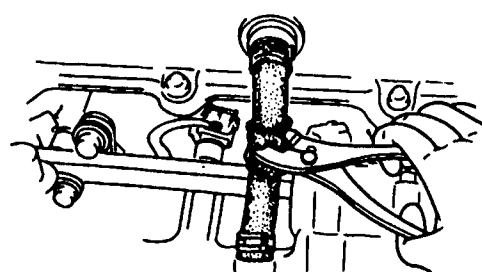
F

STEP	INSPECTION		ACTION
10	Check if spark plugs are OK WEAR AND CARBON BUILDUP PLUG GAP 1.0—1.1mm (0.040—0.043 in)		Yes Go to next step
		No	Repair, clean, or replace 🔧 Section G
11	Try known good ECU and check if condition improves		

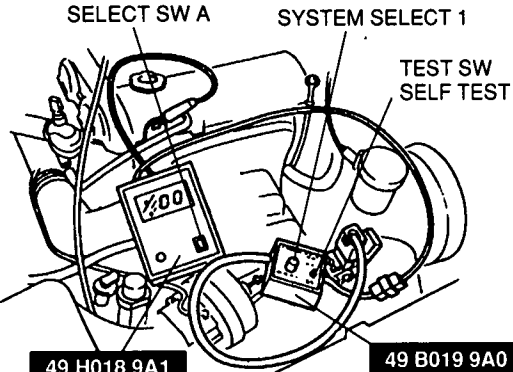
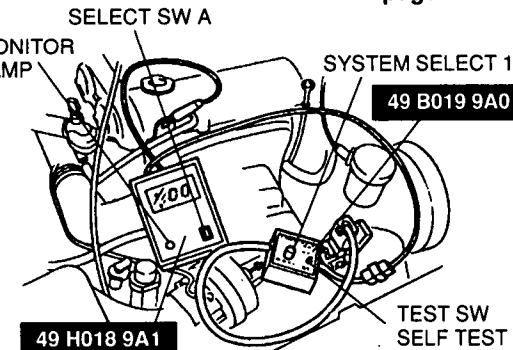
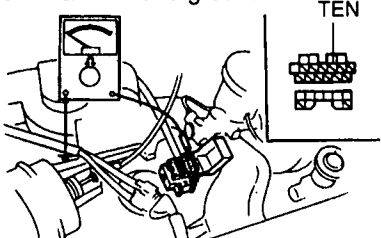
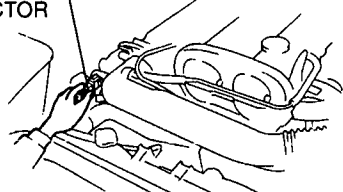
35A0FX-056

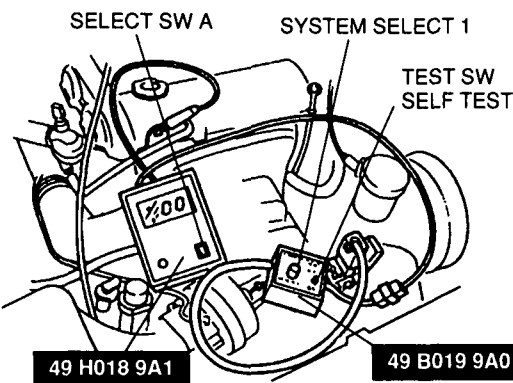
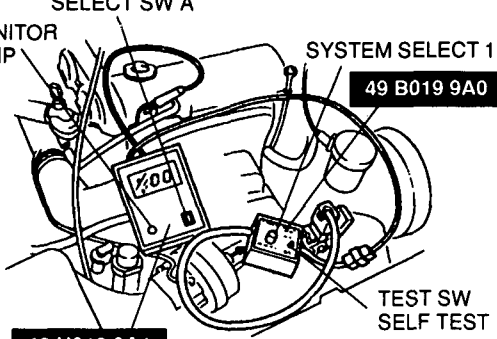
TROUBLESHOOTING GUIDE

11	HIGH IDLE SPEED — AFTER WARM-UP					
<p>[TROUBLESHOOTING HINTS] Excessive intake air supplied to engine ① Throttle valve not fully closed ② Idle speed control malfunction</p> <ul style="list-style-type: none"> • Air valve not closing • ISC solenoid valve stuck • Incorrect coolant temperature signal 						
STEP	INSPECTION	ACTION				
1	Check if throttle valve is fully closed when accelerator released	<table border="1"> <tr> <td>Yes</td> <td>Go to next step</td> </tr> <tr> <td>No</td> <td> Check if throttle linkage is correctly installed and operates freely ⇨ If OK, go to next step ⇨ If not OK, clean, adjust or replace linkage </td> </tr> </table>	Yes	Go to next step	No	Check if throttle linkage is correctly installed and operates freely ⇨ If OK, go to next step ⇨ If not OK, clean, adjust or replace linkage
Yes	Go to next step					
No	Check if throttle linkage is correctly installed and operates freely ⇨ If OK, go to next step ⇨ If not OK, clean, adjust or replace linkage					
2	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ⇨ page F-102 	<table border="1"> <tr> <td>Yes</td> <td>Go to next step</td> </tr> <tr> <td>No</td> <td> Service Code No. displayed Check for cause (Refer to specified chart) "88" flashes Check ECU terminal 1E voltage Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker </td> </tr> </table>	Yes	Go to next step	No	Service Code No. displayed Check for cause (Refer to specified chart) "88" flashes Check ECU terminal 1E voltage Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
Yes	Go to next step					
No	Service Code No. displayed Check for cause (Refer to specified chart) "88" flashes Check ECU terminal 1E voltage Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker					
3	Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON ⇨ page F-118 	<table border="1"> <tr> <td>Yes</td> <td>Go to next step</td> </tr> <tr> <td>No</td> <td> Lamp not ON/OFF with specified switch Check for cause (Refer to specified chart) Lamp always ON Check wiring between ECU terminal 1E and Self-Diagnosis Checker </td> </tr> </table>	Yes	Go to next step	No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified chart) Lamp always ON Check wiring between ECU terminal 1E and Self-Diagnosis Checker
Yes	Go to next step					
No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified chart) Lamp always ON Check wiring between ECU terminal 1E and Self-Diagnosis Checker					

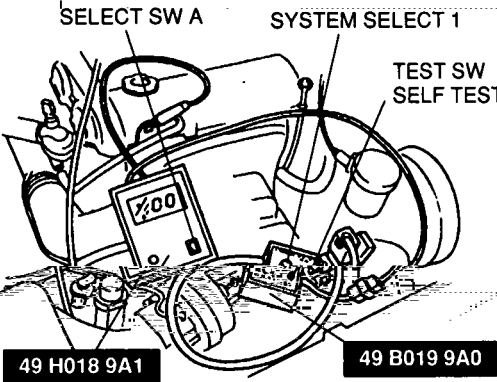



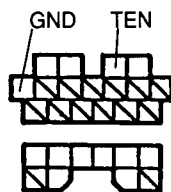
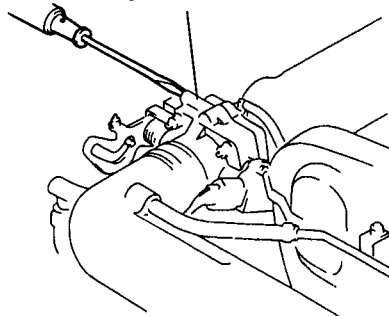



STEP	INSPECTION	ACTION	
4	Connect System Selector to diagnosis connector and set Test Switch to "SELF TEST" when engine is cold Check if engine speed decreases as engine warms up 	Yes	Go to next step
		No	Check air valve ☞ page F-123
5	Disconnect ISC solenoid valve connector at idle and check if engine condition is changed ISC SOLENOID VALVE CONNECTOR 	Yes	Go to next step
		No	Check ISC solenoid valve ☞ page F-124
6	Pinch PCV hose with pliers and check if engine speed decreases 	Yes	Check PCV valve
		No	Go to next step
7	Check if ECU terminal voltages are OK (1R, 2D, 2O and 2Q)	Yes	Try known good ECU
		No	Check for cause (Refer to "Check Point for Each Terminal") ☞ page F-144

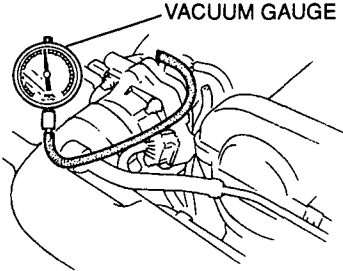

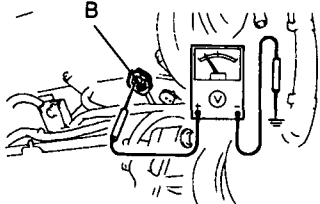



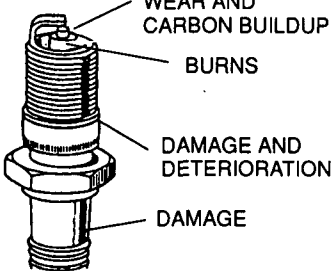






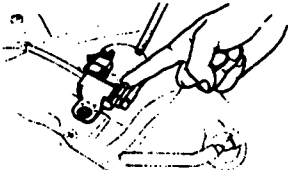
35A0FX-057

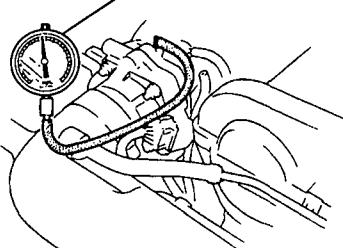
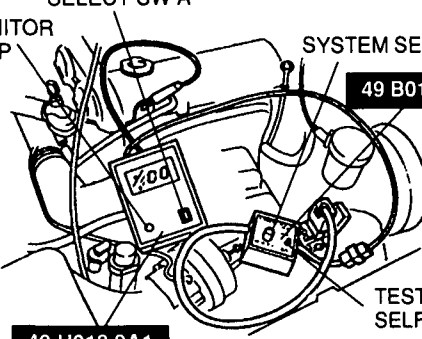
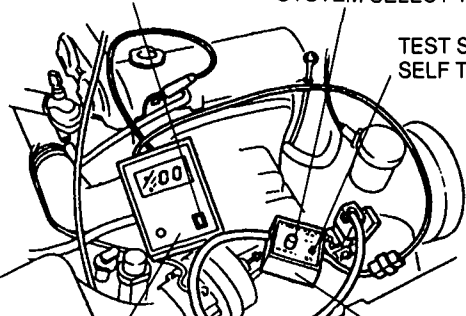
12	LOW IDLE SPEED — WHEN A/C, P/S, OR E/L ON		
DESCRIPTION	<ul style="list-style-type: none"> • Engine speed decreases at idle when A/C, P/S, or E/L ON • A/C, P/S, headlights, blower fan and electric cooling fan operate normally 		
[TROUBLESHOOTING HINTS]			
<ul style="list-style-type: none"> • Idle speed control malfunction • Engine speed feedback control malfunction • ISC solenoid valve stuck 			
STEP	INSPECTION		ACTION
1	<p>Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON</p> <p style="text-align: right;">☞ page F-102</p> 	Yes	Go to next step
2	<p>Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON</p> <p style="text-align: right;">☞ page F-118</p> 	Yes	Go to next step
3	<p>Check if continuity exists between diagnosis connector terminal TEN and ground</p> 	Yes	Check for short circuit in wiring between diagnosis connector terminal TEN and ground
4	<p>Disconnect ISC solenoid valve connector at idle and check if engine condition is changed</p> 	Yes	Try known good ECU
		No	Check ISC solenoid valve

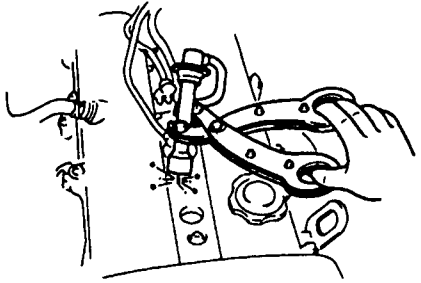
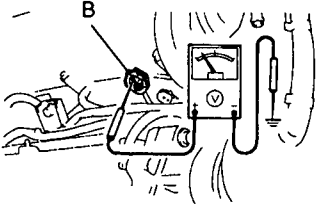
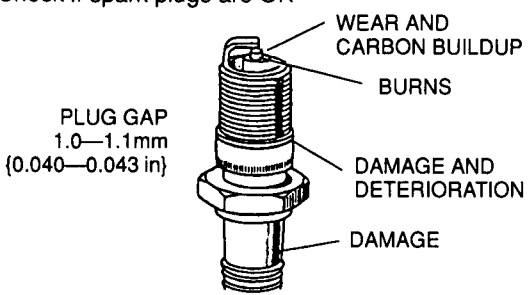
STEP	INSPECTION		ACTION
13 ROUGH IDLE JUST AFTER STARTING			
DESCRIPTION • Engine starts normally but vibrates excessively just after starting			
[TROUBLESHOOTING HINTS]			
① Fuel injection control and idle speed control malfunction • Start signal not input to ECU			
② Idle speed misadjustment ③ Ignition timing misadjustment			
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ☞ page F-102	Yes	Go to next step
		No	Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F-104
		No	"88" flashes Check ECU terminal 1E voltage ☞ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ page F-119
2	Check switches for correct operation with Self-Diagnosis Checker. Monitor lamp and ignition switch ON ☞ page F-118	Yes	Go to next step
		No	Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ page F-119
3	Check if ECU terminal 1C voltage is OK ☞ page F-141 Voltage: Approx. 10V (While cranking)	Yes	Go to next step
		No	Check for cause (Refer to "Check Point for Each Terminal") ☞ page F-144
4	Check for correct ignition timing at idle ☞ page F-100 Ignition timing: BTDC 9°—11° (10° ± 1°)	Yes	Check for correct idle speed ☞ page F-101 Idle speed: 800—900 (850 ± 50) rpm ⇨ If OK, go to next step ⇨ If not OK, adjust idle speed ☞ page F-101
		No	Adjust ignition timing ☞ page F-100
5	Try known good ECU and check if condition improves		

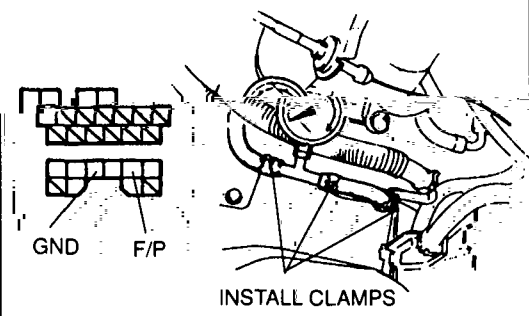
35A0FX-059

14	IDLE MOVES UP AND DOWN		
DESCRIPTION • Engine speeds up and down periodically at idle			
[TROUBLESHOOTING HINTS] ① Fuel cut occurs at idle • Air valve not closing after warm-up and idle speed reaches to fuel cut speed ② Fuel injection amount fluctuating • Bad contact point inside airflow sensor ③ Air leakage of intake air system ④ Poor ignition spark ⑤ Air/Fuel mixture too rich • Fuel evaporative system malfunction ⑥ Low engine compression			
STEP	INSPECTION		ACTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON	Yes	Go to next step
			
		No	Service Code No. displayed Check for cause (Refer to specified check sequence)  page F-104 "88" flashes Check ECU terminal 1E voltage  page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
Check for correct idle speed  page F-101 Idle speed: 800—900 (850 ± 50) rpm  CONNECT TERMINAL		Yes	Go to next step
 AIR ADJUSTING SCREW		No	Check if idle speed can be adjusted by turning air adjust screw ⇨ If OK, adjust idle speed ⇨ If not OK, check air valve  page F-123
Check for correct ignition timing at idle  page F-100 Ignition timing: BTDC 9°—11° (10° ± 1°)		Yes	Go to next step
		No	Adjust ignition timing  page F-100

STEP	INSPECTION		ACTION
4	Check for correct intake manifold vacuum at idle Intake manifold vacuum: More than 450 mmHg (17.7 inHg) 	Yes	Go to next step
		No	Low vacuum Check for air leakage of intake air system  page F-121
5	Check for fuel injector operating sound at idle with sound scope or screwdriver	Yes	Go to Step 7
		No	Go to next step
6	Check if battery voltage exists at fuel injector connector B terminal 	Yes	Check if fuel injector resistance is OK  page F-127 Resistance: 12—16Ω ⇨ If OK, check wiring between ECU and fuel injector ⇨ If not OK, replace fuel injector  page F-127
		No	Check wiring between ECU and fuel injector
7	Disconnect each high-tension lead at idle and check if engine speed decreases equally each time	Yes	Disconnect each fuel injector connector at idle and check if engine speed decreases equally each time ⇨ If OK, go to Step 9 ⇨ If not OK, check fuel injector for fuel leakage  page F-128
		No	Go to next step
8	Check if spark plugs are OK 	Yes	Check for correct engine compression  Section B ⇨ If OK, replace fuel injector  page F-127 ⇨ If not OK, check for cause (Refer to Section B)  Section B
		No	Repair, clean, or replace  Section G
9	Check if ECU terminal voltages are OK (1R, 1T, 2D, 2Q and 2X)  page F-142	Yes	Go to next step
		No	Check for cause (Refer to "Check Point for Each Terminal")  page F-144
10	Check if vacuum is felt at purge solenoid valve at idle 	Yes	Check purge solenoid valve
		No	Go to next step
11	Try known good ECU and check if condition improves		

15	ENGINE STALLS AT IDLE — ALWAYS		
DESCRIPTION • Engine starts normally but vibrates excessively and stalls at idle in every condition			
[TROUBLESHOOTING HINTS] ① Incorrect idle speed <ul style="list-style-type: none"> • Idle speed misadjustment • Idle speed control malfunction ② Air/Fuel mixture too rich or lean <ul style="list-style-type: none"> • Injector clogged or inoperative • Low fuel line pressure • Low intake air amount or air leakage ③ Poor ignition spark			
STEP	INSPECTION	ACTION	
1	Check for correct intake manifold vacuum at idle Vacuum: More than 450 mmHg {17.7 inHg} VACUUM GAUGE 	Yes: Go to next step No: Check for air leakage of intake air system components ☞ page F-121	
	2	Check if air cleaner element is clean ☞ page F-100	Yes: Go to next step No: Replace air cleaner element ☞ page F-121
3	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ☞ page F-102 SELECT SW A MONITOR LAMP SYSTEM SELECT 1 49 B019 9A0  TEST SW SELF TEST 49 H018 9A1	Yes: Go to next step No: Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F-104 "88" flashes Check ECU terminal 1E voltage ☞ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker	
	4	Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON ☞ page F-118 SELECT SW A SYSTEM SELECT 1  TEST SW SELF TEST 49 H018 9A1 49 B019 9A0	Yes: Go to next step
			No: Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ page F-119 Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker

STEP	INSPECTION	ACTION	
5	Check if ECU terminal voltages are OK (1R, 1T, 2D, 2O and 2Q) ☞ page F-142	Yes	Go to next step
		No	Check for cause (Refer to "Check Point for Each Terminal") ☞ page F-144
6	Check if strong blue spark is visible at each disconnected high-tension lead while cranking engine 	Yes	Go to next step
		No	Check ignition system (Refer to Troubleshooting "Misfire") ☞ Section G
7	Check for fuel injector operating sound at each fuel injector at idle	Yes	Go to Step 9
		No	Go to next step
8	Check if battery voltage exists at fuel injector connector B terminal 	Yes	Check if fuel injector resistance is OK ☞ page F-127 Resistance: 12—16Ω ⇨ If OK, check wiring between ECU and fuel injector ⇨ If not OK, replace fuel injector
		No	Check wiring between ECU and fuel injector
9	Check if spark plugs are OK 	Yes	Go to next step
		No	Repair or replace ☞ Section G
10	Check for EGR system malfunction	Yes	Repair or replace
		No	Go to next step

STEP	INSPECTION	ACTION
11	<p>Connect diagnosis connector terminals F/P and GND with jumper wire and check for correct fuel line pressure with ignition switch ON.</p> <p>Fuel line pressure: 265—314 kPa (2.7—3.2 kgf/cm², 39—45 psi)</p> 	<p>Yes Go to next step</p> <p>No Low pressure Check fuel line pressure while pinching fuel return hose</p> <ul style="list-style-type: none"> ⇒ If fuel line pressure quickly increases, check pressure regulator ⇒ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator. If not clogged, check fuel pump maximum pressure
12	Try known good ECU and check if condition improves	


35A0FX-061

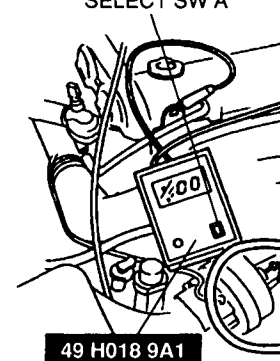
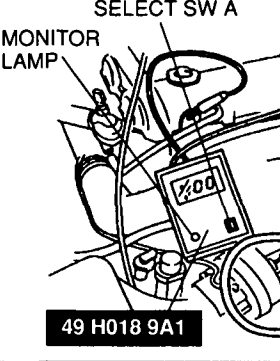
16 ENGINE STALLS AT IDLE — BEFORE WARM-UP

DESCRIPTION • Engine starts normally but vibrates excessively and stalls at idle before warm-up

[TROUBLESHOOTING HINTS]

- ① Low intake air amount
 - Air leakage of intake air system
 - Poor atomization of fuel
 - Low RVP (summer) fuel used in cold weather
- ② Air/Fuel mixture too lean
 - Idle speed control malfunction
 - Air cleaner element clogged

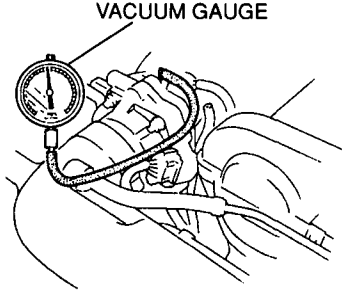
			ACTION
Diagnosis Check- page F-102 SELECT 1 TEST SW SELF TEST  49 B019 9A0	Yes	Go to next step	
	No		Service Code No. displayed Check for cause (Refer to specified check sequence) page F-104 "88" flashes Check ECU terminal 1E voltage page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
with Self- d ignition page F-118 TEM SELECT 1 49 B019 9A0 TEST SW SELF TEST	Yes	Go to next step	
	No		Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) page F-119 Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
OK	Yes	Go to next step	

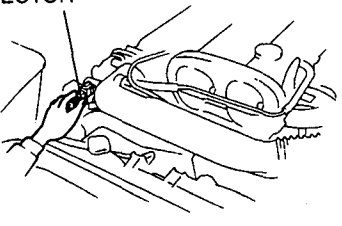
STEP	INSPECTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON  49 H018 9A1
2	Check switches for correct operation of Diagnosis Checker Monitor Lamp and switch ON  49 H018 9A1
3	Check if ECU terminal voltages are C (2D, 2O and 2Q) page F-142

Check for cause (Refer to "Check Point for Each Term" page F-144)

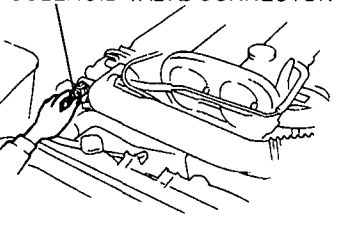
Go to next step

Check for air leakage of intake air system components page F-121

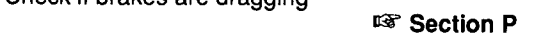
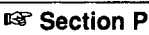
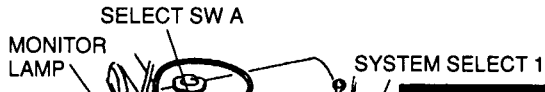

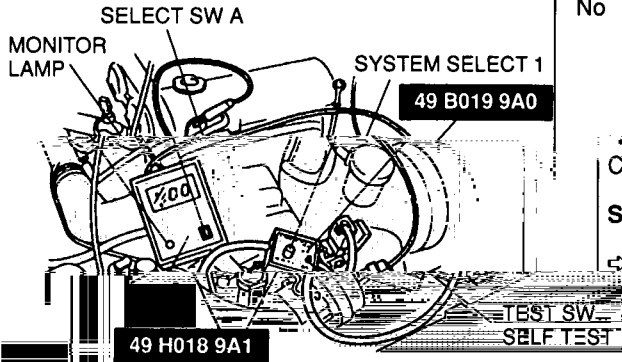

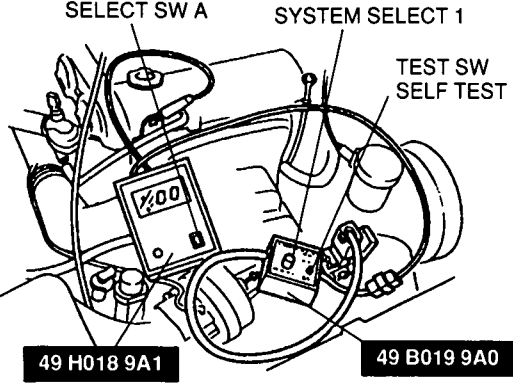

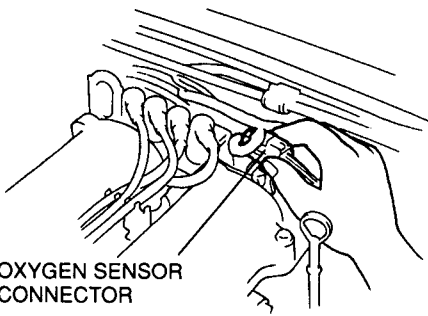
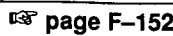
4	Check for correct intake manifold vacuum at idle Vacuum: More than 450 mmHg {17.7 inHg} 	No	Check
		Yes	Go to
		No	Check

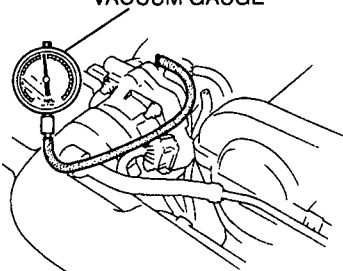
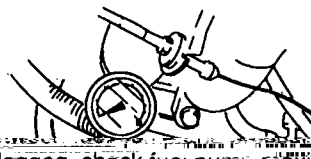
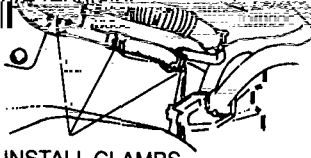
STEP	INSPECTION	ACTION	
5	Check if air cleaner element is clean ☞ page F-100	Yes	Go to next step
		No	Replace air cleaner element ☞ page F-121
6	Disconnect ISC solenoid valve connector when engine is cold and note idle speed Check if engine speed decreases after warm-up ISC SOLENOID VALVE CONNECTOR 	Yes	Go to next step
		No	Check ISC solenoid valve ☞ page F-123
7	Try known good ECU and check if condition improves	Yes	Replace ECU
		No	Change fuel to another brand

35A0FX-062

STEP	INSPECTION	ACTION	
17	ENGINE STALLS AT IDLE — AFTER WARM-UP		
DESCRIPTION • Engine runs normally at idle during warm-up but becomes rough and stalls after warm-up			
[TROUBLESHOOTING HINTS]			
① Air/Fuel mixture too lean		② Low intake air amount	
• Air leakage of intake air system		• Idle speed control malfunction	
1	Check if air is leaked from intake air system component ☞ page F-121	Yes	Repair or replace ☞ page F-121
		No	Go to next step
2	Disconnect ISC solenoid valve connector at idle and check if engine condition is changed ISC SOLENOID VALVE CONNECTOR 	Yes	Go to next step
		No	Check ISC solenoid valve ☞ page F-124
3	Go to troubleshooting No.10 "LOW IDLE SPEED/ROUGH IDLE—AFTER WARM-UP" ☞ page F-57		

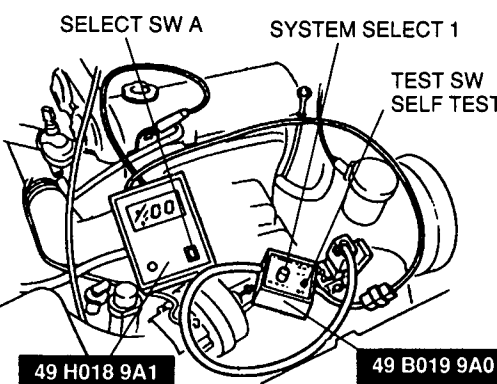
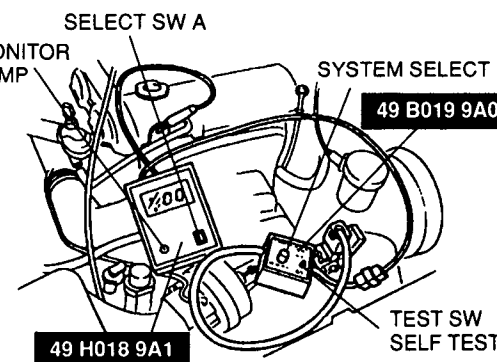
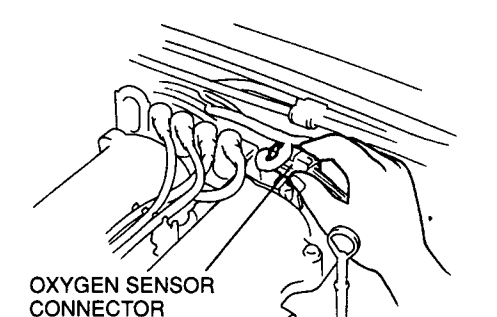
35A0FX-063

18	ENGINE STALLS DURING START-UP		
DESCRIPTION • Engine unexpectedly stops running while starting			
[TROUBLESHOOTING HINTS]			
① Misfire occurs when depressing accelerator <ul style="list-style-type: none"> • Air/Fuel mixture too rich or too lean • Incorrect ignition timing • Weak ignition 		② Lack of engine torque for start-up <ul style="list-style-type: none"> • Air/Fuel mixture too rich or too lean • Low intake air amount • Low engine compression 	
STEP	INSPECTION	ACTION	
1	Check if brakes are dragging 	Yes	Repair 
		No	Go to next step
2	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON 	Yes	Go to next step
		No	Service Code No. displayed Check for cause (Refer to specified check sequence) 
			Check ECU terminal 1E voltage 
			Specification: Battery voltage (Ignition switch ON) If OK, replace ECU. If not OK, check wiring between ECU and Self-Diagnosis Checker.
3	Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON 	Yes	Go to next step
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) 
			Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
4	Disconnect oxygen sensor connector and check if condition improves 	Yes	Check oxygen sensor 
		No	Go to next step

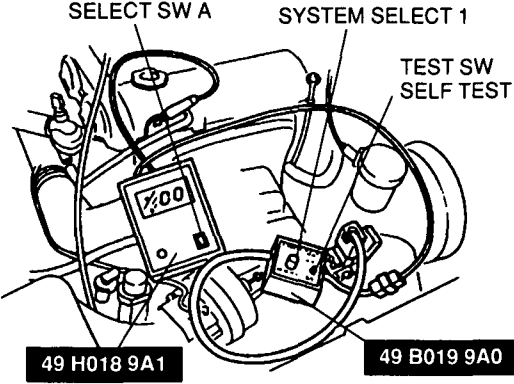
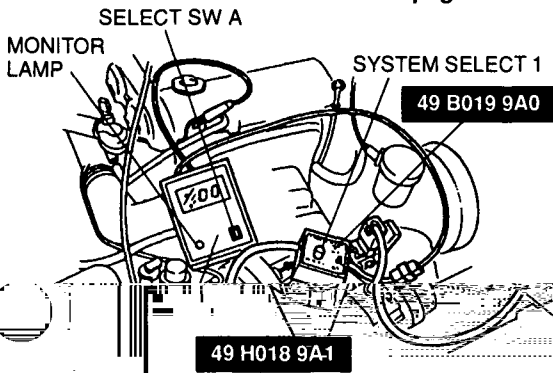
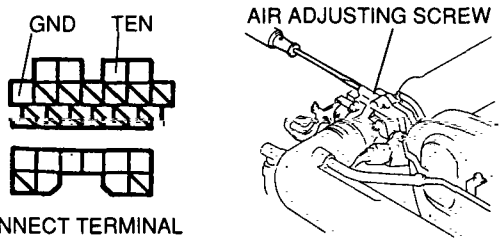
STEP	INSPECTION	ACTION	
5	Check if ECU terminal voltages are OK (2M, 2O and 2Q) ☞ page F-142	Yes	Go to next step
		No	Check for loose, Bent or "Check Point for Each Terminal". ☞ page F-144
6	Check if throttle linkage is correctly installed and operates freely	Yes	Go to next step
		No	Correct, clean, or replace as required any binding or damaged linkage and adjust cable deflection at throttle body
7	Check for correct intake manifold vacuum at idle Vacuum: More than 450 mmHg (17.7 inHg) VACUUM GAUGE 	Yes	Go to next step
		No	Check for air leakage of intake air system components ☞ page F-121
8	Check if air cleaner element is clean ☞ page F-100	Yes	Go to next step
		No	Replace air cleaner element ☞ page F-121
9	Check for correct ignition timing at idle ☞ page F-100 Ignition timing: BTDC 9°—11° (10° ± 1°)	Yes	Check if ignition timing advances when accelerating ⇨ If advances, go to next step ⇨ If no advance, replace PCME
		No	Adjust ignition timing ☞ page F-100
10	Check for correct fuel line pressure at idle Fuel line pressure: 265—314 kPa (2.7—3.2 kgf/cm², 38—46 psi) (Vacuum hose to pressure regulator disconnected) 	Yes	Check if fuel line pressure decreases when accelerating quickly ⇨ If decreases, check fuel pump maximum pressure ⇨ If OK, check fuel line and filter for clogging
		No	Low pressure Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure
	High pressure Check if fuel return line is clogged ⇨ If OK, replace pressure regulator ⇨ If not OK, replace		 INSTALL CLAMPS
on B	Yes	Go to next step	
pm	No	Check engine condition ☞ Section B <ul style="list-style-type: none"> • Worn piston, piston rings or cylinder wall • Defective cylinder head gasket • Distorted cylinder head • Improper valve seating • Valve sticking in guide 	
im-			
		11	Check for correct engine compression ☞ Section B Engine compression: 1,255—883 kPa (12.8—9.0 kgf/cm², 182—128 psi)—300
		12	Try known good ECU and check if condition proves

TROUBLESHOOTING GUIDE

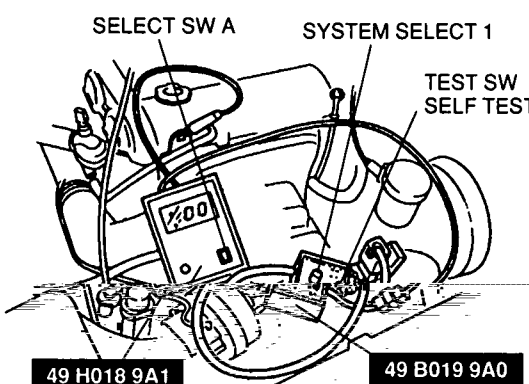
F

ENGINE STALLS ON DECELERATION	
SYMPTOM • Engine unexpectedly stops running while decelerating or after deceleration	
[TROUBLESHOOTING HINTS] • Speed drops too much when releasing accelerator • Idle speed control malfunction • Throttle cut control malfunction	
③ Engine feedback control malfunction ④ Idle speed misadjustment	
INSPECTION	ACTION
Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON <div style="text-align: right;">☞ page F-102</div>	Yes: Go to next step No: Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F-104 "88" flashes Check ECU terminal 1E voltage ☞ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
	
Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON <div style="text-align: right;">☞ page F-118</div>	Yes: Go to next step No: Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ page F-119 Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
	
Disconnect oxygen sensor connector and check if condition improves	Yes: Check oxygen sensor ☞ page F-152 No: Go to next step
	
Check if ECU terminal voltages are OK (2D, 2O, 2U, 2V 2Q, 2Y and 2Z) ☞ page F-142	Yes: Go to next step No: Check for cause (Refer to "Check Point for Each Terminal") ☞ page F-144

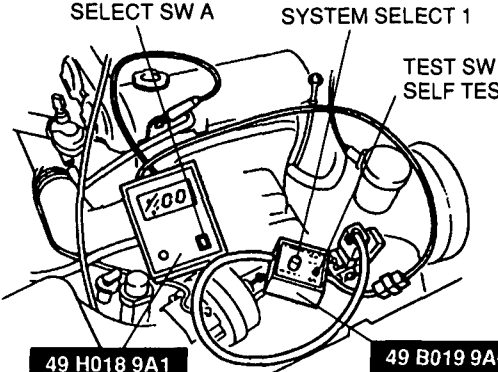
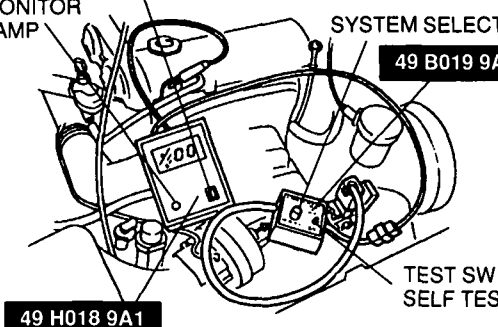
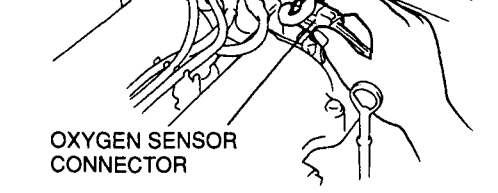
STEP	DESCRIPTION
1	Engine s ① Idle s ② Fuel
2	C D S
3	D C
4	C (

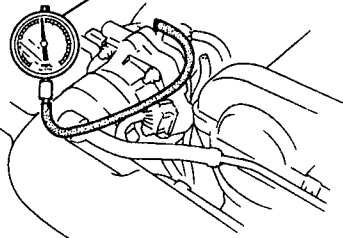
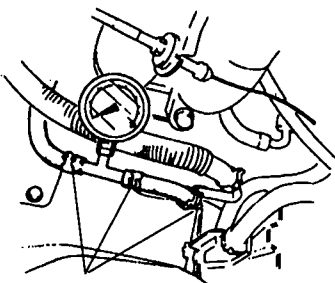
20	ENGINE STALLS AT IDLE — WHEN A/C, P/S, OR E/L ON		
DESCRIPTION	<ul style="list-style-type: none"> • Engine unexpectedly stops running at idle when A/C, P/S, or E/L ON • A/C, P/S, headlight, blower fan and electric cooling fan OK 		
[TROUBLESHOOTING HINTS]			
① Idle speed control malfunction <ul style="list-style-type: none"> • No input signal from switch • Idle speed misadjustment • ISC solenoid valve stuck 			
STEP	INSPECTION	YES	ACTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ☞ page F-102 	Yes	Go to next step
		No	Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F-104 "88" flashes Check ECU terminal 1E voltage ☞ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ page F-119 Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
2	Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON ☞ page F-118 	Yes	Go to next step
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ page F-119 Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
3	Check if ECU terminal voltages are OK (1G, 1P, 1U, 2D, 2Q and 2W) ☞ page F-141, 142	Yes	Go to next step
4	Check for correct idle speed ☞ page F-101 Idle speed: 800—900 (850 ± 50) rpm 	Yes	Go to next step
1		No	Adjust ☞ page F-10

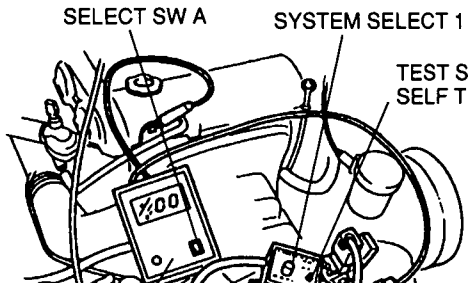

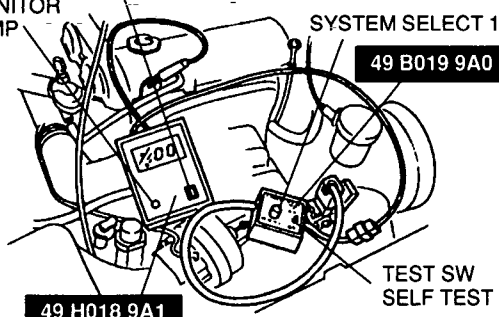
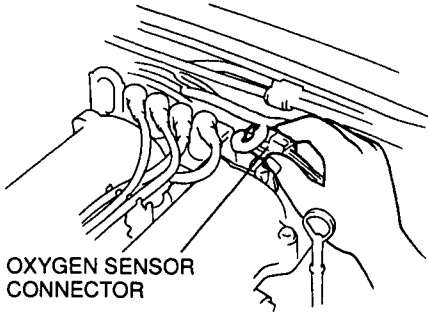


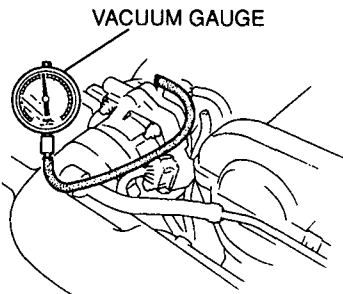
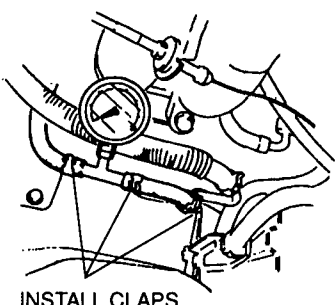
21	ENGINE STALLS SUDDENLY (INTERMITTENT)	
DESCRIPTION	<ul style="list-style-type: none"> • Engine intermittently stops running • Before stalling, engine condition OK 	
[TROUBLESHOOTING HINTS]		
① Intermittently no spark or no fuel injection <ul style="list-style-type: none"> • Poor connection in wiring harness 		
STEP	INSPECTION	ACTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ☞ page F-102 	Yes: Go to next step No: Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F-104 When checking wiring harness and connectors, tap, move, and wiggle suspect sensor and/or harness to recreate problem "88" flashes Check ECU terminal 1E voltage ☞ page F-141 Specification: Battery voltage (Ignition switch ON) ☞ If OK, replace ECU ! ☞ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Tap, move, and wiggle harness and connectors to check if ECU terminal voltages are OK (1B, 2A, 2B and 2C) ☞ page F-141, 142	Yes: Go to Troubleshooting No.2 "CRANKS NORMALLY BUT WILL NOT START (NO COMBUSTION)" ☞ page F-43 No: Check for cause (Refer to "Check Point for Each Terminal") ☞ page F-144

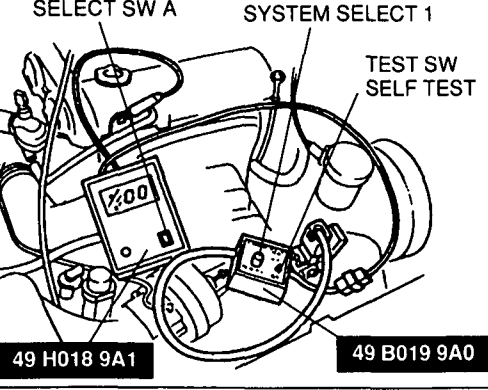
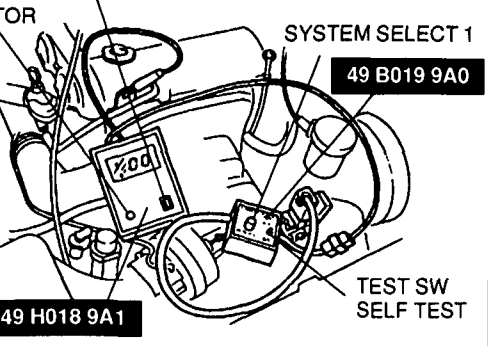
35A0FX-067

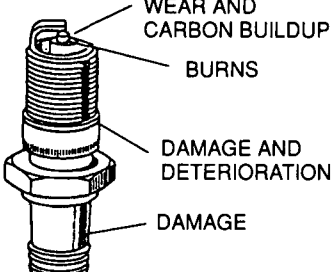
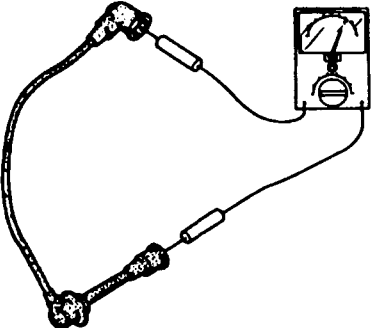
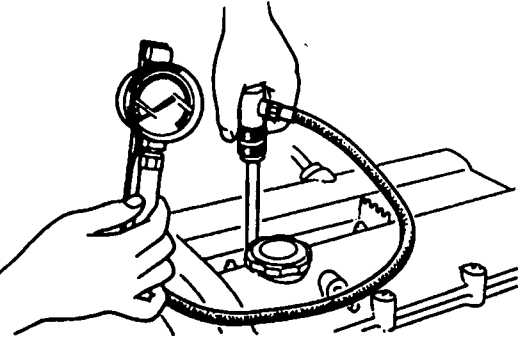
22	HESITATES/STUMBLES ON ACCELERATION	
DESCRIPTION • Flat spot occurs just after accelerator depressed or mild jerking occurs during acceleration		
[TROUBLESHOOTING HINTS] ① Air/Fuel mixture leaning when depressing accelerator <ul style="list-style-type: none"> • Fuel injection control malfunction (Correction for accelerating condition) • Air leakage of intake air system • Fuel line pressure low • Spark advance control malfunction 		
STEP	INSPECTION	ACTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ☞ page F-102	Yes Go to next step
		No Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F-104 "88" flashes Check ECU terminal 1E voltage ☞ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
	2	Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON ☞ page F-118
		No Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ page F-119 Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
3	Disconnect oxygen sensor connector and check if condition improves	Yes Check oxygen sensor ☞ page F-152
		No Go to next step
4	Check if ECU terminal voltages are OK (2M, 2O, and 2Q) ☞ page F-142	Yes Go to next step
		No Check for cause (Refer to "Check Point for Each Terminal") ☞ page F-144

STEP	INSPECTION		ACTION
5	Check if throttle linkage is correctly installed and operates freely	Yes	Go to next step
		No	Correct, clean, or replace as required any binding or damaged linkage and adjust cable deflection at throttle body
6	Check if air duct and air hoses are correctly installed ☞ page F-121	Yes	Go to next step
		No	Repair ☞ page F-121
7	Check for correct intake manifold vacuum at idle Vacuum: More than 450 mmHg {17.7 inHg} VACUUM GAUGE 	Yes	Go to next step
		No	Check for air leakage of intake air system components ☞ page F-121
8	Check if air cleaner element is clean ☞ page F-100	Yes	Go to next step
		No	Replace air cleaner element ☞ page F-121
9	Check for correct ignition timing at idle ☞ page F-100 Ignition timing: BTDC 9°—11° (10° ± 1°)	Yes	Check if ignition timing advances when accelerating ⇒ If advances, go to next step ⇒ If no advance, replace ECU
		No	Adjust ignition timing ☞ page F-100
10	Check for correct fuel line pressure at idle Fuel line pressure: 265—314 kPa {2.7—3.2 kgf/cm², 38—46 psi} (Vacuum hose to pressure regulator disconnected)  INSTALL CLAPS	Yes	Check if fuel line pressure decreases when accelerating quickly ⇒ If decreases, check fuel line and filter for clogging ⇒ If no decrease, go to next step
		No	Low pressure Check fuel line pressure while pinching fuel return hose ⇒ If fuel line pressure quickly increases, check pressure regulator ⇒ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure
11	Check for EGR system malfunction ☞ page F-131	Yes	Repair or replace
		No	Go to next step
12	Check if exhaust system is restricted ☞ page F-134	Yes	Repair or replace
		No	Go to next step
13	Try known good ECU and check if condition improves		

23	SURGES WHILE CRUISING		
DESCRIPTION • Unexpected change in engine speed which is usually repetitive			
[TROUBLESHOOTING HINTS] ① Air/Fuel mixture too lean or too rich <ul style="list-style-type: none"> • Fuel injection control malfunction • Air leakage of intake air system • Fuel line pressure low • Fuel evaporative malfunction • Spark advance control malfunction 			
STEP	INSPECTION		ACTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ↳ page F-102 	Yes: Go to next step No: Service Code No. displayed Check for cause (Refer to specified check sequence) ↳ page F-104 "88" flashes Check ECU terminal 1E voltage ↳ page F-141 Specification: Battery voltage (Ignition switch ON) ↳ If OK, replace ECU	
wiring between ECU and Self-Diagnosis			
			
49 H018 9A1 49 B019 9A0			
2 Check switches for correct operation with Self-Diagnosis Checker, Monitor Lamp and ignition switch ON ↳ page F-118			
F with specified switch Refer to specified check sequence) ↳ page F-119	SELECT SW A MONITOR LAMP SYSTEM SELECT 1 	Yes: Go to next step No: Lamp not ON/OFF Check for cause (Refer to specified check sequence)	Lamp always ON Check wiring between Self-Diagnosis Checker and ECU terminal 1D and Self-Diagnosis Checker terminal 1D
wiring between ECU terminal 1D and Self-Diagnosis Checker terminal 1D			
↳ page F-152			
3	Disconnect oxygen sensor connector and check if condition improves	Yes: Check oxygen sensor condition	
			
OXYGEN SENSOR CONNECTOR			
4	Check if ECU terminal voltages are OK (1R, 1T, 2M, 2O, and 2Q) ↳ page F-142	Yes: Go to next step	
Refer to "Check Point for Each Terminal" ↳ page F-145			
No: Check for cause (Refer to specified check sequence)			

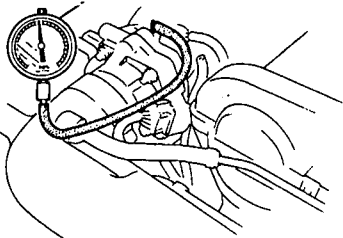
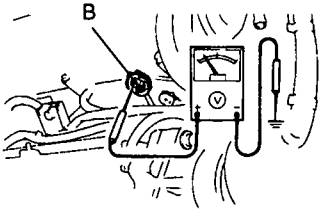
STEP	INSPECTION		ACTION
5	Check if throttle linkage is correctly installed and operates freely	Yes	Go to next step
		No	Correct, clean, or replace as required any binding or damaged linkage and adjust cable deflection at throttle body
6	Check for correct intake manifold vacuum at idle Vacuum: More than 450 mmHg (17.7 inHg) 	Yes	Go to next step
		No	Check for air leakage of intake air system components ☞ page F-121
7	Check if air cleaner element is clean ☞ page F-100	Yes	Go to next step
		No	Replace air cleaner element ☞ page F-121
8	Check for correct ignition timing at idle ☞ page F-100 Ignition timing: BTDC 9°—11° (10° ± 1°)	Yes	Check if ignition timing advances when accelerating ⇨ If advances, go to next step ⇨ If no advance, replace ECU
		No	Adjust ignition timing ☞ page F-100
9	Check for correct fuel line pressure at idle Fuel line pressure: 265—314 kPa (2.7—3.2 kgf/cm², 38—46 psi) (Vacuum hose to pressure regulator disconnected) 	Yes	Check if fuel line pressure decreases when accelerating quickly ⇨ If decreases, check fuel line and filter for clogging ⇨ If no decrease, go to next step
		No	Low pressure Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure
10	Check for EGR system malfunction ☞ page F-131	Yes	Repair or replace
		No	Go to next step
11	Check if exhaust system is restricted ☞ page F-134	Yes	Repair or replace
		No	Go to next step
12	Try known good ECU and check if condition improves		

24	LACK OF POWER		
DESCRIPTION	<ul style="list-style-type: none"> • Performance poor under load • Reduced maximum speed 		
[TROUBLESHOOTING HINTS] <ul style="list-style-type: none"> ① Factors other than engine malfunction <ul style="list-style-type: none"> • Clutch slipping • Brake dragging • Low tire pressure • Unrecommended tire size • Overloaded ② Low intake air amount <ul style="list-style-type: none"> • Throttle valve not open fully • Clogged intake air system ③ Air/Fuel mixture too lean or too rich <ul style="list-style-type: none"> • Fuel line pressure low or high • Insufficient fuel injection ④ Poor ignition ⑤ Low engine compression 			
STEP	INSPECTION	ACTION	
1	Check factors other than engine <ul style="list-style-type: none"> • Clutch slipping 	Yes	Go to next step
Brake dragging Low tire pressure Unrecommended tire size Section Q Section Q			
Check if throttle valve fully opens when depressing accelerator fully		Yes	Go to next step
Check if "00" is displayed on Self-Diagnosis Checker when ignition switch ON		Yes	Go to next step
		No	Service Code No. displayed Check for cause (Refer to specified check sequence) page F-104
Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition ON		Yes	Go to next step
		No	"88" flashes Check ECU terminal 1E voltage page F-141 Specification: Battery voltage (Ignition switch ON) If OK, replace ECU If not OK, check wiring between ECU and Self-Diagnosis Checker
Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) page F-119		No	Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker

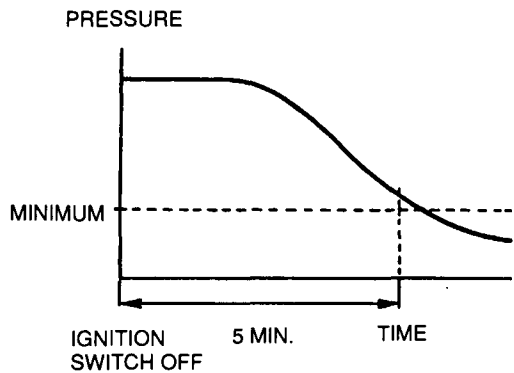
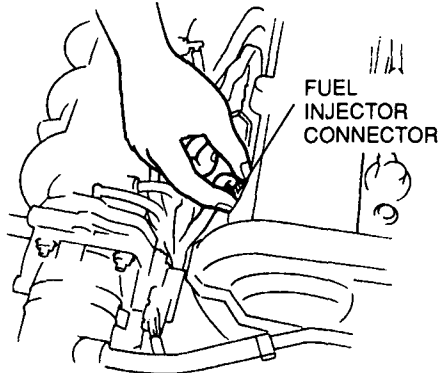
STEP	INSPECTION		ACTION
5	Check for correct ignition timing at idle ☞ page F-100 Ignition timing: BTDC 9°—11° (10° ± 1°)	Yes	Check if ignition timing advances when accelerating ⇨ If advances, go to next step ⇨ If no advance, replace ECU
		No	Adjust ignition timing ☞ page F-100
6	Check if spark plugs are OK 	Yes	Go to next step
		No	Repair, clean, or replace spark plugs ☞ Section G
7	Check if resistance of high-tension leads are OK Resistance: 16 kΩ per 1m {3.28 ft} 	Yes	Go to next step
		No	Replace high-tension leads ☞ Section G
8	Check if resistance of ignition coil is OK ☞ Section G Resistance (at 20°C {68°F}): Secondary coil ... 8.7—12.9 kΩ	Yes	Go to next step
		No	Replace ignition coil ☞ Section G
9	Check for correct engine compression ☞ Section B Engine compression: 1,255—883 kPa {12.8—9.0 kgf/cm ² , 182—128 psi}—300 rpm 	Yes	Go to next step
		No	Check engine condition ☞ Section B <ul style="list-style-type: none"> • Worn piston, piston rings or cylinder wall • Defective cylinder head gasket • Distorted cylinder head • Improper valve seating • Valve sticking in guide

F

TROUBLESHOOTING GUIDE

STEP	INSPECTION		ACTION
10	Check for correct intake manifold vacuum at idle Vacuum: More than 450 mmHg {17.7 inHg} VACUUM GAUGE 	Yes	Go to next step
		No	Check for air leakage of intake air system components ☞ page F-121
11	Check if air cleaner element is clean ☞ page F-100	Yes	Go to next step
		No	Replace air cleaner element ☞ page F-121
12	Check for fuel injector operating sound at idle	Yes	Go to Step 14
		No	Go to next step
13	Check if battery voltage exists at fuel injector connector B terminal 	Yes	Check if fuel injector resistance is OK ☞ page F-127 Resistance: 12—16Ω ⇨ If OK, check wiring between ECU and fuel injector ⇨ If not OK, check fuel injector for fuel leakage ☞ page F-128
		No	Check wiring between ECU and fuel injector
14	Check if ECU terminal voltages are OK	Yes	Go to next step

TROUBLESHOOTING GUIDE

STEP	INSPECTION		ACTION
16	Run engine at idle and check if fuel line pressure is held after ignition switch turned OFF Fuel line pressure: More than 147 kPa {1.5 kgf/cm ² , 21 psi} for 5 min. 	Yes	High pressure Check if vacuum hose to pressure regulator is damaged or poorly connected ⇨ If OK, replace pressure regulator ⇨ If not OK, repair or replace hose
		No	Check fuel injector for fuel leakage ☞ page F-128
17	Disconnect each fuel injector connector at idle and check if engine speed decreases equally each time 	Yes	Go to next step
		No	Replace fuel injector ☞ page F-127
18	Try known good ECU and check if condition improves		

35A0FX-070

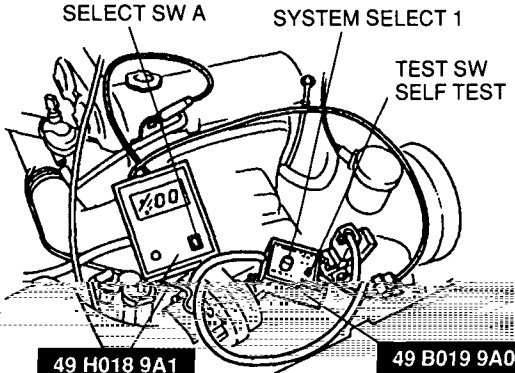
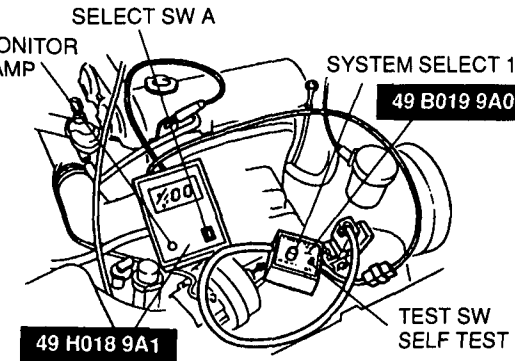
25 POOR ACCELERATION

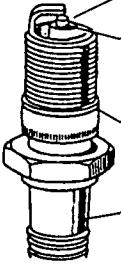
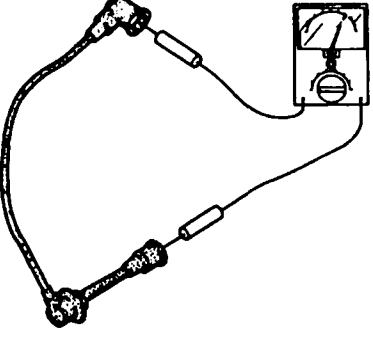
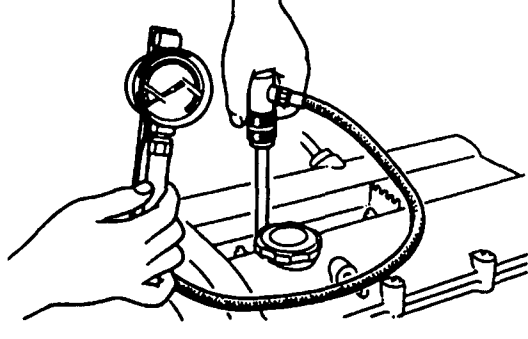
DESCRIPTION • Performance poor while accelerating

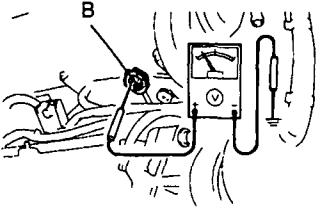
[TROUBLESHOOTING HINTS]

- ① Factors other than engine malfunction
 - Clutch slipping
 - Brake dragging
- ② Air/Fuel mixture too lean or too rich
 - Fuel line pressure low or high
 - Insufficient fuel injection
- ④ Poor ignition
- ⑤ Low engine compression

Low tire pressure
 Unrecommended tire size
 Overloaded
 Low intake air amount
 Throttle valve not open fully
 Clogged intake air system

INSPECTION		ACTION	STEP
Check factors other than engine <ul style="list-style-type: none"> • Clutch slipping • Brake dragging • Low tire pressure • Unrecommended tire size 	Yes No	Go to next step Repair	1
Check if throttle valve fully opens when depressing accelerator fully	Yes No	Go to next step Check if accelerator cable is correctly installed ⇨ If OK, check throttle body ⇨ If not OK, install accelerator cable correctly	2
Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ⇨ page F-102 	Yes No	Go to next step Service Code No. displayed Check for cause (Refer to specified check sequence) ⇨ page F-104 "88" flashes Check ECU terminal 1E voltage ⇨ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker	3
Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON ⇨ page F-118 	Yes No	Go to next step Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ⇨ page F-119 Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker	4
Check for correct ignition timing at idle ⇨ page F-100 Ignition timing: BTDC 9°—11° (10° ± 1°)	Yes No	Check if ignition timing advances when accelerating ⇨ If advances, go to next step ⇨ If no advance, replace ECU Adjust ignition timing ⇨ page F-100	5

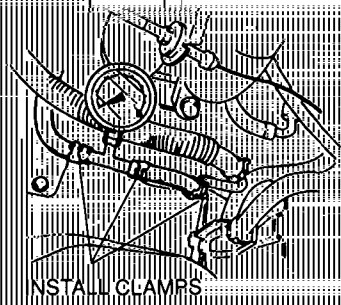
STEP	INSPECTION		ACTION
6	<p>Check if spark plugs are OK</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>PLUG GAP 1.0—1.1mm {0.040—0.043 in}</p> </div>  </div>	Yes	Go to next step
		No	Repair, clean, or replace spark plugs ➤ Section G
7	<p>Check if resistance of high-tension leads are OK</p> <p>Resistance: 16 kΩ per 1m {3.28 ft}</p> 	Yes	Go to next step
		No	Replace high-tension leads ➤ Section G
8	<p>Check if resistance of ignition coil is OK ➤ Section G</p> <p>Resistance (at 20°C {68°F}): Secondary coil ... 8.7—12.9 kΩ</p>	Yes	Go to next step
		No	Replace ignition coil ➤ Section G
9	<p>Check for correct engine compression ➤ Section B</p> <p>Engine compression: 1,255—883 kPa {12.8—9.0 kgf/cm², 182—128 psi}—300 rpm</p> 	Yes	Go to next step
		No	<p>Check engine condition ➤ Section B</p> <ul style="list-style-type: none"> • Worn piston, piston rings or cylinder wall • Defective cylinder head gasket • Distorted cylinder head • Improper valve seating • Valve sticking in guide
10	<p>Check for correct intake manifold vacuum at idle</p> <p>Vacuum: More than 450 mmHg {17.7 inHg}</p>	Yes	Go to next step
		No	Check for air leakage of intake air system components
11	<p>Check if air cleaner element is clean ➤ page F-100</p>	Yes	Go to next step
		No	Replace air cleaner element ➤ page F-121
12	<p>Check for EGR system malfunction ➤ page F-131</p>	Yes	Repair or replace
		No	Go to next step

STEP	INSPECTION	ACTION	
13	Check for fuel injector operating sound at idle	Yes	Go to Step 15
		No	Go to next step
14	Check if battery voltage exists at fuel injector connector B terminal 	Yes	Check if fuel injector resistance is OK page F-127 Resistance: Approx. 12—16Ω ⇨ If OK, check wiring between ECU and fuel injector ⇨ If not OK, check fuel injector for fuel leakage page F-128
		No	Check wiring between ECU and fuel injector
15	Check if ECU terminal voltages are OK (1B, 1T, 2D, 2O and 2Q) page F-142	Yes	Go to next step
		No	Check for cause (Refer to "Check Point for Each Terminal") page F-144
16	Check for correct fuel line pressure at idle Fuel line pressure: 265—314 kPa {2.7—3.2 kgf/cm², 38—46 psi} (Vacuum hose to pressure regulator disconnected)	Yes	Check if fuel line pressure decreases when accelerating quickly ⇨ If decreases, check fuel pump maximum pressure If OK, check fuel line and filter for clogging ⇨ If no decreases, go to next step

pressure while pinching fuel return hose
 pressure quickly increases, check pressure
 pressure gradually increases, check for clog
 in fuel pump and pressure regulator
 ed, check fuel pump maximum pressure

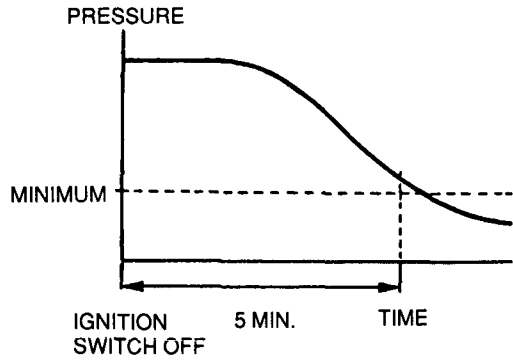
im hose to pressure regulator is damaged
 ected
 ce pressure regulator
 epair or replace hose

ector for fuel leakage **page F-128**



17. Run engine at idle and check if fuel line pressure is held after ignition switch turned OFF

Fuel line pressure:
More than 147 kPa {1.5 kgf/cm², 21 psi} for 5 min.



No **Low pressure**
 Check fuel line

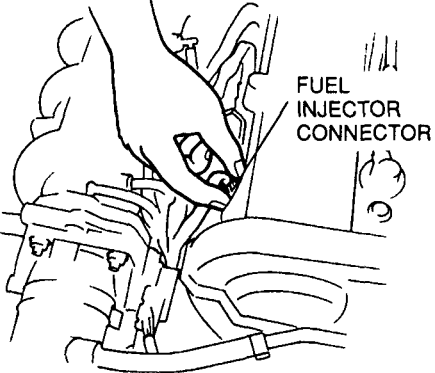
 ⇨ If fuel line
 regulator
 ⇨ If fuel line p
 ging between
 If not clogg

Yes **High pressure**
 Check if vacu
 or poorly conn

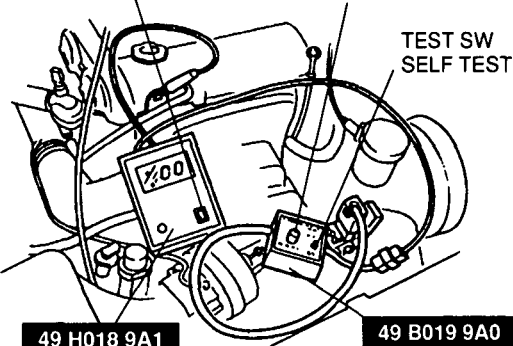
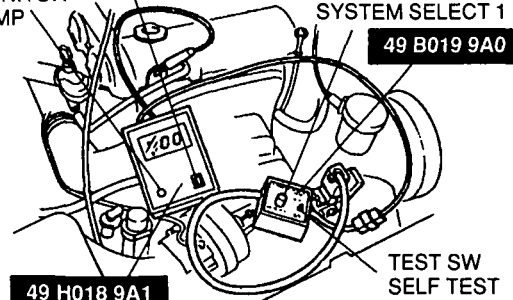
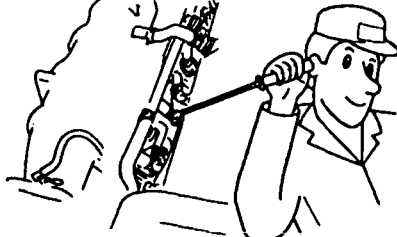
No Check fuel inj

TROUBLESHOOTING GUIDE

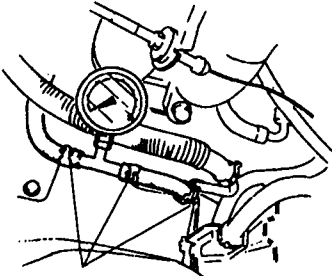
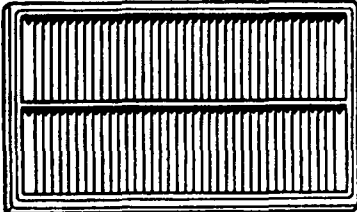
F

STEP	INSPECTION	ACTION	
18	Disconnect each fuel injector connector at idle and check if engine speed decreases equally each time 	Yes	Go to next step
		No	Replace fuel injector 🔍 page F-127
19	Try known good ECU and check if condition improves		

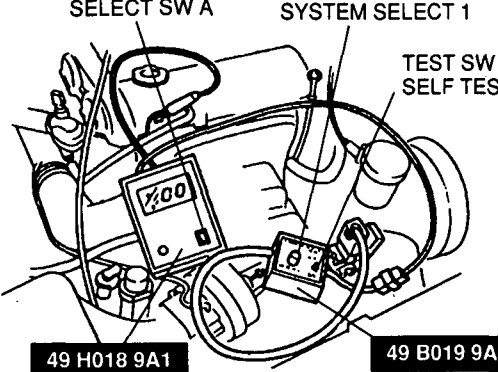
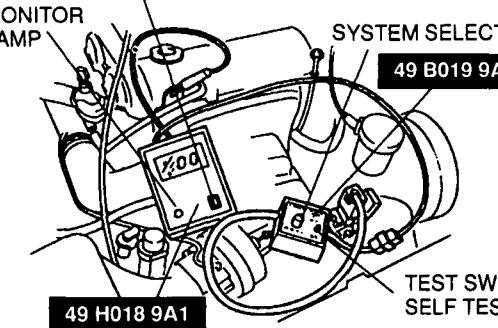
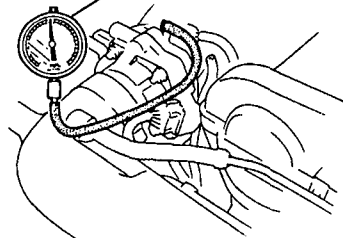
35A0FX-071

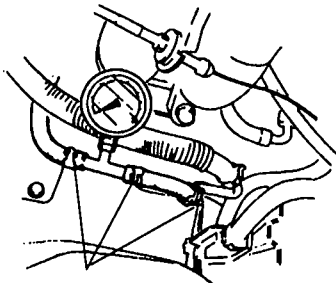
26	RUNS ROUGH ON DECELERATION/AFTERBURN		
DESCRIPTION • Engine runs rough while decelerating and abnormal combustion occurs in exhaust system			
[TROUBLESHOOTING HINTS] ① Air/Fuel mixture too rich <ul style="list-style-type: none"> • Air cleaner element clogged • Fuel injection control malfunction (Fuel cut control) • Fuel injector fuel leakage • Ignition timing misadjustment 			
STEP	INSPECTION		ACTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ☞ page F-102	Yes	Go to next step
	 <p>SELECT SW A SYSTEM SELECT 1 TEST SW SELF TEST</p> <p>49 H018 9A1 49 B019 9A0</p>	No	Service Code No. displayed Check for cause (Refer to specified check sequence) ☞ page F-104
			"88" flashes Check ECU terminal 1E voltage ☞ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON ☞ page F-118	Yes	Go to next step
	 <p>SELECT SW A MONITOR LAMP SYSTEM SELECT 1 TEST SW SELF TEST</p> <p>49 H018 9A1 49 B019 9A0</p>	No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ☞ page F-119
		Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker	
3	Check for correct ignition timing at idle ☞ page F-100 Ignition timing: BTDC 9°—11° (10° ± 1°)	Yes	Go to next step
		No	Adjust ignition timing ☞ page F-100
4	Check if fuel cut operation is OK during deceleration Fuel cut: Above 1,900 rpm after warm-up	Yes	Go to next step
		No	Try known good ECU

TROUBLESHOOTING GUIDE

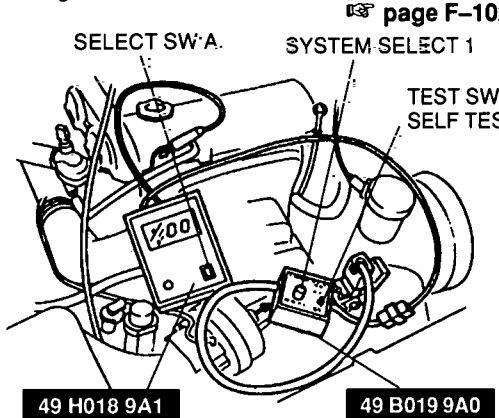
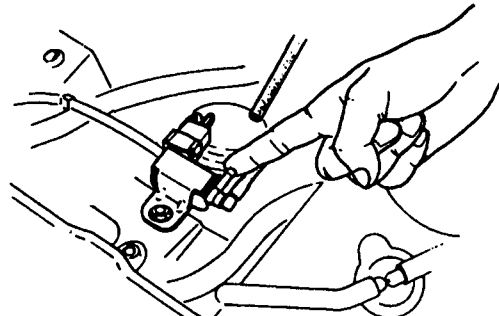
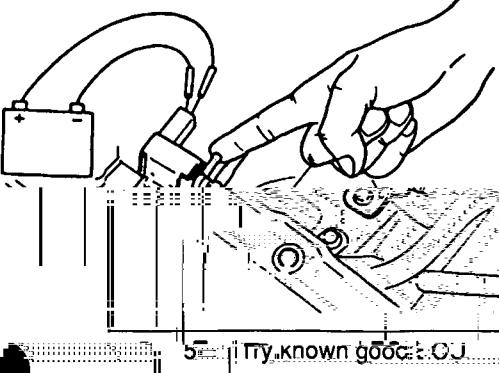
STEP	INSPECTION		ACTION
5	Run engine at idle and check if fuel line pressure is held after ignition switch turned OFF Fuel line pressure: More than 147 kPa {1.5 kgf/cm ² , 21 psi} for 5 min.  <p style="text-align: center;">INSTALL CLAMPS</p>	Yes	Go to next step
		No	Check fuel injector for fuel leakage page F-128
6	Check if air cleaner element is clean page F-100 	Yes	Go to next step
		No	Replace air cleaner element page F-121
7	Try known good ECU and check if condition improves		

35A0FX-072

27	KNOCKING		
[TROUBLESHOOTING HINTS]			
① Air/Fuel mixture too lean <ul style="list-style-type: none"> • Fuel injection amount incorrect • Fuel line pressure decreases while accelerating ② Incorrect ignition timing (too advance) ③ Overheating ④ Carbon deposits in engine			
STEP	INSPECTION		ACTION
1	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON ↳ page F-102	Yes	Go to next step
		No	Service Code No. displayed Check for cause (Refer to specified check sequence) ↳ page F-104 "88" flashes Check ECU terminal 1E voltage ↳ page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
2	Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON ↳ page F-118	Yes	Go to next step
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) ↳ page F-119 Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker
3	Check if ECU terminal voltages are OK (1R, 1T, 2D, 2O, and 2Q) ↳ page F-142	Yes	Go to next step
		No	Check for cause (Refer to "Check Point for Each Terminal") ↳ page F-144
4	Check for correct intake manifold vacuum at idle Vacuum: More than 450 mmHg {17.7 inHg} VACUUM GAUGE	Yes	Go to next step
		No	Check for air leakage of intake air system components ↳ page F-121
5	Check if air cleaner element is clean ↳ page F-100	Yes	Go to next step
		No	Replace air cleaner element ↳ page F-121

STEP	INSPECTION		ACTION
6	Check for correct fuel line pressure at idle ☞ Section B Engine compression: 1,255—883 kPa (12.8—9.0 kgf/cm², 182—128 psi)—300 rpm	Yes	Go to next step
		No	High compression Check engine condition ☞ Section B • Carbon deposits
7	Check for correct fuel line pressure at idle Fuel line pressure: 265—314 kPa (2.7—3.2 kgf/cm², 38—46 psi) (Vacuum hose to pressure regulator disconnected)  INSTALL CLAMPS	Yes	Check if fuel line pressure decreases when accelerating quickly ⇨ If decreases, check for clogging between fuel pump and pressure regulator ⇨ If no decrease, go to next step
		No	Low pressure Check fuel line pressure while pinching fuel return hose ⇨ If fuel line pressure quickly increases, check pressure regulator ⇨ If fuel line pressure gradually increases, check for clogging between fuel pump and pressure regulator If not clogged, check fuel pump maximum pressure
8	Check for correct ignition timing at idle ☞ page F-100 Ignition timing: BTDC 9°—11° (10° ± 1°)	Yes	Check if ignition timing advances when accelerating ⇨ If advances, go to next step ⇨ If no advance, replace ECU
		No	Adjust ignition timing ☞ page F-100
9	Check for EGR system malfunction ☞ page F-131	Yes	Repair or replace
		No	Go to next step
10	Check if cooling system is OK ☞ Section E	Yes	Go to next step
		No	Repair or replace • Thermostat ☞ Section E • Electric cooling fan ☞ Section B • Radiator ☞ Section E
11	Try known good ECU and check if condition improves	Yes	Replace ECU
		No	Change fuel to another brand or use higher octane fuel

35A0FX-073

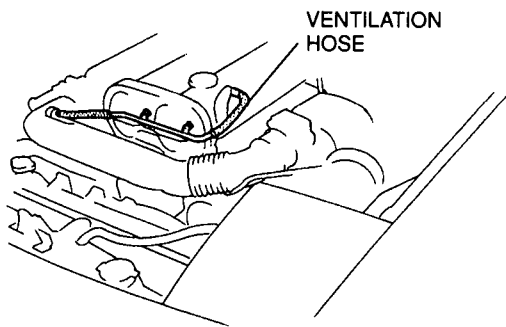
28	FUEL ODOR	
DESCRIPTION • Gasoline odor in cabin		
[TROUBLESHOOTING HINTS] ① Poor connection or damaged fuel system or fuel evaporative system ② Charcoal canister overflow due to fuel evaporative system malfunction		
STEP	INSPECTION	ACTION
1	Check if fuel leak or damage are visible at fuel system and fuel evaporative system	Yes Repair or replace No Go to next step
2	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON. 	Yes Go to next step No Service Code No. displayed Check for cause (Refer to specified check sequence): page F-104 "88" flashes Check ECU terminal 1E voltage page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker
3	Check if vacuum is felt at purge solenoid valve with engine running and throttle valve opened (Neutral switch connector disconnected) 	Yes Go to Step 5 No Check for purge solenoid valve operating sound in this condition ⇨ If OK, check vacuum hoses for clogging ⇨ If not OK, go to next step
4	Apply battery voltage and ground to purge solenoid valve and check if air flows through valve 	Yes Check ECU terminal 2X voltage page F-143 No Replace purge solenoid valve

TROUBLESHOOTING GUIDE

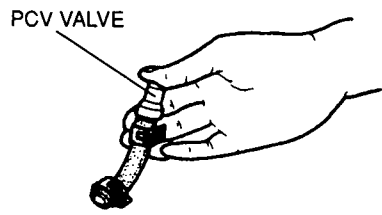
F

29	EXHAUST SULFUR SMELL	
DESCRIPTION • Exhaust gas smells abnormal (Rotten egg smell)		
[TROUBLESHOOTING HINTS] High sulfur content fuel used		
STEP	INSPECTION	ACTION
1	Change fuel to another brand	

35A0FX-075

30	HIGH OIL CONSUMPTION		
[TROUBLESHOOTING HINTS] ① PCV system malfunction ② Engine malfunction (Oil working up, working down, or leakage)			
STEP	INSPECTION	ACTION	
1	Check if PCV hose, ventilation hose or their attaching nipples are separated, damaged, clogged, or restricted	Yes	Repair or replace
		No	Go to next step
2	Check if air pressure or oil is present at ventilation hose 	Yes	Go to next step
		No	Check engine condition <ul style="list-style-type: none"> • Oil leakage • Worn valve seal • Worn valve stem • Worn valve guide

Section B

		Yes	Check engine condition <ul style="list-style-type: none"> • Worn piston ring groove • Stuck piston ring • Worn piston or cylinder
		No	Replace PCV valve

35A0FX-076

31 POOR FUEL ECONOMY

[TROUBLESHOOTING HINTS]

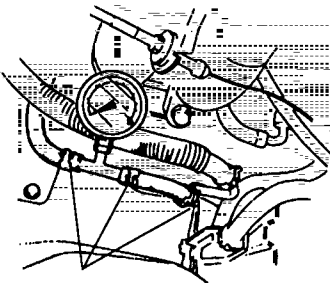
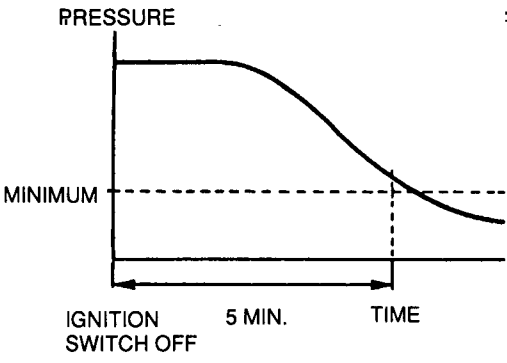
While fuel consumption is drastically increased during city driving, short-run operation, stop and go driving, extended winter warm-up periods, etc., as opposed to "trip" mileage, an attempt should be made to determine these factors when confronted with "poor mileage" conditions. However, since the operator is not always at fault, the following is offered.

- ① Operator depressing accelerator more than usual due to low engine power
 - Poor ignition
 - Low intake air amount
 - Electric spark advance control malfunction
 - Clutch slipping
 - Exhaust component restricted
- ② Air/Fuel mixture too rich
 - High fuel line pressure
- ③ Alcohol blended fuel used
- ④ High vehicle load
 - Low tire pressure
 - Unrecommended tire used
 - Brake dragging
- ⑤ Fuel cut control malfunction
- ⑥ High idle speed

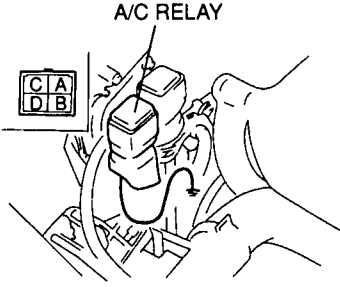



STEP	INSPECTION		ACTION
1	Check factors other than engine • Low tire pressure Section Q • Unrecommended tire used Section Q • Clutch slipping Section H • Brake dragging Section P • Exhaust component restricted page F-134	Yes	Go to next step
		No	Repair
2	Check if air hoses are connected correctly page F-121	Yes	Go to next step
		No	Repair air hoses page F-121
3	Check if air cleaner element is clean page F-100	Yes	Go to next step
		No	Replace air cleaner element page F-121
4	Check if "00" is displayed on Self-Diagnosis Checker with ignition switch ON page F-102 	Yes	Go to next step
		No	Service Code No. displayed Check for cause (Refer to specified check sequence) page F-104
		"88" flashes Check ECU terminal 1E voltage page F-141 Specification: Battery voltage (Ignition switch ON) ⇨ If OK, replace ECU ⇨ If not OK, check wiring between ECU and Self-Diagnosis Checker	
5	Check switches for correct operation with Self-Diagnosis Checker Monitor Lamp and ignition switch ON. page F-118 	Yes	Go to next step
		No	Lamp not ON/OFF with specified switch Check for cause (Refer to specified check sequence) page F-119
		Lamp always ON Check wiring between ECU terminal 1D and Self-Diagnosis Checker	

TROUBLESHOOTING GUIDE

F

STEP	INSPECTION	Yes	No	ACTION
6	Check if ECU terminal voltages are OK (2D, 2N, 2O, 2P, 2Q, 2R, 2U and 2V)	Yes	No	Go to next step Check for cause (Refer to "Check Point for Each Terminal")
	Fuel cut operation is OK during deceleration above 1,900 rpm after warm-up	Yes	No	Go to next step Try known good ECU
	Correct ignition timing at idle (page F-100)	Yes	No	Go to next step Adjust ignition timing (page F-100)
	Correct fuel line pressure at idle (pressure: 14 kPa {2.2—2.7 kgf/cm ² , 32—38 psi})	Yes	No	Go to next step High pressure Check if vacuum hose to pressure regulator is damaged or poorly connected. ⇒ If OK, replace pressure regulator. ⇒ If not OK, repair or replace hose.
10	Run engine at idle and check if fuel line pressure is held after ignition switch turned OFF. Fuel line pressure: More than 147 kPa {1.5 kgf/cm ² , 21 psi} for 5 min.	Yes	No	Go to next step Check fuel injector for fuel leakage (page F-128)
				
				
11	Change fuel to another brand			

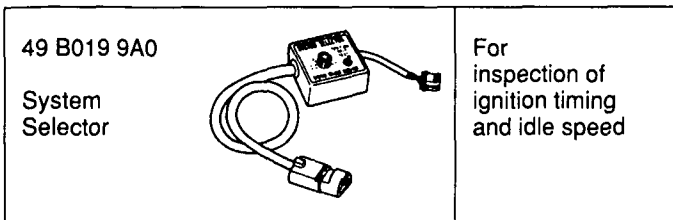
35A0FX-077

32	A/C DOES NOT WORK		
DESCRIPTION • Blower fan operates but cool air not expelled			
[TROUBLESHOOTING HINTS] <ul style="list-style-type: none"> • Open or short circuit in wiring harness • A/C relay malfunction • A/C switch malfunction • Magnetic clutch malfunction • ECU malfunction 			
STEP	INSPECTION	ACTION	
1	Ground terminal B at A/C relay with jumper wire and check if condenser fan operates when ignition switch is turned ON 	Yes	Go to next step
	No	Go to A/C system Troubleshooting  Section U	
2	Ground terminal B at ECU 1J terminal with jumper wire and check if condenser fan operates when ignition switch is turned ON	Yes	Go to next step
		No	Repair wire between ECU and A/C relay
3	Check if A/C switch is OK  Section U	Yes	Try known good ECU
		No	Check A/C switch and wiring  Section U

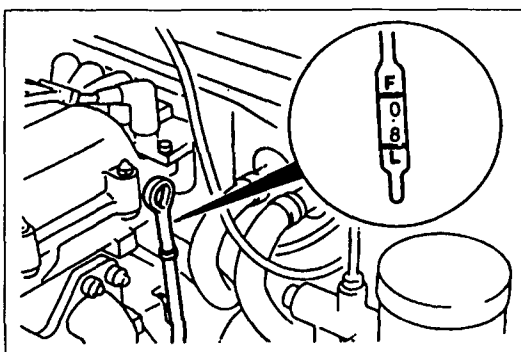
35A0FX-078

ENGINE TUNE-UP

PREPARATION SST



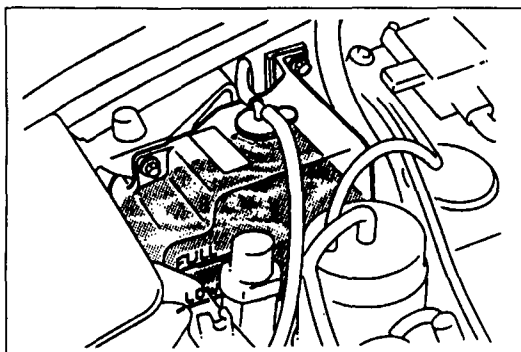
16E0F2-012



35A0FX-079

BASIC INSPECTION Engine Oil

1. Remove the dipstick and check the engine oil level and condition.
2. Add or change oil as necessary.



35A0FX-080

Coolant (engine cold)

Warning

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

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

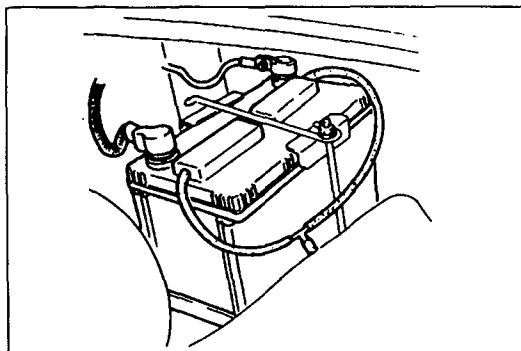
Battery

Removing the label on the top of the battery or removing the vent caps will void the battery's warranty.

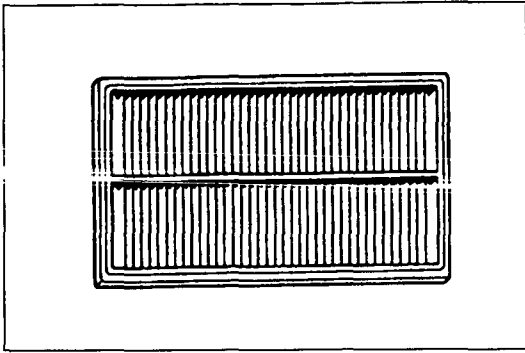
1. Clean any corrosion on the clamps or battery posts.
2. Verify that the battery top is clean. If necessary, clean with baking soda and water.
3. Verify that cables are in good condition and not frayed or corroded. Repair or replace if necessary.
4. Verify that cable clamps are tight.

Note

- Because this is a maintenance free battery, it is not necessary to check the fluid level.



35A0FX-081



35A0FX-082

Air Cleaner Element Inspection

1. Check the air cleaner element for excessive dirt and for oil and damage.

Caution

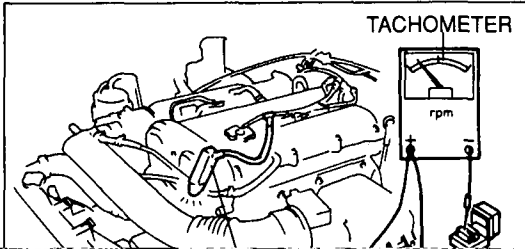
- Cleaning the element with compressed air will reduce the element's ability to filter the air. Don't use compressed air to clean the element.

2. Replace the element if necessary.

ADJUSTMENT

Preparation

1. Warm up the engine to normal operating temperature.
2. Turn all electric loads OFF.
 - Headlight switch
 - Blower switch
 - Rear window defroster switch
3. Connect the SST to the diagnosis connector



TACHOMETER

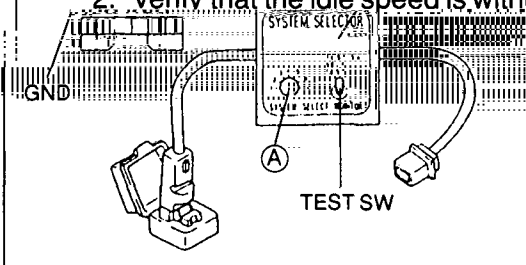
35A0FX-083

4. Connect a timing light to the engine.

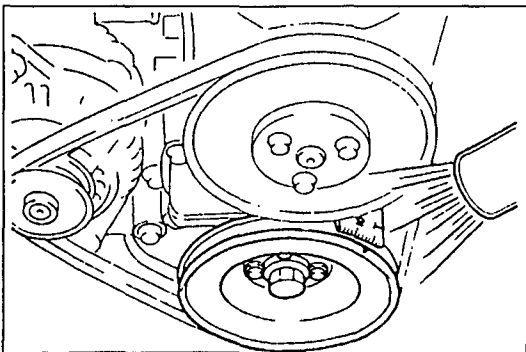
5. Connect a tachometer to the diagnosis connector terminal IG—as shown.

Ignition Timing

1. Perform Preparation. (Refer to above.)
2. Verify that the idle speed is within the specification; if not, adjust it.



35E0FX-021



35E0FX-022

Idle speed

(Neutral): 800—900 (850 ± 50) rpm

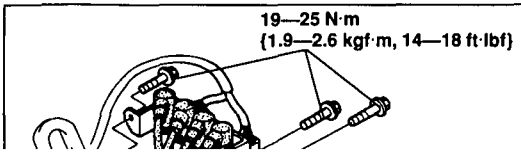
3. Set switch A to position 1.
4. Set test switch to SELF TEST.

5. If the SST is not used, connect a jumper wire between the TEN terminal and the GND terminal of the diagnosis connector.
6. Verify that the idle speed is within the specification.

Idle speed (Ground the terminal TEN): 650—975 rpm

7. Verify that the ignition timing is within the specification.

Ignition timing: BTDC 9°—11° (10° ± 1°)

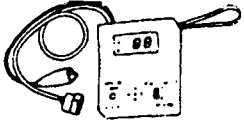
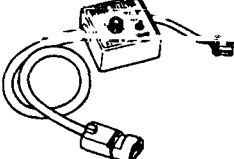


8. If not within the specification, remove the ignition coil bracket and push the ignition coil aside for easy access and then loosen the crankshaft position sensor lock bolts, and turn the crank angle sensor to make the adjustment.

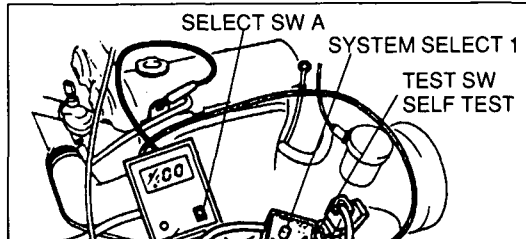
SELF-DIAGNOSIS FUNCTION

PREPARATION

SST

<p>49 H018 9A1</p> <p>Self-Diagnosis Checker</p> 	<p>For diagnosis</p>	<p>49 B019 9A0</p> <p>System Selector</p> 	<p>For diagnosis</p>
------------------------------------------------------------------------------------------------------------------------------------	----------------------	------------------------------------------------------------------------------------------------------------------------------	----------------------

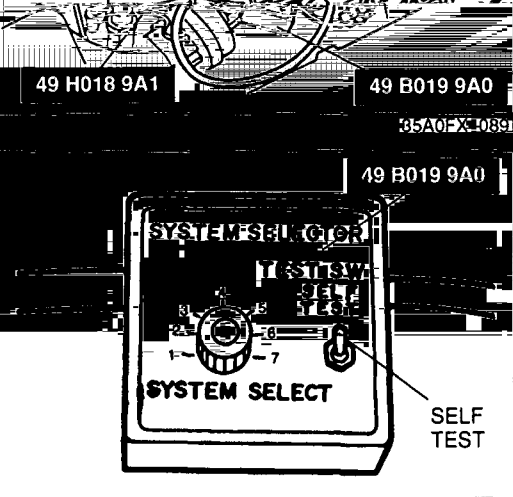
05U0FX-067



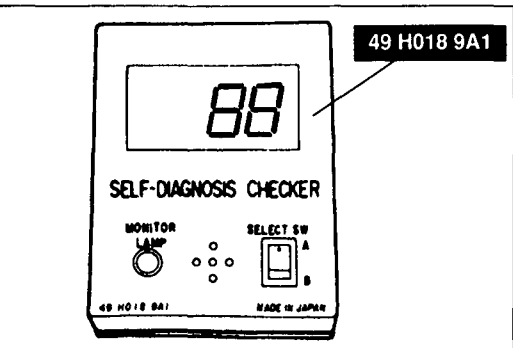
SERVICE CODE NUMBER

Inspection procedure

1. Connect the SSTs to the diagnosis connector and a ground.
2. Set the select switch to position A.



35A0FX-090



35A0FX-091

3. Set the System Selector to position 1 and ES: 1 (E: 1) as shown.

4. Turn the ignition switch ON.
5. Verify that **88** flashes on the digital display and that the buzzer sounds for **3 sec.** after turning the ignition switch ON.
6. If **88** does not flash, check the main relay, power supply circuit, and check connector wiring.
7. If **88** flashes and the buzzer continues for more than **20 sec.**, check for a short circuit between the engine control unit (ECU) terminal 1E and the diagnosis connector. Replace the engine control unit (ECU) if necessary and perform Steps 3 and 4 again.
8. Note any code numbers and check for the causes by referring to the check sequences shown on pages F-106 to F-116. Repair as necessary.
9. After repairs, cancel the code numbers by performing the "After-repair procedure". (Refer to page F-117.)

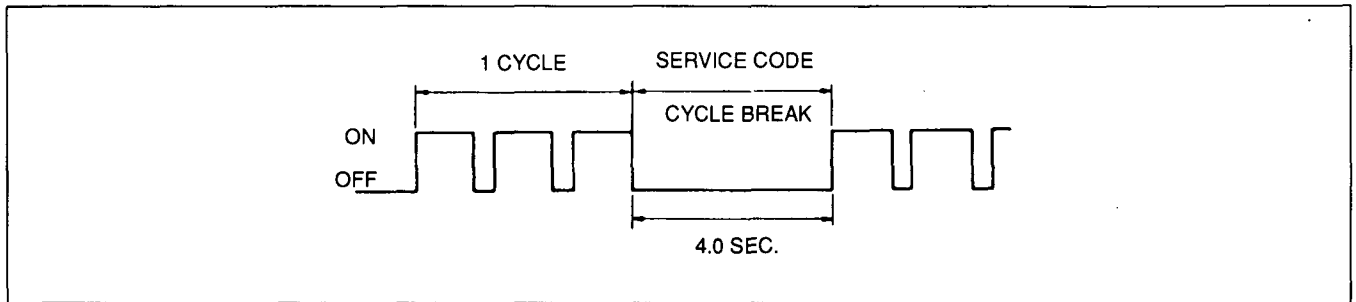
Principle of Code Cycle

Service codes are determined as shown below.

35A0FX-092

1. Code cycle break

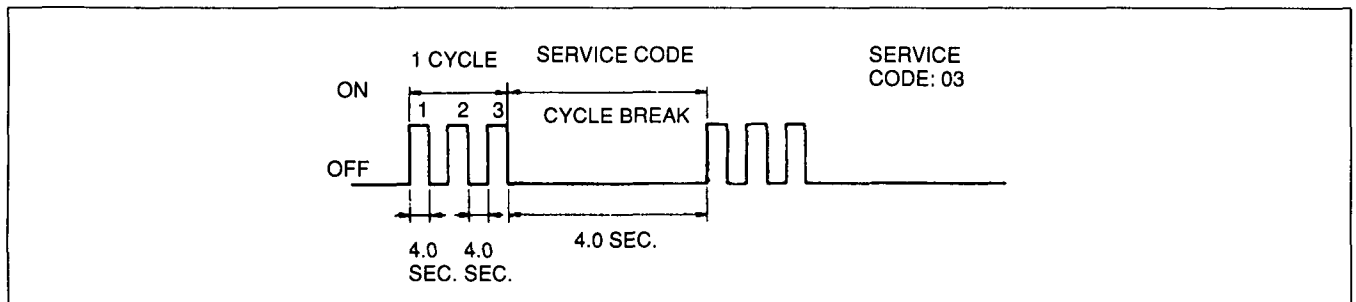
The time between service code cycles is 4.0 seconds (the time the lamp is off).



35A0FX-093

2. Second digit of service code (ones position)

The digit in the ones position of the service code represents the number of times the buzzer sounds 0.4 second during one cycle.

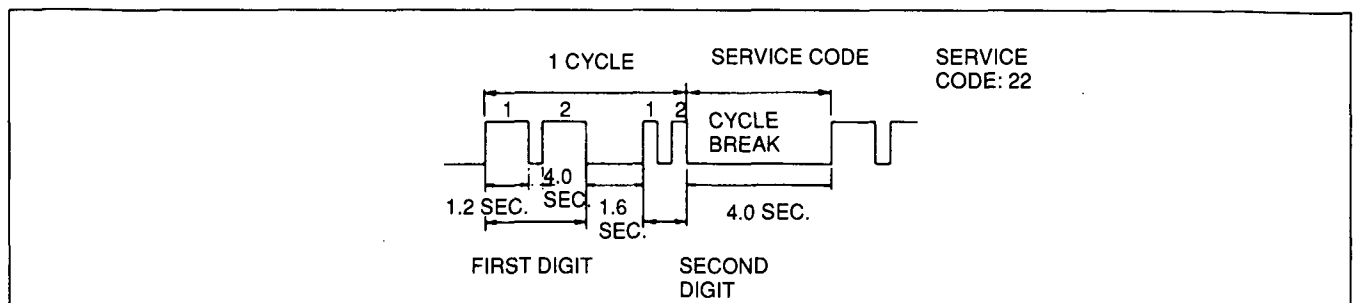


35A0FX-094

3. First digit of service code (tens position)

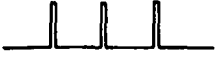















The digit in the tens position of the service code represents the number of times the buzzer is on 1.2 seconds during one cycle.

It should also be noted that the light goes off for 1.6 seconds between the long and short pulses of the buzzer.



35A0FX-095

Code Numbers

Malfunction display		Sensor or subsystem	Self-diagnosis system	Fail-safe
Code No.	Pattern of output signal (Self-Diagnosis System Checker)			
01	ON OFF 	IGF signal	No IGF-signal	—
03	ON OFF 	SGC signal	No SGC signal	Cancels fuel injection
04	ON OFF 	SGT signal	No SGT signal	Cancels fuel injection and electronic spark distribution
08	ON OFF 	Airflow sensor	Open or short circuit	Basic fuel injection amount fixed as for two driving modes (1) Idle switch: ON (2) Idle switch: OFF
09	ON OFF 	Water thermosensor	Open or short circuit	Maintains constant 35°C (95°F) command
10	ON OFF 	Intake air thermosensor (Airflow sensor)	Open or short circuit	Maintains constant 20°C (68°F) command
12	ON OFF 	Throttle sensor	Open or short circuit	Maintains constant command of throttle valve fully open
14	ON OFF 	Atmospheric pressure sensor	Open or short circuit	Maintains constant command of sea level pressure
15	ON OFF 	Oxygen sensor (Inactivation)	Sensor output continues less than 0.55V 180 sec. after engine exceeds 1,500 rpm	Cancels engine feedback operation
16	ON OFF 	EGR position sensor	Open or short circuit	Maintains constant command of EGR valve
17	ON OFF 	Oxygen sensor (Inversion)	Sensor output continues unchanged 20 sec. after engine exceeds 1,500 rpm	Cancels engine feedback operation
25	ON OFF 	PRC solenoid valve	Open or short circuit	—
26	ON OFF 	Purge solenoid valve	Open or short circuit	—
28	ON OFF 	EGR solenoid valve (vacuum)	Open or short circuit	—
29	ON OFF 	EGR solenoid valve (vent)	Open or short circuit	—
34	ON OFF 	ISC solenoid valve	Open or short circuit	—

Note

- If more than one failure is present, the code numbers will be indicated in numerical order.

After repairs, cancel the code numbers by performing the "After-repair procedure".
(Refer to page F-117.)

Troubleshooting

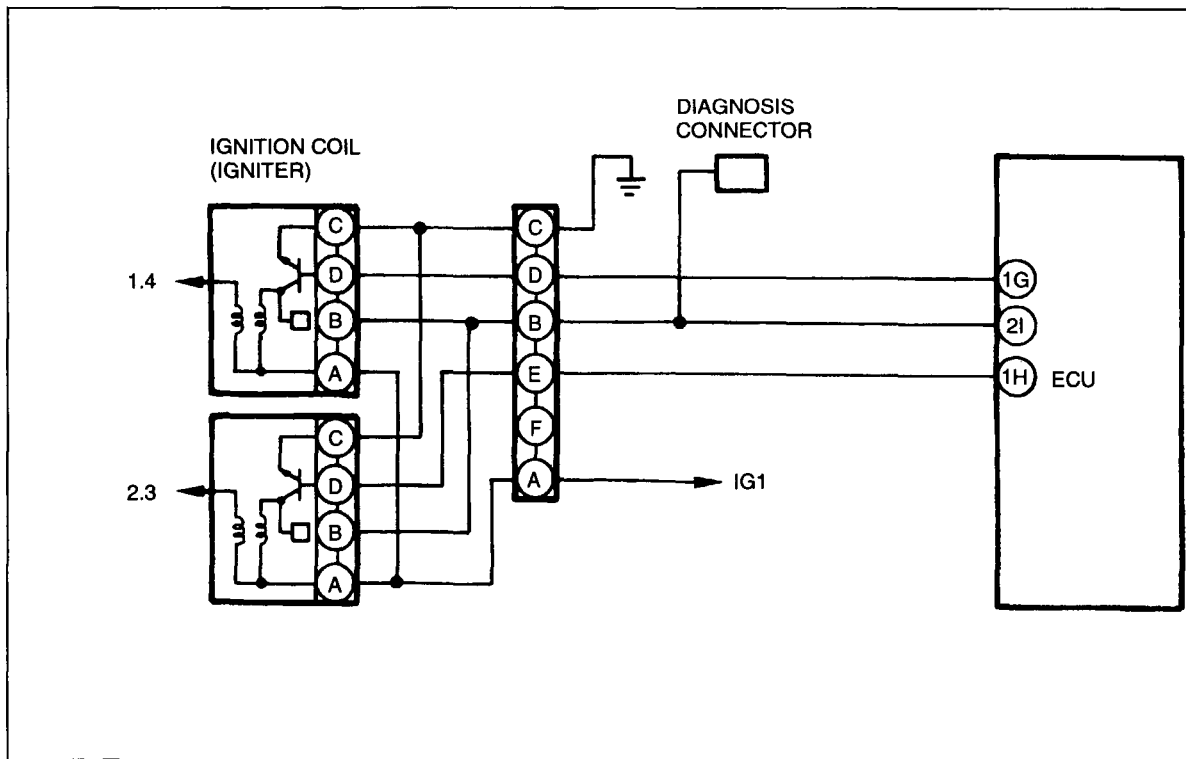
If a service code number is shown on the **SST**, check for the cause by using the chart related to the code number shown.

CODE No.	01 (IGT-SIGNAL)		
STEP	INSPECTION	ACTION	
1	Are there any poor connections at ignition coil connectors?	Yes	Repair or replace connector
		No	Go to next step

coil to ECU	Does tachometer operate?	Yes	Go to next step	
		No	Check for open circuit in wiring from ignition terminal 2I	
Section G	3	Is resistance of ignition coil OK? Resistance: Secondary 8.7—12.9 kΩ	Yes	Go to next step
			No	Replace ignition coil
coil to ignition	4	Is ignition coil terminal A voltage OK? Section G	Yes	Go to next step
			No	Check for open circuit in wiring from ignition switch
coil to ground	5	Is there continuity between ignition coil terminal C and ground?	Yes	Go to next step
			No	Check for open circuit in wiring from ignition switch
ECU	6	Are ECU terminals 1G and 1H voltages OK? page F-141	Yes	Replace ECU
			No	Check for circuit in wiring from ignition coil to ECU

35A0FX-097

Circuit Diagram



35A0FX-098

SELF-DIAGNOSIS FUNCTION

F

CODE No.	03 (SGC SIGNAL)			
STEP	INSPECTION		ACTION	
1	Are there any poor connections in crank angle sensor circuit?	Yes	Repair or replace connector	
		No	Go to next step	
2	Is Code No.03 also present?	Yes	Go to next step	
		No	Go to Step 5	
3	Is there continuity between crank angle sensor terminal A and ground?	Yes	Go to next step	
		No	Check for open circuit in wiring from crank angle sensor to ground	
4	Is there battery voltage at crank angle sensor terminal B?	Yes	Go to next step	
		No	Check for open circuit in wiring from crank angle sensor to main relay	
5	Is there continuity between crank angle sensor and ECU?	Yes	Go to next step	
		No	Check for open circuit in wiring from crank angle sensor to ECU	
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Crank angle sensor</td> <td style="width: 50%;">ECU</td> </tr> <tr> <td style="text-align: center;">D</td> <td style="text-align: center;">2G</td> </tr> </table>		Crank angle sensor
Crank angle sensor	ECU			
D	2G			
6	Is there approx. 5V at ECU terminal 2G? (With crank angle sensor connector disconnected)	Yes	Go to next step	
		No	Replace ECU	
7	Is there approx. 5V at crank angle sensor terminal D? (At harness-side connector with connector disconnected)	Yes	Replace crank angle sensor 📄 page F-149	
		No	Check for short circuit in wiring from crank angle sensor to ECU	

35A0FX-099

CODE No.	04 (SGT SIGNAL)			
STEP	INSPECTION		ACTION	
1	Are there any poor connections in crank angle sensor circuit?	Yes	Repair or replace connector	
		No	Go to next step	
2	Is Code No.04 present at same time?	Yes	Go to next step	
		No	Go to Step 5	
3	Is there continuity between crank angle sensor terminal A and ground?	Yes	Go to next step	
		No	Check for open circuit in wiring from crank angle sensor to ground	
4	Is there battery voltage at crank angle sensor terminal B	Yes	Go to next step	
		No	Check for open circuit in wiring from crank angle sensor to main relay	
5	Is there continuity between crank angle sensor and ECU?	Yes	Go to next step	
		No	Check for open circuit in wiring from crank angle sensor to ECU	
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Crank angle sensor</td> <td style="width: 50%;">ECU</td> </tr> <tr> <td style="text-align: center;">C</td> <td style="text-align: center;">2E</td> </tr> </table>		Crank angle sensor
Crank angle sensor	ECU			
C	2E			
6	Is there approx. 5V at ECU terminal 2E? (With crank angle sensor connector disconnected)	Yes	Go to next step	
		No	Replace ECU	
7	Is there approx. 5V at crank angle sensor terminal C? (At harness-side connector with connector disconnected)	Yes	Replace crank angle sensor 📄 page F-149	
		No	Check for short circuit in wiring from crank angle sensor to ECU	

sensor to

F-149

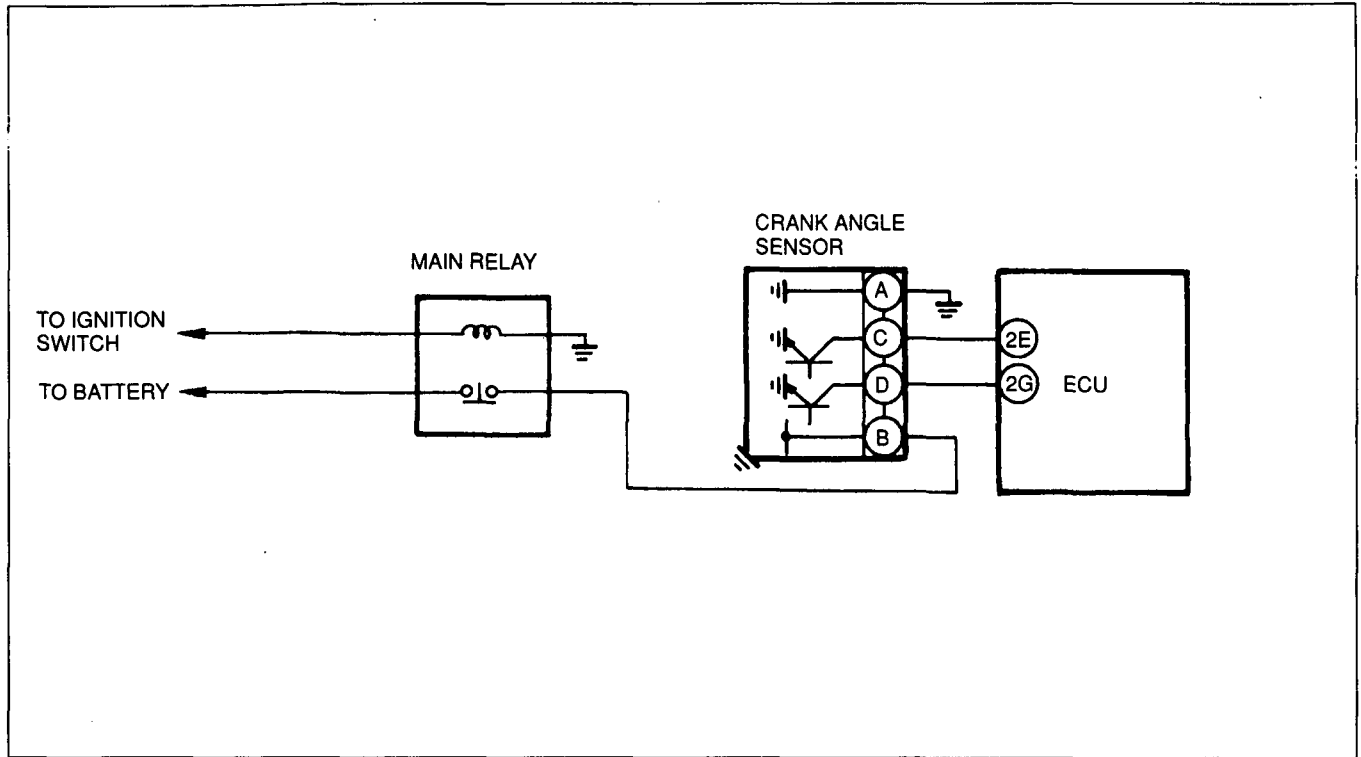
sensor to

35A0FX-100

F-107

3

Circuit Diagram



35A0FX-101

SELF-DIAGNOSIS FUNCTION

F

CODE No.	08 (AIRFLOW SENSOR)								
STEP	INSPECTION		ACTION						
1	Are there any poor connections in airflow sensor circuit?	Yes	Repair or replace connector						
		No	Go to next step						
2	Is Code No.10 present at same time?	Yes	Check for open circuit in wiring from airflow sensor terminal E to ground						
		No	Go to next step						
3	Is there continuity between airflow sensor connector and ECU? <table border="1" style="margin: 5px 0; width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Airflow sensor</td> <td style="text-align: center;">ECU</td> </tr> <tr> <td style="text-align: center;">E</td> <td style="text-align: center;">2F</td> </tr> <tr> <td style="text-align: center;">B</td> <td style="text-align: center;">2O</td> </tr> </table>	Airflow sensor	ECU	E	2F	B	2O	Yes	Go to next step
		Airflow sensor	ECU						
		E	2F						
B	2O								
No	Check for open circuit in wiring from airflow sensor to ECU								
4	Are ECU terminals 2O and 2F voltages OK? ☞ page F-142	Yes	Replace ECU						
		No	Check for short circuit in wiring from airflow sensor to ECU						

35A0FX-102

CODE No.	09 (WATER THERMOSENSOR)								
STEP	INSPECTION		ACTION						
1	Are there any poor connections in water thermosensor circuit?	Yes	Repair or replace connector						
		No	Go to next step						
2	Is there continuity between water thermosensor and ECU? <table border="1" style="margin: 5px 0; width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Water thermosensor</td> <td style="text-align: center;">ECU</td> </tr> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">2Q</td> </tr> <tr> <td style="text-align: center;">B</td> <td style="text-align: center;">2D</td> </tr> </table>	Water thermosensor	ECU	A	2Q	B	2D	Yes	Go to next step
		Water thermosensor	ECU						
		A	2Q						
B	2D								
No	Check for open circuit in wiring from water thermosensor to ECU								
3	Is resistance of water thermosensor OK? <table border="1" style="margin: 5px 0; width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Coolant temp.</td> <td style="text-align: center;">Resistance</td> </tr> <tr> <td style="text-align: center;">20°C { 68°F }</td> <td style="text-align: center;">2.3—2.6 kΩ</td> </tr> <tr> <td style="text-align: center;">80°C {176°F }</td> <td style="text-align: center;">0.3—0.4Ω</td> </tr> </table>	Coolant temp.	Resistance	20°C { 68°F }	2.3—2.6 kΩ	80°C {176°F }	0.3—0.4Ω	Yes	Go to next step
		Coolant temp.	Resistance						
		20°C { 68°F }	2.3—2.6 kΩ						
80°C {176°F }	0.3—0.4Ω								
No	Replace water thermosensor ☞ page F-150								
4	Is same Code No. present after performing after repair procedure?	Yes	Go to next step						
		No	Water thermosensor and circuit OK						
5	Are ECU terminals 2Q and 2D voltages OK? ☞ page F-142	Yes	Replace ECU						
		No	Check for short circuit in wiring from water thermosensor to ECU						

35A0FX-103

F

SELF-DIAGNOSIS FUNCTION

CODE No.	10 (INTAKE AIR THERMOSENSOR — IN AIRFLOW SENSOR)		
STEP	INSPECTION	ACTION	
1	Are there any poor connections in intake air thermosensor circuit?	Yes	Repair or replace connector
		No	Go to next step

Unit in wiring from intake air thermosensor to ECU
sensor page F-148
sensor and circuit OK
Unit in wiring from intake air thermosen-

35A0FX-104

2	Is there continuity between intake air thermosensor (in airflow sensor) and ECU?	Yes	Go to next step						
		No	Check for open circuit (in airflow sensor)						
<table border="1"> <tr> <td>Intake air thermosensor</td> <td>ECU</td> </tr> <tr> <td>C</td> <td>2D</td> </tr> <tr> <td>D</td> <td>2P</td> </tr> </table>		Intake air thermosensor	ECU	C	2D	D	2P		
Intake air thermosensor	ECU								
C	2D								
D	2P								
3	Is resistance of intake air thermosensor (in airflow sensor) OK?	Yes	Go to next step						
		No	Replace airflow sensor						
<table border="1"> <tr> <td>Terminal</td> <td>Temperature</td> <td>Resistance</td> </tr> <tr> <td>C—D</td> <td>20°C (68°F)</td> <td>2.21—2.69 kΩ</td> </tr> </table>		Terminal	Temperature	Resistance	C—D	20°C (68°F)	2.21—2.69 kΩ		
Terminal	Temperature	Resistance							
C—D	20°C (68°F)	2.21—2.69 kΩ							
4	Is same Code No. present after performing after repair procedure?	Yes	Go to next step						
		No	Intake air thermosensor						
5	Are ECU terminals 2P and 2D voltages OK? page F-142	Yes	Replace ECU						
		No	Check for short circuit to ECU						

ACTION
connector
Unit in wiring from throttle sensor to ECU

35A0FX-105

CODE No.	12 (THROTTLE SENSOR)										
STEP	INSPECTION	ACTION									
1	Check throttle sensor circuit for poor connection	Yes	Repair or replace connector								
		No	Go to next step								
2	Check wire harness between throttle sensor and ECU for continuity	Yes	Go to next step								
		No	Repair or replace								
<table border="1"> <tr> <td>Throttle sensor</td> <td>ECU</td> </tr> <tr> <td>D</td> <td>2K</td> </tr> <tr> <td>C</td> <td>2M</td> </tr> <tr> <td>A</td> <td>2D</td> </tr> </table>		Throttle sensor	ECU	D	2K	C	2M	A	2D		
Throttle sensor	ECU										
D	2K										
C	2M										
A	2D										
3	Check if ECU terminal 2M voltage is OK page F-142	Yes	Replace ECU								
		No	Check for short circuit								

SENSOR)
Replace ECU

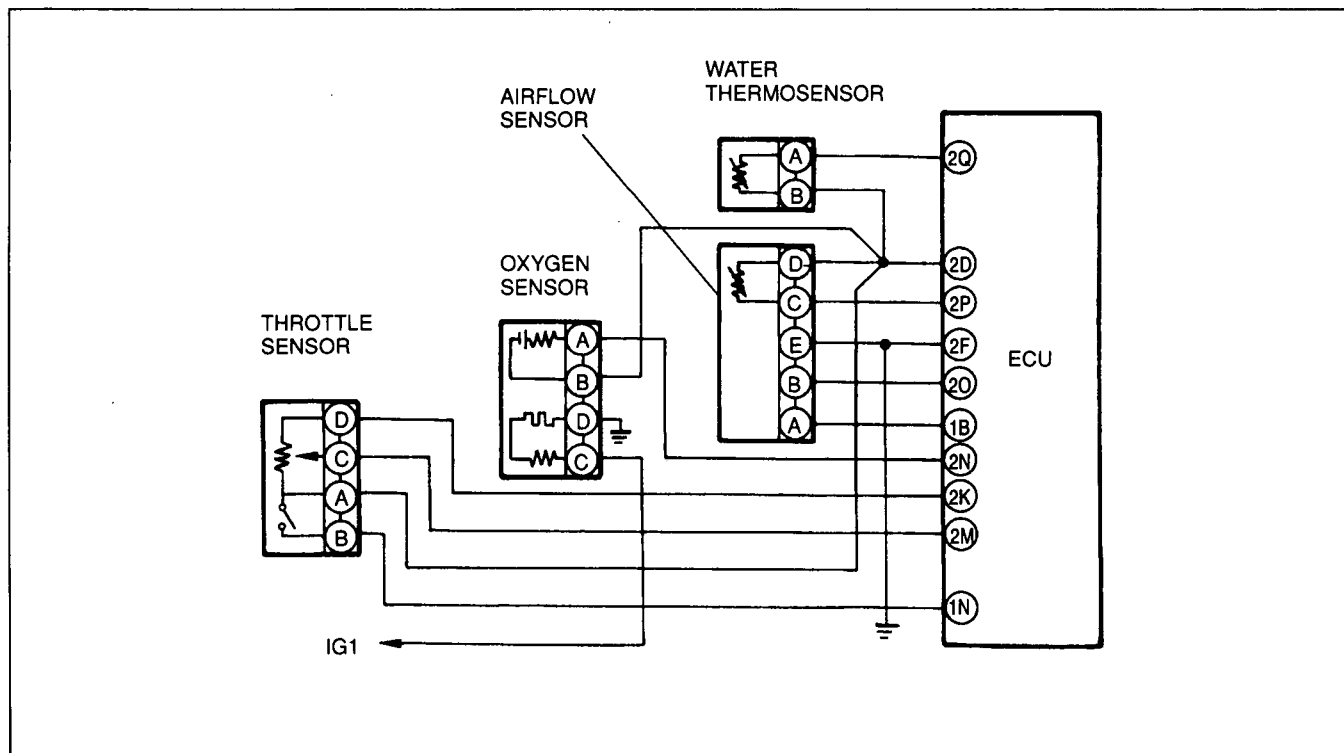
35A0FX-106

CODE No.	14 (ATMOSPHERIC PRESSURE SENSOR)		
Replace ECU			

CODE No.	15 (OXYGEN SENSOR: INACTIVATION)		
Note			
• If Code Nos.15 and 17 are both present, first perform the checking procedure for Code No.17			
STEP	INSPECTION	ACTION	
1	Are there any poor connections in oxygen sensor circuit?	Yes	Repair or replace connector
		No	Go to next step
2	Is oxygen sensor output voltage OK? <small>☞ page F-152</small>	Yes	Go to next step
		No	Replace oxygen sensor <small>☞ page F-152</small>
3	Is there continuity between oxygen sensor and ECU terminal 2N?	Yes	Go to next step
		No	Check for open circuit in wiring from oxygen sensor to ECU
4	Is ECU terminal 2N voltage OK?	Yes	Go to next step
		No	Check for short circuit in wiring from oxygen sensor to ECU
5	Is sensitivity of oxygen sensor OK? <small>☞ page F-152</small>	Yes	Replace ECU
		No	Replace oxygen sensor <small>☞ page F-152</small>

35A0FX-107

Circuit Diagram



35A0FX-108

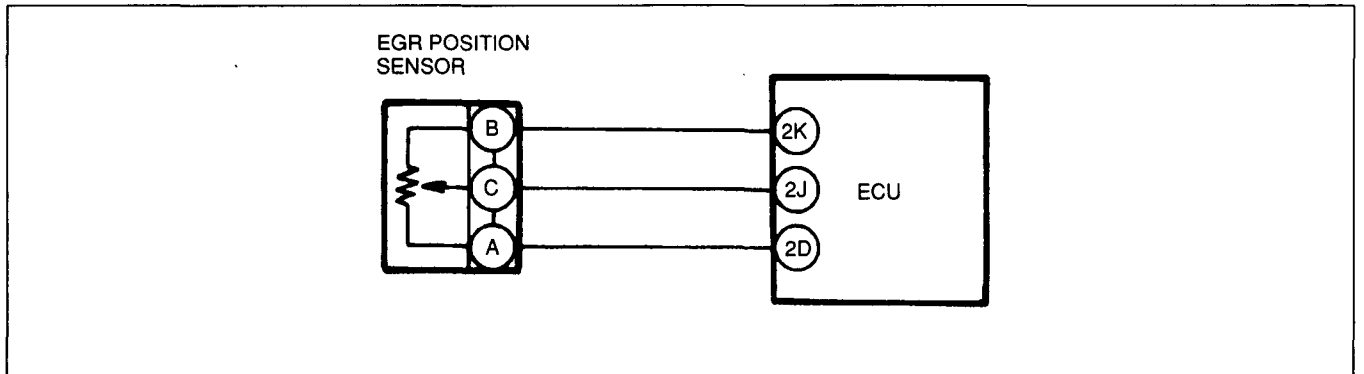
F

SELF-DIAGNOSIS FUNCTION

CODE No.	16 (EGR POSITION SENSOR)										
STEP	INSPECTION	ACTION									
1	Does EGR position sensor circuit have a poor connection?	Yes	Repair or replace connector								
		No	Go to next step								
2	Is EGR control valve OK? ☞ page F-133	Yes	Go to next step								
		No	Replace EGR control valve								
3	Is resistance of EGR position sensor OK? Resistance: (A) ↔ (B) Approx. 2.7 kΩ (A) ↔ (C) 0.5—2.7 kΩ (B) ↔ (C) 0.1—2.4 kΩ	Yes	Go to next step								
		No	Replace EGR control valve								
4	Is there continuity between EGR position sensor and ECU? <table border="1"> <tr> <td>EGR position sensor</td> <td>ECU</td> </tr> <tr> <td>C</td> <td>2J</td> </tr> <tr> <td>B</td> <td>2K</td> </tr> <tr> <td>A</td> <td>2D</td> </tr> </table>	EGR position sensor	ECU	C	2J	B	2K	A	2D	Yes	Replace ECU
		EGR position sensor	ECU								
C	2J										
B	2K										
A	2D										
No	Check for open circuit in wiring from EGR position sensor to ECU										
5	Is there 4.5—5.5V at C terminal of EGR position sensor connector? ☞ page F-132	Yes	Go to next step								
		No	Check for short circuit in wiring from EGR position sensor terminal C to ECU								
6	Is ECU terminal 2J voltage OK? ☞ page F-142	Yes	Replace ECU								
		No	Short circuit in wiring harness EGR position sensor terminal C to ECU								

35A0FX-109

Circuit Diagram



35A0FX-110

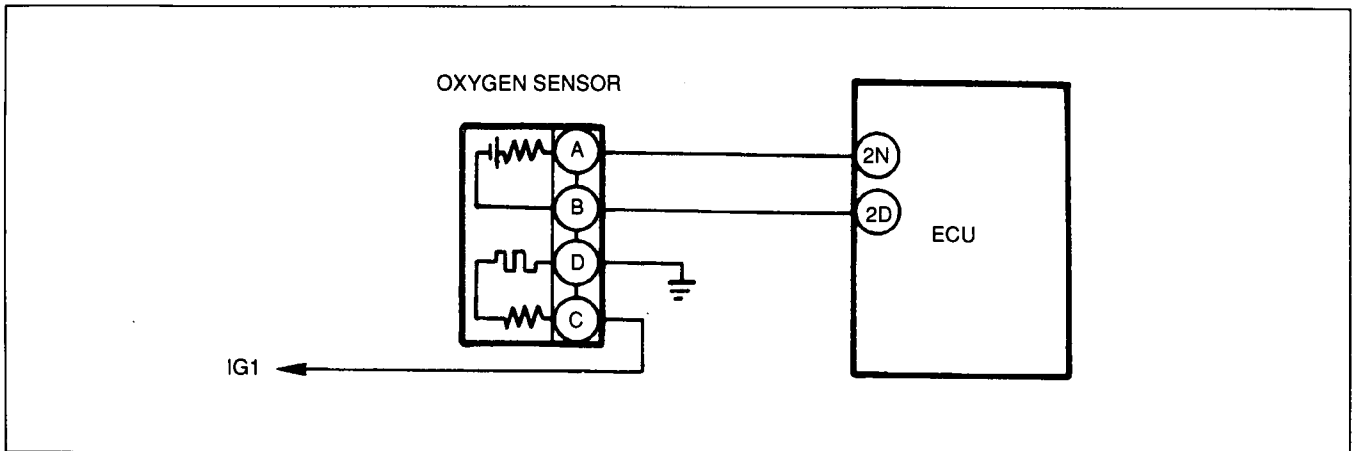
SELF-DIAGNOSIS FUNCTION

F

CODE No.	17 (OXYGEN SENSOR: INVERSION)	
STEP	INSPECTION	ACTION
1	Warm up engine and run it at 2,500—3,000 rpm for 3 min.	
2	Does monitor lamp of Self-Diagnosis Checker illuminate at idle?	Yes Go to next step
		No Check for air leak in vacuum hoses or emission components Check for contaminated oxygen sensor Check for insufficient fuel injection
3	Are spark plugs clean?	Yes Go to next step
		No Clean or replace spark plugs
4	Is oxygen sensor voltage OK? ☞ page F-152	Yes Go to next step
		No Replace oxygen sensor ☞ page F-152
5	Is same Code No. present after performing after repair procedure?	Yes Go to next step
		No Check for short circuit in wiring from oxygen sensor to ECU terminal 2N
6	Is there continuity between oxygen sensor and ECU terminal 2N?	Yes Go to next step
		No Check for open circuit in wiring from oxygen sensor to ECU
7	Is ECU terminal 2N voltage OK? ☞ page F-142	Yes Replace ECU
		No Check for short circuit in wiring from oxygen sensor to ECU

35A0FX-111

Circuit Diagram



35A0FX-112

CODE No.	25 (PRC SOLENOID VALVE)		
STEP	INSPECTION		ACTION
1	Does PRC solenoid valve circuit have a poor connection?	Yes	Repair connector and/or wiring harness
		No	Go to next step
2	Is connector terminal A voltage OK with PRC solenoid valve connector disconnected?	Yes	Go to next step
		No	Check for open or short circuit in wiring harness (PRC solenoid valve terminal A — Main relay terminal D)
3	Is continuity between PRC solenoid valve terminal B and ECU terminal 2R?	Yes	Check for short circuit in wiring harness (PRC solenoid valve terminal B — ECU terminal 2R) ⇒ If OK, go to next step ⇒ If not OK, repair wiring harness
		No	Repair wiring harness
4	Is PRC solenoid valve OK? ☞ page F-130	Yes	Replace ECU
		No	Replace PRC solenoid valve

35E0F2-025

CODE No.	26 (PURGE SOLENOID VALVE)		
STEP	INSPECTION		ACTION
1	Are there any poor connections in purge solenoid valve circuit?	Yes	Repair or replace connector
		No	Go to next step
2	Is resistance of purge solenoid valve OK? Resistance: 25 ± 2Ω	Yes	Go to next step
		No	Replace purge solenoid valve
3	Is there battery voltage at terminal A of purge solenoid valve circuit?	Yes	Go to next step
		No	Check for open circuit in wiring from purge solenoid valve to main relay
4	Is there continuity between purge solenoid valve and ECU?	Yes	Go to next step
		No	Check for open circuit in wiring from purge solenoid valve to ECU
5	Is ECU terminal 2X voltage OK? ☞ page F-143	Yes	Replace ECU
		No	Check for short circuit in wiring from purge solenoid valve to ECU

35A0F2-114

SELF-DIAGNOSIS FUNCTION

F

CODE No.	28 (EGR SOLENOID VALVE(VACUUM))		
STEP	INSPECTION		ACTION
1	If there a poor connection in EGR solenoid valve (vacuum) circuit?	Yes	Repair or replace connector
		No	Go to next step
2	Is connector terminal A voltages with EGR solenoid valve (vacuum) connector disconnected OK?	Yes	Go to next step
		No	Check for open or short circuit in wiring from EGR solenoid valve (vacuum) terminal A to main relay terminal
		Condition	Voltage
		IG switch ON	Battery voltage
3	Is continuity between EGR solenoid valve (vacuum) terminal B and ECU terminal 1T OK?	Yes	Check for short circuit in wiring from EGR solenoid valve (vacuum) terminal B to ECU terminal 1T ⇒ If OK, go to next step ⇒ If not OK, repair or replace wiring harness
		No	Repair or replace wire harness
4	Is EGR solenoid valve (vacuum) OK?	Yes	Replace ECU
		No	Replace EGR solenoid valve (vacuum)

35E0FX-026

CODE No.	29 (EGR SOLENOID VALVE(VENT))		
STEP	INSPECTION		ACTION
1	If there a poor connection in EGR solenoid valve (vent) circuit?	Yes	Repair or replace connector
		No	Go to next step
2	Is connector terminal A voltages with EGR solenoid valve (vent) connector disconnected OK?	Yes	Go to next step
		No	Check for open or short circuit in wiring from EGR solenoid valve (vent) terminal A to main relay terminal
		Condition	Voltage
		IG switch ON	Battery voltage
3	Is continuity between EGR solenoid valve (vent) terminal B and ECU terminal 1R OK?	Yes	Check for short circuit in wiring from EGR solenoid valve (vent) terminal B to ECU terminal 1R ⇒ If OK, go to next step ⇒ If not OK, repair or replace wiring harness
		No	Repair or replace wire harness
4	Is EGR solenoid valve (vent) OK?	Yes	Replace ECU
		No	Replace EGR solenoid valve (vent)

35E0FX-027

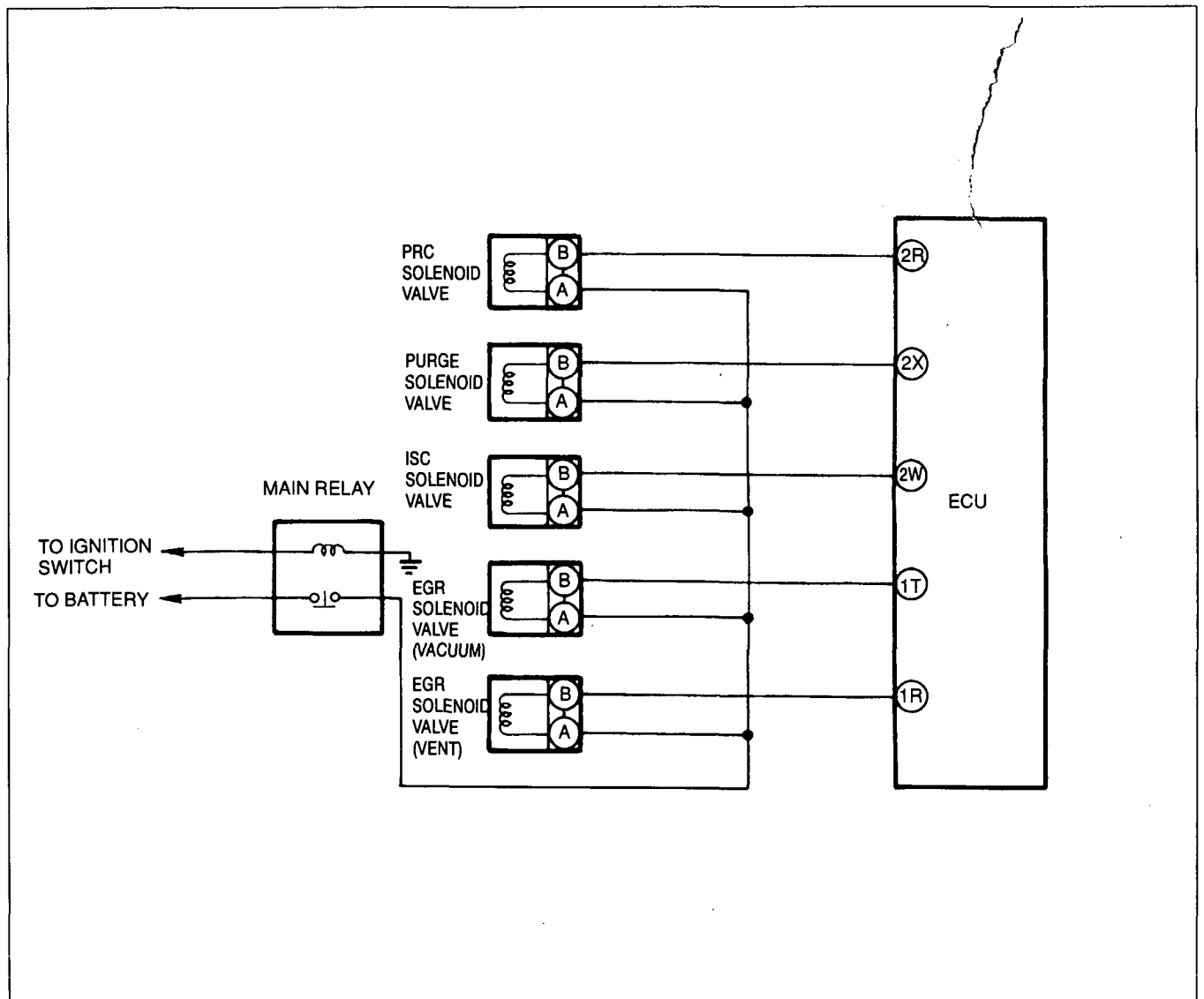
F

SELF-DIAGNOSIS FUNCTION

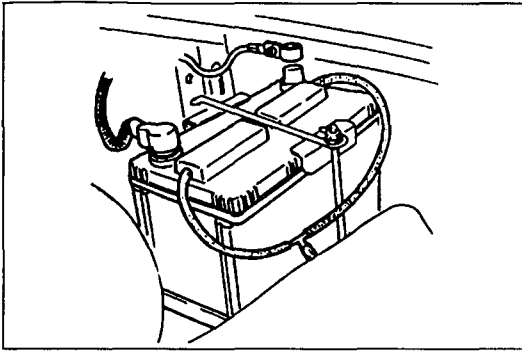
CODE No.	34 (ISC SOLENOID VALVE)						
STEP	INSPECTION	ACTION					
1	Are there any poor connections in ISC solenoid valve circuit?	Yes	Repair or replace connector				
		No	Go to next step				
2	Is resistance of ISC solenoid valve OK? Resistance: $11.5 \pm 0.8\Omega$ (20°C {68°F})	Yes	Go to next step				
		No	Replace ISC solenoid valve				
3	Is there battery voltage at terminal A of ISC solenoid valve circuit?	Yes	Go to next step				
		No	Check for open circuit in wiring from ISC solenoid valve to main relay				
4	Is there continuity between ISC solenoid valve and ECU? <table border="1" style="margin: 5px auto; width: 100px;"> <tr> <td>ISC solenoid valve</td> <td>ECU</td> </tr> <tr> <td>B</td> <td>2W</td> </tr> </table>	ISC solenoid valve	ECU	B	2W	Yes	Go to next step
		ISC solenoid valve	ECU				
B	2W						
No	Check for open circuit in wiring from ISC solenoid valve to ECU						
5	Is ECU terminal 2W voltage OK? page F-142	Yes	Replace ECU				
		No	Check for short circuit in wiring from ISC solenoid valve to ECU				

35A0FX-117

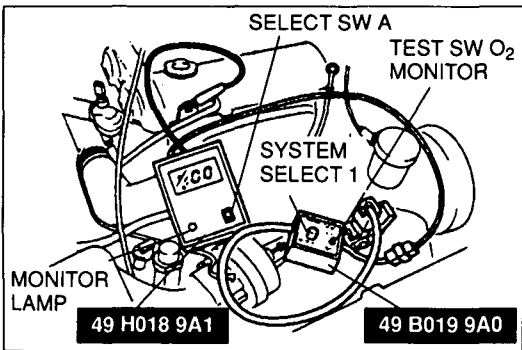
Circuit Diagram



35A0FX-118



35A0FX-119

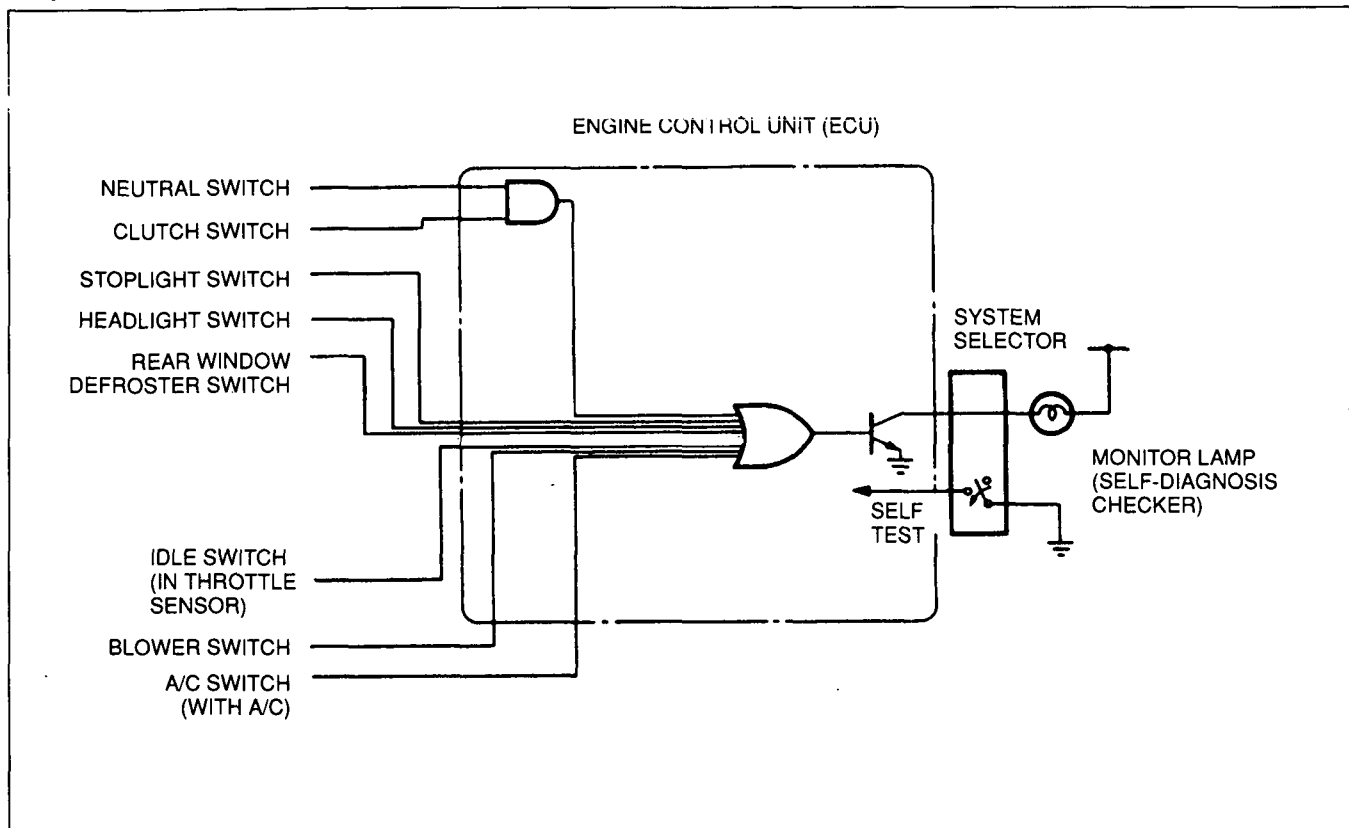


35A0FX-120

After-repair Procedure

1. Cancel the memory of malfunctions by disconnecting the negative battery cable at **least 20 seconds** and depress the brake pedal. Reconnect the negative battery cable.
2. Connect the **SST** to the diagnosis connector as shown.
3. Turn the ignition switch **ON**, but do not start the engine for **six seconds**.
4. Start and warm up the engine, then run it at **2,000 rpm for three minutes**.
5. Verify that no code numbers are displayed.

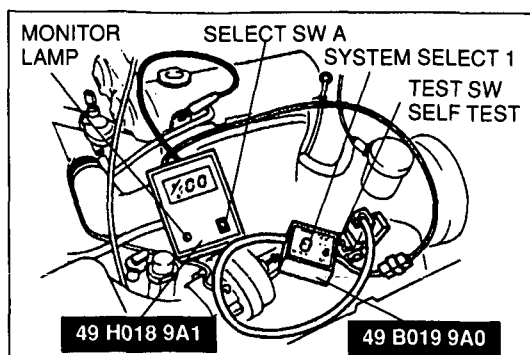
SWITCH MONITOR FUNCTION Inspection Procedure



35E0FX-028

Switch	Self-Diagnosis Checker (Monitor lamp)		Remark
	Light ON	Light OFF	
Clutch switch	Pedal released	Pedal depressed	In gear
Neutral switch	In gear	Neutral	Clutch pedal released
Idle switch (in throttle sensor)	Pedal depressed	Pedal released	—
Stoplight switch	Pedal depressed	Pedal released	—
Headlight switch	ON	OFF	—
Blower switch	ON	OFF	Blower motor position: "medium" "high" or "super high" position
A/C switch (with A/C)	ON	OFF	Fan speed control: Low position
Rear window defroster switch	ON	OFF	—

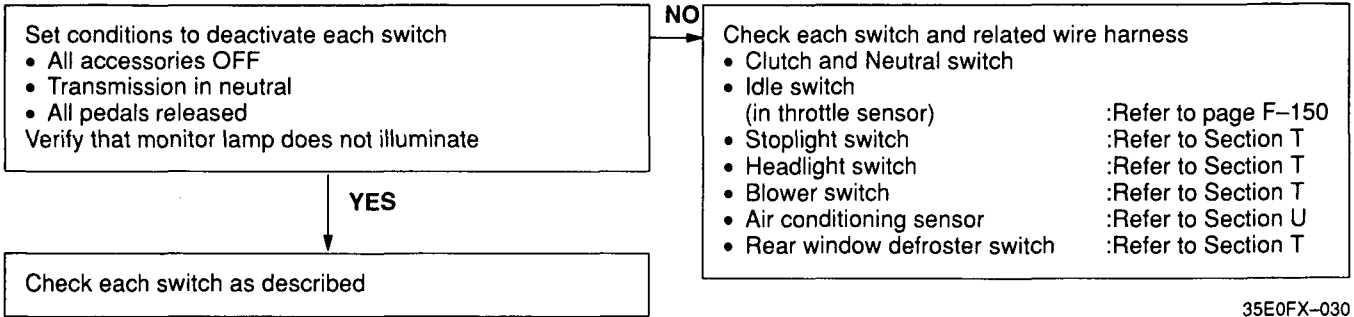
35E0FX-029



35A0FX-123

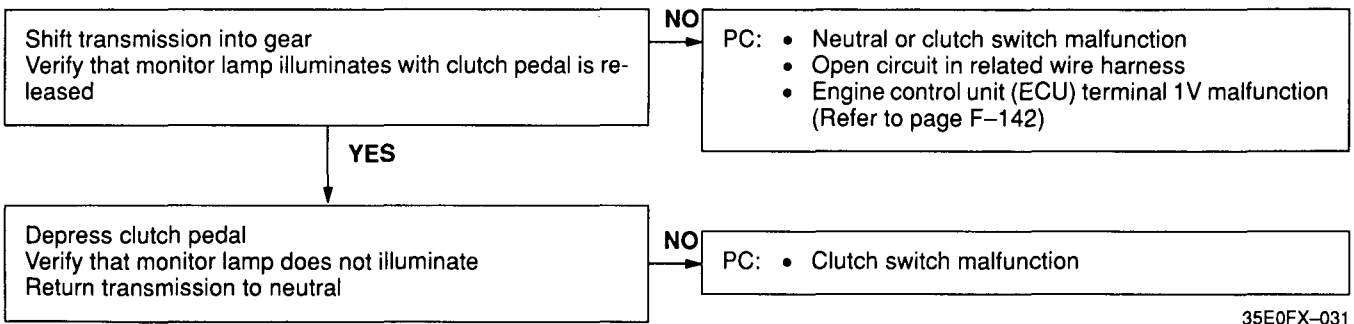
1. Connect the **SST** to the diagnosis connector as shown.
2. Turn the ignition switch ON. Check if the monitor lamp illuminates when each switch is made to function as described below.
If any switch remains activated, the monitor lamp will be illuminated.
3. Connect the **SST** to the diagnosis connector as shown.
4. Turn the ignition switch to ON (engine off). Check if the monitor lamp illuminates when each switch is adjusted as described above.

Procedure



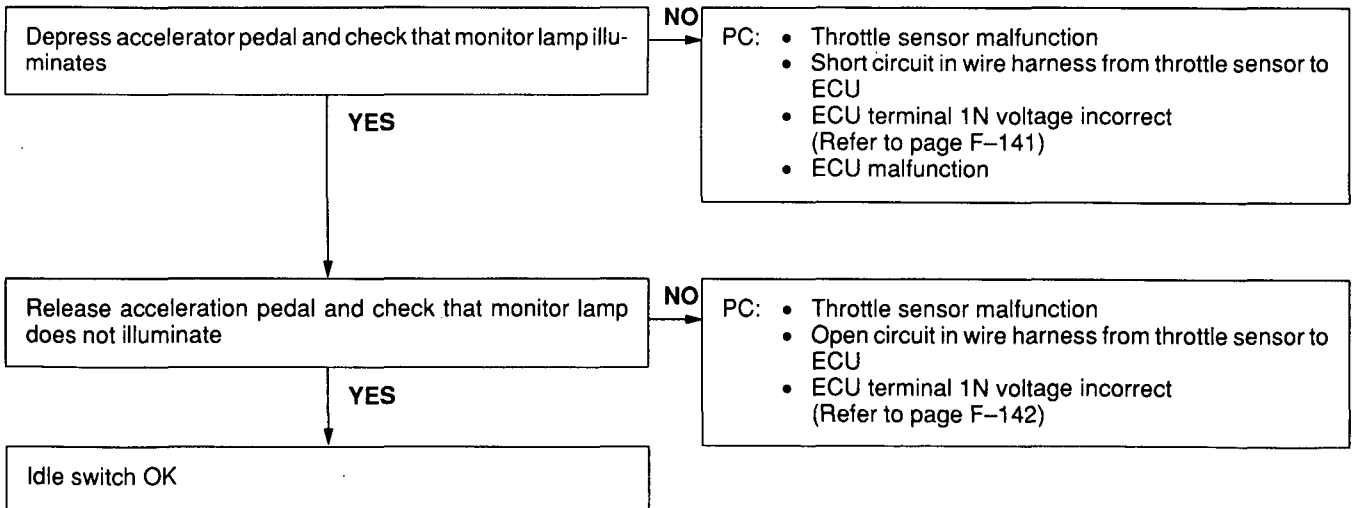
35E0FX-030

Neutral and Clutch switches



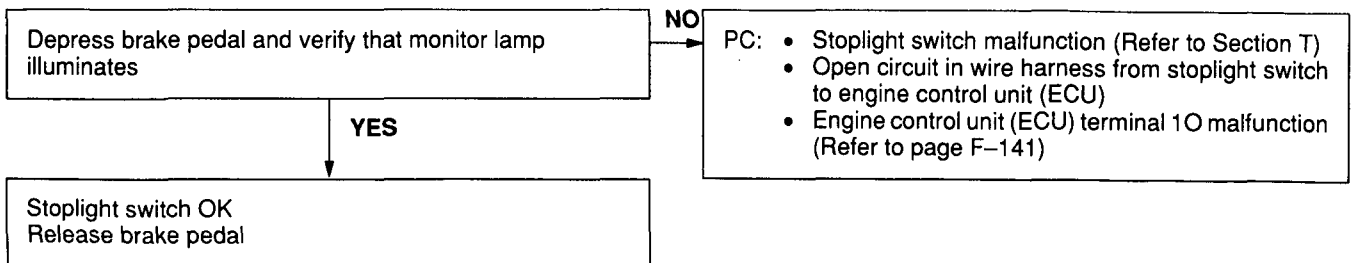
35E0FX-031

Idle switch (in throttle sensor)



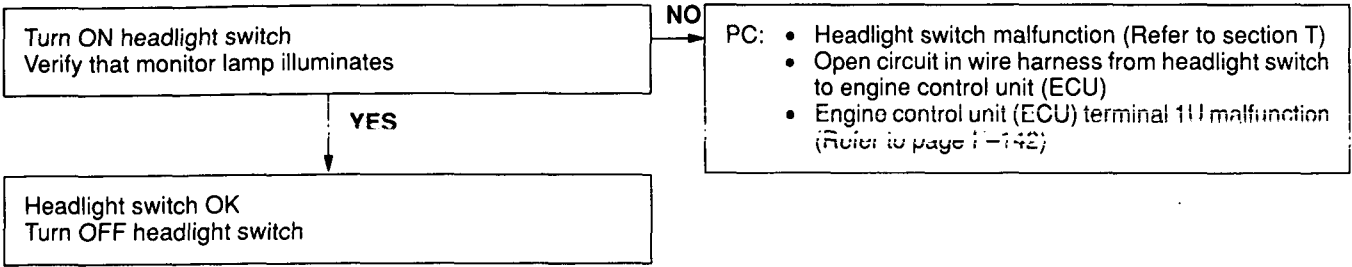
35A0FX-127

Stoplight switch



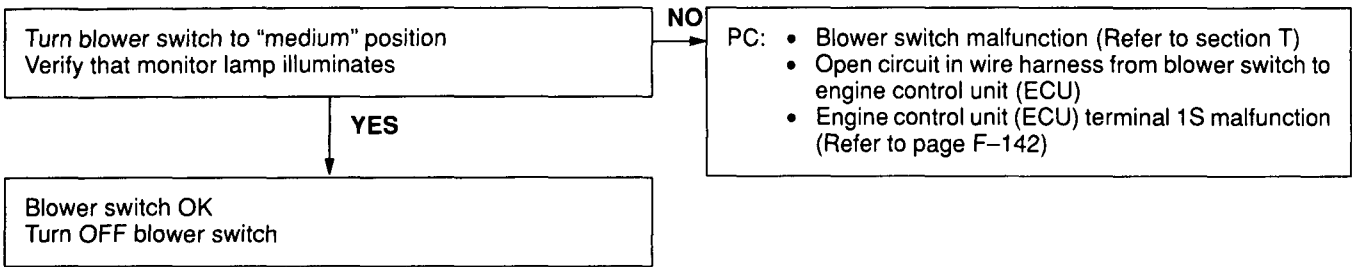
35A0FX-128

Headlight switch



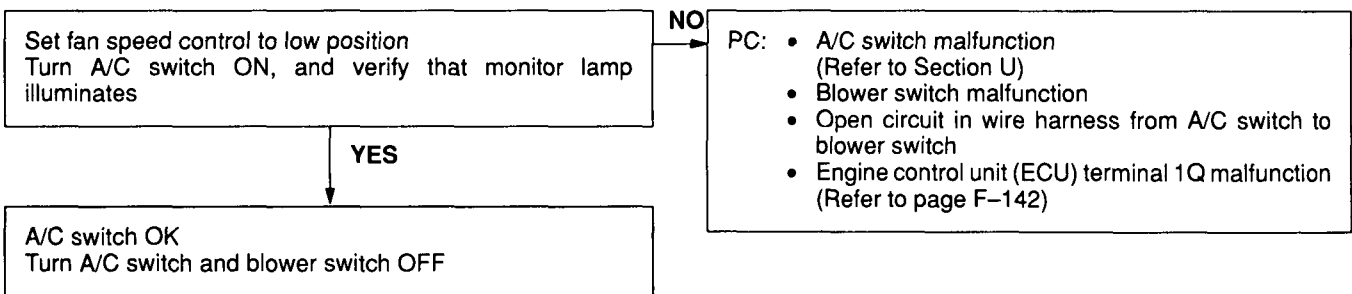
35A0FX-129

Blower switch



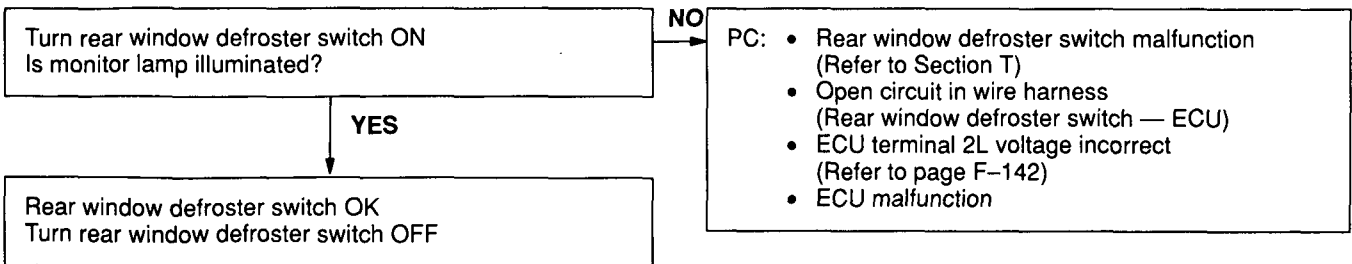
35A0FX-130

A/C switch (with A/C)



35E0FX-032

Rear window defroster switch



35A0F2-132

INTAKE AIR SYSTEM

COMPONENTS

Removal / Inspection / Installation

Warning

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

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

Warning

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

Fuel Line Safety Procedures

A. Release the fuel pressure before disconnecting a fuel line.

1. Start the engine.
2. Remove the circuit opening relay.
3. After the engine stalls, turn the ignition switch to OFF.
4. Install the circuit opening relay.

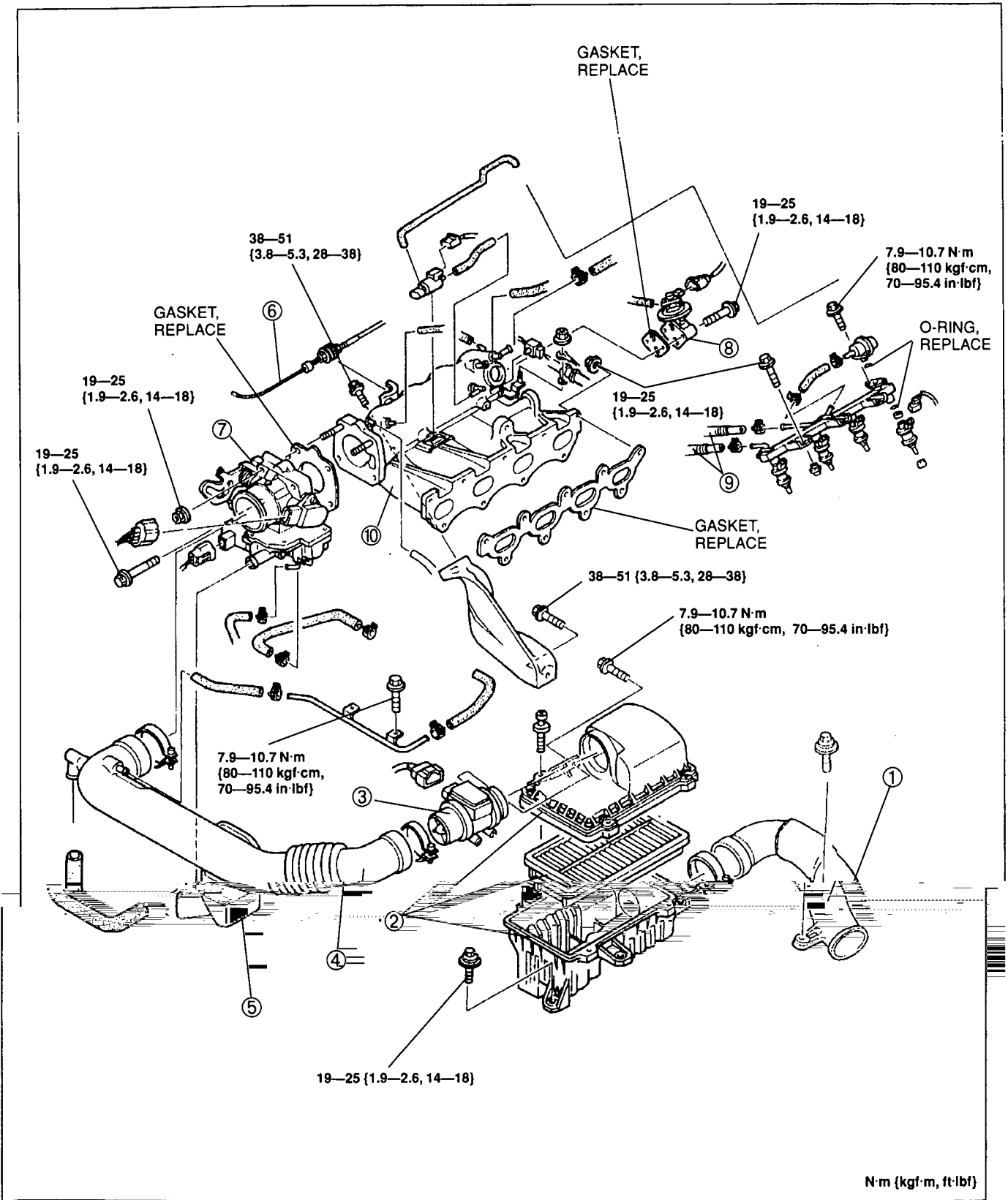
B. Avoid leakage.

1. When disconnecting a fuel line hose, wrap a rag around it to protect against fuel leakage.
2. Plug the hose after removal.

C. Install hose clamps to secure the fuel pressure gauge connections.

1. Drain the engine coolant.
2. Remove in the order shown in the figure.
3. Check the components for damage and repair or replace as necessary.
4. Install in the reverse order of removal, using new gaskets.
5. Refill the engine coolant.

INTAKE AIR SYSTEM



N-m (kgf-m, ft-lbf)

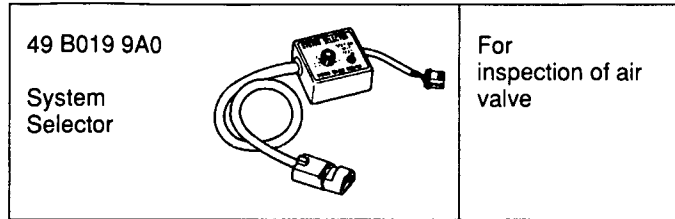
35E0FX-033

- 1. Air duct
- 2. Air cleaner assembly
Inspection / Replacement page F-148
- 3. Airflow sensor
- 4. Air hose
- 5. Resonance chamber

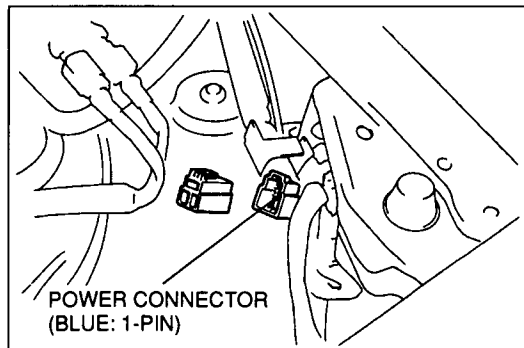
- 6. Accelerator cable
- 7. Throttle body
- 8. EGR control valve
- 9. Fuel hose
- 10. Intake manifold

IDLE SPEED CONTROL (ISC) SYSTEM

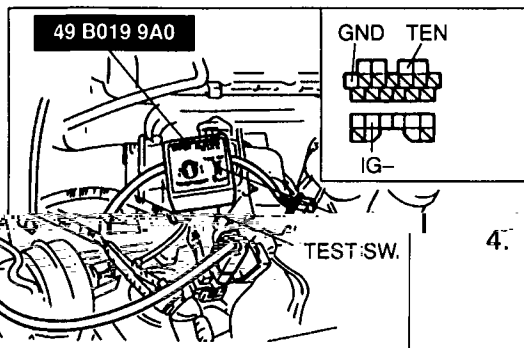
PREPARATION
SST



45U0FX-218



35A0FX-134



35A0FX-145

BAC VALVE

System Operation

Air valve

Perform this inspection when the engine is cold. (Engine coolant temperature below 20°C {68°F}.)

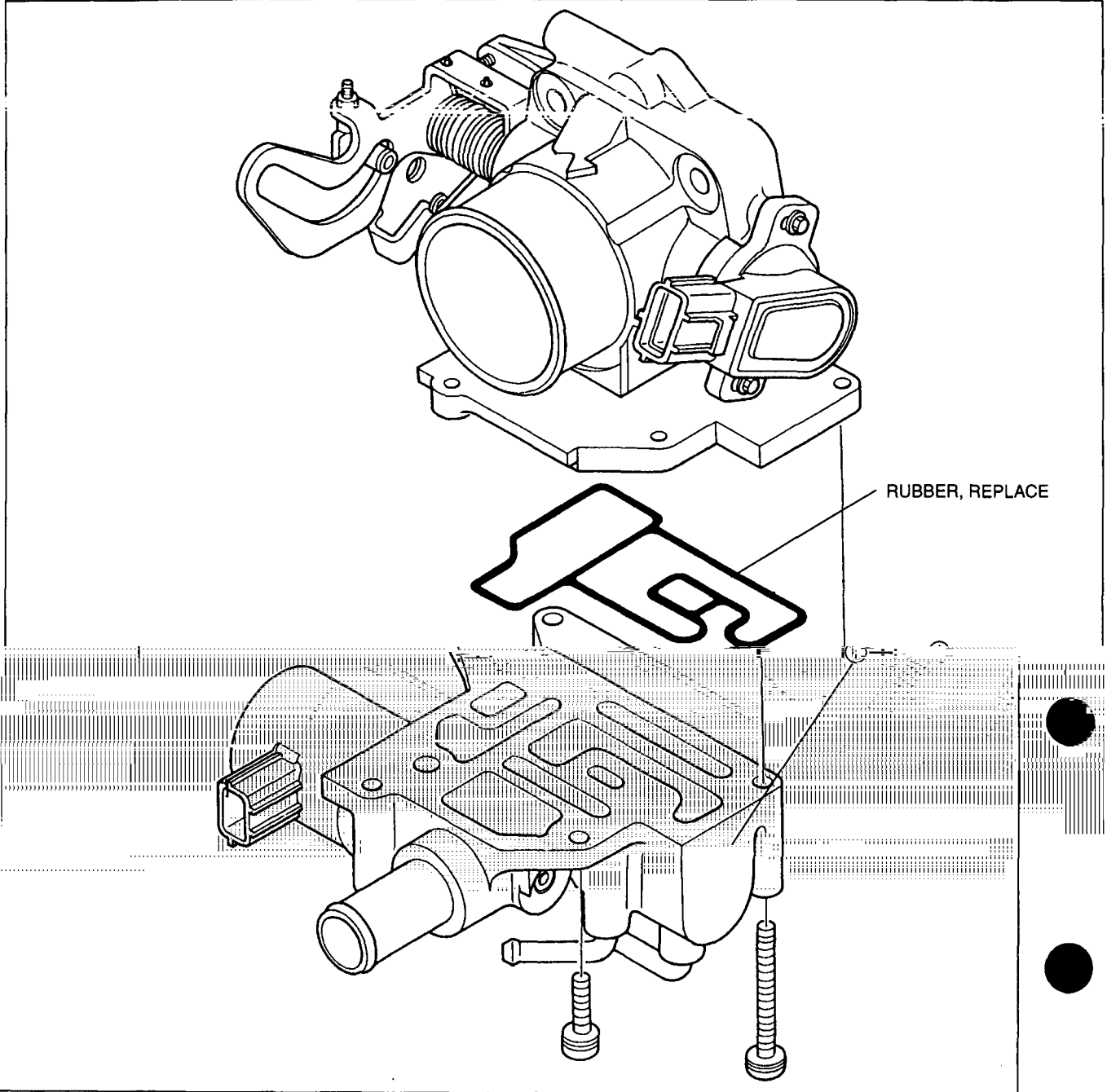
1. Connect a tachometer to the diagnosis connector terminal IG-. When using an externally powered timing light and/or tachometer connect it to the power connector (Blue: 1-pin).

Caution

- Grounding the power connector terminal (Blue: 1-pin) will burn out the 20A wiper fuse.

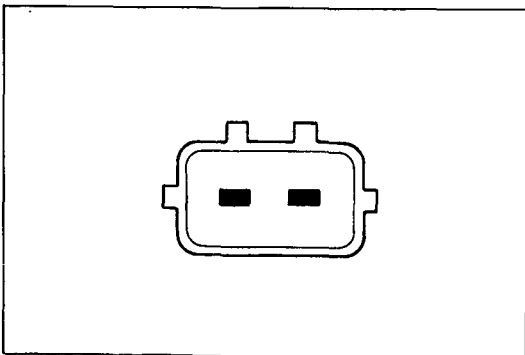
2. Connect the SST and set the TEST SW to "SELF TEST" or connect diagnosis connector terminals TEN and GND with a jumper wire.
3. Verify that the engine speed gradually decreases as the engine warms up.
4. Remove the SST or the jumper wire.

Removal / Installation



35A0FX-146

1. BAC valve
System operation page F-123



35A0FX-147

ISC SOLENOID VALVE

Inspection

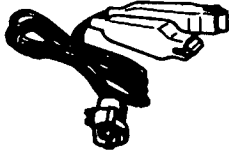
1. Disconnect the ISC solenoid valve connector
2. Connect an ohmmeter between the terminals of the ISC solenoid valve and measure the resistance.

Resistance (at 20°C {68°F}): 11.5 ± 0.8Ω

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

FUEL SYSTEM

**PREPARATION
SST**

<p>49 L018 901</p> <p>Checker, injector</p>		<p>For inspection of fuel injector</p>
-------------------------------------------------	-----------------------------------------------------------------------------------	------------------------------------------------

45U0FX-225

PRECAUTION

Warning

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

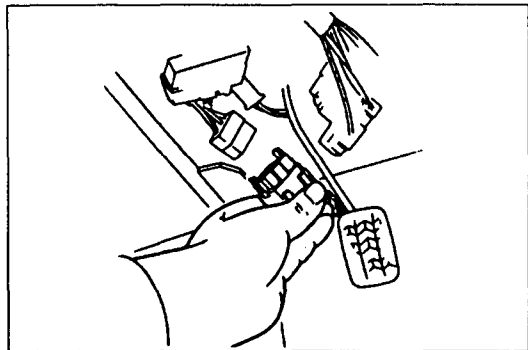
Fuel in the fuel system is under high pressure when the engine is not running.

Warning

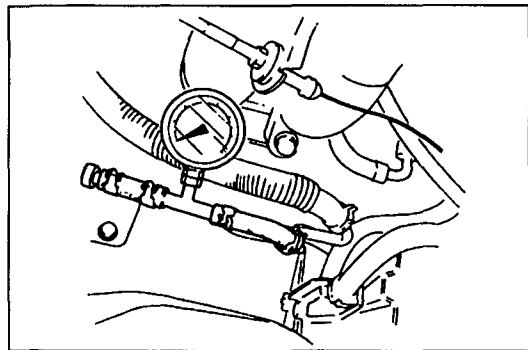
- Fuel line spills and leaks are dangerous. Fuel can ignite and cause serious injuries or death and damage. Fuel can also irritate skin and eyes. To prevent this, always complete the following "Fuel Line Safety Procedures".

Fuel Line Safety Procedures

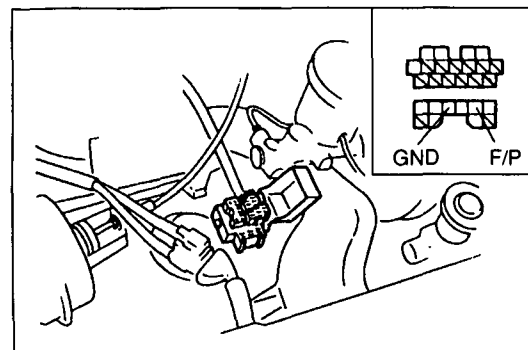
- Release the fuel pressure before disconnecting a fuel line.
 - Start the engine.
 - Disconnect the circuit opening relay connector.
 - After the engine stalls, turn the ignition switch to OFF.
 - Reconnect the circuit opening relay connector.
- Avoid leakage.
 - When disconnecting a fuel line hose, wrap a rag around it to protect against fuel leakage.
 - Plug the hose after removal.
- Install hose clamps to secure the fuel pressure gauge connections.



35A0FX-148



35A0FX-149

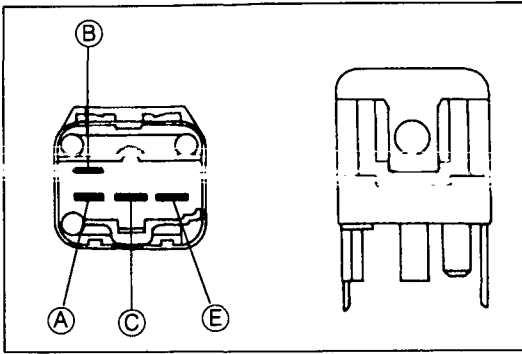


35A0FX-150

Priming Fuel System

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

1. Connect diagnosis connector terminals F/P and GND with a jumper wire.
2. Turn the ignition switch ON for **approx. 10 sec.** and check for fuel leaks.
3. Turn the ignition switch OFF and remove the jumper wire.



35A0FX-151

CIRCUIT OPENING RELAY

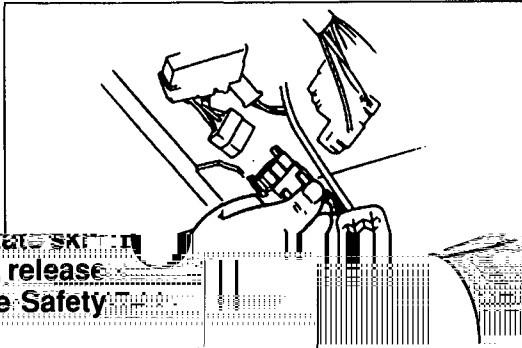
Inspection

Apply battery voltage and a ground to the terminals below and check the circuit opening relay operation as described.

Vb: Battery voltage

Vb	Grounded	Correct result
A	B	C — E: Continuity

If not as specified, replace the circuit opening relay.



35A0FX-152

PRESSURE REGULATOR

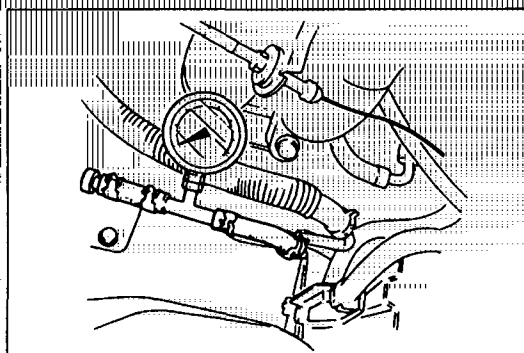
Inspection

Fuel line pressure

Warning

- Fuel line spills and leaks can be dangerous. Fuel can ignite and cause serious injuries or death and

can damage the vehicle. Fuel can also irritate skin and eyes. To prevent this from happening, release the fuel pressure according to "Fuel Line Safety Procedures" on page F-125.

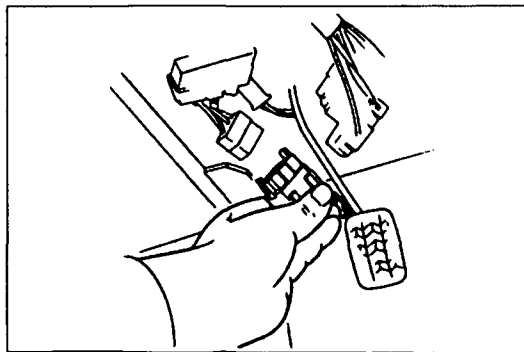


35A0FX-153

1. Disconnect the negative battery terminal.
2. Connect a fuel pressure gauge between the fuel pipe and the fuel main hose. (Install clamps as shown.)
3. Connect the negative battery terminal.
4. Start the engine and run it at idle.
5. Measure the fuel line pressure.

Fuel line pressure:

216—264 kPa {2.2—2.7 kg/cm², 31—38 psi}



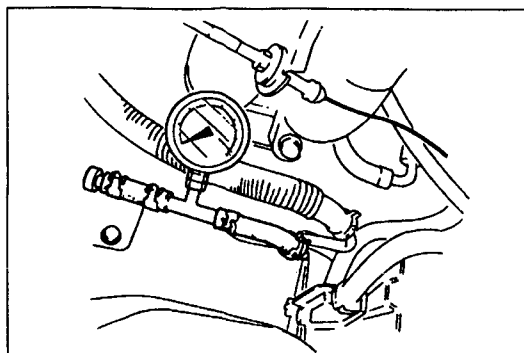
35A0FX-154

Hold pressure

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

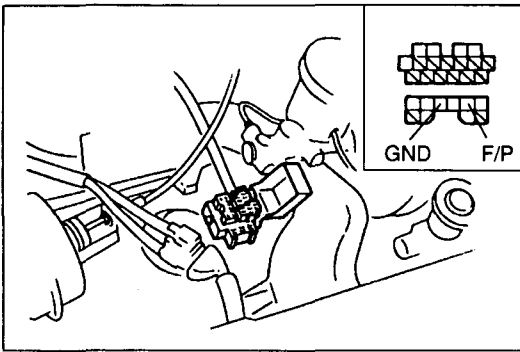
Warning

- Fuel line spills and leaks can be dangerous. Fuel can ignite and cause serious injuries or death and can damage the vehicle. Fuel can also irritate skin and eyes. To prevent this from happening, release the fuel pressure according to "Fuel Line Safety Procedures" on page F-125.



35A0FX-155

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



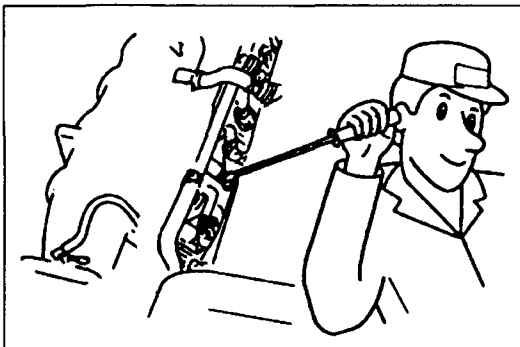
35A0FX-156

4. Connect diagnosis connector terminals F/P and GND with a jumper wire.
5. Turn the ignition switch ON for 10 sec. to operate the fuel pump.
6. Turn the ignition switch OFF and disconnect the jumper wire.
7. Block the outlet of the pressure regulator.
8. Observe the fuel pressure for 5 min.

Fuel pressure:

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

9. If pressure is as specified, replace the pressure regulator.



35A0FX-157

FUEL INJECTOR

Inspection

Operation check

1. Warm up the engine and run it at idle.
2. Listen for operational sound of the fuel injector with a screwdriver or a sound scope.
3. If no sound is heard, measure fuel injector resistance.
4. If the fuel injector resistance is OK, check wiring to the fuel injector and engine control unit (ECU) terminals 2U, 2V, 2Y and 2Z voltages.

Fuel injector resistance

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

Resistance: 12-16Ω (at 20°C {68°F})

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

Removal

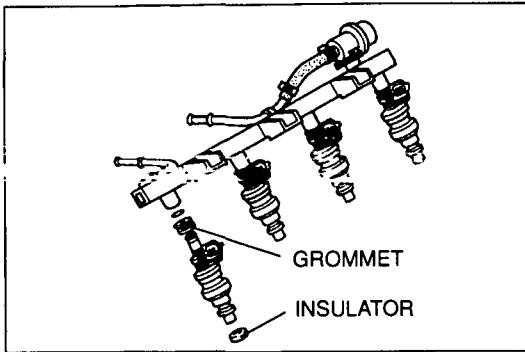
Warning

- Fuel line spills and leaks can be dangerous. Fuel can ignite and cause serious injuries or death and can damage the vehicle. Fuel can also irritate skin and eyes. To prevent this from happening, release the fuel pressure according to "Fuel Line Safety Procedures" on page I-125.

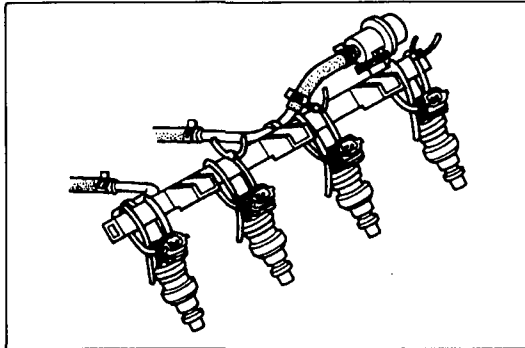
1. Disconnect the negative battery terminal.

2. Remove the PCV hose.
3. Disconnect the vacuum hose.
4. Disconnect the fuel injector connectors.

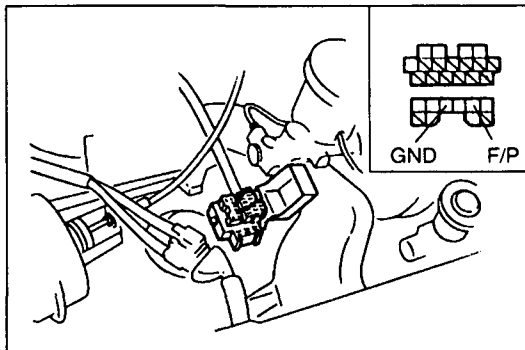
35A0FX-159



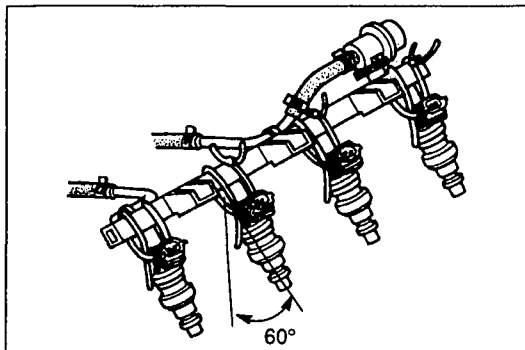
35A0FX-160



35A0FX-161



35A0FX-162



35A0FX-163

5. Remove the fuel distributor and the pressure regulator.
6. Remove the grommets, fuel injectors, and insulators.

Inspection

Fuel leakage test

1. Firmly affix the fuel injectors to the fuel distributor with wire.
2. Disconnect the fuel injector connectors.
3. Remove the fuel distributor and fuel injectors together with the fuel hoses connected.

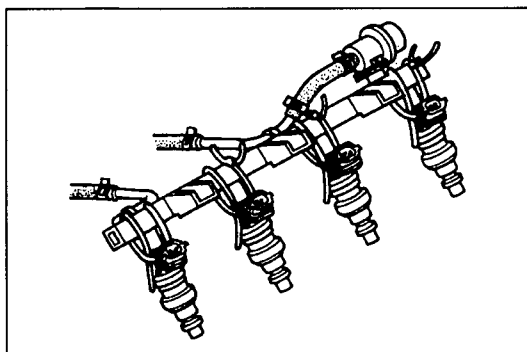
4. Connect diagnosis connector terminals F/P and GND with a jumper wire.

5. Turn the ignition switch ON.
6. Tilt the fuel injectors **approx. 60 degrees** and verify that no fuel leaks from the fuel injector nozzles.
7. If fuel leaks from an fuel injector, replace it.

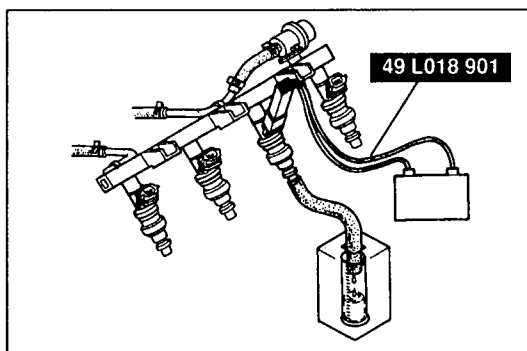
Leakage Specification

If there is more than **one drop per 2 minutes**, replace the fuel injector.

8. Turn the ignition switch OFF and remove the jumper wire.



35A0FX-164



35A0FX-165

Volume test

Warning

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

1. Firmly affix the fuel injectors to the fuel distributor with wire.
2. Disconnect the fuel injector connectors.
3. Remove the fuel distributor and fuel injectors together with the fuel hoses connected.
4. Connect the **SST** to the battery and an fuel injector.
5. Check the injection volume with a graduated container.

Injection volumes:

59—76 ml {59—76 cc, 1.8—2.3 fl oz}/15 sec.

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

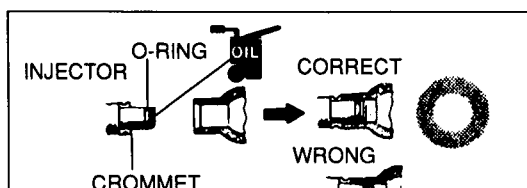
Installation

Install in the reverse order of removal, referring to **Installation note**.

Tightening torque:

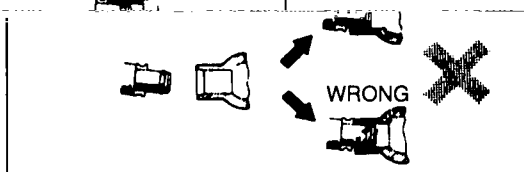
Delivery pipe

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

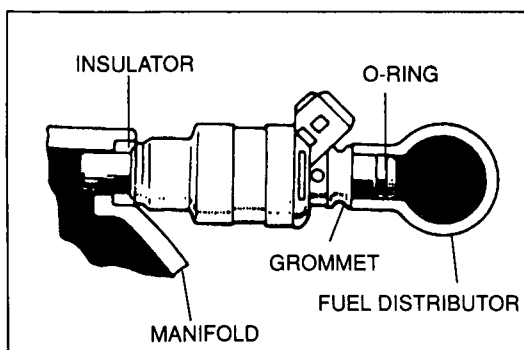


Installation note

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

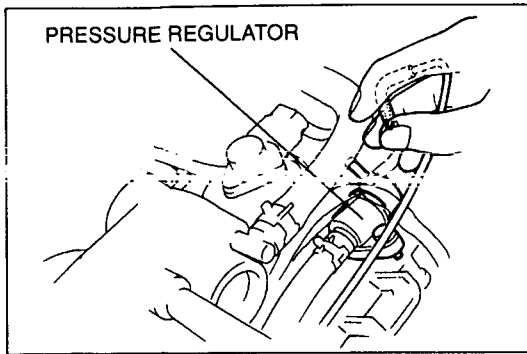


35A0FX-166

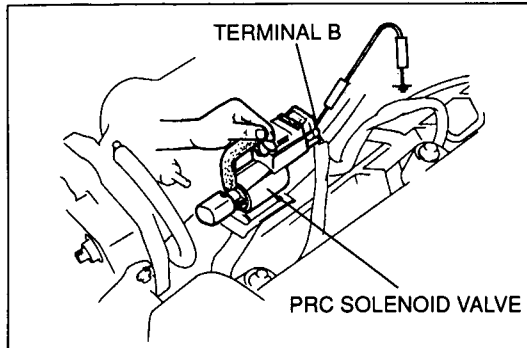


35A0FX-167

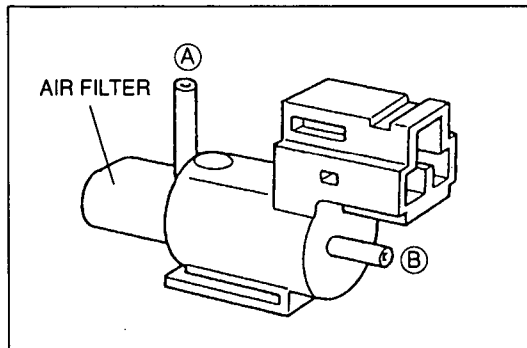
3. Use new fuel injector insulators.
4. Install the fuel injectors and new fuel injector



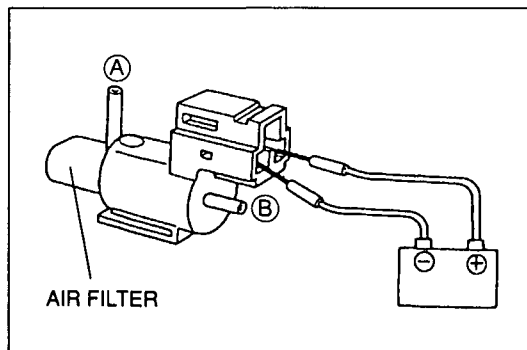
35A0FX-168



35A0FX-169



35A0FX-170



35A0FX-171

PRESSURE REGULATOR CONTROL SYSTEM

PRC SOLENOID VALVE

Inspection (On-vehicle)

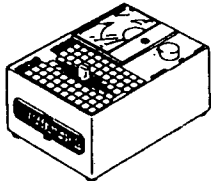
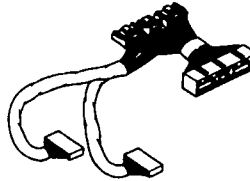
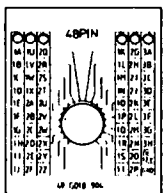
1. Start the engine and run it at idle.
2. Disconnect the vacuum hose from the pressure regulator. Verify that vacuum is felt.
3. Ground the PRC solenoid valve terminal B with a jumper wire. Verify that no vacuum is felt.
4. If vacuum exists, check the PRC solenoid valve.

Inspection

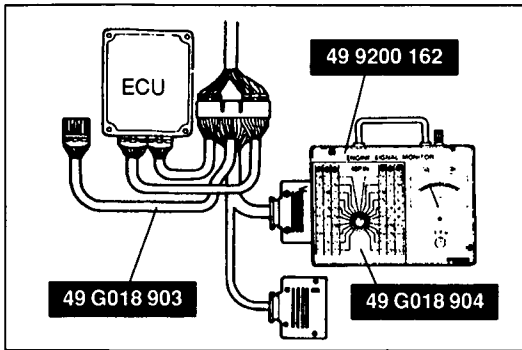
1. Disconnect the vacuum hose from the PRC solenoid valve and vacuum pipe.
2. Blow through the PRC solenoid valve from port A.
3. Verify that air flows from port B.
4. Disconnect the PRC solenoid valve connector.
5. Connect battery voltage and a ground to the terminals of the PRC solenoid valve.
6. Blow through the PRC solenoid valve from the port A.
7. Verify that air flows from the valve air filter.
8. If not as specified, replace the PRC solenoid valve.

EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM

PREPARATION
SST

<p>49 9200 162 Engine Signal Monitor</p> 	<p>For inspection of EGR</p>	<p>49 G018 903 Adapter harness</p> 	<p>For inspection of EGR</p>
<p>49 G018 904 Sheet</p> 	<p>For inspection of EGR</p>	<p>—</p>	<p>—</p>

36O0F2-110



35A0FX-172

SYSTEM OPERATION

1. Connect the SSTs to the ECU as shown.
2. Start the engine.
3. Drive the vehicle and verify that ECU terminals 1R and 1T voltage is battery voltage (VB) while the engine is still cold.
4. Warm up the engine to normal operating temperature and let it idle.
5. Drive the vehicle and verify that the Engine Signal Monitor green and red lamps flash when the SST is set to 1R and 1T.
6. Ground the ECU terminal 1T by using a jumper wire.
7. Verify that the engine runs roughly or stalls at idle.

EGR SOLENOID VALVE (VACUUM)

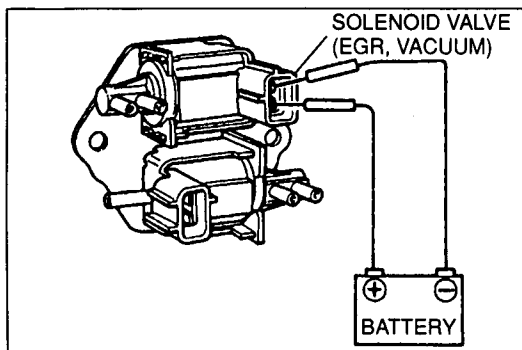
Inspection

1. Remove the solenoid valve.
2. Apply battery voltage to terminal A and ground terminal B of the solenoid valve. Verify that air flows as shown below.

Specification

VB: Battery voltage

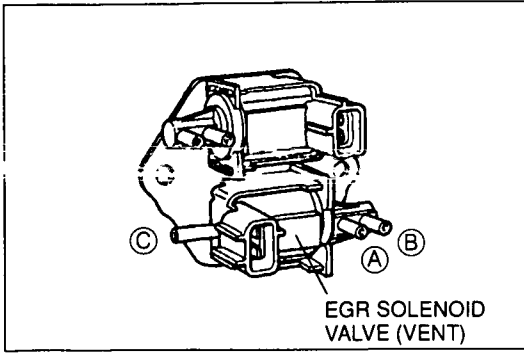
Terminal A—B	Air flow
Apply VB	Yes
Not apply VB	No



3. If not as specified, replace the EGR solenoid valve (vacuum).

F

EXHAUST GAS RECIRCULATION (EGR) CONTROL SYSTEM



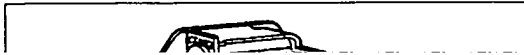
EGR SOLENOID VALVE (VENT)

Inspection

1. Remove the solenoid valve.
2. Verify that air flows as shown below.

Specification

Port	Air flow
A—B	Yes
A—C	No
B—C	No

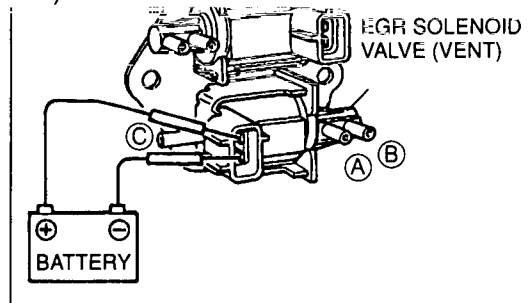


Apply voltage to terminal A and ground terminal B of the solenoid valve. Verify that air flows as shown below.

Port	Air flow
A—B	Yes
A—C	Yes
B—C	Yes

If not as specified, replace the EGR solenoid valve.

3. If not as specified, replace the EGR solenoid valve (vent).



4. Apply battery voltage to terminal A and ground terminal B of the solenoid valve. Verify that air flows as shown below.

Specification

Port	Air flow
A—B	Yes
A—C	No
B—C	No

5. If not as specified, replace the EGR solenoid valve (vent).

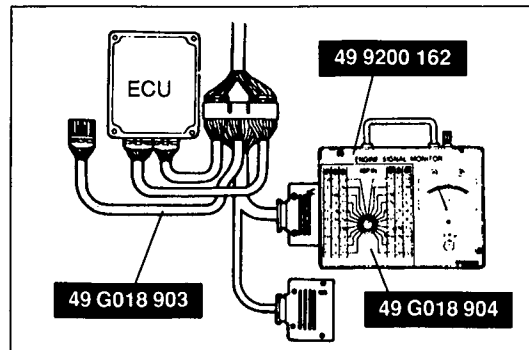
EGR POSITION SENSOR

Output voltage inspection

Disconnect the ECU connector. Connect the SST to the ECU as shown and connect a vacuum pump. Turn the ignition switch to ON (engine OFF). Measure the output voltage at the terminals as shown in the table.

	Vacuum	
	Approx. 0 kPa {0 mmHg, 0 inHg}	Approx. 20 kPa {150 mmHg, 5.9 inHg}
	4.5—5.5 V	
	0V	
	Approx. 0.8 V	Approx. 5 V

If not as specified, check the wiring harness and the ECU.



EGR POSITION SENSOR

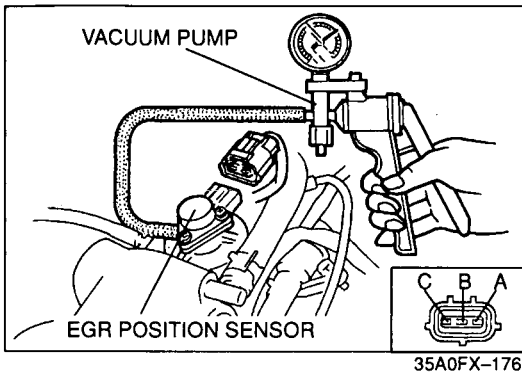
Inspection

Output voltage

1. Disconnect the ECU connector.
2. Connect the SST to the ECU as shown and connect a vacuum pump.
3. Turn the ignition switch to ON (engine OFF).
4. Measure the output voltage at the terminals as shown in the table.

Terminal	ECU
B	2K
A	2D
C	2J

5. If not as specified, check the wiring harness and the ECU.



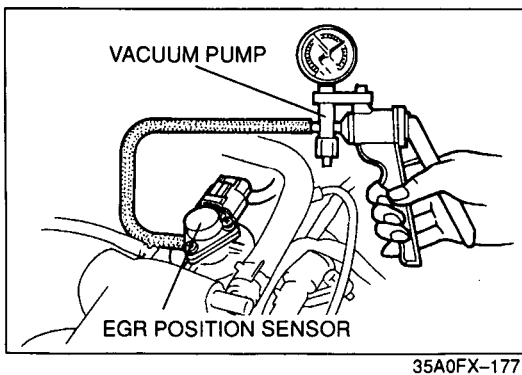
Resistance

1. Disconnect the EGR position sensor connector, and connect an ohmmeter.
2. Disconnect the vacuum hose from the EGR control valve, and connect a vacuum pump.
3. Measure the resistance between the terminals as shown while vacuum is applied.

Specification

Terminal	Resistance
B—C	0.1—2.4 kΩ
A—C	0.5—2.7 kΩ
A—B	Approx. 2.7 kΩ

4. If not as specified, replace the EGR control valve.



EGR CONTROL VALVE

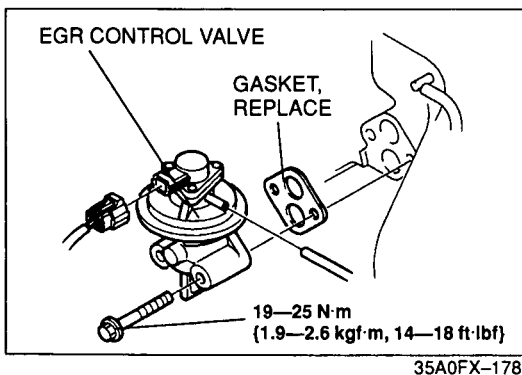
Inspection

1. Start the engine and let it idle.
2. Connect a vacuum pump as shown and apply vacuum.
3. Verify that the engine runs roughly or stalls at more than the specified vacuum.

Specification:

5.4—12.0 kPa {40—90 mmHg, 1.6—3.5 inHg}

4. If not as specified, replace the EGR control valve.



Replacement

Plug the water hoses after disconnecting them.

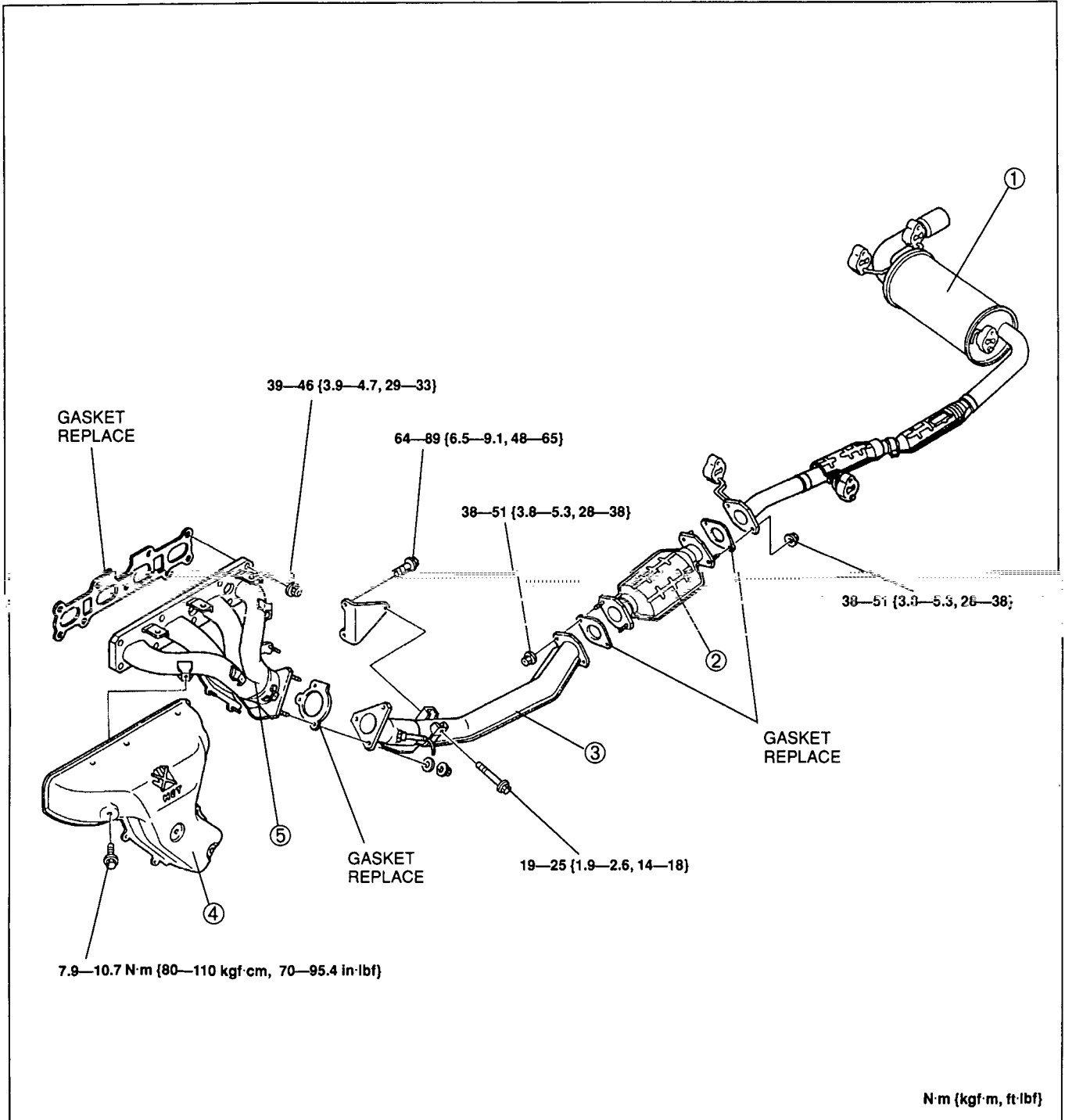
1. Remove the EGR control valve in the sequence shown below.
 - (1) EGR hoses
 - (2) Vacuum hose
 - (3) EGR position sensor connector
 - (4) EGR control valve and gasket
2. Install a new gasket, and then install the EGR control valve in the reverse order of removal.

EXHAUST SYSTEM

COMPONENTS

Removal / Inspection / Installation

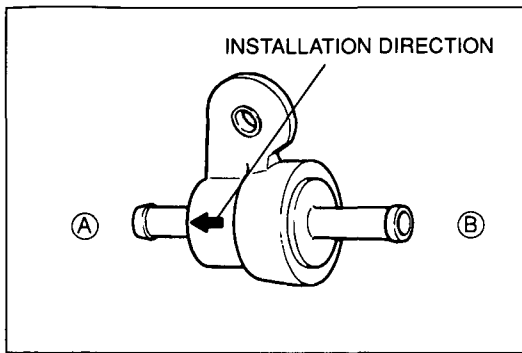
1. Remove in the sequence shown in the figure.
2. Check all components for damage, deterioration, and restriction and repair or replace as necessary.
3. Install in the reverse order of removal.



35E0FX-035

1. Main silencer
Inspect for deterioration and restriction
2. Catalytic converter
3. Front exhaust pipe
Inspect for deterioration and restriction

4. Insulator
5. Exhaust manifold
Inspect for damage



EVAPORATIVE EMISSION CONTROL SYSTEM

TWO-WAY CHECK VALVE

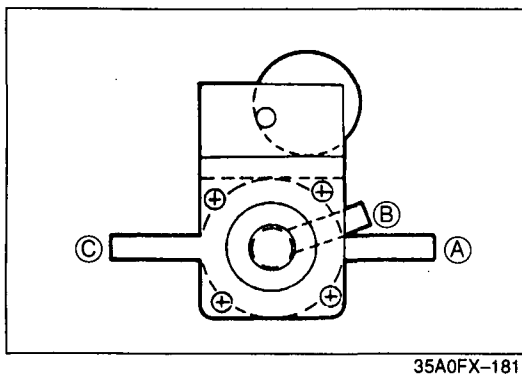
Inspection

1. Remove the valve.
2. Check the operation of the valve with a vacuum pump.

Specification

Apply approx. 15 mmHg {0.59 inHg} vacuum at port A	Airflow
Apply approx. 44 mmHg {1.73 inHg} vacuum at port B	Airflow

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



THREE-WAY CHECK VALVE

Inspection

1. Remove the valve and plug the port C.
2. Check operation of the valve with a vacuum pump.

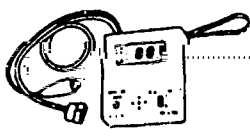
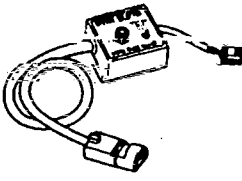
Specification

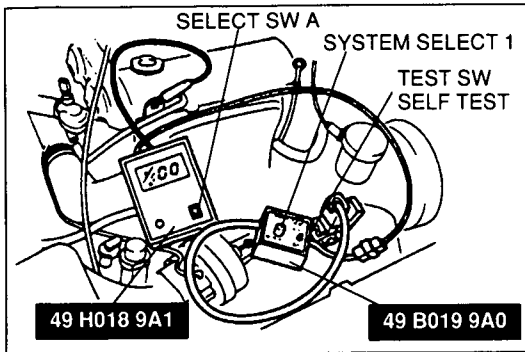
Apply approx. 37 mmHg {1.46 inHg} vacuum at port A	Airflow
Apply approx. 70 mmHg {2.76 inHg} vacuum at port B	Airflow

3. If not as specified, replace the three-way check valve.

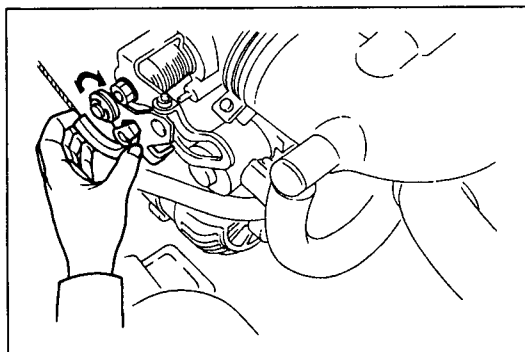
COOLING FAN CONTROL SYSTEM

PREPARATION SST

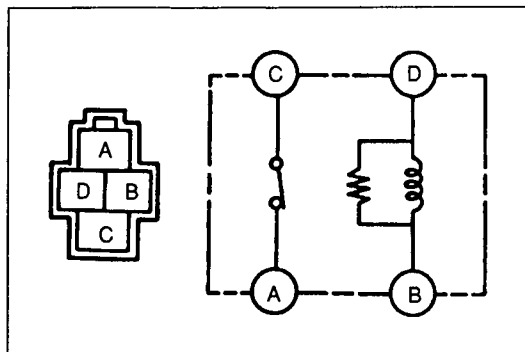
<p>49 H018 9A1</p> <p>Self-Diagnosis Checker</p> 	<p>For diagnosis</p>	<p>49 B019 9A0</p> <p>System Selector</p> 	<p>For diagnosis</p>
------------------------------------------------------------------------------------------------------------------------------------	----------------------	------------------------------------------------------------------------------------------------------------------------------	----------------------



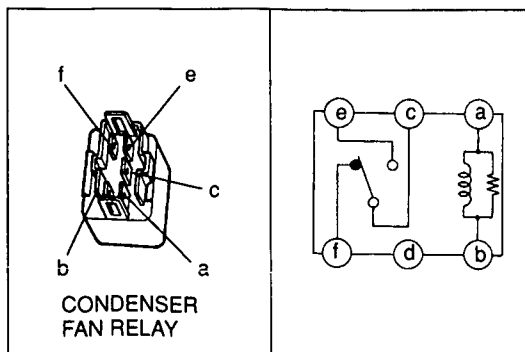
35A0FX-182



35A0FX-183



35A0FX-184



35A0FX-185

SYSTEM INSPECTION

1. Connect the **SST** to the diagnosis connector.
2. Set switch Ⓐ to position 1.
3. Set the test switch to SELF-TEST.
4. Turn the ignition switch ON.
5. Rotate the throttle link by hand and verify that cooling fan and condenser fan operates.
6. Disconnect the **SST**.
7. If not specified, inspect as following.
 - ECU 1N terminal voltage
 - ECU 2H terminal voltage
 - Cooling fan relay
 - Condenser fan relay

COOLING FAN RELAY

Inspection

1. Remove the cooling fan relay
2. Check continuity between the terminals of the relay.

V_B: Battery voltage

Terminal A — B	Terminal C — D
Apply V _B	Yes
V _B not applied	No

3. If not specified, replace the cooling fan relay.

CONDENSER FAN RELAY

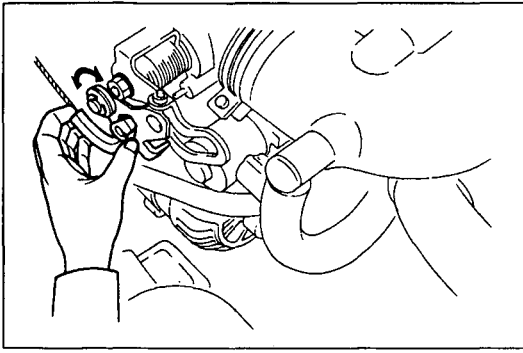
Inspection

1. Remove the condenser fan relay.
2. Check continuity between the terminals of the relay.

V_B: Battery voltage

Terminal A — B	Terminal C — E
Apply V _B	Yes
V _B not applied	No

3. If not specified, replace the condenser fan relay.

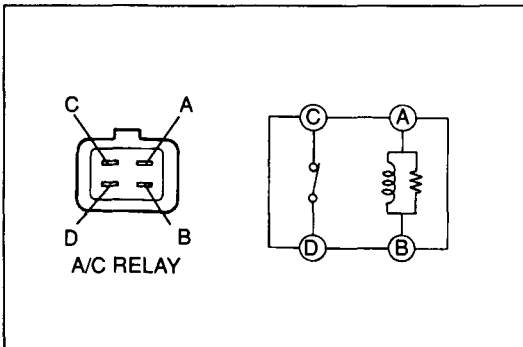


35A0FX-186

A/C CUT-OFF CONTROL SYSTEM (WITH A/C)

SYSTEM INSPECTION

1. Turn the ignition switch ON.
2. Turn the blower switch and A/C switch ON.
3. Start the engine.
4. Verify that the A/C stops for approx. 2 sec. after the engine start.
5. Rotate the throttle link to fully open position.
6. Verify that the A/C stops for approx. 5 sec. after the throttle link to fully open position.
7. If not specified, inspect as following.
 - ECU 1Q terminal voltage
 - A/C relay
 - Throttle sensor



35A0FX-187

A/C RELAY

Inspection

1. Remove the A/C relay.
2. Check the continuity between the terminals of the relay.

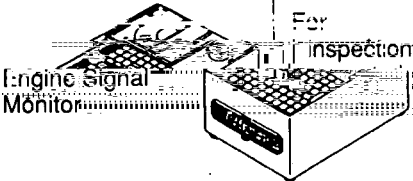
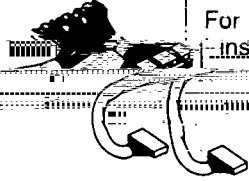
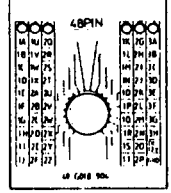
V_B: Battery voltage

Terminal A — B	Terminal C — D
Apply V _B	Yes
V _B not applied	No

3. If not specified, replace the A/C relay.

CONTROL SYSTEM

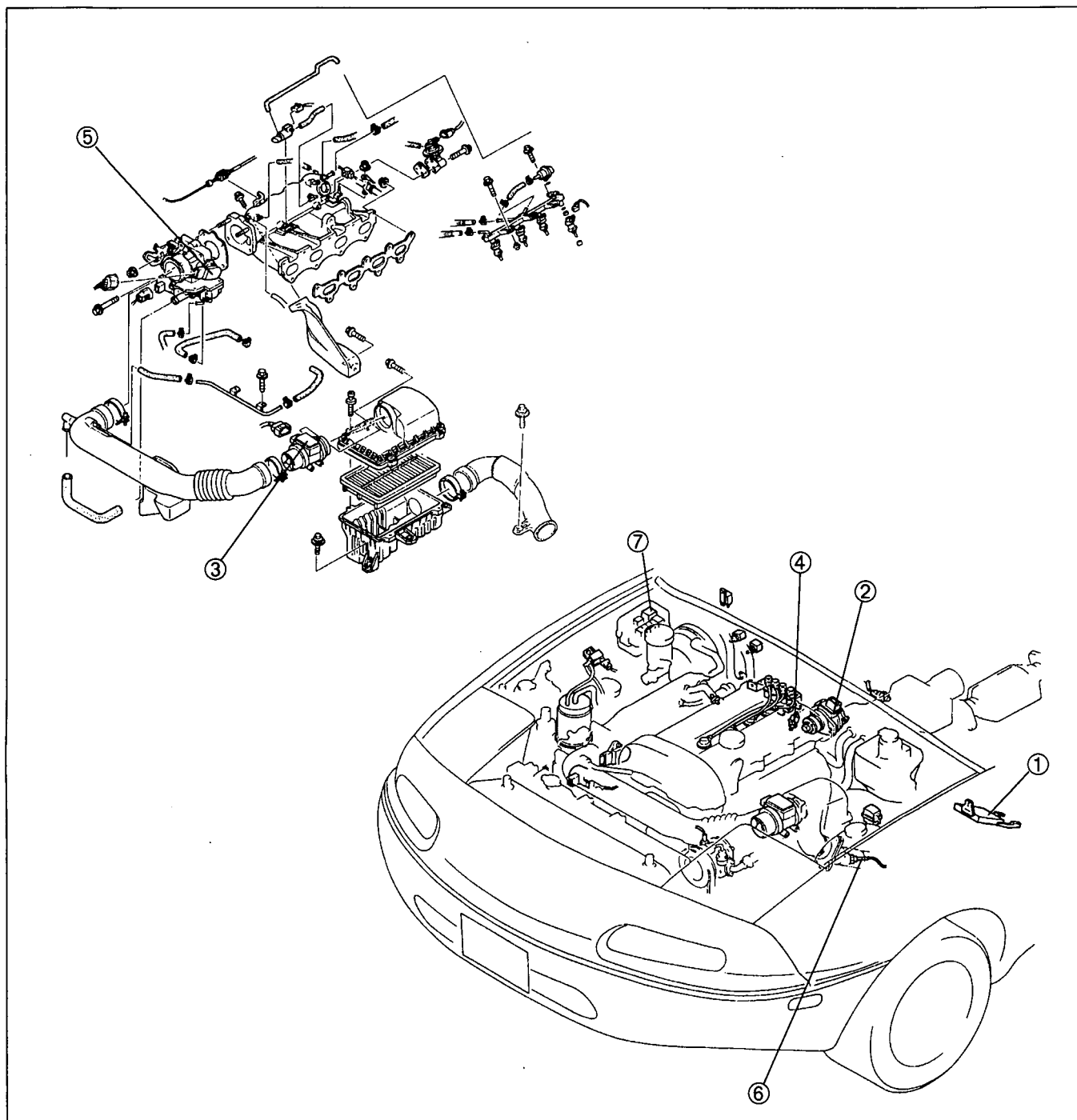
PREPARATION SST

49 9200 162	 <p>For inspection of Engine Signal Monitor</p>	49 G018 903	 <p>For inspection of Adapter harness</p>	powertrain control module (engine)
49 G018 904	 <p>Sheet</p>	For inspection of powertrain control module (engine)	-	-

DFX-188

35A

STRUCTURAL VIEW



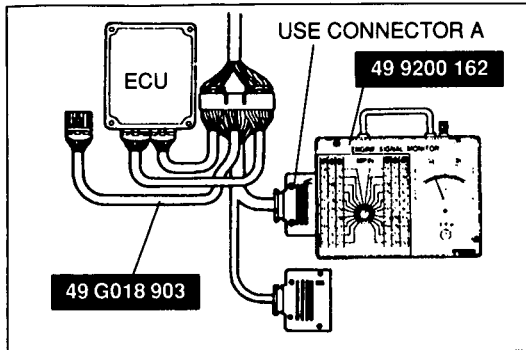
35A0FX-189

- | | |
|------------------------------------|------------------------------|
| 1. Engine control unit (ECU) | 5. Throttle sensor |
| Inspection page F-140 | Inspection page F-150 |
| 2. Crank angle sensor | Adjustment page F-151 |
| Inspection page F-149 | Replacement page F-151 |
| Replacement page F-149 | 6. Oxygen sensor |
| 3. Airflow sensor | Inspection page F-152 |
| System inspection page F-148 | Replacement page F-152 |
| Inspection page F-148 | 7. Main relay |
| 4. Water thermostator | |
| Removal page F-150 | |
| Inspection page F-150 | |
| Installation page F-150 | |

ENGINE CONTROL UNIT (ECU)

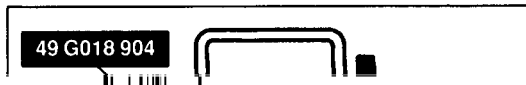
Inspection

1. Lift up the floormat in front of the passenger's seat.
(Refer to section S.)

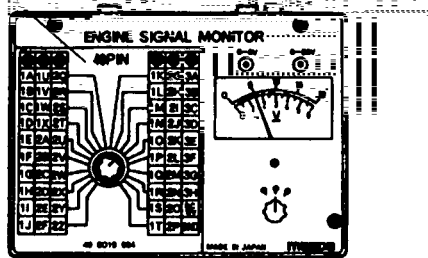


35A0FX-190

2. Connect the **SST (Engine Signal Monitor)** between the engine control unit (ECU) and the wiring harness using the **SST (Adapter)** as shown.



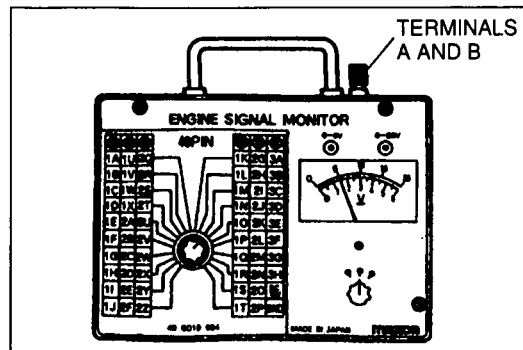
3. Place the **SST (Sheet)** on the **SST (Engine Signal Monitor)**.



35A0FX-191

4. Measure the voltage at each terminal.
(Refer to pages F-141 to F-143.)

terminal voltage is incorrect, check the input or output device and related wiring.
(Refer to pages F-141 to F-143.)



35A0FX-192

5. If any engine control unit (ECU) terminal voltage is incorrect, check the input or output device and related wiring.
(Refer to pages F-141 to F-143.)
6. If they are normal, replace the ECU.
(Refer to pages F-144 to F-147.)

terminal voltage is incorrect, check the input or output device and related wiring.
(Refer to pages F-141 to F-143.)

terminals A or B will damage the SST.

Caution

- Applying voltage to SST terminals A and B will damage the SST.

CONTROL SYSTEM

F

Terminal voltage

V_B: Battery voltage

Terminal	Input	Output	Connection to	Test condition	Voltage	Remark	
1A	○	—	Battery	Constant	V _B	For backup	
1B	○		Main relay	Ignition switch OFF	0V	—	
				Ignition switch ON	V _B		
1C	○		Ignition switch (Start position)	While cranking	Approx. 10V	—	
				Ignition switch ON	0V		
1D		○	Diagnosis connector (MEN terminal)	Test switch at "SELF-TEST" Lamp illuminated for 3 sec. after ignition switch OFF→ON	4.5—5.5V	With Self-Diagnosis Checker and System Selector	
				Lamp not illuminated after 3 sec.	V _B		
				Test switch at "O ₂ MONITOR" at idle Monitor lamp illuminated	4.5—5.5V		
				Test switch at "O ₂ MONITOR" at idle Monitor lamp not illuminated	V _B		
1E		○	Diagnosis connector (FEN terminal)	Light illuminated and buzzer sounded for 3 sec. after ignition switch OFF→ON	Below 2.5V	<ul style="list-style-type: none"> • With System Selector test switch at "SELF-TEST" • With Self-Diagnosis checker and system selector 	
				Light not illuminated and buzzer not sounded after 3 sec.	V _B		
				Light illuminated and buzzer sounded	Below 2.5V		
				Light not illuminated and buzzer not sound	V _B		
1F	—	—	—	—	—	—	
1G	○		#1, 4 Igniter (in IG COIL)	Ignition switch ON	0V	—	
				Idle	Approx. 0.2V		
1H	○		#2, 3 Igniter (in IG COIL)	Ignition switch ON	0V	—	
				Idle	Approx. 0.2V		
1I	—	—	—	—	—	—	
1J	○		A/C relay (with A/C)	Ignition switch ON	V _B	—	
				Air conditioner operates	Below 2.5V		
				Air conditioner does not operate	V _B		
1K	○		Ground	Ignition switch ON	Below 1.0 V	—	
1L		○	Cooling fan relay	Ignition switch ON	V _B	—	
				Idle	Engine coolant temp. Above 97°C (206.6°F)		Below 1.0V
					Other conditions		V _B
				<ul style="list-style-type: none"> • Ignition switch On • Ground diagnosis connector TEN terminal • Idle switch OFF 	Blow 1.0V		
1M	○		Speed sensor	While driving	2—5V	—	
				Ignition switch ON	1 or 7V		
1N	○		Idle switch (in throttle sensor)	Accelerator pedal released	0V	Ignition switch ON	
				Accelerator pedal depressed	V _B		
1O	○		Stoplight switch	Brake pedal released	0V	—	
				Brake pedal depressed	V _B		
1P	○		Power steering pressure switch	Ignition switch ON	V _B	—	
				P/S ON (at idle)	0V		
				P/S OFF (at idle)	V _B		
1Q	○		A/C switch (with A/C)	A/C switch ON	Below 2.5V	<ul style="list-style-type: none"> • Ignition switch ON • Blower motor ON 	
				A/C switch OFF	V _B		
1R		○	EGR solenoid valve (vent)	Idle	V _B	—	
				Initial acceleration*	V _B		

F

CONTROL SYSTEM

V_B: Battery voltage

Terminal	Input	Output	Connection to	Test condition	Voltage	Remark
1S	○		Blower switch	Blower switch at mid, high or super high position	Approx. 0V	Ignition switch ON
				Blower switch OFF or low	Approx. 12V	
1T		○	EGR solenoid valve (vacuum)	Idle	V _B	—
				Initial acceleration*	V _B	
1U	○		Headlight switch	Headlights ON (Tail, parking, low beam/high beam)	Approx. 12V	—
				Headlights OFF	0V	
1V	○		Neutral or clutch switch	Neutral position or clutch pedal depressed	0V	Ignition switch ON
				Other conditions	V _B	
2A	—	—	Ground (Injector)	Constant	0V	—
2B	—	—	Ground (Output)	Constant	0V	—
2C	—	—	Ground (ECU)	Constant	0V	—
2D	—	—	Ground (Input)	Constant	0V	—
2E	○		Crank angle sensor (SGT-signal)	Ignition switch ON	0V or 5V	—
				Idle	Approx. 2V	
2F	○		Airflow sensor	Ignition switch ON	Below 1.0V	—
				Idle	Below 1.0V	
2G	○		Crank angle sensor (SGC-signal)	Ignition switch ON	0V or 5V	—
				Idle	Approx. 1.5V	
2H	○		Diagnosis connector (TEN terminal)	System Selector test switch at "O ₂ MONITOR"	V _B	—
				System Selector test switch at "SELF-TEST"	0V	
2I	○		Igniter	Ignition switch ON	Approx. 11V	* Engine Signal Monitor: Green and red lamps flash
				Idle	Approx. 11V*	
2J	○		EGR position sensor	Ignition switch ON	Approx. 1.0V	—
				While running	Approx. 0—5V	
2K		○	V _{ref}	Ignition switch ON	4.5—5.5V	—
2L	○		Rear window defroster relay	Rear window defroster switch OFF	V _B	Ignition switch ON
				Rear window defroster switch ON	Below 1.0V	
2M	○		Throttle sensor	Accelerator pedal released	0.1—1.1	Ignition switch ON
				Accelerator pedal fully depressed	3.0—4.6	
2N	○		Oxygen sensor	Ignition switch ON	Below 1.0V	—
				Idle (Cold engine)	Below 1.0V	
				Idle (After warm-up)	0—1V	
				Increase engine speed (After warm-up)	0.5—1V	
				Deceleration	0—0.4V	
2O	○		Airflow sensor	Ignition switch ON	Below 1.0V	—
				Idle	1.0—2.0	
2P	○		Intake air thermosensor	At 20°C {68°F}	Approx. 2.5V	• Built in airflow sensor • Ignition switch ON
2Q	○		Water thermosensor	Engine coolant temperature 20°C {68°F}	Approx. 2.5V	Ignition switch ON
				After warm-up	Approx. 0.4V	
2R		○	PRC solenoid valve	Hot condition: Engine coolant temp. above 90°C {194°F} and intake air temp. above 70°C {158°F} for 150 sec. after engine starting	Below 1.0V	—
				Other conditions	V _B	

* Engine Signal Monitor: Green and red lamps flash

CONTROL SYSTEM

F

V_B: Battery voltage

Terminal	Input	Output	Connection to	Test condition	Voltage	Remark	
2S		○	Condenser fan relay (with A/C)	Ignition switch ON	V _B	—	
				Idle	Engine coolant temp. above 108°C {226°F}		Below 1.0V
					Other conditions		V _B
2T		○	Circuit opening relay	Ignition switch ON	V _B	—	
				Idle	Approx. 0V		
2U		○	Fuel injector No.1	Ignition switch ON	V _B	* Engine Signal Monitor: Green and red lamps flash	
				Idle	Approx. 12V*		
				Deceleration from 3,000 rpm to 1,900 rpm (After warm-up)	Approx. 12V		
2V		○	Fuel injector No.2	Ignition switch ON	V _B	* Engine Signal Monitor: Green and red lamps flash	
				Idle	Approx. 12V*		
				Deceleration from 3,000 rpm to 1,900 rpm (After warm-up)	Approx. 12V		
2W		○	ISC solenoid valve	Ignition switch ON	Approx. 2V	—	
				Idle	Approx. 9V		
2X		○	Purge solenoid valve	Ignition switch ON	V _B	—	
				Idle	V _B		
2Y		○	Fuel injector No.3	Ignition switch ON	V _B	* Engine Signal Monitor: Green and red lamps flash	
				Idle	Approx. 12V*		
				Deceleration from 3,000 rpm to 1,900 rpm (After warm-up)	Approx. 12V		
2Z		○	Fuel injector No.4	Ignition switch ON	V _B	* Engine Signal Monitor: Green and red lamps flash	
				Idle	Approx. 12V*		
				Deceleration from 3,000 rpm to 1,900 rpm (After warm-up)	Approx. 12V		

35E0FX-036

F

CONTROL SYSTEM

Check Point for Each Terminal

Vb: Battery voltage

Connection to	Abnormal voltage	Possible cause	Terminal
Always 0V (Battery OK)	<ul style="list-style-type: none"> ROOM 10A fuse burned Open circuit in wiring from ROOM 10A fuse to ECU terminal 1A 		1A Battery
Always 0V	<ul style="list-style-type: none"> Main relay malfunction Open circuit in wiring from main relay to ECU terminal 1B 		1B Main relay
Always 0V (Starter turns)	<ul style="list-style-type: none"> Open circuit in wiring from ignition switch to ECU terminal 1C 		1C Ignition switch (Start position)
Always 0V	<ul style="list-style-type: none"> Main relay malfunction Open circuit in wiring from main relay to diagnosis connector terminal Vb Open or short circuit in wiring from diagnosis connector terminal MEN to ECU terminal 1D 		1D Self-Diagnosis Checker (Monitor lamp)
Always Vb	<ul style="list-style-type: none"> Poor connection at ECU connector ECU malfunction 		
Always approx. 5V	<ul style="list-style-type: none"> ECU malfunction 		
Always below 2.5V (No display on Self-Diagnosis Checker)	<ul style="list-style-type: none"> Main relay malfunction Open circuit in wiring from main relay to diagnosis connector terminal Vb 		1E Self-Diagnosis Checker (Code No.)
Always below 2.5V ("88" is displayed and buzzer sounds continuously)	<ul style="list-style-type: none"> Open or short circuit in wiring from diagnosis connector terminal FEN to ECU terminal 1E 		
		Always Vb	<ul style="list-style-type: none"> Poor connection at ECU connector ECU malfunction
		Always 0V	<ul style="list-style-type: none"> Refer to Code No.01 troubleshooting (Refer to section G)
		Always below 2.5V (A/C does not operate)	<ul style="list-style-type: none"> A/C relay malfunction (Refer to section U) Open circuit in wiring from main relay to A/C relay terminal 1J
		Always below 2.5V (A/C switch OFF but A/C operates)	<ul style="list-style-type: none"> Short circuit in wiring from A/C relay terminal 1J ECU malfunction
		Always Vb	<ul style="list-style-type: none"> A/C switch malfunction (Refer to section U) Poor connection at ECU connector ECU malfunction
		Always Vb	<ul style="list-style-type: none"> Open circuit in wiring from ECU terminal 1K to ground ECU malfunction
		Always below 1.0V	<ul style="list-style-type: none"> Open or short circuit in wiring from fan relay to ECU terminal 1L ECU malfunction
		Always approx. 1V	<ul style="list-style-type: none"> Speed sensor malfunction Short circuit in wiring from speed sensor to ECU terminal 1M
		Always approx. 7V	<ul style="list-style-type: none"> Speed sensor malfunction Open circuit in wiring from vehicle speed sensor to ECU terminal 1M

V_b: Battery voltage

Terminal	Connection to	Abnormal voltage	Possible cause
1N	Throttle sensor (Idle terminal)	Always 0V	<ul style="list-style-type: none"> • Throttle sensor misadjustment (Refer to page F-150) • Short circuit in wiring from ECU terminal 1N to throttle sensor • ECU malfunction
		Always V _b	<ul style="list-style-type: none"> • Throttle sensor misadjustment (Refer to page F-150) • Open circuit in wiring from ECU terminal 1N to throttle sensor • Open circuit in wiring from throttle sensor to ground
1O	Stoplight switch	Always 0V (Stoplights OK)	<ul style="list-style-type: none"> • Open circuit in wiring from stoplight switch to ECU terminal 1O
1P	Power steering pressure switch	Always 0V	<ul style="list-style-type: none"> • Power steering pressure switch malfunction • Short circuit in wiring from ECU terminal 1P to power steering pressure switch • ECU malfunction
		Always V _b	<ul style="list-style-type: none"> • Power steering pressure switch malfunction • Open circuit in wiring from ECU terminal 1P to power steering pressure switch • Open circuit in wiring from power steering pressure switch to ground
1Q	A/C switch (with A/C)	Always 0V (with blower switch ON)	<ul style="list-style-type: none"> • A/C switch malfunction (Refer to section U) • Short circuit in wiring from ECU terminal 1Q to A/C switch • Poor connection at ECU connector • ECU malfunction
		Always V _b (with blower switch ON) (Blower fan OK)	<ul style="list-style-type: none"> • A/C switch malfunction (Refer to section U) • Open circuit in wiring from ECU terminal 1Q to A/C switch • Open circuit in wiring from A/C switch to blower switch
1R	EGR solenoid valve (vent)	Always 0V	<ul style="list-style-type: none"> • Refer to Code No.29 Troubleshooting (Refer to page F-115)
1S	Blower switch	Always 0V (Blower fan OK)	<ul style="list-style-type: none"> • Short circuit in wiring from blower switch to ECU terminal 1S • Poor connection at ECU connector • ECU malfunction
		Always V _b (Blower fan OK)	<ul style="list-style-type: none"> • Open circuit in wiring from blower switch to ECU terminal 1S
1T	EGR solenoid (vacuum)	Always 0V	<ul style="list-style-type: none"> • Refer to Code No.28 Troubleshooting (Refer to page F-115)
1U	Headlight switch	Always 0V (Headlights OK)	<ul style="list-style-type: none"> • Open or short circuit in wiring from headlight relay to ECU terminal 1U
1V	Neutral switch/Clutch switch	Always 0V	<ul style="list-style-type: none"> • Neutral switch malfunction • Clutch switch malfunction • Short circuit in wiring from ECU terminal 1V to neutral or clutch switch
		Always V _b	<ul style="list-style-type: none"> • Neutral switch malfunction • Clutch switch malfunction • Open circuit in wiring from ECU terminal 1V to neutral or clutch switch • Poor connection at ECU connector
2A 2B 2C 2D	Ground	More than 0V	<ul style="list-style-type: none"> • Poor contact at ground terminal • Open circuit in wiring from ECU to ground
2E	Crank angle sensor (SGT-signal)	Always 0V or approx. 5V	<ul style="list-style-type: none"> • Refer to Code No.04 troubleshooting (Refer to page F-107)
2F	Airflow sensor	Always below 2V or 4V	<ul style="list-style-type: none"> • Refer to code No.08 Troubleshooting (Refer to page F-109)

F

CONTROL SYSTEM

V_B: Battery voltage

Terminal	Connection to	Abnormal voltage	Possible cause
2G	Crank angle sensor (SGC-signal)	Always 0V or approx. 5V	<ul style="list-style-type: none"> Refer to Code No.03 troubleshooting (Refer to page F-107)
2H	Diagnosis connector (Terminal TEN)	Always 0V	<ul style="list-style-type: none"> Short circuit in wiring from ECU terminal 2H to diagnosis connector terminal TEN
		Always V _B	<ul style="list-style-type: none"> Open circuit in wiring from ECU terminal 2H diagnosis connector terminal TEN Open circuit in wiring from diagnosis connector terminal GND to ground
2I	Igniter	Always 0V	<ul style="list-style-type: none"> Refer to Code No.01 troubleshooting (Refer to page F-106)
2J	EGR position sensor	Always approx. 0V or approx. 5V	<ul style="list-style-type: none"> Refer to Code No.16 Troubleshooting (Refer to page F-112)
2K	Vref	Always 0V	<ul style="list-style-type: none"> Short circuit in wiring from ECU terminal 2K to throttle sensor, ECU, or airflow sensor Poor connection at ECU connector ECU malfunction
			<ul style="list-style-type: none"> Short circuit in wiring from ECU terminal 2K to throttle sensor, ECU, or airflow sensor Poor connection at ECU connector ECU malfunction
		Illumination light	

CONTROL SYSTEM

F

V_B: Battery voltage

Terminal	Connection to	Abnormal voltage	Possible cause
2W	ISC solenoid valve	Always 0V or V _B	<ul style="list-style-type: none"> • Refer to Code No.34 troubleshooting (Refer to page F-116)
			<ul style="list-style-type: none"> • ISC solenoid valve malfunction
2X	Purge solenoid valve	Always 0V or V _B	<ul style="list-style-type: none"> • Refer to Code No.26 troubleshooting (Refer to page F-114)
			<ul style="list-style-type: none"> • Purge solenoid valve malfunction
2Y 2Z	Fuel injector	Always 0V	<ul style="list-style-type: none"> • Main relay malfunction • Open or short circuit in wiring from fuel injector to ECU terminal 2Y or 2Z
		Always V _B	<ul style="list-style-type: none"> • ECU malfunction

35E0FX-037



Do not drop subject the sensor to sharp shocks.
Do not put or allow anything in the sensor.

Connect the air flow sensor connector.
Remove the air flow sensor.
Check for damage of the sensor.
Install the air flow sensor.

Inspection

Connect the ECU connectors.
Connect the SSTs (Engine Signal Monitor and Adapter) to the ECU as shown.
Check the SST (Sheet) on the SST (Engine Signal Monitor).

Check the voltage of terminals 2O and 2F.

Inspection

Condition	IG ON	Idle
2O	Below 1.0V	1.0—2.0V
2F	Below 1.0V	

If voltage is not as specified, replace the air flow sensor.

Tightening torque:

10.7 N·m {80—110 kgf·cm, 70—95.4 in·lbf}

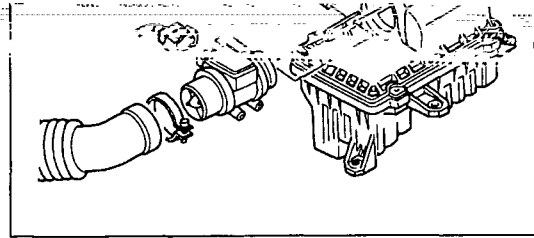
Inspection

Check the temperature.
Set the ignition switch OFF.
Connect the air flow sensor connector.
Check the resistance of the intake air thermosensor as shown.

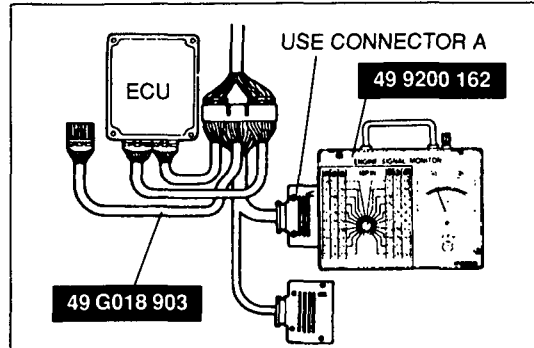
Specification: 2.21—2.69 (at 20°C {68°F})

If resistance is not as specified, replace the air flow sensor.

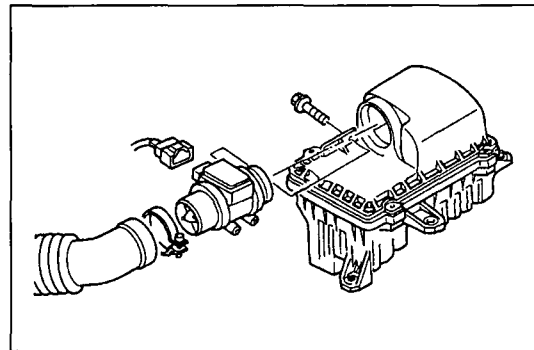
AIRFLOW SENSOR Inspection Visual inspection



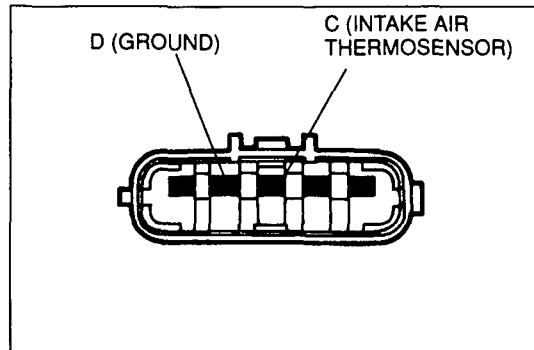
35A0FX-195



35A0FX-196



35A0FX-197



35A0FX-198

Caution

- Do not
- Do not

1. Disconnect
2. Remove
3. Check
4. Install

Voltage

1. Disconnect
2. Connect
3. Place
4. Check

Specific

Terminal	2O	2F

5. If not

Tightening torque

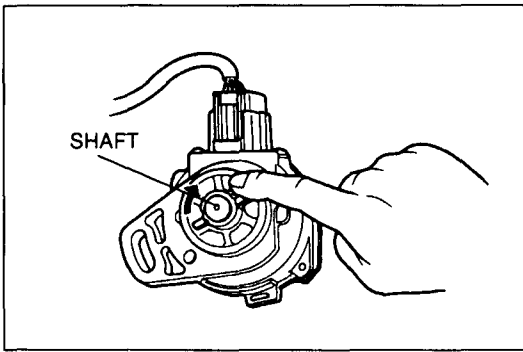
7.9

Inspection

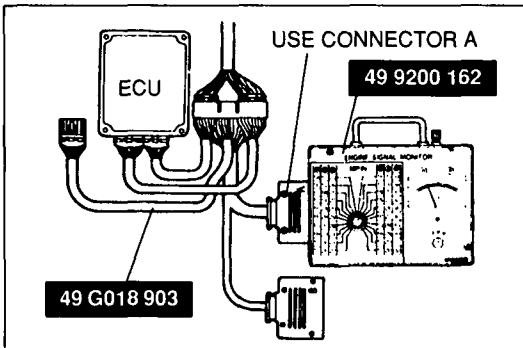
1. Verify
2. Disconnect
3. Measure

Specific

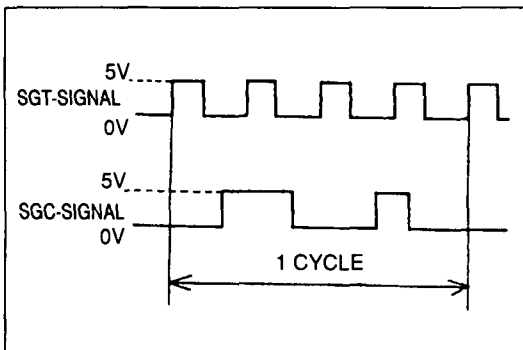
4. If not



35A0FX-199



35A0FX-200



35A0FX-201

CRANK ANGLE SENSOR

Inspection

1. Remove the crank angle sensor.

Warning

- Disconnect the fuel injector connector.
- When checking the crank angle sensor, do not connect the igniter connector

2. Connect the crank angle sensor shown in figure.
3. Disconnect the fuel injector connector.
4. Turn the ignition switch ON.
5. Connect the **SSTs** (Engine Signal Monitor and Adapter Harness) to the ECU.
6. Set the **SST** (Engine Signal Monitor) as shown below.
7. Rotate the sensor drive by hand and measure the output voltage.

Specification

Position	Voltage
2E (SGT signal)	Approx. 5V (4 pulses/rev)
2G (SGC signal)	Approx. 5V (2 pulses/rev)

9. Start the engine and adjust the ignition timing. (Refer to page F-100.)

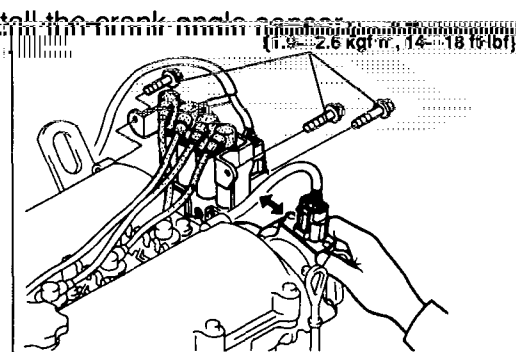
Ignition timing: BTDC 9°—11° (10 ± 1°)

10. Tighten the crank angle sensor lock bolt to the specified torque.

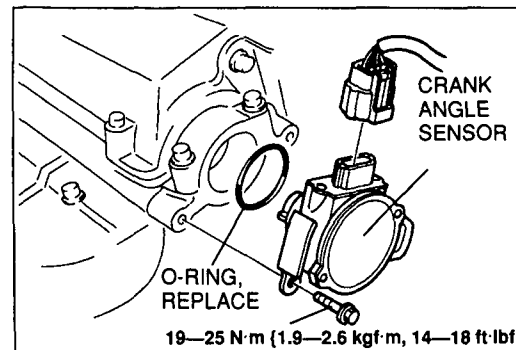
Tightening torque:
19—25 N·m {1.9—2.6 kgf·m, 14—18 ft·lbf}

Replacement

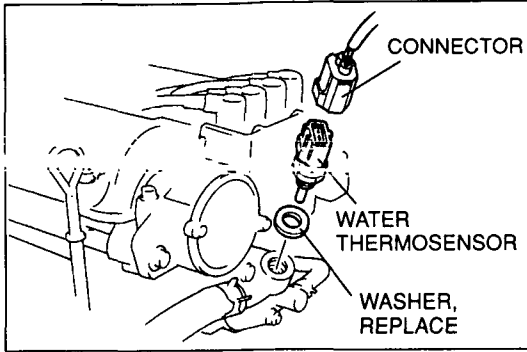
1. Remove the ignition coil. (Refer to section G.)
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



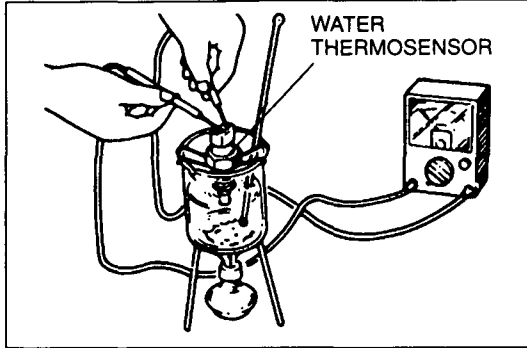
35A0FX-202



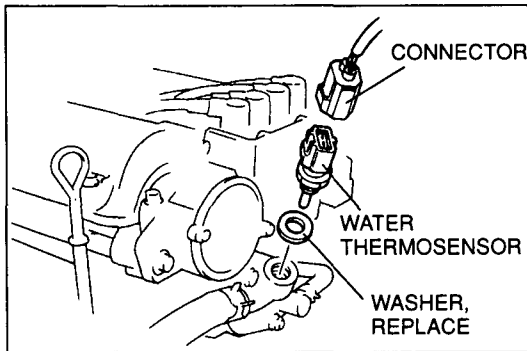
35A0FX-203



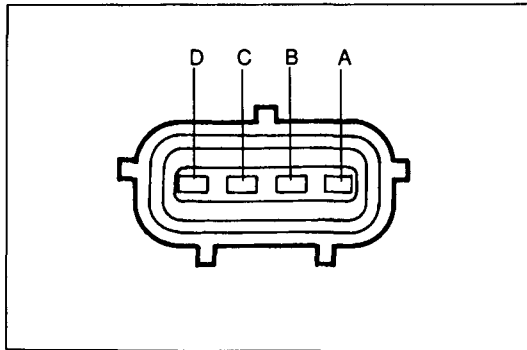
35A0FX-204



35A0FX-205



35A0FX-206



35A0FX-207



(Refer to page F-151.)
 Insert a feeler gauge 0.4 mm (0.016 in) between the stopper and the throttle lever.

Verify that no continuity the throttle sensor terminals C and D.

If continuity, adjust the throttle sensor.

(Refer to page F-151.)

WATER THERMOSENSOR

Removal

1. Remove the ignition coil assembly. (Refer to section G.)
2. Disconnect the water thermostensor connector.
3. Remove the water thermostensor.

Inspection

1. Place the sensor in water with a thermometer and heat the water gradually.
2. Measure resistance of the sensor with an ohmmeter.

Specification

Coolant	Resistance kΩ
20°C (68°F)	2.3 — 2.6
80°C (176°F)	0.3 — 0.4

3. If not as specified, replace the water thermostensor.

Installation

1. Install the water thermostensor and a new washer.

Tightening torque:

25—29 N·m {2.5—3.0 kgf·m, 19—21 ft·lbf}

2. Connect the water thermostensor connector.
3. Install the ignition coil assembly. (Refer to section G.)

THROTTLE SENSOR

Inspection

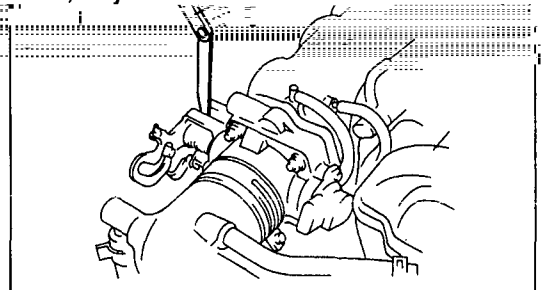
Idle switch

1. Turn the ignition switch OFF and the throttle valve fully closed.
2. Disconnect the throttle sensor connector.
3. Check continuity of the throttle sensor terminals C and D.

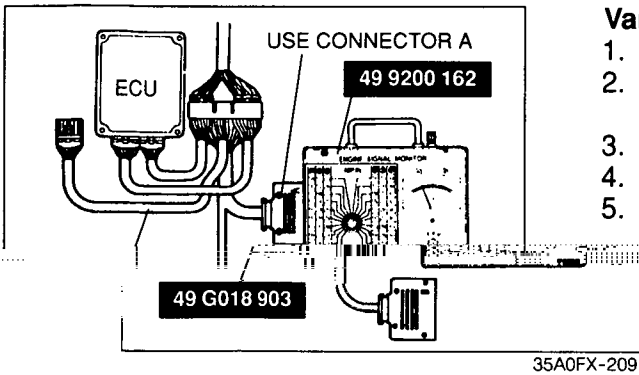
Specification

Terminals	Throttle valve fully closed
C — D	Continuity

4. If not as specified, adjust the throttle sensor.



35A0FX-208



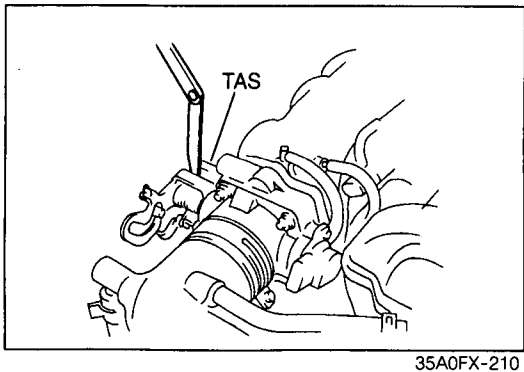
Variable resistor

1. Remove the ECU.
2. Connect the **SSTs (Engine Signal Monitor and Adapter Harness)** to the ECU.
3. Set the **SST (Engine Signal Monitor)** to position 2M.
4. Turn the ignition switch ON.
5. Rotate the throttle link by hand and verify that voltage is within the specification.

Specification

ECU terminal	Throttle valve position	
	Fully closed	Fully open
2M	0.1—1.1V	3.0—4.6V

6. If not as specified, adjust the throttle sensor. (Refer to below.)



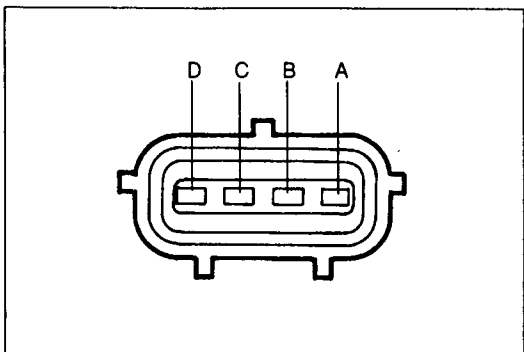
Adjustment

Note

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

Idle switch

1. Turn the ignition switch OFF and the throttle valve fully closed.
2. Disconnect the throttle sensor connector.
3. Loosen the throttle sensor screws.
4. Rotate the throttle sensor and adjust continuity of the sensor terminals C and D as shown.



Specification

Clearance	Continuity
0.3 mm {0.012 in}	Yes
0.4 mm {0.016 in}	No

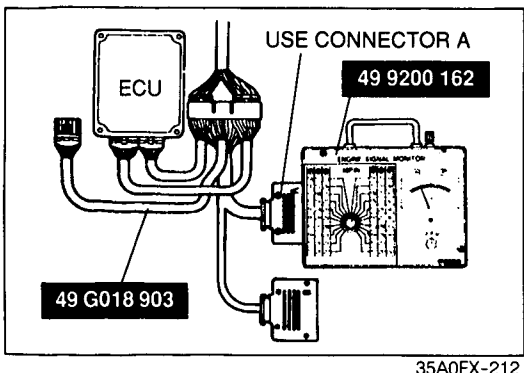
5. Tighten the throttle sensor screws.

Tightening torque:

1.6—2.3 N·m {16—24 kgf·m, 14—20 in·lbf}

Variable resistor

1. Remove the ECU.
2. Connect the **SSTs** to the ECU connector as shown.
3. Verify that the throttle valve is fully closed.
4. Loosen the attaching screws.
5. Turn the ignition switch to ON.
6. Measure the ECU terminal 2M voltage.
7. Adjust the voltage to the specification



Specification

Fully closed: 0.1—1.1V

Fully open: 3.0—4.6V

(Verify that the voltage increase is directly proportioned to the throttle valve opening angle.)

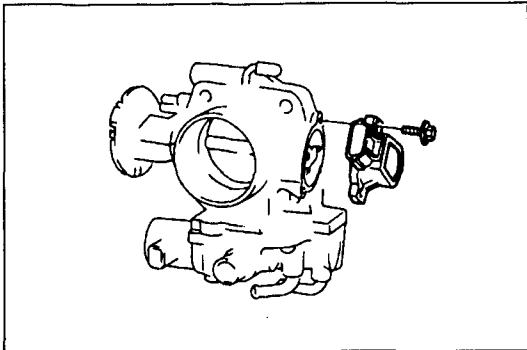
8. Tighten the attaching screws.

Tightening torque:

1.6—2.3 N·m {16—24 kgf·m, 14—20 in·lbf}

9. If not adjusted, replace the throttle sensor.

35E0FX-038



35A0FX-213

Replacement

1. Turn the ignition switch OFF.
2. Remove the throttle sensor screws.
3. Remove the throttle sensor.
4. Replace a new throttle sensor and adjust it. (Refer to page F-151.)
5. Tighten the throttle sensor screws.

Tightening torque:

1.6—2.3 N·m {16—24 kgf·cm, 14—20 in·lbf}

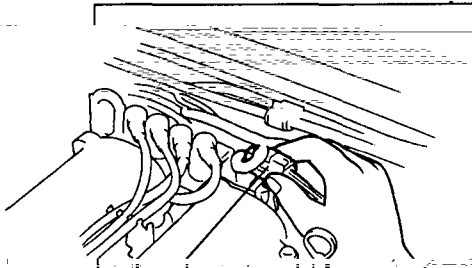
OXYGEN SENSOR

Inspection

On-vehicle

1. Warm-up the engine to normal operating temperature and run it at idle.
2. Disconnect the oxygen sensor connector.
3. Measure the voltage at terminal A.

Specification



OXYGEN SENSOR CONNECTOR



35A0FX-214

Engine condition	Idle (V)	Increasing engine speed (V)	Decreasing engine speed (V)
Terminal A	Below 1.0	0.5—1.0	0—0.4

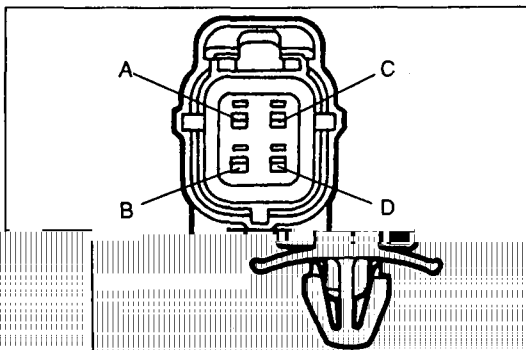
4. If not as specified, check the intake air system, the fuel system and run the self-diagnosis test.
5. If these system are OK, replace the oxygen sensor.

Heater

1. Disconnect the oxygen sensor connector.
2. Measure resistance between terminals C and D.

Resistance: Approx. 13Ω (20°C {68°F})

3. Replace the heater if not as specified.



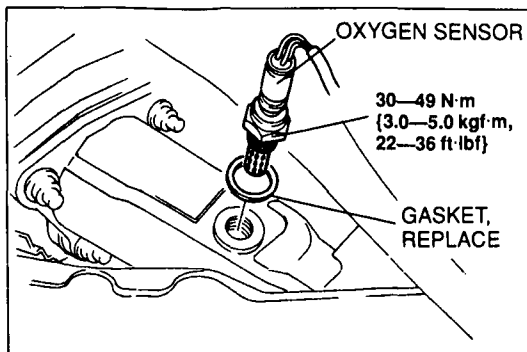
35A0FX-215

Replacement

1. Disconnect the oxygen sensor connector.
2. Remove the oxygen sensor.
3. Install in the reverse order of removal.

Tightening torque:

30—49 N·m {3.0—5.0 kgf·m, 22—36 ft·lbf}



35A0FX-216

Before beginning any service procedure, refer to section T of this manual for air bag system service warnings.

ENGINE ELECTRICAL SYSTEMS

INDEX G- 2

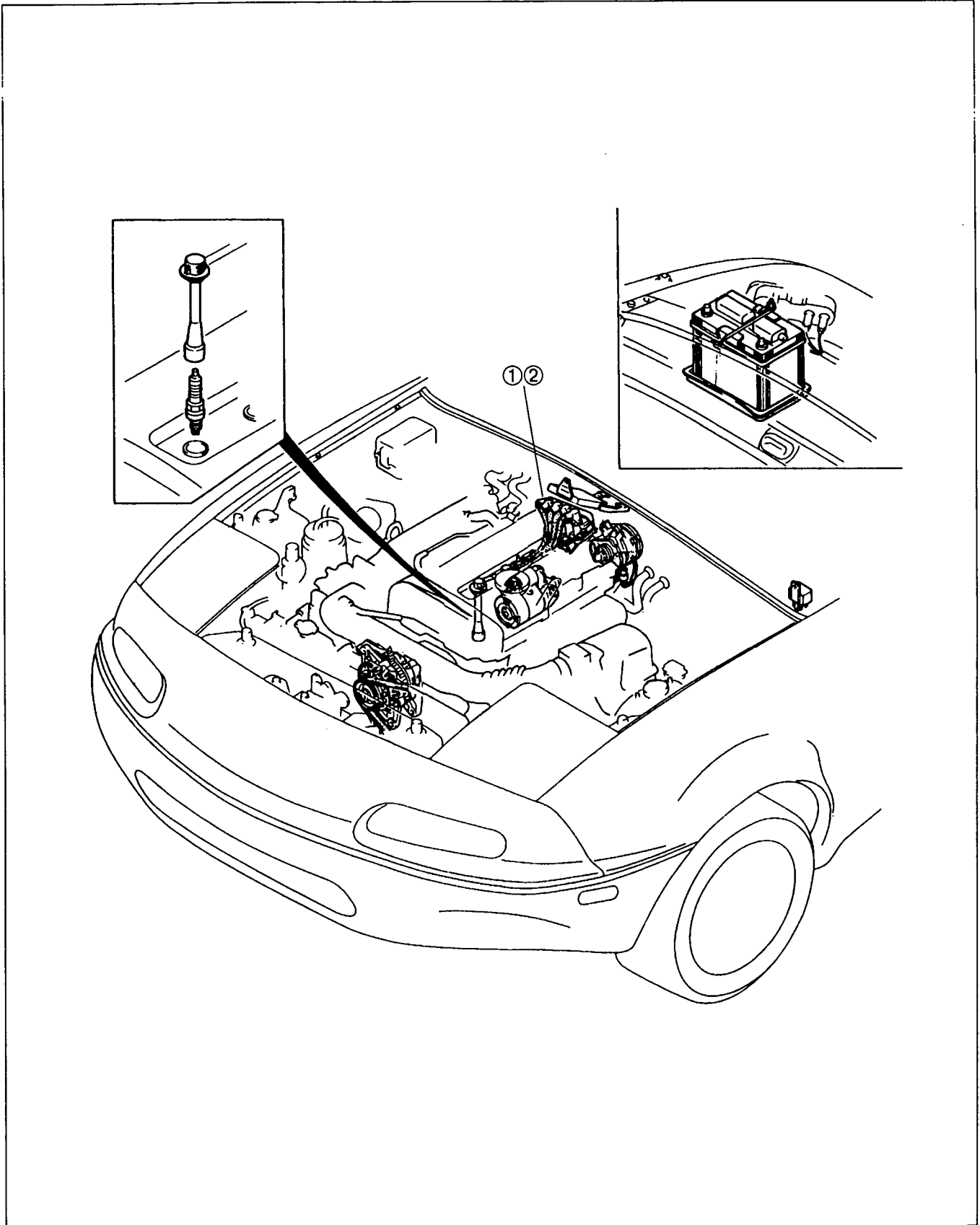
FEATURES

OUTLINE G- 3
OUTLINE OF CONSTRUCTION G- 3
SPECIFICATIONS G- 3
IGNITION SYSTEM G- 4
OUTLINE G- 4
CIRCUIT DIAGRAM G- 4
IGNITION COIL (WITH IGNITER) G- 5

SERVICE

SUPPLEMENTAL SERVICE INFORMATION G- 6
IGNITION SYSTEM G- 6
IGNITION COIL G- 6
IGNITER (IN IGNITION COIL) G- 7

INDEX



35A0GX-002

1. Ignition coil
Inspection page G-6
Replacement page G-6

2. Igniter (in ignition coil)
Inspection page G-7

OUTLINE

OUTLINE OF CONSTRUCTION

- The engine electrical systems of the new MX-5 is basically the same as that of the previous model. However, some parts have been changed according to the change of the engine type from B6 DOHC to BP DOHC.

35A0GX-003

SPECIFICATIONS

Item		Engine	BP DOHC	
Battery	Voltage	V	12, Negative ground	
	Type and capacity	(5-hour rate)	S46A24L(S) (32 Ah) Maintenance-free	
	Quick recharging	Current (A)	Max. 20	
		Time	Max. 30 minutes	
Dark current*1		mA	20.0	
Alternator	Type		A.C.	
	Output	V-A	12-65	
	Regulator type		Transistorized (built-in IC regulator)	
	Regulated voltage	V	14.3-14.9	
	Brush length	mm (in)	Standard	21.5 (0.85)
			Minimum	8 (0.31)
	Drive belt deflection	New	5.5-7.0 (0.22-0.28)	
	mm (in)	Used	6.0-7.5 (0.24-0.30)	
Starter	Type		Direct	
	Output	V-kW	12-0.95	
	Brush length	mm (in)	Standard	17.0 (0.67)
			Minimum	11.5 (0.45)
Ignition system	Type		Electronic spark advance (ESA)	
	Spark advance control		Engine control unit controls spark advance	
Ignition timing*2		BTDC (°CA)/rpm	10/850	
Ignition coil	Type		Molded (with igniter)	
	Primary coil winding	Ω	—	
	Secondary coil winding	kΩ	5.7-12.9 (20°C (68°F))	
Spark plug	Type		NGK : BKR5E-11 BKR6E-11i (Standard) NIPPONDENSO : K16PR-U11 K20RR-U11i (Standard)	
	Plug gap	mm (in)	1.0-1.1 (0.040-0.043)	
	Firing order		1-3-4-2	

*1 Dark current is the constant flow of current while the ignition switch is OFF. (i.e. engine control unit, audio, etc.)

*2. With System Selector (49 B019 9A0) test switch at SELF TEST.

■ Changed from previous model.

35E0GX-001

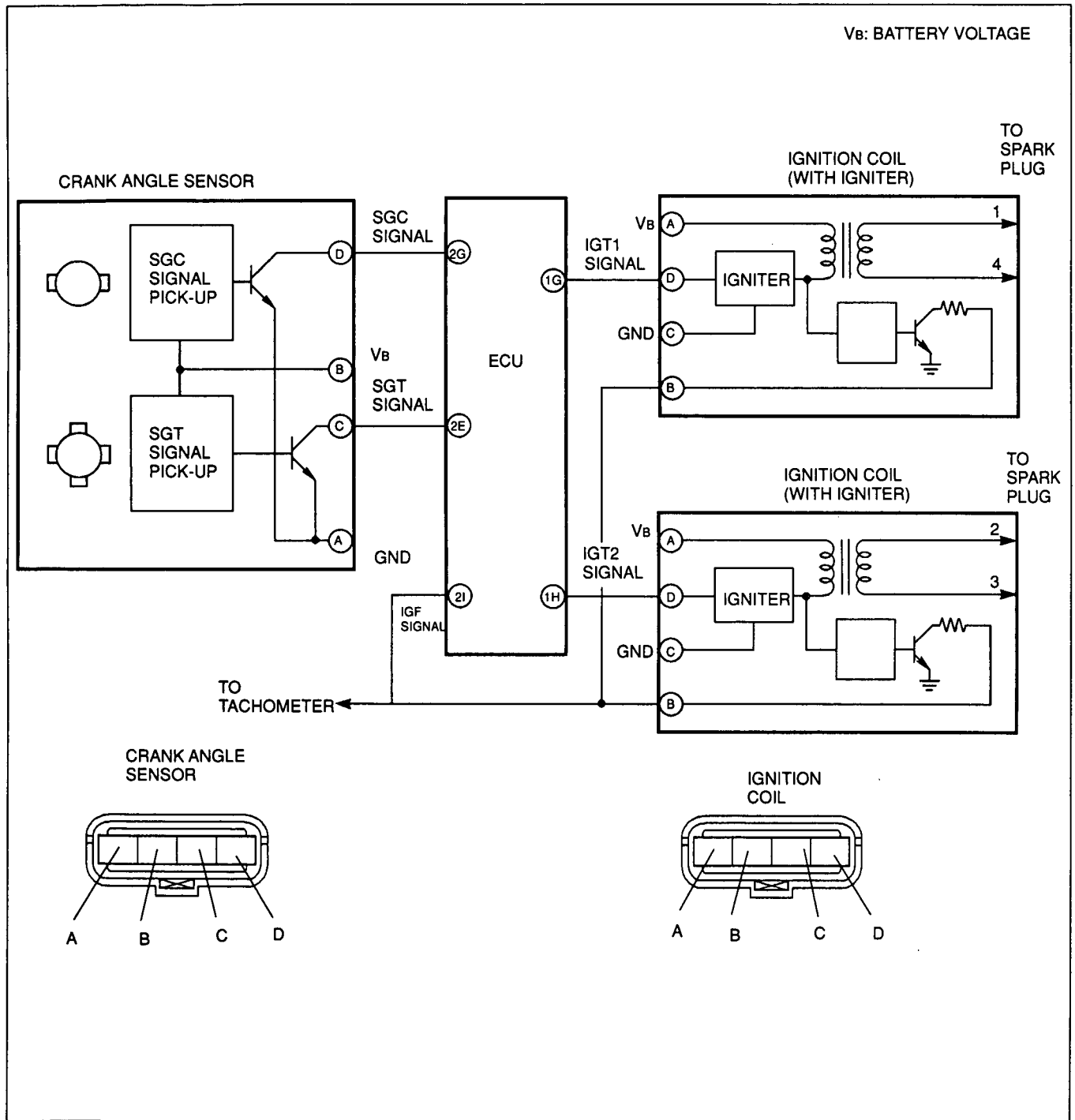
IGNITION SYSTEM

OUTLINE

- The ignition system is basically the same as that of the previous model. The following points are changed.
- The ignition coil includes an igniter.
- The location of the ignition coil is changed from the exhaust camshaft side to the intake camshaft side.

35A0GX-005

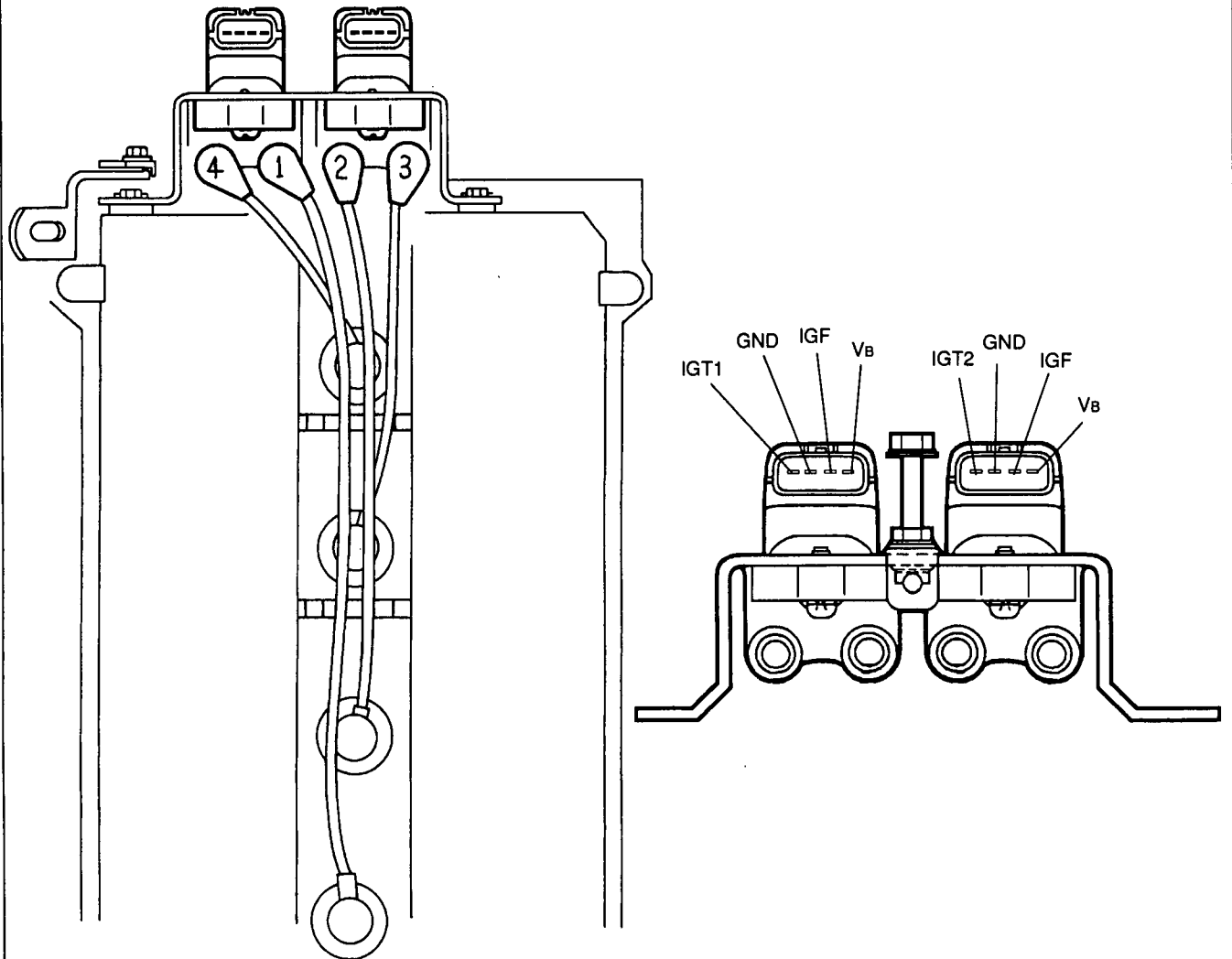
CIRCUIT DIAGRAM



- Two igniters are controlled by the ECU individually.
- Each ignition coil outputs voltage at both negative (-) and positive (+) sides of the secondary winding to fire two spark plugs at the same time.
- After firing, the igniters send ignition pulse (IGF signal) to the ECU and the tachometer.

IGNITION COIL (WITH IGNITER)

V_B: BATTERY VOLTAGE



G

35A0GX-007

The ignition coils operate the No.1, 4 and No.2, 3 cylinders respectively.

SUPPLEMENTAL SERVICE INFORMATION

The following points in this section are changed in comparison with the Mazda MX-5 Workshop Manual 9/89 (1221-10-89I) and Mazda MX-5 Workshop Manual Supplement 7/90 (1246-10-90G).

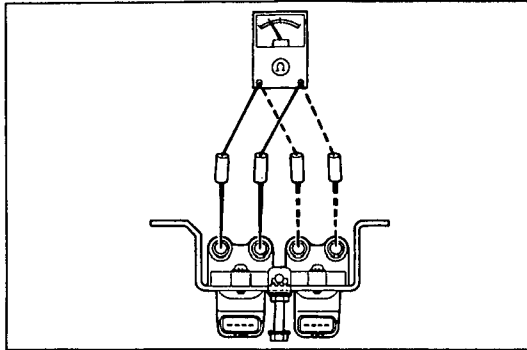
Ignition coil:

- Inspection
- Replacement

Igniter

- Inspection

35E0GX-002



35A0GX-009

IGNITION SYSTEM

IGNITION COIL

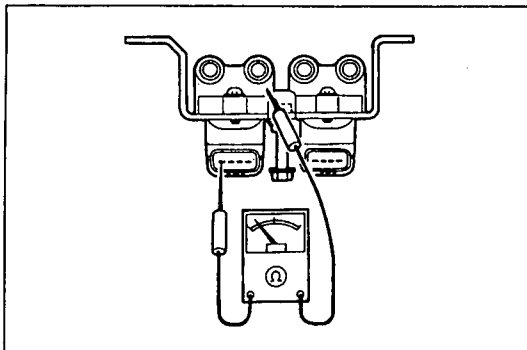
Inspection

Secondary coil winding

1. Remove the high-tension leads.
2. Measure resistance of the secondary coil winding of each coil with an ohmmeter.

Secondary coil winding resistance (at 20°C {68°F}):
8.7—12.9 k Ω

3. If not within specification, replace the ignition coil.



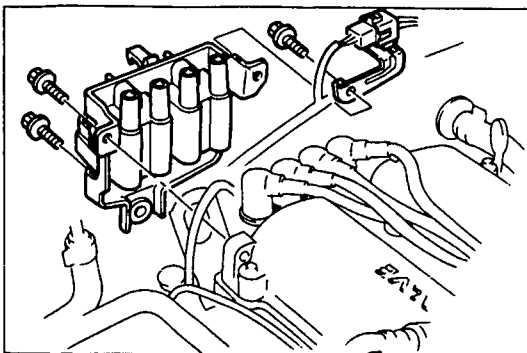
35A0GX-010

Insulation resistance of case

1. Remove the high-tension leads and disconnect the connectors.
2. Use a **500V megger** tester to measure the insulation resistance between the primary terminal and the coil case.

Resistance : Above 10 M Ω

3. If not within specification, replace the ignition coil.



35A0GX-011

Replacement

1. Remove the high-tension leads and disconnect the ignition coil connector.
2. Remove the installation bolts and the ignition coil.
3. Install in the reverse order of removal.

Tightening torque:

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

IGNITER (IN IGNITION COIL)

Inspection

1. Measure the voltage of the ECU terminal as follows. (Refer to section F.)
 - 1G igniter (Nos.1, 4)
 - 1H igniter (Nos.2, 3)
 - 2E, 2G crank angle sensor (SGT, SGC)
 - 2F, 2O airflow sensor
2. Check the ignition coil and high-tension leads for damage, deterioration, and corrosion.
3. Check the poor connection of ignition coil, high-tension leads and ECU.
4. If all are normal, but misfire still occurs, replace the ignition coil.

35A0GX-012

CLUTCH

FEATURES

OUTLINE H- 2
SPECIFICATIONS H- 2

35A0HX-001

OUTLINE

- The basic construction is the same as that of the previous model. The clutch unit specifications have been modified due to the use of a BP DOHC engine.

35A0HX-002

SPECIFICATIONS

Item	Engine/Transmission		BP DOHC	
			M15M-D	
Clutch control			Hydraulic	
Clutch cover	Type		Diaphragm spring	
	Set load	N (kgf, lbf)	4,310 (440, 968)	
Clutch disc	Outer diameter		215 (8.46)	
	Inner diameter		150 (5.91)	
	Thickness	Pressure plate side	mm (in)	3.8 (0.15)
		Flywheel side	mm (in)	3.5 (0.14)
Clutch pedal	Type		Suspended	
	Pedal ratio		6.13	
	Full stroke	mm (in)	120 (4.72)	
	Height	mm (in)	175—185 (6.89—7.28)	
Type			Conversion	
Inner diameter		mm (in)	15.87 (0.625)	
Type			Adjustment – free	
Inner diameter		mm (in)	19.05 (0.750)	
			SAE J1703 or FMVSS116 DOT-3	

ster

ease

d

icates new specifications

35A0HX-003

Clutch ma
cylinder

Clutch rel
cylinder

Clutch flu

inc

Before beginning any service procedure, refer to section T of this manual for air bag system service warnings.

MANUAL TRANSMISSION (M15M-D)

INDEX J- 2

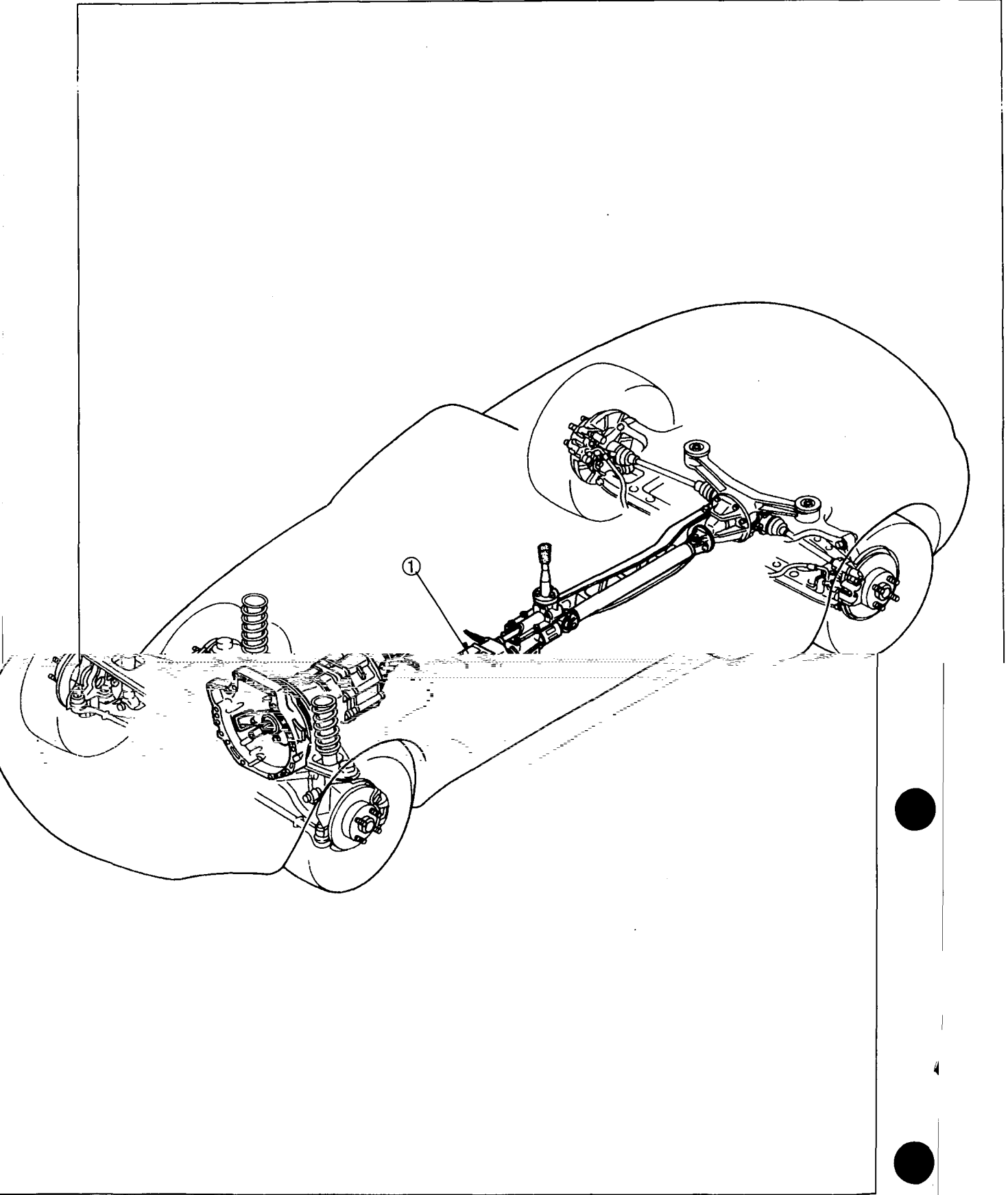
FEATURES

OUTLINE J- 3
FEATURES J- 3
TRANSMISSION J- 3
DOUBLE CONE SYNCHRONIZER
MECHANISM J- 3
SHIFT INTERLOCK MECHANISM J- 5

SERVICE

SUPPLEMENTAL SERVICE INFORMATION J- 6
TRANSMISSION J- 7
DISASSEMBLY / ASSEMBLY J- 7

INDEX



Transmission
Disassembly / Assembly page J-7

1. T

OUTLINE

- Use of a double cone synchronizer (synchro) mechanism for 2nd gear improves operability.
- Use of an interlock pin within the 3rd/4th shift rod improves reliability of the antidouble engagement device.

FEATURES

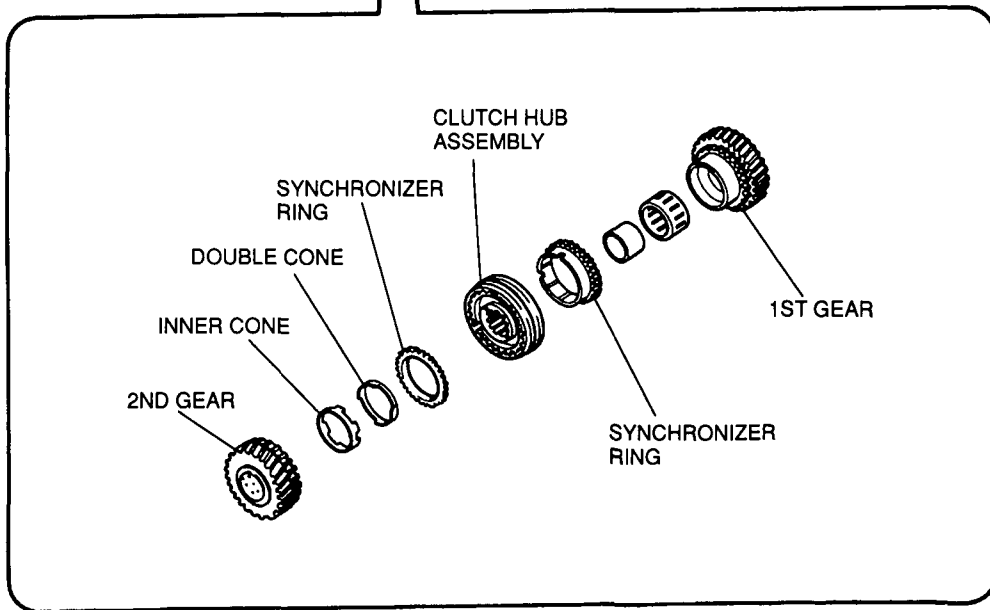
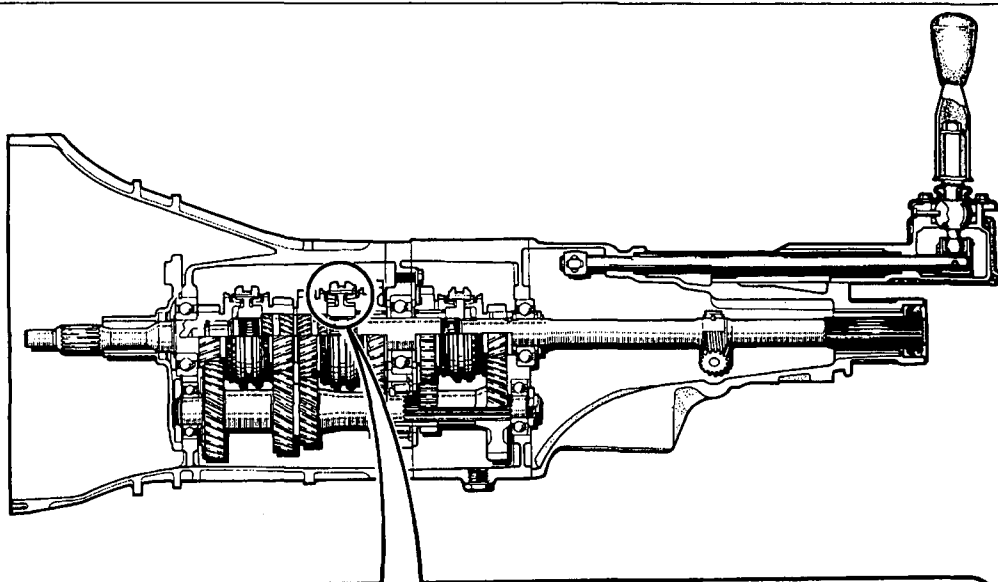
Improved operability — Double cone synchro mechanism is adopted.

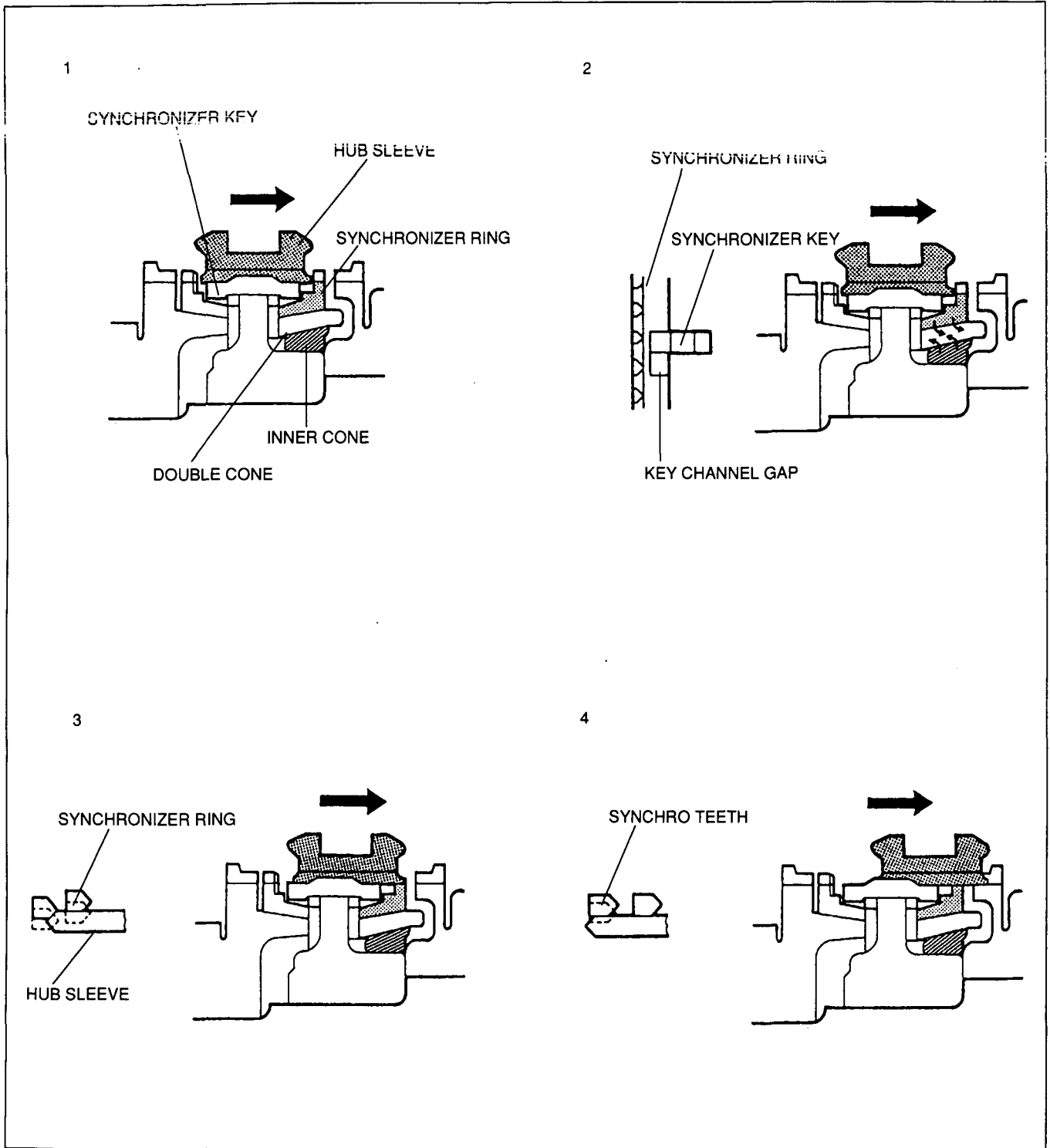
Improved reliability — 3rd/4th shift rod has an interlock pin.

TRANSMISSION

DOUBLE CONE SYNCHRONIZER MECHANISM

- A double cone synchronizer (synchro) mechanism is used for the 2nd gear.
- The double cone synchro mechanism is a compact device capable of heavy duty meshing.
- The synchro mechanism reduces meshing time and improves operation.
- The double cone synchro mechanism includes a synchronizer ring, a double cone, and an inner cone.





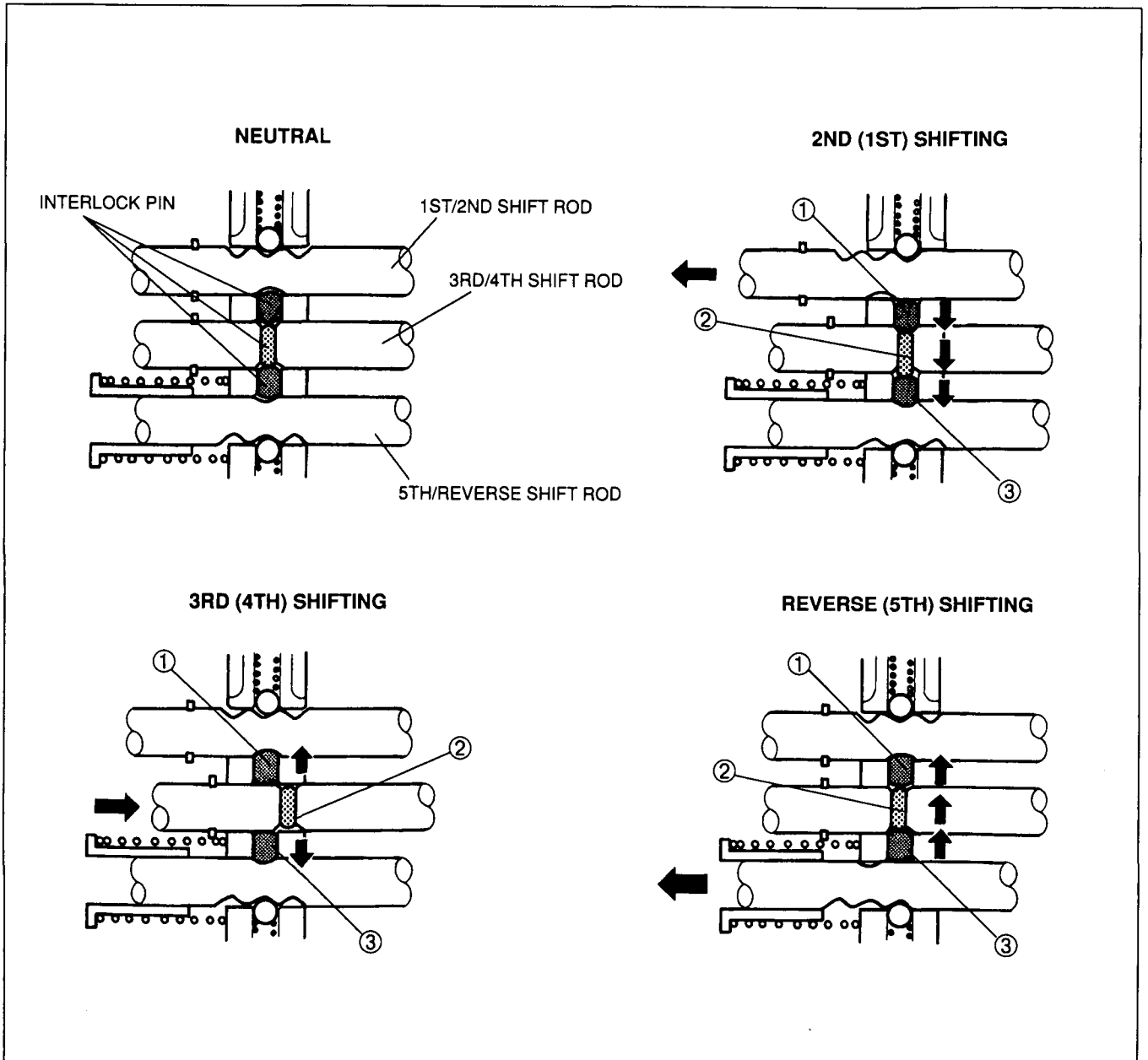
35A0JX-004

Operation

1. When the hub sleeve moves rightward (in the direction of the arrow), the synchronizer key presses against the synchronizer ring. The synchronizer ring is pressed onto the double cone, and the double cone is pressed onto the inner cone.
2. As the hub sleeve continues moving rightward, the key causes friction between the synchronizer ring, double cone, and inner cone. The synchronizer ring turns only the distance that the key channel gap allows, aligning the teeth of the hub sleeve and the synchronizer ring. As the hub sleeve continues moving, the friction between the cones becomes greater, and the difference between the rotational speeds of the synchronizer ring, inner cone, and double cone (unified with gear) gradually disappears.
3. The hub sleeve then moves up onto the synchronizer key and engages the synchronizer ring.
4. The hub sleeve then engages the synchro teeth of the gear to complete the shift.

SHIFT INTERLOCK MECHANISM

- In previous interlock mechanisms if a shift rod is pushed, an interlock pin is forced out, locking only the neighboring shift rod. In the new interlock mechanism, another interlock pin installed inside the 3rd/4th shift rod ensures that when either the 1st/2nd, 3rd/4th, or 5th/Reverse shift rod is moved, the remaining two shift rods are locked. This provides reliable double-engagement prevention.



35A0JX-005

Operation

1st/2nd shifting

Movement of the 1st/2nd shift rod forces interlock pin 1 out of the 1st/2nd shift rod groove, and locks the 3rd/4th shift rod. Pin 2, forced by pin 1, pushes out pin 3 to lock the 5th/Reverse shift rod.

3rd/4th shifting

Movement of the 3rd/4th shift rod forces out pins 1 and 3, and locks the 1st/2nd and 5th/Reverse shift rods. Pin 2 does not affect the other pins or shift rods or shift rods during 3rd/4th shifting.

5th/Reverse shifting

When performing 5th/Reverse shifting, the interlock pins function the same way as in 1st/2nd shifting, except the pin movement order is in reverse, and the 3rd/4th and 1st/2nd shift rods are locked.

SUPPLEMENTAL SERVICE INFORMATION

The following points shown in this section have changed since publication of the MX-5 Workshop Manual (122-1110-891).

e changed.

e changed.

35E0JX-001

Shift fork and shift rod parts

- Disassembly / Assembly procedures have

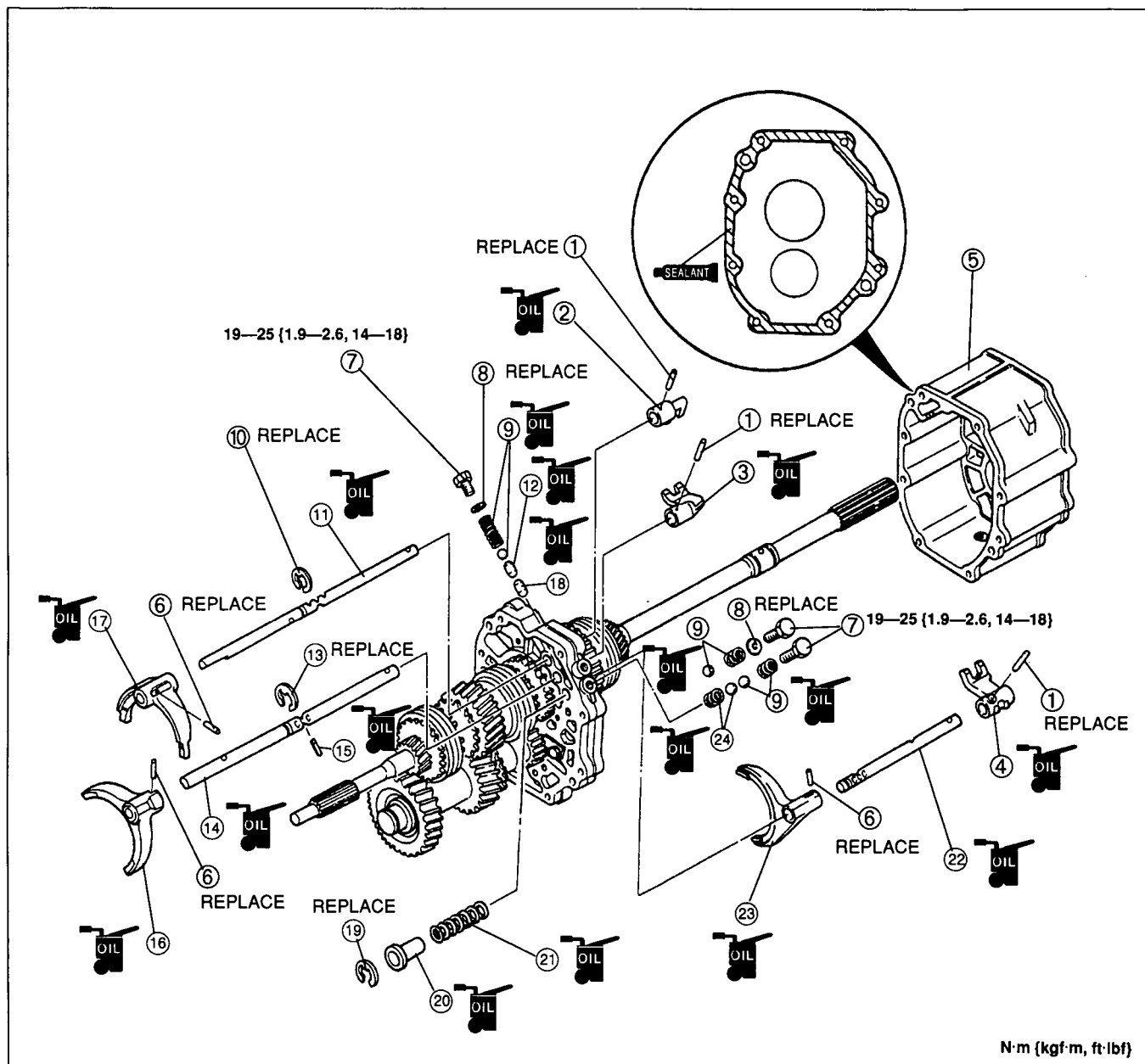
Mainshaft parts

- Disassembly / Assembly procedures have

TRANSMISSION

DISASSEMBLY / ASSEMBLY Shift Fork and Shift Rod Parts

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.



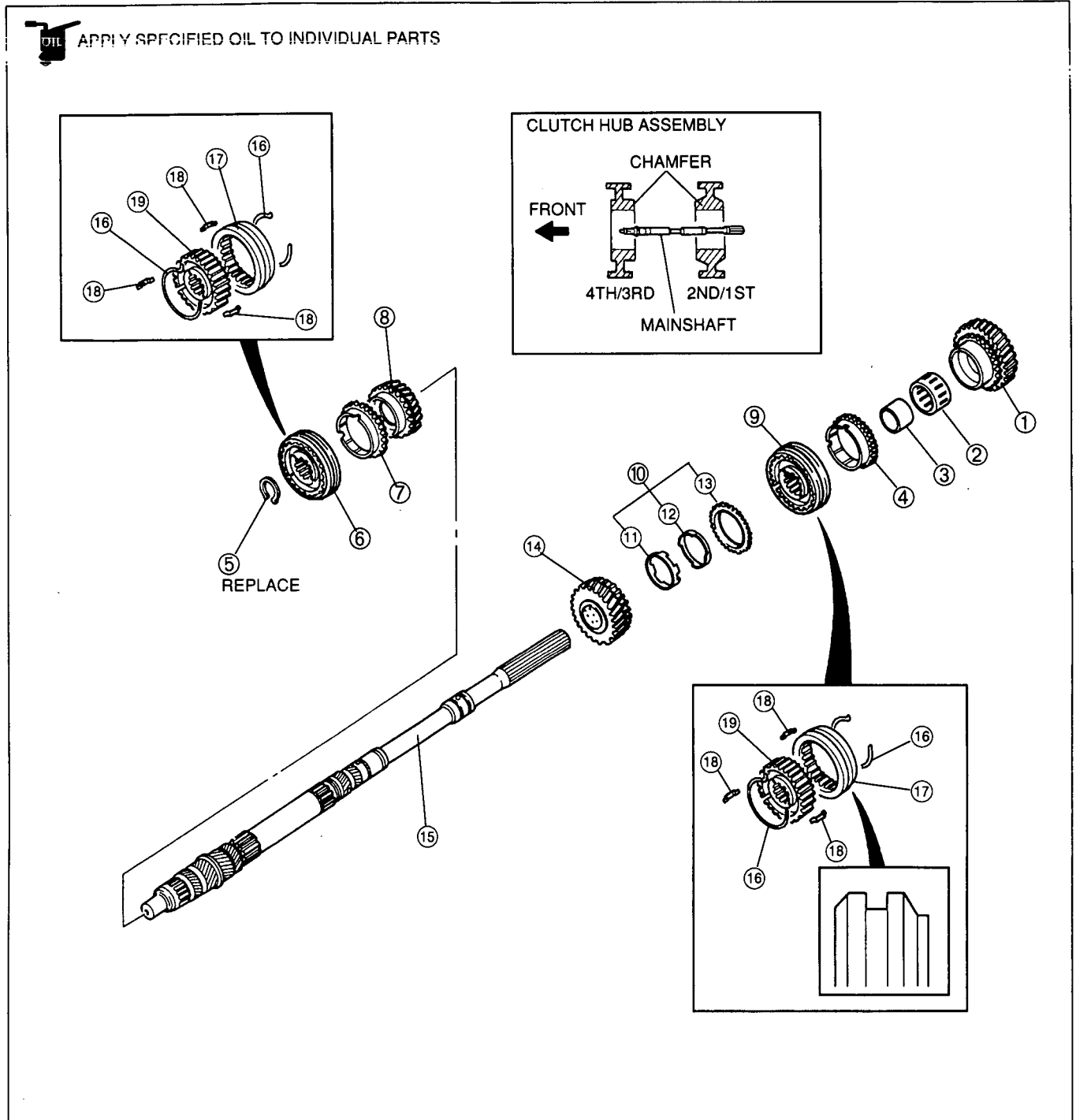
N·m (kgf·m, ft·lbf)

35A0JX-007

- | | |
|------------------------------|----------------------------|
| 1. Roll pin | 13. Clip |
| 2. 1st/2nd shift rod end | 14. 3rd/4th shift rod |
| 3. 3rd/4th shift rod end | 15. Interlock pin |
| 4. 5th/Reverse shift rod end | 16. 3rd/4th shift fork |
| 5. Intermediate housing | 17. 1st/2nd shift fork |
| 6. Roll pin | 18. Interlock pin |
| 7. Cap plug | 19. Clip |
| 8. Washer | 20. Spacer |
| 9. Spring and ball | 21. Spring |
| 10. Clip | 22. 5th/Reverse shift rod |
| 11. 1st/2nd shift rod | 23. 5th/Reverse shift fork |
| 12. Interlock pin | 24. Spring and ball |

Mainshaft Parts

1. Disassemble in the order shown in the figure.
2. Assemble in the reverse order of disassembly.



35A0JX-008

- | | |
|--------------------------------|------------------------------|
| 1. 1st gear | 11. Inner cone |
| 2. Bearing | 12. Double cone |
| 3. Bearing race | 13. 2nd synchronizer ring |
| 4. 1st synchronizer ring | 14. 2nd gear |
| 5. Snap ring | 15. Mainshaft |
| 6. 3rd/4th clutch hub assembly | 16. Synchronizer key springs |
| 7. 3rd synchronizer ring | 17. Clutch hub sleeve |
| 8. 3rd gear | 18. Synchronizer key |
| 9. 1st/2nd clutch hub assembly | 19. Clutch hub |
| 10. 2nd synchronizer assembly | |

PROPELLER SHAFT

FEATURES

OUTLINE L- 2
FEATURES L- 2
SPECIFICATIONS L- 2
PROPELLER SHAFT L- 2

35A0LX-001

L

OUTLINE, PROPELLER SHAFT

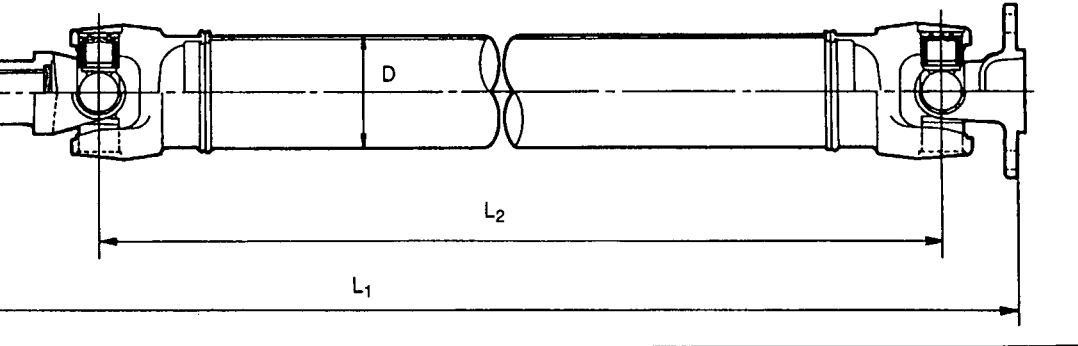
OUTLINE

ft pipe is friction welded for improved marketability.
s and tightening torque have been modified due to a change in the differential.

ability — Friction welding

35A0LX-002

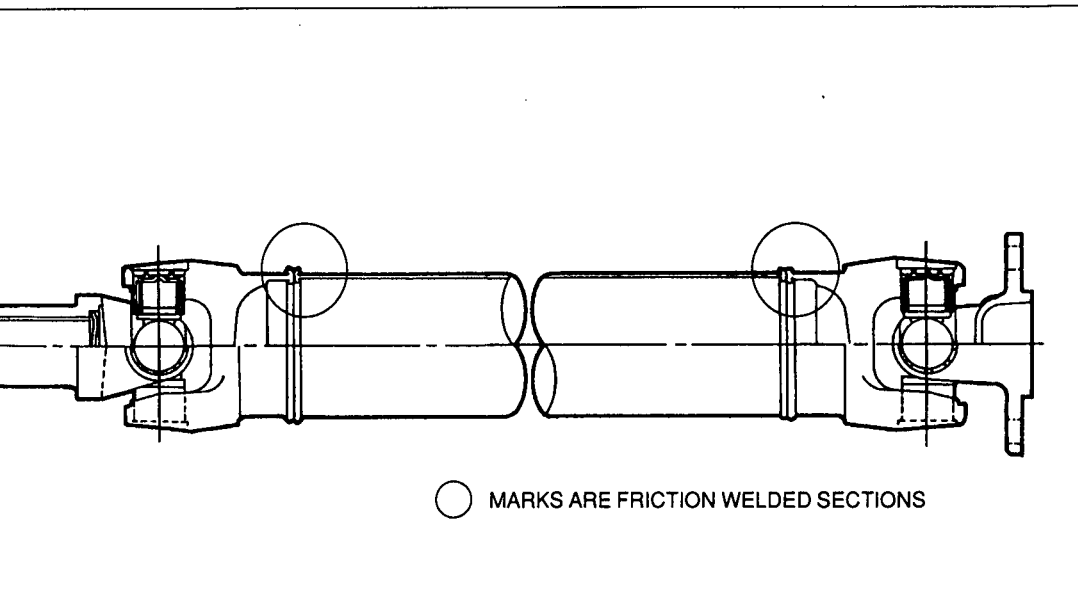
Engine		BP DOHC
mm {in}	L ₁	1,001 (39.41)
	L ₂	816 (32.1)
mm {in}	D	60.5 (2.38)
mm {in}		0.4 (0.016)
Differential — Propeller shaft N·m (kgf·m, ft·lbf)		50—58 (5.0—6.0, 37—43)



Specifications

35A0LX-003

SHAFT



35A0LX-004

ft pipe is friction welded, providing uniform welding of joints. By adopting this system,
been improved and thermal deformation lowered when compared with that of conven-
g.

- The propeller sha
- The specifications

FEATURES

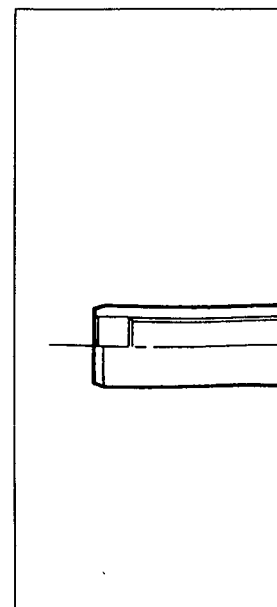
Improved marketa

SPECIFICATIONS

Item
Length
Outer diameter
Runout
Tightening torque (Differ

indicates new sp

PROPELLER S



- The propeller sha
- marketability has
- tional arch weldin

Before beginning any service procedure, refer to section T of this manual for air bag system service warnings.

FRONT AND REAR AXLES

INDEX M- 2

FEATURES

OUTLINE M- 3
OUTLINE OF CONSTRUCTION M- 3
SPECIFICATIONS M- 3

TORQUE SENSING LIMITED SLIP

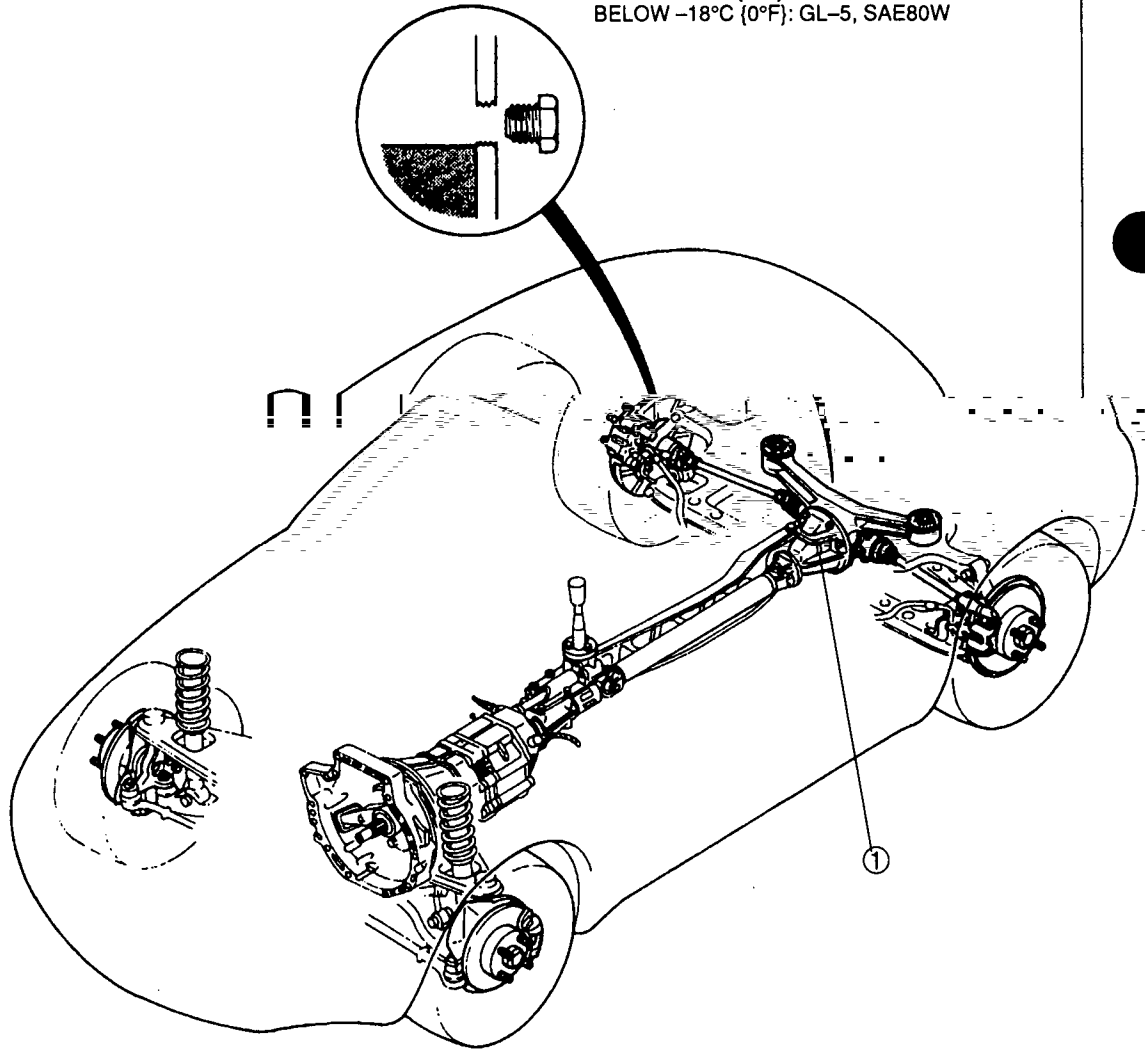
DIFFERENTIAL ("TORSEN" LSD) M- 4
OUTLINE M- 4
CONSTRUCTION M- 6
OPERATION M- 7
VEHICLE CHARACTERISTICS M- 9

SERVICE

SUPPLEMENTAL SERVICE INFORMATION M-10
TROUBLESHOOTING GUIDE M-10
DIFFERENTIAL M-10
DIFFERENTIAL M-11
PREPARATION M-11
DIFFERENTIAL, STANDARD; DIFFERENTIAL,
TORQUE SENSING LIMITED SLIP
("TORSEN" LSD) M-13

INDEX

OIL SPECIFICATION
ABOVE -18°C (0°F): GL-5, SAE90
BELOW -18°C (0°F): GL-5, SAE80W



- 1. Differential
 - Removal / Installation page M-13
 - Disassembly / Inspection /
Assembly page M-14

OUTLINE

OUTLINE OF CONSTRUCTION

- A larger-size standard differential has been adopted to allow for use of a BP DOHC engine.
- A torque sensing limited-slip differential ("TORSEN" LSD) is optional equipment to improve drivability and stability.

SPECIFICATIONS

Item		Specifications
Drive shaft		
Joint type	Wheel side	Bell joint
	Differential side	Double-off set joint
Length mm (in) (between centers of joints)	Left side	470.3 (18.52)
	Right side	470.3 (18.52)
Shaft diameter	mm (in)	22.5 (0.89)
Differential		
Differential type		"TORSEN" LSD Standard
Ring gear size	mm (in)	182.88 (7.20)
Final gear ratio		4.100
Reduction gear		Hypoid gear
Differential gear		Worm gear Straight-bevel gear
Ring gear teeth		41
Drive pinion gear teeth		10
Oil	Grade	API Service GL-5
	Viscosity	Above -18°C (0°F): SAE90 Below -18°C (0°F): SAE80
	Capacity L {US qt, Imp qt}	1.00 (1.06, 0.88)

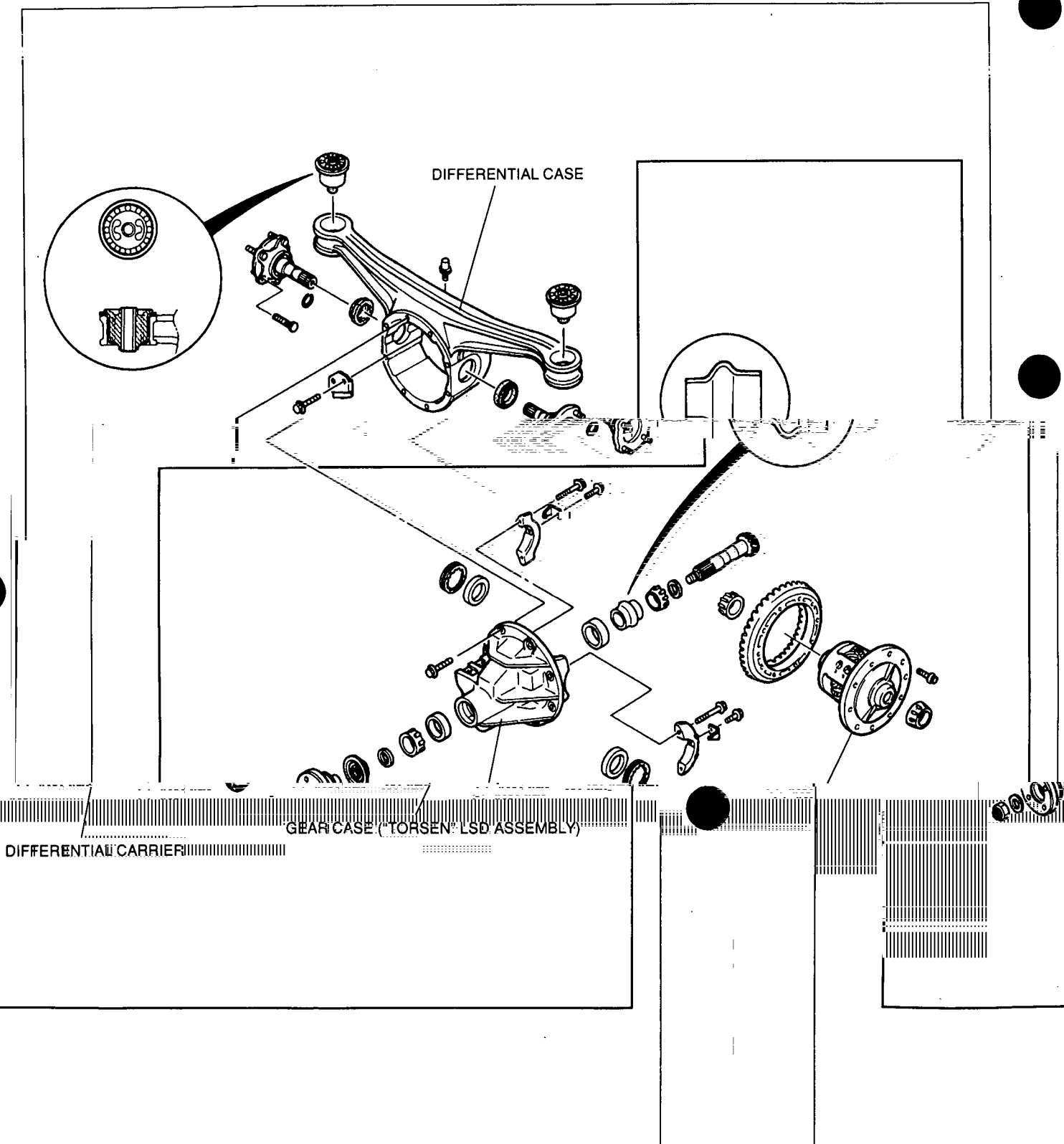
M

▨ indicates new specifications..... JSEUMN-081

M TORQUE SENSING LIMITED SLIP DIFFERENTIAL ("TORSEN" LSD)

TORQUE SENSING LIMITED SLIP DIFFERENTIAL ("TORSEN" LSD)

OUTLINE



ed-slip differential ("TORSEN" LSD) is optional equipment to improve drivability (page M-5.)

ifferential, with the gear case ("TORSEN" LSD ASSEMBLY) securely mounted rigidity of the differential and reduces noise and vibration. made of aluminum alloy to reduce weight.

- The torque sensing limited slip differential improves drivability and stability. (Refer to page M-5.)
- The integral carrier differential assembly, mounted within the differential case, improves the rigidity of the differential. The differential case is made of aluminum alloy to reduce weight.

TORQUE SENSING LIMITED SLIP DIFFERENTIAL ("TORSEN" LSD)

M

- The torque sensing limited-slip differential ("TORSEN" LSD) is a torque-proportioning type LSD with a large bias ratio*. It uses the friction of the worm gear teeth and the thrust washers for the differential-limiting force.
- In comparison with viscous-type or friction-type LSD, it has the following benefits.

1. Large bias ratio
2. Less change of bias ratio over time of vehicle use
3. Standard differential oil is used (special LSD oil not needed)
4. Improved overall traction and improved controllability under acceleration

* Bias ratio

A bias ratio indicates the effectiveness of the LSD function. For an open (non-LSD) differential, when one wheel is spinning, torque to the other wheel is decreased. For LSD, increased torque is transmitted to the wheel not spinning. This torque ratio is called bias ratio.

The bias ratio is calculated as follows:

$$\text{Bias ratio} = \frac{\text{Rotational torque of high resistance shaft}}{\text{Rotational torque of low resistance shaft}}$$

45U0MX-705

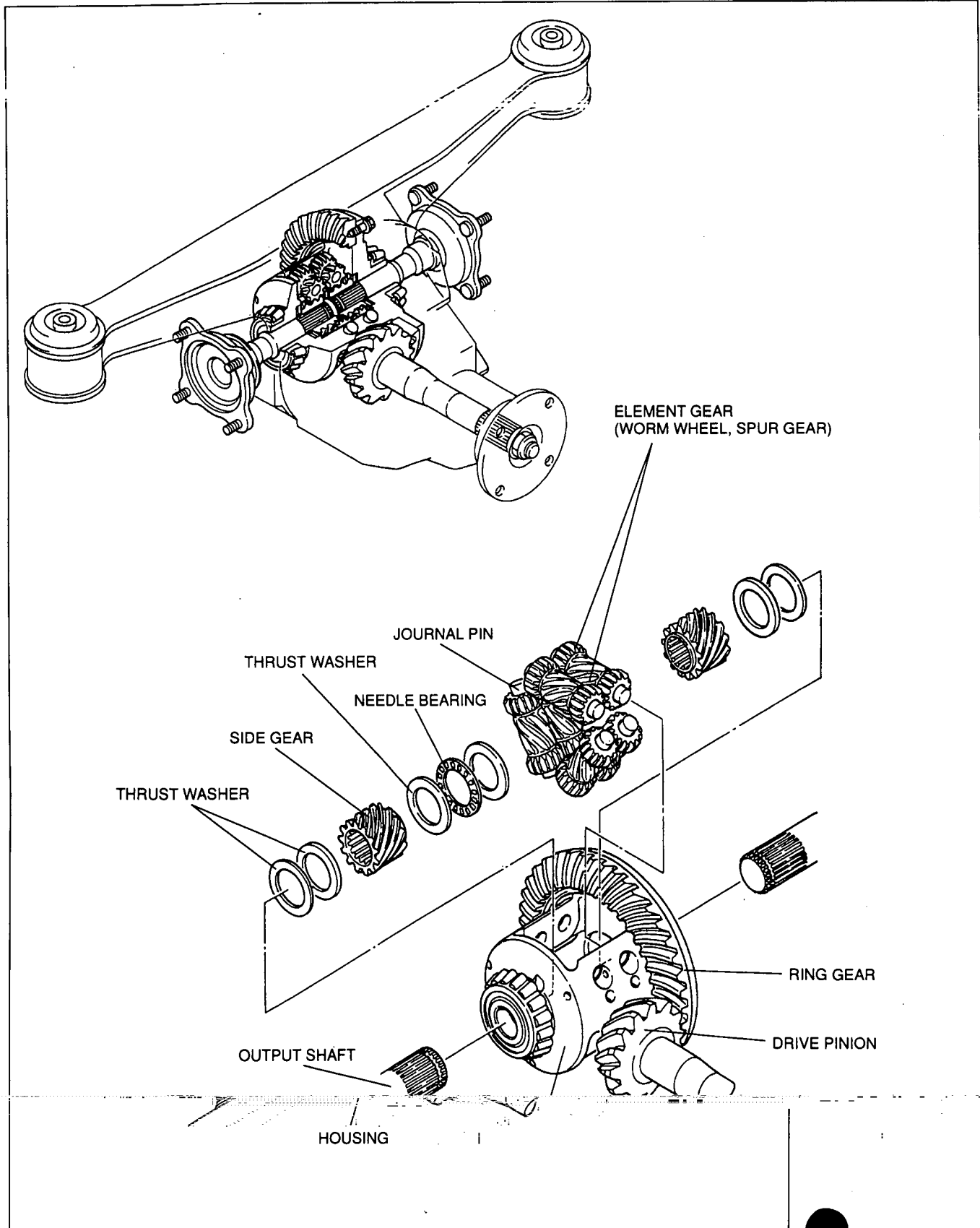
M

Comparison of "TORSEN" LSD and Other Differentials

	"TORSEN" LSD	Viscous LSD	Friction-type LSD
Differential-limiting force generation mechanism	<ul style="list-style-type: none"> • Frictional force of worm gear teeth • Frictional force of thrust washers 	Viscous resistance of silicone oil	Frictional resistance of metal and composition plates
Differential-limiting force generation type	Torque-proportioning system	Wheel speed-proportioning system	Torque-proportioning system
Characteristics			

M TORQUE SENSING LIMITED SLIP DIFFERENTIAL ("TORSEN" LSD)

CONSTRUCTION



The torque sensing limited-slip differential is composed of the LSD assembly and differential mechanism. The LSD assembly consists of two side gears, six element gears (each consisting of two spur gears, a worm gear and a journal pin), a needle bearing, and six thrust washers. The journal pins are fixed in the housing.

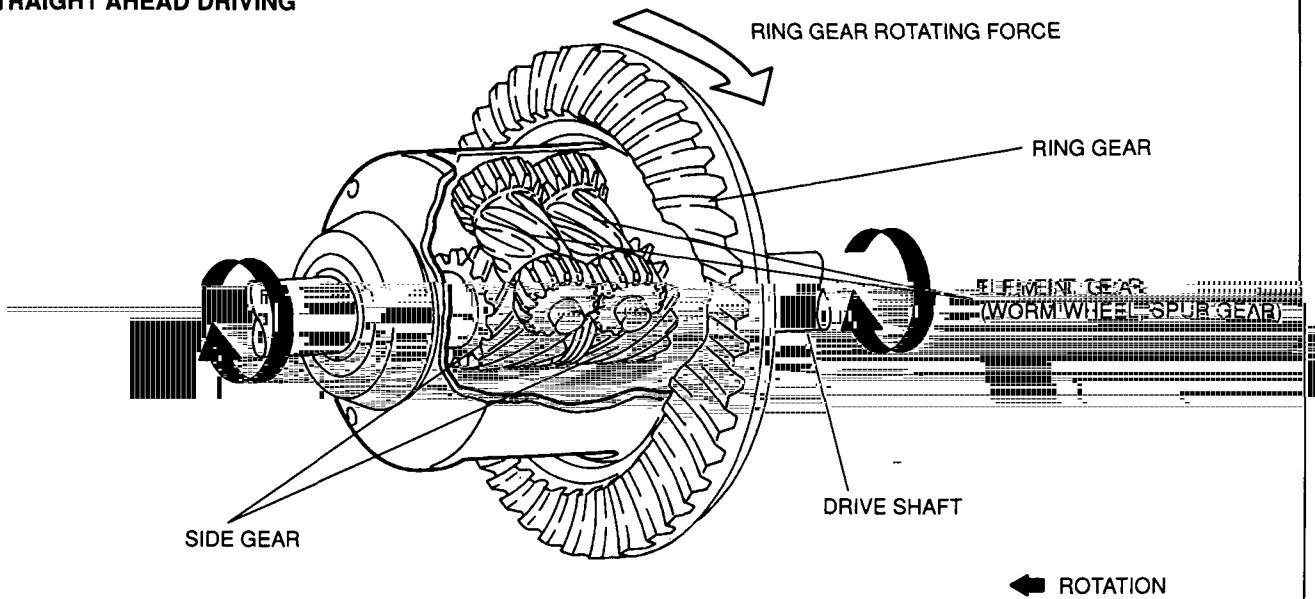
- The torque sensing limited-slip differential is composed of the LSD assembly and differential mechanism. The LSD assembly consists of two side gears, six element gears (each consisting of two spur gears, a worm gear and a journal pin), a needle bearing, and six thrust washers. The journal pins are fixed in the housing.

TORQUE SENSING LIMITED SLIP DIFFERENTIAL ("TORSEN" LSD)

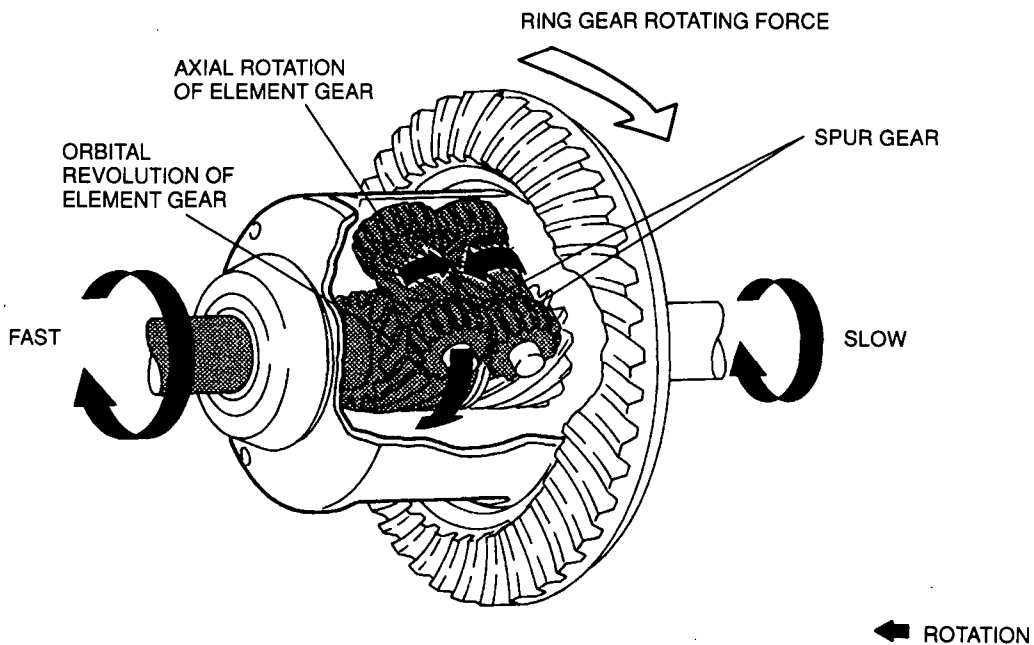
M

OPERATION

STRAIGHT AHEAD DRIVING



DIFFERENTIAL OPERATION



45U0MX-708

Straight Ahead Driving

When driving straight, the right and left side gears rotate at the same speed and the differential assembly rotates as a unit. Input force from the ring gear is transmitted to the drive shafts through the element gears and the side gears. During this operation, the element gears turn with the side gears.

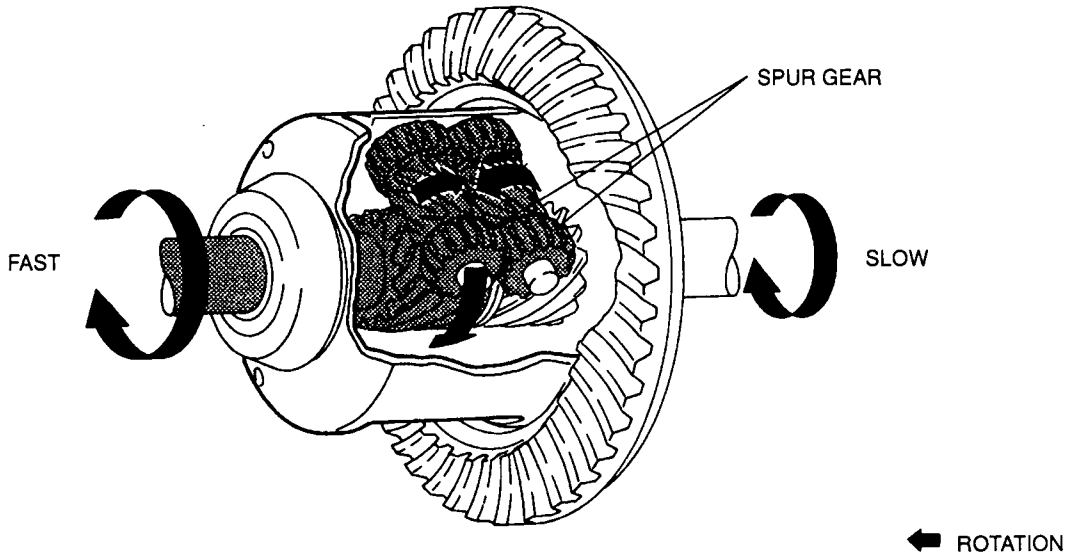
Differential Operation

When rotation speed between the right and left wheel becomes different, the element gears revolve in the opposite direction of each other to absorb the difference.

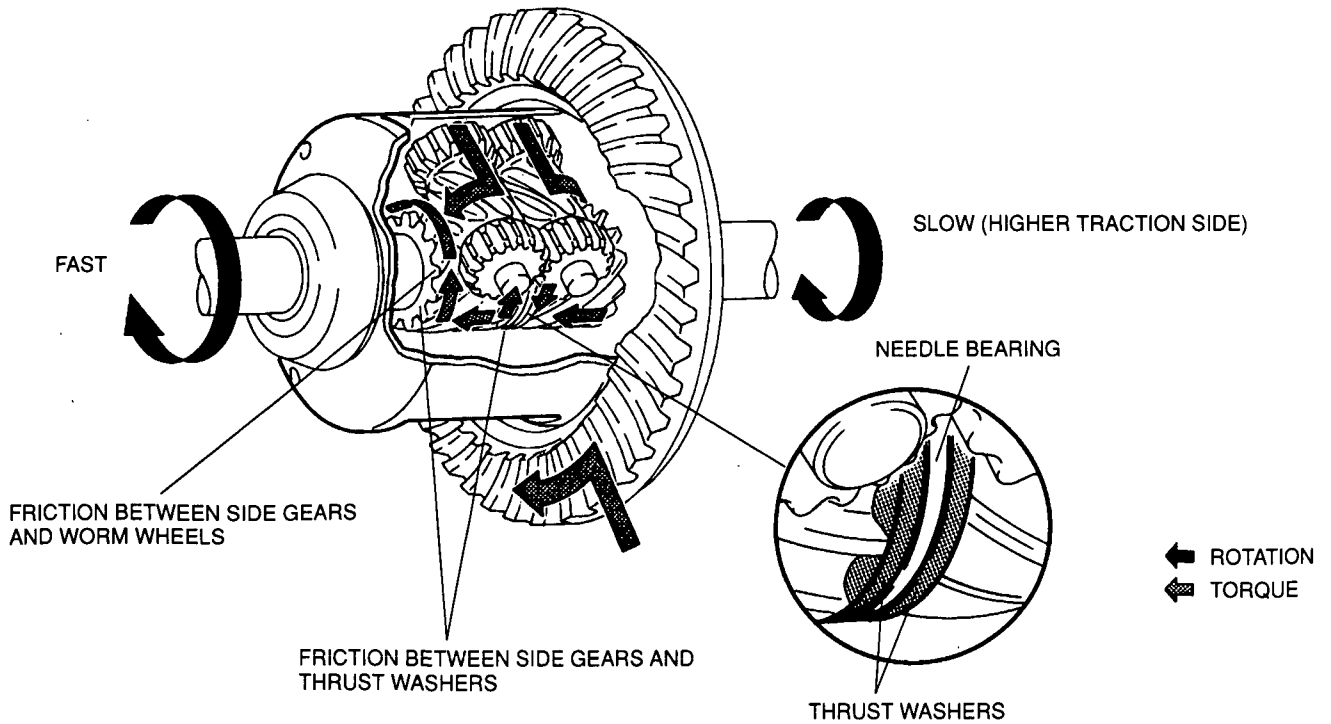
The function of the spur gears is similar to that of a pinion gear in a conventional differential.

LIMITED-SLIP OPERATION

ROTATION OF ELEMENT GEARS



TORQUE FLOW

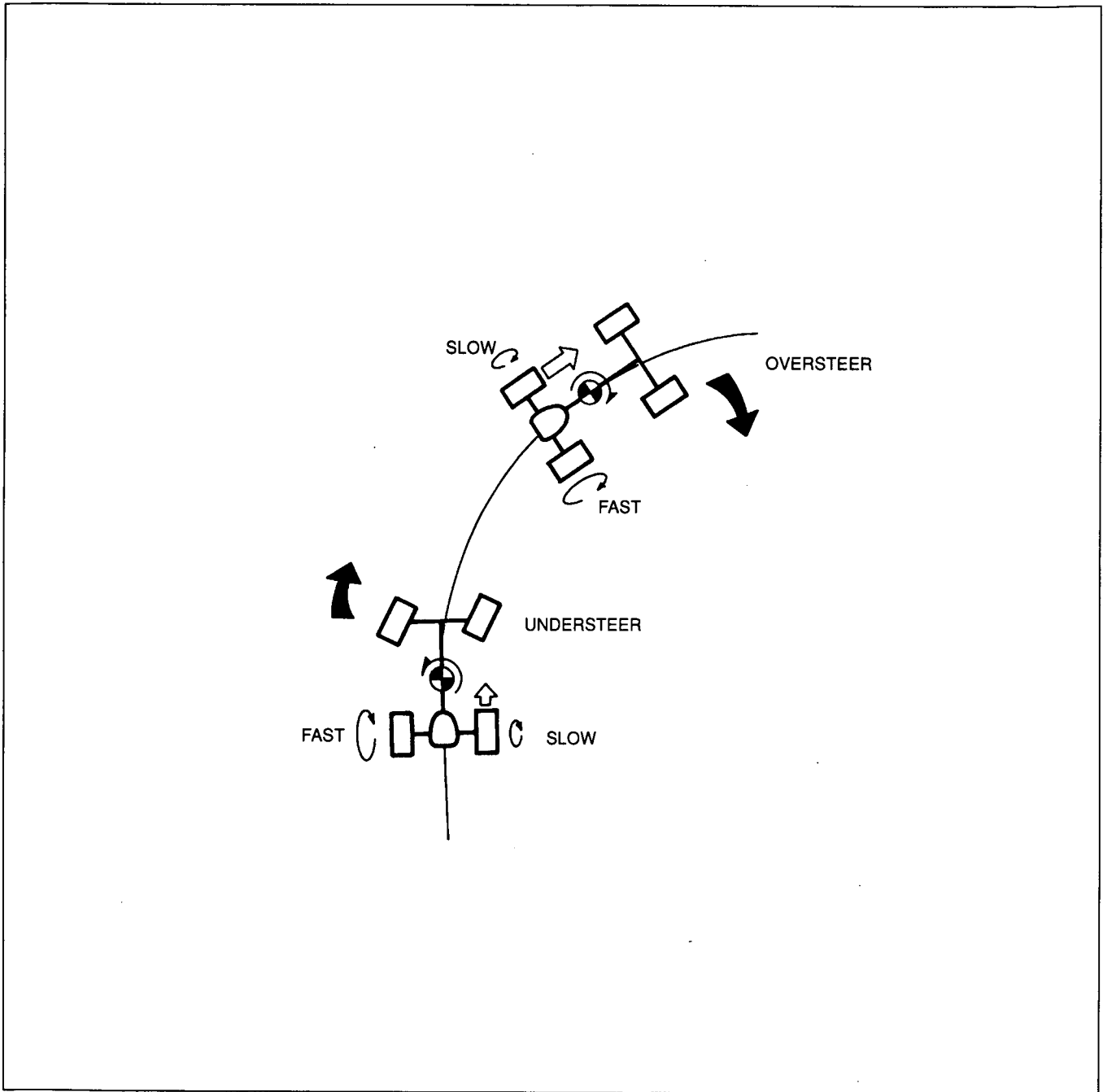


45U0MX-709

Limited-slip Operation

When the differential encounters a condition such as a wheel spinning, thrust force is generated by the worm gears. The rotational torque of the spinning wheel is reduced by the friction between the side gears and the worm wheels, and friction between the side gears, thrust washers, and needle bearing. The torque is then transmitted to the higher traction side. The torque transmitted to the high traction side is proportionate to the input torque of the ring gear.

VEHICLE CHARACTERISTICS



45U0MX-710

The vehicle's cornering is improved because of the steering characteristic of the "TORSEN" LSD.

Light Understeer at Beginning of Turn

At the beginning of a turn, greater torque is applied to the inner wheel because it rotates slower than the outer wheel. This torque gently forces the vehicle outward (understeer).

Understeer During Turning

If the accelerator is further depressed during the turn, torque applied to the inner wheel becomes greater and understeering becomes more pronounced.

Oversteer at Limit of Turn

At the limit of the turn, the torque is reduced. While the vehicle is still turning, extra torque is applied to the outer wheel. Thus the vehicle is gently forced inward (oversteer).

M SUPPLEMENTAL SERVICE INFORMATION, TROUBLESHOOTING GUIDE

SUPPLEMENTAL SERVICE INFORMATION

- The following points in this section are different from the MX-5 Workshop Manual (1221-10-89I).

Differential

- Removal / installation procedures has been changed.
- Disassembly / Inspection / Assembly procedures has been changed.

35E0MX-002

TROUBLESHOOTING GUIDE

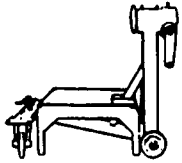
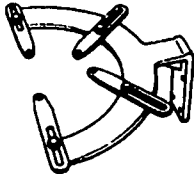


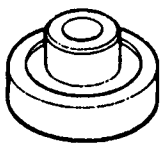
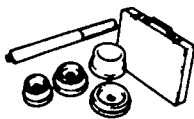
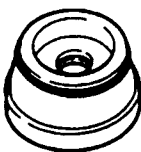
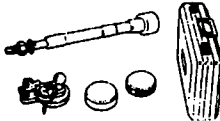
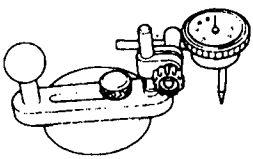
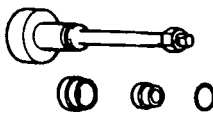

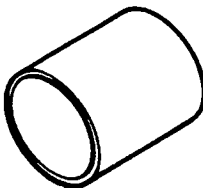
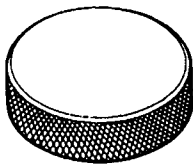



DIFFERENTIAL

Problem	Possible Cause	Action	Page
Abnormal noise	Improperly adjusted ring gear backlash	Adjust	M-18
	Worn or damaged side bearing	Replace	M-18
	Worn or damaged drive pinion bearing	Replace	M-15
	Worn or damaged gear in LSD assembly ("TORSEN" LSD)	Replace	M-14
	Worn thrust washer	Replace	M-18
	Improperly adjusted side gear backlash	Adjust	M-18
Heat buildup	Insufficient drive pinion gear backlash	Adjust	M-15
	Excessive bearing preload	Adjust	M-15
Oil leakage	Loose differential carrier	Tighten or repair	M-14
No differential operation	Misassembled or damaged	Repair	M-14

45U0MX-005


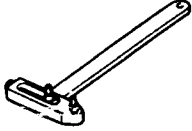
DIFFERENTIAL

PREPARATION
SST

<p>49 0107 680A Engine stand</p> 	<p>For disassembly and assembly of differential</p>	<p>49 M005 561 Hanger, differential carrier</p> 	<p>For disassembly and assembly of differential</p>
<p>49 G030 795 Installer, oil seal</p> 	<p>For installation of oil seal</p>	<p>49 G030 797 Handle (Part of 49 G030 795)</p> 	<p>For installation of bearing outer race</p>
<p>49 F027 004 Attachment ϕ80 (Part of 49 F027 0A1)</p> 	<p>For installation of bearing outer race (rear bearing)</p>	<p>49 F027 0A1 Installer set, bearing</p> 	<p>For installation of bearing</p>
<p>49 F027 005 Attachment ϕ62 (Part of 49 F027 0A1)</p> 	<p>For installation of bearing outer race (front bearing)</p>	<p>49 F027 0A0 Gauge set, pinion height adjustment</p> 	<p>For adjustment of pinion height</p>
<p>49 0727 570 Gauge body, pinion height (Part of 49 F027 0A0)</p> 	<p>For adjustment of pinion height</p>	<p>49 8531 565 Pinion model</p> 	<p>For adjustment of pinion height</p>
<p>49 8531 567 Collar A (Part of 49 8531 565)</p> 	<p>For adjustment of pinion height</p>	<p>49 H027 001 Collar</p> 	<p>For adjustment of pinion height</p>
<p>49 0305 555 Gauge block</p> 	<p>For adjustment of pinion height</p>	<p>49 D017 2A1 Installer set, bearing</p> 	<p>For installation of bearing</p>
<p>49 F401 337A Attachment C (Part of 49 D017 2A1)</p> 	<p>For installation of bearing inner race (rear bearing)</p>	<p>49 F401 331 Body (Part of 49 D017 2A1)</p> 	<p>For installation of bearing inner race (rear bearing)</p>

M

DIFFERENTIAL

<p>49 G030 338</p> <p>Attachment E (Part of 49 D017 2A1)</p>		<p>For installation of bearing inner race (side bearing)</p>	<p>49 0259 720</p> <p>Wrench, differential side bearing adjusting nut</p> 	<p>For adjustment of drive pinion and ring gear backlash</p>
----------------------------------------------------------------------	-----------------------------------------------------------------------------------	------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------

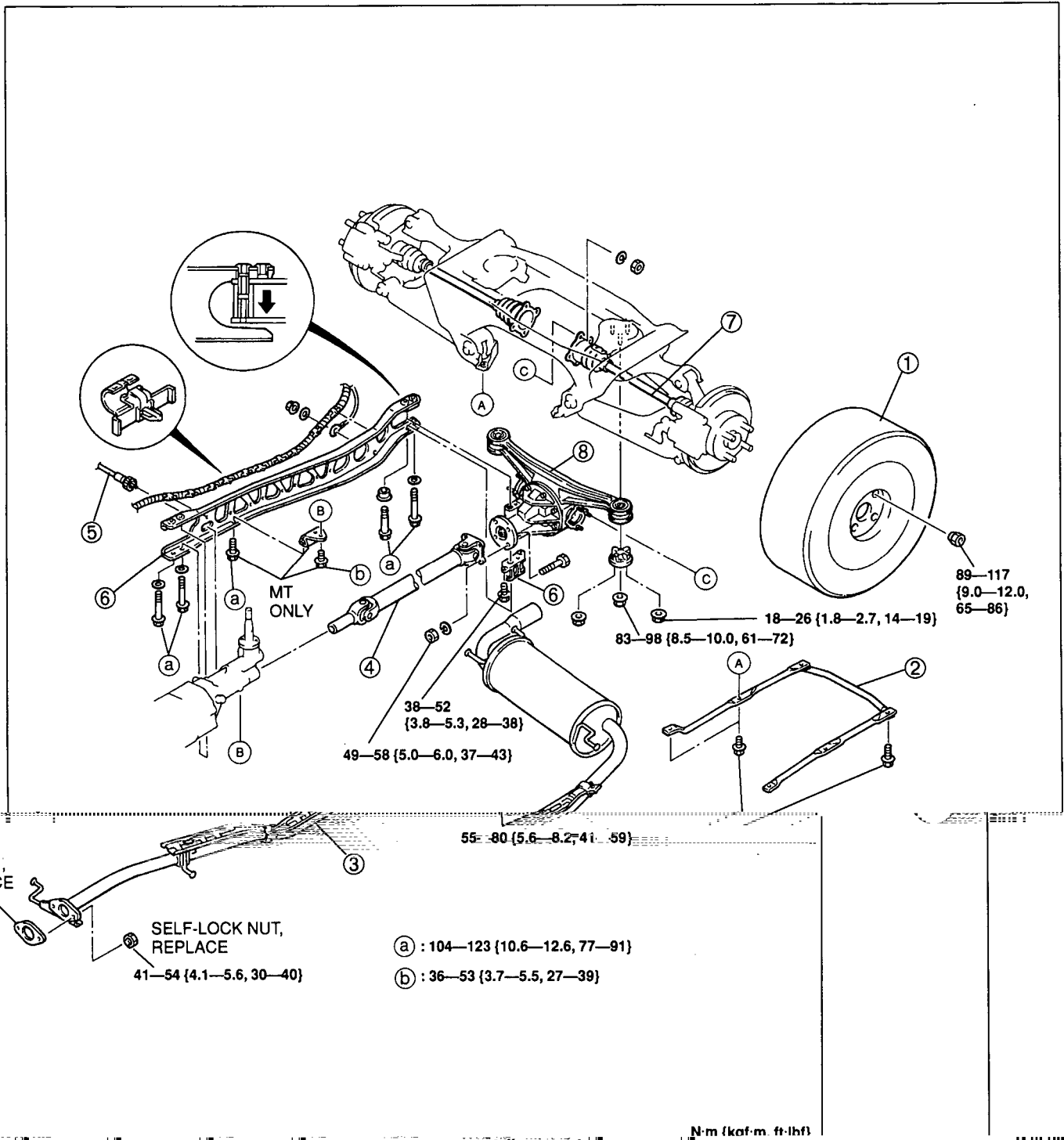
45U0MX-037

DIFFERENTIAL

M

DIFFERENTIAL, STANDARD; DIFFERENTIAL, TORQUE SENSING LIMITED SLIP ("TORSEN" LSD) Removal / Installation

1. Drain the differential oil.
2. Remove in the order shown in the figure, referring to **Removal Note**.
3. Install in the reverse order of removal, referring to **Installation Note**.
4. Add the specified oil to the specified level.



GASKE1, REPLACE

SELF-LOCK NUT, REPLACE

41-54 {4.1-5.6, 30-40}

6 Power plant frame (PRF)

7. Drive shafts

8. Differential

Disassembly / Inspection /

Assembly page M-14

1. Rear wheels

2. Differential mounting pipe

3. Exhaust pipe

4. Propeller shaft

5. Speedometer cable

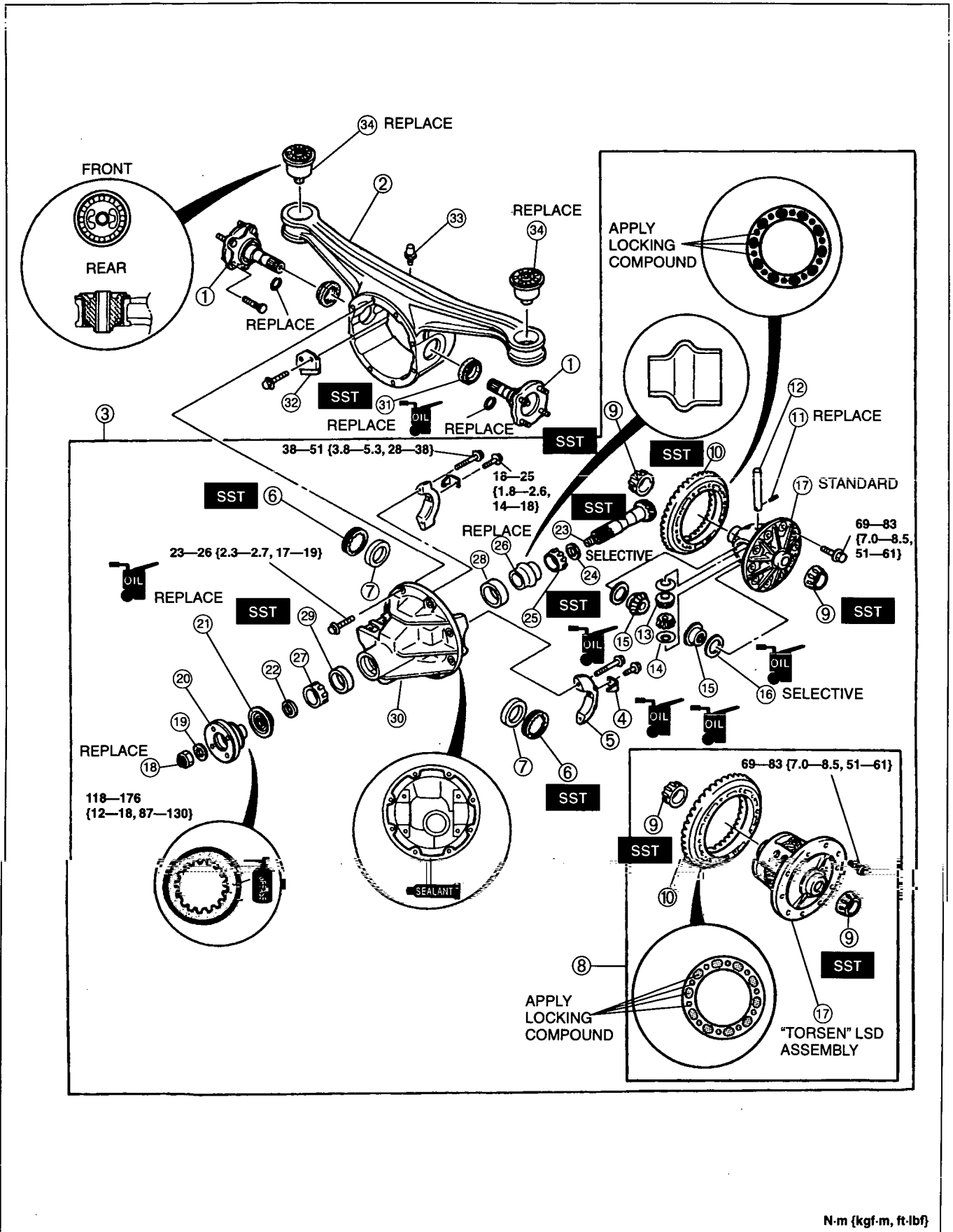
45U0VX-046

M

DIFFERENTIAL

Disassembly / Inspection / Assembly

1. Disassemble in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly, referring to **Assembly Note**.

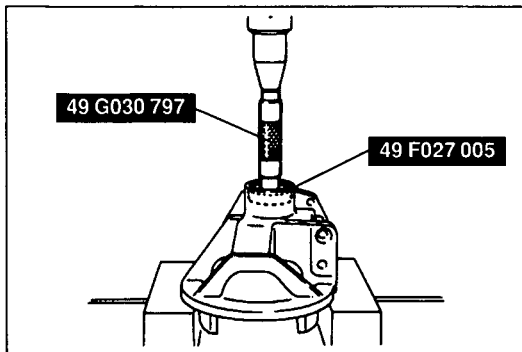


N-m {kgf-m, ft-lbf}

05U0MX-084

- 1. Output shafts
- 2. Differential case
- 3. Differential gear assembly
- 4. Lock plates
- 5. Bearing caps
- 6. Adjusting nuts
Assembly Note page M-18
- 7. Bearing outer races (Side bearing)
- 8. Gear case assembly ("TORSEN" LSD)
- 9. Bearing inner races (Side bearing)
Assembly Note page M-18
- 10. Ring gear
- 11. Knock pin (Standard)
- 12. Pinion shaft (Standard)
- 13. Pinion gears (Standard)
- 14. Thrust washers (Standard)
- 15. Side gears (Standard)
- 16. Thrust washers (Standard)
Assembly Note page M-18
- 17. Gear case
- 18. Locknut (Companion flange)
- 19. Washer
- 20. Companion flange
Assembly Note page M-17
- 21. Oil seal (Companion flange)
- 22. Washer
- 23. Drive pinion
- 24. Spacer
Assembly Note page M-16
- 25. Bearing inner race (Front bearing)
Assembly Note page M-16
- 26. Collapsible spacer
- 27. Bearing inner race (Rear bearing)
Assembly Note page M-16
- 28. Bearing outer race (Rear bearing)
Assembly Note below
- 29. Bearing outer race (Front bearing)
Assembly Note below
- 30. Differential carrier
- 31. Oil seal (Output shaft)
- 32. Baffle
- 33. Breather
- 34. Differential mount

45U0MX-053

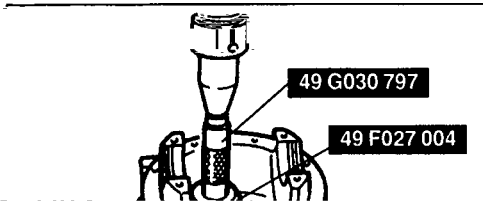


45U0MX-064

Assembly note

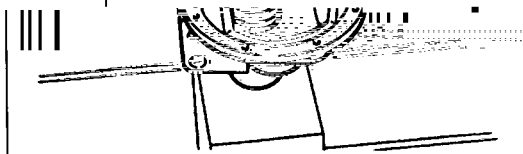
Bearing outer race (front bearing)

Install the bearing outer race (front bearing) by using the SST.

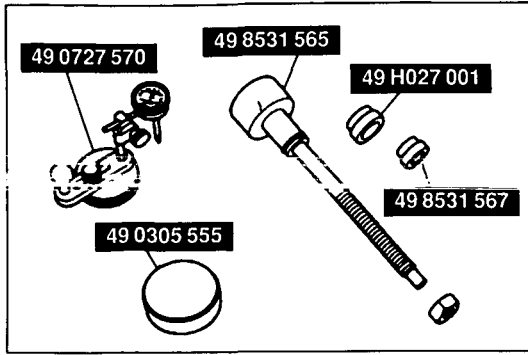


Bearing outer race (rear bearing)

Install the bearing outer race (rear bearing) by using the SST.



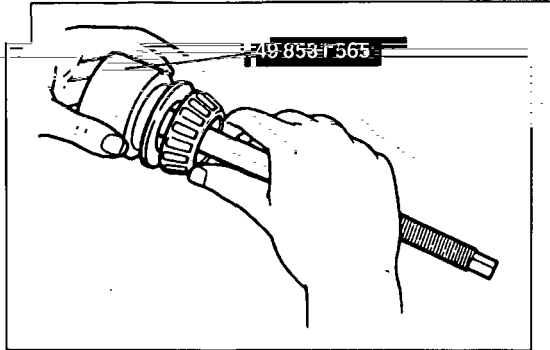
45U0MX-065



45U0MX-066

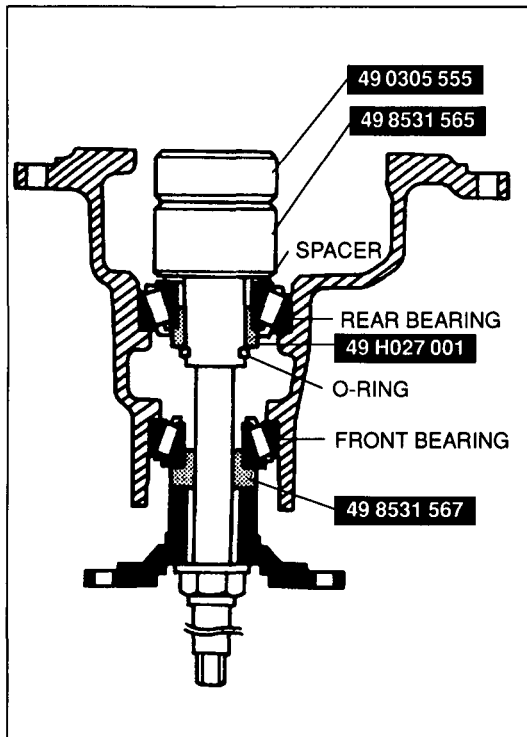
Bearing inner race (rear bearing), Bearing inner race (front bearing), Spacer

1. Adjust the drive pinion height as follows, by using the SST.



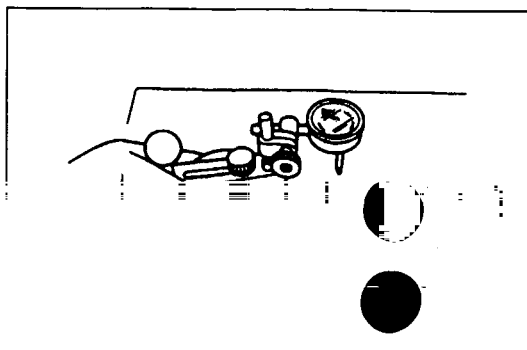
45U0MX-067

- (1) Install the previously-removed spacer onto the SST so that the bearing side of the spacer abuts the drive pinion. Then install the rear bearing and O-ring onto the SST/spacer as shown in the figure.

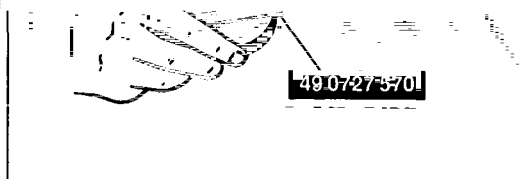


45U0MX-068

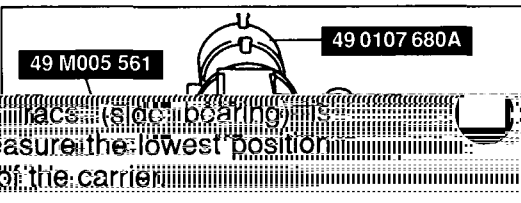
- (2) Assemble the spacer, bearing inner race (rear bearing), and SST. Secure the SST with the O-ring. Install this assembly in the carrier. Install the bearing inner race (front bearing), the SST, companion flange, washer, and nut.
- (3) Tighten the nut just enough so that the companion flange can still be turned by hand.



- (4) Place the SST on the surface plate and set the dial indicator to "Zero".

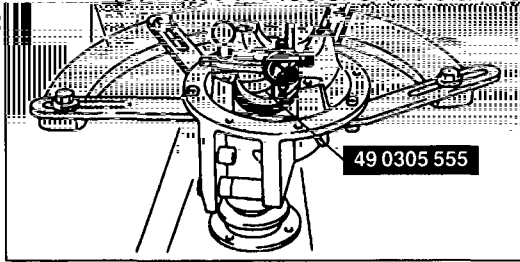


45U0MX-069



(5) Place the SST atop the drive pinion model. Set the gauge body atop the gauge block.

(6) Place the feeler of the dial indicator so that it contacts

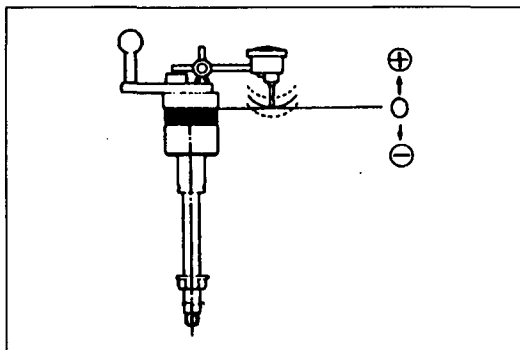


45U0MX-070

where the bearing is installed in the carrier on the left and right

(left and right) values obtained in step (6) and divide the total by 2.

(in)



45U0MX-071

(7) Add the two (left and right) values obtained in step (6) and divide the total by 2.

Specification: 0mm {0.000 in}

Adjustment, adjust the pinion height by selecting the spacer of the thickness necessary. Spacers are available in increments of 0.03mm {0.0012 in}.

Selected in the procedure above, the spacer is facing the drive pinion.

Mark	Thickness	Mark	Thickness
08	3.08mm {0.1213 in}	29	3.29mm {0.1295 in}
11	3.11mm {0.1224 in}	32	3.32mm {0.1307 in}
14	3.14mm {0.1224 in}	35	3.35mm {0.1319 in}
17	3.17mm {0.1248 in}	38	3.38mm {0.1331 in}
20	3.20mm {0.1260 in}	41	3.41mm {0.1343 in}
23	3.23mm {0.1271 in}	44	3.44mm {0.1354 in}
26	3.26mm {0.1283 in}	47	3.47mm {0.1366 in}

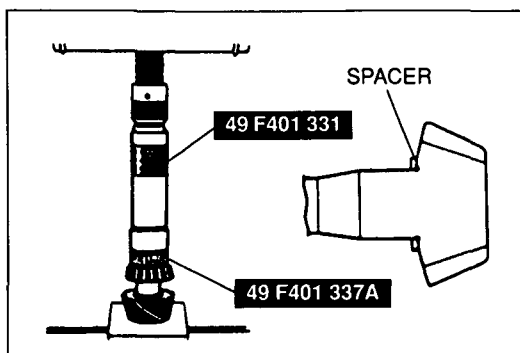
45U0MX-072

(8) If not within specification, select a spacer. Select the spacer closest to that needed in increments of 0.03mm {0.0012 in}.

(9) Install the spacer, spacer with the beveled side facing the drive pinion.

Press the drive pinion into the drive pinion until the force increases sharply.

Press the rear race (rear bearing) on with the SST.

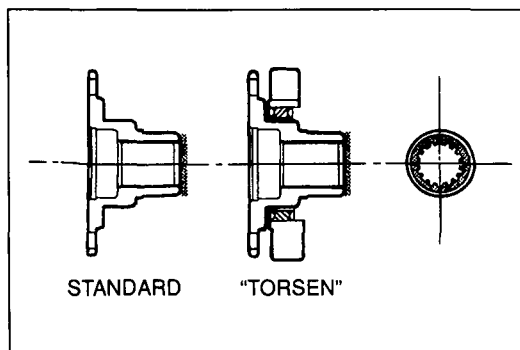


45U0MX-073

(10) Press the spacer on until the required force starts to increase.

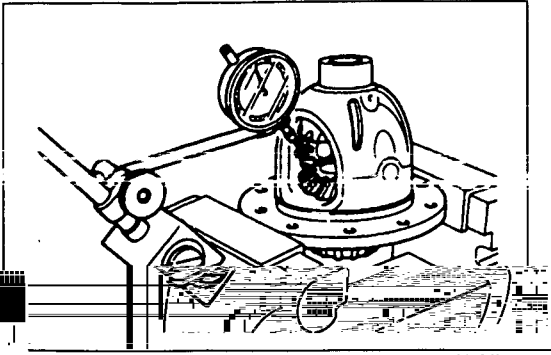
2. Install the spacer.
3. Press the bearing inner race with the SST.

Press to the end face of the companion flange.



45U0MX-077

Companion flange
Apply a light coat of grease to the companion flange.



45U0MX-079

Thrust washers (Standard)

Adjust the backlash of the side gears and pinion gear as follows. (Standard)

- (1) Set a dial gauge against the pinion gear as shown.
- (2) Secure one of the side gears.
- (3) Move the pinion gear, and measure the backlash at the end of it.

Standard backlash: $0.11\text{--}0.13\text{mm}$ { $0.004\text{--}0.005\text{in}$ }

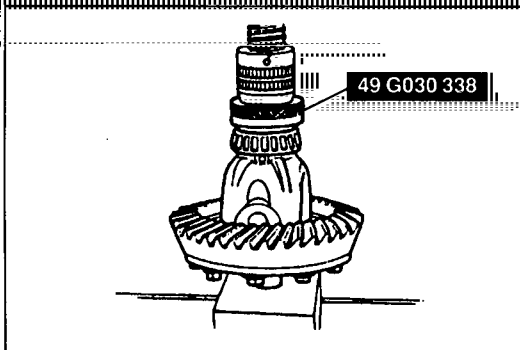
- (4) If the backlash exceeds the standard, use the selectable thrust washers for adjustment.

Thrust washer thickness:

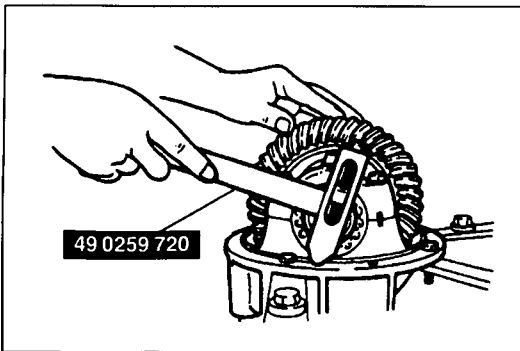
Identification mark	Thickness
0	2.00 mm {0.0787 in}
0.5	2.05 mm {0.0807 in}
1	2.10 mm {0.0827 in}
1.5	2.15 mm {0.0846 in}
2	2.20 mm {0.0866 in}

Bearing inner races (Side bearing)

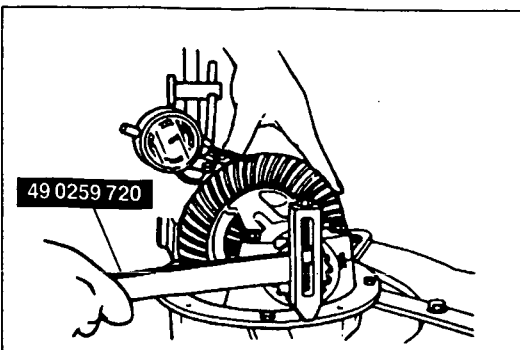
Press the bearing inner races (Side bearing) on to the SST.



45U0MX-082



45U0MX-083

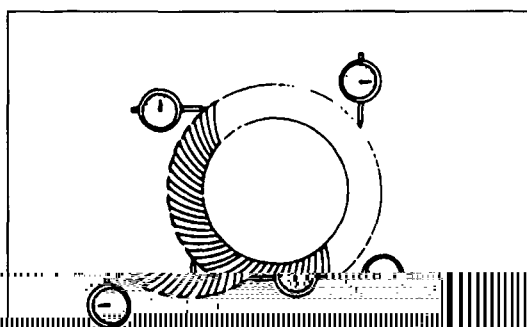


45U0MX-084

Adjusting nuts

1. Install the differential gear assembly in the carrier.
2. Note the identification marks on the adjusting nuts and install them on their respective sides.
3. Install the differential bearing caps, making sure the identification mark on the cap corresponds with the mark on the carrier by using the SST. Then temporarily tighten the bolts.

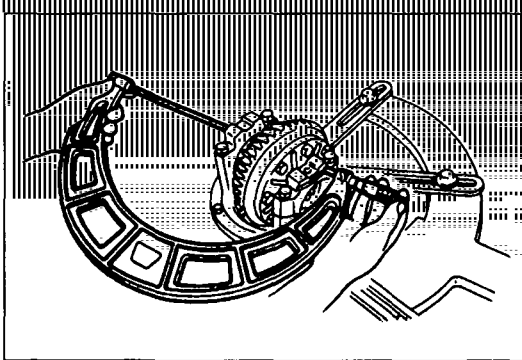
- (1) Mark the ring gear at four points at approx. 90° intervals. Mount a dial indicator to the carrier so that the feeler comes in contact at a right angle with the ring gear teeth.
- (2) Turn both bearing adjusters equally by using the SST until the backlash is $0.09\text{--}0.11\text{mm}$ { $0.0036\text{--}0.0043\text{in}$ }.



- (3) Check the backlash at the three other marked points, and make sure the maximum backlash is less than **0.07mm {0.0028 in}**.

45U0MX-085

4. Tighten or loosen the adjusting nuts equally until the distance between the pilot sections on the bearing caps is **185.428—185.50mm {7.3004—7.3031 in}**.
5. Recheck the backlash.



45U0MX-086

Before beginning any service procedure, refer to section T of this manual for air bag system service warnings.

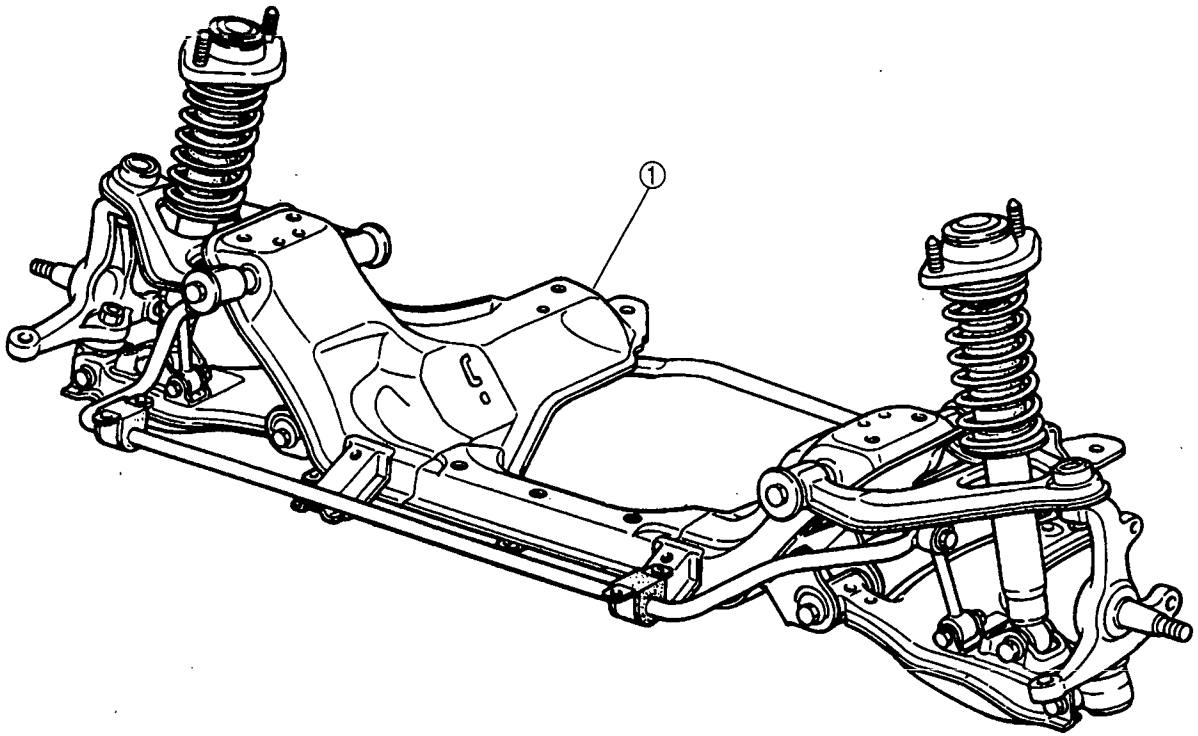
SUSPENSION

INDEX R- 2
OUTLINE R- 3
 SPECIFICATIONS R- 3
SUPPLEMENTAL SERVICE INFORMATION R- 4
FRONT SUSPENSION (DOUBLE-WISHBONE) ... R- 5
 FRONT CROSSMEMBER R- 5
REAR SUSPENSION (DOUBLE-WISHBONE) R- 6
 REAR CROSSMEMBER R- 6

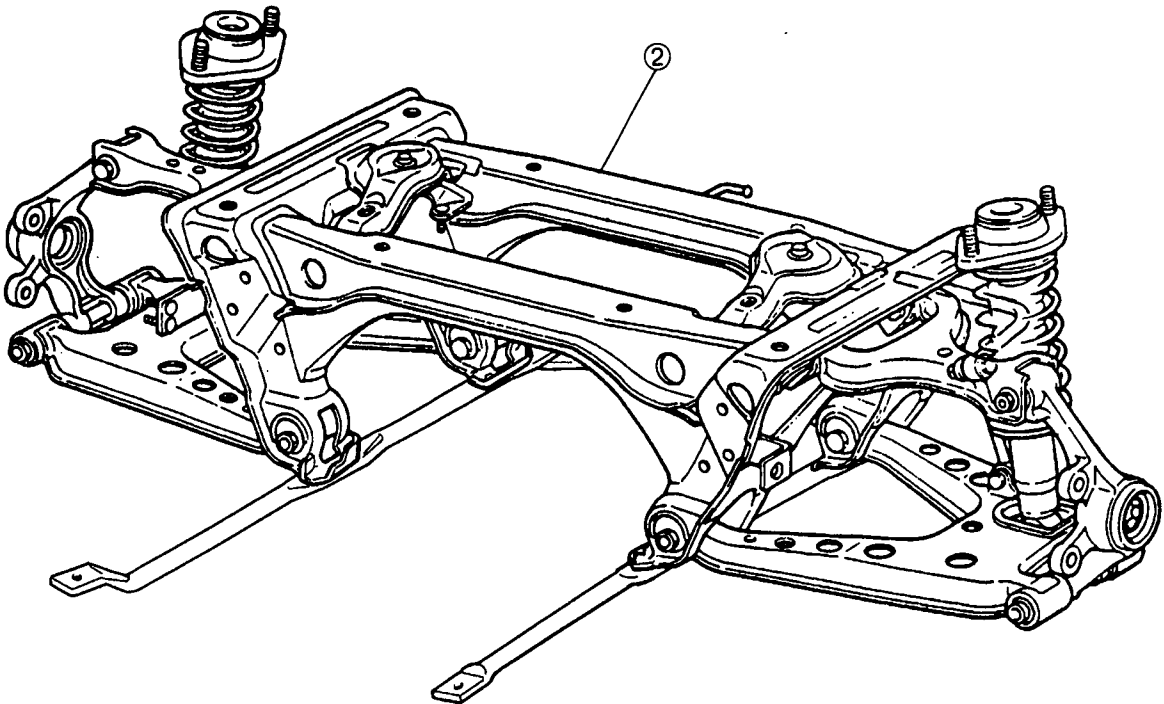
25U0RX-001

INDEX

FRONT SUSPENSION



REAR SUSPENSION



15U0RX-002

1. Front crossmember
Removal / Inspection /
Installation page R-5

2. Rear crossmember
Removal / Inspection /
Installation page R-6

OUTLINE

1. A performance rod has been added to the front crossmember for improved drivability.
2. A differential mounting pipe has been added to the rear crossmember for improved drivability.

SPECIFICATIONS

Item	Transmission		MT		
	Differential		"TORSEN" LSD	Standard	
Front suspension					
Type	Double-wishbone				
Stabilizer	Type	Torsion bar			
	Diameter	mm (in)	20.0 (0.79)		
Shock absorbers	Cylindrical double-acting, low-pressure gas charged				
Coil springs	Identification color	White			
	Wire diameter	mm (in)	11.0 (0.43)		
	Coil inner diameter	mm (in)	83.0 (3.27)		
	Free length	mm (in)	292.5 (11.52)		
	No. of coils	6.32			
Rear suspension					
Type	Double-wishbone				
Stabilizer	Type	Torsion bar			
	Diameter	mm (in)	12.0 (0.47)	11.0 (0.43)	
Shock absorbers	Cylindrical double-acting, low-pressure gas charged				
Coil springs	Identification color	Yellow			
	Wire diameter	mm (in)	10.1 (0.40)		
	Coil inner diameter	mm (in)	83.0 (3.27)		
	Free length	mm (in)	348.5 (13.72)		
	No. of coils	7.68			
Wheel alignment					
Front wheel alignment (Unladen*1)	Total toe-in	mm (in)	3 ± 3 (0.12 ± 0.12)		
		degree	0°18' ± 18'		
	Maximum steering angle	Inner	37°23' ± 2°		
		Outer	32°32' ± 2°		
	Camber angle*2	0°24' ± 45'			
	Caster angle*3	4°26' ± 45'			
SAI*4	11°20'				
Rear wheel alignment (Unladen*1)	Total toe-in	mm (in)	3 ± 3 (0.12 ± 0.12)		
		degree	0°18' ± 18'		
	Camber angle*2	-0°43' ± 30'			

*1 Fuel tank full; radiator coolant and engine oil at specified level, and spare tire, jack, and tools in designated position

*2 Difference between left and right must not exceed 1°

*3 Difference between left and right must not exceed 1°30'

*4 SAI; Steering Axis Inclination

■ Indicates new specifications

"TORSEN" is a registered trademark of ZEXEL-GLEASON USA. INC

SUPPLEMENTAL SERVICE INFORMATION

The following points in this section are different from the MX-5 Workshop Manual (1221-10-89I).

Front crossmember

- Removal / Inspection / Installation

Rear crossmember

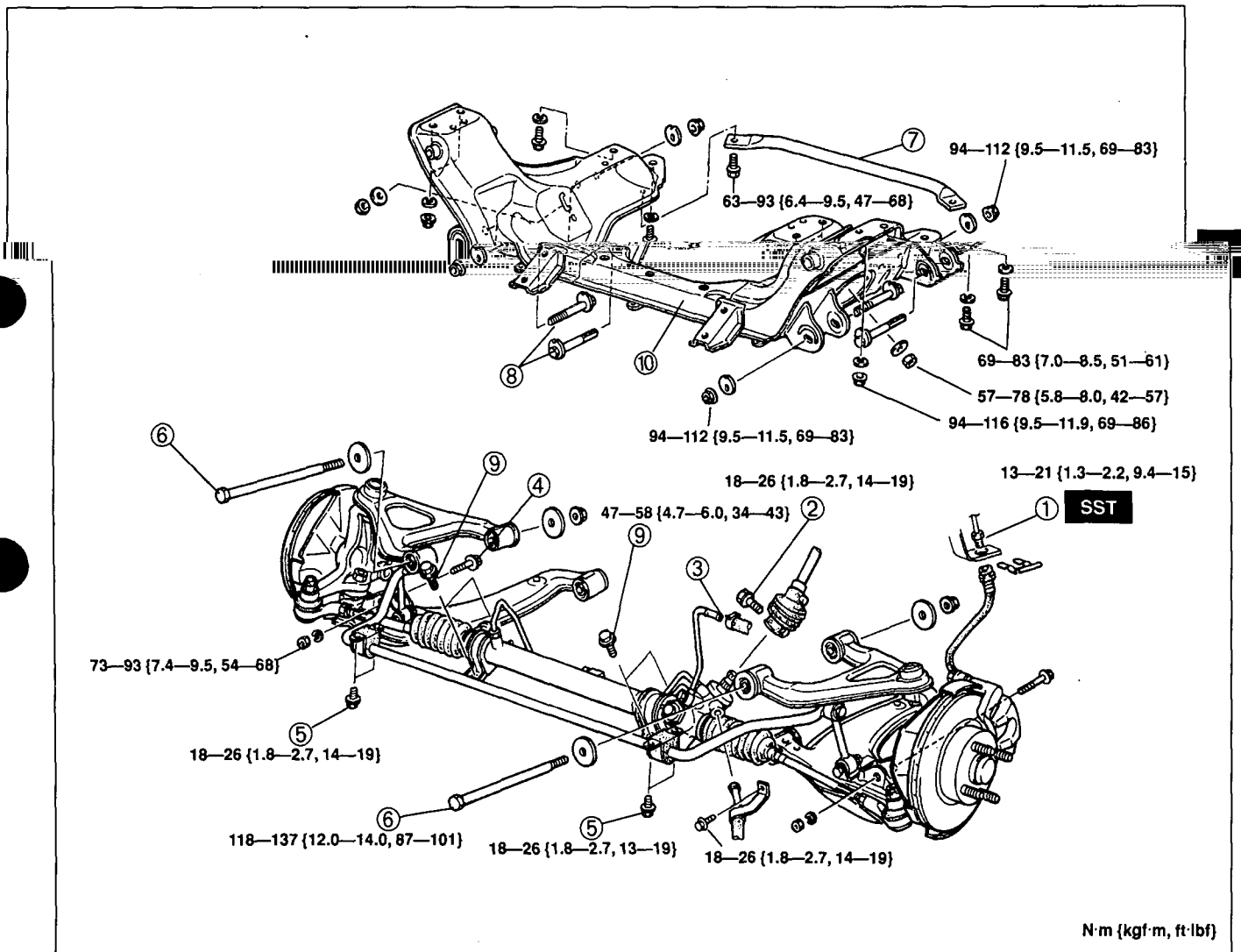
- Removal / Inspection / Installation

FRONT SUSPENSION (DOUBLE-WISHBONE)

FRONT CROSSMEMBER

Removal / Inspection / Installation

1. Jack up the vehicle.
2. Remove the wheels and the undercover.
3. Support the engine with a hoist.
4. Lower the crossmember and other suspension parts as an assembly, and then separate the parts.
5. Remove in the order shown in the figure.
6. Inspect all parts and repair or replace as necessary.
7. Loosely tighten the stabilizer bracket, upper arm, and lower arm bolts. Tighten all other nuts and bolts to the specified torques.
8. Lower the vehicle.
9. With the vehicle unloaded, tighten the stabilizer bracket, upper arm, and lower arm bolts to the specified torques.
10. Adjust the front wheel alignment.
11. Bleed the air from the brake system.
12. Bleed the air from the power steering system.



25U0RX-013

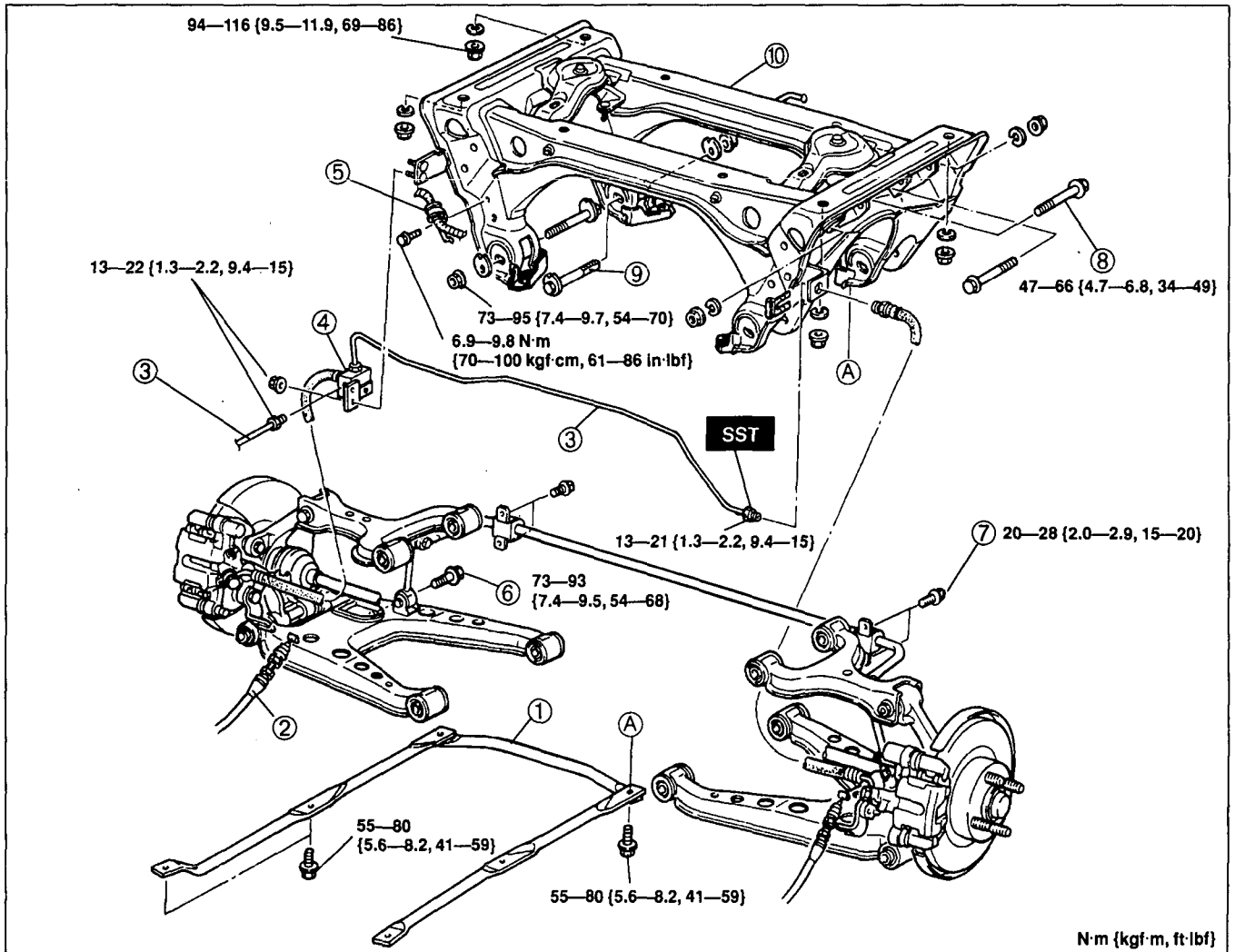
- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ol style="list-style-type: none"> 1. Brake pipe 2. Pinion shaft bolt 3. Power steering pipe 4. Shock absorber bolt 5. Stabilizer bracket bolt 6. Upper arm bolt | <ol style="list-style-type: none"> 7. Performance rod 8. Adjusting cam bolt 9. Steering gear bracket bolt 10. Front crossmember assembly
Inspect for damage |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

REAR SUSPENSION (DOUBLE-WISHBONE)

REAR CROSSMEMBER

Removal / Inspection / Installation

1. Jack up the vehicle and support it with safety stands.
2. Remove the wheels and tires.
3. Remove the differential and the power plant frame.
4. Lower the crossmember and other suspension parts as an assembly, and then separate the parts.
5. Remove in the order shown in the figure.
6. Inspect parts and repair or replace as necessary.
7. Install in the reverse order of removal.
8. Loosely tighten the stabilizer bracket, upper arm, and lower arm bolts. Tighten all other nuts and bolts to the specified torques.
9. Lower the vehicle.
10. With the vehicle unloaded, tighten the stabilizer bracket, upper arm, and lower arm bolts to the specified torques.
11. Adjust the rear wheel alignment.
12. Bleed the air from the brake system.
13. Adjust the parking brake lever stroke.



N·m {kgf·m, ft·lbf}

25UORX-018

- | | |
|-------------------------------|-------------------------------|
| 1. Differential mounting pipe | 7. Stabilizer bracket bolt |
| 2. Parking brake cable | 8. Upper arm bolt |
| 3. Brake pipe | 9. Adjusting cam bolt |
| 4. Brake pipe joint | 10. Rear crossmember assembly |
| 5. Battery cable bracket | Inspect for damage |
| 6. Shock absorber bolt | |

Before beginning any service procedure, refer to section T of this manual for air bag system service warnings.

BODY

INDEX S- 2

FEATURES

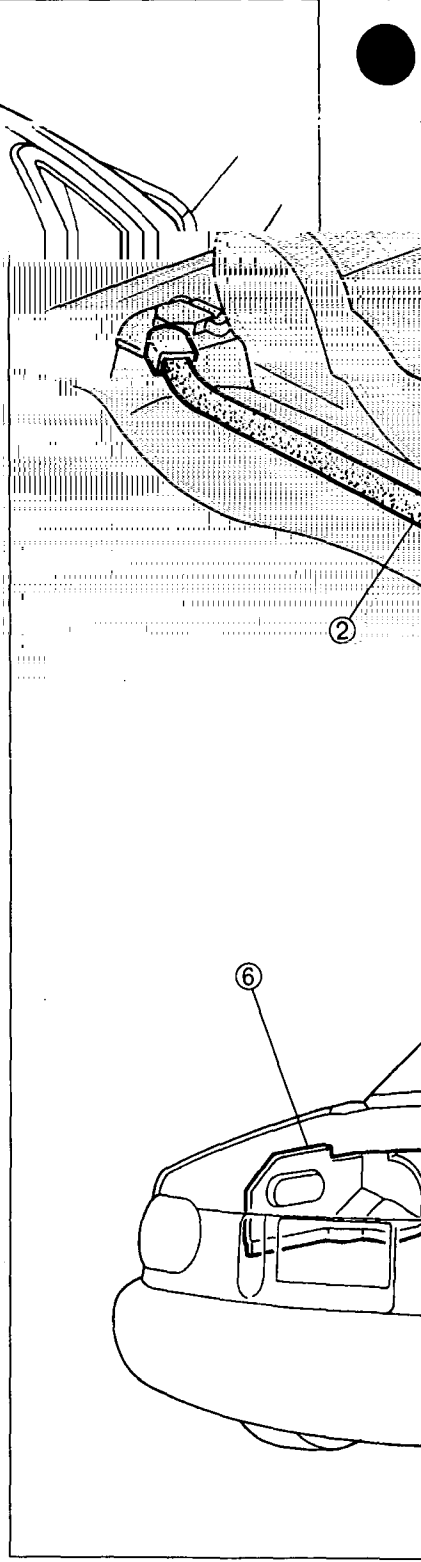
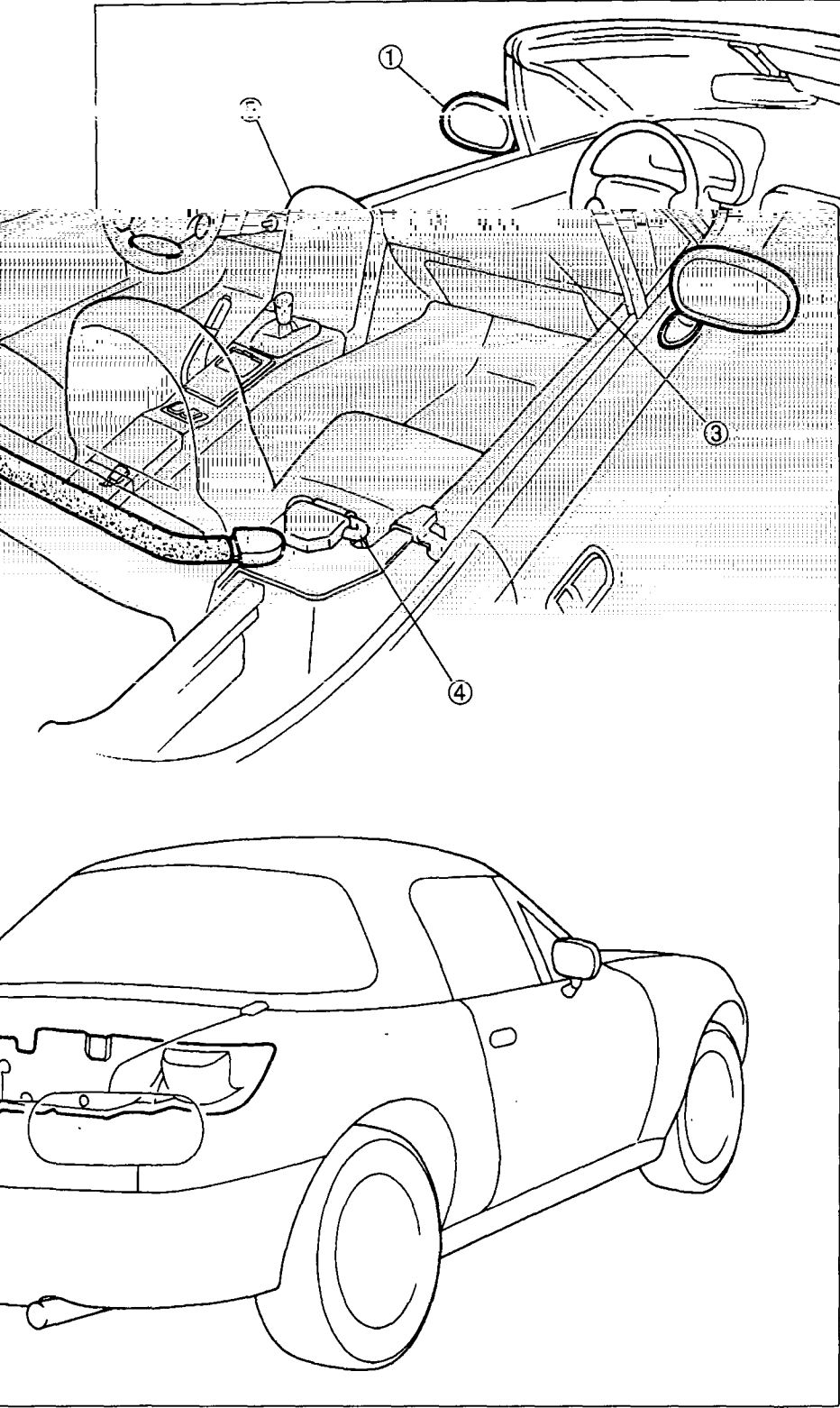
OUTLINE S- 3
OUTLINE OF CONSTRUCTION S- 3

SERVICE

SUPPLEMENTAL SERVICE INFORMATION S- 3
POWER OUTSIDE MIRROR S- 4
 COMPONENTS S- 4
 POWER OUTSIDE MIRROR S- 5
 POWER OUTSIDE MIRROR SWITCH S- 5
BRACE BAR S- 6
 COMPONENTS S- 6
DASHBOARD AND CONSOLE S- 7
 COMPONENTS S- 7
TRIM S-10
 COMPONENTS S-10
SEAT BELT S-11
 COMPONENTS S-11
SEAT S-12
 COMPONENTS S-12

35E0SX-001

INDEX



- page S-4
- page S-5
- page S-6
- page S-7
- 4. Seat belt
Removal / Installation page S-11
- 5. Seat
Removal / Installation page S-12
Disassembly / Assembly page S-13
- 6. Trim
Removal / Installation page S-10

- 1. Power outside mirror
Removal / Installation ..
Inspection
- 2. Brace bar
Removal / Installation ..
- 3. Dashboard and console
Removal / Installation ..

OUTLINE

OUTLINE OF CONSTRUCTION

- The power outside mirrors are optional equipment to improve convenience.
- The brace bar is standard equipment to improve rigidity of the body.
- The trunk side trim is installed in the trunk to improve appearance.
- The seat belt buckles are installed on the seats.
- On models equipped with an air bag system, removal and installation of the dashboard and console has changed.

SUPPLEMENTAL SERVICE INFORMATION

The following changes and/or additions have been made since publication of the 1989 Mazda MX-5 Workshop Manual (1222-10-89I).

Outside mirror

- Removal / Installation / Inspection

Brace bar

- Removal / Installation

Dashboard and console

- Removal / Installation

Trim

- Removal / Installation

Seat belt

- Removal / Installation

Seat

- Removal / Installation
- Disassembly / Assembly

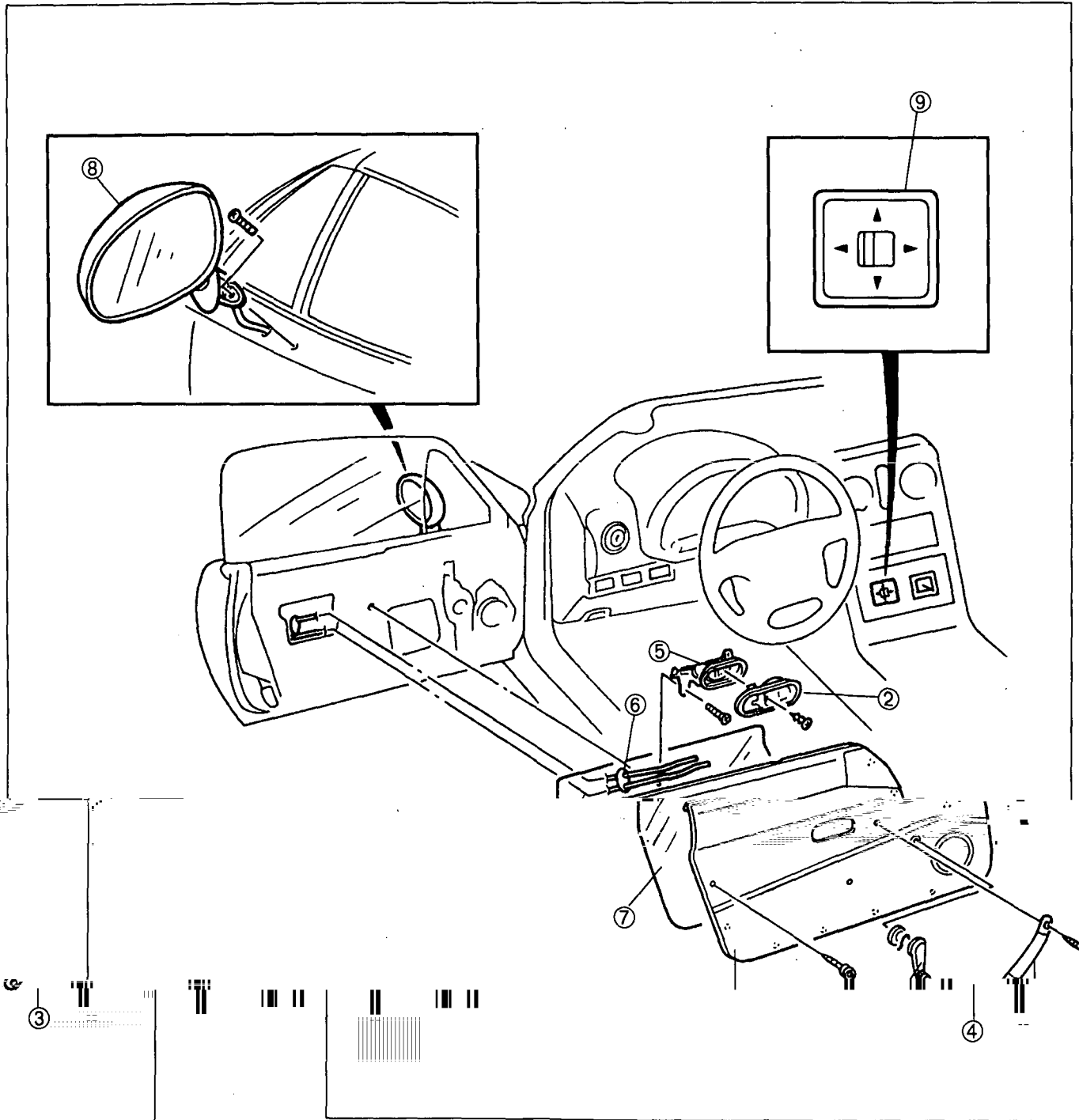
S

POWER OUTSIDE MIRROR

COMPONENTS

Removal / Installation

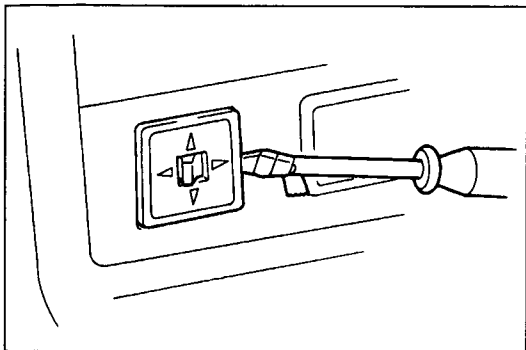
1. Disconnect the negative battery cable.
2. Remove in the order shown in the figure, referring to **Removal Note**
3. Install in the reverse order of removal.



1. Regulator handle
2. Inner handle cover
3. Pull handle
4. Door trim
5. Inner handle
6. Sealing pad

7. Door screen
8. Power outside mirror
Inspection
9. Power outside mirror sw
Removal Note
- Inspection

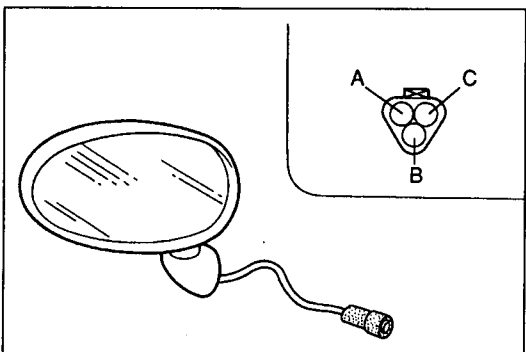
..... page S-5
 wch
 page S-5
 page S-5



Removal Note

Power outside mirror switch

Remove the power outside mirror switch by using a protected screwdriver as shown in the figure.



POWER OUTSIDE MIRROR

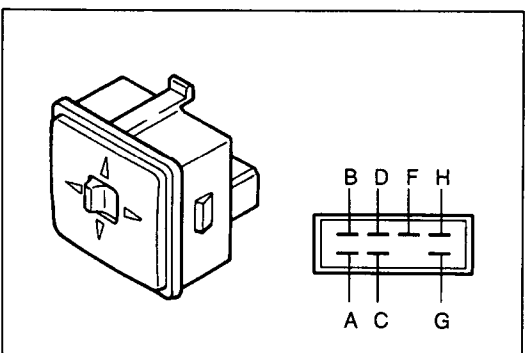
Inspection

1. Remove the power outside mirror. (Refer to page S-4.)
2. Check for continuity between the mirror terminals.

A	B	C
○—○	○—○	○—○

○—○: Continuity

3. If not as specified, replace the power outside mirror.



POWER OUTSIDE MIRROR SWITCH

Inspection

1. Remove the power outside mirror switch. (Refer to above.)
2. Check for continuity between the switch terminals.

Switch position		Terminal							
		A	B	C	D	F	G	H	
Left	UP	○—○	○—○			○—○	○—○	○—○	
	DOWN	○—○	○—○			○—○	○—○	○—○	
	LEFT	○—○		○—○	○—○	○—○	○—○	○—○	
	RIGHT	○—○	○—○			○—○	○—○	○—○	
Right	UP			○—○	○—○	○—○	○—○	○—○	
	DOWN			○—○	○—○	○—○	○—○	○—○	
	LEFT			○—○	○—○	○—○	○—○	○—○	
	RIGHT			○—○	○—○	○—○	○—○	○—○	

○—○: Continuity

3. If not as specified, replace the power outside mirror switch.

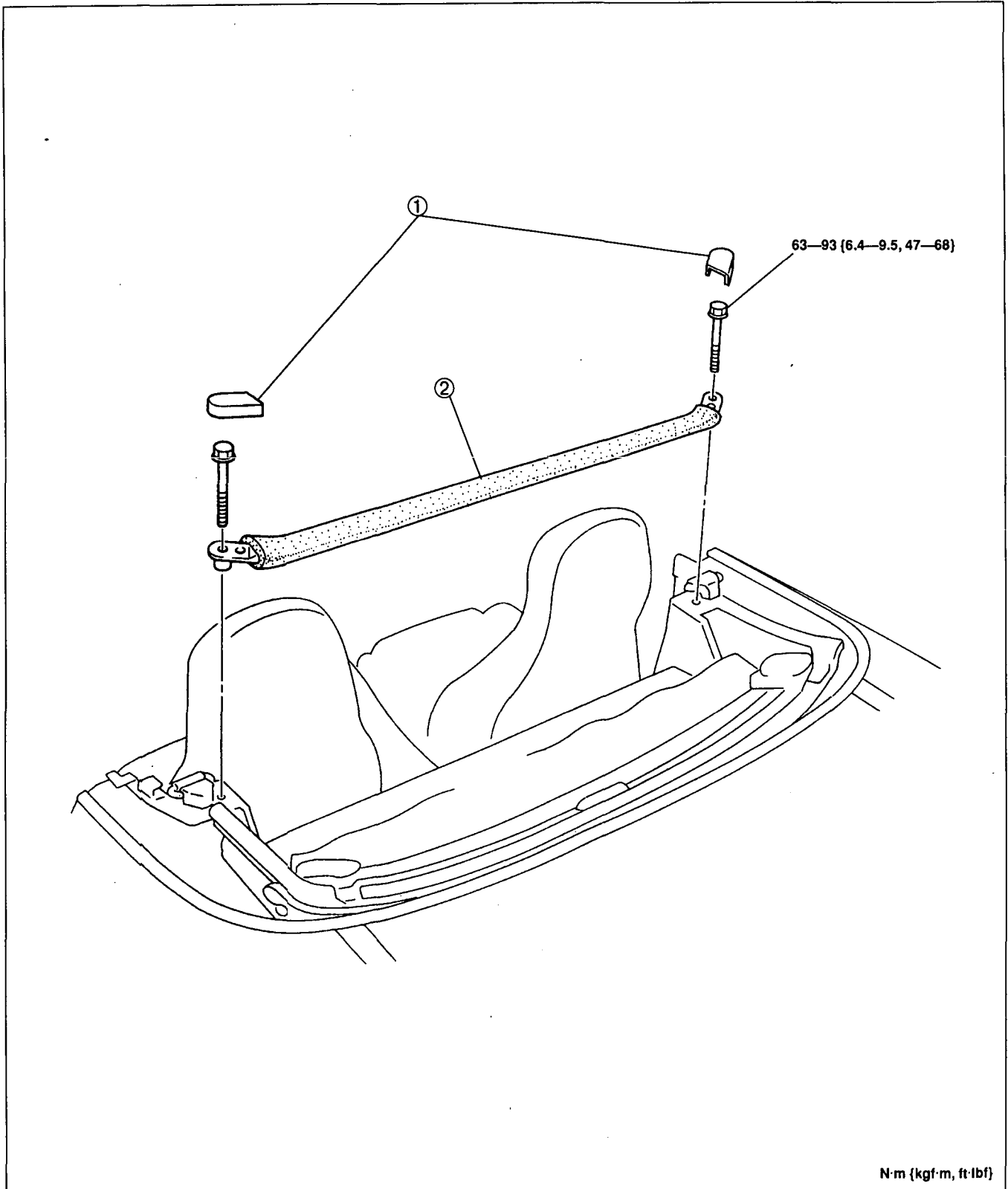
S

BRACE BAR

COMPONENTS

Removal / Installation

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



N·m {kgf·m, ft·lbf}

1. Cover

2. Brace bar

DASHBOARD AND CONSOLE

COMPONENTS

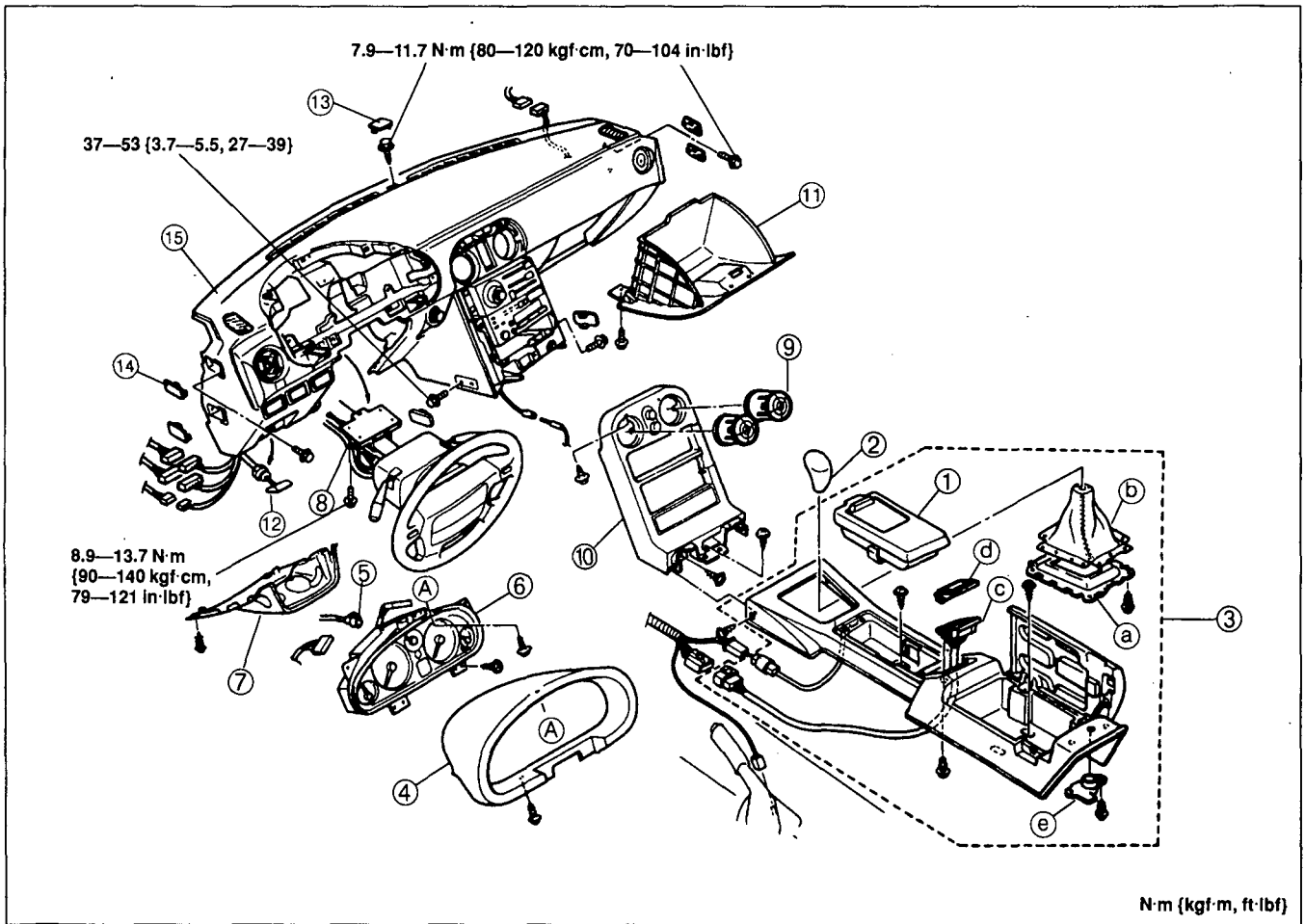
Removal / Installation

1. Disconnect the negative battery cable.

Warning

- Handling the air bag module improperly can accidentally deploy the air bag, which may seriously injure you. Read **SERVICE WARNINGS**, section T, before handling the air bag module.

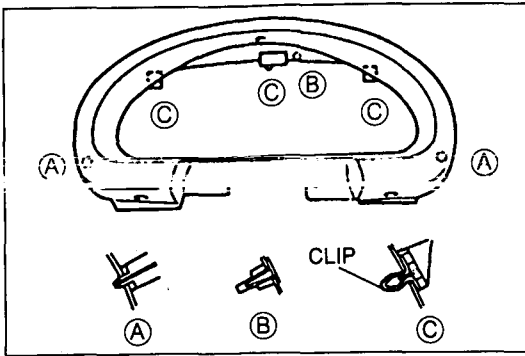
2. Remove in the order shown in the figure, referring to **Removal Note**. To remove the dashboard, remove the control wires of the heater unit and blower unit.
3. Install in the reverse order of removal, referring to **Installation Note**.



N·m (kgf·m, ft·lbf)

35U0SX-046

- | | |
|----------------------------------|----------------------------------|
| 1. Ashtray | 8. Steering shaft |
| 2. Shift lever knob | 9. Center louver |
| 3. Rear console assembly | Removal Note page S-8 |
| a. Boot plate | 10. Center panel assembly |
| b. Shift lever boot | Removal Note page S-8 |
| c. Power window switch | 11. Glove compartment |
| d. Cover (Without power windows) | 12. Bonnet release knob |
| e. Console lock assembly | 13. Center hole cover |
| 4. Meter hood assembly | Removal Note page S-9 |
| Removal Note page S-8 | 14. Side cover |
| 5. Speedometer cable | Removal Note page S-8 |
| 6. Instrument cluster | 15. Dashboard |
| 7. Center lower panel assembly | Installation Note page S-9 |
| Removal Note page S-8 | |

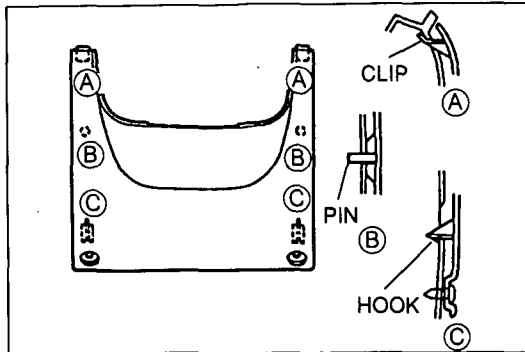


95A0SX-077

Removal Note

Meter hood assembly

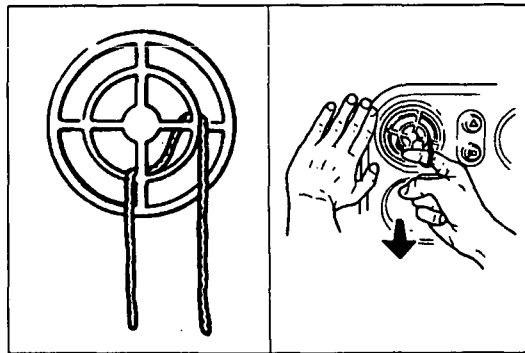
1. Remove the meter hood assembly mounting screws.
2. Pull the meter hood assembly forward to remove it.



95A0SX-078

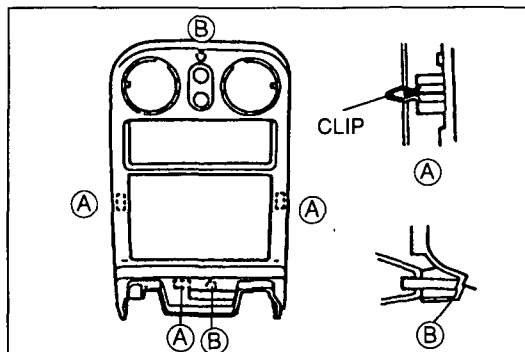
Center lower panel assembly

1. Remove the center lower panel assembly mounting screws.
2. Pull the center lower panel assembly forward to remove it.



Center louver

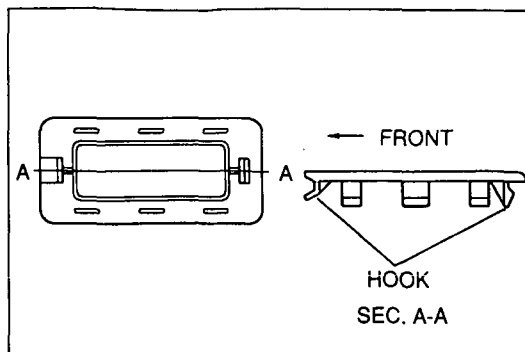
1. Thread a piece of string through the center louver.
2. Pull the string straight out while holding onto the center panel.



95A0SX-080

Center panel assembly

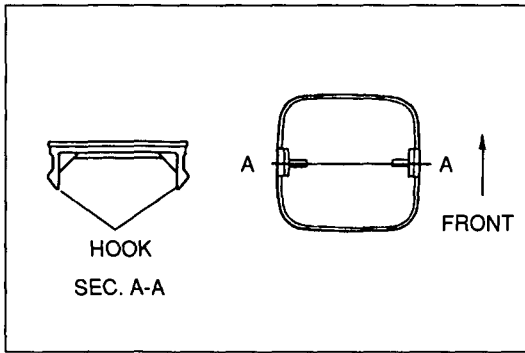
1. Remove the center louver. (See above.)
2. Remove the center panel assembly mounting screws.
3. Pull the center panel assembly forward to remove it.



95A0SX-081

Side cover

1. Unhook the side cover from the dashboard with a protected screwdriver.



95A0SX-082

Center hole cover

Unhook the cover from the dashboard with a protected screwdriver.

Installation Note

Dashboard

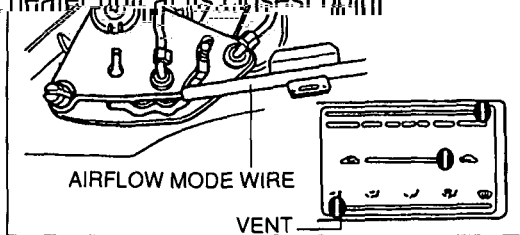
Install the control wires to the heater unit and blower unit as described below after installing the dashboard.

95A0SX-083



Airflow mode wire

1. Set the airflow mode control lever to Vent position.
2. Connect and clamp the wire with the shutter lever on the heater unit at its closest point

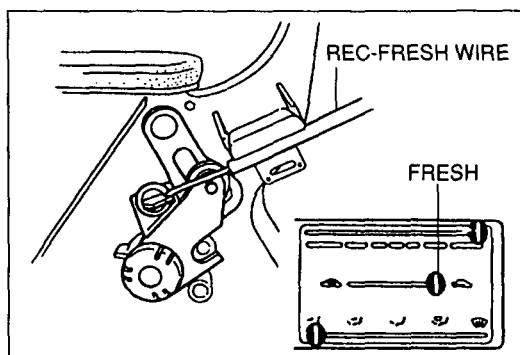


95A0SX-084

Caution

- After installation, move the lever to Vent position and verify that it moves the full stroke to Vent.

ation, move the airflow mode control lever to Vent position. Verify that the wire is securely attached, and that the lever moves the full stroke from Defrost to Vent.



95A0SX-085

REC-FRESH wire

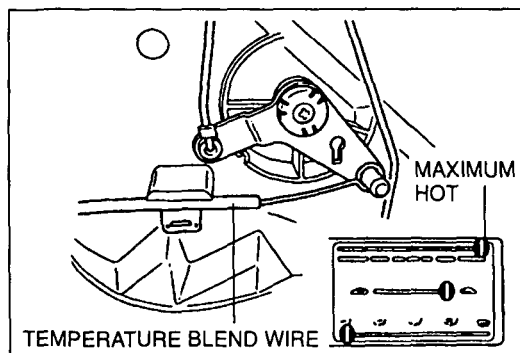
1. Set the selector lever to Fresh position.
2. Connect and clamp the wire with the shutter lever on the heater unit at its closest point.

Caution

- After installation, verify that the lever moves the full stroke to Fresh.

er lever to Fresh position. Clamp the wire with the shutter lever on the heater unit at its closest point.

ation, move the Rec-Fresh lever to Fresh position. Verify that the wire is securely attached, and that the lever moves the full stroke from Recirculation to Fresh.



95A0SX-086

Temperature blend wire

1. Set the temperature blend lever to Max-Hot position.
2. Connect and clamp the wire with the shutter lever on the heater unit at its closest point.

Caution

- After installation, verify that the lever moves the full stroke to Max-Hot and that it moves the full stroke to Cold.

nd wire. Set the temperature blend lever to Max-Hot position. Clamp the wire with the shutter lever on the heater unit at its closest point.

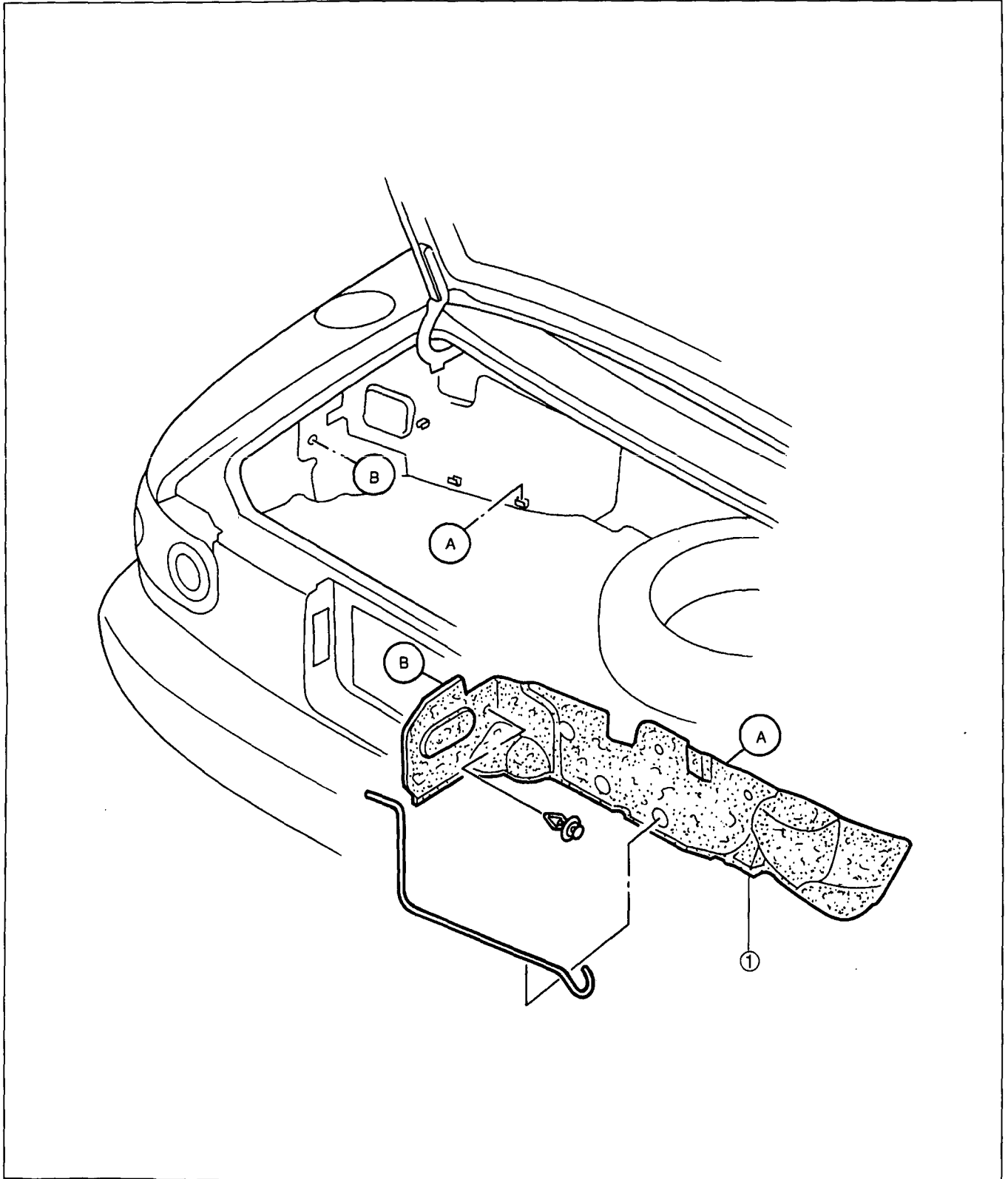
ation, move the temperature blend lever to Max-Hot position. Verify that the wire is securely attached, and that the lever moves the full stroke from Hot to Cold.

TRIM

COMPONENTS

Removal / Installation

1. Remove as shown in the figure.
2. Install as shown in the figure.



1. Trunk side trim

SEAT BELT

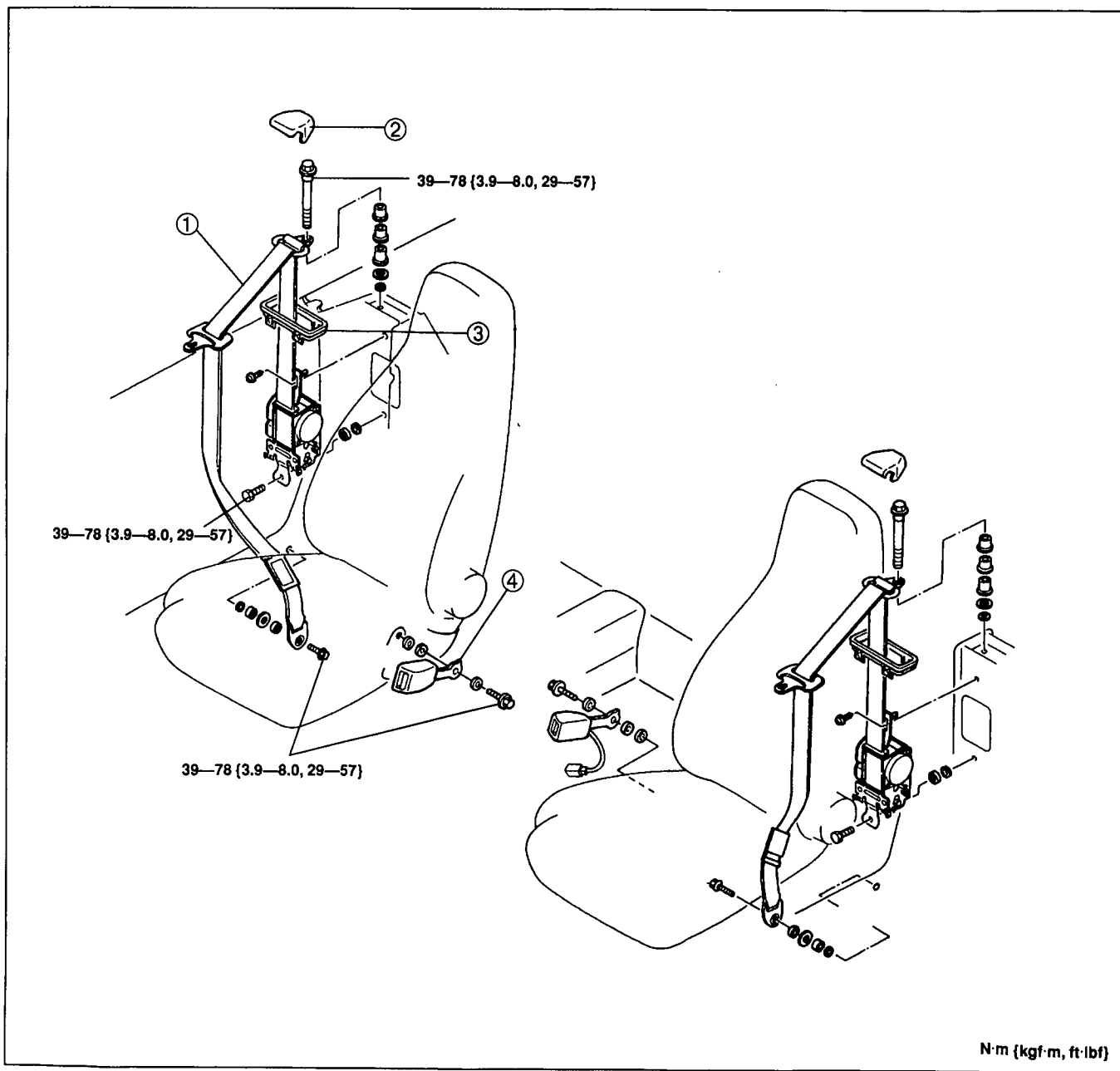
COMPONENTS

Removal / Installation

Caution

- The ELR (emergency locking retractor) has a spring that will unwind if the retractor's cover is removed. The spring cannot be rewound by hand. If this occurs, the ELR will not work properly. Therefore, do not disassemble the retractor.

1. Remove the brace bar. (Refer to page S-6.)
2. Remove the quarter trim.
3. Remove in the order shown in the figure. Before removing the driver's seat belt buckle, disconnect the negative battery cable.
4. Install in the reverse order of removal.



1. Seat belt
2. Anchor cover

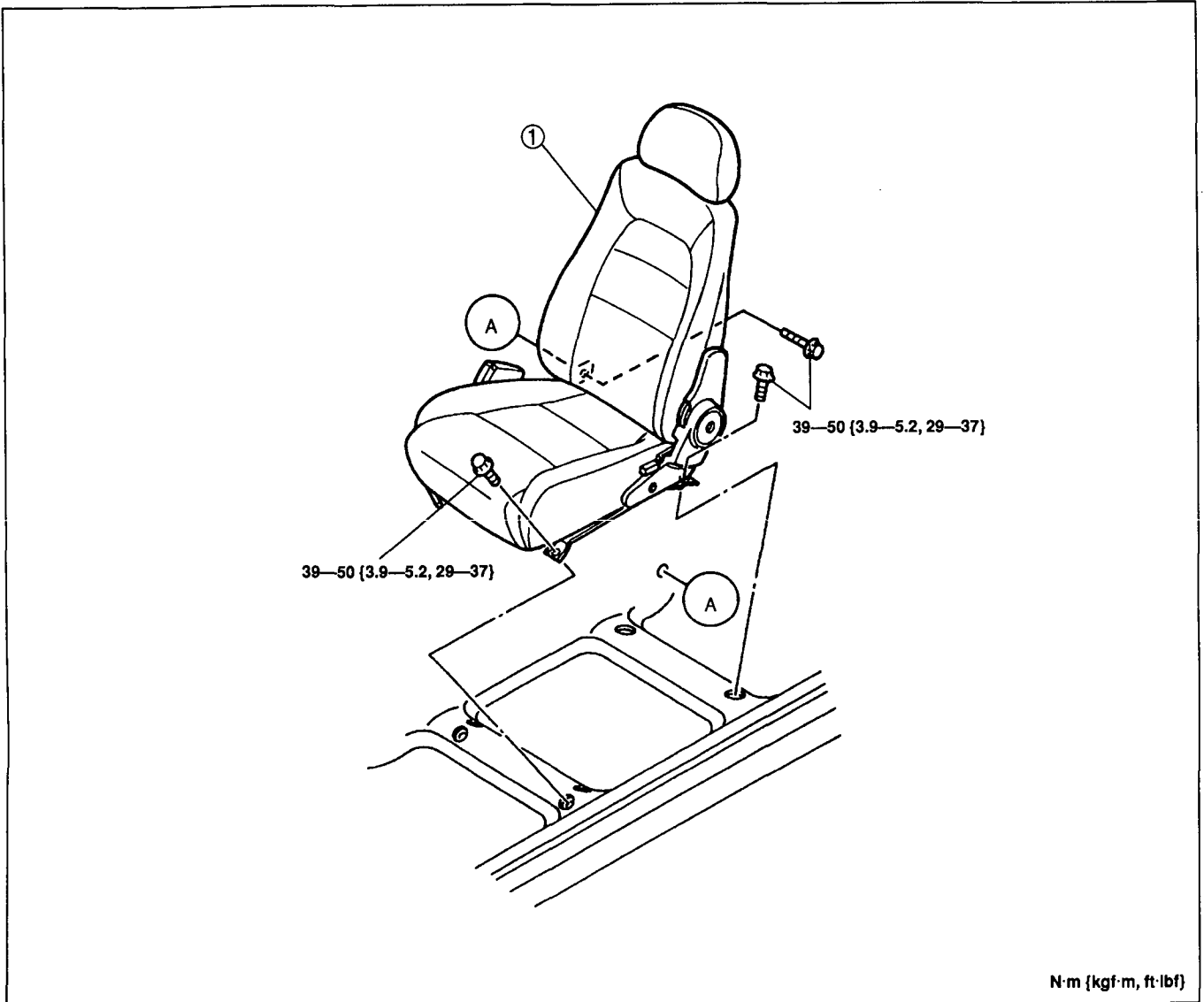
3. Bezel
4. Buckle

SEAT

COMPONENTS

Removal / Installation

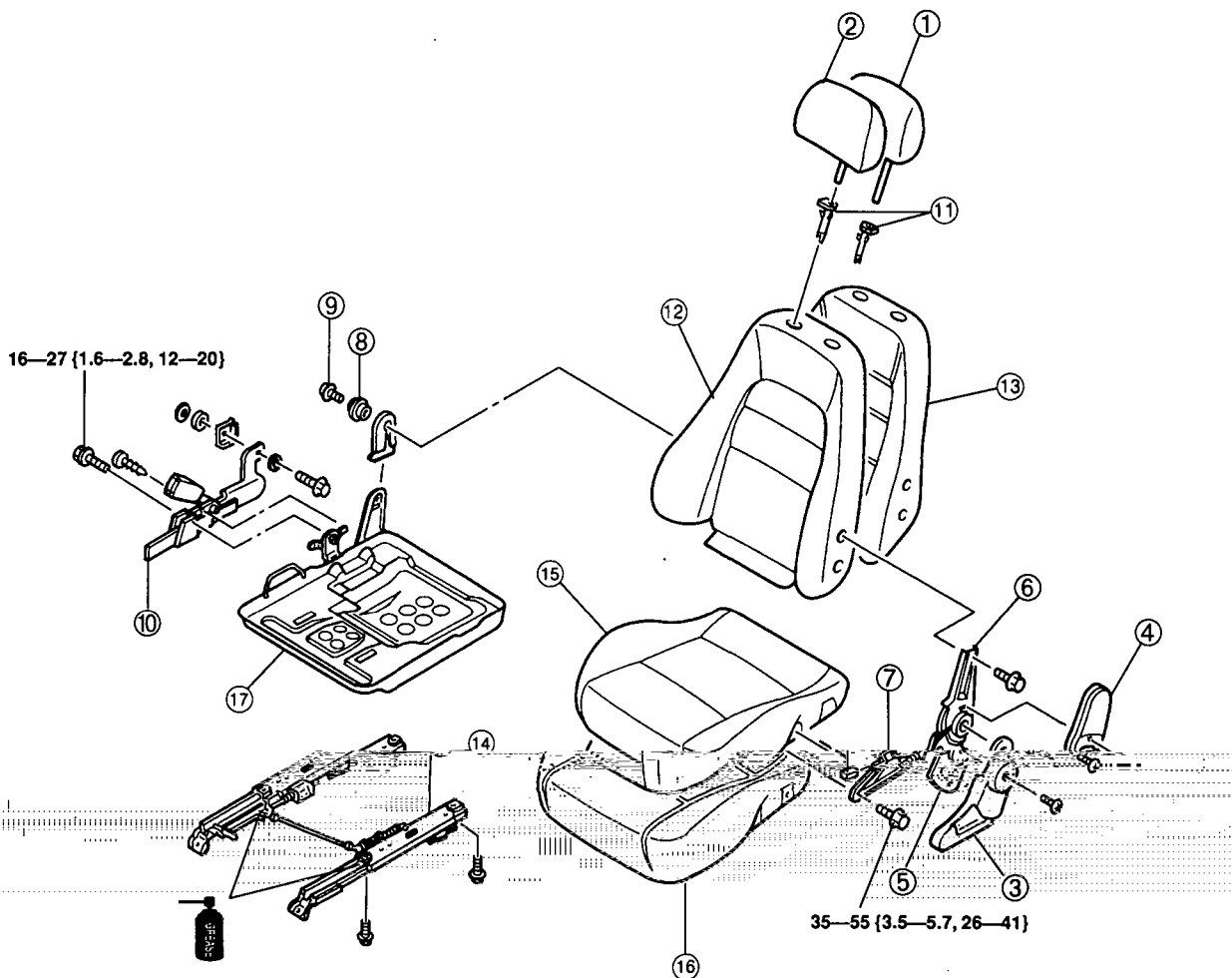
1. Remove in the order shown in the figure. Before removing the driver's seat, disconnect the negative battery cable.
2. Install in the reverse order of removal.



1. Front seat
Disassembly / Assembly page S-13

Disassembly / Assembly

1. Disassemble in the order shown in the figure, referring to **Disassembly Note**.
2. Assemble in the reverse order of disassembly.



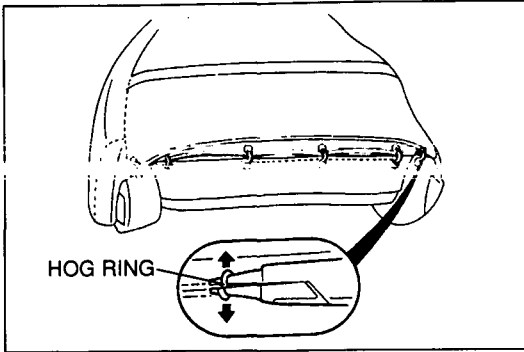
N·m {kgf·m, ft·lbf}

1. Headrest
2. Headrest trim
3. Recliner knuckle cover
4. Side cover
5. Seat belt protector
6. Recliner knuckle
7. Knuckle knob
8. Hinge cover
9. Bush
10. Belt anchor unit

11. Pole guide
12. Seat back trim
- Disassembly Note page S-14
13. Seat back pad
14. Slide adjuster
15. Seat cushion trim
- Disassembly Note page S-14
16. Seat cushion pad
17. Seat cushion frame

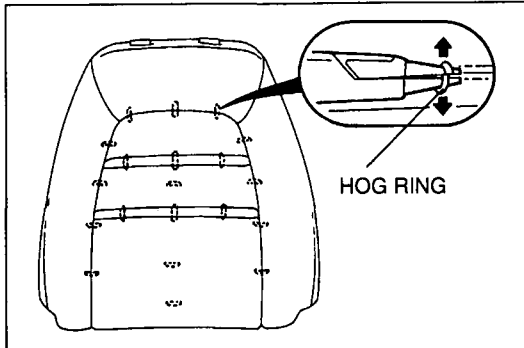
S

SEAT



Disassembly Note Seat back trim

1. Remove the hog rings from the lower part of the seat back.



2. Pull the seat back trim away from the padding and remove the remaining hog rings.

BODY ELECTRICAL SYSTEM

INDEX	T- 2
RELAY/SWITCH	T- 2
INSTRUMENT CLUSTER/AIR BAG SYSTEM ...	T- 3

FEATURES

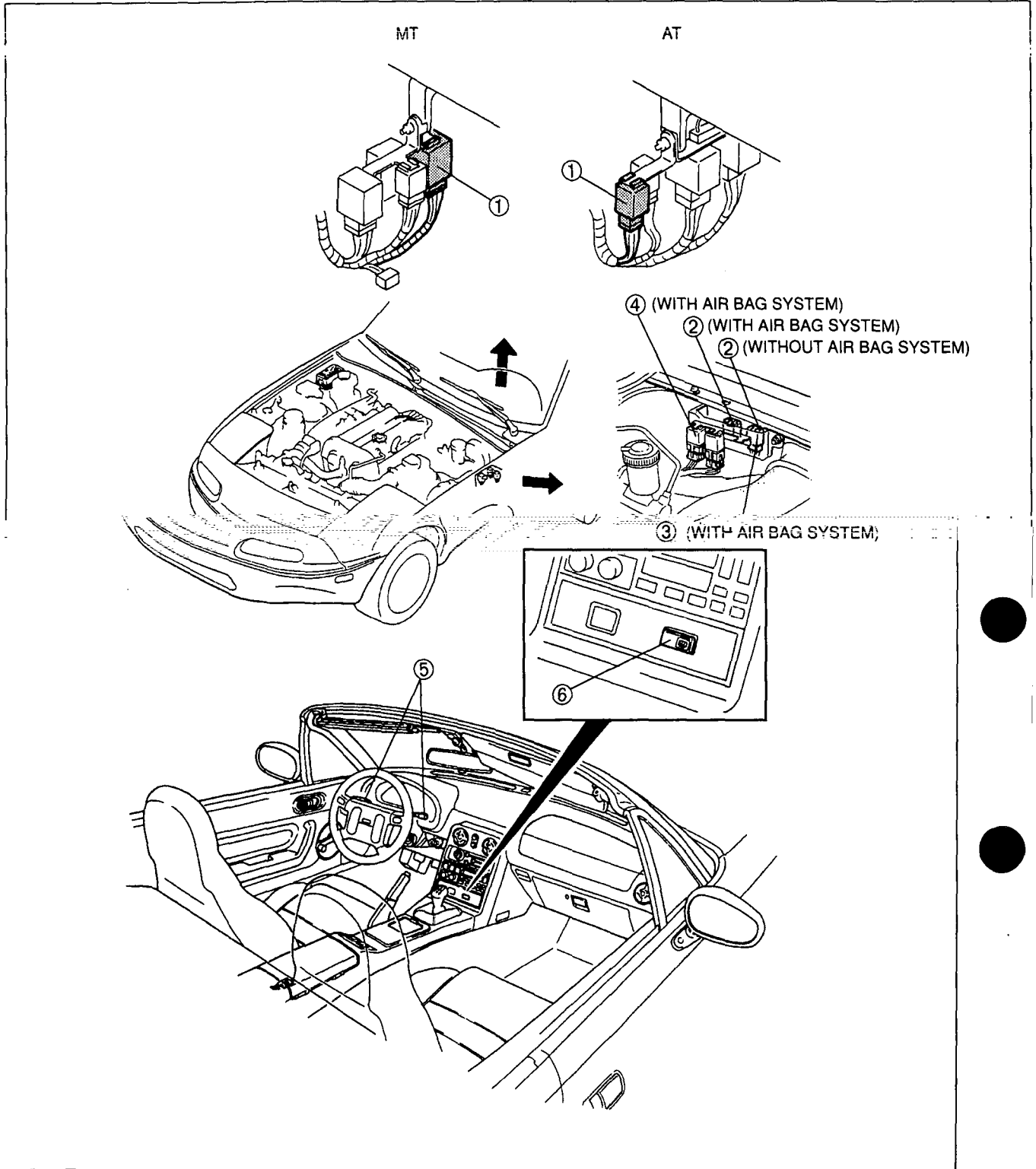
OUTLINE	T- 4
OUTLINE OF CONSTRUCTION	T- 4
RELAY	T- 4
SWITCH	T- 5
INSTRUMENT CLUSTER	T- 5
AIR BAG SYSTEM	T- 6
COMPONENT DESCRIPTION	T- 6
SYSTEM DESCRIPTION	T- 7
AIR BAG MODULE	T- 8
INFLATOR	T- 9
D-SENSOR AND S-SENSOR	T-10
CLOCK SPRING	T-11
DIAGNOSTIC MODULE	T-12
AIR BAG SYSTEM WARNING LIGHT	T-12

SERVICE

SUPPLEMENTAL SERVICE INFORMATION	T-13
RELAY	T-13
HEADLIGHT RELAY	T-13
TNS RELAY	T-13
SWITCH	T-14
COMBINATION SWITCH	T-14
REAR WINDOW DEFROSTER SWITCH	T-16
INSTRUMENT CLUSTER	T-16
TACHOMETER	T-16
EXTERIOR LIGHTING SYSTEM	T-17
TROUBLESHOOTING	T-17
AIR BAG SYSTEM	T-25
PREPARATION	T-25
STRUCTURAL VIEW	T-25
SERVICE WARNINGS	T-26
GENERAL PROCEDURES	T-27
TROUBLESHOOTING	T-27
AIR BAG MODULE	T-49
DIAGNOSTIC MODULE	T-50
CLOCK SPRING	T-51
CRASH SENSOR (D-SENSOR)	T-52
CRASH SENSOR (S-SENSOR)	T-55
AIR BAG MODULE DISPOSAL PROCEDURE ..	T-57
INSPECTION OF SST (DEPLOYMENT TOOL) ..	T-59

INDEX

RELAY/SWITCH

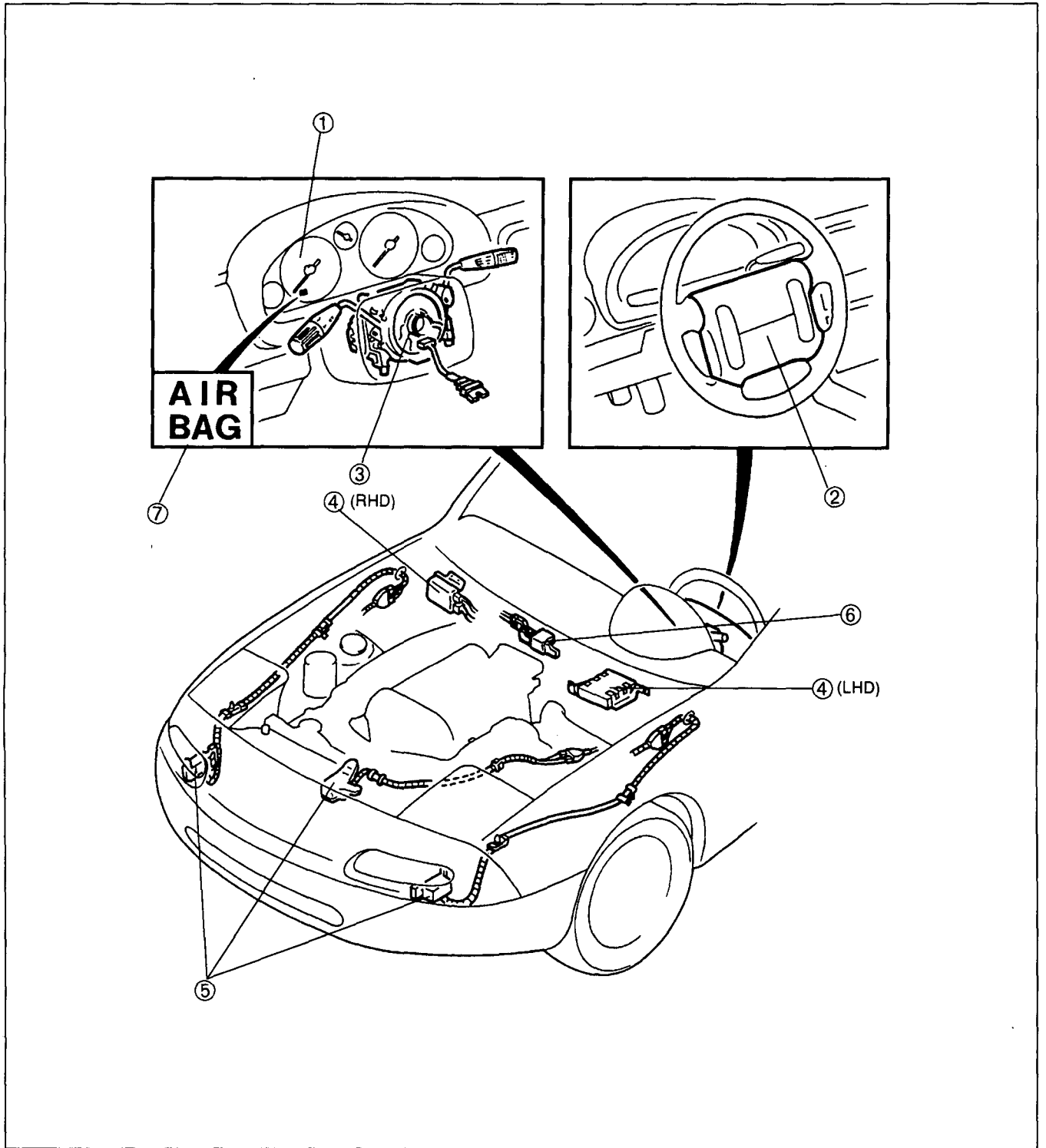


35E0TX-002

- 1. Retractable headlight unit
- 2. Headlight cleaner relay (LHD only)
- 3. Headlight relay
Inspection page T-13
- 4. TNS relay
Inspection page T-13

- 5. Combination switch
Removal / Installation page T-14
Adjustment page T-14
Inspection page T-15
- 6. Rear window defroster switch
Removal / Installation page T-16

INSTRUMENT CLUSTER/AIR BAG SYSTEM



35E0TX-003

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> 1. Tachometer
Inspection page T-16 2. Air bag module
Removal / Installation page T-49
Disposal procedure page T-57 3. Clock spring
Removal / Installation page T-14
Inspection page T-51 | <ul style="list-style-type: none"> 4. Diagnostic module
Removal / Installation page T-50 5. Crash sensor (D-sensor)
Removal / Installation page T-52
Inspection page T-54 6. Crash sensor (S-sensor)
Removal / Installation page T-55
Inspection page T-56 7. Air bag system warning light |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

OUTLINE

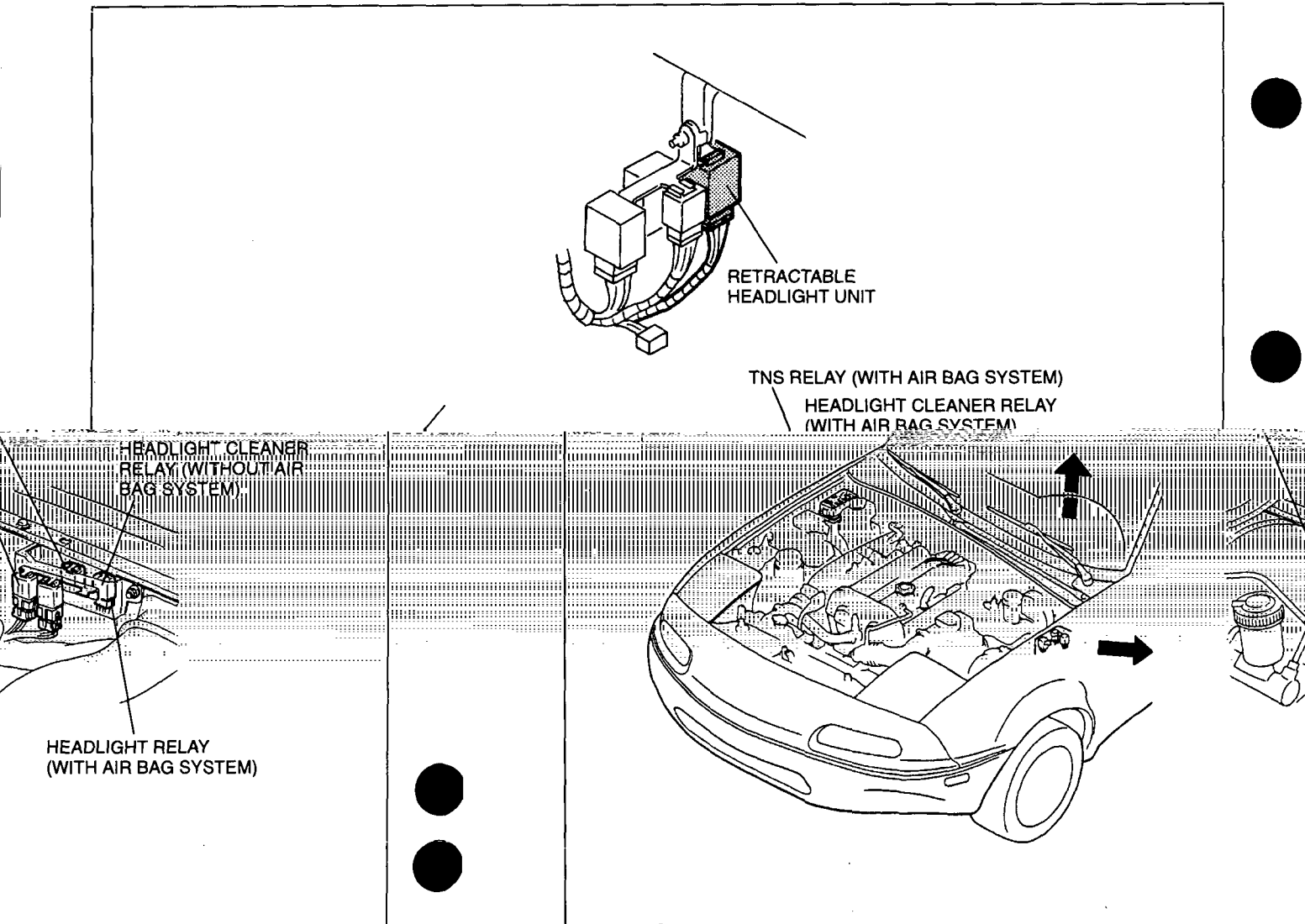
OUTLINE OF CONSTRUCTION

- The location of the retractable headlight unit is changed (LHD only).
- The location of the headlight cleaner relay is changed (Air bag system only).
- A TNS relay and a headlight relay are added (Air bag system only).
- A clock spring is built into the combination switch for use with the air bag system.
- The location of the rear window defroster switch is changed (LHD only).
- The allowable indication of the tachometer is changed.
- An air bag system warning light is equipped for use with the air bag system.
- An air bag system is included to provide increased protection for the driver in an accident when used in conjunction with the seat belts. When the vehicle suffers a frontal crash, the air bag in the steering wheel inflates to protect the driver's head and chest from injury.
- The air bag system consists of:
 - Air bag module
 - Clock spring connector
 - Diagnostic module
 - Crash sensors (D-sensors and S-sensor)
 - Air bag system warning light
 - Air bag wiring harness

35E0TX-004

RELAY

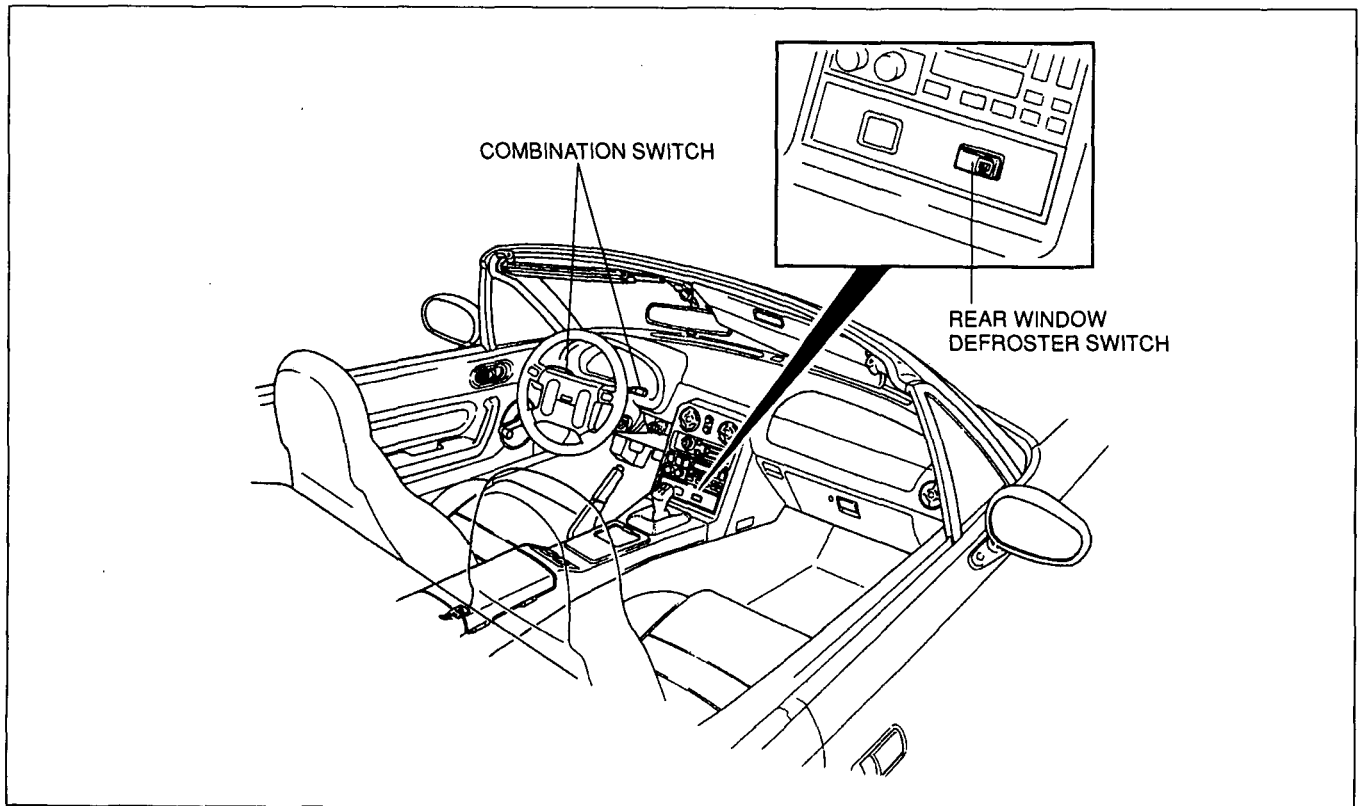
STRUCTURAL VIEW



35E0TX-005

SWITCH

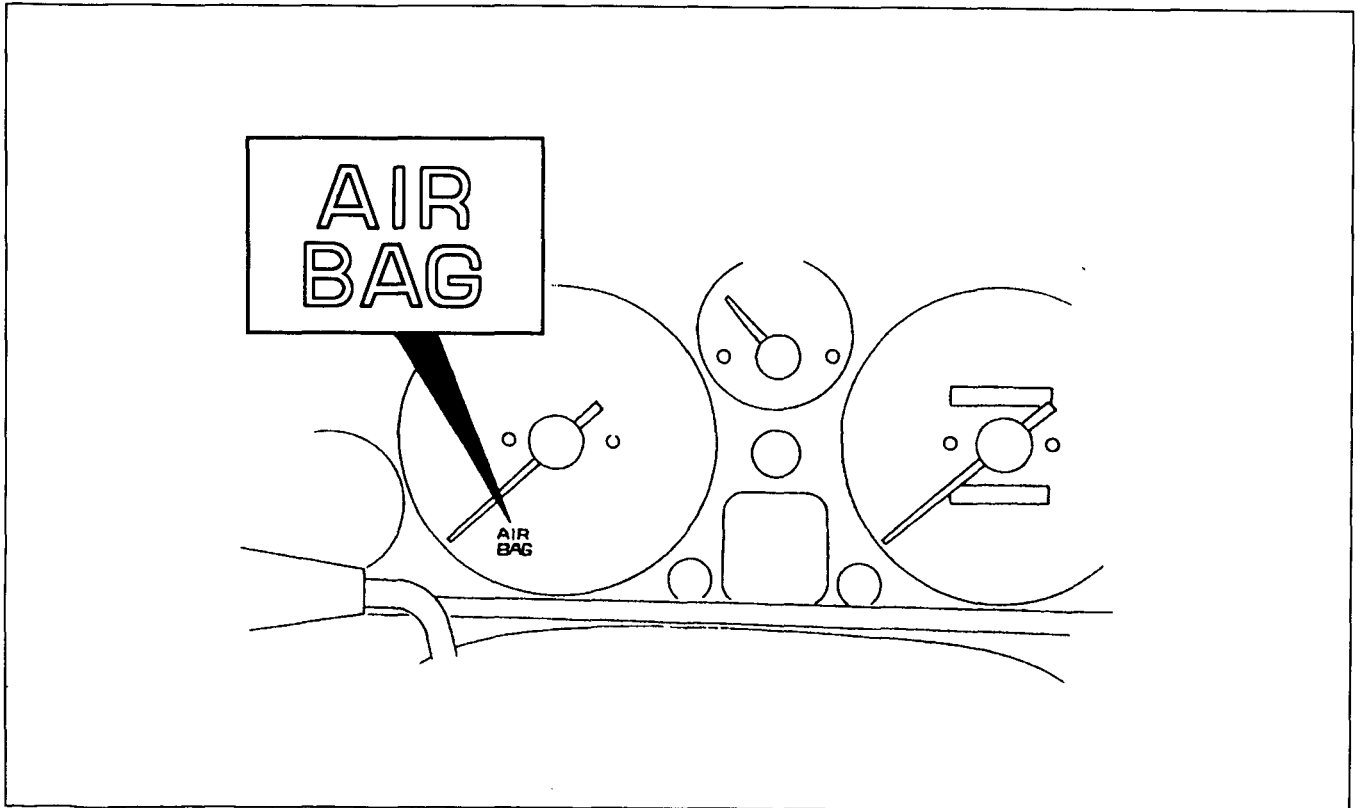
STRUCTURAL VIEW



35U0TX-006

INSTRUMENT CLUSTER

STRUCTURAL VIEW



35U0TX-007

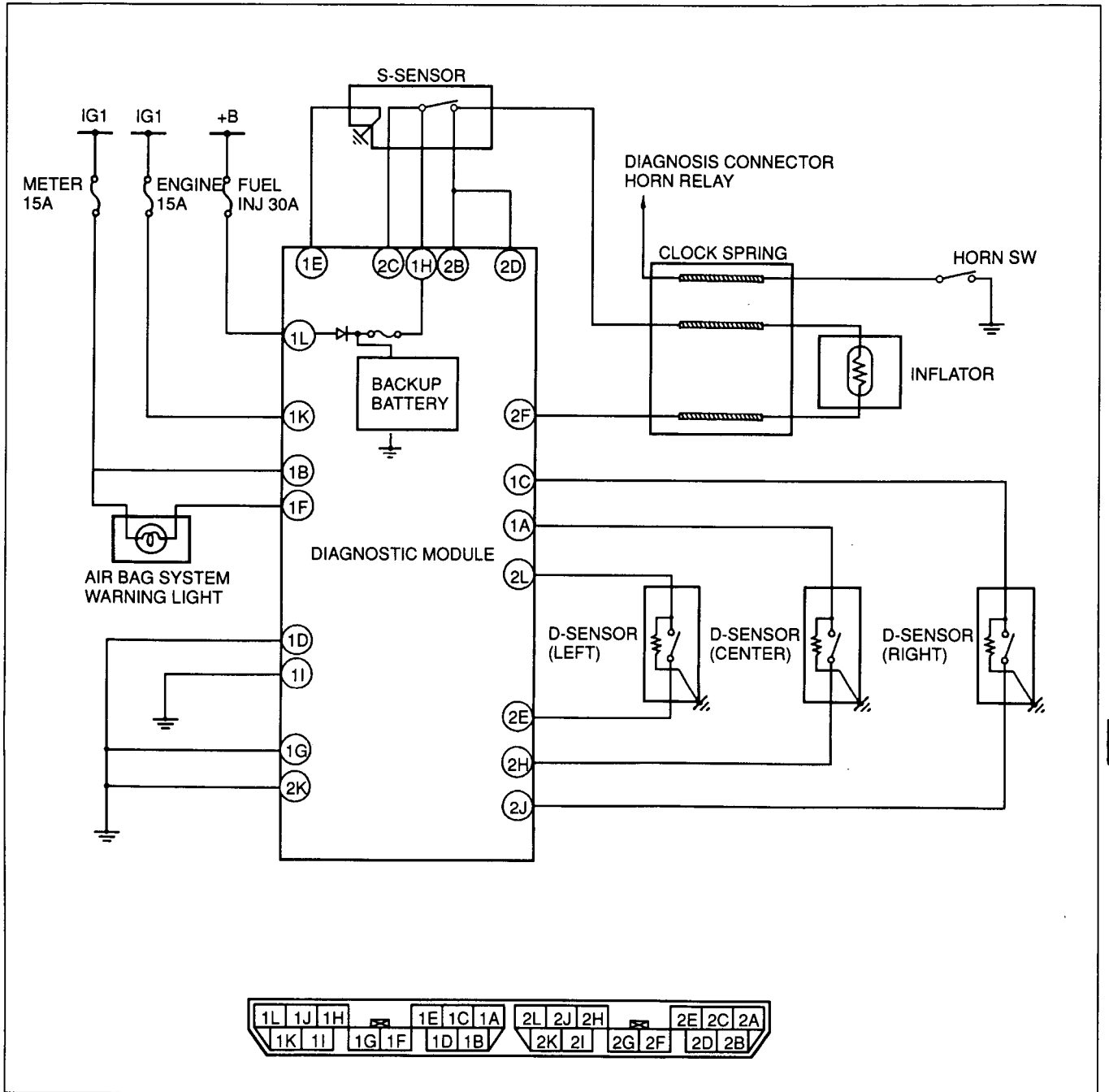
AIR BAG SYSTEM

COMPONENT DESCRIPTION

Component		Function	Remark
Air bag system warning light		Light illuminates or flashes if malfunction occurs in air bag system	Located in instrument cluster
Air bag module		Deploys air bag when current flows to integrated igniter	Located in steering wheel hub
Clock spring		Ensures uninterrupted electrical connection to air bag module while allowing steering wheel to turn	Part of combination switch
Crash sensor	D-sensor	Activated(closed) when crash impact detected Acting with S-sensor, completes circuit to inflator	Located in front part of vehicle(left, right, and center)
	S-sensor	Activated(closed) when crash impact detected Acting with D-sensor, completes circuit to inflator	Located behind heater unit in passenger compartment
Diagnostic module		Monitors components and harnesses in air bag system Indicates system malfunction by flashing or illuminating air bag system warning light If warning light is bunt, sounds warning buzzer Detects short circuit between air bag module and ground or crash sensor malfunction and melts system fuse to prevent unintended air bag deployment	Contains back-up battery

35E0TX-008

SYSTEM DESCRIPTION
System Diagram



35E0TX-009

SYSTEM OPERATION

1. During Normal Condition

- The diagnostic module constantly monitors the components and wiring of the air bag system for malfunctions, open circuits, and short circuits.
- If a malfunction is detected, the diagnostic module illuminates or flashes the warning light.
- If there is a short circuit in the sensors or sensor harnesses, the diagnostic module activates the warning light and shuts down the system to prevent accidental deployment of the air bag.

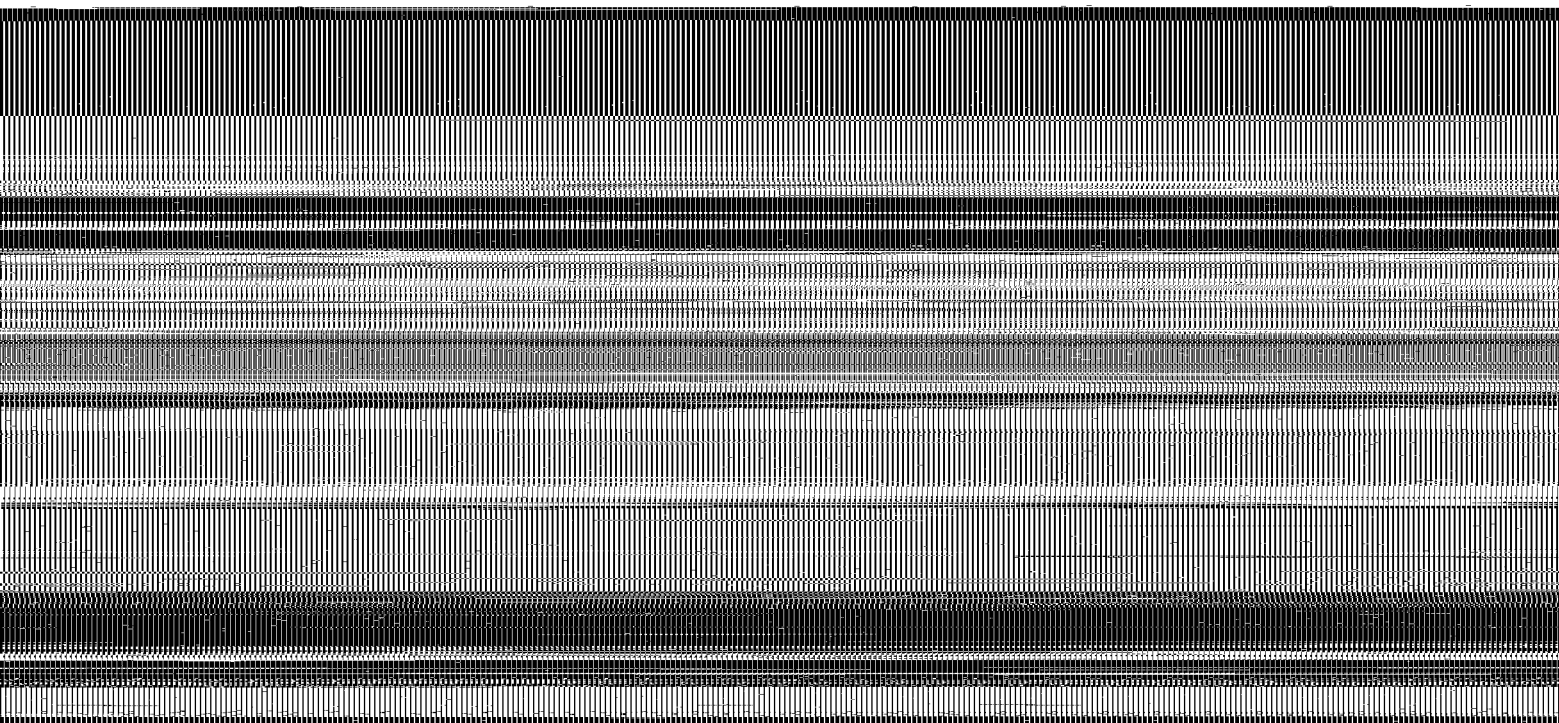
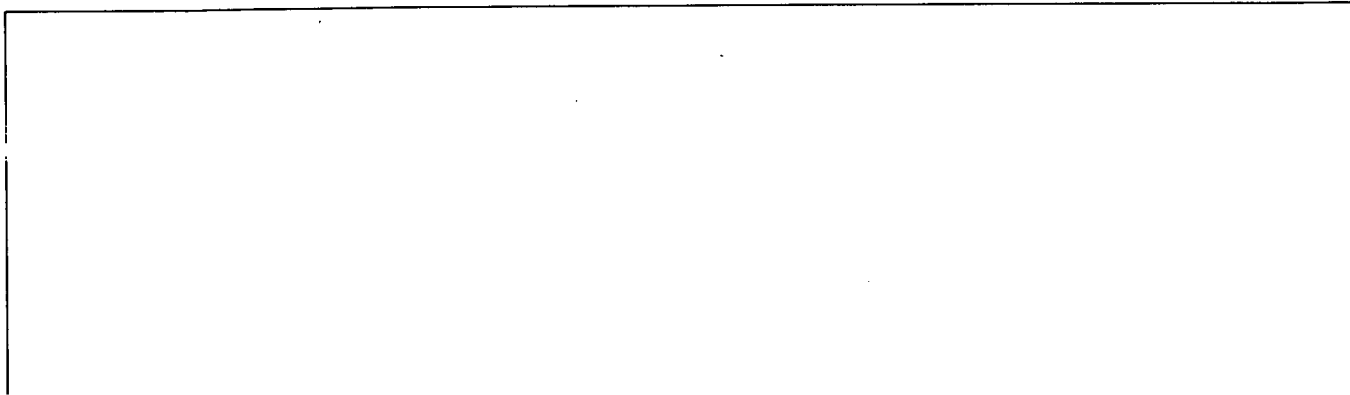
2. During Collision

- When either of the D-sensors and the S-sensor are activated (closed) simultaneously by shock of a collision, the circuit to the inflator is completed. The inflator creates nitrogen gas and the air bag is deployed.
- The air bag releases the nitrogen gas from a vent hole in the back of the bag to reduce shock to the driver and to allow easier exit from the vehicle.

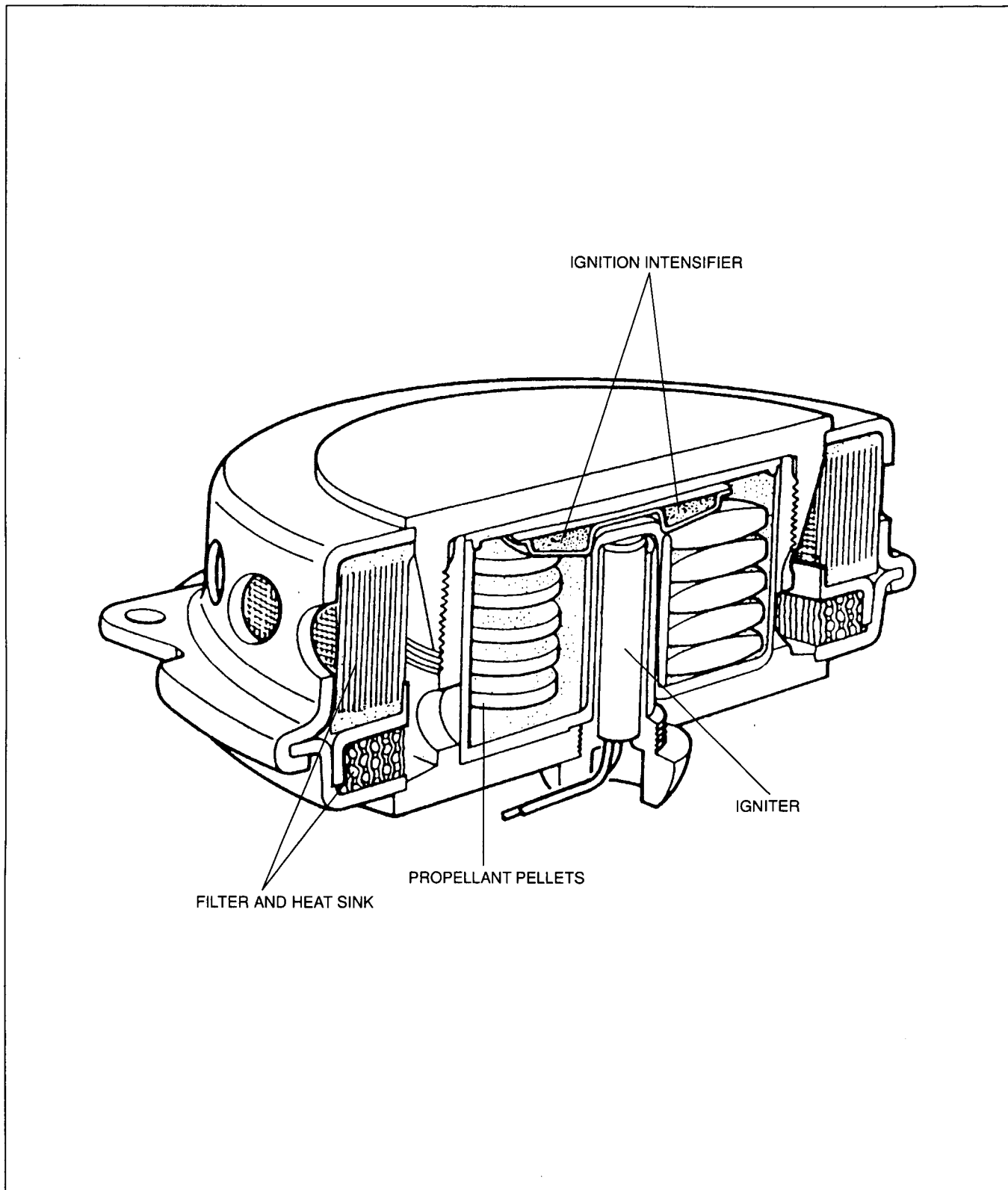
T

AIR BAG SYSTEM

AIR BAG MODULE



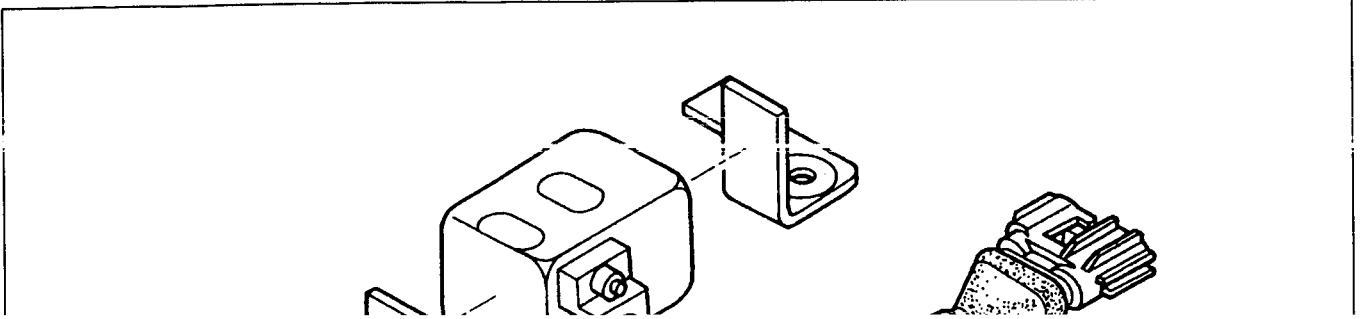
INFLATOR



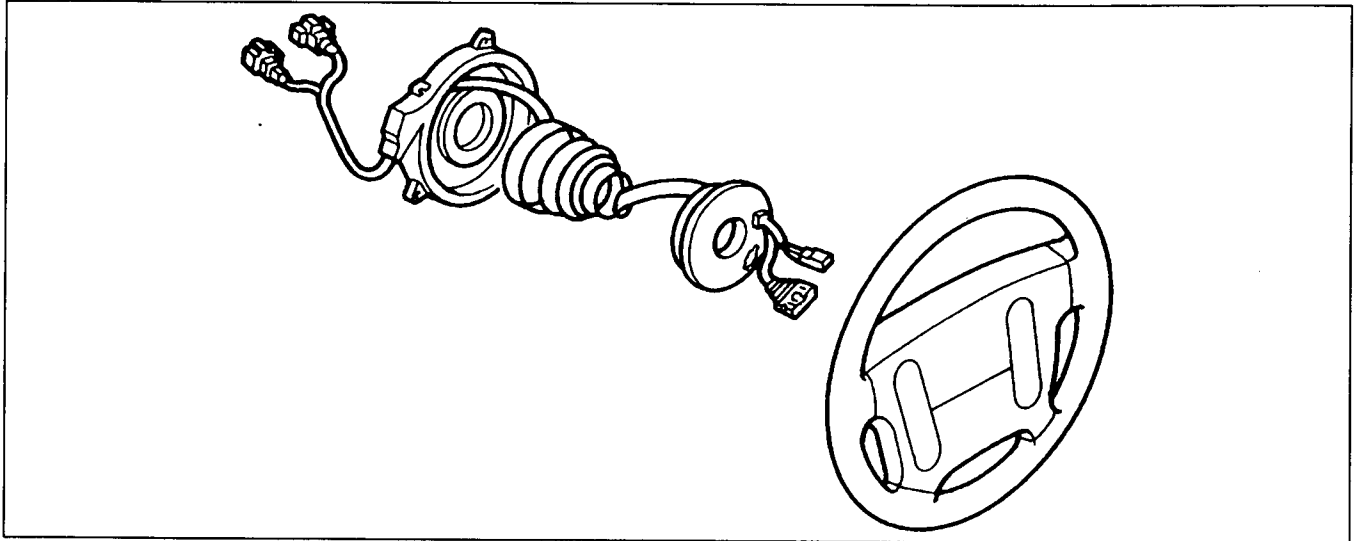
35E0TX-011

- The inflator is contained in the air bag module.
- When the inflator receives an electric signal from the sensor, the igniter ignites and combusts the ignition intensifier and propellant pellets, generating the nitrogen gas.
- The filter and heat sink cools and filters the gas as it inflates the air bag.
- To prevent the inflator from being damaged and possibly not working when necessary, the inflator will self-ignite if its temperature exceeds 190°C {374°F}. The self-igniting agent is mixed in the ignition intensifier to trigger the activation.

D-SENSOR AND S-SENSOR



CLOCK SPRING



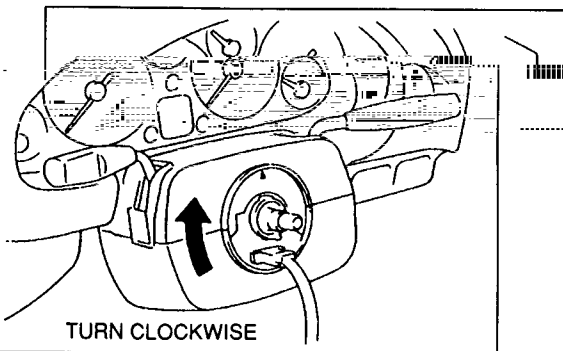
35E0TX-015

- The clock spring connector is part of the combination switch. Because of this, the clock spring connector and combination switch are serviced as an assembly.
- The connector allows the steering wheel to be turned without breaking the electrical contact to the air bag module.

Adjustment

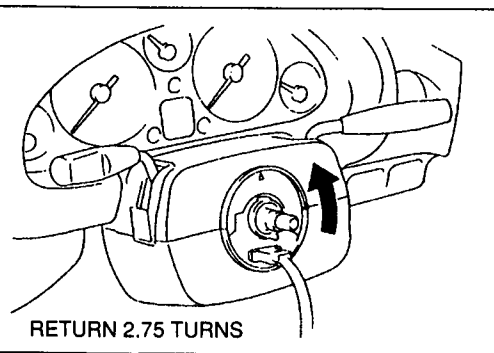
Before installing the air bag module, adjust the clock spring connector.

1. Set the front wheels straight ahead.
2. Turn the clock spring connector clockwise until it stops. Do not force it.



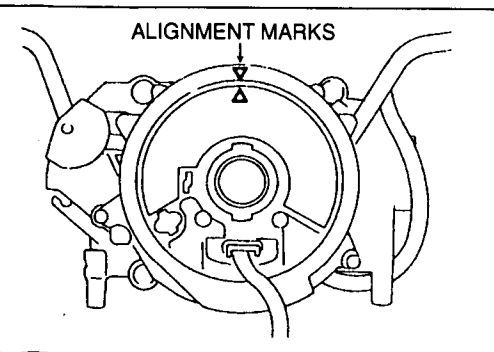
35E0TX-016

3. Turn the connector counterclockwise 2.75 turns.



35E0TX-017

4. Align the mark on the clock spring connector with that on the outer housing.

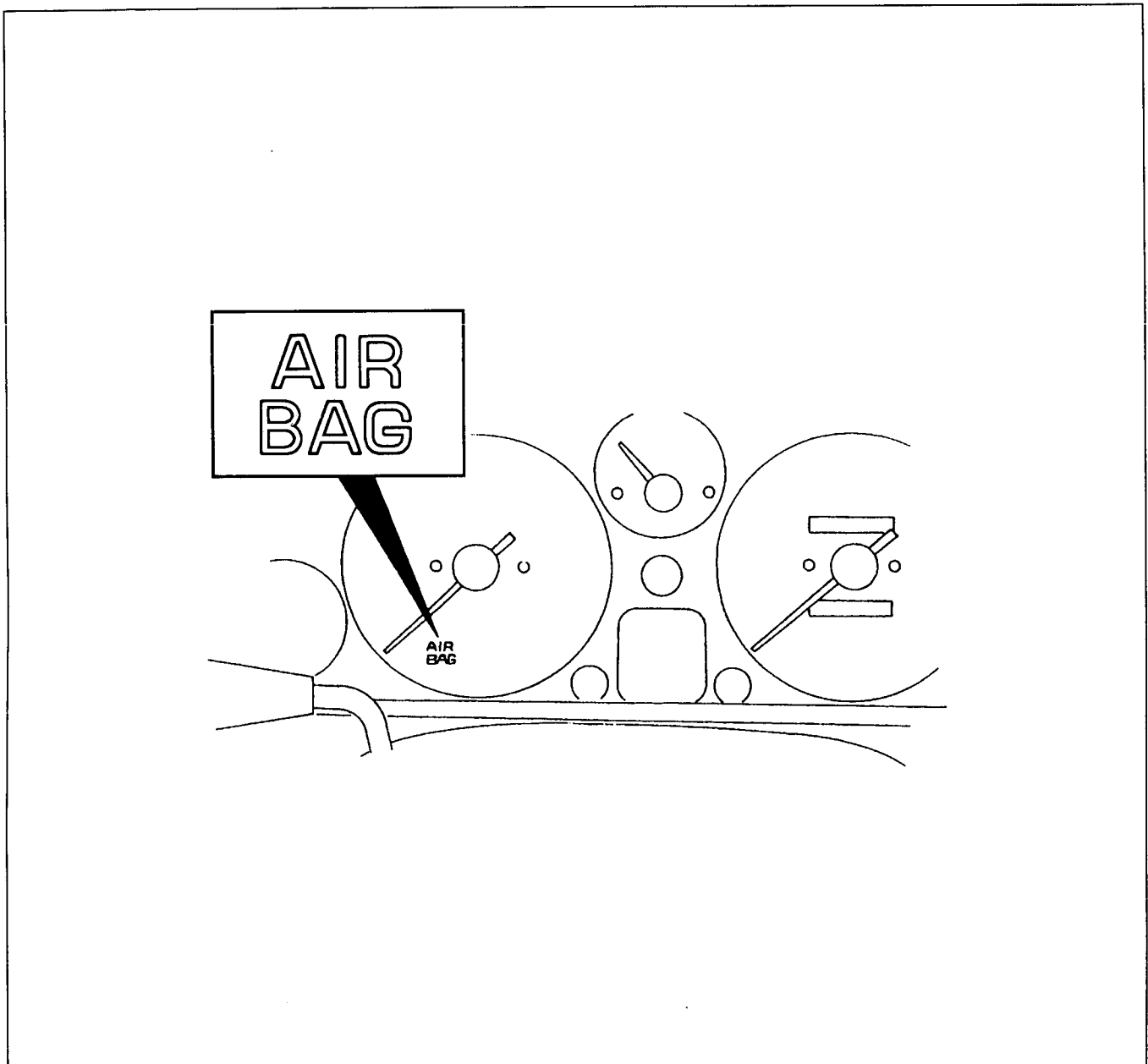


35E0TX-018

DIAGNOSTIC MODULE

- The diagnostic module contains a microcomputer that monitors the air bag system components and wiring harnesses.
- If a malfunction is detected in the system, the diagnostic module flashes or illuminates the air bag system warning light. System faults can be determined by the coded warning light display.
- If a malfunction occurs in the system and the warning light is burnt, an audible alarm in the diagnostic module sounds.
- If a short circuit is detected between the air bag module and ground or if a crash sensor malfunctions, the system-down fuse in the diagnostic module melts to prevent unintended deployment of the air bag.
- The diagnostic module contains a back-up battery to power the system and deploy the air bag in case the vehicle's battery becomes disconnected in a collision.

35E0TX-019

AIR BAG SYSTEM WARNING LIGHT

35E0TX-020

- The air bag system warning light is located in the instrument cluster.
- The warning light flashes or illuminates to indicate malfunctions in the air bag system.
- Normally, when the ignition switch is turned to ON, the warning light illuminates for 4–6 seconds and then goes off.
- If the warning light remains on, does not illuminate, or flashes, a problem exists in the air bag system.

SUPPLEMENTAL SERVICE INFORMATION

The following changes and/or additions have been made since publication of the MX-5 Workshop Manual (1221-10-89I and 1246-10-90G).

Headlight relay

- Inspection

TNS relay

- Inspection

Combination switch

- Removal / Installation
- Adjustment
- Inspection

Rear window defroster switch

- Removal / Installation

Tachometer

- Inspection

Exterior lighting system

- Troubleshooting

Air bag system

- Preparation
- Service warnings
- General procedures
- Troubleshooting

Air bag module

- Removal / Installation

Diagnostic module

- Removal / Installation

Clock spring

- Inspection

Crash sensor (D-sensor)

- Removal / Installation
- Installation note
- Inspection

Crash sensor (S-sensor)

- Removal / Installation
- Installation note
- Inspection

Air bag module disposal procedure

- Air bag deployment
- Air bag disposal

Inspection of SST (deployment tool)

- Inspection procedure

35E0TX-021

RELAY

HEADLIGHT RELAY

1. Disconnect the headlight relay connector and remove the headlight relay.
2. Check for continuity between the headlight relay terminals.

V_b: Battery voltage

Connection		A	B	C	D
V _b	Ground				
—	—	○—○			
A	B			○—○	

○—○: Continuity

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

TNS RELAY

Inspection

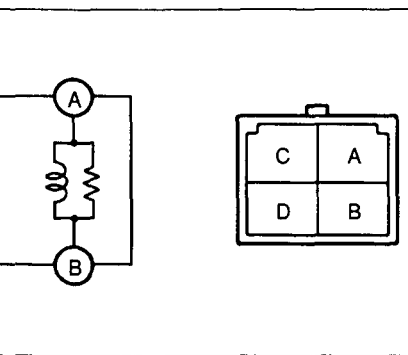
1. Disconnect the TNS relay connector and remove the TNS relay.
2. Check for continuity between the TNS relay terminals.

V_b: Battery voltage

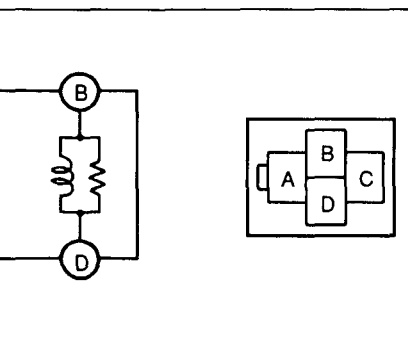
Connection		B	D	A	C
V _b	Ground				
—	—	○—○			
D	B			○—○	

○—○: Continuity

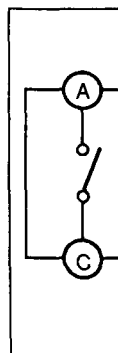
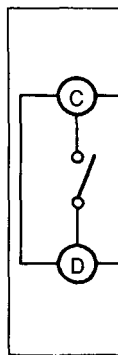
3. If not as specified, replace the TNS relay.



35E0TX-022



35E0TX-023

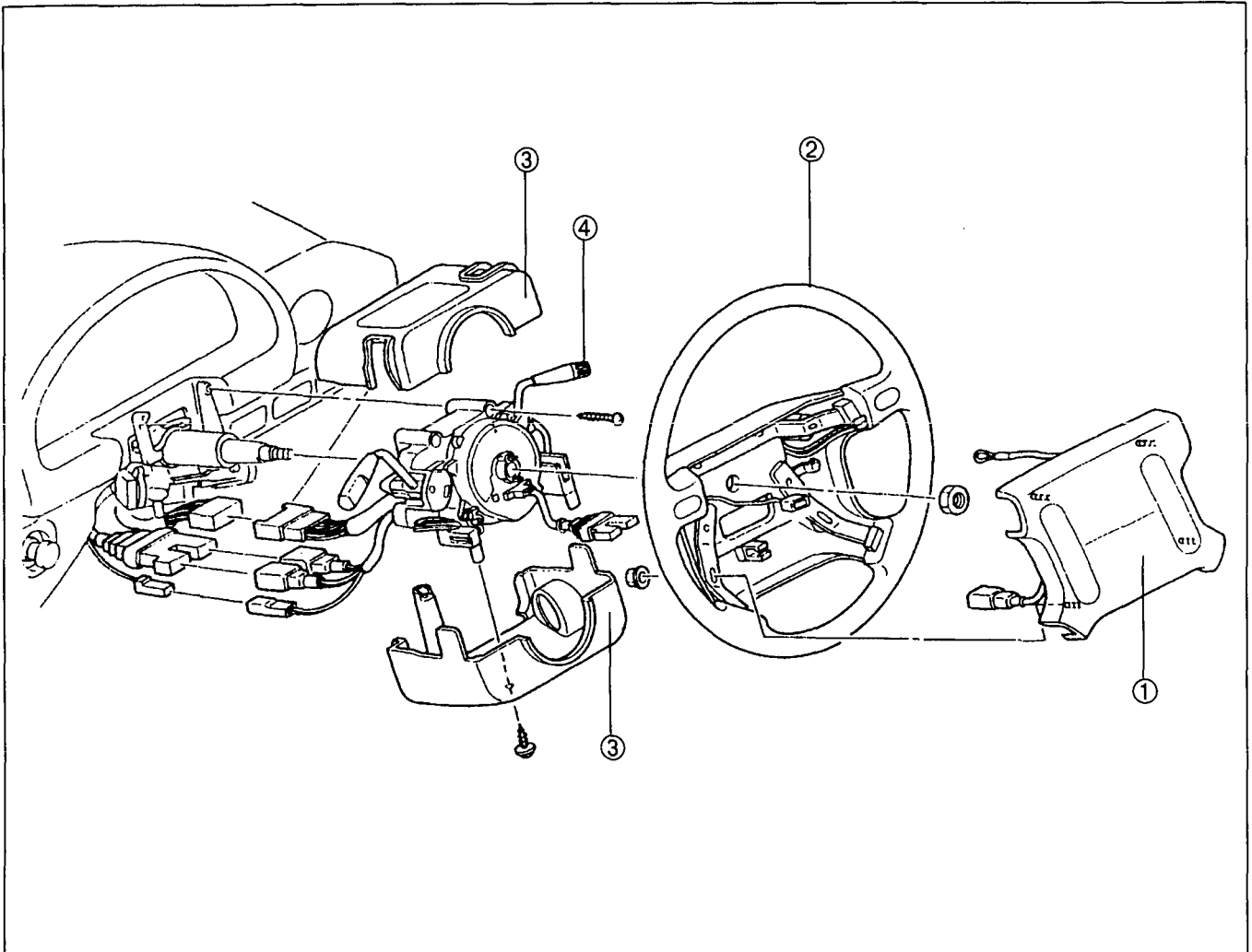


SWITCH

COMBINATION SWITCH
Removal / Installation**Warning**

- Handling the air bag module improperly can accidentally deploy the air bag, which may seriously injure you. Read **SERVICE WARNINGS**, page T-26, before handling the air bag module.

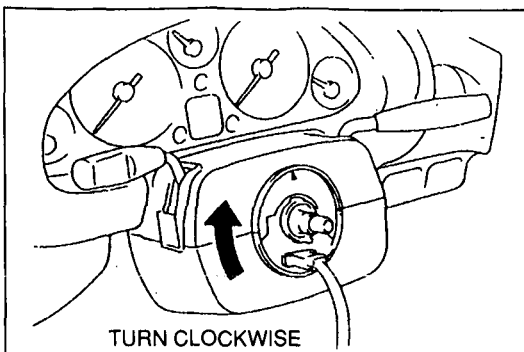
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.



35E0TX-024

1. Air bag module
2. Steering wheel

3. Column cover
4. Combination switch

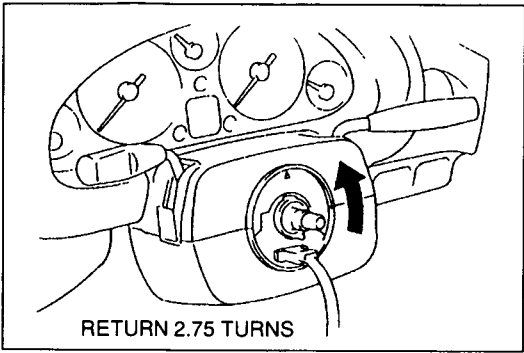


35E0TX-025

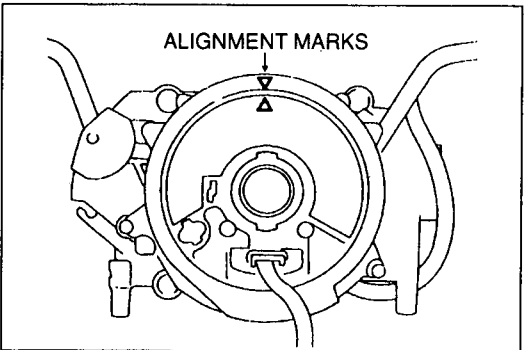
Adjustment

Before installing the steering wheel, adjust the clock spring connector.

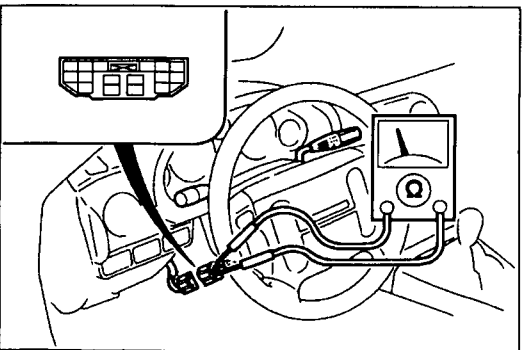
1. Set the front wheels straight ahead.
2. Turn the clock spring connector clockwise until it stops.
Do not force it.



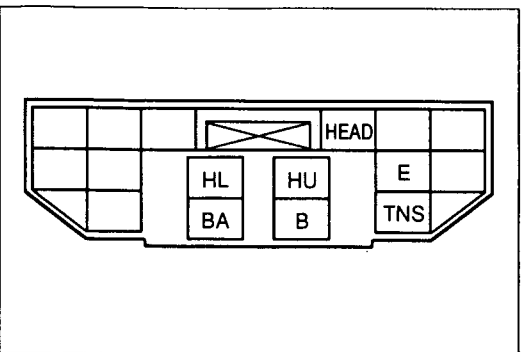
35E0TX-026



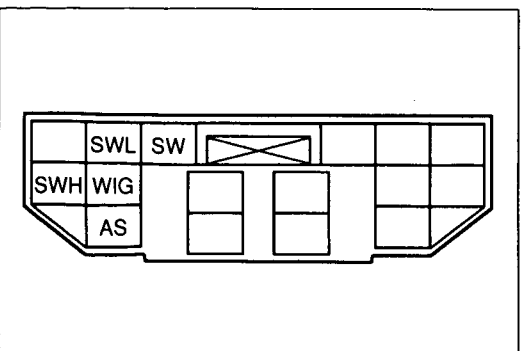
35E0TX-027



35E0TX-028



35E0TX-029



35E0TX-030

3. Turn the connector counterclockwise 2.75 turns.

4. Align the mark on the clock spring connector with that on the outer housing.

Inspection

Check for continuity between the switch terminals while operating each switch.

Light and dimmer switch

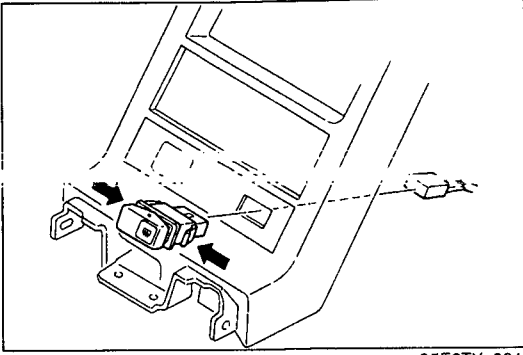
Terminal		Switch position						
		E	TNS	HEAD	BA	HL	HU	B
Light and dimmer switch	Off							
	Parking	○—○						
	Headlight		○—○—○					
		LO				○—○		
HI				○—○		○—○		
Passing							○—○	
							○—○	

○—○: Continuity

Windshield wiper and washer switch

Terminal		Switch position				
		AS	SWL	SWH	WIG	SW
Wiper switch	Off	One-touch on	○—○			
		One-touch off		○—○		○—○
	INT	○—○				
	LO		○—○		○—○	
Washer switch	HI			○—○		
	On				○—○	

○—○: Continuity



35E0TX-031

REAR WINDOW DEFROSTER SWITCH

Removal / Installation

1. Remove the center panel assembly.
2. Remove the rear window defroster switch from the audio panel.
3. Install in the reverse order of removal.

Standard indication (rpm)	Allowable indication (rpm)
2,000	1,970—2,150
3,000	3,000—3,180
4,000	4,000—4,240
5,000	5,000—5,300

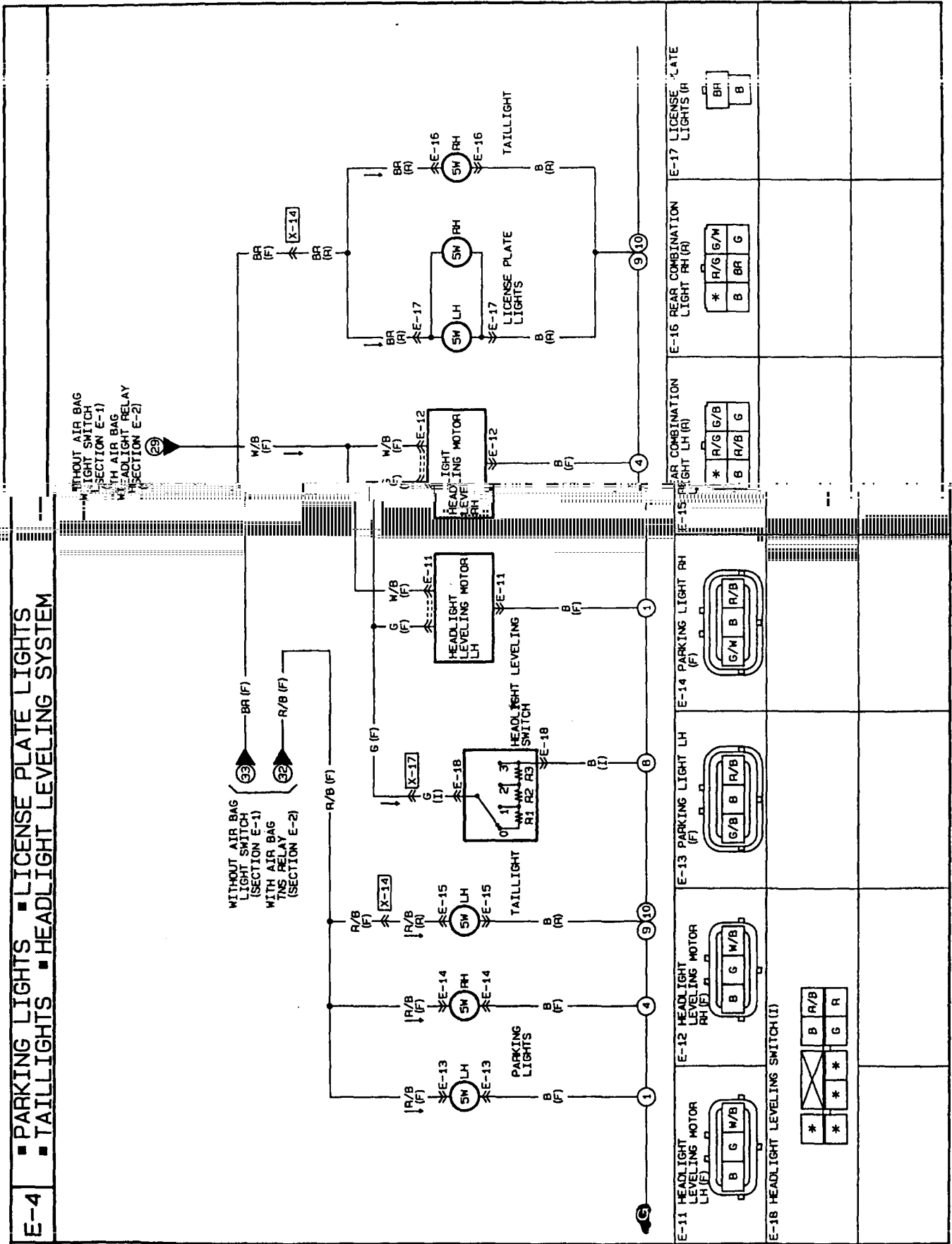
INSTRUMENT CLUSTER

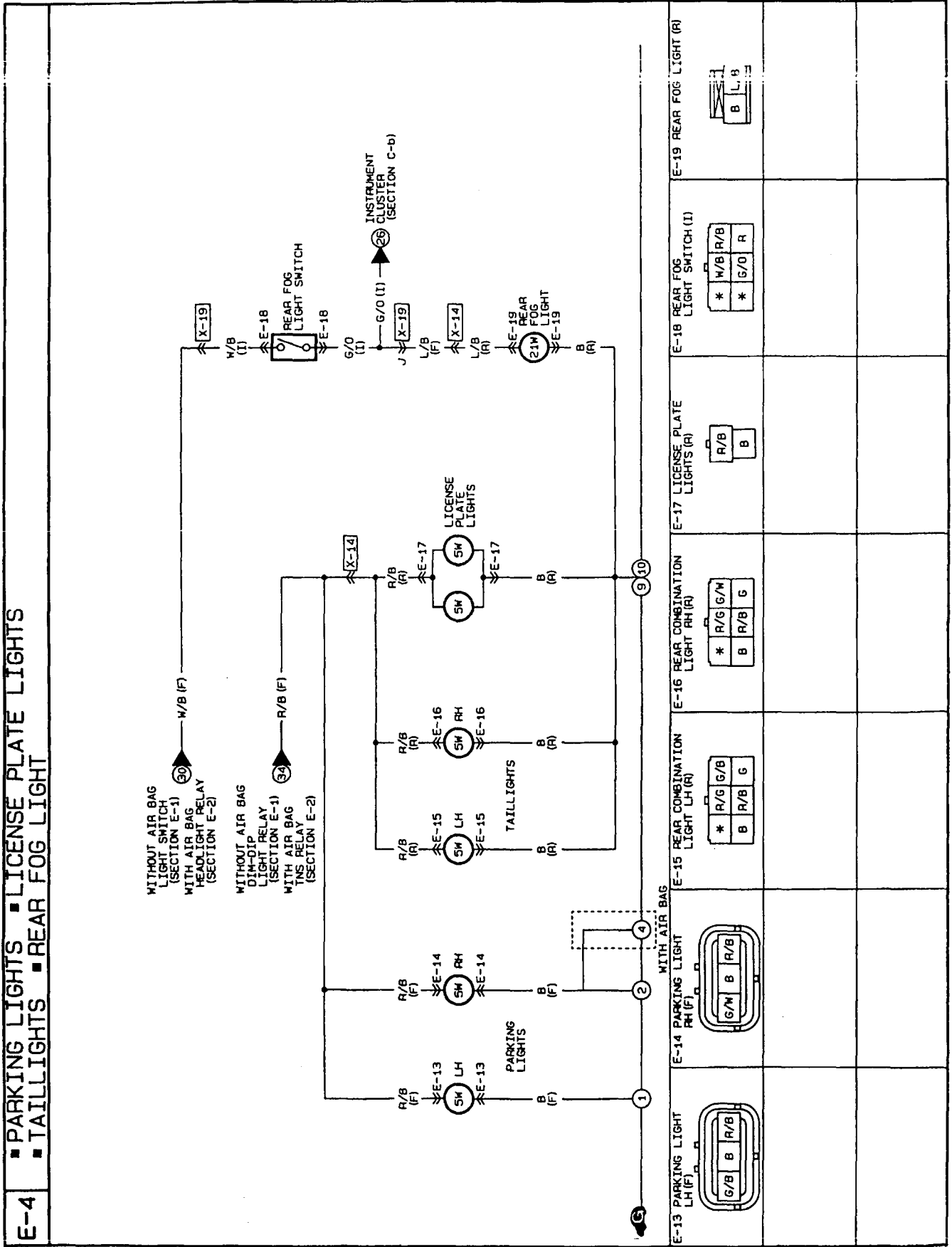
TACHOMETER

Inspection

1. Connect a test tachometer to the engine and start the engine.
2. Check the tachometer for allowable indication error.
3. If not as specified, replace the tachometer.

35E0TX-032



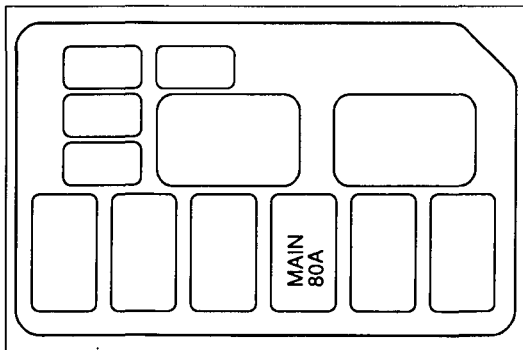


Flowchart No.1	Symptom	TNS and headlights do not illuminate
-----------------------	----------------	--------------------------------------

Possible cause

- Burnt MAIN 80A fuse
- Damaged combination switch
- Poor connection of connector
- Damaged wiring harness

35E0TX-037

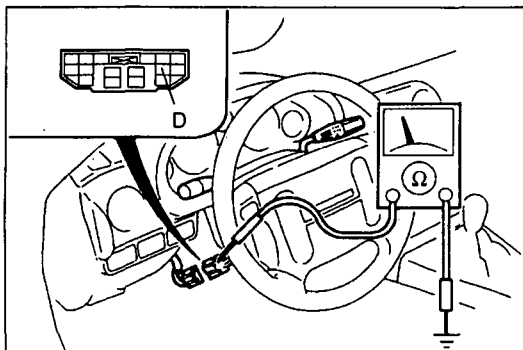


35E0TX-038

Step 1 (LHD only)

Check the MAIN 80A fuse in the main fuse block.

Fuse	Action
OK	Go to Step 2
Burnt	Replace fuse after checking and repairing wiring harness



35E0TX-039

Step 2

1. Disconnect the combination switch connector.
2. Check for continuity between terminal D (B) of the combination switch connector and ground.

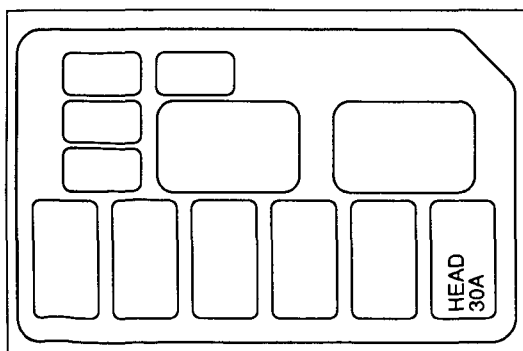
Continuity	Action
Yes	Replace combination switch (Refer to page T-14)
No	Repair wiring harness (Combination switch—Ground)

Flowchart No.2	Symptom	TNS illuminate, but headlights do not illuminate
-----------------------	----------------	--------------------------------------------------

Possible cause

- Burnt HEAD 30A fuse
- Damaged headlight relay
- Damaged combination switch
- Open or short circuit in wiring harness
- Poor connection of connector

35E0TX-040

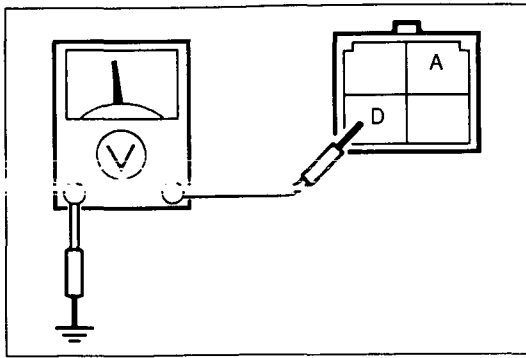


35E0TX-041

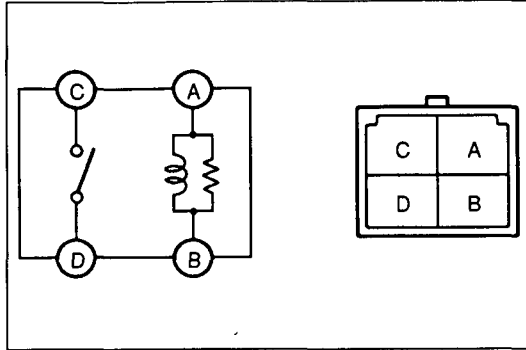
Step 1 (RHD only)

Check the HEAD 30A fuse in the main fuse block.

Fuse	Action
OK	Go to Step 2
Burnt	Replace fuse after checking and repairing wiring harness



35E0TX-042



35E0TX-043

Step 2

Measure the voltage at terminals A (W) and D (W) [LHD] or A (R/L) and D (R/L) [RHD] of the headlight relay connector (4-pin).

V_B: Battery voltage

Voltage	Action
V _B	Go to Step 3
Other	Repair wiring harness (Main fuse block—Headlight relay)

Step 3

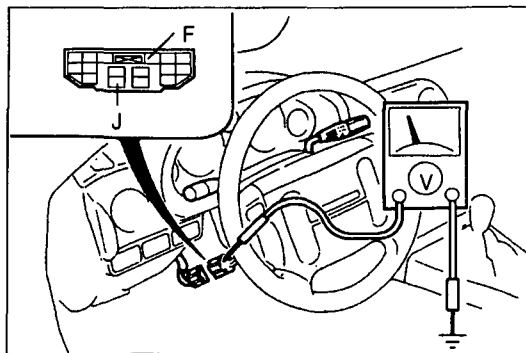
1. Disconnect the headlight relay connector and remove the headlight relay.
2. Check for continuity between the headlight relay terminals.

V_B: Battery voltage

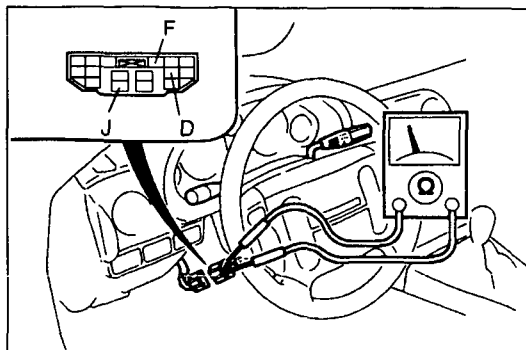
Connection		A	B	C	D
V _B	Ground				
—	—	○—○	○—○		
A	B			○—○	○—○

○—○: Continuity

3. If correct, install the headlight relay, reconnect the relay connector, and go to Step 4.
4. If not as specified, replace the headlight relay.



35E0TX-044



35E0TX-045

Step 4

1. Disconnect the combination switch connector.
2. Measure the voltage at terminal F (L/Y) [LHD] or J (W/B) [RHD] of the combination switch connector.

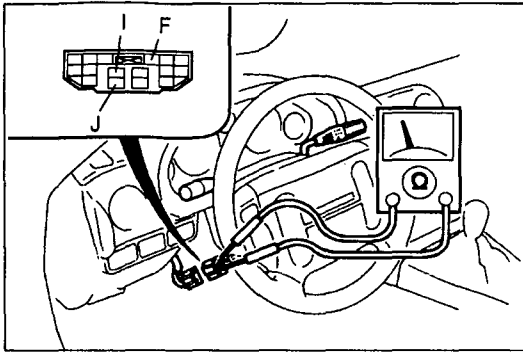
V_B: Battery voltage

Voltage	Action
V _B	Go to Step 5
Other	Repair wiring harness (Headlight relay—Combination switch)

Step 5

1. Turn the headlight switch to the second position.
2. Check for continuity between terminals F and D (LHD) or J and D (RHD) of the combination switch connector.

Continuity	Action
Yes	Go to Step 6
No	Replace combination switch (Refer to page T-14)

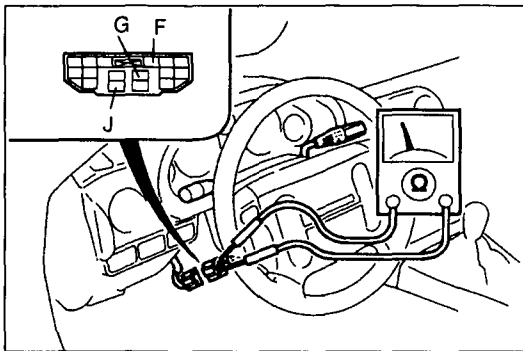


35E0TX-046

Step 6

1. Set the headlights at low beam.
2. Check for continuity between terminals J and I (LHD) or F and I (RHD) of the combination switch connector.

Continuity	Action
Yes	Go to Step 7
No	Replace combination switch (Refer to page T-14)

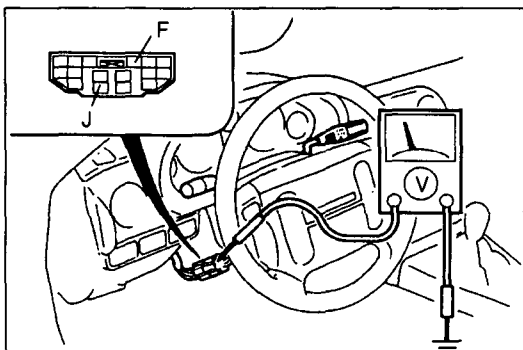


35E0TX-047

Step 7

1. Set the headlights at high beam.
2. Check for continuity between terminals J and G (LHD) or F and G (RHD) of the combination switch connector.

Continuity	Action
Yes	Go to Step 8
No	Replace combination switch (Refer to page T-14)



35E0TX-048

Step 8

1. Reconnect the combination switch connector.
2. Verify that the headlight switch is at the second position.
3. Measure the voltage at terminal J (R) [LHD] or F (L/Y) [RHD] of the combination switch connector.

V_B: Battery voltage

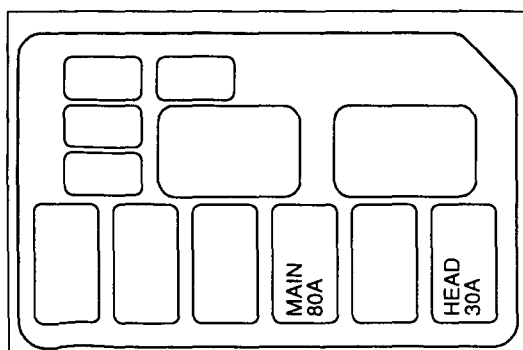
Voltage	Action
V _B	Repair wiring harness (Combination switch—Headlight)
Other	Repair wiring harness (Headlight relay—Combination switch)

Flowchart No.3	Symptom	TNS do not illuminate, but headlights illuminate
----------------	---------	--------------------------------------------------

Possible cause

- Burnt TAIL 10A, TAIL LH 10A, TAIL RH 10A, HEAD 30A, or MAIN 80A fuse
- Damaged TNS relay
- Damaged combination switch
- Open or short circuit in wiring harness
- Poor connection of connector

35E0TX-049



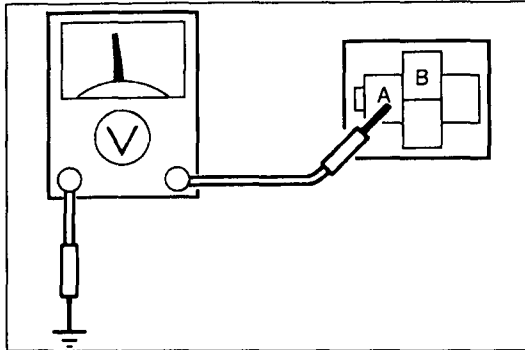
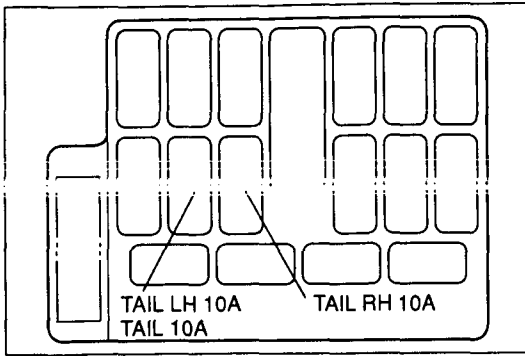
35E0TX-050

Step 1

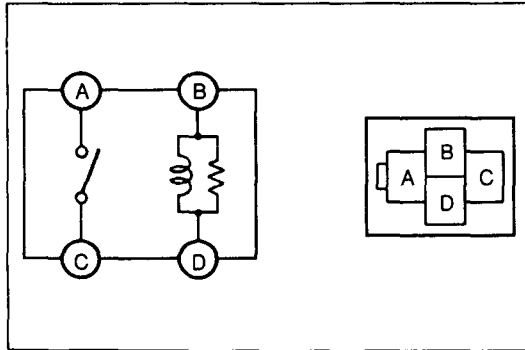
1. Check the following fuses.

Fuse	Amperage (A)	Market	Location
MAIN	80	RHD	Main fuse block
HEAD	30		Fuse block
TAIL	10		
TAIL LH	10	LHD	Fuse block
TAIL RH			

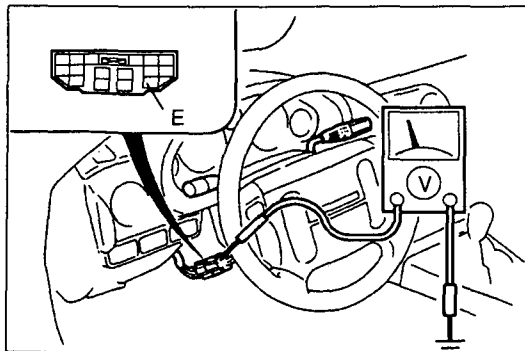
2. If a fuse is burnt, check for a short circuit in the wiring before replacing the fuse.
3. If the fuses are OK, go to Step 2.



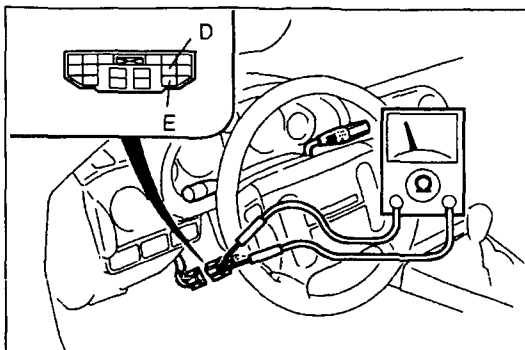
35E0TX-051



35E0TX-052



35E0TX-053



35E0TX-054

Step 2

Measure the voltage at terminals A (W) and B (W) [LHD] or A (W/R) and B (W/R) [RHD] of the TNS relay connector (4-pin).

V_B: Battery voltage

Voltage	Action
V _B	Go to Step 3
Other	Repair wiring harness (Main fuse block—TNS relay)

Step 3

1. Disconnect the TNS relay connector and remove the TNS relay.
2. Check for continuity between the TNS relay terminals.

V_B: Battery voltage

Connection		B	D	A	C
V _B	Ground				
—	—	○—○	○—○		
B	D			○—○	○—○

○—○: Continuity

3. If correct, install the TNS relay, reconnect the relay connector, and go to Step 4.
4. If not as specified, replace the TNS relay.

Step 4

1. Verify that the headlight switch is off.
2. Measure the voltage at terminal E (LG) of the combination switch connector.

V_B: Battery voltage

Voltage	Action
V _B	Go to Step 5
Other	Repair wiring harness (TNS relay—Combination switch)

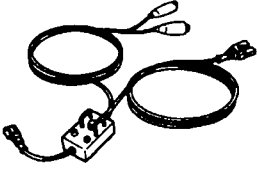
Step 5

1. Disconnect the combination switch connector.
2. Turn the headlight switch to the first position.
3. Check for continuity between terminals E and D of the combination switch connector.

Continuity	Action
Yes	Repair wiring harness (TNS relay—Fuse—TNS)
No	Replace combination switch (Refer to page T-14).

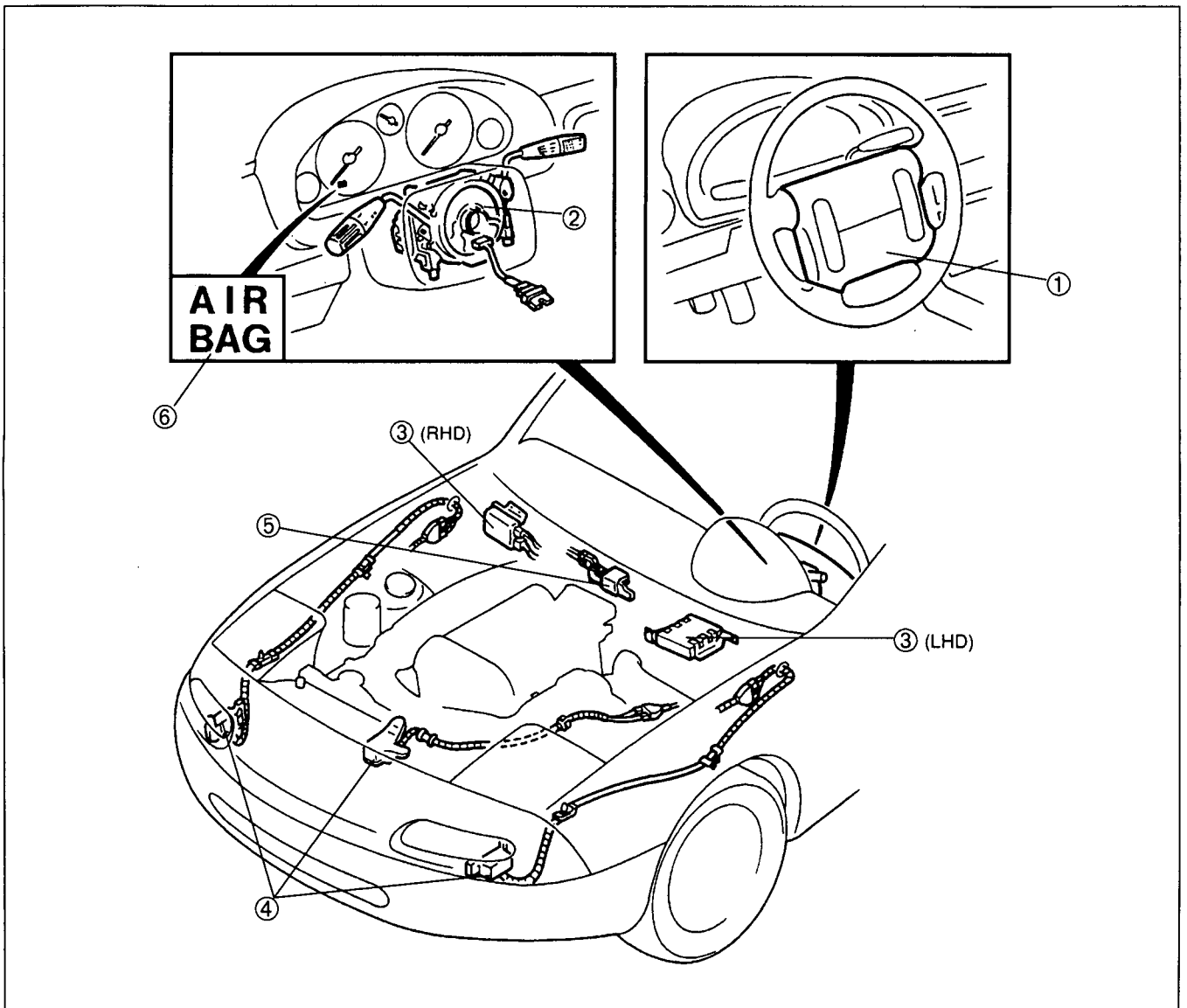
AIR BAG SYSTEM

PREPARATION SST

49 H066 002 Deployment tool		For deployment of air bag module
------------------------------------	-----------------------------------------------------------------------------------	----------------------------------

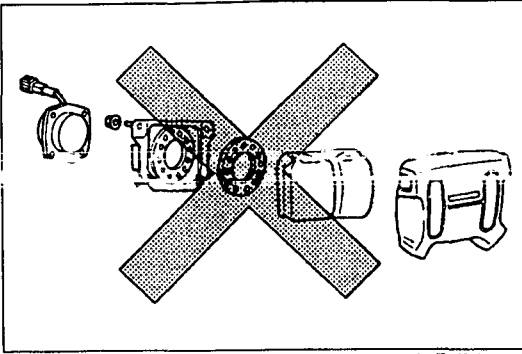
46U0TX-812

STRUCTURAL VIEW



35E0TX-055

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> 1. Air bag module
Removal / Installation page T-49
Disposal procedure page T-57 2. Clock spring
Removal / Installation page T-14
Inspection page T-51 3. Diagnostic module
Removal / Installation page T-50 | <ul style="list-style-type: none"> 4. Crush sensor (D-sensor)
Removal / Installation page T-52
Inspection page T-54 5. Crash sensor (S-sensor)
Removal / Installation page T-55
Inspection page T-56 6. Air bag system warning light |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

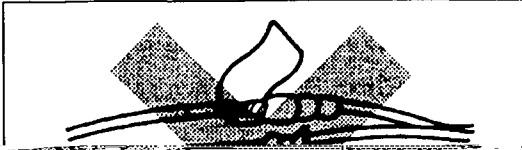


35E0TX-056

SERVICE WARNINGS

Component Disassembly

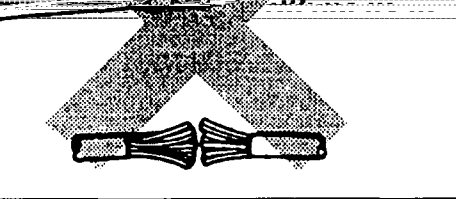
Disassembling and reassembling the components of the air bag system can render the system inoperative, which may result in serious injury or death in the event of an accident. Do not disassemble any air bag system components.



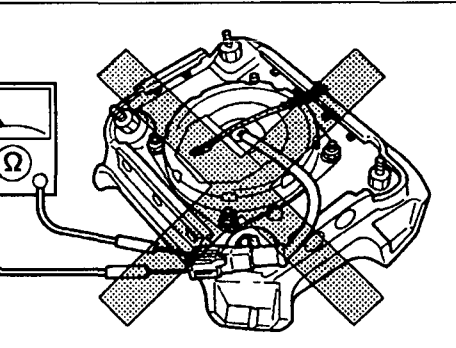
Wiring Harness Repair

Incorrectly repairing an air bag system wiring harness can accidentally deploy the air bag, which can cause serious injury. If a problem is found in the system wiring, replace the wiring harness. Do not try to

repair it.



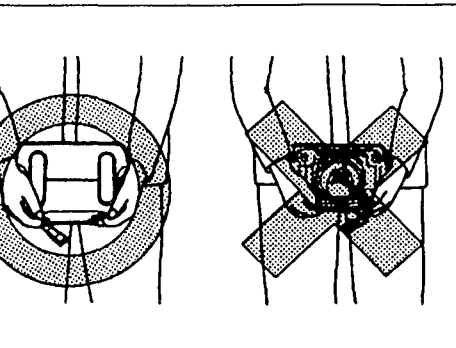
35E0TX-057



35E0TX-058

Air Bag Module Inspection

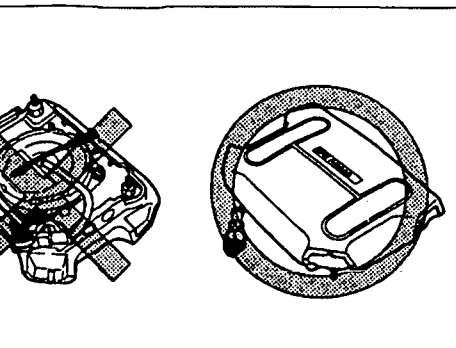
Inspecting the air bag module with an ohmmeter can deploy the air bag, which can cause serious injury. Do not use an ohmmeter to inspect the air bag module.



35E0TX-059

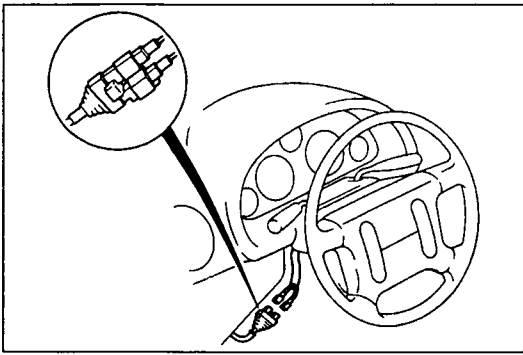
Air Bag Module Handling

A live (undeployed) air bag may accidentally deploy when it is handled and cause serious injury. When carrying a live air bag module, point the trim cover away from your body to lessen the chance of injury in case it deploys.



35E0TX-060

A live air bag placed face down on a surface is dangerous. If the air bag deploys, the motion of the module can cause serious injury. Always face the trim cover up to reduce the motion of the module in case it accidentally deploys.



35E0TX-061

GENERAL PROCEDURES Before Servicing

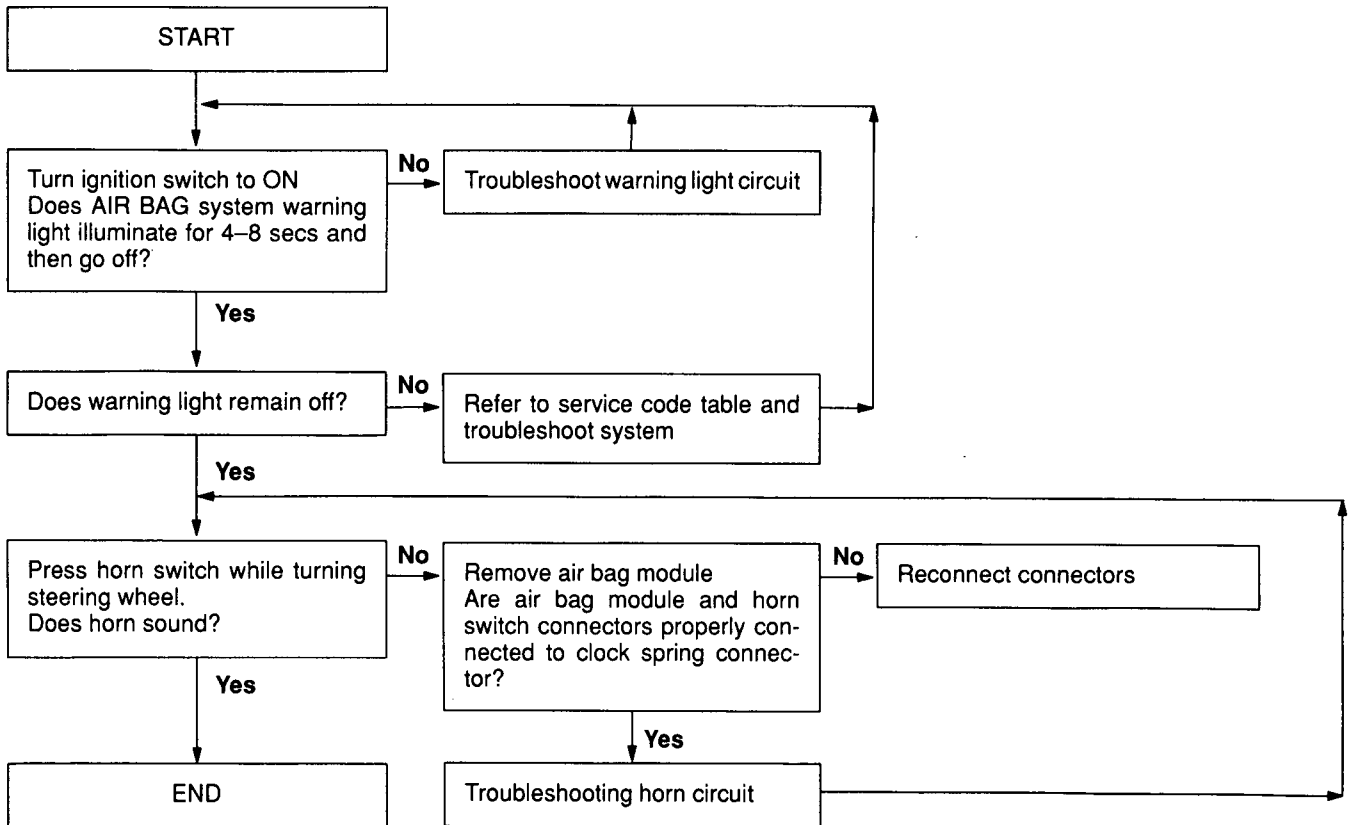
1. Disconnect the negative battery cable.
2. Remove the lower panel.
3. Disconnect the orange and blue clock spring connectors.

TROUBLESHOOTING

Troubleshooting Procedure

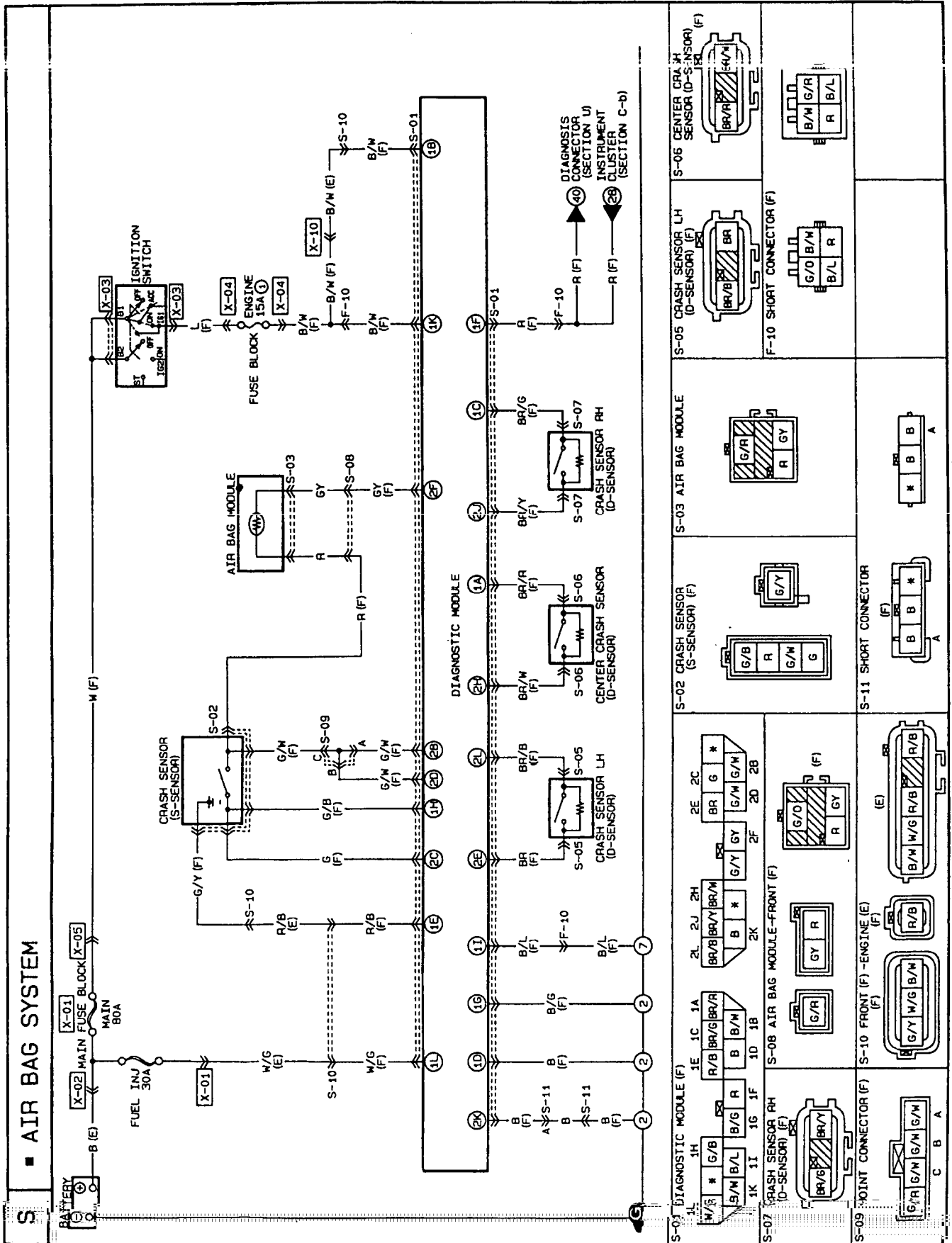
The air bag diagnostic module has a self-diagnosis function that flashes or illuminates the AIR BAG system warning light to indicate trouble in the air bag system. The trouble can be determined by the warning light illumination or flashing pattern. If the light does not illuminate but the system still has trouble, a warning buzzer will sound 5 cycles of 5 times each.

Flowchart



35E0TX-062

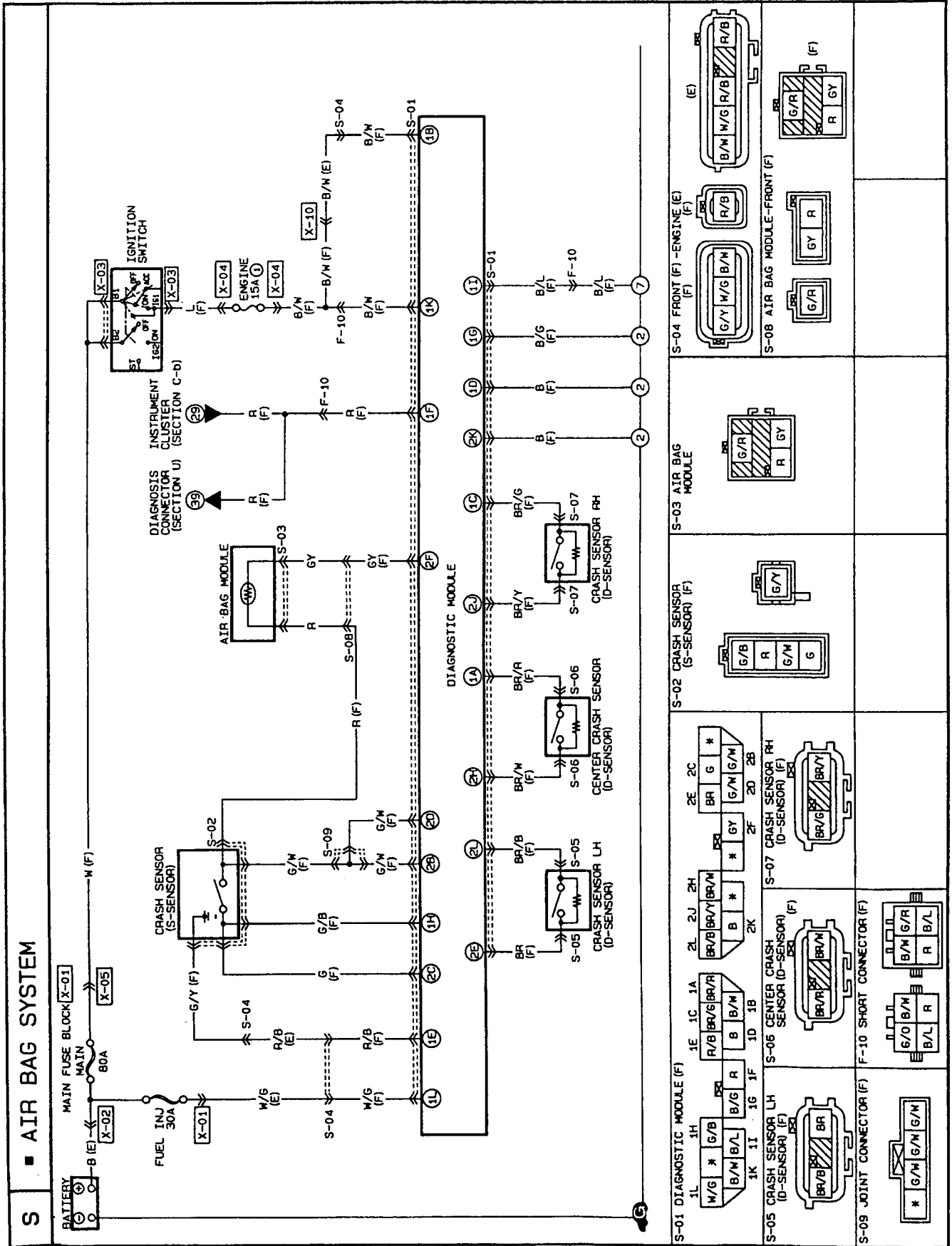
Circuit Diagram (LHD)








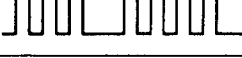
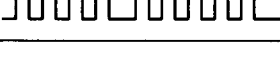
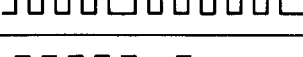
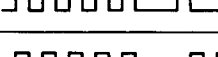
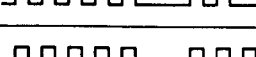
AIR BAG SYSTEM

T

(RHD)



Service Code Table

Priority	Service code	Output signal (Air bag system warning light)	Possible cause	Flowchart No.
1	0	Air bag system warning light does not illuminate for 4-8 seconds	Poor connection of diagnostic module connector	1
		Air bag system warning light remains ON	Poor connection of diagnostic module connector	2
2	12	ON  OFF	Open circuit or poor connection of power source circuit	3
3	13	ON  OFF	Damaged D-sensor (D-sensor ON)	14
4	21	ON  OFF	Poor installation of S-sensor	4
5	22	ON  OFF	Damaged S-sensor (S-sensor ON)	5
6	23	ON  OFF	Open connection in S-sensor feed circuit	6
7	24	ON  OFF	S-sensor circuit open	7
8	32	ON  OFF	High resistance or open circuit in air bag module circuit	8
9	34	ON  OFF	Low resistance in air bag module circuit	9
10	41	ON  OFF	Open circuit between diagnostic module and D-sensor	10
11	44	ON  OFF	Poor installation of right D-sensor	11
12	45	ON  OFF	Poor installation of center D-sensor	12
13	46	ON  OFF	Poor installation of left D-sensor	13
14	51	ON  OFF	System-down fuse burnt	15
15	52	ON  OFF	Damaged back-up power supply	16
16	53	ON  OFF	Damaged diagnostic module	17
17	99	Flashes quickly and continuously	Poor connection at all D-sensors	Check and correct connections as necessary

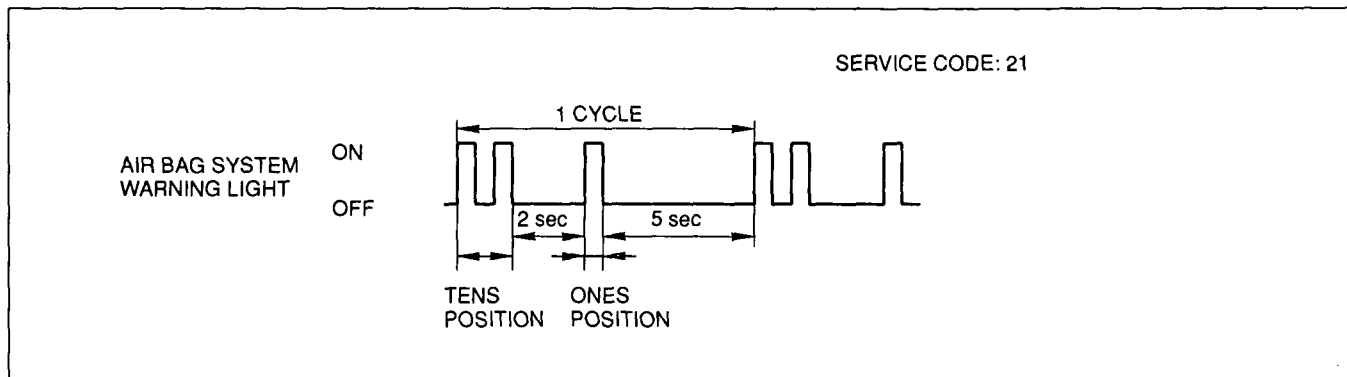
35E0TX-065

Note

- If two or more troubles exist in the air bag system, the warning light indicates the cause of the trouble with the highest priority.

Air Bag System Warning Light Cycle

Service codes are displayed by the air bag system warning light in tens position and ones position order. The time between the tens position and the ones position is 2.0 seconds. The time between service codes cycles (air bag system warning light is off) is 5.0 seconds. For example, if the service code is "21", there will be 2 flashes (tens position), a 2-second break, 1 flash (ones position), and a 5-second break. The cycle then repeats.



35E0TX-066

Flowchart No.1	Symptom	Air bag system warning light does not illuminate for 4–8 seconds
-----------------------	----------------	------------------------------------------------------------------

Possible cause

- Burnt air bag warning light bulb
- Defective diagnostic module
- Defective wiring harness

35E0TX-067

Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

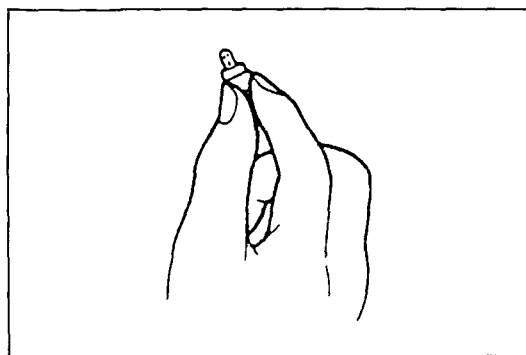
1. Disconnect the diagnostic module connector.
2. Turn the ignition switch to ON.
3. Check the air bag system warning light.

Light condition	Action
Illuminate	Replace diagnostic module (Refer to page T-50)
Not illuminate	Go to Step 3

Step 3

1. Remove the instrument cluster. (Refer to the MX-5 Workshop Manual (1221-10-89I), section T.)
2. Check the air bag system warning light bulb.

Bulb	Action
Burnt	Replace bulb
OK	Replace air bag wiring harness



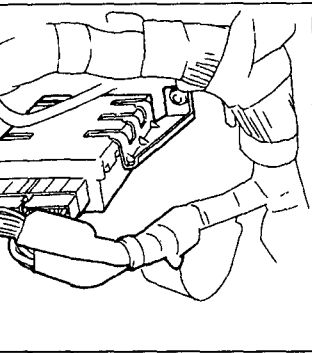
35E0TX-068

Flowchart No. 2	Symptom	Air bag system warning light remains ON
-----------------	---------	-----------------------------------------

ion of diagnostic module connector
gnostic module
ng harness

- Possible cause**
- Poor connect
 - Defective dia
 - Defective wiri

35E0TX-069



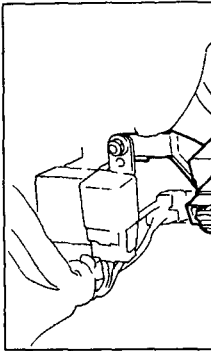
35E0TX-070

Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

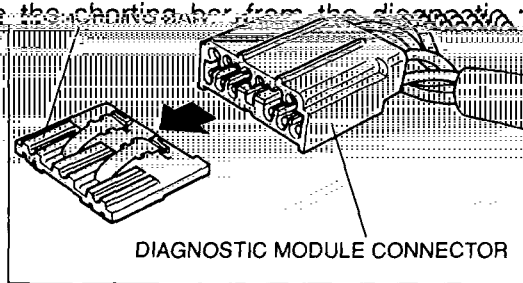
1. Verify that the diagnostic module connector is securely connected to the diagnostic module.
2. Verify that the shorting bar is in the fully retracted position.
3. If the connector and shorting bar are OK, go to step 3.



Step 3

1. Disconnect the diagnostic module connector.
2. Remove the shorting bar from the diagnostic module connector.

ing light
Action:
y wiring harness
stic module
T-50)



DIAGNOSTIC MODULE CONNECTOR

35E0TX-071

3. Check the air bag system warning light condition.

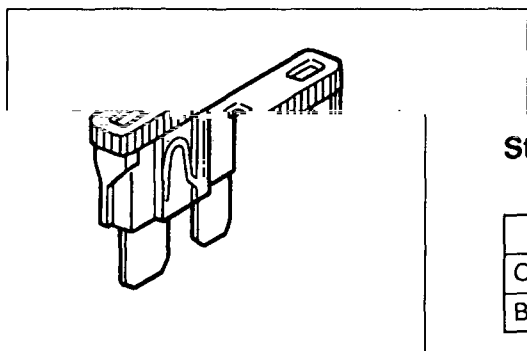
Light condition	Action
Illuminate	Replace air bag system warning light
Not illuminate	Replace diagnostic module (Refer to page T-50)

Flowchart No.3	Symptom	Service Code 12
-----------------------	----------------	-----------------

Possible cause

- Burnt FUEL INJ fuse
- Defective diagnostic module
- Defective wiring harness
- Defective S-sensor

35E0TX-072



35E0TX-073

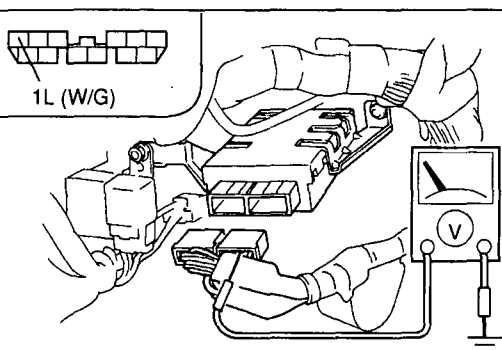
Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

Check the FUEL INJ fuse.

Fuse	Action
OK	Go to Step 3
Burnt	Go to Step 4



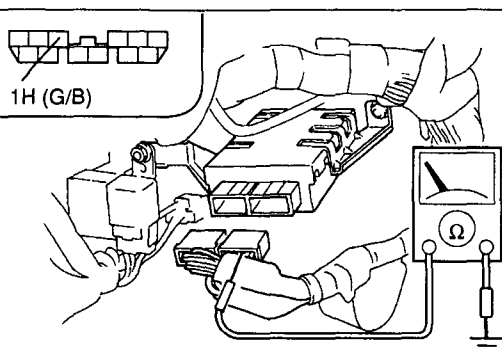
35E0TX-074

Step 3

1. Disconnect the diagnostic module connector.
2. Connect the negative battery cable.
3. Measure the voltage at terminal 1L (W/G) of the diagnostic module connector.

V_B: Battery voltage

Voltage	Action
V _B	Replace diagnostic module (Refer to page T-50)
Other	Replace air bag wiring harness

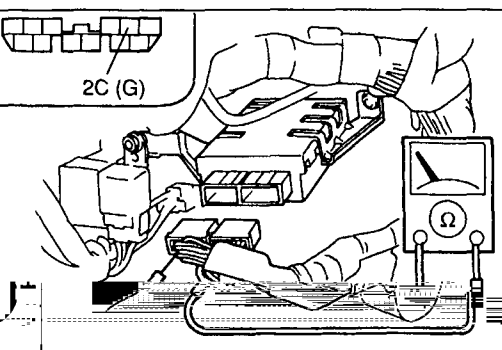


35E0TX-075

Step 4

1. Disconnect the diagnostic module connector.
2. Check for continuity between terminal 1H (G/B) of the diagnostic module connector and ground.

Continuity	Action
Yes	Go to Step 5
No	Replace diagnostic module (Refer to page T-50)

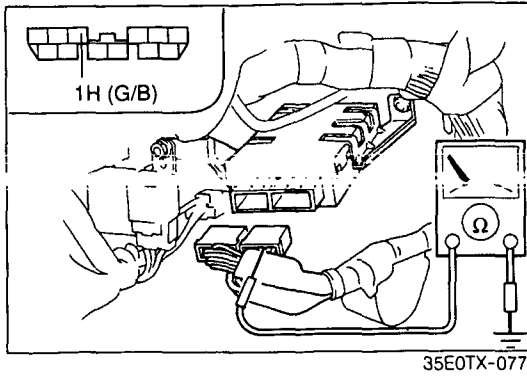


35E0TX-076

Step 5

1. Remove the dashboard. (Refer to the MX-5 Workshop Manual (1221-10-89I), section S.)
2. Disconnect the orange and blue S-sensor connectors.
3. Check for continuity between terminal 2C (G) of the diagnostic module connector and ground.

Continuity	Action
Yes	Replace air bag wiring harness
No	Go to Step 6



Step 6

Check for continuity between terminal 1H (G/B) of the diagnostic module connector and ground.

Continuity	Action
Yes	Replace air bag wiring harness and FUSE INJ fuse
No	Replace S-sensor (Refer to page T-55)

Flowchart No.4

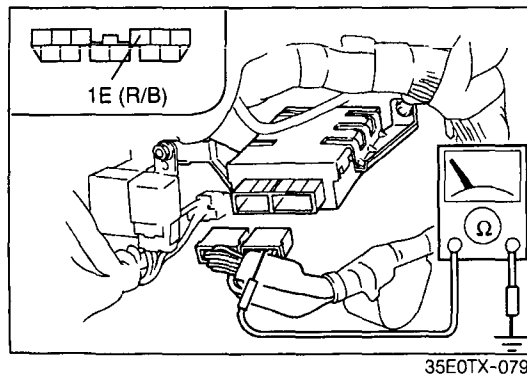
Symptom

Service Code 21

Possible cause

- Defective S-sensor
- Defective wiring harness
- Defective diagnostic module

35E0TX-078



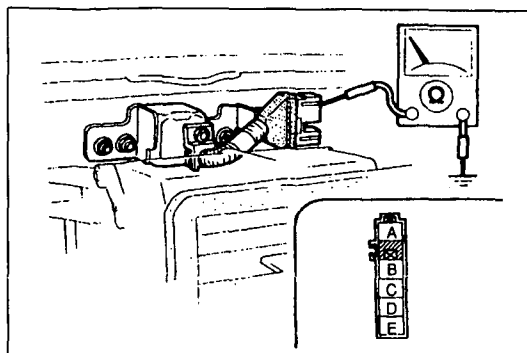
Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

1. Disconnect the diagnostic module connector.
2. Check for continuity between terminal 1E (R/B) of the diagnostic module connector and ground.

Continuity	Action
Yes	Replace diagnostic module (Refer to page T-50)
No	Go to Step 3



Step 3

1. Remove the dashboard. (Refer to the MX-5 Workshop Manual (1221-10-89I), section S.)
2. Disconnect the orange and blue S-sensor connectors.
3. Check for continuity between terminal A of the S-sensor connector and ground.

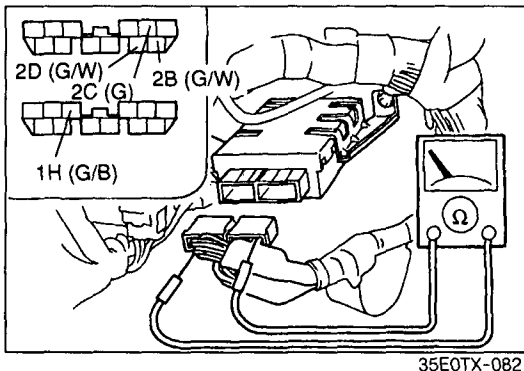
Continuity	Action
Yes	Replace air bag wiring harness
No	Replace S-sensor (Refer to page T-55)

Flowchart No.5	Symptom	Service Code 22
----------------	---------	-----------------

Possible cause

- Defective diagnostic module
- Defective S-sensor
- Defective wiring harness

35E0TX-081



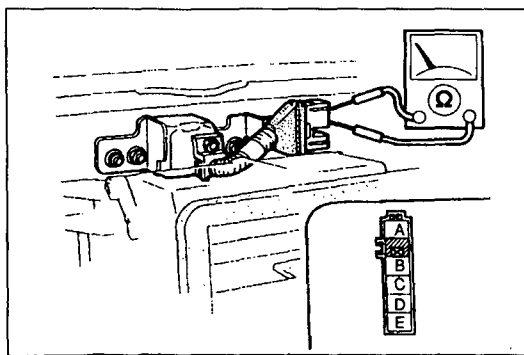
Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

1. Disconnect the diagnostic module connector.
2. Check for continuity between terminal 1H (G/B) or 2C (G) and terminal 2B (G/W) or 2D (G/W) of the diagnostic module connector.

Continuity	Action
Yes	Replace diagnostic module (Refer to page T-50)
No	Go to Step 3



Step 3

1. Remove the dashboard. (Refer to the MX-5 Workshop Manual (1221-10-89), section S.)
2. Disconnect the orange and blue S-sensor connectors.
3. Check for continuity between terminal B or E and terminal C or D of the S-sensor connector.

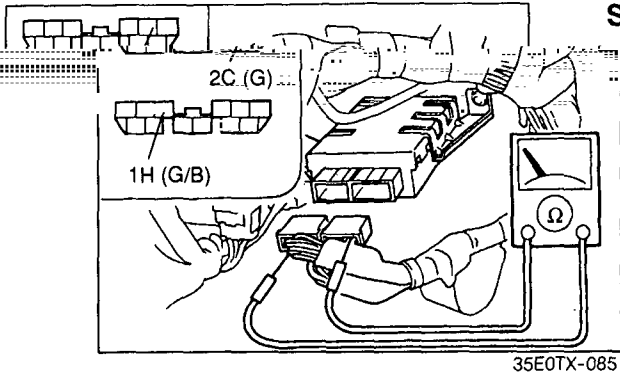
Continuity	Action
Yes	Replace S-sensor (Refer to page T-55)
No	Replace air bag wiring harness

Flowchart No.6	Symptom	Service Code 23
----------------	---------	-----------------

Possible cause

- Defective S-sensor
- Defective wiring harness
- Defective diagnostic module

35E0TX-084



35E0TX-085

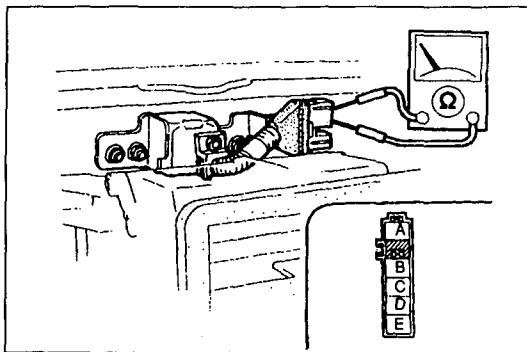
Step 1

Continuity Tester Service procedure: GENERAL PROCEDURES, page T-27.

Step 2

1. Disconnect the diagnostic module connector.
2. Check for continuity between terminals 2C (G) and 1H (G/B) of the diagnostic module connector.

Continuity	Action
Yes	Replace diagnostic module (Refer to page T-50)
No	Go to Step 3



35E0TX-086

Step 3

1. Remove the dashboard. (Refer to the MX-5 Workshop Manual (1221-10-89I), section S.)
2. Disconnect the orange and blue S-sensor connectors.
3. Check for continuity between terminals E and B of the S-sensor connector.

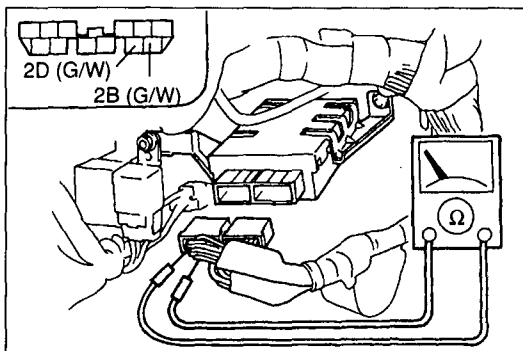
Continuity	Action
Yes	Replace air bag wiring harness
No	Replace S-sensor (Refer to page T-55)

Flowchart No.7	Symptom	Service Code 24
-----------------------	----------------	-----------------

Possible cause

- Defective wiring harness
- Defective diagnostic module

35E0TX-087



35E0TX-088

Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

1. Disconnect the diagnostic module connector.
2. Check for continuity between terminals 2B (G/W) and 2D (G/W) of the diagnostic module connector.

Continuity	Action
Yes	Replace diagnostic module (Refer to page T-50)
No	Replace air bag wiring harness

Flowchart No.8	Symptom	Service Code 32
----------------	---------	-----------------

Possible cause

- Defective air bag module
- Defective clock spring
- Defective wiring harness
- Defective diagnostic module

Warning

- Handling the air bag module improperly can accidentally deploy the air bag, which may seriously injure you. Read SERVICE WARNINGS, page T-26, before handling the air bag module.

35E0TX-089

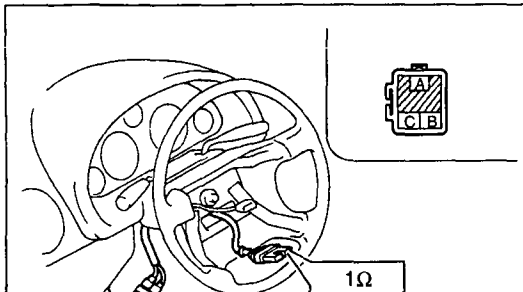
Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

1. Remove the air bag module. (Refer to page T-49.)
2. Install a 1-ohm (rated power 1W) resistor between terminals B and C of the air bag module connector.
3. Connect the negative battery cable.
4. Turn the ignition switch to ON and check the service code.

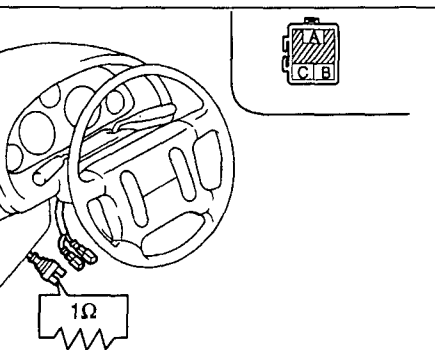
Service code	Action
32	Remove 1-ohm resistor and go to Step 3
Other	Replace air bag module (Refer to page T-49)



Step 3

1. Disconnect the clock spring connector.
2. Install a 1-ohm (rated power 1W) resistor between terminals B (R) and C (GY) of the clock spring connector.
3. Connect the negative battery cable.
4. Turn the ignition switch to ON and check the service code.

Service code	Action
32	Remove 1-ohm resistor and go to Step 4
Other	Replace combination switch (Refer to page T-14)

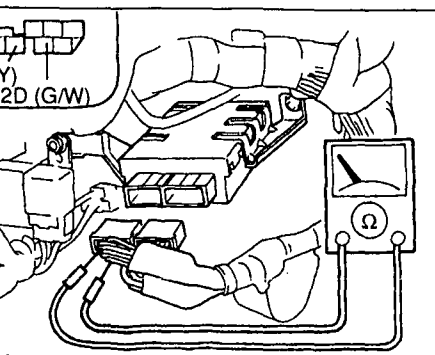


35E0TX-091

Step 4

1. Turn the ignition switch to LOCK.
2. Disconnect the negative battery cable.
3. Disconnect the diagnostic module connector.
4. Measure the resistance between terminals 2D (G/W) and 2F (GY) of the diagnostic module connector.

Resistance	Action
1.00 Ω	Replace diagnostic module (Refer to page T-50)
More than 1.00 Ω	Replace air bag wiring harness



35E0TX-092

Flowchart No.9	Symptom	Service Code 34
-----------------------	----------------	-----------------

Possible cause

- Defective air bag module
- Defective clock spring
- Defective wiring harness
- Defective diagnostic module

Warning

- Handling the air bag module improperly can accidentally deploy the air bag, which may seriously injure you. Read **SERVICE WARNINGS**, page T-26, before handling the air bag module.

35E0TX-093

Step 1

Carry out "Before Servicing" procedure under **GENERAL PROCEDURES**, page T-27.

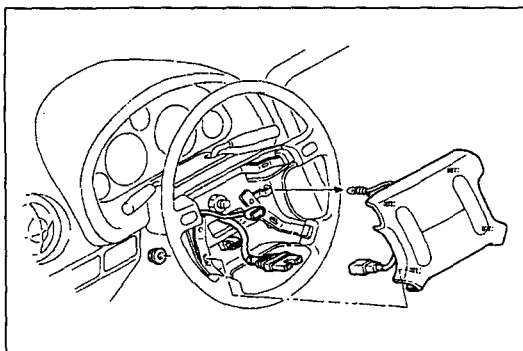
Step 2

1. Remove the air bag module. (Refer to page T-49.)
2. Make sure the shorting bars at the diagnostic module connector, clock spring connectors, and air bag module are properly installed.

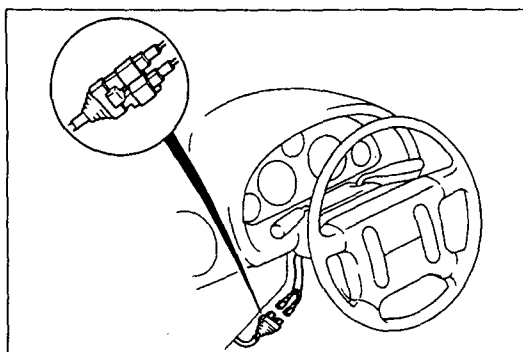
Note

- An engaged shorting bar or poorly mated connector can cause code 34 to set.

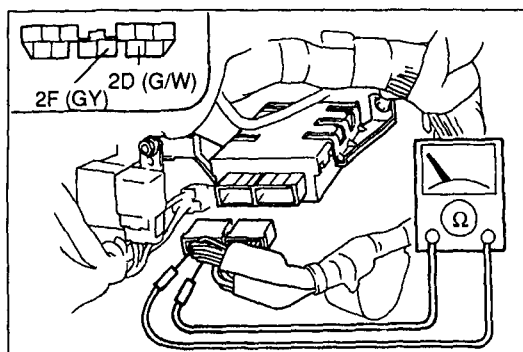
3. Connect the negative battery cable.
4. Turn the ignition switch to ON and check the service code.



35E0TX-094



35E0TX-095



35E0TX-096

Step 3

1. Turn the ignition switch to LOCK.
2. Disconnect the clock spring connector.
3. Turn the ignition switch to ON and check the service code.

Service code	Action
32	Replace combination switch (Refer to page T-14)
34	Go to Step 4

Step 4

1. Turn the ignition switch to LOCK.
2. Disconnect the negative battery cable.
3. Disconnect the diagnostic module connector.
4. Measure the resistance between terminals 2D (G/W) and 2F (GY) of the diagnostic module connector.

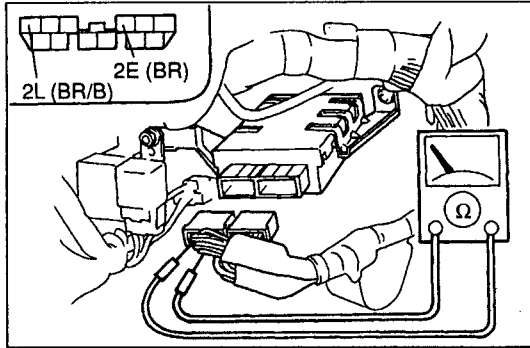
Resistance	Action
1.00 Ω	Replace diagnostic module (Refer to page T-50)
Less than 1.00 Ω	Replace wiring harness

Flowchart No.10	Symptom	Service Code 41
-----------------	---------	-----------------

Possible cause

- Poor connection of D-sensor connector
- Defective D-sensor
- Defective wiring harness
- Defective diagnostic module

35E0TX-097



35E0TX-098

Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

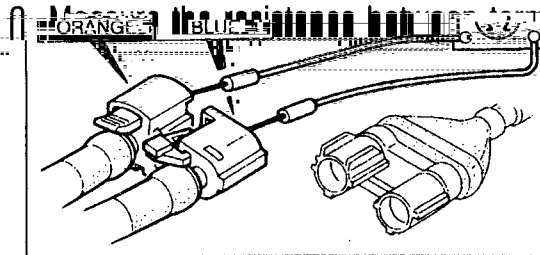
1. Disconnect the diagnostic module connector.
2. Measure the resistance between terminals 2L (BR/B) and 2E (BR) of the diagnostic module connector.

Resistance	Action
1.13—1.23 kΩ	Go to Step 4
Other	Go to Step 3



Step 3

1. Disconnect the left D-sensor connector.



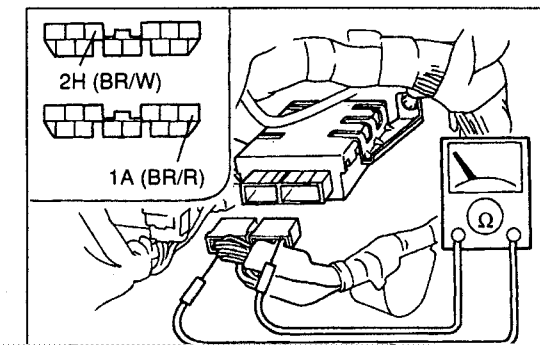
35E0TX-099

Resistance:
1.13—1.23 kΩ
Other

Action
Replace air bag wiring harness
Replace left D-sensor (Refer to page T-52)

Measure the resistance between terminals 2H (BR/W) and 1A (BR/R) of the diagnostic module connector.

Action
Go to Step 6
Go to Step 5



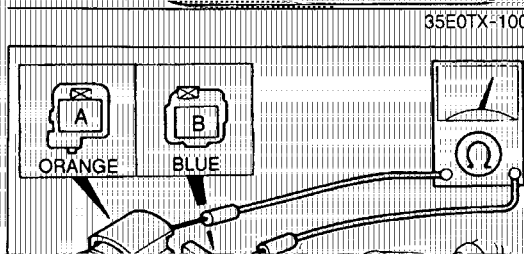
Resistance
1.13—1.23 kΩ
Other

Step 4

Measure the resistance between terminals 2H (BR/W) and 1A (BR/R) of the diagnostic module connector.

Measure the resistance between terminals A and B of the center D-sensor connector.

Action
Replace air bag wiring harness
Replace center D-sensor

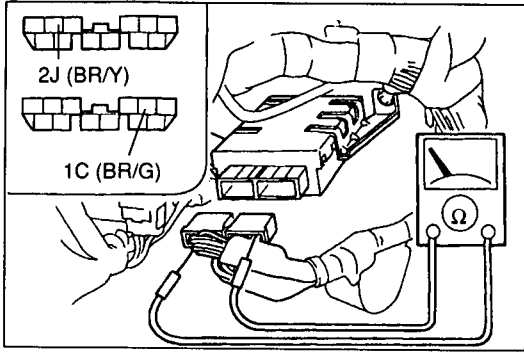


35E0TX-100

Step 5

1. Disconnect the center D-sensor connector.
2. Measure the resistance between terminals A and B of the center D-sensor connector.

Resistance	Action
1.13—1.23 kΩ	Replace air bag wiring harness
Other	Replace center D-sensor

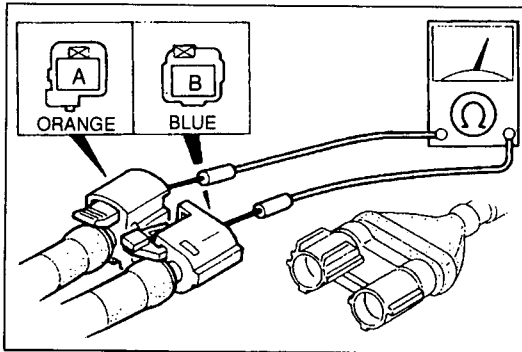


35E0TX-102

Step 6

Measure the resistance between terminals 2J (BR/Y) and 1C (BR/G) of the diagnostic module connector.

Resistance	Action
1.13—1.23 k Ω	Replace diagnostic module (Refer to page T-50)
Other	Go to Step 7



35E0TX-103

Step 7

1. Disconnect the right D-sensor connector.
2. Measure the resistance between terminals A and B of the right D-sensor connector.

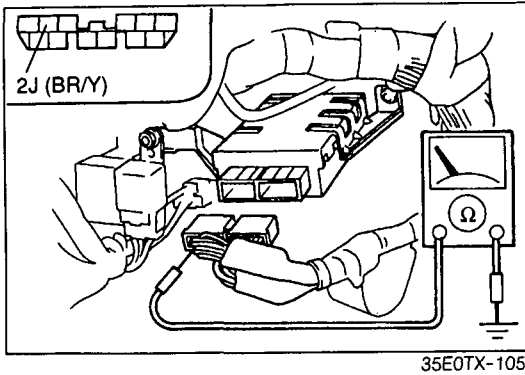
Resistance	Action
1.13—1.23 k Ω	Replace air bag wiring harness
Other	Replace right D-sensor (Refer to page T-52)

Flowchart No.11	Symptom	Service Code 44
------------------------	----------------	-----------------

Possible cause

- Poor installation of right D-sensor
- Defective right D-sensor
- Defective wiring harness
- Defective diagnostic module

35E0TX-104



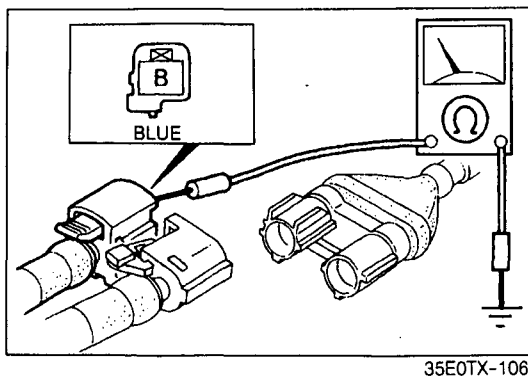
Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

1. Disconnect the diagnostic module connector.
2. Check for continuity between terminal 2J (BR/Y) of the diagnostic module connector and ground.

Continuity	Action
Yes	Replace diagnostic module (Refer to page T-50)
No	Go to Step 3



Step 3

1. Disconnect the right D-sensor connector.
2. Check for continuity between terminal B of the right D-sensor connector and ground.

Continuity	Action
Yes	Replace air bag wiring harness
No	Replace right D-sensor (Refer to page T-52)

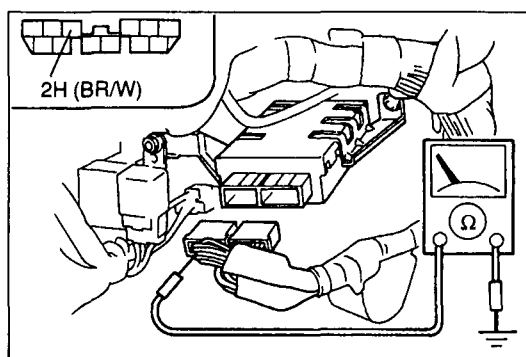
Flowchart No.12	Symptom	Service Code 45
------------------------	----------------	-----------------

Possible cause

- Poor installation of center D-sensor
- Defective center D-sensor
- Defective wiring harness

Replace diagnostic module

35E0TX-107



35E0TX-108

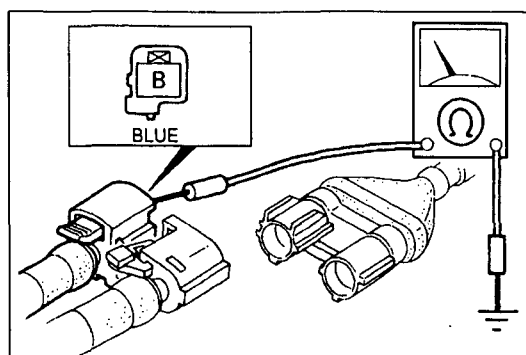
Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

1. Disconnect the diagnostic module connector.
2. Check for continuity between terminal 2H (BR/W) of the diagnostic module connector and ground.

Continuity	Action
Yes	Replace diagnostic module (Refer to page T-50)
No	Go to Step 2



35E0TX-109

Step 3

1. Disconnect the center D-sensor connector.
2. Check for continuity between terminal B of the center D-sensor connector and ground.

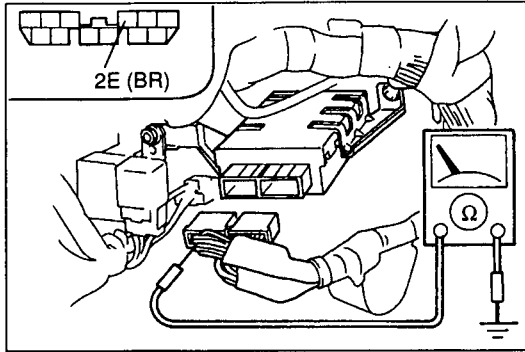
Continuity	Action
Yes	Replace air bag wiring harness
No	Replace center D-sensor (Refer to page T-52)

Flowchart No.13	Symptom	Service Code 46
------------------------	----------------	------------------------

Possible cause

- Poor installation of left D-sensor
- Defective left D-sensor
- Defective wiring harness
- Defective diagnostic module

35E0TX-110



35E0TX-111

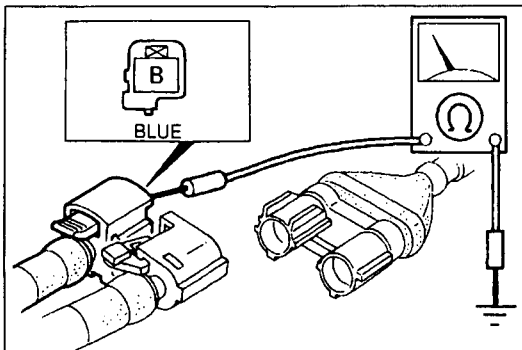
Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

1. Disconnect the diagnostic module connector.
2. Check for continuity between terminal 2E (BR) of the diagnostic module connector and ground.

Continuity	Action
Yes	Replace diagnostic module (Refer to page T-50)
No	Go to Step 3



35E0TX-112

Step 3

1. Disconnect the left D-sensor connector.
2. Check for continuity between terminal B of the left D-sensor connector and ground.

Continuity	Action
Yes	Replace air bag wiring harness
No	Replace left D-sensor (Refer to page T-52)

Flowchart No.14	Symptom	Service Code 13
------------------------	----------------	-----------------

Possible cause

- Defective air bag module
- Defective D-sensor
- Defective clock spring
- Defective diagnostic module
- Defective S-sensor
- Defective wiring harness

Note

- When fault code 13 sets, the diagnostic module blows an internal non-replaceable thermal fuse to prevent accidental deployment of the air bag. The diagnostic module must be replaced once code 13 has set, but should not be replaced until the cause for the fault is repaired.

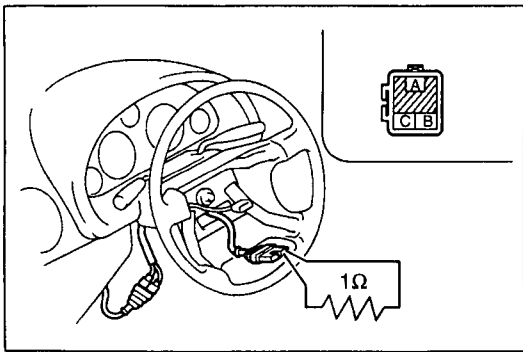
35E0TX-113

Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

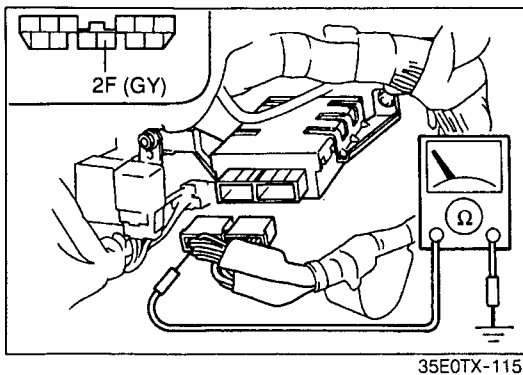
1. Remove the air bag module. (Refer to page T-49.)
2. Install a 1-ohm (rated power 1W) resistor between terminals B and C of the air bag module connector.
3. Connect the negative battery cable.
4. Turn the ignition switch to ON and check the service code.



Service code	Action
51	Replace air bag module and then replace diagnostic module (Refer to pages T-49, 50)
Other	Go to Step 3

Step 3

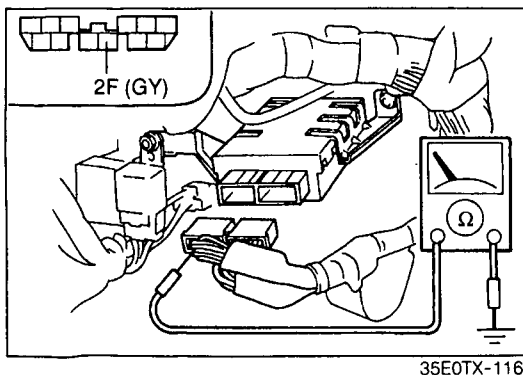
1. Turn the ignition switch to LOCK.
2. Disconnect the diagnostic module connector.
3. Check for continuity between terminal 2F (GY) of the diagnostic module connector and ground.



Continuity	Action
Yes	Go to Step 4
No	Go to Step 6

Step 4

1. Disconnect the clock spring connector.
2. Check for continuity between terminal 2F (GY) of the diagnostic module connector and ground.



Continuity	Action
Yes	Go to Step 5
No	Replace combination switch and then replace diagnostic module (Refer to pages T-14, 50)

Step 5

1. Remove the dashboard. (Refer to the MX-5 Workshop Manual (1221-10-89), section S.)

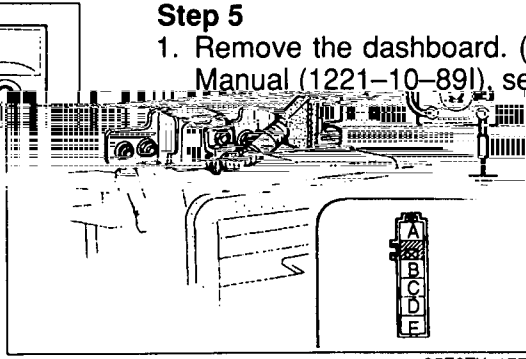
blue S-sensor connectors.
 en terminal C of the S-sensor

2. Disconnect the orange and
3. Check for continuity between connector and ground.

Action

sensor and then replace diagnos-
 Refer to pages T-50, 55)

r bag wiring harness and then
 gnostic module
 ge T-50)



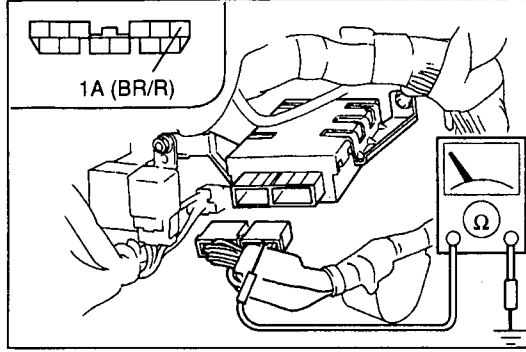
35E0TX-177

en terminal 1A (BR/R) of the
 or and ground.

Action

7

8



35E0TX-118

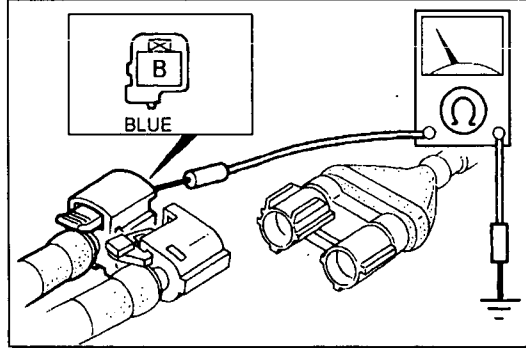
sensor connector.

en terminal B of the center
 ound.

Action

enter D-sensor and then replace
 module (Refer to pages T-50, 52)

r bag wiring harness and then
 gnostic module
 ge T-50)



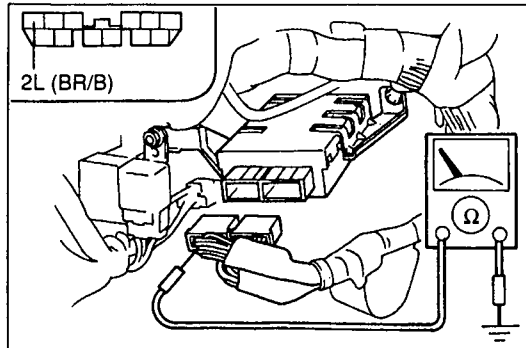
35E0TX-119

en terminal 2L (BR/B) of the
 or and ground.

Action

9

10



35E0TX-120

Continuity	
Yes	Replace S-sensor and diagnostic module (Refer to page T-50)
No	Replace air bag wiring harness and replace diagnostic module (Refer to page T-50)

Step 6

1. Check for continuity between diagnostic module connector and ground.

Continuity	
Yes	Go to Step 7
No	Go to Step 8

Step 7

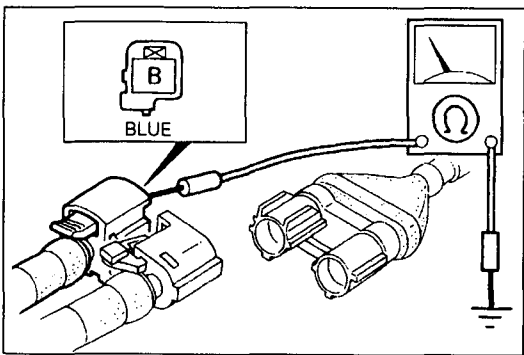
1. Disconnect the center D-sensor.
2. Check for continuity between center D-sensor connector and ground.

Continuity	
Yes	Replace center D-sensor and diagnostic module (Refer to page T-50)
No	Replace air bag wiring harness and replace diagnostic module (Refer to page T-50)

Step 8

1. Check for continuity between diagnostic module connector and ground.

Continuity	
Yes	Go to Step 9
No	Go to Step 10

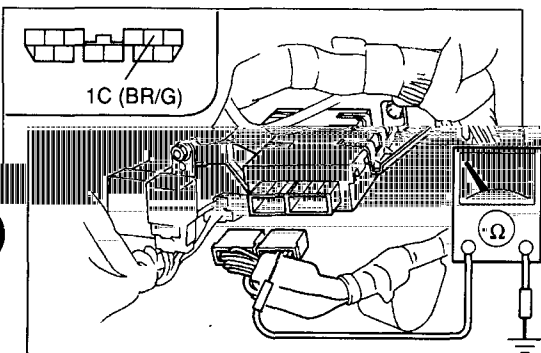


35E0TX-121

Step 9

1. Disconnect the left D-sensor connector.
2. Check for continuity between terminal B of the left D-sensor connector and ground.

Continuity	Action
Yes	Replace D-sensor and then replace diagnostic module (Refer to pages T-50, 52)
No	Replace air bag wiring harness and then replace diagnostic module (Refer to page T-50)

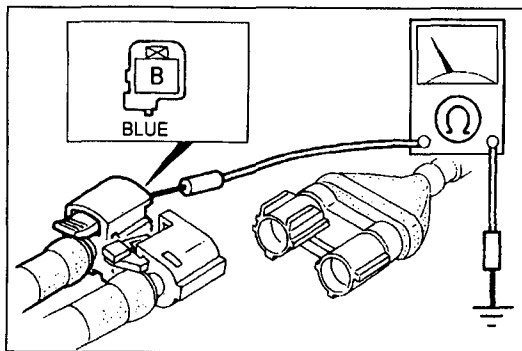


35E0TX-122

Step 10

- Check for continuity between terminal 1C (BR/G) of the diagnostic module connector and ground.

Continuity	Action
Yes	Go to Step 11
No	Replace diagnostic module (Refer to page T-50)



35E0TX-123

Step 11

1. Disconnect the right D-sensor connector.
2. Check for continuity between terminal B of the right D-sensor connector and ground.

Continuity	Action
Yes	Replace D-sensor and then replace diagnostic module (Refer to pages T-50, 52)
No	Replace air bag wiring harness and then replace diagnostic module (Refer to page T-50)

Flowchart No.15

Symptom

Service Code 51

Possible cause

- Blown internal fuse in diagnostic module (fault conditions no longer present)
- Diagnostic module not replaced after service code 13 set and conditions corrected
- Intermittent short in air bag deployment circuit

Remedy

If repairs were made for a service code 13, replace the diagnostic module. If an intermittent short is suspected, inspect the wiring harnesses and connectors for damage. If they are not damaged, wiggle the harness and connectors to induce the intermittent short; service code 13 will be set when the fault is induced. Then follow the troubleshooting procedure for service code 13.

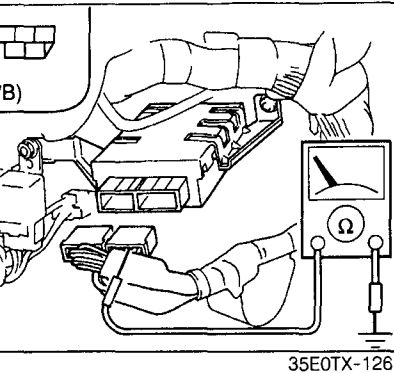
35E0TX-124

Flowchart No.16	Symptom	Service Code 52
-----------------	---------	-----------------

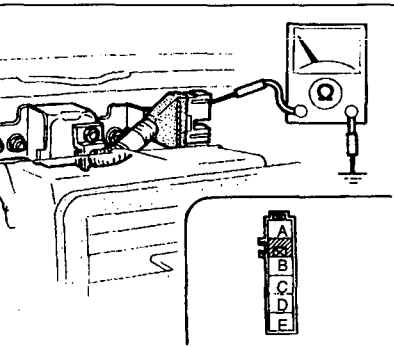
Cause
 Defective wiring harness
 Defective S-sensor
 Defective diagnostic module

35E0TX-125

Possible
 • Defective
 • Defective
 • Defective



35E0TX-126



35E0TX-127

Step 1

Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.

Step 2

1. Disconnect the diagnostic module connector.
2. Check for continuity between terminal 1H (G/B) of the diagnostic module connector and ground.

Continuity	Action
Yes	Go to Step 3
No	Replace diagnostic module (Refer to page T-50)

Step 3

1. Remove the dashboard. (Refer to the MX-5 Workshop Manual (1221-10-89I), section S.)
2. Disconnect the orange and blue S-sensor connectors.
3. Check for continuity between terminal B of the S-sensor connector and ground.

Continuity	Action
Yes	Replace S-sensor (Refer to page T-55)
No	Replace air bag wiring harness

Flowchart No.17	Symptom	Service Code 53
-----------------	---------	-----------------

Cause
 Internal failure of diagnostic module

Replace the diagnostic module. (Refer to page T-50.)

35E0TX-128

Flowchart

Possible
 • Internal

Remedy
 • Replace

AIR BAG MODULE Removal / Installation

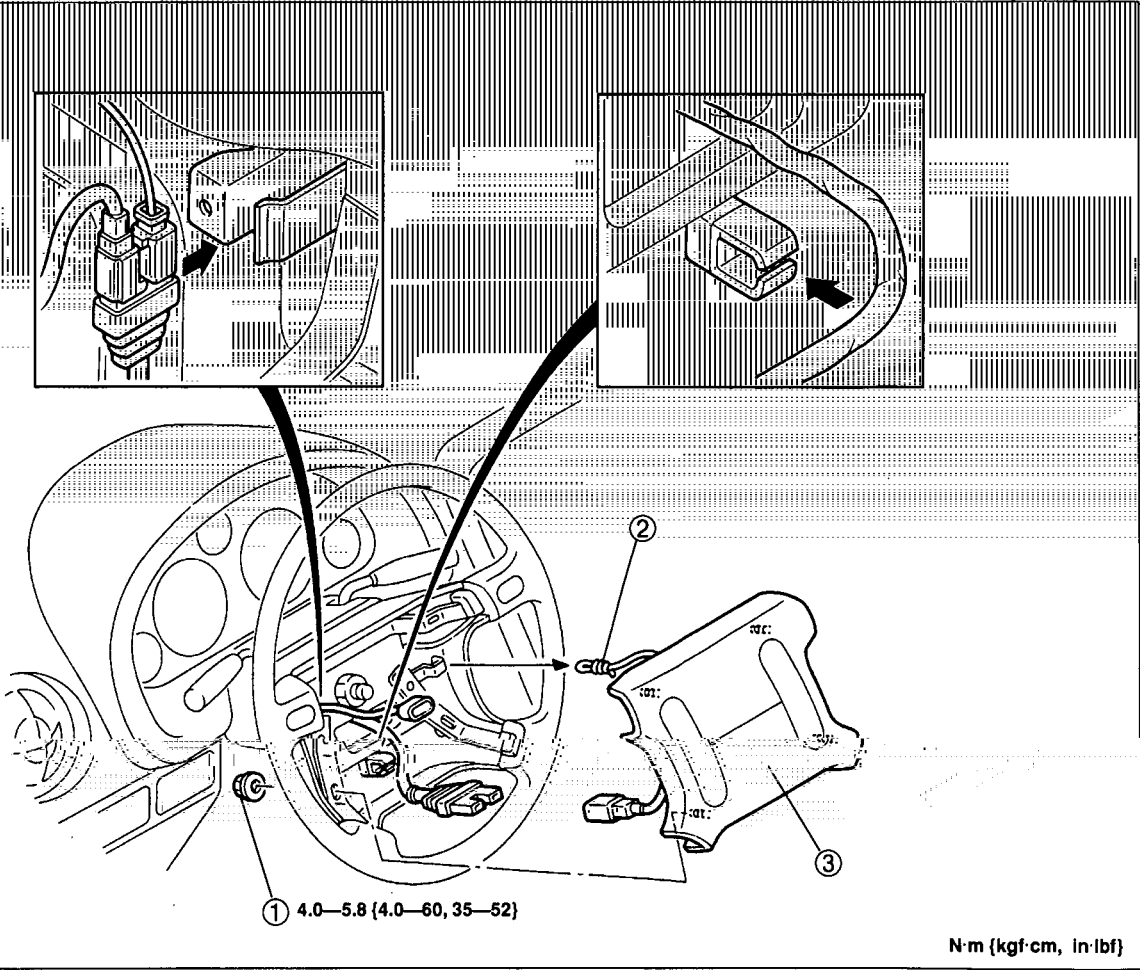
Warning

~~Handling the air bag module improperly can accidentally deploy the air bag, which may seriously injure you. Read SERVICE WARNINGS, page T-26, before handling the air bag module.~~

1. Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.
2. Remove in the order shown in the figure.

removal. Install in the reverse order of removal. See Troubleshooting chart (page T-27) to verify that the air bag system is operating normally.

3. Install in the reverse order of removal.
4. Follow the troubleshooting flow chart.



① 4.0–5.8 (4.0–60, 35–52)

N·m {kgf·cm, in·lbf}

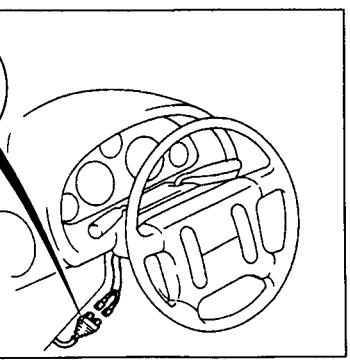
35E0TX-129

3. Air bag module
Disposal procedure page T-57

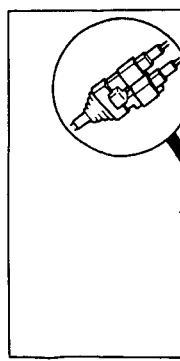
1. Bolts
2. Support r

Installation note Air bag module

1. Connect the blue and orange clock spring connectors.
2. Connect the negative battery cable.
3. Turn the ignition switch to ON and verify that service code 32 is set.
4. If another service code is set, troubleshoot the system.
5. If service code 32 is set, turn the ignition switch to OFF and disconnect the negative battery cable.
6. Disconnect the orange and blue clock spring connectors.
7. Install the air bag module.

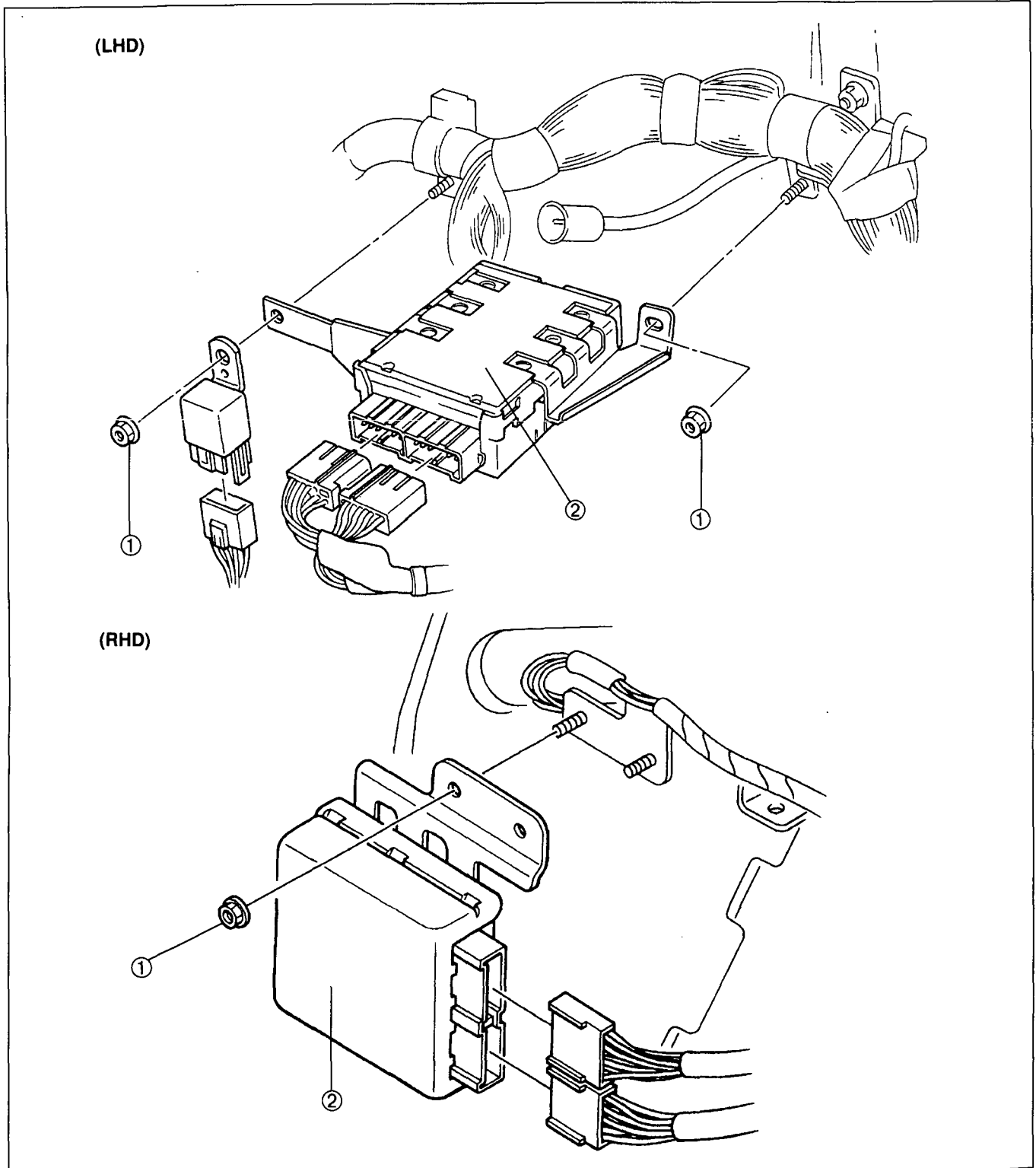


35E0TX-130



DIAGNOSTIC MODULE**Removal / Installation**

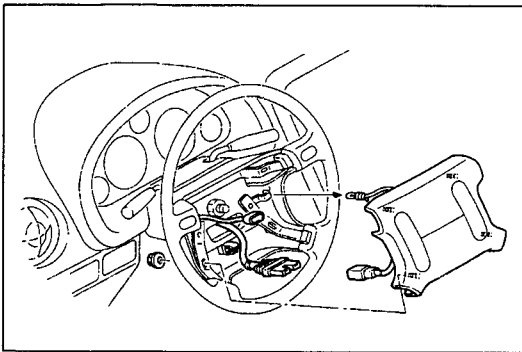
1. Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.
2. Remove the dashboard and console (RHD).
(Refer to the MX-5 Workshop Manual (1221-10-89I), section S.)
3. Remove in the order shown in the figure
4. Install in the reverse order of removal.
5. Follow the troubleshooting flowchart (page T-27) to verify that the air bag system is operating normally.



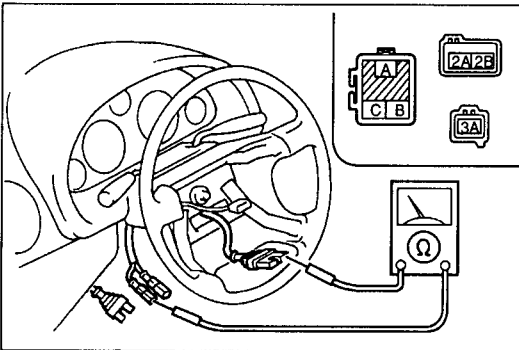
35E0TX-131

1. Nuts

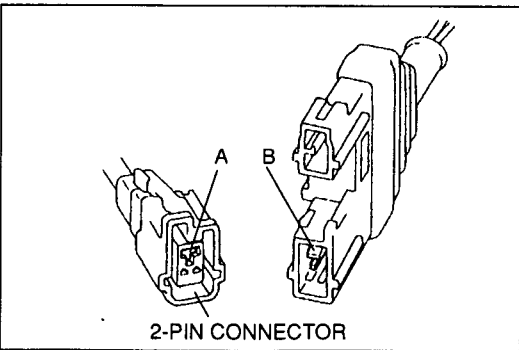
2. Diagnostic module



35E0TX-132

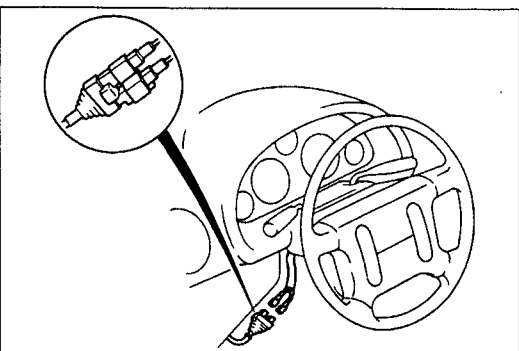


35E0TX-133

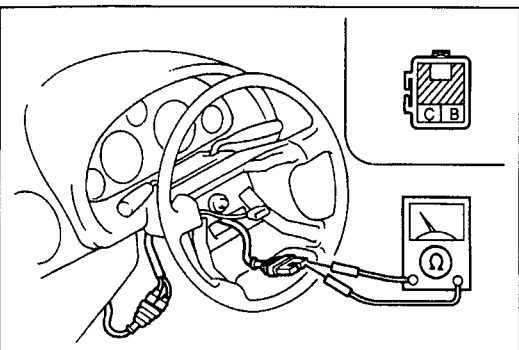


2-PIN CONNECTOR

35E0TX-134



35E0TX-135



35E0TX-136

CLOCK SPRING Inspection

Warning

- Handling the air bag module improperly can accidentally deploy the air bag, which may seriously injure you. Read **SERVICE WARNINGS**, page T-26, before handling the air bag module.

1. Carry out "Before Servicing" procedure under **GENERAL PROCEDURES**, page T-27.
2. Remove the air bag module.
(Refer to page T-49.)
3. Check for continuity between terminals of the clock spring.

Terminals					
A	B	C	2A	2B	3A
○	○	○	○	○	○

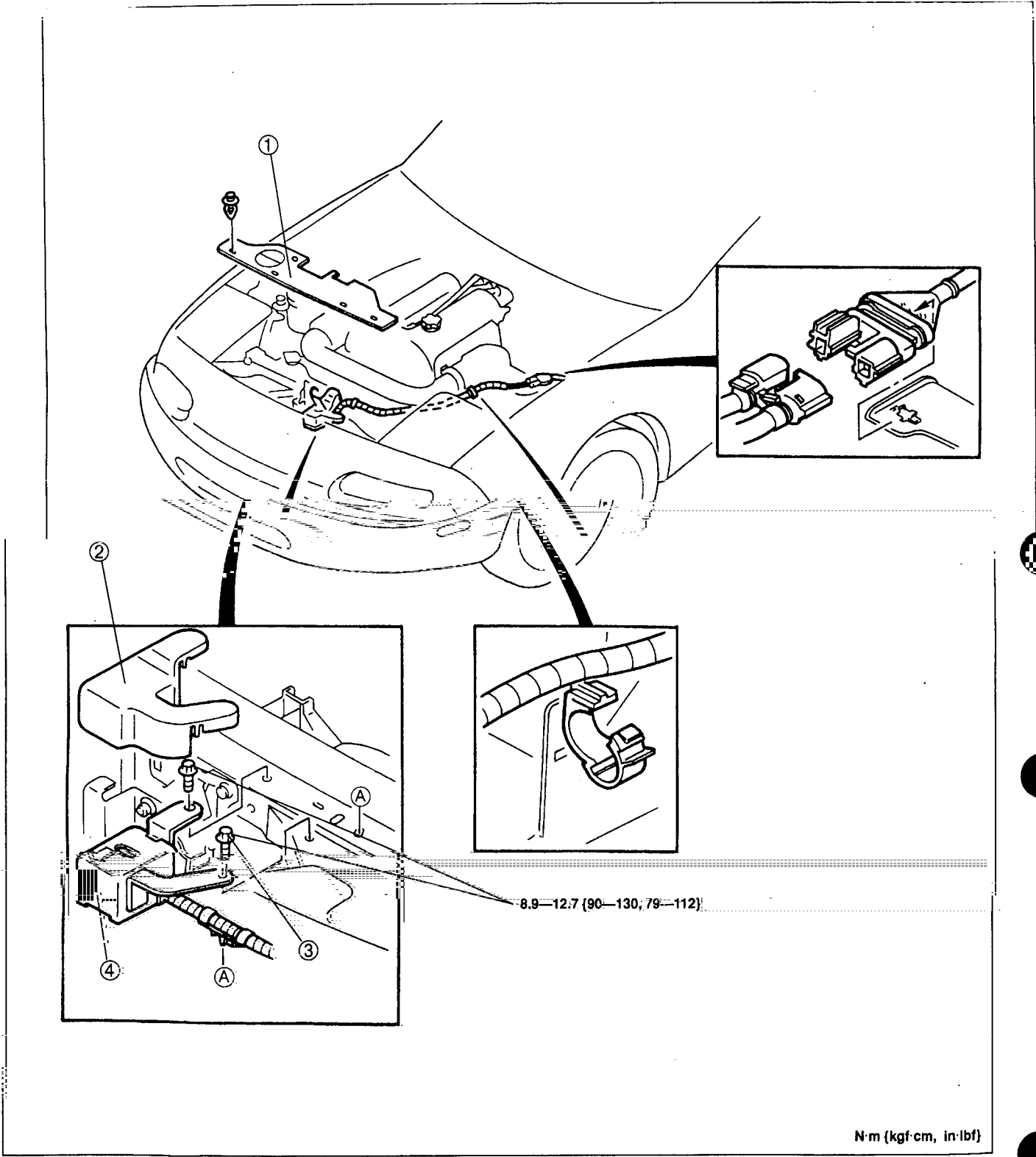
○—○: Continuity

4. If not as specified, replace the combination switch.
(Refer to page T-14.)
5. Connect the blue and orange clock spring connectors.
6. Check if the pin B of the clock spring connector (harness-side) is broken.
7. If pin B is broken, replace the air bag wiring harness.
8. Check if the pin B of the air bag module connector (on clock spring) is broken.
9. If pin B is broken, replace the combination switch.
(Refer to page T-14.)
10. Disconnect the diagnostic module connector.
11. Connect the blue and orange clock spring connectors.
12. Check for continuity between terminals B and C of the clock spring.
13. If continuity exists, replace the combination switch.
(Refer to page T-14.)

CRASH SENSOR (D-SENSOR)

Removal / Installation

1. Carry out "Before Servicing" procedure under GENERAL PROCEDURE, page T-27.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.



35E0TX-137

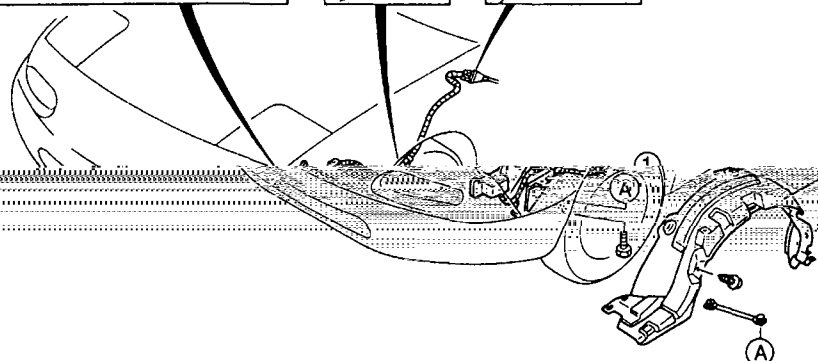
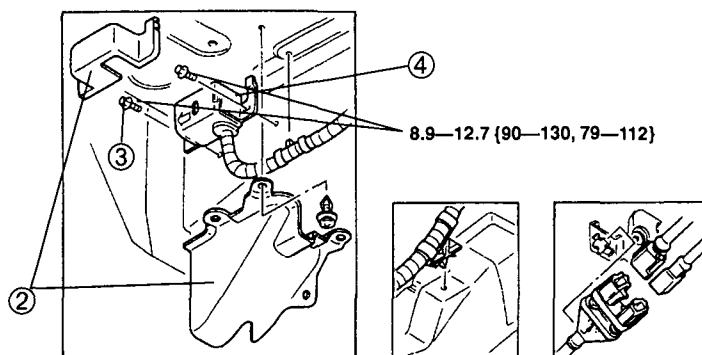
Crash sensor (D-sensor, center)page T-54

1. Upper seal boards
2. Cover
3. Bolts

4. Crash sensor
Inspect

AIR BAG SYSTEM

T



- 1. Mud guard
- 2. Cover
- 3. Bolts

- 4. Crash sensor (D-sensor, right)
- Inspection pag

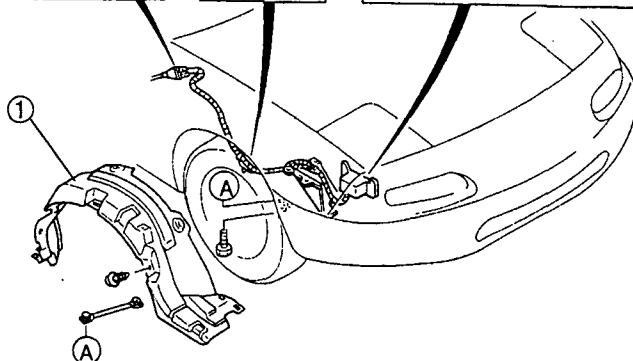
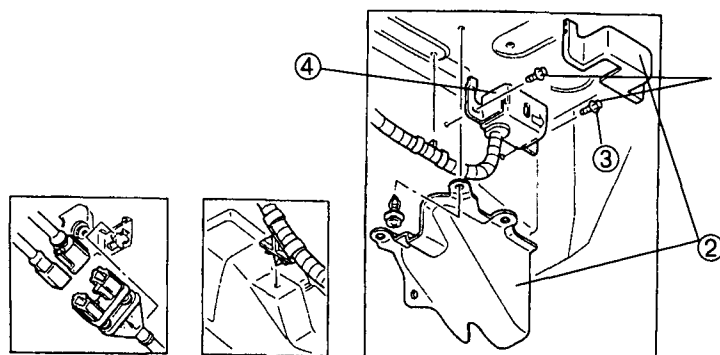
N·m {kgf·cm}

n, in·lbf}

5E0TX-138

e T-54

-112}



- 1. Mud guard
- 2. Cover
- 3. Bolts

- 4. Crash sensor (D-sensor, left)
- Inspection pag

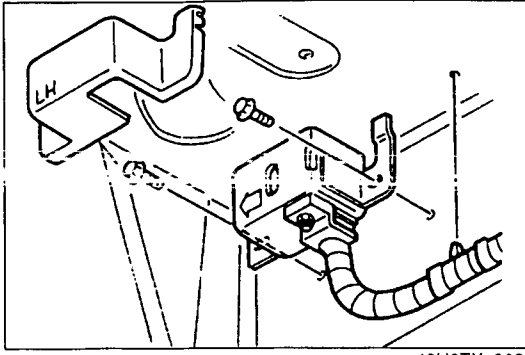
N·m {kgf·cm}

m, in·lbf}

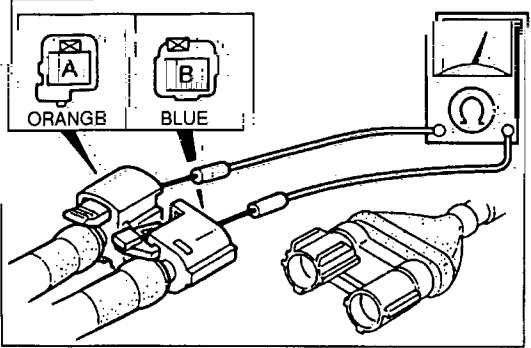
5E0TX-139

e T-54

T-53



46U0TX-903



35E0TX-140

Installation note

Crash sensor (D-sensor)

1. If the crash sensor mounting area is damaged, repair the area to its original shape before reinstalling the sensor.
2. Point the arrow on the crash sensor toward the front of the vehicle. Then install it and tighten the bolts to the specified torque.

Inspection

1. Disconnect the D-sensor connectors: (center, RH, and LH). Measure resistance of each sensor:

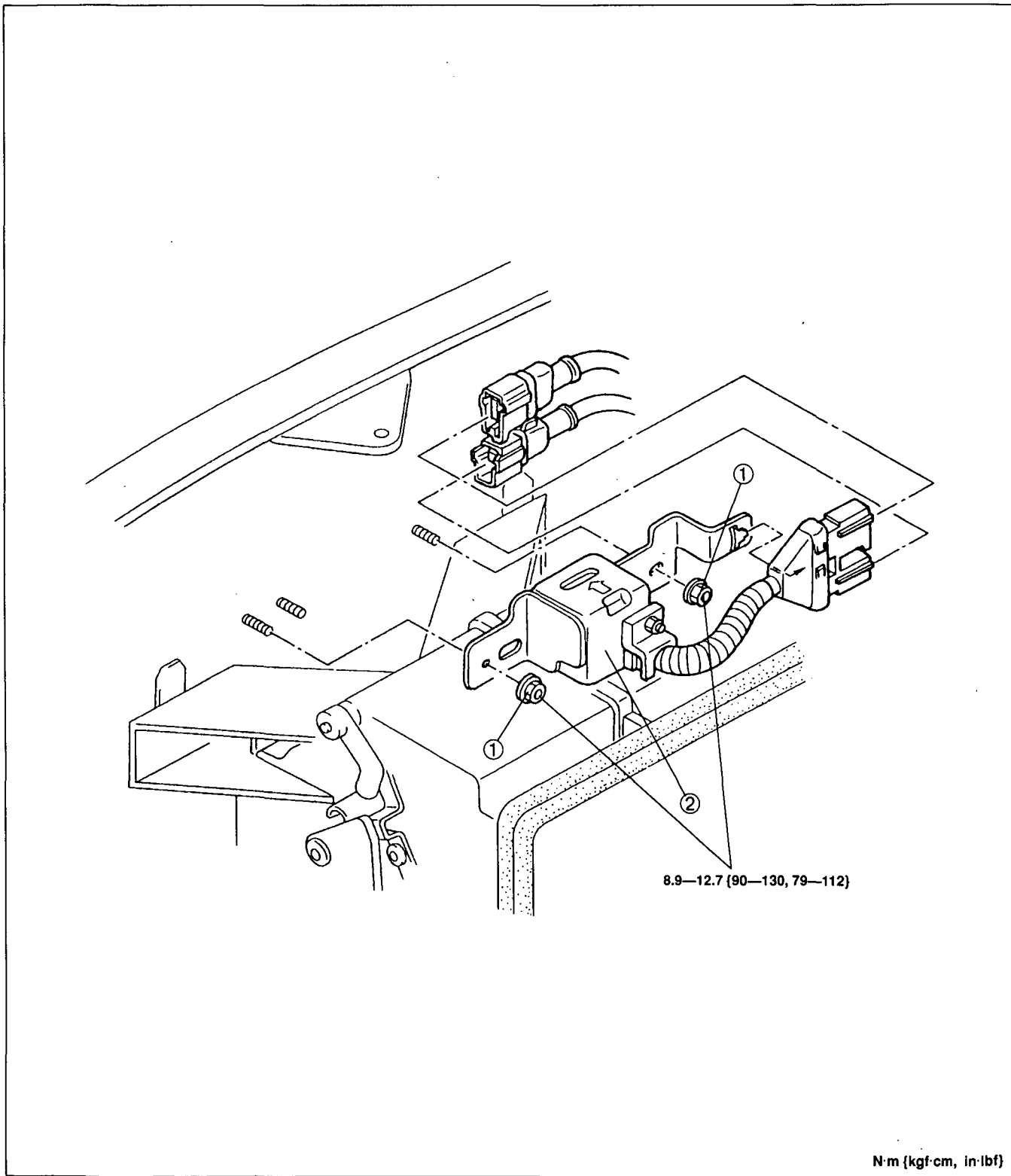
Terminal		Resistance
A	B	Approx. 1.18 kΩ

2. If not as specified, replace the crash sensor. (Refer to pages T-52, 53.)

CRASH SENSOR (S-SENSOR)

Removal / Installation

1. Carry out "Before Servicing" procedure under GENERAL PROCEDURES, page T-27.
2. Remove the dashboard. (Refer to the MX-5 Workshop Manual (1221-10-89I), section S.)
3. Remove in the order shown in the figure.
4. Install in the reverse order of removal.

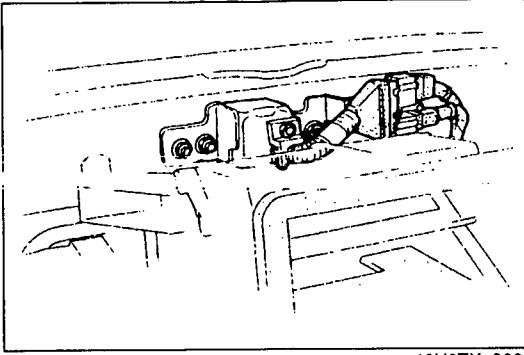


35E0TX-141

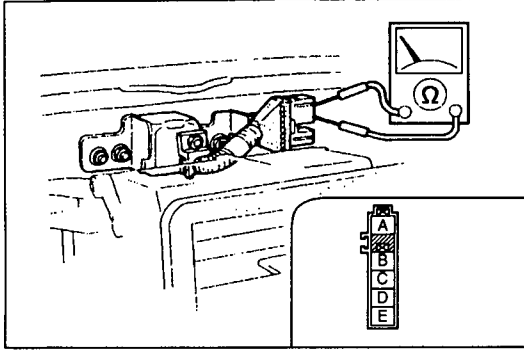
1. Nuts

2. Crash sensor (S-sensor)

Inspection page T-56



46U0TX-906



35E0TX-142

Installation note

Crash sensor (S-sensor)

1. If the crash sensor mounting area is damaged, repair the area to its original shape before reinstalling the sensor.
2. Point the arrow on the crash sensor toward the front of the vehicle. Then install it and tighten the bolts to the specified torque.

Inspection

1. Disconnect the S-sensor connector.
2. Check for continuity between terminals of the S-sensor.

Ground	Terminals				
	A	B	C	D	E
○	○	○	○	○	○
	○—○	○—○		○—○	

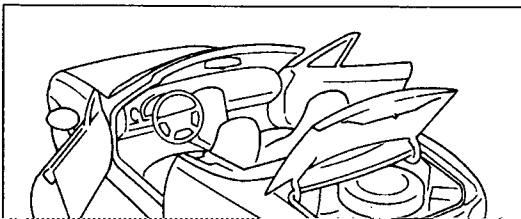
○—○: Continuity

3. If not as specified, replace the S-sensor.
(Refer to page T-55.)

AIR BAG MODULE DISPOSAL PROCEDURE

Before scrapping a vehicle with an undeployed air bag module, deploy the air bag. Never dispose of a live air bag module. If the deployment tool SST is not available, consult the nearest Mazda representative for assistance.

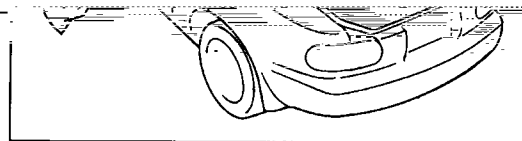
46U0TX-908



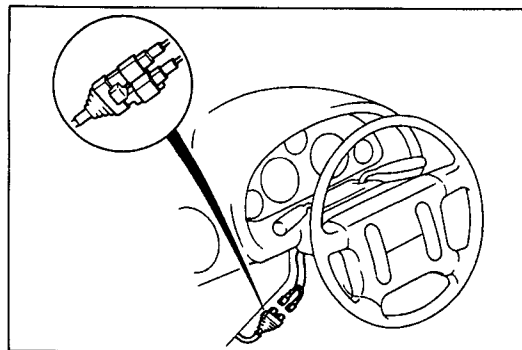
Air Bag Deployment

1. Move the vehicle to an open space, away from strong winds, and open all of the vehicle's doors.
2. Disconnect the negative battery cable.
3. Follow the appropriate procedure for the air bag module.

The air bag module is firmly mounted to the steering wheel. (Refer to the MX-5 Workshop Manual (1221-10-89I), section S.)



35E0TX-143

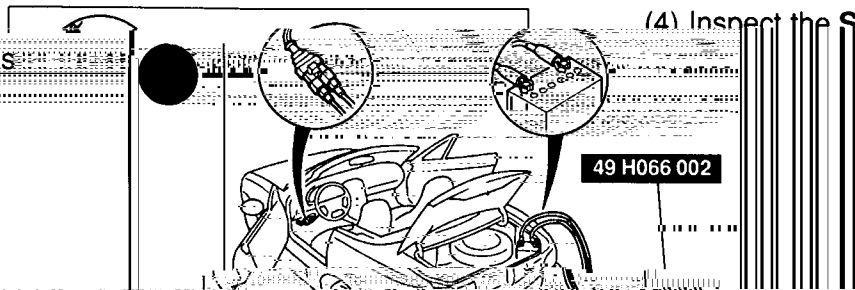


35E0TX-144

- ### Air bag module
- (1) Make sure the air bag is fully deployed.
 - (2) Remove the air bag module from the steering wheel.
 - (3) Disconnect the air bag module connectors.

SST (Refer to page T-59).

- 5) Connect the SST to the clock spring connector as shown in the figure.



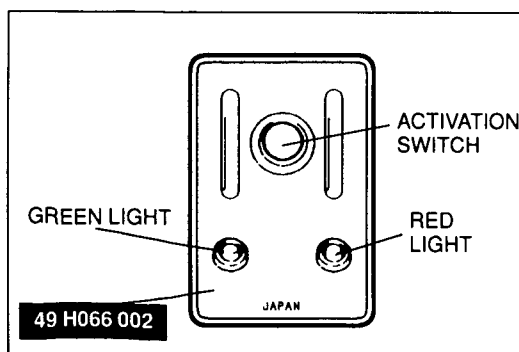
49 H066 002

Connect the positive battery terminal to the positive terminal. The red light on the SST is illuminated. Stand at least 6 m {20 ft} away from the vehicle.

Press the activation switch on the SST to deploy the air bag.



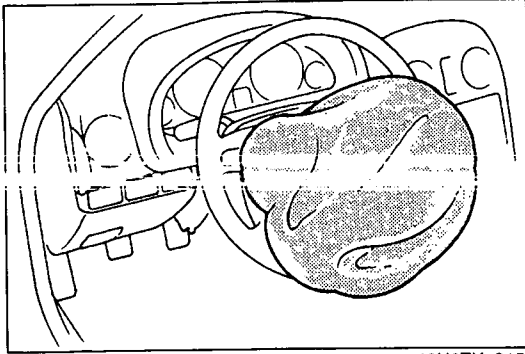
35E0TX-145



49 H066 002

35E0TX-146

4. Connect the red clip of the SST to the positive terminal and the black clip to the negative terminal.
5. Verify that the red light on the SST is illuminated.
6. Make sure all persons are standing at least 6 m {20 ft} away from the vehicle.
7. Press the activation switch on the SST to deploy the air bag.



46U0TX-915

Air Bag Disposal

Warning

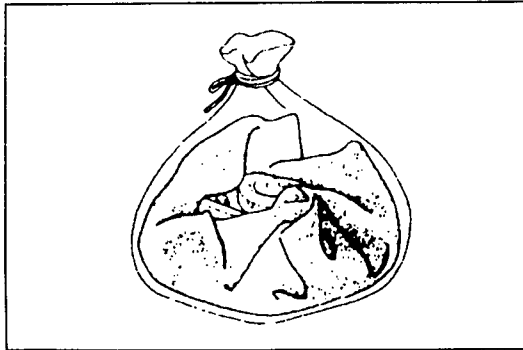
- The air bag is very hot immediately after it deploys. You can be burned. Do not touch the air bag module for at least 15 minutes after deployment.

Warning

- Pouring water on a deployed air bag is dangerous. The water will mix with the residual gases to form a gas that can make breathing difficult if inhaled. Do not pour water on the deployed air bag module.

Warning

- A deployed air bag module may contain deposits of sodium hydroxide, a caustic by-product of the gas-generated combustion. If this substance gets in your eyes or on your hands, it can cause irritation and itching. When handling a deployed air bag module, wear gloves and safety glasses.

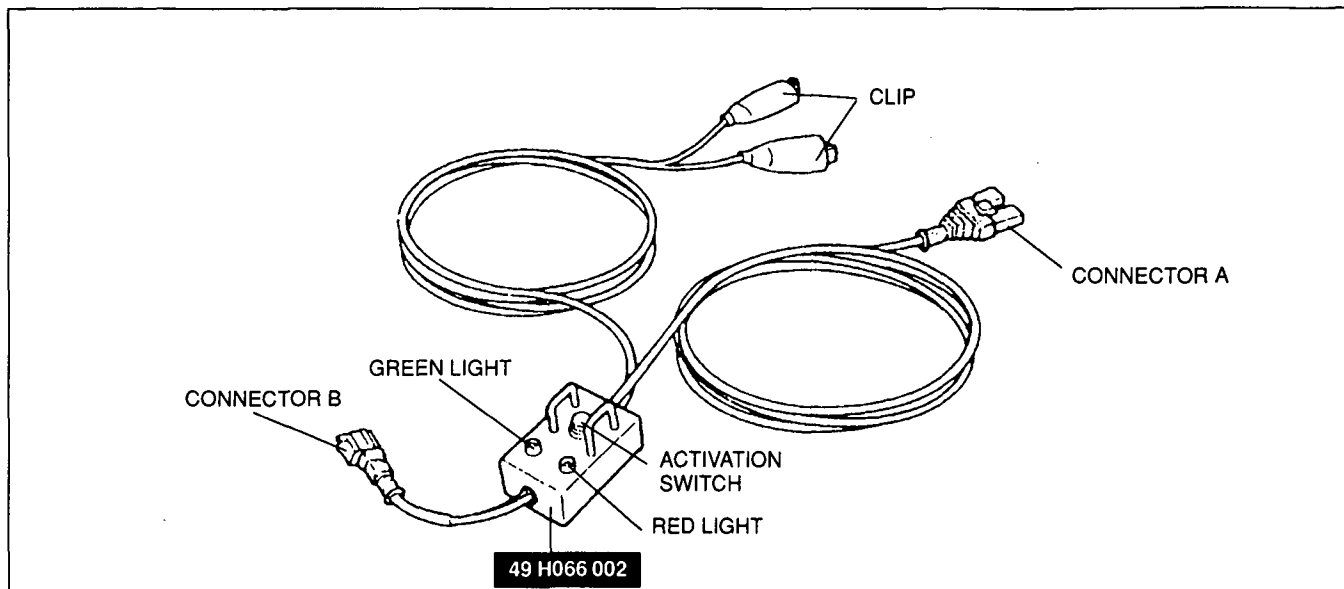


46U0TX-916

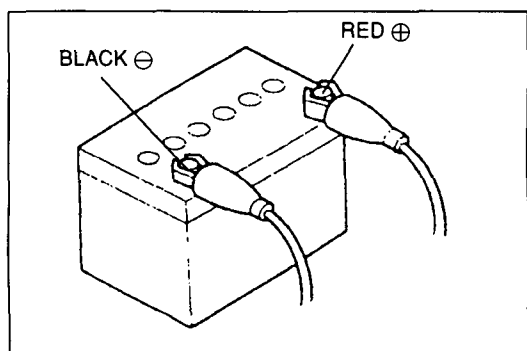
1. Put on gloves and safety glasses.
2. Place the deployed air bag module in a plastic bag, seal it, and then dispose of it.
3. Wash your hands after removing your gloves.

INSPECTION OF SST (DEPLOYMENT TOOL)

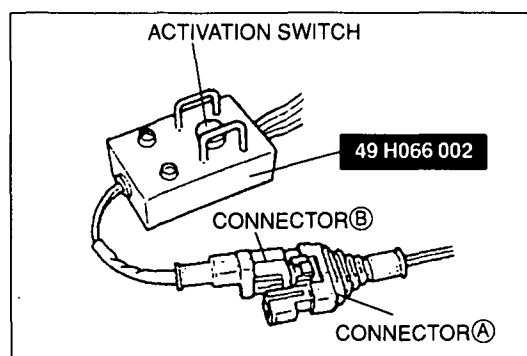
- Use the **SST** (deployment tool) to deploy a live air bag module before disposing of it.
- Before connecting the **SST** to the clock spring connector or air bag module connector, inspect the operation of the **SST**.



35E0TX-147



35E0TX-148

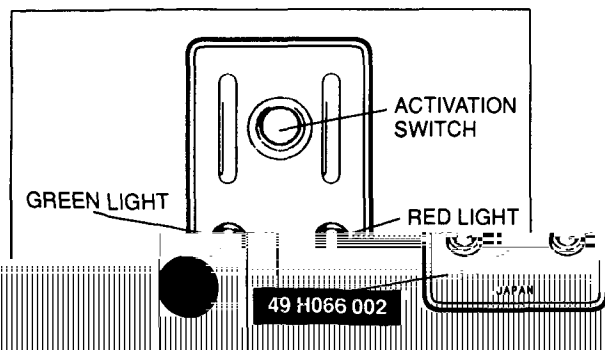


Inspection Procedure

1. Follow the steps below to inspect the operation of the **SST**.

Step	Inspection procedure	Light condition	
		Green	Red
1	Connect red clip to positive battery terminal and black clip to negative battery terminal	ON	OFF
2	Connect connectors A and B of SST	OFF	OFF
3	Press activation switch	ON	OFF

2. If not as specified, do not use the **SST** because it may cause the air bag to unexpectedly deploy upon connection to the module.



TECHNICAL DATA

MEASUREMENTS	TD- 2
ENGINE	TD- 2
LUBRICATION SYSTEM	TD- 5
COOLING SYSTEM	TD- 5
FUEL AND EMISSION CONTROL SYSTEMS ...	TD- 6
ENGINE ELECTRICAL SYSTEM	TD- 7
CLUTCH	TD- 7
MANUAL TRANSMISSION	TD- 8
PROPELLER SHAFT	TD- 9
FRONT AND REAR AXLES	TD- 9
STEERING SYSTEM	TD- 9
BRAKING SYSTEM	TD-10
WHEELS AND TIRES	TD-10
SUSPENSION	TD-11
BODY ELECTRICAL SYSTEM	TD-12
STANDARD BOLT AND NUT TIGHTENING TORQUE	TD-12

35E0TX-001

A. MEASUREMENTS

Item		Measurements	
Overall length	mm {in}	3,948 {155.4}	
Overall width	mm {in}	1,676 {65.9}	
Overall height	mm {in}	1,224 {48.2}	
Wheelbase	mm {in}	2,266 {89.2}	
Tread	Front	mm {in}	1,410 {55.5}
	Rear	mm {in}	1,428 {56.2}

B. ENGINE

Item		Engine	BP DOHC
Type			Gasoline, 4-cycle
Cylinder arrangement and number			In-line, 4-cylinders
Combustion chamber			Pentroof
Valve system			DOHC, belt-driven 16 valves
Bore x Stroke		mm {in}	83.0 x 85.0 {3.27 x 3.35}
Total piston displacement		ml {cc, cu in}	1,840 {1,840, 112}
Compression ratio			9.0
Compression pressure kPa {kgf/cm ² , psi}-rpm	Standard		1,255 {12.8, 182}-300
	Minimum		883 {9.0, 128}-300
	Maximum difference between each cylinder		196 {2.0, 28}
Valve timing	IN	Open (BTDC°)	5
		Close (ABDC°)	48
	EX	Open (BBDC°)	56
		Close (ATDC°)	14
Valve clearance	mm {in}	IN	0: Maintenance-free
		EX	0: Maintenance-free
Cylinder head			
Height		mm {in}	133.8—134.0 {5.268—5.275}
Distortion		mm {in}	0.10 {0.004} max.
Grinding		mm {in}	0.10 {0.004} max.
Cylinder head to HLA clearance	mm {in}	Standard	0.025—0.066 {0.0010—0.0025}
		Maximum	0.18 {0.0071}
Valve and valve guide			
Valve head diameter	mm {in}	IN	32.9—33.1 {1.296—1.303}
		EX	27.85—28.15 {1.097—1.108}
Valve head margin thickness	mm {in}	IN	0.9 {0.035}
		EX	1.0 {0.039}
Valve face angle		IN	45°
		EX	45°
Valve length	mm {in}	Standard	101.89 {4.0114}
		Minimum	100.39 {3.9524}
	EX	Standard	101.99 {4.0153}
		Minimum	100.49 {3.9563}
Valve stem diameter	mm {in}	IN	5.970—5.985 {0.2351—0.2356}
		EX	5.965—5.980 {0.2349—0.2354}
Guide inner diameter		mm {in}	5.99—6.03 {0.2359—0.2374}
Valve stem-to-guide clearance	mm {in}	IN	0.005—0.060 {0.0002—0.0023}
		EX	0.010—0.065 {0.0004—0.0025}
		Maximum	0.20 {0.008}
Guide projection (Height "A")	mm {in}	IN	18.3—18.9 {0.721—0.744}
		EX	18.3—18.9 {0.721—0.744}
Valve seat			
Seat angle		IN	45°
		EX	45°

▨ indicates changed items.

TECHNICAL DATA

TD

Item		Engine	BP DOHC	
Seat contact width		mm {in}	0.8—1.4 {0.032—0.055}	
Seat sinking	mm {in}	Standard	45.0 {1.772}	
		Maximum	46.5 {1.831}	
Valve spring				
Free length	mm {in}	IN	46.26 {1.821}	
		EX	46.26 {1.821}	
Minimum length	mm {in}	IN	39.5 {1.56} with a set load of 224—253 N {22.8—25.8 kgf, 50.2—56.7 lbf}	
		EX	39.5 {1.56} with a set load of 224—253 N {22.8—25.8 kgf, 50.2—56.7 lbf}	
Out-of-square	mm {in}	IN	1.62 {0.0638} max.	
		EX	1.62 {0.0638} max.	
Camshaft				
Cam height	mm {in}	IN	Standard	44.094 {1.7360}
			Minimum	43.894 {1.7281}
		EX	Standard	44.600 {1.7559}
			Minimum	44.400 {1.7480}
Journal diameter	mm {in}	Standard (No.1—No.5)	25.940—25.965 {1.0213—1.0222}	
Camshaft bearing oil clearance	mm {in}	Standard (No.1—No.5)	0.035—0.081 {0.0014—0.0031}	
		Maximum	0.15 {0.006}	
Camshaft runout	mm {in}		0.03 {0.0012} max.	
Camshaft end play	mm {in}	Standard	0.07—0.19 {0.0028—0.0074}	
		Maximum	0.20 {0.008}	
Cylinder block				
Height	mm {in}		221.5 {8.720}	
Distortion	mm {in}		0.15 {0.006} max.	
Grinding	mm {in}		0.20 {0.008} max.	
Cylinder bore diameter	mm {in}	Standard size	83.000—83.019 {3.2678—3.2684}	
		0.25 {0.01} oversize	83.256—83.263 {3.2778—3.2780}	
		0.50 {0.02} oversize	83.506—83.513 {3.2877—3.2879}	
Cylinder bore taper and out-of-round	mm {in}		0.019 {0.0007} max.	
Piston				
Piston diameter Measured at 90° to pin bore axis and 16.5mm {0.65 in} below oil ring groove	mm {in}	Standard size::	82.954—82.974 {3.2660—3.2666}	
		0.25 {0.01} oversize	83.211—83.217 {3.2761—3.2762}	
		0.50 {0.02} oversize	83.461—83.467 {3.2859—3.2861}	
Piston-to-cylinder clearance	mm {in}	Standard	0.032—0.059 {0.0013—0.0023}	
		Maximum	0.15 {0.006}	
Piston ring				
Thickness	mm {in}	Top	1.47—1.49 {0.0579—0.0586}	
		Second	1.47—1.49 {0.0579—0.0586}	
End gap (Measured in cylinder)	mm {in}	Top	0.15—0.30 {0.006—0.011}	
		Second	0.15—0.30 {0.006—0.011}	
		Oil (rail)	0.20—0.70 {0.008—0.027}	
		Maximum	1.0 {0.039}	
Ring groove width in piston	mm {in}	Top	1.52—1.535 {0.0599—0.0604}	
		Second	1.52—1.54 {0.0599—0.0606}	
		Oil	3.02—3.04 {0.1189—0.1196}	
Piston ring-to-ring groove clearance	mm {in}	Top	0.03—0.065 {0.0012—0.0025}	
		Second	0.03—0.07 {0.0012—0.0027}	
		Maximum	0.15 {0.006}	

■ indicates changed items.

TD

Item		Engine	BP DOHC	
Piston pin				
Diameter		mm (in)	19.987—19.993 {0.7869—0.7871}	
Piston-to-piston pin clearance		mm (in)	-0.005—0.013 {-0.0002—0.0005}	
Connecting rod bush-to-piston pin clearance		mm (in)	0.010—0.027 {0.0004—0.0010}	
Connecting rod and connecting rod bearing				
Length (Center to center)		mm (in)	132.85—132.95 {5.231—5.234}	
Bending		mm (in)	0.030 {0.0012} max./100 {3.94}	
Small end bore (Bush inner diameter)		mm (in)	20.003—20.014 {0.7876—0.7879}	
Big end bore		mm (in)	48.000—48.016 {1.8898—1.8903}	
Big end width		mm (in)	21.838—21.890 {0.8598—0.8618}	
Connecting rod side clearance	mm (in)	Standard	0.110—0.262 {0.0044—0.0103}	
		Maximum	0.30 {0.012}	
Crankshaft				
Crankshaft runout		mm (in)	0.04 {0.0016} max.	
Main journal diameter	mm (in)	Standard size	Standard	49.938—49.956 {1.9661—1.9667}
			Minimum	49.904 {1.9647}
		0.25 {0.01} undersize	Standard	49.704—49.708 {1.9569—1.9570}
			Minimum	49.652 {1.9548}
		0.50 {0.02} undersize	Standard	49.454—49.458 {1.9470—1.9471}
			Minimum	49.402 {1.9450}
		0.75 {0.03} undersize	Standard	49.204—49.208 {1.9372—1.9373}
			Minimum	49.152 {1.9351}
Main journal out-of-round		mm (in)	0.05 {0.0020} max.	
Crankpin diameter	mm (in)	Standard size	Standard	44.940—44.956 {1.7693—1.7699}
			Minimum	44.908 {1.7680}
		0.25 {0.01} undersize	Standard	44.690—44.706 {1.7595—1.7600}
			Minimum	44.658 {1.7582}
		0.50 {0.02} undersize	Standard	44.440—44.456 {1.7497—1.7502}
			Minimum	44.408 {1.7483}
		0.75 {0.03} undersize	Standard	44.190—44.206 {1.7398—1.7403}
			Minimum	44.158 {1.7385}
Crankpin out-of-round		mm (in)	0.05 {0.0020} max.	
Main bearing				
Main journal bearing oil clearance	mm (in)	Standard	0.018—0.036 {0.0008—0.0014}	
		Maximum	0.10 {0.004}	
Available undersize bearing		mm (in)	0.25 {0.010}, 0.50 {0.020}, 0.75 {0.030}	
Crank pin bearing				
Crank pin bearing oil clearance	mm (in)	Standard	0.020—0.044 {0.0008—0.0017}	
		Maximum	0.10 {0.004}	
Available undersize bearing		mm (in)	0.25 {0.010}, 0.50 {0.020}, 0.75 {0.030}	
Thrust bearing				
Crankshaft end play	mm (in)	Standard	0.080—0.282 {0.0032—0.0111}	
		Maximum	0.30 {0.012}	
Bearing width	mm (in)	Standard size	2.500—2.550 {0.0985—0.1003}	
		0.25 {0.01} oversize	2.625—2.675 {0.1034—0.1053}	
		0.50 {0.02} oversize	2.750—2.800 {0.1083—0.1102}	
		0.75 {0.03} oversize	2.875—2.925 {0.1132—0.1151}	
Timing belt				
Belt deflection		mm (in)/98 N {10 kgf, 22 lbf}	9.0—11.5 {0.36—0.45}	

▨ indicates changed items.

D. LUBRICATION SYSTEM

Item		Engine	BP DOHC
Lubrication system			Force-fed type
Oil pump			
Type			Trochoid gear
Relief pressure		kPa {kgf/cm ² , psi}	344—441 {3.5—4.5, 50—63}
Oil pressure	kPa {kgf/cm ² , psi}	1,000 rpm	98—196 {1.0—2.0, 15—28}
		3,000 rpm	295—392 {3.0—4.0, 43—56}
Inner rotor tooth tip to outer rotor clearance mm {in}		Standard	0.02—0.18 {0.0008—0.0070}
		Maximum	0.20 {0.0079}
Outer rotor to body clearance mm {in}		Standard	0.09—0.18 {0.0036—0.0070}
		Maximum	0.20 {0.0079}
Side clearance mm {in}		Standard	0.03—0.12 {0.0012—0.0047}
		Maximum	0.14 {0.0055}
Oil filter			
Type			Full-flow, paper element
Relief pressure differential		kPa {kgf/cm ² , psi}	79—117 {0.8—1.2, 12—17}
Engine oil			
Capacity	Total (dry engine) L {US qt, Imp qt}		4.0 {4.2, 3.5}
	Oil replacement L {US qt, Imp qt}		3.6 {3.8, 3.2}
	Oil and oil filter replacement L {US qt, Imp qt}		3.8 {4.0, 3.3}
Engine oil			API Service SD, SE, SF
Viscosity number	Above 30°C {86°F}		SAE 40
	0°C—40°C {32°F—104°F}		SAE 30
	-10°C—20°C {14°F—68°F}		SAE 20W-20
	Above -10°C {14°F}		SAE 20W-40 or 20W-50
	-25°C—30°C {-13°F—86°F}		SAE 10W-30
	Above -25°C {-13°F}		SAE 10W-40 or 10W-50
	Below 0°C {32°F}		SAE 5W-30
Below -20°C {-4°F}		SAE 5W-20	

■ indicates changed items.

TD

E. COOLING SYSTEM

Item		Engine	BP DOHC
Cooling system			Water-cooled, forced circulation
Water pump			
Type			Centrifugal, V-ribbed belt driven
Impeller diameter		mm {in}	75 {2.95}
Number of impeller blades			6
Water seal type			Unified mechanical seal
Thermostat			
Type			Wax, two-stage
Opening temperature		°C {°F}	Main: 86.5—89.5 {188—193}, Sub: 83.5—86.5 {183—187}
Full-open temperature		°C {°F}	100 {212}
Full-open lift		mm {in}	Main: 8.0 {0.31} min., Sub: 1.5 {0.06} min.
Radiator			
Type			Corrugated fin
Cap valve opening pressure		kPa {kgf/cm ² , psi}	73.6—102 {0.75—1.05, 10.7—14.9}
Cooling circuit checking pressure		kPa {kgf/cm ² , psi}	103 {1.05, 14.9}

■ indicates changed items.

Engine		31-DO-C		
Type		Electric		
Number of blades		5		
Impeller diameter		320 {12.0}		
W-V		120-12		
A		below 7.7		
L {US qt, Imp qt}		6.0 {6.3, 5.3}		
Coolant protection	Volume percentage %		Specific gravity at 20°C {68°F}	
	Water	Coolant		
	Above -16°C {3°F}	65 35		1.054
	Above -26°C {-15°F}	55 45		1.066
Above -40°C {-40°F}	45 55	1.078		

Item
Cooling fan
Type
Number of blades
Outer diameter
Capacity
Current
Coolant
Capacity
Antifreeze

indicates changed items.

AND EMISSION CONTROL SYSTEMS

Item	Specification	
Idle speed rpm	800—900 {850 ± 50}	
Timing BTDC	9°—11° {10° ± 1°}	
Body	Horizontal draft	
Diameter mm {in}	55 {2.2}	
Impeller	Impeller (in-tank)	
Pressure kPa {kgf/cm ² , psi}	480—657 {4.9—6.7, 69—95}	
Filter	Low-pressure side	Nylon element
	High-pressure side	Paper element
Pressure regulator	Diaphragm	
Operating pressure kPa {kgf/cm ² , psi}	265—314 {2.7—3.2, 38—46}	
Resistor	High-ohmic	
Drive Voltage	Voltage	
Resistance Ω	12—16 {at 20°C {68°F}}	
Solenoid valve		
Resistance Ω	10.7—12.3 {at 20°C {68°F}}	
Temperature °C {°F}	Below 40 {104}	
Solenoid valve		
Resistance Ω	23—27 {at 20°C {68°F}}	
Angle sensor	Hall effect	
Thermosensor		
Resistance kΩ	20°C {68°F}	2.3—2.6
	80°C {176°F}	0.3—0.4
Capacity L {US gal, Imp gal}	48 {12.7, 10.5}	
Filter type	Oil permeated	

F. FUEL

Idle speed
Ignition timing
Throttle
Type
Throat diameter
Fuel pump
Type
Output pressure
Fuel filter
Type
Pressure regulator
Type
Regulator
Fuel injector
Type
Type of drive
Resistance
ISC solenoid
Solenoid
Air valve
Opening
Purge solenoid
Solenoid
Crank angle sensor
Type
Water thermostat
Resistance
Fuel tank
Capacity
Air cleaner
Element

system selector (49 B019 9A0) test switch at SELF TEST
indicates changed items.

*....with switch
indicates changed items.

Item	Specification
Accelerator cable	
Free play	mm {in} 1—3 {0.039—0.118}
Fuel	
Specification	Unleaded regular (RON 87 or higher)

G. ENGINE ELECTRICAL SYSTEM

Item		Engine	BP DOHC	
Battery	Voltage	V	12, Negative ground	
	Type and capacity (5-hour rate)		S46A24L(S) (32 Ah) Maintenance-free	
Dark current*1		mA	20.0	
Alternator	Type		A.C.	
	Output	V—A	12—65	
	Regulator type		Transistorized (built-in IC regulator)	
	Regulated voltage	V	14.3—14.9	
	Brush length	mm {in}	Standard	21.5 {0.85}
			Minimum	8 {0.31}
	Drive belt deflection	mm {in}	New	5.5—7.0 {0.22—0.28}
Used			6.0—7.5 {0.24—0.30}	
Starter	Type		Direct	
	Output	V—kW	12—0.95	
	Brush length	mm {in}	Standard	17.0 {0.67}
			Minimum	11.5 {0.45}
Ignition system	Type		Electronic spark advance (ESA)	
	Spark advance control		Engine control unit controls spark advance	
Ignition timing*2		BTDC (°CA)/rpm	10/850	
Ignition coil	Type		Molded (with igniter)	
	Primary coil winding	Ω	—	
	Secondary coil winding	kΩ	8.7—12.9	
Spark plug	Type		NGK : BKR5E-11 BKR6E-11 (Standard) NIPPONDENSO : K16PR-U11 K20PR-U11 (Standard)	
	Plug gap	mm {in}	1.0—1.1 {0.040—0.043}	
	Firing order		1—3—4—2	

*1 Dark current is the constant flow of current while the ignition switch is OFF. (i.e. engine control unit, audio, etc.)

*2 With System Selector (49 B019 9A0) test switch at SELF TEST.

■ indicates changed items.

H. CLUTCH

Item		Engine	BP DOHC
Clutch control			Hydraulic
Clutch pedal			
Type			Suspended
Pedal ratio			6.13
Full stroke	mm {in}		120 {4.72}
Height (with carpet)	mm {in}		175—185 {6.89—7.28}
Free play	mm {in}		0.6—3.1 {0.02—0.12}
Distance to carpet when clutch fully disengaged	mm {in}	Minimum	68 {2.68}

Item		Engine	BP DOHC
Flywheel			
Runout limit		mm (in)	0.2 {0.008}
Clutch disc			
Type			Single dry plate
Runout limit		mm (in)	0.7 {0.028}
Wear limit		mm (in)	0.3 {0.012} from rivet head
Outer diameter		mm (in)	215 {8.46}
Inner diameter		mm (in)	150 {5.91}
Facing thickness	mm (in)	Flywheel side	3.5 {0.14}
		Pressure plate side	3.8 {0.15}
Clutch cover			
Type			Diaphragm spring
Set load		N {kgf, lbf}	4,310 {440, 968}

■ indicates changed items.

J. MANUAL TRANSMISSION

Item		Transmission	M15M-D
Gear ratio	1st		3.136
	2nd		1.888
	3rd		1.330
	4th		1.000
	5th		0.814
	Reverse		3.758
Oil capacity		L {US qt, Imp qt}	2.0 {2.1, 1.8}
Mainshaft	Runout	mm (in) Maximum	0.03 {0.0012}
	Clearance between mainshaft and gear (or bush)	mm (in) Wear limit	0.15 {0.006}
Reverse idle gear	Clearance between reverse idle gear bushing and shaft	mm (in) Wear limit	0.15 {0.006}
Shift fork and rod	Clearance between shift fork and clutch sleeve	mm (in) Wear limit	0.5 {0.020}
	Clearance between shift rod gate and control lever	mm (in) Wear limit	0.8 {0.032}
Synchronizer ring	Clearance between synchronizer ring and side of gear when fitted	mm (in) Standard	1.5 {0.059}
		mm (in) Wear limit	0.8 {0.032}
Shift rod spring (5th/Reverse)	Free length	mm (in)	75 {2.953}
Detent ball spring (1st/2nd)	Free length	mm (in)	22.5 {0.886}
Detent ball spring (3rd/4th)	Free length	mm (in)	22.5 {0.886}
Detent ball spring (5th/Reverse)	Free length	mm (in)	17.0 {0.669}

SAE:75W-90 Above 10°C (50°F) Lubricant: All seasons API Service GL-4 or GL-5 SAE 80W-90 API Service GL-4 or GL-5

L. PROPELLER SHAFT

Item	Specification
Max. permissible run-out	mm (in) 0.4 (0.016)

M. FRONT AND REAR AXLES

Item		Specifications
Front axle	Type	Double-wishbone
	Bearing	Angular ball bearing
	Wheel bearing play mm (in) Maximum	0.05 (0.002)
Rear axle		Type: Double-wishbone
Bearing		Angular ball bearing
Wheel bearing play mm (in) Maximum		0.05 (0.002)
Differential		Type: "TORSEN" LSD Standard
Gear		Hypoid gear
Ratio		4.100
Gear type		Worm gear ("TORSEN" LSD) Straight-bevel gear
Gear size mm (in)		182.88 (7.20)
Grade		API service GL-5
Viscosity		Above -18°C (0°F): SAE 90 Below -18°C (0°F): SAE 80W
Capacity L {US qt, Imp qt}		1.00 (1.06, 0.88)
Locknut preload (without oil seal)		Locknut tightening torque: 128—284 N·m {13—29 kgf·m, 94.1—209.7 ft·lbf} 0.9—1.3 N·m {9—14 kgf·cm, 7.9—12.1 in·lbf}
Pinion	Side gear and pinion gear	0—0.1 {0—0.004}
	Final gear	0.09—0.11 {0.0035—0.0043}
Pilot section to pilot section mm (in)		185.428—185.50 {7.301—7.303}

Registered trademark of ZEXEL-GLEASON USA, INC. and its items.

TD

Item	Specification
Type	Double-wishbone
Bearing	Angular ball bearing
Wheel bearing play	mm (in) Maximum 0.05 (0.002)
Differential	Type: "TORSEN" LSD Standard
Oil	API service GL-5
Drive pinion	Locknut tightening torque: 128—284 N·m {13—29 kgf·m, 94.1—209.7 ft·lbf}
Backlash	Side gear and pinion gear: 0—0.1 {0—0.004}
Length	Final gear: 0.09—0.11 {0.0035—0.0043}

"TORSEN" is a registered trademark of ZEXEL-GLEASON USA, INC. and its items. ■ indicates changed items.

ITEM

Type	Manual steering	Power steering
mm (in)	370 {14.6}	
mm (in)	0—30 {0—1.18}	
N {kgf, lbf}	4.9—29.4 {0.5—3.0, 1.1—6.6}	23.5—35.3 {2.4—3.6, 5.3—8.0}
turns	3.36	2.8
Collapsible, non-tilt		
2-cross joint		
Engine speed sensing		
Rack-and-pinion		
∞ (infinite)		
mm (in)	121.0 {4.76}	
ATF Dexron®II or M-III		
L {US qt, Imp qt}	0.8 {0.85, 0.70}	
kPa {kgf/cm ² , psi}	7,603—8,339 {77.5—85.0, 1,102—1,209}	

N. STEERING SYSTEM

Item	Specification
Steering wheel	
Outer diameter	
Free play	
Wheel effort	
Lock-to-lock	
Steering Shaft	
Shaft type	
Joint type	
Power steering system	
Power assist type	
Gear type	
Gear ratio	
Rack stroke	
Power steering fluid	
Fluid capacity	
Fluid pressure	

P. BRAKING SYSTEM

Item		Specifications	
Brake pedal	Height (with carpet) mm {in}	171—181 {6.73—7.13}	
	Free play mm {in}	4—7 {0.16—0.28}	
	Reserve travel (without carpet, clearance when pedal is depressed at 589 N {60 kgf, 132 lbf}) mm {in}	95 {3.74}	
Master cylinder	Type	Tandem	
	Bore mm {in}	22.22 {0.87}	
	Fluid type	SAE J1703 or FMVSS116, DOT-3	
Front brake (Disc)	Type	Disc	
	Thickness of pad mm {in}	Standard	8.0 {0.31}
		Limit	1.0 {0.04}
	Thickness of disc plate mm {in}	Standard	20.0 {0.79}
		Limit	18.0 {0.71}
	Disc plate runout mm {in}	0.1 {0.004} max.	
Wheel cylinder bore mm {in}	51.1 {2.01}		
Rear brake (Disc)	Type	Disc	
	Thickness of pad mm {in}	Standard	8.0 {0.31}
		Limit	1.0 {0.04}
	Thickness of disc plate mm {in}	Standard	9.0 {0.35}
		Limit	8.0 {0.31}
Wheel cylinder bore mm {in}	31.75 {1.25}		
Parking brake	Lever notches (Pulled at 196 N {20 kgf, 44 lbf})	7—9	
Power brake unit	Type	Single diaphragm	
	Diameter mm {in}	214 {8.0}	
	Push rod-to-piston clearance mm {in}	When vacuum applied to the unit is approx. 66.7 kPa {500 mmHg, 19.7 inHg} 0.1—0.4 {0.004—0.016}	
	Fluid pressure per treading force kPa {kgf/cm ² , psi}/N {kgf, lbf}	1,079—1,177 {11—12, 156—171}/196 {20, 44} at 0 kPa {0 mmHg, 0 inHg} min. 5,199—5,494 {53—56, 754—796}/196 {20, 44} at 66.7 kPa {500 mmHg, 19.7 inHg} min.	
Rear wheel hydraulic control system	Type	PBV	
	Bend portion (Rear brake pressure) kPa {kgf/cm ² , psi}	2,943 {30, 427}	

■ indicates changed items.

Q. WHEELS AND TIRES

Item	Type	Standard	Temporary spare
		Size	14 × 5.1/30, 14 × 6.0/11
Wheel	Offset mm {in}	45 {1.77}	
	Pitch circle diameter mm {in}	100 {3.94}	
	Material	Aluminum alloy	Steel
Tire	Size	185/60R14 82H	T115/70D14
	Air pressure kPa {kgf/cm ² , psi}	180 {1.8, 26}	415 {4.2, 60}
Wheel and tire	Runout limit mm {in}	Horizontal	2.0 {0.079}
		Vertical	1.5 {0.059}
	Maximum unbalance (at rim edge) g {oz}		10 {0.35}

R. SUSPENSION

Item		Differential	"TORSEN" LSD	Standard
Front suspension				
Type		Double-wishbone		
Stabilizer	Type	Torsion bar		
	Diameter mm {in}	20.0 (0.79)		
Shock absorbers		Cylindrical double-acting, low-pressure gas charged		
Coil springs	Identification color	White		
	Wire diameter mm {in}	11.0 {0.43}		
	Coil inner diameter mm {in}	83.0 {3.27}		
	Free length mm {in}	292.5 {11.52}		
	Coil number	6.32		

Rear suspension				
Type		Double-wishbone		
Stabilizer	Type	Torsion bar		
	Diameter mm {in}	20.0 (0.79)		

Shock absorbers		Cylindrical double-acting, low-pressure gas charged		
Coil springs	Identification color	Yellow		
	Wire diameter mm {in}	10.1 (0.40)		
	Coil inner diameter mm {in}	83.0 (3.27)		
	Free length mm {in}	348.5 (13.72)		
	Coil number	7.68		
Wheel alignment				
Front wheel alignment (Unladen*1)	Total toe-in	mm {in}	3 ± 3 (0.12 ± 0.12)	
		degree	0°18' ± 18'	
	Maximum steering angle	Inner	37°23' ± 2°	
		Outer	32°32' ± 2°	
	Camber angle*2	0°24' ± 45'		
	Caster angle*3	4°26' ± 45'		
King pin angle	11°20'			
Rear wheel alignment (Unladen*1)	Total toe-in	mm {in}	3 ± 3 (0.12 ± 0.12)	
		degree	0°18' ± 18'	
	Camber angle*2	-0°43' ± 30'		

*1 Fuel tank full; radiator coolant and engine oil at specified level, and spare tire, jack, and tools in designated position.

*2 Difference between left and right must not exceed 1°.

*3 Difference between left and right must not exceed 1°30'.

■ indicates changed items.

T. BODY ELECTRICAL SYSTEM

Item	Wattage
Warning and indicator lights	
Beam	3.4
Turn (L and RH)	3.4
Hazard	1.4
Illumination	3.4 x 4
Brake	1.4
Charge	1.4
Washer	1.4
Retractor	1.4
ABS	1.4
Air bag system	1.4
Rear fog	1.4
Rear window defroster	1.4
Parking (Italy, Spain only)	1.4
Exterior lights	
Headlights	60/55
Front turn signal lights	21
Front side turn signal lights	5
License plate lights	5
Rear turn signal lights	21
Stop/taillights	21/5
Rear fog light	21
Back-up lights	21
High-mount stoplight	18.4
Interior lights	
5	
Illumination lights	
Ash tray	3.4
Heater control switch panel	1.4
A/C switch	1.4
Hazard switch	1.4

▨ indicates changed items.

STANDARD BOLT AND NUT TIGHTENING TORQUE

Diameter mm {in}	Pitch mm {in}	4T			6T			8T		
		N-m	kgf-m	ft-lbf	N-m	kgf-m	ft-lbf	N-m	kgf-m	ft-lbf
6 {0.236}	1 {0.039}	4.3—6.1	0.43—0.63	3.2—4.5	6.9—9.8	0.7—1.0	5.0—7.2	7.9—11.7	0.8—1.2	5.8—8.6
8 {0.315}	1.25 {0.049}	10—14	1.0—1.5	7.3—10.8	16—22	1.6—2.3	12—16	18—26	1.8—2.7	13—19
10 {0.394}	1.25 {0.049}	20—28	2.0—2.9	15—20	32—46	3.2—4.7	24—33	37—53	3.7—5.5	27—39
12 {0.472}	1.5 {0.059}	35—50	3.5—5.1	26—36	55—80	5.6—8.2	41—59	63—93	6.4—9.5	47—68
14 {0.551}	1.5 {0.059}	—	—	—	76—102	7.7—10.5	56—75	98—137	10—14	73—101
16 {0.630}	1.5 {0.059}	—	—	—	118—156	12—16	87—115	157—215	16—22	116—159
18 {0.709}	1.5 {0.059}	—	—	—	167—225	17—23	123—166	226—304	23—31	167—224
20 {0.787}	1.5 {0.059}	—	—	—	236—313	24—32	174—231	305—421	31—43	225—311
24 {0.945}	1.5 {0.059}	—	—	—	403—549	41—56	297—405	540—725	55—74	698—935

SPECIAL TOOLS

GENERAL INFORMATION	ST- 2
ENGINE	ST- 3
CLUTCH AND MANUAL TRANSMISSION	ST- 4
DIFFERENTIAL	ST- 5
FRONT AND REAR AXLES	ST- 6
STEERING SYSTEM	ST- 6
BRAKING SYSTEM	ST- 9
FRONT AND REAR SUSPENSIONS	ST- 9
CHECKERS AND OTHER EQUIPMENT	ST-10

35ESTX-001

GENERAL INFORMATION

The letters A and B in the priority column indicate the degree of importance of each tool.

A Indispensable

The tools ranked A in this list are indispensable for performing operations satisfactorily, easily, safely, and efficiently. It is, therefore, advisable that all service shops have these tools.

B Selective

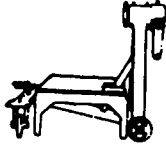
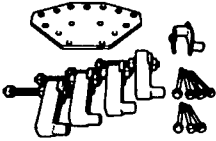
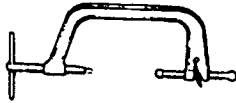
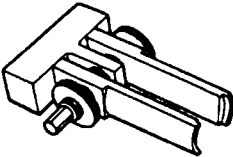

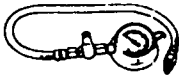
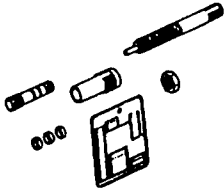
The tools ranked B are not as necessary as tools ranked A, but all service shops should have them to perform repairs more easily and efficiently.

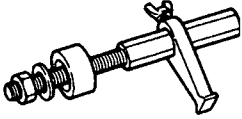
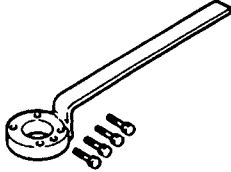
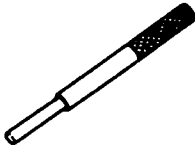
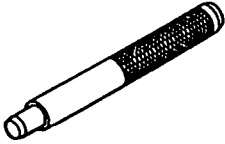
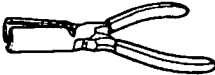
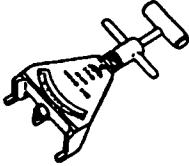
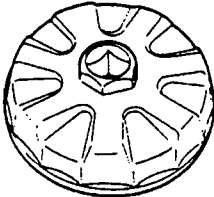
25USTX-001

SPECIAL TOOLS

ST

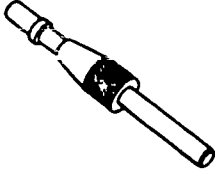
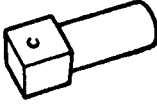
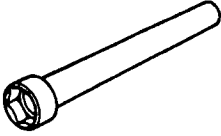
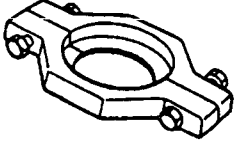
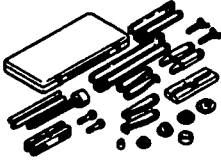
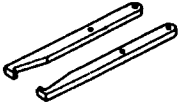

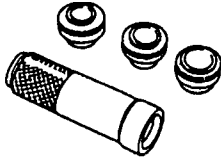
ENGINE


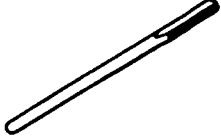
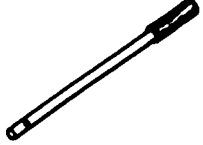

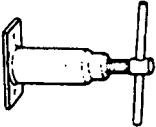
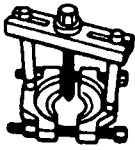
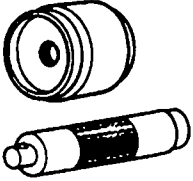
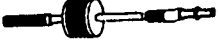
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0107 680A Engine stand	A	
49 L010 1A0 Hanger set, engine stand	A	
49 0636 100B Arm, valve spring lifter	A	
49 B012 0A2 Pivot	A	
49 9200 145 Adapter set, radiator cap tester	A	
49 0187 280 Oil pressure gauge	A	
49 L012 0A0 Installer set, valve seal & valve guide	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 E011 1A0 Brake set, ring gear	A	
49 D011 102 Lock tool, crankshaft	A	
49 B012 005 Remover & installer, valve guide	A	
49 0221 061A Remover & installer, piston pin	B	
49 S120 170 Remover, valve seal	A	
49 9200 020 V-ribbed belt tension gauge	A	
49 G014 001 Wrench, oil filter	A	

ST

CLUTCH AND MANUAL TRANSMISSION


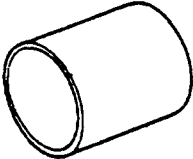

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 SE01 310A Centering tool, clutch disc	A	
49 0259 440 Holder, mainshaft	A	
49 1243 465A Wrench, mainshaft lock nut	A	
49 0636 145 Puller, fan pulley boss	A	
49 0839 425C Puller set, bearing	A	
49 H017 101 Hook	A	
49 0180 321A Installer, main drive gear bearing	A	
49 F401 330B Installer set, bearing	A	

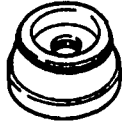
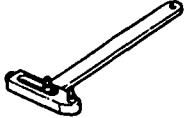

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0259 770B Wrench, flare nut	A	
49 0187 451A Guide, interlock pin assembly	B	
49 0862 350 Guide, shift fork assembly	B	
49 0500 330 Installer, bearing	A	
49 0305 430 Pusher, main drive shaft	A	
49 0710 520 Puller, bearing	A	
49 B025 0A0 Installer, dust seal	A	
49 1285 071 Puller, bearing	A	

SPECIAL TOOLS

ST

DIFFERENTIAL

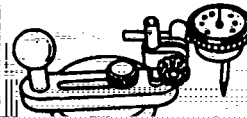
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 M005 561 Hanger, differential carrier	A	
49 H027 001 Collar	A	
49 8531 565 Pinion model	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F027 005 Attachment $\phi 62$	A	
49 0259 720 Adjustment wrench, side bearing	B	
49 G030 338 Attachment E	A	

49 0727-570

Gauge body, pinion height

A



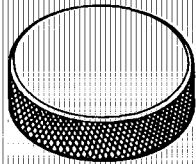
49 F027-004

Attachment $\phi 80$

A

49 0305 555
Gauge block

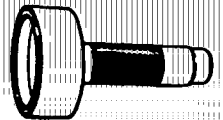
A



ST

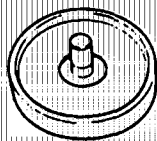
49 B001 795
Installer, oil seal

A



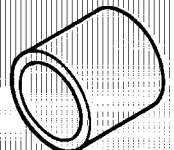
49 N034 213
Installer, rubber bushing

A



49 U027 003
Installer, oil seal

A



49 F401 337A
Attachment C

A



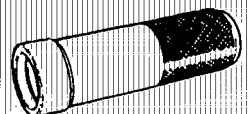
49 S120 710
Holder, coupling flange

A

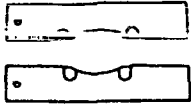
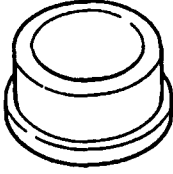

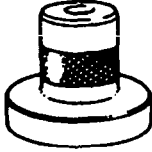


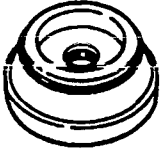

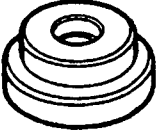
49 F401 331
Body

A

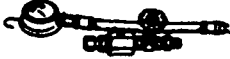



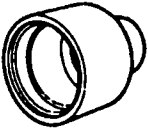

FRONT AND REAR AXLES



TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F026 103 Pulier, wheel hub	A	
49 F027 009 Attachment $\phi 68$ & $\phi 77$	A	
49 G033 107 Installer, dust cover	A	
49 V001 795 Installer, oil seal	A	



TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F027 007 Attachment $\phi 72$	A	
49 G033 102 Handle	A	
49 G030 727 Attachment A	A	



STEERING SYSTEM

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 1232 670A Gauge set, power steering	A	
49 H002 671		

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 1243 785 Installer, dust boot	A	
49 D032 310		

A	
A	





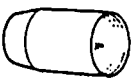
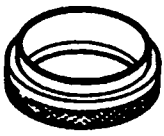
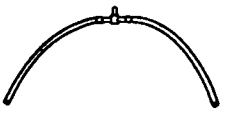
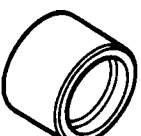
Protector, pinion shaft	A	
49 B032 305 Holder, power steering pump	A	


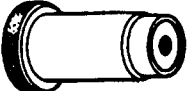

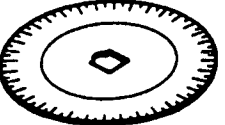
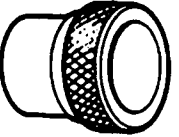



Adapter		
49 B032 302A Adapter		

SPECIAL TOOLS

ST








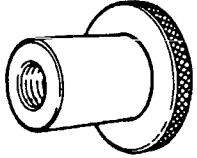

STEERING SYSTEM (CONT'D)

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 H032 321A Hexagon wrench (Except P/S)	A	
49 N032 303 Remover body, back-up ring & oil seal	A	
49 D032 302 Attachment	A	
49 N032 302 Guide, oil seal	A	
49 N032 304 Protector, oil seal	A	
49 N032 305 Protector, back-up ring & oil seal	A	
49 G032 317 Hose	A	
49 D032 306 Support block	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 D032 304 Installer, oil seal & bearing	A	
49 D032 301 Installer body, oil seal & bearing	A	
49 D032 305 Remover, oil seal & bearing	A	
49 D032 316 Protractor	A	
49 D032 315 Seal ring former & guide	A	
49 G032 319 Adapter	A	
49 D032 313 Seal ring former	A	
49 N032 301 Protector body, oil seal	A	

ST


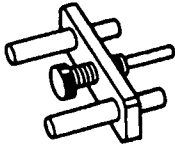
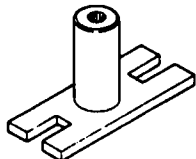
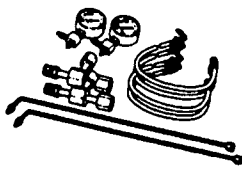
STEERING SYSTEM (CONT'D)

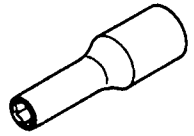
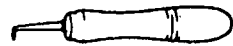
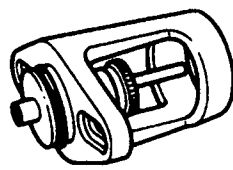
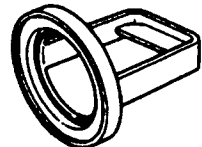
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION	TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 F032 303 Handle			49 D032 307 Dimensional tool		
49 D032 303 Attachment	A		49 Q118 850C Puller, ball joint	A	
49 O180 510B	A		49 H032 301 Attachment, preload measuring	B	
001 remover	A		49 B001 605 Caster camber gauge adapter	A	
			49 G030 797 Handle	A	

SPECIAL TOOLS

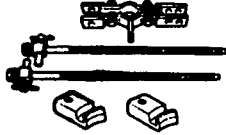
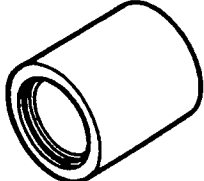
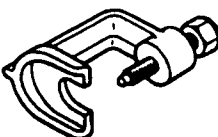
ST

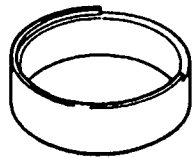
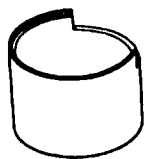
BRAKING SYSTEM

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0221 600C Expand tool, disc brake	A	
49 F043 001 Adjust gauge	A	
49 B043 003 Lock tool, turning	A	
49 U043 0A0 Gauge set, oil pressure	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 B043 004 Wrench, socket	A	
49 0208 701A Air out tool, boot	A	
49 B043 001 Adjust gauge	A	
49 H026 101A Installer, sensor rotor	A	

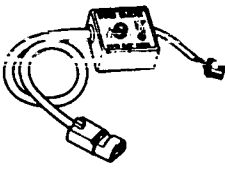
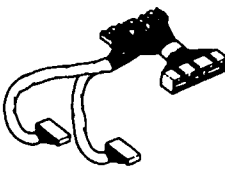
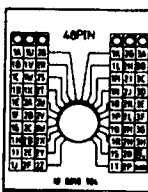
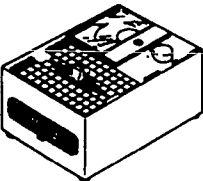

FRONT AND REAR SUSPENSIONS

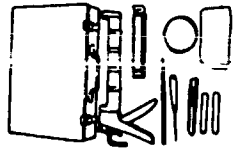
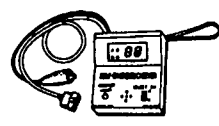
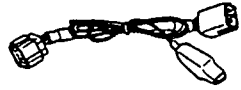

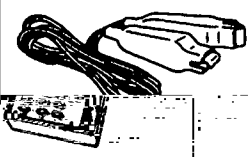
TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 G034 1A0 Compressor, coil spring	A	
49 H028 301 Installer, dust boot	A	
49 0727 575 Puller, ball joint	B	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 N028 201 Support block	A	
49 B034 201 Support block	A	

ST

CHECKERS AND OTHER EQUIPMENT

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 B019 9A0 System selector	A	
49 G018 903 Adapter harness (Engine signal monitor)	A	
49 G018 904 Sheet (Engine signal monitor)	A	
49 9200 162A Engine signal monitor	A	
49 0839 285 Checker, fuel and	A	

TOOL NUMBER & DESCRIPTION	PRIORITY	ILLUSTRATION
49 0305 870A Tool set, window	A	
49 H018 9A1 Self-diagnosis checker	A	
49 H066 003 Adapter, harness	A	
49 H066 002 Tool, deployment	A	
49 L018 901 Injector, checker	A	



1993 Mazda Motor
Manufactured in Japan
372-10-931