## 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.



## 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



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


PRINTED IN JAPAN, SEP. '95 Ⓤ
1509–10–95I

## VEHICLE IDENTIFICATION NUMBERS (VIN)

JMZ NA18P20# 300001 —
JMZ NA18C20# 300001 —

## RELATED MATERIALS

MX–5 Training Manual ..... 3165–10–89I
MX–5 Workshop Manual ..... 1221–10–89I
MX–5 Workshop Manual Supplement ..... 1246–10–90G
MX–5 Workshop Manual Supplement ..... 1372–10–93I
MX–5 Workshop Manual Supplement ..... 1451–10–94L
323,626 / MX–6, XEDOS 6, XEDOS 9
IMMOBILIZER SYSTEM SERVICE MANUAL ..... 1503–10–95A
MX–5 Wiring Diagram (Europe) ..... 5333–10–94L
MX–5 Wiring Diagram (UK) ..... 5334–10–94L
MX–5 Wiring Diagram (Europe) ..... 5360–10–95I
MX–5 Wiring Diagram (UK) ..... 5361–10–95I

# GENERAL INFORMATION

## ABBREVIATIONS

| | | | |
|---|---|---|---|
| ACC | Accessory | MT | Manual transmission |
| ATF | Automatic transmission fluid | RH | Right hand |
| IG | Ignition | SST | Special service tool |
| LH | Left hand | SW | Switch |
| LSD | Limited slip differential | | |

## SCHEDULED MAINTENANCE

### SCHEDULED MAINTENANCE TABLE

**Chart symbols:**

I : Inspect
Visual examination and/or functional measurement of a system's operation or performance.
A: Adjust
R: Replace
T: Tighten

Remarks:

- To ensure efficient operation of the engine and all systems related to emission control, the ignition and fuel systems must be serviced regularly. It is strongly recommended that all servicing related to these systems be done by an authorized Mazda Dealer.
- After 90,000 km {54,000 miles} or 72 months, continue to follow the described maintenance at the recommended intervals.
- Refer below for a description of items marked* in the maintenance chart.

*1 : Also adjust and inspect the power steering and air conditioner drive belts, if equipped.

*2 : Replacement of the timing belt is required at every 90,000 km {54,000 miles}. Failure to replace the timing belt may result in damage to the engine.

*3 : If the vehicle is operated under any of the following conditions, change the engine oil and oil filter every 10,000 km {6,000 miles} or shorter.
  a) Driving in dusty conditions
  b) Extended periods of idling or low speed operation
  c) Driving for long periods in cold temperatures or driving regularly at short distances ( less than 8 km {5 miles}) only

*4 : If the vehicle is operated in very dusty or sandy areas, inspect and replace, if necessary the air cleaner element more often than the recommended intervals.

*5 : This is a full function check of electrical systems such as lights, wiper and washer systems (including wiper blades), and power windows.

*6 : If the brakes are used extensively (for example, continuous hard driving or mountain driving) or if the vehicle is operated in extremely humid climates, change the brake fluid annually.

| Maintenance interval / Maintenance item | Number of months or kilometers {miles}, whichever comes first | | | | | | |
|---|---|---|---|---|---|---|---|
| Months | — | 12 | 24 | 36 | 48 | 60 | 72 |
| Kilometers | 1,000 | 15,000 | 30,000 | 45,000 | 60,000 | 75,000 | 90,000 |
| Miles | 600 | 9,000 | 18,000 | 27,000 | 36,000 | 45,000 | 54,000 |
| Drive belts*1 | A | I | I | I | I | II | II |
| Engine timing belt*2 | Replace every 90,000 km {54,000 miles} | | | | | | |
| Engine oil*3 | | R | R | R | R | R | R |
| Oil filter*3 | | R | R | R | R | R | R |
| Cooling system (including coolant level adjustment) | | | I | | I | | I |
| Engine coolant | Replace every 2 years | | | | | | |
| Idle speed | | | A | | A | | A |
| Air cleaner element*4 | | I | I | R | I | I | R |
| Fuel filter | | | | | R | | |
| Fuel lines and hoses | | | I | | I | | I |
| Initial ignition timing | | | I | | I | | I |
| Spark plugs | | | A | | A | | A |
| Spark plugs (only for sweden) | Adjust every 50,000 km {30,000 miles} | | | | | | |
| EGR system | | | I | | I | | I |
| EGR system (only for sweden) | Inspect every 80,000 km {48,000 miles} | | | | | | |
| Evaporative system | | | I | | I | | I |
| Evaporative system (only for sweden) | Inspect every 80,000 km {48,000 miles} | | | | | | |
| Dash pot | | | A | | A | | A |
| Dash pot (only for sweden) | Adjust every 80,000 km {48,000 miles} | | | | | | |
| Battery condition | I | I | I | I | I | I | I |
| All electrical system*5 | | I | I | I | I | I | I |
| Headlight alignment | | | A | | A | | A |
| Brake and clutch pedal | | I | I | I | I | I | I |
| Clutch fluid | | I | I | I | I | I | I |
| Brake lines, hoses and connections | | I | I | I | I | I | I |
| Brake fluid*6 | | I | R | I | R | I | R |
| Parking brake | | A | A | A | A | A | A |
| Power brake unit and hoses | | I | I | I | I | I | I |
| Disc brakes | | I | I | I | I | I | I |
| Power steering fluid | | I | I | I | I | I | I |
| Power steering system and hoses | | I | I | I | I | I | I |
| Steering and front suspension | | I | I | I | I | I | I |
| Manual transmission oil | | | A | | A | | R |
| Rear axle oil | | | A | | A | | R |
| Drive shaft dust boots | | | I | | I | | I |
| Bolts and nuts on chassis and body | T | T | T | T | T | T | T |
| Body condition (for rust, corrosion and perforation) | Inspect annually | | | | | | |
| Exhaust system and heat shields | I | | I | | I | | I |
| Tires (including spare tire) with inflation pressure adjustment | | I | I | I | I | I | I |
| Hinges and catches | | A | A | A | A | A | A |
| Underside of vehicle | | I | I | I | I | I | I |
| Seat belts | | | I | | I | | I |
| Road test | | I | I | I | I | I | I |

**Before beginning any service procedure, refer to section T of the MX–5 Workshop Manual (1451–10–94L) for air bag system service warnings.**

# FUEL AND EMISSION CONTROL SYSTEMS (B6)



## FEATURES

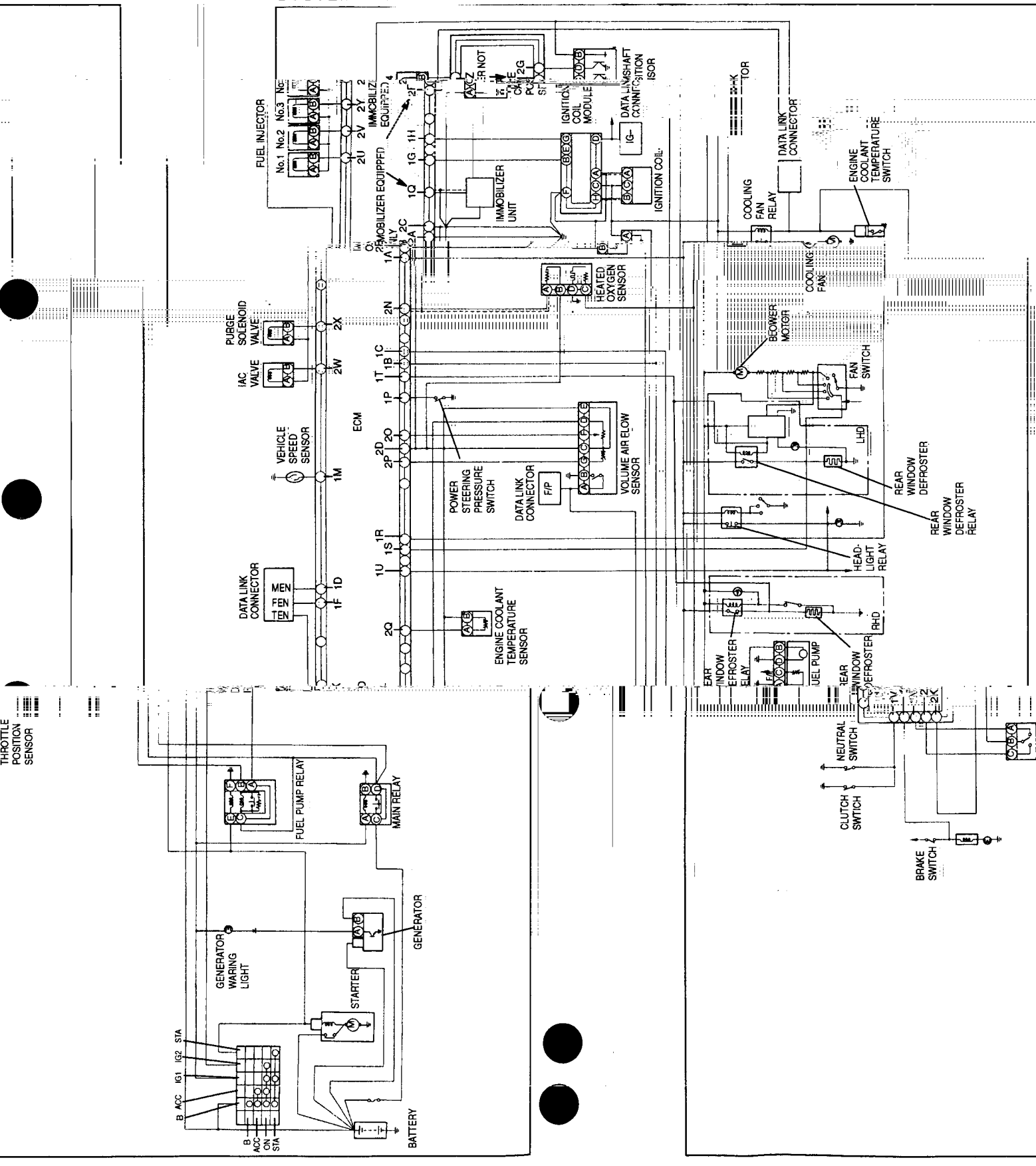


## SERVICE

## OUTLINE

- The ECM has been modified according to the addition of the immobilizer system.
- No changes have been made to vehicles that are not equipped with the immobilizer system.

### SYSTEM WIRING DIAGRAM



# CONTROL SYSTEM

## OUTLINE

- Immediately after the engine is started, the immobilizer judges if the ignition key is valid or not. When the key is valid, the ECM continues to run the engine. When the key is invalid, the immobilizer unit actuates the ECM to carry out the fuel cut-off and the ignition cut-off operations, and as a result, the engine stops in a few seconds. (Refer to IMMOBILIZER SYSTEM SERVICE MANUAL.)

# SUPPLEMENTAL SERVICE INFORMATION

The following changes and / or additions have been made since publication of the Mazda MX–5 Workshop Manual Supplement (1451–10–94L) and IMMOBILIZER SYSTEM SERVICE MANUAL (1503–10–95A).



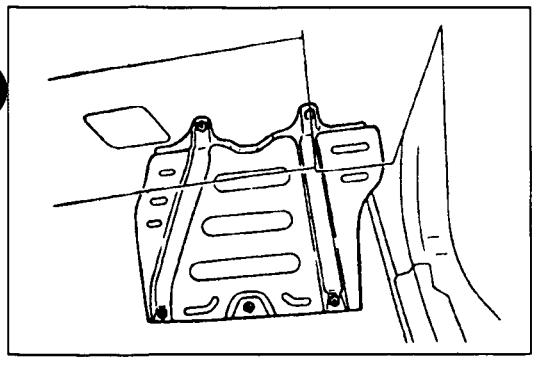
**Engine control module (ECM)**
- Removal / Installation procedure modified
- Inspection procedure modified

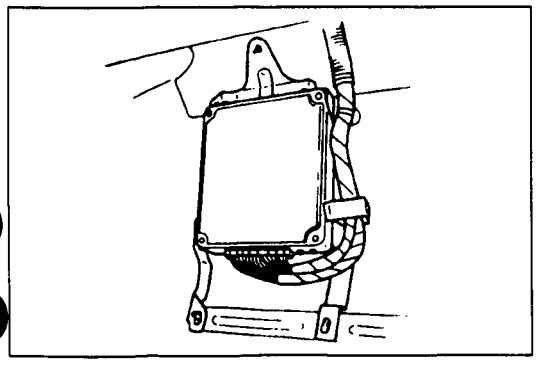
**On-board diagnostic system**
- Inspection procedure modified

# CONTROL SYSTEM

## ENGINE CONTROL MODULE (ECM) REMOVAL / INSTALLATION

**Note**
- The ECM equipped on a vehicle with the immobilizer system operates normally only when the correct ID number and cord word are input in it. (Refer to IMMOBILIZER SYSTEM SERVICE MANUAL.)
- The ECM with the ID number and cord word stored is only applicable to the vehicle that the ECM has originally been equipped.





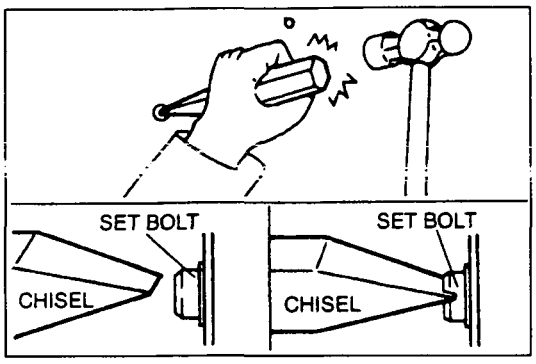
1. Disconnect the negative battery cable.
2. Lift up the floormat in front of the passenger's seat.
3. Remove the protector cover.

**Note**
- If the set bolt is used, refer to set bolt removal note and set bolt installation note.

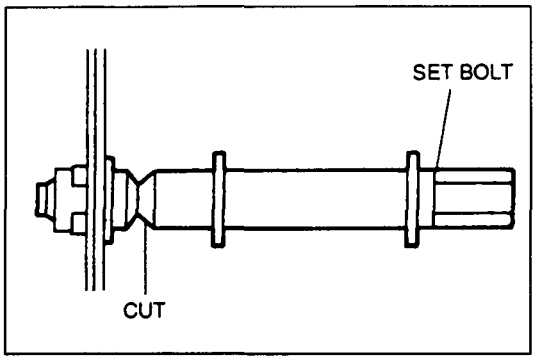
4. Disconnect the ECM connector.
5. Remove the ECM.
6. Install in the reverse order of removal.

**Tightening torque:**
**18—26 N·m {1.8—2.7 kgf·m , 14—19 ft·lbf }**

7. Input the ID number and cord word, referring to "IMMOBILIZER SYSTEM SERVICE MANUAL".




**Set bolt removal note**
- Using a chisel and a hammer, cut a groove on the head of the set bolt so that a screwdriver can be inserted.
- Loosen the set bolt by using an impact screwdriver or pliers.



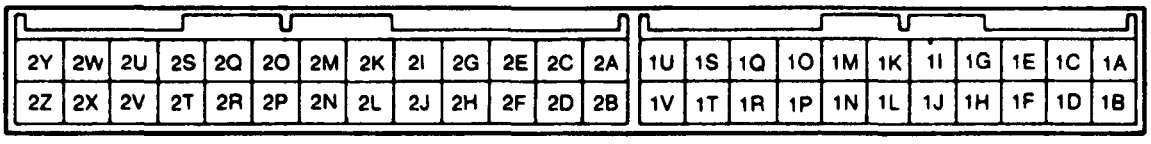

**Set bolt installation note**
- Install new set bolt and tighten it until the neck of the bolt is cut.

**Tightening torque:**
**18.6—25.5 N·m {1.90—2.60 kgf·m , 13.8—18.8 ft·lbf }**

## ENGINE CONTROL MODULE (ECM) INSPECTION

### Terminal voltage (Reference)

- Terminal voltage list has been modified. (Inspection procedure and **SSTs** are not modified.)




| Terminal | Signal | Connected to | Test condition | Voltage (V) | Possible malfunction |
|---|---|---|---|---|---|
| 1Q | Communication (Immobilizer) | Immobilizer unit | Check signal by using oscilloscope. Refer to "IMMOBILIZER SYSTEM SERVICE MANUAL" | — | • ECM*1<br>• Immobilizer unit |
| 2F | SGT | Camshaft position sensor | Ignition switch ON | Approx. 0 V or 5 V | • Camshaft position sensor |
| | | | Idle | Approx. 2 V | |

*1: If the immobilizer unit functions normally, replace the ECM.

# ON-BOARD DIAGNOSTIC SYSTEM

## DIAGNOSTIC TROUBLE CODE NUMBER INSPECTION

**Note**
- The following diagnostic trouble code numbers have been added according to the adoption of the immobilizer system. Other code numbers remain unchanged.

| Code No. | Indicator pattern | Diagnosed circuit |
|---|---|---|
| 71 |  | Immobilizer unit—ECM communication error |
| 72 |  | ID number unregistered |
| 73 |  | Code words do not match |
| 74 |  | ID numbers do not match |
| 75 |  | Code ward / ID number writing and reading error |
| 76 |  | Code word unregistered |

| Diagnostic trouble code No.71 | Immobilizer unit—ECM communication error |
|---|---|
| Symptom | Command transmission exceeded limit |
| Possible cause | • Defect in immobilizer unit—ECM communication line<br>• Immobilizer unit malfunction<br>• ECM malfunction |

| STEP | INSPECTION | | ACTION |
|---|---|---|---|
| 1 | Erase diagnostic trouble code from memory. Is same code No. present after rechecking? | Yes | Go to next step |
| | | No | Carry out troubleshooting of other diagnostic trouble code No. if displayed |
| 2 | Check continuity of wiring harness between immobilizer unit and ECM, and visually check connectors. Is there open or short circuit in communication line between ECM terminal and immobilizer unit terminal A? | Yes | Repair or replace as necessary |
| | | No | Go to next step |
| 3 | Erase diagnostic trouble code from memory and start engine. Does engine continue running normally? | Yes | Carry out troubleshooting of other diagnostic trouble code No. if displayed |
| | | No | If code No.71 displayed again, inspect immobilizer unit. Go to next step.<br>☞ IMMOBILIZER SYSTEM SERVICE MANUAL |
| 4 | Erase diagnostic trouble code from memory and start engine. Does engine continue running normally? | Yes | Carry out troubleshooting of other diagnostic trouble code No. if displayed |
| | | No | If code No.71 displayed again, replace immobilizer unit with previous one and replace ECM.<br>☞ IMMOBILIZER SYSTEM SERVICE MANUAL |

| Diagnostic trouble code No.72 | ID number unregistered |
|---|---|
| Symptom | ID number is not stored in ECM |
| Possible cause | ECM replacement procedure not correct |

| STEP | ACTION |
|---|---|
| 1 | Reinput ID number<br>☞IMMOBILIZER SYSTEM SERVICE MANUAL |

| Diagnostic trouble code No.73 | Code words do not match |
|---|---|
| Symptom | Code words stored in immobilizer unit and ECM do not match |
| Possible cause | • Transformation of code word stored in immobilizer unit<br>• Transformation of code word stored in ECM |

| STEP | INSPECTION | | ACTION |
|---|---|---|---|
| 1 | Erase diagnostic trouble code from memory. Is same code No. present after rechecking? | Yes | Go to next step |
| | | No | Carry out troubleshooting of other diagnostic trouble code No. if displayed |
| 2 | Is diagnostic trouble code No.75 also shown? | Yes | Carry out troubleshooting of diagnostic trouble code No.75 |
| | | No | Go to next step |
| 3 | Using new key, carry out key duplication ☞IMMOBILIZER SYSTEM SERVICE MANUAL<br>Is code word (required for key duplication) entered? | Yes | Replace ECM<br>☞ IMMOBILIZER SYSTEM SERVICE MANUAL |
| | | No | Replace immobilizer unit<br>☞ IMMOBILIZER SYSTEM SERVICE MANUAL |

Do not use ECM on other vehicle for testing. Diagnostic trouble code No.73 will be displayed again.

| Diagnostic trouble code No.74 | ID numbers do not match |
|---|---|
| Symptom | ID numbers stores in immobilizer unit and ECM do not match (Symptom occurs only after immobilizer unit is replaced and key ID number is registered) |
| Possible cause | • Unregistered key is used<br>• Transformation of ID number stored in ECM |

| STEP | INSPECTION | | ACTION |
|---|---|---|---|
| 1 | Erase diagnostic trouble code from memory. Is same code No. present after rechecking? | Yes | Go to next step |
| | | No | Carry out troubleshooting of other diagnostic trouble code No. if displayed |
| 2 | Start engine using another registered key. Does engine start normally? | Yes | Previous key defective of unregistered |
| | | No | Replace immobilizer unit and ECM at same time using set parts<br>☞IMMOBILIZER SYSTEM SERVICE MANUAL |

| Diagnostic trouble code No.75 | Code word / ID number writing and reading error |
|---|---|
| Symptom | ECM internal EEPROM damaged |
| Possible cause | ECM internal EEPROM damaged |

| STEP | INSPECTION | | ACTION |
|---|---|---|---|
| 1 | Erase diagnostic trouble code from memory. Is same code No. present after rechecking? | Yes | Replace ECM<br>☞ **IMMOBILIZER SYSTEM SERVICE MANUAL** |
| | | No | Carry out troubleshooting of other diagnostic trouble code No. if displayed |

| Diagnostic trouble code No.76 | Code word unregistered |
|---|---|
| Symptom | Code word is not stored in ECM |
| Possible cause | ECM replacement procedure not correct |

| STEP | ACTION |
|---|---|
| 1 | Reinput ID number<br>☞**IMMOBILIZER SYSTEM SERVICE MANUAL** |

**Before beginning any service procedure, refer to section T of the MX–5 Workshop Manual (1451–10–94L) for air bag system service warnings.**

# FUEL AND EMISSION CONTROL SYSTEMS (BP)



## FEATURES



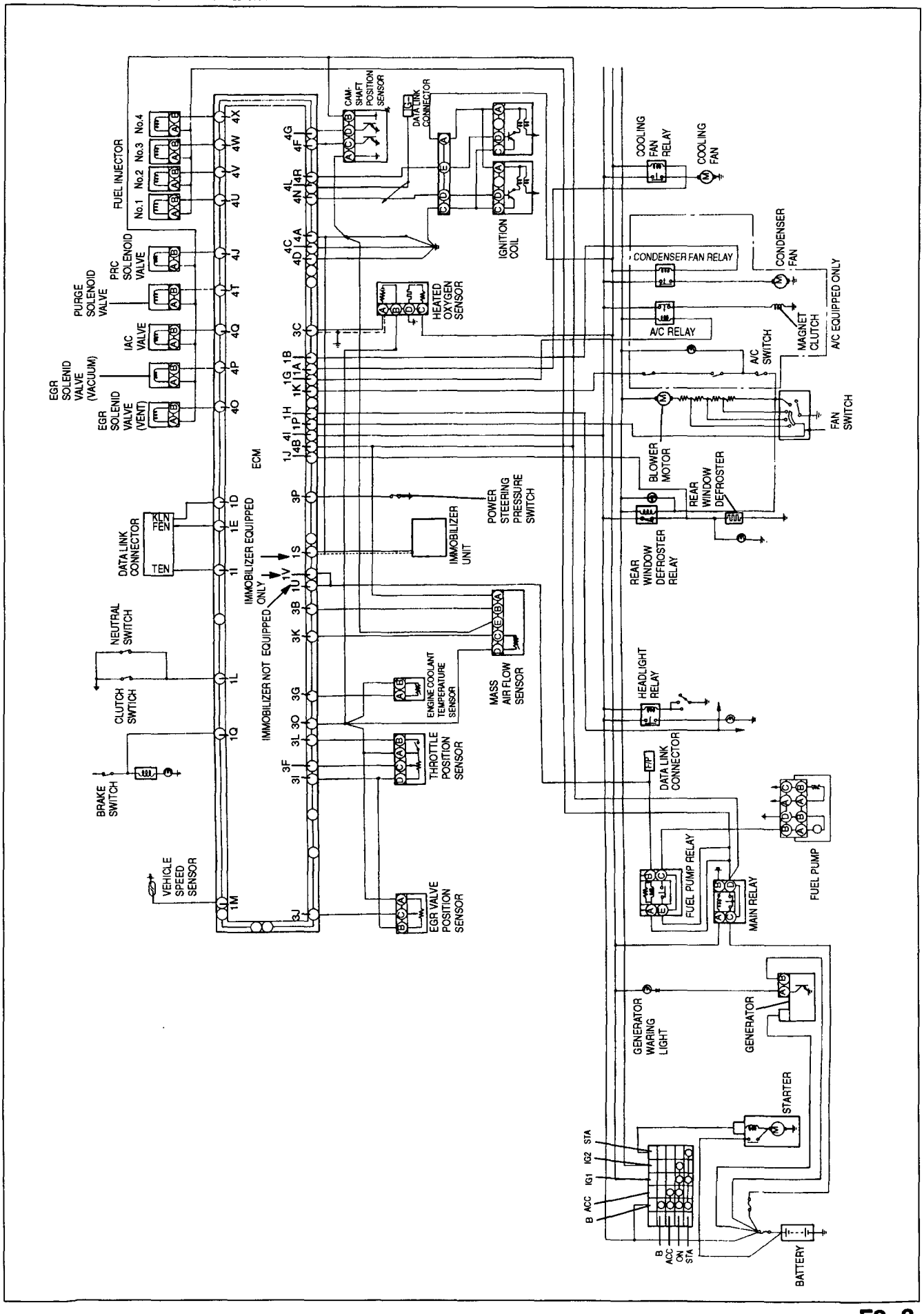
## SERVICE

## OUTLINE

The following points have been changed compared with the previous model.
- Immobilizer system added.
- STA (start) signal eliminated.
- Following points modified according to the ECM modification.
  - ECM pin location modified.
  - Diagnostic trouble codes indicated in four digits.
  - Oxygen monitor function and switch monitor function eliminated. *

* By using the New Generation Star (NGS) tester, "PID/DATA MONITOR AND RECORD" function and "SIMULATION TEST" function become available instead of oxygen monitor function and switch monitor function.
Until the NGS tester is introduced, inspect the oxygen sensor and the switch system input signals by checking the ECM terminal voltages.

## SYSTEM WIRING DIAGRAM



## CONTROL SYSTEM

### OUTLINE

- Immediately after the engine is started, the immobilizer judges if the ignition key is valid or not. When the key is valid the ECM continues to run the engine. When the key is invalid, the immobilizer unit actuates the ECM to carry out the fuel cut-off and the ignition cut-off operations, and as a result, the engine stops in a few saconds. (Refer to IMMOBILIZER SYSTEM SERVICE MANUAL.)

## SUPPLEMENTAL SERVICE INFORMATION

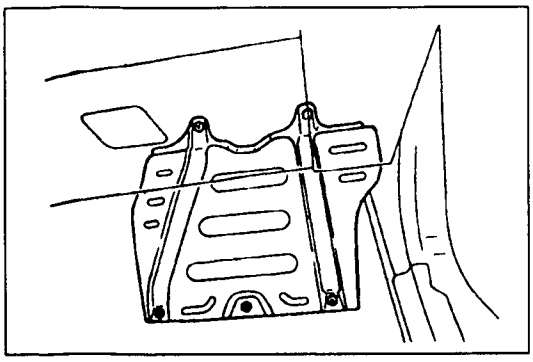
The following changes and / or additions have been made since publication of the Mazda MX–5 Workshop Manual Supplement (1451–10–94L) and IMMOBILIZER SYSTEM SERVICE MANUAL (1503–10–95A).

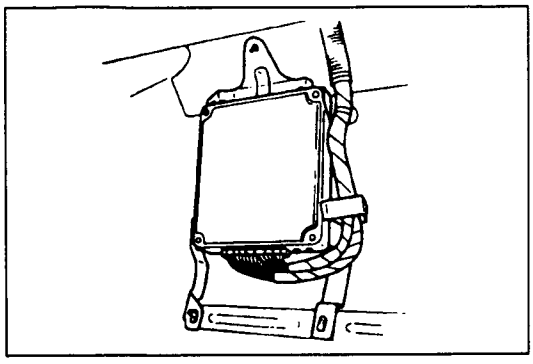
**Engine control module (ECM)**

- Removal / Installation procedure modified
- Inspection procedure modified

**On-board diagnostic system**

- Inspection procedure modified





## CONTROL SYSTEM

### ENGINE CONTROL MODULE (ECM) REMOVAL / INSTALLATION

**Note**
- The ECM equipped on a vehicle with the immobilizer system operates normally only when the correct ID number and cord word are input in it. (Refer to IMMOBILIZER SYSTEM SERVICE MANUAL.)
- The ECM with the ID number and cord word stored is only applicable to the vehicle that the ECM has originally been equipped.

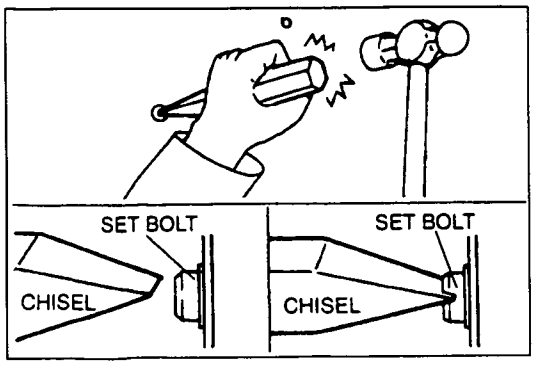
1. Disconnect the negative battery cable.
2. Lift up the floormat in front of the passenger's seat.
3. Remove the protector cover.

**Note**
- If the set bolt is used, refer to set bolt removal note and set bolt installation note.

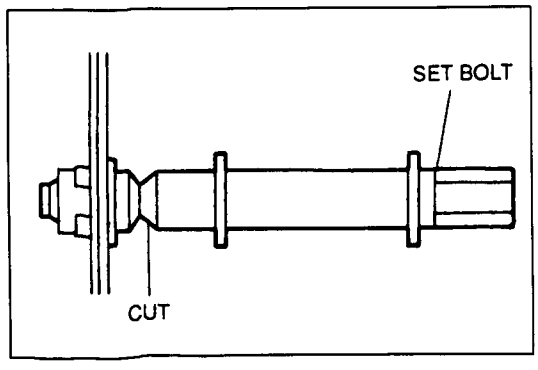
4. Disconnect the ECM connector.
5. Remove the ECM.
6. Install in the reverse order of removal.

**Tightening torque:**
**18—26 N·m {1.8—2.7 kgf·m , 14—19 ft·lbf }**

7. Input the ID number and cord word, referring to "IMMOBILIZER SYSTEM SERVICE MANUAL".

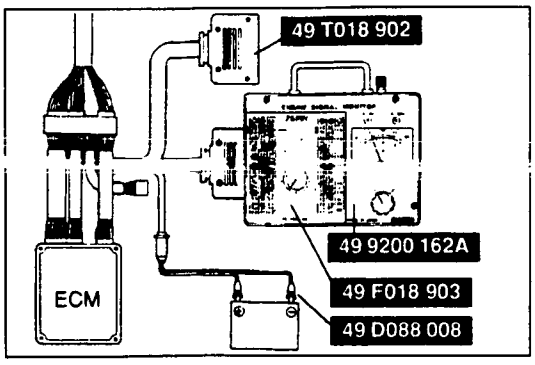


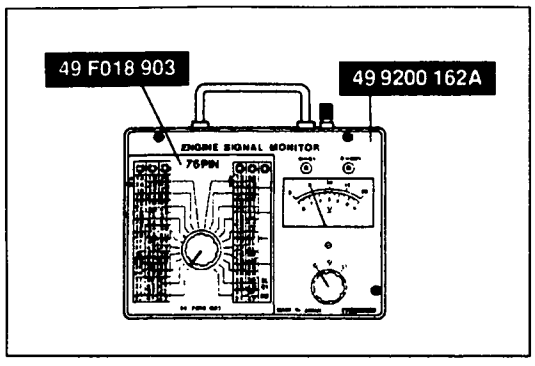

**Set bolt removal note**
- Using a chisel and a hammer, cut a groove on the head of the set bolt so that a screwdriver can be inserted.
- Loosen the set bolt by using an impact screwdriver or pliers.

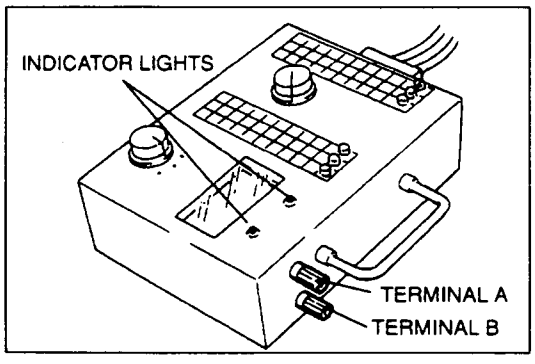



**Set bolt installation note**
- Install new set bolt and tighten it until the neck of the bolt is cut.

**Tightening torque:**
**18.6—25.5 N·m {1.90—2.60 kgf·m , 13.8—18.8 ft·lbf }**




## ENGINE CONTROL MODULE (ECM) INSPECTION

**Caution**

- **The ECM terminal voltages vary with change in measuring conditions and vehicle conditions. Always carry out a total inspection of the input systems, output systems, and ECM to determine the cause of trouble. Otherwise, a wrong diagnosis will be made.**

1. Disconnect the negative battery cable.
2. Remove the ECM.
3. Disconnect the ECM connector.
4. Connect the **SST** (Harness Adapter) to the ECM connector.
5. Connect the **SSTs** (Engine Signal Monitor and Harness adapter, power) to the **SST** (Harness Adapter). Use connector A of the harness adapter for ECM terminals 1A through 1V and 3A through 3P. Use connector B for ECM terminals 4A through 4Z.
6. Place the **SST** (Sheet) on the **SST** (Engine Signal Monitor).
7. Measure the voltage at each ECM terminal by switching the selector switch and the monitor switch.
8. If any incorrect voltage is detected, check related systems, wiring harnesses and connectors referring to the possible malfunction in the terminal voltage list.

**Caution**

- **Disconnecting the connectors of the ECM and the SST (Harness Adapter) while the battery is connected can damage the ECM and the SST (Engine Signal Monitor). Disconnect the nagative battery cable and the SST (harness adapter, power) before disconnecting the connectors.**
- **Applying voltage to terminals A and B of the SST (Engine Signal Monitor) can damage the SST (Engine Signal Monitor).**

**Note**

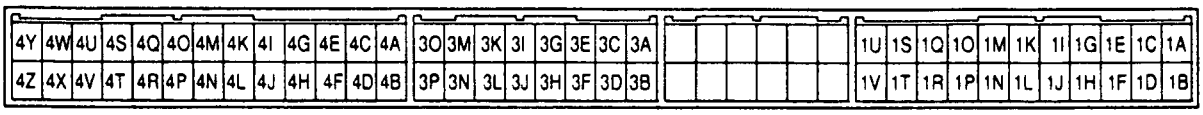
- The indicator lights of the **SST** (Engine Signal Monitor), provided for confirmation of the voltmeter range, is also used for detection of the pulse such as the fuel injector control signal, which is difficult to detect by using the voltmeter.
- Terminals A and B of the **SST** (Engine Signal Monitor) are for connection of an external instrument. By connecting an external instrument such as a circuit tester or an oscilloscope, various inspections in addition to the measurement of the ECM terminal voltages are made possible.
- If the tires are rotated by using a chassis roller with the ignition switch at ON, the ABS control module may memori

ze the action as a malfunction and the ABS light may illuminate. If the ignition switch is o LOCK and then to ON again, the ABS warning not illuminate, because the action will be con- a past malfunction.

warning turned t light wil sidered

## Terminal voltage (Reference)

B+: Battery positive voltage
*1: In data link connector




| Terminal | Signal | Connected to | Test condition | | Voltage (V) | Possible malfunction |
|---|---|---|---|---|---|---|
| 1A | Cooling fan control | Cooling fan relay | Ignition switch ON | Cooling fan operating/Terminal TEN ground and throttle valve open | Below 1.0 | • Cooling fan relay |
| | | | | Cooling fan stop | B+ | |
| 1B | Condenser fan control | Condenser fan relay | Ignition switch ON | Condenser fan operating/Terminal TEN ground and throttle valve open | Below 1.0 | • Condenser fan relay |
| | | | | Condenser fan stop | B+ | |
| 1C | — | — | — | | — | — |
| 1D | Serial communication | Data link connector terminal MEN or KLN *1 | Carry out inspection according to diagnostic trouble code<br>Diagnostic trouble code output is a part of serial communication<br>Judgement by terminal voltage is not possible | | — | • On-board diagnostic system |
| 1E | Diagnostic trouble code output | Data link connector (Terminal FEN *1) | Ignition switch ON (Terminal TEN *1 grounded) | No diagnostic trouble code output | B+ | • ECM terminal 1E —*1 FEN harness |
| | | | | Diagnostic trouble code output | Below 1.0—B+ | |
| 1F | — | — | — | | — | — |
| 1G | A/C control | A/C relay | Ignition switch ON | | B+ | • A/C relay |
| | | | Idle | A/C operating | Below 2.0 | |
| | | | | A/C stop | B+ | |
| 1H | Headlight | Headlight switch | Headlight switch OFF | | Below 1.0 | • Headlight switch |
| | | | Headlight switch ON | | B+ | |
| 1I | Diagnostic test mode | Data link connector (Terminal TEN *1) | Ignition switch ON | Open terminal *1TEN | B+ | • ECM terminal 1I —*1TEN harness |
| | | | | Short terminal *1TEN | Below 1.0 | |
| 1J | Rear window defroster | Rear window defroster relay | Ignition switch ON | Rear window defroster switch OFF | Below 1.0 | • Rear window defroster relay |
| | | | | Rear window defroster switch ON | B+ | |
| 1K | A/C | A/C switch | Idle | A/C switch and fan switch ON | Approx. 2.0 | • A/C switch<br>• Refrigerant pressure switch |
| | | | | A/C switch OFF | B+ | |

B+: Battery positive voltage
*1: In data link connector

| Terminal | Signal | Connected to | Test condition | | Voltage (V) | Possible malfunction |
|---|---|---|---|---|---|---|
| 1L | Load/No load distinction | Neutral/clutch switch | Ignition switch ON | Other than neutral position and clutch pedal released | B+ | • Neutral switch<br>• Clutch switch |
| | | | | Neutral position or clutch pedal depressed | Below 1.0 | |
| 1M | Vehicle speed | Vehicle speed sensor | Ignition switch ON | | Approx. 7.0 or Below 1.5 | • Vehicle speed sensor |
| | | | Driving | | Approx. 3.0 | |
| 1N | — | — | — | | — | — |
| 1O | — | — | — | | — | — |
| 1P | Blower | Fan switch | Ignition switch ON | Fan switch OFF or ON at 1st | B+ | • Fan switch |
| | | | | Fan switch ON at 2nd or higher | Below 1.0 | |
| 1Q | Brake | Brake switch | Brake pedal released | | Below 1.0 | • Brake switch |
| | | | Brake pedal depressed | | B+ | |
| 1R | — | — | — | | — | — |
| 1S | Communication (Immobilizer) | Immobilizer unit | Check signal by using oscilloscope. Refer to "IMMOBILIZER SYSTEM SERVICE MANUAL" | | — | • ECM<br>• Immobilizer |
| 1T | — | — | — | | — | — |
| 1U | Fuel pump control | Fuel pump relay | Ignition switch ON | | B+ | • Fuel pump relay |
| | | | Cranking | | Below 1.0 | |
| | | | Idle | | | |
| 1V | Fuel pump control (Equipped with immobilizer) | Fuel pump relay | Ignition switch ON | | B+ | • Fuel pump relay |
| | | | Cranking | | Below 1.0 | |
| | | | Idle | | | |
| 3A | — | — | — | | — | — |
| 3B | Mass air flow sensor (VGP) | Mass air flow sensor | Ignition switch ON | | Below 1.0 | • Mass air flow sensor |
| | | | Idle | | 1.0—2.0 | |
| 3C | Heated oxygen sensor | Heated oxygen sensor | Ignition switch ON | | Approx. 0 | • Heated oxygen sensor |
| | | | Idle | Engine cold | 0.1—0.9 | |
| | | | | After warms up | Below 1.0 | |
| | | | Acceleration | | 0.5—1.0 | |
| | | | Deceleration | | 0—0.5 | |
| 3D | — | — | — | | — | — |
| 3E | — | — | — | | — | — |

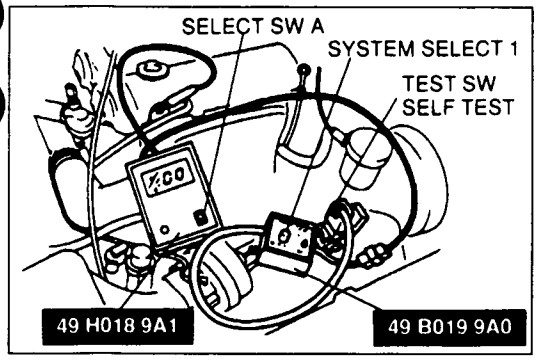
B+: Battery positive voltage
*1: In data link connector

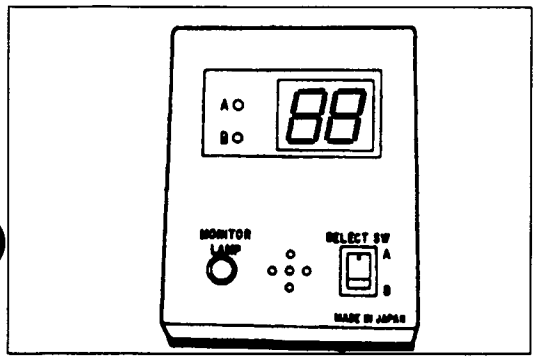
| Terminal | Signal | Connected to | Test condition | | Voltage (V) | Possible malfunction |
|---|---|---|---|---|---|---|
| 3F | Throttle position (TVO) | Throttle position sensor | Ignition switch ON | Closed throttle position | 0.1—1.1 | • Throttle position sensor<br>• ECM terminal 3I voltage |
| | | | | Wide open throttle | 3.1—4.5 | |
| 3G | Engine coolant temperature | Engine coolant temperature sensor | Ignition switch ON | Engine coolant temp. 20 °C {68 °F } | Approx. 2.5 | • Engine coolant temperature sensor |
| | | | | After warm up | Below 1.0 | |
| 3H | — | — | — | | — | — |
| 3I | Constant voltage (Vref) | Throttle position sensor<br>EGR valve position sensor | Ignition switch ON | | Approx. 5.0 | • ECM terminal 4B voltage |
| 3J | EGR valve position | EGR valve position sensor | Ignition switch ON | | Approx. 0.8 | • EGR valve position sensor<br>• ECM terminal 3I voltage |
| | | | Idle | | | |
| 3K | Intake air temperature | Intake air temperature sensor | Ignition switch ON | Intake air temperature 20 °C {68 °F } | Approx. 2.5 | • Mass air flow sensor |
| 3L | Closed throttle position | Closed throttle position switch | Ignition switch ON | Accelerator pedal released | Below 1.0 | • Throttle position sensor |
| | | | | Accelerator pedal depressed | B+ | |
| 3M | — | — | — | | — | — |
| 3N | — | — | — | | — | — |
| 3O | Analogue sensor ground | Ground | Constant | | Below 1.0 | • ECM 3O terminal harness (Open) |
| 3P | Power steering pressure | Power steering pressure switch | Ignition switch ON | | B+ | • Power steering pressure switch |
| | | | Idle | P/S not operating | | |
| | | | | P/S operating | Below 1.0 | |
| 4A | ECM ground | Ground | Constant | | Below 1.0 | • ECM 4A harness (Open) |
| 4B | Power supply | Main relay (FUEL INJ relay) | Ignition switch | OFF | Below 1.0 | • Main relay |
| | | | | ON | B + | |
| 4C | Fuel injector ground | Ground | Constant | | Below 1.0 | • ECM 4C terminal harness continuity (Open) |
| 4D | Output device ground | Ground | Constant | | Below 1.0 | • ECM 4D terminal harness continuity (Open) |
| 4E | — | — | — | | — | — |

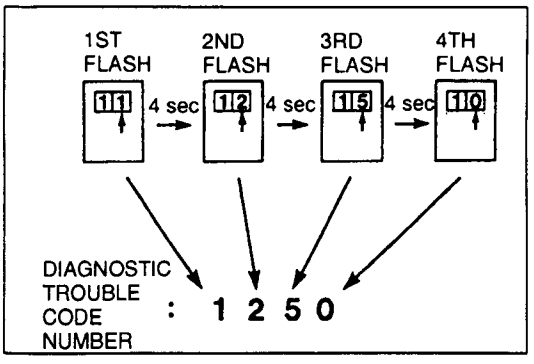
B+: Battery positive voltage
*1: In data link connector

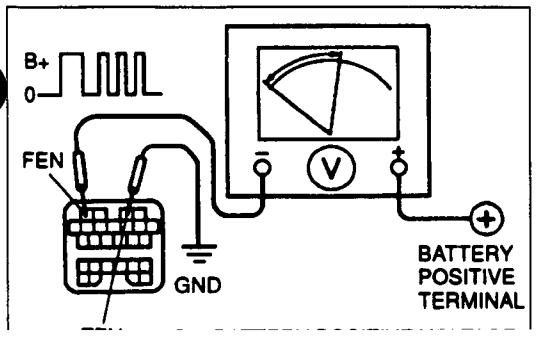
| Terminal | Signal | Connected to | Test condition | Voltage (V) | Possible malfunction |
|---|---|---|---|---|---|
| 4F | SGT | Camshaft position sensor | Ignition switch ON | 0 or Approx. 5.0 | • Camshaft position sensor |
| | | | Idle | Approx. 2.0 | |
| 4G | SGC | | Ignition switch ON | 0 or Approx. 5.0 | |
| | | | Idle | Approx. 1.5 | |
| 4H | — | — | — | — | — |
| 4I | Back-up power supply | Battery | Constant | B+ | • ECM terminal 4I—battery harness and connector |
| 4J | Pressure regulator control | PRC solenoid valve | Idle (Approx.149 sec after hot start) | Below 3.0 | • PRC solenoid valve |
| | | | Other | B+ | |
| 4K | — | — | — | — | — |
| 4L | Engine speed | Tachometer | Ignition switch ON | 0 or Approx. 11 | • ECM terminal 4L—tachometer<br>• ECM |
| | | | Idle | Approx. 6* | |
| 4M | — | — | — | — | — |
| 4N | IGT1 | Ignition coil | Ignition switch ON | Below 1.0 | • Ignition coil |
| | | | Idle | Approx. 0.2 | |
| 4O | EGR control (Vent) | EGR solenoid valve (Vent) | Ignition switch ON | B+ | • EGR solenoid valve (Vent) |
| | | | Idle | | |
| 4P | EGR control (Vacuum) | EGR solenoid valve (Vacuum) | Ignition switch ON | B+ | • EGR solenoid valve (Vacuum) |
| | | | Idle | | |
| 4Q | Idle air control | Idle air control | Ignition switch ON | Below 4.8 | • Idle air control |
| | | | After warm up (NC | Approx. 3 | |
| | | | Idle | Below 1.0 | • gnition coil |
| | | | | Approx. 0.2 | |
| | | | — | — | — |
| | | | | B+ | • Purge solenoid valve |
| | | | | B+ | • Fuel injector |
| | | | | B+* | |
| | | | — | — | — |
| | | | — | — | — |
| 4R | IGT2 | Ignition coil | | | Ignition switch ON |
| | | | | | Idle |
| 4S | — | — | | | — |
| 4T | Purge control | Purge solenoid valve | | | Ignition switch ON |
| | | | | | Idle |
| 4U | Fuel injector control | Fuel injector No.1 | | | Ignition switch ON |
| 4V | | Fuel injector No.2 | | | |
| 4W | | Fuel injector No.3 | | | |
| 4X | | Fuel injector No.4 | | | |
| 4Y | — | — | | | — |
| 4Z | — | — | | | — |

* Engine Signal Monitor: Green and red lights flash




# ON-BOARD DIAGNOSTIC SYSTEM

## DIAGNOSTIC TROUBLE CODE NUMBER INSPECTION

### Using the SST

1. Connnect the **SST** (System Selector) to the data link connector.
2. Set system select to position 1.
3. Set test switch to SELF-TEST.
4. Connect the **SST** (Self-Diagnosis Checker) to the system selector connector and to a ground.
5. Set select switch to position A.
6. Turn the ignition switch to ON and verify that "88" flashes on the digital display and buzzer sounds for 3 seconds.
7. If not, check the main relay, power supply circuit, and data link connector wiring.
8. If "88" flashes and the buzzer sounds continuously for more than 20 seconds, check for a short circuit between ECM terminal 1E and the data link connector. Replace the ECM if necessary and perform step 3 through 7 again.
9. Note any code numbers and check for the causes by referring to the check sequences shown on page F2–12. Repair as necessary.

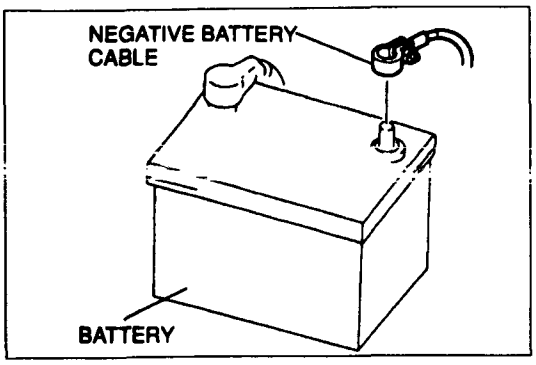
**Note**

- A diagnostic trouble code is cosist of four numbers. They are shown one by one in the right window on the display by each flash. ("1" is always shown on the left window.)
- If there is no malfunction, "00" is displayed on the display.
- When there are multiple malfunctions, the codes are displayed in numerical order.

10. After repairs, cancel the code numbers by performing the "After Repair Procedure" (Refer to page F2–12).

### Using a voltmeter

1. Connect the data link connector terminals TEN and GND by using a jumper wire.
2. Connect a voltmeter – (negative) terminal to the data link connector teminal FEN, and + (positive) terminal to the + (positive) terminal of the battery.
3. Turn the ignition switch to ON.
4. Observe the voltmeter needle and note the code number (s).

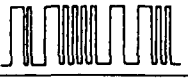
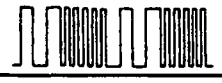



**After Repair Procedure**

1. After repairs, disconnect the negative battery cable for at least 20 seconds, and depress the brake pedal. Reconnect the negative battery cable.
2. Warm up the engine to normal operating temperature.
3. Perform trouble code inspection again and verify that no service codes are displayed.

**Diagnostic trouble code**

- For troubleshooting procedure of each diagnostic trouble code other than additional diagnostic trouble code, refer to the workshop manual for the previous model.

| Code No. | | Indicator pattern | Diagnosed circuit |
|---|---|---|---|
| Previous model | New model | | |
| 03 | 1345 |  | Camshaft position sensor (SGC signal) |
| 04 | — | — | — |
| 08 | 0100 |  | Mass air flow sensor |
| 09 | 0115 |  | Engine coolant temperature sensor |
| 10 | 0110 |  | Intake air temperature sensor |
| 12 | 0120 |  | Throttle position sensor |
| 14 | 1195 |  | Barometric pressure sensor |
| 15 | 0134 |  | Heated oxygen sensor (inactivation) |
| 16 | 1402 |  | EGR valve position sensor |
| 17 | 1170 |  | Heated oxygen sensor (inversion) |
| 25 | 1250 |  | PRC solenoid valve |
| 26 | 0443 |  | Purge solenoid valve |
| 28 | 1485 |  | EGR solenoid valve (vacuum) |
| 29 | 1486 |  | EGR solenoid valve (vent) |
| 34 | 0505 |  | Idle air control valve |

| Code No. | | Indicator pattern | Diagnosed circuit |
|---|---|---|---|
| Previous model | New model | | |
| — | 0500 |  | Vehicle speed sensor |
| — | 1602* |  | Immobilizer unit—ECM communication error (Immobilizer) |
| — | 1603* |  | ID number unregistered (Immobilizer) |
| — | 1604* |  | Code word unregistered (Immobilizer) |
| — | 1608 |  | ECM internal circuit malfunction |
| — | 1621* |  | Code words do not match (Immobilizer) |
| — | 1622* |  | ID numbers do not match (Immobilizer) |
| — | 1623* |  | Code word / ID number writing and reading error (Immobilizer) |

*: Equipped with immobilizer

| Diagnostic trouble code No. P0500 | Vehicle speed sensor-malfunction |
|---|---|
| Symptom | No vehicle speed sensor signal input from vehicle speed sensor while driving |
| Possible cause | • Vihicle speed sensor malfunction<br>• Open or short circuit in wiring from vehicle speed sensor to ECM terminal 1M |

| STEP | INSPECTION | | ACTION |
|---|---|---|---|
| 1 | Does vehicle speed sensor connector or ECM connector have poor connection? | Yes | Repair or replace connector |
| | | No | Go to next step |
| 2 | Is ECM terminal 1M voltage OK? | Yes | Go to step 4 |
| | | No | Go to next step |
| 3 | Is there continuity between vehicle speed sensor terminal and PCM terminal 1M? | Yes | Go to next step |
| | | No | Repair or replace wiring harness |
| 4 | Erase diagnostic trouble code from memory. Is same code No. present after rechecking? | Yes | Replace ECM |
| | | No | Intermittent poor connection of harness or connector (Repair connector and/or harness) |

| Diagnostic trouble code No. P1602 | Immobilizer unit—ECM communication error |
|---|---|
| Symptom | Command transmission exceeded limit |
| Possible cause | • Defect in immobilizer unit—ECM communication line<br>• Immobilizer unit malfunction<br>• ECM malfunction |

| STEP | INSPECTION | | ACTION |
|---|---|---|---|
| 1 | Erase diagnostic trouble code from memory. Is same code No. present after rechecking? | Yes | Go to next step |
| | | No | Carry out troubleshooting of other diagnostic trouble code No. if displayed |
| 2 | Check continuity of wiring harness between immobilizer unit and ECM, and vusually check connectors. Is there open or short circuit in communication line between ECM terminal and immobilizer unit terminal A? | Yes | Repair or replace as necessary |
| | | No | Go to next step |
| 3 | Erase diagnostic trouble code from memory and start engine. Does engine continue running normally? | Yes | Carry out troubleshooting of other diagnostic trouble code No. if displayed |
| | | No | If code No.1602 displayed again, inspect immobilizer unit<br>Go to next step<br>☞ **IMMOBILIZER SYSTEM SERVICE MANUAL** |
| 4 | Erase diagnostic trouble code from memory and start engine. Does engine continue running normally? | Yes | Carry out troubleshooting of other diagnostic trouble code No. if displayed |
| | | No | If code No.1602 displayed again, replace immobilizer unit with previous one and replace ECM<br>☞ **IMMOBILIZER SYSTEM SERVICE MANUAL** |

| Diagnostic trouble code No. P1603 | ID number unregistered |
|---|---|
| Symptom | ID number is not stored in ECM |
| Possible cause | ECM replacement procedure not correct |

| STEP | ACTION |
|---|---|
| 1 | Reinput ID number<br>☞**IMMOBILIZER SYSTEM SERVICE MANUAL** |

| Diagnostic trouble code No. P1604 | Code word unregistered |
|---|---|
| Symptom | Code word is not stored in ECM |
| Possible cause | ECM replacement procedure not correct |

| STEP | ACTION |
|---|---|
| 1 | Reinput ID number<br>☞**IMMOBILIZER SYSTEM SERVICE MANUAL** |

| Diagnostic trouble code No. 1608 | ECM malfunction |
|---|---|
| Symptom | ECM does not read diagnostic trouble codes from output devices |
| Possible cause | • ECM malfunction |

| STEP | INSPECTION | ACTION |
|---|---|---|
| — | — | Replace ECM |

| Diagnostic trouble code No. P1621 | Code words do not match | | |
|---|---|---|---|
| Symptom | Code words stored in immobilizer unit and ECM do not match | | |
| Possible cause | • Transformation of code word stored in immobilizer unit<br>• Transformation of code word stored in ECM | | |
| STEP | INSPECTION | | ACTION |
| 1 | Erase diagnostic trouble code from memory. Is same code No. present after rechecking? | Yes | Go to next step |
| | | No | Carry out troubleshooting of other diagnostic trouble code No. if displayed |
| 2 | Is diagnostic trouble code No.1623 also shown? | Yes | Carry out troubleshooting of diagnostic trouble code No. 1623 |
| | | No | Go to next step |
| 3 | Using new key, carry out key duplication ☞**IMMOBILIZER SYSTEM SERVICE MANUAL**<br>Is code word (required for key duplication) entered? | Yes | Replace ECM<br>☞ **page F2–5** |
| | | No | Replace immobilizer unit<br>☞ **IMMOBILIZER SYSTEM SERVICE MANUAL** |

Do not use ECM on other vehicle for testing. Diagnostic trouble code No.1621 will be displayed again.

| Diagnostic trouble code No. P1622 | ID numbers do not match | | |
|---|---|---|---|
| Symptom | ID numbers stored in immobilizer unit and ECM do not match (Symptom occurs only after immobilizer unit is replaced and key ID number is registered) | | |
| Possible cause | • Unregistered key is used<br>• Transformation of ID number stored in ECM | | |
| STEP | INSPECTION | | ACTION |
| 1 | Erase diagnostic trouble code from memory. Is same code No. present after rechecking? | Yes | Go to next step |
| | | No | Carry out troubleshooting of other diagnostic trouble code No. if displayed |
| 2 | Start engine using another registered key. Does engine start normally? | Yes | Previous key defective of unregistered |
| | | No | Replace immobilizer unit and ECM at same time using set parts<br>☞**page F2–5 and IMMOBILIZER SYSTEM SERVICE MANUAL** |

| Diagnostic trouble code No. P1623 | Code word / ID number wrinting and reading error | | |
|---|---|---|---|
| Symptom | ECM internal EEPROM damaged | | |
| Possible cause | ECM internal EEPROM damaged | | |
| STEP | INSPECTION | | ACTION |
| 1 | Erase diagnostic trouble code from memory. Is same code No. present after rechecking? | Yes | Replace ECM<br>☞ **page F2–5** |
| | | No | Carry out troubleshooting of other diagnostic trouble code No. if displayed |

**Before beginning any service procedure, refer to section T of the MX–5 Workshop Manual (1451–10–94L) for air bag system service warnings.**

# FRONT AND REAR AXLES

**FEATURES**

# OUTLINE

### OUTLINE OF CONSTRUCTION

- A torque sensing limited slip differential ("TORSEN" type B LSD) is an optional equipment for LH drive models to improve drivability and stability.

# TORQUE SENSING LIMITED SLIP DIFFERENTIAL ("TORSEN" TYPE B LSD)

### OUTLINE

- The "TORSEN" type B LSD has been equipped on the LH drive models, instead of the previous "TORSEN" type A LSD*, to improve drivability and stability,
- The standard differential assembly and the "TORSEN" type B LSD assembly are interchange–able.
- The "TORSEN" type B LSD has the following benefits compared with the "TORSEN" type A LSD.

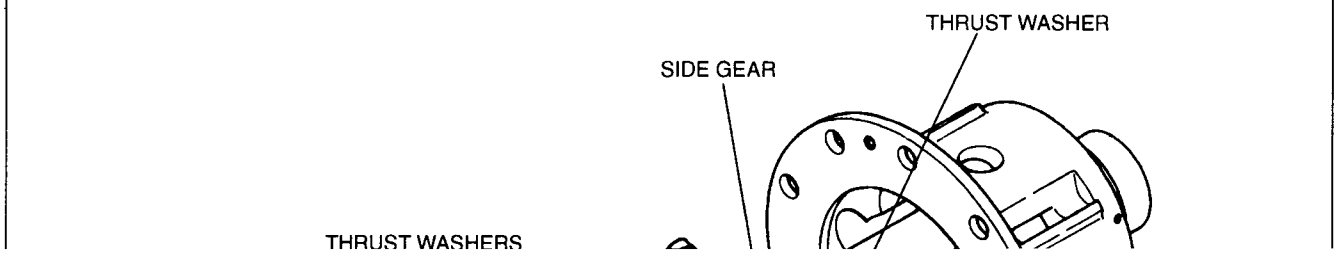
1. For operation restriction mechanism, the "TORSEN" type A LSD uses the friction of the worm gear teeth, while the "TORSEN" type B LSD employs the friction between the planet gear and the gear case, and between the side gear and the thrust washer.
2. In the "TORSEN" type A LSD, the bias ratio** differs depending on the rotation direction. In the "TORSEN" type B LSD, however, the bias ratio is the same regardless of the rotation direction.

* The differential which has been called "TORSEN" LSD in the previous manual is called "TORSEN" type A LSD in this manual.

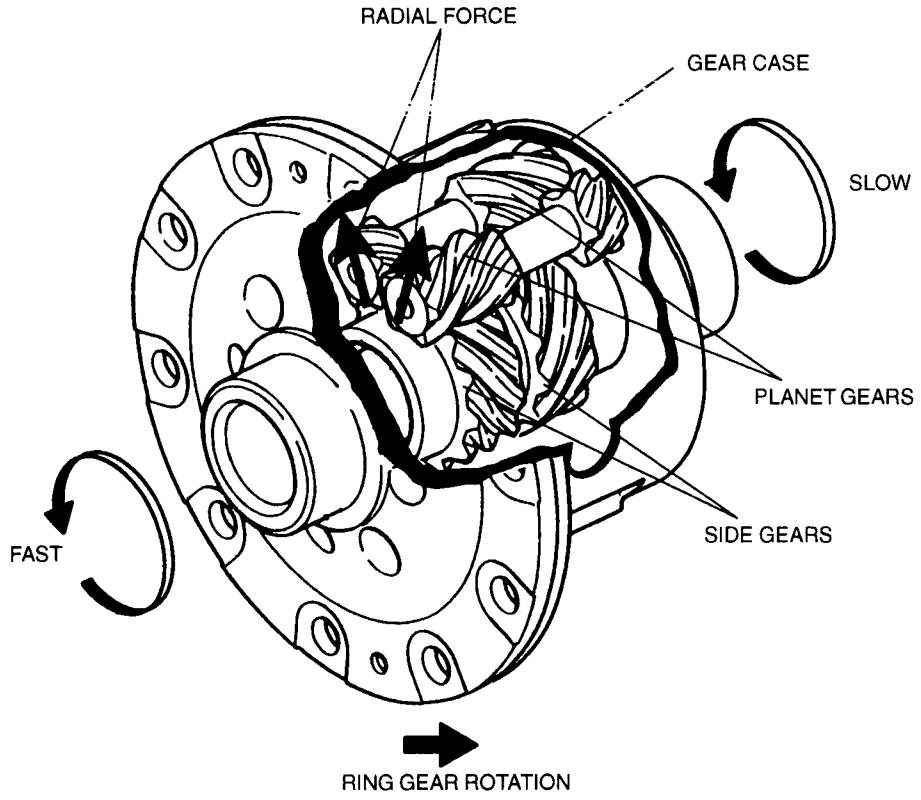
** Bias ratio
The bias ratio is to indicate the effectiveness of the LSD function. In the standard type differential, which applies the equal rotational torque to both RH and LH driving wheels, when either of the wheels is splipped by snow or ice and is spinning, the same amount of rotational torque is applied to the other wheel. In the LSD, rotational torque of the spinning when is increased and applied to the other wheel. This torque ratio is called bias ratio.

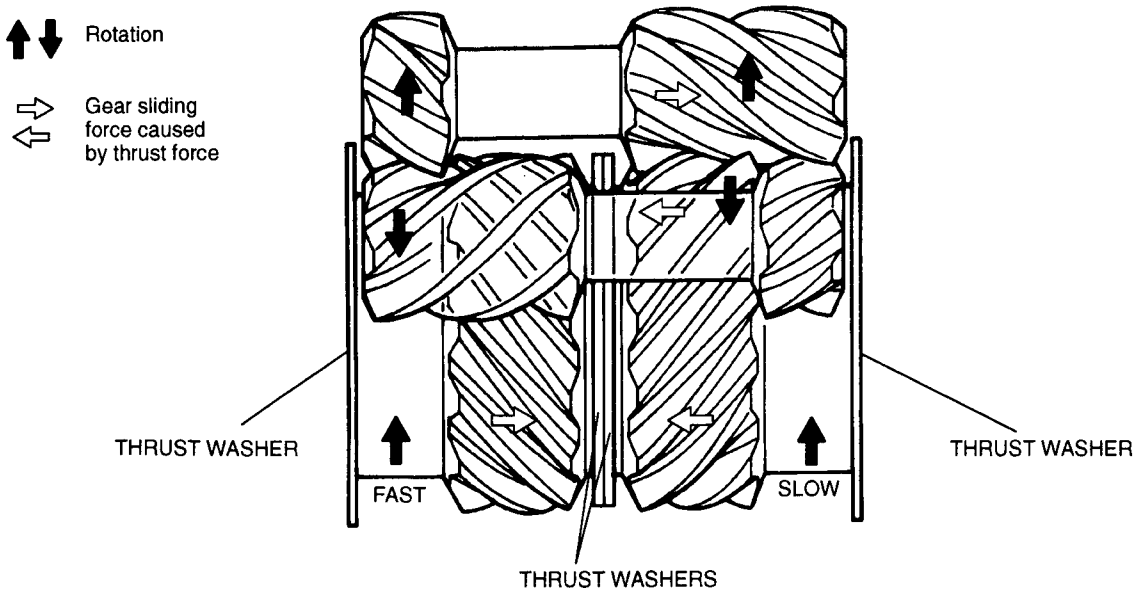
$$\text{Bias ratio} = \frac{\text{Rotational torque of slower wheel}}{\text{Rotational torque of faster wheel}}$$

## CONSTRUCTION



## OPERATION




* The figure above shows the differential operation in the driving condition.
When the engine brake is applied, all gears move in the opposite direction of the arrows and the side gears are pressed against the differential case.

### Limited-Slip Operation

When one the driving wheels is spinning and the differential operation is restricted, thrust force and radial force are generated between the helical gears by engage reaction. Rotation torque of the spinning wheel is reduced by friction between the planet gear teeth and the gear case, between the planet gear end surface in axial direction and the gear case, and between the side gear and the thrust washer. The reduced torque is transmitted to the higher traction side, and functions as the limited-slip differential. This torque is proportional to the ring gear input torque.

# TECHNICAL DATA

# TECHNICAL DATA

## M. FRONT AND REAR AXLES

| Item \ Engine/Transmission | | BP DOHC | |
|---|---|---|---|
| | | MT | |
| **Drive shaft** | | | |
| Joint type | Wheel side | Bell joint | |
| | Differential side | Double-offset joint | |
| Overall length (air in boot at atmospheric pressure mm { in }) | Left side | 767.3—777.3 {30.20—30.60} | |
| | Right side | 767.3—777.3 {30.20—30.60} | |
| Shaft diameter mm { in } | | 24.0 {0.94} | |
| **Differential** | | | |
| Differential type | | "TORSEN" TYPE B LSD | Standard |
| Ring gear size mm { in } | | 182.88 {7.20} | |
| Final gear ratio | | 4.100 | |
| Reduction gear | | Hypoid gear | |
| Differential gear | | Helical 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<br>Below–18 °C {0 °F }: SAE80 | |
| | Capacity L { US qt , Imp qt } | 1.00 {1.06, 0.88} | |

## T. BODY ELECTRICAL SYSTEM

| Bulb | | Specifications |
|---|---|---|
| Exterior light | Headlight | 60/55W |
| | Front turn light | 21W |
| | Front side turn light | 5W |
| | Licence plate light | 5W |
| | Rear turn light | 21W |
| | Stop/taillight | 21/5W |
| | Back-up light | 21W |
| | High-mount brake light | 18.4W |
| Interior light | Interior light | 8W |
| Warning and indicator light | Generator warning light | 1.4W |
| | Brake system warning light | 1.4W |
| | Washer fluid-level warning light | 1.4W |
| | ABS warning light | 1.4W |
| | Air bag system warning light | 1.4W |
| | Hazard warning light | 1.4W |
| | Rear fog light indicator light | 1.4W |
| | Retractor indicator light | 1.4W |
| | Immobilizer indicator light | 1.4W |
| | High beam indicator light | 3.4W |
| | Rear window defroster indicator light | 1.4W |
| | Turn signal indicator light | 3.4W×2 |
| | Instrument cluster illumination | 3.4W×4 |

**Before beginning any service procedure, refer to section T of the MX–5 Workshop Manual (1451–10–94L) for air bag system service warnings.**

# STEERING SYSTEM

## FEATURES



## SERVICE

# OUTLINE

## OUTLINE OF CONSTRUCTION

- Due to the addition of the immobilizer system, when replacing the steering lock for the steering wheel and column, the ID code must be input into the system, because if this is not done, the engine can not be started.

# SUPPLEMENTAL SERVICE INFORMATION

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

**Steering wheel and column**

- Disassembly / Assembly procedures modified

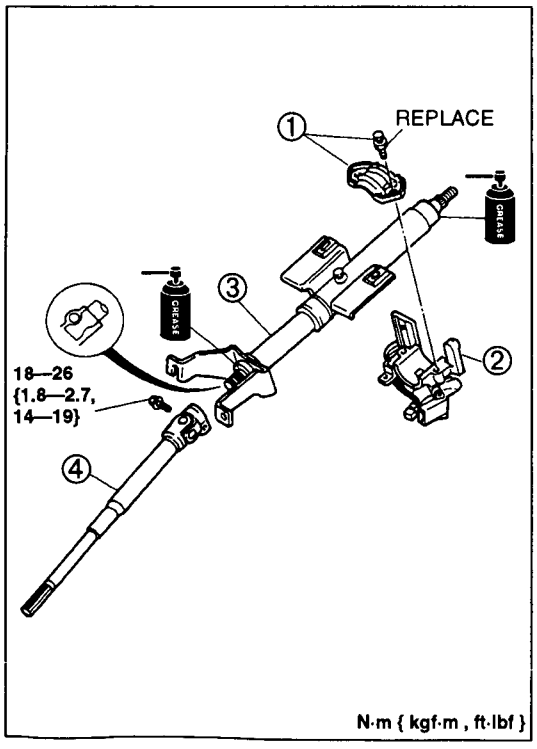
# MANUAL STEERING

## STEERING WHEEL AND COLUMN DISASSEMBLY / ASSEMBLY

**Caution**

- **After replacing the steering lock with a new one, the engine cannot be started without inputting the ID number of the keys. Input the ID number, referring to "key replacement or duplicate keys" (Refer to IMMOBILIZER SYSTEM General Information, section T.)**

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




1. Steering lock mounting bolts and bracket
2. Steering lock assembly
3. Steering shaft
4. Intermediate shaft

**Before beginning any service procedure, refer to section T of the MX–5 Workshop Manual (1451–10–94L) for air bag system service warnings.**

# BRAKING SYSTEM

## FEATURES



## SERVICE

# OUTLINE

## OUTLINE OF CONSTRUCTION

- For models with the immobilizer system, the bolts which fix the ABS control module panel have been changed. Set bolts are now used.

# SUPPLEMENTAL SERVICE INFORMATION

The following changes and / or additions have been made since publication of the Mazda MX–5 Workshop Manual Supplement (1451–10–94L).

### ABS control module

- Removal / Installation procedure modified

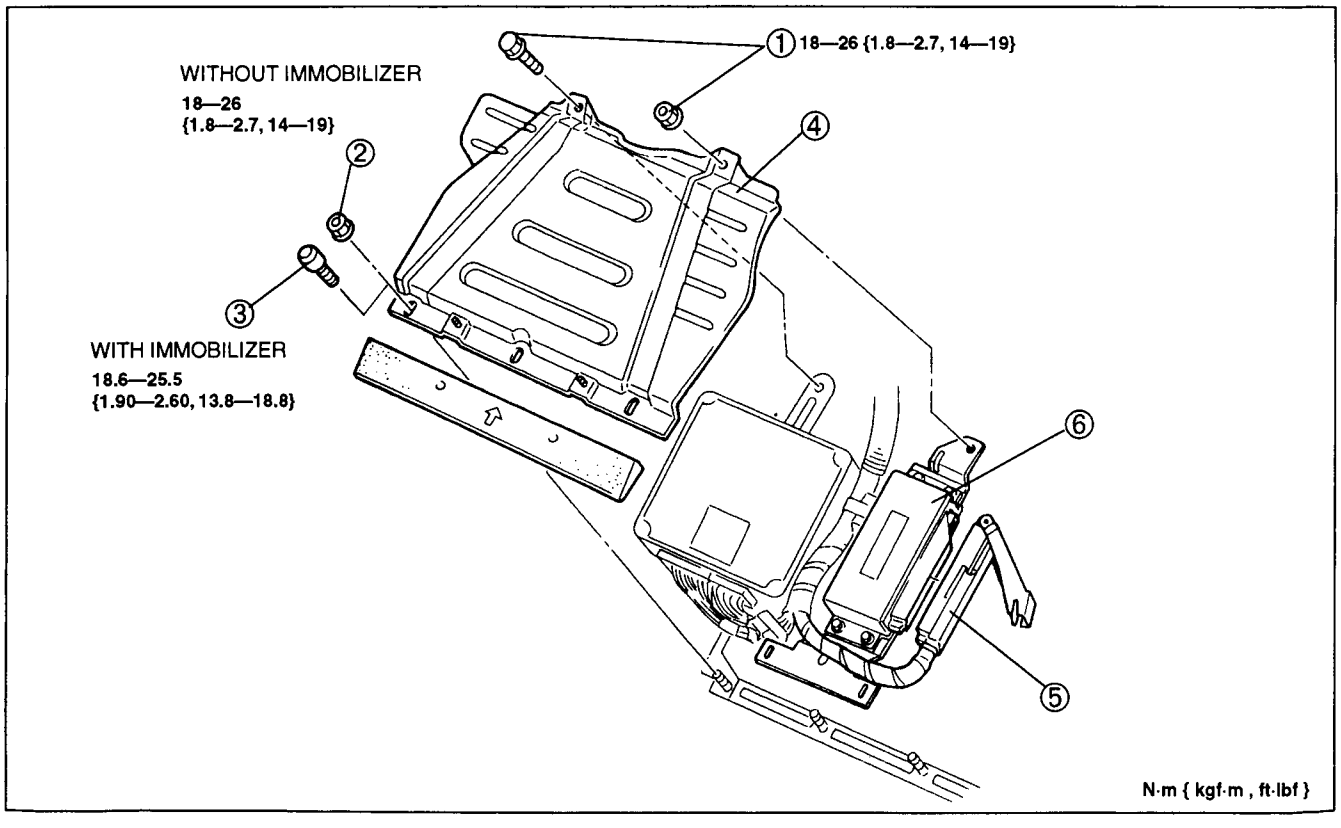
# ANTILOCK BRAKE SYSTEM (ABS)

## ABS CONTROL MODULE REMOVAL / INSTALLATION

1. Lift up the passenger side carpet.
2. Remove in the order shown in the figure.
3. Install in the reverse order of removal.

**Caution**

- **Connect the connector securely. If a poor contact occurs, the ABS may malfunction.**




1. Bolt and nut
2. Nut
3. Set bolt
   Refer to removal note
   Refer to installation note
4. Control module panel
5. Connector
6. ABS control module

**Set Bolt Removal Note**
**(Refer to Section F2.)**
**Set Bolt Installation Note**
**(Refer to Section F2.)**

**Before beginning any service procedure, refer to section T of the MX–5 Workshop Manual (1451–10–94L) for air bag system service warnings.**

# BODY

## FEATURES



## SERVICE

# OUTLINE

## OUTLINE OF CONSTRUCTION

- The rearview mirror has been redesigned.

# SUPPLEMENTAL SERVICE INFORMATION

The following changes and / or additions have been made since publication of the Mazda MX–5 Workshop Manual Supplement (1221–10–89I).

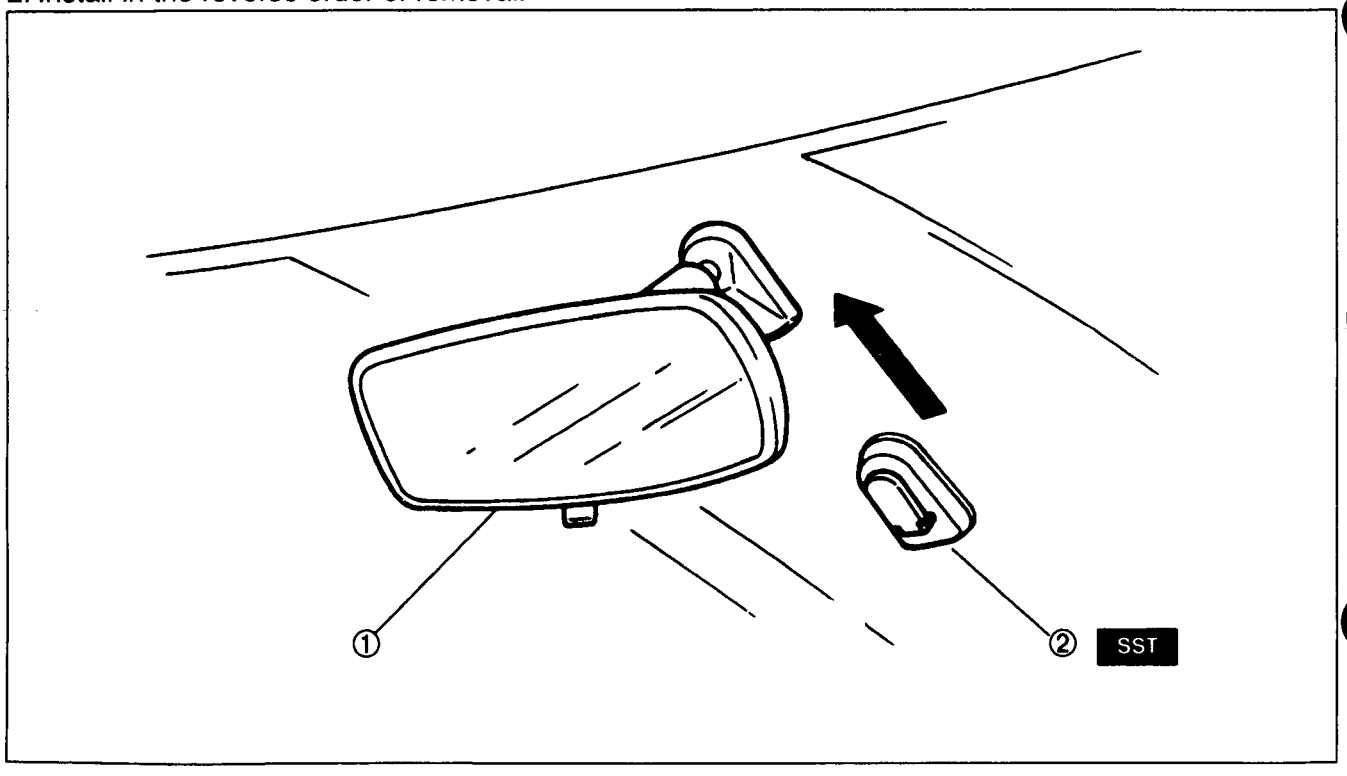
**Rearview mirror**

- Removal / Installation procedure modified

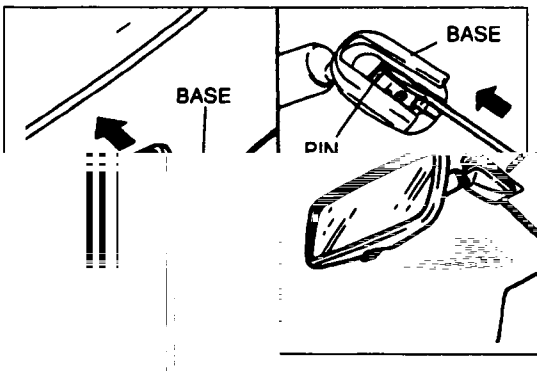
# REARVIEW MIRROR

## REARVIEW MIRROR REMOVAL / INSTALLATION

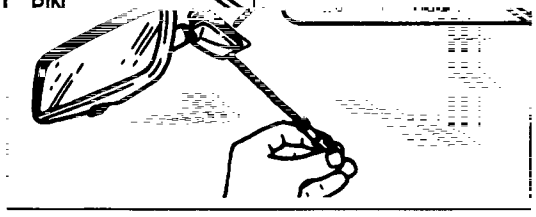
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.

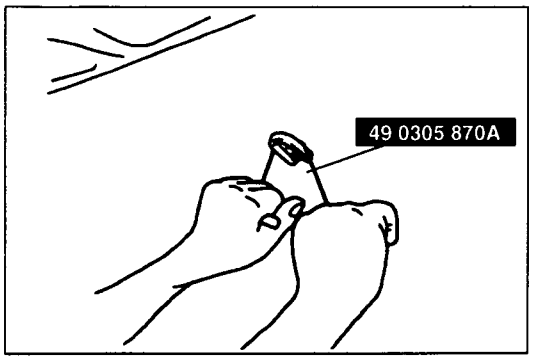



1. Rearview mirror
   Rearview mirror removal note ..... page S–3
2. Base
   Base removal note ..... page S–3
   Base installation note ..... page S–3

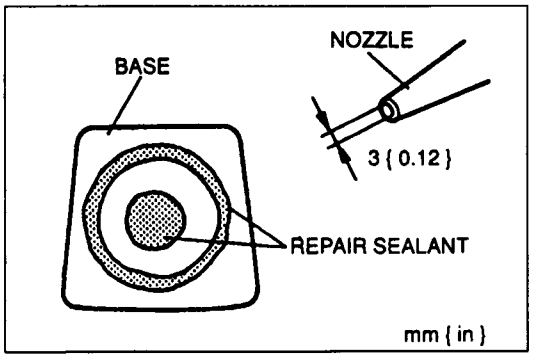



**Rearview Mirror Removal Note**
1. Insert a flathead screwdriver between the mirror and the base.
2. Push the base pin to remove the mirror.

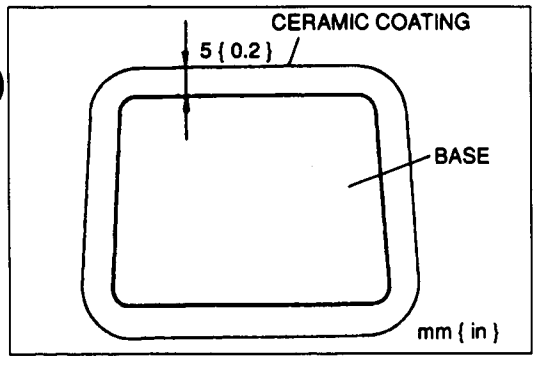





**Base Removal Note**
1. Wind each end of a wire around a bar.
2. Saw through the sealant to remove the base sawing action to spread the work over the wh wire to prevent it from breaking.




**Base Installation Note**
1. Cut away all of the original sealant by using
2. Clean and degrease the glass.
3. Apply primer to the glass and the base. Us primer on the glass and body primer on the the bonding area free of dirt and grease, and the surface. Allow the primer to dry for appr **minutes.**
4. Apply a **3 mm {0.12 in }** bead of repair sealan




5. Center the base in the ceramic coating and the glass. Use ethyl alcohol to remove any e sealant.

**Hardening time of repair sealant**

| Temperature | Surface hardening time | Time requ can be pu |
|---|---|---|
| 5 °C {41 °F } | Approx. 1.5 hr | |
| 20 °C {68 °F } | Approx. 1 hr | |
| 35 °C {95 °F } | Approx. 10 min | |

e. Use a long
hole length of

a razor knife.

se only glass
base. Keep
do not touch
oximately **30**

t to the base.

press it onto
excess repair

| ired until car t into service |
|---|
| 12 hr |
| 4 hr |
| 2 hr |

S

**Before beginning any service procedure, refer to section T of the MX–5 Workshop Manual (1451–10–94L) for air bag system service warnings.**

# BODY ELECTRICAL SYSTEM

## FEATURES



## SERVICE

# OUTLINE

## OUTLINE OF CONSTRUCTION

- Immobilizer system has been added.

## IMMOBILIZER SYSTEM

### OUTLINE

- The immobilizer system of the Mazda MX-5 is basically the same as that for the Mazda 323, 626, MX-6, XEDOS 6, and XEDOS 9.

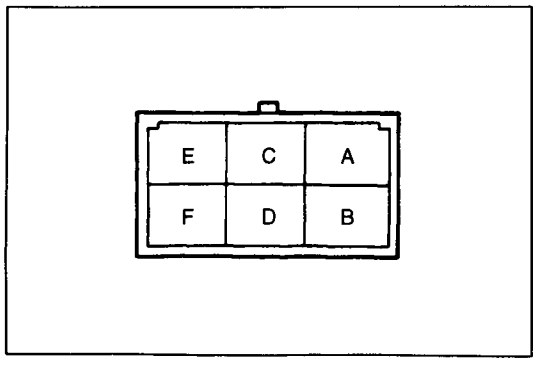
# SUPPLEMENTAL SERVICE INFORMATION

The following changes and / or additions have been made since publication of the Mazda MX-5 Workshop Manual (1221–10–89I), Mazda MX-5 Workshop Manual Supplement (1246–10–90G), Mazda MX-5 Workshop Manual Supplement (1372–10–93I), and Mazda MX–5 Workshop Manual Supplement (1451–10–94L).

**Ignition switch**
- Inspection procedure added

**Interior light**
- Removal / Installation procedure modified

**Immobilizer unit**
- Removal / Installation procedure added




# POWER SYSTEM

### IGNITION SWITCH INSPECTION

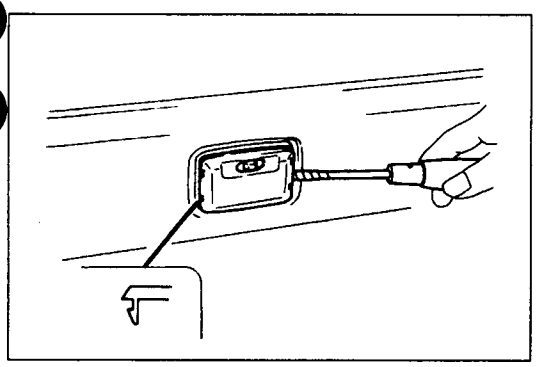
**Vehicles equipped with immobilizer system**

1. Disconnect the ignition switch connector.
2. Check for continuity between the terminals of the switch

O—O : Continuity

| Switch position \ Terminal | C | D | F | B | A | E |
|---|---|---|---|---|---|---|
| LOCK | | | | | | |
| ACC | O | | O | | | |
| ON | O | | O | O | | |
| | | O | | | O | |
| START | O | | | O | | |
| | | O | | | | O |

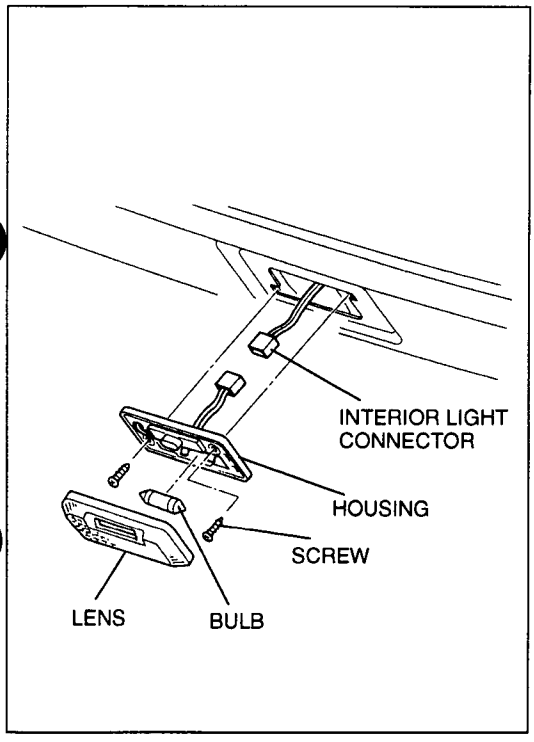
3. If not as specified, replace the steering lock. (Refer to section N, MANUAL STEERING, STEERING WHEEL AND COLUMN DISASSEMBLY/ASSEMBLY.)



## INTERIOR LIGHTING SYSTEM

### INTERIOR LIGHT REMOVAL / INSTALLATION

1. Insert a flathead screwdriver which has been wrapped in tape as shown in the figure.
2. Twist the screwdriver to remove the lens.

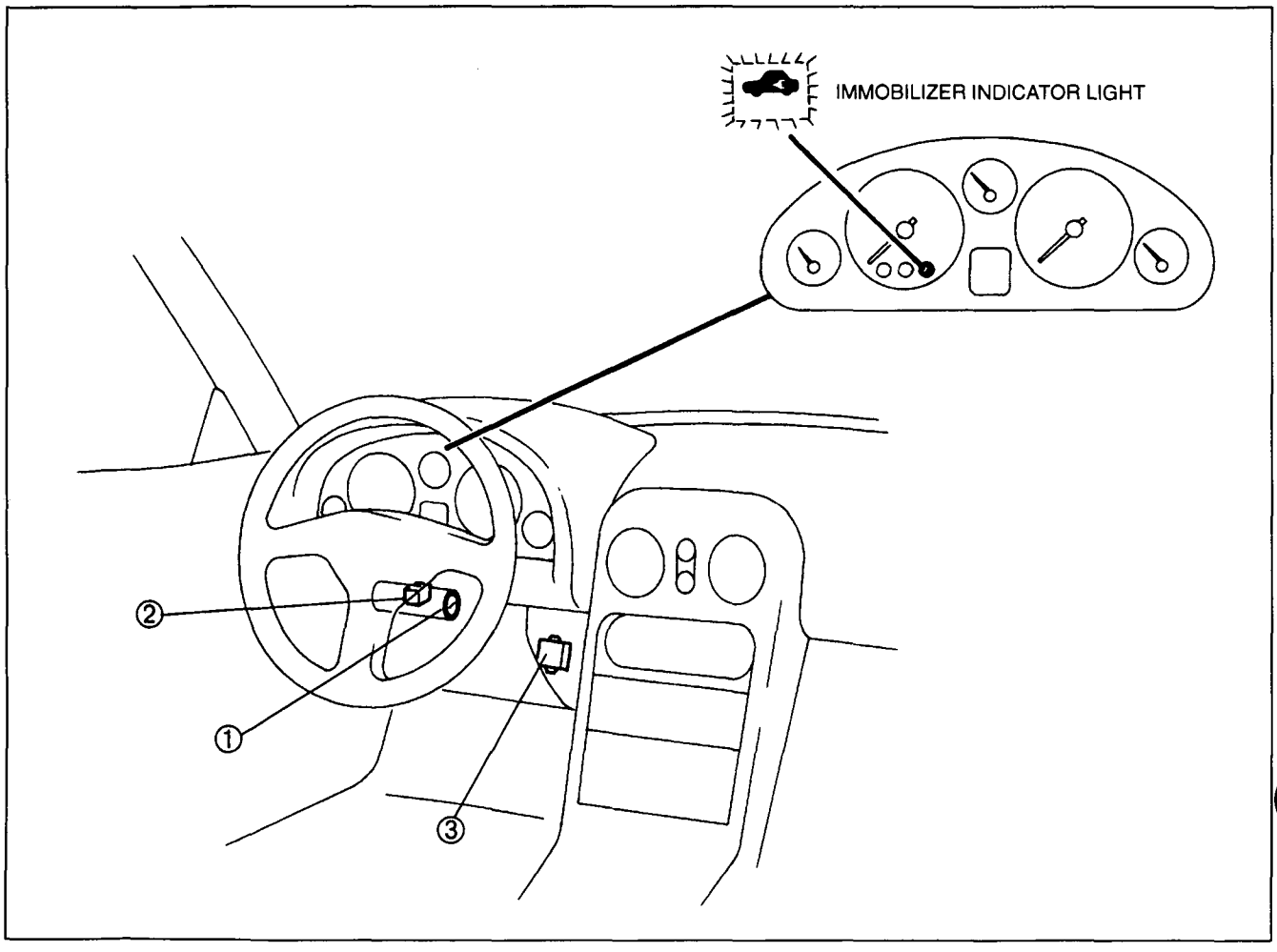



3. Remove the screw.
4. Disconnect the interior light connector.
5. Remove the housing.
6. Remove the bulb.
7. Install in the reverse order of removal.

# IMMOBILIZER SYSTEM

**Caution**
- **When an immobilizer system component (such as the ECM (PCM), immobilizer unit, coil and pre-amplifier, or the key) has failed, it must be accurately determined according to the trouble-shooting procedures or by the display of the diagnostic trouble codes prior to carrying out the service procedures. If a normal component is mistakenly replaced and the ID number and / or code word are input into the new component, then neither component can be reused on other vehicles.**

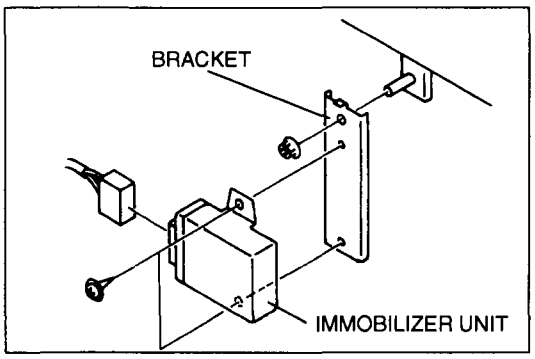
## STRUCTURAL VIEW




1. Coil
2. Pre-amplifier
3. Immobilizer unit

**Note**
- The coil and the pre-amplifier are part of the assembly with the steering lock. When the coil and/or pre-amplifier must be replaced, replace the steering lock.
  (Refer to section N, MANUAL STEERING, STEERING WHEEL AND COLUMN DISASSEMBLY / ASSEMBLY.)

**Note**
- The following service procedure for the Mazda MX–5 are basically the same as for the Mazda 323, 626, MX–6, XEDOS 6, and XEDOS 9.
  - Coil and pre-amplifier inspection
  - Immobilizer unit inspection
  - ID number input procedure
  - CODE WORD input procedure




**IMMOBILIZER UNIT REMOVAL / INSTALLATION**

1. Remove the center lower panel assembly.
2. Remove the nut.
3. Remove the bracket.
4. Disconnect the connector.
5. Remove the screws.
6. Remove the immobilizer unit.
7. Install in the reverse order of removal.

**Caution**

- **After replacing the immobilizer unit with a new one, the engine cannot be started without inputting the ID number of the keys and the code word of the new immobilizer unit. Input the ID number and code word.**

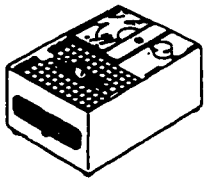
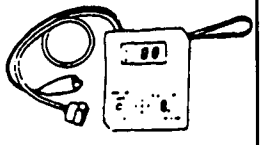
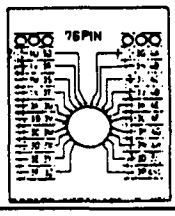
# SPECIAL TOOLS

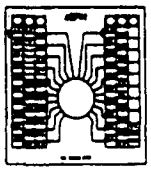
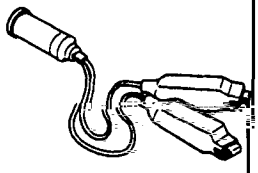
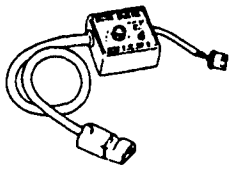
# SPECIAL TOOLS

## 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 is this list are not as necessary as tools ranked A, but all service shops should have them to perform repairs more easily and efficiently.

## CHECKERS AND OTHER EQUIPMENT

| TOOL NUMBER & DESCRIPTION | PRIORITY | ILLUSTRATION |
|---|---|---|
| 49 9200 162A<br>Engine signal monitor | A |  |
| 49 T018 902<br>Harness adapter | A |  |
| 49 H018 9A1<br>Self-Diagnosis checker | A |  |
| 49 F018 903<br>Sheet (BP) | A |  |

| TOOL NUMBER & DESCRIPTION | PRIORITY | ILLUSTRATION |
|---|---|---|
| 49 G018 906<br>Sheet (B6) | A |  |
| 49 D088 008<br>Harness adapter power | A |  |
| 49 B019 9A0<br>System selector | A |  |