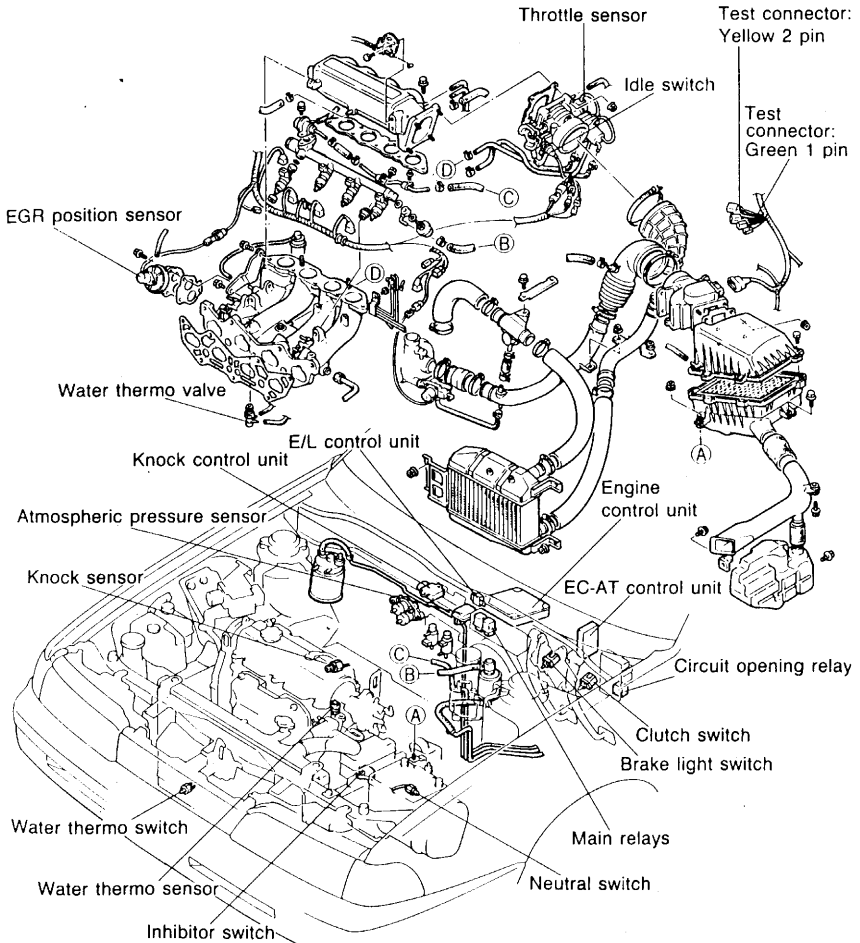


# FUEL AND EMISSION CONTROL SYSTEMS (TURBO)

|  |        |  |        |
|--|--------|--|--------|
| <b>OUTLINE</b> .....                                     | 4B— 2  | PULSATION DAMPER .....   | 4B— 59 |
| SYSTEM DIAGRAM .....                                     | 4B— 2  | INJECTOR .....   | 4B— 59 |
| COMPONENT LOCATION .....                                 | 4B— 3  | TRANSFER PUMP CONTROL<br>SYSTEM (4 WHEEL STEERING) .....       | 4B— 61 |
| VACUUM HOSE ROUTING<br>DIAGRAM .....                     | 4B— 6  | PRESSURE REGULATOR<br>CONTROL SYSTEM .....                     | 4B— 63 |
| SPECIFICATIONS .....                                     | 4B— 7  | COMPONENT DESCRIPTIONS .....                                   | 4B— 64 |
| <b>TROUBLESHOOTING GUIDE</b> .....                       | 4B— 8  | TROUBLESHOOTING .....  | 4B— 64 |
| <b>TROUBLESHOOTING WITH SST</b> ..                       | 4B— 10 | REPLACEMENT .....  | 4B— 66 |
| INSPECTION PROCEDURE .....                               | 4B— 11 | FUEL TANK .....  | 4B— 70 |
| AFTER-REPAIR PROCEDURE .....                             | 4B— 11 | <b>DECELERATION CONTROL<br/>SYSTEM</b> .....                   | 4B— 73 |
| PRINCIPLE OF CODE CYCLE .....                            | 4B— 13 | COMPONENT DESCRIPTIONS .....                                   | 4B— 74 |
| CODE NUMBER .....  | 4B— 14 | TROUBLESHOOTING .....  | 4B— 74 |
| <b>SWITCH MONITOR FUNCTION</b> .....                     | 4B— 30 | <b>ELECTRONIC SPARK ADVANCE<br/>(ESA) CONTROL SYSTEM</b> ..... | 4B— 76 |
| INSPECTION PROCEDURE .....                               | 4B— 31 | COMPONENT DESCRIPTIONS .....                                   | 4B— 77 |
| <b>IDLE ADJUSTMENT</b> .....                             | 4B— 34 | TROUBLESHOOTING .....  | 4B— 78 |
| IDLE SPEED .....   | 4B— 34 | <b>EXHAUST GAS RECIRCULATION<br/>(EGR) SYSTEM</b> .....        | 4B— 80 |
| IDLE MIXTURE .....                                       | 4B— 34 | COMPONENT DESCRIPTION .....                                    | 4B— 81 |
| <b>INTAKE AIR SYSTEM</b> .....                           | 4B— 35 | TROUBLESHOOTING .....  | 4B— 81 |
| COMPONENT DESCRIPTIONS .....                             | 4B— 35 | <b>EVAPORATIVE EMISSION<br/>CONTROL (EEC) SYSTEM</b> .....     | 4B— 85 |
| REMOVAL .....  | 4B— 36 | <b>POSITIVE CRANKCASE<br/>VENTILATION (PCV) SYSTEM</b> .....   | 4B— 86 |
| PARTS INSPECTION .....                                   | 4B— 37 | <b>EXHAUST SYSTEM</b> .....                                    | 4B— 87 |
| REPLACEMENT .....  | 4B— 38 | <b>CONTROL SYSTEM</b> .....                                    | 4B— 88 |
| INSTALLATION .....                                       | 4B— 39 | RELATIONSHIP CHART .....                                       | 4B— 89 |
| <b>IDLE SPEED CONTROL (ISC)<br/>SYSTEM</b> .....         | 4B— 41 | EGI MAIN FUSE .....  | 4B— 91 |
| COMPONENT DESCRIPTIONS .....                             | 4B— 42 | MAIN RELAY .....   | 4B— 91 |
| TROUBLESHOOTING .....                                    | 4B— 43 | CIRCUIT OPENING RELAY .....                                    | 4B— 91 |
| <b>TURBOCHARGING SYSTEM</b> .....                        | 4B— 46 | ENGINE CONTROL UNIT .....                                      | 4B— 92 |
| COMPONENT DESCRIPTIONS .....                             | 4B— 46 | NEUTRAL SWITCH .....   | 4B— 97 |
| TROUBLESHOOTING .....                                    | 4B— 47 | CLUTCH SWITCH .....  | 4B— 97 |
| OPERATION NOTE .....                                     | 4B— 47 | BRAKE LIGHT SWITCH .....                                       | 4B— 97 |
| SERVICE NOTE .....                                       | 4B— 47 | P/S PRESSURE SWITCH .....                                      | 4B— 97 |
| TURBOCHARGER BOOST<br>PRESSURE .....                     | 4B— 47 | INHIBITOR SWITCH .....   | 4B— 98 |
| WASTE GATE .....   | 4B— 48 | E/L CONTROL UNIT .....   | 4B— 98 |
| AIR BYPASS VALVE .....                                   | 4B— 48 | AIR FLOW METER .....   | 4B— 99 |
| INTERCOOLER .....  | 4B— 48 | THROTTLE SENSOR .....  | 4B—100 |
| OVERBOOST WARNING .....                                  | 4B— 48 | IDLE SWITCH .....  | 4B—102 |
| TURBOCHARGER .....                                       | 4B— 48 | WATER THERMO SENSOR .....                                      | 4B—103 |
| <b>FUEL SYSTEM</b> .....                                 | 4B— 52 | WATER THERMO SWITCH .....                                      | 4B—103 |
| COMPONENT DESCRIPTIONS .....                             | 4B— 53 | OXYGEN SENSOR .....  | 4B—103 |
| TROUBLESHOOTING .....                                    | 4B— 54 | ATMOSPHERIC PRESSURE<br>SENSOR .....                           | 4B—104 |
| FUEL PRESSURE RELEASE AND<br>SERVICING FUEL SYSTEM ..... | 4B— 55 |  |        |
| MULTI-PRESSURE TESTER .....                              | 4B— 56 |  |        |
| FUEL PRESSURE .....                                      | 4B— 57 |  |        |
| FUEL PUMP .....  | 4B— 58 |  |        |

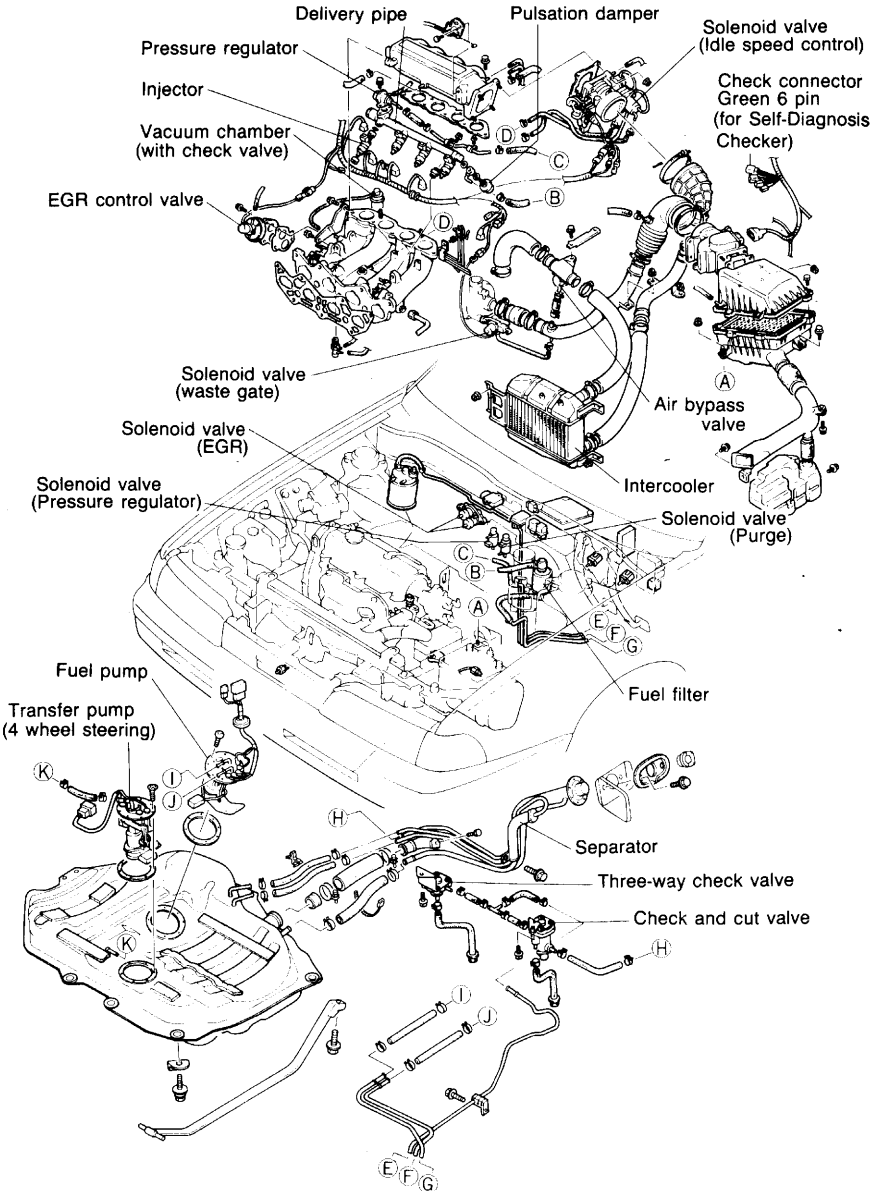


## COMPONENT LOCATION Input Devices

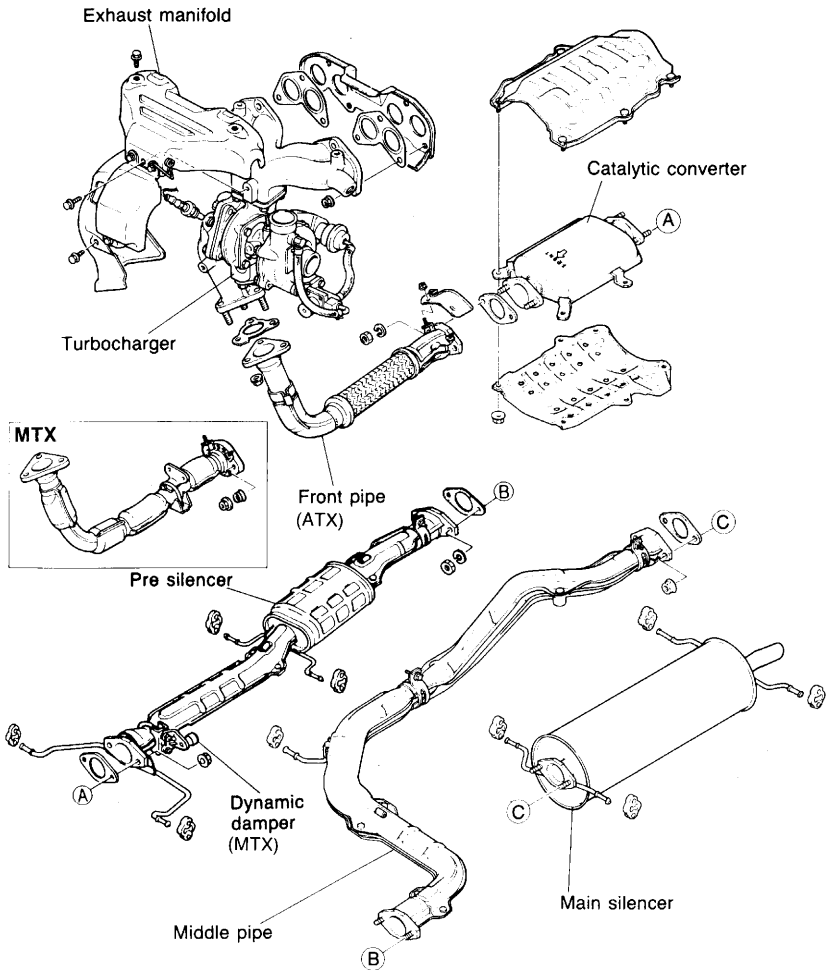


# 4B OUTLINE

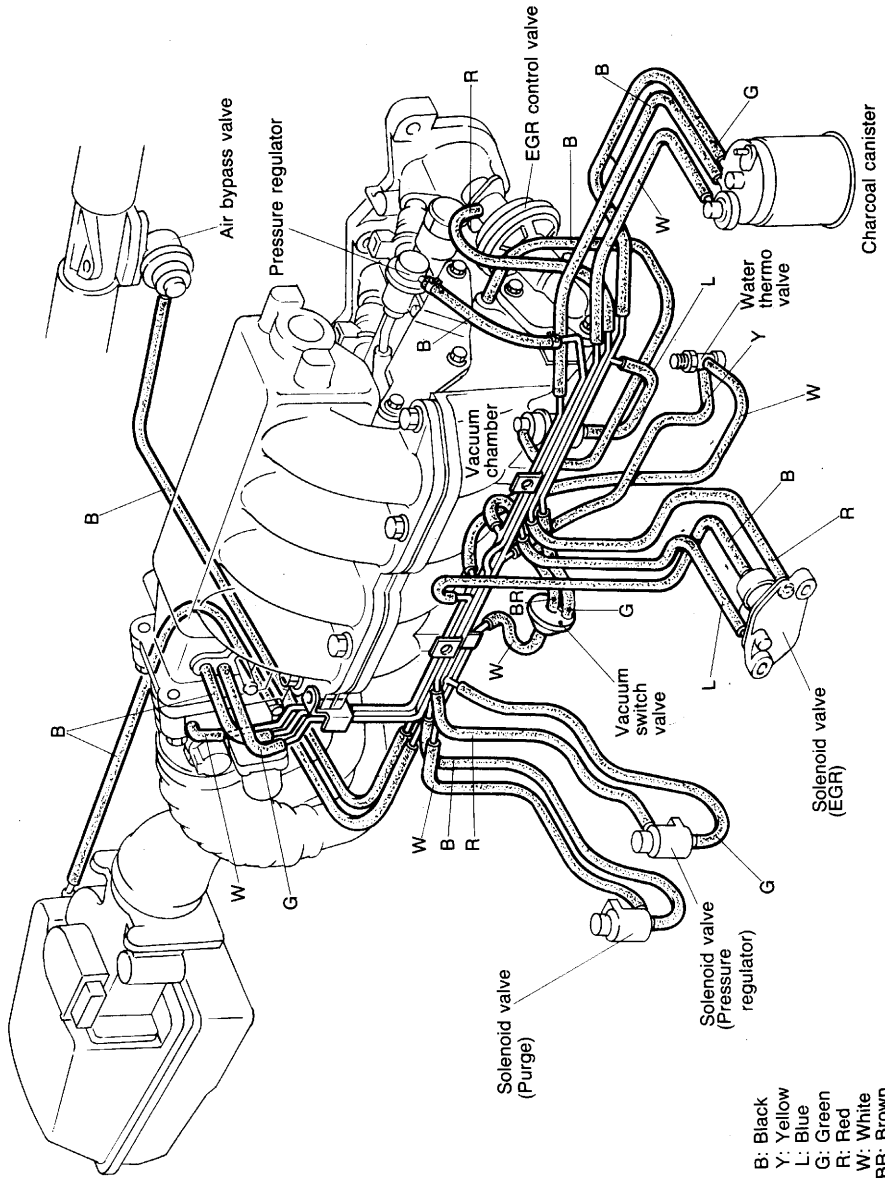
## Fuel and Output Devices



Exhaust System



## VACUUM HOSE ROUTING DIAGRAM



## SPECIFICATIONS

| Item                            |                                | Engine type  | Turbo Engine  |
|---------------------------------|--------------------------------|--|---|
| Idle speed                      |                                | rpm  | 750 ± 25 (ATX: P range)*  |
| <b>Throttle body</b>            |                                |  |   |
| Type                            |                                | Horizontal draft (2-barrel)  |   |
| Throat diameter                 | mm (in)                        | No. 1  | MTX: 40 (1.6), ATX: 46 (1.8)  |
|                                 |                                | No. 2  | MTX: 46 (1.8), ATX: 40 (1.6)  |
| <b>Air flow meter</b>           |                                |  |   |
| Resistor                        | Ω                              | E2—Vs  | Fully closed: 20—400 Fully open: 20—1,000                                     |
|                                 |                                | E2—VC  | 100—400   |
|                                 |                                | E2—VB  | 200—400   |
|                                 |                                | E2—THA   | -20°C (-4°F) 13,600—18,400<br>20°C (68°F) 2,210—2,690<br>60°C (140°F) 493—667 |
| <b>Fuel pump</b>                |                                |  |   |
| Type                            |                                | Impeller (in tank)   |   |
| Output pressure                 | kPa (kg/cm <sup>2</sup> , psi) | Main pump: 441—588 (4.5—6.0, 64—85)<br>Transfer pump: 39 (0.4, 5.7) max.           |   |
| Feeding capacity                | cc (cu in)/10 seconds          | Main pump: 220 (13.4) min.<br>Transfer pump: 190 (11.6) min.                       |   |
| <b>Fuel filter</b>              |                                |  |   |
| Type                            | Low pressure side              |  | Nylon element   |
|                                 | High pressure side             |  | Paper element   |
| <b>Pressure regulator</b>       |                                |  |   |
| Type                            |                                | Diaphragm  |   |
| Regulating pressure             | kPa (kg/cm <sup>2</sup> , psi) | 235—275 (2.4—2.8, 34—40)   |   |
| <b>Injector</b>                 |                                |  |   |
| Type                            |                                | High-ohmic   |   |
| Type of drive                   |                                | Voltage  |   |
| Resistance                      | Ω                              | 11—15  |   |
| Injection amount                | cc (cu in)/15 seconds          | 73—90 (4.45—5.49)  |   |
| <b>Idle speed control valve</b> |                                |  |   |
| Solenoid resistance             | Ω                              | 6.3—9.9  |   |
| <b>Turbocharger</b>             |                                |  |   |
| Cooling method                  |                                | Engine coolant   |   |
| Lubrication method              |                                | Engine oil   |   |
| Boost pressure (Maximum)        | kPa (kg/cm <sup>2</sup> , psi) | 60 (0.61, 8.7): Solenoid duty value 100%<br>45 (0.46, 6.5): Solenoid duty value 0% |   |
| <b>Fuel tank</b>                |                                |  |   |
| Capacity                        | liters (US gal, Imp gal)       | 60 (15.9, 13.2), 57 (15.0, 12.5): 4-wheel steering vehicle                         |   |
| <b>Air cleaner</b>              |                                |  |   |
| Element type                    |                                | Oil permeated  |   |
| <b>Fuel</b>                     |                                |  |   |
| Specification                   |                                | Unleaded premium (Unleaded regular)  |   |

\* With test connector grounded

86U048-002

# 4B TROUBLESHOOTING GUIDE

## TROUBLESHOOTING GUIDE

This troubleshooting guide shows the malfunction numbers and the symptoms of various failures. Perform troubleshooting as described below.

| Possible cause                    | Input sensors and switches |                         |                         |                         |              |                |                     |                          |                 |                             |               |                     |                 |                                     |                        |                                   | Output solenoid valves          |                                     |                             |  |  |  |
|-----------------------------------|----------------------------|-------------------------|-------------------------|-------------------------|--------------|----------------|---------------------|--------------------------|-----------------|-----------------------------|---------------|---------------------|-----------------|-------------------------------------|------------------------|-----------------------------------|---------------------------------|-------------------------------------|-----------------------------|--|--|--|
|                                   | Ignition pulse             | Distributor (No signal) | Distributor (G1 signal) | Distributor (G2 signal) | Knock sensor | Air flow meter | Water thermo sensor | Intake air thermo sensor | Throttle sensor | Atmospheric pressure sensor | Oxygen sensor | EGR position sensor | Feedback system | Solenoid valve (Pressure regulator) | Solenoid valve (Purge) | Solenoid valve (EGR, vacuum side) | Solenoid valve (EGR, vent side) | Solenoid valve (Idle speed control) | Solenoid valve (Waste gate) |  |  |  |
| Symptom                           | 4B<br>16                   | 4B<br>16                | 4B<br>17                | 4B<br>17                | 4B<br>18     | 4B<br>19       | 4B<br>20            | 4B<br>21                 | 4B<br>22        | 4B<br>23                    | 4B<br>24      | 4B<br>25            | 4B<br>26        | 4B<br>26                            | 4B<br>27               | 4B<br>27                          | 4B<br>28                        | 4B<br>28                            | 4B<br>28                    |  |  |  |
| 1 Fault Indicated by SST Code No. | 01                         | 02                      | 03                      | 04                      | 05           | 08             | 09                  | 10                       | 12              | 14                          | 15            | 16                  | 17              | 25                                  | 26                     | 28                                | 29                              | 34                                  | 42                          |  |  |  |

| Symptom |  | Possible cause   |
|---------|--|--|
| 1       | Fault Indicated by SST Code No.                | 01-42  |
| 2       | Hard start or won't start (Crank OK)           | 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42   |
| 3       | Engine stalls                                  | While warming up: 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42<br>After warming up: 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42 |
| 4       | Rough idle                                     | While warming up: 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42<br>After warming up: 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42 |
| 5       | High idle speed after warming up               | 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42   |
| 6       | Poor acceleration, hesitation or lack of power | 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42   |
| 7       | Runs rough on deceleration                     | 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42   |
| 8       | Afterburn in exhaust system                    | 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42   |
| 9       | Poor fuel consumption                          | 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42   |
| 10      | Excessive oil consumption                      | 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42   |
| 11      | Engine stalls or rough after hot starting      | 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42   |
| 12      | Knocking                                       | 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42   |
| 13      | Abnormal noise or vibration                    | 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42   |
| 14      | Fails emission test                            | 01-04, 08-10, 12-14, 15, 16-17, 25-26, 28-29, 34, 42   |

### TROUBLESHOOTING PROCEDURE

**Note**  
Step 1 under symptom is to quickly determine what system or unit may be at fault by use of the SST. (Self-Diagnosis Checker 49 H018 9A1)

**1st:** Check input sensors and output solenoid valves with the SST. (Refer to page 4B-11.)

**2nd:** Check other switches with the SST. (Refer to page 4B-31.)

**3rd:** Check the following items:

|  |  |
|--|--|
| <p><b>Electrical system</b></p> <ul style="list-style-type: none"> <li>1) Battery condition</li> <li>2) Fuses</li> </ul>   | <p><b>Ignition system</b></p> <ul style="list-style-type: none"> <li>1) Ignition spark</li> <li>2) Ignition timing (with test connector grounded)</li> </ul>   |
| <p><b>Fuel system</b></p> <ul style="list-style-type: none"> <li>1) Fuel level</li> <li>2) Fuel leakage</li> <li>3) Fuel filter</li> <li>4) Idle speed (with test connector grounded)</li> </ul> | <p><b>Intake air system</b></p> <ul style="list-style-type: none"> <li>1) Air cleaner element</li> <li>2) Vacuum or air leakage</li> <li>3) Vacuum hose routing</li> <li>4) Accelerator cable</li> </ul> |
| <p><b>Engine</b></p> <ul style="list-style-type: none"> <li>1) Compression</li> <li>2) Overheating</li> </ul>  | <p><b>Others</b></p> <ul style="list-style-type: none"> <li>1) Clutch slippage</li> <li>2) Brake dragging</li> </ul>   |

**4th:** Check Fuel and Emission Control Systems. (Refer to page 4B-9.)



# TROUBLESHOOTING GUIDE 4B

The Troubleshooting Guide lists the systems most likely to cause a given symptom. After finding systems to check, refer to the pages shown for detailed guides for each system.

|         |    | Fuel and Emission Control Systems |       |   |       |  |       |                                   |       |   |       |  |       |   |  |  |  |   |  |                                |  |   |  |
|---------|----|-----------------------------------|-------|---|-------|--|-------|-----------------------------------|-------|---|-------|--|-------|---|--|--|--|---|--|--------------------------------|--|---|--|
|         |    | Possible cause                    |       | Intake Air System<br>(Poor connection of components, throttle body) |       | Fuel System<br>(Fuel injection, Fuel pressure) |       | Pressure Regulator Control System |       | Idle Speed Control (ISC) System<br>(Air valve, Idle speed control solenoid malfunction) |       | Turbocharging System<br>(Oil & water passage, Turbine and compressor wheels malfunction) |       | Electronic Spark Advance (ESA)<br>System (Knock control system) |  | EGR System<br>(EGR control valve stuck and open) |  | EEC System<br>(Vacuum switch valve, No.1 purge valve malfunction) |  | PCV System<br>(System clogged) |  | Deceleration System<br>(Fuel cut operation malfunction) |  |
| Symptom |    | Page                              | 4B-35 | 4B-52   | 4B-63 | 4B-41  | 4B-46 | 4B-76                             | 4B-80 | 4A-67   | 4A-72 | 4B-73  | 4A-73 |   |  |  |  |   |  |                                |  |   |  |
| Symptom | 2  | 3                                 | 2     |   |       |  |       | 1                                 |       |   |       |  |       |   |  |  |  |   |  |                                |  |   |  |
|         | 3  | 4                                 | 3     |   | 1     |  |       |                                   | 2     |   |       |  |       |   |  |  |  |   |  |                                |  |   |  |
|         |    | 5                                 | 4     |   | 2     |  |       |                                   | 3     |   | 1     |  |       |   |  |  |  |   |  |                                |  |   |  |
|         | 4  | 5                                 | 4     |   | 1     |  |       |                                   | 3     |   | 2     |  |       |   |  |  |  |   |  |                                |  |   |  |
|         |    | 6                                 | 5     |   | 2     |  |       |                                   | 3     | 4   | 1     |  |       |   |  |  |  |   |  |                                |  |   |  |
|         | 5  | 2                                 |       |   |       | 1  |       |                                   |       |   |       |  |       |   |  |  |  |   |  |                                |  |   |  |
|         | 6  | 3                                 | 4     |   |       |  | 6     |                                   | 1     | 2   |       |  | 5     |   |  |  |  |   |  |                                |  |   |  |
|         | 7  |                                   | 3     |   |       | 2  |       |                                   |       |   |       | 1  |       |   |  |  |  |   |  |                                |  |   |  |
|         | 8  | 3                                 | 4     |   | 1     |  |       |                                   |       |   |       | 2  |       |   |  |  |  |   |  |                                |  |   |  |
|         | 9  |                                   | 2     |   |       |  |       |                                   | 3     |   |       | 1  | 4     |   |  |  |  |   |  |                                |  |   |  |
|         | 10 |                                   |       |   |       |  | 1     |                                   |       |   |       |  |       |   |  |  |  |   |  |                                |  |   |  |
|         | 11 |                                   | 2     | 1   |       |  |       |                                   |       |   |       |  |       |   |  |  |  |   |  |                                |  |   |  |
|         | 12 |                                   |       |   |       |  | 2     | 1                                 |       |   |       |  |       |   |  |  |  |   |  |                                |  |   |  |
|         | 13 |                                   |       |   |       |  | 1     |                                   |       |   |       |  |       |   |  |  |  |   |  |                                |  |   |  |
| 14      | 6  | 7                                 |       | 4   |       |  |       |                                   | 2     | 5   | 3     | 1  |       |   |  |  |  |   |  |                                |  |   |  |

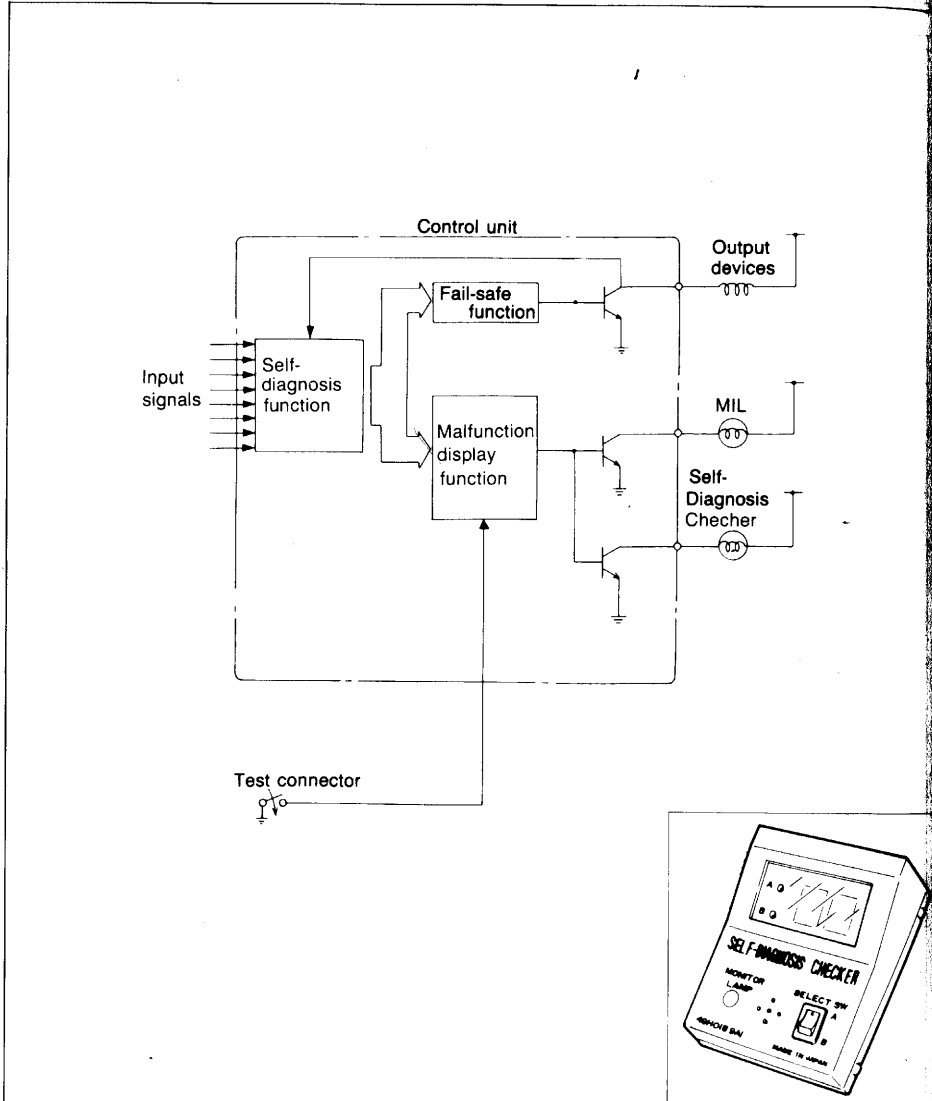
96U04B-003

The numbers of the list show the priorities of inspections from the most possible to that with the lowest possibility. These were determined on the following basis:

- Ease of inspection
- Most possible system
- Most possible point in system

# 4B TROUBLESHOOTING WITH SST

## TROUBLESHOOTING WITH SST

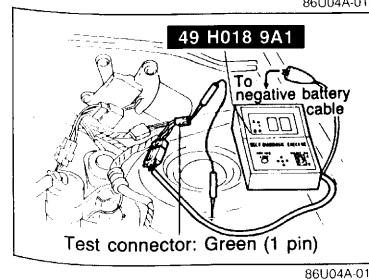
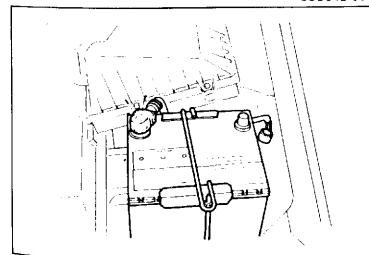
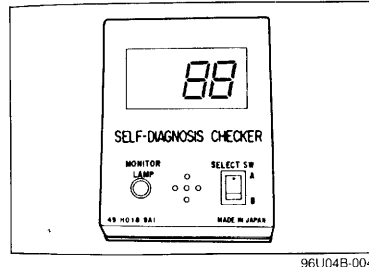
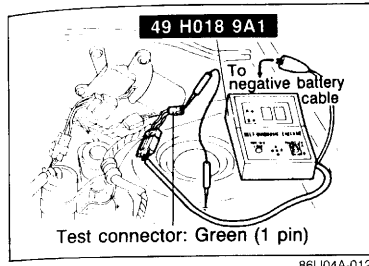
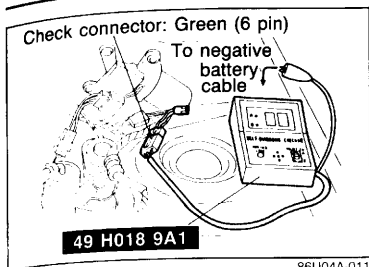


86U04A

When troubles occur in the main input devices or output devices, check for the cause using the **SST**. Failures of each input and output device are indicated and retrieved from the control unit as malfunction code numbers.

### Note

The control unit constantly checks for malfunction of the input devices. But, the control unit checks for malfunction of output devices only in a 3 second period after the ignition switch turned ON and the test connector is grounded.



## INSPECTION PROCEDURE

1. Connect the **SST** to the check connector. (Green, 6-pin) and the negative battery terminal.
2. Set the select switch to position A.

### Note

The check connector is located at the rear of the left side wheel housing.

3. Ground the test connector (Green, 1-pin) with a jumper wire.

### Note

The test connector is located near the Self-Diagnosis Checker check connector.

4. Turn the ignition switch ON.
5. Verify that **88** flashes on the digital display and that the buzzer sounds for **three seconds** after turning the ignition switch ON.
6. If **88** does not flash, check the main relay (Refer to page 4B—91), power supply circuit, and check connector wiring.
7. If **88** flashes and the buzzer sounds continuously for more than **20 seconds**, replace the engine control unit and perform steps 3 and 4 again.
8. Note the code numbers and check for the causes by referring to the check sequences shown on pages **from 4B—16 to 4B—29**. Repair as necessary.

### Note

Cancel the code numbers by performing the after-repair procedure after repairing.

## AFTER-REPAIR PROCEDURE

1. Cancel the memory of malfunctions by disconnecting the negative battery cable and depressing the brake pedal for **at least five seconds**; then reconnect the negative battery cable.
2. Connect the **SST** to the check connector.
3. Ground the test connector (Green, 1-pin) with a jumper wire.

## 4B TROUBLESHOOTING WITH SST

**Ignition switch: ON  
for six seconds**

86U04A-016

4. Turn the ignition switch ON, but do not start the engine for **six seconds**.
5. Start and warm up the engine, then run it at **2,000 rpm** for **two** minutes.
6. Verify that no code numbers are displayed.

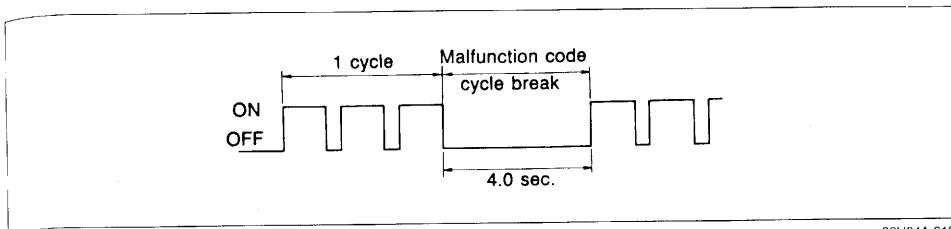
## PRINCIPLE OF CODE CYCLE

Malfunction codes are determined as shown below

86U04A-017

### 1. Code cycle break

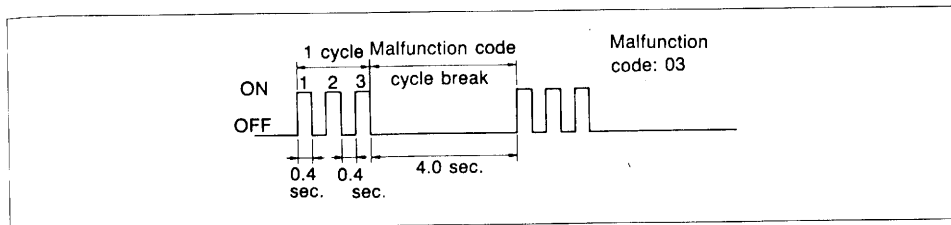
The time between malfunction code cycles is 4.0 sec (the time the light is off).



86U04A-018

### 2. Second digit of malfunction code (ones position)

The digit in the ones position of the malfunction code represents the number of times the buzzer is on 0.4 sec during one cycle.

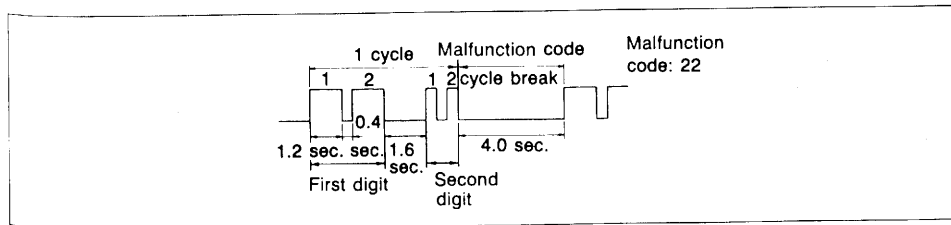


86U04A-019

### 3. First digit of malfunction code (tens position)

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





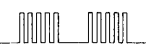








It should also be noted that the light goes off for 1.6 sec. between the long and short pulses of the buzzer.








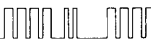
69G04C-554

# 4B TROUBLESHOOTING WITH SST

## CODE NUMBER

| Malfunction display  |   | Sensor or subsystem                       | Self-diagnosis  | Fail-safe  |
|----------------------|---|---|---|--|
| Malfunction code no. | MIL output signal pattern   |   |   |  |
| 01                   | ON <br>OFF   | Ignition pulse                            | No ignition signal  | —  |
| 02                   | ON <br>OFF   | Ne signal                                 | No Ne signal from crank angle sensor  | —  |
| 03                   | ON <br>OFF   | G1 signal                                 | No G1 signal  | Neither G1 nor G2 signal.<br>Engine stopped  |
| 04                   | ON <br>OFF   | G2 signal                                 | No G2 signal  |  |
| 05                   | ON <br>OFF   | Knock sensor and knock control unit       | Open or short circuit   | <ul style="list-style-type: none"> <li>Retards ignition timing 6° in heavy-load condition</li> <li>Waste gate opens earlier</li> </ul>     |
| 08                   | ON <br>OFF   | Air flow meter                            | Open or short circuit   | Maintains basic signal at preset value   |
| 09                   | ON <br>OFF   | Water thermo sensor                       | Open or short circuit   | Maintains constant command <ul style="list-style-type: none"> <li>35°C (95°F) for EGI</li> <li>50°C (122°F) for ISC control use</li> </ul> |
| 10                   | ON <br>OFF   | Intake air thermo sensor (air flow meter) | Open or short circuit   | Maintains constant 20°C (68°F) command   |
| 12                   | ON <br>OFF   | Throttle sensor                           | Open or short circuit   | Maintains constant command of throttle valve fully open  |
| 14                   | ON <br>OFF  | Atmospheric pressure sensor               | Open or short circuit   | Maintains constant command of sea level pressure   |
| 15                   | ON <br>OFF | Oxygen sensor                             | Sensor output continues less than 0.55V 120 sec. after engine starts (1,500 rpm)      | Cancels EGI feedback operation   |
| 16                   | ON <br>OFF | EGR position sensor                       | Open or short circuit<br>Sensor output does not match target value (incorrect output) | Cuts off EGR<br>—  |
| 17                   | ON <br>OFF | Feedback system                           | Sensor output not changed 20 sec. after engine exceeds 1,500 rpm                      | Cancels EGI feedback operation   |

86U04B-00

| Malfunction display  |   | Sensor or subsystem                 | Self-diagnosis        | Fail-safe |
|----------------------|---|-------------------------------------|-----------------------|-----------|
| Malfunction code no. | MIL output signal pattern   |                                     |                       |           |
| 25                   | ON <br>OFF | Solenoid valve (pressure regulator) | Open or short circuit | —         |
| 26                   | ON <br>OFF | Solenoid valve (purge control)      |                       | —         |
| 28                   | ON <br>OFF | Solenoid valve (EGR-vacuum)         |                       | —         |
| 29                   | ON <br>OFF | Solenoid valve (EGR-vent)           |                       | —         |
| 34                   | ON <br>OFF | Solenoid valve (Idle speed control) |                       | —         |
| 42                   | ON <br>OFF | Solenoid valve (waste gate)         |                       | —         |

86U04B-006

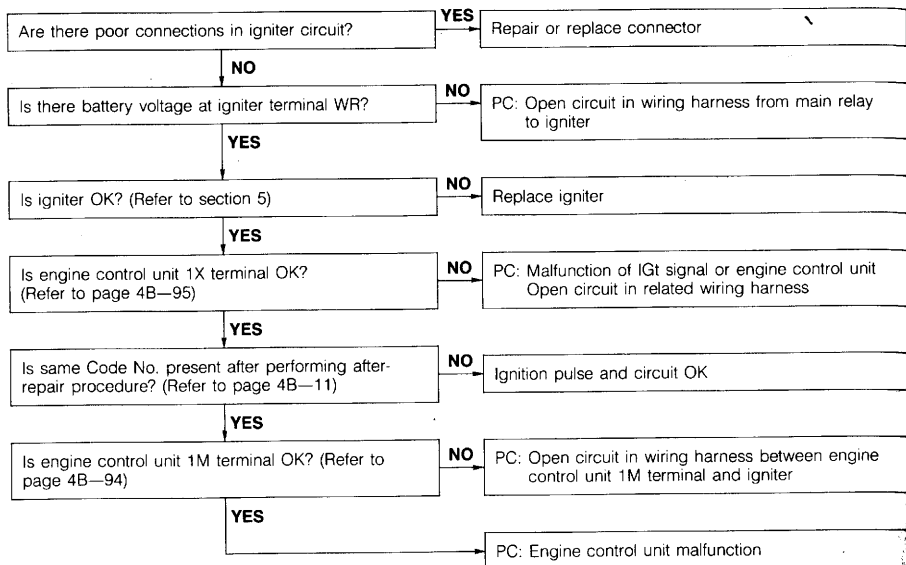
**Caution**

- a) If there is more than one failure present, the lowest number malfunction code is displayed first, the remaining codes are displayed sequentially.
- b) After repairing a failure, turn off the ignition switch and disconnect the negative battery cable and depress the brake pedal for at least 5 seconds to erase the memory of a malfunction code.

# 4B TROUBLESHOOTING WITH SST

## Code No. 01 (Ignition pulse)

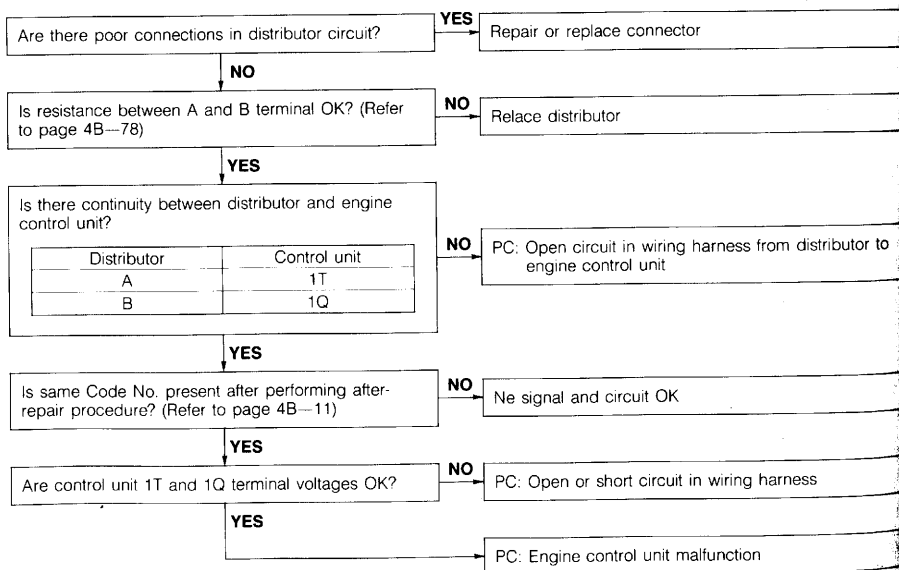
PC: Possible Cause



96U04B-005

## Code No. 02 (Ne signal)

PC: Possible Cause



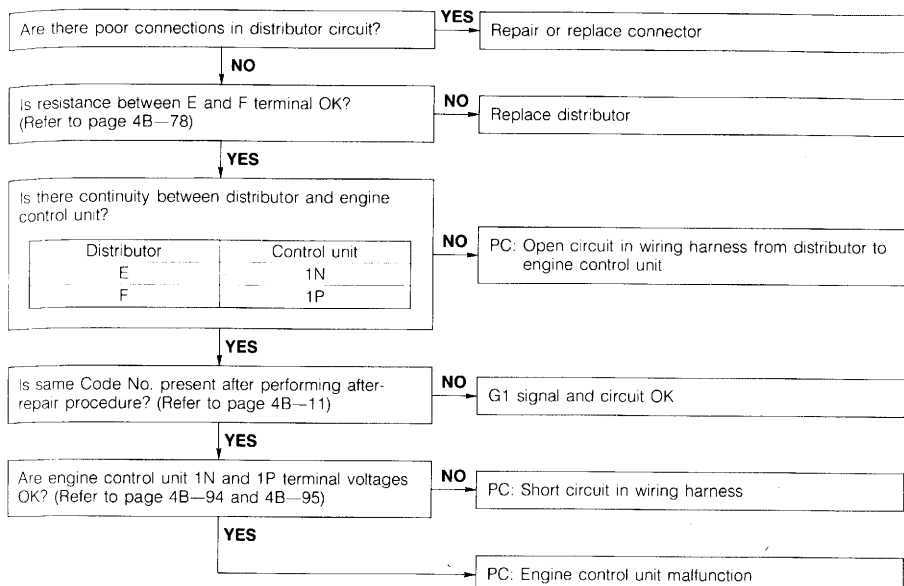
| Distributor | Control unit |
|-------------|--------------|
| A           | 1T           |
| B           | 1Q           |

96U04B-00



## Code No. 03 (G1 signal)

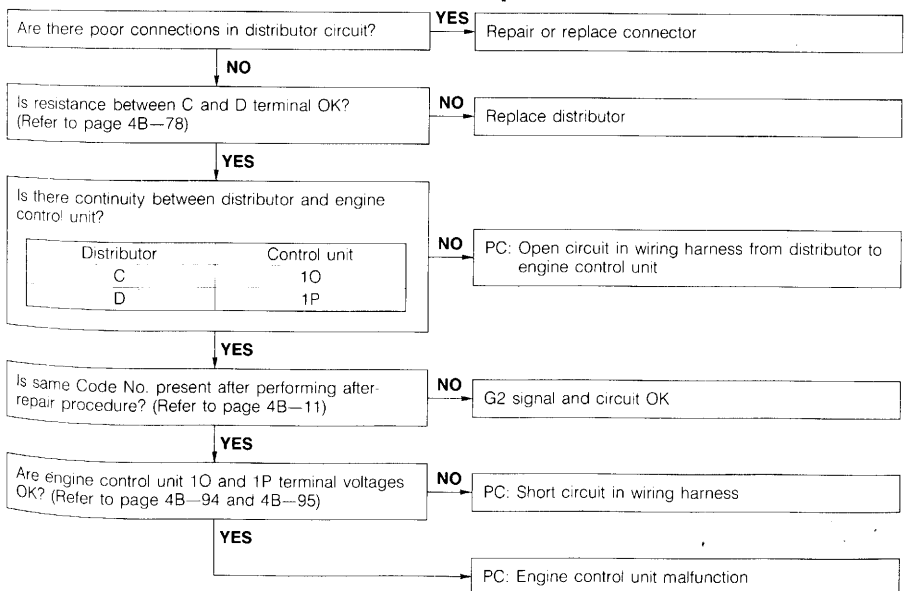
**PC: Possible Cause**



96U04B-007

## Code No. 04 (G2 signal)

**PC: Possible Cause**

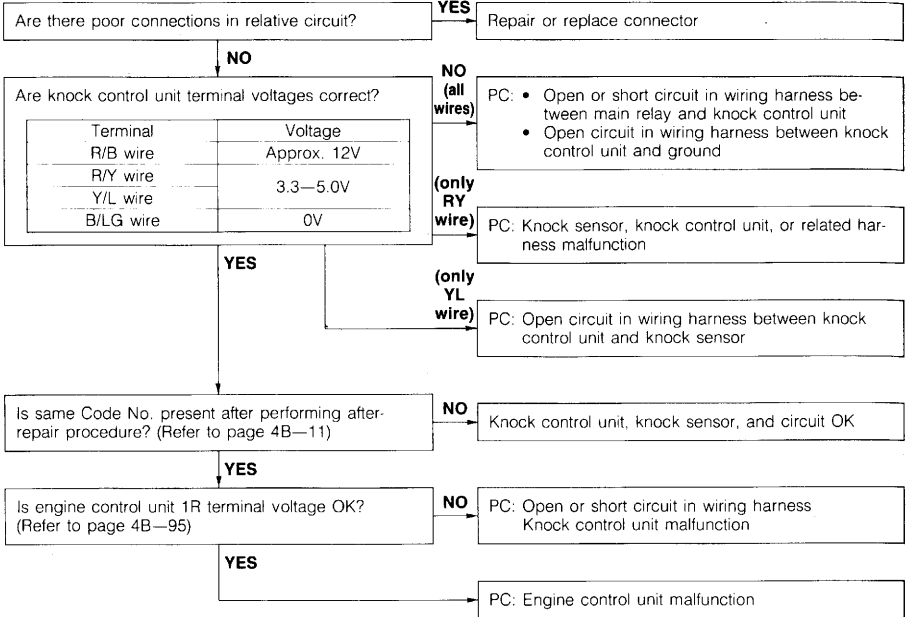


76U04B-008

# 4B TROUBLESHOOTING WITH SST

## Code No. 05 (Knock sensor and Knock control unit)

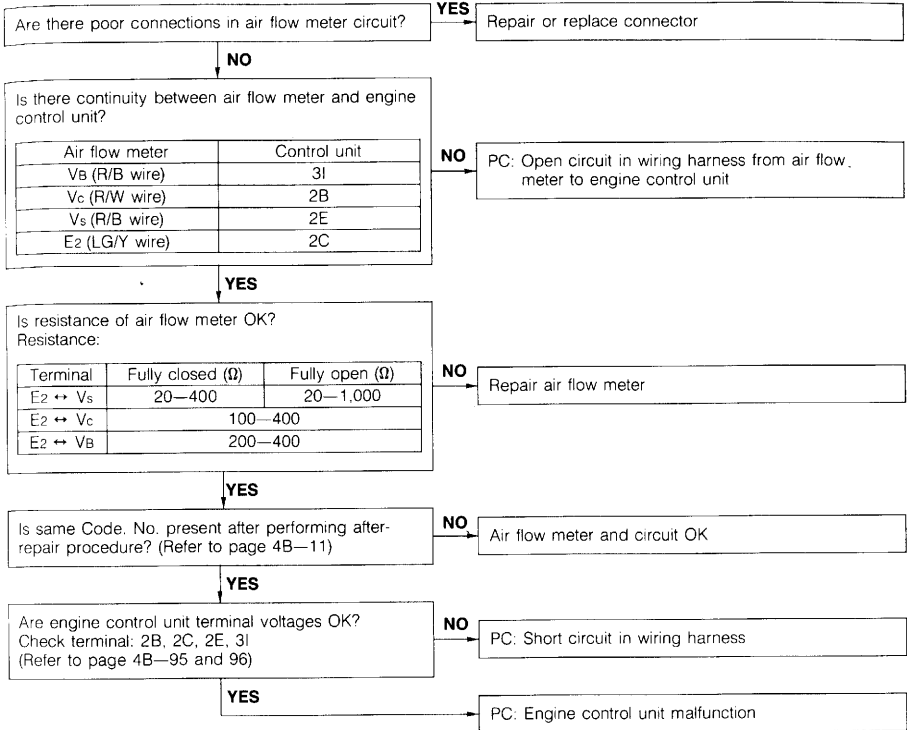
PC: Possible Cause



96U04B-009

## Code No. 08 (Air flow meter)

**PC: Possible Cause**

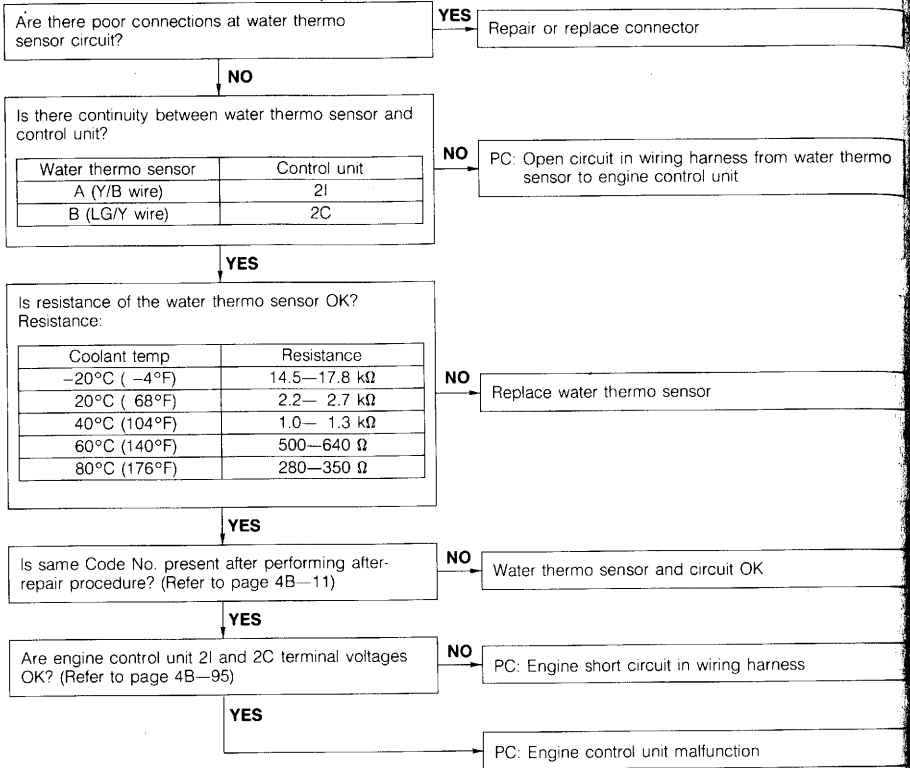


96U04B-010

# 4B TROUBLESHOOTING WITH SST

## Code No. 09 (Water thermo sensor)

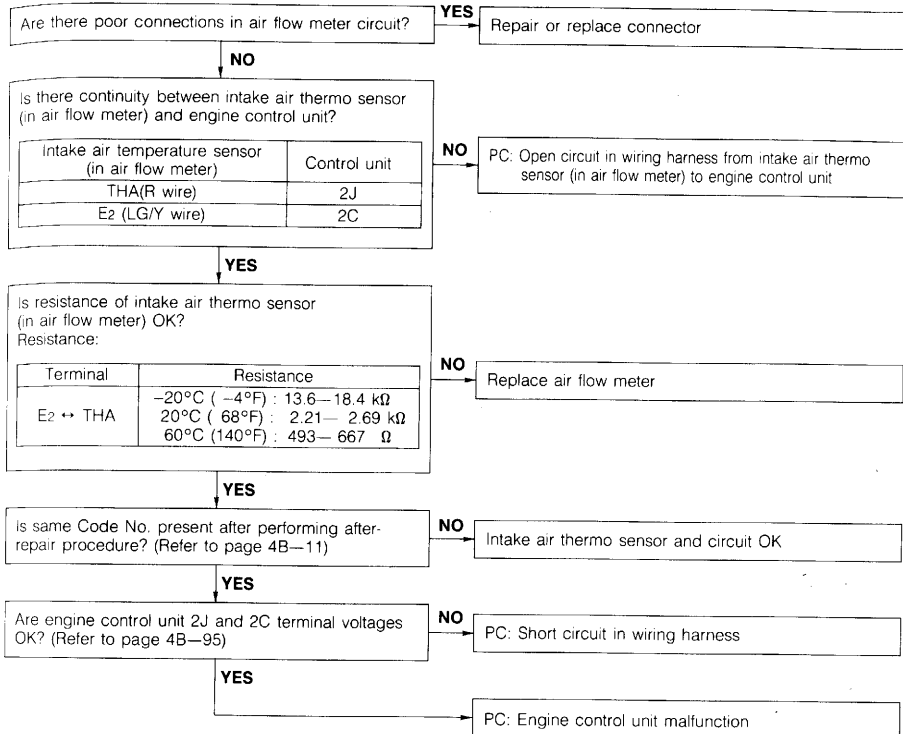
PC: Possible Cause



96U04B-01

## Code No. 10 (Intake air thermo sensor)

PC: Possible Cause

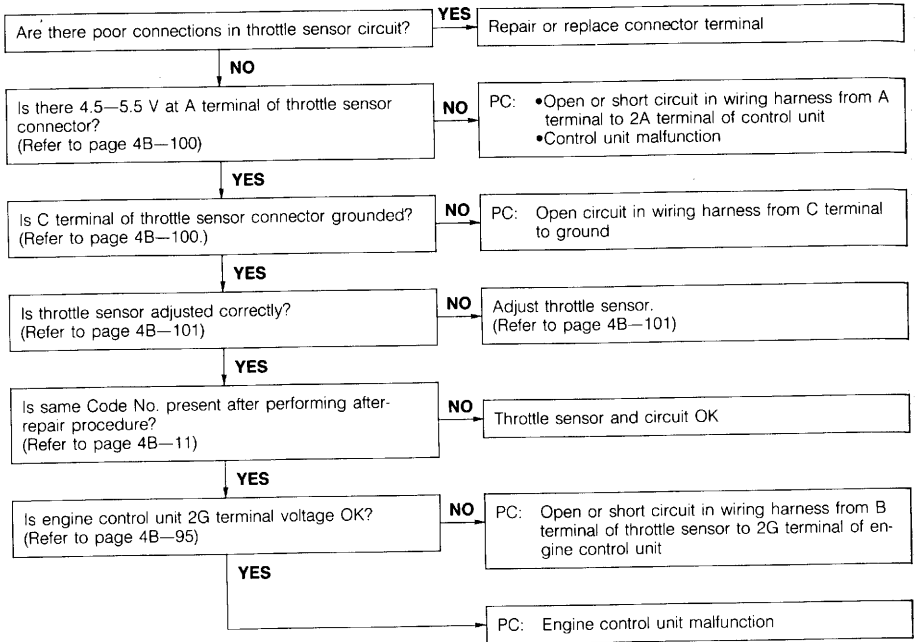


96U04B-012

# 4B TROUBLESHOOTING WITH SST

## Code No. 12 (Throttle sensor)

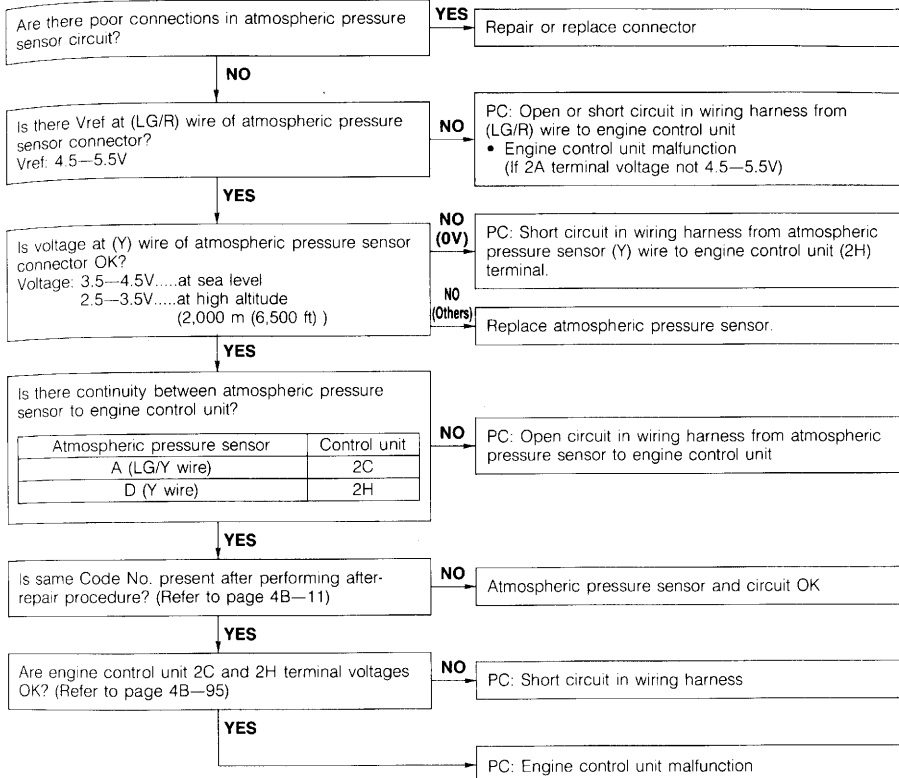
PC: Possible cause



96U04B-013

## Code No. 14 (Atmospheric pressure sensor)

**PC: Possible cause**



96U04B-014

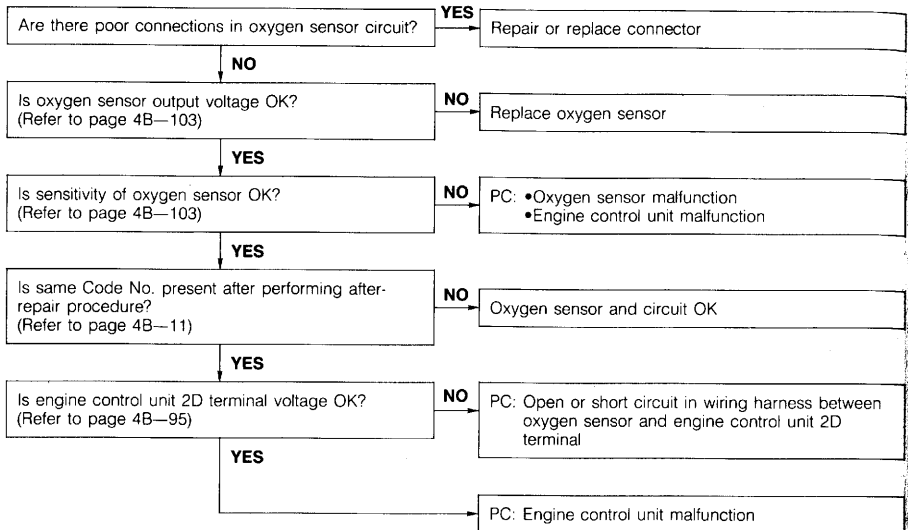
# 4B TROUBLESHOOTING WITH SST

## Code No. 15 (Oxygen sensor)

PC: Possible Cause

### Note

When Codes No. 15 and 17 are present at the same time, first perform the checking procedure for Code No. 17. (Refer to page 4B—26.)

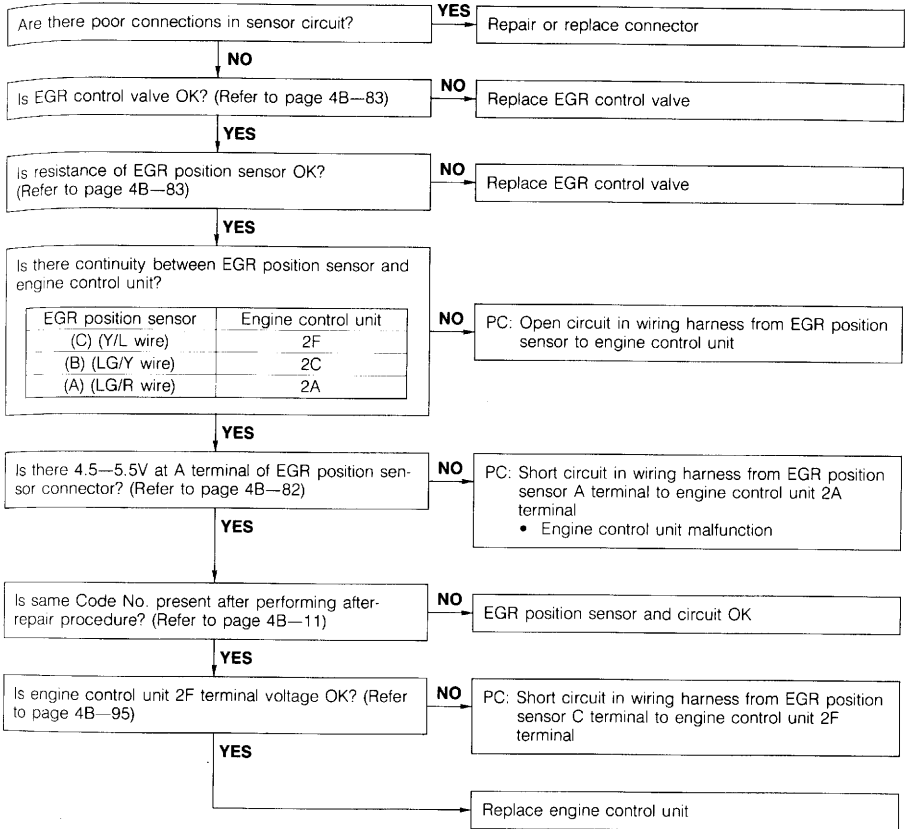


96U04B-015



## Code No. 16 (EGR position sensor)

PC: Possible Cause

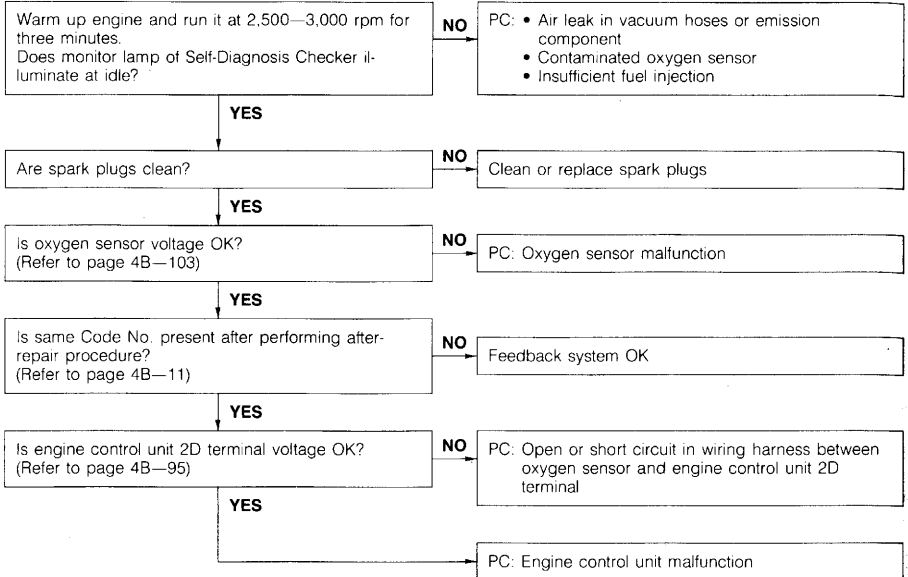


96U04B-016

# 4B TROUBLESHOOTING WITH SST

## Code No. 17 (Feedback system)

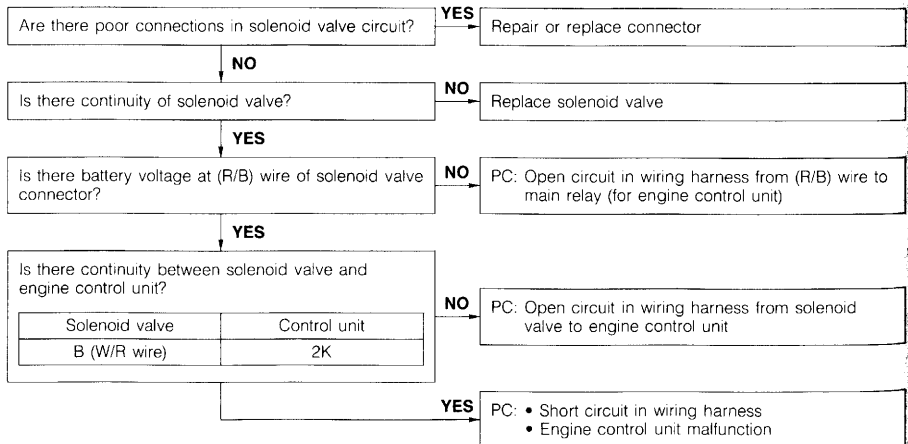
PC: Possible Cause



96U04B-017

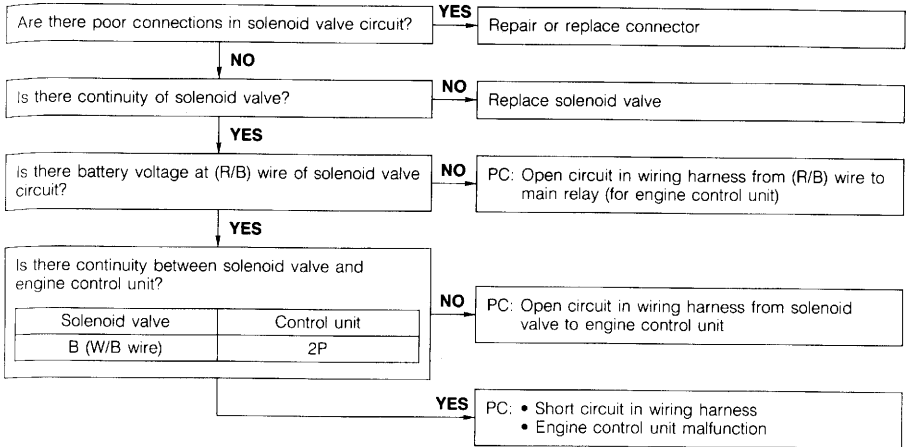
## Code No. 25 (Solenoid valve-Pressure regulator)

PC: Possible Cause



86U04A-029

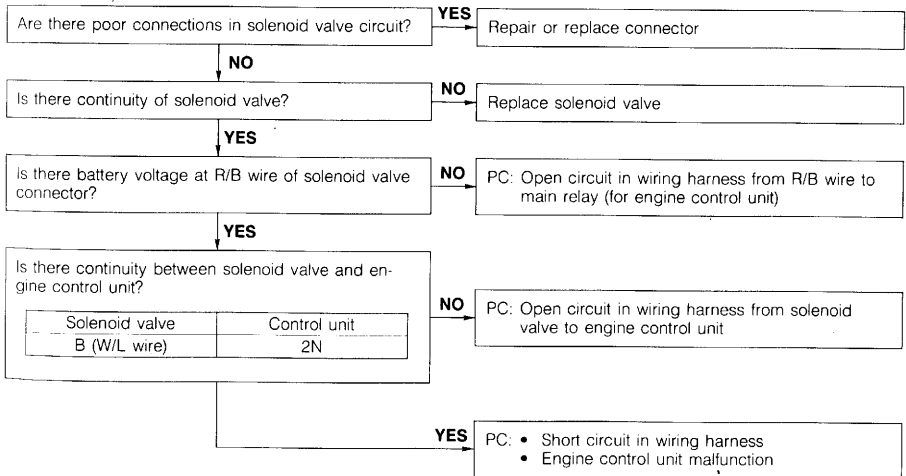
## Code No. 26 (Solenoid valve-Purge)



86U04A-030

## Code No. 28 (Solenoid valve—EGR, vacuum side)

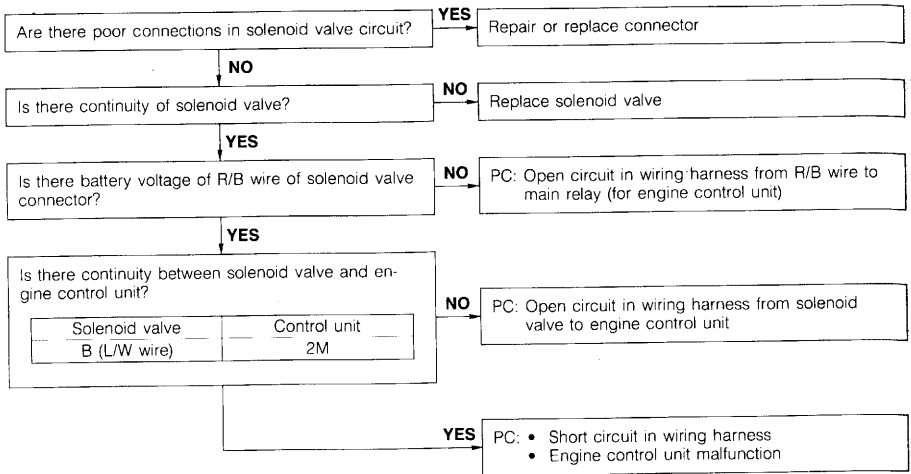
**PC: Possible Cause**



86U04B-020

# 4B TROUBLESHOOTING WITH SST

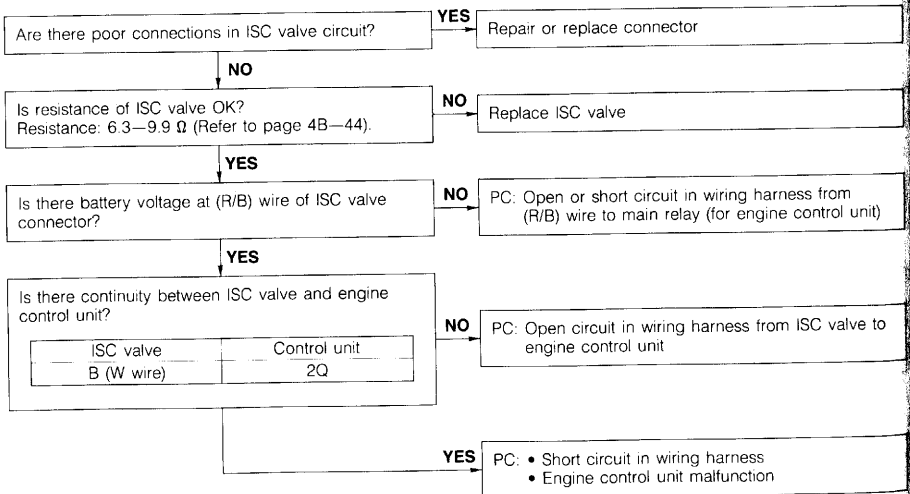
## Code No. 29 (Solenoid valve—EGR, vent side)



86U04B-021

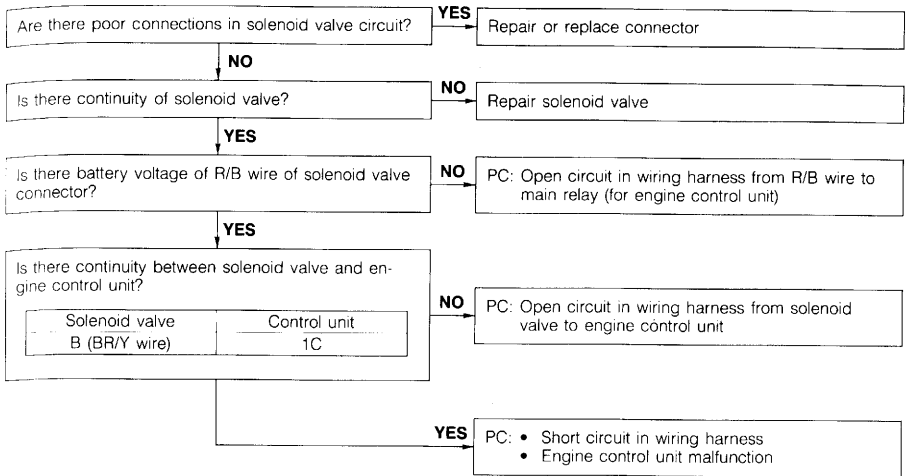
## Code No. 34 (Solenoid valve—Idle speed control valve (ISC))

PC: Possible Cause



96U04A-018

## Code No. 42 (Solenoid valve—Waste gate)



86U04B-022

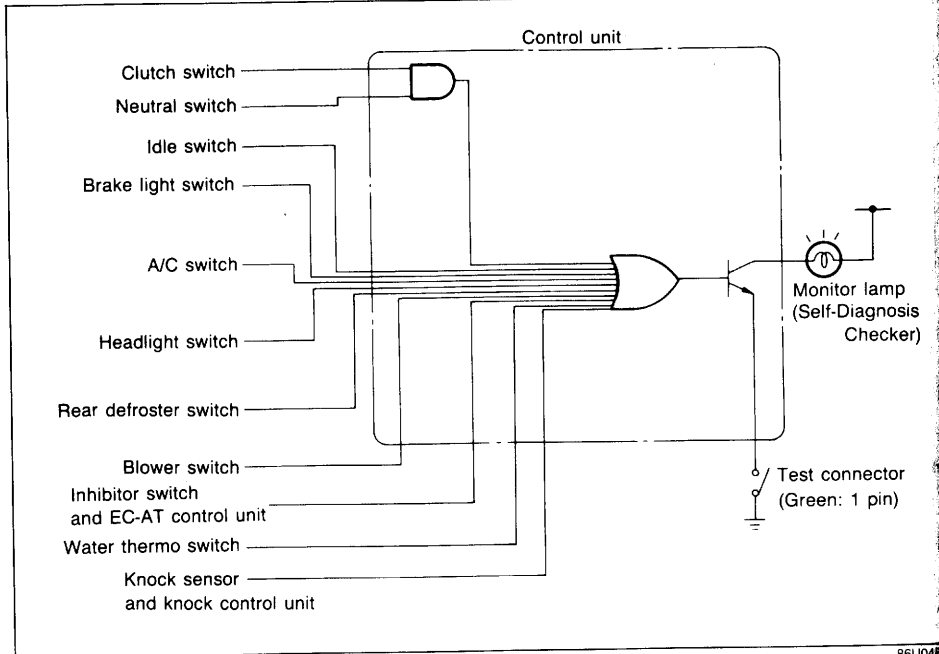
# 4B SWITCH MONITOR FUNCTION

## SWITCH MONITOR FUNCTION

Individual switches can be monitored by the SST.

### Note

The test connector must be grounded and the ignition switch ON (engine stopped).

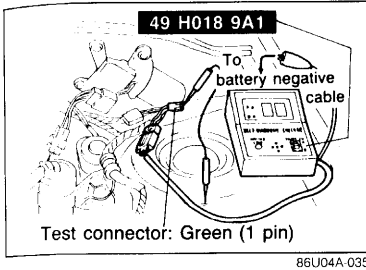
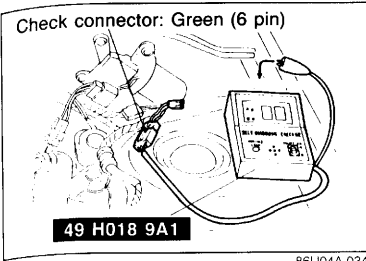


86U04B

| Switch                                  | Self-Diagnosis Checker (Monitor lamp) |                    | Remarks                                    |
|---|---------------------------------------|--------------------|--|
|   | Light ON                              | Light OFF          |  |
| Clutch switch                           | Pedal released                        | Pedal depressed    | Gear: IN                                   |
| Neutral switch                          | In gear                               | Neutral            | Clutch pedal released                      |
| Idle switch                             | Pedal depressed                       | Pedal released     | —  |
| Brake light switch                      | Pedal depressed                       | Pedal released     | —  |
| A/C switch                              | ON                                    | OFF                | Blower motor position: "1" position        |
| Headlight switch                        | ON                                    | OFF                | —  |
| Rear defroster switch                   | ON                                    | OFF                | —  |
| Blower switch                           | ON                                    | OFF                | Blower motor position: "3" or "4" position |
| Inhibitor switch and EC-AT control unit | D, 1, 2 and R range                   | P and N range      | —  |
| Water thermo switch (Electrical fan)    | Terminal disconnected                 | Terminal connected | While fan not operating                    |
| Knock sensor and knock control unit     | While tapping engine hanger           | —                  | With test connector grounded               |

## INSPECTION PROCEDURE

1. Warm up the engine to normal operating temperature and stop it.
2. Connect the **SST** to the check connector (Green, 6-pin) and the negative battery terminal.



3. Connect a jumper wire between the test connector (Green, 1-pin) and a ground.
4. Turn the ignition switch ON. Check if monitor lamp illuminates when each switch is made to function as described below.

### Caution

- a) If any one of the switches is activated, the monitor lamp will stay on.
- b) Do not start the engine.

## Procedure

Set conditions to deactivate each switch

- All accessories OFF
- Transmission in neutral
- All pedals released

Verify that monitor lamp does not illuminate

YES

Check each switch as described

NO

Check each switch and related wiring harness

- Clutch and Neutral switch :Refer to page 4B—97
- Idle switch :Refer to page 4B—102
- Brake light switch :Refer to 4B—105
- A/C switch :Refer to section 15
- Headlight switch :Refer to section 15
- Rear defroster switch :Refer to section 15
- Blower switch :Refer to section 15
- Inhibitor switch :Refer to page 4B—98
- Water thermo switch :Refer to section 3

96U04B-019

## Neutral and Clutch switch (MTX)

Shift transmission into gear  
Check that monitor lamp illuminates with clutch pedal released

NO

- PC:
- Neutral or clutch switch malfunction (Refer to 4B—97)
  - Open circuit in related wiring harness
  - Engine control 3D terminal malfunction (Refer to page 4B—96)

YES

Depress clutch pedal  
Check that monitor lamp does not illuminate  
Return transmission to neutral

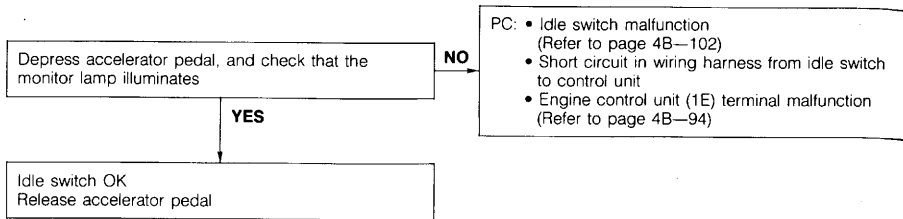
NO

- PC:
- Clutch switch malfunction (Refer to page 4B—97)

96U04B-020

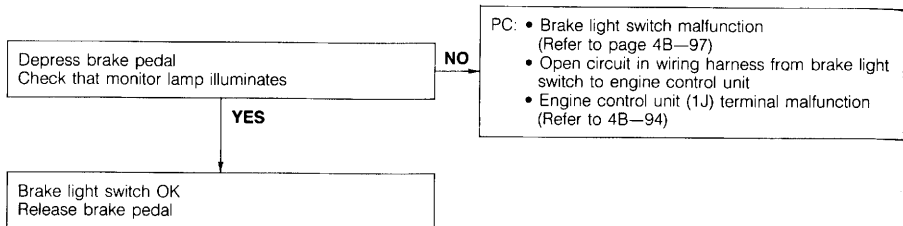
# 4B SWITCH MONITOR FUNCTION

## Idle switch



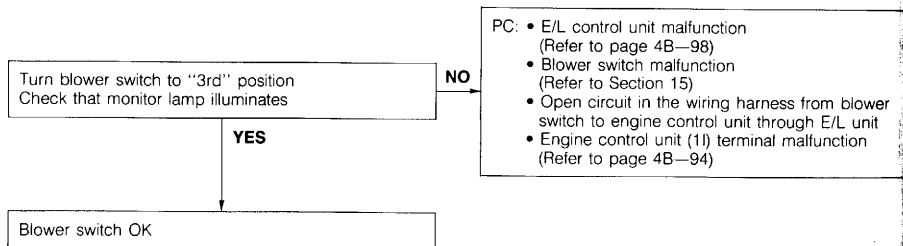
96U04B-021

## Brake light switch



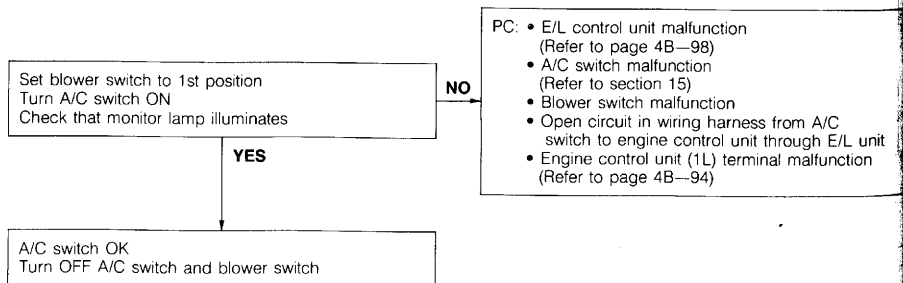
96U04B-022

## Blower switch



96U04B-023

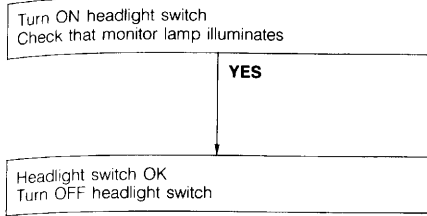
## A/C switch



96U04B-024

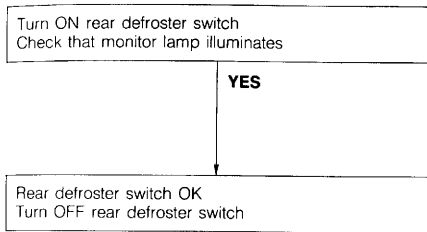


## Headlight switch



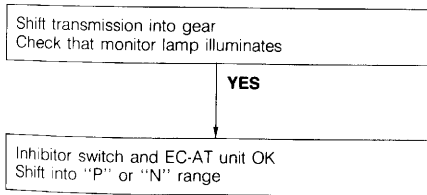
96U04B-025

## Rear defroster switch



96U04B-026

## Inhibitor switch

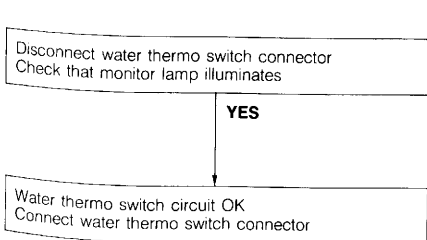


96U04B-027

## Water thermo switch circuit (not included in switch inspection)

### Warning

The electrical fan operates when the connector is disconnected. Use caution.



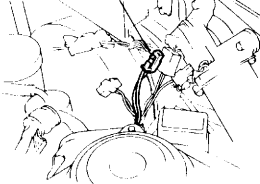
96U04B-028

Idle speed  
Automatic  
Control  
Function

Engine Control Unit

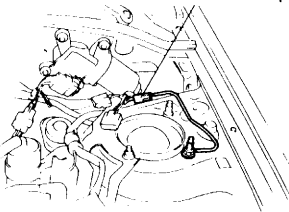
86U04A-045

Check connector (White)  
(for tachometer)

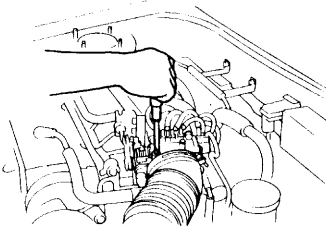


86U04A-046

Test connector Green 1 pin



86U04A-047



86U04A-048

Idle mixture  
Automatic  
Control  
Function

Engine Control Unit

86U04A-049

## IDLE ADJUSTMENT

### IDLE SPEED

Because the idle speed is controlled automatically by the engine control unit through the idle speed control (ISC) solenoid valve, usually it is not necessary to check and adjust the idle speed.

However, the idle speed should be adjusted when rough idling occurs when the test connector (Green, 1-pin) is grounded.

### Preparation

- 1) Check the condition of the engine (plugs, leaks in hoses, etc.).
- 2) Make sure all accessories are OFF.
- 3) Warm up the engine and run it for **Three minutes** at **2,500—3,000 rpm** in neutral.
- 4) Check the initial ignition timing and adjust if necessary.

### Inspection and Adjustment

1. Ground the test connector with a jumper wire.

2. Check that the idle speed is within specification.

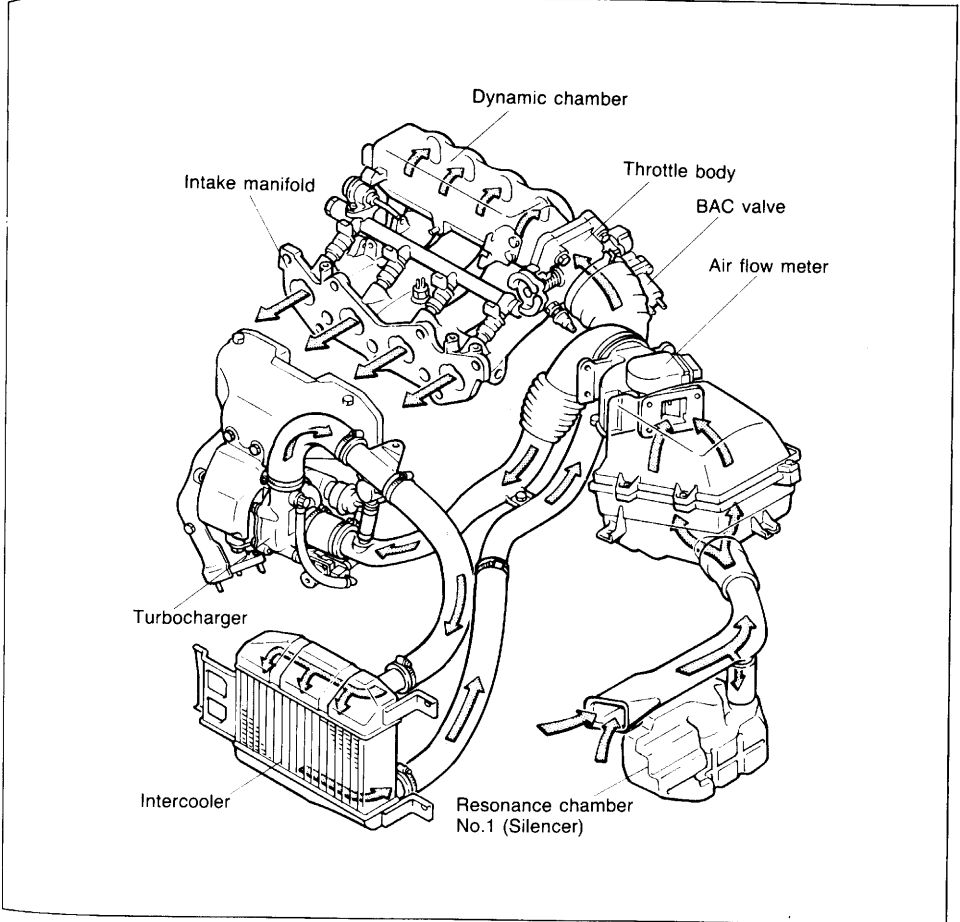
**Idle speed: 750 ± 25 rpm**  
MTX: Neutral  
ATX: P range

3. If the idle speed is not within specification, remove the blind cap from the throttle body and adjust it by turning the adjust screw.
4. After adjusting the idle speed, install the blind cap and connect the jumper wire from the test connector.

### IDLE MIXTURE

Because an automatic compensation function for air/fuel mixture is built into the engine control unit, it is necessary to check and adjust the idle mixture.

## INTAKE AIR SYSTEM



86U04B-153

This system controls the air required by the engine for operation. The system consists of the air duct, air cleaner, air flow meter, throttle body, dynamic chamber, and intake manifold.

### COMPONENT DESCRIPTIONS

| Component       | Function   | Remarks  | Application |                |
|-----------------|--|--|-------------|----------------|
|                 |  |  | New model   | Previous model |
| Air cleaner     | Filters air into throttle body                                     |  | ○           | ○              |
| Air flow meter  | Detects amount of intake air; sends signal to control unit         | Intake air temp sensor and fuel pump switch are integrated | ○           | ○              |
| Throttle sensor | Detects throttle valve opening angle; sends signal to control unit | Installed on throttle body                                 | ○           | ○              |
| Throttle body   | Controls intake air quantity                                       | Integrated throttle sensor and idle switch                 | ○           | ○              |

86U04A-051

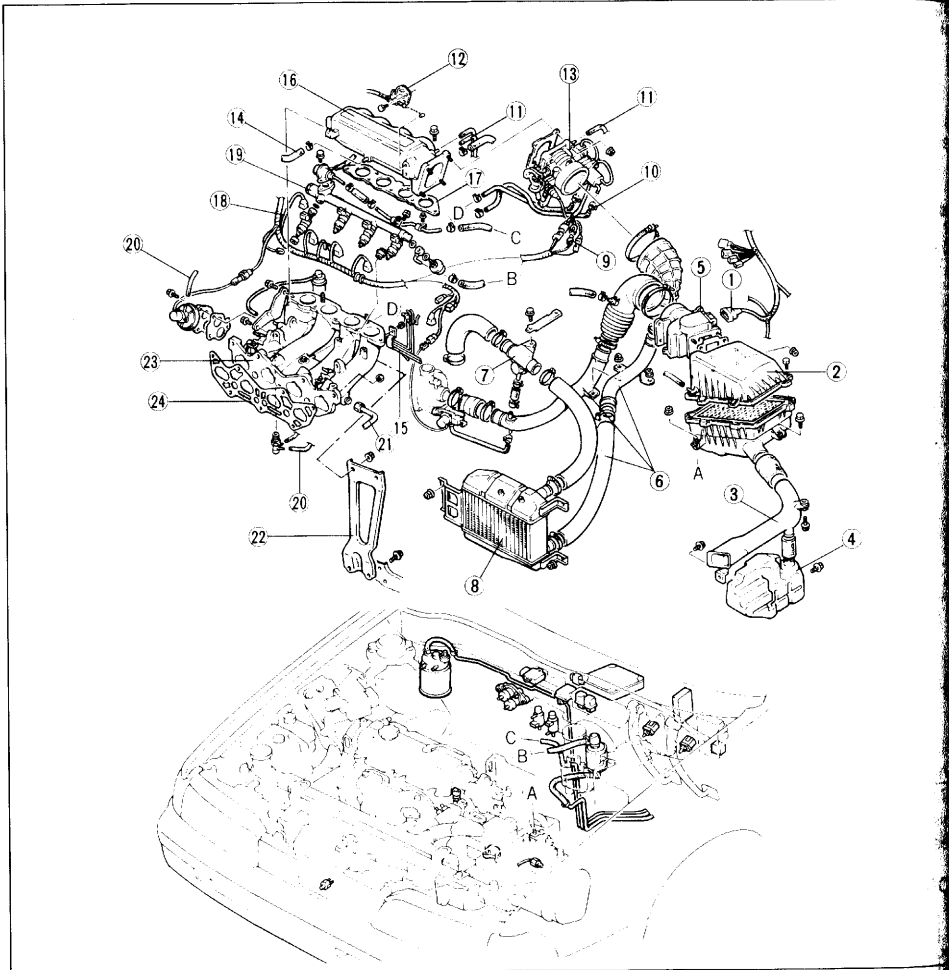
# 4B INTAKE AIR SYSTEM

## REMOVAL

### Caution

Before removing the following parts, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page 4B-55.)

Remove in the sequence shown in the figure.



96U04B

- |                             |                          |                             |
|-----------------------------|--------------------------|-----------------------------|
| 1. Air flow meter connector | 9. Connectors            | 17. Gasket                  |
| 2. Air cleaner              | 10. Water hoses          | 18. Wiring harness          |
| 3. Air duct                 | 11. Vacuum hoses         | 19. Delivery pipe assembly  |
| 4. Resonance chamber No.1   | 12. Accelerator cable    | 20. Vacuum hoses            |
| 5. Air flow meter           | 13. Throttle body        | 21. EGR pipe                |
| 6. Air hoses                | 14. PCV hose             | 22. Intake manifold bracket |
| 7. Air bypass valve         | 15. Vacuum pipe assembly | 23. Intake manifold         |
| 8. Intercooler              | 16. Dynamic chamber      | 24. Gasket                  |

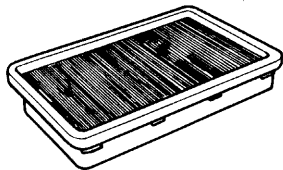
## PARTS INSPECTION

### Air Cleaner Element

1. Check the condition of the air cleaner element.
2. Replace, if necessary.

#### Caution

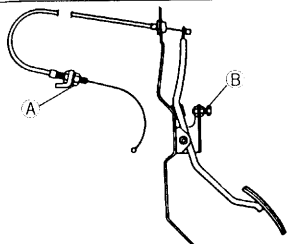
**Do not use the compressed air to clean the air cleaner element.**



69G04A-059

### Accelerator Cable

1. Inspect the deflection of the cable. If the deflection is not within **1—3 mm (0.04—0.12 in.)**, adjust by turning nuts A.
2. Depress the accelerator pedal to the floor and confirm that the throttle valve is fully opened. Adjust by turning bolt B if necessary.



86U04A-053

### Throttle Body

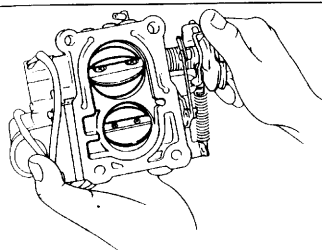
#### Note

**The No. 2 throttle valve is preset at the factory to begin opening after the No. 1 throttle valve has opened approx. 25 degrees (MTX) or 10 degrees (ATX).**

1. Check that the No. 1 and No. 2 throttle valves move smoothly when the throttle lever is moved from fully closed to fully open.
2. Replace, if necessary.

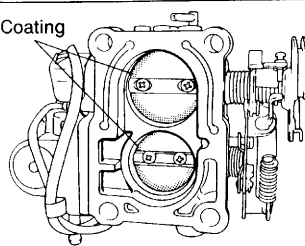
#### Caution

**Do not remove the thin sealing coating from the throttle valve or bore.**



86U04A-054

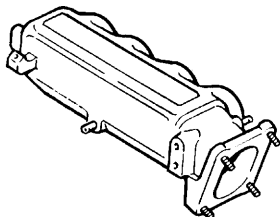
#### Coating



69G04C-050

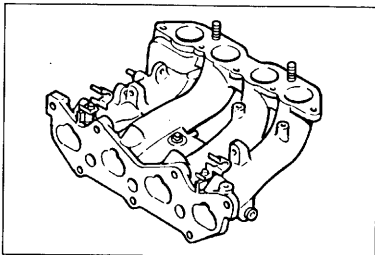
### Dynamic Chamber

1. Visually check the dynamic chamber for damage.
2. Replace, if necessary.

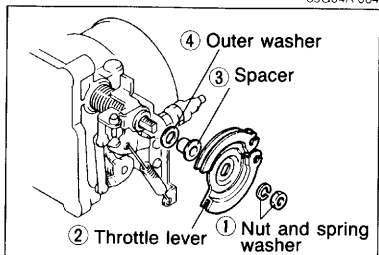


69G04A-062

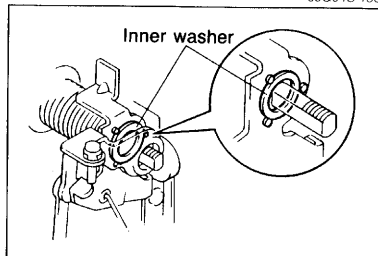
## 4B INTAKE AIR SYSTEM



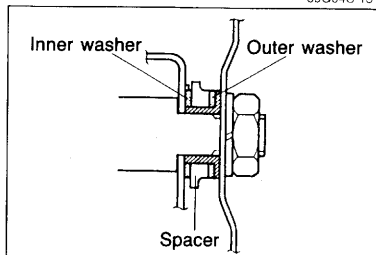
69G04A-064



69G04C-130



69G04C-131



96U04B-030

### Intake Manifold

1. Visually check the intake manifold for damage.
2. Replace, if necessary.

### REPLACEMENT Throttle Lever Removal

#### Caution

When loosening the throttle lever nut, hold the throttle valves fully open to prevent damaging the idle switch.

Remove the throttle lever in the sequence shown in the figure.

### Installation

1. Check that the inner washer is in the proper position as shown in the figure.
2. Assemble the spacer and outer washer and install them onto the throttle shaft.
3. Install the throttle lever onto the throttle shaft.

#### Caution

When tightening the throttle lever nut, hold the throttle valves fully closed to prevent bending the stopper lever.

4. Tighten the throttle lever nut.

### Tightening torque:

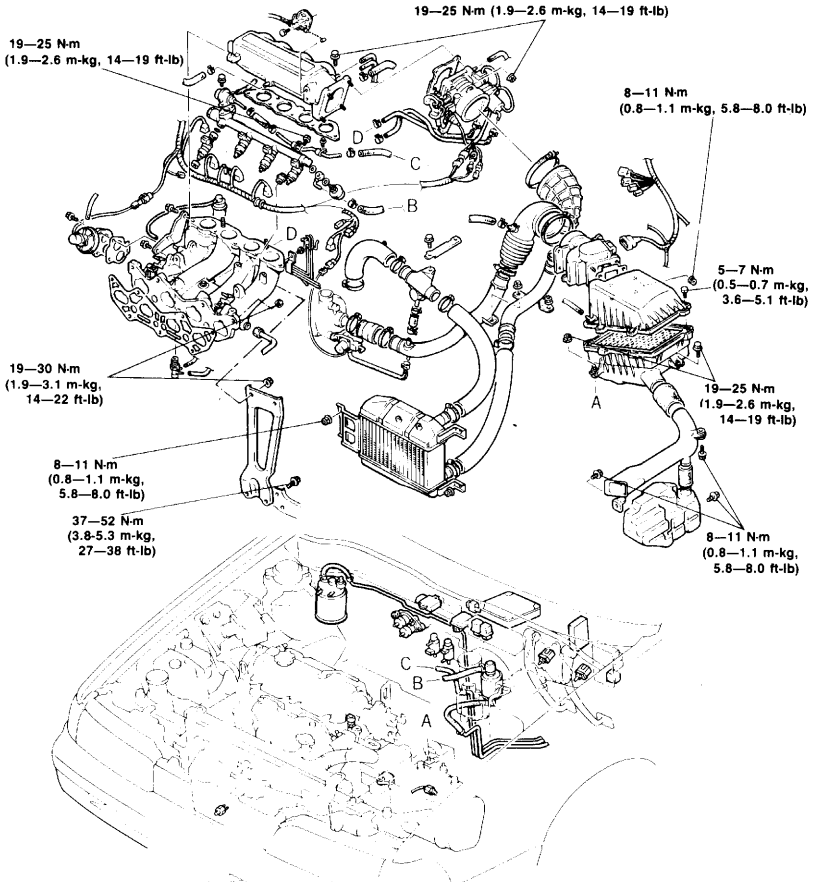
16—23 N·m (1.6—2.3 m·kg, 12—17 ft·lb)

5. Check that the inner and outer washer and spacer are assembled correctly as shown.
6. Check that the No. 1 and No. 2 throttle valves move smoothly and that the No. 2 throttle valve is closed completely when the No. 1 throttle valve is closed.
7. Check the operation of the idle switch.  
(Refer to page 4B—102)

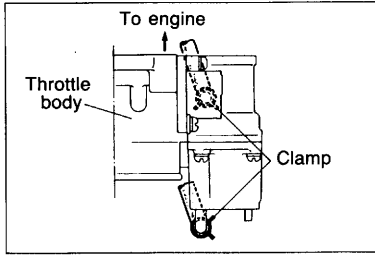
## INSTALLATION

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

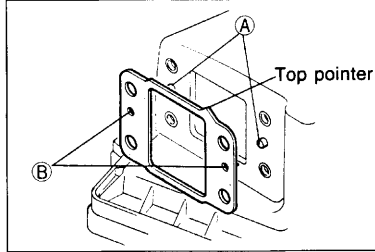
## Torque Specification



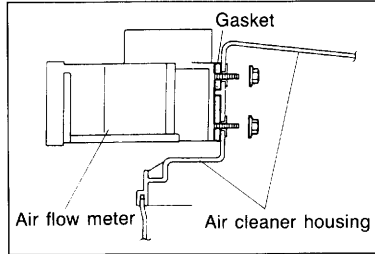
# 4B INTAKE AIR SYSTEM



86U04A-056



96U04A-025



96U04A-026

## Installation Note

### Water hose spring clamps

Face the clamp end as shown in the figure.

### Gasket

Use new gaskets at the intake manifold, dynamic chamber and throttle body.

### Air flow meter

1. Mount the gasket onto the air cleaner housing, being sure that the holes (B) are fit over the pins (A).
2. Make sure the top pointer of the gasket faces upward.

3. Install the air flow meter.

### Torque specification:

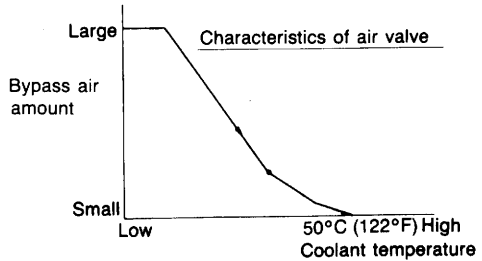
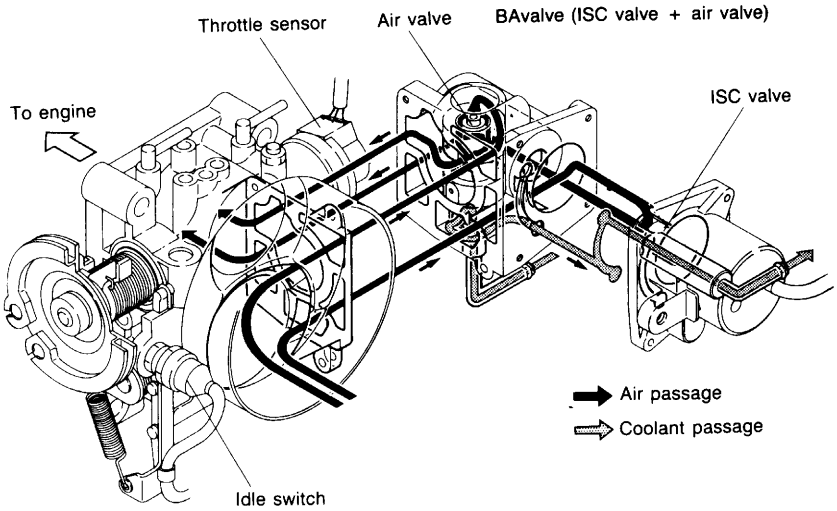
8—11 N·m (0.8—1.1 m·kg, 5.8—8.0 ft·lb)

### Caution

If nuts are tightened below specified torque, the nuts loosen and the loose of nuts may cause damage to the engine.



IDLE SPEED CONTROL (ISC) SYSTEM



86U04A-057

To improve idle smoothness, the ISC system controls the intake air amount by regulating the bypass air amount that passes through the throttle body.

This system consists of the BAC valve and the control system.

The BAC valve consists of the air valve which functions only during cold engine conditions (**below 50°C (122°F)**) and the ISC valve which works throughout the entire engine speed range.

# 4B ISC SYSTEM

## COMPONENT DESCRIPTIONS

| Component                                  | Function  | Remarks   | Application |                |
|--|---|---|-------------|----------------|
|  |   |   | New model   | Previous model |
| <b>Air valve</b>                           | When cold, supplies bypass air into dynamic chamber   | <ul style="list-style-type: none"> <li>Engine speed increased to shorten warm-up period</li> <li>Thermo wax type</li> <li>Installed in BAC valve</li> </ul> | ○           | ○              |
| <b>Clutch switch</b>                       | Detects in-gear condition; sends signal to control unit                                       | Switch ON when clutch pedal released  | ○           | ○              |
| <b>E/L control unit</b>                    | Detects that E/L is being applied; sends signal to control unit                               |   | ○           | X              |
| <b>Engine control unit</b>                 | Detects signals from input sensors and switches; controls solenoid valve (idle speed control) |   | ○           | ○              |
| <b>Idle switch</b>                         | Detects when throttle valve fully closed; sends signal to control unit                        | Installed on throttle body  | ○           | ○              |
| <b>Inhibitor switch</b>                    | Detects in-gear condition; sends signal to EC-AT control unit                                 | Switch ON in "N" or "P" range   | ○           | ○              |
| <b>Ne rotor and pick-up</b>                | Detects crank angle at 30° intervals; sends signal to control unit                            | Engine speed signal   | ○           | X              |
| <b>Neutral switch</b>                      | Detects in-gear condition; sends signal to control unit                                       | Switch ON when in-gear  | ○           | ○              |
| <b>P/S pressure switch</b>                 | Detects P/S operation; sends signal to control unit   | P/S: ON when steering wheel turned right or left  | ○           | ○              |
| <b>Solenoid valve (Idle speed control)</b> | Controls bypass air amount  | <ul style="list-style-type: none"> <li>Controlled by duty signal from control unit</li> <li>With integrated air valve</li> <li>Works idle-up</li> </ul>     | ○           | X              |
| <b>Test connector</b>                      | For Self-Diagnosis Checker and idle speed adjustment  | 1-pin connector (Green)   | ○           | X              |
| <b>Throttle sensor</b>                     | Detects throttle valve opening angle; sends signal to control unit                            | Installed on throttle body  | ○           | ○              |

86U04B-034

## TROUBLESHOOTING

Check the condition of the wiring harness and connectors before checking the sensors or switches.

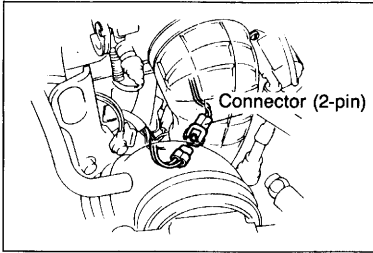
**Note**

Make the system inspection first. If no problem is found, continue with the next system inspection of the Troubleshooting Guide. (Refer to pages 4B—8 and 9.)

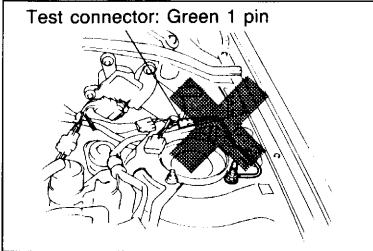
| Symptom                          | Page             | Possible cause |                     |                                     | Electrical load control unit | Engine control unit terminal |       |       | System inspection |
|----------------------------------|------------------|----------------|---------------------|-------------------------------------|------------------------------|------------------------------|-------|-------|-------------------|
|                                  |                  | Air valve      | P/S pressure switch | Solenoid valve (Idle speed control) |                              | 1K                           | 1W    | 2Q    |                   |
|                                  |                  | 4B—44          | 4B—97               | 4B—44                               | 4B—98                        | 4B—94                        | 4B—95 | 4B—96 | 4B—44             |
| Engine stalls                    | While warming up | 4              |                     | 1                                   |                              |                              | 2     | 3     |                   |
|                                  | After warming up |                | 2                   | 1                                   | 3                            | 5                            | 4     | 6     |                   |
| Rough idle                       | While warming up | 5              |                     | 2                                   |                              |                              | 3     | 4     | 1                 |
|                                  | After warming up |                | 3                   | 2                                   | 4                            | 6                            | 5     | 7     | 1                 |
| High idle speed after warming up |                  | 7              | 3                   | 2                                   | 4                            | 6                            | 5     | 7     | 1                 |
| Runs rough on deceleration       |                  |                |                     | 2                                   |                              |                              | 3     | 4     | 1                 |
| Afterburn in exhaust system      |                  | 5              |                     | 2                                   |                              |                              | 3     | 4     | 1                 |
| Fails emission test              |                  | 5              |                     | 2                                   |                              |                              | 3     | 4     | 1                 |

96U04A-033

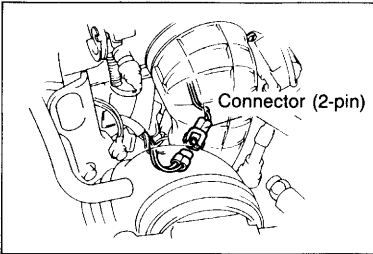
# 4B ISC SYSTEM



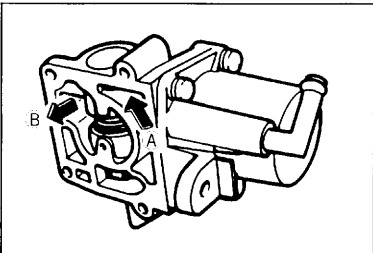
86U04B-036



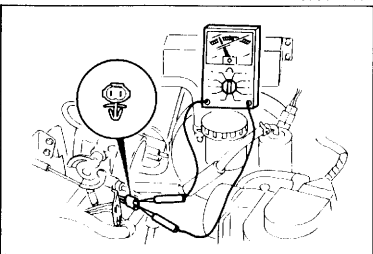
86U04A-061



86U04B-153



86U04B-037



86U04A-064

## System Inspection

### (Air valve)

1. Disconnect the ISC valve connector when the engine is cold and idling.
2. Note the engine speed and reconnect the connector.
3. Warm up the engine to the normal operating temperature and disconnect the connector again.
4. Check that the engine speed is lower when the connector is disconnected warm than when it is disconnected when cold.

### (ISC valve)

5. Connect the ISC valve connector.

### Note

**Make sure that the test connector is not grounded and that the idle speed is set to specification.**

6. Again disconnect the ISC valve connector with the engine is at normal operating temperature.
7. Check that the engine speed decreases.
8. Reconnect the ISC valve connector.

## BAC Valve

### Air valve

1. Remove the BAC valve from the throttle body.
2. Blow air through the valve from port A and check that air comes out of port B when the BAC valve is cold.
3. If not correct, replace the BAC valve.

### Note

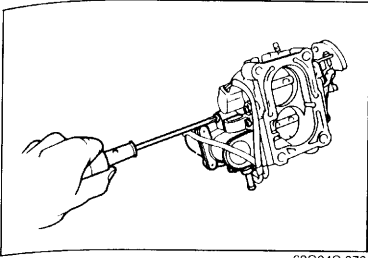
**Refer to "Installation" on this page for the BAC valve installation.**

### ISC valve

1. Disconnect the ISC valve connector.
2. Connect an ohmmeter to the terminals of the ISC valve.
3. Check the resistance.

**Resistance (normal operating temperature): 6.3—9.9**

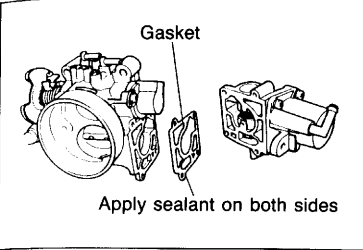
4. If not correct, replace the BAC valve.



69G04C-070

## Removal

1. Remove the screws.
2. Remove the BAC valve from the throttle body.



69G04C-071

## Installation

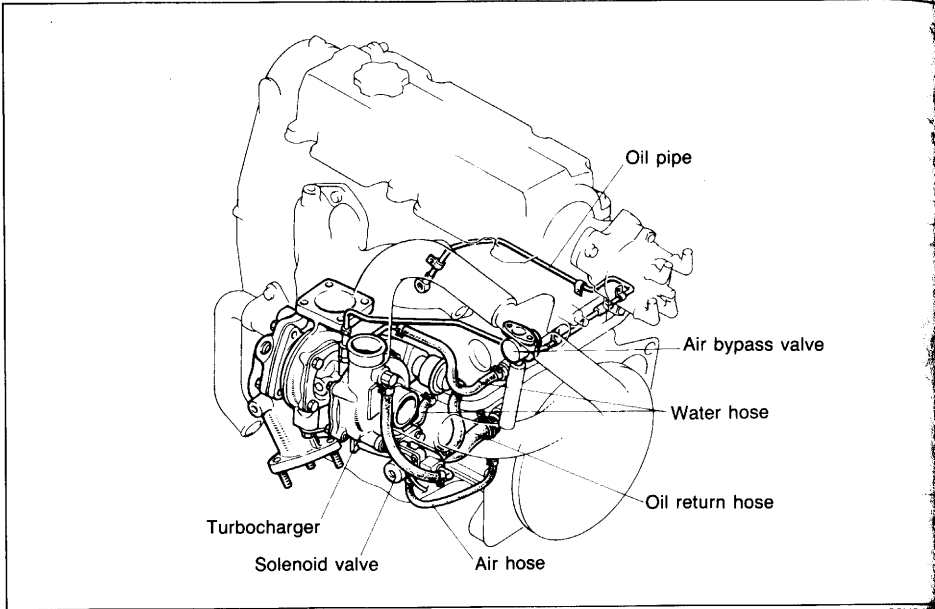
### Caution

**Use a new gasket.**

1. Remove any dirt or old sealant from the contact surfaces.
2. Apply sealant to both sides of the gasket.
3. Tighten the screws.

# 4B TURBOCHARGING SYSTEM

## TURBOCHARGING SYSTEM



86U04B

This system utilizes the energy of the exhaust gas to pressurize the intake air. It therefore supplies more than the normal amount of air into the combustion chamber. As a result of the more fully charged combustion chamber, higher output and higher torque can be obtained by a turbocharged engine than that of a comparable non-turbocharged engine.

If knocking occurs during high-boost condition, the maximum boost is reduced by the solenoid valve to prevent possible engine damage.

### COMPONENT DESCRIPTIONS

| Component                          | Function   | Remarks                                | Application |                |
|------------------------------------|--|--|-------------|----------------|
|                                    |  |  | New model   | Previous model |
| <b>Air bypass valve</b>            | Bypasses compressed air from after turbocharger to before turbocharger during deceleration; prevents noise |  | ○           | X              |
| <b>Engine control unit</b>         | Detects signals from input sensors; controls solenoid valve (waste gate) operation                         |  | ○           | X              |
| <b>Intake air thermo sensor</b>    | Detects intake air temperature; sends signal to control unit   | Installed in air flow meter            | ○           | ○              |
| <b>Intercooler</b>                 | Reduces compressed air temperature from turbocharger   |  | ○           | X              |
| <b>Knock control unit</b>          | Receives knock signal from knock sensor; sends signal to control unit                                      |  | ○           | ○              |
| <b>Knock sensor</b>                | Detects engine knocking; sends signal to knock control unit  |  | ○           | ○              |
| <b>Solenoid valve (Waste gate)</b> | Controls turbocharger boost pressure applied to actuator   |  | ○           | X              |
| <b>Turbocharger</b>                | Pressurizes intake air utilizing exhaust gas flow  | Integrated solenoid valve (waste gate) | ○           | ○              |

## TROUBLESHOOTING

Check the condition of the wiring harness and connectors before checking sensors or switches.

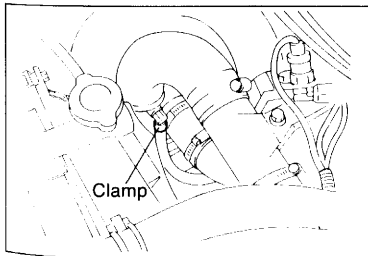
| Symptom  | Possible cause |                  |             |                |                  |                   |
|--|----------------|------------------|-------------|----------------|------------------|-------------------|
|  | Turbocharger   | Air bypass valve | Intercooler | Boost pressure | Waste gate valve | Overboost warning |
|  | 4B—48          | 4B—48            | 4B—48       | 4B—47          | 4B—48            | 4B—48             |
| Poor acceleration, hesitation or lack of power | 4              | 3                | 6           | 1              | 2                | 5                 |
| Excessive oil consumption                      | 1              |                  |             |                |                  |                   |
| Knocking                                       | 3              |                  |             | 2              | 1                |                   |
| Abnormal noise or vibration                    | 2              | 1                |             |                |                  |                   |

96U04B-034

## OPERATION NOTE

1. Do not accelerate suddenly or operate at full throttle immediately after starting a cold engine. Allow the engine to reach normal operating temperature before using full power.
2. Run the engine at idle for at least 30 seconds after heavy-load or high-speed driving before stopping.
3. If there is a sudden drop in power while driving, it is possible that there is a fault related to the turbocharger. Before shutting the engine off, immediately reduce speed and drive at the lowest possible engine speed.

86U04B-041



86U04B-042

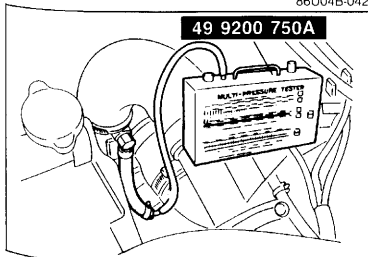
## SERVICE NOTE

### Attachment of Hoses

To prevent the hoses from becoming disconnected due to boost pressure, be sure to attach them securely with the spring clamps.

### Overboost Warning Buzzer

The warning buzzer indicates a possible fault of either the wastegate, actuator, or solenoid valve (wastegate). These components must be checked if the buzzer sounds.



86U04B-043

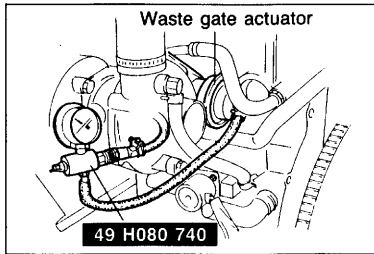
## TURBOCHARGER BOOST PRESSURE

1. Be sure the engine is cool.
2. Disconnect hose A from the solenoid valve and connect the **SST** as shown.
3. Warm up the engine to normal operating temperature.
4. Increase the engine speed to **4,000 rpm** and check that the boost pressure is within specification.

### Specification:

**Above 0 kPa (0 kg/cm<sup>2</sup>, 0 psi) (any positive pressure)**

# 4B TURBOCHARGING SYSTEM

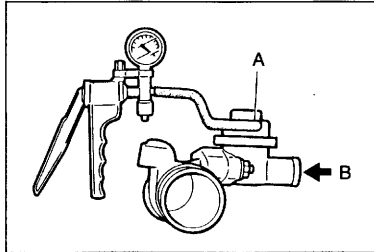


## WASTE GATE

1. Be sure the engine is cool.
2. Remove the exhaust manifold insulator and side insulator.
3. Remove the hose (connected to actuator) and connect the **SST** as shown.
4. Apply **58.9 kPa (0.6 kg/cm<sup>2</sup>, 8.5 psi)** of compressed air.
5. Check that the rod moves when disconnecting and reconnecting the hose supplying the compressed air.

### Caution

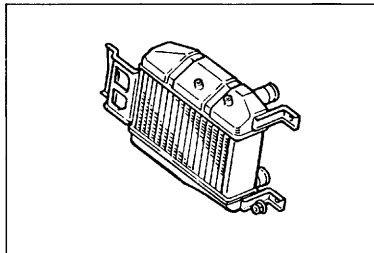
**Do not apply compressed air over 98 kPa (1.0 kg/cm<sup>2</sup>, 14 psi).**



## AIR BYPASS VALVE

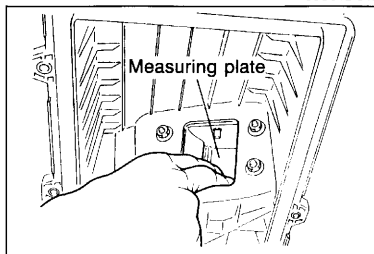
1. Remove the air bypass valve.
2. Connect a vacuum pump to port A of the valve.
3. Apply vacuum and blow from port B.
4. Check that air flows at the specified vacuum.
5. If not correct, replace the air bypass valve.

**Vacuum: 250—400 mmHg (9.8—15.7 inHg)**



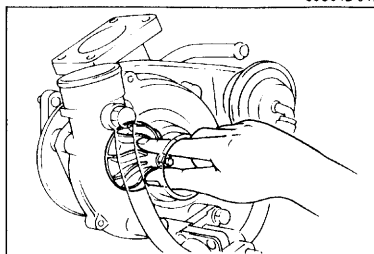
## INTERCOOLER

1. Remove the intercooler.
2. Inspect it for cracks, restriction, or damage.
3. Replace if necessary.



## OVERBOOST WARNING

1. Start the engine and run it at **2,000 rpm**.
2. Lift the air cleaner upper case, and push the measuring plate open fully.
3. Check that the warning buzzer sounds and the engine speed drops or engine stalls.

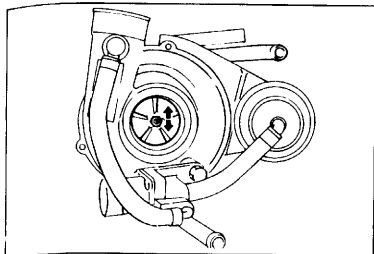


## TURBOCHARGER

### Inspection of Compressor Wheel Assembly

1. Be sure the engine is cool.
2. Remove the air hose.
3. Check that the wheel assembly turns smoothly.
4. If there is excessive load or noise, replace the turbocharger.

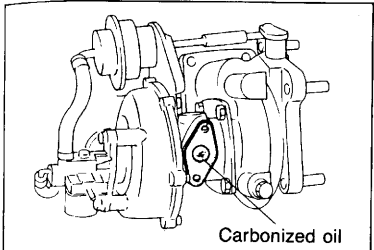




86U04B-049

## Inspection of Turbine Wheel Deflection

1. Be sure the engine is cool.
2. Remove the air hose.
3. Check that the wheel does not touch the compressor housing.
4. If the wheel touches the housing, replace the turbocharger.

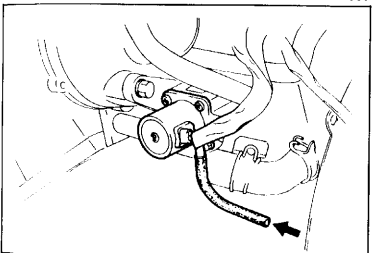


Carbonized oil

86U04B-050

## Inspection of Oil Passage

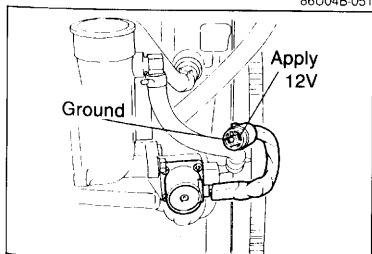
1. Be sure the engine is cool.
2. Remove the oil return pipe.
3. Check that carbonized oil is not blocking the oil passage in the turbocharger or the oil return pipe.
4. Replace the turbocharger and return pipe if necessary.



86U04B-051

## Inspection of Solenoid Valve

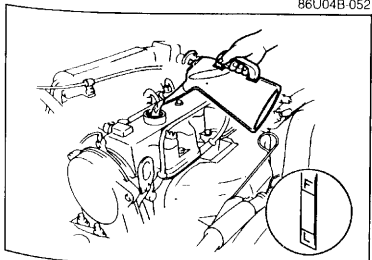
1. Disconnect the small air tube from the air hose.
  2. Disconnect the solenoid valve connector.
  3. Blow through the air tube and check that the air does not flow.
  4. If not correct, replace the solenoid valve and turbocharger as an assembly.
5. Apply 12V to the solenoid valve as shown.
  6. Blow through the air tube and check that air passes.
  7. If not correct, replace the solenoid valve and turbocharger as an assembly.



86U04B-052

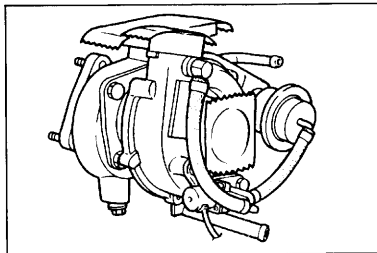
## Removal and Installation

- Precaution**
1. When replacing the turbocharger, always check the engine oil level and quality, as well as the oil pipe leading to the turbocharger and the oil return pipe. Replace, if necessary.

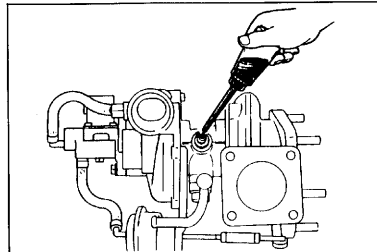


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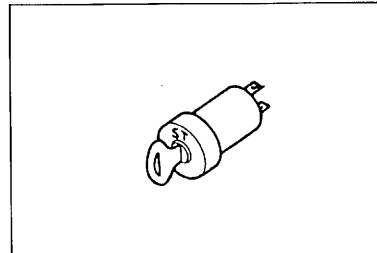
# 4B TURBOCHARGING SYSTEM



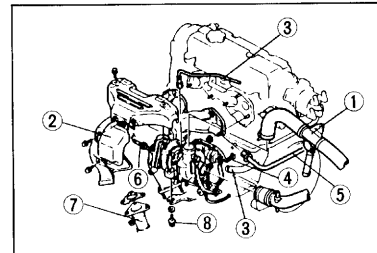
86U04B-054



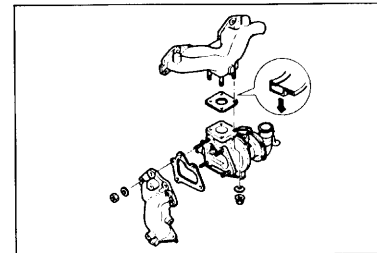
86U04B-055



86U04B-056



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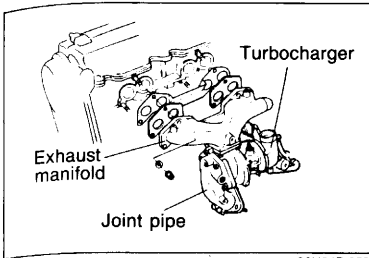


86U04B-058

2. Be careful of the following when removing, installing, and handling the turbocharger.
  - (1) Do not drop the turbocharger.
  - (2) Do not use actuator rod to carry the turbocharger
  - (3) Put the turbocharger with the turbine shaft horizontal
  - (4) Do not bend the actuator mounting or rod.
  - (5) Cover the intake, exhaust, and oil passages to prevent dirt or other material from entering.
  
3. When reinstalling the turbocharger, perform the following.
  - (1) Remove all the gaskets and sealant.
  - (2) Use new gaskets.
  - (3) Supply **25 cc (1.5 cu in)** of oil in the oil passage of the turbocharger.
  
4. After replacing the turbocharger, perform the following:
  - (1) Disconnect the connector from the igniter.
  - (2) Crank the engine for **20 seconds**.
  - (3) Reconnect the connector.
  - (4) Start the engine and run at idle for **30 seconds**.
  - (5) Stop the engine and disconnect the negative battery cable and depress the brake pedal for at least 5 seconds to cancel the malfunction code.

## Removal of turbocharger.

1. Cool the engine and drain the engine coolant.
2. Remove the parts in the order below.
  - 1) Air hoses and air bypass valve
  - 2) Insulators
  - 3) Oil pipe and oil return hose from turbocharger
  - 4) Water hoses from water pipe
  - 5) EGR pipe from exhaust manifold
  - 6) Oxygen sensor
  - 7) Front pipe
  - 8) Bolt
  
3. Remove the turbocharger and exhaust manifold as an assembly.
4. Disassemble the exhaust manifold and turbocharger.



86U04B-059

## Installation

1. Assemble the exhaust manifold and turbocharger.

### Tightening torque:

**Exhaust manifold — turbocharger;**  
27—39 N·m (2.8—4.0 m·kg, 20—29 ft·lb)

**Turbocharger — joint pipe**  
37—63 N·m (3.8—6.4 m·kg, 27—46 ft·lb)

**Turbocharger — turbocharger bracket**  
31—41 N·m (3.2—4.2 m·kg, 23—30 ft·lb)

### Caution

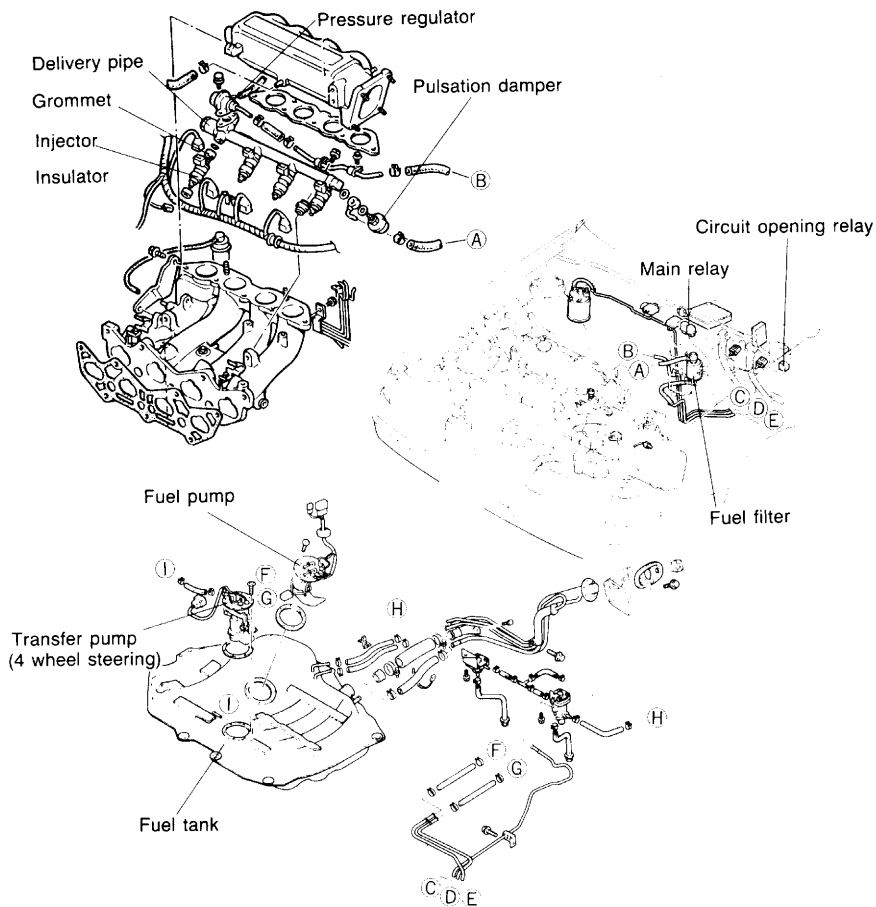
- a) Replace gasket if bent or cracked.
- b) Use the specified nut to mount the turbocharger.

2. Install parts in the reverse order of removal.

86U04B-060

# 4B FUEL SYSTEM

## FUEL SYSTEM



86U04B-0

This system supplies the fuel necessary for combustion at a constant pressure to the injectors. Fuel is metered and injected into the intake manifold according to the injection control signals from the engine control unit. It consists of the fuel pump, fuel filters, delivery pipe, pulsation damper, pressure regulator, injector, fuel pump switch (incorporated in the air flow meter), and the circuit opening relay.

The fuel pump is mounted in the fuel tank to minimize the operating noise of the fuel pump. The injectors are directly supplied with battery voltage through the main relay. The connector of the injectors is black to distinguish the injectors for the turbocharged engine from those of the non-turbocharged engine.

## COMPONENT DESCRIPTIONS

| Component                            | Function   | Remarks  | Application |                |
|--------------------------------------|--|--|-------------|----------------|
|                                      |  |  | New model   | Previous model |
| <b>Air flow meter</b>                | Detects amount of intake air; sends signal to control unit                   | Intake air temp sensor and fuel pump switch are integrated   | ○           | ○              |
| <b>Atmospheric pressure sensor</b>   | Detects atmospheric pressure; sends signal to control unit                   |  | ○           | ○              |
| <b>Circuit opening relay</b>         | Voltage for fuel pump while engine running                                   |  | ○           | ○              |
| <b>Clutch switch</b>                 | Detects in-gear condition; sends signal to control unit                      | Switch ON when clutch pedal released   | ○           | ○              |
| <b>EC-AT control unit</b>            | Detects N or P range; sends signal to control unit                           |  | ○           | X              |
| <b>Engine control unit</b>           | Detects signals from input sensors and switches; controls injector operation |  | ○           | ○              |
| <b>Fuel filter</b>                   | Filters particles from fuel  |  | ○           | ○              |
| <b>Fuel pump</b>                     | Provides fuel to injectors   | <ul style="list-style-type: none"> <li>• Operates while engine running</li> <li>• Installed in fuel tank</li> </ul>        | ○           | ○              |
| <b>G rotor and pick-up</b>           | Detects No.1 and No.4 cylinders TDC; sends signal to control unit            | For determining fuel injection timing and ignition timing  | ○           | X              |
| <b>Idle switch</b>                   | Detects when throttle valve fully closed; sends signal to control unit       | Installed on throttle body   | ○           | ○              |
| <b>Ignition switch (ST position)</b> | Sends engine cranking signal to control unit                                 |  | ○           | ○              |
| <b>Inhibitor switch</b>              | Detects in-gear condition; sends signal to EC-AT control unit                | Switch ON in "N" or "P" range  | ○           | ○              |
| <b>Injector</b>                      | Injects fuel into intake port  | <ul style="list-style-type: none"> <li>• Controlled by signals from control unit</li> <li>• High-ohmic injector</li> </ul> | ○           | ○              |
| <b>Intake air thermo sensor</b>      | Detects intake air temperature; sends signal to control unit                 | Installed in air flow meter  | ○           | ○              |
| <b>Main relay</b>                    | Supplies electric current to injectors and control unit                      |  | ○           | ○              |
| <b>Ne rotor and pick-up</b>          | Detects crank angle at 30° intervals; sends signal to control unit           | Engine speed signal  | ○           | X              |
| <b>Neutral switch</b>                | Detects in-gear condition; sends signal to control unit                      | Switch ON when in-gear   | ○           | ○              |
| <b>Oxygen sensor</b>                 | Detects Oxygen concentration; sends signal to control unit                   | Zirconia ceramic and platinum coating  | ○           | ○              |
| <b>Pressure regulator</b>            | Adjusts fuel pressure supplied to injectors                                  |  | ○           | ○              |
| <b>Pulsation damper</b>              | Absorbs fuel pulsation   |  | ○           | ○              |
| <b>Throttle sensor</b>               | Detects throttle valve opening angle; sends signal to control unit           | Installed on throttle body   | ○           | ○              |
| <b>Water thermo sensor</b>           | Detects coolant temperature; sends signal to control unit                    |  | ○           | ○              |
| <b>Water thermo switch</b>           | Detects radiator coolant temperature; sends signal to control unit           | ON: above 17°C (63°F)  | ○           | ○              |

86U04B-062

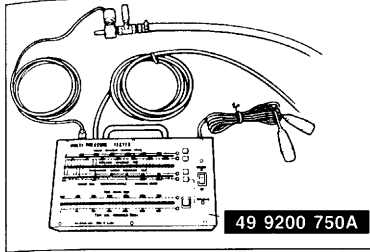
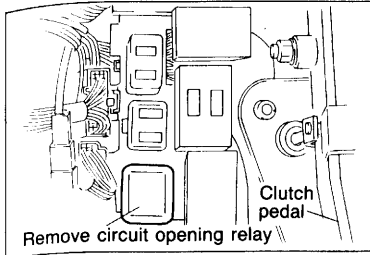
# 4B FUEL SYSTEM

## TROUBLESHOOTING

Check the condition of the wiring harness and connectors before checking the sensors or switches.

| Possible cause                                  |                  | Air flow meter | Atmospheric pressure sensor | Oxygen sensor | Throttle sensor | Water thermo sensor | Water thermo switch | Fuel pump | Injector | Fuel pressure | Engine control unit terminal |       |       |
|---|------------------|----------------|-----------------------------|---------------|-----------------|---------------------|---------------------|-----------|----------|---------------|------------------------------|-------|-------|
|   |                  |                |                             |               |                 |                     |                     |           |          |               | 20                           | 3C 3E | 3B    |
| Page  |                  | 4B-99          | 4B-104                      | 4B-103        | 4B-100          | 4B-103              | 4B-103              | 4B-58     | 4B-59    | 4B-57         | 4B-96                        | 4B-96 | 4B-96 |
| Symptom   |                  | 4B-99          | 4B-104                      | 4B-103        | 4B-100          | 4B-103              | 4B-103              | 4B-58     | 4B-59    | 4B-57         | 4B-96                        | 4B-96 | 4B-96 |
| Hard start or won't start (Crank OK)            |                  |                | 5                           |               |                 | 4                   |                     | 1         | 3        |               |                              |       | 2     |
| Engine stalls                                   | While warming up | 4              |                             |               |                 | 3                   |                     |           | 2        | 1             |                              | 5     |       |
|   | After warming up | 1              |                             |               |                 |                     |                     |           | 3        | 2             |                              | 4     |       |
| Rough idle                                      | While warming up | 4              |                             |               |                 | 3                   |                     |           | 2        | 1             |                              |       |       |
|   | After warming up | 1              | 2                           |               |                 |                     |                     |           | 4        | 3             |                              |       |       |
| Poor acceleration, hesitation, or lack of power |                  | 1              |                             |               | 3               |                     |                     |           | 4        | 2             |                              |       |       |
| Runs rough on deceleration                      |                  | 1              |                             |               |                 |                     |                     |           | 3        |               | 2                            |       |       |
| Afterburn on deceleration                       |                  | 1              |                             |               |                 |                     |                     |           | 2        |               |                              |       |       |
| Poor fuel consumption                           |                  | 5              | 6                           | 4             |                 | 3                   |                     |           | 2        | 1             |                              |       |       |
| Engine stalls or rough after hot starting       |                  | 1              |                             |               |                 |                     |                     |           | 3        | 2             |                              |       |       |
| Fails emission test                             |                  |                |                             | 1             |                 |                     |                     | 2         |          |               |                              |       |       |

96U04B-035



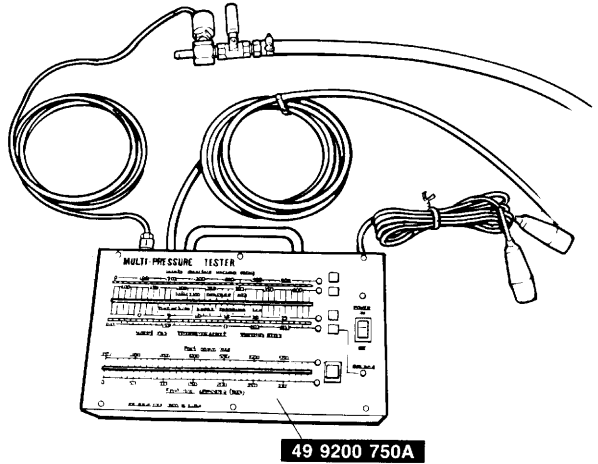
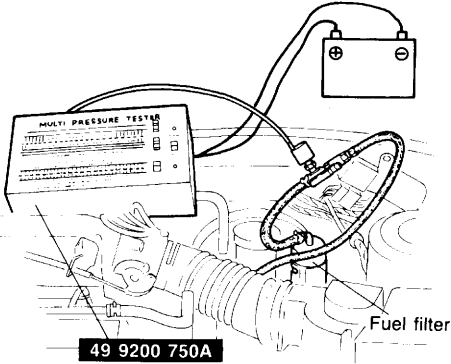
## FUEL PRESSURE RELEASE AND SERVICING FUEL SYSTEM

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

- a) Before disconnecting any fuel line, release the fuel pressure from the fuel system to reduce the possibility of injury or fire.
  1. Start the engine.
  2. Disconnect the circuit opening relay.
  3. After the engine stalls, turn OFF the ignition switch.
  4. Reconnect the circuit opening relay.
- b) Use a rag as protection from fuel spray when disconnecting the hoses.  
Plug the hoses after removal.
- c) When inspecting the fuel system, use the **SST**.

# 4B FUEL SYSTEM

## MULTI-PRESSURE TESTER (49 9200 750A)



The **MULTI-PRESSURE TESTER** (49 9200 750A) has been developed to check the fuel pressure and intake manifold vacuum. These can easily be inspected by setting the buttons on the tester.



## How to Connect Multi-Pressure Tester

### Warning

Before connecting the SST, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page 4B—55.)

1. Disconnect the negative battery terminal.
2. Disconnect the fuel main hose from the fuel filter.
3. Connect the **SST** between the fuel main hose and fuel filter with the adapter.

### Caution

Do not reverse the adapter connection.

4. Disconnect the vacuum hose from the pressure regulator control solenoid valve. Connect the **SST** vacuum hose with a three-way joint.
5. Connect the negative battery terminal.
6. Connect the **SST** to the battery.

7. Connect the terminals of the test connector (Yellow) with a jumper wire. Turn the ignition switch ON to operate the fuel pump.
8. Check for fuel leaks.

### Caution

After checking for fuel leakage, turn the ignition switch OFF and disconnect the jumper wire from the test connector.

## FUEL PRESSURE

### Note

- a) When inspecting fuel pressure, use the SST. (Refer to page 4B—57).
- b) Warm up the engine to normal operating temperature.

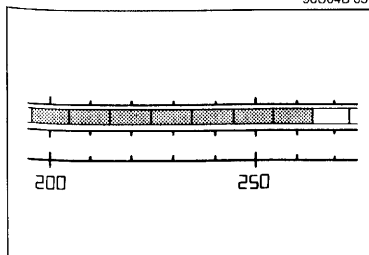
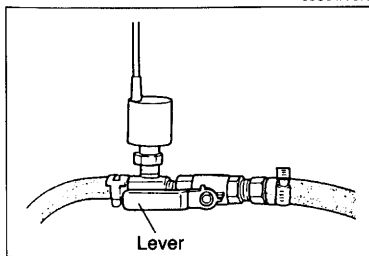
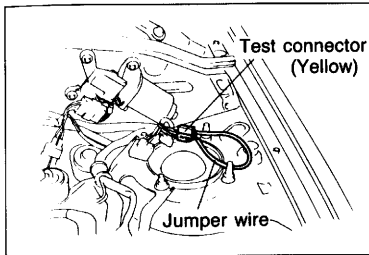
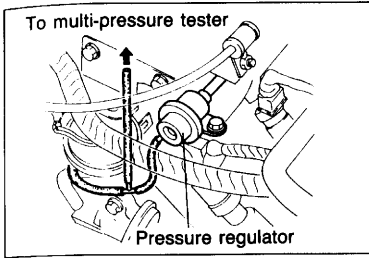
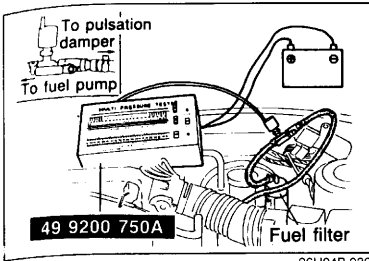
### Injection Pressure

1. Set the lever on the adapter as shown in the figure.
2. Run the engine and measure the injection pressure at various speeds.

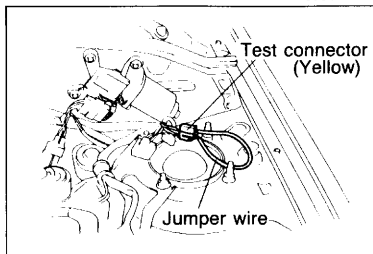
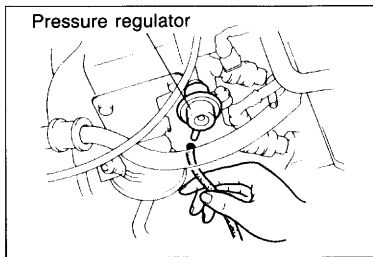
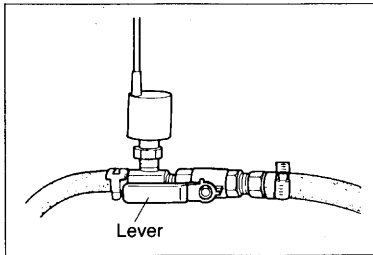
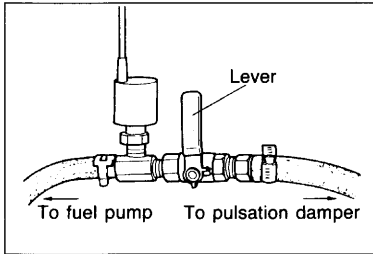
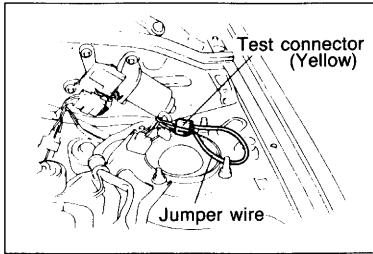
### Injection pressure:

Approx. 235—275 kPa (2.4—2.8 kg/cm<sup>2</sup>, 34—40 psi)

3. If not within specification, check the fuel pump pressure and fuel line pressure.



# 4B FUEL SYSTEM



## Fuel Pump Pressure

1. Connect the terminals of the test connector (Yellow) with jumper wire.
2. Turn the ignition switch ON to operate the fuel pump.
3. Set the lever on the adapter as shown in the figure.
4. Check the fuel pump pressure.

### Fuel pump pressure:

**441—588 kPa (4.5—6.0 kg/cm<sup>2</sup>, 64—85 psi)**

5. If the fuel pump pressure is not within specification, check the following:

### No pressure

- Fuel pump operation (Refer to page 4B—58.)

### Low pressure

- Fuel pump feeding capacity (Refer to page 4B—59.)

### High pressure

- Replace the fuel pump

6. After checking the fuel pump pressure, disconnect the jumper wire from the test connector.

## Fuel Line Pressure

1. Start the engine and run it idle.
2. Set the lever on the adapter as shown in the figure.
3. Check the fuel line pressure.

### Fuel line pressure:

**Approx. 186—226 kPa (1.9—2.3 kg/cm<sup>2</sup>, 27—33 psi)**

4. If not within specification, check the vacuum hose.

5. Disconnect the vacuum hose from pressure regulator, and place a finger over the end of the hose.
6. Check the fuel line pressure.

### Fuel line pressure:

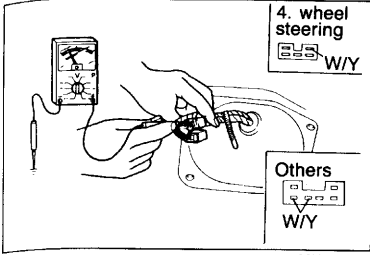
**235—275 kPa (2.4—2.8 kg/cm<sup>2</sup>, 34—40 psi)**

7. If not within specification, replace the pressure regulator.
8. Connect the vacuum hose to pressure regulator.

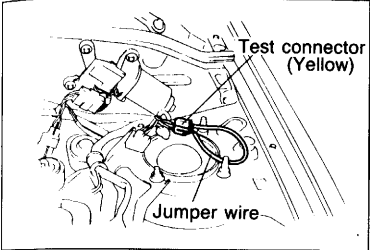
## FUEL PUMP

### Operation Test

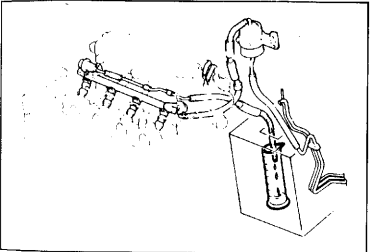
1. Connect a jumper wire to the test connector (Yellow).
2. Remove the fuel filler cap.
3. Turn the ignition switch ON.
4. Listen for operational sound of the fuel pump at the filler in.
5. Install the fuel filler cap.



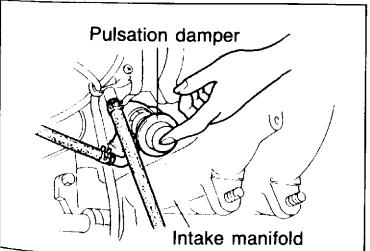
96U04B-039



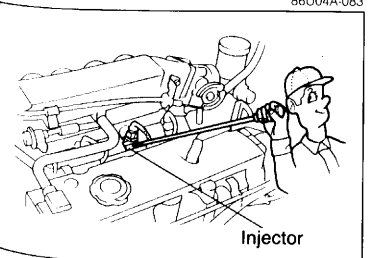
96U04B-040



86U04A-082



86U04A-083



86U04A-084

- If no sound is heard, check the voltage at the fuel pump connector (W/Y wire and a ground).

**Voltage: 12V**

- If the voltage is normal, replace the fuel pump.
- If not correct, check the circuit opening relay (Refer to page 4B—91) and its circuits.
- Disconnect the jumper wire.

## Volume Test

### Warning

**Before performing following procedures, release the fuel pressure to reduce the possibility of injury or fire. (Refer to page 4B—55)**

- Connect a jumper wire to test connector (Yellow).
  - Disconnect the fuel return hose from fuel return pipe.
  - Turn the ignition switch ON for 10 seconds, and check the feeding capacity with graduated cylinder.
- Feeding capacity:**  
**220 cc (13.4 cu in)/10 sec. min.**
- If not within specification, check the fuel filter, and fuel line.
  - Turn the ignition switch OFF and disconnect the jumper wire.

## PULSATION DAMPER

- Run the engine at idle.
- Place a finger on the screw of the pulsation damper head.
- Check that pulsation is felt.

## INJECTOR

### On-vehicle Inspection

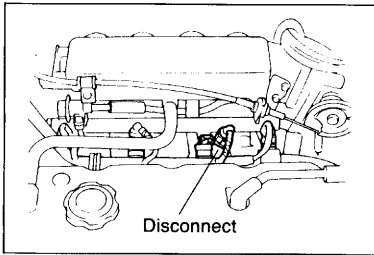
**Engine does not start**

Perform "Quick Inspection for Electrical Signal" below.

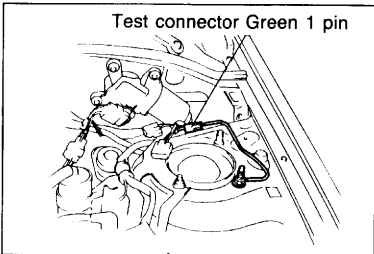
### Engine runs

- Warm up the engine and run it at idle.
- Listen for operational sound of the injector with a screwdriver or a sound scope.

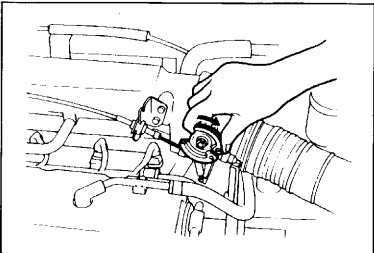
# 4B FUEL SYSTEM



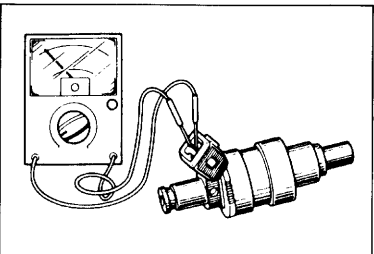
86U04A-085



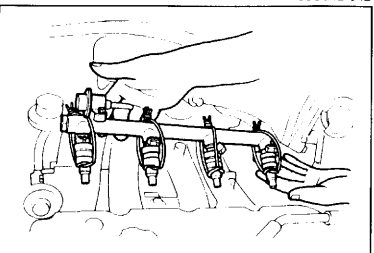
86U04A-086



96U04B-041



96U04B-042



96U04B-043

3. Disconnect the connector from each injector respectively.
4. Check that the engine speed decreases about **100—200 rpm** each time.
5. If not correct, check the following:

**No operating sound and no speed drop**  
Perform "Quick Inspection for Electrical Signal" below.

**No speed drop only**  
Injector resistance  
Injection volume of injector

### Quick Inspection for Electrical Signal

1. Ground the test connector (Green, 1-pin) with a jumper wire.
2. Turn the ignition switch ON.
3. Open the throttle valve and check for a "click" at the injector with a screwdriver or sound scope as it is opened.
4. If nothing is heard, check the injector wiring circuit.
5. If nothing is heard at all injectors, check the main relay (Refer to page 4B—91) and circuit.

### Inspection

There are 3 inspections which must be performed for the injectors.

### Resistance

1. Remove the injectors from the engine. (Refer to page 4B—67.)
2. Check the resistance of each injector with an ohmmeter.
3. If not correct, replace the injector.

**Resistance: 11—15 Ω**

### Fuel leakage test and volume test

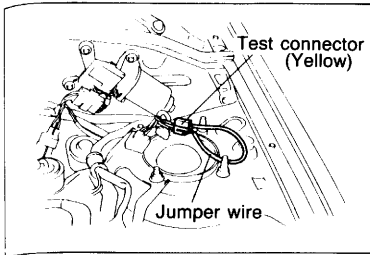
1. Lift the dynamic chamber upward.
2. Remove the injectors and delivery pipe. (Refer to page 4B—67 and 68.)
3. Affix the injectors to the delivery pipe with wire.

### Caution

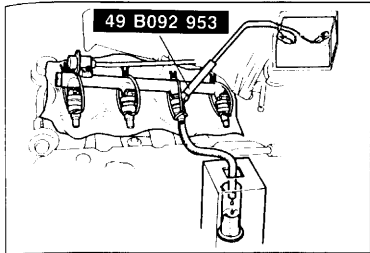
**Affix the injectors firmly to the delivery pipe so that no movement of the injectors is possible.**

### Warning

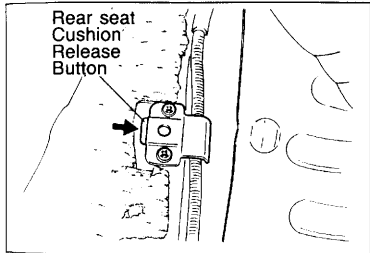
**Be extremely careful when working with fuel. Always work away from sparks or open flames.**



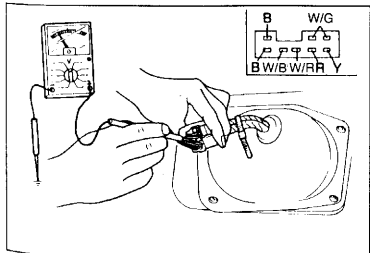
86U04A-090



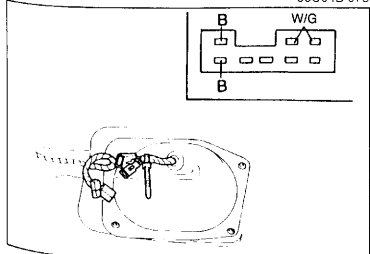
86U04B-073



86U04B-074



86U04B-075



86U04B-076

4. Connect the terminals of the fuel pump test connector with a jumper wire. Turn the ignition switch ON.
5. Check that no fuel leaks from the injector nozzles.

### Note

**After 1 minute a drop of fuel from the injector is acceptable.**

6. Connect the **SST** to the battery and injector.
7. Check the injection volume with a graduated container.

### Injection volume:

**Approx. 73—90 cc (4.45—5.49 cu in) /15 sec.**

### Caution

**When using the SST, make sure of the SST number and use correct one.**

8. If not correct, replace the injectors.

## TRANSFER PUMP CONTROL SYSTEM (4 WHEEL STEERING)

1. Remove the rear seat.
2. Remove the fuel filler cap.
3. Turn the ignition switch ON.

### Note

**a) The tank should be more than 1/3 full.**

**b) Due to the delay timer, transfer pump operation begins approx. 10 sec. after the ignition switch is turned ON.**

4. Listen for the operational sound of the transfer pump.

5. Install the fuel filler cap.

6. If no sound was heard, check the voltage at the transfer pump connector.

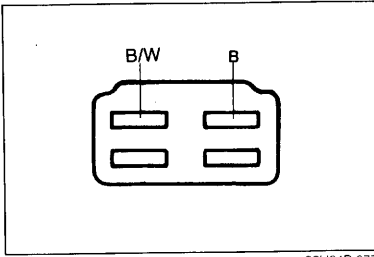
| Terminal (wire) | Voltage     |
|-----------------|-------------|
| A, C (W/G)      | Approx. 12V |
| I, J (B)        | 0V          |

7. If the voltages are correct, replace the transfer pump.
8. If not correct, disconnect the transfer pump connector.
9. Check the voltage at the terminals below.

| Terminal (wire) | Voltage     |
|-----------------|-------------|
| A, C (W/G)      | Approx. 12V |
| I, J (B)        | 0V          |

10. If the voltages are correct, replace the transfer pump.

# 4B FUEL SYSTEM



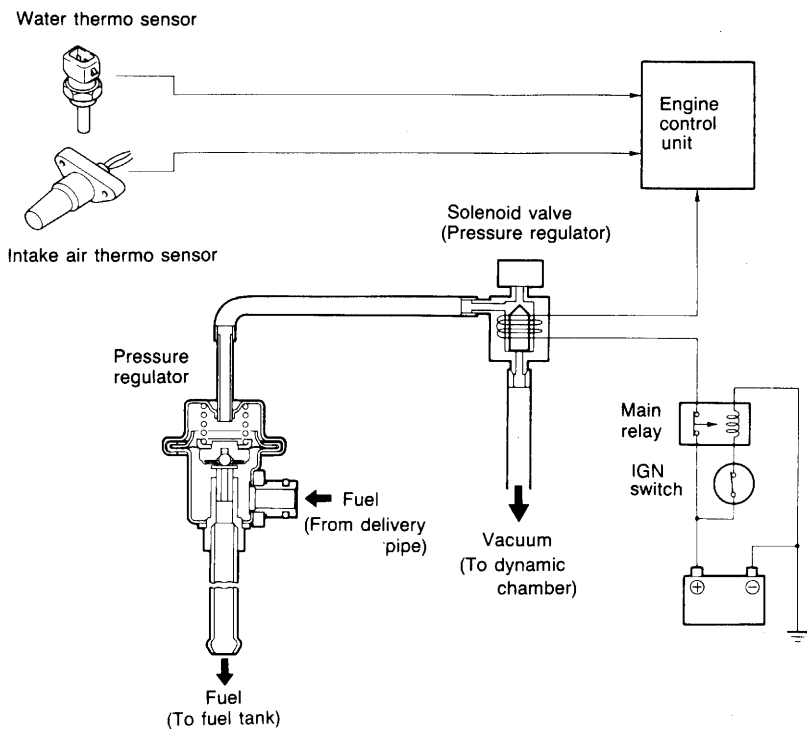
86U04B-077

11. If not correct, check the voltage at terminals of the fuel pump control unit below.

| Terminal (wire) | Voltage     |
|-----------------|-------------|
| A (B)           | Approx. 12V |
| C (B/W)         | 0V          |

12. If the voltages are correct, replace the fuel pump control unit.  
13. If not correct, repair the power supply circuit and the ground circuit for the fuel pump control unit.

## PRESSURE REGULATOR CONTROL SYSTEM



86U04A-092

To prevent percolation of the fuel during idle after the engine is restarted, vacuum is cut to the pressure regulator, increasing the fuel pressure.

**Specified time: Approx. 120 sec.**

**Operating condition: Coolant temperature — above 70°C (158°F)**

**Intake air temperature — above 20°C (68°F)**

# 4B FUEL SYSTEM

## COMPONENT DESCRIPTIONS

| Component                                   | Function  | Remarks                     | Application |                |
|---|---|-----------------------------|-------------|----------------|
|   |   |                             | New model   | Previous model |
| Engine control unit                         | Detects signals from input sensors and switches; controls solenoid valve (Pressure regulator control) |                             | ○           | ○              |
| Ignition switch (ST position)               | Sends engine cranking signal to control unit  |                             | ○           | ○              |
| Intake air thermo sensor                    | Detects intake air temperature; sends signal to control unit  | Installed in air flow meter | ○           | ○              |
| Ne rotor and pick-up                        | Detects crank angle at 30° intervals; sends signal to control unit                                    | Engine speed signal         | ○           | X              |
| Pressure regulator                          | Adjusts fuel pressure supplied to injectors   |                             | ○           | ○              |
| Solenoid valve (Pressure regulator control) | Controls vacuum line to pressure regulator  | Closes vacuum line when hot | ○           | ○              |
| Throttle sensor                             | Detects throttle valve opening angle; sends signal to control unit                                    | Installed on throttle body  | ○           | ○              |
| Water thermo sensor                         | Detects coolant temperature; sends signal to control unit   |                             | ○           | ○              |

86U04B-07

## TROUBLESHOOTING

Check the condition of the wiring harness and connections before checking the sensors or switches below.

### Note

Make the system inspection first. If no problem is found, continue with the next system inspection of the Troubleshooting Guide. (Refer to pages 4B—8 and 9.)

| Possible cause<br>Page                               | Solenoid valve (Pressure regulator control) | Water thermo sensor | Intake air thermo sensor (Airflow meter) | Throttle sensor | Engine control unit terminal<br>2K | System inspection |
|--|---|---------------------|--|-----------------|------------------------------------|-------------------|
|  | 4B—65                                       | 4B—103              | 4B—99                                    | 4B—100          | 4B—95                              | 4B—65             |
| Symptom<br>Engine stalls or rough after hot starting | 2   | 3                   | 4  | 5               | 6                                  | 1                 |

96U04B-044



## System Inspection

1. Connect the **SST** to the engine. (Refer to page 4B—57.)
2. Start the engine.

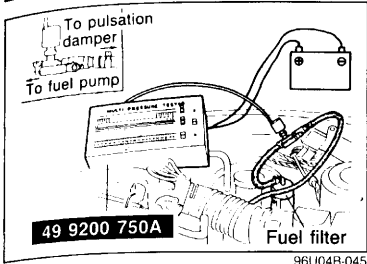
3. Warm up the engine to normal operating temperature and stop the engine.

### Warning

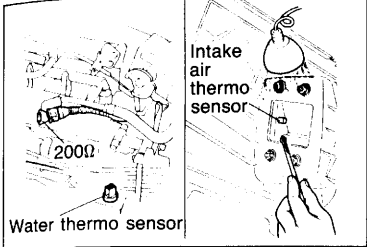
**Be careful when disconnecting the water thermo sensor connector because the surrounding area is very hot.**

4. Disconnect the water thermo sensor connector.  
Connect a resistor (**200 Ω**) to the sensor connector.
5. Lift the air cleaner upper cover assembly.
6. Heat the intake air thermo sensor to **above 30°C (86°F)**.

7. Restart the engine.
8. Check the fuel line pressure and operating times as shown in the chart.



96U04B-045



86U04A-096

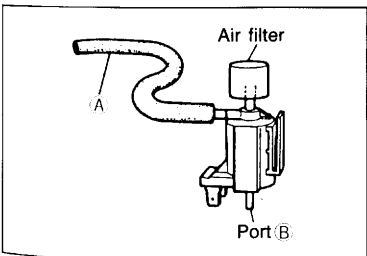
| Operating time               | Fuel line pressure kPa<br>(kg/cm <sup>2</sup> , psi) |
|------------------------------|--|
| After starting: for 120 sec. | 235—275<br>(2.4—2.8, 34—40)                          |
| After 120 sec.               | 186—226<br>(1.9—2.3, 27—33)                          |

86U04A-097

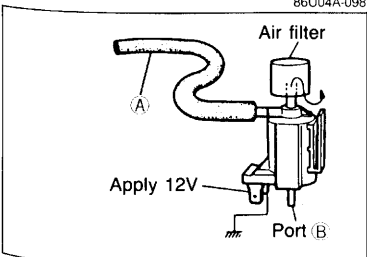
## Solenoid Valve (Pressure Regulator Control) Inspection

1. Disconnect the vacuum hose from the solenoid valve and vacuum pipe.
2. Blow through the solenoid valve from vacuum hose A.
3. Check that air flows from port B.

4. Disconnect the solenoid valve connector.
5. Connect 12V and a ground to the terminals of the solenoid valve.
6. Blow through the solenoid valve from the vacuum hose A.
7. Check that air flows from the valve air filter.

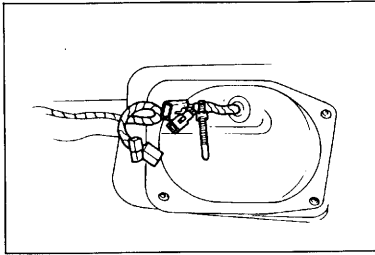


86U04A-098

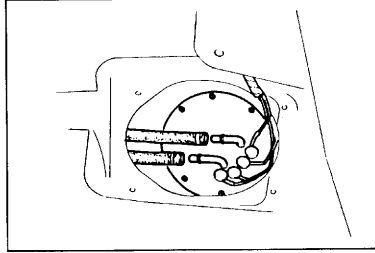


86U04A-099

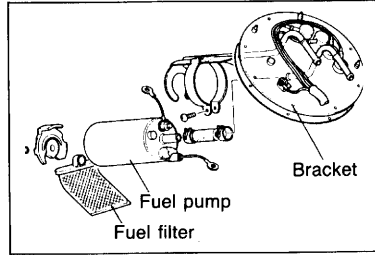
# 4B FUEL SYSTEM



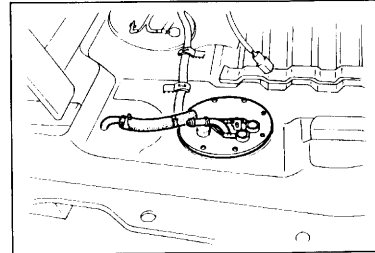
96U04B-046



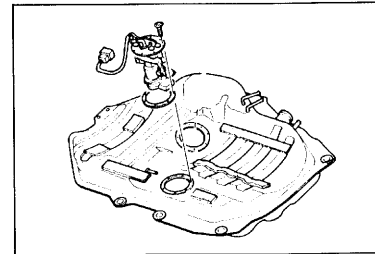
86U04A-101



86U04A-102



96U04B-047



86U04B-083

## REPLACEMENT

### Caution

- a) Before performing the following procedure, release the fuel pressure from the fuel system to reduce the possibility of injury or fire (Refer to page 4B—55)
- b) When servicing the fuel system, keep sparks, cigarettes, and open flames away from the fuel.

### Fuel Pump

1. Remove the rear seat and disconnect the fuel pump connector.
2. Remove the service hole cover.
3. Disconnect the fuel hoses.
4. Remove the fuel pump and fuel tank gauge assembly.

5. Replace the fuel pump.

### Caution

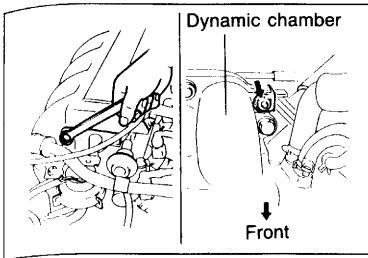
Secure the fuel pump terminals and fuel hoses securely.

6. Install in the reverse order of removal.

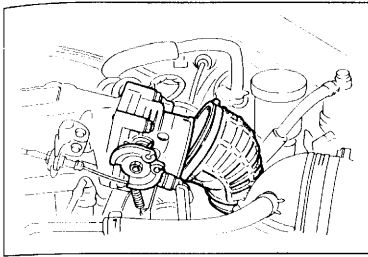
### Transfer Pump

1. Remove the fuel tank. (Refer to page 4B—70.)
2. Disconnect the fuel hoses from the transfer pump.

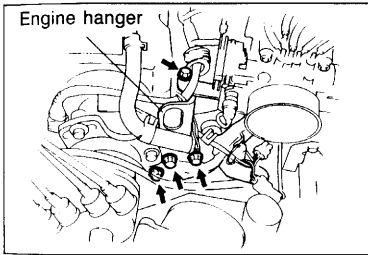
3. Remove the transfer pump.
4. Install in the reverse order of removal.



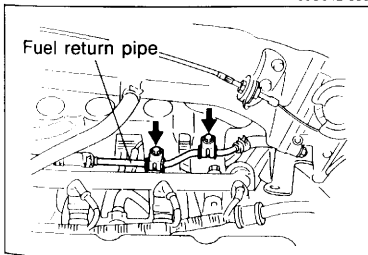
86U04B-084



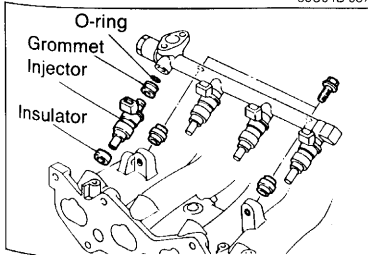
86U04B-085



86U04B-086



86U04B-087



86U04B-088

## Injector

1. Remove the wiring harness bracket.
2. Disconnect the vacuum pipe mounting bolts.

3. Disconnect the air hose from the throttle body.

4. Remove the engine hanger.
5. Remove the dynamic chamber mounting bolts and nuts.

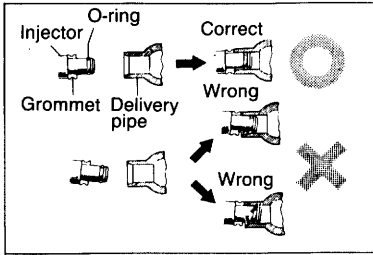
6. Lift the dynamic chamber.
7. Disconnect the fuel return pipe bracket from the intake manifold.
8. Disconnect the injector connectors.
9. Remove the delivery pipe along with the pressure regulator and pulsation damper.

10. Remove the grommets, injectors, and insulators.
11. Install in the reverse order of removal, referring to installation note.

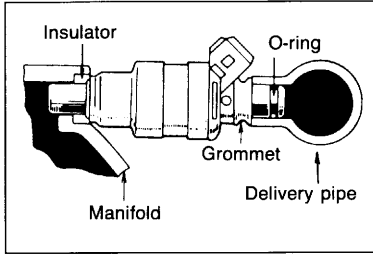
## Tightening torque:

|                        |                       |
|------------------------|-----------------------|
| <b>Delivery pipe</b>   | <b>19—25 N·m</b>      |
| <b>Dynamic chamber</b> | <b>(1.9—2.6 m·kg,</b> |
| <b>Engine hanger</b>   | <b>14—19 ft·lb)</b>   |

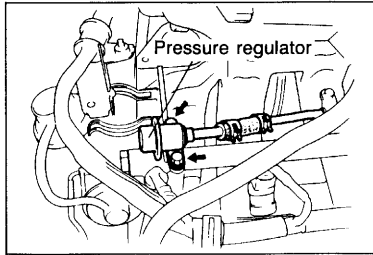
# 4B FUEL SYSTEM



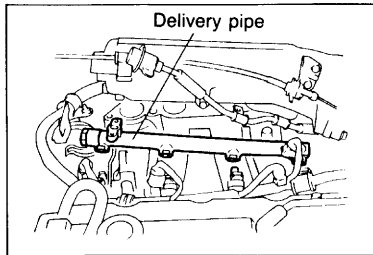
86U04A-108



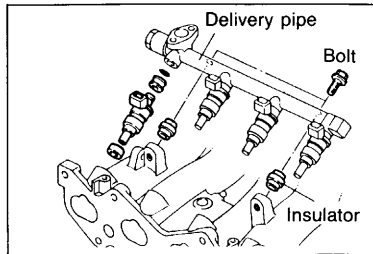
86U04A-109



96U04B-048



86U04B-090



96U04B-049

## Installation note

### Injector

1. Use new O-rings.
2. Apply a small amount of engine oil to the O-rings when stalling.

3. Install the injectors and the injector insulators.

### Delivery Pipe

1. Perform steps 1 to 7 of removal procedure for injectors. (Refer to page 4B-67.)
2. Remove the pulsation damper, pressure regulator, and injectors.

3. Replace the delivery pipe.
4. Install in the reverse order of removal, referring to installation note.

### Tightening torque:

#### Pressure regulator

8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)

#### Delivery pipe

19—25 N·m

#### Engine hanger

(1.9—2.6 m·kg,

#### Dynamic chamber

14—19 ft·lb)

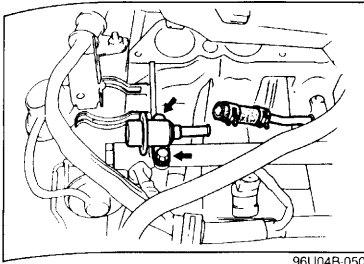
## Installation note

### Insulator

Install the insulators between the intake manifold and delivery pipe.

### Injector

Refer to page 4B-68.



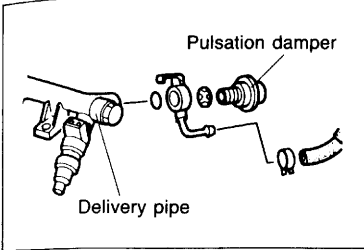
96U04B-050

### Pressure Regulator

1. Perform steps 1 to 8 of removal procedure for the injector. (Refer to page 4B—67.)
2. Disconnect the vacuum hose and fuel return hose.
3. Remove the pressure regulator.
4. Install in the reverse order of removal.

### Tightening torque:

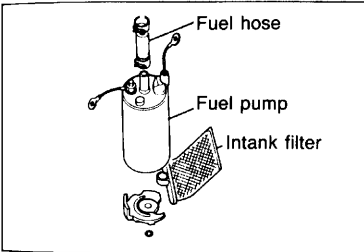
**8—11 N·m (0.8—1.1 m·kg, 69—95 in·lb)**



96U04B-051

### Pulsation Damper

1. Perform steps 1 to 7 of removal procedure for the injectors. (Refer to page 4B—67.)
2. Remove the pulsation damper.
3. Install in the reverse order of removal.

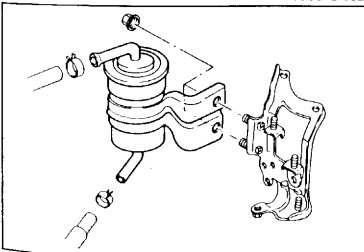


96U04B-052

### Fuel Filter

#### Low pressure side

Refer to page 4B—66.



86U04A-116

#### High pressure side

The fuel filter must be replaced at the intervals outlined in the maintenance schedule.

### Warning

**Always work away from sparks or open flames.**

1. Disconnect the fuel hoses from the fuel filter.
2. Remove the fuel filter and the bracket.
3. Install a new filter and the bracket.
4. Connect the fuel hoses.

### Note

**When installing the filter, push the fuel hoses fully onto the fuel filter and secure the hoses with spring clamps.**

# 4B FUEL SYSTEM

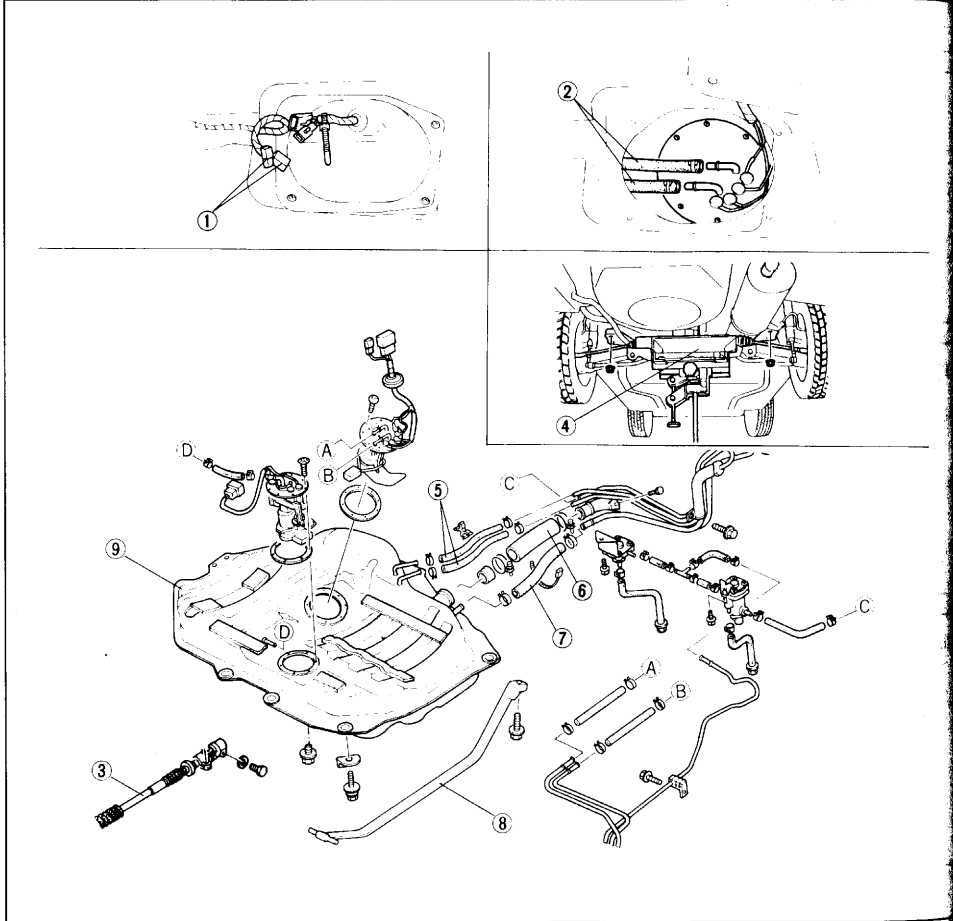
## FUEL TANK

### Removal

#### Caution

- a) Before performing the following procedure, release the fuel pressure from the fuel system to reduce the possibility of injury or fire. (Refer to page 4B—55)
- b) When removing the fuel tank, keep sparks, cigarettes, and open flames away from the fuel tank

Remove in the sequence shown in the figure.

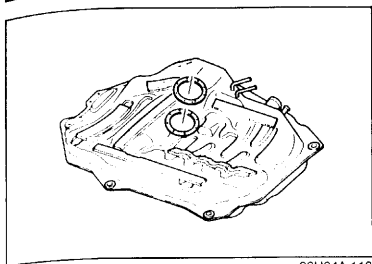


#### Note

Drain the fuel from the fuel tank before removing the tank.

- |  |                      |
|--|----------------------|
| 1. Fuel pump connectors  | 5. Evaporative hoses |
| 2. Fuel hoses  | 6. Fuel filler hose  |
| 3. Steering angle transfer shaft (4-wheel steering)<br>(Refer to section 10) | 7. Breather hose     |
| 4. Cross member (4-wheel steering)   | 8. Fuel tank strap   |
|  | 9. Fuel tank         |

96U04B-0



86U04A-118

### Inspection

1. Check the fuel tank for cracks and corrosion.
2. If any defect is found, repair or replace the tank.

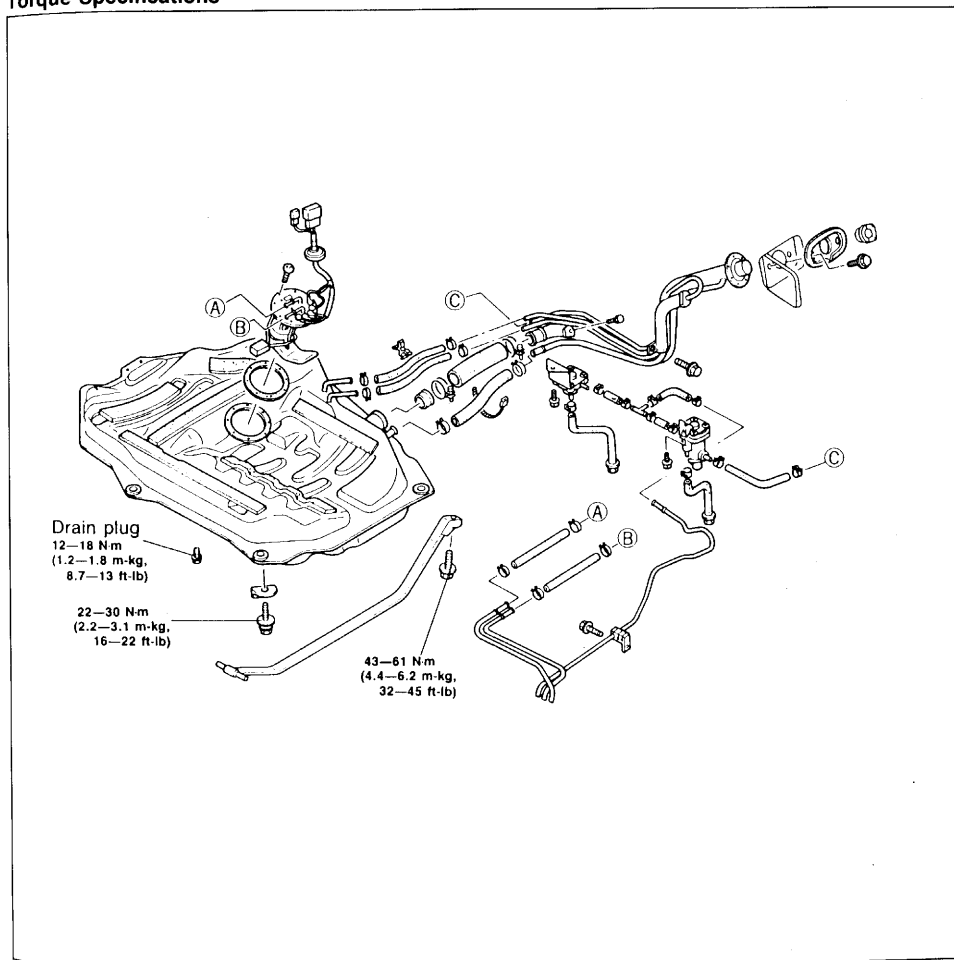
### Warning

**Before repairing, clean the fuel tank thoroughly with steam to sufficiently remove all explosive gas.**

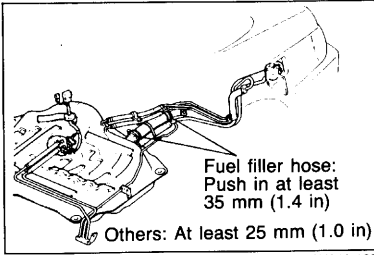
### Installation

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

### Torque Specifications



## 4B FUEL SYSTEM



### Installation note

#### Hoses

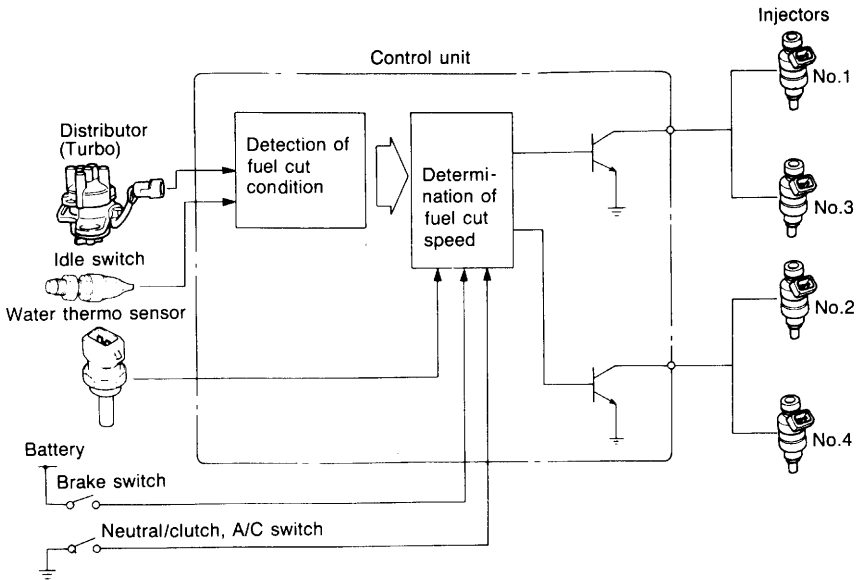
1. Push the hose ends of the main fuel hose, fuel return hose and evaporation hoses onto the fuel tank fittings **at least 25 mm (1.0 in)**.
2. Push the fuel filler hose ends onto the fuel tank pipe and filler pipe **at least 35 mm (1.4 in)**.

#### Steering angle transfer shaft (4-wheel steering)

Refer to section 10



DECELERATION CONTROL SYSTEM



86U04A-121

The fuel cut system is provided as a deceleration control system.  
This system is to improve fuel economy.

# 4B DECELERATION CONTROL SYSTEM

## COMPONENT DESCRIPTIONS

| Component                   | Function   | Remarks                              | Application           |                       |
|-----------------------------|--|--------------------------------------|-----------------------|-----------------------|
|                             |  |                                      | New model             | Previous model        |
| <b>Brake light switch</b>   | Detects braking operation (deceleration); sends signal to control unit |                                      | <input type="radio"/> | <input type="radio"/> |
| <b>Clutch switch</b>        | Detects in-gear condition; sends signal to control unit                | Switch ON when clutch pedal released | <input type="radio"/> | <input type="radio"/> |
| <b>EC-AT control unit</b>   | Detects N or P range; sends signal to control unit                     |                                      | <input type="radio"/> | X                     |
| <b>Engine control unit</b>  | Detects signals from input sensors and switches; cuts fuel injection   |                                      | <input type="radio"/> | <input type="radio"/> |
| <b>Idle switch</b>          | Detects when throttle valve fully closed; sends signal to control unit | Installed on throttle body           | <input type="radio"/> | <input type="radio"/> |
| <b>Inhibitor switch</b>     | Detects in-gear condition; sends signal to EC-AT control unit          | Switch ON in "N" or "P" range        | <input type="radio"/> | <input type="radio"/> |
| <b>Ne rotor and pick-up</b> | Detects crank angle at 30° intervals; sends signal to control unit     | Engine speed signal                  | <input type="radio"/> | X                     |
| <b>Neutral switch</b>       | Detects in-gear condition; sends signal to control unit                | Switch ON when in-gear               | <input type="radio"/> | <input type="radio"/> |
| <b>Water thermo sensor</b>  | Detects coolant temperature; sends signal to control unit              |                                      | <input type="radio"/> | <input type="radio"/> |

86U04B-096

## TROUBLESHOOTING

Check the condition of the wiring harness and connectors before checking the sensor or switches below.

### Note

**Make the system inspection first. If no problem is found, continue with the next system inspection of the Troubleshooting Guide. (Refer to page 4B—8 and 9.)**

| Possible cause | Water thermo sensor | System inspection |
|----------------|---------------------|-------------------|
| Page           | 4B—103              | 4B—75             |
| Checking order | 2                   | 1                 |

96U04B-054

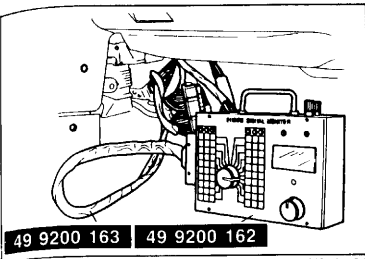
# DECELERATION CONTROL SYSTEM 4B

## System Inspection (Electrical Signal)

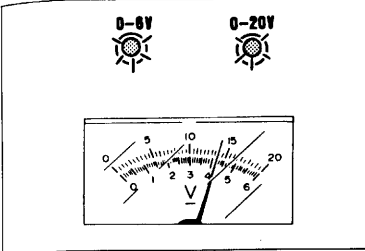
1. Connect the **SST** between the wiring harness and control unit.
2. Set 3C or 3E position on the **SST**.

### Note

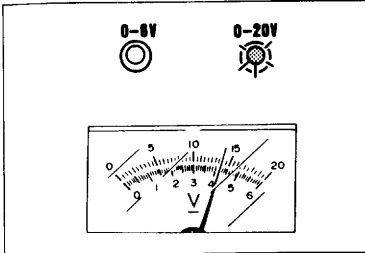
- 3C** — For No. 2 and No. 4 injectors  
**3E** — For No. 1 and No. 3 injectors



86U04A-124



86U04A-125



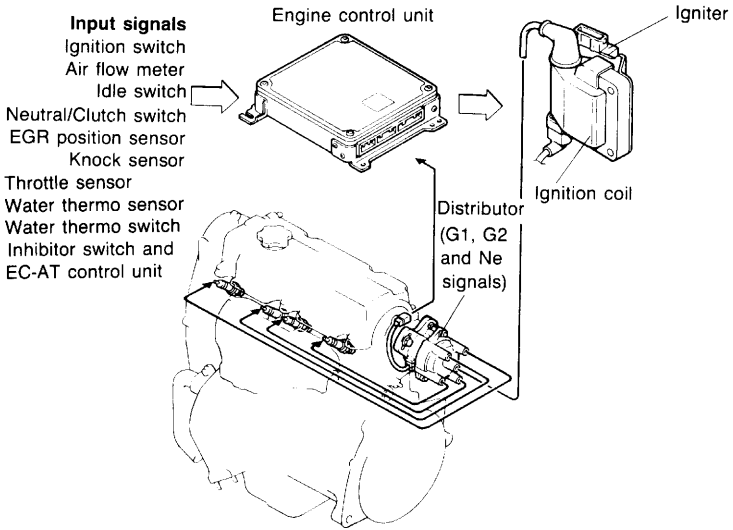
86U04A-126

3. Check that the indicator lamps alternately flash at idle.

4. Increase the engine speed to **4,000 rpm**, then suddenly decrease the engine speed.
5. Check that the red indicator lamp stays illuminated during deceleration.

# 4B ESA CONTROL SYSTEM

## ELECTRONIC SPARK ADVANCE (ESA) CONTROL SYSTEM



86U04B

This system electronically controls the ignition timing to obtain better engine performance. The best ignition timing is determined and set within the engine control unit based on signals from the various sensors and switches.

**COMPONENT DESCRIPTIONS**

| Component                            | Function  | Remarks  | Application |                |
|--------------------------------------|---|--|-------------|----------------|
|                                      |   |  | New model   | Previous model |
| <b>Air flow meter</b>                | Detects amount of intake air; sends signal to control unit                          | Intake air temp sensor and fuel pump switch are integrated | ○           | ○              |
| <b>Clutch switch</b>                 | Detects in-gear condition; sends signal to control unit                             | Switch ON when clutch pedal released                       | ○           | ○              |
| <b>Distributor</b>                   | Has Ne and G rotor  |  | ○           | X              |
| <b>EGR position sensor</b>           | Detects EGR control valve lift amount; sends signal to control unit                 | Variable resistor  | ○           | ○              |
| <b>Engine control unit</b>           | Detects signals from input sensors and switches; decides the best ignition timing   |  | ○           | X              |
| <b>G rotor and pick-up</b>           | Detects No.1 and No.4 cylinders TDC; sends signal to control unit                   | For determining fuel injection timing and ignition timing  | ○           | X              |
| <b>Idle switch</b>                   | Detects when throttle valve fully closed; sends signal to control unit              | Installed on throttle body                                 | ○           | ○              |
| <b>Igniter</b>                       | Receives spark signal from control unit and generates high voltage to ignition coil |  | ○           | X              |
| <b>Ignition switch (ST position)</b> | Sends engine cranking signal to control unit  |  | ○           | ○              |
| <b>Main relay</b>                    | Supplies electric current to injectors and control unit                             |  | ○           | ○              |
| <b>Ne rotor and pick-up</b>          | Detects crank angle at 30° intervals; sends signal to control unit                  | Engine speed signal  | ○           | X              |
| <b>Neutral switch</b>                | Detects in-gear condition; sends signal to control unit                             | Switch ON when in-gear                                     | ○           | ○              |
| <b>Knock control unit</b>            | Receives knock signal from knock sensor; sends signal to control unit               |  | ○           | ○              |
| <b>Knock sensor</b>                  | Detects engine knocking; sends signal to knock control unit                         |  | ○           | ○              |
| <b>EC-AT control unit</b>            | Detects N or P range; sends signal to control unit                                  |  | ○           | X              |
| <b>Inhibitor switch</b>              | Detects in-gear condition; sends signal to EC-AT control unit                       | Switch ON in "N" or "P" range                              | ○           | ○              |
| <b>Throttle sensor</b>               | Detects throttle valve opening angle; sends signal to control unit                  | Installed on throttle body                                 | ○           | ○              |
| <b>Water thermo sensor</b>           | Detects coolant temperature; sends signal to control unit                           |  | ○           | ○              |
| <b>Water thermo switch</b>           | Detects radiator coolant temperature; sends signal to control unit                  | ON: above 17°C (63°F)                                      | ○           | ○              |

86U04B-099

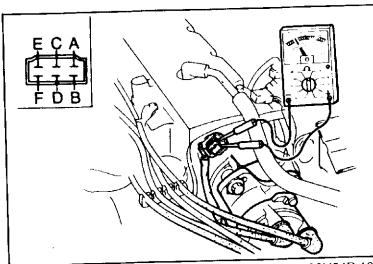
# 4B ESA CONTROL SYSTEM

## TROUBLESHOOTING

Check the condition of the wiring harness and connectors before checking sensors or switches.

| Symptom                              | Possible cause | Distributor | Igniter            | Engine control unit terminal | Knock control system |
|--------------------------------------|----------------|-------------|--------------------|------------------------------|----------------------|
|                                      |                |             |                    | 1T, 1Q, 1N, 1P, and 1O       |                      |
|                                      | Page           |             |                    |                              |                      |
|                                      |                | 4B—78       | Refer to section 5 | 4B—94 and 4B—95              | 4B—78                |
| Hard start or won't start (Crank OK) |                | 1           | 2                  | 3                            |                      |
| Knocking                             |                |             |                    |                              | 1                    |

96U04B-05



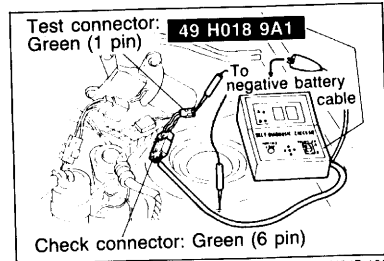
86U04B-101

### Distributor

1. Disconnect the distributor connector.
2. Connect an ohmmeter to the terminals of the distributor connector.
3. Check the resistance of the following.

| Terminal | Resistance (at 20°C, 68°F) |
|----------|----------------------------|
| A—B      | 210—260 Ω                  |
| C—D      |                            |
| E—F      |                            |

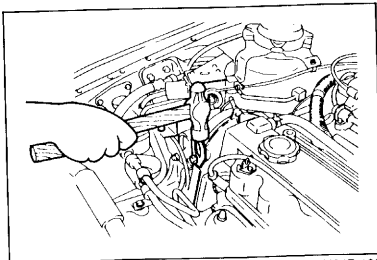
4. If not correct, replace the distributor.



86U04B-102

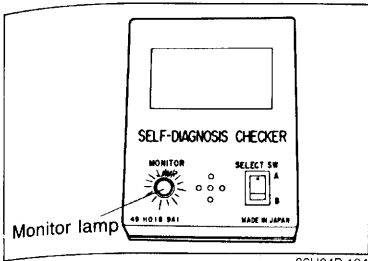
### Knock Control System

1. Connect the **SST** to the check connector.
2. Ground the test connector with a jumper wire.
3. Turn the ignition switch ON.

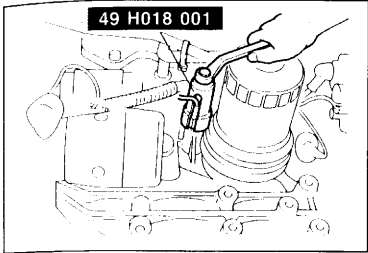


86U04B-103

4. Tap the right engine hanger (drive belt side) and check the monitor lamp on the **SST** flashes.



86U04B-104



86U04B-184

5. If not correct, connect a good knock sensor to the vehicle wiring harness and ground it.
6. Perform step 4 again and judge the malfunctioning part as follows:

| Monitor lamp flashes | Malfunction        |
|----------------------|--------------------|
| YES                  | Knock sensor       |
| NO                   | Knock control unit |

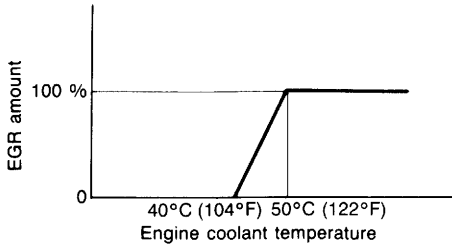
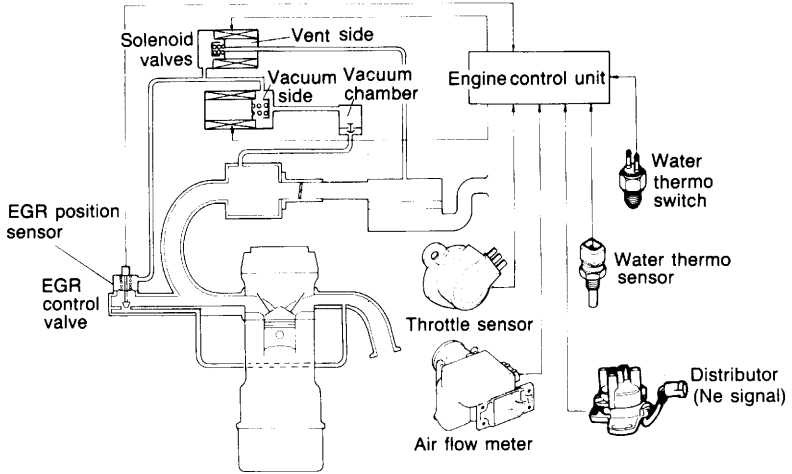
7. Replace the malfunctioning part.

### Knock Sensor Replacement

1. Disconnect the knock sensor connector.
2. Lift the vehicle and remove the intake manifold bracket.
3. Remove the knock sensor with the **SST**.
4. Install the knock sensor in the reverse order of removal.

# 4B EGR SYSTEM

## EXHAUST GAS RECIRCULATION (EGR) SYSTEM



86U04B

This system introduces exhaust gas into the intake manifold to reduce NOx in the exhaust gas. It operates depending on the throttle valve opening, driving condition, engine coolant temperature (**above 40°C, 104°F**), and radiator coolant temperature (**above 17°C, 63°F**).



## COMPONENT DESCRIPTION

| Component                   | Function  | Remarks  | Application |                |
|-----------------------------|---|--|-------------|----------------|
|                             |   |  | New model   | Previous model |
| <b>Air flow meter</b>       | Detects amount of intake air; sends signal to control unit                                      | Intake air temp sensor and fuel pump switch are integrated         | ○           | ○              |
| <b>Distributor</b>          | Has Ne and G rotors   |  | ○           | X              |
| <b>EGR control valve</b>    | Recirculates portion of exhaust gas   |  | ○           | ○              |
| <b>EGR position sensor</b>  | Detects EGR control valve lift amount; sends signal to control unit                             | Variable resistor  | ○           | ○              |
| <b>Engine control unit</b>  | Detects signals from input sensors and switches; operates solenoid valves (vent or vacuum side) |  | ○           | ○              |
| <b>Ne rotor and pick-up</b> | Detects crank angle at 30° intervals; sends signal to control unit                              | Engine speed signal  | ○           | X              |
| <b>Solenoid valve (EGR)</b> | Controls vacuum to EGR control valve  | Vent side: controls vent line<br>Vacuum side: controls vacuum line | ○           | ○              |
| <b>Throttle sensor</b>      | Detects throttle valve opening angle; sends signal to control unit                              | Installed on throttle body   | ○           | ○              |
| <b>Vacuum chamber</b>       | Stores vacuum led to solenoid valve (EGR, vacuum side) under turbocharger boost condition       | Integrated check valve   | ○           | X              |
| <b>Water thermo sensor</b>  | Detects coolant temperature; sends signal to control unit                                       |  | ○           | ○              |
| <b>Water thermo switch</b>  | Detects radiator coolant temperature; sends signal to control unit                              | ON: above 17°C (62.6°F)  | ○           | ○              |

86U04B-106

## TROUBLESHOOTING

Check the condition of the wiring harness and connectors before checking sensors or switches.

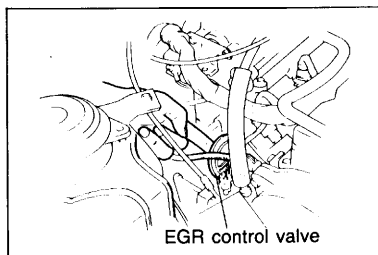
### Note

**Make the system inspection first. If no problem is found, continue with the next system inspection of the Troubleshooting Guide. (Refer to pages 4B-8 and 9.)**

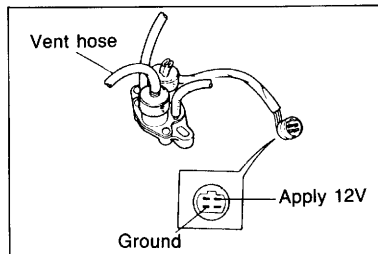
| Possible cause | Water thermo sensor | EGR control valve | EGR position sensor | Solenoid valve | Throttle sensor | Vacuum chamber | Water thermo switch | Engine control unit terminal | System inspection |       |
|----------------|---------------------|-------------------|---------------------|----------------|-----------------|----------------|---------------------|------------------------------|-------------------|-------|
|                |                     |                   |                     | Vent Vac.      |                 |                |                     | 1H<br>2M, 2N                 |                   |       |
| Page           | 4B-103              | 4B-83             | 4B-82               | 4B-82          | 4B-100          | 4B-83          | 4B-103              | 4B-94                        | 4B-95 and 96      | 4B-82 |
| Checking order | 7                   | 3                 | 4                   | 2              | 8               | 6              | 5                   | 9                            | 10                | 1     |

96U04B-056

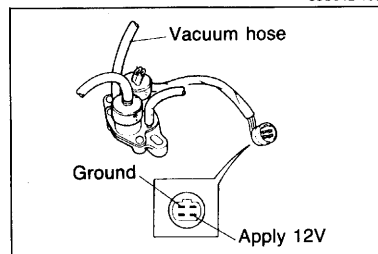
# 4B EGR SYSTEM



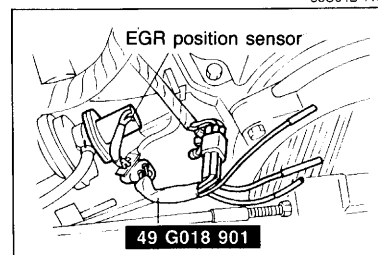
86U04B-108



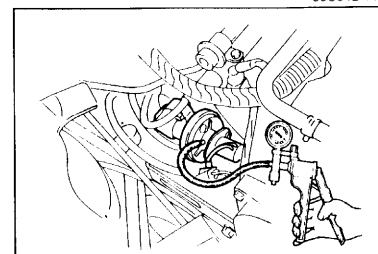
86U04B-109



86U04B-110



86U04B-111



86U04B-112

## System Inspection

1. Start the engine
2. Accelerate the engine and verify that the diaphragm of the EGR control valve does not move while the engine is cold.
3. Warm up the engine to normal operating temperature, run it at idle.

## Warning

**Be careful when checking the EGR control valve cause the surrounding area is very hot.**

4. Accelerate the engine and check that the diaphragm of EGR control valve moves upward.

## Solenoid Valve (EGR, Vent Side)

1. Disconnect the vacuum hoses.
2. Blow through the vent hose and make sure air flows.
3. Disconnect the solenoid valve connector.
4. Apply 12V and ground the valve as shown.
5. Blow through the vent hose and make sure air does not flow.
6. If not correct, replace the solenoid valves.

## Solenoid valve (EGR, Vacuum Side)

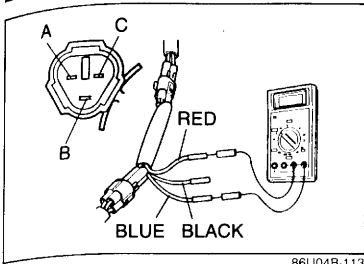
1. Disconnect the vacuum hoses.
2. Blow through the vacuum hose and make sure air does flow.
3. Disconnect the solenoid valve connector.
4. Apply 12V and ground the valve as shown.
5. Blow through the vacuum hose and make sure air flows.
6. If not correct, replace the solenoid valves.

## EGR Position Sensor

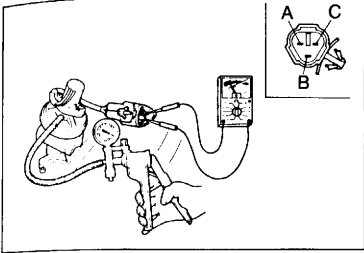
### Inspection of output voltage

1. Disconnect the EGR position sensor connector.
2. Connect the **SST** between the EGR position sensor and wiring harness.

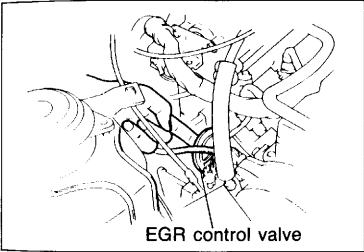
3. Disconnect the vacuum hose from the EGR control valve and connect the vacuum pump.
4. Turn the ignition switch ON.
5. Check voltage of each terminal in the conditions shown in the table.



86U04B-113

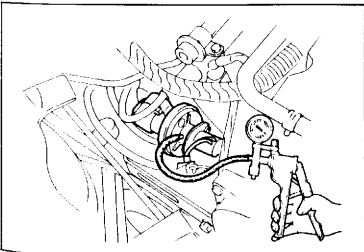


86U04B-114

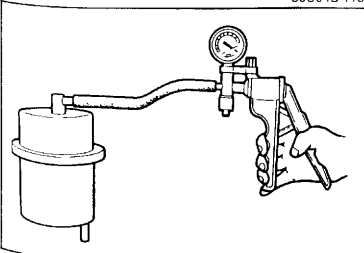


EGR control valve

86U04B-115



86U04B-116



86U04B-117

| Terminal | SST wire color | Vacuum     |                     |
|----------|----------------|------------|---------------------|
|          |                | 0          | 120 mmHg (4.7 inHg) |
| C        | Red            | 0.25—0.95V | Approx. 4.0V        |
| B        | Blue           | Below 1.5V |                     |
| A        | Black          | 4.5—5.5V   |                     |

- If not correct at A and B terminal, check the wiring harness and 2A and 2C terminals of the engine control unit.
- If not correct at C terminal, check the sensor resistance, then the wiring harness and the engine control unit 2F terminal.
- Disconnect the **SST** and reconnect the EGR position sensor connector.

### Inspection of resistance

- Disconnect the EGR position sensor connector.
- Check as shown resistance between the terminals as shown.

| Terminals | Resistance |
|-----------|------------|
| A—B       | 5 kΩ       |
| A—C       | 0.7—5 kΩ   |
| B—C       | 0.7—5 kΩ   |

### EGR Control Valve

- Manually actuate the valve by pushing on the diaphragm with finger.
- Check that the spring resistance is present and the diaphragm moves freely with no sticking or binding.

#### Note

**Before replacing the EGR control valve, check the intake air and control systems.**

- Warm up the engine and run it at idle.
- Connect a vacuum pump to the valve and apply vacuum.
- Check that the engine runs roughly or stalls at more than the specified vacuum.

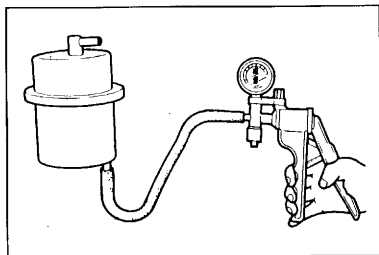
**Specification: 40—60 mmHg (1.6—2.4 inHg)**

- If not correct, replace the EGR control valve.

### Vacuum Chamber

- Disconnect the vacuum hoses from the vacuum chamber, and remove it.
- Connect the vacuum pump to the vacuum chamber as shown.
- Apply vacuum and check that no vacuum is held.
- If not correct, replace the vacuum chamber.

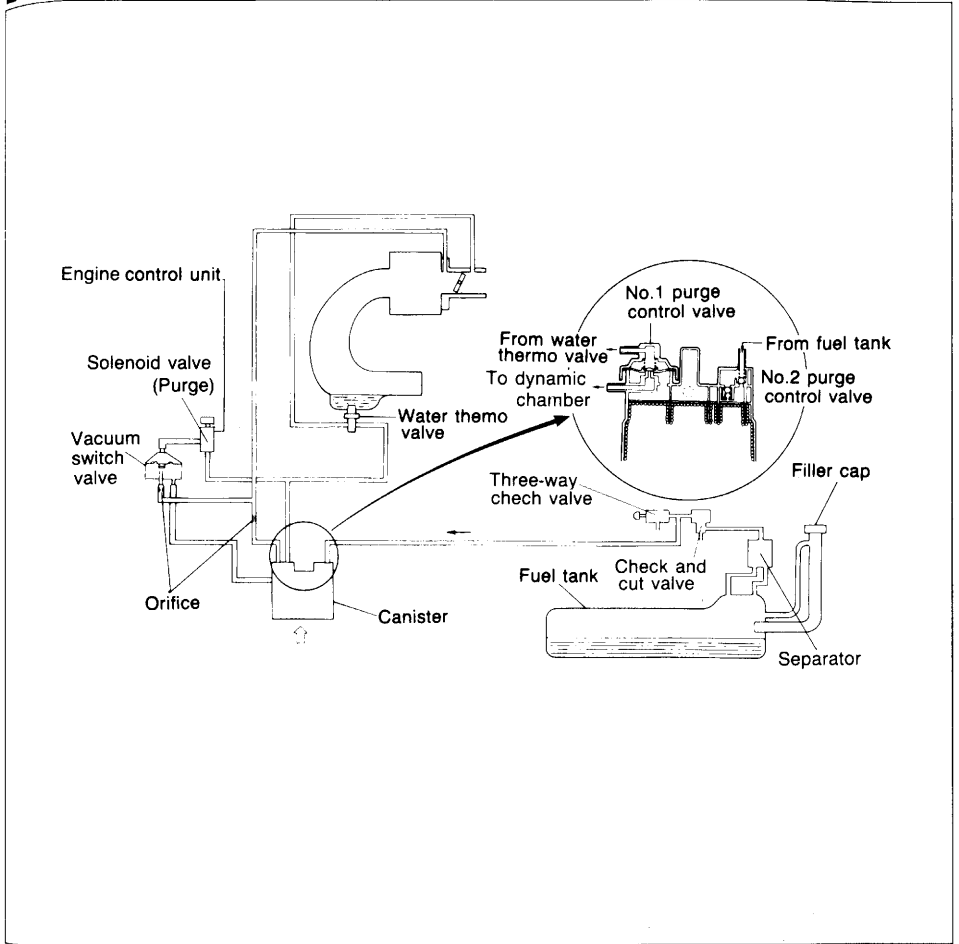
## 4B EGR SYSTEM



86U04B-118

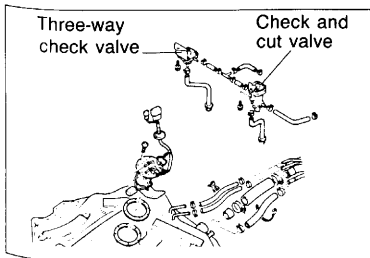
5. Connect the vacuum pump to the vacuum chamber shown.
6. Apply vacuum and check that vacuum is held.
7. If not correct, replace the vacuum chamber.

EVAPORATIVE EMISSION CONTROL (EEC) SYSTEM



96U04B 057

This system is the same as that of the non-turbo engine. Refer to page 4A—73 for servicing the system except the replacement of the three-way check valve and check and cut valve (4-wheel steering).



96U04B 058

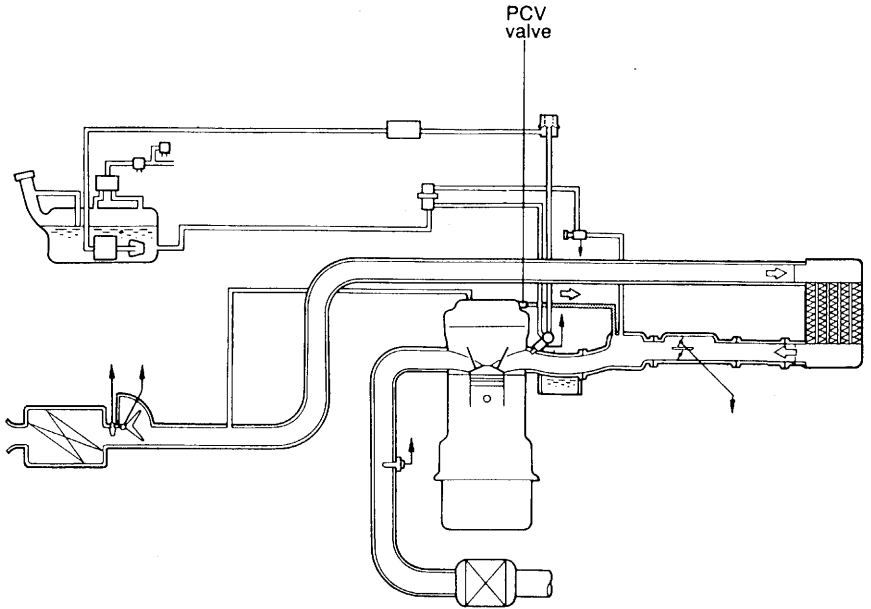
**Replacement**

**Three-way check valve and check and cut valve**

1. Remove the fuel tank. (Refer to page 4B—70.)
2. Disconnect the evaporative hoses from the three-way check valve and check and cut valve.
3. Replace them.
4. Install in the reverse order of removal.

# 4B PCV SYSTEM

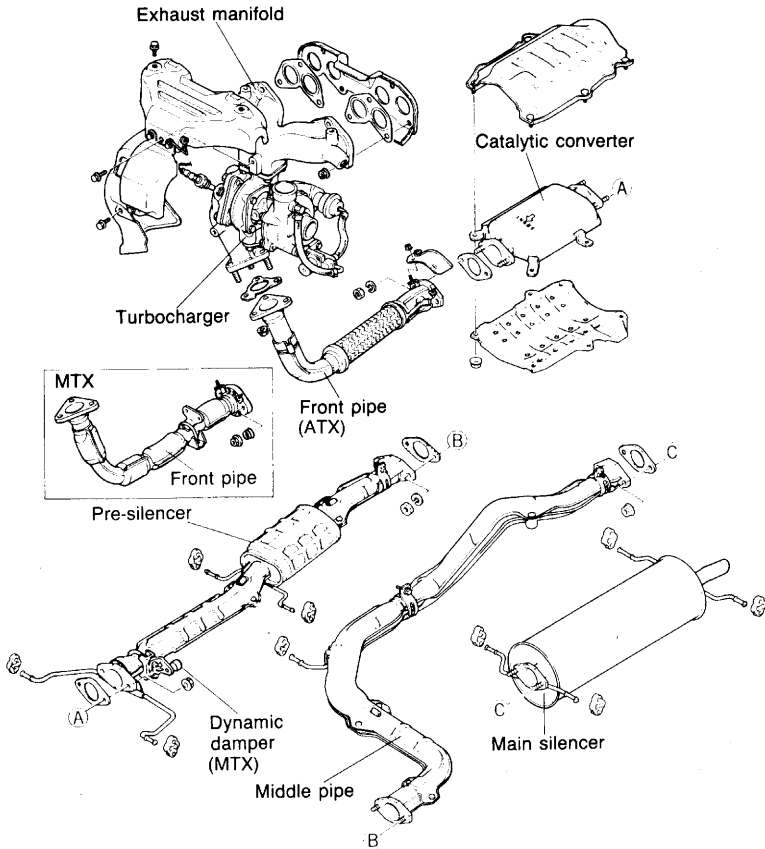
## POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM



This system is the same as that of the non-turbo engine.  
Refer to page 4A—72 for servicing the system.

96U04B 0

## EXHAUST SYSTEM



96U04B-060

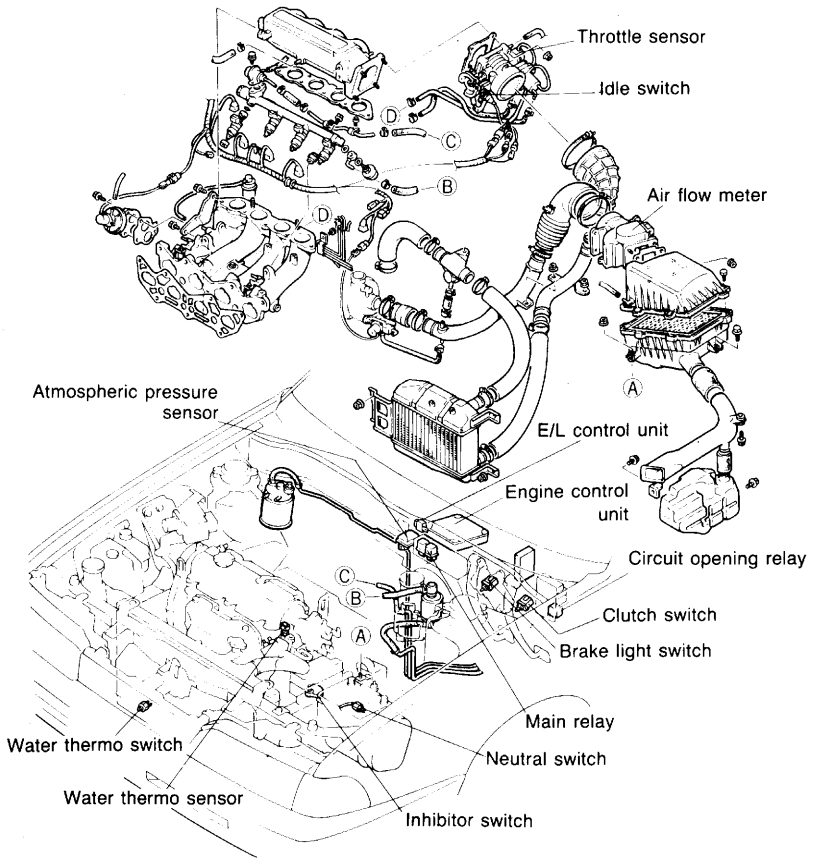
The catalytic converter is used to reduce CO, HC and NOx. The converter contains a compound of platinum and rhodium. It is a three-way catalyst type with a volume of **2,300 cc (140 cu in)**.

This system is the same as that of the non-turbo engine.

Refer to page 4A-71 for servicing the system.

# 4B CONTROL SYSTEM

## CONTROL SYSTEM



The control system consists of the input devices and the control unit. The control unit controls the fuel injection amount (EGI), fuel injection pressure, bypass air amount, ignition timing, switch monitor function, fail-safe function.



## RELATIONSHIP CHART Output Devices and Input Devices

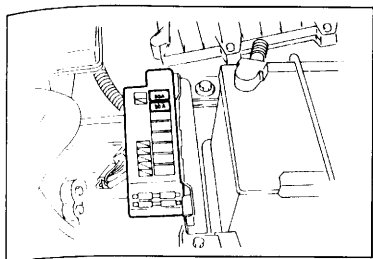
|  |  | TEST CONNECTOR                          | X | X                     | X                     | ○         | X | X         | X         | X                              | X | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|--|--|---|---|-----------------------|-----------------------|-----------|---|-----------|-----------|--------------------------------|---|---|----------------------------------|--|------------------------|--|-------------------------------------|--|----------------------------|--|---------|
|  |  | KNOCK SENSOR                            | X | X                     | X                     | X         | X | X         | X         | X                              | ○ | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | BRAKE LIGHT SWITCH                      | ○ | X                     | X                     | X         | X | X         | X         | X                              | X | X |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | EGR POSITION SENSOR                     | X | X                     | X                     | X         | ○ | ○         | X         | X                              | X | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | ELECTRICAL LOAD CONTROL UNIT            | X | X                     | X                     | ○         | X | X         | X         | X                              | X | X |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | P/S PRESSURE SWITCH                     | X | X                     | X                     | ○         | X | X         | X         | X                              | X | X |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | A/C SWITCH                              | ○ | X                     | X                     | ○         | X | X         | ○         | X                              | X | X |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | IGNITION SWITCH (STA POSITION)          | ○ | ○                     | X                     | X         | X | X         | X         | ○                              | X | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | INHIBITOR SWITCH and EC-AT CONTROL UNIT | ○ | X                     | X                     | ○         | X | X         | X         | X                              | X | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | NEUTRAL AND CLUTCH SWITCH               | ○ | X                     | X                     | ○         | X | X         | X         | X                              | X | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | OXYGEN SENSOR                           | ○ | X                     | X                     | X         | X | X         | X         | X                              | X | X |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | WATER THERMO SWITCH (RADIATOR)          | ○ | X                     | X                     | X         | ○ | ○         | X         | X                              | X | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | ATMOSPHERIC PRESSURE                    | ○ | X                     | X                     | ○         | X | X         | X         | X                              | X | X |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | INTAKE AIR THERMO SENSOR                | ○ | X                     | X                     | ○         | X | X         | X         | ○                              | ○ | X |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | WATER THERMO SENSOR                     | ○ | ○                     | X                     | ○         | ○ | ○         | ○         | ○                              | ○ | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | IDLE SWITCH                             | ○ | ○                     | X                     | ○         | ○ | ○         | X         | X                              | X | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | THROTTLE SENSOR                         | ○ | ○                     | X                     | ○         | ○ | ○         | X         | ○                              | X | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | AIR FLOW METER                          | ○ | X                     | X                     | X         | ○ | ○         | ○         | X                              | ○ | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | Ne SIGNAL                               | ○ | ○                     | X                     | ○         | ○ | ○         | ○         | ○                              | ○ | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | G2 SIGNAL                               | X | ○                     | X                     | X         | X | X         | X         | X                              | X | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | G1 SIGNAL                               | X | ○                     | X                     | X         | X | X         | X         | X                              | X | ○ |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | INPUT DEVICES                           |   |                       |                       |           |   |           |           |                                |   |   |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | OUTPUT DEVICES                          |   |                       |                       |           |   |           |           |                                |   |   |                                  |  |                        |  |                                     |  |                            |  |         |
|  |  | INJECTOR                                |   | FUEL INJECTION AMOUNT | FUEL INJECTION TIMING | BAC VALVE |   | AIR VALVE | ISC VALVE | SOLENOID VALVE (EGR Vent side) |   |   | SOLENOID VALVE (EGR Vacuum side) |  | SOLENOID VALVE (PURGE) |  | SOLENOID VALVE (PRESSURE REGULATOR) |  | SOLENOID VALVE (WASTEGATE) |  | IGNITER |
|  |  |   |   |                       |                       |           |   |           |           |                                |   |   |                                  |  |                        |  |                                     |  |                            |  |         |

○ : Related  
X : Not related

# 4B CONTROL SYSTEM

## Output Devices and Engine Conditions

| ENGINE CONDITIONS                           |   | CRANKING UP (COLD ENGINE)                               |  | MEDIUM LOAD   |  | ACCELERATION  |  | HEAVY LOAD  |  | DECELERATION  |  | IDLE (THROTTLE VALVE FULLY CLOSED)                      |  | IGN: ON (ENGINE NOT RUNNING) |  | REMARKS                                     |  |
|---|---|---|--|---|--|---|--|---|--|---|--|---|--|------------------------------|--|---|--|
| OUTPUT DEVICES                              |   | WARMING UP (DURING IDLE)                                |  | COLD  |  | WARM  |  | Rich  |  | Fuel cut  |  | Rich and lean   |  | No injection                 |  | Above 6,300 rpm: fuel cut                   |  |
|   |   | Rich  |  | 2 group (once per two revolutions)                      |  | Rich and lean   |  | Rich  |  | Rich  |  | 2 group (once per two revolutions)                      |  | No injection                 |  |   |  |
| INJECTOR                                    | INJECTION                                   | Rich  |  | Rich and lean   |  | Rich and lean   |  | Rich  |  | Fuel cut  |  | Rich and lean   |  | No injection                 |  | *Coolant temp: below 50°C (122°F)           |  |
|   | INJECTION TIMING                            | 1 group (once per revolution)                           |  | 2 group (once per two revolutions)                      |  | 2 group (once per two revolutions)                      |  | Rich  |  | Fuel cut  |  | 2 group (once per two revolutions)                      |  | No injection                 |  |   |  |
| BAC VALVE                                   | AIR VALVE                                   | Open*   |  | Close   |  | Close   |  | Close   |  | Close   |  | Close   |  | Close                        |  | *In extremely cold condition                |  |
|   | ISC VALVE                                   | Large amount of bypass air                              |  | Small amount of bypass air                              |  | Small amount of bypass air                              |  | Small amount of bypass air                              |  | Small amount of bypass air                              |  | Small amount of bypass air                              |  | No bypass                    |  |   |  |
| SOLENOID VALVE (EGR Vent side)              | SOLENOID VALVE (EGR Vent side)              | OFF (Duty value 0%) (Atmospheric pressure to EGR valve) |  | OFF (Duty value 0%) (Atmospheric pressure to EGR valve) |  | OFF (Duty value 0%) (Atmospheric pressure to EGR valve) |  | OFF (Duty value 0%) (Atmospheric pressure to EGR valve) |  | OFF (Duty value 0%) (Atmospheric pressure to EGR valve) |  | OFF (Duty value 0%) (Atmospheric pressure to EGR valve) |  | Does not operate             |  | *Depends on engine condition                |  |
|   | SOLENOID VALVE (EGR Vacuum side)            | OFF (No vacuum to EGR valve)                            |  | OFF (No vacuum to EGR valve)                            |  | OFF (No vacuum to EGR valve)                            |  | OFF (No vacuum to EGR valve)                            |  | OFF (No vacuum to EGR valve)                            |  | OFF (No vacuum to EGR valve)                            |  | Does not operate             |  |   |  |
| SOLENOID VALVE (PURGE)                      | SOLENOID VALVE (PURGE)                      | OFF (2nd stage not operated)                            |  | OFF (2nd stage not operated)                            |  | OFF (2nd stage not operated)                            |  | ON (2nd stage operates)                                 |  | ON (2nd stage operates)                                 |  | OFF (2nd stage not operated)                            |  | OFF                          |  | 1st stage: controlled by water thermo valve |  |
| SOLENOID VALVE (PRESSURE REGULATOR CONTROL) | SOLENOID VALVE (PRESSURE REGULATOR CONTROL) | OFF (Vacuum to pressure regulator)                      |  | OFF (Vacuum to pressure regulator)                      |  | OFF (Vacuum to pressure regulator)                      |  | OFF (Vacuum to pressure regulator)                      |  | OFF (Vacuum to pressure regulator)                      |  | After starting: ON* (Vacuum cut)                        |  | OFF                          |  | *During hot start only                      |  |
| SOLENOID VALVE (WASTEGATE)                  | SOLENOID VALVE (WASTEGATE)                  | OFF (Boost pressure not released)                       |  | ON (Duty value 100%)                                    |  | ON (Duty value 100%)                                    |  | ON (Duty value changes)* (Boost pressure controlled)    |  | OFF (Boost pressure not released)                       |  | OFF (Boost pressure not released)                       |  | OFF                          |  | *When knocking occurs                       |  |
| IGNITER (ignition timing)                   | IGNITER (ignition timing)                   | Fixed at BTDC 6°  |  | Advanced: depends on engine condition                   |  | Advanced: depends on engine condition                   |  | Retarded: depends on intensity of knocking              |  | Advanced: depends on engine speed                       |  | Advanced: depends on engine speed                       |  | —                            |  |   |  |

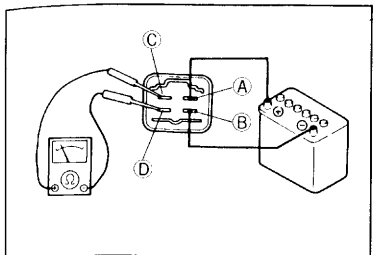


69G04A-161

## EGI MAIN FUSE

### Inspection

Check the continuity of EGI main fuse.

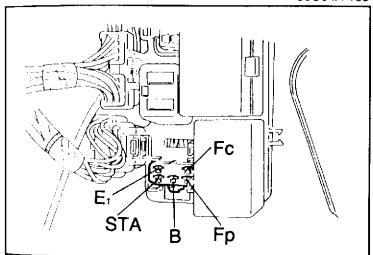


86U04A-169

## MAIN RELAY

1. Check that a "clicking" sound is heard at the main relay when turning the ignition switch ON and OFF.
2. Apply 12V and a ground to (A) and (B) terminals of the main relay.
3. Check continuity at terminals using an ohmmeter.

| Terminals | Operation | 12V Not applied | 12V Applied |
|-----------|-----------|-----------------|-------------|
| Ⓒ — Ⓓ     |           | No continuity   | Continuity  |



86U04A-170

## CIRCUIT OPENING RELAY

### Relay Circuit

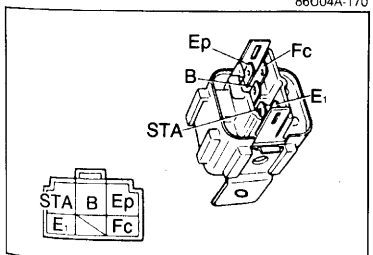
1. Remove the circuit opening relay.
2. Check the circuit as described.

| Terminal | Checking item         | Correct result  |
|----------|-----------------------|-----------------|
| Fp       | Resistance            | 0.2—30 Ω        |
| Fc       | Continuity (cranking) | ∞               |
| B        | Voltage (Ign: ON)     | Battery voltage |
| STA      | Voltage (Cranking)    | Approx. 9V      |
| E1       | Continuity            | ∞               |

### Circuit Opening Relay

Apply 12V and a ground to the terminals below and check the circuit opening relay as described.

| 12V | Grounded | Correct result      |
|-----|----------|---------------------|
| STA | E1       | B ↔ Fp: Continuity  |
| B   | Fc       | Fp: Battery voltage |



69G04A-164

### Resistance

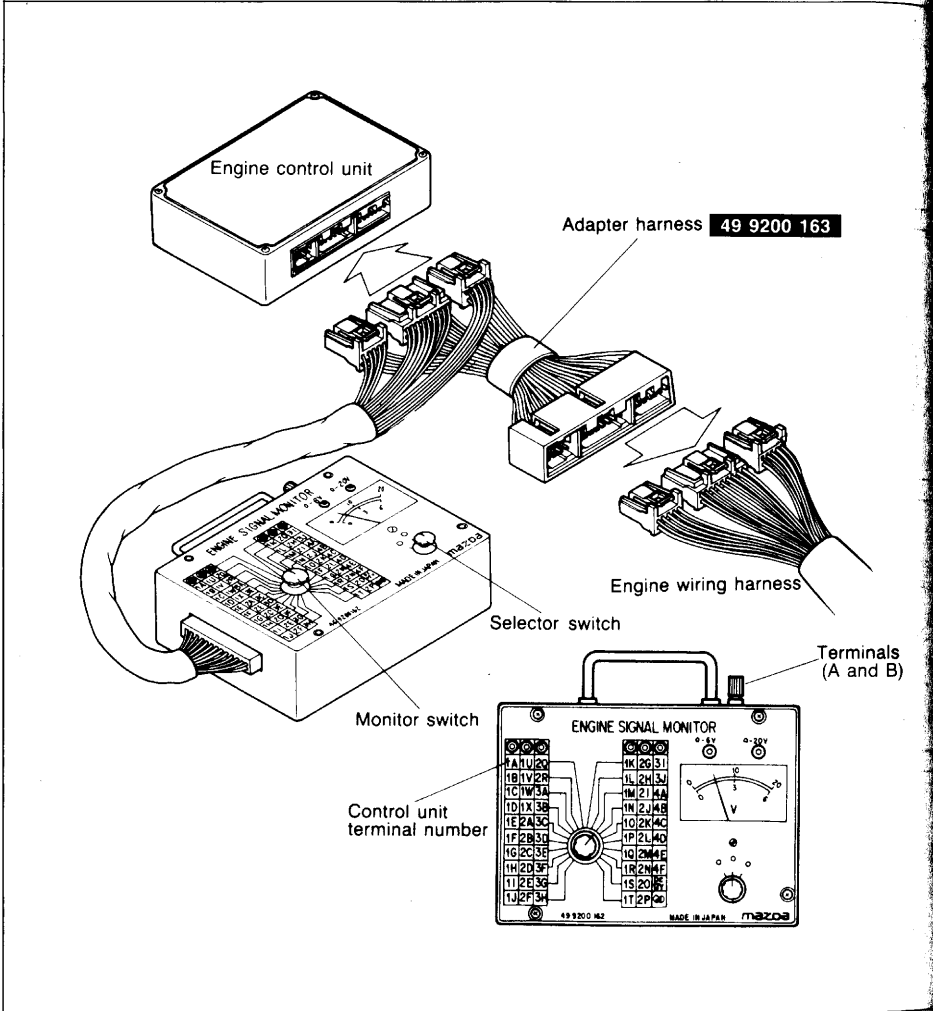
Check the resistance between the terminals using an ohmmeter.

| Between terminals | Resistance (Ω) |
|-------------------|----------------|
| STA ↔ E1          | 15—30          |
| B ↔ Fc            | 80—150         |
| B ↔ Fp            | ∞              |

# 4B CONTROL SYSTEM

## ENGINE CONTROL UNIT

Engine Signal Monitor (49 9200 162) and Adapter (49 9200 163).



The **Engine Signal Monitor** (49 9200 162) was developed to check the control unit terminal voltages. The monitor easily inspects the individual terminal voltages through selection of the monitor switch.

### How to Use the Engine Signal Monitor

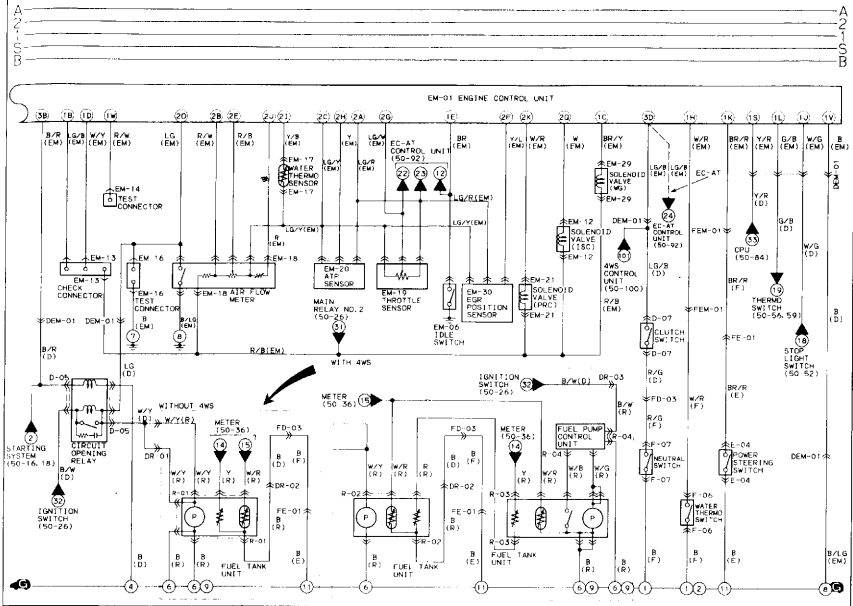
1. Connect the **Engine Signal Monitor** (49 9200 162) between the engine control unit and the engine harness using the **adapter** (49 9200 163).
2. Turn the selector switch and monitor switch to select the terminal number.
3. Check the terminal voltage.

### Caution

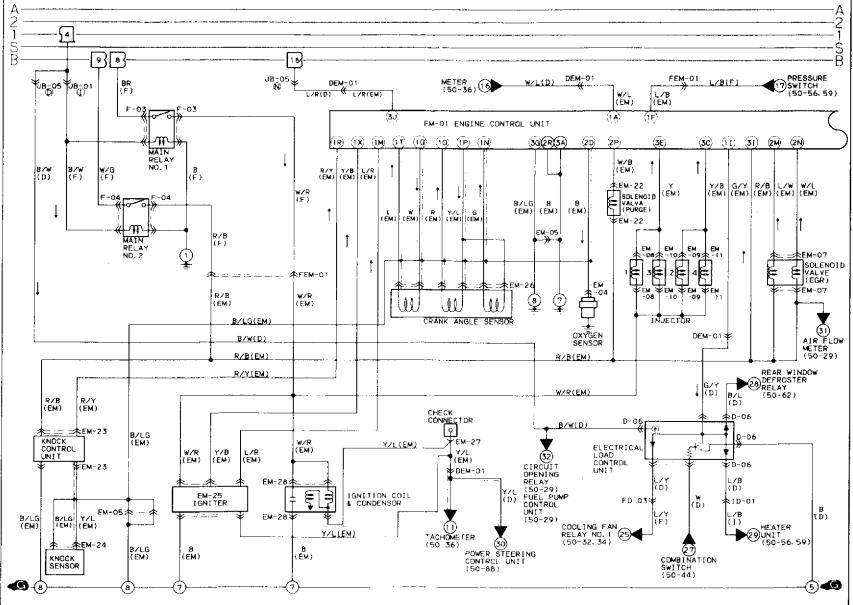
Never apply voltage to terminals A and B.

## Wiring Diagram

### FOR TURBO ■ ENGINE & FUEL CONTROL SYSTEM



### FOR TURBO ■ IGNITION SYSTEM ■ ENGINE & FUEL CONTROL SYSTEM



# 4B CONTROL SYSTEM

## Terminal Voltage

If the input and output devices and related wiring are normal, but the engine control unit terminal voltage is incorrect, replace the engine control unit.

| Terminal | Input | Output | Connection to                         | Voltage (After warming-up)  |  | Remarks   |
|----------|-------|--------|---------------------------------------|---|--|---|
|          |       |        |                                       | IGN: ON   | Idle   |   |
| 1A       |       | ○      | Malfunction indicator light           | For 3 sec. after ignition switch OFF → ON: below 4.8V (Light illuminates)<br>After 3 sec.: Battery voltage (Light does not illuminate)                            |  | <ul style="list-style-type: none"> <li>• Test connector grounded</li> <li>• Light illuminates: below 4.8V</li> <li>• Light does not illuminate: Battery voltage</li> </ul>                          |
| 1B       |       | ○      | Self-Diagnosis Checker (Code number)  | For 3 sec. after ignition switch OFF → ON: below 6.2V (Buzzer sounds)<br>After 3 sec.: Battery voltage (Buzzer does not sound)                                    |  | <ul style="list-style-type: none"> <li>• Using Self-Diagnosis Checker and test connector grounded</li> <li>• Buzzer sounds: below 6.2V</li> <li>• Buzzer does not sound: Battery voltage</li> </ul> |
| 1C       |       | ○      | Solenoid valve (Waste gate)           | Battery voltage   |  | <ul style="list-style-type: none"> <li>• Suddenly increase engine speed to above 4,500 rpm: below 3.5V</li> </ul>   |
| 1D       |       | ○      | Self-Diagnosis Checker (Monitor lamp) | Test connector grounded<br>For 3 sec. after ignition switch OFF → ON: below 6.2V (Light illuminates)<br>After 3 sec.: Battery voltage (light does not illuminate) | (Test connector grounded) approx. 5V<br>(Test connector not grounded) Monitor lamp ON: below 6.2V<br>Monitor lamp OFF: Battery voltage | With Self-Diagnosis Checker   |
| 1E       | ○     |        | Idle switch                           | Accelerator pedal released: below 0.5V<br>Accelerator pedal depressed: above 7.7V   |  |   |
| 1F       |       | ○      | A/C relay                             | Battery voltage   | A/C switch ON: below 2.5V<br>A/C switch OFF: battery voltage   | Blower motor: ON  |
| 1G       | —     | —      | —                                     | —   |  | —   |
| 1H       | ○     |        | Water thermo switch                   | Above 7.3V  |  | Radiator temp.: below 17°C (63°F)   |
|          |       |        |                                       | Below 1.5V  |  | Radiator temp.: above 17°C (63°F)   |
| 1I       | ○     |        | Electrical load control unit          | Electrical load ON: below 1.5V<br>Electrical load OFF: above 7.3V   |  | Electrical load:<br>Rear defroster<br>Headlight<br>Blower motor (3rd & 4th position)<br>Electrical fan  |
| 1J       | ○     |        | Brake light switch                    | Brake pedal released: below 3.6V<br>Brake pedal depressed: above 10.0V  |  |   |
| 1K       | ○     |        | P/S pressure switch                   | Constant above 10.5V  | P/S ON: below 1.5V<br>P/S OFF: above 10.5V   |   |
| 1L       | ○     |        | A/C switch                            | A/C switch ON: below 1.5V<br>A/C switch OFF: above 10.0V  |  | Blower motor: ON  |
| 1M       | ○     |        | Igniter (IGf signal)                  | Below 1.0V  | 0.1—1.8V   |   |
| 1N       | ○     |        | Distributor (G1 ⊕ signal)             | Approx. 0.6—0.8V  |  |   |

| Terminal | Input | Output | Connection to                               | Voltage (After warming-up)  |   | Remarks   |
|----------|-------|--------|---|---|---|---|
|          |       |        |   | IGN: ON   | Idle                                    |   |
| 1O       | ○     |        | Distributor (G2 ⊕ signal)                   | Approx. 0.6—0.8V  |   |   |
| 1P       | ○     |        | Distributor (G1, G2 ⊖ signal)               | Approx. 0.6—0.8V  |   |   |
| 1Q       | ○     |        | Distributor (Ne ⊖ signal)                   | Approx. 0.6—0.8V  |   |   |
| 1R       | ○     |        | Knock control unit                          | 3.3—5.0V  |   | Knocking: 1.3—2.6V  |
| 1S       |       | ○      | Warning buzzer<br>Overboost                 | Type A* <sup>1</sup> : Approx. 0.08V<br>Type B* <sup>2</sup> : Approx. 12V      |   | Buzzer sounds:<br>Type A: 0V<br>Type B: Blow 1V   |
| 1T       | ○     |        | Distributor (Ne ⊕ signal)                   | Approx. 0.6—0.8V  |   |   |
| 1U       | —     | —      | —   | —   |   | —   |
| 1V       | ○     |        | —   | Constant below 1.5V   |   | MTX   |
|          |       |        |   | Constant above 10.5V  |   | ATX   |
| 1W       | ○     |        | Test connector                              | Test connector grounded: below 0.5V<br>Test connector not grounded: above 10.5V |   | Green connector,<br>1-pin   |
| 1X       |       | ○      | Igniter (IGt signal)                        | Approx. 0V  | Approx. 0.6—0.8V                        |   |
| 2A       |       | ○      | V ref                                       | 4.5—5.5V  |   |   |
| 2B       | ○     |        | Air flow meter (Vc)                         | 7—9V  |   |   |
| 2C       | —     | —      | Ground (Ez)                                 | 0V  |   |   |
| 2D       | ○     |        | Oxygen sensor                               | 0V  | 0—1.0V                                  | <ul style="list-style-type: none"> <li>• Cold engine: 0V at idle</li> <li>• After warming-up: Increase engine speed: 0.5—1.0V<br/>Deceleration: 0—0.4V</li> </ul> |
| 2E       | ○     |        | Air flow meter (Vs)                         | Approx. 1.7V  | Approx. 4—6V                            | Increase engine speed:<br>voltage increases   |
| 2F       | ○     |        | EGR position sensor                         | 0.25—0.95V  |   |   |
| 2G       | ○     |        | Throttle sensor                             | Accelerator pedal released: Approx. 0.5V<br>(depends on 2A terminal voltage)    |   | Max. voltage (Throttle valve fully opened): approx. 4.3V  |
| 2H       | ○     |        | Atmospheric pressure sensor                 | At sea level: approx. 4.0V  |   |   |
| 2I       | ○     |        | Water thermo sensor                         | 0.3—0.6V  |   | Engine coolant temp. 20°C (68°F): approx. 2.5V  |
| 2J       | ○     |        | Air flow meter (Intake air thermo sensor)   | Approx. 2.5V at 20°C (68°F)   |   |   |
| 2K       |       | ○      | Solenoid valve (Pressure regulator control) | For 120 sec. after ignition switch OFF → ON: below 3.5V                         | For 120 sec. after starting: below 3.5V | Hot condition: Coolant temp. above 70°C (158°F) and Intake air temp. above 20°C (68°F)  |
|          |       |        |   | Battery voltage   |   |   |
| 2L       | —     | —      | —   | —   |   | —   |

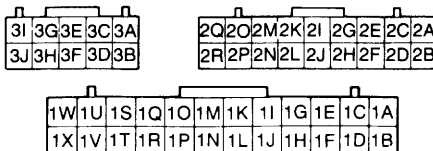
\*<sup>1</sup> Type A: Manufacturer for CPU of body electrical system is "NEC".

\*<sup>2</sup> Type B: Manufacturer for CPU of body electrical system is "YAZAKI or U-shin"

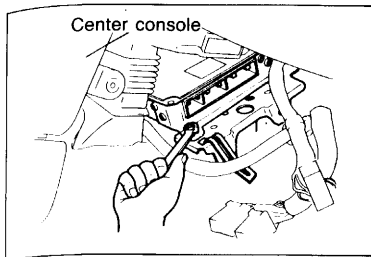
# 4B CONTROL SYSTEM

| Terminal | Input | Output | Connection to                             | Voltage (After warming-up)  |                    | Remarks  |
|----------|-------|--------|---|---|--------------------|--|
|          |       |        |   | IGN: ON   | Idle               |  |
| 2M       |       | ○      | Solenoid valve (EGR-Vent side)            | Battery voltage   |                    | <ul style="list-style-type: none"> <li>Voltages change depending on driving condition (EGR amount)</li> <li>Cold engine: battery voltage</li> <li>Radiator coolant temp-below 17°C (63°F) or Engine coolant temp-below 40°C (104°F)</li> </ul> |
| 2N       |       | ○      | Solenoid valve (EGR-vacuum side)          | Battery voltage   |                    |  |
| 2O       |       | ○      | Circuit opening relay                     | Battery voltage   | Below 3.5V         |  |
| 2P       |       | ○      | Solenoid valve (Purge control valve)      | Battery voltage   |                    | Medium and high load: below 3.5V   |
| 2Q       |       | ○      | Solenoid valve (Idle speed control valve) | Approx. 1.7—11V   |                    |  |
| 2R       | —     | —      | Ground (E02)                              | 0V  |                    |  |
| 3A       | —     | —      | Ground (E01)                              | 0V  |                    |  |
| 3B       | ○     |        | Ignition switch (Start position)          | Below 2.5V  |                    | While cranking: battery voltage  |
| 3C       |       | ○      | Injector (No. 4 and No. 2)                | Battery voltage   | *1 Battery voltage | *1 Engine Signal Monitor green and red lights flash  |
| 3D       | ○     |        | Inhibitor switch through EC-AT unit       | "N" or "P" range: below 2.5V<br>Other ranges: Battery voltage                                     |                    | ATX  |
|          |       |        | Neutral and clutch switch                 | In-gear condition<br>Clutch pedal depressed: Battery voltage<br>Clutch pedal released: below 0.5V |                    | MTX (Neutral: constant Battery voltage)  |
| 3E       |       | ○      | Injector (No. 1 and No. 3)                | Battery voltage   | *1 Battery voltage | *1 Engine Signal Monitor: green and red lights flash   |
| 3F       | —     | —      | —   | —   |                    | —  |
| 3G       | —     | —      | Ground (E1)                               | 0V  |                    |  |
| 3H       | —     | —      | —   | —   |                    | —  |
| 3I       | ○     | —      | Main relay                                | Battery voltage   |                    |  |
| 3J       | —     | —      | Battery                                   | Battery voltage   |                    | For back-up  |

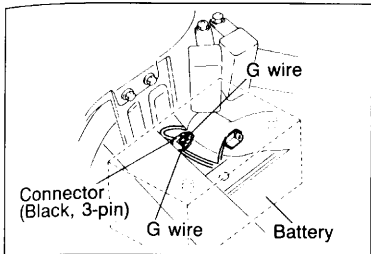
86U04B-154



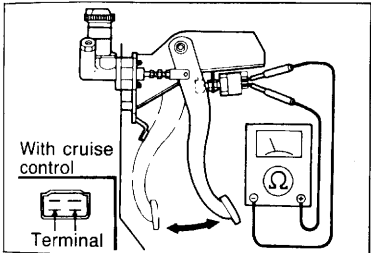




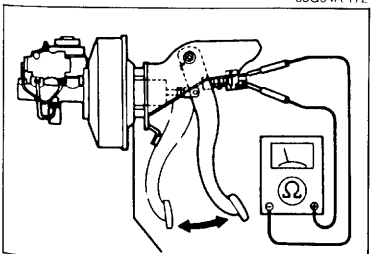
86U04A-174



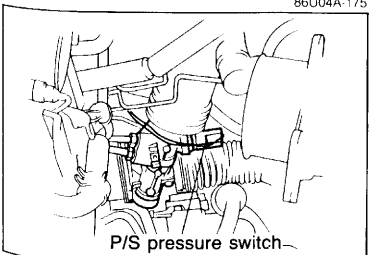
69G04A-171



69G04A-172



86U04A-175



86U04A-176

## Replacement

1. Disconnect the negative battery cable.
2. Remove the front console covers (right and left).
3. Disconnect the connectors from the control unit.
4. Replace the control unit.

## NEUTRAL SWITCH

### Inspection

1. Disconnect the neutral switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

| Transmission    | Continuity |
|-----------------|------------|
| In neutral      | No         |
| In other ranges | Yes        |

4. After checking, connect the switch connector.

### Note

Refer to section 7A for replacement of the neutral switch.

## CLUTCH SWITCH

### Inspection

1. Disconnect the clutch switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

| Pedal     | Continuity |
|-----------|------------|
| Depressed | No         |
| Released  | Yes        |

4. After checking, connect the switch connector.

### Note

Refer to section 6 for replacement of the clutch switch.

## BRAKE LIGHT SWITCH

### Inspection

1. Disconnect the brake light switch connector.
2. Connect an ohmmeter to the switch.
3. Check the continuity of the switch.

| Pedal     | Continuity |
|-----------|------------|
| Depressed | Yes        |
| Released  | No         |

4. After checking, connect the switch connector.

### Note

Refer to section 11 for replacement of the brake switch.

## P/S PRESSURE SWITCH

### Inspection

1. Disconnect the P/S pressure switch connector.
2. Connect an ohmmeter to the switch.
3. Start the engine. Check continuity of the switch while turning the steering wheel at idle.

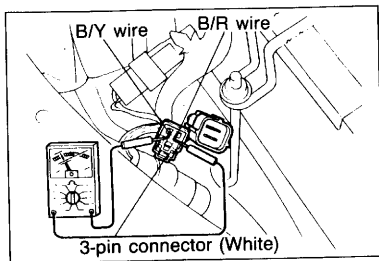
| P/S         | Continuity |
|-------------|------------|
| Turning     | Yes        |
| Not turning | No         |

4. Connect the switch connector after checking.

### Note

Refer to section 10 for replacement of the P/S pressure switch.

# 4B CONTROL SYSTEM



86U04A-177

## INHIBITOR SWITCH

### Inspection

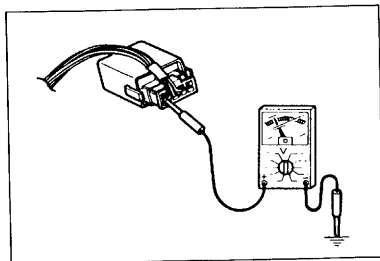
1. Disconnect the inhibitor switch connector.
2. Connect an ohmmeter to the switch.
3. Check continuity of the switch.

| Position       | Continuity |
|----------------|------------|
| P and N ranges | Yes        |
| Other ranges   | No         |

4. Connect the switch connector after checking.

### Note

Refer to Section 7B for replacement of the inhibitor switch.



69G04A-174

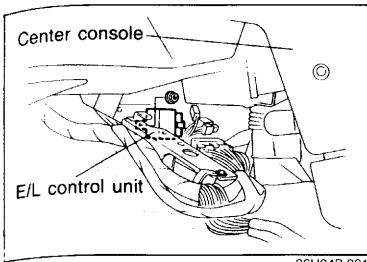
## E/L CONTROL UNIT

### Inspection

1. Connect a voltmeter between the E/L control unit and ground.
2. Start the engine and check the terminal voltages described below.

| Terminal   | Input | Output | Connection to         | Voltage (after warm-up) |      | Remarks  |
|------------|-------|--------|-----------------------|-------------------------|------|--|
|            |       |        |                       | Ignition switch: ON     | Idle |  |
| A<br>(B/W) | —     | —      | Ignition switch       | Battery voltage         |      |  |
| B          | —     | —      |                       |                         |      |  |
| C<br>(B)   | —     | —      | Ground                | 0V                      |      |  |
| D<br>(L/Y) | ○     | —      | Electrical fan relay  | Battery voltage         |      | Coolant temp.:<br>below 97°C (207°F)<br>Coolant temp.:<br>above 97°C (207°F) |
|            |       |        |                       | Below 1.5V              |      |  |
| E<br>(G/Y) | —     | ○      | Control unit (11)     | 0V                      |      | E/L: ON  |
|            |       |        |                       | Battery voltage         |      | E/L: OFF   |
| F<br>(W)   | ○     | —      | Headlight switch      | Battery voltage         |      | Headlight switch:<br>ON  |
|            |       |        |                       | Below 1.5V              |      | Headlight switch:<br>OFF   |
| G<br>(L/B) | ○     | —      | Blower motor switch   | Below 1.5V              |      | Blower motor switch: ON<br>(3rd or 4th position)                             |
|            |       |        |                       | Approx. 5V              |      | Others   |
| H<br>(B/L) | ○     | —      | Rear defroster switch | Below 1.5V              |      | Rear defroster<br>switch: ON   |
|            |       |        |                       | Battery voltage         |      | Rear defroster<br>switch: OFF  |

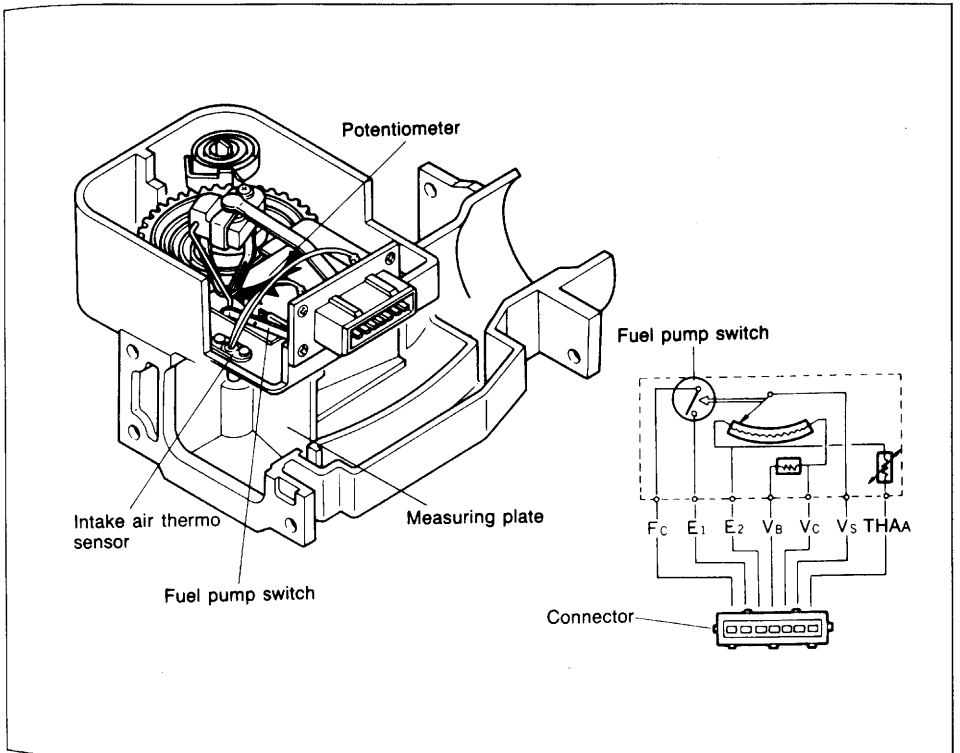
86U04A-174



### Replacement

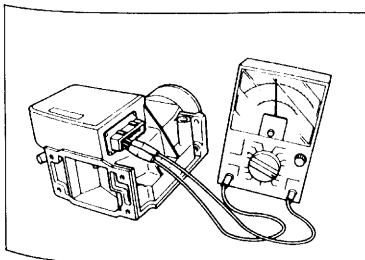
1. Remove the engine control unit. (Refer to page 4B—97)
2. Replace the E/L control unit.
3. Install in the reverse order of removal.

### AIR FLOW METER

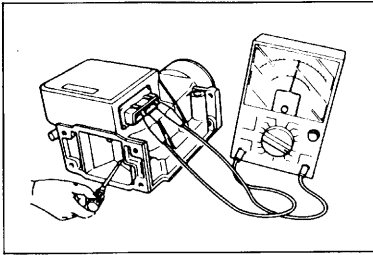


### Inspection

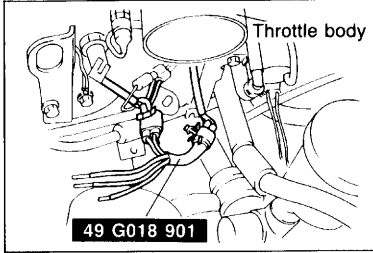
1. Remove the air flow meter. (Refer to page 4B—36)
2. Check the air flow meter body for cracks.
3. Verify that the measuring plate moves smoothly.
4. Disconnect the connector from the air flow meter.
5. Using an ohmmeter, check resistance between the terminals with the measuring plate fully closed and fully open.
6. Connect the connector to the air flow meter after inspecting.



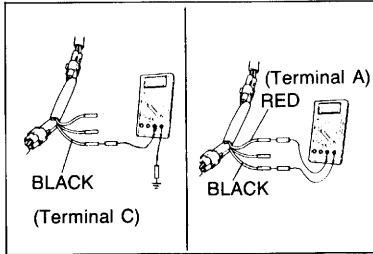
# 4B CONTROL SYSTEM



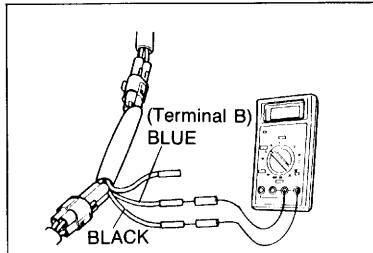
96U04B-063



86U04A-183



86U04A-184



86U04B-127

| Terminal   | Resistance ( $\Omega$ )     |  |
|--|-----------------------------|--|
|  | Fully closed                | Fully open                                   |
| E2 $\leftrightarrow$ Vs                                | 20—400                      | 20—1,000                                     |
| E2 $\leftrightarrow$ Vc                                | 100—400                     |  |
| E2 $\leftrightarrow$ Vb                                | 200—400                     |  |
| E2 $\leftrightarrow$ THA<br>(Intake air thermo sensor) | -20°C (-4°F)<br>20°C (68°F) | 13.6—18.4 k $\Omega$<br>2.21—2.69 k $\Omega$ |
| E1 $\leftrightarrow$ Fc                                | $\infty$                    | 0  |

## Note

Refer to page 4B—36 for replacement of the air meter.

## THROTTLE SENSOR

### Caution

Use a precision voltmeter with a scale of 0.01V to inspect or adjust the throttle sensor.

### Inspection

1. Remove the air hose from the throttle body.
2. Disconnect the throttle sensor connector (3-pin).
3. Connect the **SST** between the throttle sensor and the wiring harness.
4. Turn the ignition switch ON.
5. Make sure that the throttle valve is fully closed.
6. Measure **BLACK** and **RED** wire voltages. Check that the voltages are as specified.

### Specification:

**BLACK wire — Approx. 0V**  
**RED wire — 4.5—5.5V**

7. If not correct, check the battery voltage and wiring harness. If these are OK, replace the engine control unit.
8. Record the **RED** wire voltage.
9. Check that **BLUE** wire voltage for the recorded **RED** wire voltage is as specified below.

### Specification:

| RED wire voltage (V) | BLUE wire voltage (V) | RED wire voltage (V) | BLUE wire voltage (V) |
|----------------------|-----------------------|----------------------|-----------------------|
| 4.50—4.59            | 0.37—0.54             | 5.10—5.19            | 0.42—0.61             |
| 4.60—4.69            | 0.38—0.55             | 5.20—5.29            | 0.43—0.62             |
| 4.70—4.79            | 0.39—0.56             | 5.30—5.39            | 0.44—0.63             |
| 4.80—4.89            | 0.40—0.57             | 5.40—5.49            | 0.44—0.64             |
| 4.90—4.99            | 0.40—0.58             | 5.50                 | 0.44—0.66             |
| 5.00—5.09            | 0.41—0.60             |                      |                       |

10. Hold the throttle valve fully open.
11. Check that **BLUE** wire voltage for the recorded **RED** wire voltage is as specified.

### Specification:

| RED wire voltage (V) | BLUE wire voltage (V) | RED wire voltage (V) | BLUE wire voltage (V) |
|----------------------|-----------------------|----------------------|-----------------------|
| 4.50—4.59            | 3.58—4.23             | 5.10—5.19            | 4.05—4.79             |
| 4.60—4.69            | 3.66—4.32             | 5.20—5.29            | 4.13—4.88             |
| 4.70—4.79            | 3.74—4.41             | 5.30—5.39            | 4.21—4.98             |
| 4.80—4.89            | 3.82—4.51             | 5.40—5.49            | 4.29—5.07             |
| 4.90—4.99            | 3.90—4.60             | 5.50                 | 4.29—5.17             |
| 5.00—5.09            | 3.97—4.70             |                      |                       |

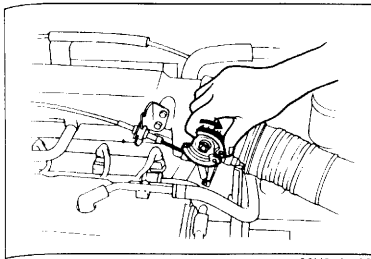
12. Check that **BLUE** wire voltage increases smoothly when opening the throttle valve from closed to fully open.
13. If not correct, replace the throttle sensor.
14. Turn the ignition OFF.
15. Disconnect the **SST** and reconnect the throttle sensor connector.
16. Disconnect the negative battery terminal and depress the brake pedal for at least 5 seconds to eliminate the control unit malfunction memory.

### Adjustment

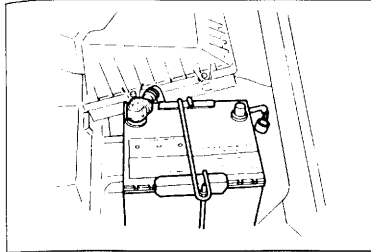
1. Remove the air hose from the throttle body.
2. Disconnect the throttle sensor connector (3-pin).
3. Connect the **SST** between the throttle sensor and the wiring harness.
4. Turn the ignition switch ON.
5. Make sure the throttle valve is fully closed.

6. Measure **RED** wire voltage and record it.

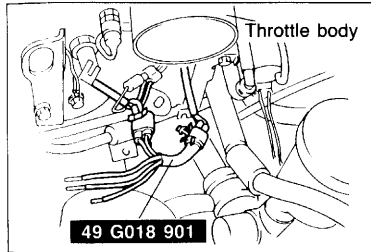
7. Change the voltmeter connection to the **BLUE** wire.
8. Loosen the throttle sensor mounting screws.



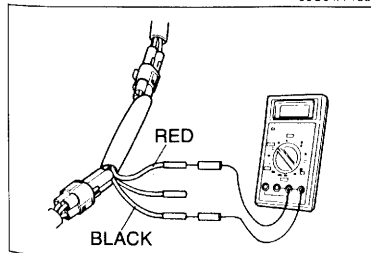
86U04A-186



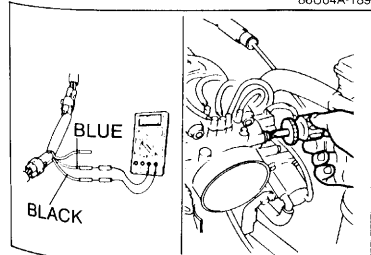
96U04A-052



86U04A-188

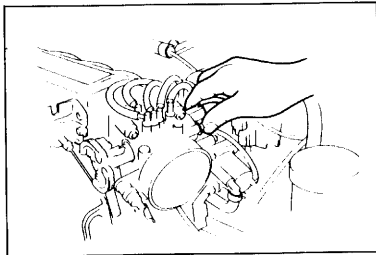


86U04A-189

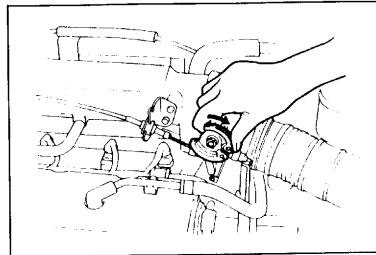


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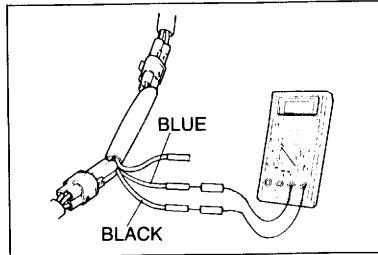
# 4B CONTROL SYSTEM



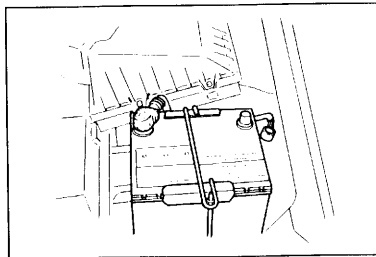
86U04B-128



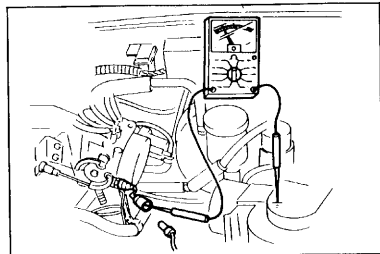
86U04A-192



76G04A-669



96U04A-053



86U04A-196

- Turn the throttle sensor to adjust **BLUE** wire voltage with the range specified for the recorded **RED** wire voltage.

### Specification:

| RED wire voltage (V) | BLUE wire voltage (V) | RED wire voltage (V) | BLUE wire voltage (V) |
|----------------------|-----------------------|----------------------|-----------------------|
| 4.50—4.59            | 0.37—0.54             | 5.10—5.19            | 0.42—0.61             |
| 4.60—4.69            | 0.38—0.55             | 5.20—5.29            | 0.43—0.62             |
| 4.70—4.79            | 0.39—0.56             | 5.30—5.39            | 0.44—0.63             |
| 4.80—4.89            | 0.40—0.57             | 5.40—5.49            | 0.44—0.64             |
| 4.90—4.99            | 0.40—0.58             | 5.50                 | 0.44—0.66             |
| 5.00—5.09            | 0.41—0.60             |                      |                       |

- Tighten the throttle sensor mounting screws.
- Recheck that **BLUE** wire voltage is within specification.
- Hold the throttle valve fully open.

- Check that **BLUE** wire voltage is within specification.

### Specification:

| RED wire voltage (V) | BLUE wire voltage (V) | RED wire voltage (V) | BLUE wire voltage (V) |
|----------------------|-----------------------|----------------------|-----------------------|
| 4.50—4.59            | 3.58—4.23             | 5.10—5.19            | 4.05—4.79             |
| 4.60—4.69            | 3.66—4.32             | 5.20—5.29            | 4.13—4.88             |
| 4.70—4.79            | 3.74—4.41             | 5.30—5.39            | 4.21—4.98             |
| 4.80—4.89            | 3.82—4.51             | 5.40—5.49            | 4.29—5.07             |
| 4.90—4.99            | 3.90—4.60             | 5.50                 | 4.29—5.17             |
| 5.00—5.09            | 3.97—4.70             |                      |                       |

- Check that **BLUE** wire voltage increases smoothly with opening the throttle valve from closed to fully open.
- If not correct, replace the throttle sensor.
- Turn the Ignition OFF.
- Disconnect the **SST** and reconnect the throttle sensor connector.
- Disconnect the negative battery terminal and depress brake pedal for at least 5 seconds to eliminate the control unit malfunction memory.

### IDLE SWITCH

#### Inspection

- Disconnect the idle switch connector (1-pin).
- Check continuity between the switch and ground.

| Throttle valve condition | Continuity |
|--------------------------|------------|
| Fully closed             | Yes*       |
| Open                     | No         |

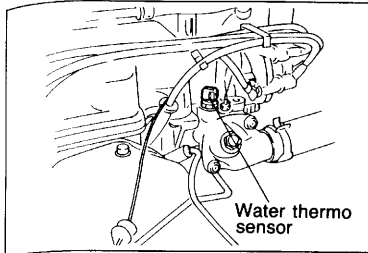
\*Less than 30Ω is acceptable

- If not correct, check condition of wiring harness of the switch. Replace the idle switch and throttle body as an assembly, if necessary.

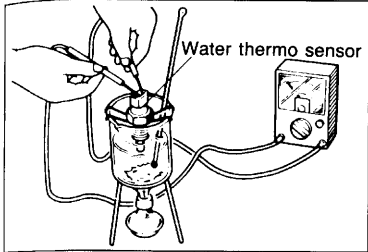
## WATER THERMO SENSOR

### Inspection

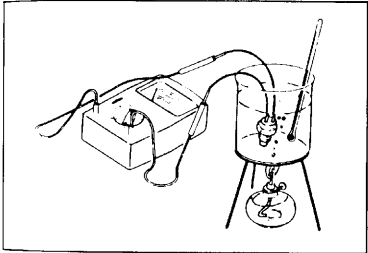
1. Remove the water thermo sensor from the cylinder head.



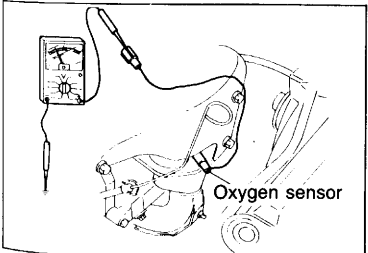
86U04A-202



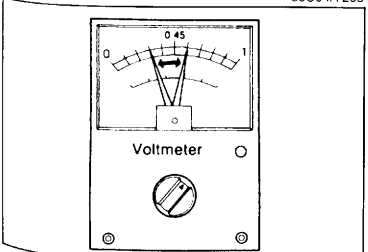
86U04A-203



86U04A-204



86U04A-205



86U04A-206

2. Place the sensor in water with a thermometer and heat the water gradually.

3. Check resistance of the sensor with an ohmmeter.

| Coolant       | Resistance   |
|---------------|--------------|
| -20°C ( -4°F) | 14.5—17.8 kΩ |
| 20°C ( 68°F)  | 2.2—2.7 kΩ   |
| 40°C (104°F)  | 1.0—1.3 kΩ   |
| 60°C (140°F)  | 500—640 Ω    |
| 80°C (176°F)  | 280—350 Ω    |

4. If not correct, replace the water thermo sensor.

## WATER THERMO SWITCH

### Inspection

1. Remove the switch from the radiator.

2. Place the switch in water with a thermometer and heat the water gradually.

3. Check for continuity of the switch with an ohmmeter.

| Coolant temp.                 | Continuity |
|-------------------------------|------------|
| More than approx. 17°C (63°F) | Yes        |
| Less than approx. 17°C (63°F) | No         |

4. If not correct, replace the water thermo switch.

## OXYGEN SENSOR

### Inspection of Output Voltage

1. Warm up the engine and run it at idle.

2. Disconnect the oxygen sensor connector.

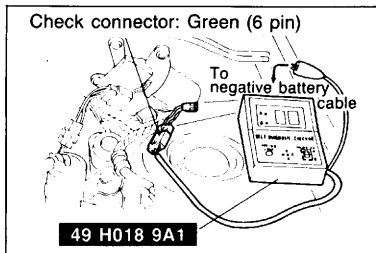
3. Connect a voltmeter between the oxygen sensor and ground.

4. Run the engine at **4,500 rpm** until the voltmeter indicates **approx. 0.7V**.

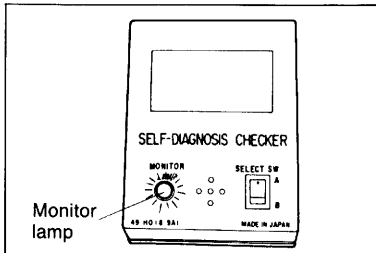
5. Increase and decrease the engine speed suddenly several times. Check to see that when the speed is increased the meter reads between **0.5V—1.0V**, and when the speed is decreased it reads between **0V—0.4V**.

6. If the voltmeter doesn't indicate as specified, replace the oxygen sensor.

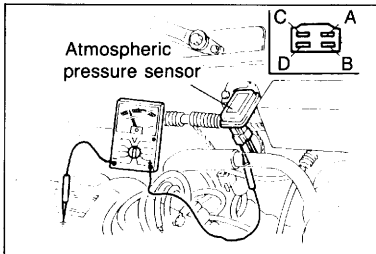
# 4B CONTROL SYSTEM



86U04A-207



86U04A-208



67U04X-154

## Inspection of Sensitivity

1. Warm up the engine to the normal operating temperature and run it at idle.
2. Connect the **SST** to the check connector.

3. Increase the engine speed to between **2,000 and 3,000 rpm**, and check that the monitor lamp flashes for 5 seconds.

**Monitor lamp: Flashes ON and OFF more than 8 times/10 sec**

## ATMOSPHERIC PRESSURE SENSOR Inspection

1. Connect a voltmeter to the atmospheric pressure sensor terminal.
2. Turn the ignition switch on and take a voltage reading.

**Voltage: 3.5—4.5V at sea level 2.5—3.5V at high altitude [2,000m (6,500 ft)]**

3. Replace the sensor if necessary.