# FUEL

**Click on the applicable bookmark to selected the required model year**

# DIESEL FUEL

## CONTENTS

# GENERAL

## OUTLINE OF CHANGE

The following maintenance service points have been established to correspond to the adoption of the F9Q1 engine.

# GENERAL INFORMATION

The common rail fuel injection system consists of sensors which detect the condition of the diesel engine, an engine-ECU which controls the system based on signals from these sensors, and actuators which operate according to control commands from the engine-ECU. The engine-ECU carries out activities such as fuel injection control and idle speed control. In addition, the engine-ECU is equipped with several self-diagnosis functions which make trouble-shooting easier in the event that a problem develops.

## FUEL INJECTION CONTROL

The injector drive time and the timing are controlled so that the appropriate quantities of fuel are supplied to the engine in response to engine conditions which can change frequently. A single injector is mounted at each cylinder. The fuel is sent from the fuel tank by the electronic fuel pump to the high pressure pump. The high pressure pump increases the fuel pressure to the pressure which is required for high-pressure injection, and then send the fuel to each injector.

## SELF-DIAGNOSIS FUNCTION

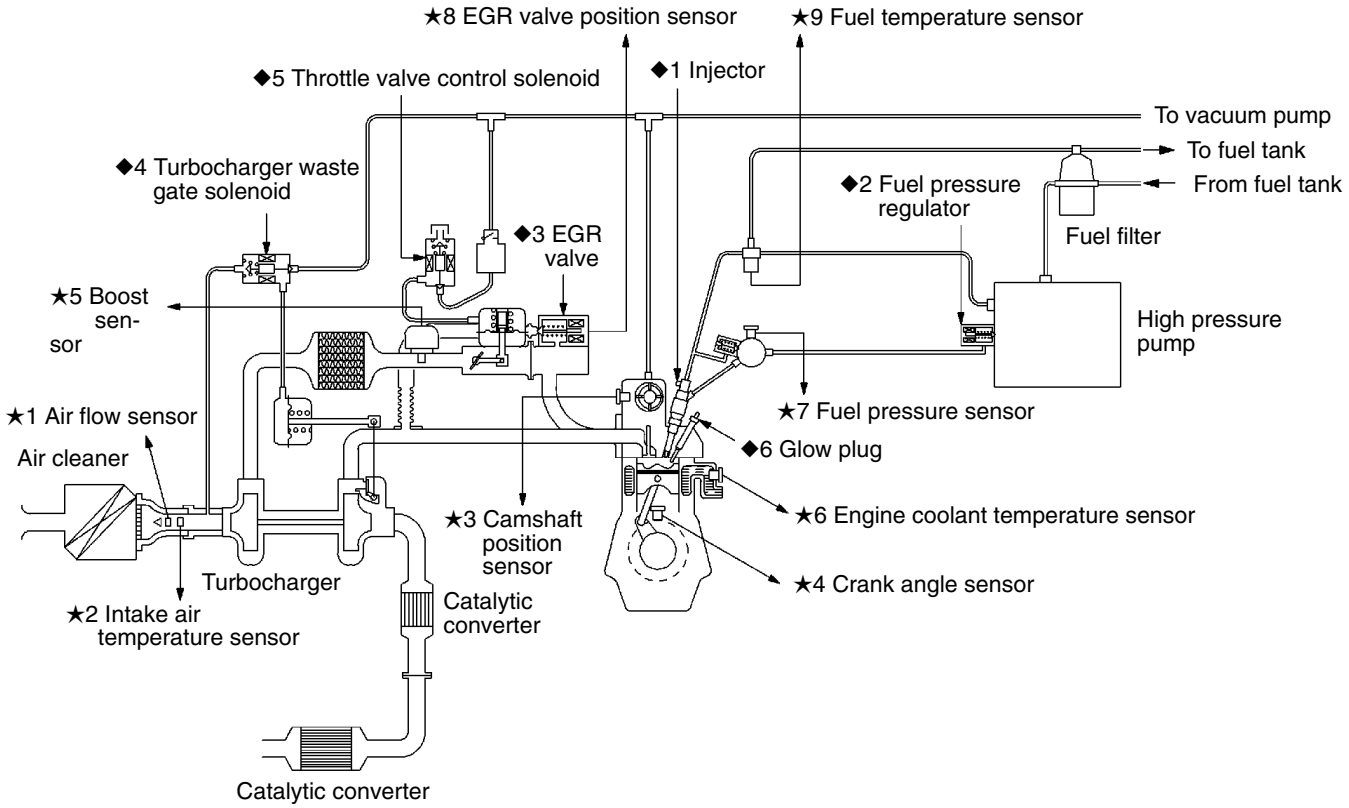
- When an abnormality is detected in any of the sensors or actuators, the engine warning lamp illuminates to warn the driver.
- When an abnormality is detected in any of the sensors or actuators, a diagnosis code number corresponding to the problem which occurred is output.
- The RAM data relating to the sensors and actuators which is stored in the engine-ECU can be read using the MUT-II. In addition, the actuators can be force-driven under certain conditions.

## OTHER CONTROL FUNCTIONS

1. A/C Relay Control
   Turn the compressor clutch of the A/C ON and OFF.
2. Glow Control
   Refer to GROUP 16.
3. Fan Control
   The revolutions of the radiator fan and condenser fan are controlled in response to the engine coolant temperature and vehicle speed.
4. EGR Control
   Refer to GROUP 17.
5. Throttle Valve Control
   The throttle valve control solenoid controls vacuum pressure to the throttle actuator to open and close the throttle valve.
6. Boost Pressure Control
   Turbocharger waste gate solenoid controls vacuum pressure to the waste gate actuator to control boost pressure.
7. Additional Heater Control
   Refer to GROUP 55.

## FUEL INJECTION SYSTEM DIAGRAM

| | | | | | |
|---|---|---|---|---|---|
| ★1 Air flow sensor<br>★2 Intake air temperature sensor<br>★3 Camshaft position sensor<br>★4 Crank angle sensor<br>★5 Boost sensor<br>★6 Engine coolant temperature sensor<br>★7 Fuel pressure sensor<br>★8 EGR valve position sensor<br>★9 Fuel temperature sensor | • Power supply<br>• Ignition switch – IG<br>• Accelerator pedal position sensor (1st channel)<br>• Accelerator pedal position sensor (2nd channel)<br>• Vehicle speed sensor<br>• A/C switch<br>• Stop lamp switch<br>• Clutch pedal switch<br>• Diagnostic control terminal | ⇨ | Engine-ECU | ⇨ | ◆1 Injector<br>◆2 Fuel pressure regulator<br>◆3 EGR valve<br>◆4 Turbocharger waste gate<br>◆5 Throttle valve control solenoid<br>◆6 Glow plug | • Main relay<br>• Glow relay box<br>• A/C relay<br>• Additional heater relay<br>• Fan motor relay<br>• Engine warning lamp<br>• Glow indicator lamp<br>• Overheat indicator lamp<br>• Diagnostic output terminal |

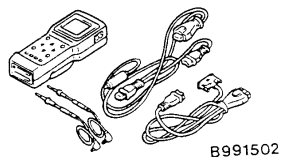
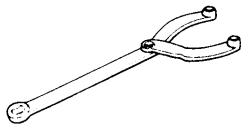
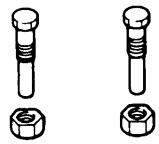



Y6030AJ

## SERVICE SPECIFICATIONS

| Items | | Specifications |
|---|---|---|
| Intake air temperature sensor resistance kΩ | at –30°C | 24.0 – 27.2 |
| | at 20°C | 2.35 – 2.55 |
| | at 100°C | 0.180 – 0.186 |
| Engine coolant temperature sensor resistance kΩ | at 25°C | 2.14 – 2.36 |
| | at 80°C | 0.27 – 0.29 |
| Accelerator pedal position sensor (1st channel) Resistance between terminals (3) and (5) Ω | | Approx. 1,200 |
| Accelerator pedal position sensor (2nd channel) Resistance between terminals (2) and (6) Ω | | Approx. 1,700 |
| Injector coil resistance Ω (at 20°C) | | Approx. 0.33 |
| Fuel temperature sensor resistance kΩ (at 25°C) | | 2.05 |
| Fuel pressure regulator Ω (at 20°C) | | Approx. 5 |
| Crank angle sensor resistance Ω | | 720 – 880 |
| Throttle valve control solenoid coil resistance Ω (at 25°C) | | 43 – 49 |

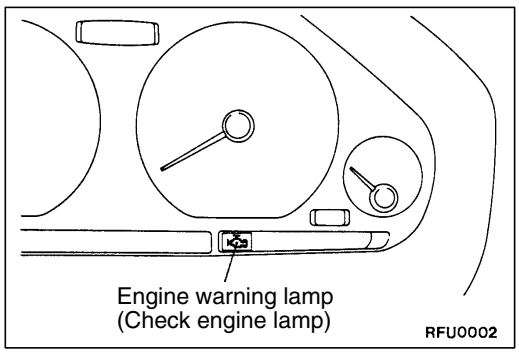
## SPECIAL TOOLS

| Tool | Number | Name | Use |
|---|---|---|---|
|  B991502 | MB991502 | MUT-II sub assembly | • Reading diagnosis code<br>• Checking the fuel injection system |
|  | MB990767 | End yoke holder | Holding the fuel high pressure pump sprocket |
|  | MD998719 | Crankshaft pulley holder pin | |

# TROUBLESHOOTING

## DIAGNOSIS TROUBLESHOOTING FLOW

Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1), GROUP 00 – How to Use Troubleshooting/Inspection Service Points.




## DIAGNOSIS FUNCTION

### ENGINE WARNING LAMP (CHECK ENGINE LAMP)

If an abnormality occurs in any of the items related to the electronic controlled injection system, the engine warning lamp will illuminate.
If the lamp remains illuminated or if the lamp illuminates while the engine is running, check the diagnosis code output.

NOTE
When the ignition switch is ON, the engine warning lamp illuminates as checking of the engine warning lamp circuit and the bulb, and then the warning lamp is extinguished after a few seconds.

### METHOD OF READING AND ERASING DIAGNOSIS CODES

Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1), GROUP 00 – How to Use Troubleshooting/Inspection Service Points.

### INSPECTION USING MUT-II DATA LIST AND ACTUATOR TESTING

1. Carry out inspection by means of the data list and the actuator test function.
   If there is an abnormality, check and repair the chassis harnesses and components.
2. After repairing, re-check using the MUT-II and check that the abnormal input and output have returned to normal as a result of the repairs.
3. Erase the diagnosis code memory.
4. Remove the MUT-II.
5. Start the engine again and carry out a road test to confirm that the problem has disappeared.

## FAIL-SAFE FUNCTION REFERENCE TABLE

| Malfunctioning item | Control contents during malfunction |
|---|---|
| Crank angle sensor system | Engine cut-off |
| Camshaft position sensor system | Engine cut-off |
| Fuel pressure sensor system | Engine cut-off |
| Boost sensor system | ● Turbocharger waste gate control is stopped<br>● EGR control is stopped |
| Air flow sensor system | EGR control is stopped |
| Engine coolant temperature sensor system | ● The coolant temperature is regulated as specified<br>● The radiator fan is driven |
| Intake air temperature sensor system | Thermoplunger control is stopped |
| EGR valve position sensor system | EGR control is stopped |
| Immobilizer system | The engine is immobilized. However, the engine is not cut-off while the engine is running |
| EGR valve system | ● Turbocharger waste gate control is stopped<br>● EGR control is stopped |
| Turbocharger waste gate solenoid system | ● Turbocharger waste gate control is stopped<br>● EGR control is stopped |
| Fuel pressure regulator system | Engine cut-off |
| Fuel pressure system | Engine cut-off |
| Engine-ECU | Engine cut-off |
| Additional heater relay system | Thermoplunger control is stopped |

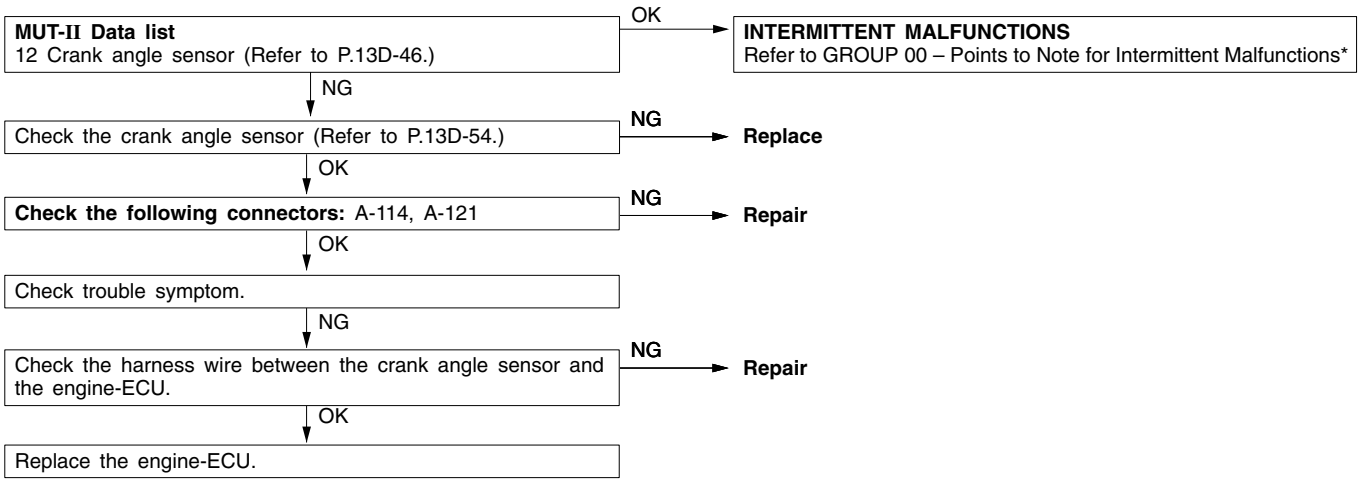
## INSPECTION CHART FOR DIAGNOSIS CODES

**Caution**
**Check that the engine-ECU earth circuit is normal before checking for the cause of the problem.**

| Code No. | Diagnosis item | Reference page |
|---|---|---|
| 11 | Crank angle sensor system | 13D-8 |
| 12 | Camshaft position sensor system | 13D-9 |
| 13 | Accelerator pedal position sensor (1st channel) system | 13D-10 |
| 14 | Accelerator pedal position sensor (2nd channel) system | 13D-11 |
| 15 | Fuel pressure sensor system | 13D-12 |
| 16 | Boost sensor system | 13D-13 |
| 17 | Barometric pressure sensor system | 13D-14 |
| 18 | Air flow sensor system | 13D-15 |
| 19 | Engine coolant temperature sensor system | 13D-16 |
| 21 | Fuel temperature sensor system | 13D-17 |
| 22 | Intake air temperature sensor system | 13D-18 |
| 23 | EGR valve position sensor system | 13D-19 |
| 24 | Glow relay box system | 13D-20 |
| 25 | Immobilizer system | 13D-21 |
| 26 | EGR valve system | 13D-22 |
| 27 | Turbocharger waste gate solenoid system | 13D-23 |
| 28 | Fuel pressure regulator system | 13D-24 |
| 29 | No. 1 injector system | 13D-25 |
| 31 | No. 2 injector system | 13D-25 |
| 32 | No. 3 injector system | 13D-26 |
| 33 | No. 4 injector system | 13D-26 |
| 34 | Glow plug system | 13D-27 |
| 35 | Vehicle speed sensor system | 13D-27 |
| 36 | Fuel pressure system | 13D-28 |
| 37 | Throttle valve control solenoid system | 13D-29 |
| 38 | Engine-ECU | 13D-30 |
| 40 | Additional heater relay system | 13D-30 |
| 41 | Fan control relay (low) system | 13D-31 |
| 42 | Stop lamp switch system | 13D-31 |
| 43 | Clutch pedal switch system | 13D-32 |
| 44 | Power latch system | 13D-32 |
| 45 | Main relay system | 13D-33 |
| 46 | Power supply system | 13D-34 |
| 47 | ECU alimentation | 13D-34 |

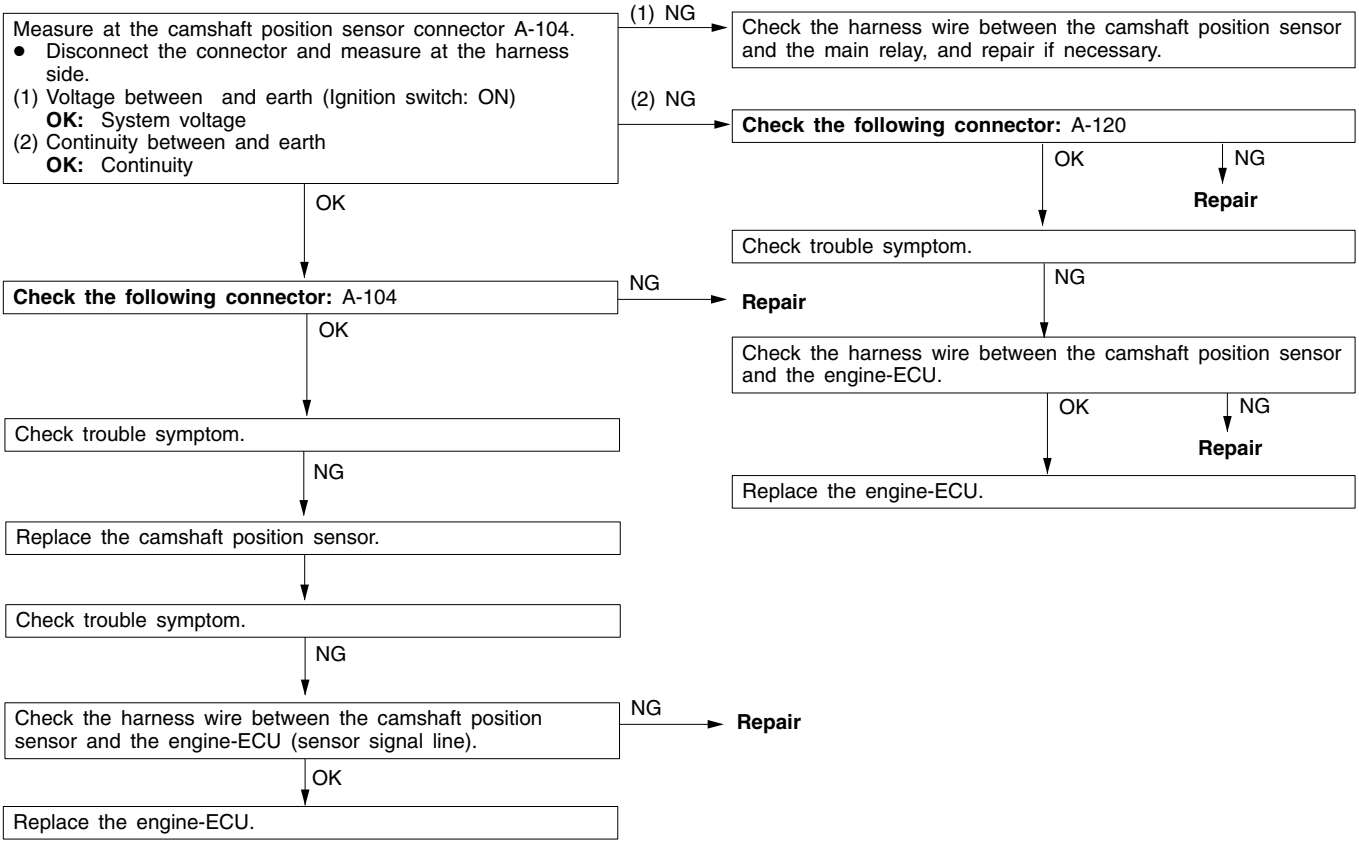
## INSPECTION PROCEDURE FOR DIAGNOSIS CODES

| Code No. 11 Crank angle sensor system | Probable cause |
|---|---|
| **Range of Check**<br>● During engine running<br>**Set Conditions**<br>● Sensor output voltage does not change (no pulse signal input)<br>or<br>● Sensor output value is 5,000 r/min or more for 1 second | ● Malfunction of the crank angle sensor<br>● Improper connector contact, open circuit or short-circuited harness wire of the crank angle sensor circuit<br>● Malfunction of the engine-ECU |

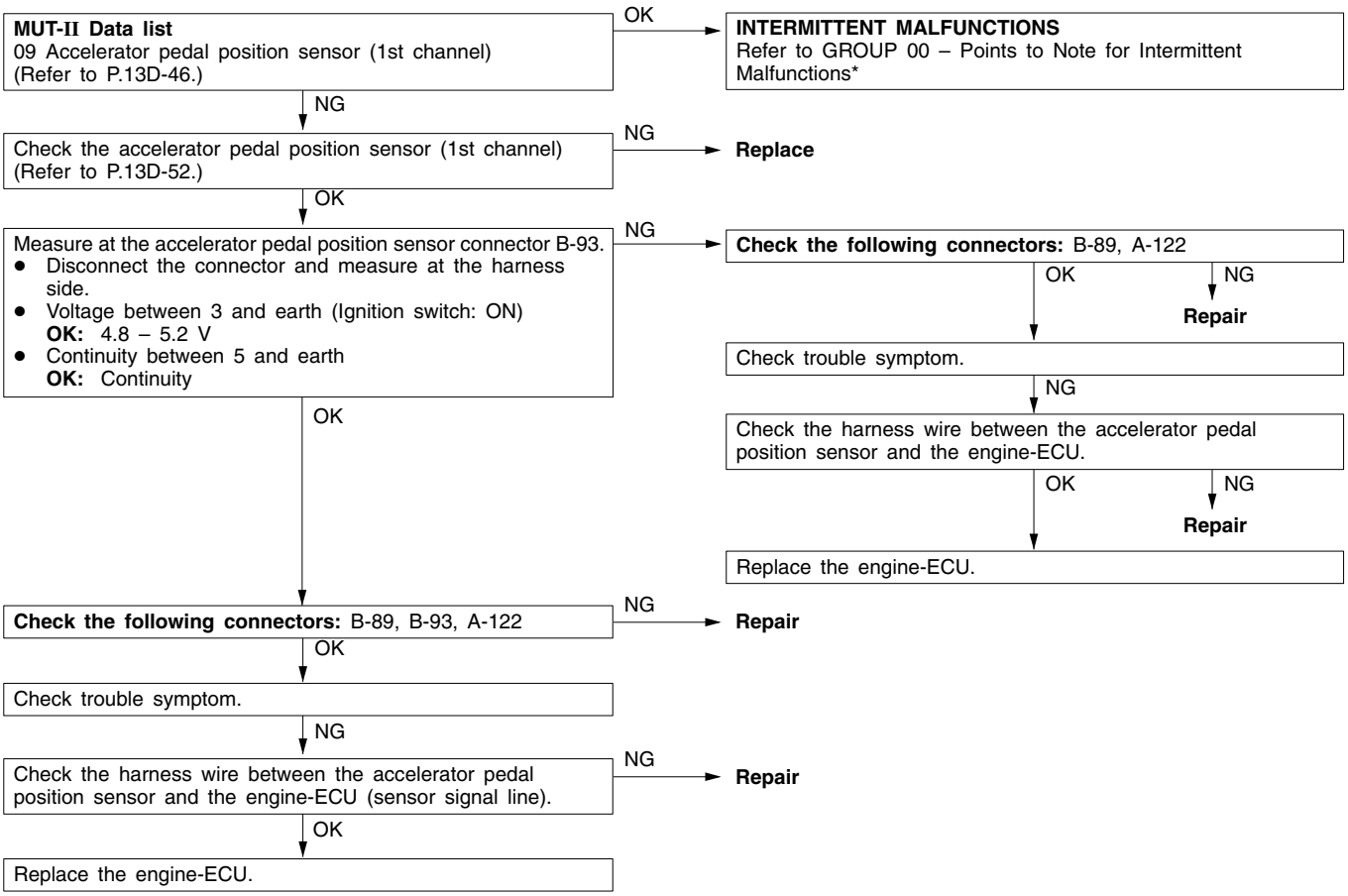



*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 12 Camshaft position sensor system | Probable cause |
|---|---|
| **Range of Check**<br>● During engine running<br>**Set Conditions**<br>● Sensor output voltage does not change for 0.5 second (no pulse signal input)<br>**Range of Check**<br>● During engine running<br>● Pulse signal detected two or more times<br>**Set Conditions**<br>● Not synchronized with crank angle sensor output<br>or<br>● Crank angle sensor output voltage does not change for 0.5 second (no pulse signal input) | ● Malfunction of the camshaft position sensor<br>● Improper connector contact, open circuit or short-circuited harness wire of the camshaft position sensor circuit<br>● Malfunction of the engine-ECU |

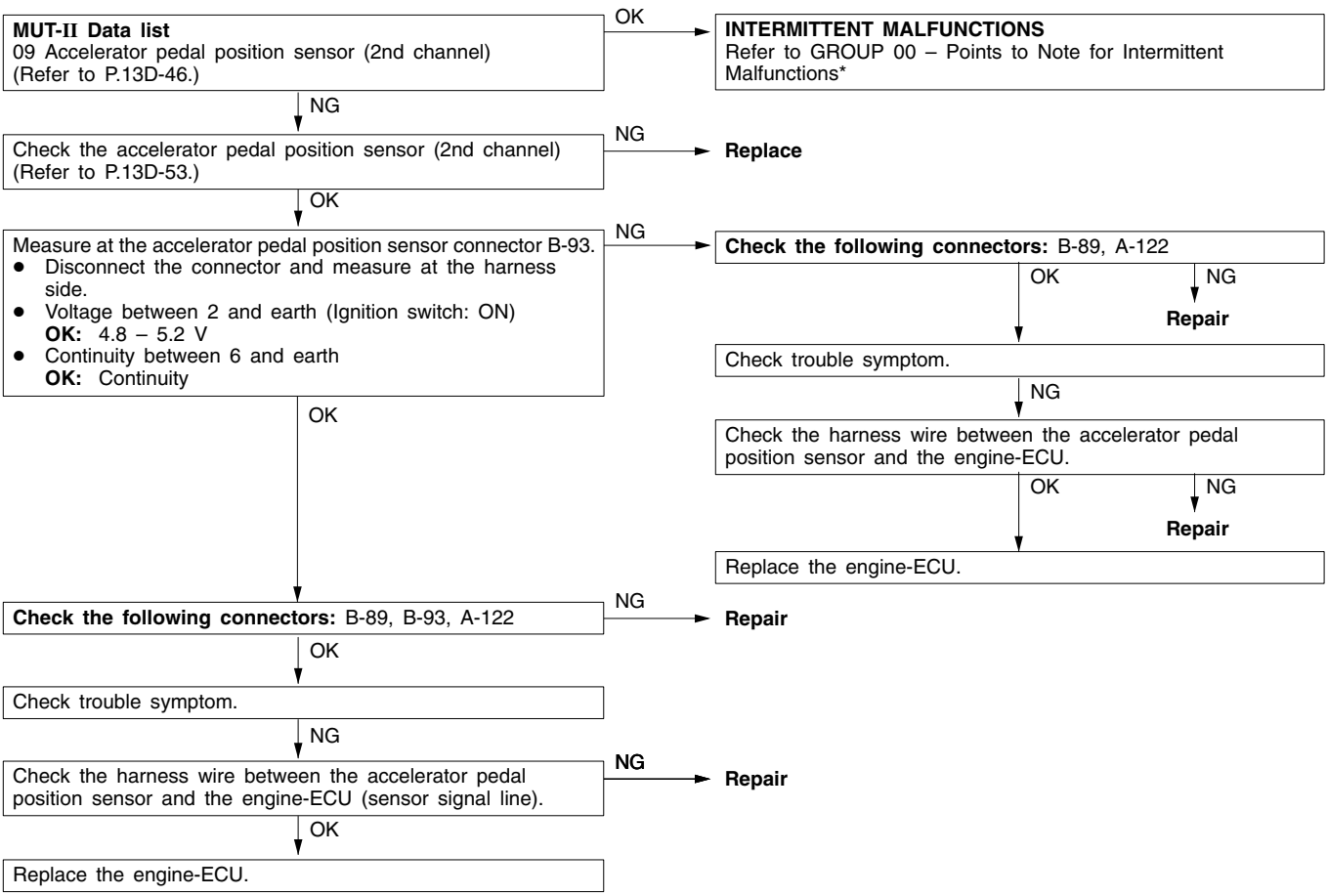


| Code No. 13 Accelerator pedal position sensor (1st channel) system | Probable cause |
|---|---|
| **Range of Check**<br>• Ignition switch: ON<br>**Set Conditions**<br>• Sensor output voltage is 200 mV or less<br>or<br>• Sensor output voltage is 4,750 mV or more | • Malfunction of the accelerator pedal position sensor (1st channel)<br>• Improper connector contact, open circuit or short-circuited harness wire of the accelerator pedal position sensor (1st channel) circuit<br>• Malfunction of the engine-ECU |



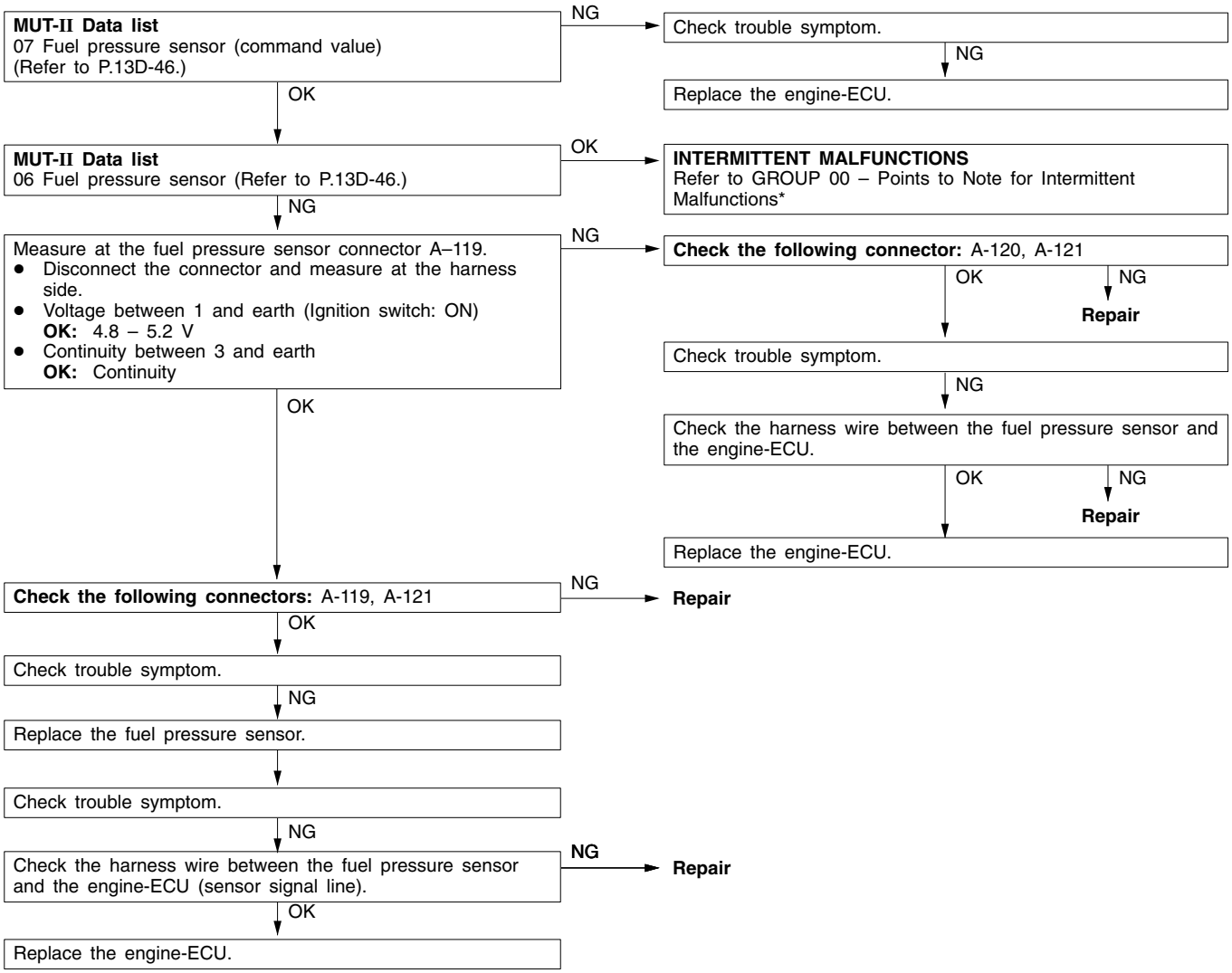

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 14 Accelerator pedal position sensor (2nd channel) system | Probable cause |
|---|---|
| **Range of Check**<br>● Ignition switch: ON<br>**Set Conditions**<br>● Sensor output voltage is 200 mV or less<br>or<br>● Sensor output voltage is 2,500 mV or more<br>**Range of Check**<br>● Ignition switch: ON<br>**Set Conditions**<br>● Output difference compared to accelerator pedal position sensor (1st channel) is 6 % or more | ● Malfunction of the accelerator pedal position sensor (2nd channel)<br>● Improper connector contact, open circuit or short-circuited harness wire of the accelerator pedal position sensor (2nd channel) circuit<br>● Malfunction of the engine-ECU |



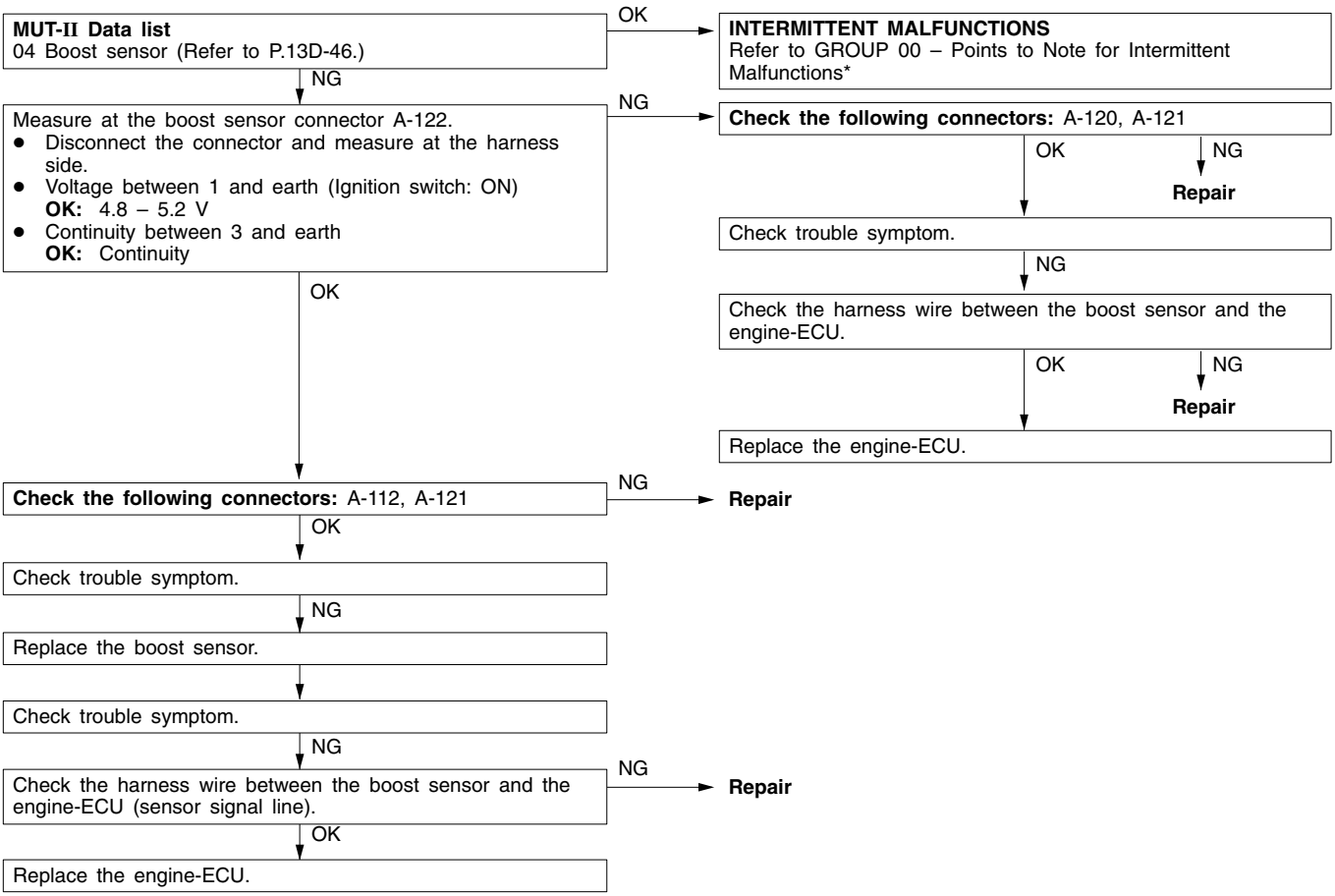

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 15 Fuel pressure sensor system | Probable cause |
|---|---|
| **Range of Check**<br>• Ignition switch: ON<br>**Set Conditions**<br>• Sensor output voltage is 250 mV or less<br>or<br>• Sensor output voltage is 4,750 mV or more<br>**Range of Check**<br>• During engine running<br>**Set Conditions**<br>• Fuel pressure varies greatly from command value | • Malfunction of the fuel pressure sensor<br>• Improper connector contact, open circuit or short-circuited harness wire of the fuel pressure sensor circuit<br>• Malfunction of the engine-ECU |




*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 16 Boost sensor system | Probable cause |
|---|---|
| **Range of Check**<br>● Ignition switch: ON<br>**Set Conditions**<br>● Sensor output voltage is 100 mV or less for 1 second<br>or<br>● Sensor output voltage is 4,900 mV or more for 1 second<br>**Range of Check**<br>● Engine speed: 900 r/min or less<br>**Set Conditions**<br>● Variation from barometric pressure sensor output signal is 15 kPa or more for 4.6 seconds | ● Malfunction of the boost sensor<br>● Improper connector contact, open circuit or short-circuited harness wire of the boost sensor circuit<br>● Malfunction of the engine-ECU |



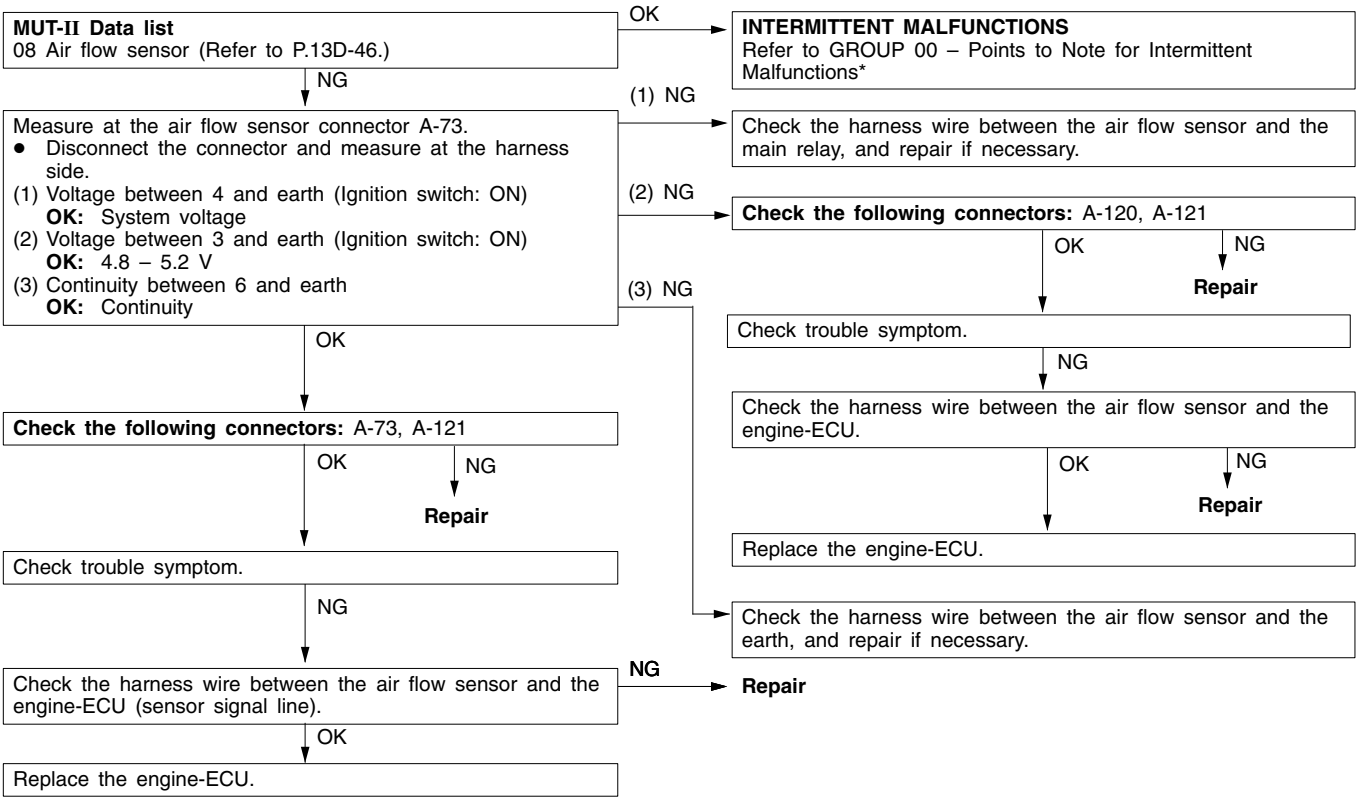

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 17 Barometric pressure sensor system | Probable cause |
|---|---|
| **Range of Check**<br>● Ignition switch: ON<br>**Set Conditions**<br>● Sensor output voltage is 200 mV or less for 1 second<br>or<br>● Sensor output voltage is 4,950 mV or more for 1 second | ● Malfunction of the barometric pressure sensor<br>● Malfunction of the engine-ECU |

**MUT-II Data list**
05 Barometric pressure sensor (Refer to P.13D-46.)
→ OK → **INTERMITTENT MALFUNCTIONS** Refer to GROUP 00 – Points to Note for Intermittent Malfunctions*
↓ NG
Check trouble symptom.
↓ NG
Replace the engine-ECU.

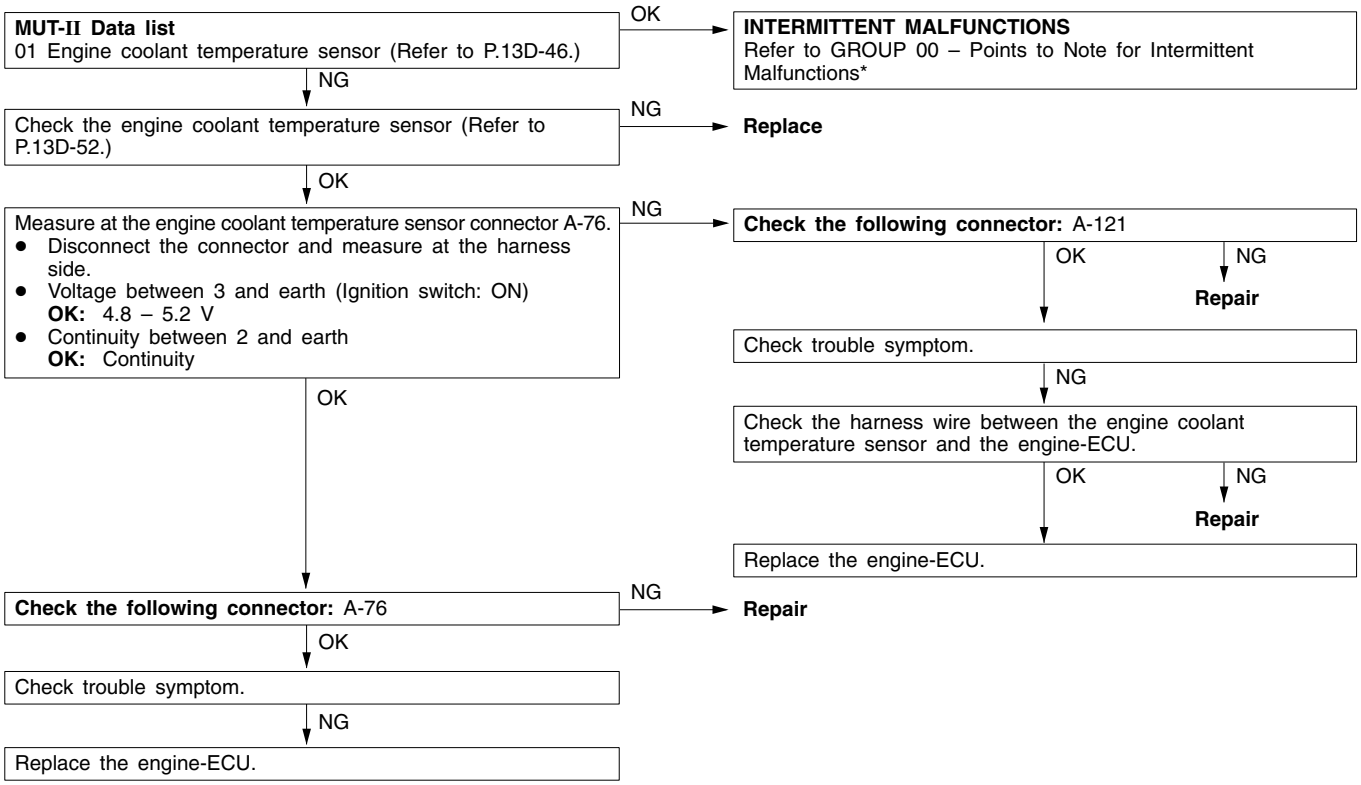
*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 18 Air flow sensor system | Probable cause |
|---|---|
| **Range of Check**<br>● Ignition switch: ON<br>**Set Conditions**<br>● Sensor output voltage is 100 mV or less for 1.5 seconds<br>or<br>● Sensor output voltage is 1,200 mV or more for 1.5 seconds<br>**Range of Check**<br>● Engine speed : 700 r/min or more<br>**Set Conditions**<br>● Sensor output is 10 kg/h or less for 1 second | ● Malfunction of the air flow sensor<br>● Improper connector contact, open circuit or short-circuited harness wire of the air flow sensor circuit<br>● Malfunction of the engine-ECU |



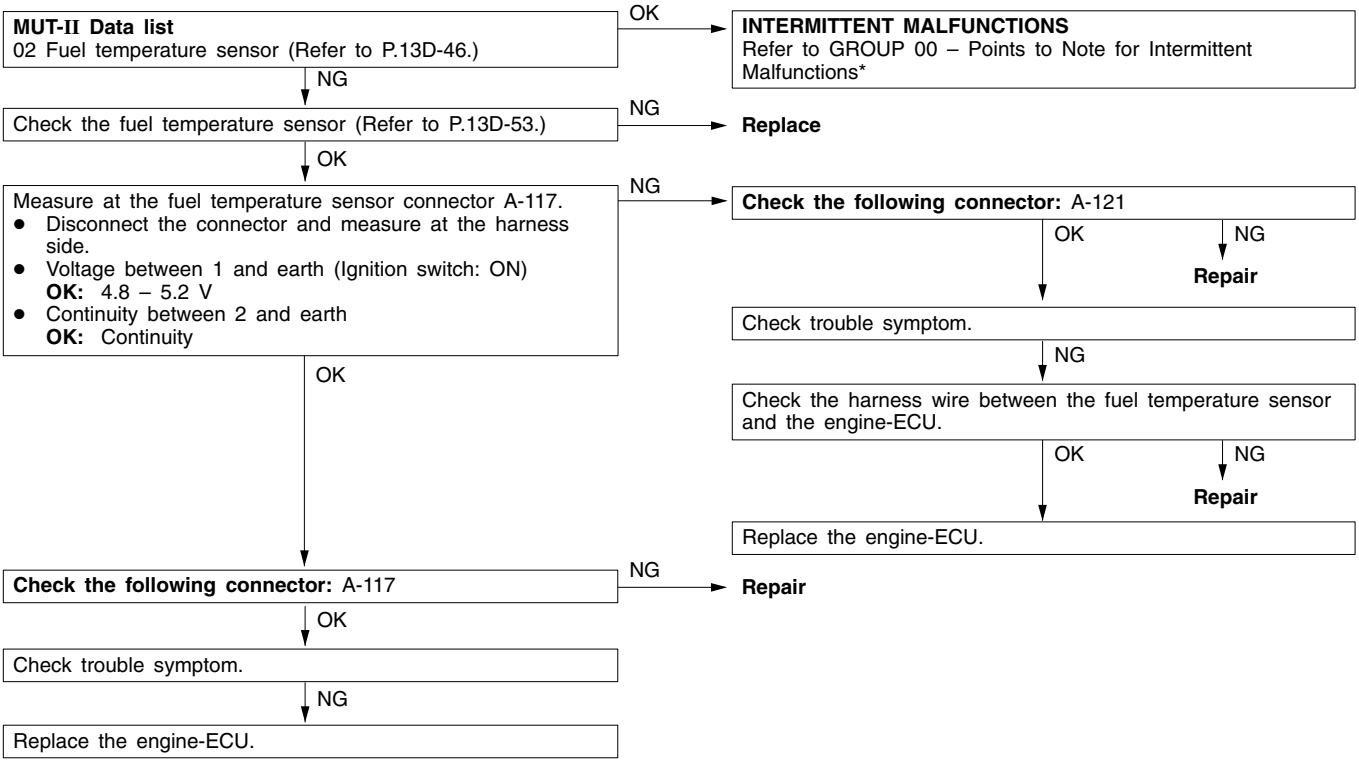

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 19 Engine coolant temperature sensor system | Probable cause |
|---|---|
| **Range of Check**<br>● Ignition switch: ON<br>**Set Conditions**<br>● Sensor output voltage is 100 mV or less for 1 second<br>or<br>● Sensor output voltage is 4,900 mV or more for 1 second | ● Malfunction of the engine coolant temperature sensor<br>● Improper connector contact, open circuit or short-circuited harness wire of the engine coolant temperature sensor circuit<br>● Malfunction of the engine-ECU |



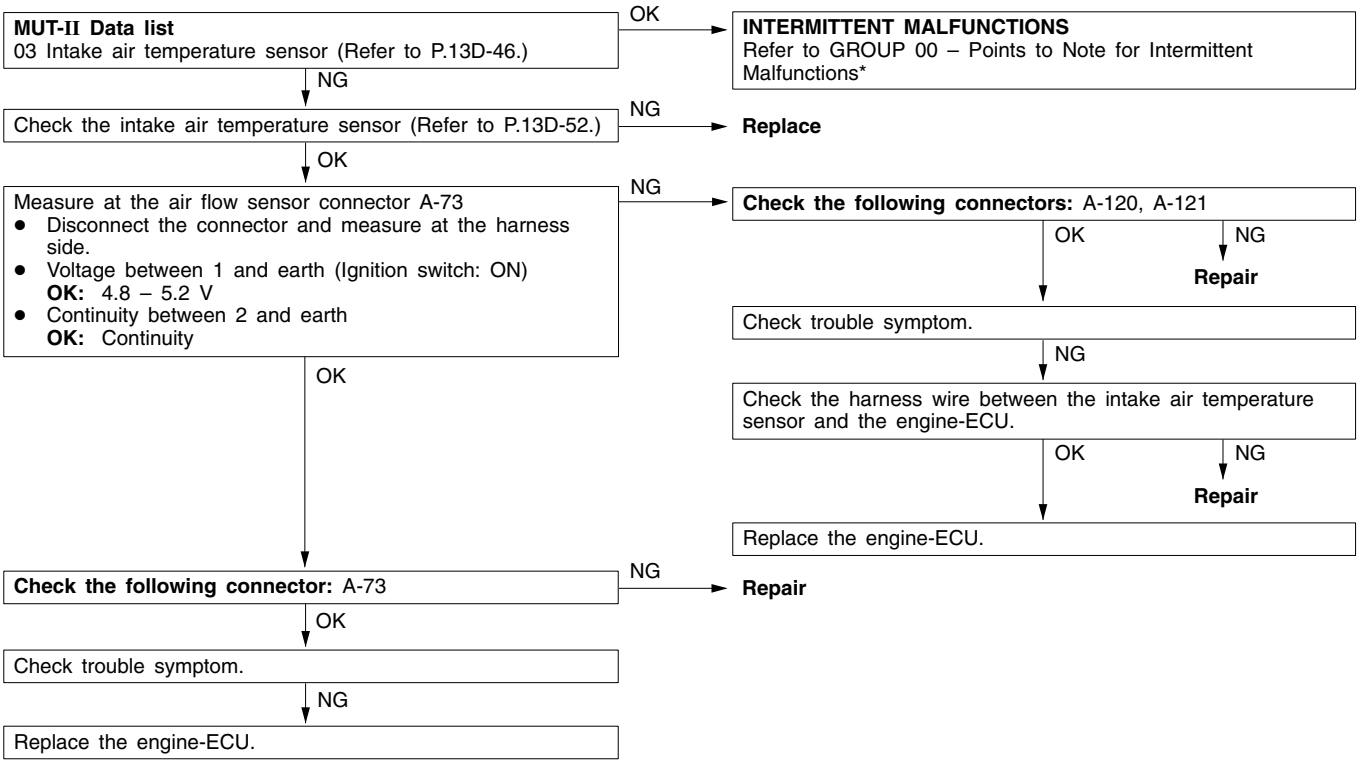

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 21 Fuel temperature sensor system | Probable cause |
|---|---|
| **Range of Check**<br>• Ignition switch: ON<br>**Set Conditions**<br>• Sensor output voltage is 100 mV or less for 1 second<br>or<br>• Sensor output voltage is 4,900 mV or more for 1 second | • Malfunction of the fuel temperature sensor<br>• Improper connector contact, open circuit or short-circuited harness wire of the fuel temperature sensor circuit<br>• Malfunction of the engine-ECU |



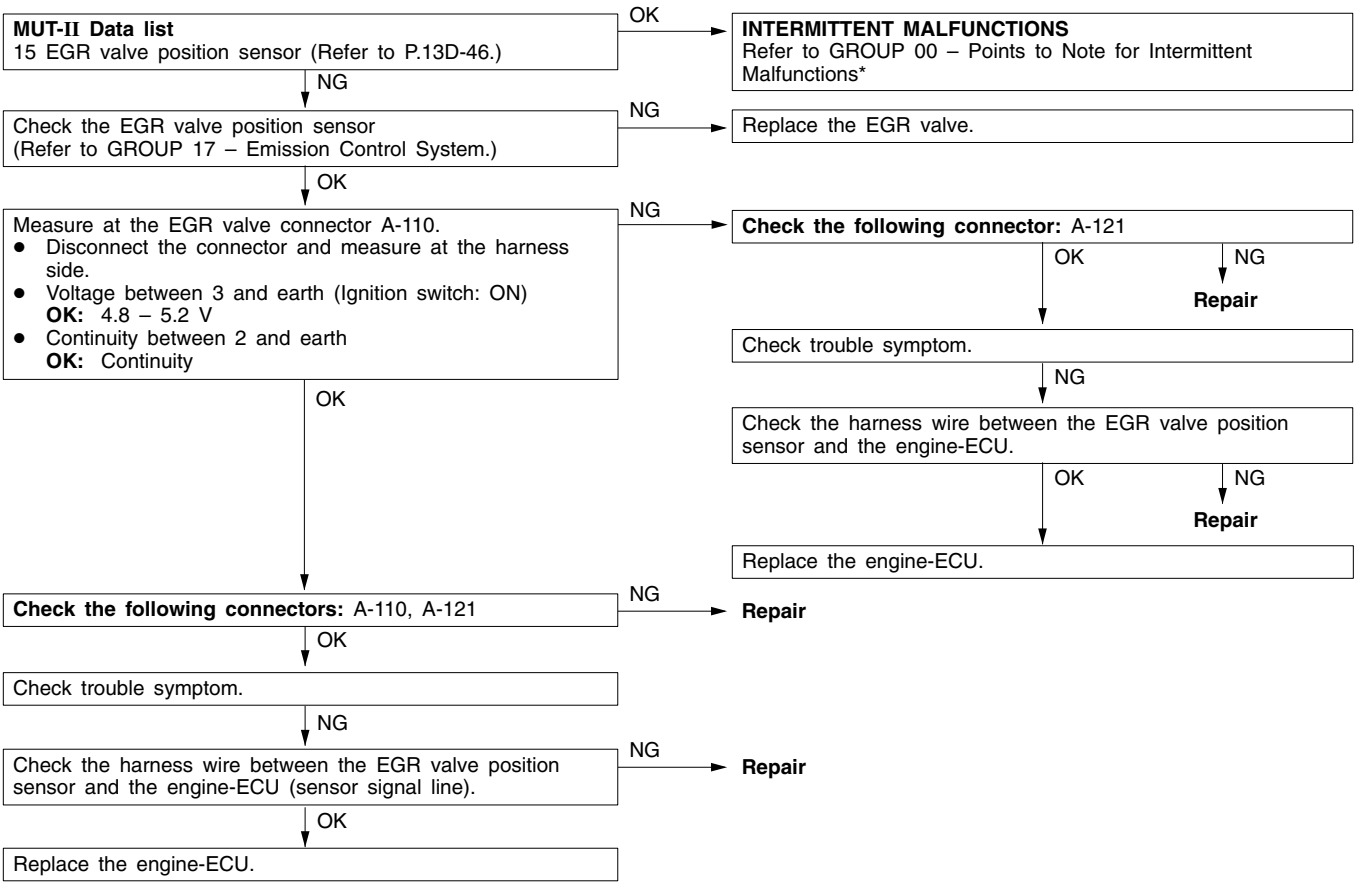

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 22 Intake air temperature sensor system | Probable cause |
|---|---|
| **Range of Check**<br>• Ignition switch: ON<br>**Set Conditions**<br>• Sensor output voltage is 100 mV or less for 1 second<br>or<br>• Sensor output voltage is 4,850 mV or more for 1 second | • Malfunction of the intake air temperature sensor<br>• Improper connector contact, open circuit or short-circuited harness wire of the intake air temperature sensor circuit<br>• Malfunction of the engine-ECU |



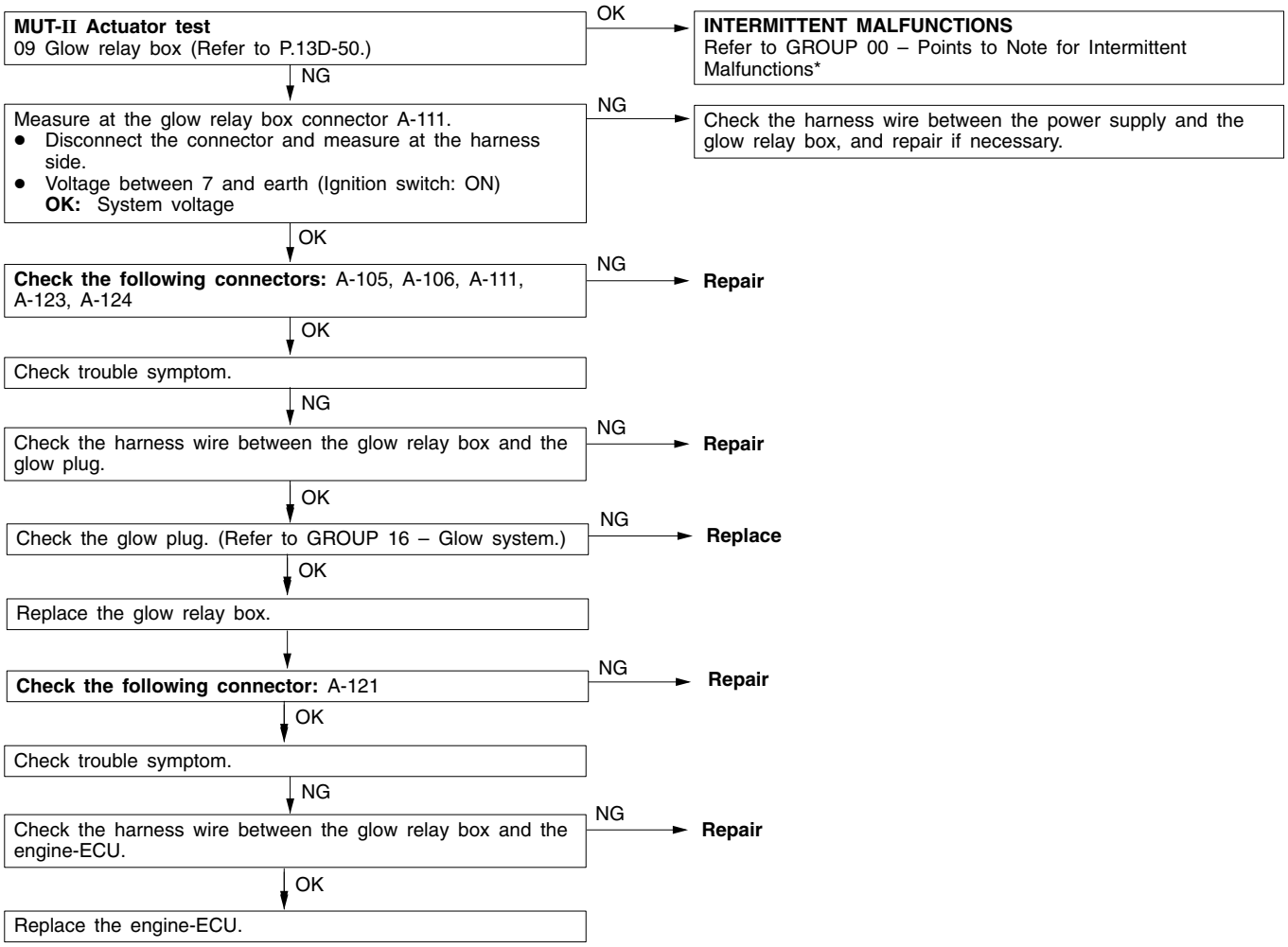

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 23 EGR valve position sensor system | Probable cause |
|---|---|
| **Range of Check**<br>• Ignition switch: ON<br>**Set Conditions**<br>• Sensor output voltage is 250 mV or less for 1 second<br>or<br>• Sensor output voltage is 4,700 mV or more for 1 second<br>**Range of Check**<br>• Ignition switch: OFF → ON<br>**Set Conditions**<br>• Sensor output voltage is 1,500 mV or more for 1 second | • Malfunction of the EGR valve position sensor<br>• Improper connector contact, open circuit or short-circuited harness wire of the EGR valve position sensor circuit<br>• Malfunction of the engine-ECU |



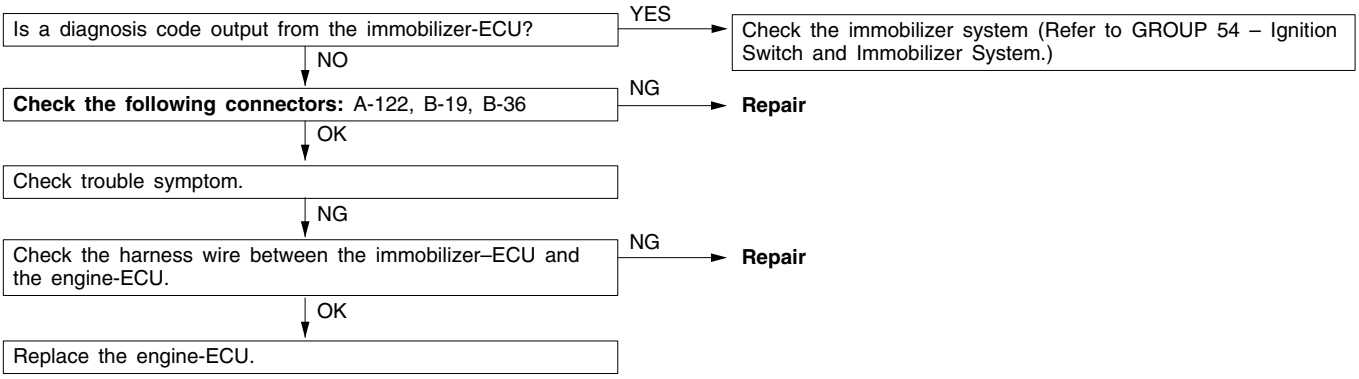

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 24 Glow relay box system | Probable cause |
|---|---|
| **Range of Check**<br>• Ignition switch: OFF→ON<br>**Set Conditions**<br>• Trouble signal input from the glow relay box | • Malfunction of the glow relay box<br>• Improper connector contact, open circuit or short-circuited harness wire of the glow relay box circuit<br>• Malfunction of the engine-ECU |



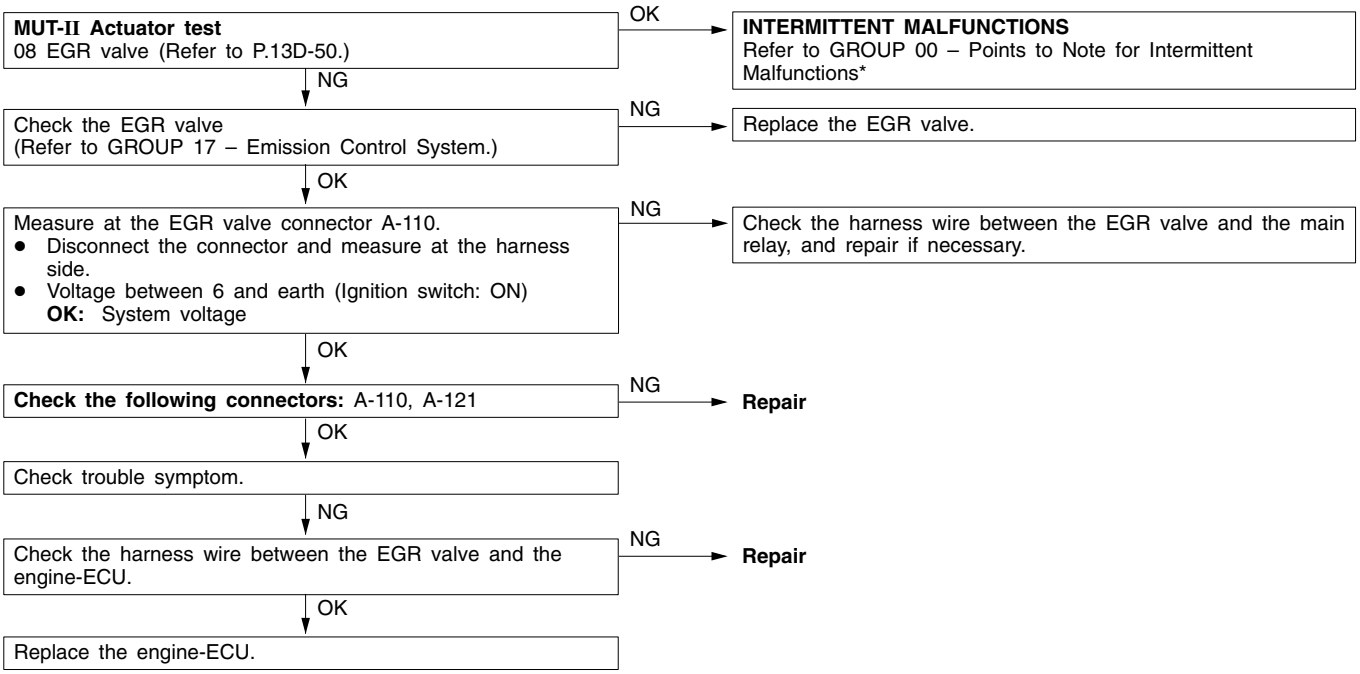

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 25 Immobilizer system | Probable cause |
|---|---|
| **Range of Check**<br>• Ignition switch: ON<br>**Set Conditions**<br>• Improper communication between the engine-ECU and Immobilizer-ECU | • Malfunction of the immobilizer-ECU<br>• Improper connector contact, open circuit or short-circuited harness wire<br>• Malfunction of the engine-ECU |



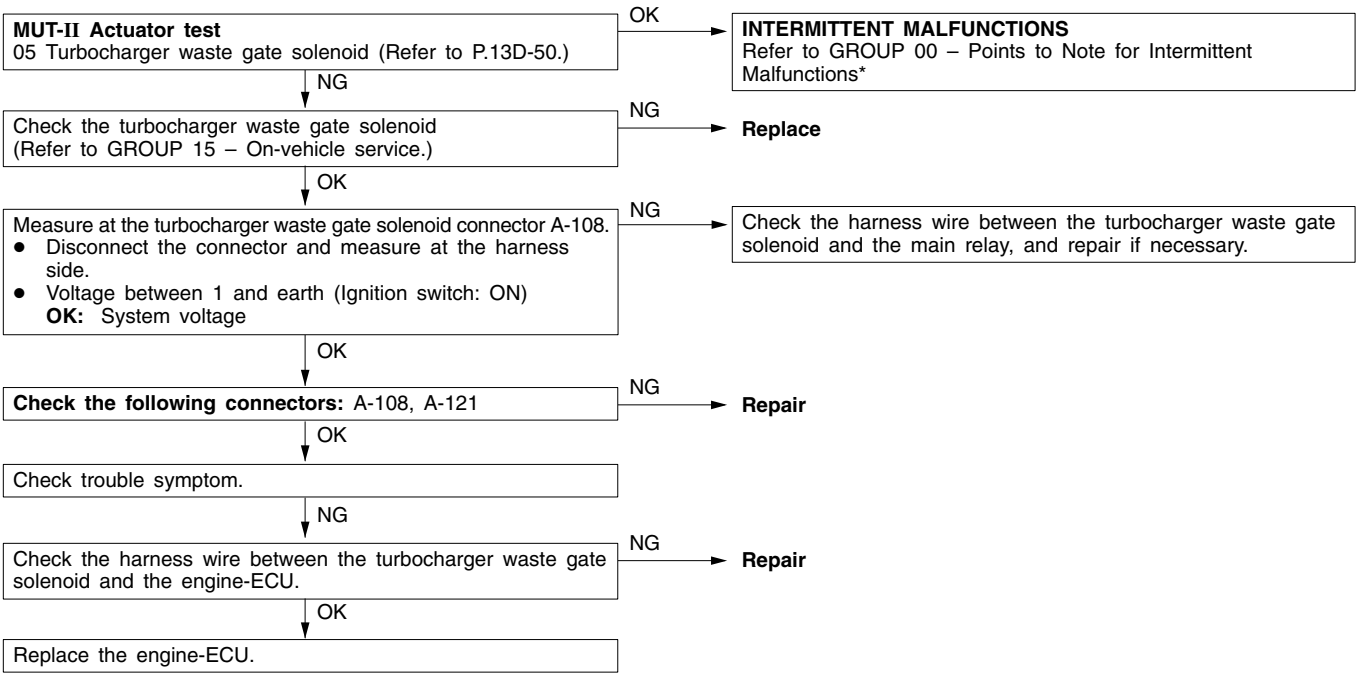

NOTE
If the engine-ECU is replaced, the immobilizer-ECU and ignition key should be replaced together with it.

| Code No. 26 EGR valve system | Probable cause |
|---|---|
| | • Malfunction of the EGR valve<br>• Improper connector contact, open circuit or short-circuited harness wire of the EGR valve circuit<br>• Malfunction of the engine-ECU |



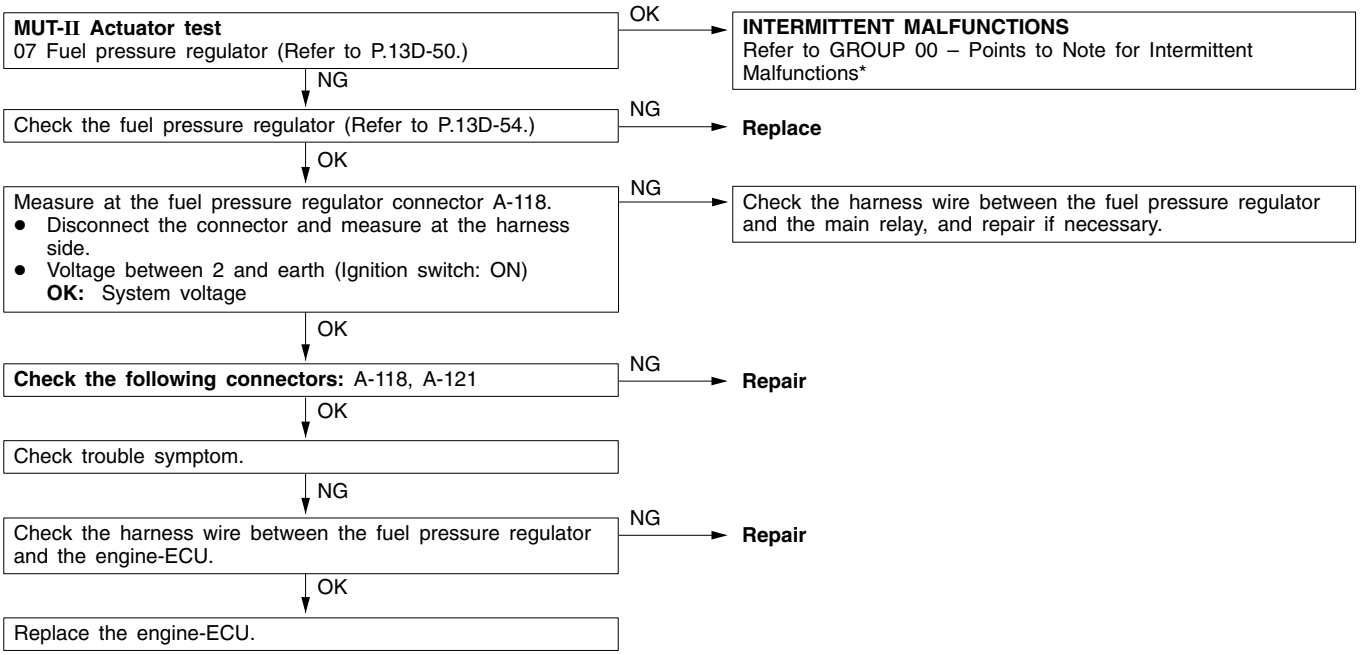

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 27 Turbocharger waste gate solenoid system | Probable cause |
|---|---|
| | • Malfunction of the turbocharger waste gate solenoid<br>• Improper connector contact, open circuit or short-circuited harness wire of the turbocharger waste gate solenoid circuit<br>• Malfunction of the engine-ECU |



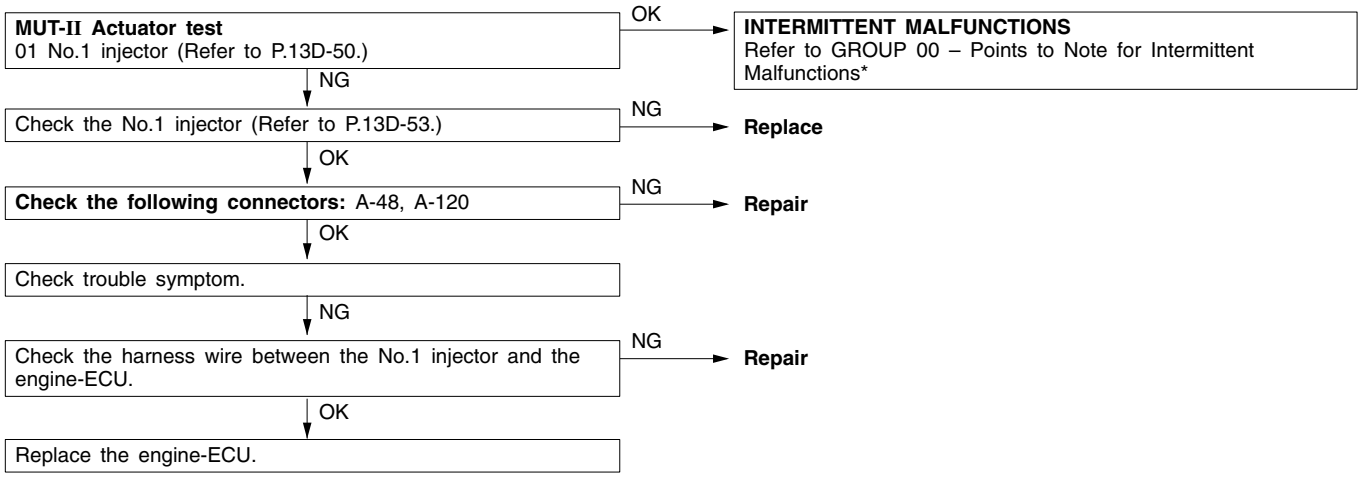

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 28 Fuel pressure regulator system | Probable cause |
|---|---|
| | • Malfunction of the fuel pressure regulator<br>• Improper connector contact, open circuit or short-circuited harness wire of the fuel pressure regulator circuit<br>• Malfunction of the engine-ECU |



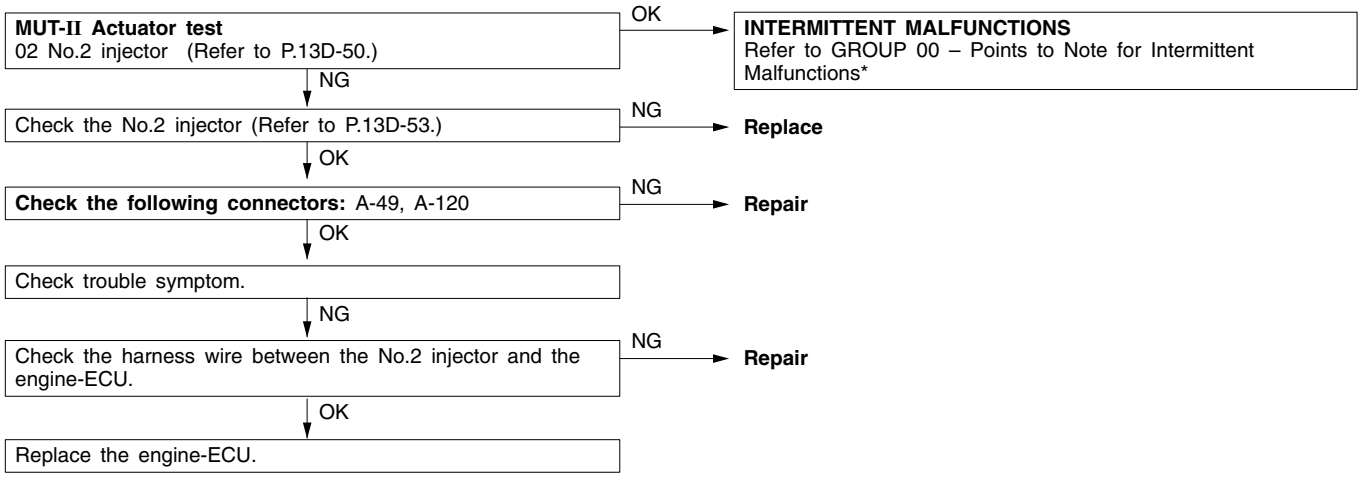

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 29 No.1 injector system | Probable cause |
|---|---|
| | • Malfunction of the No.1 injector<br>• Improper connector contact, open circuit or short-circuited harness wire of the No.1 injector circuit<br>• Malfunction of the engine-ECU |



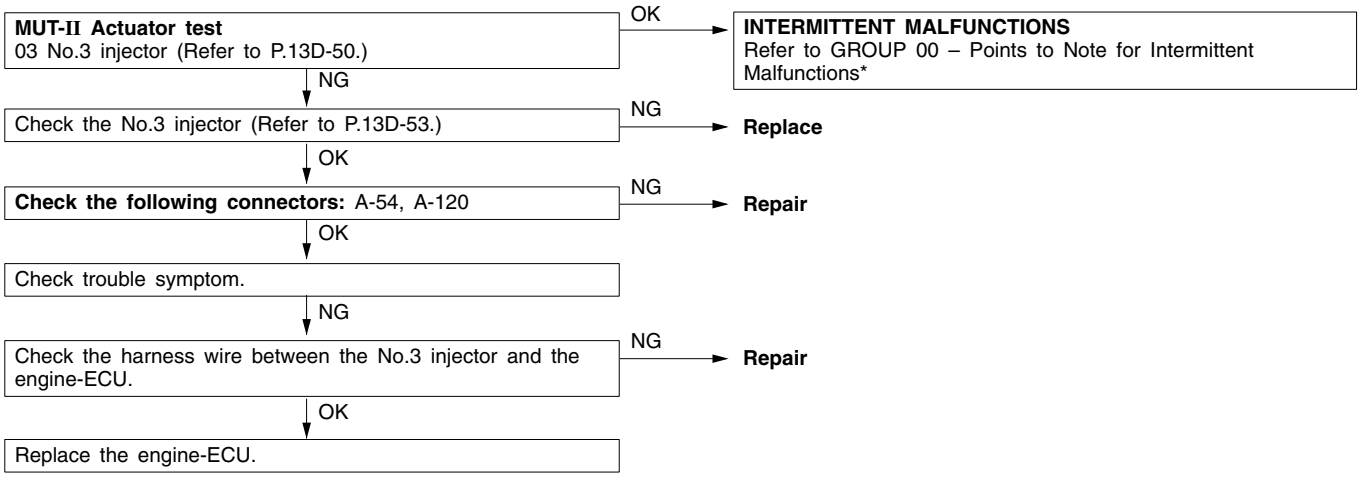

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 31 No.2 injector system | Probable cause |
|---|---|
| | • Malfunction of the No.2 injector<br>• Improper connector contact, open circuit or short-circuited harness wire of the No.2 injector circuit<br>• Malfunction of the engine-ECU |



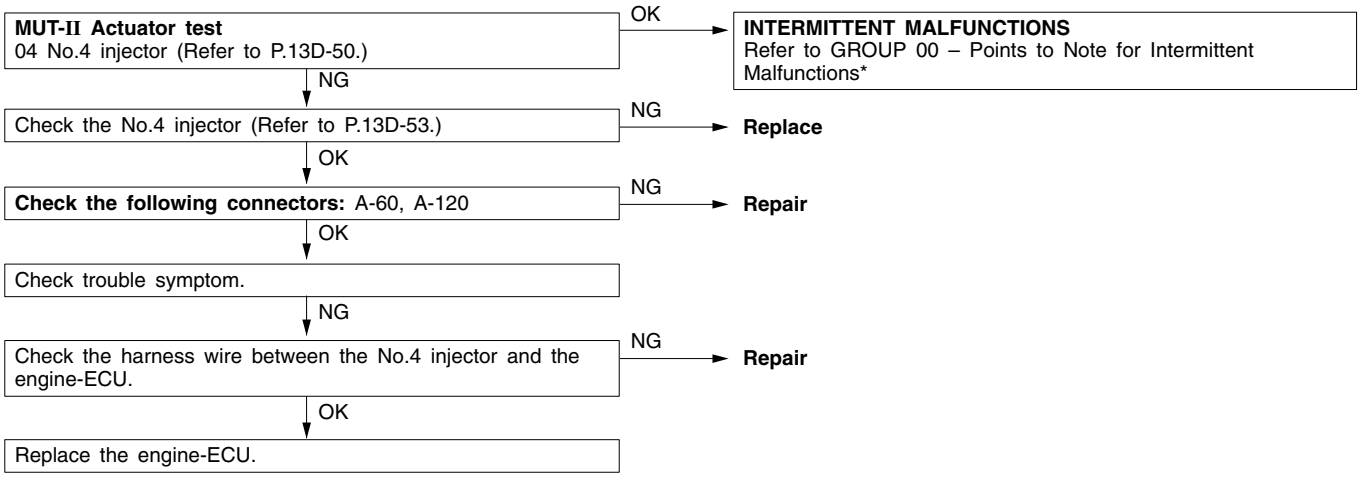

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 32 No.3 injector system | Probable cause |
|---|---|
| | • Malfunction of the No.3 injector<br>• Improper connector contact, open circuit or short-circuited harness wire of the No.3 injector circuit<br>• Malfunction of the engine-ECU |



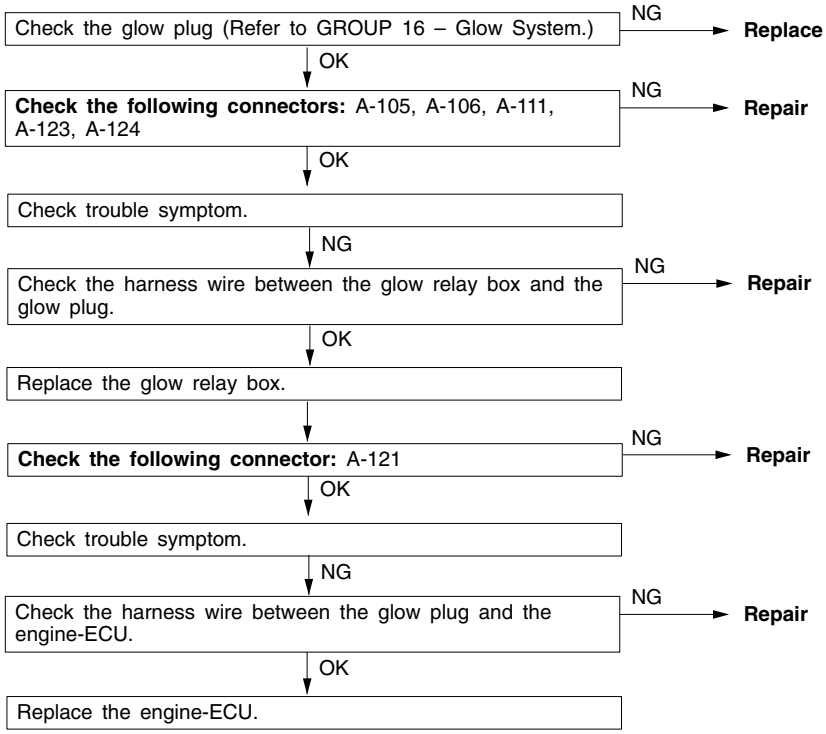

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 33 No.4 injector system | Probable cause |
|---|---|
| | • Malfunction of the No.4 injector<br>• Improper connector contact, open circuit or short-circuited harness wire of the No.4 injector circuit<br>• Malfunction of the engine-ECU |



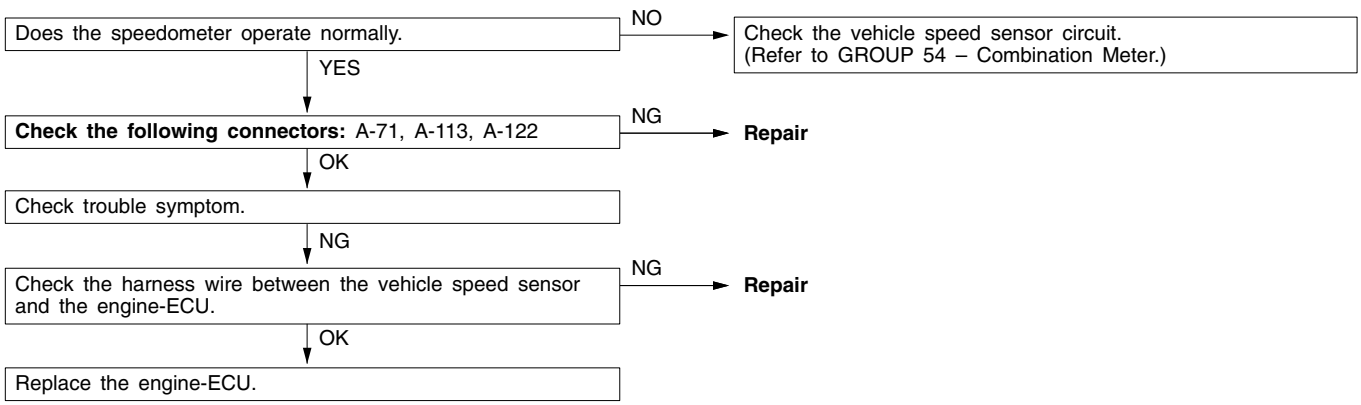

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 34 Glow plug system | Probable cause |
|---|---|
| | • Malfunction of the glow plug<br>• Improper connector contact, open circuit or short-circuited harness wire of the glow plug circuit<br>• Malfunction of the engine-ECU |

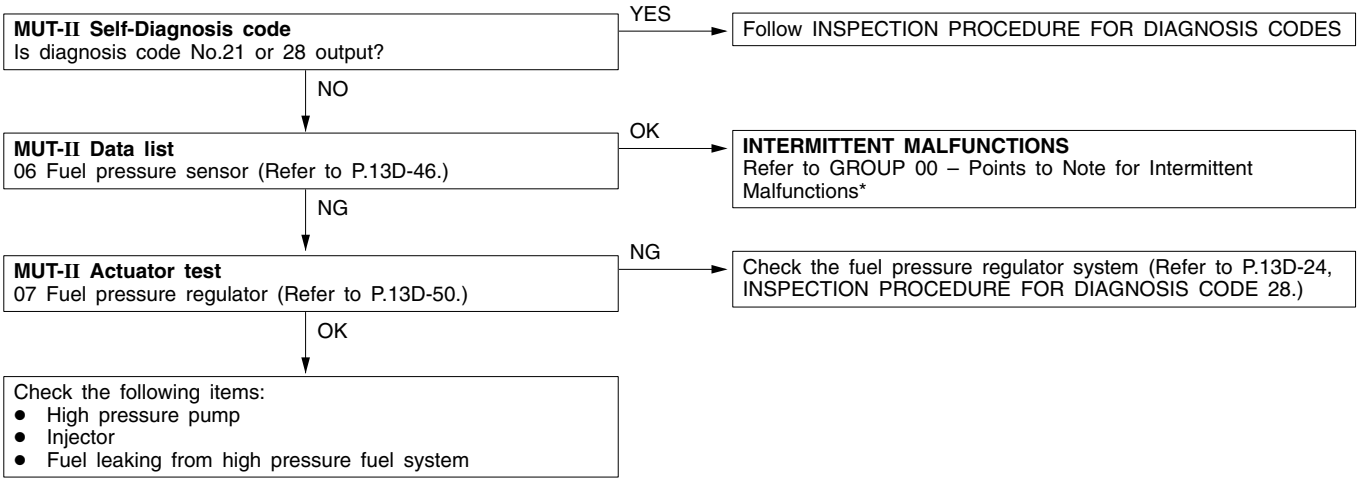



*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 35 Vehicle speed sensor system | Probable cause |
|---|---|
| **Range of Check**<br>• Ignition switch: ON<br>or<br>• During engine running<br>**Set Conditions**<br>• Sensor output voltage corresponds to a speed of 250 km/h or more for 1 second | • Malfunction of the vehicle speed sensor<br>• Improper connector contact, open circuit or short-circuited harness wire of the vehicle speed sensor circuit<br>• Malfunction of the engine-ECU |

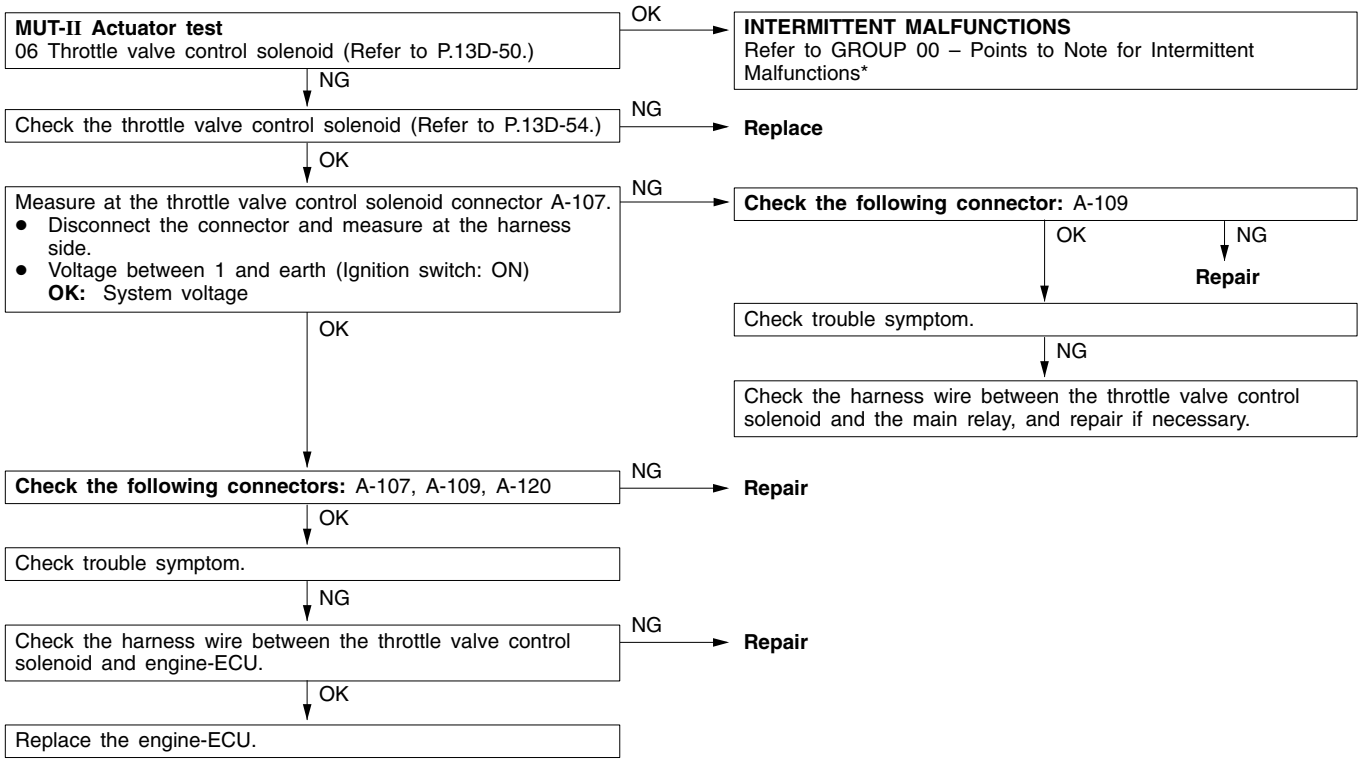


| Code No. 36 Fuel pressure system | Probable cause |
|---|---|
| | • Malfunction of the high pressure pump<br>• Malfunction of the injector<br>• Seized fuel pressure regulator<br>• Fuel leaking from high pressure fuel system |



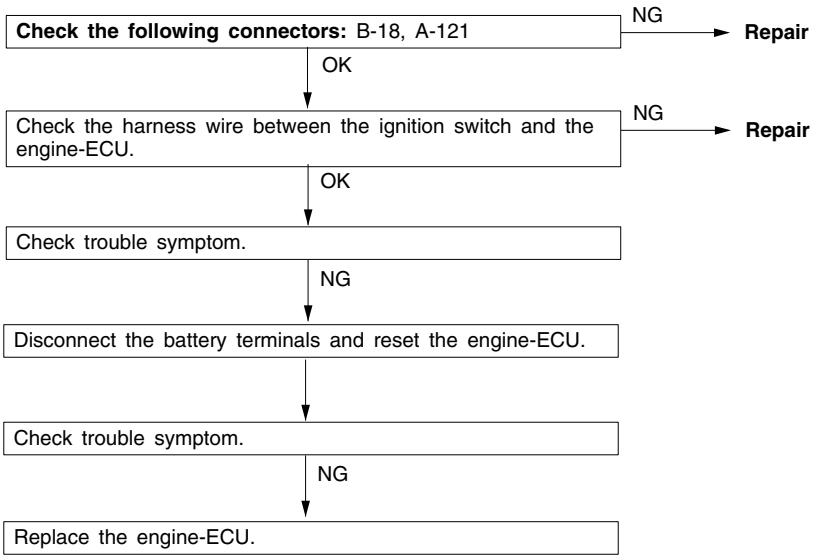

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 37 Throttle valve control solenoid system | Probable cause |
|---|---|
| | • Malfunction of the throttle valve control solenoid<br>• Improper connector contact, open circuit or short-circuited harness wire of the throttle valve control solenoid circuit<br>• Malfunction of the engine-ECU |

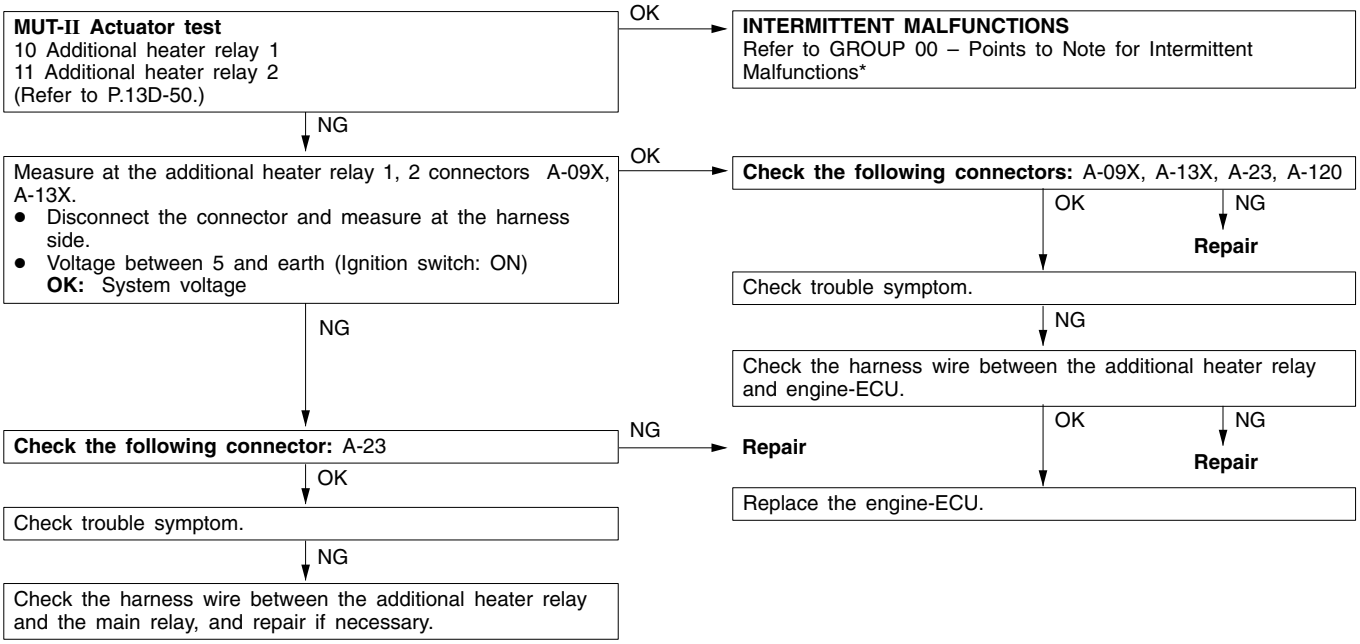



*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 38 Engine-ECU | Probable cause |
|---|---|
| | • Malfunction of the engine-ECU |

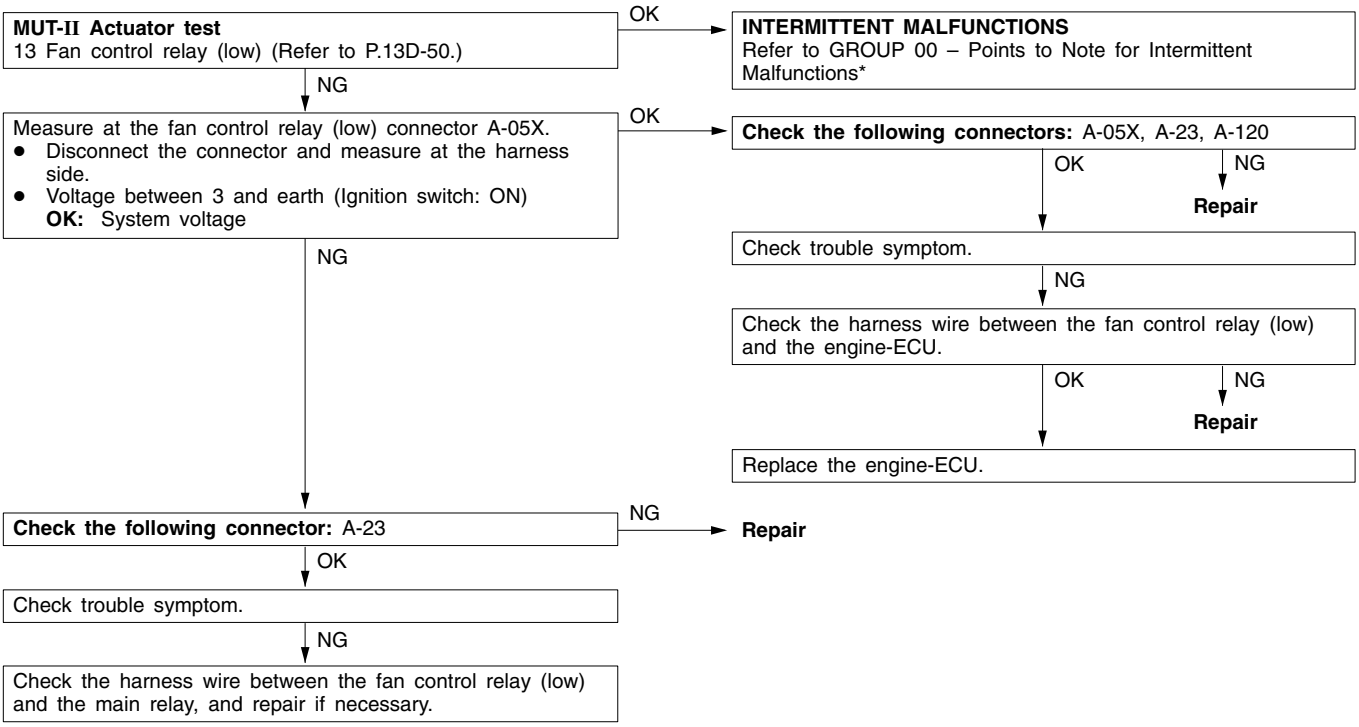



| Code No. 40 Additional heater relay system | Probable cause |
|---|---|
| | • Malfunction of the additional heater relay 1, 2<br>• Improper connector contact, open circuit or short-circuited harness wire of the additional heater relay circuit<br>• Malfunction of the engine-ECU |



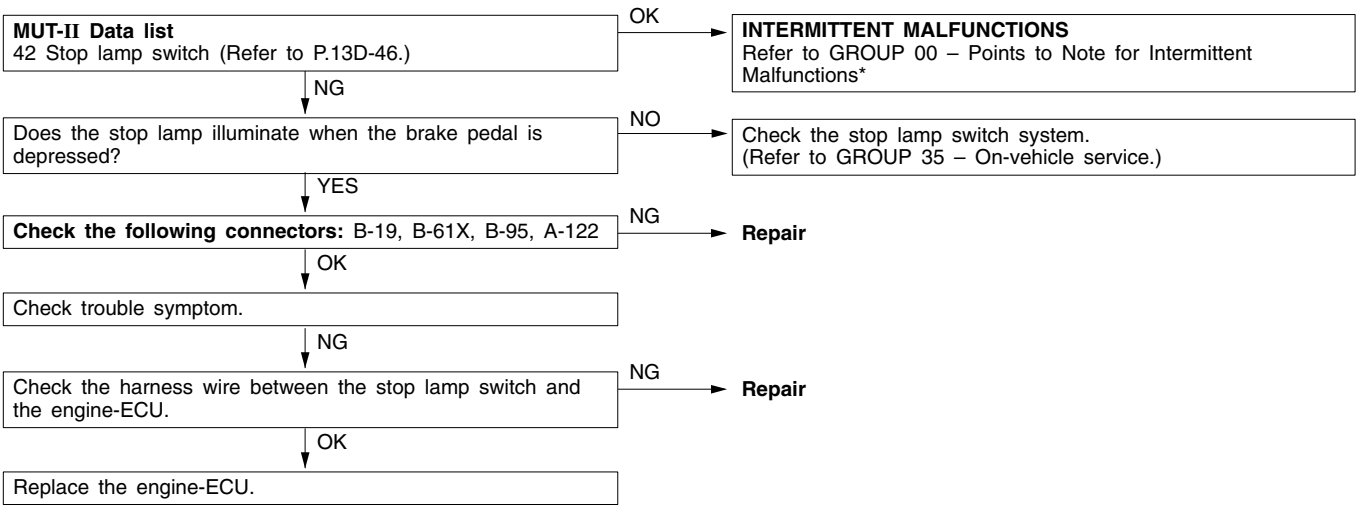

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 41 Fan control relay (low) system | Probable cause |
|---|---|
| | • Malfunction of the fan control relay<br>• Improper connector contact, open circuit or short-circuited harness wire of the fan control relay circuit<br>• Malfunction of the engine-ECU |



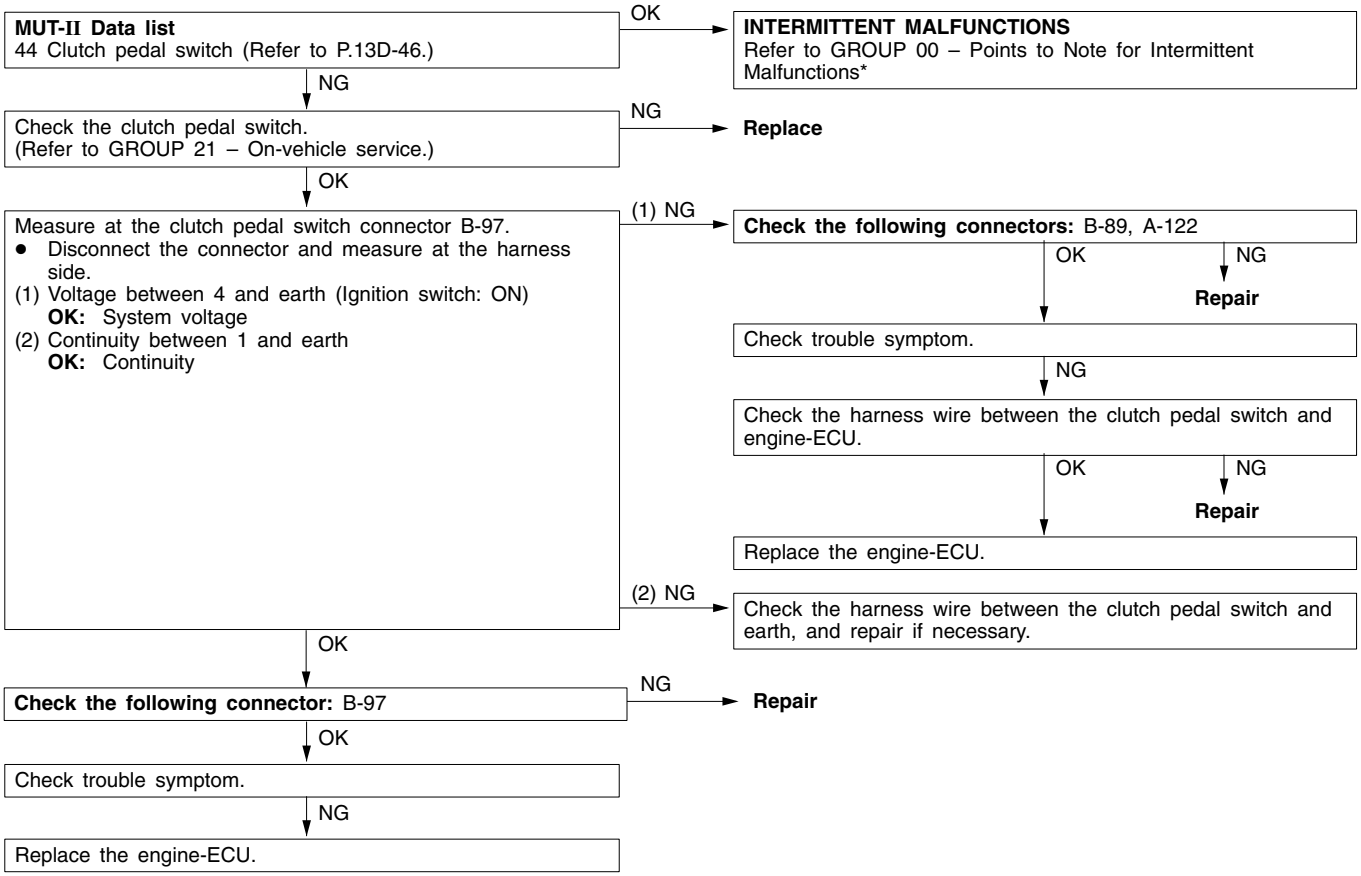

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 42 Stop lamp switch system | Probable cause |
|---|---|
| **Range of Check**<br>• Ignition switch: ON<br>**Set Conditions**<br>• Outputs for stop lamp switches 1 and 2 are different | • Malfunction of the stop lamp switch<br>• Improper connector contact, open circuit or short-circuited harness wire of the stop lamp switch circuit<br>• Malfunction of the engine-ECU |



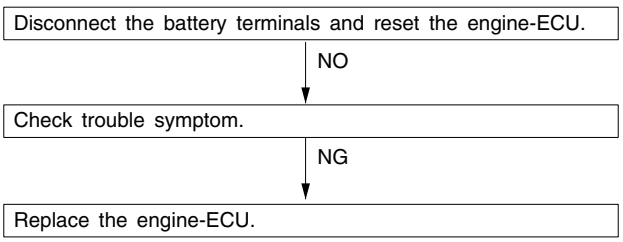

*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

| Code No. 43 Clutch pedal switch system | Probable cause |
|---|---|
| **Range of Check**<br>• Vehicle speed: 100 km/h or more<br>**Set Conditions**<br>• Clutch pedal switch remains off for 1 second | • Malfunction of the clutch pedal switch<br>• Improper connector contact, open circuit or short-circuited harness wire of the clutch pedal switch circuit<br>• Malfunction of the engine-ECU |

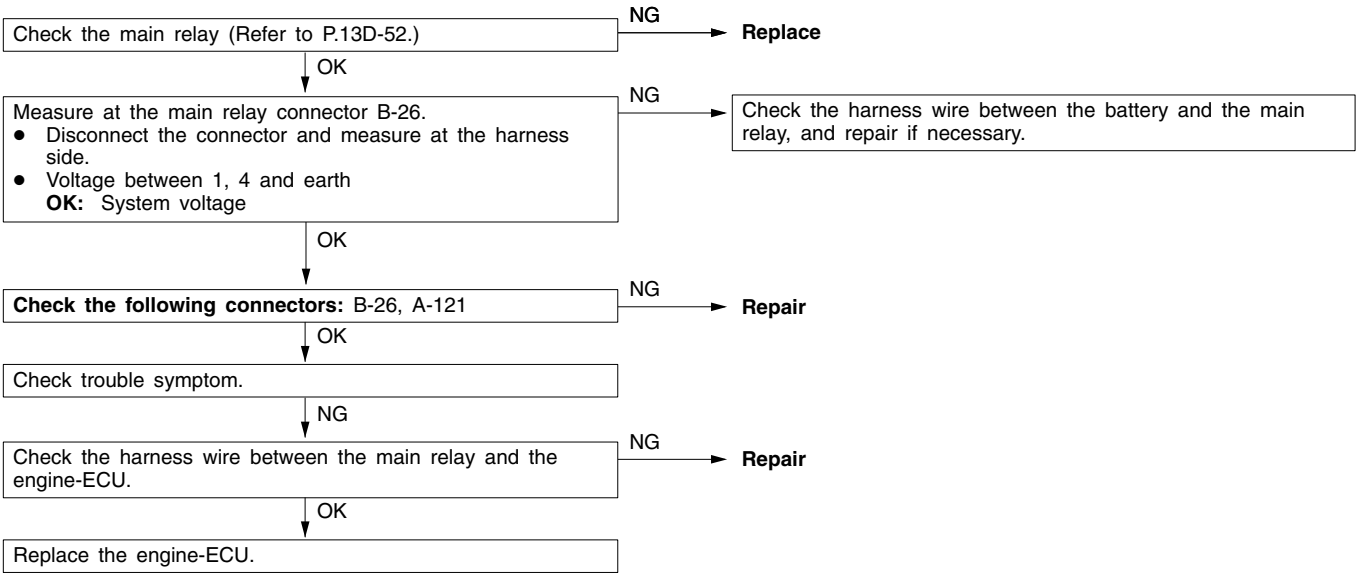



*: Refer to '99 SPACE STAR Workshop Manual (Pub. No. CMXE99E1)

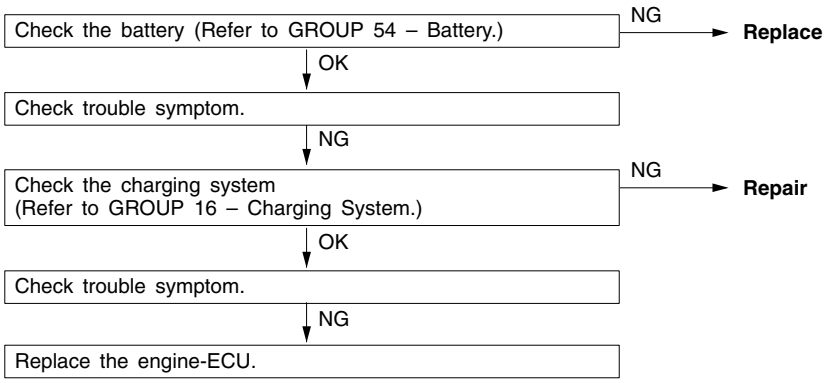
| Code No. 44 Power latch system | Probable cause |
|---|---|
| | • Malfunction of the engine-ECU |



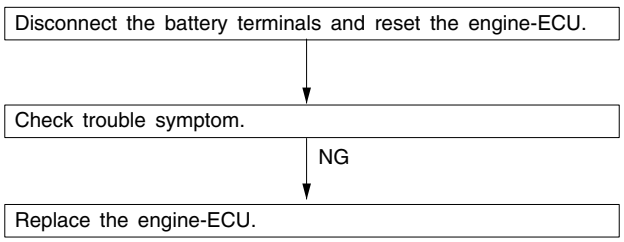
| Code No. 45 Main relay system | Probable cause |
|---|---|
| **Range of Check**<br>● Ignition switch: ON<br>**Set Conditions**<br>● Power is not supplied<br>**Range of Check**<br>● Ignition switch: OFF → ON<br>**Set Conditions**<br>● Power latch time is short or long | ● Malfunction of the main relay<br>● Improper connector contact, open circuit or short-circuited harness wire of the main relay circuit<br>● Malfunction of the engine-ECU |



| Code No. 46 Power supply system | Probable cause |
|---|---|
| **Range of Check**<br>● Ignition switch: ON<br>**Set Conditions**<br>● Power supply voltage is 6.5 V or less, or 16.5 V or more | ● Malfunction of the engine-ECU |




| Code No. 47 ECU alimentation | Probable cause |
|---|---|
| | ● Malfunction of the engine-ECU |



## INSPECTION CHART FOR TROUBLE SYMPTOMS

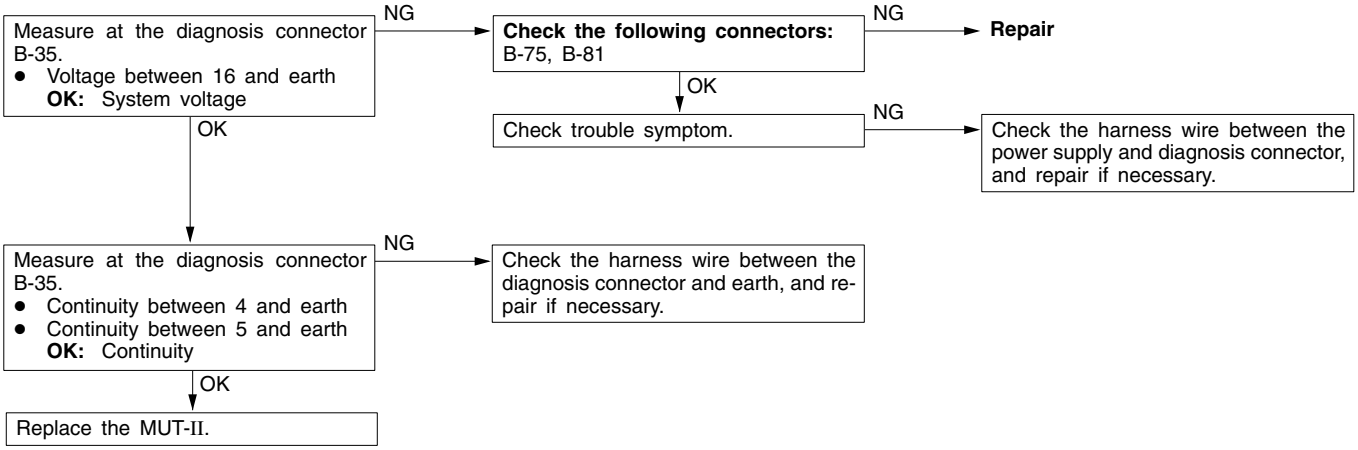
**Caution**
**Check that the engine-ECU earth circuit is normal before checking for the cause of the problem.**

| Trouble symptoms | | Inspection procedure No. | Reference page |
|---|---|---|---|
| Communication with MUT-II is impossible | Communication with all systems is not possible. | 1 | 13D-36 |
| | Communication with engine-ECU only is not possible. | 2 | 13D-36 |
| Engine warning lamp and related parts | The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position | 3 | 13D-37 |
| | The engine warning lamp remains illuminating and never goes out. | 4 | 13D-38 |
| Starting | No initial combustion (Starting not possible) | 5 | 13D-38 |
| | Poor startability when engine is cold (Poor starting) | 6 | 13D-39 |
| | Poor startability when engine is cold or warm (Poor starting) | 7 | 13D-39 |
| Idling stability (Improper idling) | Idle speed is low when engine is cold (Improper idling speed) | 8 | 13D-40 |
| | Idling speed is high (Improper idling speed) | 9 | 13D-40 |
| | Idling speed is low (Improper idling speed) | 10 | 13D-41 |
| | Idle speed is unstable (Rough idling, hunting) | 11 | 13D-41 |
| Idling stability (Engine stalls) | Engine stops soon after starting | 12 | 13D-42 |
| | Engine stops during idling | 13 | 13D-42 |
| Driving | Engine output is too low | 14 | 13D-43 |
| | Abnormal engine knocking occurs | 15 | 13D-43 |
| | Abnormally black smoke | 16 | 13D-44 |
| | Abnormally white smoke | 17 | 13D-44 |
| | Hunting occurs while driving | 18 | 13D-45 |

# INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

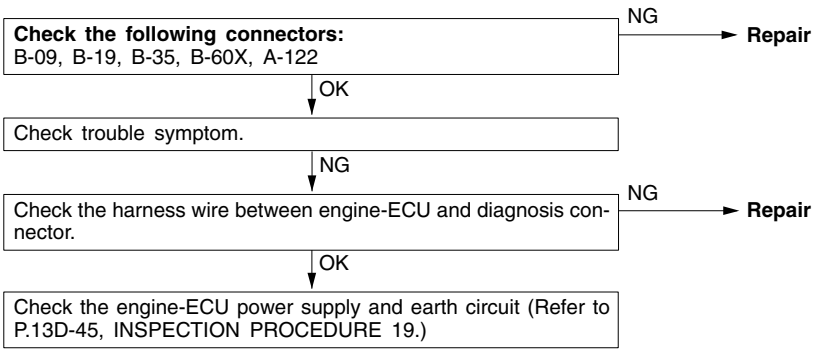
## INSPECTION PROCEDURE 1

| Communication with MUT-II is not possible (Communication with all systems is not possible) | Probable cause |
|---|---|
| The cause is probably a defect in the power supply system (including earth) for the diagnosis line. | • Malfunction of the connector<br>• Malfunction of the harness wire |




## INSPECTION PROCEDURE 2

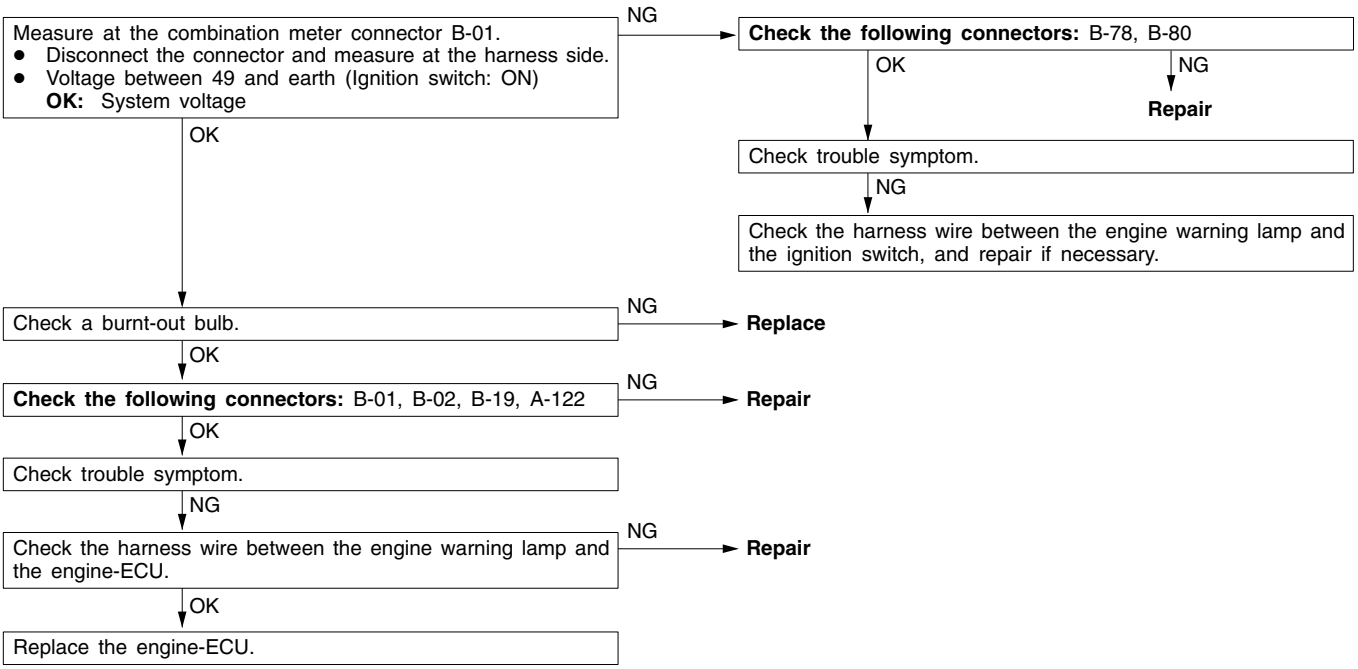
| MUT-II communication with engine-ECU is impossible. | Probable cause |
|---|---|
| One of the following causes may be suspected.<br>• No power supply to engine-ECU<br>• Defective earth circuit of engine-ECU<br>• Defective engine-ECU<br>• Improper communication line between engine-ECU and MUT-II | • Malfunction of engine-ECU power supply circuit<br>• Malfunction of the engine-ECU<br>• Open circuit between engine-ECU and diagnosis connector |




NOTE
On vehicles with the multi-center display, if a malfunction cannot be resolved after the procedure above, check the multi-center display and replace if necessary. (Refer to GROUP 54 – Multi-center Display.)

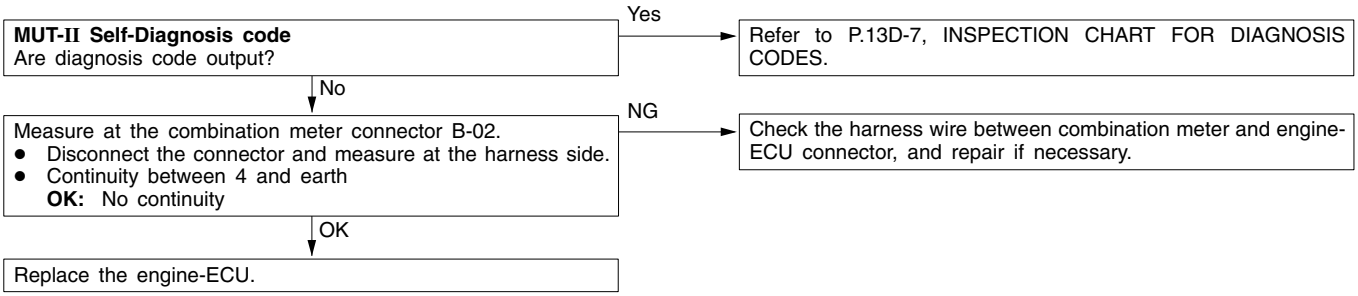
## INSPECTION PROCEDURE 3

| The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position | Probable cause |
|---|---|
| Because there is a burnt-out bulb, the engine-ECU causes the engine warning lamp to illuminate immediately after the ignition switch is turned to ON.<br>If the engine warning lamp does not illuminate immediately after the ignition switch is turned to ON, one of the malfunctions listed at right has probably occurred. | • Burnt-out bulb<br>• Defective warning lamp circuit<br>• Malfunction of the engine-ECU |



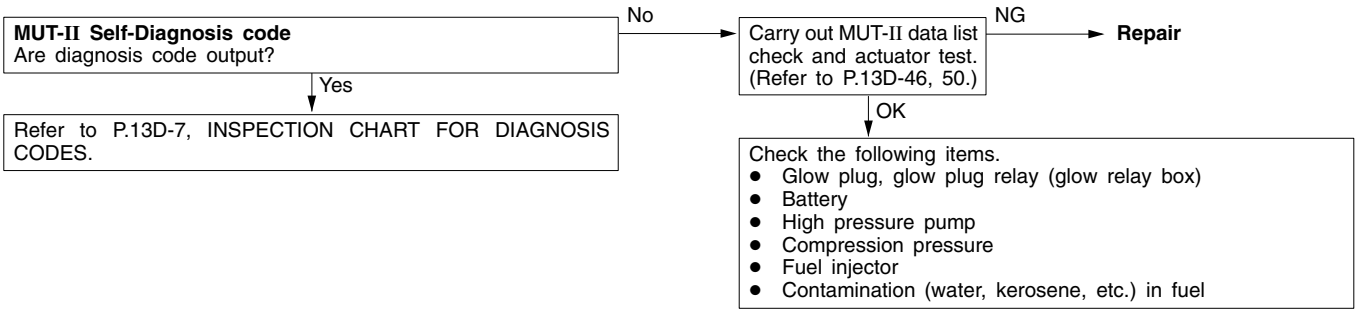
## INSPECTION PROCEDURE 4

| The engine warning lamp remains illuminating and never goes out | Probable cause |
|---|---|
| In cases such as the above, the cause is probably that the engine-ECU is detecting a problem in a sensor or actuator, or that one of the malfunctions listed at right has occurred. | • Short-circuit between the engine warning lamp and engine-ECU<br>• Malfunction of the engine-ECU |



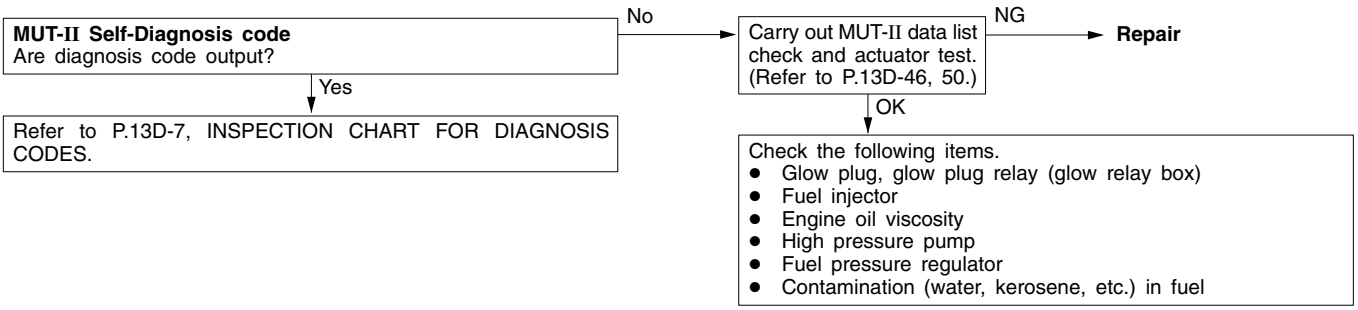

## INSPECTION PROCEDURE 5

| No initial combustion (Starting not possible) | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump, glow system or power supply. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the glow system<br>• Malfunction of the immobilizer system<br>• Malfunction of the engine-ECU |



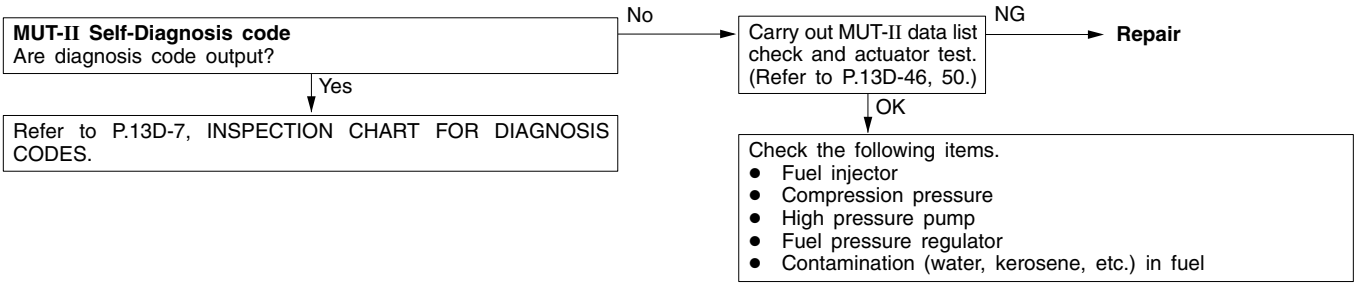
## INSPECTION PROCEDURE 6

| Poor startability when engine is cold (Poor starting) | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump, fuel system or glow system. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the fuel system<br>• Malfunction of the glow system<br>• Malfunction of the engine-ECU |



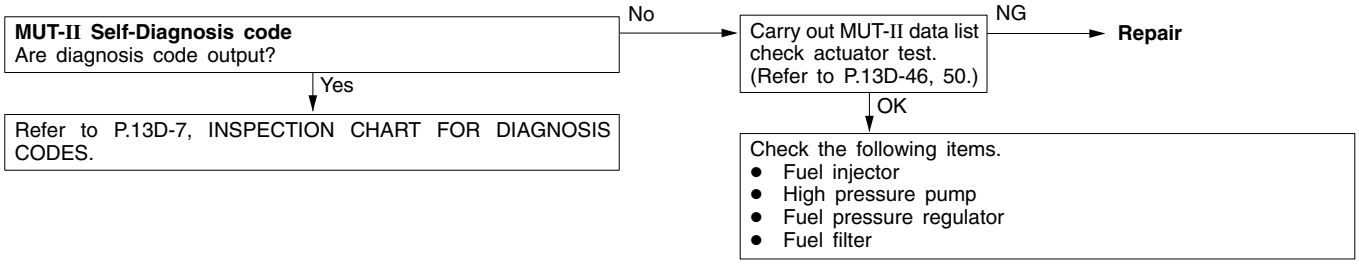

## INSPECTION PROCEDURE 7

| Poor startability when engine is both cold and warm (Poor starting) | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump or fuel system. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the fuel system<br>• Malfunction of the engine-ECU |



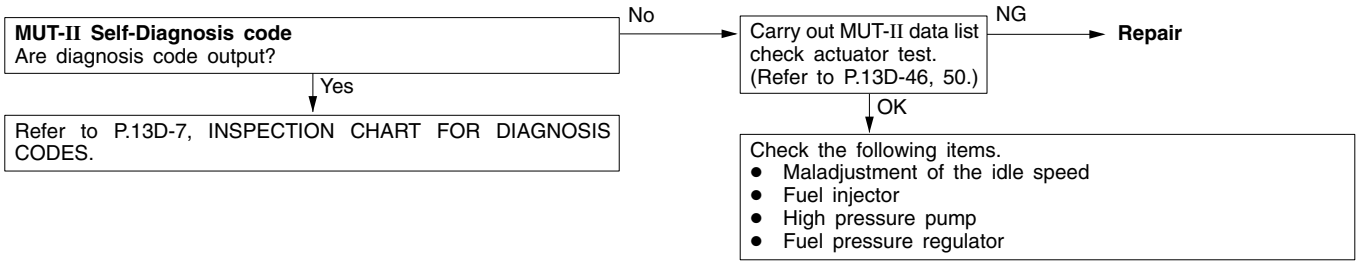
## INSPECTION PROCEDURE 8

| Idle speed is low when engine is cold (Improper idling speed) | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump or fuel system. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the fuel system<br>• Malfunction of the engine-ECU |



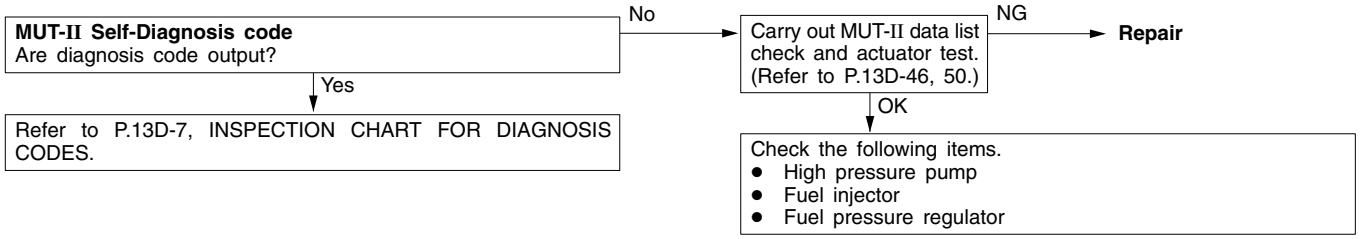

## INSPECTION PROCEDURE 9

| Idle speed is high (Improper idling speed) | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, fuel injector or high pressure pump. | • Malfunction of the control system<br>• Malfunction of the fuel injector<br>• Malfunction of the high pressure pump<br>• Malfunction of the engine-ECU |



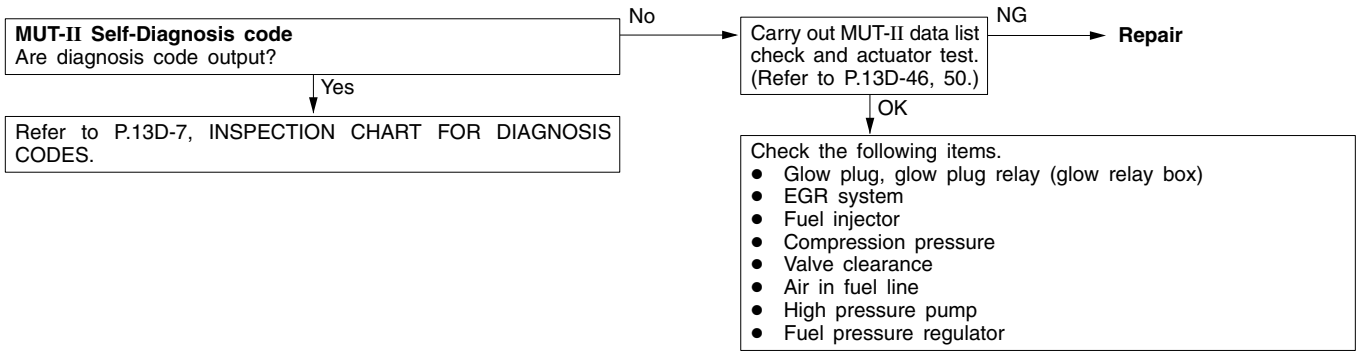
## INSPECTION PROCEDURE 10

| Idle speed is low (Improper idling speed) | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump or fuel system. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the fuel system<br>• Malfunction of the engine-ECU |



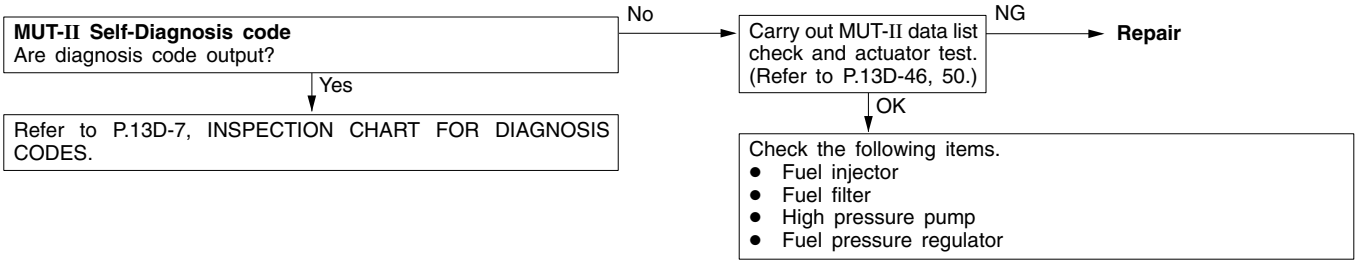

## INSPECTION PROCEDURE 11

| Idle speed is unstable (Rough idling, hunting) | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump, fuel system or glow system. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the fuel system<br>• Malfunction of the glow system<br>• Malfunction of the EGR system<br>• Malfunction of the engine-ECU |



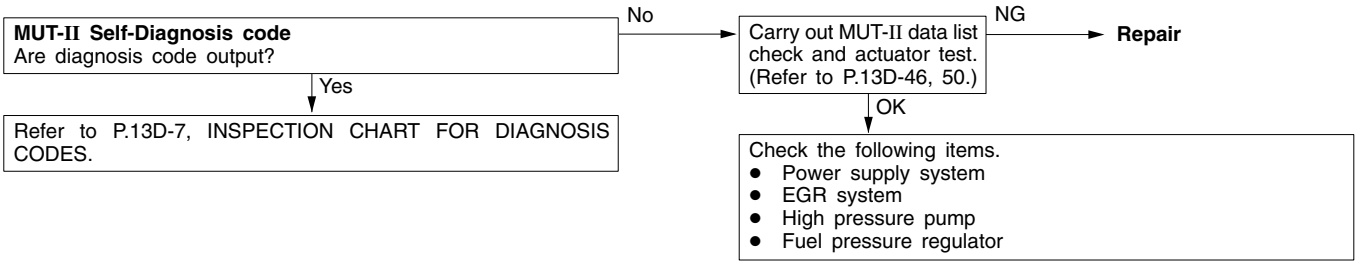
## INSPECTION PROCEDURE 12

| Engine stops soon after starting | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump or fuel system. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the fuel system<br>• Malfunction of the engine-ECU |



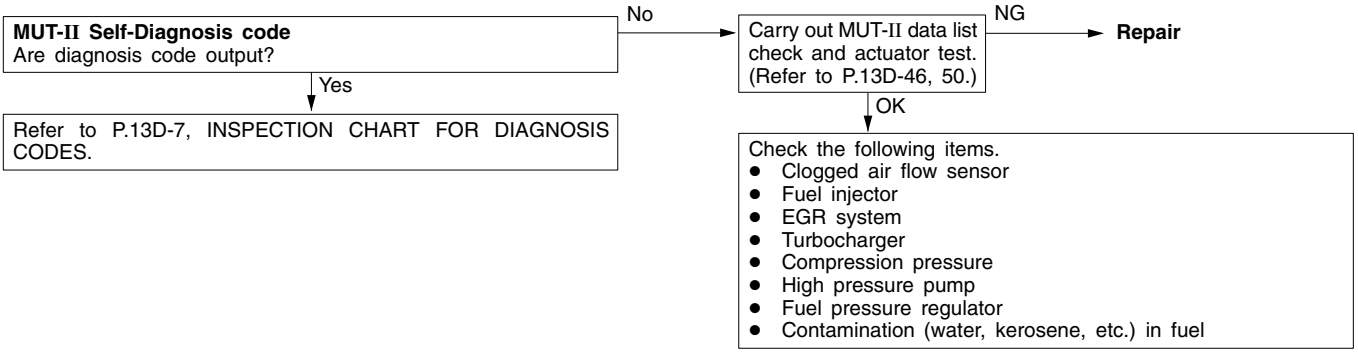

## INSPECTION PROCEDURE 13

| Engine stops during idling | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump or power supply system. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the EGR system<br>• Malfunction of the engine-ECU |



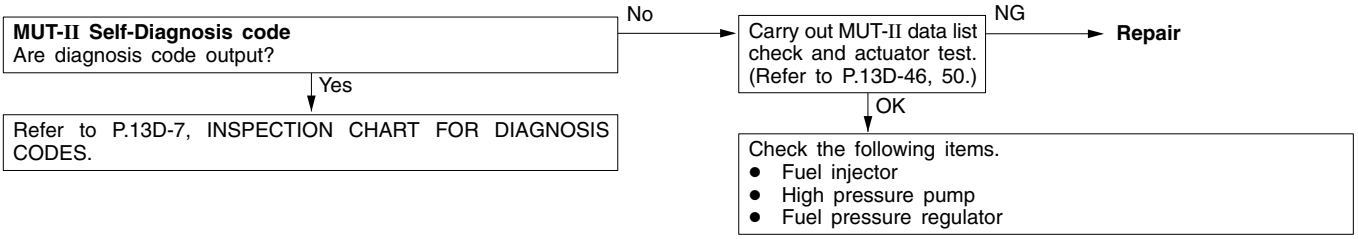
## INSPECTION PROCEDURE 14

| Engine output is too low | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump, fuel system or EGR system. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the fuel system<br>• Malfunction of the EGR system<br>• Clogged air flow sensor<br>• Malfunction of the engine-ECU |



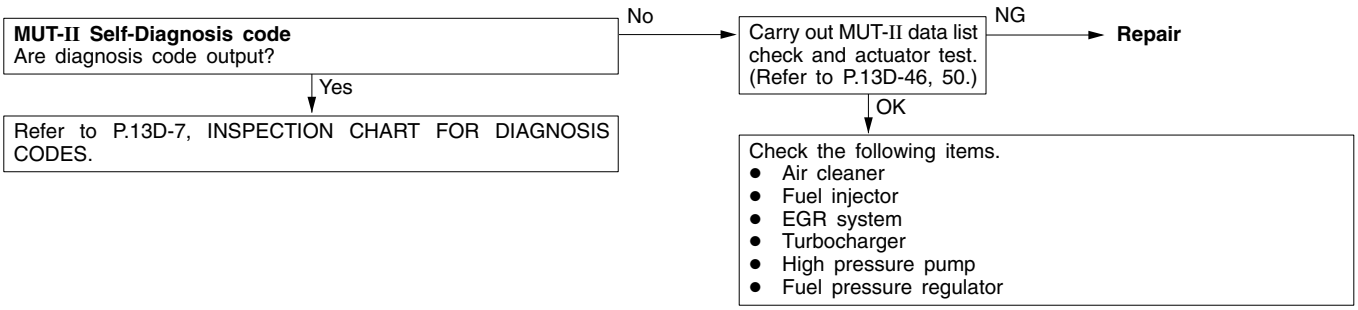

## INSPECTION PROCEDURE 15

| Abnormal engine knocking occurs | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump or fuel system. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the fuel system<br>• Malfunction of the engine-ECU |



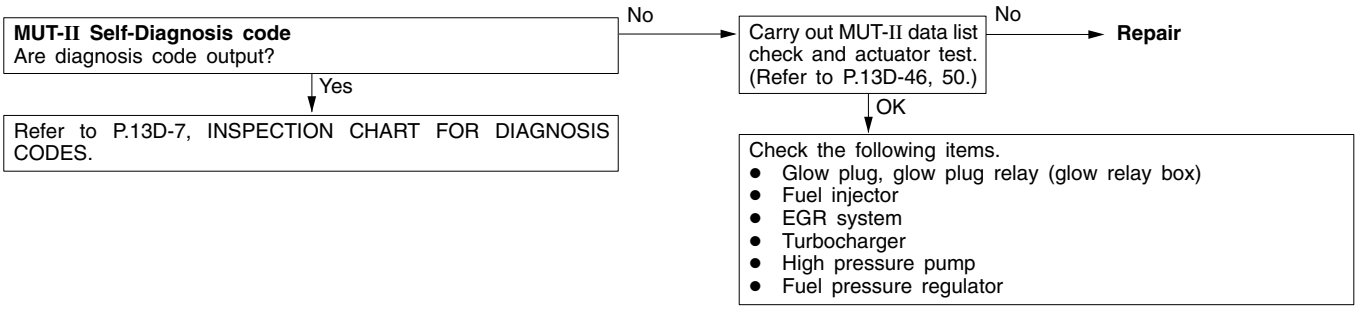
## INSPECTION PROCEDURE 16

| Abnormally black smoke | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump, fuel system or EGR system. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the fuel system<br>• Malfunction of the EGR system<br>• Malfunction of the engine-ECU |



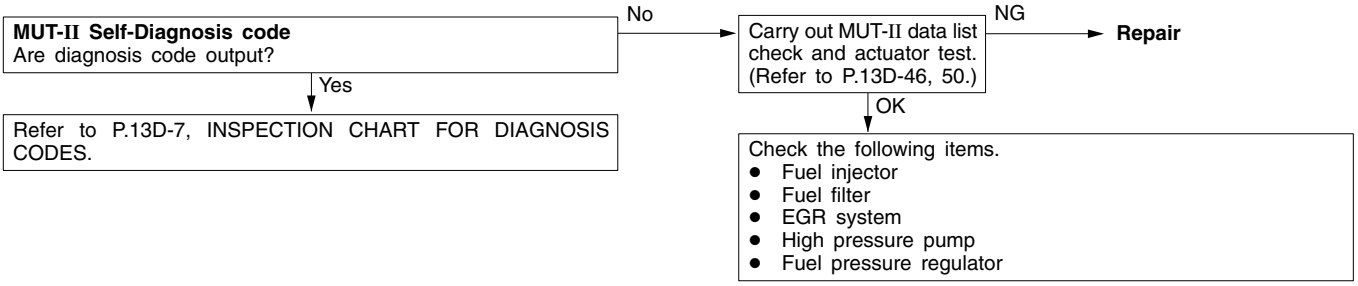

## INSPECTION PROCEDURE 17

| Abnormally white smoke | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump, fuel system, EGR system or glow system. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the fuel system<br>• Malfunction of the EGR system<br>• Malfunction of the glow system<br>• Malfunction of the engine-ECU |



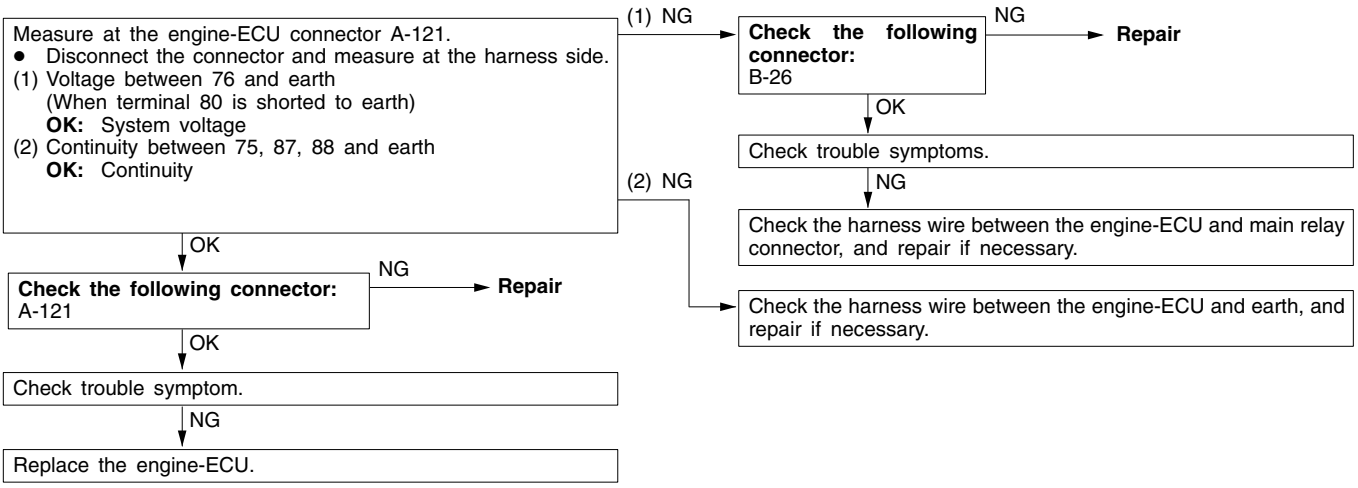
## INSPECTION PROCEDURE 18

| Hunting occurs while driving | Probable cause |
|---|---|
| The cause is probably a malfunction of the control system, high pressure pump or fuel system. | • Malfunction of the control system<br>• Malfunction of the high pressure pump<br>• Malfunction of the fuel system<br>• Malfunction of the engine-ECU |




## INSPECTION PROCEDURE 19

### Check the engine-ECU power supply and earth circuit



## DATA LIST REFERENCE TABLE

**Caution**
**Driving tests always need another personnel.**

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|---|---|---|---|---|---|---|
| 01 | Engine coolant temperature sensor | Ignition switch: ON | Engine coolant temperature is –20°C | –20°C | Code No. 19 | 13D-16 |
| | | | Engine coolant temperature is 0°C | 0°C | | |
| | | | Engine coolant temperature is 20°C | 20°C | | |
| | | | Engine coolant temperature is 40°C | 40°C | | |
| | | | Engine coolant temperature is 80°C | 80°C | | |
| 02 | Fuel temperature sensor | • In cooled state<br>• Ignition switch: ON | | Approx. the same as the outdoor temperature | Code No. 21 | 13D-17 |
| 03 | Intake air temperature sensor | Ignition switch: ON | Intake air temperature is –20°C | –20°C | Code No. 22 | 13D-18 |
| | | | Intake air temperature is 0°C | 0°C | | |
| | | | Intake air temperature is 20°C | 20°C | | |
| | | | Intake air temperature is 40°C | 40°C | | |
| | | | Intake air temperature is 80°C | 80°C | | |
| 04 | Boost sensor | Ignition switch: ON | | 950 – 1040 hPa | Code No. 16 | 13D-13 |
| | | • Engine coolant temperature: 80 – 95°C<br>• Lamp, electric cooling fan and all accessories: OFF | When engine is suddenly raced | Pressure increases | | |
| 05 | Barometric pressure sensor | Ignition switch: ON | At altitude of 0 m | 950 – 1040 hPa | Code No. 17 | 13D-14 |
| 06 | Fuel pressure sensor | Engine: After warm-up | When engine is suddenly raced | Pressure increases | Code No. 15 | 13D-12 |
| 07 | Fuel pressure sensor (command value) | Engine: After warm-up | When engine is suddenly raced | Pressure increases | – | – |

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|---|---|---|---|---|---|---|
| 08 | Air flow sensor | ● Engine coolant temperature: 80 – 95°C<br>● Lamp, electric cooling fan and all accessories: OFF | When engine is suddenly raced | Increases | – | – |
| 09 | Accelerator pedal position sensor (1st channel) | Ignition switch: ON | Release the accelerator pedal | 700 – 800 mV | Code No. 13 | 13D-10 |
| | | | Depress the accelerator pedal gradually | Increases in response to the pedal depression stroke | | |
| | | | Depress the accelerator pedal fully | 3,270 – 4,700 mV | | |
| 10 | Accelerator pedal position sensor (1st channel) | Ignition switch: ON | Release the accelerator pedal | 375 mV | Code No. 14 | 13D-11 |
| | | | Depress the accelerator pedal gradually | Increases in response to the pedal depression stroke | | |
| | | | Depress the accelerator pedal fully | 1,635 – 2,500 mV | | |
| 11 | Accelerator pedal position sensor | Ignition switch: ON | Release the accelerator pedal | 0 % | – | – |
| | | | Depress the accelerator pedal gradually | Increases in response to the pedal depression stroke | | |
| | | | Depress the accelerator pedal fully | 100 % | | |
| 12 | Crank angle sensor | ● Engine: Cranking<br>● Tachometer: Connected | Compare the engine speed readings on the tachometer and the MUT-II | Accord | Code No. 11 | 13D-8 |
| 14 | Fuel injection amount | ● Engine coolant temperature: 80 – 95°C<br>● Lamp, electric cooling fan and all accessories: OFF | Engine is Idling | 4 – 9 $mm^3$ | – | – |

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|---|---|---|---|---|---|---|
| 15 | EGR valve position sensor | • Engine coolant temperature: 80 – 95°C<br>• Lamp, electric cooling fan and all accessories: OFF | When engine is suddenly raced | Increases | Code No. 23 | 13D-19 |
| 16 | EGR valve | • Engine coolant temperature: 80 – 95°C<br>• Lamp, electric cooling fan and all accessories: OFF | Engine is Idling | 5 – 10 % | Code No. 26 | 13D-22 |
| | | | When engine is suddenly raced | Increases | | |
| 17 | Turbocharger waste gate solenoid | Ignition switch: ON | When engine is suddenly raced | Increases | Code No. 27 | 13D-23 |
| 18 | Fuel pressure regulator | Engine: After warm-up | When engine is suddenly raced | Voltage increases | Code No. 28 | 13D-24 |
| 20 | Crank angle sensor (2,000 r/min or less) | • Engine: Cranking [reading is possible at 2,000 r/min or less]<br>• Tachometer: Connected | | Engine speeds displayed on the MUT-II and tachometer are identical | – | – |
| 21 | Vehicle speed sensor | When vehicle is moving | Compare the speeds displayed on the speedometer and the MUT-II | Accord | Code No. 35 | 13D-27 |
| 41 | Ignition switch – IG | Ignition switch: ON | | ON | – | – |
| 42 | Stop lamp switch | Ignition switch: ON | Brake pedal: Depressed | ON | Code No. 42 | 13D-31 |
| | | | Brake pedal: Released | OFF | | |
| 44 | Clutch pedal switch | Ignition switch: ON | Clutch pedal: Depressed | ON | Code No. 43 | 13D-32 |
| | | | Clutch pedal: Released | OFF | | |
| 45 | Overheat indicator lamp | Ignition switch: ON | Several seconds pass after ignition switch is turned to ON | ON → OFF | – | – |
| 46 | Glow indicator lamp | Ignition switch: ON | From 0.5 – 16 seconds after ignition switch is turned to ON | ON → OFF | – | – |
| 47 | Throttle valve control solenoid | Engine: Idle | | OFF | Code No. 37 | 13D-29 |
| | | Engine: Idle → stopped | | ON | | |
| 48 | Glow relay box | Ignition switch: ON | From 0.5 – 16 seconds after ignition switch is turned to ON | ON → OFF | Code No. 24 | 13D-20 |

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|---|---|---|---|---|---|---|
| 50 | A/C relay | Engine: After warm-up, idle | A/C switch: OFF | OFF (Compressor clutch is not operating) | – | – |
| | | | A/C switch: ON | ON (Compressor clutch is operating) | | |
| 51 | A/C switch | Engine: After warm-up, idle | A/C switch: OFF | OFF | – | – |
| | | | A/C switch: ON | ON | | |
| 52 | Additional heater relay 1 | ● Engine coolant temperature: 75°C or lower<br>● Intake air temperature: 10°C or lower<br>● Post-heating complete<br>● All accessories: OFF | | ON | Code No. 40 | 13D-30 |
| | | Engine: After warm-up | | OFF | | |
| 53 | Additional heater relay 2 | ● Engine coolant temperature: 75°C or lower<br>● Intake air temperature: 10°C or lower<br>● Post-heating complete<br>● All accessories: OFF | | ON | Code No. 40 | 13D-30 |
| | | Engine: After warm-up | | OFF | | |
| 54 | Fan control relay (high) | Engine coolant temperature: 96°C or lower | | OFF | – | – |
| | | Engine coolant temperature: 102°C or higher | | ON | | |
| 55 | Fan control relay (low) | Engine coolant temperature: 99°C or lower | | OFF | – | – |
| | | Engine coolant temperature: 99 – 102°C | | ON | | |

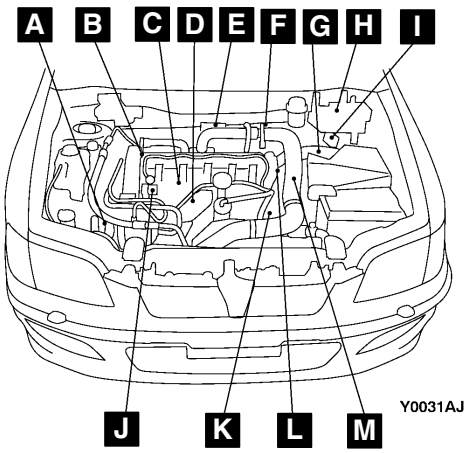
## ACTUATOR TEST REFERENCE TABLE

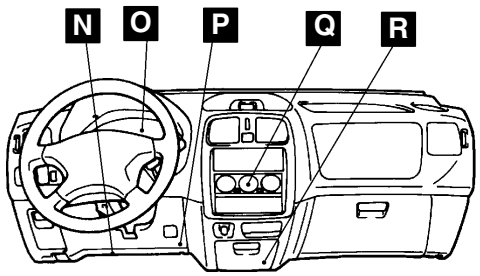
| Item No. | Inspection item | Drive contents | Inspection contents | Normal condition | Inspection procedure No. | Reference page |
|---|---|---|---|---|---|---|
| 01 | Injector | Cut fuel to No. 1 injector | Engine: After warm-up, idle (Cut the fuel supply to each injector in turn and check cylinders which don't affect idling) | Idling condition becomes different (becomes unstable) | Code No. 29 | 13D-25 |
| 02 | | Cut fuel to No. 2 injector | | | Code No. 31 | 13D-25 |
| 03 | | Cut fuel to No. 3 injector | | | Code No. 32 | 13D-26 |
| 04 | | Cut fuel to No. 4 injector | | | Code No. 33 | 13D-26 |
| 05 | Turbocharger waste gate solenoid | Solenoid valve turns from OFF to ON | Ignition switch: ON | Sound of operation can be heard when solenoid valve is driven | Code No. 27 | 13D-23 |
| 06 | Throttle valve control solenoid | Solenoid valve turns from OFF to ON | Ignition switch: ON | Sound of operation can be heard when solenoid valve is driven | Code No. 37 | 13D-29 |
| 07 | Fuel pressure regulator | Solenoid valve turns from OFF to ON | Ignition switch: ON | Sound of operation can be heard when solenoid valve is driven | Code No. 28 | 13D-24 |
| 08 | EGR valve | Solenoid valve turns from OFF to ON | Ignition switch: ON | Sound of operation can be heard when solenoid valve is driven | Code No. 26 | 13D-22 |
| 09 | Glow relay box | Relay turns from OFF to ON | • Ignition switch: ON<br>• Check operating condition on data list | OFF → ON | Code No. 24 | 13D-20 |
| 10 | Additional heater relay 1 | Relay turns from OFF to ON | Ignition switch: ON | Sound of operation can be heard when relay is driven | Code No. 40 | 13D-30 |
| 11 | Additional heater relay 2 | Relay turns from OFF to ON | Ignition switch: ON | Sound of operation can be heard when relay is driven | Code No. 40 | 13D-30 |
| 12 | Fan control relay (high) | Relay turns from OFF to ON | Ignition switch: ON | Fan motor operates at high speed | – | – |
| 13 | Fan control relay (low) | Relay turns from OFF to ON | Ignition switch: ON | Fan motor operates at low speed | – | – |
| 14 | Engine warning lamp | Causes engine warning lamp to illuminate | Engine: Idle | Engine warning lamp illuminates | – | – |
| 15 | Glow indicator lamp | Causes glow indicator lamp to illuminate | Engine: Idle | Glow indicator lamp illuminates | – | – |
| 16 | Overheat indicator lamp | Causes overheat indicator lamp to illuminate | Engine: Idle | Glow overheat lamp illuminates | – | – |

# ON-VEHICLE SERVICE

## COMPONENT LOCATION

| Name | Symbol | Name | Symbol |
|---|---|---|---|
| A/C relay | H | Engine-ECU (with barometric pressure sensor) | A |
| A/C switch | Q | Fuel pressure regulator | J |
| Accelerator pedal position sensor (1st and 2nd channel) | P | Fuel pressure sensor | D |
| Air flow sensor (with intake air temperature sensor) | G | Fuel temperature sensor | D |
| Boost sensor | M | Glow relay box | I |
| Camshaft position sensor | B | Injector | C |
| Clutch pedal switch | N | Main relay | R |
| Crank angle sensor | K | Stop lamp switch | N |
| Diagnosis connector | R | Throttle valve control solenoid | E |
| EGR valve | F | Turbocharger waste gate solenoid | E |
| EGR valve position sensor | F | Vehicle speed sensor | K |
| Engine coolant temperature sensor | L | | |

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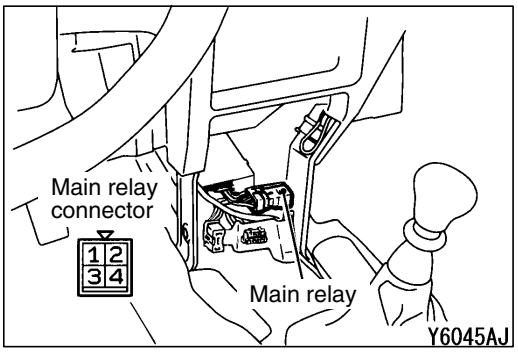
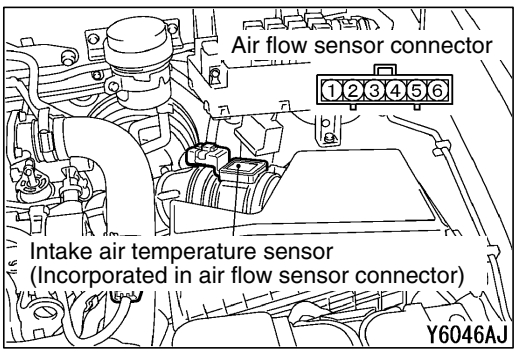



## MAIN RELAY CONTINUITY CHECK

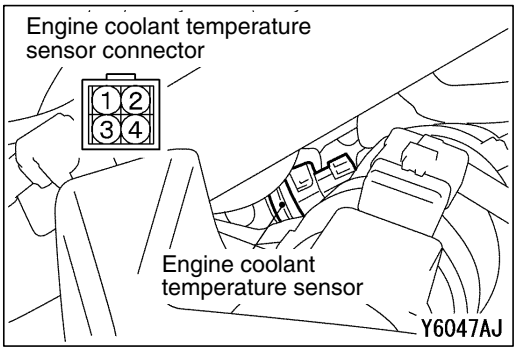
| Battery voltage | Terminal No. | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Not supplied | ○ | | ○ | |
| Supplied | ○ | ⊖ | ○ | ⊕ |




## INTAKE AIR TEMPERATURE SENSOR CHECK

1. Disconnect the air flow sensor connector.
2. Measure the resistance between terminals 1 and 2.

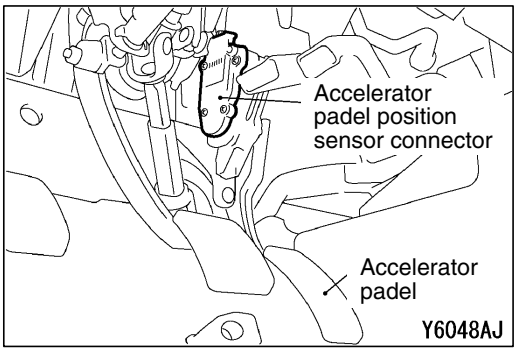
**Standard value:**
**24.0 – 27.2 kΩ (at –30°C)**
**2.35 – 2.55 kΩ (at 20°C)**
**0.180 – 0.186 kΩ (at 100°C)**




## ENGINE COOLANT TEMPERATURE SENSOR CHECK

1. Disconnect the engine coolant temperature sensor connector.
2. Measure the resistance between terminals 2 and 3.

**Standard value: 2.14 – 2.36 kΩ (at 25°C)**
**0.27 – 0.29 kΩ (at 80°C)**




## ACCELERATOR PEDAL POSITION SENSOR (1st channel) CHECK

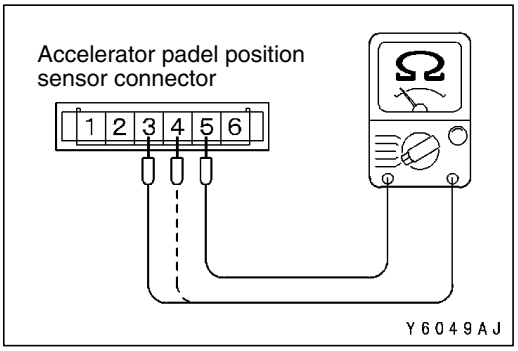
1. Disconnect the accelerator pedal position sensor connector.
2. Measure the resistance between terminals 3 and 5.

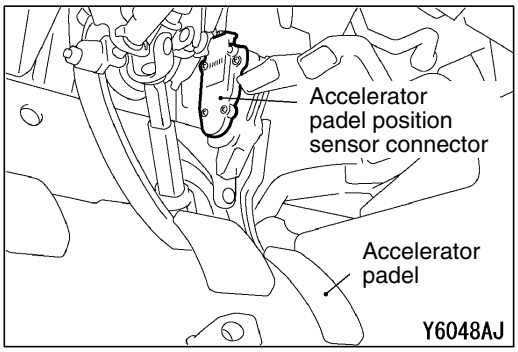
**Standard value: Approx. 1200 Ω**

3. Measure the resistance between terminals 4 and 5.

**Normal condition:**

| | |
|---|---|
| Depress the accelerator pedal slowly | Resistance value changes in accordance with the accelerator pedal depression smoothly |





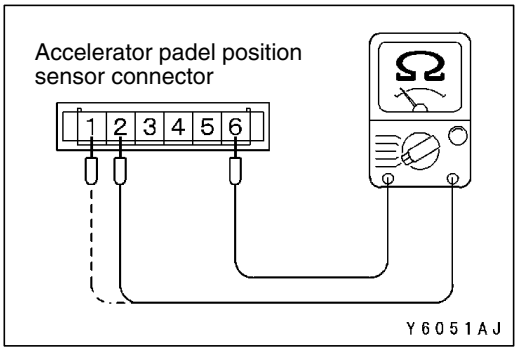

## ACCELERATOR PEDAL POSITION SENSOR (2nd channel) CHECK

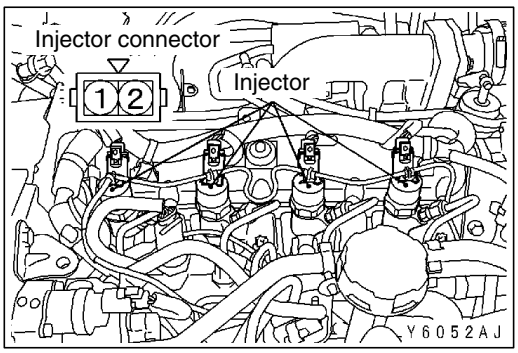
1. Disconnect the accelerator pedal position sensor connector.
2. Measure the resistance between terminals 2 and 6.

   **Standard value: Approx. 1,700 Ω**
3. Measure the resistance between terminals 1 and 6.

   **Normal condition:**

| | |
|---|---|
| Depress the accelerator pedal slowly | Resistance value changes in accordance with the accelerator pedal depression smoothly |

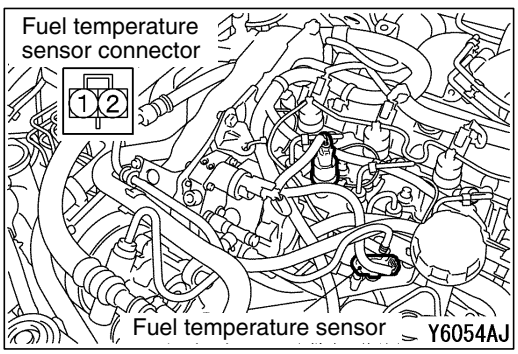



## INJECTOR CHECK

1. Disconnect the injector connector.
2. Measure the resistance between terminals.

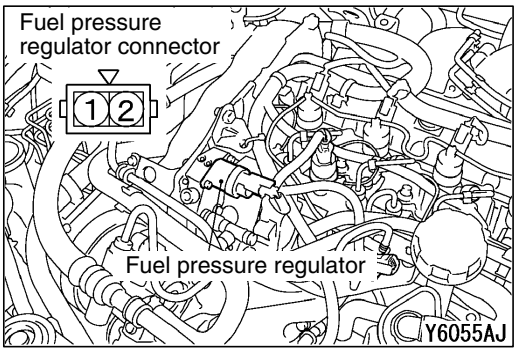
   **Standard value: Approx. 0.33 Ω (at 20°C)**




## FUEL TEMPERATURE SENSOR CHECK

1. Disconnect the fuel temperature sensor connector.
2. Measure the resistance between terminals.

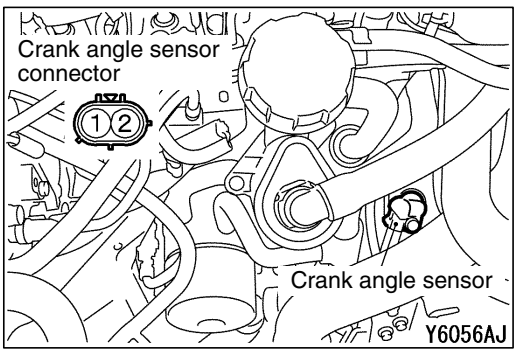
   **Standard value: 2.05 kΩ (at 25°C)**




## FUEL PRESSURE REGULATOR CHECK

1. Disconnect the fuel pressure regulator connector.
2. Measure the resistance between terminals.

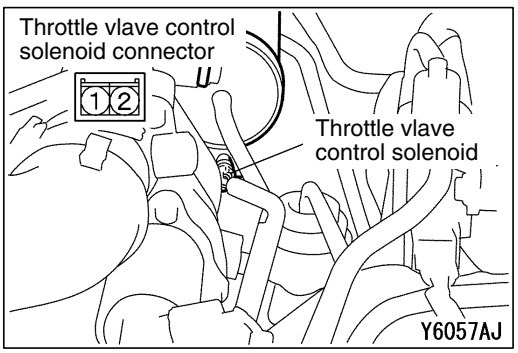
**Standard value: Approx. 5 Ω (at 20°C)**




## CRANK ANGLE SENSOR CHECK

1. Disconnect the crank angle sensor connector.
2. Measure the resistance between terminals.

**Standard value: 720 – 880 Ω**




## THROTTLE VALVE CONTROL SOLENOID CHECK

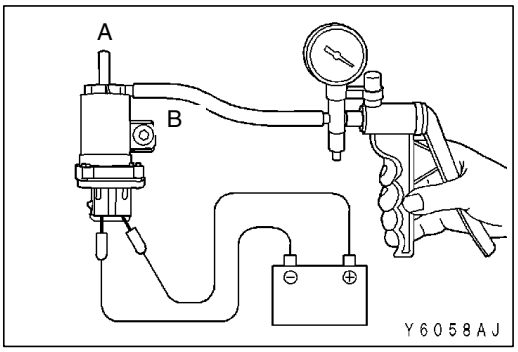
NOTE
When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

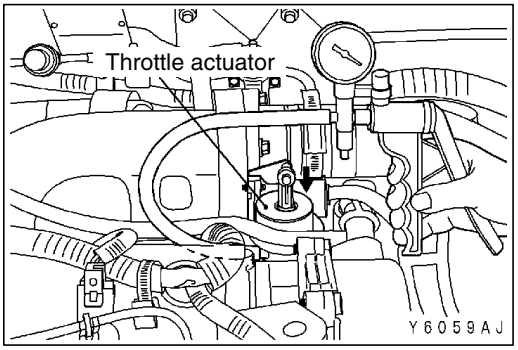
1. Disconnect the vacuum hose from the solenoid.
2. Disconnect the solenoid connector.
3. Connect a hand vacuum pump to the nipple (B) of the solenoid (refer to the illustration at left).
4. Check the airtightness by applying a vacuum with voltage applied directly from the battery to the solenoid and without applying voltage.

| Battery voltage | Nipple A condition | Normal condition |
|---|---|---|
| Applied | Open | Vacuum leaks |
| | Close | Vacuum maintained |
| Not applied | Open | Vacuum leaks |

5. Measure the resistance between the terminals.

**Standard value: 43 – 49 Ω (at 25°C)**



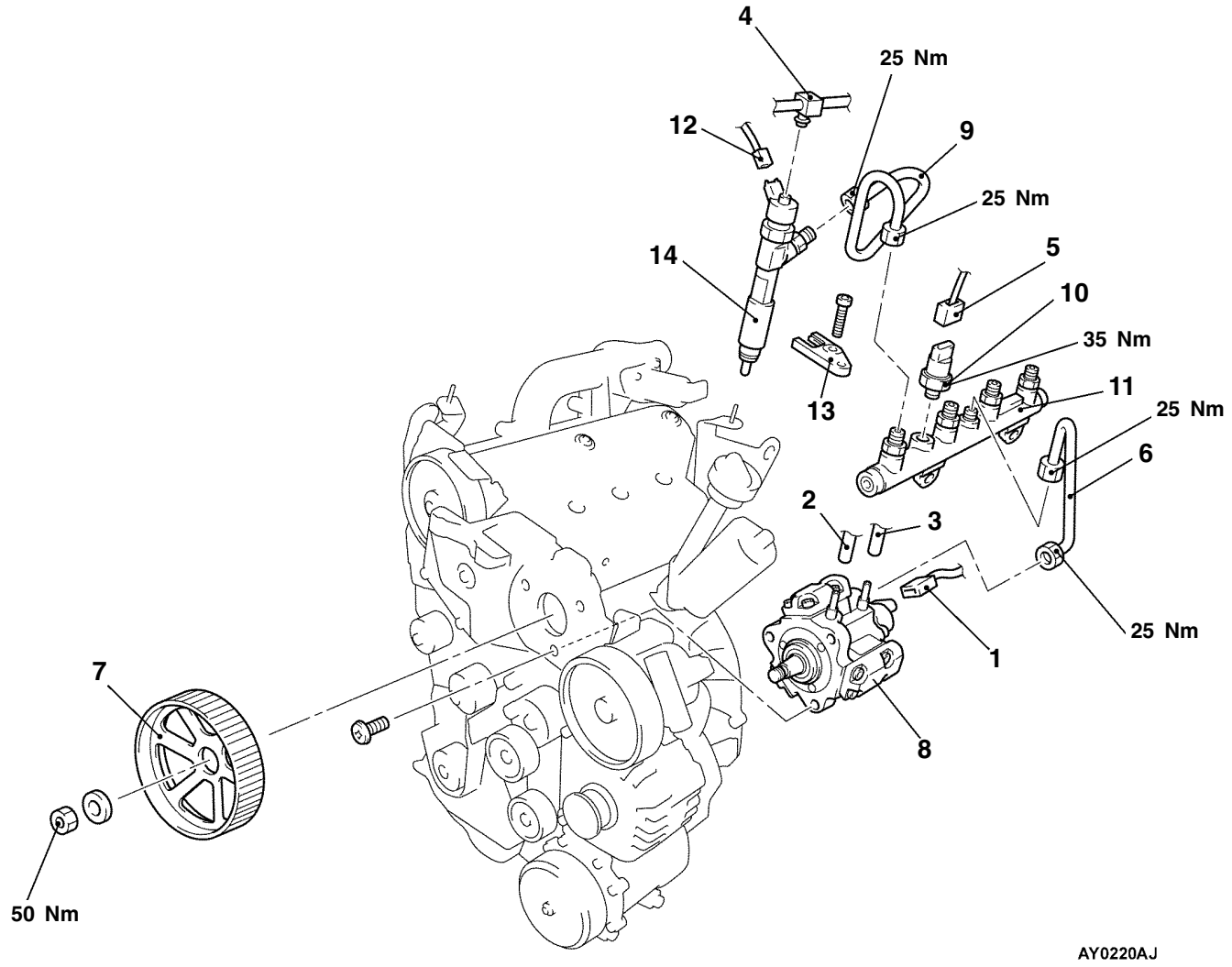




## THROTTLE ACTUATOR CHECK

1. Disconnect the vacuum hose from the throttle actuator and connect a hand vacuum pump to the throttle actuator nipple.
2. Check that the actuator rod moves smoothly when applying vacuum gradually.

# FUEL HIGH PRESSURE PUMP AND FUEL INJECTOR

## REMOVAL AND INSTALLATION




**Fuel high pressure pump removal steps**

- Timing belt (Refer to GROUP 11C.)

1. Fuel high pressure pump connector
2. ◀A▶ Fuel supply hose connection
3. ◀A▶ Fuel return hose connection
6. ◀A▶ Fuel pump pipe
7. ◀B▶ Fuel high pressure pump sprocket
8. Fuel high pressure pump

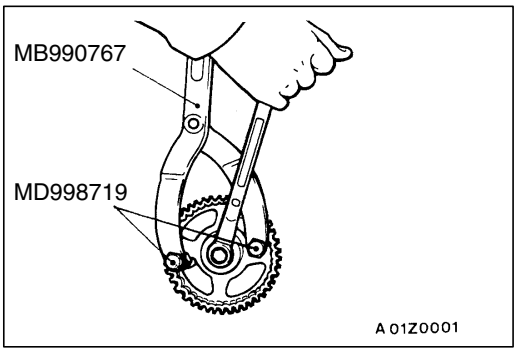
**Fuel injector removal steps**

4. ◀A▶ Fuel return tube
5. Fuel pressure sensor connector
6. ◀A▶ Fuel pump pipe
9. ◀A▶ Fuel injector pipe
10. ◀A▶ Fuen pressure sensor
11. Common rail
12. Fuel injector connector
13. Fuel injector holder
14. Fuel injector

## REMOVAL SERVICE POINTS

### ◀B▶ FUEL HOSE CONNECTION/FUEL PIPE/FUEL RETURN TUBE/FUEL PRESSURE SENSOR REMOVAL

Disconnect the fuel hose, fuel pipe, fuel return tube and the fuel pressure sensor. Then, plug them to prevent dust from entering the fuel line, common rail and the fuel high pressure pump.




### ◀B▶ FUEL HIGH PRESSURE PUMP SPROCKET REMOVAL

## INSTALLATION SERVICE POINT

### ▶A◀ FUEL HIGH PRESSURE PUMP SPROCKET INSTALLATION

Use the special tool to secure the fuel high pressure pump sprocket in the same way as during removal, and then tighten the bolt to the specified torque.

# SERVICE BULLETIN

MITSUBISHI MOTORS

**QUALITY INFORMATION ANALYSIS**
**OVERSEAS SERVICE DEPT. MITSUBISHI MOTORS CORPORATION**

| SERVICE BULLETIN | **No.:** ESB-01E13-502 | |
|---|---|---|
| | **Date:** 2001-12-19 | **<Model>** **<M/Y>** |
| **Subject:** DELETION OF NOTE ON CODE NO. 25 IMMOBILIZER SYSTEM | | (EC)CARISMA (DA0A) 96-01 |
| **Group:** FUEL | **Draft No.:** 01CH501 | (EC)SPACE STAR (DDG0A) 99-01 |
| **CORRECTION** | **INTERNATIONAL CAR ADMINISTRATION OFFICE** | O. Kai - E.V.P. & G.M. After Sales Service Dept |

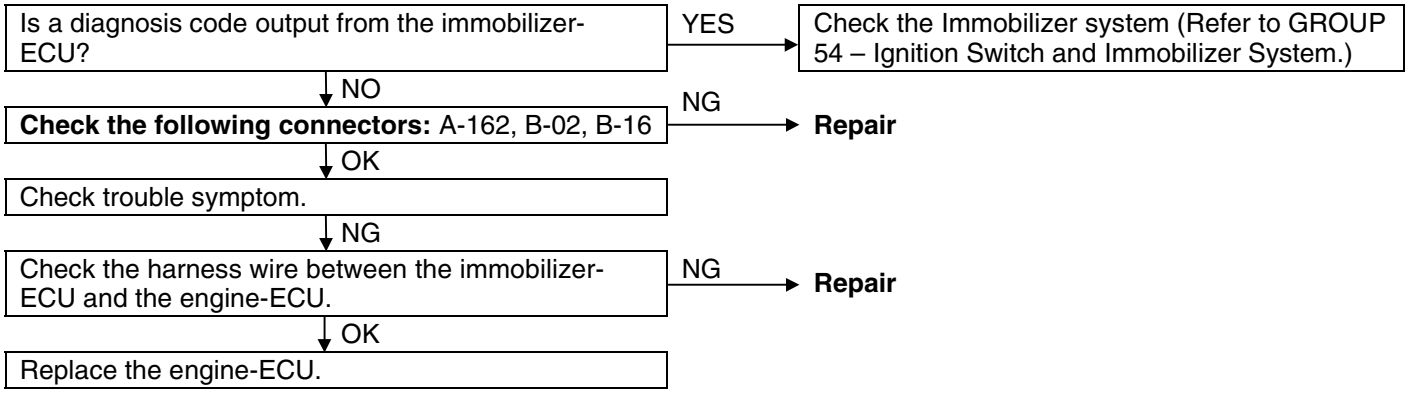
**1. Description:**

Deletion has been made of NOTE on Code No.25 Immobilizer System and Troubleshooting.

**2. Applicable Manuals:**

| Manual | Pub. No. | Language | Page(s) |
|---|---|---|---|
| 2001 CARISMA W/M SUPPLEMENT | PWDE9502-E | (English) | 13E-21 |
| | PWDS9503-E | (Spanish) | |
| | PWDF9504-E | (French) | |
| | PWDG9505-E | (German) | |
| | PWDD9506-E | (Dutch) | |
| | PWDW9507-E | (Swedish) | |
| '96 - '01 MY CARISMA W/M CD - ROM (SUPPLEMENT) | CDXX96E1CD | (English) | - |
| | CDXX96E1CD | (Spanish) | |
| | CDXZ96E1CD | (French) | |
| | CDXZ96E1CD | (German) | |
| | CDXZ96E1CD | (Dutch) | |
| | CDXX96E1CD | (Swedish) | |
| 2001 SPACE STAR W/M SUPPLEMENT | CMXE99E1-A | (English) | 13D-21 |
| | CMXS99E1-A | (Spanish) | |
| | CMXF99E1-A | (French) | |
| | CMXG99E1-A | (German) | |
| | CMXD99E1-A | (Dutch) | |
| | CMXW99E1-A | (Swedish) | |
| | CMXI99E1-A | (Italian) | |
| '99 - '01 MY SPACE STAR W/M CD - ROM (SUPPLEMENT) | CMXX99E2CD | (English) | - |
| | CMXX99E2CD | (Spanish) | |
| | CMXZ99E2CD | (French) | |
| | CMXZ99E2CD | (German) | |
| | CMXZ99E2CD | (Dutch) | |
| | CMXX99E2CD | (Swedish) | |
| | CMXZ99E2CD | (Italian) | |

| Code No. 25 Immobilizer system | Probable cause |
|---|---|
| **Range of Check**<br>• Ignition switch: ON<br>**Set Conditions**<br>• Improper communication between the engine-ECU and Immobilizer | • Malfunction of the immobilizer-ECU<br>• Improper connector contact, open circuit or short-circuited harness wire<br>• Malfunction of the engine-ECU |

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~~NOTE~~
~~If the engine-ECU is replaced, the immobilizer-ECU and ignition key should be replaced together with it.~~

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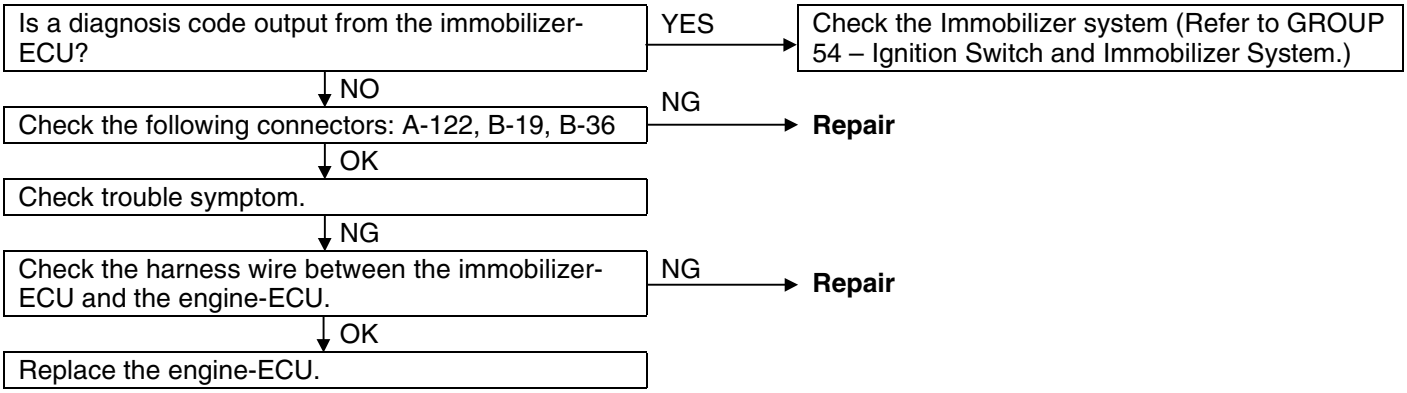


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# SERVICE BULLETIN

MITSUBISHI MOTORS

SERVICE ENGINEERING & PUBLICATION
INTERNATIONAL AFTER-SALES DEPARTMENT. MITSUBISHI MOTORS CORPORATION

| SERVICE BULLETIN | NO. : MSB–01E13–504 | |
|---|---|---|
| | DATE : 2001–11–20 | <MODEL> <M/Y><br>(EC)CARISMA 01–10<br>(DA0A)<br>(EC)SPACE STAR 01–10<br>(DG0A) |
| SUBJECT : CORRECTION TO TIGHTENING TORQUES AND ILLUSTRATIONS FOR F9Q ENGINE | | |
| GROUP : FUEL | DRAFTNO. : 01AL030 | |
| CORRECTION | INTERNATIONAL AFTER-SALES DEPARTMENT | T. Inoue – Manager<br>SERVICE ENGINEERING & PUBLICATION |

## 1. Description:

On the F9Q engine installed on the CARISMA and SPACE STAR, corrections have been made to the following items:

- Shape and tightening torque of the fuel high pressure pump sprocket mounting nut
- Tightening torque of the fuel pressure sensor
- Shape of the fuel injector pump bracket mounting bolt

## 2. Applicable Manuals:

| Manual | Pub. No. | Page |
|---|---|---|
| '01 CARISMA<br>Workshop Manual (Supplement) | PWDE9502–E (English)<br>PWDS9503–E (Spanish)<br>PWDF9504–E (French)<br>PWDG9505–E (German)<br>PWDD9506–E (Dutch)<br>PWDW9507–E (Swedish) | 13E–55 |
| '01 SPACE STAR<br>Workshop Manual (Supplement) | CMXE99E1–A (English)<br>CMXS99E1–A (Spanish)<br>CMXF99E1–A (French)<br>CMXD99E1–A (Dutch) | 13D–55 |

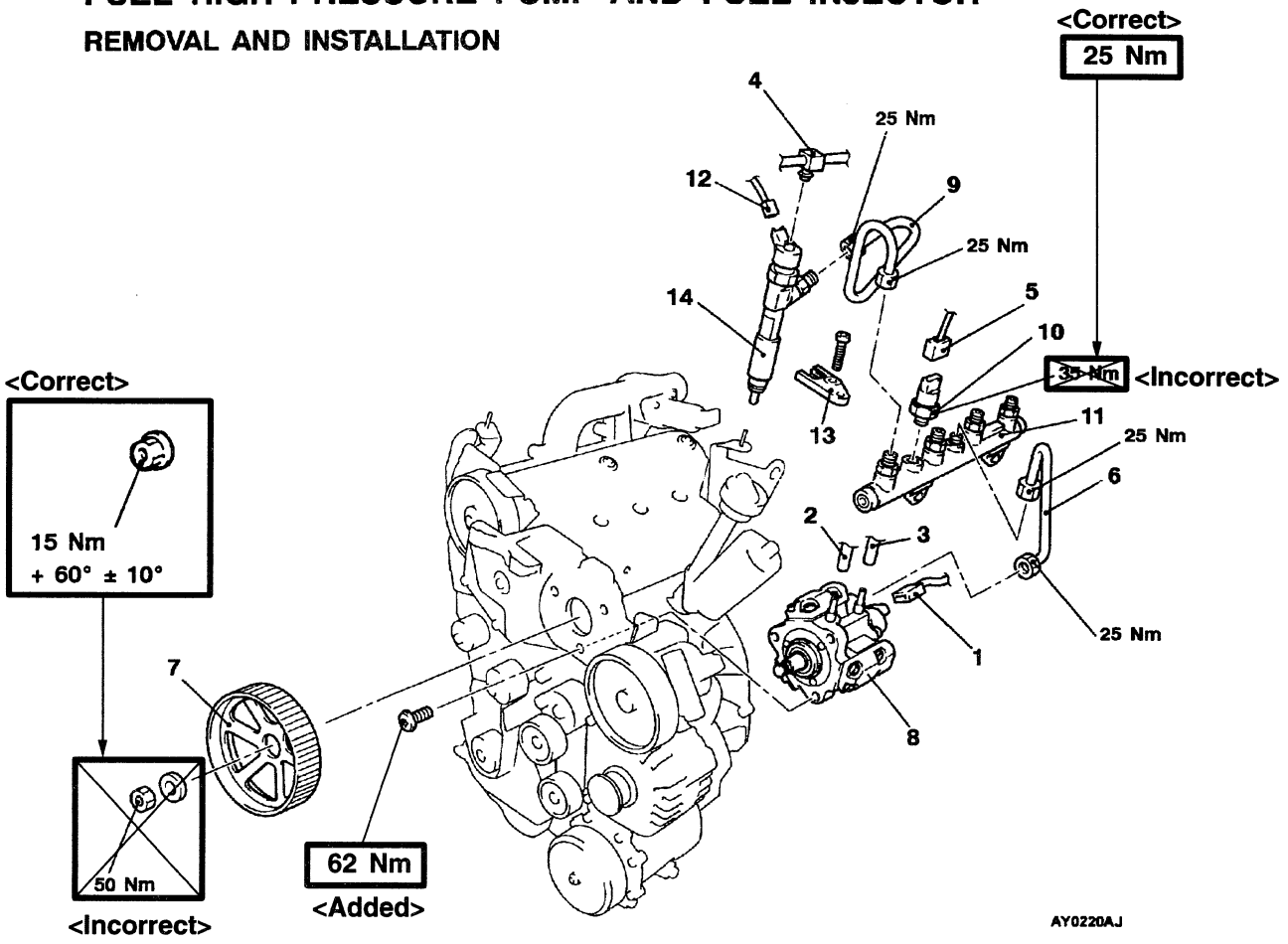
**3. Details:**

'01 CARISMA Workshop Manual (Supplement)



## FUEL HIGH PRESSURE PUMP AND FUEL INJECTOR

### REMOVAL AND INSTALLATION




**Fuel high pressure pump removal steps**

- Timing belt (Refer to GROUP 11C.)

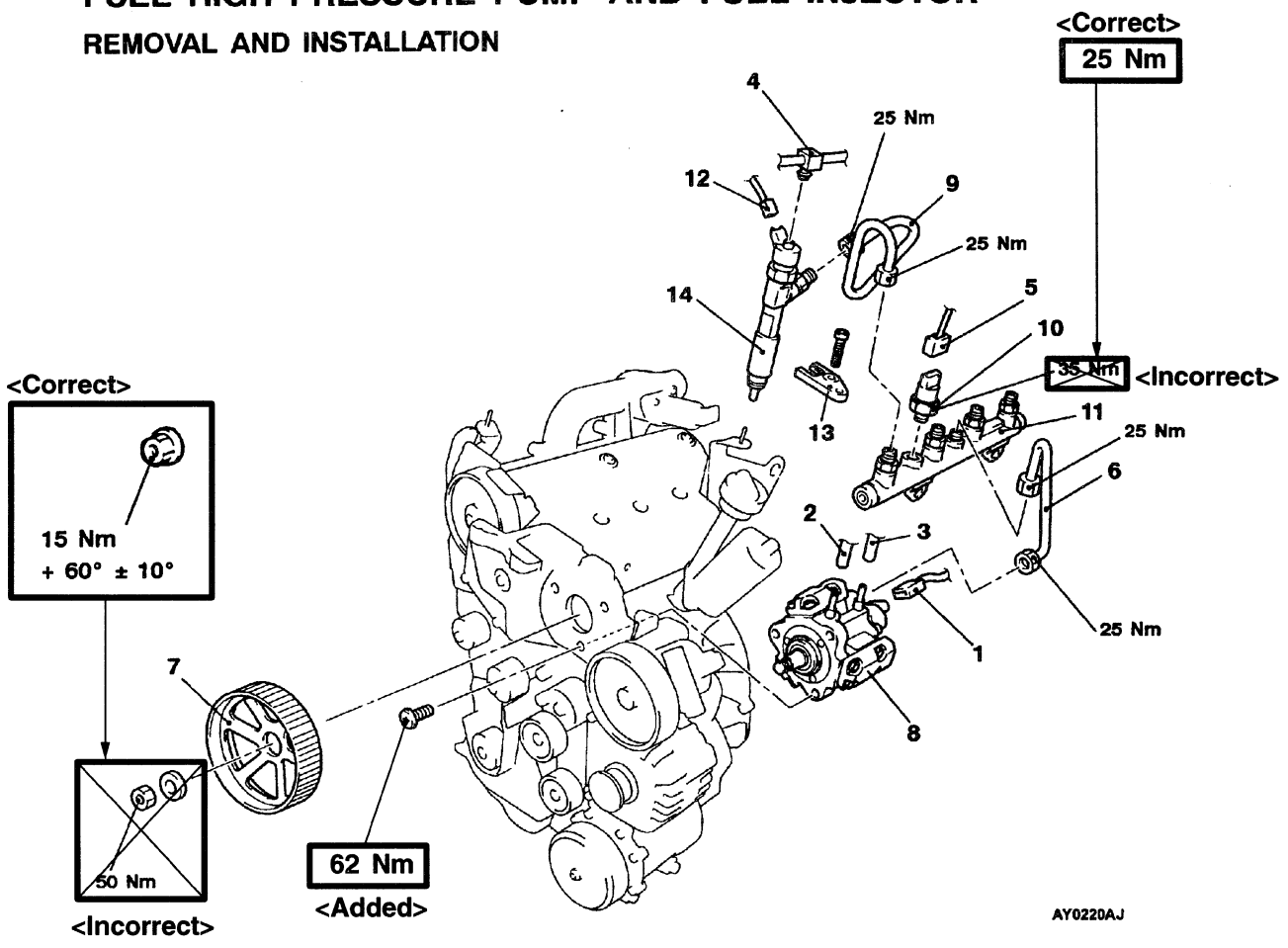
◀A▶ 1. Fuel high pressure pump connector
◀A▶ 2. Fuel supply hose connection
◀A▶ 3. Fuel return hose connection
◀A▶ 6. Fuel pump pipe
◀B▶ ▶A◀ 7. Fuel high pressure pump sprocket
8. Fuel high pressure pump

**Fuel injector removal steps**

◀A▶ 4. Fuel return tube
5. Fuel pressure sensor connector
◀A▶ 6. Fuel pump pipe
◀A▶ 9. Fuel injector pipe
◀A▶ 10. Fuel pressure sensor
11. Common rail
12. Fuel injector connector
13. Fuel injector holder
14. Fuel injector

# FUEL HIGH PRESSURE PUMP AND FUEL INJECTOR

## REMOVAL AND INSTALLATION

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