
FUEL



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MULTIPOINT FUEL INJECTION (MPI)

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MULTIPOINT FUEL INJECTION (MPI) <4G6>

GENERAL

OUTLINE OF CHANGES

Due to the changes shown below, the service procedures regarding the different description from the previous version have been established.

- On-board Diagnostics System has been adopted to expand the diagnostic items and to change diagnosis code numbering system.
- The engine-ECU has been changed. <Vehicles with M/T>
- An engine-A/T-ECU has been adopted. <Vehicles with A/T>
- An ignition failure sensor has been adopted.
- The injector has been changed.
- The oxygen sensor has been changed.

GENERAL INFORMATION

SELF-DIAGNOSIS FUNCTION

Following functions have been added.

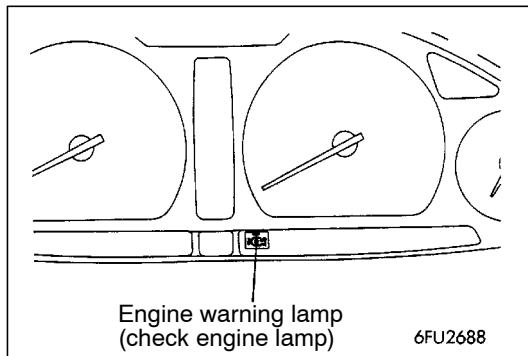
- The engine-ECU records the engine operating condition when the diagnosis code is set. This data is called "freeze frame" data. It can be read by using the MUT-II, and can be used in simulation tests for troubleshooting.

GENERAL SPECIFICATIONS

| Items | | Specifications |
|----------------------|------------------------------|----------------|
| Engine-ECU <M/T> | Identification model No. | E2T67693 |
| Engine-A/T-ECU <A/T> | Identification model No. | E6T30571 |
| Actuators | Injector identification mark | CDH240 |

SERVICE SPECIFICATIONS

| Items | | Standard value |
|---|-------|----------------|
| Oxygen sensor output voltage V | | 0.6 - 1.0 |
| Oxygen sensor heater coil resistance (at 20°C) Ω | front | 4.5 - 8.0 |
| | rear | 11 - 18 |



TROUBLESHOOTING

DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

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

However, the warning lamp will illuminate as bulb check for five seconds whenever the ignition switch is turned to the ON position.

Engine warning lamp inspection items

| Code No. | Diagnosis item |
|----------|--|
| - | Engine-ECU <M/T> or engine-A/T-ECU <A/T> |
| P0100 | Air flow sensor system |
| P0105 | Barometric pressure sensor system |
| P0110 | Intake air temperature sensor system |
| P0115 | Engine coolant temperature sensor system |
| P0120 | Throttle position sensor system |
| P0125 | Feedback system |
| P0130 | Oxygen sensor (front) system <sensor 1> |
| P0135 | Oxygen sensor heater (front) system <sensor 1> |
| P0136 | Oxygen sensor (rear) system <sensor 2> |
| P0141 | Oxygen sensor heater (rear) system <sensor 2> |
| P0170 | Abnormal fuel system |
| P0201 | No. 1 injector system |
| P0202 | No. 2 injector system |
| P0203 | No. 3 injector system |
| P0204 | No. 4 injector system |
| P0300★ | Ignition coil (power transistor) system |
| P0301 | No. 1 cylinder misfire detected |
| P0302 | No. 2 cylinder misfire detected |
| P0303 | No. 3 cylinder misfire detected |
| P0304 | No. 4 cylinder misfire detected |
| P0335 | Crank angle sensor system |
| P0340 | Camshaft position sensor system |

| Code No. | Diagnosis item |
|----------|---|
| P0403 | EGR valve system |
| P0420 | Catalyst malfunction |
| P0443 | Purge control solenoid valve system |
| P0505 | Idle speed control system |
| P0510 | Idle position switch system |
| P0551 | Power steering fluid pressure switch system |

NOTE

1. If the engine warning lamp illuminates because of a malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>, communication between MUT-II and the engine-ECU <M/T> or engine-A/T-ECU <A/T> is impossible. In this case, the diagnosis code cannot be read.
2. After the engine-ECU <M/T> or engine-A/T-ECU <A/T> has detected a malfunction, the engine warning lamp illuminates when the engine is next turned on and the same malfunction is re-detected. However, for items marked with a "★" in the diagnosis code number column, the engine warning lamp illuminates only on the first detection of the malfunction.
3. After the engine warning lamp illuminates, it will be switched off under the following conditions.
 - (1) When the engine-ECU <M/T> or engine-A/T-ECU <A/T> monitored the power train malfunction three times* and met set condition requirements, it detected no malfunction.
*: In this case, "one time" indicates from engine start to stop.
 - (2) For misfiring malfunction, when driving conditions (engine speed, engine coolant temperature, etc.) are similar to those when the malfunction was first recorded.
4. Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

METHOD OF READING AND ERASING DIAGNOSIS CODES

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

DIAGNOSIS USING DIAGNOSIS 2 MODE

1. Switch the diagnosis mode of the engine control unit to DIAGNOSIS 2 mode using the MUT-II.
2. Carry out a road test.
3. Take a reading of the diagnosis code and repair the problem location.
4. Turn the ignition switch to OFF and then back to ON again.

NOTE

By turning the ignition switch to OFF, the ENGINE-ECU will switch the diagnosis mode from DIAGNOSIS 2 mode to DIAGNOSIS 1 mode.

5. Erase the diagnosis codes.

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, and then start the engine again and carry out a road test to confirm that the problem has disappeared.

FREEZE FRAME DATA

When the engine-ECU <M/T> or engine-A/T-ECU <A/T> detects a malfunction and stores a diagnosis code, it also stores a current status of the engine. This function is called "Freeze frame data." By analyzing this "freeze frame" data with the MUT-II, an effective troubleshooting can be performed.

The display items of freeze frame data are shown below.

Display item list

| Data item | | Unit |
|---|--|---------|
| Engine coolant temperature sensor | | °C |
| Engine speed | | r/min |
| Vehicle speed | | km/h |
| Long-term fuel compensation (long-term fuel trim) | | % |
| Short-term fuel compensation (short-term fuel trim) | | % |
| Fuel control condition | Open loop | OL |
| | Closed loop | CL |
| | Open loop owing to drive condition | OL-DRV. |
| | Open loop owing to system malfunction | OL-SYS. |
| | Closed loop based on one oxygen sensor | CL-H02S |
| Calculation load value | | % |
| Diagnosis code during data recording | | - |

NOTE

If malfunctions have been detected in multiple systems, store one malfunction only, which has been detected first.

READINESS TEST STATUS

The engine-ECU <M/T> or engine-A/T-ECU <A/T> monitors the following main diagnosis items, judges if these items are in good condition or not, and stores its history. This history can be read out by using MUT-II. (If the ECU has judged an item before, the MUT-II displays "Complete.")

In addition, if diagnosis codes are erased or the battery cable is disconnected, this history will also be erased (the memory will be reset).

- Catalyst: P0420
- Oxygen sensor: P0130
- Oxygen sensor heater: P0135, P0141

FAIL-SAFE FUNCTION REFERENCE TABLE

When the main sensor malfunctions are detected by the diagnosis function, the vehicle is controlled by means of the pre-set control logic to maintain safe conditions for driving.

| Malfunctioning item | Control contents during malfunction |
|-----------------------------------|--|
| Air flow sensor | <ol style="list-style-type: none"> 1. Uses the throttle position sensor signal and engine speed signal (crank angle sensor signal) to take reading of the basic injector drive time and basic ignition timing from the pre-set mapping. 2. Fixes the ISC servo in the appointed position so idle control is not performed. |
| Intake air temperature sensor | Controls as if the intake air temperature is 25°C. |
| Throttle position sensor (TPS) | No increase in fuel injection amount during acceleration due to the throttle position sensor signal. |
| Engine coolant temperature sensor | Controls as if the engine coolant temperature is 80°C. |
| Camshaft position sensor | <p>Injects fuel to all cylinders simultaneously.</p> <p>(However, after the ignition switch is turned to ON, the No. 1 cylinder top dead centre is not detected at all.)</p> |
| Barometric pressure sensor | Controls as if the barometric pressure is 101 kPa. |
| Detonation sensor | Switches the ignition timing from ignition timing for super petrol to ignition timing for standard petrol. |
| Ignition coil, power transistor | Cuts off the fuel supply to cylinders with an abnormal ignition. |
| Oxygen sensor (front) | Air/fuel ratio feedback control (closed loop control) is not performed. |
| Oxygen sensor (rear) | Performs the feedback control (closed loop control) of the air/fuel ratio by using only the signal of the oxygen sensor (front) installed on the front of the catalytic converter. |
| Alternator FR terminal | Does not control the output of the alternator according to an electrical load. (works as a normal alternator) |
| Misfiring | If the detected misfiring causes damage to the catalyst, the misfiring cylinder will be shut down. |

INSPECTION CHART FOR DIAGNOSIS CODES

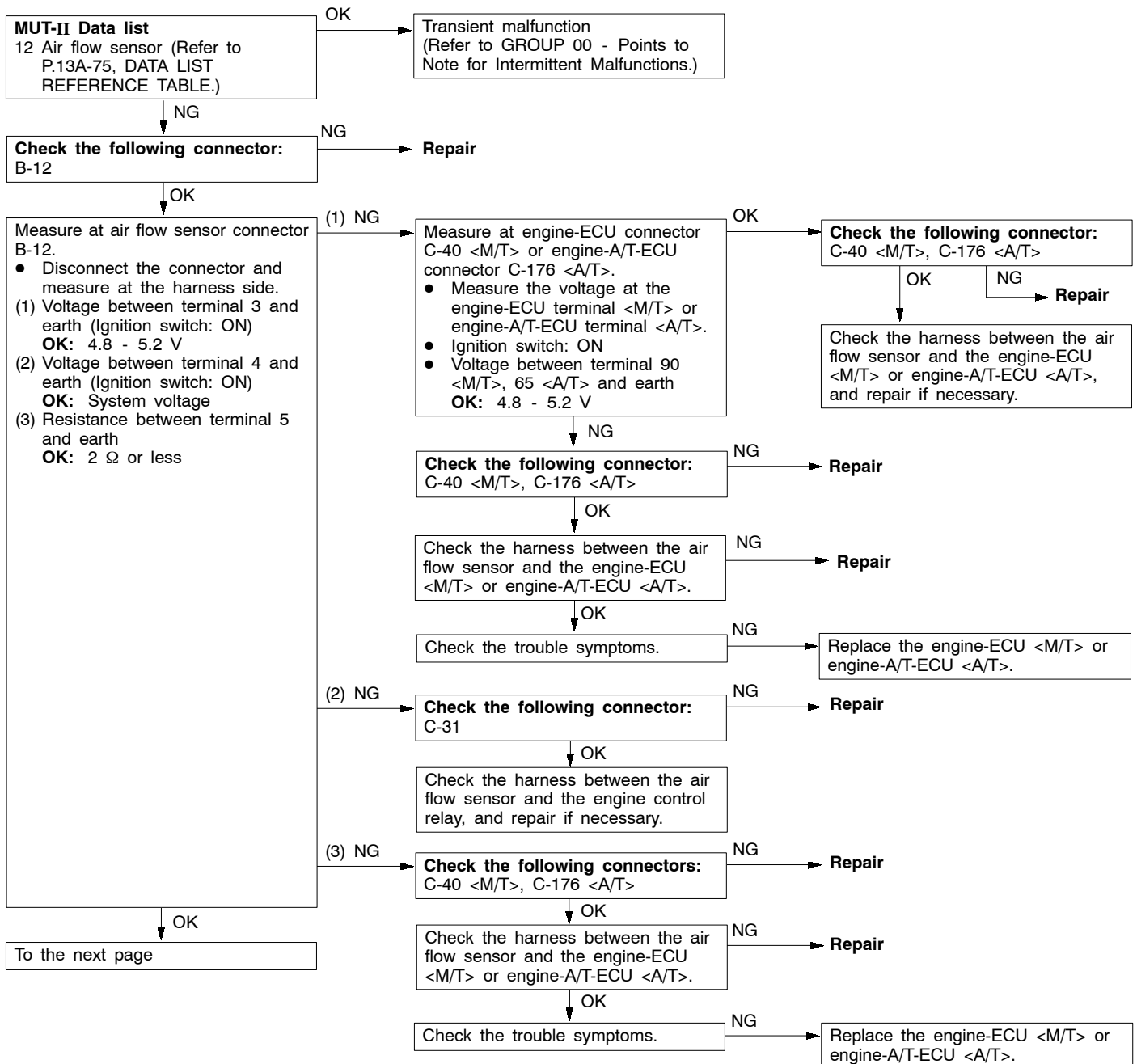
| Code No. | Diagnosis item | Reference page |
|----------|--|----------------|
| P0100 | Air flow sensor system | 13A-10 |
| P0105 | Barometric pressure sensor system | 13A-12 |
| P0110 | Intake air temperature sensor system | 13A-14 |
| P0115 | Engine coolant temperature sensor system | 13A-16 |
| P0120 | Throttle position sensor system | 13A-18 |
| P0125 | Feedback system | 13A-20 |
| P0130 | Oxygen sensor (front) system <sensor 1> | 13A-21 |
| P0135 | Oxygen sensor heater (front) system <sensor 1> | 13A-23 |
| P0136 | Oxygen sensor (rear) system <sensor 2> | 13A-24 |
| P0141 | Oxygen sensor heater (rear) system <sensor 2> | 13A-26 |
| P0170 | Abnormal fuel system | 13A-27 |
| P0201 | No. 1 injector system | 13A-28 |
| P0202 | No. 2 injector system | 13A-28 |
| P0203 | No. 3 injector system | 13A-28 |
| P0204 | No. 4 injector system | 13A-28 |
| P0300★ | Ignition coil (power transistor) system | 13A-29 |
| P0301 | No. 1 cylinder misfire detected | 13A-31 |
| P0302 | No. 2 cylinder misfire detected | 13A-31 |
| P0303 | No. 3 cylinder misfire detected | 13A-31 |
| P0304 | No. 4 cylinder misfire detected | 13A-31 |
| P0325 | Detonation sensor system | 13A-32 |
| P0335 | Crank angle sensor system | 13A-32 |
| P0340 | Camshaft position sensor system | 13A-34 |
| P0403 | EGR valve system | 13A-36 |
| P0420 | Catalyst malfunction | 13A-37 |
| P0443 | Purge control solenoid valve system | 13A-38 |
| P0500 | Vehicle speed sensor system | 13A-39 |
| P0505 | Idle speed control system | 13A-39 |
| P0510 | Idle position switch system | 13A-41 |
| P0551 | Power steering fluid pressure switch system | 13A-42 |
| P1500 | Alternator FR terminal system | 13A-43 |
| P1610 | Immobilizer system | 13A-44 |

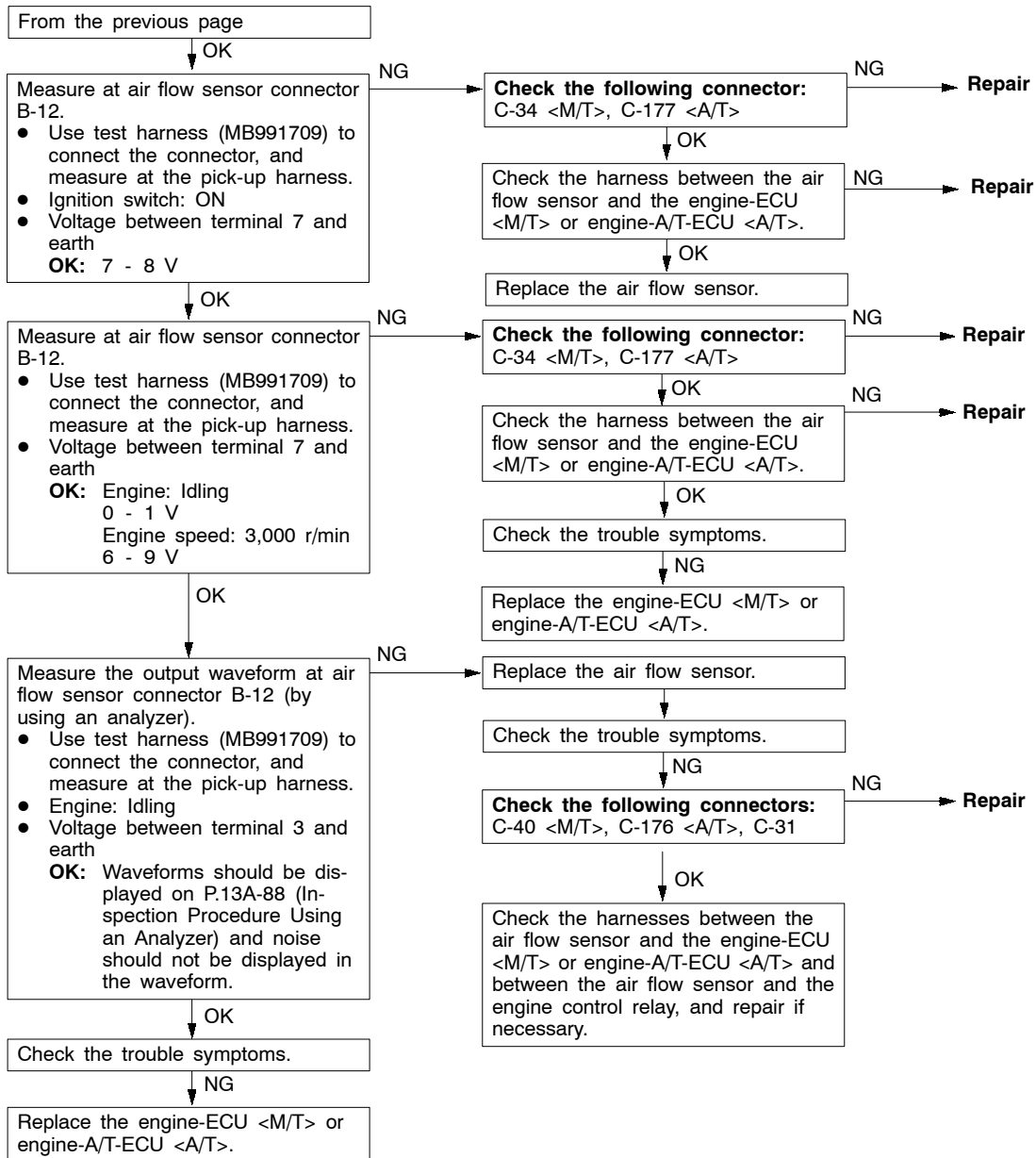
NOTE

1. Do not replace the engine-ECU <M/T> or engine-A/T-ECU <A/T> until a through terminal check reveals there are no short/open circuit.
2. Check that the engine-ECU <M/T> or engine-A/T-ECU <A/T> earth circuit is normal before checking for the cause of the problem.
3. After the engine-ECU <M/T> or engine-A/T-ECU <A/T> has detected a malfunction, a diagnosis code is recorded the next time the engine is started and the same malfunction is re-detected. However, for items marked with a “★”, the diagnosis code is recorded on the first detection of the malfunction.
4. Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

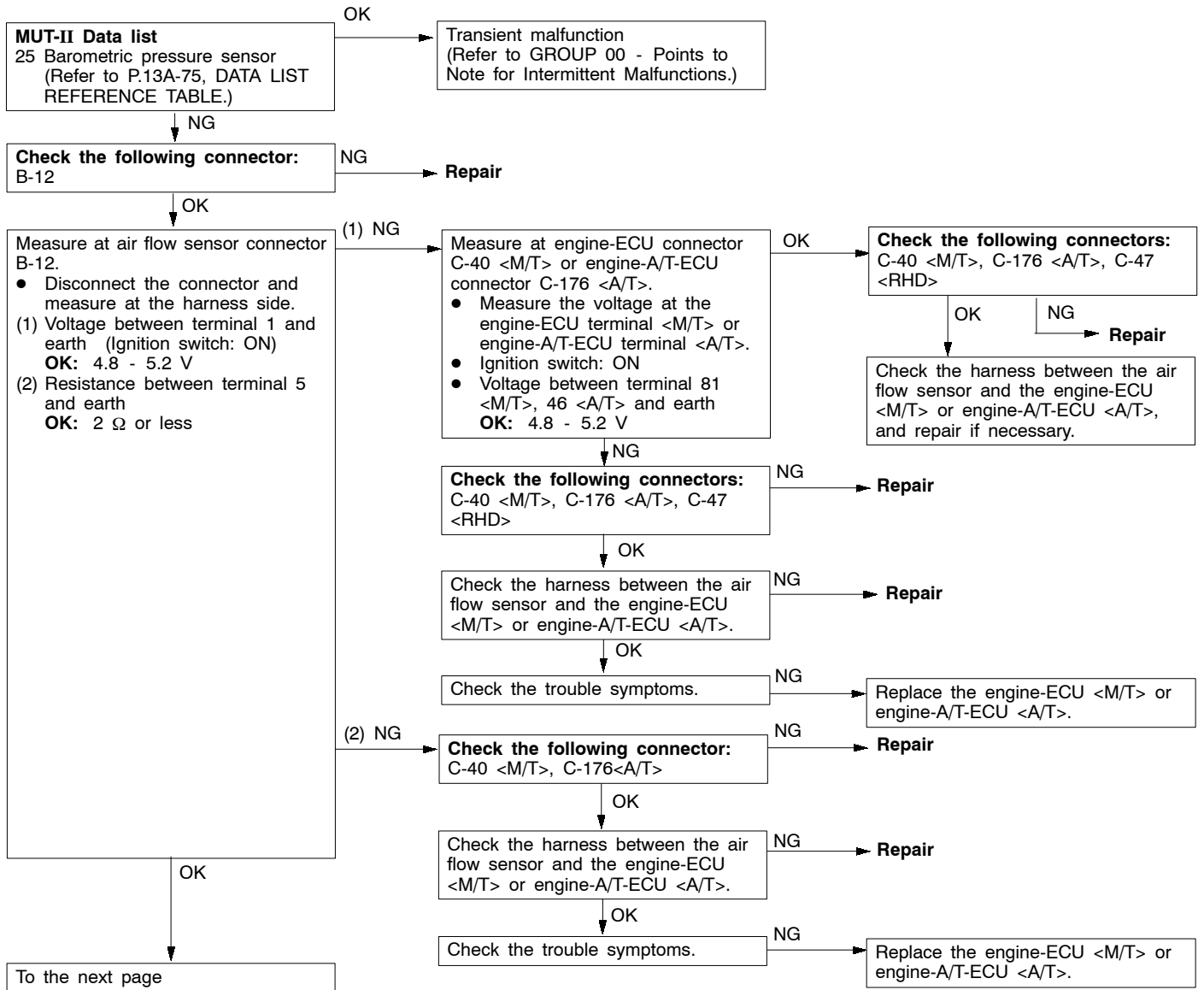
INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

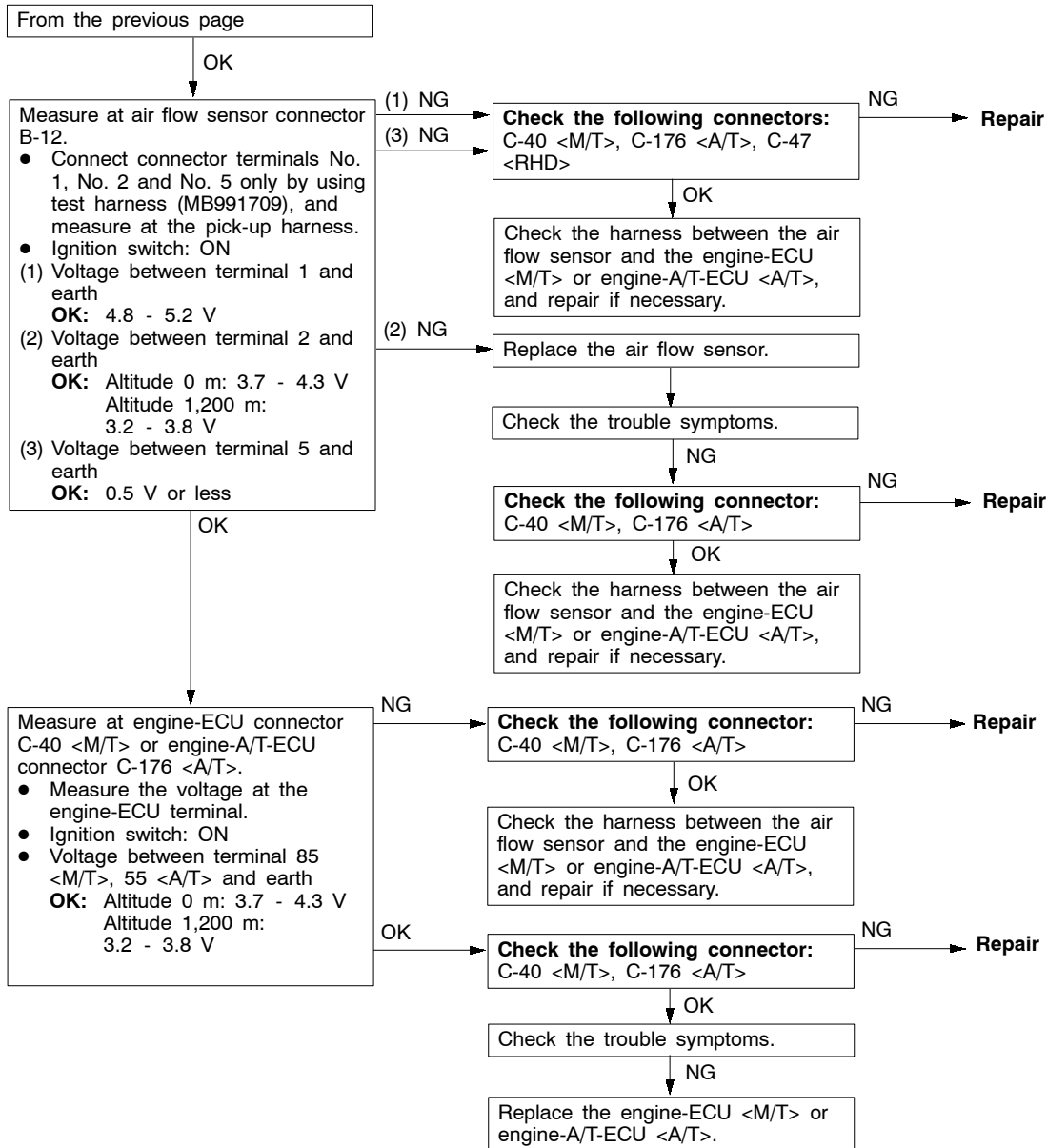
| Code No. P0100 Air flow sensor system | Probable cause |
|--|---|
| Range of Check • Engine speed: 500 r/min or more Set Conditions • The sensor output frequency is 3.3 Hz or less for four seconds. | • Malfunction of air flow sensor • Open or short circuit in air flow sensor circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



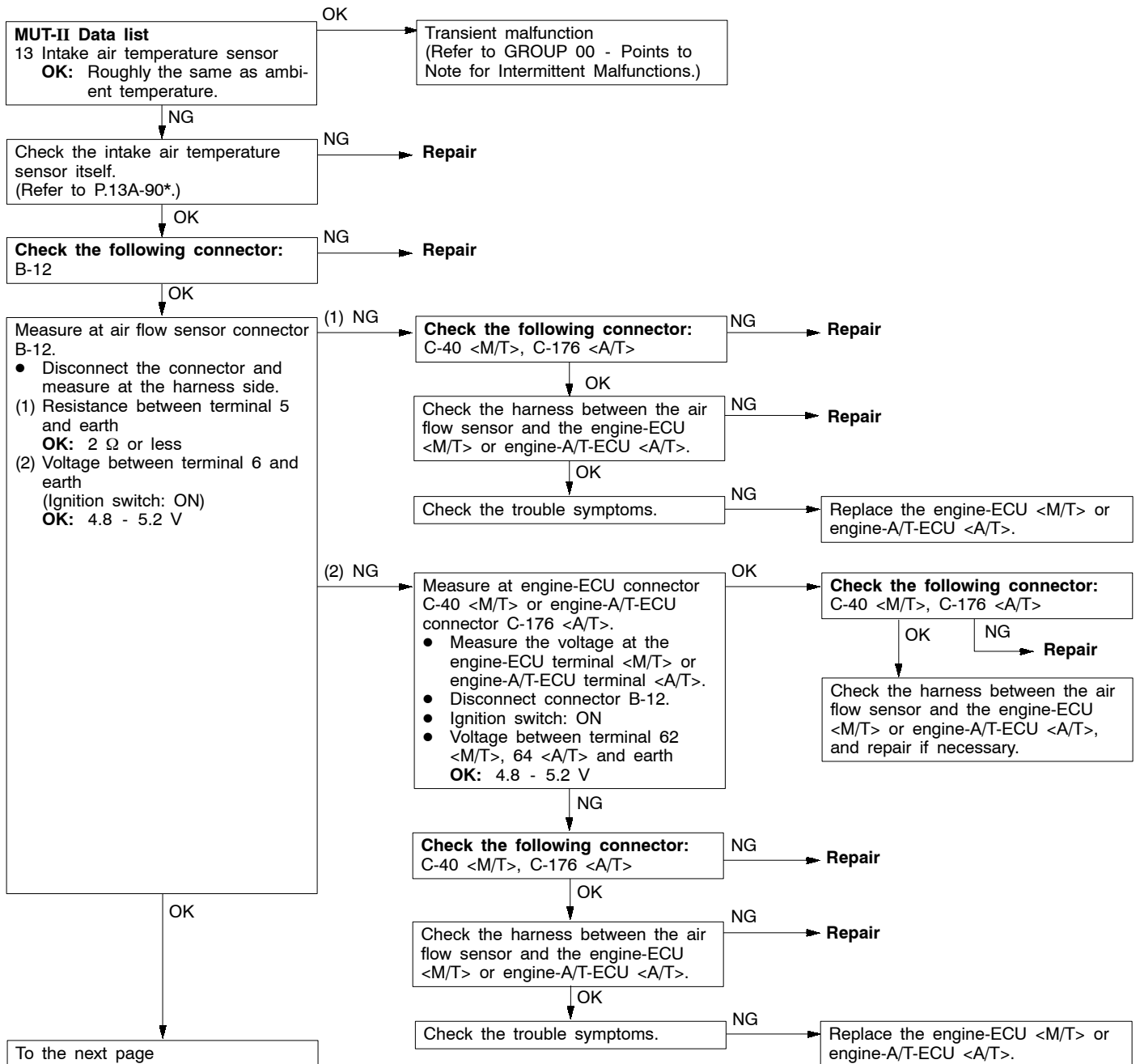


| Code No. P0105 Barometric pressure sensor system | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. Battery voltage: 8 V or more <p>Set Conditions</p> <ul style="list-style-type: none"> The sensor output voltage is 4.5 V or more for four seconds (equivalent to 114 kPa of barometric pressure) <p>or</p> <ul style="list-style-type: none"> The sensor output voltage is 0.2 V or less (equivalent to 53 kPa of barometric pressure) | <ul style="list-style-type: none"> Malfunction of barometric pressure sensor Open or short circuit in barometric pressure sensor circuit or loose connector contact Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |



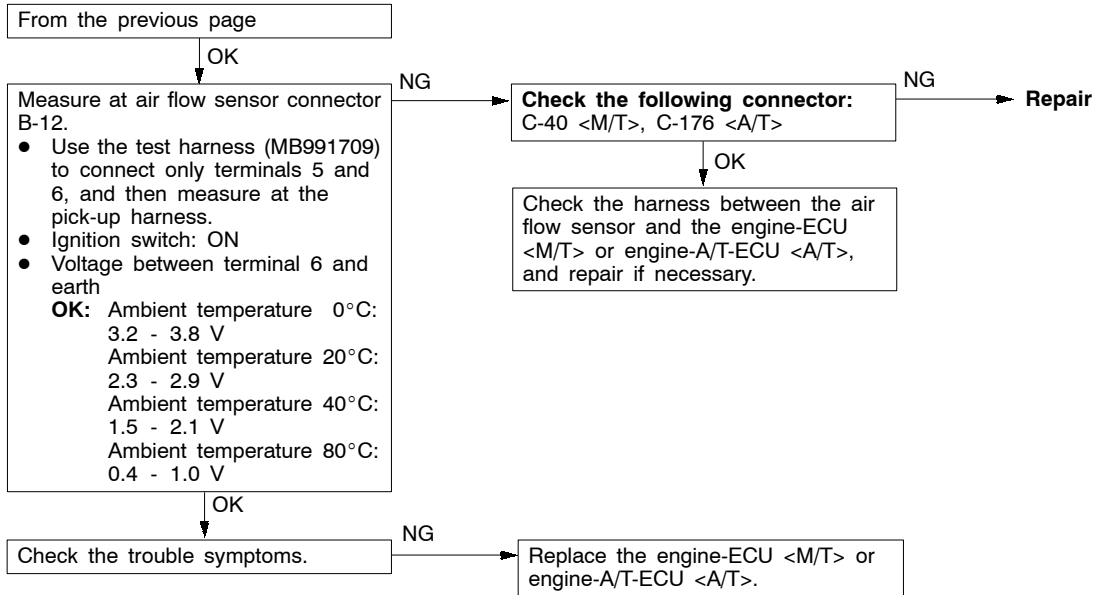


| Code No. P0110 Intake air temperature sensor system | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. <p>Set Conditions</p> <ul style="list-style-type: none"> The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C of intake air temperature) <p>or</p> <ul style="list-style-type: none"> The sensor output voltage is 0.2 V or more for four seconds (equivalent to 125°C of intake air temperature) | <ul style="list-style-type: none"> Malfunction of intake air temperature sensor Open or short circuit in intake air temperature sensor or loose connector contact Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |

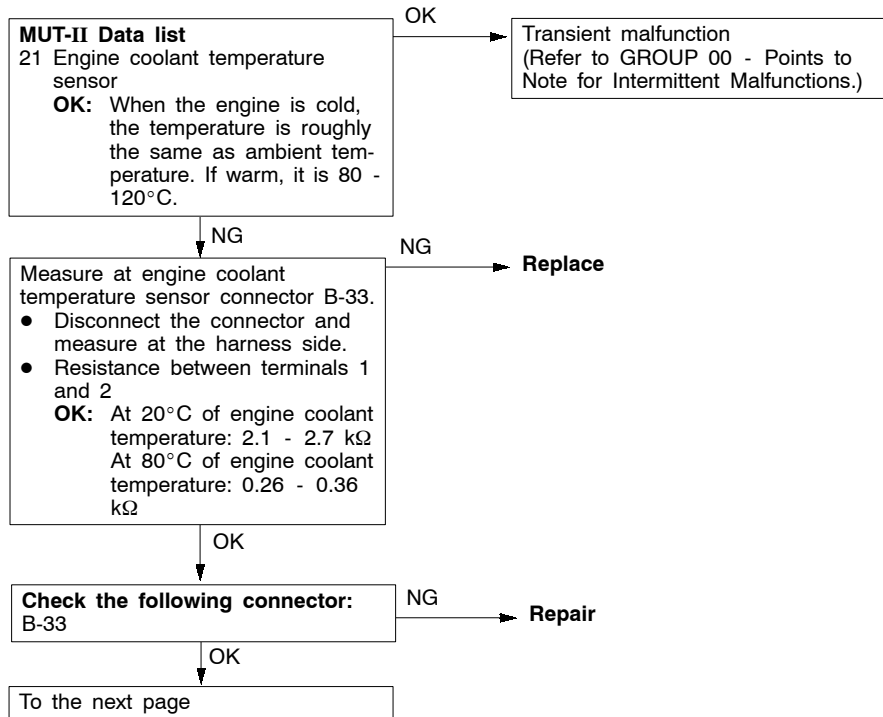


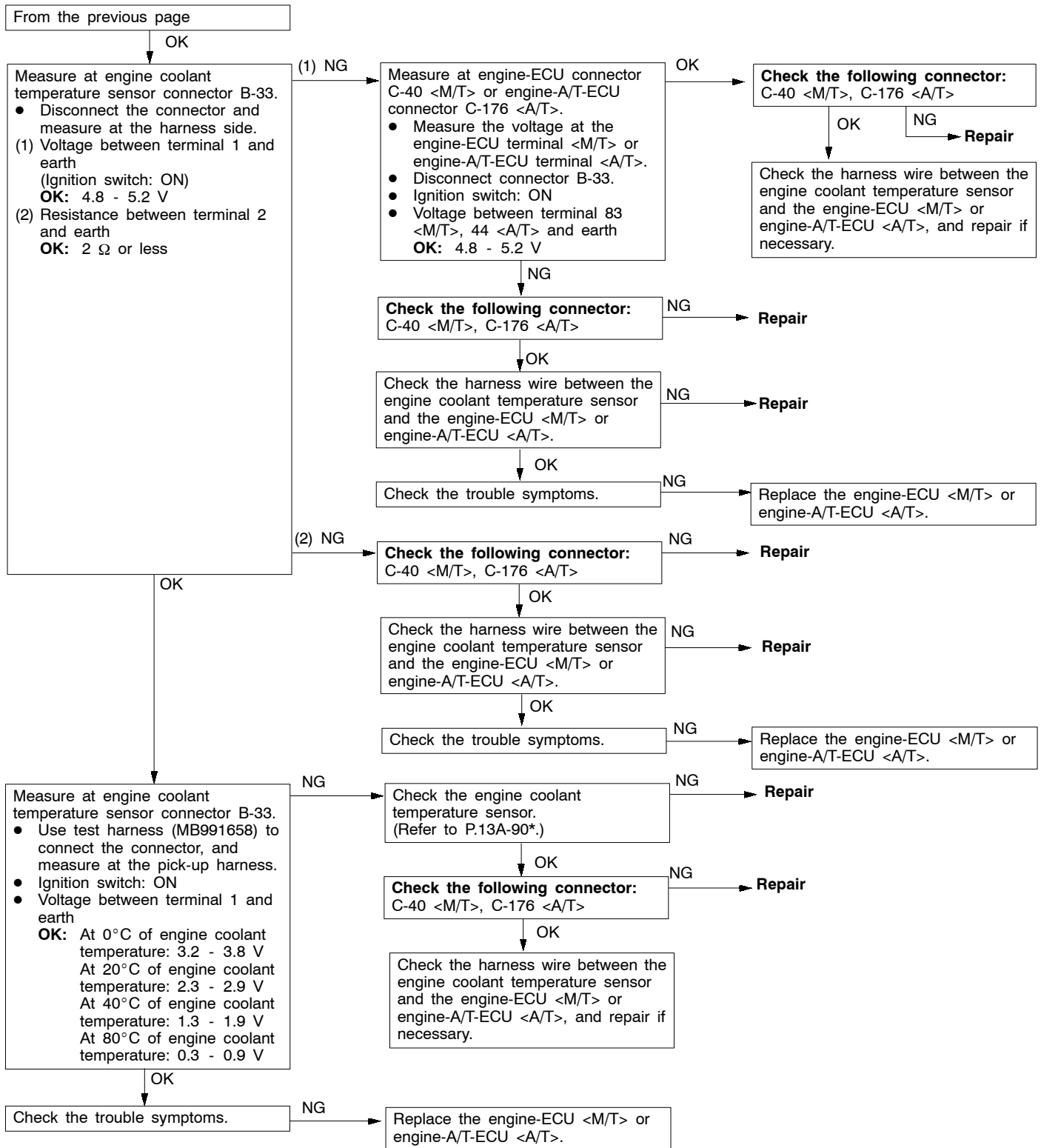
NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)



| Code No. P0115 Engine coolant temperature sensor system | Probable cause |
|--|---|
| Range of Check • Engine: Two seconds after the engine has been started Set Conditions • The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C or lower of engine coolant temperature) or • The sensor output voltage is 0.1 V or less for four seconds (equivalent to 140°C or higher of engine coolant temperature) | <ul style="list-style-type: none"> • Malfunction of engine coolant temperature sensor • Open or short circuit in the engine coolant temperature sensor circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |
| Range of Check • Engine: After starting Set Conditions • The engine coolant temperature has reduced from over 40°C to less than 40°C, and that condition has lasted for five minutes or more. | |

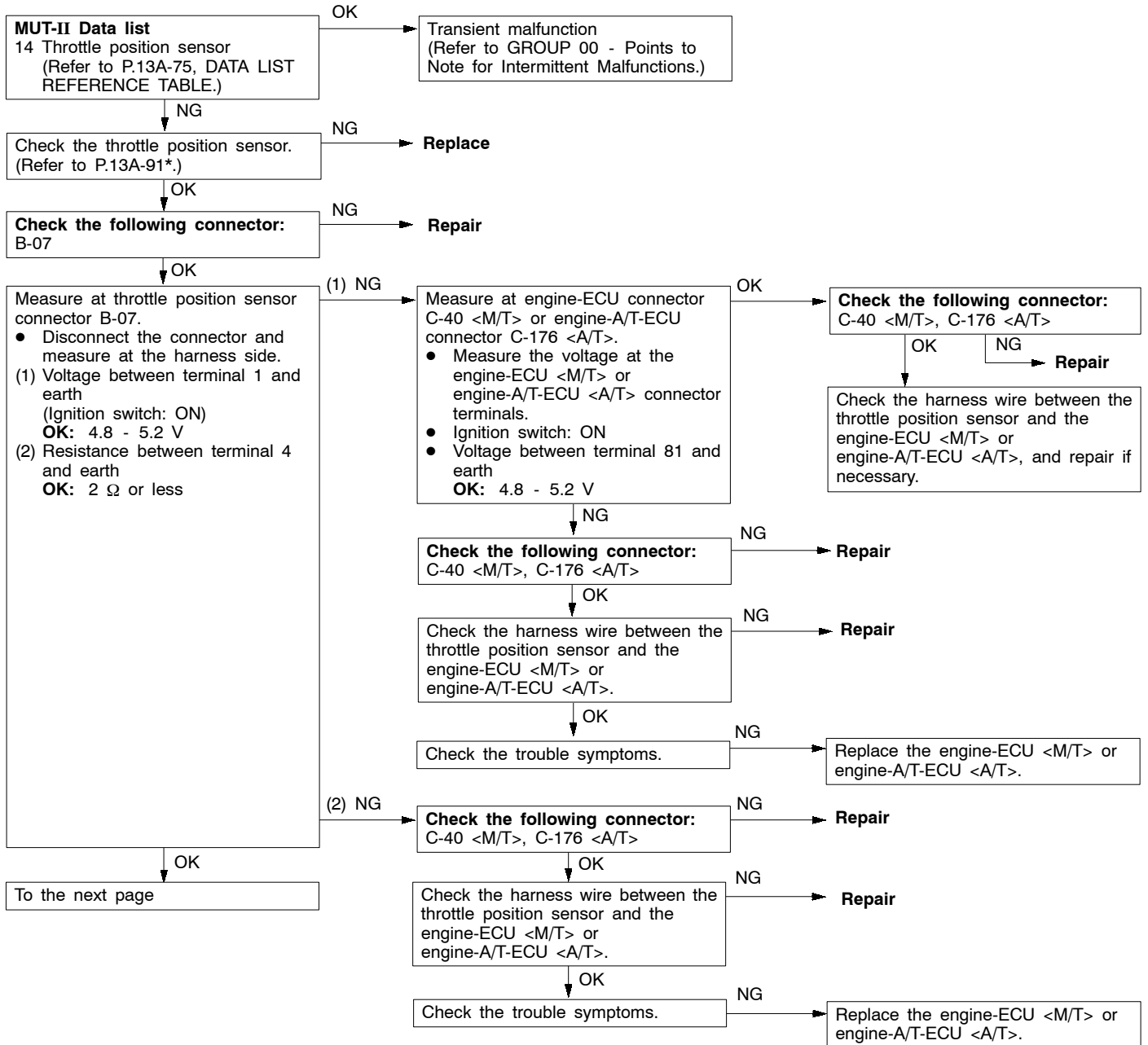




NOTE:

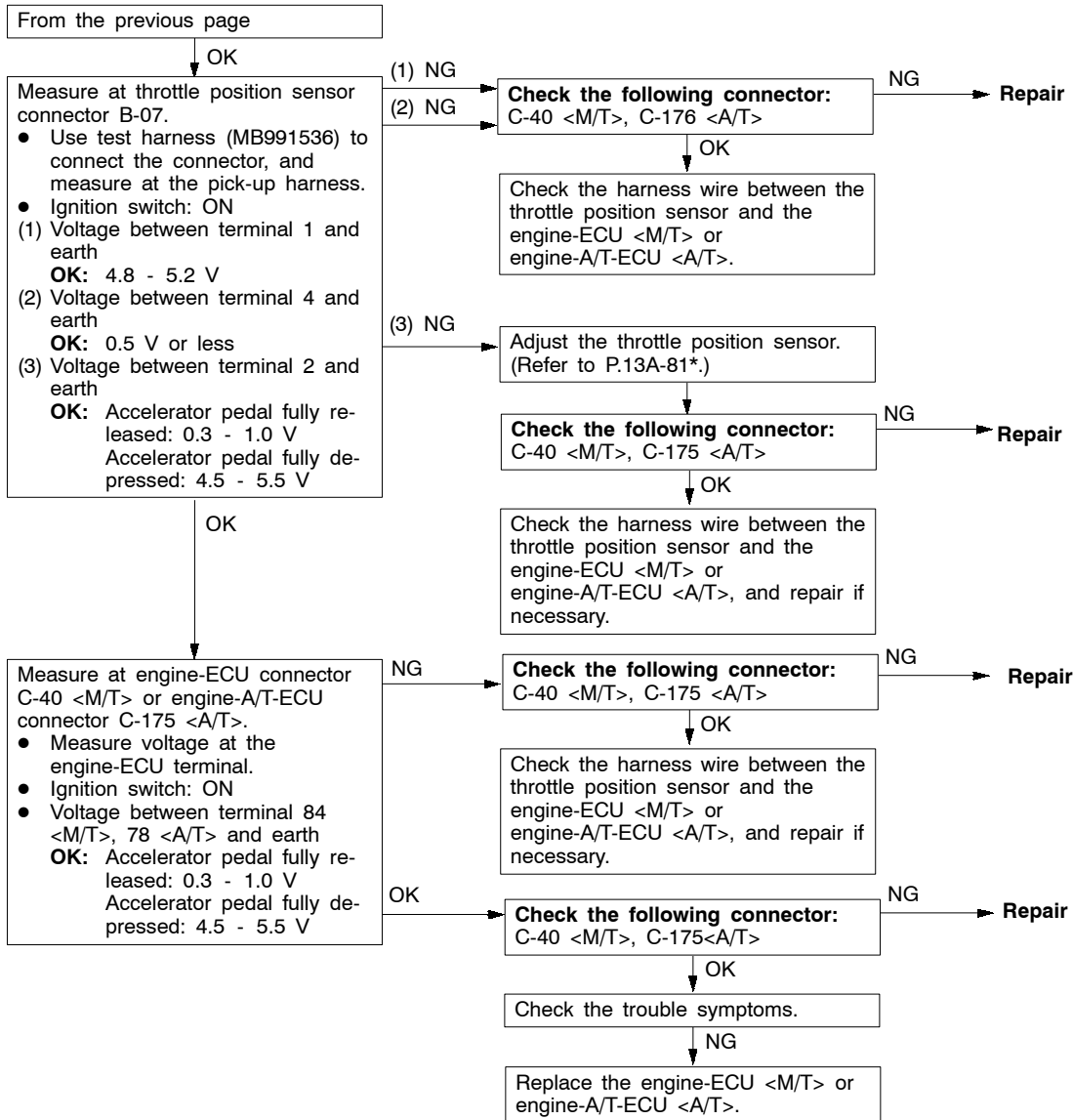
*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

| Code No. P0120 Throttle position sensor system | Probable cause |
|--|---|
| Range of Check <ul style="list-style-type: none"> Excluding two seconds after the ignition switch is turned ON or immediately after the engine starts. Set Conditions <ul style="list-style-type: none"> When the idle position switch is ON, the sensor output voltage is 2 V or more for 4 seconds or <ul style="list-style-type: none"> The sensor output voltage is 0.2 V or less for 4 seconds | <ul style="list-style-type: none"> Malfunction of throttle position sensor Improper connector contact, open circuit or short-circuited harness wire Improper "ON" state of idle position switch Short circuit of the idle position switch signal line Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |



NOTE:

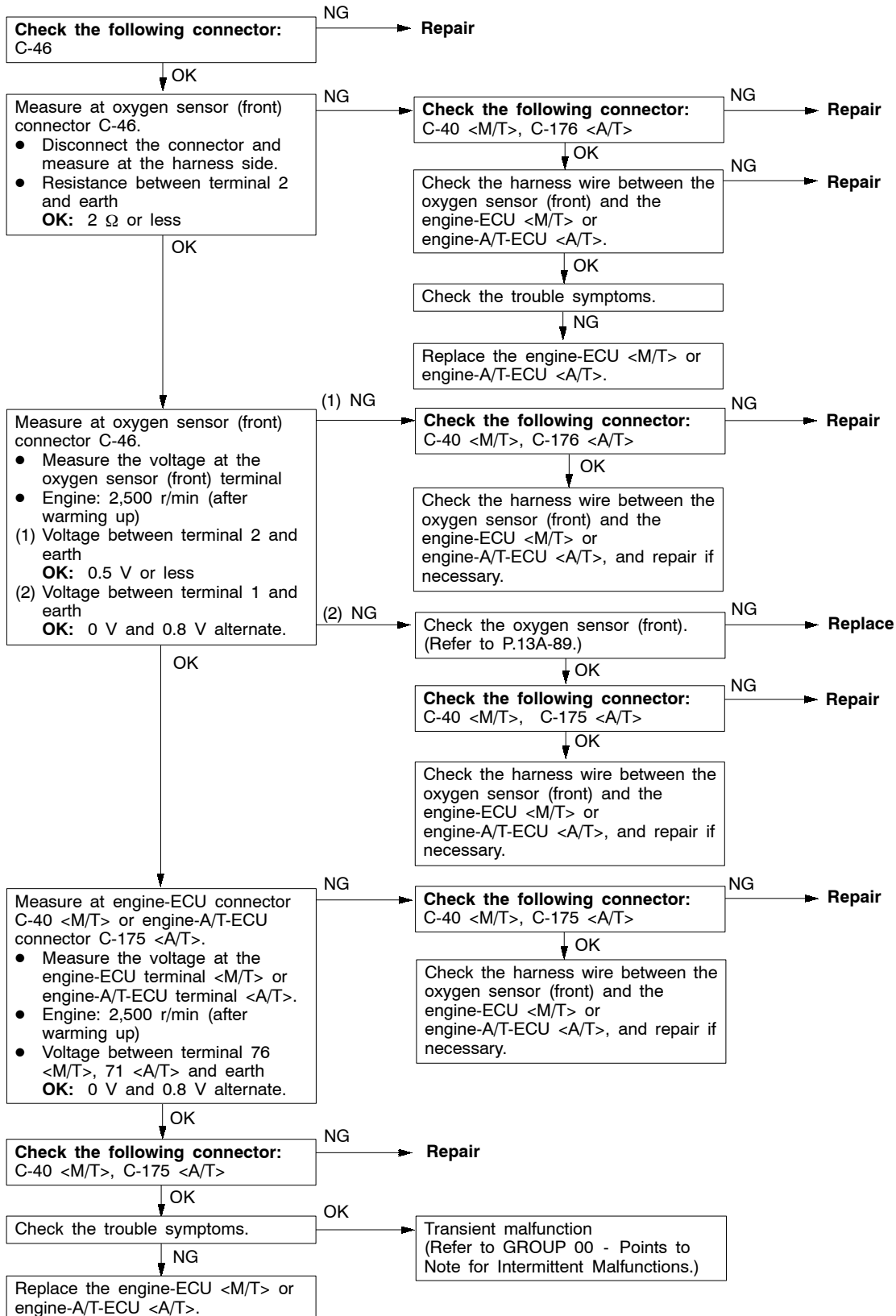
*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)



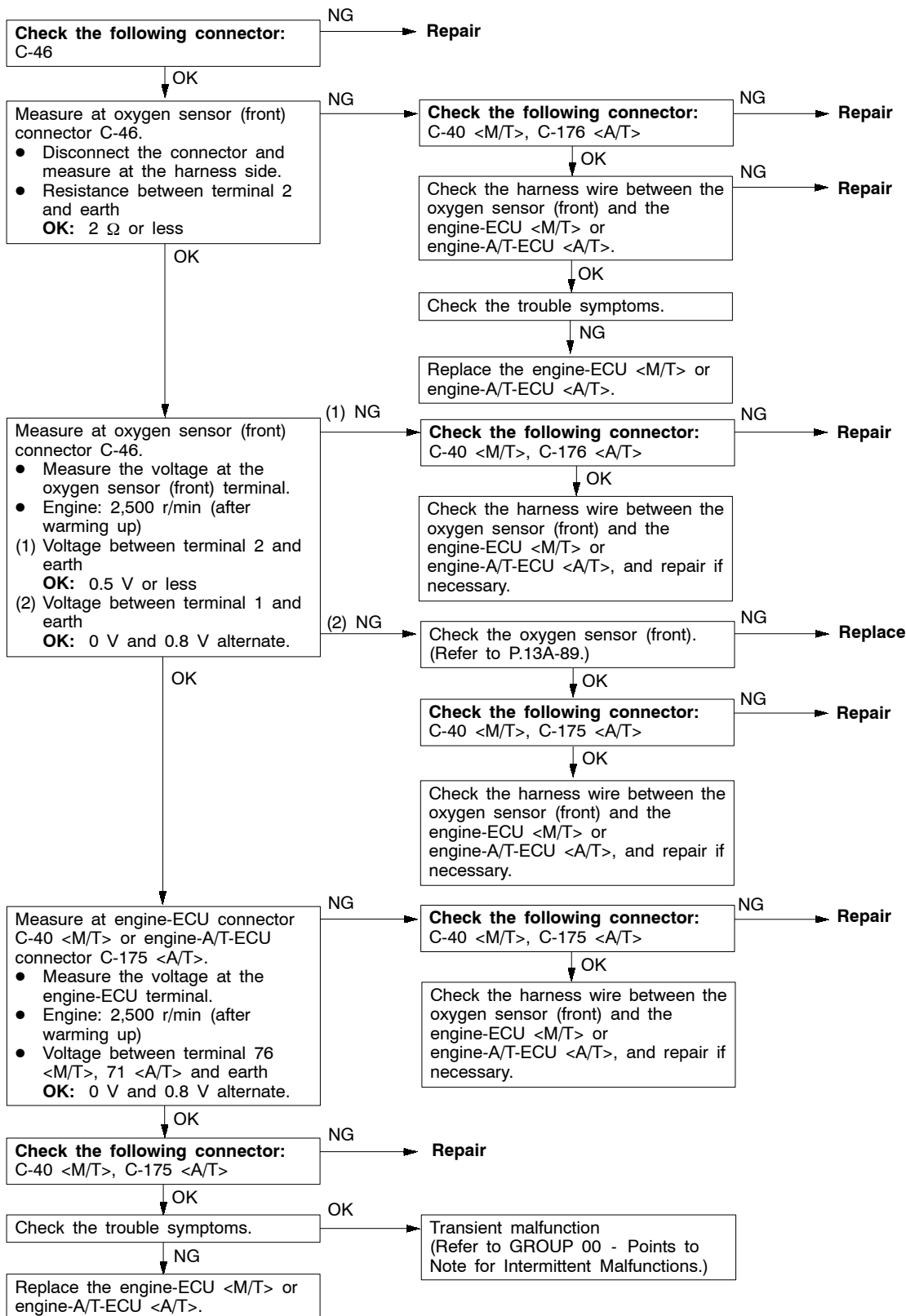
NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

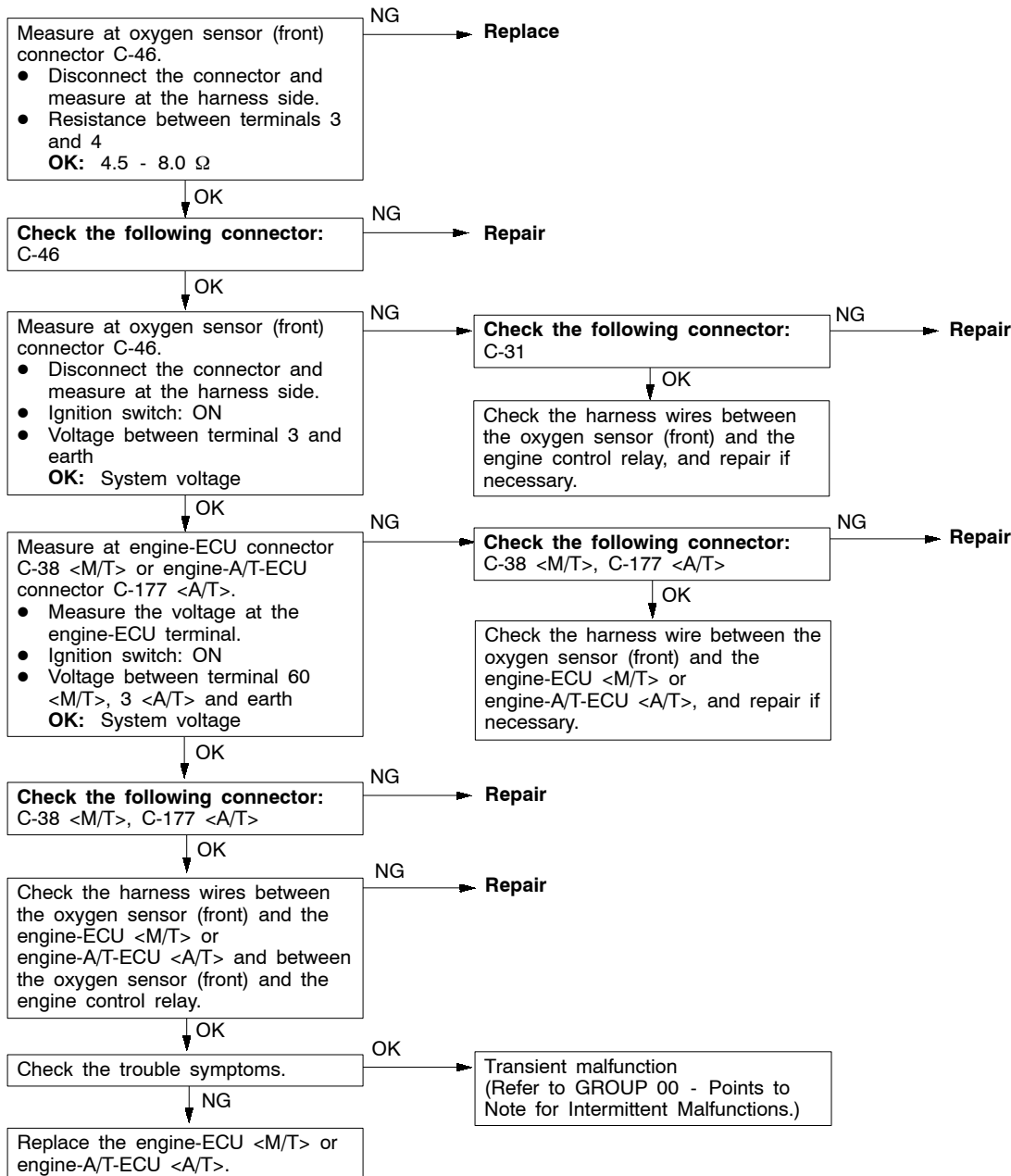
| Code No. P0125 Feedback system | Probable cause |
|--|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> The engine coolant temperature is approx. 80°C or more. During stoichiometric feedback control The vehicle is not being decelerated. <p>Set Conditions</p> <ul style="list-style-type: none"> Oxygen sensor (front) output voltage has been higher or lower than 0.5 V for at least thirty seconds. | <ul style="list-style-type: none"> Malfunction of oxygen sensor (front) Open or short circuit in the oxygen sensor (front) circuit or loose connector contact Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |



| Code No. P0130 Oxygen sensor (front) system <sensor 1> | Probable cause |
|--|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> • Three minutes have been passed since the engine has been started. • The engine coolant temperature is approx. 80°C or more. • Engine speed is 1,200 r/min or more • Driving on a level surface at constant speed. <p>Set Conditions</p> <ul style="list-style-type: none"> • The oxygen sensor (front) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the oxygen sensor (front) inside the engine-ECU. | <ul style="list-style-type: none"> • Malfunction of oxygen sensor (front) • Open or short circuit in the oxygen sensor (front) circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |
| <p>Range of Check</p> <ul style="list-style-type: none"> • Engine speed is 2,800 r/min or less • During driving • During air/fuel ratio feedback control <p>Set Conditions</p> <ul style="list-style-type: none"> • The oxygen sensor (front) output frequency is six or less per 10 seconds on average. | |

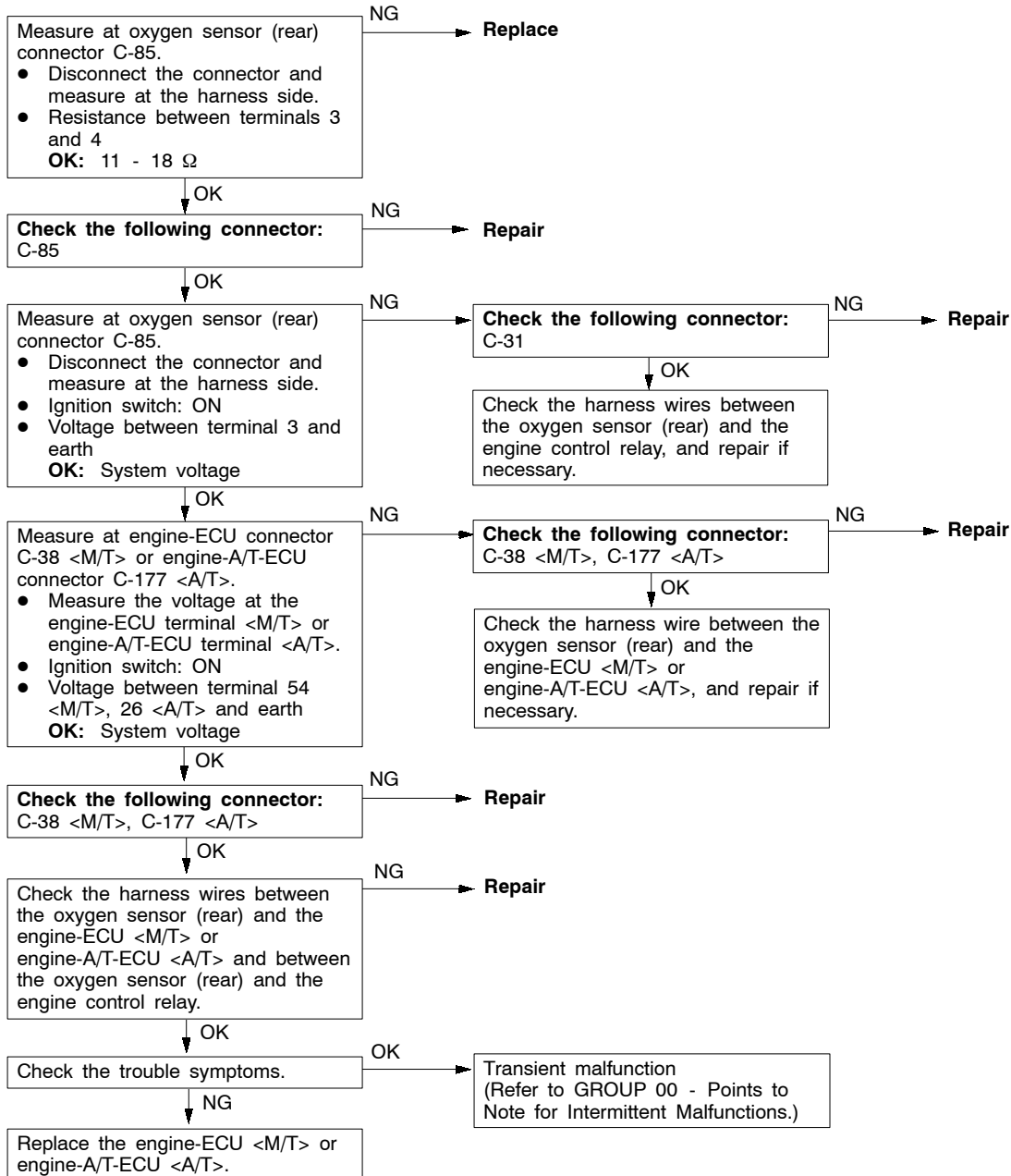


| Code No. P0135 Oxygen sensor heater (front) system <sensor 1> | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> • The engine coolant temperature is approx. 20°C or more. • The oxygen sensor heater (front) remains on. • The engine speed is 50 r/min or more. • Battery voltage is 11 - 16 V. <p>Set Conditions</p> <ul style="list-style-type: none"> • The current, which flows through the oxygen sensor heater (front), is 0.2 A or less or 3.5 A or more for six seconds. | <ul style="list-style-type: none"> • Malfunction of oxygen sensor heater (front) • Open or short circuit in the oxygen sensor heater (front) circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |

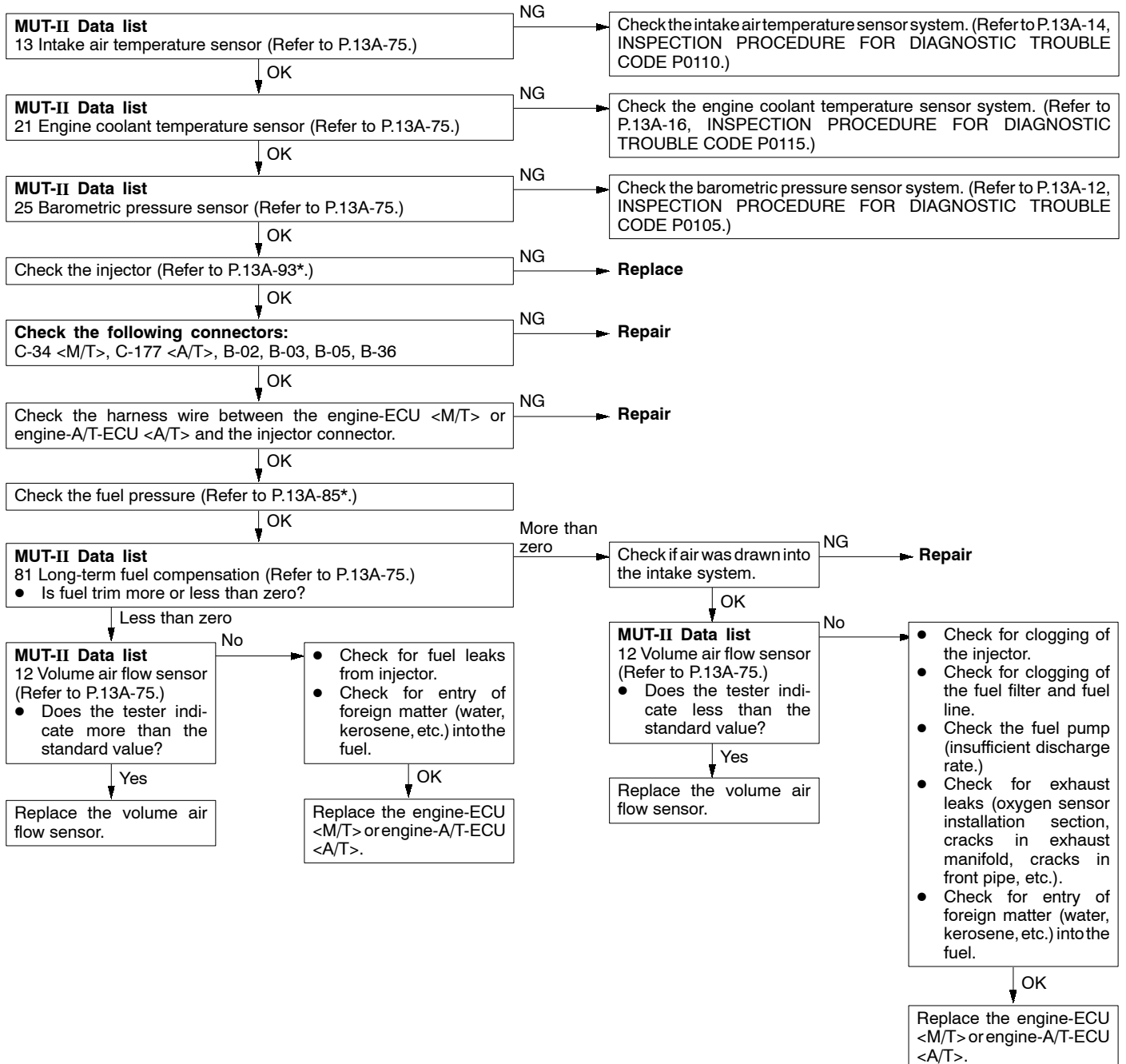


| Code No. P0136 Oxygen sensor (rear) system <sensor 2> | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none">• Three minutes have been passed since the engine has been started.• The engine coolant temperature is approx. 80°C or more.• Engine speed is 1,200 r/min or more• Driving on a level surface at constant speed. <p>Set Conditions</p> <ul style="list-style-type: none">• The oxygen sensor (rear) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the oxygen sensor (rear) inside the engine-ECU <M/T> or engine-A/T-ECU <A/T>. | <ul style="list-style-type: none">• Malfunction of oxygen sensor (rear)• Open or short circuit in the oxygen sensor (rear) circuit or loose connector contact• Malfunction of engine-ECU <M/T>• Malfunction of engine-A/T-ECU <A/T> |

| Code No. P0141 Oxygen sensor heater (rear) system <sensor 2> | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> The engine coolant temperature is approx. 20°C or more. The oxygen sensor heater (rear) remains on. The engine speed is 50 r/min or more. Battery voltage is 11 - 16 V. <p>Set Conditions</p> <ul style="list-style-type: none"> The current, which flows through the oxygen sensor heater (rear), is 0.2 A or less or 3.5 A or more for six seconds. | <ul style="list-style-type: none"> Malfunction of oxygen sensor heater (rear) Open or short circuit in the oxygen sensor heater (rear) circuit or loose connector contact Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |



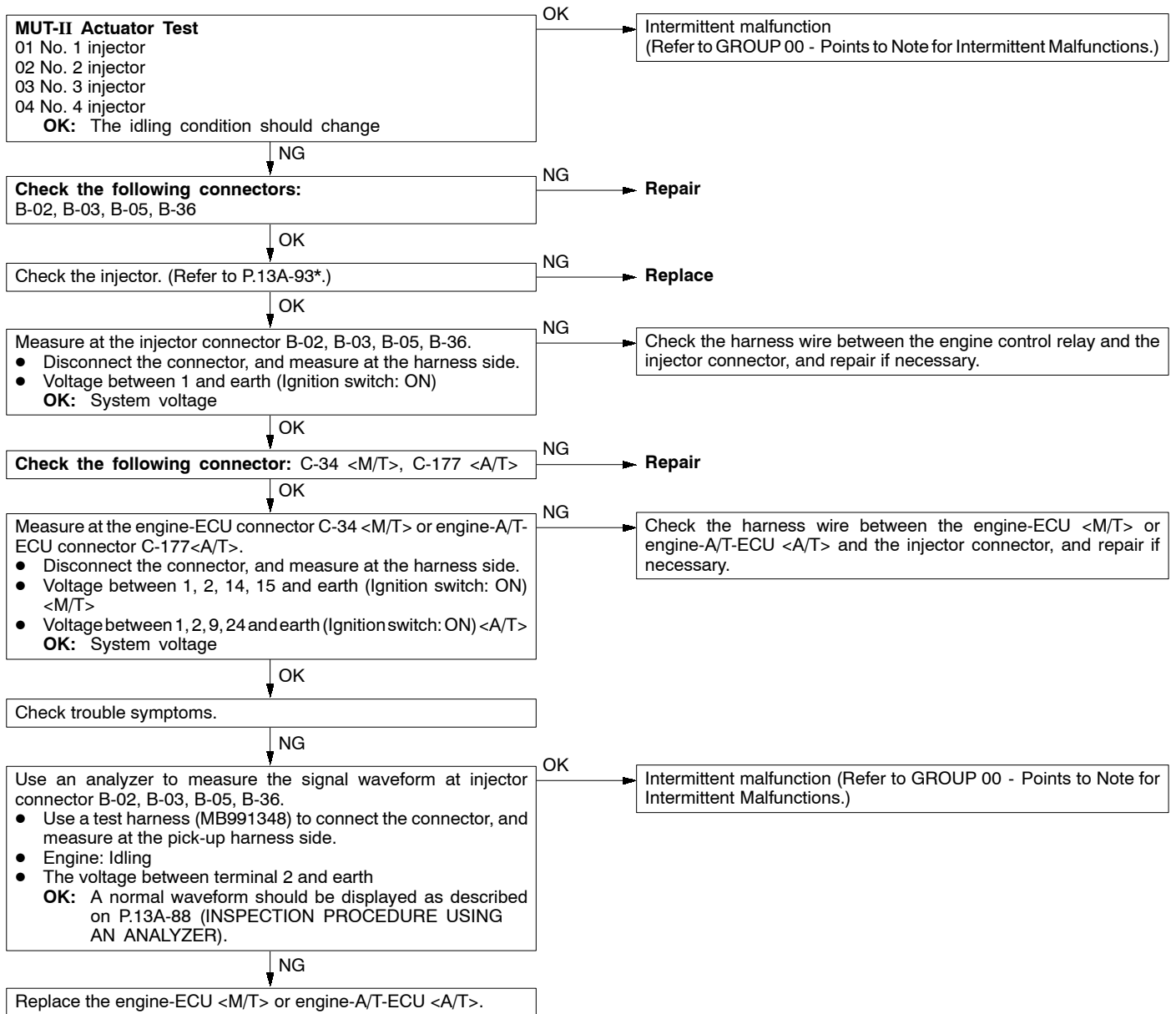
| Code No. P0170 Abnormal fuel system | Probable cause |
|--|---|
| Range of Check • Engine: Being learning the air/fuel ratio Set Conditions • Ten seconds or more have been passed while the fuel injection amount compensation value is too low. or • Ten seconds or more have been passed while the fuel injection amount compensation value is too high. | <ul style="list-style-type: none"> • Incorrect fuel pressure • Malfunction of fuel supply system • Malfunction of oxygen sensor (front) • Malfunction of intake air temperature sensor • Malfunction of barometric pressure sensor • Malfunction of air flow sensor • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

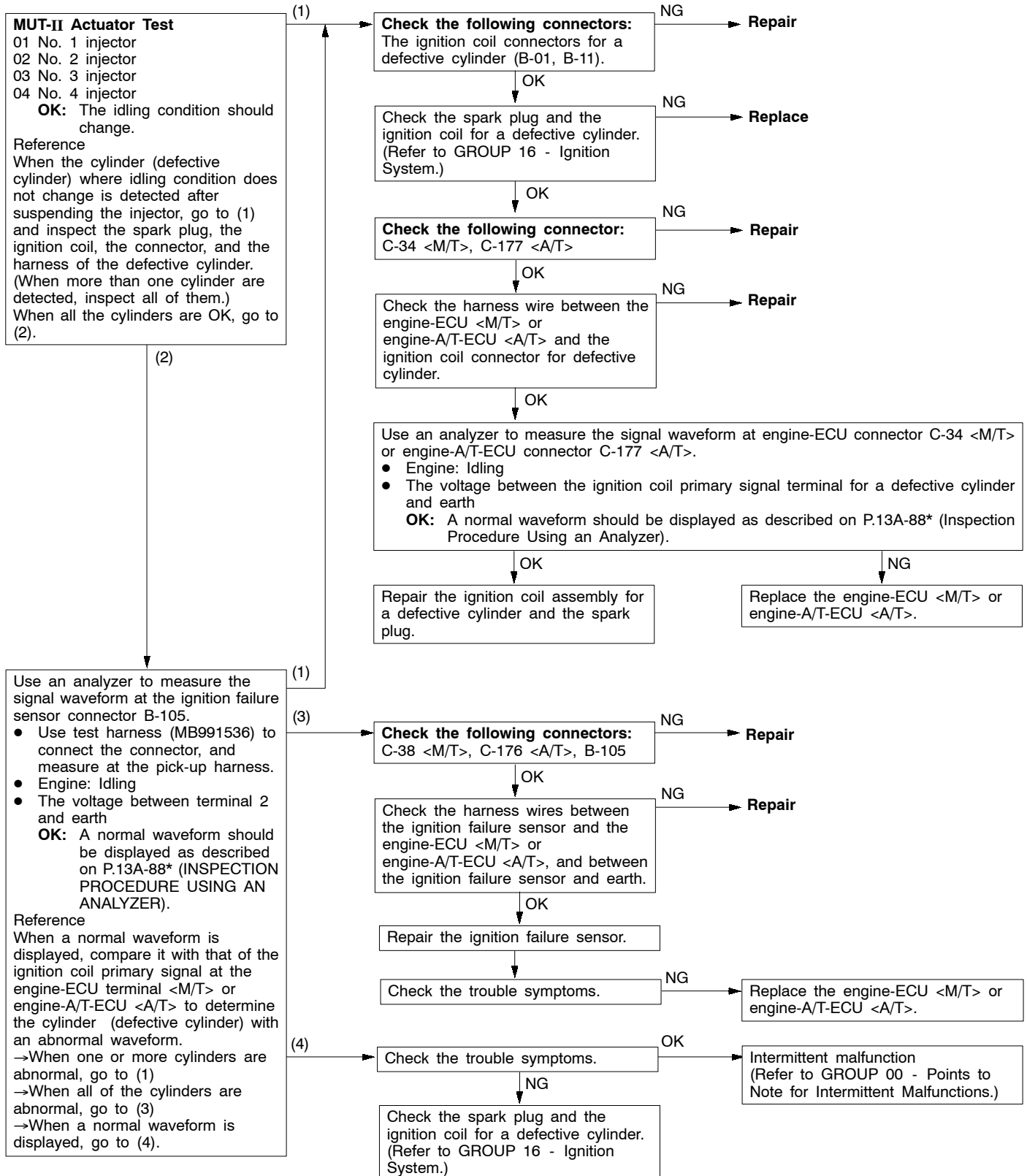
| | |
|--|---|
| Code No. P0201 No. 1 injector system Code No. P0202 No. 2 injector system Code No. P0203 No. 3 injector system Code No. P0204 No. 4 injector system | Probable cause |
| Range of Check • Engine speed is approx. 50 - 1,000 r/min • The throttle position sensor output voltage is 1.15 V or less. • Actuator test by MUT-II is not carried out. Set Conditions • Surge voltage of injector coil is not detected for 4 seconds. | <ul style="list-style-type: none"> • Malfunction of the injector • Improper connector contact, open circuit or short-circuited harness wire of the injector circuit • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



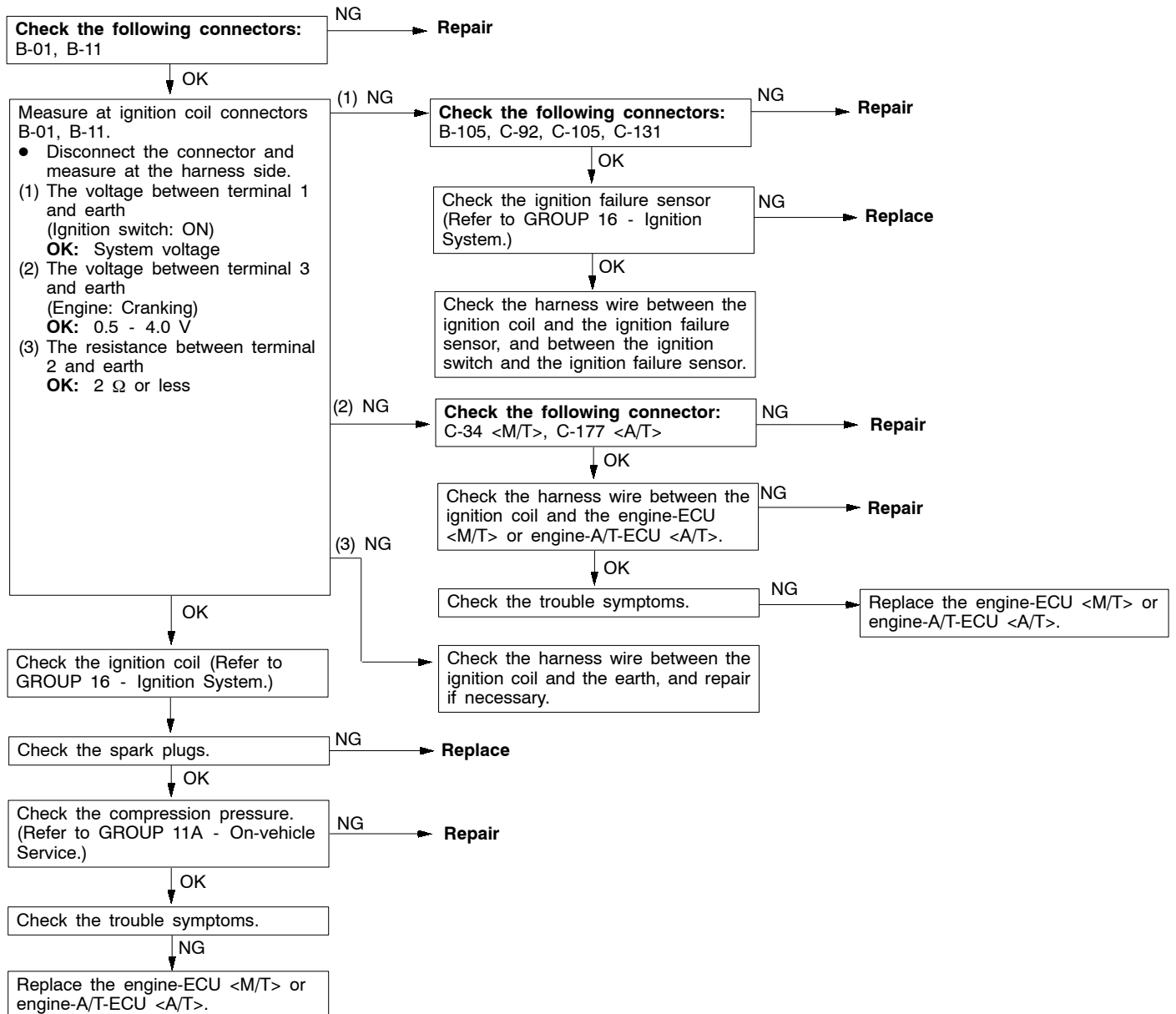
NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

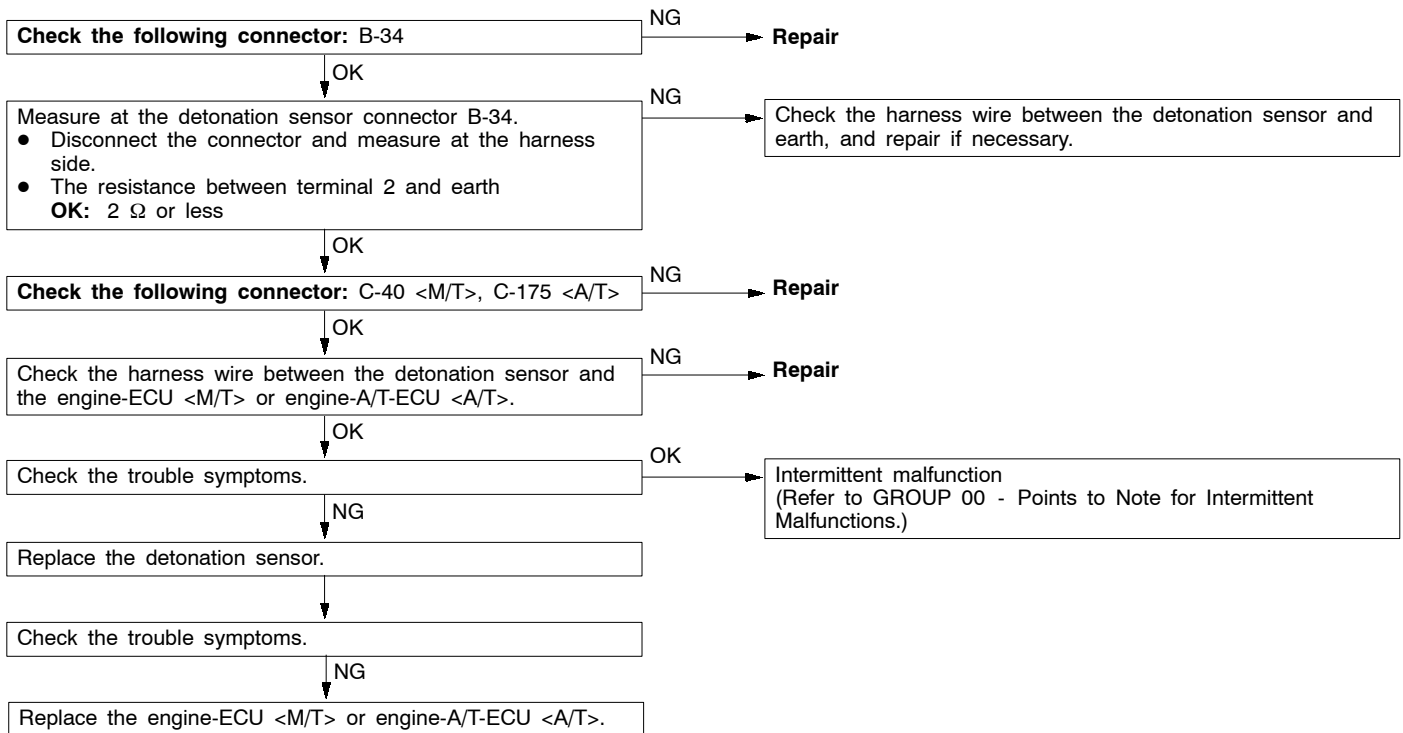
| Code No. P0300 Ignition coil (power transistor) system | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none">● Engine speed is approx. 50 - 4,000 r/min.● Engine is not cranking. <p>Set Conditions</p> <ul style="list-style-type: none">● The ignition failure sensor does not send a signal about a certain cylinder for four seconds. | <ul style="list-style-type: none">● Malfunction of the ignition coil● Malfunction of the ignition failure sensor● Malfunction of spark plug● Open or short circuit in the primary ignition circuit or loose connector contact● Malfunction of engine-ECU <M/T>● Malfunction of engine-A/T-ECU <A/T> |



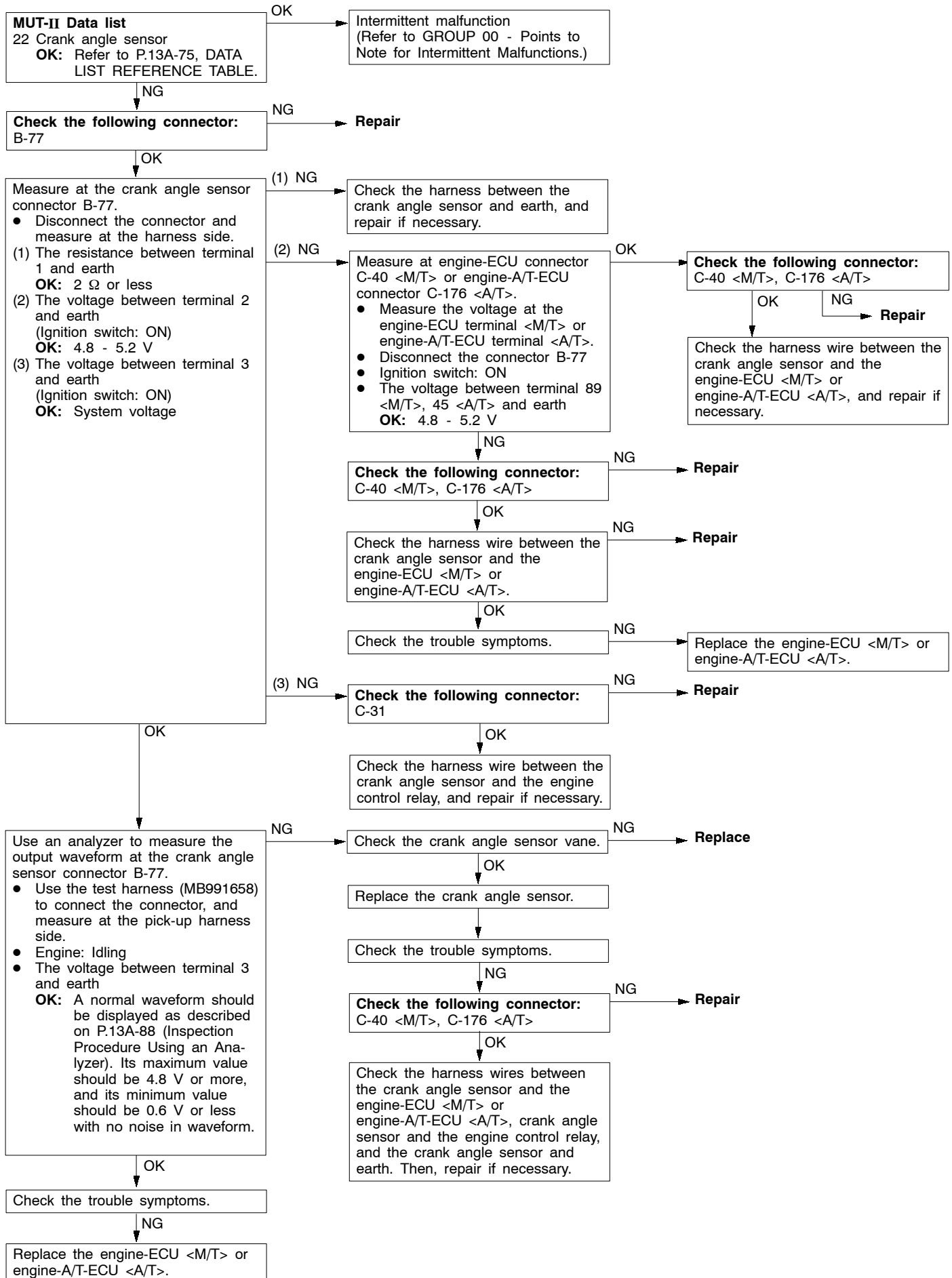
| | |
|---|---|
| Code No. P0301 No. 1 cylinder misfire detected Code No. P0302 No. 2 cylinder misfire detected Code No. P0303 No. 3 cylinder misfire detected Code No. P0304 No. 4 cylinder misfire detected | Probable cause <ul style="list-style-type: none"> • Malfunction of the ignition system • Abnormal compression • Malfunction of injector • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |
| Range of Check <ul style="list-style-type: none"> • The engine speed is 500 - 4,500 r/min. • While the engine is running except deceleration and sudden acceleration. Set Conditions <ul style="list-style-type: none"> • The number of misfires exceeds a predetermined number per 200 engine revolutions (Misfire has occurred in only one cylinder). or <ul style="list-style-type: none"> • The number of misfires exceeds a predetermined number per 100 engine revolutions (Misfire has occurred in only one cylinder). | |



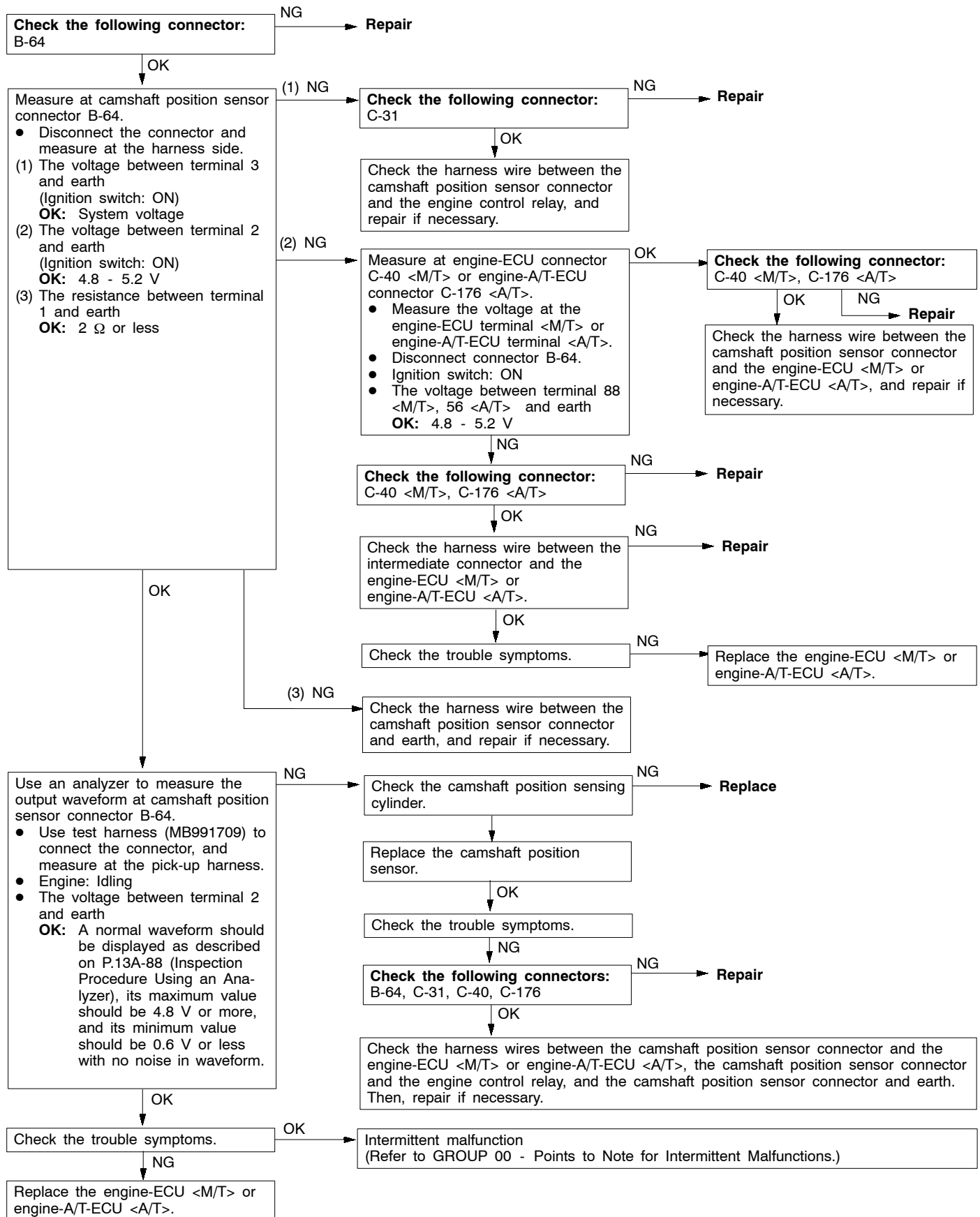
| Code No. P0325 Detonation sensor system | Probable cause |
|--|---|
| Range of Check • Engine: Two seconds after the engine has been started Set Conditions • Changes in sensor output voltage (detonation sensor peak voltage per 1/2 crankshaft rotation) in 200 consecutive cycles are 0.06 V or less. | • Malfunction of the detonation sensor • Open or short circuit in the detonation sensor circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



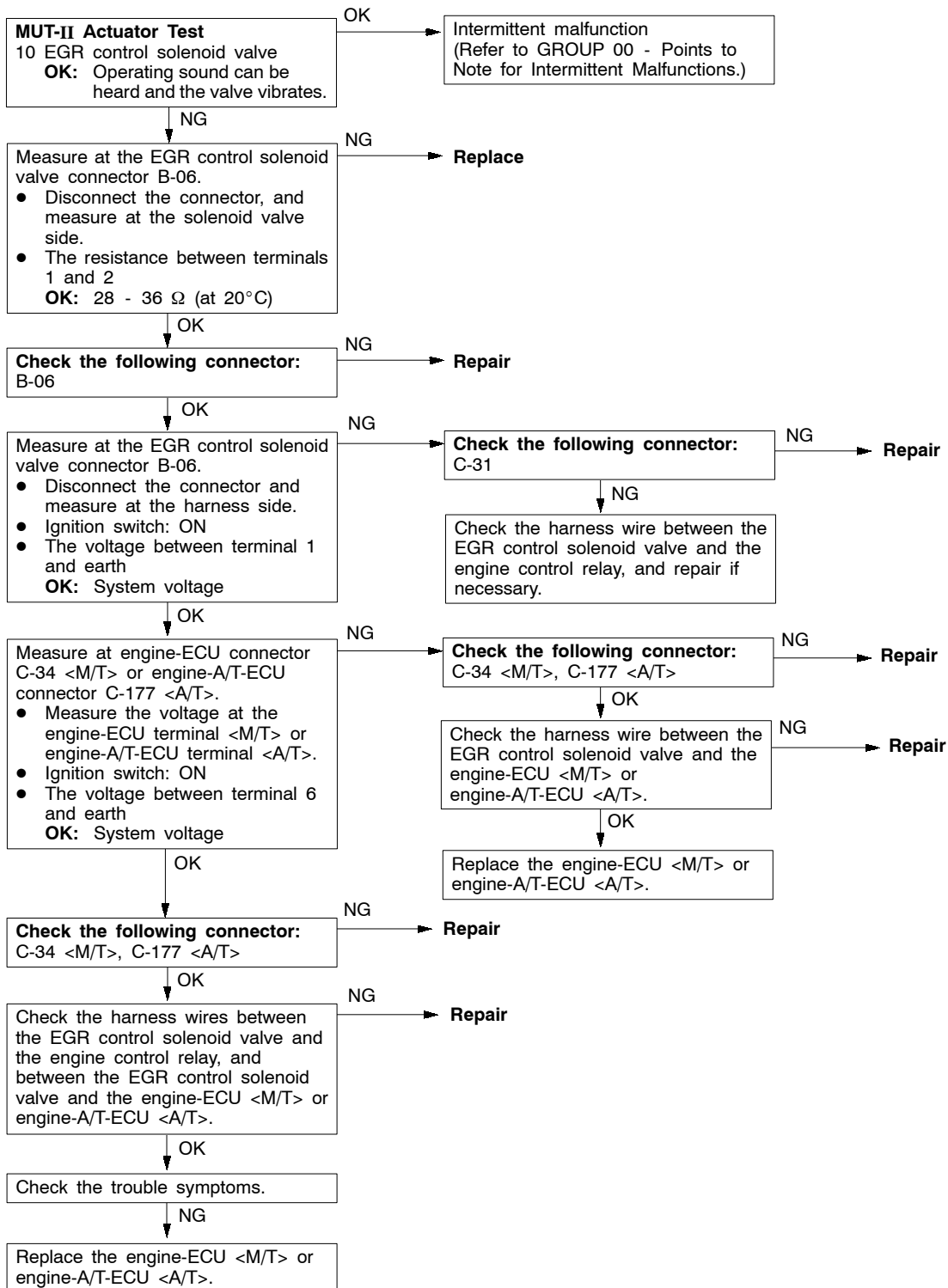
| Code No. P0335 Crank angle sensor system | Probable cause |
|--|---|
| Range of Check • Engine is cranking Set Conditions • Sensor output voltage does not change for 4 seconds (no pulse signal input). | • Malfunction of the crank angle sensor. • Open or short circuit in the crank angle sensor circuit or loose connector contact. • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



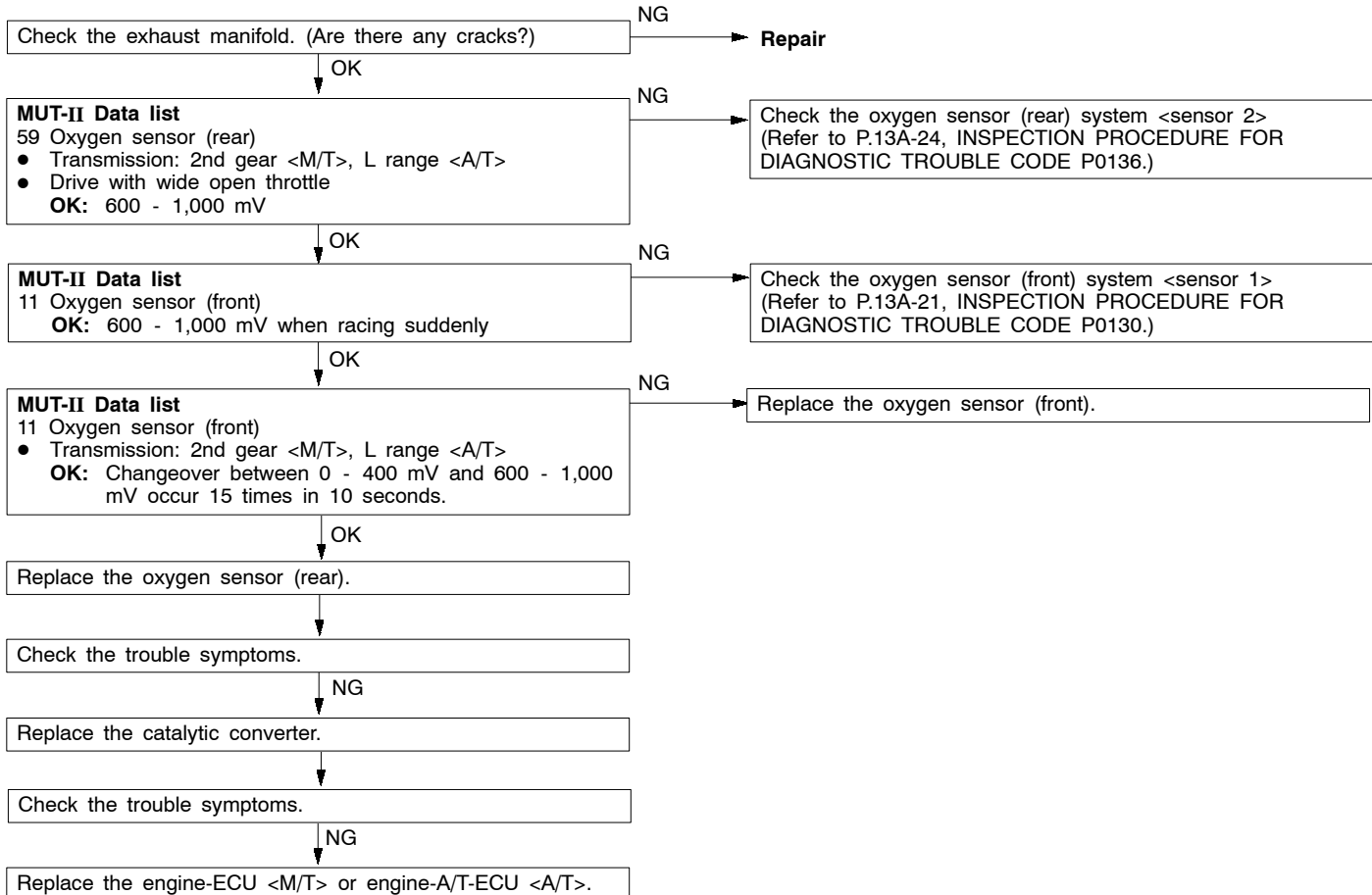
| Code No. P0340 Camshaft position sensor system | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none">● Ignition switch: ON● Engine speed: 50 r/min or more <p>Set Conditions</p> <ul style="list-style-type: none">● The sensor output voltage does not change for 4 seconds (no pulse signal input). | <ul style="list-style-type: none">● Malfunction of the camshaft position sensor● Open or short circuit in the camshaft position sensor circuit or loose connector contact.● Malfunction of engine-ECU <M/T>● Malfunction of engine-A/T-ECU <A/T> |



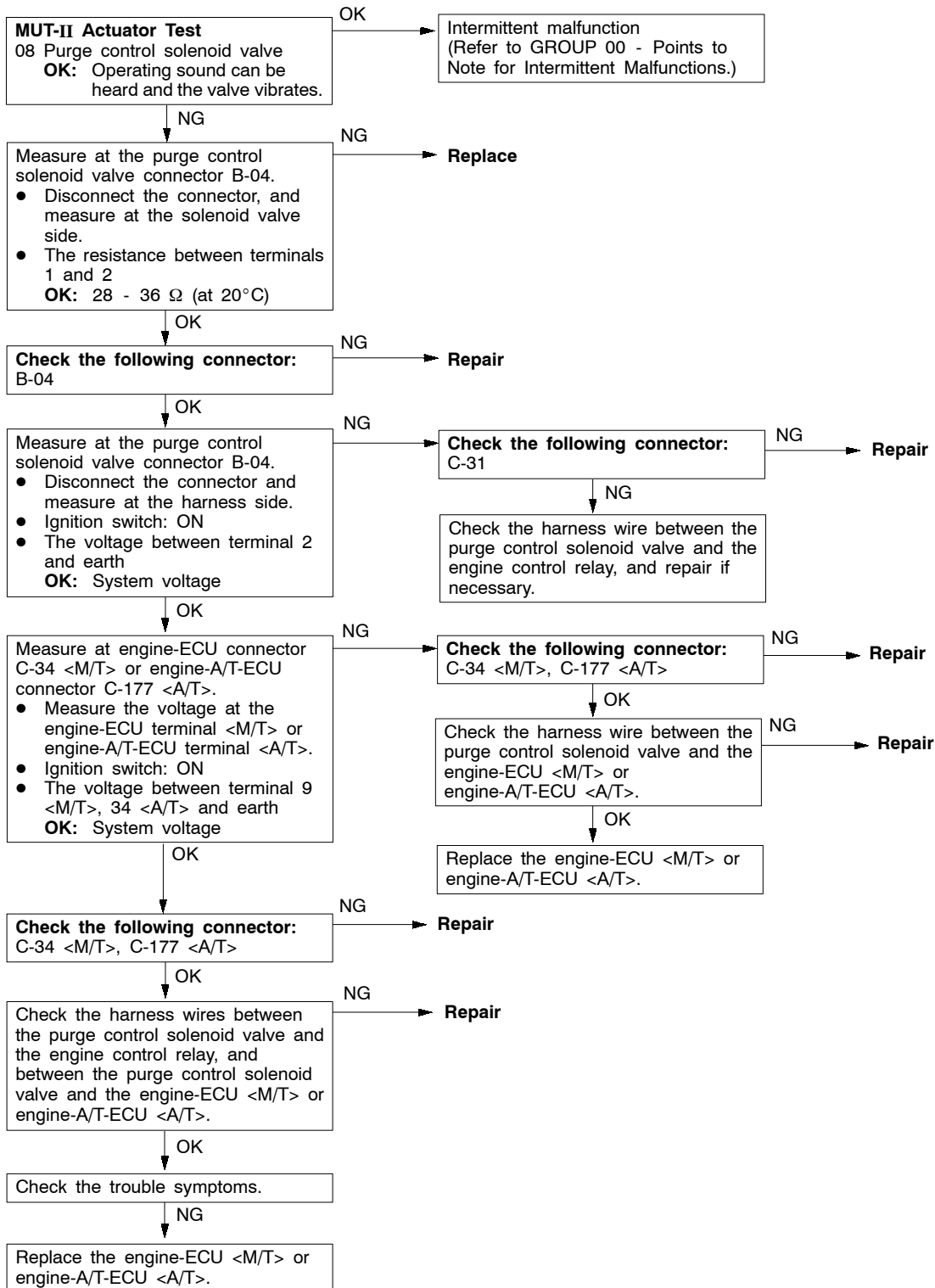
| Code No. P0403 EGR control solenoid valve system | Probable cause |
|--|---|
| Range of Check • Ignition switch: ON • Battery voltage is 10 V or more. Set Conditions • The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off. | • Malfunction of the EGR control solenoid valve • Open or short circuit in the EGR control solenoid valve circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



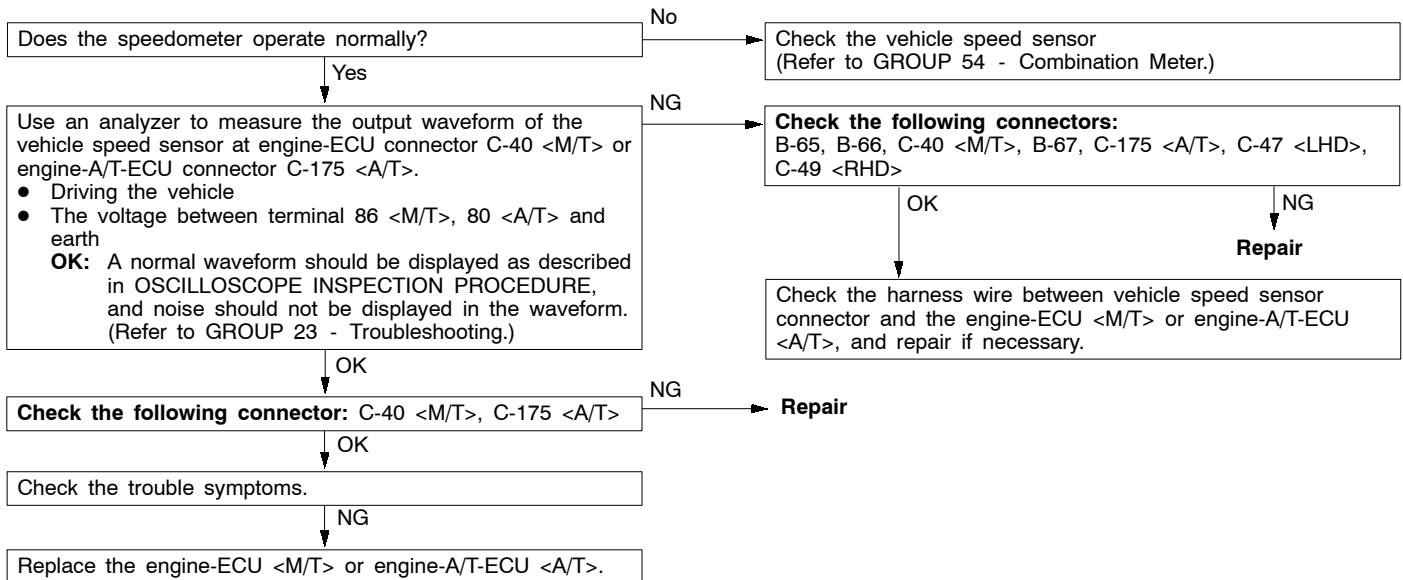
| Code No. P0420 Catalyst malfunction | Probable cause |
|---|--|
| Range of Check <ul style="list-style-type: none"> • The engine speed is 3,000 r/min or less. • During driving • During air/fuel ratio feedback control Set Conditions <ul style="list-style-type: none"> • The ratio between the oxygen sensor (rear) and the oxygen sensor (front) output frequencies reaches 0.8 per 12 seconds on average. | <ul style="list-style-type: none"> • Malfunction of catalyst • Malfunction of the oxygen sensor (front) • Malfunction of the oxygen sensor (rear) • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



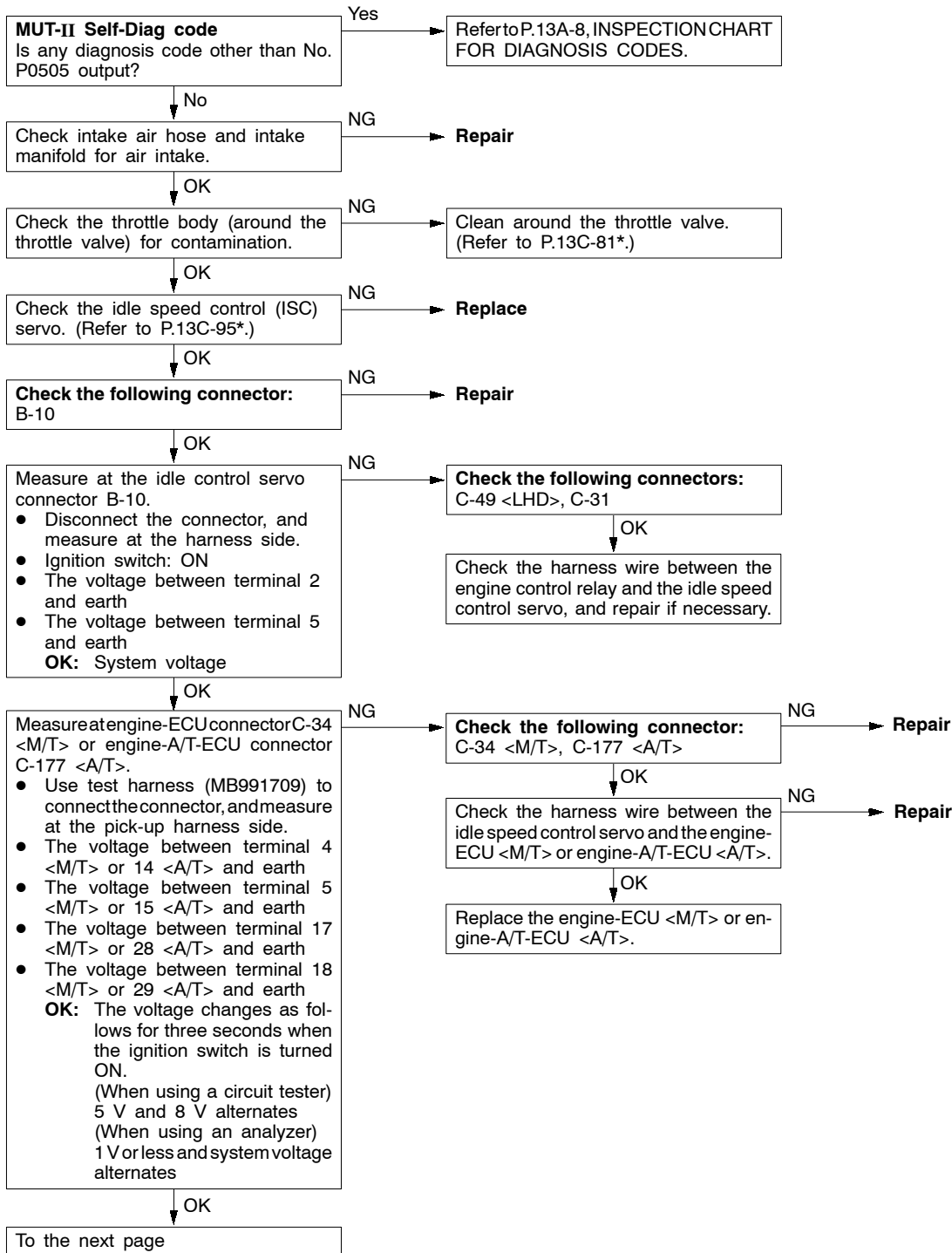
| Code No. P0443 Purge control solenoid valve system | Probable cause |
|---|---|
| Range of Check <ul style="list-style-type: none"> Ignition switch: ON Battery voltage is 10 V or more. Set Conditions <ul style="list-style-type: none"> The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off. | <ul style="list-style-type: none"> Malfunction of the purge control solenoid valve Open or short circuit in the purge control solenoid valve circuit or loose connector contact Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |



| Code No. P0500 Vehicle speed sensor system | Probable cause |
|---|---|
| Range of Check <ul style="list-style-type: none"> Engine: Two seconds after the engine was started Idle switch: OFF Engine speed: 2,500 r/min or more During high engine load Set Conditions <ul style="list-style-type: none"> The sensor output voltage does not change for 2 seconds (no pulse signal input). | <ul style="list-style-type: none"> Malfunction of the vehicle speed sensor Open or short circuit in the vehicle speed sensor circuit or loose connector contact Malfunction of engine-ECU <M/T> Malfunction of engine-A/C-ECU <A/T> |

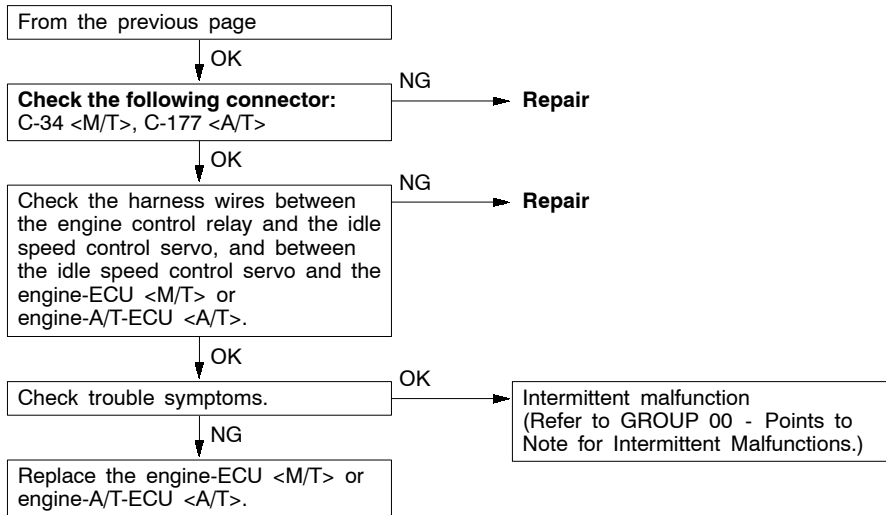


| Code No. P0505 Idle speed control (ISC) system | Probable cause |
|---|---|
| Check Area <ul style="list-style-type: none"> Vehicle speed has reached 1.5 km/h at least once. Under the closed loop idle speed control. Judgment Criteria <ul style="list-style-type: none"> Actual idle speed has continued to be higher than the target idle speed by 300 r/min or more for 10 sec. Check Area <ul style="list-style-type: none"> Vehicle speed has reached 1.5 km/h at least once. During idle speed closed loop control. The highest temperature at the last drive is 45°C or less. Engine coolant temperature is approx. 80°C or more. Battery voltage is 10 V or more. Barometric pressure is 76 kPa or higher. Intake air temperature is -10°C or more. Judgment Criteria <ul style="list-style-type: none"> Actual idle speed has been minimum 200 r/min higher than the target idle speed for ten seconds. Check Area <ul style="list-style-type: none"> During idle speed closed loop control. Engine coolant temperature is about 80°C or higher. Battery voltage is 10 V or higher. Power steering switch is off. Volumetric efficiency is 40 % or lower. Barometric pressure is 76 kPa or higher. Intake air temperature is -10°C or more. Judgment Criteria <ul style="list-style-type: none"> Actual idle speed has been minimum 100 r/min higher than the target idle speed for ten seconds. | <ul style="list-style-type: none"> Malfunction of idle speed control (ISC) servo Improper connector contact, open circuit or short-circuit harness wire Malfunction of engine-ECU <M/T> Malfunction of engine-A/C-ECU <A/T> |

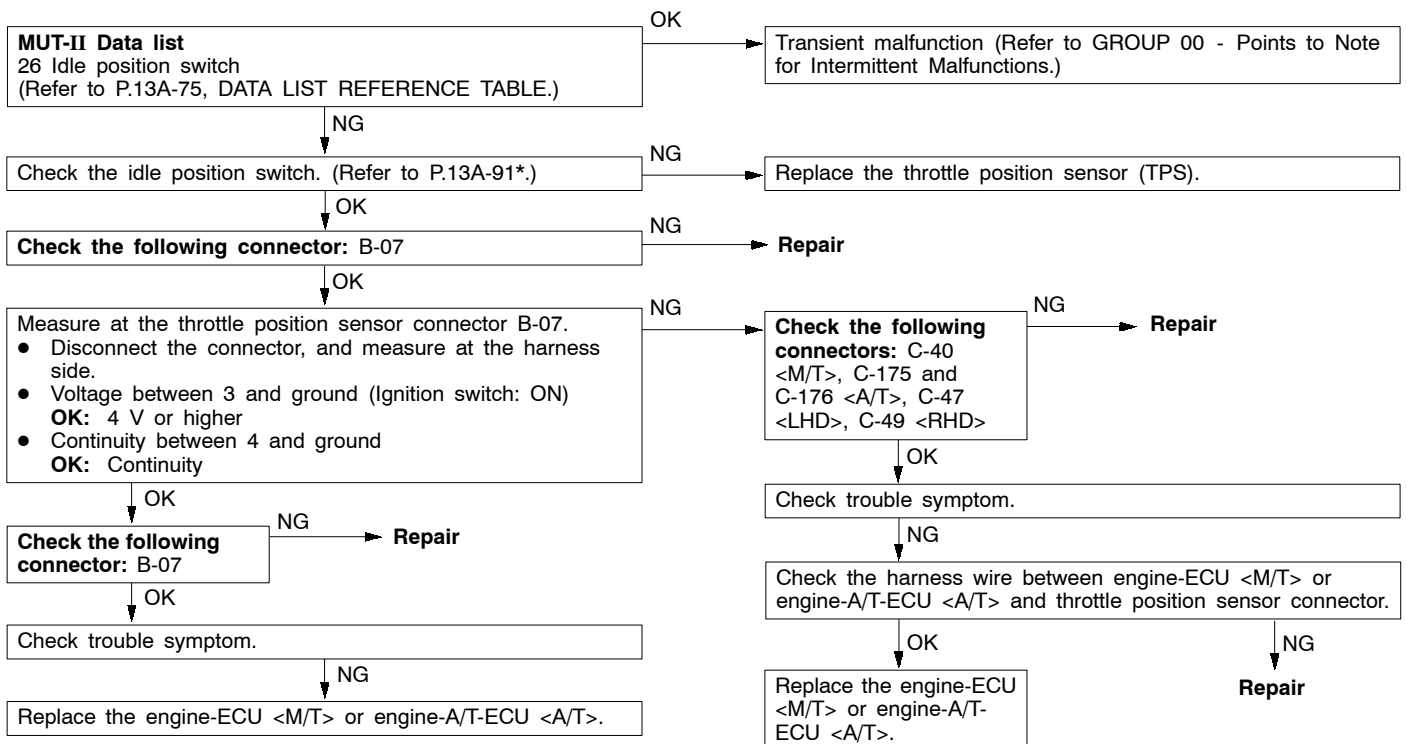


NOTE:

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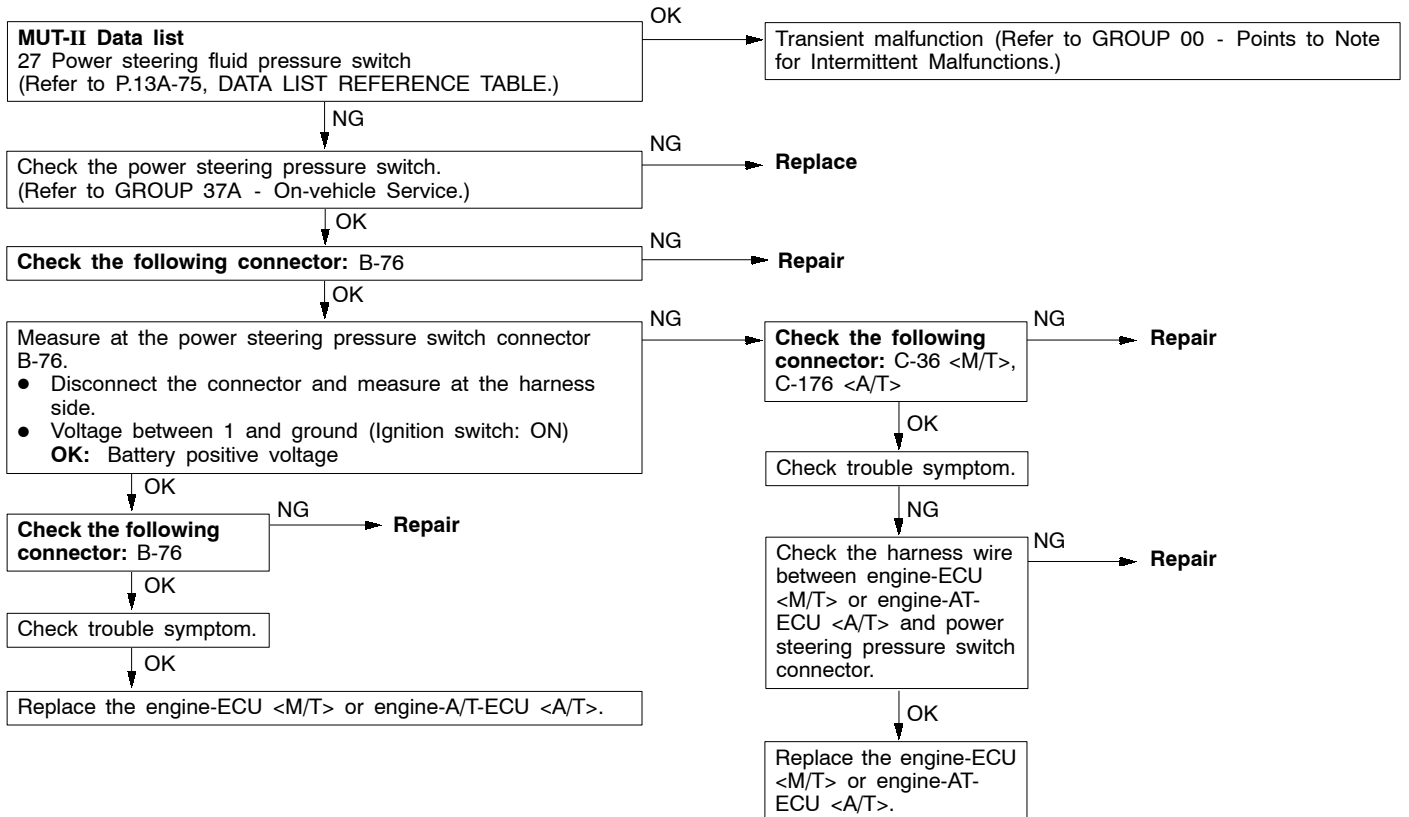
| Code No. P0510 Idle Position Switch System | Probable cause |
|--|--|
| <p>Check Area</p> <ul style="list-style-type: none"> Throttle position sensor output voltage is 2.0 V or more. <p>Judgment Criteria</p> <ul style="list-style-type: none"> Idle position switch has been turned on. <p>Check Area</p> <ul style="list-style-type: none"> Repeat the *1 drive and *2 stop 15 times or more. <p>*1 drive: The vehicle remains under the following conditions for at least two seconds; engine speed is 1,500 rpm or higher, air flow sensor output waveform is 100 Hz or higher, and vehicle speed is more than 30 km/h for two seconds.</p> <p>*2 stop: The vehicle remains under the following conditions for at least two seconds; engine speed is 800 rpm or lower, and vehicle speed is less than 1.5 km/h.</p> <p>Judgment Criteria</p> <ul style="list-style-type: none"> Idle position switch remains off. | <ul style="list-style-type: none"> Malfunction of idle position switch Open or shorted idle position switch circuit, or loose connector. Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |



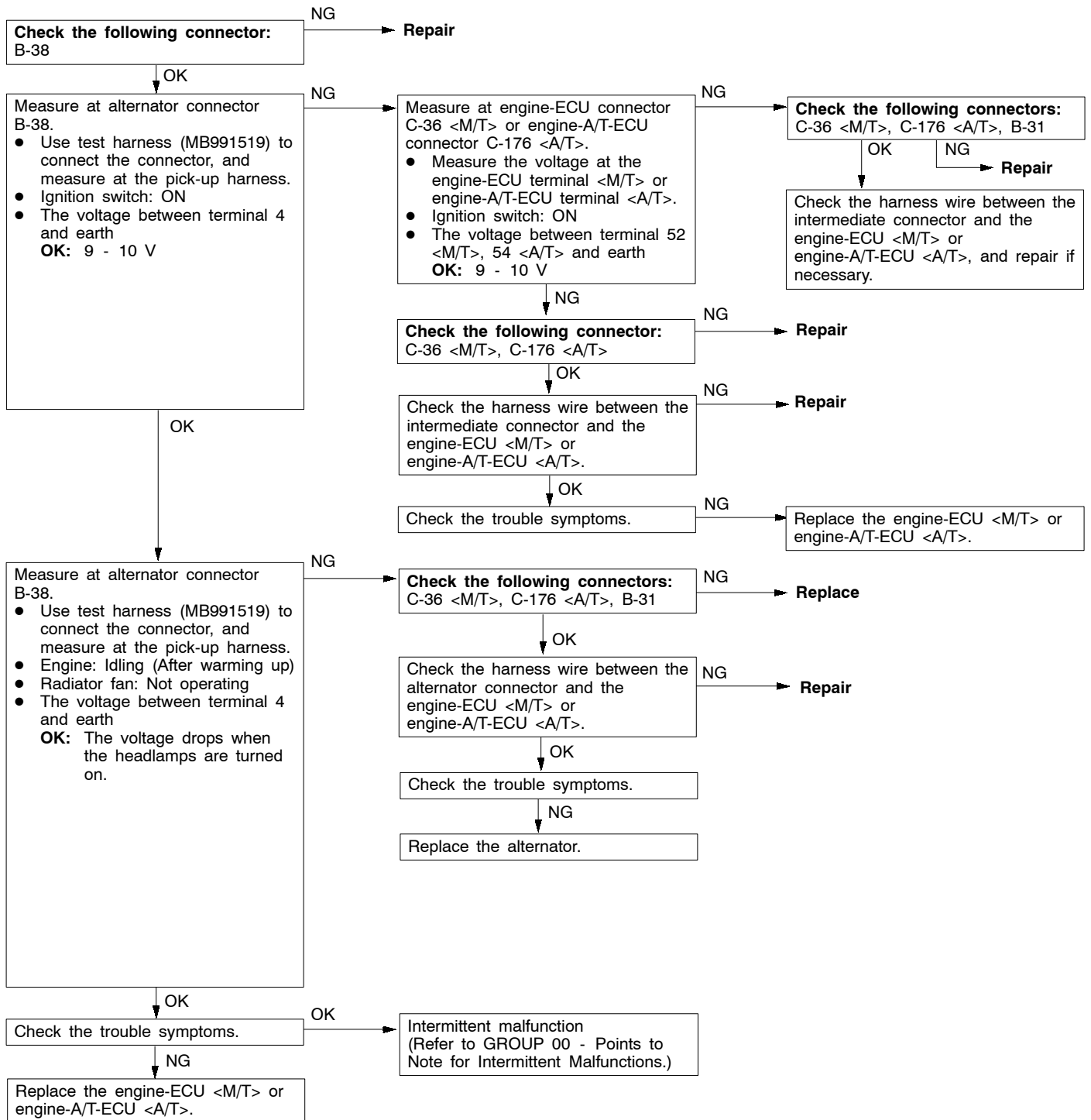
NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

| Code No. P0551 Power steering fluid pressure switch system | Probable cause |
|---|---|
| <p>Check Area</p> <ul style="list-style-type: none"> Intake air temperature is -10°C or higher. Barometric pressure is 76 kPa or higher. Engine coolant temperature is 30°C or more. Repeat the *1 drive and *2 stop ten times or more. <p>*1: Engine speed is 2,500 r/min or higher, volumetric efficiency is 55 % or higher and vehicle speed is 5 km/h or higher for 4 seconds or more.</p> <p>*2: Vehicle speed is 1.5 km/h or lower.</p> <p>Judgment Criteria</p> <ul style="list-style-type: none"> Power steering pressure switch remains on. | <ul style="list-style-type: none"> Power steering fluid pressure switch failed. Open or shorted power steering fluid pressure switch circuit or loose connector Malfunction of the engine-ECU <M/T> Malfunction of the engine-A/C-ECU <A/T> |



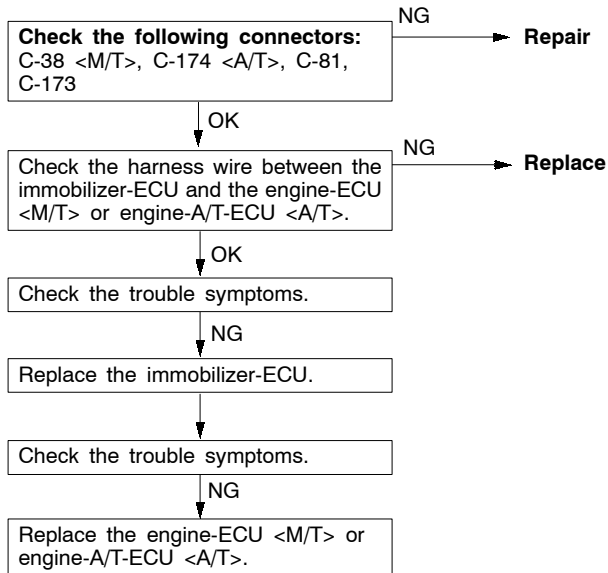
| Code No. P1500 Alternator FR terminal system | Probable cause |
|---|--|
| Range of Check • Engine speed: 50 r/min or more Set Conditions • Input voltage from the alternator FR terminal is system voltage for 20 seconds. | • Open circuit in alternator FR terminal circuit • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



| Cord No. P1610 Immobilizer system | Probable cause |
|--|---|
| Range of Check • Ignition switch: ON Set Conditions • Improper communication between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the immobilizer-ECU | • Open or short circuit, or loose connector contact • Malfunction of the immobilizer-ECU • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |

NOTE

- (1) If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.
- (2) This code may be displayed when registering the key ID code.



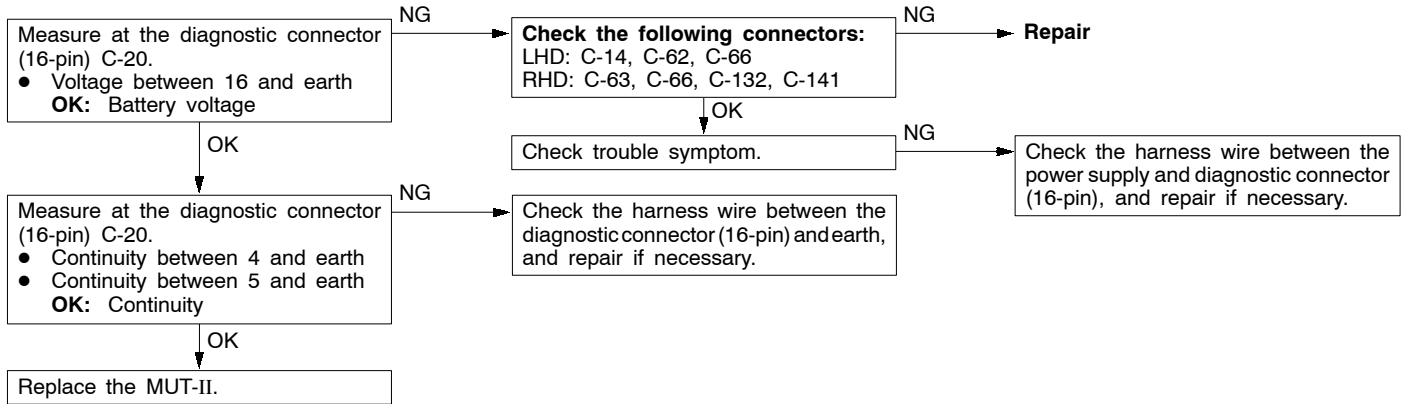
INSPECTION CHART FOR TROUBLE SYMPTOMS

| Trouble symptom | | Inspection procedure No. | Reference page |
|--|---|--------------------------|----------------|
| Communication with MUT-II is impossible. | Communication with all systems is not possible. | 1 | 13A-46 |
| | Communication with engine-ECU <M/T> or engine-A/T-ECU <A/T> only is not possible. | 2 | 13A-46 |
| 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 | 13A-47 |
| | The engine warning lamp remains illuminating and never goes out. | 4 | 13A-47 |
| Starting | No initial combustion (starting impossible) | 5 | 13A-48 |
| | Initial combustion but no complete combustion (starting impossible) | 6 | 13A-49 |
| | Long time to start (improper starting) | 7 | 13A-50 |
| Idling stability (Improper idling) | Unstable idling (Rough idling, hunting) | 8 | 13A-51 |
| | Idling speed is high. (Improper idling speed) | 9 | 13A-53 |
| | Idling speed is low. (Improper idling speed) | 10 | 13A-54 |
| Idling stability (Engine stalls) | When the engine is cold, it stalls at idling. (Die out) | 11 | 13A-55 |
| | When the engine becomes hot, it stalls at idling. (Die out) | 12 | 13A-56 |
| | The engine stalls when starting the car. (Pass out) | 13 | 13A-58 |
| | The engine stalls when decelerating. | 14 | 13A-58 |
| Driving | Hesitation, sag or stumble | 15 | 13A-59 |
| | The feeling of impact or vibration when accelerating | 16 | 13A-60 |
| | The feeling of impact or vibration when decelerating | 17 | 13A-60 |
| | Poor acceleration | 18 | 13A-61 |
| | Surge | 19 | 13A-63 |
| | Knocking | 20 | 13A-64 |
| Dieseling | | 21 | 13A-64 |
| Too high CO and HC concentration when idling | | 22 | 13A-65 |
| Low alternator output voltage (approx. 12.3 V) | | 23 | 13A-66 |
| Idling speed is improper when A/C is operating | | 24 | 13A-66 |
| Fans (radiator fan, A/C condenser fan) are inoperative | | 25 | 13A-67 |

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

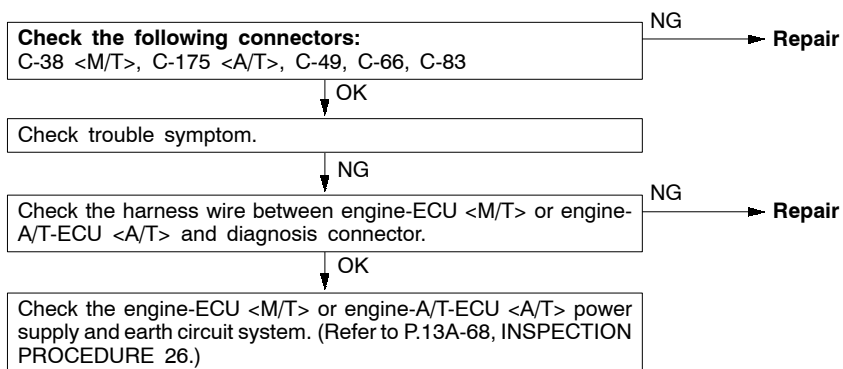
INSPECTION PROCEDURE 1

| 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. | <ul style="list-style-type: none"> • Malfunction of the connector • Malfunction of the harness wire |



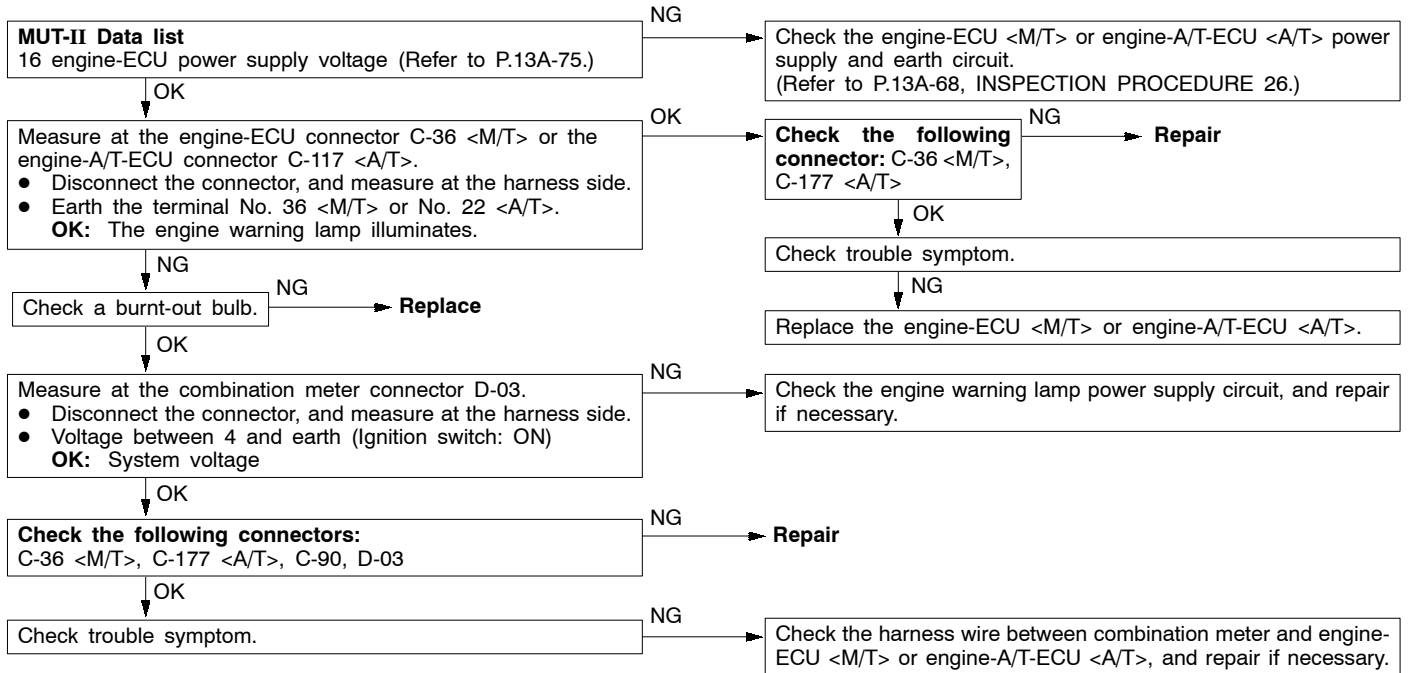
INSPECTION PROCEDURE 2

| MUT-II communication with engine-ECU <M/T> or engine-A/T-ECU <A/T> is impossible. | Probable cause |
|--|--|
| One of the following causes may be suspected. <ul style="list-style-type: none"> • No power supply to engine-ECU <M/T> or engine-A/T-ECU <A/T>. • Defective earth circuit of engine-ECU <M/T> or engine-A/T-ECU <A/T>. • Defective engine-ECU <M/T> or engine-A/T-ECU <A/T>. • Improper communication line between engine-ECU <M/T> or engine-A/T-ECU <A/T> and MUT-II | <ul style="list-style-type: none"> • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply circuit • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T> • Open circuit between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and diagnosis connector |



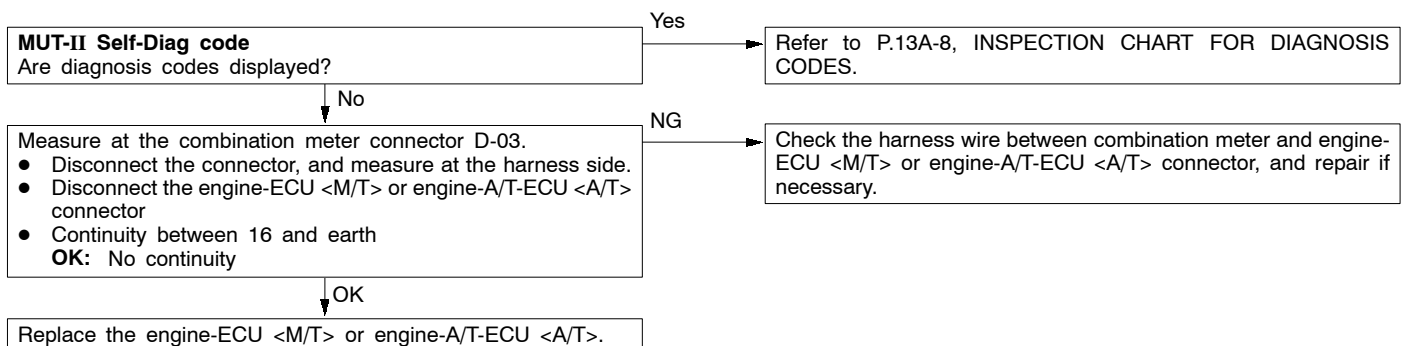
INSPECTION PROCEDURE 3

| 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 <M/T> or engine-A/T-ECU <A/T> causes the engine warning lamp to illuminate for five seconds immediately after the ignition switch is turned to ON. 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. | <ul style="list-style-type: none"> ● Burnt-out bulb ● Defective warning lamp circuit ● Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> |



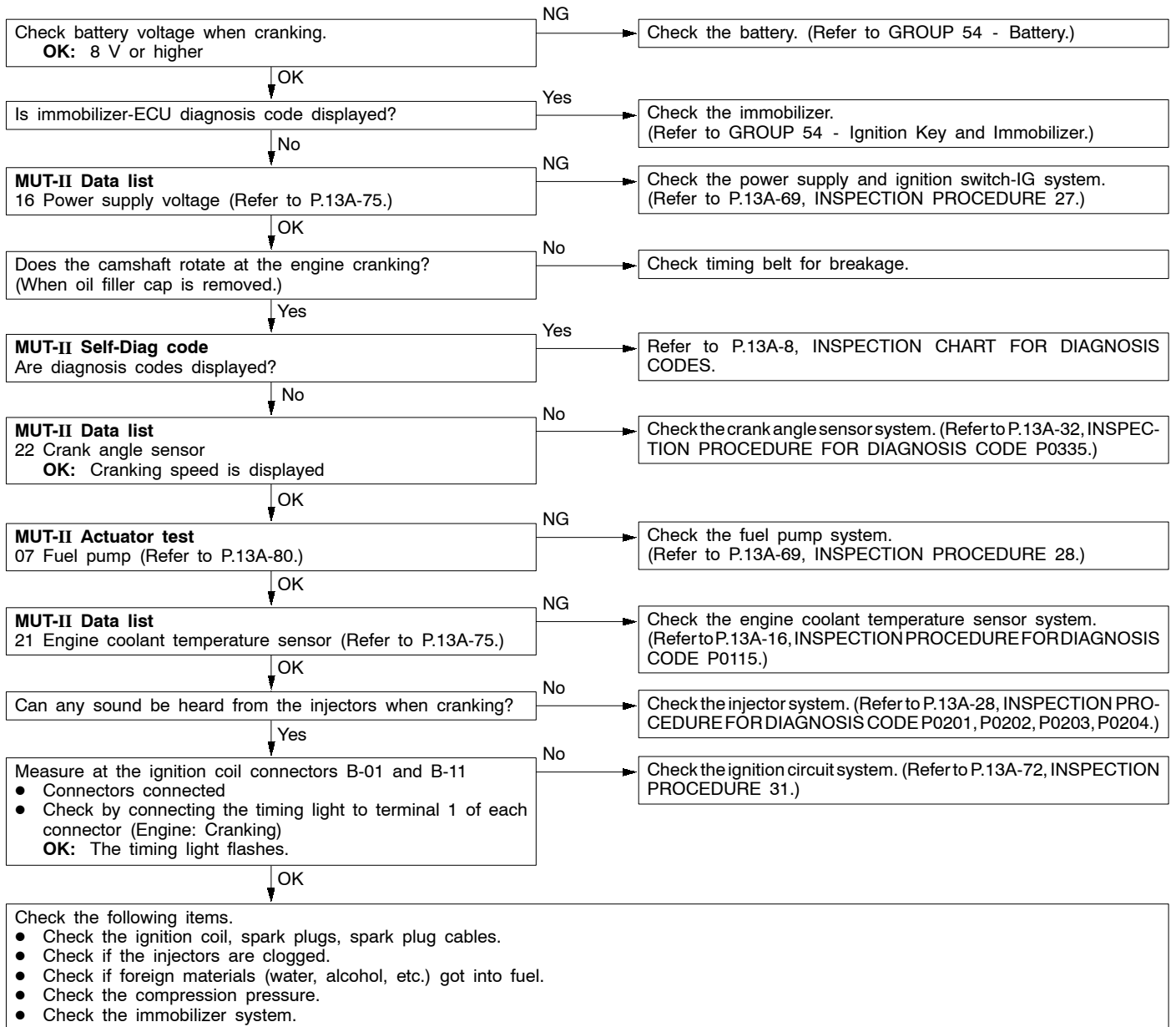
INSPECTION PROCEDURE 4

| 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 <M/T> or engine-A/T-ECU <A/T> is detecting a problem in a sensor or actuator, or that one of the malfunctions listed at right has occurred. | <ul style="list-style-type: none"> ● Short-circuit between the engine warning lamp and engine-ECU <M/T> or engine-A/T-ECU <A/T> ● Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> |



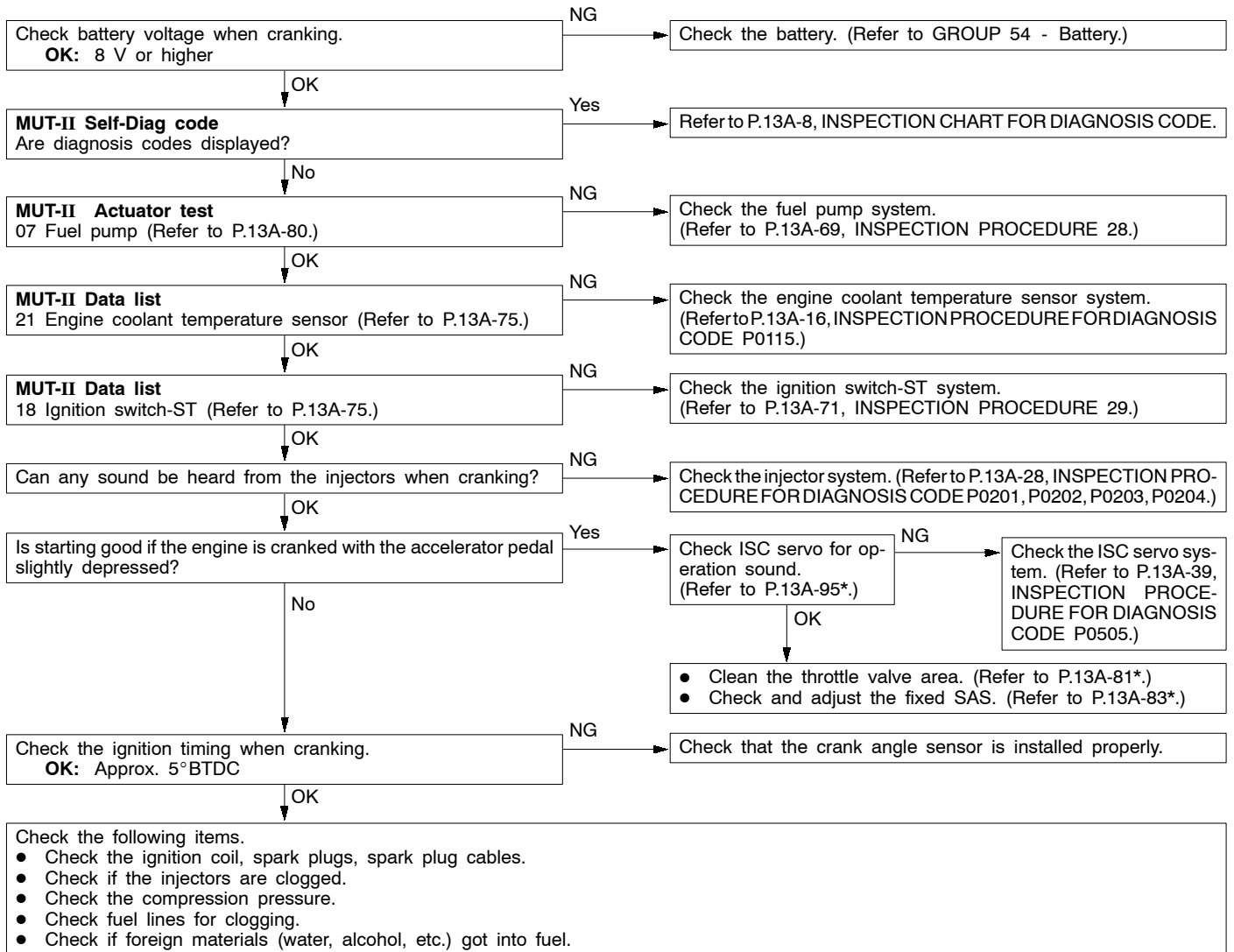
INSPECTION PROCEDURE 5

| No initial combustion (starting impossible) | Probable cause |
|--|--|
| <p>In cases such as the above, the cause is probably that a spark plug is defective, or that the supply of fuel to the combustion chamber is defective. In addition, foreign materials (water, kerosene, etc.) may be mixed with the fuel.</p> | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of the fuel pump system • Malfunction of the injectors • Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> • Malfunction of the immobilizer system • Foreign materials in fuel |



INSPECTION PROCEDURE 6

| Initial combustion but no complete combustion (starting impossible) | Probable cause |
|---|--|
| In such cases as the above, the cause is probably that the spark plugs are generating sparks but the sparks are weak, or the initial mixture for starting is not appropriate. | <ul style="list-style-type: none"> ● Malfunction of the ignition system ● Malfunction of the injector system ● Foreign materials in fuel ● Poor compression ● Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> |

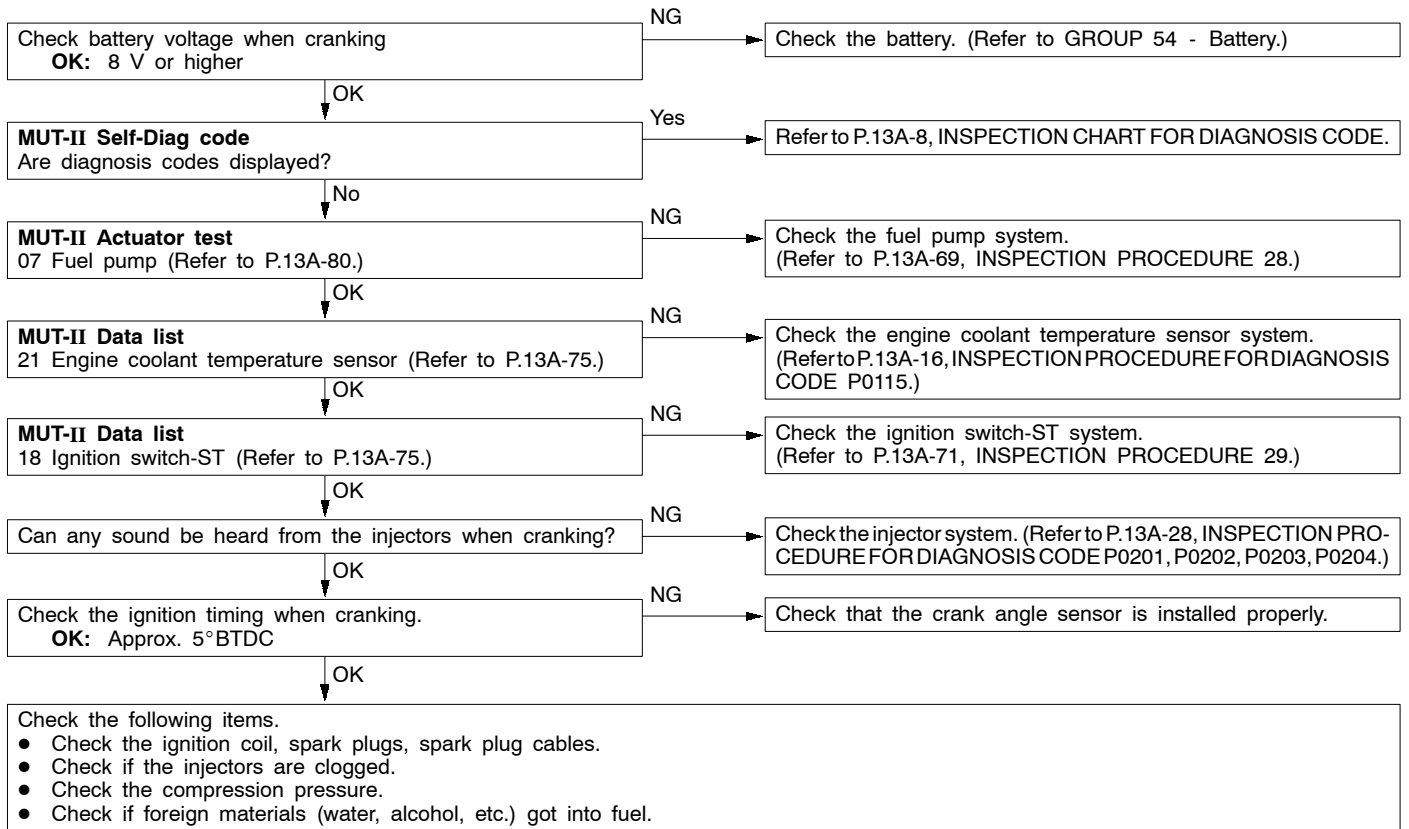


NOTE:

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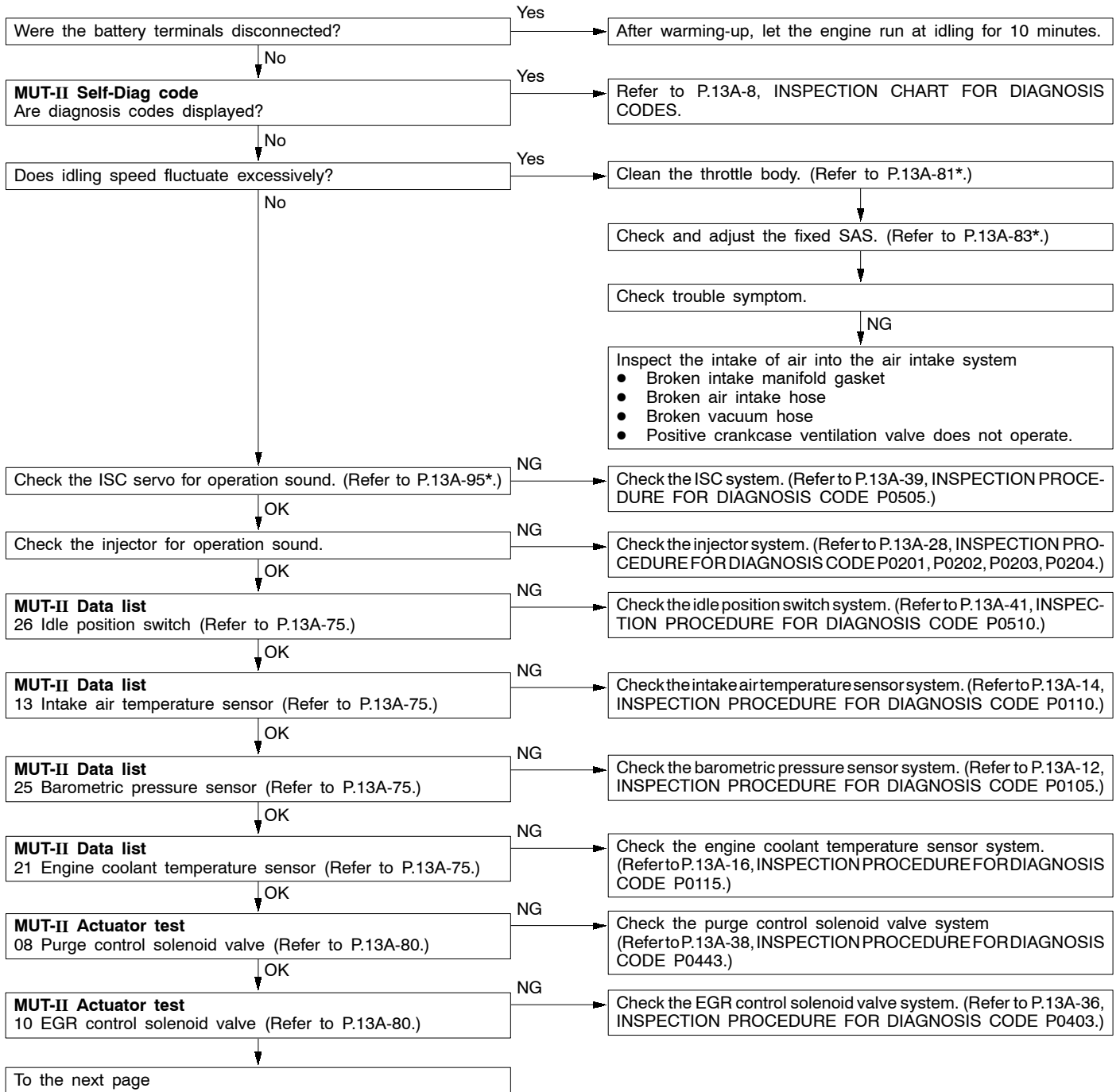
INSPECTION PROCEDURE 7

| It takes too long time to start. (Incorrect starting) | Probable cause |
|--|--|
| In cases such as the above, the cause is probably that the spark is weak and ignition is difficult, the initial mixture for starting is not appropriate, or sufficient compression pressure is not being obtained. | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of the injector system • Inappropriate gasoline use • Poor compression |



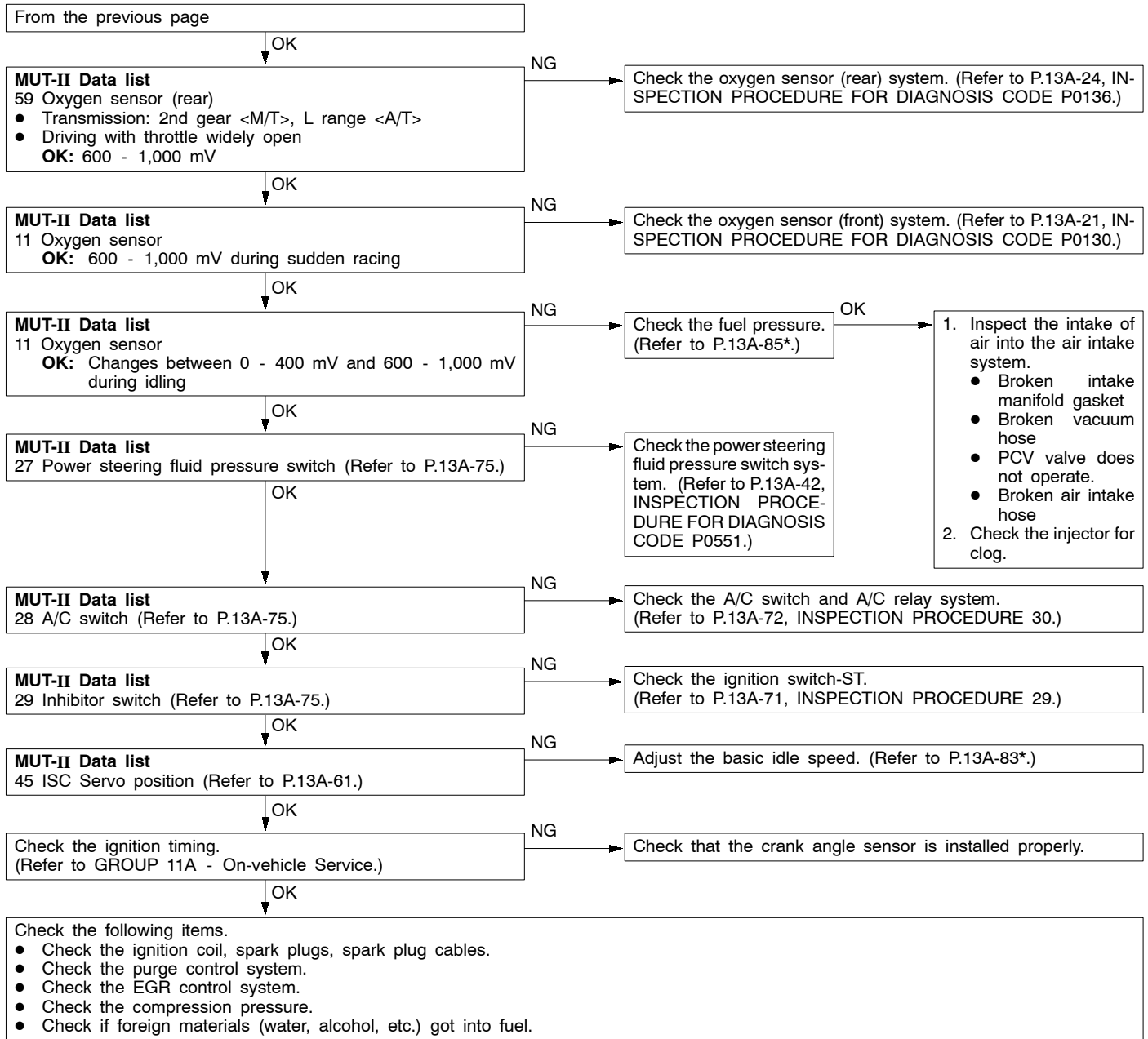
INSPECTION PROCEDURE 8

| Unstable idling (Rough idling, hunting) | Probable cause |
|---|--|
| In cases as the above, the cause is probably that the ignition system, air/fuel mixture, idle speed control (ISC) or compression pressure is defective. Because the range of possible causes is broad, inspection is narrowed down to simple items. | <ul style="list-style-type: none"> ● Malfunction of the ignition system ● Malfunction of air/fuel ratio control system ● Malfunction of the ISC system ● Malfunction of the purge control solenoid valve system ● Malfunction of the EGR solenoid valve system ● Poor compression ● Drawing air into exhaust system |



NOTE:

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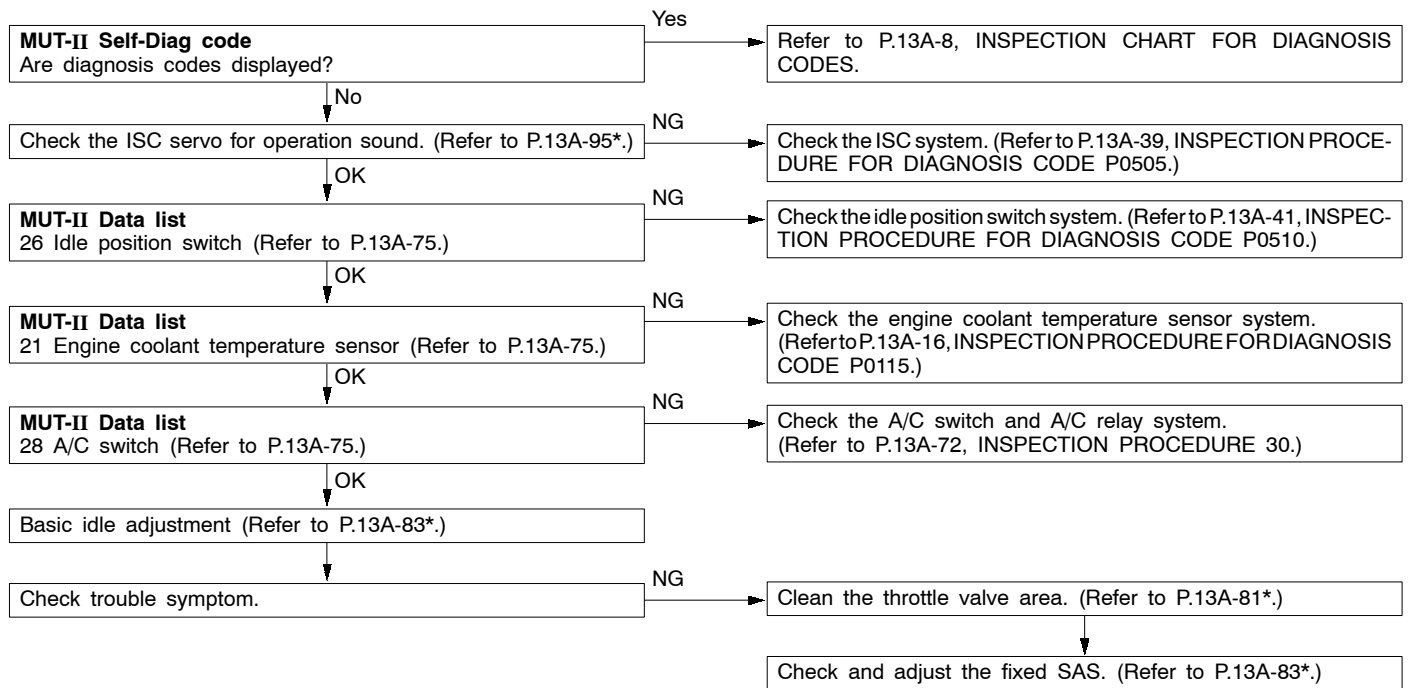


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 9

| Idling speed is high. (Improper idling speed) | Probable cause |
|--|---|
| In such cases as the above, the cause is probably that the intake air volume during idling is too great. | <ul style="list-style-type: none"> • Malfunction of the ISC system • Malfunction of the throttle body |

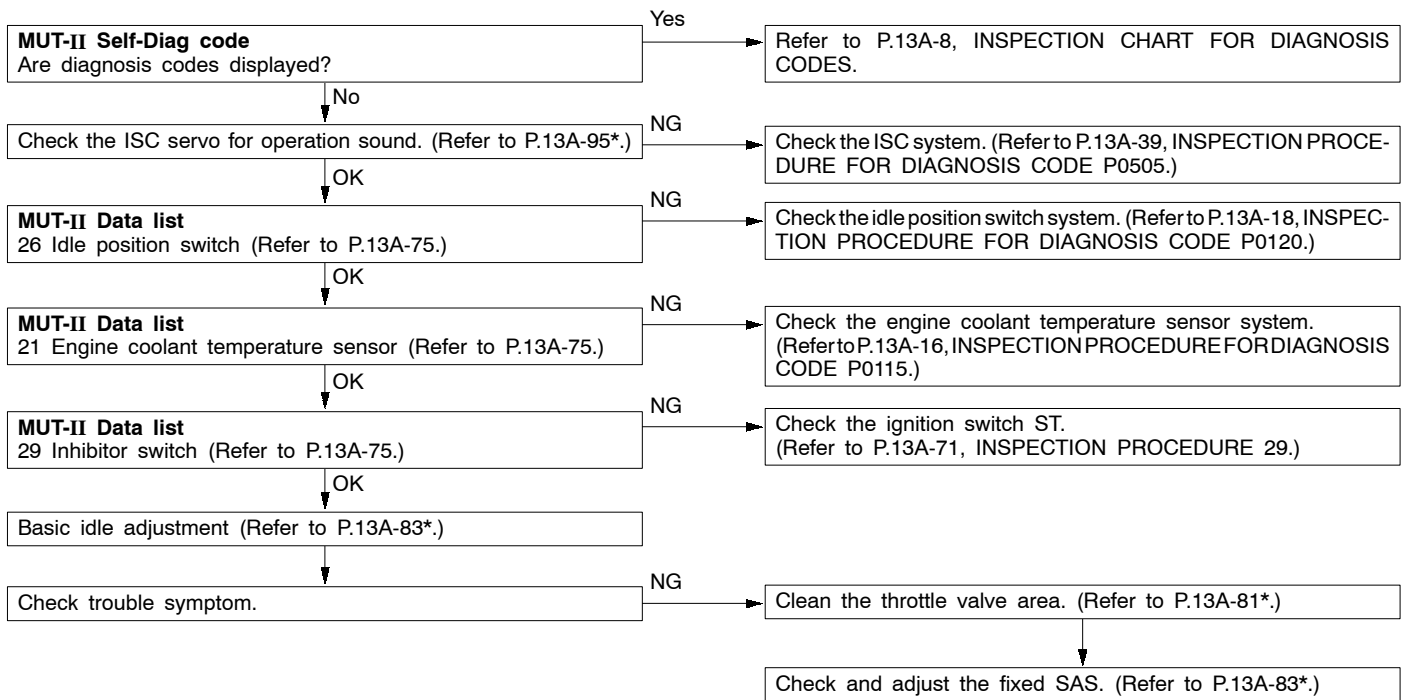


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 10

| Idling speed is low. (Improper idling speed) | Probable cause |
|--|---|
| In cases such as the above, the cause is probably that the intake air volume during idling is too small. | <ul style="list-style-type: none"> • Malfunction of the ISC system • Malfunction of the throttle body |

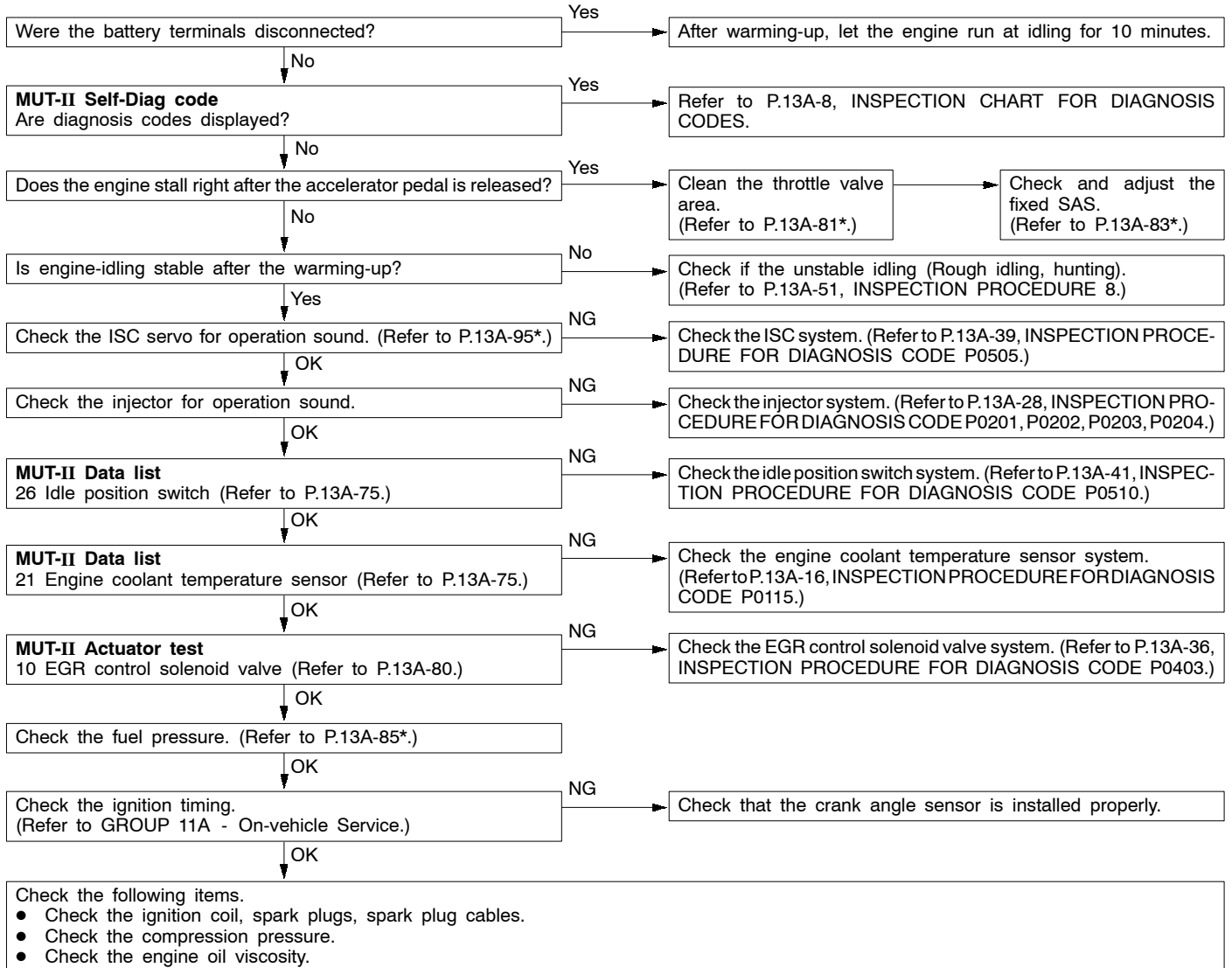


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 11

| When the engine is cold, it stalls at idling. (Die out) | Probable cause |
|--|---|
| In such cases as the above, the cause is probably that the air/fuel mixture is inappropriate when the engine is cold, or that the intake air volume is insufficient. | <ul style="list-style-type: none"> • Malfunction of the ISC system • Malfunction of the throttle body • Malfunction of the injector system • Malfunction of the ignition system |

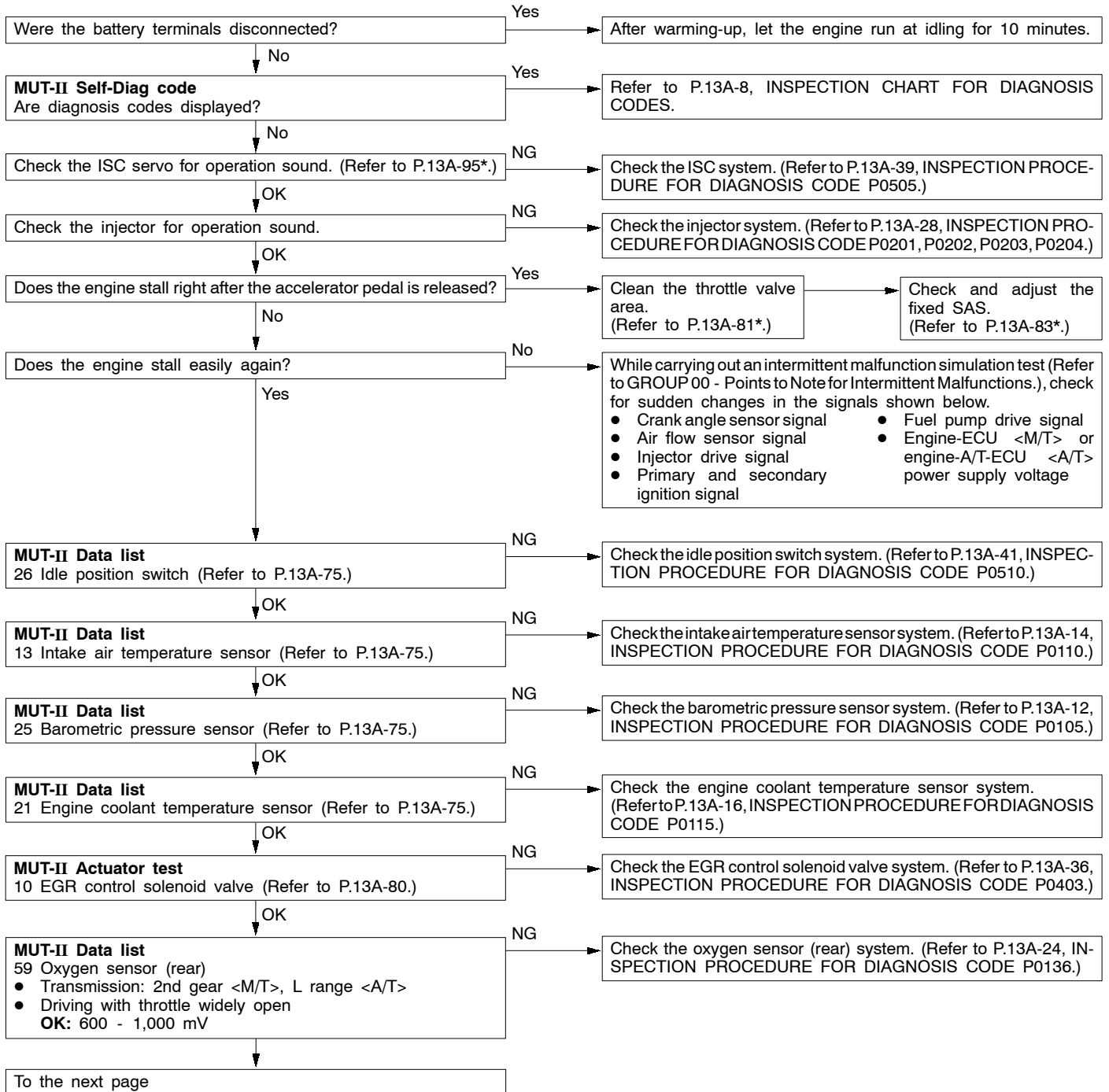


NOTE:

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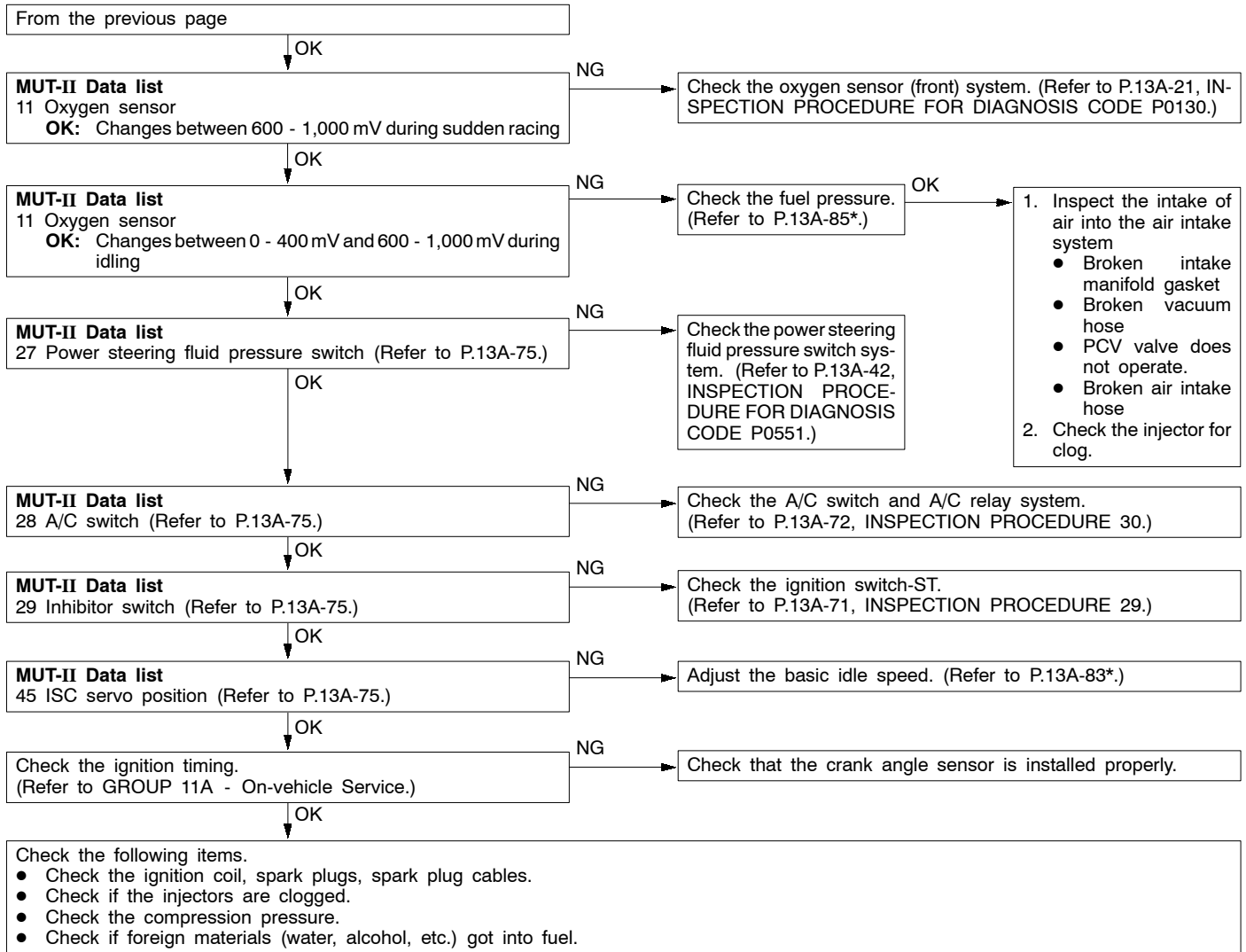
INSPECTION PROCEDURE 12

| When the engine is hot, it stalls at idling. (Die out) | Probable cause |
|--|---|
| In such cases as the above, the cause is probably that ignition system, air/fuel mixture, idle speed control (ISC) or compression pressure is defective. In addition, if the engine suddenly stalls, the cause may also be a defective connector contact. | <ul style="list-style-type: none"> ● Malfunction of the ignition system ● Malfunction of air/fuel ratio control system ● Malfunction of the ISC system ● Drawing air into intake system ● Improper connector contact |



NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

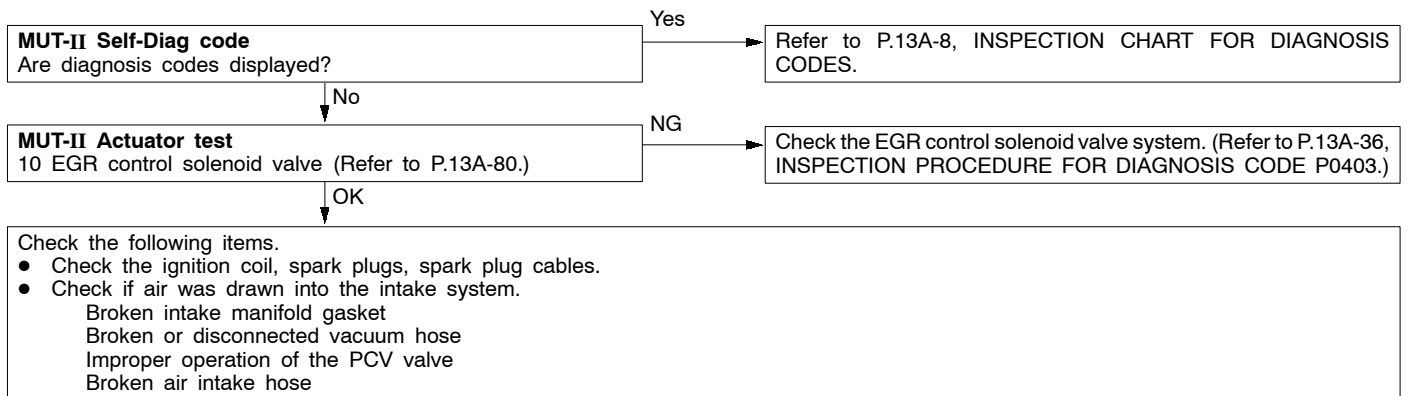


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

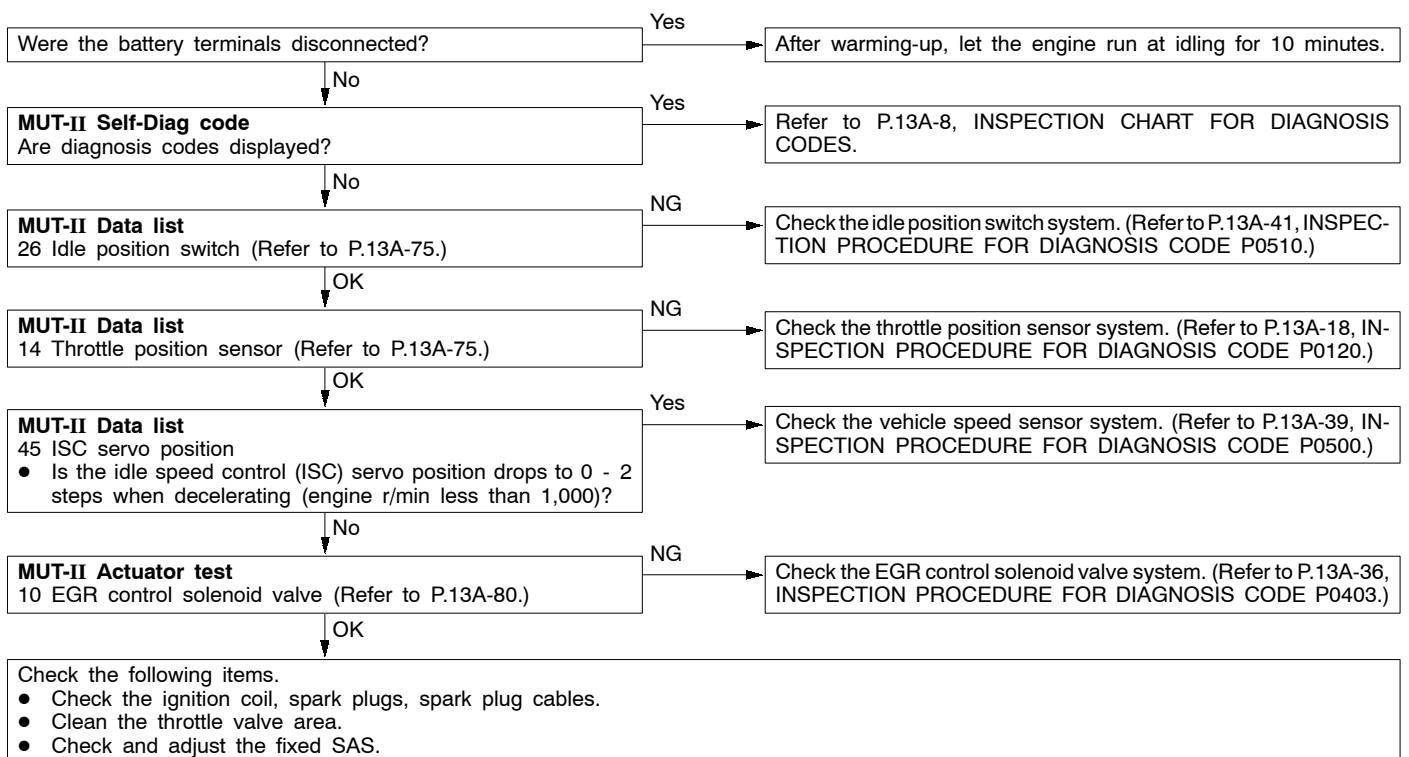
INSPECTION PROCEDURE 13

| The engine stalls when starting the car. (Pass out) | Probable cause |
|--|--|
| In cases such as the above, the cause is probably misfiring due to a weak spark, or an inappropriate air/fuel mixture when the accelerator pedal is depressed. | <ul style="list-style-type: none"> • Drawing air into intake system • Malfunction of the ignition system |



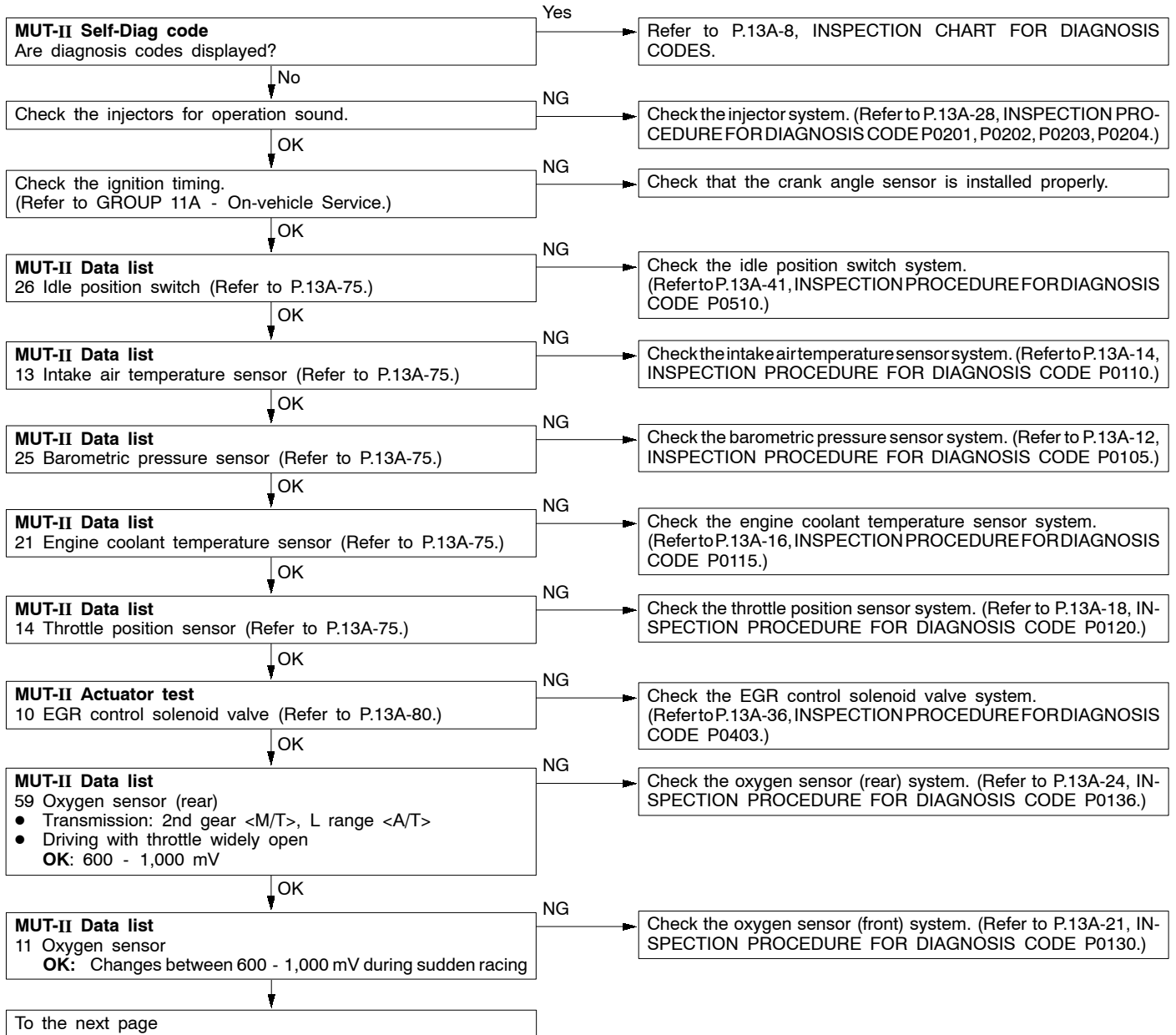
INSPECTION PROCEDURE 14

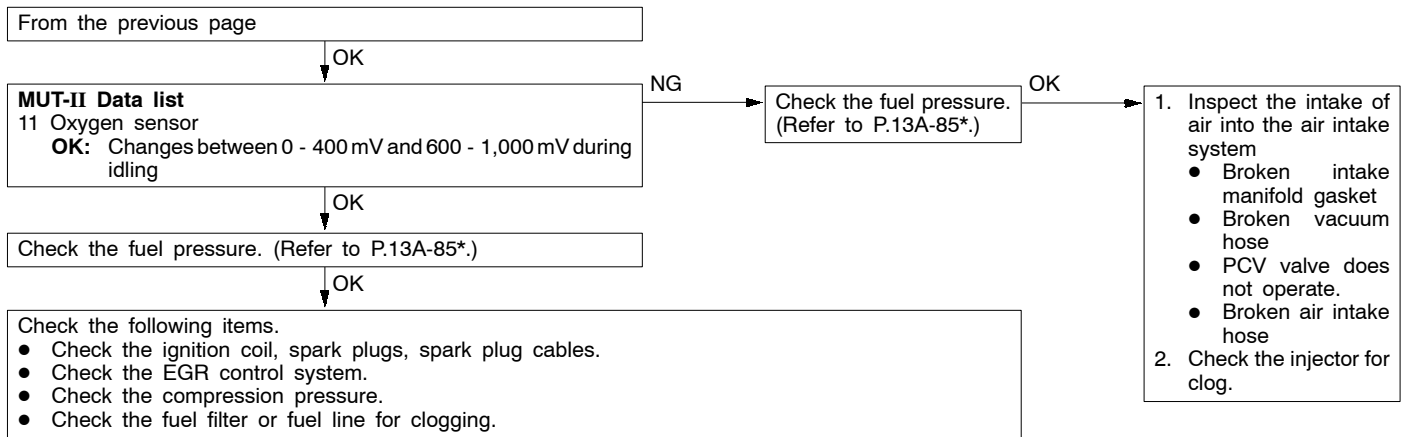
| The engine stalls when decelerating. | Probable cause |
|--|---|
| In cases such as the above, the cause is probably that the intake air volume is insufficient due to a defective idle speed control (ISC) system. | <ul style="list-style-type: none"> • Malfunction of the ISC system |



INSPECTION PROCEDURE 15

| Hesitation, sag or stumble | Probable cause |
|--|---|
| In cases such as the above, the cause is probably that ignition system, air/fuel mixture or compression pressure is defective. | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of air/fuel ratio control system • Malfunction of the fuel supply system • Malfunction of the EGR control solenoid valve system • Poor compression |



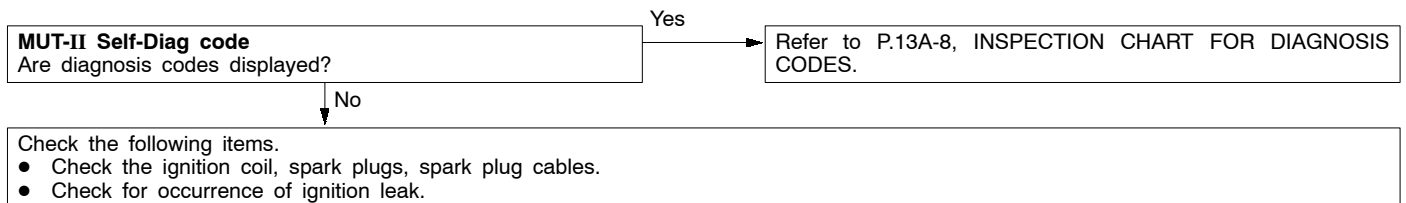


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

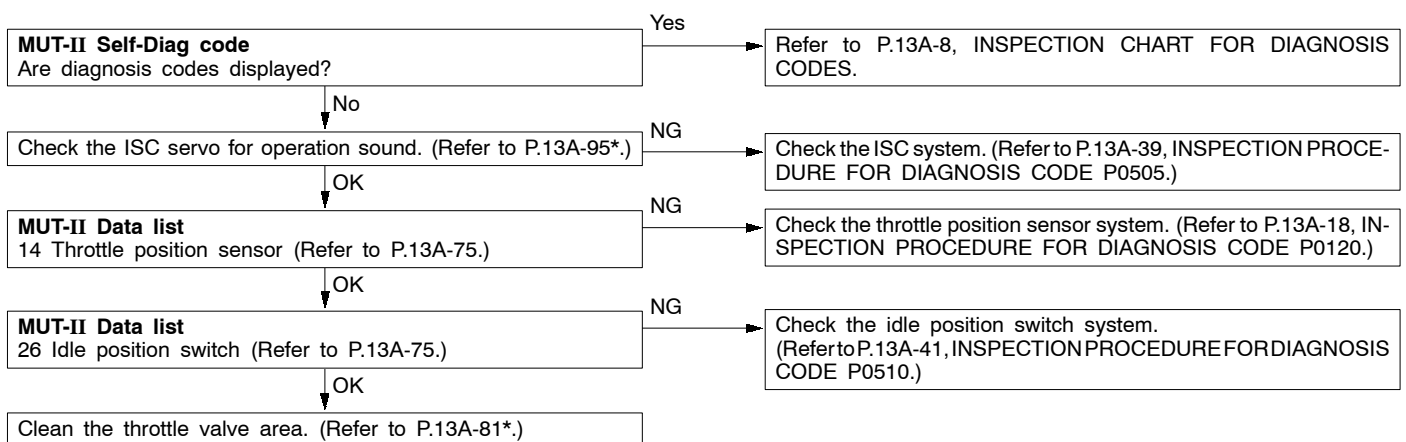
INSPECTION PROCEDURE 16

| The feeling of impact or vibration when accelerating | Probable cause |
|--|--|
| In cases such as the above, the cause is probably that there is an ignition leak accompanying the increase in the spark plug demand voltage during acceleration. | <ul style="list-style-type: none"> • Malfunction of the ignition system |



INSPECTION PROCEDURE 17

| The feeling of impact or vibration when decelerating. | Probable cause |
|---|---|
| Malfunction of the ISC system is suspected. | <ul style="list-style-type: none"> • Malfunction of the ISC system |

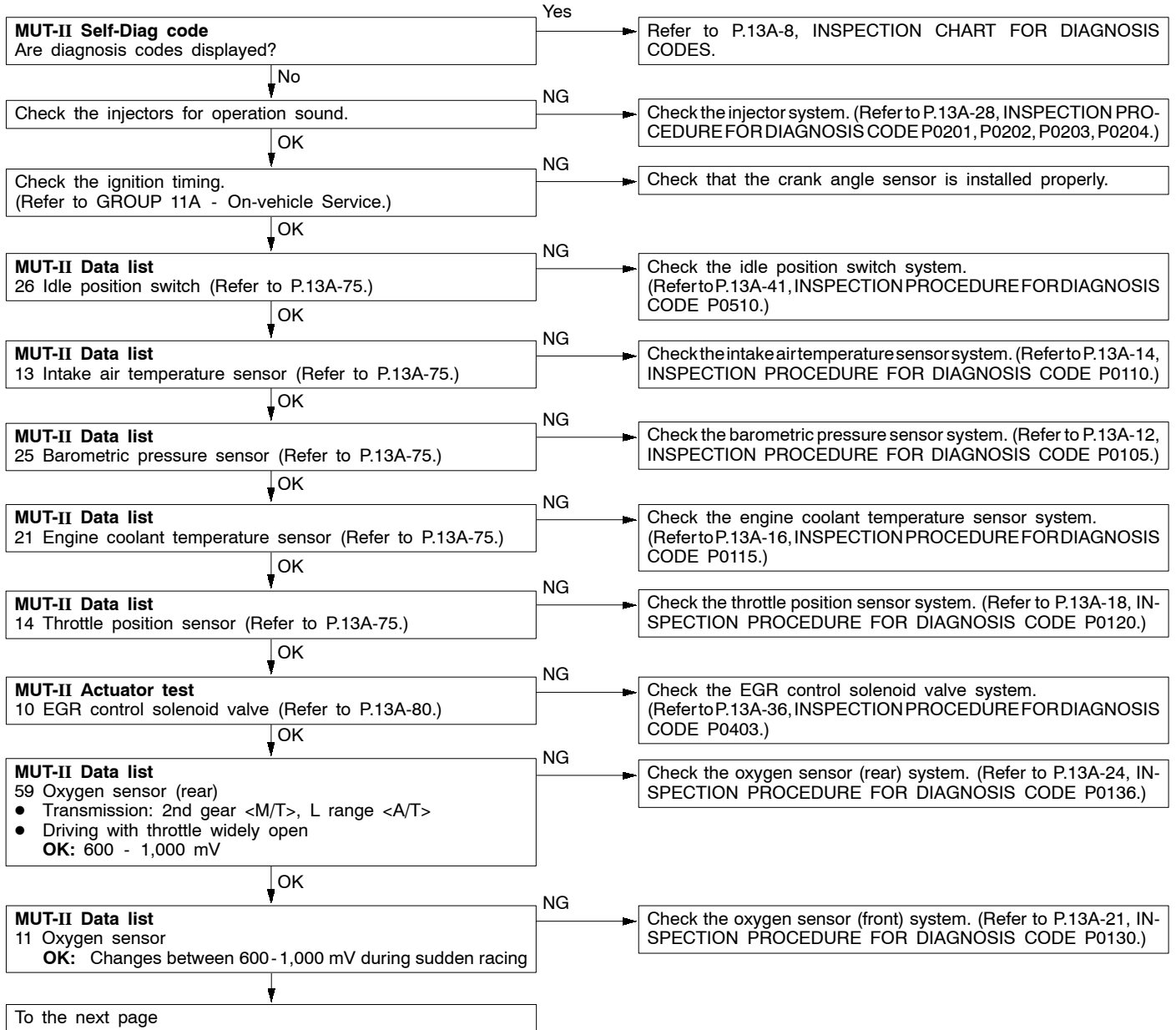


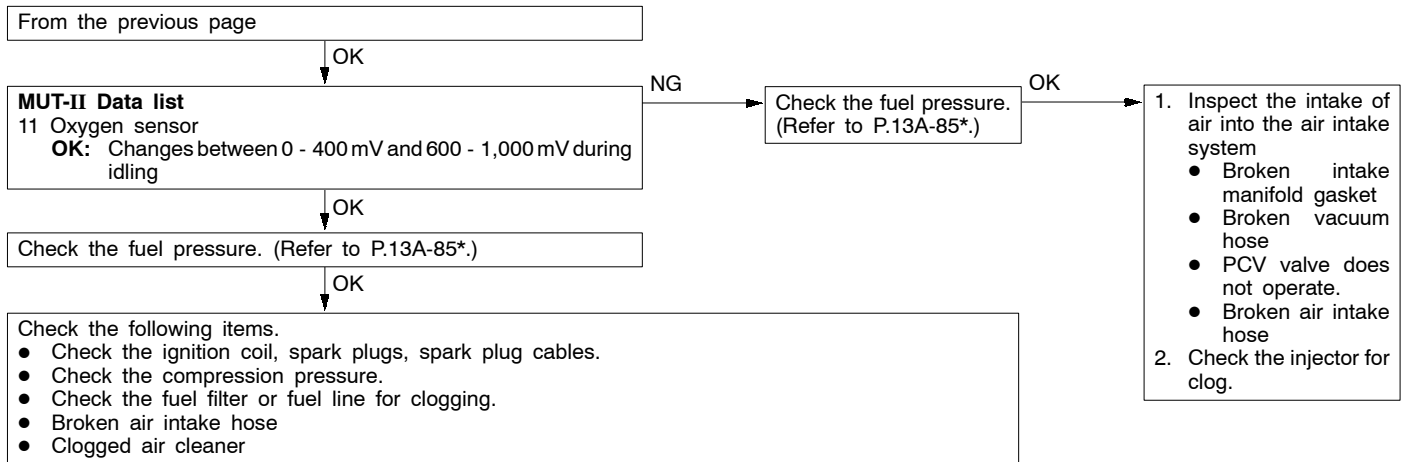
NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 18

| Poor acceleration | Probable cause |
|--|--|
| Defective ignition system, abnormal air/fuel ratio, poor compression pressure, etc. are suspected. | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of air/fuel ratio control system • Malfunction of the fuel supply system • Poor compression pressure • Clogged exhaust system |



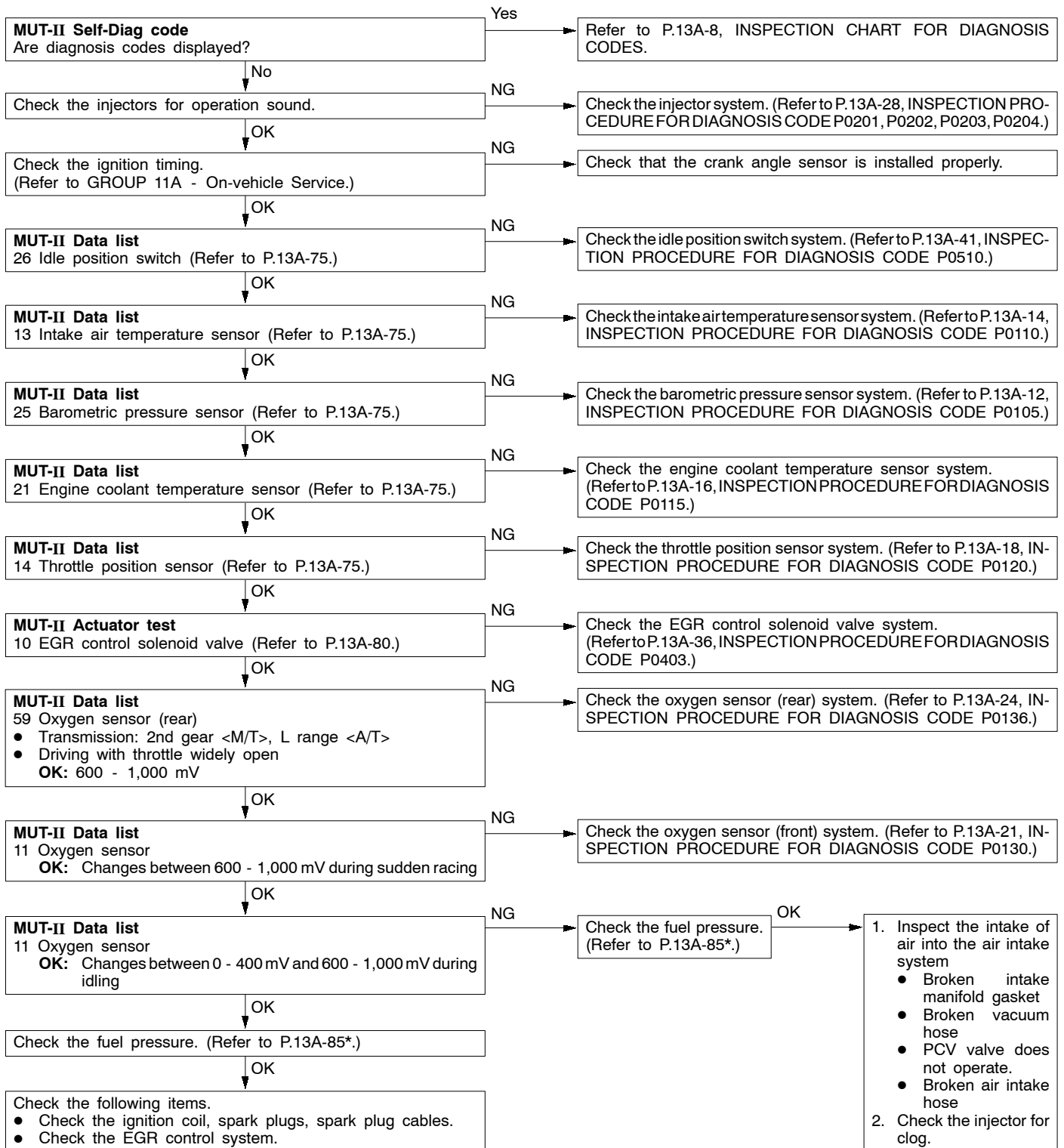


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 19

| Surge | Probable cause |
|---|--|
| Defective ignition system, abnormal air/fuel ratio, etc. are suspected. | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of air/fuel ratio control system • Malfunction of the EGR control solenoid valve system |

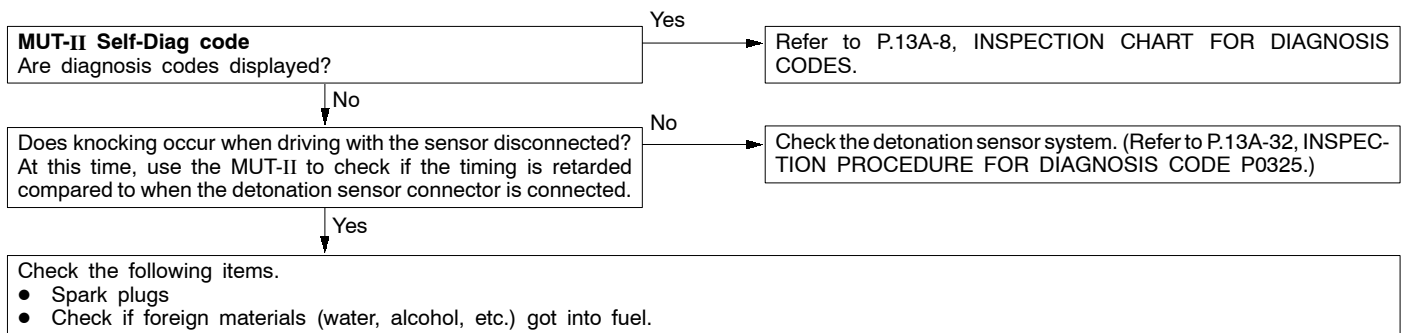


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 20

| Knocking | Probable cause |
|---|---|
| In cases as the above, the cause is probably that the detonation control is defective or the heat value of the spark plug is inappropriate. | <ul style="list-style-type: none"> Defective detonation sensor Inappropriate heat value of the spark plug |



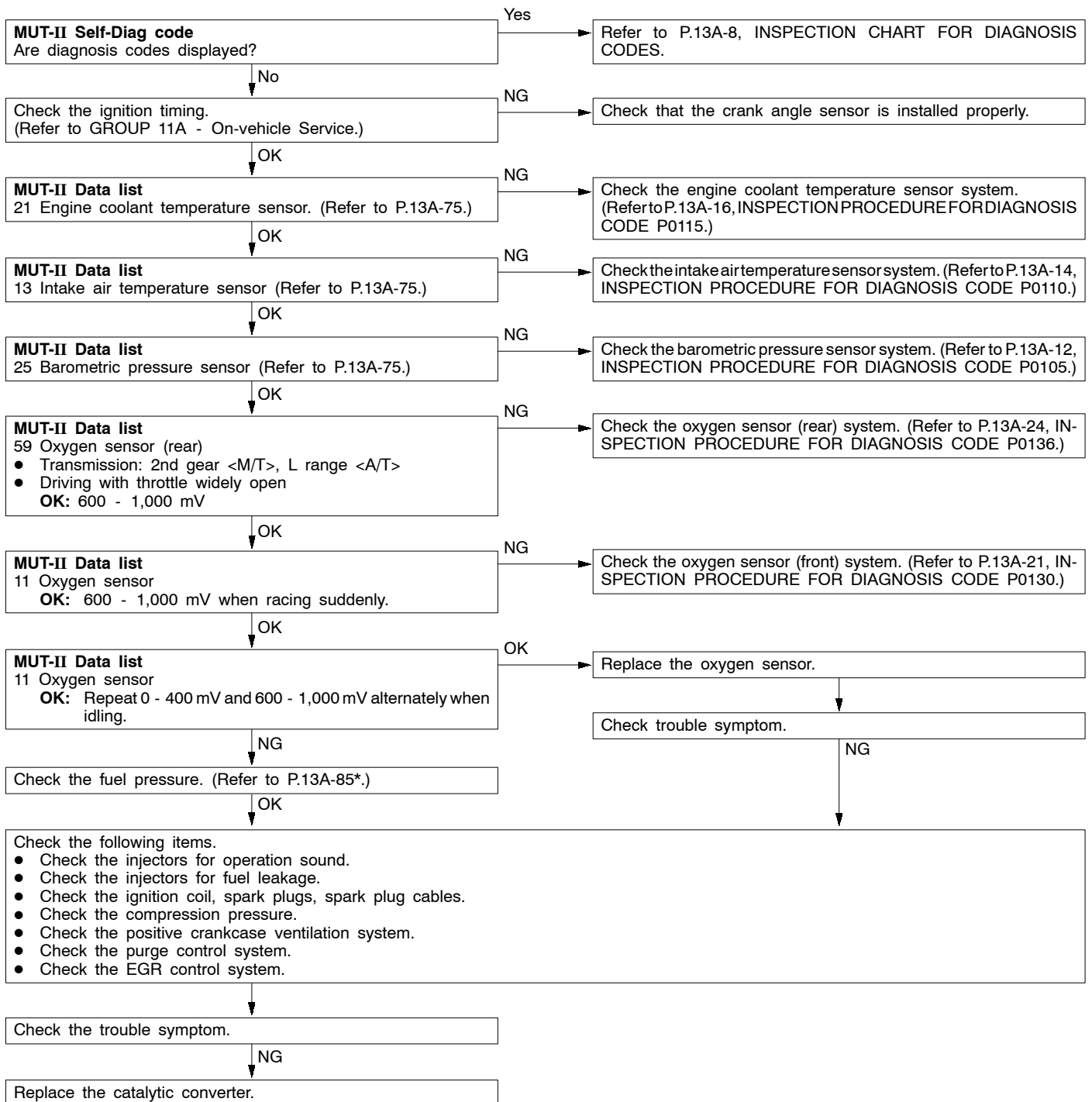
INSPECTION PROCEDURE 21

| Dieseling | Probable cause |
|---|---|
| Fuel leakage from injectors is suspected. | <ul style="list-style-type: none"> Fuel leakage from injectors |

Check the injectors for fuel leakage.

INSPECTION PROCEDURE 22

| Too high CO and HC concentration when idling | Probable cause |
|--|---|
| Abnormal air/fuel ratio is suspected. | <ul style="list-style-type: none"> Malfunction of the air/fuel ratio control system Deteriorated catalyst |

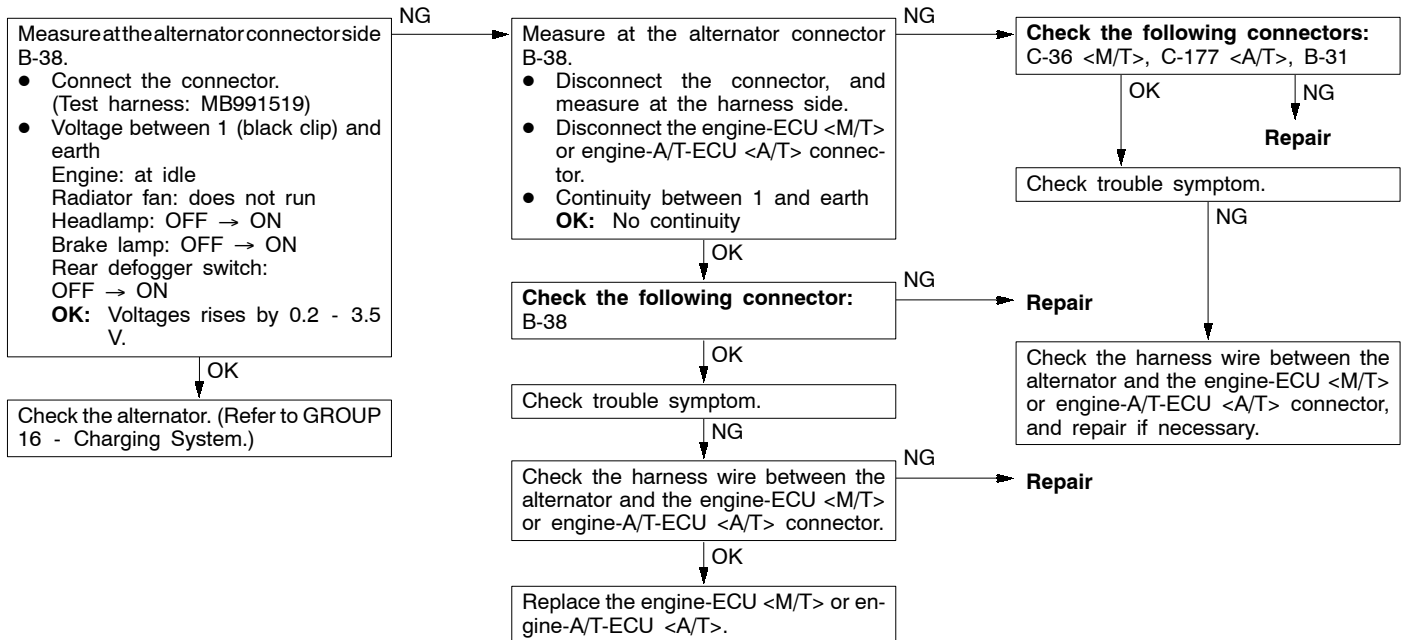


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

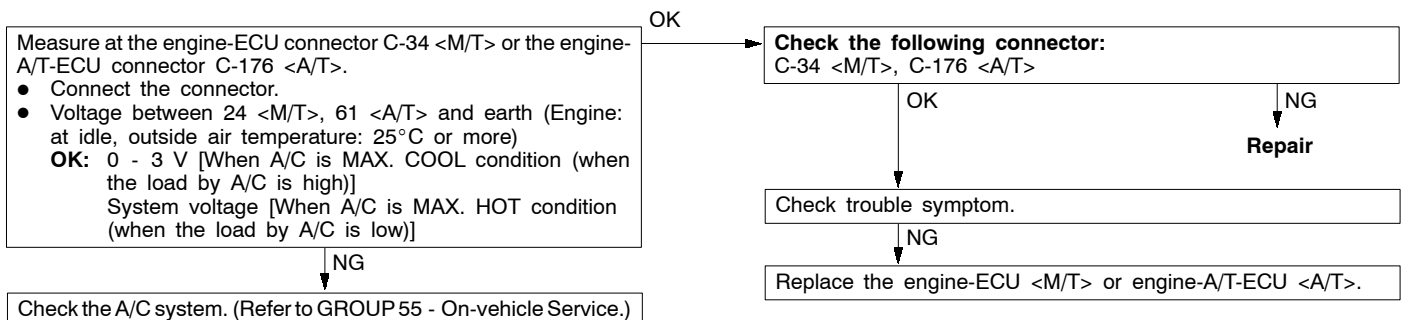
INSPECTION PROCEDURE 23

| Low alternator output voltage (approx. 12.3 V) | Probable cause |
|---|--|
| The alternator may be defective, or malfunctions, which are listed in the right column, may be suspected. | <ul style="list-style-type: none"> Malfunction of charging system Short circuit in harness between alternator G terminal and engine-ECU <M/T> or engine-A/T-ECU <A/T> Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T> |



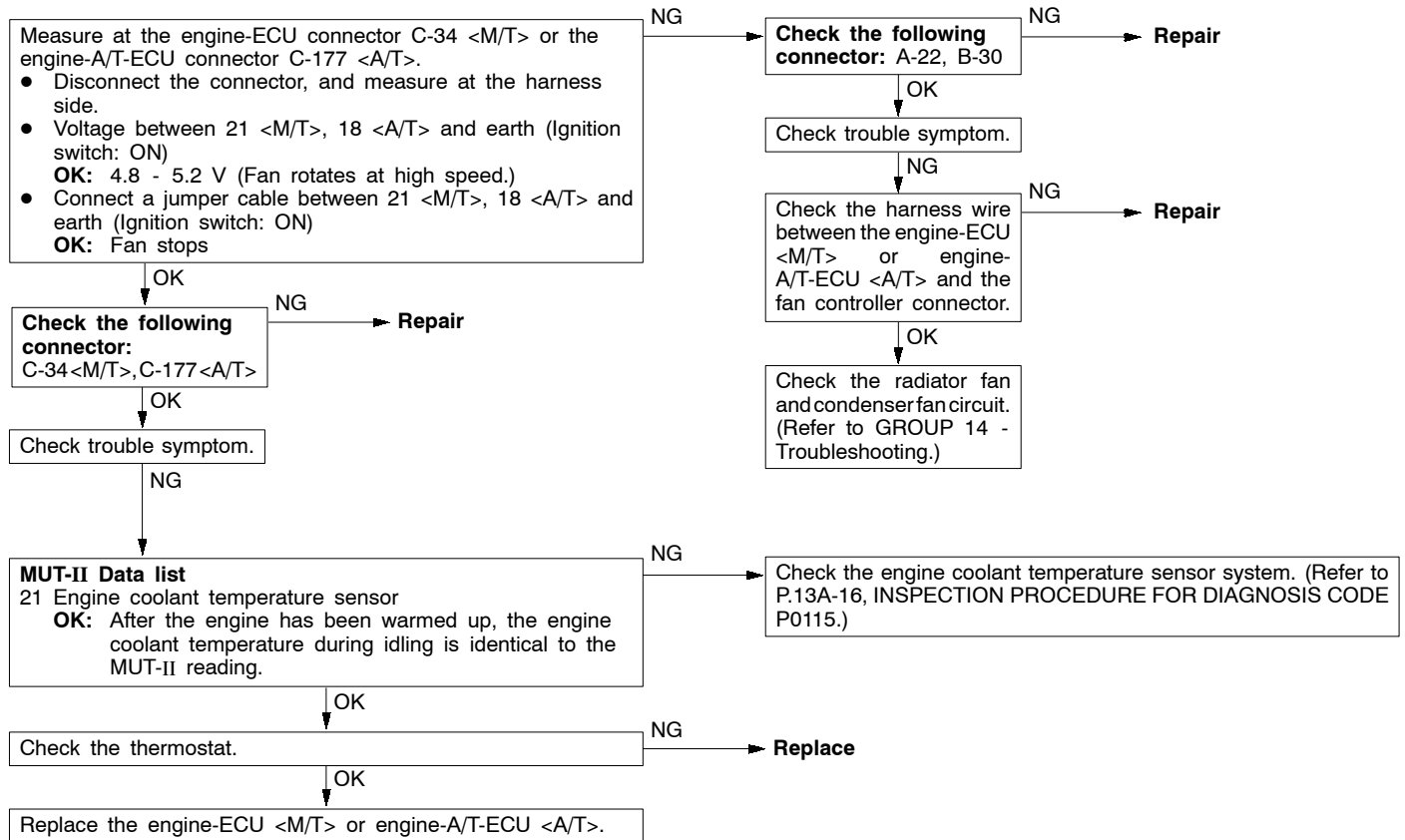
INSPECTION PROCEDURE 24

| Idling speed is improper when A/C is operating | Probable cause |
|--|--|
| <p>If the engine-ECU <M/T> or engine-A/T-ECU <A/T> detects that the air conditioner is on, it activates the idle speed control (ISC) servo to control idle-up operation.</p> <p>The A/C-ECU judges if the load caused by air conditioner operation is high or low, and converts it to voltage signal (high or low voltage) and inputs the signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.</p> <p>Based on this voltage signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the idle-up speed (for high or low load).</p> | <ul style="list-style-type: none"> Malfunction of the A/C control system Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> |



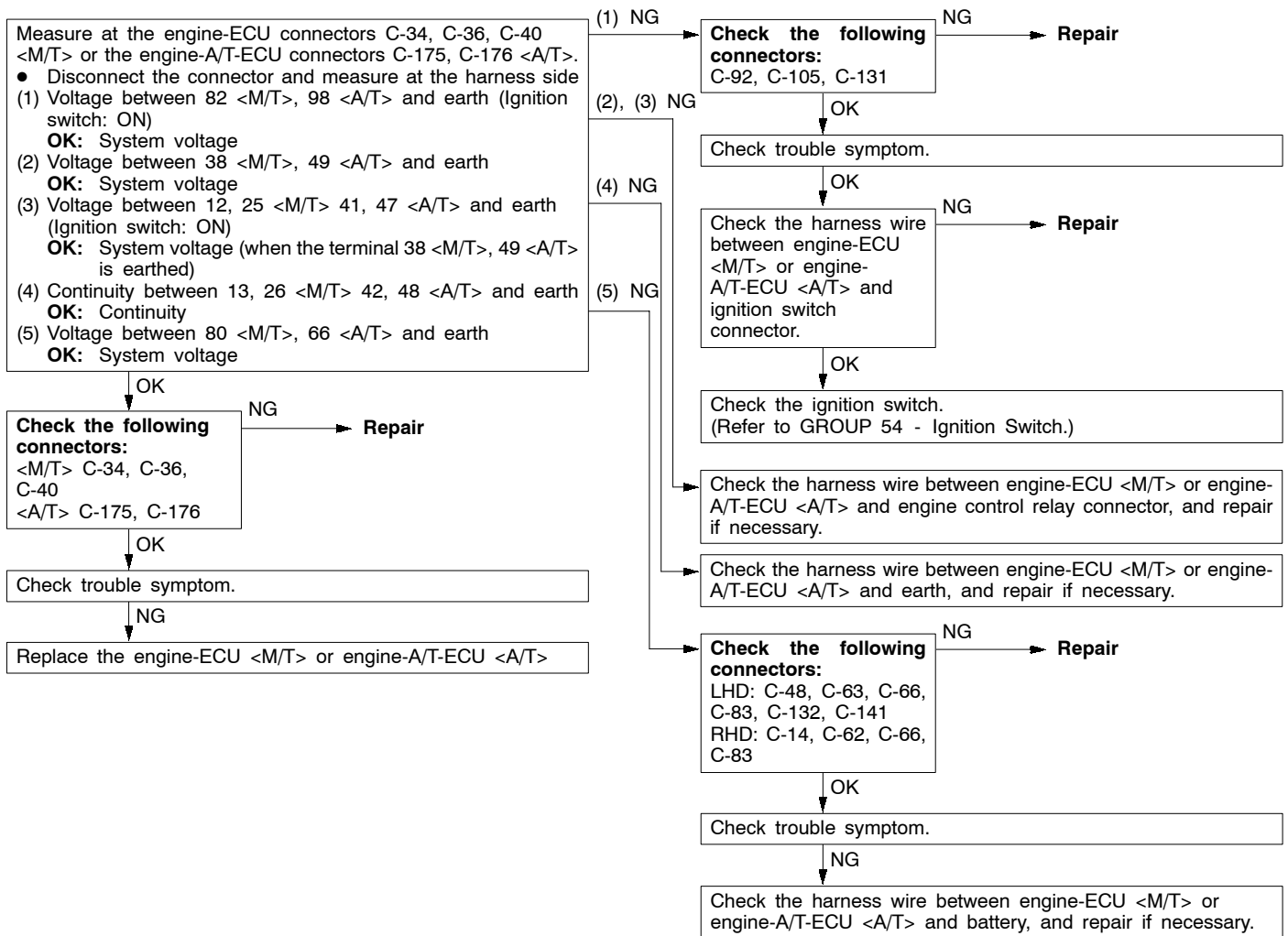
INSPECTION PROCEDURE 25

| Fans (radiator fan, A/C condenser fan) are inoperative | Probable cause |
|--|--|
| <p>The engine-ECU <M/T> or engine-A/T-ECU <A/T> outputs a duty signal to the fan controller depending on the engine coolant temperature, vehicle speed, and air conditioner switch condition.</p> <p>Based on this signal, the fan controller controls the radiator fan and condenser fan speeds (The more the average voltage at the terminal approaches 5 V, the higher the fan speed become.)</p> | <ul style="list-style-type: none"> • Malfunction of the fan motor relay • Malfunction of the fan motor • Malfunction of the fan controller • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> |



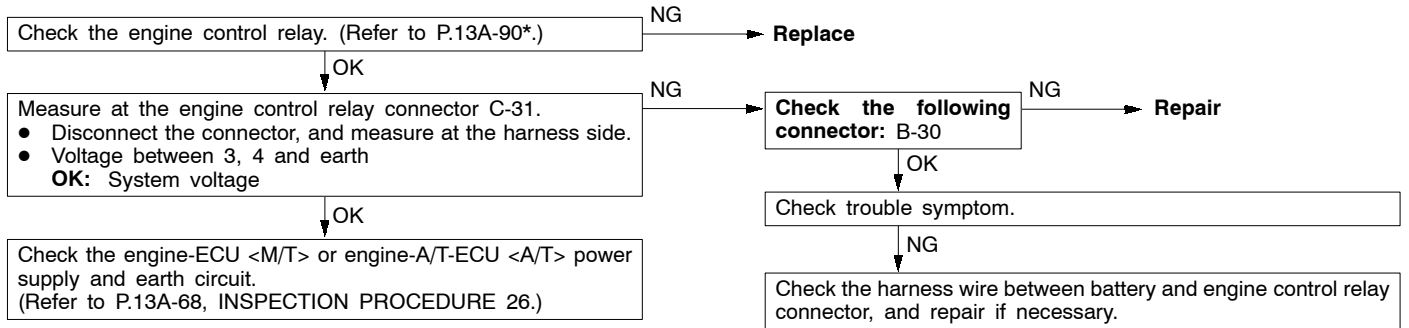
INSPECTION PROCEDURE 26

| Engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply and earth circuit system | Probable cause |
|--|---|
| The engine-ECU <M/T> or engine-A/T-ECU <A/T> may be defective, or that one of the malfunctions listed at right has occurred. | <ul style="list-style-type: none"> Improper connector contact, open circuit or short-circuited harness wire in the engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply circuit. Open circuit or short-circuited harness wire in the engine-ECU <M/T> or engine-A/T-ECU <A/T> earth circuit Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> |



INSPECTION PROCEDURE 27

| Power supply system and ignition switch-IG system | Probable cause |
|--|--|
| When an ignition switch ON signal is input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> turns the engine control relay ON. This causes battery voltage to be supplied to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, injectors and air flow sensor. | <ul style="list-style-type: none"> ● Malfunction of the ignition switch ● Malfunction of the engine control relay ● Improper connector contact, open circuit or short-circuited harness wire ● Disconnected engine-ECU <M/T> or engine-A/T-ECU <A/T> earth wire ● Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> |

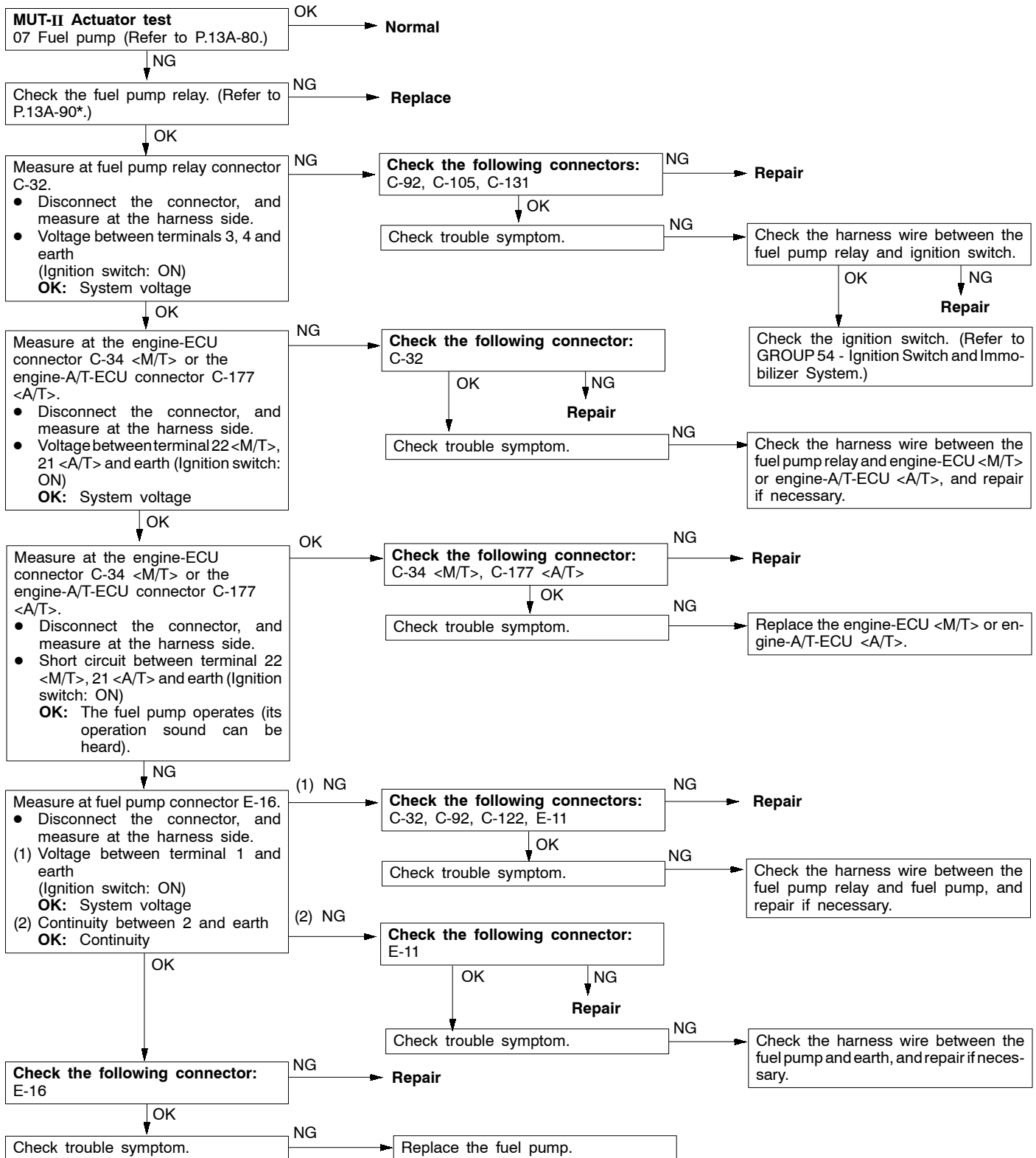


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 28

| Fuel pump system | Probable cause |
|---|---|
| The engine-ECU <M/T> or engine-A/T-ECU <A/T> turns the control relay ON when the engine is cranking or running, and this supplies power to drive the fuel pump. | <ul style="list-style-type: none"> ● Malfunction of the fuel pump relay ● Malfunction of the fuel pump ● Improper connector contact, open circuit or short-circuited harness wire ● Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> |



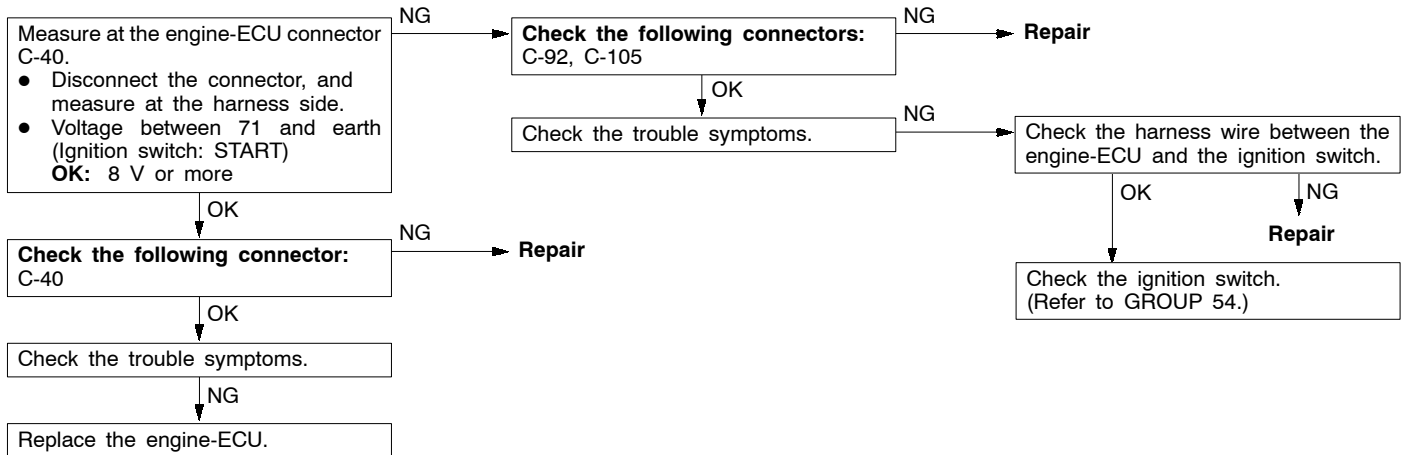
NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

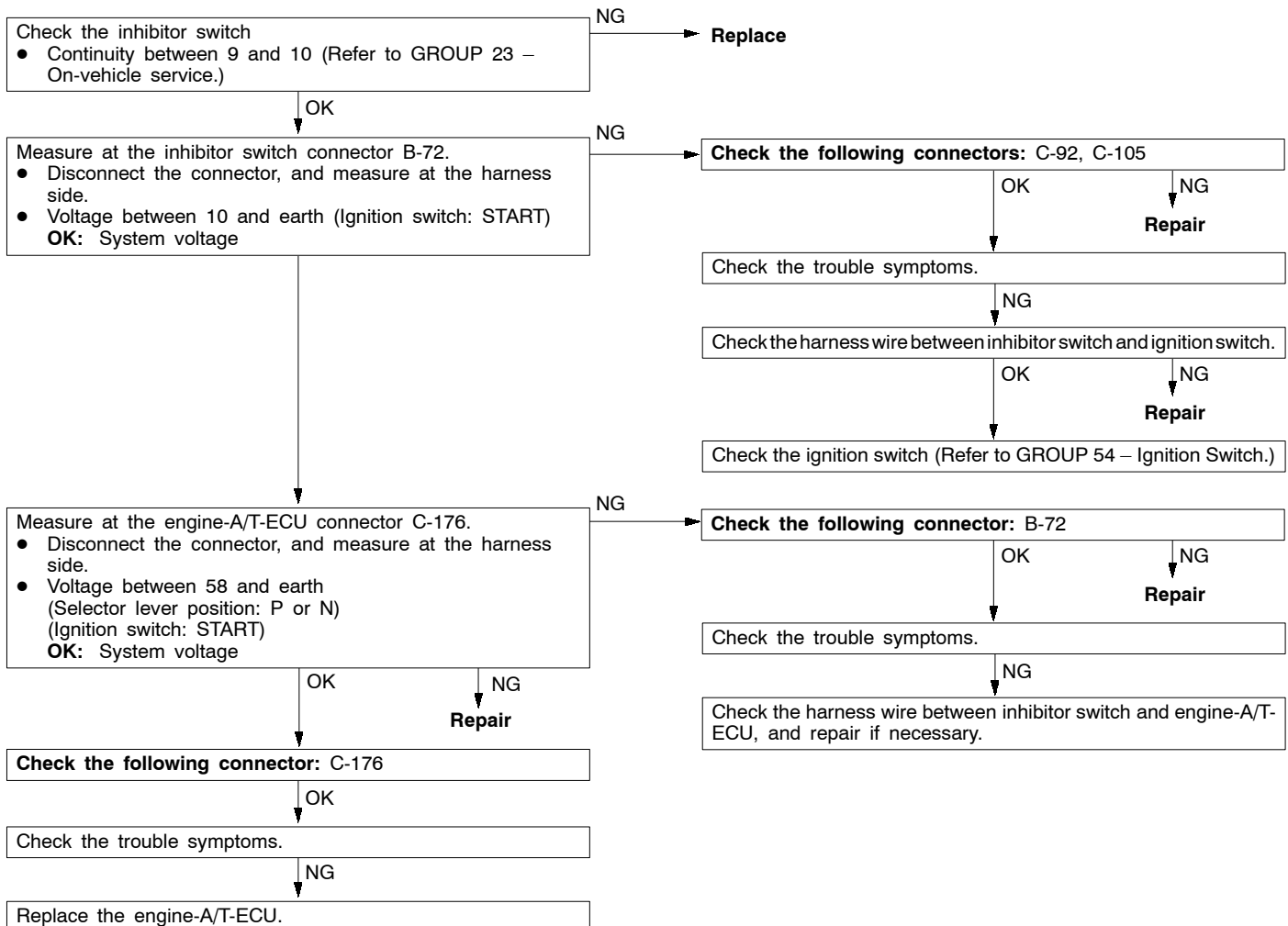
Inspection procedure 29

| Ignition switch-ST system | Probable cause |
|---|--|
| The ignition switch-ST outputs a HIGH signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T> while the engine is cranking. The engine-ECU <M/T> or engine-A/T-ECU <A/T> uses this signal to carry out functions such as fuel injection control during starting. | <ul style="list-style-type: none"> • Malfunction of the ignition switch • Malfunction of the inhibitor switch <A/T> • Open circuit or short-circuited harness wire of the ignition switch circuit • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |

<M/T>

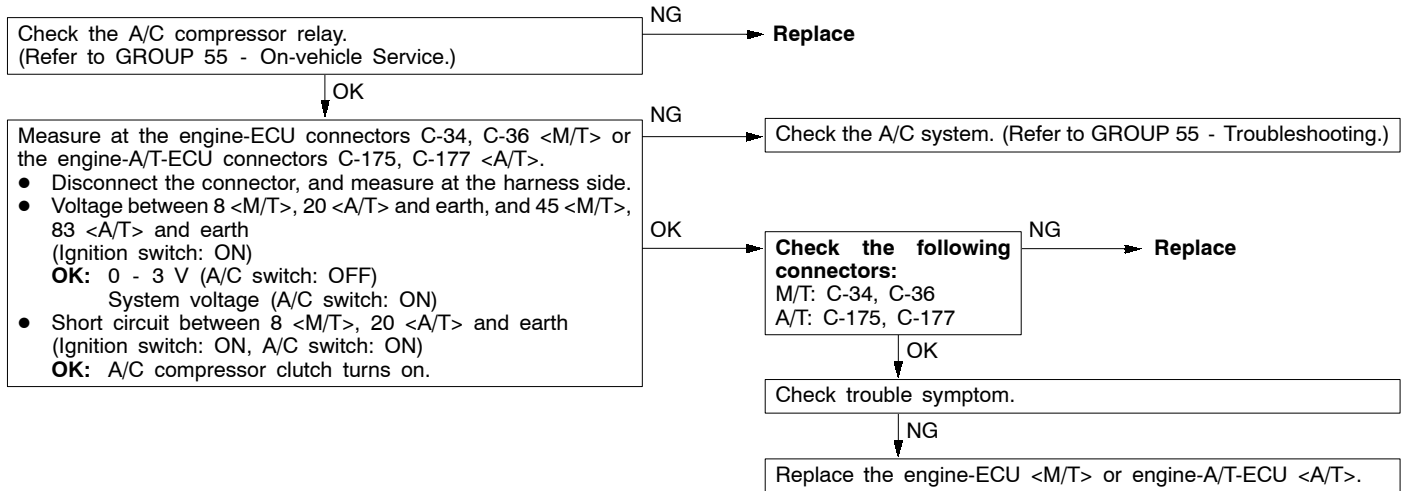


<A/T>



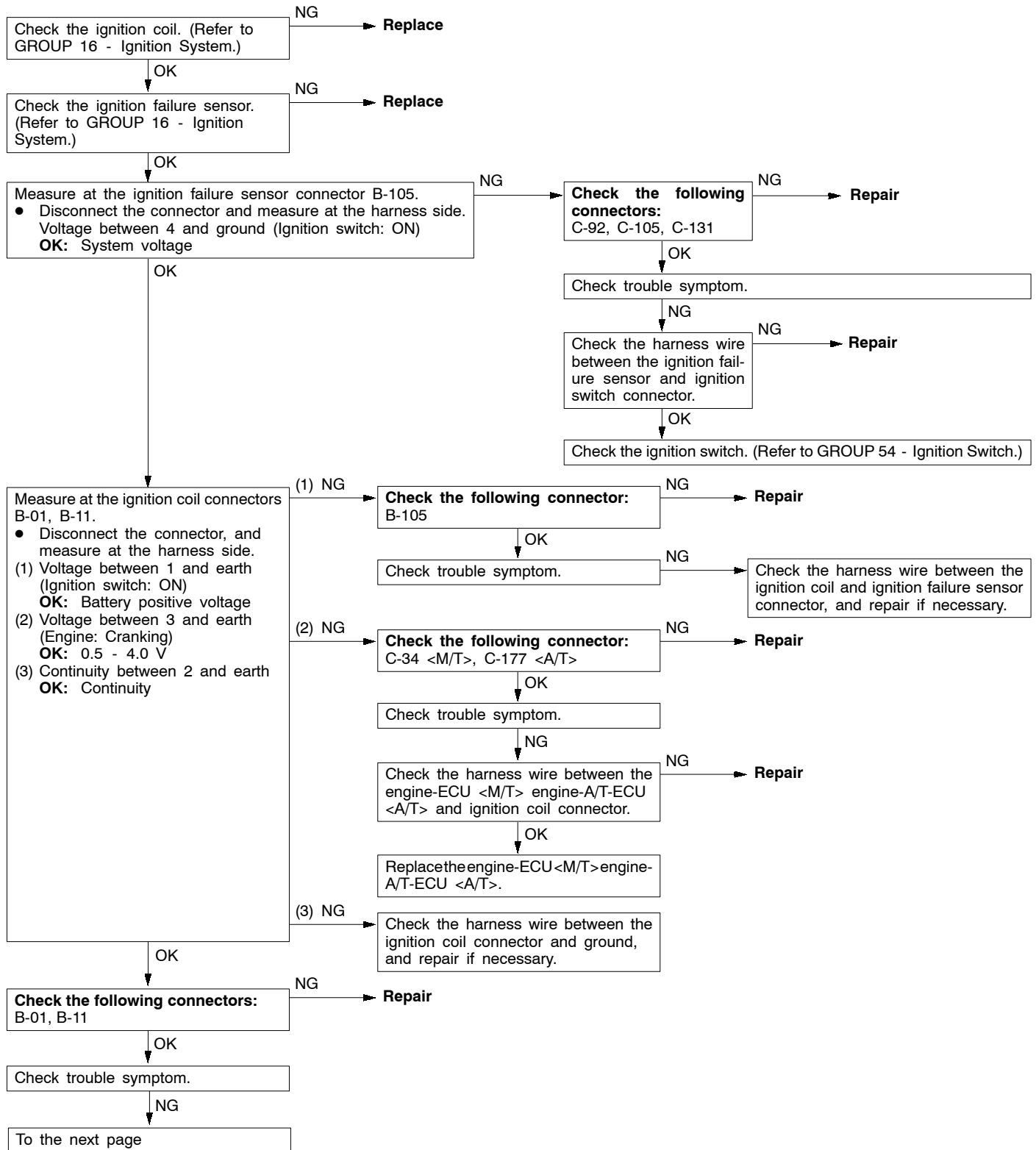
INSPECTION PROCEDURE 30

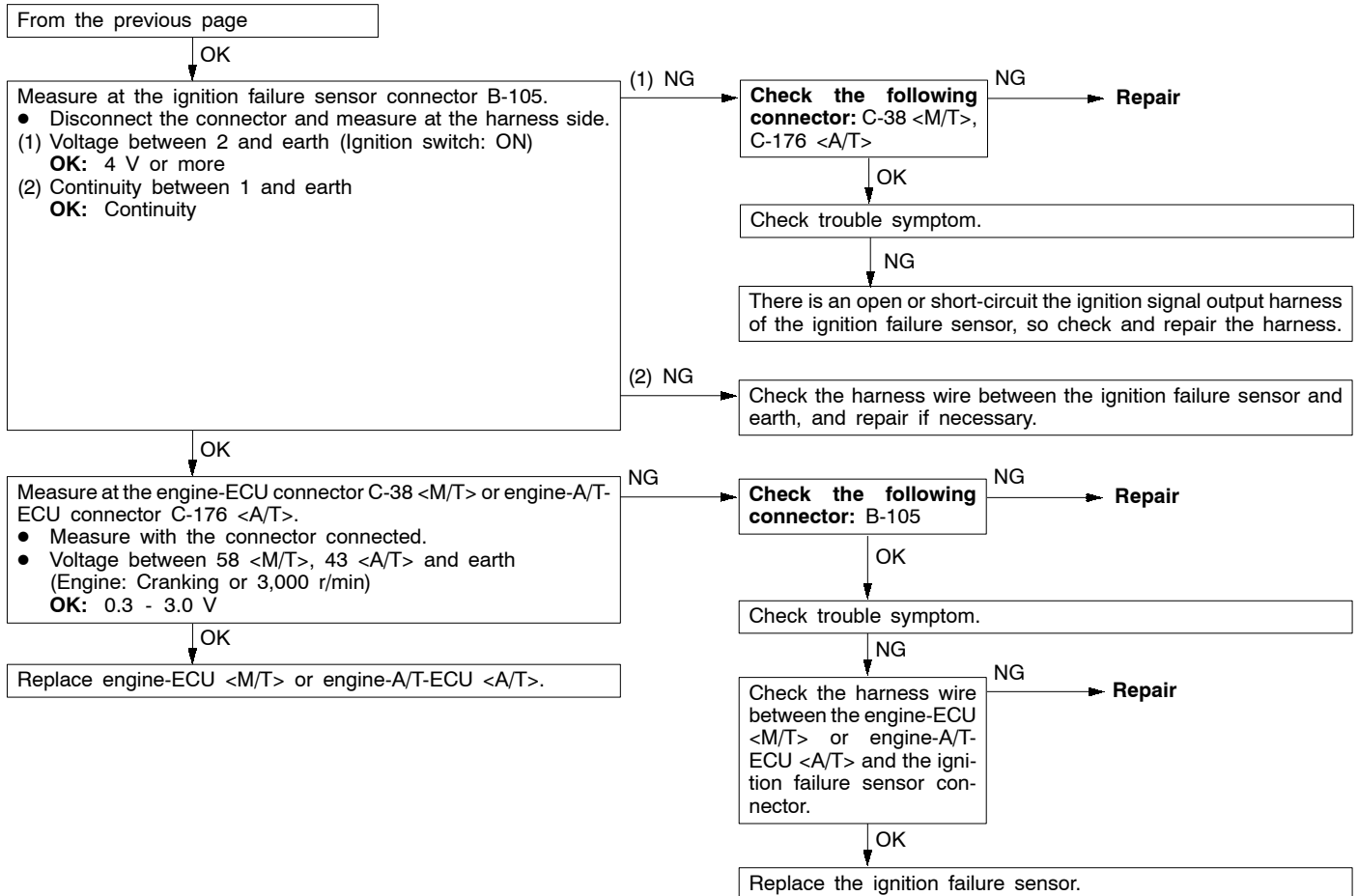
| A/C switch and A/C relay system | Probable cause |
|---|---|
| When an A/C ON signal is input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> carries out control of the idle speed control (ISC) servo, and also operates the A/C compressor magnetic clutch. | <ul style="list-style-type: none"> ● Malfunction of A/C control system ● Malfunction of A/C switch ● Improper connector contact, open circuit or short-circuited harness wire ● Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> |



INSPECTION PROCEDURE 31

| Ignition circuit system | Probable cause |
|---|---|
| The engine-ECU <M/T> or engine-A/T-ECU <A/T> interrupts the ignition coil primary current by turning the power transistor inside the engine-ECU <M/T> or engine-A/T-ECU <A/T> ON and OFF. | <ul style="list-style-type: none"> ● Malfunction of ignition coil. ● Malfunction of ignition failure sensor. ● Improper connector contact, open circuit or short-circuited harness wire ● Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> |





DATA LIST REFERENCE TABLE

Caution

When shifting the select lever to D range, the brakes should be applied so that the vehicle does not move forward.

NOTE

- *1. In a new vehicle [driven approximately 500 km or less], the air flow sensor output frequency is sometimes 10 % higher than the standard frequency.
- *2. The idle position switch normally turns off when the voltage of the throttle position sensor is 50 - 100 mV higher than the voltage at the idle position. If the throttle position switch turns back on after the throttle position sensor voltage has risen by 100 mV and the throttle valve has opened, the idle position switch and the throttle position sensor need to be adjusted.
- *3. The injector drive time represents the time when the cranking speed is at 250 r/min or below when the power supply voltage is 11 V.
- *4. In a new vehicle [driven approximately 500 km or less], the injector drive time is sometimes 10 % longer than the standard time.
- *5. In a new vehicle [driven approximately 500 km or less], the step of the stepper motor is sometimes 30 steps greater than the standard value.

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|-----------------------|---|---|--|--------------------------|----------------|
| 11 | Oxygen sensor (front) | Engine: After having warmed up Air/fuel mixture is made leaner when decelerating, and is made richer when racing. | When at 4,000 r/min, engine is suddenly decelerated | 200 mV or less | Code No. P0130 | 13A-21 |
| | | | When engine is suddenly raced | 600 - 1,000 mV | | |
| | | Engine: After having warmed up The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECU. | Engine is idling | 400 mV or less (Changes) 600 - 1,000 mV | | |
| | | | 2,500 r/min | | | |
| 12 | Air flow sensor*1 | <ul style="list-style-type: none">● Engine coolant temperature: 80 - 95°C● Lamps, electric cooling fan and all accessories: OFF● Transmission: Neutral (A/T: P range) | Engine is idling | 17 - 43 Hz (1.0 – 4.0 g/s) | - | - |
| | | | 2,500 r/min | 70 - 110 Hz (5.0 – 10.0 g/s) | | |
| | | | Engine is raced | Frequency increases in response to racing | | |

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|--------------------------------------|--|--|---|--------------------------|----------------|
| 13 | Intake air temperature sensor | Ignition switch: ON or with engine running | When intake air temperature is -20°C | -20°C | Code No. P0110 | 13A-14 |
| | | | When intake air temperature is 0°C | 0°C | | |
| | | | When intake air temperature is 20°C | 20°C | | |
| | | | When intake air temperature is 40°C | 40°C | | |
| | | | When intake air temperature is 80°C | 80°C | | |
| 14 | Throttle position sensor | Ignition switch: ON | Set to idle position | 300 - 1,000 mV | Code No. P0120 | 13A-18 |
| | | | Gradually open | Increases in proportion to throttle opening angle | | |
| | | | Open fully | 4,500 - 5,500 mV | | |
| 16 | Power supply voltage | Ignition switch: ON | | System voltage | Procedure No. 26 | 13A-68 |
| 18 | Cranking signal (ignition switch-ST) | Ignition switch: ON | Engine: Stopped | OFF | Procedure No. 29 | 13A-71 |
| | | | Engine: Cranking | ON | | |
| 21 | Engine coolant temperature sensor | Ignition switch: ON or with engine running | When engine coolant temperature is -20°C | -20°C | Code No. P0115 | 13A-16 |
| | | | When engine coolant temperature is 0°C | 0°C | | |
| | | | When engine coolant temperature is 20°C | 20°C | | |
| | | | When engine coolant temperature is 40°C | 40°C | | |
| | | | When engine coolant temperature is 80°C | 80°C | | |

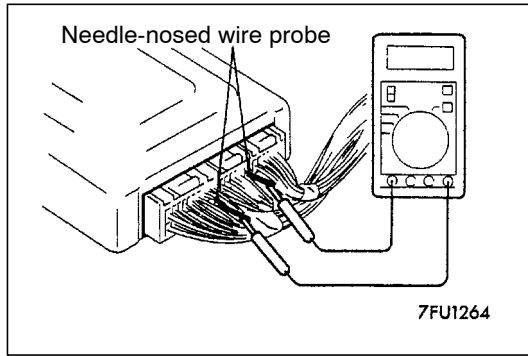
| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|--------------------------------------|--|---|-----------------------|--------------------------|----------------|
| 22 | Crank angle sensor | <ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected | Compare the engine speed readings on the tachometer and the MUT-II. | Accord | Code No. P0335 | 13A-32 |
| | | | When engine coolant temperature is -20°C | 1,275 - 1,475 rpm | | |
| | | <ul style="list-style-type: none"> Engine: Idling Idle position switch: ON | When engine coolant temperature is 0°C | 1,225 - 1,425 rpm | | |
| | | | When engine coolant temperature is 20°C | 1,100 - 1,300 rpm | | |
| | | | When engine coolant temperature is 40°C | 950 - 1,150 rpm | | |
| | | | When engine coolant temperature is 80°C | 650 - 850 rpm | | |
| 24 | Vehicle speed sensor | Drive at 40 km/h | | Approximately 40 km/h | Code No. P0500 | 13A-39 |
| 25 | Barometric pressure sensor | Ignition switch: ON | At altitude of 0 m | 101 kPa | Code No. P0105 | 13A-12 |
| | | | At altitude of 600 m | 95 kPa | | |
| | | | At altitude of 1,200 m | 88 kPa | | |
| | | | At altitude of 1,800 m | 81 kPa | | |
| 26 | Idle position switch | Ignition switch: ON Check by operating accelerator pedal repeatedly | Throttle valve: Set to idle position | ON | Code No. P0510 | 13A-41 |
| | | | Throttle valve: Slightly open | OFF*2 | | |
| 27 | Power steering fluid pressure switch | Engine: Idling | Steering wheel stationary | OFF | Code No. P0551 | 13A-42 |
| | | | Steering wheel turning | ON | | |
| 28 | A/C switch | Engine: Idling (when A/C switch is ON, A/C compressor should be operating.) | A/C switch: OFF | OFF | Procedure No. 30 | 13A-72 |
| | | | A/C switch: ON | ON | | |
| 29 | Inhibitor switch <A/T> | Ignition switch: ON | P or N | P or N | Procedure No. 29 | 13A-71 |
| | | | D, 2, L or R | D, 2, L or R | | |

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|---|--|--|--|--------------------------|----------------|
| 41 | Injectors* ³ | Engine: Cranking | When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously) | 12 - 19 ms | - | - |
| | | | When engine coolant temperature is 20°C | 26 - 40 ms | | |
| | | | When engine coolant temperature is 80°C | 6.0 - 9.1 ms | | |
| | Injectors* ⁴ | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral (A/T: P range) | Engine is idling | 1.6 - 2.8 ms | | |
| | | | 2,500 r/min | 1.4 - 2.6 ms | | |
| | | | When engine is suddenly raced | Increases | | |
| 44 | Ignition coils and power transistors | <ul style="list-style-type: none"> Engine: After having warmed up Timing lamp is set. (The timing lamp is set in order to check actual ignition timing.) | Engine is idling | 2 - 18° BTDC | Code No. P0300 | 13A-29 |
| | | | 2,500 r/min | 18 - 38° BTDC | | |
| 45 | ISC (step-per) motor position* ⁵ | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral (A/T: P range) Idle position switch: ON Engine: Idling When A/C switch is ON, A/C compressor should be operating | A/C switch: OFF | 2 - 25 STEP | - | - |
| | | | A/C switch: OFF → ON | Increases by 10 - 70 steps | | |
| | | | <ul style="list-style-type: none"> A/C switch: OFF Select lever: N range → D range | Increases by 5 - 50 steps | | |
| 49 | A/C relay | Engine: After having warmed up/Engine is idling | A/C switch: OFF | OFF (Compressor clutch is not operating) | Procedure No. 30 | 13A-72 |
| | | | A/C switch: ON | ON (Compressor clutch is operating) | | |

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|---|--|---|--|--------------------------|----------------|
| 59 | Oxygen sensor (rear) | <ul style="list-style-type: none"> Transmission: 2nd gear <M/T>, L range <A/T> Drive with throttle widely open | 3,500 r/min | 600 - 1,000 mV | Code No. P0136 | 13A-24 |
| 81 | Long-term fuel compensation | Engine: Warm, 2,500 r/min without any load (during closed loop) | | -12.5 - 12.5 % | Code No. P0170 | 13A-27 |
| 82 | Short-term fuel compensation | Engine: Warm, 2,500 r/min without any load (during closed loop) | | -30 - 25 % | Code No. P0170 | 13A-27 |
| 87 | Calculation load value | Engine: Warm | Engine: Idling | 15 - 35 % | - | - |
| | | | 2,500 r/min | 15 - 35 % | | |
| 88 | Fuel control condition | Engine: Warm | 2,500 r/min | Closed loop | Code No. P0125 | 13A-20 |
| | | | when engine is suddenly raced | Open loop - drive condition | | |
| A1 | Oxygen sensor (sensor 1) | Engine: After having warmed up | Idling | 0 V | Code No. P0130 | 13A-21 |
| | | | Sudden racing | 0.6 - 1.0 V | | |
| | | | 2,500 r/min | 0.4 V or less and 0.6 - 1.0 V alternates | | |
| A2 | Oxygen sensor (sensor 2) | <ul style="list-style-type: none"> Transmission: 2nd gear <M/T>, L range <A/T> Drive with throttle widely open | 3,500 r/min | 0.6 - 1.0 V | Code No. P0136 | 13A-24 |
| 8A | Throttle position sensor (Throttle valve opening angle) | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Ignition switch: ON (Engine: Stopped) | Release the accelerator pedal. | 6 - 20 % | Code No. P0120 | 13A-18 |
| | | | Depress the accelerator pedal gradually | Increase in response to pedal depression stroke. | | |
| | | | Depress the accelerator pedal fully. | 80 - 100 % | | |

ACTUATOR TEST REFERENCE TABLE

| Item No. | Inspection item | Drive contents | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|------------------------------|--|---|--|--|--------------------------|----------------|
| 01 | Injectors | Cut fuel to No. 1 injector | Engine: After having warmed up/Engine is idling (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. P0201 | 13A-28 |
| 02 | | Cut fuel to No. 2 injector | | | | Code No. P0202 | 13A-28 |
| 03 | | Cut fuel to No. 3 injector | | | | Code No. P0203 | 13A-28 |
| 04 | | Cut fuel to No. 4 injector | | | | Code No. P0204 | 13A-28 |
| 07 | Fuel pump | Fuel pump operates and fuel is recirculated. | <ul style="list-style-type: none"> Engine: Cranking Fuel pump: Forced driving Inspect according to both the above conditions. | Pinch the return hose with fingers to feel the pulse of the fuel being recirculated. | Pulse is felt. | Procedure No. 28 | 13A-69 |
| | | | | Listen near the fuel tank for the sound of fuel pump operation. | Sound of operation is heard. | | |
| 08 | Purge control solenoid valve | Solenoid valve turns from OFF to ON. | Ignition switch: ON | | Sound of operation can be heard when solenoid valve is driven. | Code No. P0443 | 13A-38 |
| 10 | EGR control solenoid valve | Solenoid valve turns from OFF to ON. | Ignition switch: ON | | Sound of operation can be heard when solenoid valve is driven. | Code No. P0403 | 13A-36 |
| 17 | Basic ignition timing | Set to ignition timing adjustment mode | Engine: Idling Timing light is set | | 5° BTDC | - | - |
| 21 | Fan controller | Drive the fan motor | Ignition switch: ON | | Radiator fan and condenser fan operate at high speed | Procedure No. 25 | 13A-67 |



CHECK AT THE ENGINE-ECU TERMINALS

TERMINAL VOLTAGE CHECK CHART

1. Connect a needle-nosed wire probe (test harness: MB991223 or paper clip) to a voltmeter probe.
2. Insert the needle-nosed wire probe into each of the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector terminals from the wire side, and measure the voltage while referring to the check chart.

NOTE

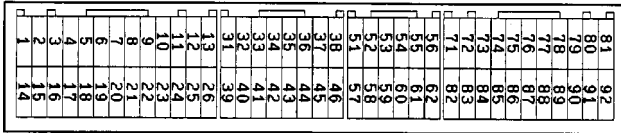
- (1) Make the voltage measurement with the engine-ECU <M/T> or engine-A/T-ECU <A/T> connectors connected.
- (2) You may find it convenient to pull out the engine-ECU <M/T> or engine-A/T-ECU <A/T> to make it easier to reach the connector terminals.
- (3) The checks can be carried out off the order given in the chart.

Caution

Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine-ECU <M/T> or engine-A/T-ECU <A/T> or all of them. Be careful to prevent this!

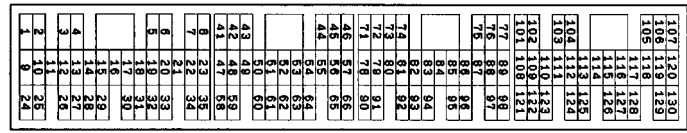
3. If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
4. After repair or replacement, recheck with the voltmeter to confirm that the repair has corrected the problem.

Engine-ECU <M/T> Connector Terminal Arrangement



9FU0393

Engine-A/T-ECU <A/T> Connector Terminal Arrangement



7FU1763

| Terminal No. <M/T> | Terminal No. <A/T> | Check item | Check condition (Engine condition) | Normal condition |
|--------------------|--------------------|---|--|---|
| 1 | 1 | No. 1 injector | While engine is idling after having warmed up, suddenly depress the accelerator pedal. | From 11 - 14 V, momentarily drops slightly |
| 14 | 9 | No. 2 injector | | |
| 2 | 24 | No. 3 injector | | |
| 15 | 2 | No. 4 injector | | |
| 4 | 14 | Stepper motor coil <A1> | Engine: Soon after the warmed up engine is started | System voltage ↔ 0 V (Changes repeatedly) |
| 17 | 28 | Stepper motor coil <A2> | | |
| 5 | 15 | Stepper motor coil <B1> | | |
| 18 | 29 | Stepper motor coil <B2> | | |
| 6 | 6 | EGR control solenoid valve | Ignition switch: ON | System Voltage |
| | | | While engine is idling, suddenly depress the accelerator pedal. | From system voltage, momentarily drops |
| 8 | 20 | A/C relay | <ul style="list-style-type: none"> Engine: Idle speed A/C switch: OFF → ON (A/C compressor is operating) | System voltage or momentarily 6 V or more → 0 - 3 V |
| 9 | 34 | Purge control solenoid valve | Ignition switch: ON | System voltage |
| | | | Running at 3,000 r/min while engine is warming up after having been started. | 0 - 3 V |
| 10 | 11 | Ignition coil - No. 1, No. 4 (power transistor) | Engine r/min: 3,000 r/min | 0.3 - 3.0 V |
| 23 | 12 | Ignition coil - No. 2, No. 3 (power transistor) | | |
| 12 | 41 | Power supply | Ignition switch: ON | System voltage |
| 25 | 47 | | | |

| Terminal No. <M/T> | Terminal No. <A/T> | Check item | Check condition (Engine condition) | | Normal condition |
|--------------------|--------------------|--------------------------------------|--|--|--|
| 19 | 19 | Air flow sensor reset signal | Engine: Idle speed | | 0 - 1 V |
| | | | Engine r/min: 3,000 r/min | | 6 - 9 V |
| 21 | 18 | Fan controller | Radiator fan and condenser fan are not operating | | 0 - 0.3 V |
| | | | Radiator fan and condenser fan are operating | | 0.7 V or more |
| 22 | 21 | Fuel pump relay | Ignition switch: ON | | System voltage |
| | | | Engine: Idle speed | | 0 - 3 V |
| 24 | 61 | A/C switch 2 | <ul style="list-style-type: none"> Engine: Idling Outside air temperature: 25°C or more | When A/C is MAX. COOL condition (when the load by A/C is high) | 0 - 3 V |
| | | | | (When A/C is MAX. HOT condition (when the load by A/C is low)) | System voltage |
| 33 | 8 | Alternator G terminal | <ul style="list-style-type: none"> Engine: Warm, idle (radiator fan: OFF) Headlamp: OFF to ON Rear defogger switch: OFF to ON Brake lamp: ON | | Voltage rises by 0.2 - 3.5 V. |
| 41 | 54 | Alternator FR terminal | <ul style="list-style-type: none"> Engine: Warm, idle (radiator fan: OFF) Headlamp: OFF to ON Rear defogger switch: OFF to ON Brake lamp: ON | | Voltage drops by 0.2 - 3.5 V. |
| 36 | 22 | Engine warning lamp | Ignition switch: "LOCK" (OFF) position → ON | | 0 - 3 V → 9 - 13 V (After several seconds have elapsed) |
| 37 | 52 | Power steering fluid pressure switch | Engine: Idling after warming up | When steering wheel is stationary | System voltage |
| | | | | When steering wheel is turned | 0 - 3 V |
| 38 | 49 | Control relay (Power supply) | Ignition switch: "LOCK" (OFF) position | | System voltage |
| | | | Ignition switch: ON | | 0 - 3 V |
| 45 | 83 | A/C switch 1 | Engine: Idle speed | Turn the A/C switch OFF | 0 - 3 V |
| | | | | Turn the A/C switch ON (A/C compressor is operating) | System voltage |
| 58 | 43 | Tachometer signal | Engine r/min: 3,000 r/min | | 0.3 - 3.0 V |

| Terminal No. <M/T> | Terminal No. <A/T> | Check item | Check condition (Engine condition) | | Normal condition |
|--------------------|--------------------|-----------------------------------|---|---|-----------------------------------|
| 60 | 3 | Oxygen sensor (front) heater | Engine: Idling after warming up | | 0 - 3 V |
| | | | Engine r/min: 5,000 r/min. | | System voltage |
| 54 | 26 | Oxygen sensor (rear) heater | Engine: Idling after having warmed up | | 0 - 3 V |
| | | | Engine r/min: 5,000 r/min | | System voltage |
| 71 | 58 | Ignition switch-ST | Engine: Cranking | | 8 V or more |
| 72 | 64 | Intake air temperature sensor | Ignition switch: ON | When intake air temperature is 0°C | 3.2 - 3.8 V |
| | | | | When intake air temperature is 20°C | 2.3 - 2.9 V |
| | | | | When intake air temperature is 40°C | 1.5 - 2.1 V |
| | | | | When intake air temperature is 80°C | 0.4 - 1.0 V |
| 75 | 73 | Oxygen sensor (rear) | <ul style="list-style-type: none"> • Transmission: 2nd gear <M/T>, L range <A/T> • Engine r/min: 3,500 r/min or more • Driving with the throttle valve widely open | | 0.6 - 1.0 V |
| 76 | 71 | Oxygen sensor (front) | Engine: Running at 2,500 r/min after warmed up (Check using a digital type voltmeter) | | 0 ↔ 0.8 V (Changes repeatedly) |
| 80 | 66 | Backup power supply | Ignition switch: "LOCK" (OFF) position | | System voltage |
| 81 | 46 | Sensor impressed voltage | Ignition switch: ON | | 4.5 - 5.5 V |
| 82 | 98 | Ignition switch-IG | Ignition switch: ON | | System voltage |
| 83 | 44 | Engine coolant temperature sensor | Ignition switch: ON | When engine coolant temperature is 0°C | 3.2 - 3.8 V |
| | | | | When engine coolant temperature is 20°C | 2.3 - 2.9 V |
| | | | | When engine coolant temperature is 40°C | 1.3 - 1.9 V |
| | | | | When engine coolant temperature is 80°C | 0.3 - 0.9 V |

| Terminal No. <M/T> | Terminal No. <A/T> | Check item | Check condition (Engine condition) | | Normal condition |
|--------------------|--------------------|----------------------------|---|-------------------------------------|---------------------------------|
| 84 | 78 | Throttle position sensor | Ignition switch: ON | Set throttle valve to idle position | 0.3 - 1.0 V |
| | | | | Fully open throttle valve | 4.5 - 5.5 V |
| 85 | 55 | Barometric pressure sensor | Ignition switch: ON | When altitude is 0 m | 3.7 - 4.3 V |
| | | | | When altitude is 1,200 m | 3.2 - 3.8 V |
| 86 | 80 | Vehicle speed sensor | <ul style="list-style-type: none">Ignition switch: ONMove the vehicle slowly forward | | 0 ↔ 5 V (Changes repeatedly) |
| 87 | 79 | Idle position switch | Ignition switch: ON | Set throttle valve to idle position | 0 - 1 V |
| | | | | Slightly open throttle valve | 4 V or more |
| 88 | 56 | Camshaft position sensor | Engine: Cranking | | 0.4 - 3.0 V |
| | | | Engine: Idle speed | | 0.5 - 2.0 V |
| 89 | 45 | Crank angle sensor | Engine: Cranking | | 0.4 - 4.0 V |
| | | | Engine: Idle speed | | 1.5 - 2.5 V |
| 90 | 65 | Air flow sensor | Engine: Idle speed | | 2.2 - 3.2 V |
| | | | Engine r/min: 2,500 r/min | | |

CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

1. Turn the ignition switch to "LOCK" (OFF) position.
2. Disconnect the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.
3. Measure the resistance and check for continuity between the terminals of the engine-ECU <M/T> or engine-A/T-ECU <A/T> harness-side connector while referring to the check chart.

NOTE

- (1) When measuring resistance and checking continuity, a harness for checking contact pin pressure should be used instead of inserting a test probe.
- (2) Checking need not be carried out in the order given in the chart.

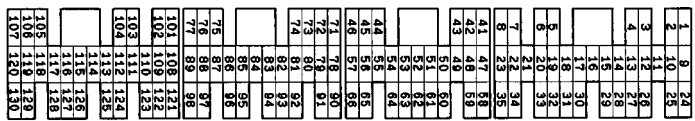
Caution

If the terminals that should be checked are mistaken, or if connector terminals are not correctly shorted to earth, damage may be caused to the vehicle wiring, sensors, engine-ECU <M/T> or engine-A/T-ECU <A/T> and/or ohmmeter.

Be careful to prevent this!

4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and then repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

**Engine-ECU <M/T> Harness Side
Connector Terminal Arrangement**

**Engine-A/T-ECU <A/T> Harness Side
Connector Terminal Arrangement**


7FU1764

9FU0392

| Terminal No.<M/T> | Terminal No. <A/T> | Inspection item | Normal condition (Check condition) |
|-------------------|--------------------|--|------------------------------------|
| 1 - 12 | 1 - 41 | No. 1 injector | 13 - 16 Ω (At 20°C) |
| 14 - 12 | 9 - 41 | No. 2 injector | |
| 2 - 12 | 24 - 41 | No. 3 injector | |
| 15 - 12 | 2 - 41 | No. 4 injector | |
| 4 - 12 | 14 - 41 | Stepper motor coil (A1) | 28 - 33 Ω (At 20°C) |
| 17 - 12 | 28 - 41 | Stepper motor coil (A2) | |
| 5 - 12 | 15 - 41 | Stepper motor coil (B1) | |
| 18 - 12 | 29 - 41 | Stepper motor coil (B2) | |
| 6 - 12 | 6 - 41 | EGR control solenoid valve | 29 - 35 Ω (At 20°C) |
| 9 - 12 | 34 - 41 | Purge control solenoid valve | 29 - 35 Ω (At 20°C) |
| 13 - Body earth | 42 - Body earth | Engine-ECU earth <M/T> Engine-A/T-ECU earth <A/T> | Continuity (0 Ω) |
| 26 - Body earth | 48 - Body earth | Engine-ECU earth <M/T> Engine-A/T-ECU earth <A/T> | |
| 60 - 12 | 3 - 41 | Oxygen sensor (front) heater | 4.5 - 8.0 Ω (At 20°C) |
| 54 - 12 | 26 - 41 | Oxygen sensor (rear) heater | 11 - 18 Ω (At 20°C) |

| Terminal No.<M/T> | Terminal No. <A/T> | Inspection item | Normal condition (Check condition) |
|-------------------|--------------------|-----------------------------------|---|
| 72 - 92 | 64 - 57 | Intake air temperature sensor | 5.3 - 6.7 kΩ (When intake air temperature is 0°C) |
| | | | 2.3 - 3.0 kΩ (When intake air temperature is 20°C) |
| | | | 1.0 - 1.5 kΩ (When intake air temperature is 40°C) |
| | | | 0.30 - 0.42 kΩ (When intake air temperature is 80°C) |
| 83 - 92 | 44 - 57 | Engine coolant temperature sensor | 5.1 - 6.5 kΩ (When coolant temperature is 0°C) |
| | | | 2.1 - 2.7 kΩ (When coolant temperature is 20°C) |
| | | | 0.9 - 1.3 kΩ (When coolant temperature is 40°C) |
| | | | 0.26 - 0.36 kΩ (When coolant temperature is 80°C) |
| 87 - 92 | 79 - 57 | Idle position switch | Continuity (When throttle valve is at idle position) |
| | | | No continuity (When throttle valve is slightly open) |

INSPECTION PROCEDURE USING AN ANALYZER

On vehicles with A/T, the ECU controls the engine and the transmission comprehensively (This is called engine-A/T-ECU). Due to this, the following describe only the inspection procedures at the engine-A/T-ECU terminals. On vehicles with M/T, the ECU (engine-ECU) has not been changed, so the inspection procedures at the ECU terminals are the same as before.

AIR FLOW SENSOR

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 65.

CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 56. (When checking the camshaft position sensor signal wave pattern.)
2. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 45. (When checking the crank angle sensor signal wave pattern.)

INJECTOR

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 1. (When checking the No. 1 cylinder.)
2. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 9. (When checking the No. 2 cylinder.)
3. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 24. (When checking the No. 3 cylinder.)
4. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 2. (When checking the No. 4 cylinder.)

IDLE SPEED CONTROL SERVO (STEPPER MOTOR)

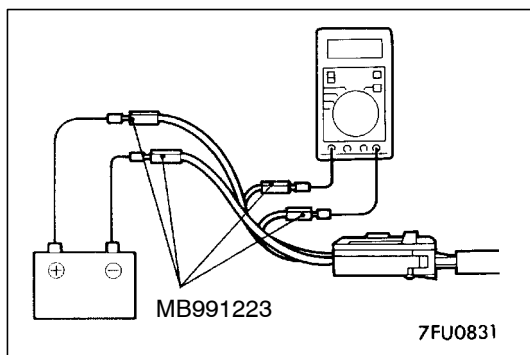
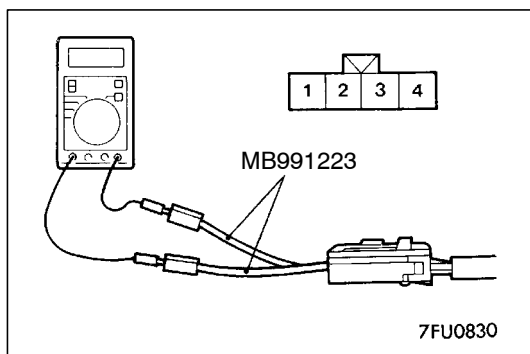
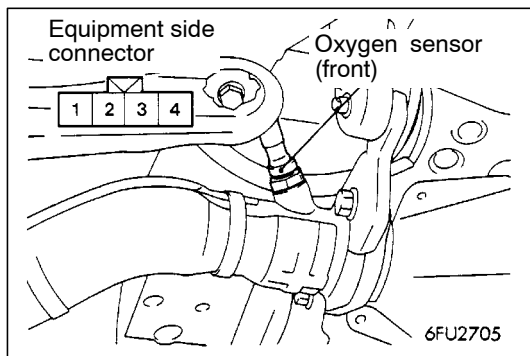
Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 14, connection terminal 28, connection terminal 15, and connection terminal 29 respectively.

IGNITION COIL AND POWER TRANSISTOR

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 11 (No. 1 - No. 4), terminal 12 (No. 2 - No. 3) respectively



ON-VEHICLE SERVICE

OXYGEN SENSOR CHECK

<Oxygen sensor (front)>

1. Disconnect the oxygen sensor connector and connect the special tool (test harness) to the connector on the oxygen sensor side.
2. Make sure that there is continuity (4.5 - 8.0 Ω at 20°C) between terminal 3 and terminal 4 on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80°C or higher.

5. Use the jumper wire to connect terminal 3 of the oxygen sensor connector to the battery (+) terminal and terminal 4 to the battery (-) terminal.

Caution

Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.

6. Connect a digital voltage meter between terminal 1 and terminal 2.
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

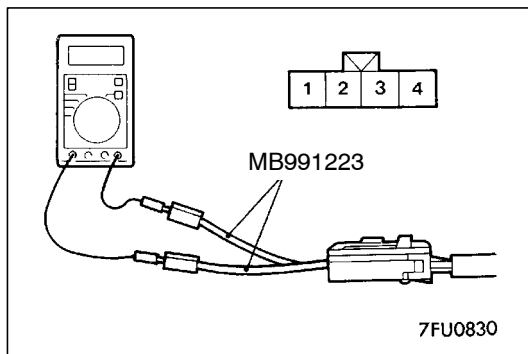
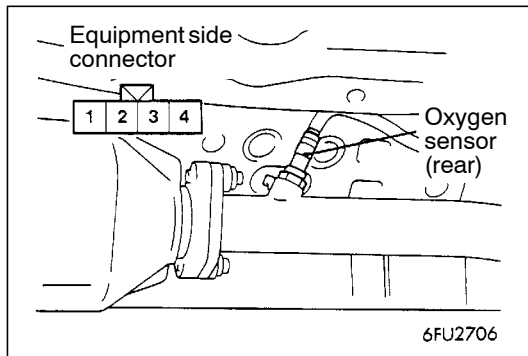
Standard value:

| Engine | Oxygen sensor output voltage | Remarks |
|------------------------|------------------------------|---|
| When racing the engine | 0.6 - 1.0 V | If you make the air/fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 - 1.0 V. |

8. If the sensor is defective, replace the oxygen sensor.

NOTE

For removal and installation of the oxygen sensor, refer to GROUP 15 - Exhaust Pipe and Main Muffler.



<Oxygen sensor (rear)>

1. Disconnect the oxygen sensor connector and connect the special tool (test harness set) to the connector on the oxygen sensor side.
2. Make sure that there is continuity ($11 - 18 \Omega$ at 20°C) between terminal 3 and terminal 4 on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.

NOTE

- (1) If the MUT-II does not display the standard value although no abnormality is found by the above mentioned continuity test and harness check, replace the oxygen sensor (rear).
- (2) For removal and installation of the oxygen sensor, refer to GROUP 15 - Exhaust Pipe and Main Muffler.

MULTIPOINT FUEL INJECTION (MPI) <6A1>

GENERAL

OUTLINE OF CHANGES

Due to the changes shown below, the service procedures regarding the different description from the previous version have been established.

- On-board Diagnostics System has been adopted to expand the diagnostic items and to change diagnosis code numbering system.
- The engine-ECU has been changed. (from 76-pin connector to 93-pin connector)
- The oxygen sensor has been changed.

GENERAL INFORMATION

SELF-DIAGNOSIS FUNCTION

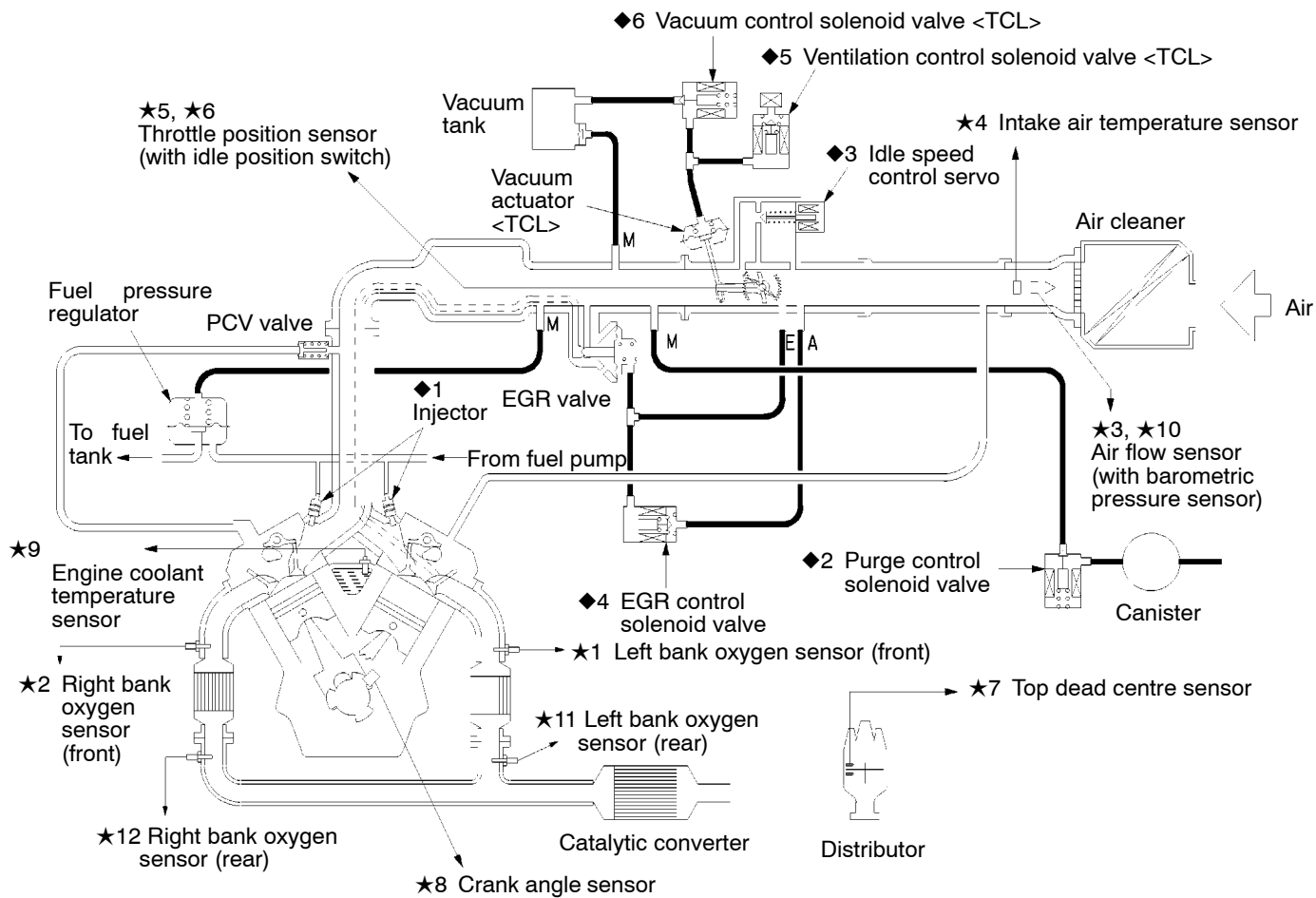
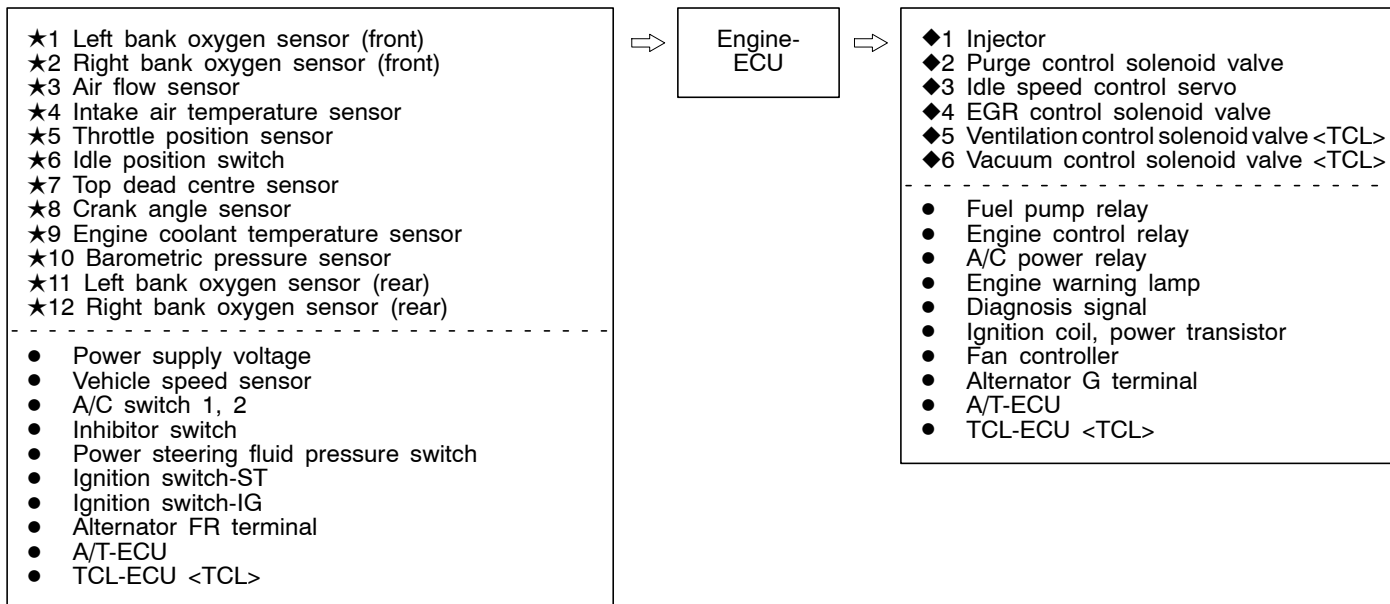
Following functions have been added.

- The engine-ECU records the engine operating condition when the diagnosis code is set. This data is called "freeze frame" data. It can be read by using the MUT-II, and can be used in simulation tests for troubleshooting.

GENERAL SPECIFICATIONS

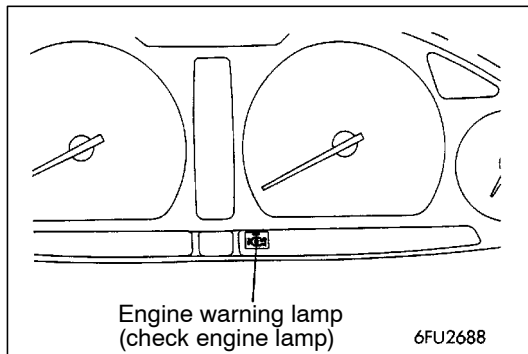
| Items | | Specifications |
|------------|--------------------------|---|
| Engine-ECU | Identification model No. | E6T30473 <Vehicles without TCL> E6T30474 <Vehicles with TCL> |

MULTIPOINT FUEL INJECTION SYSTEM DIAGRAM



SERVICE SPECIFICATIONS

| Items | Standard value |
|---|----------------|
| Oxygen sensor output voltage V | 0.6 - 1.0 |
| Oxygen sensor heater coil resistance front (at 20°C) Ω | 4.5 - 8.0 |
| Oxygen sensor heater coil resistance rear (at 20°C) Ω | 11 - 18 |



TROUBLESHOOTING

DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

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

However, the warning lamp will illuminate as bulb check for five seconds whenever the ignition switch is turned to the ON position.

Engine warning lamp inspection items

| Code No. | Diagnosis item |
|----------|---|
| - | Engine-ECU |
| P0100 | Air flow sensor system |
| P0105 | Barometric pressure sensor system |
| P0110 | Intake air temperature sensor system |
| P0115 | Engine coolant temperature sensor system |
| P0120★ | Throttle position sensor (1st channel) system |
| P0125 | Feedback system |
| P0130 | Oxygen sensor (front) system <Bank 1 sensor 1> |
| P0135 | Oxygen sensor heater (front) system <Bank 1 sensor 1> |
| P0136 | Oxygen sensor (rear) system <Bank 1 sensor 2> |
| P0141 | Oxygen sensor heater (rear) system <Bank 1 sensor 2> |
| P0150 | Oxygen sensor (front) <Bank 2 sensor 1> |
| P0155 | Oxygen sensor heater (front) <Bank 2 sensor 1> |
| P0156 | Oxygen sensor (rear) <Bank 2 sensor 2> |
| P0161 | Oxygen sensor heater (rear) <Bank 2 sensor 2> |
| P0170 | Abnormal fuel system (Bank 1) |
| P0173 | Abnormal fuel system (Bank 2) |
| P0201 | No. 1 injector system |
| P0202 | No. 2 injector system |
| P0203 | No. 3 injector system |
| P0204 | No. 4 injector system |
| P0205 | No. 5 injector system |
| P0206 | No. 6 injector system |

| Code No. | Diagnosis item |
|----------|---|
| P0300★ | Ignition coil (power transistor) system |
| P0301 | No. 1 cylinder misfire detected |
| P0302 | No. 2 cylinder misfire detected |
| P0303 | No. 3 cylinder misfire detected |
| P0304 | No. 4 cylinder misfire detected |
| P0305 | No. 5 cylinder misfire detected |
| P0306 | No. 6 cylinder misfire detected |
| P0335 | Crank angle sensor system |
| P0340 | Top dead centre sensor system |
| P0403 | EGR valve system |
| P0421 | Catalyst malfunction (Bank 1) |
| P0431 | Catalyst malfunction (Bank 2) |
| P0443 | Purge control solenoid valve system |
| P0505 | Idle speed control system |
| P0510 | Idle position switch system |
| P0551 | Power steering fluid pressure switch system |
| P1101 | Vacuum control solenoid valve system |
| P1102 | Ventilation control solenoid valve system |

NOTE

1. If the engine warning lamp illuminates because of a malfunction of the engine-ECU, communication between MUT-II and the engine-ECU is impossible. In this case, the diagnosis code cannot be read.
2. After the engine-ECU has detected a malfunction, the engine warning lamp illuminates when the engine is next turned on and the same malfunction is re-detected. However, for items marked with a "★" in the diagnosis code number column, the engine warning lamp illuminates only on the first detection of the malfunction.
3. After the engine warning lamp illuminates, it will be switched off under the following conditions.
 - (1) When the engine-ECU monitored the power train malfunction three times* and met set condition requirements, it detected no malfunction.
*: In this case, "one time" indicates from engine start to stop.
 - (2) For misfiring malfunction, when driving conditions (engine speed, engine coolant temperature, etc.) are similar to those when the malfunction was first recorded.
4. Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

METHOD OF READING AND ERASING DIAGNOSIS CODES

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

DIAGNOSIS USING DIAGNOSIS 2 MODE

1. Switch the diagnosis mode of the engine control unit to DIAGNOSIS 2 mode using the MUT-II.
2. Carry out a road test.
3. Take a reading of the diagnosis code and repair the problem location.
4. Turn the ignition switch to OFF and then back to ON again.

NOTE

By turning the ignition switch to OFF, the ENGINE-ECU will switch the diagnosis mode from DIAGNOSIS 2 mode to DIAGNOSIS 1 mode.

5. Erase the diagnosis codes.

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, and then start the engine again and carry out a road test to confirm that the problem has disappeared.

FREEZE FRAME DATA

When the engine-ECU detects a malfunction and stores a diagnosis code, it also stores a current status of the engine. This function is called "Freeze frame data." By analyzing this "freeze frame" data with the MUT-II, an effective troubleshooting can be performed.

The display items of freeze frame data are shown below.

Display item list

| Data item | | Unit |
|---|--|---------|
| Engine coolant temperature sensor | | °C |
| Engine speed | | r/min |
| Vehicle speed | | km/h |
| Long-term fuel compensation (long-term fuel trim) | | % |
| Short-term fuel compensation (short-term fuel trim) | | % |
| Fuel control condition | Open loop | OL |
| | Closed loop | CL |
| | Open loop owing to drive condition | OL-DRV. |
| | Open loop owing to system malfunction | OL-SYS. |
| | Closed loop based on one oxygen sensor | CL-H02S |
| Calculation load value | | % |
| Diagnosis code during data recording | | - |

NOTE

If malfunctions have been detected in multiple systems, store one malfunction only, which has been detected first.

READINESS TEST STATUS

The engine-ECU monitors the following main diagnosis items, judges if these items are in good condition or not, and the stores its history. This history can be read out by using MUT-II. (If the ECU has judged a item before, the MUT-II displays "Complete.")

In addition, if diagnosis codes are erased or the battery cable is disconnected, this history will also be erased (the memory will be reset).

- Catalyst: P0421, P0431
- Oxygen sensor: P0130, P0150
- Oxygen sensor heater: P0135, P0141, P0155, P0161

FAIL-SAFE FUNCTION REFERENCE TABLE

When the main sensor malfunctions are detected by the diagnosis function, the vehicle is controlled by means of the pre-set control logic to maintain safe conditions for driving.

| Malfunctioning item | Control contents during malfunction |
|--|--|
| Air flow sensor | <ol style="list-style-type: none"> 1. Uses the throttle position sensor signal and engine speed signal (crank angle sensor signal) to take reading of the basic injector drive time and basic ignition timing from the pre-set mapping. 2. Fixes the ISC servo in the appointed position so idle control is not performed. |
| Intake air temperature sensor | Controls as if the intake air temperature is 25°C. |
| Throttle position sensor (TPS) | No increase in fuel injection amount during acceleration due to the throttle position sensor signal. |
| Engine coolant temperature sensor | Controls as if the engine coolant temperature is 80°C. |
| Top dead centre sensor | Injects fuel to all cylinders simultaneously. (However, after the ignition switch is turned to ON, the No. 1 cylinder top dead centre is not detected at all.) |
| Barometric pressure sensor | Controls as if the barometric pressure is 101 kPa. |
| Detonation sensor | Switches the ignition timing from ignition timing for super petrol to ignition timing for standard petrol. |
| Right bank oxygen sensor (front) and left bank oxygen sensor (front) | Air/fuel ratio feedback control (closed loop control) is not performed. |
| Right bank oxygen sensor (rear) and left bank oxygen sensor (rear) | Performs the feedback control (closed loop control) of the air/fuel ratio by using only the signal of the oxygen sensor (front) installed on the front of the catalytic converter. |
| Communication wire with transmission control unit <A/T> | Ignition timing is not retarded during transmission gear shifting (overall engine and transmission control). |
| Alternator FR terminal | Does not control the output of the alternator according to an electrical load. (works as a normal alternator) |
| Misfiring | If the detected misfiring causes damage to the catalyst, the misfiring cylinder will be shut down. |

NOTE

When a problem is detected in the vacuum control solenoid valve, ventilation control solenoid valve, crank angle sensor or any of the above items, traction control is not performed <Vehicles with TCL>.

INSPECTION CHART FOR DIAGNOSIS CODES

| Code No. | Diagnosis item | Reference page |
|----------|---|----------------|
| P0100 | Air flow sensor system | 13A-101 |
| P0105 | Barometric pressure sensor system | 13A-103 |
| P0110 | Intake air temperature sensor system | 13A-105 |
| P0115 | Engine coolant temperature sensor system | 13A-106 |
| P0120★ | Throttle position sensor 1 system | 13A-109 |
| P0125 | Feedback system | 13A-110 |
| P0130 | Oxygen sensor (front) system <Bank 1 sensor 1> | 13A-113 |
| P0135 | Oxygen sensor heater (front) system <Bank 1 sensor 1> | 13A-115 |
| P0136 | Oxygen sensor (rear) system <Bank 1 sensor 2> | 13A-116 |
| P0141 | Oxygen sensor heater (rear) system <Bank 1 sensor 2> | 13A-118 |
| P0150 | Oxygen sensor (front) <Bank 2 sensor 1> | 13A-119 |
| P0155 | Oxygen sensor heater (front) <Bank 2 sensor 1> | 13A-121 |
| P0156 | Oxygen sensor (rear) <Bank 2 sensor 2> | 13A-122 |
| P0161 | Oxygen sensor heater (rear) <Bank 2 sensor 2> | 13A-124 |
| P0170 | Abnormal fuel system (Bank 1) | 13A-125 |
| P0173 | Abnormal fuel system (Bank 2) | 13A-126 |
| P0201 | No. 1 injector system | 13A-127 |
| P0202 | No. 2 injector system | 13A-127 |
| P0203 | No. 3 injector system | 13A-127 |
| P0204 | No. 4 injector system | 13A-127 |
| P0205 | No. 5 injector system | 13A-127 |
| P0206 | No. 6 injector system | 13A-127 |
| P0300★ | Ignition coil (power transistor) system | 13A-128 |
| P0301 | No. 1 cylinder misfire detected | 13A-129 |
| P0302 | No. 2 cylinder misfire detected | 13A-129 |
| P0303 | No. 3 cylinder misfire detected | 13A-129 |
| P0304 | No. 4 cylinder misfire detected | 13A-129 |
| P0305 | No. 5 cylinder misfire detected | 13A-129 |
| P0306 | No. 6 cylinder misfire detected | 13A-129 |
| P0325 | Detonation sensor system | 13A-130 |
| P0335 | Crank angle sensor system | 13A-130 |
| P0340 | Top dead centre sensor system | 13A-132 |

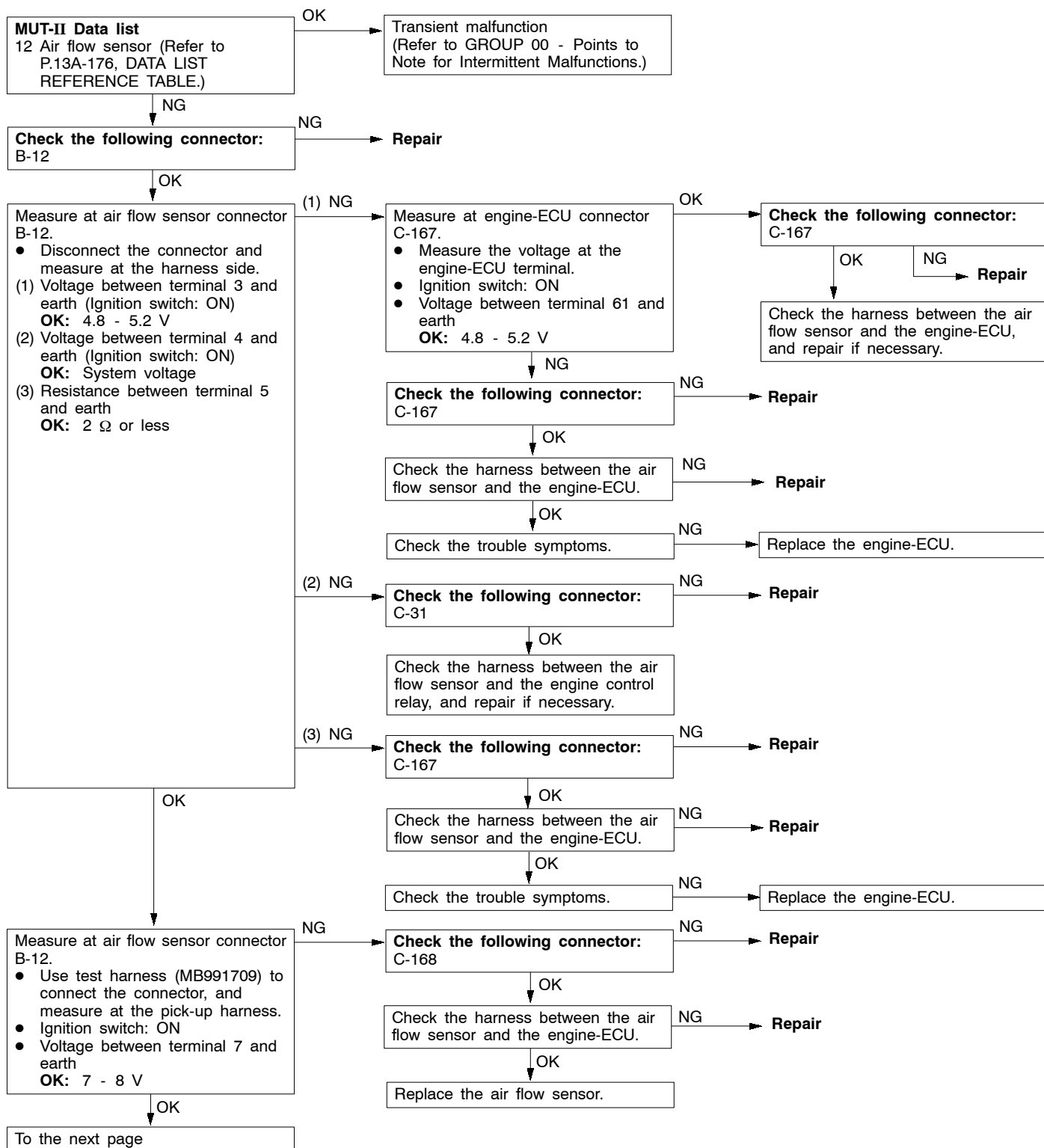
| Code No. | Diagnosis item | Reference page |
|----------|--|----------------|
| P0403 | EGR valve system | 13A-133 |
| P0421 | Catalyst malfunction (Bank 1) | 13A-134 |
| P0431 | Catalyst malfunction (Bank 2) | 13A-135 |
| P0443 | Purge control solenoid valve system | 13A-136 |
| P0500 | Vehicle speed sensor system | 13A-137 |
| P0505 | Idle speed control system | 13A-137 |
| P0510 | Idle position switch system | 13A-139 |
| P0551 | Power steering fluid pressure switch system | 13A-140 |
| P1101 | Vacuum control solenoid valve system | 13A-141 |
| P1102 | Ventilation control solenoid valve system | 13A-142 |
| P1500 | Alternator FR terminal system | 13A-143 |
| P1600 | Communication wire with A/T-ECU system <A/T> | 13A-144 |
| P1610 | Immobilizer system | 13A-144 |

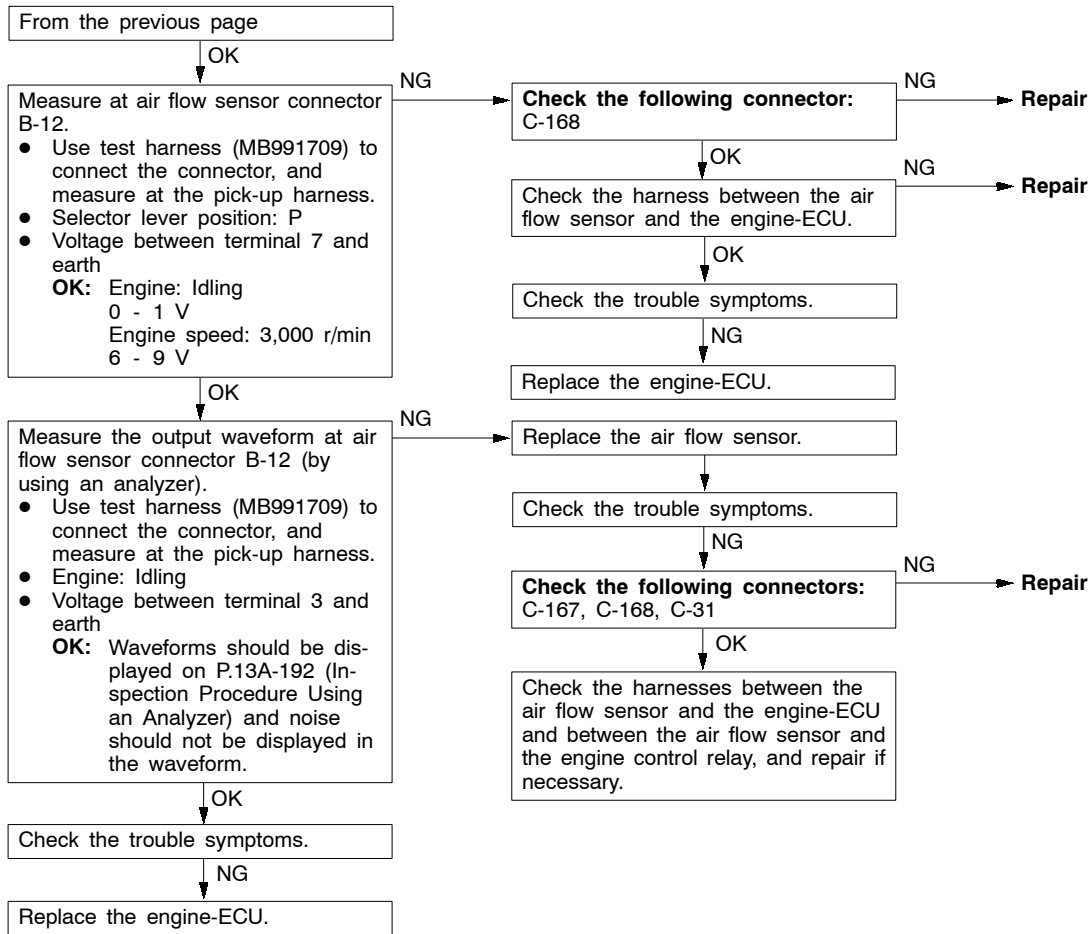
NOTE

1. Do not replace the engine-ECU until a through terminal check reveals there are no short/open circuit.
2. Check that the engine-ECU earth circuit is normal before checking for the cause of the problem.
3. After the engine-ECU has detected a malfunction, a diagnosis code is recorded the next time the engine is started and the same malfunction is re-detected. However, for items marked with a "★", the diagnosis code is recorded on the first detection of the malfunction.
4. Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

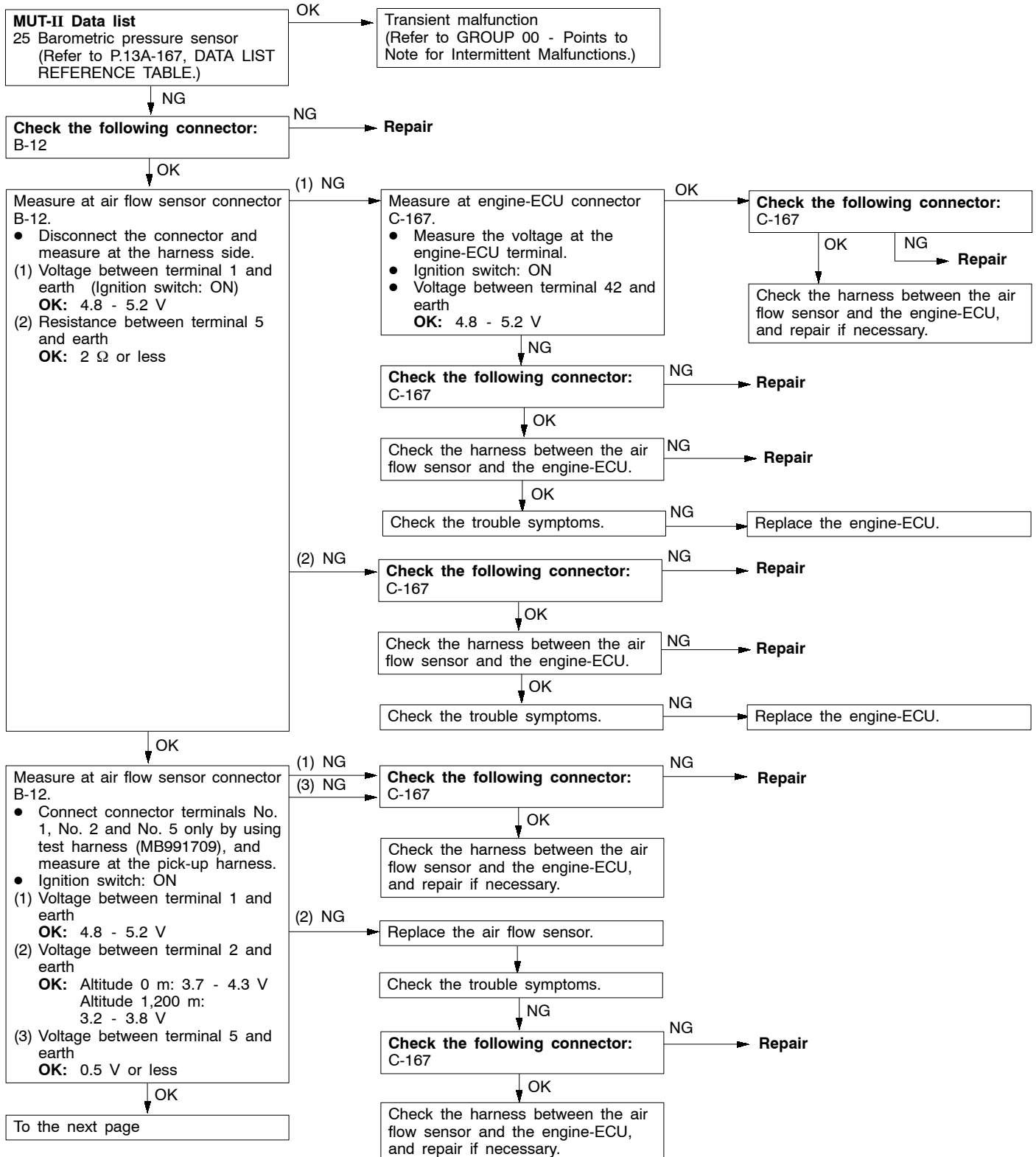
INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

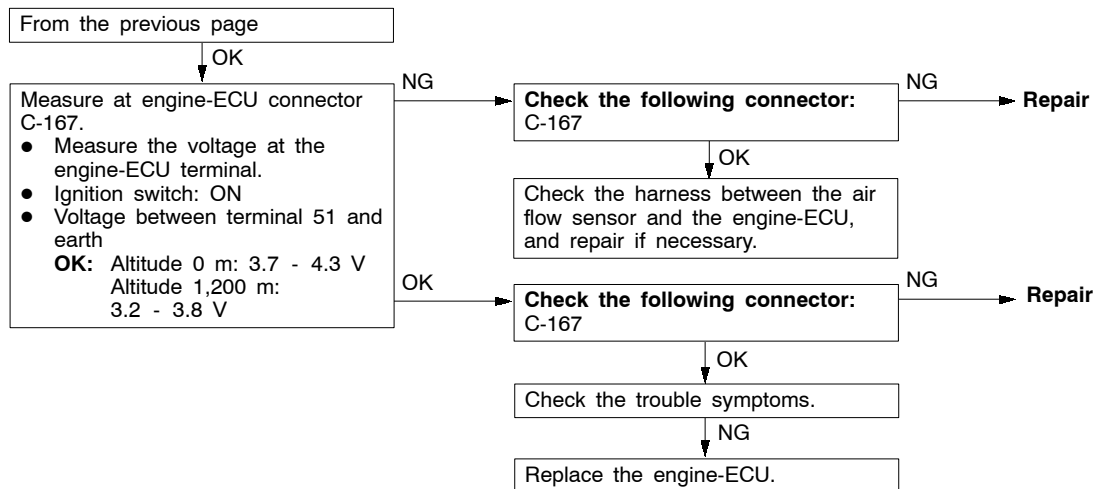
| Code No. P0100 Air flow sensor system | Probable cause |
|--|--|
| Range of Check • Engine speed: 500 r/min or more Set Conditions • The sensor output frequency is 3.3 Hz or less for four seconds. | • Malfunction of air flow sensor • Open or short circuit in air flow sensor circuit or loose connector contact • Malfunction of engine-ECU |



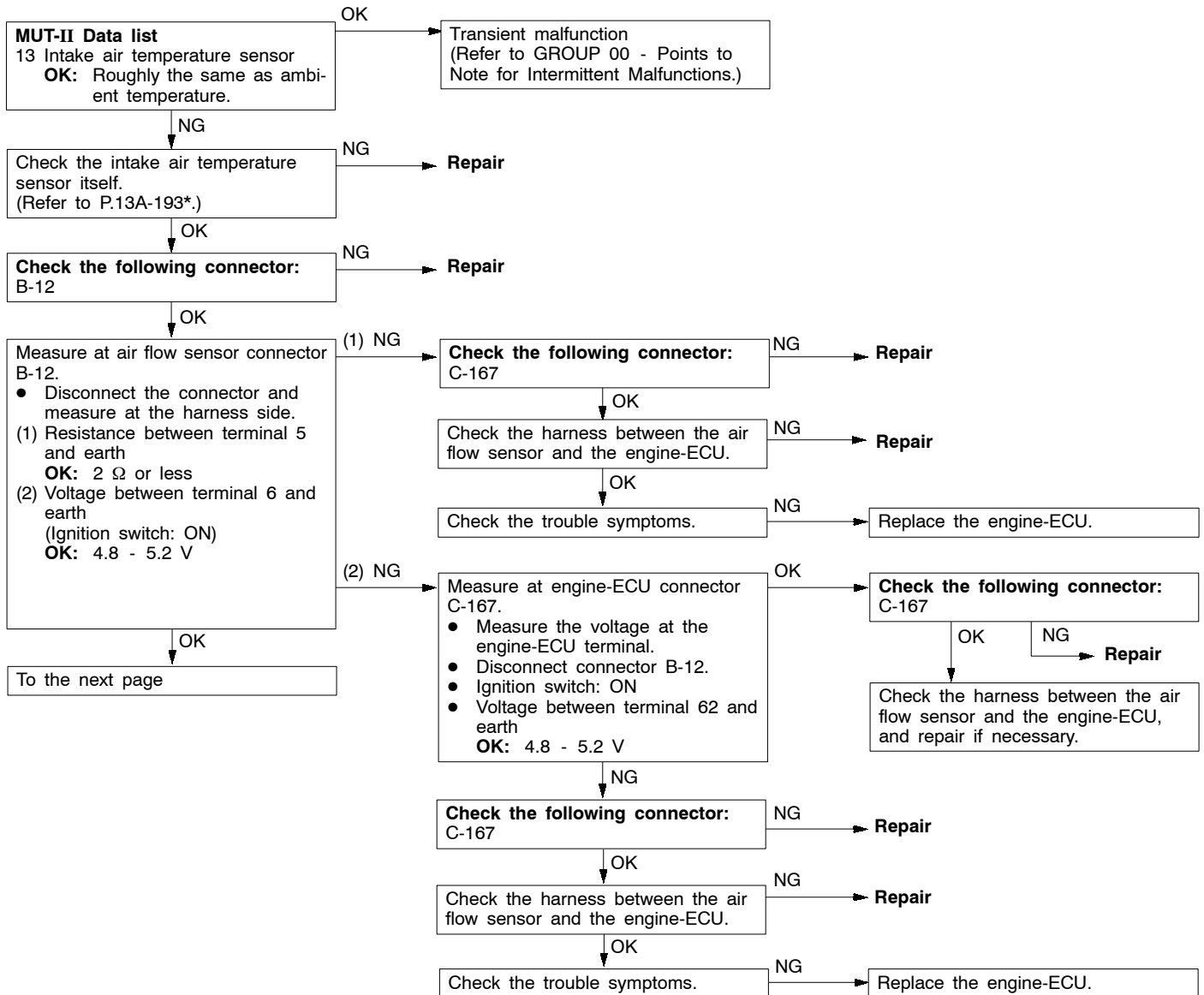


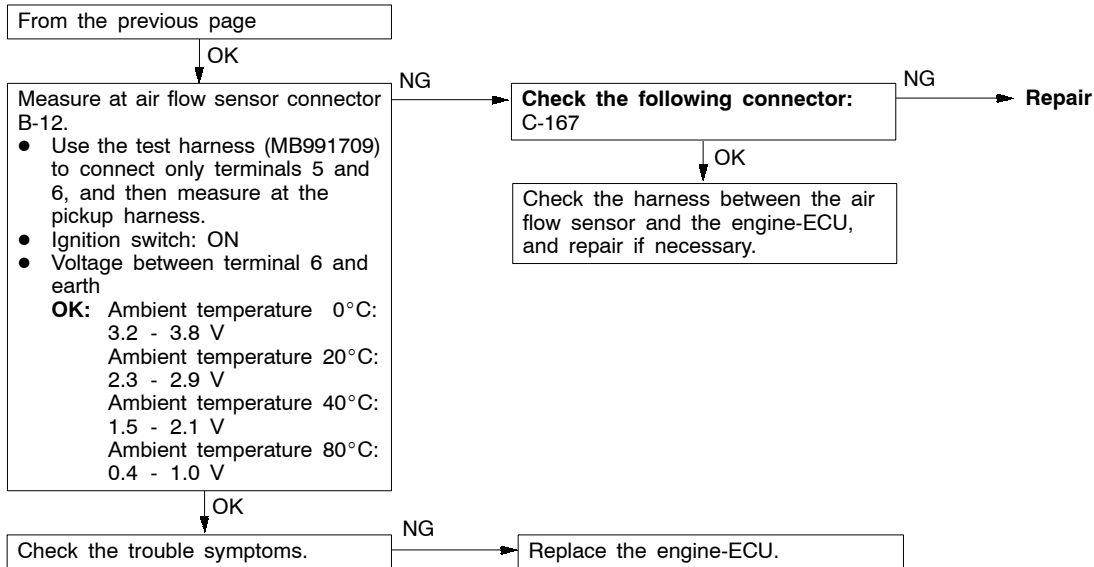
| Code No. P0105 Barometric pressure sensor system | Probable cause |
|--|--|
| Range of Check <ul style="list-style-type: none"> Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. Battery voltage: 8 V or more Set Conditions <ul style="list-style-type: none"> The sensor output voltage is 4.5 V or more for four seconds (equivalent to 114 kPa of barometric pressure) or <ul style="list-style-type: none"> The sensor output voltage is 0.2 V or less (equivalent to 53 kPa of barometric pressure) | <ul style="list-style-type: none"> Malfunction of barometric pressure sensor Open or short circuit in barometric pressure sensor circuit or loose connector contact Malfunction of engine-ECU |





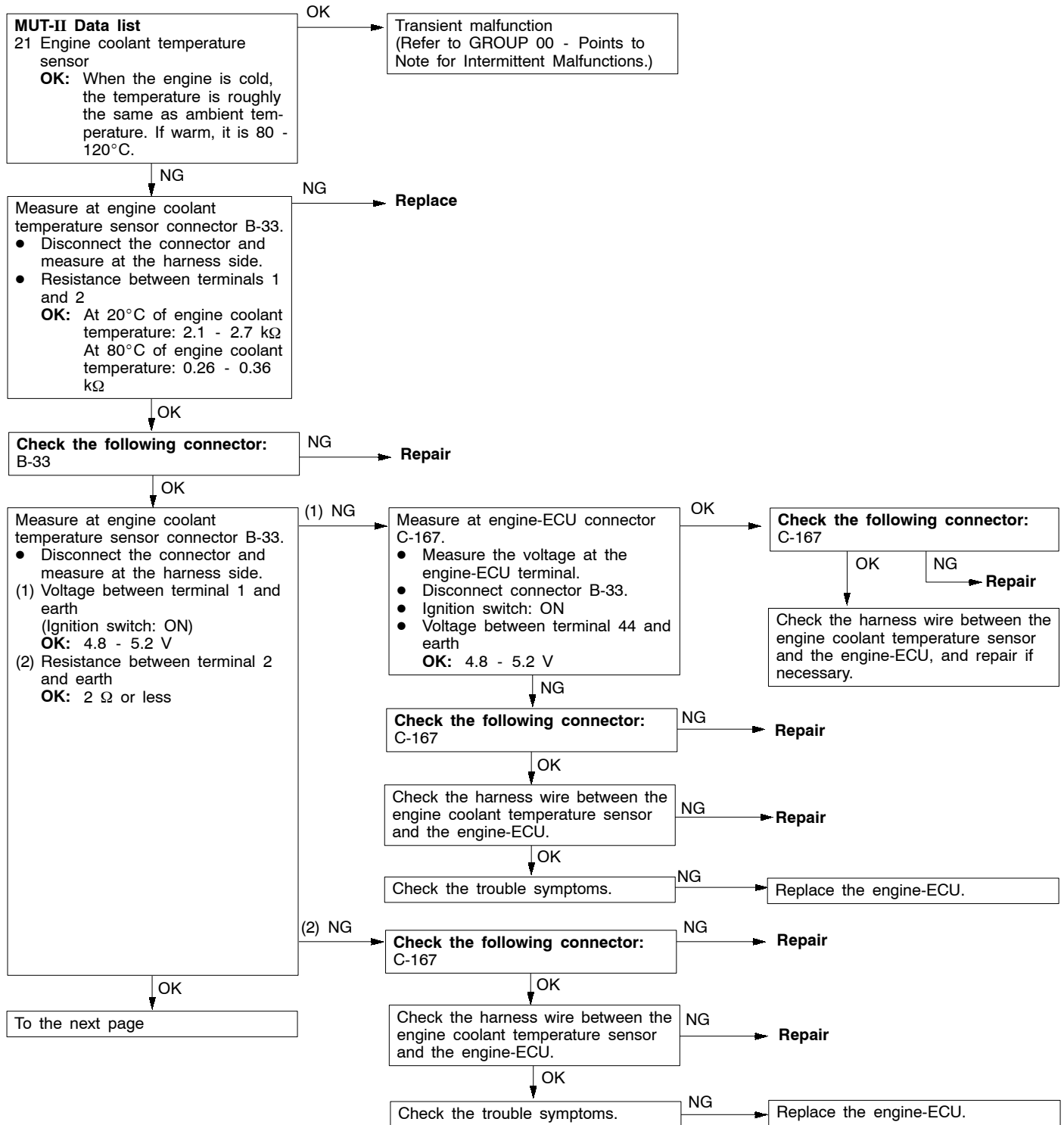
| Code No. P0110 Intake air temperature sensor system | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none"> Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. <p>Set Conditions</p> <ul style="list-style-type: none"> The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C of intake air temperature) <p>or</p> <ul style="list-style-type: none"> The sensor output voltage is 0.2 V or more for four seconds (equivalent to 125°C of intake air temperature) | <ul style="list-style-type: none"> Malfunction of intake air temperature sensor Open or short circuit in intake air temperature sensor or loose connector contact Malfunction of engine-ECU |

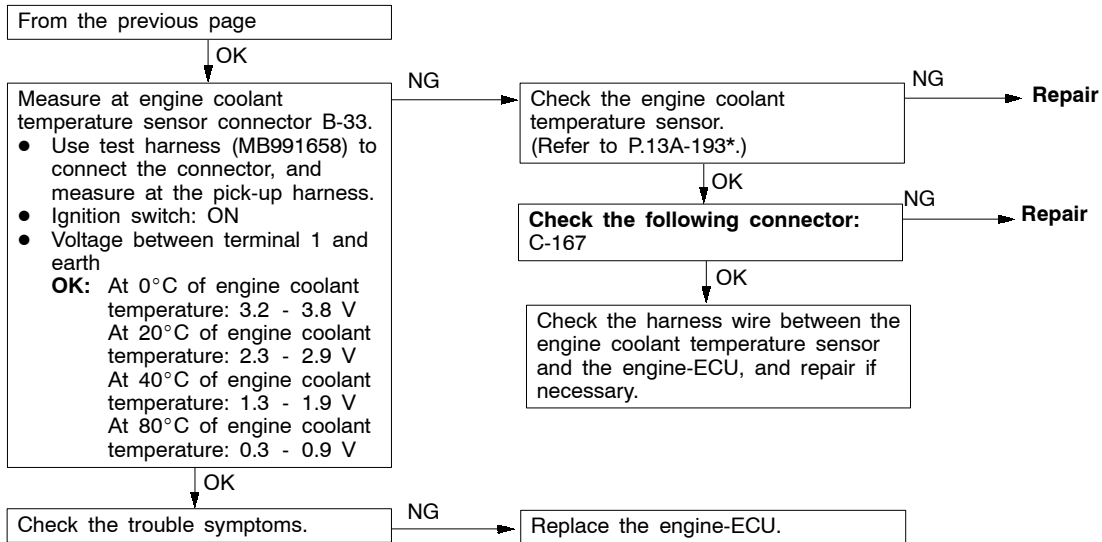


**NOTE:**

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611).

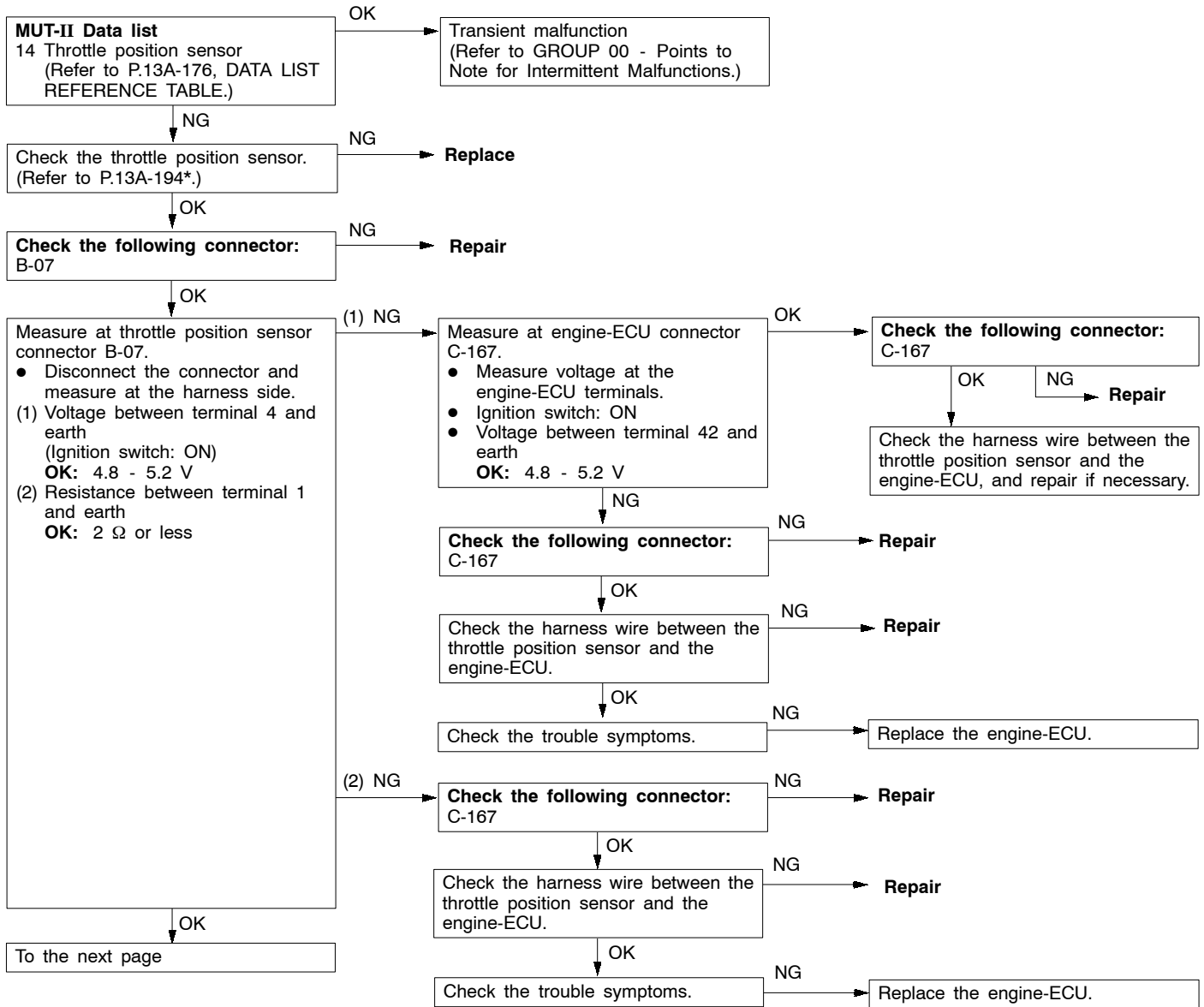
| Code No. P0115 Engine coolant temperature sensor system | Probable cause |
|---|--|
| Range of Check • Engine: Two seconds after the engine has been started Set Conditions • The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C of engine coolant temperature) or • The sensor output voltage is 0.1 V or less for four seconds (equivalent to 140°C of engine coolant temperature) | <ul style="list-style-type: none"> • Malfunction of engine coolant temperature sensor • Open or short circuit in the engine coolant temperature sensor circuit or loose connector contact • Malfunction of engine-ECU |
| Range of Check • Engine: After starting Set Conditions • The engine coolant temperature has reduced from over 40°C to less than 40°C, and that condition has lasted for five minutes or more. | |

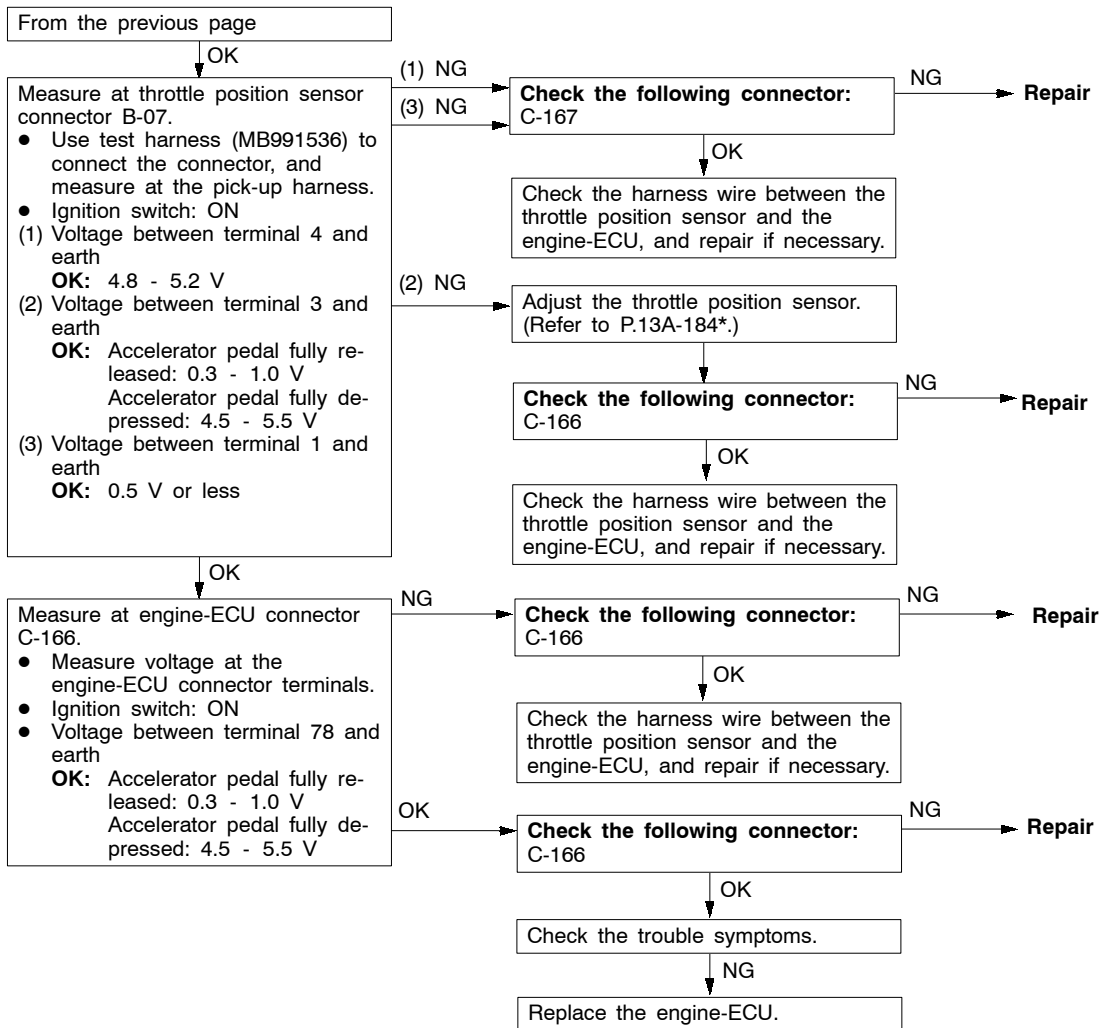


**NOTE:**

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611).

| Code No. P0120 Throttle position sensor system | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned ON or immediately after the engine starts. <p>Set Conditions</p> <ul style="list-style-type: none"> When the idle position switch is ON, the sensor output voltage is 2 V or more for 4 seconds <p>or</p> <ul style="list-style-type: none"> The sensor output voltage is 0.2 V or less for 4 seconds | <ul style="list-style-type: none"> Malfunction of throttle position sensor Improper connector contact, open circuit or short-circuited harness wire Improper "ON" state of idle position switch Short circuit of the idle position switch signal line Malfunction of engine-ECU <M/T> |

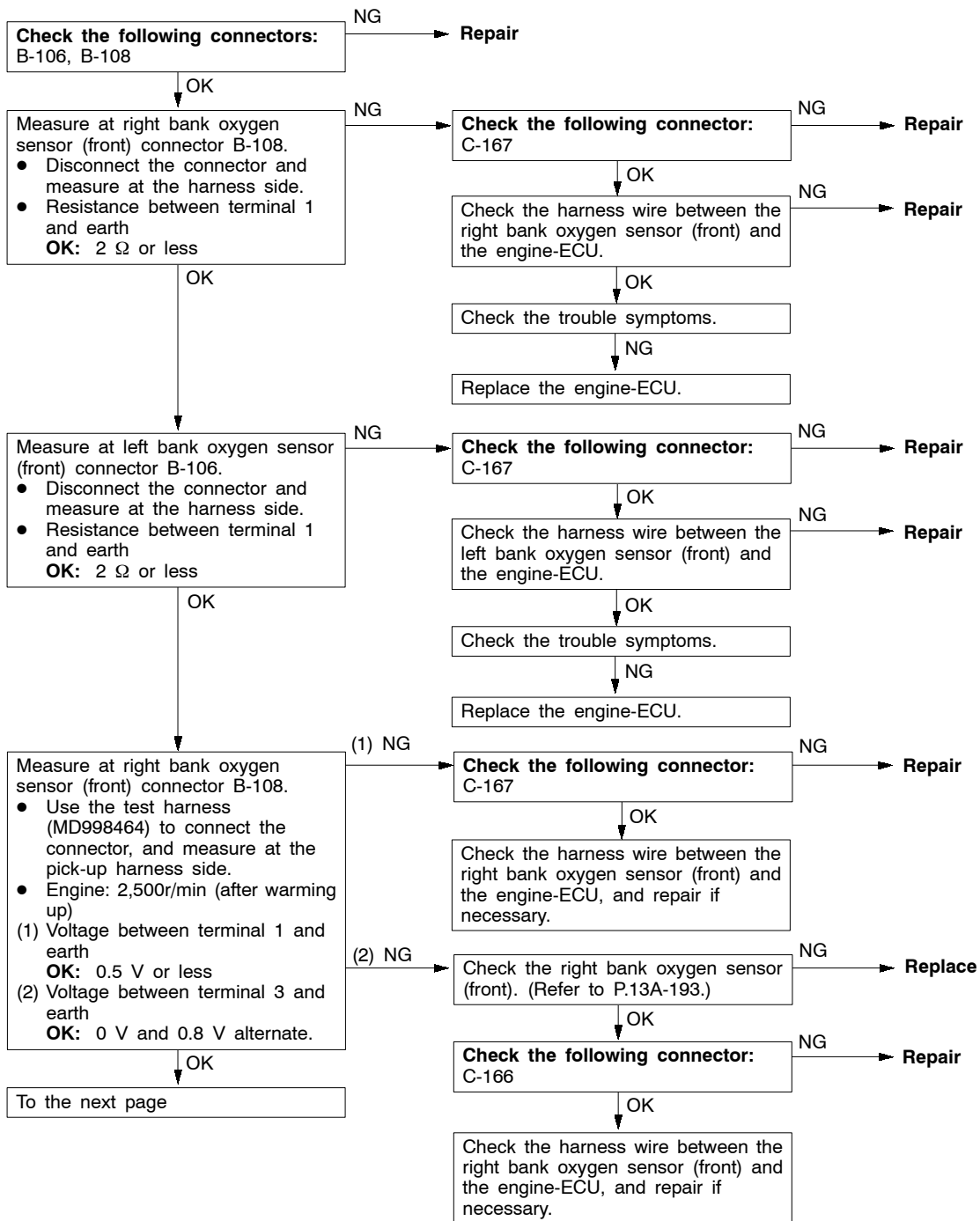


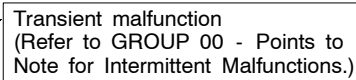


NOTE:

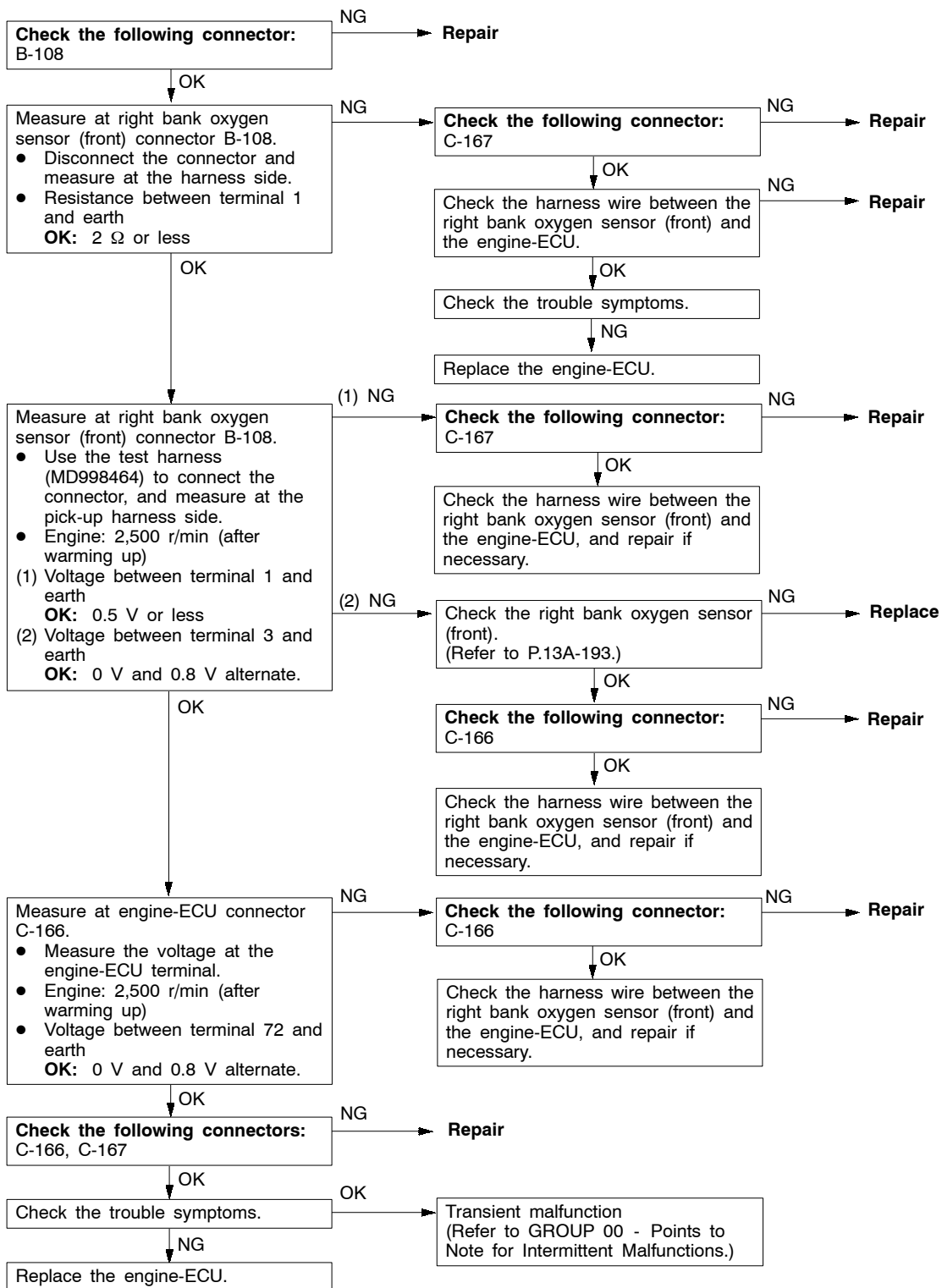
*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611).

| Code No. P0125 Feedback system | Probable cause |
|--|--|
| <p>Range of Check</p> <ul style="list-style-type: none"> • The engine coolant temperature is approx. 80°C or more. • During stoichiometric feedback control • The vehicle is not being decelerated. <p>Set Conditions</p> <ul style="list-style-type: none"> • Right bank oxygen sensor (front) output voltage has been higher or lower than 0.5 V for at least thirty seconds. • Left bank oxygen sensor (front) output voltage has been higher or lower than 0.5 V for at least thirty seconds. | <ul style="list-style-type: none"> • Malfunction of oxygen sensor (front) • Open or short circuit in the right bank oxygen sensor (front) circuit or loose connector contact • Open or short circuit in the left bank oxygen sensor (front) circuit or loose connector contact • Malfunction of engine-ECU |

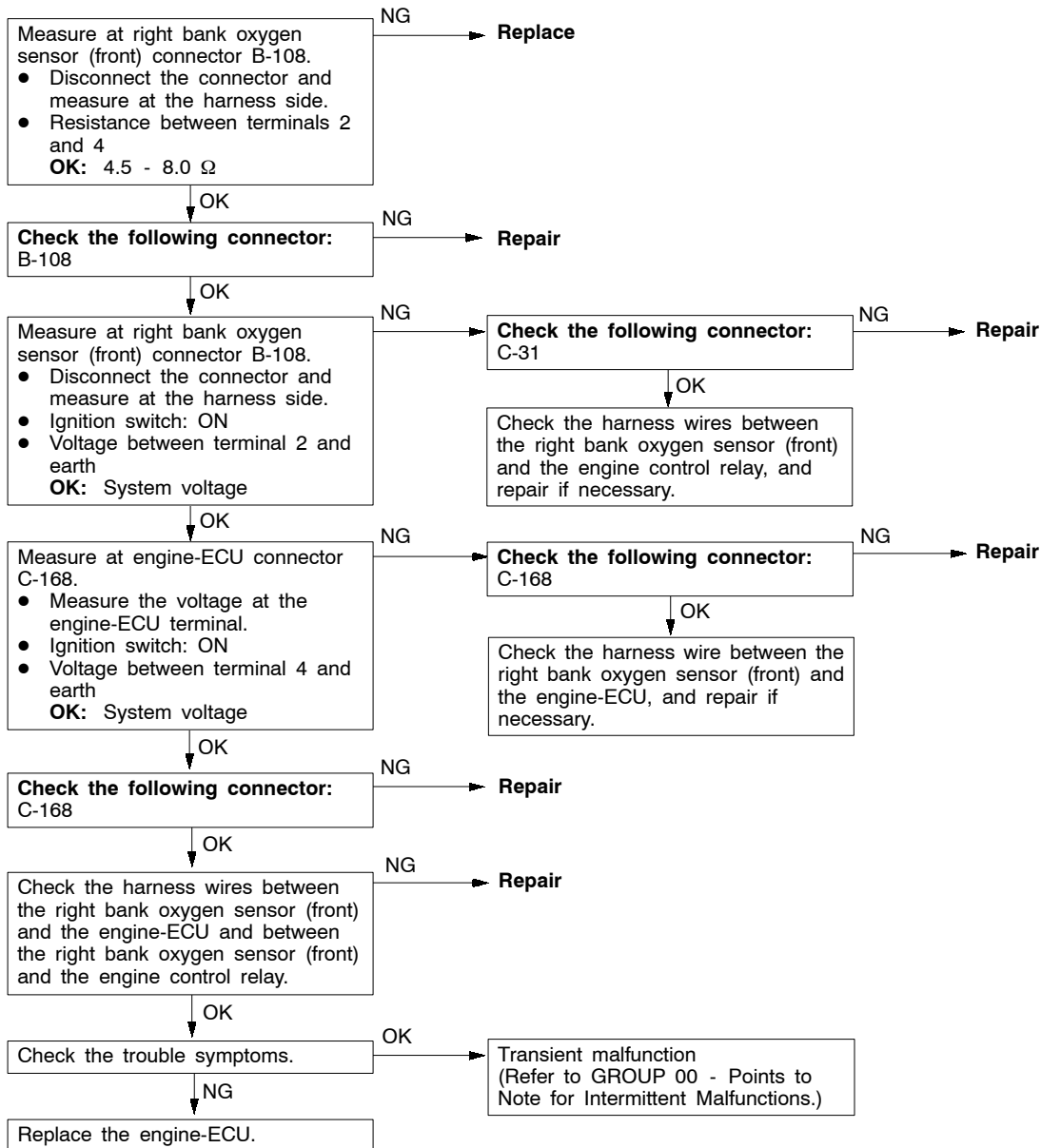




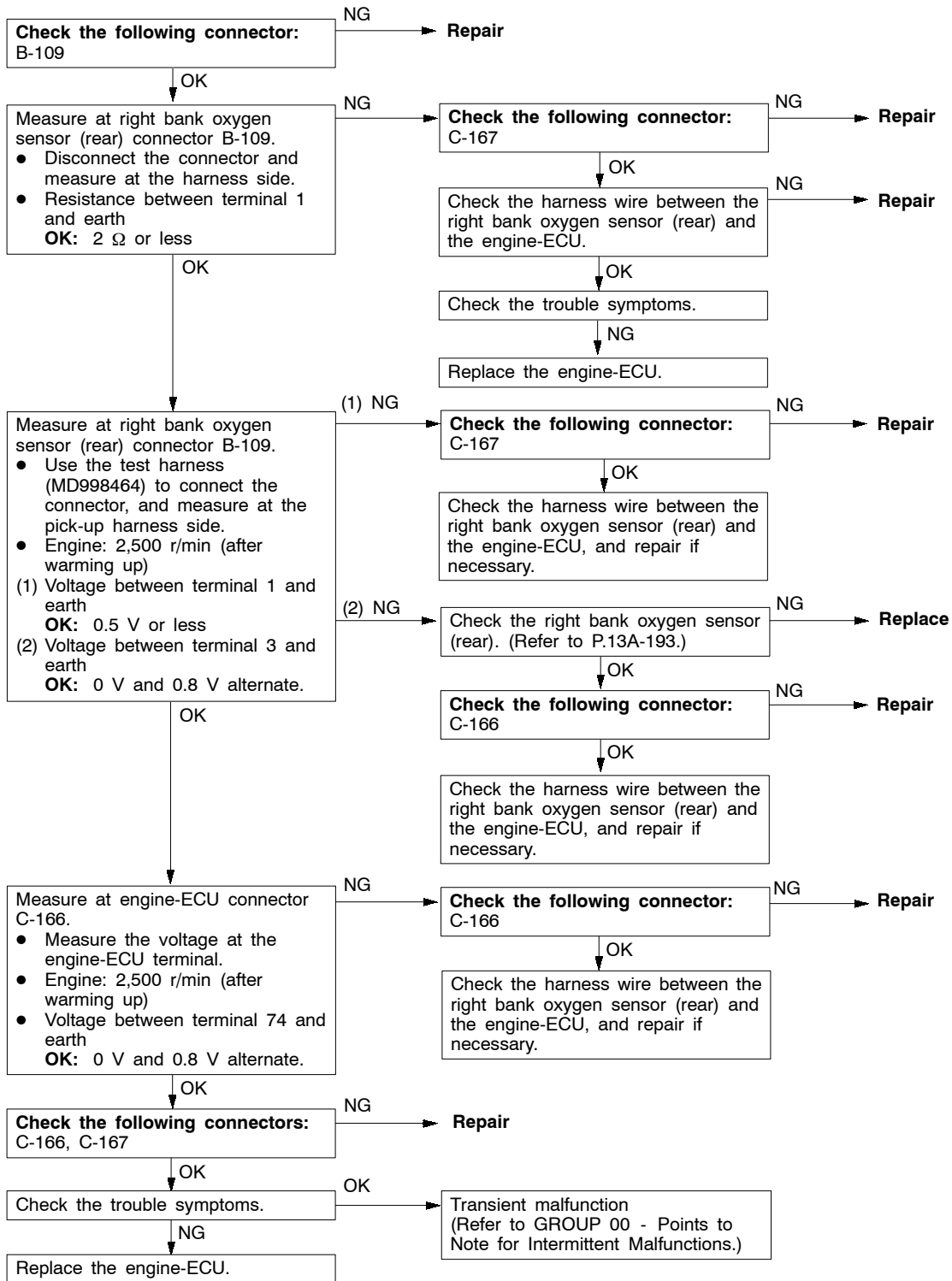
| Code No. P0130 Oxygen sensor (front) system <Bank 1 sensor 1> | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none"> • Three minutes have been passed since the engine has been started. • The engine coolant temperature is approx. 80°C or more. • Intake air temperature is 20 - 50°C • Engine speed is 2,000 – 3,000 r/min or more • Driving on a level surface at constant speed. <p>Set Conditions</p> <ul style="list-style-type: none"> • The right bank oxygen sensor (front) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the right bank oxygen sensor (front) inside the engine-ECU. | <ul style="list-style-type: none"> • Malfunction of right bank oxygen sensor (front) • Open or short circuit in the right bank oxygen sensor (front) circuit or loose connector contact • Malfunction of engine-ECU |
| <p>Range of Check</p> <ul style="list-style-type: none"> • Engine speed is 3,000 r/min or less • During driving • During air/fuel ratio feedback control <p>Set Conditions</p> <ul style="list-style-type: none"> • The right bank oxygen sensor (front) output frequency is five or less per 12 seconds on average. | |



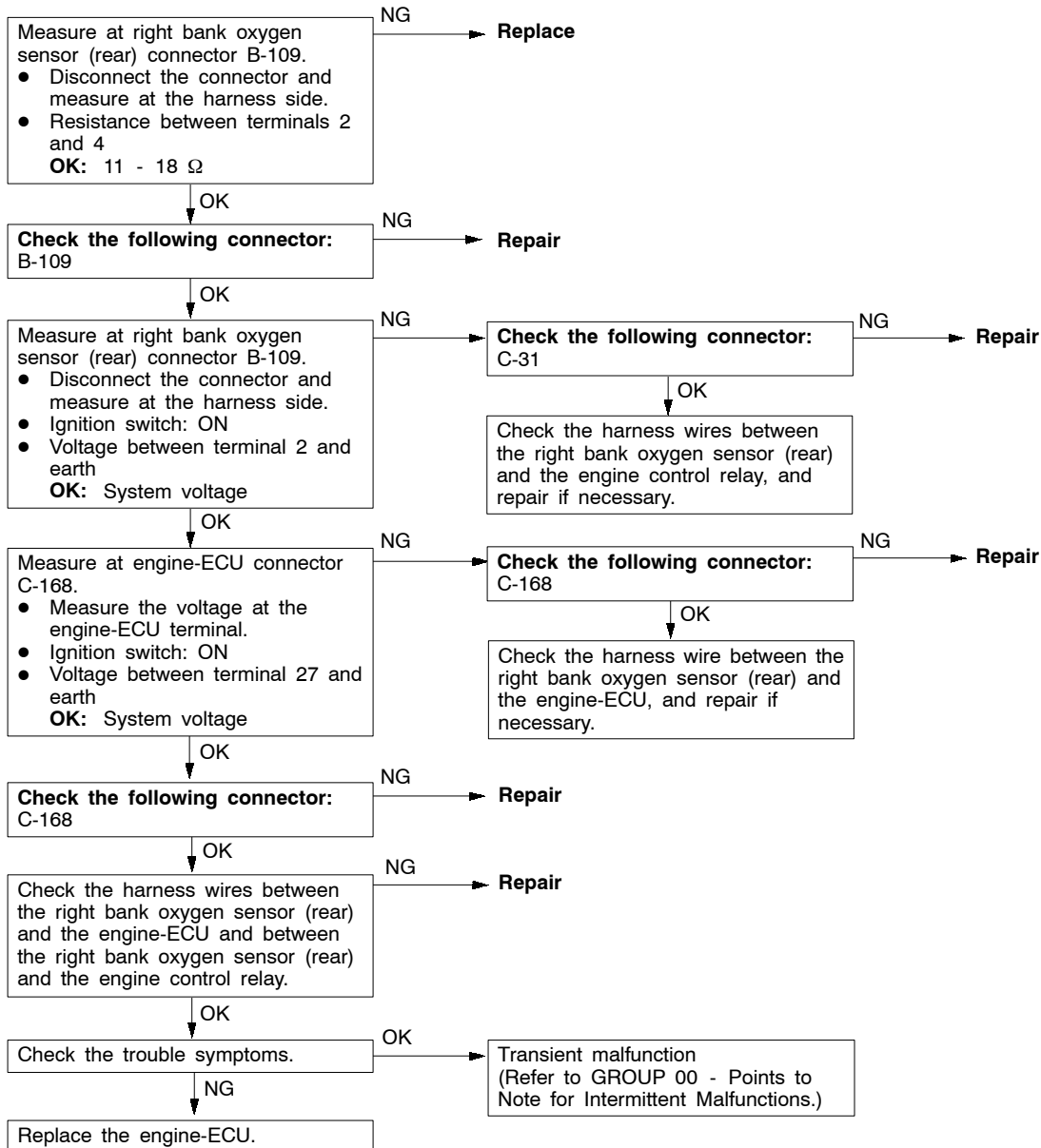
| Code No. P0135 Oxygen sensor heater (front) system <Bank 1 sensor 1> | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> • The engine coolant temperature is approx. 20°C or more. • The oxygen sensor heater (front) remains on. • The engine speed is 50 r/min or more. • Battery voltage is 11 - 16 V. <p>Set Conditions</p> <ul style="list-style-type: none"> • The current, which flows through the oxygen sensor heater (front), is 0.2 A or less or 3.5 A or more for six seconds. | <ul style="list-style-type: none"> • Malfunction of right bank oxygen sensor heater (front) • Open or short circuit in the oxygen sensor heater (front) circuit or loose connector contact • Malfunction of engine-ECU |



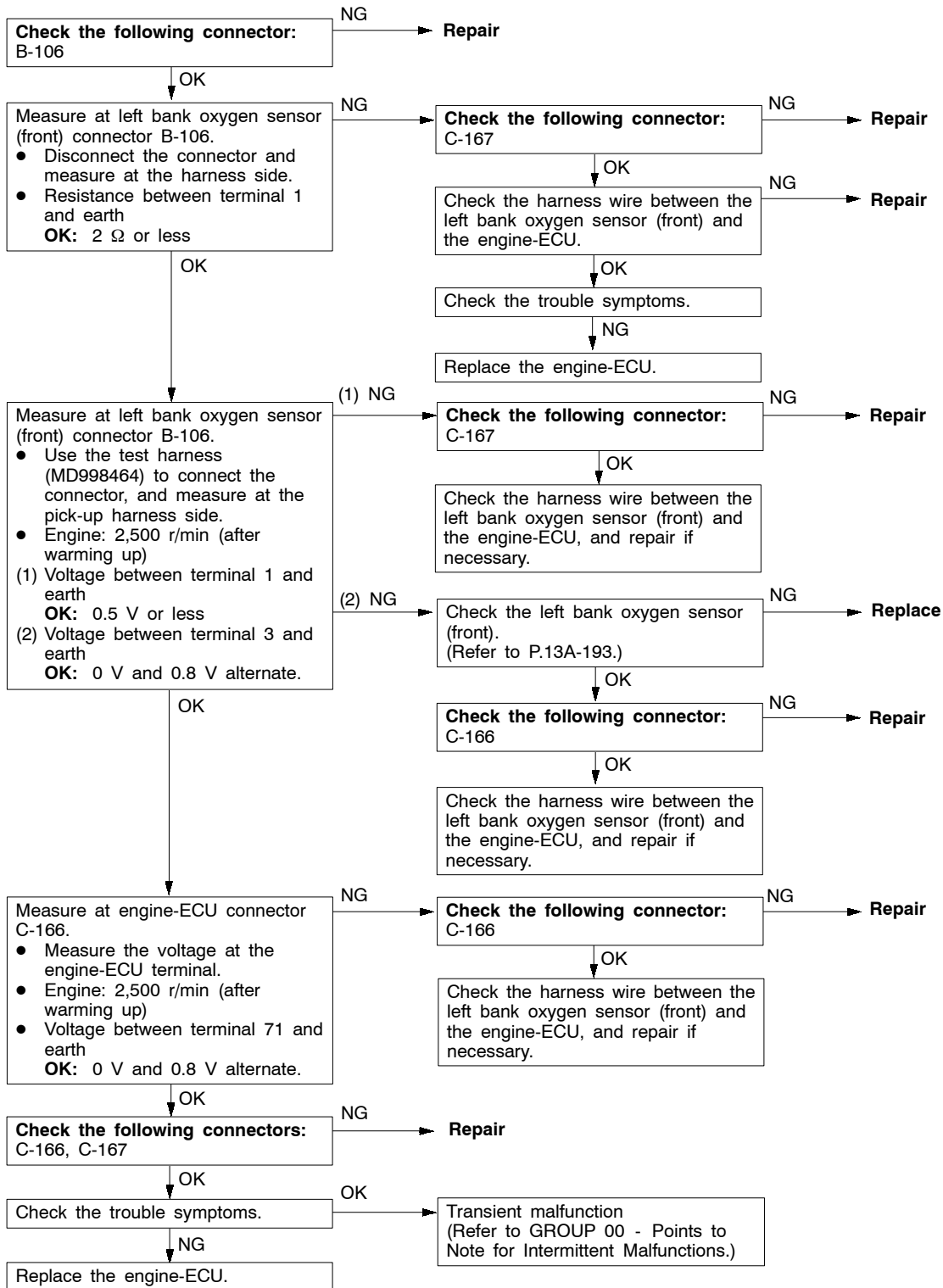
| Code No. P0136 Oxygen sensor (rear) system <Bank 1 sensor 2> | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none">• Three minutes have been passed since the engine has been started.• The engine coolant temperature is approx. 80°C or more.• Engine speed is 1,200 r/min or more• Driving on a level surface at constant speed. <p>Set Conditions</p> <ul style="list-style-type: none">• The right bank oxygen sensor (rear) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the right bank oxygen sensor (rear) inside the engine-ECU. | <ul style="list-style-type: none">• Malfunction of right bank oxygen sensor (rear)• Open or short circuit in the right bank oxygen sensor (rear) circuit or loose connector contact• Malfunction of engine-ECU |



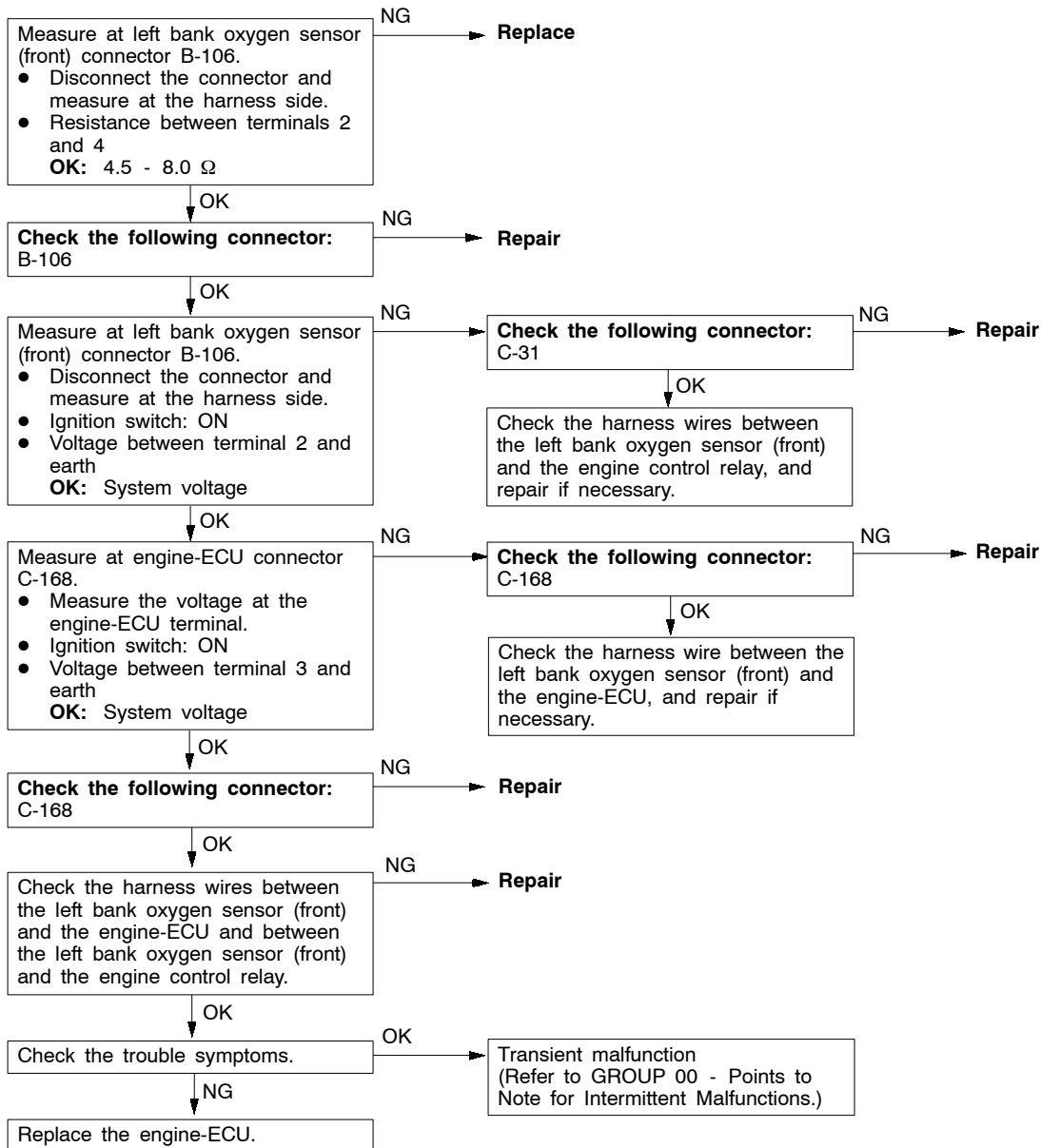
| Code No. P0141 Oxygen sensor heater (rear) system <Bank 1 sensor 2> | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> • The engine coolant temperature is approx. 20°C or more. • The oxygen sensor heater (rear) remains on. • The engine speed is 50 r/min or more. • Battery voltage is 11 - 16 V. <p>Set Conditions</p> <ul style="list-style-type: none"> • The current, which flows through the oxygen sensor heater (rear), is 0.2 A or less or 3.5 A or more for six seconds. | <ul style="list-style-type: none"> • Malfunction of right bank oxygen sensor heater (rear) • Open or short circuit in the oxygen sensor heater (rear) circuit or loose connector contact • Malfunction of engine-ECU |



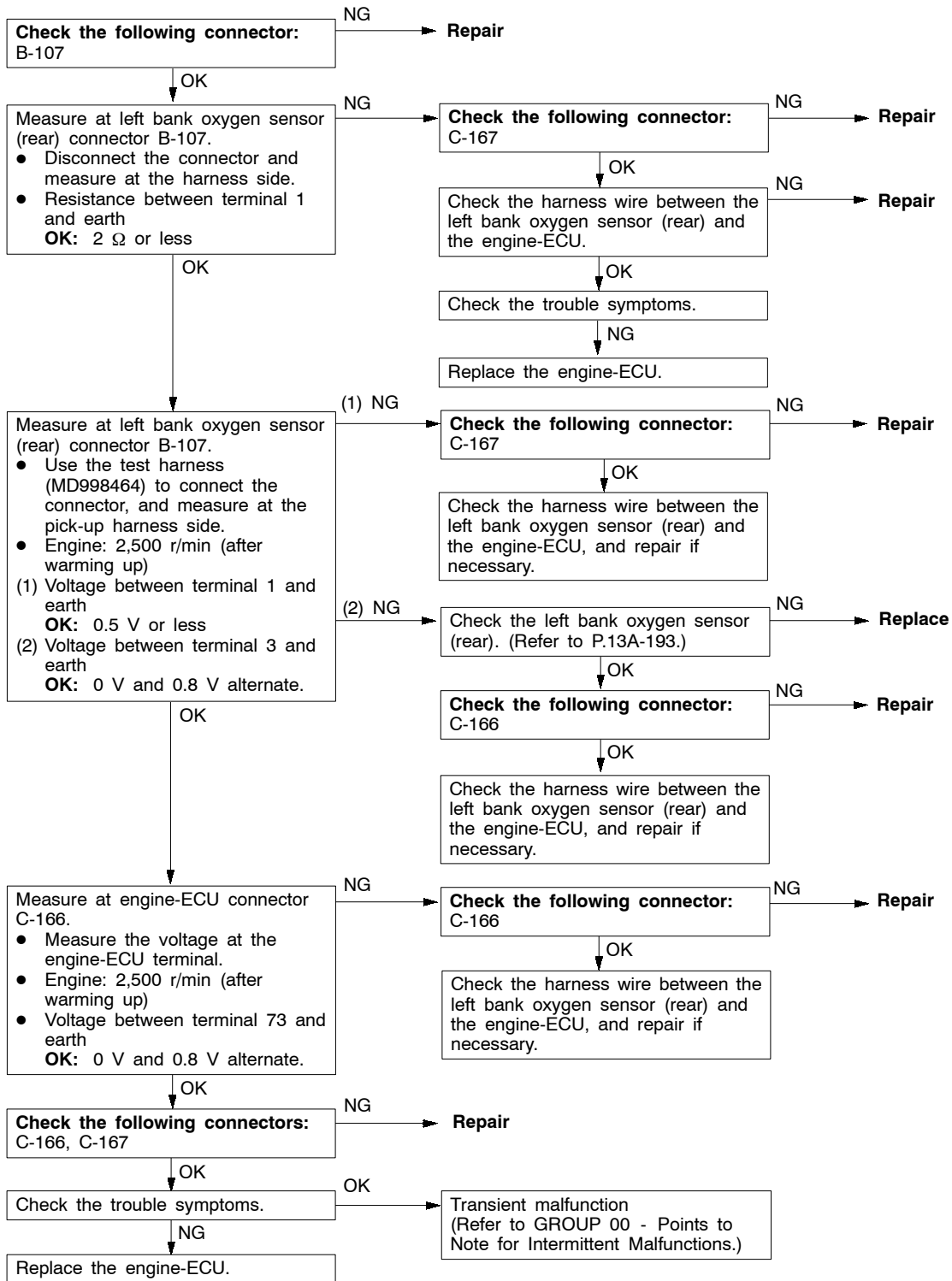
| Code No. P0150 Oxygen sensor (front) system <Bank 2 sensor 1> | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none"> ● Three minutes have been passed since the engine has been started. ● The engine coolant temperature is approx. 80°C or more. ● Intake air temperature is 20 - 50°C ● Engine speed is 2,000 – 3,000 r/min or more ● Driving on a level surface at constant speed. <p>Set Conditions</p> <ul style="list-style-type: none"> ● The left bank oxygen sensor (front) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the left bank oxygen sensor (front) inside the engine-ECU. | <ul style="list-style-type: none"> ● Malfunction of left bank oxygen sensor (front) ● Open or short circuit in the left bank oxygen sensor (front) circuit or loose connector contact ● Malfunction of engine-ECU |
| <p>Range of Check</p> <ul style="list-style-type: none"> ● Engine speed is 3,000 r/min or less ● During driving ● During air/fuel ratio feedback control <p>Set Conditions</p> <ul style="list-style-type: none"> ● The left bank oxygen sensor (front) output frequency is five or less per 12 seconds on average. | |



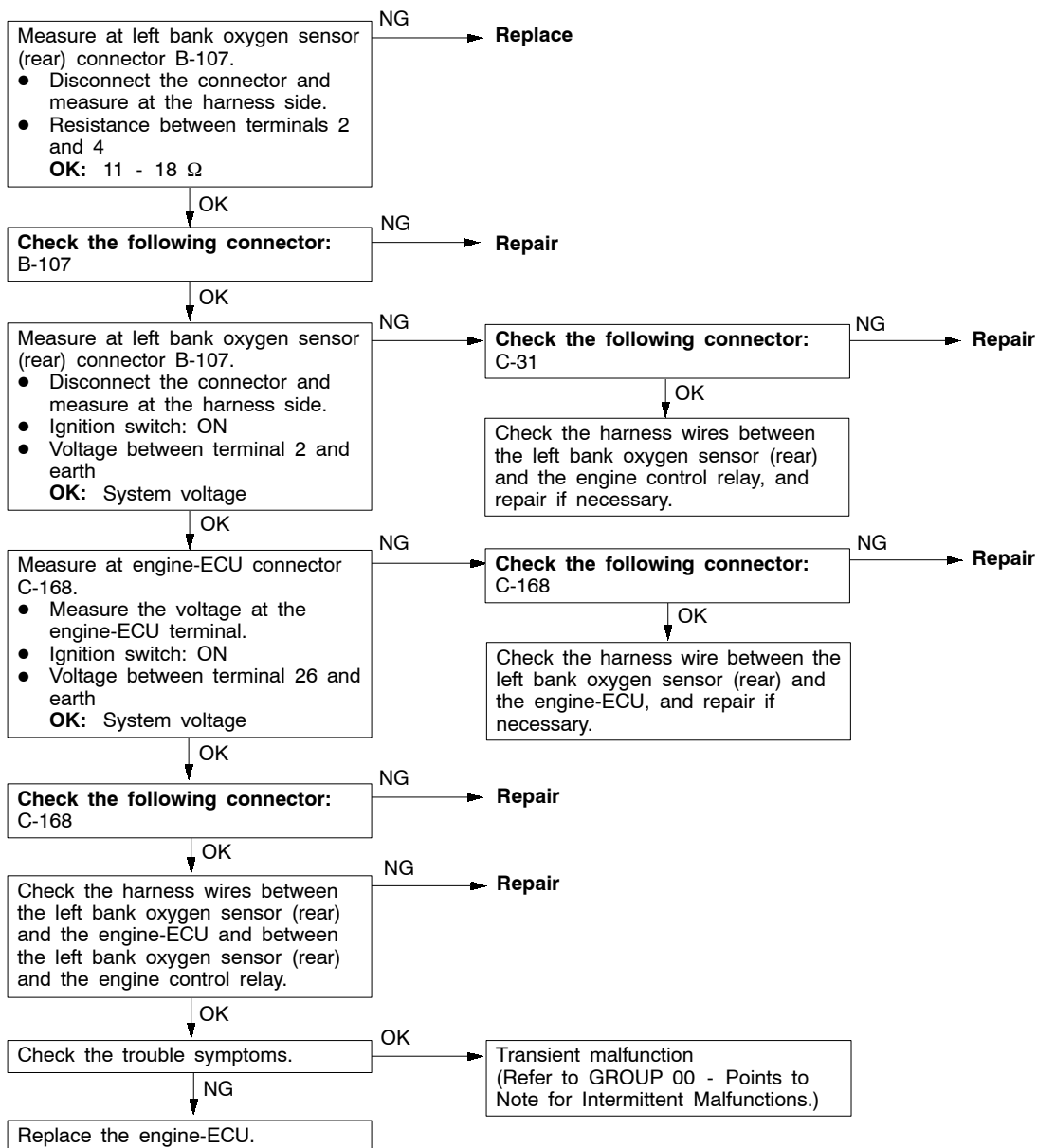
| Code No. P0155 Oxygen sensor heater (front) system <Bank 2 sensor 1> | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none"> • The engine coolant temperature is approx. 20°C or more. • The oxygen sensor heater (front) remains on. • The engine speed is 50 r/min or more. • Battery voltage is 11 - 16 V. <p>Set Conditions</p> <ul style="list-style-type: none"> • The current, which flows through the oxygen sensor heater (front), is 0.2 A or less or 3.5 A or more for six seconds. | <ul style="list-style-type: none"> • Malfunction of left bank oxygen sensor heater (front) • Open or short circuit in the left bank oxygen sensor heater (front) circuit or loose connector contact • Malfunction of engine-ECU |



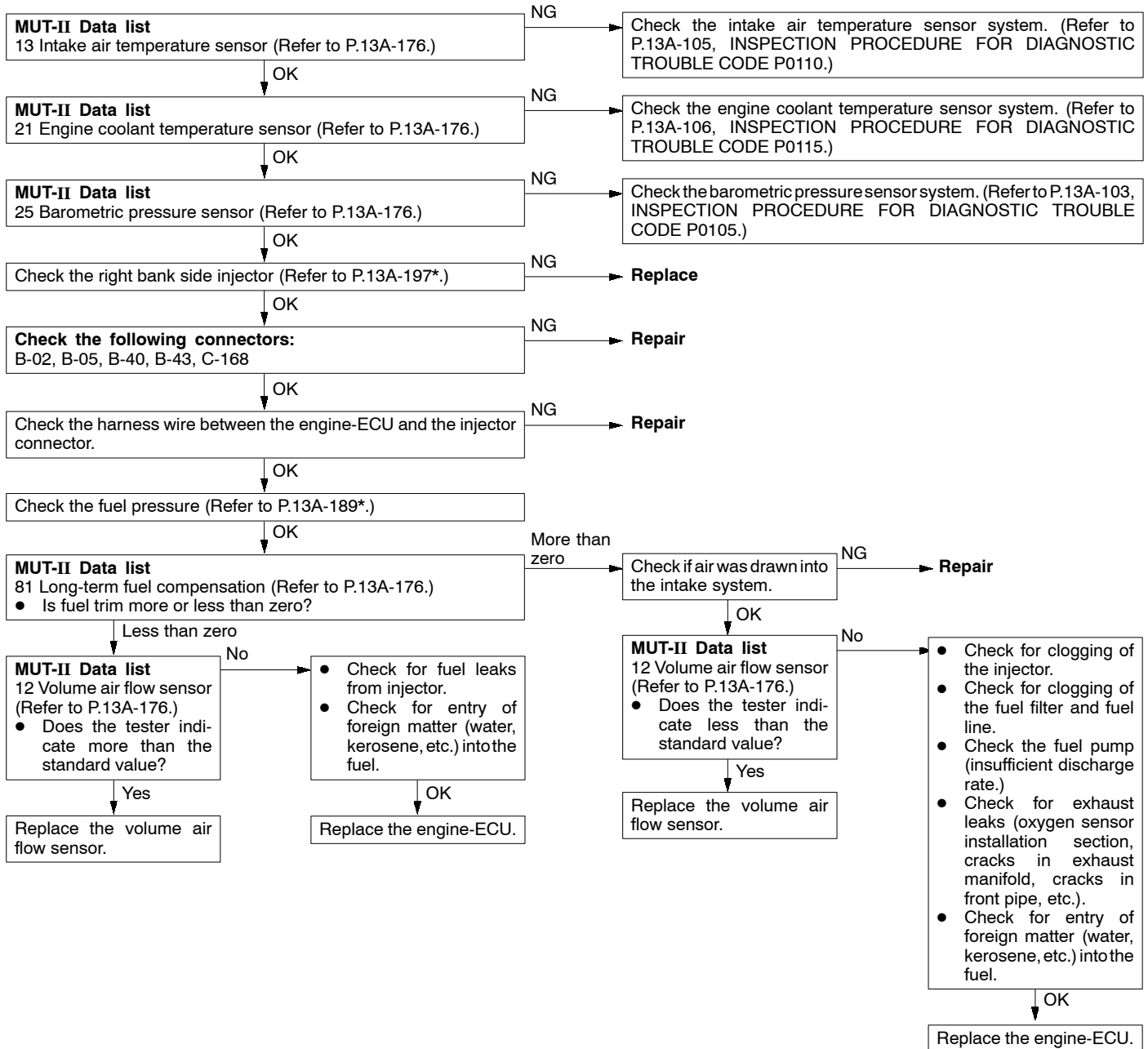
| Code No. P0156 Oxygen sensor (rear) system <Bank 2 sensor 2> | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none">• Three minutes have been passed since the engine has been started.• The engine coolant temperature is approx. 80°C or more.• Engine speed is 1,200 r/min or more• Driving on a level surface at constant speed. <p>Set Conditions</p> <ul style="list-style-type: none">• The left bank oxygen sensor (rear) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the left bank oxygen sensor (rear) inside the engine-ECU. | <ul style="list-style-type: none">• Malfunction of left bank oxygen sensor (rear)• Open or short circuit in the left bank oxygen sensor (rear) circuit or loose connector contact• Malfunction of engine-ECU |



| Code No. P0161 Oxygen sensor heater (rear) system <Bank 2 sensor 2> | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none"> • The engine coolant temperature is approx. 20°C or more. • The oxygen sensor heater (rear) remains on. • The engine speed is 50 r/min or more. • Battery voltage is 11 - 16 V. <p>Set Conditions</p> <ul style="list-style-type: none"> • The current, which flows through the oxygen sensor heater (rear), is 0.2 A or less or 3.5 A or more for six seconds. | <ul style="list-style-type: none"> • Malfunction of left bank oxygen sensor heater (rear) • Open or short circuit in the left bank oxygen sensor heater (rear) circuit or loose connector contact • Malfunction of engine-ECU |



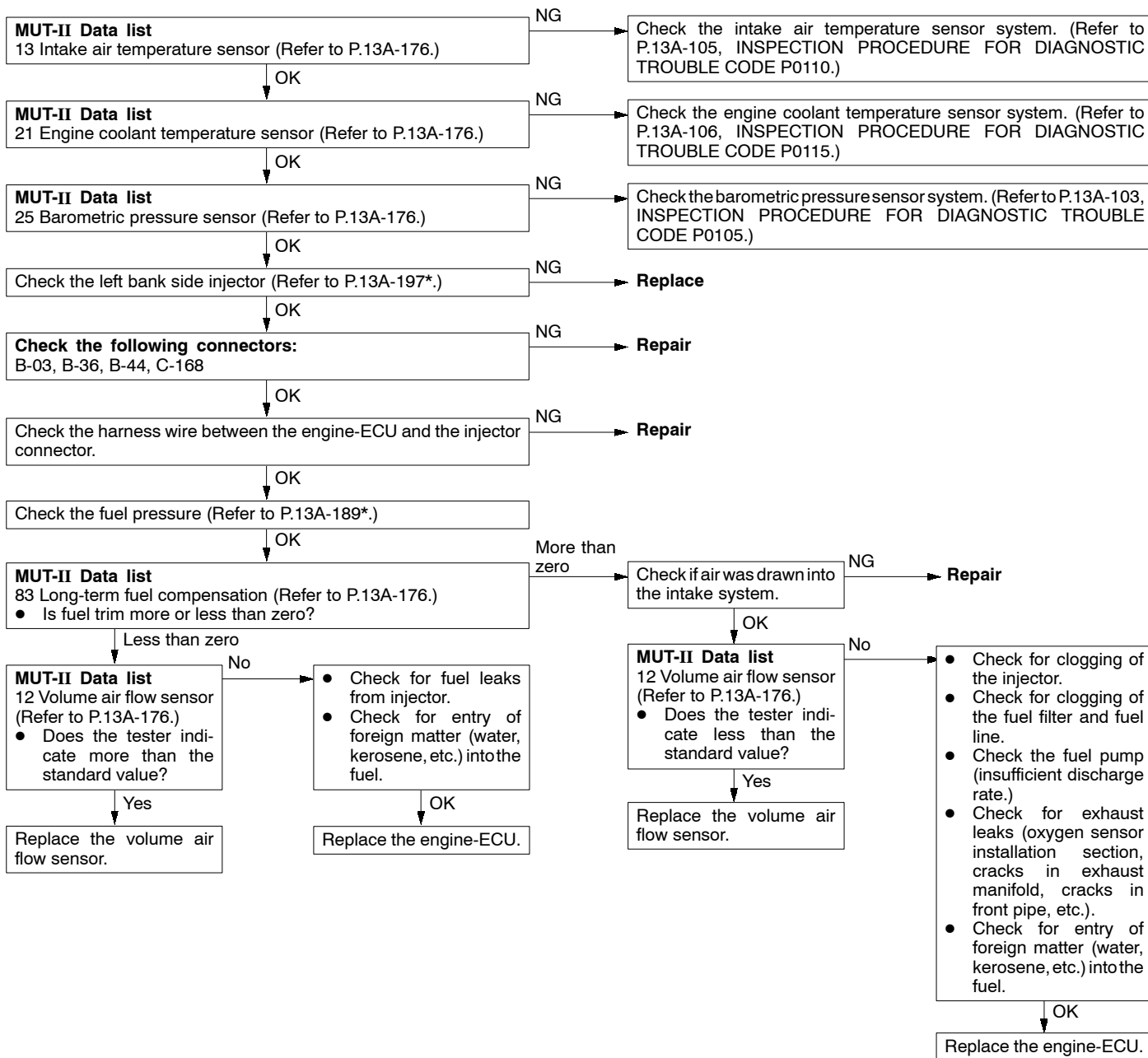
| Code No. P0170 Abnormal fuel system (Bank 1) | Probable cause |
|--|---|
| Range of Check • Engine: Being learning the air-fuel ratio Set Conditions • Ten seconds or more have been passed while the fuel injection amount compensation value is too low. or • Ten seconds or more have been passed while the fuel injection amount compensation value is too high. | <ul style="list-style-type: none"> • Incorrect fuel pressure • Malfunction of fuel supply system • Malfunction of right bank oxygen sensor (front) • Malfunction of intake air temperature sensor • Malfunction of barometric pressure sensor • Malfunction of air flow sensor • Malfunction of engine-ECU |



NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

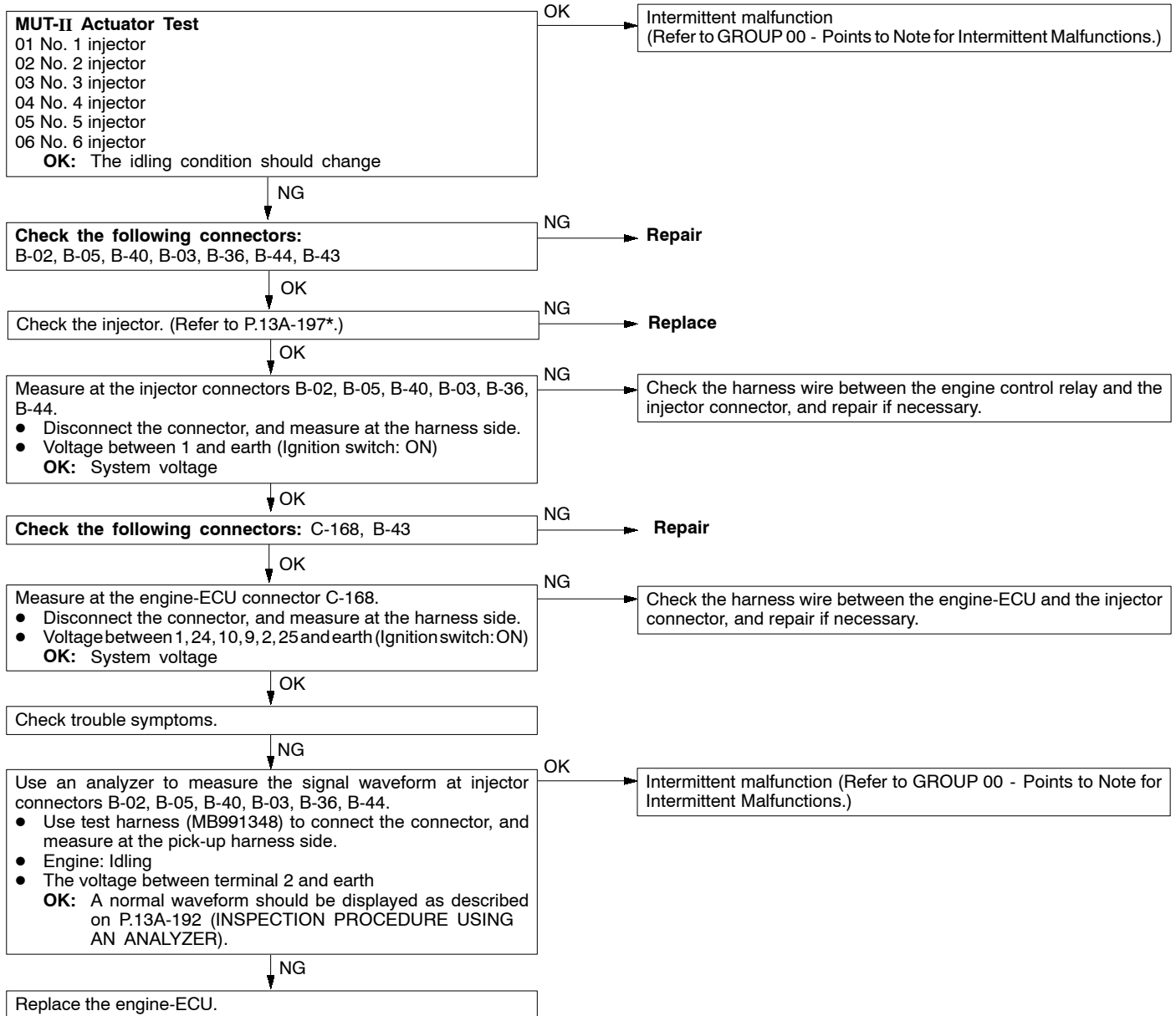
| Code No. P0173 Abnormal fuel system (Bank 2) | Probable cause |
|--|--|
| Range of Check • Engine: Being learning the air/fuel ratio Set Conditions • Ten seconds or more have been passed while the fuel injection amount compensation value is too low. or • Ten seconds or more have been passed while the fuel injection amount compensation value is too high. | <ul style="list-style-type: none"> • Incorrect fuel pressure • Malfunction of fuel supply system • Malfunction of left bank oxygen sensor (front) • Malfunction of intake air temperature sensor • Malfunction of barometric pressure sensor • Malfunction of air flow sensor • Malfunction of engine-ECU |



NOTE:

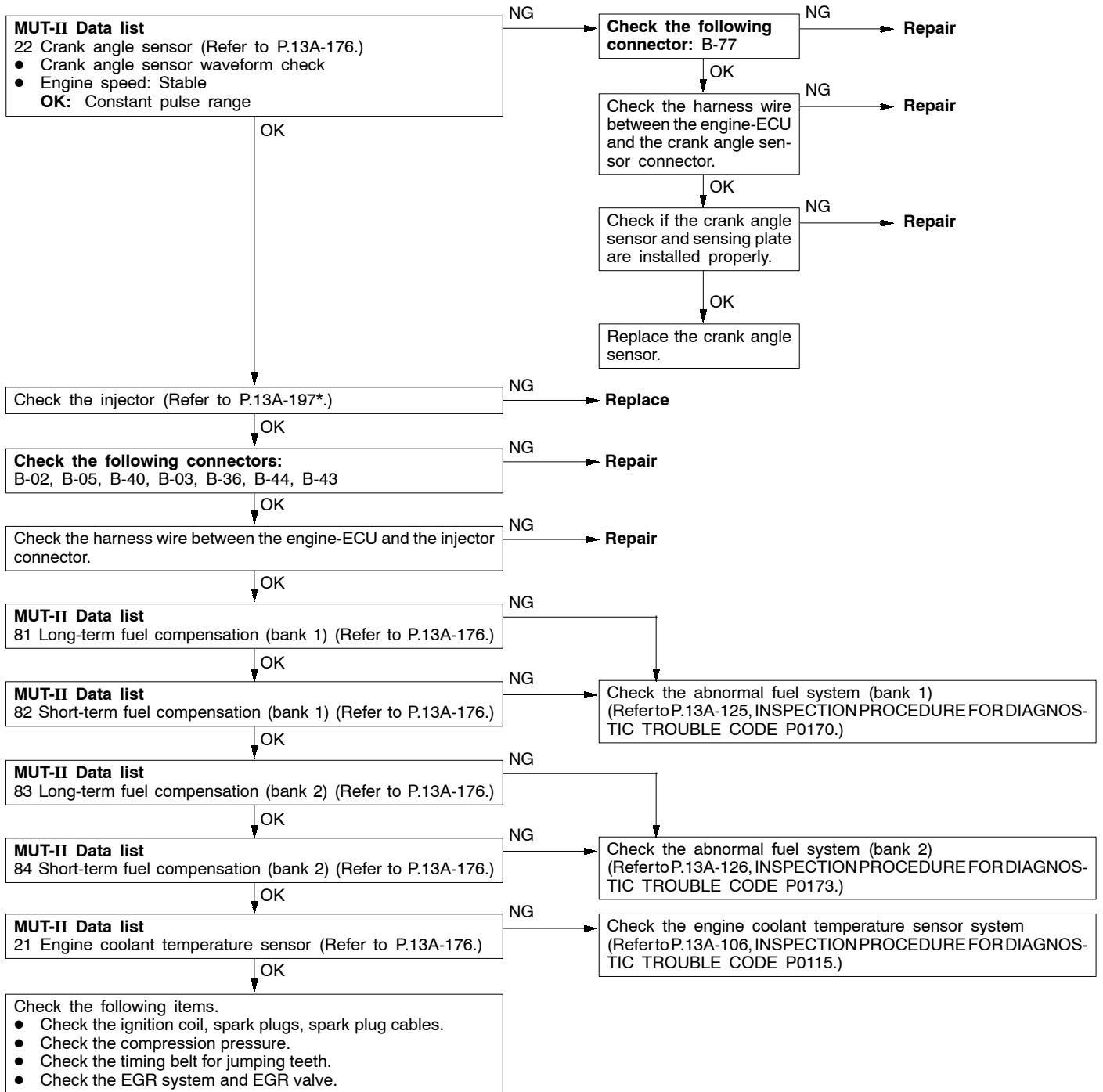
*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

| | |
|---|--|
| Code No. P0201 No. 1 injector system Code No. P0202 No. 2 injector system Code No. P0203 No. 3 injector system Code No. P0204 No. 4 injector system Code No. P0205 No. 5 injector system Code No. P0206 No. 6 injector system | Probable cause |
| Range of Check <ul style="list-style-type: none"> Engine speed is approx. 50 - 1,000 r/min The throttle position sensor output voltage is 1.15 V or less. Actuator test by MUT-II is not carried out. Set Conditions <ul style="list-style-type: none"> Surge voltage of injector coil is not detected for 4 seconds. | <ul style="list-style-type: none"> Malfunction of the injector Improper connector contact, open circuit or short-circuited harness wire of the injector circuit Malfunction of engine-ECU |

**NOTE:**

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

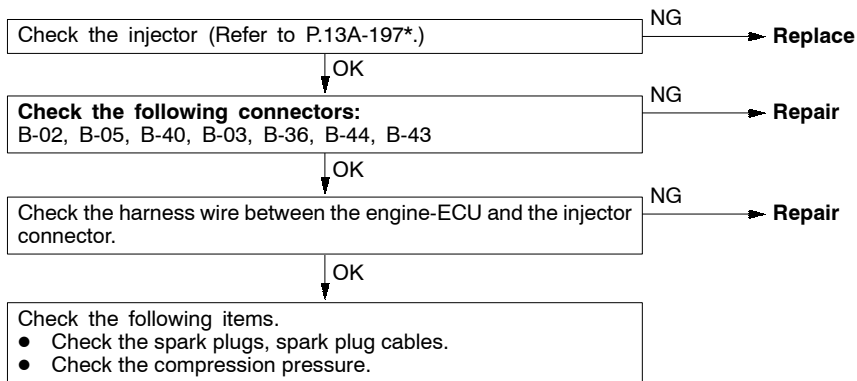
| Code No. P0300 Ignition coil (power transistor) system | Probable cause |
|---|--|
| Range of Check <ul style="list-style-type: none"> Engine speed is 500 - 3,500 r/min. While the engine is running except deceleration and sudden acceleration. Set Conditions <ul style="list-style-type: none"> The number of misfires exceeds a predetermined number per 200 engine revolutions (Misfire has occurred in two cylinders or more). or <ul style="list-style-type: none"> The number of misfires exceeds a predetermined number per 100 engine revolutions (Misfire has occurred in two cylinders or more). | <ul style="list-style-type: none"> Malfunction of the ignition system Poor crank angle sensor signal Incorrect air/fuel ratio Abnormal compression Engine coolant temperature sensor failed Timing belt teeth jumped Malfunction of the injector Malfunction of engine-ECU |



NOTE:

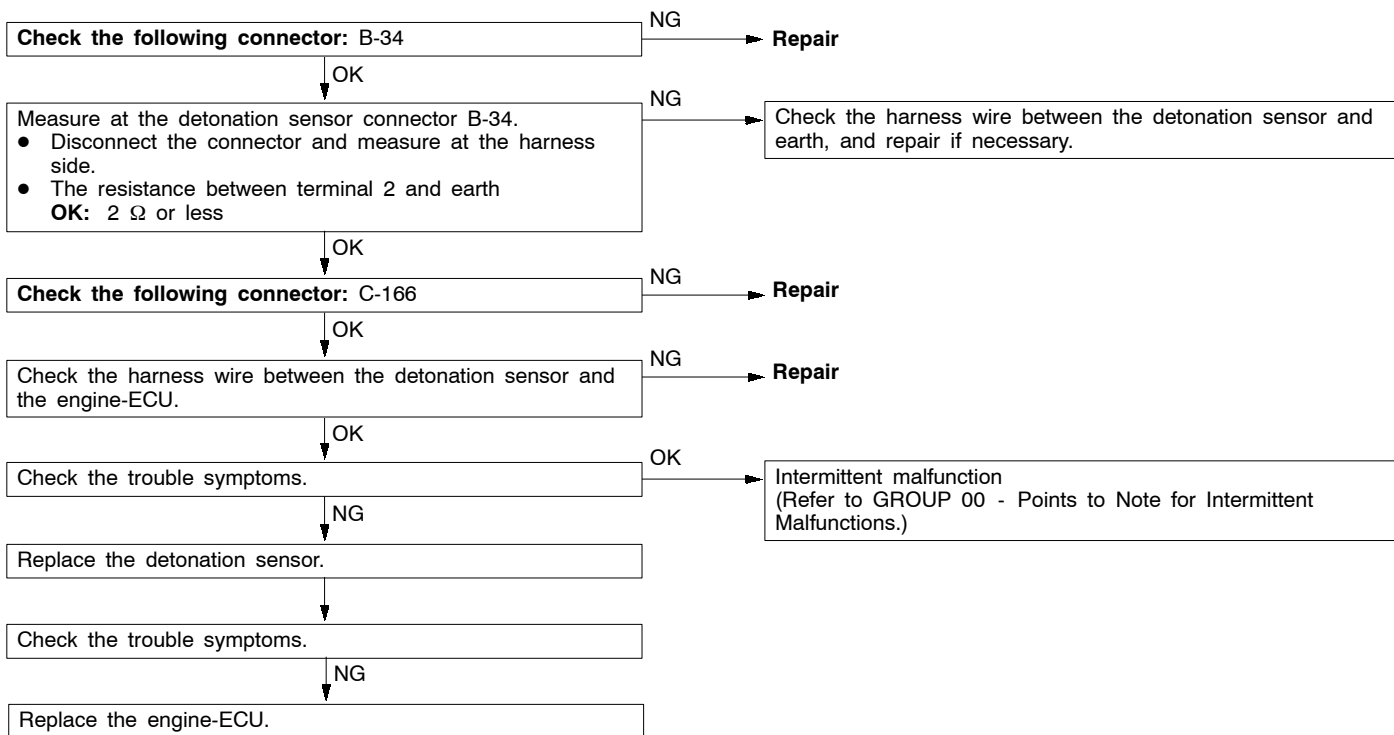
*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

| | |
|---|--|
| Code No. P0301 No. 1 cylinder misfire detected Code No. P0302 No. 2 cylinder misfire detected Code No. P0303 No. 3 cylinder misfire detected Code No. P0304 No. 4 cylinder misfire detected Code No. P0305 No. 5 cylinder misfire detected Code No. P0306 No. 6 cylinder misfire detected | Probable cause |
| Range of Check <ul style="list-style-type: none"> • The engine speed is 500 - 3,500 r/min. • While the engine is running except deceleration and sudden acceleration. Set Conditions <ul style="list-style-type: none"> • The number of misfires exceeds a predetermined number per 200 engine revolutions (Misfire has occurred in only one cylinder). or <ul style="list-style-type: none"> • The number of misfires exceeds a predetermined number per 100 engine revolutions (Misfire has occurred in only one cylinder). | <ul style="list-style-type: none"> • Malfunction of the ignition system • Abnormal compression • Malfunction of injector • Malfunction of engine-ECU |

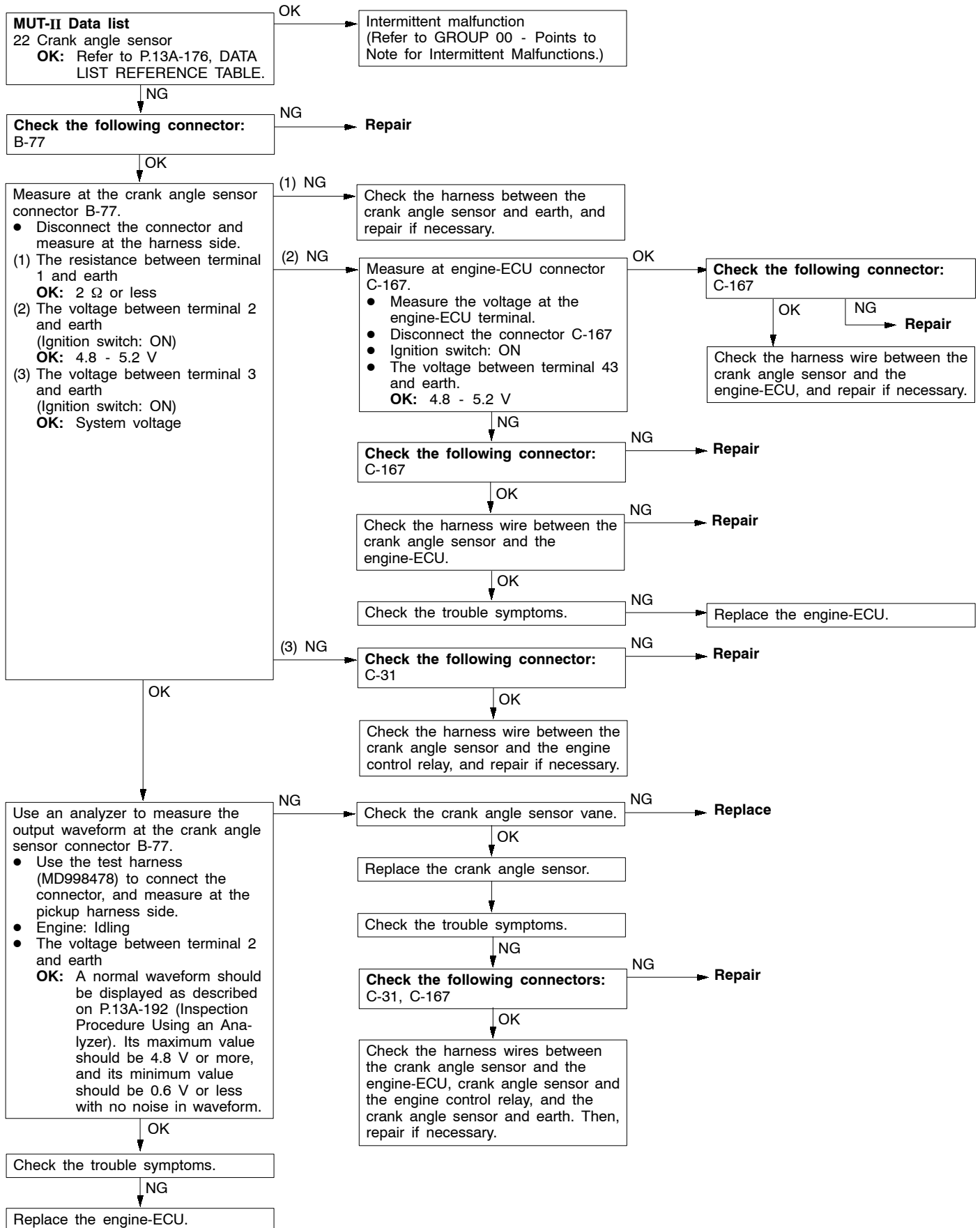
**NOTE:**

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

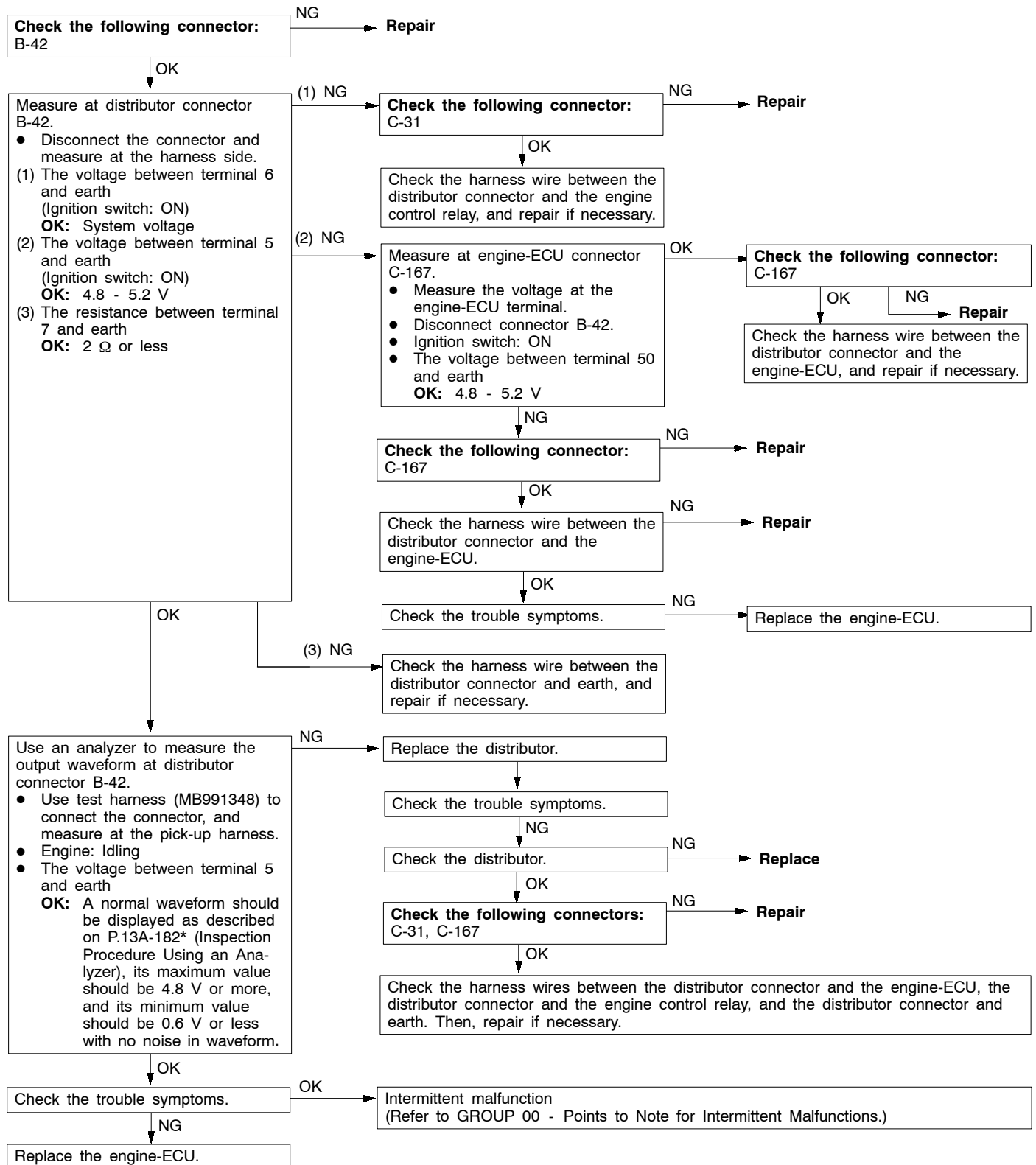
| Code No. P0325 Detonation sensor system | Probable cause |
|--|--|
| Range of Check • Engine: Two seconds after the engine has been started Set Conditions • Changes in sensor output voltage (detonation sensor peak voltage per 1/3 crankshaft rotation) in 200 consecutive cycles are 0.08 V or less. | • Malfunction of the detonation sensor • Open or short circuit in the detonation sensor circuit or loose connector contact • Malfunction of engine-ECU |



| Code No. P0335 Crank angle sensor system | Probable cause |
|--|--|
| Range of Check • Engine is cranking Set Conditions • Sensor output voltage does not change for 4 seconds (no pulse signal input). | • Malfunction of the crank angle sensor. • Open or short circuit in the crank angle sensor circuit or loose connector contact. • Malfunction of engine-ECU |



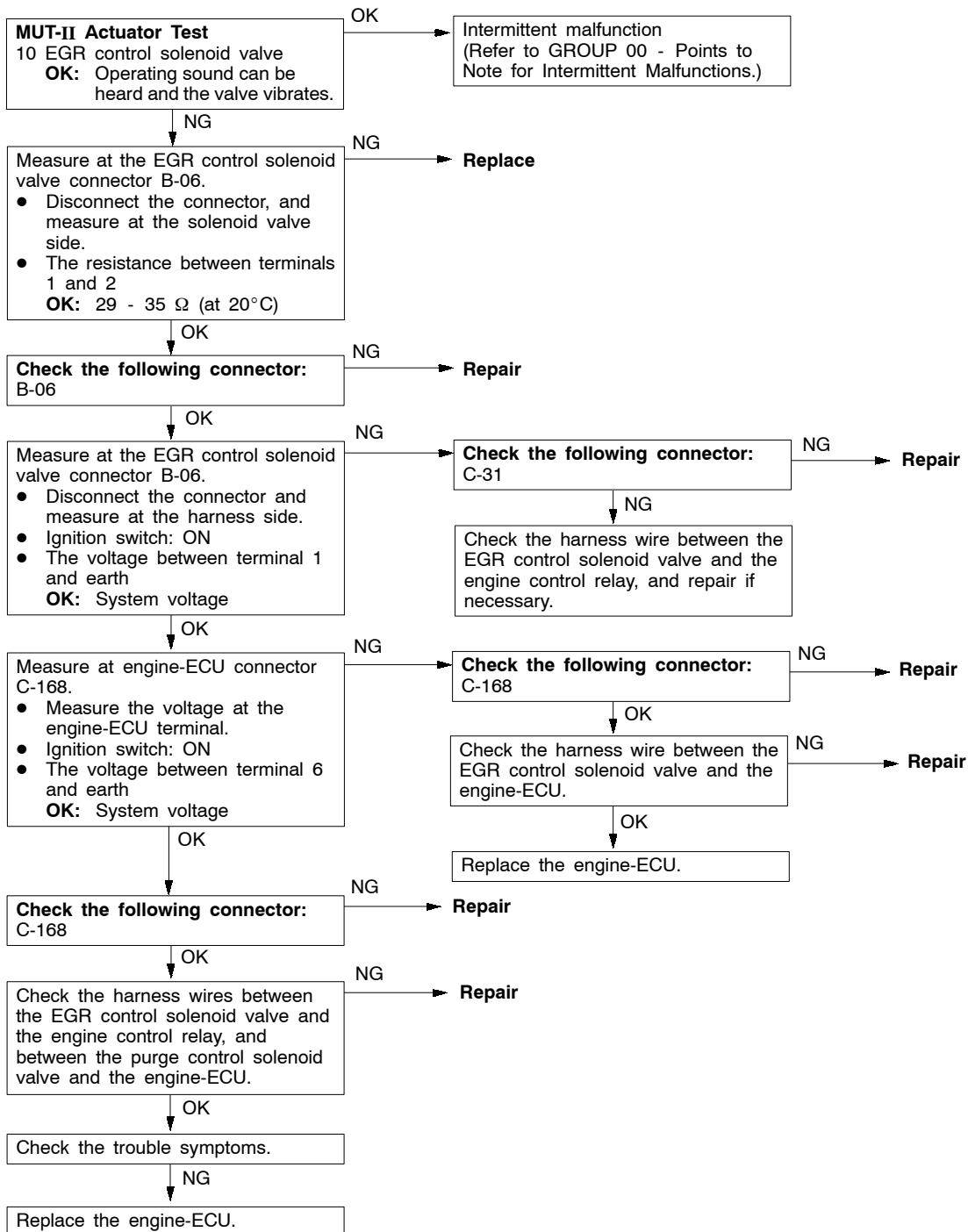
| Code No. P0340 Top dead centre sensor system | Probable cause |
|---|---|
| Range of Check <ul style="list-style-type: none"> After the engine was started Set Conditions <ul style="list-style-type: none"> The sensor output voltage does not change for 4 seconds (no pulse signal input). | <ul style="list-style-type: none"> Malfunction of the camshaft position sensor Open or short circuit in the camshaft position sensor circuit or loose connector contact. Malfunction of engine-ECU |



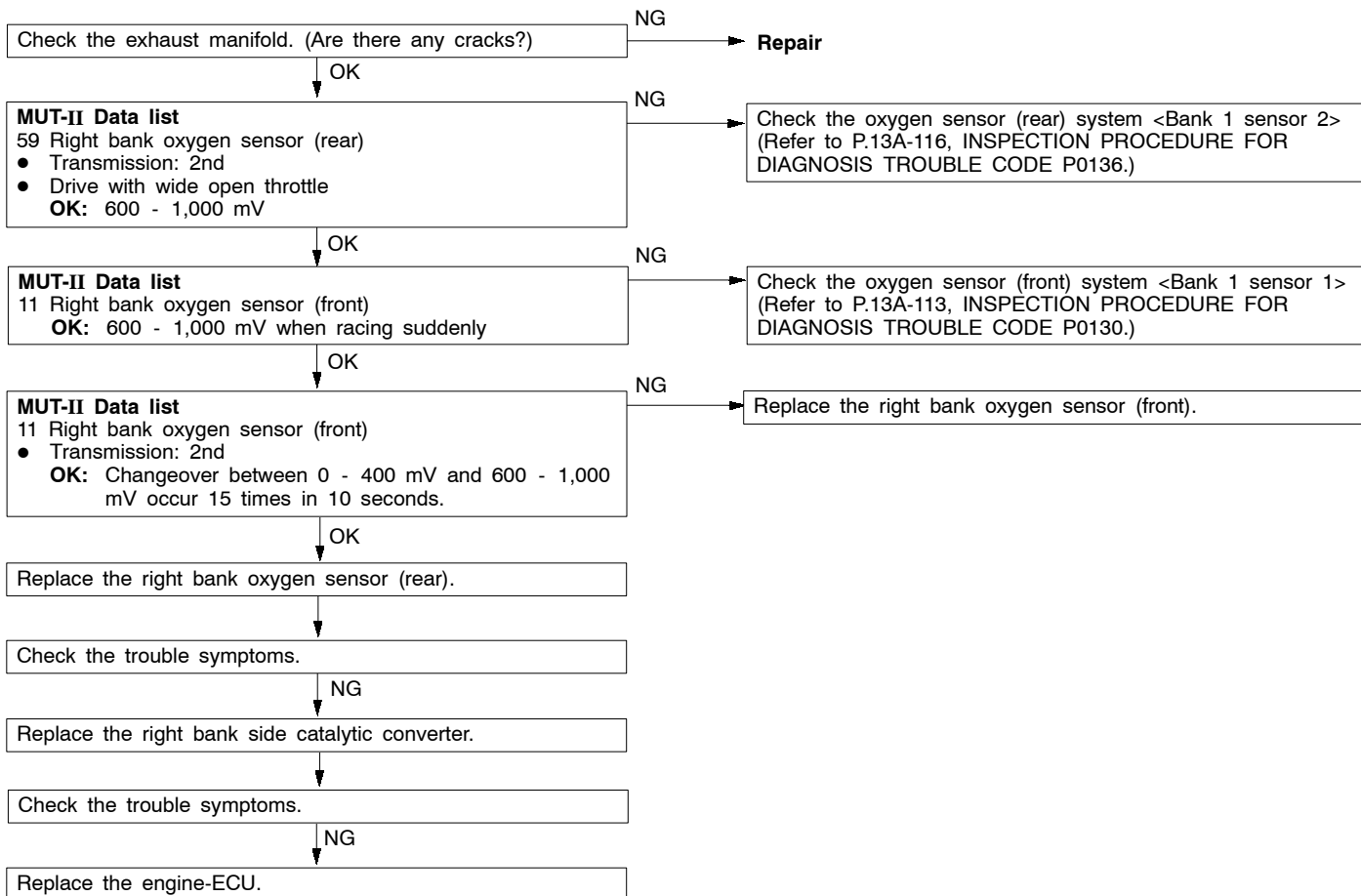
NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

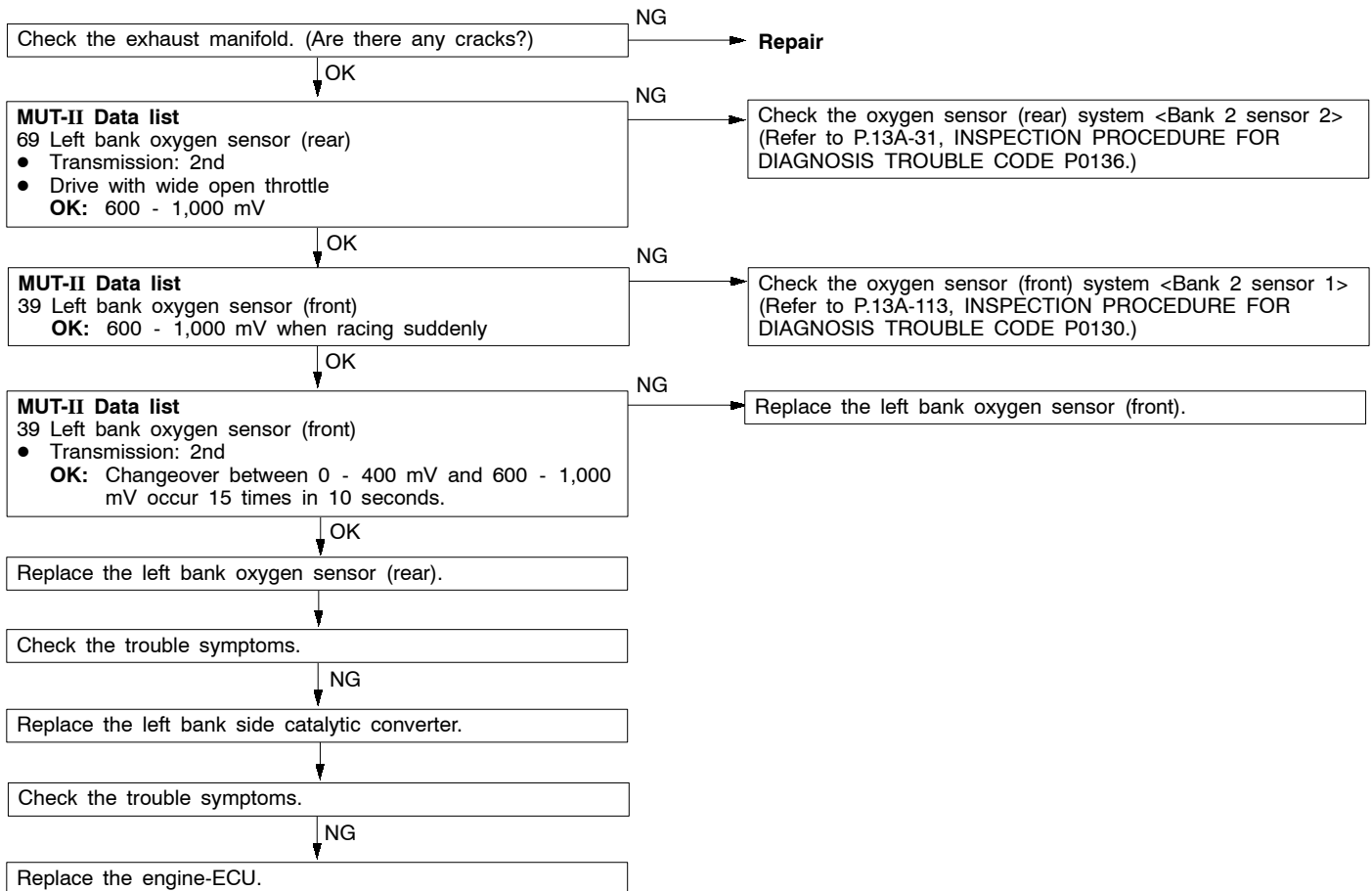
| Code No. P0403 EGR control solenoid valve system | Probable cause |
|---|--|
| Range of Check <ul style="list-style-type: none"> Ignition switch: ON Battery voltage is 10 V or more. Set Conditions <ul style="list-style-type: none"> The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off. | <ul style="list-style-type: none"> Malfunction of the EGR control solenoid valve Open or short circuit in the EGR control solenoid valve circuit or loose connector contact Malfunction of engine-ECU |



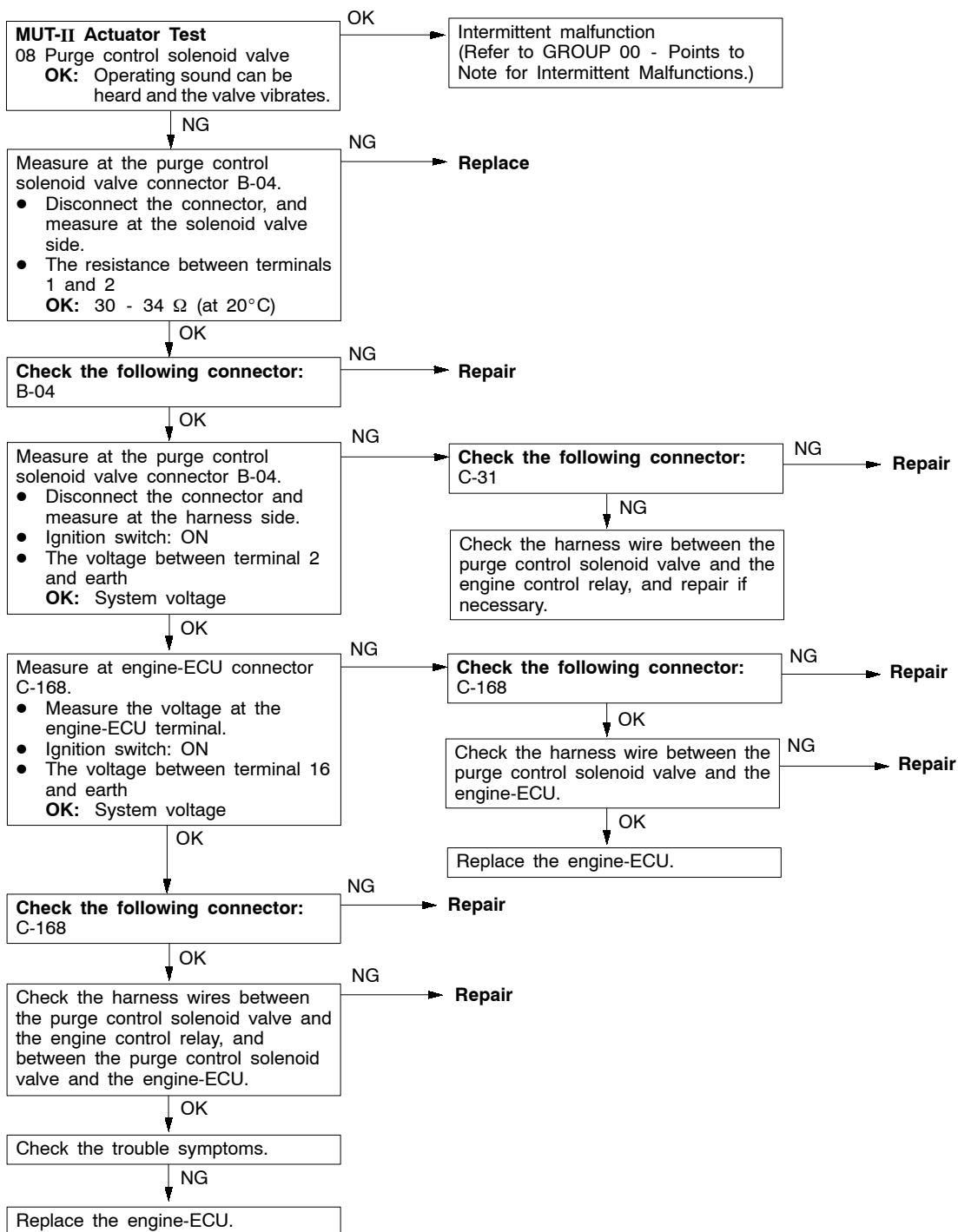
| Code No. P0421 Catalyst malfunction (Bank 1) | Probable cause |
|---|---|
| Range of Check <ul style="list-style-type: none"> • The engine speed is 3,000 r/min or less. • During driving • During air/fuel ratio feedback control Set Conditions <ul style="list-style-type: none"> • The ratio between the right bank oxygen sensor (rear) and the right bank oxygen sensor (front) output frequencies reaches 0.8 per 12 seconds on average. | <ul style="list-style-type: none"> • Malfunction of right bank side catalyst • Malfunction of the right bank oxygen sensor (front) • Malfunction of the right bank oxygen sensor (rear) • Malfunction of engine-ECU |



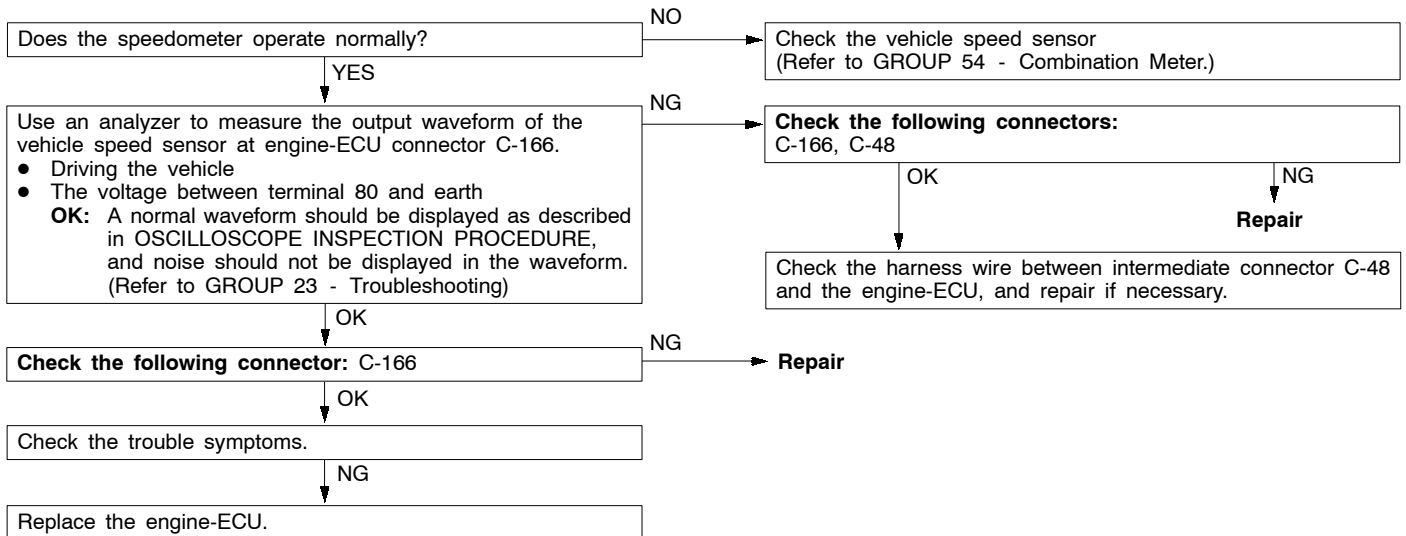
| Code No. P0431 Catalyst malfunction | Probable cause |
|---|--|
| Range of Check <ul style="list-style-type: none"> • The engine speed is 3,000 r/min or less. • During driving • During air/fuel ratio feedback control Set Conditions <ul style="list-style-type: none"> • The ratio between the left bank oxygen sensor (rear) and the left bank oxygen sensor (front) output frequencies reaches 0.8 per 12 seconds on average. | <ul style="list-style-type: none"> • Malfunction of left bank side catalyst • Malfunction of the left bank oxygen sensor (front) • Malfunction of the left bank oxygen sensor (rear) • Malfunction of engine-ECU |



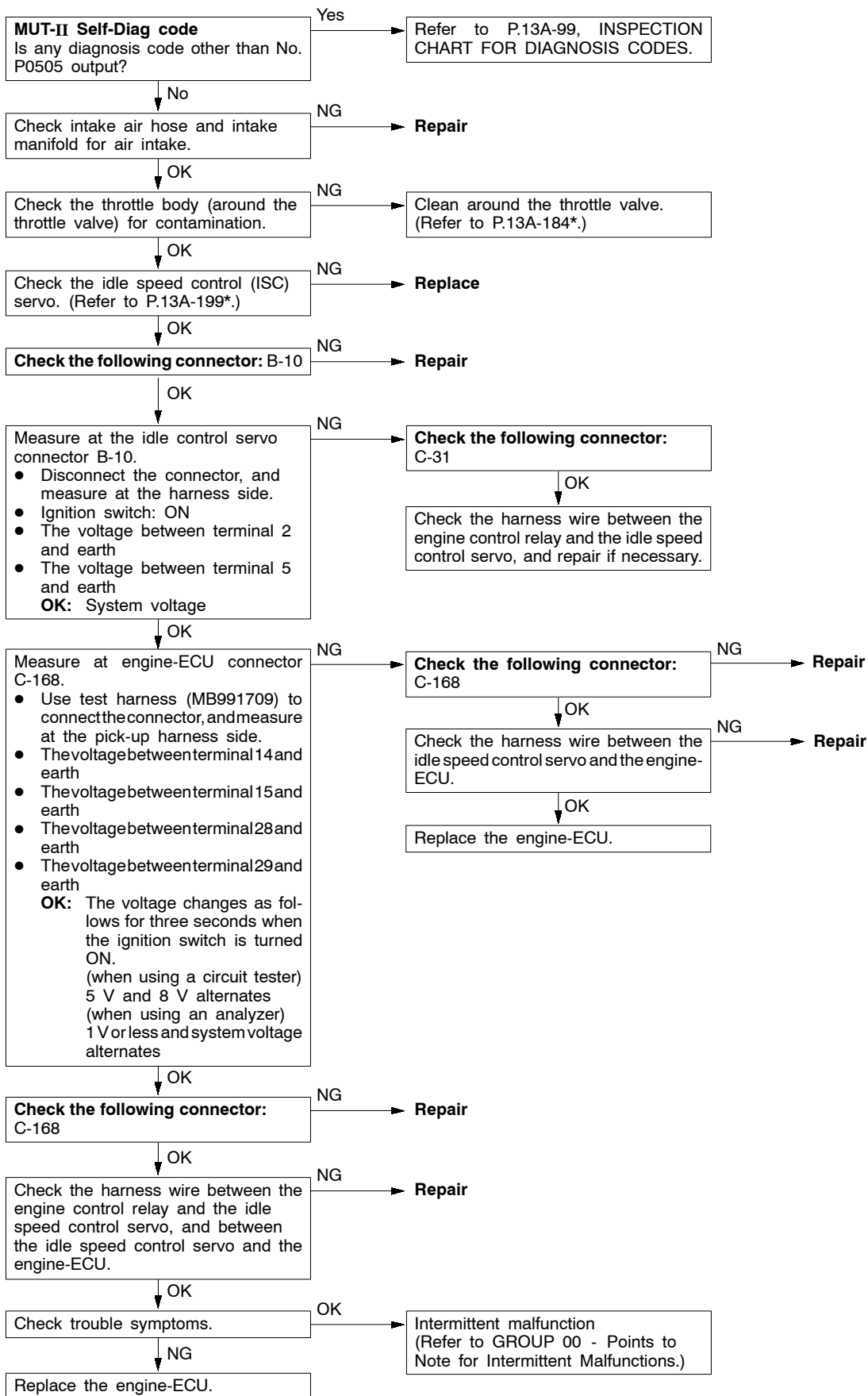
| Code No. P0443 Purge control solenoid valve system | Probable cause |
|---|--|
| Range of Check <ul style="list-style-type: none"> Ignition switch: ON Battery voltage is 10 V or more. Set Conditions <ul style="list-style-type: none"> The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off. | <ul style="list-style-type: none"> Malfunction of the purge control solenoid valve Open or short circuit in the purge control solenoid valve circuit or loose connector contact Malfunction of engine-ECU |



| Code No. P0500 Vehicle speed sensor system | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none"> Engine: Two seconds after the engine was started Idle switch: OFF Engine speed: 3,000 r/min or more During high engine load <p>Set Conditions</p> <ul style="list-style-type: none"> The sensor output voltage does not change for 4 seconds (no pulse signal input). | <ul style="list-style-type: none"> Malfunction of the vehicle speed sensor Open or short circuit in the vehicle speed sensor circuit or loose connector contact Malfunction of engine-ECU |



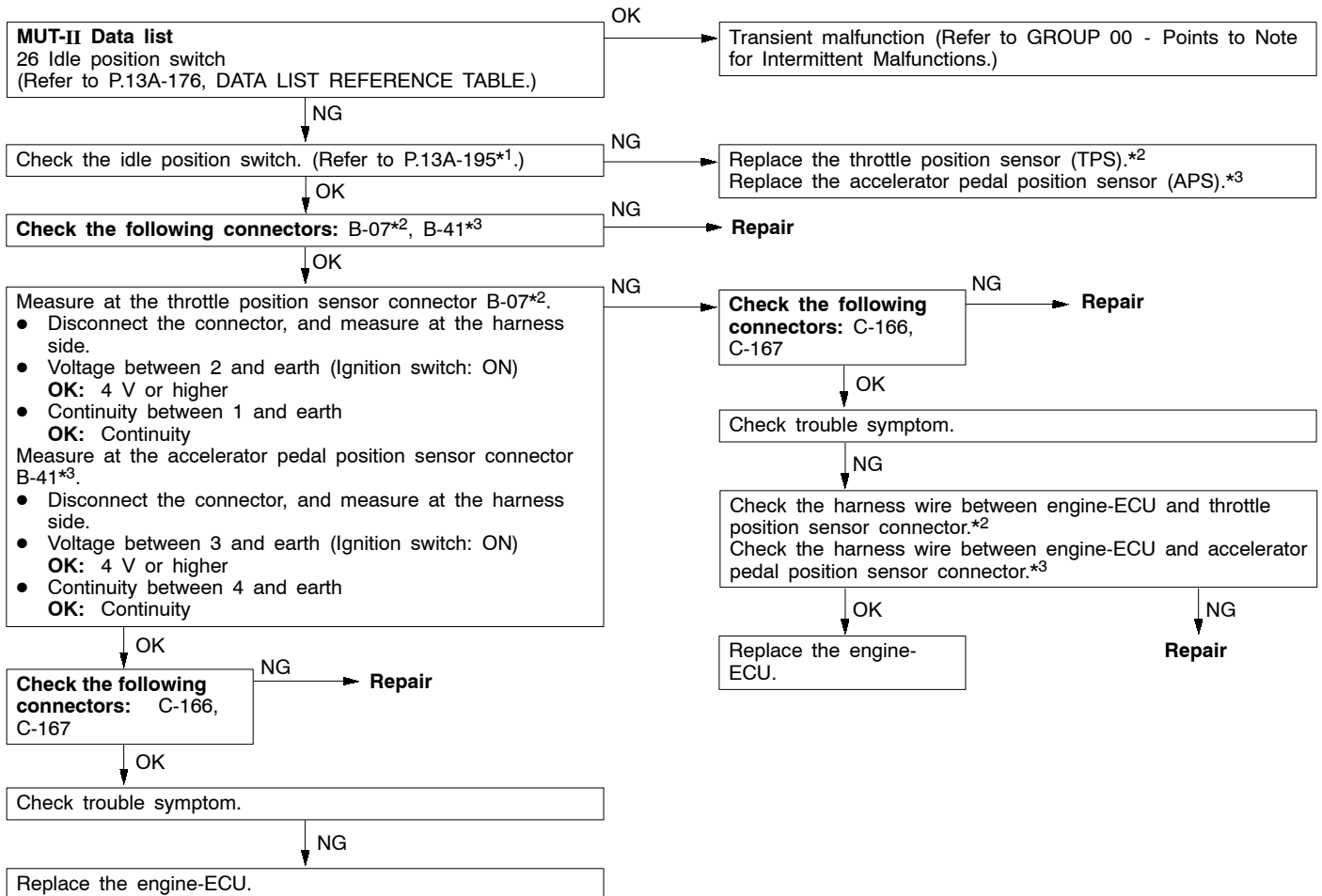
| Code No. P0505 Idle speed control (ISC) system | Probable cause |
|--|--|
| <p>Check Area</p> <ul style="list-style-type: none"> Vehicle speed has reached 1.5 km/h at least once. Under the closed loop idle speed control. <p>Judgment Criteria</p> <ul style="list-style-type: none"> Actual idle speed has continued to be higher than the target idle speed by 300 r/min or more for 10 sec. <p>Check Area</p> <ul style="list-style-type: none"> Vehicle speed has reached 1.5 km/h at least once. During idle speed closed loop control. The highest temperature at the last drive is 45°C or less. Engine coolant temperature is approx. 80°C or more. Battery voltage is 10 V or more. Barometric pressure is 76 kPa or higher. Intake air temperature is -10°C (14°F) or more. <p>Judgment Criteria</p> <ul style="list-style-type: none"> Actual idle speed has been minimum 200 r/min higher than the target idle speed for ten seconds. <p>Check Area</p> <ul style="list-style-type: none"> During idle speed closed loop control. Engine coolant temperature is about 80°C or higher. Battery voltage is 10 V or higher. Power steering switch is off. Volumetric efficiency is 40 % or lower. Barometric pressure is 76 kPa or higher. Intake air temperature is -10°C or more. <p>Judgment Criteria</p> <ul style="list-style-type: none"> Actual idle speed has been minimum 100 r/min higher than the target idle speed for ten seconds. | <ul style="list-style-type: none"> Malfunction of idle speed control (ISC) servo Improper connector contact, open circuit or short-circuit harness wire Malfunction of engine-ECU |



NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

| Code No. P0510 Idle position switch system | Probable cause |
|--|---|
| <p>Check Area</p> <ul style="list-style-type: none"> Throttle position sensor output voltage is 2.0 V or more. <p>Judgment Criteria</p> <ul style="list-style-type: none"> Idle position switch has been turned on. <p>Check Area</p> <ul style="list-style-type: none"> Repeat the *1 drive and *2 stop 15 times or more. <p>*1 drive: The vehicle remains under the following conditions for at least two seconds; engine speed is 1,500 rpm or higher, air flow sensor output waveform is 100 Hz or higher, and vehicle speed is more than 30 km/h for two seconds.</p> <p>*2 stop: The vehicle remains under the following conditions for at least two seconds; engine speed is 800 rpm or lower, and vehicle speed is less than 1.5 km/h.</p> <p>Judgment Criteria</p> <ul style="list-style-type: none"> Idle position switch remains off. | <ul style="list-style-type: none"> Malfunction of idle position switch Open or shorted idle position switch circuit, or loose connector. Malfunction of engine-ECU |



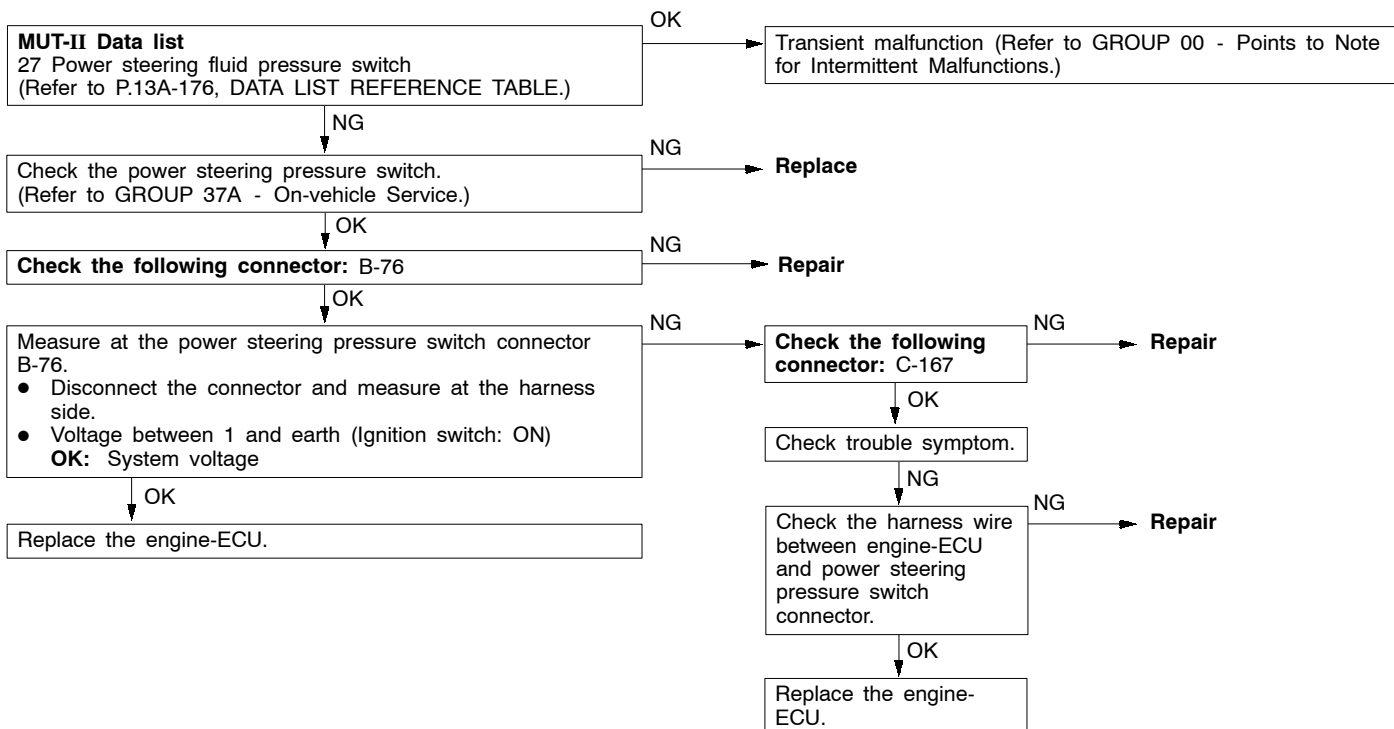
NOTE:

*1: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

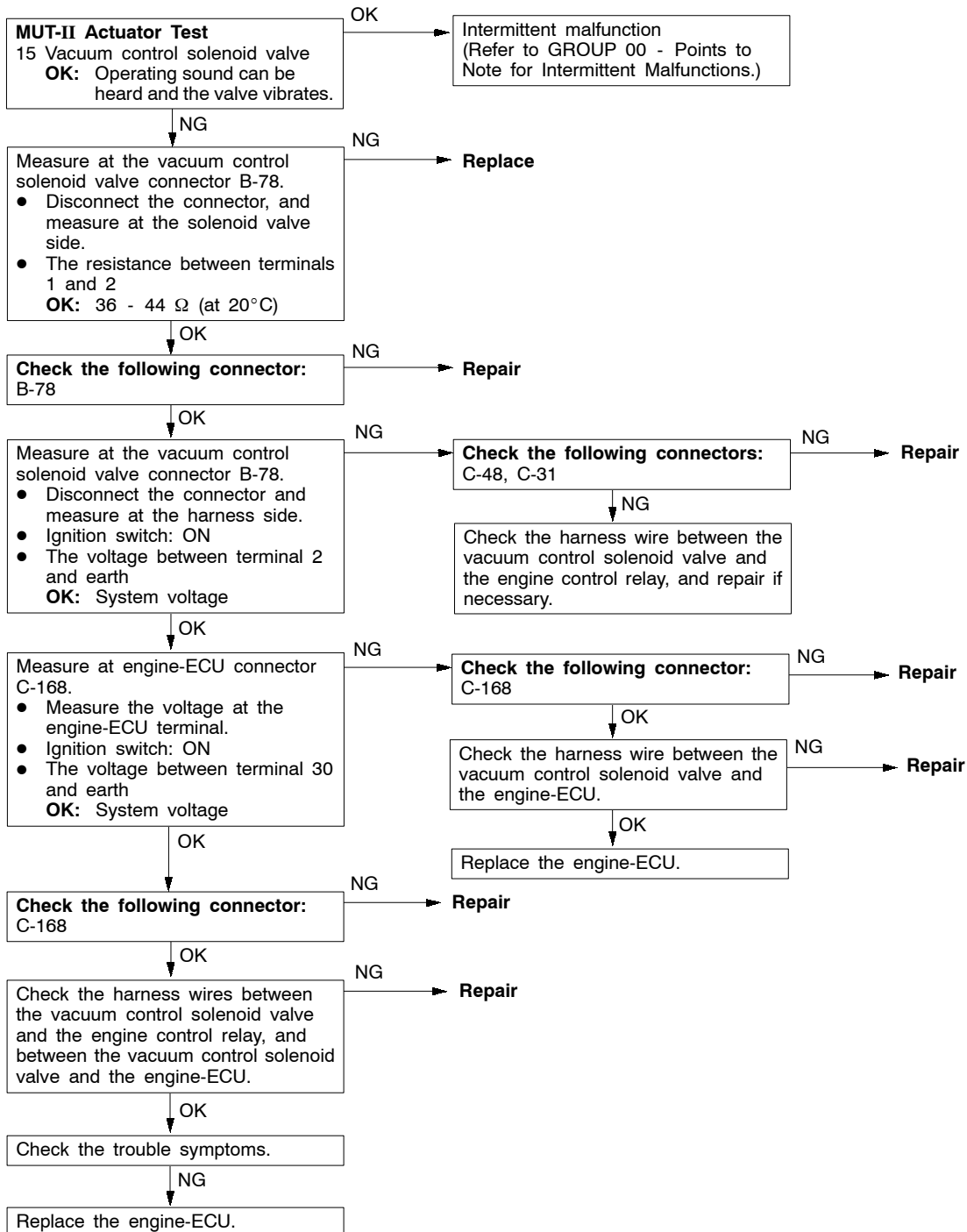
*2: Vehicles without TCL and vehicles without ASC.

*3: Vehicles with TCL and vehicles with ASC.

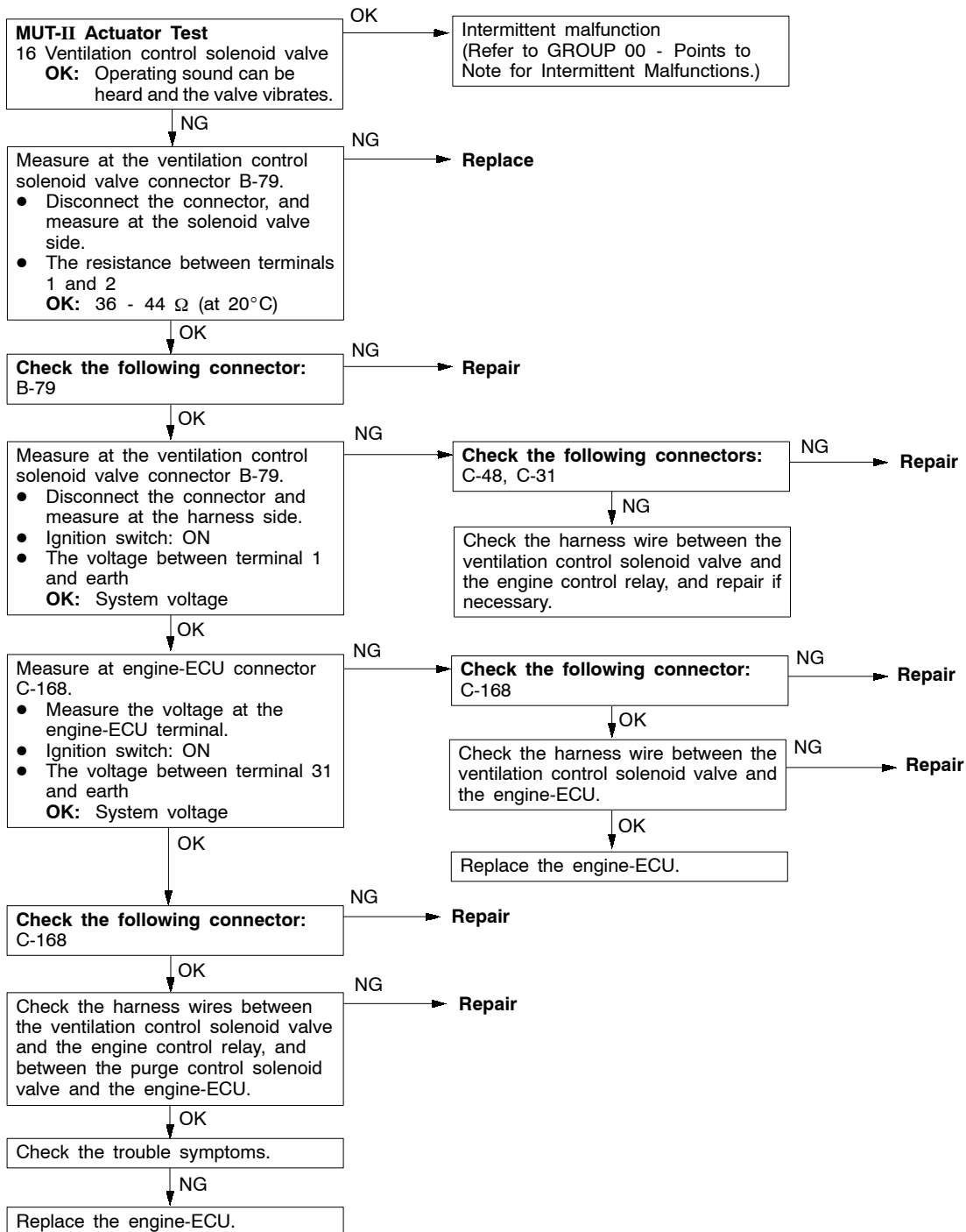
| Code No. P0551 Power steering fluid pressure switch system | Probable cause |
|---|---|
| <p>Check Area</p> <ul style="list-style-type: none"> Intake air temperature is -10°C or higher. Barometric pressure is 76 kPa or higher. Engine coolant temperature is 30°C or more. Repeat *1 drive and *2 stop ten times or more. <p>*1: Engine speed is 2,500 r/min or higher, volumetric efficiency is 55 % or higher and vehicle speed is 5 km/h or higher for 4 seconds or more.</p> <p>*2: Vehicle speed is 1.5 km/h or lower.</p> <p>Judgment Criteria</p> <ul style="list-style-type: none"> Power steering pressure switch remains on. | <ul style="list-style-type: none"> Power steering fluid pressure switch failed. Open or shorted power steering fluid pressure switch circuit, or loose connector. Engine-ECU failed. |



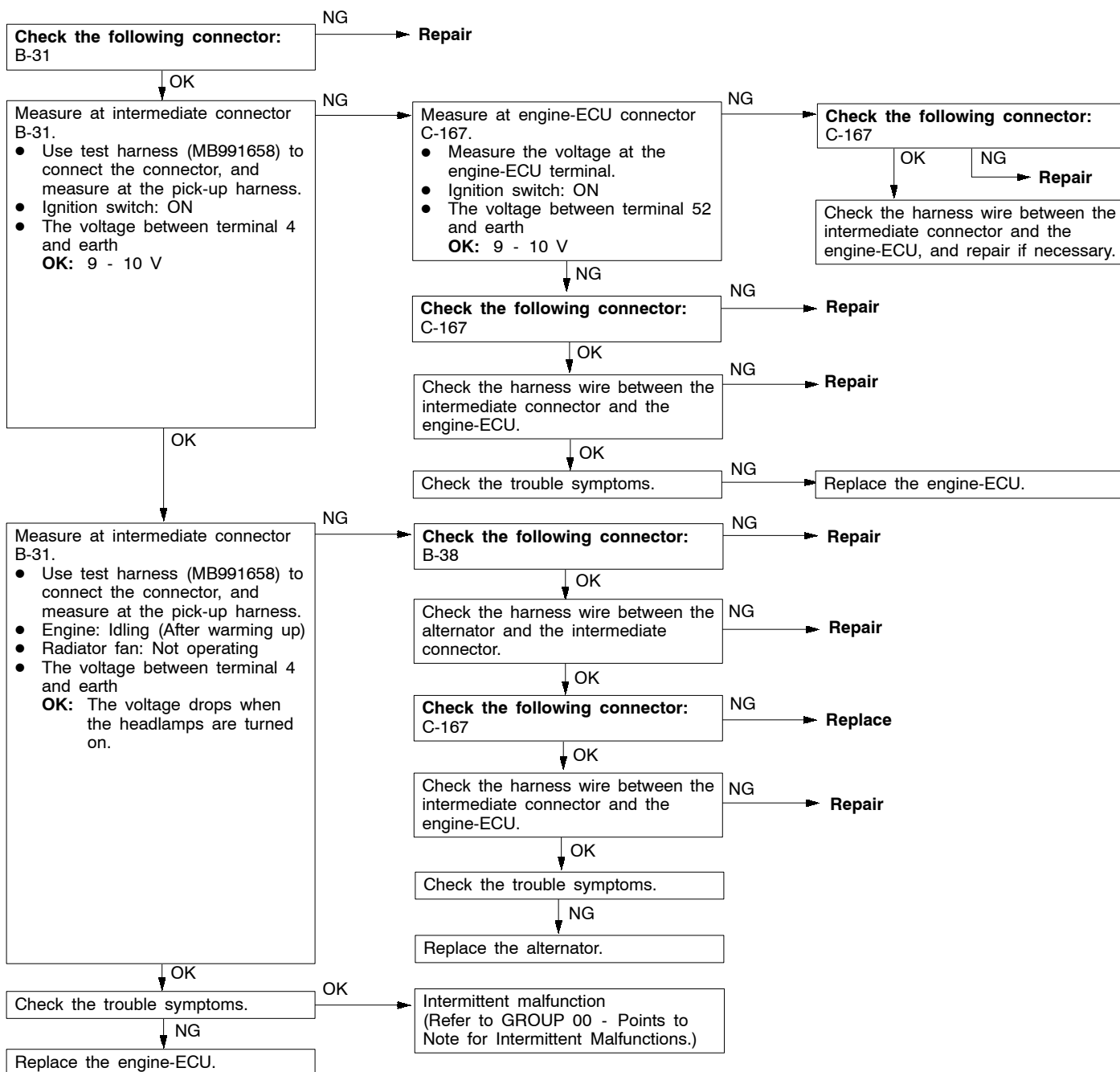
| Code No. P1101 Vacuum control solenoid valve system <Vehicles with TCL and vehicles with ASC> | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds immediately after the engine starts. Battery voltage is 10 V or more. Forced actuation by means of MUT-II is not being carried out. <p>Set condition</p> <p>Solenoid valve drive or non-drive instruction and energized condition of solenoid coil are different.</p> | <ul style="list-style-type: none"> Malfunction of the vacuum control solenoid valve Improper connector contact, open circuit or short-circuited harness wire of the vacuum control solenoid valve Malfunction of the engine-ECU |



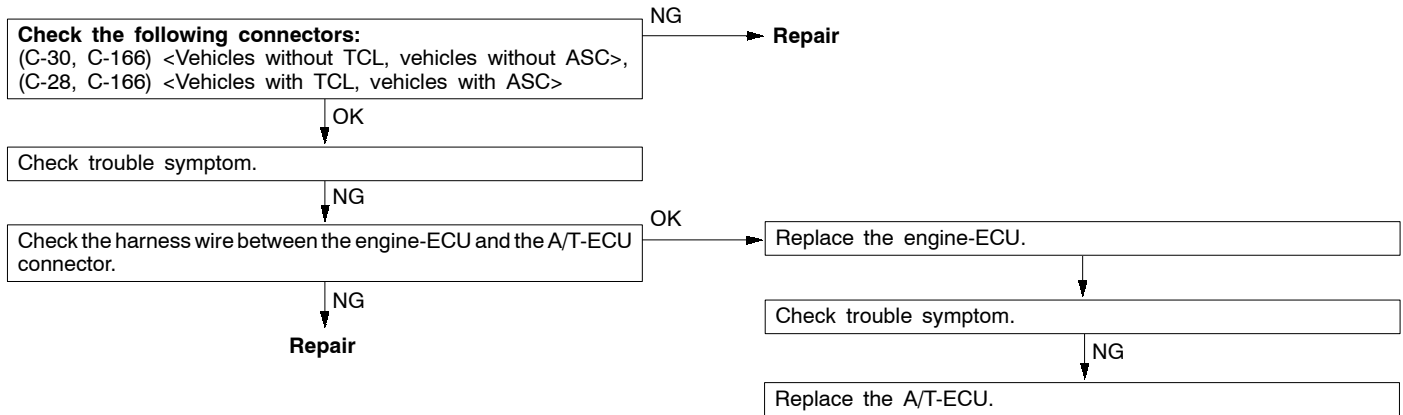
| Code No. P1102 Ventilation control solenoid valve system <Vehicles with TCL and vehicles with ASC> | Probable cause |
|--|--|
| <p>Range of Check</p> <ul style="list-style-type: none"> • Ignition switch: ON • Excluding 60 seconds immediately after the engine starts. • Battery voltage is 10 V or more. • Forced actuation by means of MUT-II is not being carried out. <p>Set condition Solenoid valve drive or non-drive instruction and energized condition of solenoid coil are different.</p> | <ul style="list-style-type: none"> • Malfunction of the ventilation control solenoid valve • Improper connector contact, open circuit or short-circuited harness wire of the ventilation control solenoid valve • Malfunction of the engine-ECU |



| Code No. P1500 Alternator FR terminal system | Probable cause |
|---|---|
| Range of Check • Engine speed: 50 r/min or more Set Conditions • Input voltage from the alternator FR terminal is system voltage for 20 seconds. | • Open circuit in alternator FR terminal circuit • Malfunction of engine-ECU |



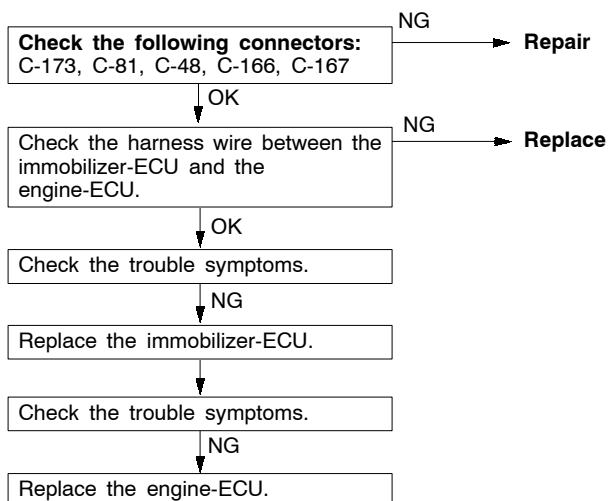
| Code No. 1600 Communication wire with A/T-ECU system <A/T> | Probable cause |
|---|--|
| Range of Check <ul style="list-style-type: none"> 60 seconds or more have passed immediately after engine was started. Engine speed is approx. 50 r/min or more Set conditions The voltage of the torque reduction request signal from the A/T-ECU is LOW for 1.5 seconds or more. | <ul style="list-style-type: none"> Malfunction of the harness wire and the connector Malfunction of the engine-ECU Malfunction of the A/T-ECU |



| Cord No. P1610 Immobilizer system | Probable cause |
|---|--|
| Range of Check <ul style="list-style-type: none"> Ignition switch: ON Set Conditions <ul style="list-style-type: none"> Improper communication between the engine-ECU and the immobilizer-ECU | <ul style="list-style-type: none"> Open or short circuit, or loose connector contact Malfunction of the immobilizer-ECU Malfunction of the engine-ECU |

NOTE

- If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.
- This code may be displayed when registering the key ID code.



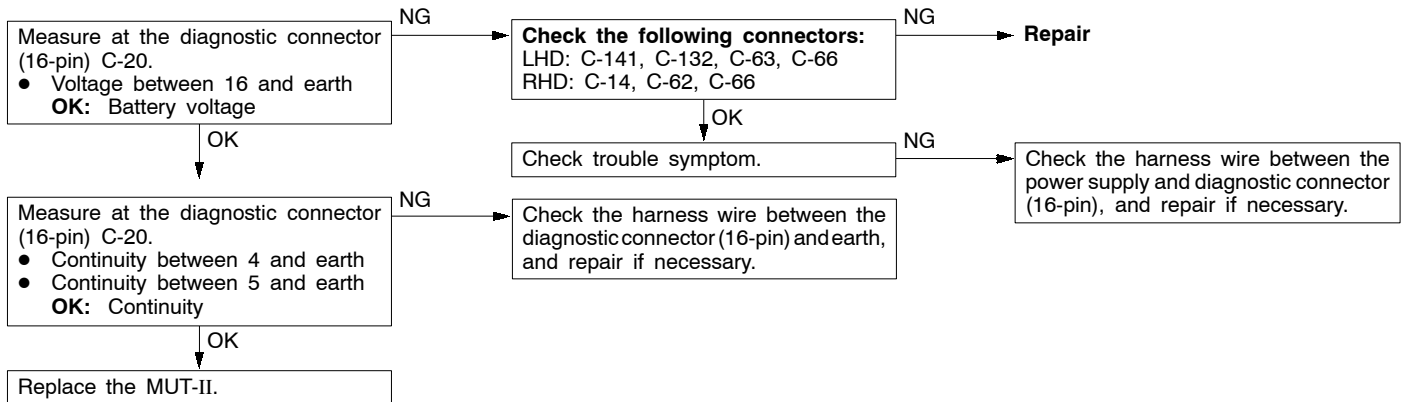
INSPECTION CHART FOR TROUBLE SYMPTOMS

| Trouble symptom | | Inspection procedure No. | Reference page |
|--|---|--------------------------|----------------|
| Communication with MUT-II is impossible. | Communication with all systems is not possible. | 1 | 13A-146 |
| | Communication with engine-ECU only is not possible. | 2 | 13A-146 |
| 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 | 13A-147 |
| | The engine warning lamp remains illuminating and never goes out. | 4 | 13A-147 |
| Starting | No initial combustion (starting impossible) | 5 | 13A-148 |
| | Initial combustion but no complete combustion (starting impossible) | 6 | 13A-149 |
| | Long time to start (improper starting) | 7 | 13A-150 |
| Idling stability (Improper idling) | Unstable idling (Rough idling, hunting) | 8 | 13A-151 |
| | Idling speed is high. (Improper idling speed) | 9 | 13A-153 |
| | Idling speed is low. (Improper idling speed) | 10 | 13A-154 |
| Idling stability (Engine stalls) | When the engine is cold, it stalls at idling. (Die out) | 11 | 13A-155 |
| | When the engine becomes hot, it stalls at idling. (Die out) | 12 | 13A-156 |
| | The engine stalls when starting the car. (Pass out) | 13 | 13A-158 |
| | The engine stalls when decelerating. | 14 | 13A-158 |
| Driving | Hesitation, sag or stumble | 15 | 13A-159 |
| | The feeling of impact or vibration when accelerating | 16 | 13A-161 |
| | The feeling of impact or vibration when decelerating | 17 | 13A-161 |
| | Poor acceleration | 18 | 13A-162 |
| | Surge | 19 | 13A-164 |
| | Knocking | 20 | 13A-166 |
| Dieseling | | 21 | 13A-166 |
| Too high CO and HC concentration when idling | | 22 | 13A-166 |
| Low alternator output voltage (approx. 12.3 V) | | 23 | 13A-168 |
| Idling speed is improper when A/C is operating | | 24 | 13A-168 |
| Fans (radiator fan, A/C condenser fan) are inoperative | | 25 | 13A-169 |

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

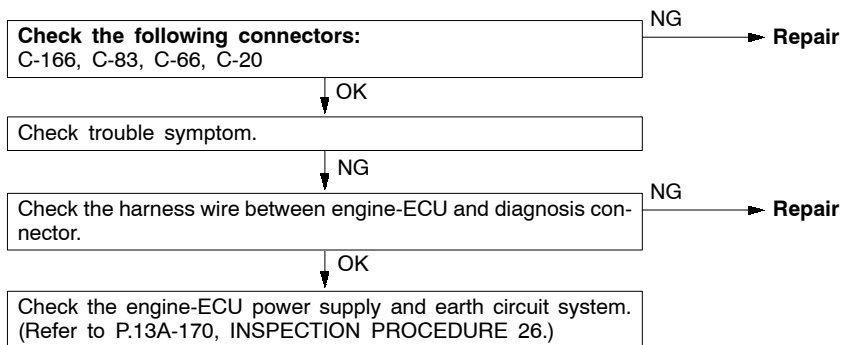
INSPECTION PROCEDURE 1

| 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. | <ul style="list-style-type: none"> • Malfunction of the connector • Malfunction of the harness wire |



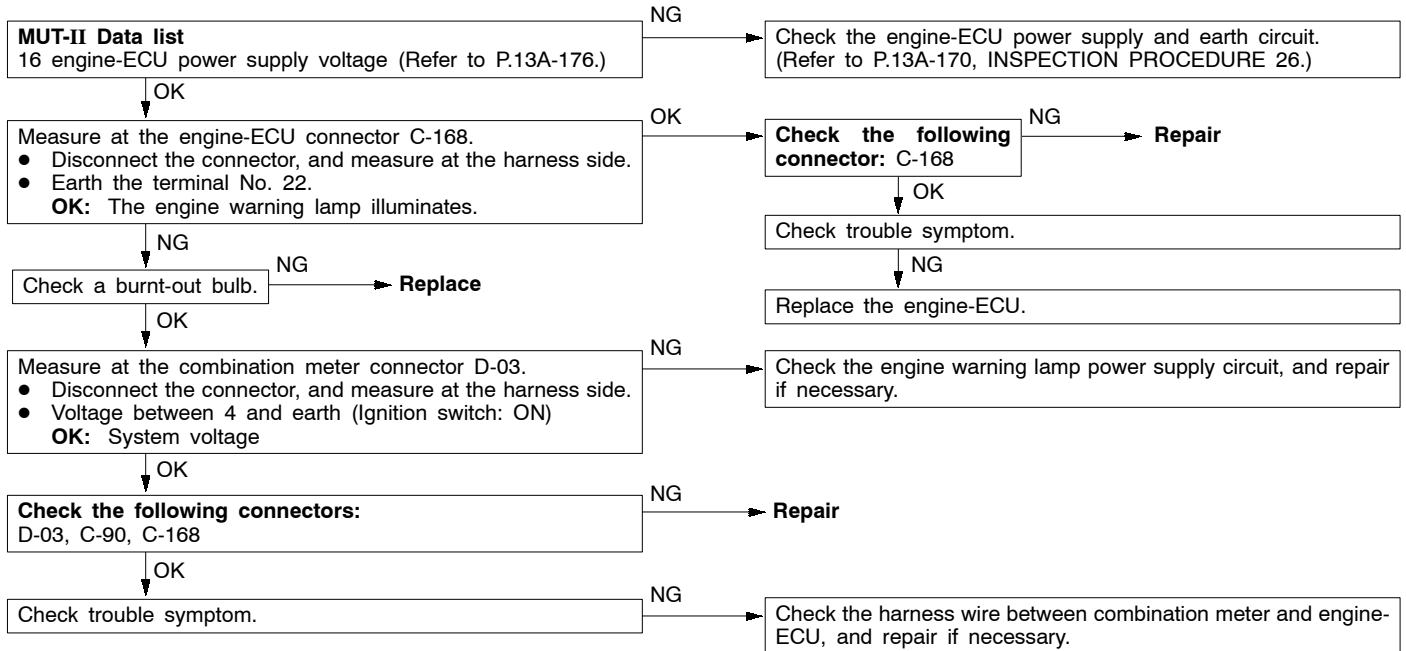
INSPECTION PROCEDURE 2

| MUT-II communication with engine-ECU is impossible. | Probable cause |
|--|--|
| One of the following causes may be suspected. <ul style="list-style-type: none"> • No power supply to engine-ECU. • Defective earth circuit of engine-ECU. • Defective engine-ECU. • Improper communication line between engine-ECU and MUT-II | <ul style="list-style-type: none"> • Malfunction of engine-ECU power supply circuit • Malfunction of engine-ECU • Open circuit between the engine-ECU and diagnosis connector |



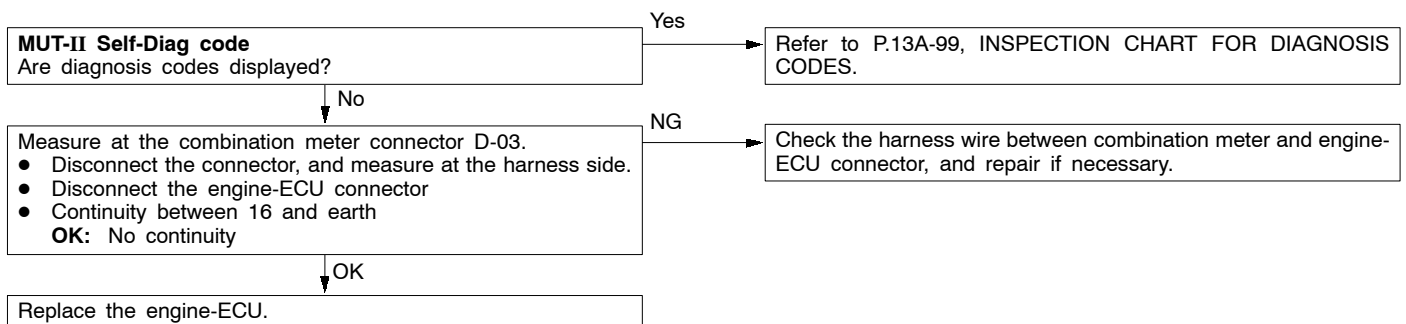
INSPECTION PROCEDURE 3

| 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 for five seconds immediately after the ignition switch is turned to ON. 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. | <ul style="list-style-type: none"> ● Burnt-out bulb ● Defective warning lamp circuit ● Malfunction of the engine-ECU |



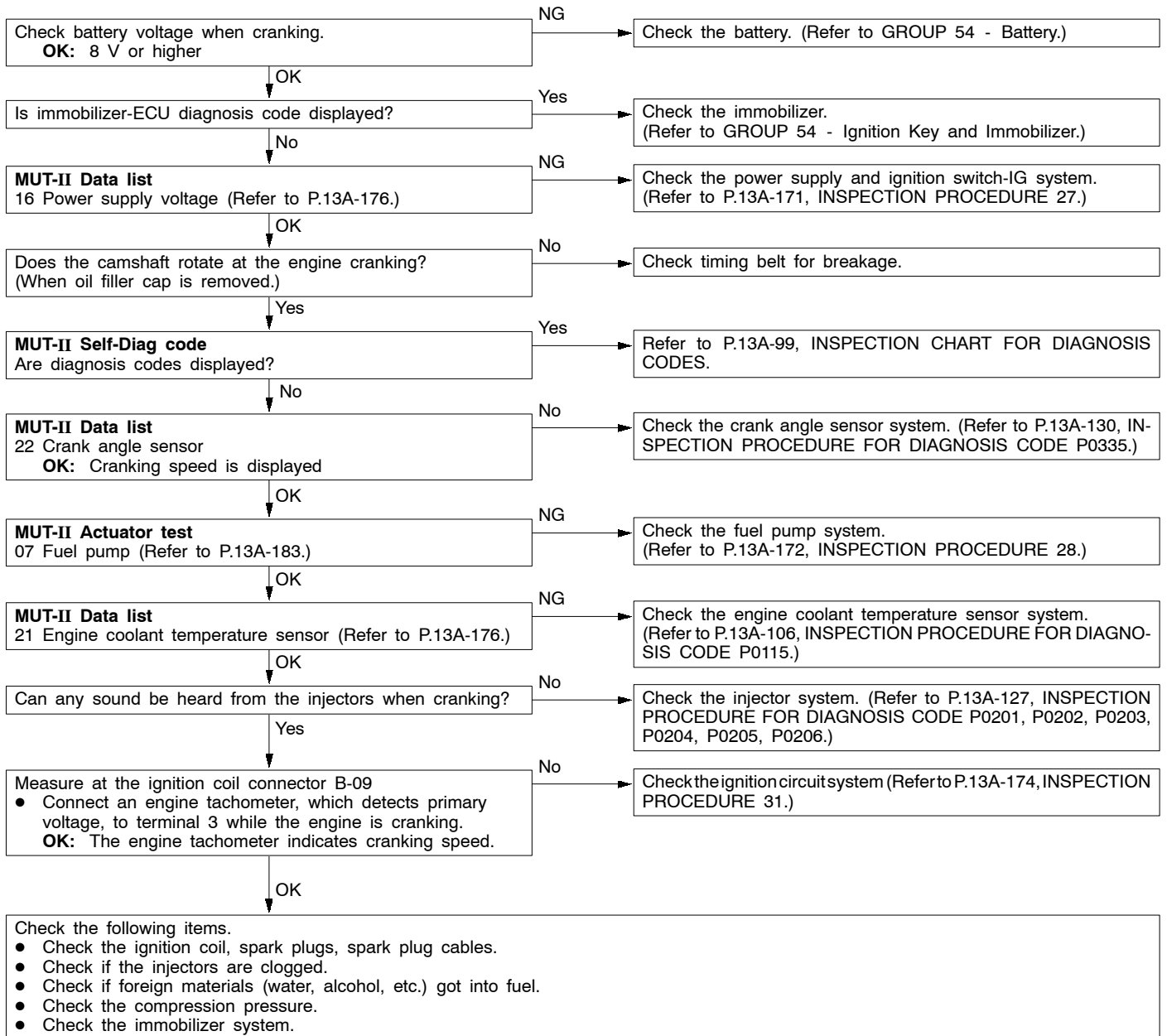
INSPECTION PROCEDURE 4

| 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. | <ul style="list-style-type: none"> ● Short-circuit between the engine warning lamp and engine-ECU ● Malfunction of the engine-ECU |



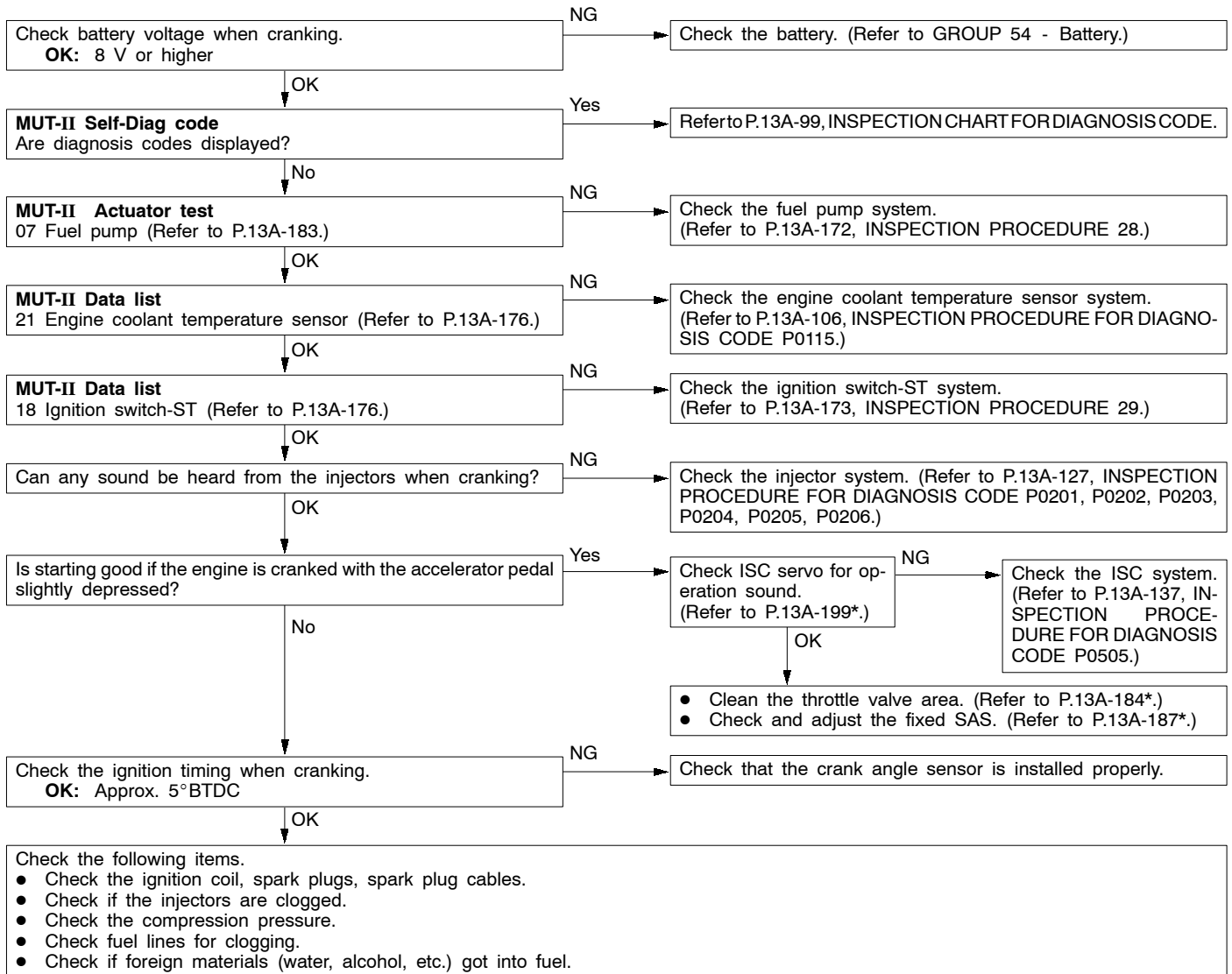
INSPECTION PROCEDURE 5

| No initial combustion (starting impossible) | Probable cause |
|--|--|
| <p>In cases such as the above, the cause is probably that a spark plug is defective, or that the supply of fuel to the combustion chamber is defective. In addition, foreign materials (water, kerosene, etc.) may be mixed with the fuel.</p> | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of the fuel pump system • Malfunction of the injectors • Malfunction of the engine-ECU • Malfunction of the immobilizer system • Foreign materials in fuel |



INSPECTION PROCEDURE 6

| Initial combustion but no complete combustion (starting impossible) | Probable cause |
|---|--|
| In such cases as the above, the cause is probably that the spark plugs are generating sparks but the sparks are weak, or the initial mixture for starting is not appropriate. | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of the injector system • Foreign materials in fuel • Poor compression • Malfunction of the engine-ECU |

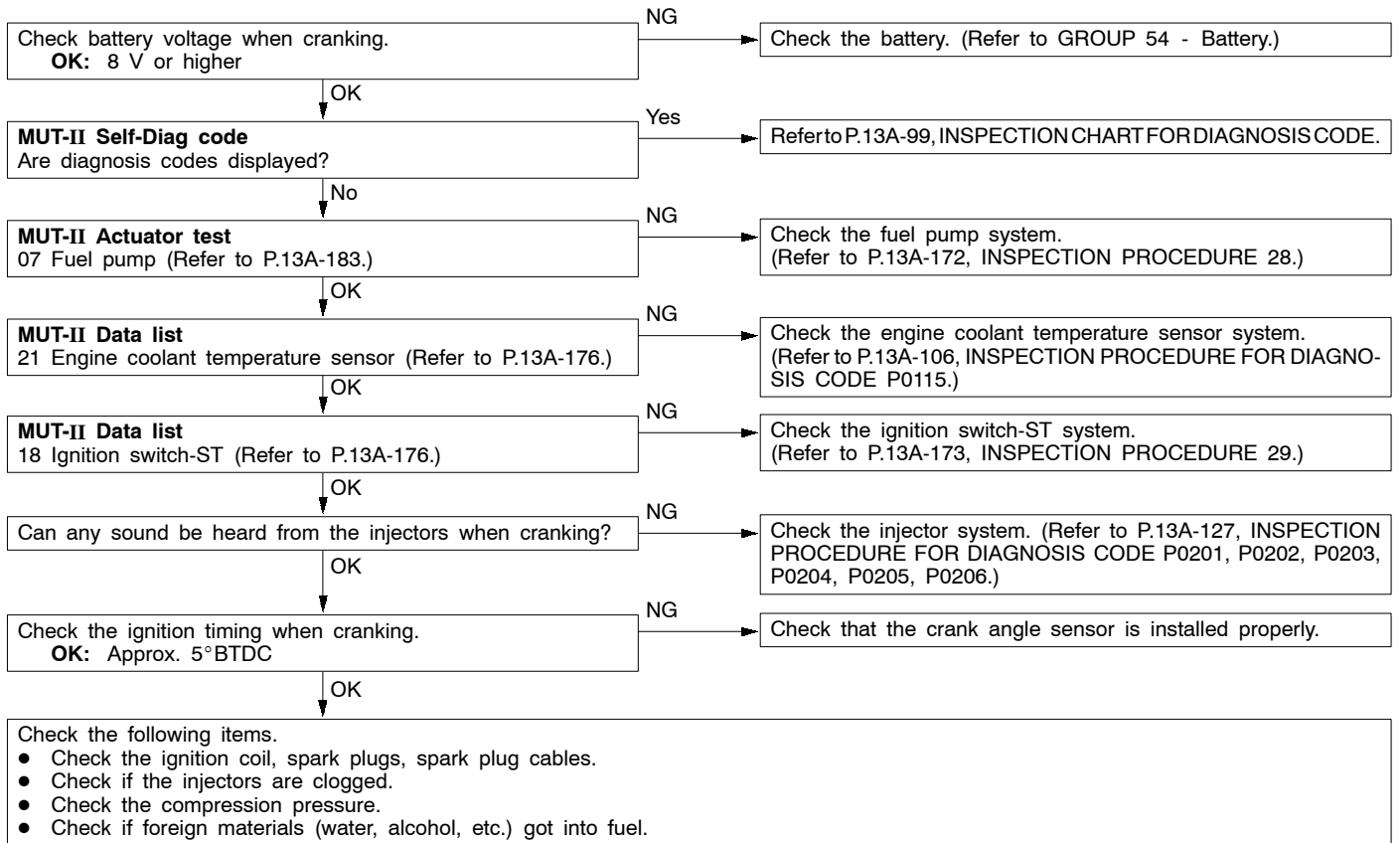


NOTE:

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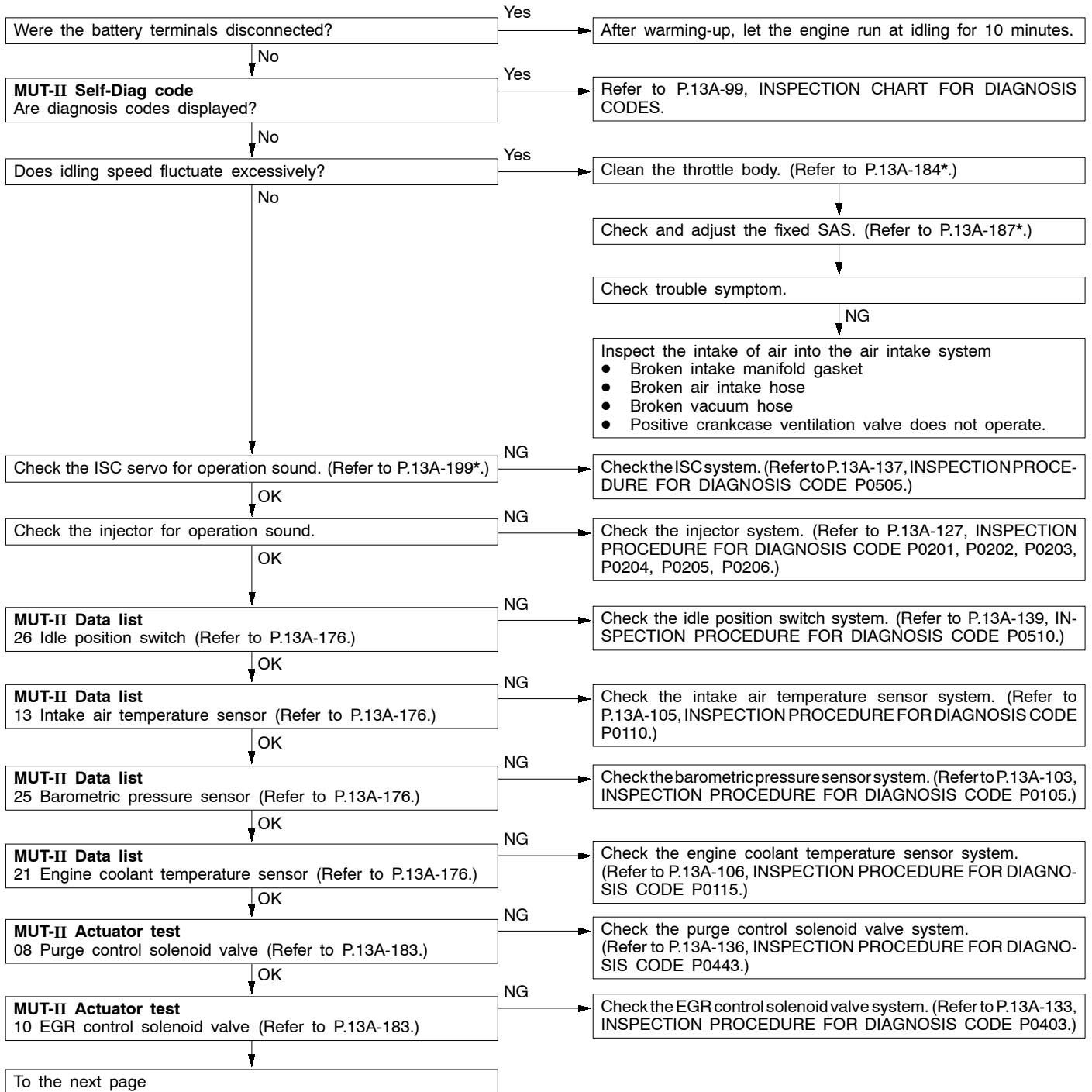
INSPECTION PROCEDURE 7

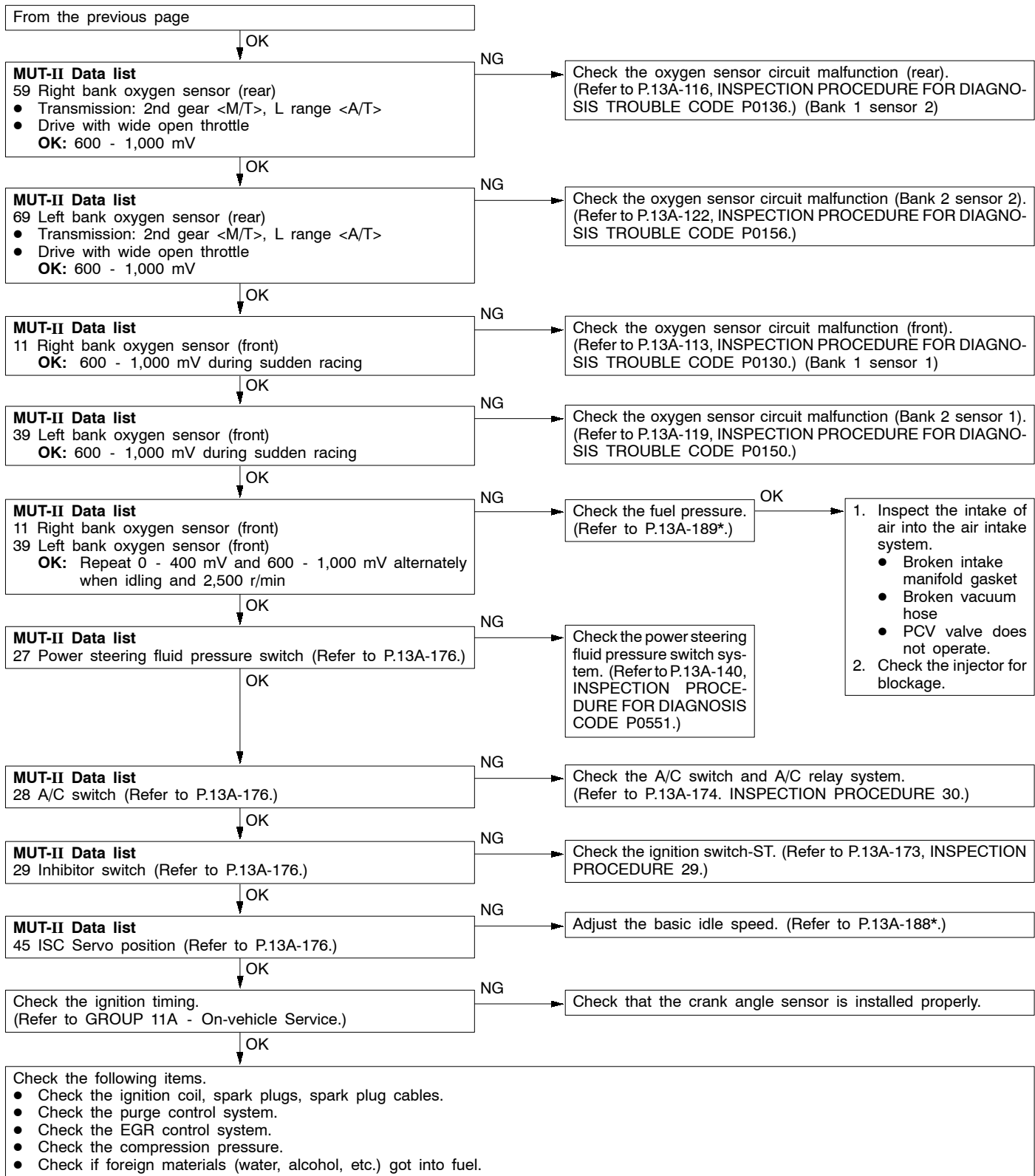
| It takes too long time to start. (Incorrect starting) | Probable cause |
|--|--|
| In cases such as the above, the cause is probably that the spark is weak and ignition is difficult, the initial mixture for starting is not appropriate, or sufficient compression pressure is not being obtained. | <ul style="list-style-type: none"> ● Malfunction of the ignition system ● Malfunction of the injector system ● Inappropriate gasoline use ● Poor compression |



INSPECTION PROCEDURE 8

| Unstable idling (Rough idling, hunting) | Probable cause |
|---|--|
| In cases as the above, the cause is probably that the ignition system, air/fuel mixture, idle speed control (ISC) or compression pressure is defective. Because the range of possible causes is broad, inspection is narrowed down to simple items. | <ul style="list-style-type: none"> ● Malfunction of the ignition system ● Malfunction of air/fuel ratio control system ● Malfunction of the ISC system ● Malfunction of the purge control solenoid valve system ● Malfunction of the EGR solenoid valve system ● Poor compression ● Drawing air into exhaust system |



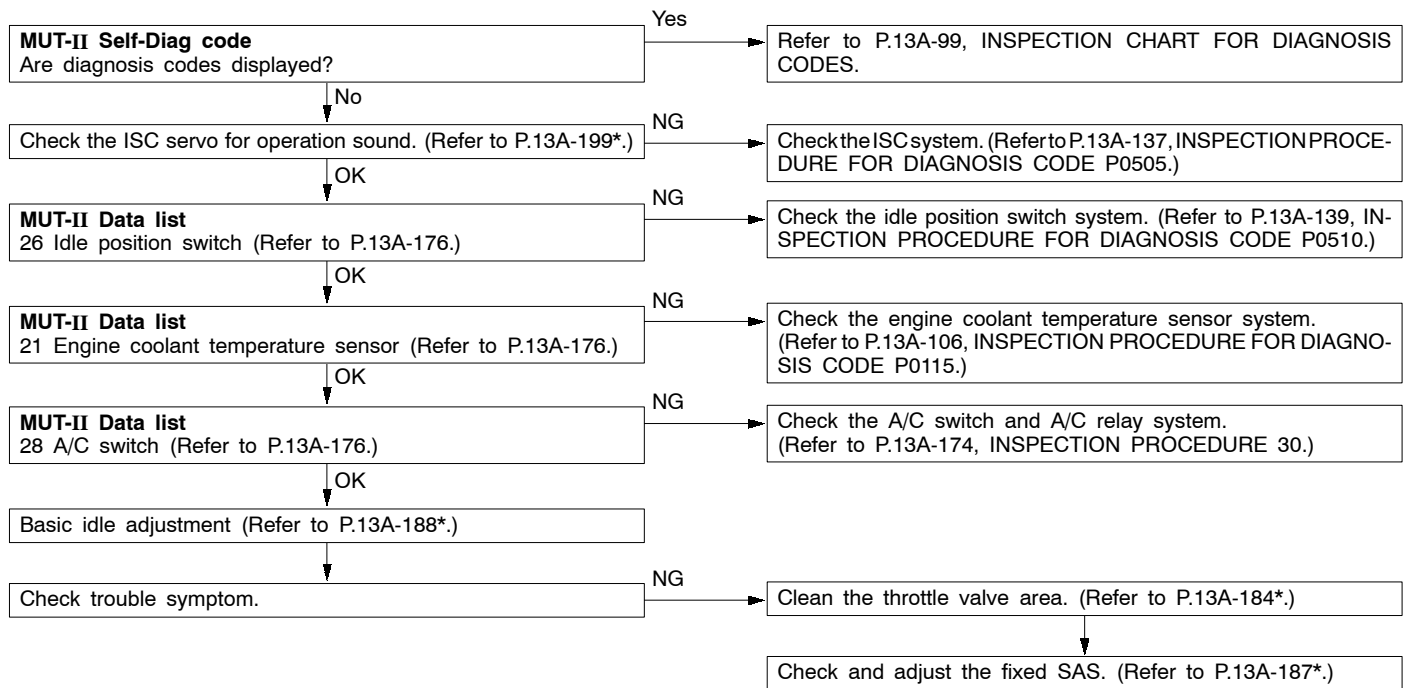


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 9

| Idling speed is high. (Improper idling speed) | Probable cause |
|--|---|
| In such cases as the above, the cause is probably that the intake air volume during idling is too great. | <ul style="list-style-type: none"> • Malfunction of the ISC system • Malfunction of the throttle body |

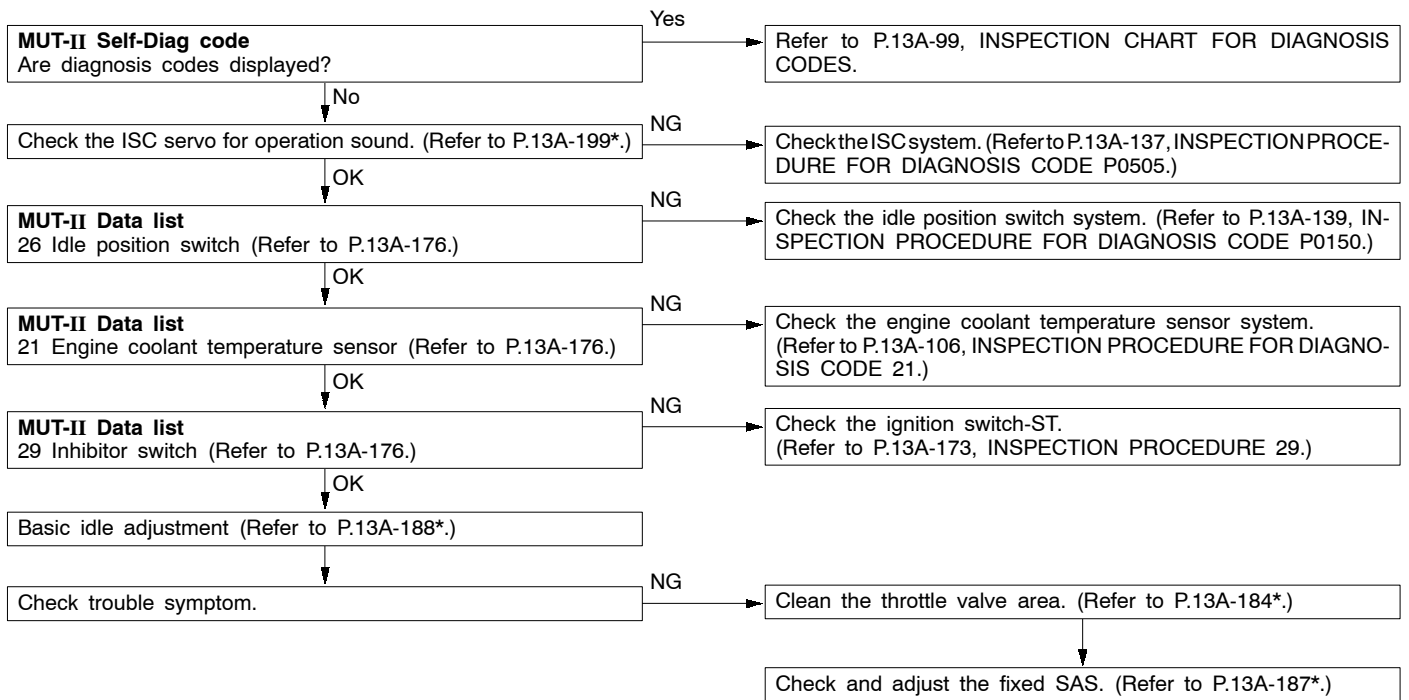


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 10

| Idling speed is low. (Improper idling speed) | Probable cause |
|--|---|
| In cases such as the above, the cause is probably that the intake air volume during idling is too small. | <ul style="list-style-type: none"> • Malfunction of the ISC system • Malfunction of the throttle body |

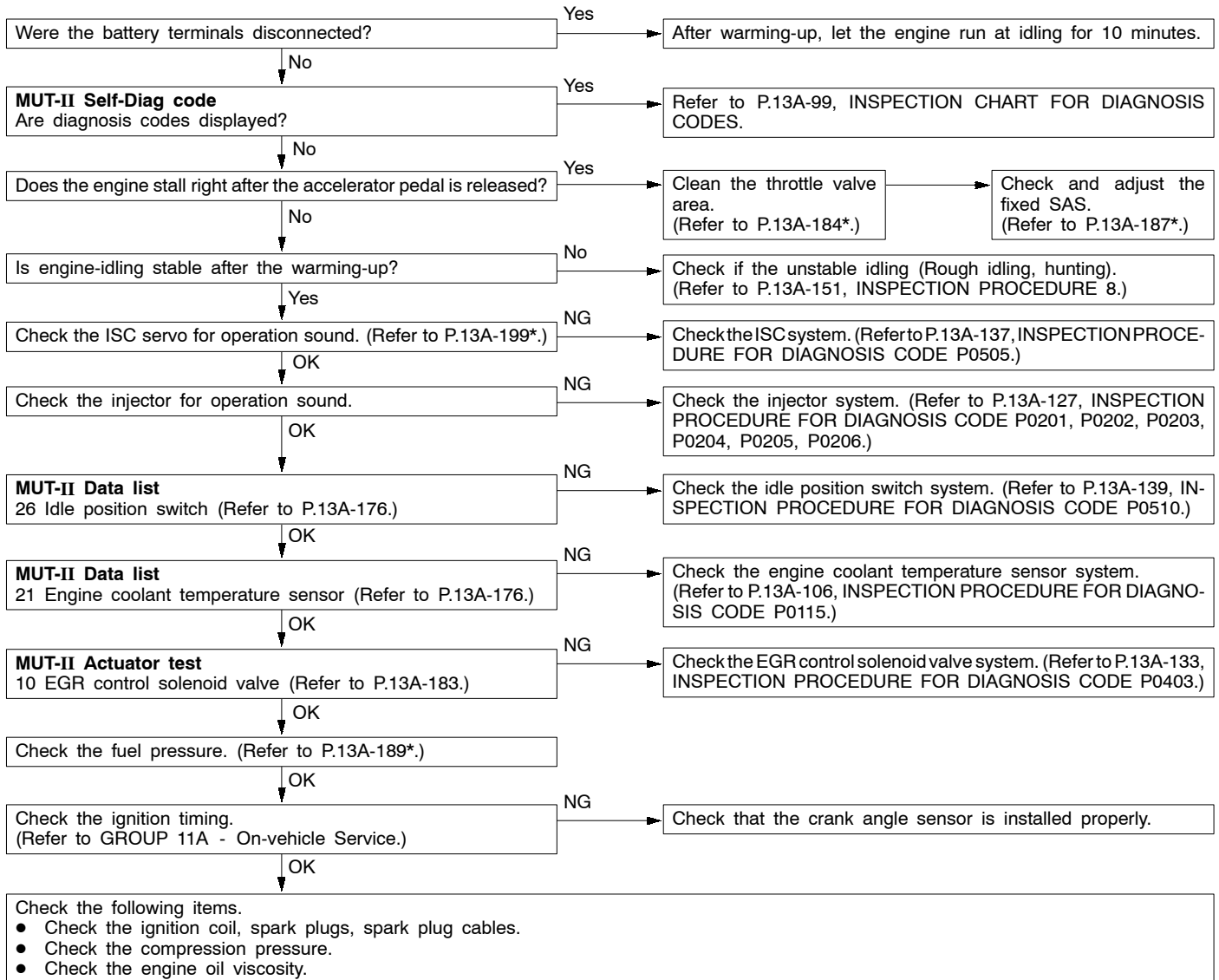


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 11

| When the engine is cold, it stalls at idling. (Die out) | Probable cause |
|--|---|
| In such cases as the above, the cause is probably that the air/fuel mixture is inappropriate when the engine is cold, or that the intake air volume is insufficient. | <ul style="list-style-type: none"> • Malfunction of the ISC system • Malfunction of the throttle body • Malfunction of the injector system • Malfunction of the ignition system |

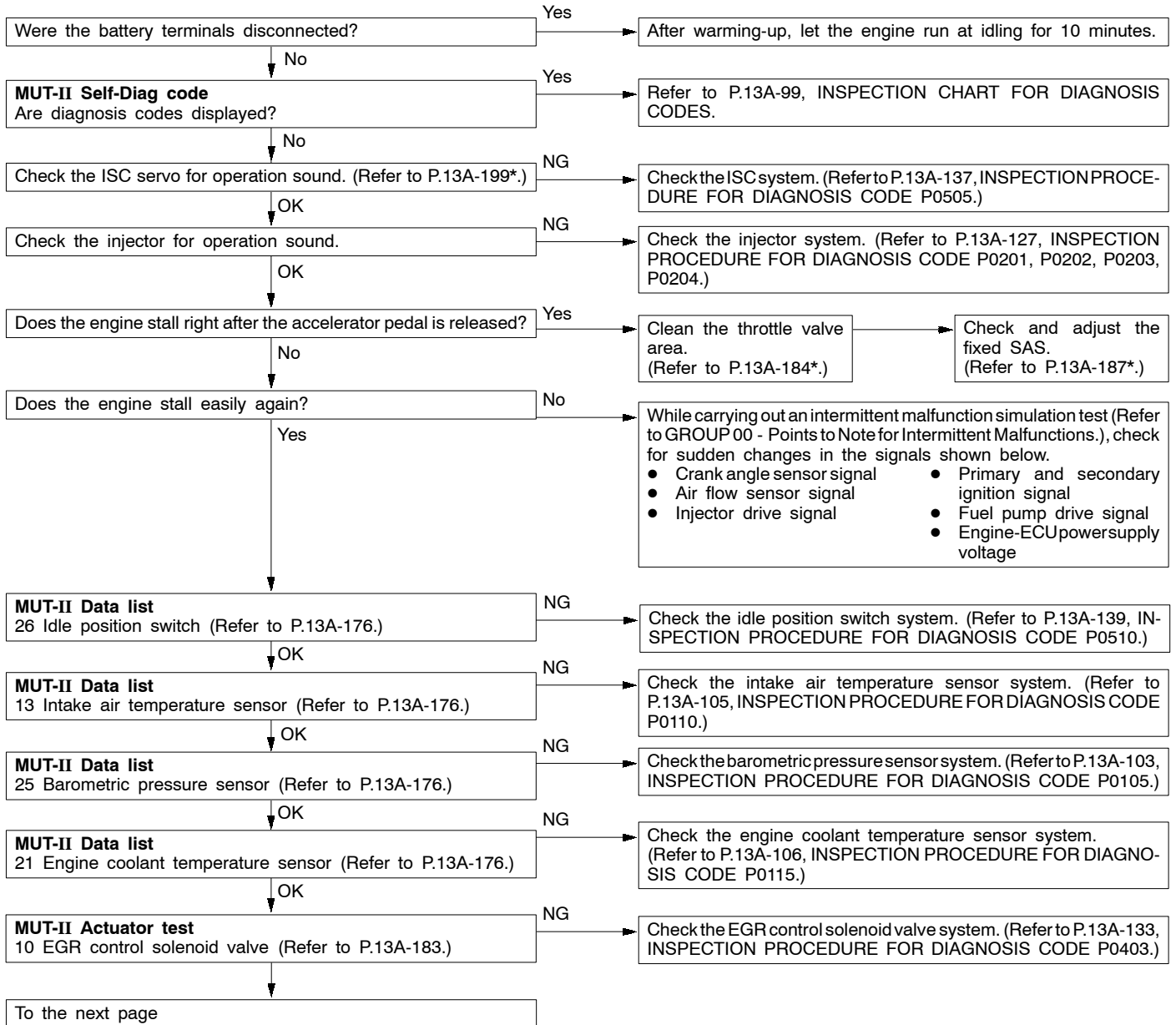


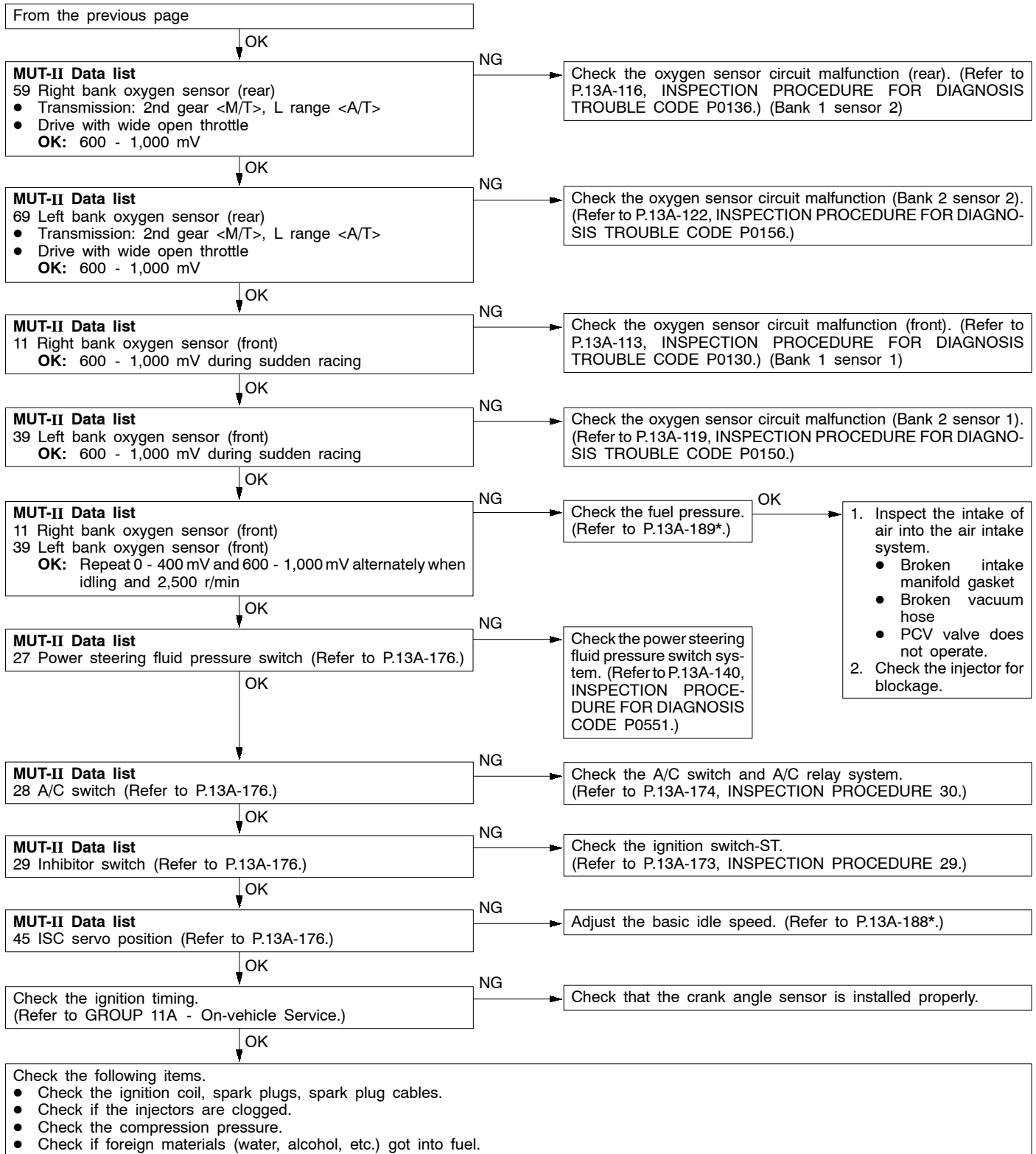
NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 12

| When the engine is hot, it stalls at idling. (Die out) | Probable cause |
|--|---|
| In such cases as the above, the cause is probably that ignition system, air/fuel mixture, idle speed control (ISC) or compression pressure is defective. In addition, if the engine suddenly stalls, the cause may also be a defective connector contact. | <ul style="list-style-type: none"> ● Malfunction of the ignition system ● Malfunction of air/fuel ratio control system ● Malfunction of the ISC system ● Drawing air into intake system ● Improper connector contact |



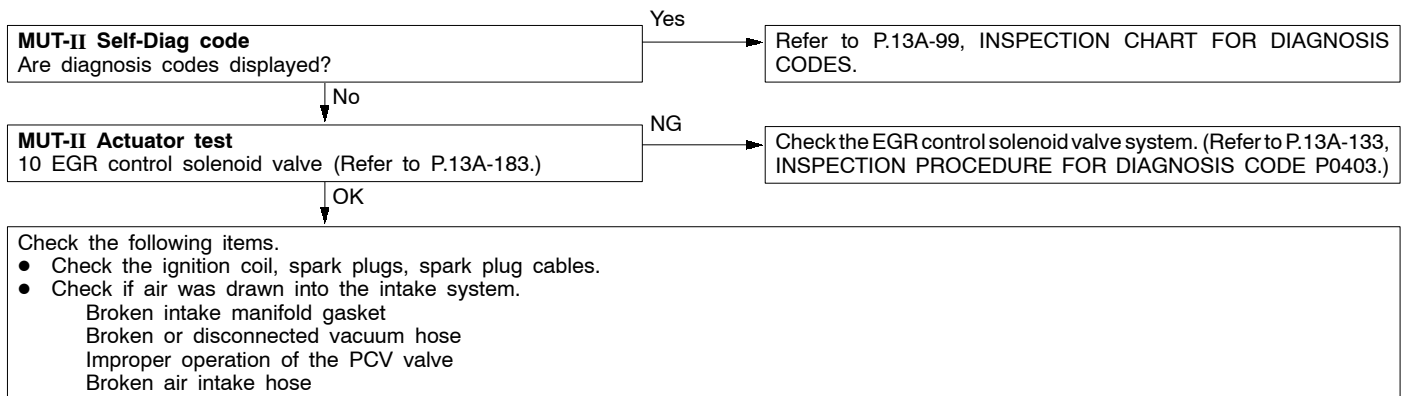


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*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

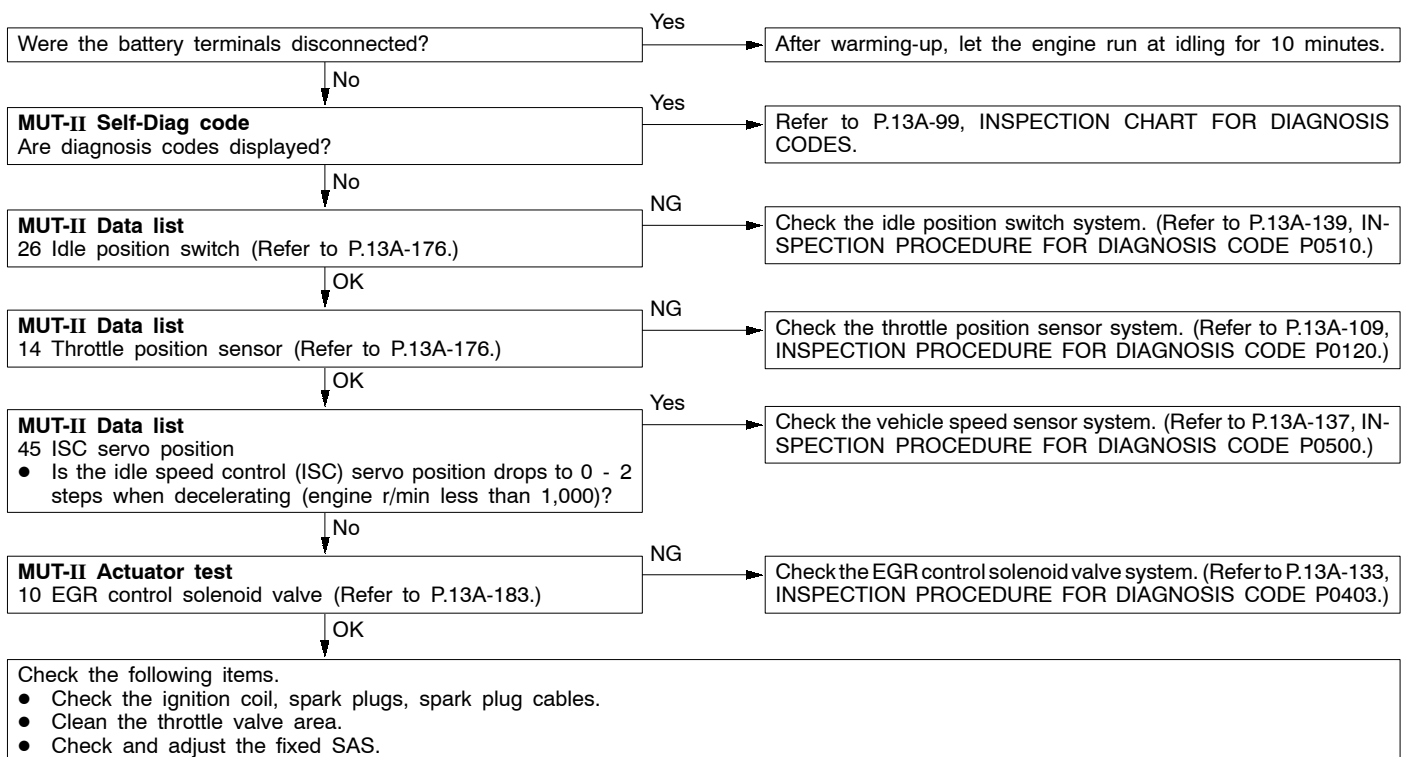
INSPECTION PROCEDURE 13

| The engine stalls when starting the car. (Pass out) | Probable cause |
|--|--|
| In cases such as the above, the cause is probably misfiring due to a weak spark, or an inappropriate air/fuel mixture when the accelerator pedal is depressed. | <ul style="list-style-type: none"> • Drawing air into intake system • Malfunction of the ignition system |



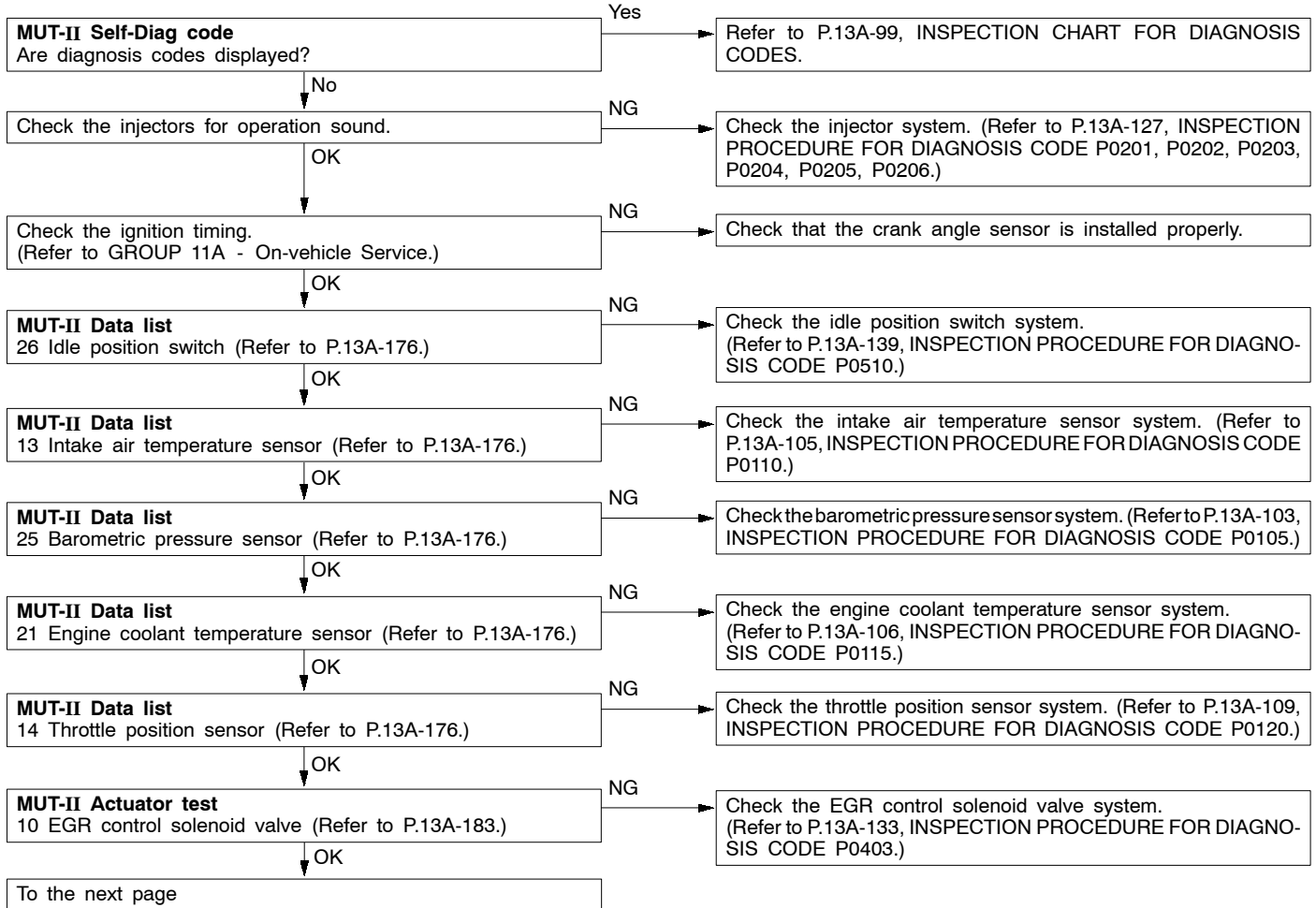
INSPECTION PROCEDURE 14

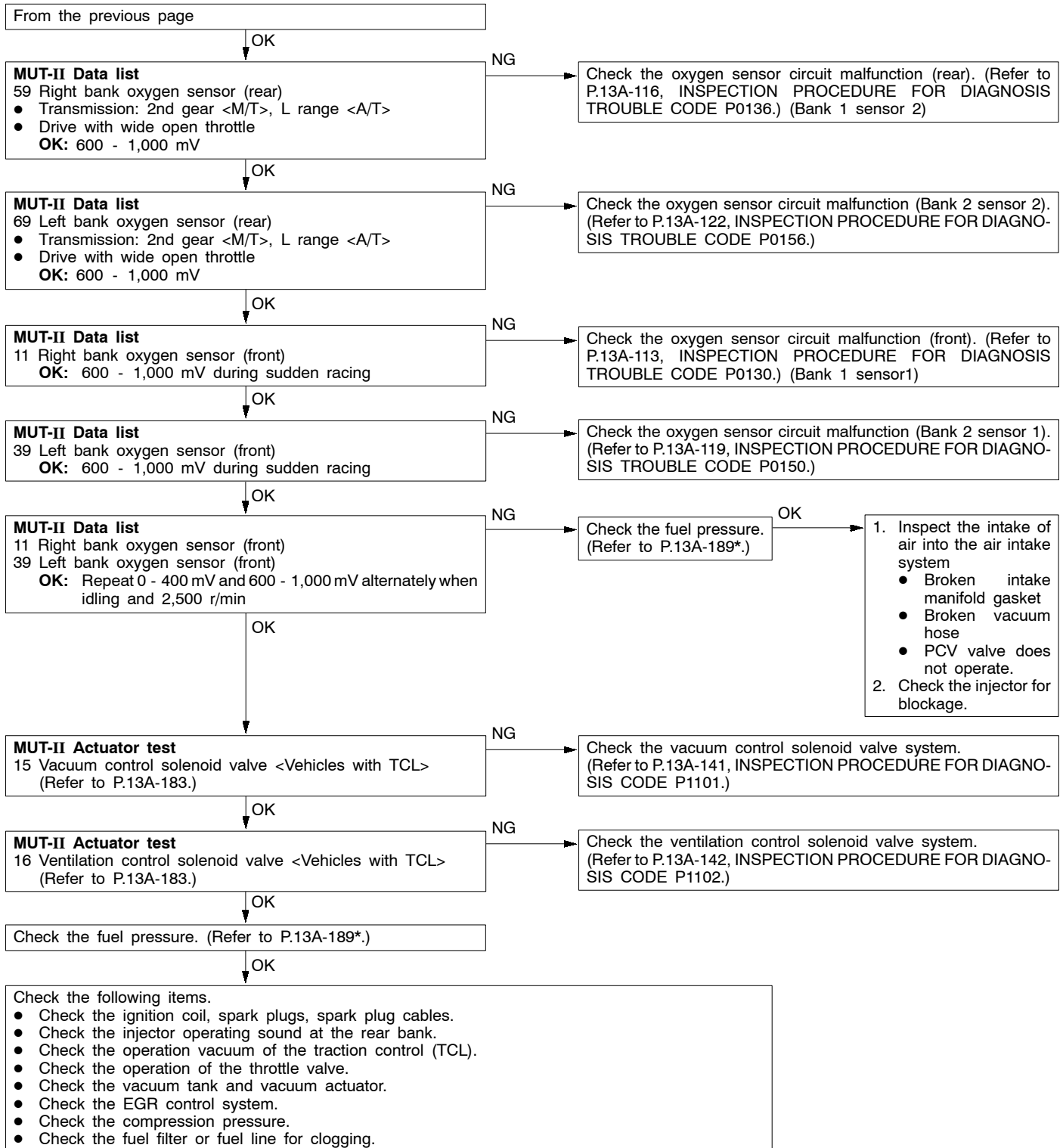
| The engine stalls when decelerating. | Probable cause |
|--|---|
| In cases such as the above, the cause is probably that the intake air volume is insufficient due to a defective idle speed control (ISC) system. | <ul style="list-style-type: none"> • Malfunction of the ISC system |



INSPECTION PROCEDURE 15

| Hesitation, sag or stumble | Probable cause |
|--|---|
| In cases such as the above, the cause is probably that ignition system, air/fuel mixture or compression pressure is defective. | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of air/fuel ratio control system • Malfunction of the fuel supply system • Malfunction of the EGR control solenoid valve system • Poor compression |



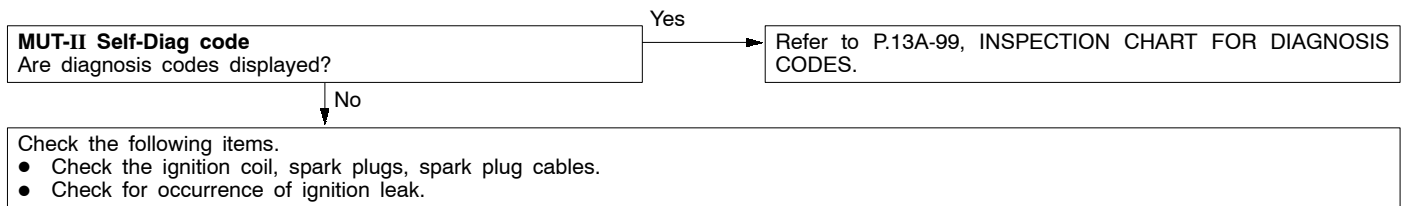


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

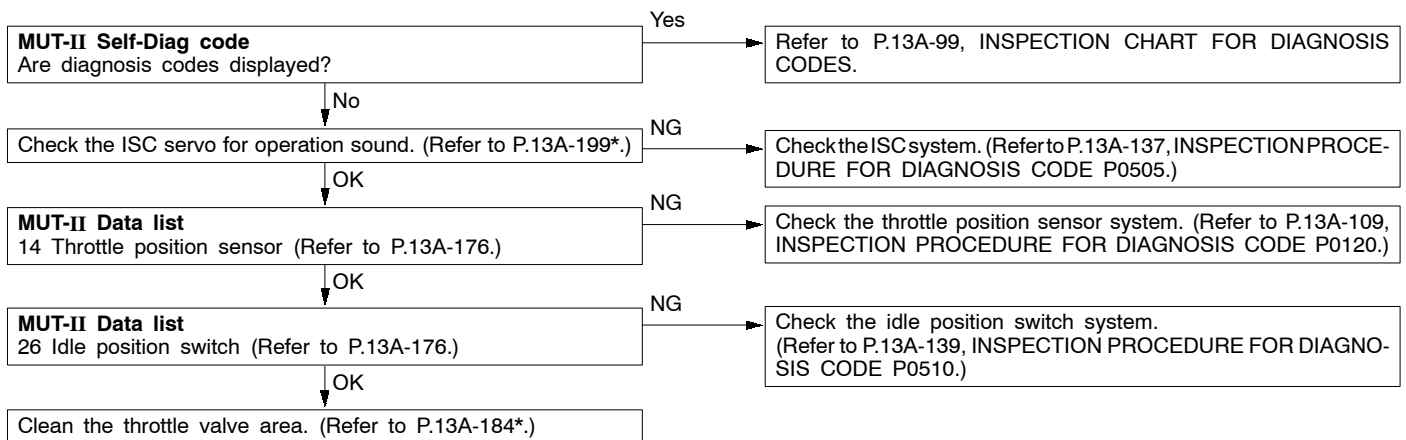
INSPECTION PROCEDURE 16

| The feeling of impact or vibration when accelerating | Probable cause |
|--|--|
| In cases such as the above, the cause is probably that there is an ignition leak accompanying the increase in the spark plug demand voltage during acceleration. | <ul style="list-style-type: none"> Malfunction of the ignition system |



INSPECTION PROCEDURE 17

| The feeling of impact or vibration when decelerating. | Probable cause |
|---|---|
| Malfunction of the ISC system is suspected. | <ul style="list-style-type: none"> Malfunction of the ISC system |

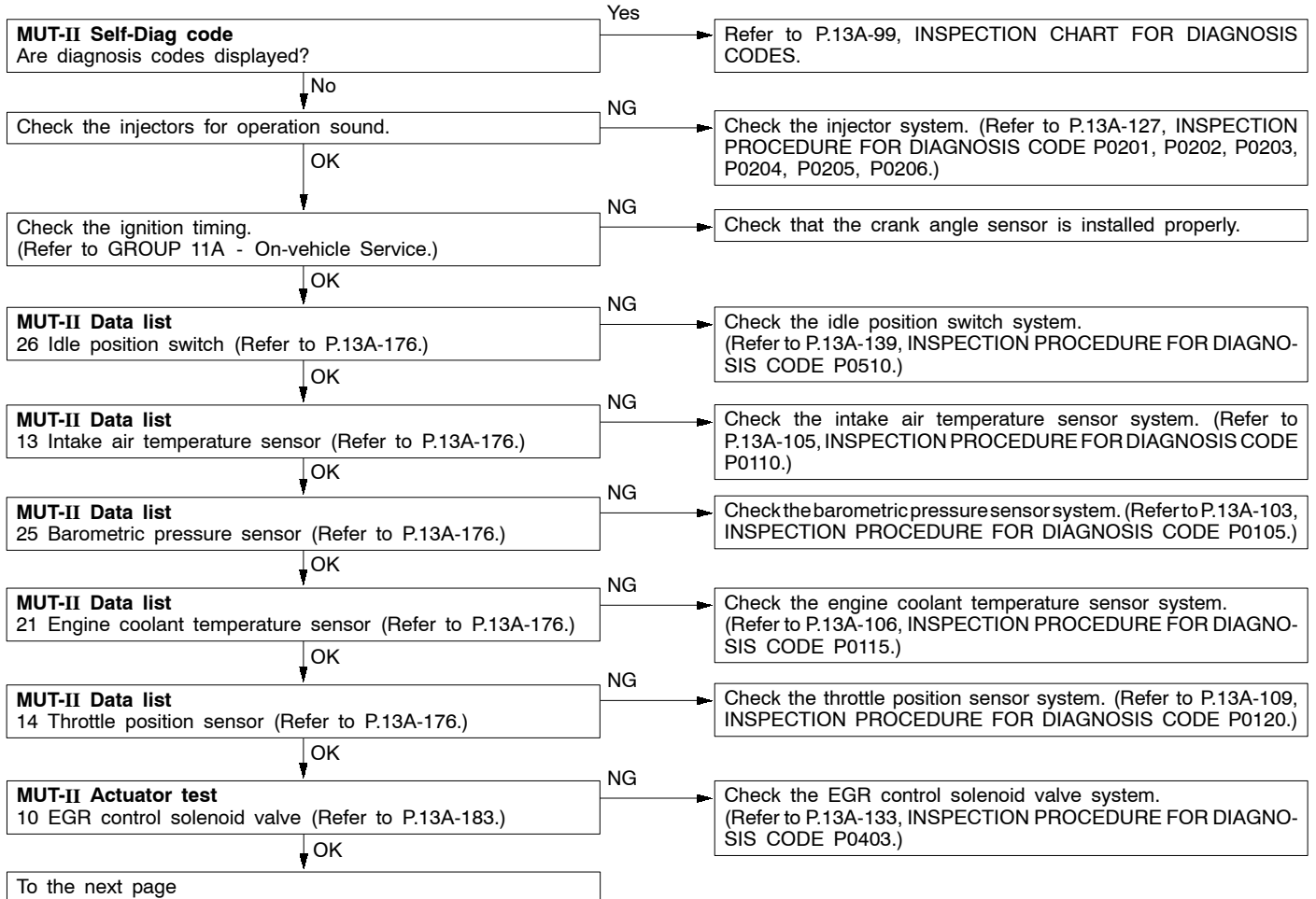


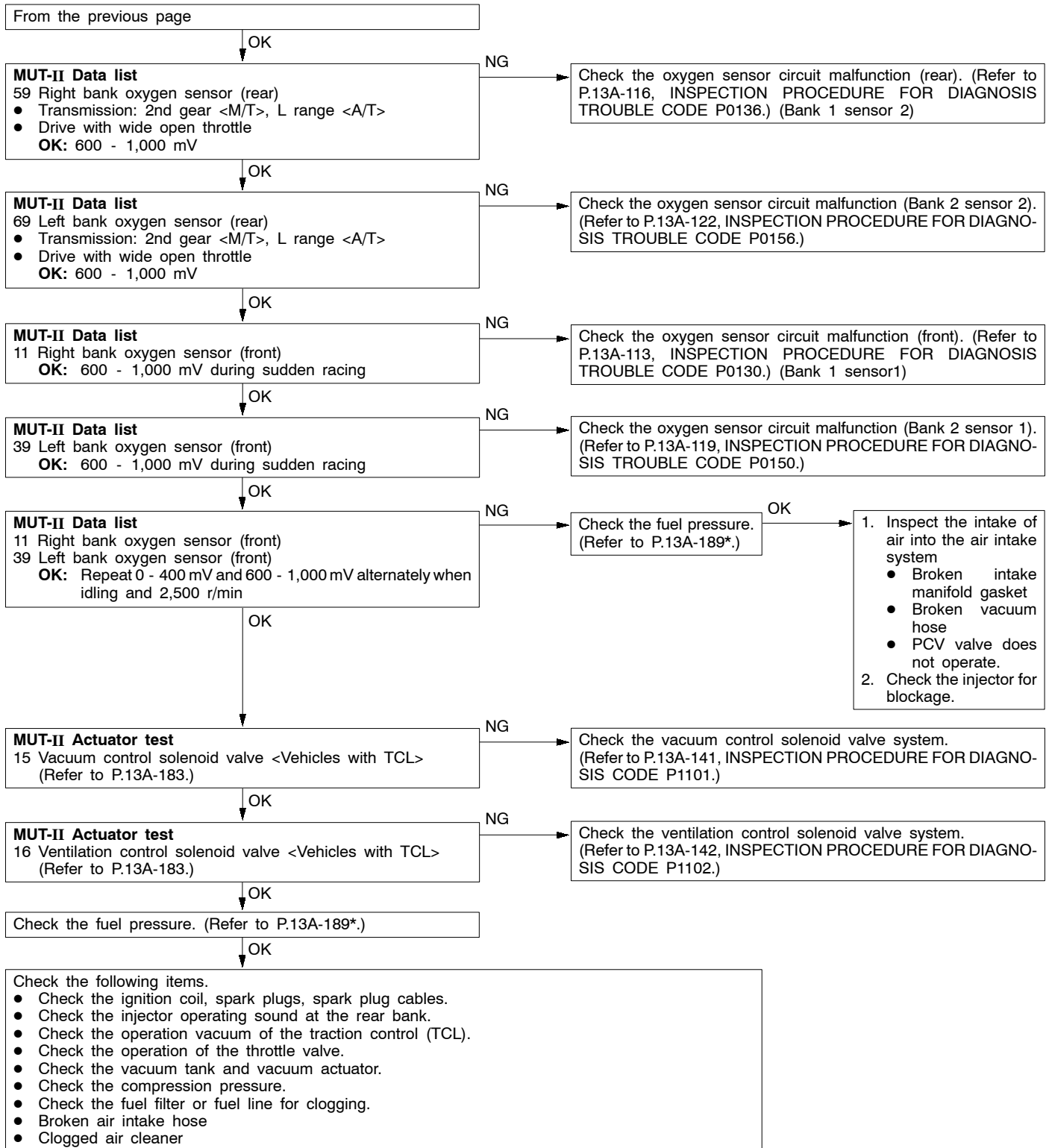
NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 18

| Poor acceleration | Probable cause |
|--|--|
| Defective ignition system, abnormal air-fuel ratio, poor compression pressure, etc. are suspected. | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of air/fuel ratio control system • Malfunction of the fuel supply system • Poor compression pressure • Clogged exhaust system |



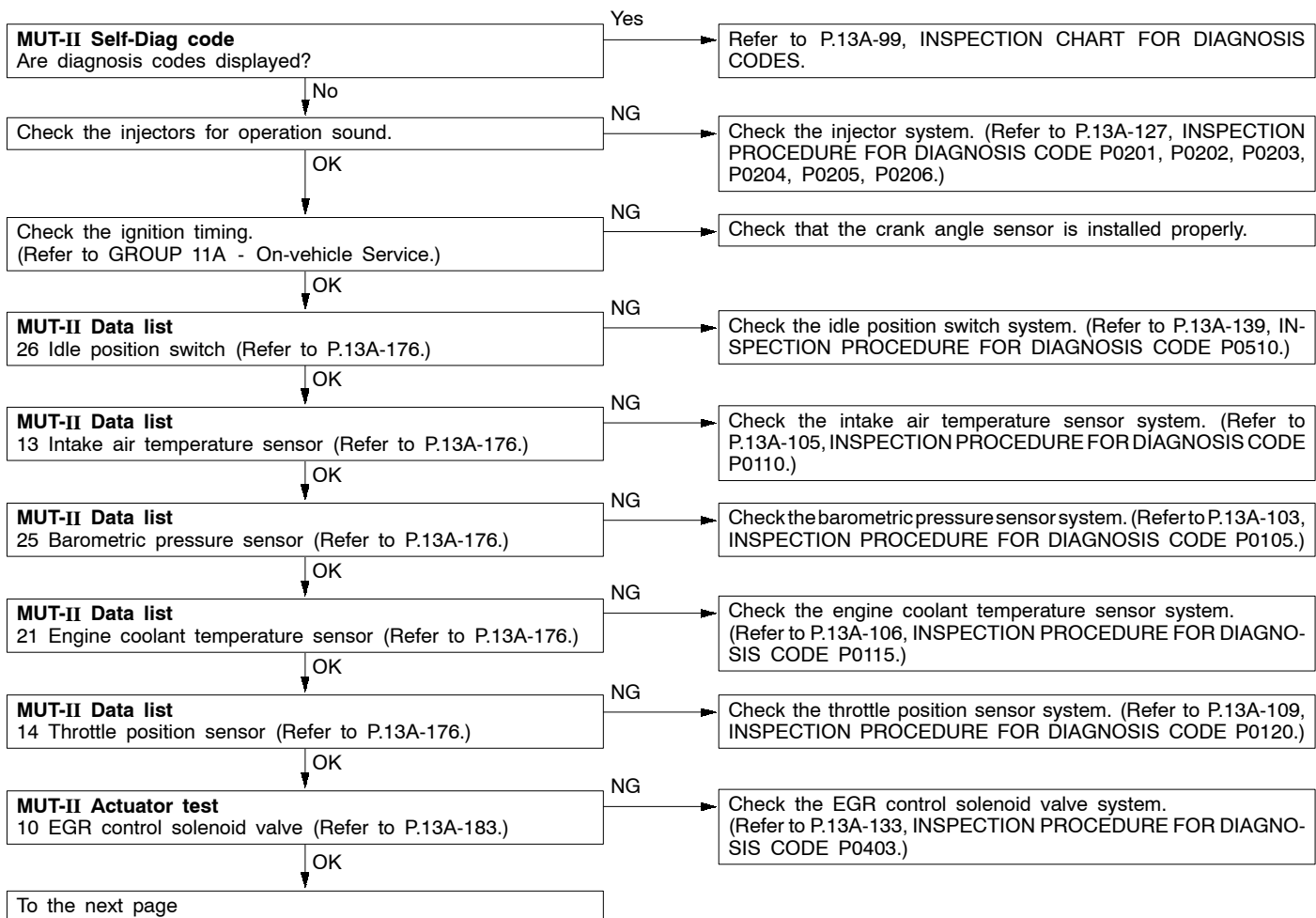


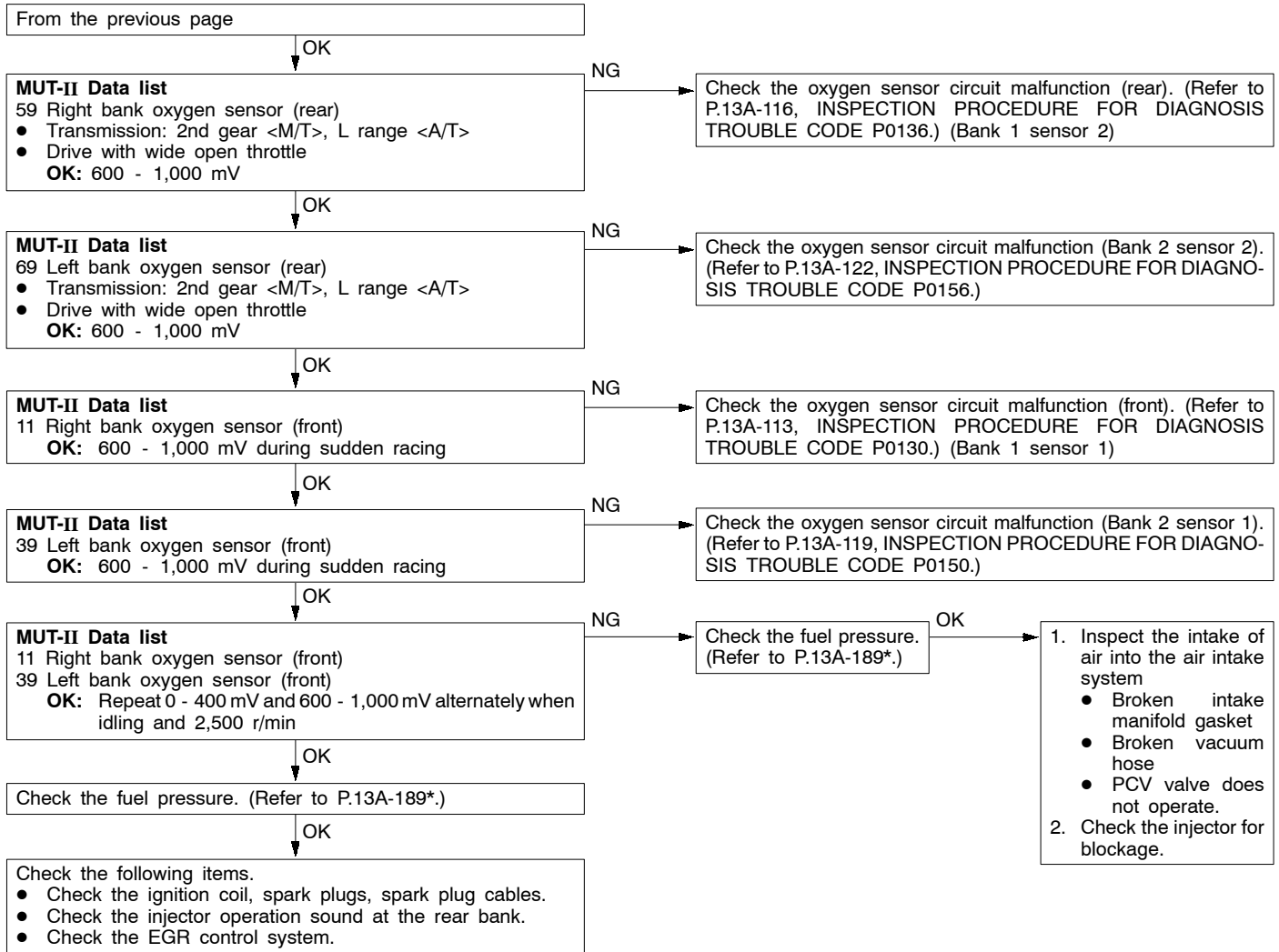
NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 19

| Surge | Probable cause |
|---|--|
| Defective ignition system, abnormal air-fuel ratio, etc. are suspected. | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of air-fuel ratio control system • Malfunction of the EGR control solenoid valve system |



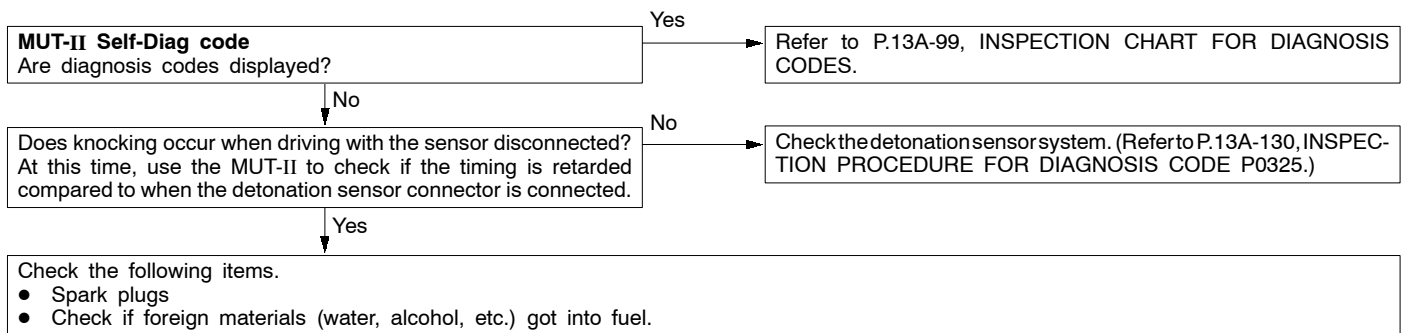


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 20

| Knocking | Probable cause |
|---|---|
| In cases as the above, the cause is probably that the detonation control is defective or the heat value of the spark plug is inappropriate. | <ul style="list-style-type: none"> Defective detonation sensor Inappropriate heat value of the spark plug |



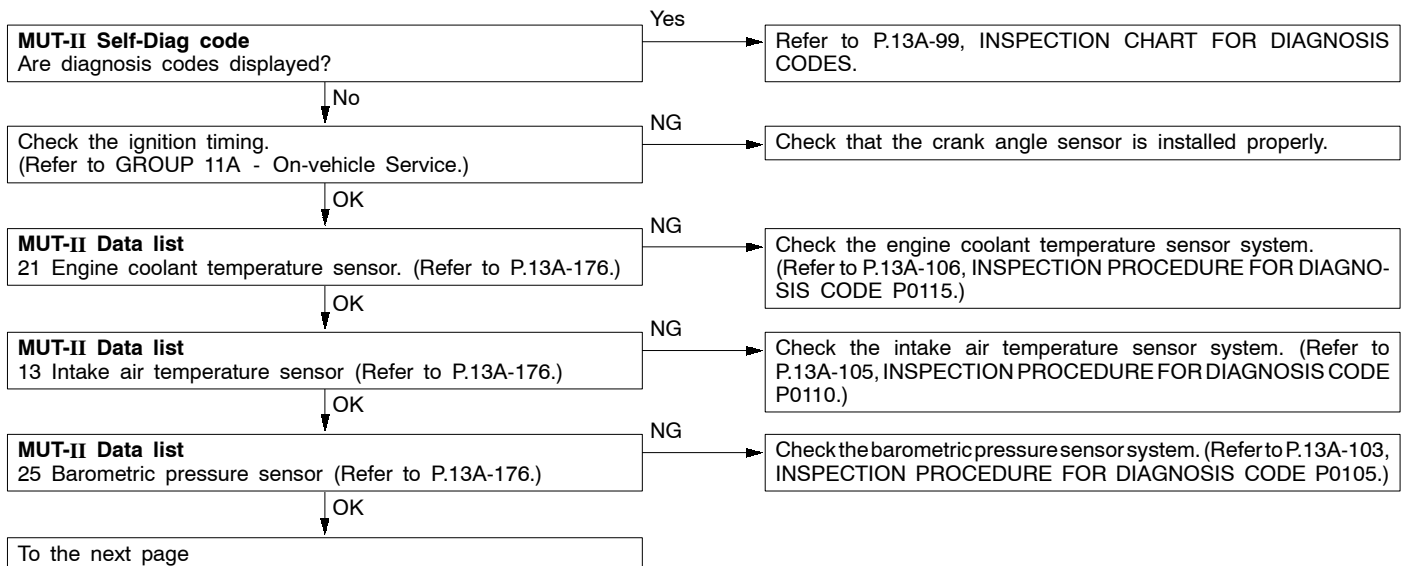
INSPECTION PROCEDURE 21

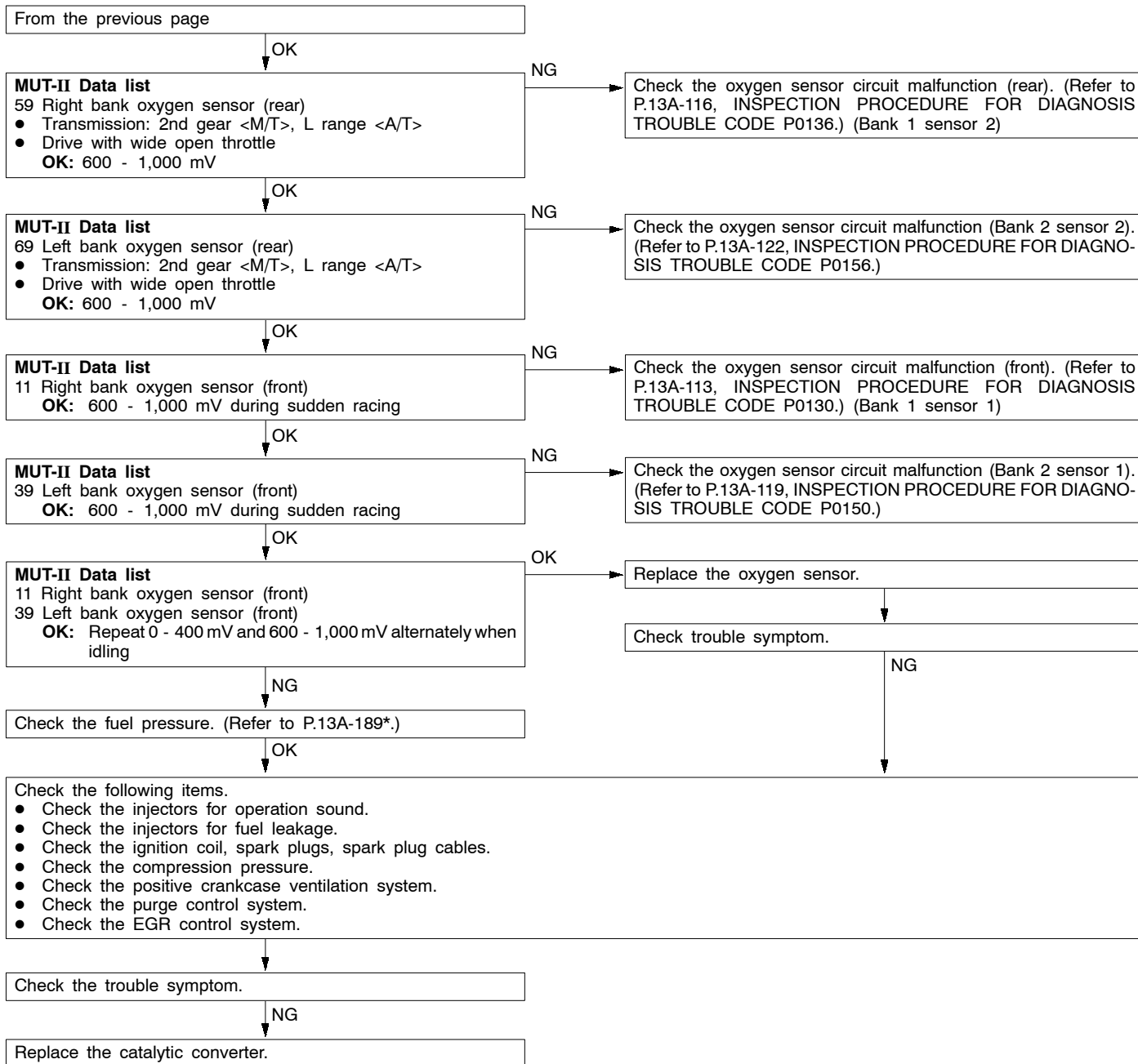
| Dieseling | Probable cause |
|---|---|
| Fuel leakage from injectors is suspected. | <ul style="list-style-type: none"> Fuel leakage from injectors |

Check the injectors for fuel leakage.

INSPECTION PROCEDURE 22

| Too high CO and HC concentration when idling | Probable cause |
|--|---|
| Abnormal air/fuel ratio is suspected. | <ul style="list-style-type: none"> Malfunction of the air/fuel ratio control system Deteriorated catalyst |



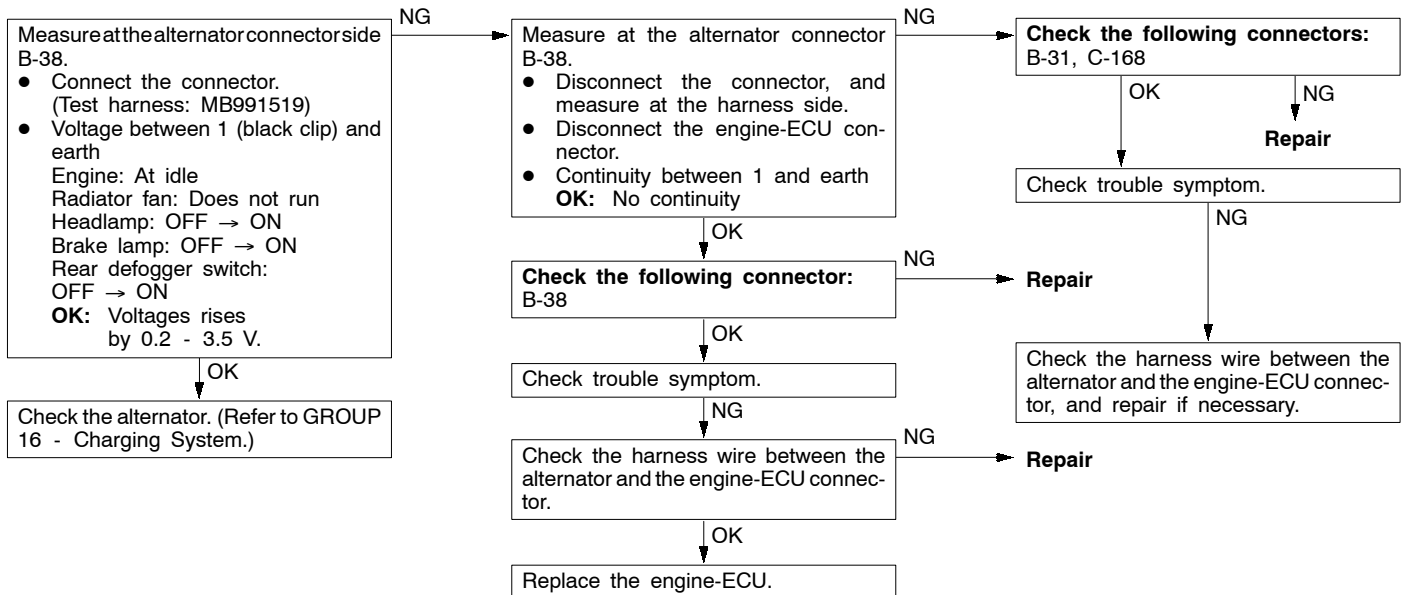


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

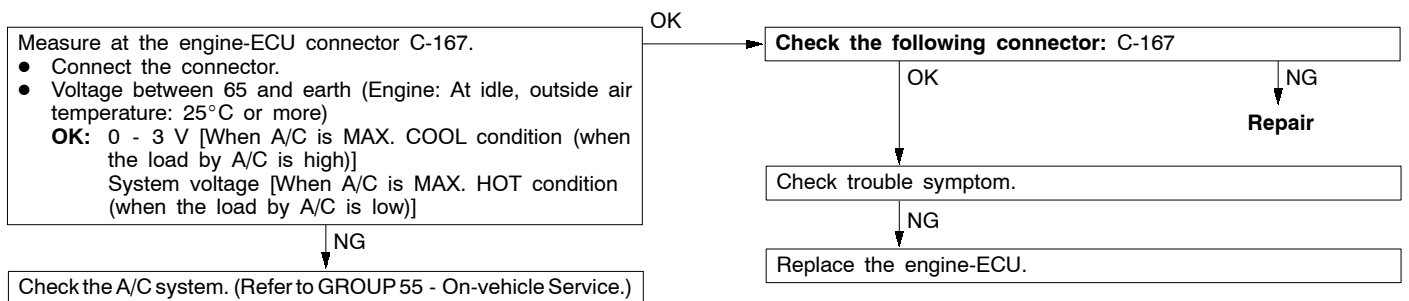
INSPECTION PROCEDURE 23

| Low alternator output voltage (approx. 12.3 V) | Probable cause |
|---|--|
| The alternator may be defective, or malfunctions, which are listed in the right column, may be suspected. | <ul style="list-style-type: none"> • Malfunction of charging system • Short circuit in harness between alternator G terminal and engine-ECU • Malfunction of engine-ECU |



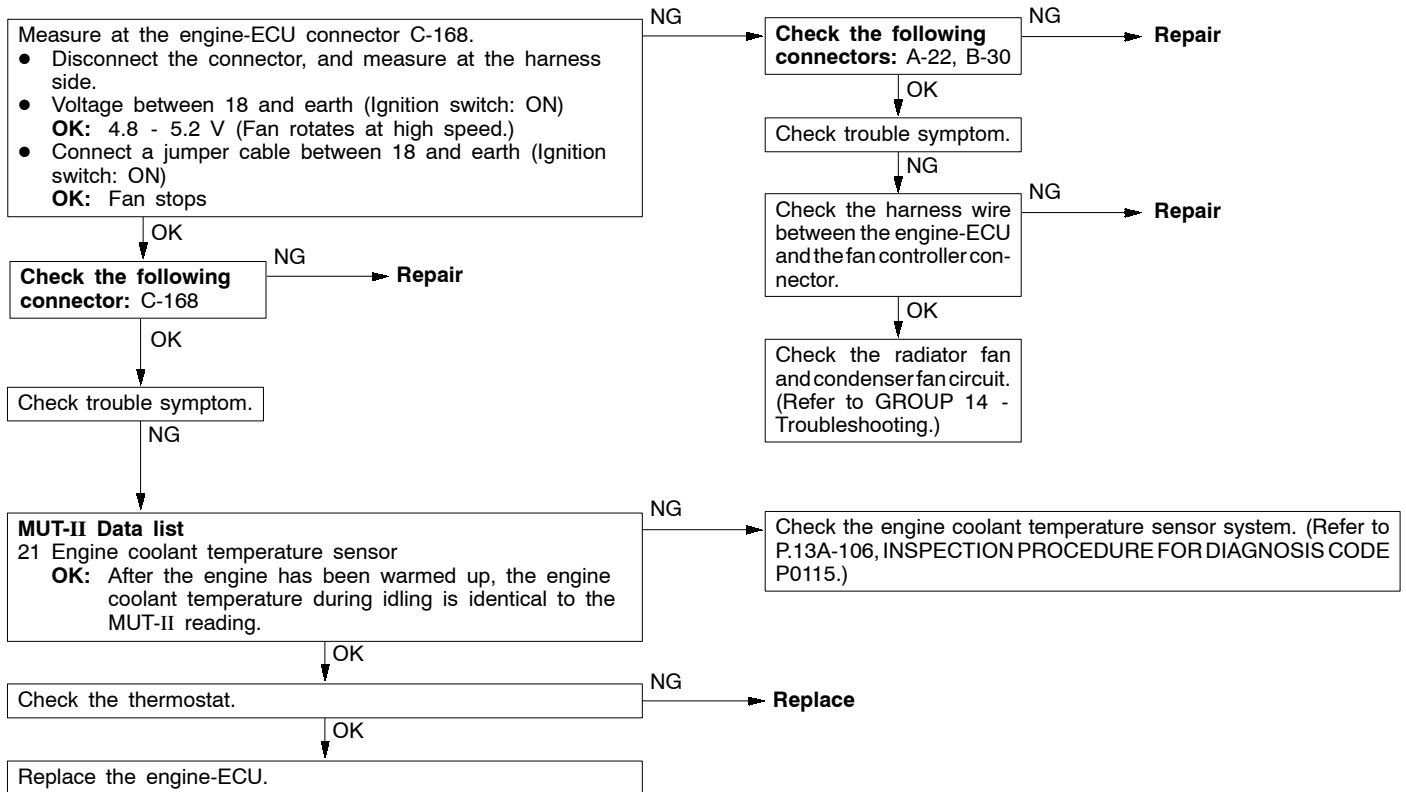
INSPECTION PROCEDURE 24

| Idling speed is improper when A/C is operating | Probable cause |
|--|--|
| <p>If the engine-ECU detects that the air conditioner is on, it activates the idle speed control (ISC) servo to control idle-up operation.</p> <p>The A/C-ECU judges if the load caused by air conditioner operation is high or low, and converts it to voltage signal (high or low voltage) and inputs the signal to the engine-ECU.</p> <p>Based on this voltage signal, the engine-ECU controls the idle-up speed (for high or low load).</p> | <ul style="list-style-type: none"> • Malfunction of the A/C control system • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU |



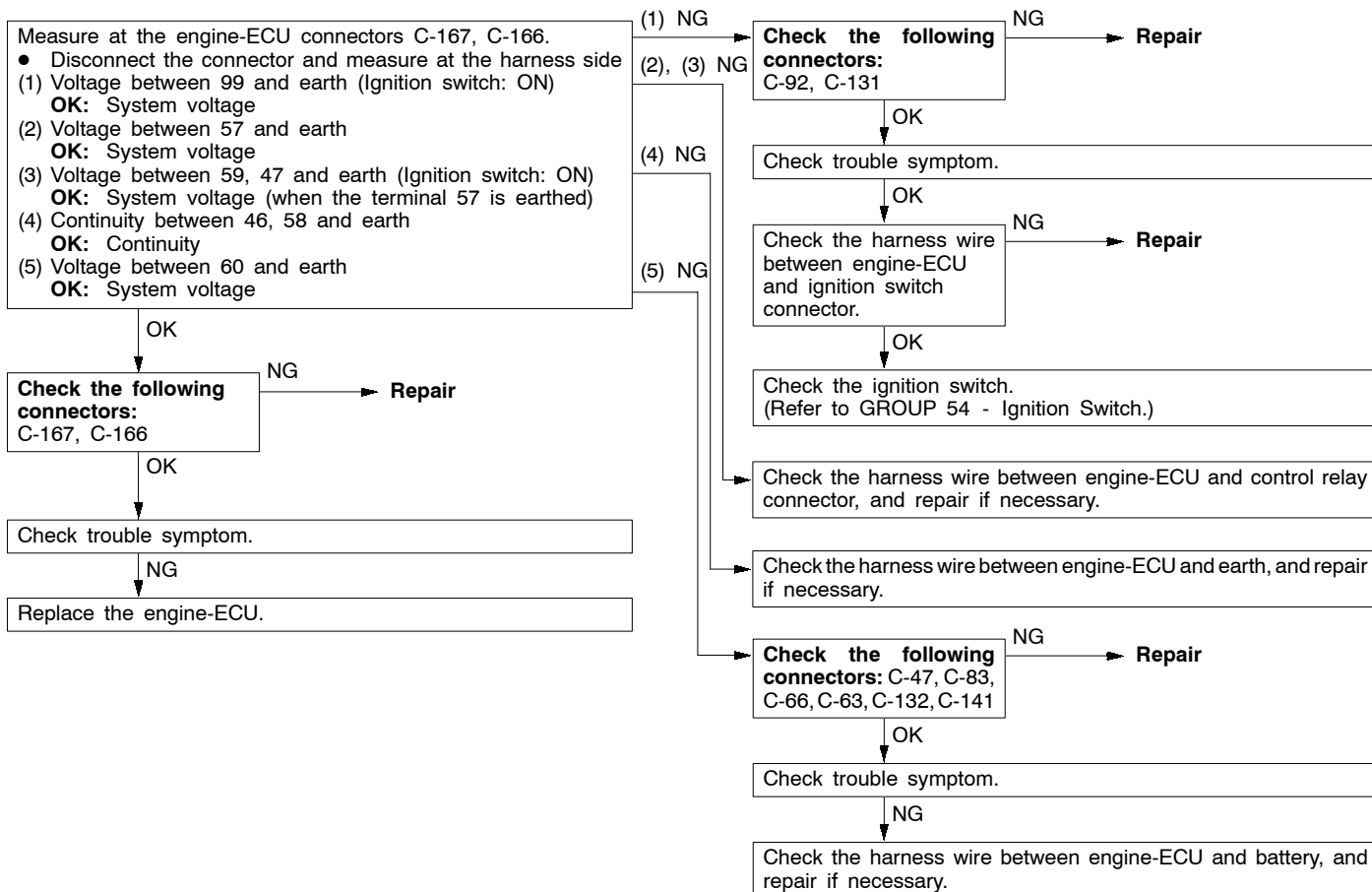
INSPECTION PROCEDURE 25

| Fans (radiator fan, A/C condenser fan) are inoperative | Probable cause |
|---|--|
| <p>The engine-ECU outputs a duty signal to the fan controller depending on the engine coolant temperature, vehicle speed, and air conditioner switch condition. Based on this signal, the fan controller controls the radiator fan and condenser fan speeds (The more the average voltage at the terminal approaches 5 V, the higher the fan speed become.)</p> | <ul style="list-style-type: none"> • Malfunction of the fan motor relay • Malfunction of the fan motor • Malfunction of the fan controller • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU |



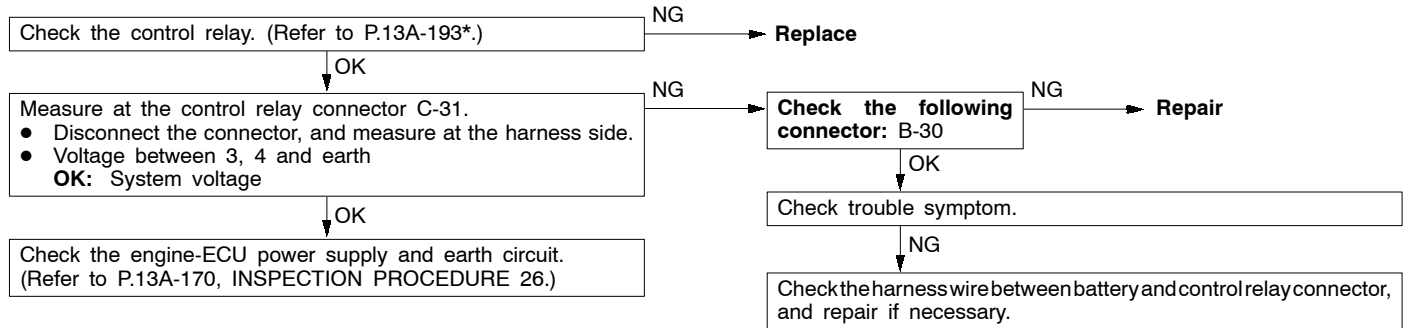
INSPECTION PROCEDURE 26

| Engine-ECU power supply and earth circuit system | Probable cause |
|--|---|
| The engine-ECU may be defective, or that one of the malfunctions listed at right has occurred. | <ul style="list-style-type: none"> Improper connector contact, open circuit or short-circuited harness wire in the engine-ECU power supply circuit. Open circuit or short-circuited harness wire in the engine-ECU earth circuit Malfunction of the engine-ECU |



INSPECTION PROCEDURE 27

| Power supply system and ignition switch-IG system | Probable cause |
|---|---|
| When an ignition switch ON signal is input to the engine-ECU, the engine-ECU turns the control relay ON. This causes battery voltage to be supplied to the engine-ECU, injectors and air flow sensor. | <ul style="list-style-type: none"> • Malfunction of the ignition switch • Malfunction of the control relay • Improper connector contact, open circuit or short-circuited harness wire • Disconnected engine-ECU earth wire • Malfunction of the engine-ECU |

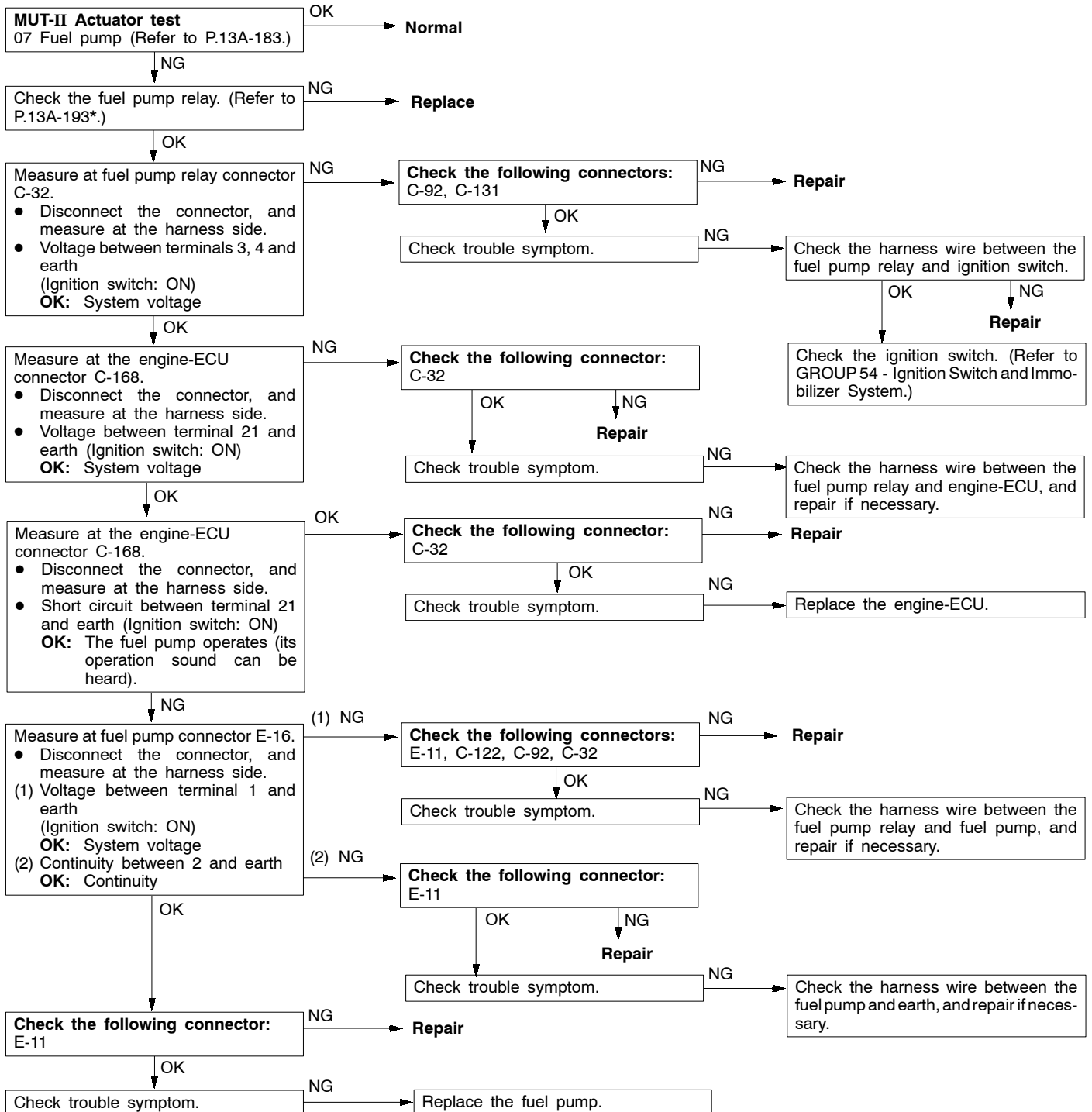


NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

INSPECTION PROCEDURE 28

| Fuel pump system | Probable cause |
|---|---|
| The engine-ECU turns the control relay ON when the engine is cranking or running, and this supplies power to drive the fuel pump. | <ul style="list-style-type: none"> • Malfunction of the fuel pump relay • Malfunction of the fuel pump • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU |



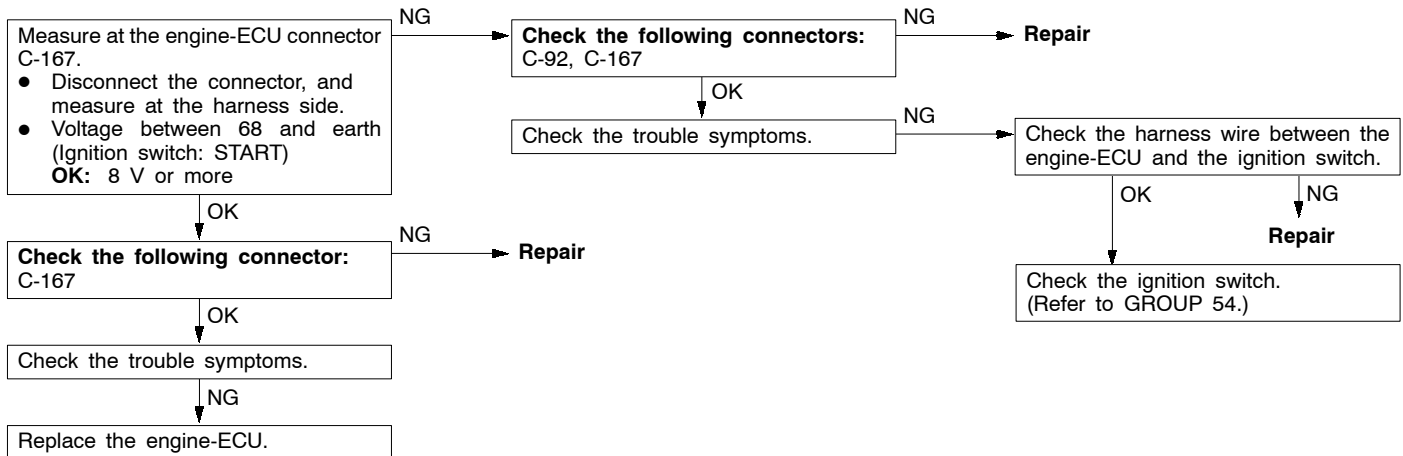
NOTE:

*: Refer to the '97 GALANT Workshop Manual (Pub. No. PWDE9611)

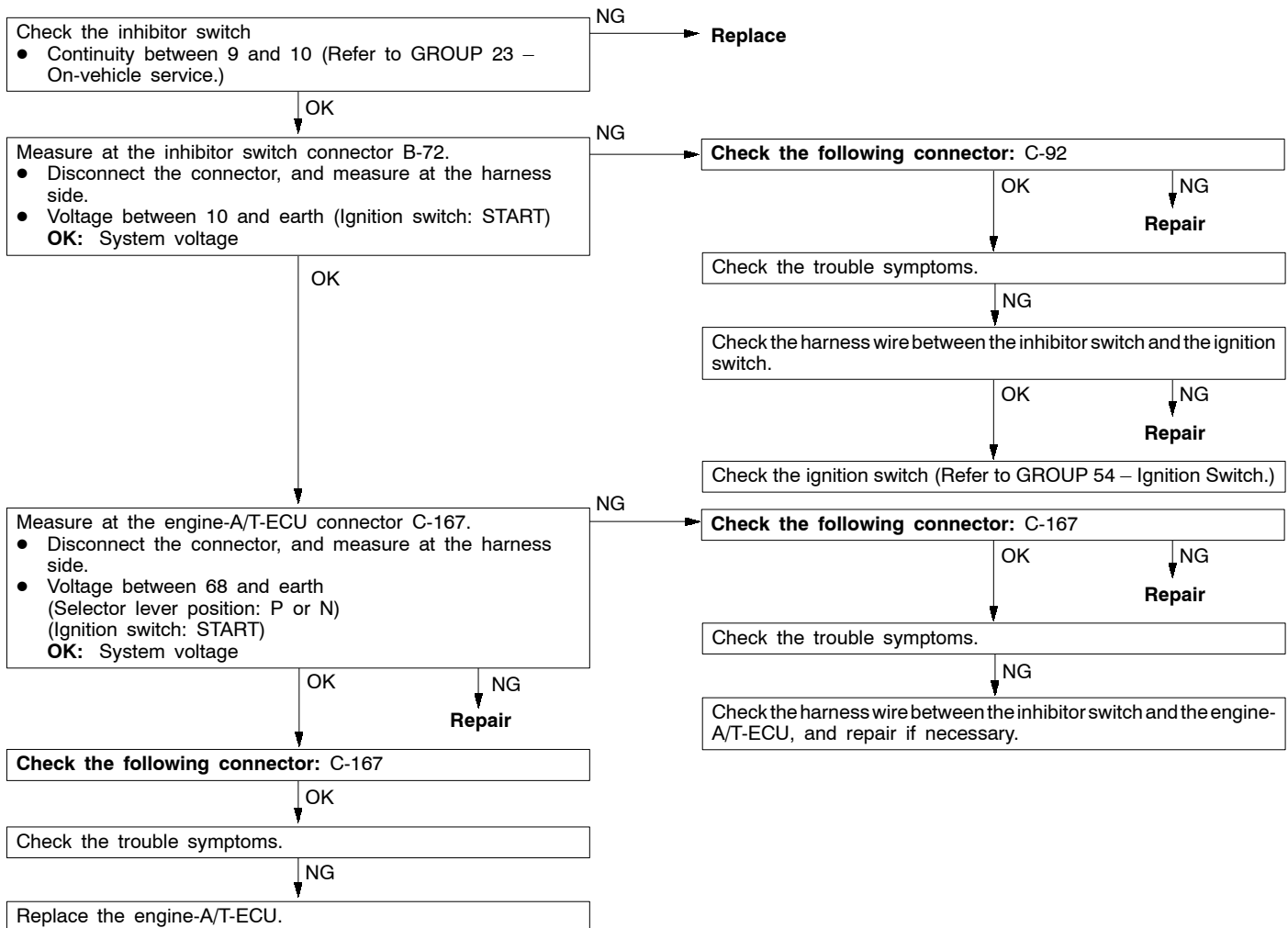
INSPECTION PROCEDURE 29

| Ignition switch-ST system | Probable cause |
|---|---|
| <p>The ignition switch-ST outputs a HIGH signal to the engine-ECU while the engine is cranking.</p> <p>The engine-ECU uses this signal to carry out functions such as fuel injection control during starting.</p> | <ul style="list-style-type: none"> • Malfunction of the ignition switch • Malfunction of the inhibitor switch <A/T> • Open circuit or short-circuited harness wire of the ignition switch circuit • Malfunction of the engine-ECU |

<M/T>

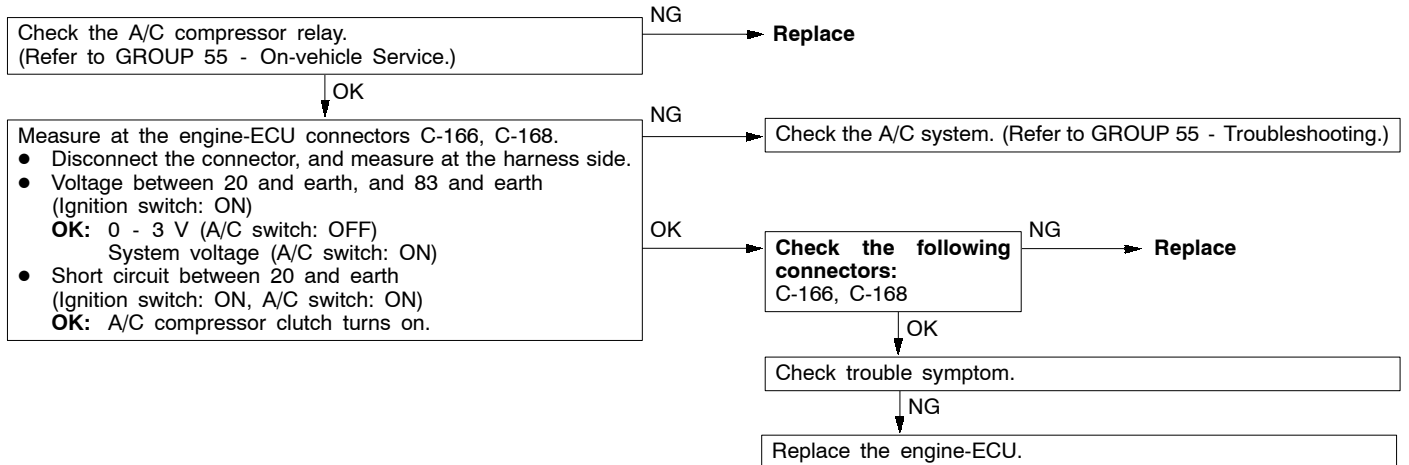


<A/T>



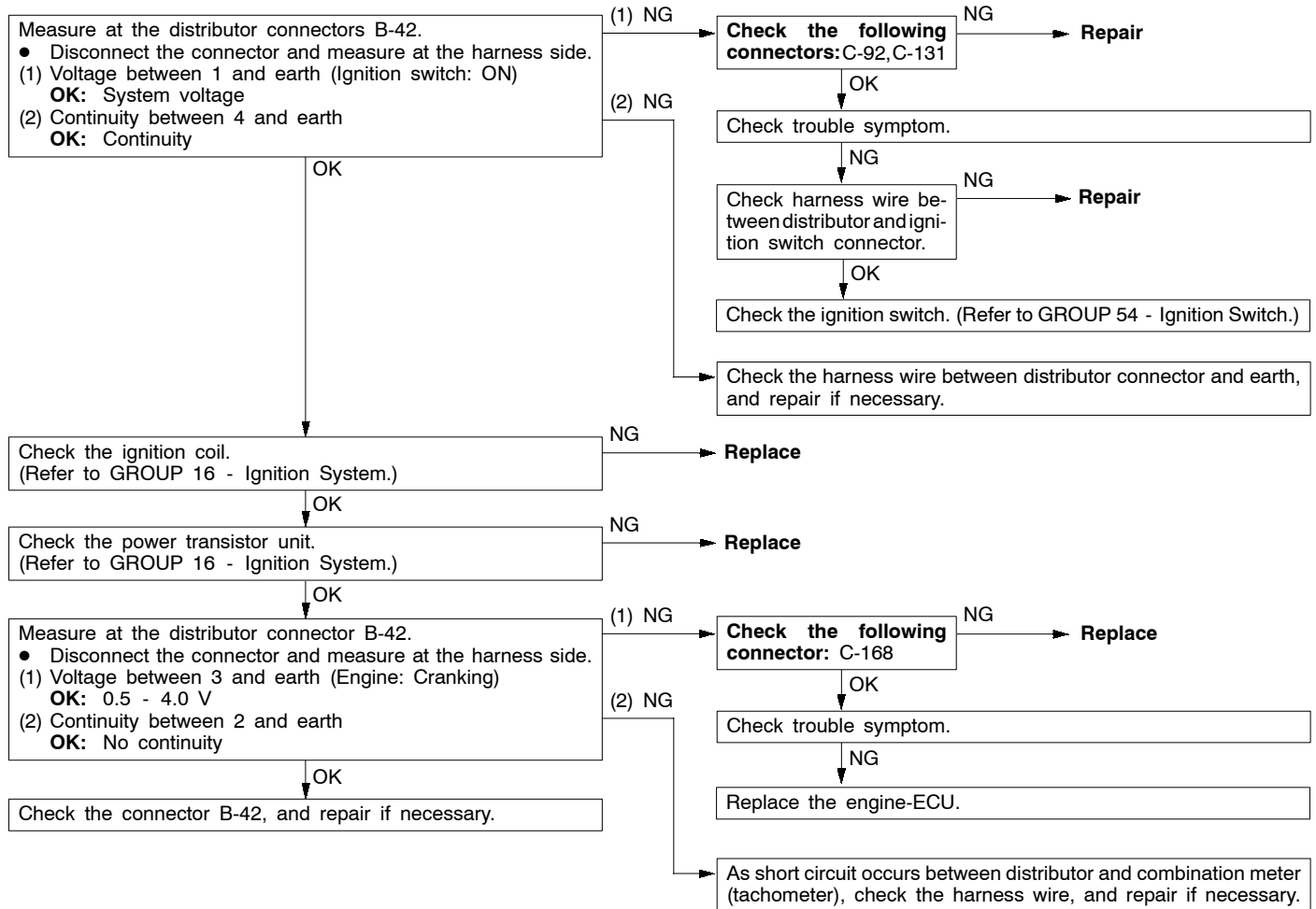
INSPECTION PROCEDURE 30

| A/C switch and A/C relay system | Probable cause |
|---|---|
| When an A/C ON signal is input to the engine-ECU, the engine-ECU carries out control of the idle speed control (ISC) servo, and also operates the A/C compressor magnetic clutch. | <ul style="list-style-type: none"> ● Malfunction of A/C control system ● Malfunction of A/C switch ● Improper connector contact, open circuit or short-circuited harness wire ● Malfunction of the engine-ECU |



INSPECTION PROCEDURE 31

| Ignition circuit system | Probable cause |
|--|---|
| The engine-ECU interrupts the ignition coil primary current by turning the ignition power transistor inside the engine-ECU ON and OFF. | <ul style="list-style-type: none"> ● Malfunction of ignition coil ● Malfunction of power transistor unit ● Improper connector contact, open circuit or short-circuited harness wire ● Malfunction of the engine-ECU |



DATA LIST REFERENCE TABLE

Caution

When shifting the select lever to D range, the brakes should be applied so that the vehicle does not move forward.

NOTE

- *1. In a new vehicle [driven approximately 500 km or less], the air flow sensor output frequency is sometimes 10 % higher than the standard frequency.
- *2. The idle position switch normally turns off when the voltage of the throttle position sensor is 50 - 100 mV higher than the voltage at the idle position. If the throttle position switch turns back on after the throttle position sensor voltage has risen by 100 mV and the throttle valve has opened, the idle position switch and the throttle position sensor need to be adjusted.
- *3. The injector drive time represents the time when the cranking speed is at 250 r/min or below when the power supply voltage is 11 V.
- *4. In a new vehicle [driven approximately 500 km or less], the injector drive time is sometimes 10 % longer than the standard time.
- *5. In a new vehicle [driven approximately 500 km or less], the step of the stepper motor is sometimes 30 steps greater than the standard value.

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|----------------------------------|---|---|--|--------------------------|----------------|
| 11 | Right bank oxygen sensor (front) | Engine: After having warmed up Air/fuel mixture is made leaner when decelerating, and is made richer when racing. | When at 4,000 r/min, engine is suddenly decelerated | 200 mV or less | Code No. P0130 | 13A-113 |
| | | | When engine is suddenly raced | 600 - 1,000 mV | | |
| | | Engine: After having warmed up The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECU. | Engine is idling | 400 mV or less (Changes) 600 - 1,000 mV | | |
| | | | 2,500 r/min | | | |
| 12 | Air flow sensor*1 | <ul style="list-style-type: none">● Engine coolant temperature: 80 - 95°C● Lamps, electric cooling fan and all accessories: OFF● Transmission: Neutral (A/T: P range) | Engine is idling | 14 - 40 Hz (1.8 - 4.9 g/s) | — | — |
| | | | 2,500 r/min | 42 - 82 Hz (6.8 - 13.8 g/s) | | |
| | | | Engine is raced | Frequency increases in response to racing | | |

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|--------------------------------------|--|--|---|--------------------------|----------------|
| 13 | Intake air temperature sensor | Ignition switch: ON or with engine running | When intake air temperature is -20°C | -20°C | Code No. P0110 | 13A-105 |
| | | | When intake air temperature is 0°C | 0°C | | |
| | | | When intake air temperature is 20°C | 20°C | | |
| | | | When intake air temperature is 40°C | 40°C | | |
| | | | When intake air temperature is 80°C | 80°C | | |
| 14 | Throttle position sensor | Ignition switch: ON | Set to idle position | 300 - 1,000 mV | Code No. P0120 | 13A-109 |
| | | | Gradually open | Increases in proportion to throttle opening angle | | |
| | | | Open fully | 4,500 - 5,500 mV | | |
| 16 | Power supply voltage | Ignition switch: ON | | System voltage | Procedure No. 26 | 13A-170 |
| 18 | Cranking signal (ignition switch-ST) | Ignition switch: ON | Engine: Stopped | OFF | Procedure No. 29 | 13A-173 |
| | | | Engine: Cranking | ON | | |
| 21 | Engine coolant temperature sensor | Ignition switch: ON or with engine running | When engine coolant temperature is -20°C | -20°C | Code No. P0115 | 13A-106 |
| | | | When engine coolant temperature is 0°C | 0°C | | |
| | | | When engine coolant temperature is 20°C | 20°C | | |
| | | | When engine coolant temperature is 40°C | 40°C | | |
| | | | When engine coolant temperature is 80°C | 80°C | | |

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|--------------------------------------|--|---|-----------------------|--------------------------|----------------|
| 22 | Crank angle sensor | <ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected | Compare the engine speed readings on the tachometer and the MUT-II. | Accord | Code No. P0335 | 13A-130 |
| | | | When engine coolant temperature is -20°C | 1,300 - 1,500 rpm | | |
| | | <ul style="list-style-type: none"> Engine: Idling Idle position switch: ON | When engine coolant temperature is 0°C | 1,300 - 1,500 rpm | | |
| | | | When engine coolant temperature is 20°C | 1,300 - 1,500 rpm | | |
| | | | When engine coolant temperature is 40°C | 1,100 - 1,300 rpm | | |
| | | | When engine coolant temperature is 80°C | 550 - 750 rpm | | |
| 24 | Vehicle speed sensor | Drive at 40 km/h | | Approximately 40 km/h | Code No. P0500 | 13A-137 |
| 25 | Barometric pressure sensor | Ignition switch: ON | At altitude of 0 m | 101 kPa | Code No. P0105 | 13A-103 |
| | | | At altitude of 600 m | 95 kPa | | |
| | | | At altitude of 1,200 m | 88 kPa | | |
| | | | At altitude of 1,800 m | 81 kPa | | |
| 26 | Idle position switch | Ignition switch: ON Check by operating accelerator pedal repeatedly | Throttle valve: Set to idle position | ON | Code No. P0510 | 13A-139 |
| | | | Throttle valve: Slightly open | OFF*2 | | |
| 27 | Power steering fluid pressure switch | Engine: Idling | Steering wheel stationary | OFF | Code No. P0551 | 13A-140 |
| | | | Steering wheel turning | ON | | |
| 28 | A/C switch | Engine: Idling (when A/C switch is ON, A/C compressor should be operating.) | A/C switch: OFF | OFF | Procedure No. 30 | 13A-174 |
| | | | A/C switch: ON | ON | | |
| 29 | Inhibitor switch <A/T> | Ignition switch: ON | P or N | P or N | Procedure No. 29 | 13A-173 |
| | | | D, 2, L or R | D, 2, L or R | | |

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|---------------------------------|---|---|---|--------------------------|----------------|
| 34 | Air flow sensor reset signal | Engine: After having warmed up | Engine is idling | ON | Code No. P0100 | 13A-101 |
| | | | 2,000 r/min | OFF | | |
| 37 | Volumetric efficiency | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Lights, power cooling fan and all accessories: OFF Transmission: Neutral (A/T: P range) | Engine is idling | 15 - 35 % | - | - |
| | | | 2,000 r/min | 15 - 35 % | | |
| | | | Engine is suddenly raced | Volumetric efficiency increases in response to racing | | |
| 38 | Crank angle sensor | <ul style="list-style-type: none"> Engine: Cranking [reading is possible at 2,000 r/min or less] Tachometer: Connected | | Engine speeds displayed on the MUT-II and tachometer are identical. | Code No. P0335 | 13A-130 |
| 39 | Left bank oxygen sensor (front) | <ul style="list-style-type: none"> Engine: After having warmed up Air/fuel mixture is made leaner when decelerating, and is made richer when racing. | When at 4,000 r/min, engine is suddenly decelerated | 200 mV or less | Code No. P0150 | 13A-119 |
| | | | When engine is suddenly raced | 600 - 1,000 mV | | |
| | | <ul style="list-style-type: none"> Engine: After having warmed up The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECU. | Engine is idling | 400 mV or less (Changes) | | |
| | | | 2,500 r/min | 600 - 1,000 mV | | |

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|--|--|--|----------------------------|--------------------------|----------------|
| 41 | Injectors* ³ | Engine: Cranking | When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously) | 23 - 80 ms | - | - |
| | | | When engine coolant temperature is 20°C | 12 - 40 ms | | |
| | | | When engine coolant temperature is 80°C | 2.0 - 8.0 ms | | |
| | Injectors* ⁴ | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral (A/T: P range) | Engine is idling | 2.6 - 3.8 ms | | |
| | | | 2,500 r/min | 1.8 - 3.0 ms | | |
| | | | When engine is suddenly raced | Increases | | |
| 44 | Ignition coils and power transistors | <ul style="list-style-type: none"> Engine: After having warmed up Timing lamp is set. (The timing lamp is set in order to check actual ignition timing.) | Engine is idling | 1 - 15° BTDC | - | - |
| | | | 2,500 r/min | 23 - 43° BTDC | | |
| 45 | ISC (stepper) motor position* ⁵ | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral (A/T: P range) Idle position switch: ON Engine: Idling When A/C switch is ON, A/C compressor should be operating | A/C switch: OFF | 2 - 25 STEP | - | - |
| | | | A/C switch: OFF → ON | Increases by 10 - 70 steps | | |
| | | | <ul style="list-style-type: none"> A/C switch: OFF Select lever: N range → D range | Increases by 5 - 50 steps | | |

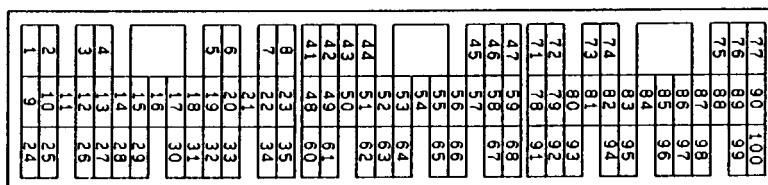
| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|---------------------------------------|--|-------------------------------|--|--------------------------|----------------|
| 49 | A/C relay | Engine: After having warmed up/Engine is idling | A/C switch: OFF | OFF (Compressor clutch is not operating) | Procedure No. 30 | 13A-174 |
| | | | A/C switch: ON | ON (Compressor clutch is operating) | | |
| 59 | Right bank oxygen sensor (rear) | <ul style="list-style-type: none"> Transmission: 2nd gear <M/T>, L range <A/T> Drive with throttle widely open | 3,500 r/min | 600 - 1,000 mV | Code No. P0136 | 13A-116 |
| 69 | Left bank oxygen sensor (rear) | <ul style="list-style-type: none"> Transmission: 2nd gear <M/T>, L range <A/T> Drive with throttle widely open | 3,500 r/min | 600 - 1,000 mV | Code No. P0156 | 13A-122 |
| 81 | Long-term fuel compensation (bank 1) | Engine: Warm, 2,500 r/min without any load (during closed loop) | | -12.5 - 12.5 % | Code No. P0170 | 13A-125 |
| 82 | Short-term fuel compensation (bank 1) | Engine: Warm, 2,500 r/min without any load (during closed loop) | | -16.8 - 16.8 % | Code No. P0170 | 13A-125 |
| 83 | Long-term fuel compensation (bank 2) | Engine: Warm, 2,500 r/min without any load (during closed loop) | | -12.5 - 12.5 % | Code No. P0173 | 13A-126 |
| 84 | Short-term fuel compensation (bank 2) | Engine: Warm, 2,500 r/min without any load (during closed loop) | | -16.8 - 16.8 % | Code No. P0173 | 13A-126 |
| 87 | Calculation load value | Engine: Warm | Engine: Idling | 10 - 30 % | - | - |
| | | | 2,500 r/min | 10 - 30 % | | |
| 88 | Fuel control condition (bank 1) | Engine: Warm | 2,500 r/min | Closed loop | Code No. P0125 | 13A-110 |
| | | | When engine is suddenly raced | Open loop - drive condition | | |
| 89 | Fuel control condition (bank 2) | Engine: Warm | 2,500 r/min | Closed loop | Code No. P0125 | 13A-110 |
| | | | When engine is suddenly raced | Open loop - drive condition | | |

| Item No. | Inspection item | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|---|--|---|---|--------------------------|----------------|
| A1 | Oxygen sensor (Bank 1, sensor 1) | Engine: After warm-up | Idling | 0 V | Code No. P0130 | 13A-113 |
| | | | Sudden racing | 0.6 - 1.0 V | | |
| | | | 2,500 r/min | 0.4 V or less and 0.6 - 1.0 V alternates | | |
| A2 | Oxygen sensor (Bank 1, sensor 2) | <ul style="list-style-type: none"> Transmission: 2nd gear <M/T>, L range <A/T> Drive with throttle widely open | 3,500 r/min | 0.6 - 1.0 V | Code No. P0136 | 13A-116 |
| A3 | Oxygen sensor (Bank 2, sensor 1) | Engine: After having warmed up | Idling | 0 V | Code No. P0150 | 13A-119 |
| | | | Sudden racing | 0.6 - 1.0 V | | |
| | | | 2,500 r/min | 0.4 V or less and 0.6 - 1.0 V alternates | | |
| A4 | Oxygen sensor (Bank 2, sensor 2) | <ul style="list-style-type: none"> Transmission: 2nd gear <M/T>, L range <A/T> Drive with throttle widely open | 3,500 r/min | 0.6 - 1.0 V | Code No. P0156 | 13A-122 |
| 8A | Throttle position sensor (throttle valve opening angle) | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Ignition switch: ON (Engine: Stopped) | Release the accelerator pedal | 6 - 20 % | Code No. P0120 | 13A-109 |
| | | | Depress the accelerator pedal gradually | Increase in response to pedal depression stroke | | |
| | | | Depress the accelerator pedal fully | 80 - 100 % | | |

ACTUATOR TEST REFERENCE TABLE

| Item No. | Inspection item | Drive contents | Inspection contents | | Normal condition | Inspection procedure No. | Reference page |
|----------|---|--|---|--|--|---|----------------|
| 01 | Injectors | Cut fuel to No. 1 injector | Engine: After having warmed up/ Engine is idling (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. P0201, P0202, P0203, P0204, P0205, P0206 | 13A-127 |
| 02 | | Cut fuel to No. 2 injector | | | | | |
| 03 | | Cut fuel to No. 3 injector | | | | | |
| 04 | | Cut fuel to No. 4 injector | | | | | |
| 05 | | Cut fuel to No. 5 injector | | | | | |
| 06 | | Cut fuel to No. 6 injector | | | | | |
| 07 | Fuel pump | Fuel pump operates and fuel is recirculated. | <ul style="list-style-type: none"> Engine: Cranking Fuel pump: Forced driving Inspect according to both the above conditions. | Pinch the return hose with fingers to feel the pulse of the fuel being recirculated. | Pulse is felt. | Procedure No. 28 | 13A-172 |
| | | | | Listen near the fuel tank for the sound of fuel pump operation. | Sound of operation is heard. | | |
| 08 | Purge control solenoid valve | Solenoid valve turns from OFF to ON. | Ignition switch: ON | | Sound of operation can be heard when solenoid valve is driven. | Code No. P0443 | 13A-136 |
| 10 | EGR control solenoid valve | Solenoid valve turns from OFF to ON. | Ignition switch: ON | | Sound of operation can be heard when solenoid valve is driven. | Code No. P0403 | 13A-133 |
| 15 | Vacuum control solenoid valve <Vehicles with TCL> | Solenoid valve turns from OFF to ON. | Ignition switch: ON | | Sound of operation can be heard when solenoid valve is driven. | Code No. P1101 | 13A-141 |
| 16 | Ventilation control solenoid valve <Vehicles with TCL> | Solenoid valve turns from OFF to ON. | Ignition switch: ON | | Sound of operation can be heard when solenoid valve is driven. | Code No. P1102 | 13A-142 |

| Item No. | Inspection item | Drive contents | Inspection contents | Normal condition | Inspection procedure No. | Reference page |
|----------|-----------------------|--|---|---|--------------------------|----------------|
| 17 | Basic ignition timing | Set to ignition timing adjustment mode | Engine: Idling Timing light is set | 5° BTDC | - | - |
| 21 | Fan controller | Drive the fan motor | <ul style="list-style-type: none">Ignition switch: ON | Radiator fan and condenser fan rotate at high speed | Procedure No. 25 | 13A-169 |

CHECK AT THE ENGINE-ECU TERMINALS**TERMINAL VOLTAGE CHECK CHART****Engine-ECU Connector Terminal Arrangement**

7FU2119

| Terminal No. | Check item | Check condition (Engine condition) | Normal condition |
|--------------|----------------------------|--|--|
| 1 | No. 1 injector | While engine is idling after having warmed up, suddenly depress the accelerator pedal. | From 11 - 14 V, momentarily drops slightly |
| 9 | No. 2 injector | | |
| 24 | No. 3 injector | | |
| 2 | No. 4 injector | | |
| 10 | No. 5 injector | | |
| 25 | No. 6 injector | | |
| 14 | Stepper motor coil <A1> | Engine: Soon after the warmed up engine is started | 10 - 15 V ↔ 0 - 6 V (Changes repeatedly) |
| 28 | Stepper motor coil <A2> | | |
| 15 | Stepper motor coil <B1> | | |
| 29 | Stepper motor coil <B2> | | |
| 6 | EGR control solenoid valve | Ignition switch: ON | System Voltage |
| | | While engine is idling, suddenly depress the accelerator pedal. | From system voltage, momentarily drops |
| 8 | Alternator G terminal | <ul style="list-style-type: none"> Engine: Warm up, and then idling Radiator fan: Not operating Headlamp: OFF → ON Stop lamp: OFF → ON Rear defogger switch: OFF → ON | Voltage increases by 0.2 - 3.5 V |
| 52 | Alternator FR terminal | <ul style="list-style-type: none"> Engine: Warm up, and then idling Radiator fan: Not operating Headlamp: OFF → ON Stop lamp: OFF → ON Rear defogger switch: OFF → ON | Voltage decrease |
| 11 | Power transistor unit | Engine r/min: 3,000 r/min | 0.3 - 3.0 V |
| 47 | Power supply | Ignition switch: ON | System voltage |
| 59 | | | |

| Terminal No. | Check item | Check condition (Engine condition) | | Normal condition |
|--------------|---|--|--|--|
| 19 | Air flow sensor reset signal | Engine: Idle speed | | 0 - 1 V |
| | | Engine r/min: 3,000 r/min | | 6 - 9 V |
| 18 | Fan controller | When the radiator fan and condenser fan are not operating | | 0 - 0.3 V |
| | | When the radiator fan and condenser fan are operating | | 0.7 V or more |
| 20 | A/C relay | <ul style="list-style-type: none"> Engine: Idle speed A/C switch: OFF → ON (A/C compressor is operating) | | System voltage or momentarily 6 V or more → 0 - 3 V |
| 21 | Fuel pump relay | Ignition switch: ON | | System voltage |
| | | Engine: Idle speed | | 0 - 3 V |
| 16 | Purge control solenoid valve | Ignition switch: ON | | System voltage |
| | | Running at 3,000 r/min while engine is warming up after having been started. | | 0 - 3 V |
| 22 | Engine warning lamp | Ignition switch: OFF → ON | | 0 - 3 V → 9 - 13 V (After several seconds have elapsed) |
| 30 | Vacuum control solenoid valve <Vehicles with TCL> | Ignition switch: ON | | System voltage |
| 31 | Ventilation control solenoid valve <Vehicles with TCL> | Ignition switch: ON | | System voltage |
| 54 | Power steering fluid pressure switch | Engine: Idling after warming up | When steering wheel is stationary | System voltage |
| | | | When steering wheel is turned | 0 - 3 V |
| 57 | Control relay (Power supply) | Ignition switch: OFF | | System voltage |
| | | Ignition switch: ON | | 0 - 3 V |
| 83 | A/C switch 1 | Engine: Idle speed | Turn the A/C switch OFF | 0 - 3 V |
| | | | Turn the A/C switch ON (A/C compressor is operating) | System voltage |

| Terminal No. | Check item | Check condition (Engine condition) | | Normal condition |
|--------------|--|---|--|--------------------------------|
| 65 | A/C switch 2 | <ul style="list-style-type: none"> Engine: Idling Outside air temperature: 25°C or more | When A/C is MAX. COOL condition (when the load by A/C is high) | 0 - 3 V |
| | | | When A/C is MAX. HOT condition (When the load by A/C is low) | System voltage |
| 68 | Ignition switch - ST | Engine: Cranking | | 8 V or more |
| 62 | Intake air temperature sensor | Ignition switch: ON | When intake air temperature is 0°C | 3.2 - 3.8 V |
| | | | When intake air temperature is 20°C | 2.3 - 2.9 V |
| | | | When intake air temperature is 40°C | 1.5 - 2.1 V |
| | | | When intake air temperature is 80°C | 0.4 - 1.0 V |
| 71 | Left bank oxygen sensor (front) | Engine: Running at 2,500 r/min after having warmed up (Check using a digital type voltmeter) | | 0 ↔ 0.8 V (Changes repeatedly) |
| 73 | Left bank oxygen sensor (rear) | <ul style="list-style-type: none"> Transmission: 2nd gear <M/T>, L range <A/T> Engine speed: 3,500 r/min or more Driving with the throttle valve widely open | | 0.6 - 1.0 V |
| 72 | Right bank oxygen sensor (front) | Engine: Running at 2,500 r/min after having warmed up (Check using a digital type voltmeter) | | 0 ↔ 0.8 V (Changes repeatedly) |
| 74 | Right bank oxygen sensor (rear) | <ul style="list-style-type: none"> Transmission: 2nd gear <M/T>, L range <A/T> Engine speed: 3,500 r/min or more Driving with the throttle valve widely open | | 0.6 - 1.0 V |
| 3 | Left bank oxygen sensor heater (front) | Engine: Idling | | 0 - 3 V |
| | | Engine: 3,500 r/min | | System voltage |
| 26 | Left bank oxygen sensor heater (rear) | Engine: Idling | | 0 - 3 V |
| | | Engine: 3,500 r/min | | System voltage |

| Terminal No. | Check item | Check condition (Engine condition) | | Normal condition |
|--------------|---|--|---|---------------------------------|
| 4 | Right bank oxygen sensor heater (front) | Engine: Idling | | 0 - 3 V |
| | | Engine: 3,500 r/min | | System voltage |
| 27 | Right bank oxygen sensor heater (rear) | Engine: Idling | | 0 - 3 V |
| | | Engine: 3,500 r/min | | System voltage |
| 60 | Backup power supply | Ignition switch: OFF | | System voltage |
| 42 | Sensor impressed voltage | Ignition switch: ON | | 4.5 - 5.5 V |
| 99 | Ignition switch-IG | Ignition switch: ON | | System voltage |
| 44 | Engine coolant temperature sensor | Ignition switch: ON | When engine coolant temperature is 0°C | 3.2 - 3.8 V |
| | | | When engine coolant temperature is 20°C | 2.3 - 2.9 V |
| | | | When engine coolant temperature is 40°C | 1.3 - 1.9 V |
| | | | When engine coolant temperature is 80°C | 0.3 - 0.9 V |
| 78 | Throttle position sensor | Ignition switch: ON | Set throttle valve to idle position | 0.3 - 1.0 V |
| | | | Fully open throttle valve | 4.5 - 5.5 V |
| 51 | Barometric pressure sensor | Ignition switch: ON | When altitude is 0 m | 3.7 - 4.3 V |
| | | | When altitude is 1,200 m | 3.2 - 3.8 V |
| 80 | Vehicle speed sensor | <ul style="list-style-type: none"> Ignition switch: ON Move the vehicle slowly forward | | 0 ↔ 5 V (Changes repeatedly) |
| 79 | Idle position switch | Ignition switch: ON | Set throttle valve to idle position | 0 - 1 V |
| | | | Slightly open throttle valve | 4 V or more |
| 50 | Top dead centre sensor | Engine: Cranking | | 0.4 - 3.0 V |
| | | Engine: Idle speed | | 0.5 - 2.0 V |
| 43 | Crank angle sensor | Engine: Cranking | | 0.4 - 4.0 V |
| | | Engine: Idle speed | | 1.5 - 2.5 V |

| Terminal No. | Check item | Check condition (Engine condition) | | Normal condition |
|--------------|------------------------|------------------------------------|---|------------------|
| 61 | Air flow sensor | Engine: Idle speed | | 2.2 - 3.2 V |
| | | Engine r/min: 2,500 r/min | | |
| 67 | Inhibitor switch <A/T> | Ignition switch: ON | Set selector lever to P or N | 0 - 3 V |
| | | | Set selector lever to Other than P or N | 8 - 14 V |

CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

Engine-ECU Harness Side Connector Terminal Arrangement

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|

7FU2120

| Terminal No. | Inspection item | Normal condition (Check condition) |
|-----------------|--|------------------------------------|
| 1 - 47 | No. 1 injector | 13 - 16 Ω (At 20°C) |
| 9 - 47 | No. 2 injector | |
| 24 - 47 | No. 3 injector | |
| 2 - 47 | No. 4 injector | |
| 10 - 47 | No. 5 injector | |
| 25 - 47 | No. 6 injector | |
| 14 - 47 | Stepper motor coil (A1) | 28 - 33 Ω (At 20°C) |
| 28 - 47 | Stepper motor coil (A2) | |
| 15 - 47 | Stepper motor coil (B1) | |
| 29 - 47 | Stepper motor coil (B2) | |
| 6 - 47 | EGR control solenoid valve | 29 - 35 Ω (At 20°C) |
| 16 - 47 | Purge control solenoid valve | 30 - 34 Ω (At 20°C) |
| 30 - 47 | Vacuum control solenoid valve system <Vehicles with TCL> | 36 - 44 Ω (At 20°C) |
| 31 - 47 | Ventilation control solenoid valve system <Vehicles with TCL> | 36 - 44 Ω (At 20°C) |
| 46 - Body earth | Engine-ECU earth | Continuity (0 Ω) |
| 58 - Body earth | Engine-ECU earth | |
| 3 - 47 | Left bank oxygen sensor heater control (front) | 4.5 - 8.0 Ω (At 20°C) |
| 26 - 47 | Left bank oxygen sensor heater control (rear) | 11 - 18 Ω (At 20°C) |
| 4 - 47 | Right bank oxygen sensor heater (front) | 4.5 - 8.0 Ω (At 20°C) |
| 27 - 47 | Right bank oxygen sensor heater (rear) | 11 - 18 Ω (At 20°C) |

| Terminal No. | Inspection item | Normal condition (Check condition) |
|-----------------|-----------------------------------|--|
| 62 - 49 | Intake air temperature sensor | 5.3 - 6.7 k Ω (When intake air temperature is 0°C) |
| | | 2.3 - 3.0 k Ω (When intake air temperature is 20°C) |
| | | 1.0 - 1.5 k Ω (When intake air temperature is 40°C) |
| | | 0.30 - 0.42 k Ω (When intake air temperature is 80°C) |
| 44 - 49 | Engine coolant temperature sensor | 5.1 - 6.5 k Ω (When coolant temperature is 0°C) |
| | | 2.1 - 2.7 k Ω (When coolant temperature is 20°C) |
| | | 0.9 - 1.3 k Ω (When coolant temperature is 40°C) |
| | | 0.26 - 0.36 k Ω (When coolant temperature is 80°C) |
| 79 - 49 | Idle position switch | Continuity (when throttle valve is at idle position) |
| | | No continuity (when throttle valve is slightly open) |
| 67 - Body earth | Inhibitor switch <A/T> | Continuity (when select lever is at P or N) |
| | | No continuity (when select lever is at D, 2, L or R) |

INSPECTION PROCEDURE USING AN ANALYZER

Due to the change on the engine-ECU, the following describes only the inspection procedures at the engine-ECU terminals.

AIR FLOW SENSOR

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 61.

TOP DEAD CENTRE SENSOR AND CRANK ANGLE SENSOR

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 50. (When checking the top dead centre sensor signal wave pattern.)
2. Connect the analyzer special patterns pickup to engine-ECU terminal 43. (When checking the crank angle sensor signal wave pattern.)

INJECTOR

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 1. (When checking the No. 1 cylinder.)
2. Connect the analyzer special patterns pickup to engine-ECU terminal 9. (When checking the No. 2 cylinder.)
3. Connect the analyzer special patterns pickup to engine-ECU terminal 24. (When checking the No. 3 cylinder.)
4. Connect the analyzer special patterns pickup to engine-ECU terminal 2. (When checking the No. 4 cylinder.)
5. Connect the analyzer special patterns pickup to engine-ECU terminal 10. (When checking the No. 5 cylinder.)
6. Connect the analyzer special patterns pickup to engine-ECU terminal 25. (When checking the No. 6 cylinder.)

IDLE SPEED CONTROL SERVO (STEPPER MOTOR)

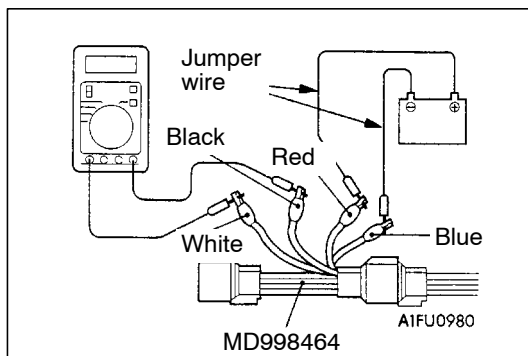
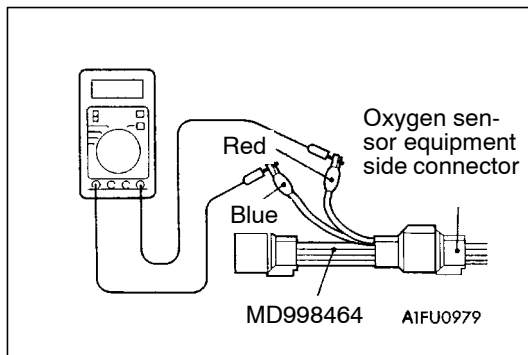
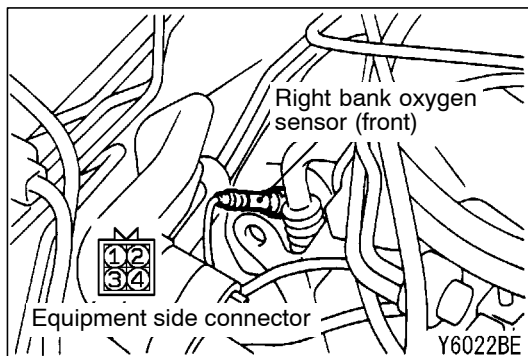
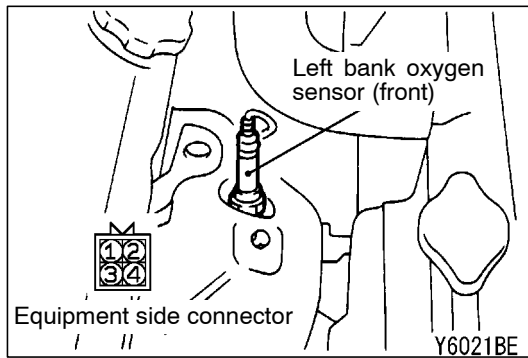
Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 14, connection terminal 28, connection terminal 15, and connection terminal 29 respectively.

IGNITION COIL AND POWER TRANSISTOR

Alternate method (Test harness not available)

1. Connect the analyzer special patterns pickup to engine-ECU terminal 11.



ON-VEHICLE SERVICE

OXYGEN SENSOR CHECK

<Left bank oxygen sensor (front) and right bank oxygen sensor (front)>

1. Disconnect the oxygen sensor connector and connect the special tool (test harness) to the connector on the oxygen sensor side.
2. Make sure that there is continuity ($4.5 - 8.0 \Omega$ at 20°C) between terminal 1 (red clip of special tool) and terminal 3 (blue clip of special tool) on the oxygen sensor connector.

3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80°C or higher.
5. Use a jumper wire to connect terminal 1 (red clip) of the oxygen sensor connector to the battery (+) terminal and terminal 3 (blue clip) to the battery (-) terminal.

Caution

Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.

6. Connect a digital voltage meter between terminal 2 (black clip) and terminal 4 (white clip).
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

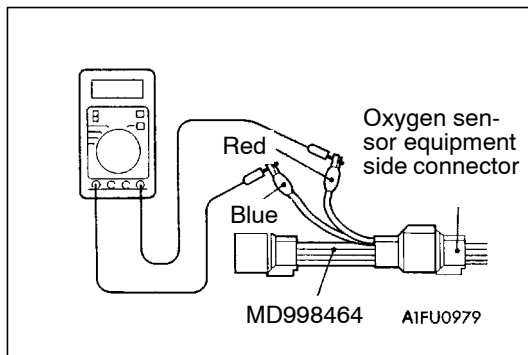
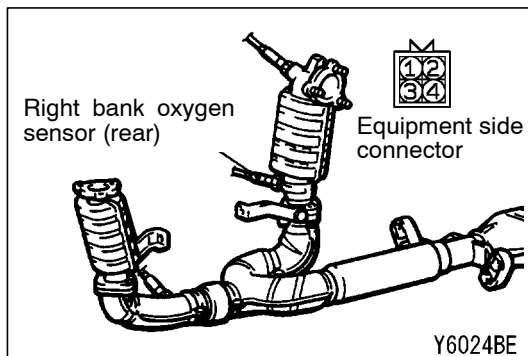
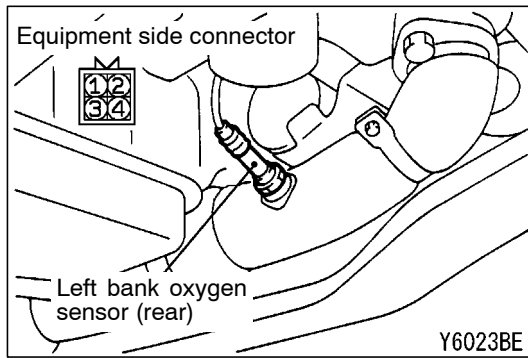
Standard value:

| Engine | Oxygen sensor output voltage | Remarks |
|------------------------|------------------------------|---|
| When racing the engine | 0.6 - 1.0 V | If you make the air/fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 - 1.0 V. |

8. If the sensor is defective, replace the oxygen sensor.

NOTE

For removal and installation of the oxygen sensor, refer to GROUP 15 - Exhaust Pipe and Main Muffler.



<Left bank oxygen sensor (rear) and Right bank oxygen sensor (rear)>

1. Disconnect the oxygen sensor connector and connect the special tool (test harness set) to the connector on the oxygen sensor side.
2. Make sure that there is continuity ($11 - 18 \Omega$ at 20°C) between terminal 1 (red clip of special tool) and terminal 3 (blue clip of special tool) on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.

NOTE

- (1) If the MUT-II does not display the standard value although no abnormality is found by the above mentioned continuity test and harness check, replace the oxygen sensor (rear).
- (2) For removal and installation of the oxygen sensor, refer to GROUP 15 - Exhaust Pipe and Main Muffler.

GASOLINE DIRECT INJECTION (GDI)

CONTENTS

| | | | |
|--|------------|---|------------|
| GENERAL | 2 | Fuel Pump Operation Check | 121 |
| Outline of Changes | 2 | Fuel Pressure Test | 122 |
| GENERAL INFORMATION | 2 | Fuel Leak Check | 125 |
| SERVICE SPECIFICATIONS | 4 | Oxygen Sensor Check | 126 |
| TROUBLESHOOTING | 5 | FUEL PUMP (HIGH PRESSURE) AND FUEL PRESSURE REGULATOR (HIGH PRESSURE) | 128 |
| ON-VEHICLE SERVICE | 121 | INJECTOR | 133 |
| Fuel Pump Connector Disconnection (How to Reduce the Fuel Pressure) | 121 | | |

GENERAL

OUTLINE OF CHANGES

Due to the changes shown below, the service procedures regarding the different description from the previous version have been established.

- On-board Diagnostics System has been adopted to expand the diagnostic items and to change diagnosis code numbering system.
- Fuel pressure regulator (high-pressure) incorporate fuel pump (high-pressure) has been adopted.
- An ignition failure sensor has been adopted.
- An engine-A/T-ECU has been adopted. <Vehicles with A/T>

GENERAL INFORMATION

SELF-DIAGNOSIS FUNCTION

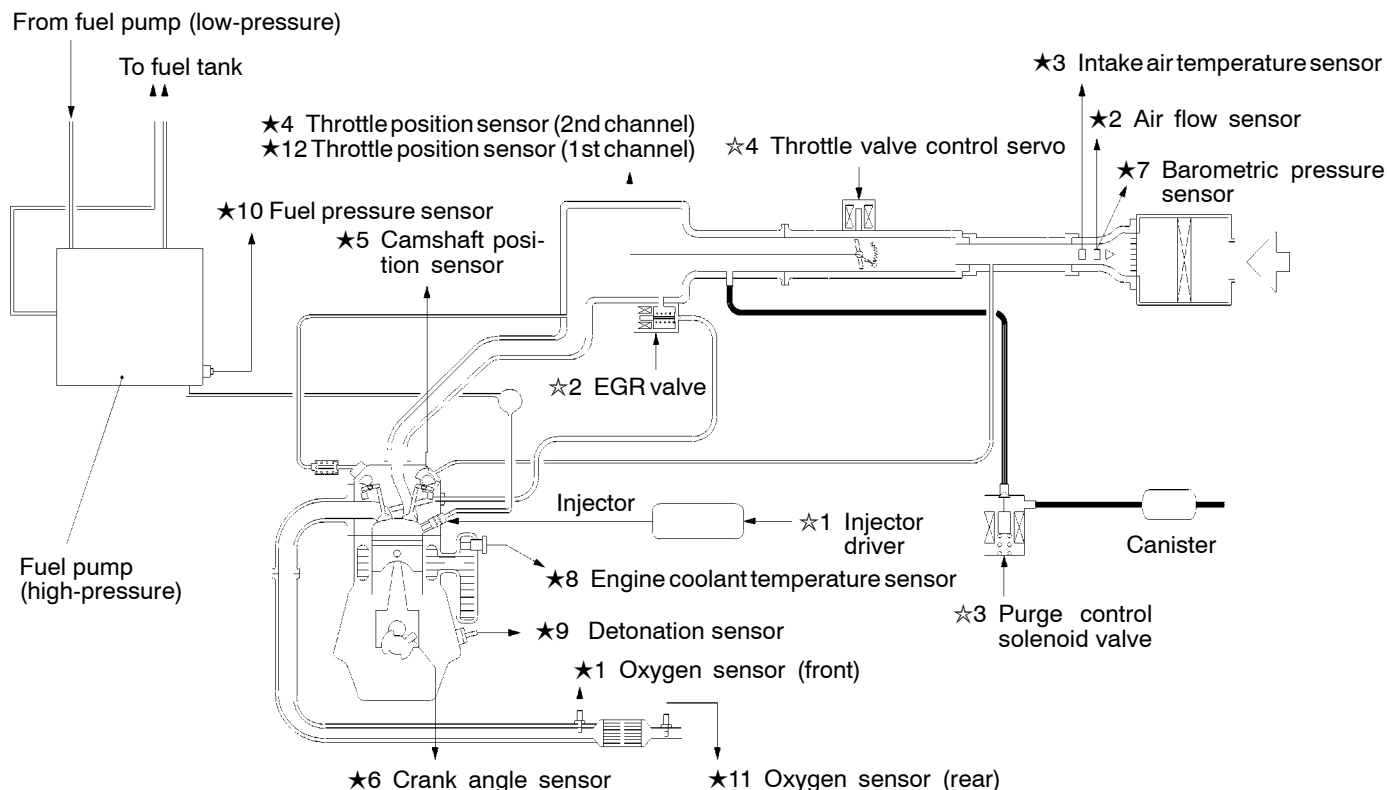
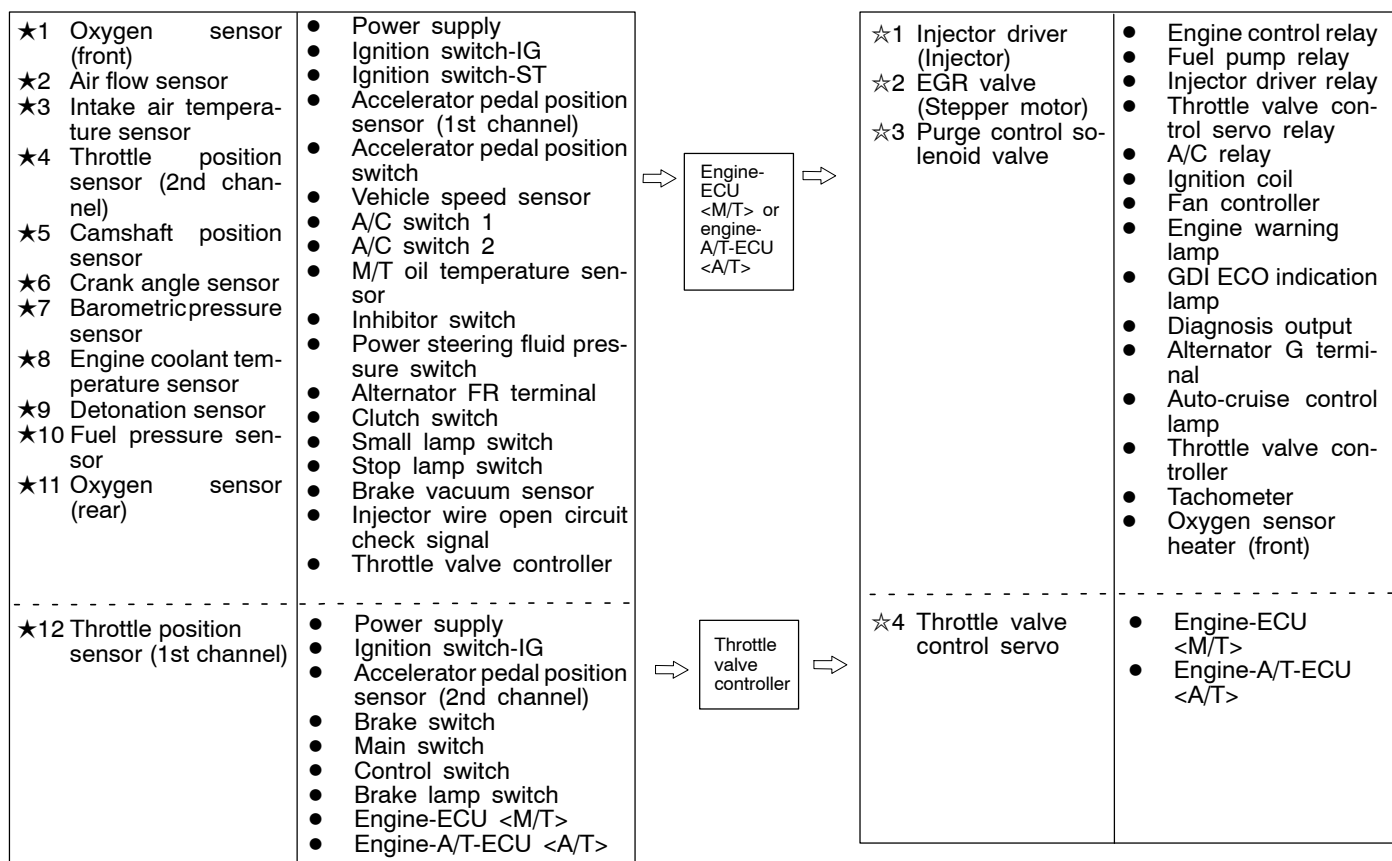
Following functions have been added.

- The engine-ECU records the engine operating condition when the diagnosis code is set.
This data is called “freeze frame” data.
This data can be read by using the MUT-II, are can then be used in simulation tests for troubleshooting.

GENERAL SPECIFICATIONS

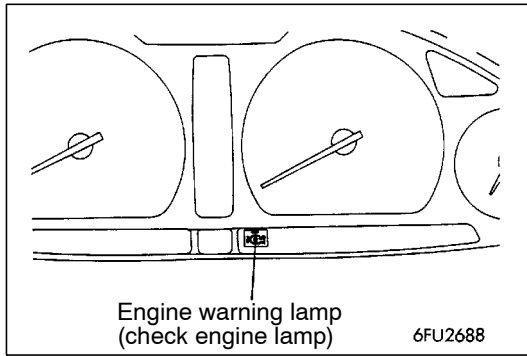
| Items | | Specifications |
|----------------------|--------------------|----------------|
| Engine-ECU <M/T> | Identification No. | E2T72886 |
| Engine-A/T-ECU <A/T> | Identification No. | E2T79574 |

GASOLINE DIRECT INJECTION SYSTEM DIAGRAM



SERVICE SPECIFICATIONS

| Items | | Standard value |
|---|------------------------|-------------------|
| Fuel pressure | High-pressure side MPa | 4 - 6.9 |
| | Low-pressure side kPa | Approximately 324 |
| Oxygen sensor output voltage (during revving) V | | 0.6 - 1.0 |
| Oxygen sensor heater resistance (at 20°C) Ω | Front | 4.5 - 8.0 |
| | Rear | 11 - 18 |



TROUBLESHOOTING

DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

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

However, the warning lamp will illuminate as bulb check for five seconds whenever the ignition switch is turned to the ON position.

Engine warning lamp inspection items

| Code No. | Diagnosis item |
|----------|--|
| - | Engine-ECU <M/T> or engine-A/T-ECU <A/T> |
| P0100 | Air flow sensor system |
| P0105 | Barometric pressure sensor system |
| P0110 | Intake air temperature sensor system |
| P0115 | Engine coolant temperature sensor system |
| P0120★ | Throttle position sensor (1st channel) system |
| P0125 | Feedback system |
| P0130 | Oxygen sensor (front) system <sensor 1> |
| P0135 | Oxygen sensor heater (front) system <sensor 1> |
| P0136 | Oxygen sensor (rear) system <sensor 2> |
| P0141 | Oxygen sensor heater (rear) system <sensor 2> |
| P0170 | Abnormal fuel system |
| P0190★ | Abnormal fuel pressure |
| P0201 | No. 1 injector system |
| P0202 | No. 2 injector system |
| P0203 | No. 3 injector system |
| P0204 | No. 4 injector system |
| P0220★ | Accelerator pedal position sensor (1st channel) system |
| P0225★ | Throttle position sensor (2nd channel) system |
| P0300★ | Ignition coil (power transistor) system |
| P0301 | No. 1 cylinder misfire detected |
| P0302 | No. 2 cylinder misfire detected |
| P0303 | No. 3 cylinder misfire detected |

| Code No. | Diagnosis item |
|----------|---|
| P0304 | No. 4 cylinder misfire detected |
| P0335 | Crank angle sensor system |
| P0340 | Camshaft position sensor system |
| P0403 | EGR valve system |
| P0420 | Catalyst malfunction |
| P0443 | Purge control solenoid valve system |
| P1200 | Injector driver system |
| P1220★ | Electronic-controlled throttle valve system |
| P1221★ | Throttle valve position feedback system |
| P1223★ | Communication line with throttle valve controller |
| P1224★ | Throttle valve control servo motor (motor 1st phase malfunction) system |
| P1225★ | Accelerator pedal position sensor (2nd channel) system |
| P1228★ | Throttle valve control servo motor (motor 2nd phase malfunction) system |
| P1515 | Brake vacuum sensor system |

NOTE

- If the engine warning lamp illuminates because of a malfunction of the engine-ECU (engine-A/T-ECU), communication between MUT-II and the engine-ECU (engine-A/T-ECU) is impossible. In this case, the diagnosis code cannot be read.
- After the engine-ECU (engine-A/T-ECU) has detected a malfunction, the engine warning lamp illuminates when the engine is next turned on and the same malfunction is re-detected. However, for items marked with a "★" in the diagnosis code number column, the engine warning lamp illuminates only on the first detection of the malfunction.
As for P1220, P1221, P1223, P1224, and P1228, the engine warning lamp flashes. If malfunctions are detected at the throttle position sensor (1st channel) and the throttle position sensor (2nd channel) at the same time, or malfunctions are detected at the accelerator pedal position sensor (1st channel) and the accelerator pedal position sensor (2nd channel) at the same time, the engine warning lamp will flash.
- After the engine warning lamp illuminates, it will be switched off under the following conditions.
 - When the engine-ECU (engine-A/T-ECU) monitored the power train malfunction three times* and met set condition requirements, it detected no malfunction.
*: In this case, "one time" indicates from engine start to stop.
 - For misfiring malfunction, when driving conditions (engine speed, engine coolant temperature, etc.) are similar to those when the malfunction was first recorded.
- Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

METHOD OF READING AND ERASING DIAGNOSIS CODES

Refer to GROUP 00 - How to Use Troubleshooting/Inspection Service Points.

DIAGNOSIS USING DIAGNOSIS 2 MODE

1. Switch the diagnosis mode of the engine-ECU <M/T> or engine A/T-ECU <A/T> to DIAGNOSIS 2 mode using the MUT-II.
2. Carry out a road test.
3. Take a reading of the diagnosis code and repair the problem location.
4. Turn the ignition switch to OFF and then back to ON again.

NOTE

By turning the ignition switch to OFF, the engine-ECU <M/T> or engine-A/T-ECU <A/T> will switch the diagnosis mode from DIAGNOSIS 2 mode to DIAGNOSIS 1 mode.

5. Erase the diagnosis codes.

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, and then start the engine again and carry out a road test to confirm that the problem has disappeared.

FREEZE FRAME DATA

When the engine-ECU <M/T> or engine-A/T-ECU <A/T> detects a malfunction and stores a diagnosis code, it also stores a current status of the engine. This function is called "Freeze frame data." By analyzing this "freeze frame" data with the MUT-II, an effective troubleshooting can be performed.

The display items of freeze frame data are shown below.

Display item list

| Data item | | Unit |
|---|--|---------|
| Engine coolant temperature sensor | | °C |
| Engine speed | | r/min |
| Vehicle speed | | km/h |
| Long-term fuel compensation (long-term fuel trim) | | % |
| Short-term fuel compensation (short-term fuel trim) | | % |
| Fuel control condition | Open loop | OL |
| | Closed loop | CL |
| | Open loop owing to drive condition | OL-DRV. |
| | Open loop owing to system malfunction | OL-SYS. |
| | Closed loop based on one oxygen sensor | CL-H02S |
| Calculation load value | | % |
| Diagnosis code during data recording | | - |

NOTE

If malfunctions have been detected in multiple systems, store one malfunction only, which has been detected first.

READINESS TEST STATUS

The engine-ECU <M/T> or engine-A/T-ECU <A/T> monitors the following main diagnosis items, judges if these items are in good condition or not, and the stores its history. This history can be read out by using MUT-II. (If the ECU has judged a item before, the MUT-II displays "Complete.") In addition, if diagnosis codes are erased or the battery cable is disconnected, this history will also be erased (the memory will be reset).

- Catalyst: P0420
- Oxygen sensor: P0130
- Oxygen sensor heater: P0135, P0141

FAIL-SAFE FUNCTION REFERENCE TABLE

When the main sensor malfunctions are detected by the diagnosis function, the vehicle is controlled by means of the pre-set control logic to maintain safe conditions for driving.

| Malfunctioning item | Control contents during malfunction |
|---|---|
| Air flow sensor | <ol style="list-style-type: none"> 1. Suspends lean burn operation. 2. Uses the throttle position sensor signal and engine speed signal (crank angle sensor signal) to take reading of the basic injector drive time and basic ignition timing from the pre-set mapping. |
| Intake air temperature sensor | Controls as if the intake air temperature is 25°C. |
| Throttle position sensor (2nd channel) | <ol style="list-style-type: none"> 1. Suspends lean burn operation. 2. Controls the throttle opening angle feedback (half as much as the opening rate in the normal condition) by using signals from the throttle position sensor (1st channel). However, this controlling system is not applied if the throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 - 6 V. 3. Refrains from controlling the throttle opening angle feedback if the throttle position sensor (1st channel) is also defective. |
| Engine coolant temperature sensor | Controls as if the engine coolant temperature is 80°C. (Moreover, the control system is working until the ignition switch is turned OFF if the sensor signal returns to normal.) |
| Camshaft position sensor | Controls maintaining the condition before determined as failure. Fuel will be cut-off 4 seconds after a malfunction is detected. (However, only if No. 1 cylinder TDC has never been detected after the ignition switch is turned to the ON position) |
| Vehicle speed sensor | <ol style="list-style-type: none"> 1. Suspends lean burn operation. However, the control is cancelled as a certain time passes by with the engine speed of 1,500 r/min or more. 2. Suspends lean burn operation during the engine idling. |
| Barometric pressure sensor | Controls as if the barometric pressure is 101 kPa. |
| Detonation sensor | Fixes the ignition timing as that for standard petrol. |
| Injector | <ol style="list-style-type: none"> 1. Suspends lean burn operation. 2. Suspends the exhaust gas recirculation. |
| Ignition coil (incorporating power transistor) | <ol style="list-style-type: none"> 1. Suspends lean burn operation. 2. Cuts off the fuel supply to cylinders with an abnormal ignition signal. |
| Fuel pressure sensor | <ol style="list-style-type: none"> 1. Controls as if the fuel pressure is 5 MPa. (If there is open or short circuit). 2. Turns off the fuel pump relay (If the fuel pressure is excessively high). 3. Suspends fuel injection. (when the low pressure is detected and the engine speed is more than 3,000 r/min) |
| Alternator FR terminal | Refrains from controlling to suppress the alternator output to electrical load. (Operated as a normal alternator) |
| Accelerator pedal position sensor (2nd channel) | <ol style="list-style-type: none"> 1. Suspends lean burn operation. 2. Controls the throttle valve position by using signals from the accelerator pedal position sensor (1st channel). (However, the control system is not applicable if the difference from the accelerator pedal position sensor (1st channel) output voltage is 1.0 V or higher.) 3. Suspends the electronic controlled throttle valve system if accelerator pedal position sensor (1st channel) is also defective. |

| Malfunctioning item | Control contents during malfunction |
|---|--|
| Accelerator pedal position sensor (1st channel) | <ol style="list-style-type: none"> 1. Suspends lean burn operation. 2. Controls the throttle valve position by using signals from the accelerator pedal position sensor (2nd channel). (However, this control is not applicable if the voltage difference between the accelerator pedal position sensor (1st channel) and accelerator pedal position sensor (2nd channel) is 1.0 V or higher.) 3. Also suspends the electronic-controlled throttle valve system when the accelerator pedal position sensor (2nd channel) is defective. |
| Throttle position sensor (1st channel) | <ol style="list-style-type: none"> 1. Suspends lean burn operation. 2. Controls throttle opening angle feedback by using signals from throttle position sensor (2nd channel). (However, the controlling system is not applied when the throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 - 6 V.) 3. Refrains from controlling the throttle opening angle feedback when throttle position sensor (2nd channel) is also defective. |
| Electronic-controlled throttle valve system | <ol style="list-style-type: none"> 1. Suspends the electronic controlled throttle valve system. 2. Suspends lean burn operation. 3. Suspends the idle speed feedback control. |
| Throttle valve position feedback | <ol style="list-style-type: none"> 1. Suspends the electronic controlled throttle valve system. 2. Suspends lean burn operation. 3. Suspends the engine speed feedback control. |
| Communication line between the throttle valve controller and the engine-ECU <M/T> or engine-A/T-ECU <A/T> | <ol style="list-style-type: none"> 1. Communication error between the throttle valve controller and the engine-ECU <M/T> or engine-A/T-ECU <A/T>: <ul style="list-style-type: none"> ● Suspends lean burn operation. ● Cuts the fuel supply when the engine speed reaches 3,000 r/min or more. ● Suspends the cruise-control. 2. Communication error between the throttle valve controller and the engine-ECU <M/T> or engine-A/T-ECU <A/T>: <ul style="list-style-type: none"> ● Suspends lean burn operation. ● Cuts the fuel supply when the engine speed reaches 3,000 r/min or more. ● Suspends the cruise-control. ● The throttle valve controller controls the throttle valve opening angle by using signals from accelerator pedal position sensor (2nd channel). |
| Throttle valve control servo motor (Motor 1st phase malfunction) | Disables lean-mixture combustion. |
| Throttle valve control servo motor (Motor 2nd phase malfunction) | <ol style="list-style-type: none"> 1. Disables the electronic-controlled throttle valve system. 2. Disables lean-mixture combustion. 3. Disables idle engine speed feedback control. |
| Misfiring | If the detected misfiring causes damage to the catalyst, the misfiring cylinder will be shut down. |

NOTE

If the electronic-controlled throttle valve system is suspended, the engine warning lamp will illuminate.

INSPECTION CHART FOR DIAGNOSIS CODES

| Code No. | Diagnosis item | Reference page |
|----------|--|----------------|
| P0100 | Air flow sensor system | 13I-13 |
| P0105 | Barometric pressure sensor system | 13I-15 |
| P0110 | Intake air temperature sensor system | 13I-17 |
| P0115 | Engine coolant temperature sensor system | 13I-18 |
| P0120★ | Throttle position sensor (1st channel) system | 13I-21 |
| P0125 | Feedback system | 13I-23 |
| P0130 | Oxygen sensor (front) system <sensor 1> | 13I-25 |
| P0135 | Oxygen sensor heater (front) system <sensor 1> | 13I-27 |
| P0136 | Oxygen sensor (rear) system <sensor 2> | 13I-28 |
| P0141 | Oxygen sensor heater (rear) system <sensor 2> | 13I-30 |
| P0170 | Abnormal fuel system | 13I-31 |
| P0190★ | Abnormal fuel pressure | 13I-33 |
| P0201 | No. 1 injector system | 13I-34 |
| P0202 | No. 2 injector system | 13I-36 |
| P0203 | No. 3 injector system | 13I-37 |
| P0204 | No. 4 injector system | 13I-38 |
| P0220★ | Accelerator pedal position sensor (1st channel) system | 13I-40 |
| P0225★ | Throttle position sensor (2nd channel) system | 13I-43 |
| P0300★ | Ignition coil (power transistor) system | 13I-44 |
| P0301 | No. 1 cylinder misfire detected | 13I-46 |
| P0302 | No. 2 cylinder misfire detected | 13I-46 |
| P0303 | No. 3 cylinder misfire detected | 13I-46 |
| P0304 | No. 4 cylinder misfire detected | 13I-46 |
| P0325 | Detonation sensor system | 13I-47 |
| P0335 | Crank angle sensor system | 13I-47 |
| P0340 | Camshaft position sensor system | 13I-49 |
| P0403 | EGR valve system | 13I-51 |
| P0420 | Catalyst malfunction | 13I-53 |
| P0443 | Purge control solenoid valve system | 13I-54 |
| P0500 | Vehicle speed sensor system | 13I-55 |
| P1200 | Injector driver system | 13I-55 |
| P1220★ | Electronic-controlled throttle valve system | 13I-56 |

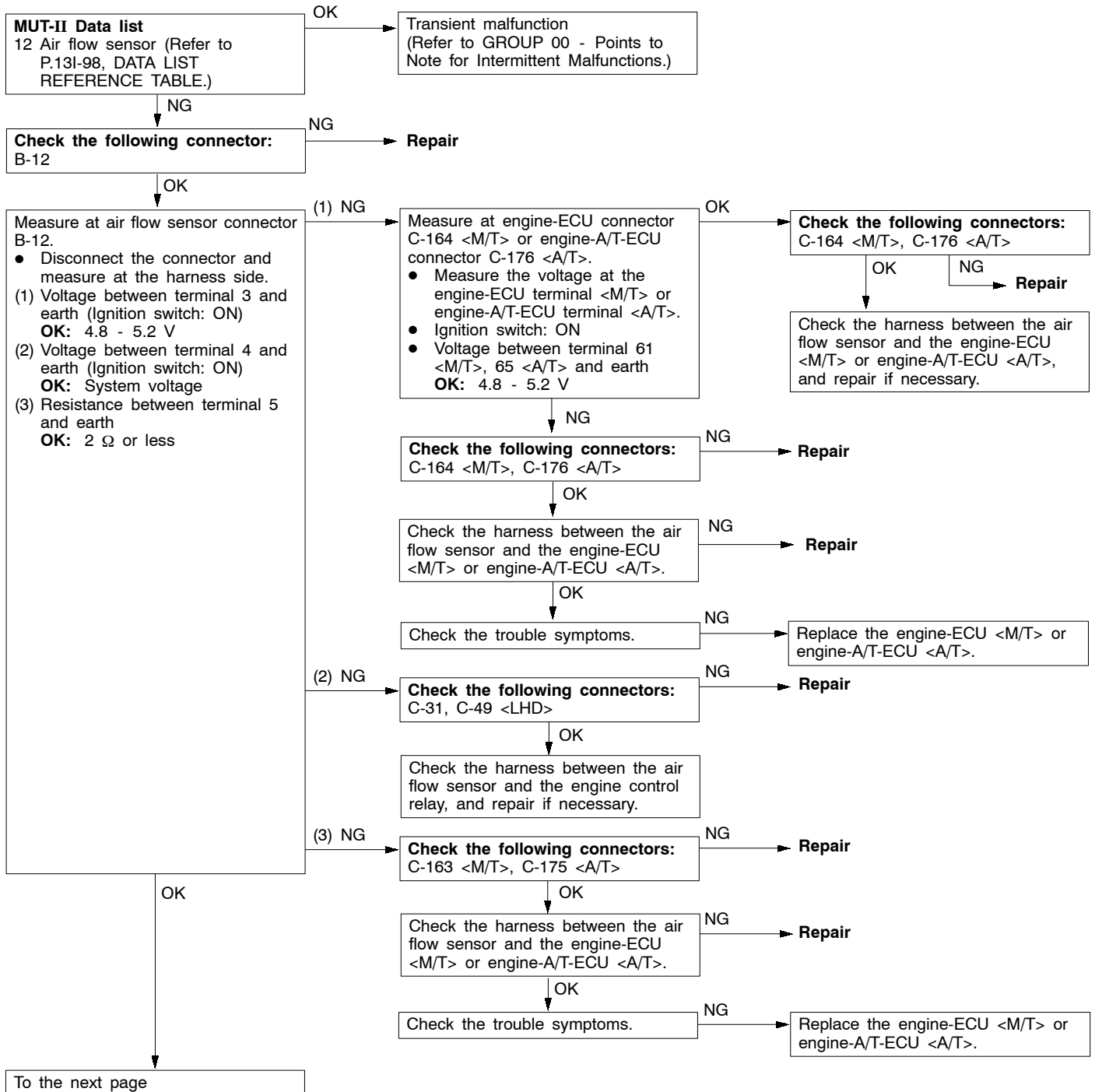
| Code No. | Diagnosis item | Reference page |
|----------|---|----------------|
| P1221★ | Throttle valve position feedback system | 13I-57 |
| P1223★ | Communication line with the throttle valve controller | 13I-58 |
| P1224★ | Throttle valve control servo motor (motor 1st phase malfunction) system | 13I-59 |
| P1225★ | Accelerator pedal position sensor (2nd channel) system | 13I-60 |
| P1228★ | Throttle valve control servo motor (motor 2nd phase malfunction) system | 13I-62 |
| P1500 | Alternator FR terminal system | 13I-63 |
| P1515 | Brake vacuum sensor system | 13I-64 |
| P1610 | Immobilizer system | 13I-66 |

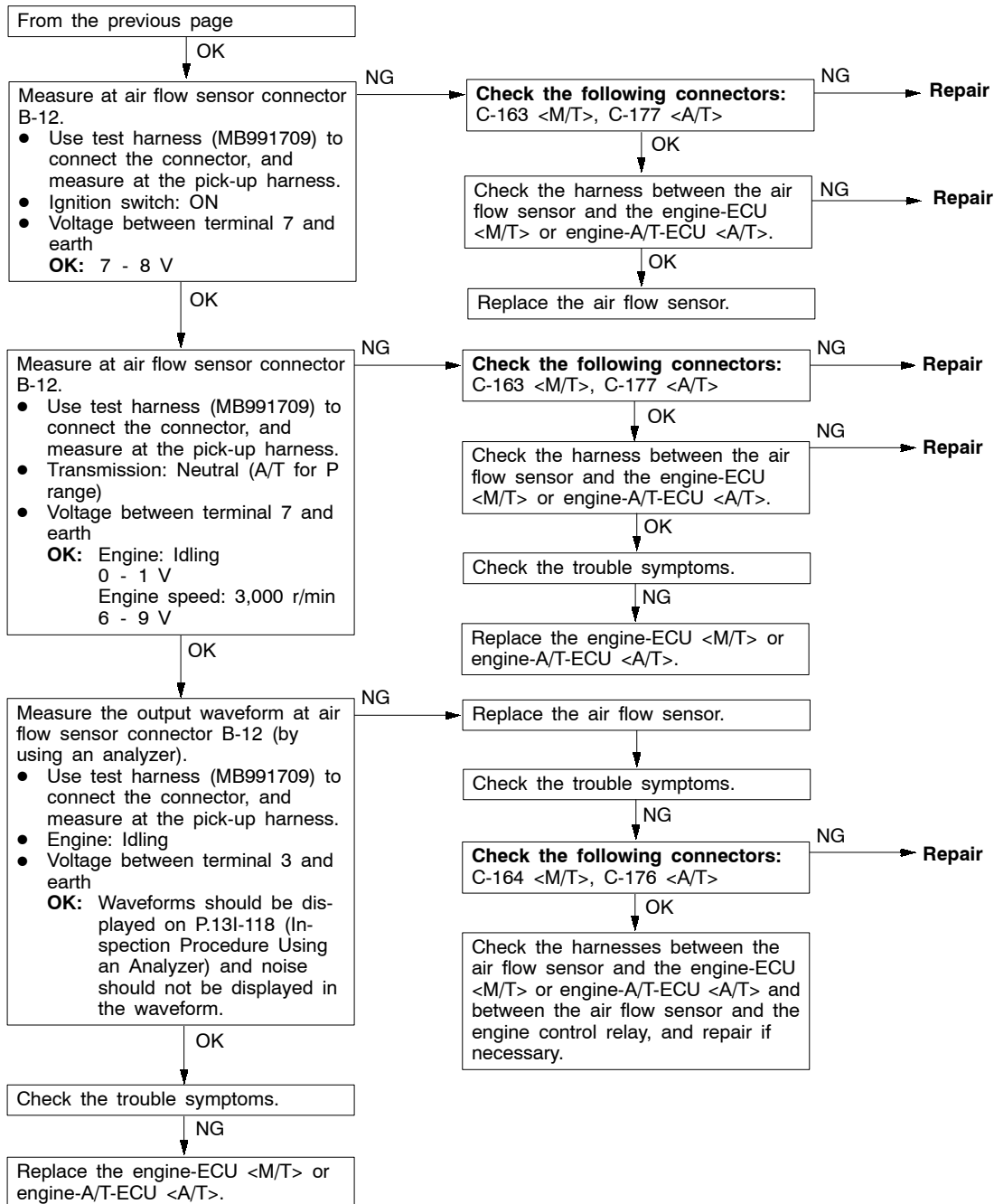
NOTE

1. Do not replace the engine-ECU <M/T> or engine-A/T-ECU <A/T> until a through terminal check reveals there are no short/open circuit.
2. Check that the engine-ECU <M/T> or engine-A/T-ECU <A/T> earth circuit is normal before checking for the cause of the problem.
3. After the engine-ECU <M/T> or engine-A/T-ECU <A/T> has detected a malfunction, a diagnosis code is recorded the next time the engine is started and the same malfunction is re-detected. However, for items marked with a “★”, the diagnosis code is recorded on the first detection of the malfunction.
4. Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second closest to the engine.

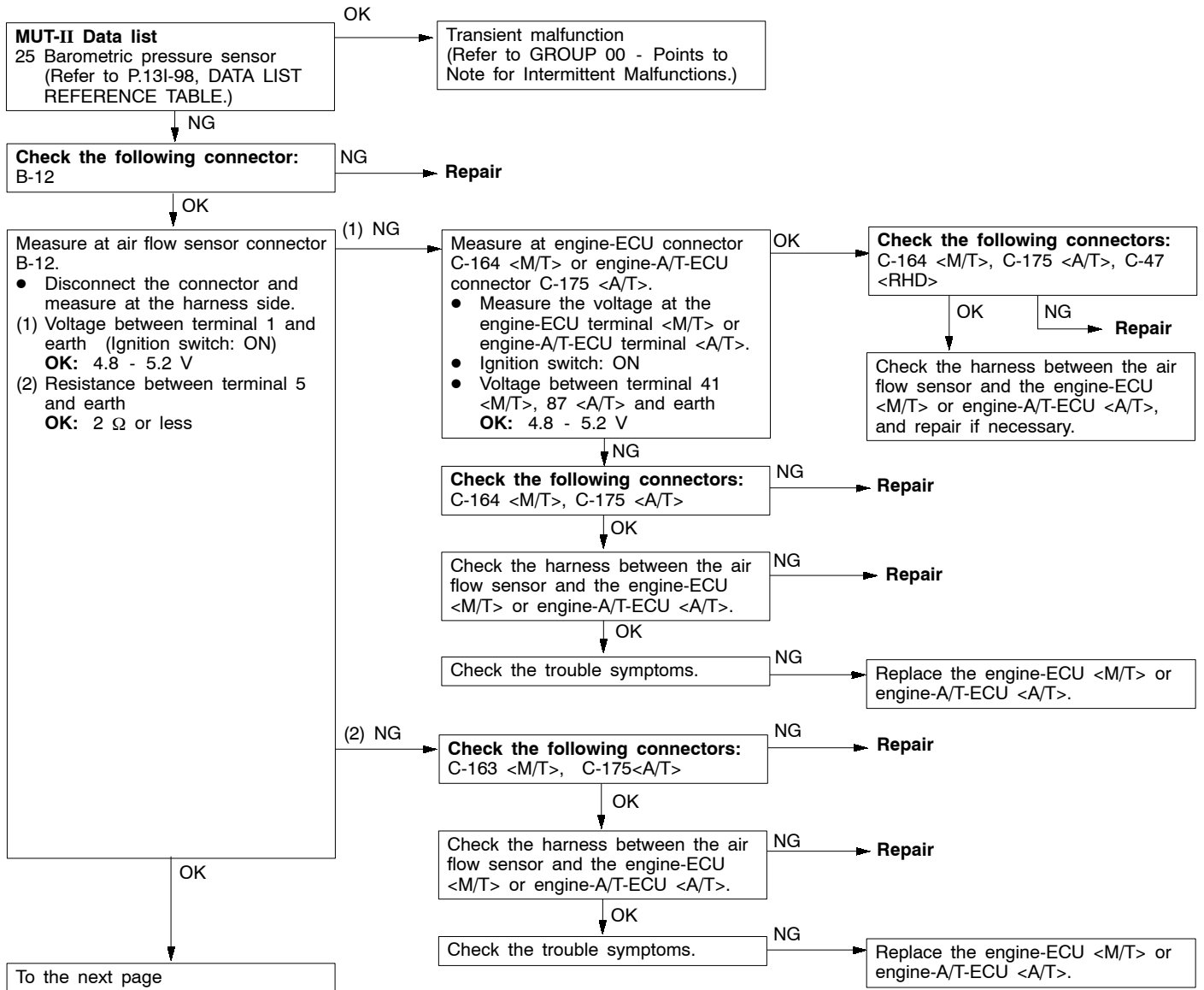
INSPECTION PROCEDURE CLASSIFIED BY DIAGNOSIS CODE

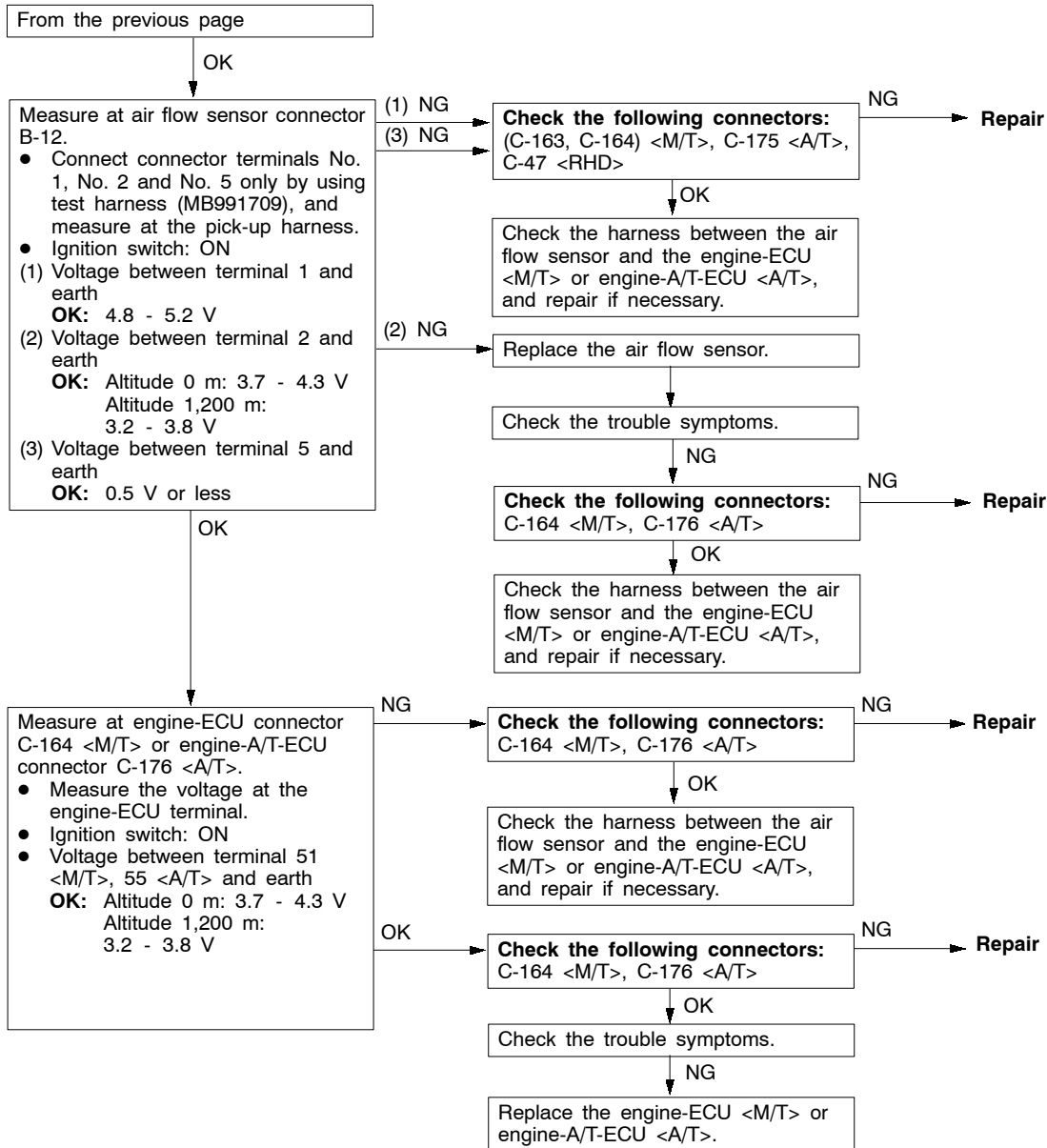
| Code No. P0100 Air flow sensor system | Probable cause |
|--|---|
| Range of Check • Engine speed: 500 r/min or more Set Conditions • The sensor output frequency is 3.3 Hz or less for four seconds. | • Malfunction of air flow sensor • Open or short circuit in air flow sensor circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



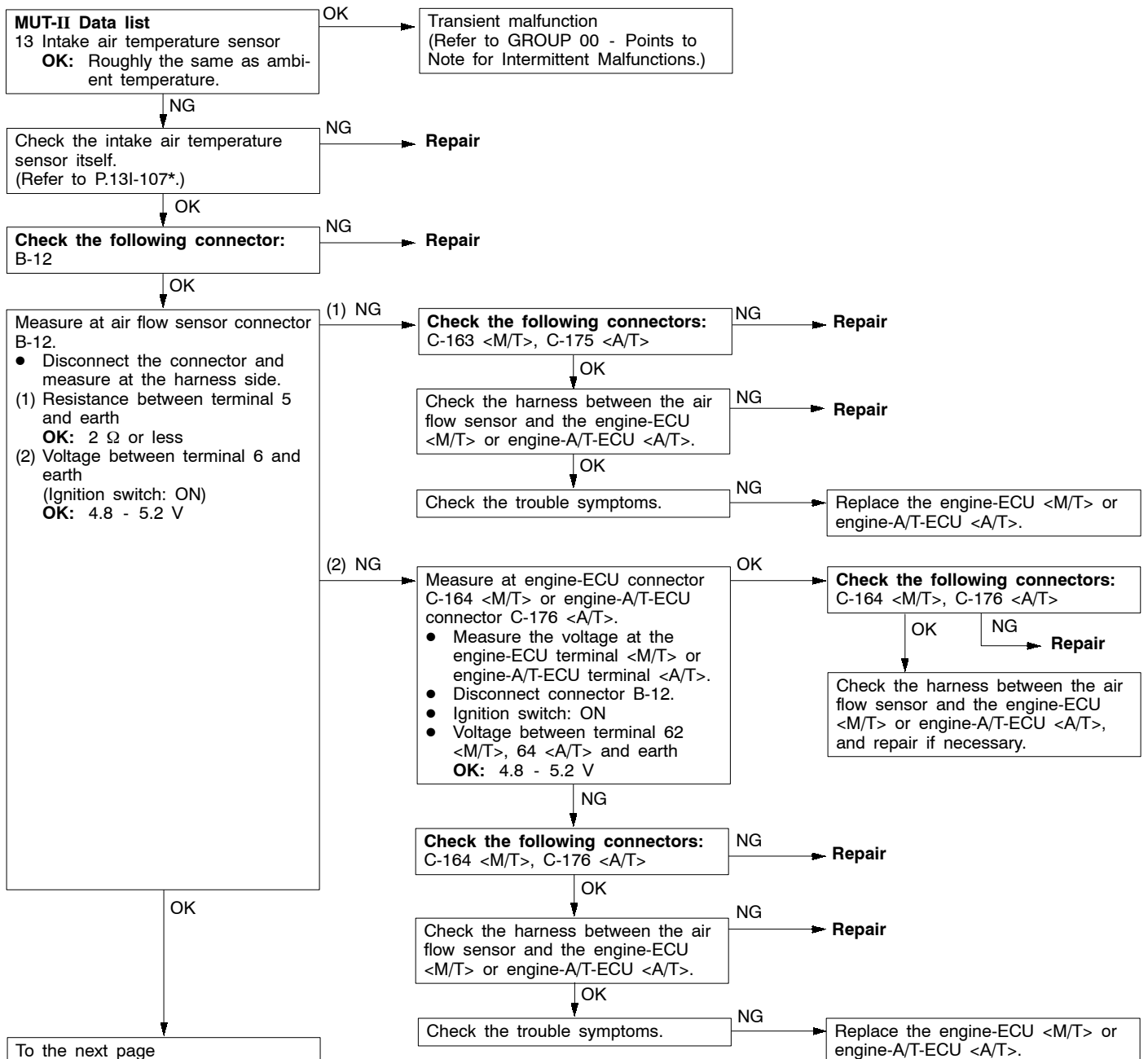


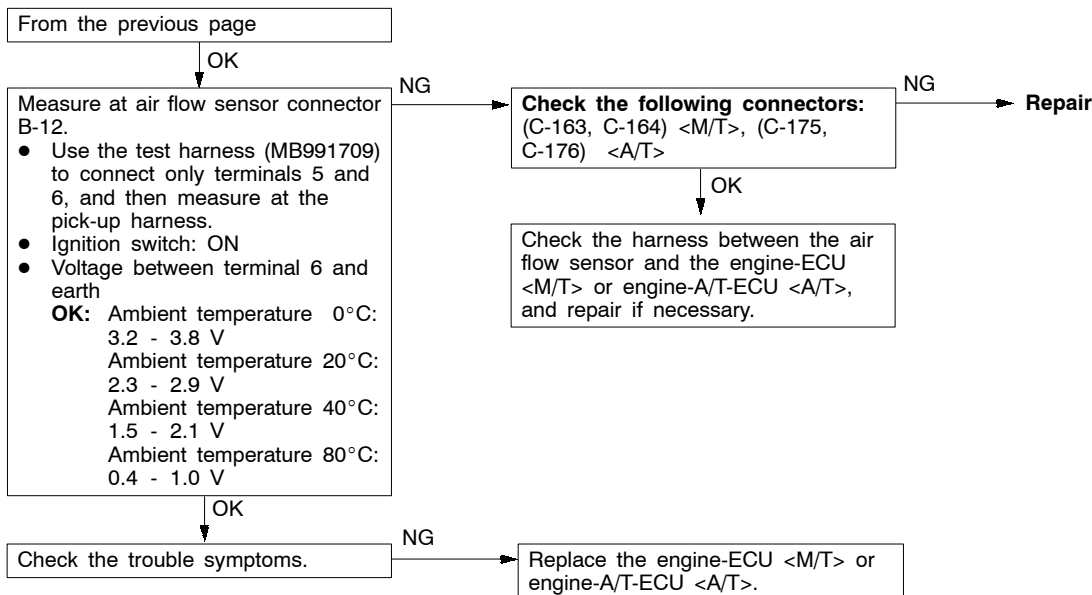
| Code No. P0105 Barometric pressure sensor system | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. Battery voltage: 8 V or more <p>Set Conditions</p> <ul style="list-style-type: none"> The sensor output voltage is 4.5 V or more for four seconds (equivalent to 114 kPa of barometric pressure) <p>or</p> <ul style="list-style-type: none"> The sensor output voltage is 0.2 V or less (equivalent to 53 kPa of barometric pressure) | <ul style="list-style-type: none"> Malfunction of barometric pressure sensor Open or short circuit in barometric pressure sensor circuit or loose connector contact Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |





| Code No. P0110 Intake air temperature sensor system | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> Two seconds have passed since the ignition switch is turned ON or the engine starting process is completed. <p>Set Conditions</p> <ul style="list-style-type: none"> The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C of intake air temperature) <p>or</p> <ul style="list-style-type: none"> The sensor output voltage is 0.2 V or more for four seconds (equivalent to 125°C of intake air temperature) | <ul style="list-style-type: none"> Malfunction of intake air temperature sensor Open or short circuit in intake air temperature sensor or loose connector contact Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |

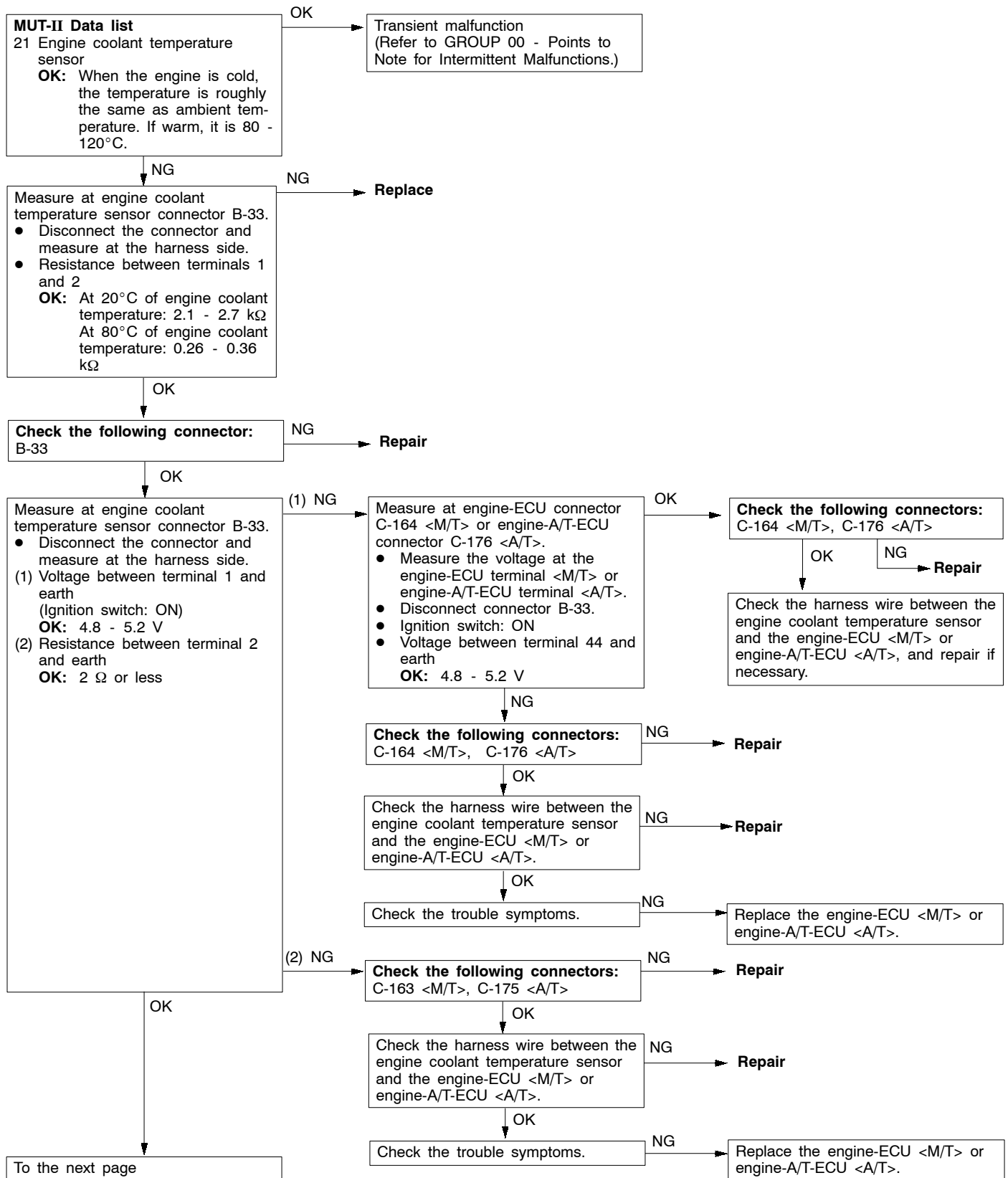


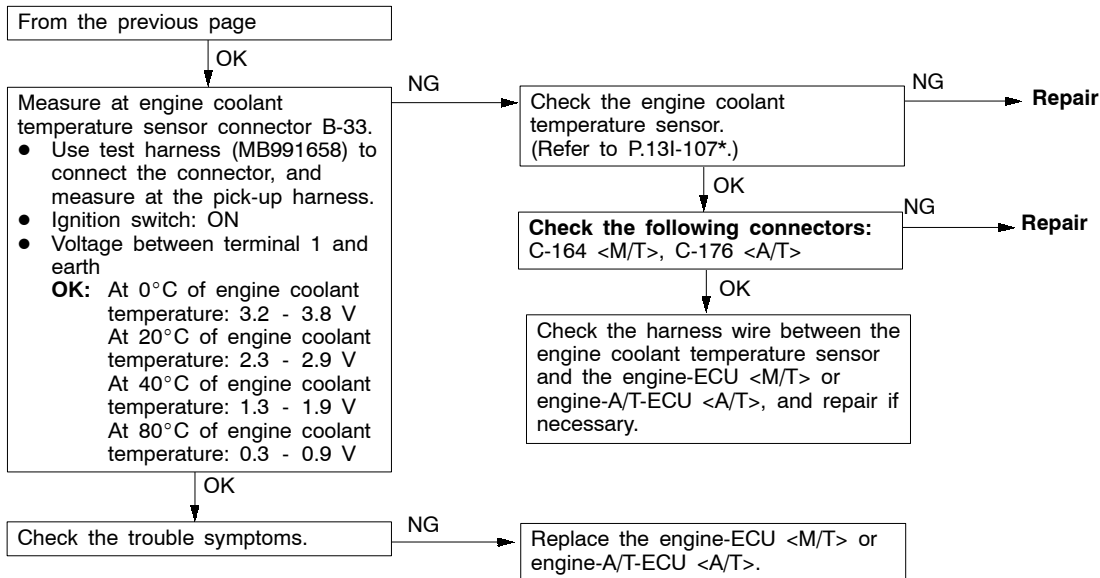


NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

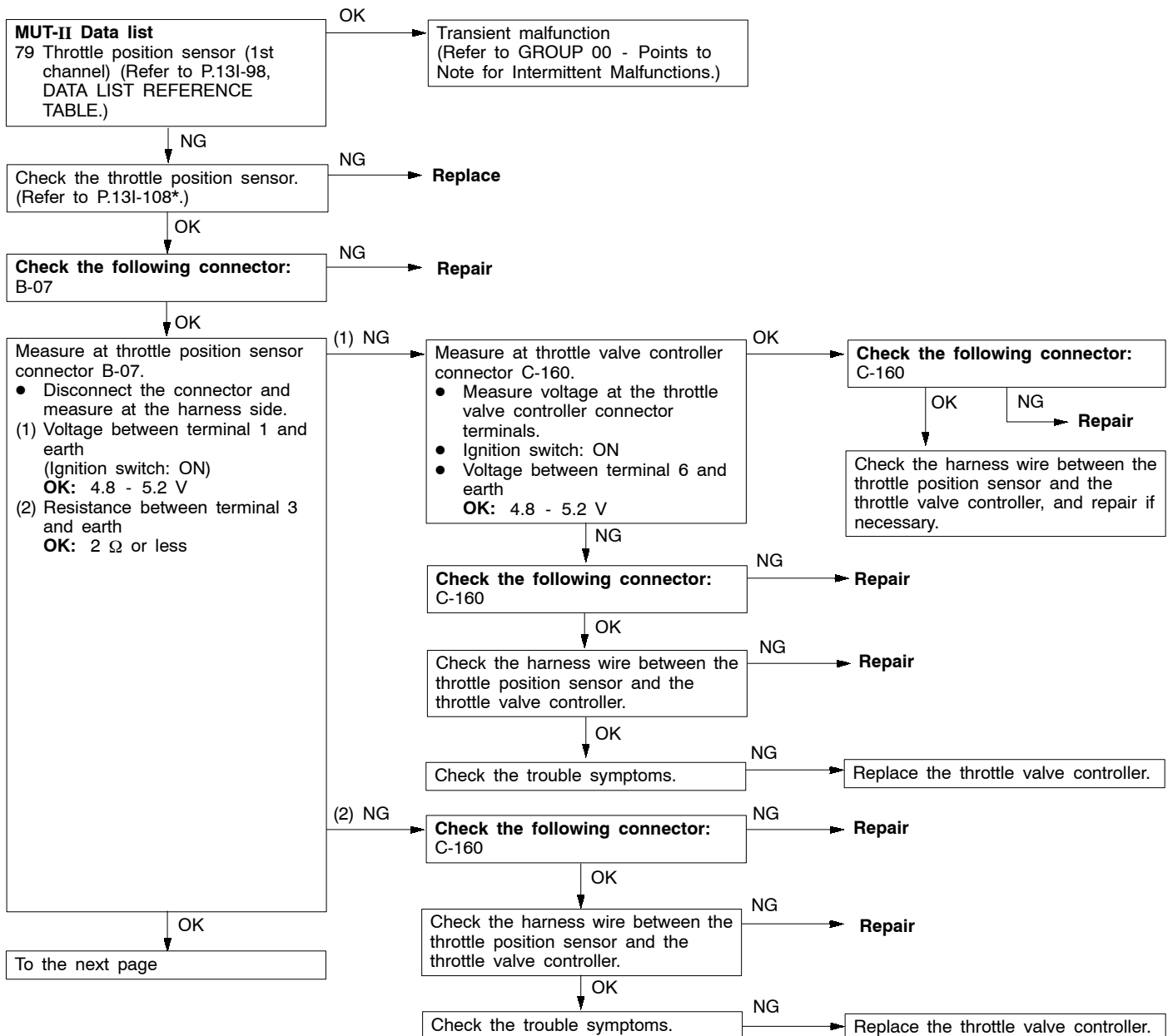
| Code No. P0115 Engine coolant temperature sensor system | Probable cause |
|--|---|
| Range of Check <ul style="list-style-type: none"> • Engine: Two seconds after the engine has been started Set Conditions <ul style="list-style-type: none"> • The sensor output voltage is 4.6 V or more for four seconds (equivalent to -45°C of engine coolant temperature) or <ul style="list-style-type: none"> • The sensor output voltage is 0.1 V or less for four seconds (equivalent to 140°C of engine coolant temperature) | <ul style="list-style-type: none"> • Malfunction of engine coolant temperature sensor • Open or short circuit in the engine coolant temperature sensor circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |
| Range of Check <ul style="list-style-type: none"> • Engine: After starting Set Conditions <ul style="list-style-type: none"> • The engine coolant temperature has reduced from over 40°C to less than 40°C, and that condition has lasted for five minutes or more. | |

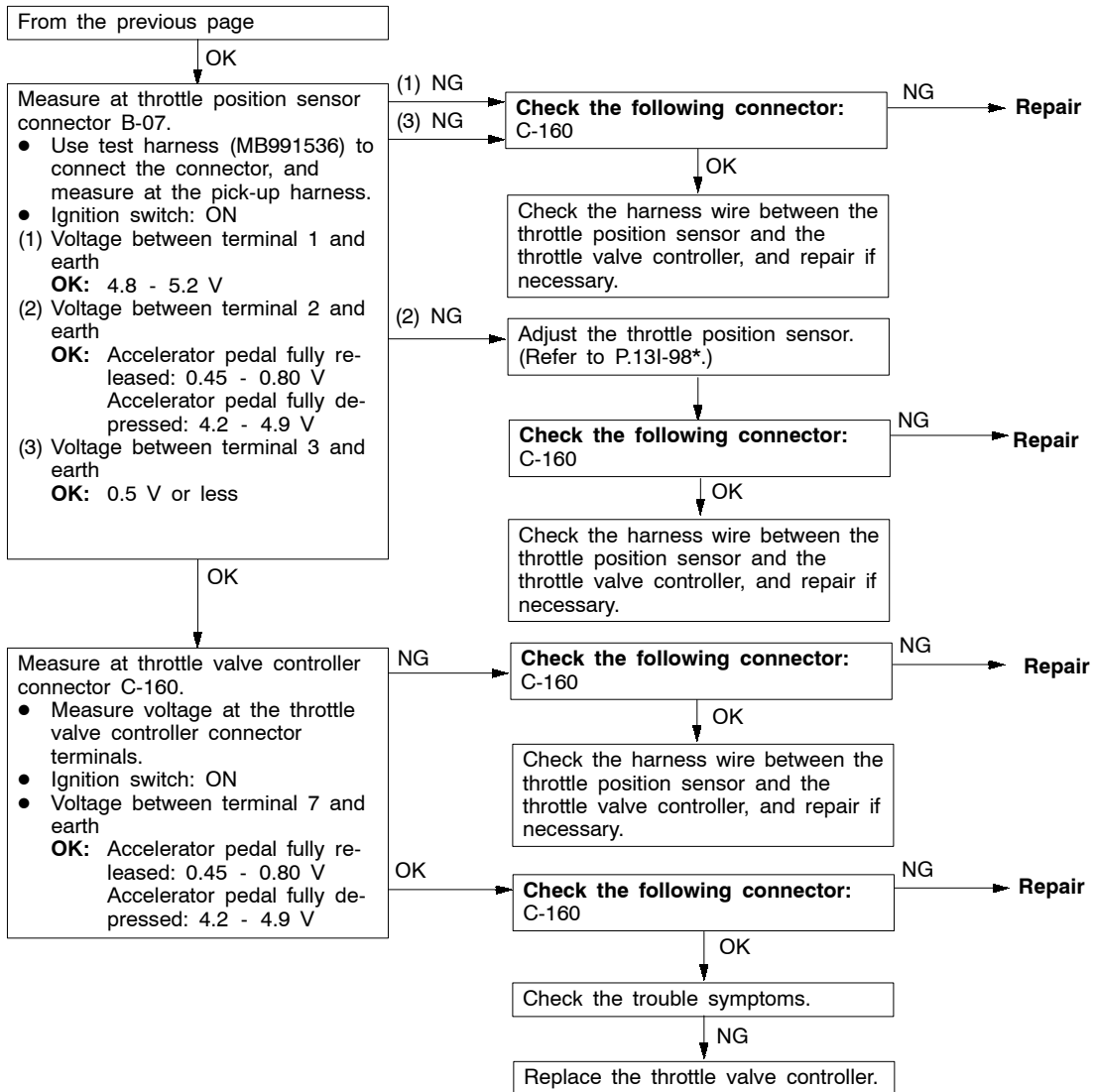


**NOTE:**

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

| Code No. P0120 Throttle position sensor (1st channel) system | Probable cause |
|---|---|
| <p>The throttle valve controller judges a malfunction, and then transmit the result to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.</p> <p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON <p>Set Conditions</p> <ul style="list-style-type: none"> The sensor output voltage is 0.2 V or less. <p>or</p> <ul style="list-style-type: none"> The sensor output voltage is 4.85 V or more and the throttle position sensor (2nd channel) output voltage is 2.5 V or more. <p>or</p> <ul style="list-style-type: none"> The throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 - 6 V. <p>or</p> <ul style="list-style-type: none"> The opening angle of throttle position sensor (1st channel) is different from its target by 1 V or more. <p>or</p> <ul style="list-style-type: none"> The throttle position sensor (1st channel) output changes within 25 mV when the throttle control servo moves one step. | <ul style="list-style-type: none"> Malfunction of throttle position sensor Open or short circuit in the throttle position sensor (1st channel) circuit or loose connector contact Malfunction of throttle valve controller Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |

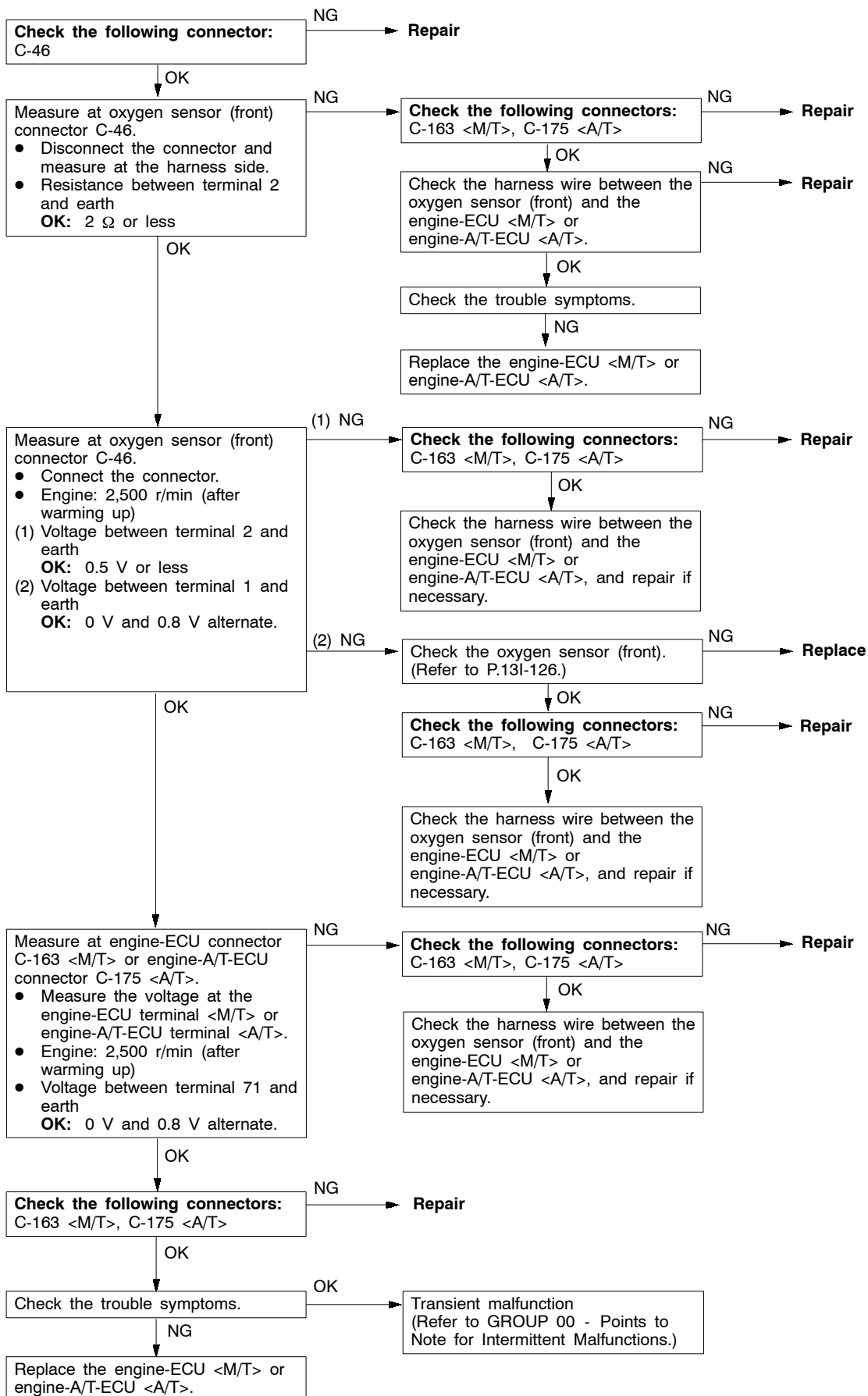




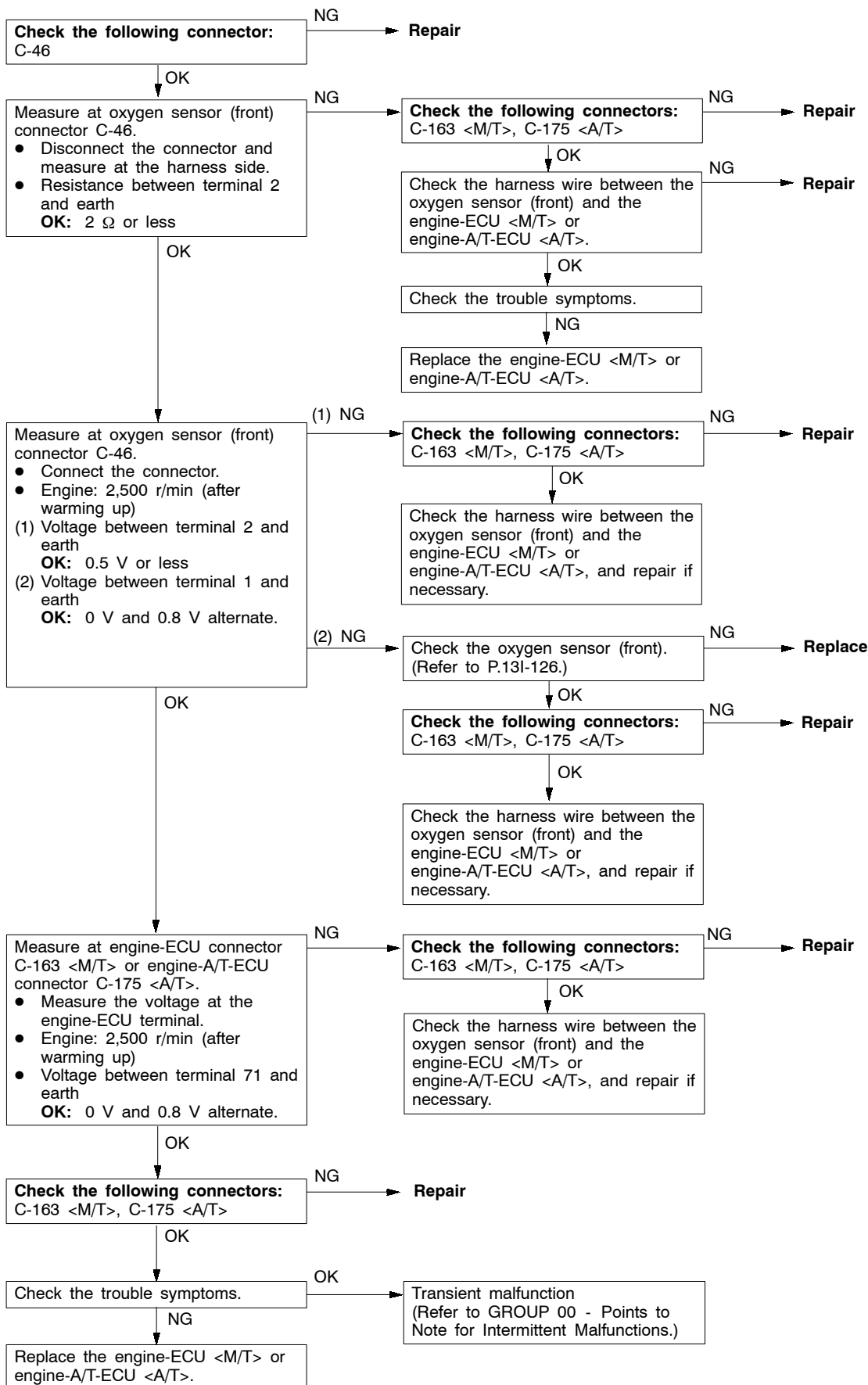
NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

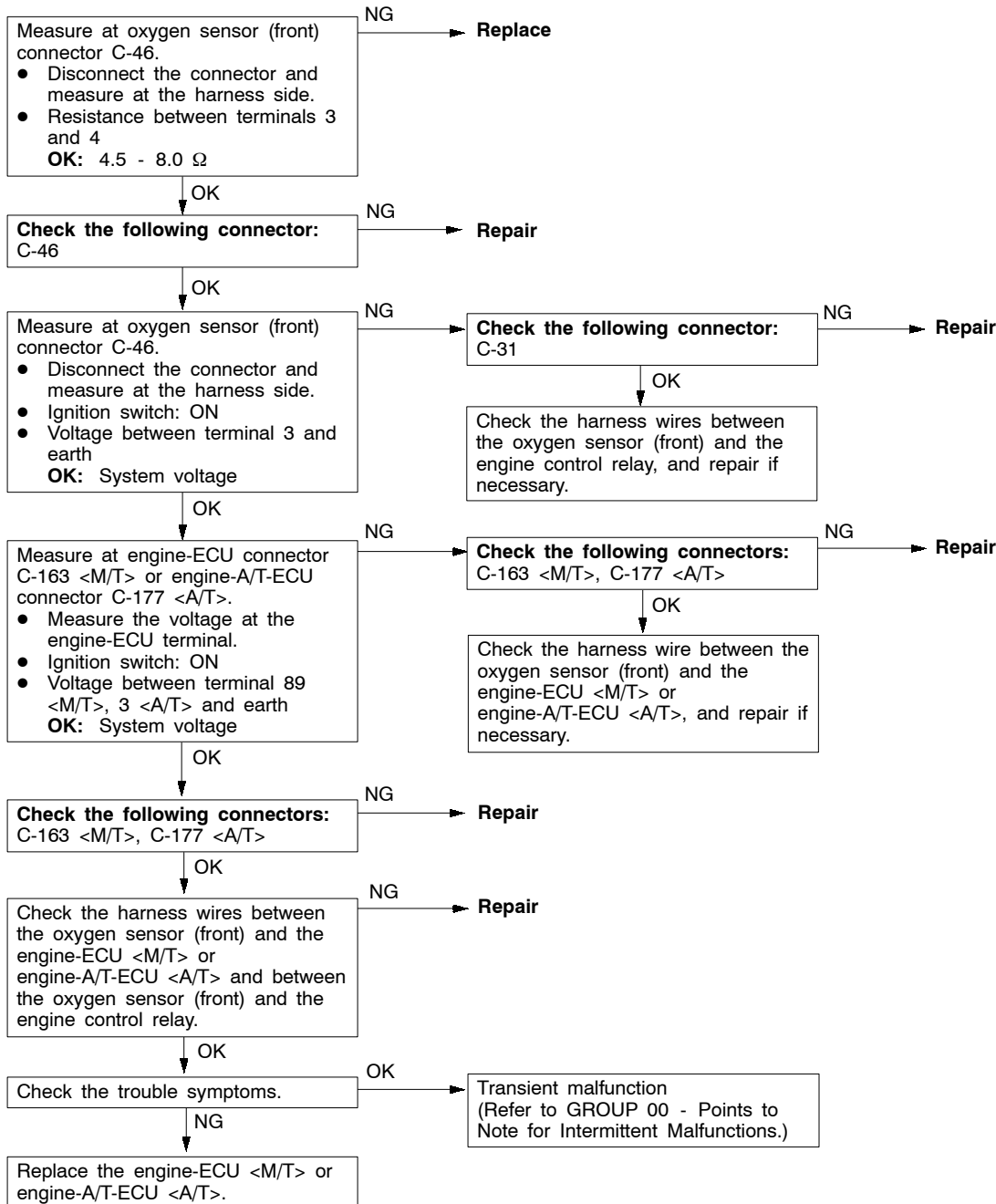
| Code No. P0125 Feedback system | Probable cause |
|--|--|
| <p>Range of Check</p> <ul style="list-style-type: none">• The engine coolant temperature is approx. 80°C or more.• During stoichiometric feedback control• The vehicle is not being decelerated. <p>Set Conditions</p> <ul style="list-style-type: none">• Oxygen sensor (front) output voltage has been higher or lower than 0.5 V for at least thirty seconds. | <ul style="list-style-type: none">• Malfunction of oxygen sensor (front)• Open or short circuit in the oxygen sensor (front) circuit or loose connector contact• Malfunction of engine-ECU <M/T>• Malfunction of engine-A/T-ECU <A/T> |



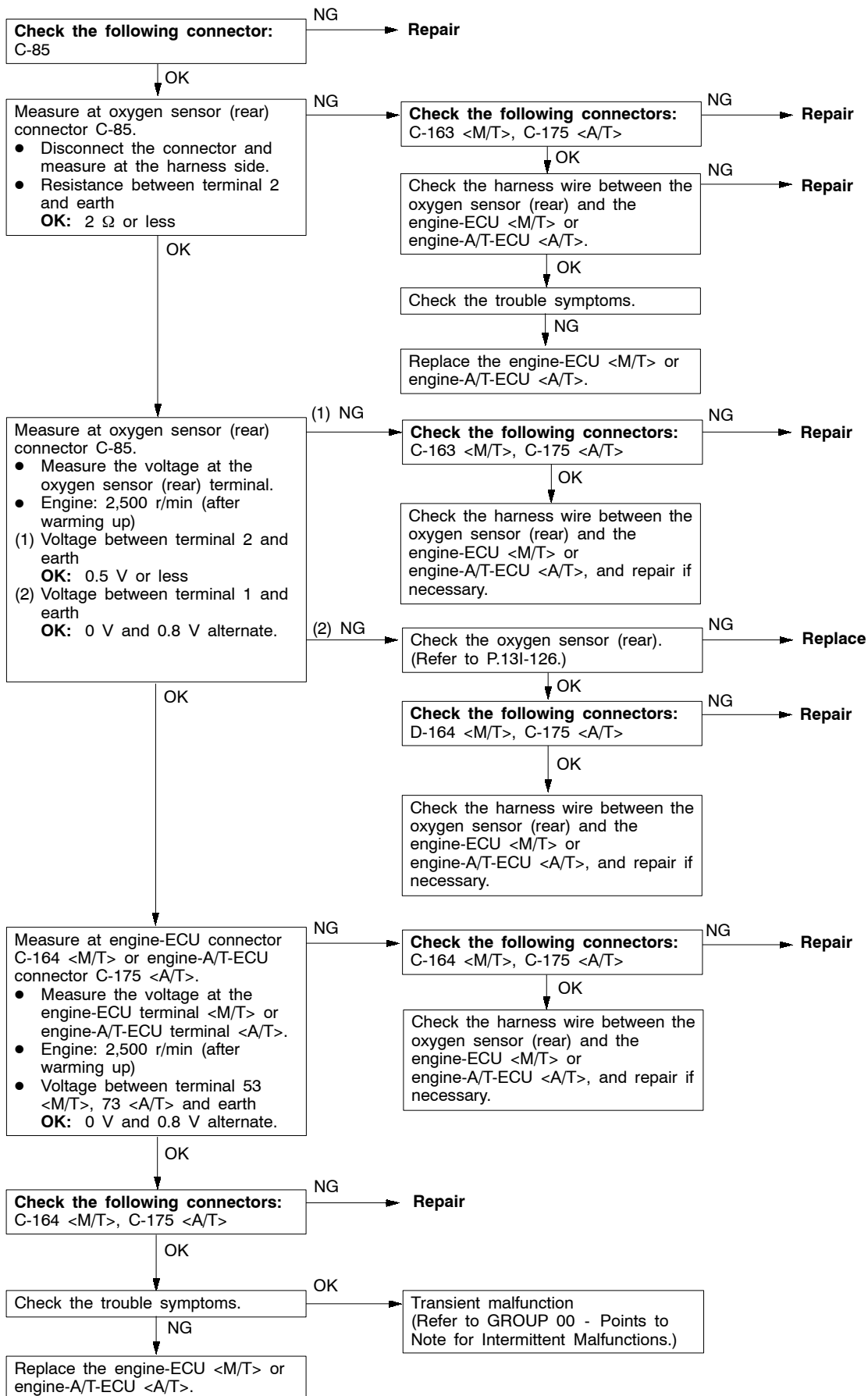
| Code No. P0130 Oxygen sensor (front) system <sensor 1> | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> ● Three minutes have been passed since the engine has been started. ● The engine coolant temperature is approx. 80°C or more. ● Intake air temperature is 20 - 50°C ● Engine speed is 1,200 r/min or more ● Driving on a level surface at constant speed. <p>Set Conditions</p> <ul style="list-style-type: none"> ● The oxygen sensor (front) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the oxygen sensor (front) inside the engine-ECU <M/T> or engine-A/T-ECU <A/T>. <p>Range of Check</p> <ul style="list-style-type: none"> ● Engine speed is 3,000 r/min or less ● During driving ● During air/fuel ratio feedback control <p>Set Conditions</p> <ul style="list-style-type: none"> ● The oxygen sensor (front) output frequency is five or less per 12 seconds on average. | <ul style="list-style-type: none"> ● Malfunction of oxygen sensor (front) ● Open or short circuit in the oxygen sensor (front) circuit or loose connector contact ● Malfunction of engine-ECU <M/T> ● Malfunction of engine-A/T-ECU <A/T> |



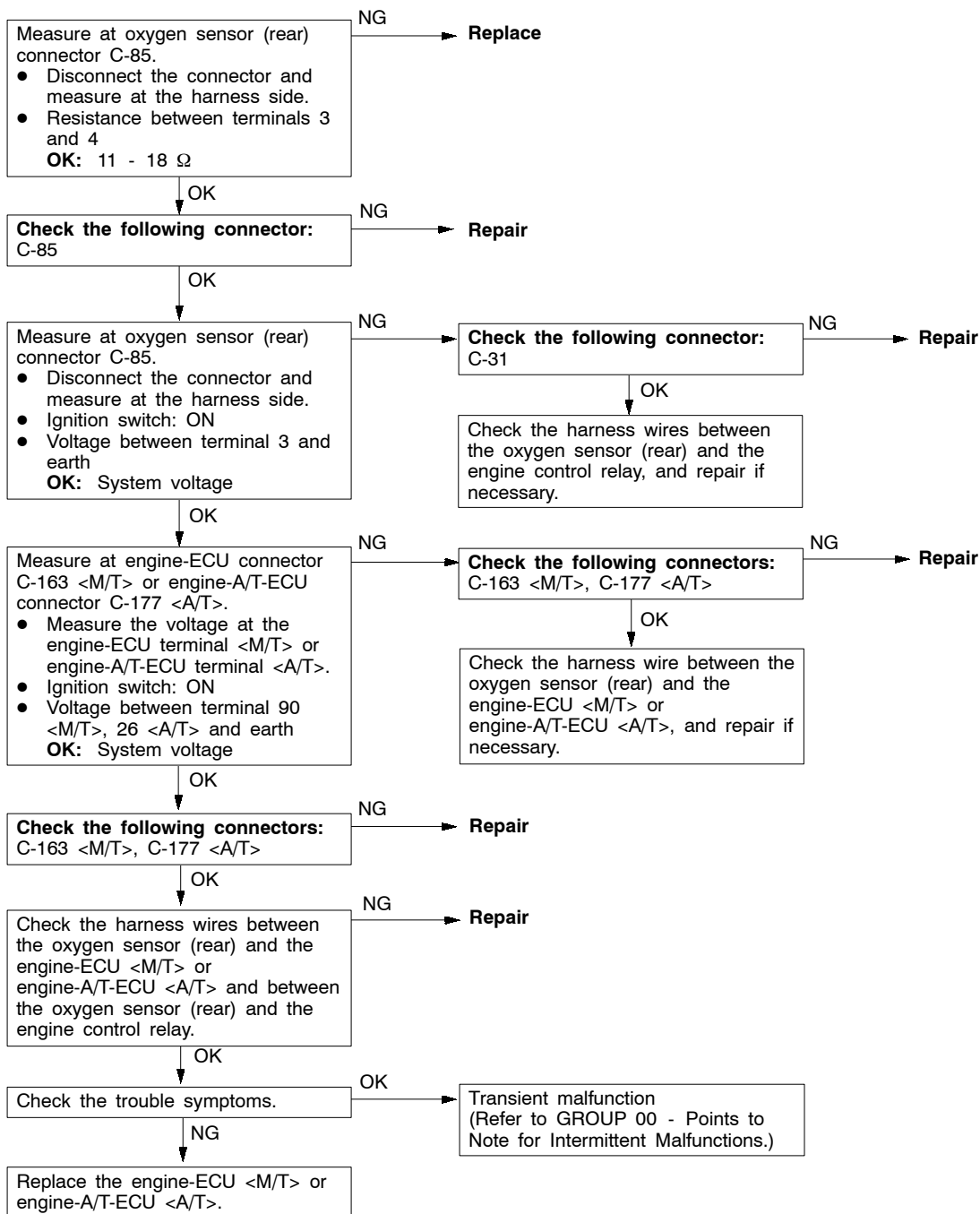
| Code No. P0135 Oxygen sensor heater (front) system <sensor 1> | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> • The engine coolant temperature is approx. 20°C or more. • The oxygen sensor heater (front) remains on. • The engine speed is 50 r/min or more. • Battery voltage is 11 - 16 V. <p>Set Conditions</p> <ul style="list-style-type: none"> • The current, which flows through the oxygen sensor heater (front), is 0.2 A or less or 3.5 A or more for six seconds. | <ul style="list-style-type: none"> • Malfunction of oxygen sensor heater (front) • Open or short circuit in the oxygen sensor heater (front) circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



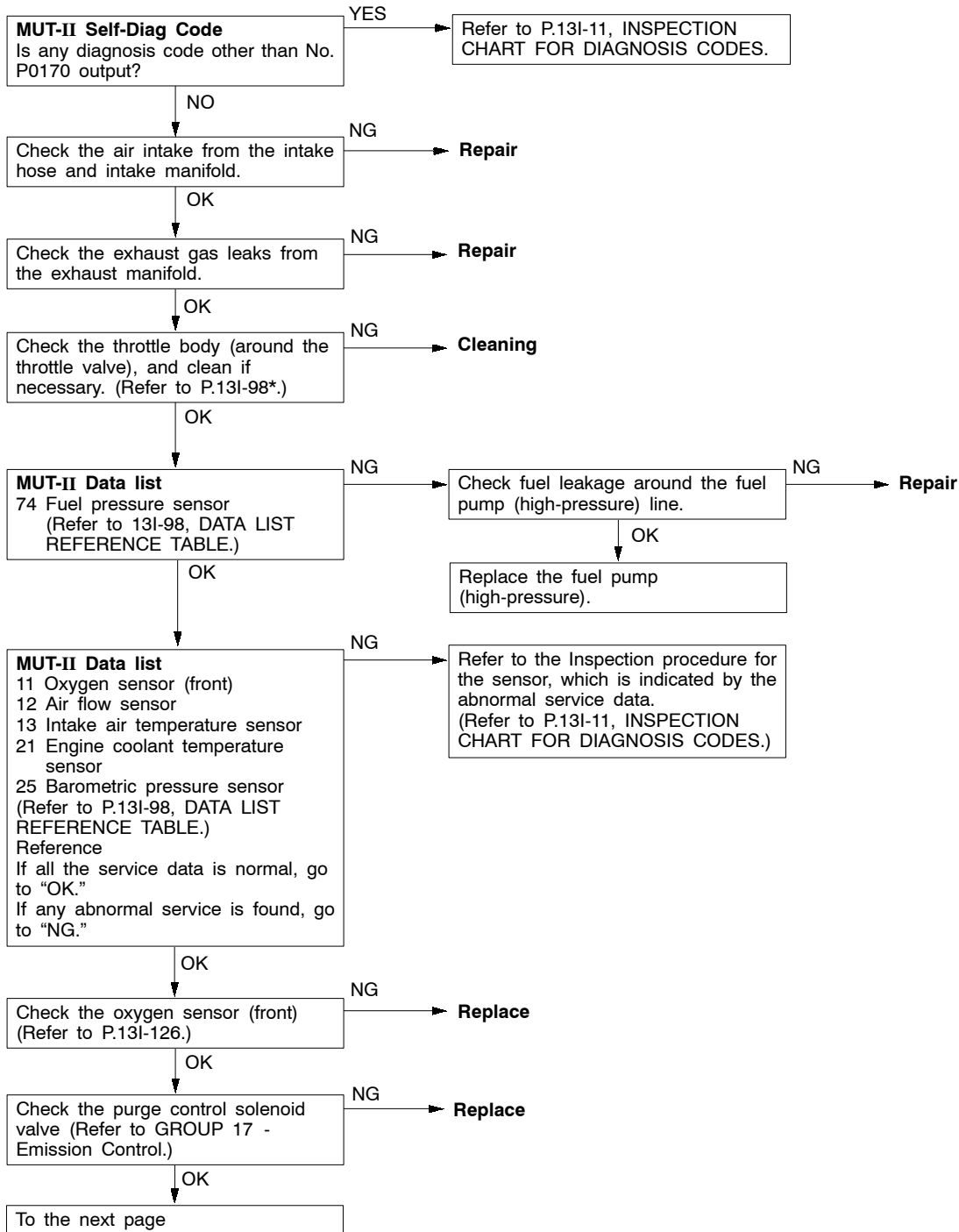
| Code No. P0136 Oxygen sensor (rear) system <sensor 2> | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> • Three minutes have been passed since the engine has been started. • The engine coolant temperature is approx. 80°C or more. • Intake air temperature is 20 - 50°C • Engine speed is 1,200 r/min or more • Driving on a level surface at constant speed. <p>Set Conditions</p> <ul style="list-style-type: none"> • The oxygen sensor (rear) output voltage is 4.5 V or more when the sensor output voltage is 0.2 V or less and a voltage of 5 V is applied to the oxygen sensor (rear) inside the engine-ECU <M/T> or engine-A/T-ECU <A/T>. | <ul style="list-style-type: none"> • Malfunction of oxygen sensor (rear) • Open or short circuit in the oxygen sensor (rear) circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |
| <p>Range of Check</p> <ul style="list-style-type: none"> • Two seconds have passed after the engine-ECU <M/T> or engine-A/T-ECU <A/T> detected an open circuit. • When the oxygen sensor (front) is in good condition. <p>Set Conditions</p> <ul style="list-style-type: none"> • When the air/fuel ratio is rich, the oxygen sensor (front) output voltage is 0.5 V or more, the oxygen sensor (rear) output voltage is less than 0.1 V, and the oxygen sensor (rear) output voltage fluctuates within 0.078 V. | |



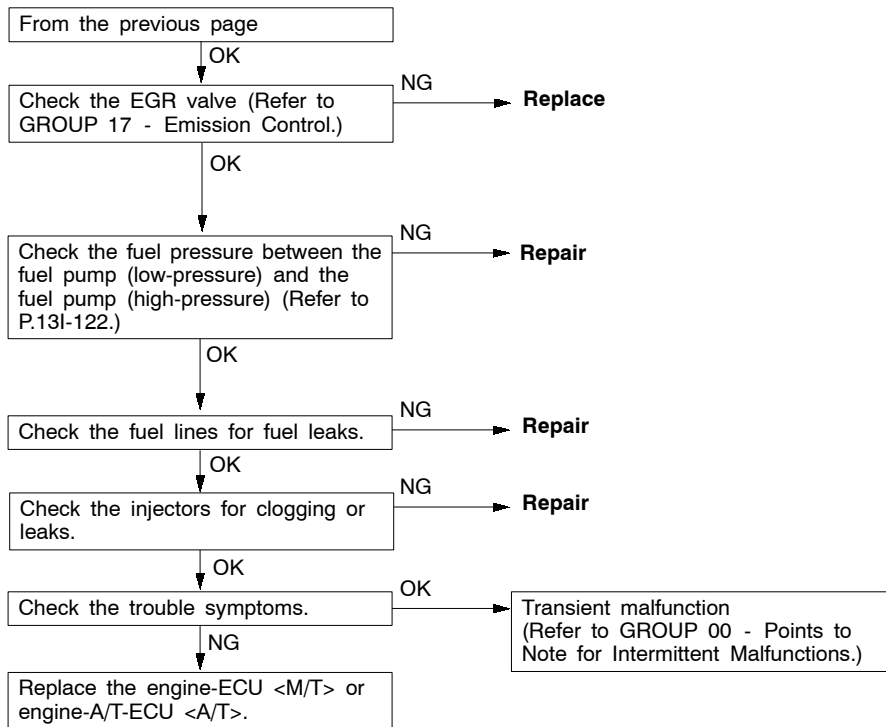
| Code No. P0141 Oxygen sensor heater (rear) system <sensor 2> | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> The engine coolant temperature is approx. 20°C or more. The oxygen sensor heater (rear) remains on. The engine speed is 50 r/min or more. Battery voltage is 11 - 16 V. <p>Set Conditions</p> <ul style="list-style-type: none"> The current, which flows through the oxygen sensor heater (rear), is 0.2 A or less or 3.5 A or more for six seconds. | <ul style="list-style-type: none"> Malfunction of oxygen sensor heater (rear) Open or short circuit in the oxygen sensor heater (rear) circuit or loose connector contact Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |



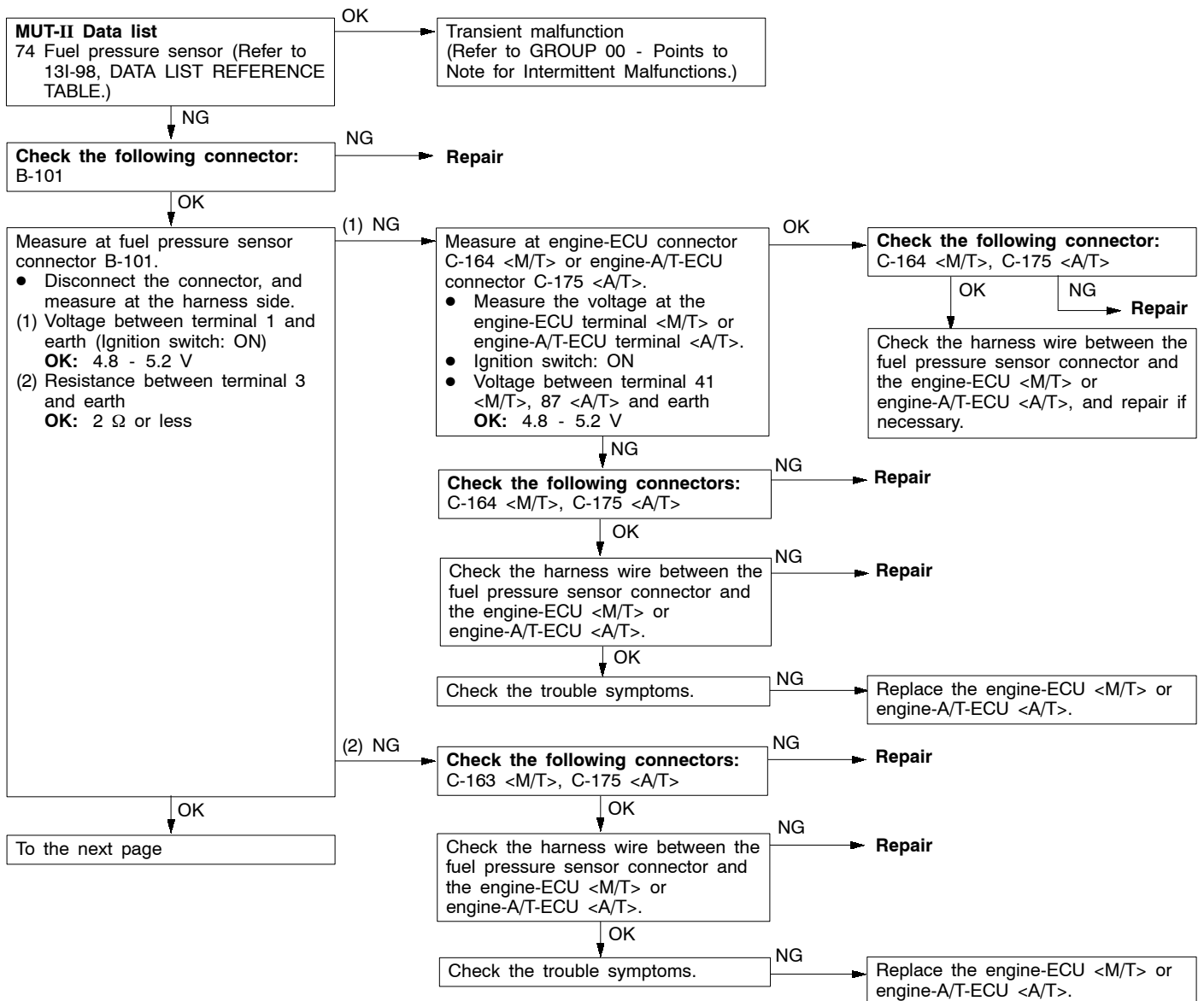
| Code No. P0170 Abnormal fuel system | Probable cause |
|--|--|
| Range of Check • Engine: Being learning the air-fuel ratio Set Conditions • Ten seconds or more have been passed while the fuel injection amount compensation value is too low. or • Ten seconds or more have been passed while the fuel injection amount compensation value is too high. | • Malfunction of fuel supply system • Malfunction of oxygen sensor (front) • Malfunction of intake air temperature sensor • Malfunction of barometric pressure sensor • Malfunction of air flow sensor • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |

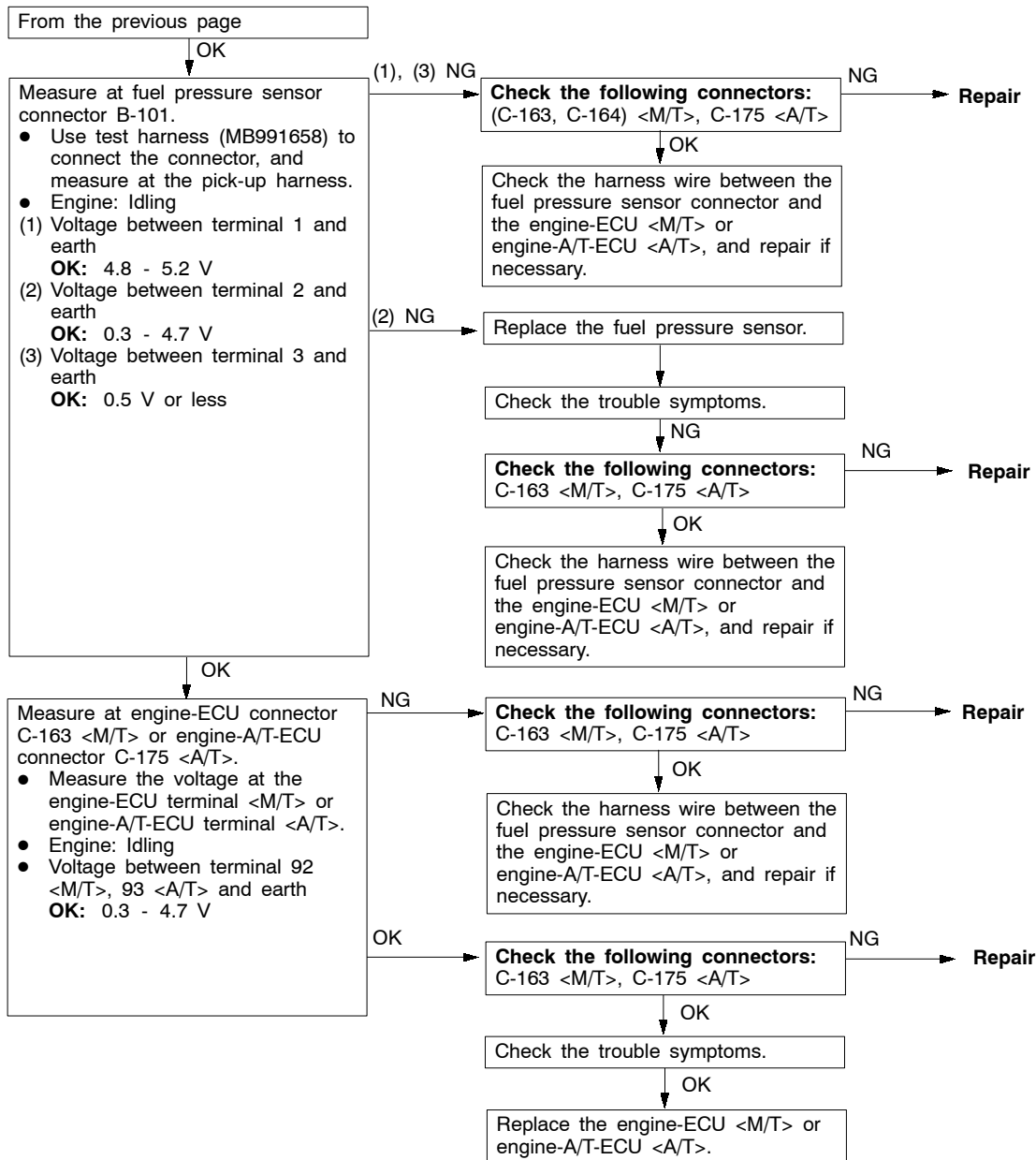
**NOTE:**

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

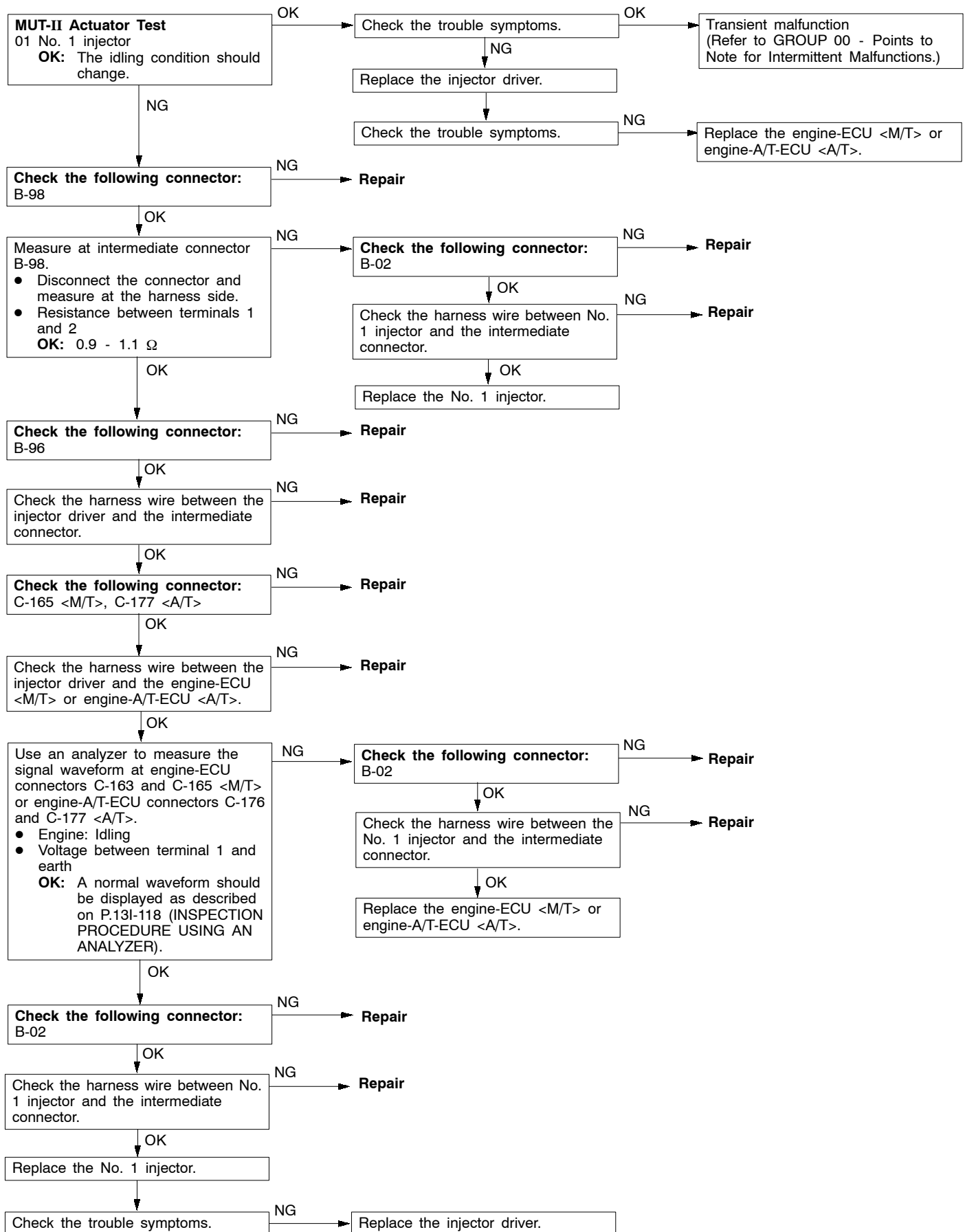


| Code No. P0190 Abnormal fuel pressure | Probable cause |
|---|---|
| Range of Check • Ignition switch: ON Set Conditions • The sensor output voltage is 4.8 V or more, or 0.2 V or less for four seconds. | • Malfunction of fuel pressure sensor • Open or short circuit in the fuel pressure sensor circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |
| Range of Check • The following conditions are detected temporarily after the engine has been started. (1) Engine speed: 1,000 r/min or more (2) Fuel pressure: 2 MPa or more • Engine running Set Conditions • The fuel pressure is 6.9 MPa or more, or 2 MPa or less for four seconds. | • Malfunction of high-pressure fuel pump • Clogging of high-pressure fuel lines |
| This diagnosis code will also be output when air is trapped into the high-pressure fuel lines (such as poor fuel level). In that case, the air can be evacuated by operating the engine for at least 15 seconds at 2,000 r/min. After the repair, use the MUT-II to erase the diagnosis code. | • Air trapped due to poor fuel level |

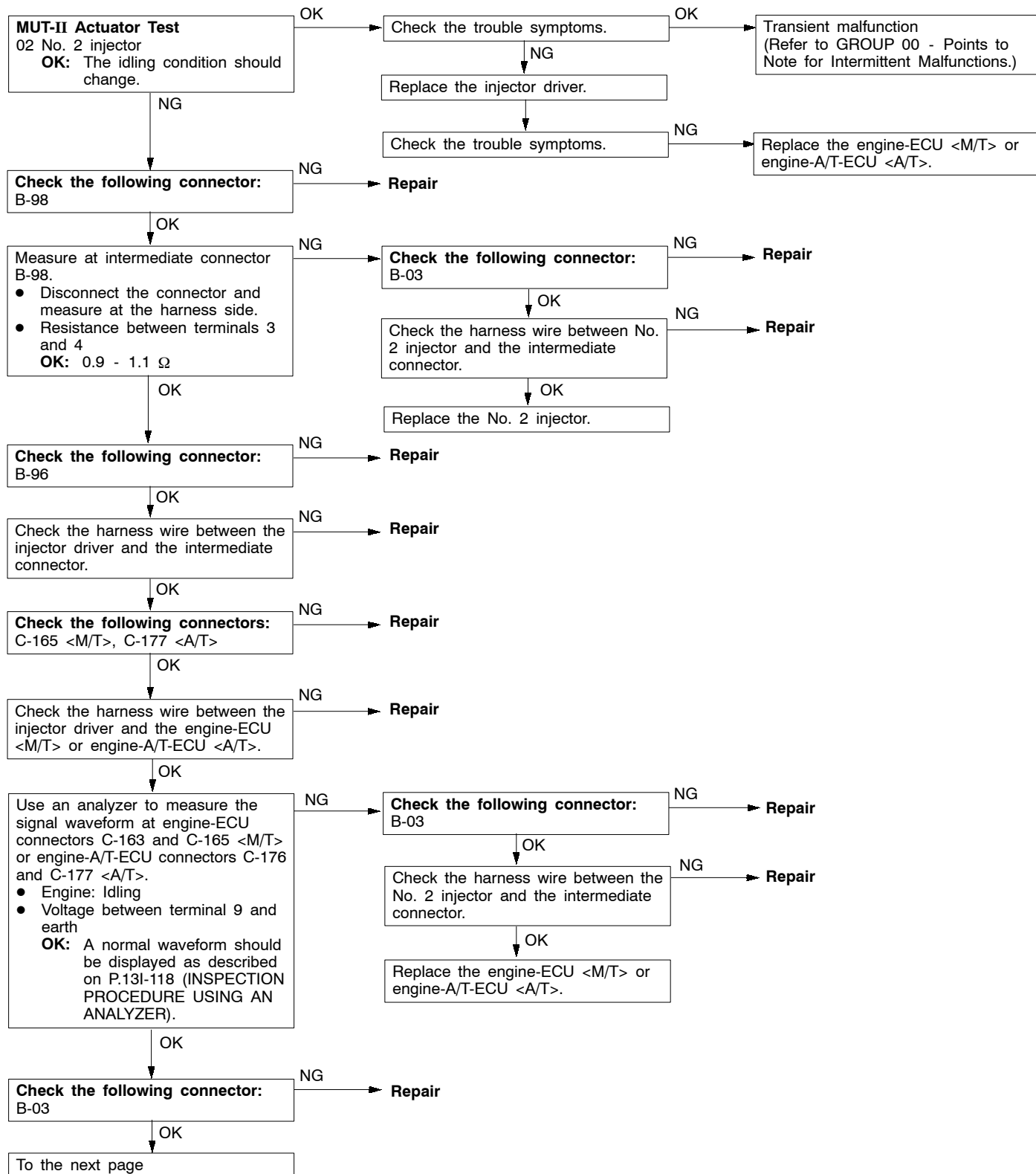


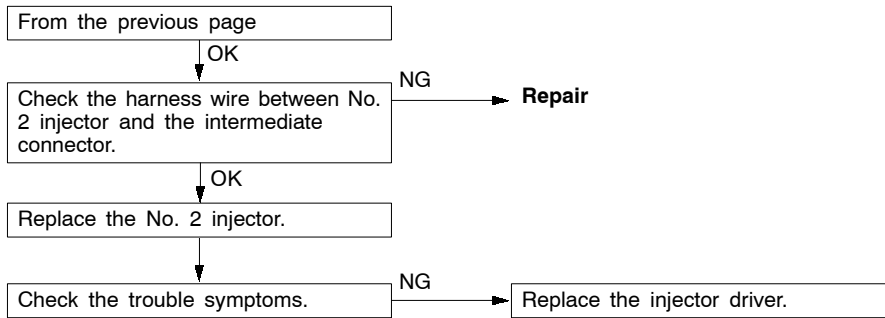


| Code No. P0201 No. 1 injector system | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> • The engine speed is 4,000 r/min or less. • The battery voltage is 10 V or more. • The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress. <p>Set Conditions</p> <ul style="list-style-type: none"> • The injector driver is not transmitting a injector open circuit check signal for four seconds. | <ul style="list-style-type: none"> • Malfunction of No. 1 injector • Open or short circuit in the No. 1 injector circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |

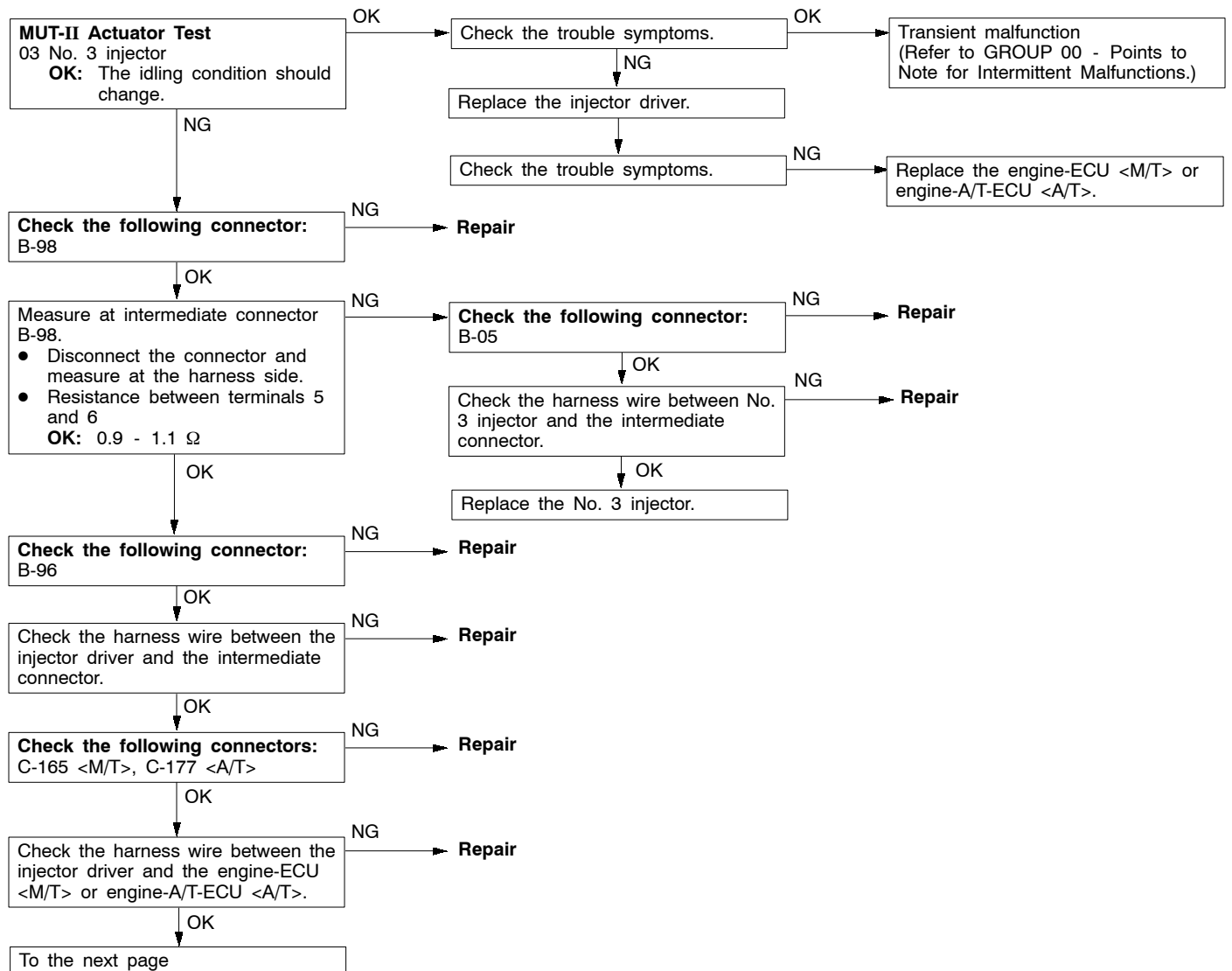


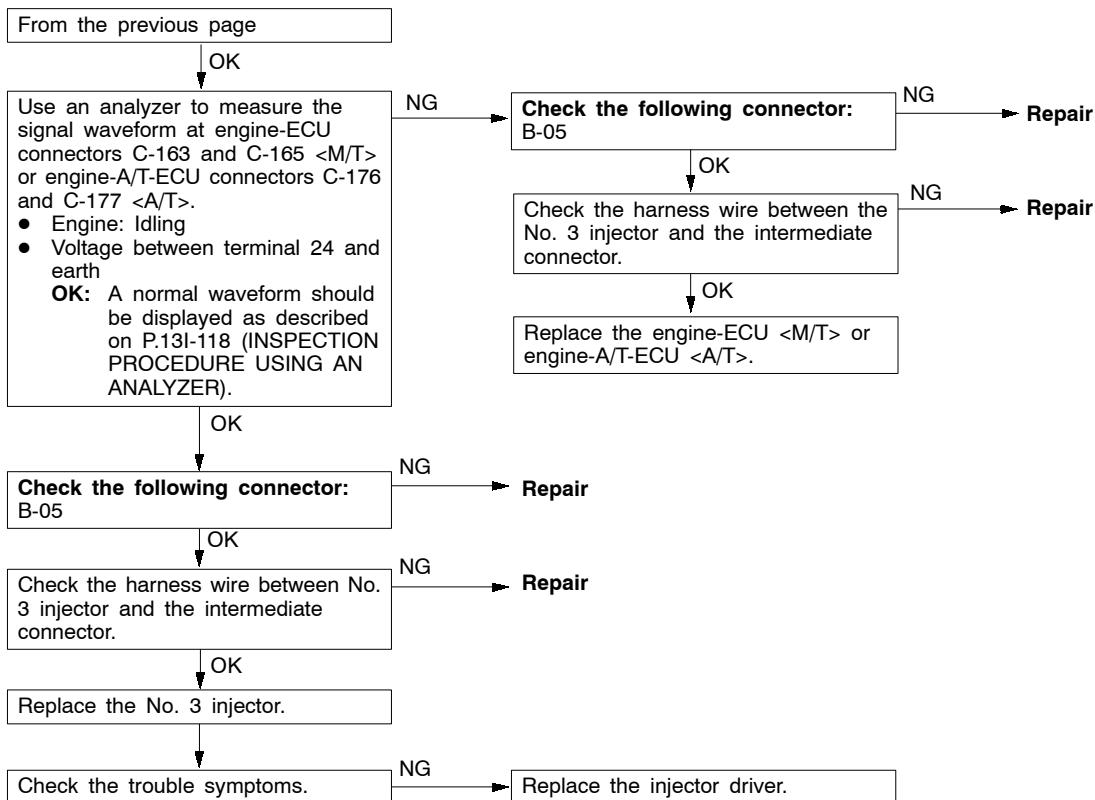
| Code No. P0202 No. 2 injector system | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> • The engine speed is 4,000 r/min or less. • The battery voltage is 10 V or more. • The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress. <p>Set Conditions</p> <ul style="list-style-type: none"> • The injector driver is not transmitting a injector open circuit check signal for four seconds. | <ul style="list-style-type: none"> • Malfunction of No. 2 injector • Open or short circuit in the No. 2 injector circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



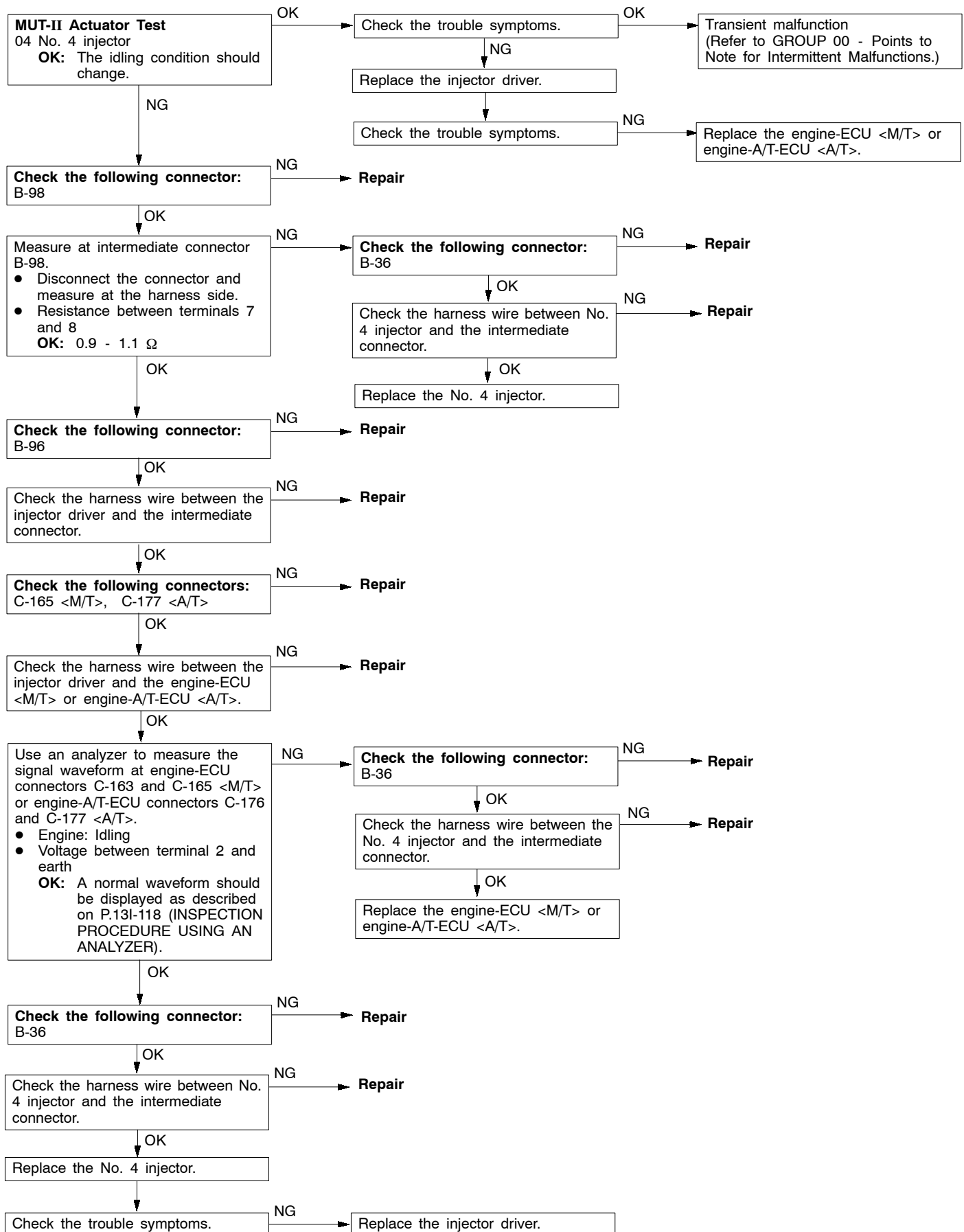


| Code No. P0203 No. 3 injector system | Probable cause |
|---|---|
| Range of Check <ul style="list-style-type: none"> • The engine speed is 4,000 r/min or less. • The battery voltage is 10 V or more. • The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress. Set Conditions <ul style="list-style-type: none"> • The injector driver is not transmitting a injector open circuit check signal for four seconds. | <ul style="list-style-type: none"> • Malfunction of No. 3 injector • Open or short circuit in the No. 3 injector circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |

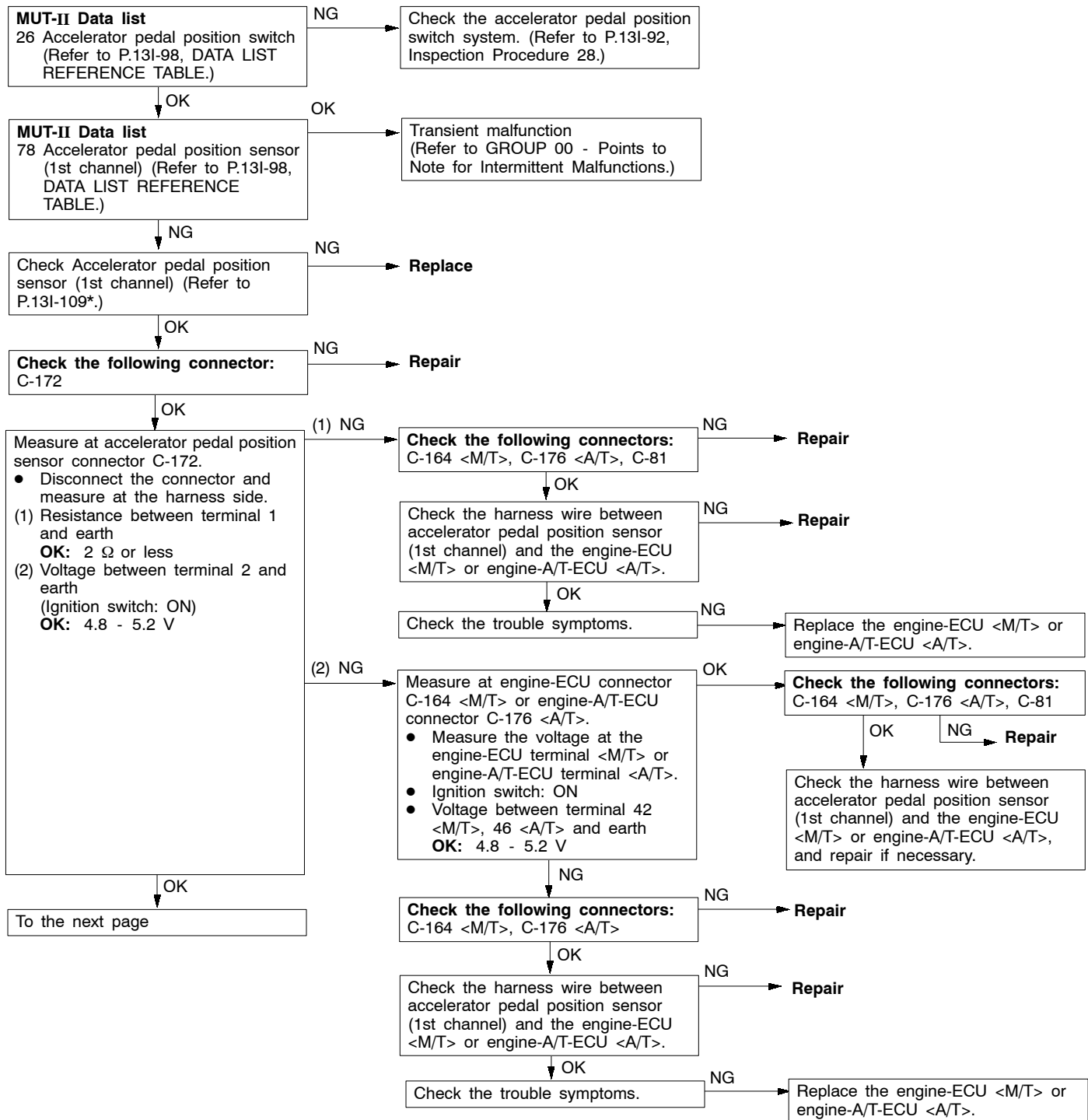


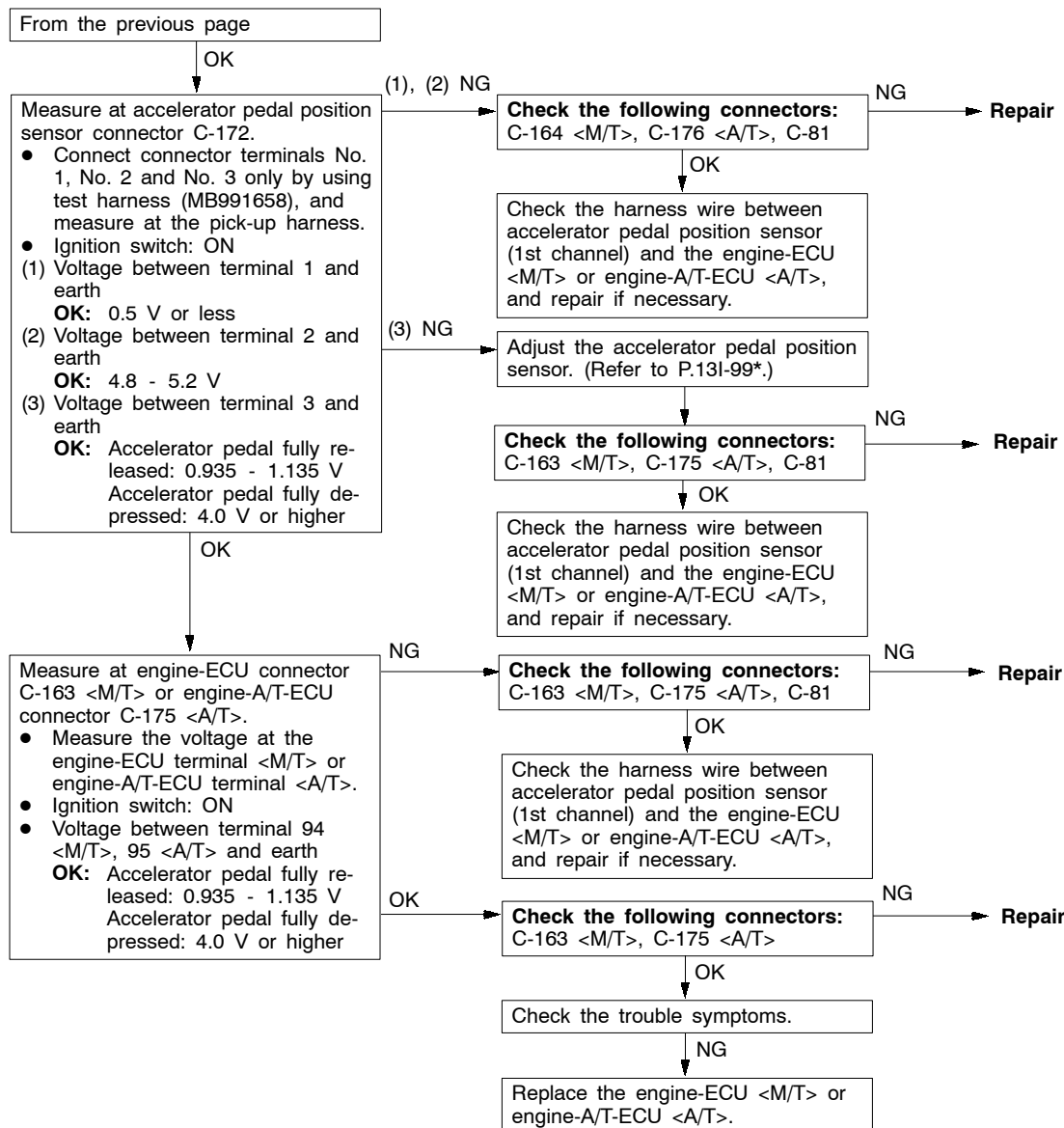


| Code No. P0204 No. 4 injector system | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> The engine speed is 4,000 r/min or less. The battery voltage is 10 V or more. The fuel cut operation or the injector operation (by carrying out the Actuator Test) is not in progress. <p>Set Conditions</p> <ul style="list-style-type: none"> The injector driver is not transmitting a injector open circuit check signal for four seconds. | <ul style="list-style-type: none"> Malfunction of No. 4 injector Open or short circuit in the No. 4 injector circuit or loose connector contact Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |



| Code No. P0220 Accelerator pedal position sensor (1st channel) system | Probable cause |
|---|--|
| <p>Range of Check</p> <ul style="list-style-type: none"> Accelerator pedal position sensor (2nd channel) is normal. Communication between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the throttle valve controller is normal. <p>Set Conditions</p> <ul style="list-style-type: none"> The output voltage of accelerator pedal position sensor (1st channel) is 0.2 V or less for one second. <p>or</p> <ul style="list-style-type: none"> The output voltage of accelerator pedal position sensor (2nd channel) is 2.5 V or less, and that of accelerator pedal position sensor (1st channel) is 4.5 V or more for one second <p>or</p> <ul style="list-style-type: none"> The difference between accelerator pedal position sensor (1st channel) and accelerator pedal position sensor (2nd channel) output voltages is 1.0 V or more (i.e. the throttle opening angle changes slightly). <p>or</p> <ul style="list-style-type: none"> The output voltage of accelerator pedal position sensor (1st channel) is 1.875 V or more for one second when the accelerator pedal position switch is turned on. | <ul style="list-style-type: none"> Malfunction of accelerator pedal position sensor (1st channel) Open or short circuit in the accelerator pedal position sensor (1st channel) circuit or loose connector contact Accelerator pedal position switch seized ON Malfunction of throttle valve controller Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |

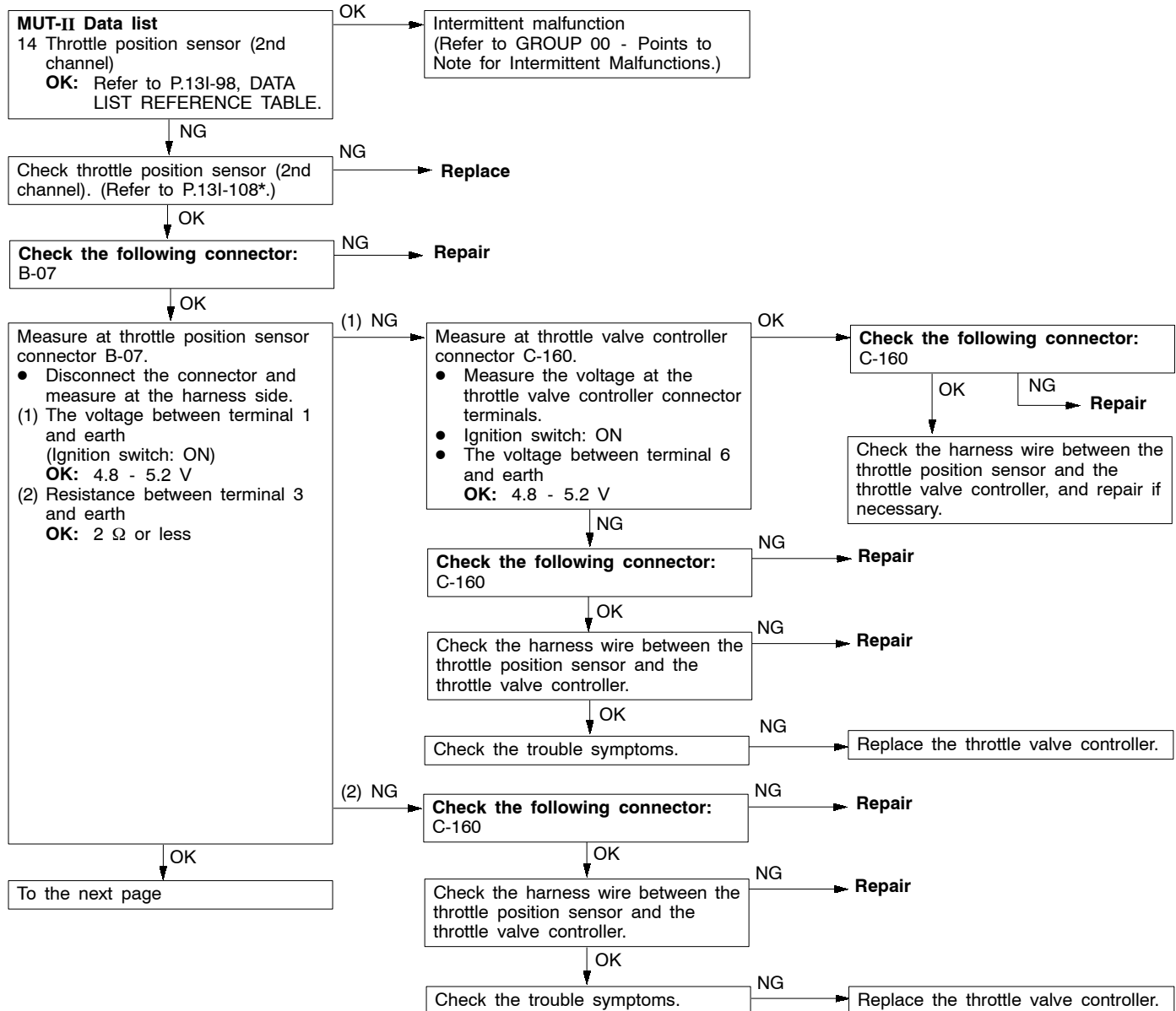


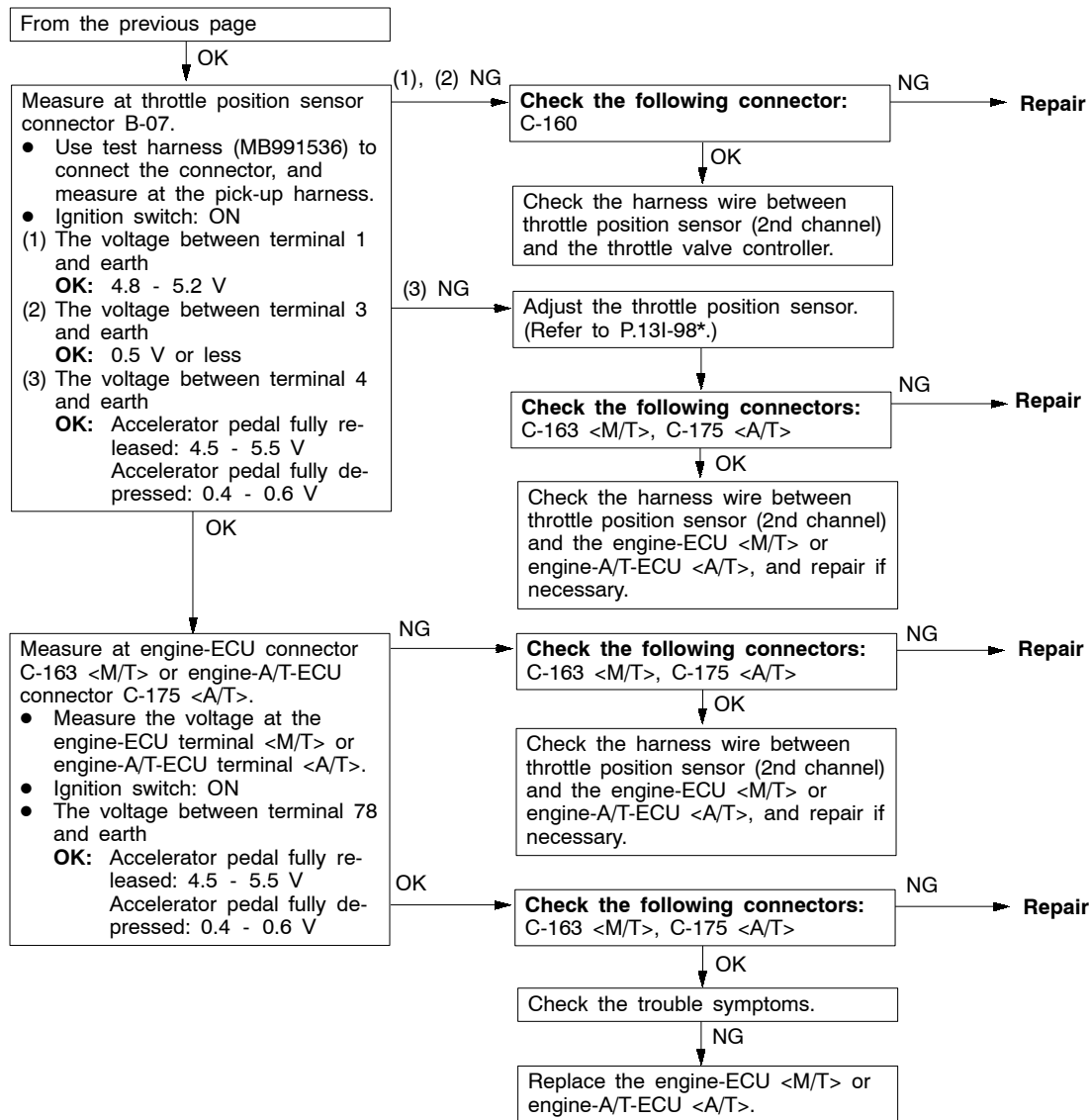


NOTE:

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| Code No. 0225 Throttle position sensor (2nd channel) system | Probable cause |
|--|---|
| <p>The throttle valve controller judges a malfunction, and then transmit the result to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.</p> <p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON The throttle position sensor (1st channel) is normal. <p>Set Conditions</p> <ul style="list-style-type: none"> The sensor output voltage is 0.2 V or less for four seconds. <p>or</p> <ul style="list-style-type: none"> The sensor output voltage is 4.85 V or more for four seconds, and the output voltage of the throttle position sensor (1st channel) is 1.2 V or more. <p>or</p> <ul style="list-style-type: none"> The throttle position sensor (1st channel) and throttle position sensor (2nd channel) combination output voltage is outside 4 - 6 V. | <ul style="list-style-type: none"> Malfunction of throttle position sensor (2nd channel) Open or short circuit in the throttle position sensor (2nd channel) circuit or loose connector contact Malfunction of the throttle valve controller Malfunction of the engine-ECU <M/T> Malfunction of the engine-A/T-ECU <A/T> |

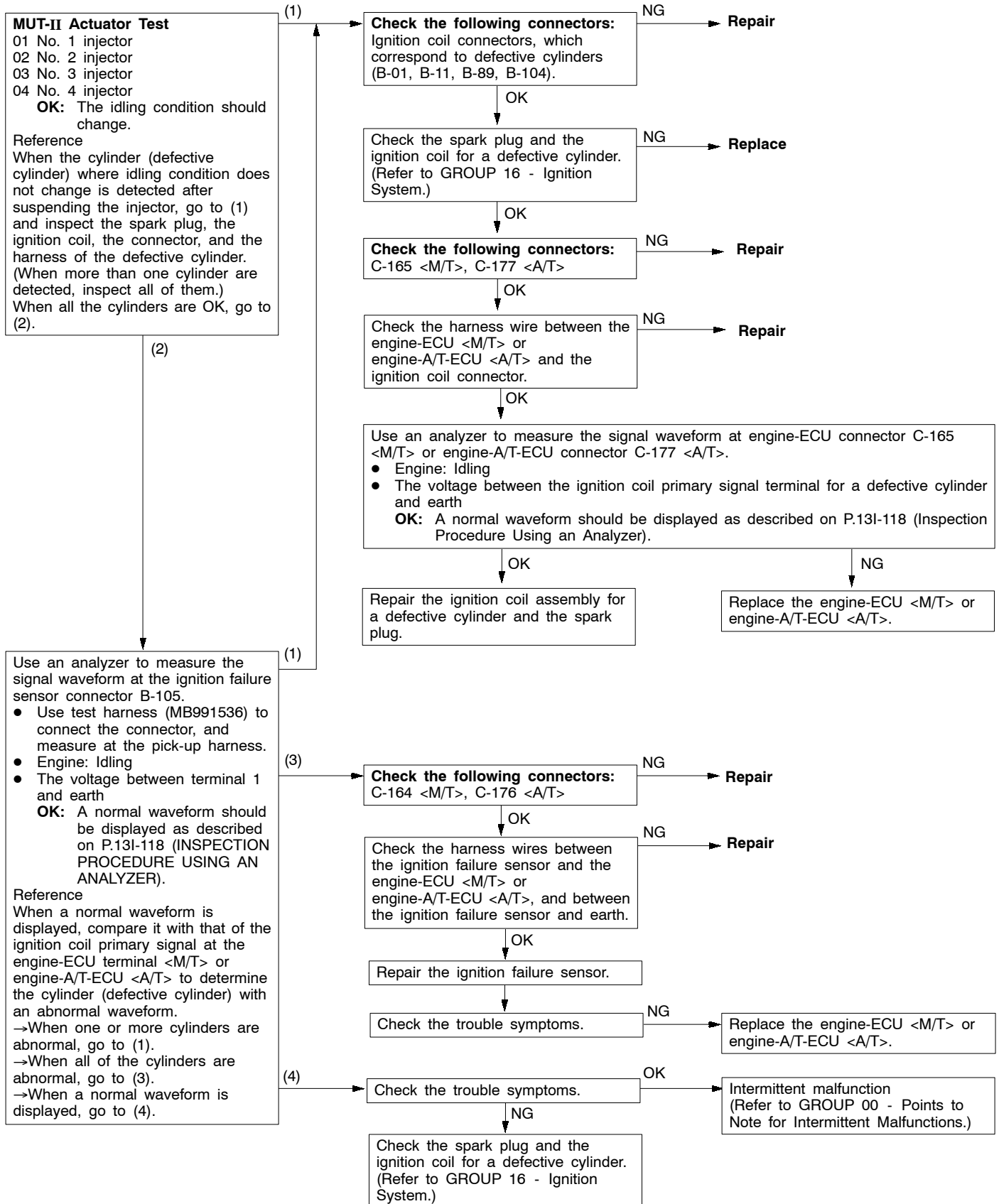




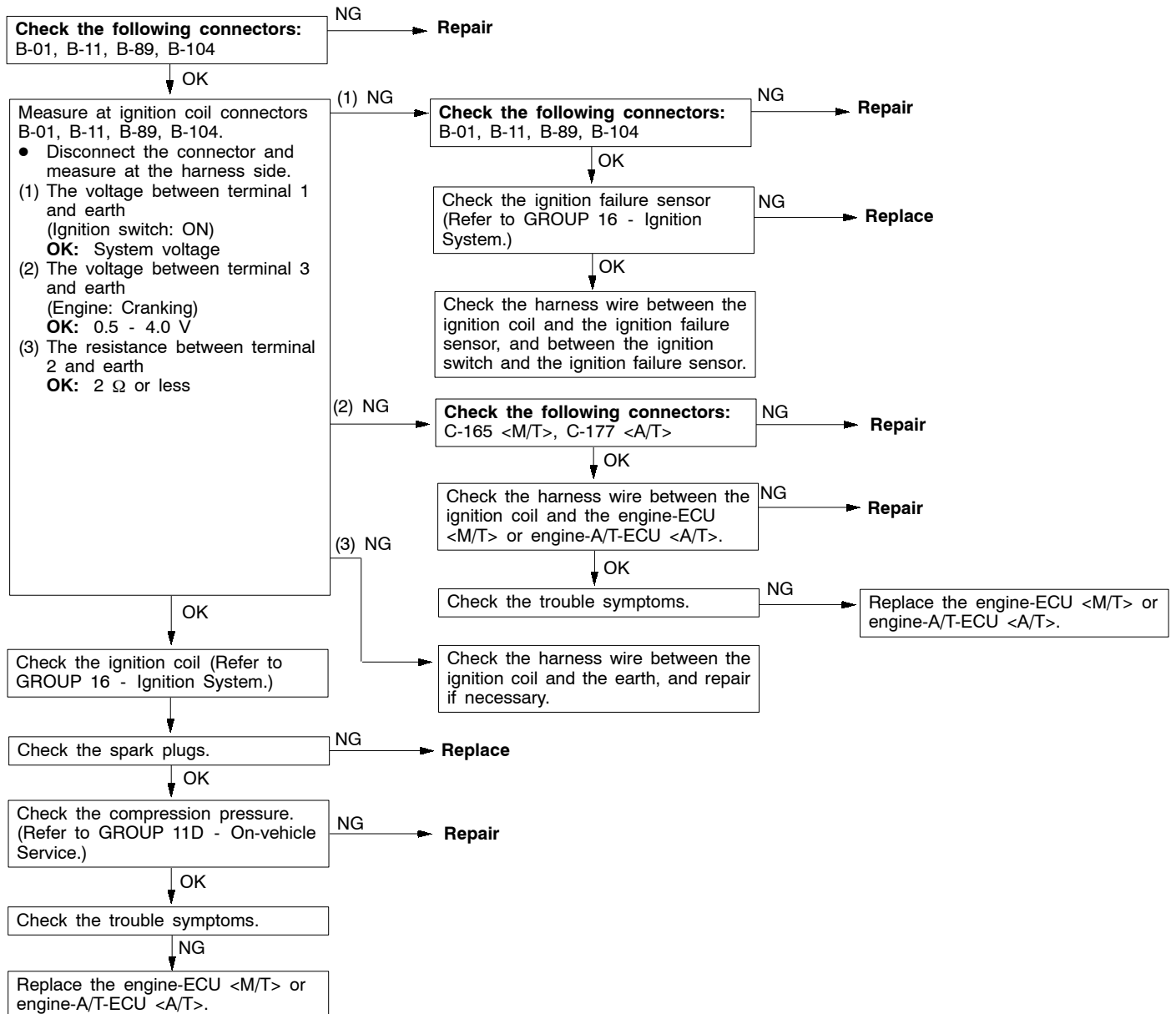
NOTE:

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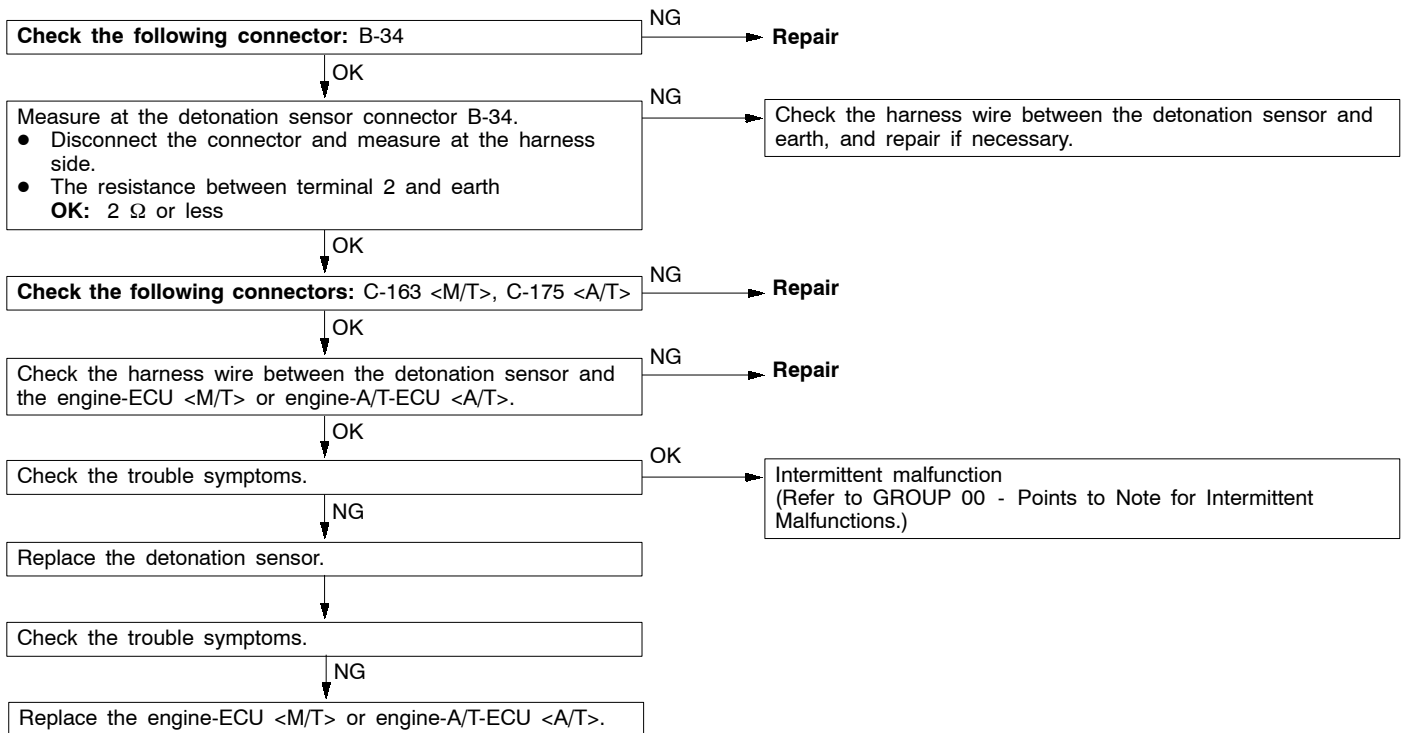
| Code No. P0300 Ignition coil (power transistor) system | Probable cause |
|--|---|
| Range of Check <ul style="list-style-type: none"> • Engine speed is approx. 50 - 4,000 r/min. • Engine is not cranking. Set Conditions <ul style="list-style-type: none"> • The ignition failure sensor does not send a signal about a certain cylinder for four seconds. | <ul style="list-style-type: none"> • Malfunction of the ignition coil • Malfunction of the ignition failure sensor • Malfunction of spark plug • Open or short circuit in the primary ignition circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



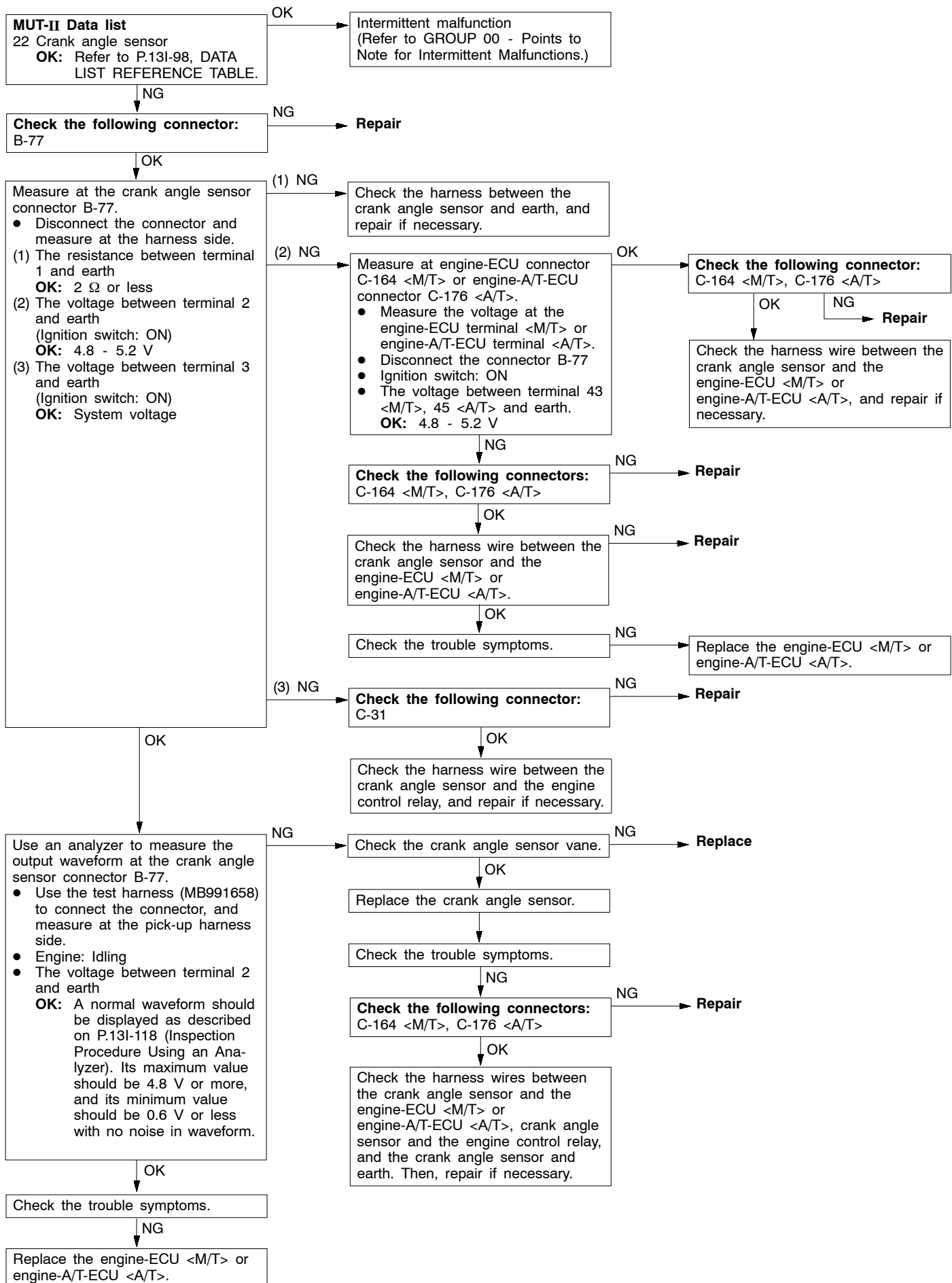
| | |
|--|---|
| Code No. P0301 No. 1 cylinder misfire detected Code No. P0302 No. 2 cylinder misfire detected Code No. P0303 No. 3 cylinder misfire detected Code No. P0304 No. 4 cylinder misfire detected | Probable cause |
| Range of Check • The engine speed is 500 - 4,500 r/min. • While the engine is running except deceleration and sudden acceleration. Set Conditions • The number of misfires exceeds a predetermined number per 200 engine revolutions (Misfire has occurred in only one cylinder). or • The number of misfires exceeds a predetermined number per 100 engine revolutions (Misfire has occurred in only one cylinder). | • Malfunction of the ignition system • Abnormal compression • Malfunction of injector • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



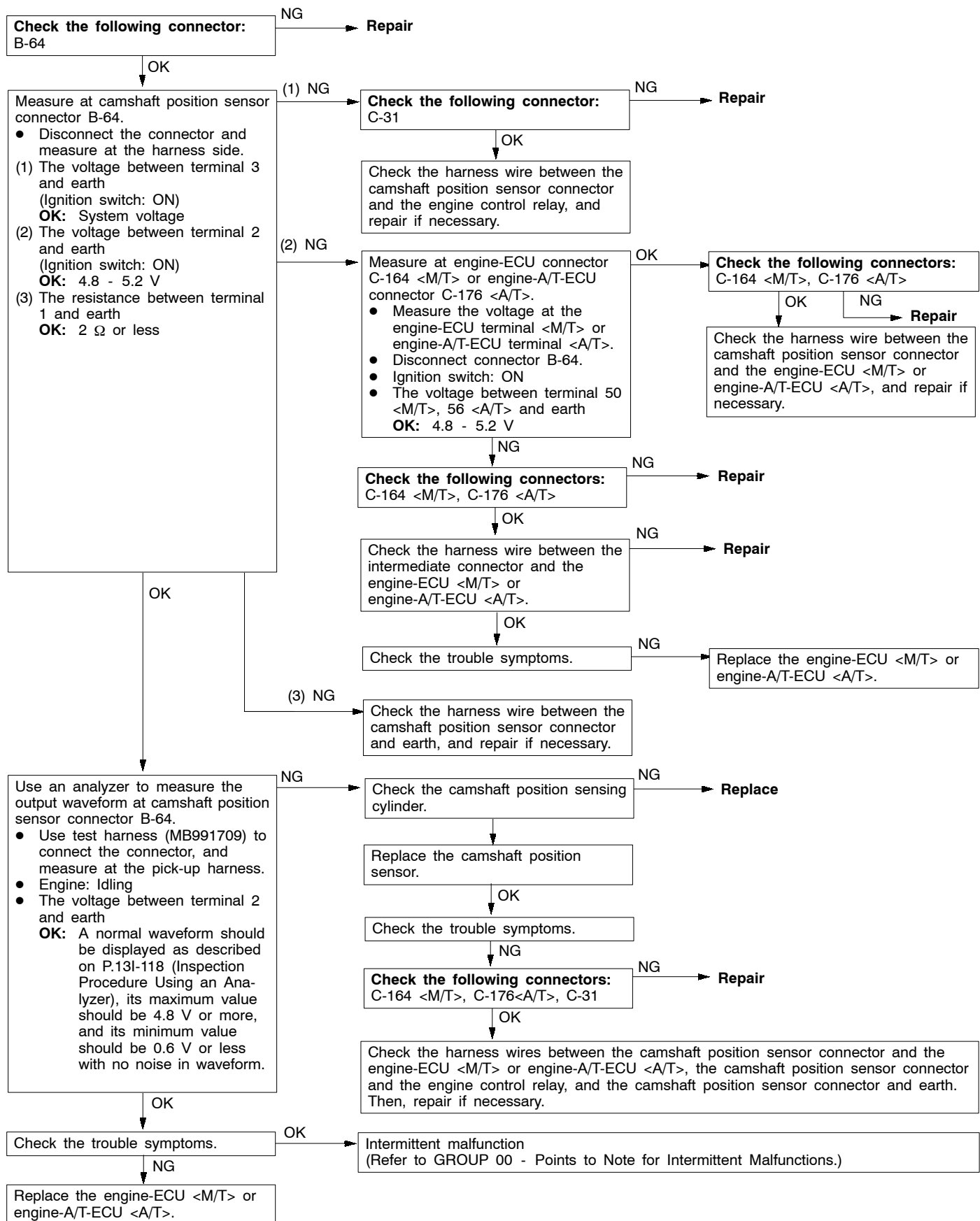
| Code No. P0325 Detonation sensor system | Probable cause |
|--|---|
| Range of Check • Engine: Two seconds after the engine has been started Set Conditions • Changes in sensor output voltage (detonation sensor peak voltage per 1/3 crankshaft rotation) in 200 consecutive cycles are 0.08 V or less. | • Malfunction of the detonation sensor • Open or short circuit in the detonation sensor circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



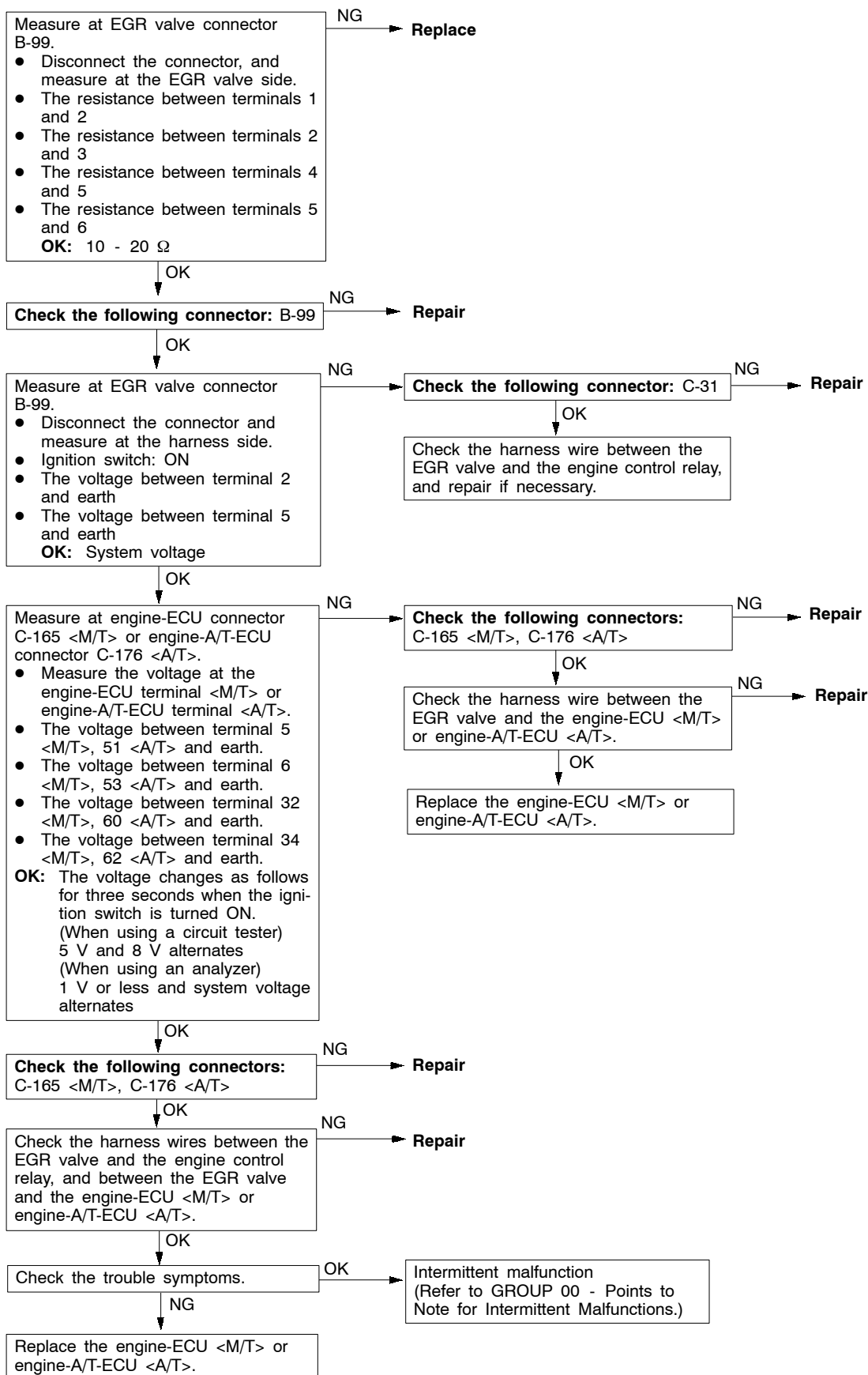
| Code No. P0335 Crank angle sensor system | Probable cause |
|--|---|
| Range of Check • Engine is cranking Set Conditions • Sensor output voltage does not change for 4 seconds (no pulse signal input). | • Malfunction of the crank angle sensor. • Open or short circuit in the crank angle sensor circuit or loose connector contact. • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



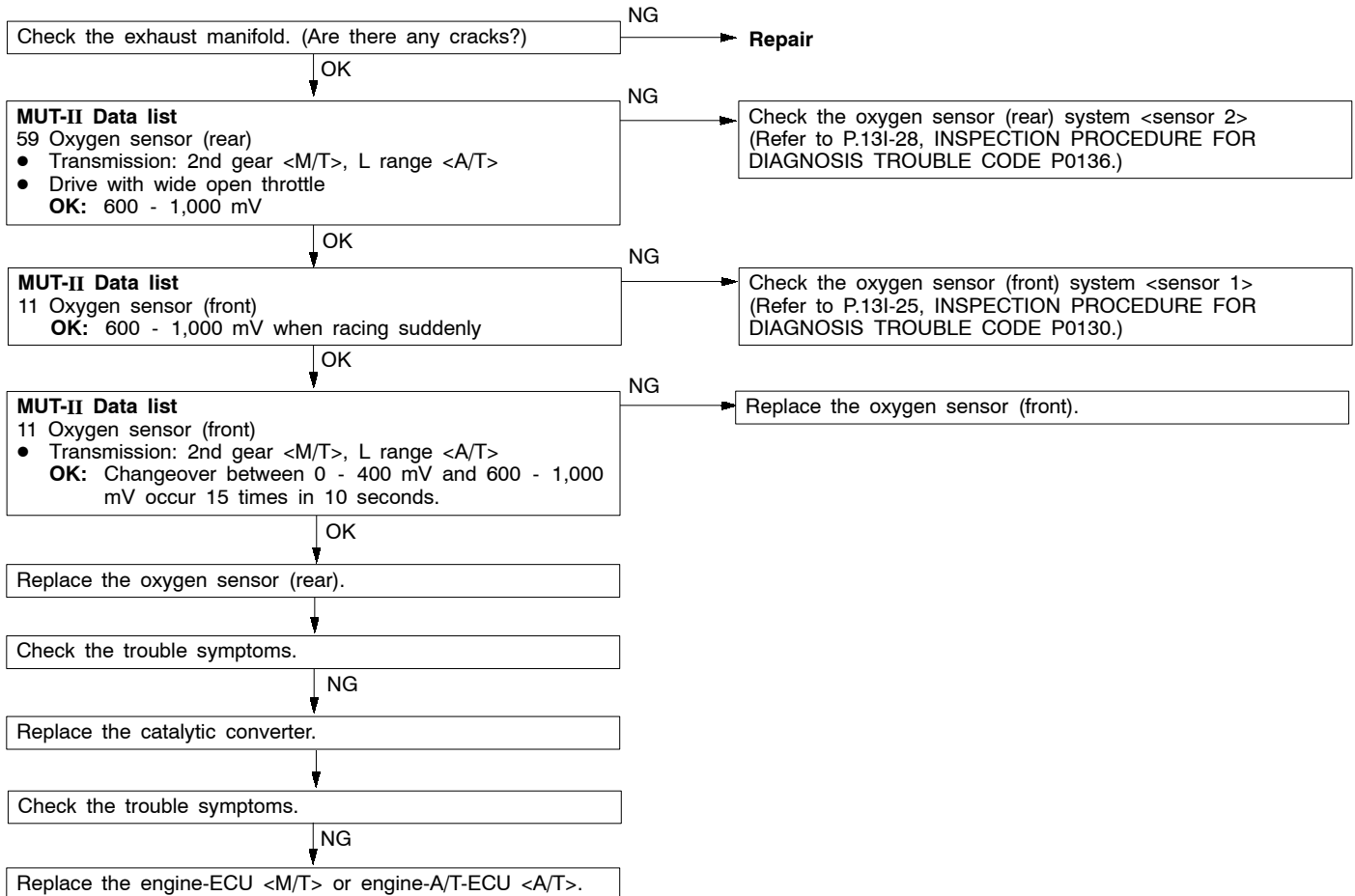
| Code No. P0340 Camshaft position sensor system | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none">● After the engine was started <p>Set Conditions</p> <ul style="list-style-type: none">● The sensor output voltage does not change for 4 seconds (no pulse signal input). | <ul style="list-style-type: none">● Malfunction of the camshaft position sensor● Open or short circuit in the camshaft position sensor circuit or loose connector contact.● Malfunction of engine-ECU <M/T>● Malfunction of engine-A/T-ECU <A/T> |



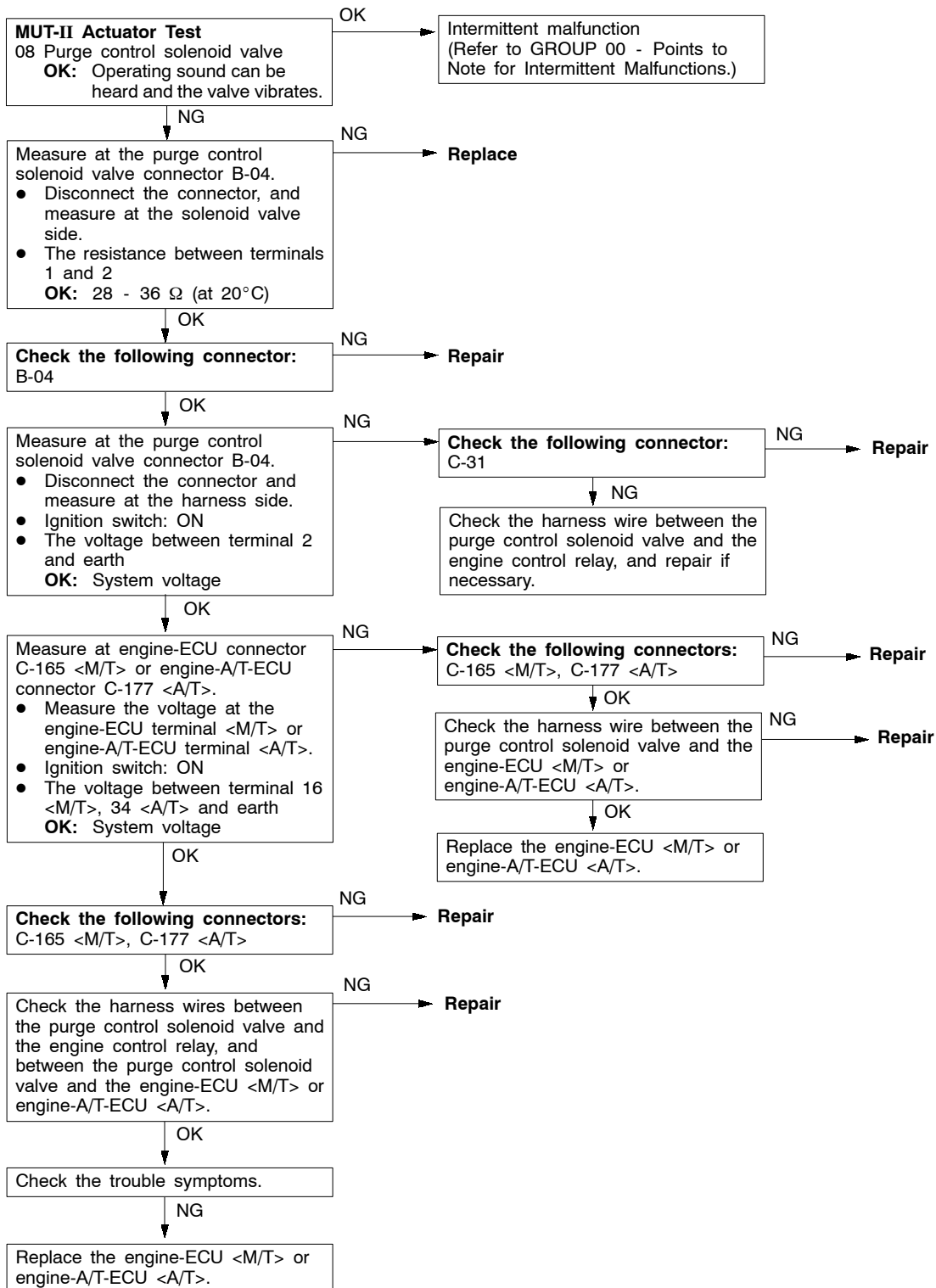
| Code No. P0403 EGR valve system | Probable cause |
|--|--|
| <p>Range of Check</p> <ul style="list-style-type: none">● Ignition switch: OFF to ON● EGR valve is in operation after the engine starting process is complete. <p>Set Conditions</p> <ul style="list-style-type: none">● Off-surge voltage is not generated from the motor coil while the EGR valve control motor is running. | <ul style="list-style-type: none">● Malfunction of the EGR valve● Open or short circuit in the EGR valve circuit or loose connector contact● Malfunction of engine-ECU <M/T>● Malfunction of engine-A/T-ECU <A/T> |



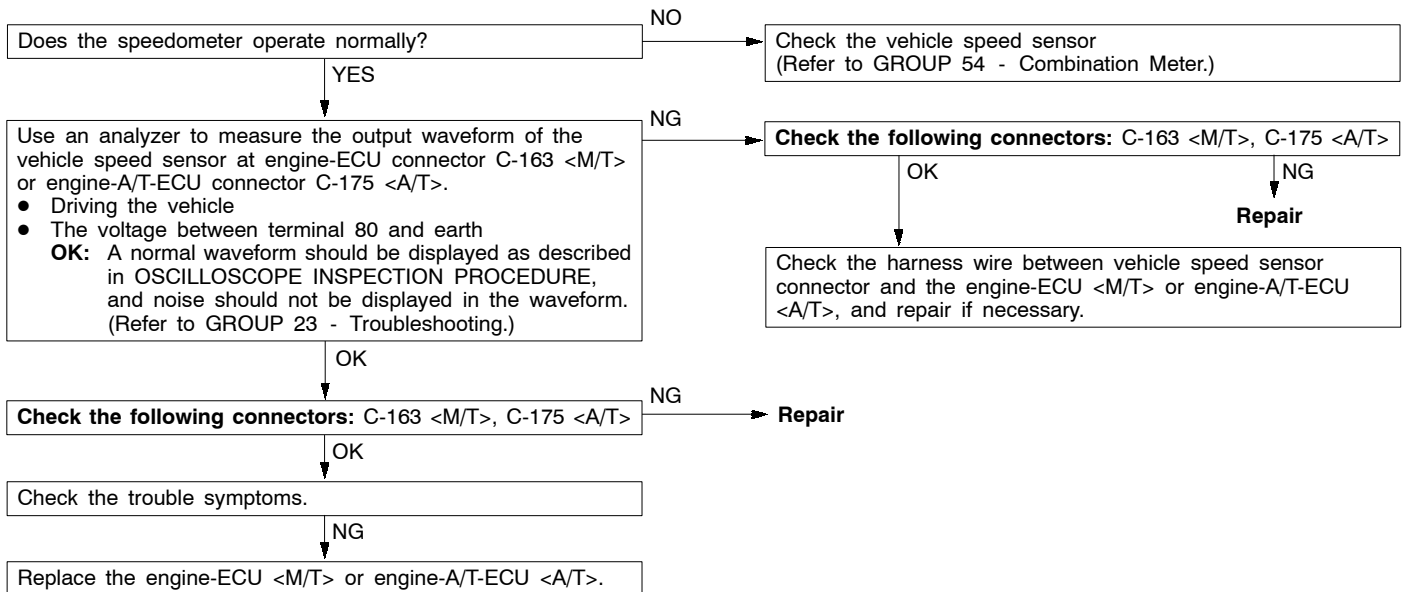
| Code No. P0420 Catalyst malfunction | Probable cause |
|---|--|
| Range of Check <ul style="list-style-type: none"> • The engine speed is 3,000 r/min or less. • During driving • During air/fuel ratio feedback control Set Conditions <ul style="list-style-type: none"> • The ratio between the oxygen sensor (rear) and the oxygen sensor (front) output frequencies reaches 0.8 per 12 seconds on average. | <ul style="list-style-type: none"> • Malfunction of catalyst • Malfunction of the oxygen sensor (front) • Malfunction of the oxygen sensor (rear) • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



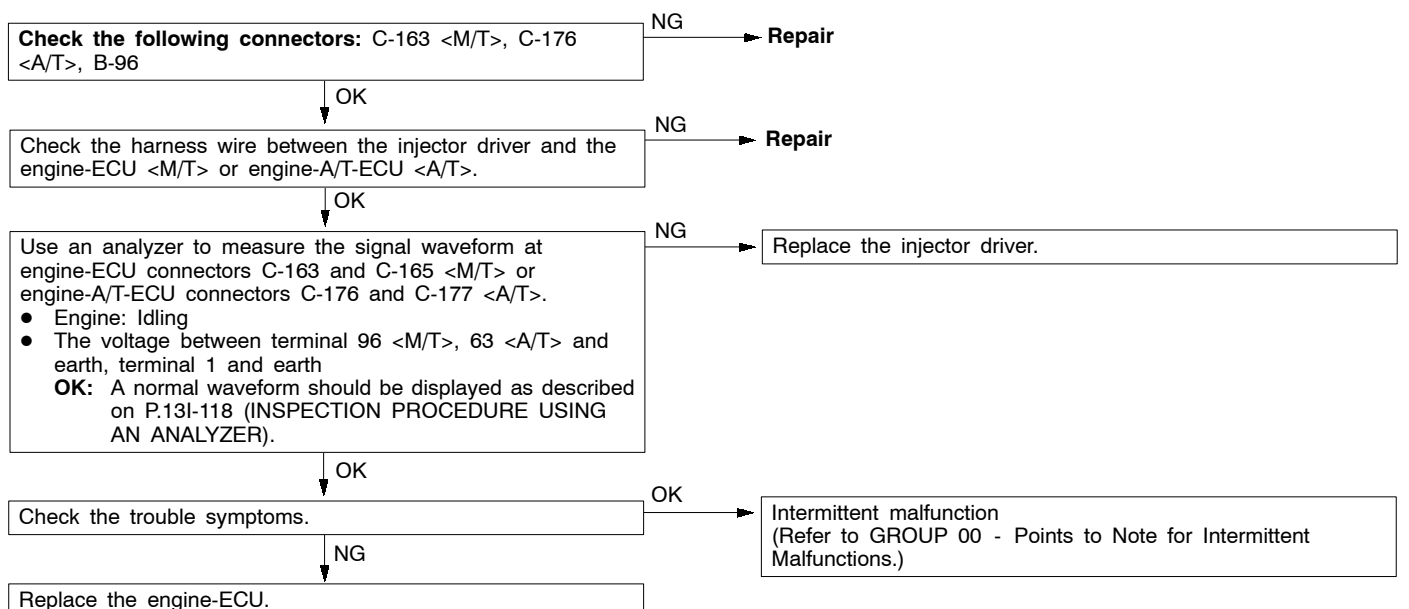
| Code No. P0443 Purge control solenoid valve system | Probable cause |
|--|---|
| Range of Check • Ignition switch: ON • Battery voltage is 10 V or more. Set Conditions • The solenoid coil surge voltage (battery voltage + 2 V) is not detected when the purge control solenoid valve is turned from on to off. | • Malfunction of the purge control solenoid valve • Open or short circuit in the purge control solenoid valve circuit or loose connector contact • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



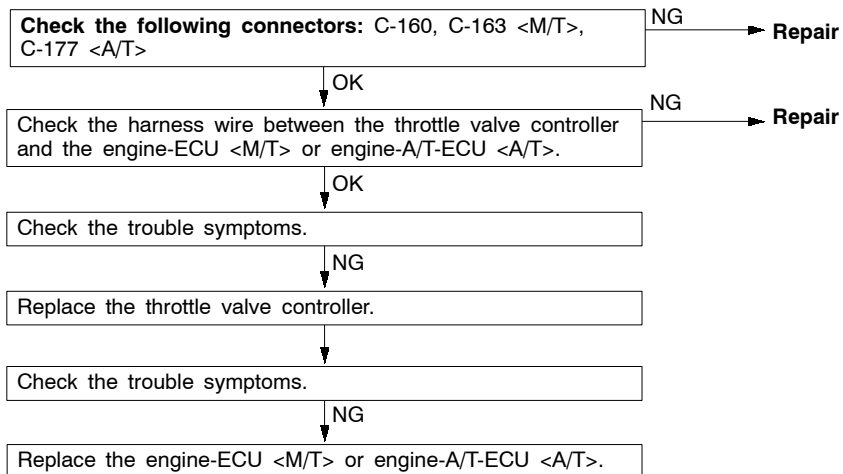
| Code No. P0500 Vehicle speed sensor system | Probable cause |
|---|---|
| Range of Check <ul style="list-style-type: none"> Engine: Two seconds after the engine was started Idle switch: OFF Engine speed: 2,500 r/min or more During high engine load Set Conditions <ul style="list-style-type: none"> The sensor output voltage does not change for 4 seconds (no pulse signal input). | <ul style="list-style-type: none"> Malfunction of the vehicle speed sensor Open or short circuit in the vehicle speed sensor circuit or loose connector contact Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |



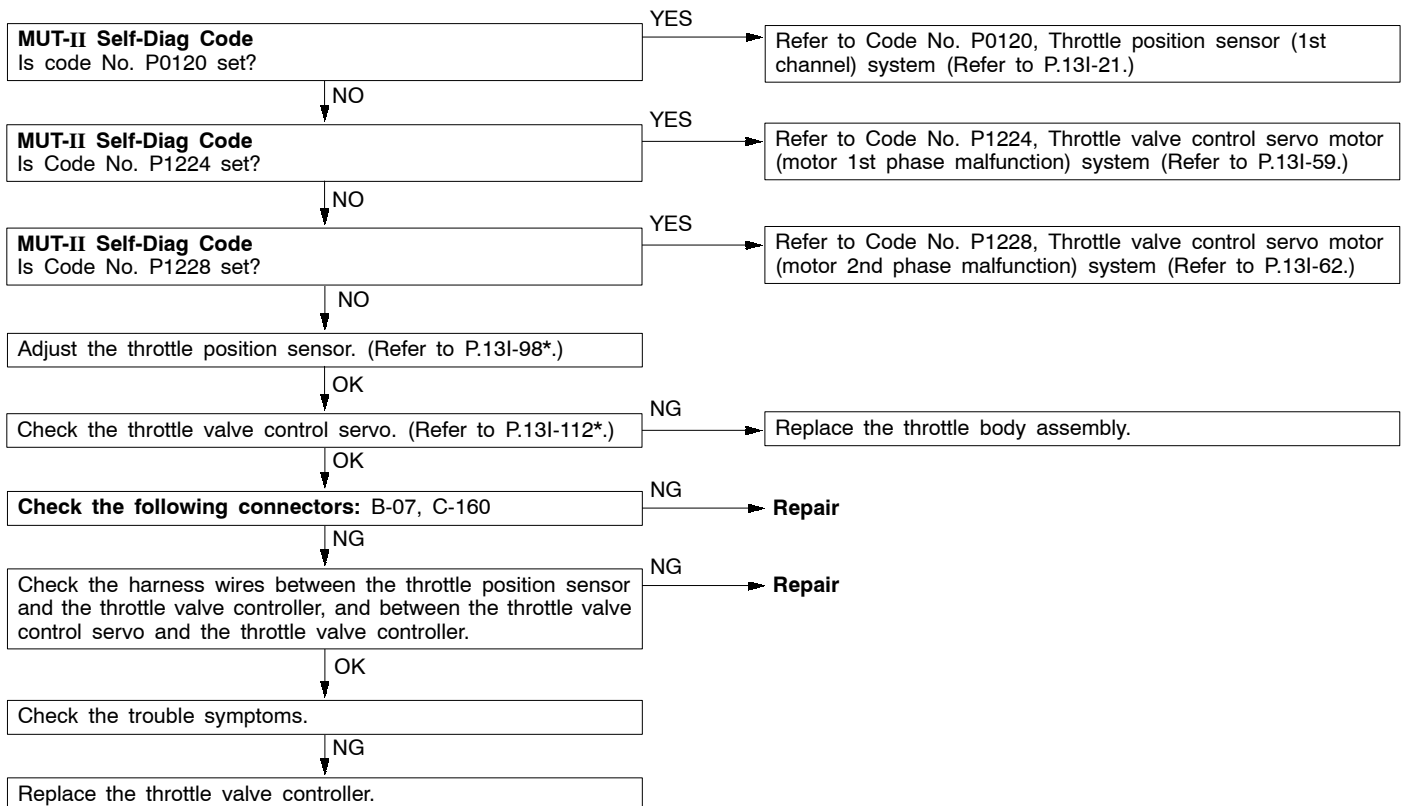
| Code No. P1200 Injector driver system | Probable cause |
|--|---|
| Range of Check <ul style="list-style-type: none"> Engine speed: 4,000 r/m or less Battery voltage: 10 V or more The fuel cut operation and the injector operation (by carrying out the Actuator test) are not in progress. During high engine load Set Conditions <ul style="list-style-type: none"> Injector open circuit check signal is not output from the injector driver. | <ul style="list-style-type: none"> Malfunction of the injector driver Open or short circuit, or loose connector contact Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |



| Code No. P1220 Electronic-controlled throttle valve system | Probable cause |
|--|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Error in communication between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the throttle valve controller <p>Set Conditions</p> <ul style="list-style-type: none"> Output voltage of throttle position sensor (2nd channel) fluctuates significantly (approx. 1 V or more) from an expected value, based on that of the accelerator pedal position sensor (2nd channel). <p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Error in communication between the throttle valve controller and the engine-ECU <M/T> or engine-A/T-ECU <A/T> <p>Set Conditions</p> <ul style="list-style-type: none"> The output voltage of the throttle position sensor (2nd channel) is significantly different (approx. 1 V) from the throttle valve opening angle (voltage), which the engine-ECU <M/T> or engine-A/T-ECU <A/T> request the throttle valve controller. | <ul style="list-style-type: none"> Short in communication line Malfunction of the engine-ECU <M/T> Malfunction of the engine-A/T-ECU <A/T> Malfunction of the throttle valve controller |

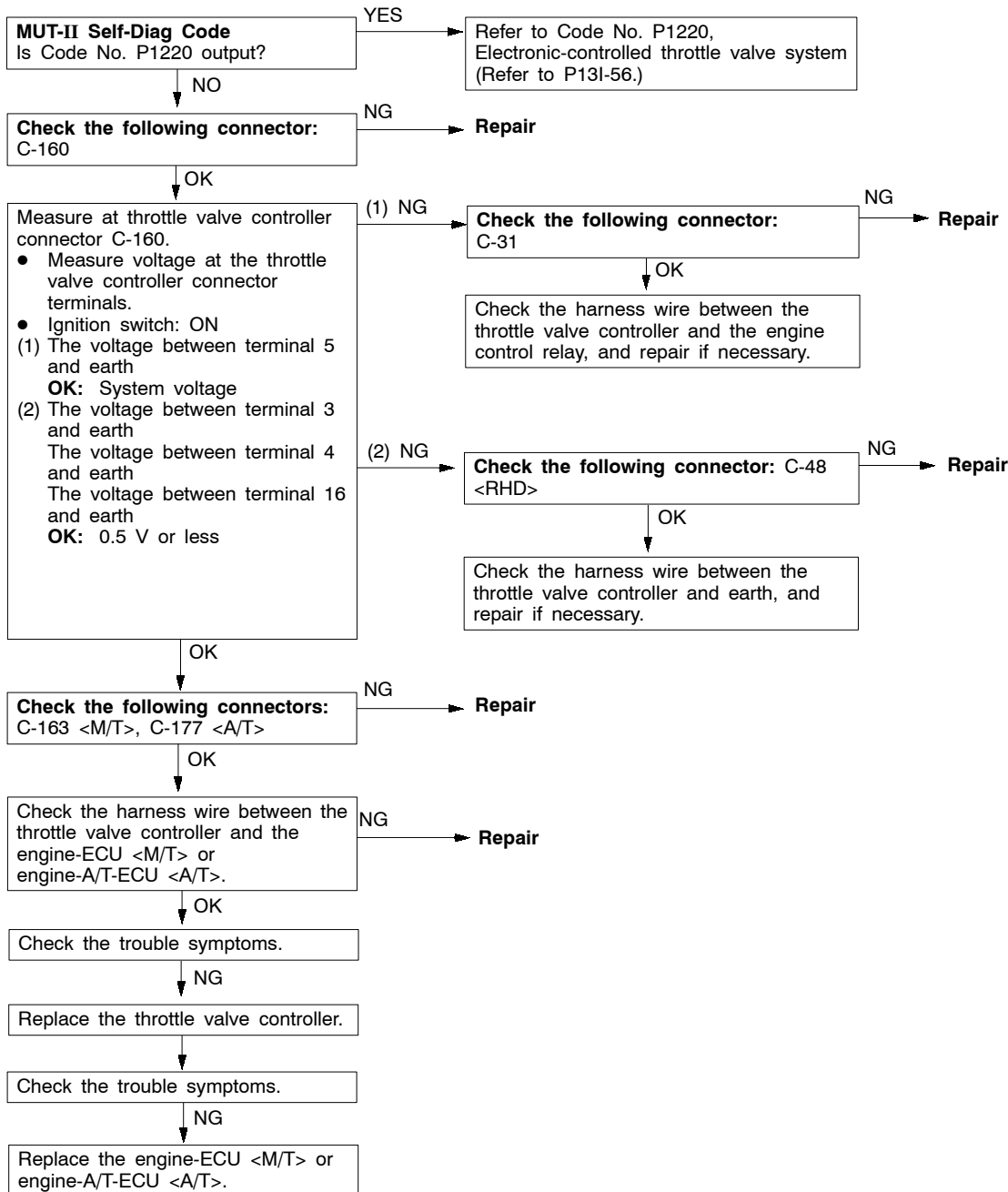


| Code No. P1221 Throttle valve position feedback system | Probable cause |
|--|---|
| <p>The throttle valve controller judges a malfunction, and then transmit the result to the engine-ECU <M/T> or engine-A/T-ECU <A/T>.</p> <p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Battery voltage: 10 V or more <p>Set Conditions</p> <ul style="list-style-type: none"> Failure in the motor position feedback (The engine-ECU <M/T> or engine-A/T-ECU <A/T> detects that the current in the motor is excessive and the opening angle difference between the target value of throttle position sensor (1st channel) and the actual value of throttle position sensor (1st channel) is 1.0 V or more) | <ul style="list-style-type: none"> Malfunction of throttle position sensor (1st channel) Open or short circuit in the throttle position sensor (1st channel) circuit or loose connector contact Malfunction of the throttle valve controller |

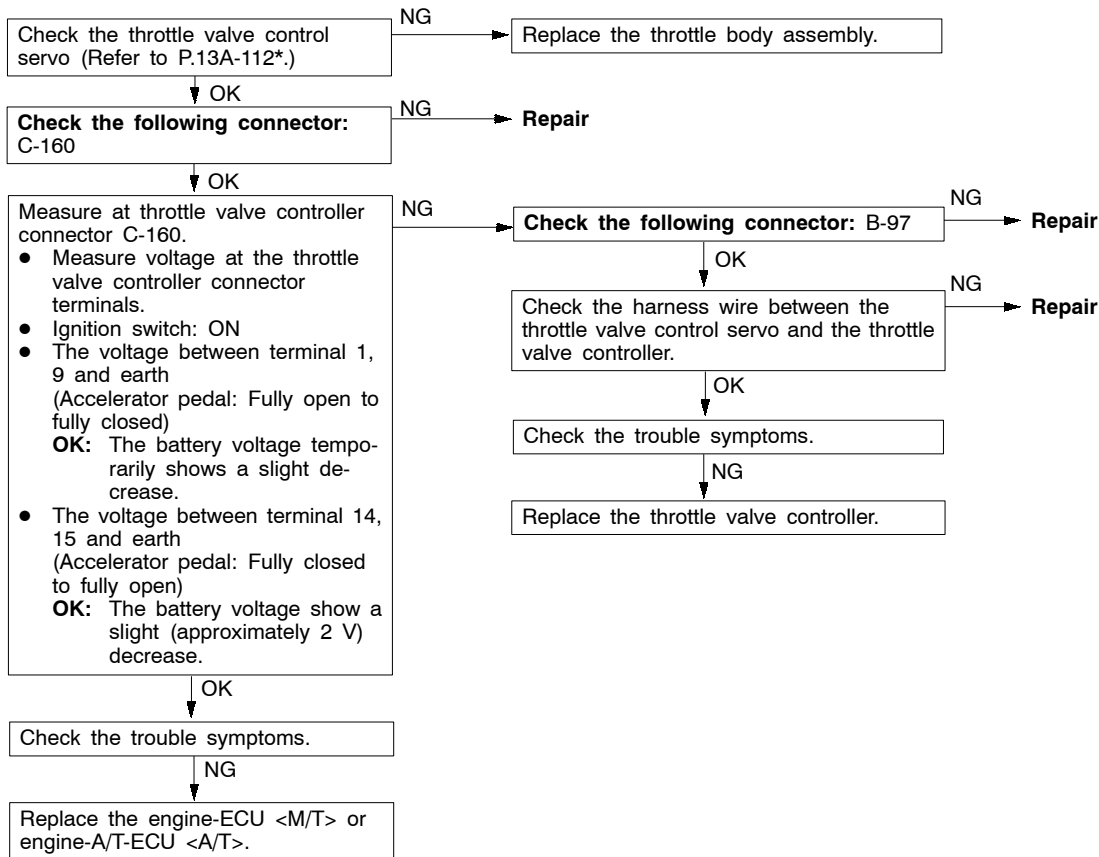
**NOTE:**

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| Code No. P1223 Communication line system with the throttle valve controller | Probable cause |
|--|---|
| Range of Check <ul style="list-style-type: none"> Ignition switch: ON Battery voltage: 8 V or more. Engine: Not cranking Set Conditions <ul style="list-style-type: none"> System detects an error in communication line between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the throttle valve controller, and between the throttle valve controller and the engine-ECU <M/T> or engine-A/T-ECU <A/T>. | <ul style="list-style-type: none"> Short in communication line Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> Malfunction of throttle valve controller |

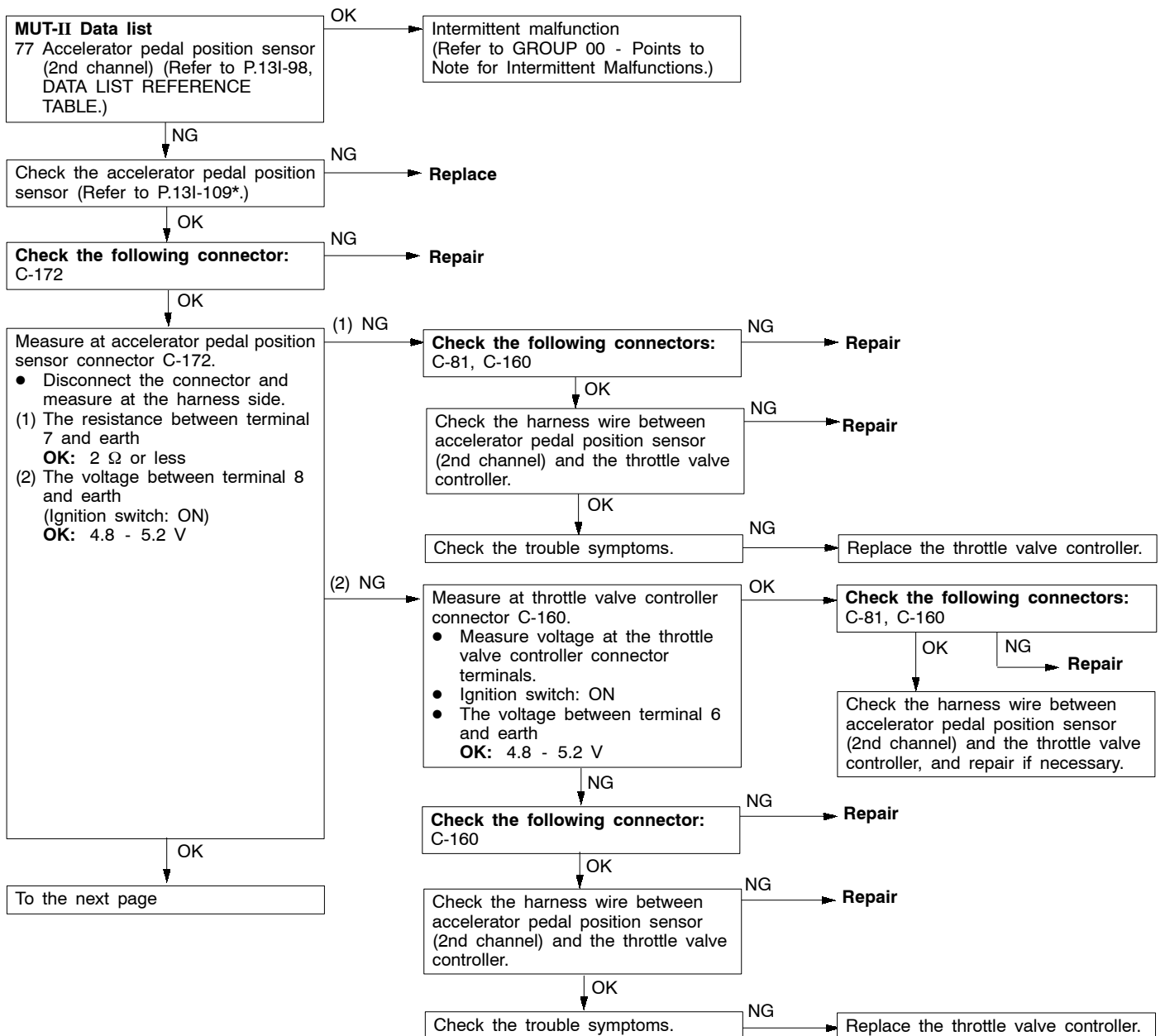


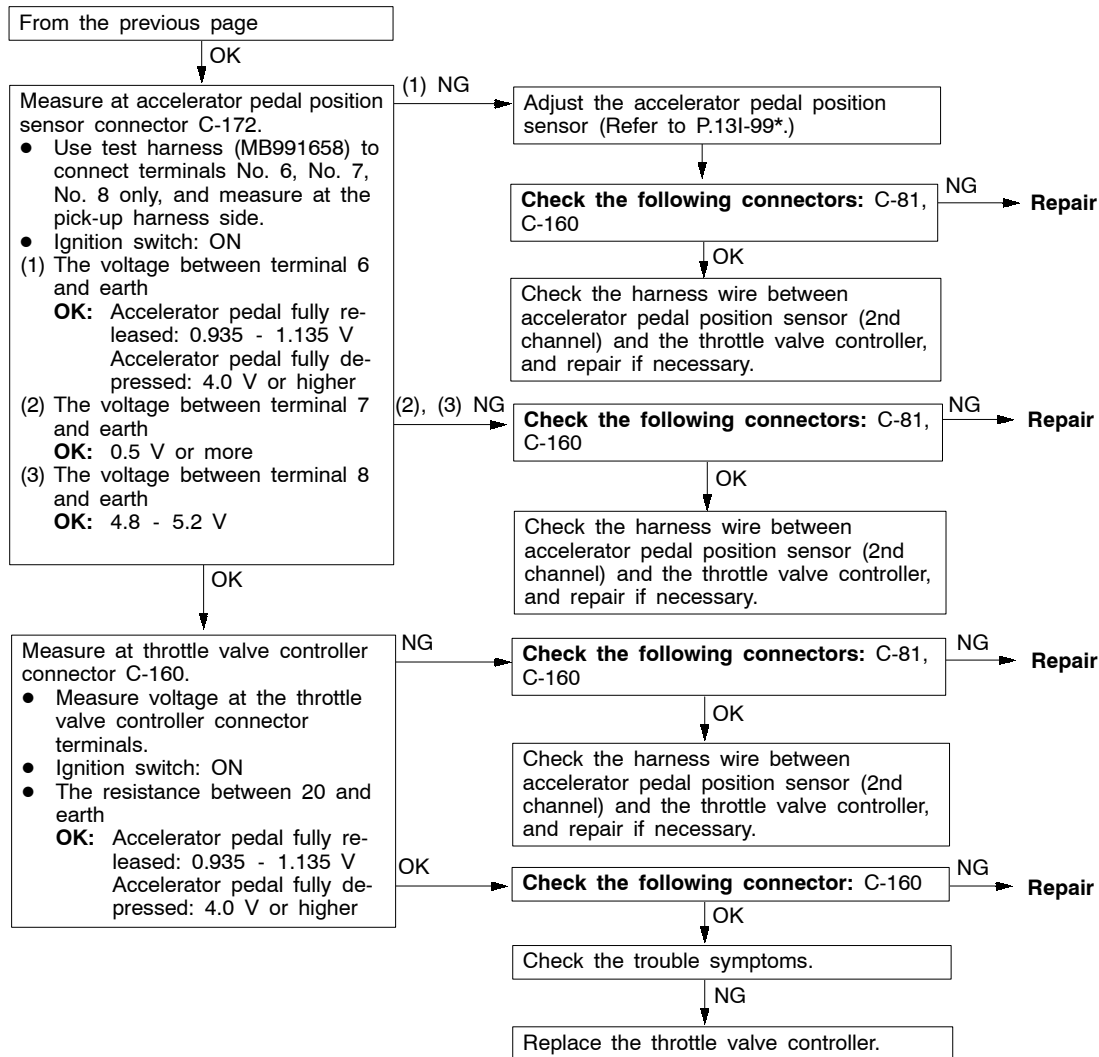
| Code No. P1224 Throttle valve control servo motor (Motor 1st phase malfunction) system | Probable cause |
|--|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> Throttle valve control servo relay: ON System voltage: 8 V or more. <p>Set Conditions</p> <ul style="list-style-type: none"> Throttle valve control servo drive circuit is shorted to earth. Other power source interferences with throttle valve control servo drive circuit. Throttle valve control servo drive circuit is open circuit. | <ul style="list-style-type: none"> Malfunction of the throttle valve control servo Open circuit or short-circuited harness wire in throttle valve control servo system, or poor connector contact Malfunction of the throttle valve controller |

**NOTE:**

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| Code No. P1225 Accelerator pedal position sensor (2nd channel) system | Probable cause |
|---|---|
| <p>Range of Check</p> <ul style="list-style-type: none"> Accelerator pedal position sensor (1st channel) is normal. Communication between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the throttle valve controller is normal. <p>Set Conditions</p> <ul style="list-style-type: none"> Output voltage of the accelerator pedal position sensor (2nd channel) is 0.2 V or less for one second <p>or</p> <ul style="list-style-type: none"> Output voltage of the accelerator pedal position sensor (1st channel) is 2.5 V or less, and output voltage of the accelerator pedal position sensor (2nd channel) is 4.5 V or more for one second. <p>or</p> <ul style="list-style-type: none"> Difference between the accelerator pedal position sensor (1st and 2nd channels) output voltages exceeds 1.0 V (i.e. when the throttle valve opening angle changes slightly). | <ul style="list-style-type: none"> Malfunction of accelerator pedal position sensor (2nd channel) Open or short circuit in accelerator pedal position sensor (2nd channel) circuit or loose connector contact Malfunction of the throttle valve controller Malfunction of engine-ECU <M/T> Malfunction of engine-A/T-ECU <A/T> |

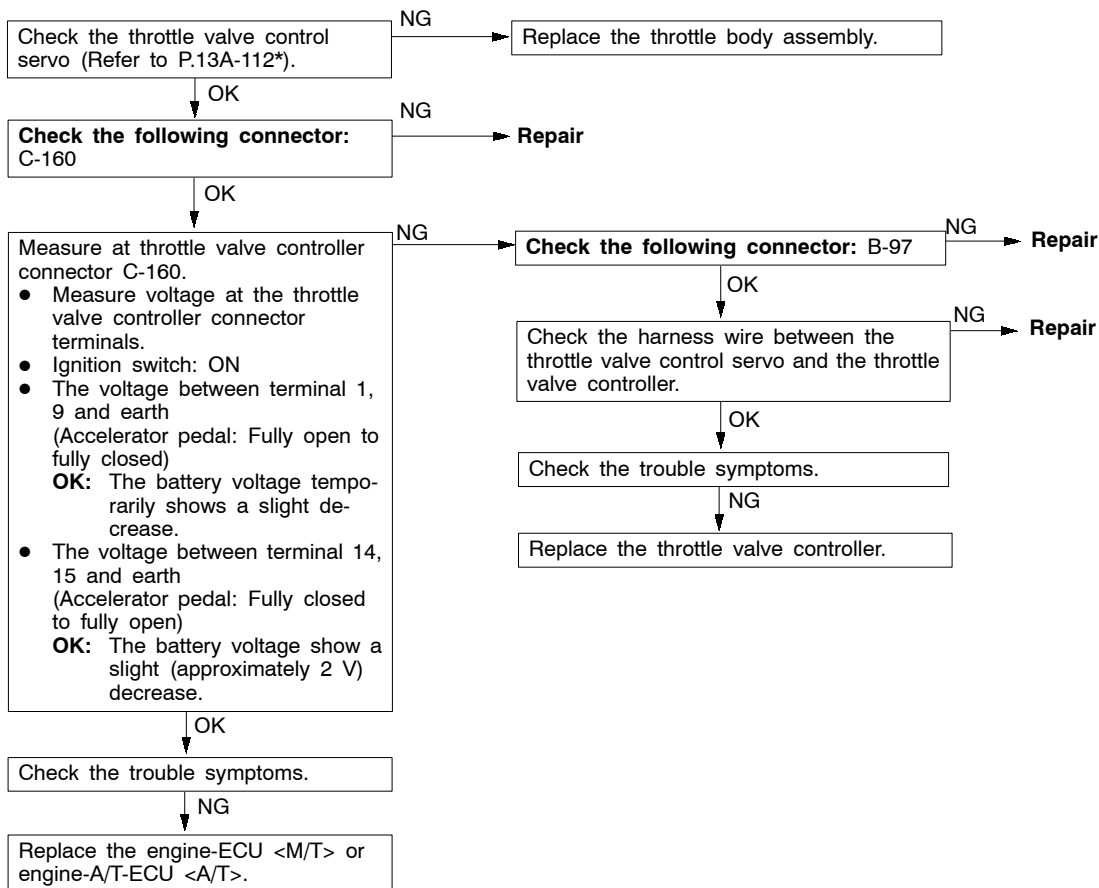




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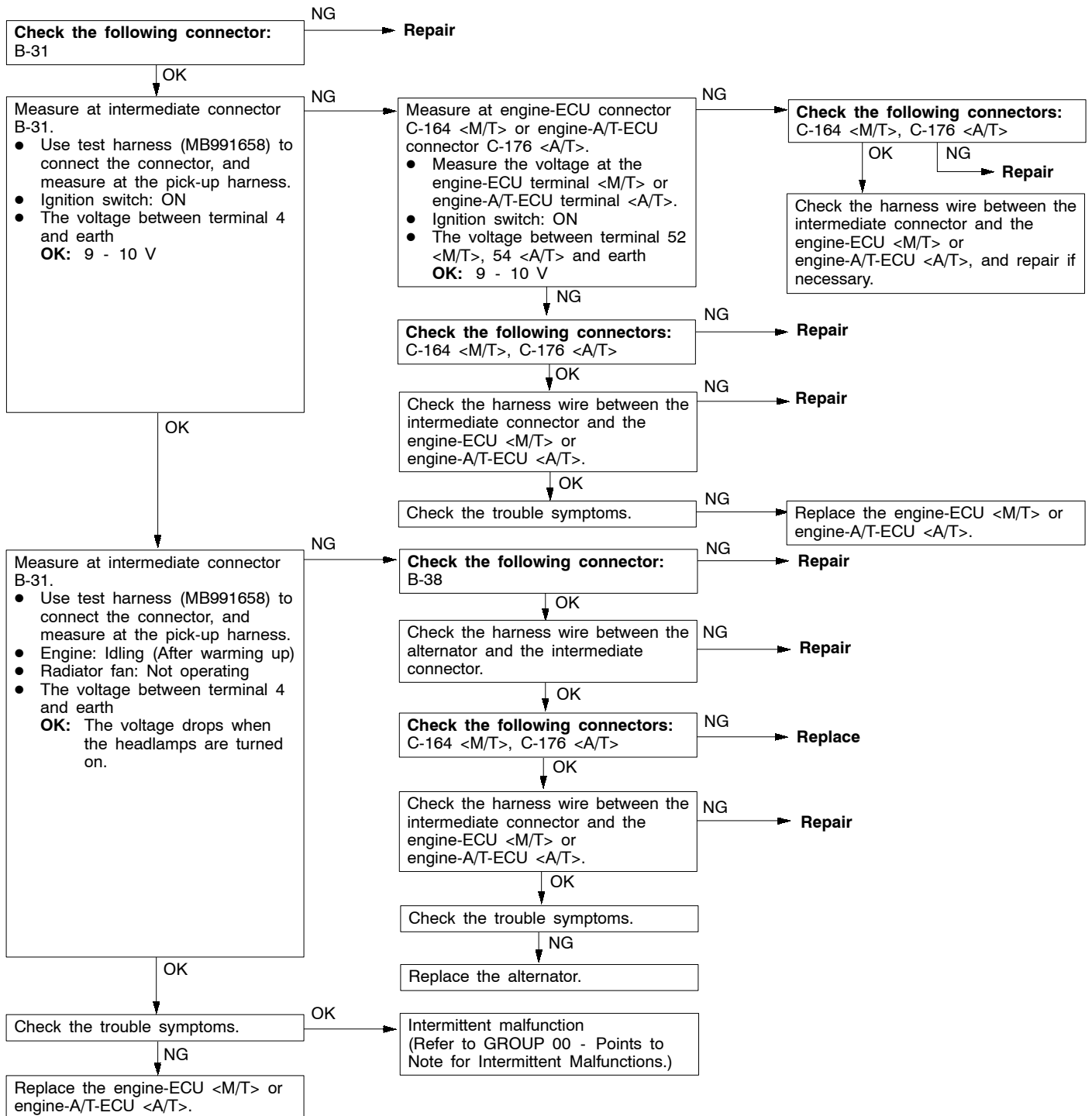
*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

| Code No. P1228 Throttle valve control servo motor (Motor 2nd phase malfunction) system | Probable cause |
|--|---|
| Range of Check <ul style="list-style-type: none"> Throttle valve control servo relay: ON System voltage: 8 V or more Set Conditions <ul style="list-style-type: none"> Throttle valve control servo drive circuit is shorted to earth. Other power source interferes with throttle valve control servo drive circuit. Throttle valve control servo drive circuit is open-circuit. | <ul style="list-style-type: none"> Malfunction of the throttle valve control servo Open circuit or short-circuited harness wire in throttle valve control servo system, or poor connector contact Malfunction of the throttle valve controller |

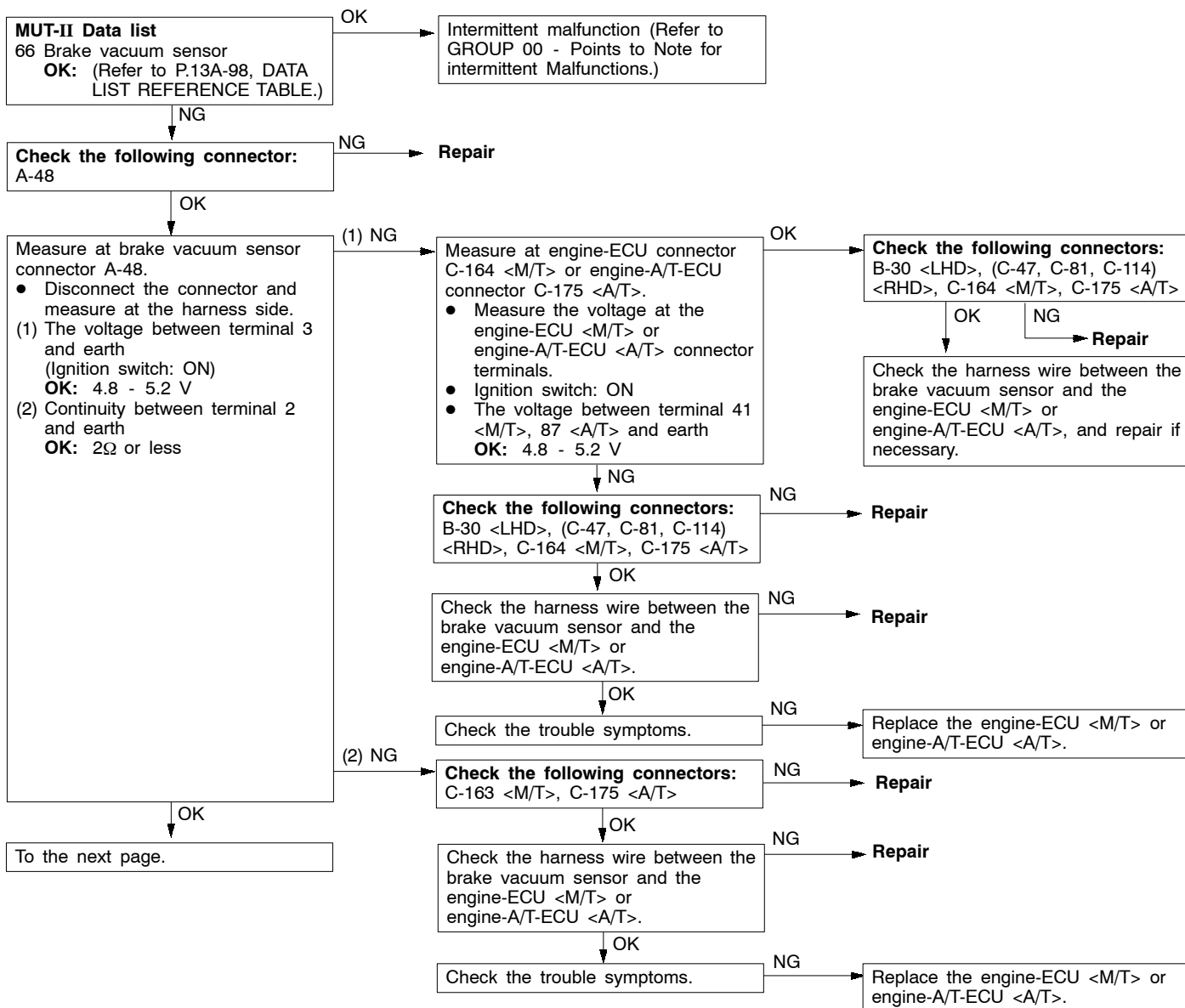
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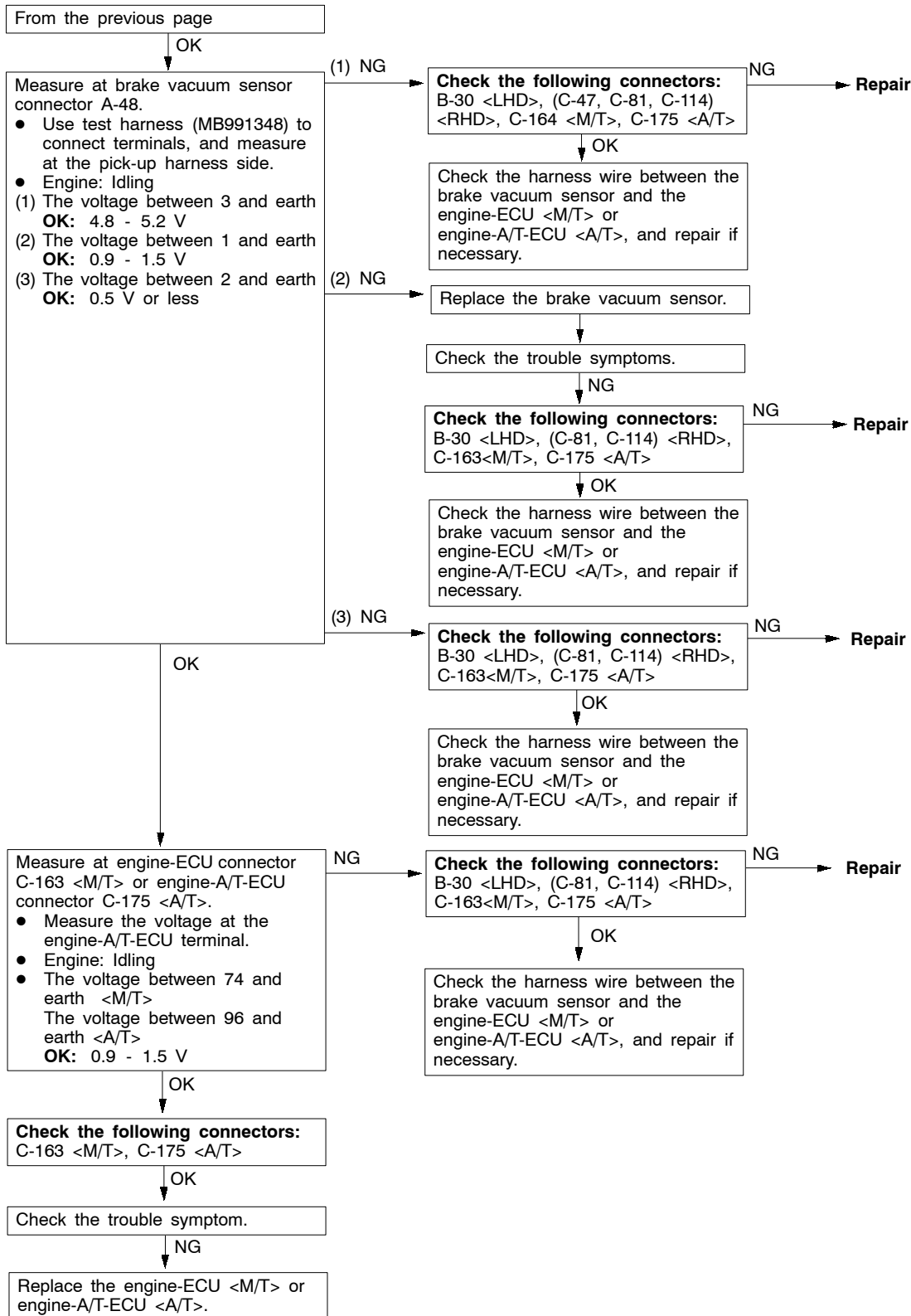
*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

| Code No. P1500 Alternator FR terminal system | Probable cause |
|---|--|
| Range of Check • Engine speed: 50 r/min or more Set Conditions • Input voltage from the alternator FR terminal is system voltage for 20 seconds. | • Open circuit in alternator FR terminal circuit • Malfunction of engine-ECU <M/T> • Malfunction of engine-A/T-ECU <A/T> |



| Code No. P1515 Brake vacuum sensor system | Probable cause |
|---|---|
| Range of Check • Ignition switch: ON Set Conditions • Sensor output voltage is 4.8 V or more. or • Sensor output voltage is 0.2 V or less. | • Malfunction of the brake vacuum sensor • Improper connector contact, open circuit or short-circuited harness wire of the brake vacuum sensor • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |

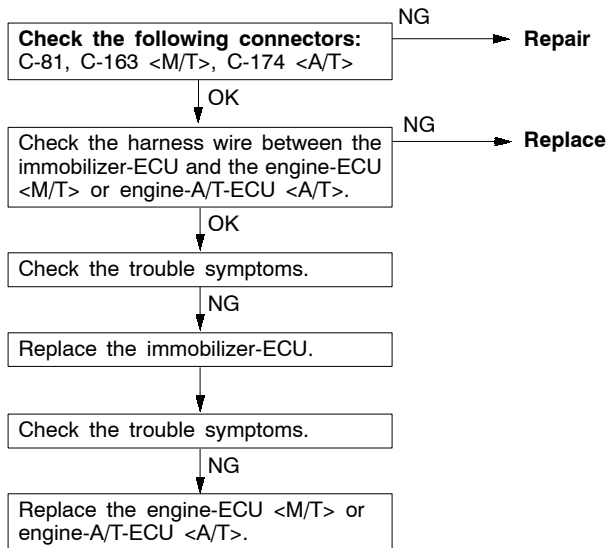




| Cord No. P1610 Immobilizer system | Probable cause |
|--|---|
| Range of Check • Ignition switch: ON Set Conditions • Improper communication between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the immobilizer-ECU | • Open or short circuit, or loose connector contact • Malfunction of the immobilizer-ECU • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |

NOTE

- (1) If the registered ignition keys are close each other when starting the engine, radio interference may cause this code to be displayed.
- (2) This code may be displayed when registering the key ID code.



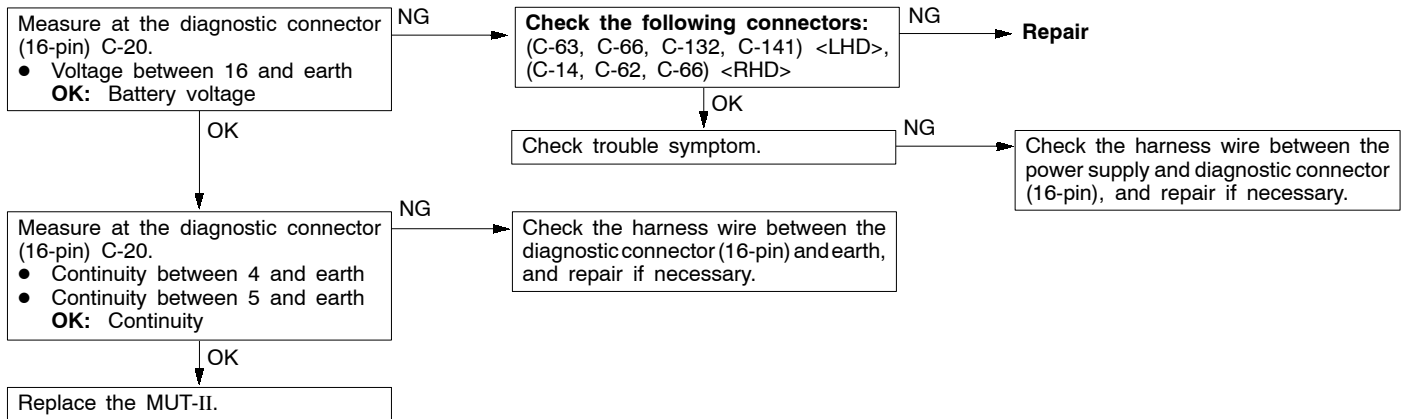
INSPECTION CHART FOR TROUBLE SYMPTOMS

| Trouble symptom | | Inspection procedure No. | Reference page |
|--|---|--------------------------|----------------|
| Communication with MUT-II is impossible. | Communication with all systems is not possible. | 1 | 13I-68 |
| | Communication with engine-ECU only is not possible. | 2 | 13I-68 |
| 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 | 13I-69 |
| | The engine warning lamp remains illuminating and never goes out. | 4 | 13I-69 |
| Starting | No initial combustion (starting impossible) | 5 | 13I-70 |
| | Initial combustion but no complete combustion (starting impossible) | 6 | 13I-72 |
| | Long time to start (improper starting) | | |
| Idling stability (Improper idling) | Unstable idling (Rough idling, hunting) | 7 | 13I-73 |
| | Idling speed is high. (Improper idling speed) | 8 | 13I-75 |
| | Idling speed is low. (Improper idling speed) | | |
| Idling stability (Engine stalls) | When the engine is cold, it stalls at idling. (Die out) | 9 | 13I-76 |
| | When the engine is hot, it stalls at idling. (Die out) | 10 | 13I-77 |
| | The engine stalls when starting the car. (Pass out) | 11 | 13I-79 |
| | The engine stalls when decelerating. | 12 | 13I-80 |
| Driving | Hesitation, sag or stumble | 13 | 13I-81 |
| | Poor acceleration | | |
| | Surge | | |
| | The feeling of impact or vibration when accelerating | 14 | 13I-82 |
| | The feeling of impact or vibration when decelerating | 15 | 13I-83 |
| | Knocking | 16 | 13I-83 |
| Dieseling | | 17 | 13I-83 |
| Too high CO and HC concentration when idling | | 18 | 13I-84 |
| Low alternator output voltage (approx. 12.3 V) | | 19 | 13I-85 |
| Idling speed is improper when A/C is operating. | | 20 | 13I-86 |
| Fans (radiator fan, A/C condenser fan) are inoperative | | 21 | 13I-86 |
| Clutch switch system malfunction <M/T> | | 22 | 13I-87 |
| GDI ECO indicator lamp system | GDI ECO indicator lamp does not illuminate. | 23 | 13I-87 |
| | GDI ECO indicator lamp remains illuminated and does not go off. | 24 | 13I-88 |

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

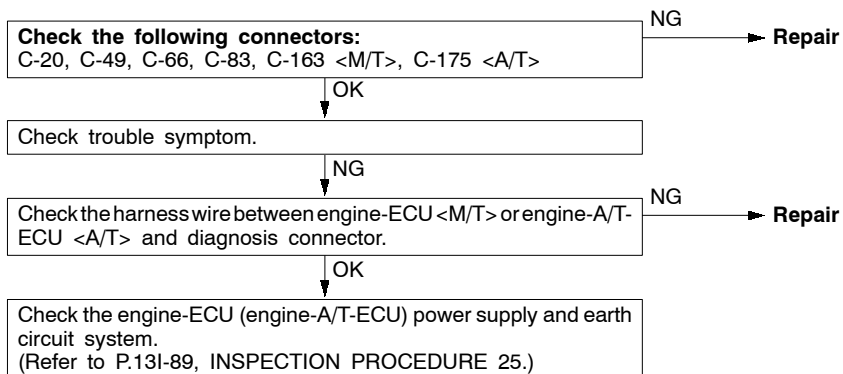
INSPECTION PROCEDURE 1

| 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. | <ul style="list-style-type: none"> • Malfunction of the connector • Malfunction of the harness wire • Malfunction of MUT-II |



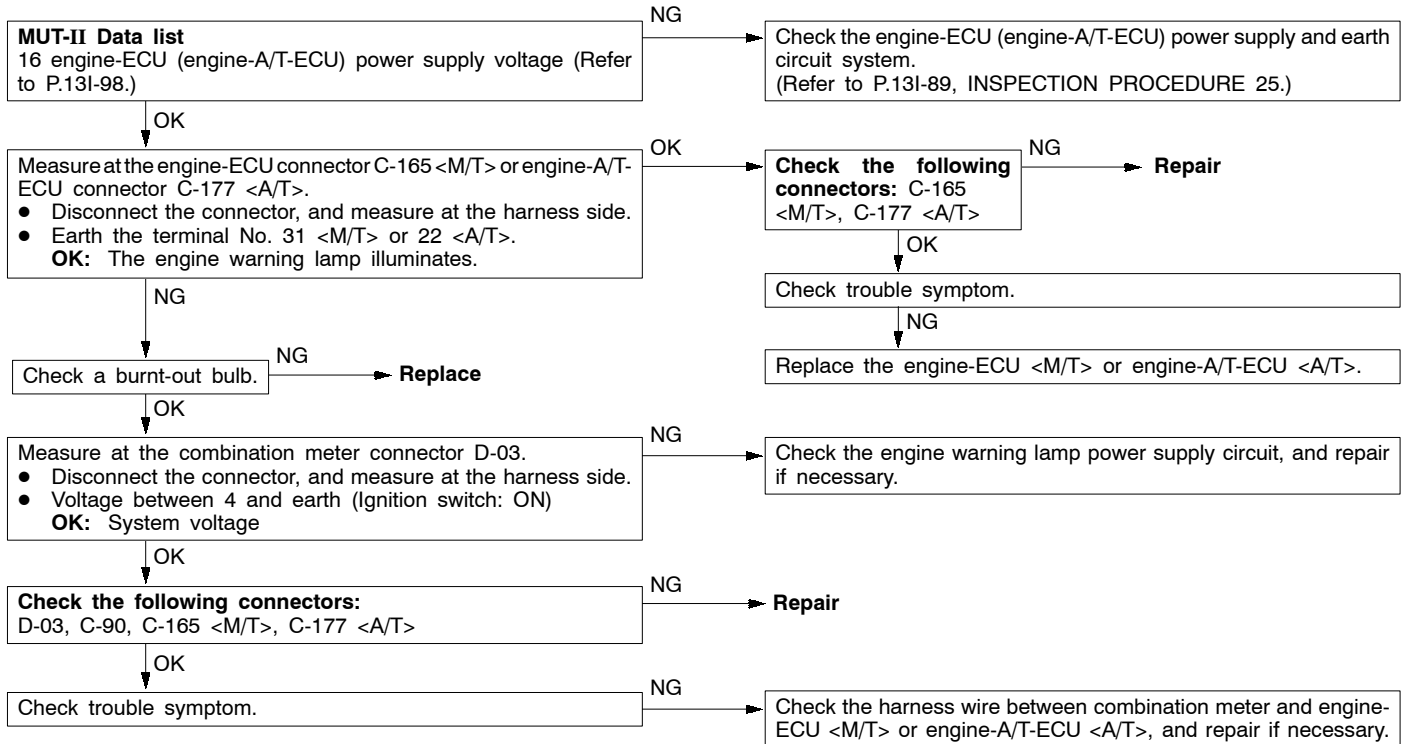
INSPECTION PROCEDURE 2

| MUT-II communication with engine-ECU (engine-A/T-ECU) is not possible. | Probable cause |
|--|--|
| One of the following causes may be suspected. <ul style="list-style-type: none"> • No power supply to engine-ECU <M/T> or engine-A/T-ECU <A/T>. • Defective earth circuit of engine-ECU <M/T> or engine-A/T-ECU <A/T>. • Defective engine-ECU <M/T> or engine-A/T-ECU <A/T>. • Improper communication line between engine-ECU <M/T> or engine-A/T-ECU <A/T> and MUT-II | <ul style="list-style-type: none"> • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T> power supply circuit • Malfunction of engine-ECU <M/T> or engine-A/T-ECU <A/T> • Open circuit between the engine-ECU <M/T> or engine-A/T-ECU <A/T> and diagnosis connector |



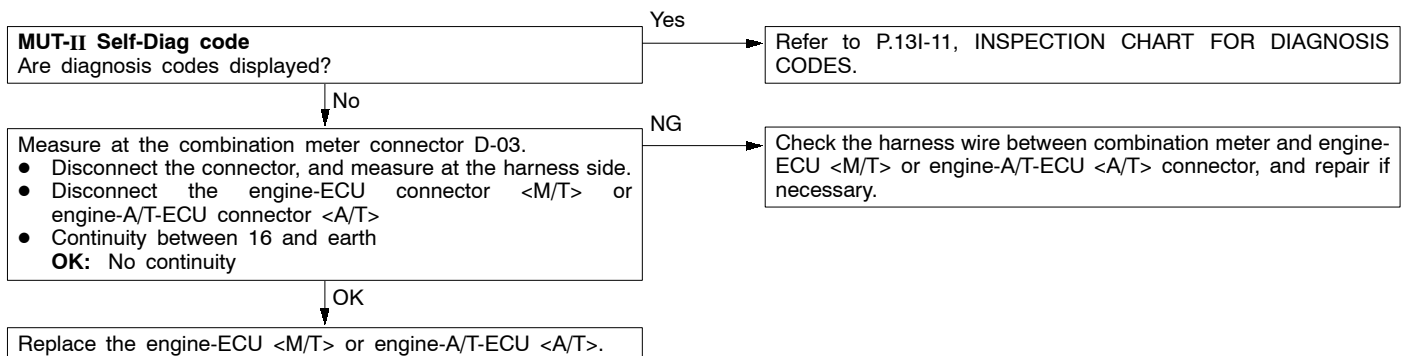
INSPECTION PROCEDURE 3

| 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 <M/T> or engine-A/T-ECU <A/T> causes the engine warning lamp to illuminate for five seconds immediately after the ignition switch is turned to ON. 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. | <ul style="list-style-type: none"> ● Burnt-out bulb ● Defective warning lamp circuit ● Malfunction of the engine-ECU <M/T> ● Malfunction of the engine-A/T-ECU <A/T> |



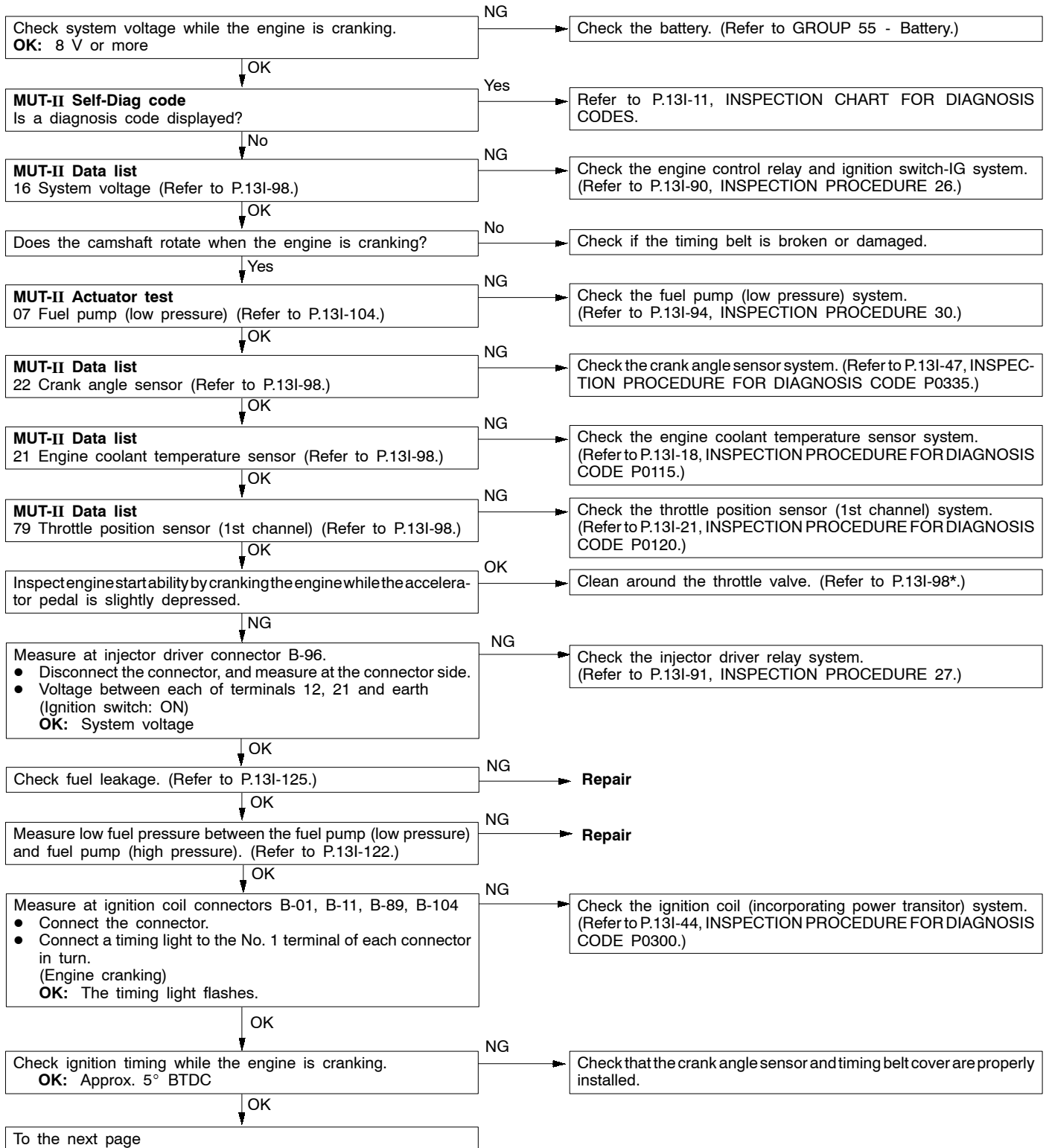
INSPECTION PROCEDURE 4

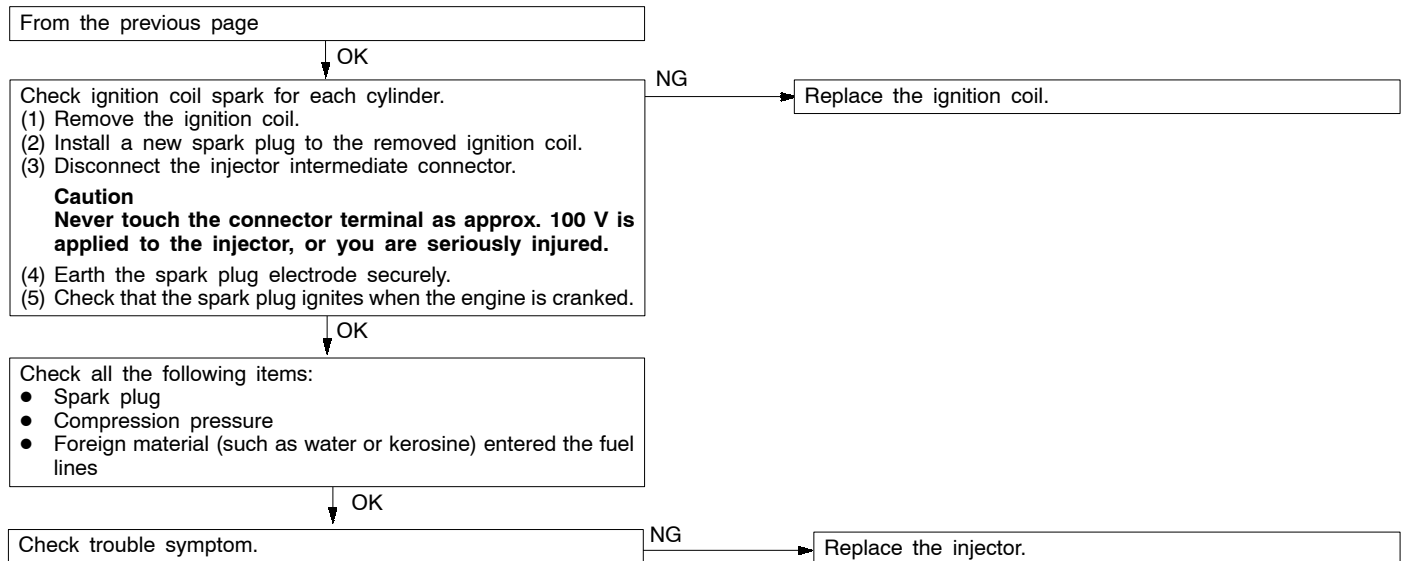
| The engine warning lamp remains illuminating and never goes out. | Probable cause |
|---|--|
| In cases such as the above, the cause is probably that the engine-ECU <M/T> or engine-A/T-ECU <A/T> is detecting a problem in a sensor or actuator, or that one of the malfunctions listed at right has occurred. | <ul style="list-style-type: none"> ● Short-circuit between the engine warning lamp and engine-ECU ● Malfunction of the engine-ECU <M/T> ● Malfunction of the engine-A/T-ECU <A/T> |



INSPECTION PROCEDURE 5

| No initial combustion (starting impossible) | Probable cause |
|---|---|
| This is caused by incorrect fuel supply into the combustion chamber, and improper ignition circuit. Besides that, foreign material may be contaminated in fuel. | <ul style="list-style-type: none"> • Malfunction of the fuel supply system • Malfunction of the ignition system • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |

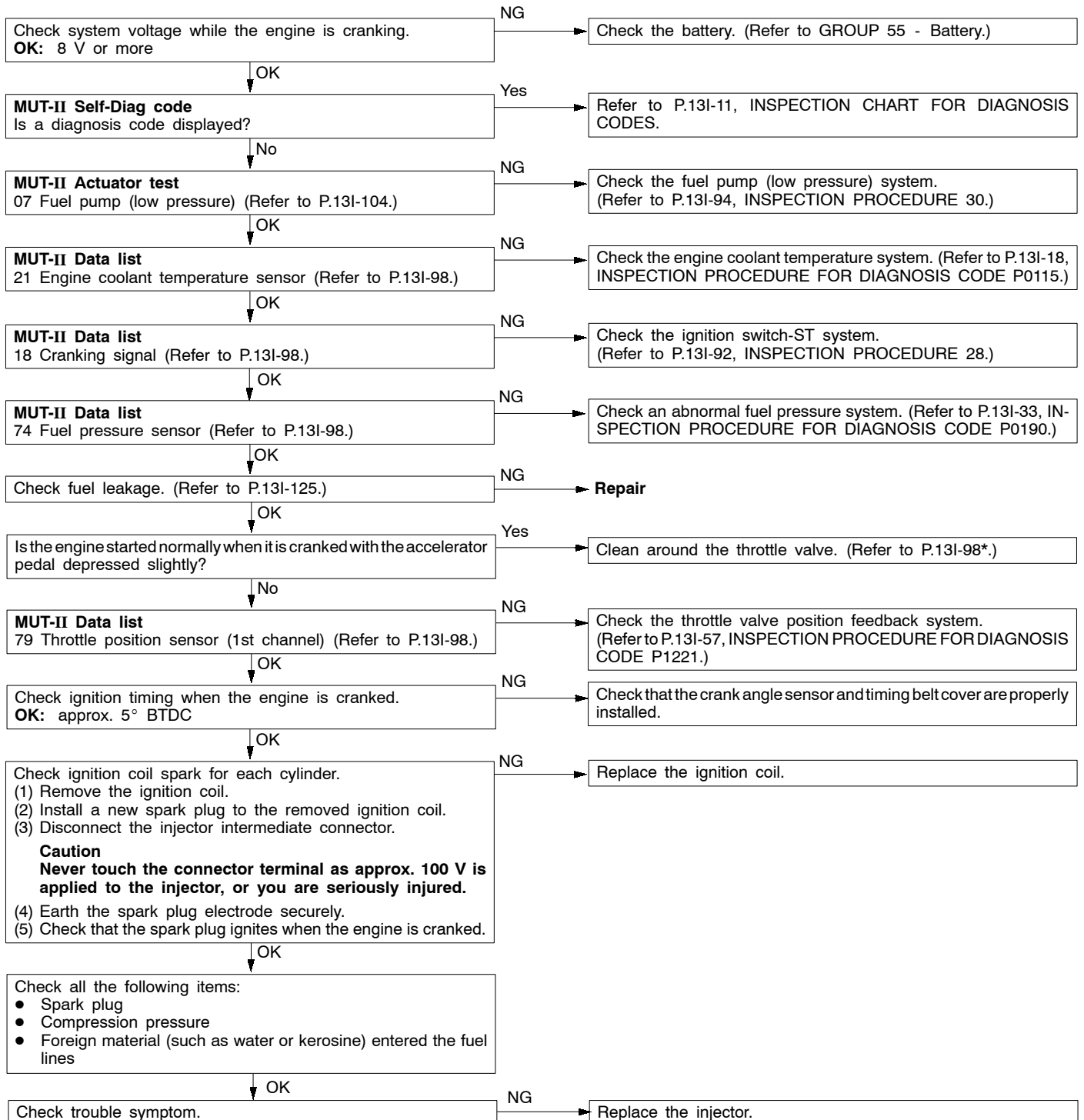


**NOTE:**

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

INSPECTION PROCEDURE 6

| Initial combustion takes place, but does not complete (start impossible), too long time to start (poor start) | Probable cause |
|---|--|
| This may be caused by improper spark plug ignition (poor spark), improper mixture during engine cranking, improper fuel pressure. | <ul style="list-style-type: none"> • Malfunction of the fuel supply system • Malfunction of the fuel pressure sensor • Malfunction of the ignition system • Malfunction of the electronic-controlled throttle valve system • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |

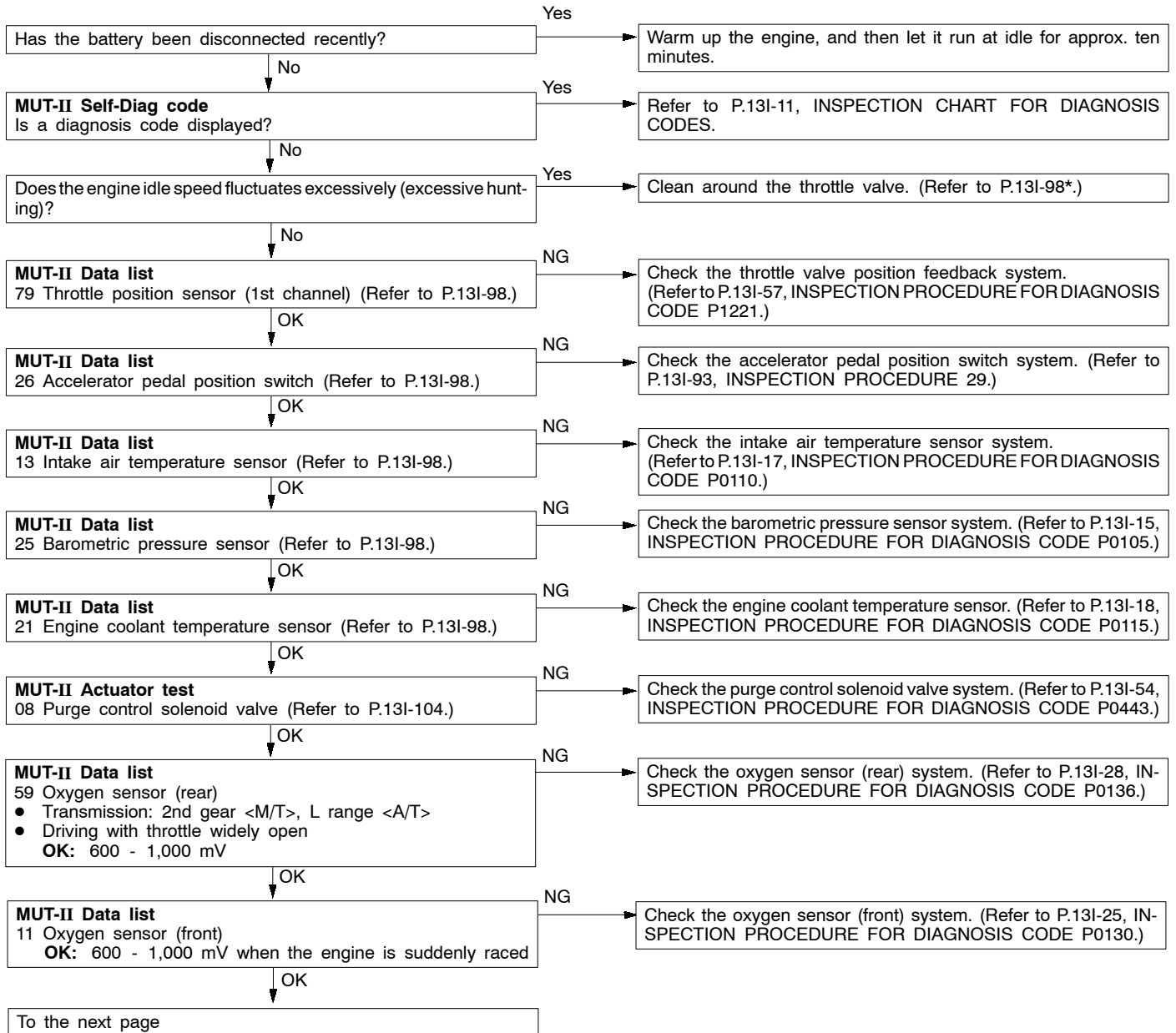


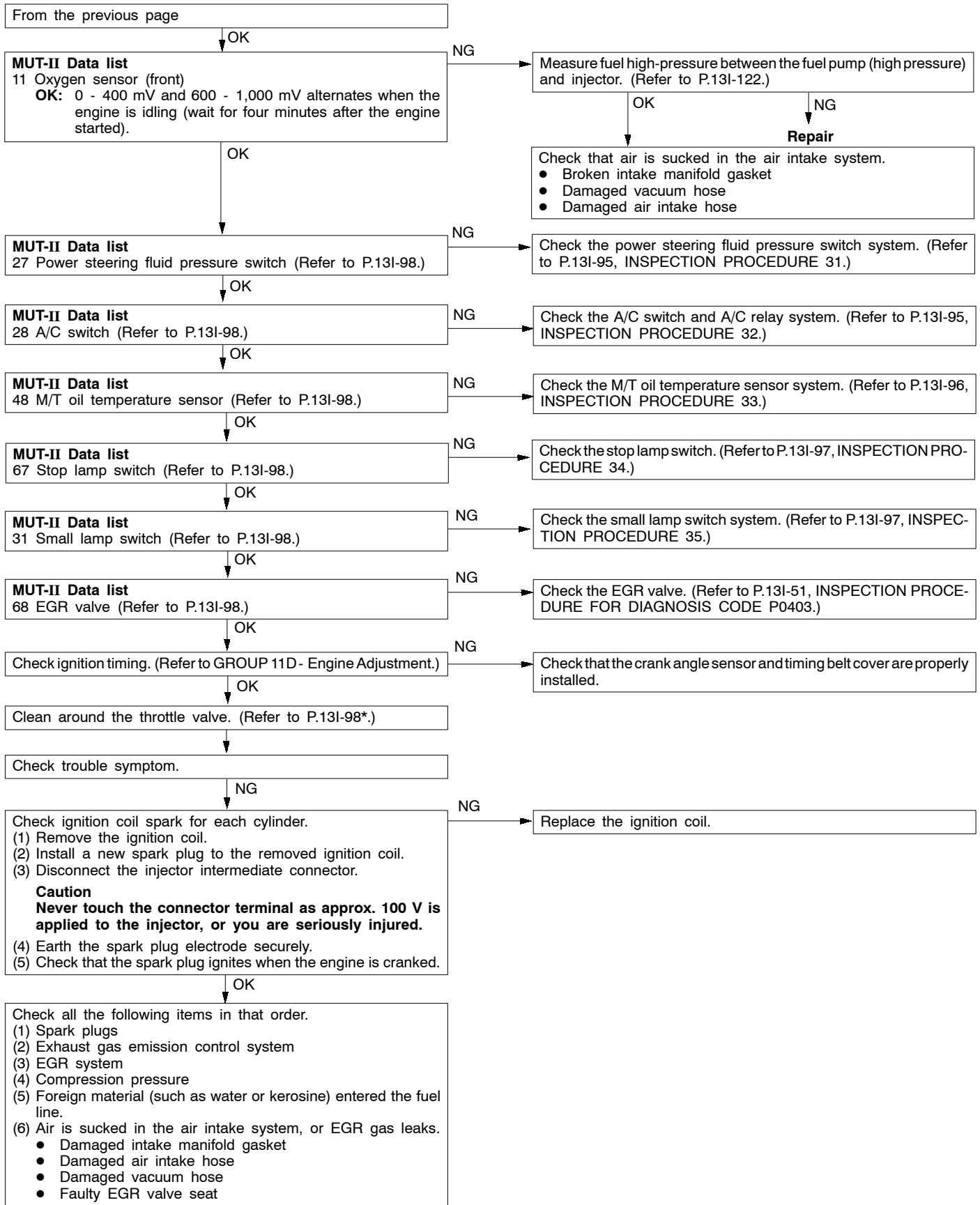
NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

INSPECTION PROCEDURE 7

| Unstable idling (rough idle, hunting) | Probable cause |
|--|--|
| This malfunction is probably caused by a faulty ignition system, improper air/fuel ratio, a faulty electronic-controlled throttle valve system, improper compression pressure, etc. As many causes can be suspected, diagnose from easier items. | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of the air/fuel ratio control system • Malfunction of the electronic-control throttle valve system • Improper compression pressure • Air sucking into the air intake system |



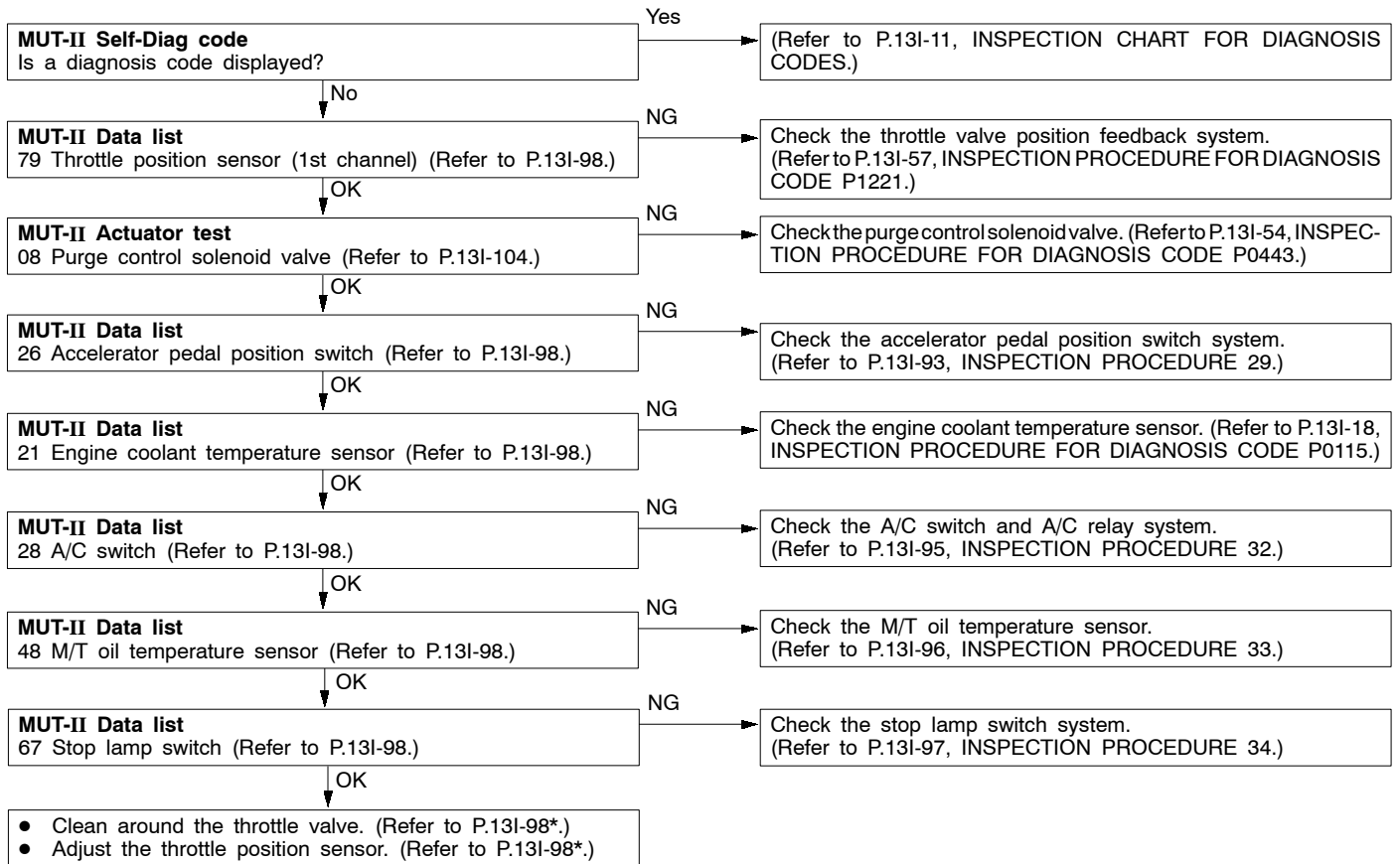


NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

INSPECTION PROCEDURE 8

| Idle speed is high or low (Improper idling) | Probable cause |
|---|--|
| The cause is probably that the intake air amount during idling is too great or too small. | <ul style="list-style-type: none"> • Malfunction of the electronic-controlled throttle valve system • Malfunction of the throttle body |

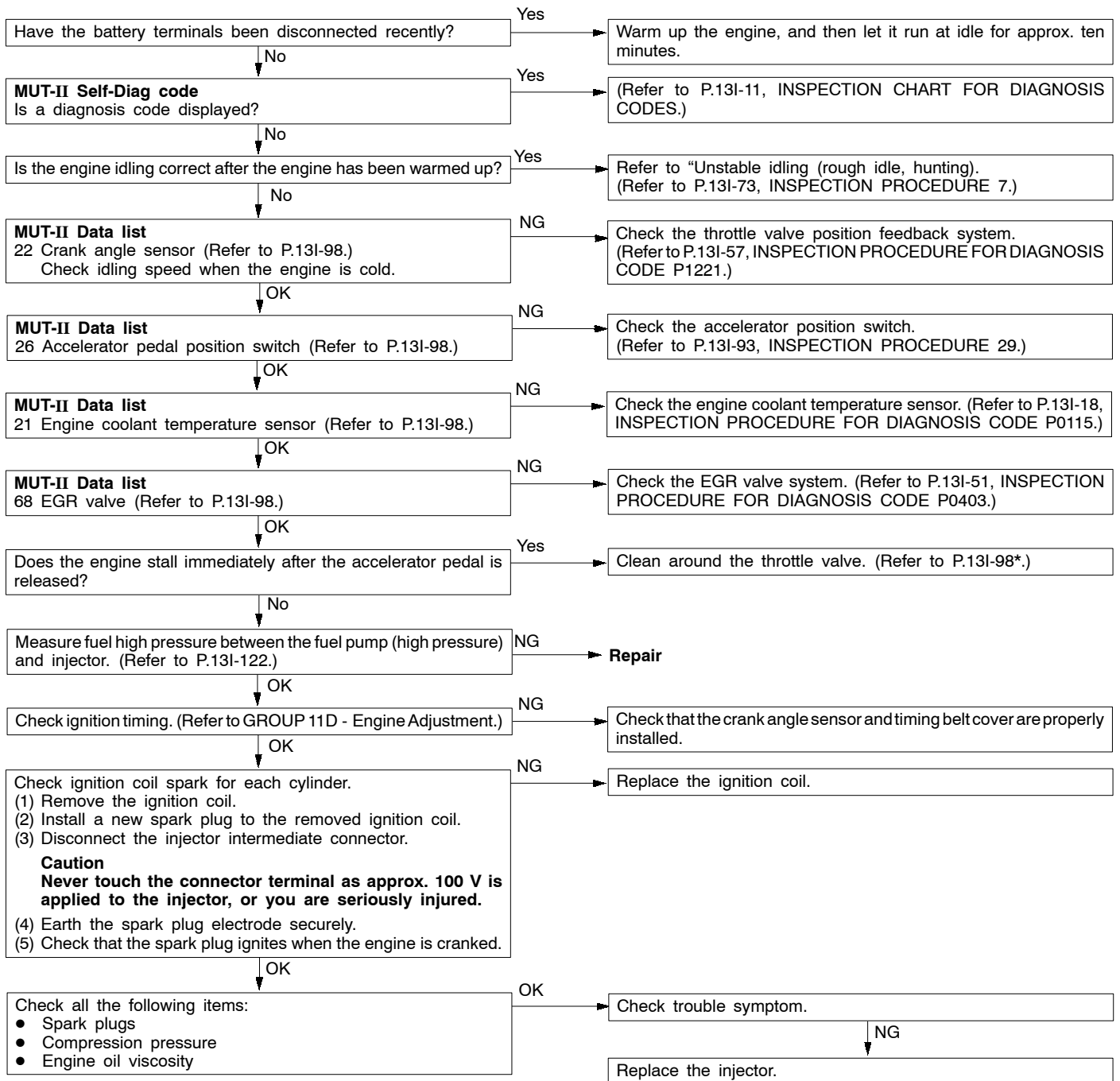


NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

INSPECTION PROCEDURE 9

| When the engine is cold, it stalls at idling. (Die out) | Probable cause |
|--|---|
| The cause is probably an incorrect air/fuel ratio or poor intake air amount when the engine is cold. | <ul style="list-style-type: none"> • Malfunction of the electronic-control throttle valve system • Malfunction of the throttle body |

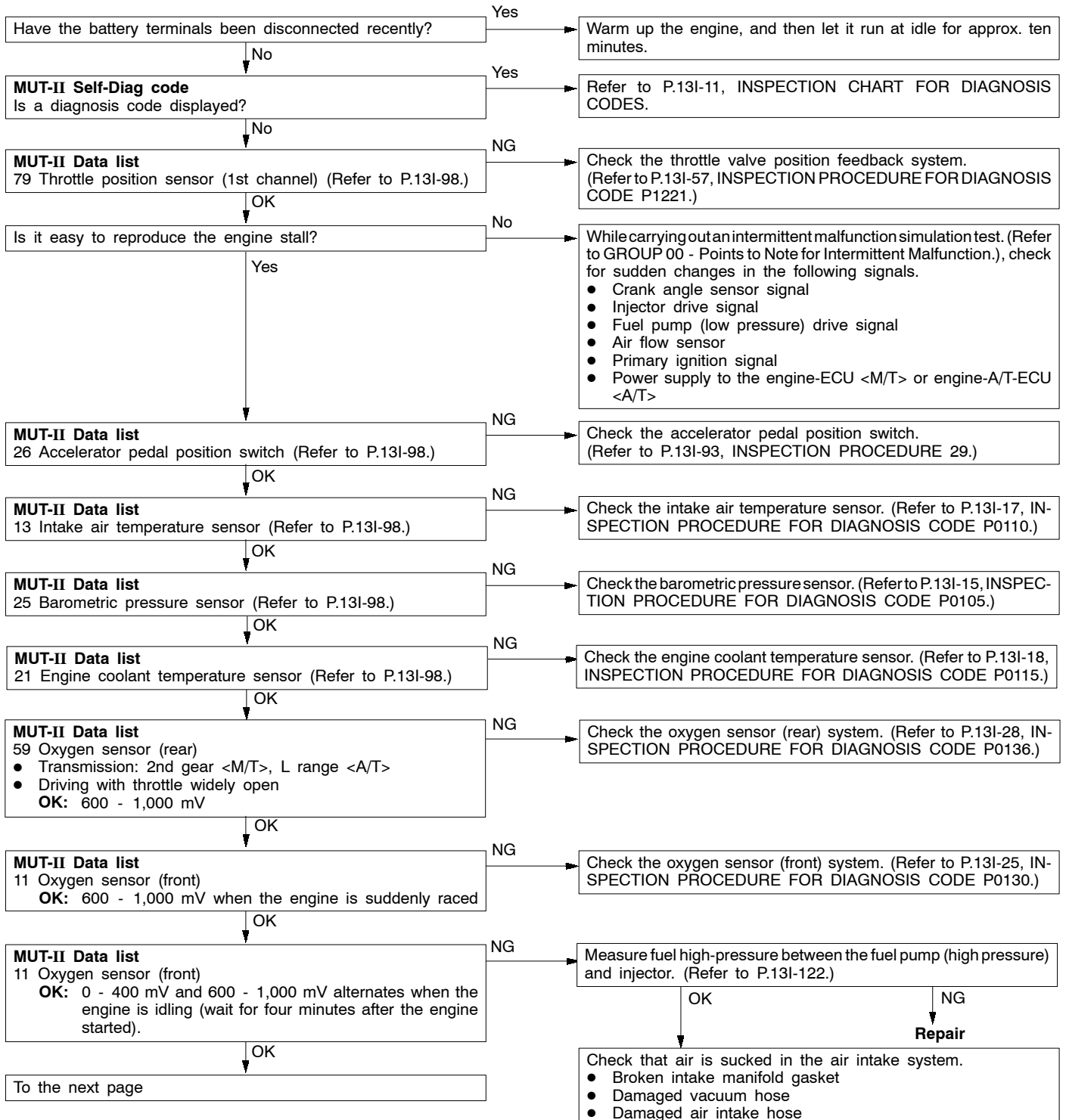


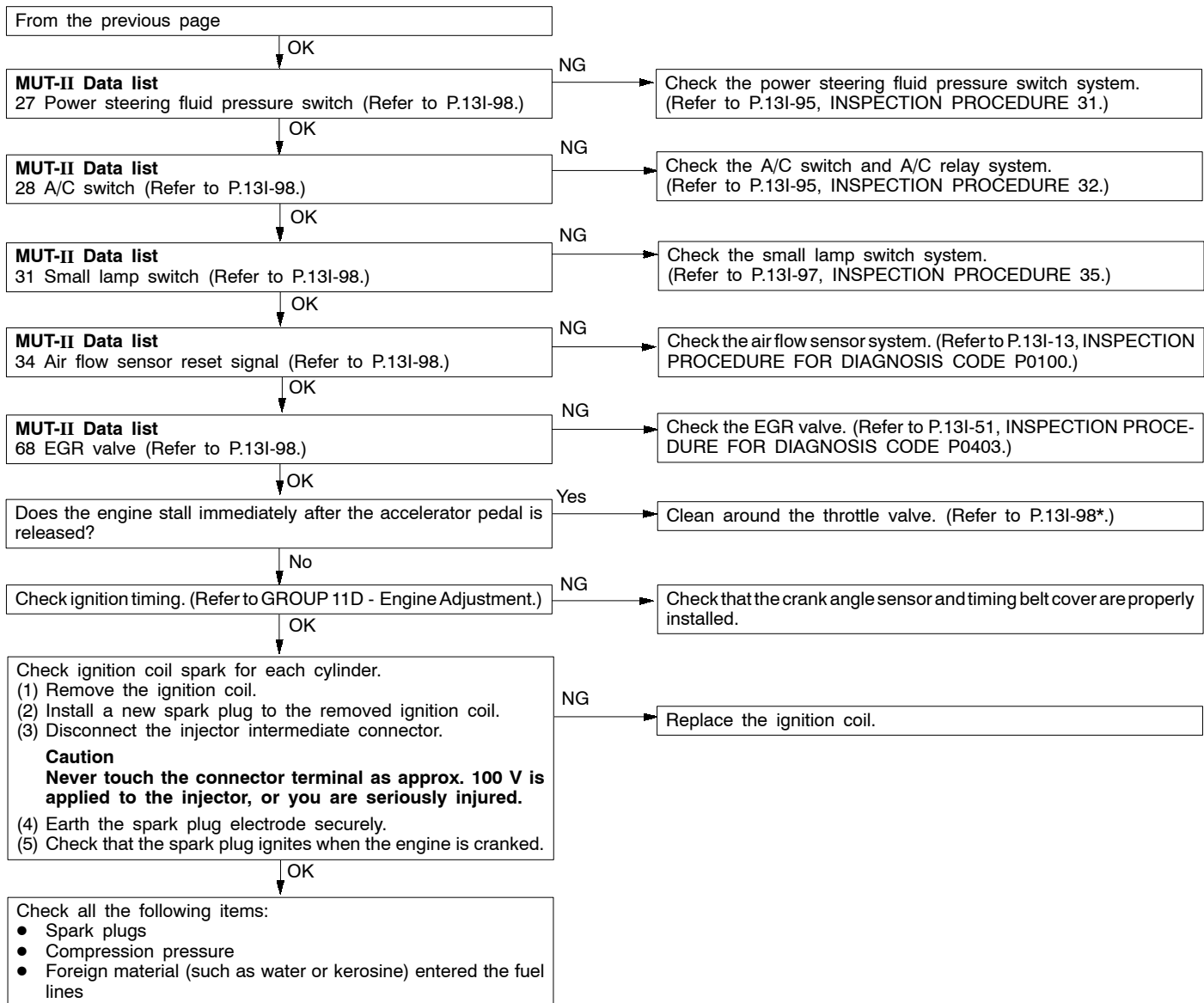
NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

INSPECTION PROCEDURE 10

| When the engine is hot, it stalls at idling. (Die out) | Probable cause |
|---|---|
| The cause is probably an improper air/fuel ratio, faulty electronic-controlled throttle valve system, compression pressure. In addition, if the engine stalls suddenly, another possible cause might be a poor connector contact. | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of air/fuel ratio control system • Malfunction of electronic-controlled throttle valve system • Malfunction of the throttle body • Poor connector contact • Improper compression pressure • Air stuck in the air intake system |



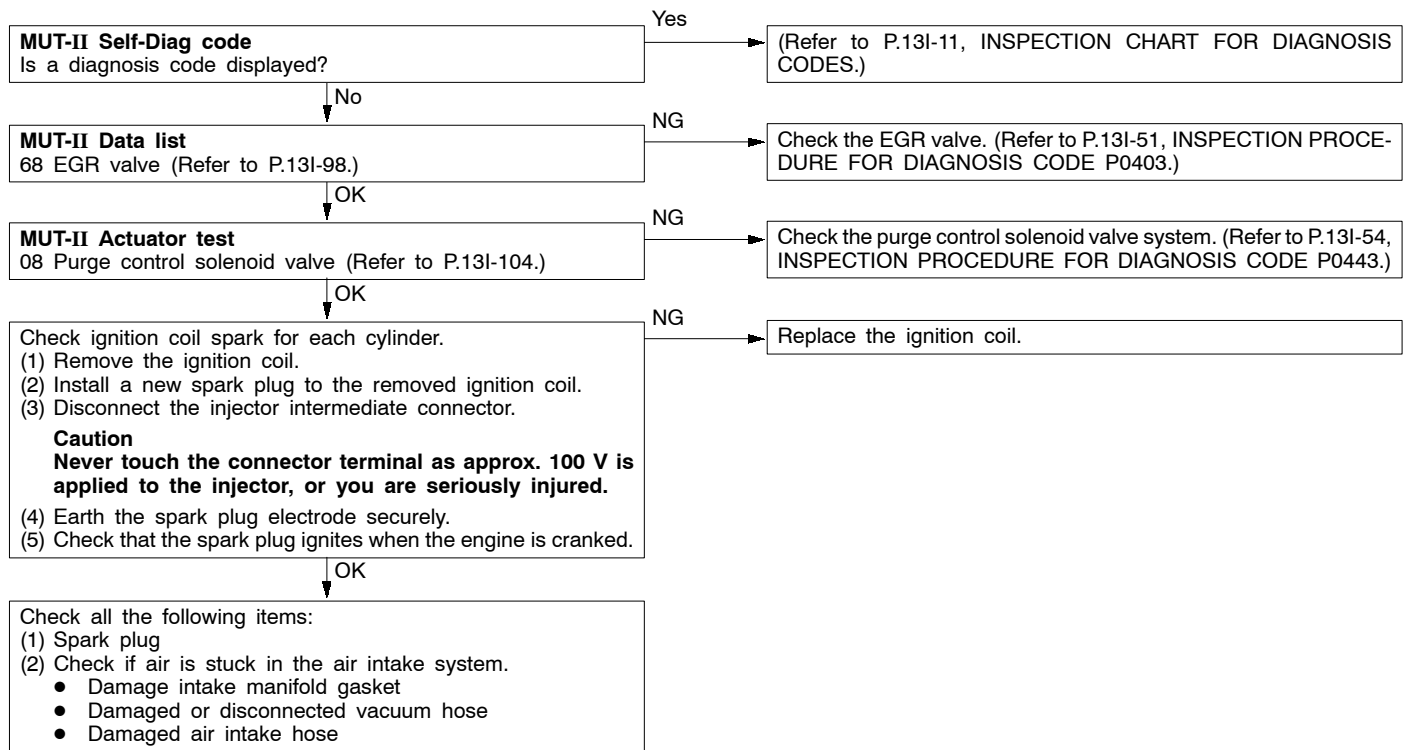


NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

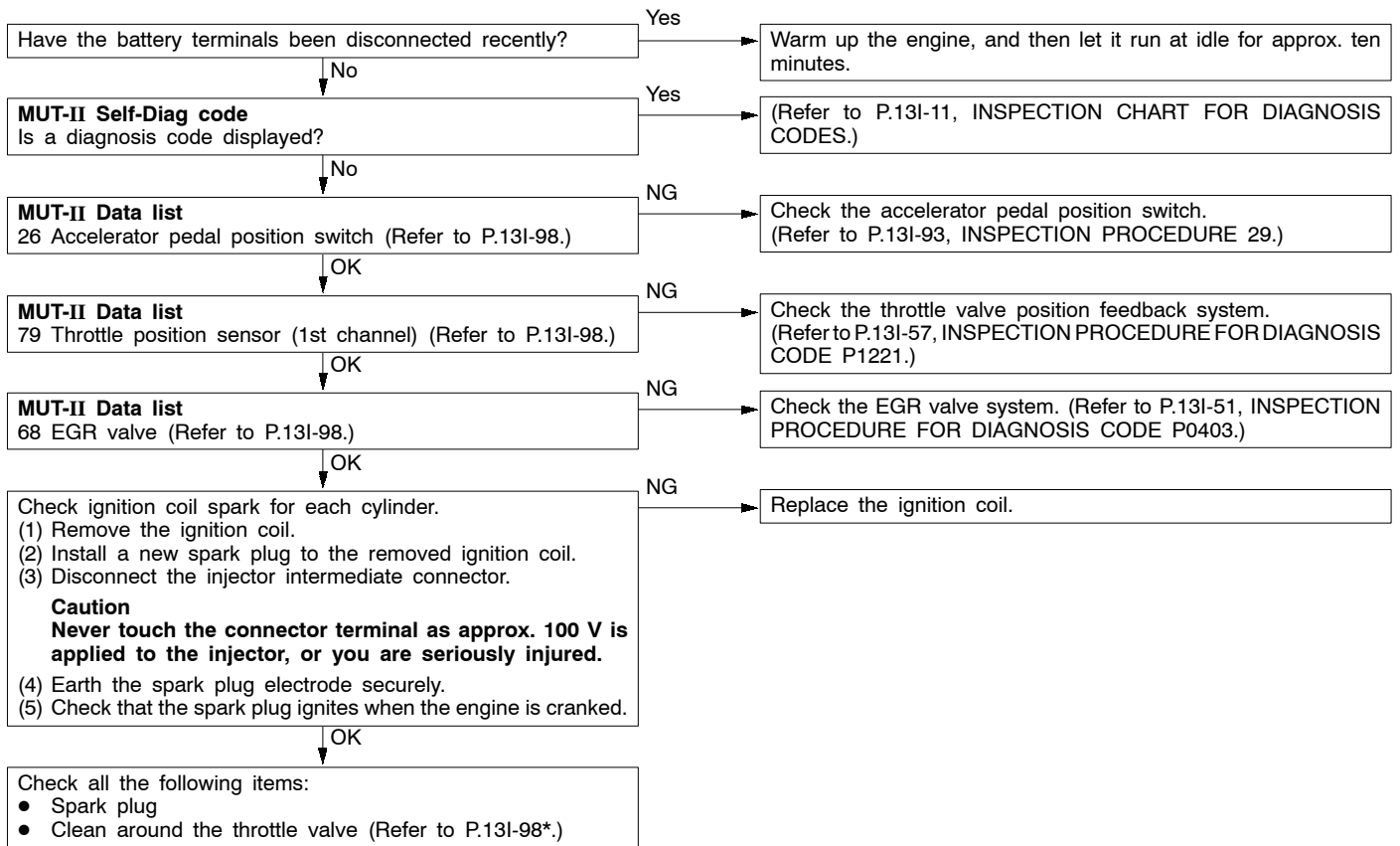
INSPECTION PROCEDURE 11

| The engine stalls when starting the car. (Pass out) | Probable cause |
|--|--|
| The cause is probably poor ignition due to a malfunctioning spark plug (weak spark), or an incorrect air/fuel ratio when the accelerator is depressed. | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of the EGR valve • Air stuck in the air intake system |



INSPECTION PROCEDURE 12

| The engine stalls when decelerating. | Probable cause |
|---|--|
| The cause is probably an improper air/fuel ratio due to a faulty EGR system, or poor intake air volume due to a faulty electronic-controlled throttle valve system. | <ul style="list-style-type: none"> • Malfunction of the electronic-controlled throttle valve system • Malfunction of the EGR valve |

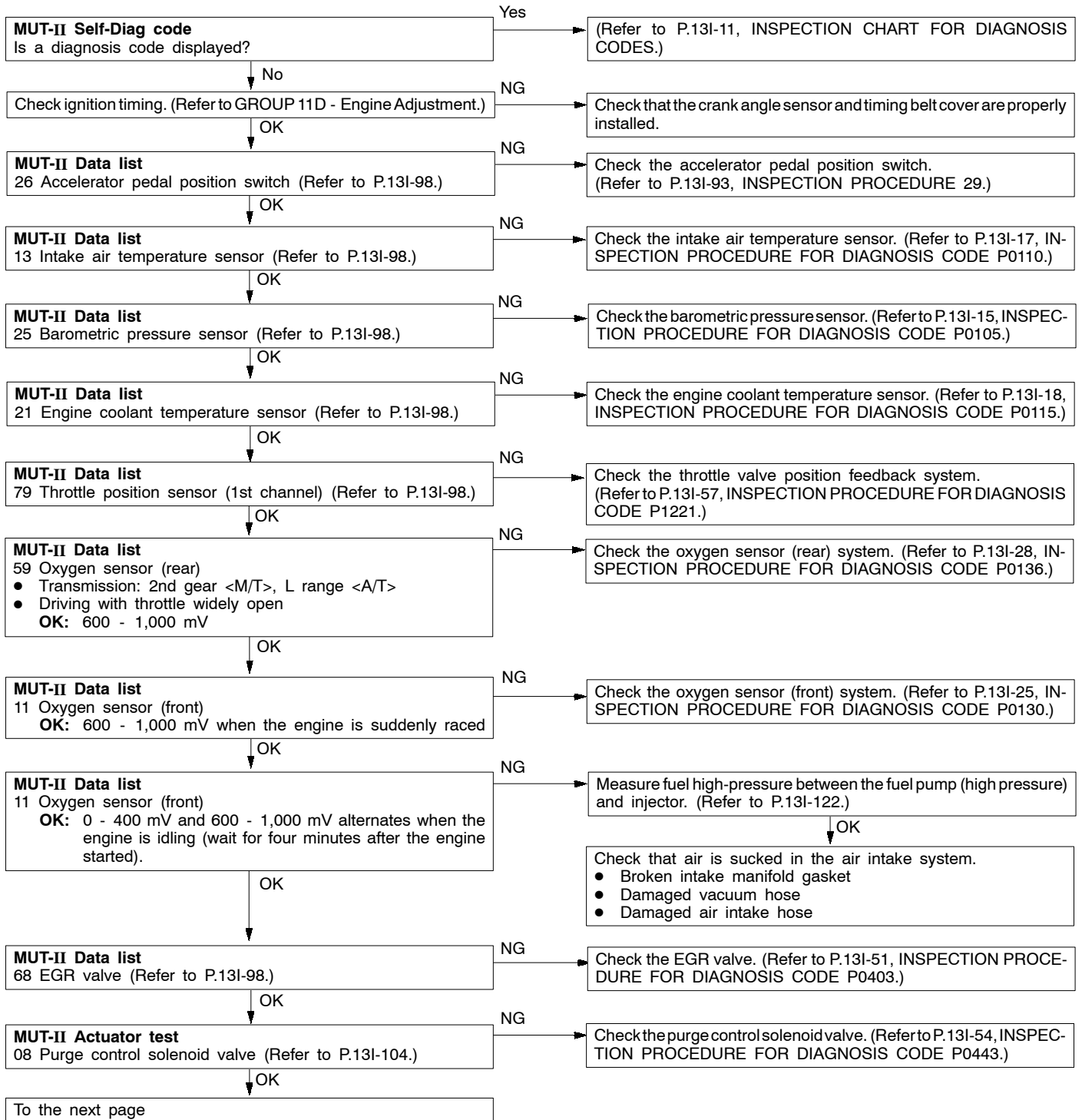


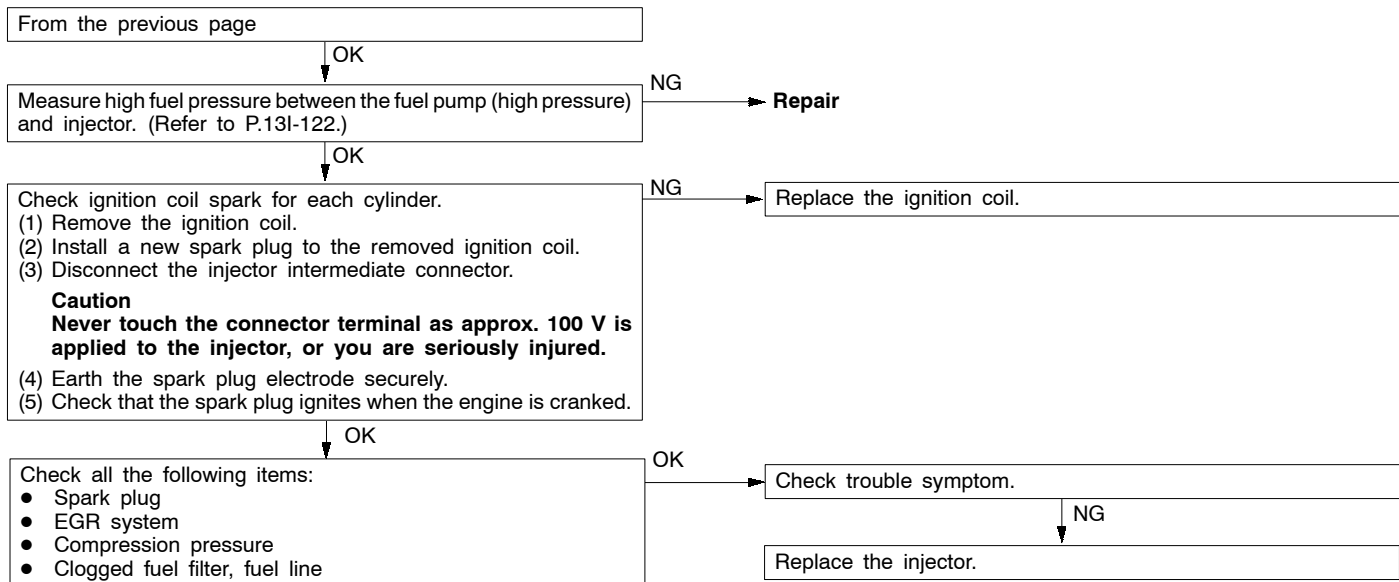
NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

INSPECTION PROCEDURE 13

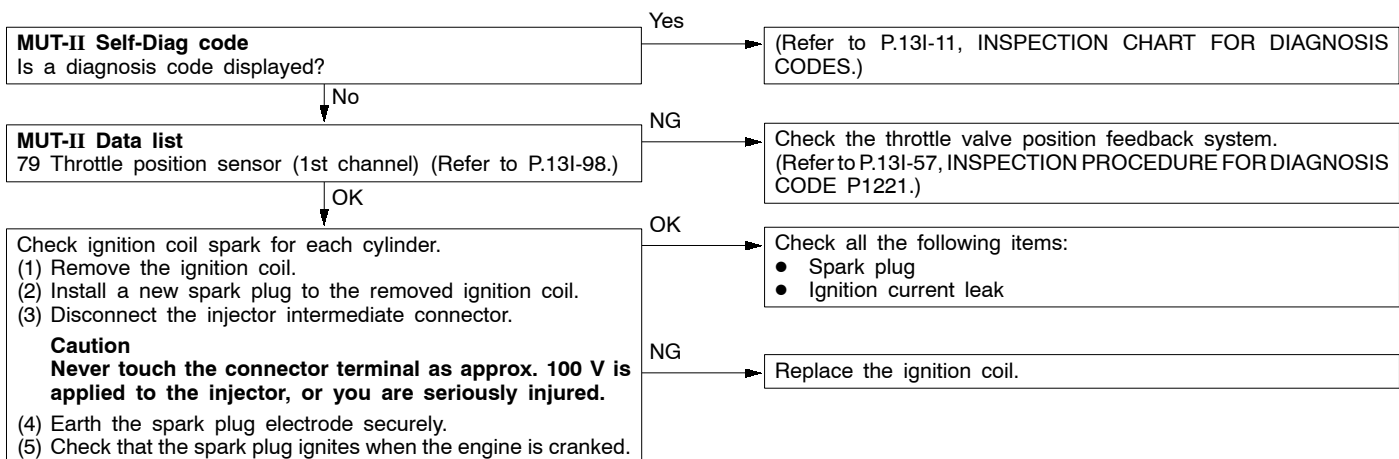
| Hesitation, sag, stumble, poor acceleration or surge | Probable cause |
|---|---|
| The cause is probably a malfunction of the ignition system, electronic-controlled throttle valve system, compression pressure, etc. | <ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of the air/fuel ratio control system • Malfunction of the electronic-controlled throttle valve system • Improper compression pressure • Air stuck in the air intake system |





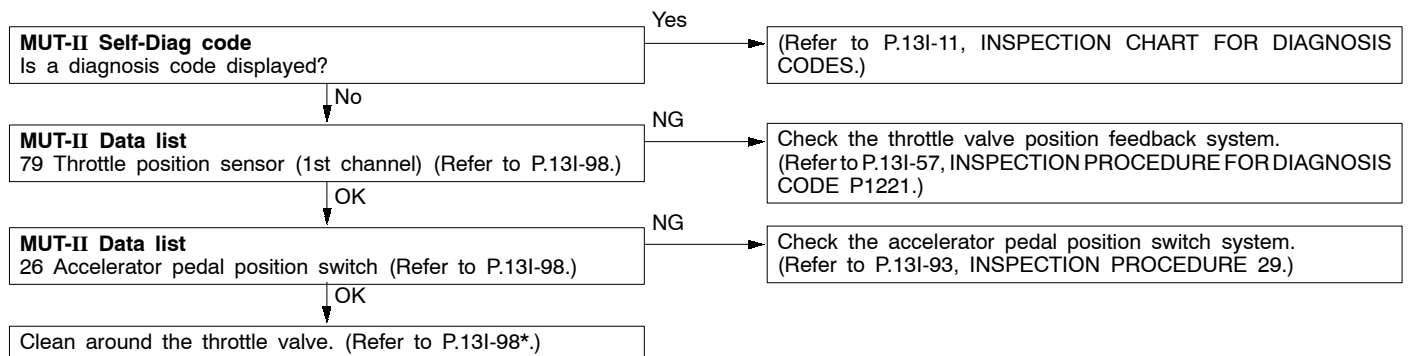
INSPECTION PROCEDURE 14

| The feeling of impact when accelerating | Probable cause |
|--|--|
| The cause is probably an ignition leak being generated in line with an increase in the spark plug request voltage during acceleration. | <ul style="list-style-type: none"> Malfunction of the ignition system |



INSPECTION PROCEDURE 15

| The feeling of impact when decelerating | Probable cause |
|--|--|
| The cause is probably insufficient intake air due to a faulty electronic-controlled throttle valve system. | <ul style="list-style-type: none"> Malfunction of the electronic-controlled throttle valve system |

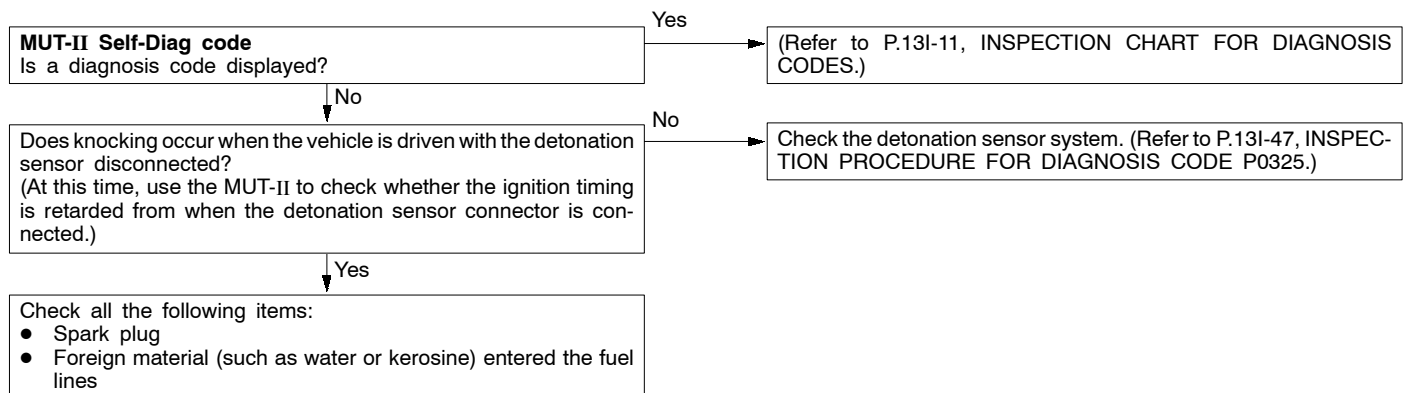


NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

INSPECTION PROCEDURE 16

| Knocking | Probable cause |
|---|--|
| The cause is probably incorrect detonation control or improper heat range of the spark plugs. | <ul style="list-style-type: none"> Malfunction of the detonation sensor Improper heat range of the spark plugs |



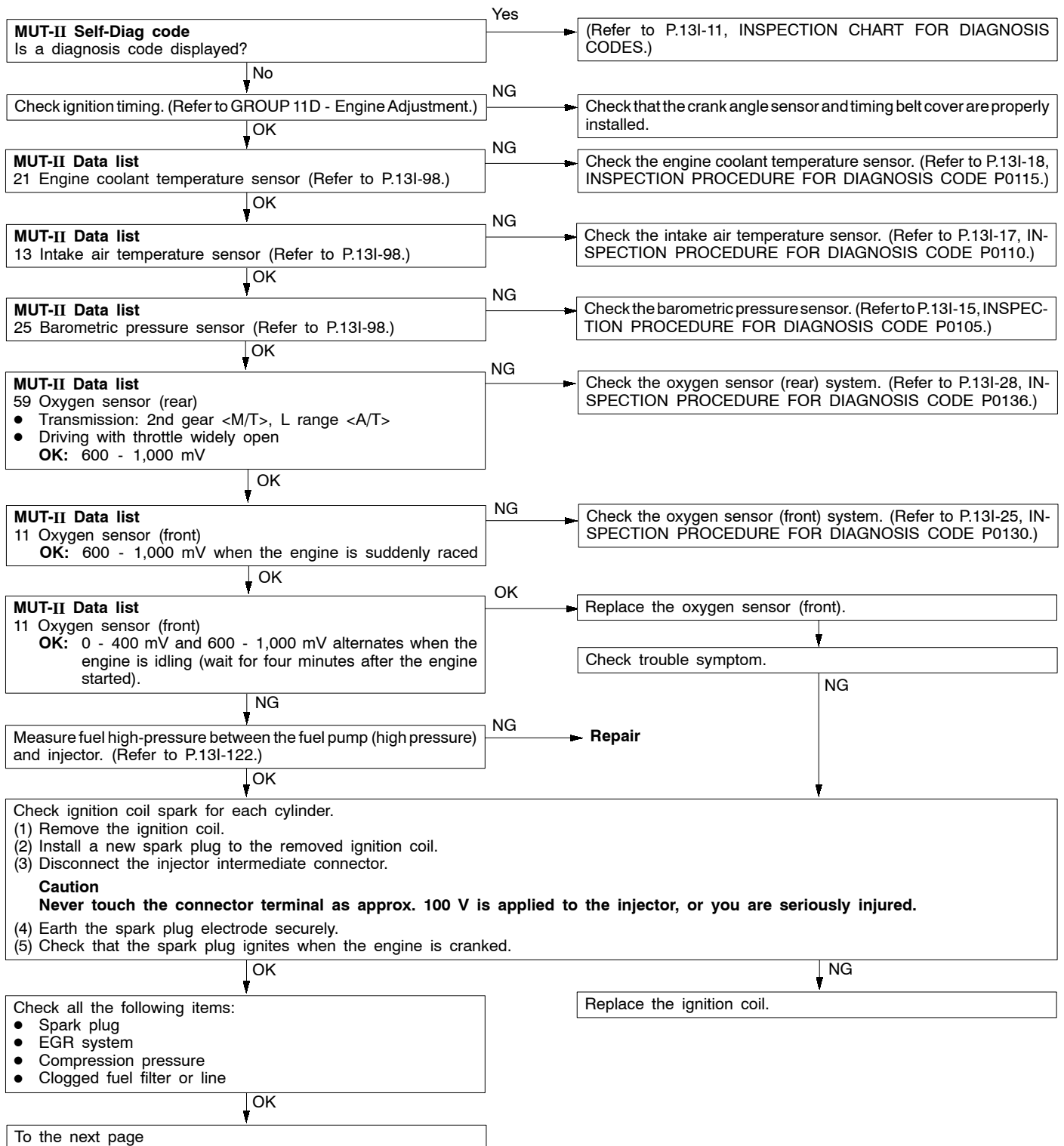
INSPECTION PROCEDURE 17

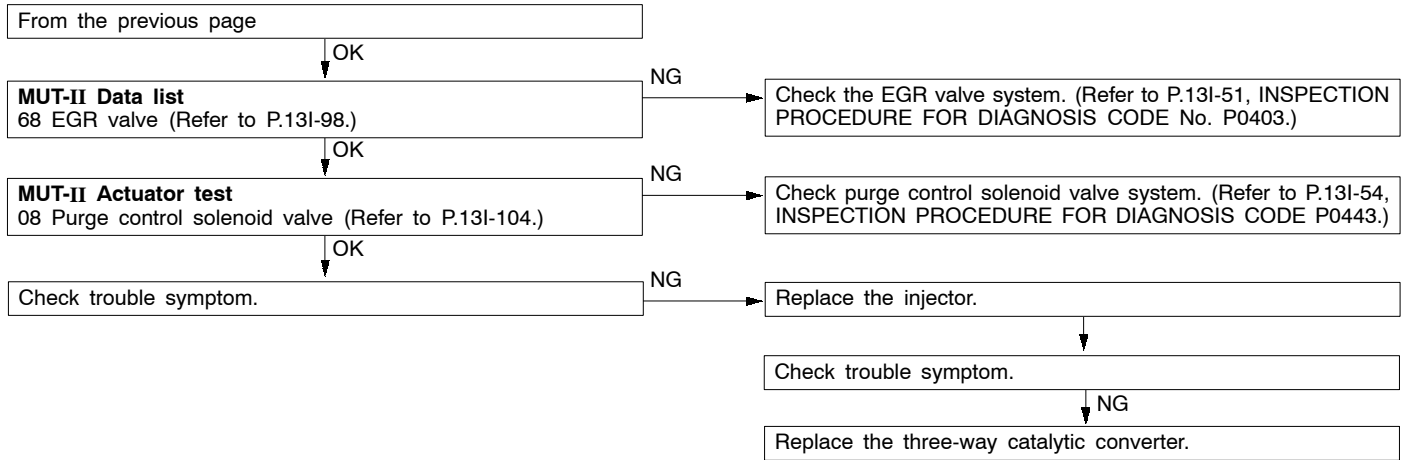
| Run-on (dieseling) | Probable cause |
|--|---|
| The cause is probably fuel leak from injector(s) | <ul style="list-style-type: none"> Malfunction of the injector |

Replace the injector.

INSPECTION PROCEDURE 18

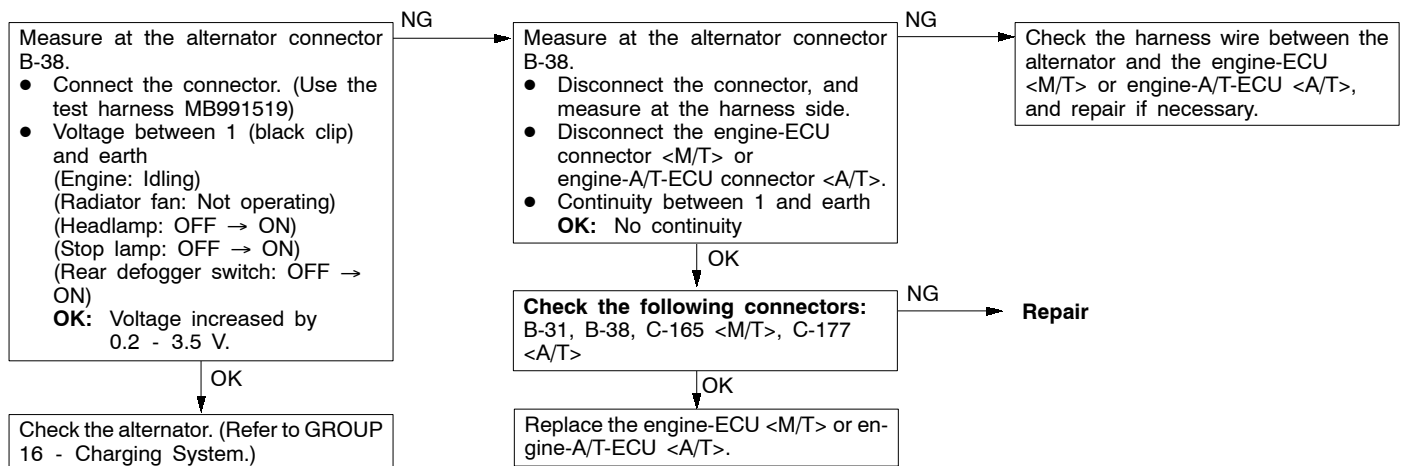
| Too high CO and HC concentration when idling | Probable cause |
|---|---|
| The cause is probably an incorrect air/fuel ratio | <ul style="list-style-type: none"> • Malfunction of air/fuel ratio control system • Deterioration of the catalyst |





INSPECTION PROCEDURE 19

| Low alternator output voltage (approx. 12.3 V) | Probable cause |
|---|---|
| The cause is probably a malfunction of the alternator or one of the problems listed at right. | <ul style="list-style-type: none"> Malfunction of the charging system Open circuit between the alternator G terminal and the engine-ECU <M/T> or engine-A/T-ECU <A/T> Malfunction of the engine-ECU <M/T> Malfunction of the engine-A/T-ECU <A/T> |



INSPECTION PROCEDURE 20

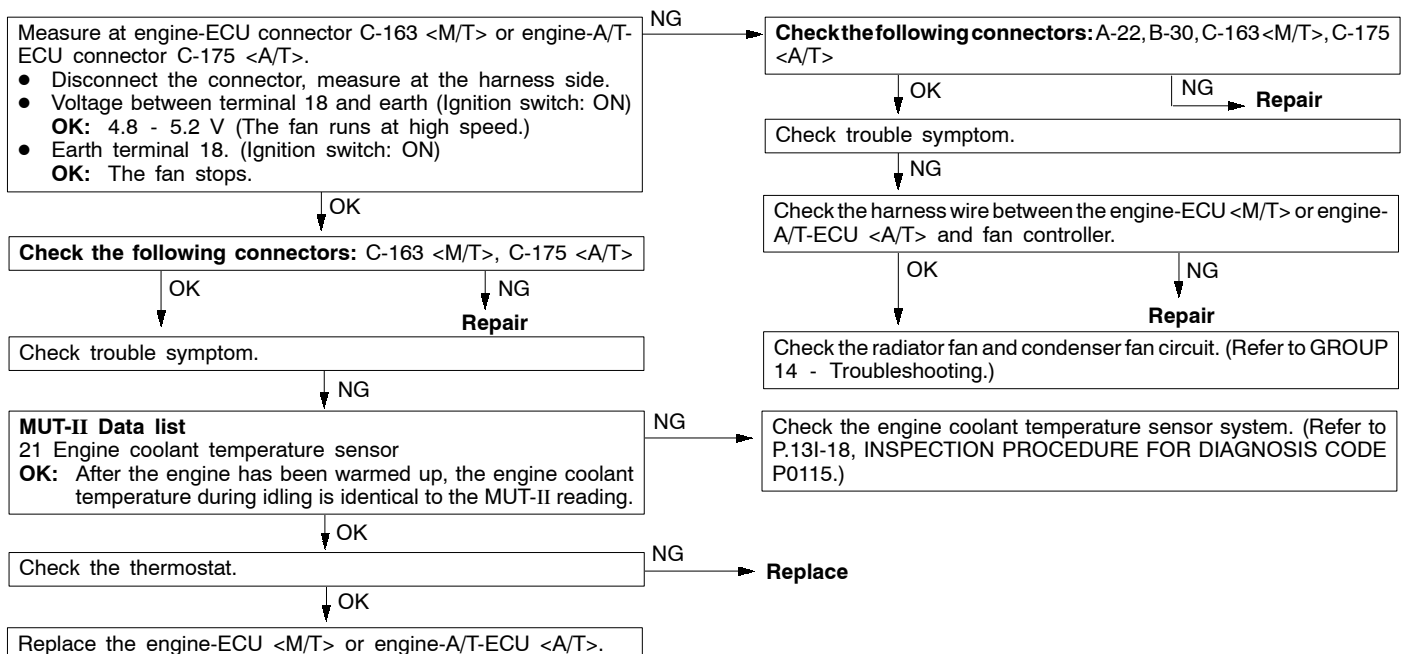
| Idling speed is improper when A/C is operating | Probable cause |
|--|---|
| <p>If the engine-ECU <M/T> or engine-A/T-ECU <A/T> detects that the air conditioner is on, it activates the idle speed control (ISC) servo to control idle-up operation. The A/C pressure sensor monitors the A/C compressor, and sends a signal to the engine-ECU<M/T> or engine-A/T-ECU<A/T>. The ECU controls fast idling speed according to this signal.</p> | <ul style="list-style-type: none"> • Malfunction of the A/C control system • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the A/C pressure sensor • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |


```

graph TD
    Start([Start]) --> Step1[Measure at the A/C pressure sensor connector A-52.  
• Disconnect the connector, and measure at the harness side.  
(1) Voltage between 3 and earth (Ignition switch: ON)  
OK: 4.5 - 5.5 V  
(2) Continuity between 1 and earth  
OK: Continuity]
    Step1 -- OK --> Step2[Measure at the engine-ECU connector C-164 <M/T> or engine-A/T-ECU connector C-175 <A/T>.  
• Connect the connector.  
• Voltage between 64 <M/T> or 94 <A/T> and earth (Engine: Idling)  
OK: 8 V or more [When the A/C is MAX. COOL condition (when the load by A/C is high)] 4 V or lower [When the A/C is MAX. HOT condition (when the load by A/C is low)]]
    Step1 -- (1) NG --> Step1a[Check the following connectors: C-14 <L.H.>, (C-47, C-115) <R.H.>, C-81, C-164 <M/T>, C-175 <A/T>]
    Step1 -- (2) NG --> Step1b[Check the following connectors: C-14 <L.H.>, C-115 <R.H.>, C-81, C-163 <M/T>, C-177 <A/T>]
    Step2 -- OK --> Step2a[Replace the engine-ECU<M/T> or engine-A/T-ECU <A/T>.]
    Step2 -- NG --> Step2b[Check the following connectors: A-52, C-14 <L.H.>, C-115 <R.H.>, C-81, C-164 <M/T>, C-175 <A/T>]
    Step2b -- OK --> Step2c[Check the trouble symptoms.]
    Step2b -- NG --> Step2d[Check the following connectors: C-14 <L.H.>, C-115 <R.H.>, C-81, C-164 <M/T>, C-175 <A/T>]
    Step2c -- OK --> Step2e[Replace the engine-ECU<M/T> or engine-A/T-ECU <A/T>.]
    Step2c -- NG --> Step2f[Check the harness wire between the A/C pressure sensor and engine-ECU <M/T> or engine-A/T-ECU <A/T>.]
    Step2d -- OK --> Step2g[Check the trouble symptoms.]
    Step2d -- NG --> Step2h[Check the harness wire between the A/C pressure sensor and engine-ECU <M/T> or engine-A/T-ECU <A/T>.]
    Step2f -- OK --> Step2i[Replace the A/C pressure sensor.]
    Step2f -- NG --> Step2j[Repair]
    Step2g -- OK --> Step2k[Replace the engine-ECU<M/T> or engine-A/T-ECU <A/T>.]
    Step2g -- NG --> Step2l[Check the harness wire between the A/C pressure sensor and engine-ECU <M/T> or engine-A/T-ECU <A/T>, and repair if necessary.]
    Step2h -- OK --> Step2m[Replace the engine-ECU<M/T> or engine-A/T-ECU <A/T>.]
    Step2h -- NG --> Step2n[Repair]
    Step2l --> End([End])
  
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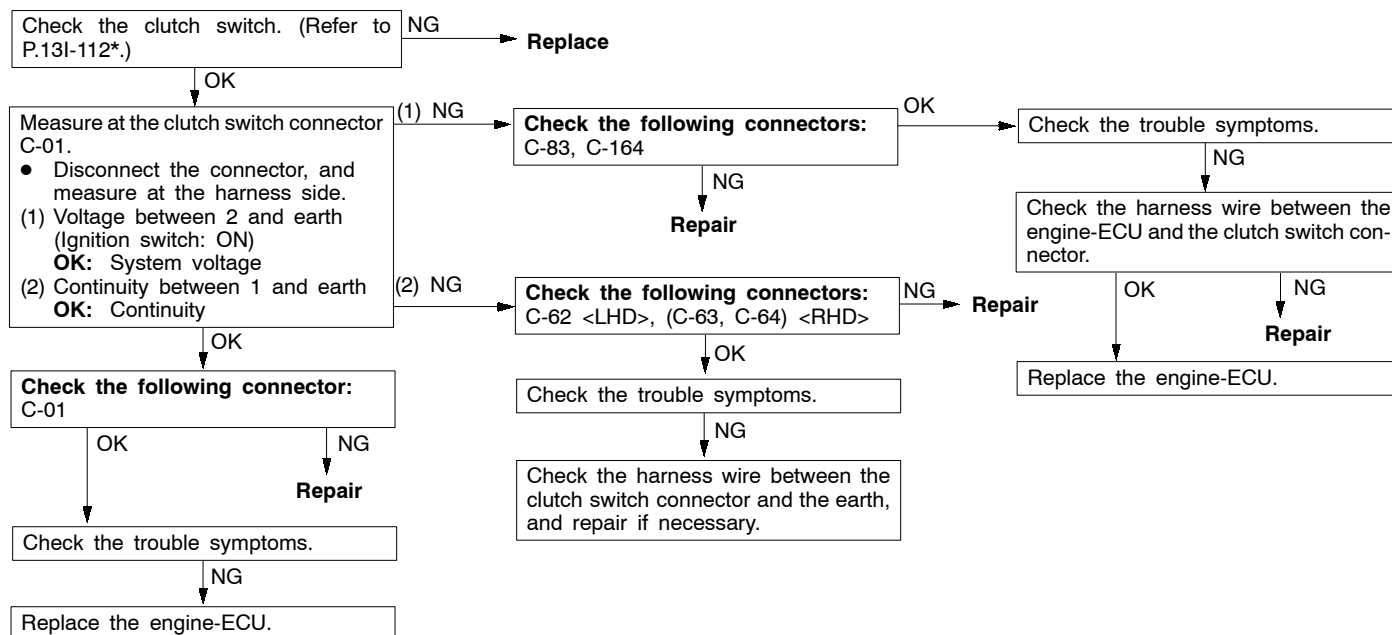
INSPECTION PROCEDURE 21

| Fans (radiator fan, A/C condenser fan) are inoperative. | Probable cause |
|---|---|
| <p>The engine-ECU <M/T> or engine-A/T-ECU <A/T> sends a duty signal to the fan controller according to engine coolant temperature, vehicle speed, or A/C switch load. The fan controller controls radiator fan and condenser fan speeds, based on this signal. (The closer the terminal voltage comes to 5V, the higher the fan speed becomes.)</p> | <ul style="list-style-type: none"> • Malfunction of the fan motor relay • Malfunction of the fan motor • Malfunction of the fan controller • Open or short circuit, or poor connector contact • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |



INSPECTION PROCEDURE 22

| Clutch switch system malfunction <M/T> | Probable cause |
|---|--|
| The clutch pedal switch sends a signal indicating clutch pedal depression to the engine-ECU. The engine-ECU controls the fuel injection properly according to this signal, thus prevents the fluctuation of the engine speed during shift change. | <ul style="list-style-type: none"> • Malfunction of the clutch switch • Open circuit or short-circuited harness wire in the clutch switch circuit • Malfunction of the engine-ECU |

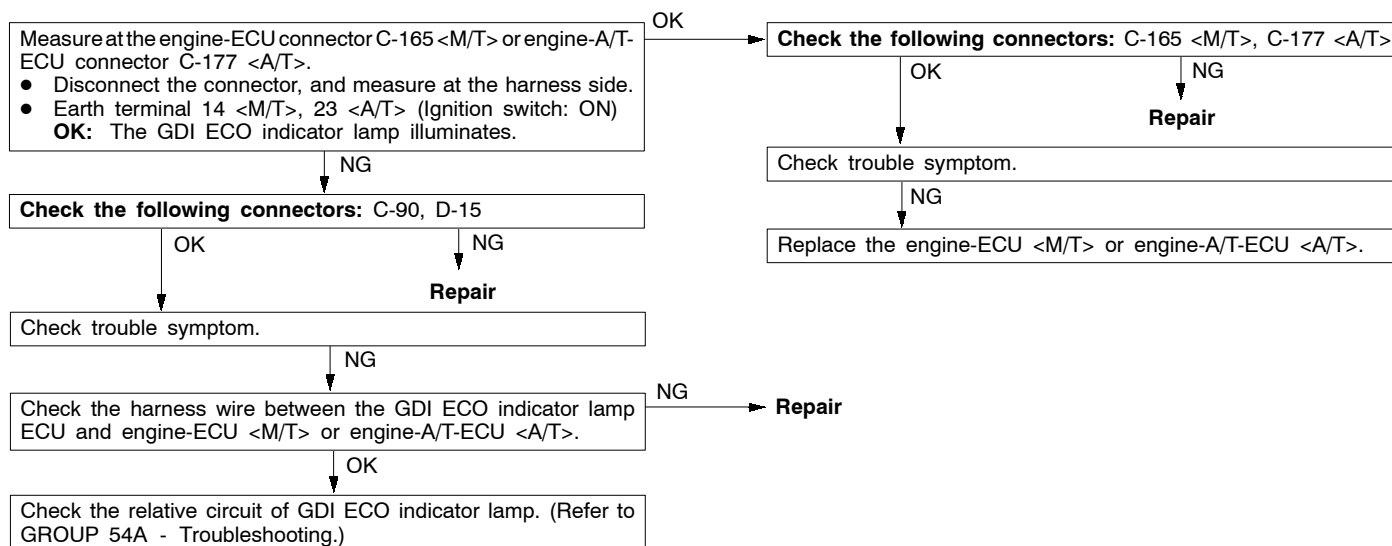


NOTE:

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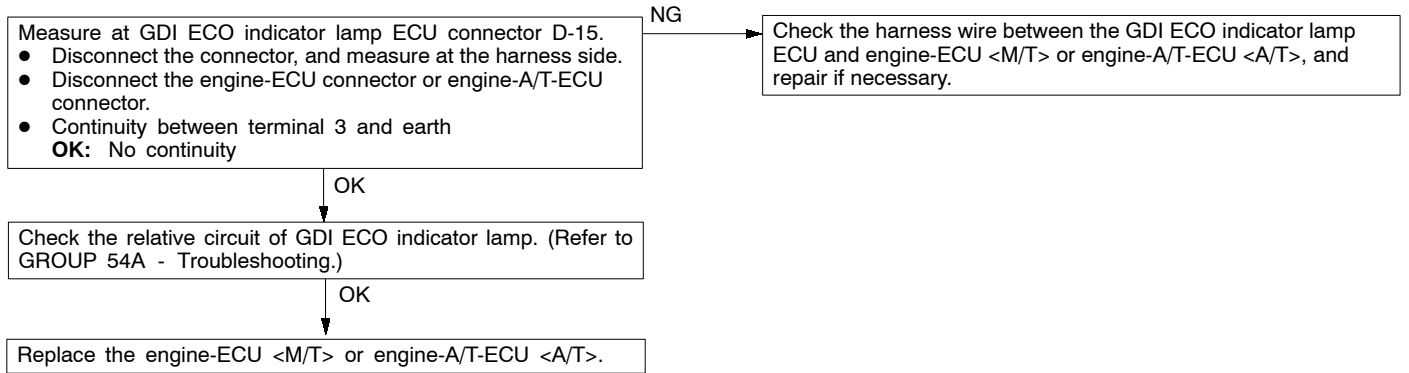
INSPECTION PROCEDURE 23

| GDI ECO indicator lamp does not illuminate. | Probable cause |
|--|---|
| If the GDI ECO indicator lamp does not illuminate after turning switch, the causes listed in the right column are suspected. | <ul style="list-style-type: none"> • Burned-out GDI ECO indicator lamp bulb • Open circuit or short-circuited harness wire in the GDI ECO indicator lamp circuit • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> • Malfunction of the GDI ECO indicator lamp ECU |

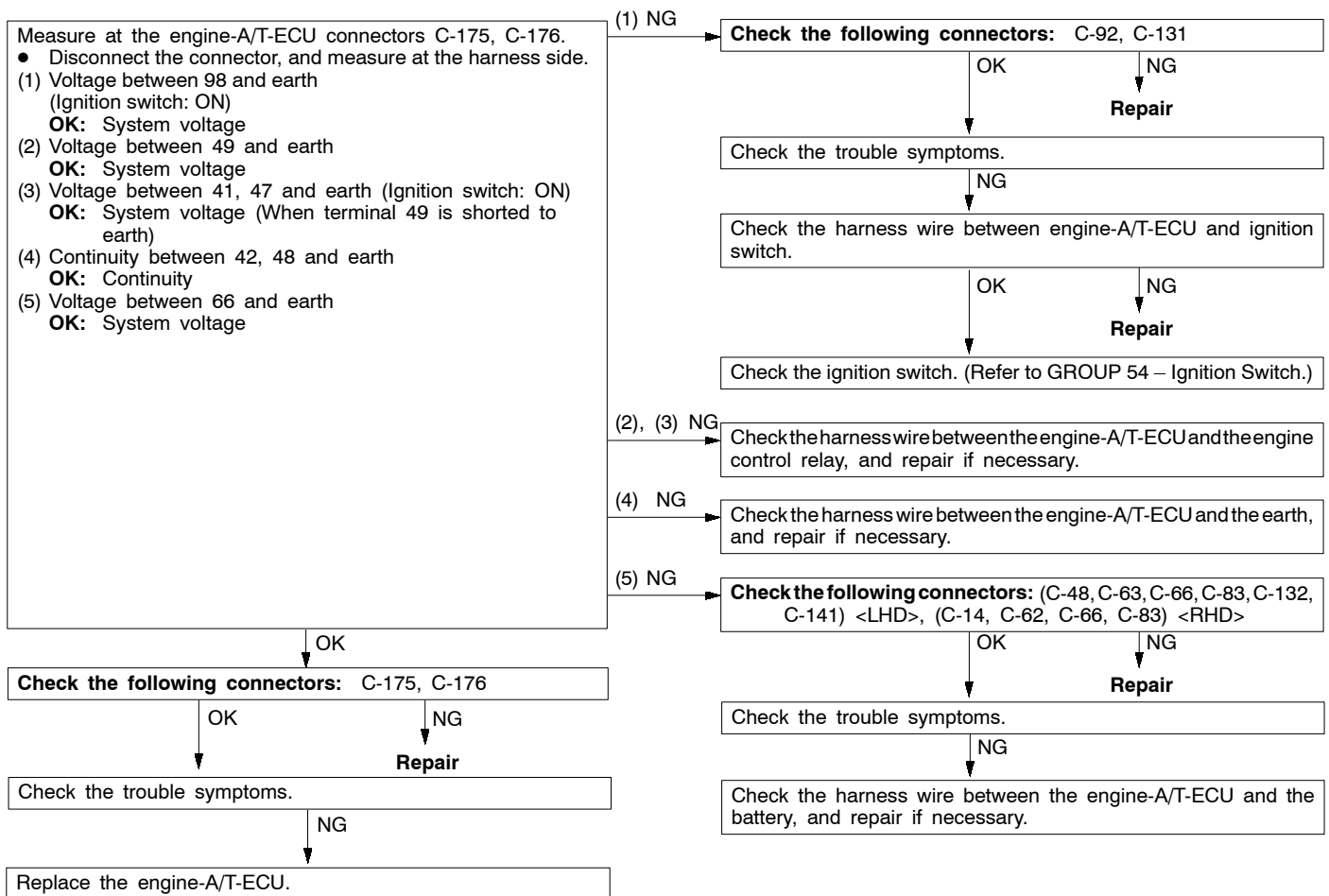


INSPECTION PROCEDURE 24

| GDI ECO indicator lamp remains illuminated and does not go off. | Probable cause |
|--|--|
| If the GDI ECO indicator lamp does not go off during high load operation, the causes listed in the right column are suspected. | <ul style="list-style-type: none"> • Short circuit between the GDI ECO indicator lamp and engine-ECU • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> • Malfunction of the GDI ECO indicator lamp ECU |

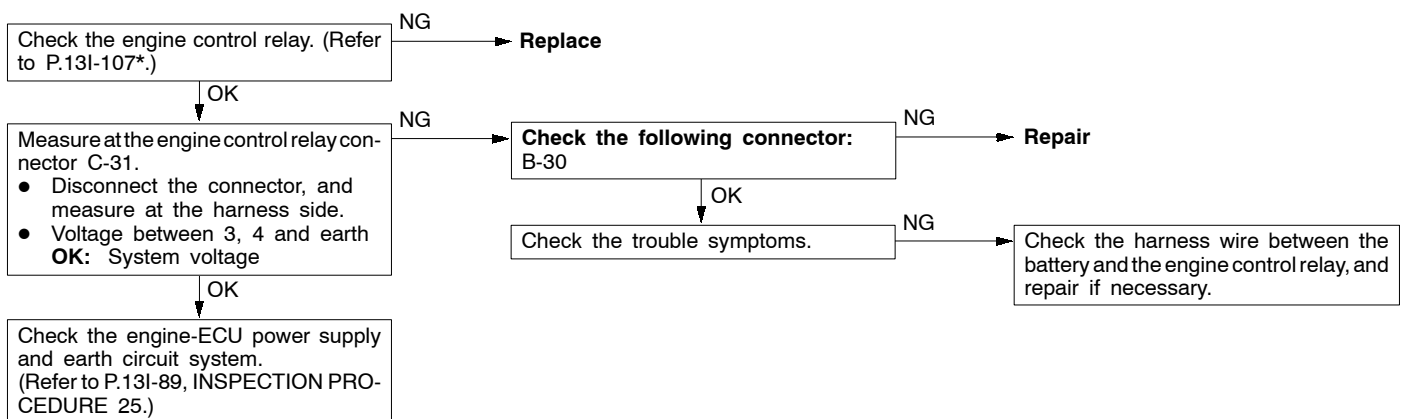


<A/T>



INSPECTION PROCEDURE 26

| Engine control relay and ignition switch-IG system | Probable cause |
|---|---|
| When the ignition switch ON signal is input to the engine-ECU <M/T> or engine-A/T-ECU <A/T>, the engine-ECU <M/T> or engine-A/T-ECU <A/T> turns on the engine control relay. This causes system voltage to be supplied to the engine-ECU <M/T> or engine-A/T-ECU <A/T> and to the sensors and actuators. | <ul style="list-style-type: none"> Malfunction of the ignition switch Malfunction of the engine control relay Open circuit or short-circuited harness wire of the engine control relay circuit Malfunction of the engine-ECU <M/T> Malfunction of the engine-A/T-ECU <A/T> |

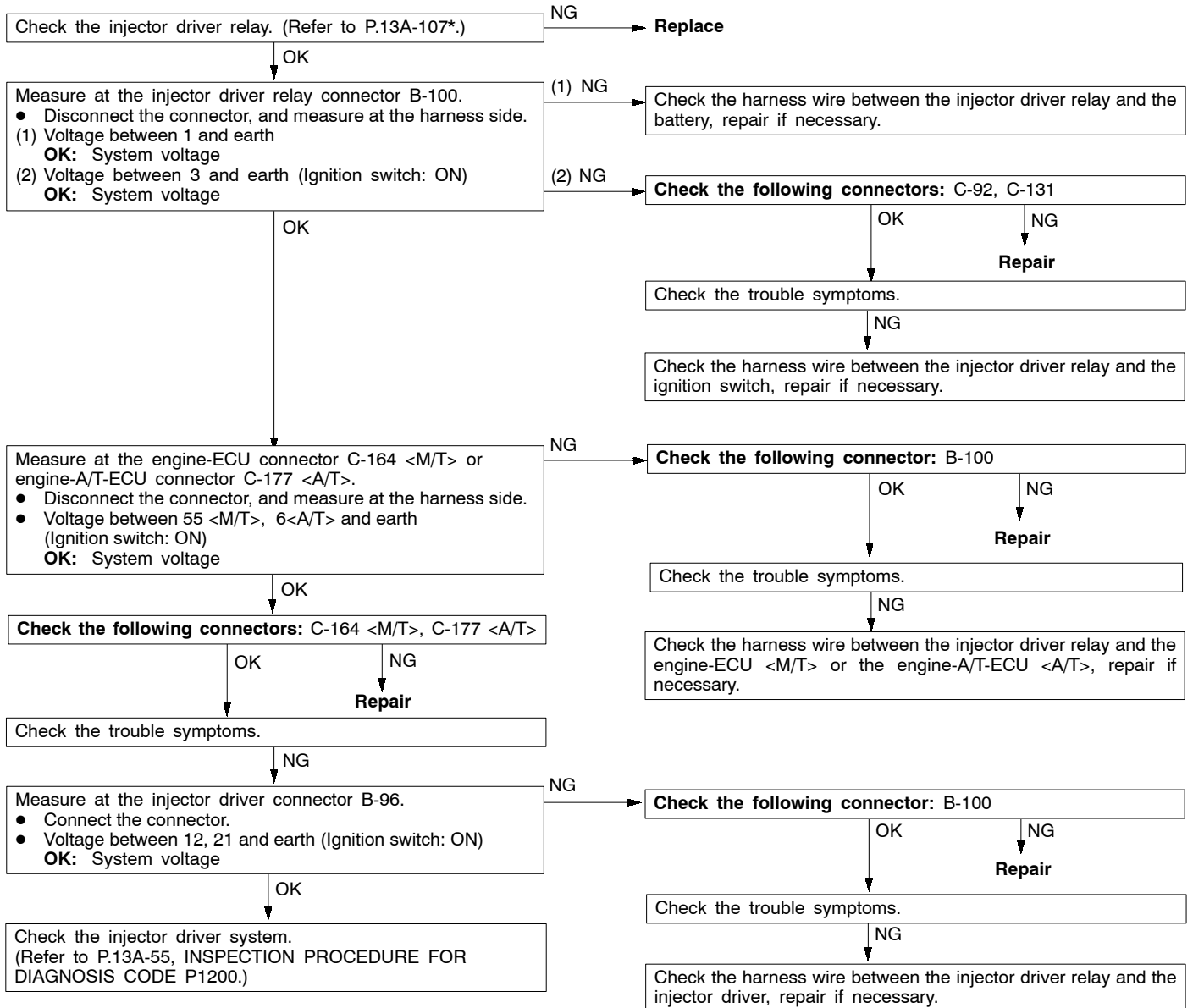


NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

INSPECTION PROCEDURE 27

| Injector driver relay system | Probable cause |
|---|---|
| When the ignition switch ON signal is input to the engine-ECU <M/T> or the engine-A/T-ECU <A/T>, engine-ECU <M/T> or the engine -A/T-ECU <A/T> turns on the injector driver relay. This causes system voltage to be supplied to the injector driver. | <ul style="list-style-type: none"> • Malfunction of the injector driver relay • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T> |



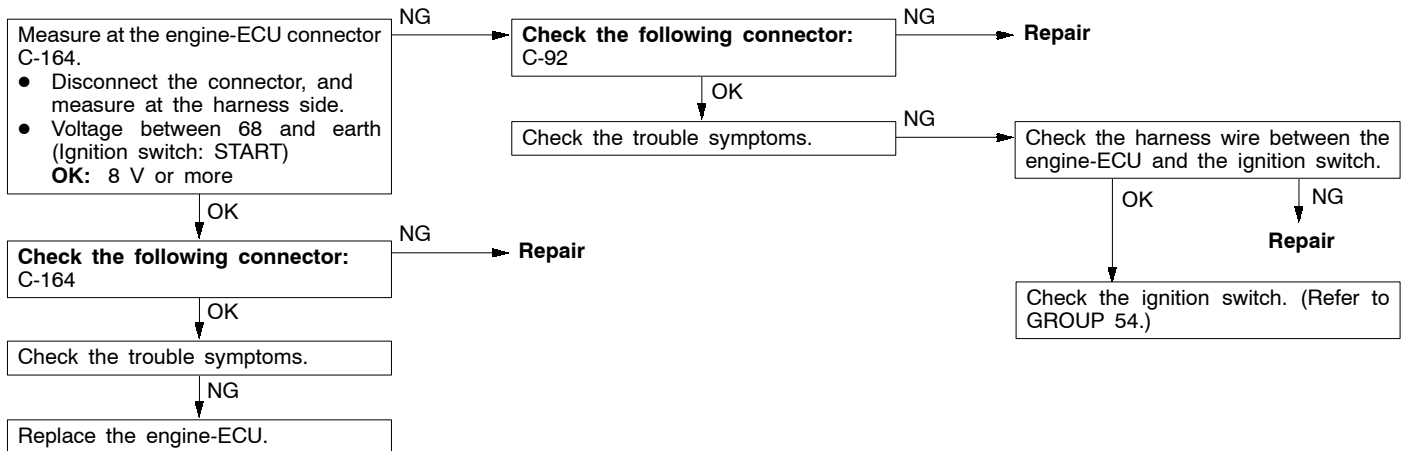
NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

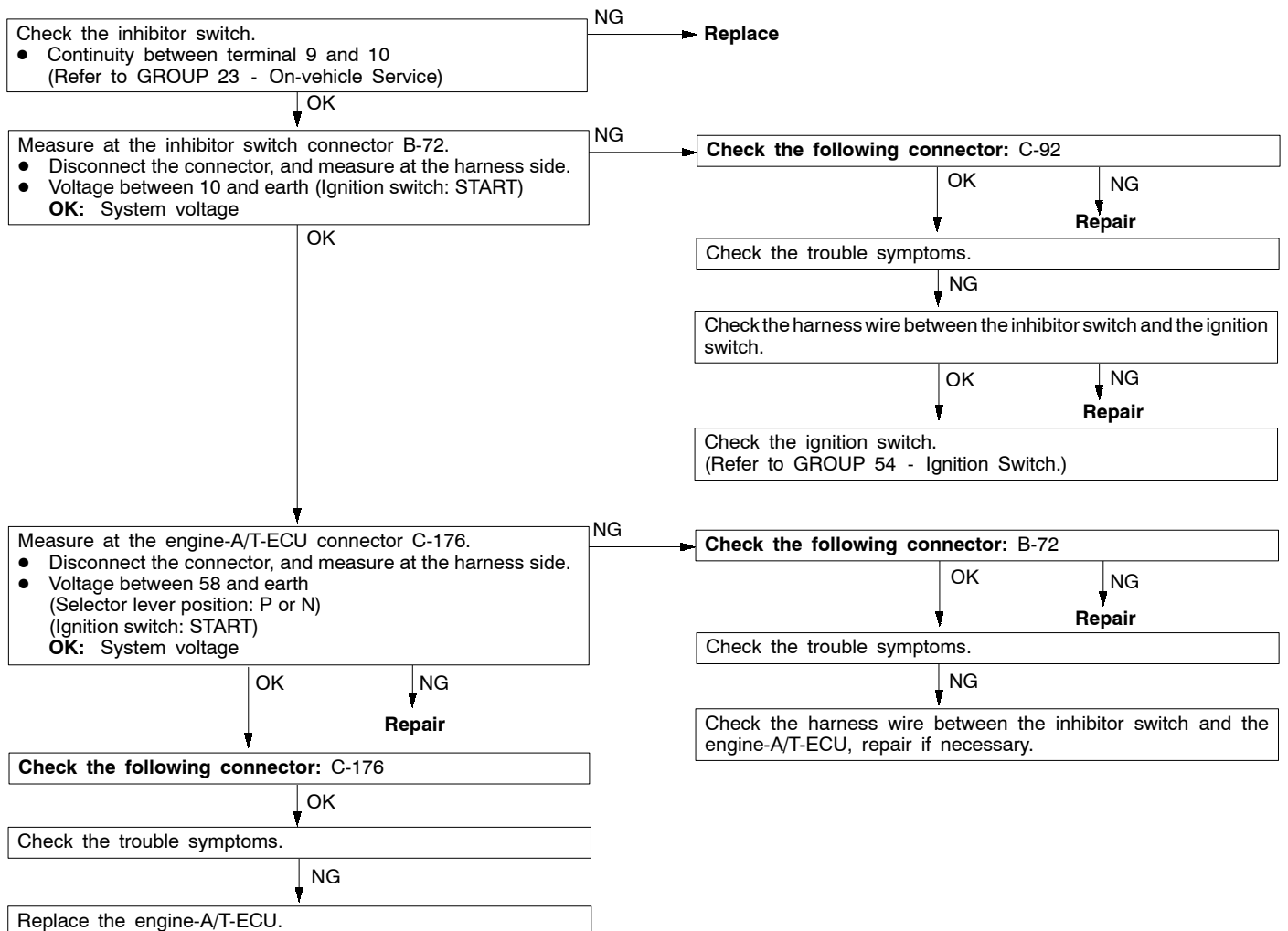
INSPECTION PROCEDURE 28

| Ignition switch-ST system | Probable cause |
|---|--|
| <p>The ignition switch-ST outputs a HIGH signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T> while the engine is cranking.</p> <p>The engine-ECU <M/T> or engine-A/T-ECU <A/T> uses this signal to carry out functions such as fuel injection control during starting.</p> | <ul style="list-style-type: none"> • Malfunction of the ignition switch • Malfunction of the inhibitor switch <A/T> • Open circuit or short-circuited harness wire of the ignition switch circuit • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |

<M/T>

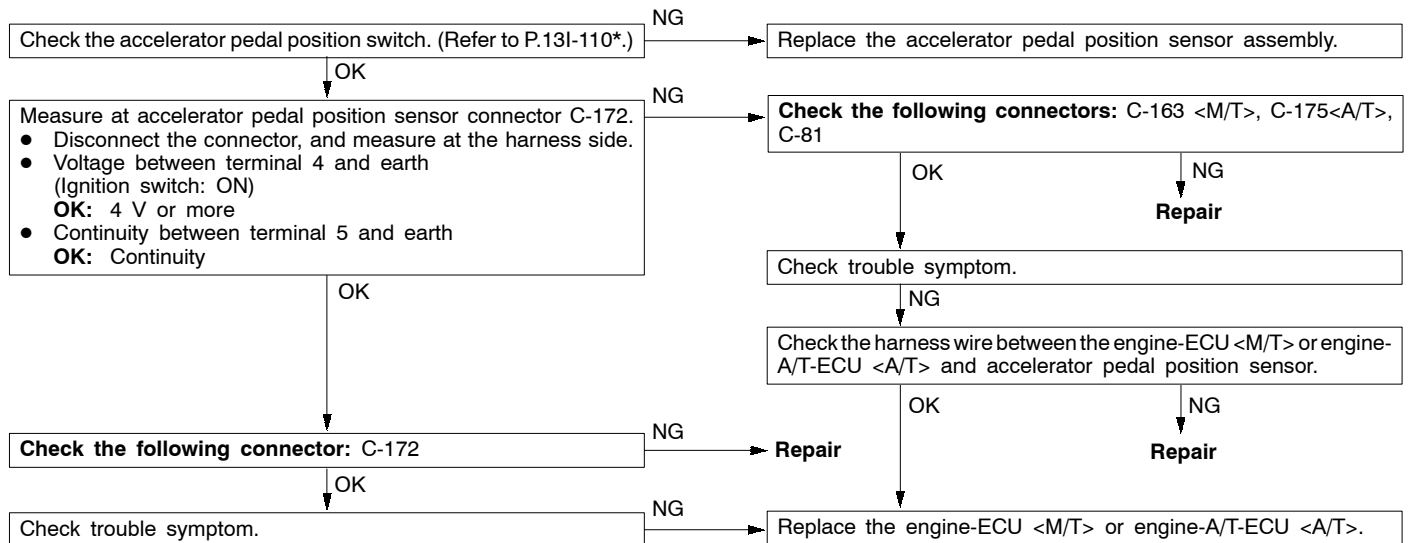


<A/T>



INSPECTION PROCEDURE 29

| Accelerator pedal position switch system | Probable cause |
|---|---|
| The accelerator pedal position switch detects that the accelerator pedal is fully closed, and sends a signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T>. The engine-ECU <M/T> or engine-A/T-ECU <A/T> controls idle speed, based on this signal. | <ul style="list-style-type: none"> • Maladjustment of the accelerator cable • Maladjustment of the accelerator pedal position switch • Open circuit or short-circuited harness wire in the accelerator pedal position switch system, or poor connector contact • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |

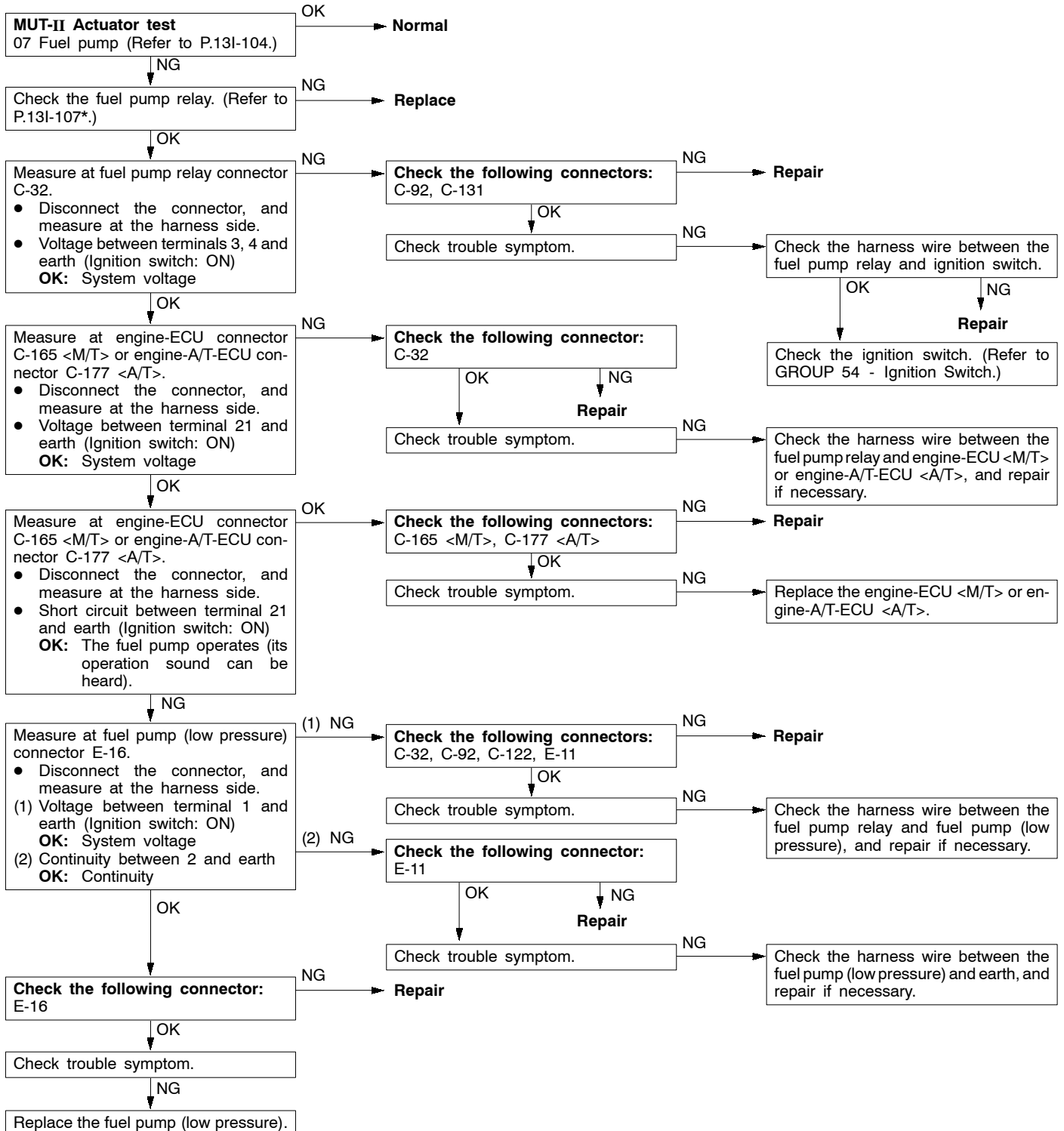


NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

INSPECTION PROCEDURE 30

| Fuel pump (low pressure) system | Probable cause |
|---|--|
| The engine-ECU <M/T> or engine-A/T-ECU <A/T> turns on the fuel pump relay while the engine is cranking or running, and supplies power source to the fuel pump (low pressure). | <ul style="list-style-type: none"> • Malfunction of the fuel pump relay • Malfunction of the fuel pump (low pressure) • Open circuit or short-circuited harness wire in the fuel pump (low pressure) circuit, or poor connector contact • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |

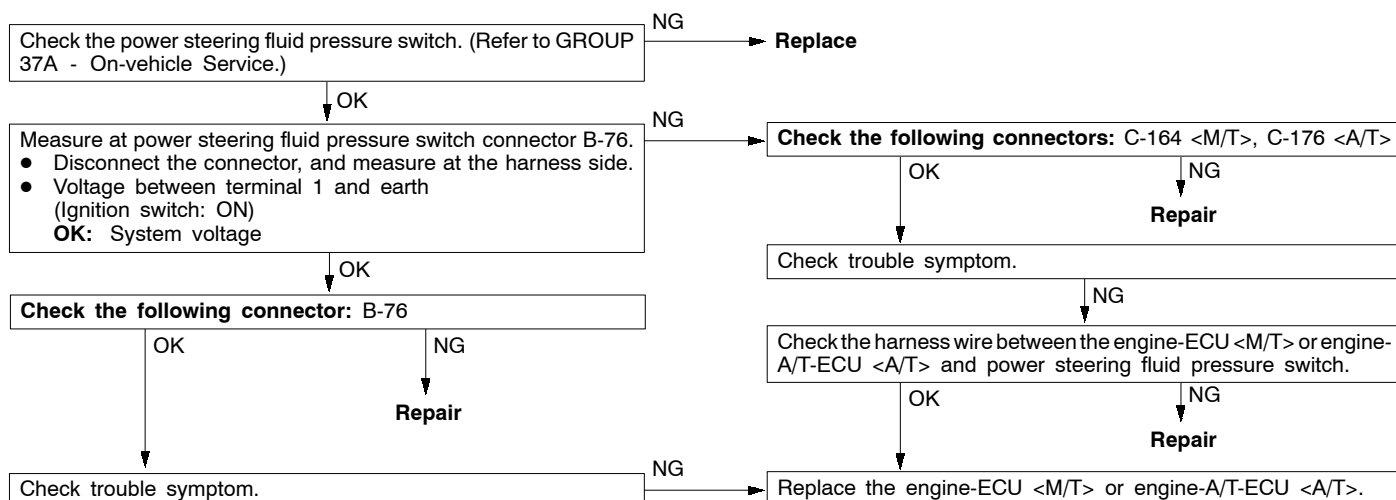


NOTE:

*: Refer to the '99 GALANT Workshop Manual (Pub. No. PWDE9611-A)

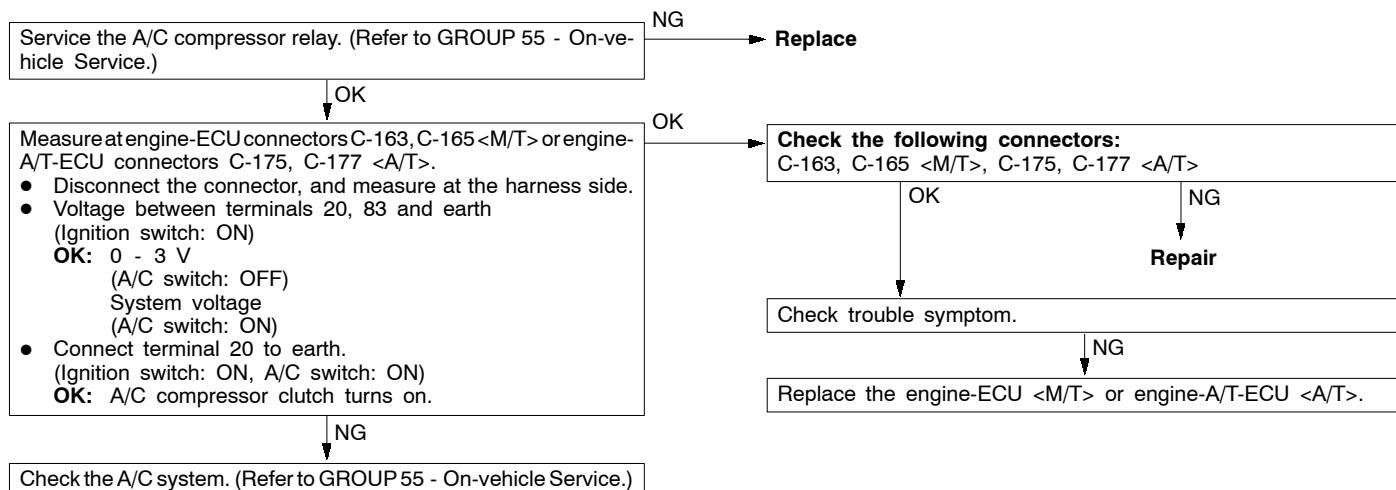
INSPECTION PROCEDURE 31

| Power steering fluid pressure switch system | Probable cause |
|--|--|
| The power steering fluid pressure switch sends a signal to the engine-ECU <M/T> or engine-A/T-ECU <A/T> according to power steering load. Based on this signal, the engine-ECU <M/T> or engine-A/T-ECU <A/T> controls the throttle control servo so that idle speed increases when the power steering is in operation. | <ul style="list-style-type: none"> • Malfunction of the power steering fluid pressure switch • Open circuit or short-circuited harness wire in the power steering fluid pressure switch circuit, or poor connector contact • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |



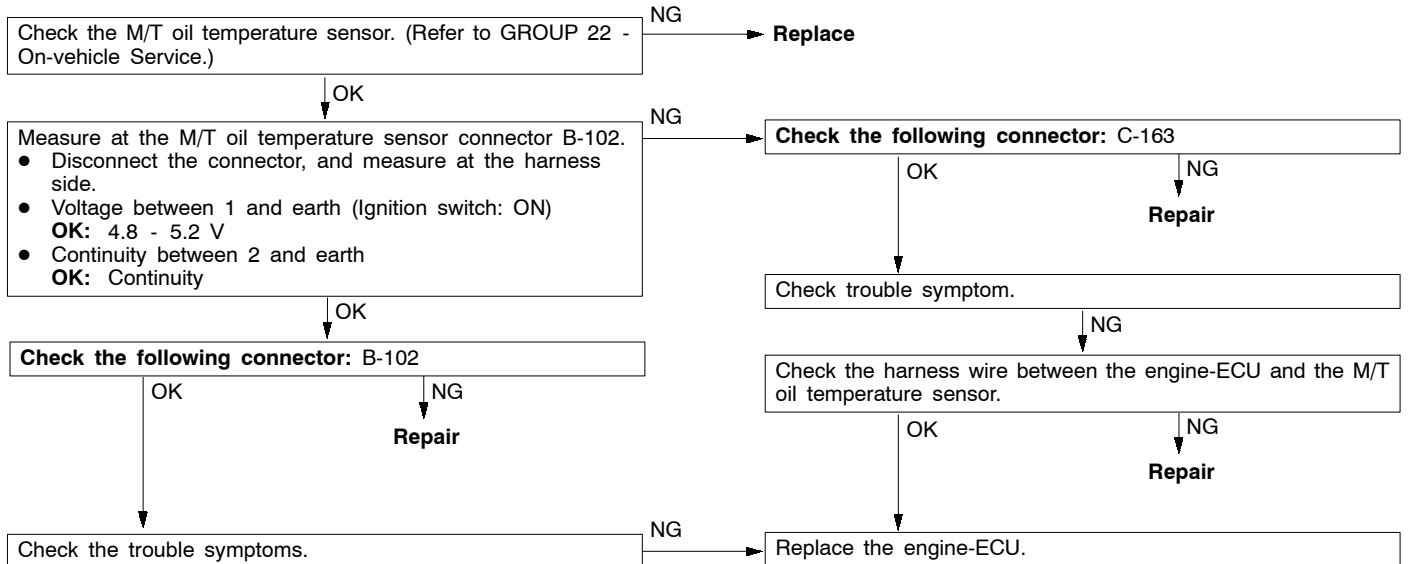
INSPECTION PROCEDURE 32

| A/C switch and A/C relay system | Probable cause |
|---|---|
| If the engine-ECU receives a 'A/C on' signal, it operates the throttle control servo and A/C compressor magnetic clutch so that idle speed increases. | <ul style="list-style-type: none"> • Malfunction of the A/C control system • Malfunction of the A/C switch • Open circuit or short-circuited harness wire in the A/C switch circuit, or poor connector contact • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |



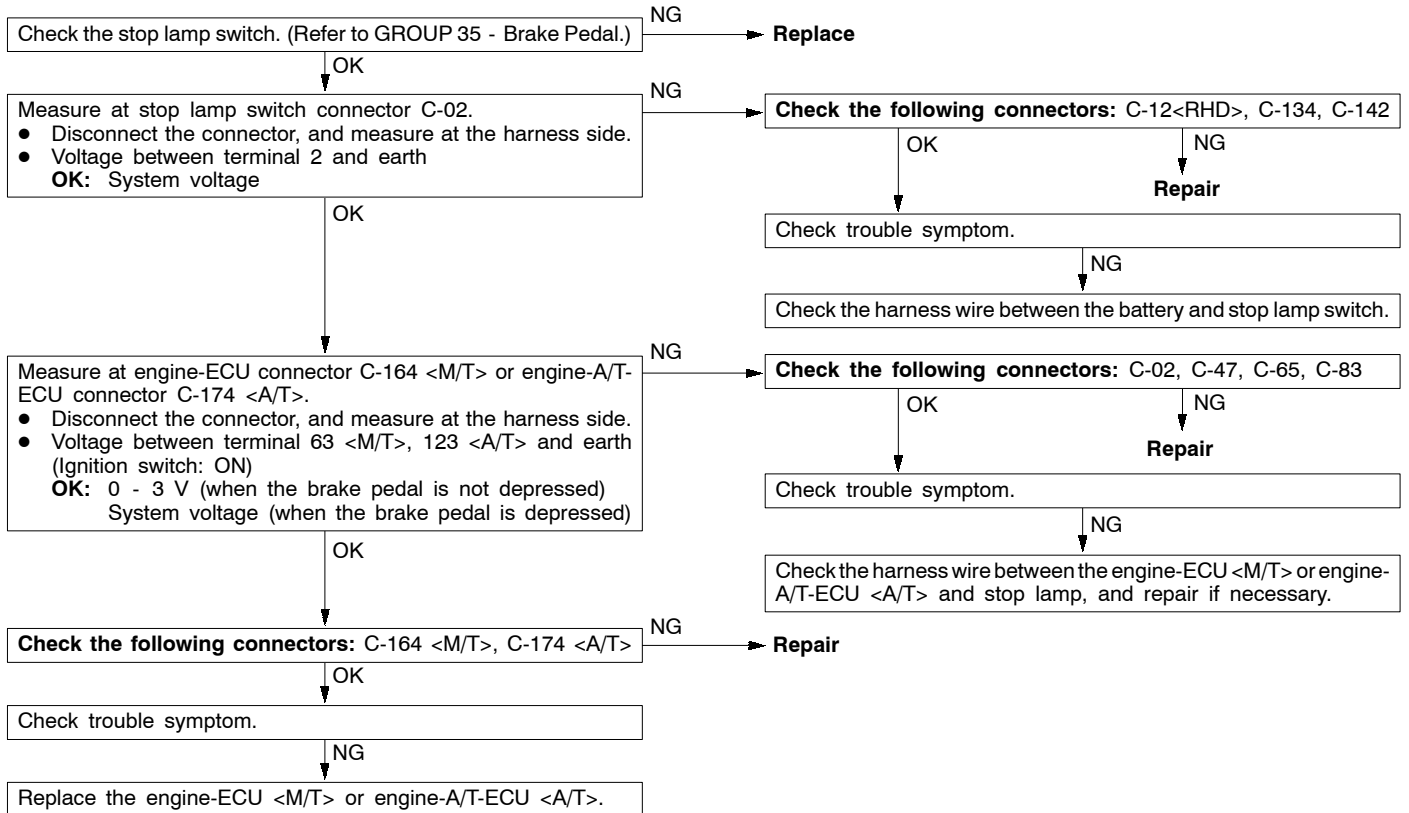
INSPECTION PROCEDURE 33

| M/T oil temperature sensor system | Probable cause |
|--|--|
| This sensor inputs the manual transmission oil temperature to the engine-ECU. The engine-ECU uses this input to control the idle speed control servo so that the idle speed is increased when the manual transmission oil temperature becomes low. | <ul style="list-style-type: none"> • Malfunction of the M/T oil temperature sensor • Open circuit or short-circuited harness wire in the M/T oil temperature sensor circuit • Malfunction of the engine-ECU |



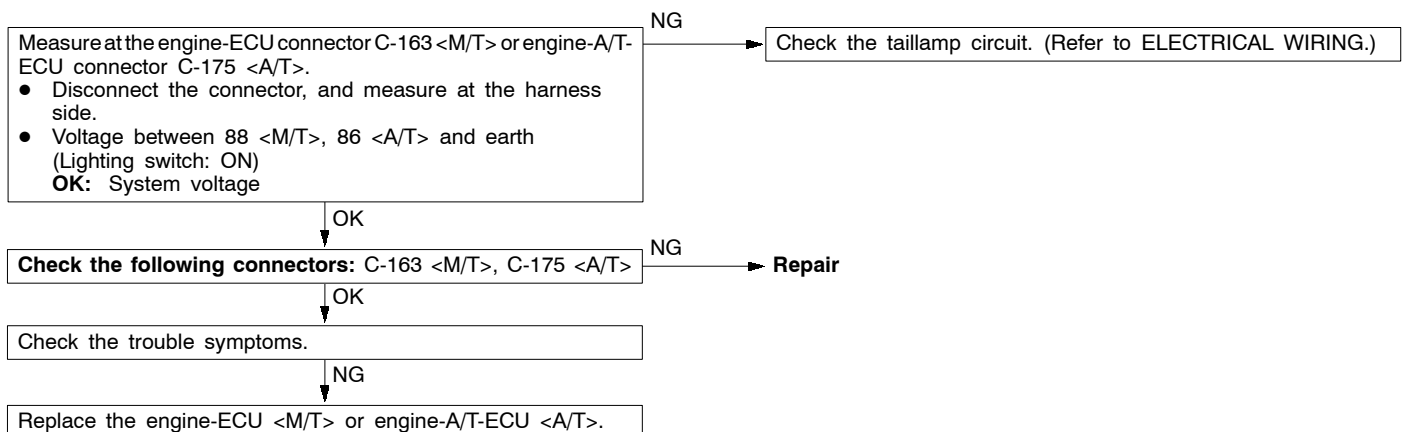
INSPECTION PROCEDURE 34

| Stop lamp switch system | Probable cause |
|---|---|
| The engine-ECU <M/T> or engine-A/T-ECU <A/T> determines whether the brake pedal is depressed or not, by means of the stop lamp switch input signal. | <ul style="list-style-type: none"> • Malfunction of the stop lamp switch • Open circuit or short-circuited harness wire in the stop lamp circuit, or poor connector contact • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |



INSPECTION PROCEDURE 35

| Small lamp switch system | Probable cause |
|---|--|
| The engine-ECU <M/T> or engine-A/T-ECU <A/T> determines whether the small lamp switch is on or off. According to that information, the engine-ECU <M/T> or engine-A/T-ECU <A/T> controls alternator output current when the vehicle is started. | <ul style="list-style-type: none"> • Improper connector contact, open circuit or short-circuited harness wire in the taillamp circuit • Malfunction of the engine-ECU <M/T> • Malfunction of the engine-A/T-ECU <A/T> |



DATA LIST REFERENCE TABLE

Caution

When shifting the select lever to D range, the brakes should be applied so that the vehicle does not move forward.

NOTE

*1: Within four minutes after starting the engine

*2: In a new vehicle [driven approximately 500 km or less], the injector drive time is sometimes 10 % longer than the standard time.

*3: The accelerator pedal position switch normally turns off when the voltage of the accelerator pedal position sensor (1st channel) is 300 - 500 mV higher than the voltage at the idle position. If the accelerator pedal position switch turns back on after the accelerator pedal position sensor voltage has risen by 100 mV and the throttle valve has opened, the accelerator pedal position switch and the accelerator pedal position sensor (1st channel) need to be adjusted.

*4: Transmission oil temperature is 50°C or more.

| Item No. | Check items | Requirements | Normal condition | Inspection procedure No. | Reference page |
|----------|-------------------------------|---|-------------------------------|---|--------------------------|
| 11 | Oxygen sensor (front) | Engine: After warm-up | Idling | 200 mV or less*1 | Code No. P0130 13I-25 |
| | | | Sudden racing | 600 - 1,000 mV | |
| | | | 2,500 r/min | 400 mV or less and 600 - 1,000 mV alternates. | |
| 12 | Air flow sensor | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral (A/T: P range) | Idling | 20 - 55 Hz (2.0 - 5.0 g/s) | Code No. P0100 13I-13 |
| | | | 2,500 r/min | 70 - 90 Hz (6.0 - 12.0 g/s) | |
| | | | Racing | Frequency increases in response to racing. | |
| 13 | Intake air temperature sensor | Ignition switch: ON | Intake air temperature: -20°C | -20°C | Code No. P0110 13I-17 |
| | | | Intake air temperature: 0°C | 0°C | |
| | | | Intake air temperature: 20°C | 20°C | |
| | | | Intake air temperature: 40°C | 40°C | |
| | | | Intake air temperature: 80°C | 80°C | |

| Item No. | Check items | Requirements | | Normal condition | Inspection procedure No. | Reference page |
|----------|--|---|---|--|--------------------------|----------------|
| 14 | Throttle position sensor (2nd channel) | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Ignition switch: ON (Engine stopped) | Release the accelerator pedal. | 4,500 - 5,500 mV | Code No. P0225 | 13I-43 |
| | | | Depress the accelerator pedal gradually. | Voltage decreases in response to the pedal depression. | | |
| | | | Depress the accelerator pedal fully. | 400 - 600 mV | | |
| 16 | Power supply voltage | Ignition switch: ON | | System voltage | Procedure No. 25 | 13I-89 |
| 18 | Cranking signal (Ignition switch-ST) | Transmission: Neutral (A/T: P range) | Engine: Stopped | OFF | Procedure No. 28 | 13I-92 |
| | | | Engine: Cranking | ON | | |
| 21 | Engine coolant temperature sensor | Ignition switch: ON | Engine coolant temperature: -20°C | -20°C | Code No. P0115 | 13I-18 |
| | | | Engine coolant temperature: 0°C | 0°C | | |
| | | | Engine coolant temperature: 20°C | 20°C | | |
| | | | Engine coolant temperature: 40°C | 40°C | | |
| | | | Engine coolant temperature: 80°C | 80°C | | |
| 22 | Crank angle sensor | <ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected | Compare the engine speed readings on the tachometer and the MUT-II. | Accord | Code No. P0335 | 13I-47 |
| | | | Engine coolant temperature: -20°C | 1,300 - 1,500 r/min | | |
| | | <ul style="list-style-type: none"> Engine: Idling Accelerator pedal position switch: ON | Engine coolant temperature: 0°C | 1,200 - 1,400 r/min | | |
| | | | Engine coolant temperature: 20°C | 1,050 - 1,250 r/min | | |
| | | | Engine coolant temperature: 40°C | 850 - 1,050 r/min | | |
| | | | Engine coolant temperature: 80°C | 500 - 700 r/min <M/T>*1, *4 550 - 750 r/min <A/T>*1 | | |
| 24 | Vehicle speed sensor | Drive at 40 km/h | | Approximately 40 km/h | Code No. P0500 | 13I-55 |

| Item No. | Check items | Requirements | | Normal condition | Inspection procedure No. | Reference page |
|----------|--------------------------------------|---|---|---|--------------------------|----------------|
| 25 | Barometric pressure sensor | Ignition switch: ON | Altitude: 0 m | 101 kPa | Code No. P0105 | 13I-15 |
| | | | Altitude: 600 m | 95 kPa | | |
| | | | Altitude: 1,200 m | 88 kPa | | |
| | | | Altitude: 1,800 m | 81 kPa | | |
| 26 | Accelerator pedal position switch | Ignition switch: ON (Depress and release the accelerator pedal several times) | Release the accelerator pedal. | ON | Procedure No. 29 | 13I-93 |
| | | | Depress the accelerator pedal slightly. | OFF | | |
| 27 | Power steering fluid pressure switch | Engine: Idling | Steering wheel stationary | OFF | Procedure No. 31 | 13I-95 |
| | | | Steering wheel turning | ON | | |
| 28 | A/C switch | Engine: Idling (The A/C compressor is running when the A/C switch is on.) | A/C switch: OFF | OFF | Procedure No. 32 | 13I-95 |
| | | | A/C switch: ON | ON | | |
| 31 | Small lamp switch | Engine: Idling | Lighting switch: OFF | OFF | Procedure No. 35 | 13I-97 |
| | | | Lighting switch: ON | ON | | |
| 34 | Air flow sensor reset signal | Engine: After having warmed up | Engine is idling | ON | Code No. P0100 | 13I-13 |
| | | | 3,000 r/min | OFF | | |
| 37 | Volumetric efficiency | <ul style="list-style-type: none">Engine coolant temperature: 80 - 95°CLamps, electric cooling fan and all accessories: OFFTransmission: Neutral (A/T: P range) | Engine is idling | 15 - 35 % | - | - |
| | | | 2,500 r/min | 15 - 35 % | | |
| | | | Engine is suddenly raced | Volumetric efficiency increases in response to racing | | |
| 38 | Crank angle sensor | <ul style="list-style-type: none">Engine: Cranking [reading is possible at 2,000 r/min or less]Tachometer: Connected | Engine speeds displayed on the MUT-II and tachometer are identical. | | - | - |

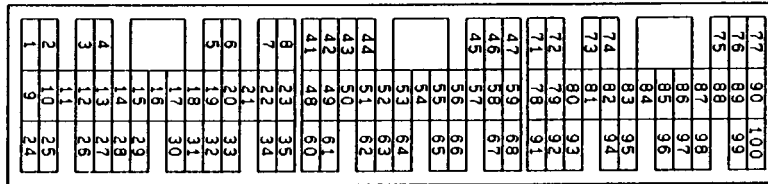
| Item No. | Check items | Requirements | | Normal condition | Inspection procedure No. | Reference page |
|----------|----------------------------|---|--|--|--------------------------|----------------|
| 41 | Injector drive time*2 | <ul style="list-style-type: none">Engine coolant temperature: 80 - 95°CLamps, electric cooling fan and all accessories: OFFTransmission: Neutral (A/T: P range) | Idling | 0.4 - 0.6 ms*1 | - | - |
| | | | 2,500 r/min | 0.4 - 0.8 ms | | |
| | | | Sudden racing | Increases | | |
| 44 | Ignition advance | <ul style="list-style-type: none">Engine: After warm-upSet a timing light. | Idling | 15 - 25° BTDC*1 | Code No. P0300 | 13I-44 |
| | | | 2,500 r/min | 25 - 35° BTDC | | |
| 48 | M/T oil temperature sensor | Drive after the engine has warmed up. | Drive for 15 minutes or more | Gradually increases to 50 - 90°C | Procedure No. 33 | 13I-96 |
| 49 | A/C relay | Engine: After warm-up, idling | A/C switch: OFF | OFF (compressor clutch is not operating) | Procedure No. 32 | 13I-95 |
| | | | A/C switch: ON | ON (compressor clutch is operating) | | |
| 59 | Oxygen sensor (rear) | <ul style="list-style-type: none">Transmission: 2nd gear (A/T: L range)Drive with throttle widely open | 3,500 r/min | 600 - 1,000 mV | Code No. P0136 | 13I-28 |
| 66 | Brake vacuum sensor | <ul style="list-style-type: none">Engine coolant temperature: 80 - 95°CLamps, electric cooling fan and all accessories: OFFTransmission: Neutral (A/T: P range) | Stop the engine from idling speed, and then depress the brake pedal several times with the ignition switch on. | Displayed pressure increases. | Code No. P1515 | 13I-64 |
| 67 | Stop lamp switch | Ignition switch: ON | Brake pedal: Depressed | OFF | Procedure No. 34 | 13I-97 |
| | | | Brake pedal: Released | ON | | |
| 68 | EGR valve | <ul style="list-style-type: none">Engine coolant temperature: 80 - 95°CLamps, electric cooling fan and all accessories: OFFTransmission: Neutral (A/T: P range) | Idling | 0 - 15 STEP | Code No. P0403 | 13I-51 |
| | | | 2,500 r/min | 0 - 10 STEP | | |

| Item No. | Check items | Requirements | | Normal condition | Inspection procedure No. | Reference page |
|----------|---|---|--|---|--------------------------|----------------|
| 74 | Fuel pressure sensor | <ul style="list-style-type: none">Engine coolant temperature: 80 - 95°CLamps, electric cooling fan and all accessories: OFFTransmission: Neutral (A/T: P range) | Engine: Idling | 4 - 6.9 MPa | Code No. P0190 | 13I-33 |
| 77 | Accelerator pedal position sensor (2nd channel) | Ignition switch: ON | Release the accelerator pedal. | 935 - 1,135 mV | Code No. P1225 | 13I-60 |
| | | | Depress the accelerator pedal gradually. | Increases in response to the pedal depression stroke. | | |
| | | | Depress the accelerator pedal fully. | 4,000 mV or more | | |
| 78 | Accelerator pedal position sensor (1st channel)*3 | Ignition switch: ON | Release the accelerator pedal. | 935 - 1,135 mV | Code No. P0220 | 13I-40 |
| | | | Depress the accelerator pedal gradually. | Increases in response to pedal depression stroke. | | |
| | | | Depress the accelerator pedal fully. | 4,200 mV or more | | |
| 79 | Throttle position sensor (1st channel) | <ul style="list-style-type: none">Engine coolant temperature: 80 - 95°CIgnition switch: ON (Engine stopped) | Release the accelerator pedal. | 450 - 800 mV | Code No. P0120 | 13I-21 |
| | | | Depress the accelerator pedal gradually. | Increases in response to pedal depression stroke. | | |
| | | | Depress the accelerator pedal fully. | 4,200 - 4,900 mV | | |
| | | Engine: After warm-up, idling | No load | 450 - 1,000 mV | | |
| | | | A/C switch: OFF → ON | Increases by 100 - 600 mV. | | |
| | | | Selector lever: N → D range | Increases by 0 - 200 mV. | | |
| 81 | Long-term fuel compensation | Engine: Warm, 2,500 r/min without any load (during closed loop) | | -5 - 10 % | Code No. P0170 | 13I-31 |
| 82 | Short-term fuel compensation | Engine: Warm, 2,500 r/min without any load (during closed loop) | | -25 - 25 % | Code No. P0170 | 13I-31 |

| Item No. | Check items | Requirements | | Normal condition | Inspection procedure No. | Reference page |
|----------|---|---|--|--|--------------------------|----------------|
| 85 | Fuel pressure sensor | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral (A/T: P range) | Engine: Idling | 4,000 - 6,900 kPa | - | - |
| 87 | Calculation load value | Engine: Warm | Engine: Idling | 30 - 50 % | - | - |
| | | | 2,500 r/min | 30 - 50 % | | |
| 88 | Fuel control condition | Engine: Warm | 2,500 r/min | Closed loop | Code No. P0125 | 13I-23 |
| | | | When engine is suddenly raced | Open loop - drive condition | | |
| 99 | Fuel injection mode | Engine: After warm up | Idling (after four minutes or more have passed since engine start) | Lean compression | - | - |
| | | | 2,500 r/min | Stoichiometric metric feedback | | |
| | | | Sudden racing after idle position | Open loop | | |
| A1 | Oxygen sensor (front) | Engine: After warm-up | Idling | 0 V | Code No. P0130 | 13I-25 |
| | | | Sudden racing | 0.6 - 1.0 V | | |
| | | | 2,500 r/min | 0.4 V or less and 0.6 - 1.0 V alternates | | |
| A2 | Oxygen sensor (rear) | <ul style="list-style-type: none"> Transmission: 2nd gear <M/T>, L range <A/T> Drive with throttle widely open | 3,500 r/min | 0.6 - 1.0 V | Code No. P0136 | 13I-28 |
| 8A | Throttle position sensor (1st channel) (Throttle valve opening angle) | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Ignition switch: ON (Engine: stopped) | Release the accelerator pedal. | 8 - 16 % | Code No. P0120 | 13I-21 |
| | | | Depress the accelerator pedal gradually. | Increase in response to pedal depression stroke. | | |
| | | | Depress the accelerator pedal fully. | 80 - 100 % | | |
| | | Engine: After warm-up, idling | No load | 8 - 18 % | | |
| | | | A/C switch: OFF → ON | Rises by 2 - 10 % | | |

ACTUATOR TEST REFERENCE TABLE

| Item No. | Inspection item | Drive contents | Inspection contents | Normal condition | Inspection procedure No. | Reference page |
|----------|---|---|---|--|--------------------------|----------------|
| 01 | Injectors | Cut fuel to No. 1 injector | Engine: After having warmed up/Engine is idling (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. P0201 | 13I-34 |
| 02 | | Cut fuel to No. 2 injector | | | Code No. P0202 | 13I-36 |
| 03 | | Cut fuel to No. 3 injector | | | Code No. P0203 | 13I-37 |
| 04 | | Cut fuel to No. 4 injector | | | Code No. P0204 | 13I-38 |
| 07 | Fuel pump (low pressure) | Fuel pump operates and fuel is recirculated. | Ignition switch: ON | Sound of operation is heard. | Procedure No. 30 | 13I-94 |
| 08 | Purge control solenoid valve | Solenoid valve turns from OFF to ON. | Ignition switch: ON | Sound of operation can be heard when solenoid valve is driven. | Code No. P0443 | 13I-54 |
| 17 | Basic ignition timing | Set the engine-ECU <M/T> or engine-A/T-ECU <A/T> to ignition timing adjustment mode | Idling after engine warm up | 5° BTDC | - | - |
| 21 | Fan controller | Drive the fan motor | Ignition switch: ON | The fan motor operates | Procedure No. 21 | 13I-86 |
| 34 | Electronic-controlled throttle valve system | Stop the throttle control servo. | Ignition switch: ON | Throttle valve is opened slightly. | Code No. P1220 | 13I-56 |

CHECK AT THE ENGINE-ECU TERMINALS <M/T>**TERMINAL VOLTAGE CHECK CHART****Engine-ECU Connector Terminal Arrangement**

7FU2119

| Terminal No. | Check item | Check requirements (engine condition) | | Normal condition |
|--------------|------------------------------|--|---|---|
| 1 | No. 1 injector | Engine: Warm up, and then depress the accelerator pedal suddenly from the idle speed. | | Decreases slightly for short time from 9 - 13 V |
| 9 | No. 2 injector | | | |
| 24 | No. 3 injector | | | |
| 2 | No. 4 injector | | | |
| 3 | No. 1 ignition coil | Engine: 3,000 r/min | | 0.3 - 3.0 V |
| 13 | No. 2 ignition coil | | | |
| 12 | No. 3 ignition coil | | | |
| 4 | No. 4 ignition coil | | | |
| 5 | EGR valve (D) | Ignition switch: Immediately after turning ON | | 5 - 8 V (fluctuates for approx. three seconds) |
| 6 | EGR valve (C) | | | |
| 32 | EGR valve (B) | | | |
| 34 | EGR valve (A) | | | |
| 8 | Alternator G terminal | <ul style="list-style-type: none"> Engine: Warm up, and then idling Radiator fan: Not operating Headlamp: OFF → ON Stop lamp: OFF → ON Rear defogger switch: OFF → ON | | Voltage increases by 0.2 - 3.5 V |
| 14 | GDI ECO indication lamp | Ignition switch: OFF → ON | | 0 - 3 V (System voltage after five seconds) |
| | | Engine: When the accelerator pedal is suddenly depressed while the engine is idling | | System voltage |
| 16 | Purge control solenoid valve | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Ignition switch: ON | Engine: Stopped | System voltage |
| | | | Engine: Start the engine, and then increase engine speed up to 3,500 r/min. | Voltage decreases |

| Terminal No. | Check item | Check requirements (engine condition) | | Normal condition |
|--------------|---|---|----------------------------------|--|
| 18 | Fan controller | Radiator and condenser fans are not operating. | | 0 - 0.3 V |
| | | Radiator and condenser fans are operating. | | 0.7 V or more |
| 20 | A/C relay | <ul style="list-style-type: none"> Engine: Idling A/C switch: OFF → ON (Compressor is operating) | | System voltage, or changes from momentarily 6 V or more to 0 → 3 V |
| 21 | Fuel pump relay | Ignition switch: ON | Engine: Stopped | System voltage |
| | | | Engine: Idling | 0 - 3 V |
| 31 | Engine warning lamp | Ignition switch: OFF → ON | | 0 - 3 V → System voltage (after several seconds) |
| 41 | Sensor power supply | Ignition switch: ON | | 4.5 - 5.5 V |
| 42 | Power supply to accelerator pedal position sensor (1st channel) | Ignition switch: ON | | 4.5 - 5.5 V |
| 43 | Crank angle sensor | Engine: Cranking | | 0.4 - 4.0 V |
| | | Engine: Idling | | 1.5 - 2.5 V |
| 44 | Engine coolant temperature sensor | Ignition switch: ON | Engine coolant temperature: 0°C | 3.2 - 3.8 V |
| | | | Engine coolant temperature: 20°C | 2.3 - 2.9 V |
| | | | Engine coolant temperature: 40°C | 1.3 - 1.9 V |
| | | | Engine coolant temperature: 80°C | 0.3 - 0.9 V |
| 45 | Engine ignition signal | Engine: 3,000 r/min | | 0.3 - 3.0 V |
| 47 | Power supply | Ignition switch: ON | | System voltage |
| 59 | | | | |
| 50 | Camshaft position sensor | Engine: Cranking | | 0.3 - 3.0 V |
| | | Engine: Idling | | 0.5 - 3.5 V |
| 51 | Barometric pressure sensor | Ignition switch: ON | Altitude: 0 m | 3.7 - 4.3 V |
| | | | Altitude: 1,200 m | 3.2 - 3.8 V |
| 52 | Alternator FR terminal | <ul style="list-style-type: none"> Engine: Warm up, and then idling Radiator fan: Not operating Headlamp: OFF → ON Stop lamp: OFF → ON Rear defogger: OFF → ON | | Voltage decreases |

| Terminal No. | Check item | Check requirements (engine condition) | | Normal condition |
|--------------|--------------------------------------|--|---|-----------------------|
| 53 | Oxygen sensor (rear) | <ul style="list-style-type: none">• Transmission: 2nd gear• Engine speed: 3,500 r/min or more• Driving with the throttle valve widely open | | 0.6 - 1.0 V |
| 54 | Power steering fluid pressure switch | Engine: Warm up, and then idling | Steering wheel stationary | System voltage |
| | | | Steering wheel turning | 0 - 3 V |
| 55 | Injector driver relay | Ignition switch: OFF | | 0 - 0.1 V |
| | | Ignition switch: ON | | 0.5 - 1.0 V |
| 56 | Throttle valve control servo relay | Ignition switch: OFF | | 0 - 0.3 V |
| | | Ignition switch: ON | | 0.5 - 1.0 V |
| 57 | Engine control relay | Ignition switch: OFF | | 0 - 3 V |
| | | Ignition switch: ON | | System voltage |
| 60 | Back-up power source | Ignition switch: OFF | | System voltage |
| 61 | Air flow sensor | Engine: Idling | | 2.2 - 3.2 V |
| | | Engine: 2,500 r/min | | |
| 62 | Intake air temperature sensor | Ignition switch: ON | Intake air temperature: 0°C | 3.2 - 3.8 V |
| | | | Intake air temperature: 20°C | 2.3 - 2.9 V |
| | | | Intake air temperature: 40°C | 1.5 - 2.1 V |
| | | | Intake air temperature: 80°C | 0.4 - 1.0 V |
| 63 | Stop lamp switch | Depress the brake pedal. | | System voltage |
| | | Release the brake pedal. | | 0 - 3 V |
| 64 | A/C pressure sensor | Engine: Idling | Set the A/C switch to Max. COOL (under high load) | 8 V or more |
| | | | Set the A/C switch to MAX. HOT (under low load) | 4 V or less |
| 66 | Clutch switch | Depress the clutch pedal. | | 0 - 3 V |
| | | Release the clutch pedal. | | System voltage |
| 68 | Ignition switch-ST | Engine: Cranking | | 8 V or more |
| 71 | Oxygen sensor (front) | Engine: Warm up, and then hold the engine speed at 2,500 r/min (Use a digital voltmeter). | | 0 ↔ 0.8 V alternates. |

| Terminal No. | Check item | Check requirements (engine condition) | | Normal condition |
|--------------|---|---|--|--|
| 73 | M/T oil temperature sensor | M/T oil temperature: 25°C | | 2.4 - 2.7 V |
| | | M/T oil temperature: 80°C | | 0.5 - 0.8 V |
| 74 | Brake vacuum sensor | Engine: Stop the engine from idle speed, turn the ignition switch ON, and then depress the brake pedal several times. | | Voltage increases |
| 76 | Air flow sensor reset signal | Engine: Idling | | 0 - 1 V |
| | | Engine: 3,000 r/min | | 6 - 9 V |
| 78 | Throttle position sensor (2nd channel) | Ignition switch: ON | Release the accelerator pedal. | 4.5 - 5.5 V |
| | | | Depress the accelerator pedal fully. | 0.4 - 0.6 V |
| 79 | Accelerator pedal position switch | Ignition switch: ON | Release the accelerator pedal. | 0 - 1 V |
| | | | Depress the accelerator pedal fully. | 4 V or more |
| 80 | Vehicle speed sensor | <ul style="list-style-type: none"> Ignition switch: ON Move the vehicle forward. | | 0 ↔ system voltage alternates. |
| 83 | A/C switch | Engine: Idling | A/C switch: OFF | 0 - 3 V |
| | | | A/C switch: ON (Compressor is operating) | System voltage |
| 88 | Small lamp switch | Lighting switch: OFF | | 0 - 3 V |
| | | Lighting switch: ON (Taillamp: ON) | | System voltage |
| 89 | Oxygen sensor heater (front) | Engine: Idling | | 0 - 3 V |
| | | Engine: 3,500 r/min | | System voltage |
| 90 | Oxygen sensor heater (rear) | Engine: Idling | | 0 - 3 V |
| | | Engine: 3,500 r/min | | System voltage |
| 92 | Fuel pressure sensor | Engine: Idling | | 0.3 - 4.7 V |
| 94 | Accelerator pedal position sensor (1st channel) | Ignition switch: ON | Release the accelerator pedal. | 0.9 - 1.2 V |
| | | | Depress the accelerator pedal fully. | 4 V or more |
| 96 | Injector open circuit check signal | Engine: Increase engine speed from idle speed to 4,000 r/min. | | Decreases slightly (approx. 0.7 V) from 4.5 V - 5.0 V. |
| 99 | Ignition switch-IG | Ignition switch: ON | | System voltage |

**CHECK CHART FOR RESISTANCE AND CONTINUITY
BETWEEN TERMINALS**

1. Turn the ignition switch to OFF.
2. Disconnect the engine-ECU connector.
3. Measure the resistance and check for continuity between the terminals of the engine-ECU harness-side connector while referring to the check chart.

NOTE

- (1) When measuring resistance and checking continuity, a harness for checking contact pin pressure should be used instead of inserting a test probe.
- (2) Checking need not be carried out in the order given in the chart.

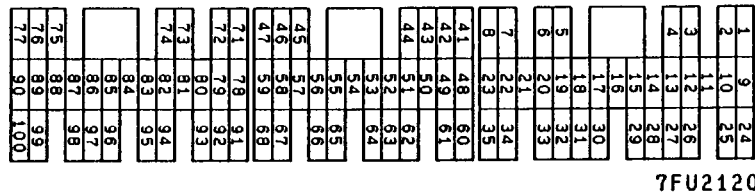
Caution

If the terminals that should be checked are mistaken, or if connector terminals are not correctly shorted to earth, damage may be caused to the vehicle wiring, sensors, engine-ECU and/or ohmmeter.

Be careful to prevent this!

4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and then repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

Engine-ECU Harness Side Connector Terminal Arrangement



| Terminal No. | Check item | Standard value, normal condition (check requirements) |
|-----------------|--------------------------------------|--|
| 5 - 47 | EGR valve (D) | 10 - 20 Ω (at 20°C) |
| 6 - 47 | EGR valve (C) | |
| 32 - 47 | EGR valve (B) | |
| 34 - 47 | EGR valve (A) | |
| 16 - 47 | Purge control solenoid valve | 28 - 36 Ω (at 20°C) |
| 44 - 72 | Engine coolant temperature sensor | 5.1 - 6.5 k Ω (when engine coolant temperature is 0°C) |
| | | 2.1 - 2.7 k Ω (when engine coolant temperature is 20°C) |
| | | 0.9 - 1.3 k Ω (when engine coolant temperature is 40°C) |
| | | 0.26 - 0.36 k Ω (when engine coolant temperature is 80°C) |
| 46 - Body earth | Earth | Continuity (0 Ω) |
| 58 - Body earth | | |
| 62 - 72 | Intake air temperature sensor | 5.3 - 6.7 k Ω (when intake air temperature is 0°C) |
| | | 2.3 - 3.0 k Ω (when intake air temperature is 20°C) |
| | | 1.0 - 1.5 k Ω (when intake air temperature is 40°C) |
| | | 0.30 - 0.42 k Ω (when intake air temperature is 80°C) |
| 79 - 49 | Accelerator pedal position switch | Continuity (when the accelerator pedal is released) |
| | | No continuity (when the accelerator pedal is slightly depressed) |
| 89 - 47 | Oxygen sensor heater control (front) | 4.5 - 8.0 Ω (at 20°C) |
| 90 - 47 | Oxygen sensor heater (rear) | 11 - 18 Ω (at 20°C) |

CHECK AT THE ENGINE-A/T-ECU TERMINALS <A/T>**TERMINAL VOLTAGE CHECK CHART**

Engine-A/T-ECU Connector Terminal Arrangement

| | | |
|-----|-----|-----|
| 107 | 120 | 130 |
| 106 | 119 | 128 |
| 105 | 118 | 127 |
| | 117 | 126 |
| | 116 | 125 |
| | 115 | 124 |
| | 114 | 123 |
| 104 | 113 | 122 |
| 103 | 112 | 121 |
| | 111 | 120 |
| 102 | 110 | 119 |
| 101 | 109 | 118 |
| | 108 | 117 |
| | 107 | 116 |
| 77 | 88 | 98 |
| 76 | 87 | 97 |
| | 86 | 96 |
| | 85 | 95 |
| | 84 | 94 |
| | 83 | 93 |
| 74 | 82 | 92 |
| 73 | 81 | 91 |
| 72 | 80 | 90 |
| 71 | 79 | 89 |
| | 78 | 88 |
| 44 | 55 | 65 |
| | 54 | 64 |
| | 53 | 63 |
| | 52 | 62 |
| 43 | 51 | 61 |
| 42 | 50 | 60 |
| | 49 | 59 |
| 41 | 48 | 58 |
| | 47 | 57 |
| 8 | 23 | 34 |
| 7 | 22 | 33 |
| | 21 | 32 |
| 6 | 20 | 31 |
| | 19 | 30 |
| | 18 | 29 |
| | 17 | 28 |
| | 16 | 27 |
| | 15 | 26 |
| 4 | 14 | 25 |
| 3 | 13 | 24 |
| | 12 | 23 |
| 2 | 11 | 22 |
| | 10 | 21 |
| | 9 | 20 |

7FU1763

| Terminal No. | Check item | Check condition (Engine condition) | Normal condition |
|--------------|------------------------------|---|---|
| 1 | No. 1 injector | While engine is idling after having warmed up, suddenly depress the accelerator pedal. | From 9 - 13 V, momentarily drops slightly |
| 9 | No. 2 injector | | |
| 24 | No. 3 injector | | |
| 2 | No. 4 injector | | |
| 3 | Oxygen sensor heater (front) | Engine: Idling | 0 - 3 V |
| | | Engine: 3,500 r/min | System voltage |
| 6 | Injector driver relay | Ignition switch: OFF | 0 - 0.1 V |
| | | Ignition switch: ON | 0.5 - 1.0 V |
| 8 | Alternator G terminal | <ul style="list-style-type: none"> Engine: Idling after warming-up Radiator fan: Not operating Headlamp: OFF to ON Stop lamp: OFF to ON Defogger switch: OFF to ON | The voltage increases by 0.2 - 3.5 V |
| 54 | Alternator FR terminal | <ul style="list-style-type: none"> Engine: Idling after warming-up Radiator fan: Not operating Headlamp: OFF to ON Stop lamp: OFF to ON Defogger switch: OFF to ON | The voltage drops |
| 11 | No. 1 ignition coil | Engine speed: 3,000 r/min | 0.3 - 3.0 V |
| 12 | No. 2 ignition coil | | |
| 31 | No. 3 ignition coil | | |
| 30 | No. 4 ignition coil | | |
| 14 | Throttle control servo relay | Ignition switch: OFF | 0 - 0.1 V |
| | | Ignition switch: ON | 0.5 - 1.0 V |
| 18 | Fan controller | Condenser fan not operating | System voltage |
| | | Condenser fan operating | 0 - 3 V or more |
| 19 | Air flow sensor reset signal | Engine: Idling | 0 - 1 V |
| | | Engine speed: 3,000 r/min | 6 - 9 V |

| Terminal No. | Check item | Check condition (Engine condition) | | Normal condition |
|--------------|---|--|---|--|
| 20 | A/C relay | <ul style="list-style-type: none"> Engine: Idling A/C switch: OFF to ON (Compressor operating) | | System voltage or changes momentarily 6 V or more to 0 - 3 V |
| 21 | Fuel pump relay | Ignition switch: ON | | System voltage |
| | | Engine: Idling | | 0 - 3 V |
| 22 | Engine warning lamp | Ignition switch: OFF to ON | | System voltage |
| 23 | GDI ECO indication lamp | Ignition switch: OFF → ON | | 0 - 3 V (System voltage after five seconds) |
| | | Rev the engine suddenly. | | System voltage |
| 26 | Oxygen sensor heater (rear) | Engine: Idling | | 0 - 3 V |
| | | Engine: 3,500 r/min | | System voltage |
| 34 | Purge control solenoid valve | <ul style="list-style-type: none"> Engine coolant temperature: 80 - 95°C Ignition switch: ON | Engine: Stopped | System voltage |
| | | | Engine: After starting, increase the engine speed up to 3,500 r/min | The voltage drops |
| 41 | Power supply | Ignition switch: ON | | System voltage |
| 47 | | | | |
| 43 | Engine ignition signal | Engine speed: 3,000 r/min | | 0.3 - 3.0 V |
| 44 | Engine coolant temperature sensor | Ignition switch: ON | When engine coolant temperature is 0°C | 3.2 - 3.8 V |
| | | | When engine coolant temperature is 20°C | 2.3 - 2.9 V |
| | | | When engine coolant temperature is 40°C | 1.3 - 1.9 V |
| | | | When engine coolant temperature is 80°C | 0.3 - 0.9 V |
| 45 | Crank angle sensor | Engine: Cranking | | 0.4 - 4.0 V |
| | | Engine: Idling | | 1.5 - 2.5 V |
| 46 | Power supply voltage applied to accelerator pedal position sensor (1st channel) | Ignition switch: ON | | 4.5 - 5.5 V |
| 49 | Engine control relay | Ignition switch: OFF | | 0 - 3 V |
| | | Ignition switch: ON | | System voltage |
| 51 | EGR valve (A) | Ignition switch: OFF to ON | | 5 - 8 V (Repeatedly changes for approx. 3 seconds) |
| 53 | EGR valve (C) | | | |
| 60 | EGR valve (B) | | | |
| 62 | EGR valve (C) | | | |

| Terminal No. | Check item | Check condition (Engine condition) | | Normal condition |
|--------------|--|---|---|--|
| 52 | Power steering fluid pressure switch | Engine: Idling after warming-up | When steering wheel is stationary | System voltage |
| | | | When steering wheel is turned | 0 - 3 V |
| 55 | Barometric pressure sensor | Ignition switch: ON | At an altitude of 0 m | 3.7 - 4.3 V |
| | | | At an altitude of 1,200 m | 3.2 - 3.8 V |
| 56 | Camshaft position sensor | Engine: Cranking | | 0.3 - 3.0 V |
| | | Engine: Idling | | 0.5 - 3.5 V |
| 58 | Ignition switch-ST | Engine: Cranking | | 8 V or more |
| 63 | Injector open circuit check signal | Engine: Increases from idling up to 4,000 r/min | | The voltage decreases slightly (approx. 0.7 V) from 4.5 - 5.0 V. |
| 64 | Intake air temperature sensor | Ignition switch: ON | When intake air temperature is 0°C | 3.2 - 3.8 V |
| | | | When intake air temperature is 20°C | 2.3 - 2.9 V |
| | | | When intake air temperature is 40°C | 1.5 - 2.1 V |
| | | | When intake air temperature is 80°C | 0.4 - 1.0 V |
| 65 | Air flow sensor | Engine: Idling | | 2.2 - 3.2 V |
| | | Engine speed: 2,500 r/min | | |
| 66 | Backup power supply | Ignition switch: OFF | | System voltage |
| 71 | Oxygen sensor (front) | Engine: Running at 2,500 r/min after warming-up (Check by using a digital voltmeter.) | | Voltages of 0 V and 0.8 V alternate |
| 73 | Oxygen sensor (rear) | <ul style="list-style-type: none">● Transmission: L range● Engine speed: 3,500 r/min or more● Driving with the throttle valve widely open | | 0.6 - 1.0 V |
| 78 | Throttle position sensor (2nd channel) | Ignition switch: ON | Release the accelerator pedal. | 4.5 - 5.5 V |
| | | | Depress the accelerator pedal fully. | 0.4 - 0.6 V |
| 79 | Accelerator pedal position switch | Ignition switch: ON | Release the accelerator pedal. | 0 - 1 V |
| | | | Depress the accelerator pedal slightly. | 4 V or more |
| 80 | Vehicle speed sensor | <ul style="list-style-type: none">● Ignition switch: ON● Move the vehicle slowly forward | | Voltages of 0 and 8 - 12 V alternate (changes repeatedly) |

| Terminal No. | Check item | Check condition (Engine condition) | | Normal condition |
|--------------|---|---|---|-------------------|
| 83 | A/C switch | Engine: Idling | A/C switch: OFF | 0 - 3 V |
| | | | A/C switch: ON (Compressor is operating) | System voltage |
| 86 | Small lamp switch | Lighting switch: OFF | | 0 - 3 V |
| | | Lighting switch: Tail light position | | System voltage |
| 87 | Sensor applied voltage | Ignition switch: ON | | 4.5 - 5.5 V |
| 93 | Fuel pressure sensor | Engine: Idling | | 0.3 - 4.7 V |
| 94 | A/C pressure sensor | Engine: Idling | Set the A/C switch to MAX. COOL (under high load) | 8 V or more |
| | | | Set the A/C switch to MAX. HOT (under low load) | 4 V or less |
| 95 | Accelerator pedal position sensor (1st channel) | Ignition switch: ON | Release the accelerator pedal. | 0.9 - 1.2 V |
| | | | Depress the accelerator pedal fully. | 4.0 V or higher |
| 96 | Brake vacuum sensor | Engine: Stop the engine from idle speed, turn the ignition switch ON, and then depress the brake pedal several times. | | Voltage increases |
| 98 | Ignition switch-IG | Ignition switch: ON | | System voltage |
| 123 | Stop lamp switch | Depress the brake pedal. | | System voltage |
| | | Release the brake pedal. | | 0 - 3 V |

**CHECK CHART FOR RESISTANCE AND CONTINUITY
BETWEEN TERMINALS**

1. Turn the ignition switch to OFF.
2. Disconnect the engine-A/T-ECU connector.
3. Measure the resistance and check for continuity between the terminals of the engine-A/T-ECU harness-side connector while referring to the check chart.

NOTE

- (1) When measuring resistance and checking continuity, a harness for checking contact pin pressure should be used instead of inserting a test probe.
- (2) Checking need not be carried out in the order given in the chart.

Caution

If the terminals that should be checked are mistaken, or if connector terminals are not correctly shorted to earth, damage may be caused to the vehicle wiring, sensors, engine-A/T-ECU and/or ohmmeter.

Be careful to prevent this!

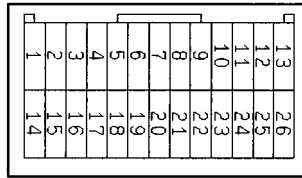
4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and then repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

Engine-A/T-ECU Harness Side Connector Terminal Arrangement

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|---|---|---|---|---|---|---|
| 107 | 106 | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 | 81 | 80 | 79 | 78 | 77 | 76 | 75 | 74 | 73 | 72 | 71 | 70 | 69 | 68 | 67 | 66 | 65 | 64 | 63 | 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|---|---|---|---|---|---|---|

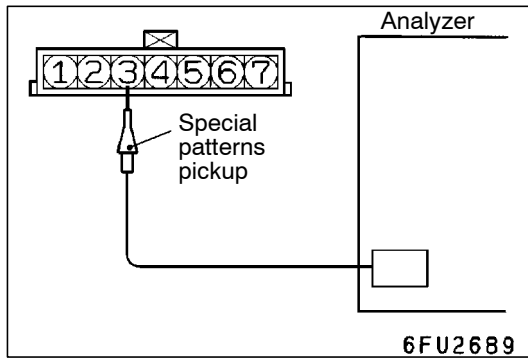
7FU1764

| Terminal No. | Check item | Standard value, normal condition (check conditions) |
|------------------------------------|-----------------------------------|--|
| 3 - 41 | Oxygen sensor heater (front) | 4.5 - 8.0 Ω (at 20°C) |
| 26 - 41 | Oxygen sensor heater (rear) | 11 - 18 Ω (at 20°C) |
| 34 - 41 | Purge control solenoid valve | 28 - 36 Ω (at 20°C) |
| Between terminal 42 and body earth | Earth | Continuity (0 Ω) |
| Between terminal 48 and body earth | | |
| 51 - 41 | EGR valve (A) | 10 - 20 Ω (at 20°C) |
| 53 - 41 | EGR valve (C) | |
| 60 - 41 | EGR valve (B) | |
| 62 - 41 | EGR valve (D) | |
| 44 - 81 | Engine coolant temperature sensor | 5.1 - 6.5 k Ω (When coolant temperature is 0°C) |
| | | 2.1 - 2.7 k Ω (When coolant temperature is 20°C) |
| | | 0.9 - 1.3 k Ω (When coolant temperature is 40°C) |
| | | 0.26 - 0.36 k Ω (When coolant temperature is 80°C) |
| 64 - 81 | Intake air temperature sensor | 5.3 - 6.7 k Ω (When intake air temperature is 0°C) |
| | | 2.3 - 3.0 k Ω (When intake air temperature is 20°C) |
| | | 1.0 - 1.5 k Ω (When intake air temperature is 40°C) |
| | | 0.30 - 0.42 k Ω (When intake air temperature is 80°C) |
| 79 - 81 | Accelerator pedal position switch | Continuity (when the accelerator pedal is released) |
| | | No continuity (when the accelerator pedal is depressed slightly) |

CHECK AT THE THROTTLE VALVE CONTROLLER TERMINALS**TERMINAL VOLTAGE CHECK CHART****Throttle Valve Controller Terminal Arrangement**

7FU2121

| Terminal No. | Check items | Requirements | | Normal value |
|--------------|---|--|--------------------------------------|---|
| 1 | Throttle valve control servo (A+) | <ul style="list-style-type: none">● Ignition switch: ON● Accelerator pedal: Fully opened → fully closed | | Decreases slightly from system voltage. |
| 9 | Throttle valve control servo (B+) | | | |
| 14 | Throttle valve control servo (A-) | <ul style="list-style-type: none">● Ignition switch: ON● Accelerator pedal: Fully closed → fully opened | | Decreases slightly (approx. 2 V) from system voltage. |
| 15 | Throttle valve control servo (B-) | | | |
| 2 | Power supply to throttle valve control servo | Ignition switch: ON | | System voltage |
| 19 | | | | |
| 5 | Power supply | Ignition switch: ON | | System voltage |
| 6 | Sensor voltage | Ignition switch: ON | | 4.5 - 5.5 V |
| 7 | Throttle position sensor (1st channel) | Ignition switch: ON | Release the accelerator pedal. | 0.4 - 0.8 V |
| | | | Depress the accelerator pedal fully. | 4.2 - 4.9 V |
| 20 | Accelerator pedal position sensor (2nd channel) | Ignition switch: ON | Release the accelerator pedal. | 0.9 - 1.2 V |
| | | | Depress the accelerator pedal fully. | 4 V or more |
| 22 | Ignition switch-IG | Ignition switch: ON | | System voltage |



INSPECTION PROCEDURE USING AN ANALYZER

AIR FLOW SENSOR (AFS)

The followings have been changed from the previous description.

Alternate Method (Test harness not available)

<Vehicles with M/T>

1. Connect the analyzer special patterns pickup to engine-ECU terminal 61.

<Vehicles with A/T>

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 65.

CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR

The measurement method has been changed from the previous description.

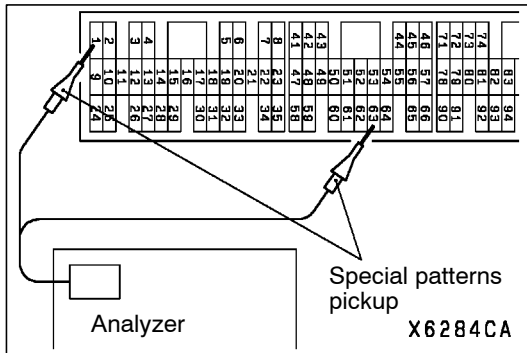
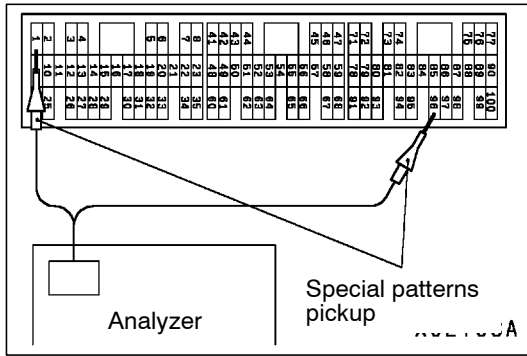
Alternate Method (Test harness not available)

<Vehicles with M/T>

1. Connect the analyzer special patterns pickup to engine-ECU terminal 50. (When checking the camshaft position sensor signal wave pattern.)
2. Connect the analyzer special patterns pickup to engine-ECU terminal 43. (When checking the crank angle sensor signal wave pattern.)

<Vehicles with A/T>

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 56. (When checking the camshaft position sensor signal wave pattern.)
2. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 45. (When checking the crank angle sensor signal wave pattern.)



INJECTORS AND INJECTOR OPEN CIRCUIT CHECK SIGNAL

Measurement Method

<Vehicles with M/T>

1. Connect the analyzer special patterns pickup to terminal 1 (No. 1 injector) of the engine-ECU connector.
2. Connect the analyzer special patterns pickup to terminal 96 (injector open circuit check signal) of the engine-ECU connector.
3. After checking terminal 1, check terminal 9 (No. 2 injector), terminal 24 (No. 3 injector) and terminal 2 (No. 4 injector).

<Vehicles with A/T>

1. Connect the analyzer special patterns pickup to terminal 1 (No. 1 injector) of the engine-A/T-ECU connector.
2. Connect the analyzer special patterns pickup to terminal 63 (injector open circuit check signal) of the engine-A/T-ECU connector.
3. After checking terminal 1, check terminal 9 (No. 2 injector), terminal 24 (No. 3 injector) and terminal 2 (No. 4 injector).

IGNITION COIL AND POWER TRANSISTOR (Power transistor control signal)

The followings have been changed from the previous description.

Alternate Method (Test harness not available)

<Vehicles with M/T>

1. Connect the analyzer special patterns pickup to engine-ECU terminal 3 (No. 1 ignition coil), terminal 13 (No. 2 ignition coil), terminal 12 (No. 3 ignition coil) and terminal 4 (No. 4 ignition coil) respectively.

<Vehicles with A/T>

1. Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 11 (No. 1 ignition coil), terminal 12 (No. 2 ignition coil), terminal 31 (No. 3 ignition coil) and terminal 30 (No. 4 ignition coil) respectively.

EGR VALVE (STEPPER MOTOR)

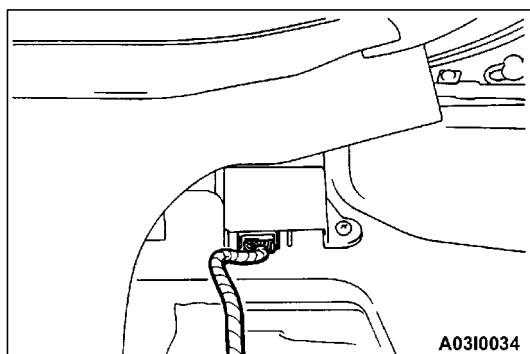
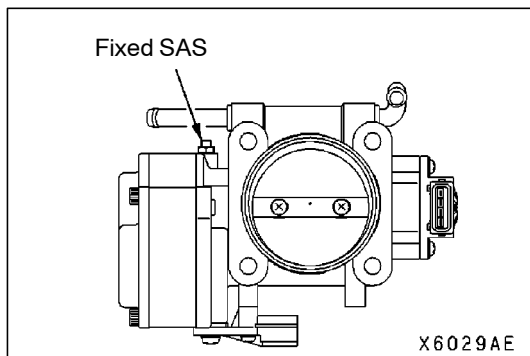
The followings have been changed from the previous description.

Alternate Method (Test harness not available)**<Vehicles with M/T>**

Connect the analyzer special patterns pickup to engine-ECU terminal 34, connection terminal 32, connection terminal 6, and connection terminal 5 respectively.

<Vehicles with A/T>

Connect the analyzer special patterns pickup to engine-A/T-ECU terminal 51, connection terminal 60, connection terminal 53, and connection terminal 62 respectively.



ON-VEHICLE SERVICE

Caution

- (1) Never attempt to tamper the fixed SAS. The fixed SAS is precisely adjusted at factory.
- (2) Should it be tampered, the full closed position of the throttle valve will be changed. This causes the engine-ECU to learn a wrong position of the throttle valve.

FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE FUEL PRESSURE)

When removing the fuel pipe, hose, etc., since fuel pressure in the fuel pipe line is high, do the following operation so as to release fuel pressure in the line and prevent fuel from running out.

1. Remove the fuel filler cap to release pressure in the fuel tank.
2. Remove the fuel pump relay.
3. Connect the MUT-II to the diagnosis connector.

Caution

Turn off the ignition switch before disconnecting or connecting the MUT-II.

4. Turn off the ignition switch.
5. Select "Item No. 74" from the MUT-II Data list.
6. Crank the engine for at least two seconds.
7. If the engine is not be started, use the MUT-II to make sure that the fuel pressure is 0.5 MPa or less. Then turn off the ignition switch.
8. If the engine is started, release fuel pressure by the following procedure:
 - (1) Turn off the ignition switch, and then stop the engine.
 - (2) Disconnect one of the ignition coil connectors.
 - (3) Crank the engine for at least two seconds.
 - (4) If the engine is not be started, use the MUT-II to make sure that the fuel pressure is 0.5 MPa or less. Then turn off the ignition switch.
 - (5) If the engine is started, stop it by racing and use the MUT-II to make sure that the fuel pressure is 0.5 MPa or less. Then turn off the ignition switch.
 - (6) Reconnect the ignition coil connector.

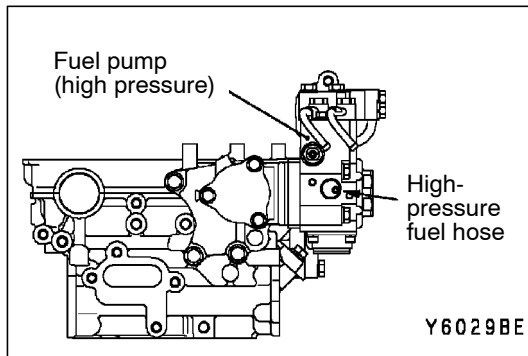
Caution

Clean the spark plug which corresponds to the disconnected ignition coil connector.

9. Remove the MUT-II.
10. Install the fuel pump relay.

FUEL PUMP OPERATION CHECK

This procedure is the same as for the 4G6-MPI engine.



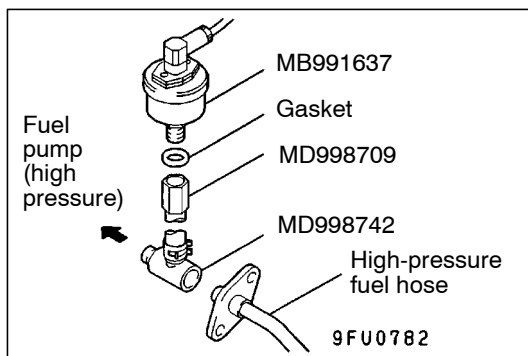
FUEL PRESSURE TEST

MEASUREMENT OF FUEL LOW PRESSURE BETWEEN FUEL PUMP (LOW PRESSURE) AND FUEL PUMP (HIGH PRESSURE)

1. Release residual pressure from the fuel pipe line to prevent fuel gush out. (Refer to P. 13I-121)
2. Disconnect the high-pressure fuel hose at the fuel pump (high pressure) side.

Caution

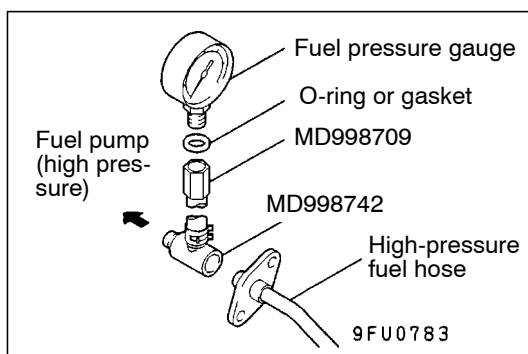
Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.



3. Remove the union joint and bolt from the special tool (adapter hose) and instead attach the special tool (hose adapter) to the adapter hose.
4. Install the special tool (for measuring the fuel pressure) that was set up in step 3.

<When using the fuel pressure gauge set (special tool)>

- (1) Install the special tool (for measuring the fuel pressure) between the high-pressure fuel hose and the fuel pump (high pressure).
- (2) Install the fuel pressure gauge set (special tool) on the special tool (for measuring the fuel pressure) putting the gasket between them.
- (3) Connect the lead wire of the fuel pressure gauge set (special tool) to the power supply (cigarette lighter socket) and to the MUT-II.



<When using the fuel pressure gauge>

- (1) Install the fuel pressure gauge on the special tool (for measuring the fuel pressure) putting a suitable O-ring or gasket between them.
- (2) Install the special tool which was set up in step (1) between the high-pressure fuel hose and the fuel pump (high pressure).

5. Connect the MUT-II to the diagnosis connector.

Caution

Turn off the ignition switch before disconnecting or connecting the MUT-II.

6. Turn the ignition switch to ON. (But do not start the engine.)
7. Select "Item No. 07" from the MUT-II Actuator test to drive the fuel pump (low pressure) at the fuel tank side. Check that there are no fuel leaks from any parts.
8. Finish the actuator test or turn the ignition switch to OFF.
9. Start the engine and run at idle.
10. Measure fuel pressure while the engine is running at idle.

Standard value: approximately 324 kPa

11. Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.
12. If fuel pressure is out of the standard value, troubleshoot and repair according to the table below.

| Symptom | Probable cause | Remedy |
|---|--|--|
| <ul style="list-style-type: none"> ● Fuel pressure too low ● Fuel pressure drops after racing | Clogged fuel filter | Replace fuel filter |
| | Fuel leaking to return side due to poor fuel pressure regulator (low pressure) valve seating or settled spring | Replace fuel pressure regulator (low pressure) |
| | Low fuel pump (low pressure) delivery pressure | Replace the fuel pump (low pressure) |
| Fuel pressure too high | Binding valve in fuel pressure regulator (low pressure) | Replace fuel pressure regulator (low pressure) |
| | Clogged fuel return hose or pipe | Clean or replace hose or pipe |

13. Stop the engine and check change of fuel pressure gauge reading. Normal if the reading does not drop within 2 minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below.

| Symptom | Probable cause | Remedy |
|---|---|--|
| Fuel pressure drops gradually after engine is stopped | Leaky fuel pressure regulator (low pressure) valve seat | Replace fuel pressure regulator (low pressure) |
| Fuel pressure drops sharply immediately after engine is stopped | Check valve in fuel pump (low pressure) is held open | Replace the fuel pump (low pressure) |

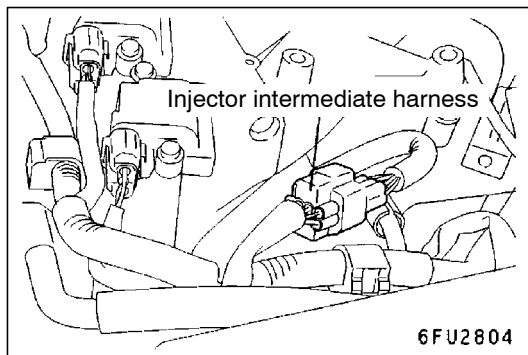
14. Release residual pressure from the fuel pipe line. (Refer to P.13I-121.)

15. Remove the fuel pressure gauge and special tools from the fuel pump (high pressure).

Caution

Cover the hose connection with rags to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

16. Replace the O-ring at the end of the high-pressure fuel hose with a new one. Furthermore, apply engine oil to the new O-ring before replacement.
17. Fit the high-pressure fuel hose to the fuel pump (high pressure) and tighten the mounting bolt to specified torque.
18. Check for any fuel leaks by following the procedure in step 7.
19. Disconnect the MUT-II.

**MEASUREMENT OF FUEL HIGH PRESSURE BETWEEN FUEL PUMP (HIGH PRESSURE) AND INJECTORS****NOTE**

Measurement of the fuel pressure between the fuel pump (high pressure) and the injectors should be carried out after checking that the fuel pressure between the fuel pump (low pressure) and the fuel pump (high pressure) is normal.

1. Connect the MUT-II to the diagnosis connector.
2. Disconnect the injector intermediate harness connector.
3. Turn the ignition switch to ON.
4. Select "Item No. 74" from the MUT-II Data list.
5. Crank the engine continuously for 2 seconds or more, and visually check that there are no fuel leaks from any parts.

Caution

If any fuel leaks appear, stop cranking immediately and repair the source of the leak.

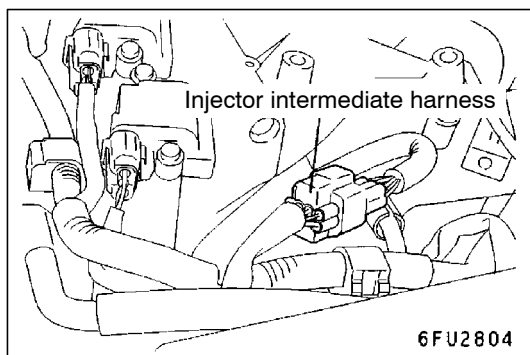
6. Check if the fuel pressure is more than 1 MPa immediately after 20 seconds have passed since cranking was finished.
7. If the fuel pressure is lower than 1 MPa, it means that there is likely to be a leak in the high-pressure fuel system, so this system should be checked.
8. Turn the ignition switch to OFF.
9. Connect the injector intermediate harness connector.
10. Start the engine and run at idle.
11. Measure fuel pressure while the engine is running at idle.

Standard value: 4 - 6.9 MPa

12. Check to see that fuel pressure at idle does not drop even after the engine has been raced several times.
13. If fuel pressure is out of the standard value, troubleshoot and repair according to the table below.

| Symptom | Probable cause | Remedy |
|---|---|---------------------------------------|
| <ul style="list-style-type: none"> ● Fuel pressure too low ● Fuel pressure drops after racing | Fuel leaking to return side due to poor fuel pressure regulator valve seating or settled spring in the fuel pump (high pressure). | Replace fuel pump (high pressure) |
| | Low fuel pump (high pressure) delivery pressure | Replace the fuel pump (high pressure) |
| Fuel pressure too high | Clogged fuel pressure regulator valve in the fuel pump (high pressure) | Replace fuel pump (high pressure) |
| | Clogged fuel return hose or pipe | Clean or replace hose or pipe |

14. Stop the engine and turn the ignition switch to OFF.
15. Disconnect the MUT-II.



FUEL LEAK CHECK

1. Connect the MUT-II to the diagnosis connector.
2. Disconnect the injector intermediate harness connector.
3. Turn the ignition switch to ON.
4. Select "Item No. 74" from the MUT-II Data list.
5. Crank the engine continuously for two seconds or more, and visually check that there are no fuel leaks from any parts.

Caution

If any fuel leaks appear, stop cranking immediately and repair the source of the leak.

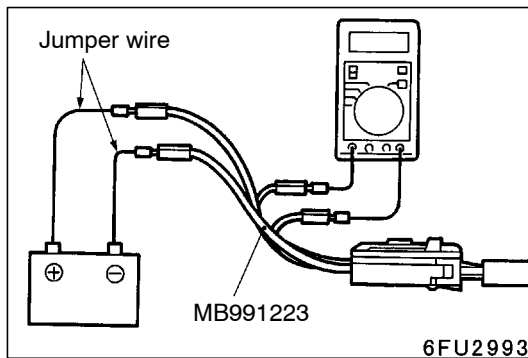
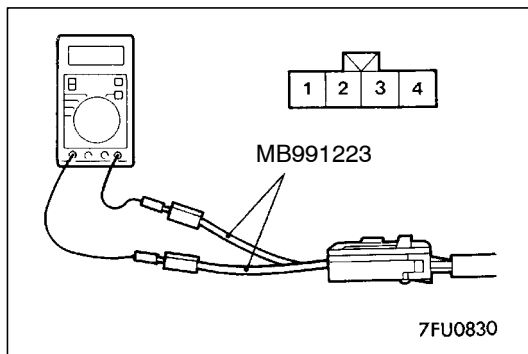
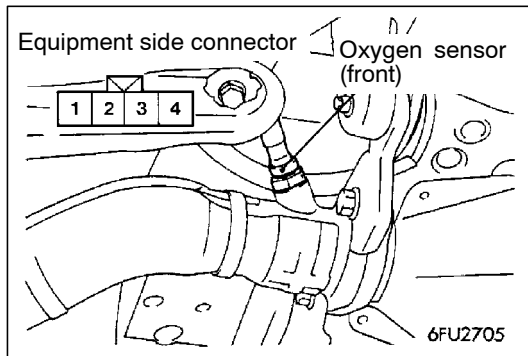
6. Crank the engine, and then measure fuel pressure immediately after 20 seconds.

Limit: Minimum 1 MPa

Caution

If the fuel pressure is less than 1 MPa, there may be a partial fuel leak in the high-pressure fuel system.

7. Turn off the ignition switch.
8. Reconnect the injector intermediate connector.
9. Remove the MUT-II.



OXYGEN SENSOR CHECK

<Oxygen sensor (front)>

1. Disconnect the oxygen sensor connector and connect the special tool (harness set) to the connector on the oxygen sensor side.
2. Make sure that there is continuity ($4.5 - 8.0 \Omega$ at 20°C) between terminal 3 and terminal 4 on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.
4. Warm up the engine until engine coolant is 80°C or higher.

5. Use a jumper wire to connect terminal 3 of the oxygen sensor connector to the battery (+) terminal and terminal 4 to the battery (-) terminal.

Caution

Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.

6. Connect a digital voltage meter between terminal 1 and terminal 2.
7. While repeatedly racing the engine, measure the oxygen sensor output voltage.

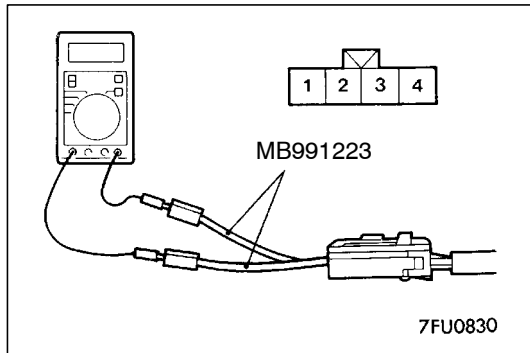
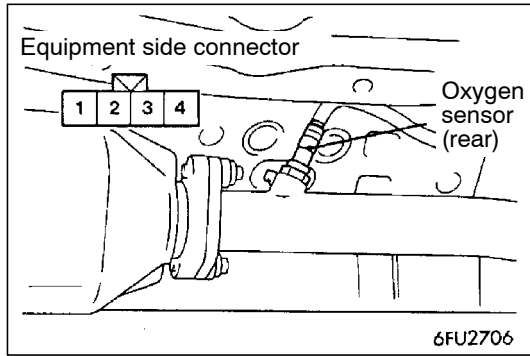
Standard value:

| Engine | Oxygen sensor output voltage | Remarks |
|------------------------|------------------------------|---|
| When racing the engine | 0.6 - 1.0 V | If you make the air/fuel ratio rich by racing the engine repeatedly, a normal oxygen sensor will output a voltage of 0.6 - 1.0 V. |

8. If the sensor is defective, replace the oxygen sensor.

NOTE

For removal and installation of the oxygen sensor, refer to GROUP 15 - Exhaust Pipe and Main Muffler.

**<Oxygen sensor (rear)>**

1. Disconnect the oxygen sensor connector and connect the special tool (test harness set) to the connector on the oxygen sensor side.
2. Make sure that there is continuity ($11 - 18 \Omega$ at 20°C) between terminal 3 and terminal 4 on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.

NOTE

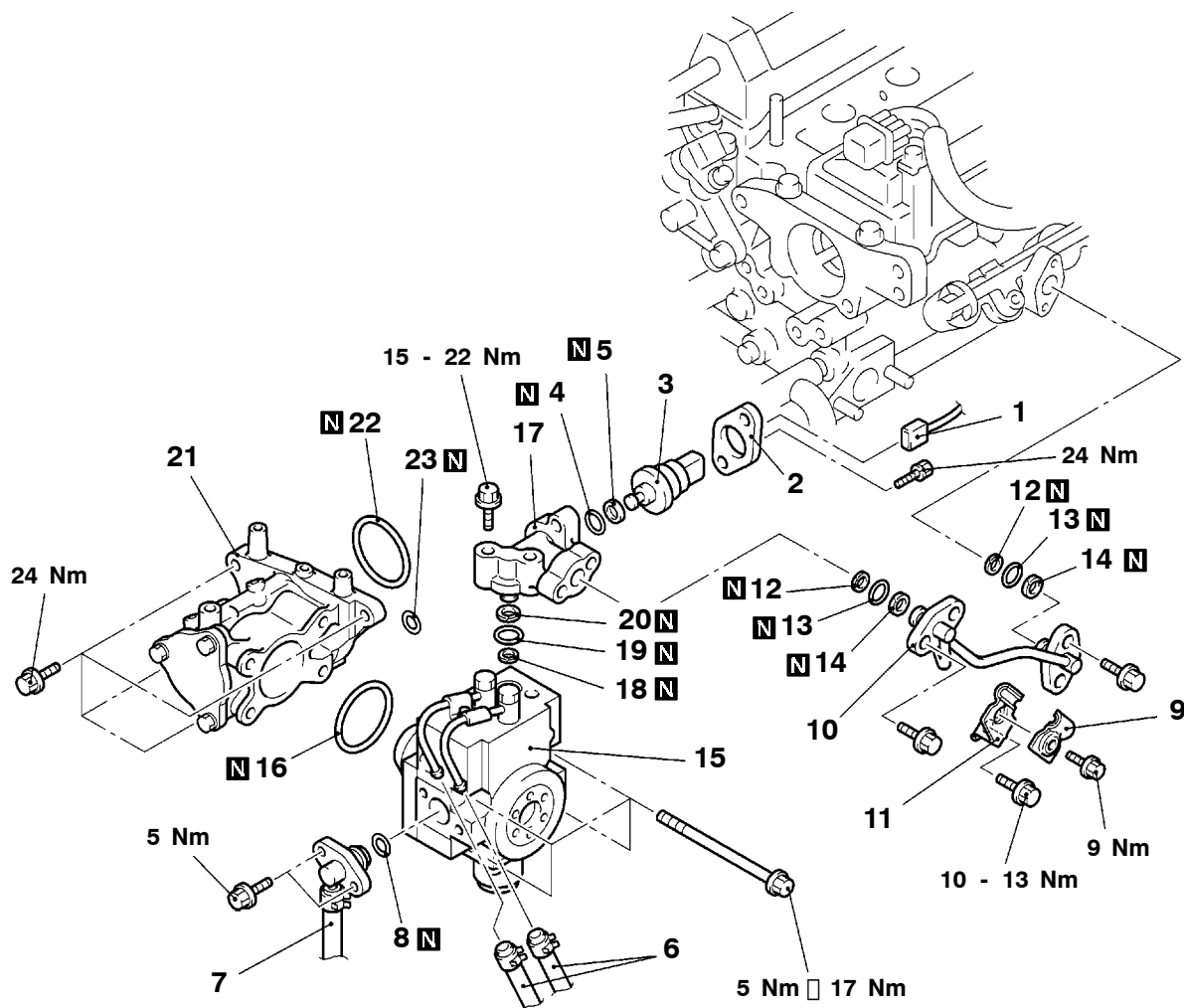
- (1) If the MUT-II does not display the standard value although no abnormality is found by the above mentioned continuity test and harness check, replace the oxygen sensor (rear).
- (2) For removal and installation of the oxygen sensor, refer to GROUP 15 - Exhaust Pipe and Main Muffler.

FUEL PUMP (HIGH PRESSURE)

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

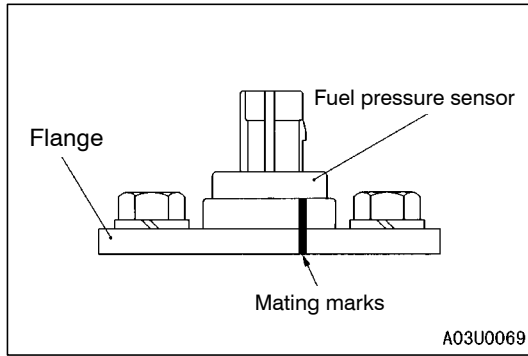
- Prevention of fuel discharge <before removal only> (Refer to P.13I-121.)
- Engine Cover Removal and Installation
- Air Cleaner Assembly Removal and Installation
- Fuel Leak Check <after installation only> (Refer to P.13I-125)



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Removal steps

- | | | | |
|-----|---|-----|--|
| ▶H◀ | • Air-bleed the high-pressure fuel line | ▶D◀ | 12. Back-up ring A |
| ◀A▶ | 1. Fuel pressure sensor harness connector | ▶D◀ | 13. O-ring |
| ▶G◀ | 2. Flange | ▶D◀ | 14. Back-up ring B |
| ▶G◀ | 3. Fuel pressure sensor | ▶C◀ | 15. Fuel pump (high pressure) assembly |
| ▶F◀ | 4. O-ring | | 16. O-ring |
| ▶F◀ | 5. Back-up ring | ▶B◀ | 17. Fuel fitting |
| ▶E◀ | 6. Fuel return hose connection | ▶B◀ | 18. Back-up ring A |
| | 7. Fuel pressure hose connection | ▶B◀ | 19. O-ring |
| | 8. O-ring | ▶B◀ | 20. Back-up ring B |
| | 9. Clamp | ▶A◀ | 21. Pump camshaft case assembly |
| ▶D◀ | 10. Fuel pipe | | 22. O-ring |
| | 11. Fuel pipe bracket | | 23. O-ring |



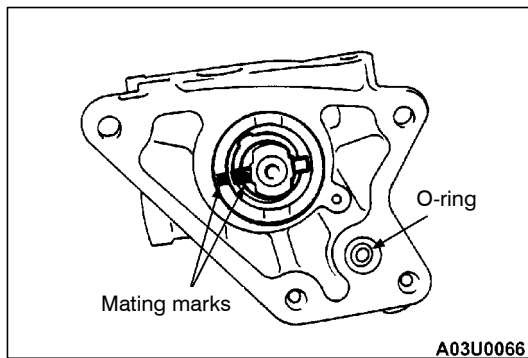
REMOVAL SERVICE POINT

◀A▶ FLANGE REMOVAL

If the fuel pressure sensor is used again, write the mating mark on the the sensor and the mating mark on the flange before removing the flange.

NOTE

The shape of the flange is deformed by torsioning during installation to secure the sufficient sealing performance and the rigidity of the fuel pressure sensor. Therefore, write mating marks so that the phase and the side of a flange can be matched with the original condition. Furthermore, if the fuel pressure sensor needs to be replaced with a new one, a flange should be replaced as well.



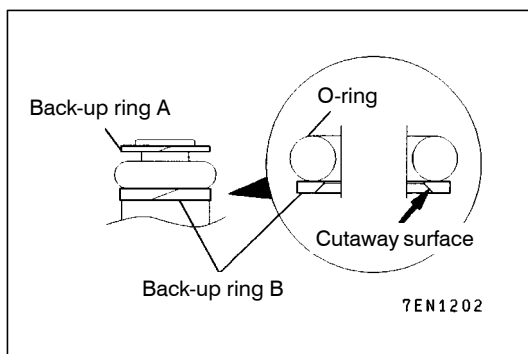
INSTALLATION SERVICE POINT

▶A◀ PUMP CAMSHAFT CASE ASSEMBLY INSTALLATION

1. Set the No.1 cylinder to the compression top dead centre position.
2. Align the mating mark on the housing of the pump camshaft case assembly with the mating mark on the coupling, and then install the pump camshaft case assembly to the engine.

Caution

Take care not to drop the O-ring.



▶B◀ BACK-UP RING B/O-RING/BACK-UP RING A/ FUEL FITTING INSTALLATION

1. Install the back-up rings and the O-ring as shown in the illustration.

Caution

- (1) Install the back-up ring B facing its cutaway surface toward the opposite side of the O-ring as shown in the illustration.

- (2) Take care not to install the back-up ring for the fuel pressure sensor by mistake. (Outer diameter of the back-up ring A: 14.8 mm)
2. Apply new engine oil a little to the O-ring.

Caution

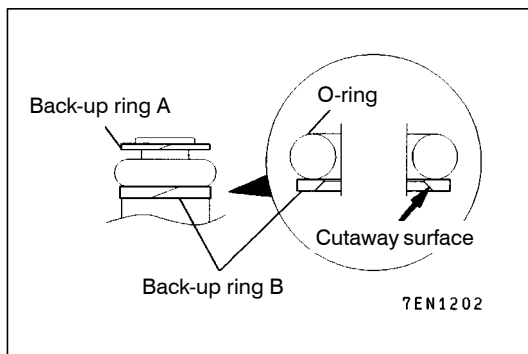
Take care not let any of the engine oil get inside the fuel pump (high pressure).

3. Insert the fuel fitting straight into the mounting hole of fuel pump (high pressure). Ensure that the fuel fitting should be securely inserted without being torsioned and tighten the mounting bolt to the specified torque.

Tightening torque: 10 - 13 Nm

►C◄ FUEL PUMP (HIGH PRESSURE) ASSEMBLY INSTALLATION

1. Apply new engine oil a little to the O-ring and the roller of the fuel pump (high pressure).
2. Insert the fuel pump (high pressure) straight into the mounting hole of the pump camshaft case to tighten the mounting bolt lightly (a little tighter than by doing with fingers). Installation to the specified torque should be done with ►D◄.



►D◄ BACK-UP RING B/O-RING/BACK-UP RING A/ FUEL PIPE INSTALLATION

1. Install the back-up ring and the O-ring as shown in the illustration.

Caution

- (1) Install the back-up ring B facing its cutaway surface toward the opposite side of the O-ring as shown in the illustration.
- (2) Take care not to install the back-up ring for the fuel pressure sensor by mistake. (Outer diameter of the back-up ring A: 14.8 mm)

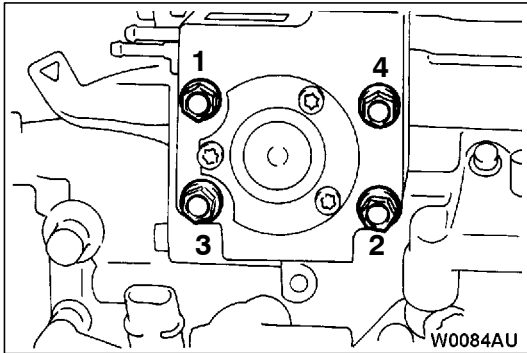
2. Apply new engine oil a little to the O-ring.

Caution

Take care not let any of the engine oil get inside the fuel pump (high pressure).

3. Insert the fuel pipe straight into the mounting hole of the fuel pump (high pressure) and the delivery pipe. Make sure that the fuel pipe should be securely inserted to the bottom without being tortured and tighten the mounting bolt to the specified torque.

Tightening torque: 10 - 13 Nm



4. Tighten the temporarily tightened fuel pump (high pressure) mounting bolt to 5 Nm in the order of the illustrated numbers.
5. Tighten the bolt to 17 Nm in the order of the illustrated numbers again. The deviation of tightening torque should be 2 Nm or less.

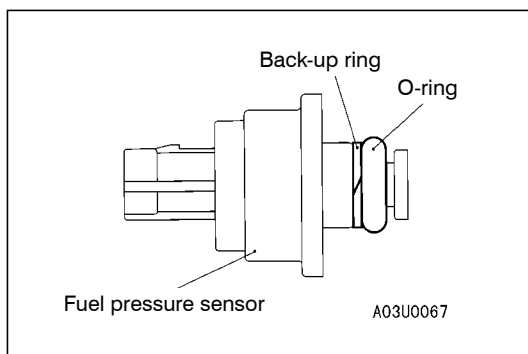
►E◄ FUEL PRESSURE HOSE INSTALLATION

1. Install the back-up rings and the O-ring as shown in the illustration.

Caution

Take care not to let any of the engine oil get inside the fuel pump (high pressure).

2. While being careful not to damage the O-ring, turn the high-pressure fuel hose to the left and right and connect it to the pump (high pressure). After connecting, check that the hose turns smoothly.
3. If the hose does not turn smoothly, the cause may be that the O-ring is getting caught. Disconnect the hose, check the O-ring for damage and re-connect the hose to the fuel pump (high pressure) and then re-check.



►F◄ BACK-UP RING/O-RING INSTALLATION

Install the back-up ring and the O-ring as shown in the illustration.

Caution

Take care not to install the back-up ring A for the injector, fuel feed pipe or fuel return pipe by mistake. (Outer diameter of the back-up ring for the fuel pressure sensor: 15.1 mm)

**►G◄ FUEL PRESSURE SENSOR/FLANGE
INSTALLATION**

1. Apply new engine oil a little to the O-ring.

Caution

Take care not to let any of the engine oil get inside the delivery pipe.

2. Align the mating marks on the removal and install to the fuel fitting.

Caution

If the fuel pressure sensor is replaced with a new one, a flange should be replaced as well.

►H◄ AIR-BLEED THE HIGH PRESSURE FUEL LINE

1. After installing the fuel pump (high-pressure), run the engine at 2000 r/min for 15 seconds or more to air-bleed the high-pressure fuel line.

NOTE

If the removal of the fuel pipe causes the air to be trapped inside the high-pressure fuel line, diagnosis code No.P0190 is output for abnormal fuel pressure.

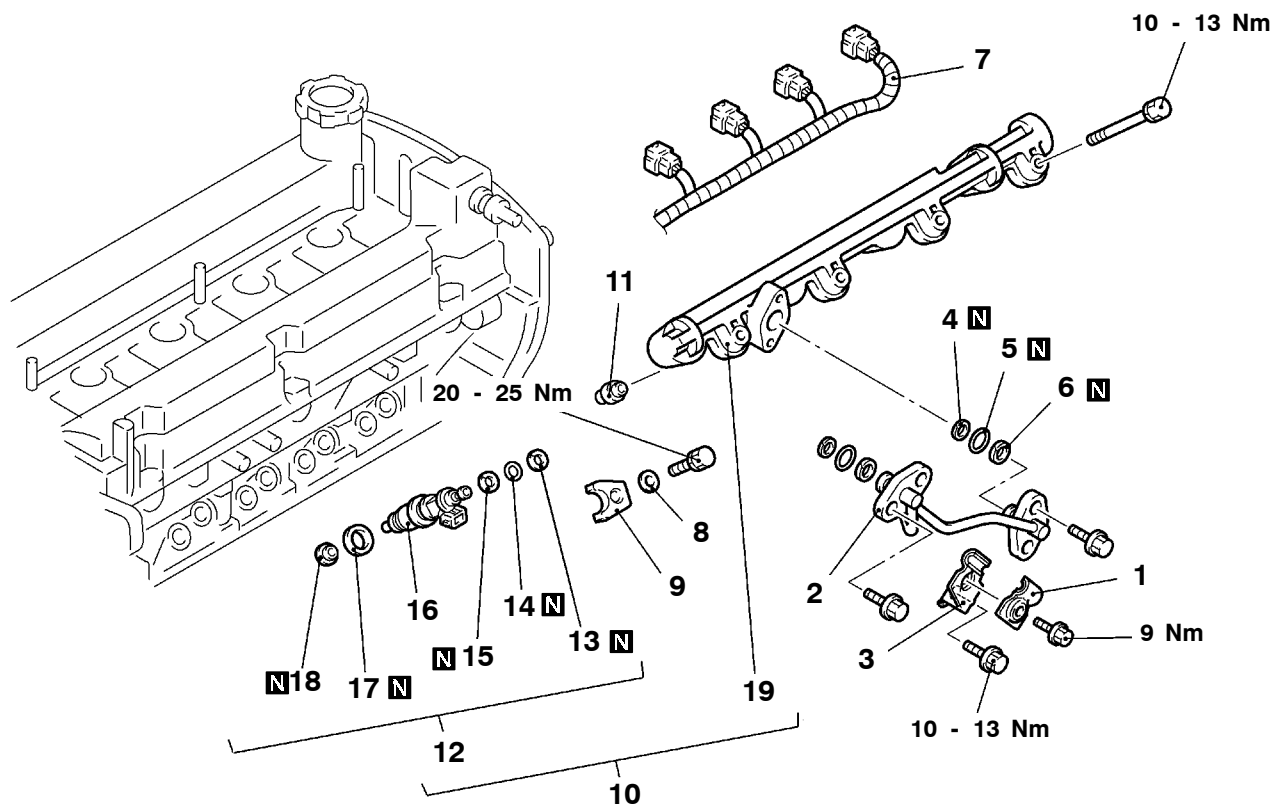
2. If the trouble code No. P0190 of the fuel pressure sensor system is output after checking the diagnosis code using the MUT-II, erase the trouble code.

INJECTOR

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Prevention of Fuel Discharge <before removal only> (Refer to P.13I-121.)
- Engine Cover Removal and Installation
- Air Cleaner Assembly Removal and Installation
- Intake Manifold Removal and Installation (Refer to GROUP 15.)
- Fuel Leak Check <after installation only> (Refer to P.13I-125)



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Removal steps

- ▶E◀ • Air-bleed the high-pressure fuel line
- ▶D◀ 1. Clamp
- ▶D◀ 2. Fuel pipe
- ▶D◀ 3. Fuel pipe bracket
- ▶D◀ 4. Back-up ring A
- ▶D◀ 5. O-ring
- ▶D◀ 6. Back-up ring B
- ◀A▶ 7. Injector harness connector
- ▶C▶ 8. Injector harness washer
- ▶C▶ 9. Injector holder
- ◀B▶ ▶C▶ 10. Delivery pipe and Fuel injector assembly

- ▶C▶ 11. Insulator
- ▶B▶ 12. Fuel injector assembly
- ▶A▶ 13. Back-up ring A
- ▶A▶ 14. O-ring
- ▶A▶ 15. Back-up ring B
- ▶C▶ 16. Fuel injector
- ▶C▶ 17. Injector gasket
- ▶A▶ 18. Corrugated washer
- ▶A▶ 19. Delivery pipe

REMOVAL SERVICE POINTS

◀A▶ INJECTOR HARNESS CONNECTOR DISCONNECTION

Caution

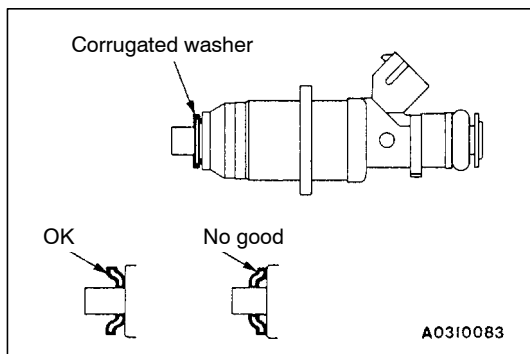
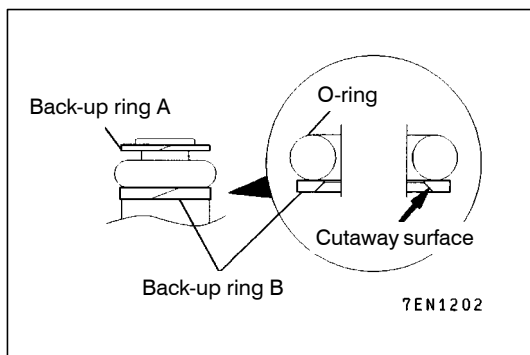
Disconnect the battery (-) cable from its terminal before carrying out this operation.

◀B▶ DELIVERY PIPE AND FUEL INJECTOR ASSEMBLY REMOVAL

Remove the delivery pipe with the fuel injector assembly still attached.

Caution

Be careful not to drop the fuel injector assembly when removing the delivery pipe assembly.



INSTALLATION SERVICE POINTS

▶A◀ CORRUGATED WASHER/BACK-UP RING B/ O-RING/BACK-UP RING A INSTALLATION

1. Install the back-up ring and the O-ring as shown in the illustration.

Caution

(1) Install the back-up ring B facing its cutaway surface toward the opposite side of the O-ring as shown in the illustration.

(2) Take care not to install the back-up ring for the fuel pressure sensor by mistake.

(Outer diameter of the back-up ring A: 14.8 mm)

2. Apply white vaseline to prevent the corrugated washer from falling and install it to the in the illustrated direction.

Caution

If the corrugated washer which was once tightened is used again, it can cause fuel leak or gas leak. Therefore, always use a new one.

▶B◀ FUEL INJECTOR ASSEMBLY INSTALLATION

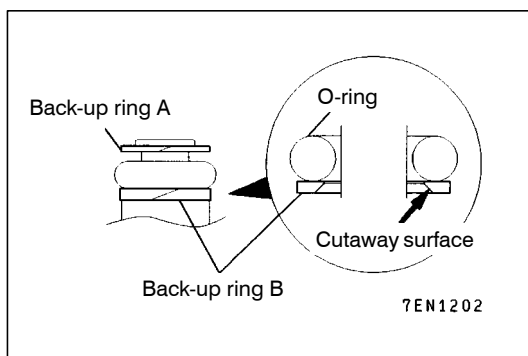
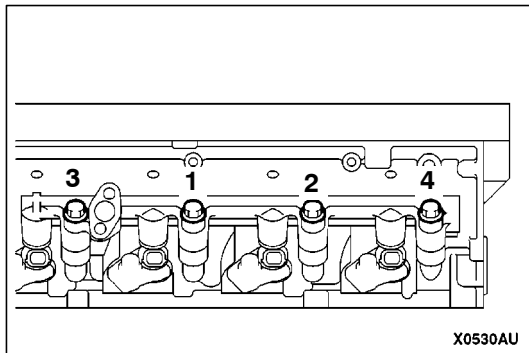
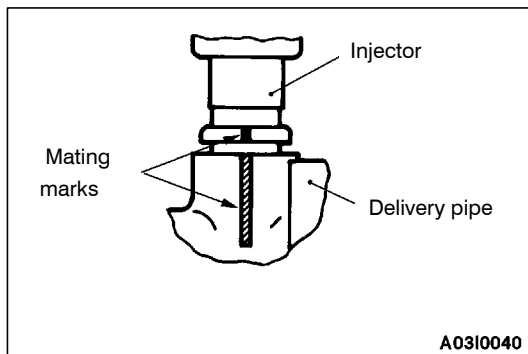
1. Apply new engine oil a little to the O-ring of the injector.

Caution

Take care not to let any of the engine oil get inside the delivery pipe.

2. Insert the injector straight into the mounting hole of the delivery pipe. Check that the injector smoothly turns after insertion.

3. If the injector does not turn smoothly, the engagement of the O-ring may be the cause. After removing the injector to check the O-ring for damage, insert the injector again into the delivery pipe.



►C◄ INJECTOR GASKET/INSULATOR/DELIVERY PIPE AND FUEL INJECTOR ASSEMBLY/INJECTOR HOLDER/INJECTOR HARNESS WASHER INSTALLATION

1. Make the mating mark on the injector with the mating mark on the delivery pipe.
2. Install the injector gasket and the insulator to the cylinder head.
3. Install the delivery pipe and the fuel injector assembly to the cylinder head and temporarily tighten the mounting bolt.
4. Install the injector holder and the injector washer and tighten the mounting bolt to the specified torque.

Tightening torque: 20 - 25 Nm

5. Tighten the temporarily tightened delivery and injector assembly mounting bolts to the specified torque in the order of the illustrated numbers.

Tightening torque: 10 - 13 Nm

►D◄ BACK-UP RING B/O-RING/BACK-UP RING A/ FUEL PIPE INSTALLATION

1. Install the back-up ring and the O-ring as shown in the illustration.

Caution

- (1) Install the back-up ring B facing its cutaway surface toward the opposite side of the O-ring as shown in the illustration.
- (2) Take care not to install the back-up ring A for the back-up ring for the fuel pressure sensor by mistake.
(Outer diameter of back-up ring A: 14.8 mm)

2. Apply new engine oil a little to the O-ring.

Caution

Take care not to let any of the engine oil get inside the fuel pump (high pressure).

3. Insert the fuel pipe fitting straight into the mounting bolt of the fuel pump (high-pressure) and the delivery pipe. Make sure that the fuel fitting is inserted the mounting holes of the fuel pump (high-pressure) and the delivery pipe, and then tighten the bolts to the specified torque.

Tightening torque: 10 - 13 Nm

►E◄ AIR-BLEED THE HIGH-PRESSURE FUEL LINE

1. After installing the injector, run the engine at 2000 r/min for 15 seconds or more to air-bleed the high-pressure fuel line.

NOTE

If the removal of the fuel pipe causes the air to be trapped inside the high-pressure fuel line, diagnosis code No.P0190 is output for abnormal fuel pressure.

2. If the trouble code No. 0190 of the fuel pressure sensor system is output after checking the diagnosis with the MUT-II, erase the trouble code.