
MULTIPOINT FUEL INJECTION (MPI)

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GENERAL

OUTLINE OF CHANGES

- A rear oxygen sensor has been added.
- The camshaft position sensor has been changed to the stick type (the same type as in the COLT/LANCER).
- An alternator generation control system has been adopted.
- The terminal layout of the engine control unit has been changed.
- Because of these changes, the service procedures have been established as described below.

TROUBLESHOOTING

FAIL-SAFE FUNCTION REFERENCE TABLE

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.
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INSPECTION CHART FOR DIAGNOSIS CODES

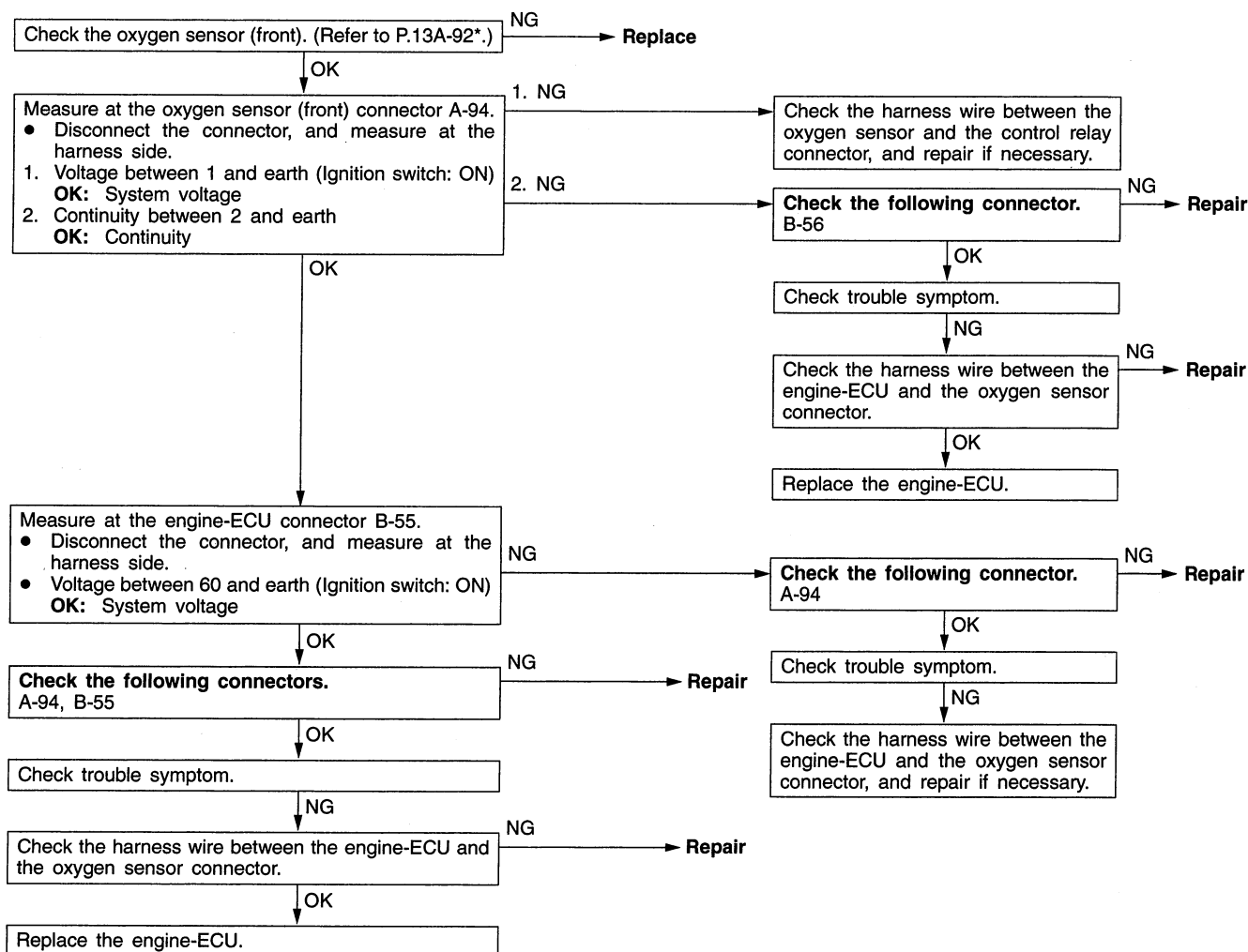
Code No.	Diagnosis item	Reference page
11	Oxygen sensor (front) system	13A-3
12	Air flow sensor system	13A-4
13	Intake air temperature sensor system	13A-4
14	Throttle position sensor system	13A-5
21	Engine coolant temperature sensor system	13A-6
22	Crank angle sensor system	13A-7
23	Camshaft position sensor	13A-8
24	Vehicle speed sensor system	13A-8
25	Barometric pressure sensor system	13A-9
31	Detonation sensor system	13A-10
36*1	Ignition timing adjustment signal system	13A-10
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44	Ignition coil and power transistor unit system	13A-11
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59	Oxygen sensor (rear) system	13A-13
64	Alternator FR terminal system	13A-14

NOTE

*1: Malfunction code No. 36 is not memorized.

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

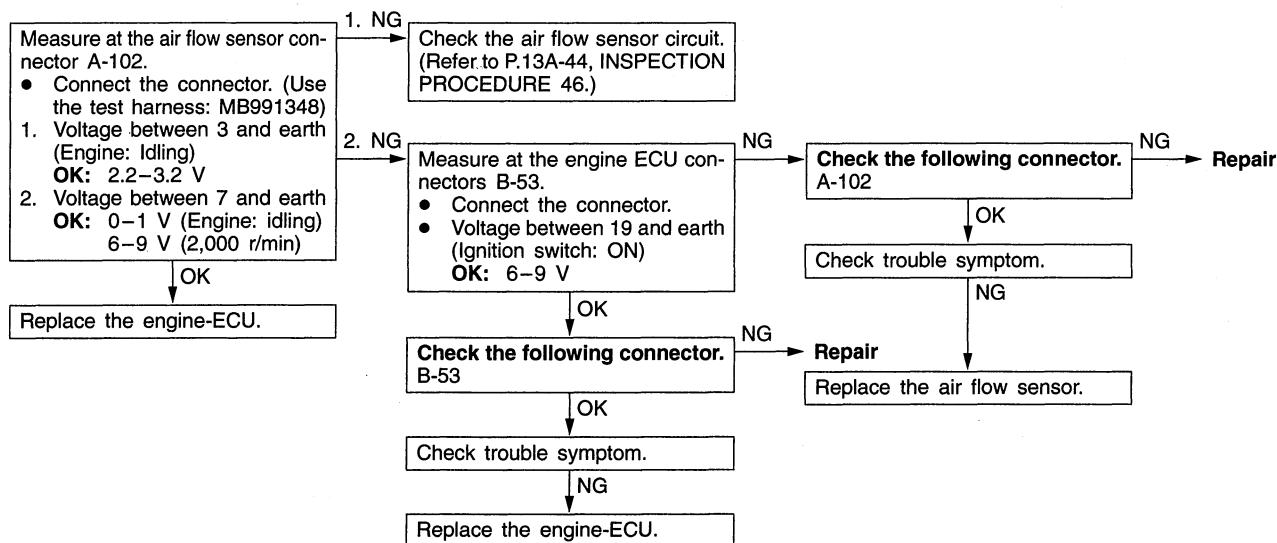
Code No. 11 Oxygen sensor (Front) system	Probable cause
Range of Check • 3 minutes have passed after engine was started. • Engine coolant temperature is approx. 80°C or more. • Intake air temperature is 20–50°C. • Engine speed is approx. 2,000–3,000 r/min • Vehicle is moving at constant speed on a flat, level road surface Set conditions • The oxygen sensor output voltage is around 0.6 V for 30 seconds (does not cross 0.6 V for 30 seconds). • When the range of check operations given above which accompany starting of the engine are carried out four time in succession, a problem is detected after each operation.	• Malfunction of the oxygen sensor • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU



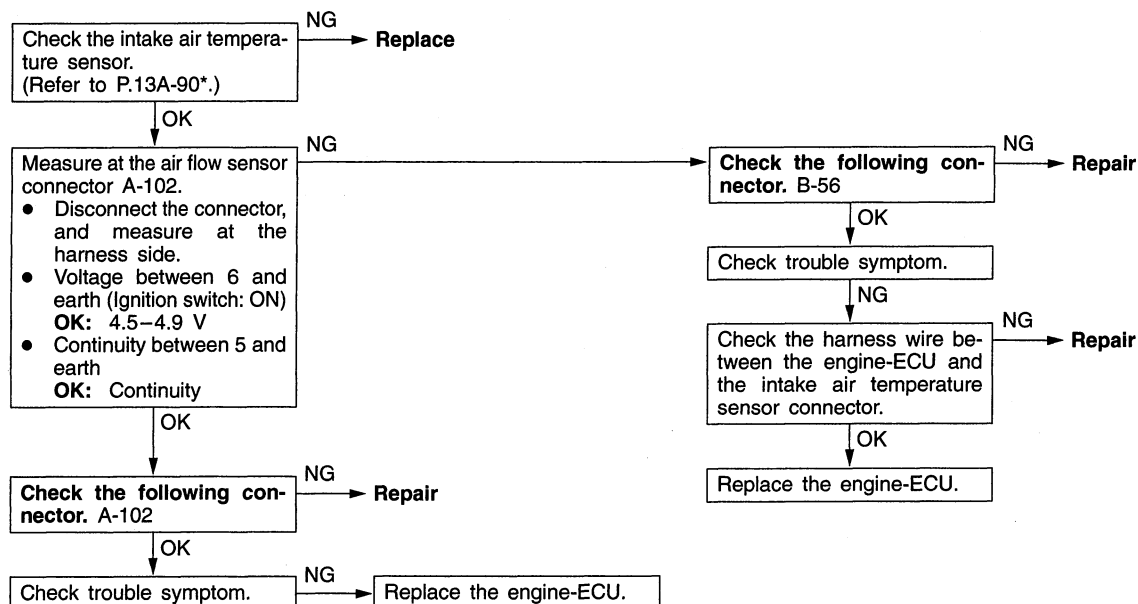
NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

Code No. 12 Air flow sensor system	Probable cause
Range of Check • Engine speed is 500 r/min or more. Set conditions • Sensor output frequency is 3 Hz or less for 4 seconds.	• Malfunction of the air flow sensor • Improper connector contact, open circuit or short-circuited harness wire of the air flow sensor • Malfunction of the engine-ECU



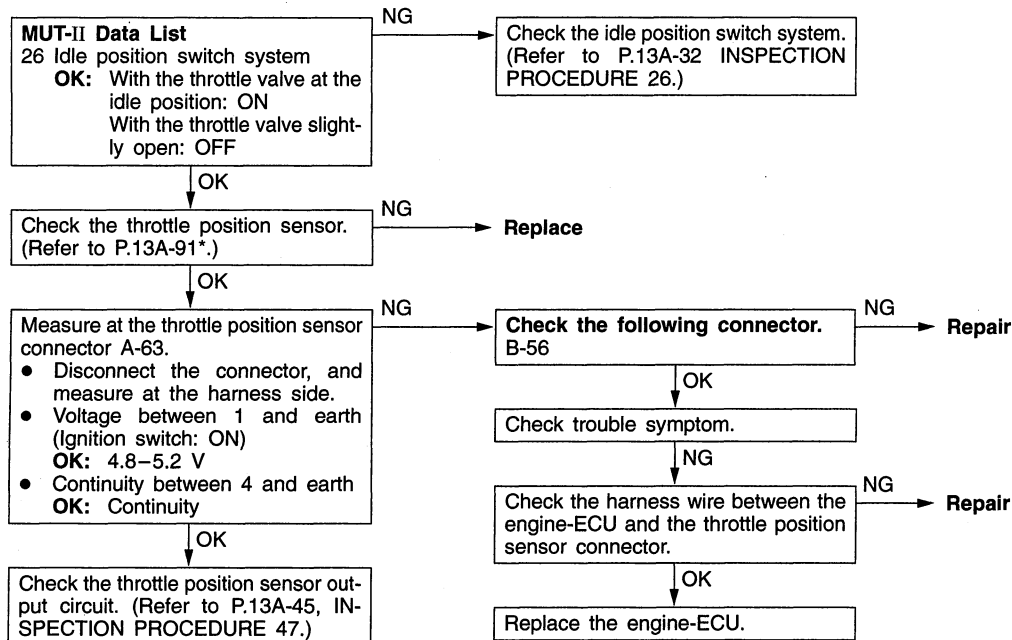
Code No. 13 Intake air temperature sensor system	Probable cause
Range of Check • Ignition switch: ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions • Sensor output voltage is 4.6 V or more (corresponding to an intake air temperature of -45°C or less) for 4 seconds. or • Sensor output voltage is 0.2V or less (corresponding to an intake air temperature of 125°C or more) for 4 seconds.	• Malfunction of the intake air temperature sensor • Improper connector contact, open circuit or short-circuited harness wire of the intake air temperature sensor circuit • Malfunction of the engine-ECU



NOTE

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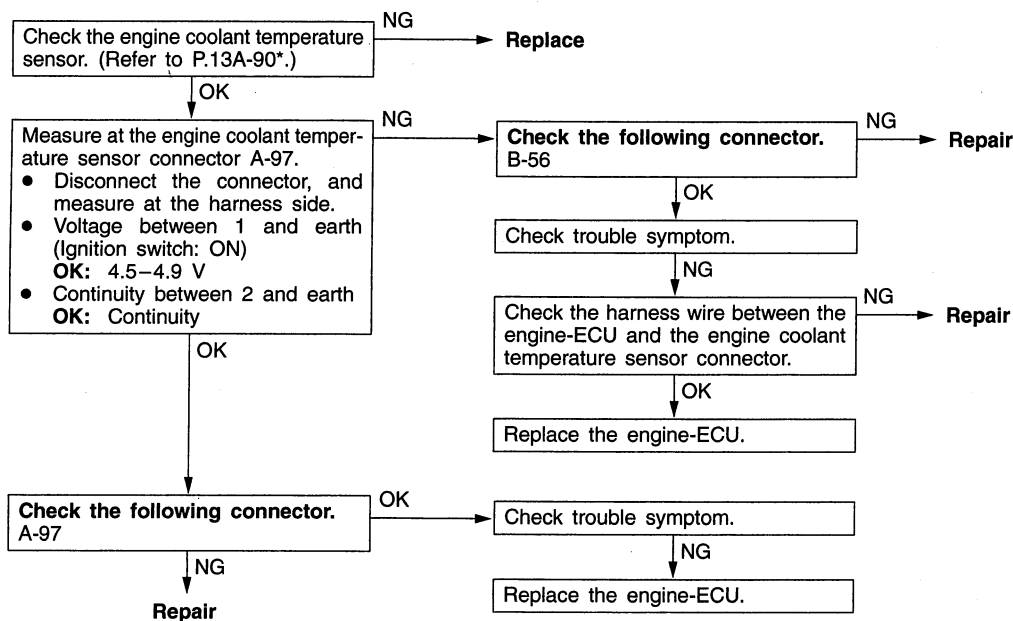
Code No. 14 Throttle position sensor system	Probable cause
Range of Check - Ignition switch: ON - Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions - When the idle position switch is ON, the sensor output voltage is 2 V or more for 4 seconds. or - The sensor output voltage is 0.2 V or less for 4 seconds.	- Malfunction of the throttle position sensor or maladjustment - Improper connector contact, open circuit or short-circuited harness wire of the throttle position sensor circuit - Improper "ON" state of idle position switch - Short circuit of the idle position switch signal line - Malfunction of the engine-ECU



NOTE

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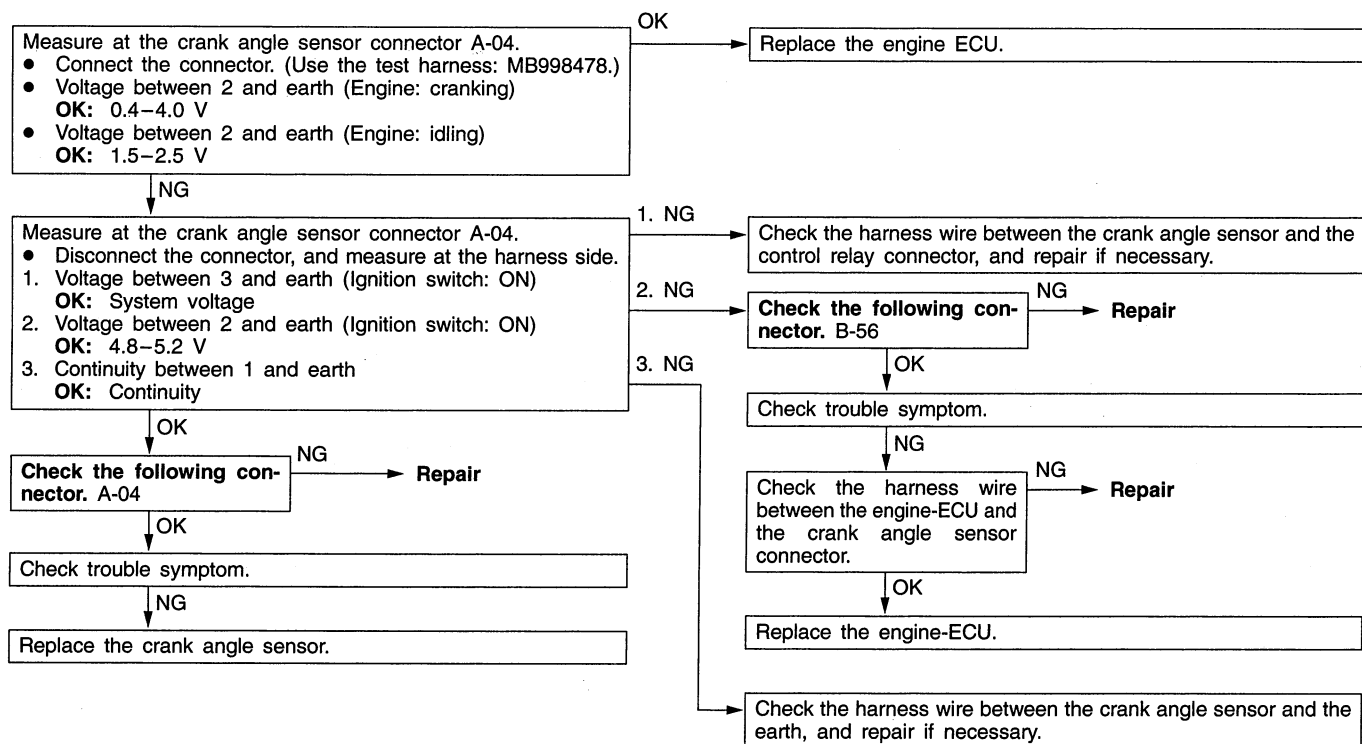
Code No. 21 Engine coolant temperature sensor system	Probable cause
Range of Check - Ignition switch: ON - Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions - Sensor output voltage is 4.6 V or more (corresponding to an engine coolant temperature of -45°C or less) for 4 seconds. or - Sensor output voltage is 0.1 V or less (corresponding to an engine coolant temperature of 140°C or more) for 4 seconds.	- Malfunction of the engine coolant temperature sensor - Improper connector contact, open circuit or short-circuited harness wire of the engine coolant temperature sensor circuit - Malfunction of the engine-ECU
Range of Check - Ignition switch: ON - Engine speed is approx. 50 r/min or more Set conditions - The sensor output voltage increases from 1.6 V or less (corresponding to an engine coolant temperature of 40°C or more) to 1.6 V or more (corresponding to an engine coolant temperature of 40°C or less). - After this, the sensor output voltage is 1.6 V or more for 5 minutes.	



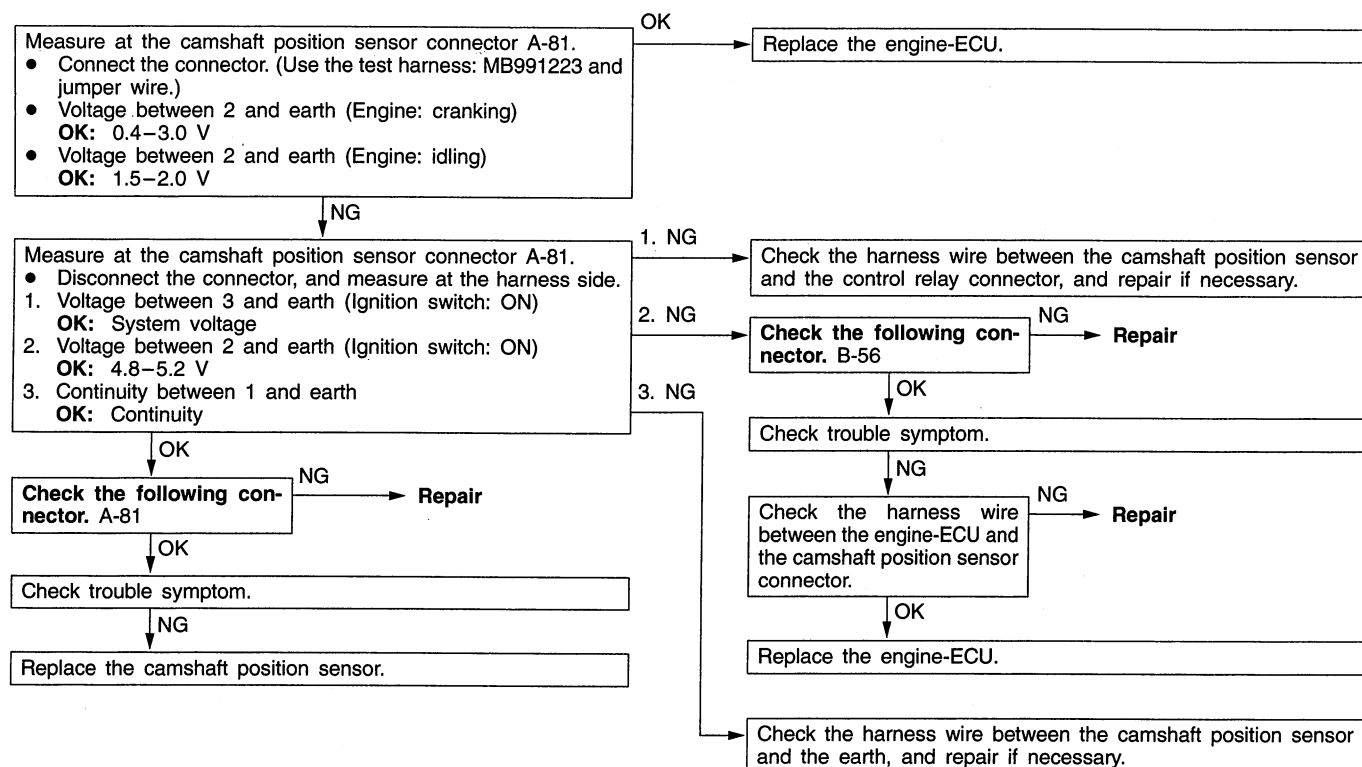
NOTE

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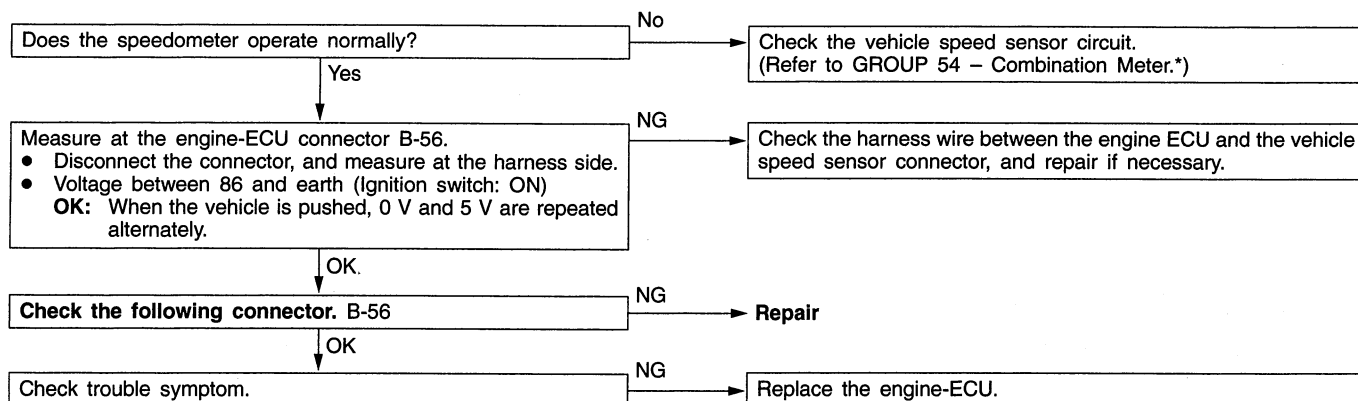
Code No. 22 Crank angle sensor system	Probable cause
Range of Check • Engine is cranking. Set conditions • Sensor output voltage does not change for 4 seconds (no pulse signal input.)	• Malfunction of the crank angle sensor • Improper connector contact, open circuit or short-circuited harness wire of the crank angle sensor circuit • Malfunction of the engine-ECU



Code No. 23 Camshaft position sensor system	Probable cause
Range of Check - Ignition switch: ON - Engine speed is approx. 50 r/min or more. Set conditions - Sensor output voltage does not change for 4 seconds (no pulse signal input.)	- Malfunction of the top dead centre sensor - Improper connector contact, open circuit or short-circuited harness wire of the top dead centre sensor circuit - Malfunction of the engine-ECU



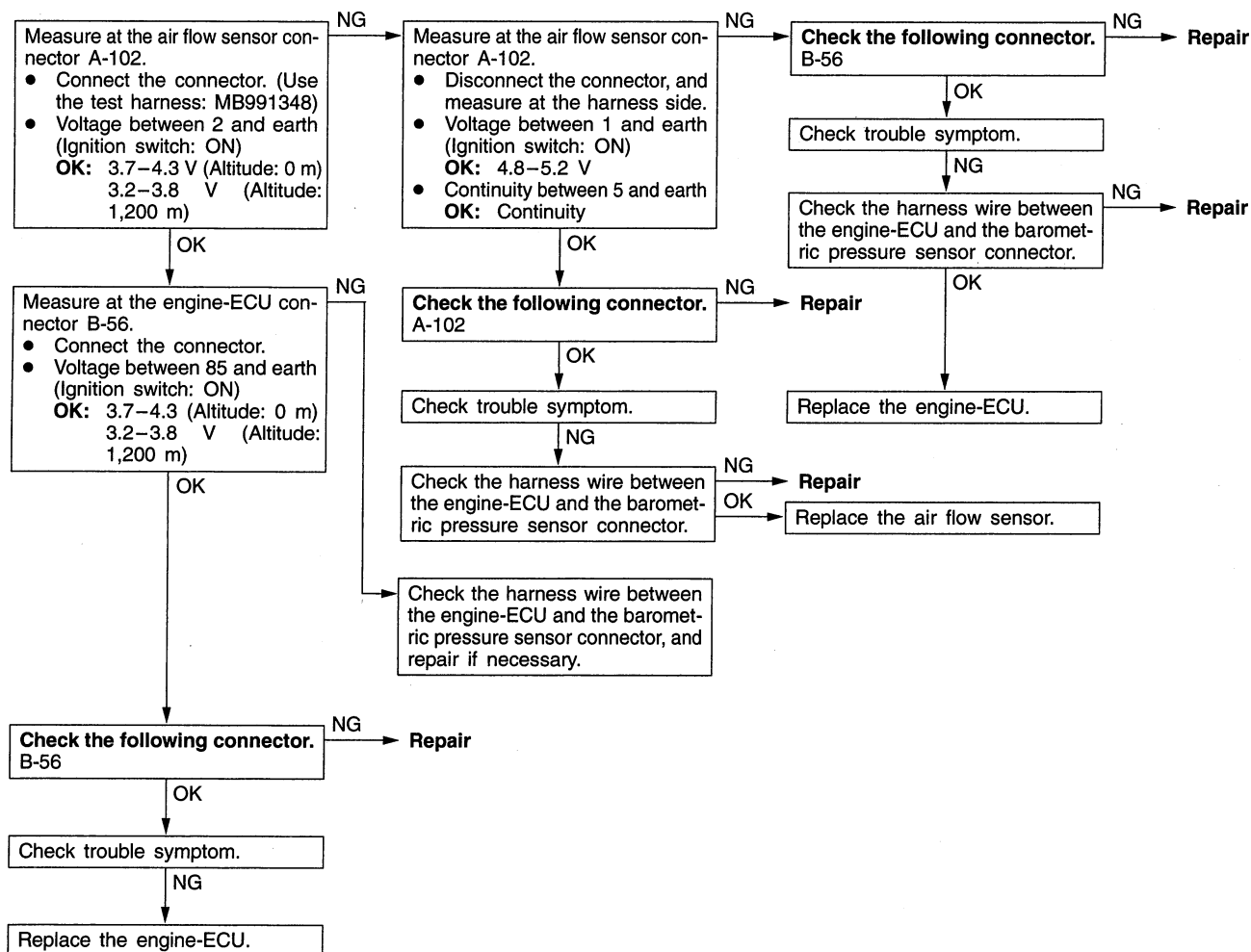
Code No. 24 Vehicles speed sensor system	Probable cause
Range of check - Ignition switch: ON - Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. - Idle position switch: OFF - Engine speed is 3,000 r/min or more. - Driving under high engine load conditions. Set conditions - Sensor output voltage does not change for 4 seconds (no pulse signal input).	- Malfunction of the vehicle speed sensor - Improper connector contact, open circuit or short-circuited harness wire of the vehicle speed sensor circuit - Malfunction of the engine-ECU



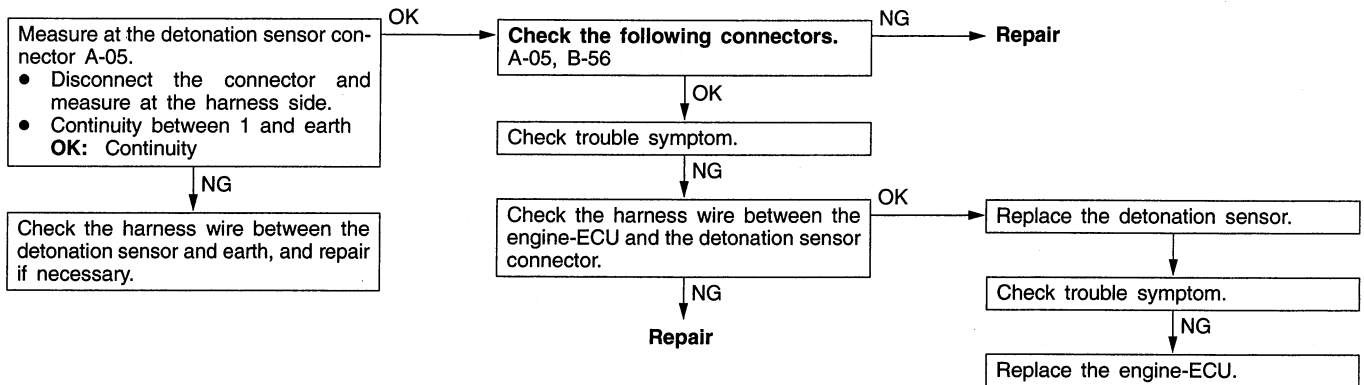
NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

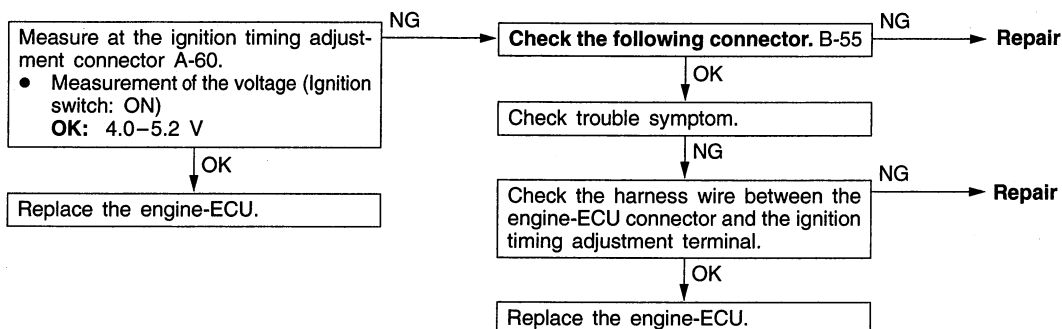
Code No. 25 Barometric pressure sensor system	Probable cause
Range of Check - Ignition switch: ON - Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. - Battery voltage is 8 V or more. Set conditions - Sensor output voltage is 4.5 V or more (corresponding to a barometric pressure of 114 kPa or more) for 4 seconds. or - Sensor output voltage is 0.2 V or less (corresponding to a barometric pressure of 5.33 kPa or less) for 4 seconds.	- Malfunction of the barometric pressure sensor - Improper connector contact, open circuit or short-circuited harness wire of the barometric pressure sensor circuit - Malfunction of the engine-ECU



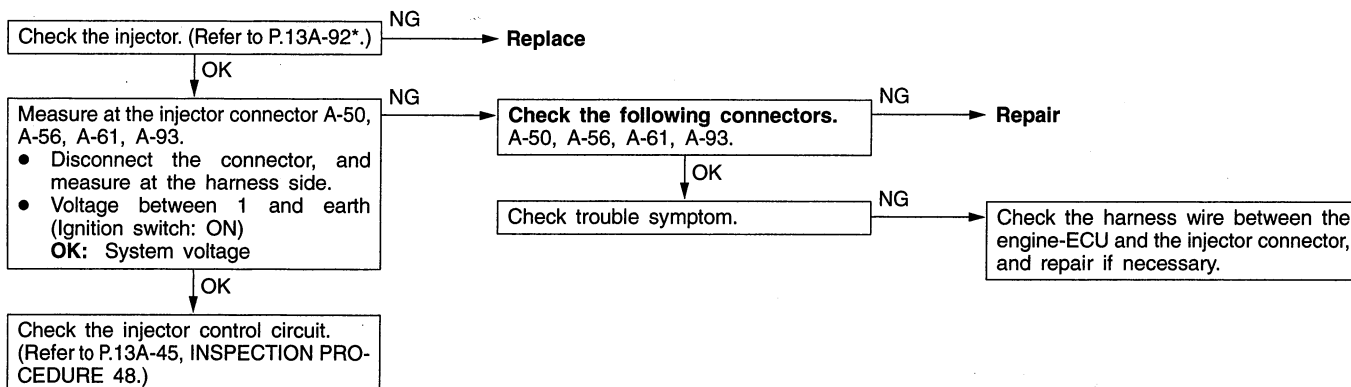
Code No. 31 Detonation sensor system	Probable cause
Range of Check - Ignition switch: ON - Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. - Engine speed is approx. 5,000 r/min or more Set conditions The change in the detonation sensor output voltage (detonation sensor peak voltage at each 1/2 revolution of the crankshaft) is less than 0.06 V for 200 times in succession.	- Malfunction of the detonation sensor - Improper connector contact, open circuit or short-circuited harness wire of the detonation sensor circuit - Malfunction of the engine-ECU



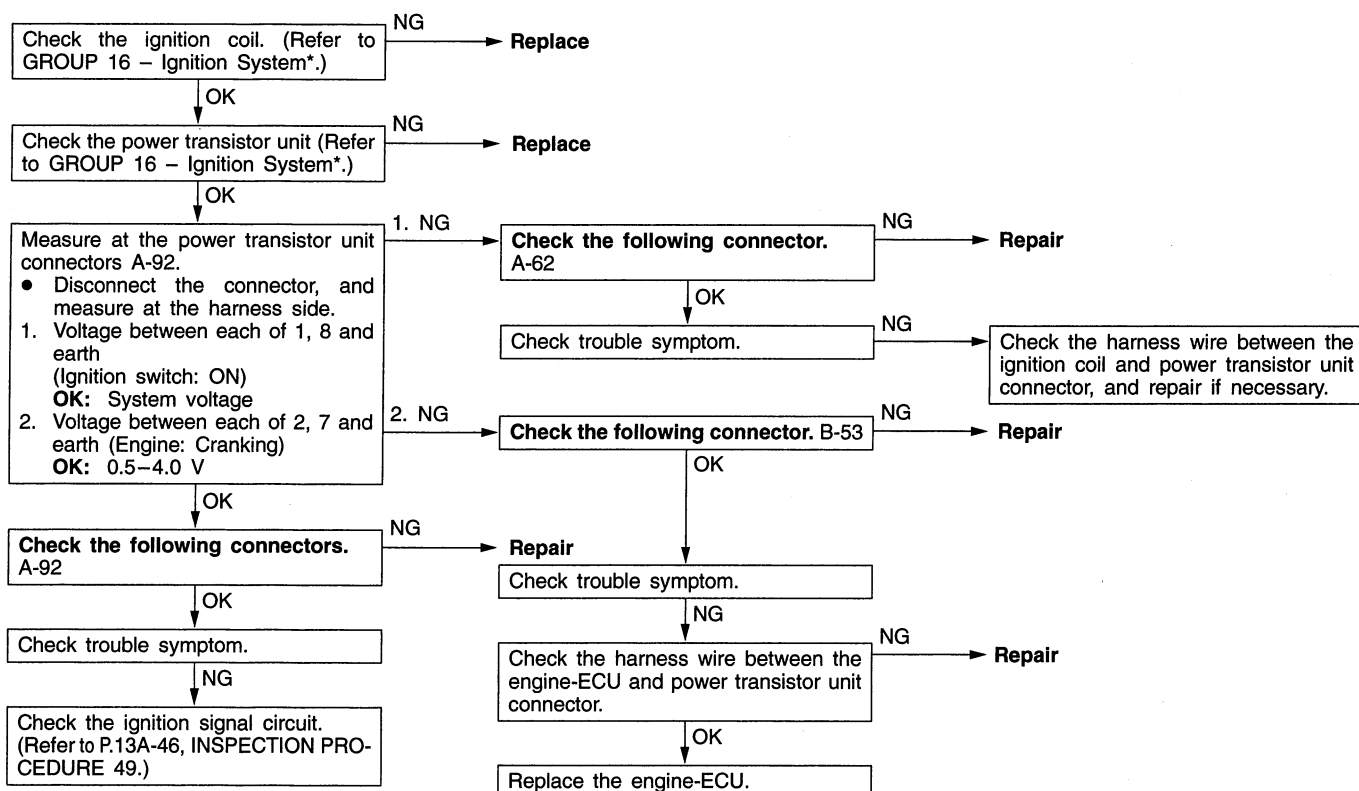
Code No. 36 Ignition timing adjustment signal system	Probable cause
Range of Check - Ignition switch: ON Set conditions - The ignition timing adjusting signal wire is shorted to the earth.	- Short circuit to earth of the ignition timing adjustment signal line - Malfunction of the engine-ECU



Code No. 41 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.	- Malfunction of the injector - Improper connector contact, open circuit or short-circuited harness wire of the injector circuit - Malfunction of the engine-ECU



Code No. 44 Ignition coil and power transistor unit system	Probable cause
Range of Check - Engine speed is approx. 50–4,000 r/min - Engine is not cranking. Set conditions - The ignition signal from the same coil is not input for 4 seconds. However, this excludes cases where no ignition signal is input from any coils.	- Malfunction of the ignition coil - Improper connector contact, open circuit or short-circuited harness wire of the ignition primary circuit - Malfunction of the power transistor unit - Malfunction of the engine-ECU



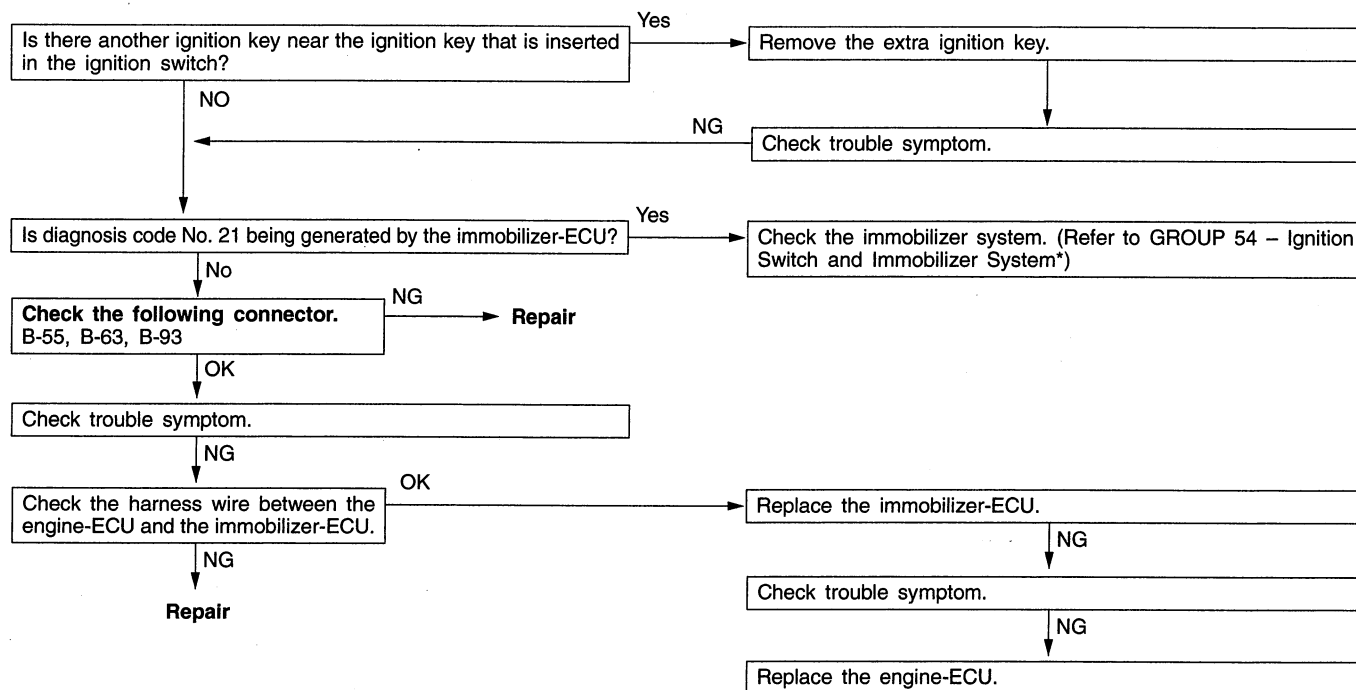
NOTE

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Code No. 54 Immobilizer system	Probable cause
Range of Check • Ignition switch: ON Set Conditions • There is a problem with communication between the engine-ECU and the immobilizer-ECU.	• Radio interference with ID codes • Incorrect ID code • Malfunction of harness or connector • Malfunction of the immobilizer-ECU • Malfunction of the engine-ECU

NOTE

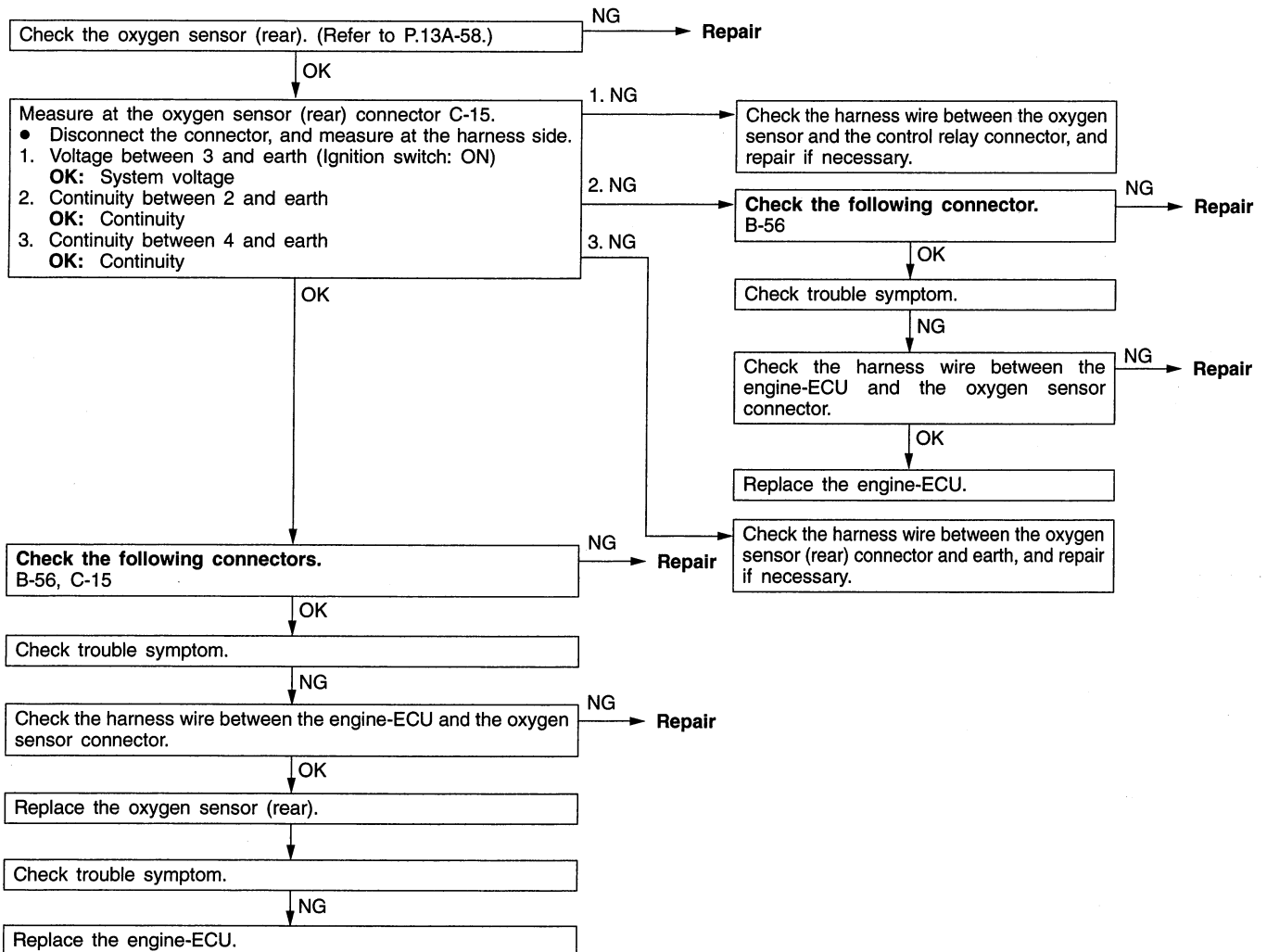
- When starting the engine, one ignition key's ID code interferes with another ignition key's code.
- This diagnosis code may be displayed when an ID-code is registered.



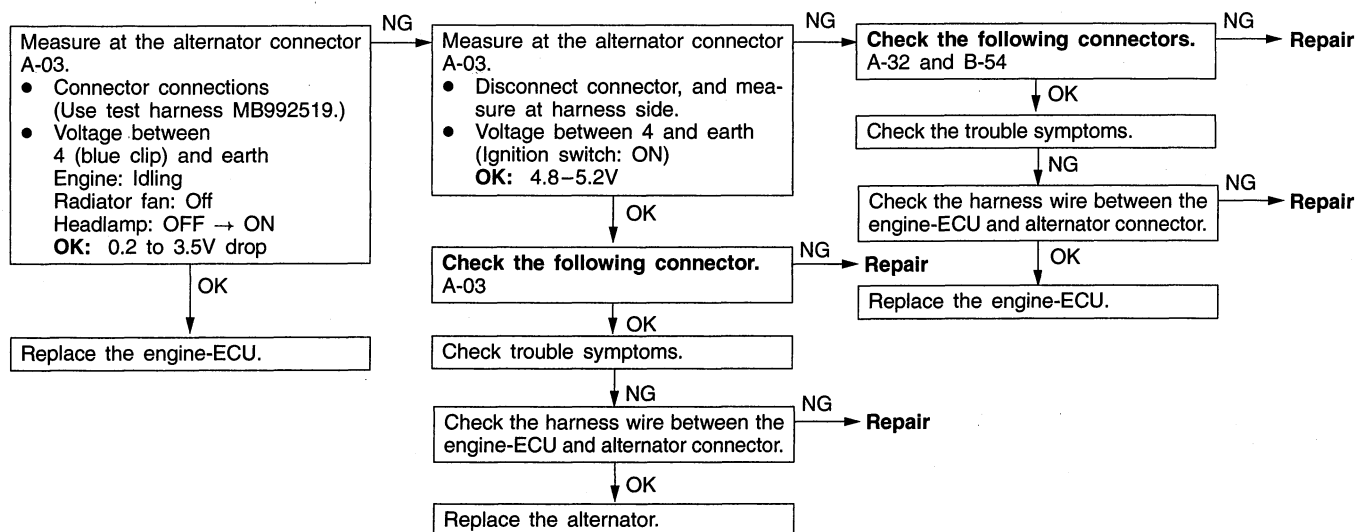
NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

Code No. 59 Oxygen sensor (rear) system	Probable cause
Range of Check 3 minutes have passed after engine was started. - Engine coolant temperature is approx. 80°C or more. - Idle position switch: OFF - The throttle position sensor output voltage is 4.1 V or more. - Open loop control in operation 20 seconds have passed after deceleration finished. Set Conditions - The oxygen sensor (rear) output voltage is 0.1 V or less. - The difference in the maximum and minimum values for the oxygen sensor (rear) output voltage is 0.08 V or less. - The oxygen sensor (rear) output voltage is 0.5 V or more. - The above conditions continue for a continuous period of 5 seconds.	- Malfunction of the oxygen sensor (rear) - Improper connector contact, open circuit or short-circuited harness wire - Malfunction of the engine-ECU



Code No. 64 Alternator FR terminal system	Probable cause
Range of Check • Engine speed is approx. 50 r/min or more Set Conditions • Input voltage from alternator FR terminal is 4.5V or more for 20 seconds.	• Alternator FR terminal circuit is open-circuited. • Malfunction of the engine-ECU



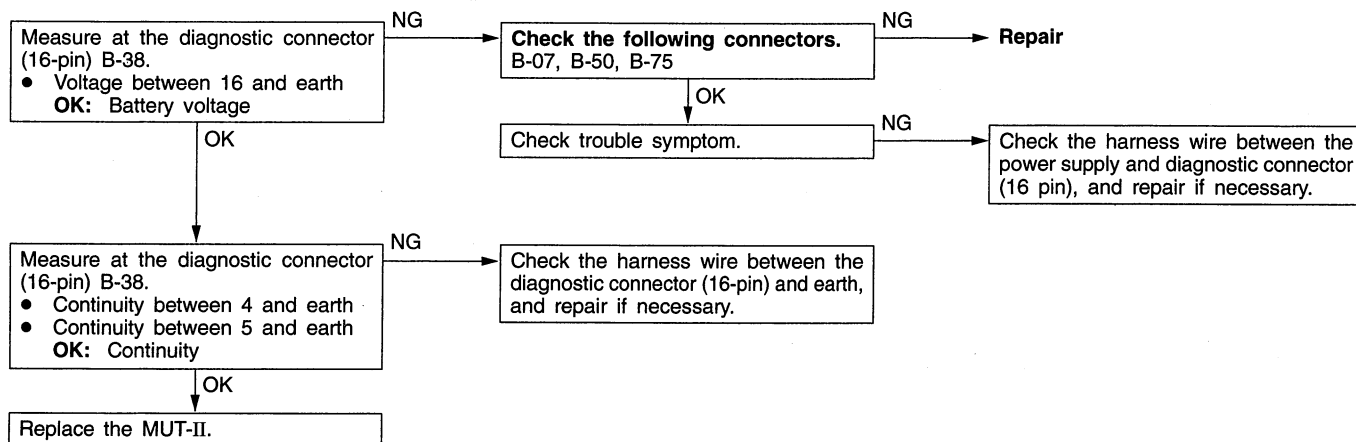
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is impossible.	Communication with all systems is not possible.	1	13A-16
	Communication with engine-ECU only is not possible.	2	13A-17
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-18
	The engine warning lamp remains illuminating and never goes out.	4	13A-18
Starting	No initial combustion (starting impossible)	5	13A-19
	Initial combustion but no complete combustion (starting impossible)	6	13A-20
	It take too long time to start (improper starting)	7	13A-21
Idling stability (Improper idling)	Unstable idling (Rough idling, hunting)	8	13A-22
	Idling speed is high. (Improper idling speed)	9	13A-23
	Idling speed is low. (Improper idling speed)	10	13A-23
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	11	13A-24
	When the engine becomes hot, it stalls at idling. (Die out)	12	13A-25
	The engine stalls when the vehicle starts. (Pass out)	13	13A-26
	The engine stalls when decelerating.	14	13A-26
Driving	Hesitation, sag or stumble	15	13A-27
	The feeling of impact or vibration when accelerating	16	13A-27
	The feeling of impact or vibration when decelerating	17	13A-28
	Poor acceleration	18	13A-28
	Surge	19	13A-29
	Knocking	20	13A-29
Dieseling		21	13A-29
Too high CO and HC concentration when idling		22	13A-30
Low alternator output voltage (approx. 12.3V)		23	13A-31

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

INSPECTION PROCEDURE 1

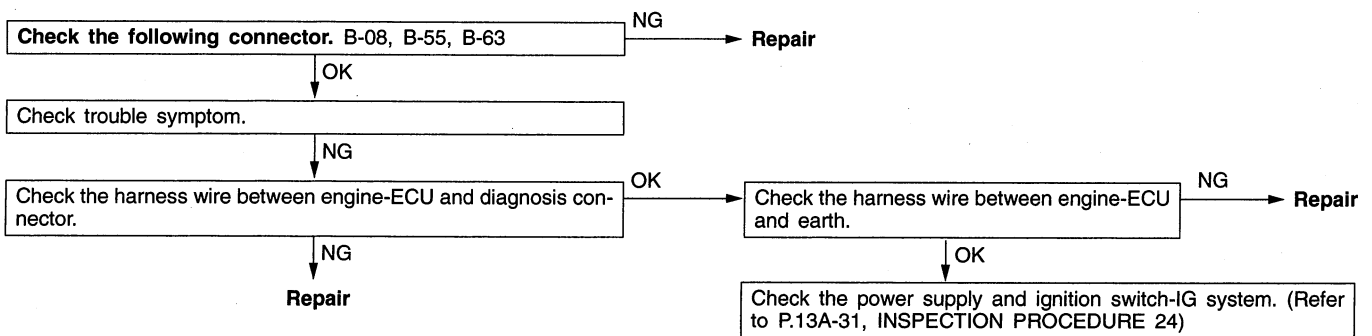
Communication with MUT-II is not possible. (Communication with all systems is not possible.)	Probable cause
The cause is probably a defect in the power supply system (including earth) for the diagnosis line.	• Malfunction of the connector • Malfunction of the harness wire



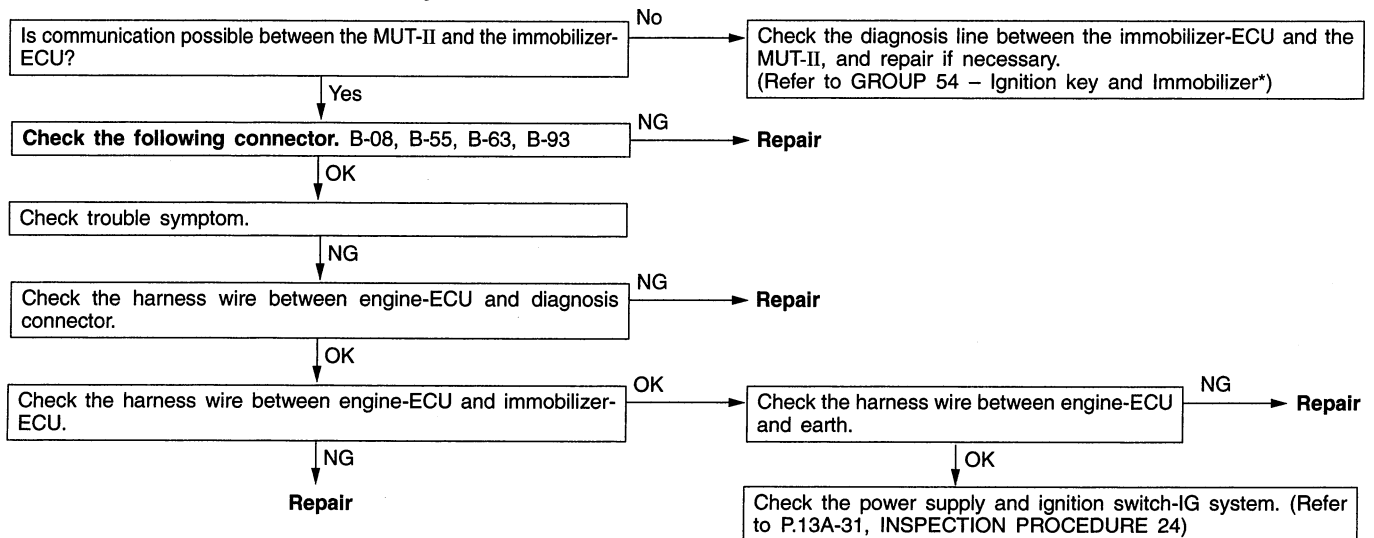
INSPECTION PROCEDURE 2

MUT-II communication with engine-ECU is impossible.	Probable cause
One of the following causes may be suspected. • No power supply to engine-ECU • Defective earth circuit of engine-ECU • Defective engine-ECU • Improper communication line between engine-ECU and MUT-II	<Vehicles without immobilizer system> • Malfunction of engine-ECU power supply circuit • Malfunction of the engine-ECU • Open circuit between engine-ECU and diagnosis connector <Vehicles with immobilizer system> • Malfunction of engine-ECU power supply circuit • Malfunction of the engine-ECU • Malfunction of the immobilizer-ECU • Open circuit between immobilizer-ECU and diagnosis connector • Open circuit between engine-ECU and immobilizer-ECU

<Vehicles without immobilizer system>



<Vehicles with immobilizer system>



NOTE

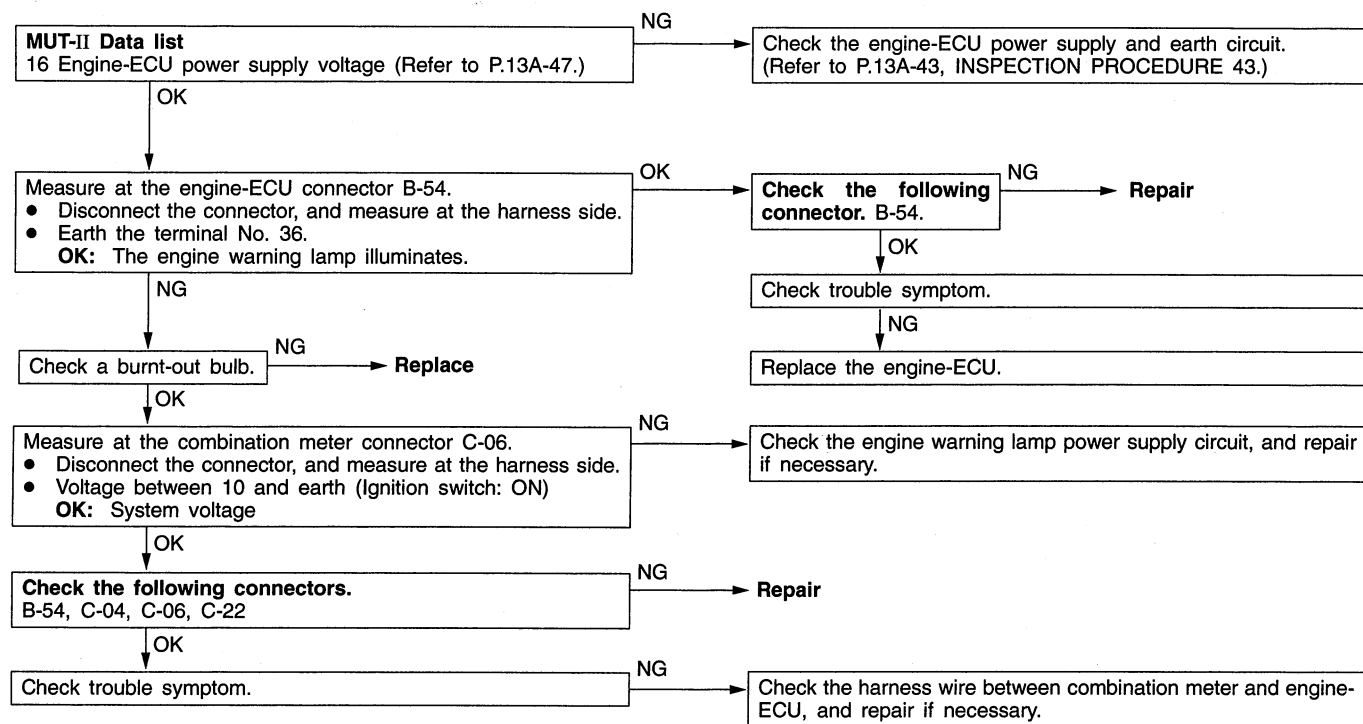
*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

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.

- Burnt-out bulb
- Defective warning lamp circuit
- Malfunction of the engine ECU

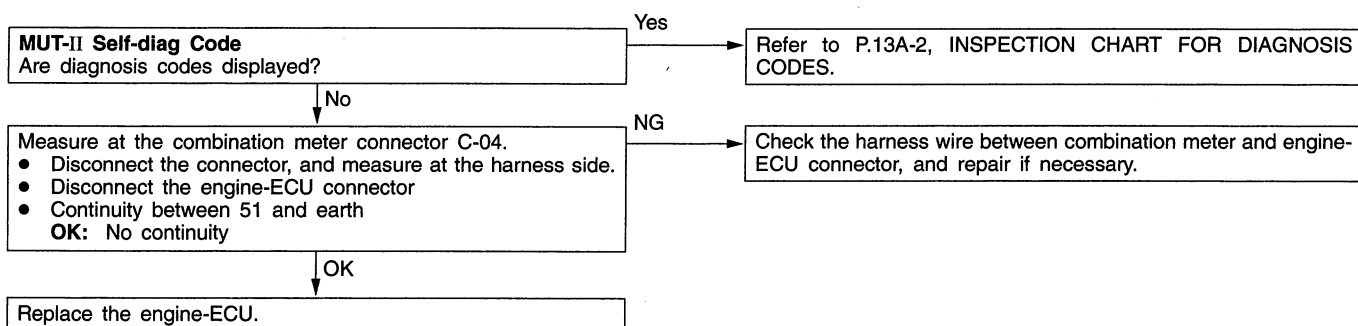


INSPECTION PROCEDURE 4

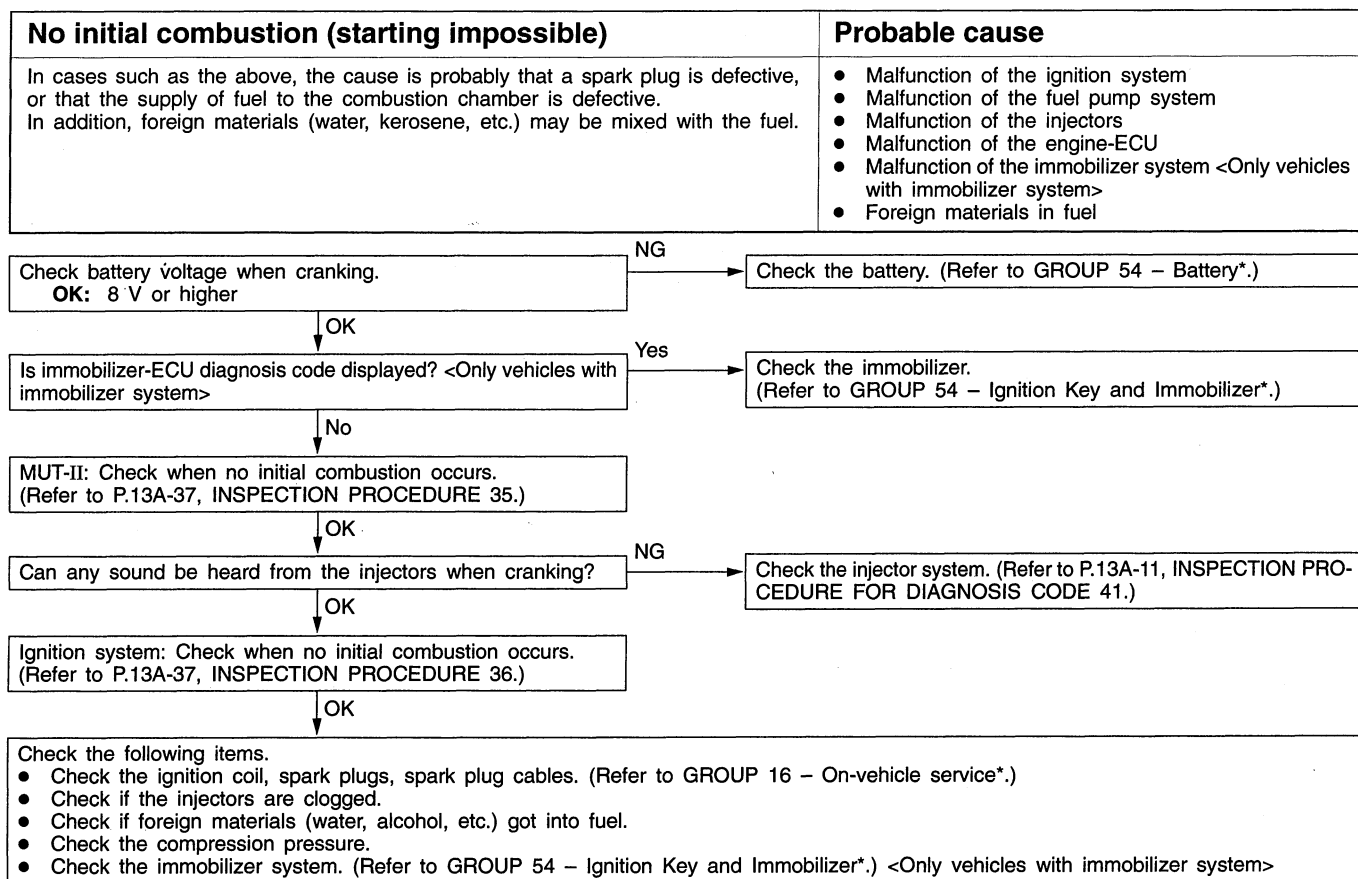
The engine warning lamp remains illuminating and never goes out.**Probable cause**

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.

- Short-circuit between the engine warning lamp and engine-ECU
- Malfunction of the engine-ECU



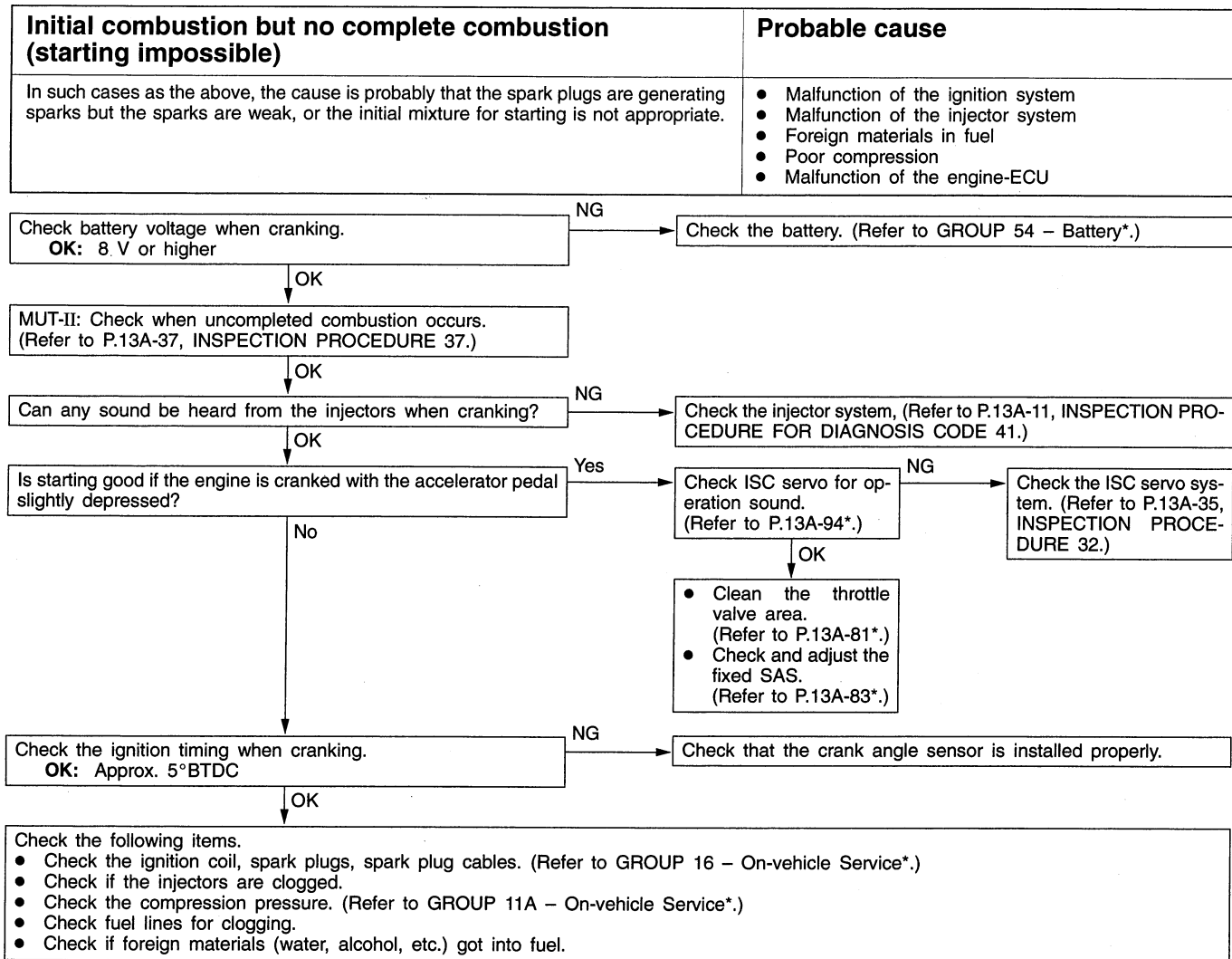
INSPECTION PROCEDURE 5



NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 6

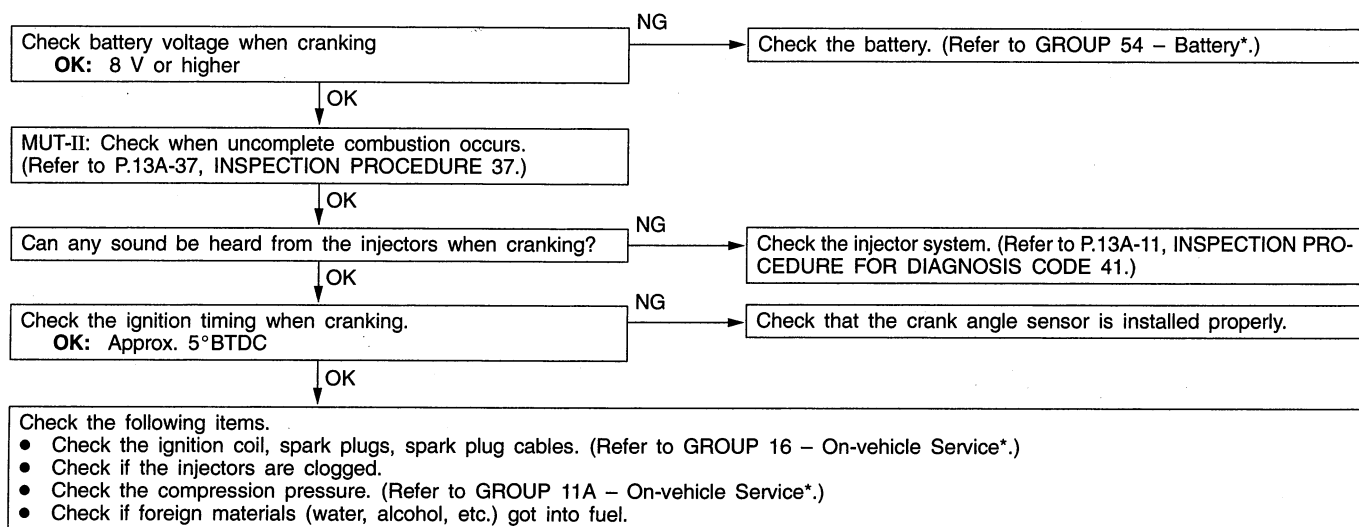


NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 7

It takes too long 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.	• Malfunction of the ignition system • Malfunction of the injector system • Inappropriate gasoline use • Poor compression

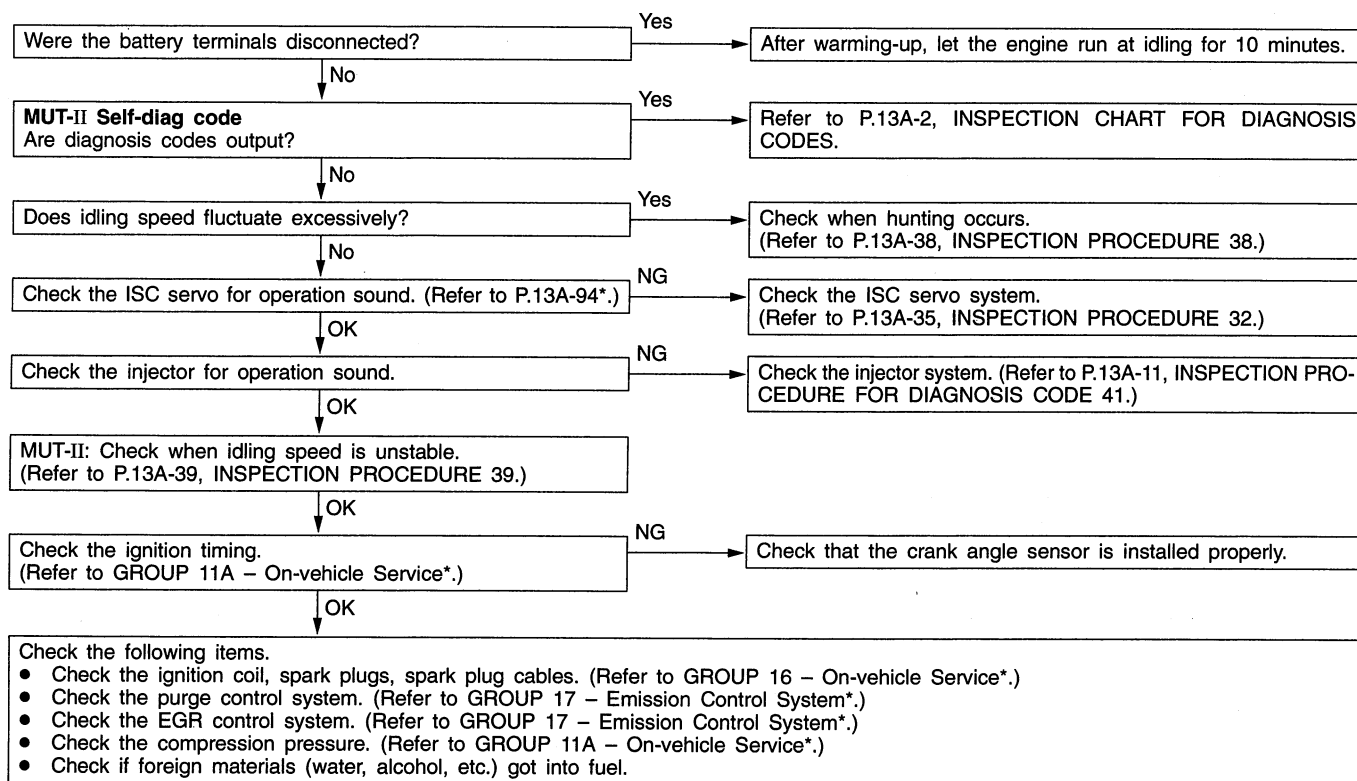


NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 8

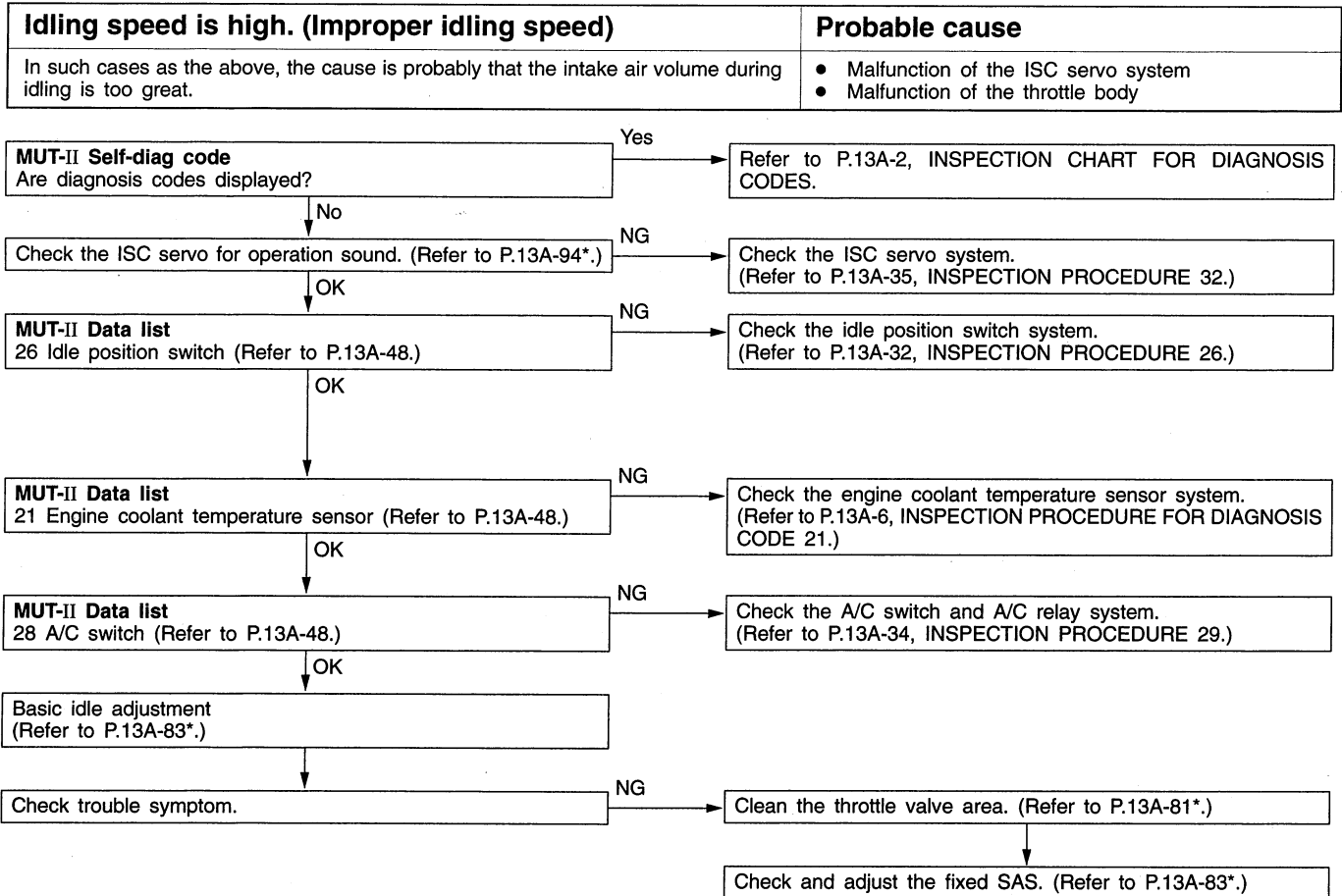
Idling is unstable (Rough idling, hunting)	Probable cause
In cases as the above, the cause is probably that the ignition system, air/fuel mixture, idle speed control (ISC) or compression pressure is defective. Because the range of possible causes is broad, inspection is narrowed down to simple items.	● 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



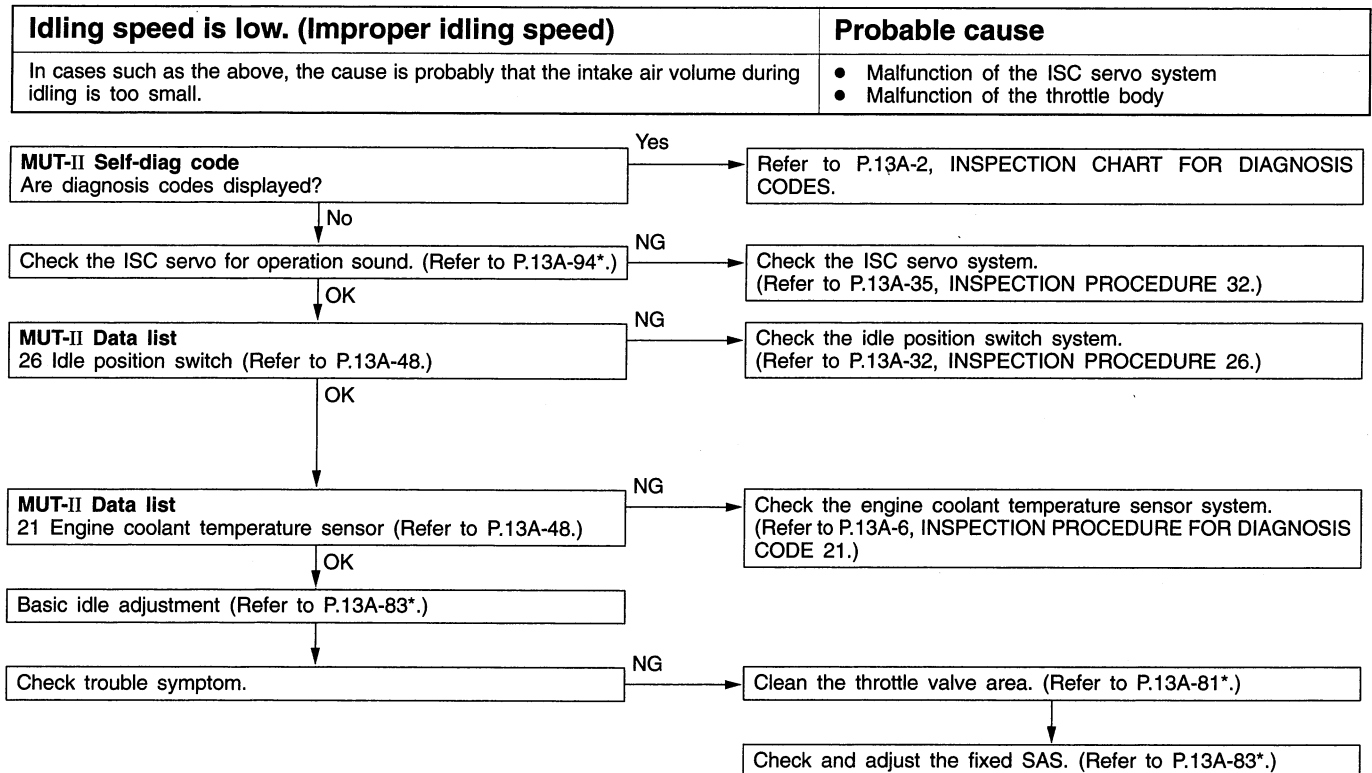
NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 9



INSPECTION PROCEDURE 10

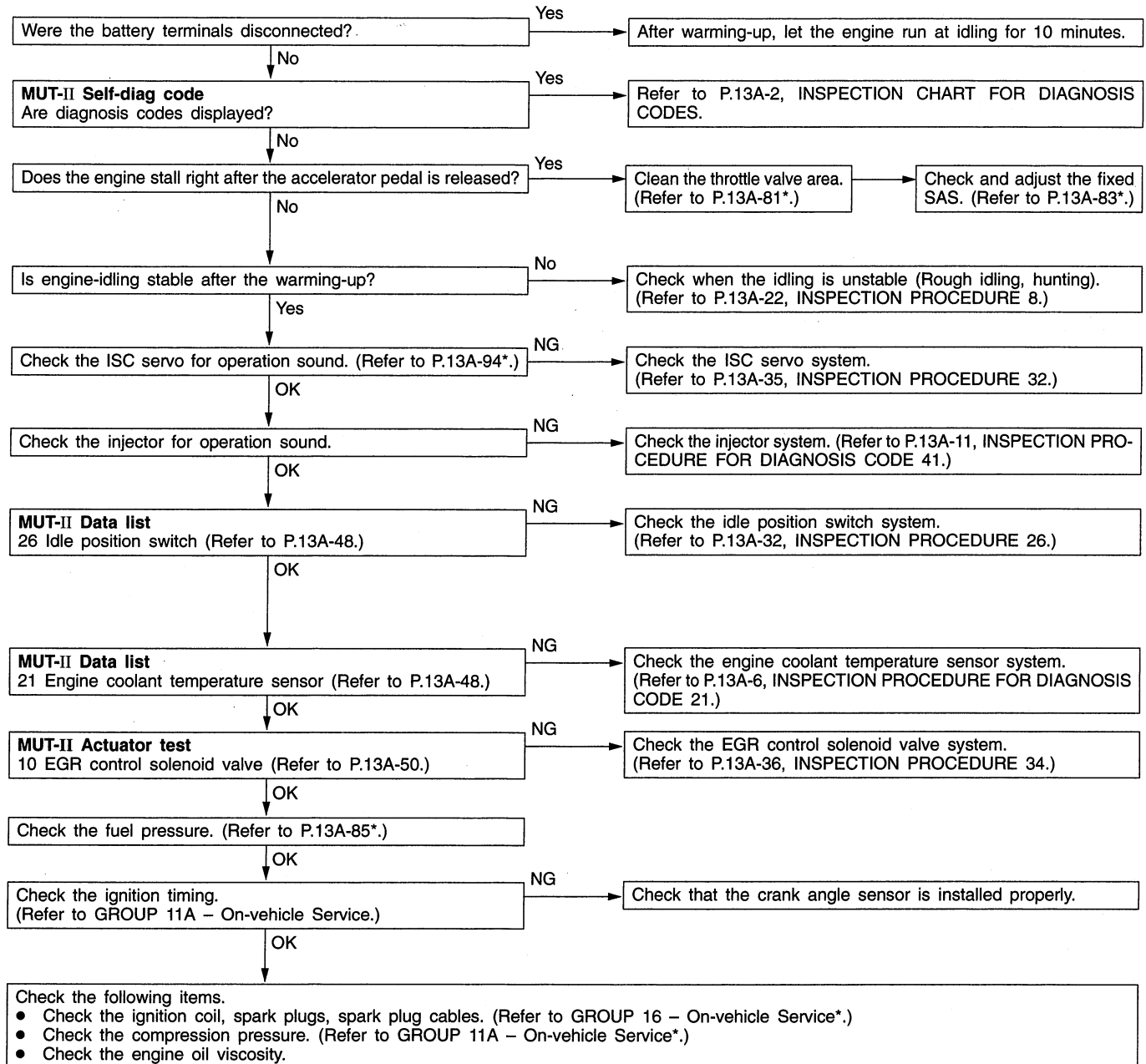


NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

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.	• Malfunction of the ISC servo system • Malfunction of the throttle body • Malfunction of the injector system • Malfunction of the ignition system

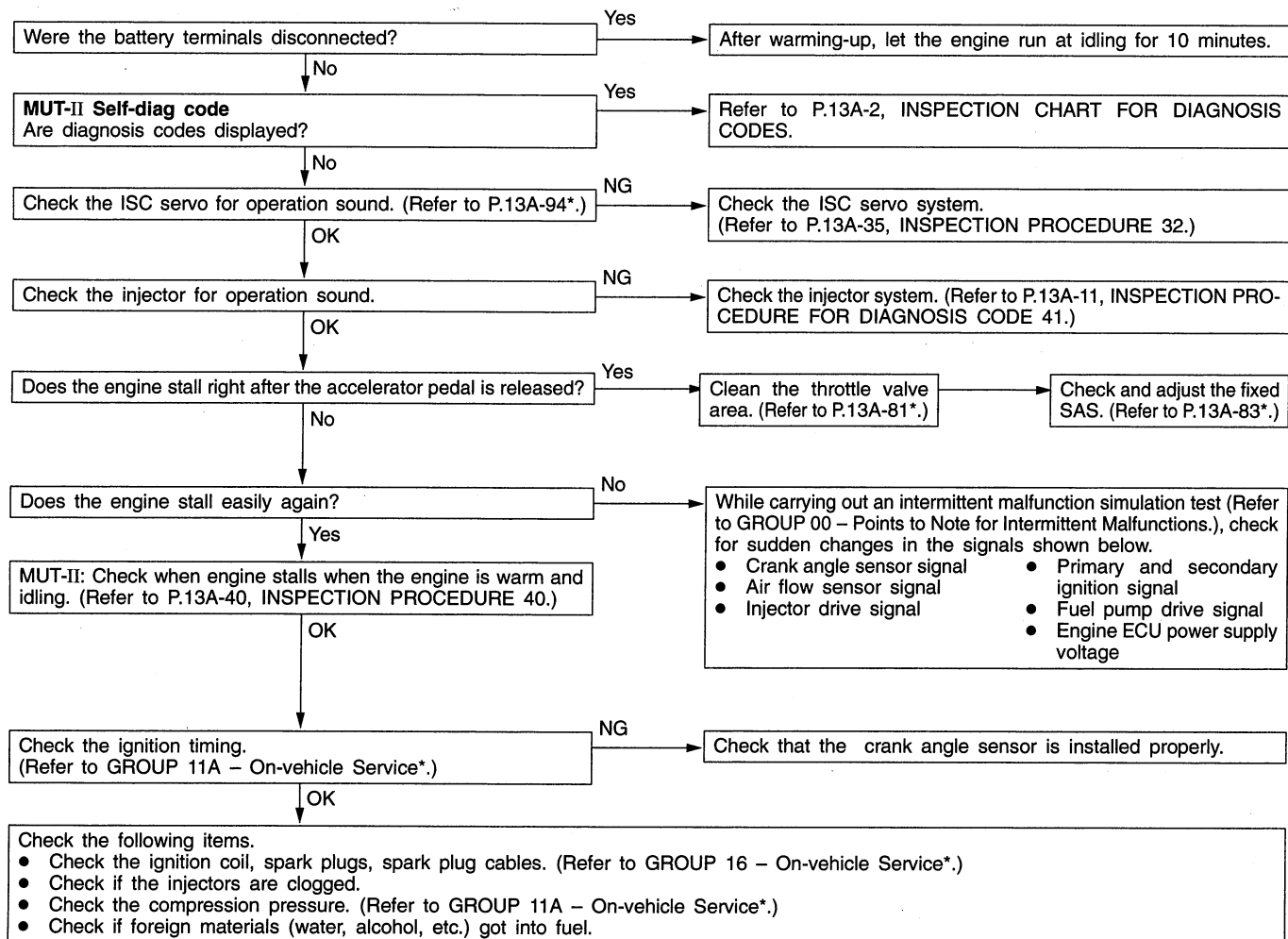


NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

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.	• 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

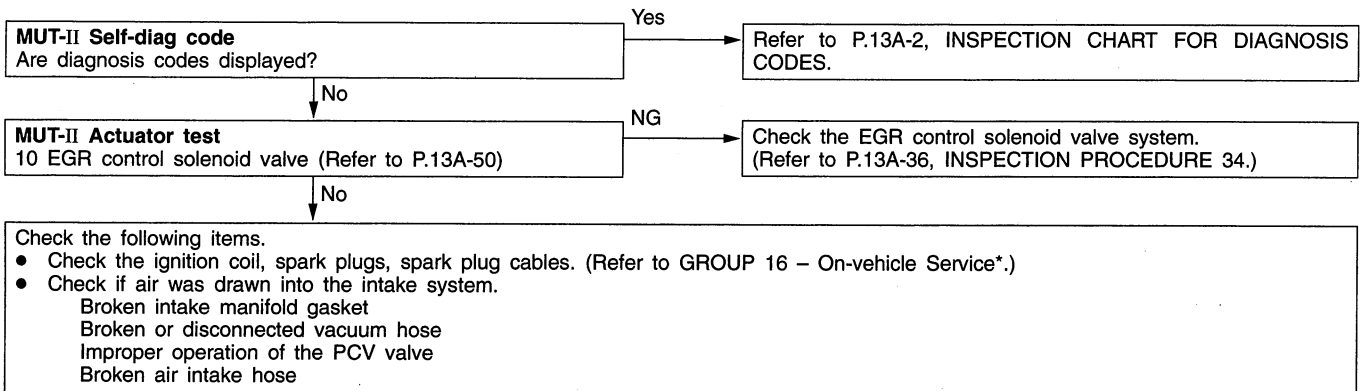


NOTE

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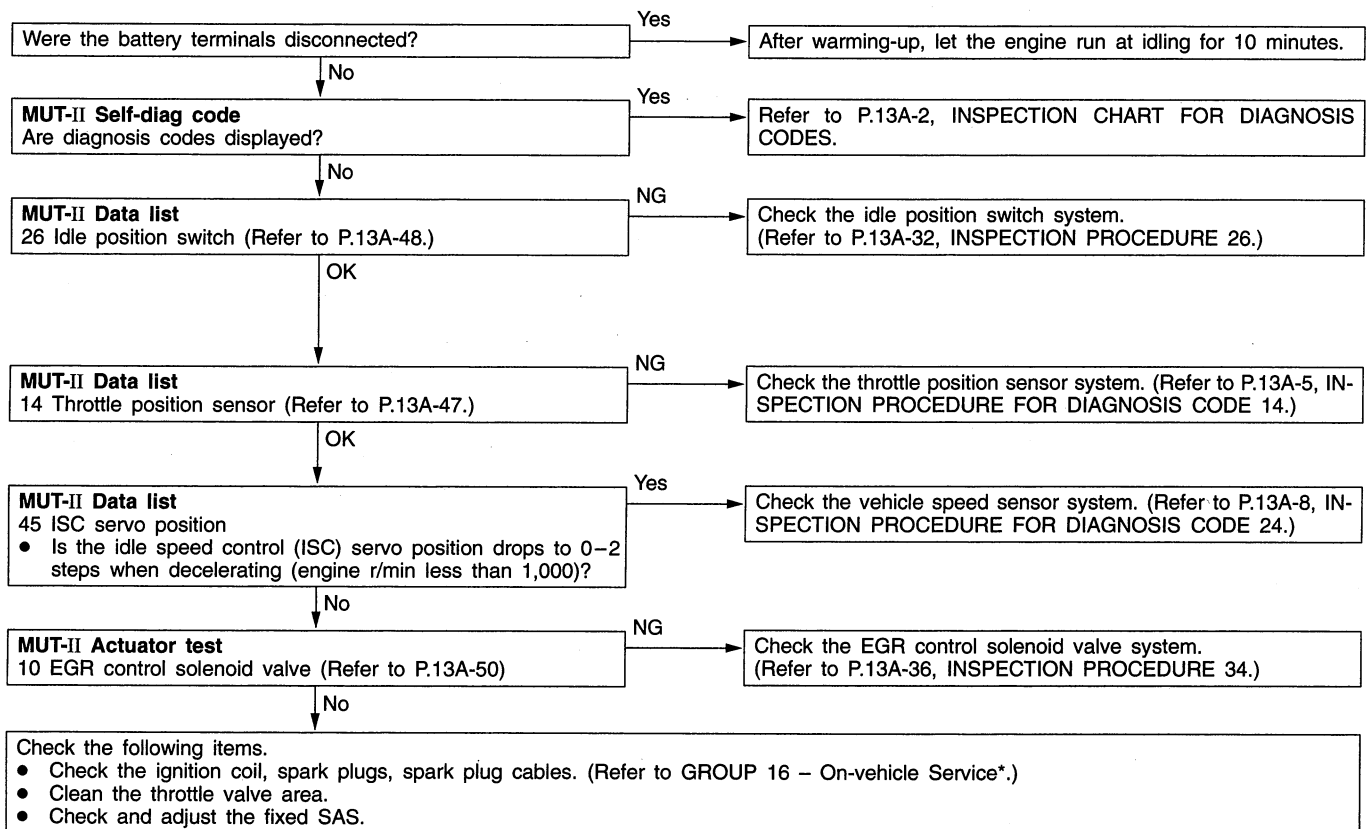
INSPECTION PROCEDURE 13

The engine stalls when the vehicle starts. (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.	• 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) servo system.	• Malfunction of the ISC system

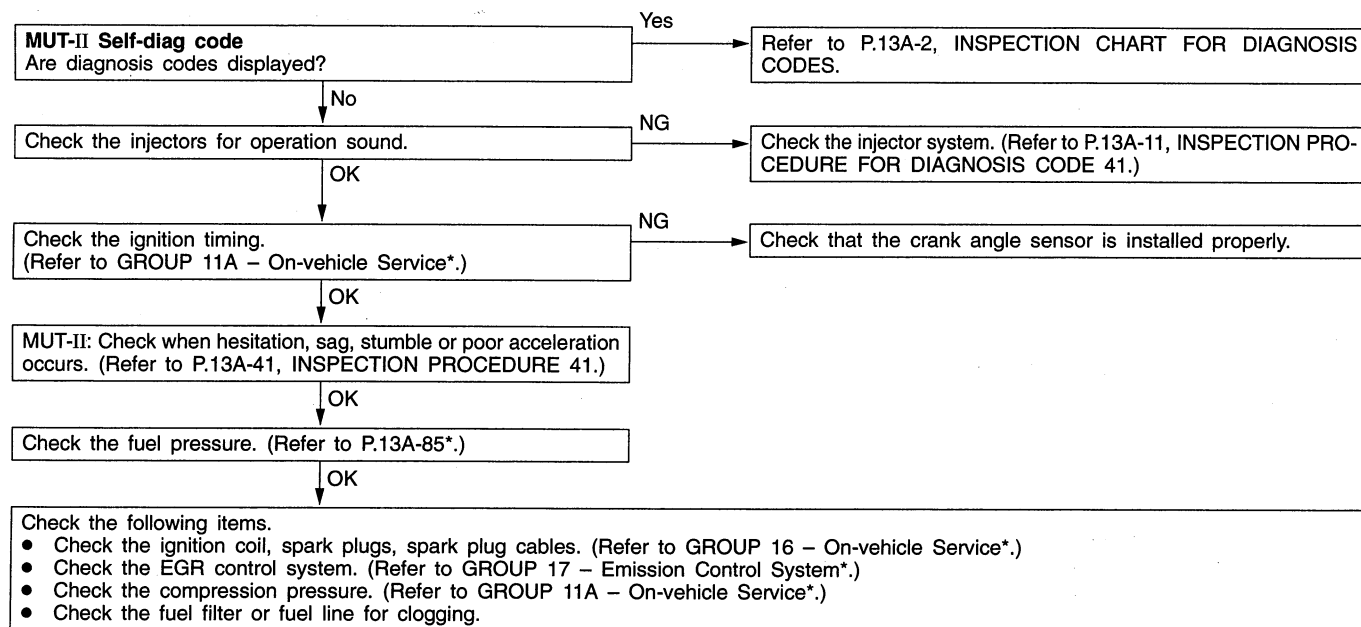


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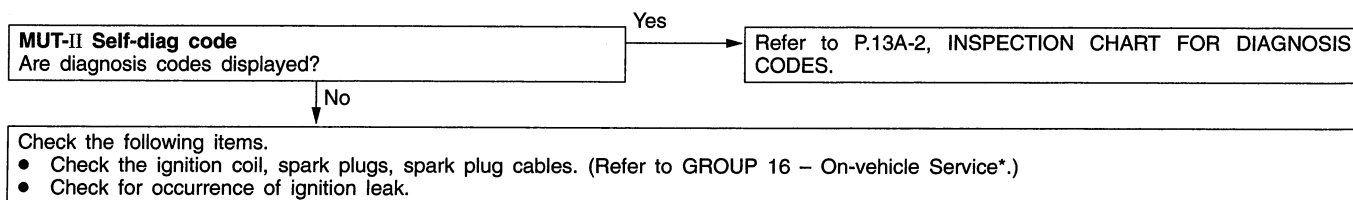
INSPECTION PROCEDURE 15

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.	• 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



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.	• Malfunction of the ignition system

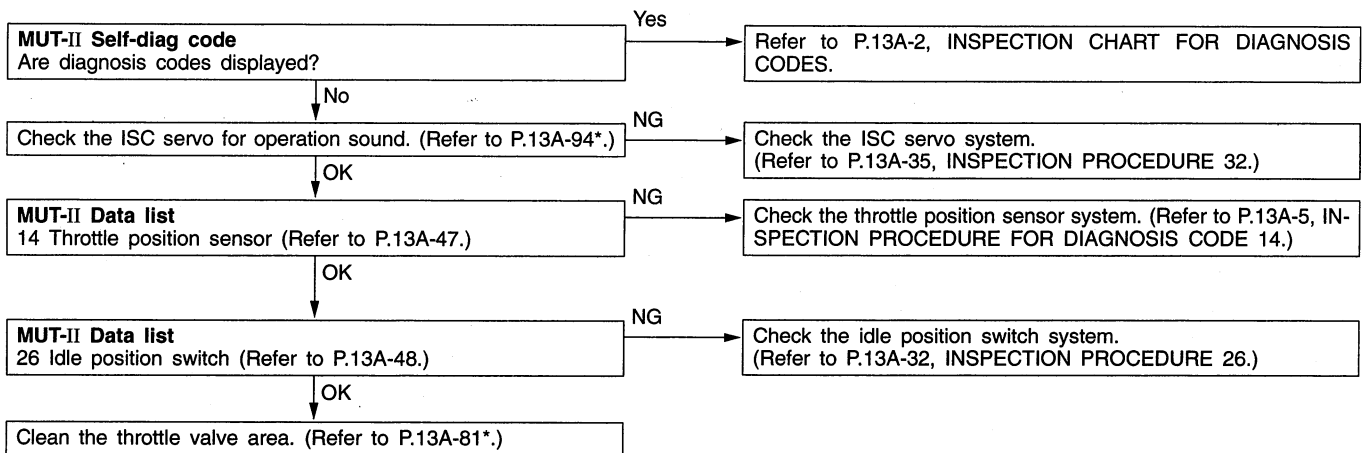


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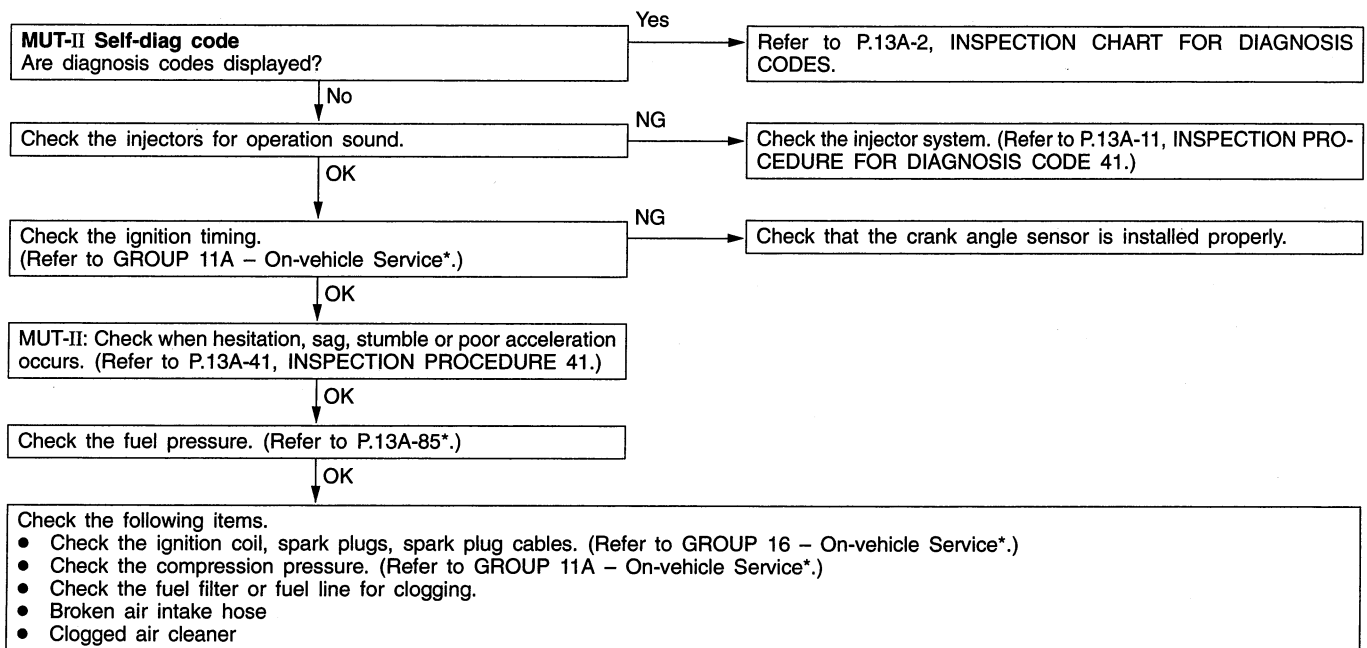
INSPECTION PROCEDURE 17

The feeling of impact or vibration when decelerating.	Probable cause
Malfunction of the ISC system is suspected.	Malfunction of the ISC system



INSPECTION PROCEDURE 18

Poor acceleration	Probable cause
Defective ignition system, abnormal air-fuel ratio, poor compression pressure, etc. are suspected.	- Malfunction of the ignition system - Malfunction of air-fuel ratio control system - Malfunction of the fuel supply system - Poor compression pressure - Clogged exhaust system

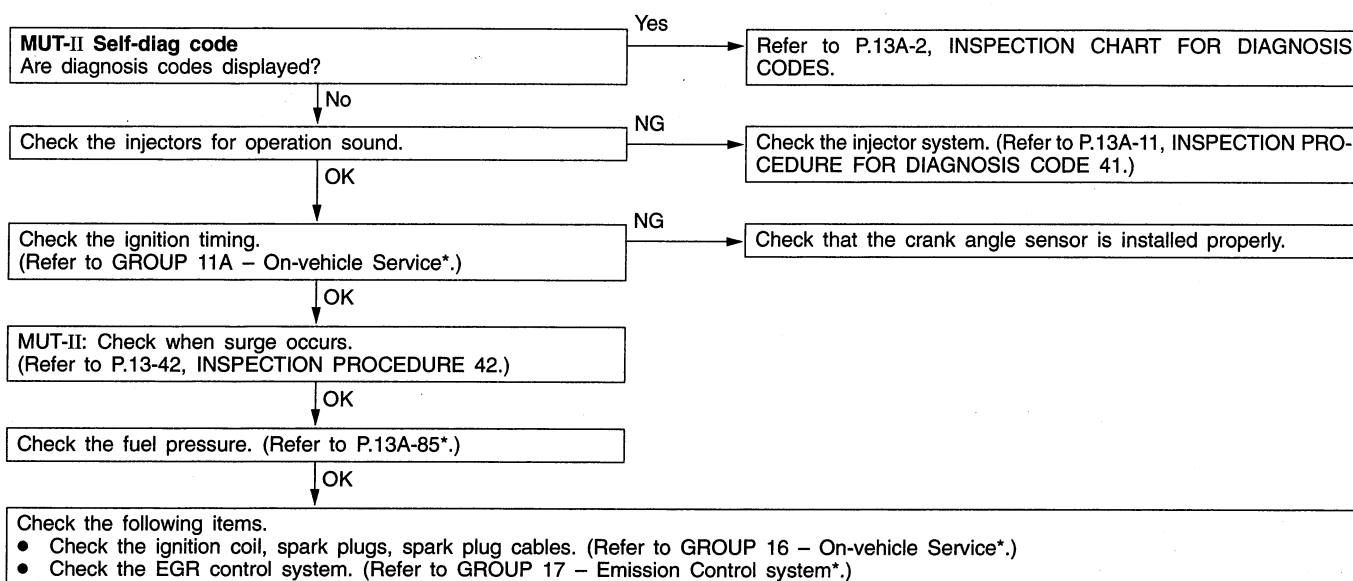


NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

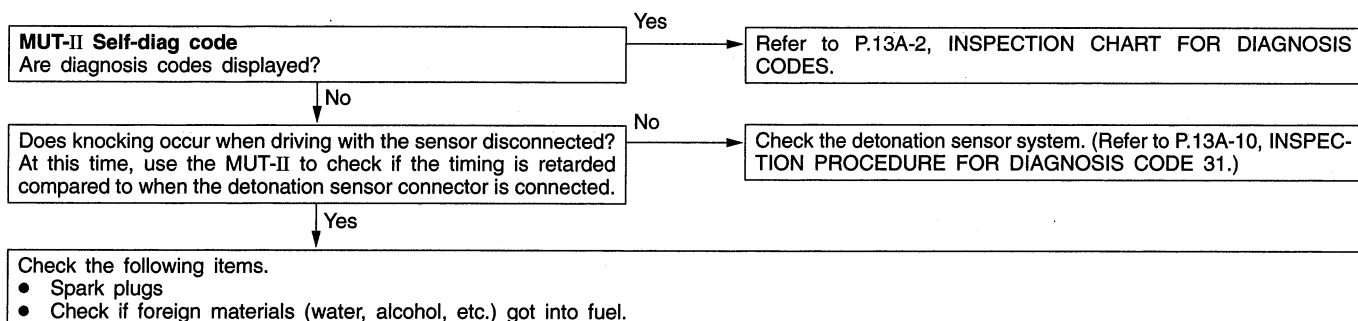
INSPECTION PROCEDURE 19

Surge	Probable cause
Defective ignition system, abnormal air-fuel ratio, etc. are suspected.	• Malfunction of the ignition system • Malfunction of air-fuel ratio control system • Malfunction of the EGR control solenoid valve system



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.	• Defective detonation sensor • Inappropriate heat value of the spark plug



INSPECTION PROCEDURE 21

Dieseling	Probable cause
Fuel leakage from injectors is suspected.	• Fuel leakage from injectors

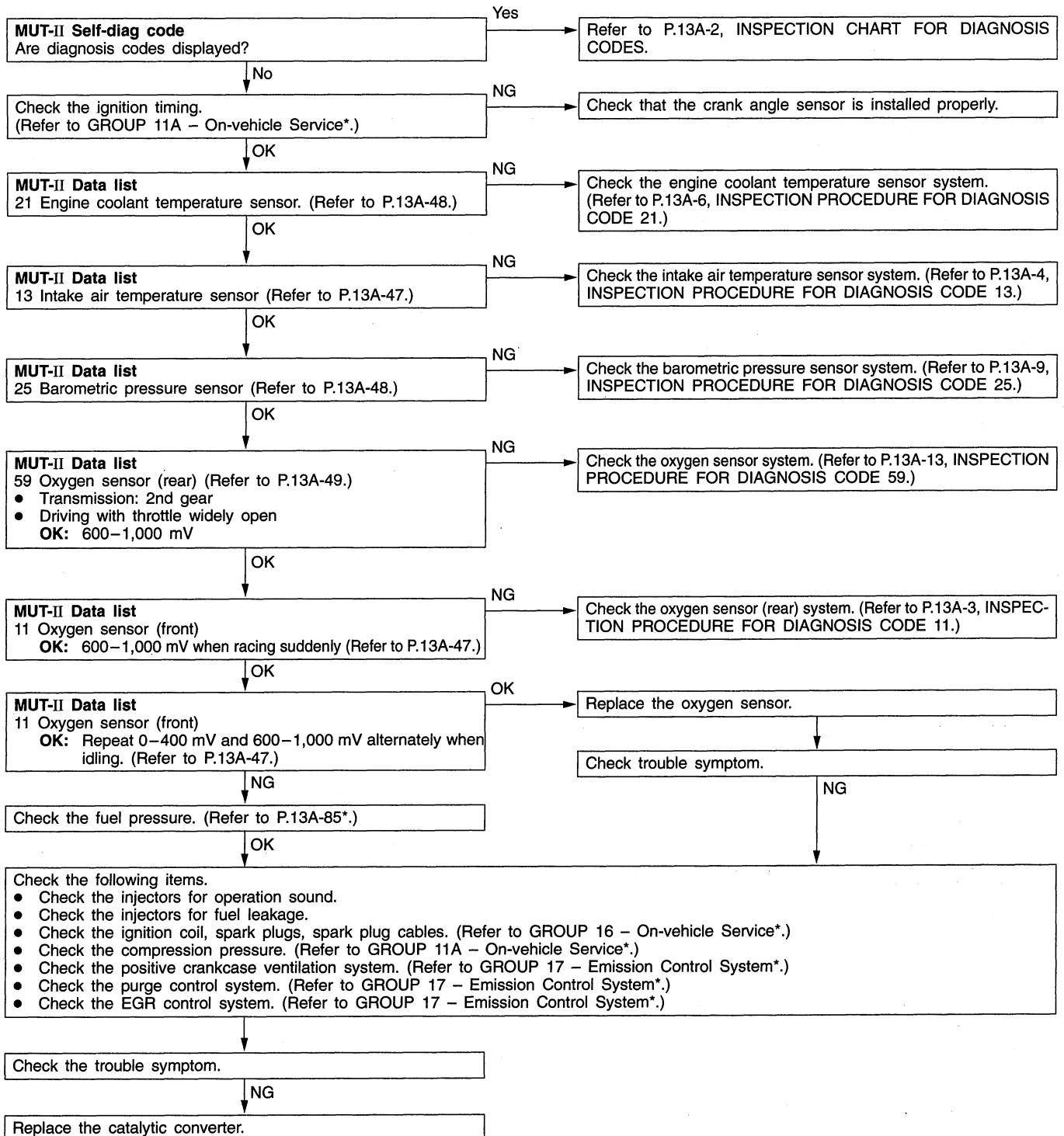
Check the injectors for fuel leakage.

NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 22

Too high CO and HC concentration when idling	Probable cause
Abnormal air-fuel ratio is suspected.	- Malfunction of the air-fuel ratio control system - Deteriorated catalyst

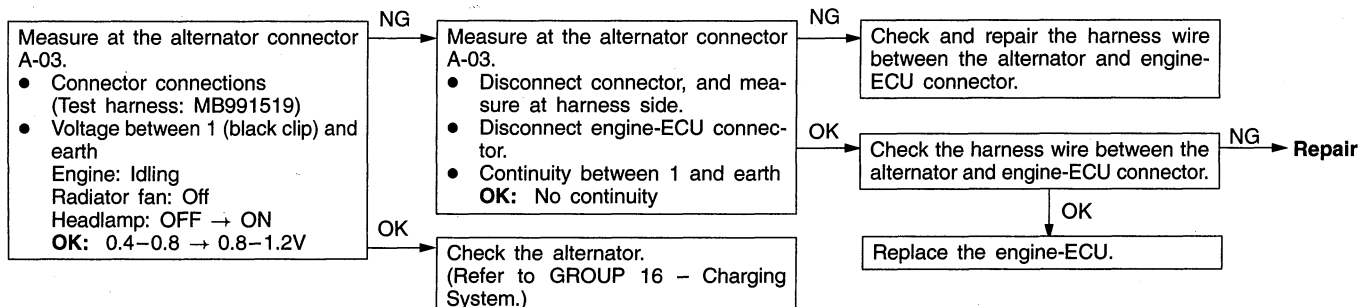


NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

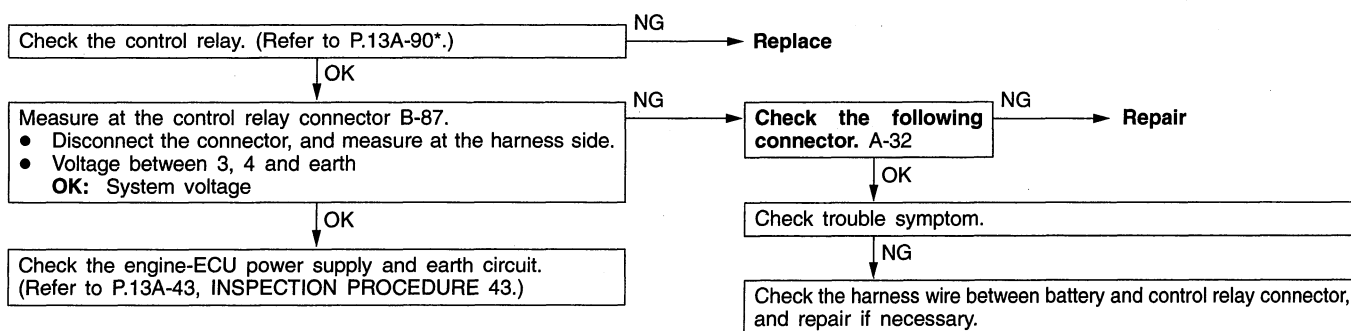
INSPECTION PROCEDURE 23

Alternator output voltage is low (Approx. 12.3V)	Probable cause
Defective alternator or troubles described at right are suspected.	- Charging system is out of order (Refer to GROUP 16 – Charging System.) - Short circuit in harness between the alternator terminal G and the engine-ECU - Malfunction of the engine-ECU



INSPECTION PROCEDURE 24

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.	- 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

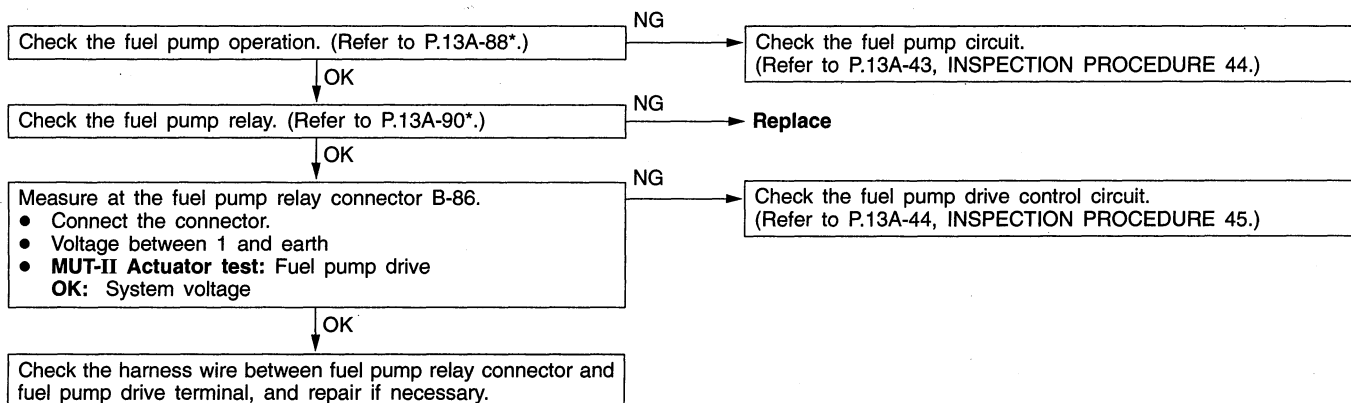


NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

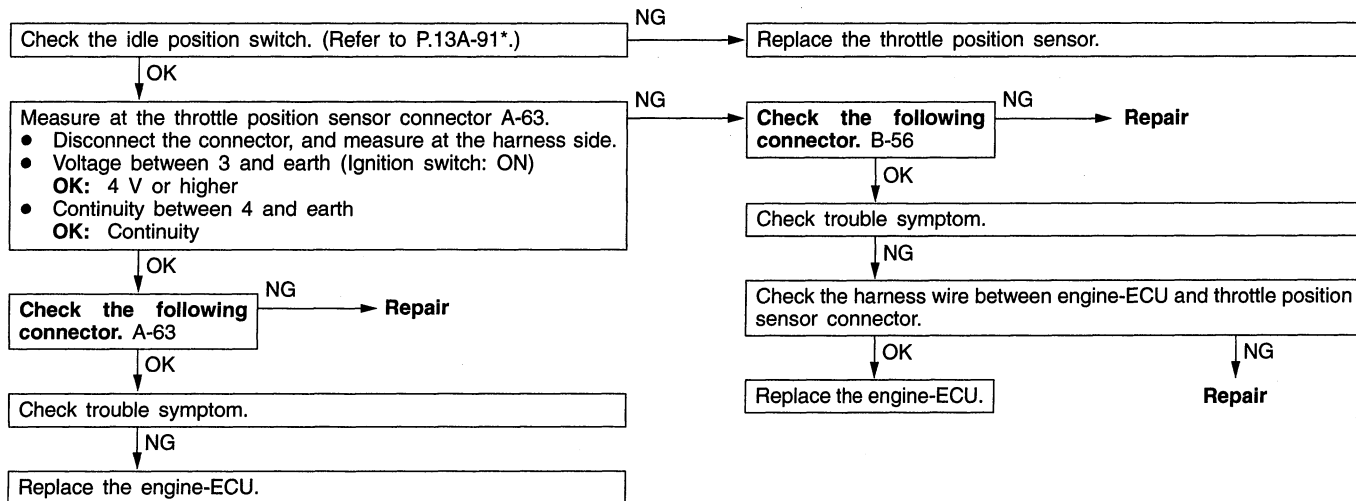
INSPECTION PROCEDURE 25

Fuel pump system	Probable cause
The engine-ECU turns the fuel pump relay ON when the engine is cranking or running, and this supplies power to drive the fuel pump.	• 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



INSPECTION PROCEDURE 26

Idle position switch system	Probable cause
The idle position switch inputs the condition of the accelerator pedal, i.e. whether it is depressed or released (HIGH/LOW), to the engine-ECU. The engine-ECU controls the idle speed control servo based on this input.	• Maladjustment of the accelerator pedal • Maladjustment of the fixed SAS • Maladjustment of the idle position switch and throttle position sensor • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU



NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 27

Ignition switch-ST system	Probable cause
The ignition switch-ST inputs a HIGH signal to the engine-ECU while the engine is cranking. The engine-ECU controls fuel injection, etc. during starting based on this input.	• Malfunction of ignition switch • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU


```

graph TD
    Start([Measure at the engine-ECU connector B-56.  
• Disconnect the connector, and measure at the harness side.  
1. Voltage between 71 and earth (Ignition switch: START)  
OK: 8V or more  
2. Continuity between 91 and earth  
OK: Continuity]) -- OK --> CheckB56[Check the following connector. B-56]
    Start -- NG --> CheckB56B63[Check the following connectors. B-56, B-63]
    CheckB56 -- NG --> Repair1[Repair]
    CheckB56 -- OK --> CheckSymptom1[Check trouble symptom.]
    CheckSymptom1 -- NG --> ReplaceECU[Replace the engine-ECU.]
    CheckSymptom1 -- OK --> CheckB56B63
    CheckB56B63 -- OK --> CheckSymptom2[Check trouble symptom.]
    CheckB56B63 -- NG --> CheckHarness[Check harness wire between the engine-ECU and ignition switch connector.]
    CheckHarness -- NG --> Repair2[Repair]
    CheckHarness -- OK --> CheckIgnitionSwitch[Check the ignition switch.  
(Refer to GROUP 54 – Ignition Switch and Immobilizer system*.)]
    CheckIgnitionSwitch -- NG --> CheckHarness91[Check the harness wire between engine-ECU connector (terminal No. 91) and earth, and repair if necessary.]
    CheckIgnitionSwitch -- OK --> End([End])
    CheckHarness91 --> End
  
```

INSPECTION PROCEDURE 28

Power steering fluid pressure switch system	Probable cause
The presence or absence of power steering load is input to the engine-ECU. The engine-ECU controls the idle speed control (ISC) servo based on this input.	• Malfunction of power steering fluid pressure switch • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU


```

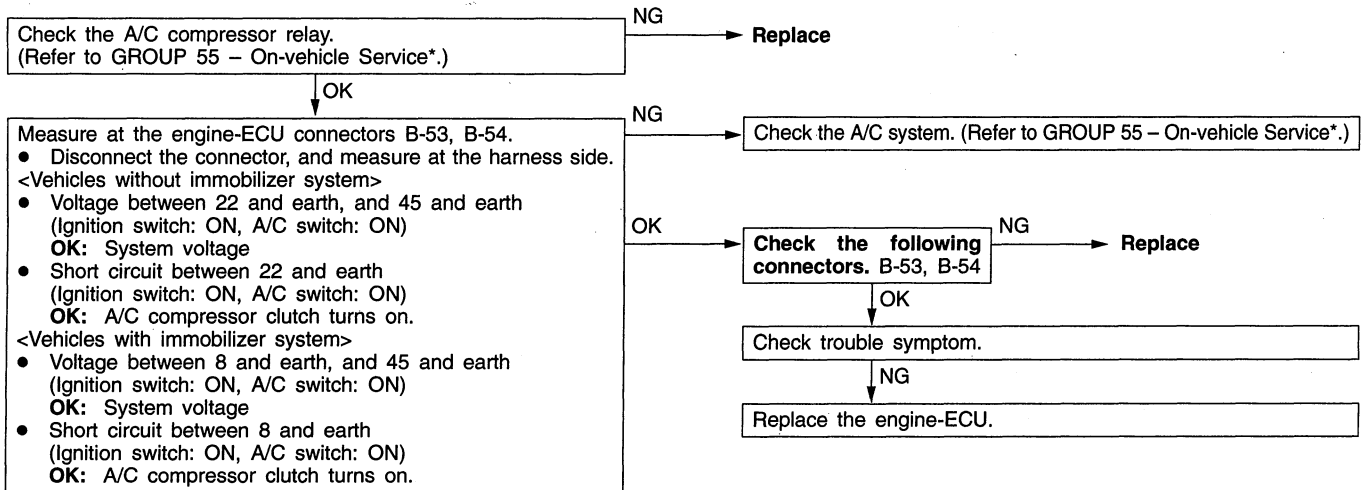
graph TD
    Start([Check the power steering fluid pressure switch.  
(Refer to GROUP 37A – On-vehicle Service*.)]) -- NG --> ReplaceSwitch[Replace]
    Start -- OK --> MeasureA49[Measure at the power steering fluid pressure switch connector A-49.  
• Disconnect the connector, and measure at the harness side.  
• Voltage between 1 and earth (Ignition switch: ON)  
OK: System voltage]
    MeasureA49 -- NG --> CheckB54[Check the following connector. B-54]
    MeasureA49 -- OK --> CheckA49[Check the following connector. A-49]
    CheckA49 -- NG --> Repair1[Repair]
    CheckA49 -- OK --> CheckSymptom1[Check trouble symptom.]
    CheckSymptom1 -- NG --> ReplaceECU1[Replace the engine-ECU.]
    CheckSymptom1 -- OK --> CheckB54
    CheckB54 -- OK --> CheckSymptom2[Check trouble symptom.]
    CheckB54 -- NG --> CheckHarness[Check harness wire between engine-ECU and power steering fluid pressure switch connector.]
    CheckHarness -- NG --> Repair2[Repair]
    CheckHarness -- OK --> ReplaceECU2[Replace the engine-ECU.]
  
```

NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

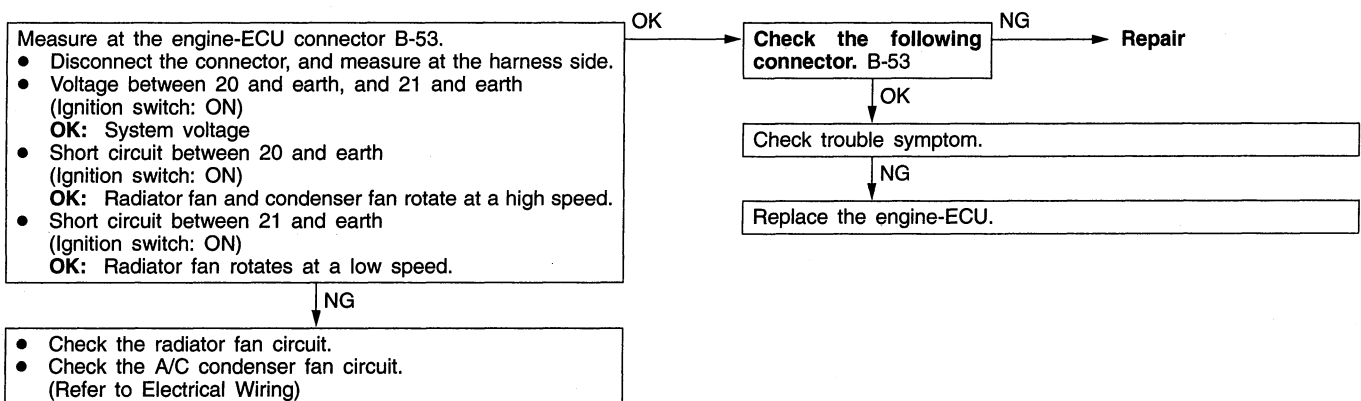
INSPECTION PROCEDURE 29

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.	• 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 30

Fan motor relay system (Radiator fan, A/C condenser fan)	Probable cause
The fan motor relay is controlled by the power transistor inside the engine-ECU turning ON and OFF.	• Malfunction of fan motor relay • Malfunction of fan motor • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of engine-ECU

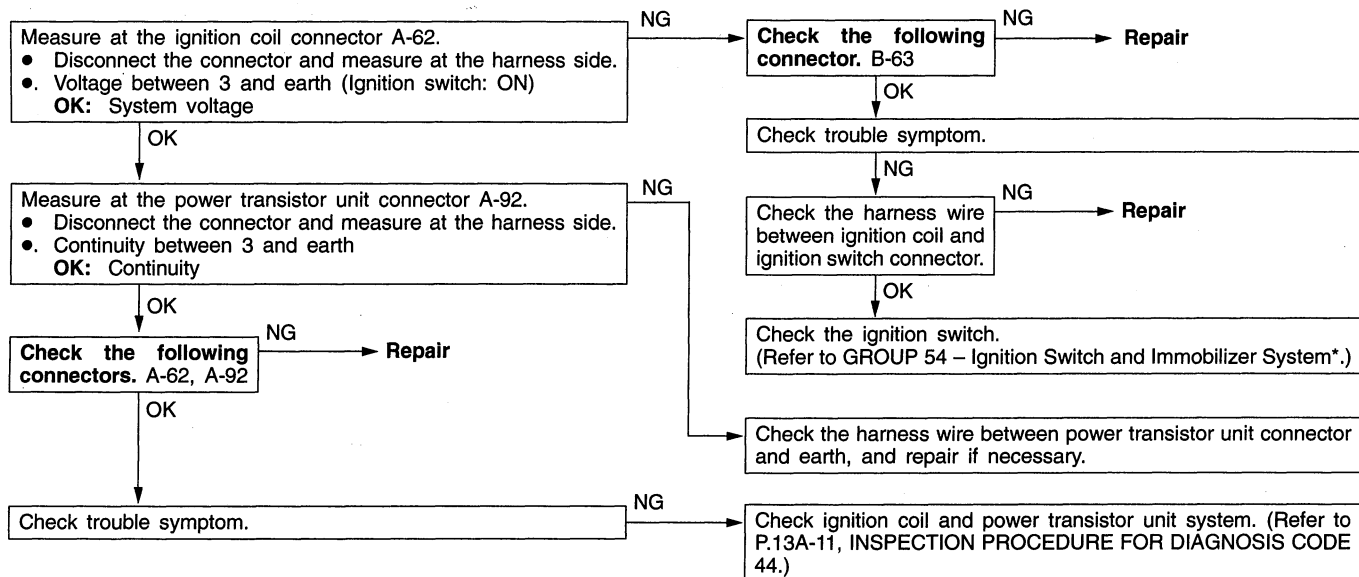


NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

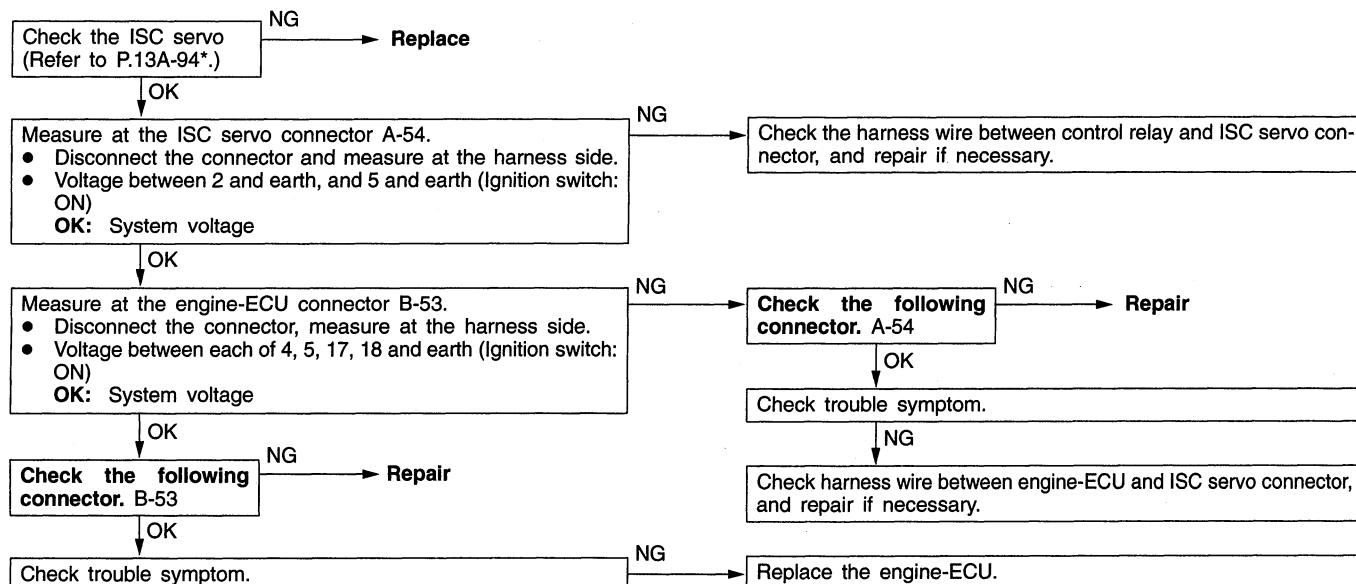
INSPECTION PROCEDURE 31

Ignition circuit system	Probable cause
The engine-ECU interrupts the ignition coil primary current by turning the power transistor inside the engine-ECU ON and OFF.	• Malfunction of ignition switch. • Malfunction of power transistor unit • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU



INSPECTION PROCEDURE 32

Idle speed control (ISC) servo (Stepper motor) system	Probable cause
The engine-ECU controls the intake air volume during idling by opening and closing the servo valve located in the bypass air passage.	• Malfunction of ISC servo • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU

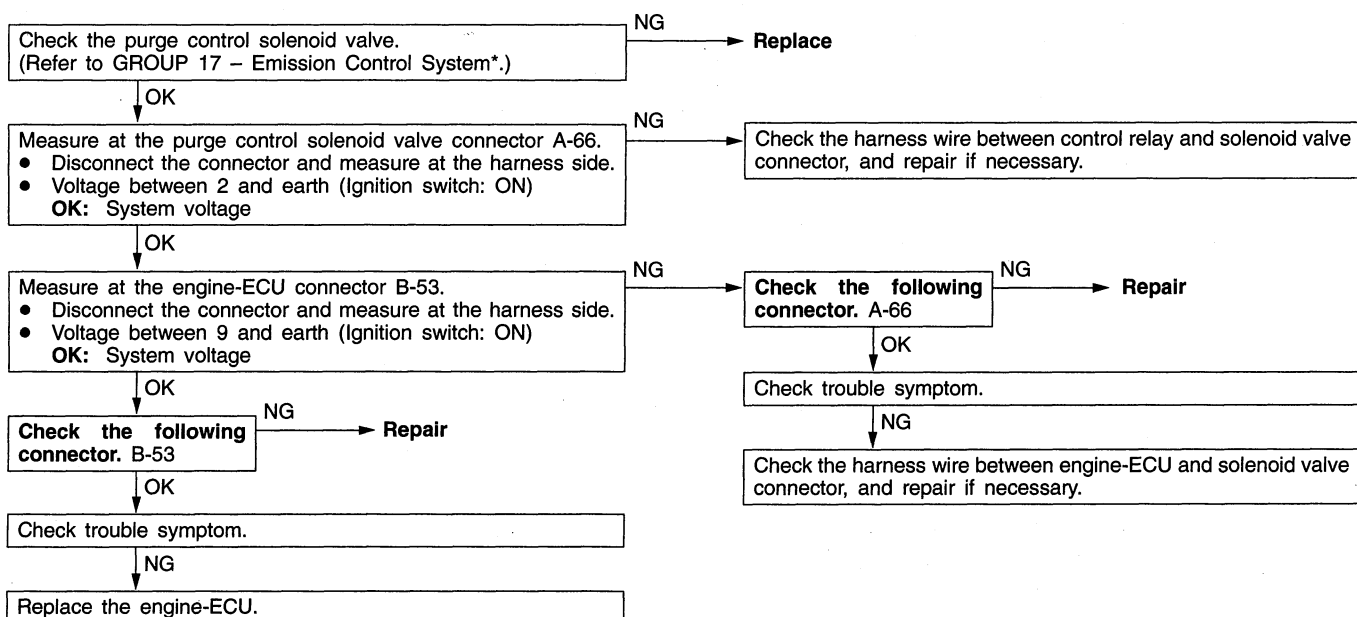


NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

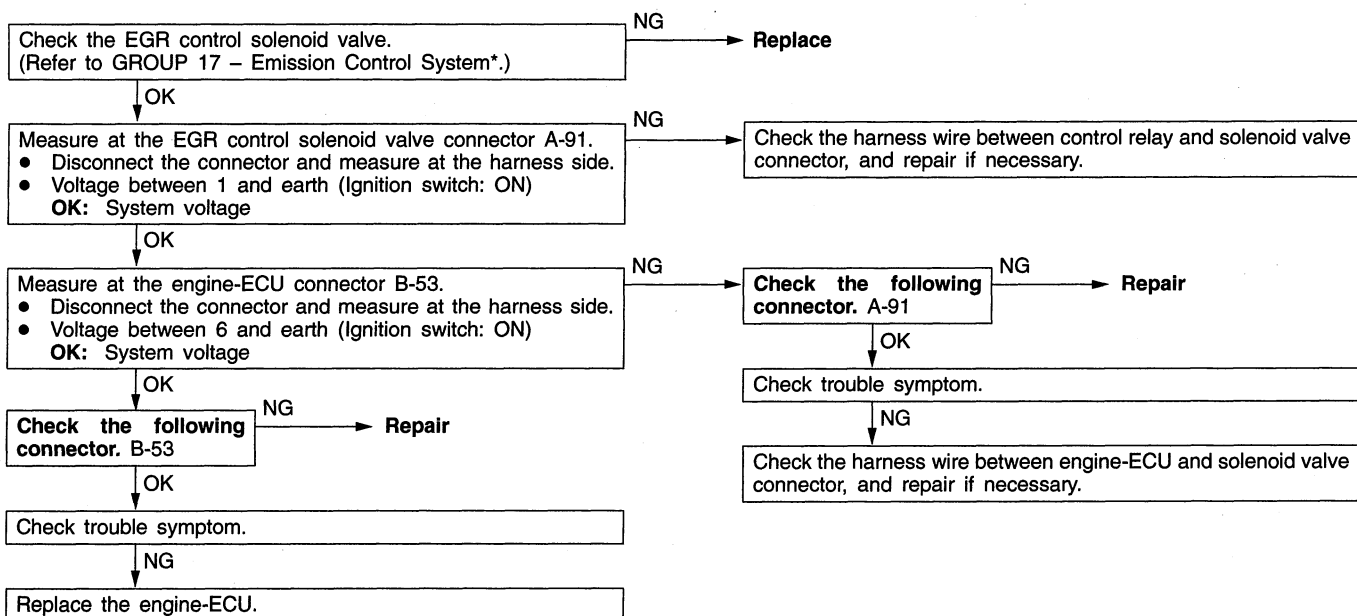
INSPECTION PROCEDURE 33

Purge control solenoid valve system	Probable cause
The purge control solenoid valve controls the purging of air from the canister located inside the intake manifold.	- Malfunction of solenoid valve - Improper connector contact, open circuit or short-circuited harness wire. - Malfunction of the engine-ECU



INSPECTION PROCEDURE 34

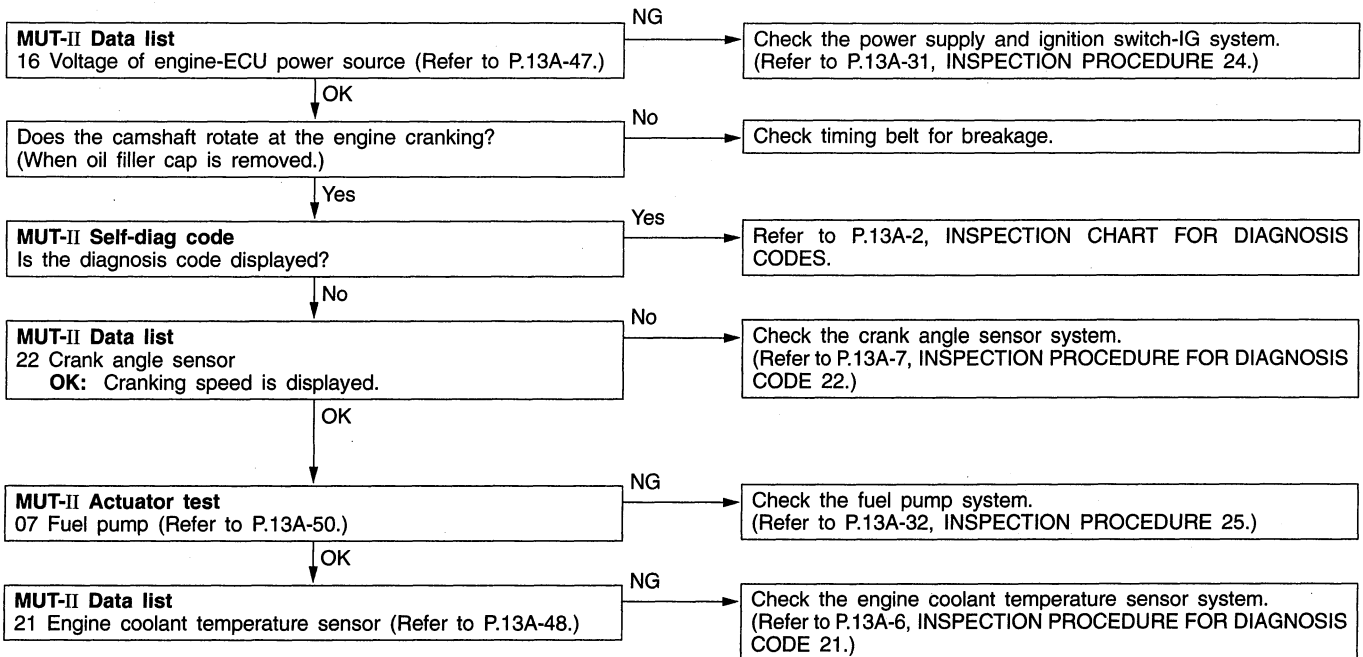
EGR control solenoid valve system	Probable cause
The EGR control solenoid valve is controlled by the negative pressure resulting from EGR operation leaking to port "A" of the throttle body.	- Malfunction of solenoid valve - Improper connector contact, open circuit or short-circuited harness wire. - Malfunction of the engine-ECU



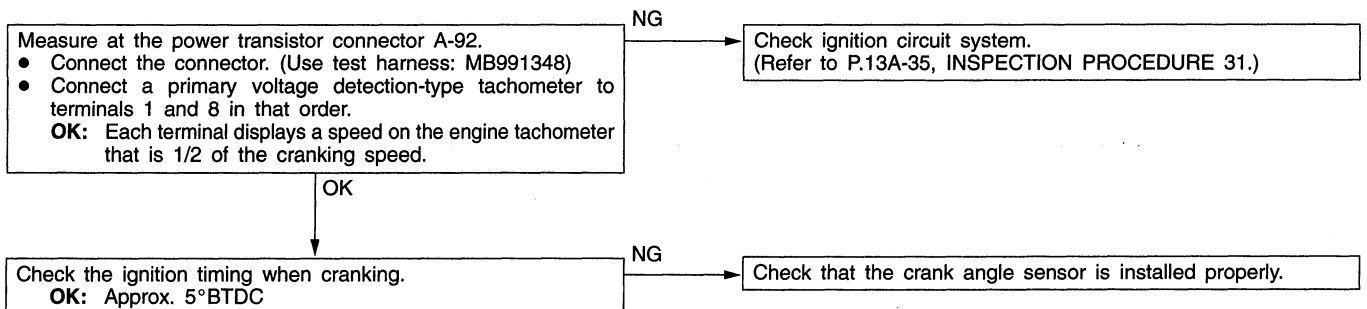
NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

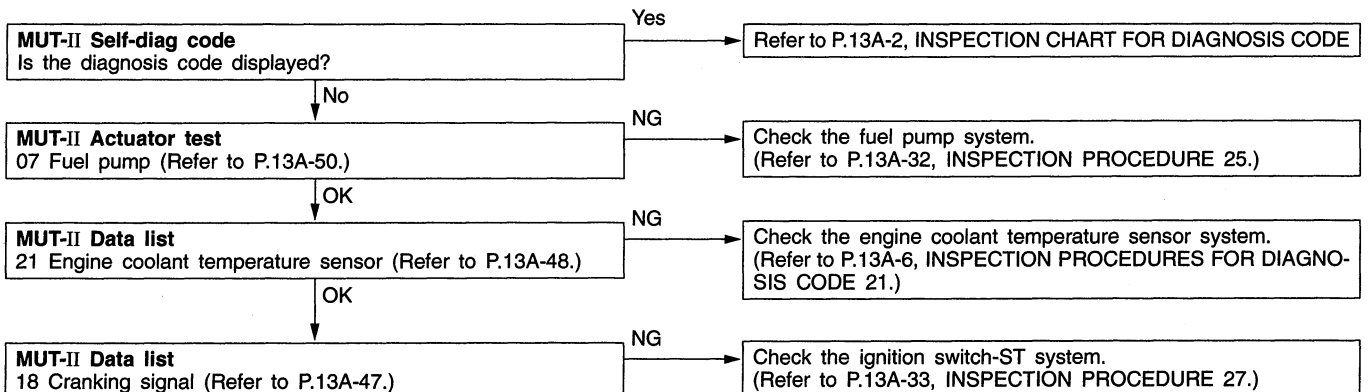
INSPECTION PROCEDURE 35

MUT-II: Check when no initial combustion occurs.

INSPECTION PROCEDURE 36

Ignition system: Check when no initial combustion occurs.

INSPECTION PROCEDURE 37

MUT-II: Check when uncomplete combustion occurs.

INSPECTION PROCEDURE 38

Check when hunting occurs.

Clean the throttle body. (Refer to P.13A-81*.)



Check and adjust the fixed SAS. (Refer to P.13A-83*.)



Check trouble symptom.



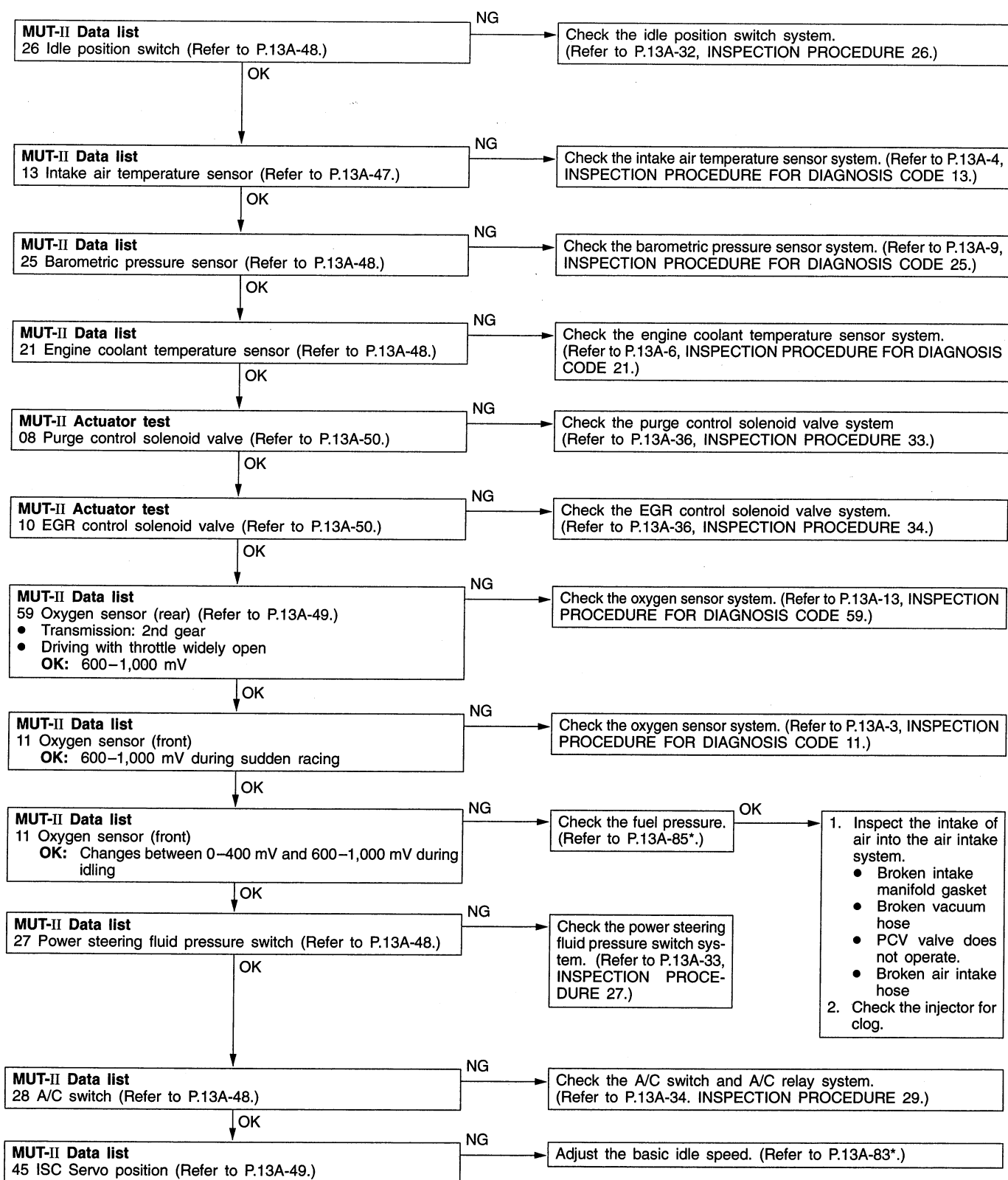
Inspect the intake of air into the air intake system

- Broken intake manifold gasket
- Broken air intake hose
- Broken vacuum hose
- Positive crankcase ventilation valve does not operate.

NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 39

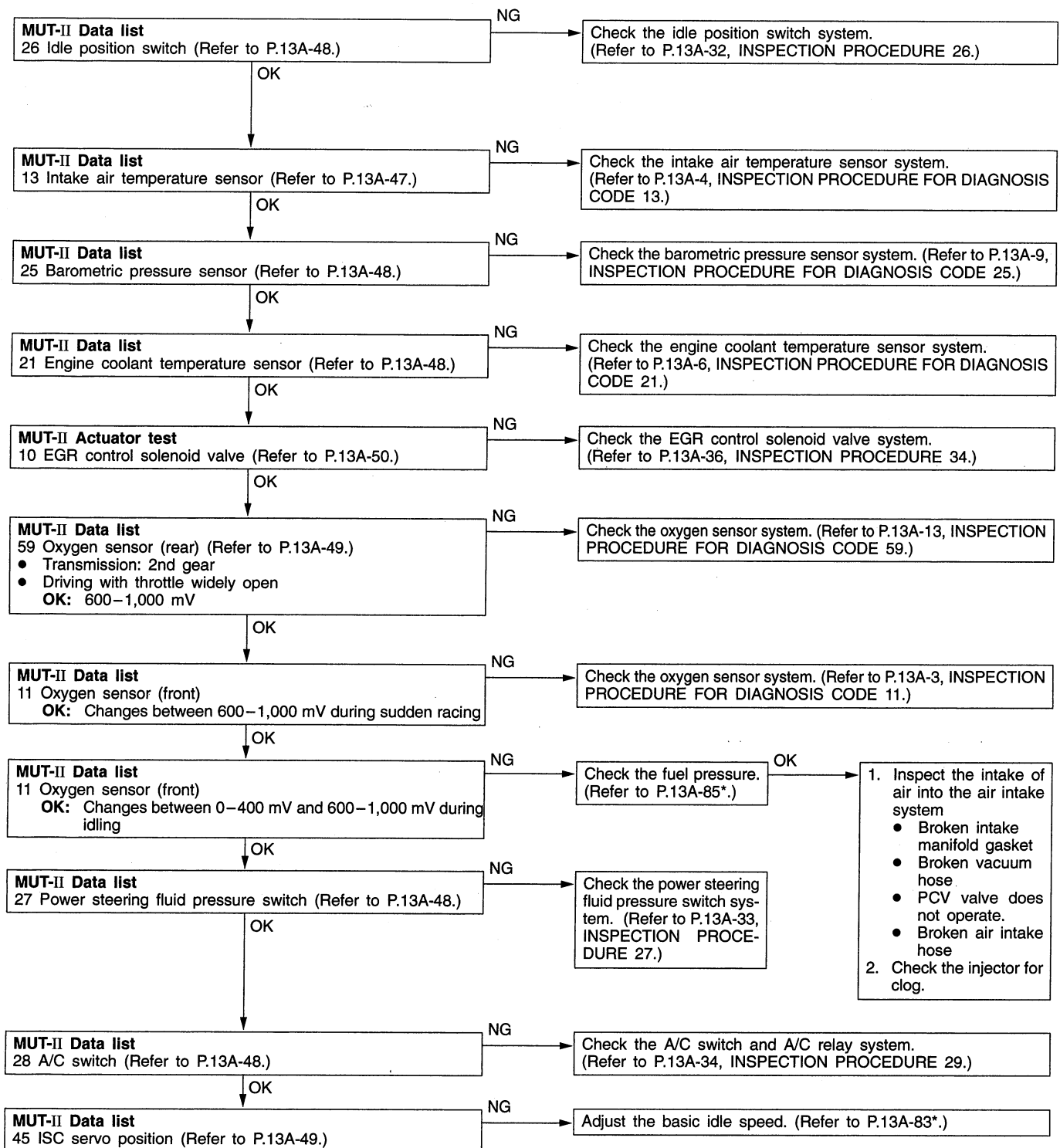
MUT-II: Check when idling speed is unstable.

NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 40

MUT-II: Check when engine stalls when the engine is warmed up and idling.

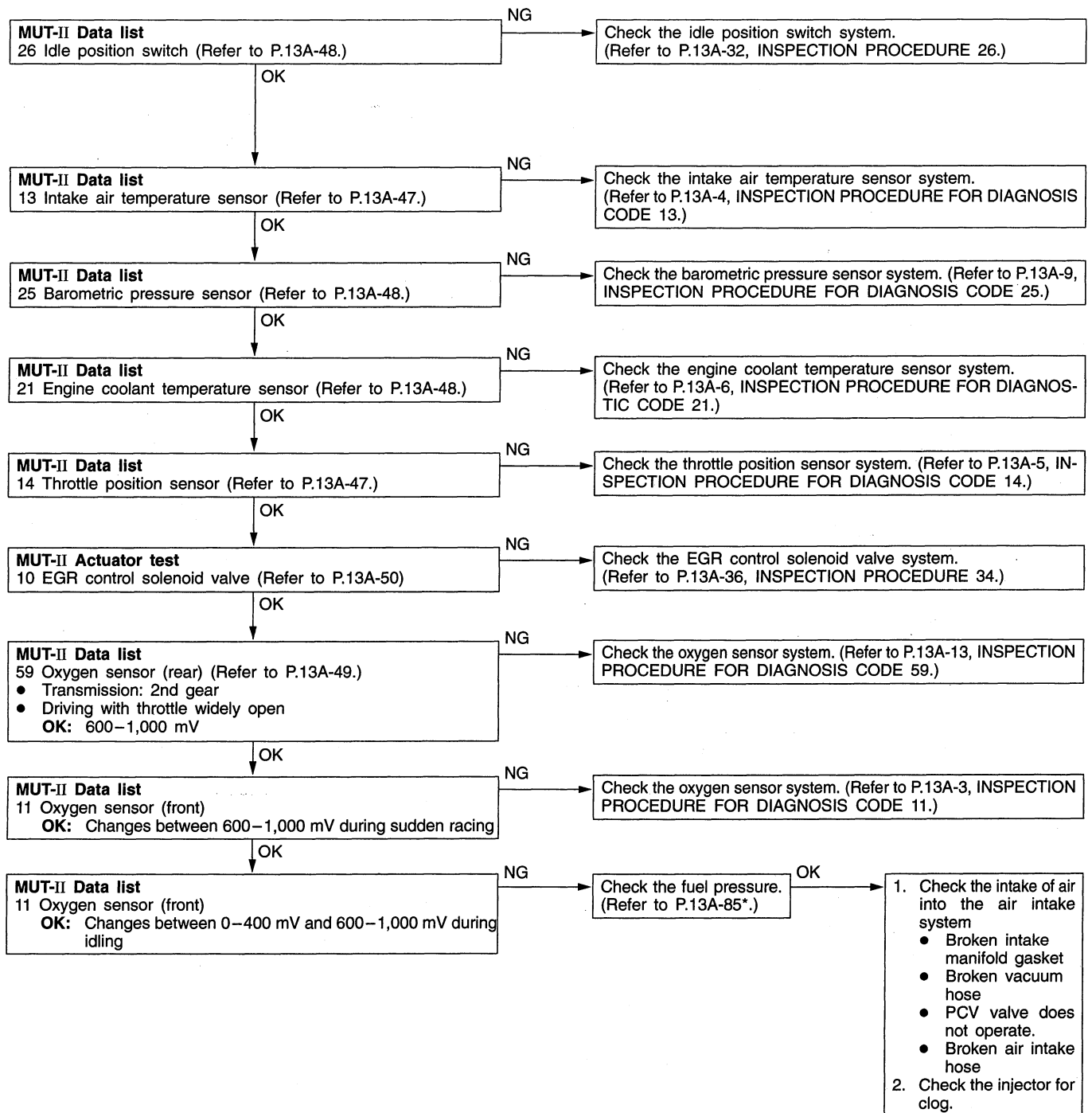


NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 41

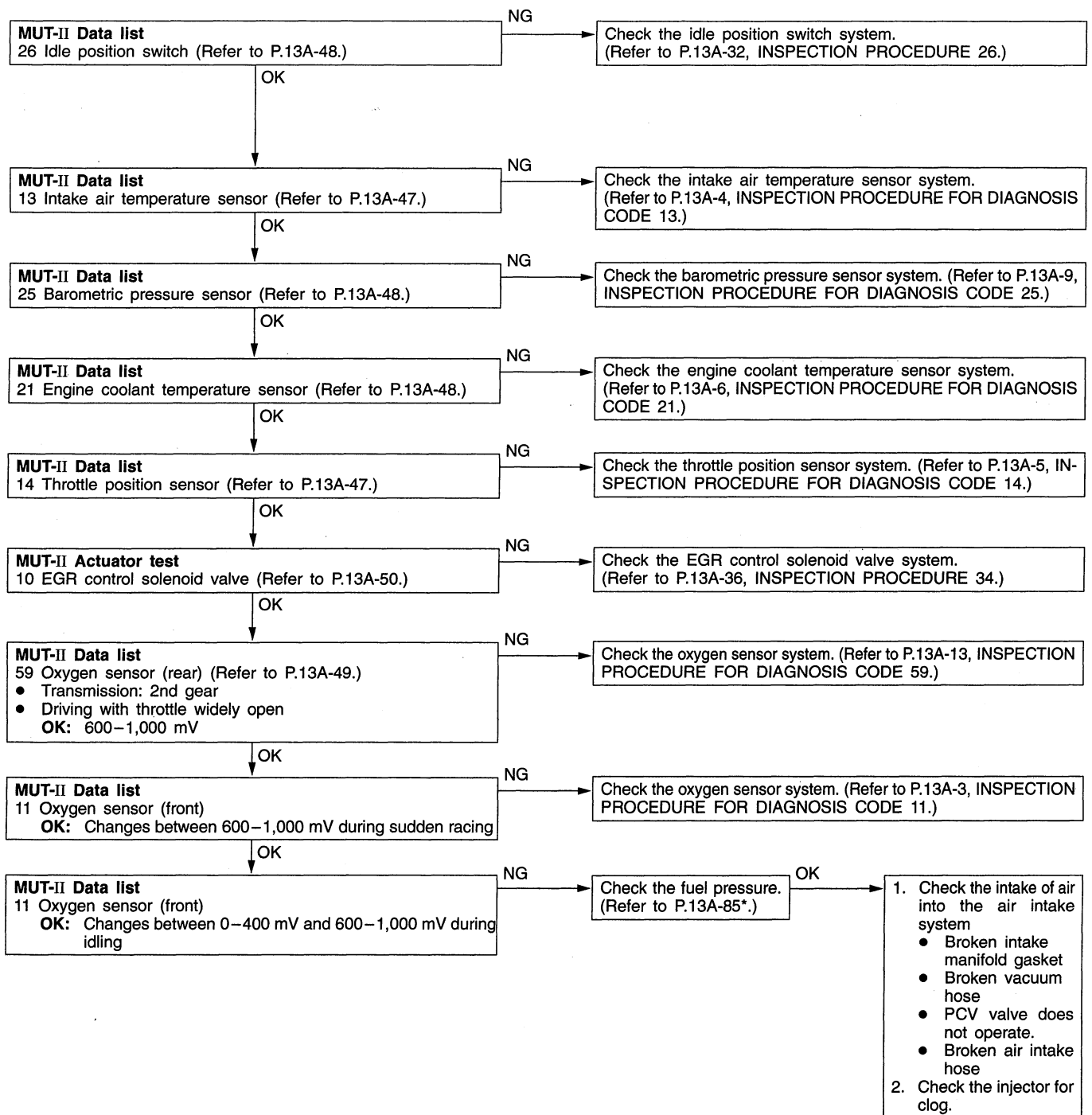
MUT-II: Check when hesitation, sag, stumble or poor acceleration occurs.



NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 42

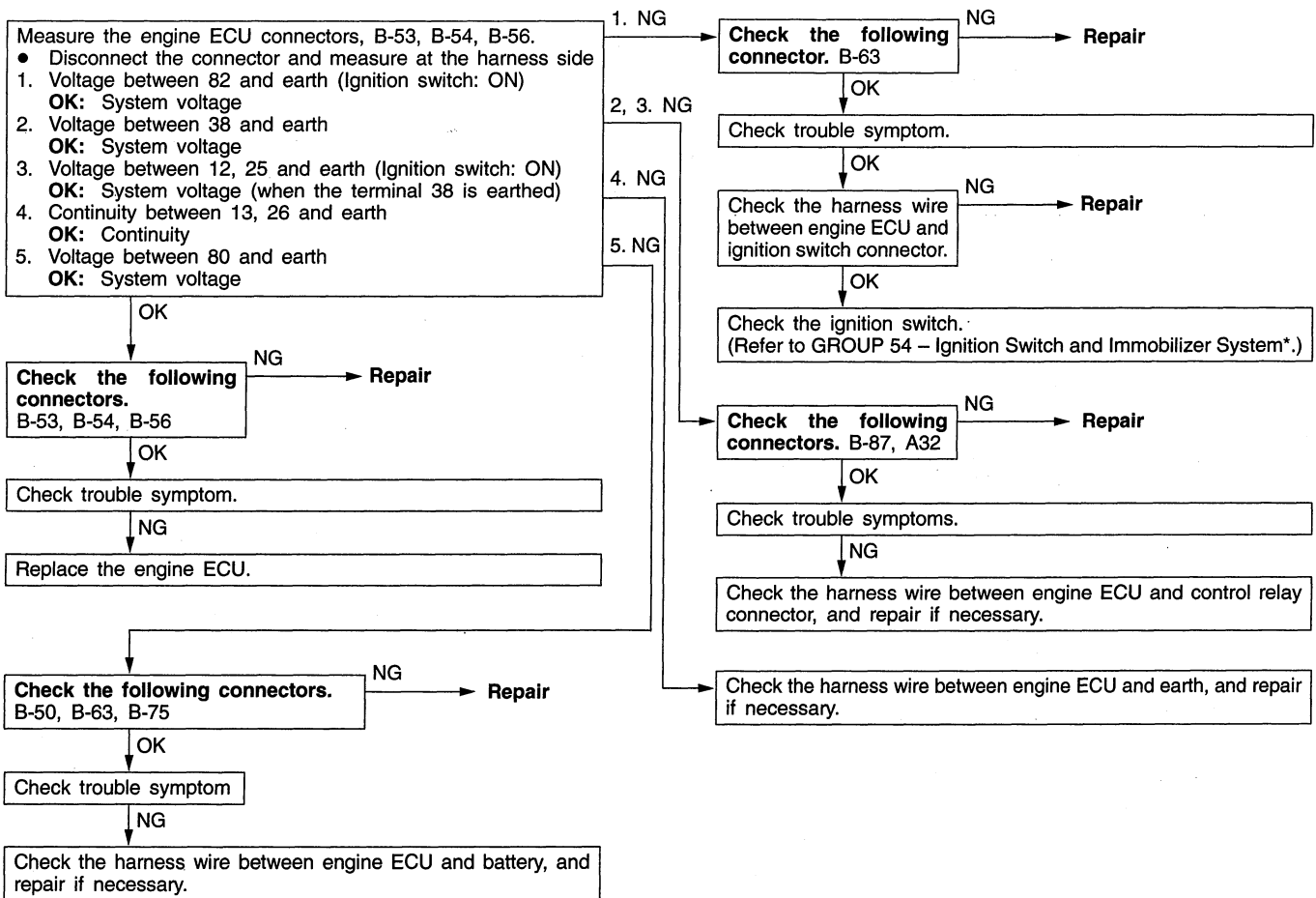
MUT-II Check when surge occurs.

NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

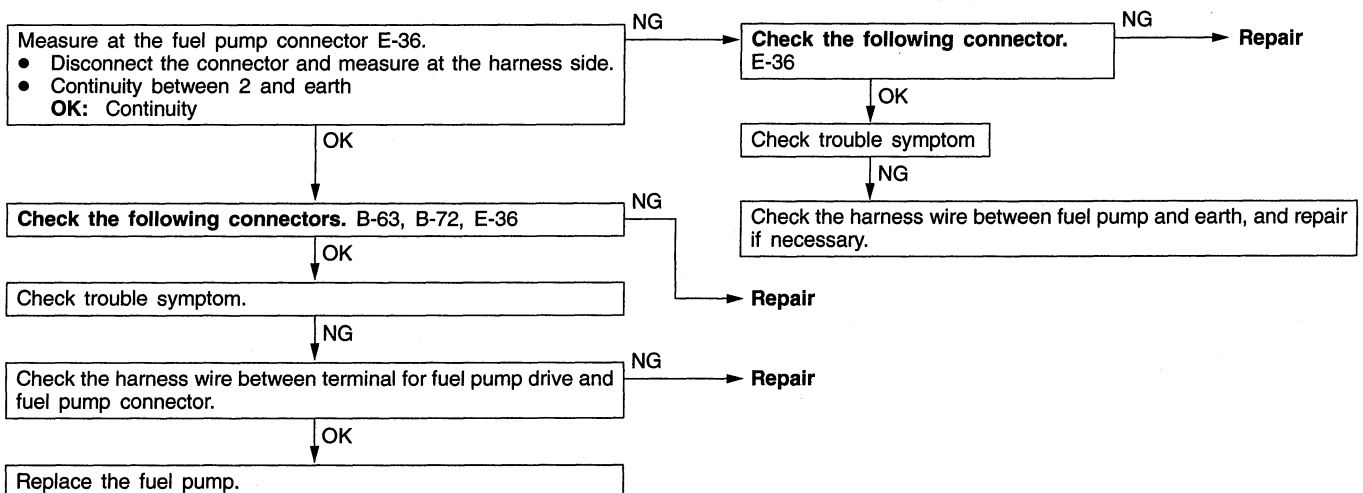
INSPECTION PROCEDURE 43

Check the engine ECU power supply and earth circuit.



INSPECTION PROCEDURE 44

Check the fuel pump circuit.

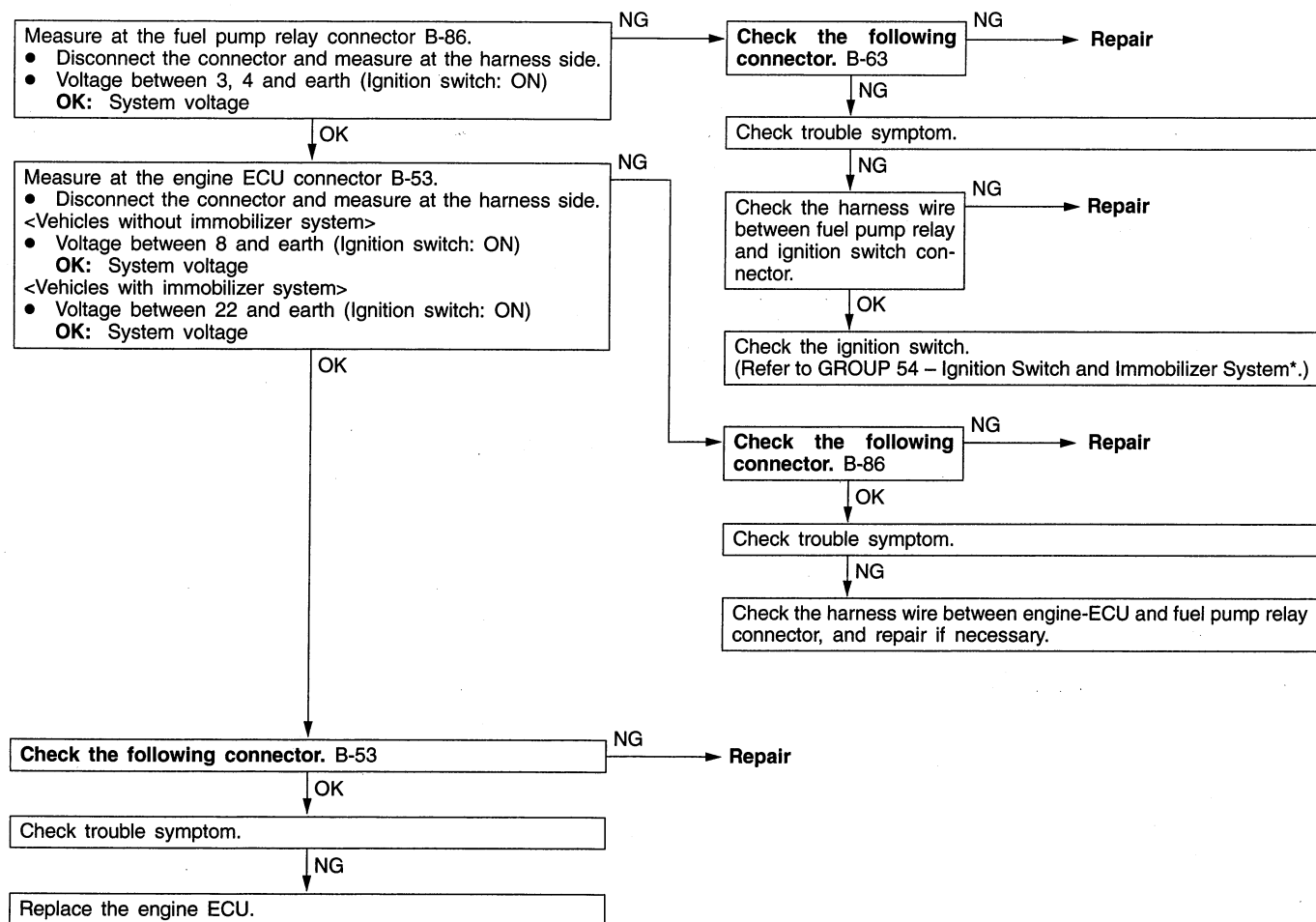


NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

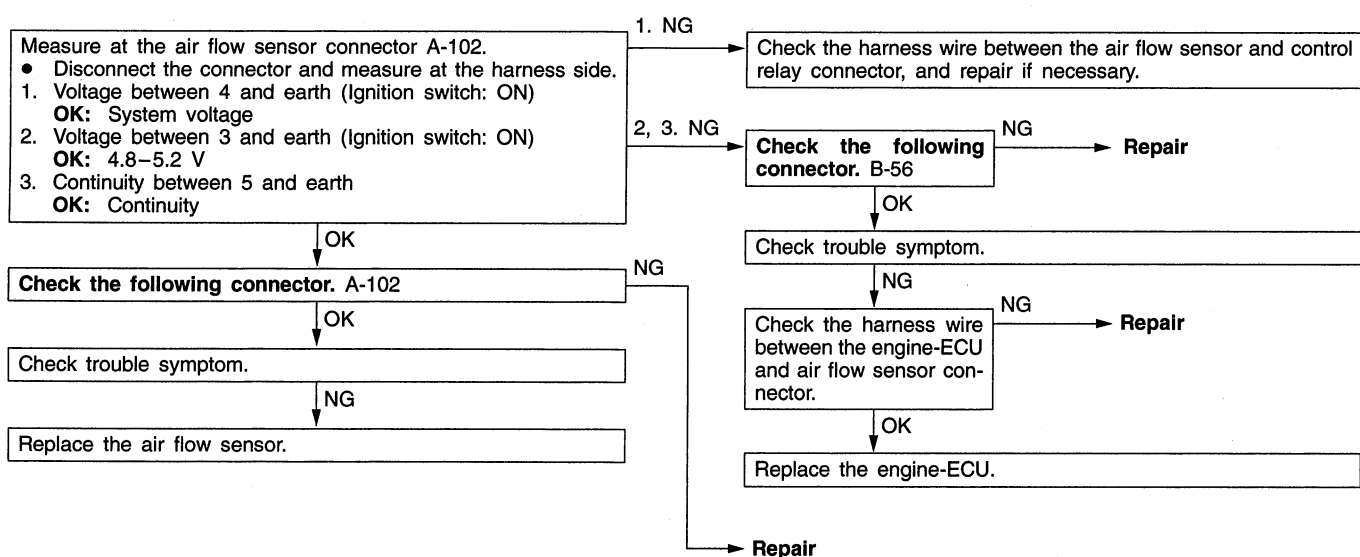
INSPECTION PROCEDURE 45

Check the fuel pump drive control circuit.



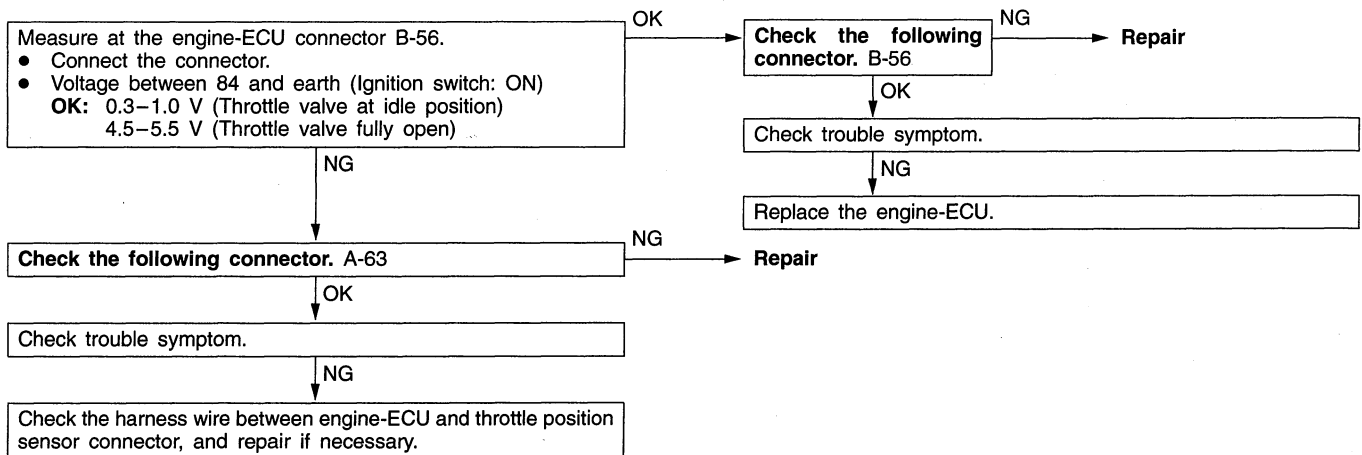
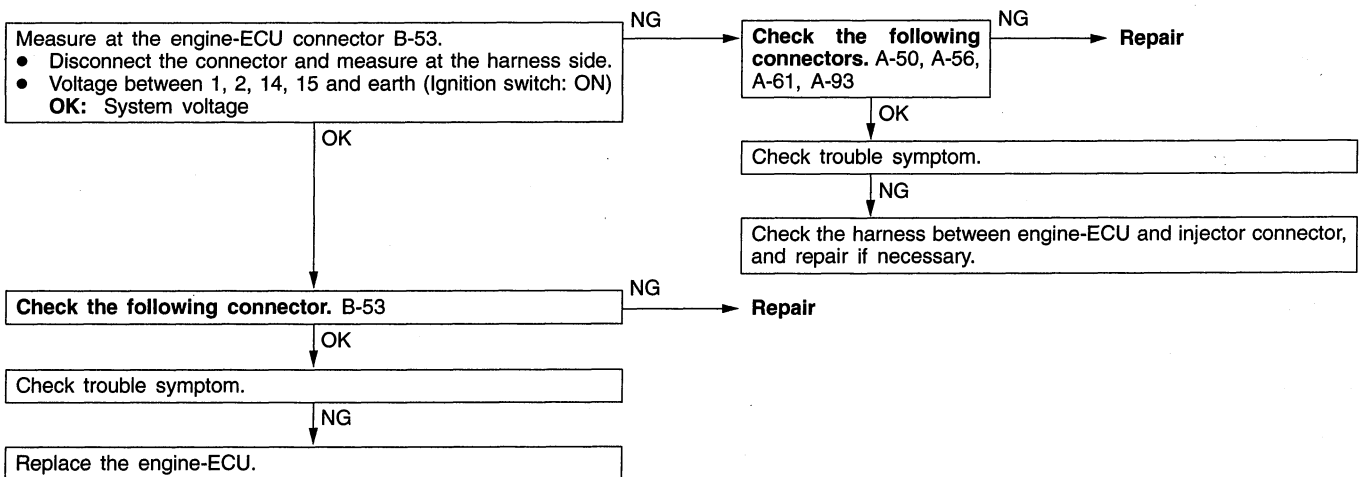
INSPECTION PROCEDURE 46

Check air flow sensor (AFS) control circuit.



NOTE

*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 47**Check throttle position sensor (TPS) output circuit.****INSPECTION PROCEDURE 48****Check injector control circuit**

Check the ignition signal circuit.



- *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 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.
- *3. In a new vehicle [driven approximately 500 km or less], the injector drive time is sometimes 10% longer than the standard time.
- *4. 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.
- *5. 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.

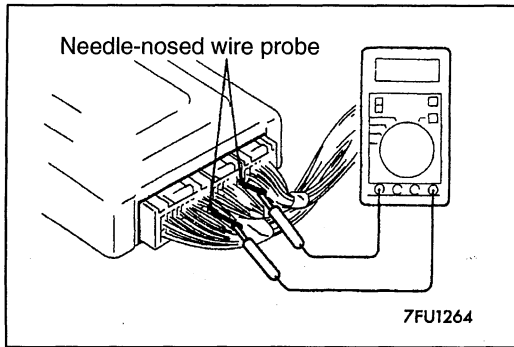
Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
11	Oxygen sensor (front)	Engine: After having warmed up Air/fuel mixture is made leaner when decelerating, and is made richer when racing.	When at 4,000 r/min, engine is suddenly decelerated	200 mV or less	Code No. 11	13A-3
			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)		
			2,500 r/min	600–1,000 mV		
12	Air flow sensor*1	- Engine coolant temperature: 80–95°C - Lamps and all accessories: OFF - Transmission: Neutral	Engine is idling	25–51 Hz	–	–
			2,500 r/min	49–89		
			Engine is raced	Frequency increases in response to racing		
13	Intake air temperature sensor	Ignition switch: ON or with engine running	When intake air temperature is –20°C	–20°C	Code No. 13	13A-4
			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. 14	13A-5
			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. 24	13A-31
18	Cranking signal (ignition switch-ST)	Ignition switch: ON	Engine: Stopped	OFF	Procedure No. 27	13A-33
			Engine: Cranking	ON		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
21	Engine coolant temperature sensor	Ignition switch: ON or with engine running	When engine coolant temperature is -20°C	-20°C	Code No. 21	13A-6
			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		
22	Crank angle sensor	- Engine: Cranking - Tachometer: Connected	Compare the engine speed readings on the tachometer and the MUT-II.	Accord	Code No. 22	13A-7
		- Engine: Idling - Idle position switch: ON	When engine coolant temperature is -20°C	1,300–1,500 rpm		
			When engine coolant temperature is 0°C	1,200–1,400 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	750–950 rpm		
25	Barometric pressure sensor	Ignition switch: ON	At altitude of 0 m	101 kPa	Code No. 25	13A-9
			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	Procedure No. 26	13A-32
			Throttle valve: Slightly open	OFF*5		
27	Power steering fluid pressure switch	Engine: Idling	Steering wheel stationary	OFF	Procedure No. 28	13A-33
			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. 29	13A-34
			A/C switch: ON	ON		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
41	Injectors *2	Engine: Cranking	When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously)	15–23 ms	–	–
			When engine coolant temperature is 20°C	32–47 ms		
			When engine coolant temperature is 80°C	7.4–11.0 ms		
	Injectors*3	- Engine coolant temperature: 80–95°C - Lamps and all accessories: OFF - Transmission: Neutral	Engine is idling	2.2–3.4 ms		
			2,500 r/min	1.7–2.9 ms		
			When engine is suddenly raced	Increases		
44	Ignition coils and power transistors	- Engine: After having warmed up - Timing lamp is set. (The timing lamp is set in order to check actual ignition timing.)	Engine is idling	0–13 °BTDC	–	–
			2,500 r/min	23–43 °BTDC		
45	ISC (stepper) motor position *4	- Engine coolant temperature: 80–95°C - Lamps and all accessories: OFF - Transmission: Neutral - 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		
49	A/C relay	Engine: After having warmed up/Engine is idling	A/C switch: OFF	OFF (Compressor clutch is not operating)	Procedure No. 29	13A-34
			A/C switch: ON	ON (Compressor clutch is operating)		
59	Oxygen sensor (rear)	- Transmission: 2nd gear - Drive with throttle widely open	3,500 r/min	600–1,000 mV	Code No. 59	13A-13

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. 41	13A-11
02		Cut fuel to No. 2 injector					
03		Cut fuel to No. 3 injector					
04		Cut fuel to No. 4 injector					
07	Fuel pump	Fuel pump operates and fuel is recirculated.	- 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. 25	13A-32
				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.	Procedure No. 33	13A-36
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.	Procedure No. 34	13A-36
20	Radiator fan (Hi) Condenser fan (Hi)	Drive the fan motors (radiator and condenser).	Ignition switch: ON A/C switch: ON		Fan motor operates at high speed	Procedure No. 30	13A-34
21	Radiator fan (Lo)	Drive the radiator fan motor	Ignition switch: ON A/C switch: ON		Fan motor operates at low speed.	Procedure No. 30	13A-34

**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 connector terminals from the wire side, and measure the voltage while referring to the check chart.

NOTE

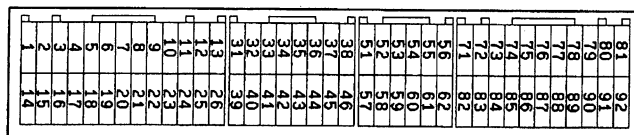
1. Make the voltage measurement with the engine ECU connectors connected.
2. You may find it convenient to pull out the engine ECU to make it easier to reach the connector terminals.
3. The checks can be carried out off the order given in the chart.

Caution

Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine ECU 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 Connector Terminal Arrangement



9FU0393

NOTE

*: Vehicles with immobilizer system

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
14	No. 2 injector		
2	No. 3 injector		
15	No. 4 injector		
4	Stepper motor coil <A1>	Engine: Soon after the warmed up engine is started	System voltage ↔ 0 V (Changes repeatedly)
17	Stepper motor coil <A2>		
5	Stepper motor coil <B1>		
18	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 or 22*	Fuel pump relay	Ignition switch: ON	System voltage
		Engine: Idle speed	0–3V
9	Purge control solenoid valve	Ignition switch: ON	System voltage
		Running at 3,000r/min while engine is warming up after having been started.	0–3V
10	Power transistor unit A	Engine r/min: 3,000 r/min	0.3–3.0V
23	Power transistor unit B		
12	Power supply	Ignition switch: ON	System voltage
25			
19	Air flow sensor reset signal	Engine: Idle speed	0–1V
		Engine r/min: 3,000 r/min	6–9V

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
20	Fan motor relay (High)	Radiator fan is not running (engine coolant temperature is 90°C or less)		System Voltage
		Radiator fan is running at high speed (engine coolant temperature is 105°C or more)		0–3V
21	Fan motor relay (Low)	Radiator fan is not running (engine coolant temperature is 90°C or less)		System Voltage
		Radiator fan is running at low speed (engine coolant temperature is 90–105°C or more)		0–3V
22 or 8*	A/C relay	- Engine: Idle speed - A/C switch: OFF → ON (A/C compressor is running)		System voltage or momentarily 6V or more → 0–3V
33	Alternator G terminal	- Engine: Warm, idle (radiator fan: OFF) - Headlamp: OFF to ON - Rear defogger switch: OFF to ON - Brake lamp: ON		Rises by 0.2–3.5V
41	Alternator FR terminal	- Engine: Warm, idle (radiator fan: OFF) - Headlamp: OFF to ON - Rear defogger switch: OFF to ON - Brake lamp: ON		Drops by 0.2–3.5V
36	Engine warning lamp	Ignition switch: OFF → ON		0–3V → 9–13V (After several seconds have elapsed)
37	Power steering fluid pressure switch	Engine: Idling after warming up	When steering wheel is stationary	System voltage
			When steering wheel is turned	0–3V
38	Control relay (Power supply)	Ignition switch: OFF		System voltage
		Ignition switch: ON		0–3V
45	A/C switch	Engine: Idle speed	Turn the A/C switch OFF	0–3V
			Turn the A/C switch ON (A/C compressor is operating)	System voltage
52	Ignition timing adjustment terminal	Ignition switch: ON	Earth the ignition timing adjustment terminal	0–1V
			Remove the earth connection from the ignition timing adjustment terminal	4.0–5.5V
58	Engine ignition signal	Engine r/min: 3,000 r/min		0.3–3.0V
60	Oxygen sensor heater	Engine: Idling after warming up		0–3V
		Engine r/min: 5,000 r/min.		System voltage

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
71	Ignition switch – ST	Engine: Cranking		8V or more
72	Intake air temperature sensor	Ignition switch: ON	When intake air temperature is 0°C	3.2–3.8V
			When intake air temperature is 20°C	2.3–2.9V
			When intake air temperature is 40°C	1.5–2.1V
			When intake air temperature is 80°C	0.4–1.0V
75	Oxygen sensor (rear)	• 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		0.6–1.0V
76	Oxygen sensor (front)	Engine: Running at 2,500 r/min after warmed up (Check using a digital type voltmeter)		0 ↔ 0.8V (Changes repeatedly)
80	Backup power supply	Ignition switch: OFF		System voltage
81	Sensor impressed voltage	Ignition switch: ON		4.5–5.5V
82	Ignition switch – IG	Ignition switch: ON		System voltage
83	Engine coolant temperature sensor	Ignition switch: ON	When engine coolant temperature is 0°C	3.2–3.8V
			When engine coolant temperature is 20°C	2.3–2.9V
			When engine coolant temperature is 40°C	1.3–1.9V
			When engine coolant temperature is 80°C	0.3–0.9V
84	Throttle position sensor	Ignition switch: ON	Set throttle valve to idle position	0.3–1.0V
			Fully open throttle valve	4.5–5.5V
85	Barometric pressure sensor	Ignition switch: ON	When altitude is 0m	3.7–4.3V
			When altitude is 1,200m	3.2–3.8V
86	Vehicle speed sensor	• Ignition switch: ON • Move the vehicle slowly forward		0 ↔ 5V (Changes repeatedly)
87	Idle position switch	Ignition switch: ON	Set throttle valve to idle position	0–1V
			Slightly open throttle valve	4V or more

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
88	Camshaft position sensor	Engine: Cranking	0.4–3.0V
		Engine: Idle speed	0.5–2.0V
89	Crank angle sensor	Engine: Cranking	0.4–4.0V
		Engine: Idle speed	1.5–2.5V
90	Air flow sensor	Engine: Idle speed	2.2–3.2V
		Engine r/min: 2,500 r/min	

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.

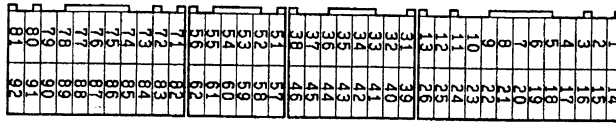
Caution

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!

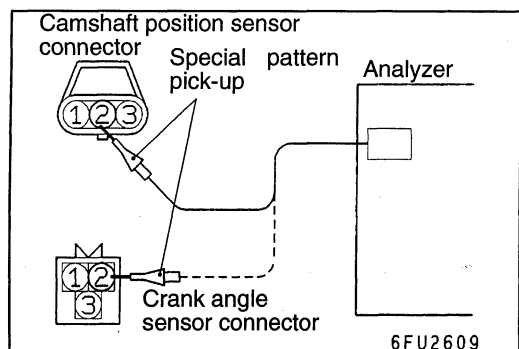
4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and then repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

Engine-ECU Harness Side Connector Terminal Arrangement



9FU0392

Terminal No.	Inspection item	Normal condition (Check condition)
1-12	No. 1 injector	13-16 Ω (At 20°C)
14-12	No. 2 injector	
2-12	No. 3 injector	
15-12	No. 4 injector	
4-12	Stepper motor coil (A1)	28-33 Ω (At 20°C)
17-12	Stepper motor coil (A2)	
5-12	Stepper motor coil (B1)	
18-12	Stepper motor coil (B2)	
6-12	EGR control solenoid valve	36-44 Ω (At 20°C)
9-12	Purge control solenoid valve	36-44 Ω (At 20°C)
13-Body earth	Engine-ECU earth	Continuity (0 Ω)
26-Body earth	Engine-ECU earth	
60-12	Oxygen sensor heater	7-40 Ω (At 20°C)
72-92	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)
83-92	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)
87-92	Idle position switch	Continuity (when throttle valve is at idle position)
		No continuity (when throttle valve is slightly open)



INSPECTION PROCEDURE USING AN ANALYZER CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR

Measurement Method

1. Disconnect the camshaft position sensor connector and connect the special tool (test harness: MB991223) and jumper wire in between. (All terminals should be connected.)
2. Connect the analyzer special pattern pickup to camshaft position sensor terminal 2.
3. Disconnect the crank angle sensor connector and connect the special tool (test harness: MD998478) in between.
4. Connect the analyzer special pattern pickup to crank angle sensor terminal 2.

Alternate Method (Test harness not available)

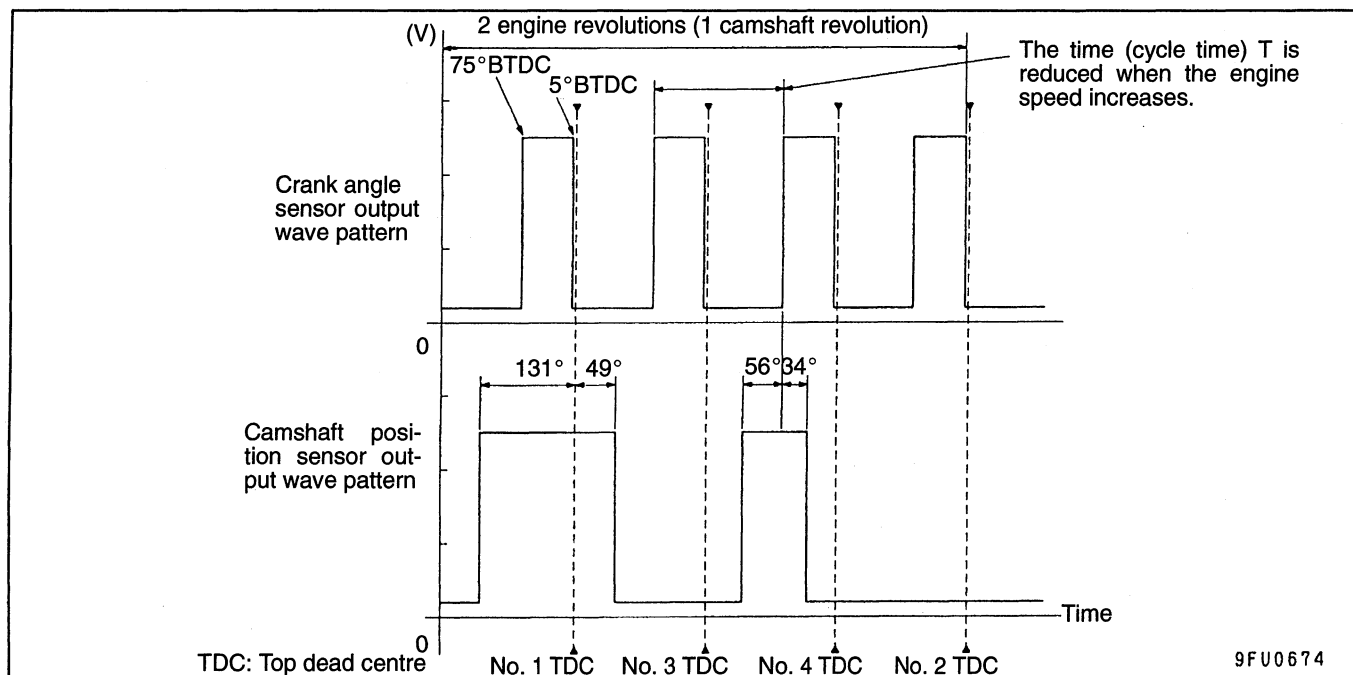
1. Connect the analyzer special pattern pickup to engine-ECU terminal 88. (When checking the camshaft position sensor signal wave pattern.)
2. Connect the analyzer special pattern pickup to engine-ECU terminal 89. (When checking the crank angle sensor signal wave pattern.)

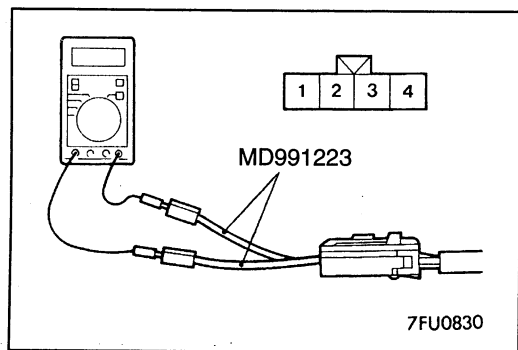
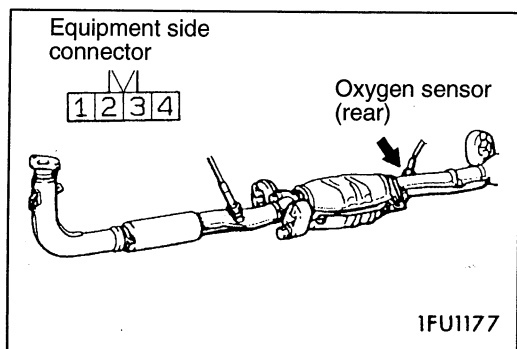
Standard Wave Pattern

Observation conditions

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine r/min	Idle speed

Standard wave pattern





ON-VEHICLE SERVICE

OXYGEN SENSOR CHECK

<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 ($7-40\ \Omega$ 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.