FUEL

CONTENTS

NOTE
THE GROUPS MARKED BY ▒ ARE NOT IN THIS MANUAL

MULTIPOINT FUEL INJECTION (MPI)

CONTENTS

GENERAL

OUTLINE OF CHANGES

- The 6B model specification has been added as one of the 4G92 engines.
- The distributorless low-voltage distribution method has been used for the SOHC engine.
- The crank angle sensor, which detects the crank angle directly from the crankshaft, has been used for the SOHC engine.
- A new stick-type camshaft position sensor has been used.
- The ignition timing adjustment connector has been abolished.

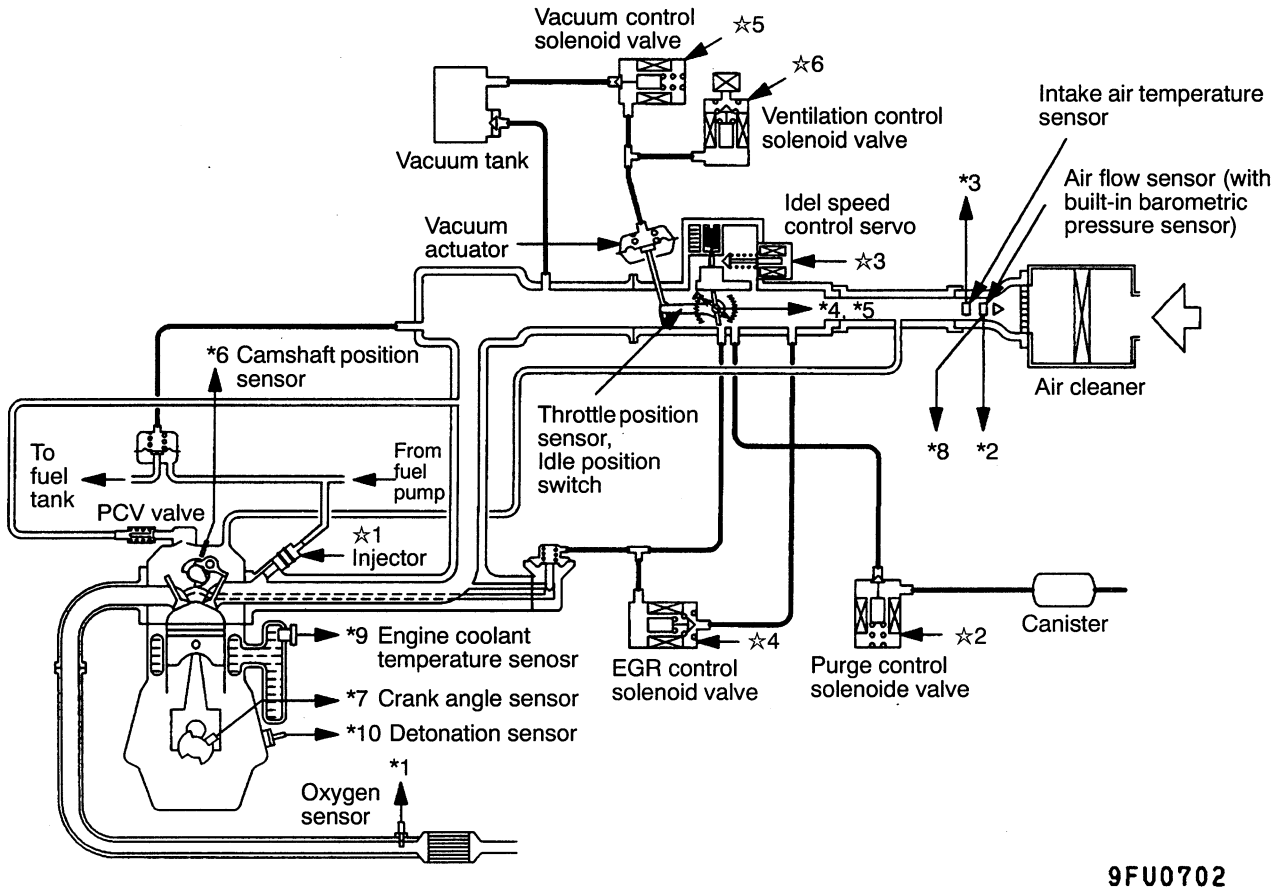
GENERAL INFORMATION

Items		Specifications
Engine-ECU	Identification model No.	E2T63285 <4G92> E2T63284 <4G92 (6B models)> E2T63286 <4G93-SOHC (Vehicles without TCL)> E2T63287 <4G93-SOHC (Vehicles with TCL)> E2T63288 <4G93-DOHC>

MULTI POINT FUEL INJECTION SYSTEM DIAGRAM

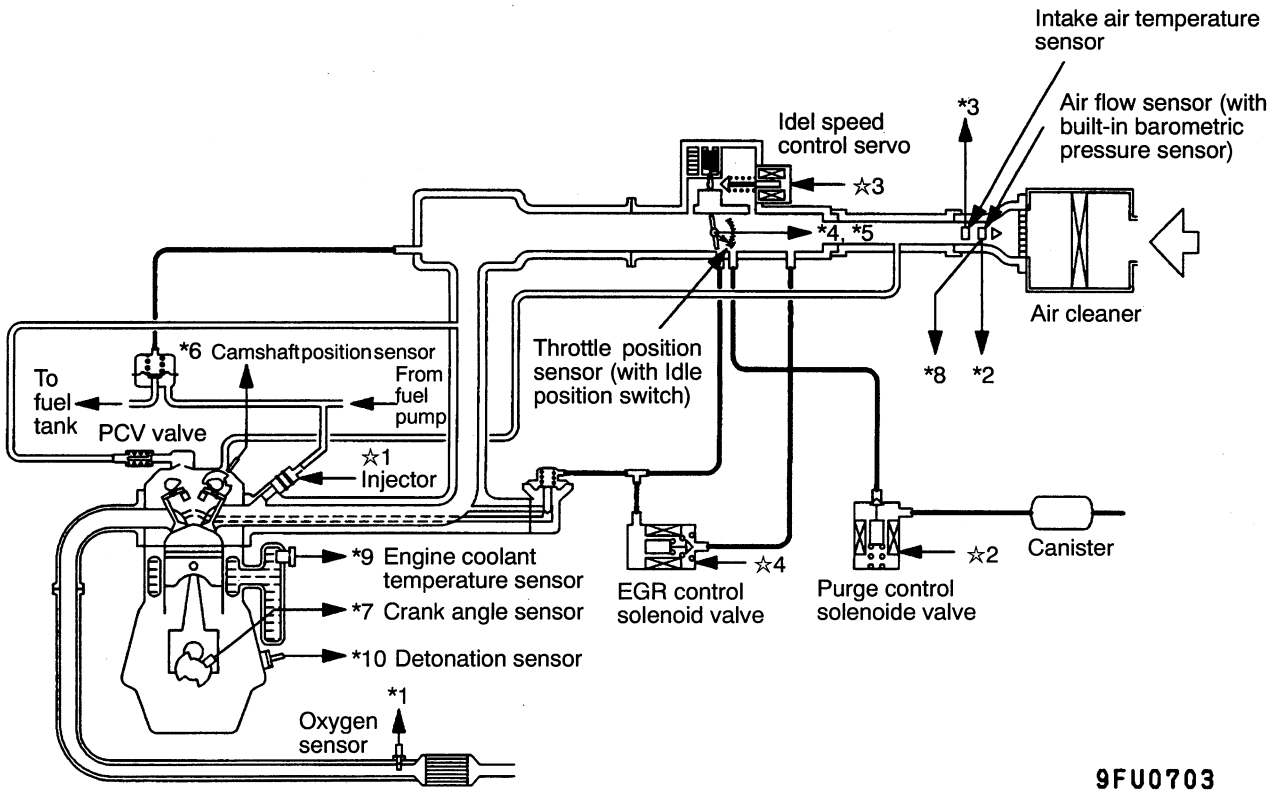
<4G92, 4G93-SOHC>

*1 Oxygen sensor *2 Air flow sensor *3 Intake air temperature sensor *4 Throttle position sensor *5 Idle position switch *6 Camshaft position sensor *7 Crank angle sensor *8 Barometric pressure sensor *9 Engine coolant temperature sensor *10 Detonation sensor	• Power supply • Vehicle speed sensor • A/C switch • Inhibitor switch • Power steering fluid pressure switch • Ignition switch-ST • Ignition switch-IG • A/T-ECU • TCL-ECU <Vehicles with TCL>	⇨	Engine-ECU	⇨	☆1 Injector ☆2 Purge control solenoid valve ☆3 Idle speed control servo ☆4 EGR control solenoid valve ☆5 Vacuum control solenoid valve <Vehicles with TCL> ☆6 Ventilation control solenoid valve <Vehicles with TCL>	• Control relay • Fuel pump relay • A/C power relay • Engine warning lamp • Diagnosis signal • Ignition coil • A/T-ECU • TCL-ECU <Vehicles with TCL>



<4G93-DOHC>

*1 Oxygen sensor *2 Air flow sensor *3 Intake air temperature sensor *4 Throttle position sensor *5 Idle position switch *6 Camshaft position sensor *7 Crank angle sensor *8 Barometric pressure sensor *9 Engine coolant temperature sensor *10 Detonation sensor	• Power supply • Vehicle speed sensor • A/C switch • Inhibitor switch • Power steering fluid pressure switch • Ignition switch-ST • Ignition switch-IG	⇨	Engine-ECU	⇨	☆1 Injector ☆2 Purge control solenoid valve ☆3 Idle speed control servo ☆4 EGR control solenoid valve • Control relay • Fuel pump relay • A/C power relay • Engine warning lamp • Diagnosis signal • Ignition coil



SERVICE SPECIFICATIONS

Items	4G92 (6B models)
Basic idle speed r/min	800 ± 50

TROUBLESHOOTING

DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

The ignition timing adjustment signal has been abolished from the previous check items. In addition, the following check items have been added for the SOHC engine. The other items are the same as before.

Camshaft position sensor
Ignition coil, powr transistor

FAIL-SAFE FUNCTION REFERENCE TABLE

The following malfunctions have been added for the SOHC engine. In addition, the top dead centre sensor has been abolished to correspond to the use of the camshaft position sensor. The other items are the same as before.

Malfunctioning	Control contents during malfucntion
Camshaft position sensor	Cuts off the fuel supply 4 seconds after a problem is detected. (However, after the ignition switch is turned to ON, the No.1 cylinder top dead centre is not detected at all.)
Ignition coil, power transistor	Cuts off the fuel supply to cylinders with an abnormal igniton.

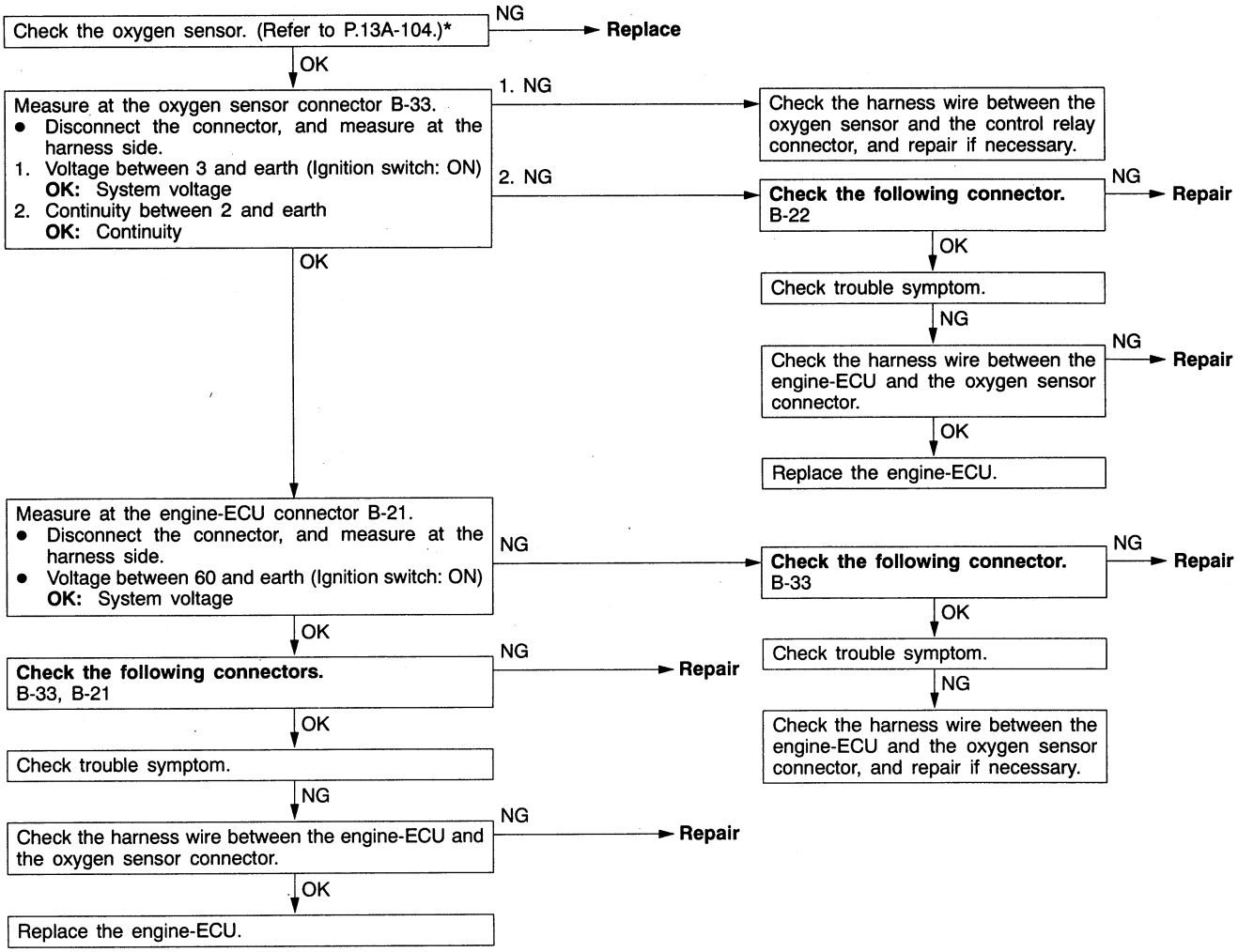
INSPECTION CHART FOR DIAGNOSIS CODES

Code No.	Diagnosis item	Reference page
11	Oxygen sensor system	13A-8
12	Air flow sensor system	13A-9
13	Intake air temperature sensor system	13A-9
14	Throttle position sensor system	13A-10
21	Engine coolant temerature sensor system	13A-11
22	Crank angle sensor system	13A-12
23	Camshaft position sensor system	13A-13
24	Vehicle speed sensor system	13A-14
25	Barometric pressure sensor system	13A-15
31	Detonation sensor system	13A-16
41	Injector system	13A-16
44	Ignition coil and power trnasistor unit system	13A-17
54*	Immobilizer system	GROUP 54 – Ignition key and Immobilizer
61	Communication wire with A/T-ECU system <A/T>	13A-18
71	Vacuum control solenoid valve system <Vehciles with TCL>	13A-19
72	Ventilation control solenoid valve system <Vehicles with TCL>	13A-20

NOTE
*: Refer to GROUP 54 – Ignition key and Immobilizer-Troubleshooting.

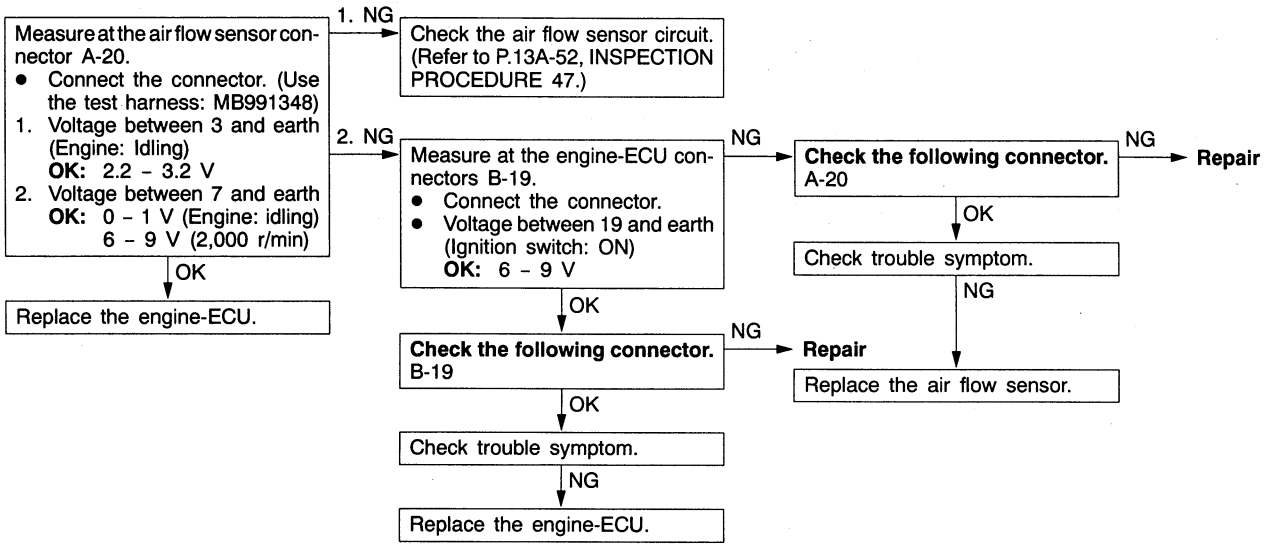
INSPECTION PROCEDURE FOR DIAGNOSIS CODES

Code No. 11 Oxygen sensor 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

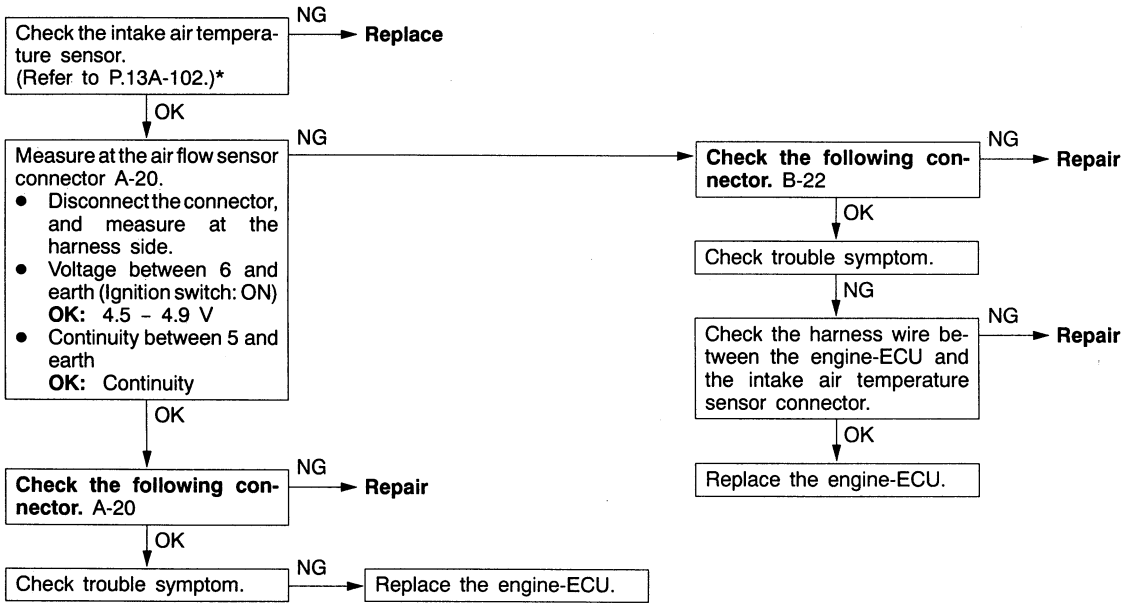


*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

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

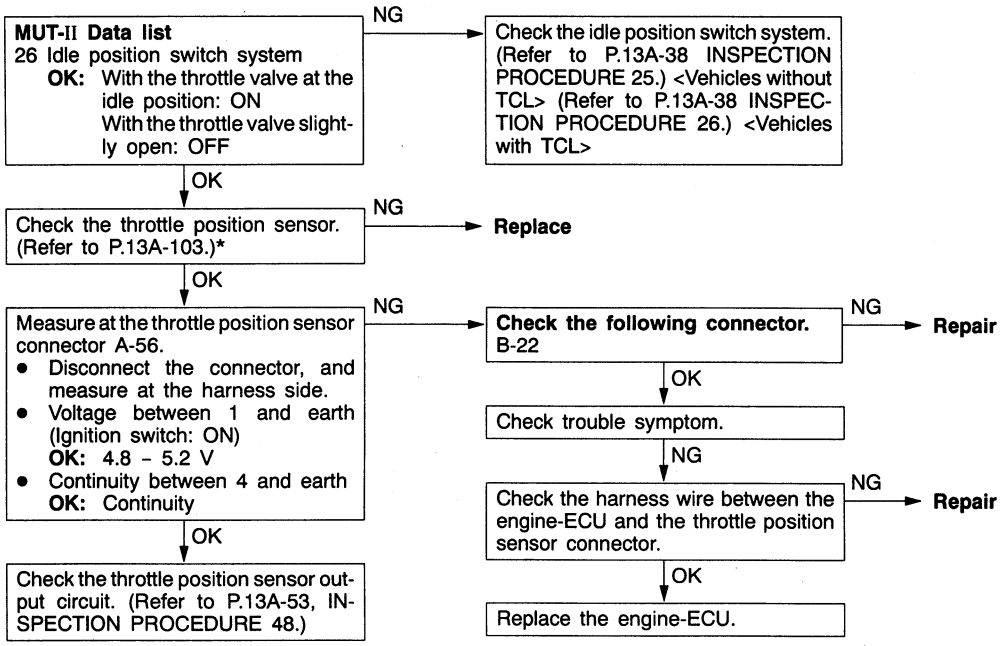


Code No. 13 Intake air temperature sensor system	Probable cause
Range of Check ● Ignition switch: ON ● Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions ● Sensor output voltage is 4.6 V or more (corresponding to an intake air temperature 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



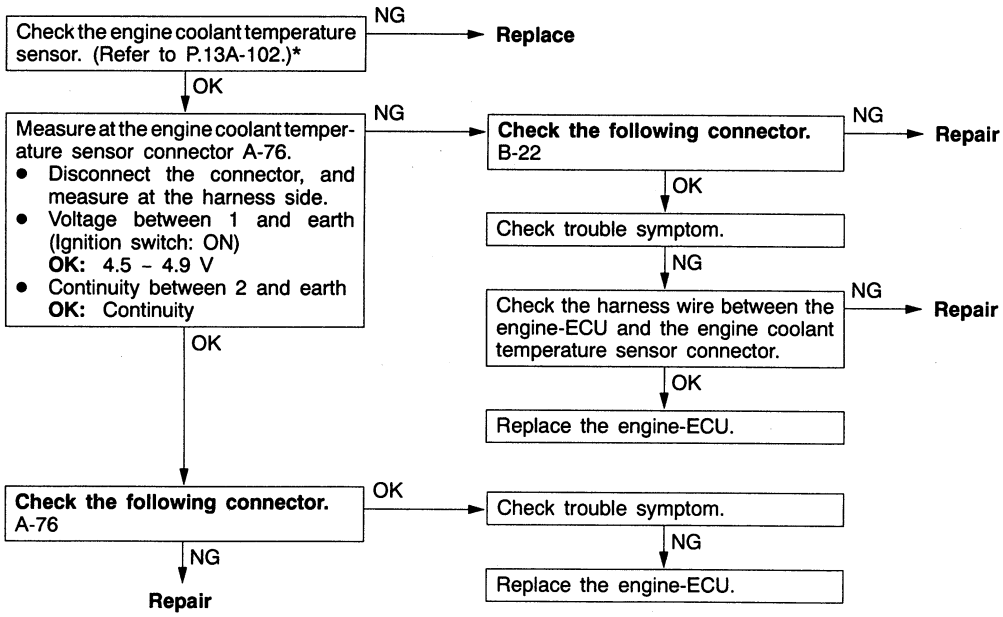
*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

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



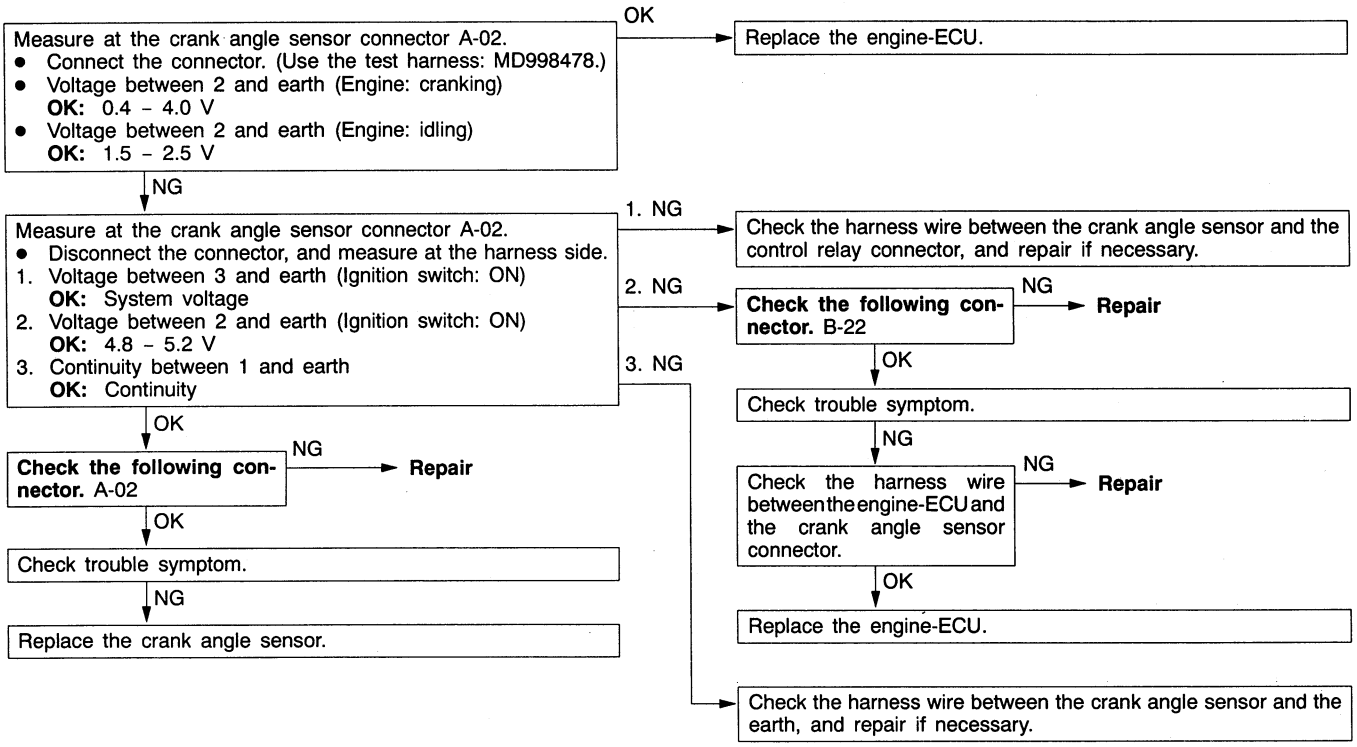
*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

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.	

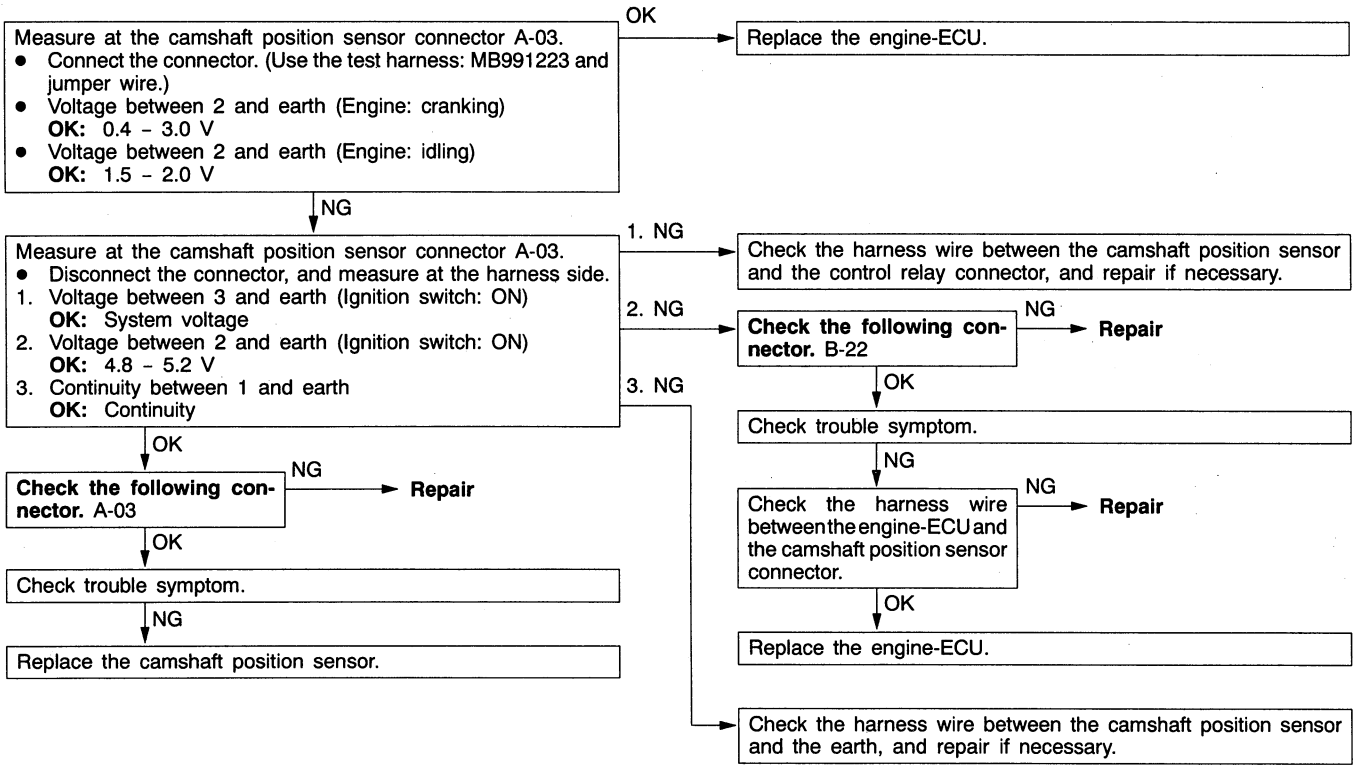


*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

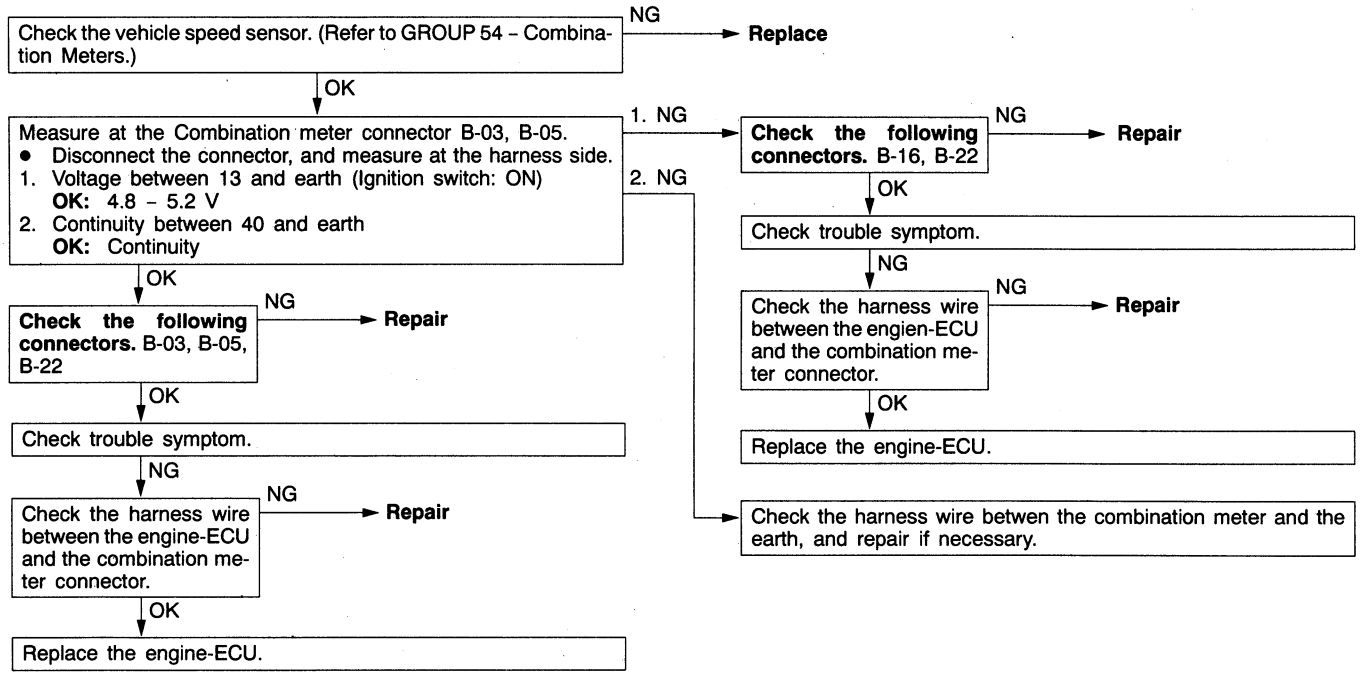
Code No. 22 Crank angle sensor system	Probable cause
Range of Check ● Engine is cranking. Set conditions ● Sensor output voltage does not change for 4 seconds (no pulse signal input.)	● Malfunction of the crank angle sensor ● Improper connector contact, open circuit or short-circuited harness wire of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



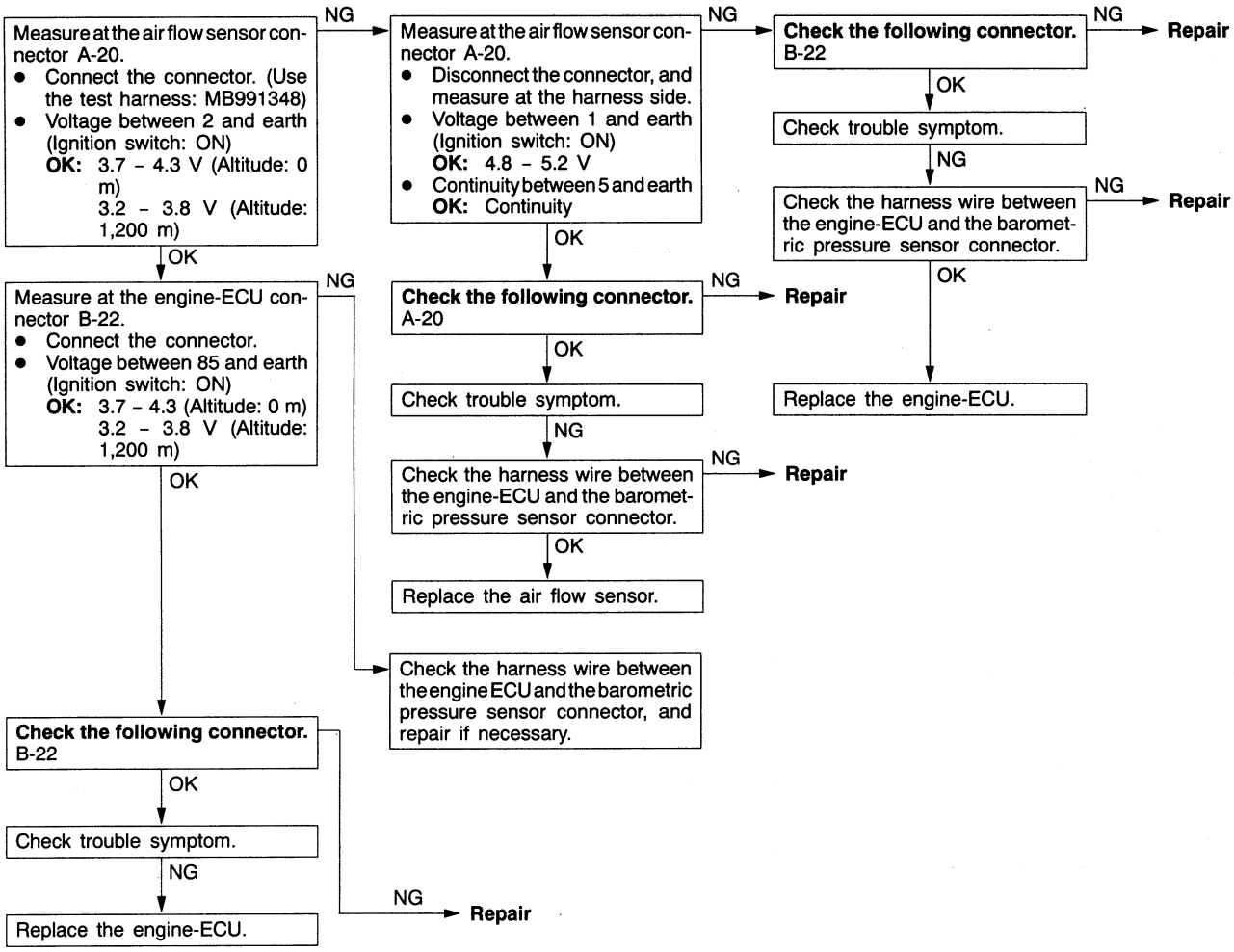
Code No. 23 Camshaft position sensor system	Probable cause
Range of Check • Ignition switch: ON • Engine speed is approx. 50 r/min or more. Set conditions • Sensor output voltage does not change for 4 seconds (no pulse signal input.)	• Malfunction of the camshaft position sensor • Improper connector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



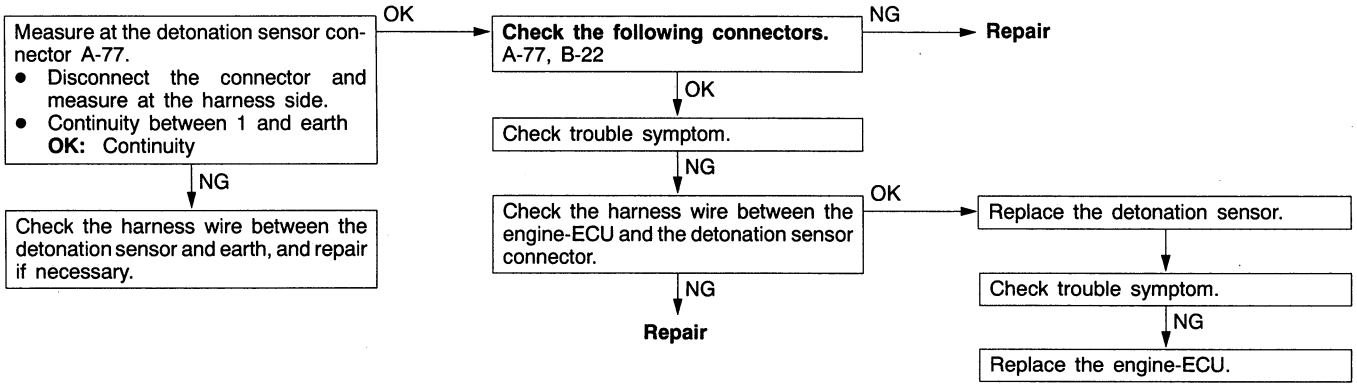
Code No. 24 Vehicles speed sensor system	Probable cause
Range of check ● Ignition switch: ON ● Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. ● Idle position switch: OFF ● Engine speed is 3,000 r/min or more. ● Driving under high engine load conditions. 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



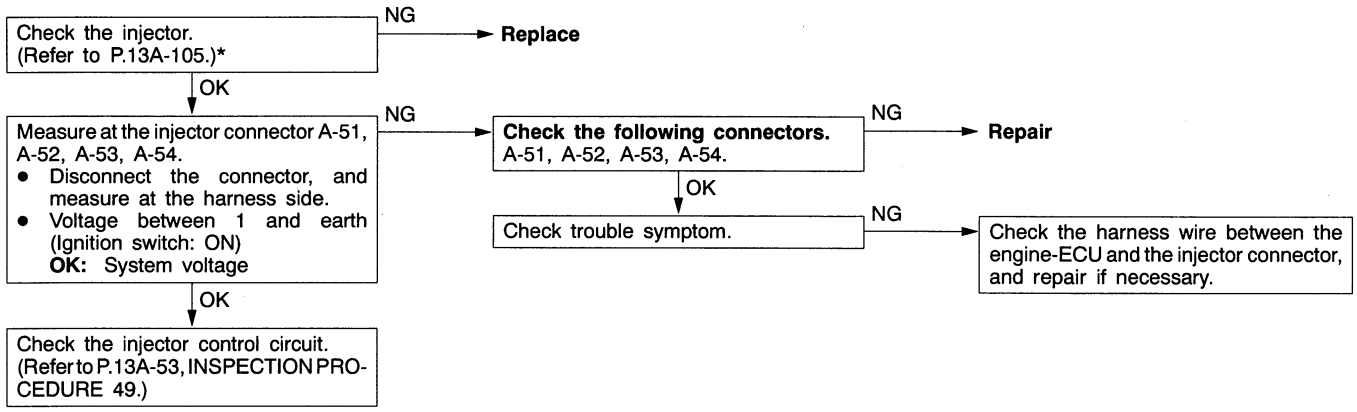
Code No. 25 Barometric pressure sensor system	Probable cause
Range of Check • Ignition switch: ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. • Battery voltage is 8 V or more. Set conditions • Sensor output voltage is 4.5 V or more (corresponding 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

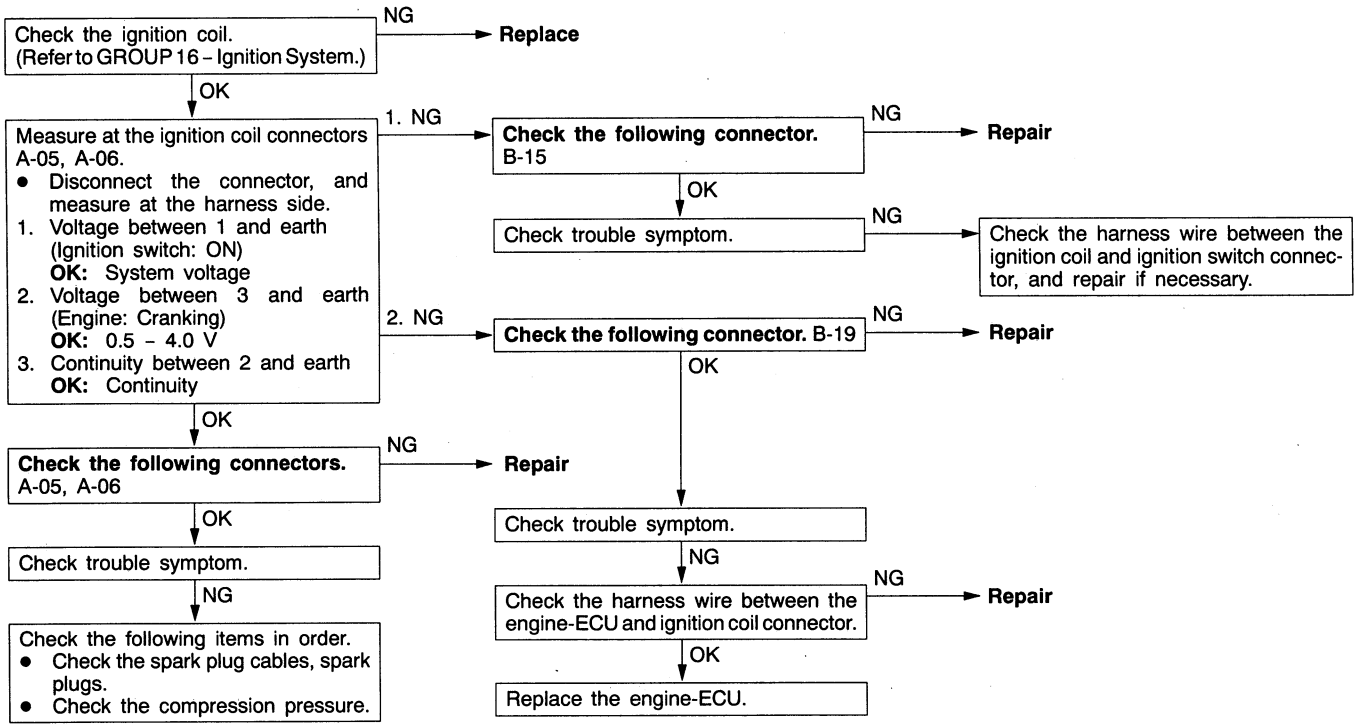


Code No. 41 Injector system	Probable cause
Range of Check ● Engine speed is approx. 50 – 1,000 r/min ● The throttle position sensor output voltage is 1.15 V or less. ● Actuator test by MUT-II is not carried out. Set conditions ● Surge voltage of injector coil is not detected for 4 seconds.	● Malfunction of the injector ● Improper connector contact, open circuit or short-circuited harness wire of the injector circuit ● Malfunction of the engine-ECU



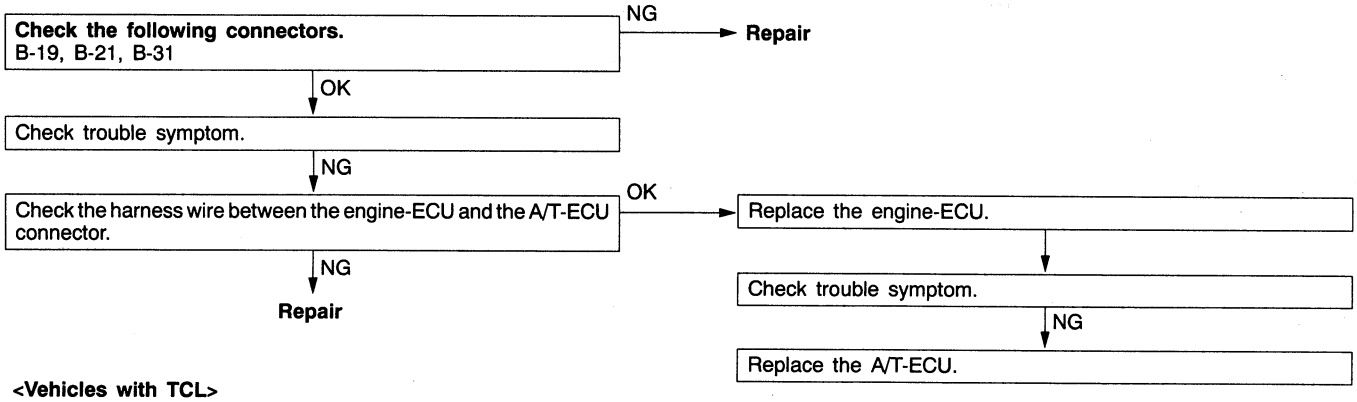
*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

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 engine-ECU

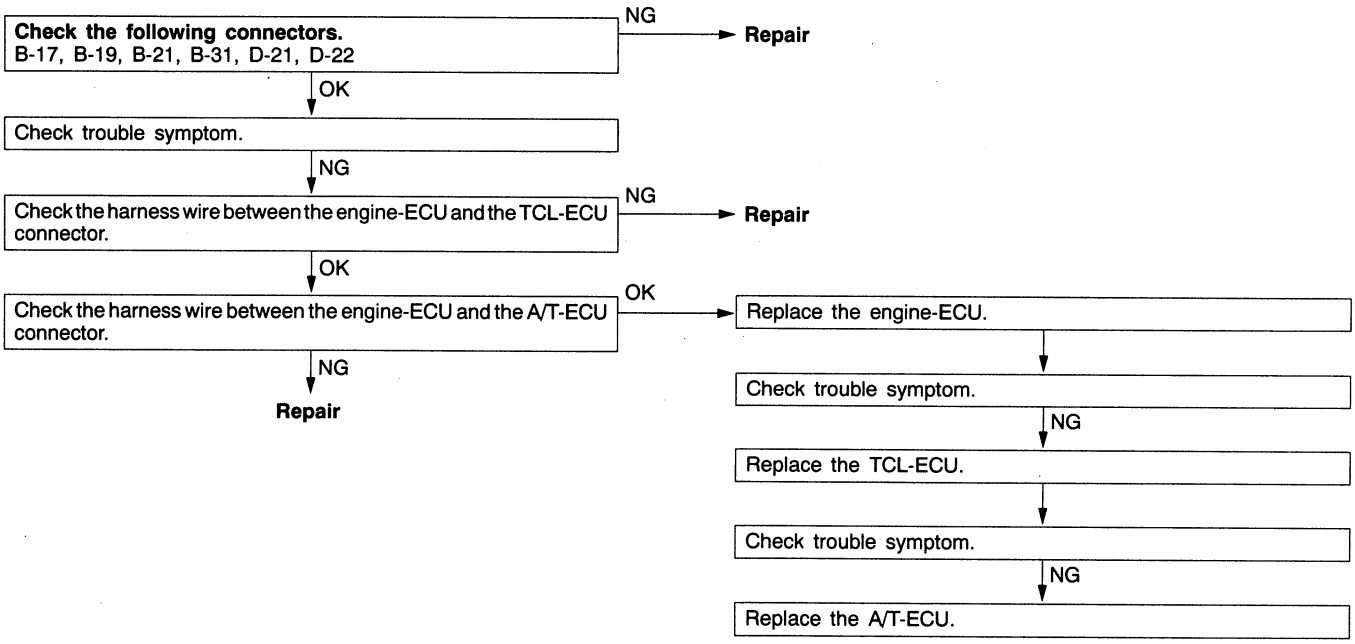


Code No. 61 Communication wire with A/T-ECU system <A/T>	Probable cause
Range of Check • 60 seconds or more have passed immediately after engine was started. • Engine speed is approx. 50 r/min or more Set conditions The voltage of the torque reduction request signal from the A/T-ECU is LOW for 1.5 seconds or more.	• Malfunction of the harness wire and the connector • Malfunction of the engine ECU • Malfunction of the A/T-ECU • Malfunction of the TCL-ECU <Vehicles with TCL>

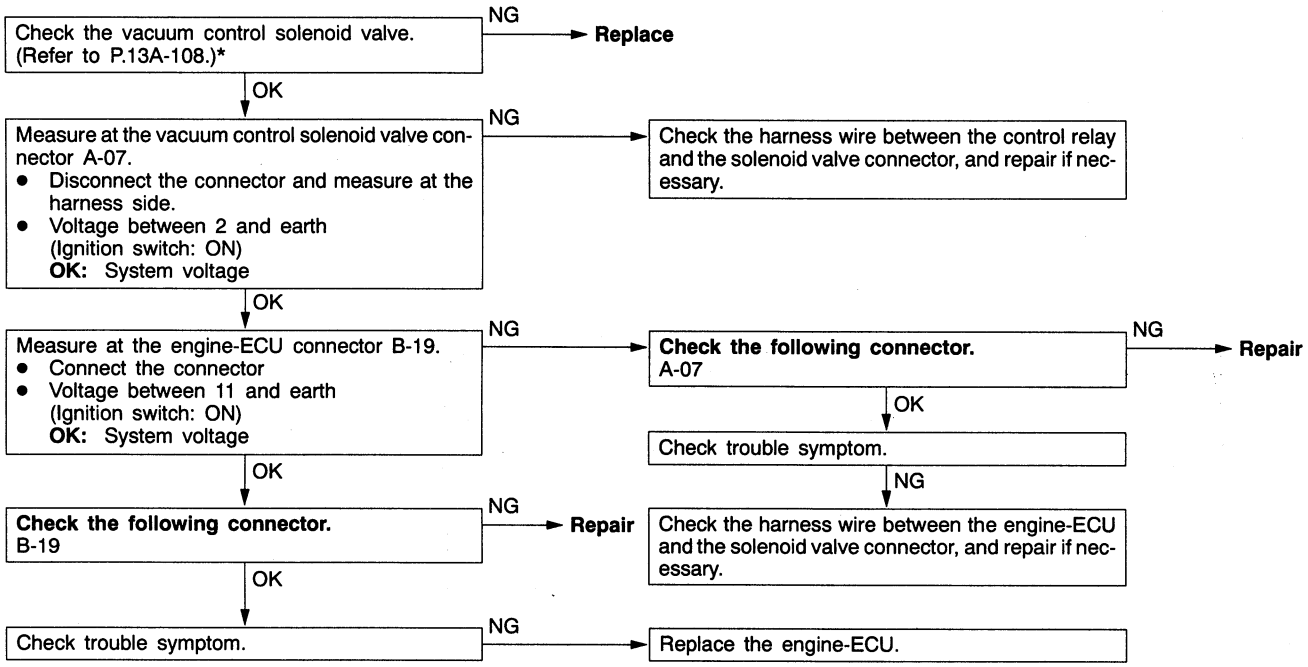
<Vehicles without TCL>



<Vehicles with TCL>

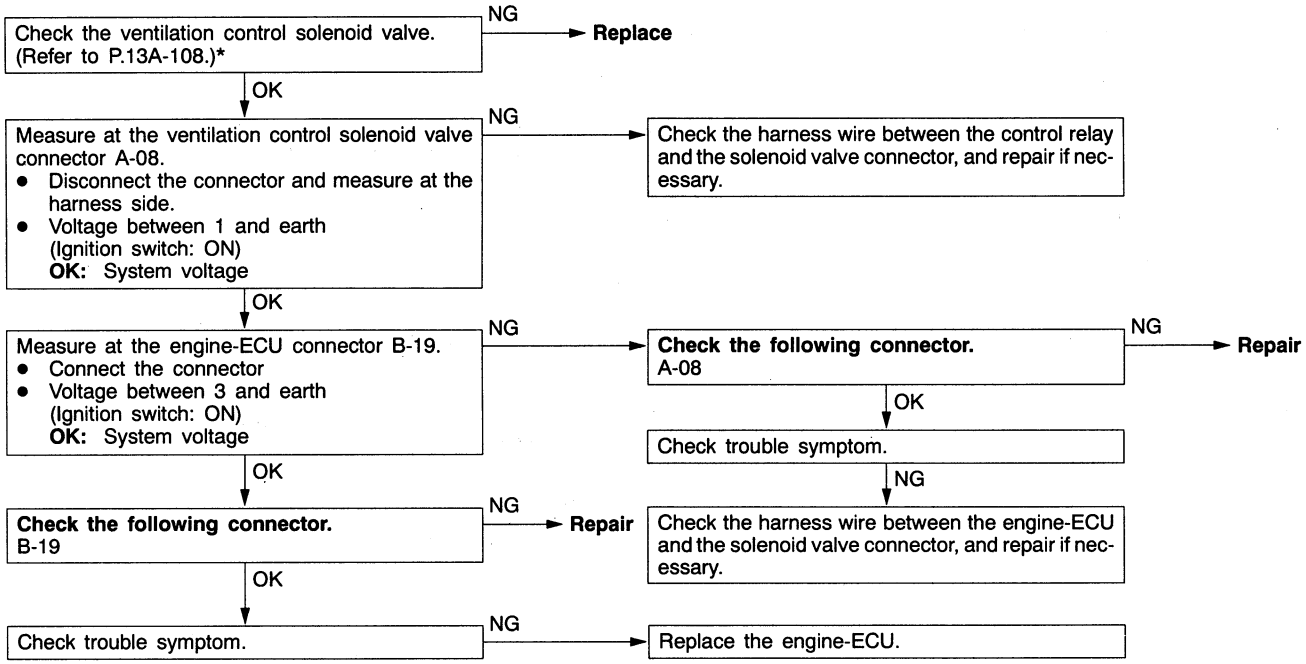


Code No. 71 Vacuum control solenoid valve system <Vehicles with TCL>	Probable cause
Range of Check • Ignition switch: ON • Excluding 60 seconds immediately after the engine starts. • Battery voltage is 10 V or more. • Forced actuation by means of MUT-II is not being carried out. Set condition Solenoid valve drive or non-drive instruction and energized condition of solenoid coil are different.	• 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



*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

Code No. 72 Ventilation control solenoid valve system <Vehicles with TCL>	Probable cause
Range of Check ● 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. Set condition Solenoid valve drive or non-drive instruction and energized condition of solenoid coil are different.	● 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



*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

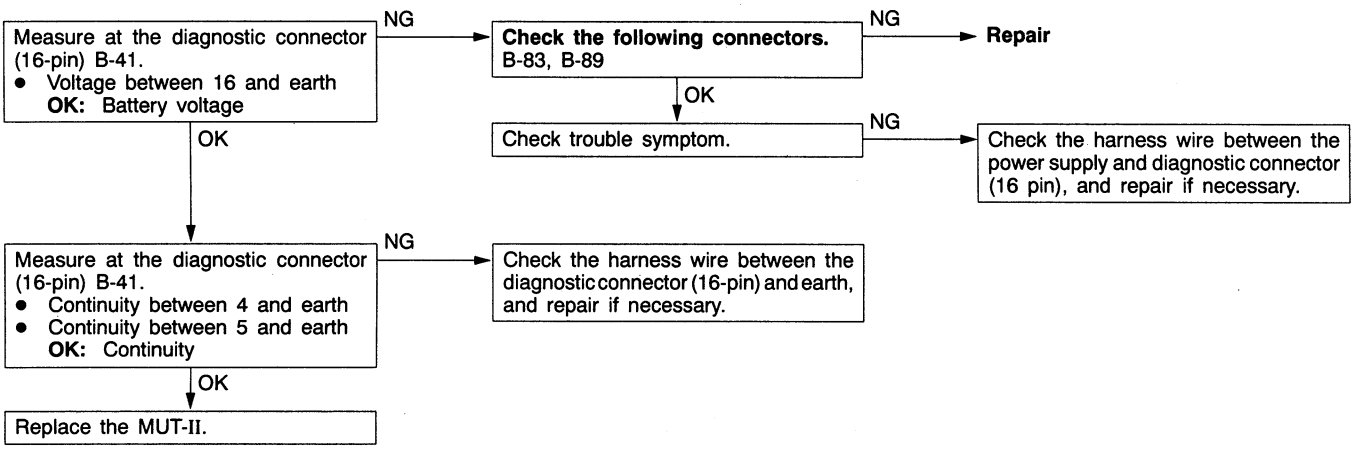
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is impossible.	Communication with all systems is not possible.	1	13A-22
	Communication with engine ECU only is not possible.	2	13A-22
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-23
	The engine warning lamp remains illuminating and never goes out.	4	13A-23
Starting	No initial combustion (starting impossible)	5	13A-24
	Initial combustion but no complete combustion (starting impossible)	6	13A-25
	Long time to start (improper starting)	7	13A-26
Idling stability (Improper idling)	Unstable idling (Rough idling, hunting)	8	13A-27
	Idling speed is high. (Improper idling speed)	9	13A-28
	Idling speed is low. (Improper idling speed)	10	13A-29
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	11	13A-30
	When the engine becomes hot, it stalls at idling. (Die out)	12	13A-31
	The engine stalls when starting the car. (Pass out)	13	13A-32
	The engine stalls when decelerating.	14	13A-32
Driving	Hesitation, sag or stumble	15	13A-33
	The feeling of impact or vibration when accelerating	16	13A-33
	The feeling of impact or vibration when decelerating	17	13A-34
	Poor acceleration	18	13A-34
	Surge	19	13A-35
	Knocking	20	13A-35
Dieseling		21	13A-35
Too high CO and HC concentration when idling		22	13A-36

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

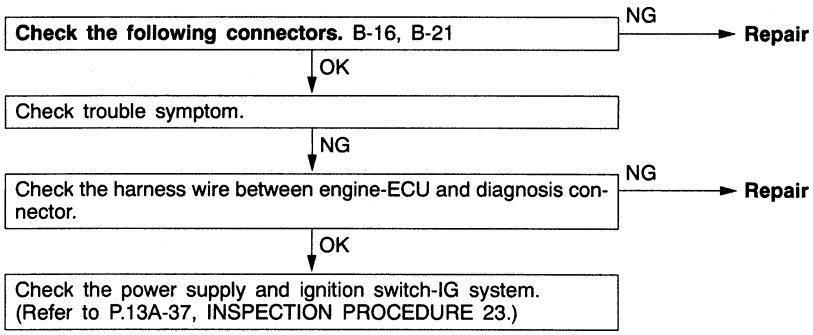
INSPECTION PROCEDURE 1

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



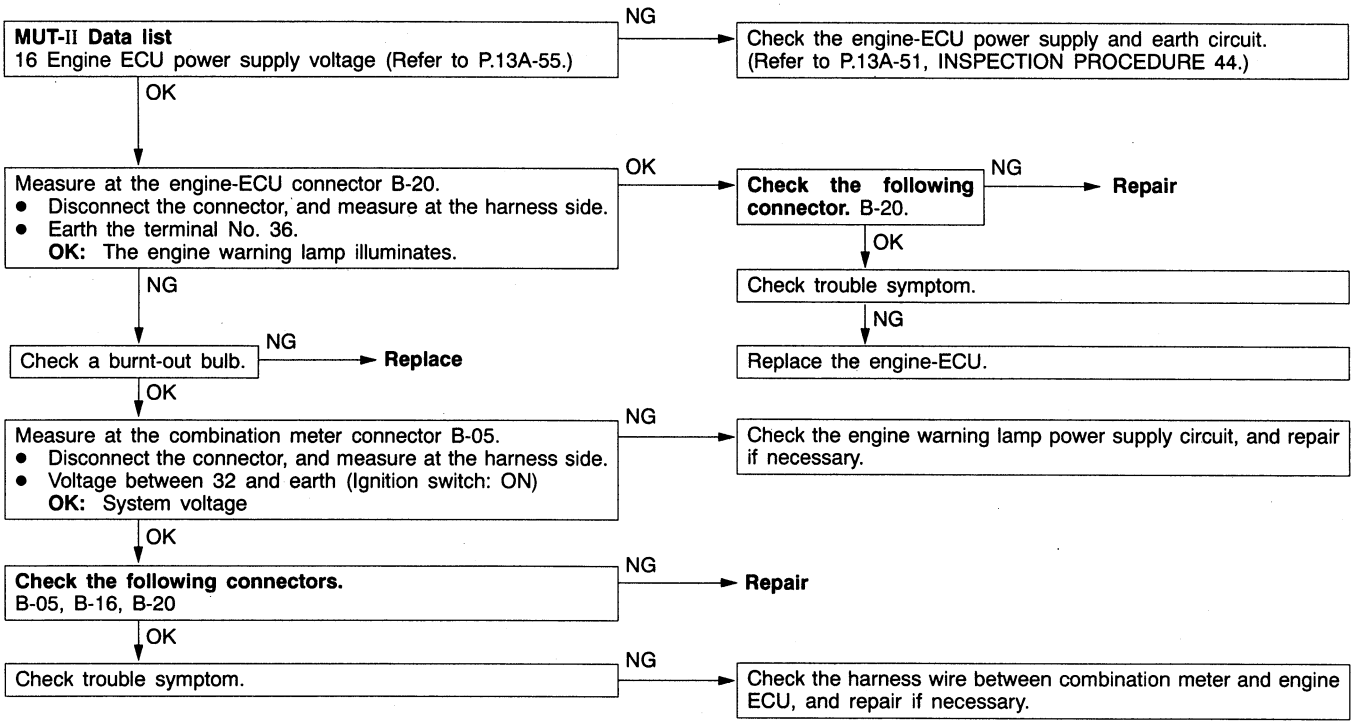
INSPECTION PROCEDURE 2

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	• Malfunction of engine-ECU power supply circuit • Malfunction of the engine-ECU • Open circuit between engine-ECU and diagnosis connector



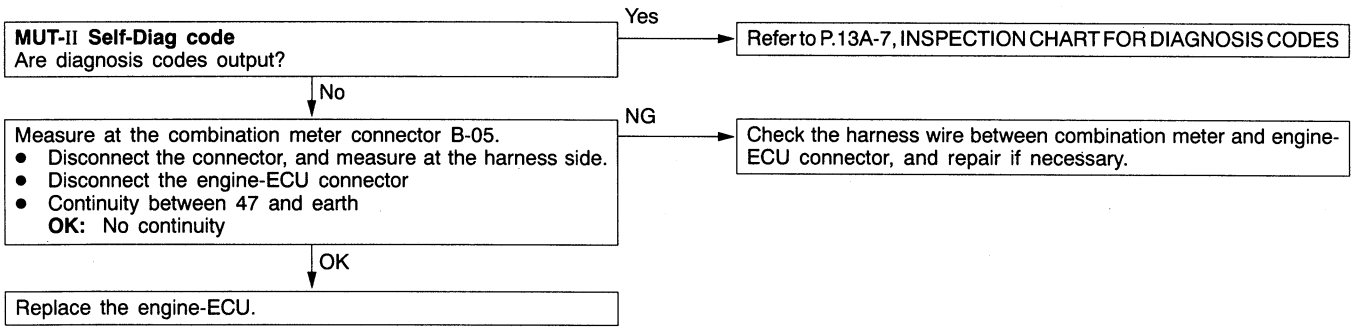
INSPECTION PROCEDURE 3

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



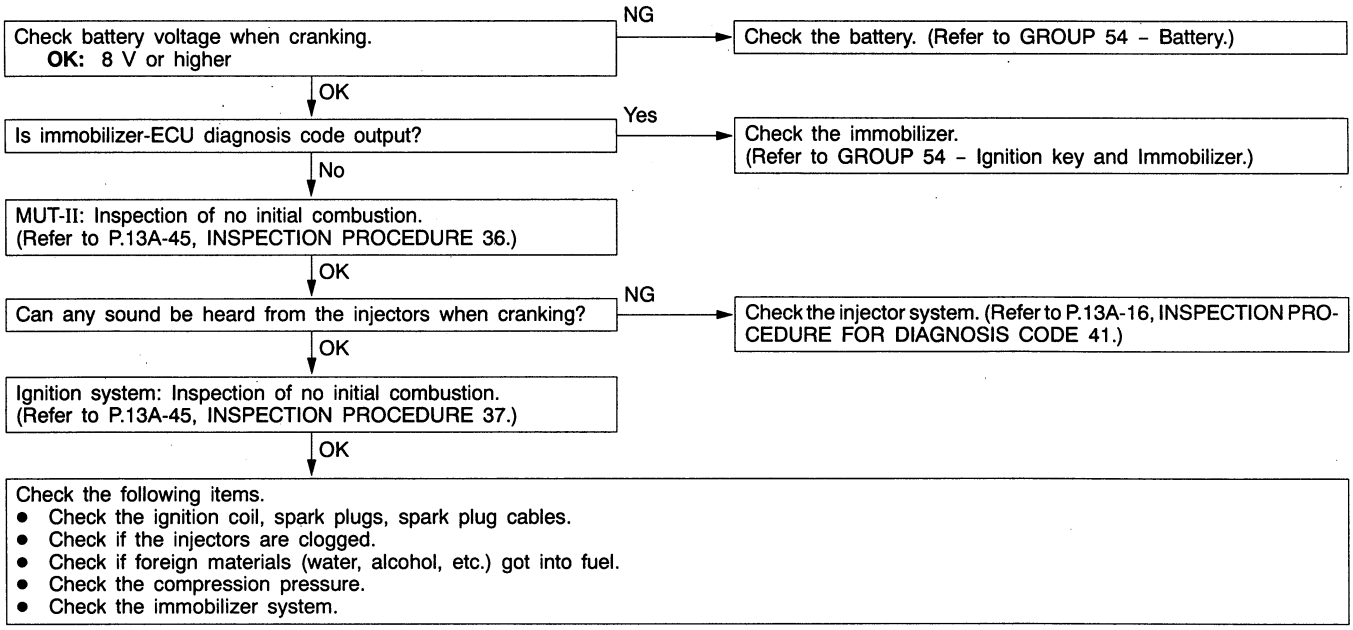
INSPECTION PROCEDURE 4

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



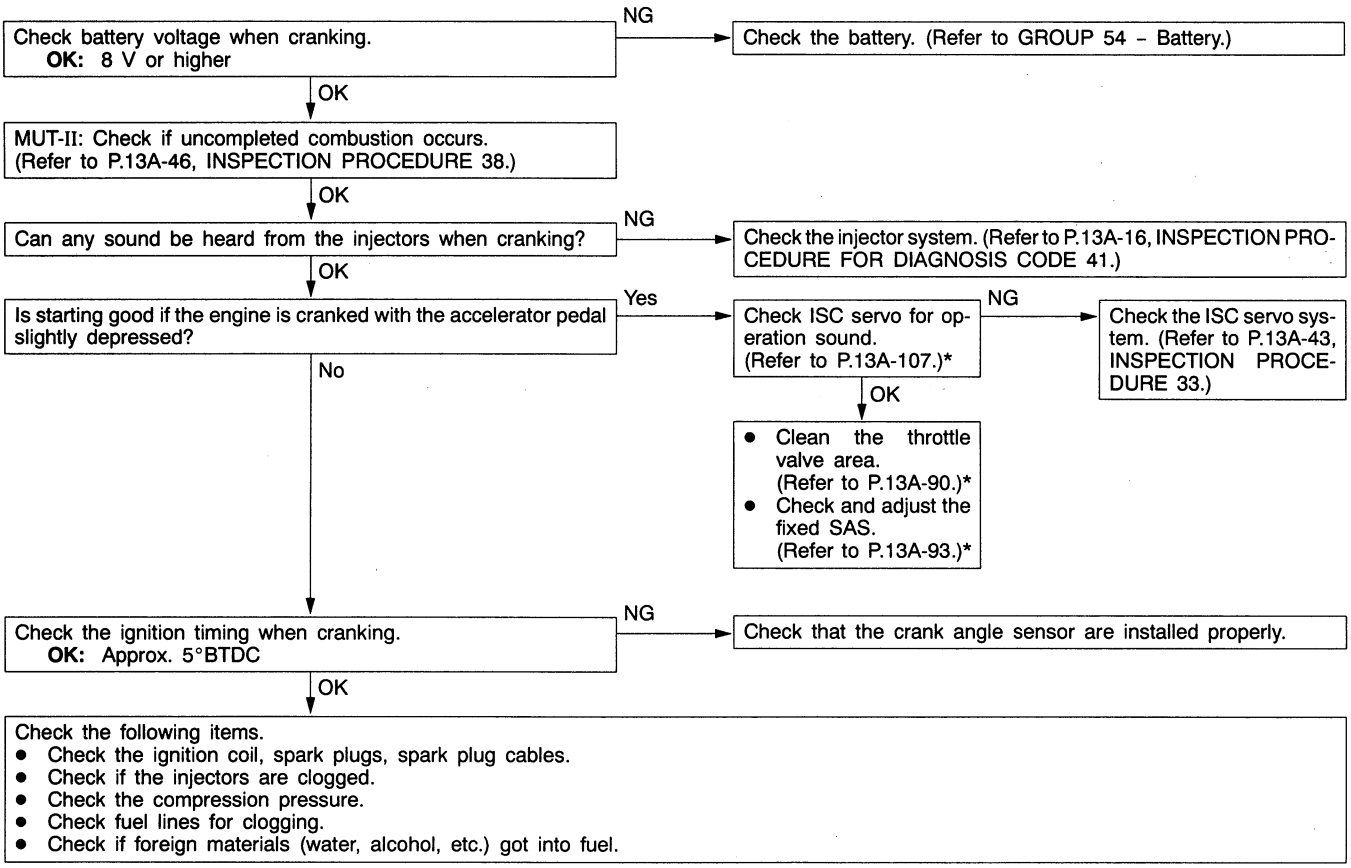
INSPECTION PROCEDURE 5

No initial combustion (starting impossible)	Probable cause
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.	• 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

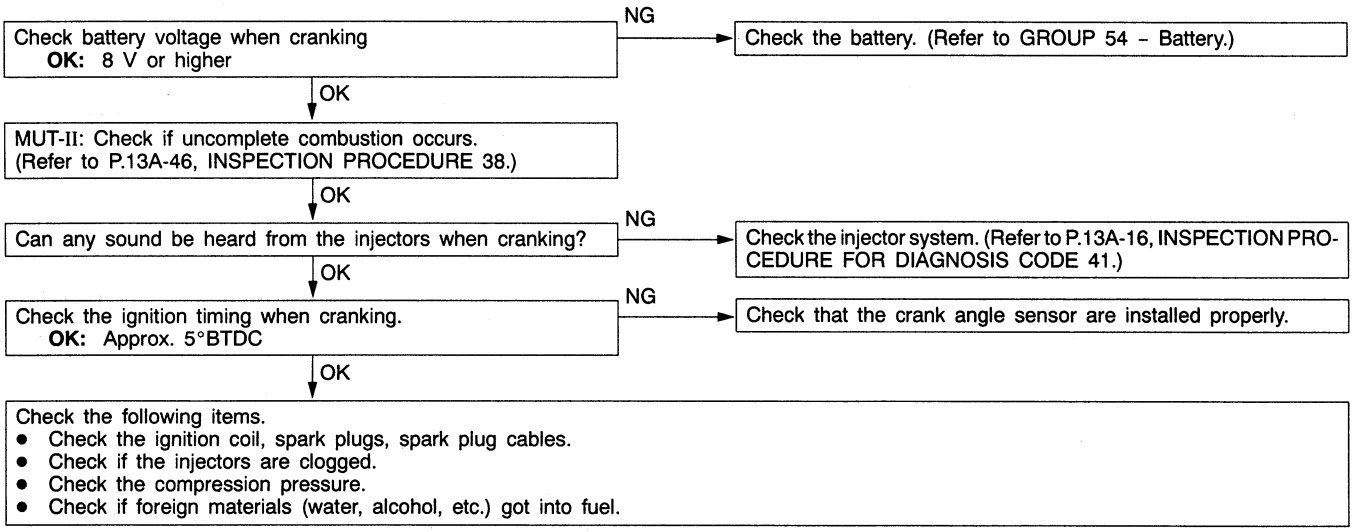
Initial combustion but no complete combustion (starting impossible)	Probable cause
In such cases as the above, the cause is probably that the spark plugs are generating sparks but the sparks are weak, or the initial mixture for starting is not appropriate.	• Malfunction of the ignition system • Malfunction of the injector system • Foreign materials in fuel • Poor compression • Malfunction of the engine-ECU



*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

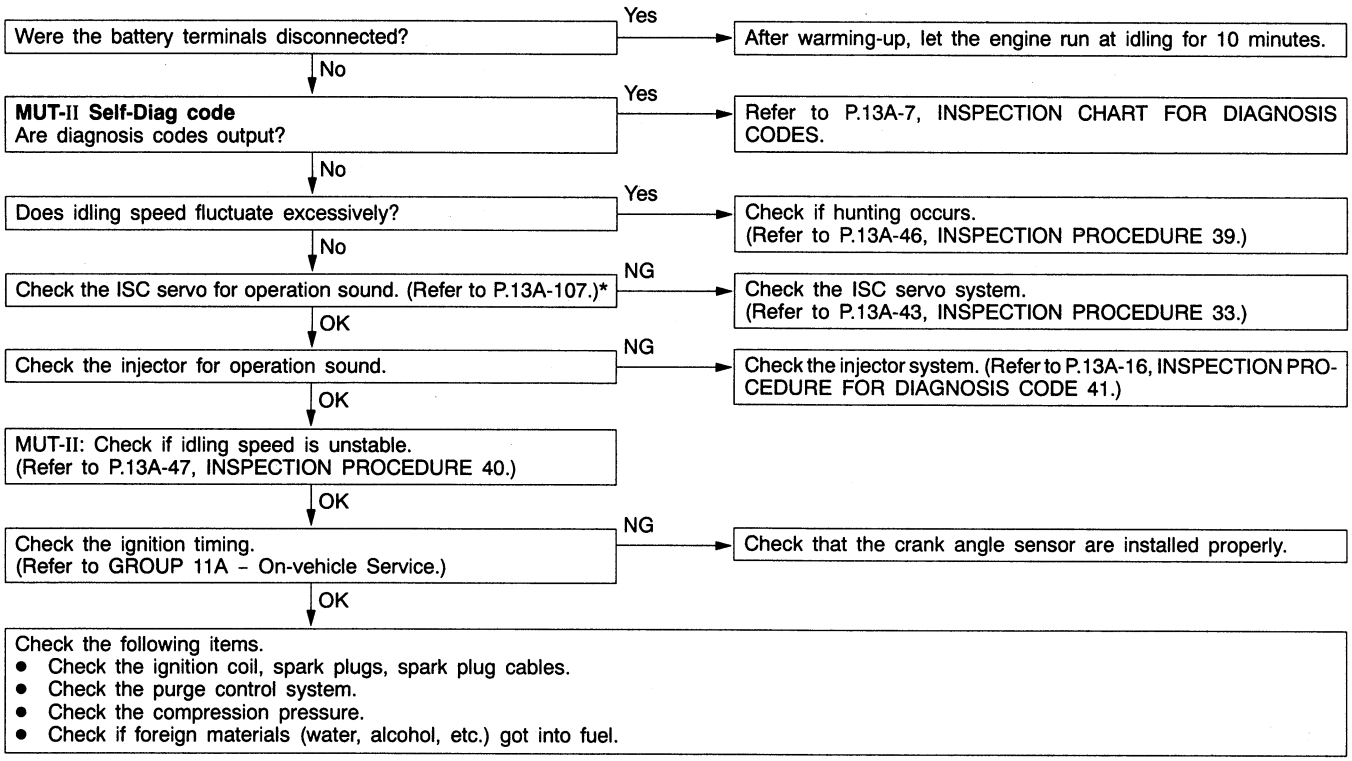
INSPECTION PROCEDURE 7

In 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.	• Malfunction of the ignition system • Malfunction of the injector system • Inappropriate gasoline use • Poor compression



INSPECTION PROCEDURE 8

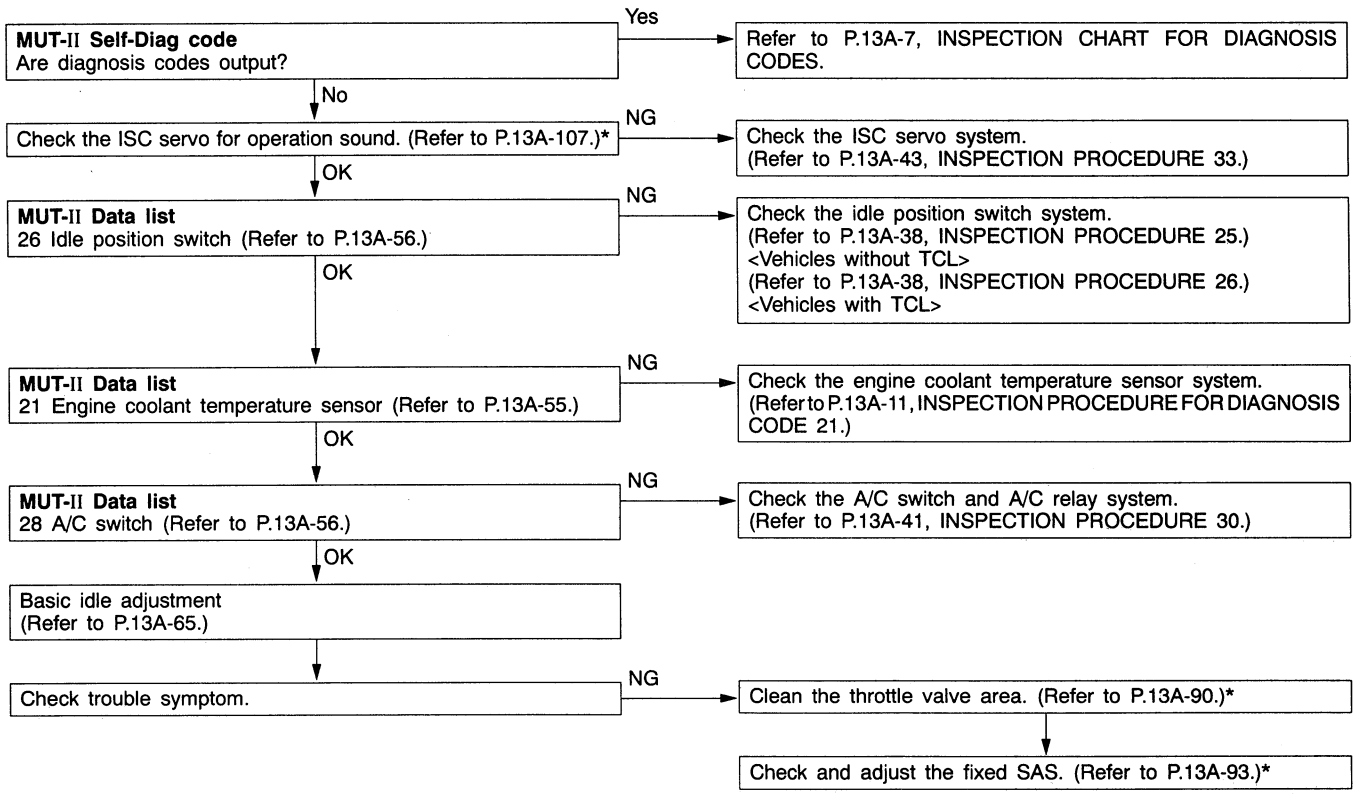
Unstable idling (Rough idling, hunting)	Probable cause
In cases as the above, the cause is probably that the ignition system, air/fuel mixture, idle speed control (ISC) or compression pressure is defective. Because the range of possible causes is broad, inspection is narrowed down to simple items.	•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



*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

INSPECTION PROCEDURE 9

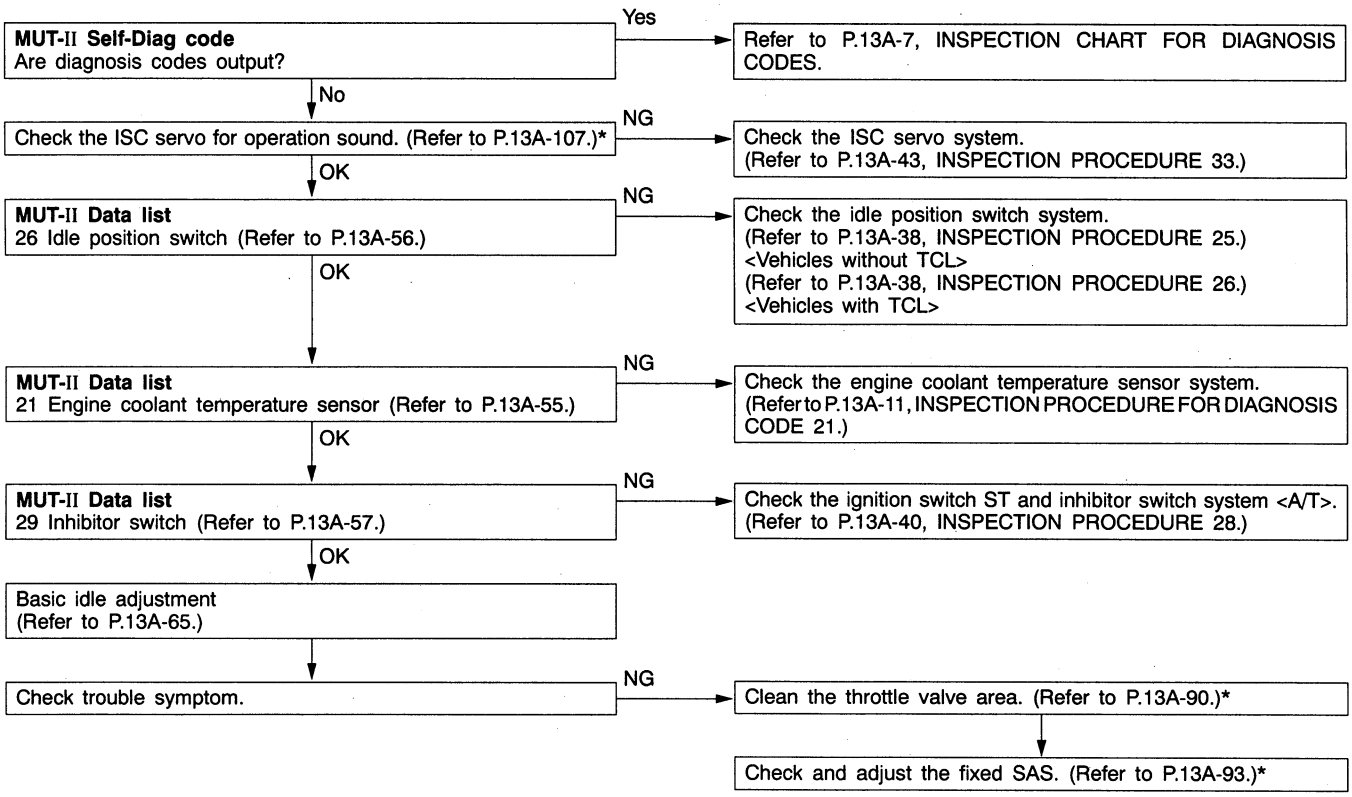
Idling speed is high. (Improper idling speed)	Probable cause
In such cases as the above, the cause is probably that the intake air volume during idling is too great.	• Malfunction of the ISC servo system • Malfunction of the throttle body



*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

INSPECTION PROCEDURE 10

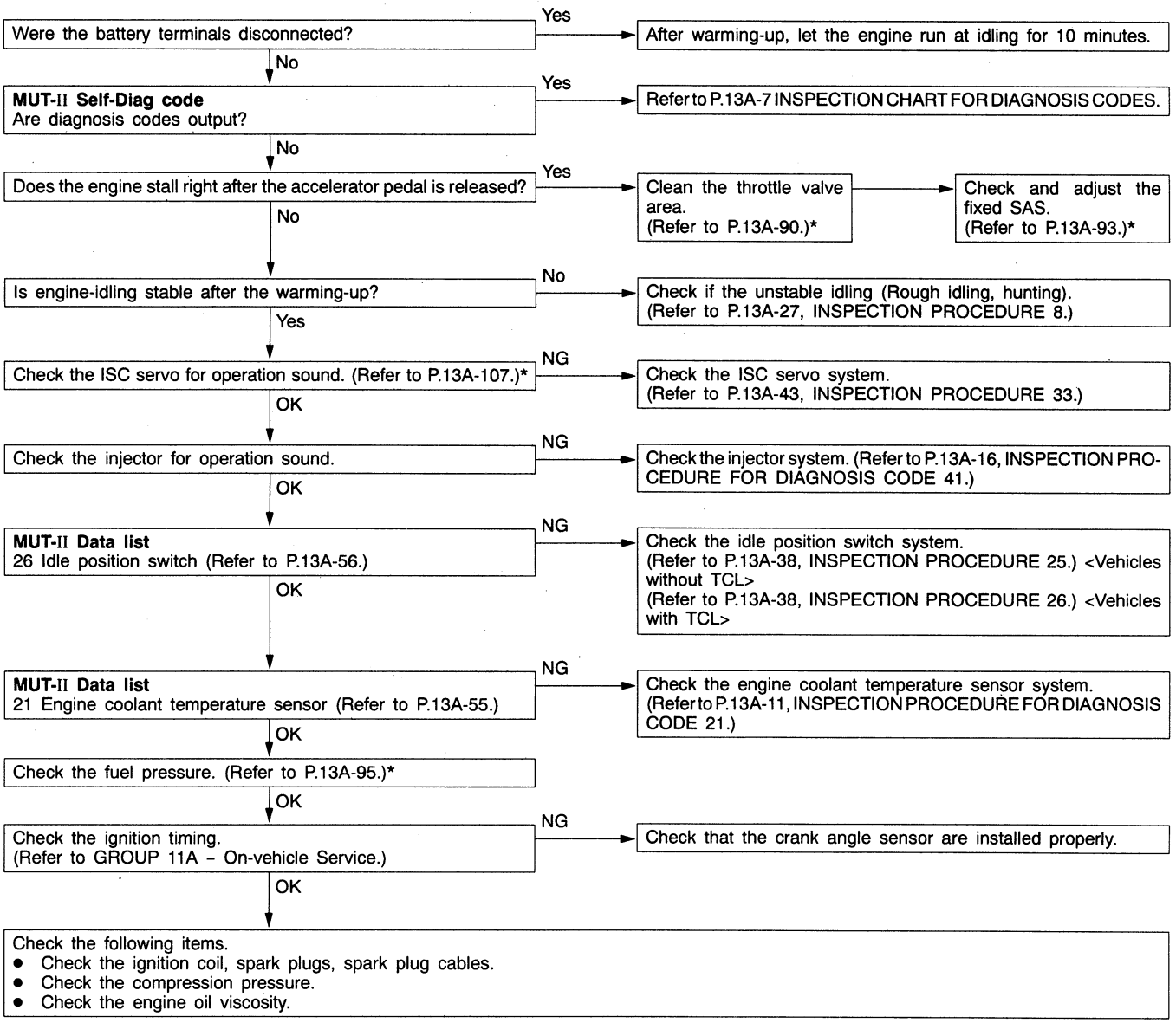
Idling speed is low. (Improper idling speed)	Probable cause
In cases such as the above, the cause is probably that the intake air volume during idling is too small.	• Malfunction of the ISC servo system • Malfunction of the throttle body



*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

INSPECTION PROCEDURE 11

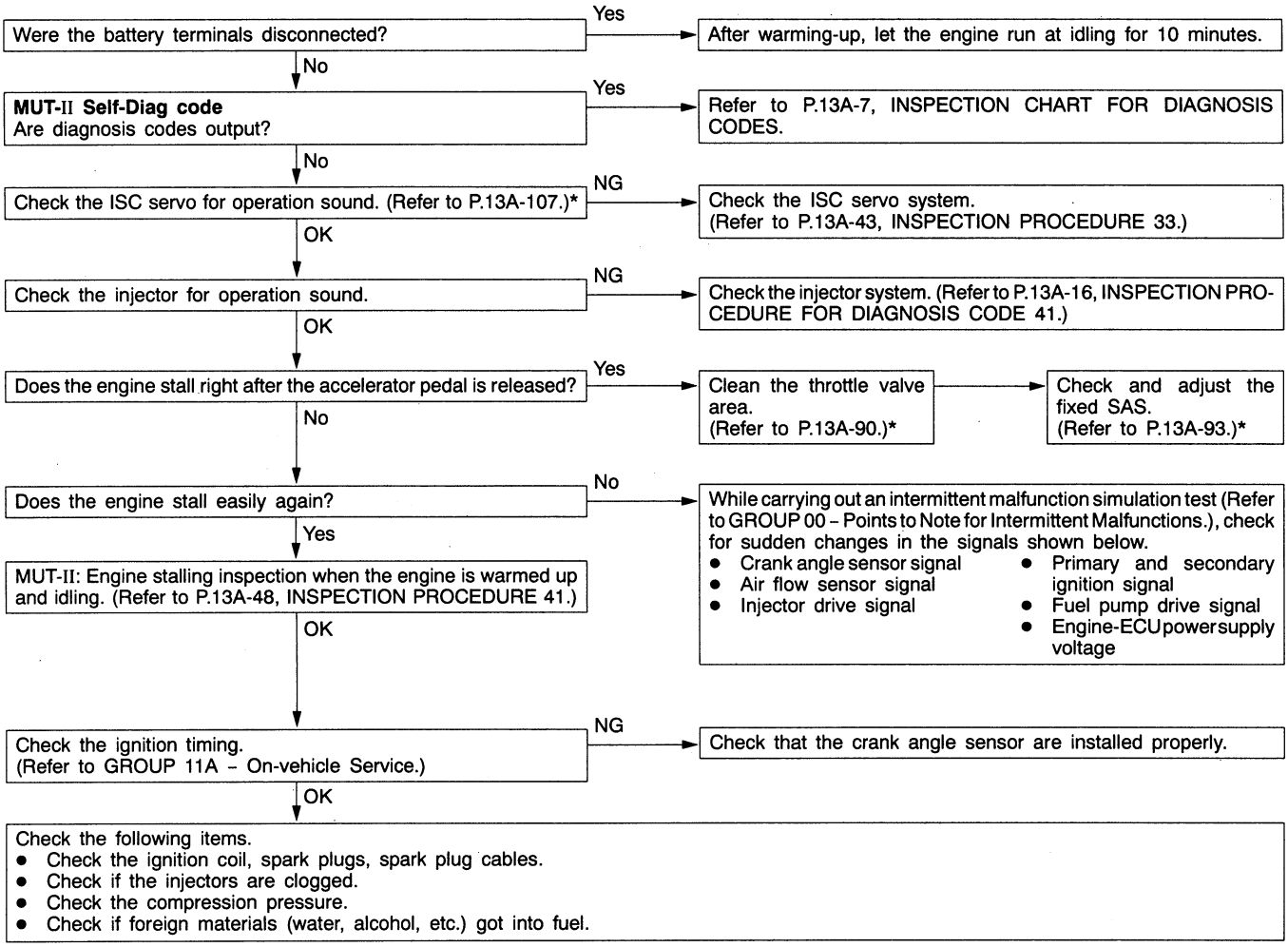
When the engine is cold, it stalls at idling. (Die out)	Probable cause
In such cases as the above, the cause is probably that the air/fuel mixture is inappropriate when the engine is cold, or that the intake air volume is insufficient.	• Malfunction of the ISC servo system • Malfunction of the throttle body • Malfunction of the injector system • Malfunction of the ignition system



*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

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



*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

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.	• Drawing air into intake system • Malfunction of the ignition system

MUT-II Self-Diag code
Are diagnosis codes output?
→ Yes: Refer to P.13A-7, INSPECTION CHART FOR DIAGNOSIS CODES.
↓ No:

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables.
- Check if air was drawn into the intake system.
  - Broken intake manifold gasket
  - Broken or disconnected vacuum hose
  - Improper operation of the PCV valve
  - Broken air intake hose

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

Were the battery terminals disconnected?
→ Yes: After warming-up, let the engine run at idling for 10 minutes.
↓ No:

MUT-II Self-Diag code
Are diagnosis codes output?
→ Yes: Refer to P.13A-7, INSPECTION CHART FOR DIAGNOSIS CODES.
↓ No:

MUT-II Data list
26 Idle position switch (Refer to P.13A-56.)
→ NG: Check the idle position switch system.
(Refer to P.13A-38, INSPECTION PROCEDURE 25.)
<Vehicles without TCL>
(Refer to P.13A-38, INSPECTION PROCEDURE 26.)
<Vehicles with TCL>
↓ OK:

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-55.)
→ NG: Check the throttle position sensor system. (Refer to P.13A-10, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 14.)
↓ OK:

MUT-II Data list
45 ISC servo position
- Is the idle speed control (ISC) servo position drops to 0 – 2 steps when decelerating (engine r/min less than 1,000)?

→ Yes: Check the vehicle speed sensor system. (Refer to P.13A-14, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 24.)
↓ No:

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables.
- Clean the throttle valve area.
- Check and adjust the fixed SAS.

*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

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

MUT-II Self-Diag code
Are diagnosis codes output?
Yes → Refer to P.13A-7, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Check the injectors for operation sound.
NG → Check the injector system. (Refer to P.13A-16, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 41.)
OK ↓

Check the ignition timing.
(Refer to GROUP 11A – On-vehicle Service.)
NG → Check that the crank angle sensor are installed properly.
OK ↓

MUT-II: Check if hesitation, sag, stumble or poor acceleration occur.
(Refer to P.13A-49, INSPECTION PROCEDURE 42.)
OK ↓

Check the fuel pressure. (Refer to P.13A-95.)*
OK ↓

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables.
- Negative pressure check during traction control operation <Vehicles with TCL>
- Throttle valve operation check <Vehicles with TCL>
- Vacuum tank and vacuum actuator check <Vehicles with TCL>
- Check the EGR system.
- Check the compression pressure.
- Check the fuel filter or fuel line for clogging.

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

MUT-II Self-Diag code
Are diagnosis codes output?
Yes → Refer to P.13A-7, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables.
- Check for occurrence of ignition leak.

*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

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

MUT-II Self-Diag code
Are diagnosis codes output?
Yes → Refer to P.13A-7, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Check the ISC servo for operation sound. (Refer to P.13A-107.)*
NG → Check the ISC servo system. (Refer to P.13A-43, INSPECTION PROCEDURE 33.)
OK ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-55.)
NG → Check the throttle position sensor system. (Refer to P.13A-10, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 14.)
OK ↓

MUT-II Data list
26 Idle position switch (Refer to P.13A-56.)
NG → Check the idle position switch system.
(Refer to P.13A-38, INSPECTION PROCEDURE 25.)
<Vehicles without TCL>
(Refer to P.13A-38, INSPECTION PROCEDURE 26.)
<Vehicles with TCL>
OK ↓

Clean the throttle valve area. (Refer to P.13A-90.)*

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

MUT-II Self-Diag code
Are diagnosis codes output?
Yes → Refer to P.13A-7, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Check the injectors for operation sound.
NG → Check the injector system. (Refer to P.13A-16, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 41.)
OK ↓

Check the ignition timing.
(Refer to GROUP 11A – On-vehicle Service.)
NG → Check that the crank angle sensor are installed properly.
OK ↓

MUT-II: Check if hesitation, sag, stumble or poor acceleration occur.
(Refer to P.13A-49, INSPECTION PROCEDURE 42.)
OK ↓

Check the fuel pressure. (Refer to P.13A-95.)*
OK ↓

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables.
- Negative pressure check during traction control operation <Vehicles with TCL>
- Throttle valve operation check <Vehicles with TCL>
- Vacuum tank and vacuum actuator check <Vehicles with TCL>
- Check the compression pressure.
- Check the fuel filter or fuel line for clogging.
- Broken air intake hose
- Clogged air cleaner

*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

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

MUT-II Self-Diag code
Are diagnosis codes output?
Yes → Refer to P.13A-7, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Check the injectors for operation sound.
NG → Check the injector system. (Refer to P. 13A-16, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 41.)
OK ↓

Check the ignition timing.
(Refer to GROUP 11A – On-vehicle Service.)
NG → Check that the crank angle sensor are installed properly.
OK ↓

MUT-II: Check if surge occurs.
(Refer to P.13-50, INSPECTION PROCEDURE 43.)
OK ↓

Check the fuel pressure. (Refer to P.13A-95.)*
OK ↓

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables.
- Check the EGR 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

MUT-II Self-Diag code
Are diagnosis codes output?
Yes → Refer to P.13A-7, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Does knocking occur when driving with the sensor disconnected? At this time, use the MUT-II to check if the timing is retarded compared to when the detonation sensor connector is connected.
No → Check the detonation sensor system. (Refer to P.13A-16, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 31.)
Yes ↓

Check the following items.
- Spark plugs
- Check if foreign materials (water, alcohol, etc.) got into fuel.

INSPECTION PROCEDURE 21

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

Check the injectors for fuel leakage.

*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

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

MUT-II Self-Diag code
Are diagnosis codes output?
Yes → Refer to P.13A-7, INSPECTION CHART FOR DIAGNOSIS CODES.
No ↓

Check the ignition timing.
(Refer to GROUP 11A – On-vehicle Service.)
NG → Check that the crank angle sensor are installed properly.
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor. (Refer to P.13A-55.)
NG → Check the engine coolant temperature sensor system. (Refer to P.13A-11, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-55.)
NG → Check the intake air temperature sensor system. (Refer to P.13A-9, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 13.)
OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer to P.13A-56.)
NG → Check the barometric pressure sensor system. (Refer to P.13A-15, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 25.)
OK ↓

MUT-II Data list
11 Oxygen sensor
OK: 600 – 1,000 mV when racing suddenly (Refer to P.13A-54.)
NG → Check the oxygen sensor system. (Refer to P.13A-8, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 11.)
OK ↓

MUT-II Data list
11 Oxygen sensor
OK: Repeat 0 – 400 mV and 600 – 1,000 mV alternately when idling. (Refer to P.13A-54.)
OK → Replace the oxygen sensor. → Check trouble symptom.
NG ↓

Check the fuel pressure. (Refer to P.13A-95.)*
OK ↓

Check the following items.
- Check the injectors for operation sound.
- Check the injectors for fuel leakage.
- Check the ignition coil, spark plugs, spark plug cables.
- Check the compression pressure.
- Check the positive crankcase ventilation system.
- Check the purge control system.
- Check the EGR control system.

↓

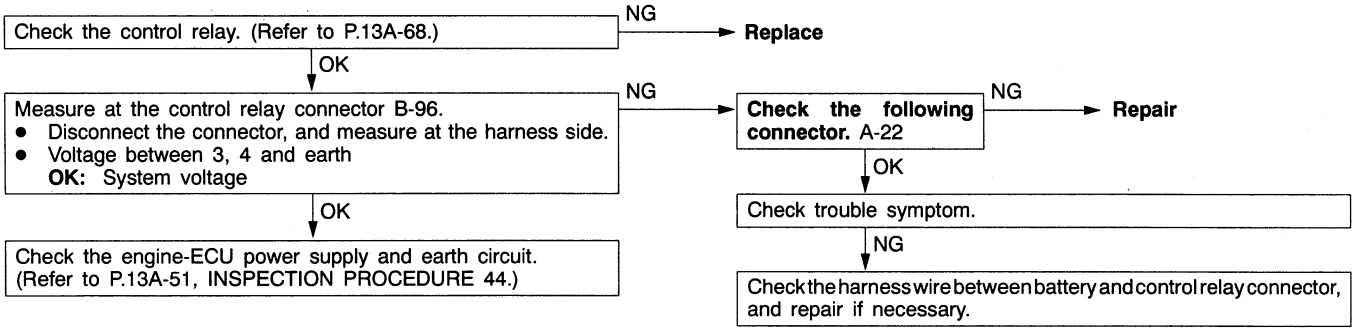
Check the trouble symptom.
NG ↓

Replace the catalytic converter.

*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

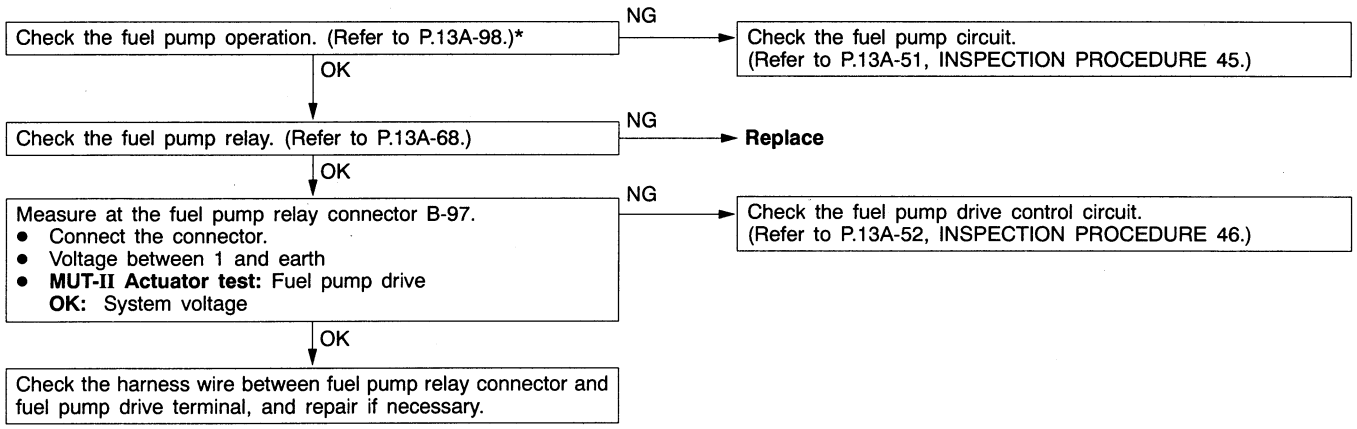
INSPECTION PROCEDURE 23

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



INSPECTION PROCEDURE 24

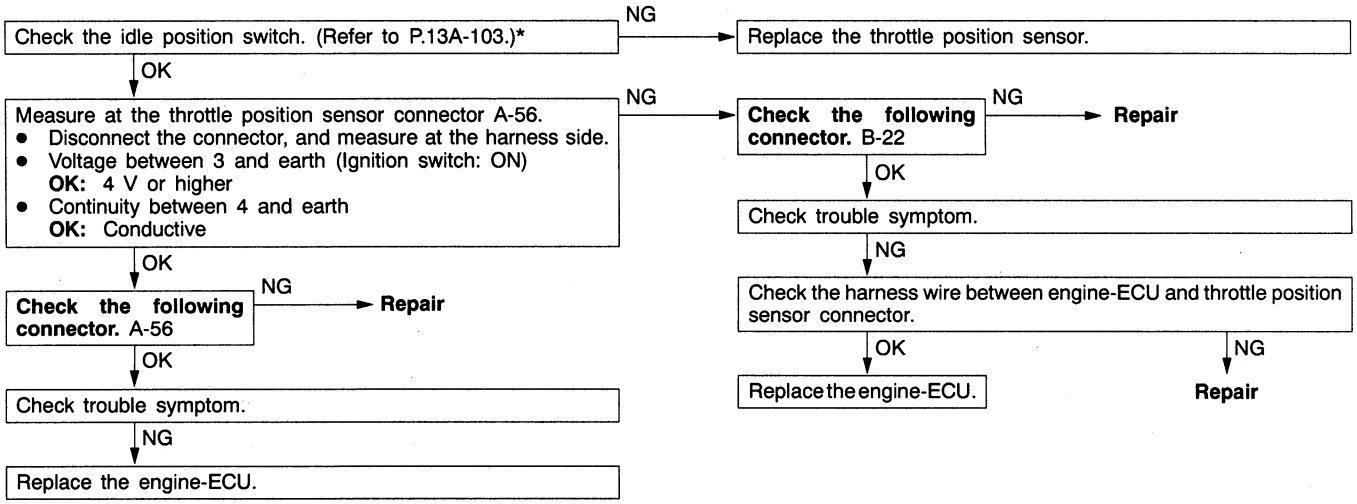
Fuel pump system	Probable cause
The engine-ECU turns the control relay ON when the engine is cranking or running, and this supplies power to drive the fuel pump.	• Malfunction of the fuel pump relay • Malfunction of the fuel pump • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU



*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

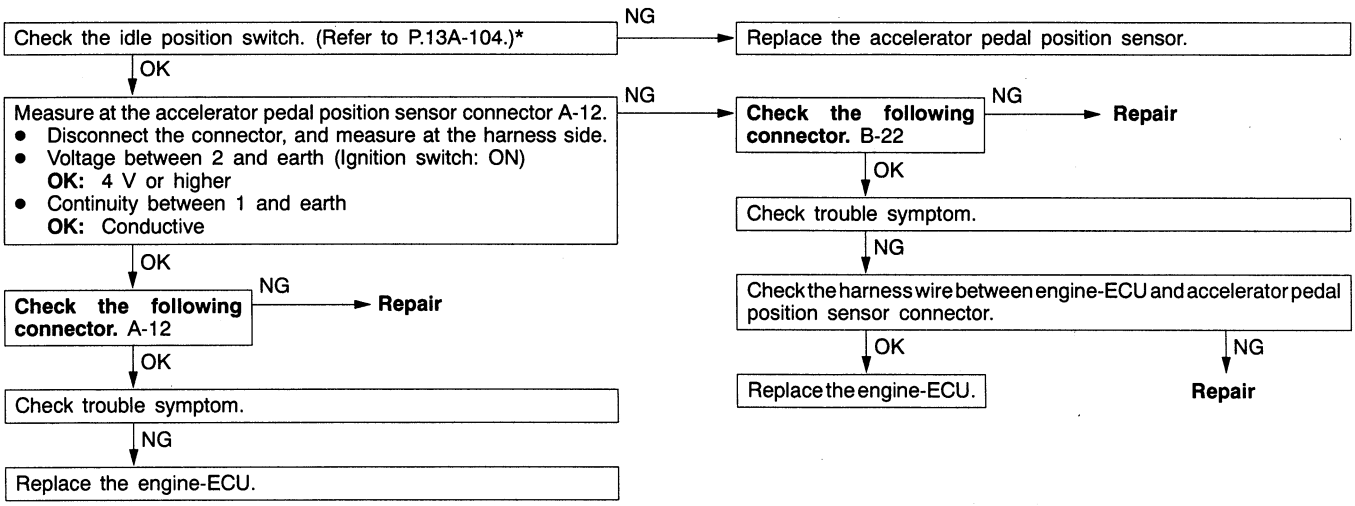
INSPECTION PROCEDURE 25

Idle position switch system <Vehicles without TCL>	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



INSPECTION PROCEDURE 26

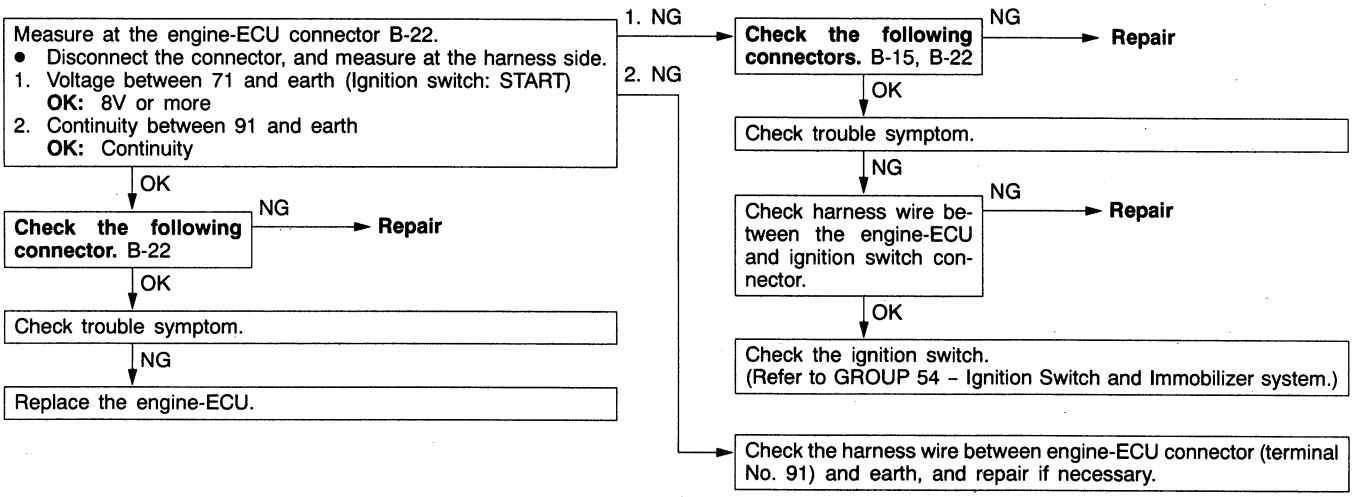
Idle position switch system <Vehicles with TCL>	Probable cause
The idle position switch inputs the condition of the accelerator pedal, i.e. whether it is depressed or released (HIGH/LOW), to the engine-ECU. The engine-ECU controls the idle speed control servo based on this input.	• Maladjustment of the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



*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

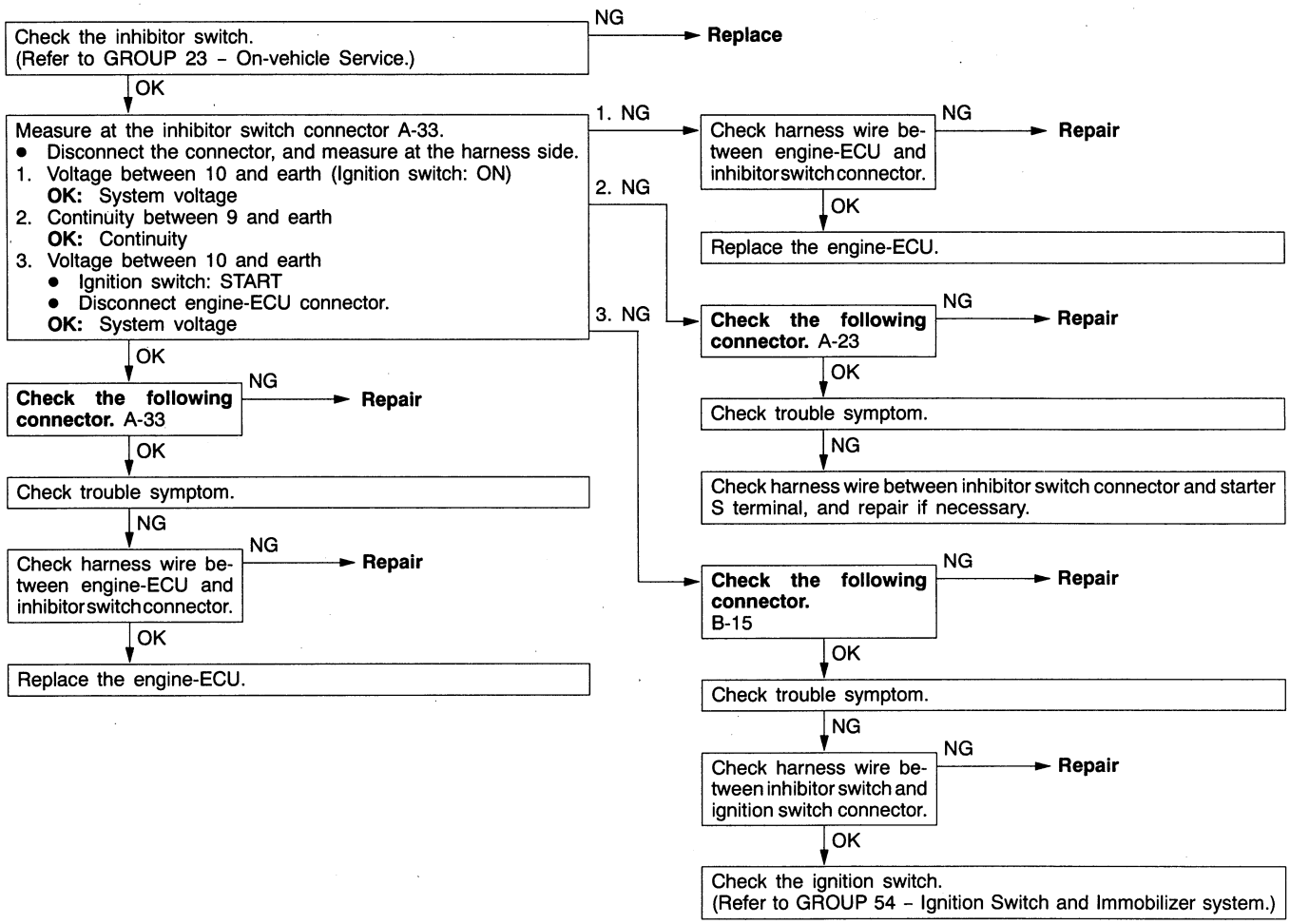
INSPECTION PROCEDURE 27

Ignition switch-ST system <M/T>	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



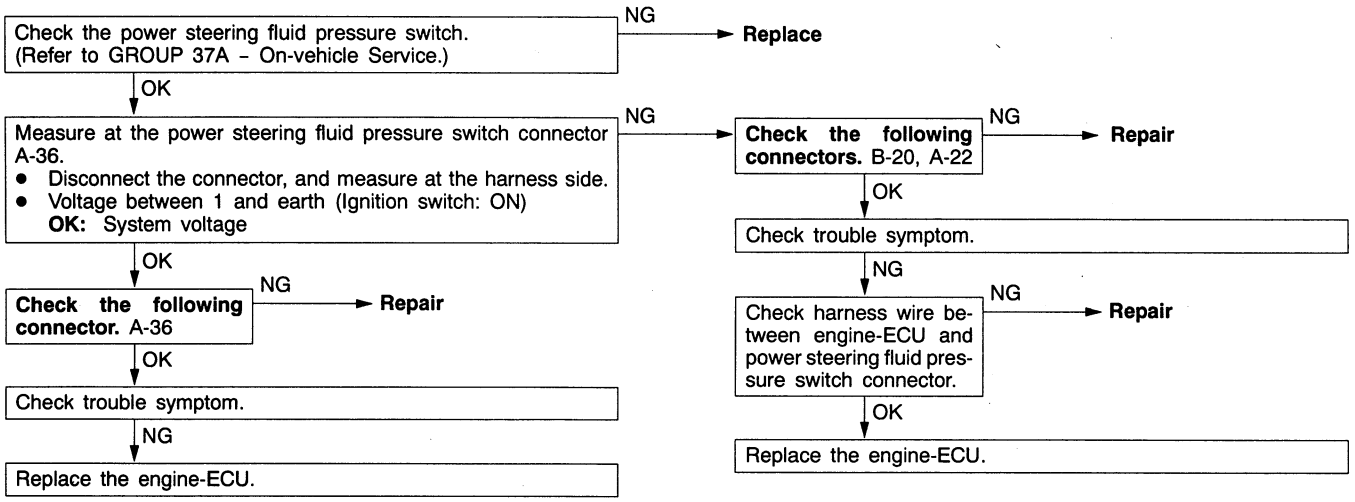
INSPECTION PROCEDURE 28

Ignition switch-ST and inhibitor switch system <A/T>	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. • The inhibitor switch inputs the condition of the select lever, i.e. whether it is in P or N range or in some other range, to the engine-ECU. The engine-ECU controls the idle speed control (ISC) servo based on this input.	• Malfunction of ignition switch • Malfunction of inhibitor switch • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU.



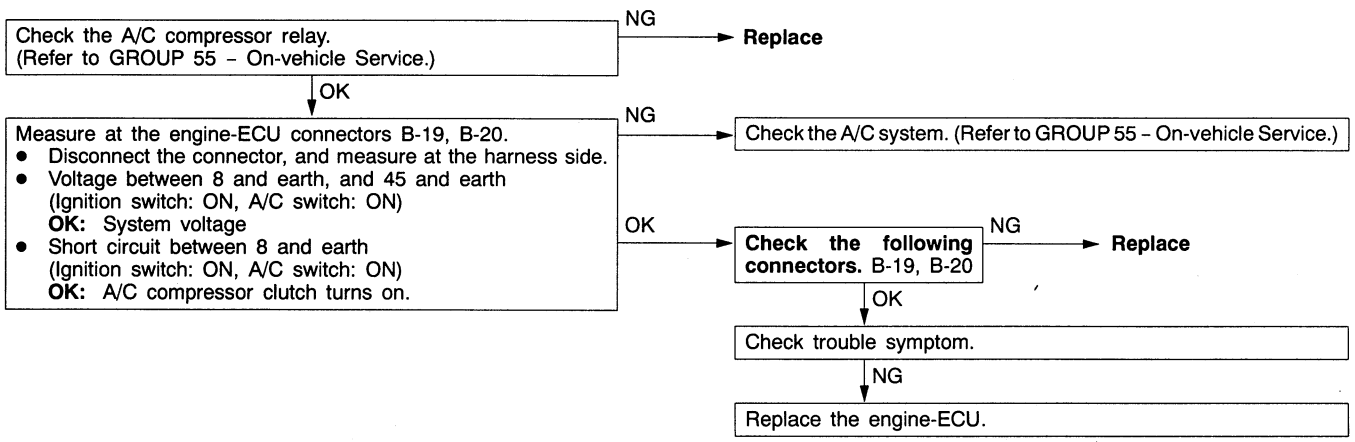
INSPECTION PROCEDURE 29

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



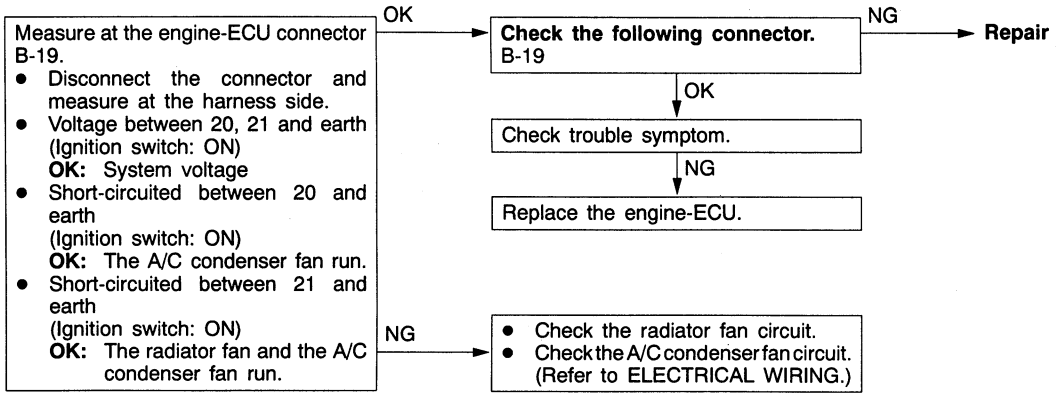
INSPECTION PROCEDURE 30

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.	• 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



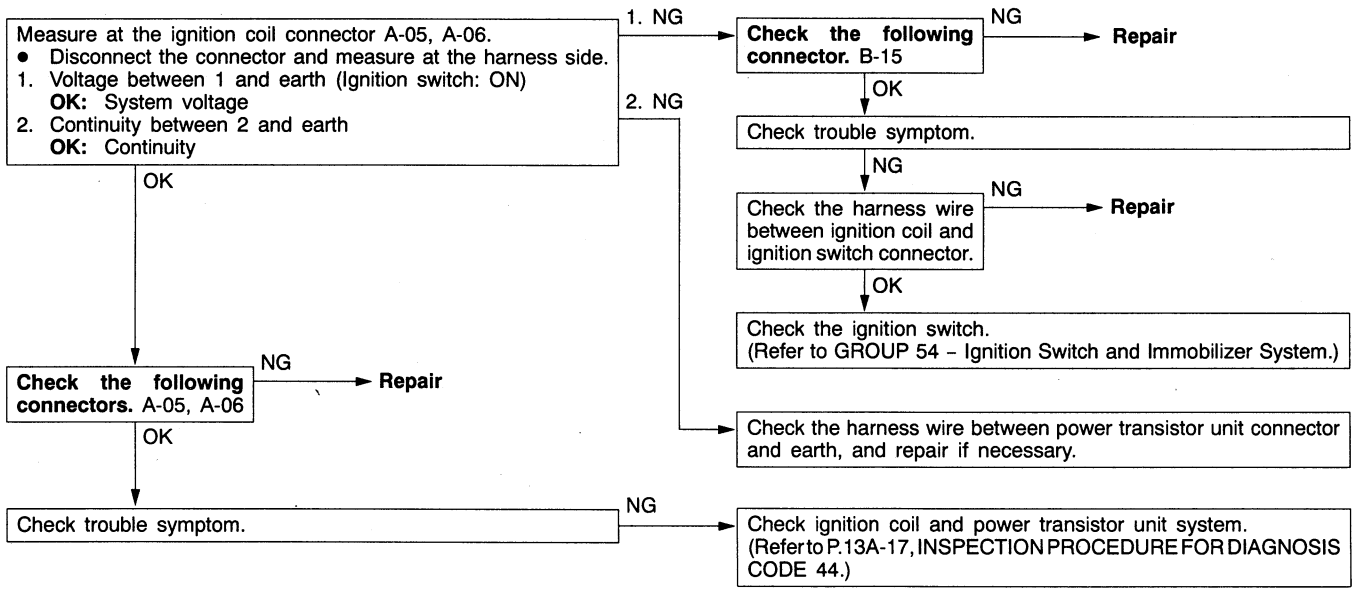
INSPECTION PROCEDURE 31

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



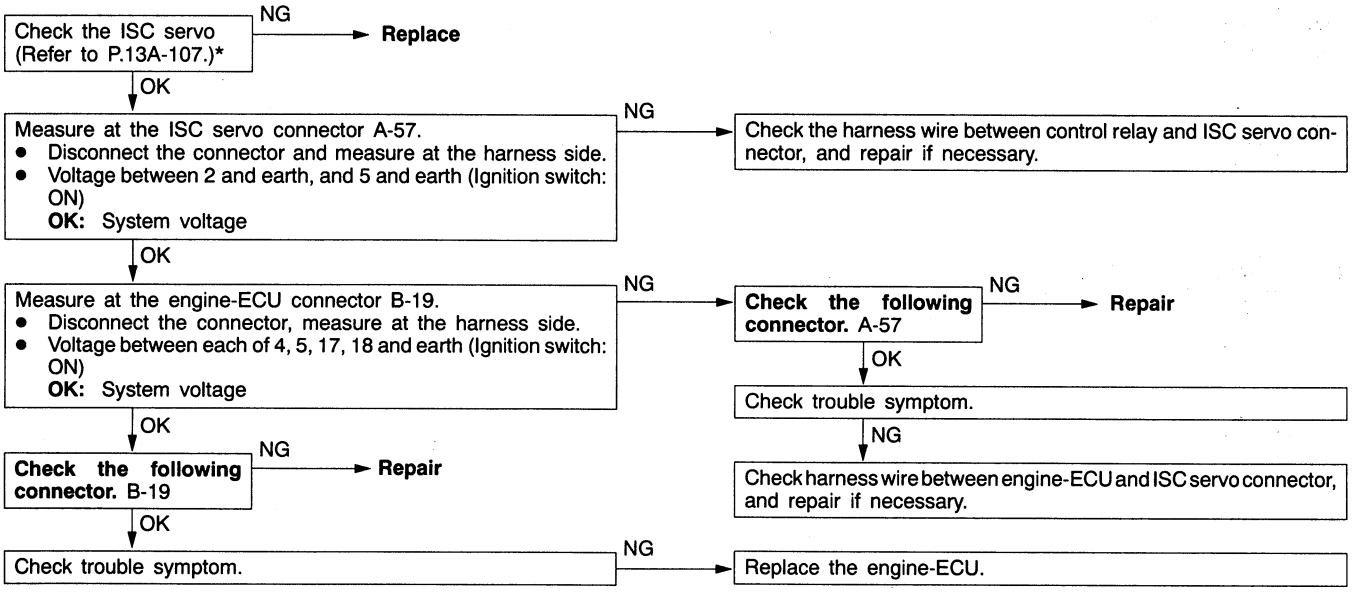
INSPECTION PROCEDURE 32

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. • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU



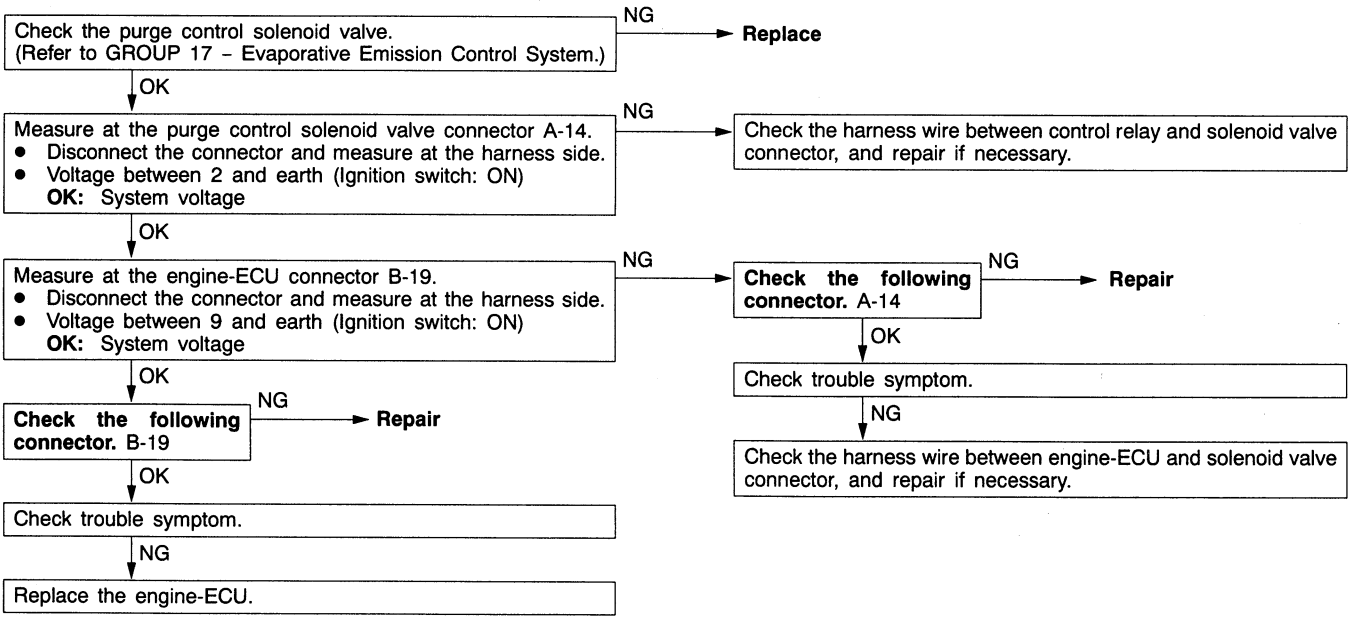
INSPECTION PROCEDURE 33

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



INSPECTION PROCEDURE 34

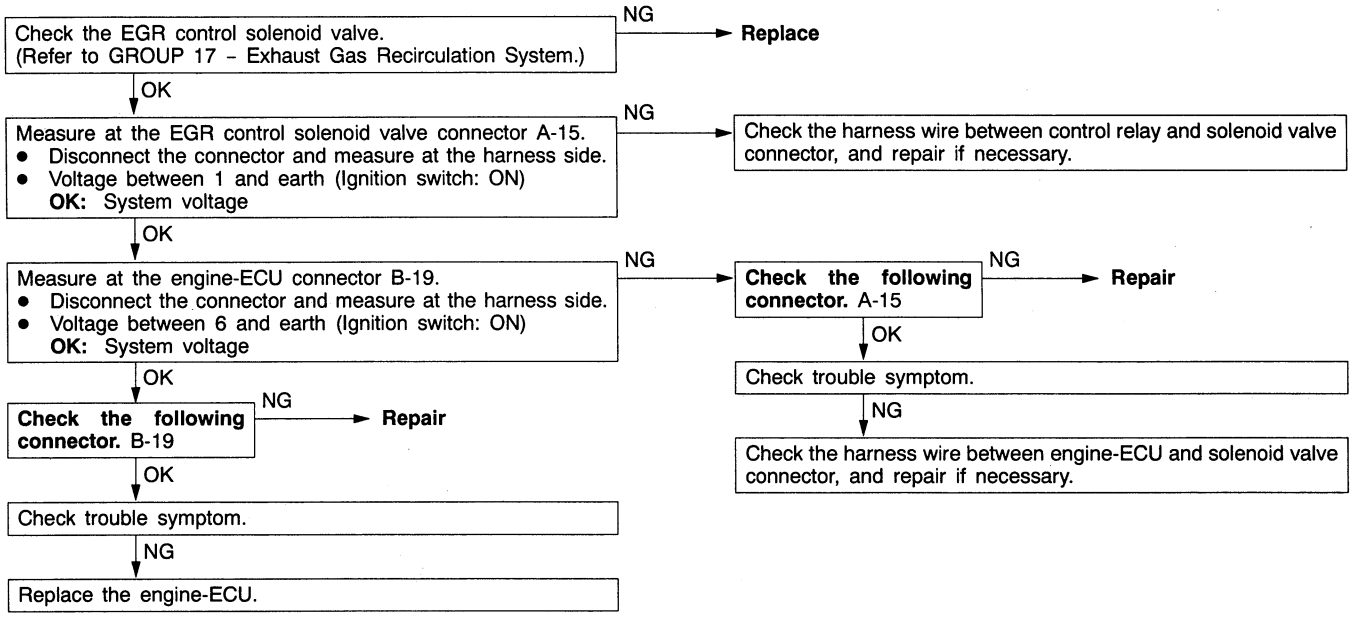
Purge control solenoid valve system	Probable cause
The purge control solenoid valve controls the purging of air from the canister located inside the intake manifold.	• Malfunction of solenoid valve • Improper connector contact, open circuit or short-circuited harness wire. • Malfunction of the engine-ECU



*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

INSPECTION PROCEDURE 35

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



INSPECTION PROCEDURE 36

MUT-II: Inspection of no initial combustion

MUT-II Data list
16 Voltage of engine-ECU power source (Refer to P.13A-55.)
- NG → Check the power supply and ignition switch-IG system. (Refer to P.13A-37, INSPECTION PROCEDURE 23.)
- OK ↓

Does the camshaft rotate at the engine cranking? (When oil filler cap is removed.)
- No → Check timing belt for breakage.
- Yes ↓

MUT-II Self-Diag code
Is the diagnosis code output?
- Yes → Refer to P.13A-7, INSPECTION CHART FOR DIAGNOSIS CODES.
- No ↓

MUT-II Data list
22 Crank angle sensor
OK: Cranking speed is displayed.
- No → Check the crank angle sensor system. (Refer to P.13A-12, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 22.)
- OK ↓

MUT-II Actuator test
07 Fuel pump (Refer to P.13A-59.)
- NG → Check the fuel pump system. (Refer to P.13A-37, INSPECTION PROCEDURE 24.)
- OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-55.)
- NG → Check the engine coolant temperature sensor system. (Refer to P.13A-11, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)

INSPECTION PROCEDURE 37

Ignition system: Inspection of no initial combustion.

Measure at the ignition coil connector A-05, A-06.
- Connect the connector. (Use test harness: MB991348)
- Connect a primary voltage detection-type tachometer to terminal (1) of each connector in turn.

OK: Each terminal displays a speed on the engine tachometer that is 1/2 of the cranking speed.
- NG → Check ignition circuit system. (Refer to P.13A-42, INSPECTION PROCEDURE 32.)
- OK ↓

Check the ignition timing when cranking.
OK: Approx. 5°BTDC
- NG → Check that the crank angle sensor are installed properly.

INSPECTION PROCEDURE 38

MUT-II: Check if uncomplete combustion occurs.

MUT-II Self-Diag code
Is the diagnosis code output?
- Yes → Refer to P.13A-7, INSPECTION CHART FOR DIAGNOSIS CODE
- No ↓

MUT-II Actuator test
07 Fuel pump (Refer to P.13A-59.)
- NG → Check the fuel pump system. (Refer to P.13A-37, INSPECTION PROCEDURE 24.)
- OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-55.)
- NG → Check the engine coolant temperature sensor system. (Refer to P.13A-11, INSPECTION PROCEDURES FOR DIAGNOSIS CODE 21.)
- NG ↓

MUT-II Data list
18 Ignition switch-ST (Refer to P.13A-55.)
- NG → Check the ignition switch-ST system <M/T>. (Refer to P.13A-39, INSPECTION PROCEDURE 27.) Check the ignition switch-ST and inhibitor switch system <A/T>. (Refer to P.13A-40, INSPECTION PROCEDURE 28.)

INSPECTION PROCEDURE 39

Check if hunting occurs.

Clean the throttle body. (Refer to P.13A-90.)*
↓
Check and adjust the fixed SAS. (Refer to P.13A-93.)*
↓
Check trouble symptom.
- NG ↓

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.

*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

INSPECTION PROCEDURE 40

MUT-II: Check if idling speed is unstable.

MUT-II Data list
26 Idle position switch (Refer to P.13A-56.)
- NG → Check the idle position switch system. (Refer to P.13A-38, INSPECTION PROCEDURE 25.) <Vehicles without TCL> (Refer to P.13A-38, INSPECTION PROCEDURE 26.) <Vehicles with TCL>
- OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-55.)
- NG → Check the intake air temperature sensor system. (Refer to P.13A-9, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 13.)
- OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer to P.13A-56.)
- NG → Check the barometric pressure sensor system. (Refer to P.13A-15, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 25.)
- OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-55.)
- NG → Check the engine coolant temperature sensor system. (Refer to P.13A-11, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)
- OK ↓

MUT-II Actuator test
08 Purge control solenoid valve (Refer to P.13A-59.)
- NG → Check the purge control solenoid valve system (Refer to P.13A-43, INSPECTION PROCEDURE 34.)
- OK ↓

MUT-II Data list
11 Oxygen sensor
OK: 600–1,000 mV during sudden racing
- NG → Check the oxygen sensor system. (Refer to P.13A-8, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 11.)
- OK ↓

MUT-II Data list
11 Oxygen sensor
OK: Changes between 0–400 mV and 600–1,000 mV during idling
- NG → Check the fuel pressure. (Refer to P.13A-95.)*
  - OK → 1. Inspect the intake of air into the air intake system.
    - Broken intake manifold gasket
    - Broken vacuum hose
    - PCV valve does not operate.
    - Broken air intake hose
    2. Check the injector for clog.
- OK ↓

MUT-II Data list
27 Power steering fluid pressure switch (Refer to P.13A-56.)
- NG → Check the power steering fluid pressure switch system. (Refer to P.13A-41, INSPECTION PROCEDURE 29.)
- OK ↓

MUT-II Data list
28 A/C switch (Refer to P.13A-56.)
- NG → Check the A/C switch and A/C relay system. (Refer to P.13A-41. INSPECTION PROCEDURE 30.)
- OK ↓

MUT-II Data list
29 Inhibitor switch (Refer to P.13A-57.)
- NG → Check the ignition switch-ST and inhibitor switch system. <A/T> (Refer to P.13A-40, INSPECTION PROCEDURE 28.)
- OK ↓

MUT-II Data list
45 ISC Servo position (Refer to P.13A-58.)
- NG → Adjust the basic idle speed. (Refer to P.13A-65.)

*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

INSPECTION PROCEDURE 41

MUT-II: Engine stalling inspection when the engine is warmed up and idling.

MUT-II Data list
26 Idle position switch (Refer to P.13A-56.)
NG → Check the idle position switch system. (Refer to P.13A-38, INSPECTION PROCEDURE 25.) <Vehicles without TCL> (Refer to P.13A-38, INSPECTION PROCEDURE 26.) <Vehicles with TCL>
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-55.)
NG → Check the intake air temperature sensor system. (Refer to P.13A-9, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 13.)
OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer to P.13A-56.)
NG → Check the barometric pressure sensor system. (Refer to P.13A-15, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 25.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-55.)
NG → Check the engine coolant temperature sensor system. (Refer to P.13A-11, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)
OK ↓

MUT-II Data list
11 Oxygen sensor
OK: Changes between 600 – 1,000 mV during sudden racing
NG → Check the oxygen sensor system. (Refer to P.13A-8, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 11.)
OK ↓

MUT-II Data list
11 Oxygen sensor
OK: Changes between 0 – 400 mV and 600 – 1,000 mV during idling
NG → Check the fuel pressure. (Refer to P.13A-95.)*
OK → 1. Inspect the intake of air into the air intake system
- Broken intake manifold gasket
- Broken vacuum hose
- PCV valve does not operate.
- Broken air intake hose

2. Check the injector for clog.

OK ↓

MUT-II Data list
27 Power steering fluid pressure switch (Refer to P.13A-56.)
NG → Check the power steering fluid pressure switch system. (Refer to P.13A-41, INSPECTION PROCEDURE 29.)
OK ↓

MUT-II Data list
28 A/C switch (Refer to P.13A-56.)
NG → Check the A/C switch and A/C relay system. (Refer to P.13A-41, INSPECTION PROCEDURE 30.)
OK ↓

MUT-II Data list
29 Inhibitor switch (Refer to P.13A-57.)
NG → Check the ignition switch-ST and inhibitor switch system. <A/T> (Refer to P.13A-40, INSPECTION PROCEDURE 28.)
OK ↓

MUT-II Data list
45 ISC servo position (Refer to P.13A-58.)
NG → Adjust the basic idle speed. (Refer to P.13A-65.)

*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

INSPECTION PROCEDURE 42

MUT-II: Check if hesitation, sug, stumble or poor acceleration occurs.

MUT-II Data list
26 Idle position switch (Refer to P.13A-56.)
NG → Check the idle position switch system. (Refer to P.13A-38, INSPECTION PROCEDURE 25.) <Vehicles without TCL> (Refer to P.13A-38, INSPECTION PROCEDURE 26.) <Vehicles with TCL>
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-55.)
NG → Check the intake air temperature sensor system. (Refer to P.13A-9, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 13.)
OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer to P.13A-56.)
NG → Check the barometric pressure sensor system. (Refer to P.13A-15, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 25.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-55.)
NG → Check the engine coolant temperature sensor system. (Refer to P.13A-11, INSPECTION PROCEDURE FOR DIAGNOSTIC CODE 21.)
OK ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-55.)
NG → Check the throttle position sensor system. (Refer to P.13A-10, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 14.)
OK ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-59.)
NG → Check the EGR control solenoid valve system. (Refer to P.13A-44, INSPECTION PROCEDURE 35.)
OK ↓

MUT-II Data list
11 Oxygen sensor
OK: Changes between 600 – 1,000 mV during sudden racing
NG → Check the oxygen sensor system. (Refer to P.13A-8, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 11.)
OK ↓

MUT-II Data list
11 Oxygen sensor
OK: Changes between 0 – 400 mV and 600 – 1,000 mV during idling
NG → Check the fuel pressure. (Refer to P.13A-95.)* OK →
1. Inspect the intake of air into the air intake system
   - Broken intake manifold gasket
   - Broken vacuum hose
   - PCV valve does not operate.
   - Broken air intake hose
2. Check the injector for clog.

OK ↓

MUT-II Actuator test
15 Vacuum control solenoid valve <Vehicle with TCL> (Refer to P.13A-59.)
NG → Check the vacuum control solenoid valve system. (Refer to P.13A-19, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 71.)
OK ↓

MUT-II Actuator test
16 Ventilation control solenoid valve <Vehicle with TCL> (Refer to P.13A-60.)
NG → Check the ventilation control solenoid valve system. (Refer to P.13A-20, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 72.)

*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

INSPECTION PROCEDURE 43

MUT-II Check if surge occurs.

MUT-II Data list
26 Idle position switch (Refer to P.13A-56.)
NG → Check the idle position switch system.
(Refer to P.13A-38, INSPECTION PROCEDURE 25.)
<Vehicles without TCL>
(Refer to P.13A-38, INSPECTION PROCEDURE 26.)
<Vehicles with TCL>
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer to P.13A-55.)
NG → Check the intake air temperature sensor system. (Refer to P.13A-9, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 13.)
OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer to P.13A-56.)
NG → Check the barometric pressure sensor system. (Refer to P.13A-15, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 25.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer to P.13A-55.)
NG → Check the engine coolant temperature sensor system. (Refer to P.13A-11, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)
OK ↓

MUT-II Data list
14 Throttle position sensor (Refer to P.13A-55.)
NG → Check the throttle position sensor system. (Refer to P.13A-10, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 14.)
OK ↓

MUT-II Actuator test
10 EGR control solenoid valve (Refer to P.13A-59.)
NG → Check the EGR control solenoid valve system. (Refer to P.13A-44, INSPECTION PROCEDURE 35.)
OK ↓

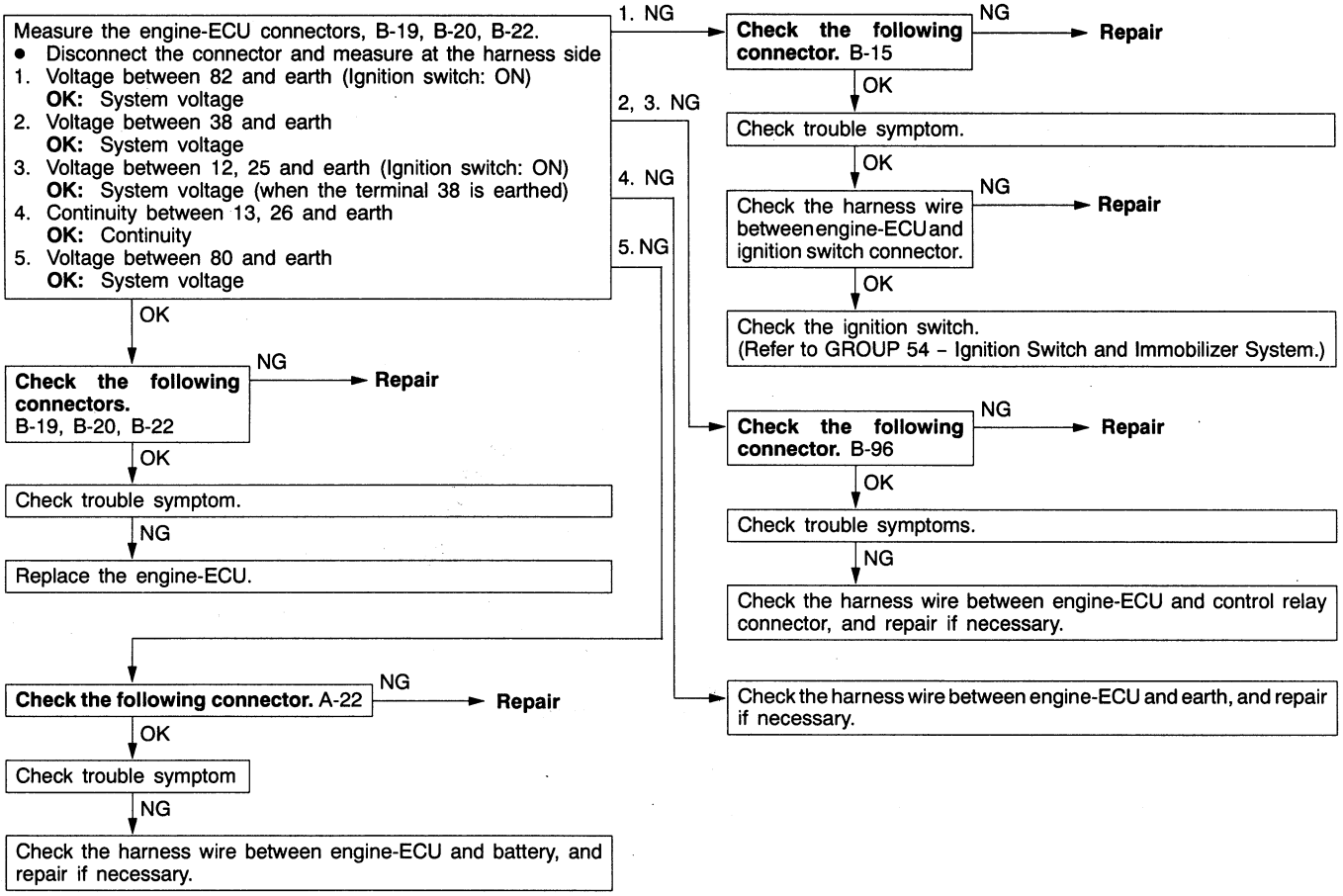
MUT-II Data list
11 Oxygen sensor
OK: Changes between 600 – 1,000 mV during sudden racing
NG → Check the oxygen sensor system. (Refer to P.13A-8, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 11.)
OK ↓

MUT-II Data list
11 Oxygen sensor
OK: Changes between 0 – 400 mV and 600 – 1,000 mV during idling
NG → Check the fuel pressure. (Refer to P.13A-95.)*
OK →
1. Inspect the intake of air into the air intake system
   - Broken intake manifold gasket
   - Broken vacuum hose
   - PCV valve does not operate.
   - Broken air intake hose
2. Check the injector for clog.

*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).

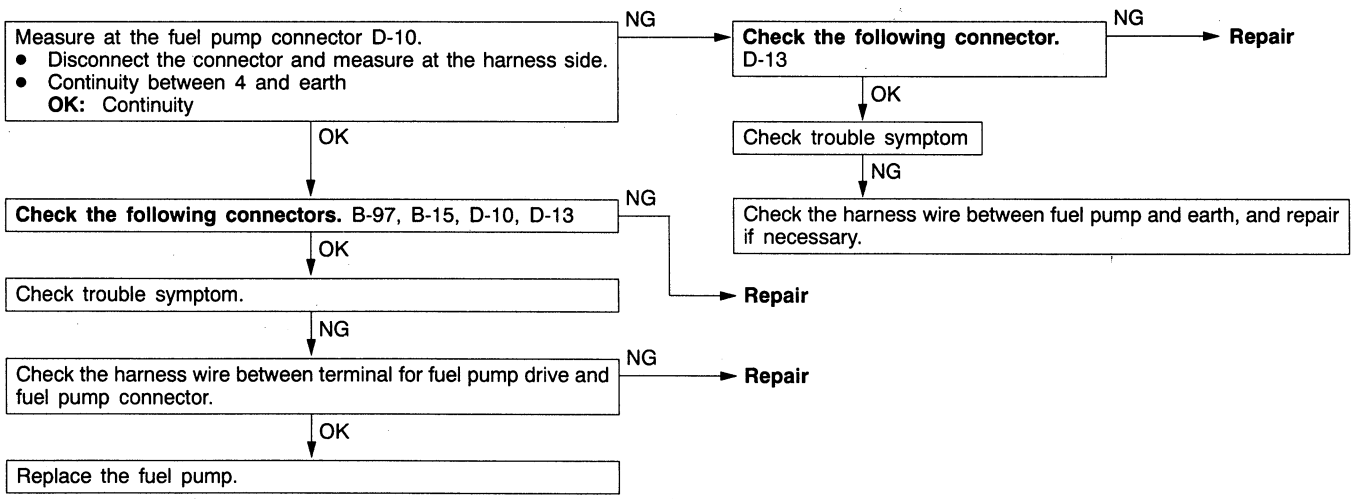
INSPECTION PROCEDURE 44

Check the engine-ECU power supply and earth circuit.



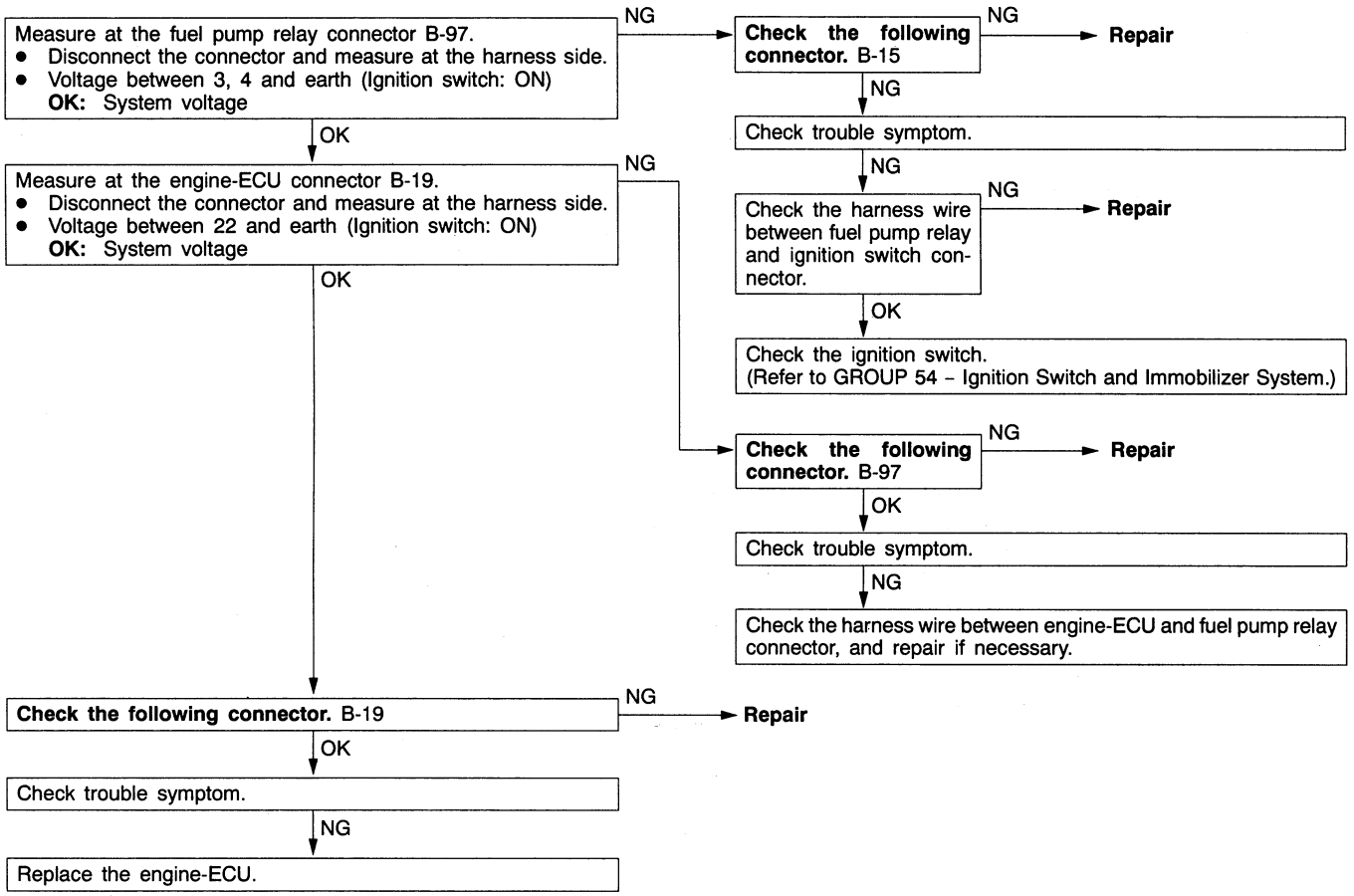
INSPECTION PROCEDURE 45

Check fuel pump circuit.



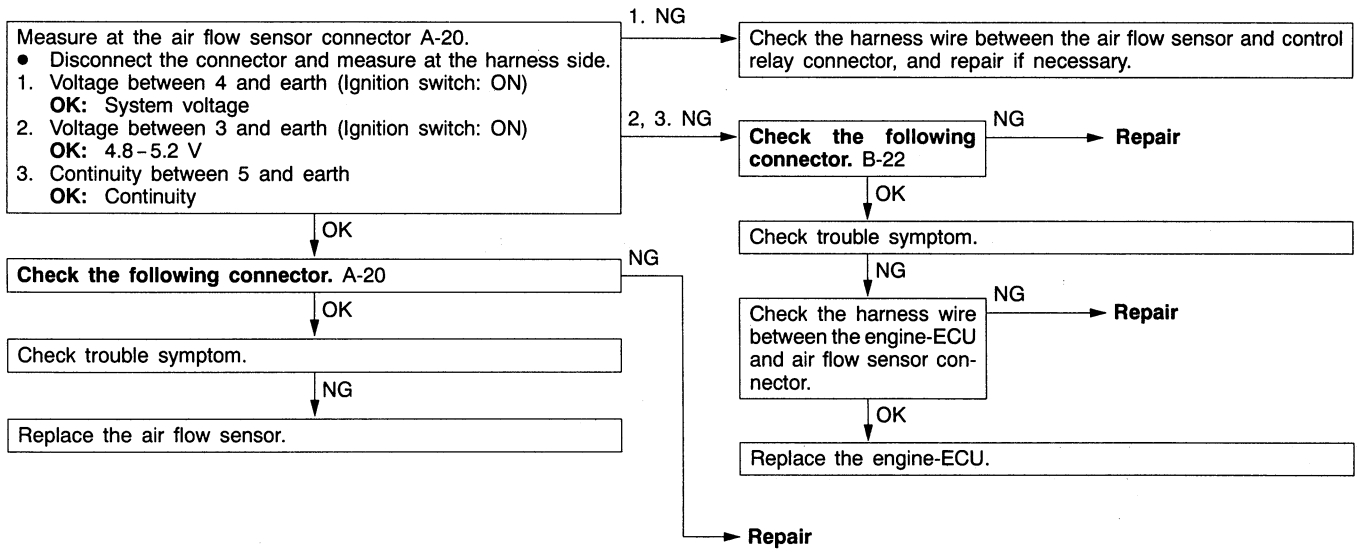
INSPECTION PROCEDURE 46

Check the fuel pump drive control circuit.



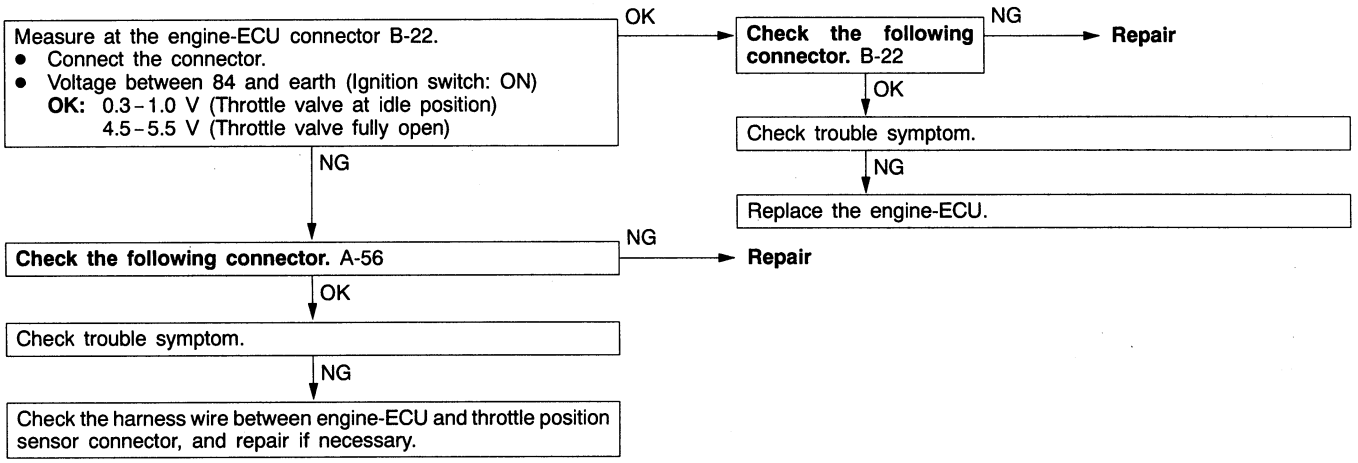
INSPECTION PROCEDURE 47

Check air flow sensor (AFS) control circuit.



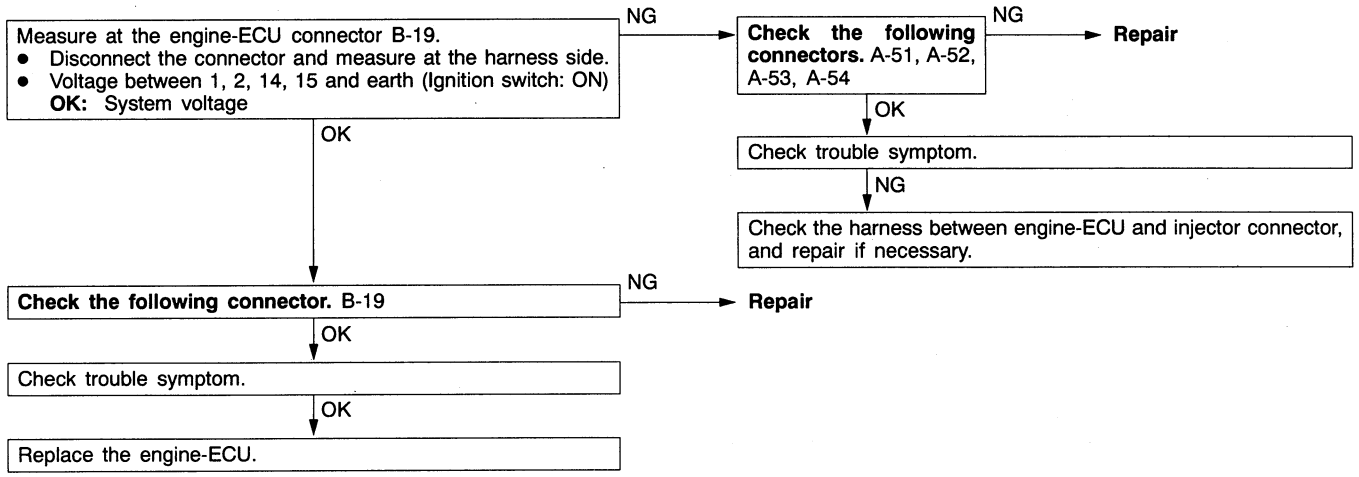
INSPECTION PROCEDURE 48

Check throttle position sensor (TPS) output circuit.



INSPECTION PROCEDURE 49

Check injector control circuit



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 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	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-8
			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 (A/T: P range)	Engine is idling	25 – 51 Hz <Except (4G92 (6B model)> 18 – 44 Hz <4G92 (6B model)>	–	–
			2,500 r/min	80 – 120 Hz <4G92> 74 – 114 Hz <4G93-SOHC> 55 – 95 Hz <4G92 (6B model), 4G93-DOHC>		
			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. 13	13A-9
			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-10
			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. 23	13A-37
18	Cranking signal (ignition switch-ST)	Ignition switch: ON	Engine: Stopped	OFF	Procedure No. 27 <M/T> Procedure No. 28 <A/T>	13A-39 13A-40
			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. 21	13A-11
			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	• Engine: Cranking • Tachometer: Connected	Compare the engine speed readings on the tachometer and the MUT-II.	Accord	Code No. 22	13A-12
		• Engine: Idling • Idle position switch: ON	When engine coolant temperature is –20°C	1,400 – 1,600 r/min		
			When engine coolant temperature is 0°C	1,350 – 1,550 r/min		
			When engine coolant temperature is 20°C	1,300 – 1,500 r/min <4G92, 4G93-DOHC> 1,250 – 1,200 r/min <4G93-SOHC>		
			When engine coolant temperature is 40°C	1,100 – 1,300 r/min <4G92, 4G93-DOHC> 1,000 – 1,200 r/min <4G93-SOHC>		
			When engine coolant temperature is 80°C	650 – 850 r/min <4G92> 700 – 900 r/min <4G93>		
25	Barometric pressure sensor	Ignition switch: ON	At altitude of 0 m	101 kPa	Code No. 25	13A-15
			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. 25 <Vehicles without TCL> Procedure No. 26 <Vehicles with TCL>	13A-38
			Throttle valve: Slightly open	OFF*5		
27	Power steering fluid pressure switch	Engine: Idling	Steering wheel stationary	OFF	Procedure No. 29	13A-41
			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-41
			A/C switch: ON	ON		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
29	Inhibitor switch <A/T>	Ignition switch: ON	P or N	P or N	Procedure No. 28	13A-40
			D, 2, L or R	D, 2, L or R		
41	Injectors *2	Engine: Cranking	When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously)	13 – 19 ms <4G92> 15 – 22 ms <4G93-SOHC> 12 – 18 ms <4G93-DOHC>	–	–
			When engine coolant temperature is 20°C	27 – 40 ms <4G92> 31 – 46 ms <4G93-SOHC> 25 – 38 ms <4G93-DOHC>		
			When engine coolant temperature is 80°C	5.9 – 8.9 ms <Except 4G92 (6B model)> 6.4 – 9.6 ms <4G92 (6B model)> 7.2 – 10.8 ms <4G93-SOHC> 6.0 – 9.0 ms <4G93-DOHC>		
	Injectors*3	• Engine coolant temperature: 80 – 95°C • Lamps and all accessories: OFF • Transmission: Neutral (A/T : P range)	Engine is idling	1.7 – 2.9 ms <Except 4G92 (6B model)> 1.4 – 2.6 ms <4G92 (6B model)> 2.2 – 3.4 ms <4G93-SOHC> 2.0 – 3.2 ms <4G93-DOHC>		
			2,500 r/min	1.4 – 2.6 ms <Except 4G92 (6B model), 4G93-DOHC> 1.2 – 2.4 ms <4G92 (6B model)> 2.0 – 3.2 ms <4G93-DOHC>		
			When engine is suddenly raced	Increases		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
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	2 – 18 °BTDC <Except 4G92 (6B model), 4G93-DOHC> 0 – 16 °BTDC <4G92 (6B model), 4G93-SOHC>	–	–
			2,500 r/min	30 – 50 °BTDC <4G92> 22 – 42 °BTDC <4G93>		
45	ISC (stepper) motor position *4	• Engine coolant temperature: 80 – 95°C • Lamps 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		
			• 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-41
			A/C switch: ON	ON (Compressor clutch is operating)		

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-16
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. 24	13A-37
				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. 34	13A-43
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. 35	13A-44
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. 71	13A-19

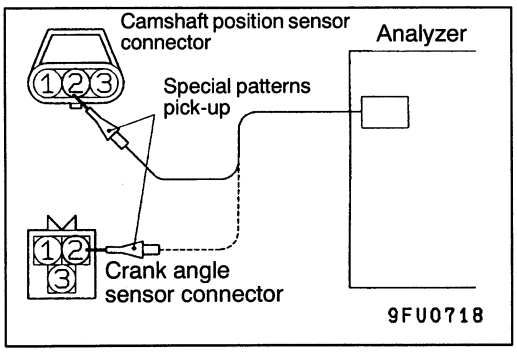
Item No.	Inspection item	Drive contents	Inspection contents	Normal condition	Inspection procedure No.	Reference page
16	Ventilation control solenoid valve <Vehicles with TCL>	Solenoid valve turns from OFF to ON.	Ignition switch: ON	Sound of operation can be heard when solenoid valve is driven.	Code No. 72	13A-20
17	Basic ignition timing	Set to ignition timing adjustment mode	Engine: Idling Timing light is set	5° BTDC	–	–
20	Condenser fan	Drive the fan motors (condenser)	• Ignition switch: ON • A/C switch: ON	Fan motor operates	Procedure No. 31	13A-42
21	Radiator fan and Condenser fan	Drive the fan motors (radiator and condenser).	Ignition switch: ON A/C switch: ON	Fan motor operates	Procedure No. 31	13A-42

CHECK AT THE ENGINE-ECU TERMINALS

TERMINAL VOLTAGE CHECK CHART

The ignition timing adjustment terminal has been deleted from the previous check items. In addition, the following check items have been added or changed for the SOHC engine. The other items are the same as before.

Terminal No. <SOHC>	Check item	Check condition (Engine condition)	Normal condition
10	Ignition coil-No.1, No.4 (power transistor)	Engine r/min: 3000 r/min	0.3 – 3.0 V
23	Ignition coil-No.2, No.3 (power transistor)		
58	Engine ignition signal	Engine r/min: 3000 r/min	0.3 – 3.0 V
88	Camshaft position sensor	Engine: Cranking	0.4 – 3.0 V
		Engine: Idle speed	0.5 – 2.0 V



INSPECTION PROCEDURE USING AN ANALYZER

CAMSHAFT POSITION SENSOR AND CRANK ANGLE SENSOR

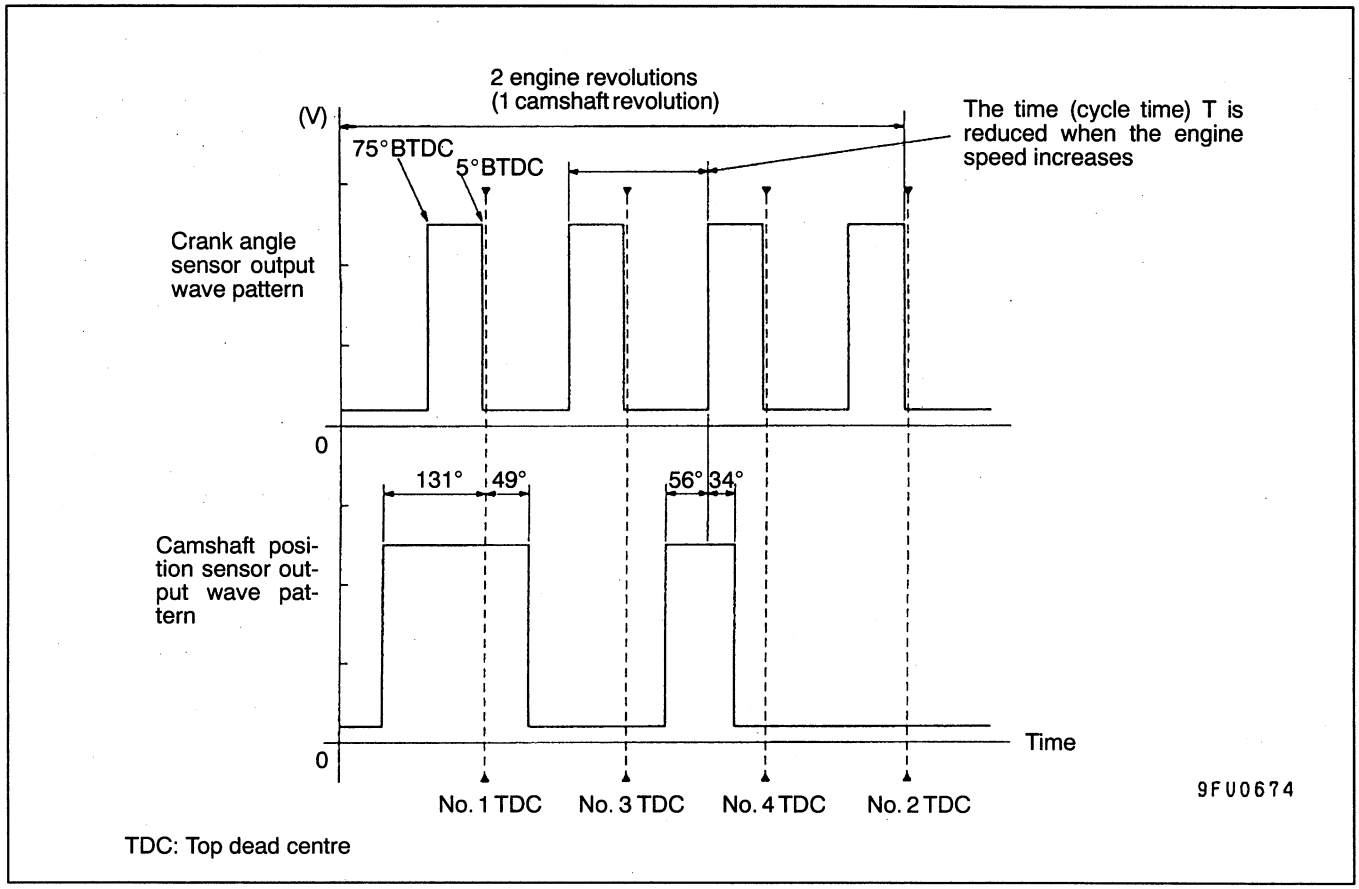
Measurement Method

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 patterns 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 patterns pickup to crank angle sensor terminal 2.

Alternate Method (Test harness not available)

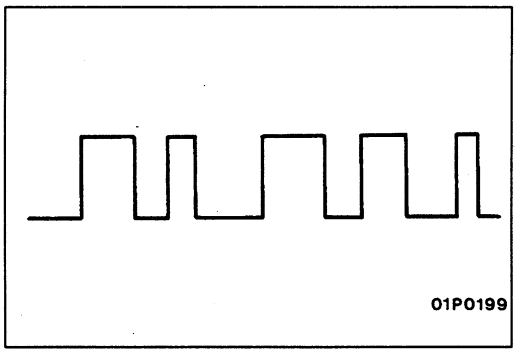
1. Connect the analyzer special patterns pickup to engine-ECU terminal 88. (When checking the camshaft position sensor signal wave pattern.)
2. Connect the analyzer special patterns pickup to engine-ECU terminal 89. (When checking the crank angle sensor signal wave pattern.)

Standard wave pattern



Wave Pattern Observation Points

Check that cycle time T becomes shorter when the engine speed increases.



Examples of Abnormal Wave Patterns

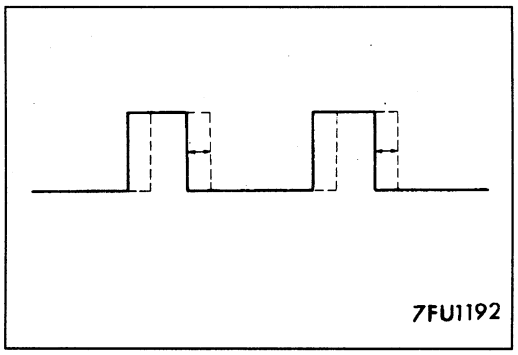
- Example 1

  Cause of problem

  Sensor interface malfunction

  Wave pattern characteristics

  Rectangular wave pattern is output even when the engine is not started.



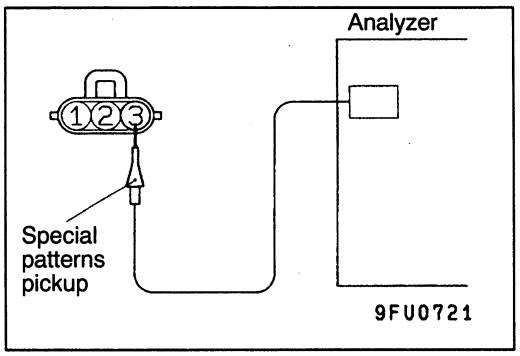
- Example 2

  Cause of problem

  Loose timing belt
  Abnormality in sensor disk

  Wave pattern characteristics

  Wave pattern is displaced to the left or right.



IGNITION COIL AND POWER TRANSISTOR

- Ignition coil primary signal
  Refer to GROUP 16 – Ignition System.
- Power transistor control signal

Measurement Method

1. Disconnect the ignition coil connector, and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to terminal (3) of each ignition coil connector in turn.

Alternate Method (Test harness not available)

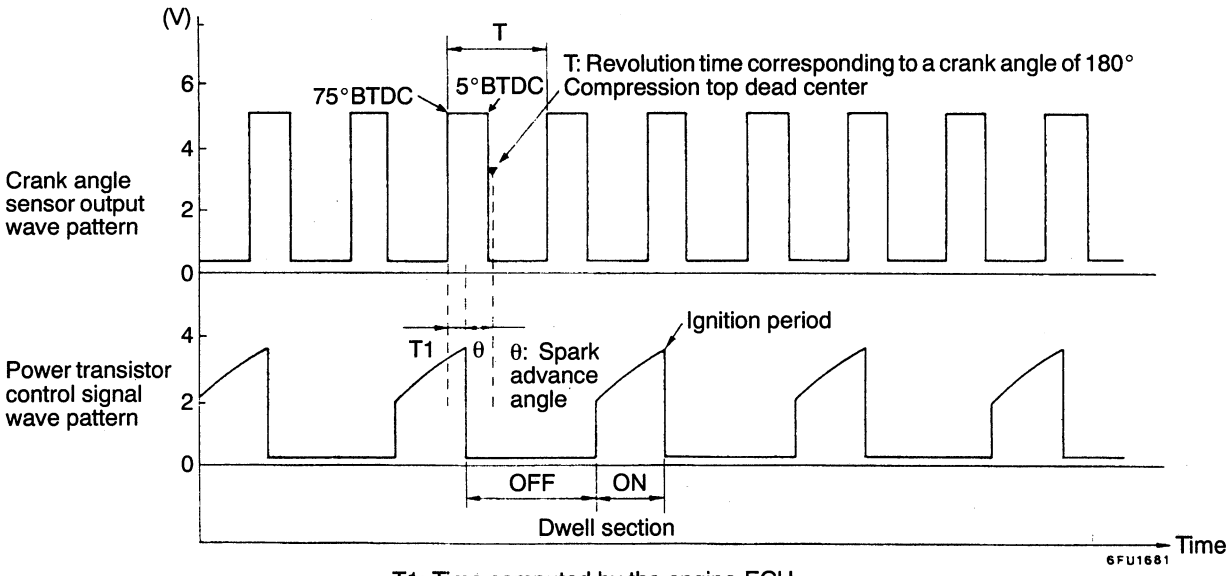
1. Connect the analyzer special patterns pickup to engine-ECU terminal 10 (No. 1 – No. 4), terminal 23 (No. 2 – No. 3) respectively.

Standard Wave Pattern

Observation condition

Function	Special patterns
Pattern height	Low
Pattern selector	Display
Engine r/min	Approx. 1,200 r/min

Standard wave pattern

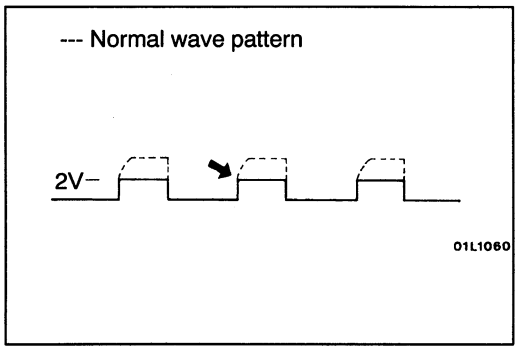


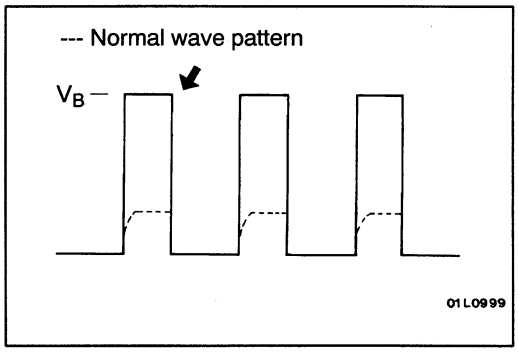
T1: Time computed by the engine-ECU

Wave Pattern Observation Points

Point: Condition of wave pattern build-up section and maximum voltage (Refer to abnormal wave pattern examples 1 and 2.)

Condition of wave pattern build-up section and maximum voltage	Probable cause
Rises from approx. 2V to approx. 4.5V at the top-right	Normal
2V rectangular wave	Open-circuit in ignition primary circuit
Rectangular wave at power voltage	Power transistor malfunction





Examples of Abnormal Wave Patterns

- Example 1

  Wave pattern during engine cranking

  Cause of problem

  Open-circuit in ignition primary circuit

  Wave pattern characteristics

  Top-right part of the build-up section cannot be seen, and voltage value is approximately 2V too low.

- Example 2

  Wave pattern during engine cranking

  Cause of problem

  Malfunction in power transistor

  Wave pattern characteristics

  Power voltage results when the power transistor is ON.

ON-VEHICLE SERVICE

BASIC IDLE SPEED ADJUSTMENT

NOTE
1. The standard idling speed has been adjusted, by the speed adjusting screw (SAS), by the manufacturer, and there should usually be no need for readjustment.
2. If the adjustment has been changed by mistake, the idle speed may become too high or the idle speed may drop too low when loads from components such as the A/C are placed on the engine. If this occurs, adjust by the following procedure.
3. The adjustment, if made, should be made after first confirming that the spark plugs, the injectors, the idle speed control servo, the compression pressure, etc., are all normal.

1. Before inspection and adjustment, set the vehicle to the pre-inspection condition.
2. Connect the MUT-II to the diagnosis connector (16-pin).

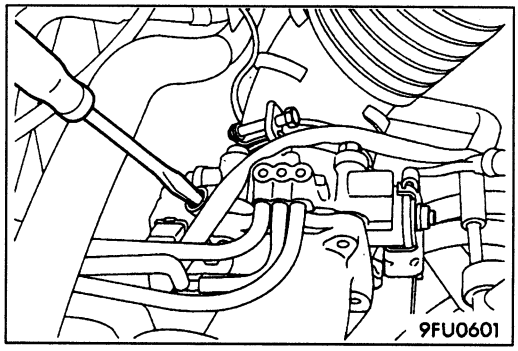
   NOTE
   When the MUT-II is connected, the diagnosis control terminal should be earthed.
3. Start the engine and run at idle.
4. Select the item No.30 of the MUT-II Actuator test.

   NOTE
   This holds the ISC servo at the basic step to adjust the basic idle speed.
5. Check the idle speed.

   Standard value:
   750 ± 50 r/min <Except 4G92 (6B model)>
   800 ± 50 r/min <4G92 (6B models), 4G93>

NOTE
1. The engine speed may be 20 to 100 r/min lower than indicated above for a new vehicle [driven approximately 500 km or less], but no adjustment is necessary.
2. If the engine stalls or the engine speed is low even though the vehicle has been driven approximately 500 km or more, it is probable that deposits are adhered to the throttle valve, so clean it. (Refer to P.13A-90.)*

*: Refer to '96 CARISMA Workshop Manual (Pub. No.PWDE9502).



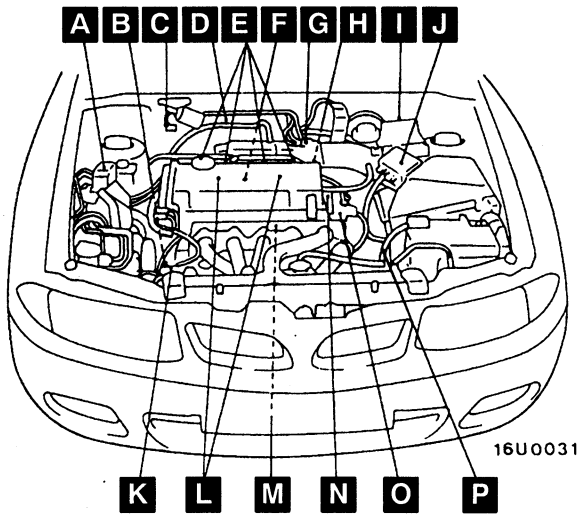
6. If not within the standard value range, turn the speed adjusting screw (SAS) to make the necessary adjustment.

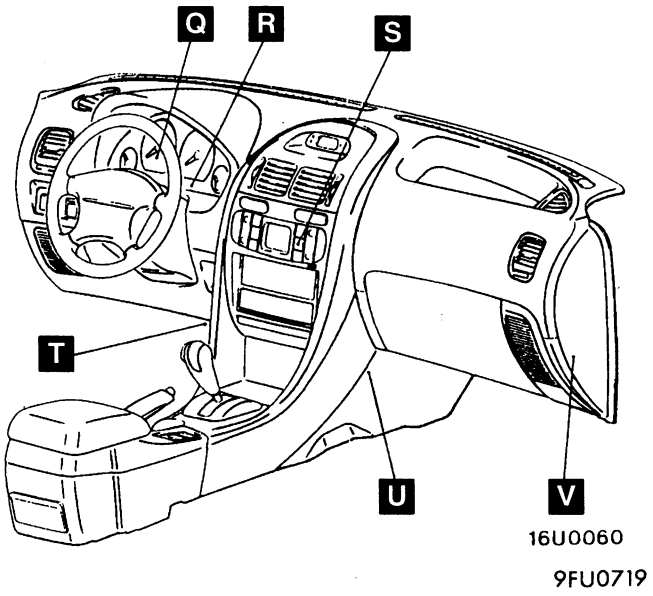
   NOTE
   If the idling speed is higher than the standard value range even when the SAS is fully closed, check whether or not there is any indication that the fixed SAS has been moved. If there is an indication that it has been moved, adjust the fixed SAS.
7. Press the MUT-II clear key, and release the ISC servo from the Actuator test mode.

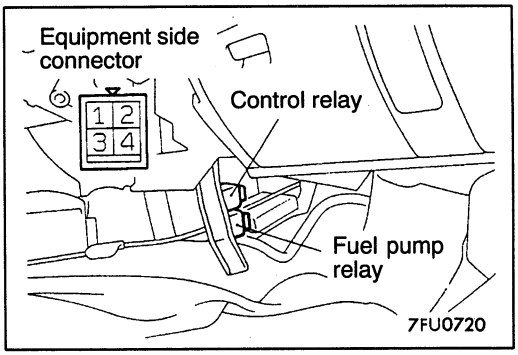
   NOTE
   Unless the ISC servo is released, the Actuator test mode will continue 27 minutes.
8. Switch OFF the ignition switch.
9. Disconnect the MUT-II.
10. Start the engine again and let it run at idle speed for about 10 minutes; check that the idling condition is normal.

COMPONENT LOCATION

Name	Symbol	Name	Symbol
Accelerator pedal position sensor (with idle position switch) <SOHC-vehicles with TCL>	H	Fuel pomp relay	U
A/C relay	A	Idle speed control servo	H
A/C switch	S	Ignition coil	L
Air flow sensor (with intake air temperature sensor and barometric pressure sensor)	J	Inhibitor switch <A/T>	P
Camshaft position sensor	N	Injector	E
Control relay	U	Oxygen sensor	M
Crank angle sensor	B	Power steering fluid pressure switch	K
Detonation sensor	F	Purge control solenoid valve <SOHC-L.H. drive vehicles, DOHC>	I
Diagnosis connector	T	Purge control solenoid valve <SOHC-R.H. drive vehicles>	C
EGR control solenoid valve <SOHC-L.H. drive vehicles, DOHC>	I	Throttle position sensor <SOHC-vehicles with TCL>	G
EGR control solenoid valve <SOHC-R.H. drive vehicles>	C	Throttle position sensor (with idle position switch) <SOHC-vehicles without TCL, DOHC>	G
Engine coolant temperature sensor	O	Vacuum control solenoid valuve <SOHC-vehicles with TCL>	D
Engine-ECU	V	Vehicle speed sensor	Q
Engine warning lamp (check engine lamp)	R	Ventilation control solenoid valve <SOHC-vehicles with TCL>	D
Fuel pump check terminal	D		







CONTROL RELAY AND FUEL PUMP RELAY CONTINUITY CHECK

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

DIESEL FUEL

CONTENTS

GENERAL

OUTLINE OF CHANGE

The following maintenance service points have been established to correspond to the adoption of the F8QT engine.
Applicable models: 1900D

GENERAL INFORMATION

The electronically-controlled injection pump system consists of sensors which detect the condition of the diesel engine, an engine-ECU which controls the system based on signals from these sensors, and actuators which operate according to control commands from the engine-ECU.

The engine-ECU carries out operations such as fuel injection timing control and idle up control. In addition, the engine-ECU is equipped with several self-diagnosis functions which make troubleshooting easier in the event that a problem develops.

FUEL INJECTION TIMING CONTROL

The position of the injection pump timer piston is controlled so that fuel injection is carried out at the optimum timing in accordance with the engine running condition.

The timer piston position is determined by the timing control solenoid valve which is located in the high-pressure chamber of the timer piston.

SELF-DIAGNOSIS FUNCTION

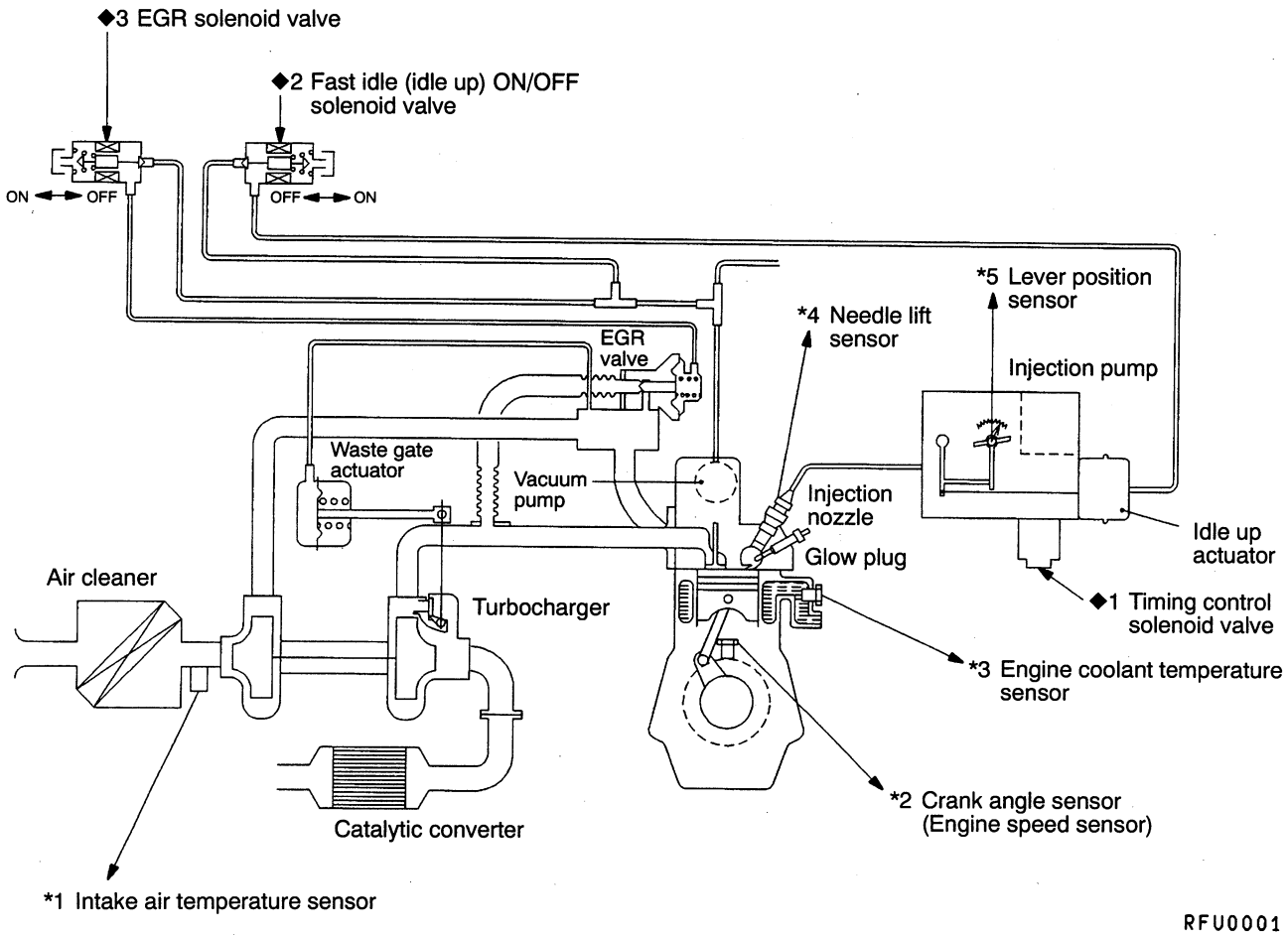
- When an abnormality is detected in any of the sensors or actuators, the engine warning lamp illuminates to warn the driver.
- When an abnormality is detected in any of the sensors or actuators, a diagnosis code number corresponding to the problem which occurred is output.
- The RAM data relating to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

OTHER CONTROL FUNCTIONS

1. A/C Relay Control
   Turns the compressor clutch of the A/C ON and OFF.
2. Glow Control
   Refer to GROUP 16.
3. EGR Control
   Refer to GROUP 17.
4. Idle up Control
   The idle up control is performed when the engine is cold or the A/C is ON.

DIESEL FUEL SYSTEM DIAGRAM

*1 Intake air temperature sensor *2 Crank angle sensor (Engine speed sensor) *3 Engine coolant temperature sensor *4 Needle lift sensor *5 Lever position sensor --- ● Power supply voltage ● Vehicle speed sensor ● A/C switch ● Power steering fluid pressure switch	⇨ Engine-ECU ⇨	◆1 Timing control solenoid valve ◆2 Fast idle (idle up) ON/OFF solenoid valve ◆3 EGR solenoid valve --- ● A/C power relay ● Engine warning lamp ● Glow indicator lamp ● Diagnosis signal ● Glow relay box (glow plug relay 1, glow plug relay 2)

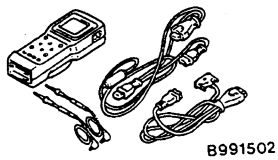
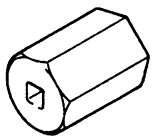
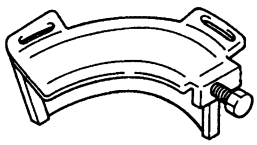
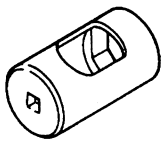


RFU0001

SERVICE SPECIFICATIONS

Items		Specifications
Intake air temperature sensor resistance kΩ	At 20°C	3.3 – 3.8
	At 80°C	0.32 – 0.35
Engine coolant temperature sensor resistance kΩ	At 20°C	3.3 – 3.8
	At 80°C	0.32 – 0.35
Resistance between lever position sensor terminals (1) – (3) kΩ		3.3 – 5.0
Resistance between lever position sensor terminals (1) – (2) kΩ	Throttle lever idle position	1.5 – 3.5
	Throttle lever full open	4.1 – 7.1
Crank angle sensor output voltage mV (AC voltage)		300 or more
Crank angle sensor resistance Ω		200 – 270
Needle lift sensor resistance Ω		95 – 125
Timing control solenoid valve coil resistance Ω		10.5 – 13.5
Fast idle ON/OFF solenoid valve coil resistance Ω		27 – 31 (at 23°C)
Fuel injection initial pressure kPa		13,000

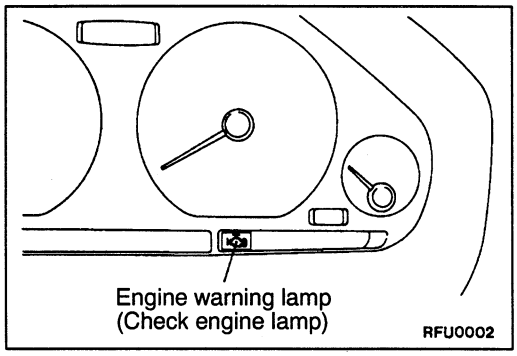
SPECIAL TOOLS

Tool	Number	Name	Use
 B991502	MB991502	MUT-II sub assembly	• Reading diagnosis code • Checking the electronic control fuel injection pump system
	MB996036	Hexagon socket	• Removal of screwed sleeve and nut assembly
	MB996043	Sprocket stopper	• Locking the injection pump socket
	MB996041	Special socket	• Removal of the fuel injectors

TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING FLOW

Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502), GROUP 00 – How to Use Troubleshooting/Inspection Service Points.



DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

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

Engine warning lamp inspection items

Engine coolant temperature sensor
Lever position sensor
Needle lift sensor
Timing control solenoid valve
Crank angle sensor

NOTE
When the ignition switch is ON, the engine warning lamp illuminates as checking of the engine warning lamp circuit and the bulb, and then the warning lamp is extinguished when the engine is start.

METHOD OF READING AND ERASING DIAGNOSIS CODES

Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502), GROUP 00 – How to Use Troubleshooting/Inspection Service Points.

INSPECTION USING MUT-II DATA LIST AND ACTUATOR TESTING

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

FAIL-SAFE FUNCTION REFERENCE TABLE

Malfunctioning item	Fuel injection timing control	Glow control	EGR control	Idle up control	Air condition control
Engine coolant temperature sensor	Sets a pseudo coolant temperature based on the cumulative engine speed since the engine was started. $-20 \leq t°C \leq 80$	<Pre-glow> Approx. 14-second control is carried out as if the engine coolant temperature is -30°C. <After glow> Control is carried out as if the engine coolant temperature is 60°C.	Carry out control as if the water temperature is 0°C.	Sets a pseudo coolant temperature based on the cumulative engine speed since the engine was started. $-20 \leq t°C \leq 80$	ON/OFF control is carried out using only the vehicle speed sensor signal.
Lever position sensor	Carry out control as if the lever opening angle is approx. 50%.	Carry out control as if the lever opening angle is approx. 50%.	EGR control is stopped.	–	Carry out control as if the lever opening angle is approx. 30%.
Barometric pressure sensor	Carry out control as if the altitude is 900 m.	Carry out control as if the altitude is 900 m.	EGR control is stopped.	–	–
Intake air temperature sensor	Carry out control as if the intake air temperature is 22°C.	–	EGR control is stopped.	–	–
Battery voltage	Carry out control as if the battery voltage is 13.5 V.	Glow control is stopped.	–	–	–
Crank angle sensor (Engine speed sensor)	Carry out fully-advanced control.	<Pre-glow> – <After glow> The control time is set to 210 seconds.	EGR control is stopped.	Idle up control is not carried out as if the engine speed is 2,000 r/min.	The engine speed is set to 2,000 r/min.

Malfunctioning item	Fuel injection timing control	Glow control	EGR control	Idle up control	Air condition control
Needle lift sensor	Does not carry out feedback control. (OPEN LOOP)	–	–	–	–
Vehicle speed sensor	–	–	The vehicle speed is set to 175 km/h.	The vehicle speed is set to 175 km/h.	The vehicle speed is set to 175 km/h.
EGR solenoid valve	–	–	EGR control is stopped.	–	–
Glow indicator lamp	–	Glow indicator lamp does not illuminate.	–	–	–
Glow plug relay 1	–	The functioning of glow plug relay 2 is stopped.	–	–	–
Glow plug relay 2	–	The functioning of glow plug relay 1 is stopped.	–	–	–
Fast idle ON/ OFF solenoid valve	–	–	–	Idle up control is stopped.	–
Engine warning lamp	Engine warning lamp does not illuminate.	Engine warning lamp does not illuminate.	Engine warning lamp does not illuminate.	Engine warning lamp does not illuminate.	Engine warning lamp does not illuminate.

INSPECTION CHART FOR DIAGNOSIS CODES

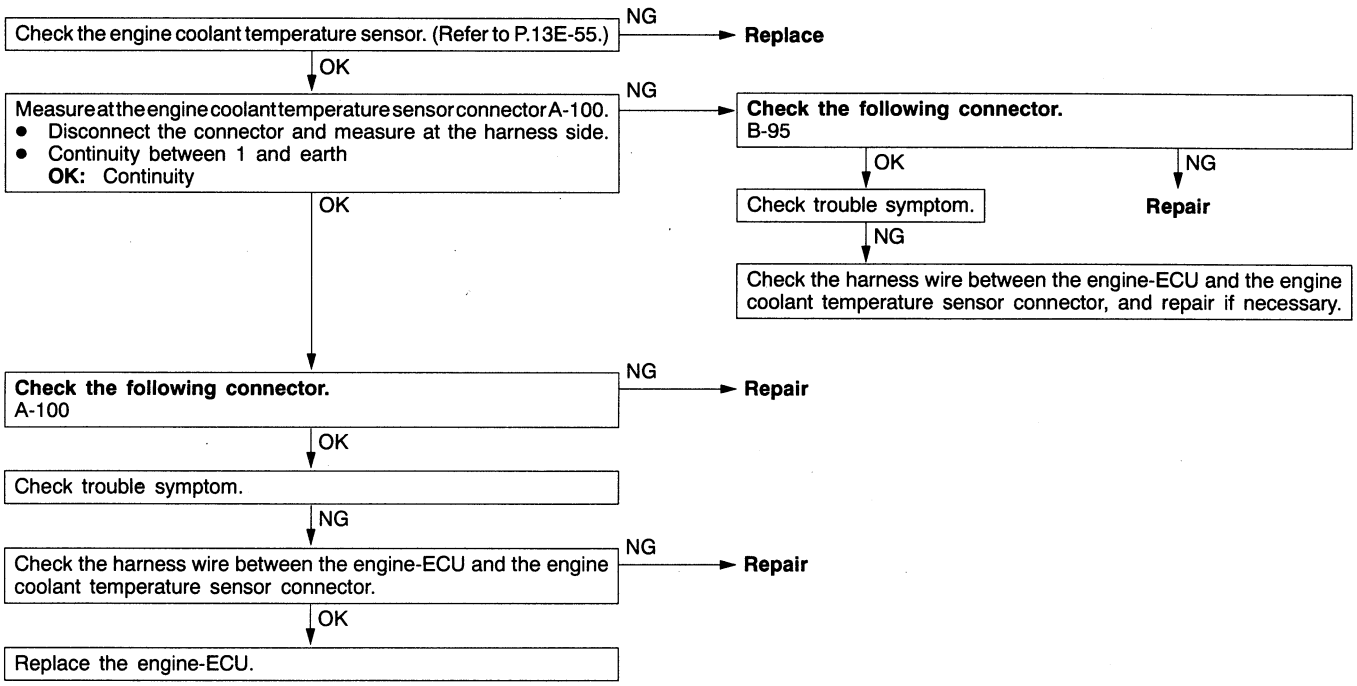
Caution
Check that the engine-ECU earth circuit is normal before checking for the cause of the problem.

Code No.	Diagnosis item	Reference page
11	Physical engine coolant temperature under range	13E-10
12	Lever position under range	13E-11
13	Physical barometric pressure under range	13E-11
14	Physical intake air temperature under range	13E-12
15	Battery voltage under range	13E-13
16	Engine speed (crank angle sensor)	13E-14
17	Needle lift	13E-15
18	Vehicle speed input stuck low	13E-16
21	Timing control solenoid valve drive stuck low	13E-17
22	EGR solenoid valve drive stuck low	13E-18
23	Glow indicator lamp drive stuck low	13E-19
24	Glow plug relay 1 drive stuck low	13E-20
25	Glow plug relay 2 drive stuck low	13E-21
26	Fast idle ON/OFF solenoid valve drive stuck low	13E-22
28	Engine warning lamp drive stuck low	13E-23
31	Physical engine coolant temperature over range	13E-24
32	Lever position over range	13E-25
33	Physical barometric pressure over range	13E-25
34	Physical intake air temperature over range	13E-26
35	Battery voltage over range	13E-26
38	Vehicle speed input stuck high	13E-27
41	Timing control solenoid valve drive stuck high	13E-28
42	EGR solenoid valve drive stuck high	13E-28
43	Glow indicator lamp drive stuck high	13E-28
44	Glow plug relay 1 drive stuck high	13E-29
45	Glow plug relay 2 drive stuck high	13E-29

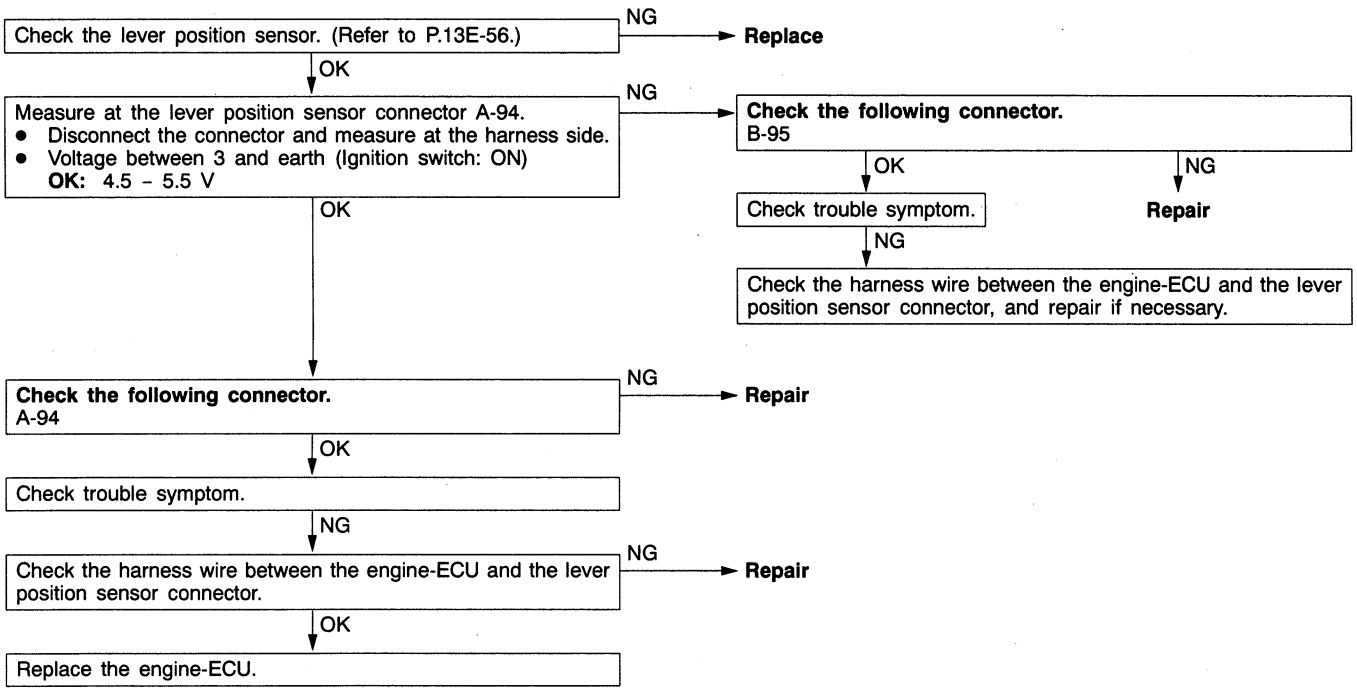
Code No.	Diagnosis item	Reference page
46	Fast idle ON/OFF solenoid valve drive stuck high	13E-30
47	Air conditioning drive stuck high	13E-30
48	Engine warning lamp drive stuck high	13E-31
51	Timing control fault	13E-32
53	Glow plug 1 (No.1, No.3 cylinder) voltage monitor fault.	13E-33
54	Glow plug 2 (No.2, No.4 cylinder) voltage monitor fault.	13E-33
55	Sensor supply voltage under range	13E-34

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

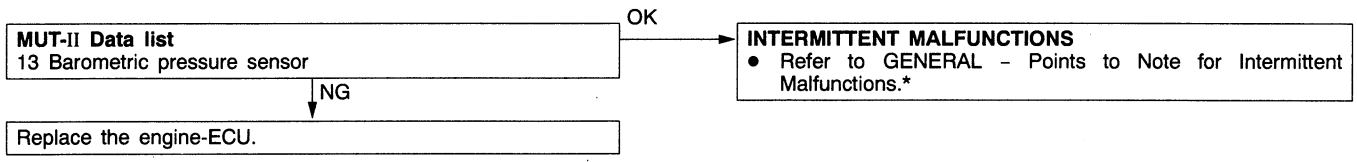
Code No.11 Physical engine coolant temperature under range	**Probable cause**
Range of Check • Ignition switch: ON **Set Conditions** • Engine coolant temperature sensor output voltage is 4.96 V or more (corresponding to an engine coolant temperature of −45°C or less).	• Malfunction of the engine coolant temperature sensor • Open circuit in engine coolant temperature sensor or poor connector contact • Malfunction of the engine-ECU



Code No.12 Lever position under range	Probable cause
Range of Check • Ignition switch: ON **Set Conditions** • Lever position sensor output voltage is 0.2 V or less.	• Malfunction of the lever position sensor • Short-circuit in lever position sensor signal line • Open circuit in lever position sensor power supply line • Malfunction of the engine-ECU

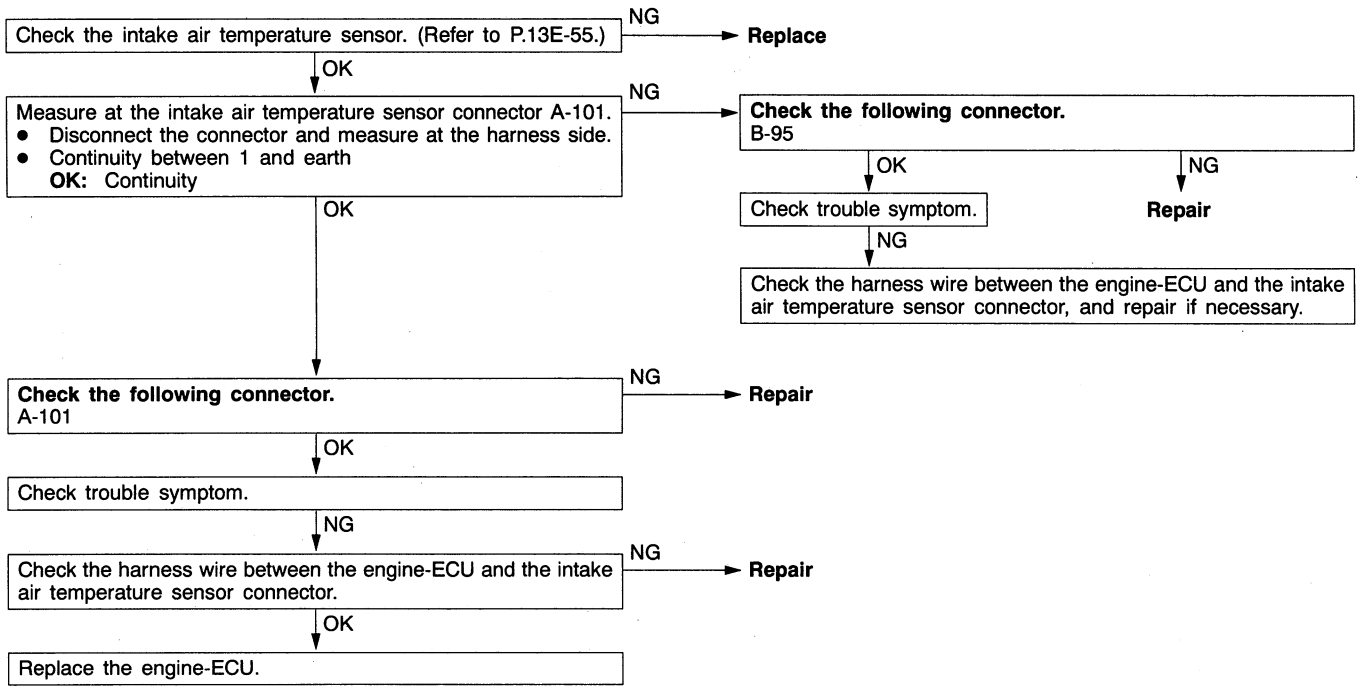


Code No.13 Physical barometric pressure under range	Probable cause
Range of Check • Ignition switch: ON **Set Conditions** • Barometric pressure sensor output pressure is 18 kPa or less. or • Sensor is not carrying out electrical control.	• Malfunction of the barometric pressure sensor (built into engine-ECU) • Malfunction of the engine-ECU

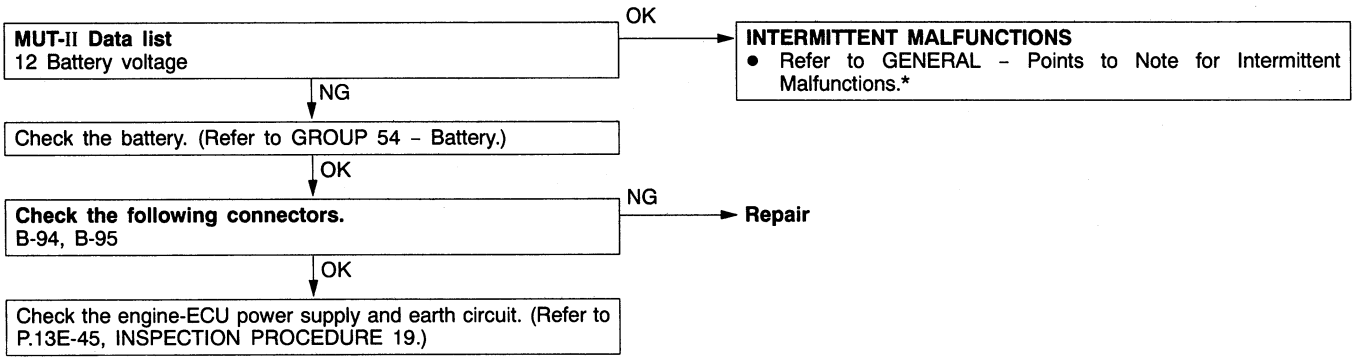


*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

Code No.14 Physical intake air temperature under range	Probable cause
Range of Check • Ignition switch: ON **Set Conditions** • Intake air temperature sensor output voltage is 4.96 V or more. (corresponding to an intake air temperature of −45°C or less)	• Malfunction of the intake air temperature sensor • Open circuit in intake air temperature sensor circuit or poor connector contact • Malfunction of the engine-ECU

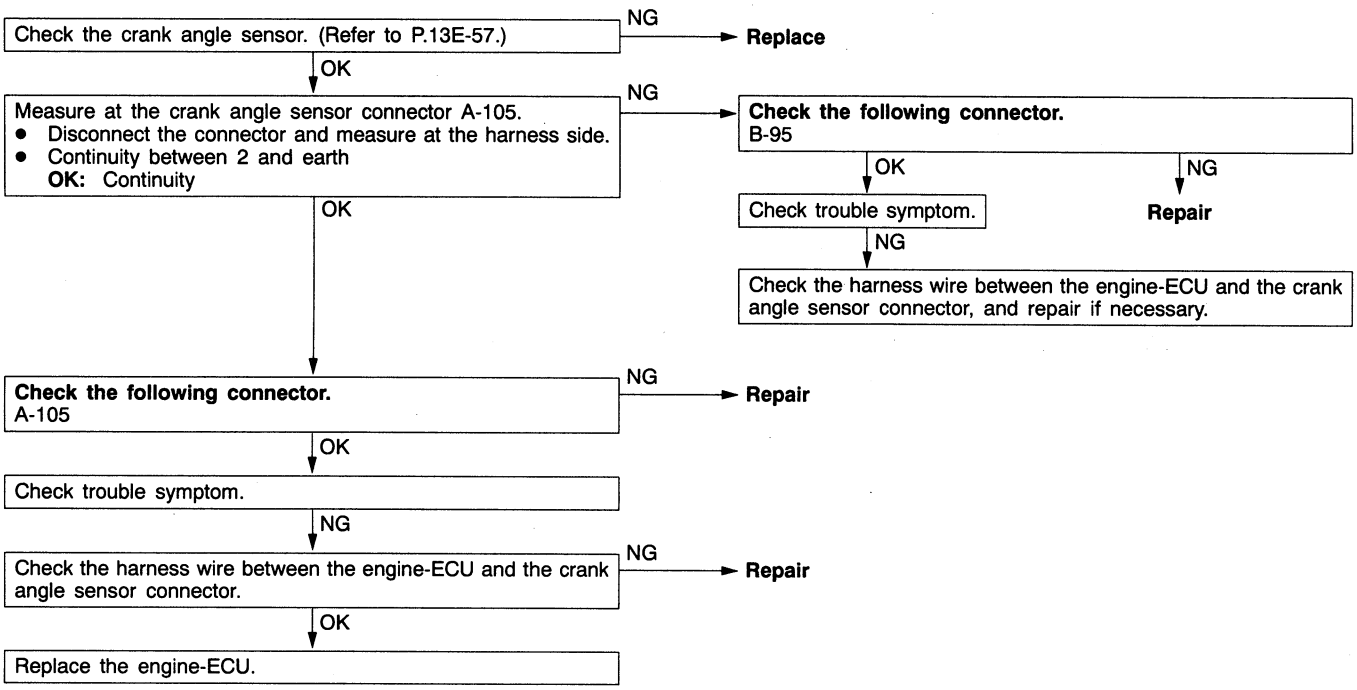


Code No.15 Battery voltage under range	Probable cause
Range of Check ● Ignition switch: ON **Set Conditions** ● Battery voltage is 6 V or less	● Insufficient battery charge or malfunction of the battery ● Malfunction of the engine-ECU power supply line ● Malfunction of the engine-ECU earth line ● Malfunction of the engine-ECU

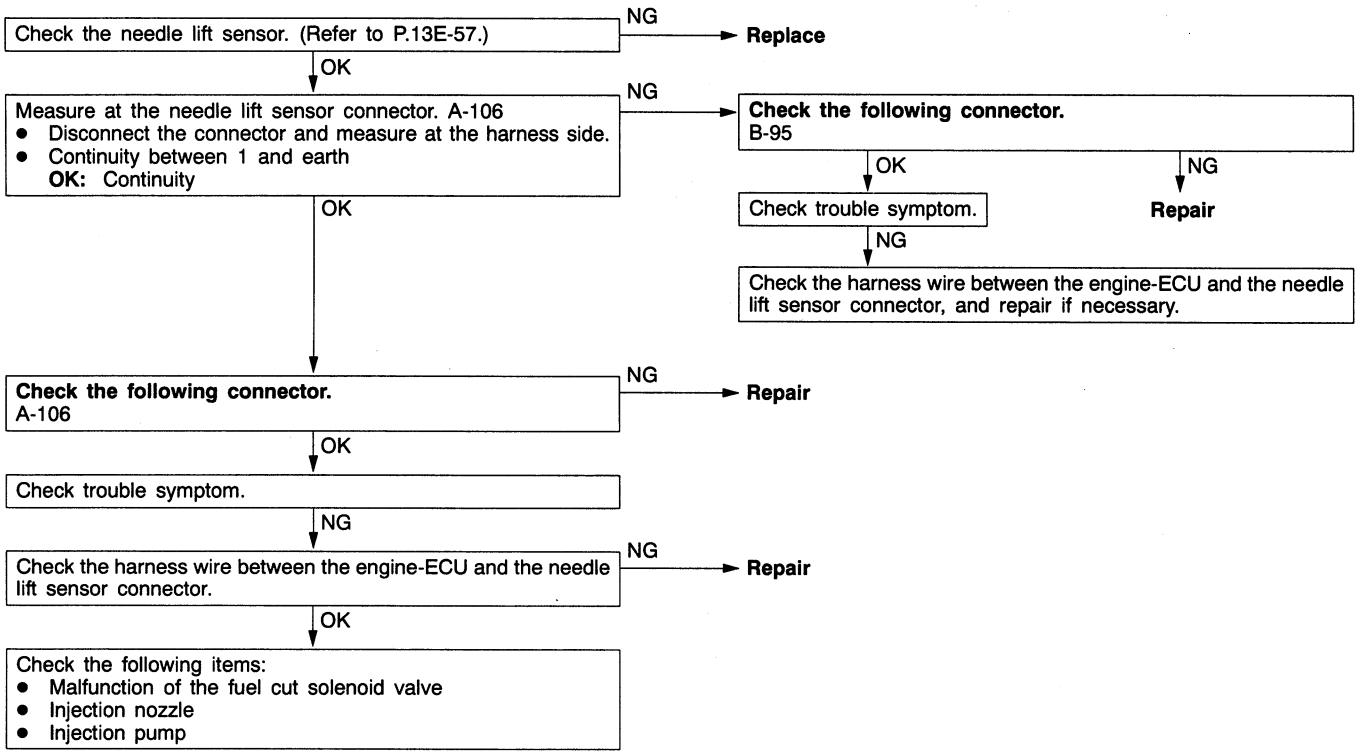


*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

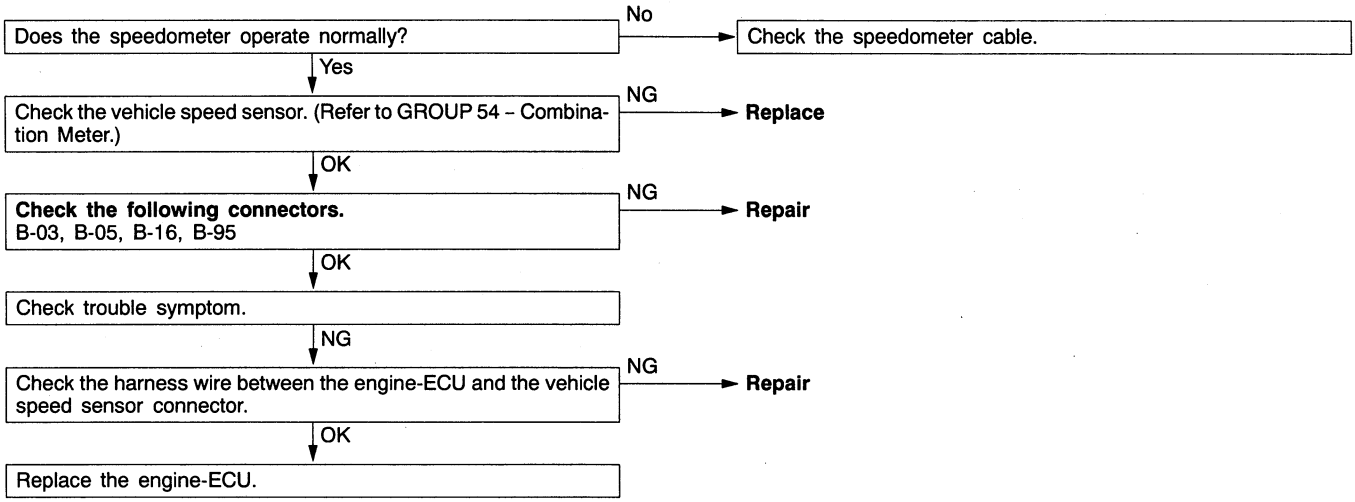
Code No.16 Engine speed (crank angle sensor)	Probable cause
Range of Check • During engine running **Set Conditions** • No crank angle sensor pulse signal is input during two successive needle lift sensor pulse signal inputs. or • The needle lift sensor signals and crank angle sensor signals are not synchronized.	• Malfunction of the crank angle sensor • Open circuit or short-circuit in crank angle sensor circuit or poor connector contact • Malfunction of the engine-ECU



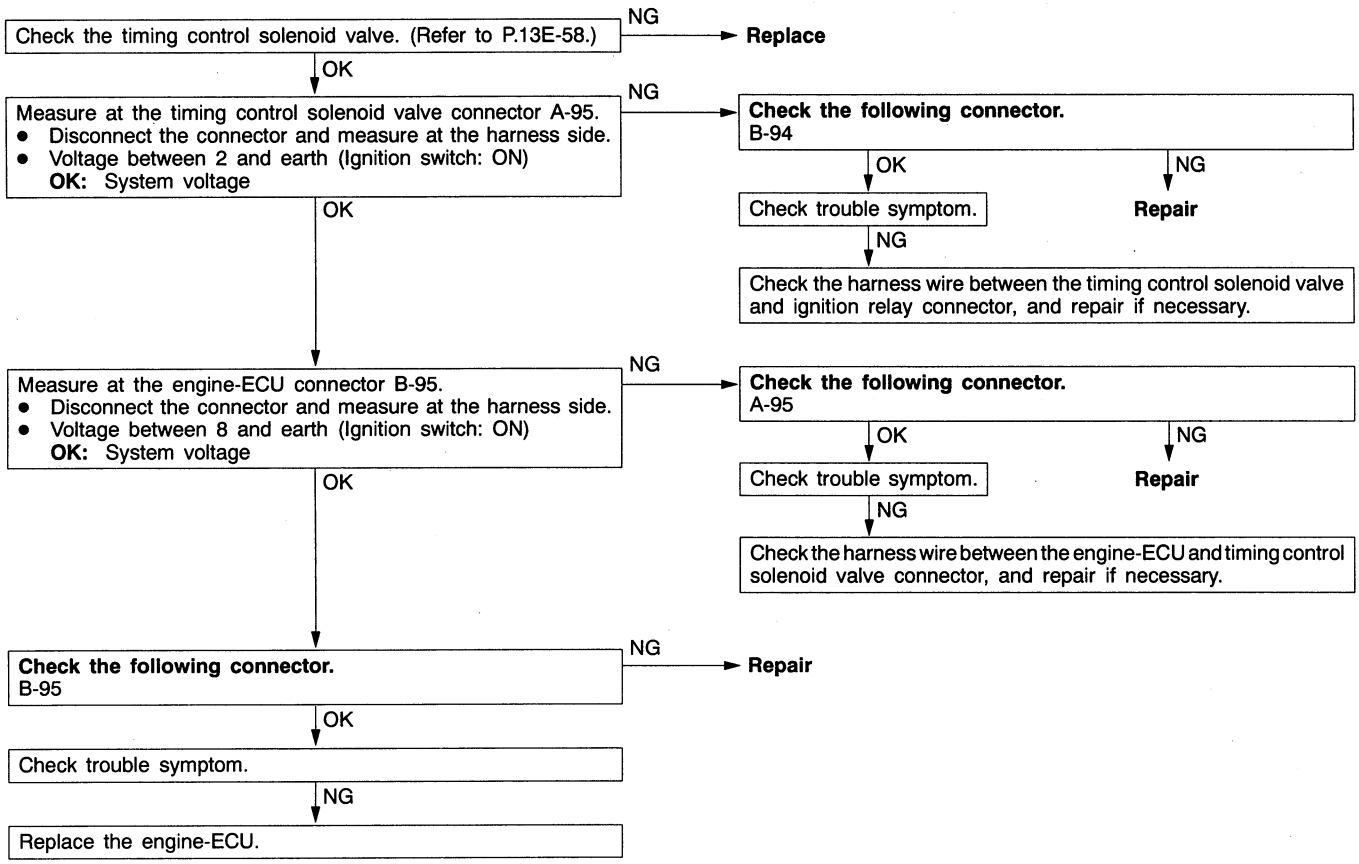
Code No.17 Needle lift	Probable cause
Range of Check • During engine running **Set Conditions** • No needle lift sensor pulse signal is input during eight successive crank angle sensor pulse signal inputs. or • Noise detected in needle lift sensor signal. or • The crank angle sensor signals and needle lift sensor signals are not of synchronizer.	• Malfunction of the needle lift sensor • Open circuit or short-circuit in needle lift sensor circuit or poor connector contact • Malfunction of the engine-ECU • Malfunction of the fuel cut solenoid valve



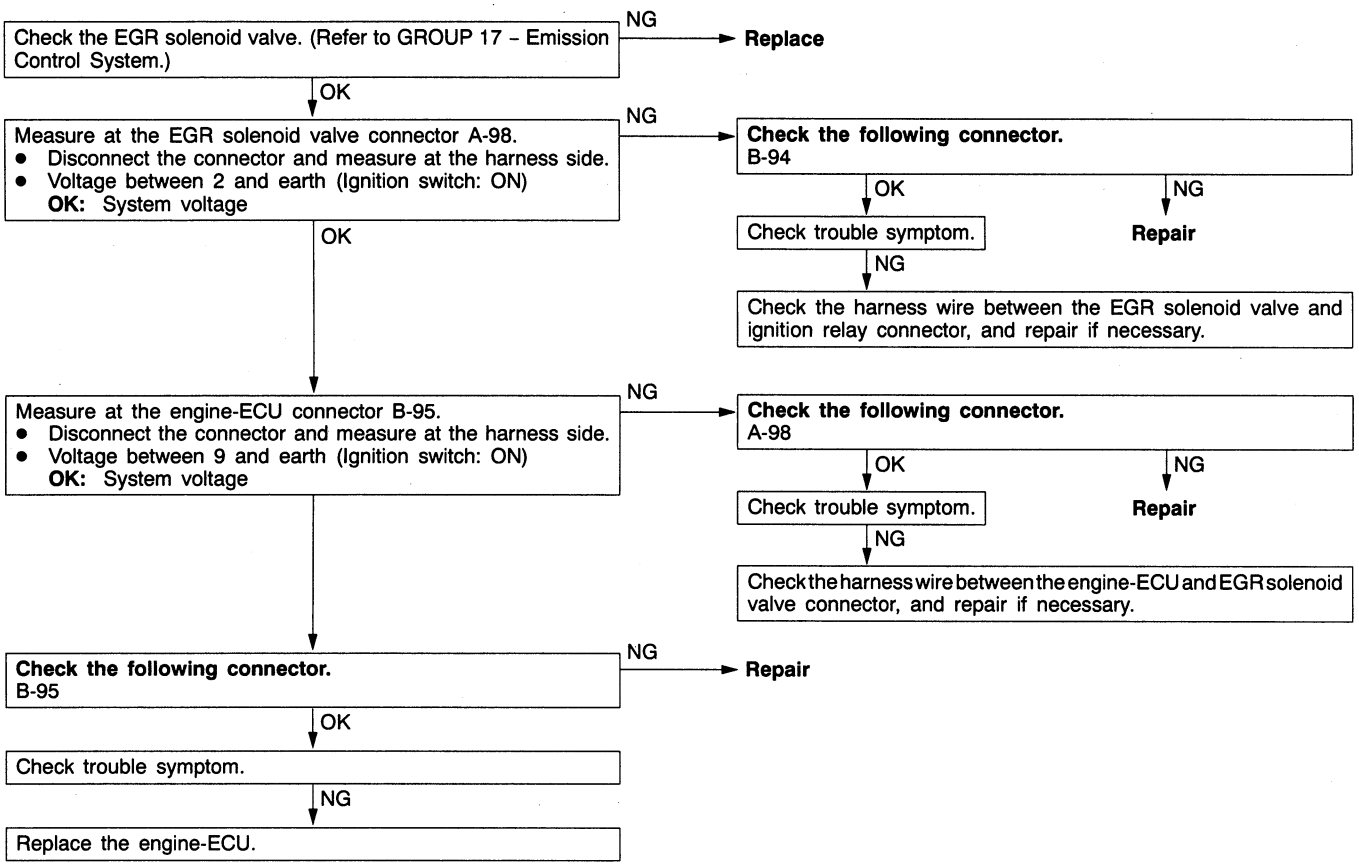
Code No.18 Vehicle speed input stuck low	Probable cause
Range of Check • Ignition switch: ON • Engine speed: 1,000 – 2,800 r/min • Lever position sensor opening angle: 50 – 78% **Set Conditions** • Vehicle speed sensor signal stays at the low level and does not change.	• Malfunction of the vehicle speed sensor • Short-circuit in vehicle speed sensor circuit • Malfunction of the engine-ECU



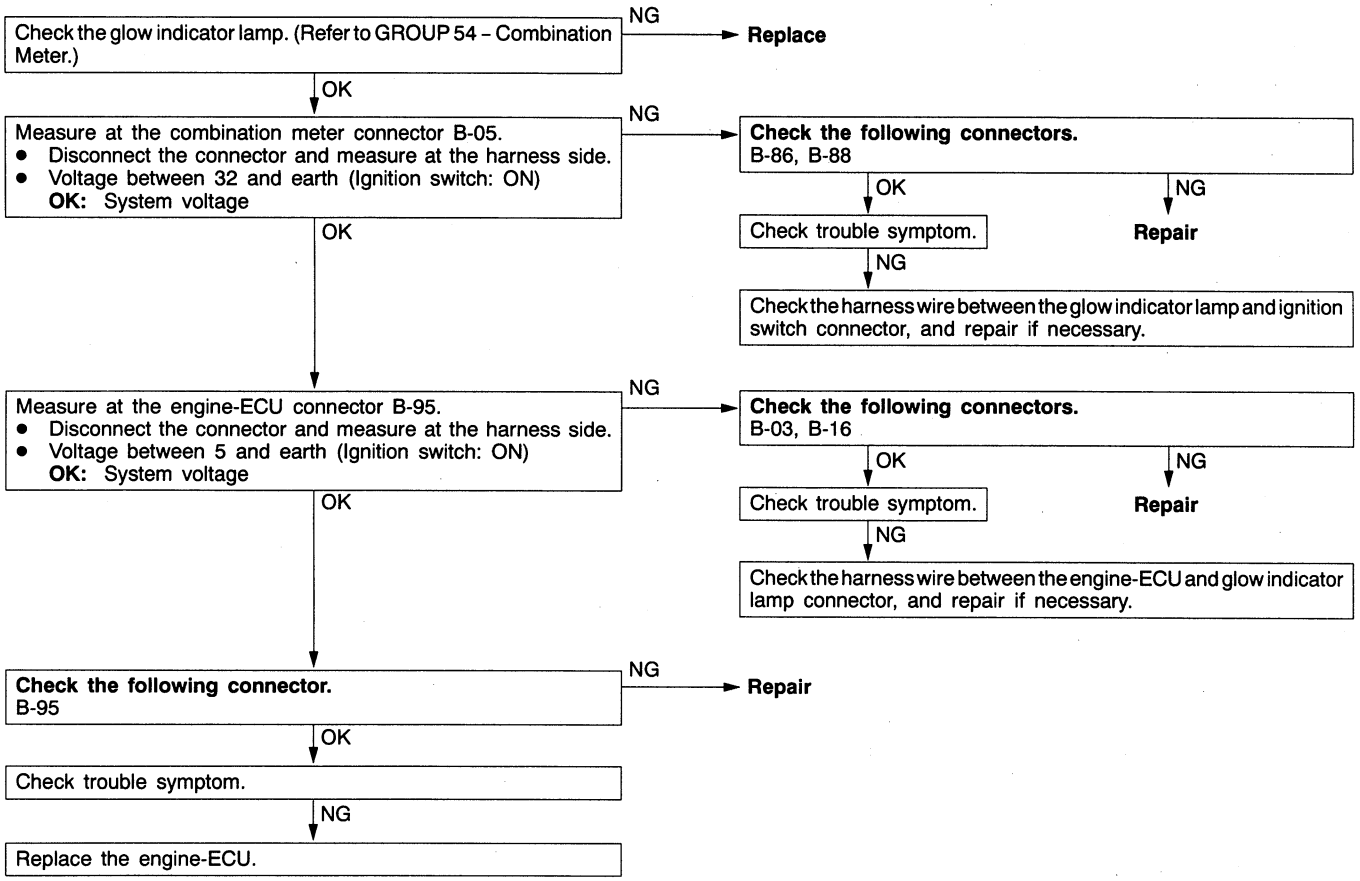
Code No.21 Timing control solenoid valve drive stuck low	Probable cause
Range of Check ● When timing control solenoid valve is being driven. **Set Conditions** ● Engine-ECU output command is different from timing control solenoid valve drive condition.	● Malfunction of the timing control solenoid valve ● Open circuit or short-circuit in timing control solenoid valve circuit or poor connector contact ● Malfunction of the engine-ECU



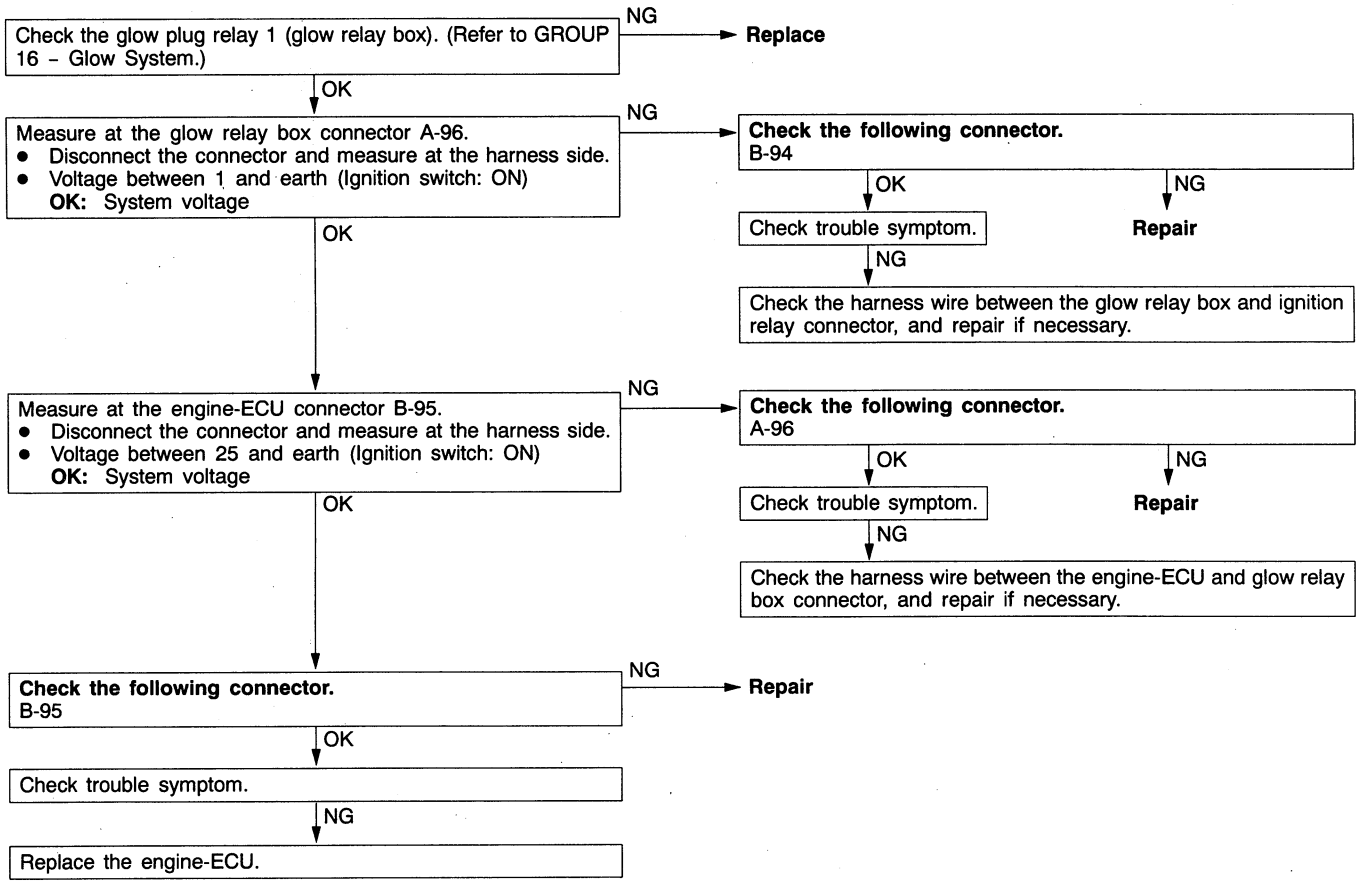
Code No.22 EGR Solenoid valve drive stuck low	Probable cause
Range of Check • When solenoid valve is being driven. **Set Conditions** • Engine-ECU output command is different from solenoid valve drive condition.	• Malfunction of the EGR solenoid valve • Open circuit or short-circuit in EGR solenoid valve circuit or poor connector contact • Malfunction of the engine-ECU



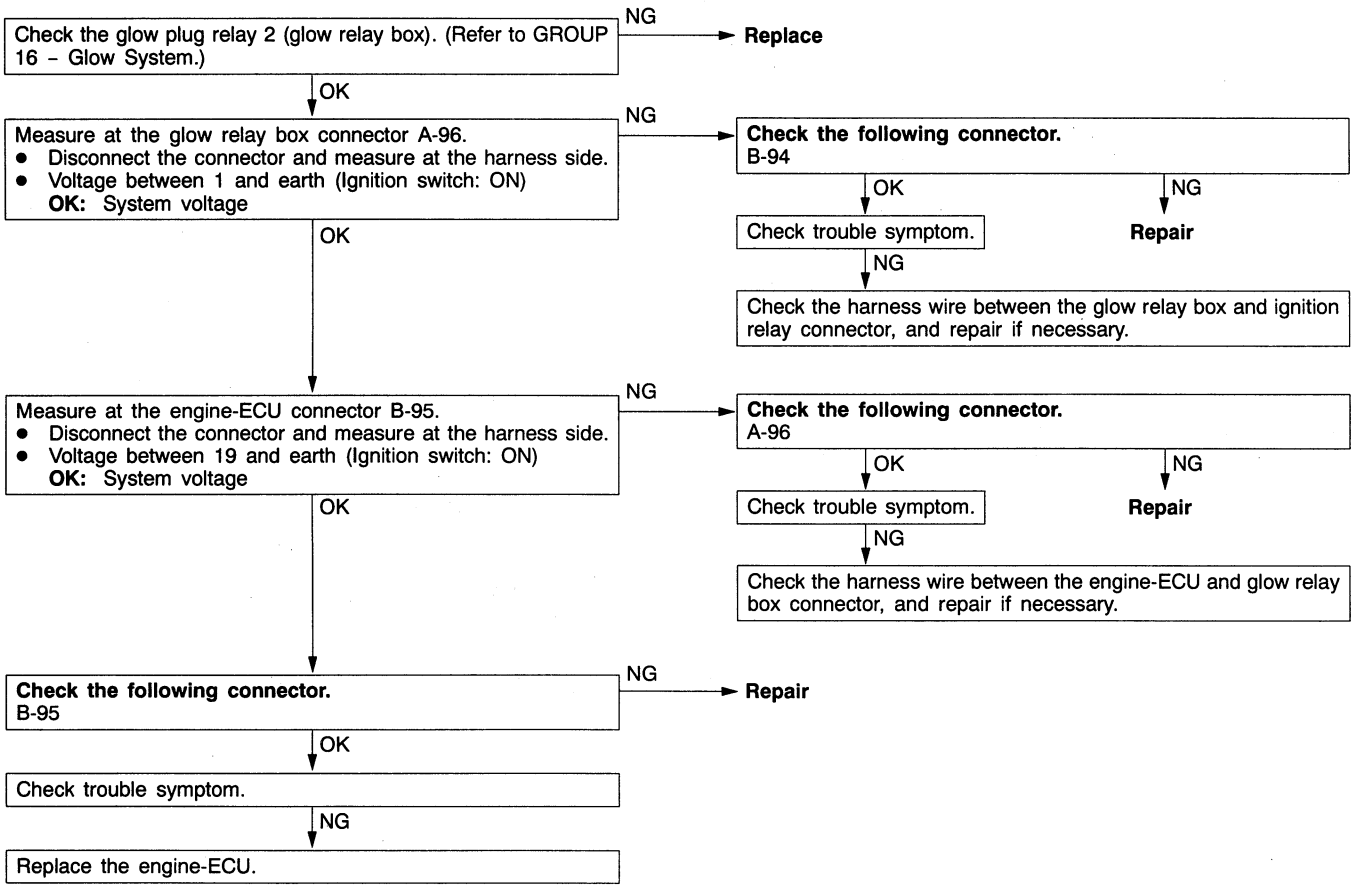
Code No.23 Glow indicator lamp drive stuck low	Probable cause
Range of Check • When glow indicator lamp is being driven. **Set Conditions** • Engine-ECU output command is different from glow indicator lamp drive condition.	• Malfunction of the glow indicator lamp • Open circuit or short-circuit in glow indicator lamp circuit or poor connector contact • Malfunction of the engine-ECU



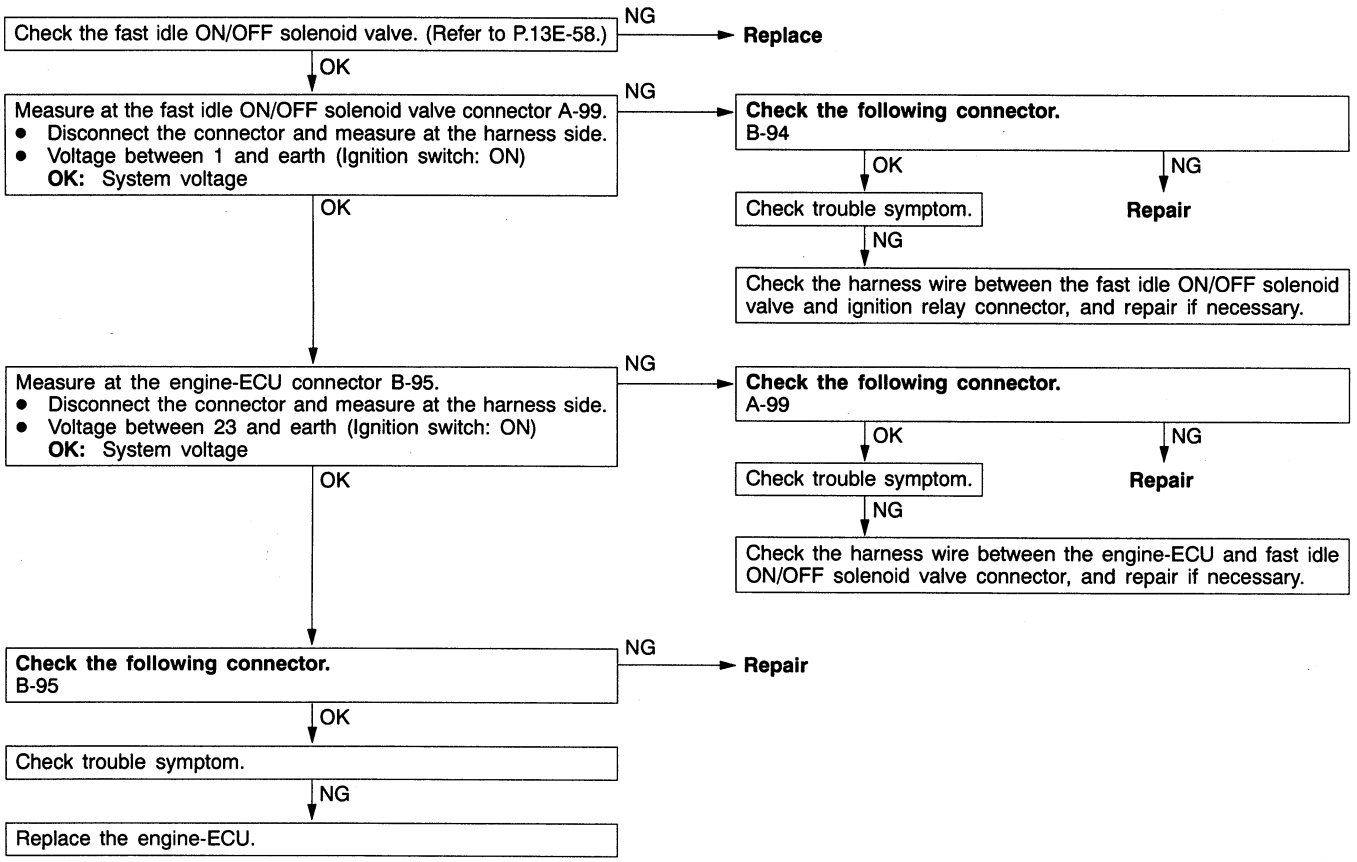
Code No.24 Glow plug relay 1 drive stuck low	Probable cause
Range of Check • When glow plug relay 1 is being driven **Set Conditions** • Engine-ECU output command is different from glow plug relay 1 drive condition	• Malfunction of the glow plug relay 1 • Open circuit or short-circuit in glow plug relay 1 circuit or poor connector contact • Malfunction of the engine-ECU



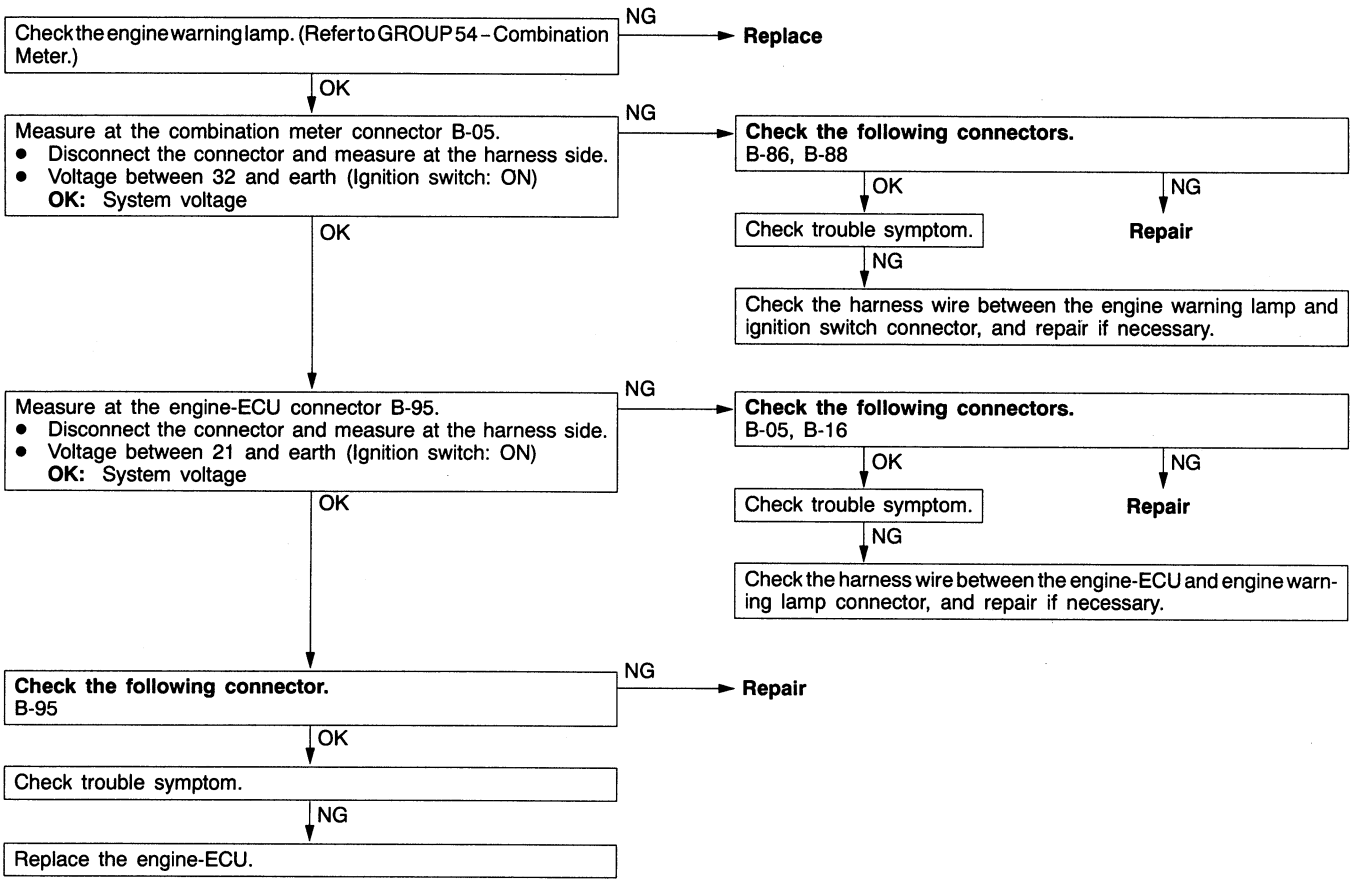
Code No.25 Glow plug relay 2 drive stuck low	Probable cause
Range of Check • When glow plug relay 2 is being driven **Set Conditions** • Engine-ECU output command is different from glow plug relay 2 drive condition	• Malfunction of the glow plug relay 2 • Open circuit or short-circuit in glow plug relay 2 circuit or poor connector contact • Malfunction of the engine-ECU



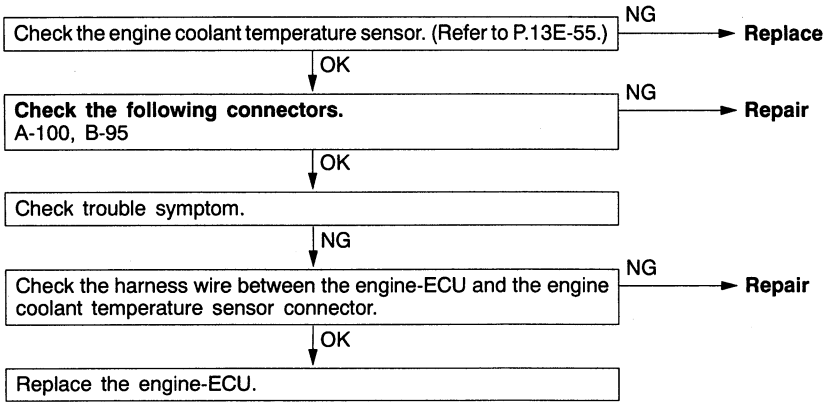
Code No.26 Fast idle ON/OFF solenoid valve drive stuck low	Probable cause
Range of Check • When solenoid valve is being driven **Set Conditions** • Engine-ECU output command is different from solenoid valve drive condition	• Malfunction of the fast idle ON/OFF solenoid valve • Open circuit or short-circuit in fast idle ON/OFF solenoid valve circuit or poor connector contact • Malfunction of the engine-ECU



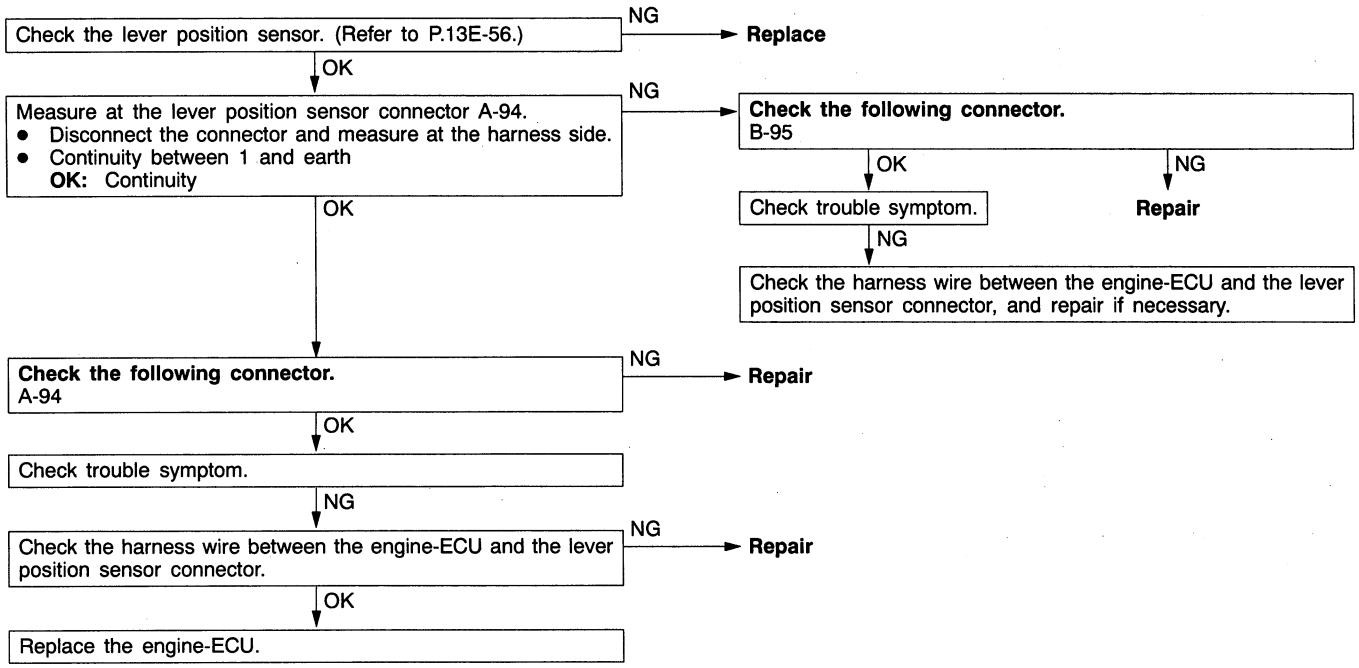
Code No.28 Engine warning lamp drive stuck low	Probable cause
Range of Check • When engine warning lamp is being driven **Set Conditions** • Engine-ECU output command is different from engine warning lamp drive condition	• Malfunction of the engine warning lamp • Open circuit or short-circuit in engine warning lamp circuit or poor connector contact • Malfunction of the engine-ECU



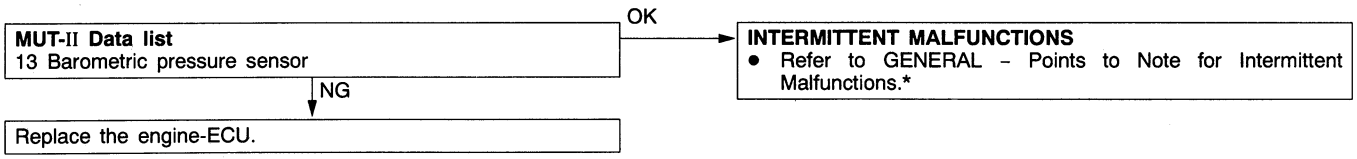
Code No.31 Physical engine coolant temperature over range	Probable cause
Range of Check • Ignition switch: ON **Set Conditions** • Engine coolant temperature sensor output voltage is 0.3 V or less (corresponding to an engine coolant temperature of 135°C or more)	• Malfunction of the engine coolant temperature sensor • Short-circuit in engine coolant temperature sensor circuit • Malfunction of the engine-ECU



Code No.32 Lever position over range	Probable cause
Range of Check • Ignition switch: ON **Set Conditions** • Lever position sensor output voltage is 4.9 V or more	• Malfunction of the lever position sensor • Open circuit in lever position sensor earth line • Malfunction of the engine-ECU

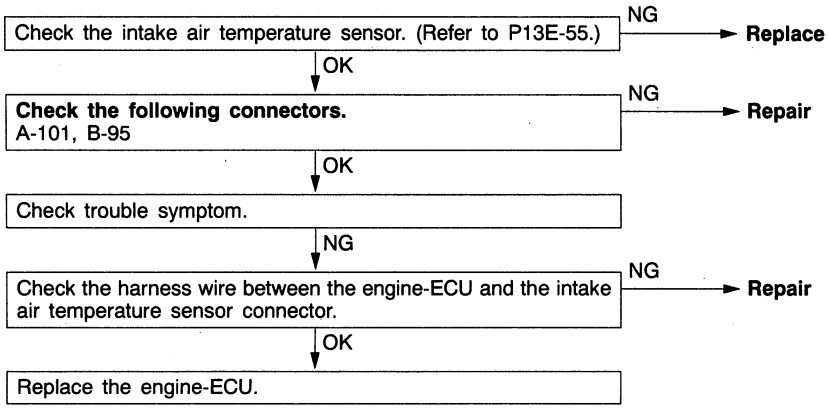


Code No.33 Physical barometric pressure over range	Probable cause
Range of Check • Ignition switch: ON **Set Conditions** • Barometric pressure sensor output pressure is 105 kPa or more or • Sensor is not carrying out electrical control.	• Malfunction of the barometric pressure sensor (built into engine-ECU) • Malfunction of the engine-ECU

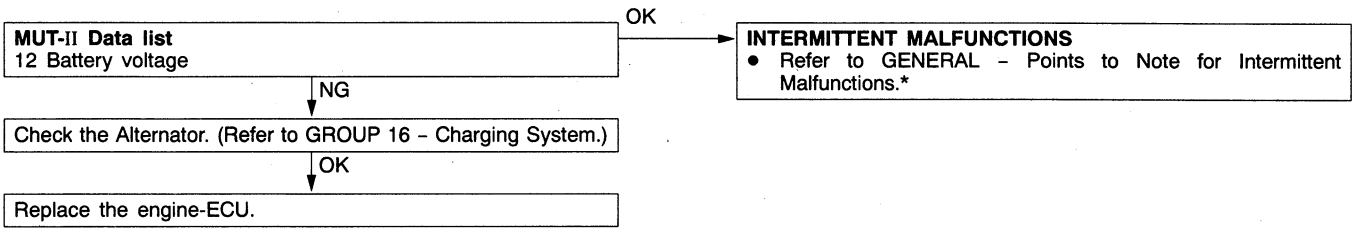


*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

Code No.34 Physical intake air temperature over range	Probable cause
Range of Check • Ignition switch: ON **Set Conditions** • Intake air temperature sensor output voltage is 0.3 V or less (corresponding to an intake air temperature of 135°C or more)	• Malfunction of the intake air temperature sensor • Short-circuit in intake air temperature sensor circuit • Malfunction of the engine-ECU

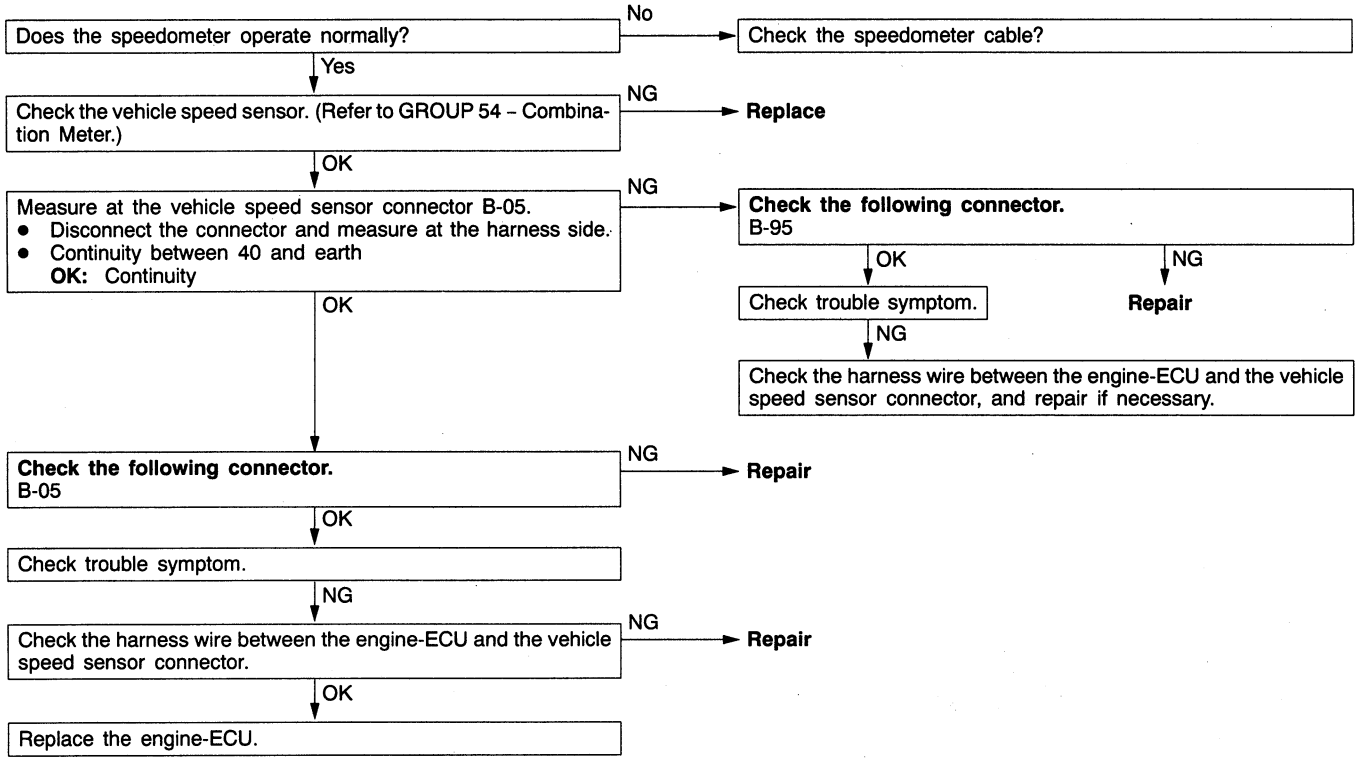


Code No.35 Battery voltage over range	Probable cause
Range of Check • Ignition switch: ON **Set Conditions** • Battery voltage is 16 V or more	• Malfunction of the engine-ECU



*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

Code No.38 Vehicle speed input stuck high	Probable cause
Range of Check ● Ignition switch: ON ● Engine speed: 1,000 – 2,800 r/min ● Lever position sensor opening angle: 50 – 78% **Set Conditions** ● Vehicle speed sensor signal stays at the high level and does not change.	● Malfunction of the vehicle speed sensor ● Open circuit in vehicle speed sensor circuit or poor connector contact ● Malfunction of the engine-ECU



Code No.41 Timing control solenoid valve drive stuck high	Probable cause
Range of Check • When timing control solenoid valve is being driven **Set Conditions** • Engine-ECU output command is different from timing control solenoid valve drive condition	• Malfunction of the engine-ECU

MUT-II Actuator test
20 Timing control solenoid valve
→ OK → **INTERMITTENT MALFUNCTIONS**
• Refer to GENERAL – Points to Note for Intermittent Malfunctions.*
↓ NG
Replace the engine-ECU.

*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

Code No.42 EGR solenoid valve drive stuck high	Probable cause
Range of Check • When solenoid valve is being driven **Set Conditions** • Engine-ECU output command is different from solenoid valve drive condition.	• Malfunction of the engine-ECU

MUT-II Actuator test
19 EGR solenoid valve
→ OK → **INTERMITTENT MALFUNCTIONS**
• Refer to GENERAL – Points to Note for Intermittent Malfunctions.*
↓ NG
Replace the engine-ECU.

*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

Code No.43 Glow indicator lamp drive stuck high	Probable cause
Range of Check • When glow indicator lamp is being driven. **Set Conditions** • Engine-ECU output command is different from glow indicator lamp drive condition.	• Malfunction of the engine-ECU

MUT-II Actuator test
22 Glow indicator lamp
→ OK → **INTERMITTENT MALFUNCTIONS**
• Refer to GENERAL – Points to Note for Intermittent Malfunctions.*
↓ NG
Replace the engine-ECU.

*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

Code No.44 Glow plug relay 1 drive stuck high	Probable cause
Range of Check ● When glow plug relay 1 is being driven **Set Conditions** ● Engine-ECU output command is different from glow plug relay 1 drive condition	● Malfunction of the engine-ECU

MUT-II Actuator test
23 Glow plug relay 1.
→ OK → **INTERMITTENT MALFUNCTIONS**
● Refer to GENERAL – Points to Note for Intermittent Malfunctions.*
↓ NG
Replace the engine-ECU.

*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

Code No. 45 Glow plug relay 2 drive stuck high	Probable cause
Range of Check ● When glow plug relay 2 is being driven **Set Conditions** ● Engine-ECU output command is different from glow plug relay 2 drive condition	● Malfunction of the engine-ECU

MUT-II Actuator test
27 Glow plug relay 2
→ OK → **INTERMITTENT MALFUNCTIONS**
● Refer to GENERAL – Points to Note for Intermittent Malfunctions.*
↓ NG
Replace the engine-ECU.

*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

Code No.46 Fast idle ON/OFF solenoid valve drive stuck high	Probable cause
Range of Check • When solenoid valve is being driven **Set Conditions** • Engine-ECU output command is different from solenoid valve drive condition.	• Malfunction of the engine-ECU

MUT-II Actuator test
26 Fast idle ON/OFF solenoid valve.
→ OK → **INTERMITTENT MALFUNCTIONS**
• Refer to GENERAL – Points to Note for Intermittent Malfunctions.*
↓ NG
Replace the engine-ECU.

*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

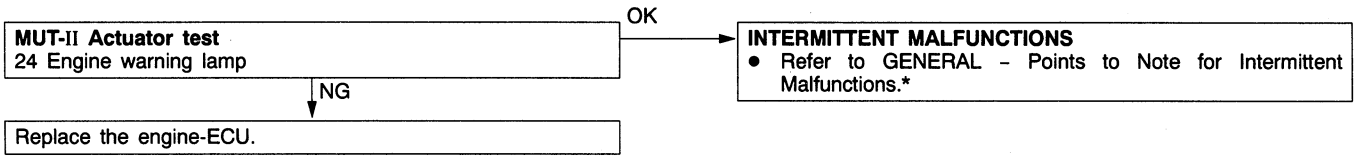
Code No.47 Air conditioning drive stuck high	Probable cause
Range of Check • When A/C relay is being driven **Set Conditions** • Engine-ECU output command is different from A/C relay drive condition	• Malfunction of the engine-ECU

MUT-II Status test
18 A/C switch
→ NG → Check the A/C switch and related circuit.
(Refer to GROUP 55 – A/C switch.)
(Refer to ELECTRICAL WIRING.)
↓ OK

Measure at the engine-ECU connector B-95.
• Connect the connector
• Voltage between 20 and earth
(Engine: idling, A/C switch: OFF → ON)
OK: Momentarily 6 V or more → 0 – 3 V
→ OK → **INTERMITTENT MALFUNCTIONS**
• Refer to GENERAL – Points to Note for Intermittent Malfunctions.*
↓ NG
Replace the engine-ECU.

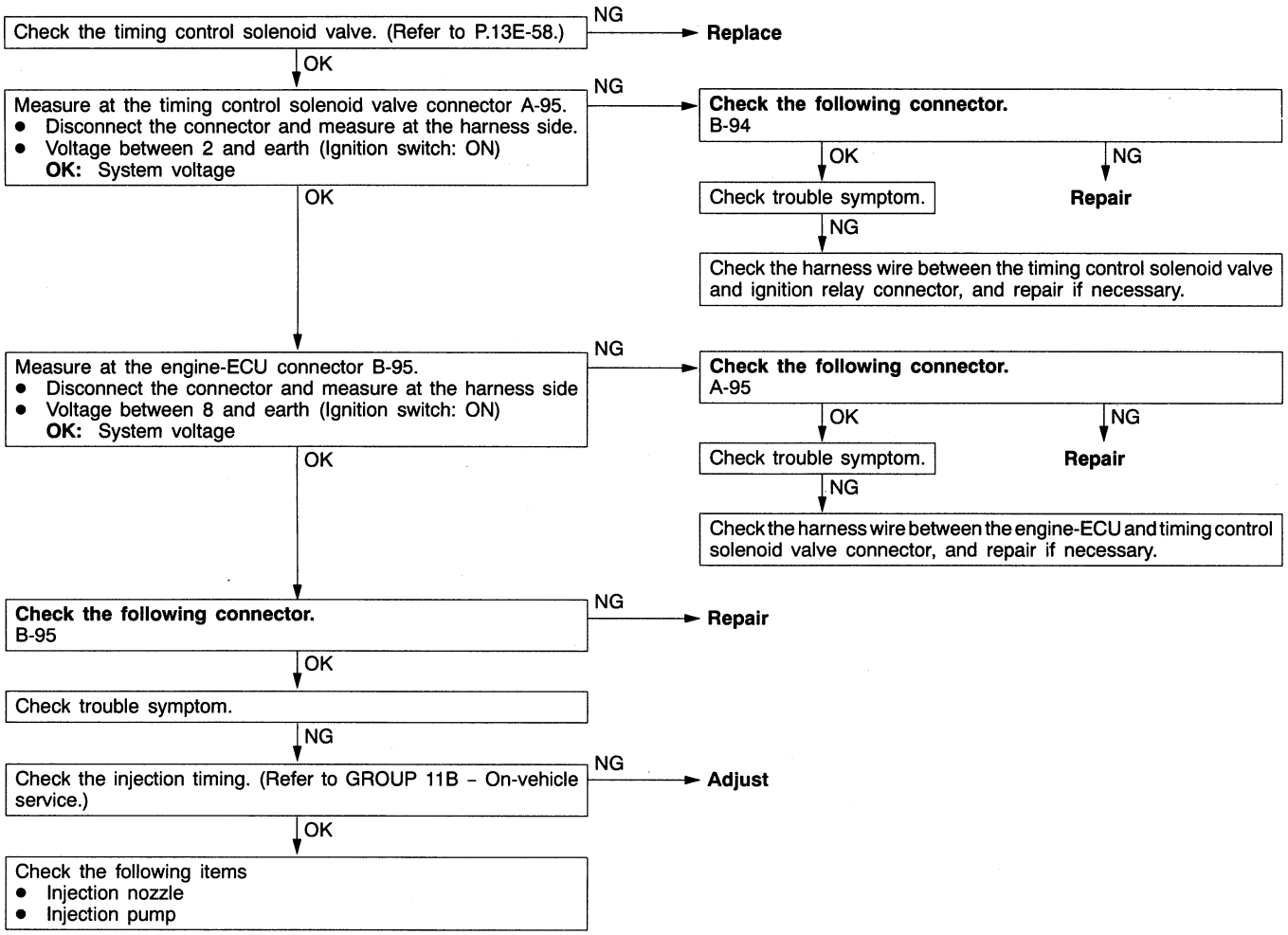
*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

Code No.48 Engine warning lamp drive stuck high	Probable cause
Range of Check • When engine warning lamp is being driven **Set Conditions** • Engine-ECU output command is different from engine warning lamp drive condition.	• Malfunction of the engine-ECU



*: Refer to '96 CARISMA Workshop Manual (Pub. No. PWDE9502).

Code No.51 Timing control fault	Probable cause
Range of Check • During engine running **Set Conditions** • Target engine-ECU advance value differs greatly from actual engine-ECU advance value.	• Malfunction of the timing control solenoid valve • Open circuit or short-circuit in timing control solenoid valve circuit or poor connector contact • Incorrect injection timing adjustment • Malfunction of the injection pump • Malfunction of the engine-ECU



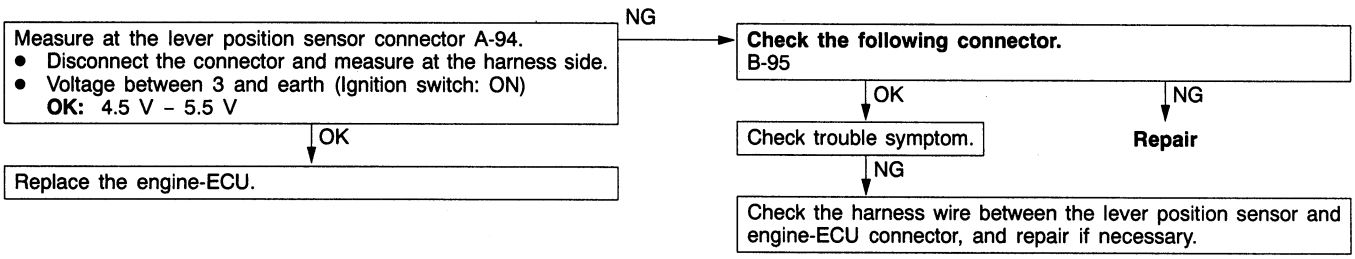
Code No.53 Glow plug 1 (No.1, No.3 cylinder) voltage monitor fault	Probable cause
Range of Check • When the glow plug 1 is ON, except during cranking **Set Conditions** • Glow plug 1 applied voltage (system voltage) falls by 4 V or more when glow plug 1 is caused to be ON.	• Insufficient battery charge or malfunction of the battery • Malfunction of the No.1 glow plug • Malfunction of the No.3 glow plug

Check the battery. (Refer to GROUP 54 – Battery.)
↓ OK
Check the glow plug 1 (for No.1, No.3 cylinder). (Refer to GROUP 16 – Glow System.) → NG → **Replace**
↓ OK
- Check the wiring harness between the battery and glow plug relay.
- Check the wiring harness between the glow plug relay and glow plug.

Code No.54 Glow plug 2 (No.2, No.4 cylinder) voltage monitor fault	Probable cause
Range of Check • When the glow plug 2 is ON, except during cranking **Set Conditions** • Glow plug 2 applied voltage (system voltage) falls by 4 V or more when glow plug 2 is caused to be ON.	• Insufficient battery charge or malfunction of the battery • Malfunction of the No.2 glow plug • Malfunction of the No.4 glow plug

Check the battery. (Refer to GROUP 54 – Battery.)
↓ OK
Check the glow plug 2. (for No.2, No.4 cylinder) (Refer to GROUP 16 – Glow System.) → NG → **Replace**
↓ OK
- Check the wiring harness between the battery and glow plug relay.
- Check the wiring harness between the glow plug relay and glow plug.

Code No.55 Sensor supply voltage under range	Probable cause
Range of Check • Ignition switch: ON **Set Conditions** • Sensor supply voltage is 4.5 V or less	• Short-circuit in sensor supply voltage circuit • Malfunction of the engine-ECU



INSPECTION CHART FOR TROUBLE SYMPTOMS

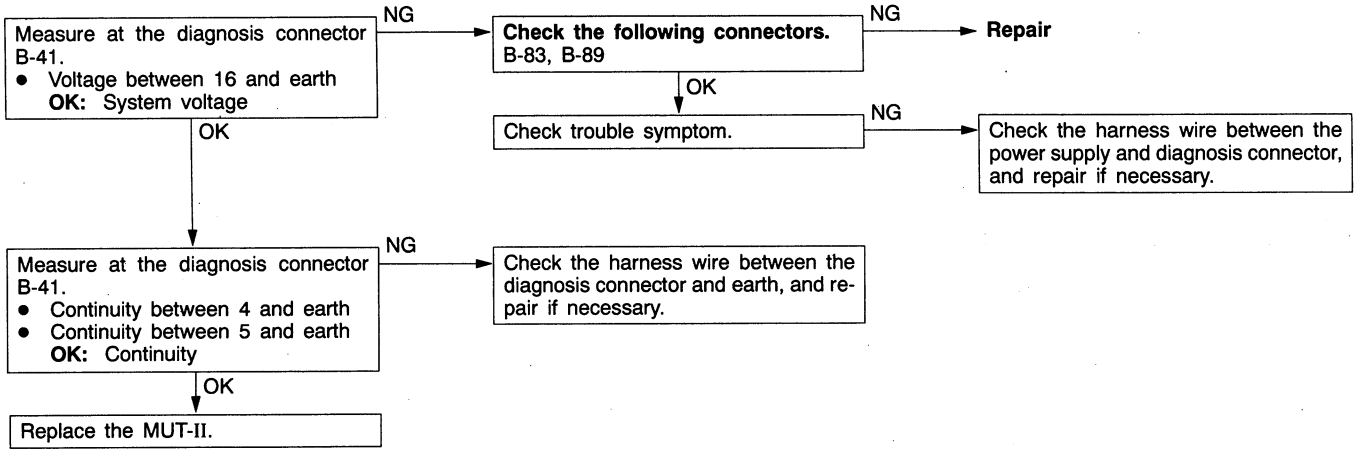
Caution
Check that the engine-ECU earth circuit is normal before checking for the cause of the problem.

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

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

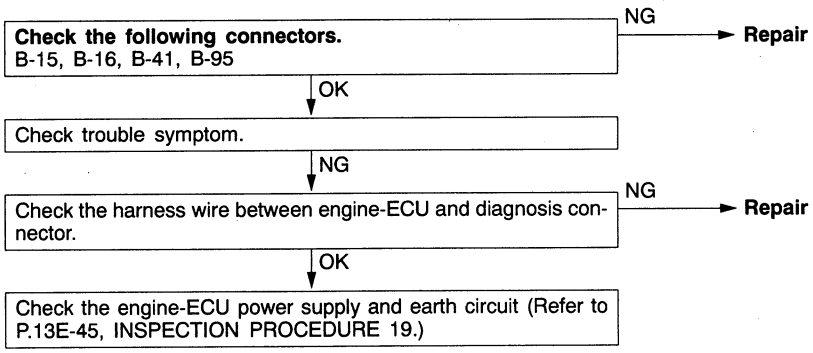
INSPECTION PROCEDURE 1

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



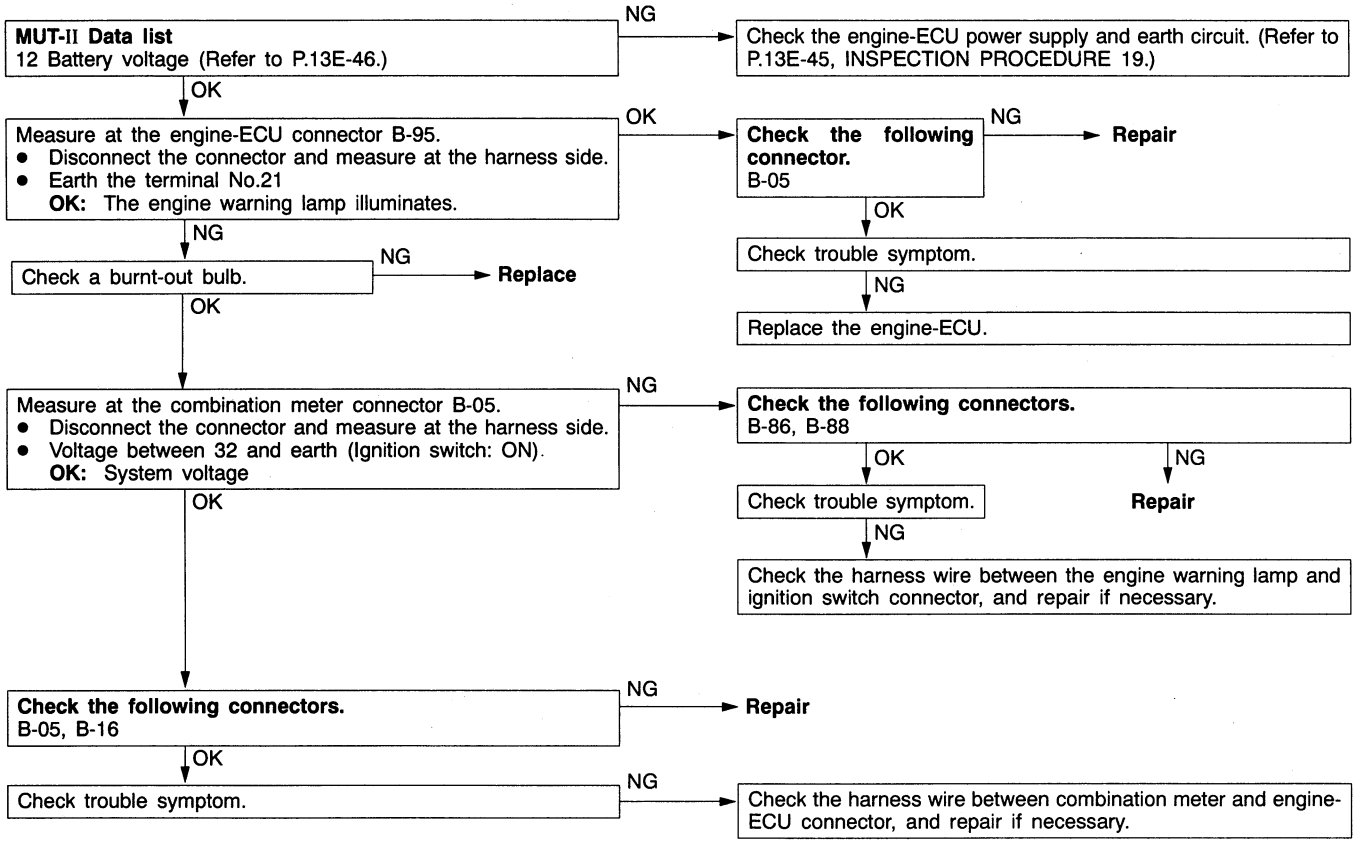
INSPECTION PROCEDURE 2

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	• Malfunction of engine-ECU power supply circuit • Malfunction of the engine-ECU • Open circuit between 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 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

MUT-II Self-Diagnosis code
Are diagnosis code output?
- Yes → Refer to P.13E-9, INSPECTION CHART FOR DIAGNOSIS CODES.
- No ↓

Measure at the combination meter connector B-03.
- Disconnect the connector and measure at the harness side.
- Continuity between 47 and earth
  OK: No continuity

NG → Check the harness wire between combination meter and engine-ECU connector, and repair if necessary.

OK ↓

Replace the engine-ECU.

INSPECTION PROCEDURE 5

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

Is immobilizer-ECU diagnosis code output? <Only vehicles with immobilizer system>
- Yes → Check the immobilizer system.
- No ↓

MUT-II Self-Diagnosis code
Are diagnosis code output?
- Yes ↓

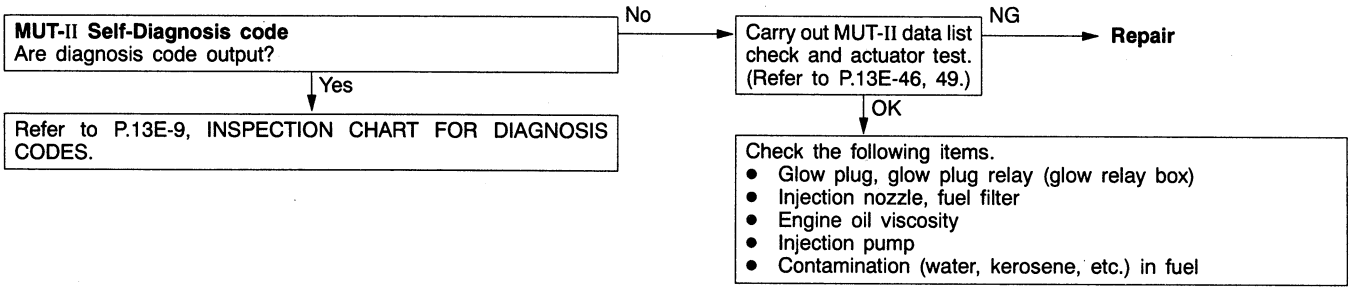
Refer to P.13E-9, INSPECTION CHART FOR DIAGNOSIS CODES.

No → Carry out MUT-II data list check and actuator test. (Refer to P.13E-46, 49.)
- NG → **Repair**
- OK ↓

Check the following items.
- Glow plug, glow plug relay (glow relay box)
- Battery
- Injection nozzle
- Compression pressure
- Malfunction of the injection pump and the fuel cut solenoid valve
- Contamination (water, kerosene, etc.) in fuel
- Immobilizer system

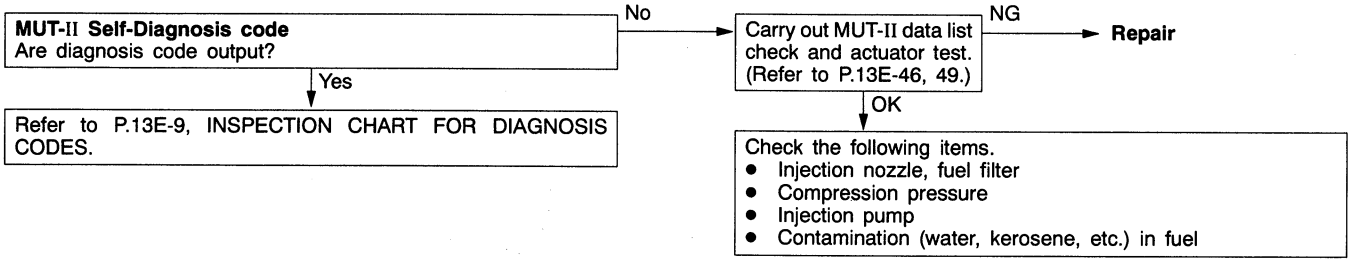
INSPECTION PROCEDURE 6

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



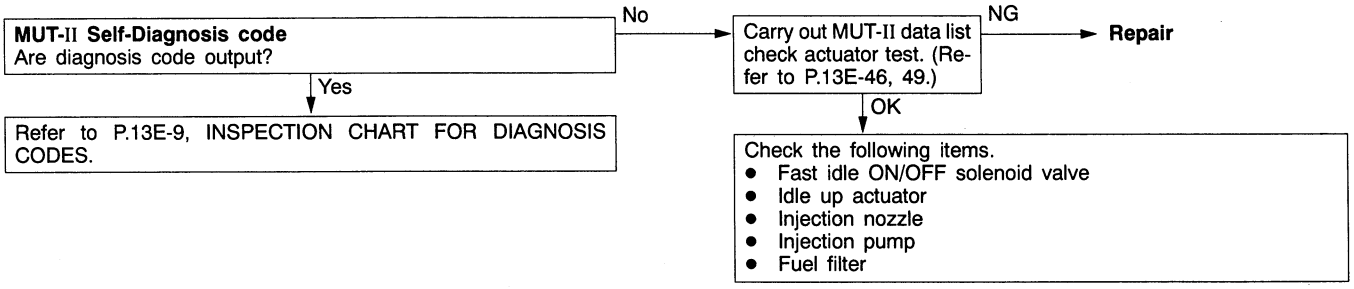
INSPECTION PROCEDURE 7

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



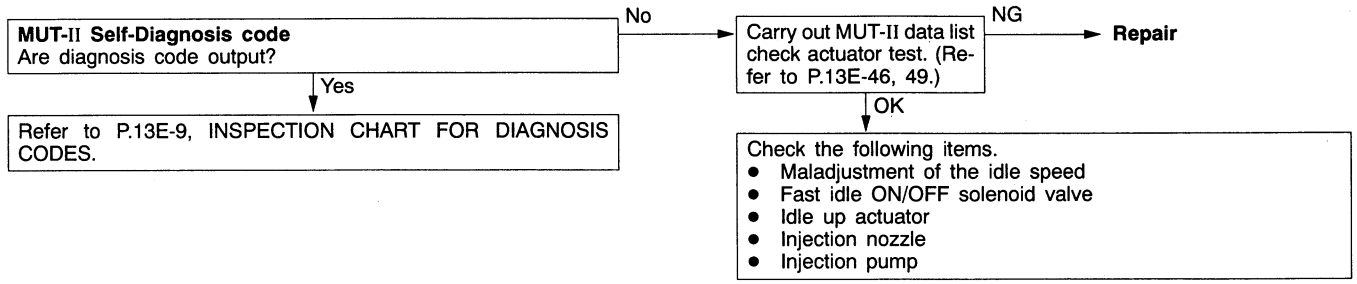
INSPECTION PROCEDURE 8

Idle speed is low when engine is cold (Improper idling speed)	Probable cause
The cause is probably a malfunction of the fast idle system, control system, injection pump or fuel system.	• Malfunction of the fast idle system • Malfunction of the control system • Malfunction of the injection pump • Malfunction of the fuel system • Malfunction of the engine-ECU



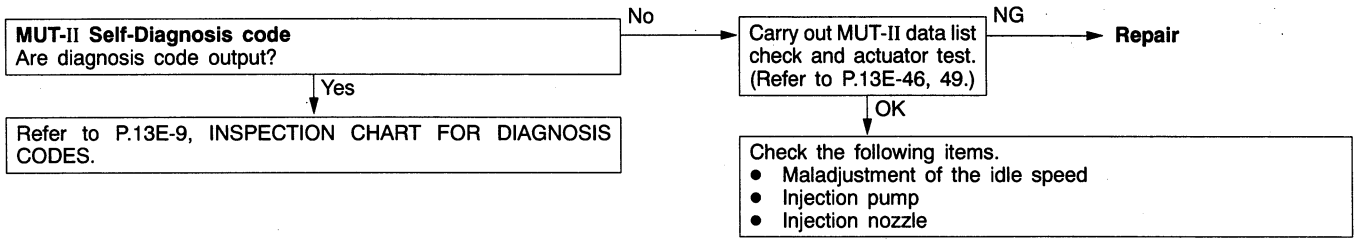
INSPECTION PROCEDURE 9

Idle speed is high (Improper idling speed)	Probable cause
The cause is probably a malfunction of the control system, injection nozzle, injection pump or fast idle system.	• Malfunction of the control system • Malfunction of the injection nozzle • Malfunction of the injection pump • Malfunction of the fast idle system • Malfunction of the engine-ECU



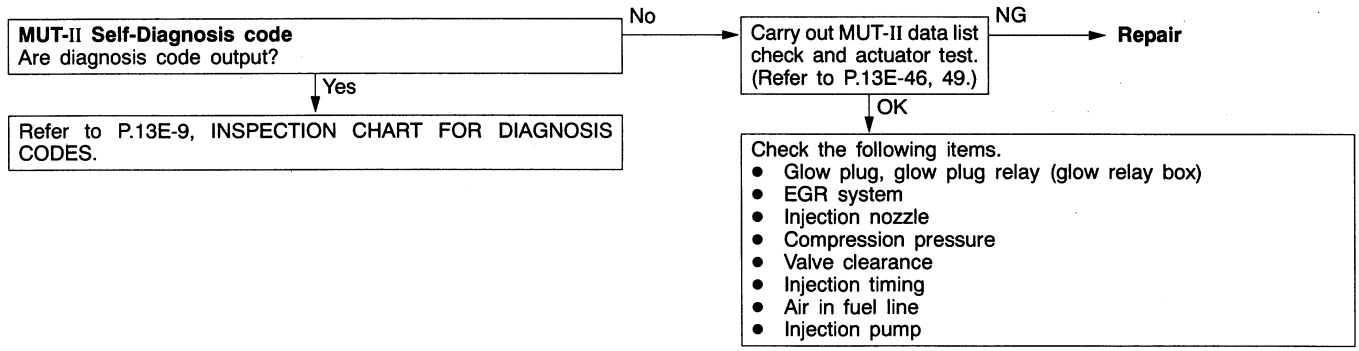
INSPECTION PROCEDURE 10

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



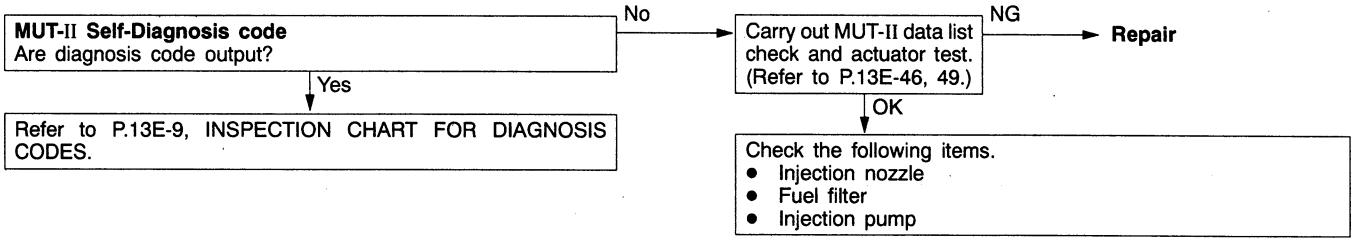
INSPECTION PROCEDURE 11

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



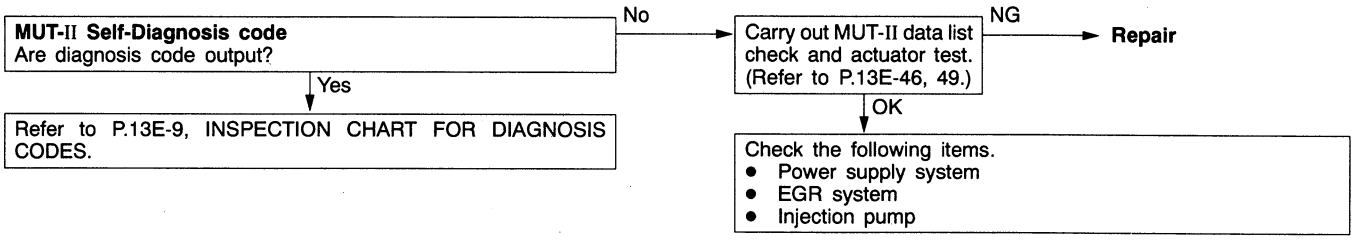
INSPECTION PROCEDURE 12

Engine stops soon after starting	Probable cause
The cause is probably a malfunction of the control system, injection pump or fuel system.	• Malfunction of the control system • Malfunction of the injection pump • Malfunction of the fuel system • Malfunction of the engine-ECU



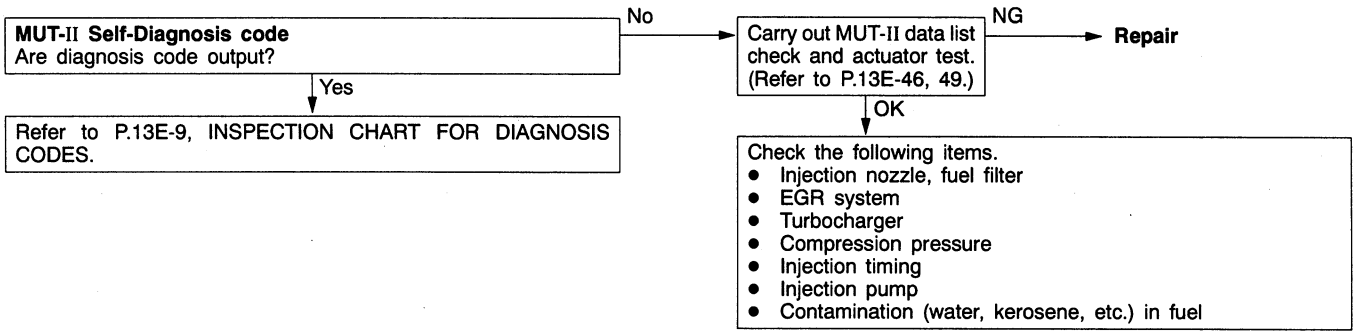
INSPECTION PROCEDURE 13

Engine stops during idling	Probable cause
The cause is probably a malfunction of the control system, injection pump or power supply system.	• Malfunction of the control system • Malfunction of the injection pump • Malfunction of the EGR system • Malfunction of the engine-ECU



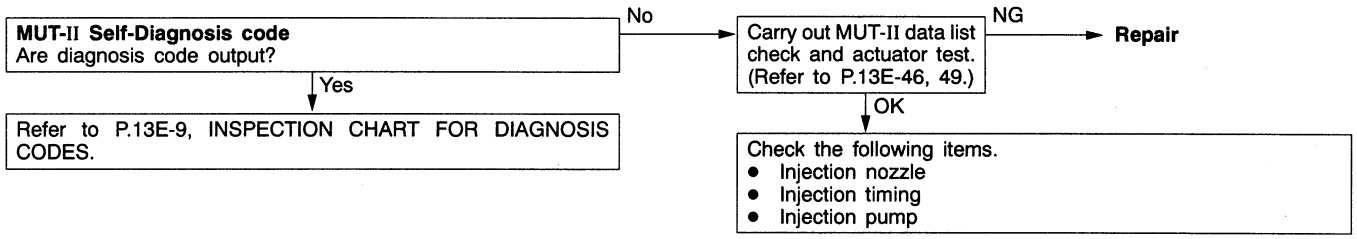
INSPECTION PROCEDURE 14

Engine output is too low	Probable cause
The cause is probably a malfunction of the control system, injection pump, fuel system or EGR system.	• Malfunction of the control system • Malfunction of the injection pump • Malfunction of the fuel system • Malfunction of the EGR system • Malfunction of the engine-ECU



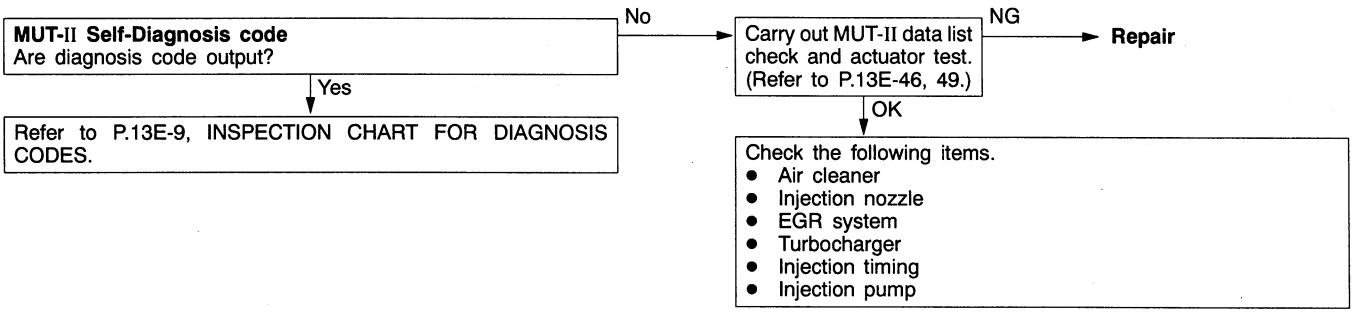
INSPECTION PROCEDURE 15

Abnormal engine knocking occurs	Probable cause
The cause is probably a malfunction of the control system, injection pump or fuel system.	• Malfunction of the control system • Malfunction of the injection pump • Malfunction of the fuel system • Malfunction of the engine-ECU



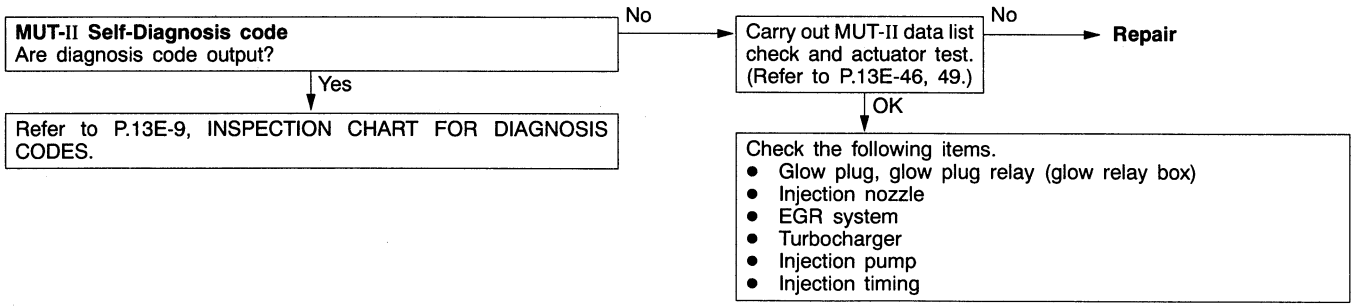
INSPECTION PROCEDURE 16

Abnormally black smoke	Probable cause
The cause is probably a malfunction of the control system, injection pump, fuel system or EGR system.	• Malfunction of the control system • Malfunction of the injection pump • Malfunction of the fuel system • Malfunction of the EGR system • Malfunction of the engine-ECU



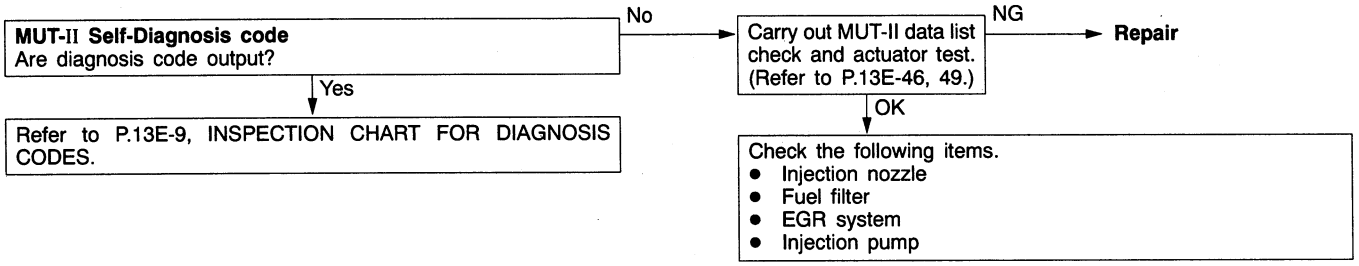
INSPECTION PROCEDURE 17

Abnormally white smoke	Probable cause
The cause is probably a malfunction of the control system, injection pump, fuel system, EGR system or glow system.	• Malfunction of the control system • Malfunction of the injection pump • Malfunction of the fuel system • Malfunction of the EGR system • Malfunction of the glow system • Malfunction of the engine-ECU



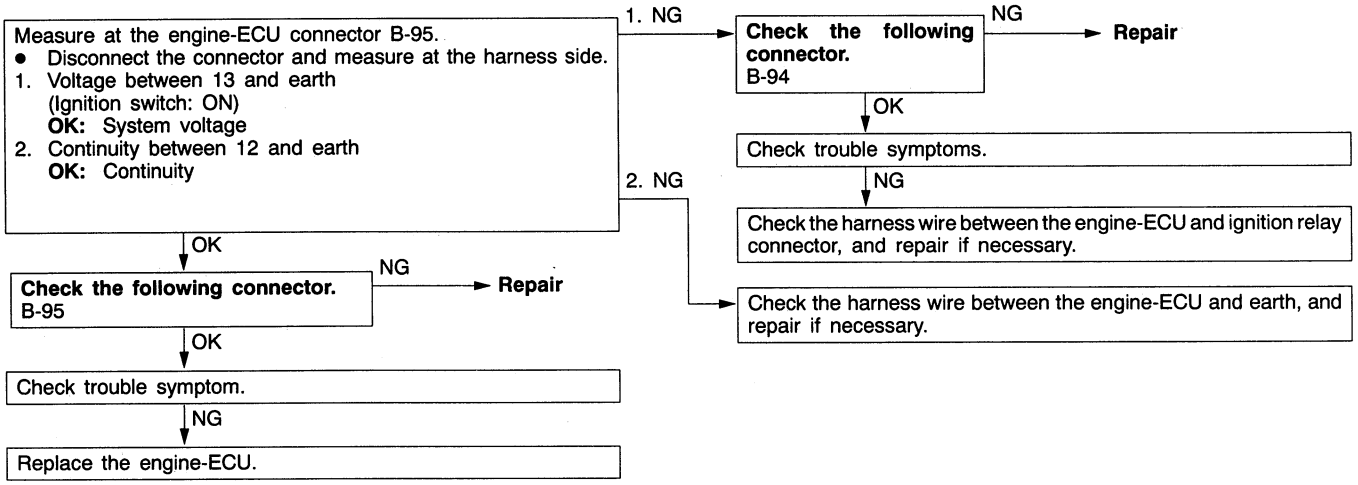
INSPECTION PROCEDURE 18

Hunting occurs while driving	Probable cause
The cause is probably a malfunction of the control system, injection pump or fuel system.	• Malfunction of the control system • Malfunction of the injection pump • Malfunction of the fuel system • Malfunction of the engine-ECU



INSPECTION PROCEDURE 19

Check the engine-ECU power supply and earth circuit



DATA LIST REFERENCE TABLE

Caution
Driving tests always need another personnel.

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
10	Engine coolant temperature sensor	Ignition switch: ON or with engine running	Engine coolant temperature is –20°C	–20°C	Code No.11, 31	13E-10, 24
			Engine coolant temperature is 0°C	0°C		
			Engine coolant temperature is 20°C	20°C		
			Engine coolant temperature is 40°C	40°C		
			Engine coolant temperature is 80°C	80°C		
11	Intake air temperature sensor	Ignition switch: ON or with engine running	Intake air temperature is –20°C	–20°C	Code No.14, 34	13E-12, 26
			Intake air temperature is 0°C	0°C		
			Intake air temperature is 20°C	20°C		
			Intake air temperature is 40°C	40°C		
			Intake air temperature is 80°C	80°C		
12	Battery voltage	Ignition switch: ON		11 – 13	Code No.15, 35	13E-13, 26
		Engine: 2500 r/min		13 – 15		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
13	Barometric pressure sensor	Ignition switch: ON	At altitude of 0 m	101 kPa	Code No.13, 33	13E-11, 25
			At altitude of 600 m	95 kPa		
			At altitude of 1200 m	88 kPa		
			At altitude of 1800 m	81 kPa		
14	Lever position sensor	Ignition switch: ON	Set to idle position	10 – 30%	Code No.12, 32	13E-11, 25
			Gradually open	Increases in proportion to lever opening angle		
			Open fully	70 – 90%		
15	Crank angle sensor (Engine speed sensor)	• Engine: Cranking • Tachometer: Connected		Engine speeds displayed on the MUT-II and tachometer are identical.	Code No.16	13E-14
		• Engine: Idle	Fast idle ON/OFF solenoid valve: OFF	800 – 850 r/min		
			Fast idle ON/OFF solenoid valve: ON	850 – 950 r/min		
16	EGR ratio	• Engine: Warm, idle • Altitude: 500 m or less • Intake air temperature: 10°C or less		40 – 60% (immediately after engine is started)	–	–
17	Vehicle speed sensor	Drive at 40 km/h		Approx. 40 km/h	Code No.18, 38	13E-16, 27

STATUS TEST REFERENCE TABLE

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
18	A/C switch	Engine: Idle (When A/C switch is ON, A/C compressor should be operating)	A/C switch: OFF	OFF	–	–
			A/C switch: ON	ON		
19	EGR solenoid valve	• Engine coolant temperature: 60°C or more • Engine: Idle	For approx. 3 seconds immediately after engine is started	INACTIVE	–	–
			From approx. 3 seconds or more after engine is started	ACTIVE		
20	Timing control solenoid valve	Ignition switch: ON (Engine does not start)		ACTIVE	–	–
21	Tachometer	Ignition switch: ON (Engine does not start)		ACTIVE	–	–
22	Glow indicator (preheating) lamp*1	• Engine: Stopped	From 2 – 20 seconds after ignition switch is turned to ON	OFF	–	–
23	Glow plug relay 1*1	• Engine coolant temperature: 60°C or less • Engine: Stopped	For 10 – 28 seconds immediately after ignition switch is turned to ON	ACTIVE	–	–
			For 10 – 28 seconds after ignition switch is turned to ON	INACTIVE		
24	Engine warning lamp	• Ignition switch: ON • Engine: Stopped		ON	–	–
		Engine: Started		OFF		
25	A/C relay	Engine: Warm, idle		ACTIVE	–	–
		Rapid racing		INACTIVE		

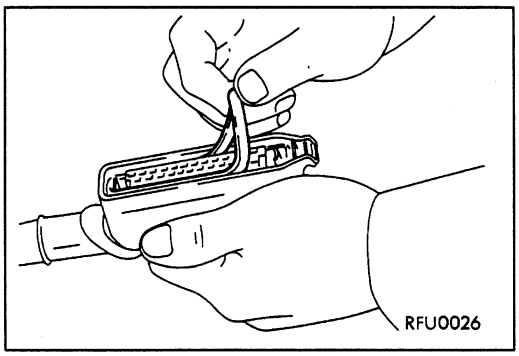
NOTE
*1: It depends of engine coolant temperature and altitude at engine starting how long the glow indicator lamp is illuminated.

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
26	Fast idle ON/OFF solenoid valve	Engine coolant temperature: 15°C or less	Engine: Idle	ACTIVE	–	–
			Engine: 1000 r/min	INACTIVE		
27	Glow plug relay 2*1	• Engine coolant temperature: 60°C or less • Engine: Stopped	For 10 – 28 seconds immediately after ignition switch is turned to ON	ACTIVE	–	–
			From 10 – 28 seconds after ignition switch is turned to ON	INACTIVE		

NOTE
*1: It depends of engine coolant temperature and altitude at engine starting how long the glow indicator lamp is illuminated.

ACTUATOR TEST REFERENCE TABLE

Item No.	Inspection item	Drive contents	Inspection contents	Normal condition	Inspection procedure No.	Reference page
01	Glow plug relay 1	Glow plug relay 1 turns from OFF to ON.	Ignition switch: ON (except during pre-glow)	Operating sound can be heard	Code No.24, 44	13E-20, 29
02	Glow plug relay 2	Glow plug relay 2 turns from OFF to ON.	Ignition switch: ON (except during pre-glow)	Operating sound can be heard	Code No.25, 45	13E-21, 29
03	Fast idle ON/OFF solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON	Clicks when solenoid valve is driven.	Code No.26, 46	13E-22, 30
04	Glow indicator lamp	Causes glow indicator lamp to illuminate.	Ignition switch: ON	Glow indicator lamp illuminates.	Code No.23, 43	13E-19, 28
05	Engine warning lamp	Causes engine warning lamp to illuminate.	Ignition switch: ON	Engine warning lamp extinguish provisionally.	Code No.28, 48	13E-23, 31



CHECK AT THE ENGINE-ECU TERMINALS

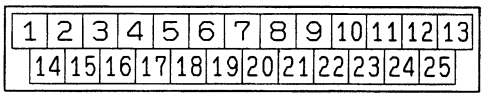
TERMINAL VOLTAGE CHECK CHART

1. Disconnect the connector from the engine-ECU.
2. Remove the cover mounting screw from the connector.
3. Remove the packing from the connector.
4. With the cover removed from the connector, connect the connector to the engine-ECU.
5. Connect a needle-nosed wire probe (paper clip) to a voltmeter probe.
6. 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. Measure voltage with the engine-ECU connectors connected.
   2. Pull out the engine-ECU, and it is easier to reach the connector terminals.
   3. Checks don't have to be carried out in the order given in the chart.

   Caution
   Short-circuiting the positive (+) probe between a connector terminal and ground could damage any one of the vehicle wiring, the sensor, engine-ECU, or all three. Be careful not to damage these.
7. If voltmeter shows any division from standard value, check the corresponding sensor, actuator and related electrical wiring, then repair or replace.
8. After repair or replacement, recheck with the voltmeter to confirm that the problem has been corrected.
9. Disconnect the connector from the engine-ECU.
10. Install the packing and the cover to the connector, and then re-connect the connector to the engine-ECU.

Engine-ECU Connector Terminal Arrangement



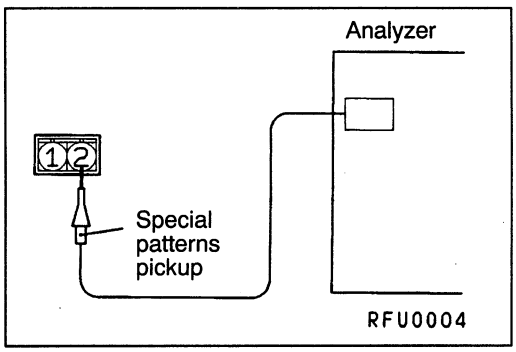
RFU0003

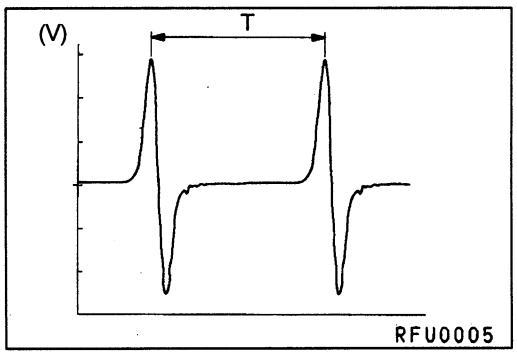
Caution
Do not measure the terminal voltages of the needle lift sensor and crank angle sensor, as this may cause damage to the engine-ECU.

NOTE
*1: Varies depending on the engine coolant temperature and altitude when the engine is started.

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
2	Vehicle speed sensor	• Ignition switch: ON • Move the vehicle slowly forward		0 ↔ Approx.12 V (Changes repeatedly)
3	A/C switch	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
5	Glow indicator lamp	• Engine coolant temperature: 60°C or less • Ignition switch: OFF → ON		0 – 3 V → System voltage (after 2 – 20 seconds have passed)*1
8	Timing control solenoid valve	Ignition switch: ON		System voltage
		Engine: Idle speed		8 – 12
9	EGR solenoid valve	Ignition switch: ON		System voltage
		Engine: Started, idle speed		From system voltage, drops after approx.3 seconds have passed
10	Lever position sensor power supply	Ignition switch: ON		4. 5 – 5.5 V
13	Power supply	Ignition switch: ON		System voltage
14	Engine coolant temperature sensor	Ignition switch: ON	Engine coolant temperature: 20°C or less	3.6 – 4.2 V
			Engine coolant temperature: 80°C or less	0.9 – 1.5 V
15	Intake air temperature sensor	Ignition switch: ON	Intake air temperature: 20°C	3.6 – 4.2 V
			Intake air temperature: 80°C	0.9 – 1.5 V

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
16	Lever position sensor	Ignition switch: ON	Set to idle position	0.5 – 1.5 V
			Open fully	4.5 – 5.5 V
19	Glow plug relay 2	• Engine coolant temperature: 60°C or less • Ignition switch: OFF → ON		0 – 3 V → System voltage (after approx. 8 seconds or more have passed the glow lamp switched off)
20	A/C relay	• Engine: Idle speed • A/C switch: OFF → ON		Momentarily 6 V or more → 0 – 3 V
21	Engine warning lamp	Ignition switch: ON → ST		0 – 3 V → System voltage (After engine has started)
23	Fast idle ON/OFF solenoid valve	Engine coolant temperature: 15°C or less	Engine: Idle	0 – 3 V
			Engine: 1000 r/min	System voltage
25	Glow plug relay 1	• Engine coolant temperature: 60°C or less • Ignition switch: OFF → ON		0 – 3 V → System voltage (after approx. 8 seconds or more have passed the glow lamp switched off)





INSPECTION PROCEDURE USING AN ANALYZER

CRANK ANGLE SENSOR

Measurement Method

1. Disconnect the crank angle sensor connector, and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to crank angle sensor connector 2.

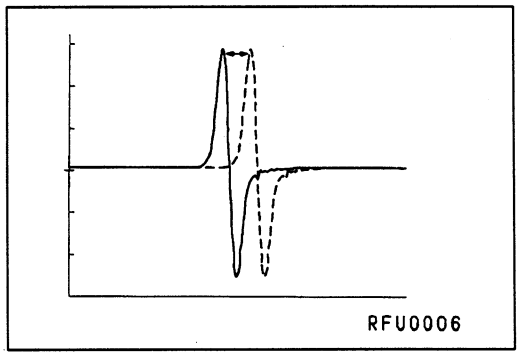
Standard Wave Pattern

Observation conditions

Function	Special patterns
Pattern height	Variable
Variable knob	Adjust while viewing the wave pattern
Pattern selector	Display
Engine r/min	Idle speed

Wave Pattern Observation Points

Check to be sure that cycle time T becomes shorter when the engine speed increased.


RFU0006

Examples of Abnormal Wave Patterns

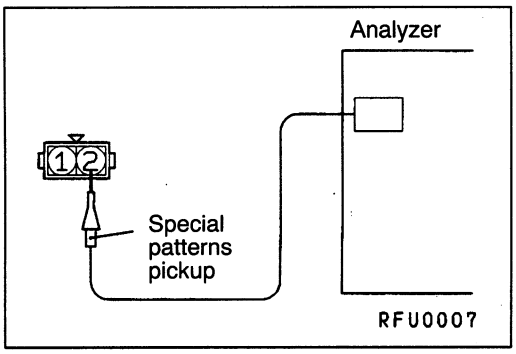
- **Example**

  Cause of problem

  Loose timing belt

  Wave pattern characteristics

  Wave pattern is displaced to the left or right.



RFU0007

NEEDLE LIFT SENSOR

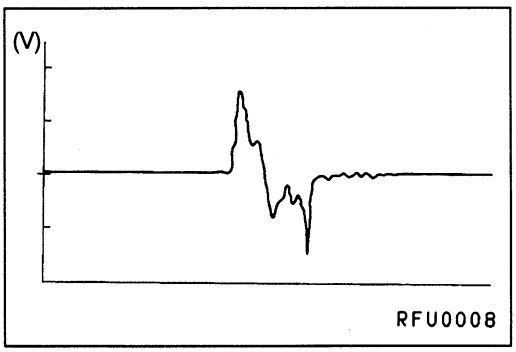
Measurement Method

1. Disconnect the needle lift sensor connector, and connect the special tool (test harness: MB991348) in between. (All terminals should be connected.)
2. Connect the analyzer special patterns pickup to needle lift sensor connector 2.

Standard Wave Pattern

Observation conditions

Function	Special patterns
Pattern height	Variable
Variable knob	Adjust while viewing the wave pattern
Pattern selector	Display
Engine r/min	Idle speed

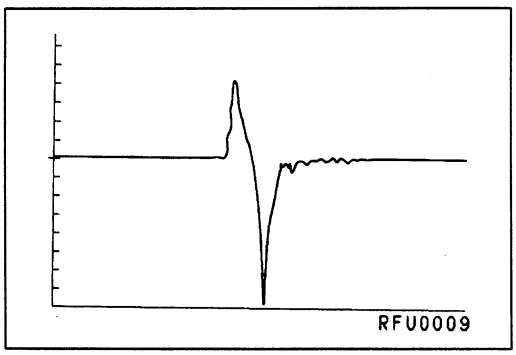


RFU0008

Wave Pattern Observation Points

Point: Injector nozzle drive time

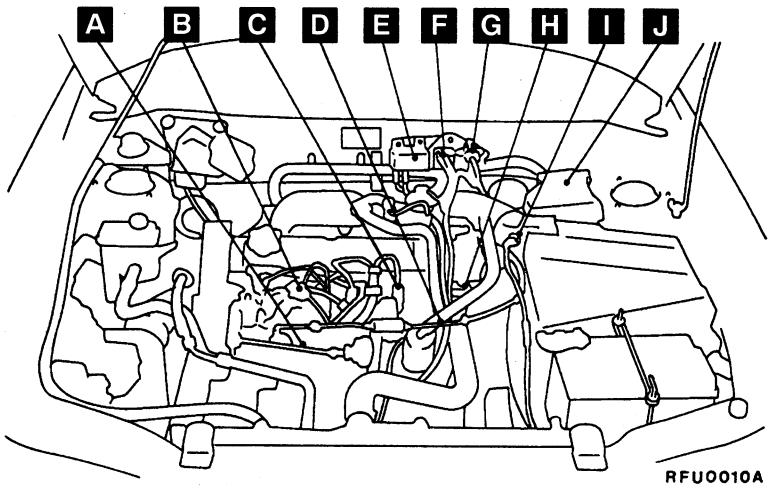
- When the engine is raced until 2500 r/min, the wave pattern is displayed as shown in the illustration. (The voltage width is extended and the pulse time is reduced.)


RFU0009

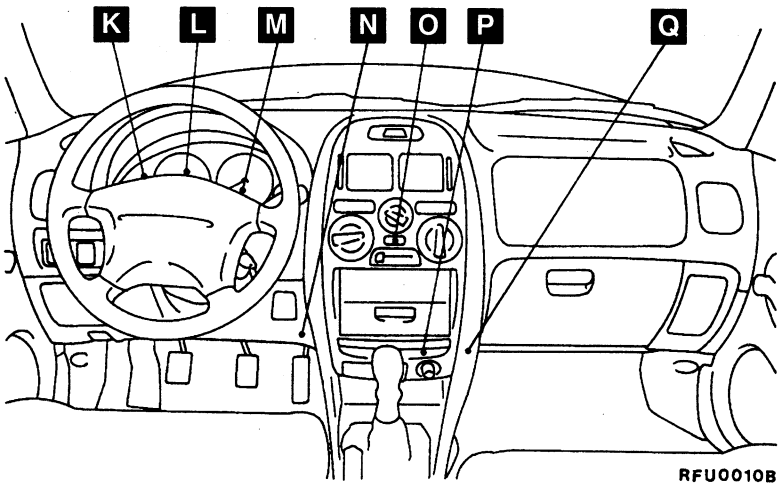
ON-VEHICLE SERVICE

COMPONENT LOCATION

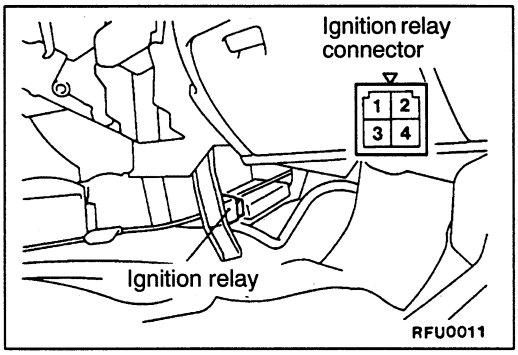
Name	Symbol	Name	Symbol
A/C relay	J	Glow relay box	E
A/C switch	O	Fast idle ON/OFF solenoid valve	G
Crank angle sensor (Engine speed sensor)	D	Ignition relay	Q
Diagnosis connector	N	Intake air temperature sensor	I
EGR solenoid valve	F	Lever position sensor	B
Engine coolant temperature sensor	H	Needle lift sensor	C
Engine-ECU	P	Timing control solenoid valve	A
Engine warning lamp (check engine lamp)	M	Vehicle speed sensor	L
Glow indicator lamp	K		



RFU0010A

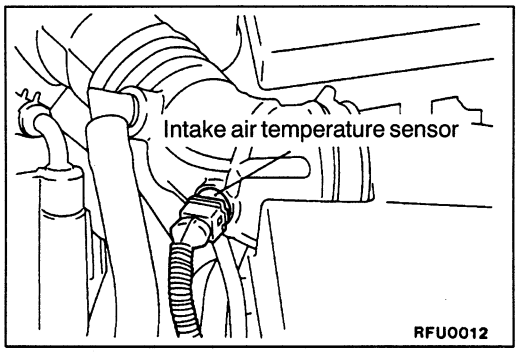


RFU0010B
RFU0010



IGNITION RELAY CONTINUITY CHECK

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



INTAKE AIR TEMPERATURE SENSOR CHECK

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

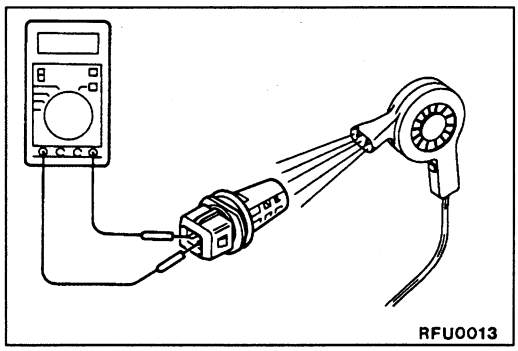
   Standard value:
   3.3 – 3.8 kΩ (at 20°C)
   0.32 – 0.35 kΩ (at 80°C)

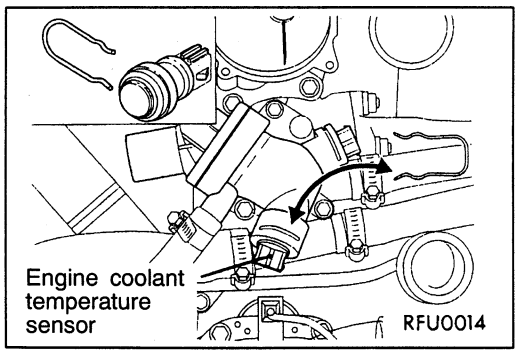
3. Remove intake air temperature sensor.
4. Measure resistance while heating the sensor using a hair drier.

   Normal condition:

Temperature (°C)	Resistance (kΩ)
Higher	Smaller

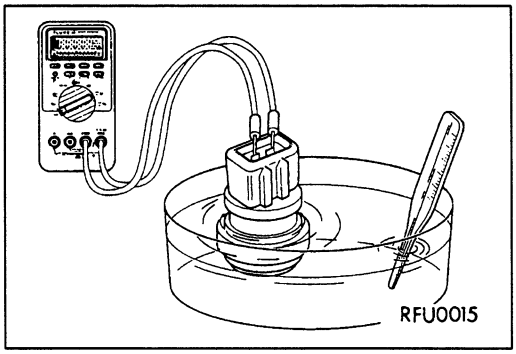
5. If the value deviates from the standard value or the resistance remains unchanged, replace the intake air temperature sensor.





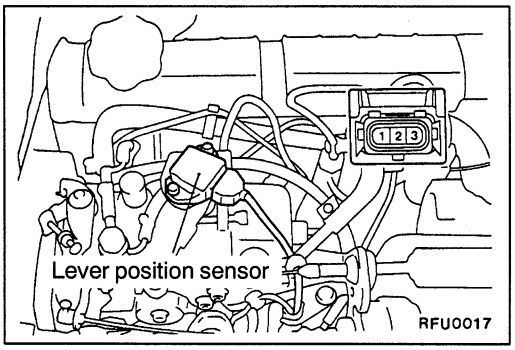
ENGINE COOLANT TEMPERATURE SENSOR CHECK

1. Disconnect the engine coolant temperature sensor connector.
2. Remove engine coolant temperature sensor.



3. With temperature sensing portion of engine coolant temperature sensor immersed in hot water, check resistance.

   Standard value:
   3.3 – 3.8 kΩ (at 20°C)
   0.32 – 0.35 kΩ (at 80°C)
4. If the resistance deviates from the standard value greatly, replace the sensor.
5. Install the new O-ring to the engine coolant temperature sensor.
6. Install engine coolant temperature sensor and fasten harness connector.



LEVER POSITION SENSOR CHECK

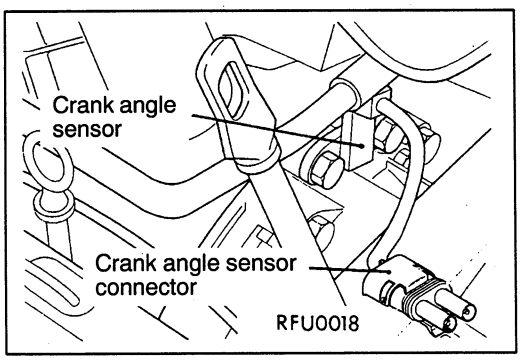
1. Disconnect the lever position sensor connector.
2. Measure resistance between terminals 1 and 3.

   Standard value: 3.3 – 5.0 kΩ
3. Measure resistance between terminals 1 and 2.

   Standard value:

Throttle lever	Resistance (kΩ)
Idle position	1.5 – 3.5
Full open	4.1 – 7.1

4. If the resistance is outside the standard value, or if it doesn't change smoothly, replace the injection pump assembly.



CRANK ANGLE SENSOR (ENGINE SPEED SENSOR) CHECK

NOTE
Do not bring the crank angle sensor within 30 cm of any magnetic material.

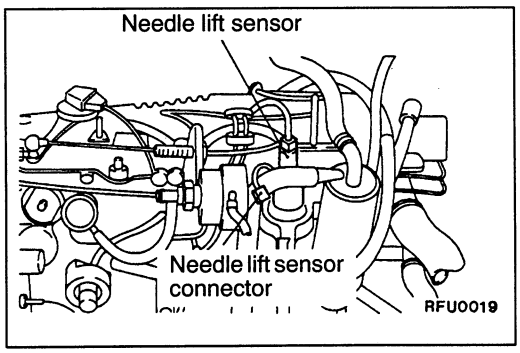
1. Disconnect the crank angle sensor connector.
2. Connect a voltage meter between the crank angle sensor connector terminals.
3. Crank the engine and measure the voltage.

   Standard value: 150 mV or more (AC voltage)

4. If the voltage is outside the standard value, check that the crank angle sensor is correctly installed.
5. If no voltage appears, measure the resistance between the terminals.

   Standard value: 200 – 270 Ω

6. If the resistance is at the standard value, check the flywheel.
7. If the engine warning lamp illuminates after inspection, use the MUT-II to erase the diagnosis code.

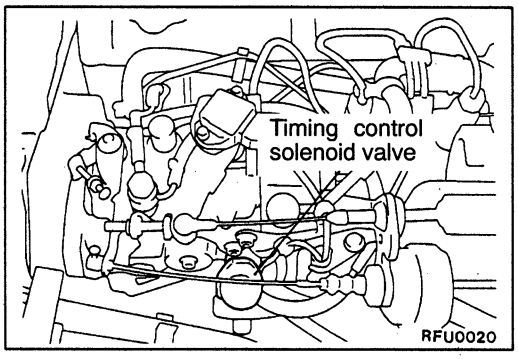


NEEDLE LIFT SENSOR CHECK

1. Disconnect the needle lift sensor connector.
2. Measure resistance between terminals.

   Standard value: 95 – 125 Ω

3. If the resistance is outside the standard value, replace the No.1 injection nozzle assembly.

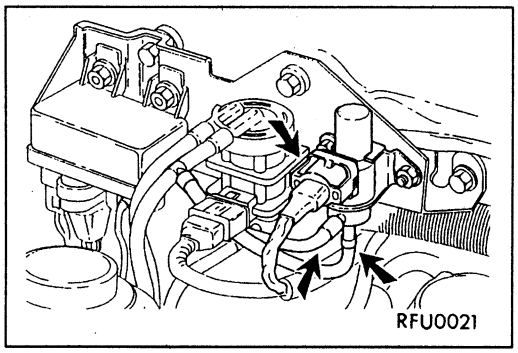


TIMING CONTROL SOLENOID VALVE CHECK

1. Check that the solenoid valve operation sound can be heard when the ignition switch is ON.
2. Disconnect the timing control solenoid valve connector.
3. Measure resistance between terminals.

   Standard value: 10.5 – 13.5 Ω

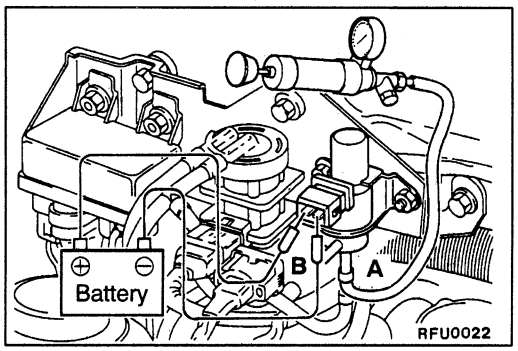
4. If the resistance is outside the standard value, replace the injection pump assembly.



FAST IDLE ON/OFF SOLENOID VALVE CHECK

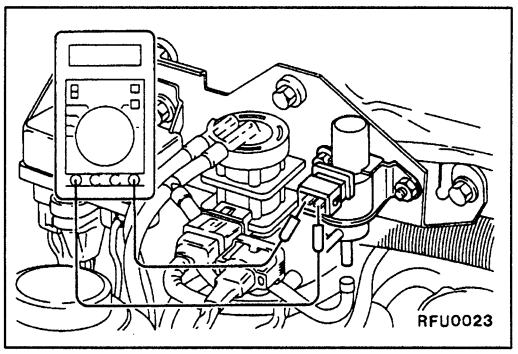
NOTE
When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.

1. Disconnect the vacuum hose from the solenoid valve.
2. Disconnect the harness connector.



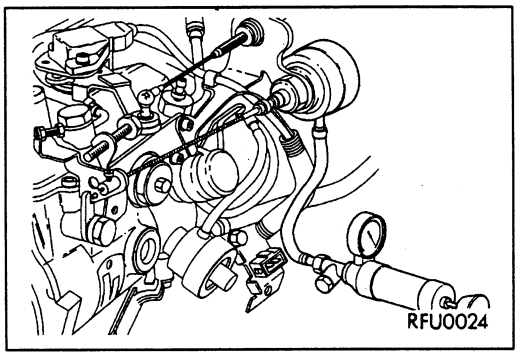
3. Connect a hand vacuum pump to the nipple A.
4. Check air-tightness by applying a vacuum with voltage applied directly from the battery to the solenoid valve and without applying voltage.

Battery voltage	Nipple B condition	Normal condition
Applied	Open	Vacuum leaks
	Closed	Vacuum maintained
Not applied	Closed	Vacuum maintained



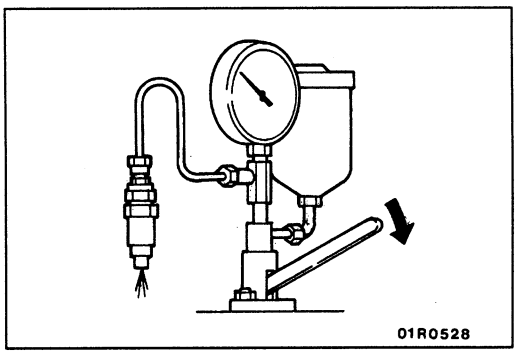
5. Measure the resistance between the terminals of the solenoid valve.

   Standard value: 27 – 31 Ω (at 23°C)



IDLE UP ACTUATOR CHECK

1. Disconnect the vacuum hose from the idle up actuator.
2. Connect a hand vacuum pump to nipple of idle up actuator.
3. Apply 53 kPa of vacuum, and check that the vacuum is maintained.



INJECTION NOZZLE CHECK

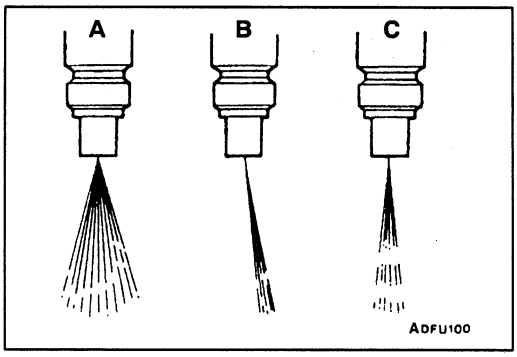
FUEL INJECTION INITIAL PRESSURE CHECK

Caution
Never touch the injection spray that is injected from the nozzle.

1. Remove the injection nozzle. (Refer to P.13E-62.)
2. Install the injection nozzle to a nozzle tester.
3. Move the lever of the nozzle tester 2 – 3 times to inject fuel and to bleed the air.
4. Gently press down the lever of the nozzle tester, and take a reading of the indication valve on the pressure gauge at the point where the needle slowly rises and then suddenly drops.

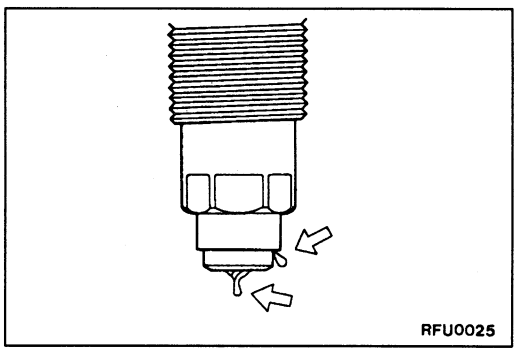
   Standard value:
   13000 kPa (Fuel injection initial pressure)
5. If the fuel injection initial pressure is outside the standard value, disassemble the injection nozzle to clean it, and then change the thickness of the shim to adjust the fuel injection initial pressure.

   NOTE
   1. For disassembly, reassembly and adjustment of the injection nozzle, refer to the Engine Workshop Manual.
   2. The adjustment shim thicknesses vary from 1.00 mm to 1.95 mm in steps of 0.05 mm.
   3. When the shim thickness is increased by 0.05 mm, the fuel injection initial pressure increases by 500 kPa.



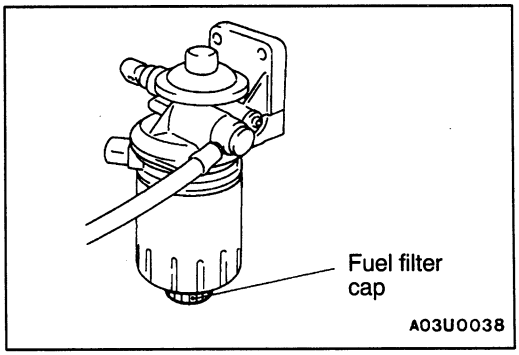
INJECTION SPRAY CONDITION CHECK

1. Move the lever of the nozzle tester rapidly (4 – 6 times per second) to eject the fuel continuously. Check to be sure that the injection spray comes out evenly in a straight, thin line (angle of spray is zero). The injection spray patterns shown in the illustration at left are wrong.
   A. Injection angle is tool large
   B. Bias
   C. Intermittent fuel injection
2. Check to be sure that no fuel drips after injection is completed.
3. If there are any drips, disassemble the injection nozzle, clean it and reinspect, or replace the injection nozzle.



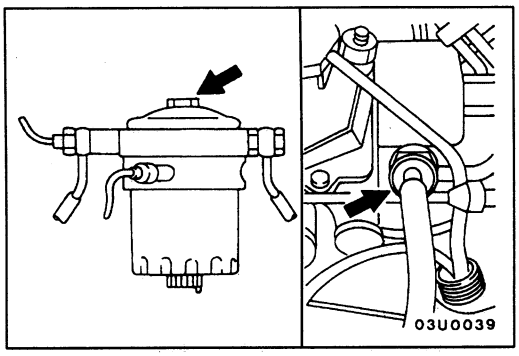
NOZZLE FUEL-TIGHT CHECK

1. Gently raise the lever of the nozzle tester until the pressure inside the injection nozzle (value displayed on pressure gauge) becomes 11,000 kPa, and after holding this pressure for approximately 10 seconds, check to be sure that there are no fuel leaks from the injection nozzle.
2. If there are any leaks, disassemble the injection nozzle, clean it and re-inspect, or replace the injection nozzle.



EVACUATION OF WATER FROM FUEL FILTER

Evacuate water by the following procedures.
1. Remove the air cleaner assembly.
2. Remove the fuel filter cap.
3. Use a manual pump to remove any water, and then attach the fuel filter cap.



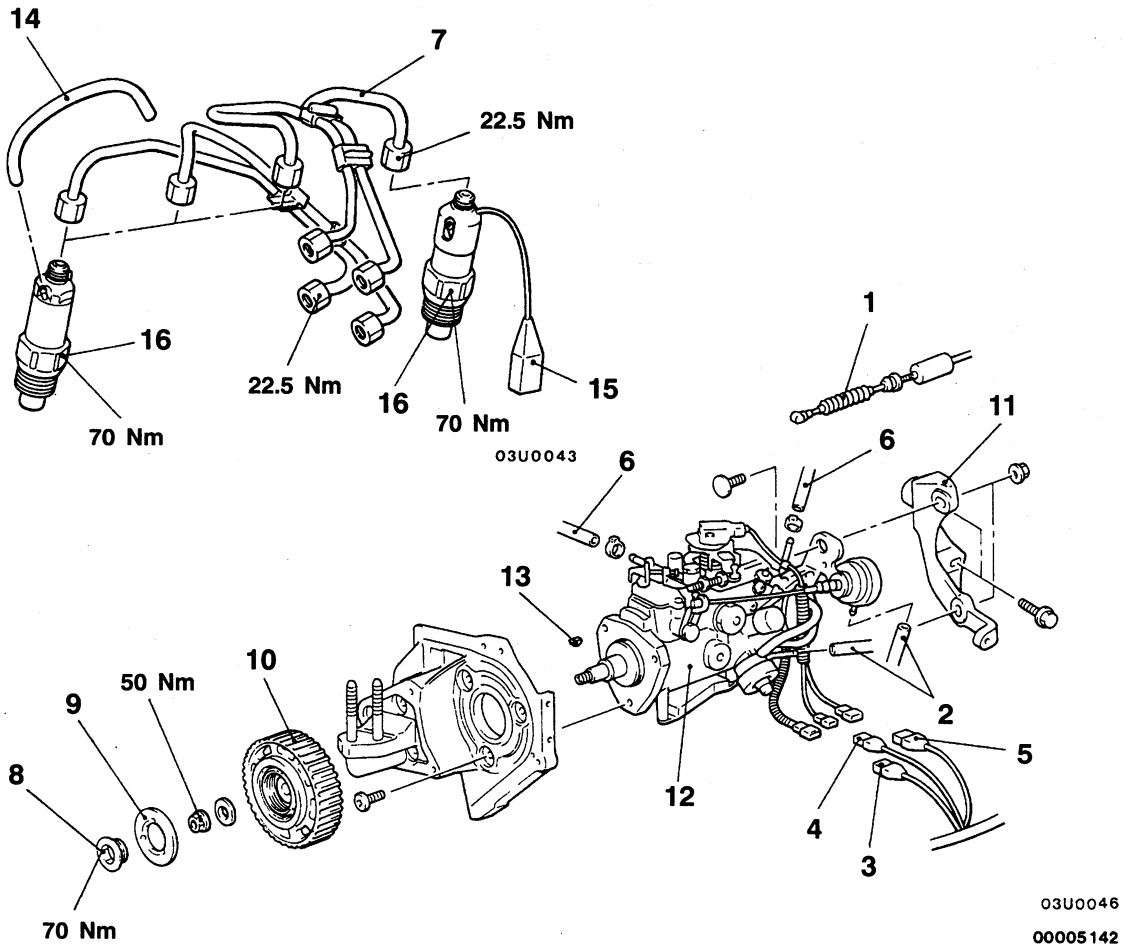
EVACUATION OF AIR FROM FUEL LINE

Bleed the air from the fuel line after refilling the fuel:
- When fuel is drained for service.
- When fuel filter is replaced.
- When main fuel line is removed.

1. Connect a long piece of tubing to the bleedscrew of the fuel injection pump with its open end in a drip tray.
2. Open the bleedscrew and operate the pump on the fuel filter until clear fuel flows out of the bleedscrew.
3. Close the bleedscrew and remove the tubing.
4. Turn the ignition switch to the "ON" position.
5. Now pump a few more times until resistance is felt; then pump five more strokes to pressurize the system.
6. Start the engine and check for leakage.

INJECTION PUMP AND NOZZLE

REMOVAL AND INSTALLATION



Fuel injection pump removal steps

- Injection timing adjustment (Refer to GROUP 11B – On-vehicle Service.)
- Timing belt (Refer to GROUP 11B.)
- Throttle cable adjustment (Refer to GROUP 13F – Accelerator Cable and Pedal.)

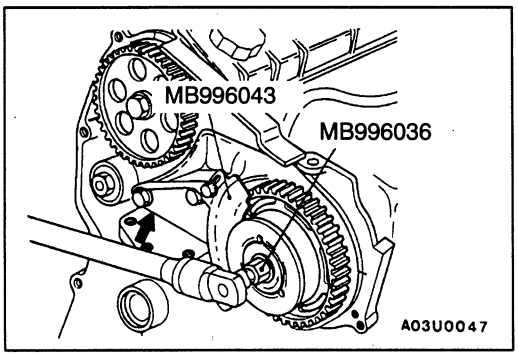
1. Throttle cable connection
2. Vacuum hoses connection
3. Load lever sensor connector
4. Proportional solenoid connector
5. Immobilizer connector
6. Fuel hoses connection
7. Fuel injection pipe

◀A▶ ▶A◀ 8. Screwed sleeve and nut assembly
9. Flange
◀A▶ ▶A◀ 10. Fuel injection pump sprocket
11. Rear pump support
12. Fuel injection pump
13. Key

Fuel injection nozzle removal steps

7. Fuel injection pipe
14. Fuel return hose
15. Needle lift sensor connector (No.1 only)

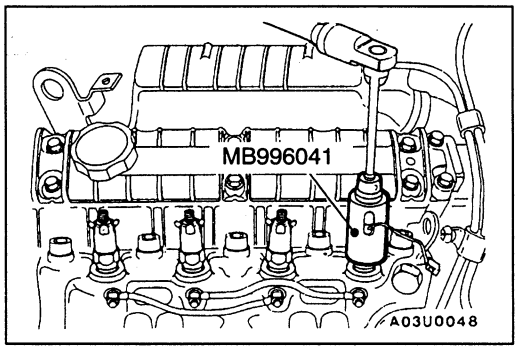
◀B▶ 16. Fuel injection nozzle



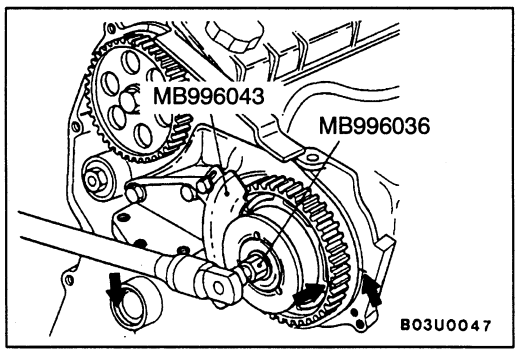
REMOVAL SERVICE POINT

◀A▶ SCREWED SLEEVE AND NUT ASSEMBLY/FUEL INJECTION PUMP SPROCKET REMOVAL

1. Locate the special tool between the pump bracket and the sprocket. Fasten the tool with the bolts supplied with the set.
2. Remove the screwed sleeve and nut assembly with special tool (release by turning clockwise).
3. Remove the nut.
4. Pull the sprocket off the shaft with a gear puller.



◀B▶ FUEL INJECTION NOZZLE REMOVAL



INSTALLATION SERVICE POINT

▶A◀ FUEL INJECTION PUMP SPROCKET/SCREWED SLEEVE AND NUT ASSEMBLY INSTALLATION

1. Align the sprocket with the mark opposite the pump bracket.
2. Locate the special tool between the pump bracket and the sprocket. Fasten the tool with the bolt supplied with the set.
3. Fit and tighten the nut to the specified torque.
4. Locate the flange with the screwed sleeve and nut assembly and tighten to the specified torque with special tool.

GROUP 13F
FUEL SUPPLY

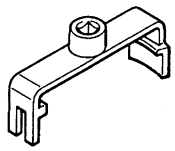
GENERAL

OUTLINE OF CHANGES

- The following service procedures have been added to the addition of the diesel-powered vehicle. Applicable models: 1900D
  1. Removal and installation of the fuel tank
  2. Removal and installation of the fuel filter

FUEL TANK

SPECIAL TOOL

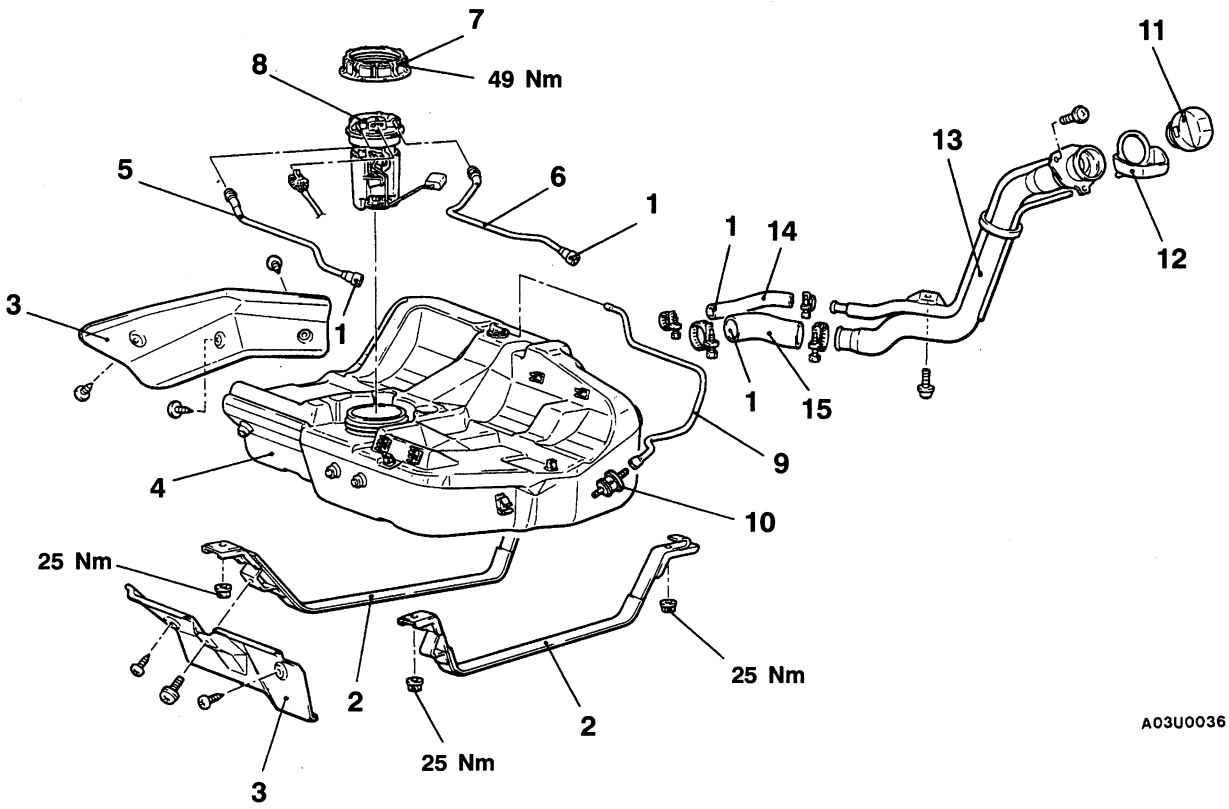
Tool	Number	Name	Use
	MB996009	Tank cap wrench	Installation of tank cap

FUEL TANK

REMOVAL AND INSTALLATION

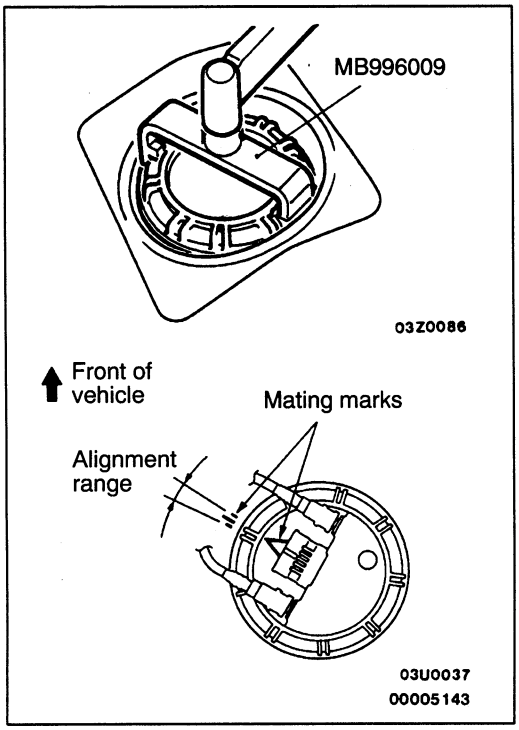
Pre-removal Operation
(1) Draining the Fuel
(2) Removal of the Centre Exhaust Pipe

Post-installation Operation
(1) Installation of Exhaust Pipe
(2) Refilling the Fuel
(3) Checking for Fuel Leaks



Removal steps

1. Hoses connection
2. Band
3. Protector
4. Fuel tank assembly
5. Fuel main hose
6. Fuel return hose
▶A◀ 7. Cap
8. Fuel pipe and gauge assembly
9. Fuel vapor hose
10. 2 way valve
11. Fuel filler cap
12. Fuel rubber drain
13. Filler neck assembly
14. Leveling hose
15. Filler hose



INSTALLATION SERVICE POINT

▶A◀ CAP INSTALLATION

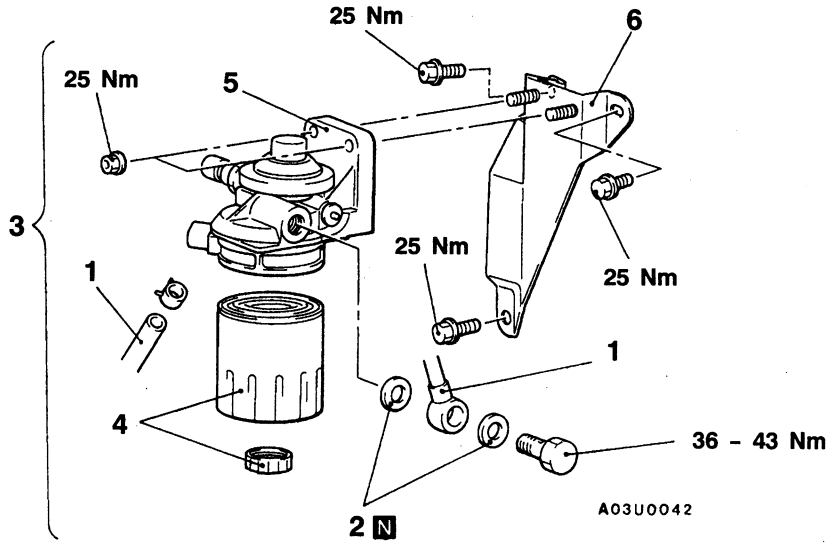
Use the special tool to align the mating marks on the fuel tank and the fuel pipe and gauge assembly, and tighten the cap to the specified torque.

Caution
When tightening, be careful not to let the fuel pipe and gauge assembly turn together with the cap. If the mating marks are misaligned, the float may measure a remaining amount of fuel incorrectly, causing the low fuel warning lamp to malfunction.

FUEL FILTER

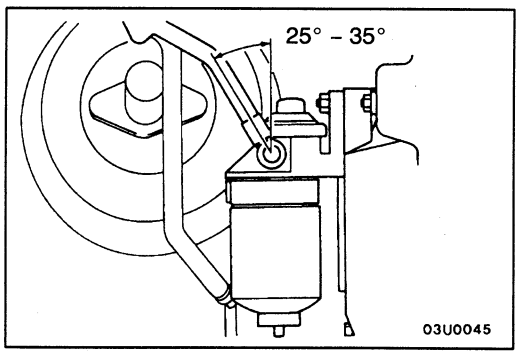
REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation
- Air Cleaner Assembly Removal and Installation



Removal steps

▶A◀ 1. Fuel hose assembly connection
2. Gasket
3. Fuel filter assembly
4. Fuel filter cartridge
5. Fuel filter pump body
6. Fuel filter bracket



INSTALLATION SERVICE POINT

▶A◀ FUEL HOSE ASSEMBLY INSTALLATION

Install the fuel hose assembly as shown in the illustration.

INSPECTION

FUEL FILTER REPLACEMENT

1. Remove the fuel tank to release the vacuum in the fuel tank.
2. Remove the air cleaner assembly.
3. Disconnect the connector and the fuel hose assembly from the fuel filter pump body to remove the fuel filter assembly from the bracket.
4. Remove the fuel filter cartridge from the fuel filter pump body.

   Caution
   Cover the cartridge with a rag to prevent fuel from gushing out.

5. Install a new filter, and bleed air from the fuel lines.
6. Start the engine, and check that there is no fuel leak.