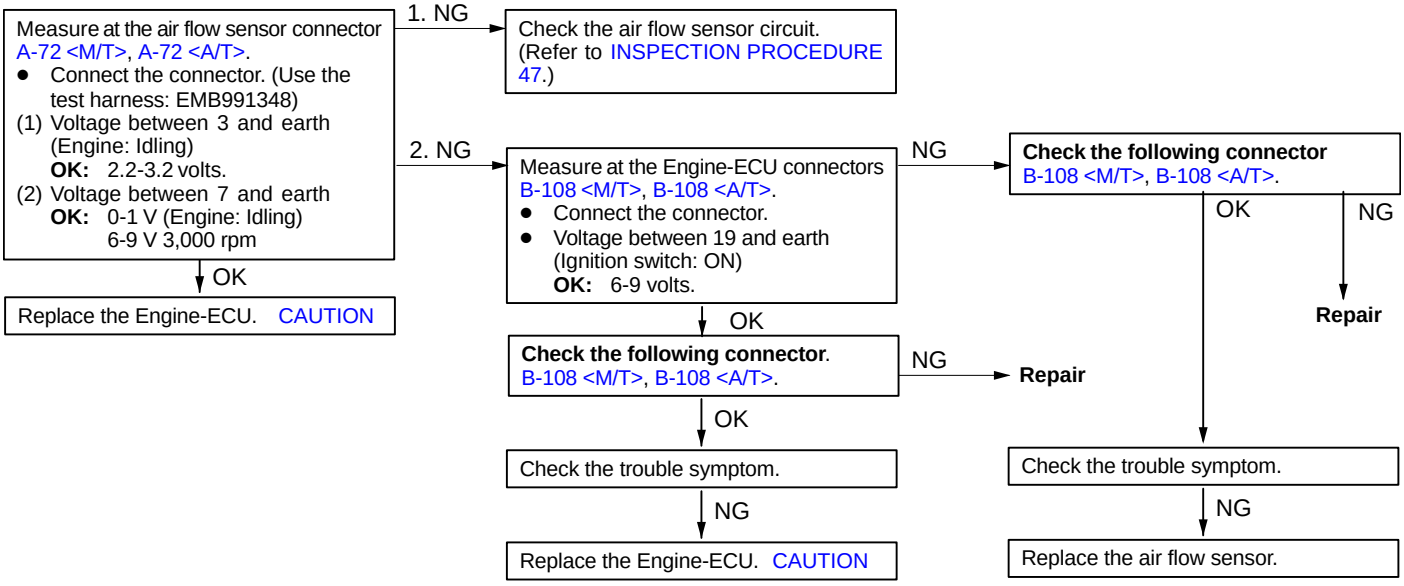
TROUBLESHOOTING

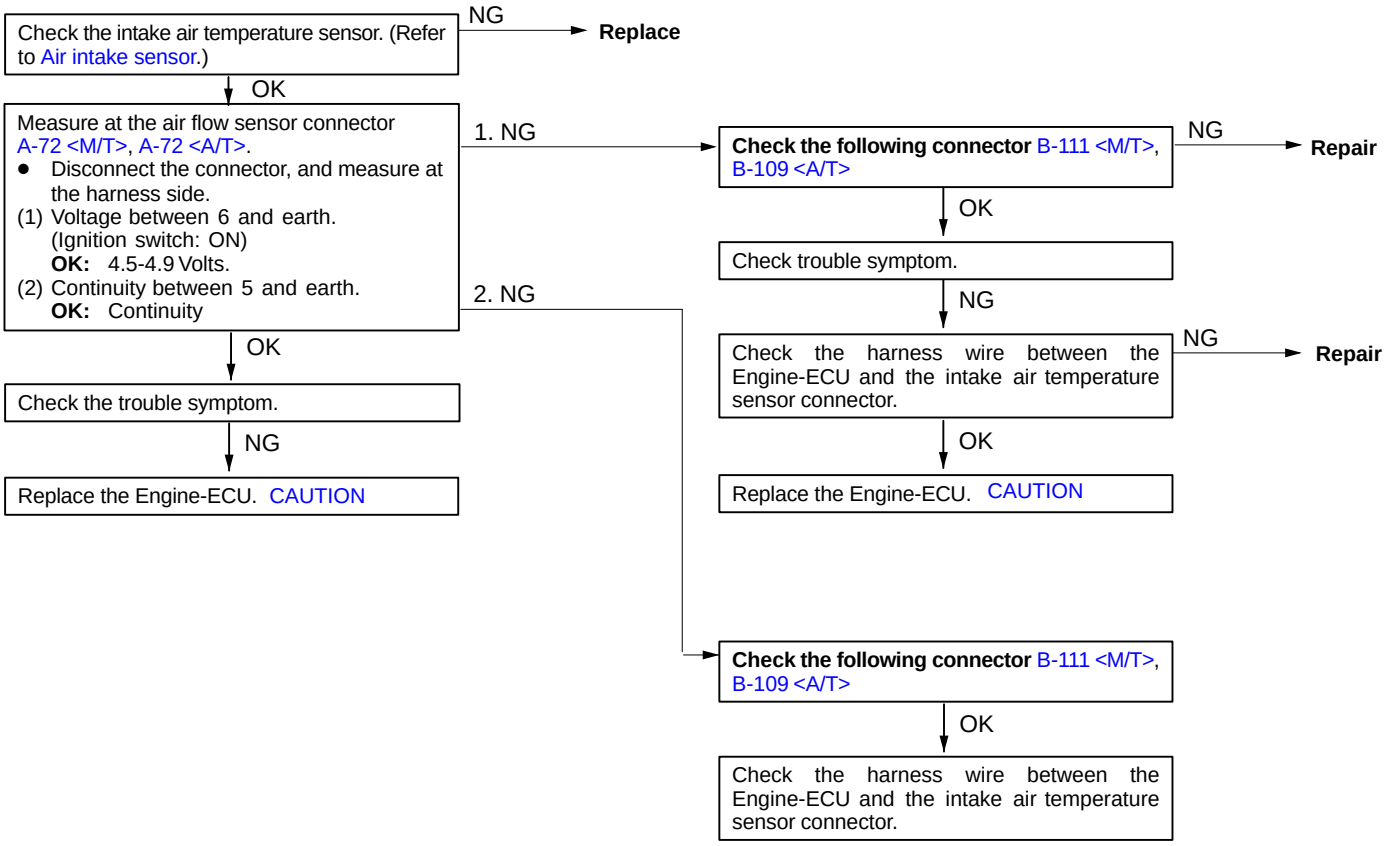
INSPECTION CHART FOR DIAGNOSIS

Code No.	Diagnosis Item
12	Air flow sensor system
13	Intake air temperature sensor system
14	Throttle position sensor system
21	Engine coolant temperature sensor system
22	Crank angle sensor system
23	Top dead centre sensor system
24	Vehicle speed sensor system
25	Barometric pressure sensor system
41	Injector system
44	Ignition coil and power transistor unit system
54	Immobiliser system
61	Communication with A/T-ECU system <A/T>
72	Vacum control solenoid valve system <vehicles with traction control>
73	Ventilation control solenoid valve system <vehicles with traction control>

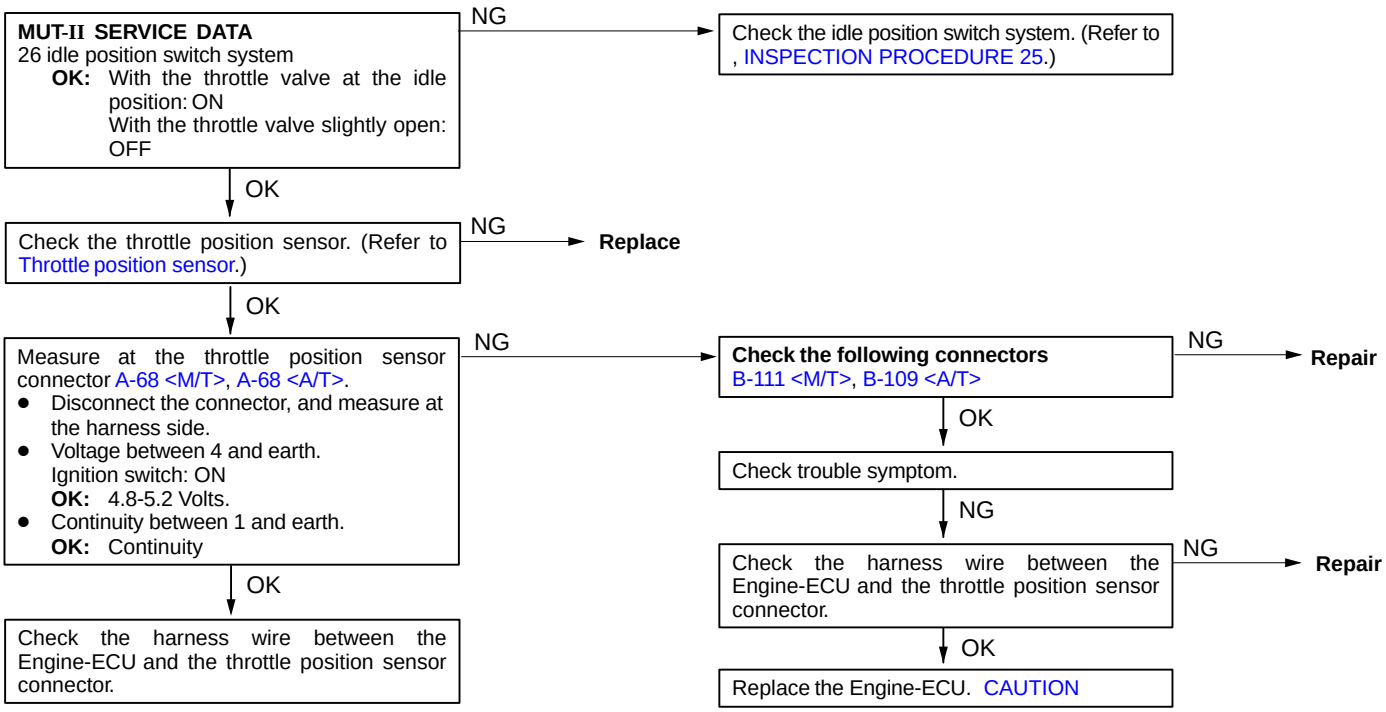
Code No. 12 Air flow sensor system	Probable cause
Range of Check ● Engine speed is 500 rpm or more Set conditions ● Sensor output frequency is 3 Hz or less for 4 seconds.	● Malfunction of the air flow sensor ● Improper connector contact, open circuit or short-circuited harness wire ● Malfunction of the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



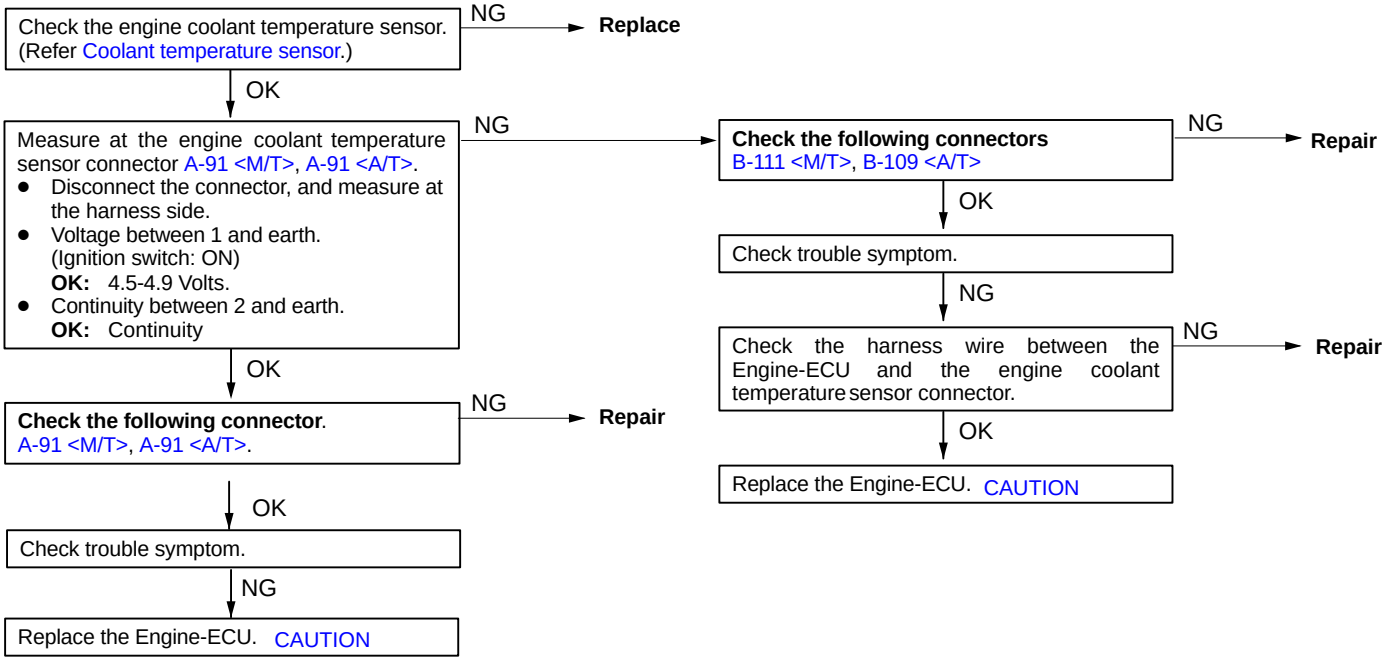
Code No. 13 Intake air temperature sensor system	Probable cause
Range of Check ● Ignition switch: ON ● Excluding 60 seconds after the ignition is turned to ON or immediately after the engine starts. Set conditions ● Sensor output voltage is 4.6 V or more (corresponding to an intake air temperature of -45°C or less) for 4 seconds. or ● Sensor output voltage is 0.2 V or more (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



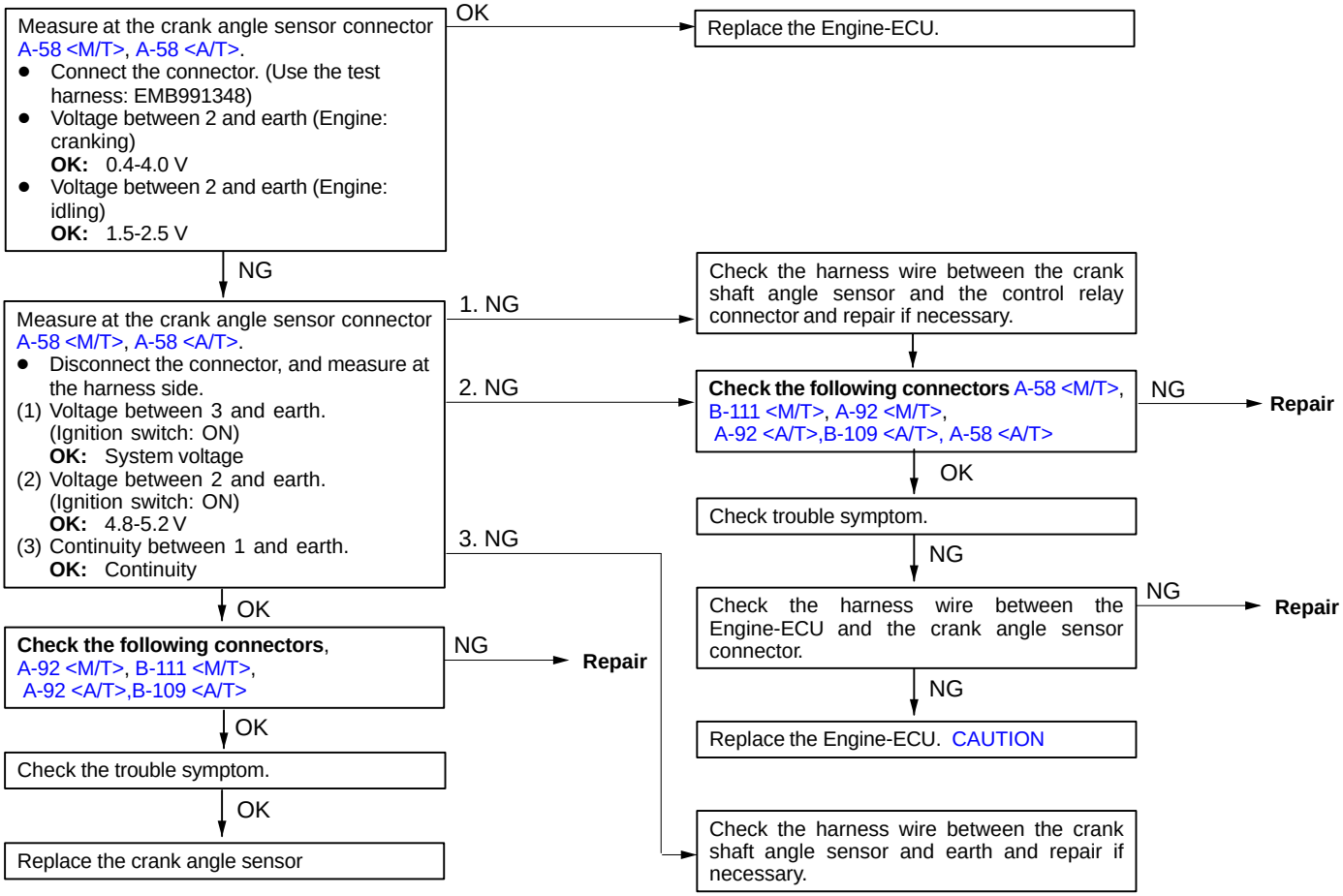
Code No. 14 Throttle position sensor system	Probable cause
Range of Check ● Ignition switch: ON ● Excluding 60 seconds after the ignition is turned to ON or immediately after the engine starts. Set conditions ● When the idle position Switch is ON, the sensor output voltage is 2 Volts or more for 4 seconds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



Code No. 21 Engine coolant temperature sensor system	Probable cause
Range of Check ● Ignition switch: ON ● Excluding 60 seconds after the ignition 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 more (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 intake air temperature sensor circuit ● Malfunction of the Engine-ECU sensor
Range of Check ● Ignition switch: ON ● Engine speed is approx. 50 rpm or more Set conditions ● Sensor output voltage increases from 1.6 V or less (corresponding to an engine coolant temperature of -40°C or less) 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.	



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



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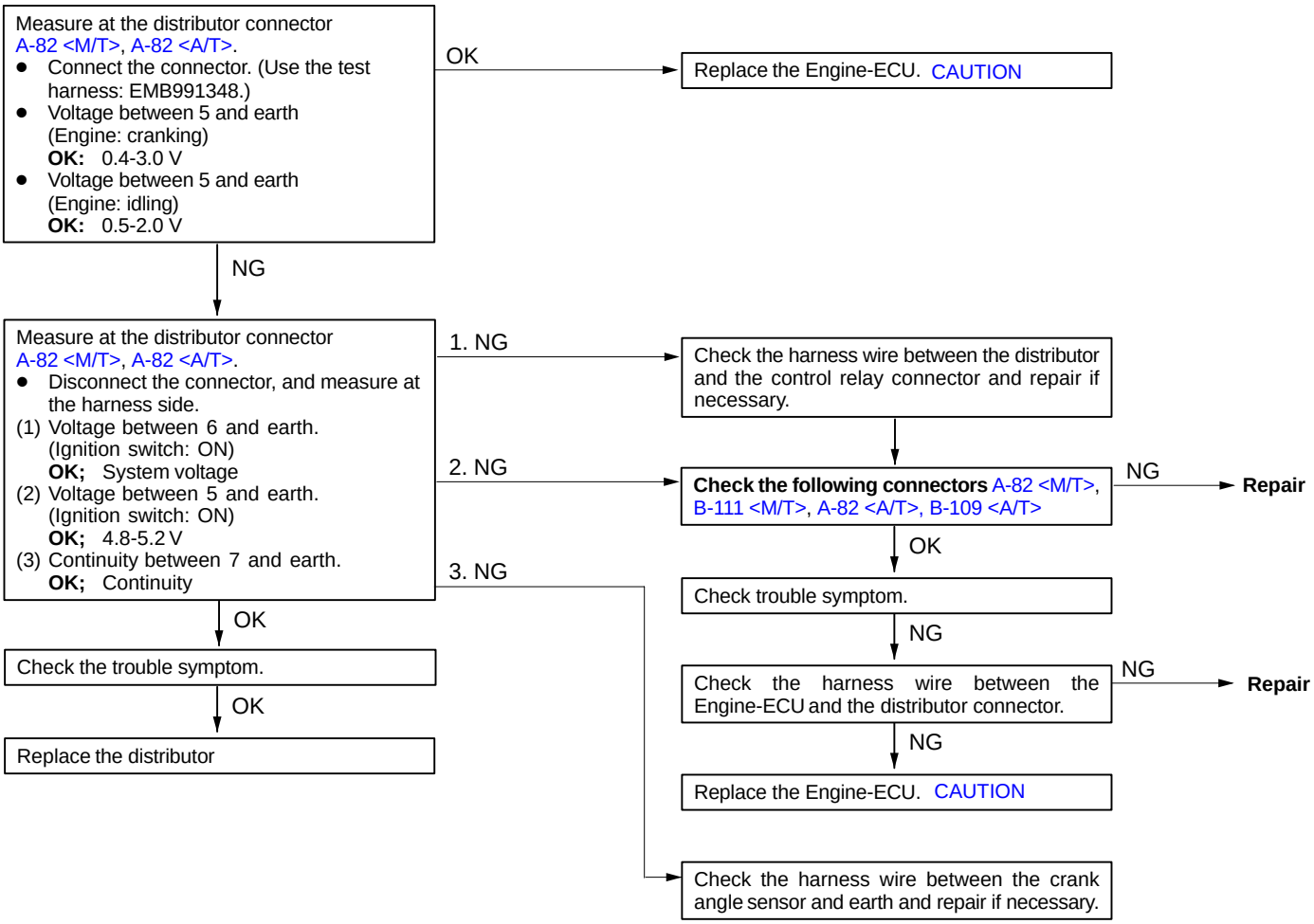
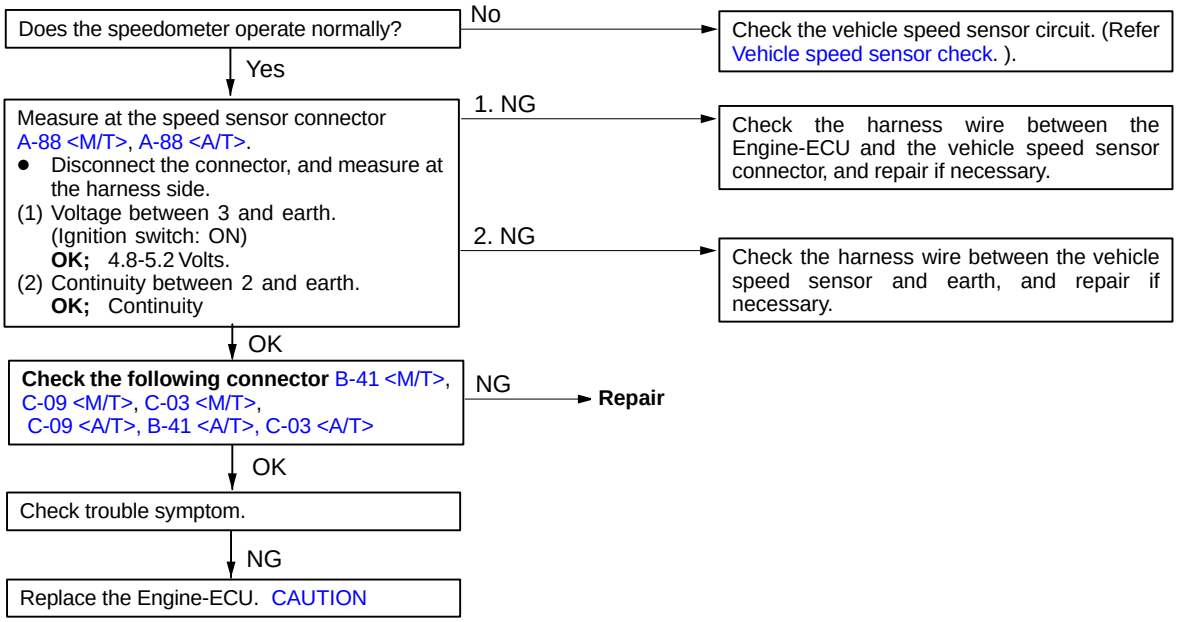
Code No. 23 Camshaft position sensor system	Probable cause
Range of Check ● Ignition Switch: ON ● Engine speed is approx. 50 rpm or more. Set conditions ● Sensor output voltage does not change for 4 seconds (no pulse signal input).	● Malfunction of the crank angle sensor ● Improper connector contact,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



Code No. 24 Vehicle 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 approx. 50 rpm or more. ● Driving under high engine load. 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



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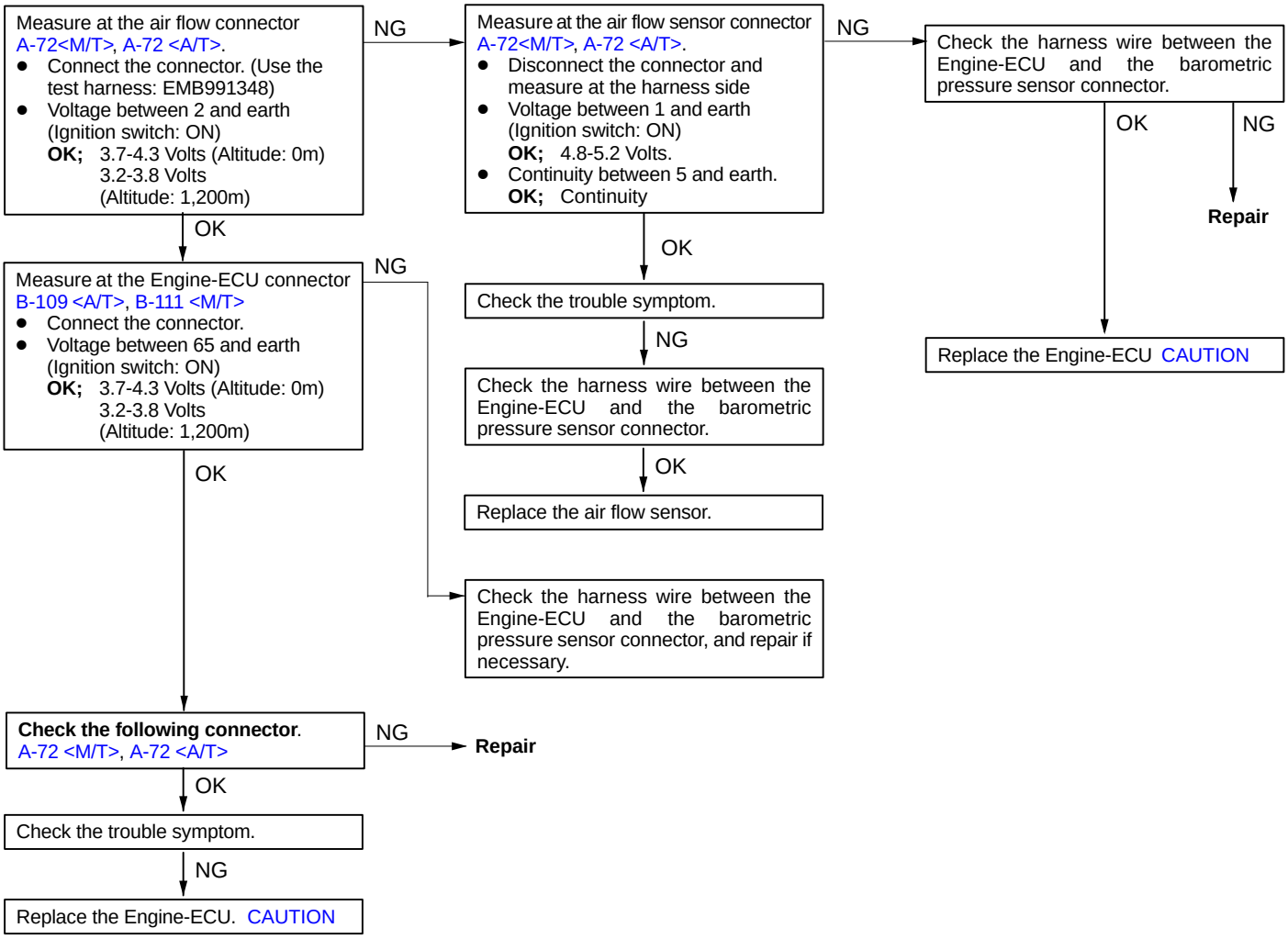
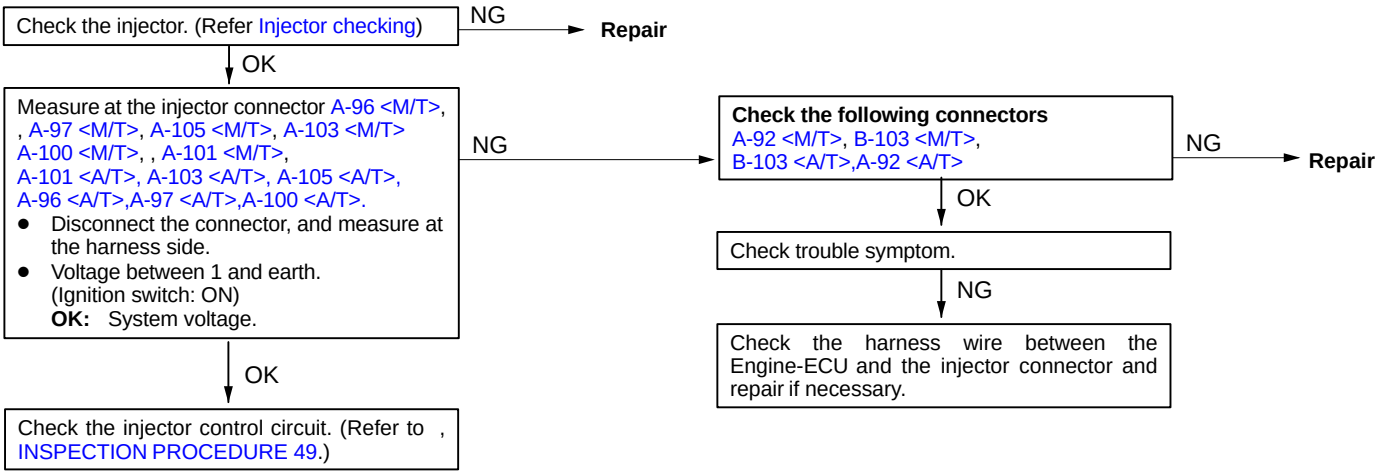
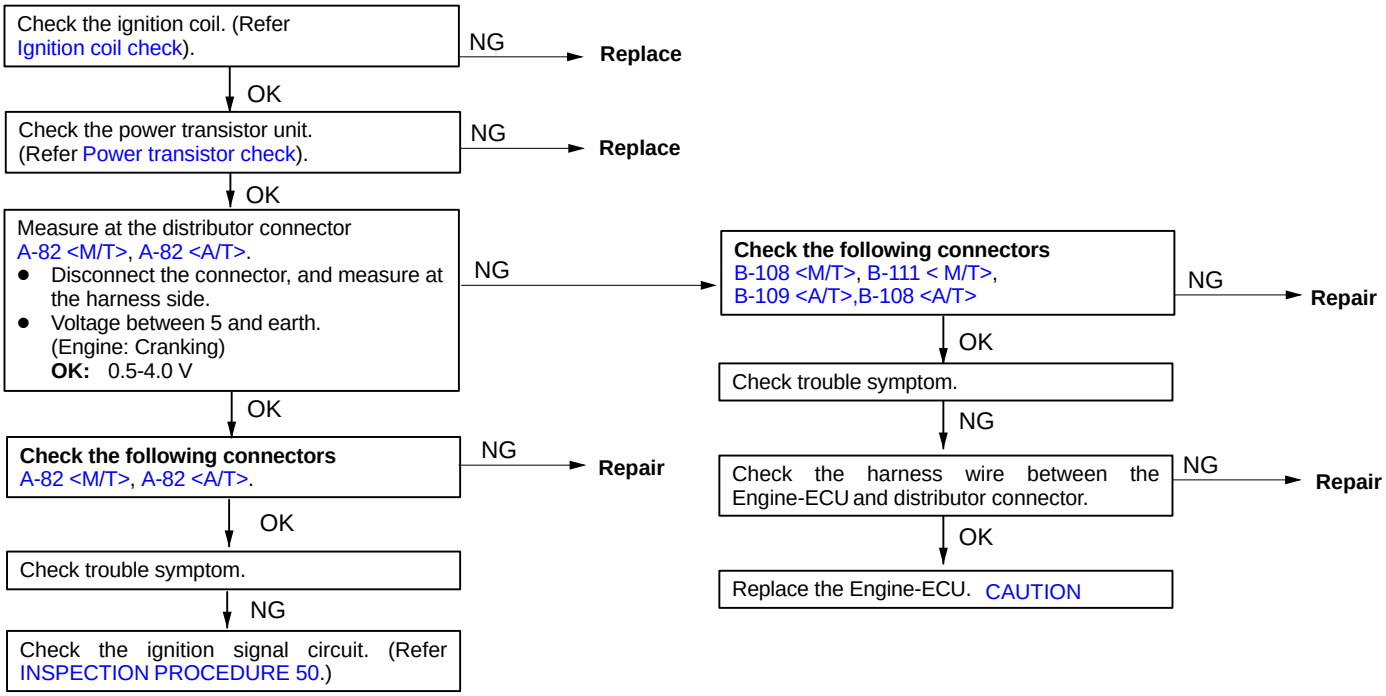
Code No. 25 Barometric pressure sensor system	Probable cause
Range of Check ● Ignition Switch: ON ● Excluding 60 seconds after the ignition switch is turned ON or immediately after the engine starts. ● Battery voltage is 8 Volts or more Set conditions ● Sensor output voltage is 4.5 Volts or more (corresponding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



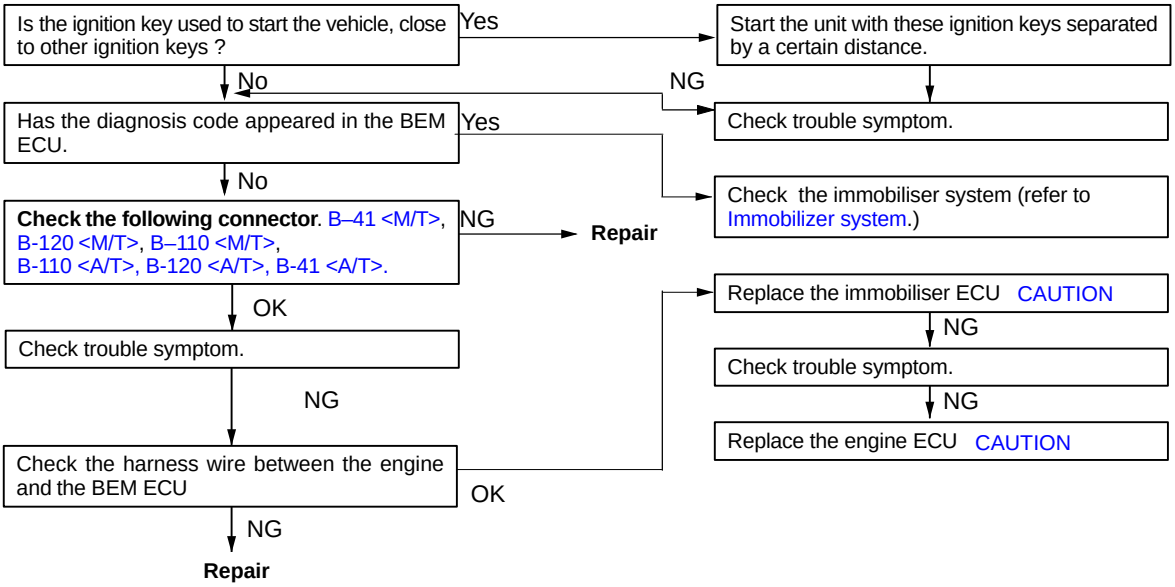
Code No. 41 Injector system	Probable cause
Range of Check ● Engine speed is approx. 50-1000 rpm ● Throttle position sensor output voltage is 1.15 Volts or less. ● Actuator test by MUT-II is not carried out. Set conditions ● Surge voltage of injector coil is not detected for 4 seconds.	● Short circuit to earth of the diagnosis control line. ● Improper connector contact, open circuit or short-circuited harness wire of the injector circuit ● Malfunction of the Engine-ECU



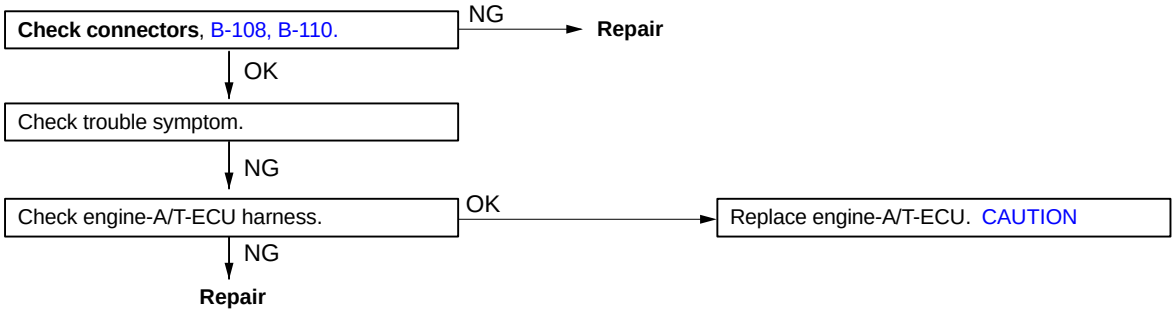
Code No. 44 Ignition coil and power transistor unit system	Probable cause
Range of Check ● Engine speed is approx. 50-4000 rpm ● Engine is not cranking. Set conditions ● The ignition signal from the same coil is not input for 4 seconds. However, this excludes cases where no ignition signal is input from any coils.	● Malfunction of the ignition coil. ● Improper connector contact, open circuit or short-circuited harness wire of the ignition primary circuit ● Malfunction of the power transistor unit ● Malfunction of the Engine-ECU



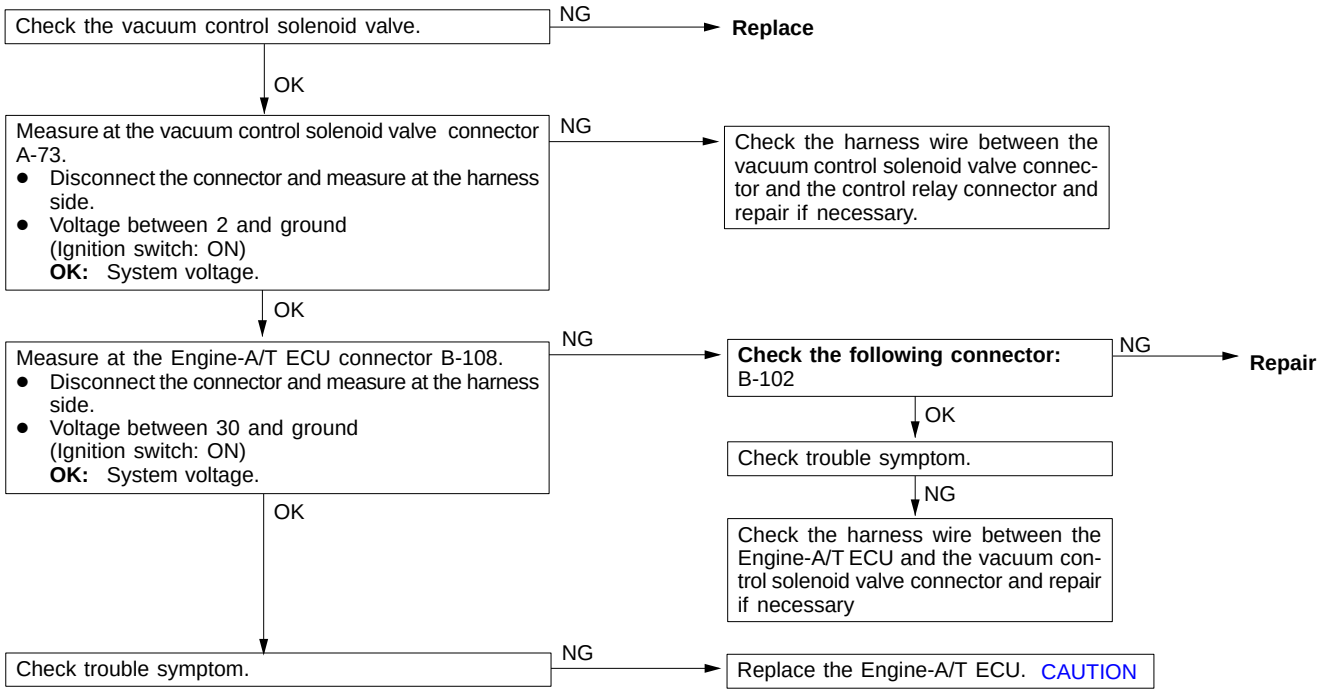
Code No. 54 Immobiliser system	Probable cause
Range of Check ● Ignition Switch: ON Set conditions ● Failure to communicate between engine ECU and immobiliser ECU.	● Confusion in ID code ● Nonmatching of ID code ● Malfunction of immobiliser ECU ● Malfunction of harness or connector ● Malfunction of the Engine-ECU



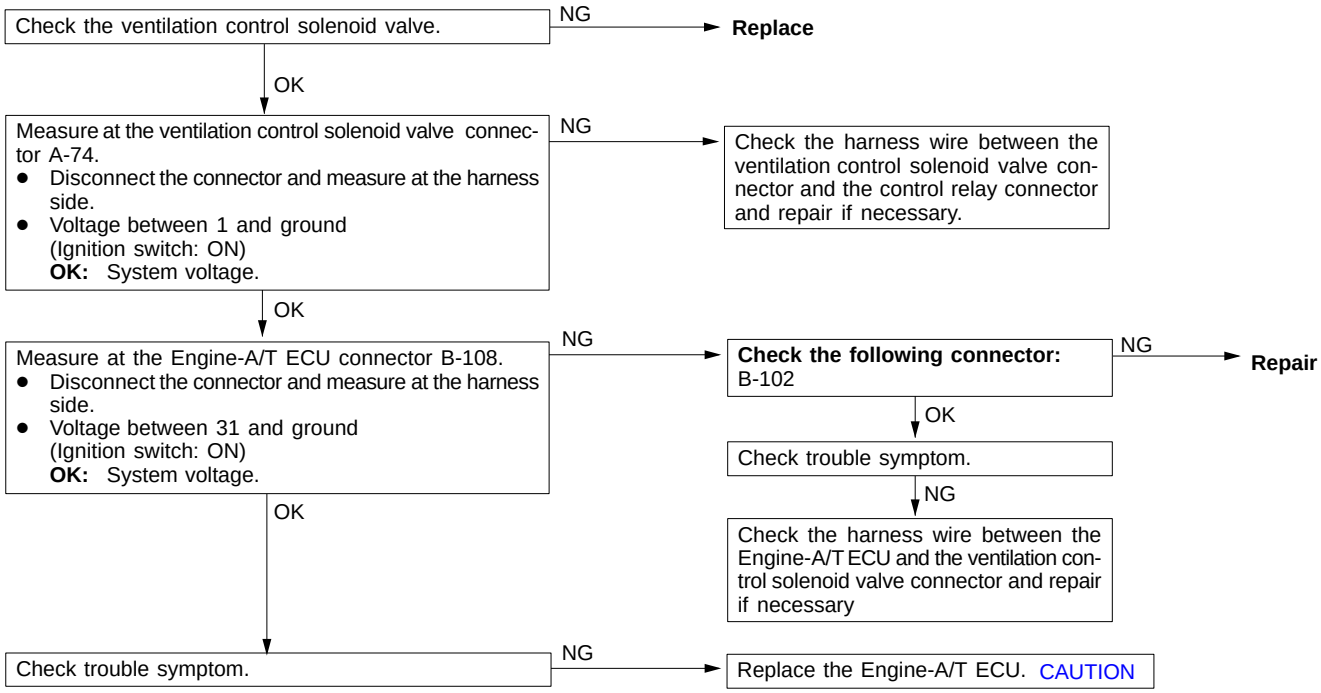
Code No. 61 Communication with Engine-A/T-ECU System <A/T>	Probable cause
Range of Check ● For a period of 60 sec or longer immediately after completing startup ● Engine revolutions approximately 50 rpm or faster Set Conditions ● The signal from the Engine-A/T ECU requesting torque reduction has been continuously input for about 5 sec or longer	● Engine-A/T ECU fault ● Harness or connector fault



Code No. 72 Vacuum Control Solenoid Valve System <Vehicles with TCL>	Probable cause
Background ● The Engine-A/T ECU checks current flow in the vacuum control solenoid circuit when the solenoid is ON and OFF. **Check Area, Judgement Criteria** **Check Area** ● Ignition switch: ON. ● 60 sec or more have passed after the ignition switch was turned on or the starting sequence was completed. ● Battery voltage is 10 V or more. ● Forced actuation by means of the MUT–II is not being carried out. **Judgement Criteria** ● Solenoid coil surge voltage (system voltage +2V) is not detected when the solenoid valve is turned ON/OFF.	● Malfunction of the vacuum control solenoid valve ● Improper connector contact, open circuit or short-circuited harness wire of the vacuum control solenoid valve ● Engine-A/T ECU failed



Code No. 73 Ventilation Control Solenoid Valve System <Vehicles with TCL>	Probable cause
Background ● The Engine-A/T ECU checks current flow in the ventilation control solenoid circuit when the solenoid is ON and OFF. **Check Area, Judgement Criteria** **Check Area** ● Ignition switch: ON. ● 60 sec or more have passed after the ignition switch was turned on or the starting sequence was completed. ● Battery voltage is 10 V or more. ● Forced actuation by means of the MUT–II is not being carried out. **Judgement Criteria** ● Solenoid coil surge voltage (system voltage +2V) is not detected when the solenoid valve is turned ON/OFF.	● Malfunction of the ventilation control solenoid valve ● Improper connector contact, open circuit or short-circuited harness wire of the ventilation control solenoid valve ● Engine-A/T ECU failed



INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.
Communication with MUT-II is impossible.	Communication with all systems is not possible.	1
	Communication with Engine-ECU only is not possible.	2
Check engine/ malfunction indicator lamp and related parts	The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position.	3
	The engine warning lamp remains illuminated and never goes out.	4
Starting	Cranks, won't start	5
	Fires up and dies	6
	Hard starting	7
Idling stability (Improper idling)	Unstable idle. (Rough idle, hunting)	8
	Idle speed is high. (Improper idle speed)	9
	Idle speed is low. (Improper idle speed)	10
Idling stability (Engine stalls)	When the engine is cold, it stalls at idle (Die out)	11
	When the engine becomes hot, it stalls at idle. (Die out)	12
	The engine stalls when accelerating. (Pass out)	13
	The engine stalls when decelerating.	14
Driving	Hesitation, sag or stumble	15
	Acceleration shock	16
	Deceleration shock	17
	Poor acceleration	18
	Surge	19
	Knocking	20
Dieseling (Run on)		21
Too high CO and HC concentration when idling		22

PROBLEM SYMPTOMS TABLE (FOR YOUR INFORMATION)

Items		Symptom
Starting	Won't start	The starter is used to crank the engine, but there is no combustion within the cylinders, and the engine won't start.
	Fires up and dies	There is combustion within the cylinders, but then the engine soon stalls.
	Hard starting	Engine starts after cranking a while.
Idling stability	Hunting	Engine speed doesn't remain constant; changes at idle.
	Rough idle	Usually, a judgement can be based upon the movement of the tachometer pointer, and the vibration transmitted to the steering wheel, shift lever, body, etc. This is called rough idle.
	Incorrect idle speed	The engine doesn't idle at the usual correct speed.
	Engine stall (Die out)	The engine stalls when the foot is taken from the accelerator pedal, regardless of whether the vehicle is moving or not.
	Engine stall (Pass out)	The engine stalls when the accelerator pedal is depressed or while it is being used.
Driving	Hesitation Sag	"Hesitation" is the delay in response of the vehicle speed (engine speed) that occurs when the accelerator is depressed in order to accelerate from the speed at which the vehicle is now travelling, or a temporary drop in vehicle speed (engine speed) during such acceleration. Serious hesitation is called "sag". (Refer to Fig. 1)
	Poor acceleration	Poor acceleration is inability to obtain an acceleration corresponding to the degree of throttle opening, even though acceleration is smooth, or the inability to reach maximum speed.
	Stumble	Engine speed increase is delayed when the accelerator pedal is initially depressed for acceleration. (Refer to Fig. 2)
	Shock	The feeling of a comparatively large impact or vibration when the engine is accelerated or decelerated.
	Surge	This is slight acceleration and deceleration feel usually steady, light throttle cruise. Most notable under light loads.
	Knocking	A sharp sound like a hammer striking the cylinder walls during driving and which adversely affects driving.
Stopping	Run on ("Dieseling")	The condition in which the engine continues to run after the ignition switch is turned to OFF. Also called "Dieseling".

Fig. 1

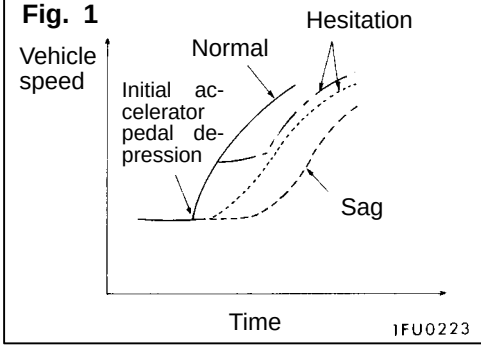
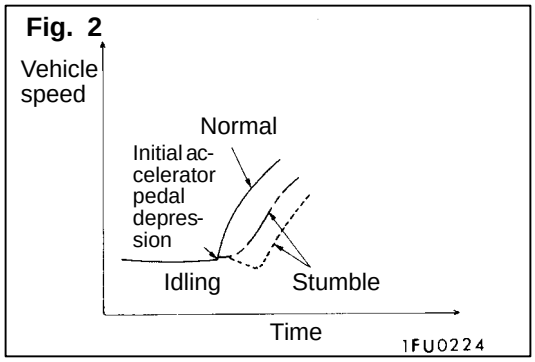


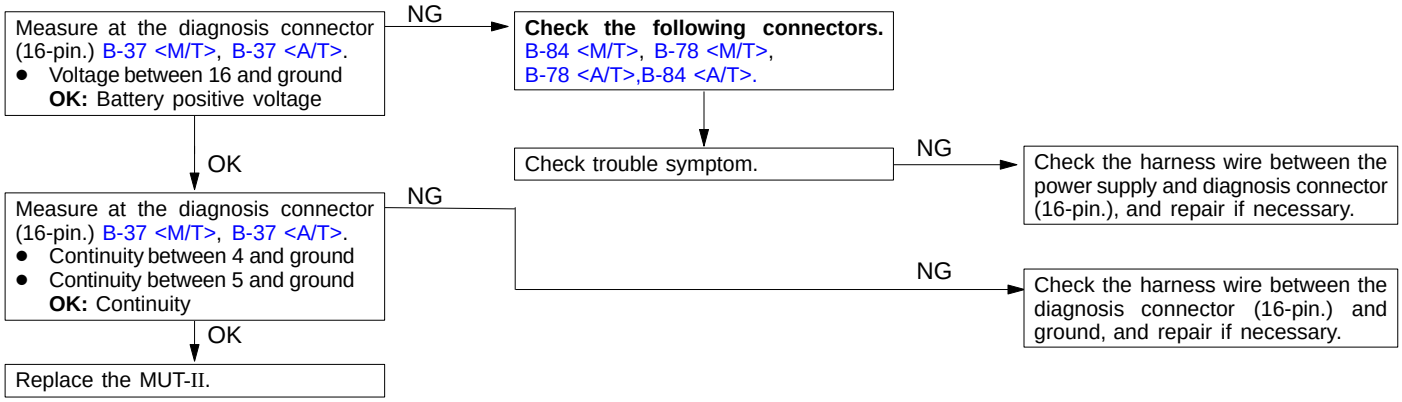
Fig. 2



INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

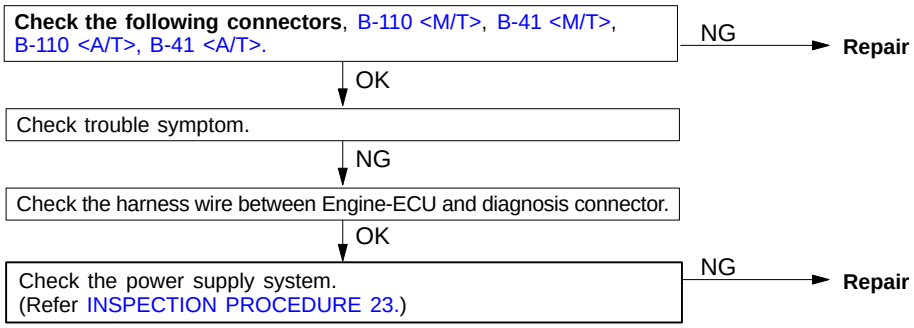
INSPECTION PROCEDURE 1

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 ground) for the diagnosis line.	• Malfunction of the connector • Malfunction of the harness wire



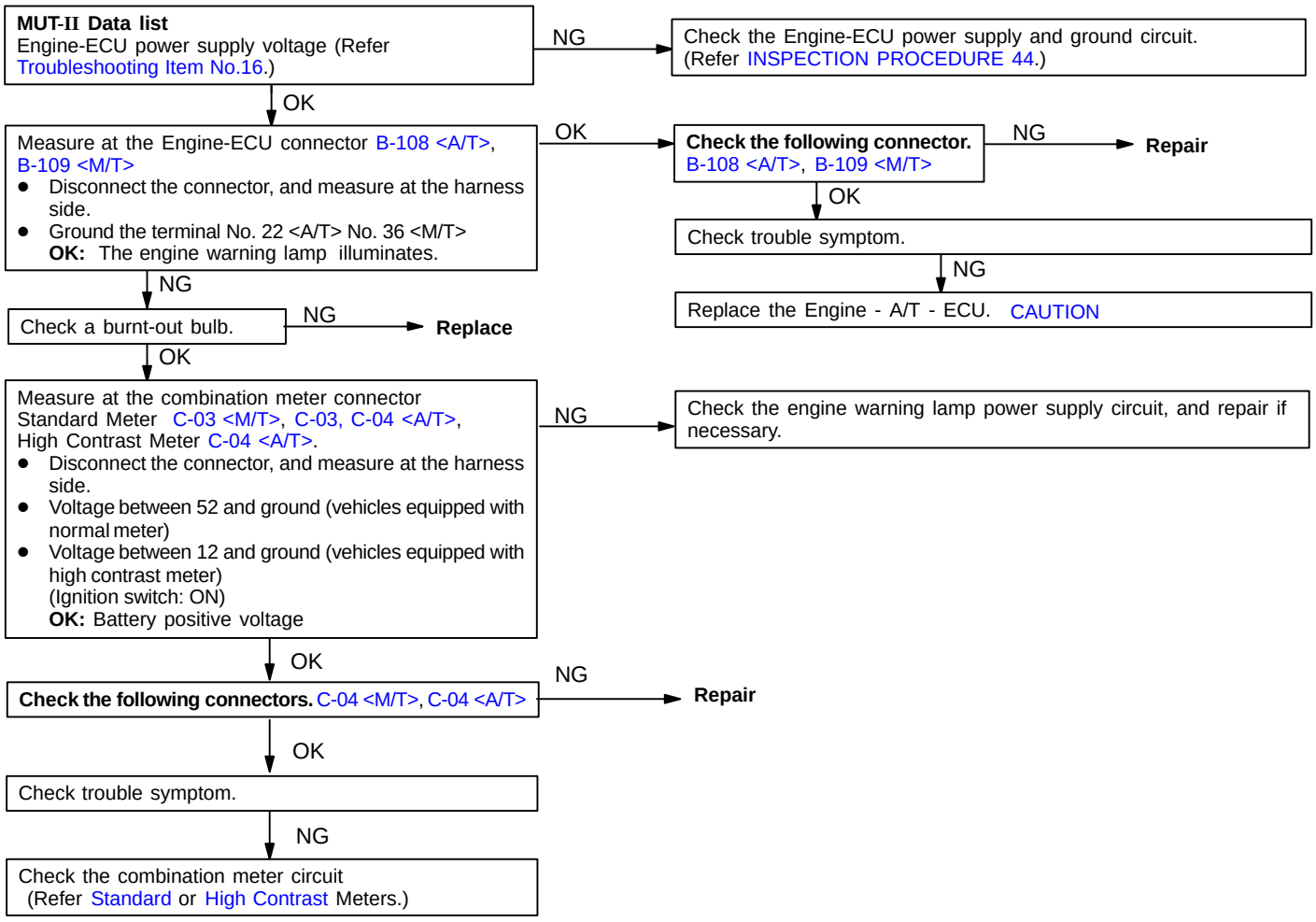
INSPECTION PROCEDURE 2

MUT-II communication with Engine-ECU is not possible.	Probable cause
One of the following causes may be suspected. • No power supply to Engine-ECU • Defective ground 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 maybe 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 these listed at right has probably occurred.	• Burnt-out bulb • Defective engine warning lamp circuit • Malfunction of the Engine-ECU



INSPECTION PROCEDURE 4

The engine warning lamp remains illuminated.	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 these listed at right has occurred.	• Short-circuit between the check engine lamp and Engine-ECU • Malfunction of the Engine-ECU

MUT-II diagnosis codes
Are diagnosis codes output?
YES → Refer to INSPECTION CHART FOR DIAGNOSIS CODES
NO ↓

Measure at the instrument panel ECU connector C-04 <M/T>, C-04 <A/T>.
- Disconnect the connector, and measure at the harness side.
- Continuity between 14 and ground
  OK: No continuity

NG → Check the harness wire between the instrument panel ECU and Engine-ECU connector, and repair if necessary.
OK ↓

Replace the Engine-ECU. CAUTION

INSPECTION PROCEDURE 5

Cranks, won't start	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 • Foreign materials in fuel

Check battery positive voltage when cranking.
OK: 8 V or higher
NG → Check the battery. (Refer Battery Servicing.)
OK ↓

MUT-II: Inspection of no initial combustion. (Refer to INSPECTION PROCEDURE 36.)
OK ↓

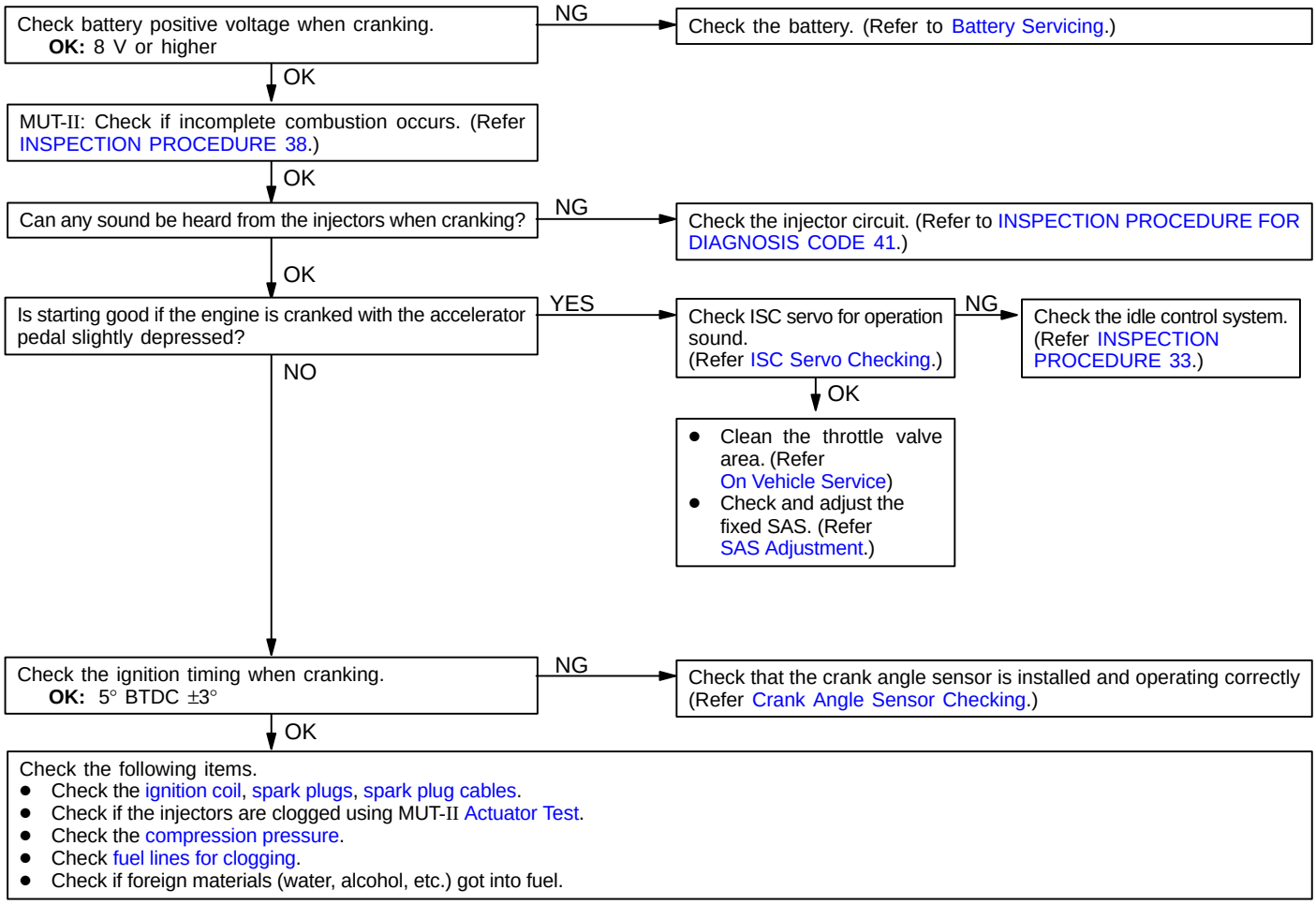
Can any sound be heard from the injectors when cranking?
NG → Check the injector circuit (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 41.)
OK ↓

Ignition system: Inspection of no initial combustion. (Refer INSPECTION PROCEDURE 36.)
OK ↓

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables.
- Check if the injectors are clogged using MUT-II Actuator Test.
- Check if foreign materials (water, alcohol, etc.) got into fuel.
- Check the compression pressure.

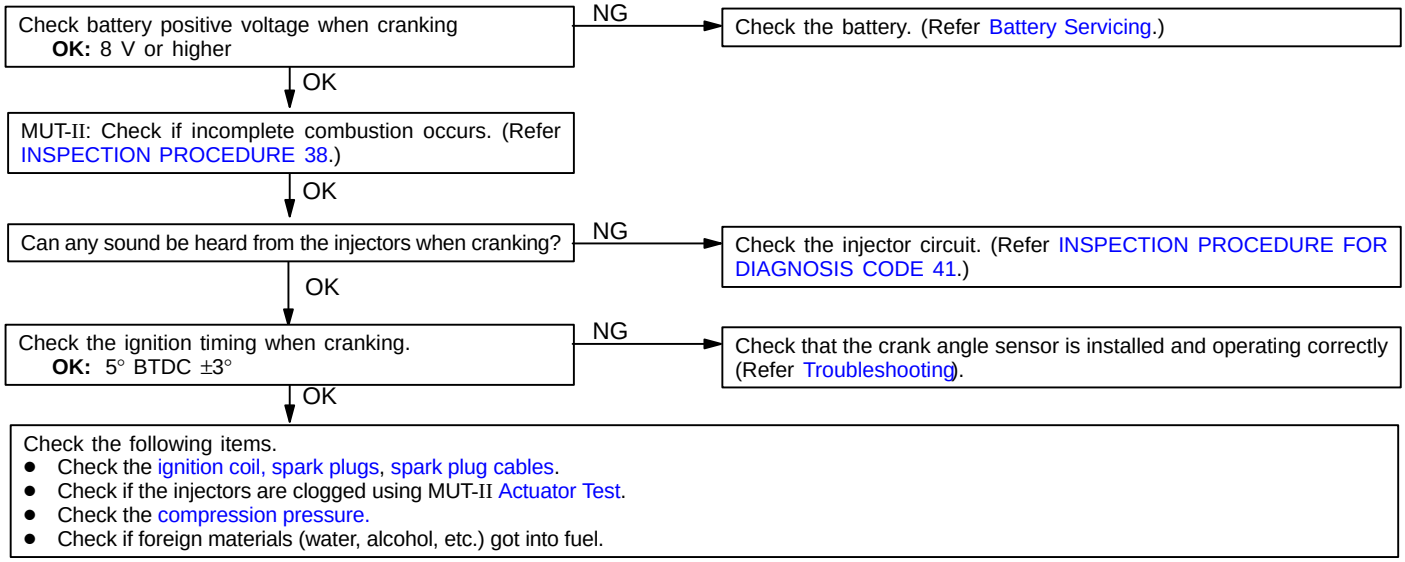
INSPECTION PROCEDURE 6

Fires up and dies.	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



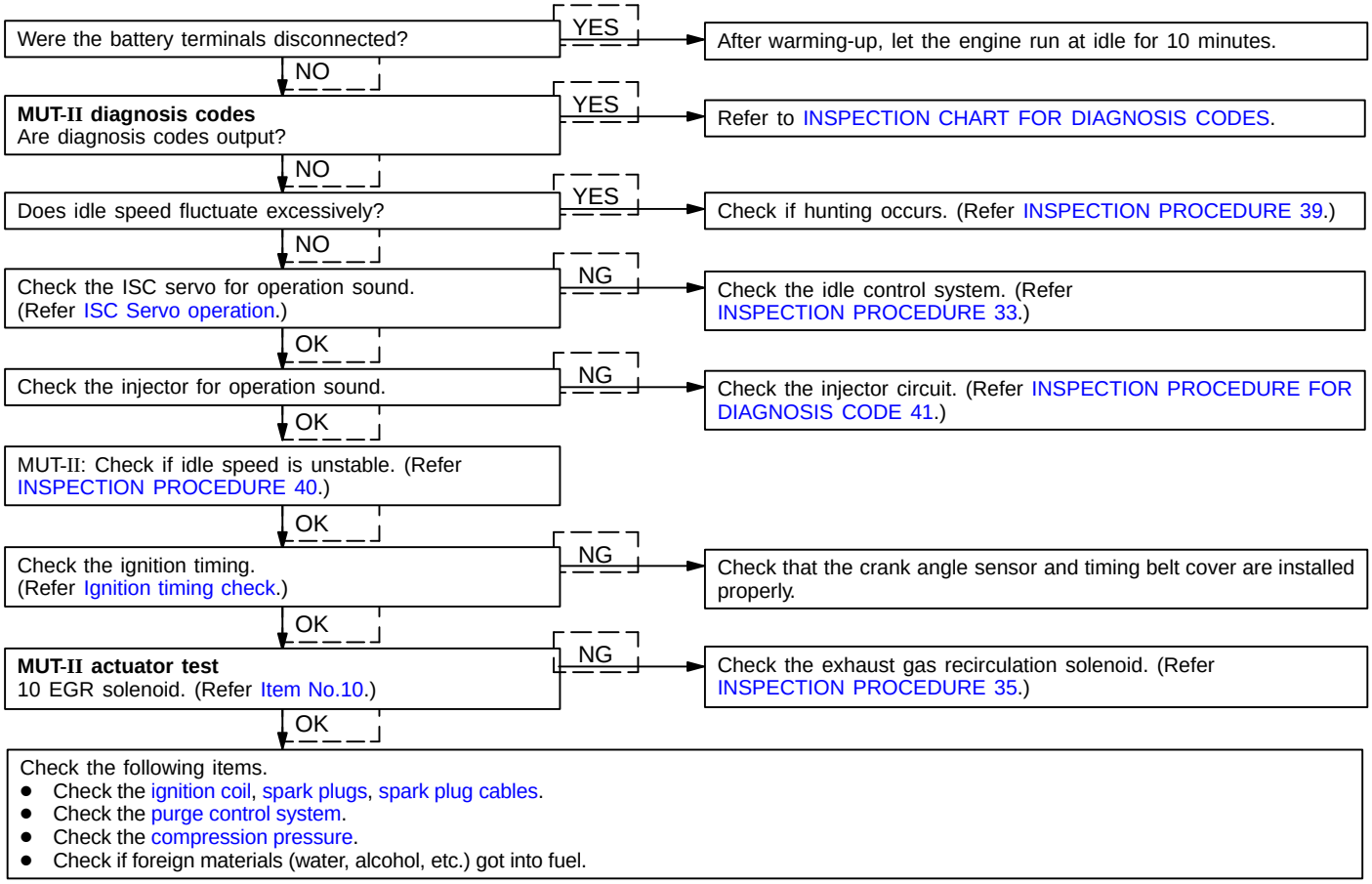
INSPECTION PROCEDURE 7

Hard 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



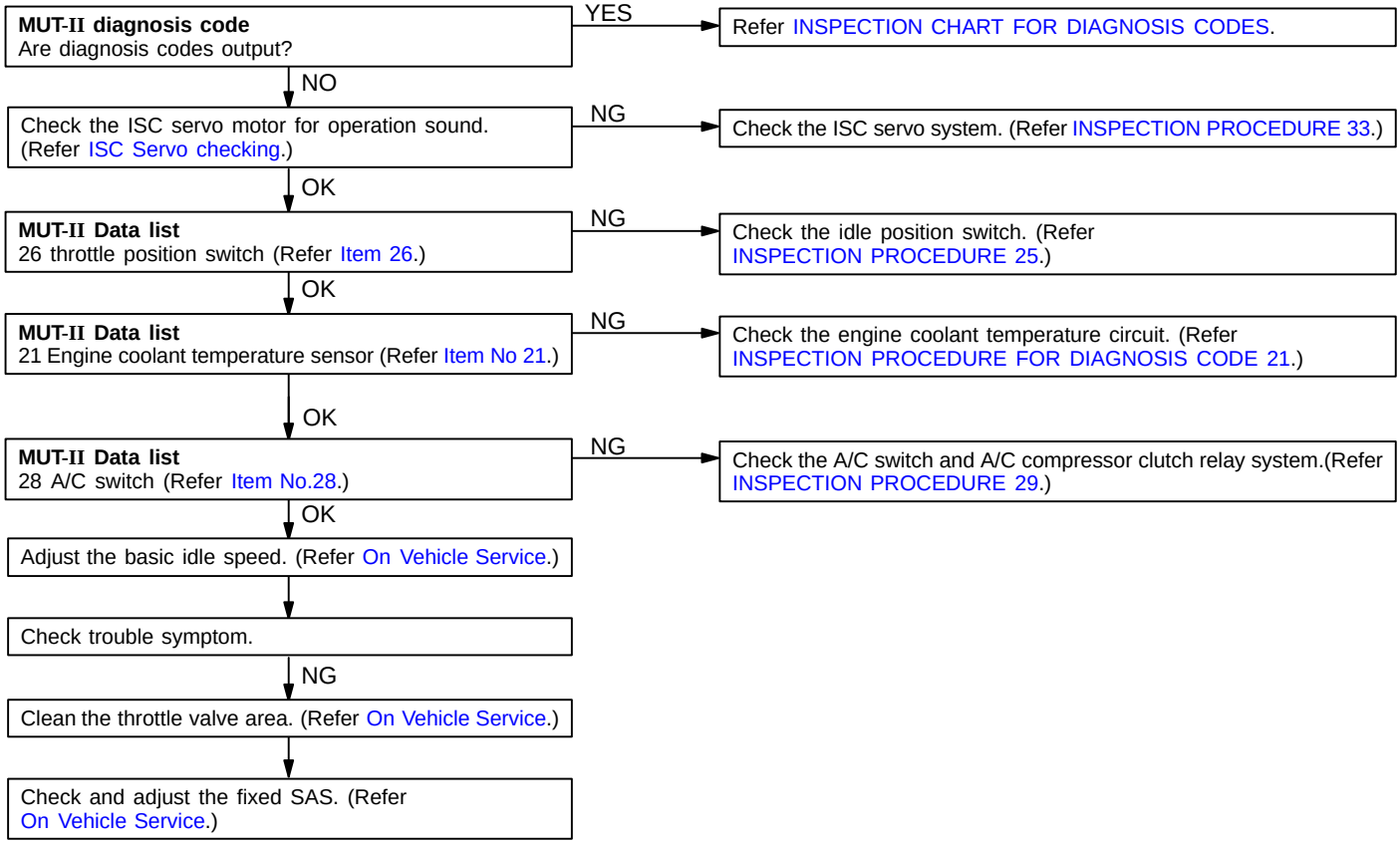
INSPECTION PROCEDURE 8

Unstable idle (Rough idle, hunting)	Probable cause
In cases such as the above, the cause is probably that the ignition system, air/fuel mixture, ISC servo 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 solenoid valve system • Poor compression • Drawing air into exhaust system • Malfunction of the EGR solenoid valve system



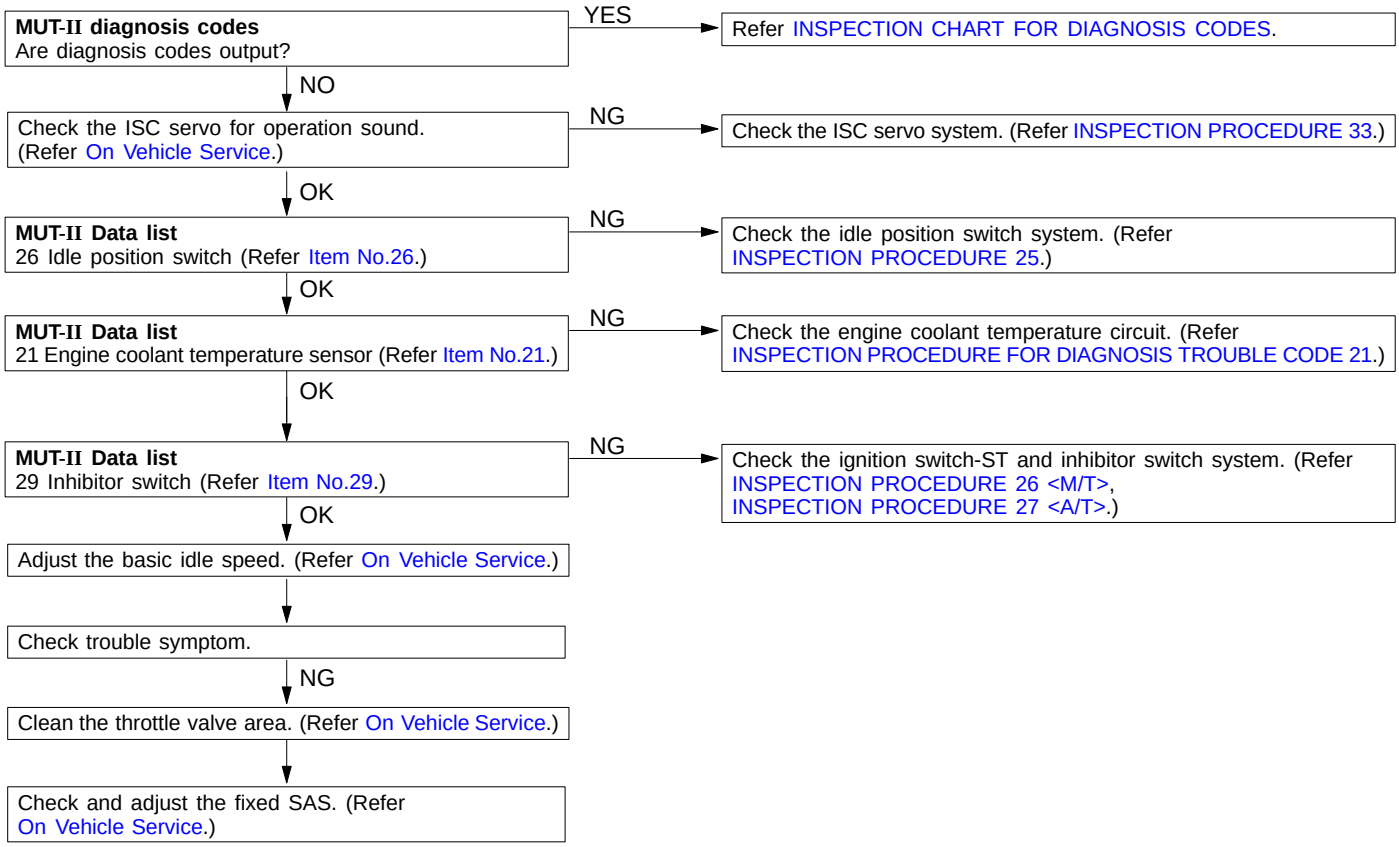
INSPECTION PROCEDURE 9

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



INSPECTION PROCEDURE 10

Idle speed is low. (Improper idle 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



INSPECTION PROCEDURE 11

When the engine is cold, it stalls at idle. (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

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

MUT-II diagnosis codes
Are diagnosis codes output?
- YES → Refer INSPECTION CHART FOR DIAGNOSIS CODES.
- NO ↓

Does the engine stall right after the accelerator pedal is released?
- YES → Clean the throttle valve area. (Refer On Vehicle Service.) → Check & adjust the fixed SAS. (Refer On Vehicle Service.)
- NO ↓

Is engine-idling stable after warming-up?
- NO → Check if the unstable idle (Rough idle, hunting). (Refer INSPECTION PROCEDURE 8.)
- YES ↓

Check the ISC servo for operation sound. (Refer ISC Servo check.)
- NG → Check the ISC servo system. (Refer INSPECTION PROCEDURE 33.)
- OK ↓

Check the injector for operation sound.
- NG → Check the injector circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 41.)
- OK ↓

MUT-II Data list
26 Closed throttle position switch (Refer Item No.26.)
- NG → Check the idle position switch. (Refer INSPECTION PROCEDURE 25.)
- OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer Item No.21.)
- NG → Check the engine coolant temperature circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)
- OK ↓

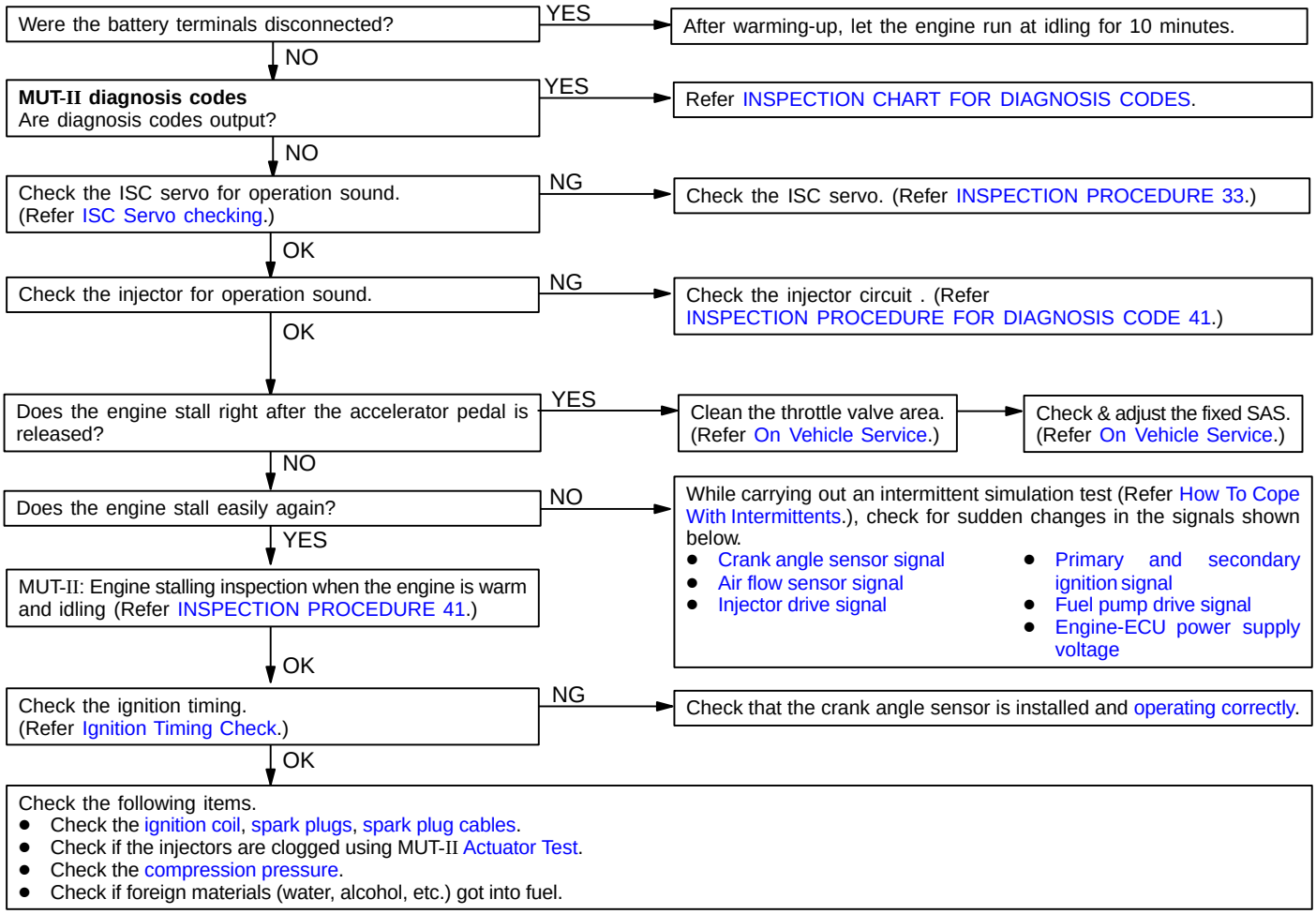
Check the fuel pressure. (Refer On Vehicle Service.)
- OK ↓

Check the ignition timing. (Refer On Vehicle Service.)
- NG → Check that the crank angle sensor is installed and operating correctly.
- OK ↓

Check the following items.
- Check the ignition coil, spark plugs, spark plug cables.
- Check the compression pressure.
- Check the engine oil viscosity.

INSPECTION PROCEDURE 12

When the engine is hot, it stalls at idle. (Die out)	Probable cause
In cases such as the above, the cause is probably that ignition system, air/fuel mixture, ISC servo 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



INSPECTION PROCEDURE 13

The engine stalls when accelerating. (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 diagnosis codes
Are diagnosis codes output?
- YES → Refer 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 or intake manifold plenum 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 ISC servo system.	• Malfunction of the ISC servo system

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

MUT-II diagnosis codes
Are diagnosis codes output?
- YES → Refer INSPECTION CHART FOR DIAGNOSIS CODES.
- NO ↓

MUT-II Data list
26 Idle position switch (Refer Item No.26.)
- NG → Check the idle position switch. (Refer INSPECTION PROCEDURE 25.)
- OK ↓

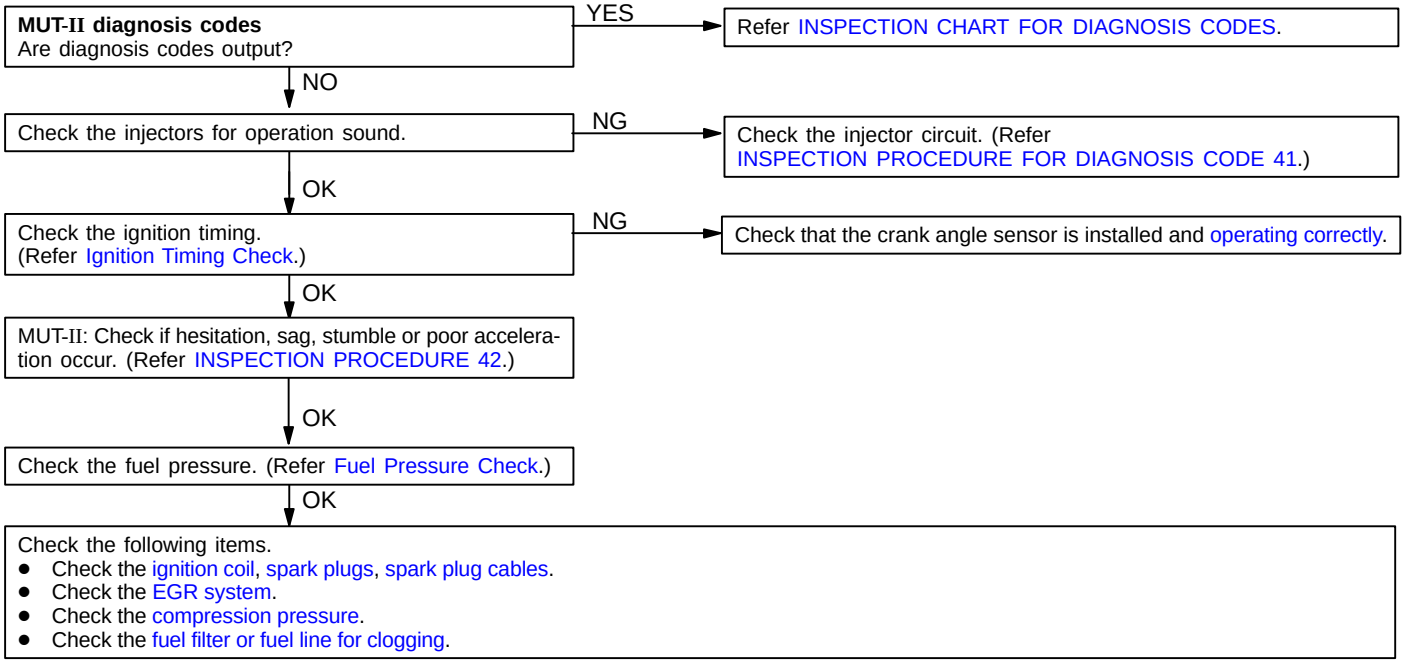
MUT-II Data list
14 Throttle position sensor (Refer Item No.14.)
- NG → Check the throttle position sensor circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 14.)
- OK ↓

MUT-II Data list
45 ISC servo position (Refer Item No.45.)
- Does the ISC servo position drop to 0–2 steps when decelerelating (engine rpm more than 1,000)?
  - YES → Check the vehicle speed sensor circuit. (Refer 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.

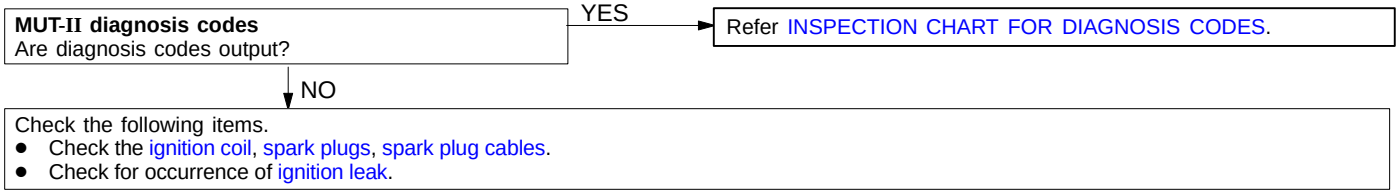
INSPECTION PROCEDURE 15

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 solenoid system • Poor compression



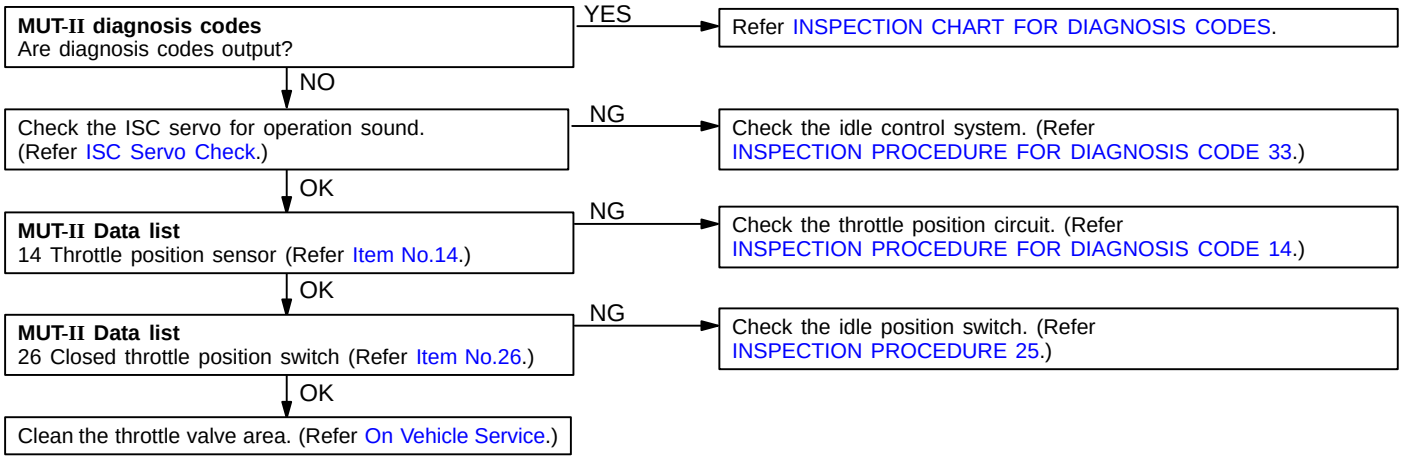
INSPECTION PROCEDURE 16

Acceleration shock	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



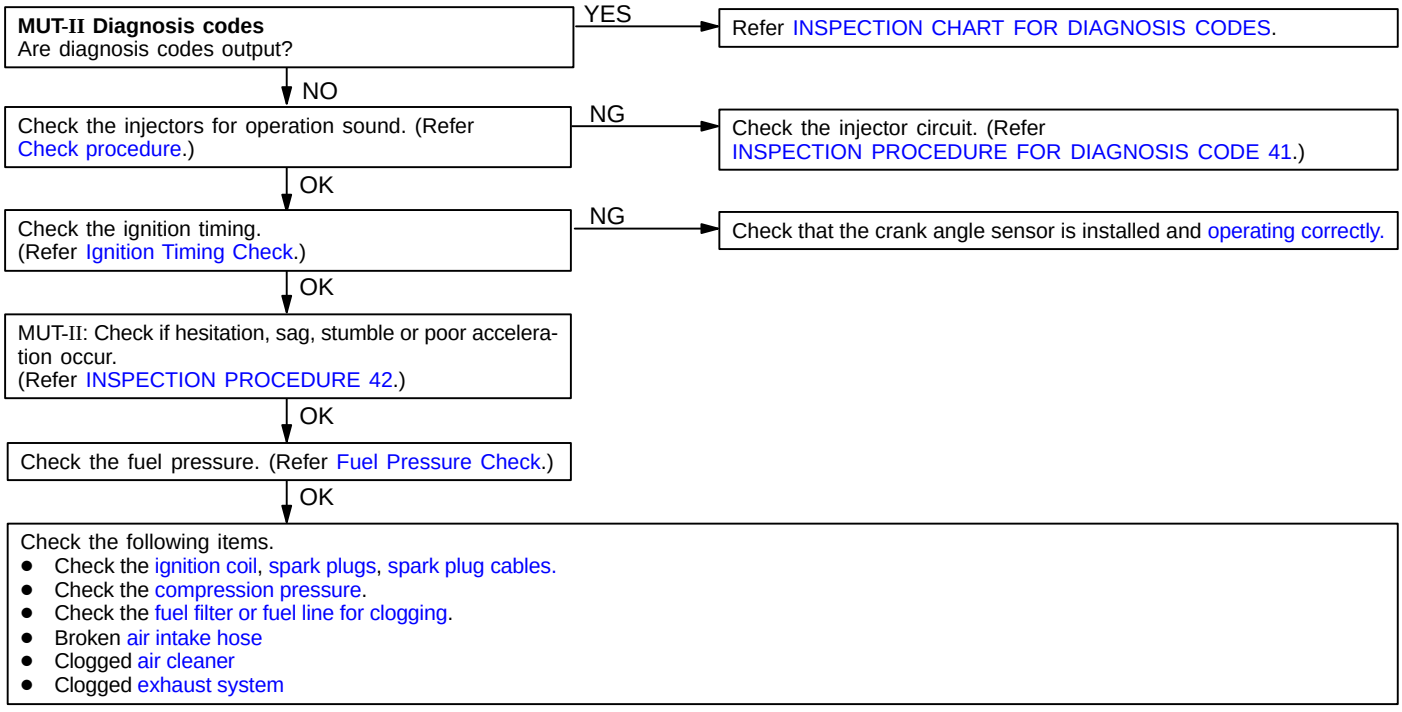
INSPECTION PROCEDURE 17

Deceleration shock	Probable cause
Malfunction of the ISC system is suspected.	• Malfunction of the ISC system



INSPECTION PROCEDURE 18

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



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 solenoid system

MUT-II Self-Diag codes
Are diagnosis codes output?
YES → Refer INSPECTION CHART FOR DIAGNOSIS CODES.
NO ↓

Check the injectors for operation sound, Check operation.
NG → Check the injector circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 41.)
OK ↓

Check the ignition timing. (Refer Ignition Timing Check.)
NG → Check that the crank angle sensor is installed and operaring correctly.
OK ↓

MUT-II: Check if surge occurs. (Refer INSPECTION PROCEDURE 43.)
OK ↓

Check the fuel pressure. (Refer Fuel pressure test.)
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 such as the above, the cause is probably that the heat value of the spark plug is inappropriate.	• Defective knock sensor • Inappropriate heat value of the spark plug

MUT-II Self-Diag codes
Are diagnosis codes output?
YES → Refer INSPECTION CHART FOR DIAGNOSIS CODES.
NO ↓

Check the following items.
- Spark plug heat range.
- 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.

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 codes
Are diagnosis codes output?
YES → Refer INSPECTION CHART FOR DIAGNOSIS CODES.
NO ↓

Check the ignition timing.
(Refer Ignition Timing Check.)
NG → Check that the crank angle sensor is installed and operating correctly.
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor.
(Refer Item No.21.)
NG → Check the engine coolant temperature circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer Item No.13.)
NG → Check the intake air temperature circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 13.)
OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer Item No.25.)
NG → Check the barometric pressure circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 25.)
OK ↓

MUT-II Data list
11 Oxygen sensor (Refer Item No.11.)
- Transmission : L range
- Driving with the throttle wide open
  OK: 600–1,000 mV

NG → Check the oxygen sensor system. (Refer INSPECTION PROCEDURE 30.)
OK ↓

Check the fuel pressure. (Refer Fuel Pressure Test.)
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 evaporative emission control system.
- Check the EGR system.

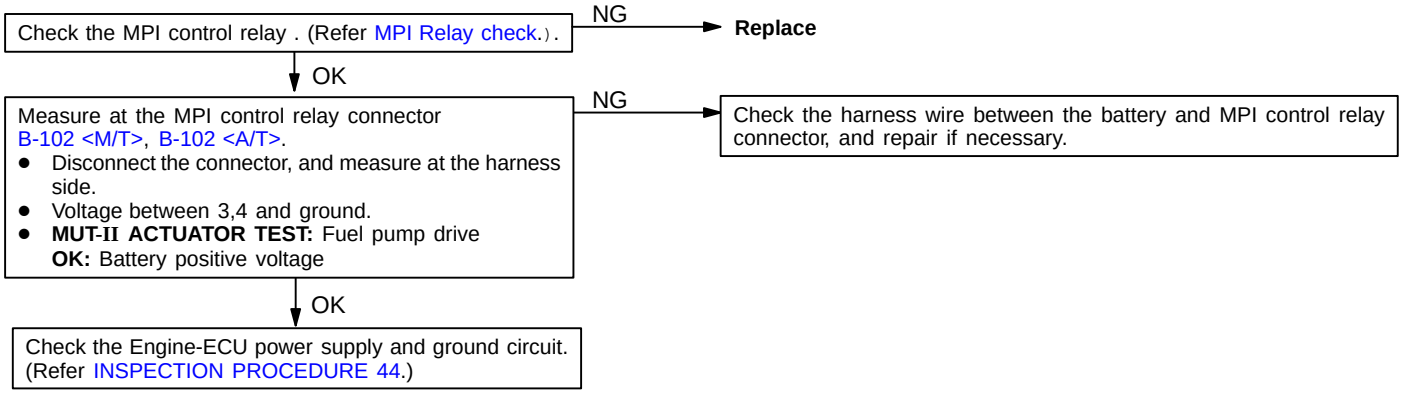
↓

Check trouble symptom.
NG ↓

Replace the three-way catalytic converter.

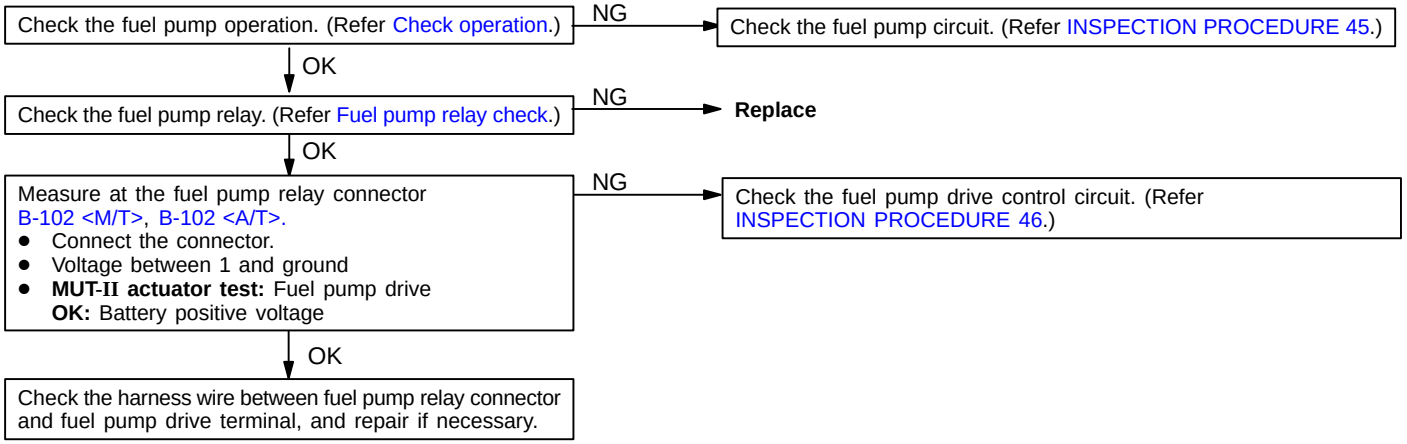
INSPECTION PROCEDURE 23

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 MPI control relay ON. This causes battery positive voltage to be supplied to the Engine-ECU, injectors and air flow sensor.	• Malfunction of the ignition switch • Malfunction of the MPI control relay • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the Engine-ECU



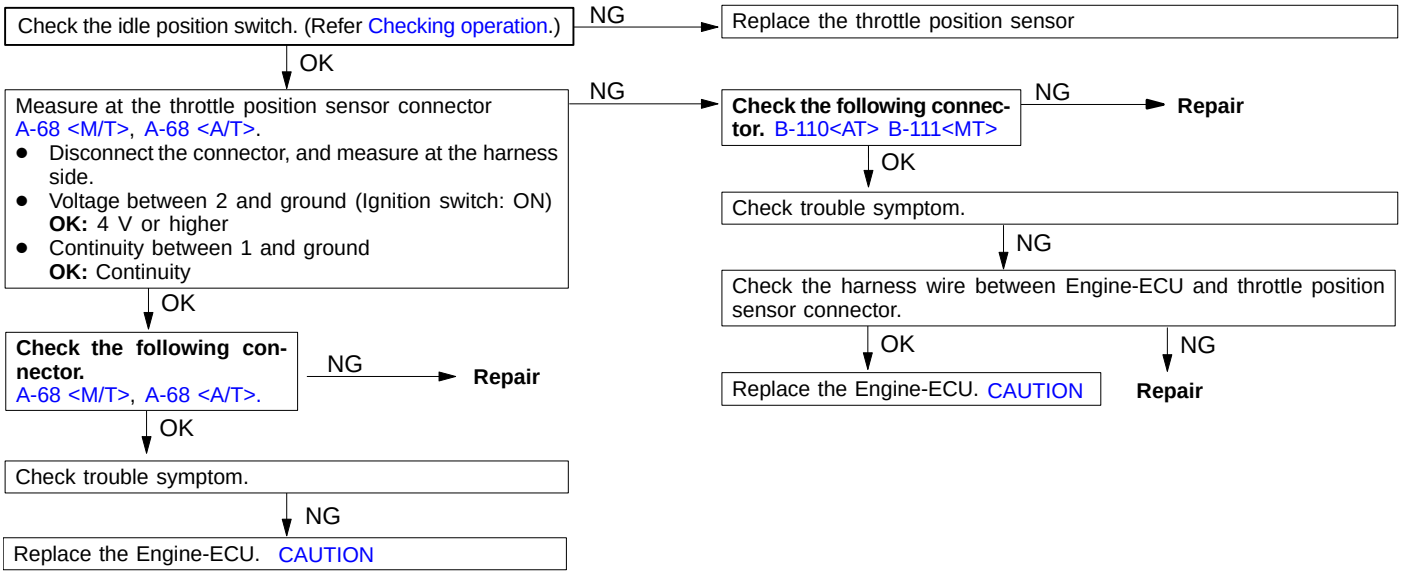
INSPECTION PROCEDURE 24

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



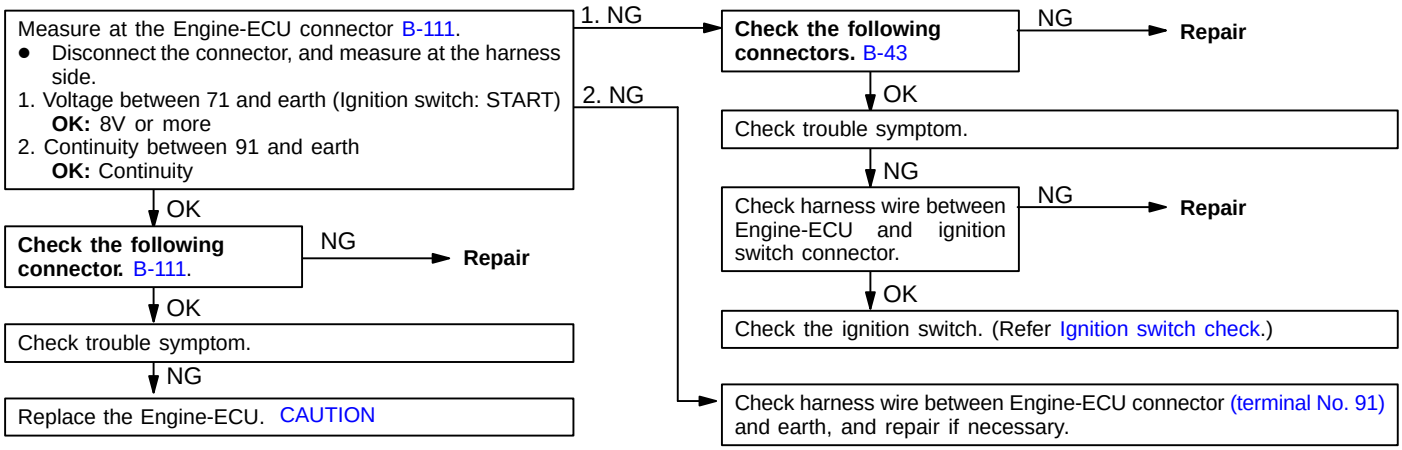
INSPECTION PROCEDURE 25

Idle position switch system	Probable cause
The idle position switch inputs the condition of the accelerator pedal, i.e. whether it is depressed or released (HIGH/LOW), to the Engine-ECU. The Engine-ECU controls the ISC 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



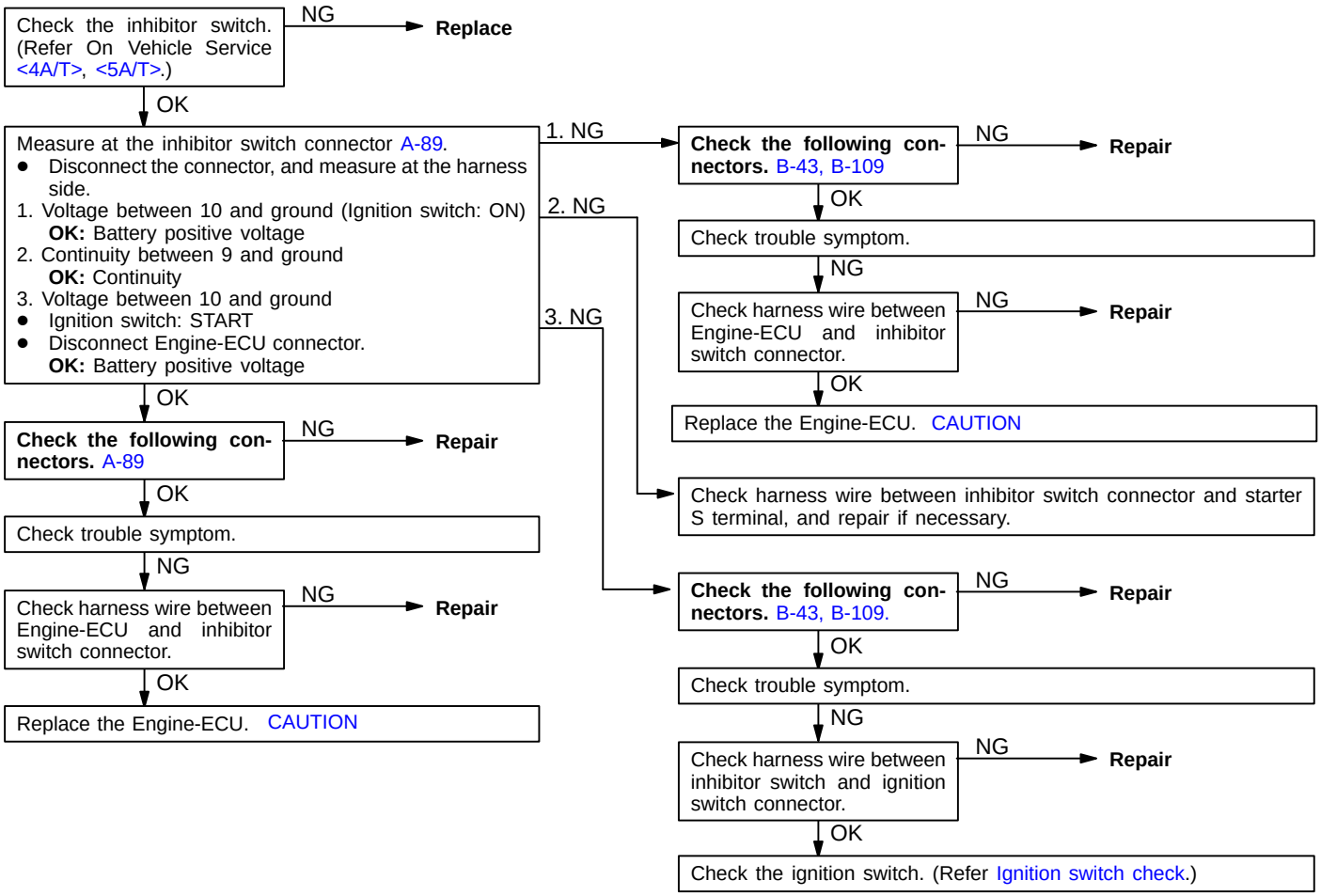
INSPECTION PROCEDURE 26

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 the 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.



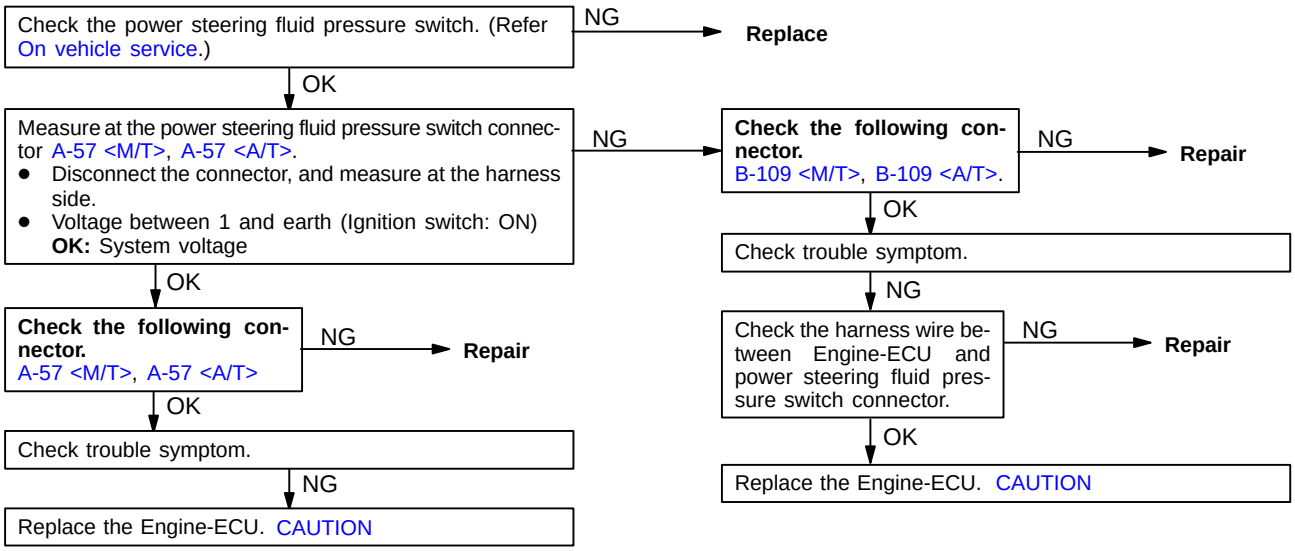
INSPECTION PROCEDURE 27

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 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.



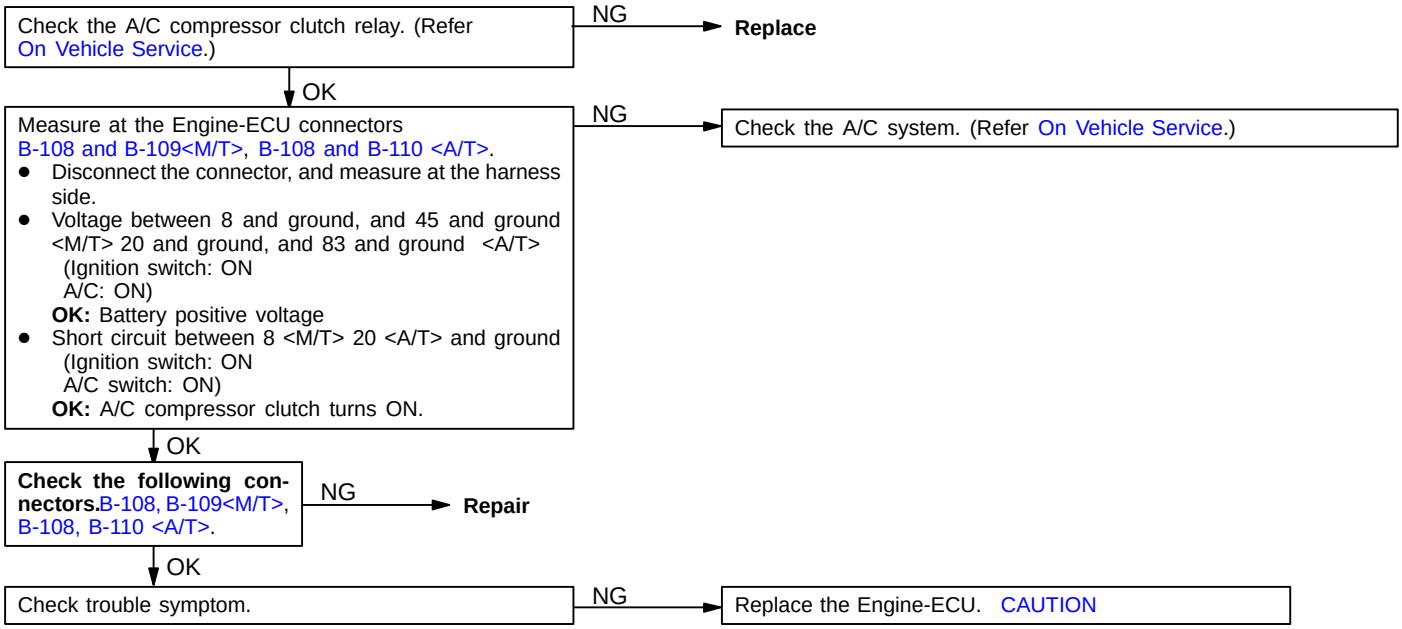
INSPECTION PROCEDURE 28

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



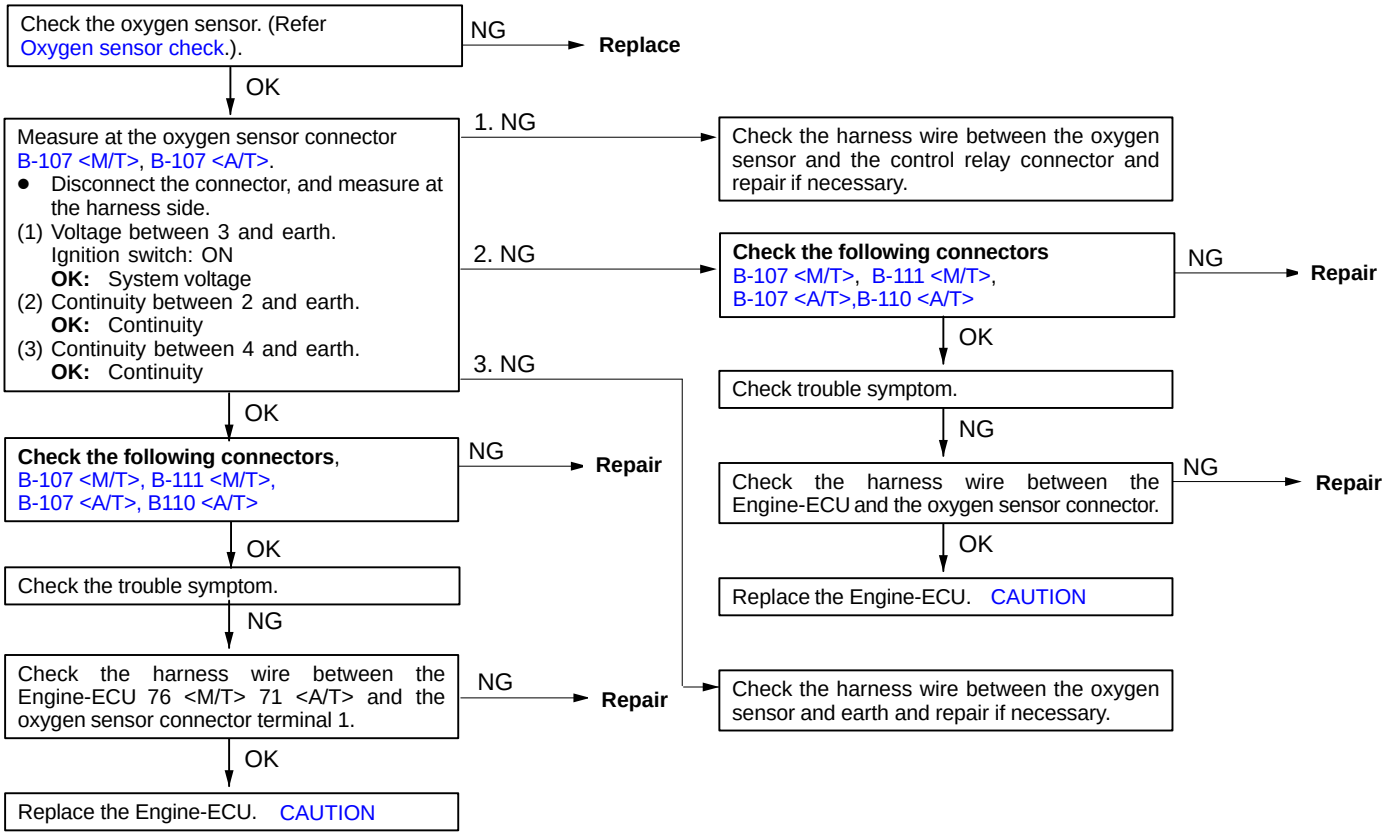
INSPECTION PROCEDURE 29

A/C switch and A/C relay system	Probable cause
When an A/C ON signal is input to the Engine-ECU, the Engine-ECU carries out control of the 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 Engine-ECU



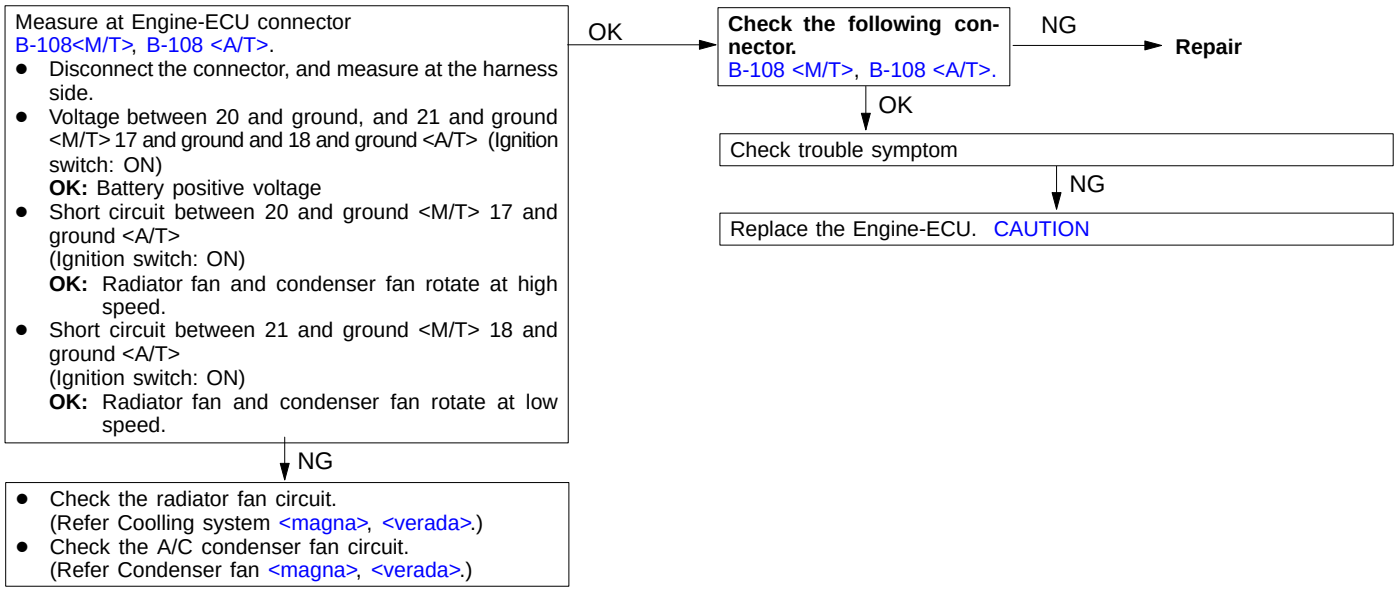
INSPECTION PROCEDURE 30

Oxygen sensor system	Probable cause
• The oxygen sensor detects the oxygen content in exhaust gas, converts it to voltage and sends the voltage to the engine ECU. • The engine ECU controls the fuel injection amount to adjust the air/fuel ratio to theoretical one.	• Malfunction of the oxygen sensor • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the Engine-ECU



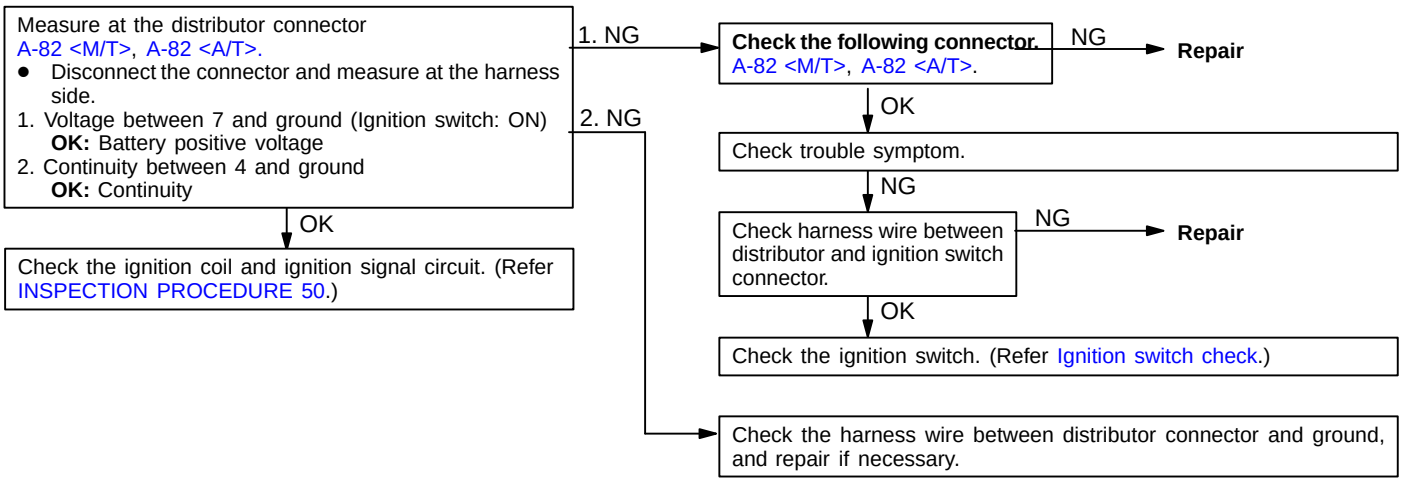
INSPECTION PROCEDURE 31

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



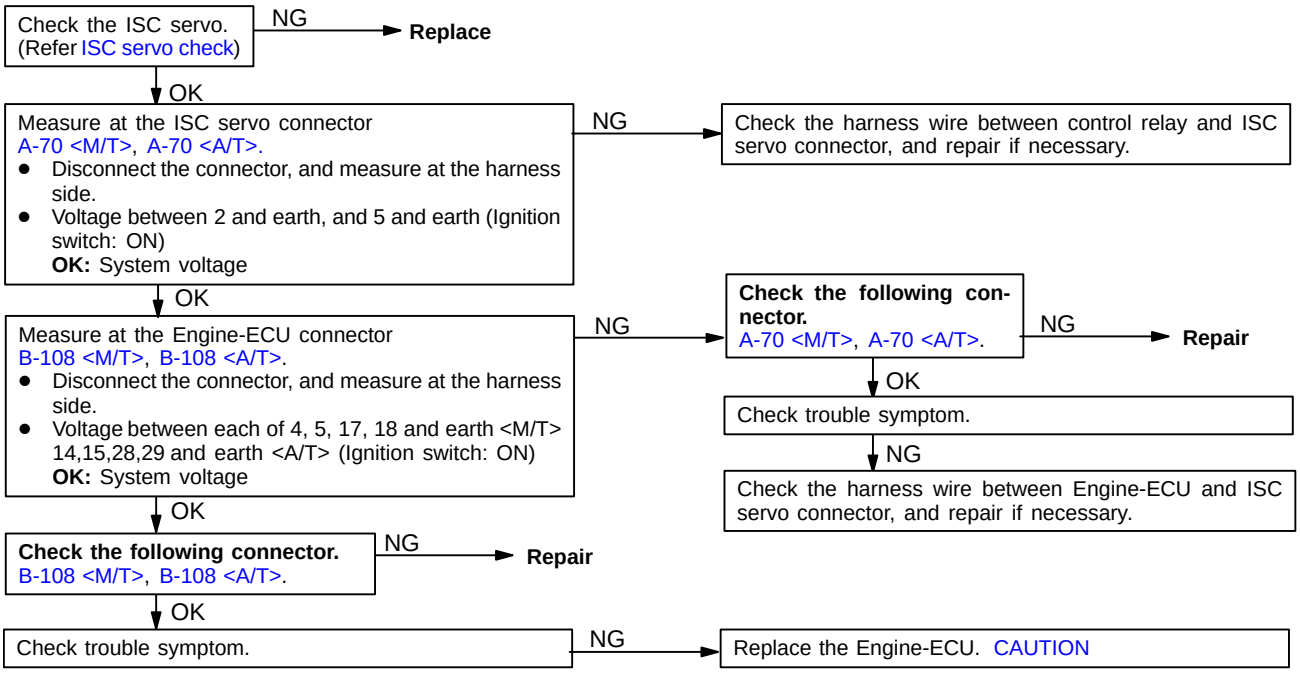
INSPECTION PROCEDURE 32

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



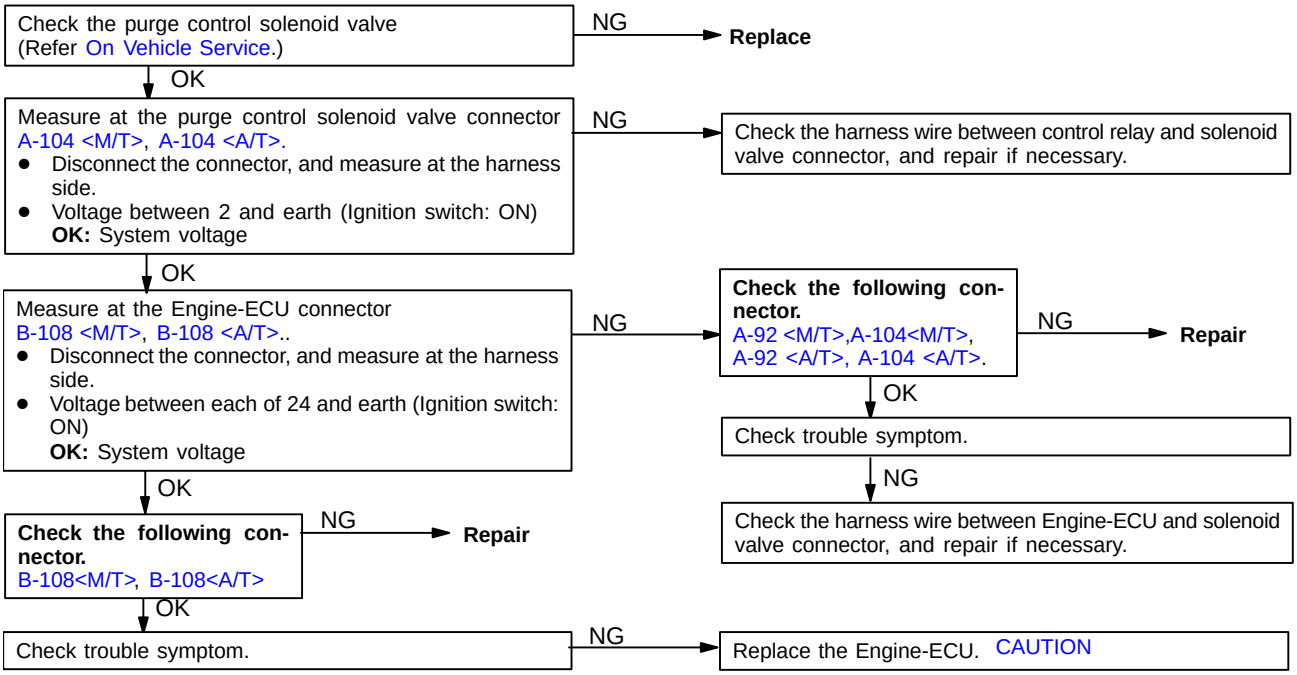
INSPECTION PROCEDURE 33

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



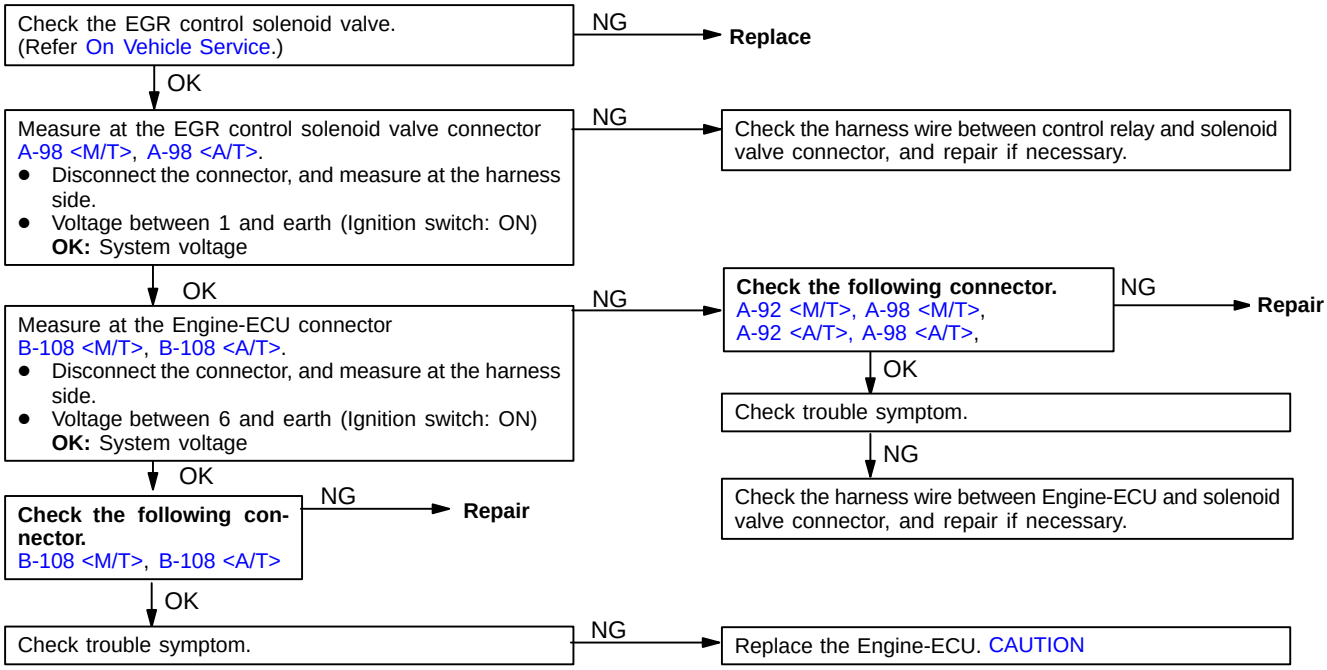
INSPECTION PROCEDURE 34

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



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 Item No.16.)
NG → Check the power supply system.
(Refer 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 codes
Are the diagnosis codes output ?
YES → Refer INSPECTION CHART FOR DIAGNOSIS CODES.
NO ↓

MUT-II Data list
22 Crank angle sensor (refer Item No.22.)
OK: Cranking speed is displayed.
NG → Check the crank angle circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 22.)
OK ↓

MUT-II actuator test
07 Fuel pump (Refer Item No.7.)
NG → Check the fuel pump system. (Refer INSPECTION PROCEDURE 24.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer Item No.21.)
NG → Check the engine coolant temperature circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)

INSPECTION PROCEDURE 37

Ignition system: Inspection of no initial combustion

Does the engine tachometer display the cranking speed?
- Connect tachometer to engine.

NG → Check the ignition circuit system
(Refer INSPECTION PROCEDURE 32.)
OK ↓

Check the ignition timing when cranking.
OK: 5° BTDC ±3°
NG → Check for the correct installation condition of crank angle sensor.

INSPECTION PROCEDURE 38

MUT-II: Check if incomplete combustion occurs.

MUT-II Self-Diag codes
Are diagnosis codes output ?
- YES → Refer INSPECTION CHART FOR DIAGNOSIS CODE.
- NO ↓

MUT-II actuator test
07 Fuel pump (Refer Item No.7.)
- NG → Check the fuel pump system. (Refer INSPECTION PROCEDURE 24.)
- OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer Item No.21.)
- NG → Check the engine coolant temperature circuit. (Refer INSPECTION PROCEDURES FOR DIAGNOSIS CODE 21.)
- OK ↓

MUT-II Data list
18 Ignition switch-ST (Refer Item No.18.)
- NG → Check the ignition switch-ST and inhibitor switch system <M/T>. (Refer INSPECTION PROCEDURE 26.) Check the ignition switch-ST and inhibitor switch system <A/T>. (Refer INSPECTION PROCEDURE 27.)

INSPECTION PROCEDURE 39

Check if hunting occurs.

Clean the throttle body. (Refer On Vehicle Service.)
↓
Check and adjust the fixed SAS (Refer On Vehicle Service.)
↓
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

INSPECTION PROCEDURE 40

MUT-II: Check if idle speed is unstable.

MUT-II Data list
26 Idle position switch (Refer Item No.26.)
NG → Check the idle position switch. (Refer INSPECTION PROCEDURE 25.)
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer Item No.13.)
NG → Check the intake air temperature circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 13.)
OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer Item No.25.)
NG → Check the barometric pressure circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 25.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer Item No.21.)
NG → Check the engine coolant temperature circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)
OK ↓

MUT-II actuator test
08 Evaporative emission purge solenoid (Refer Item No.8.)
NG → Check the purge control solenoid valve circuit (Refer INSPECTION PROCEDURE 34.)
OK ↓

MUT-II Data list
11 Oxygen sensor (Refer Item No.11.)
OK: 600–1,000 mV during sudden racing
NG → Check the oxygen sensor system. (Refer INSPECTION PROCEDURE 30)
OK ↓

MUT-II Data list
11 Oxygen sensor (Refer Item No.11.)
OK: Changes between 0–400 mV and 600–1,000 mV during idling
NG → Check the fuel pressure. (Refer Fuel pressure test.)
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 blockage.

OK ↓

MUT-II Data list
27 Power steering pressure switch (Refer Item No.27.)
NG → Check the power steering fluid pressure switch system. (Refer INSPECTION PROCEDURE 28.)

MUT-II Data list
28 A/C switch (Refer Item No.28.)
NG → Check the A/C switch and A/C relay system. (Refer INSPECTION PROCEDURE 29.)
OK ↓

MUT-II Data list
29 Inhibitor switch (Refer Item No.29.)
NG → Check the ignition switch-ST and inhibitor switch system. (Refer INSPECTION PROCEDURE 27.)
OK ↓

MUT-II Data list
45 ISC servo position (Refer Item No.45.)
NG → Adjust the basic idle speed. (Refer On Vehicle Service.)

INSPECTION PROCEDURE 41

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

MUT-II Data list
26 Idle position switch (Refer Item No.26.)
NG → Check the idle position switch. (Refer INSPECTION PROCEDURE 25.)
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer Item No.13.)
NG → Check the intake air temperature circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 13.)
OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer Item No.25.)
NG → Check the barometric pressure circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 25.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer Item No.21.)
NG → Check the engine coolant temperature circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)
OK ↓

MUT-II Data list
11 Heated oxygen sensor (Refer Item No.11.)
OK: Changes between 600–1,000 mV during sudden racing
NG → Check the oxygen sensor system. (Refer INSPECTION PROCEDURE 30)
OK ↓

MUT-II Data list
11 Heated oxygen sensor (Refer Item No.11.)
OK: Changes between 0–400 mV and 600–1,000 mV during idling
NG → Check the fuel pressure. (Refer Fuel Pressure Test.)
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 injectors for blockage.

OK ↓

MUT-II Data list
27 Power steering pressure switch (Refer Item No.27.)
NG → Check the power steering fluid pressure switch circuit (Refer INSPECTION PROCEDURE 28.)
OK ↓

MUT-II Data list
28 A/C switch (Refer Item No.28.)
NG → Check the A/C switch and A/C compressor clutch relay system. (Refer INSPECTION PROCEDURE 29.)
OK ↓

MUT-II Data list
29 Inhibitor switch (Refer Item No.29.)
NG → Check the ignition switch-ST and inhibitor switch system. (Refer INSPECTION PROCEDURE 27.)
OK ↓

MUT-II Data list
34 Air flow sensor reset signal (Refer Item No.34.)
NG → Check the air flow sensor circuit. (Refer INSPECTION PROCEDURE 47.)
OK ↓

MUT-II Data list
45 ISC servo position (Refer Item No.45.)
NG → Adjust the basic idle speed. (Refer On Vehicle Service.)

INSPECTION PROCEDURE 42

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

MUT-II Data list
26 Idle position switch (Refer Item No.26.)
NG → Check the idle position switch. (Refer INSPECTION PROCEDURE 25.)
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer Item No.13.)
NG → Check the intake air temperature circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 13.)
OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer Item No.25.)
NG → Check the barometric pressure circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 25.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer Item No.21.)
NG → Check the engine coolant temperature circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)
OK ↓

MUT-II Data list
14 Throttle position sensor (Refer Item No.14.)
NG → Check the throttle position circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 14.)
OK ↓

MUT-II actuator test
10 EGR solenoid (Refer Item No.10.)
NG → Check the EGR control solenoid circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 35.)
OK ↓

MUT-II Data list
11 Oxygen sensor (front) (Refer Item No.11.)
OK: Changes between 600–1,000 mV during sudden racing
NG → Check the oxygen sensor system. (Refer INSPECTION PROCEDURE 30)
OK ↓

MUT-II Data list
11 Oxygen sensor (Refer Item No.11.)
OK: Changes between 0–400 mV and 600–1,000 mV during idling
NG → Check the fuel pressure. (Refer Fuel Pressure Test.)
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 injectors for blockage.

INSPECTION PROCEDURE 43

MUT-II: Check if surge occurs.

MUT-II Data list
26 Idle position switch (Refer Item No.26.)
NG → Check the idle position switch circuit. (Refer INSPECTION PROCEDURE 25.)
OK ↓

MUT-II Data list
13 Intake air temperature sensor (Refer Item No.13.)
NG → Check the intake air temperature circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 13.)
OK ↓

MUT-II Data list
25 Barometric pressure sensor (Refer Item No.25.)
NG → Check the barometric pressure circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 25.)
OK ↓

MUT-II Data list
21 Engine coolant temperature sensor (Refer Item No.21.)
NG → Check the engine coolant temperature circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 21.)
OK ↓

MUT-II Data list
14 Throttle position sensor (Refer Item No.14.)
NG → Check the throttle position circuit. (Refer INSPECTION PROCEDURE FOR DIAGNOSIS CODE 14.)
OK ↓

MUT-II actuator test
10 EGR solenoid (Refer Item No.10.)
NG → Check the EGR solenoid valve circuit. (Refer INSPECTION PROCEDURE 35.)
OK ↓

MUT-II Data list
11 Oxygen sensor (Refer Item No.11.)
OK: Changes between 600–1,000 mV during sudden racing
NG → Check the oxygen sensor system. (Refer INSPECTION PROCEDURE 30)
OK ↓

MUT-II Data list
11 Oxygen sensor (Refer Item No.11.)
OK: Changes between 0–400 mV and 600–1,000 mV during idling
NG → Check the fuel pressure. (Refer Fuel Pressure Test.)
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 blockage.

INSPECTION PROCEDURE 44

Check the Engine-ECU power supply and ground circuit.

Measure at the Engine-ECU connectors
B-108, B-109, B-110, B-111 <M/T>,
B-108, B-109, B-110, B-111 <A/T>.
- Disconnect the connector and measure at the harness side
1. Voltage between 82 and ground <M/T> 98 and ground <A/T> (Ignition switch: ON)
   OK: Battery positive voltage
2. Voltage between 38 and ground <M/T> 49 and ground <A/T> (Ignition switch: ON)
   OK: Battery positive voltage
3. Voltage between 12, 25 and ground <M/T> 41, 47 and ground <A/T> (Ignition switch: ON)
   OK: Battery positive voltage
4. Continuity between 13, 26 and ground <M/T> 42,48 and ground <A/T>
   OK: Continuity
5. Voltage between 80 and ground <M/T> 66 and ground <A/T>
   OK: Battery positive voltage

1. NG → **Check the following connector.** B-43, B-77 <M/T>, B-43, B-77 <A/T>. NG → **Repair**
   OK → Check trouble symptom.
   NG → Check the harness wire between Engine-ECU and ignition switch connector. NG → **Repair**
2.,3. NG → Check the harness wire between Engine-ECU and MPI control relay connector, and repair if necessary.
4. NG → Check the harness wire between Engine-ECU and ground, and repair if necessary.
5. NG → **Check the following connector.** B-84, B-78 <M/T>, B-84, B-78 <A/T>. NG → **Repair**
   OK → Check trouble symptom.
   NG → Check the harness wire between Engine-ECU and battery, and repair if necessary.

OK → **Check the following connector.** B-108, B-109, B-110, B-111 <M/T>, B-108, B-109, B-110, B-111 <A/T> NG → **Repair**
OK → Check trouble symptoms.
NG → Replace the Engine-ECU. CAUTION

INSPECTION PROCEDURE 45

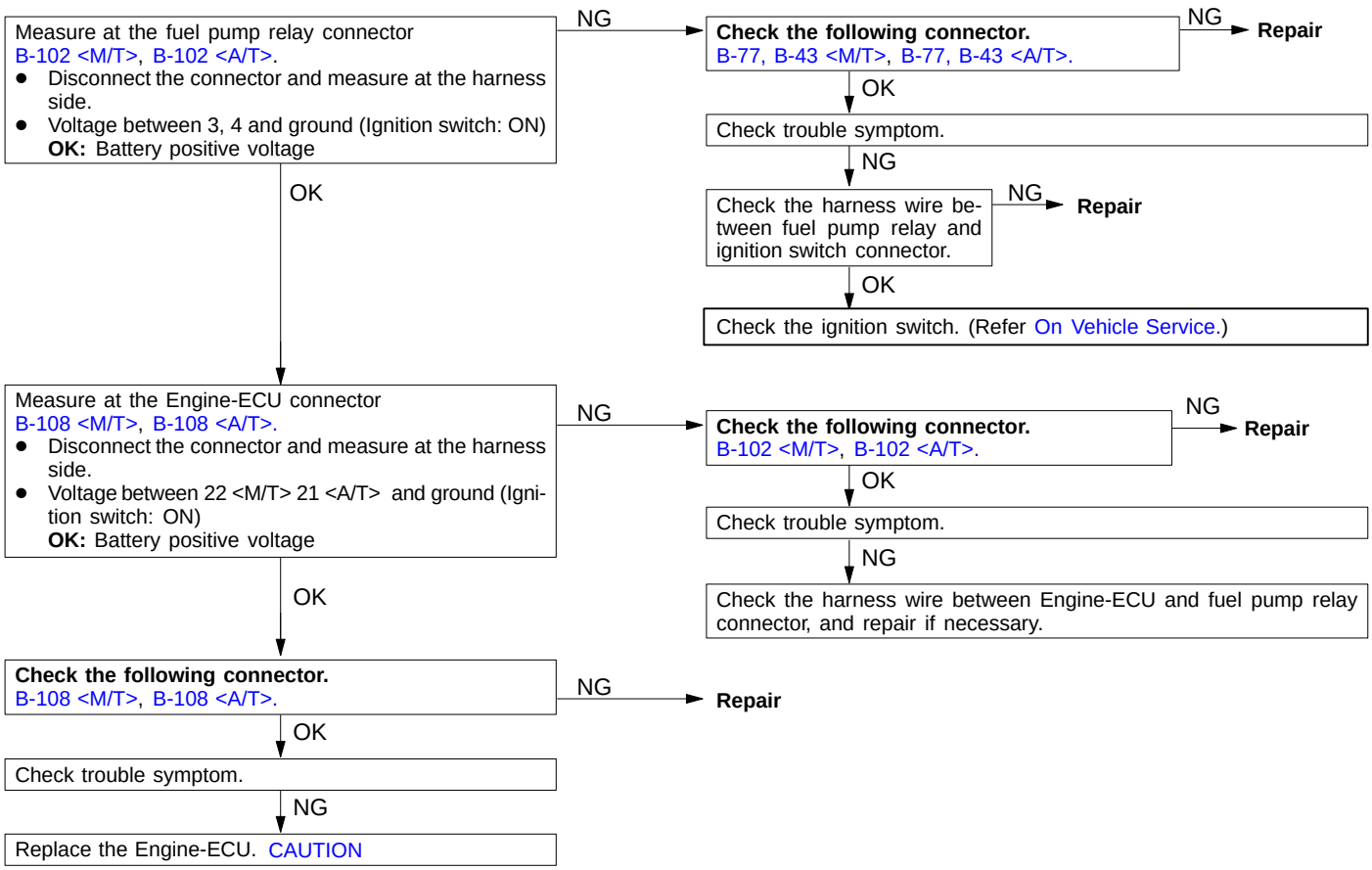
Check fuel pump circuit.

Measure at the fuel pump connector
H-01 <M/T>, H-01 <A/T>.
- Disconnect the connector and measure at the harness side.
- Continuity between 5 and ground
  OK: Continuity

NG → Check the harness wire between fuel pump and ground, and repair if necessary.
OK → **Check the following connectors.** H-09 <M/T>,H-09 <A/T> NG → **Repair**
OK → Check trouble symptom.
NG → Check the harness wire between terminal for fuel pump drive and fuel pump connector. NG → **Repair**
OK → Replace the fuel pump. CAUTION

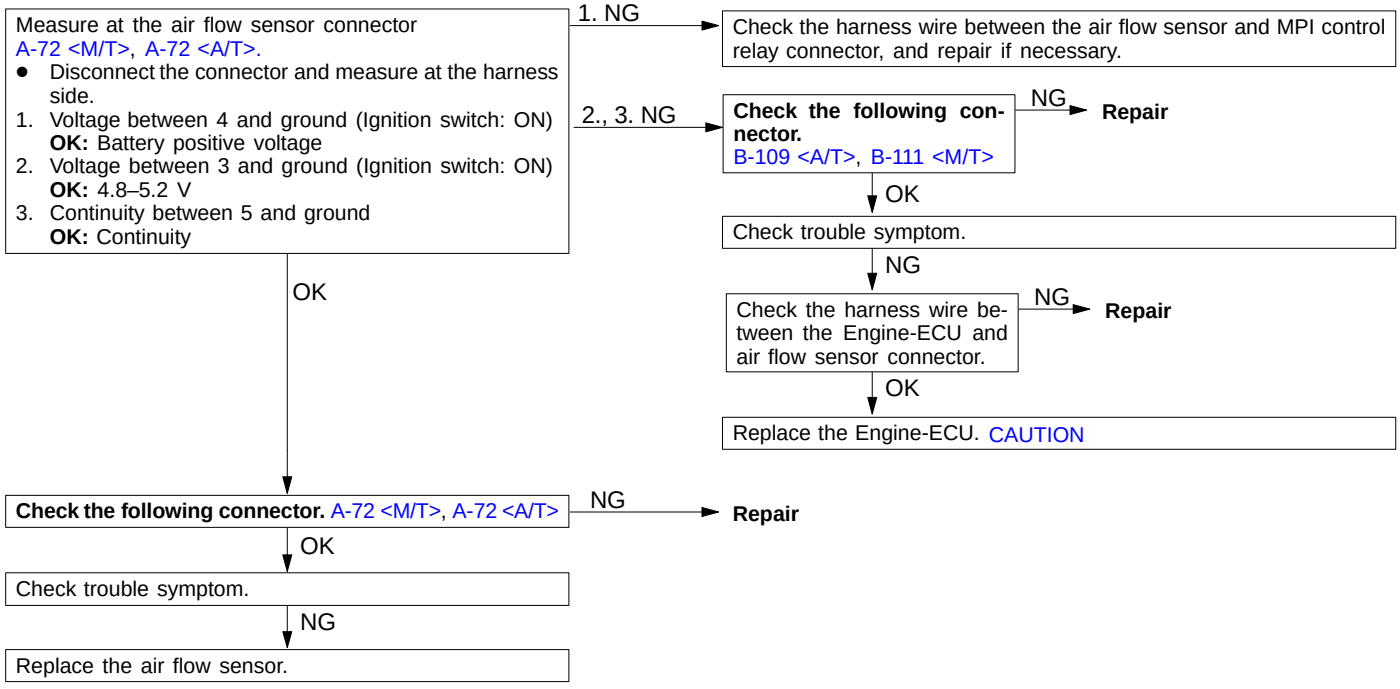
INSPECTION PROCEDURE 46

Check the fuel pump drive control circuit.



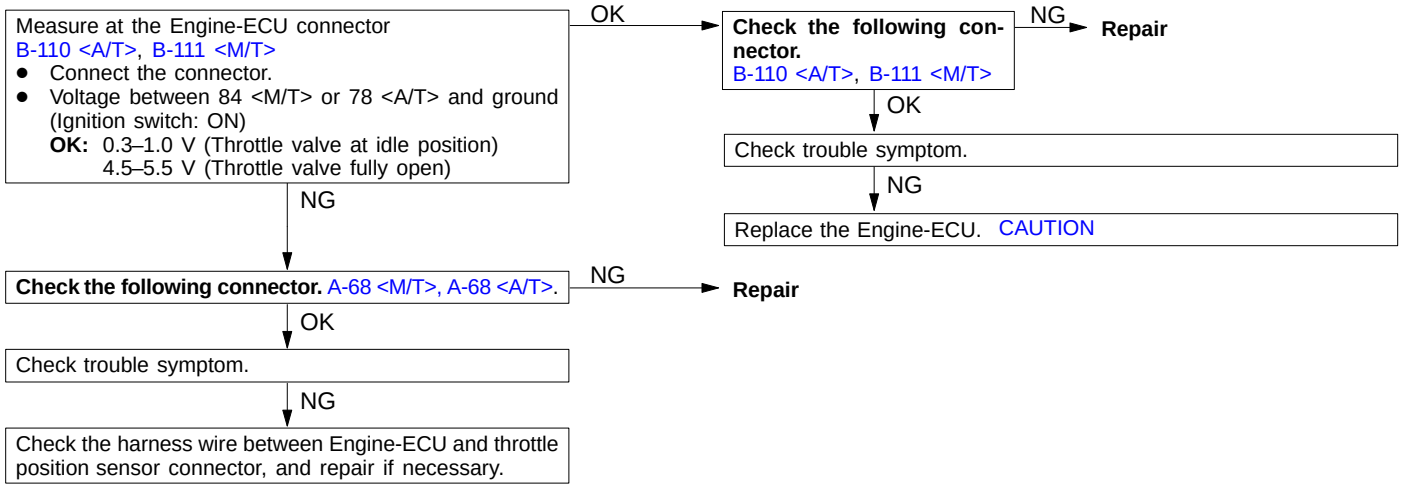
INSPECTION PROCEDURE 47

Check air flow sensor control circuit.



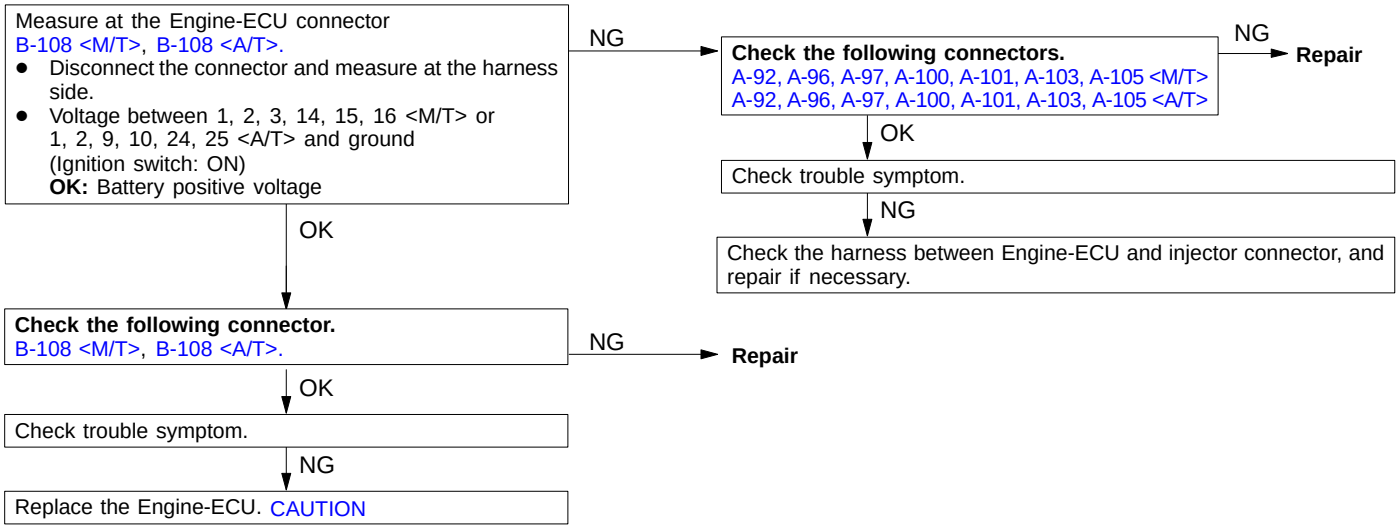
INSPECTION PROCEDURE 48

Check throttle position sensor (TPS) output circuit.



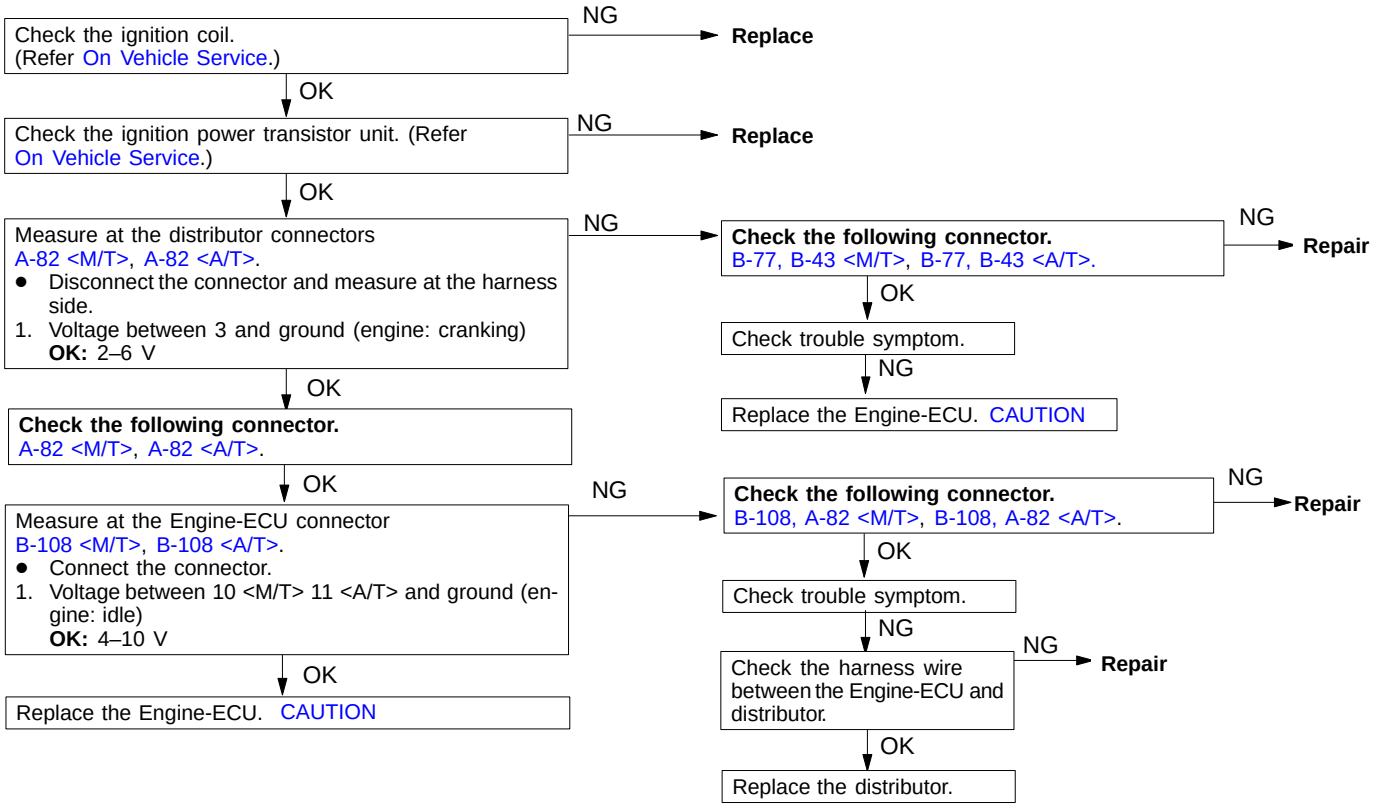
INSPECTION PROCEDURE 49

Check injector control circuit



INSPECTION PROCEDURE 50

Check ignition signal circuit.



DATA LIST REFERENCE TABLE

Caution

1. **When shifting the select lever to D range, the brakes should be applied so that the vehicle does not move forward.**
2. **Driving tests always need another personnel.**

*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: After performing a warm up idle from an initial engine temperature of –20°C, if the idle speed is lower than the standard value then it is assumed that the air volume limiter in the throttle body is defective (even if the ISC motor is fully open).
*3: The injector drive time represents the time when the cranking speed is at 250 rpm or below when the power supply voltage is 11 V.
*4: In a new vehicle [driven approximately 500 km or less], the injector drive time is sometimes 10% longer than the standard time.
*5: The idle position switch normally turns off when the voltage of the throttle position sensor is 50 – 100mV higher than the voltage at the idle position. If the closed throttle position switch turns back on after the throttle position sensor voltage has risen by 100mV and the throttle valve has opened, the closed throttle position switch and the throttle position sensor need to be adjusted.
*6: In a new vehicle [driven approximately 500 km or less], the step of the stepper motor is sometimes 3 steps greater than the standard value.

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.
11	Oxygen sensor	Engine: Warm (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	Procedure No. 30
			When engine is suddenly raced	600–1,000 mV	
		Engine: Warm (The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the Engine-ECU.)	Engine is idling	400 mV or less ↔ 600–1,000 mV (Changes)	
			2,500 r/min		
12	Air flow sensor	● Engine coolant temperature: 80–95°C ● Lights, electric cooling fan and all accessories: OFF ● Transmission: Neutral (A/T: P range)	Engine is idling	18–44 Hz	Code No. 12
			2,500 r/min	43–83 Hz	
			Engine is raced	Frequency increases in response to racing	
13t	Intake air temperature sensor	Ignition switch: ON or with engine running	When intake air temperature is –20°C	–20°C	Code No. 13
			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	

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.
14	Throttle position sensor	Ignition switch: ON	Set to idle position	300–1,000 mV (6–20%)	Code No. 14
			Gradually open	Increases in proportion to throttle opening angle	
			Open fully	4,500–5,500 mV (80–100%)	
16	Power supply voltage	Ignition switch: ON		Battery positive voltage	Procedure No. 23
18	Cranking signal (ignition switch-ST)	Ignition switch: ON	Engine: Stopped	OFF	Procedure No.26 <M/T> Procedure No. 27 <A/T>
			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
			When engine coolant temperature is 0°C	0°C	
			When engine coolant temperature is 20°C	20°C	
			When engine coolant temperature is 40°C	40°C	
			When engine coolant temperature is 80°C	80°C	
22	Crank angle sensor *2	• Engine: Cranking • Tachometer: Connected	Compare the rpm of the tachometer with the one of the MUT-II.	Identical	Code No. 22
		• Engine: Idling • Idle position switch: ON	When engine coolant temperature is –20°C	1300–1500 r/min	
			When engine coolant temperature is 0°C	1300–1500 r/min	
			When engine coolant temperature is 20°C	1300–1500 r/min	
			When engine coolant temperature is 40°C	1050–1250 r/min	
			When engine coolant temperature is 80°C	600–800 r/min	
24	Vehicle speed sensor	Drive at 40 km/h		Approx. 40 km/h	Code No. 24
25	Barometric pressure sensor	Ignition switch: ON	At altitude of 0 m	101 kPa	Code No. 25
			At altitude of 600m	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
			Throttle valve: Slightly open	OFF *5	

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.
27	Power steering pressure switch	Engine: Idling	Steering wheel stationary	OFF	Procedure No. 28
			Steering wheel turning	ON	
28	A/C switch	Engine: Idling (When A/C switch is ON, A/C compressor should be operating.)	A/C switch: OFF	OFF	Procedure No. 29
			A/C switch: ON	ON	
29	Inhibitor switch <A/T>	Ignition switch: ON	P or N	P or N	Procedure No. 27
			D,3, 2, L or R	D,3, 2, L or R	
34	Air flow sensor reset signal	Engine: Warm	Engine is idling	ON	–
			2500 r/min	OFF	
36	Ignition timing adjustment mode.	Engine: Idling	Ignition timing adjustment terminal is earthed	ON	–
			Ignition timing adjustment terminal is disconnected from earth	OFF	
37	Volumetric efficiency	● Engine coolant temperature: 80–95°C ● Lights, electric cooling fan and all accessories: OFF ● Transmission: P range	Engine is idling	15–35 %	–
			2,500 r/min	15–35 %	
			When engine is suddenly raced	Volumetric efficiency increases in response to racing	
38	Crank angle sensor	● Engine cranking (reading is possible at 2000 r/min or less) ● Tachometer: connected		Engine speeds displayed on the MUT-II and tachometer are identical.	–
41, 47	Injectors *3	Engine: Cranking	When engine coolant temperature is 0°C	12–18 ms	–
			When engine coolant temperature is 20°C	30–44 ms	
			When engine coolant temperature is 80°C	8–12 ms	
	Injectors *4	● Engine coolant temperature: 80–95°C ● Lights, electric cooling fan and all accessories: OFF ● Transmission: P range	Engine is idling	2.2–3.4 ms	
			2,500 r/min	2.0–3.2 ms	
			When engine is suddenly raced	Increases	

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.
44	Ignition coils and ignition power transistors	● Engine: After having warmed up ● Timing light is set. (The timing light is set in order to check actual ignition timing.)	Engine is idling	2–18 °BTDC	–
			2,500 r/min	25–45 °BTDC	
45	ISC servo (stepper motor) position *6	● Engine coolant temperature: 80 – 95°C ● Lights, electric cooling fan and all accessories: OFF ● Transmission: P range) ● Idle position switch: ON ● Engine: Idling (When A/C switch is ON, A/C compressor should be operating)	A/C switch: OFF	Increases by 2–25 steps	–
			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 compressor clutch relay	Engine: After having warmed up Engine is idling	A/C switch: OFF	OFF (Compressor clutch is not operating)	Procedure No. 29
			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.
01	Injectors	Cut fuel to No. 1 injector	Engine: Warm, idle (Cut the fuel supply to each injector in turn and check cylinders which don't affect idling.)		Idle speed drops equally for each injector	Code No. 41
02		Cut fuel to No. 2 injector				
03		Cut fuel to No. 3 injector				
04		Cut fuel to No. 4 injector				
05		Cut fuel to No. 5 injector				
06		Cut fuel to No. 6 injector				
07	Fuel pump	Fuel pump operates and fuel is recirculated.	• Engine: Cranking • Fuel pump: Activated 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
				Listen near the fuel tank for the sound of fuel pump operation.	Typical electric fuel pump whine.	
08	Purge control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Clicks when solenoid valve is driven.	Procedure No. 34
10	EGR control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Clicks when solenoid valve is driven.	Procedure No. 35
17	Basic ignition timing	Set to ignition timing adjustment mode	Engine: Idle Timing light is set		5°BTDC	–
20	Radiator fan (Hi) Condenser fan (Hi)	Drive the fan motors (radiator and condenser).	Ignition switch: ON A/C switch: ON		Fan motor operates at high speed.	Procedure No. 31
21	Radiator fan (Hi) Condenser fan (Low)	Drive the fan motors (radiator and condenser).	Ignition switch: ON A/C switch: ON		Fan motor operates at low speed.	Procedure No. 31
30	Basic idle speed	Set ISC servo to basic step	Engine idle speed		Stepper motor approx. 8 steps	–