

MULTIPOINT FUEL INJECTION (MPI) <4G1>

GENERAL

OUTLINE OF CHANGES

Maintenance service points for 4G15 engine have been established as follows:

The others are the same as for 4G13 engine.

- The immobilizer system has been used.
- The oxygen sensor has changed as follows:
 - (1) The installation position has been changed.
 - (2) The one of two oxygen sensors has been abolished (rear side).

- (3) The heater in sensor has been abolished.
- The exhaust gas recirculation (EGR) system has been abolished.
- The engine-ECU has been changed.
- The alternator control has been abolished.

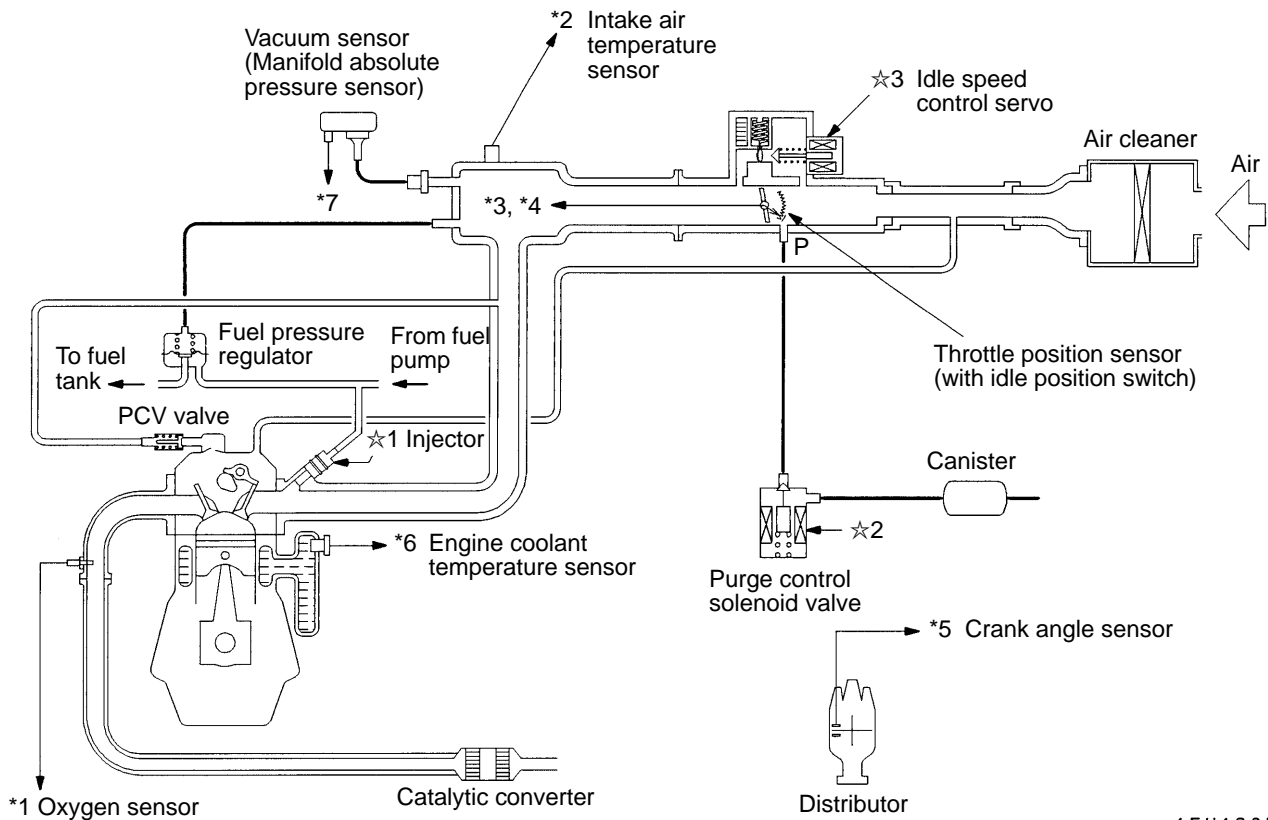
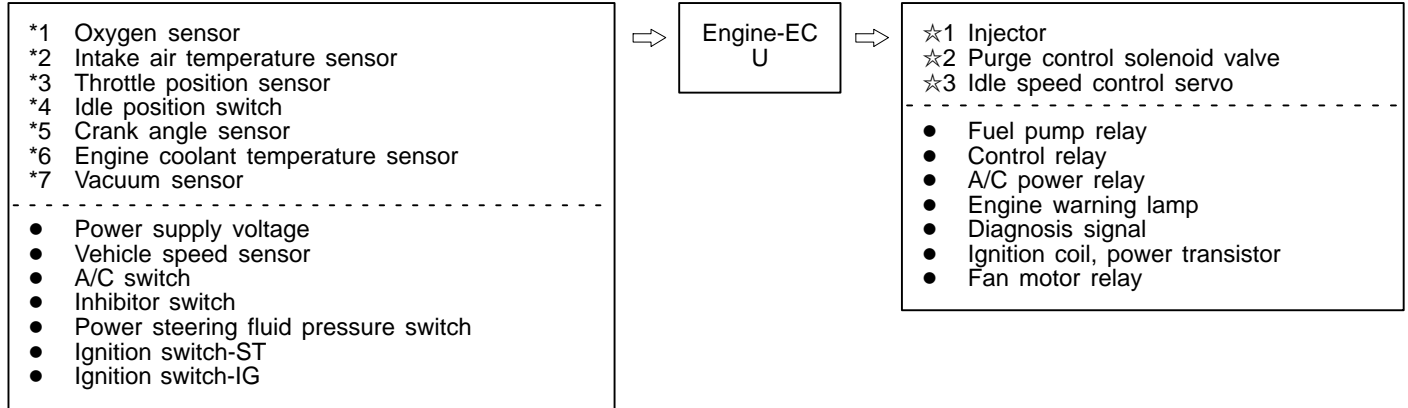
GENERAL SPECIFICATIONS

Item		Specification
Engine-ECU	Identification No.	E2T65784

MULTIPOINT FUEL INJECTION SYSTEM DIAGRAM

MAIN

Group
13

13A
1997


1FU1207

TROUBLESHOOTING**DIAGNOSIS FUNCTION****ENGINE WARNING LAMP (CHECK ENGINE LAMP)****Engine warning lamp inspection items**

The following items have been added.

- Immobilizer system

INSPECTION CHART FOR DIAGNOSIS CODES

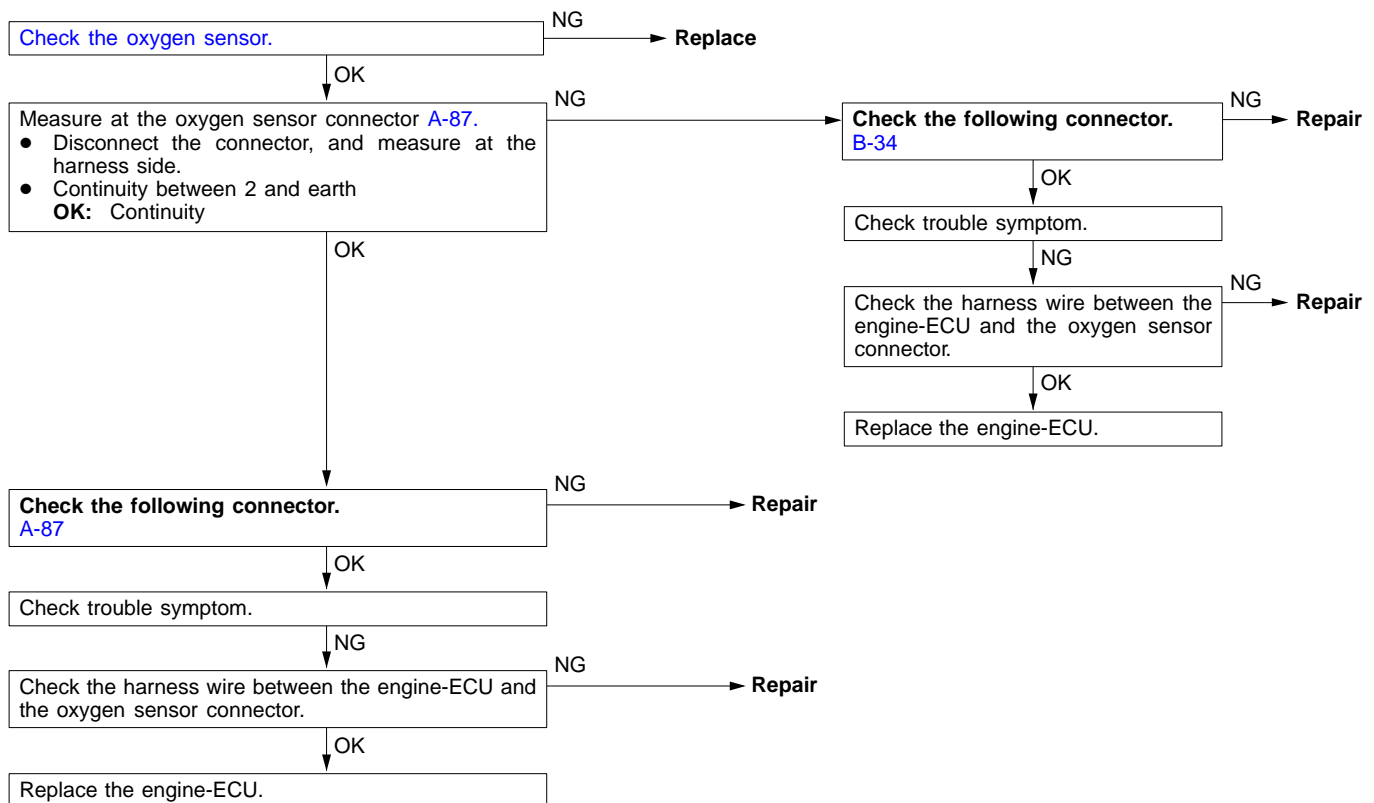
Code No.	Diagnosis item
11	Oxygen sensor system
13	Intake air temperature sensor system
14	Throttle position sensor system
21	Engine coolant temperature sensor system
22	Crank angle sensor system
24	Vehicle speed sensor system
32	Vacuum sensor system
36*	Ignition timing adjustment signal system
41	Injector system
54	Immobilizer system
61	Communication wire with A/T-ECU system <A/T>

NOTE

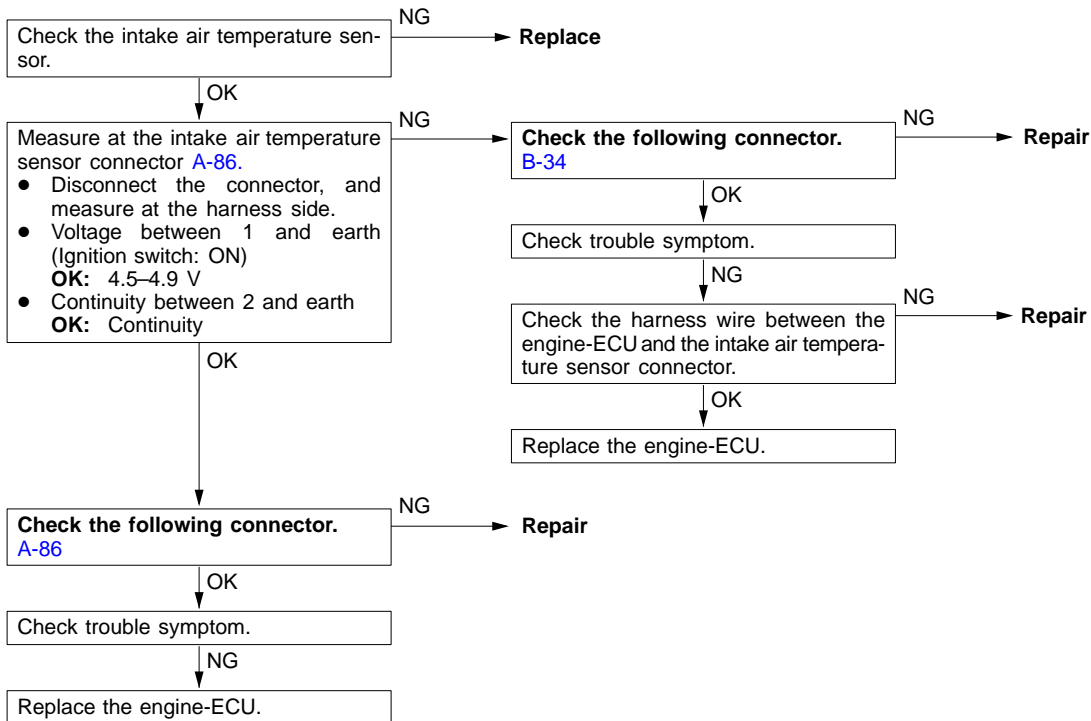
*: Diagnosis code No. 36 is not memorized.

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

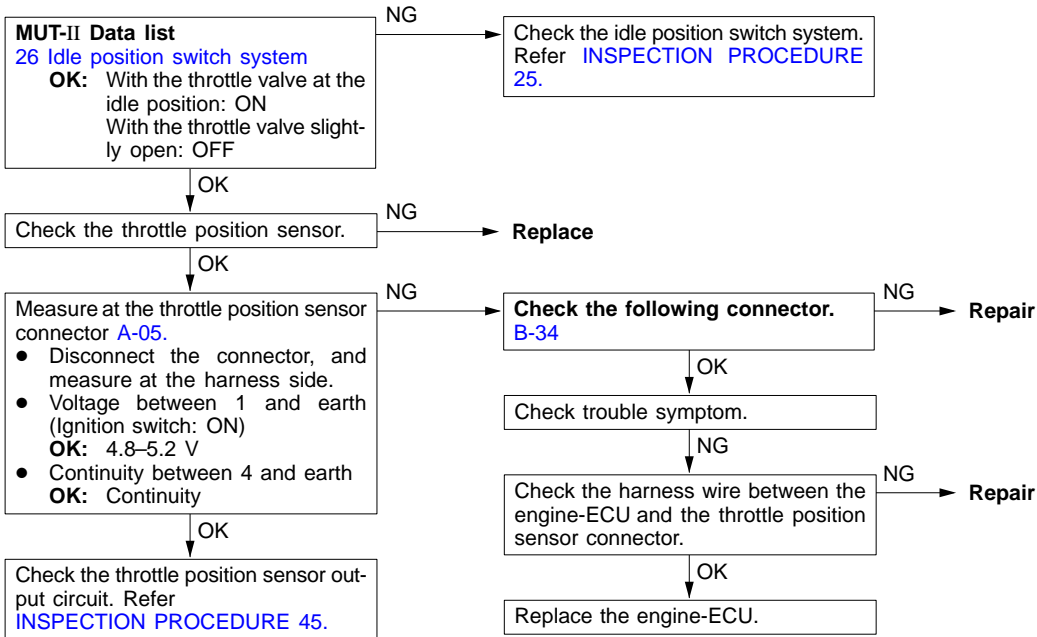
Code No. 11 Oxygen sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> • 3 minutes have passed after engine was started. • Engine coolant temperature is approx. 80°C or more. • Intake air temperature is 20–50°C. • Engine speed is approx. 2,000–3,000 r/min • Vehicle is moving at constant speed on a flat, level road surface <p>Set conditions</p> <ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • Malfunction of the oxygen sensor • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU



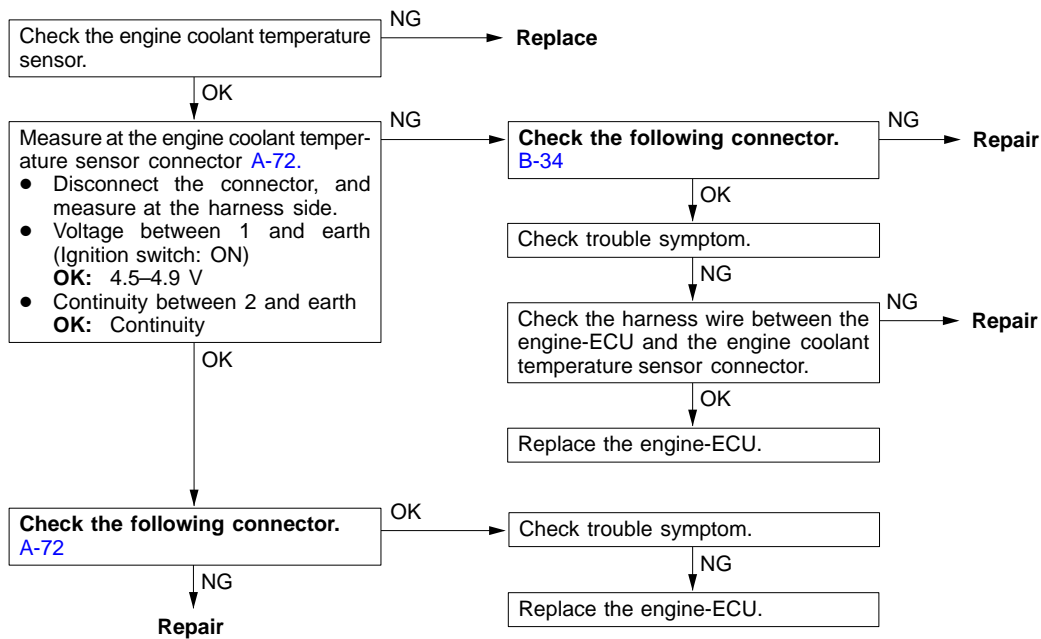
Code No. 13 Intake air temperature sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. <p>Set conditions</p> <ul style="list-style-type: none"> Sensor output voltage is 4.6 V or more (corresponding to an intake air temperature of -45°C or less) for 4 seconds. <p>or</p> <ul style="list-style-type: none"> Sensor output voltage is 0.2V or less (corresponding to an intake air temperature of 125°C or more) for 4 seconds. 	<ul style="list-style-type: none"> 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



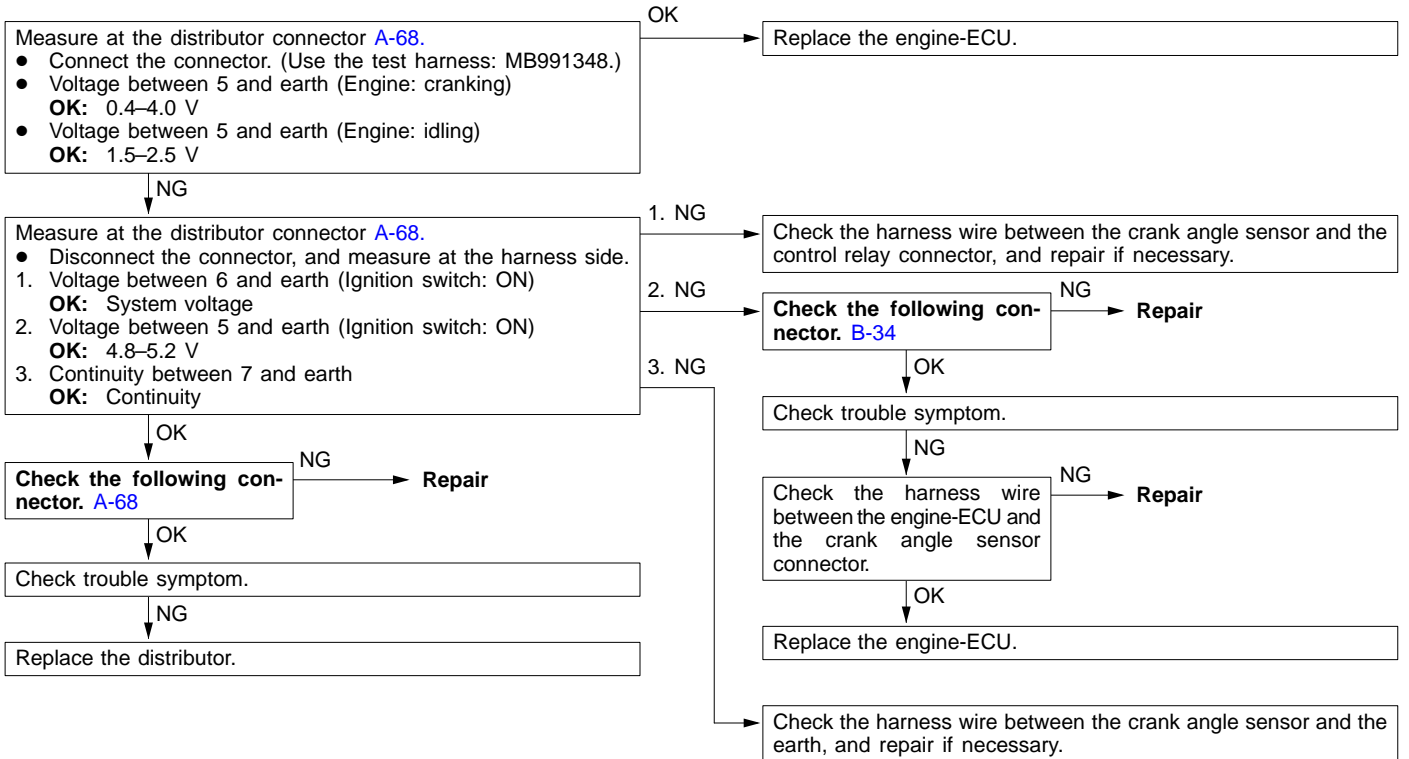
Code No. 14 Throttle position sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. <p>Set conditions</p> <ul style="list-style-type: none"> When the idle position switch is ON, the sensor output voltage is 2 V or more for 4 seconds. <p>or</p> <ul style="list-style-type: none"> The sensor output voltage is 0.2 V or less for 4 seconds. 	<ul style="list-style-type: none"> Malfunction of 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



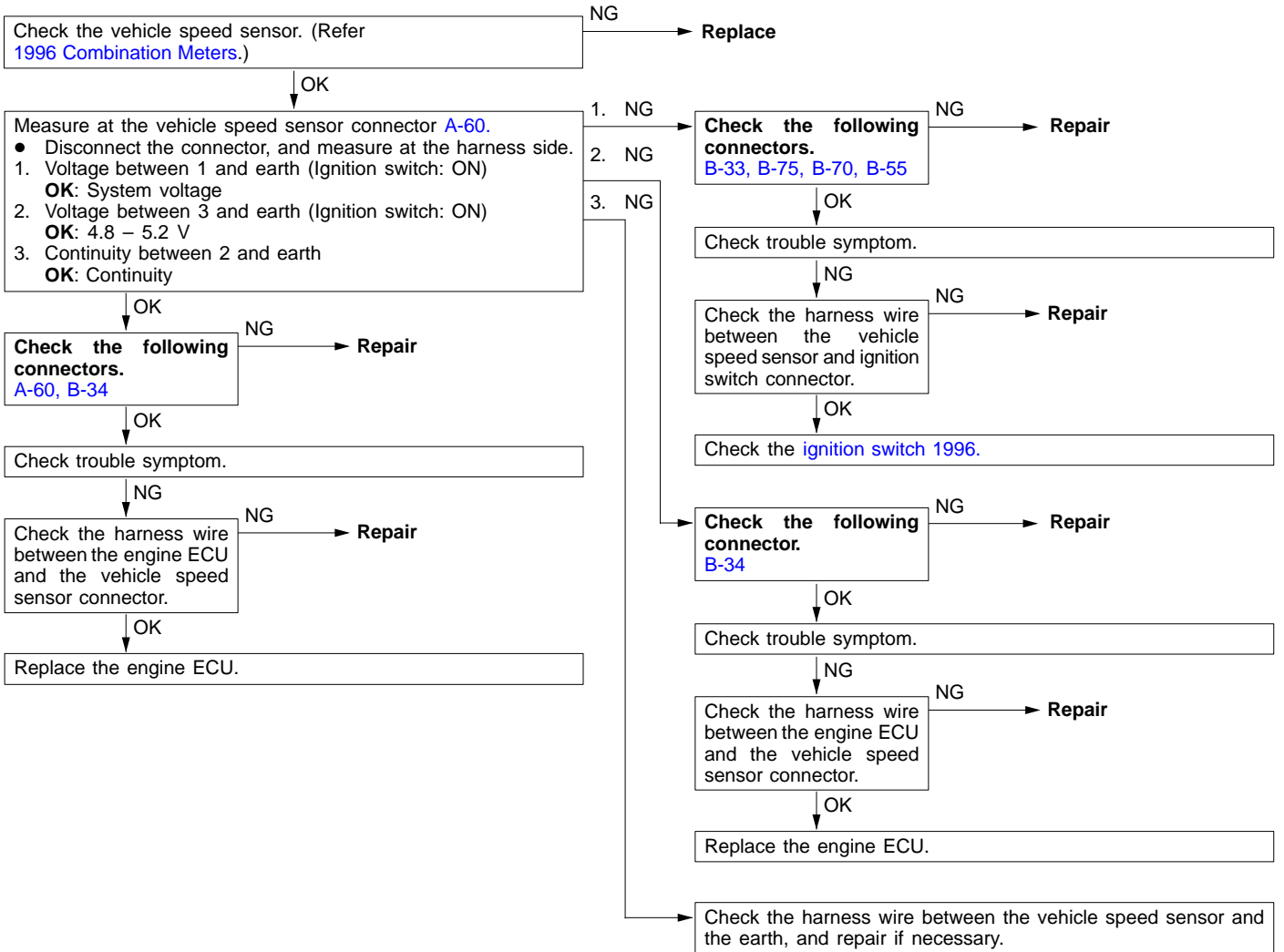
Code No. 21 Engine coolant temperature sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. <p>Set conditions</p> <ul style="list-style-type: none"> Sensor output voltage is 4.6 V or more (corresponding to an engine coolant temperature of -45°C or less) for 4 seconds. <p>or</p> <ul style="list-style-type: none"> Sensor output voltage is 0.1 V or less (corresponding to an engine coolant temperature of 140°C or more) for 4 seconds. 	<ul style="list-style-type: none"> 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
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Engine speed is approx. 50 r/min or more <p>Set conditions</p> <ul style="list-style-type: none"> 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. 	



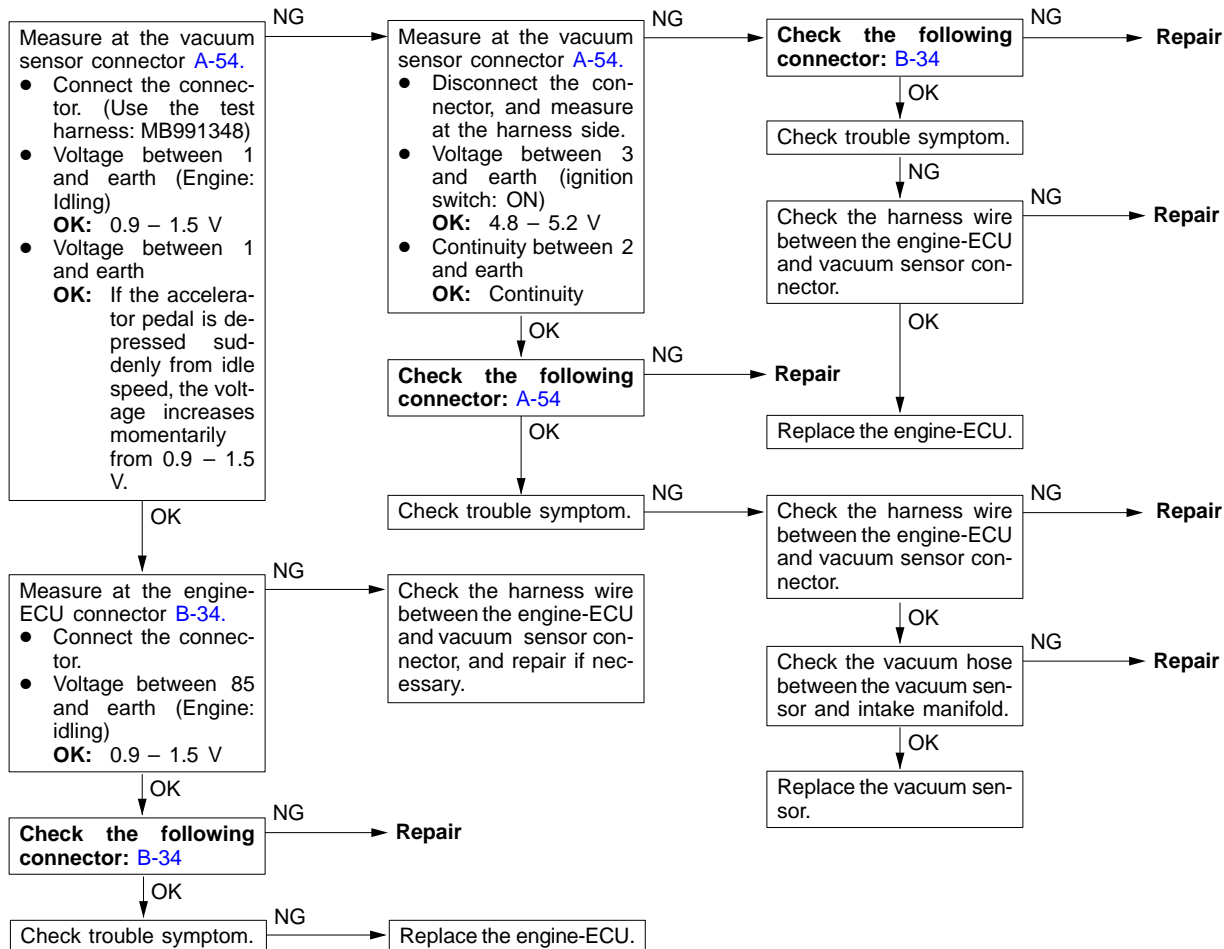
Code No. 22 Crank angle sensor system	Probable cause
Range of Check • Engine is cranking. Set conditions • Sensor output voltage does not change for 4 seconds (no pulse signal input.)	• Malfunction of the crank angle sensor • Improper connector contact, open circuit or short-circuited harness wire of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



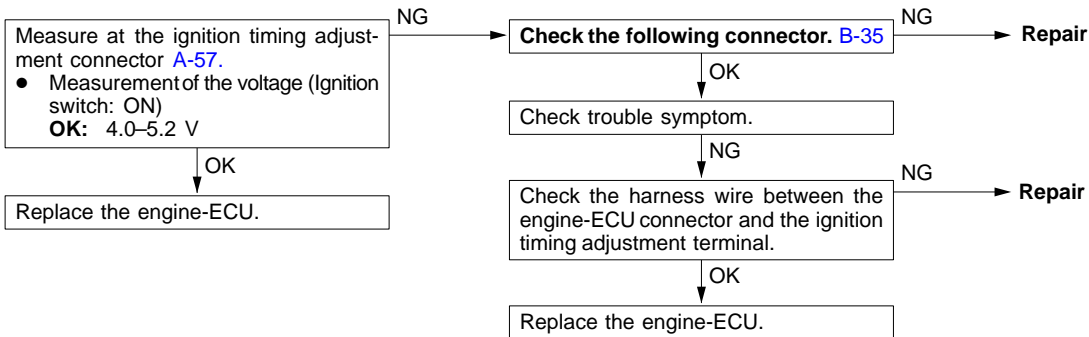
Code No. 24 Vehicles speed sensor system	Probable cause
<p>Range of check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Idle position switch: OFF Engine speed is 3,000 r/min or more. Driving under high engine load conditions. <p>Set conditions</p> <ul style="list-style-type: none"> Sensor output voltage does not change for 4 seconds (no pulse signal input). 	<ul style="list-style-type: none"> Malfunction of the vehicle speed sensor Improper connector contact, open circuit or short-circuited harness wire of the vehicle speed sensor circuit Malfunction of the engine-ECU



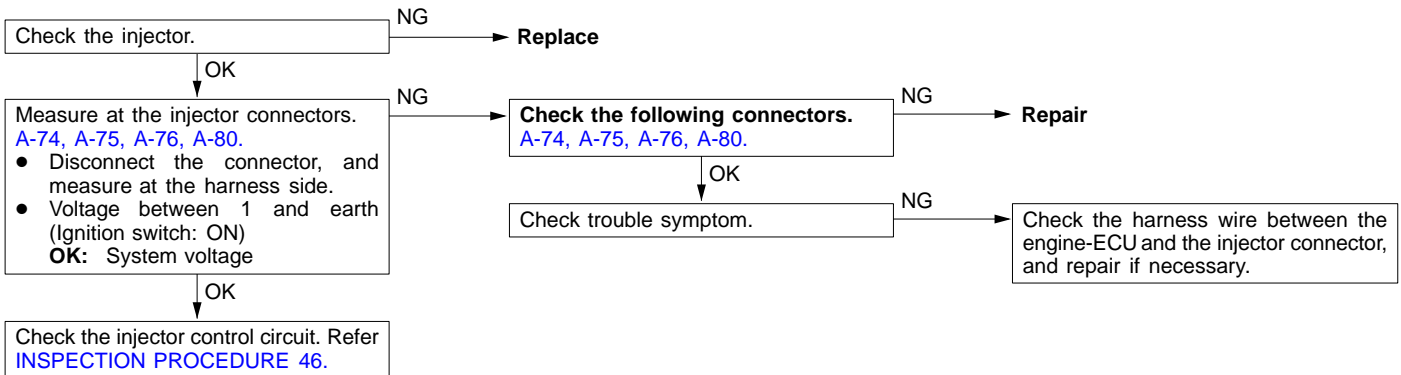
Code No.32 Vacuum sensor system	Range of Check
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON <p>Set Conditions</p> <ul style="list-style-type: none"> The output voltage of the vacuum sensor is 4.5 V or more for 4 seconds. (This corresponds to the absolute manifold pressure of 115 kPa or more.) 	<ul style="list-style-type: none"> Malfunction of the vacuum sensor Improper connector contact, open circuit or short-circuited harness Malfunction of the engine-ECU
<p>Range of Check</p> <ul style="list-style-type: none"> The output voltage of the throttle position sensor is 1.25 V or more. <p>or</p> <ul style="list-style-type: none"> The vehicle is stationary. <p>Set Conditions</p> <ul style="list-style-type: none"> The output voltage of the vacuum sensor is 0.2 V or less for 4 seconds. (This corresponds to the absolute manifold pressure of 4.9 kPa or less.) 	



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



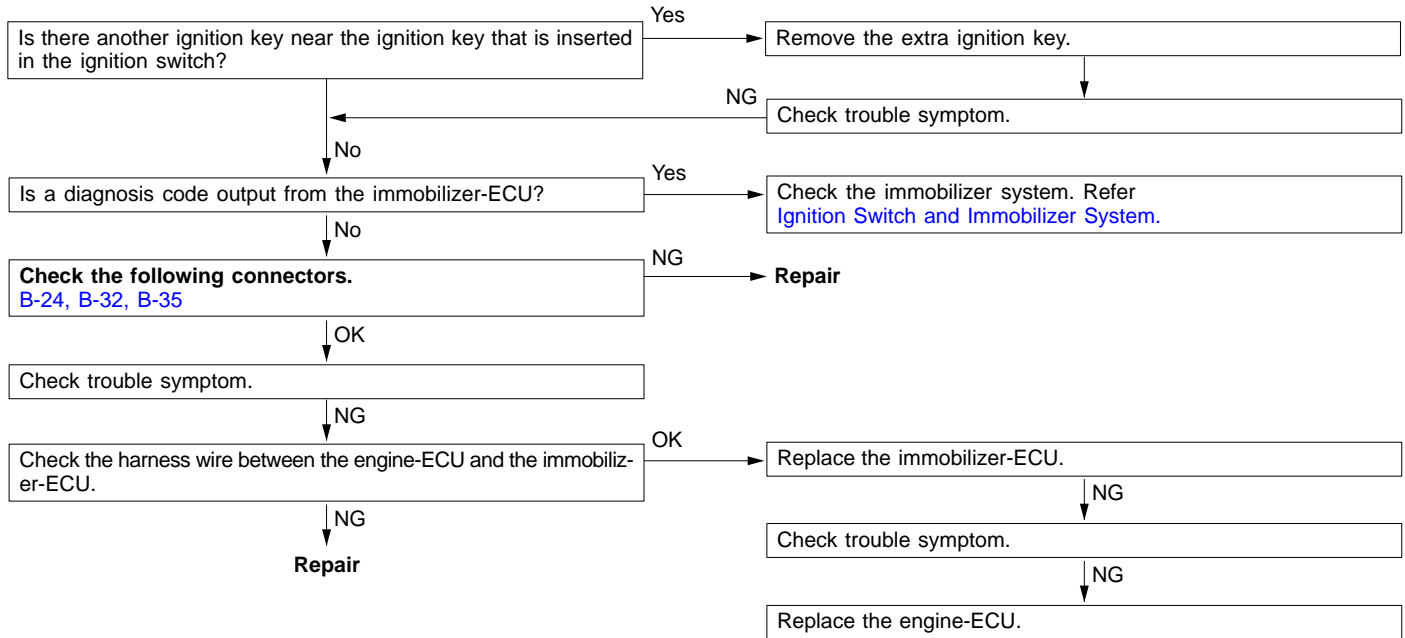
Code No. 41 Injector system	Probable cause
Range of Check • Engine speed is approx. 50–1,000 r/min • The throttle position sensor output voltage is 1.15 V or less. • Actuator test by MUT-II is not carried out. Set conditions • Surge voltage of injector coil is not detected for 4 seconds.	• Malfunction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



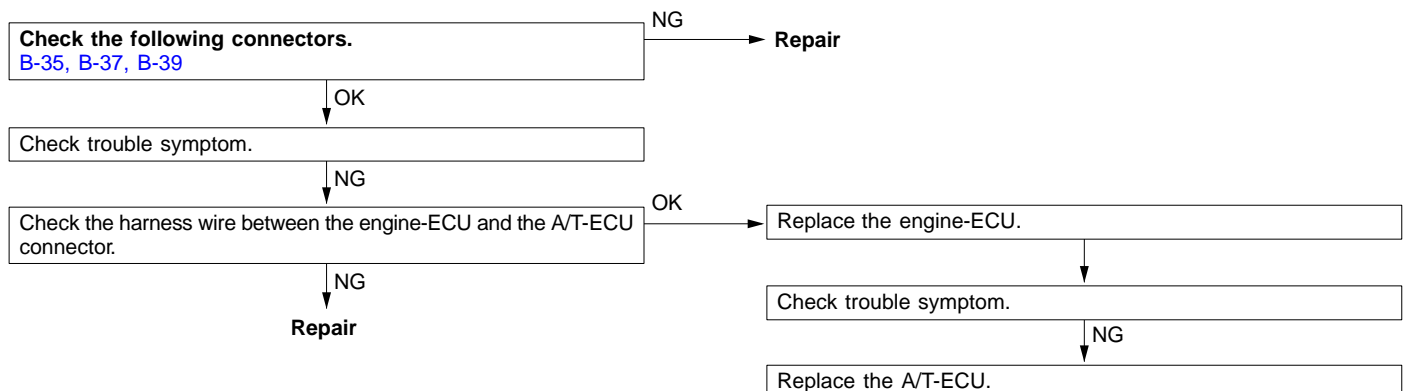
Code No.54 Immobilizer system	Probable cause
Range of Check <ul style="list-style-type: none"> Ignition switch: ON Set Conditions <ul style="list-style-type: none"> Improper communication between the engine-ECU and immobilizer-ECU 	<ul style="list-style-type: none"> Radio interference of ID codes Incorrect ID code Malfunction of harness or connector Malfunction of immobilizer-ECU Malfunction of engine-ECU

NOTE

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



Code No. 61 Communication wire with A/T-ECU system <A/T>	Probable cause
Range of Check <ul style="list-style-type: none"> 60 seconds or more have passed immediately after engine was started. Engine speed is approx. 50 r/min or more Set conditions <p>The voltage of the torque reduction request signal from the A/T-ECU is LOW for 1.5 seconds or more.</p>	<ul style="list-style-type: none"> Malfunction of the harness wire and the connector Malfunction of the engine-ECU Malfunction of the A/T-ECU



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
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
	The engine warning lamp remains illuminating and never goes out.	4
Starting	No initial combustion (starting impossible)	5
	Initial combustion but no complete combustion (starting impossible)	6
	Long time to start (improper starting)	7
Idling stability (Improper idling)	Unstable idling (Rough idling, hunting)	8
	Idling speed is high. (Improper idling speed)	9
	Idling speed is low. (Improper idling speed)	10
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	11
	When the engine becomes hot, it stalls at idling. (Die out)	12
	The engine stalls when starting the car. (Pass out)	13
	The engine stalls when decelerating.	14
Driving	Hesitation, sag or stumble	15
	The feeling of impact or vibration when accelerating	16
	The feeling of impact or vibration when decelerating	17
	Poor acceleration	18
	Surge	19
	Knocking	20
Dieseling		21
Too high CO concentration when idling		22

MAIN

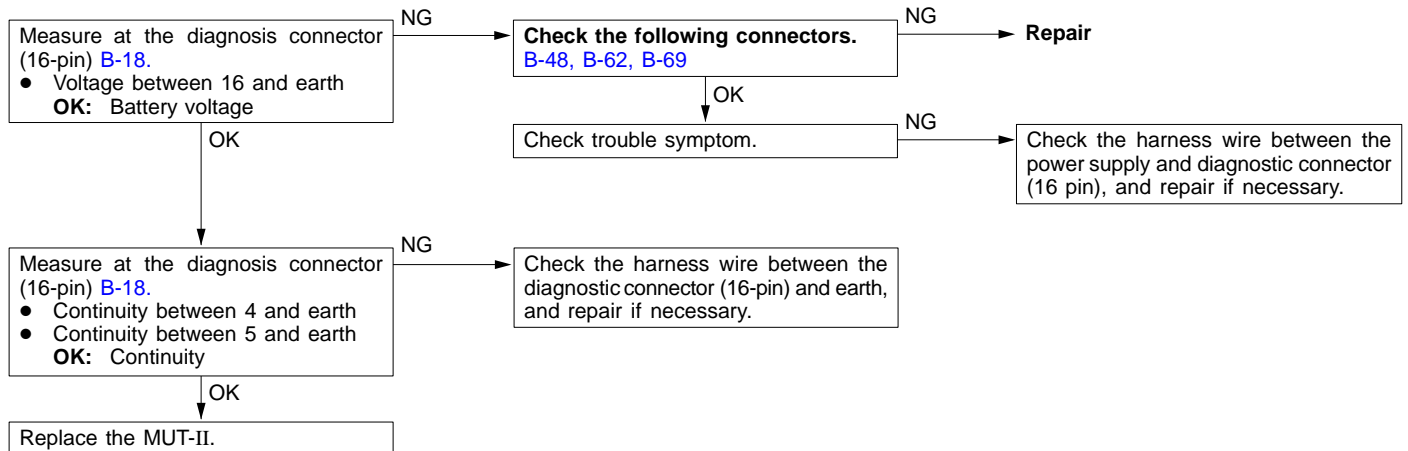
Group
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INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

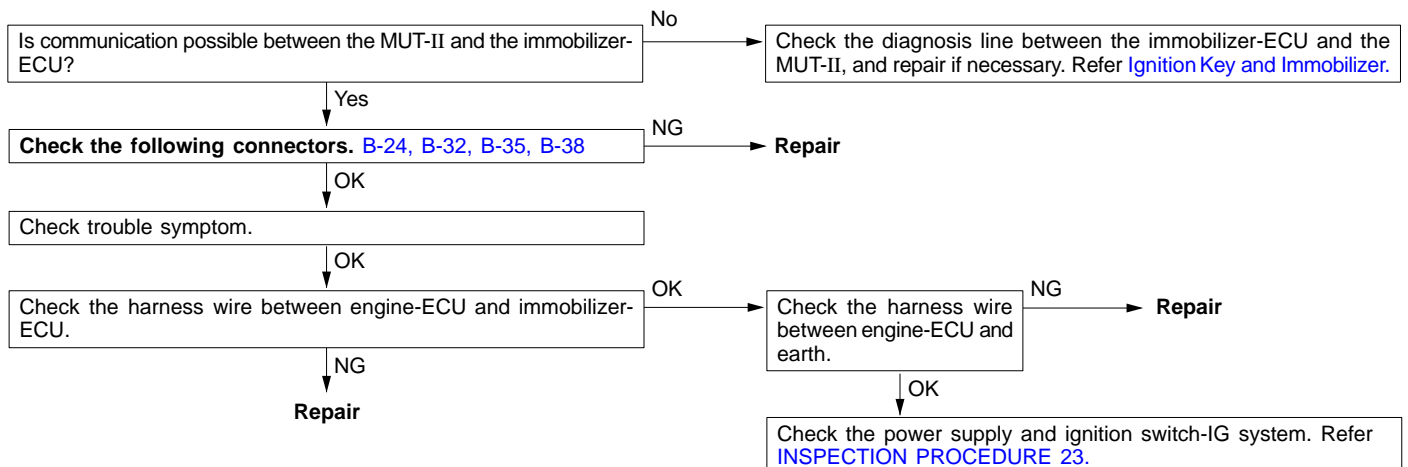
INSPECTION PROCEDURE 1

Communication with MUT-II is not possible. (Communication with all systems is not possible.)	Probable cause
The cause is probably a defect in the power supply system (including earth) for the diagnosis line.	<ul style="list-style-type: none"> Malfunction of the connector Malfunction of the harness wire



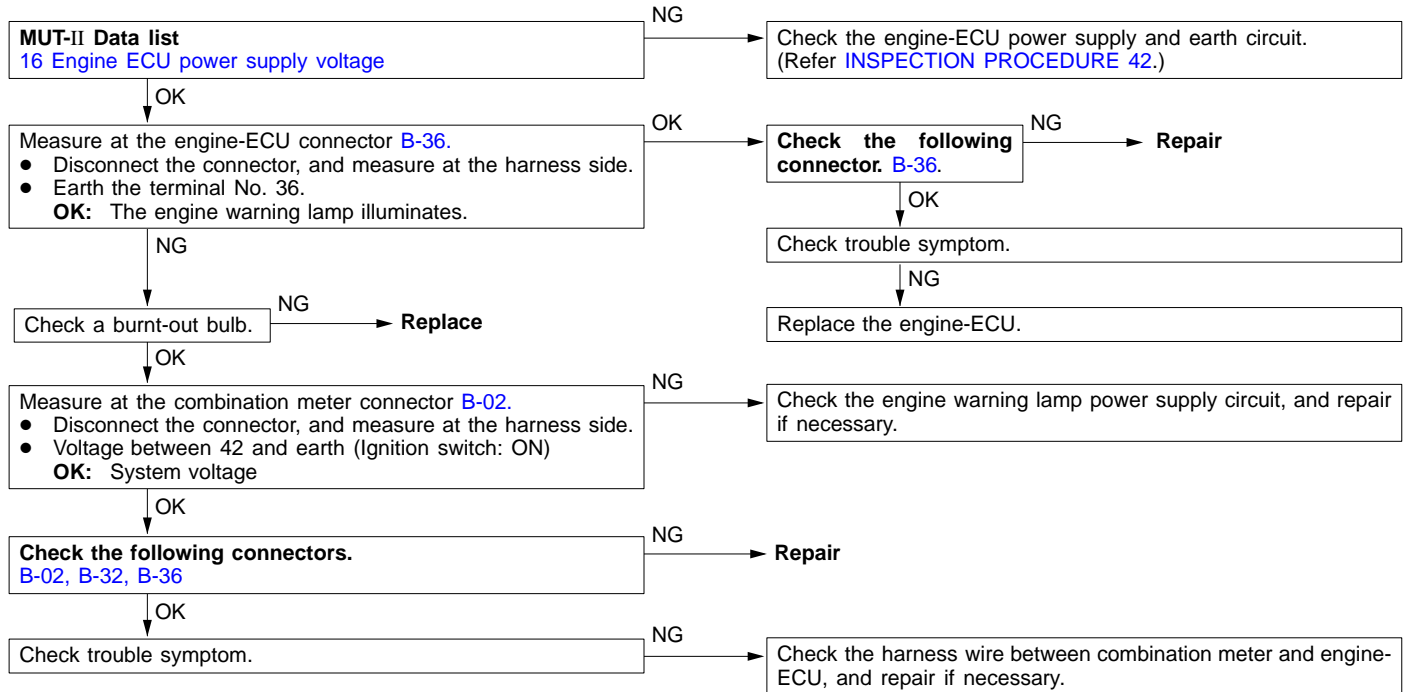
INSPECTION PROCEDURE 2

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



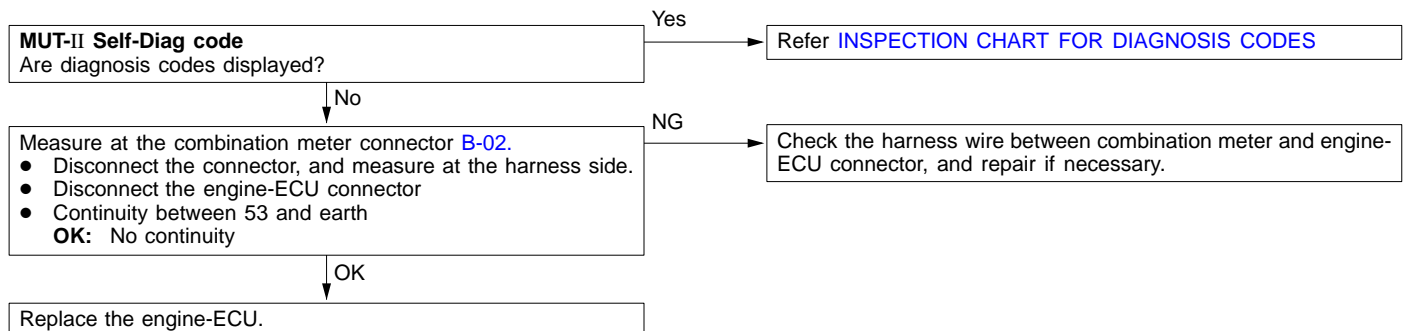
INSPECTION PROCEDURE 3

The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position.	Probable cause
Because there is a burnt-out bulb, the engine-ECU causes the engine warning lamp to illuminate for five seconds immediately after the ignition switch is turned to ON. If the engine warning lamp does not illuminate immediately after the ignition switch is turned to ON, one of the malfunctions listed at right has probably occurred.	<ul style="list-style-type: none"> Burnt-out bulb Defective warning lamp circuit Malfunction of the engine-ECU



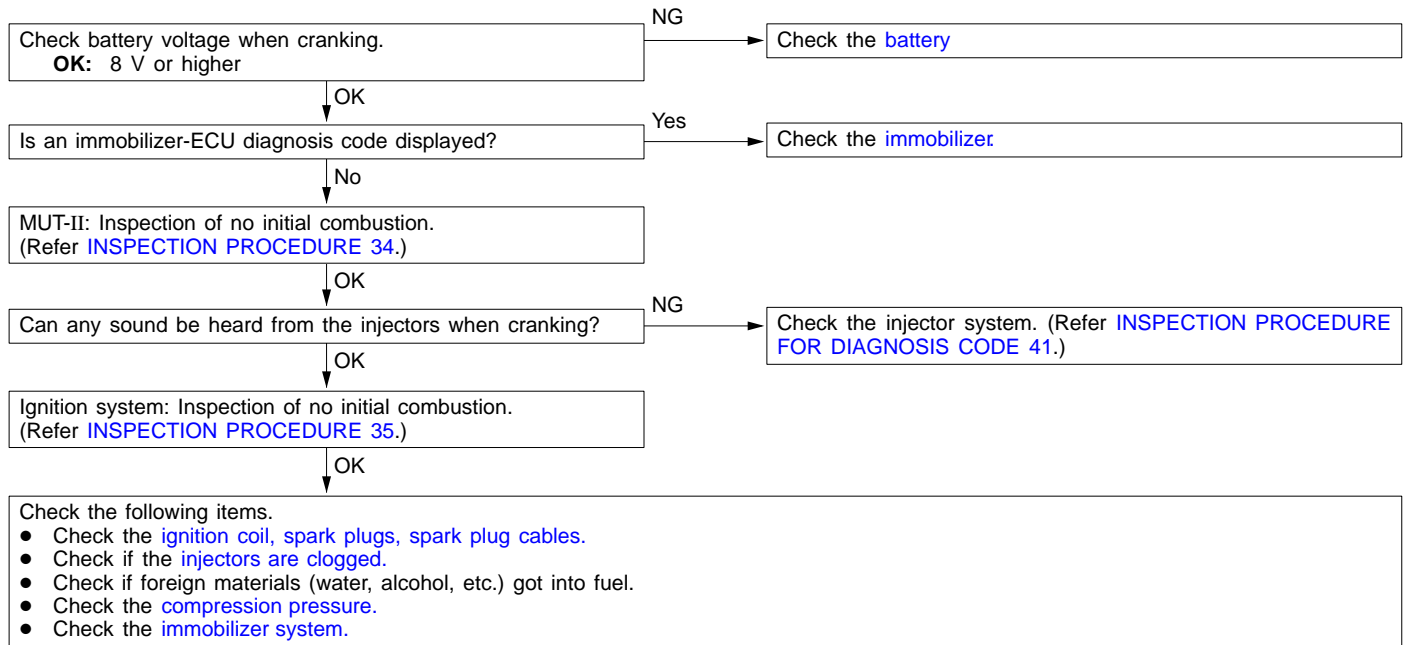
INSPECTION PROCEDURE 4

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



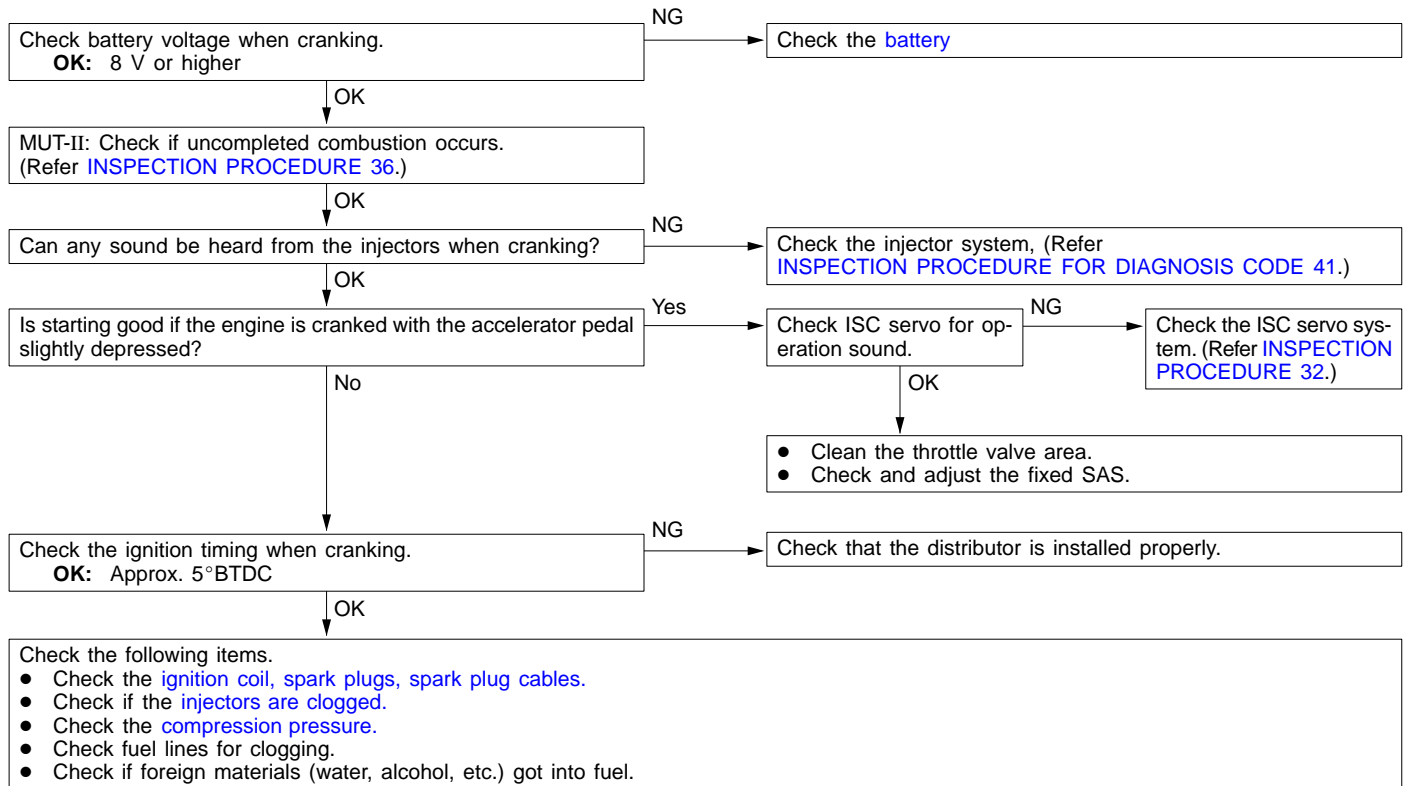
INSPECTION PROCEDURE 5

No initial combustion (starting impossible)	Probable cause
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.	<ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of the fuel pump system • Malfunction of the injectors • Malfunction of the engine-ECU • Malfunction of the immobilizer system • Foreign materials in fuel



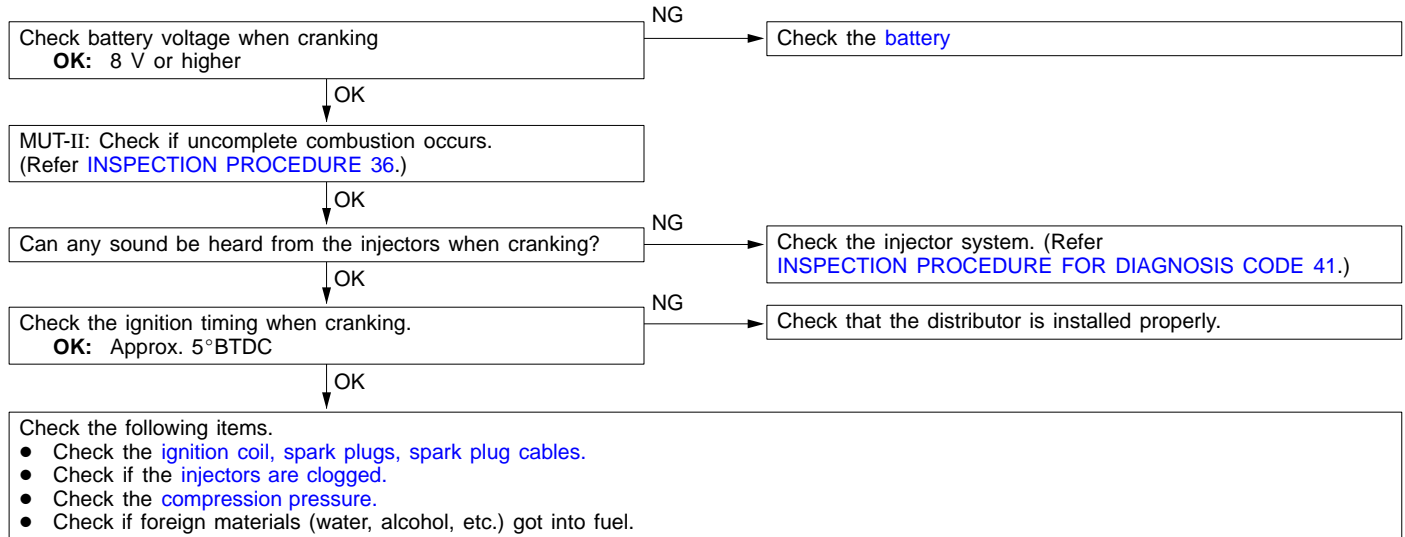
INSPECTION PROCEDURE 6

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



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.	<ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of the injector system • Inappropriate gasoline use • Poor compression



INSPECTION PROCEDURE 8

Unstable idling (Rough idling, hunting)	Probable cause
<p>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.</p>	<ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of air-fuel ratio control system • Malfunction of the ISC system • Malfunction of the purge control solenoid valve system • Poor compression • Drawing air into exhaust system


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graph TD
    Q1[Were the battery terminals disconnected?] -- Yes --> A1[After warming-up, let the engine run at idling for 10 minutes.]
    Q1 -- No --> Q2[MUT-II Self-Diag code  
Are diagnosis codes displayed?]
    Q2 -- Yes --> A2[Refer INSPECTION CHART FOR DIAGNOSIS CODES.]
    Q2 -- No --> Q3[Does idling speed fluctuate excessively?]
    Q3 -- Yes --> A3[Check if hunting occurs.  
(Refer INSPECTION PROCEDURE 37.)]
    Q3 -- No --> Q4[Check the ISC servo for operation sound.]
    Q4 -- NG --> A4[Check the ISC servo system.  
(Refer INSPECTION PROCEDURE 32.)]
    Q4 -- OK --> Q5[Check the injector for operation sound.]
    Q5 -- NG --> A5[Check the injector system. (Refer  
INSPECTION PROCEDURE FOR DIAGNOSIS CODE 41.)]
    Q5 -- OK --> Q6[MUT-II: Check if idling speed is unstable.  
(Refer INSPECTION PROCEDURE 38.)]
    Q6 -- OK --> Q7[Check the ignition timing.]
    Q7 -- NG --> A6[Check that the distributor is installed properly.]
    Q7 -- OK --> A7[Check the following items.  
• Check the ignition coil, spark plugs, spark plug cables  
• Check the purge control system.  
• Check the compression pressure.  
• Check if foreign materials (water, alcohol, etc.) got into fuel.]
  
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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 displayed?

Yes → Refer [INSPECTION CHART FOR DIAGNOSIS CODES](#).

No →

Does idling speed fluctuate excessively?

Yes → Check if hunting occurs. (Refer [INSPECTION PROCEDURE 37](#).)

No →

Check the ISC servo for operation sound.

NG → Check the ISC servo system. (Refer [INSPECTION PROCEDURE 32](#).)

OK →

Check the injector for operation sound.

NG → Check the injector system. (Refer [INSPECTION PROCEDURE FOR DIAGNOSIS CODE 41](#).)

OK →

MUT-II: Check if idling speed is unstable. (Refer [INSPECTION PROCEDURE 38](#).)

OK →

Check the [ignition timing](#).

NG → Check that the distributor is installed properly.

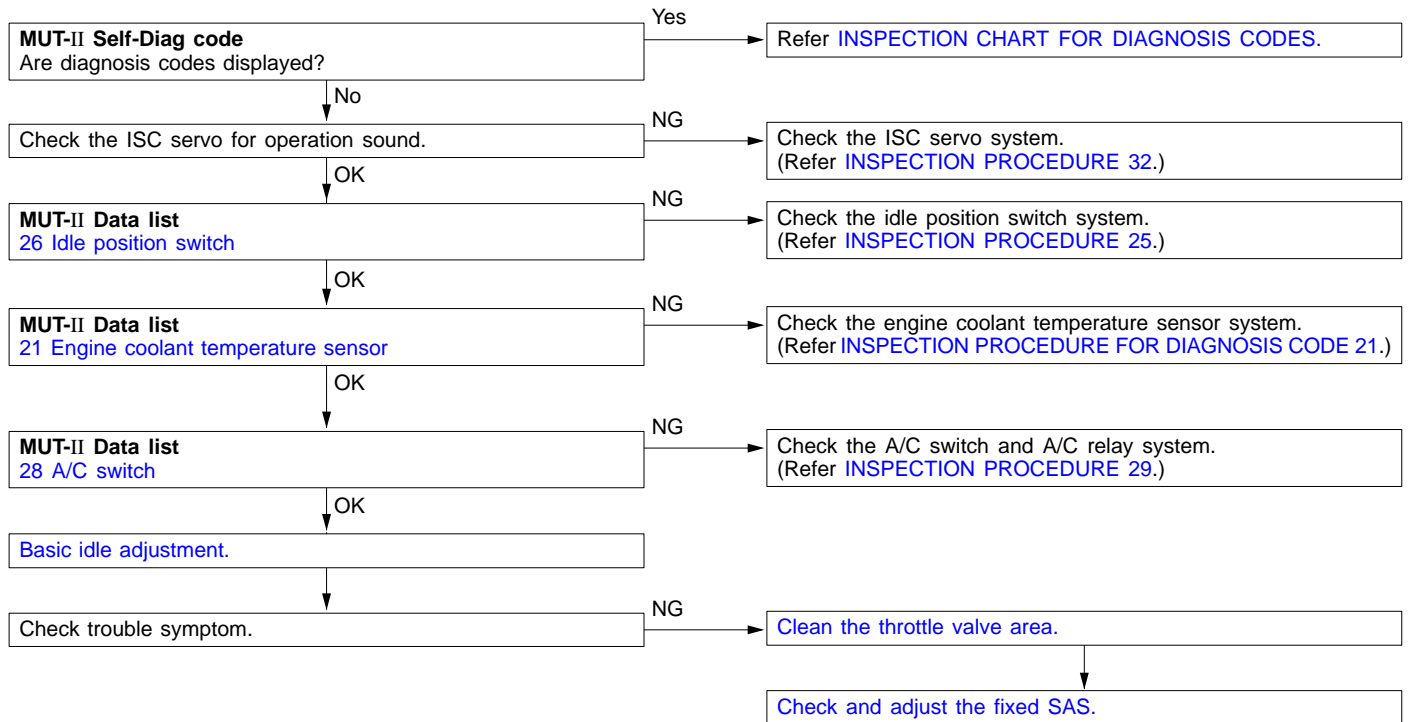
OK →

Check the following items.

- Check the [ignition coil](#), [spark plugs](#), [spark plug cables](#)
- Check the [purge control system](#).
- Check the [compression pressure](#).
- Check if foreign materials (water, alcohol, etc.) got into fuel.

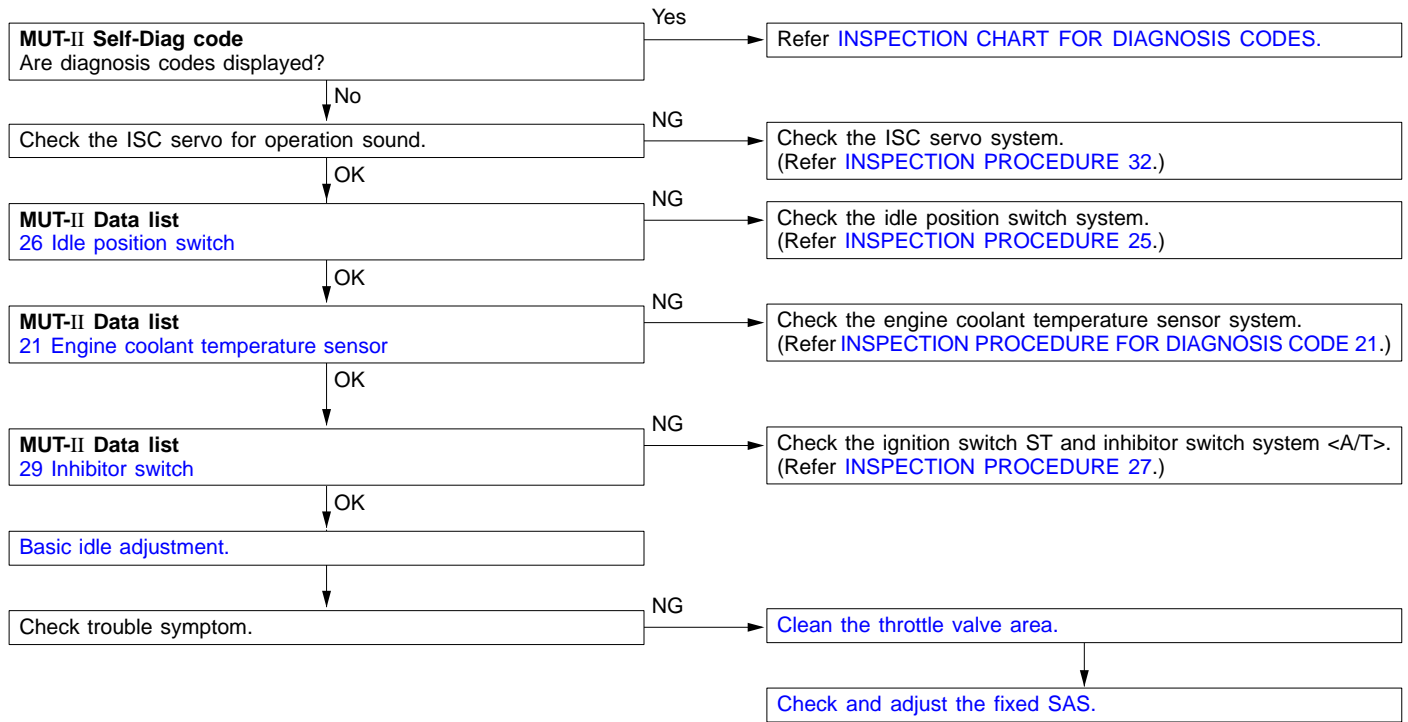
INSPECTION PROCEDURE 9

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



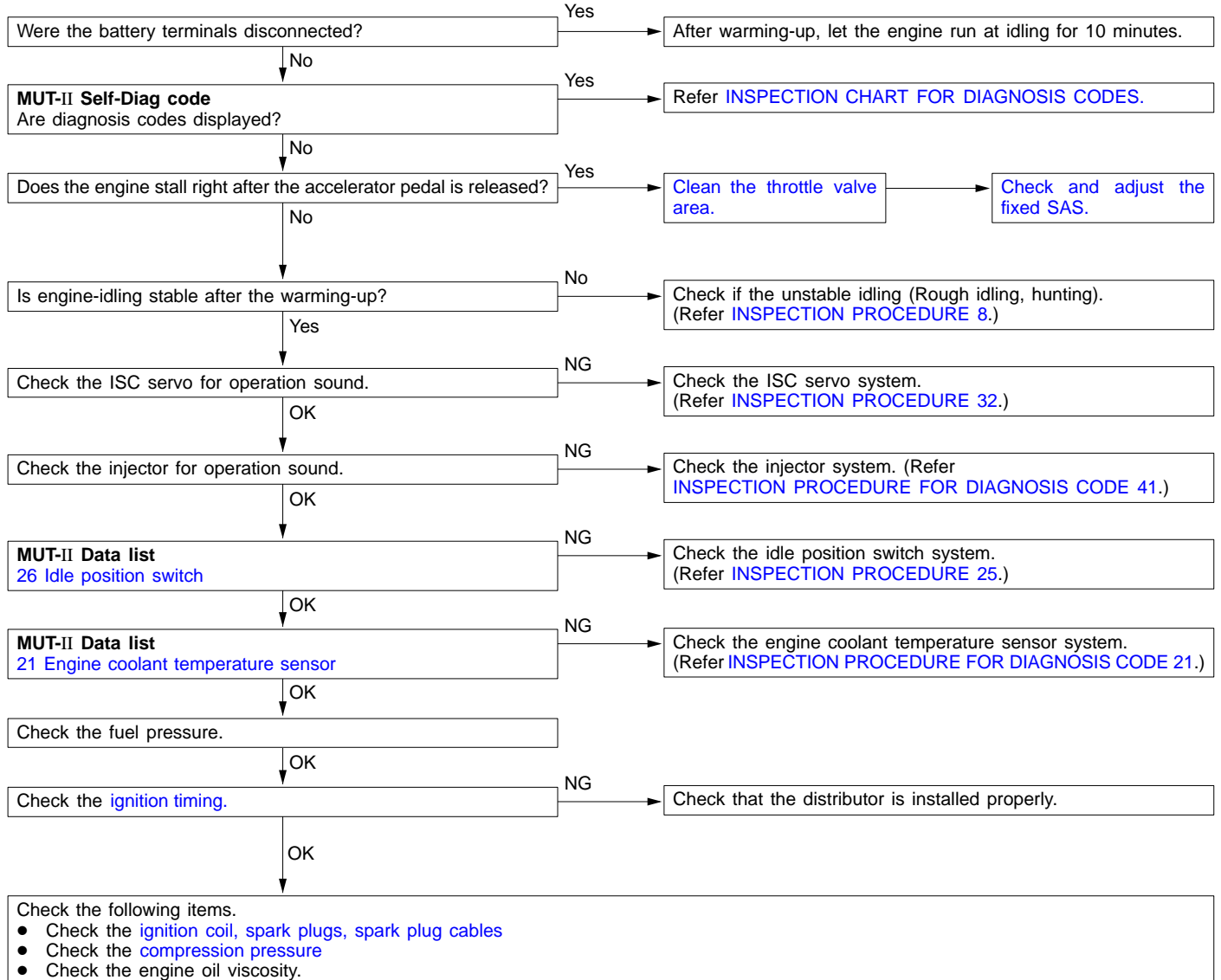
INSPECTION PROCEDURE 10

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



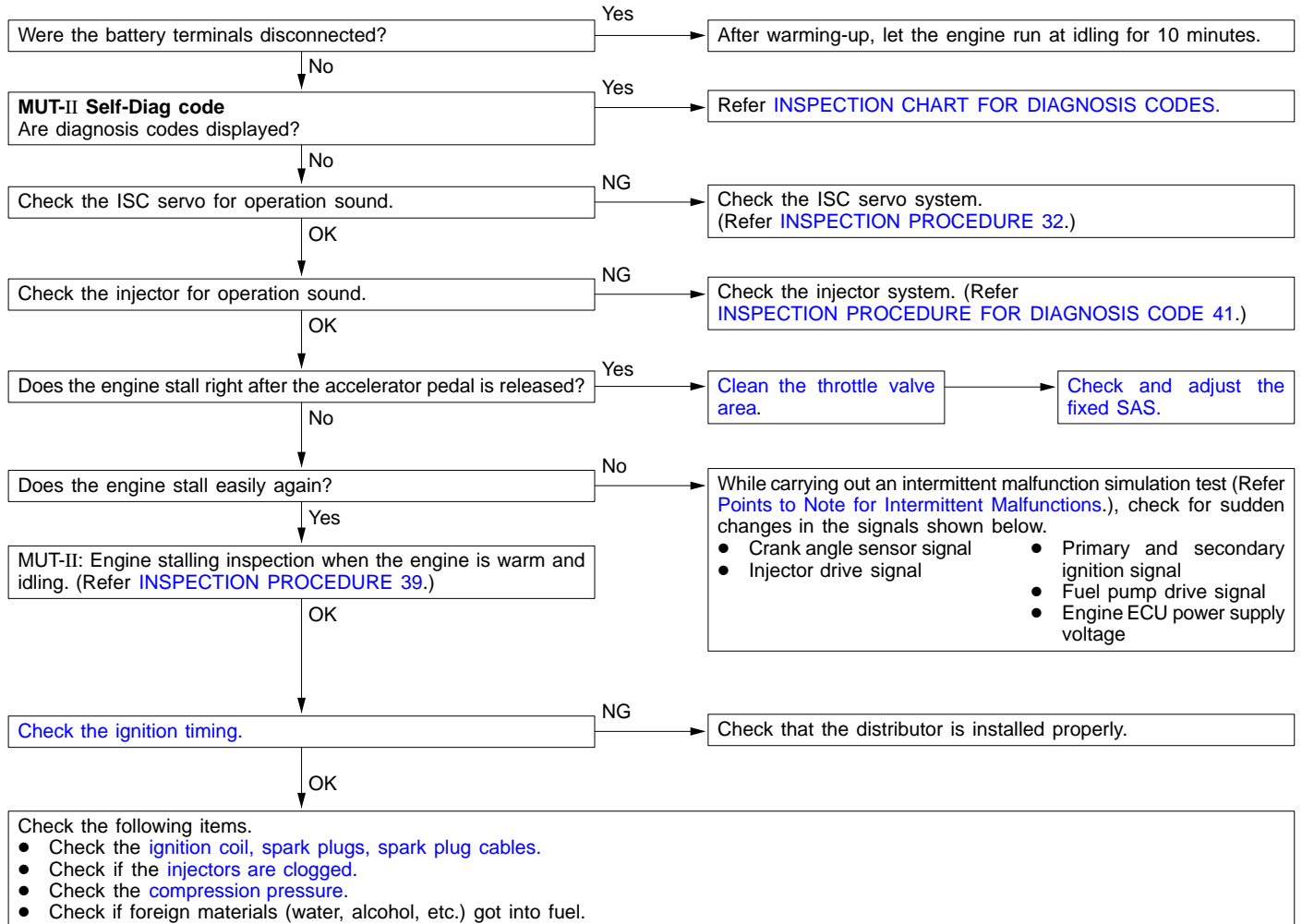
INSPECTION PROCEDURE 11

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



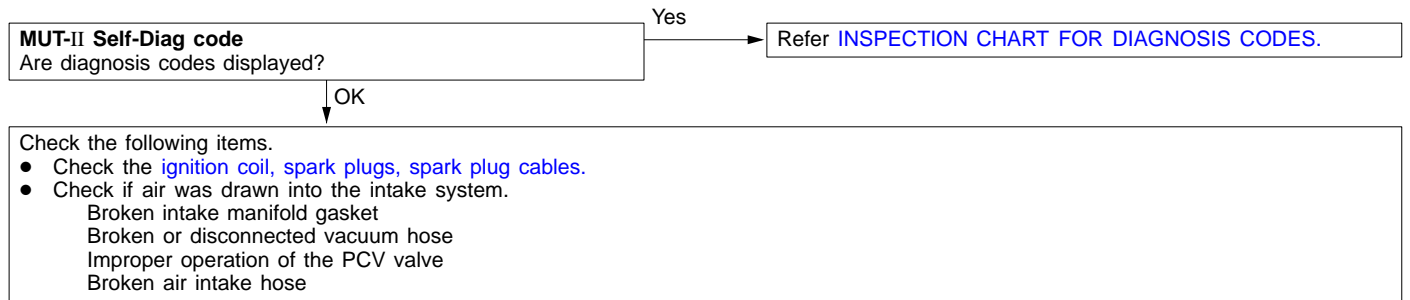
INSPECTION PROCEDURE 12

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



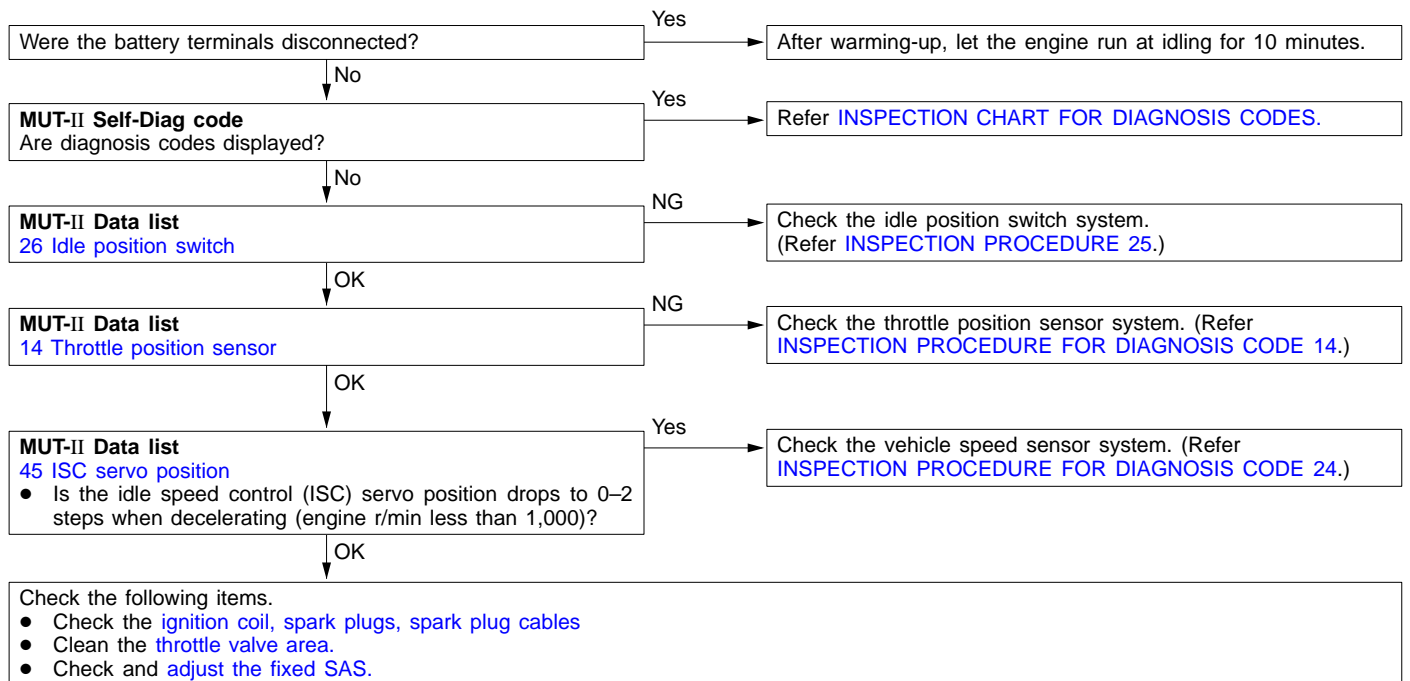
INSPECTION PROCEDURE 13

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



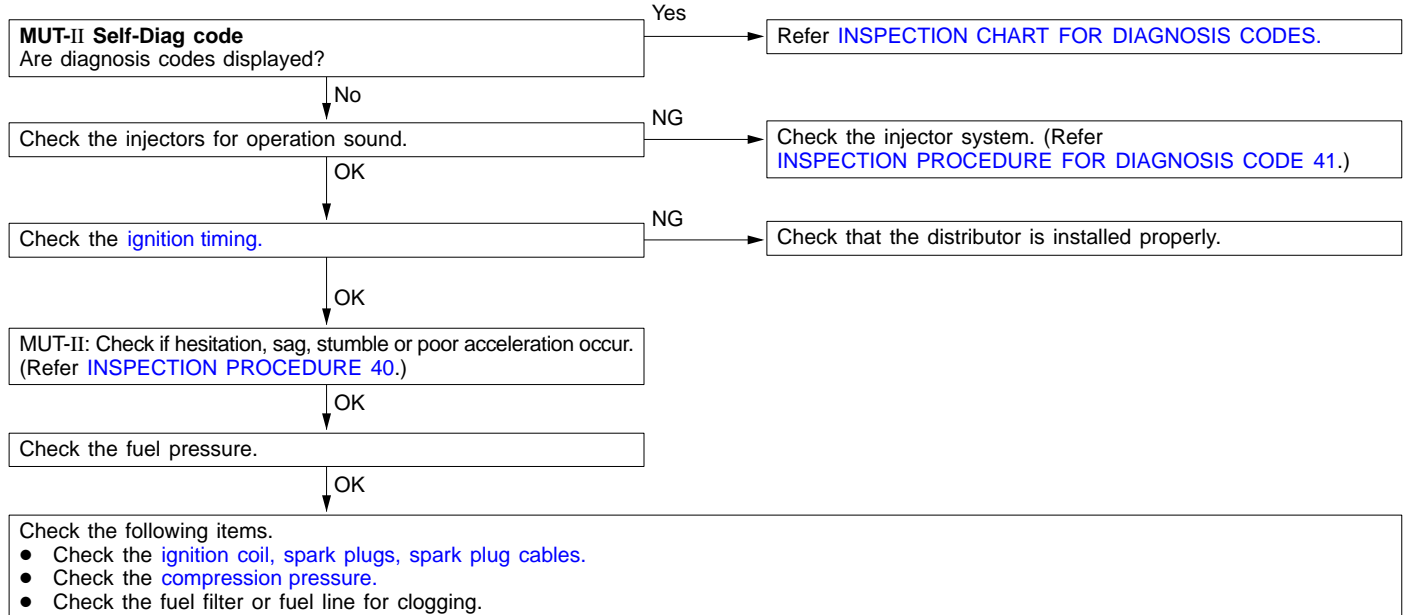
INSPECTION PROCEDURE 14

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



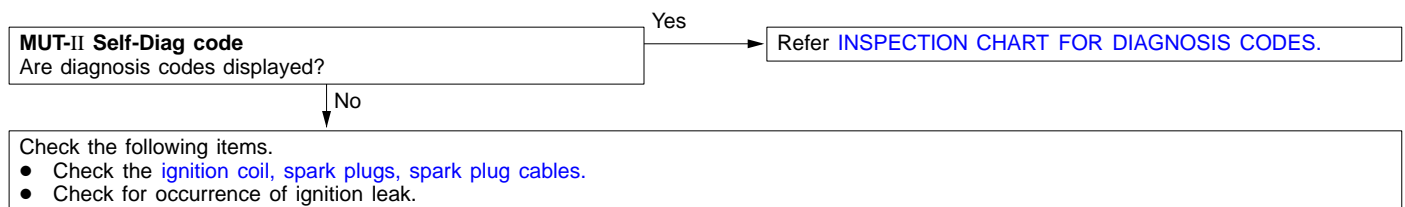
INSPECTION PROCEDURE 15

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



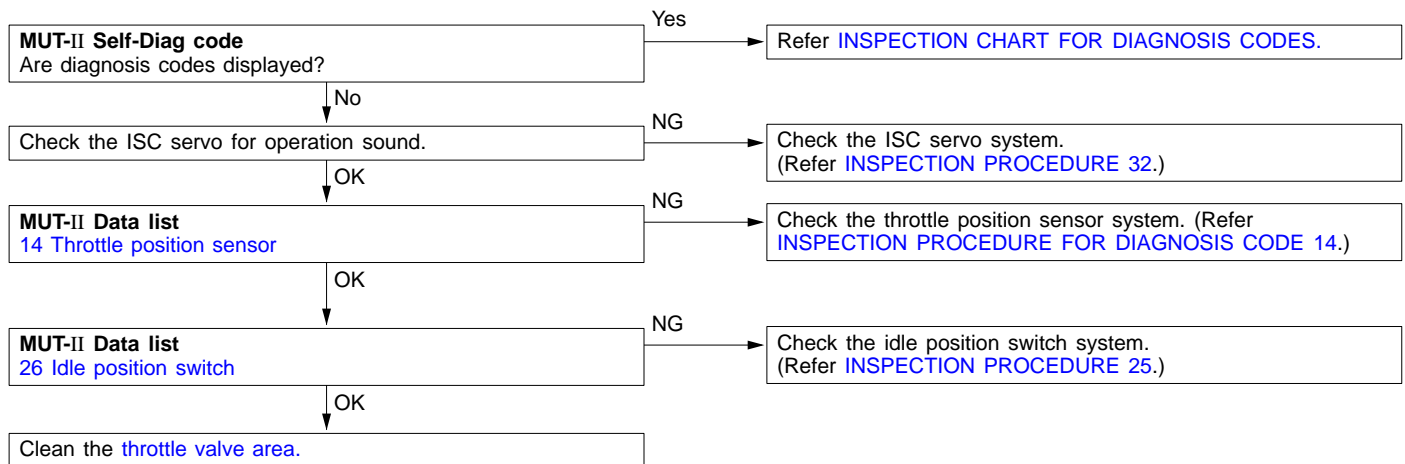
INSPECTION PROCEDURE 16

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



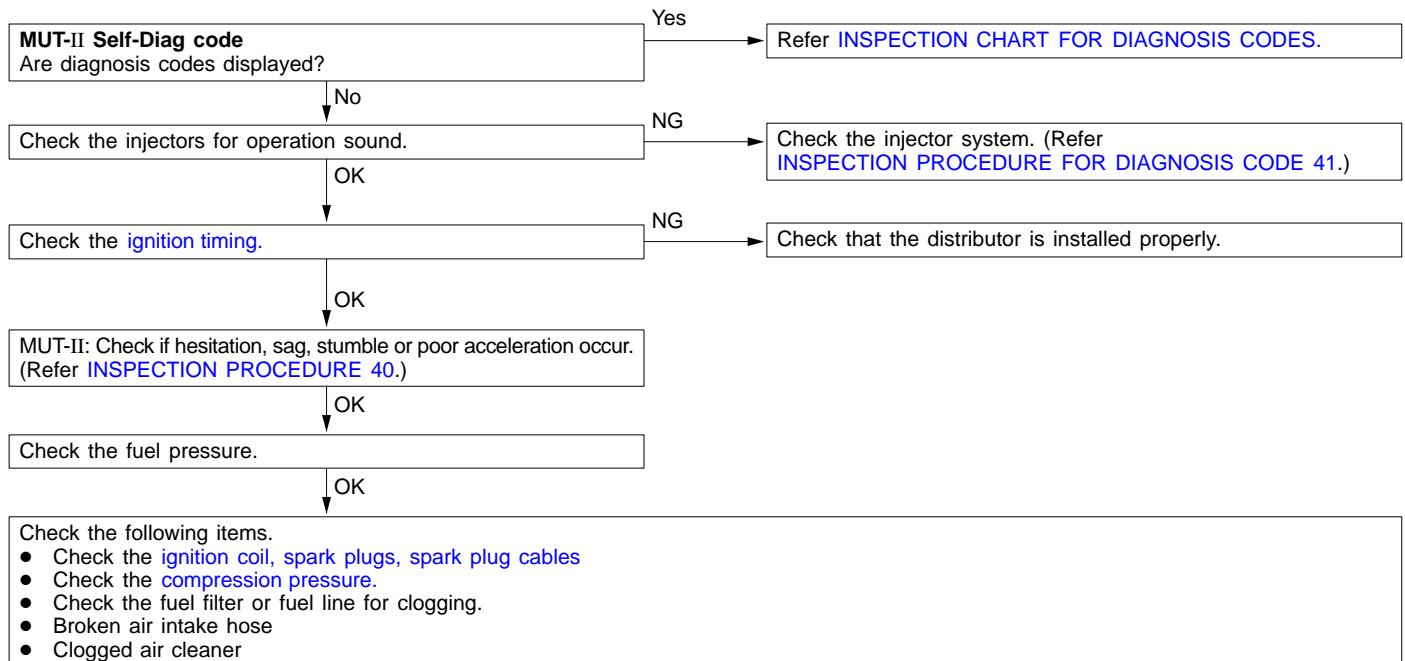
INSPECTION PROCEDURE 17

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



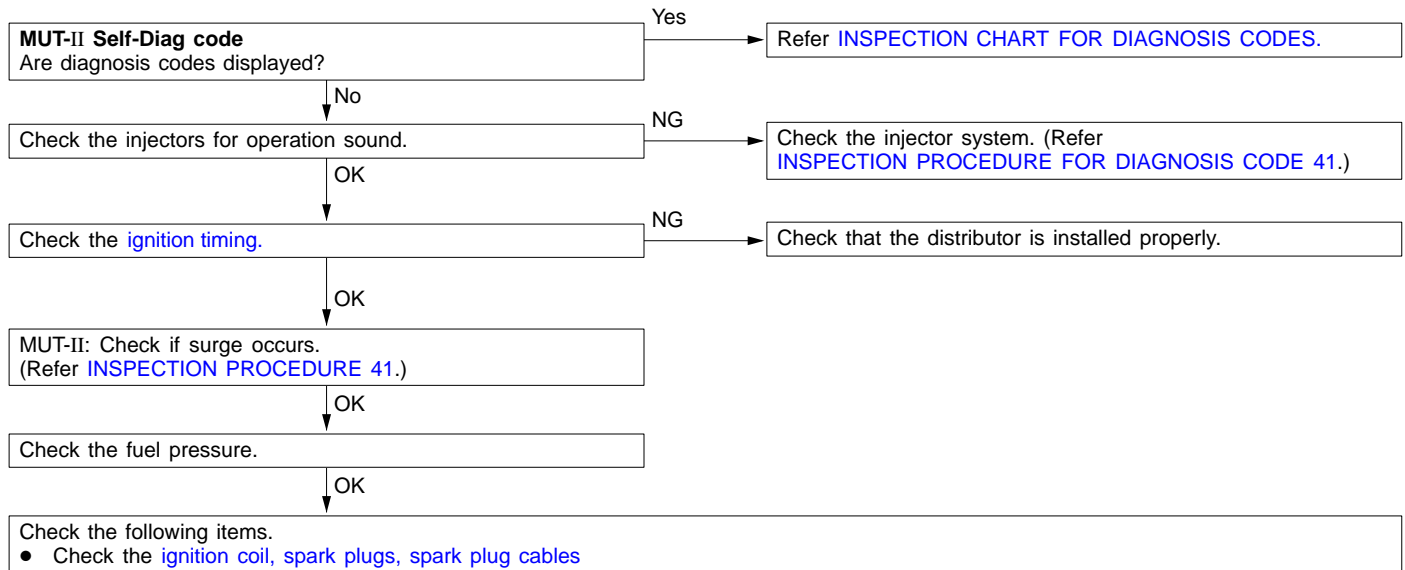
INSPECTION PROCEDURE 18

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



INSPECTION PROCEDURE 19

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



INSPECTION PROCEDURE 20

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

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

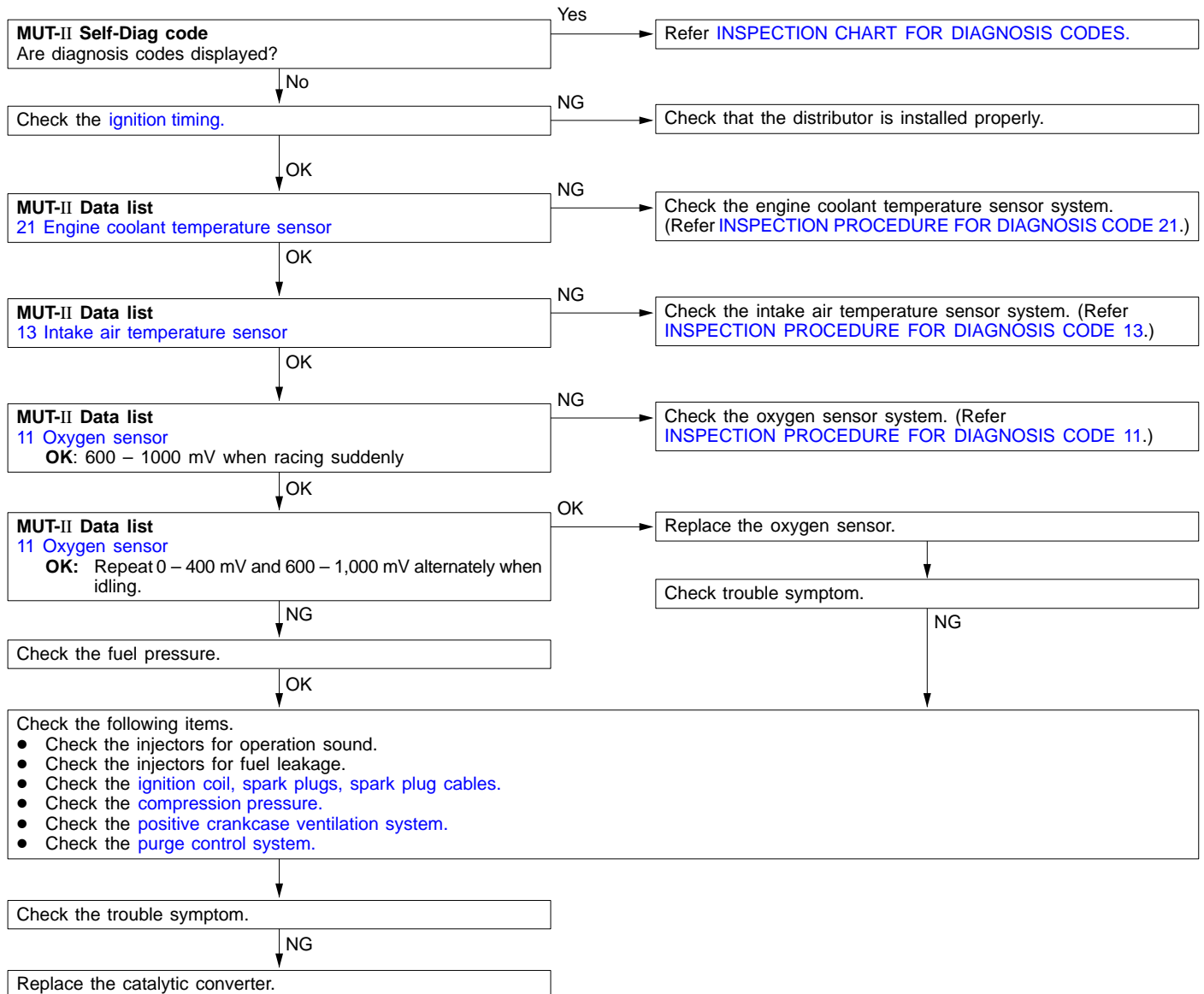
INSPECTION PROCEDURE 21

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

Check the injectors for fuel leakage.

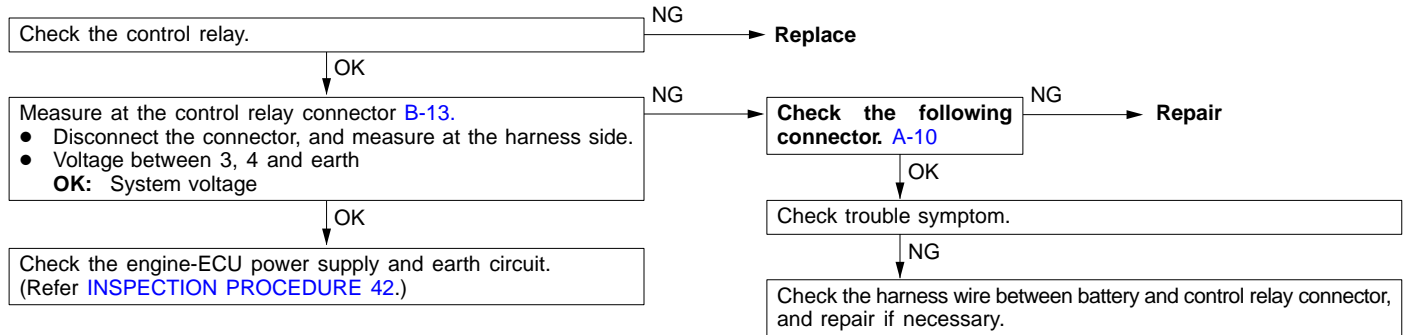
INSPECTION PROCEDURE 22

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



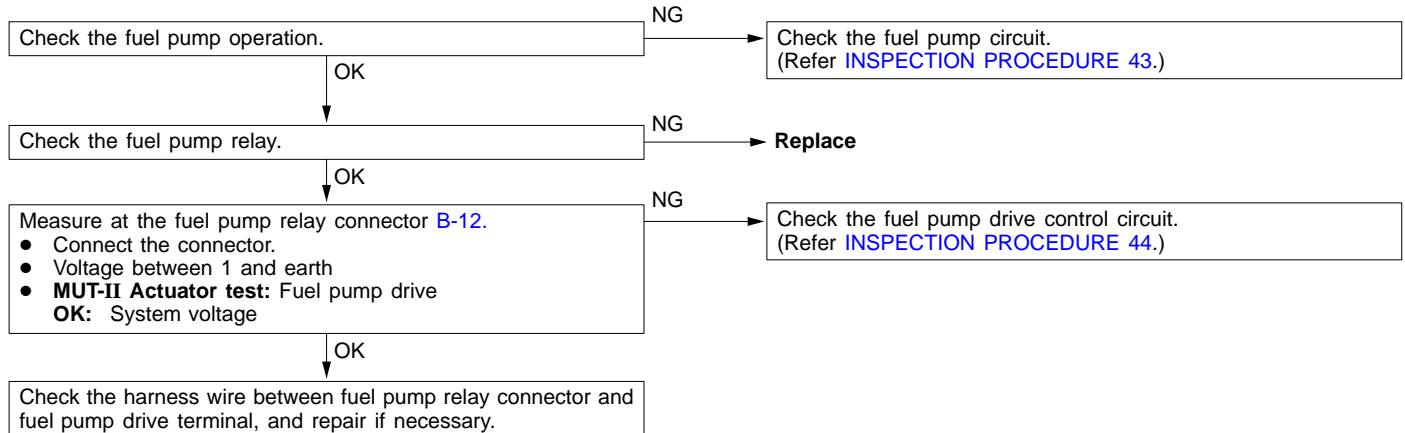
INSPECTION PROCEDURE 23

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 and injectors.	<ul style="list-style-type: none"> Malfunction of the ignition switch Malfunction of the control relay Improper connector contact, open circuit or short-circuited harness wire Disconnected engine-ECU earth wire Malfunction of the engine-ECU



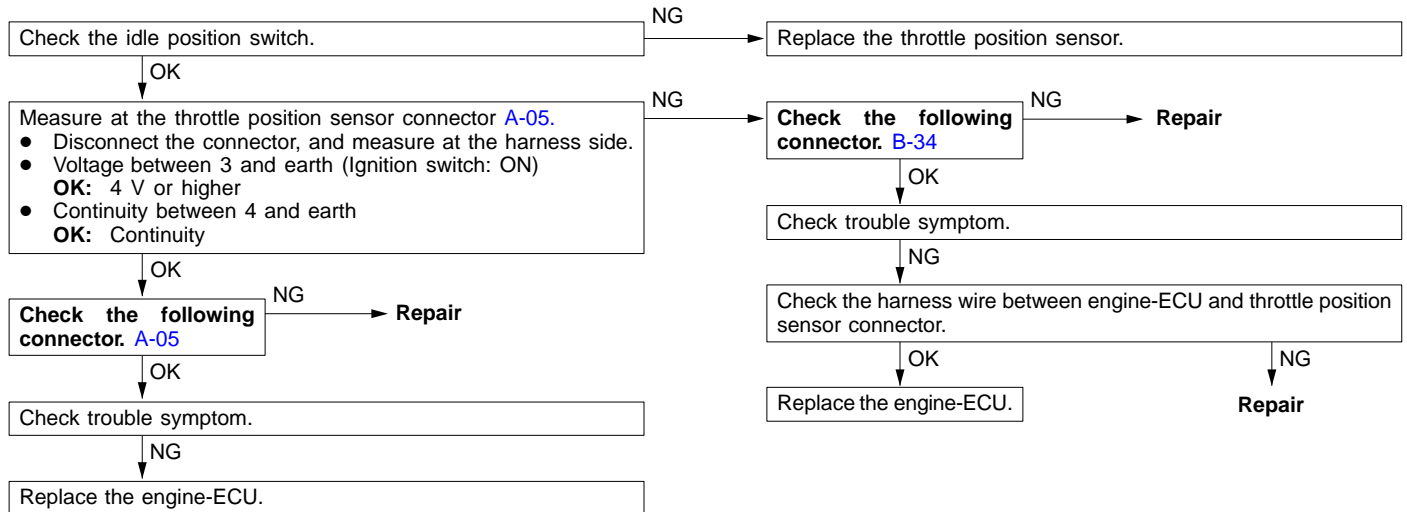
INSPECTION PROCEDURE 24

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.	<ul style="list-style-type: none"> Malfunction of the fuel pump relay Malfunction of the fuel pump Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU



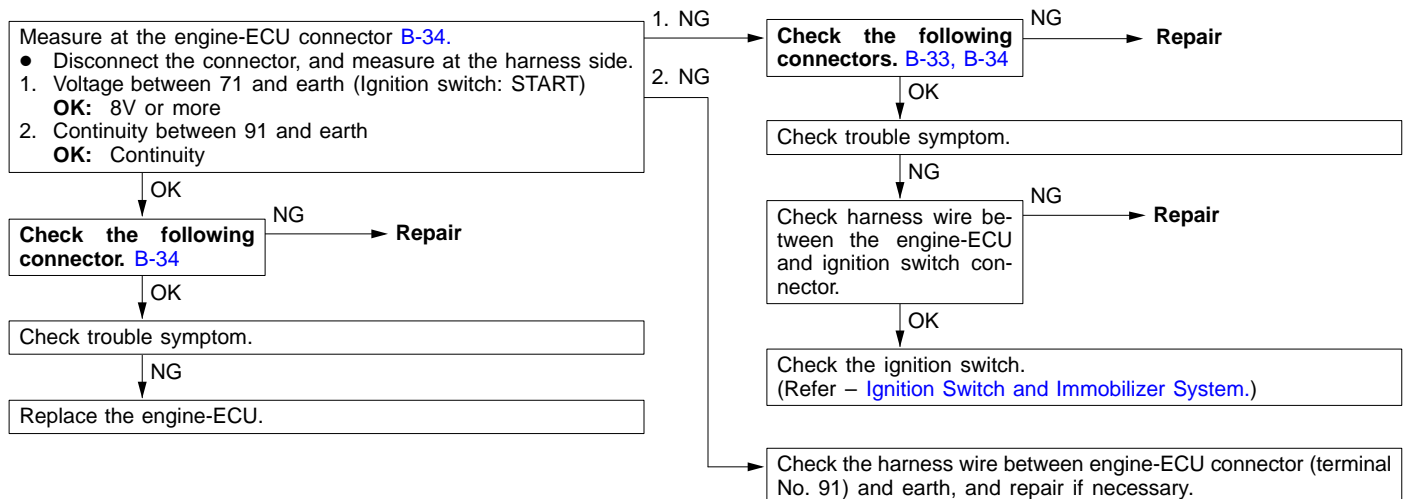
INSPECTION PROCEDURE 25

Idle position switch system	Probable cause
<p>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.</p> <p>The engine-ECU controls the idle speed control servo-based on this input.</p>	<ul style="list-style-type: none"> 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



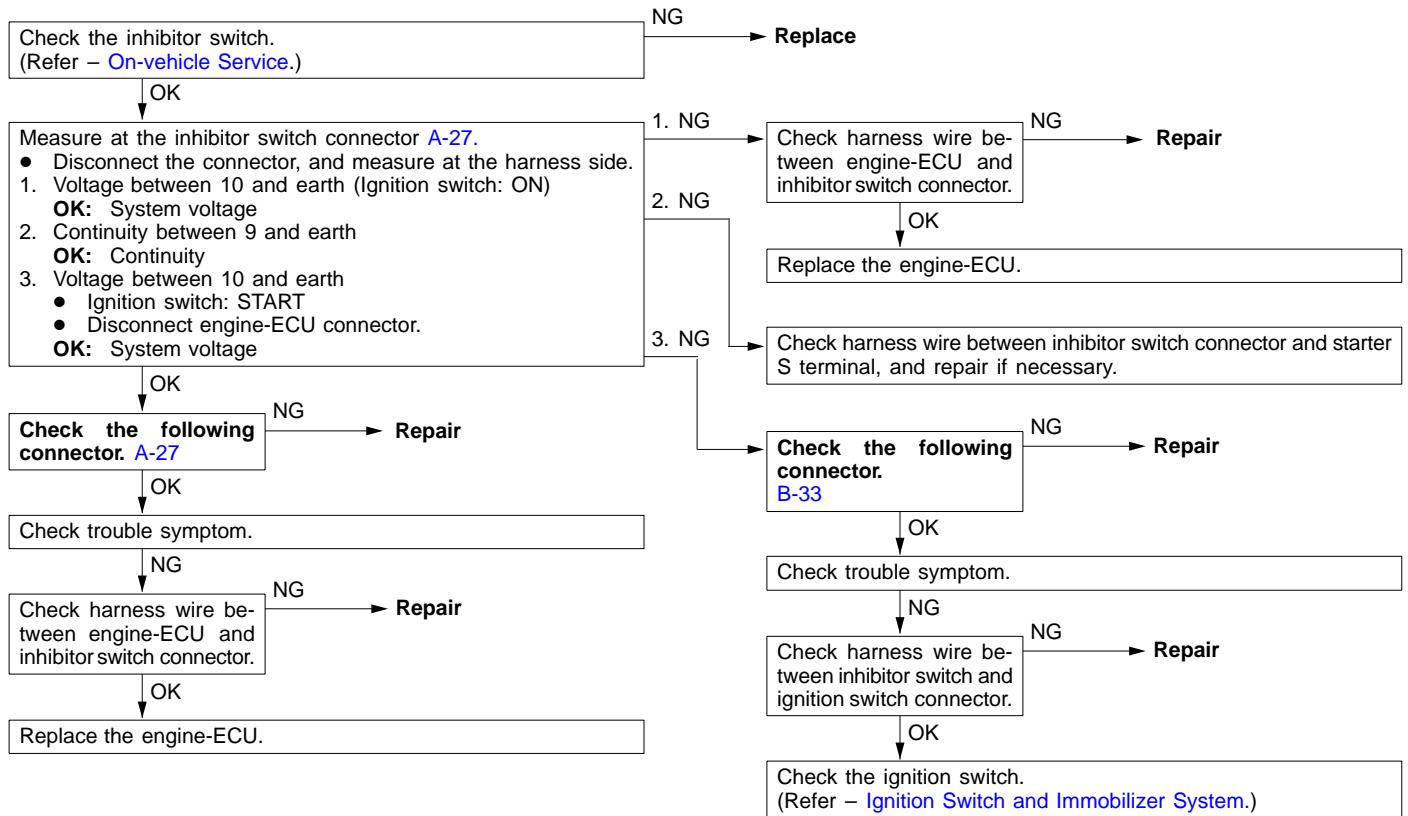
INSPECTION PROCEDURE 26

Ignition switch-ST system <M/T>	Probable cause
<p>The ignition switch-ST inputs a HIGH signal to the engine-ECU while the engine is cranking.</p> <p>The engine-ECU controls fuel injection, etc. during starting based on this input.</p>	<ul style="list-style-type: none"> Malfunction of ignition switch Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU



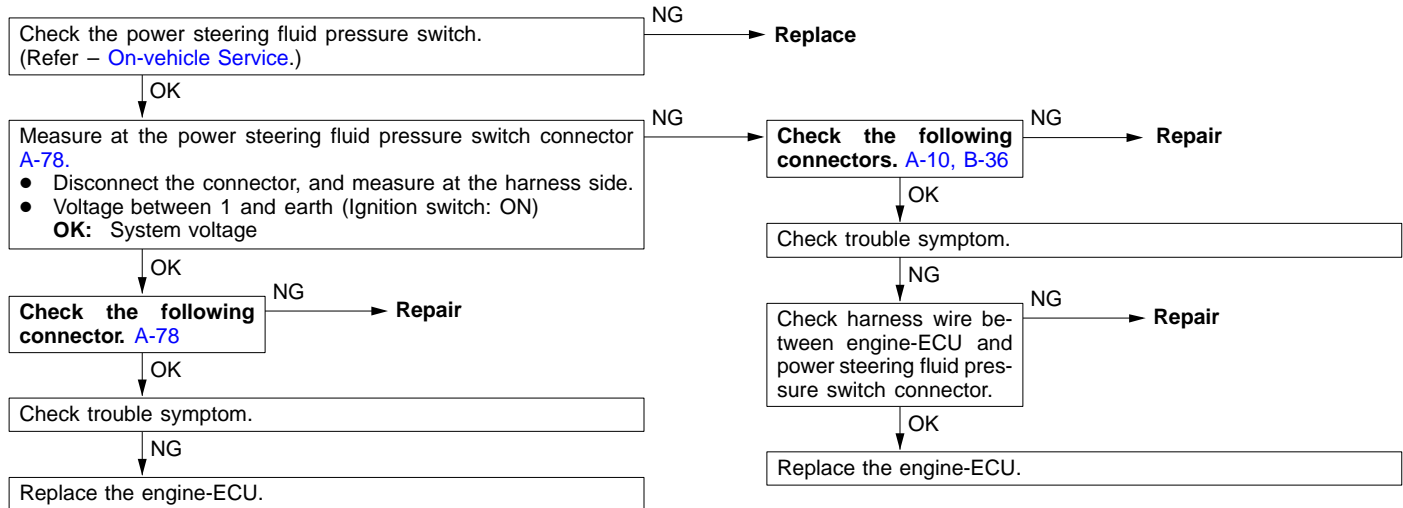
INSPECTION PROCEDURE 27

Ignition switch-ST and inhibitor switch system <A/T>	Probable cause
<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Malfunction of ignition switch Malfunction of inhibitor switch Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU.



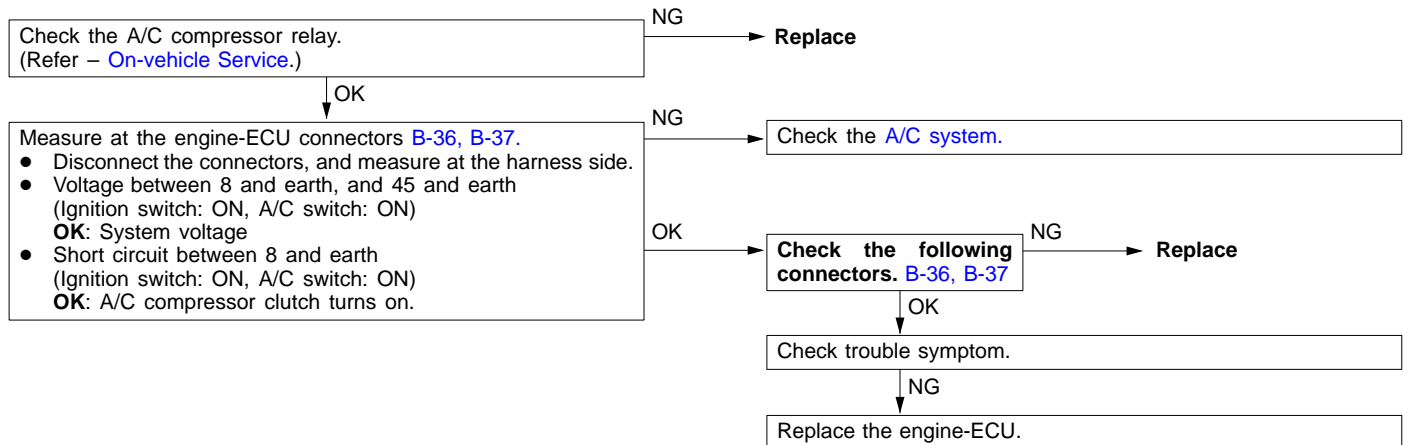
INSPECTION PROCEDURE 28

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.	<ul style="list-style-type: none"> Malfunction of power steering fluid pressure switch Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU



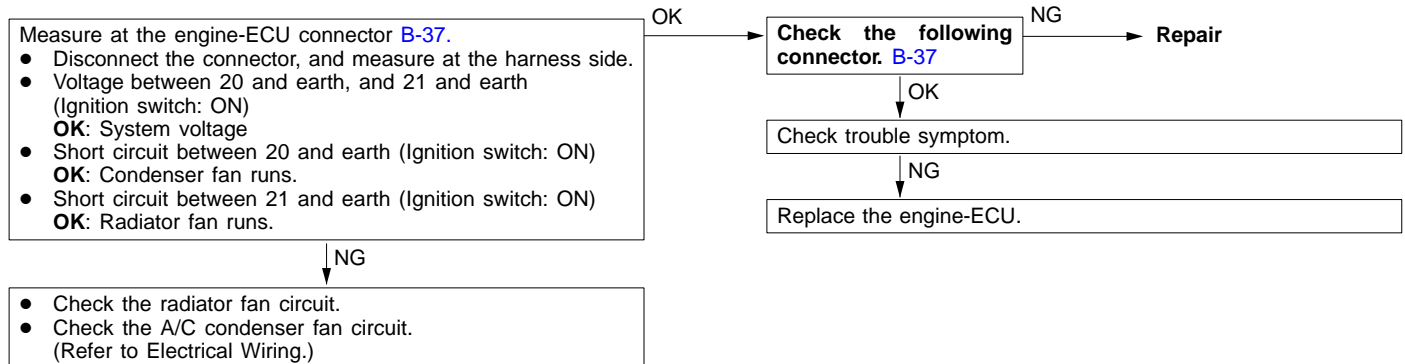
INSPECTION PROCEDURE 29

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 idle speed control (ISC) servo, and also operates the A/C compressor magnetic clutch.	<ul style="list-style-type: none"> Malfunction of A/C control system Malfunction of A/C switch Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU



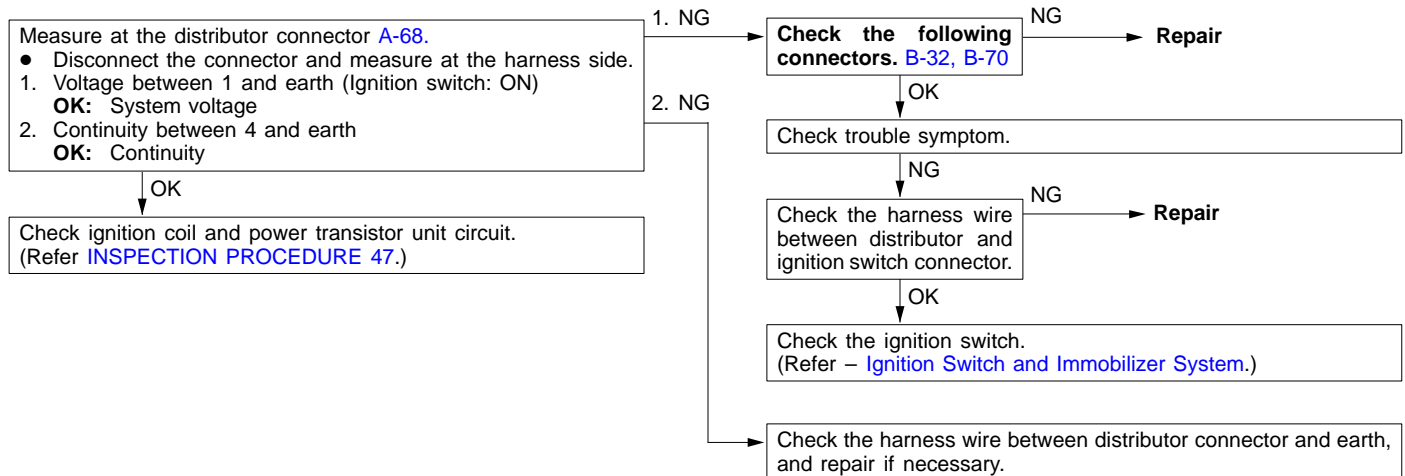
INSPECTION PROCEDURE 30

Fan motor relay system (Radiator fan, A/C condenser fan)	Probable cause
The power transistor inside the engine-ECU turns the fan motor relay on and off.	<ul style="list-style-type: none"> Malfunction of fan motor relay Malfunction of fan motor Improper connector contact, open circuit or short-circuited harness wire Malfunction of engine-ECU



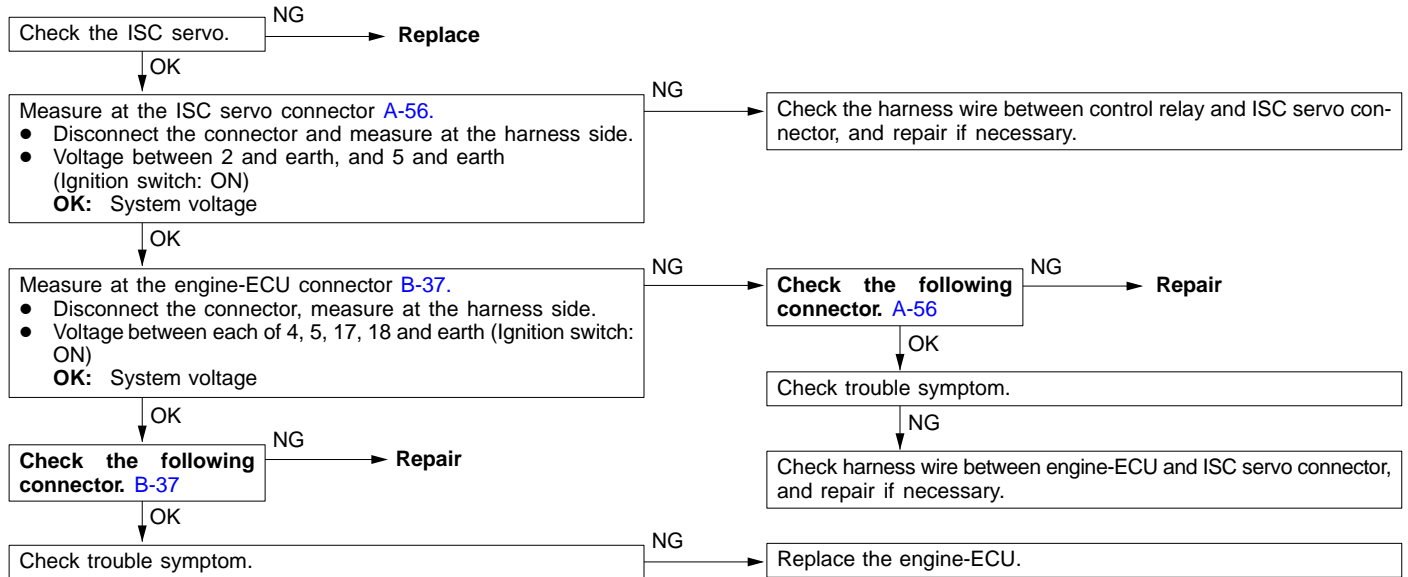
INSPECTION PROCEDURE 31

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



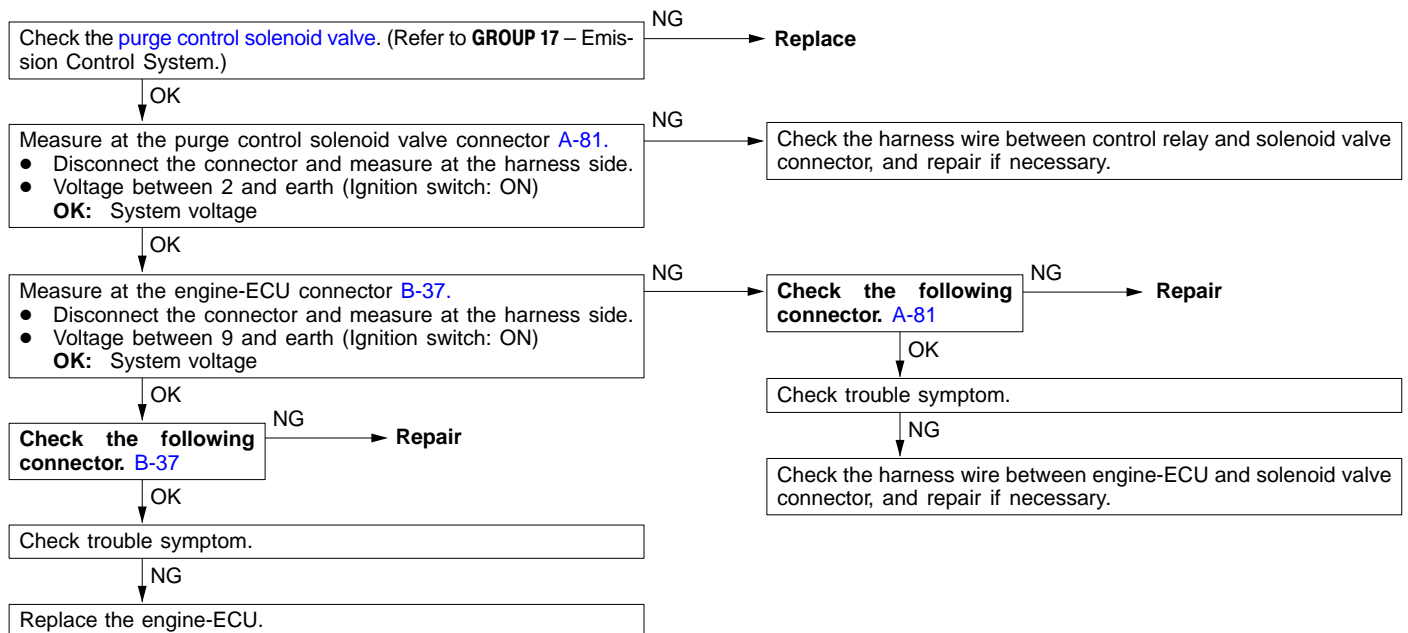
INSPECTION PROCEDURE 32

Idle speed control (ISC) servo (Stepper motor) system	Probable cause
The engine-ECU controls the intake air volume during idling by opening and closing the servo valve located in the bypass air passage.	<ul style="list-style-type: none"> Malfunction of ISC servo Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU

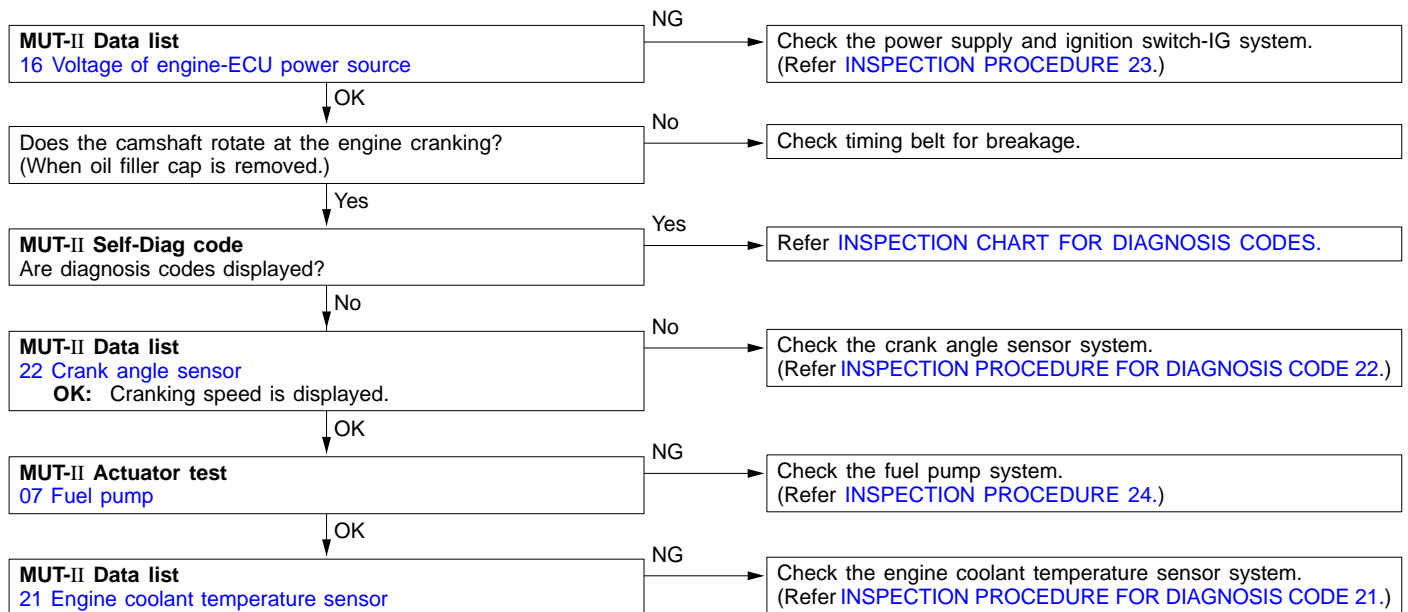


INSPECTION PROCEDURE 33

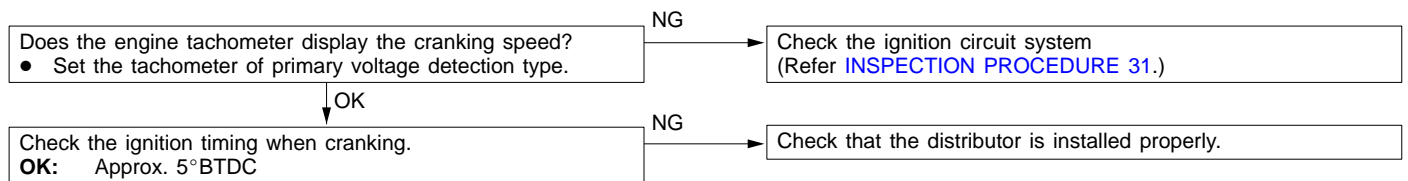
Purge control solenoid valve system	Probable cause
The purge control solenoid valve controls the purging of air from the canister located inside the intake manifold.	<ul style="list-style-type: none"> Malfunction of solenoid valve Improper connector contact, open circuit or short-circuited harness wire. Malfunction of the engine-ECU



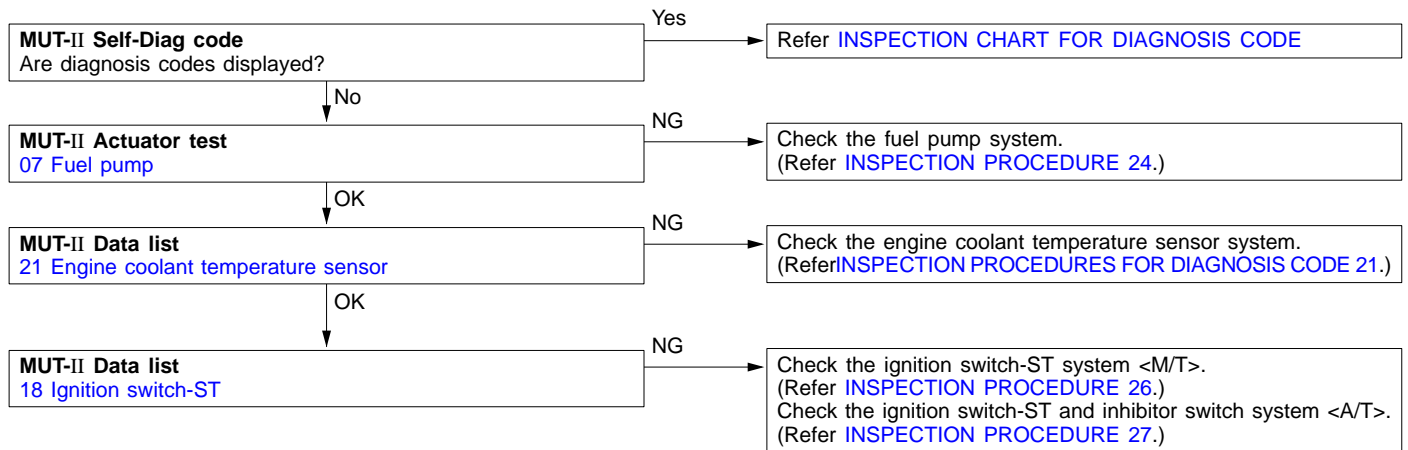
INSPECTION PROCEDURE 34

MUT-II: Inspection of no initial combustion

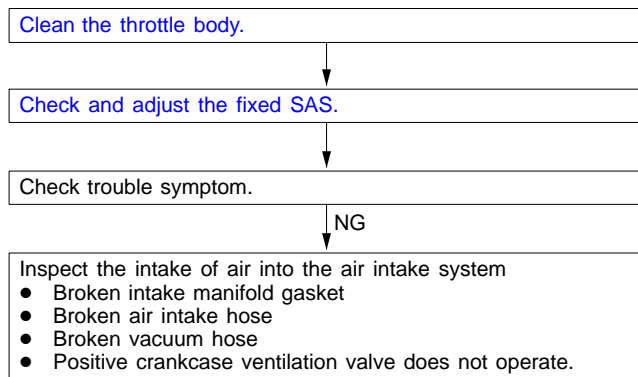
INSPECTION PROCEDURE 35

Ignition system: Inspection of no initial combustion.

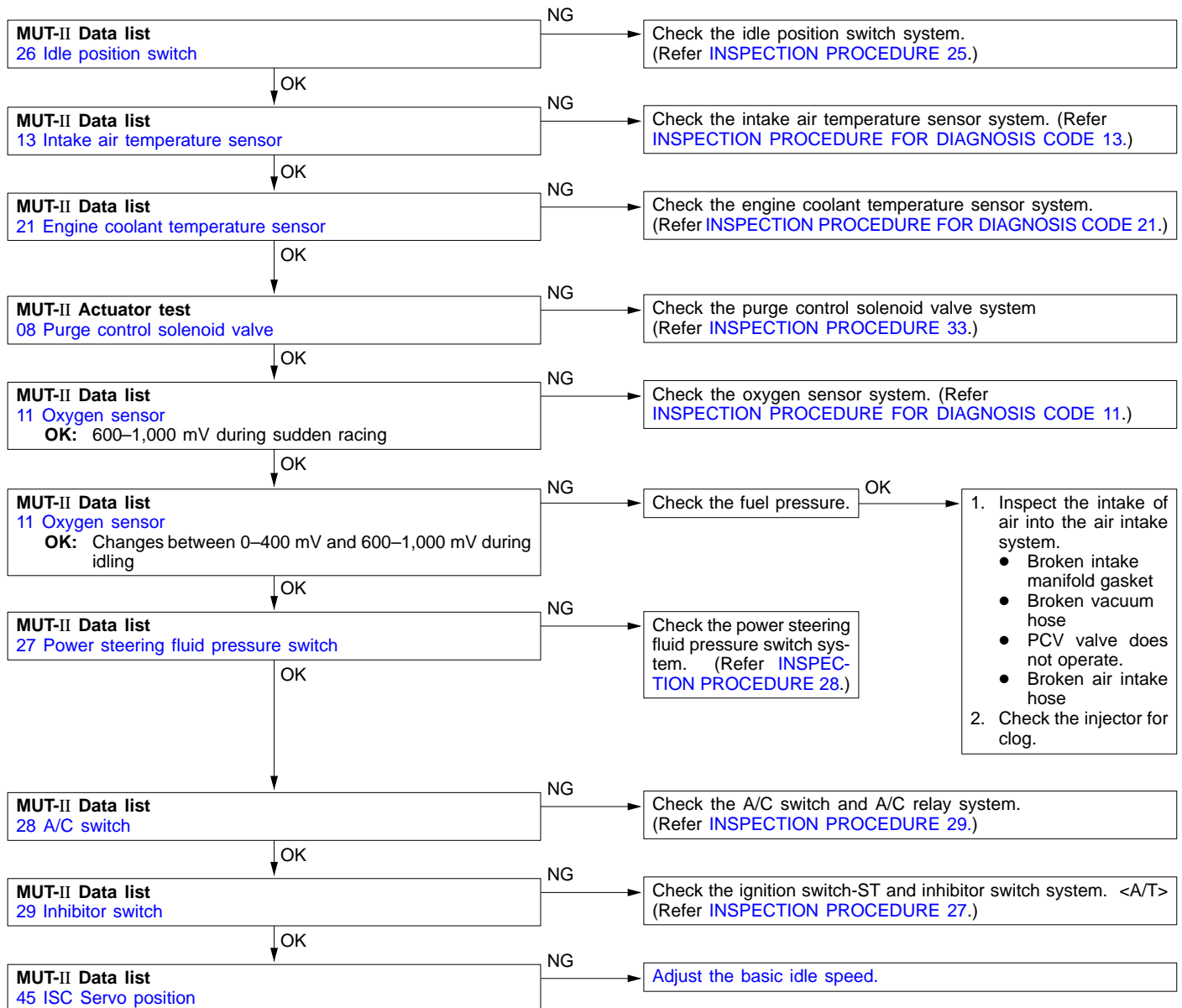
INSPECTION PROCEDURE 36

MUT-II: Check if incomplete combustion occurs.

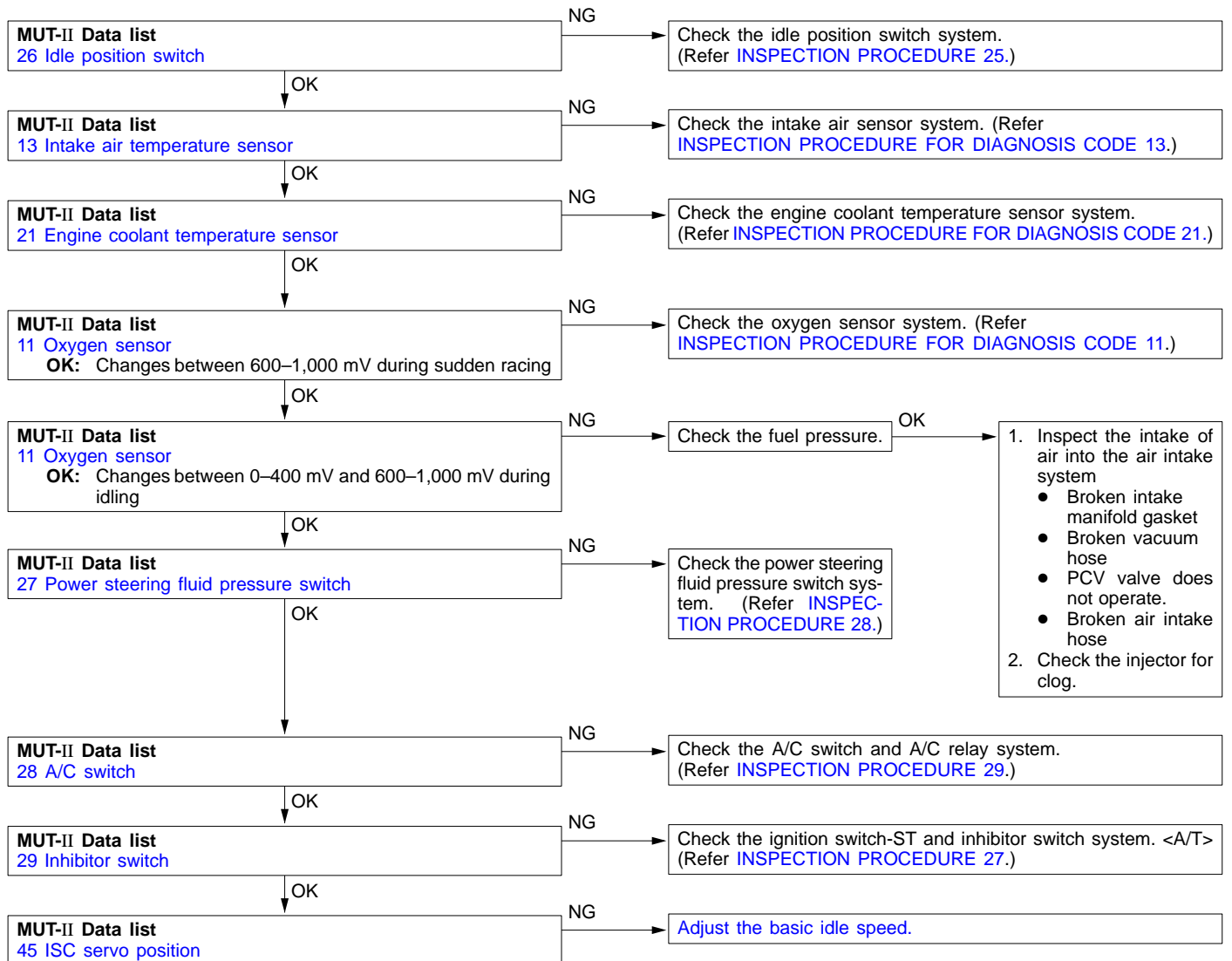
INSPECTION PROCEDURE 37

Check if hunting occurs.

INSPECTION PROCEDURE 38

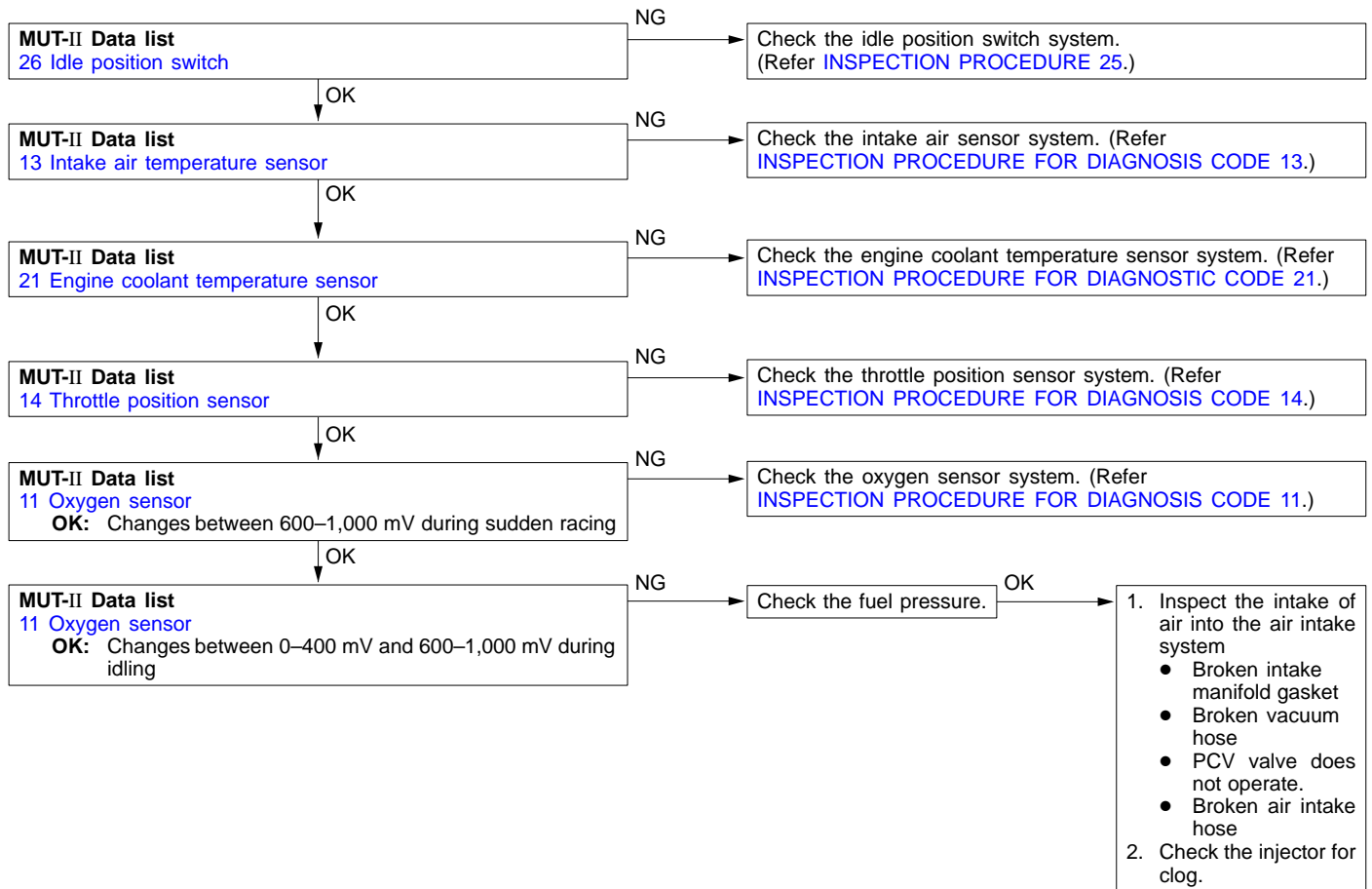
MUT-II: Check if idling speed is unstable.

INSPECTION PROCEDURE 39

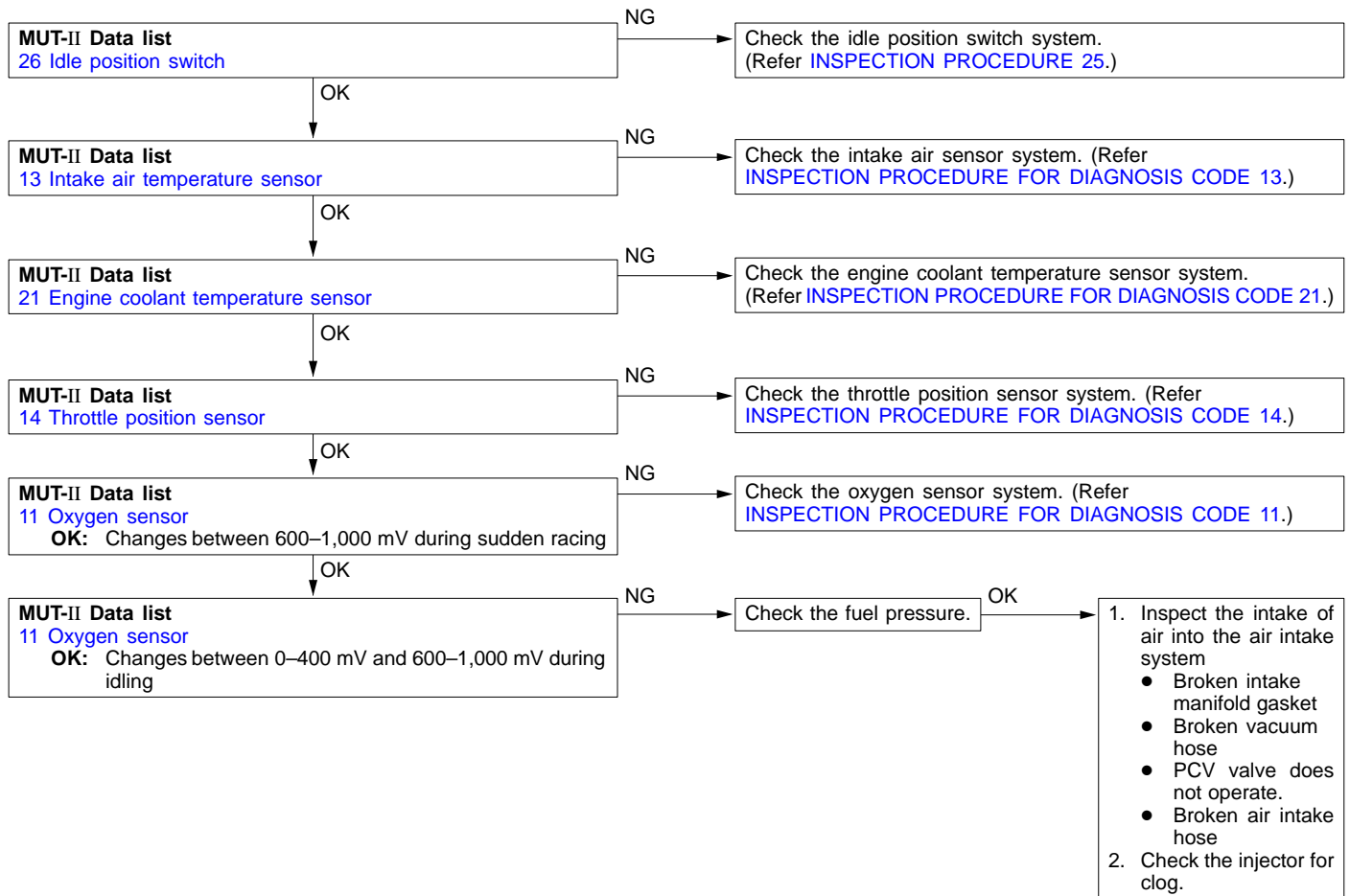
MUT-II: Engine stalling inspection when the engine is warmed up and idling.

INSPECTION PROCEDURE 40

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

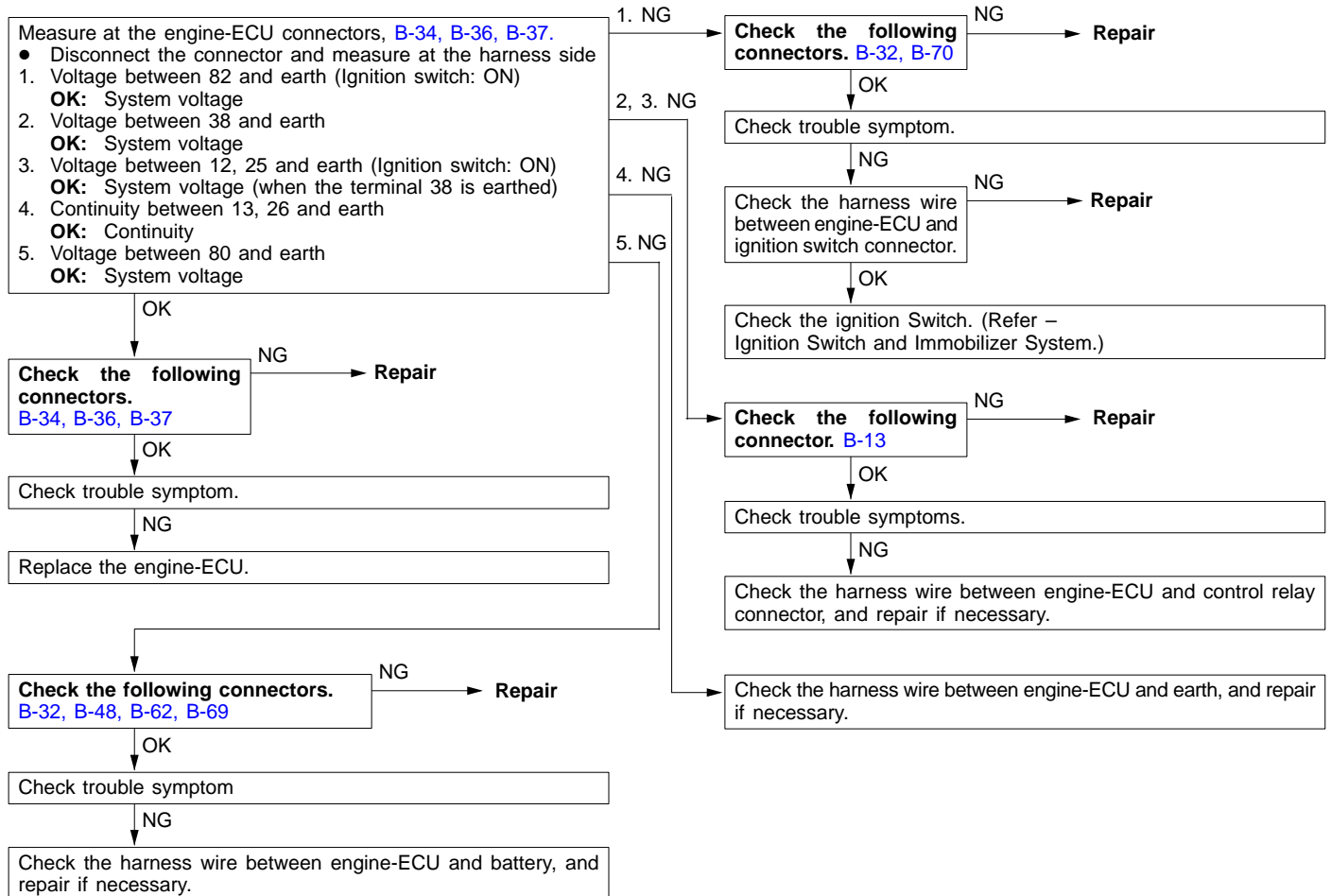


INSPECTION PROCEDURE 41

MUT-II Check if surge occurs.

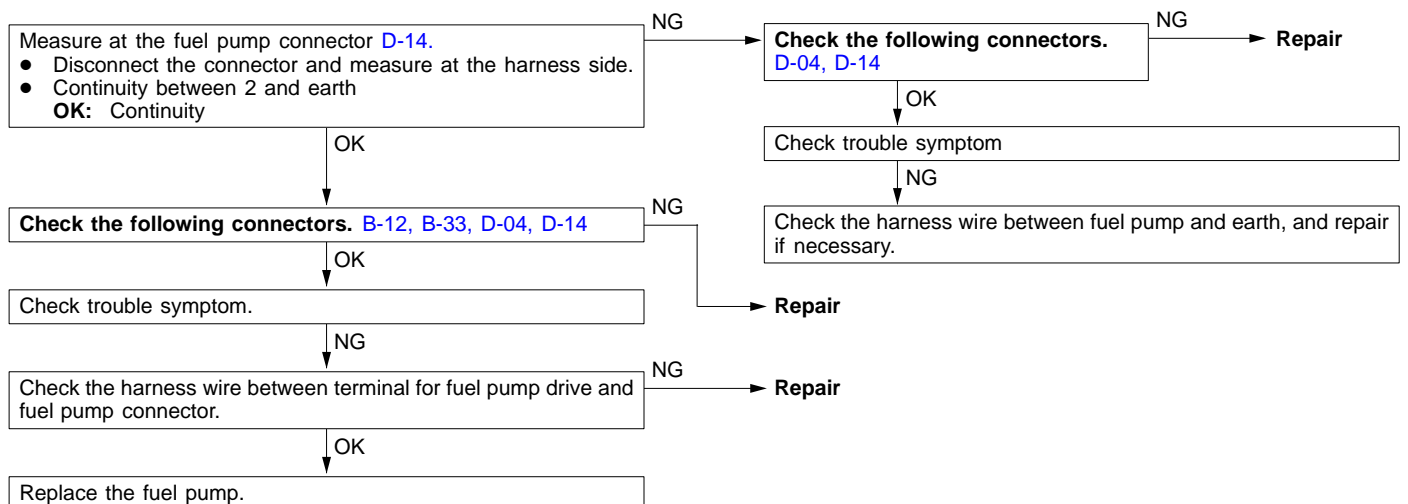
INSPECTION PROCEDURE 42

Check the engine-ECU power supply and earth circuit.



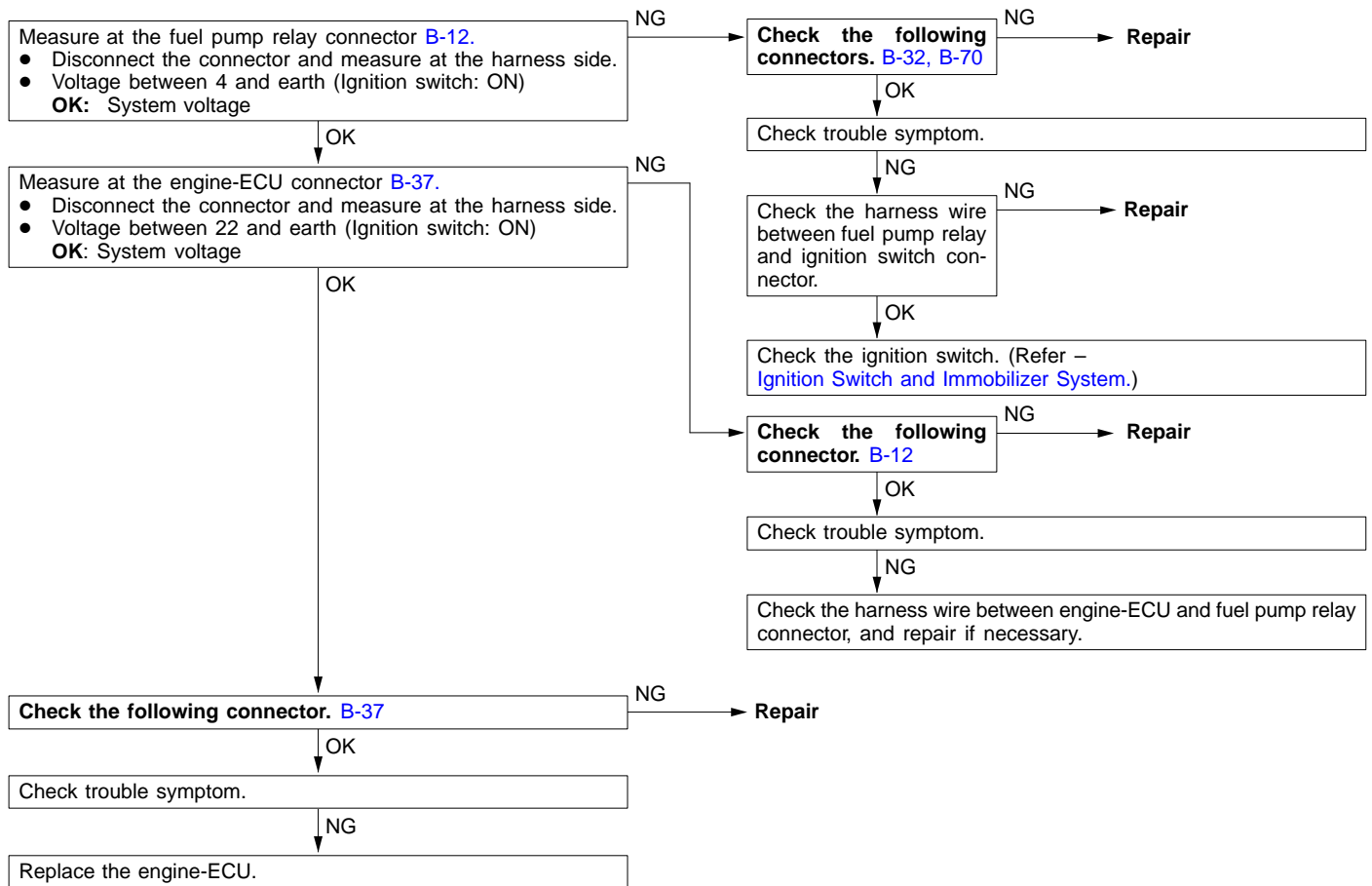
INSPECTION PROCEDURE 43

Check fuel pump circuit.



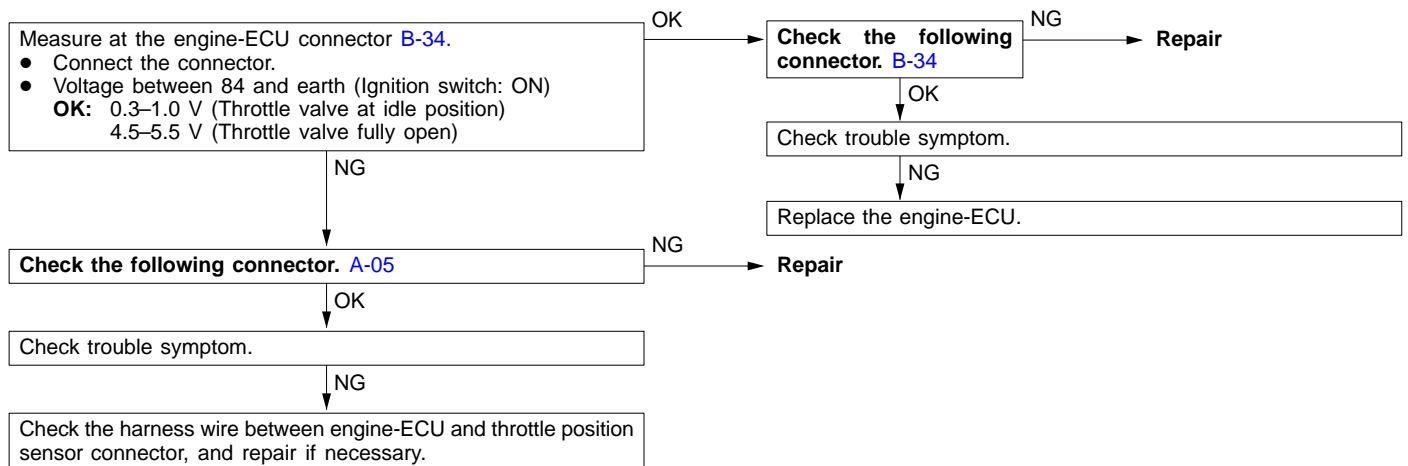
INSPECTION PROCEDURE 44

Check the fuel pump drive control circuit.



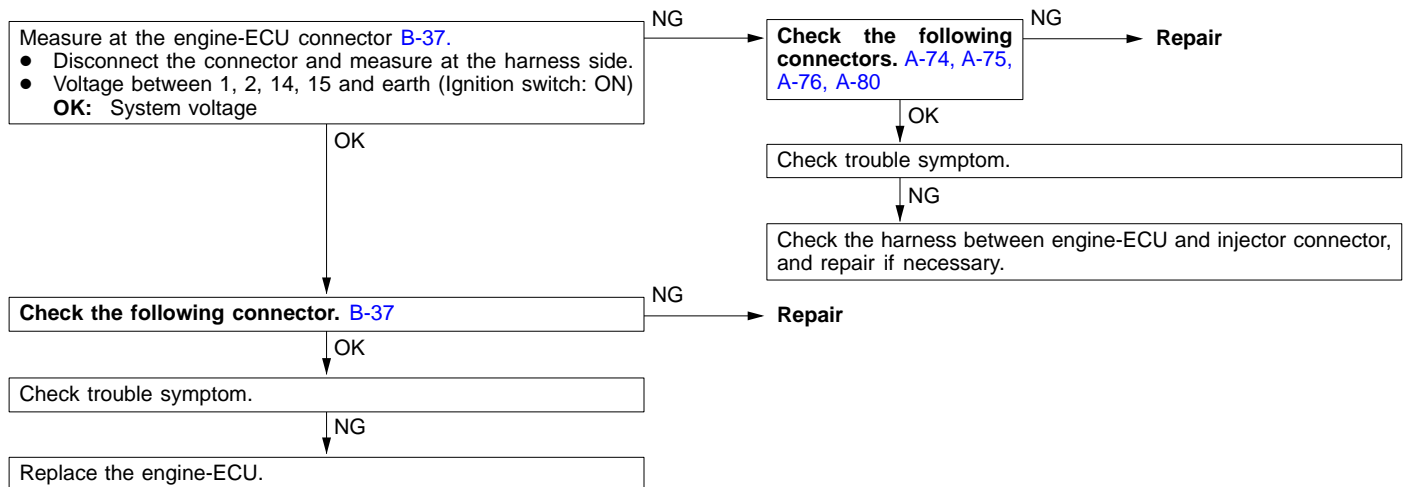
INSPECTION PROCEDURE 45

Check throttle position sensor (TPS) output circuit.



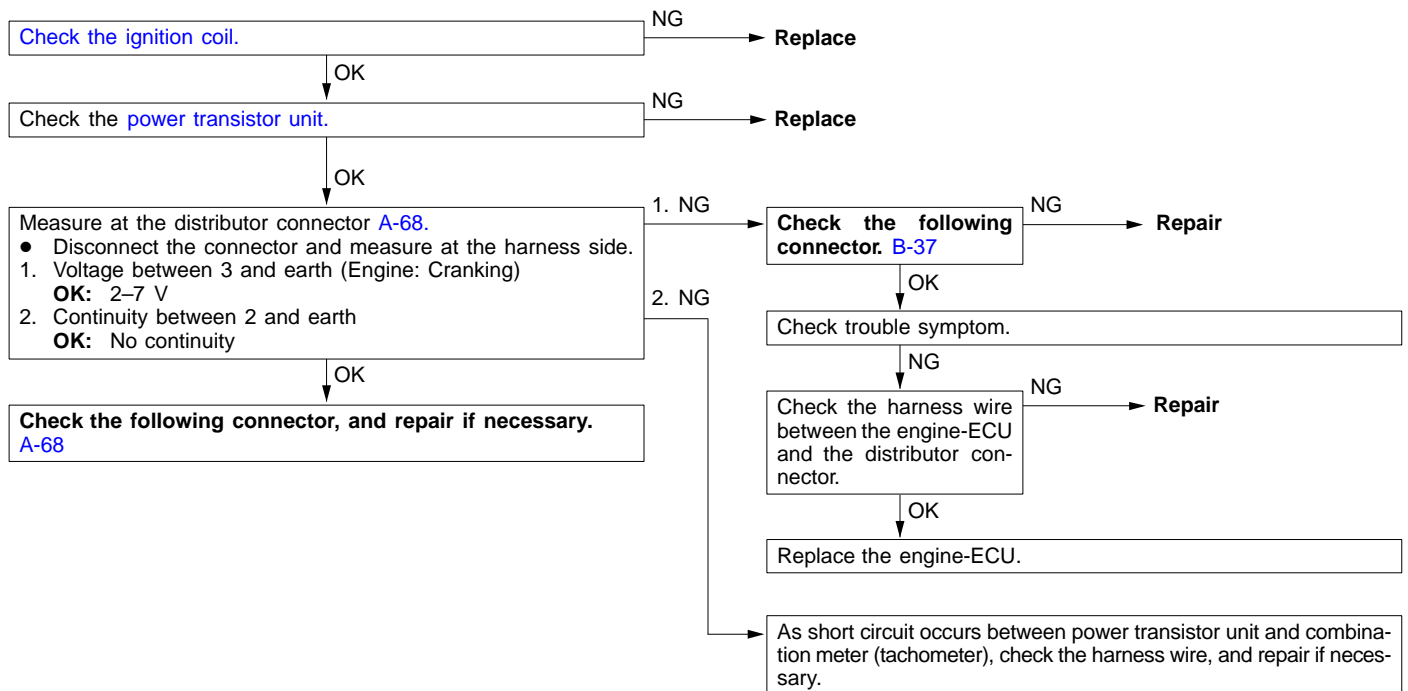
INSPECTION PROCEDURE 46

Check injector control circuit



INSPECTION PROCEDURE 47

Check ignition coil and power transistor unit 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. 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.
- *2. In a new vehicle [driven approximately 500 km or less], the air intake plenum pressure is sometimes 10% higher than the standard pressure.
- *3. The injector drive time represents the time when the cranking speed is at 250 r/min or below when the power supply voltage is 11 V.
- *4. In a new vehicle [driven approximately 500 km or less], the injector drive time is sometimes 10% longer than the standard time.
- *5. In a new vehicle [driven approximately 500 km or less], the step of the stepper motor is sometimes 30 steps greater than the standard value.

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.
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
			When engine is suddenly raced	600–1,000 mV	
		Engine:After having warmed up The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECU.	Engine is idling	400 mV or less (Changes) 600–1,000 mV	
			2,500 r/min	400 mV or less (Changes) 600–1,000 mV	
13	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	
14	Throttle position sensor	Ignition switch: ON	Set to idle position	300–1,000 mV	Code No. 14
			Gradually open	Increases in proportion to throttle opening angle	
			Open fully	4,500–5,500 mV	

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Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.
16	Power supply voltage	Ignition switch: ON		System 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	<ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected 	Compare the engine speed readings on the tachometer and the MUT-II.	Accord	Code No. 22
		<ul style="list-style-type: none"> Engine: Idling Idle position switch: ON 	When engine coolant temperature is -20°C	1,450 – 1,650 rpm	
			When engine coolant temperature is 0°C	1,370 – 1,570 rpm	
			When engine coolant temperature is 20°C	1,280 – 1,480 rpm	
			When engine coolant temperature is 40°C	1,090 – 1,290 rpm	
			When engine coolant temperature is 80°C	650 – 850 rpm	

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Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.
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*1	
27	Power steering fluid 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, 2, L or R	D, 2, L or R	
32	Vacuum sensor*2	<ul style="list-style-type: none"> Engine coolant temperature: 80 – 95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral (P range for A/T) Ignition switch: ON 	Engine: Stopped (At altitude of 0 m)	101 kPa	Code No. 32
			Engine: Stopped (At altitude of 600 m)	95 kPa	
			Engine: Stopped (At altitude of 1,200 m)	88 kPa	
			Engine: Stopped (At altitude of 1,800 m)	81 kPa	
			Engine: Idling	23.3 – 36.7 kPa	
			When engine is suddenly raced	Increases	
36	Ignition timing adjustment mode	Engine: Idling	Ignition timing adjustment terminal is earthed	ON	Code No. 36
			Ignition timing adjustment terminal is disconnected from earth	OFF	
41	Injectors *3	Engine: Cranking	When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously)	16 – 25 ms	–
			When engine coolant temperature is 20°C	36 – 55 ms	
			When engine coolant temperature is 80°C	6.4 – 9.6 ms	

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Item No.	Inspection item	Inspection contents		Normal condition	Inspection No. procedure
41	Injectors*4	<ul style="list-style-type: none"> Engine coolant temperature: 80–95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral (A/T : P range) 	Engine is idling	2.0 – 3.2 ms	–
			2,500 r/min	1.8 – 3.0 ms	
			When engine is suddenly raced	Increases	
44	Ignition coils and power transistors	<ul style="list-style-type: none"> Engine: After having warmed up Timing lamp is set. (The timing lamp is set in order to check actual ignition timing.) 	Engine is idling	2 – 18° BTDC	–
			2,500 r/min	36 – 56° BTDC	
45	ISC (stepper) motor position *5	<ul style="list-style-type: none"> Engine coolant temperature: 80–95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral (A/T : P range) Idle position switch: ON Engine: Idling When A/C switch is ON, A/C compressor should be operating 	A/C switch: OFF	2 – 25 STEP	–
			A/C switch: OFF → ON	Increases by 10 – 70 steps	
			<ul style="list-style-type: none"> A/C switch: OFF Select lever: N range → D range 	Increases by 5 – 50 steps	
49	A/C relay	Engine: After having warmed up/Engine is idling	A/C switch: OFF	OFF (Compressor clutch is not operating)	Procedure No. 29
			A/C switch: ON	ON (Compressor clutch is operating)	

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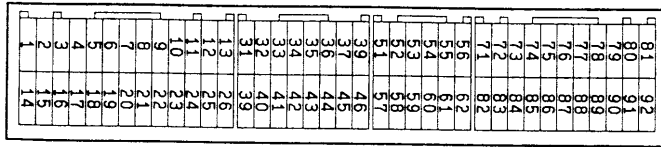
ACTUATOR TEST REFERENCE TABLE

Item No.	Inspection item	Drive contents	Inspection contents		Normal condition	Inspection procedure No.
01	Injectors	Cut fuel to No. 1 injector	Engine: 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
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.	<ul style="list-style-type: none"> Engine: Cranking Fuel pump: Forced driving Inspect according to both the above conditions.	Pinch the return hose with fingers to feel the pulse of the fuel being recirculated.	Pulse is felt.	Procedure No. 24
				Listen near the fuel tank for the sound of fuel pump operation.	Sound of operation is heard.	
08	Purge control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Sound of operation can be heard when solenoid valve is driven.	Procedure No. 33
20	Condenser fan	Drive the fan motors (condenser)	<ul style="list-style-type: none"> Ignition switch: ON A/C switch: ON 		Fan motor runs	Procedure No. 30
21	Radiator fan	Drive the fan motors (radiator)	<ul style="list-style-type: none"> Ignition switch: ON 		Fan motor runs	Procedure No. 30

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

Comparing the engine-ECU for the 4G15 engine with that for the 4G13 engine, the terminal arrangement of the A/C relay and fuel pump relay

are different. In addition, terminals Nos.6, 33, 41, 54, 60 and 75 are reserve terminals. The others are the same as for the 4G13 engine.

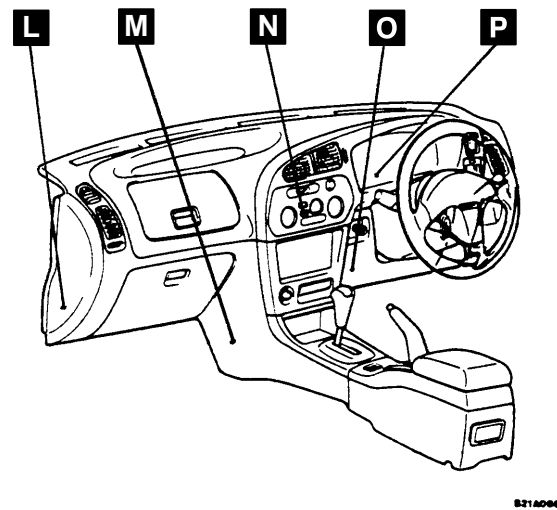
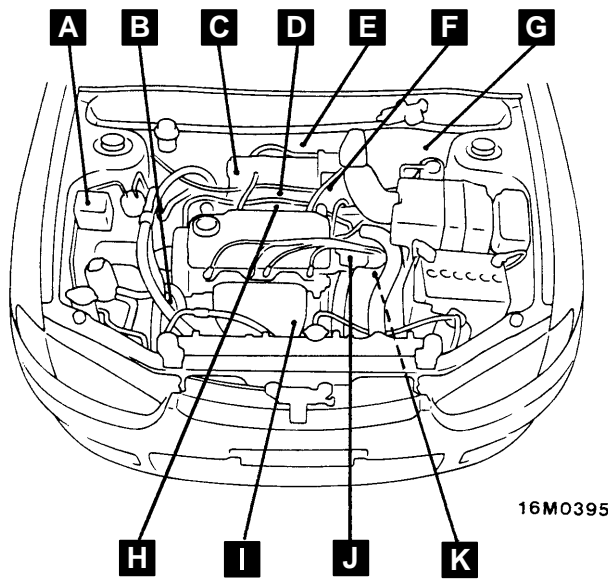


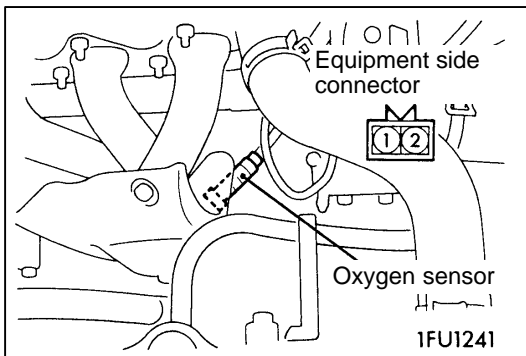
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Terminal No.	Check item	Check condition (Engine condition)	Normal condition
8	A/C relay	<ul style="list-style-type: none"> Engine: Idle speed A/C switch: OFF → ON (A/C compressor is operating) 	System voltage or momentarily 6 V or more → 0 – 3 V
22	Fuel pump	Ignition switch: ON	System voltage
		Engine: Idle speed	0 – 3 V

ON-VEHICLE SERVICE**COMPONENT LOCATION**

Name	Symbol	Name	Symbol
A/C relay	A	Ignition timing adjustment terminal	G
A/C switch	N	Inhibitor switch <A/T>	K
Control relay and fuel pump relay	M	Injectors	H
Diagnosis connector	O	Intake air temperature sensor	C
Distributor (with ignition coil and crank angle sensor)	J	Oxygen sensor	I
		Power steering fluid pressure switch	B
Engine coolant temperature sensor	J	Purge control solenoid valve	D
Engine-ECU	O	Throttle position sensor (with idle position switch)	F
Engine warning lamp (check engine lamp)	P		
Fuel pump check terminal	G	Vacuum sensor	E
Idle speed control servo	F	Vehicle speed sensor	K



**OXYGEN SENSOR CHECK**

1. Warm the engine and check that the engine coolant temperature is 80 – 95 °C.
2. Disconnect the oxygen sensor connector and connect a digital voltmeter.
3. While repeatedly racing the engine, measure the oxygen sensor output voltage.

Standard value:

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

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

NOTE

For removal and installation of the oxygen sensor, refer – [Exhaust Manifold](#).

MULTIPOINT FUEL INJECTION (MPI) <4G9>

GENERAL

OUTLINE OF CHANGES

Maintenance service points for 4G93 engine have been established as follows:

The others are the same as 4G92 engine.

- The immobilizer system has been used.
- The position of the oxygen sensor has been changed and the heater has been abolished.
- The purge control solenoid valve has been abolished.
- The exhaust gas recirculation (EGR) system has been abolished.
- The detonation sensor has been abolished.
- The engine-ECU has been changed.
- The basic idle speed has been changed.

GENERAL SPECIFICATIONS

Item		Specification
Engine-ECU	Identification No.	E2T67372

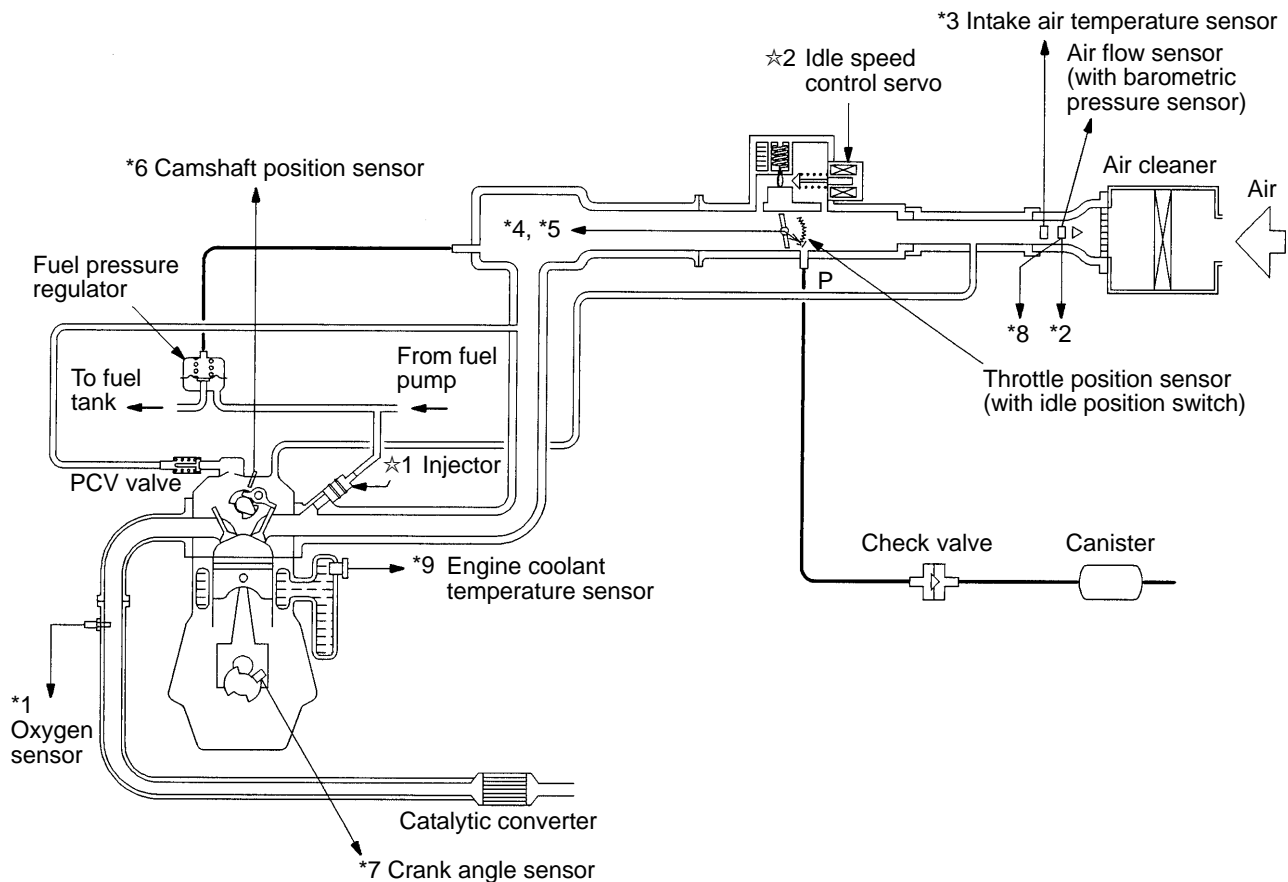
MULTI-POINT FUEL INJECTION SYSTEM DIAGRAM

- *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

- Power supply voltage
- Vehicle speed sensor
- A/C switch
- Inhibitor switch
- Power steering fluid pressure switch
- Ignition switch – ST
- Ignition switch – IG
- Alternator FR terminal

⇒ Engine-ECU ⇒

- ☆1 Injector
 - ☆2 Idle speed control servo
-
- Fuel pump relay
 - Control relay
 - A/C power relay
 - Engine warning lamp
 - Diagnosis signal
 - Ignition coil, power transistor
 - Fan motor relay
 - Alternator G terminal



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SERVICE SPECIFICATIONS

Item	Specification
Basic idle speed r/min	700 ± 50

TROUBLESHOOTING**DIAGNOSIS FUNCTION****ENGINE WARNING LAMP (CHECK ENGINE LAMP)****Engine warning lamp inspection items**

The following items have been added:

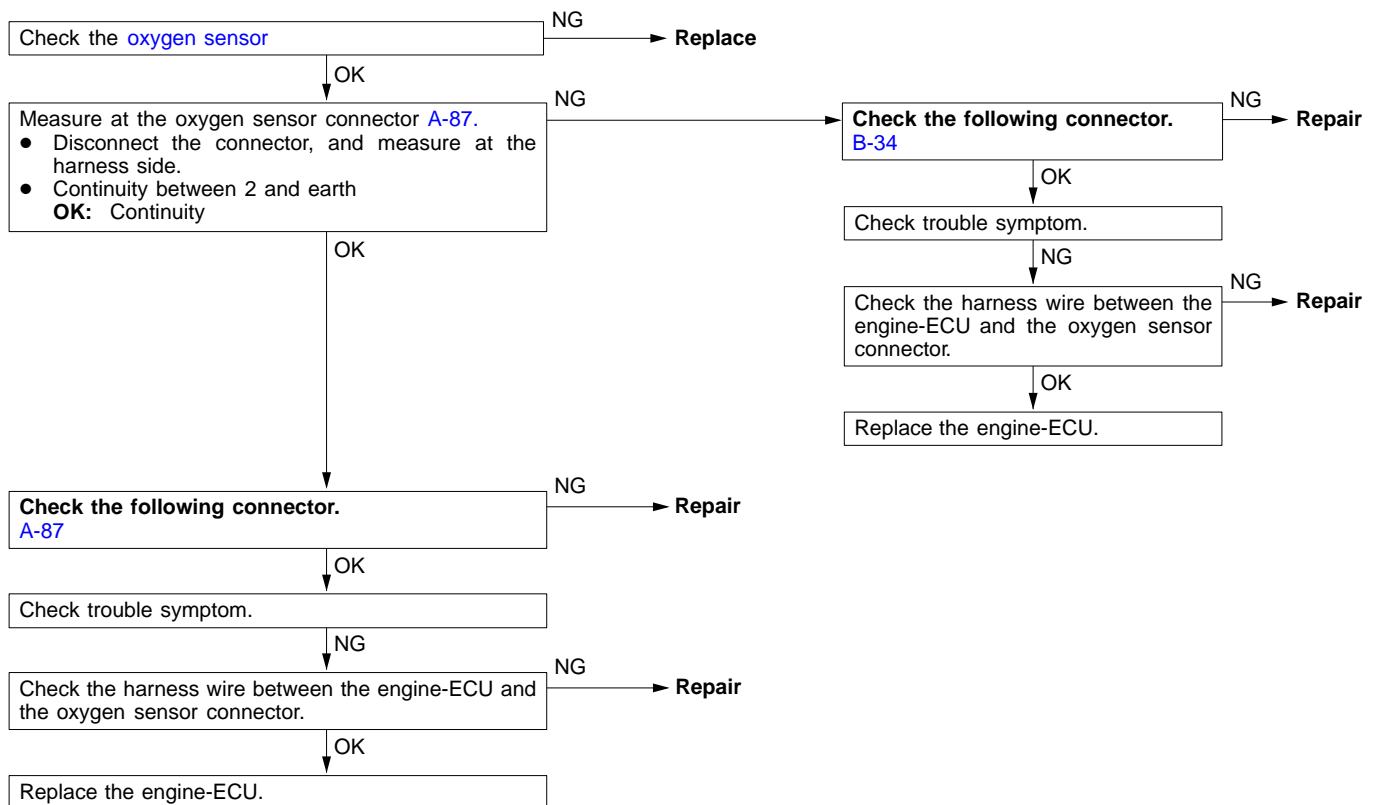
- Immobilizer system

INSPECTION CHART FOR DIAGNOSIS CODES

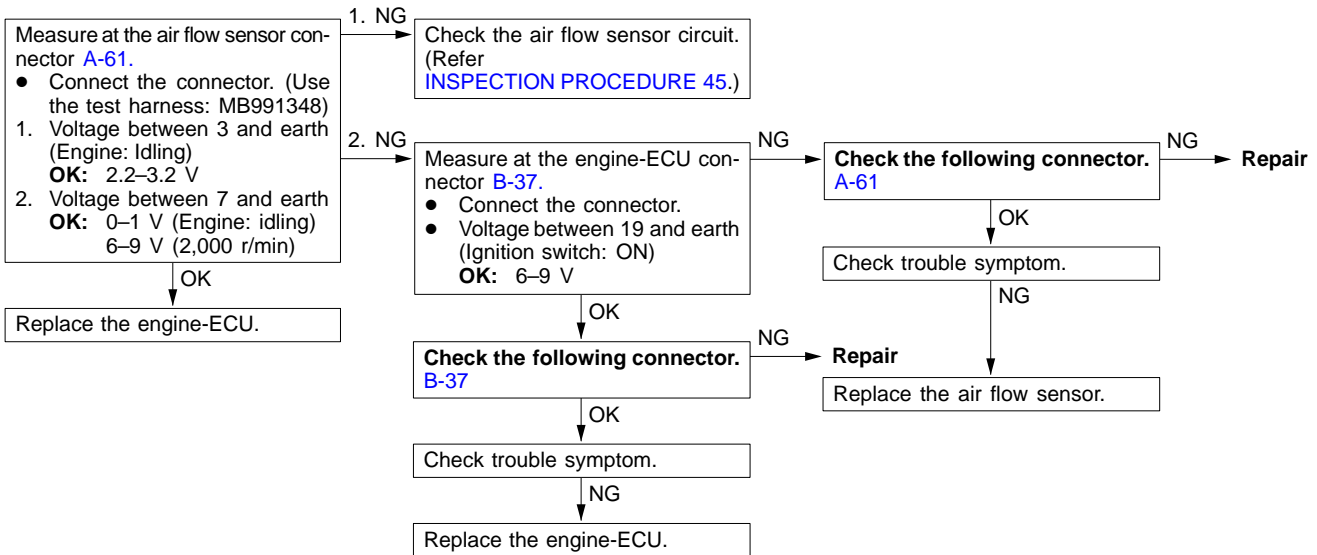
Code No.	Diagnosis item
11	Oxygen sensor system
12	Air flow sensor system
13	Intake air temperature sensor system
14	Throttle position sensor system
21	Engine coolant temperature sensor system
22	Crank angle sensor system
23	Camshaft position sensor
24	Vehicle speed sensor system
25	Barometric pressure sensor system
41	Injector system
44	Ignition coil and power transistor unit system
54	Immobilizer system
61	Communication wire with A/T-ECU system <A/T>
64	Alternator FR terminal system

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

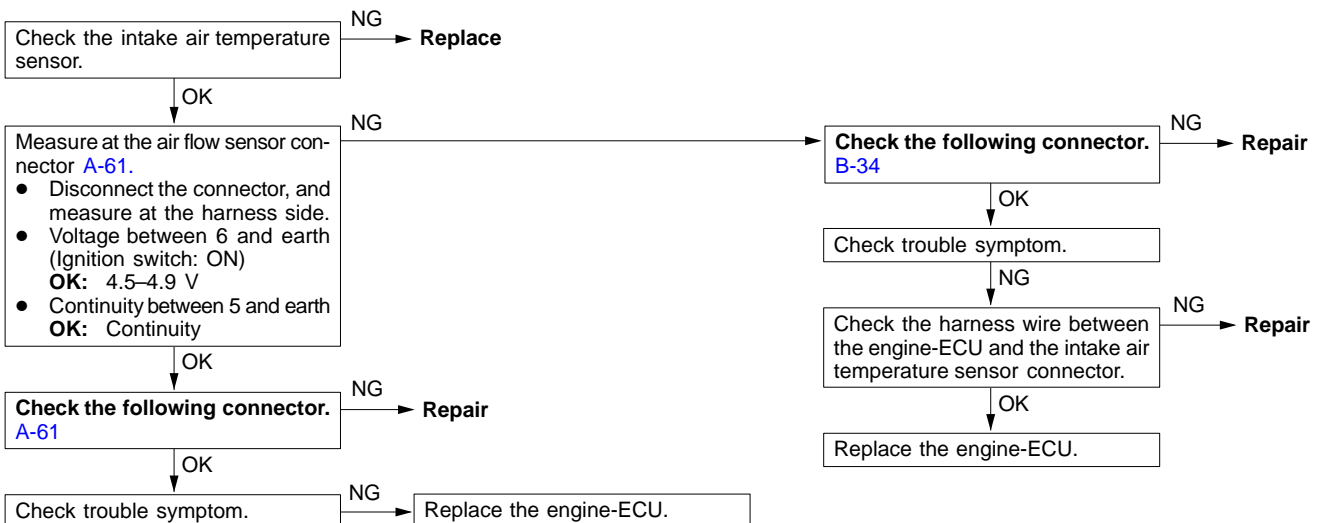
Code No. 11 Oxygen sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> 3 minutes have passed after engine was started. Engine coolant temperature is approx. 80°C or more. Intake air temperature is 20–50°C. Engine speed is approx. 2,000–3,000 r/min Vehicle is moving at constant speed on a flat, level road surface <p>Set conditions</p> <ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Malfunction of the oxygen sensor Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU



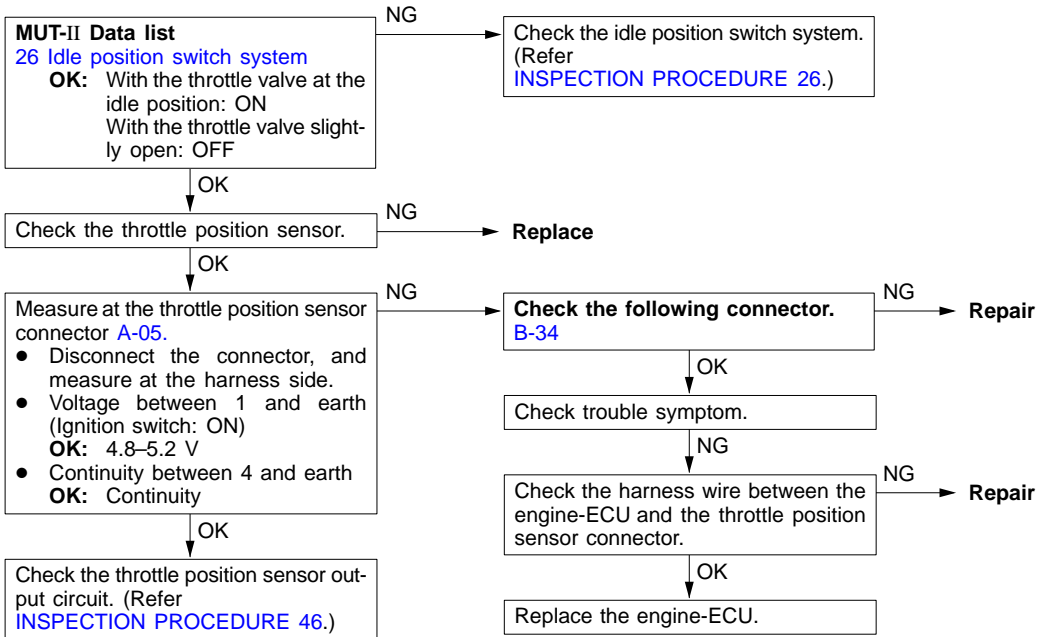
Code No. 12 Air flow sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Engine speed is 500 r/min or more. <p>Set conditions</p> <ul style="list-style-type: none"> Sensor output frequency is 3 Hz or less for 4 seconds. 	<ul style="list-style-type: none"> Malfunction 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



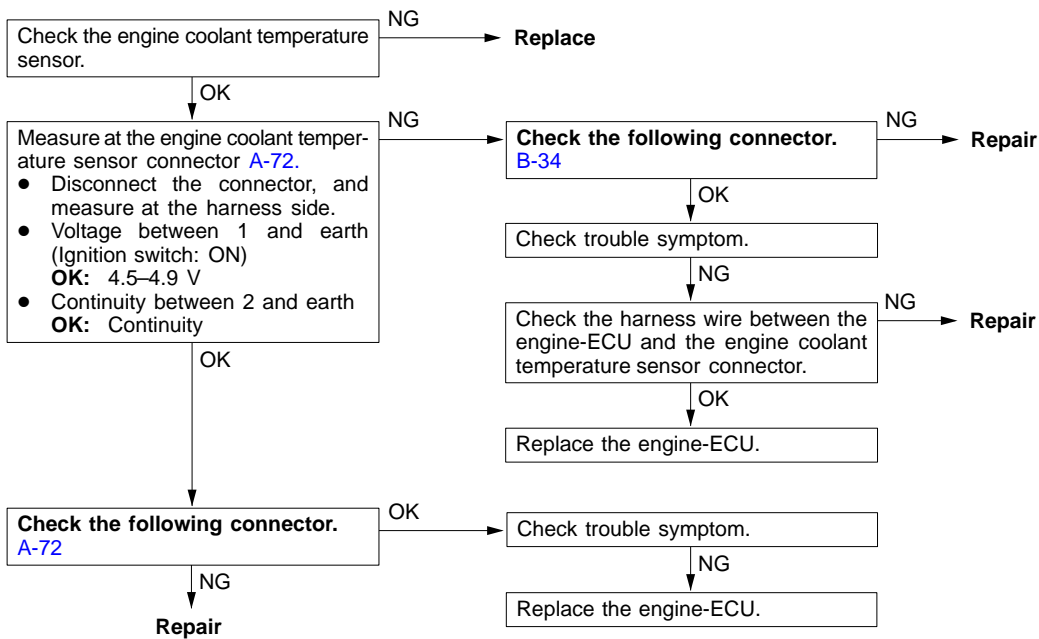
Code No. 13 Intake air temperature sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. <p>Set conditions</p> <ul style="list-style-type: none"> Sensor output voltage is 4.6 V or more (corresponding to an intake air temperature of –45°C or less) for 4 seconds. <p>or</p> <ul style="list-style-type: none"> Sensor output voltage is 0.2V or less (corresponding to an intake air temperature of 125°C or more) for 4 seconds. 	<ul style="list-style-type: none"> 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



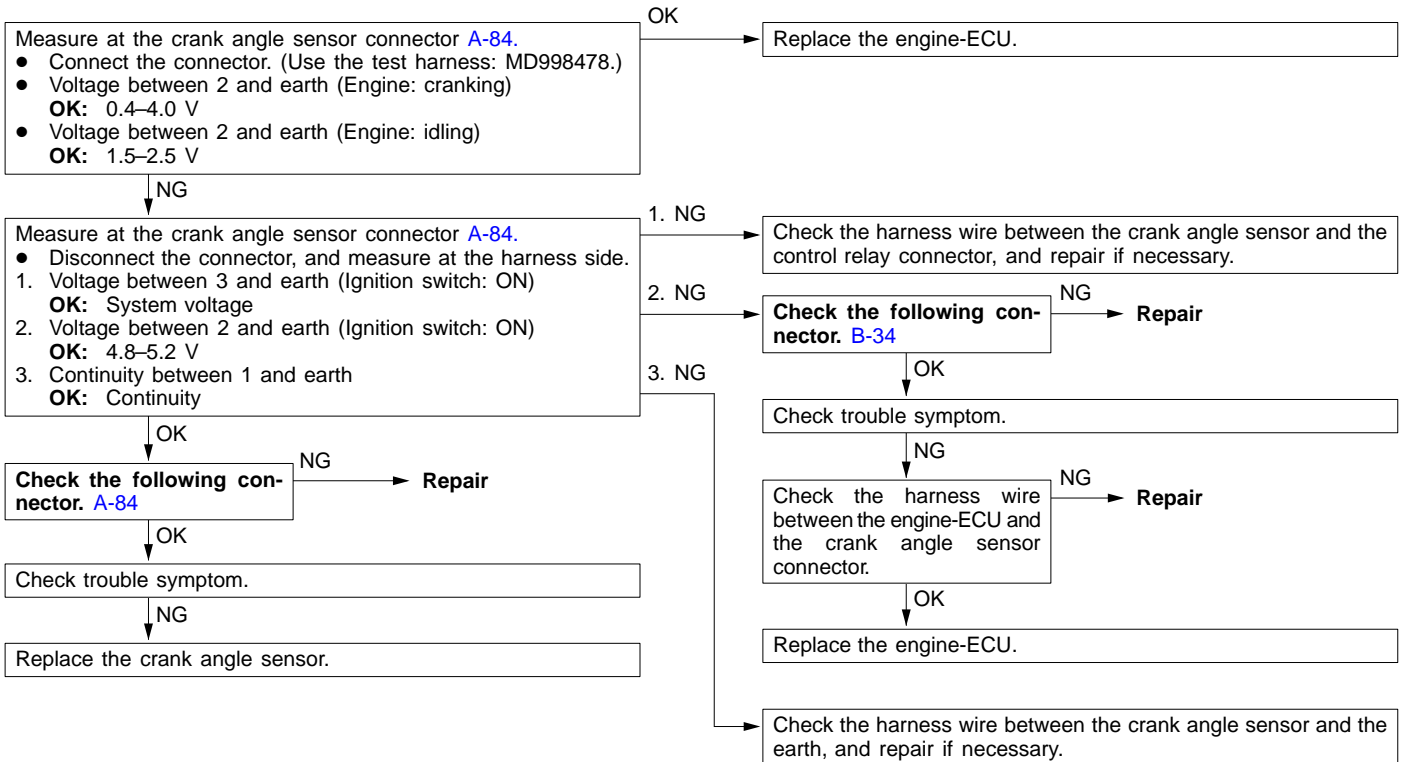
Code No. 14 Throttle position sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. <p>Set conditions</p> <ul style="list-style-type: none"> When the idle position switch is ON, the sensor output voltage is 2 V or more for 4 seconds. <p>or</p> <ul style="list-style-type: none"> The sensor output voltage is 0.2 V or less for 4 seconds. 	<ul style="list-style-type: none"> Malfunction of 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



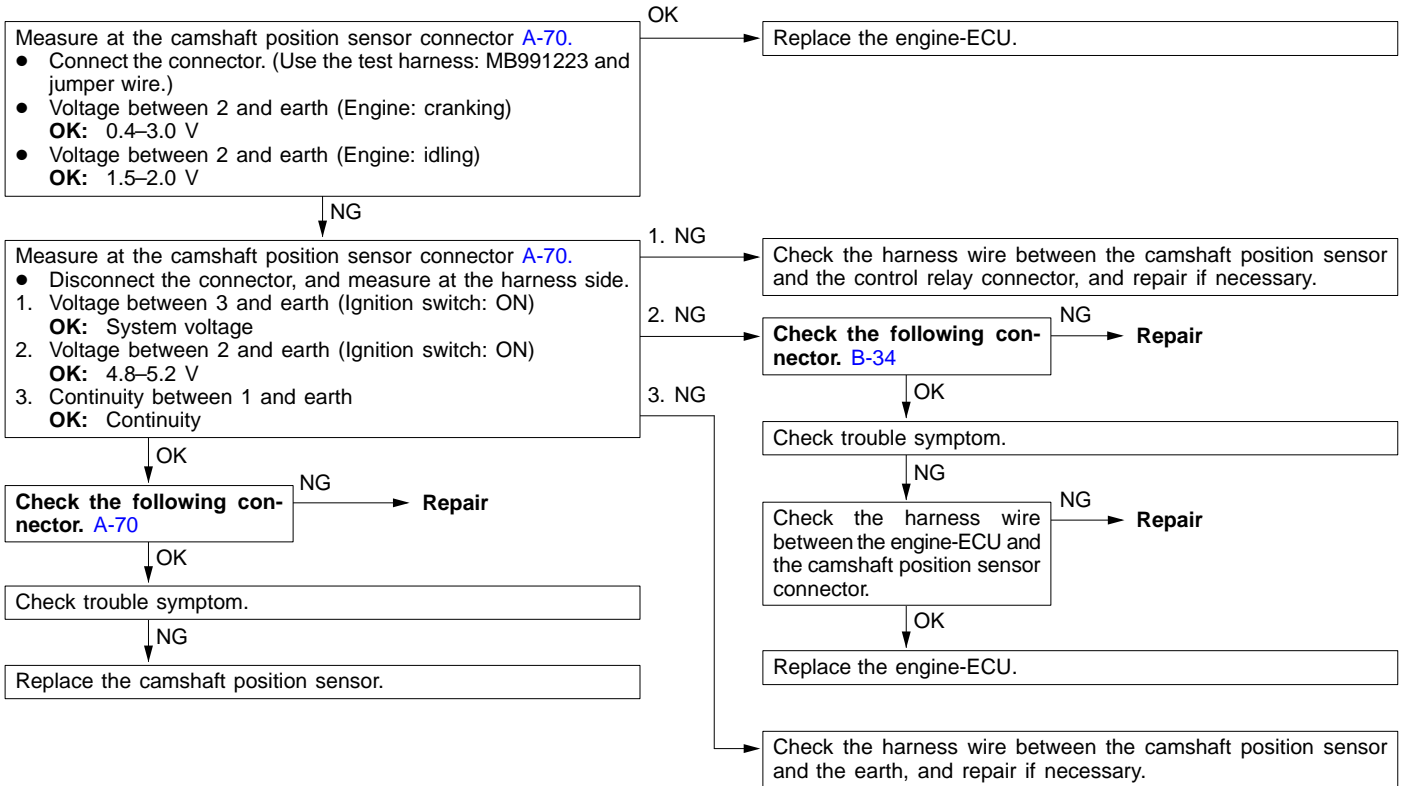
Code No. 21 Engine coolant temperature sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. <p>Set conditions</p> <ul style="list-style-type: none"> Sensor output voltage is 4.6 V or more (corresponding to an engine coolant temperature of -45°C or less) for 4 seconds. <p>or</p> <ul style="list-style-type: none"> Sensor output voltage is 0.1 V or less (corresponding to an engine coolant temperature of 140°C or more) for 4 seconds. 	<ul style="list-style-type: none"> 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
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Engine speed is approx. 50 r/min or more <p>Set conditions</p> <ul style="list-style-type: none"> 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. 	



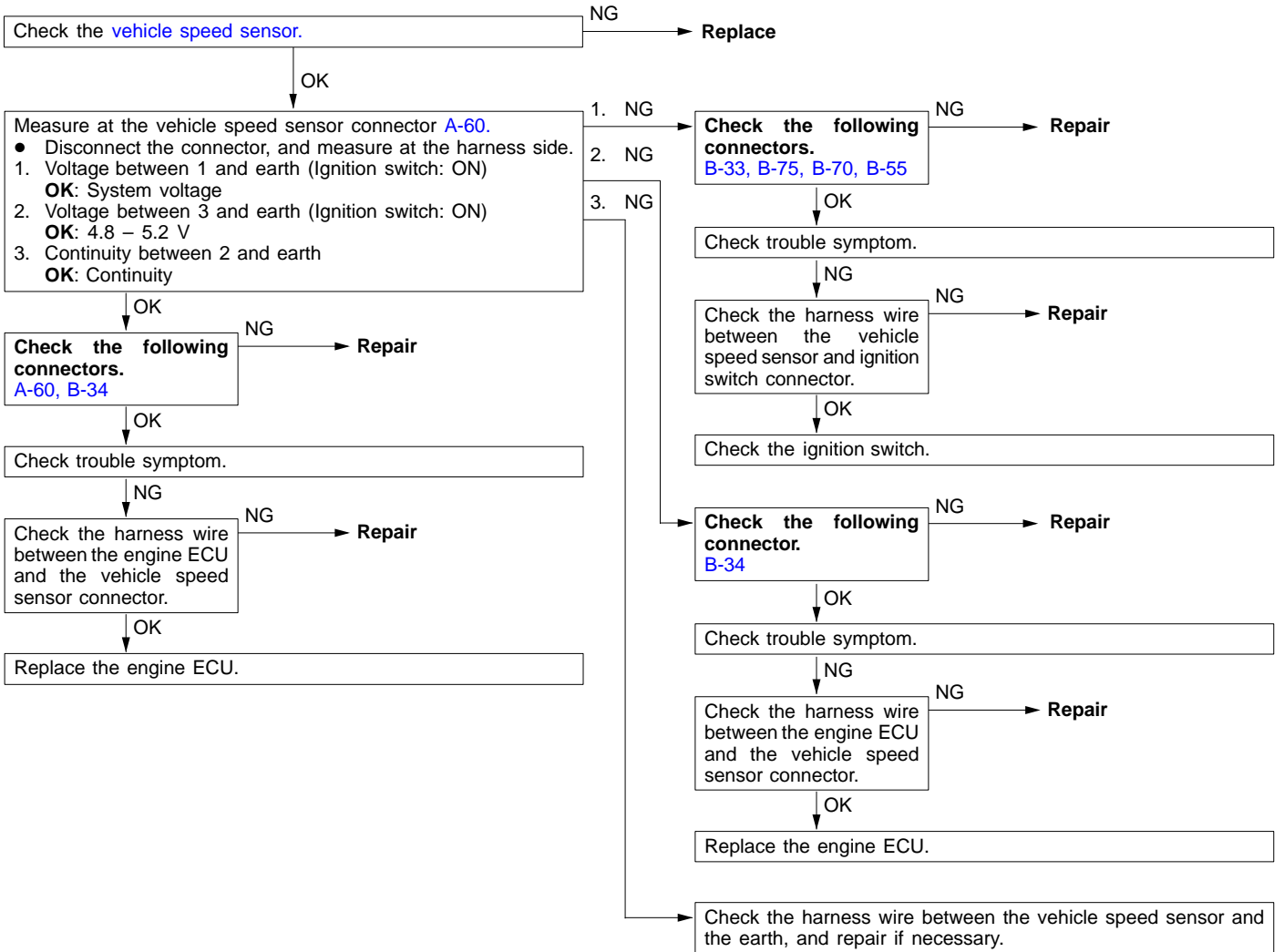
Code No. 22 Crank angle sensor system	Probable cause
Range of Check • Engine is cranking. Set conditions • Sensor output voltage does not change for 4 seconds (no pulse signal input.)	• Malfunction of the crank angle sensor • Improper connector contact, open circuit or short-circuited harness wire of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



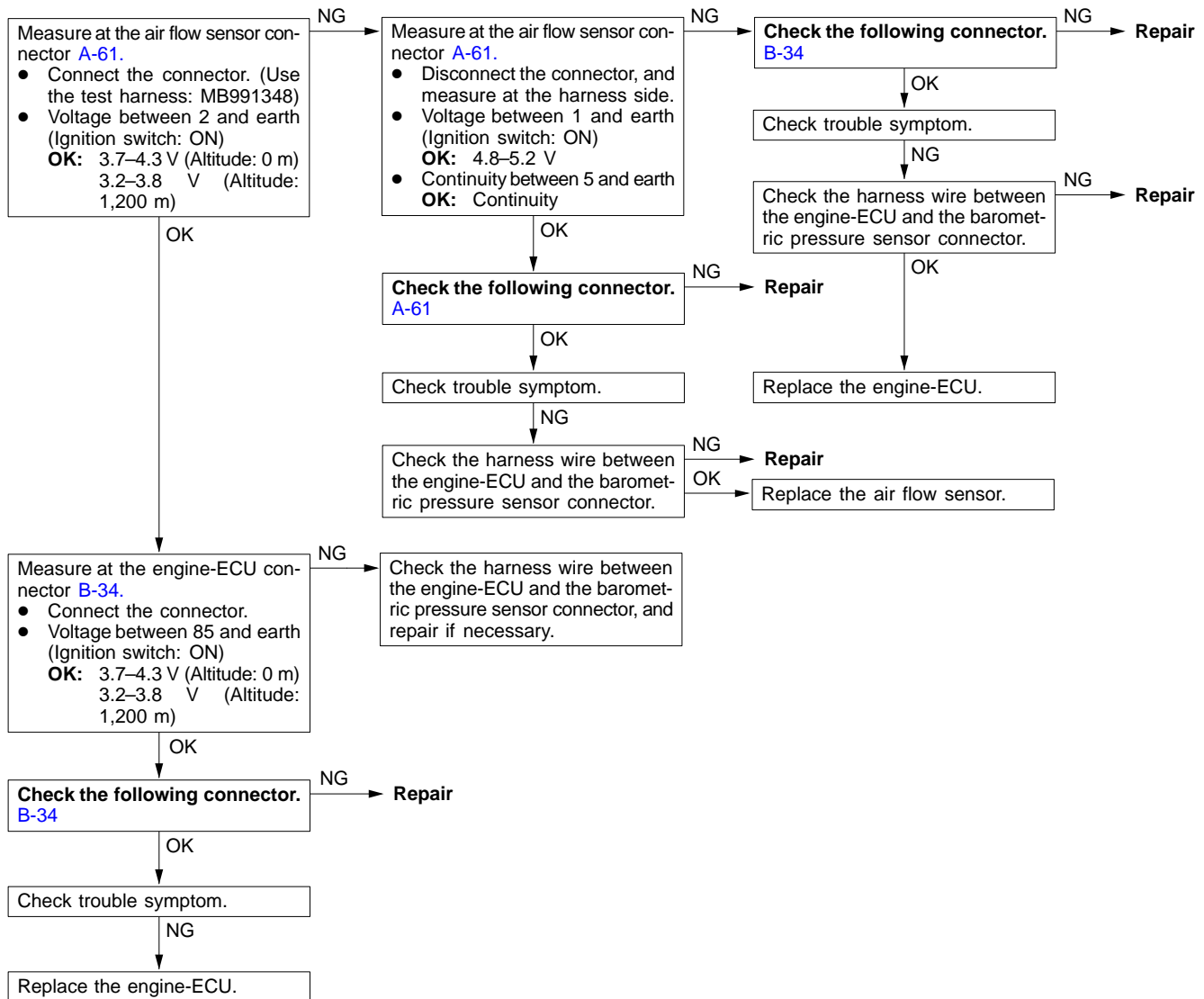
Code No. 23 Camshaft position sensor system	Probable cause
Range of Check <ul style="list-style-type: none"> Ignition switch: ON Engine speed is approx. 50 r/min or more. Set conditions <ul style="list-style-type: none"> Sensor output voltage does not change for 4 seconds (no pulse signal input.) 	<ul style="list-style-type: none"> Malfunction of the camshaft position sensor Improper connector contact, open circuit or short-circuited harness wire of the camshaft position sensor circuit Malfunction of the engine-ECU



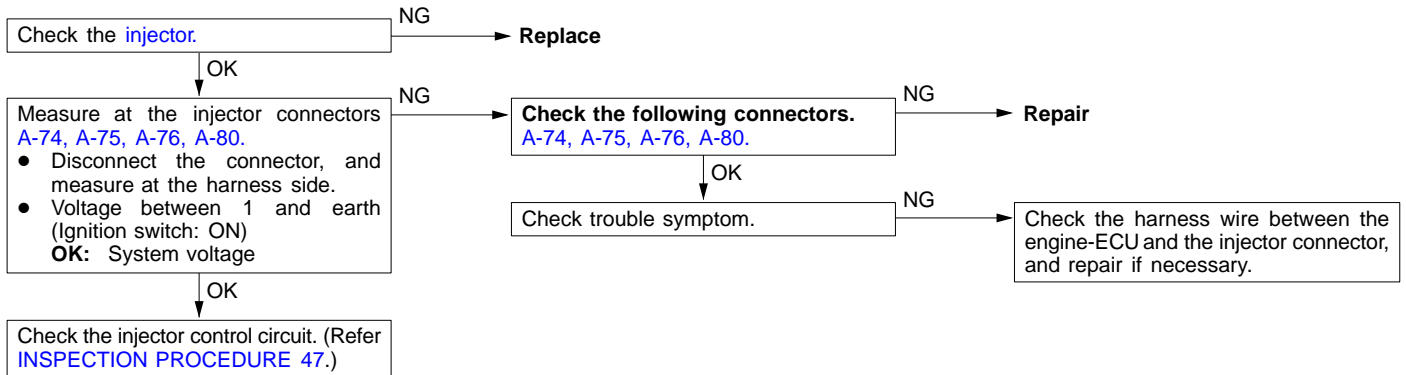
Code No. 24 Vehicles speed sensor system	Probable cause
<p>Range of check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Idle position switch: OFF Engine speed is 3,000 r/min or more. Driving under high engine load conditions. <p>Set conditions</p> <ul style="list-style-type: none"> Sensor output voltage does not change for 4 seconds (no pulse signal input). 	<ul style="list-style-type: none"> Malfunction of the vehicle speed sensor Improper connector contact, open circuit or short-circuited harness wire of the vehicle speed sensor circuit Malfunction of the engine-ECU



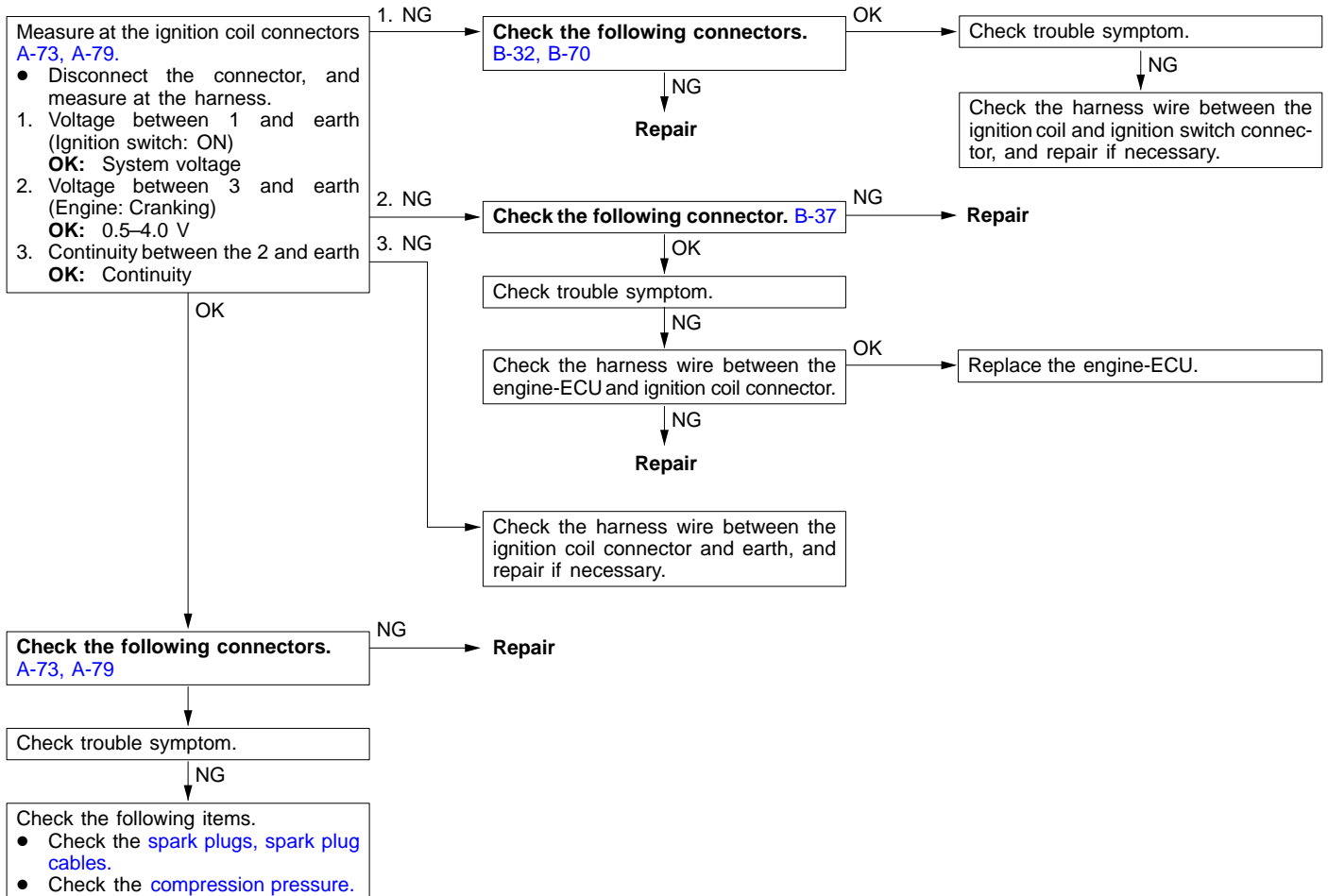
Code No. 25 Barometric pressure sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Battery voltage is 8 V or more. <p>Set conditions</p> <ul style="list-style-type: none"> Sensor output voltage is 4.5 V or more (corresponding to a barometric pressure of 114 kPa or more) for 4 seconds. <p>or</p> <ul style="list-style-type: none"> Sensor output voltage is 0.2 V or less (corresponding to a barometric pressure of 5.33 kPa or less) for 4 seconds. 	<ul style="list-style-type: none"> 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



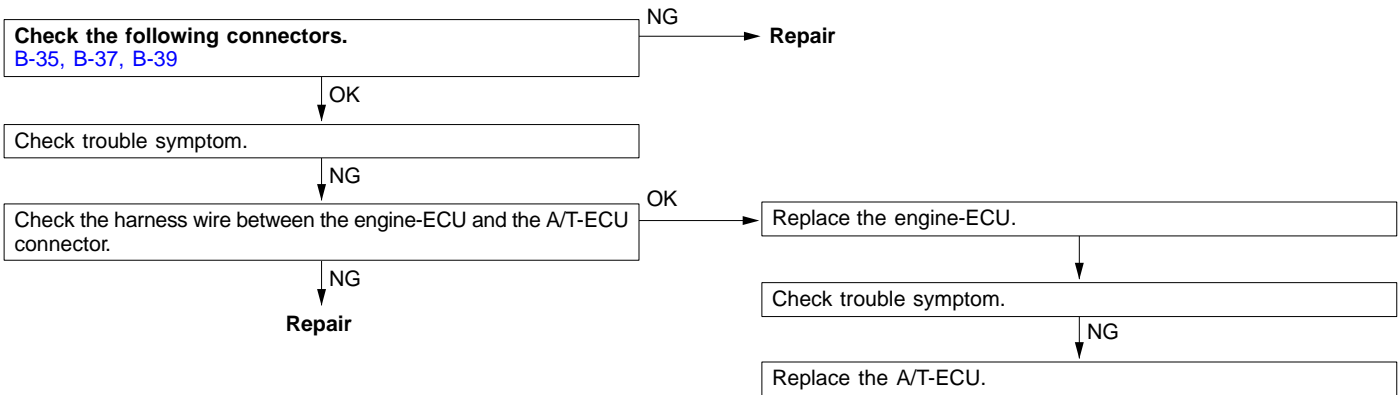
Code No. 41 Injector system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Engine speed is approx. 50–1,000 r/min The throttle position sensor output voltage is 1.15 V or less. Actuator test by MUT-II is not carried out. <p>Set conditions</p> <ul style="list-style-type: none"> Surge voltage of injector coil is not detected for 4 seconds. 	<ul style="list-style-type: none"> Malfunction of the injector Improper connector contact, open circuit or short-circuited harness wire of the injector circuit Malfunction of the engine-ECU



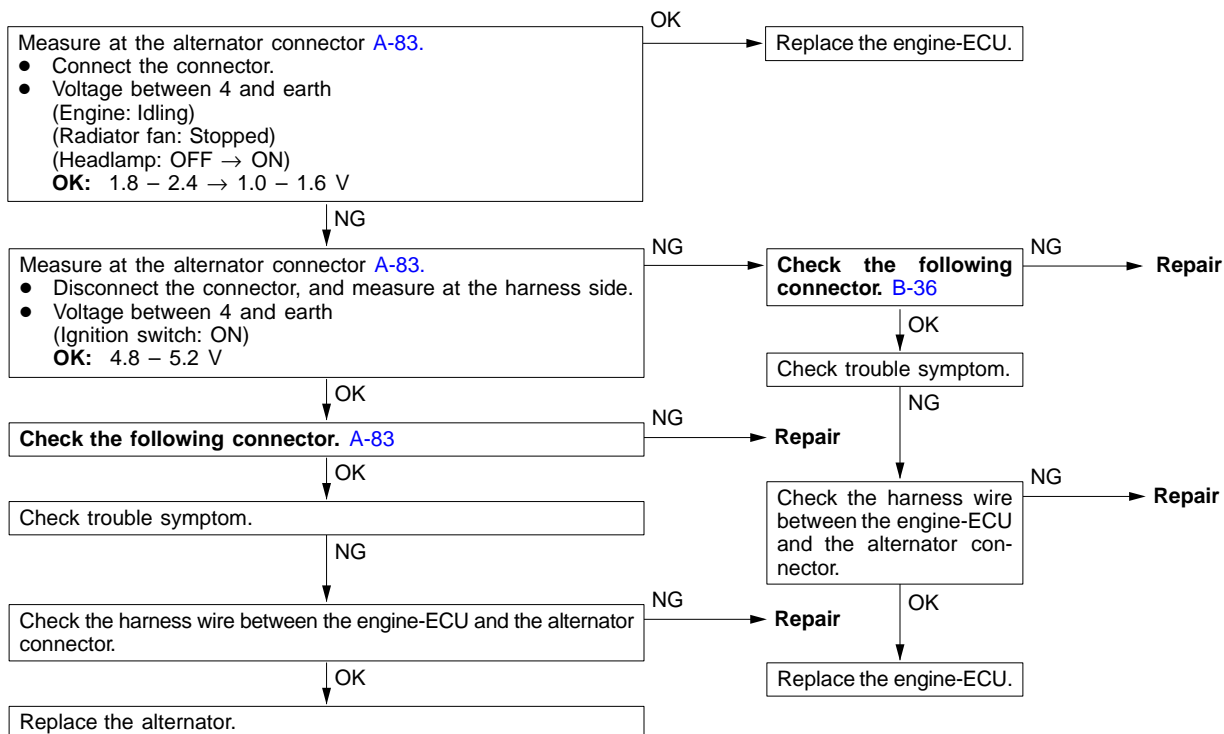
Code No. 44 Ignition coil and power transistor unit system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Engine speed is approx. 50–4,000 r/min Engine is not cranking. <p>Set conditions</p> <ul style="list-style-type: none"> The crank angle sensor detects an abnormal engine speed caused by misfire (one of the two coils fails). 	<ul style="list-style-type: none"> 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
<p>Range of Check</p> <ul style="list-style-type: none"> 60 seconds or more have passed immediately after engine was started. Engine speed is approx. 50 r/min or more <p>Set conditions</p> <p>The voltage of the torque reduction request signal from the A/T-ECU is LOW for 1.5 seconds or more.</p>	<ul style="list-style-type: none"> Malfunction of the harness wire and the connector Malfunction of the engine-ECU Malfunction of the A/T-ECU



Code No. 64 Alternator FR Terminal System	Probable cause
<p>Range of Check, Set Conditions</p> <ul style="list-style-type: none"> The alternator FR terminal signal voltage remains high for approximately 20 seconds while the engine is running. 	<ul style="list-style-type: none"> Open circuit in alternator FR terminal circuit Malfunction of the engine-ECU



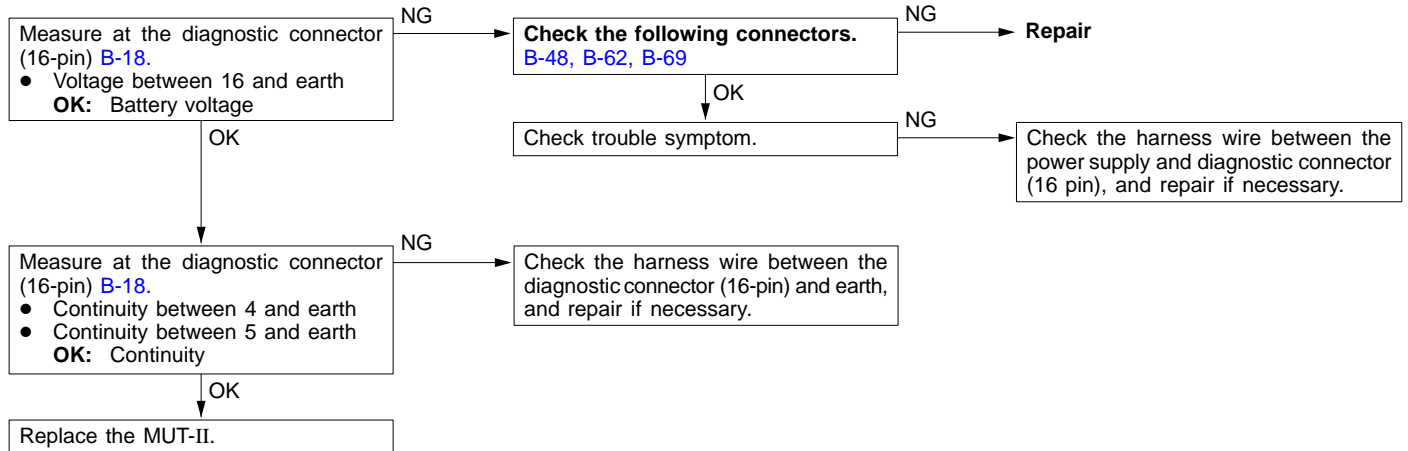
INSPECTION CHART FOR TROUBLE SYMPTOMS

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
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
	The engine warning lamp remains illuminating and never goes out.	4
Starting	No initial combustion (starting impossible)	5
	Initial combustion but no complete combustion (starting impossible)	6
	Long time to start (improper starting)	7
Idling stability (Improper idling)	Unstable idling (Rough idling, hunting)	8
	Idling speed is high. (Improper idling speed)	9
	Idling speed is low. (Improper idling speed)	10
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	11
	When the engine becomes hot, it stalls at idling. (Die out)	12
	The engine stalls when starting the car. (Pass out)	13
	The engine stalls when decelerating.	14
Driving	Hesitation, sag or stumble	15
	The feeling of impact or vibration when accelerating	16
	The feeling of impact or vibration when decelerating	17
	Poor acceleration	18
	Surge	19
	Knocking	20
Dieseling		21
Too high CO and HC concentration when idling		22
Low alternator output voltage (approx. 12.3 V)		23

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

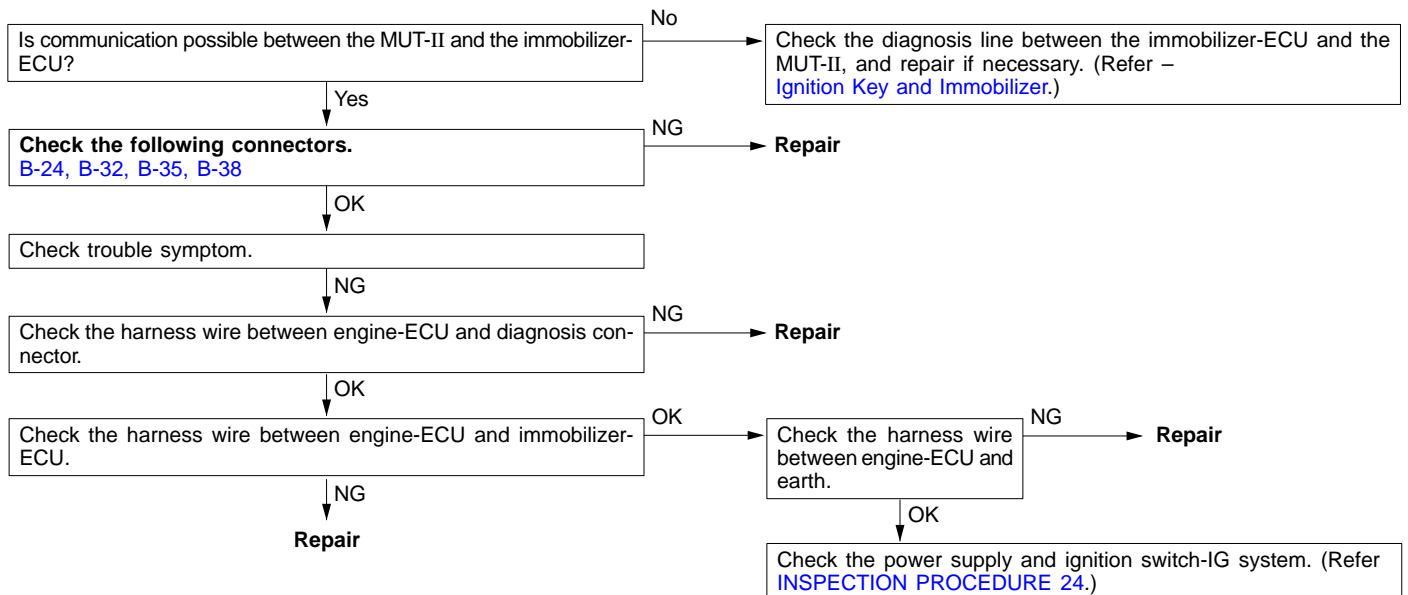
INSPECTION PROCEDURE 1

Communication with MUT-II is not possible. (Communication with all systems is not possible.)	Probable cause
The cause is probably a defect in the power supply system (including earth) for the diagnosis line.	<ul style="list-style-type: none"> Malfunction of the connector Malfunction of the harness wire



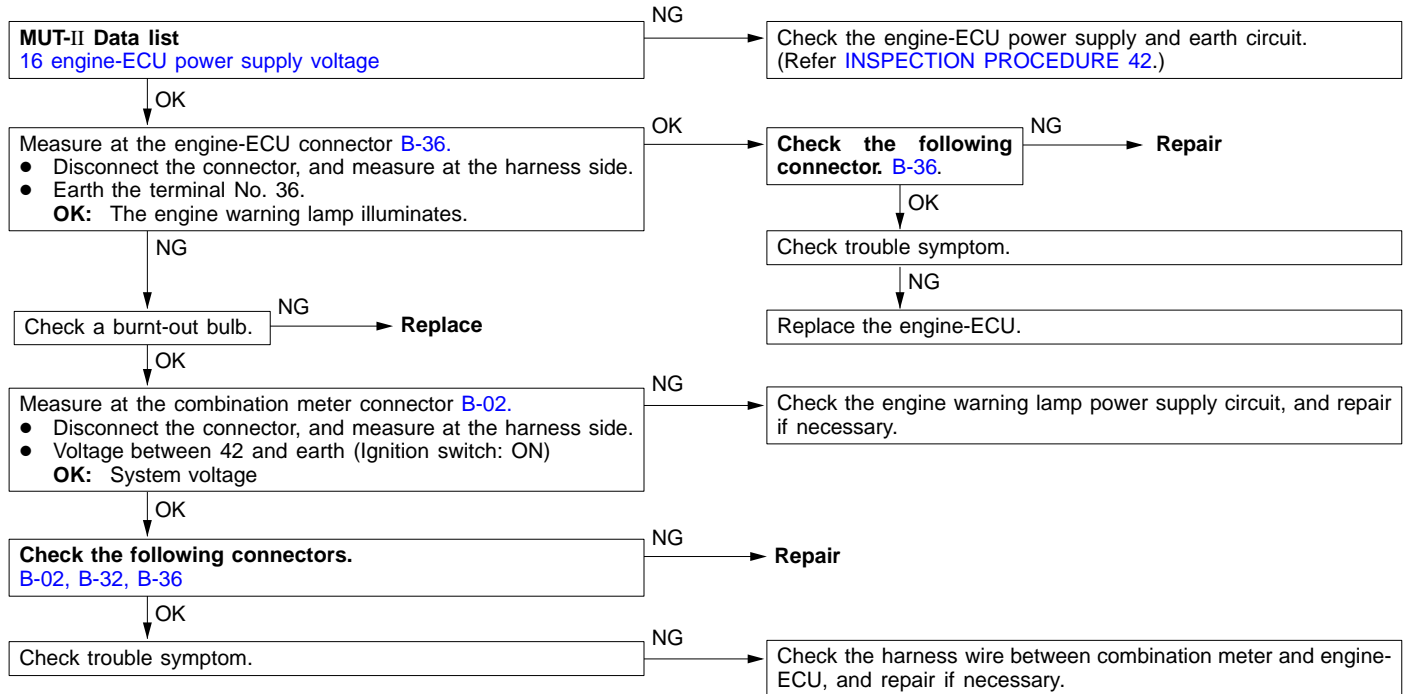
INSPECTION PROCEDURE 2

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



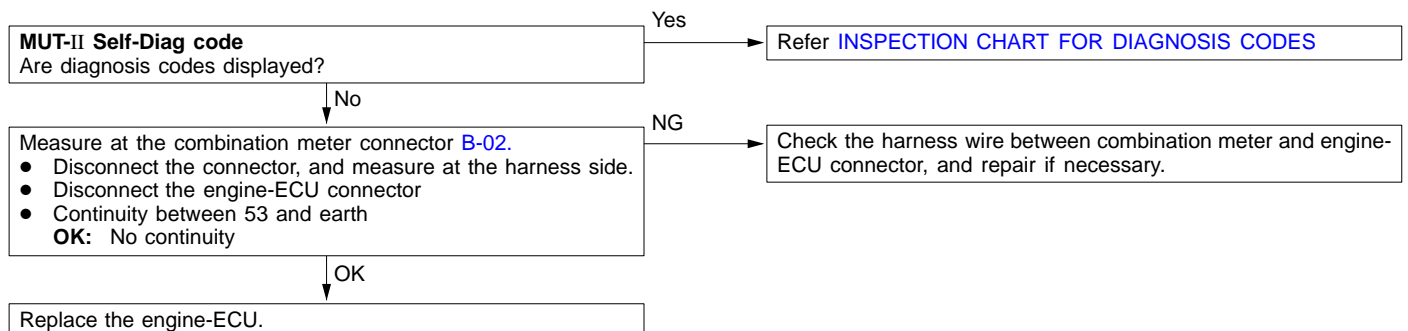
INSPECTION PROCEDURE 3

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.	<ul style="list-style-type: none"> Burnt-out bulb Defective warning lamp circuit Malfunction of the engine-ECU



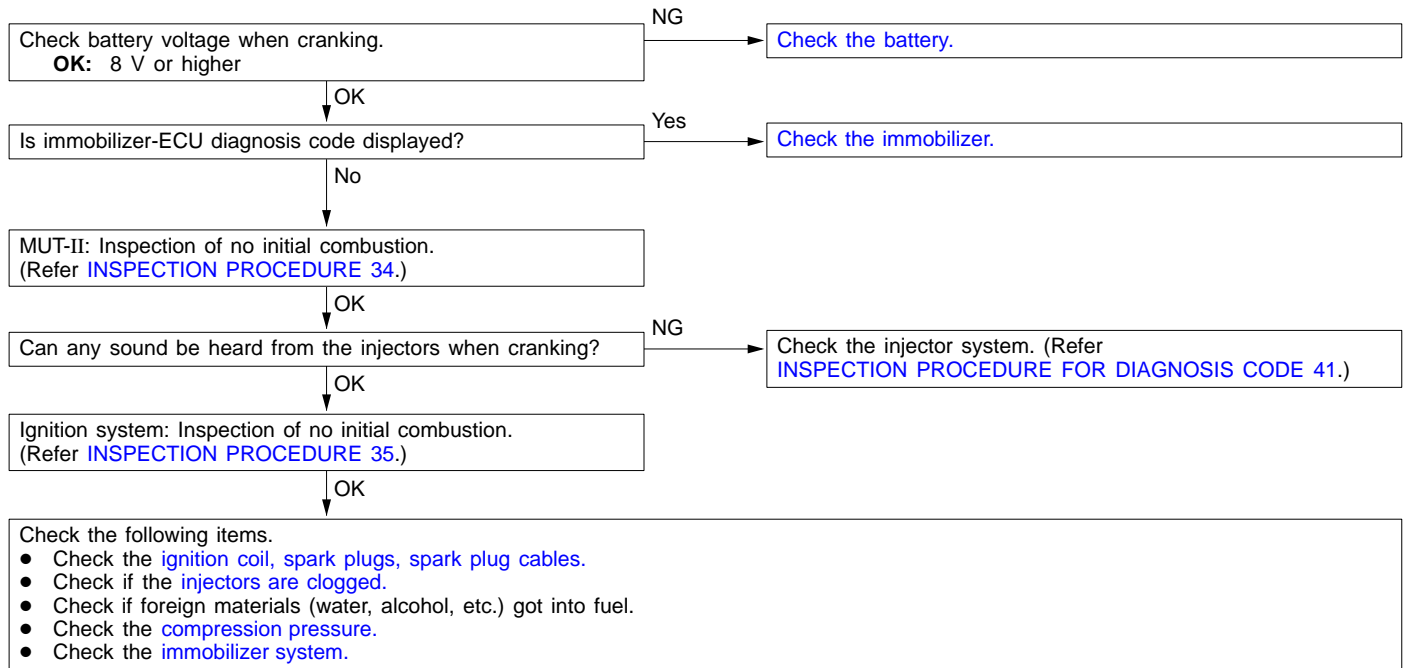
INSPECTION PROCEDURE 4

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



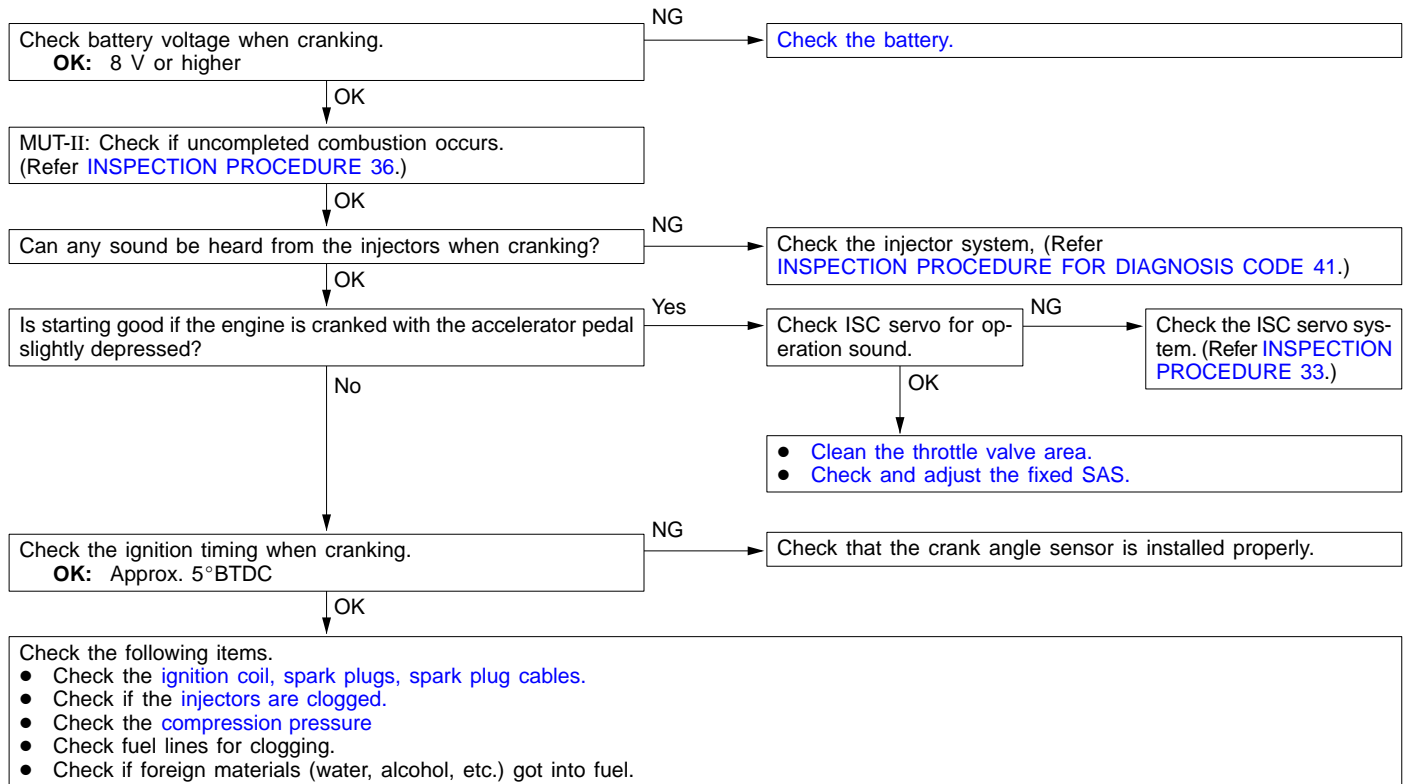
INSPECTION PROCEDURE 5

No initial combustion (starting impossible)	Probable cause
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.	<ul style="list-style-type: none"> ● Malfunction of the ignition system ● Malfunction of the fuel pump system ● Malfunction of the injectors ● Malfunction of the engine-ECU ● Malfunction of the immobilizer system ● Foreign materials in fuel



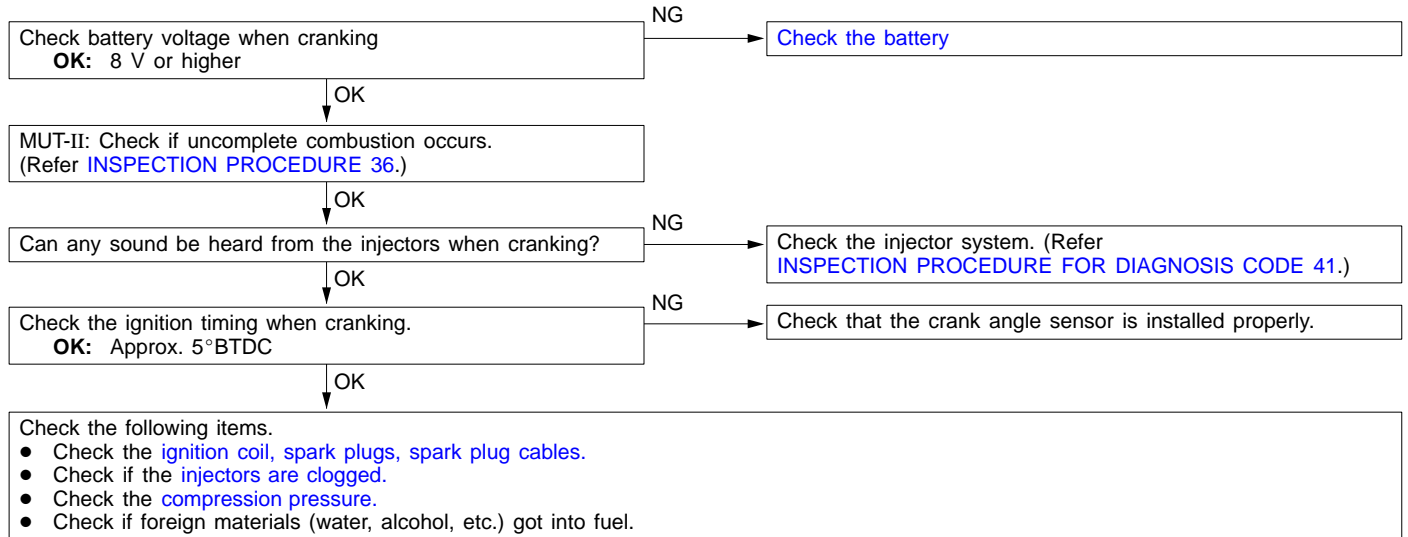
INSPECTION PROCEDURE 6

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



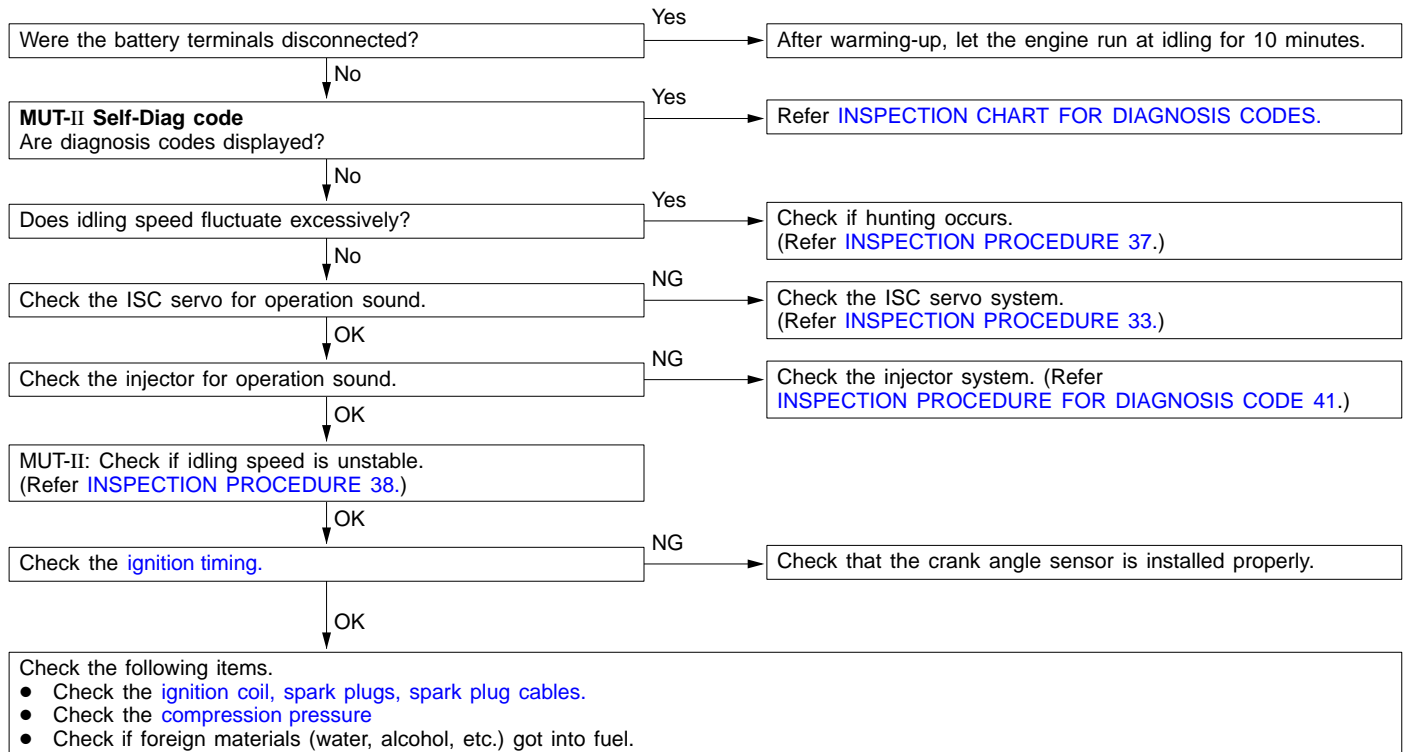
INSPECTION PROCEDURE 7

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.	<ul style="list-style-type: none"> • Malfunction of the ignition system • Malfunction of the injector system • Inappropriate gasoline use • Poor compression



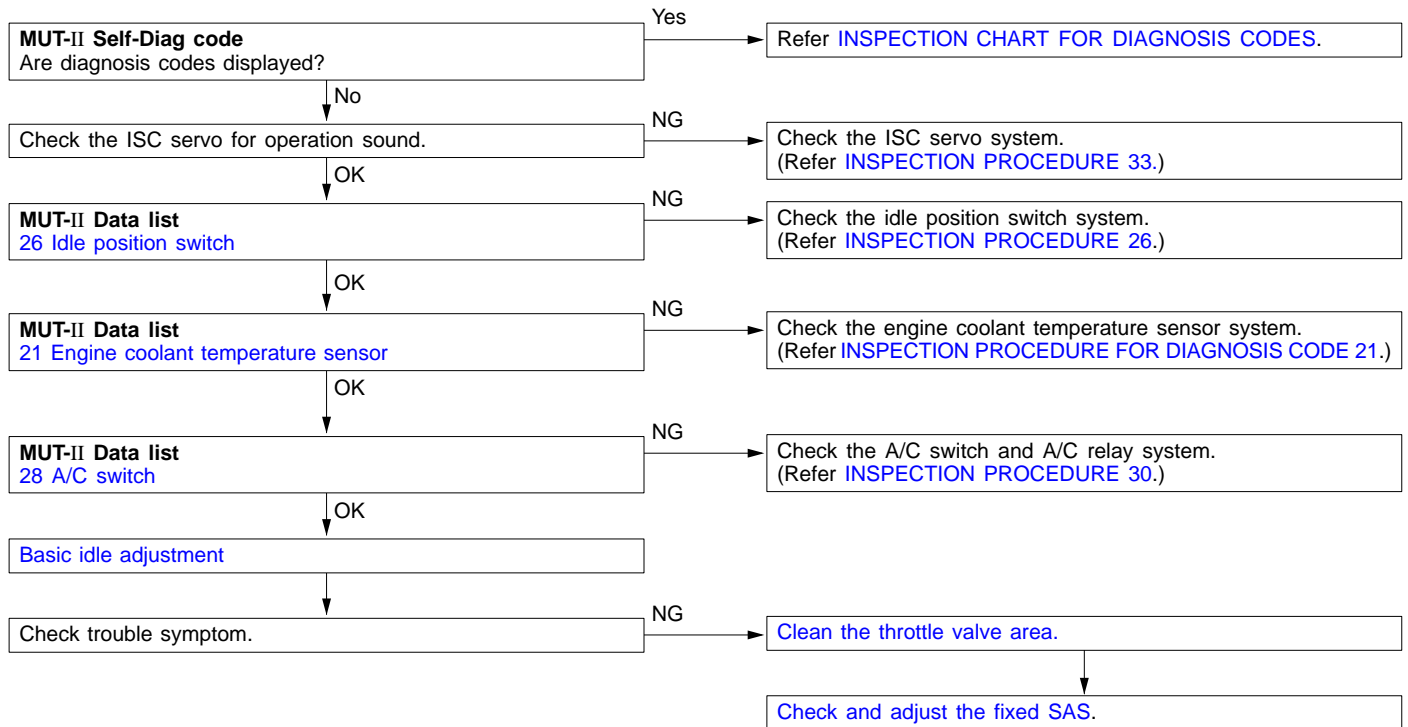
INSPECTION PROCEDURE 8

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



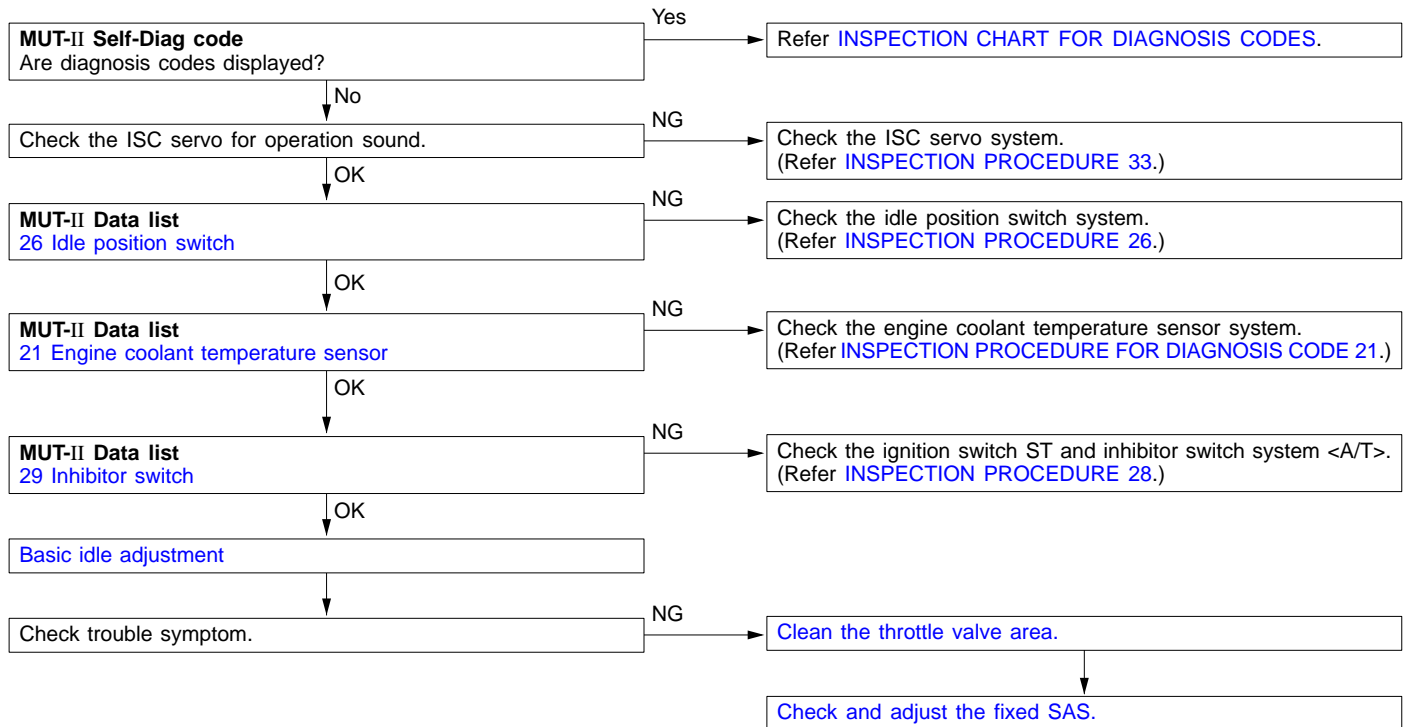
INSPECTION PROCEDURE 9

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



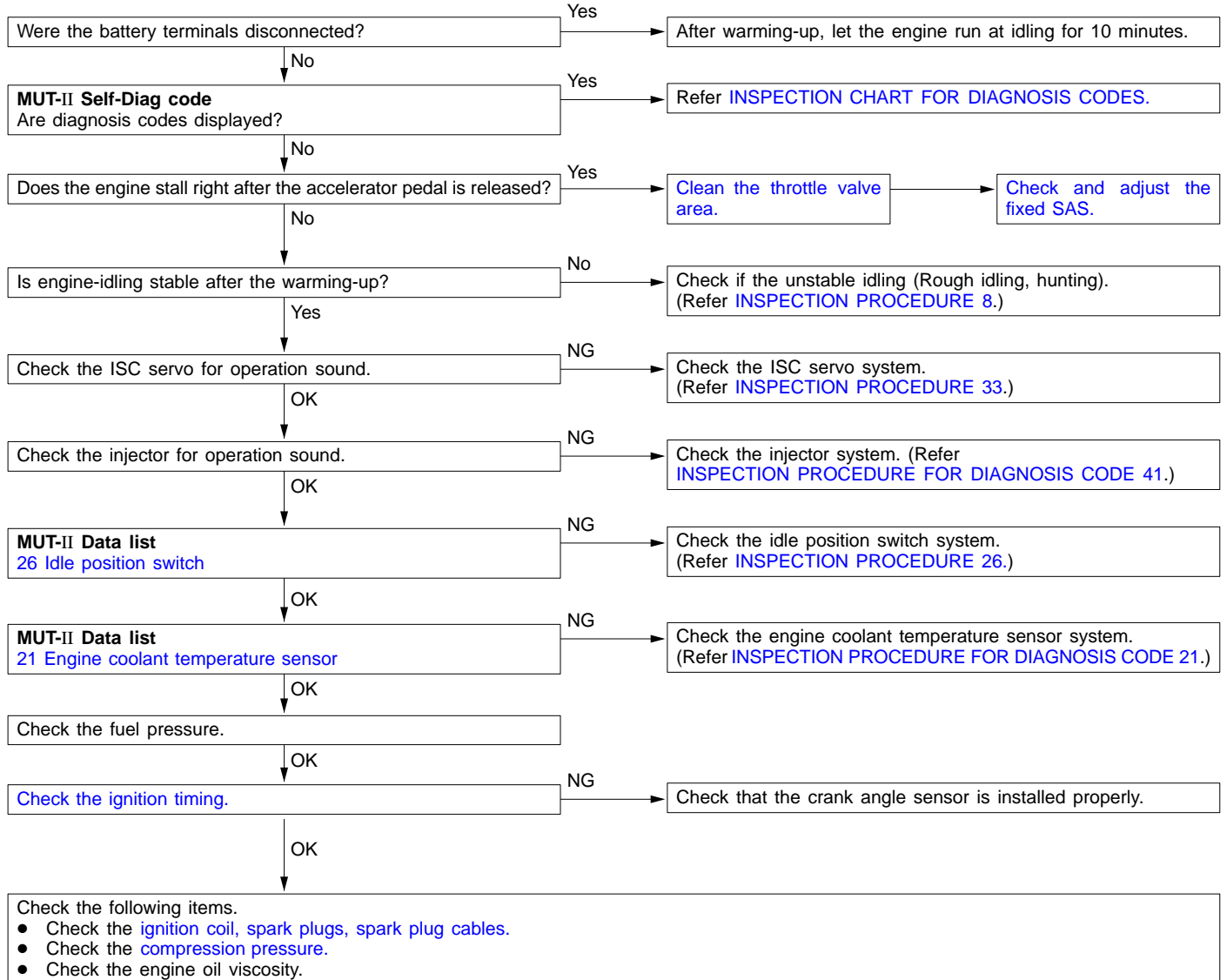
INSPECTION PROCEDURE 10

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



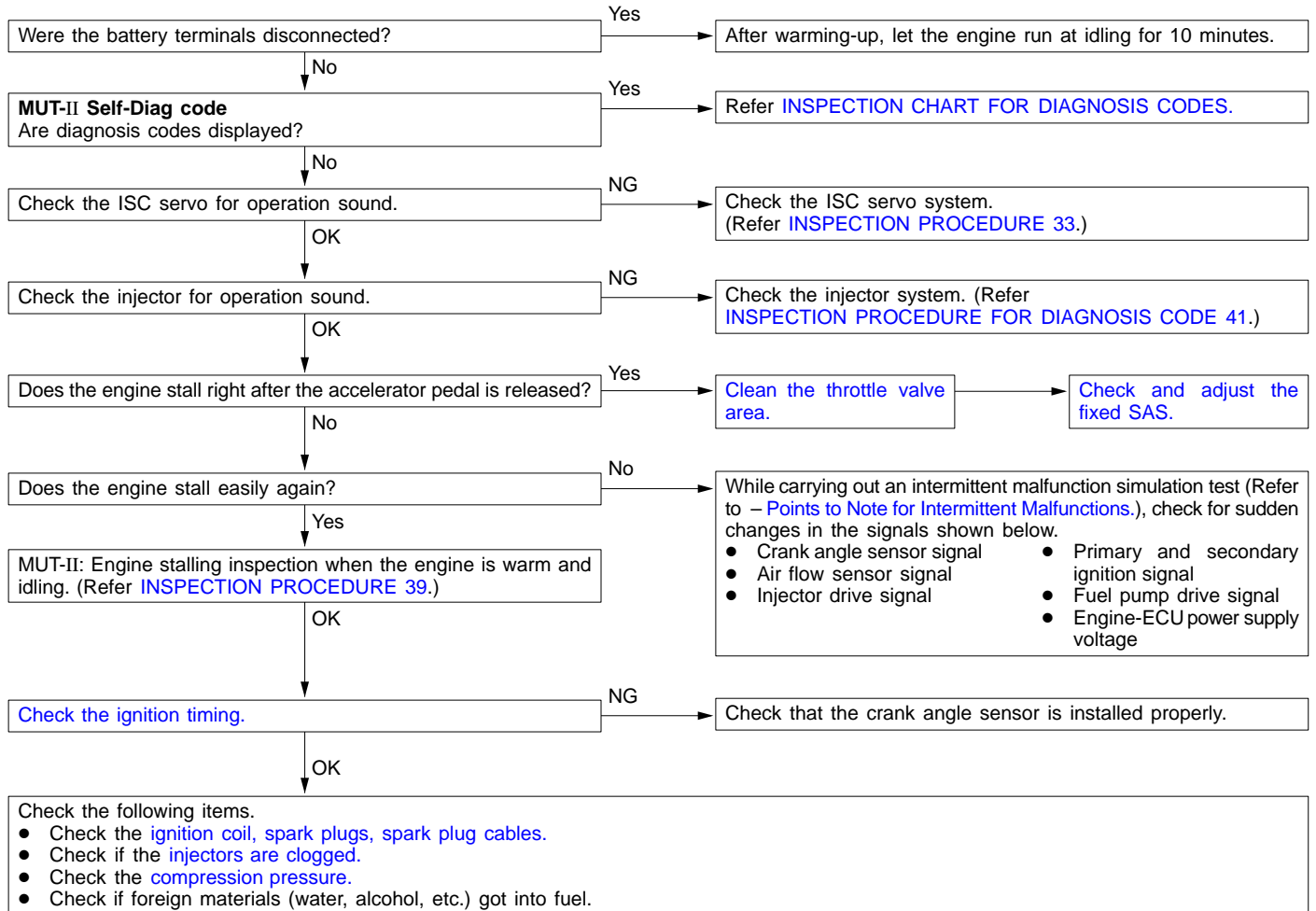
INSPECTION PROCEDURE 11

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



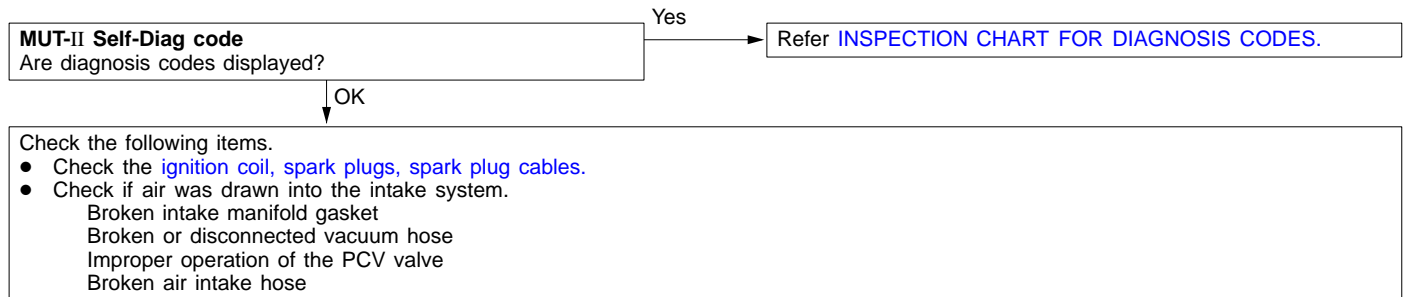
INSPECTION PROCEDURE 12

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



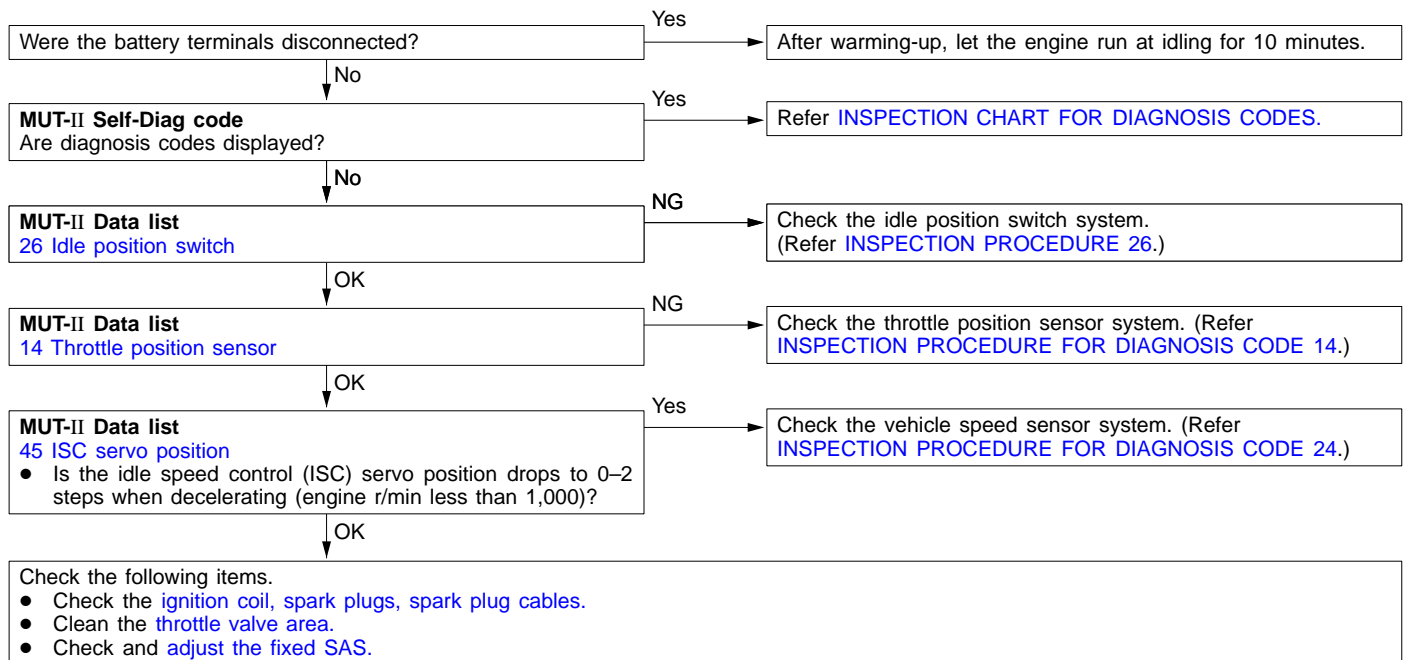
INSPECTION PROCEDURE 13

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



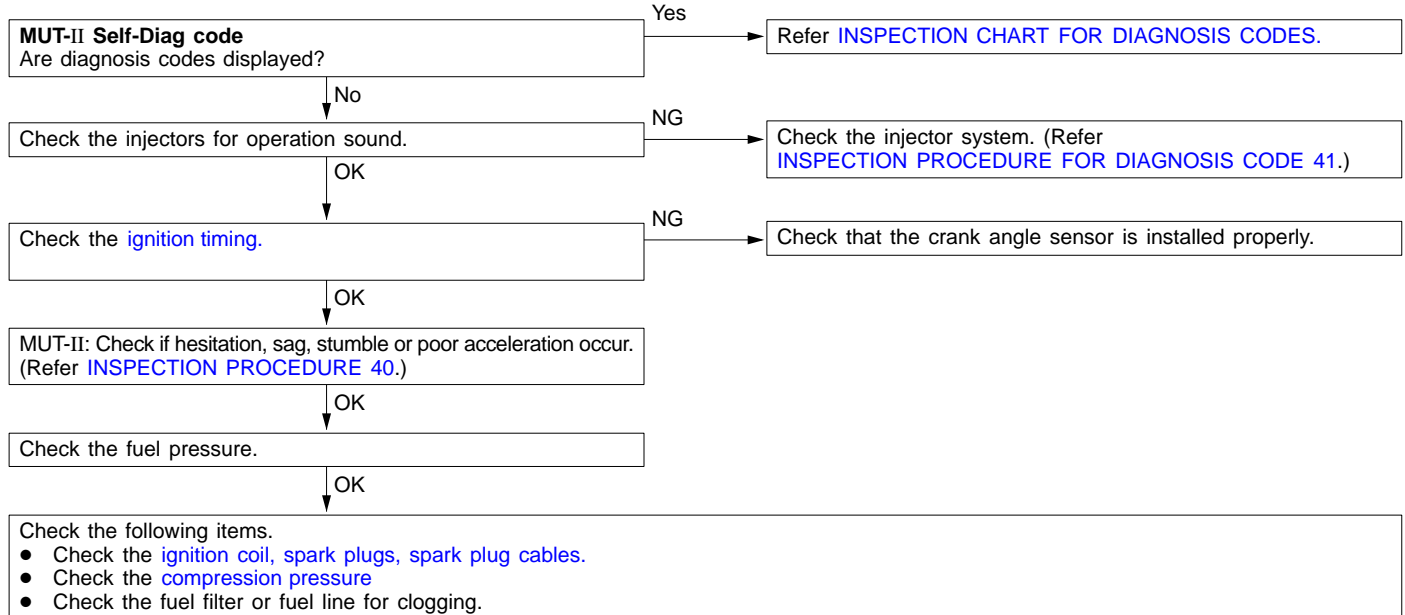
INSPECTION PROCEDURE 14

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



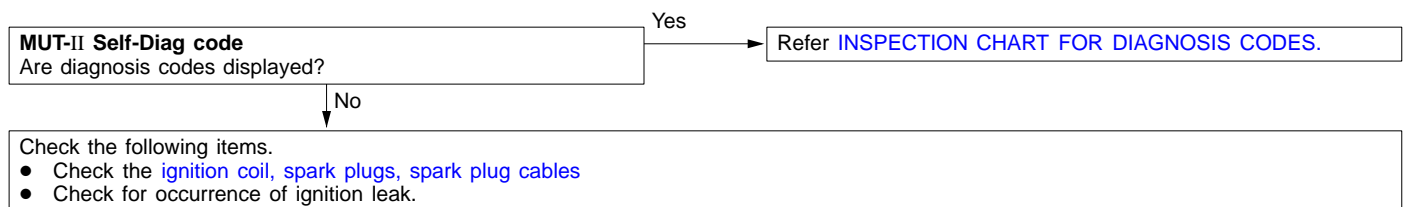
INSPECTION PROCEDURE 15

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



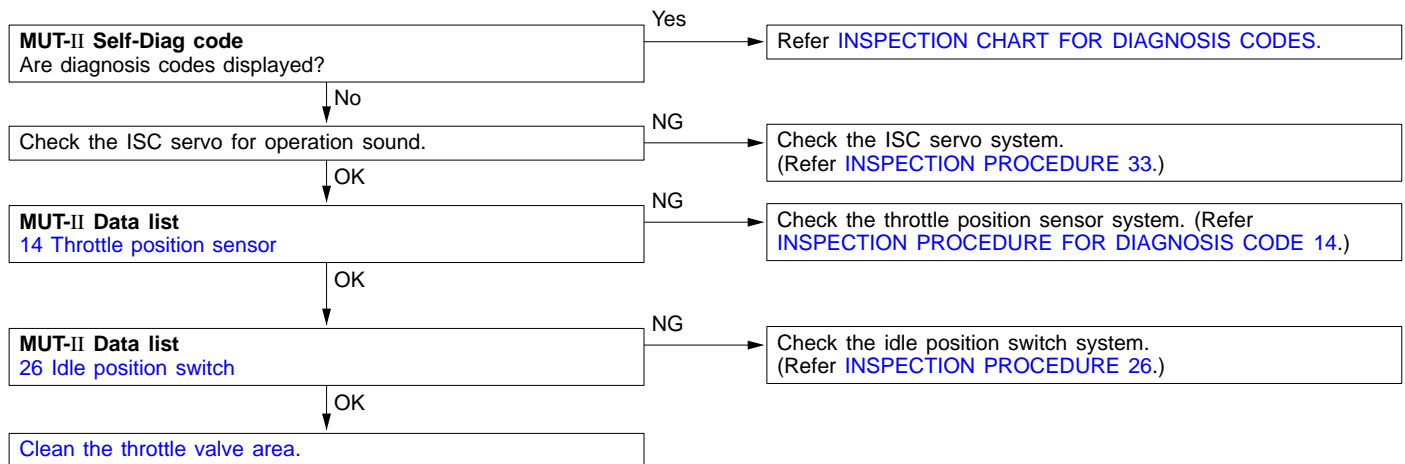
INSPECTION PROCEDURE 16

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



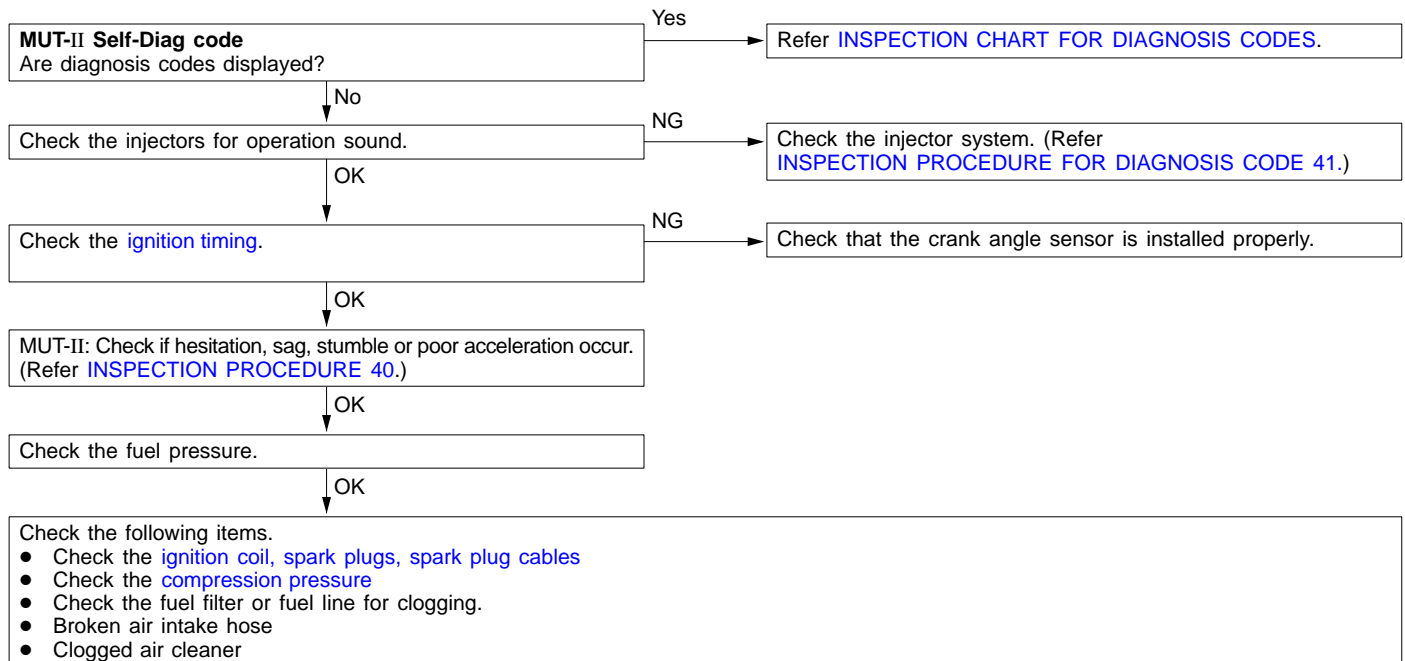
INSPECTION PROCEDURE 17

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



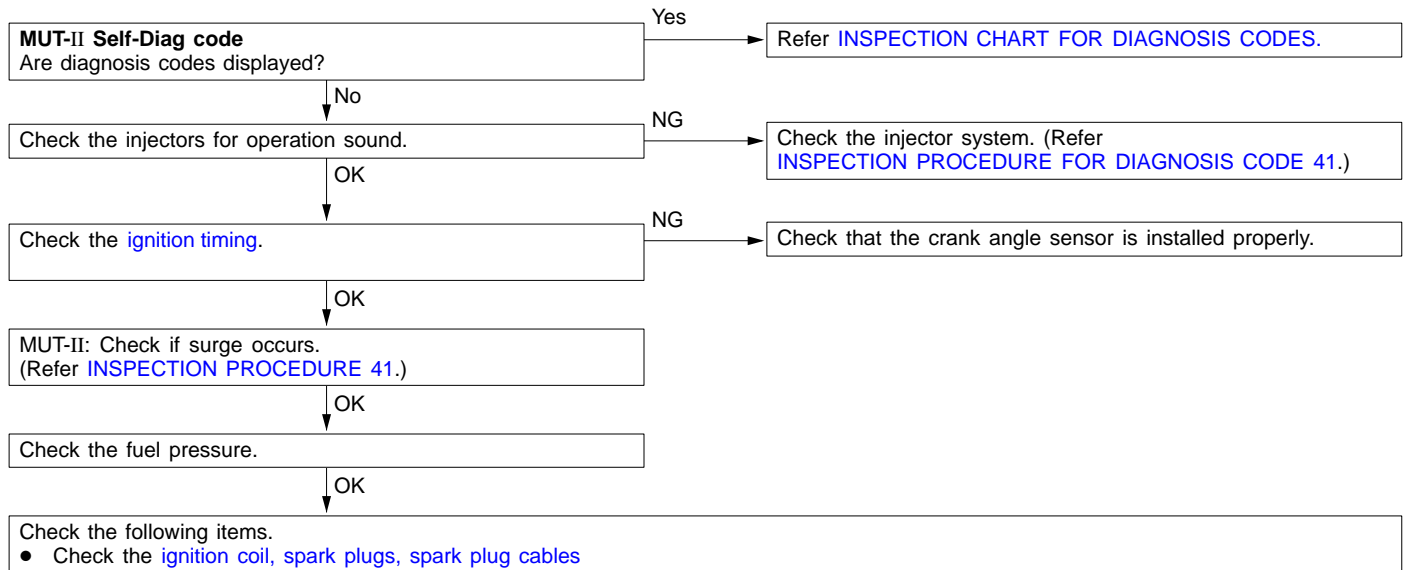
INSPECTION PROCEDURE 18

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



INSPECTION PROCEDURE 19

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



INSPECTION PROCEDURE 20

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

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

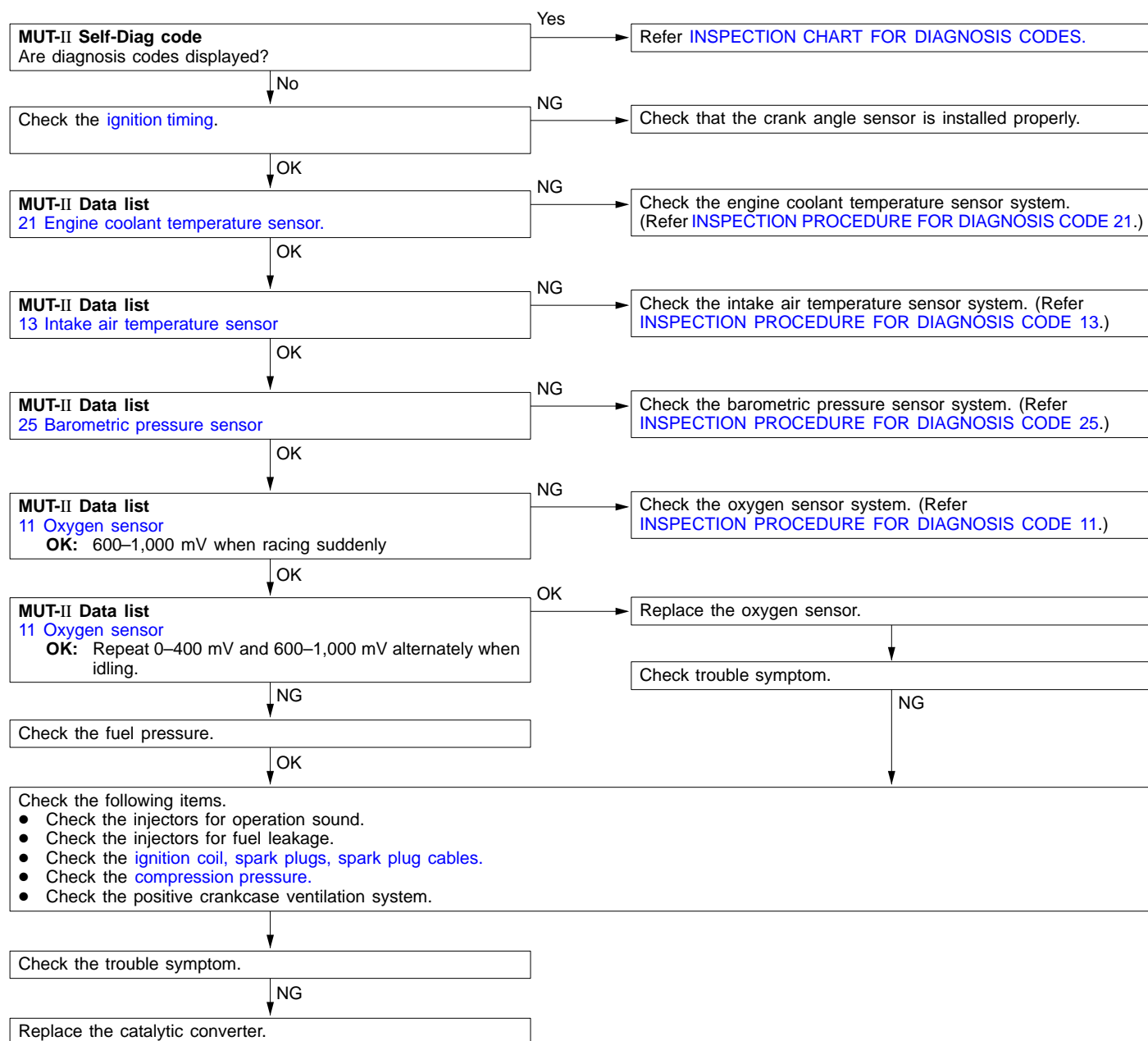
INSPECTION PROCEDURE 21

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

Check the injectors for fuel leakage.

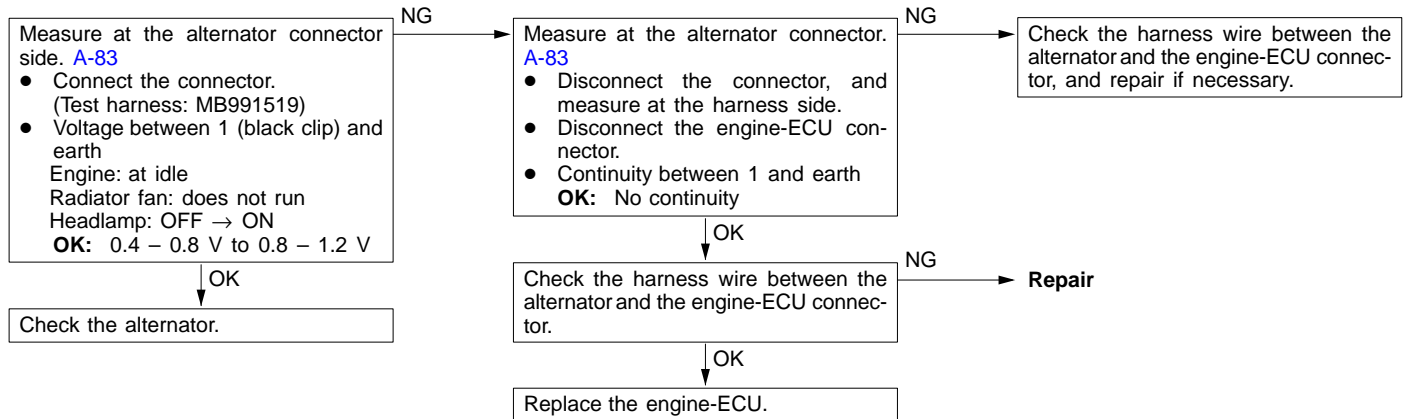
INSPECTION PROCEDURE 22

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



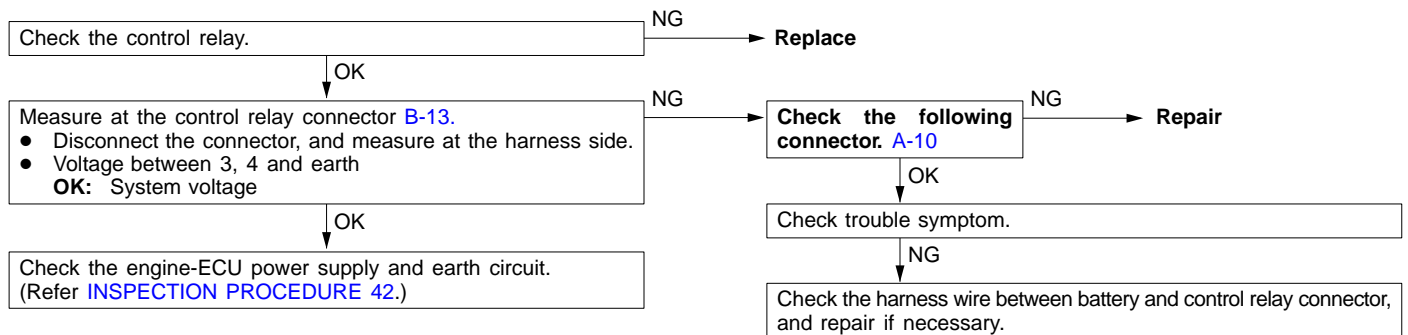
INSPECTION PROCEDURE 23

Low alternator output voltage (approx. 12.3 V)	Probable cause
The alternator may be defective, or malfunctions, which are listed in the right column, may be suspected.	<ul style="list-style-type: none"> Malfunction of charging system (Refer to GROUP 16 – Charging System.) Short circuit in harness between alternator G terminal and engine-ECU Malfunction of engine-ECU



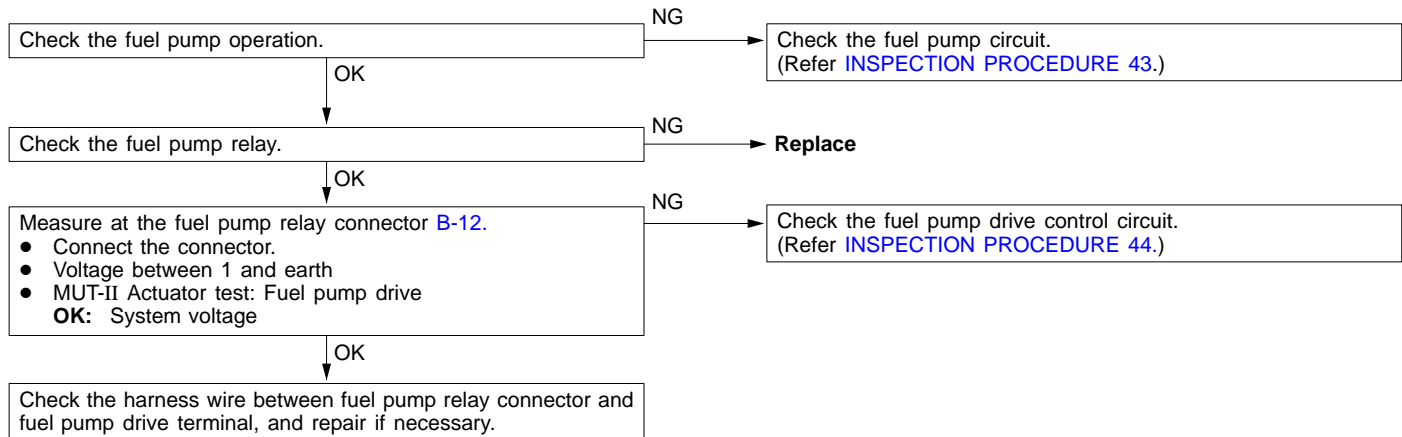
INSPECTION PROCEDURE 24

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



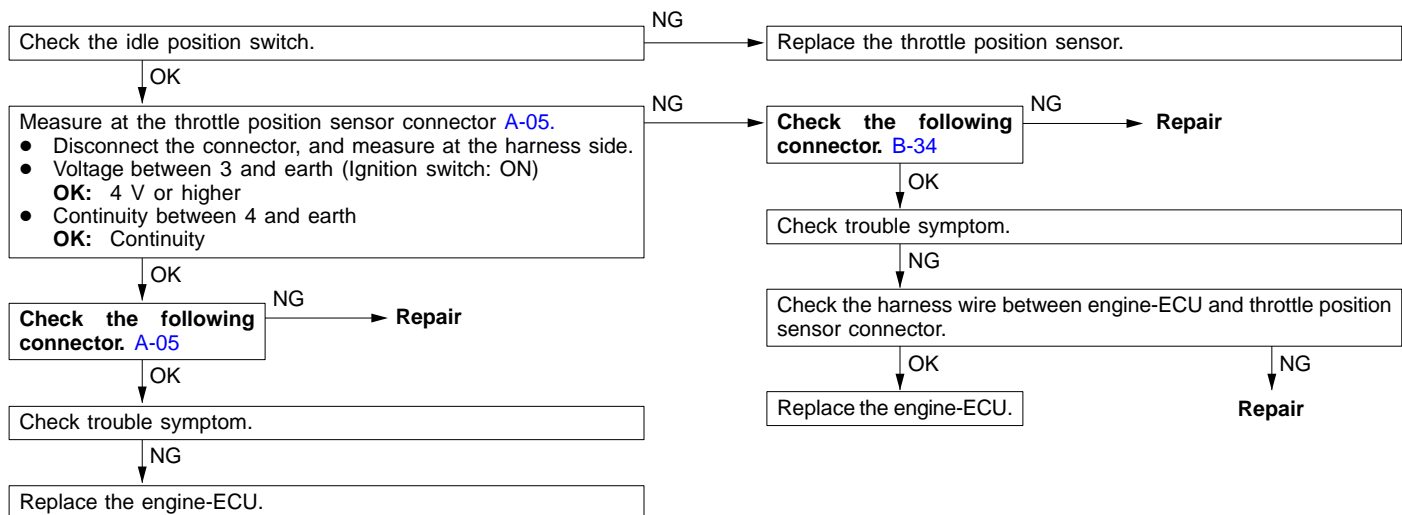
INSPECTION PROCEDURE 25

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



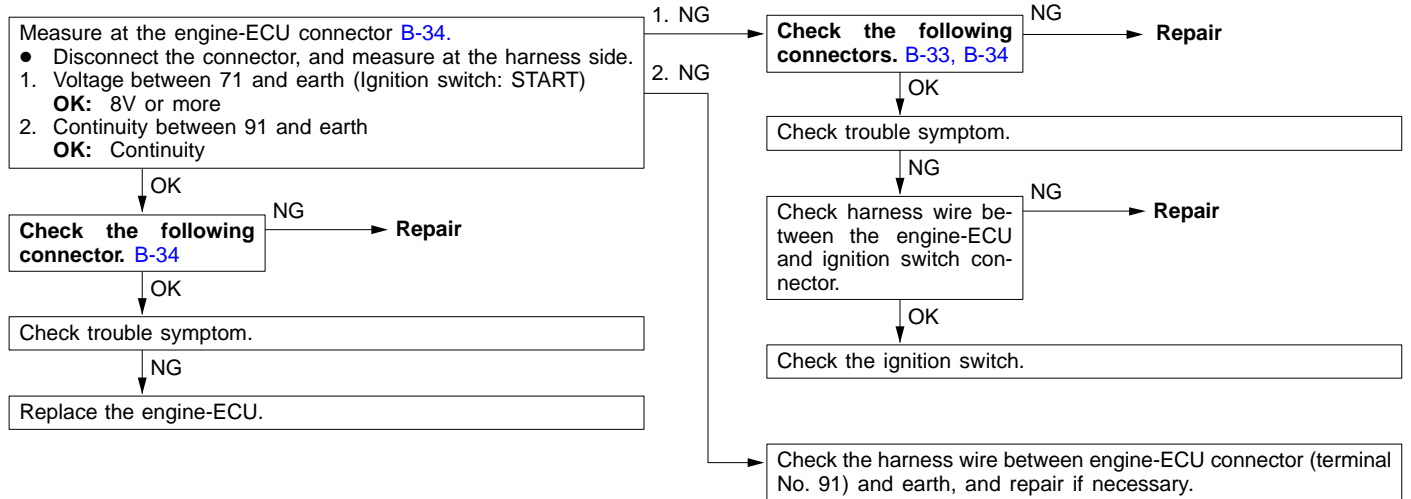
INSPECTION PROCEDURE 26

Idle position switch system	Probable cause
The idle position switch inputs the condition of the accelerator pedal, i.e. whether it is depressed or released (HIGH/LOW), to the engine-ECU. The engine-ECU controls the idle speed control servo based on this input.	<ul style="list-style-type: none"> 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



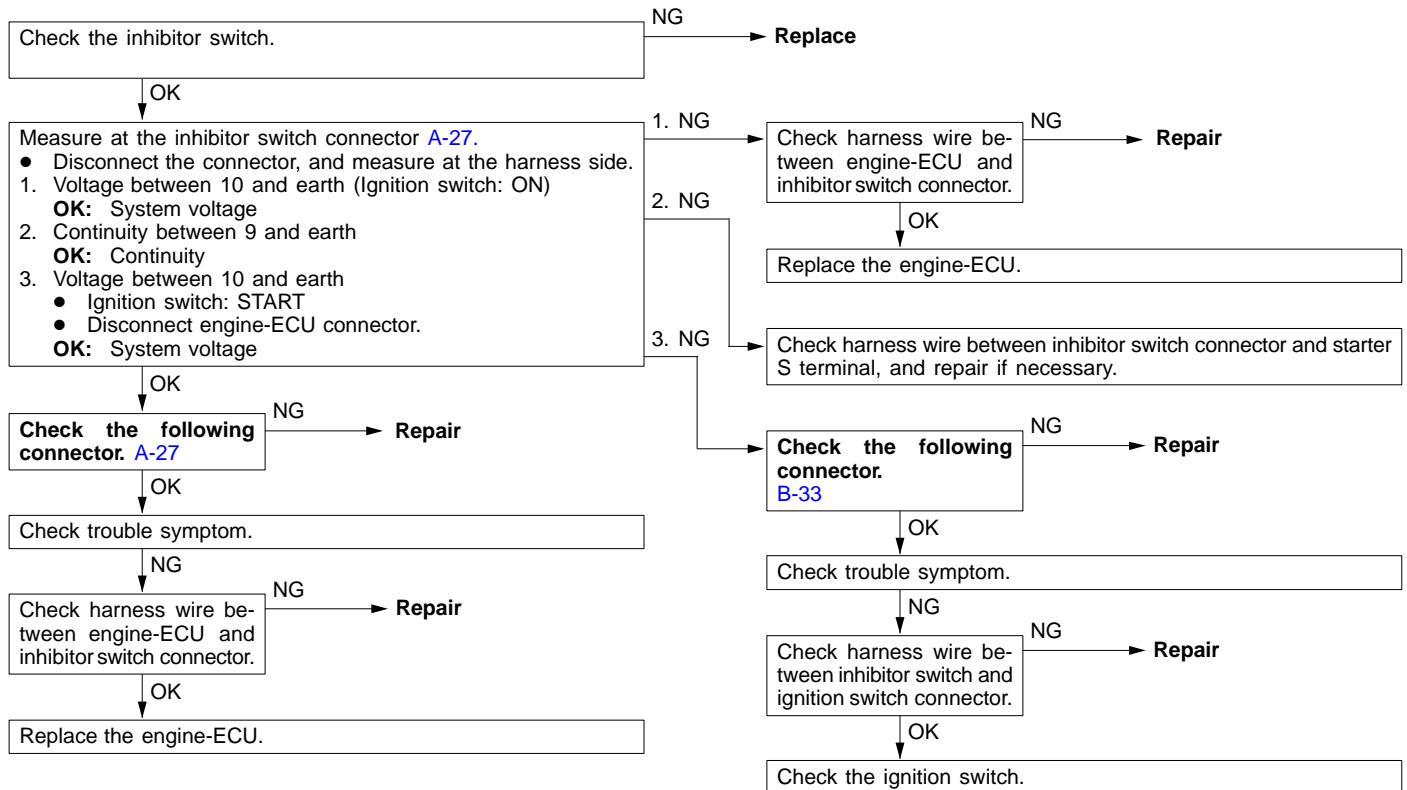
INSPECTION PROCEDURE 27

Ignition switch-ST system <M/T>	Probable cause
<p>The ignition switch-ST inputs a HIGH signal to the engine-ECU while the engine is cranking.</p> <p>The engine-ECU controls fuel injection, etc. during starting based on this input.</p>	<ul style="list-style-type: none"> Malfunction of ignition switch Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU



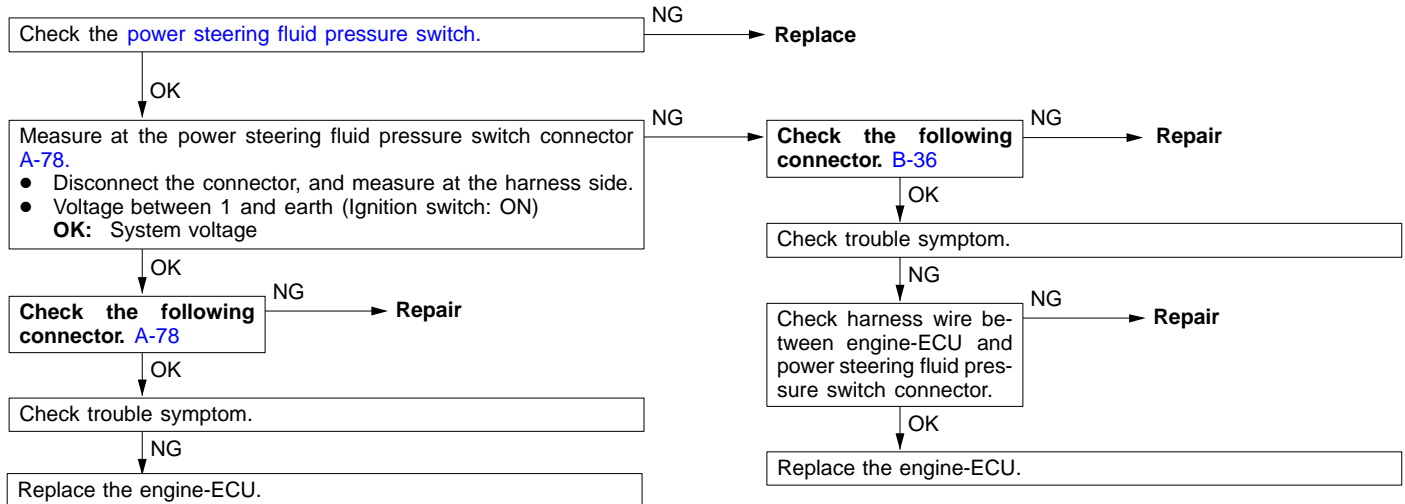
INSPECTION PROCEDURE 28

Ignition switch-ST and inhibitor switch system <A/T>	Probable cause
<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Malfunction of ignition switch Malfunction of inhibitor switch Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU.



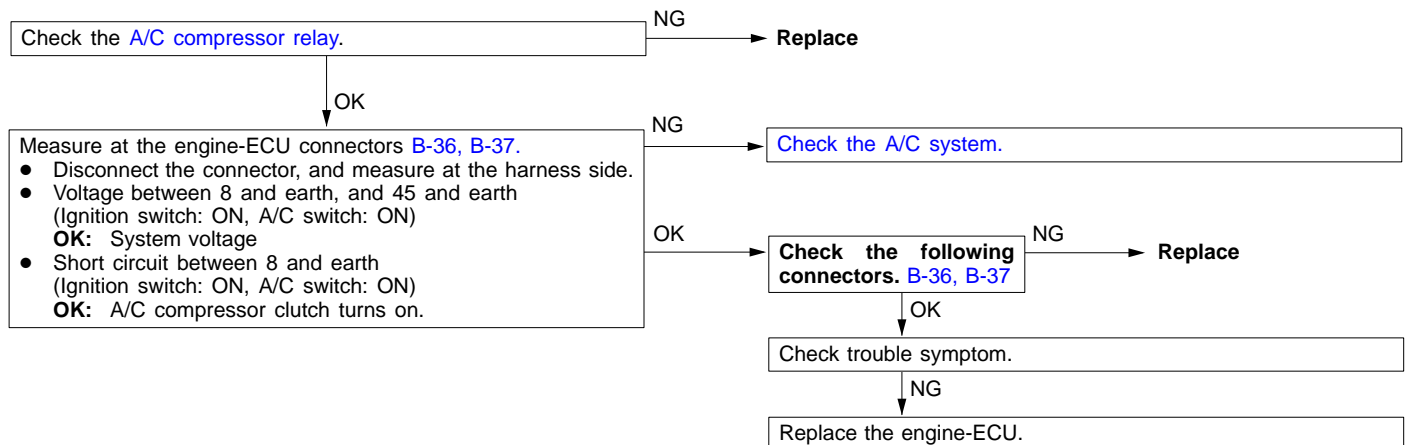
INSPECTION PROCEDURE 29

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.	<ul style="list-style-type: none"> Malfunction of power steering fluid pressure switch Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU



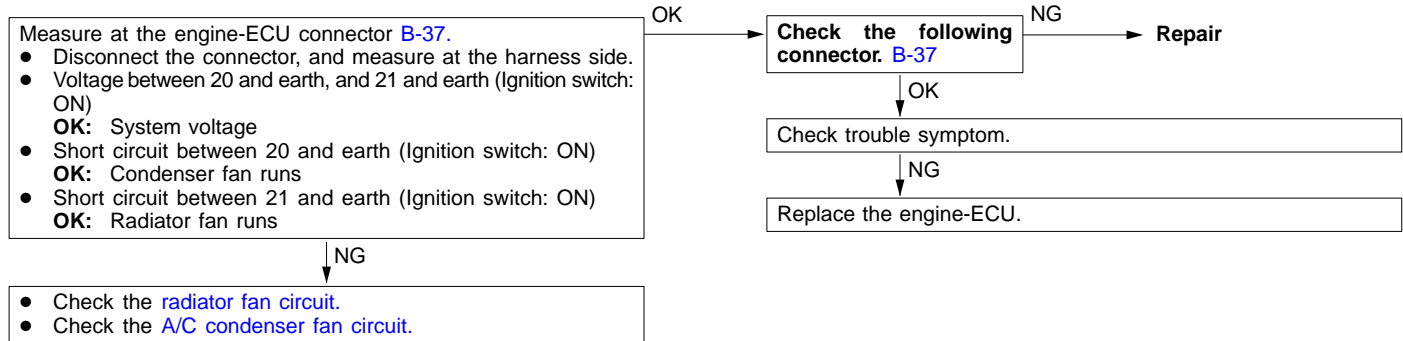
INSPECTION PROCEDURE 30

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.	<ul style="list-style-type: none"> Malfunction of A/C control system Malfunction of A/C switch Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU



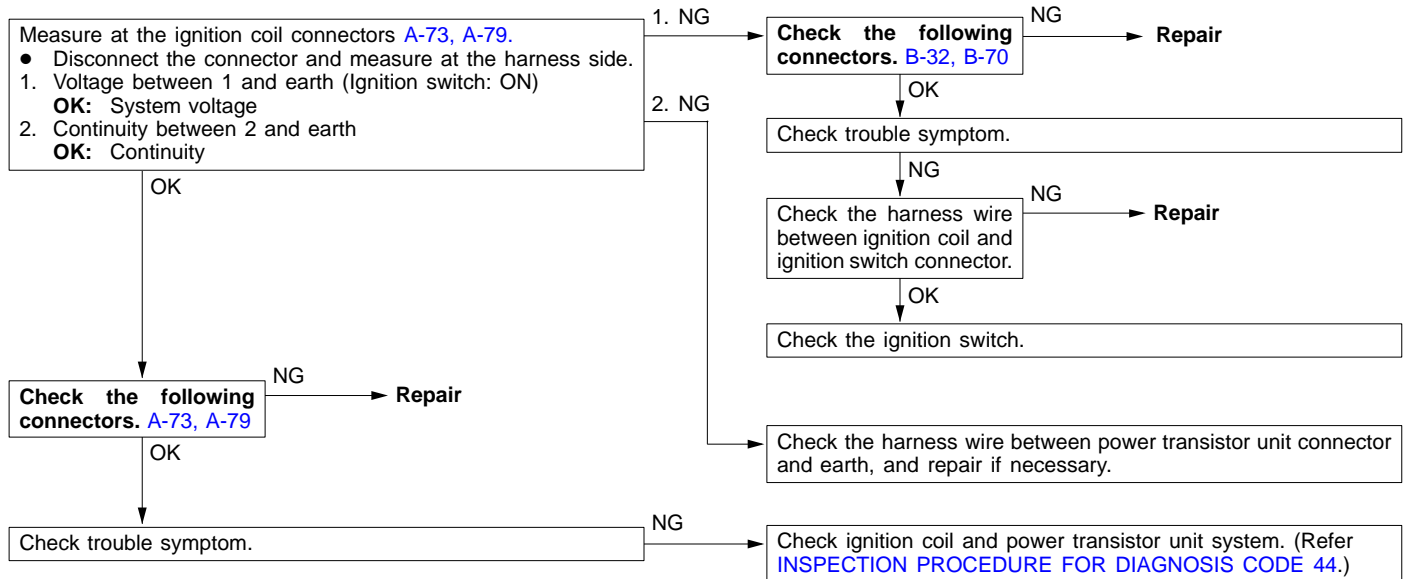
INSPECTION PROCEDURE 31

Fan motor relay system (Radiator fan, A/C condenser fan)	Probable cause
The power transistor inside the engine-ECU turns the fan motor relay on and off.	<ul style="list-style-type: none"> Malfunction of fan motor relay Malfunction of fan motor Improper connector contact, open circuit or short-circuited harness wire Malfunction of engine-ECU



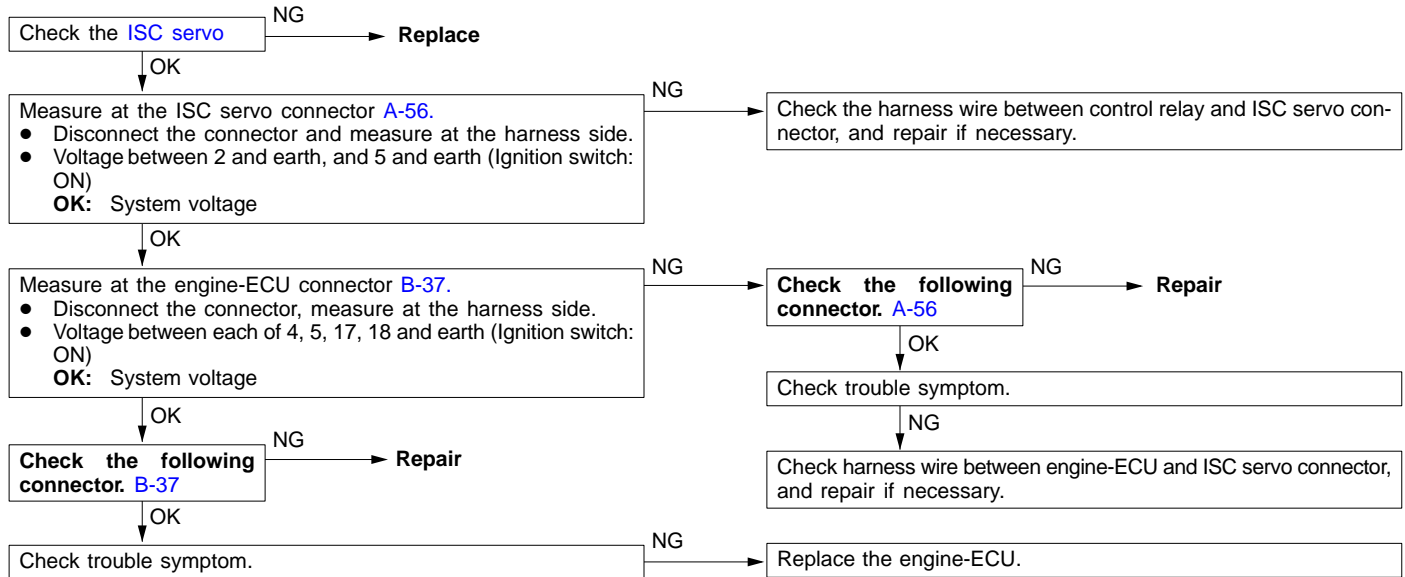
INSPECTION PROCEDURE 32

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.	<ul style="list-style-type: none"> Malfunction of ignition switch. Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU



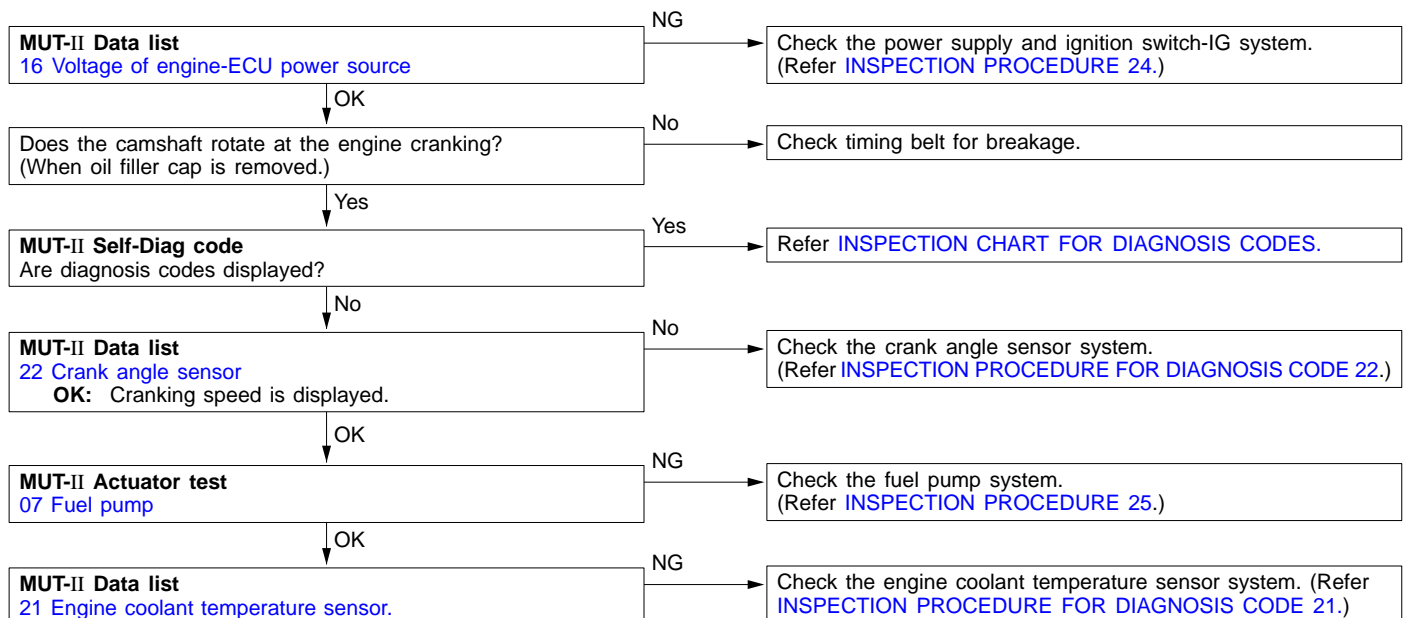
INSPECTION PROCEDURE 33

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.	<ul style="list-style-type: none"> Malfunction of ISC servo Improper connector contact, open circuit or short-circuited harness wire Malfunction of the engine-ECU



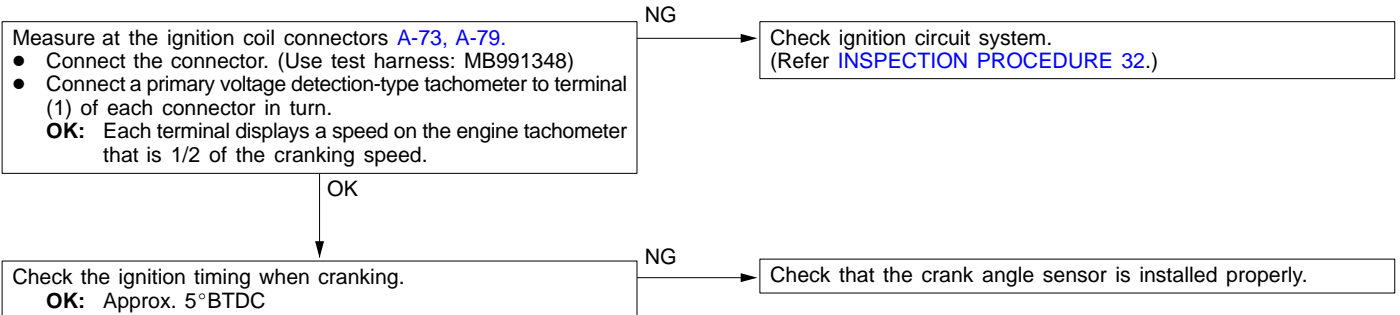
INSPECTION PROCEDURE 34

MUT-II: Inspection of no initial combustion



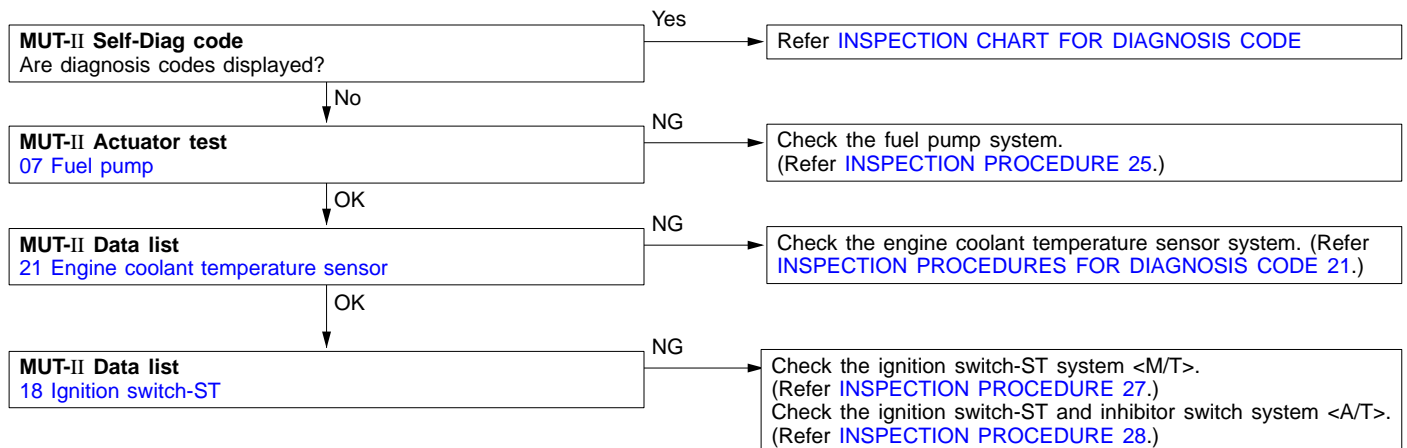
INSPECTION PROCEDURE 35

Ignition system: Inspection of no initial combustion.



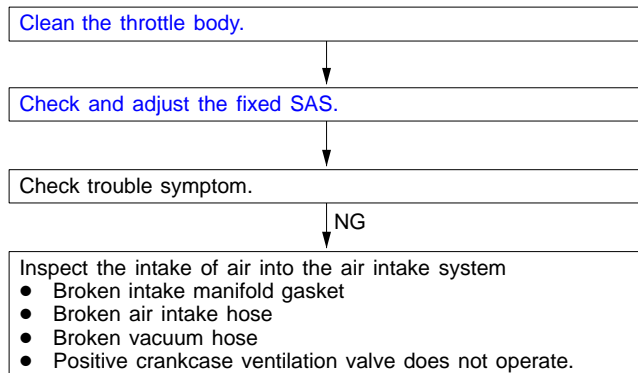
INSPECTION PROCEDURE 36

MUT-II: Check if uncomplete combustion occurs.



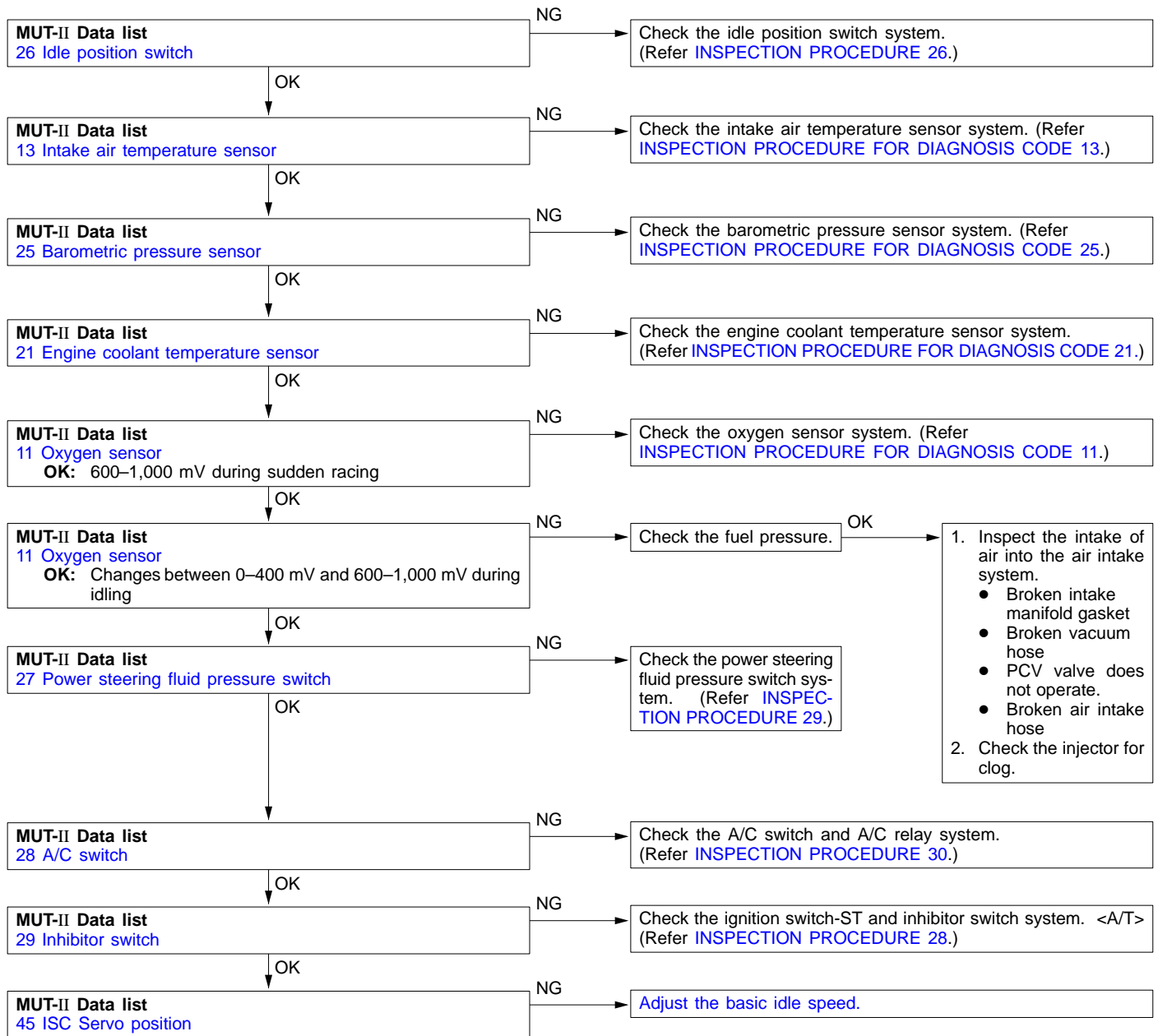
INSPECTION PROCEDURE 37

Check if hunting occurs.

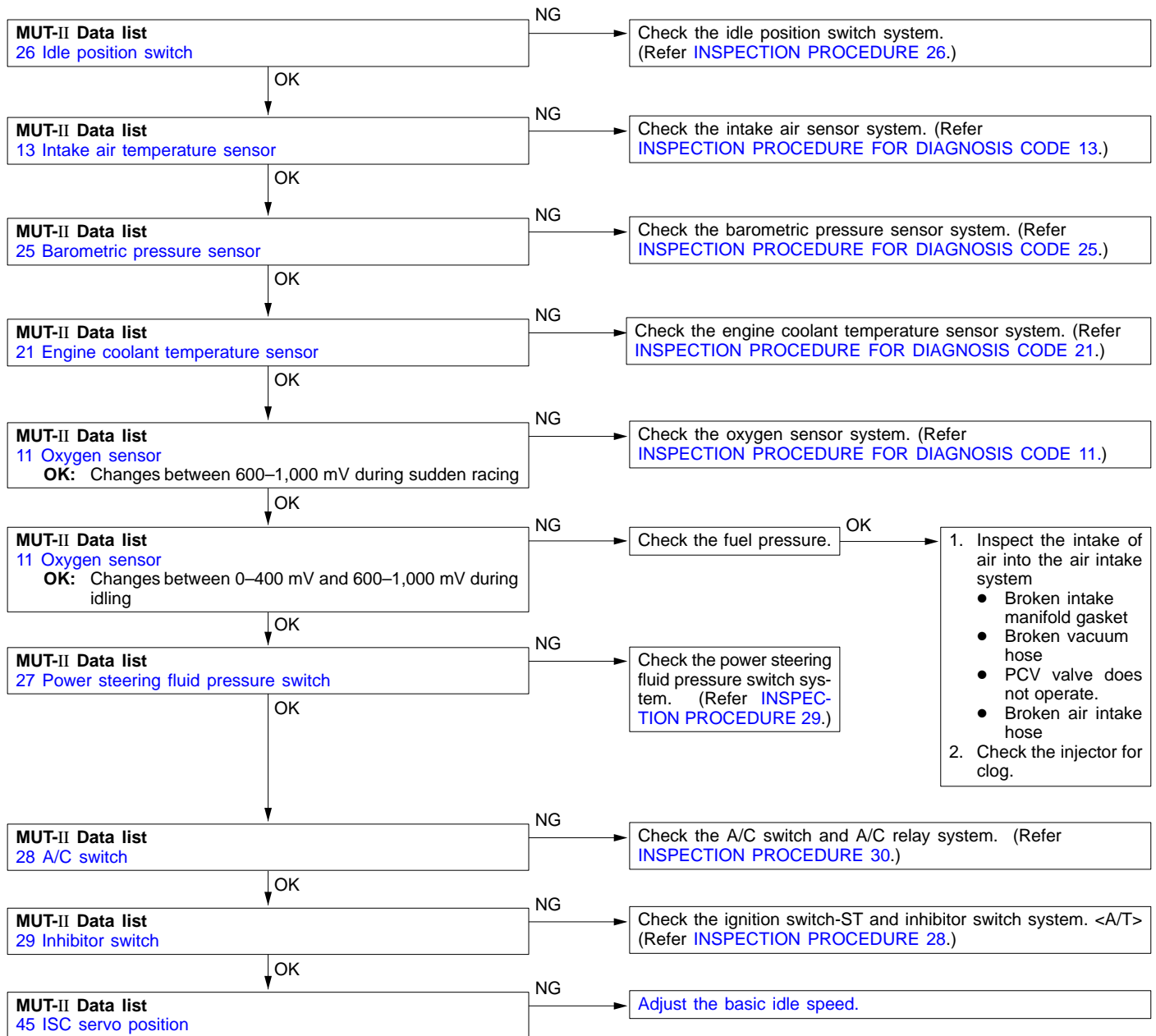


INSPECTION PROCEDURE 38

MAIN

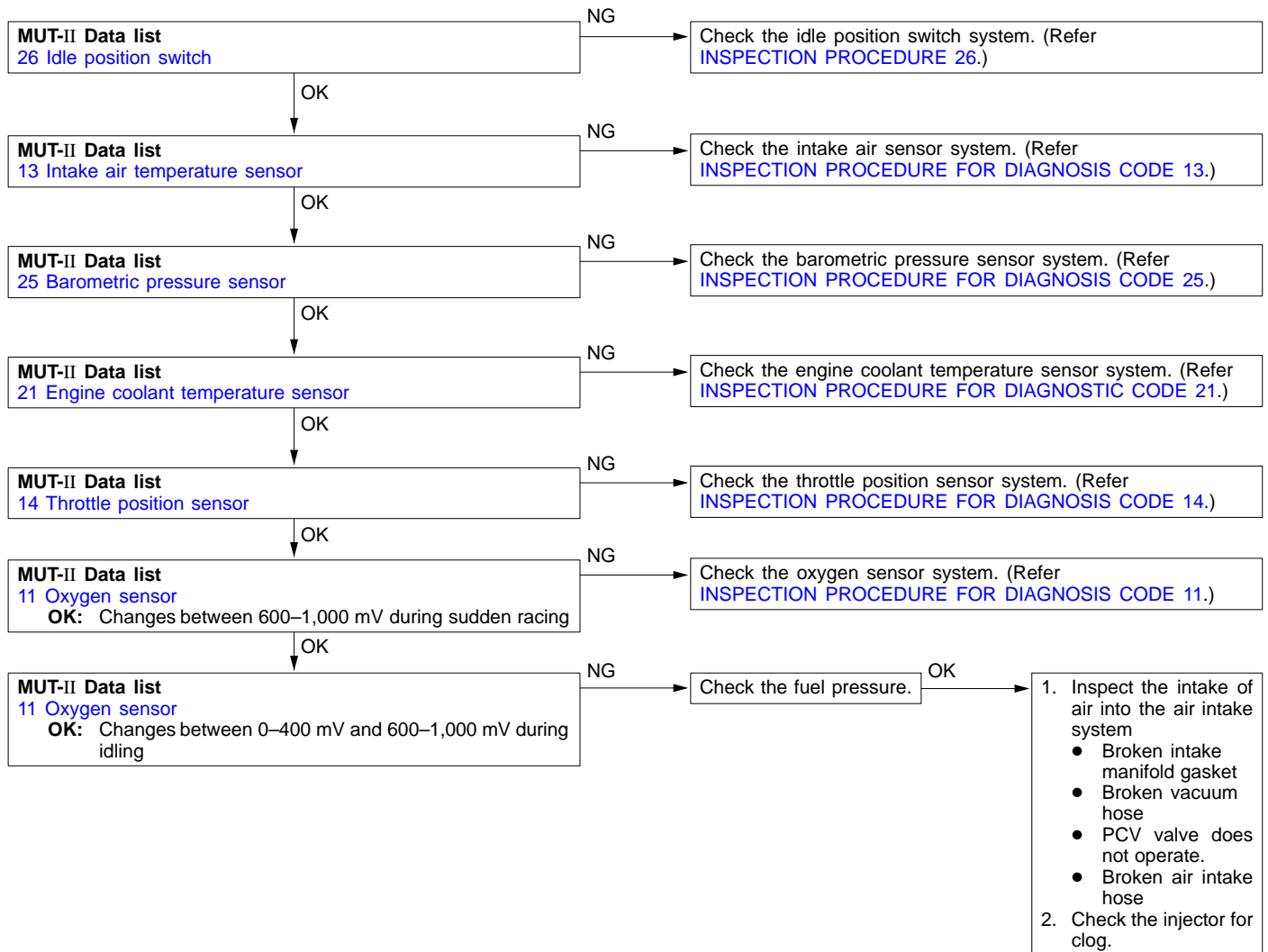
MUT-II: Check if idling speed is unstable.Group
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INSPECTION PROCEDURE 39

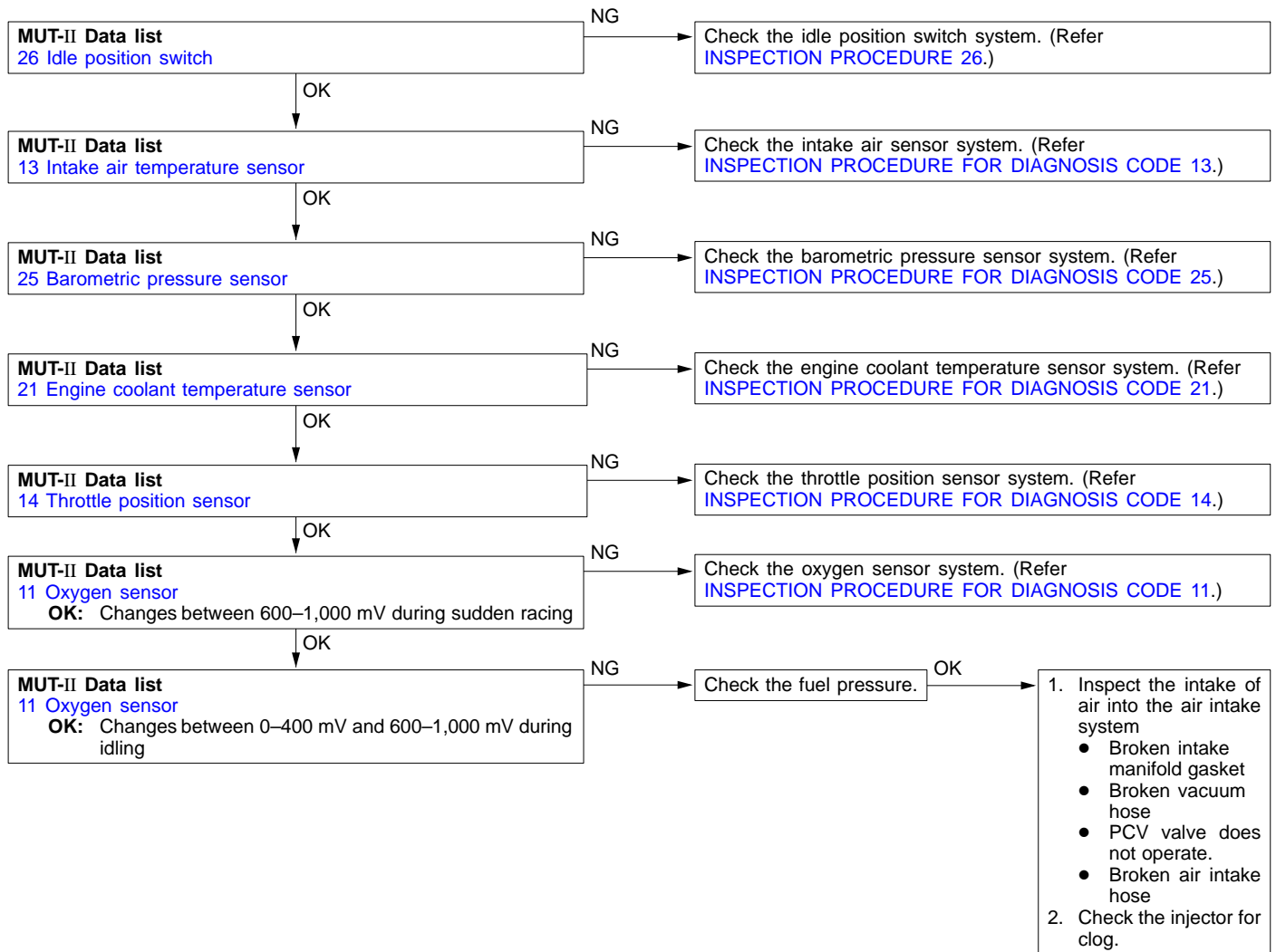
MUT-II: Engine stalling inspection when the engine is warmed up and idling.

INSPECTION PROCEDURE 40

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

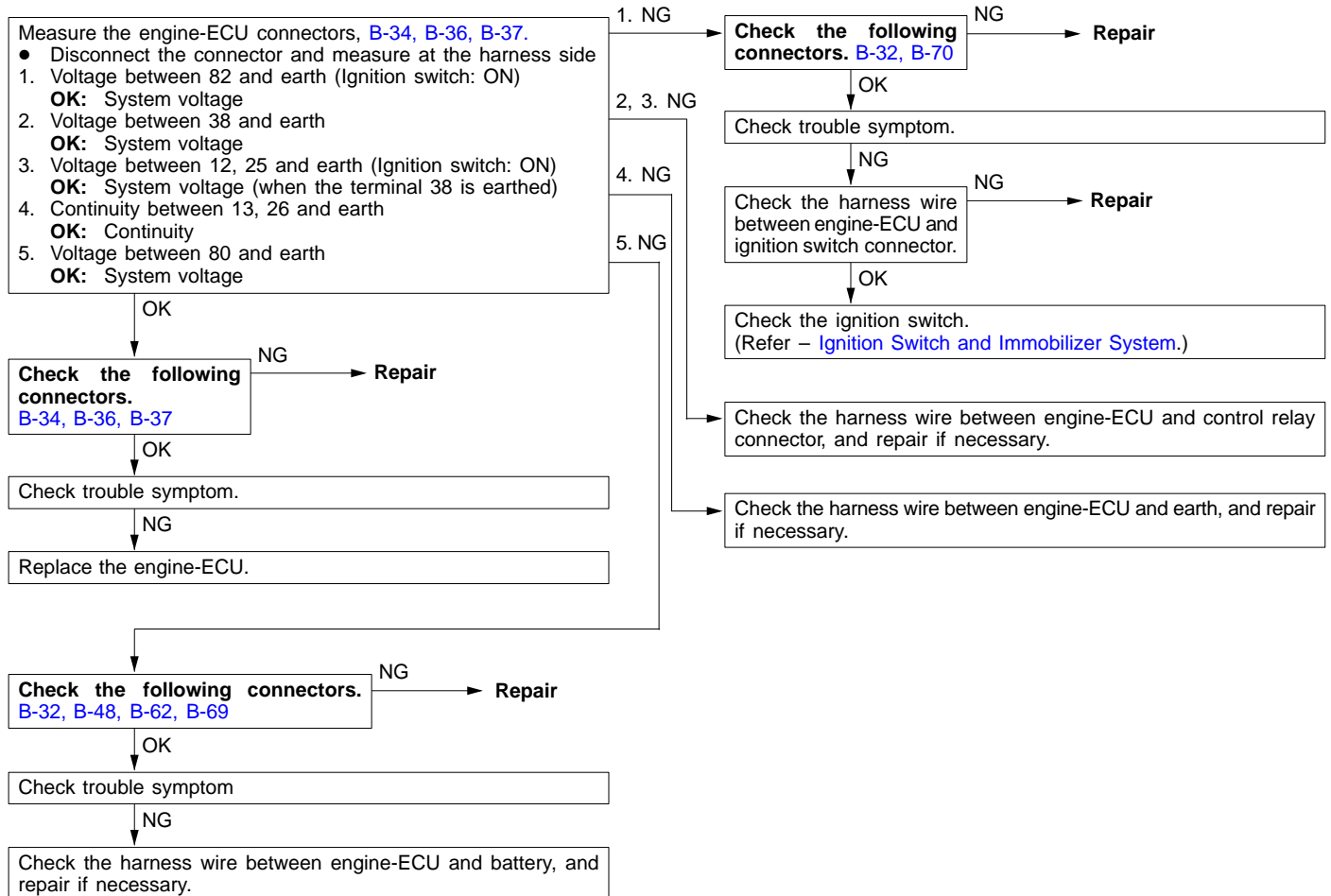


INSPECTION PROCEDURE 41

MUT-II: Check if surge occurs.

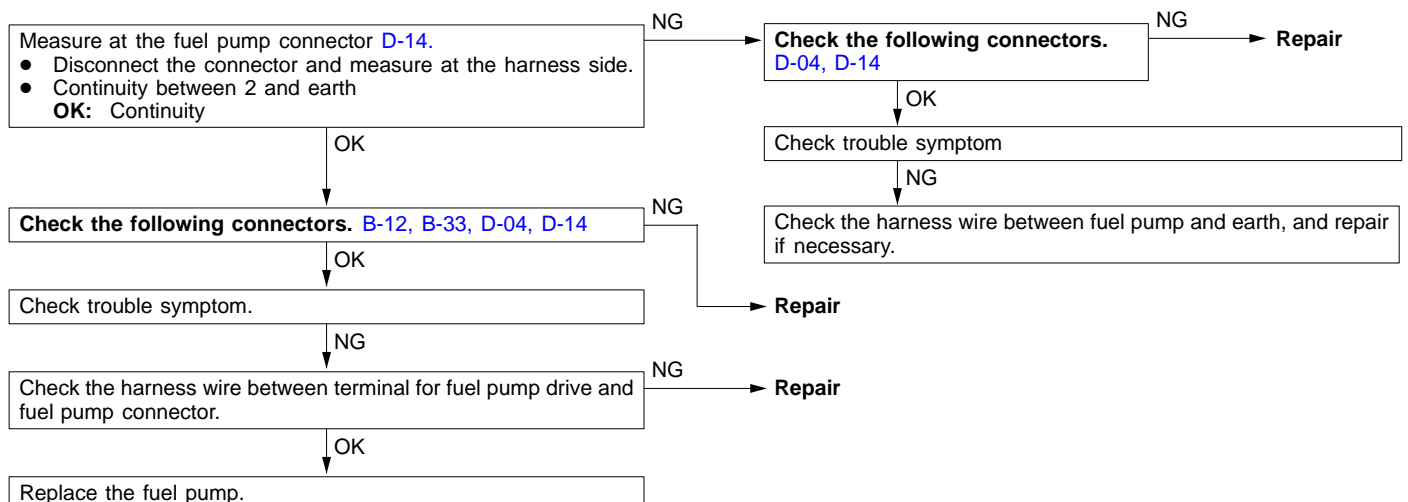
INSPECTION PROCEDURE 42

Check the engine-ECU power supply and earth circuit.



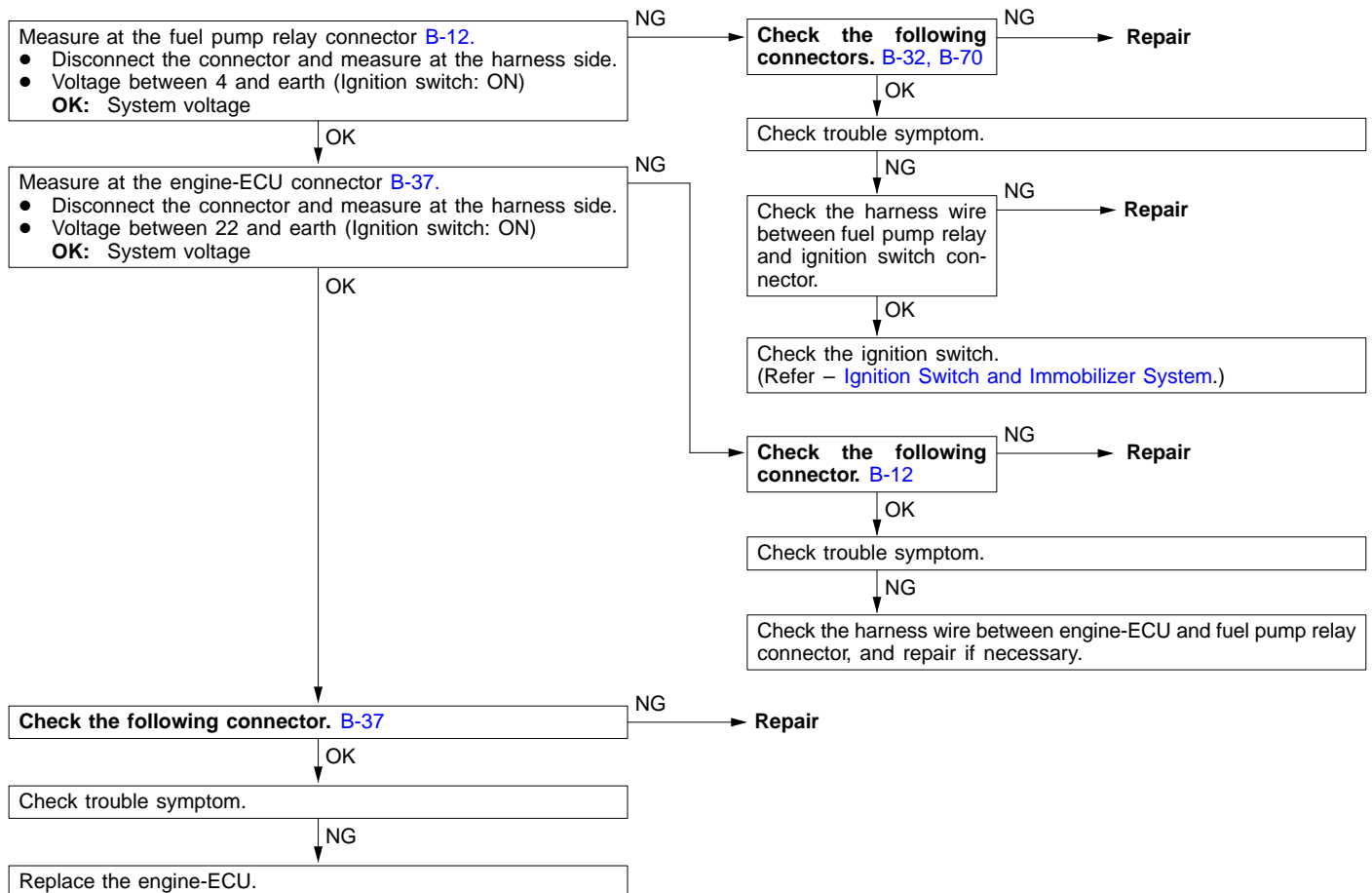
INSPECTION PROCEDURE 43

Check fuel pump circuit.



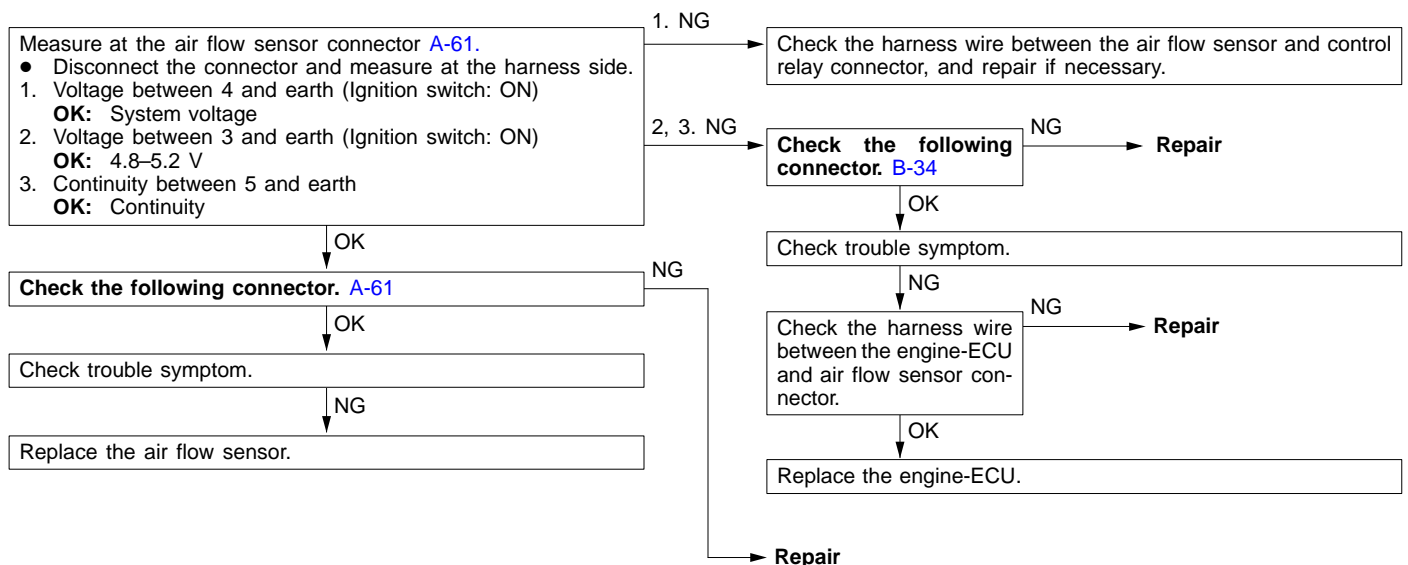
INSPECTION PROCEDURE 44

Check the fuel pump drive control circuit.



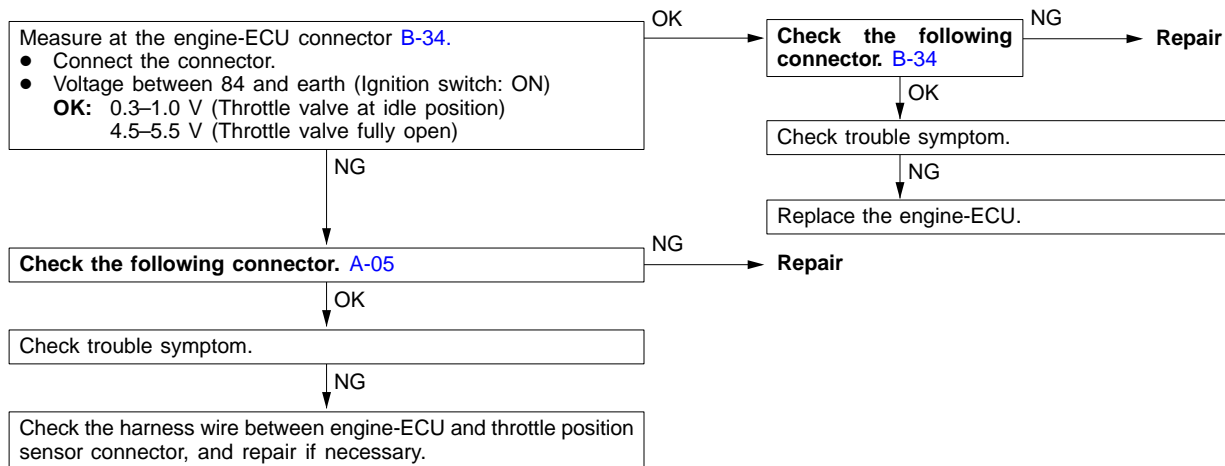
INSPECTION PROCEDURE 45

Check air flow sensor (AFS) control circuit.



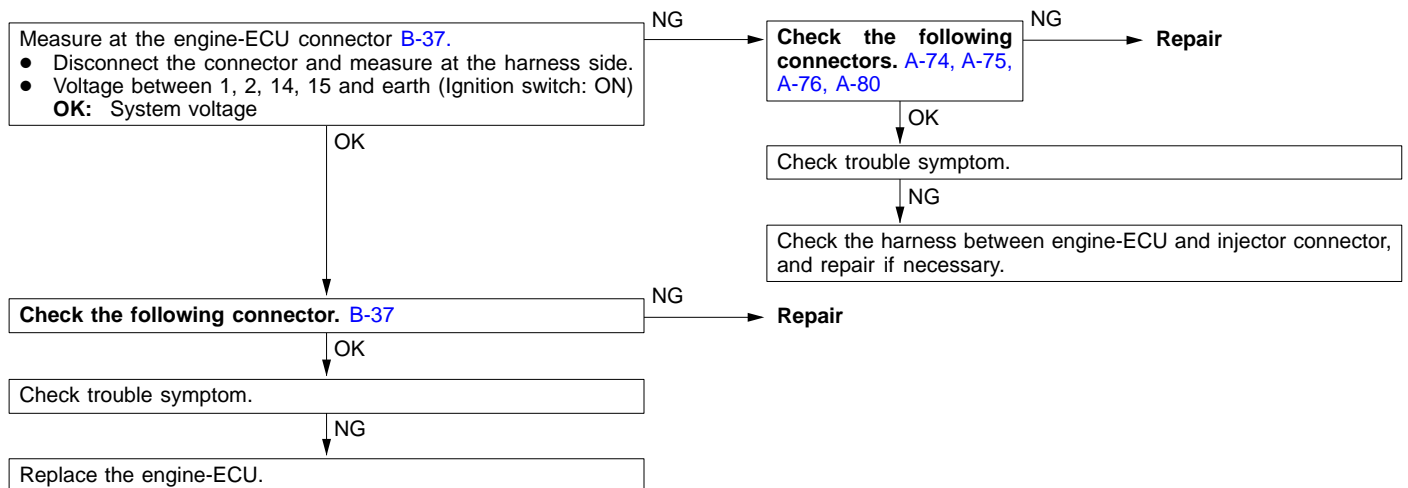
INSPECTION PROCEDURE 46

Check throttle position sensor (TPS) output circuit.



INSPECTION PROCEDURE 47

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

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.
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
			When engine is suddenly raced	600–1,000 mV	
		Engine:After having warmed up The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECU.	Engine is idling	400 mV or less (Changes) 600–1,000 mV	
			2,500 r/min	400 mV or less (Changes) 600–1,000 mV	
12	Air flow sensor*1	<ul style="list-style-type: none"> ● Engine coolant temperature: 80–95°C ● Lamps, electric cooling fan and all accessories: OFF ● Transmission: Neutral (A/T: P range) 	Engine is idling	25–51 Hz	–
			2,500 r/min	80–120 Hz	
			Engine is raced	Frequency increases in response to racing	

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Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.
13	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	
14	Throttle position sensor	Ignition switch: ON	Set to idle position	300–1,000 mV	Code No. 14
			Gradually open	Increases in proportion to throttle opening angle	
			Open fully	4,500–5,500 mV	
16	Power supply voltage	Ignition switch: ON		System voltage	Procedure No. 24
18	Cranking signal (ignition switch-ST)	Ignition switch: ON	Engine: Stopped	OFF	Procedure No. 27 <M/T>
			Engine: Cranking	ON	Procedure No. 28 <A/T>
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	

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Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.
22	Crank angle sensor	<ul style="list-style-type: none"> Engine: Cranking Tachometer: Connected 	Compare the engine speed readings on the tachometer and the MUT-II.	Accord	Code No. 22
			When engine coolant temperature is -20°C	1,400–1,600 rpm	
		<ul style="list-style-type: none"> Engine: Idling Idle position switch: ON 	When engine coolant temperature is 0°C	1,350–1,550 rpm	
			When engine coolant temperature is 20°C	1,300–1,500 rpm	
			When engine coolant temperature is 40°C	1,100–1,300 rpm	
			When engine coolant temperature is 80°C	650–850 rpm	
25	Barometric pressure sensor	Ignition switch: ON	At altitude of 0 m	101 kPa	Code No. 25
			At altitude of 600 m	95 kPa	
			At altitude of 1,200 m	88 kPa	
			At altitude of 1,800 m	81 kPa	
26	Idle position switch	Ignition switch: ON Check by operating accelerator pedal repeatedly	Throttle valve: Set to idle position	ON	Procedure No. 26
			Throttle valve: Slightly open	OFF*2	
27	Power steering fluid pressure switch	Engine: Idling	Steering wheel stationary	OFF	Procedure No. 29
			Steering wheel turning	ON	

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Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.
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
			A/C switch: ON	ON	
29	Inhibitor switch <A/T>	Ignition switch: ON	P or N	P or N	Procedure No. 28
			D, 2, L or R	D, 2, L or R	
41	Injectors *3	Engine: Cranking	When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously)	13–19 ms	–
			When engine coolant temperature is 20°C	27–40 ms	
			When engine coolant temperature is 80°C	5.9–8.9 ms	
	Injectors*4	<ul style="list-style-type: none"> Engine coolant temperature: 80–95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral (A/T : P range) 	Engine is idling	1.7–2.9 ms	
			2,500 r/min	1.4–2.6 ms	
			When engine is suddenly raced	Increases	
44	Ignition coils and power transistors	<ul style="list-style-type: none"> Engine: After having warmed up Timing lamp is set. (The timing lamp is set in order to check actual ignition timing.) 	Engine is idling	2–18° BTDC	–
			2,500 r/min	30–50° BTDC	

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Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.
45	ISC (stepper) motor position *5	<ul style="list-style-type: none"> Engine coolant temperature: 80–95°C Lamps, electric cooling fan and all accessories: OFF Transmission: Neutral (A/T : P range) Idle position switch: ON Engine: Idling When A/C switch is ON, A/C compressor should be operating 	A/C switch: OFF	2–25 STEP	–
			A/C switch: OFF → ON	Increases by 10–70 steps	
			<ul style="list-style-type: none"> A/C switch: OFF Select lever: N range → D range 	Increases by 5–50 steps	
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
			A/C switch: ON	ON (Compressor clutch is operating)	

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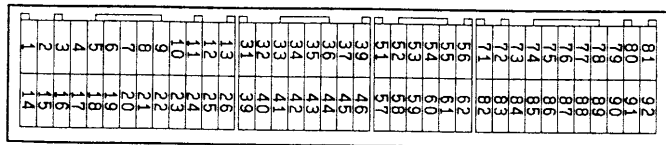
ACTUATOR TEST REFERENCE TABLE

Item No.	Inspection item	Drive contents	Inspection contents		Normal condition	Inspection procedure No.
01	Injectors	Cut fuel to No. 1 injector	Engine: 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
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.	<ul style="list-style-type: none"> Engine: Cranking Fuel pump: Forced driving Inspect according to both the above conditions.	Pinch the return hose with fingers to feel the pulse of the fuel being recirculated.	Pulse is felt.	Procedure No. 25
				Listen near the fuel tank for the sound of fuel pump operation.	Sound of operation is heard.	
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)	<ul style="list-style-type: none"> Ignition switch: ON A/C switch: ON 		Fan motor operates	Procedure No. 31
21	Radiator fan	Drive the fan motors (radiator)	<ul style="list-style-type: none"> Ignition switch: ON 		Fan motor operates	Procedure No. 31

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

Comparing the engine-ECU for the 4G93 engine with that for the 4G92 engine, the terminal arrangement of the A/C relay and fuel pump relay

are different. In addition, terminals Nos.6, 9, and 60 are reserve terminals. The others are the same as for the 4G92 engine.



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<Vehicle with immobilizer system>

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
8	A/C relay	<ul style="list-style-type: none"> Engine: Idle speed A/C switch: OFF → ON (A/C compressor is operating) 	System voltage or momentarily 6 V or more → 0 – 3 V
22	Fuel pump relay	Ignition switch: ON	System voltage
		Engine: Idle speed	0 – 3 V

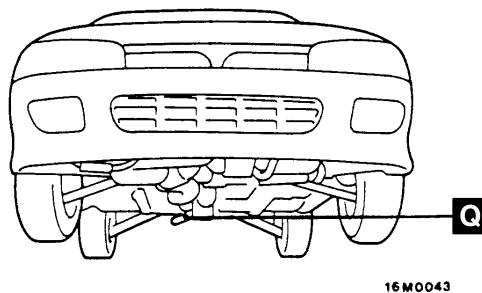
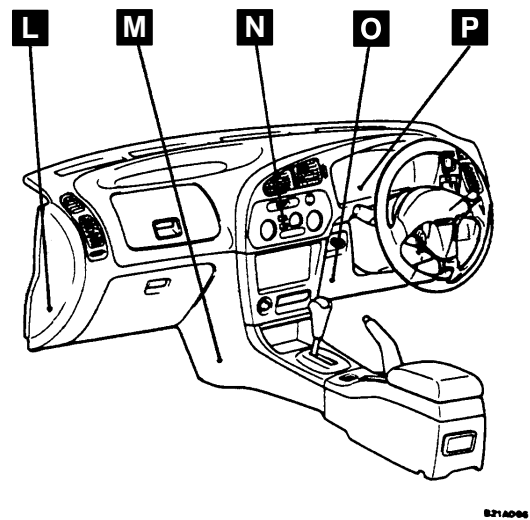
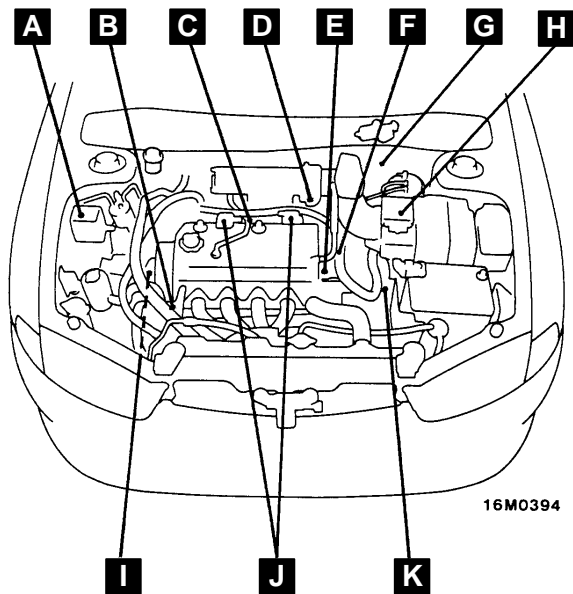
ON-VEHICLE SERVICE**BASIC IDLE SPEED ADJUSTMENT**

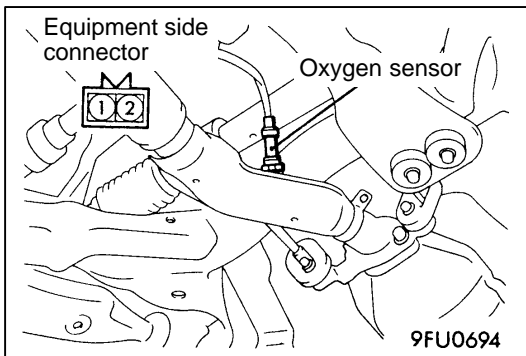
Inspection procedure is the same as vehicle with 4G92 engine.

Standard value: 700 ± 50 r/min

COMPONENT LOCATION

Name	Symbol	Name	Symbol
A/C relay	A	Fuel pump check terminal	G
A/C switch	N	Idle speed control servo	D
Air flow sensor (with intake air temperature sensor and barometric pressure sensor)	H	Ignition coil	J
Camshaft position sensor	E	Inhibitor switch <A/T>	K
Control relay and fuel pump relay	M	Injector	C
Crank angle sensor	I	Oxygen sensor	Q
Diagnosis connector	O	Power steering fluid pressure switch	B
Engine coolant temperature sensor	F	Throttle position sensor (with idle position switch)	D
Engine-ECU	M	Vehicle speed sensor	K
Engine warning lamp (check engine lamp)	P		





OXYGEN SENSOR CHECK

1. Warm the engine and check that the engine coolant temperature is 80 – 95 °C.
2. Disconnect the oxygen sensor connector and connect a digital voltmeter.

3. While repeatedly racing the engine, measure the oxygen sensor output voltage.

Standard value:

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

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

NOTE

For removal and installation of the oxygen sensor, refer – [Exhaust Manifold](#).