
FUEL

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MULTIPOINT INJECTION (MPI)

GENERAL

OUTLINE OF CHANGE

- The descriptions of the troubleshooting using an MUT-II tester have been added.
- The fuel system and its management of EVOLUTION-VI are different from those of EVOLUTION-V in the following items. Accordingly, the service procedures for these items are described herein. The service procedures for the remaining item are the same as those for EVOLUTION-V.
 - Fan motor control
 - Fuel pump drive control
 - Fuel pump relay No.2
 - Fuel pump resistor
 - Actuator test function of MUT-II (The test of the following items has been made possible.)
 - a) Item No.36: Secondary air control solenoid valve
 - b) Item No.37: Air conditioner condenser fan (High)
 - c) Item No.38: Air conditioner condenser fan (Low)

MPI System Diagram

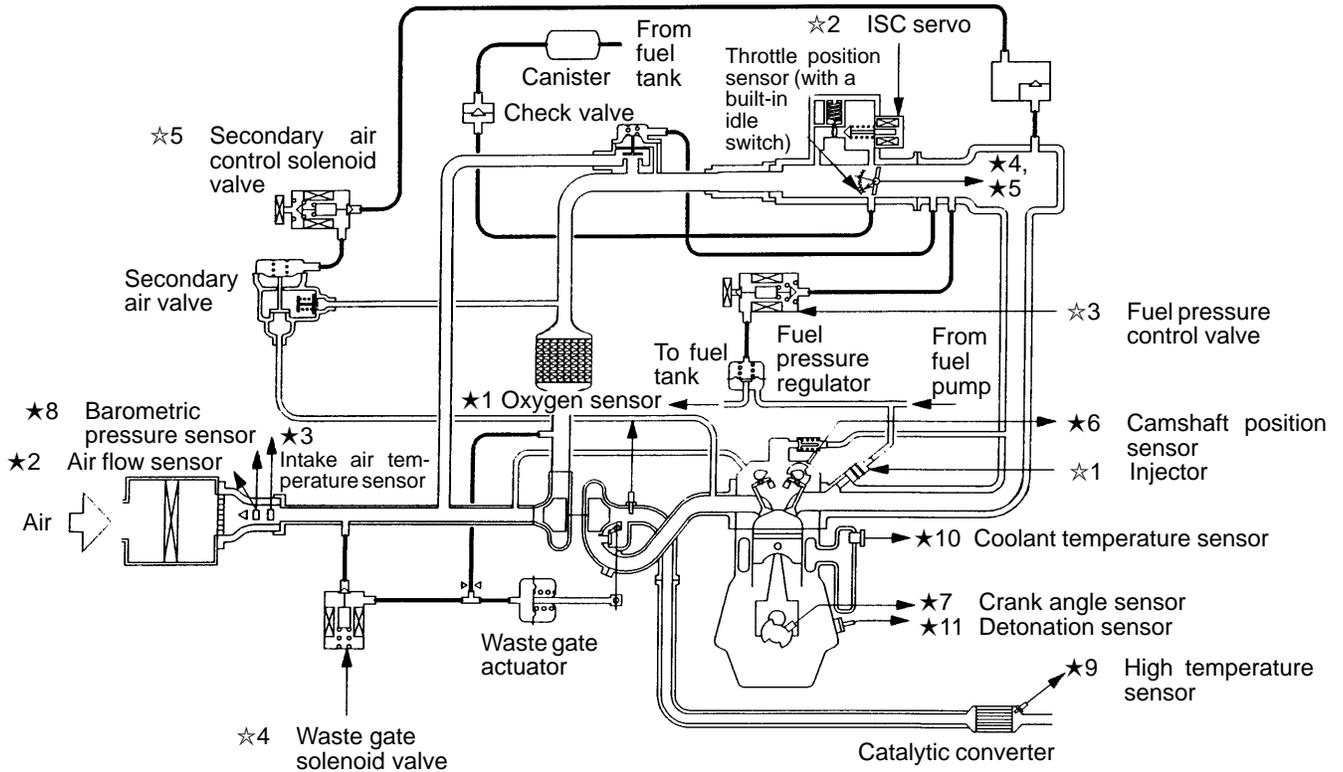
- ★1 Oxygen sensor
- ★2 Air flow sensor
- ★3 Intake air temperature sensor
- ★4 Throttle position sensor
- ★5 Idle switch
- ★6 Camshaft position sensor
- ★7 Crank angle sensor
- ★8 Barometric pressure sensor
- ★9 High temperature sensor
- ★10 Engine coolant temperature sensor
- ★11 Detonation sensor

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

⇒ Engine ECU ⇒

- ★1 Injector
- ★2 ISC servo
- ★3 Fuel pressure control valve
- ★4 Waste gate solenoid valve
- ★5 Secondary air control solenoid valve

- Control relay
- Fuel pump relay
- A/C relay
- Ignition coil
- Exhaust temperature warning lamp
- Engine warning lamp
- Diagnosis output
- Alternator G terminal
- Fan motor relay
- Tachometer
- Fuel pump relay No.2



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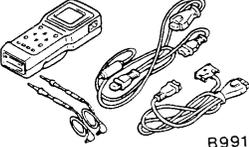
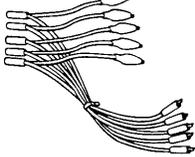
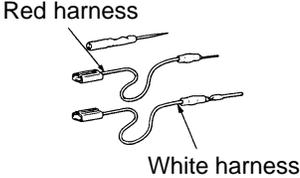
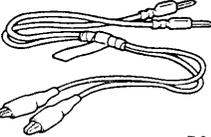
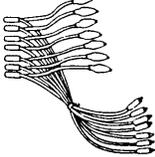
SERVICE SPECIFICATIONS

Items		Specifications
Basic ignition timing °BTDC		5 ± 3
Basic idle speed rpm		850 ± 50
Throttle position sensor adjusting voltage mV		400 – 1,000
Throttle position sensor resistance kΩ		3.5 – 6.5
ISC servo coil resistance (at 20°C) Ω		28 – 33
Intake air temperature sensor resistance kΩ	At 20°C	2.3 – 3.0
	At 80°C	0.30 – 0.42
Coolant temperature sensor resistance kΩ	At 20°C	2.1 – 2.7
	At 80°C	0.26 – 0.36
Fuel pressure kPa	When vacuum hose is connected	230
	When vacuum hose is disconnected	289 – 309
Injector coil resistance Ω		2 – 3
Amount of injector fuel leak drop/min		1 or less
Oxygen sensor output voltage V		0.6 – 1.0
Fuel pressure control valve coil resistance (at 20°C) Ω		28 – 36

SEALANT

Item	Specified sealant	Remark
Engine coolant temperature sensor threaded portion	3M Nut Locking Part No.4171 or equivalent	Drying sealant

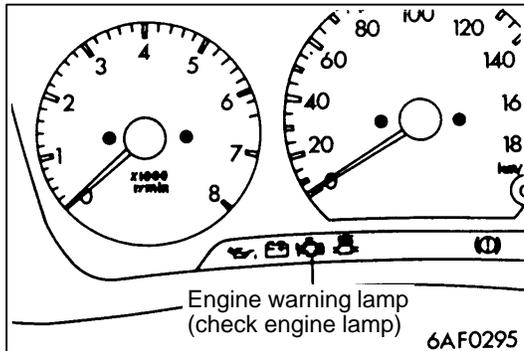
SPECIAL TOOLS

Tool	Number	Name	Use
 <p>B991502</p>	MB991502	MUT-II sub assembly	MPI system inspection
	MB991348	Test harness set	<ul style="list-style-type: none"> • Measurement of voltage during troubleshooting • Inspection using an oscilloscope
	MB991519	Alternator harness connector	Measurement of voltage during troubleshooting
	MD998478	Test harness (3-pin, triangle)	<ul style="list-style-type: none"> • Measurement of voltage during troubleshooting • Inspection using an oscilloscope
 <p>Red harness</p> <p>White harness</p>	MB991223	Inspection test harness set <ul style="list-style-type: none"> • Pin contact pressure inspection harness • Market tester contact probe (for general connectors) 	Measurement of terminal voltage
 <p>B991529</p>	MB991529	Diagnostic trouble code check harness	Reading of diagnosis codes
	MB991709	Test harness	<ul style="list-style-type: none"> • Measurement of voltage during troubleshooting • Inspection using an oscilloscope

TROUBLESHOOTING

DIAGNOSIS TROUBLESHOOTING FLOW

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



DIAGNOSIS FUNCTION

ENGINE WARNING LAMP (CHECK ENGINE LAMP)

If an abnormality occurs in any of the following items related to the Multipoint Fuel Injection (MPI) system, the engine warning lamp will illuminate.

If the lamp remains illuminated or if the lamp illuminates while the engine is running, check the diagnosis code output.

Engine warning lamp inspection items

Engine-ECU
Air flow sensor
Intake air temperature sensor
Throttle position sensor
Engine coolant temperature sensor
Crank angle sensor
Camshaft position sensor
Barometric pressure sensor
Detonation sensor
Injector
Ignition coil, power transistor unit

METHOD OF READING AND ERASING DIAGNOSIS CODES

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

INSPECTION USING MUT-II DATA LIST AND ACTUATOR TESTING

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

FAIL-SAFE FUNCTION REFERENCE TABLE

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

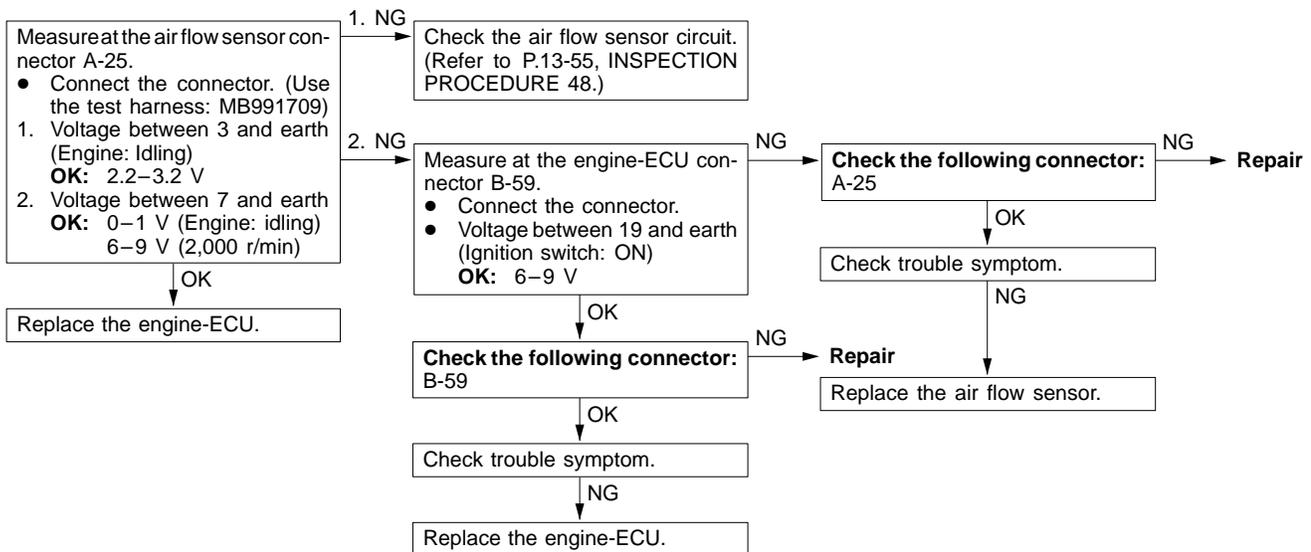
Malfunctioning item	Control contents during malfunction
Air flow sensor	<ol style="list-style-type: none"> 1. Uses the throttle position sensor signal and engine speed signal (crank angle sensor signal) to take reading of the basic injector drive time and basic ignition timing from the pre-set mapping. 2. Fixes the ISC servo in the appointed position so idle control is not performed.
Intake air temperature sensor	Controls as if the intake air temperature is 25°C.
Throttle position sensor	No increase in fuel injection amount during acceleration due to the throttle position sensor signal.
Engine coolant temperature sensor	<ol style="list-style-type: none"> 1. Controls as if the engine coolant temperature is 80°C. (This condition is maintained until the ignition switch is turned off even when the sensor signal returns normal.) 2. Lets the fan motor (radiator and condenser) run at high speed.
Camshaft position sensor	Injects fuel to all cylinders simultaneously for 4 seconds. (However, after the ignition switch is turned to ON, the No. 1 cylinder top dead centre is not detected at all.)
Barometric pressure sensor	Controls as if the barometric pressure is 101 kPa.
Detonation sensor	Switches the ignition timing from ignition timing for super petrol to ignition timing for standard petrol.
Ignition coil, power transistor unit	Cuts off the fuel supply to cylinders with an abnormal ignition.
Alternator FR terminal	Does not control the output of the alternator according to an electrical load. (works as a normal alternator)

3. INSPECTION CHART FOR DIAGNOSIS CODES

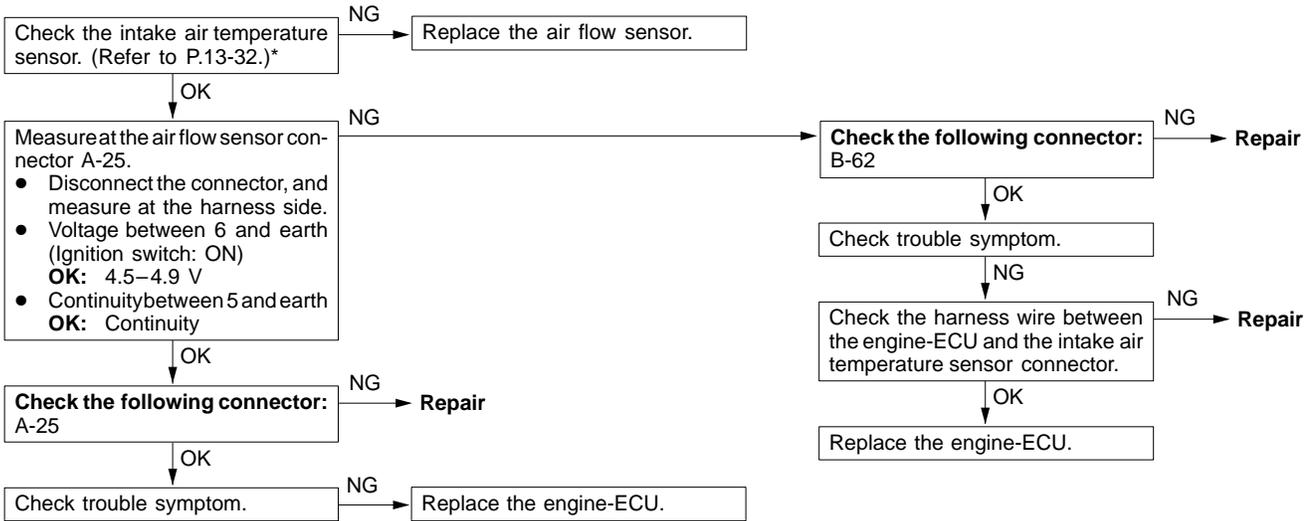
Code No.	Diagnosis item	Reference page
12	Air flow sensor system	13-8
13	Intake air temperature sensor system	13-9
14	Throttle position sensor system	13-9
21	Engine coolant temperature sensor system	13-10
22	Crank angle sensor system	13-11
23	Camshaft position sensor system	13-12
24	Vehicle speed sensor system	13-13
25	Barometric pressure sensor system	13-14
31	Detonation sensor system	13-15
41	Injector system	13-15
44	Ignition coil and power transistor unit system	13-16
64	Alternator FR terminal system	13-17

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

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 or short-circuited harness wire of the air flow sensor Malfunction of the engine-ECU



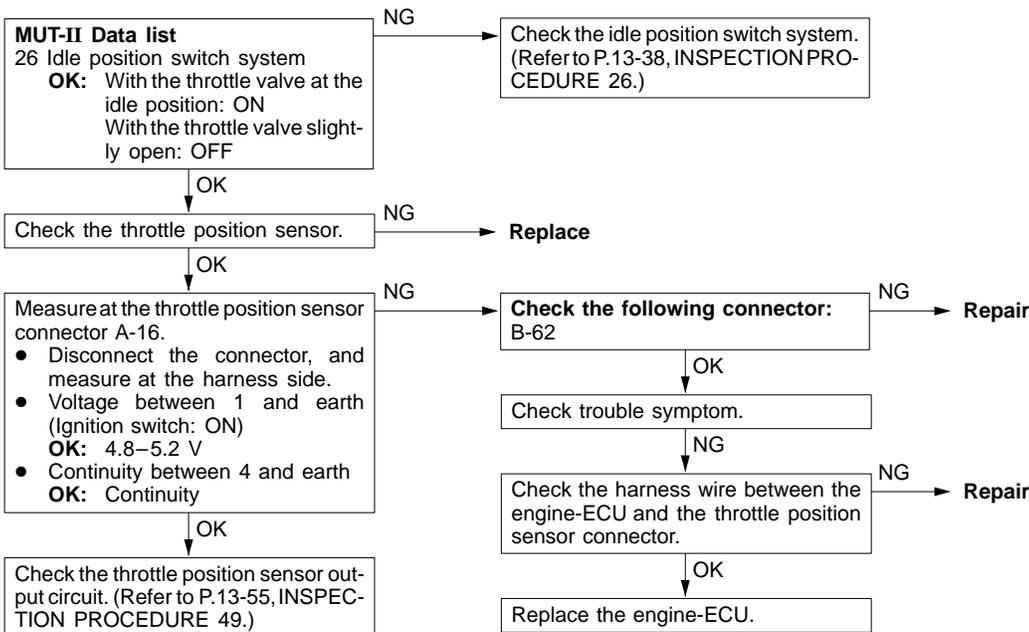
Code No. 13 Intake air temperature sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. <p>Set conditions</p> <ul style="list-style-type: none"> 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 or short-circuited harness wire of the intake air temperature sensor circuit Malfunction of the engine-ECU



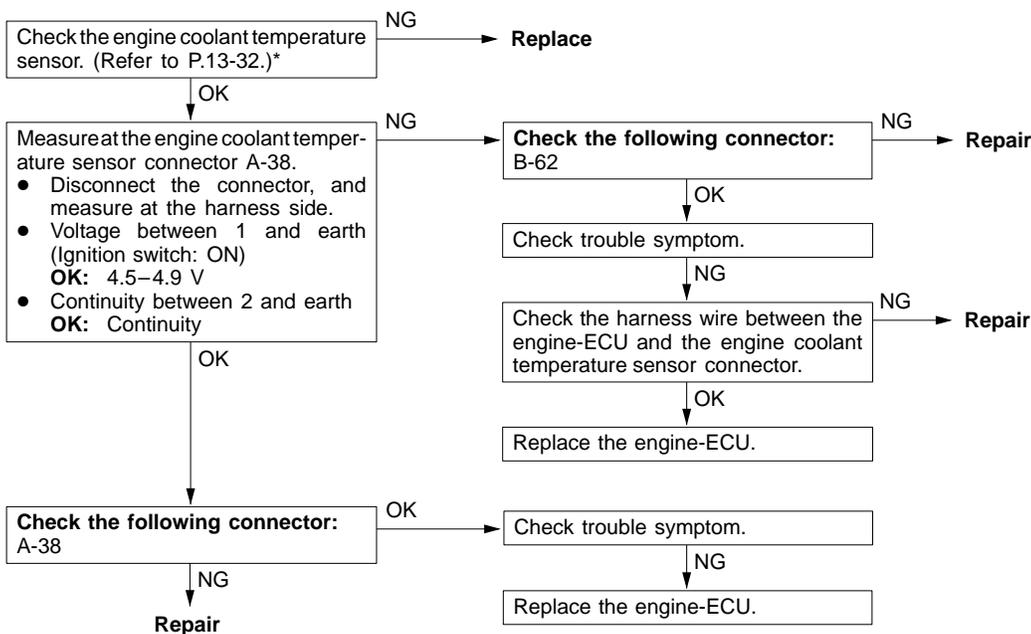
NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

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"> 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 Improper connector contact, open 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



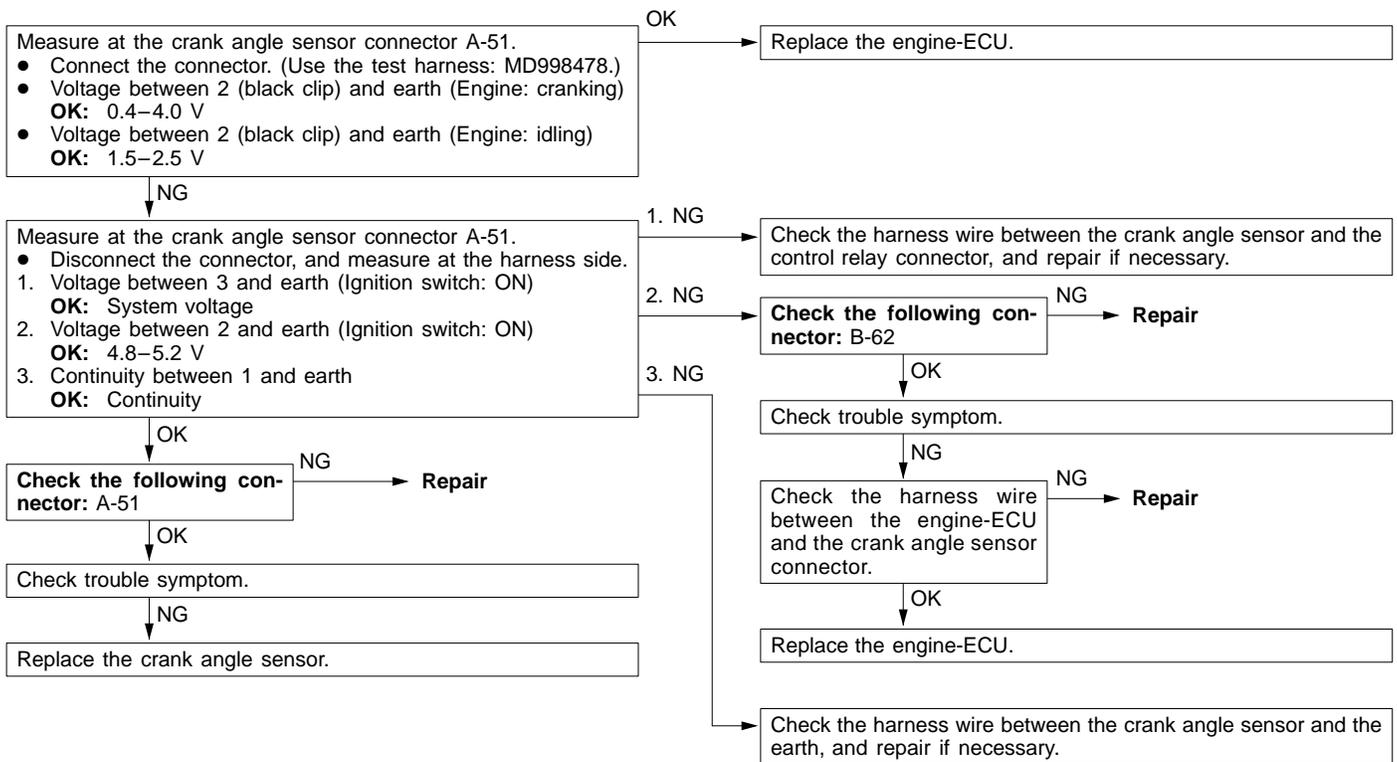
Code No. 21 Engine coolant temperature sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. <p>Set conditions</p> <ul style="list-style-type: none"> 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 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. 	



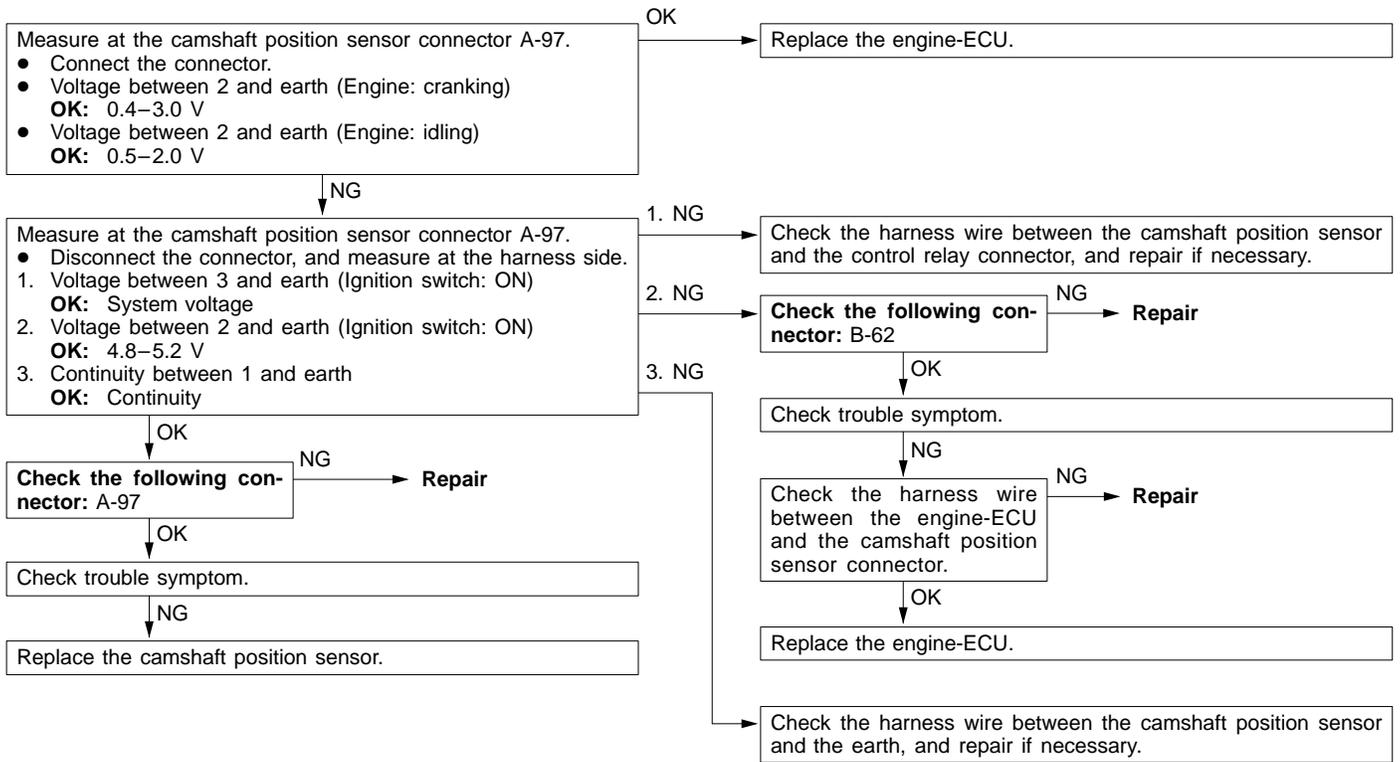
NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

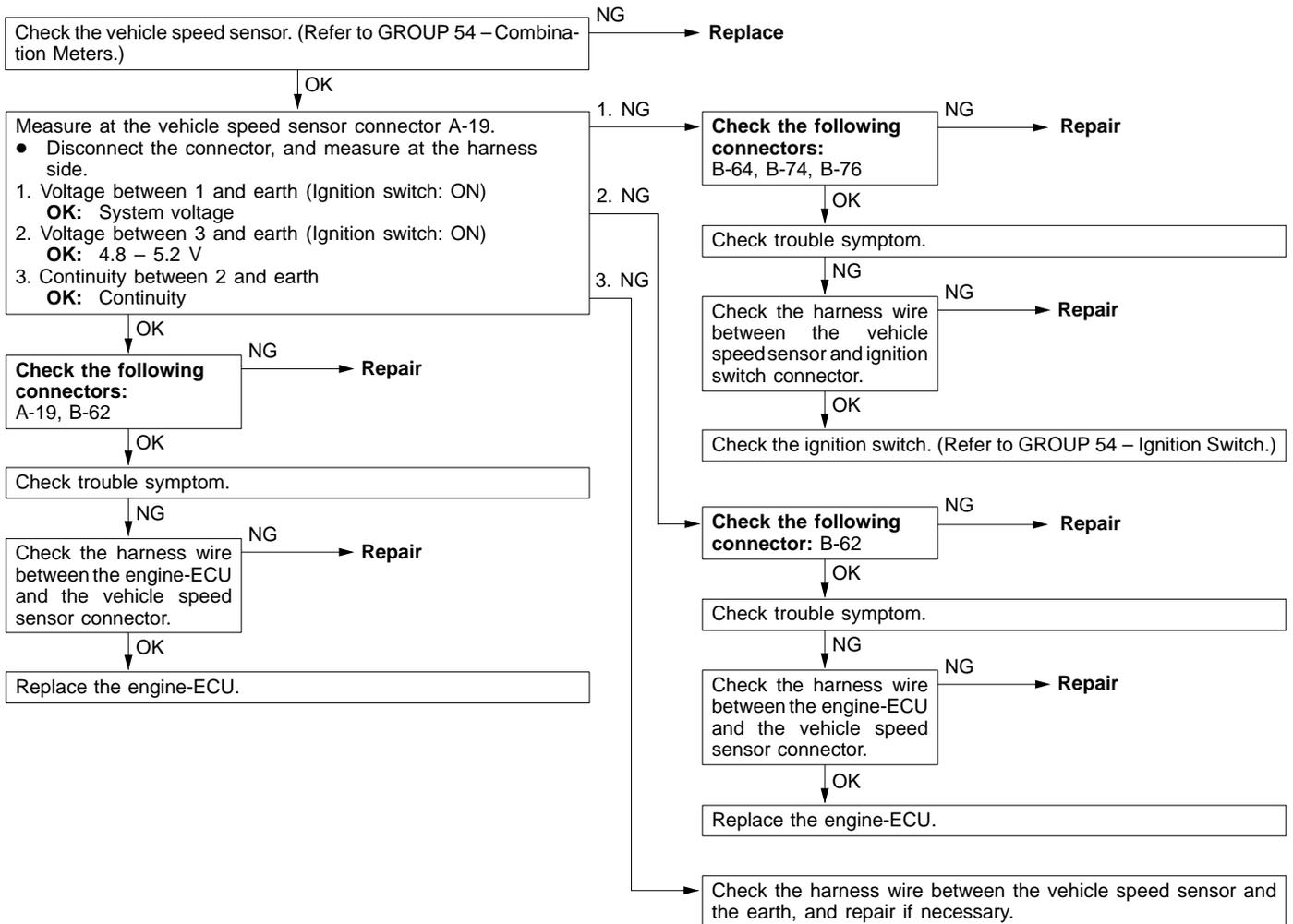
Code No. 22 Crank angle sensor system	Probable cause
Range of Check ● Engine is cranking. Set conditions ● Sensor output voltage does not change for 4 seconds (no pulse signal input.)	● Malfunction of the crank angle sensor ● Improper connector contact, open or short-circuited harness wire of the crank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



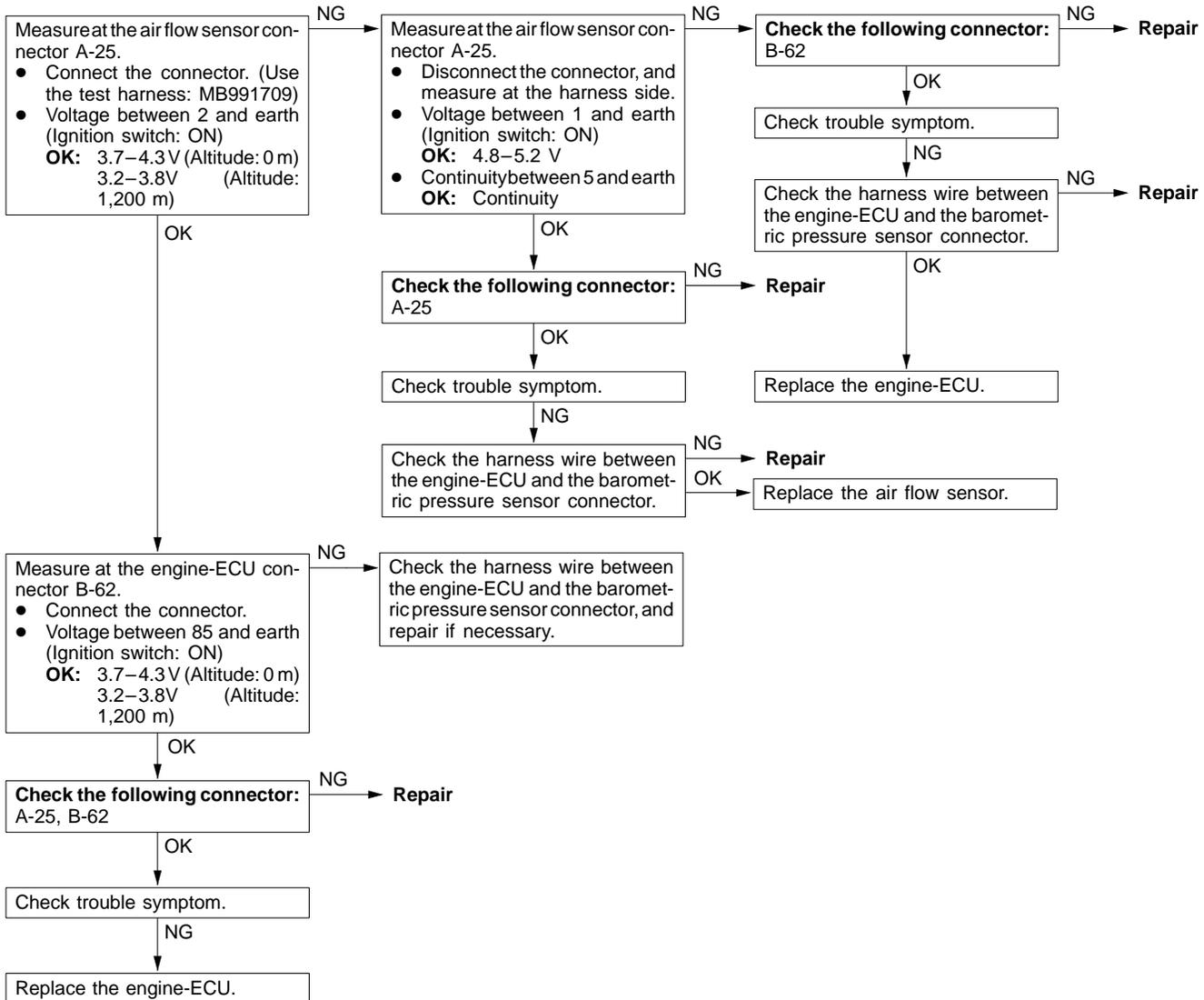
Code No. 23 Camshaft position sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> ● Ignition switch: ON ● Engine speed is approx. 50 r/min or more. <p>Set conditions</p> <ul style="list-style-type: none"> ● Sensor output voltage does not change for 4 seconds (no pulse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



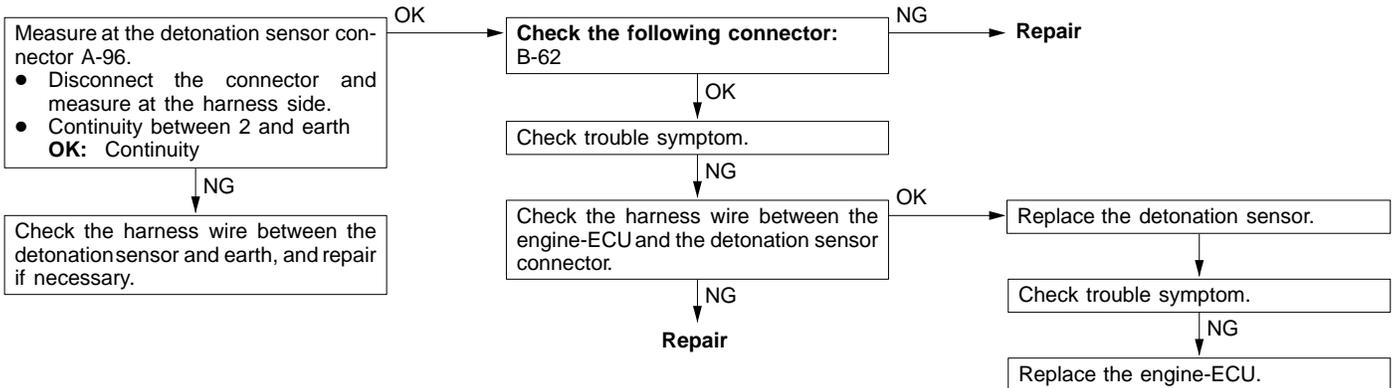
Code No. 24 Vehicles speed sensor system	Probable cause
<p>Range of check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Idle position switch: OFF Engine speed is 3,000 r/min or more. Driving 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 or short-circuited harness wire of the vehicle speed sensor circuit Malfunction of the engine-ECU



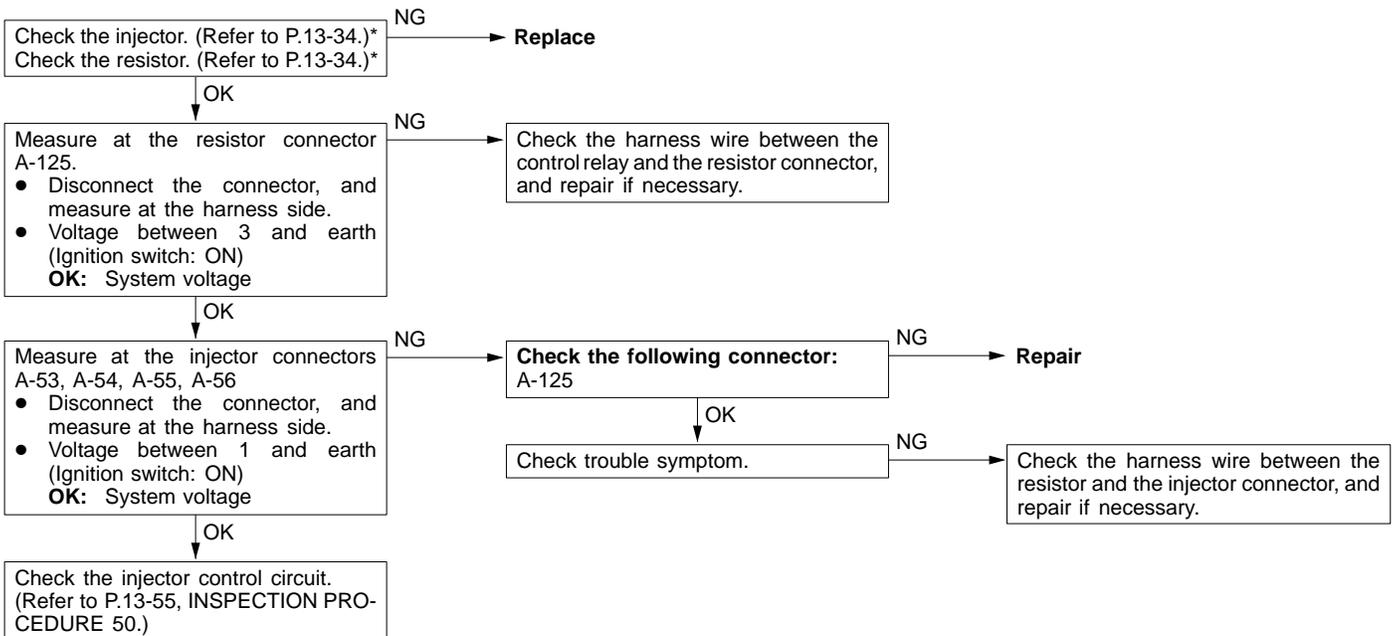
Code No. 25 Barometric pressure sensor system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Ignition switch: ON Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. <p>Set conditions</p> <ul style="list-style-type: none"> Sensor 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 or short-circuited harness wire of the barometric pressure sensor circuit Malfunction of the engine-ECU



Code No. 31 Detonation 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. • Engine speed is approx. 5,000 r/min or more • Set conditions • The change in the detonation sensor output voltage (detonation sensor peak voltage at each 1/2 revolution of the crankshaft) is less than 0.06 V for 200 times in succession. 	<ul style="list-style-type: none"> • Malfunction of the detonation sensor • Improper connector contact, open or short-circuited harness wire of the detonation sensor circuit • Malfunction of the engine-ECU



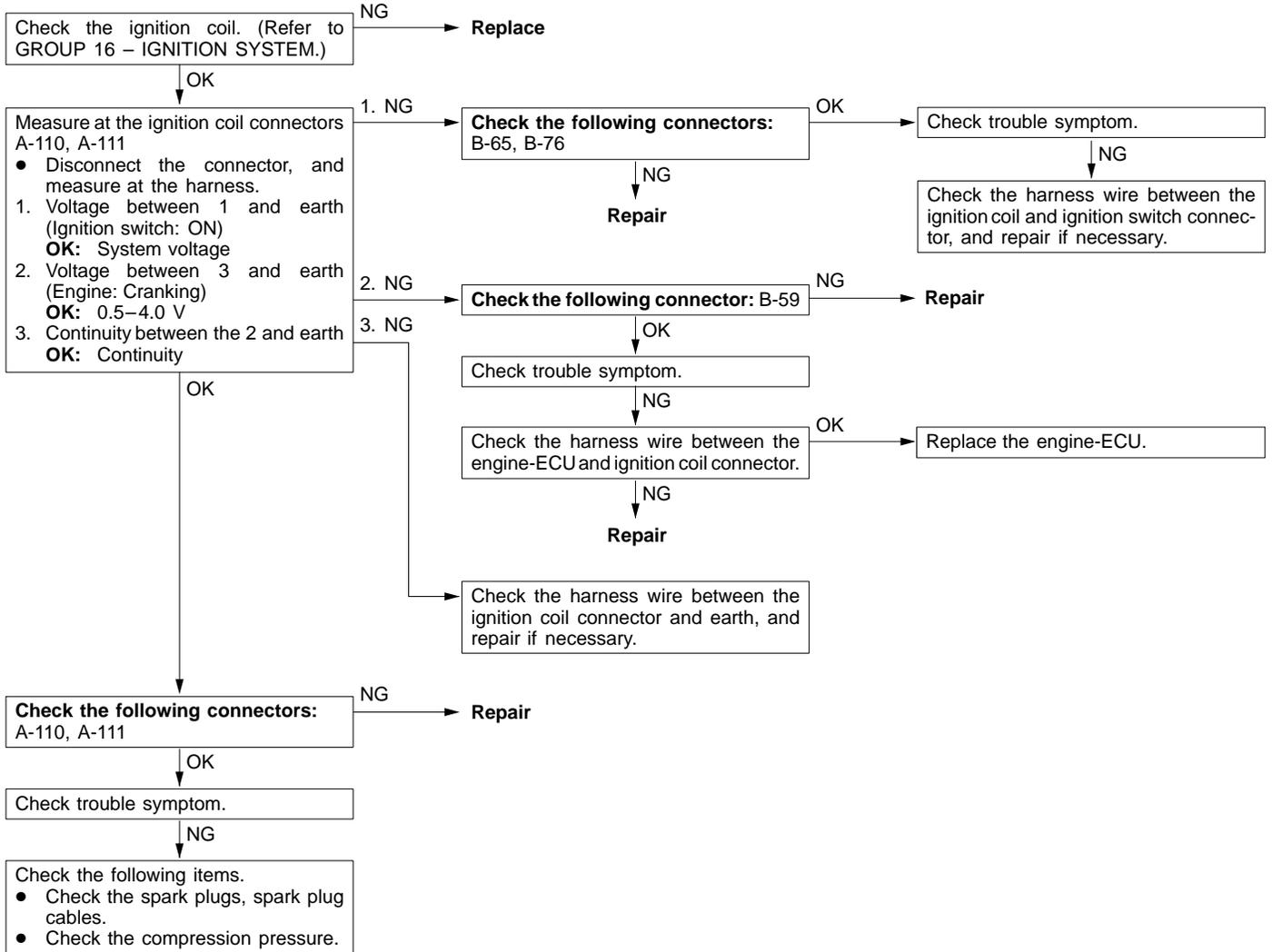
Code No. 41 Injector system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> • Engine speed is approx. 50–1,000 r/min • The throttle position sensor output voltage is 1.15 V or less. • Actuator test by MUT-II is not carried out. <p>Set conditions</p> <ul style="list-style-type: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



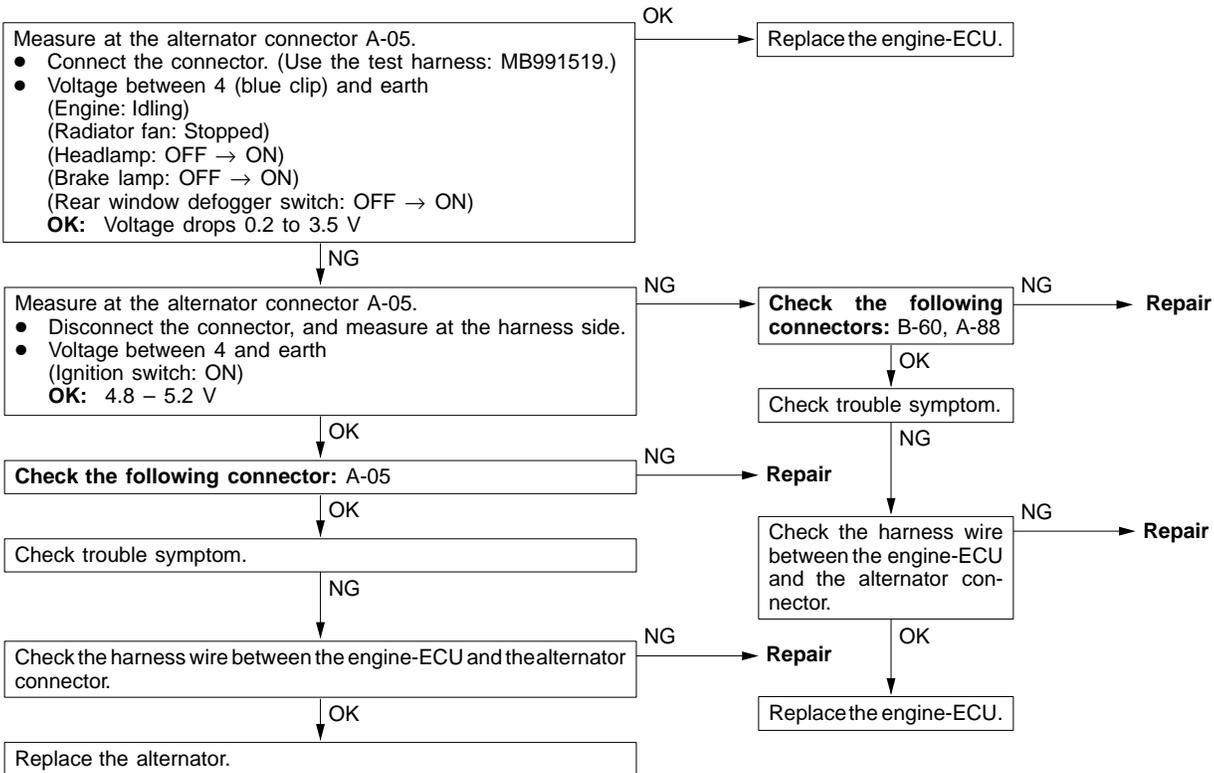
NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

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"> ● Abnormal rotation due to misfire is detected by crank angle sensor (Either one of coils fails). 	<ul style="list-style-type: none"> ● Malfunction of the ignition coil ● Improper connector contact, open or short-circuited harness wire of the ignition primary circuit ● Malfunction of the engine-ECU



Code No. 64 Alternator FR terminal system	Probable cause
<p>Range of Check</p> <ul style="list-style-type: none"> Engine speed is approx. 50 r/min or more <p>Set Conditions</p> <ul style="list-style-type: none"> The input voltage from the alternator FR terminal is higher than 4.5 V for 20 seconds. 	<ul style="list-style-type: none"> Open circuit in alternator FR terminal circuit Malfuction of the engine-ECU

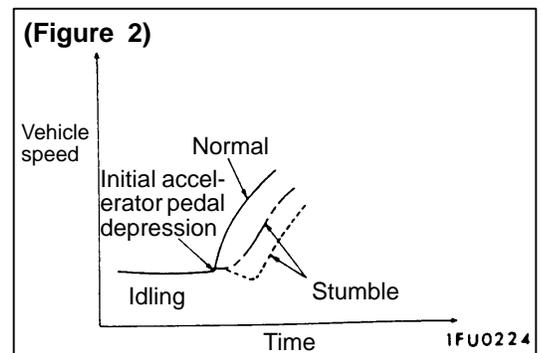
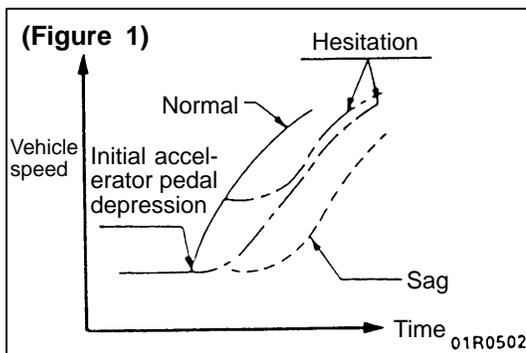


INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is impossible.	Communication with all systems is impossible.	1	13-20
	Communication with engine-ECU only is impossible.	2	13-20
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	13-21
	The engine warning lamp remains illuminating and never goes out.	4	13-21
Starting	No initial combustion (starting impossible)	5	13-22
	Initial combustion but no complete combustion (starting impossible)	6	13-23
	Long time to start (improper starting)	7	13-24
Idling stability (Improper idling)	Unstable idling (Rough idling, hunting)	8	13-25
	Idling speed is high. (Improper idling speed)	9	13-26
	Idling speed is low. (Improper idling speed)	10	13-27
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	11	13-28
	When the engine is hot, it stalls at idling. (Die out)	12	13-29
	The engine stalls when starting the car. (Pass out)	13	13-30
	The engine stalls when decelerating.	14	13-30
Driving	Hesitation, sag or stumble	15	13-31
	The feeling of impact or vibration when accelerating	16	13-31
	The feeling of impact or vibration when decelerating	17	13-32
	Poor acceleration	18	13-32
	Surge	19	13-33
	Knocking	20	13-33
Dieseling		21	13-33
Too high CO and HC concentration when idling		22	13-34
Low alternator output voltage (approx. 12.3 V)		23	13-35

PROBLEM SYMPTOMS TABLE (FOR YOUR INFORMATION)

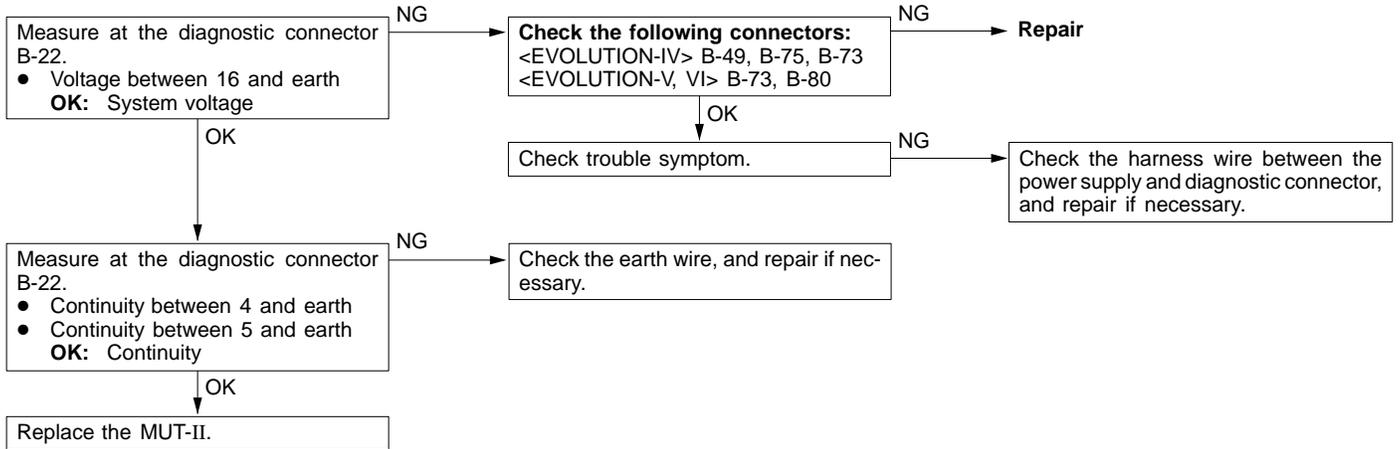
Items		Symptom
Starting	Won't start	The starter is used to crank the engine, but there is no combustion within the cylinders, and the engine won't start.
	Fires up and dies	There is combustion within the cylinders, but then the engine soon stalls.
	Hard starting	Engine starts after cranking a while.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



INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

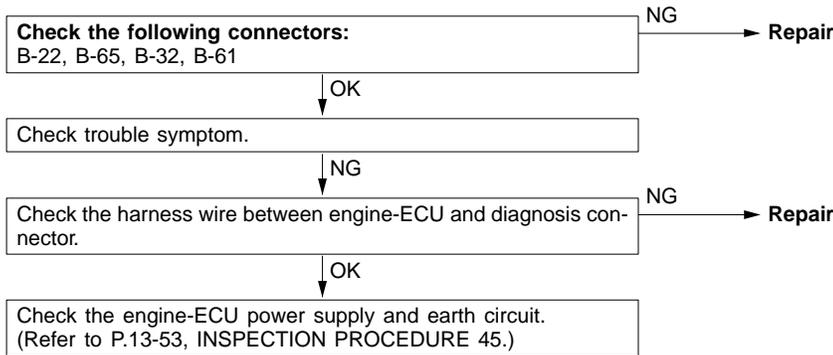
INSPECTION PROCEDURE 1

Communication with MUT-II is impossible. (Communication with all systems is impossible.)	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 diagnosis connector ● Malfunction of the harness wire



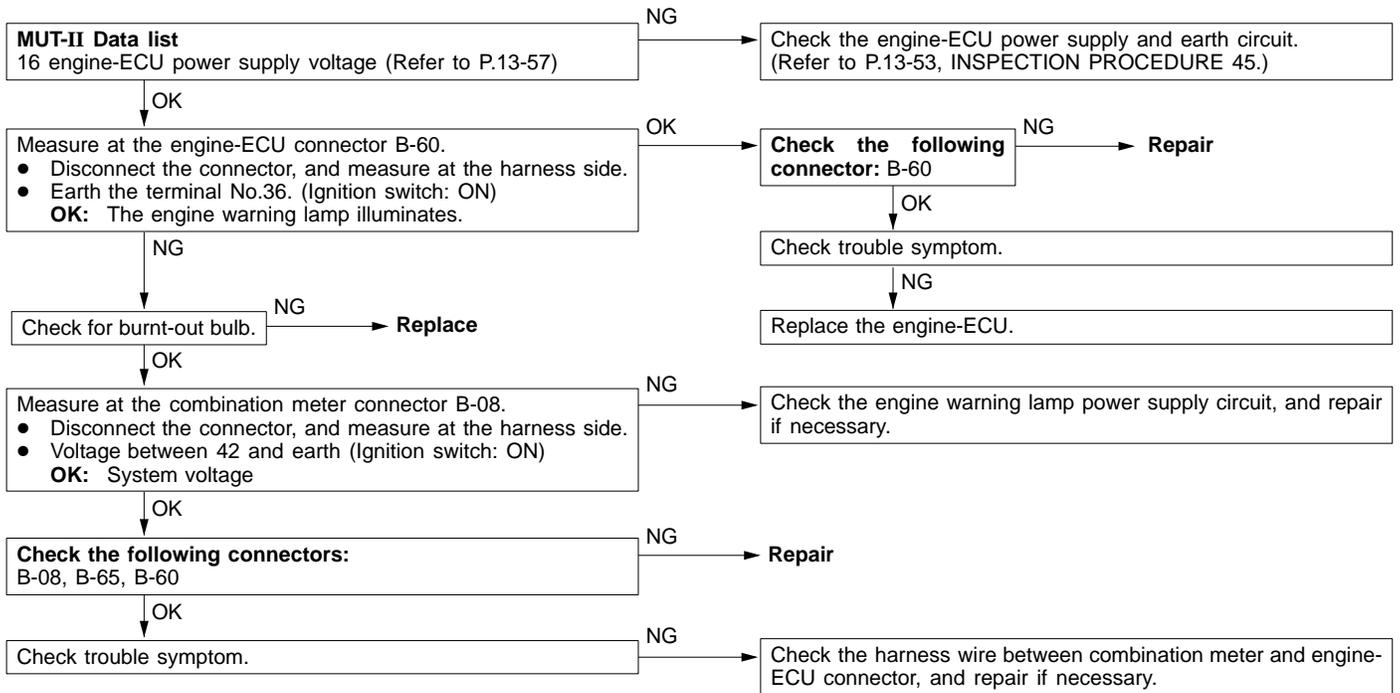
INSPECTION PROCEDURE 2

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



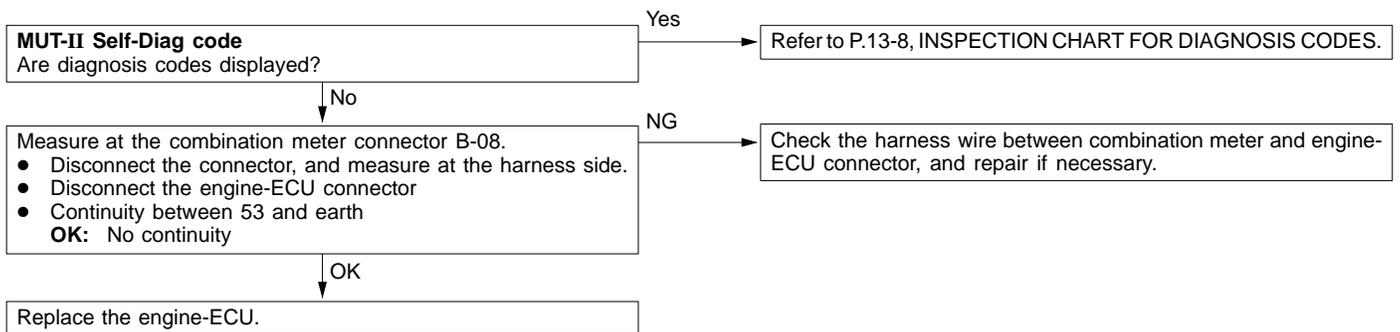
INSPECTION PROCEDURE 3

The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position.	Probable cause
For checking for 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 of the engine warning lamp • Defective engine warning lamp circuit • Malfunction of the engine-ECU



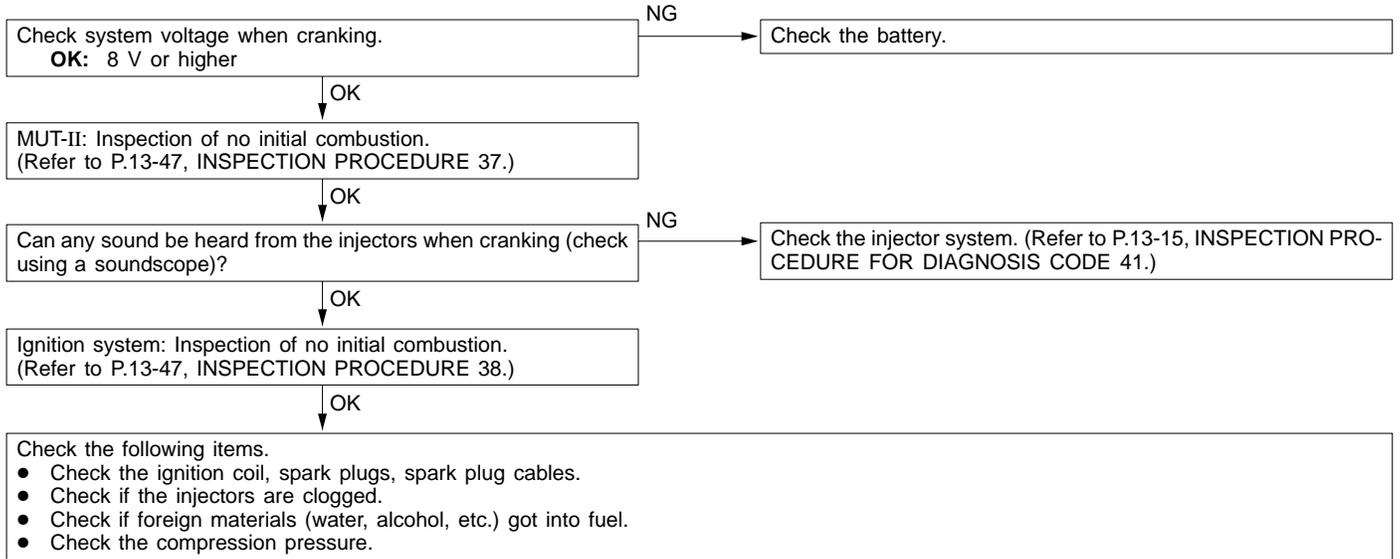
INSPECTION PROCEDURE 4

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



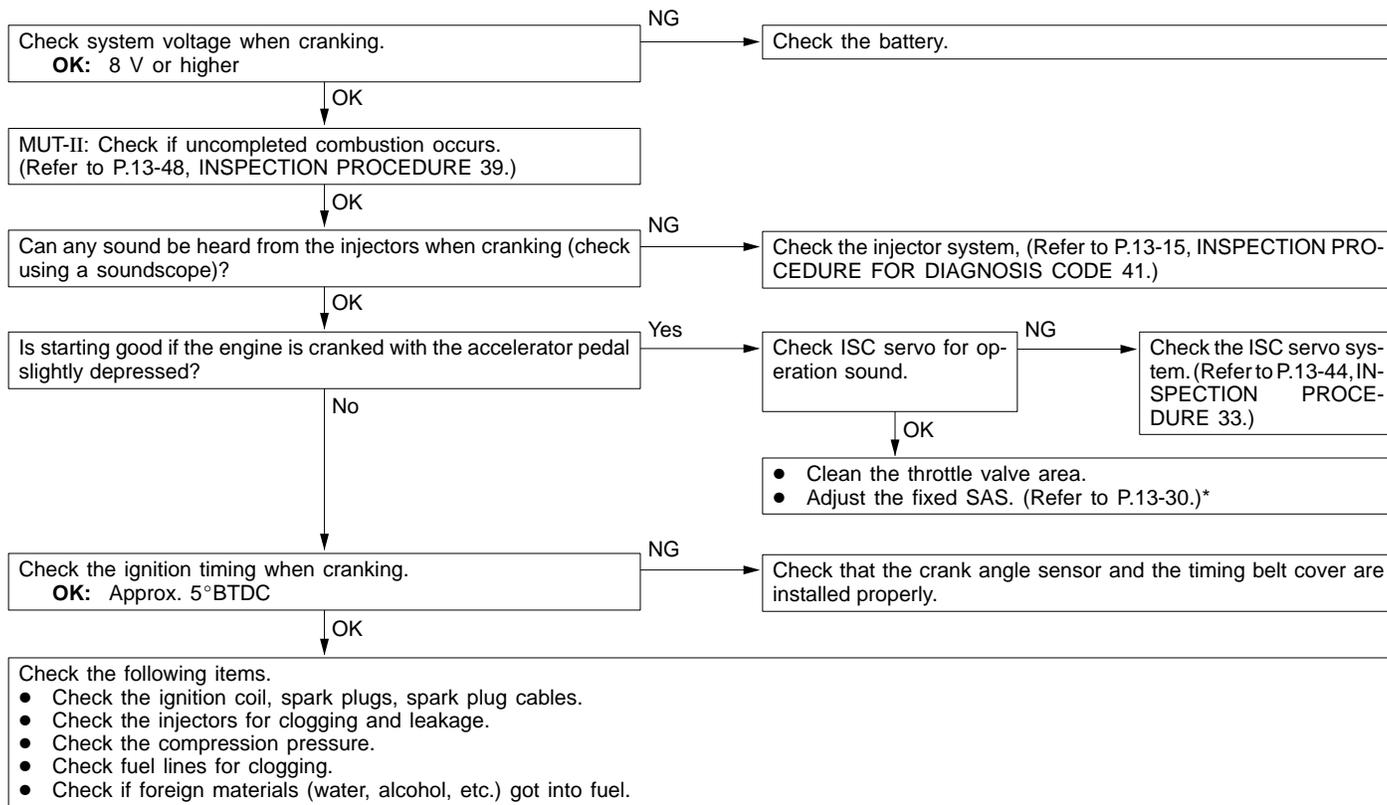
INSPECTION PROCEDURE 5

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 ● Foreign materials in fuel



INSPECTION PROCEDURE 6

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

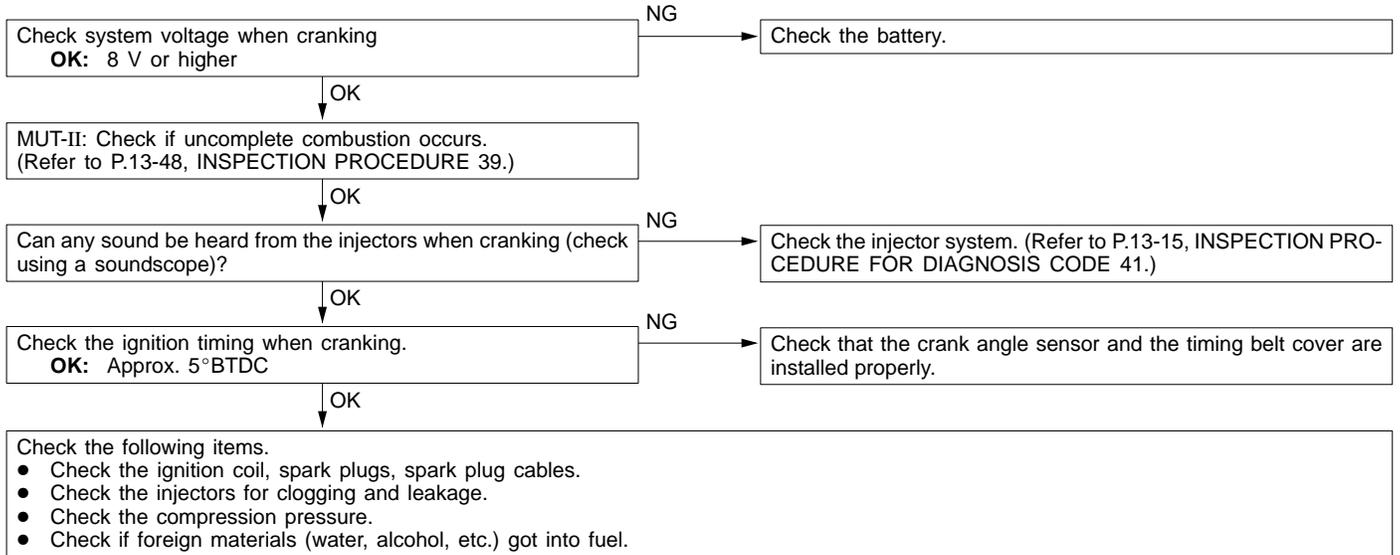


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

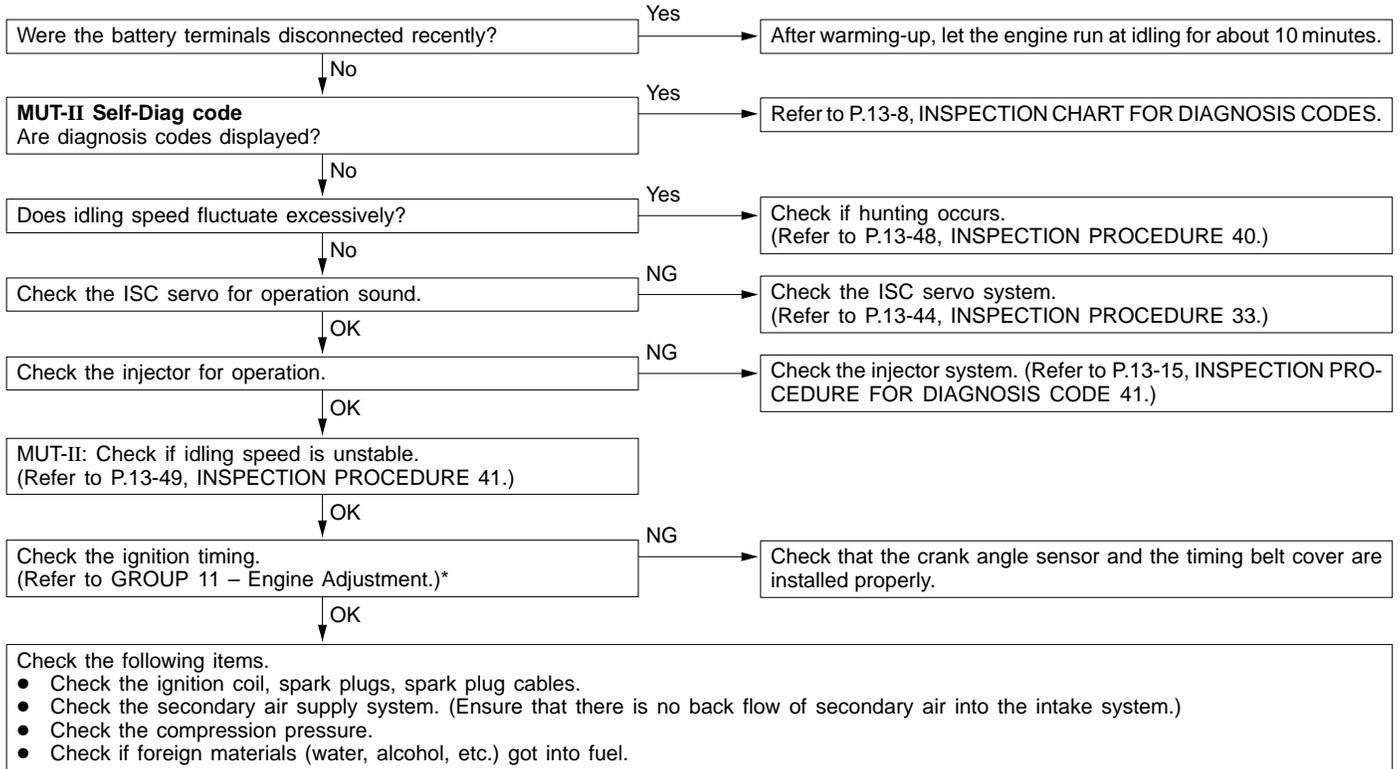
INSPECTION PROCEDURE 7

Long time to start (Improper 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 servo system ● Poor compression ● Drawing air into exhaust system ● Secondary air backflow to the intake system

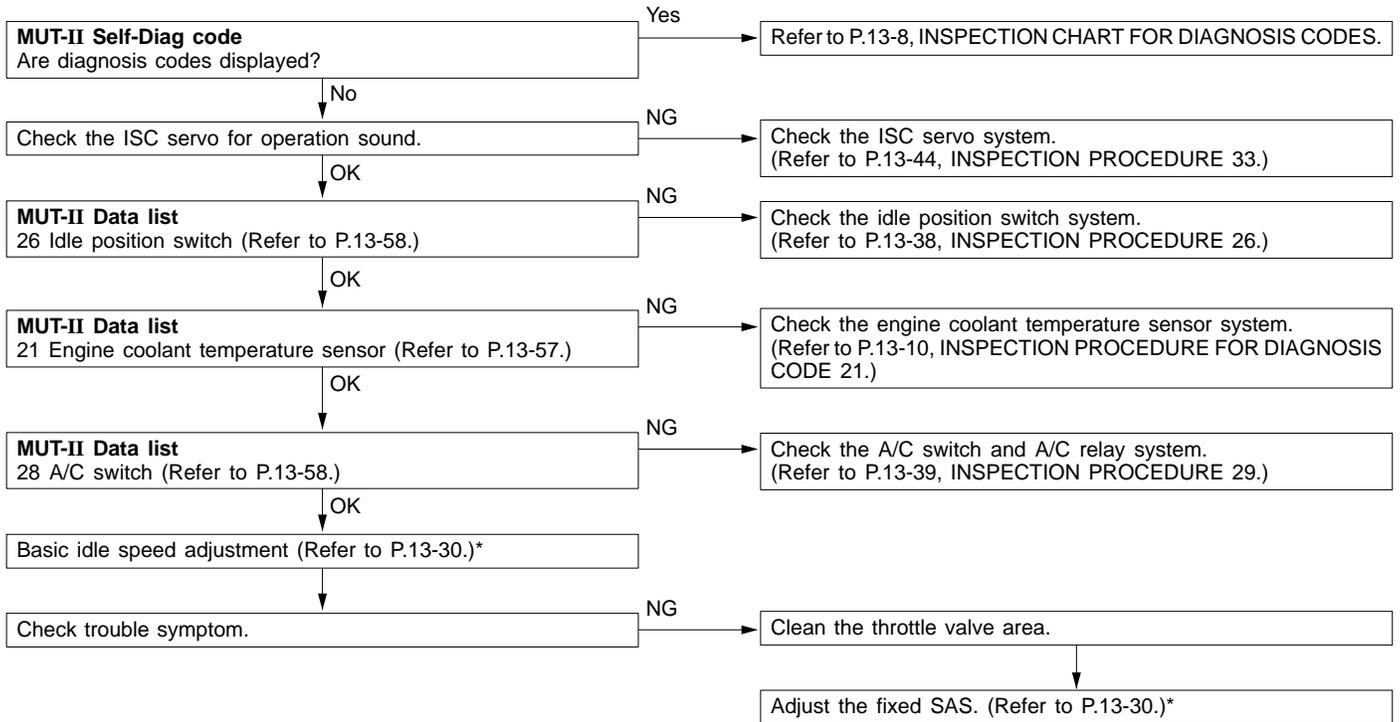


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

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

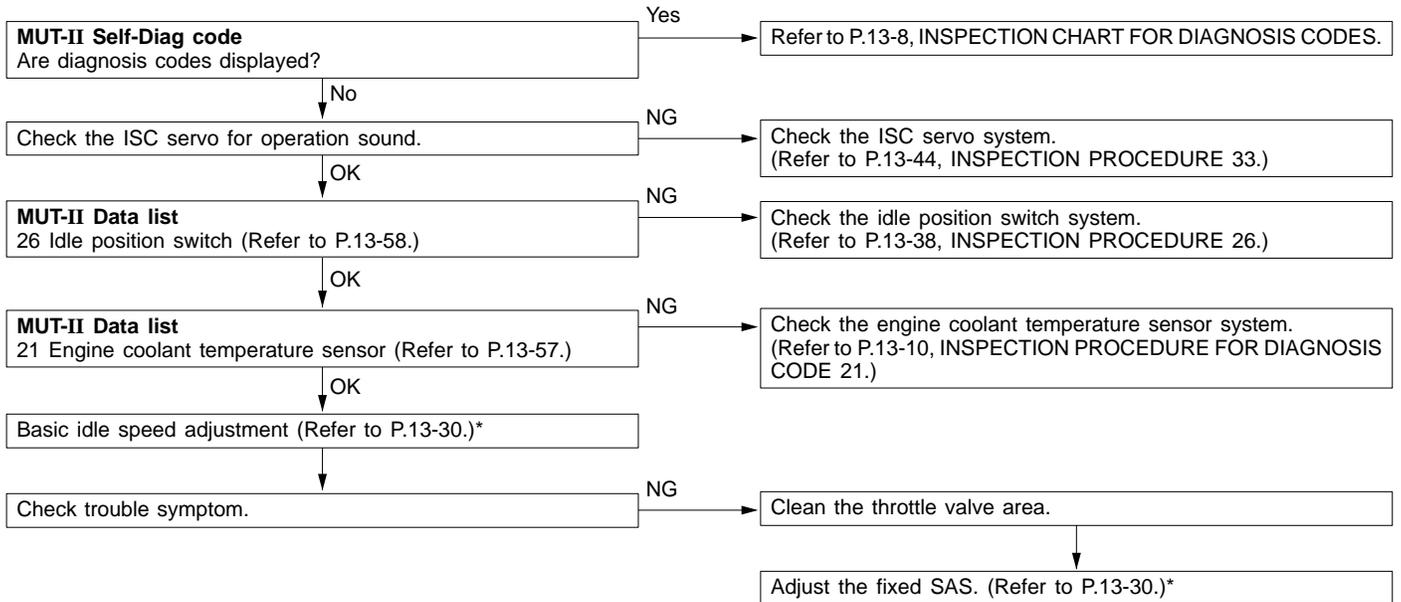


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

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

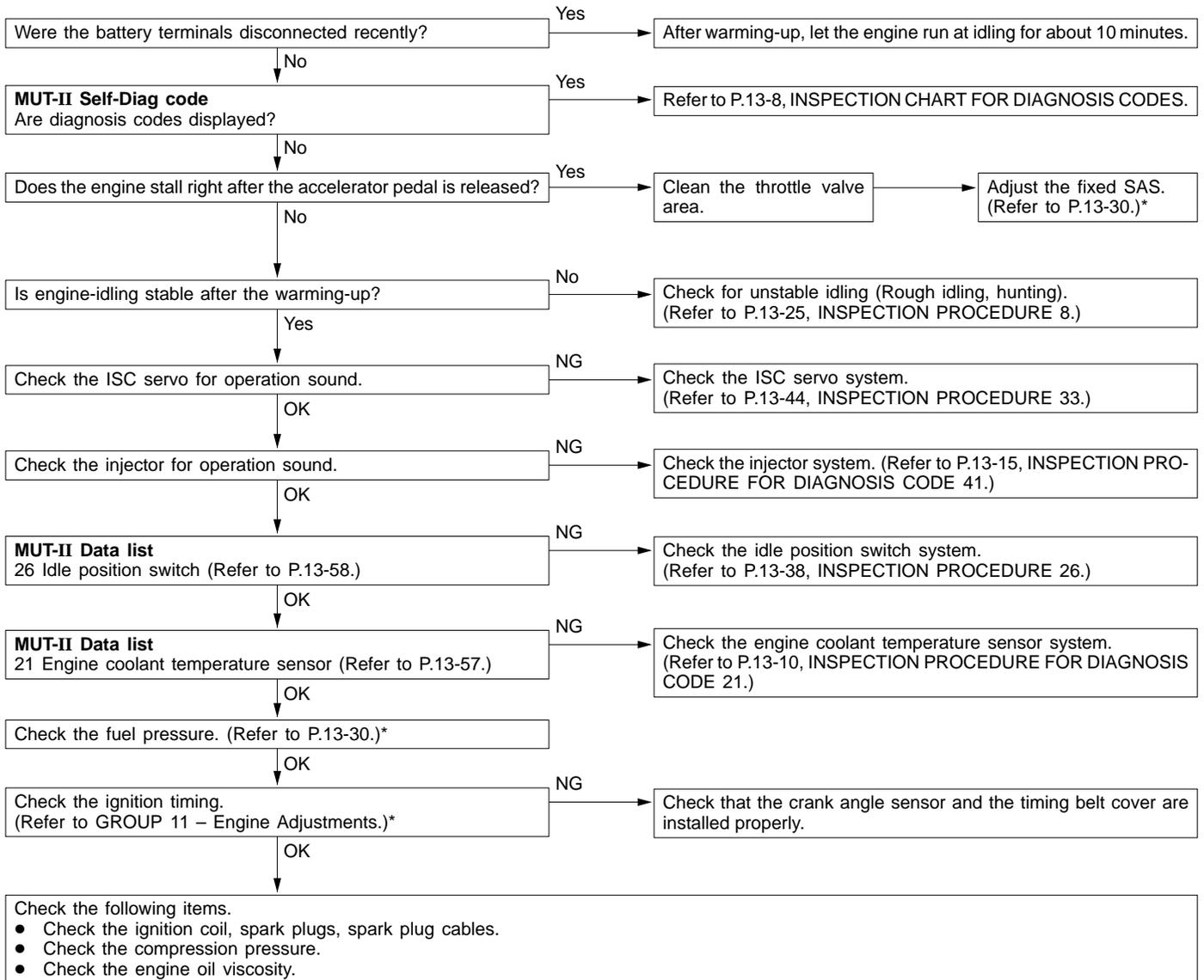


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

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

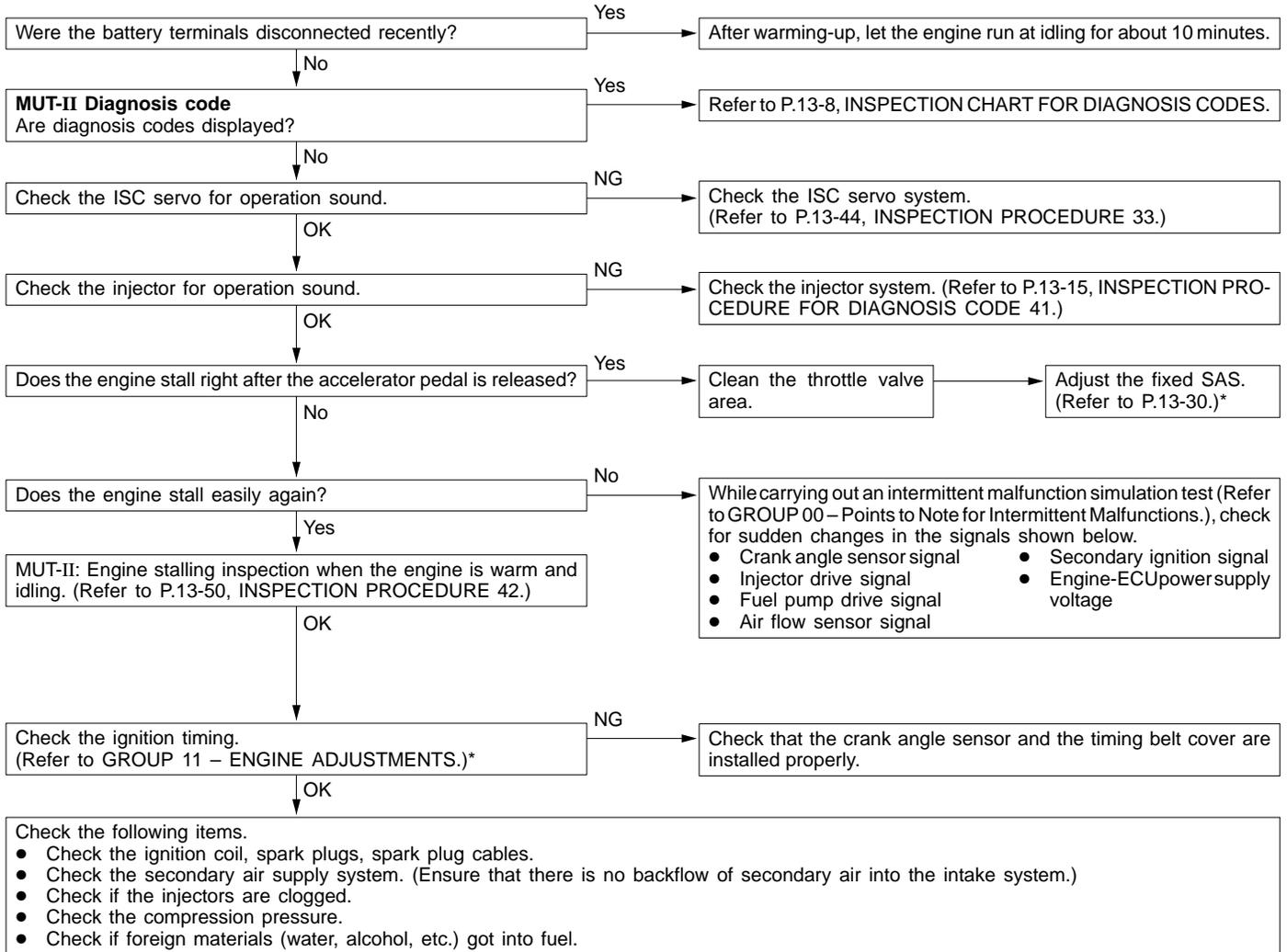


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

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 servo system ● Drawing air into intake system ● Improper connector contact ● Backflow of secondary air to the intake system

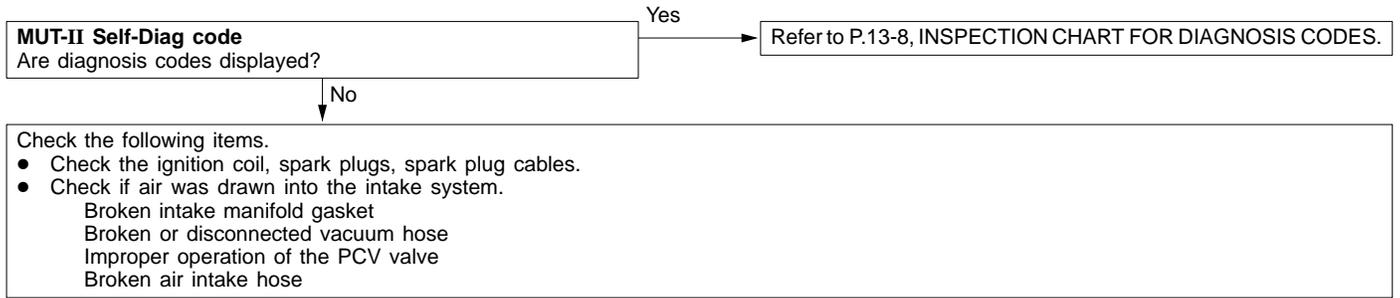


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

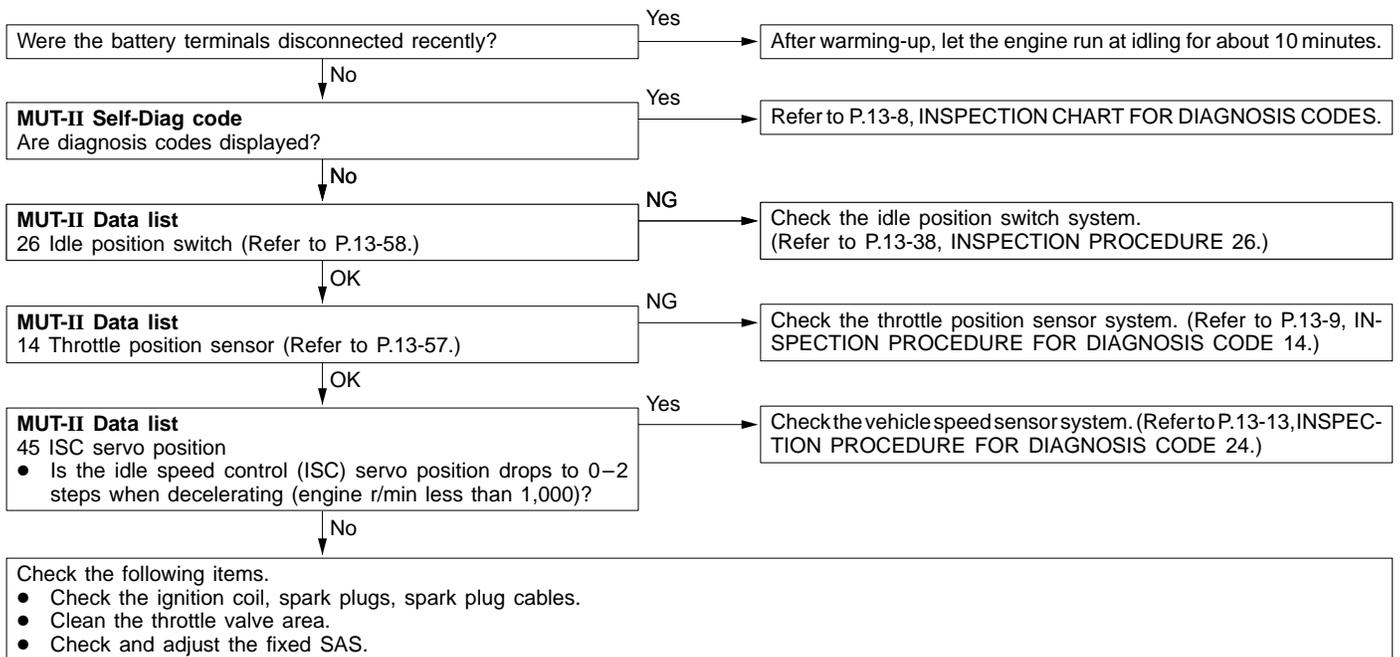
INSPECTION PROCEDURE 13

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



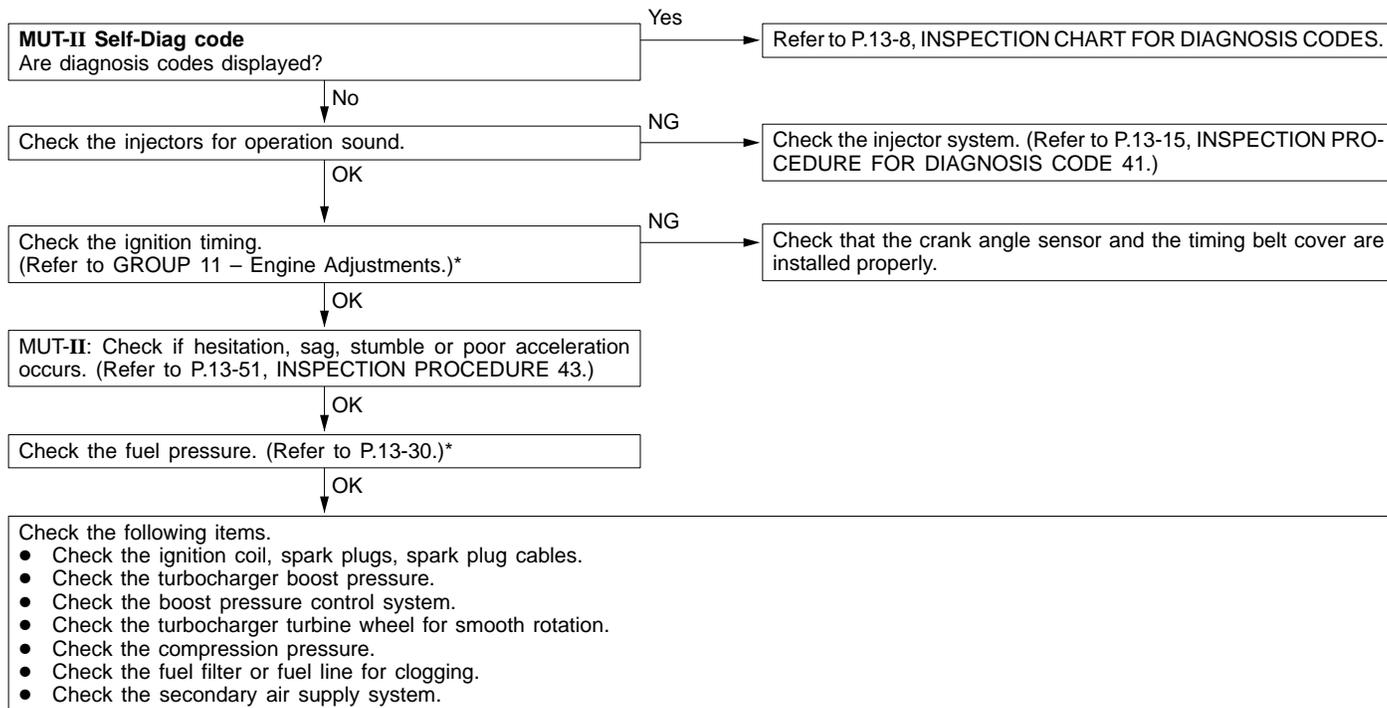
INSPECTION PROCEDURE 14

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 servo 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 ● Malfunction of the turbocharger system ● Malfunction of the secondary air supply system

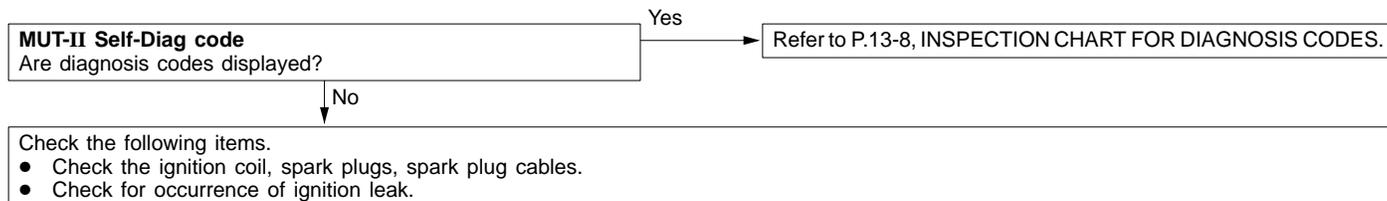


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

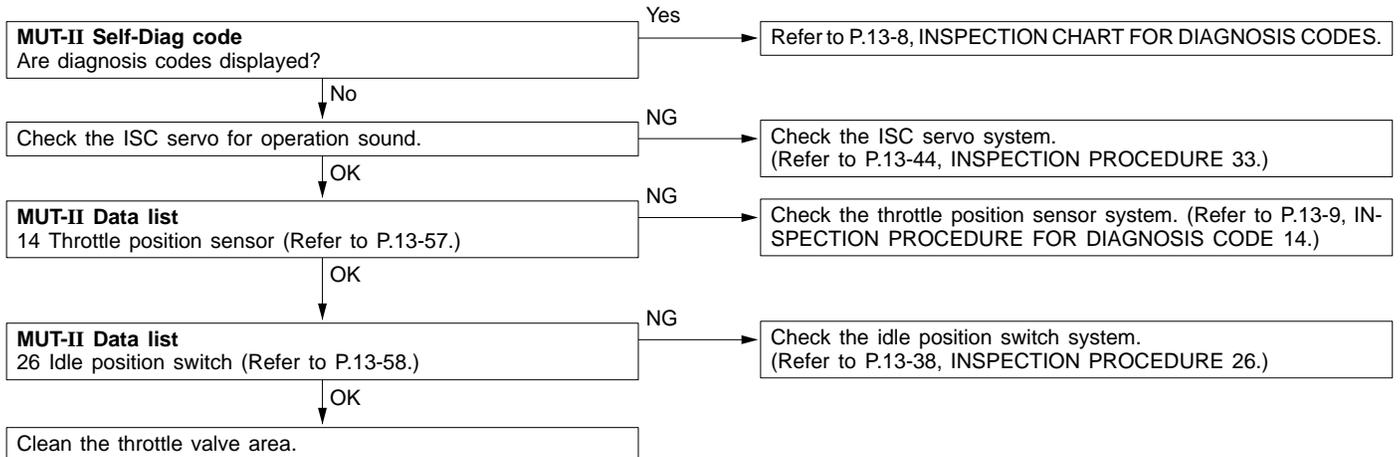
INSPECTION PROCEDURE 16

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



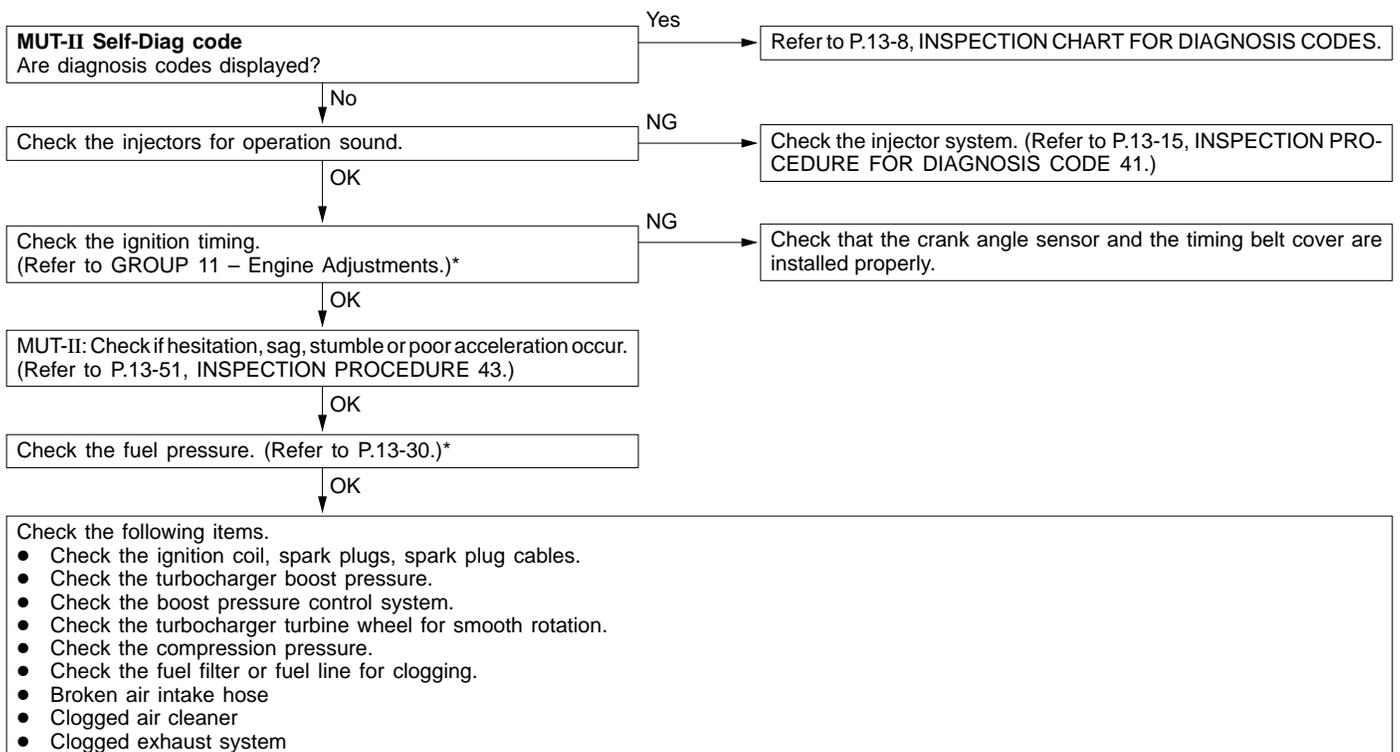
INSPECTION PROCEDURE 17

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

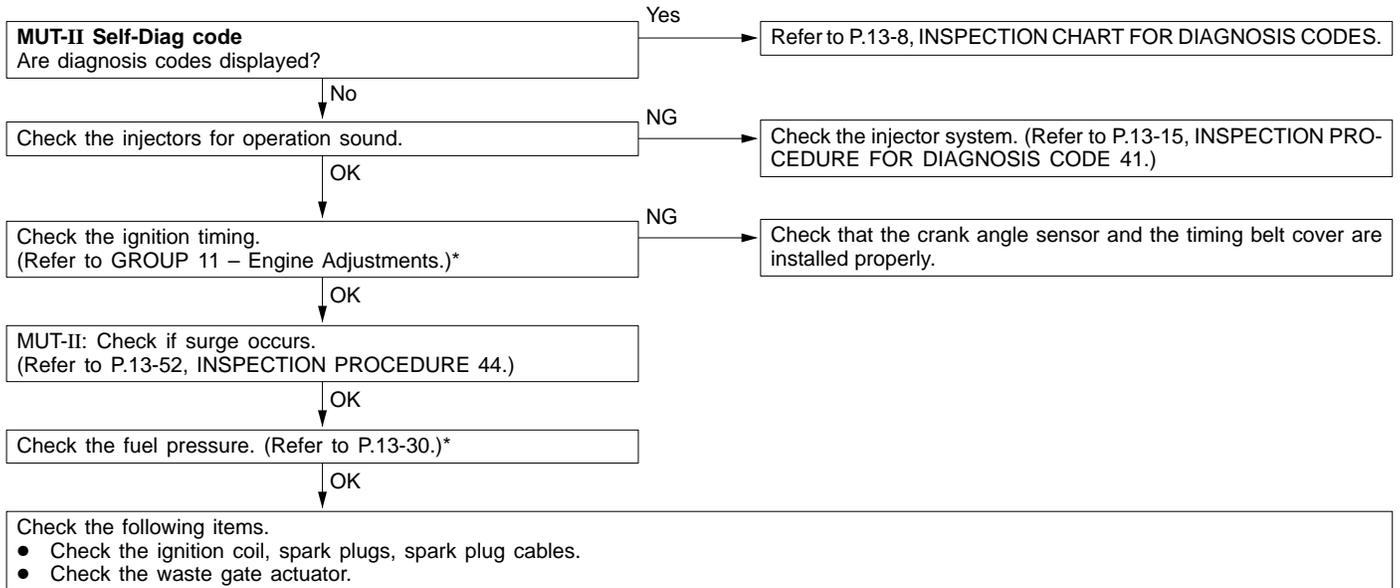


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

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

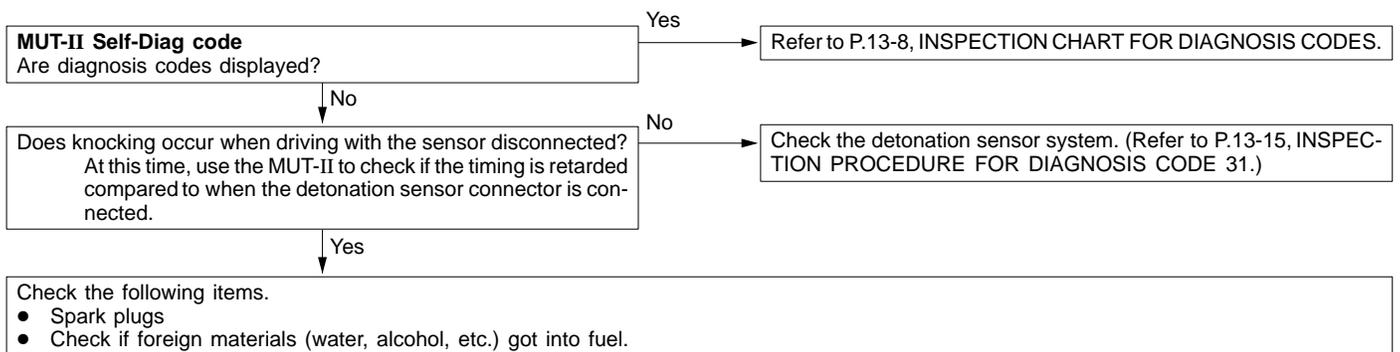


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

INSPECTION PROCEDURE 20

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



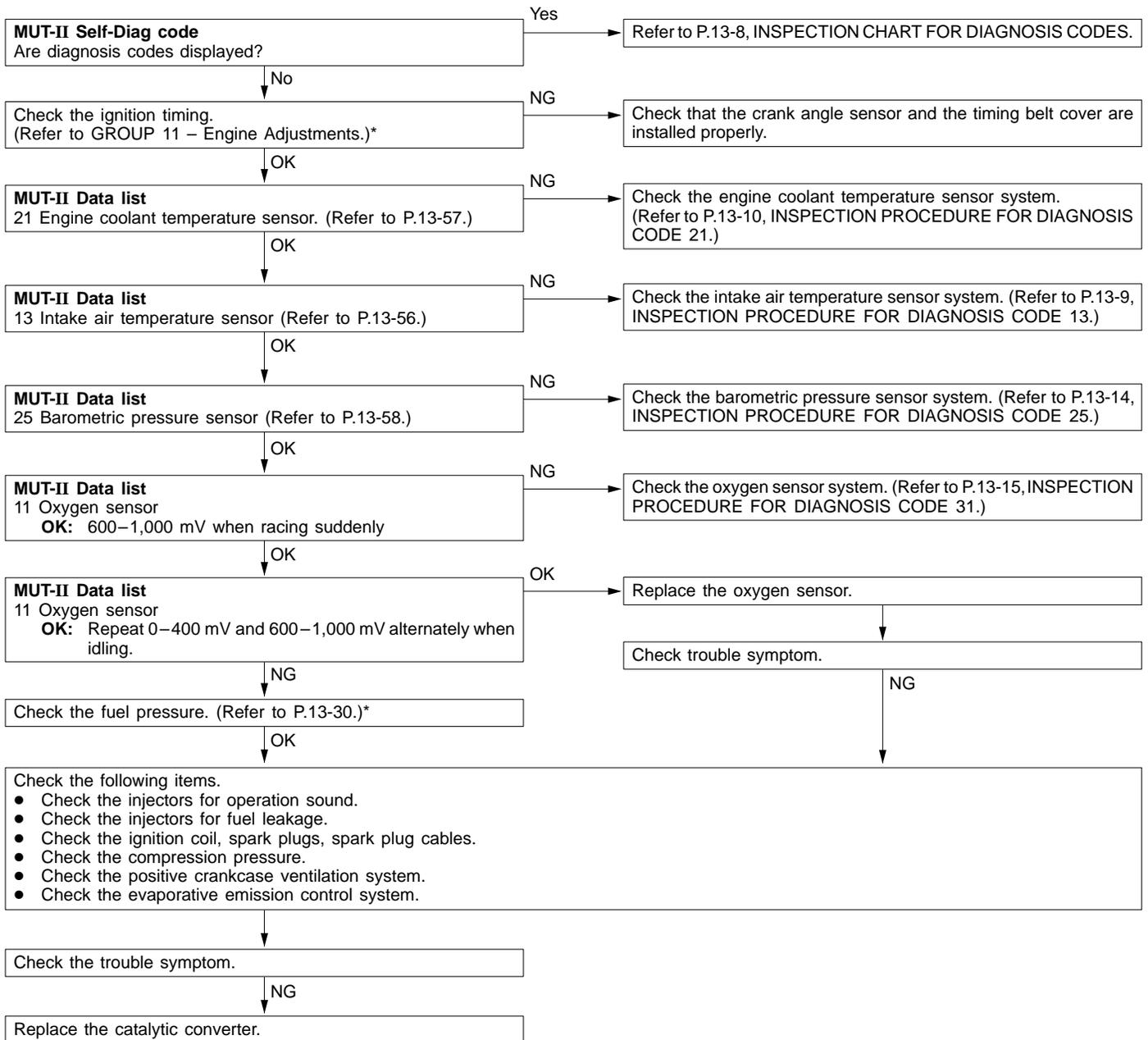
INSPECTION PROCEDURE 21

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

Check the injectors for fuel leakage.

INSPECTION PROCEDURE 22

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

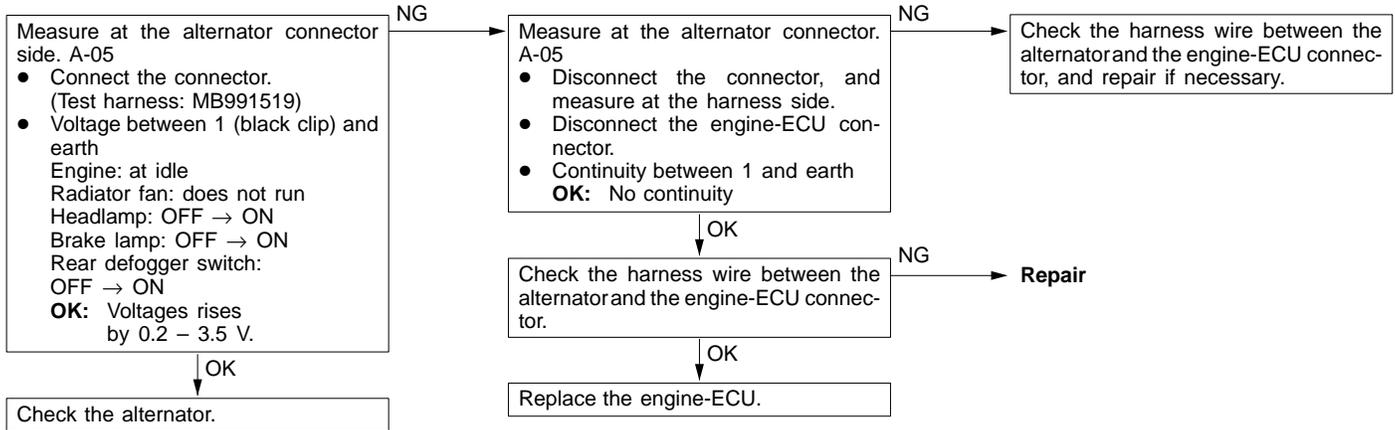


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

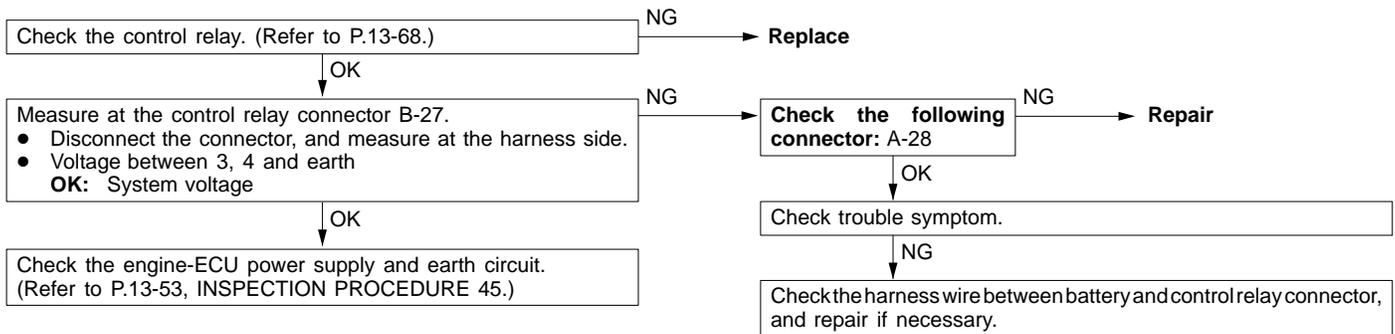
INSPECTION PROCEDURE 23

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



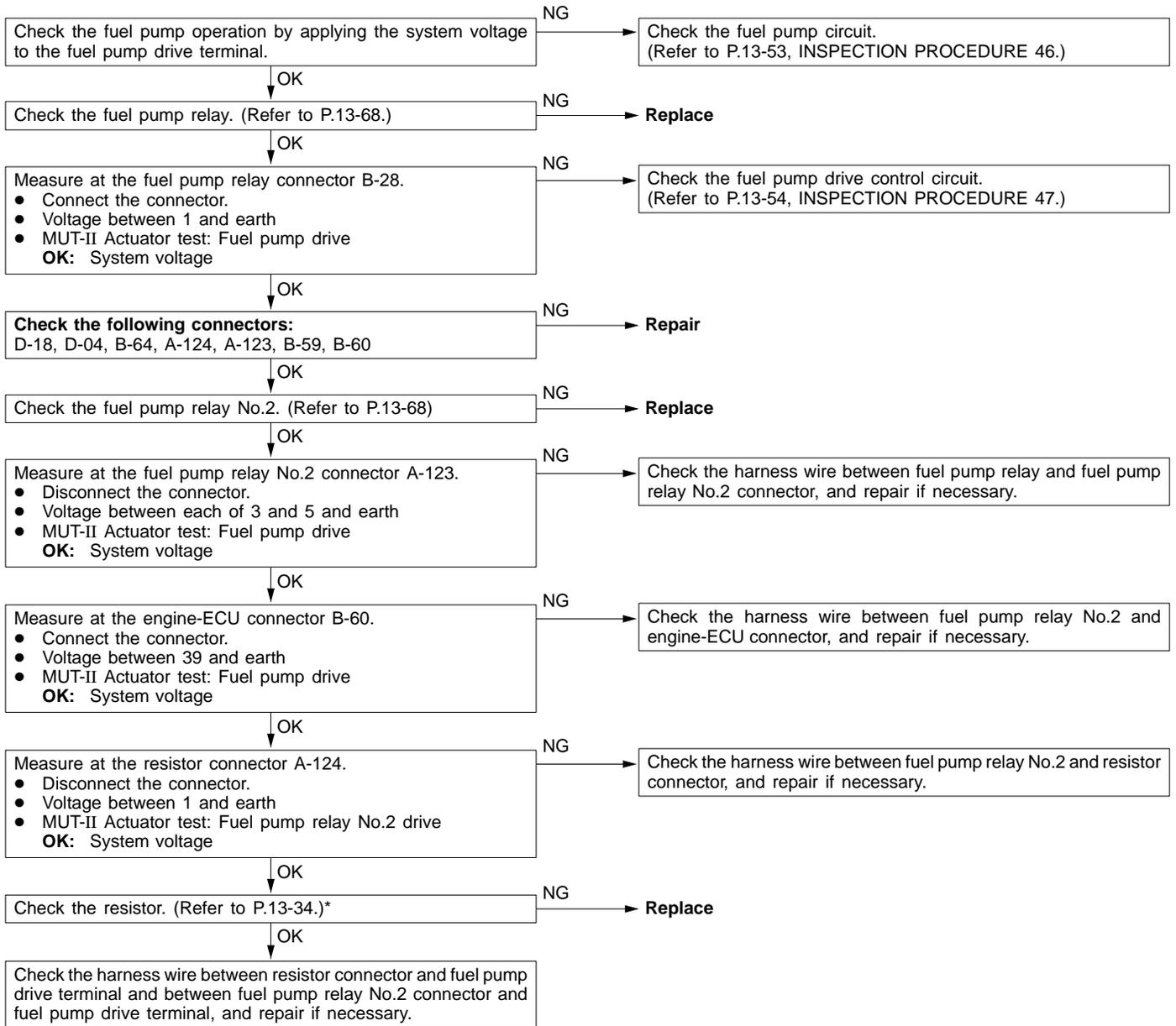
INSPECTION PROCEDURE 24

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 system 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 or short-circuited harness wire ● Disconnected engine-ECU earth wire ● Malfunction of the engine-ECU



INSPECTION PROCEDURE 25 <EVOLUTION-IV, EVOLUTION-V>

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 or short-circuited harness wire ● Malfunction of the engine-ECU



NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

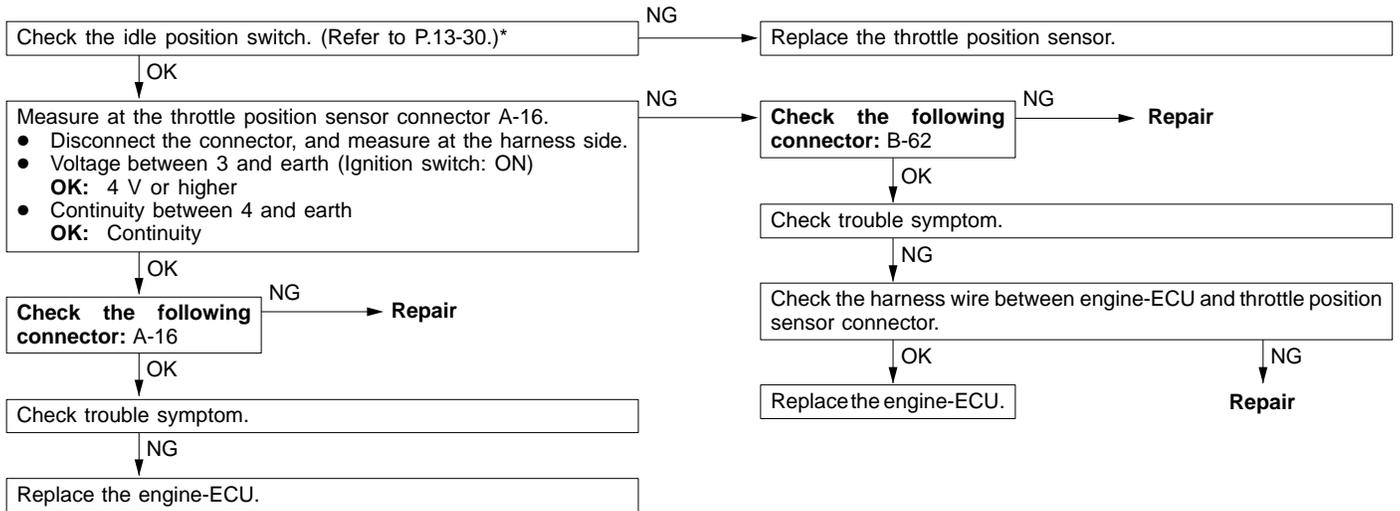
INSPECTION PROCEDURE 25 <EVOLUTION-VI>

Fuel pump system	Probable cause
<ul style="list-style-type: none"> • 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. • The engine-ECU supplies power to the fuel pump through the resistor at low load operations. It supplies power directly to the fuel pump at high load operations to increase the pump output. 	<ul style="list-style-type: none"> • Malfunction of the fuel pump relay • Malfunction of the fuel pump relay No.2 • Malfunction of the fuel pump • Malfunction of fuel pump resistor • Improper connector contact, open or short-circuited harness wire • Malfunction of 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 cable ● Maladjustment of the fixed SAS ● Maladjustment of the idle position switch and throttle position sensor ● Improper connector contact, open or short-circuited harness wire ● Malfunction of the engine-ECU

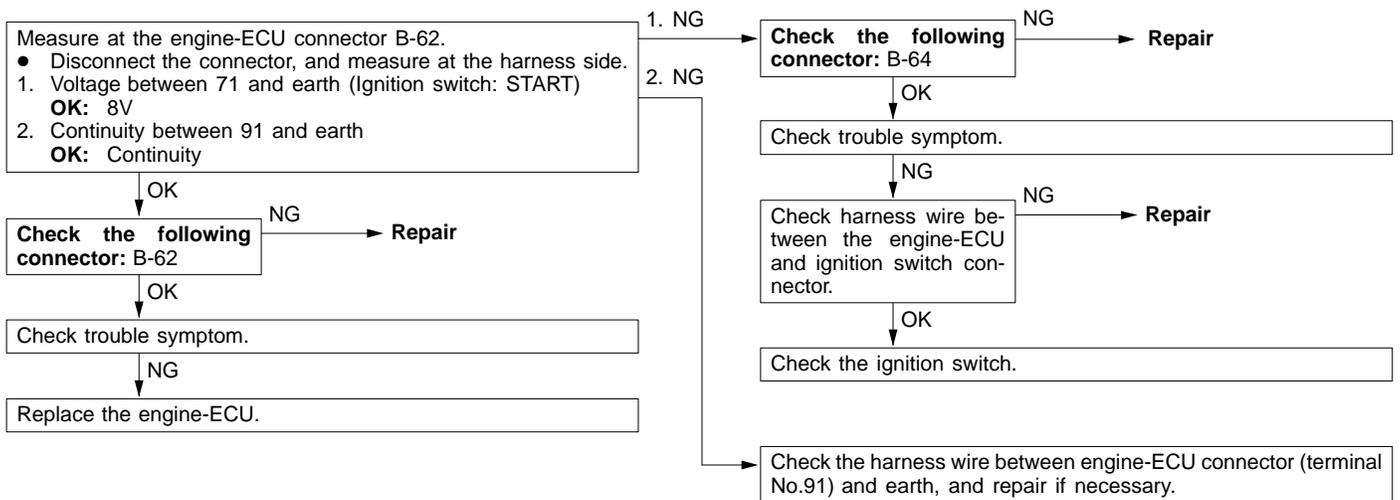


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

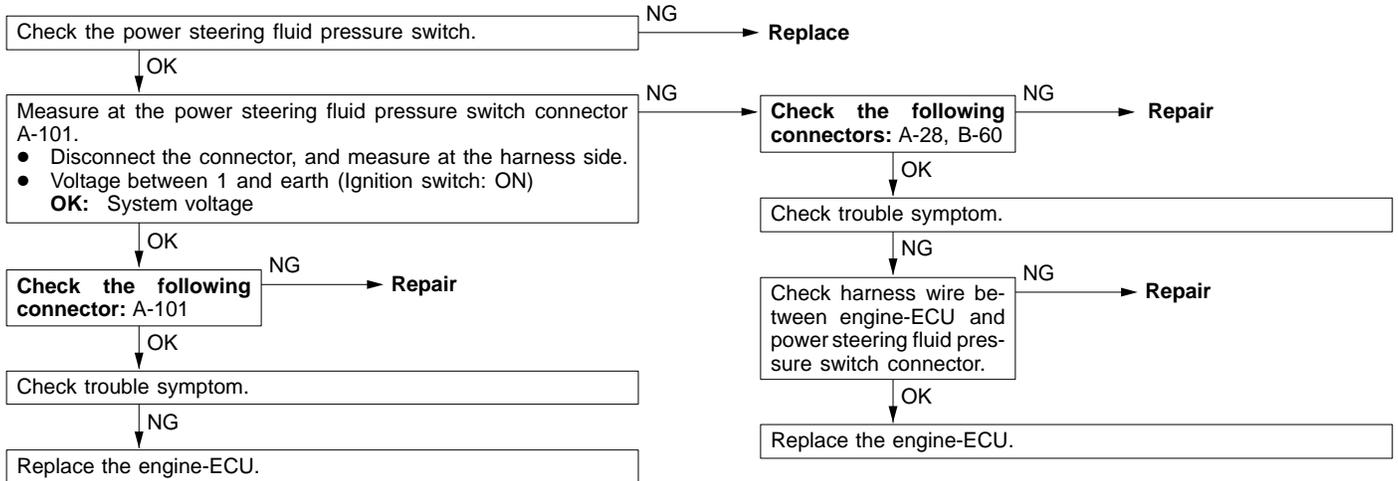
INSPECTION PROCEDURE 27

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



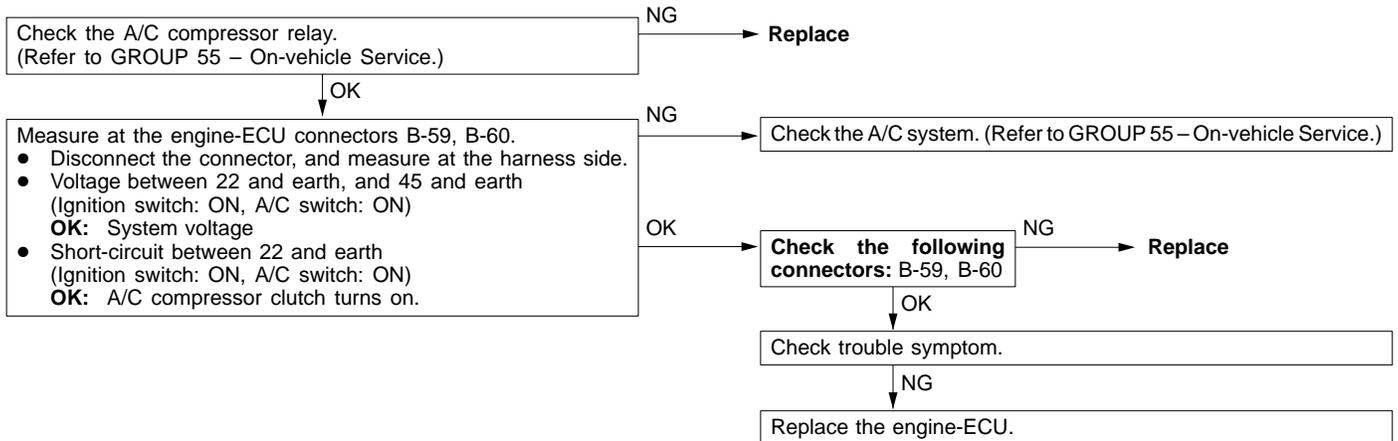
INSPECTION PROCEDURE 28

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 or short-circuited harness wire • Malfunction of the engine-ECU



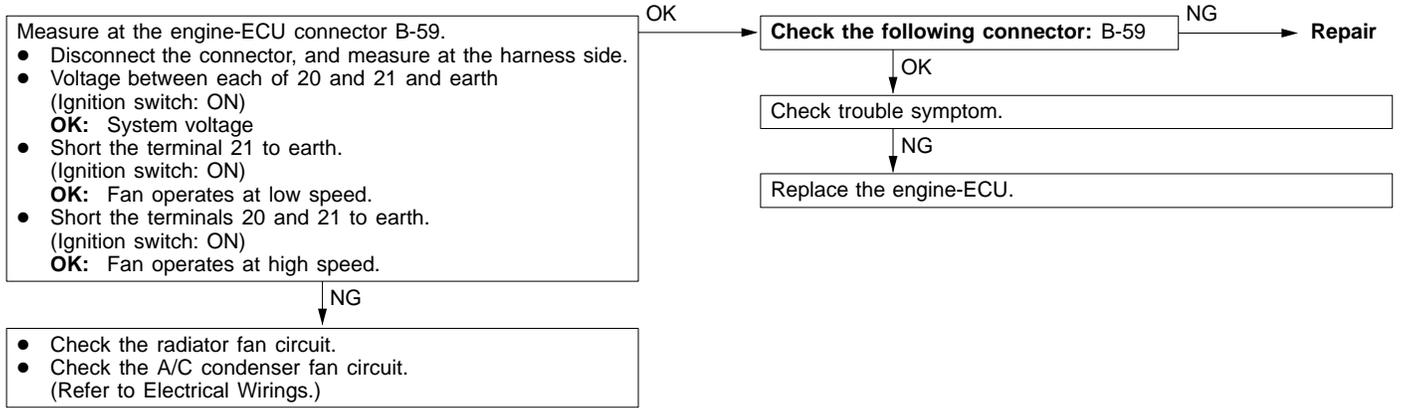
INSPECTION PROCEDURE 29

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 or short-circuited harness wire • Malfunction of the engine-ECU



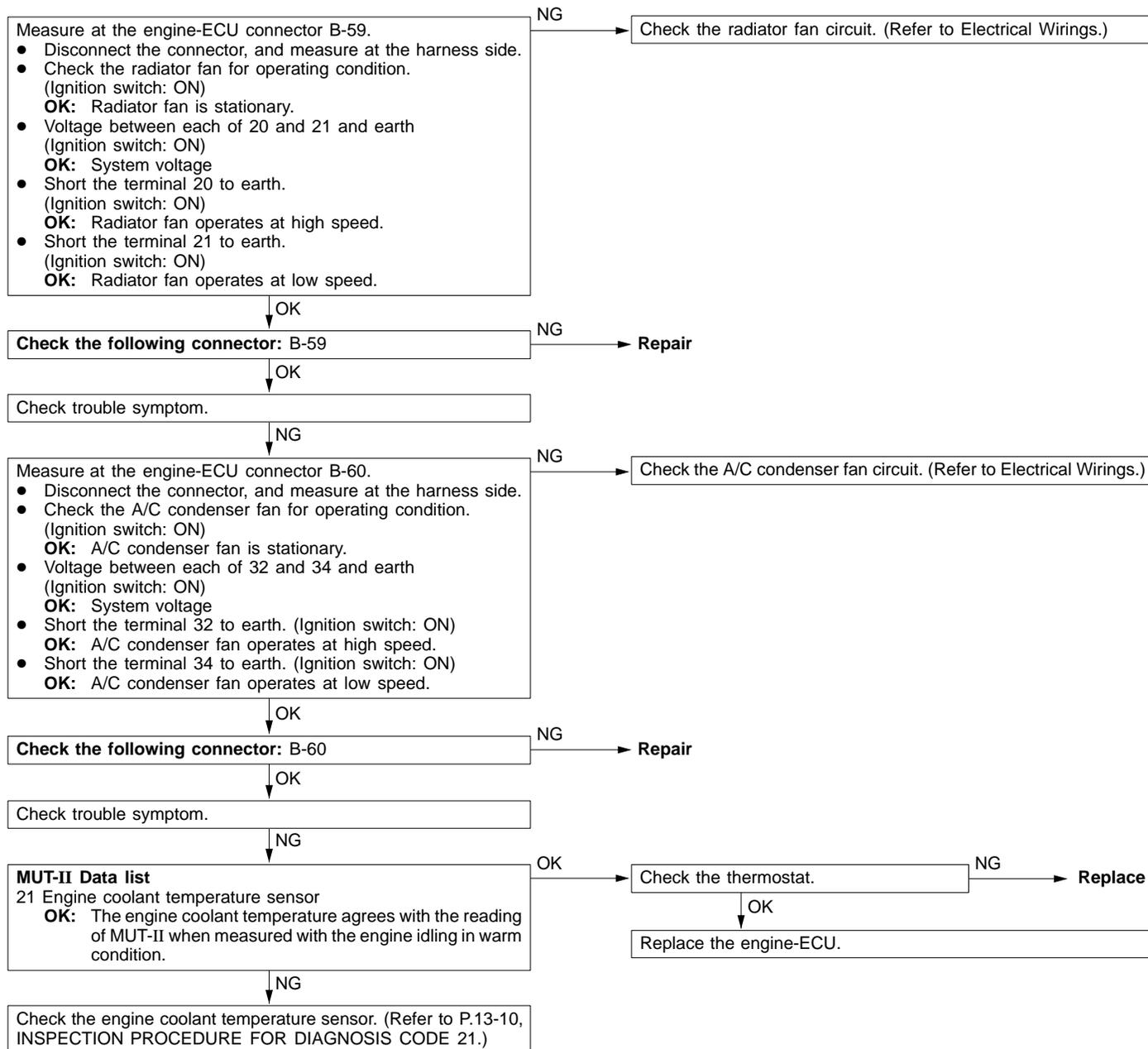
INSPECTION PROCEDURE 30 <EVOLUTION-IV, EVOLUTION-V>

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



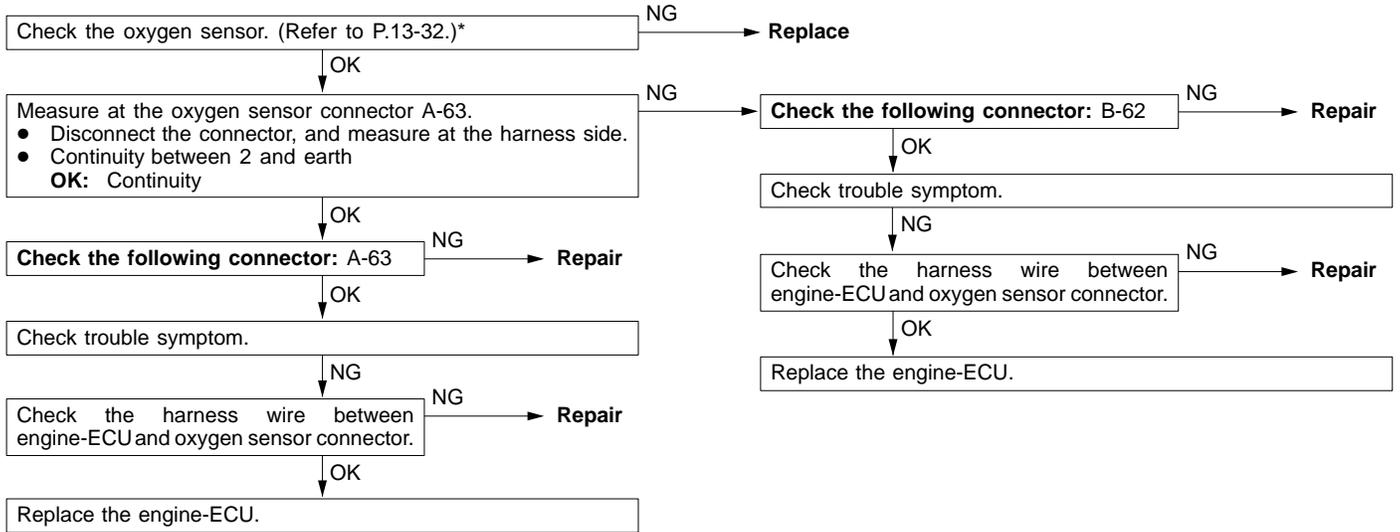
INSPECTION PROCEDURE 30 <EVOLUTION-VI>

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



INSPECTION PROCEDURE 31 <EVOLUTION-IV>

Oxygen sensor system	Probable cause
<p>When CO or HC concentration is too high, the malfunction of the parts shown at right may be the cause.</p> <ul style="list-style-type: none"> • The oxygen sensor detects the density of oxygen in exhaust gas and inputs it to the engine-ECU after converting into a voltage signal. • The engine-ECU controls the fuel injection amount based on this signal such that the stoichiometric air/fuel mixture ratio can be obtained. 	<ul style="list-style-type: none"> • Malfunction of oxygen sensor • Improper connector contact, open or short-circuited harness wire • Malfunction of engine-ECU

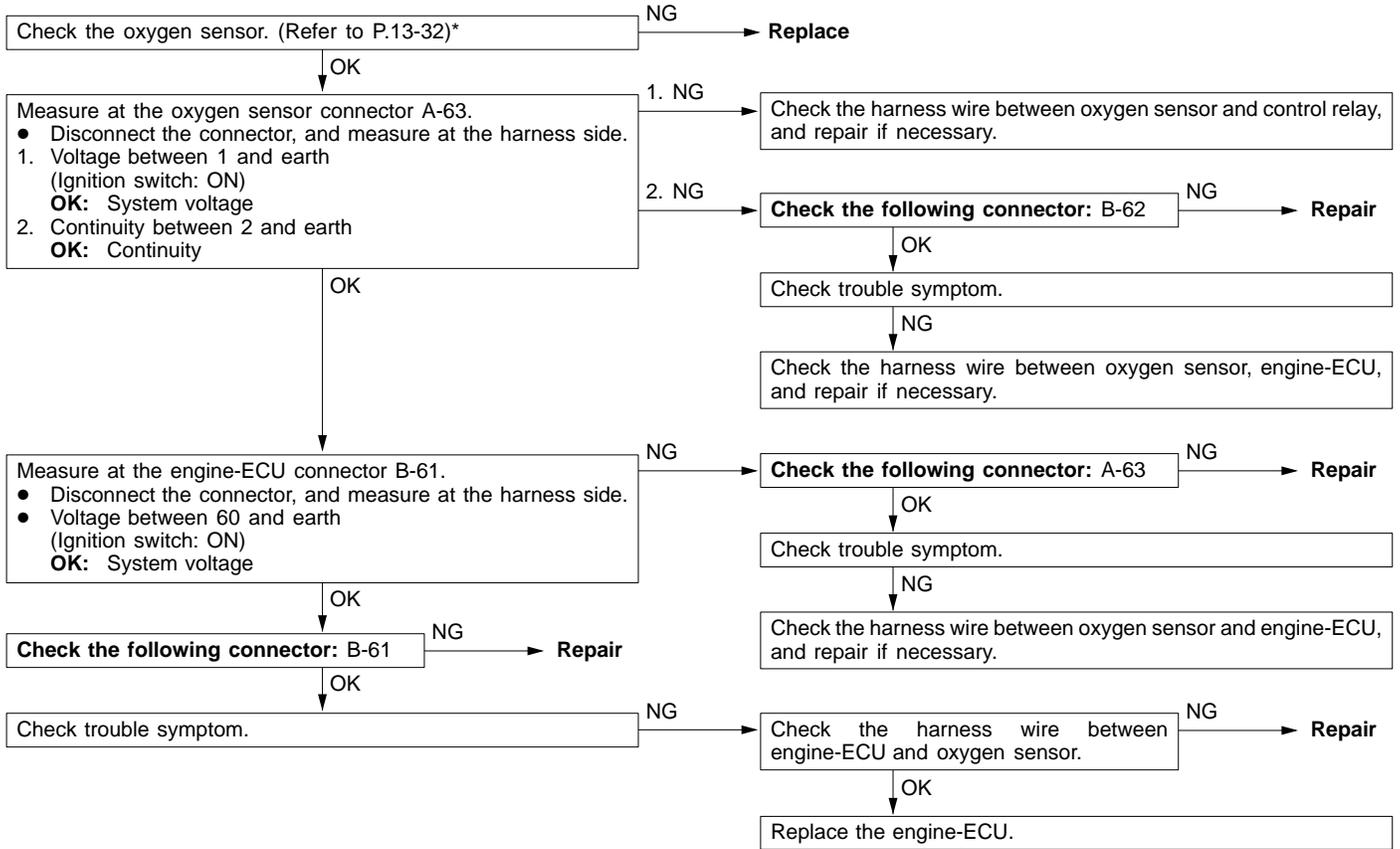


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

INSPECTION PROCEDURE 31 <EVOLUTION-V, EVOLUTION-VI>

Oxygen sensor system	Probable cause
When CO or HC concentration is too high, the malfunction of the parts shown at right may be the cause. <ul style="list-style-type: none"> • The oxygen sensor detects the density of oxygen in exhaust gas and inputs it to the engine-ECU after converting into a voltage signal. • The engine-ECU controls the fuel injection amount based on this signal such that the stoichiometric air/fuel mixture ratio can be obtained. 	<ul style="list-style-type: none"> • Malfunction of oxygen sensor • Improper connector contact, open or short-circuited harness wire • Malfunction of engine-ECU

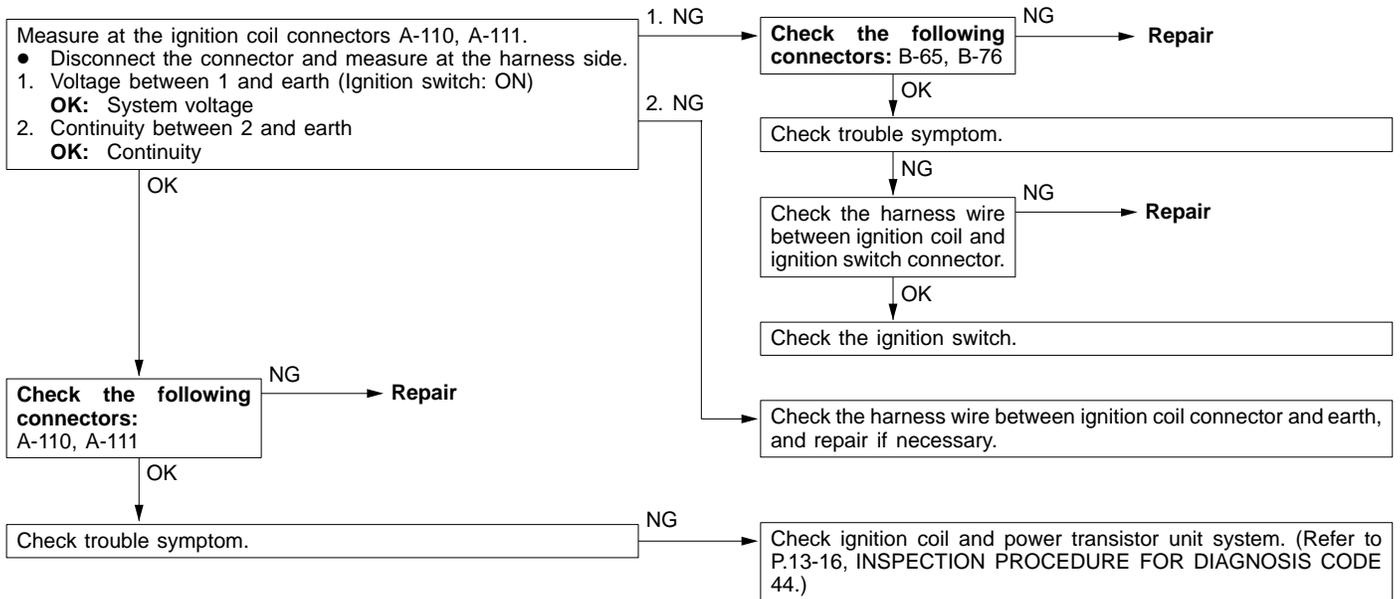


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

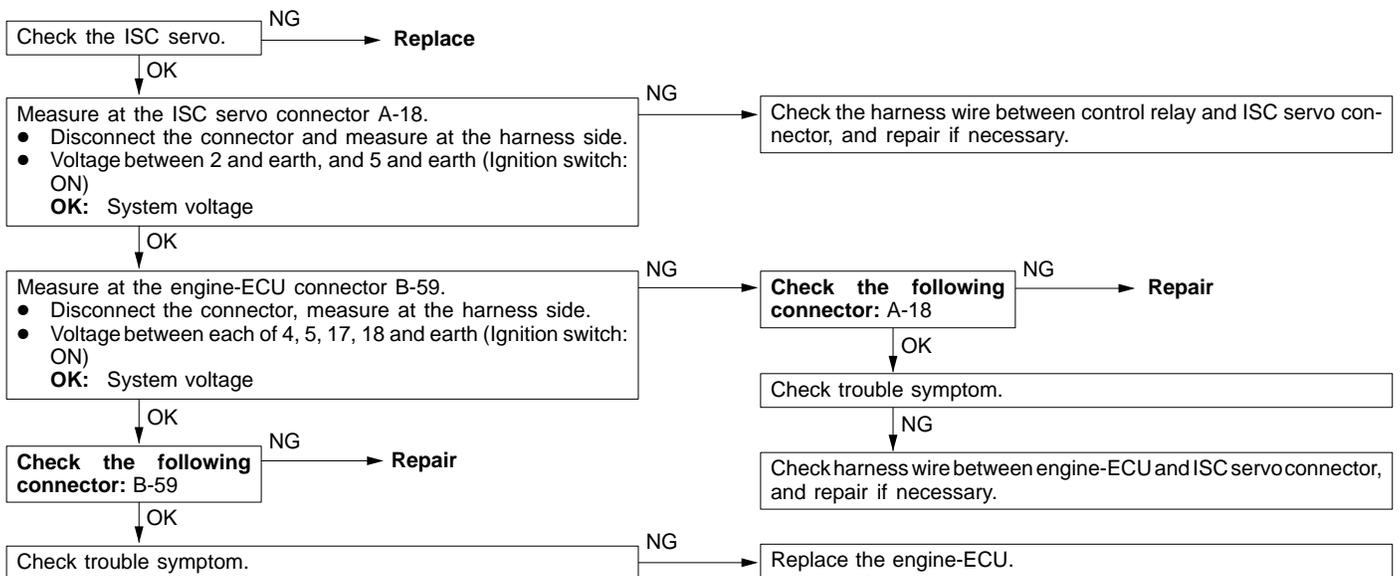
INSPECTION PROCEDURE 32

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 or short-circuited harness wire Malfunction of the engine-ECU



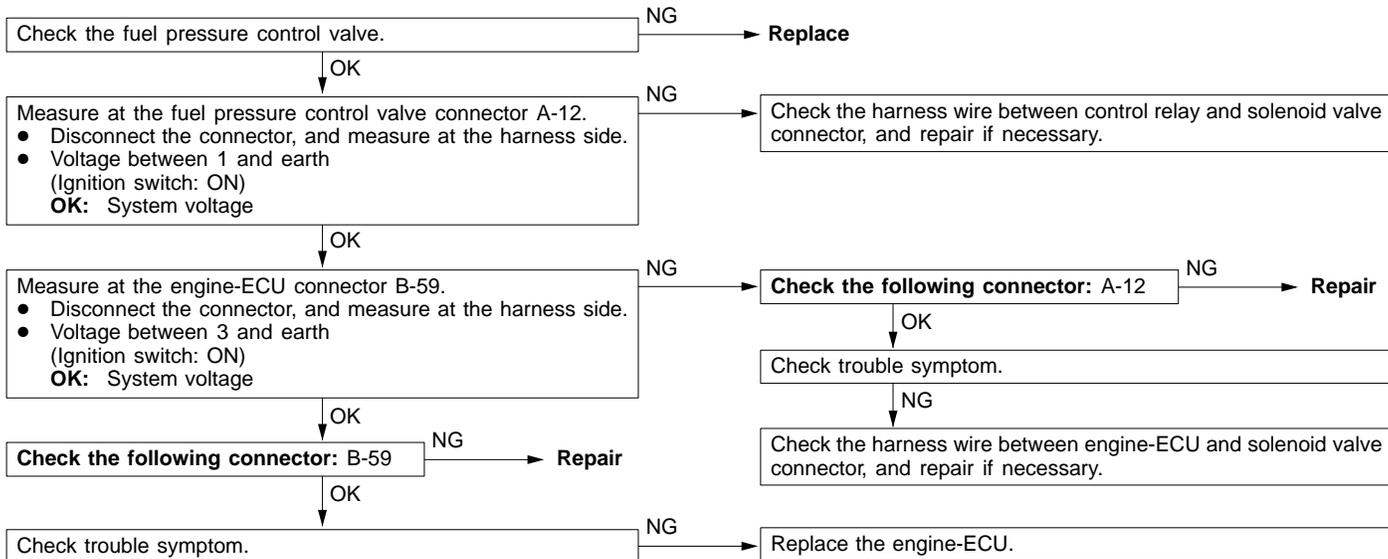
INSPECTION PROCEDURE 33

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 or short-circuited harness wire Malfunction of the engine-ECU



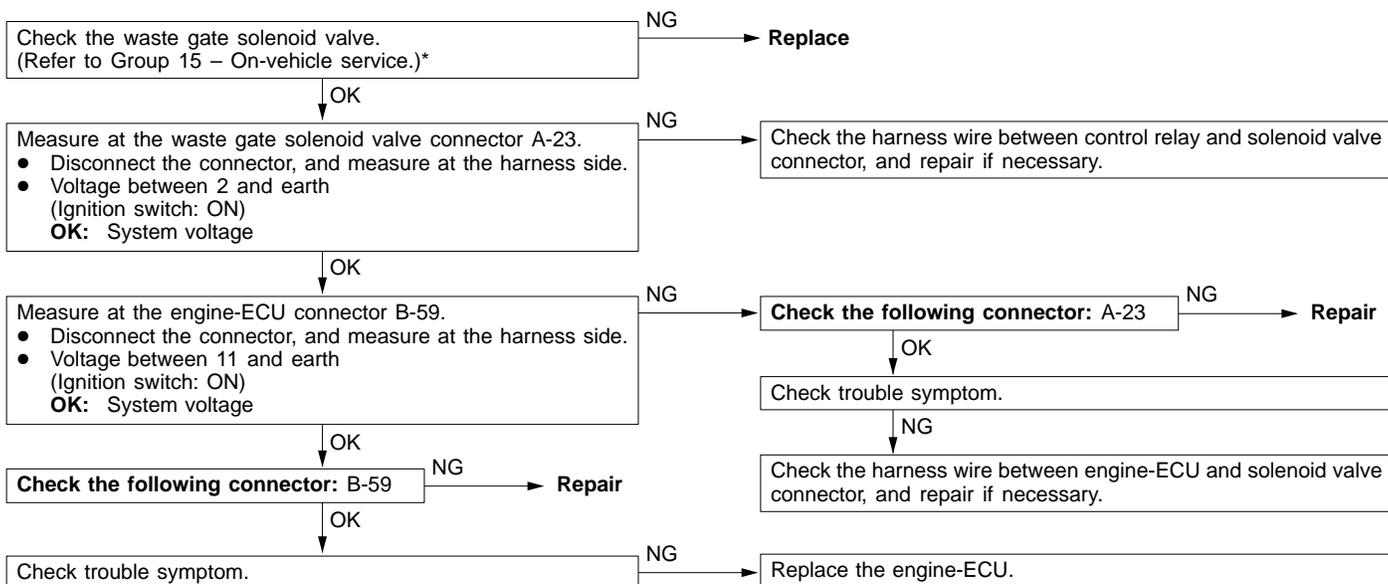
INSPECTION PROCEDURE 34

Fuel pressure control valve system	Probable cause
The fuel pressure control valve switches the pressure introduction into the fuel pressure regulator between the intake manifold and atmosphere.	<ul style="list-style-type: none"> ● Malfunction of solenoid valve ● Improper connector contact, open or short-circuited harness wire ● Malfunction of engine-ECU



INSPECTION PROCEDURE 35

Waste gate solenoid valve	Probable cause
The waste gate solenoid valve controls the boost pressure introduced into the waste gate actuator in the turbocharger.	<ul style="list-style-type: none"> ● Malfunction of solenoid valve ● Improper connector contact, open or short-circuited harness wire ● Malfunction of engine-ECU

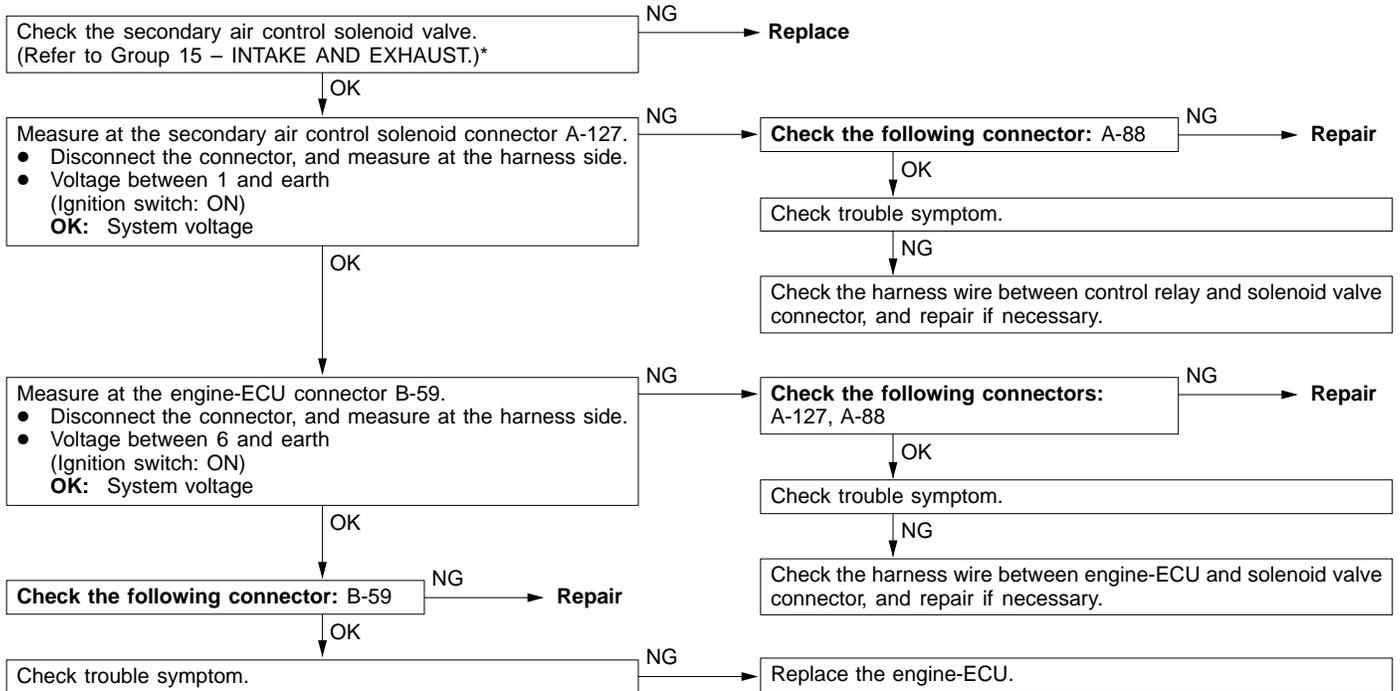


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

INSPECTION PROCEDURE 36

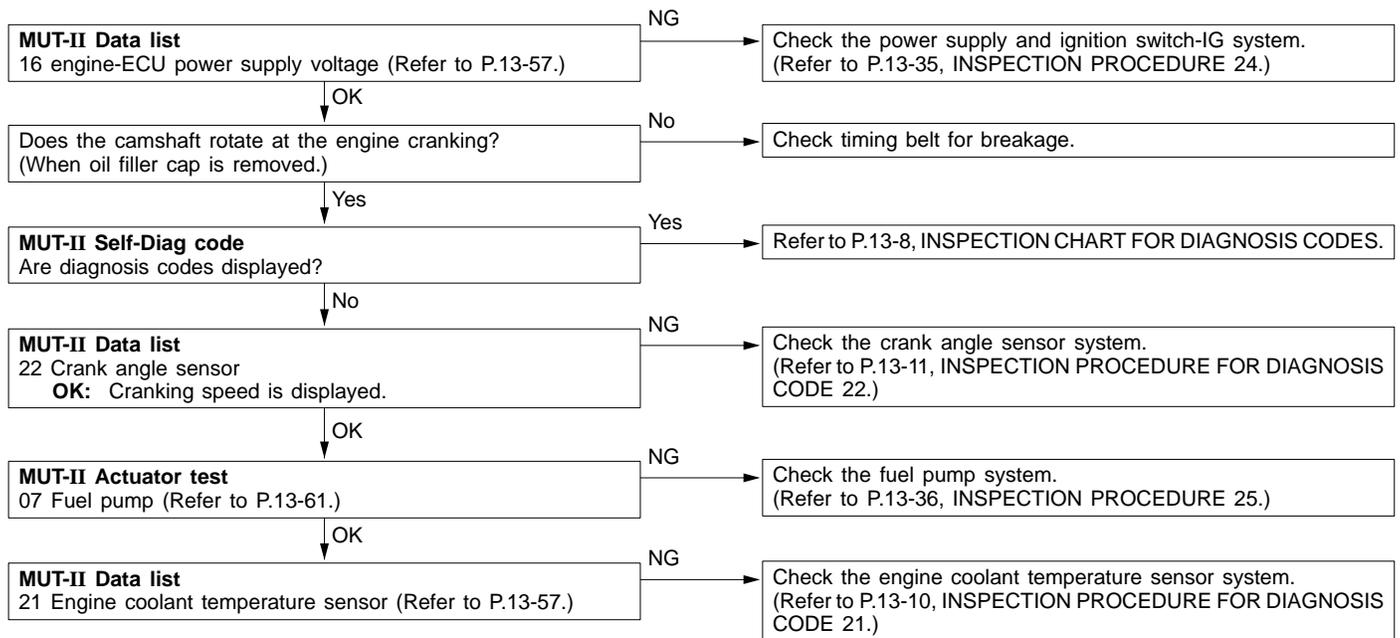
Secondary air control solenoid valve system	Probable cause
The secondary air control solenoid valve switches the pressure introduction into the secondary air valve between the intake manifold and atmosphere.	<ul style="list-style-type: none"> ● Malfunction of solenoid valve ● Improper connector contact, open or short-circuited harness wire ● Malfunction of engine-ECU



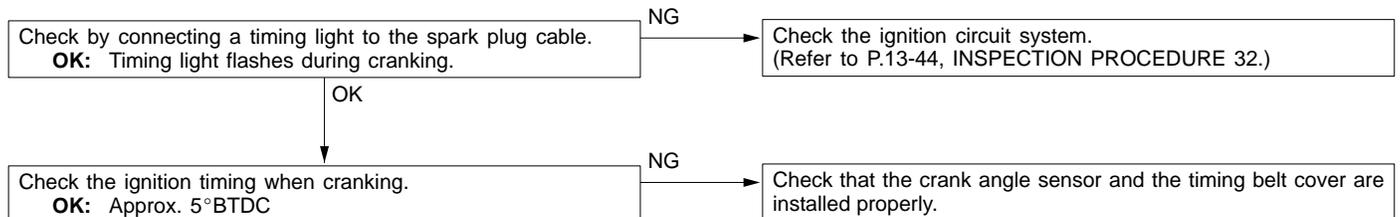
NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

INSPECTION PROCEDURE 37

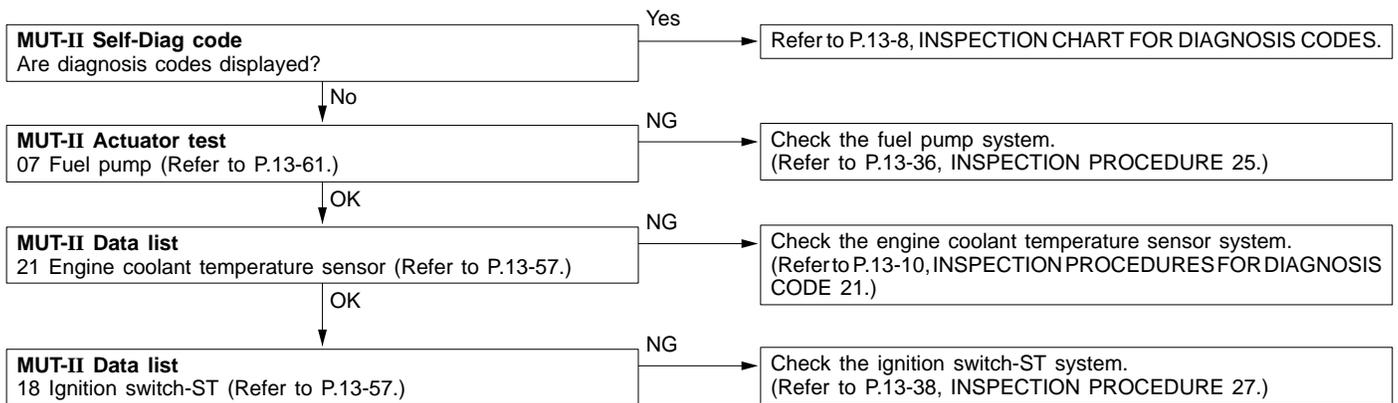
MUT-II: Inspection of no initial combustion

INSPECTION PROCEDURE 38

Ignition system: Inspection of no initial combustion.

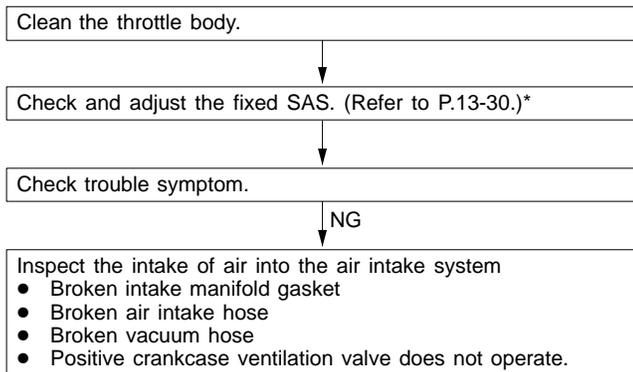
INSPECTION PROCEDURE 39

MUT-II: Check if incomplete combustion occurs.



INSPECTION PROCEDURE 40

Check if hunting occurs.

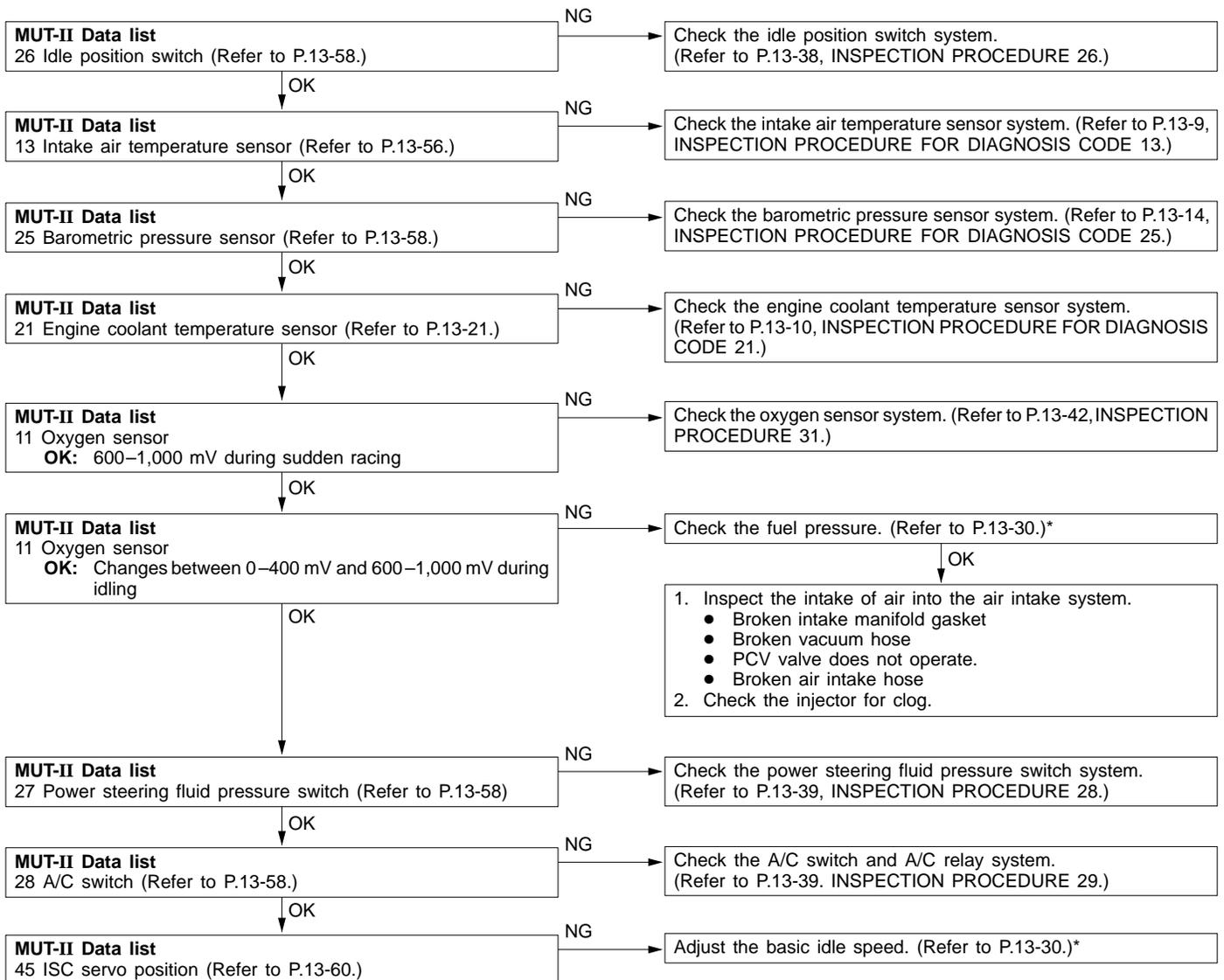


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

INSPECTION PROCEDURE 41

MUT-II: Check if idling speed is unstable.

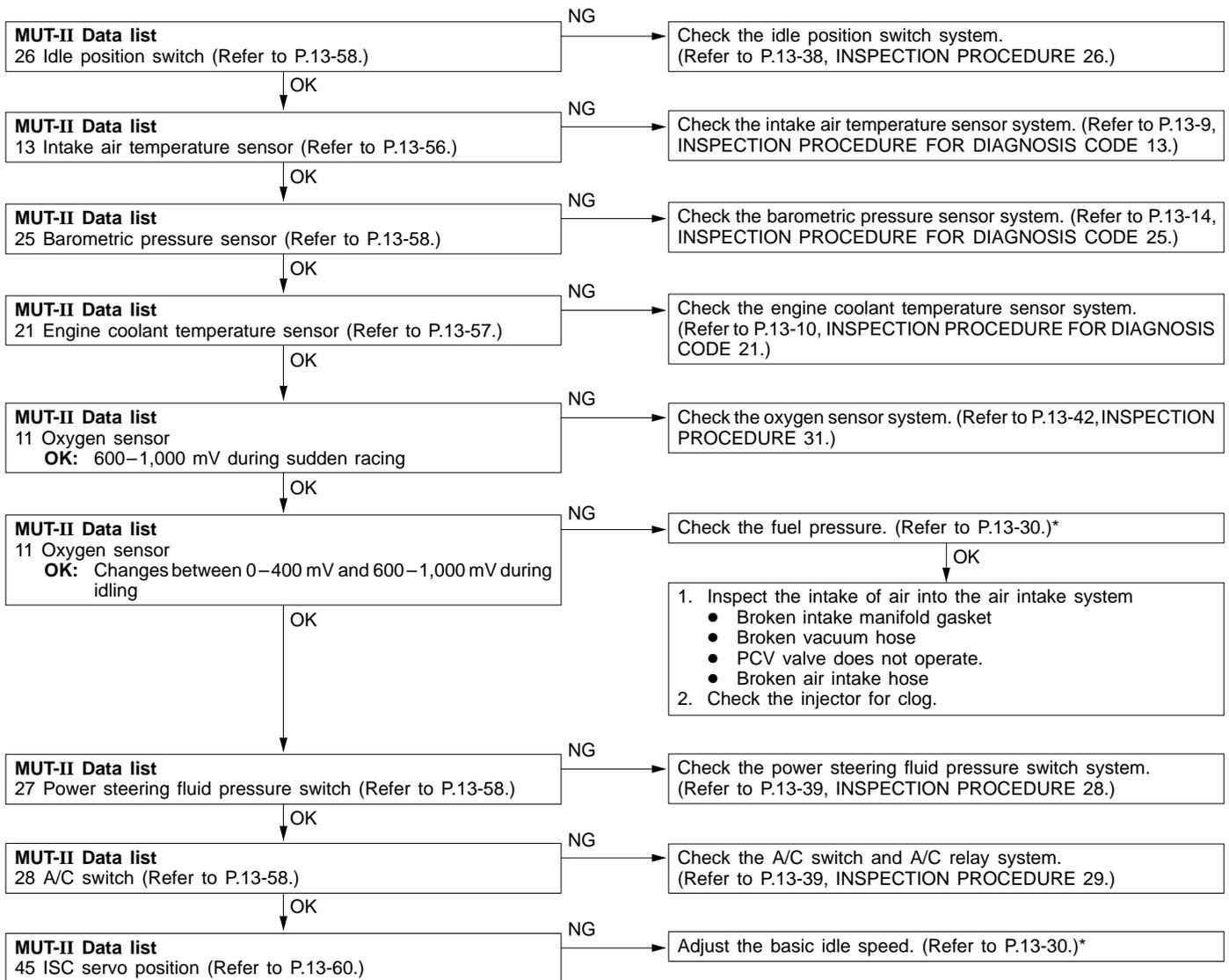


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

INSPECTION PROCEDURE 42

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

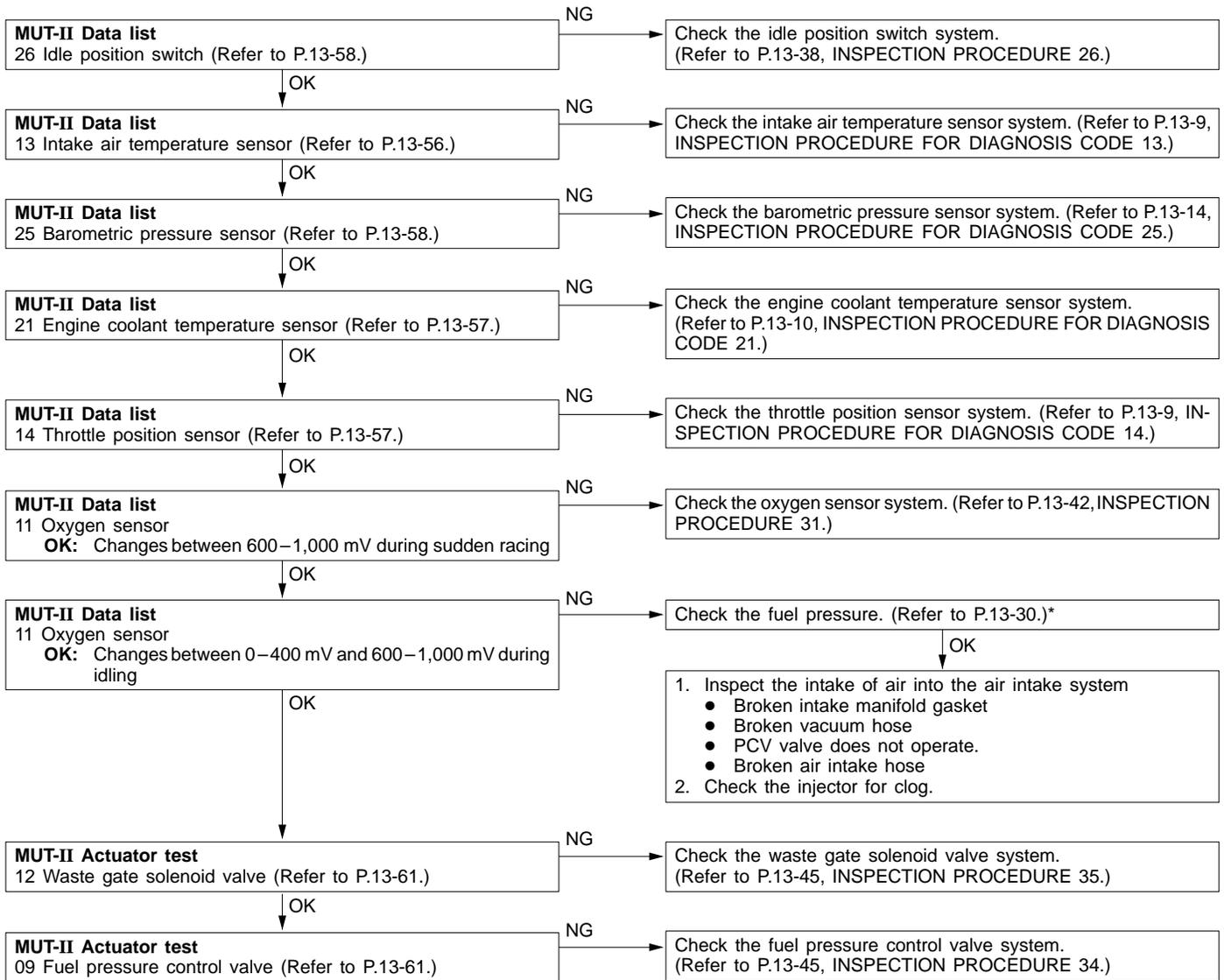


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

INSPECTION PROCEDURE 43

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

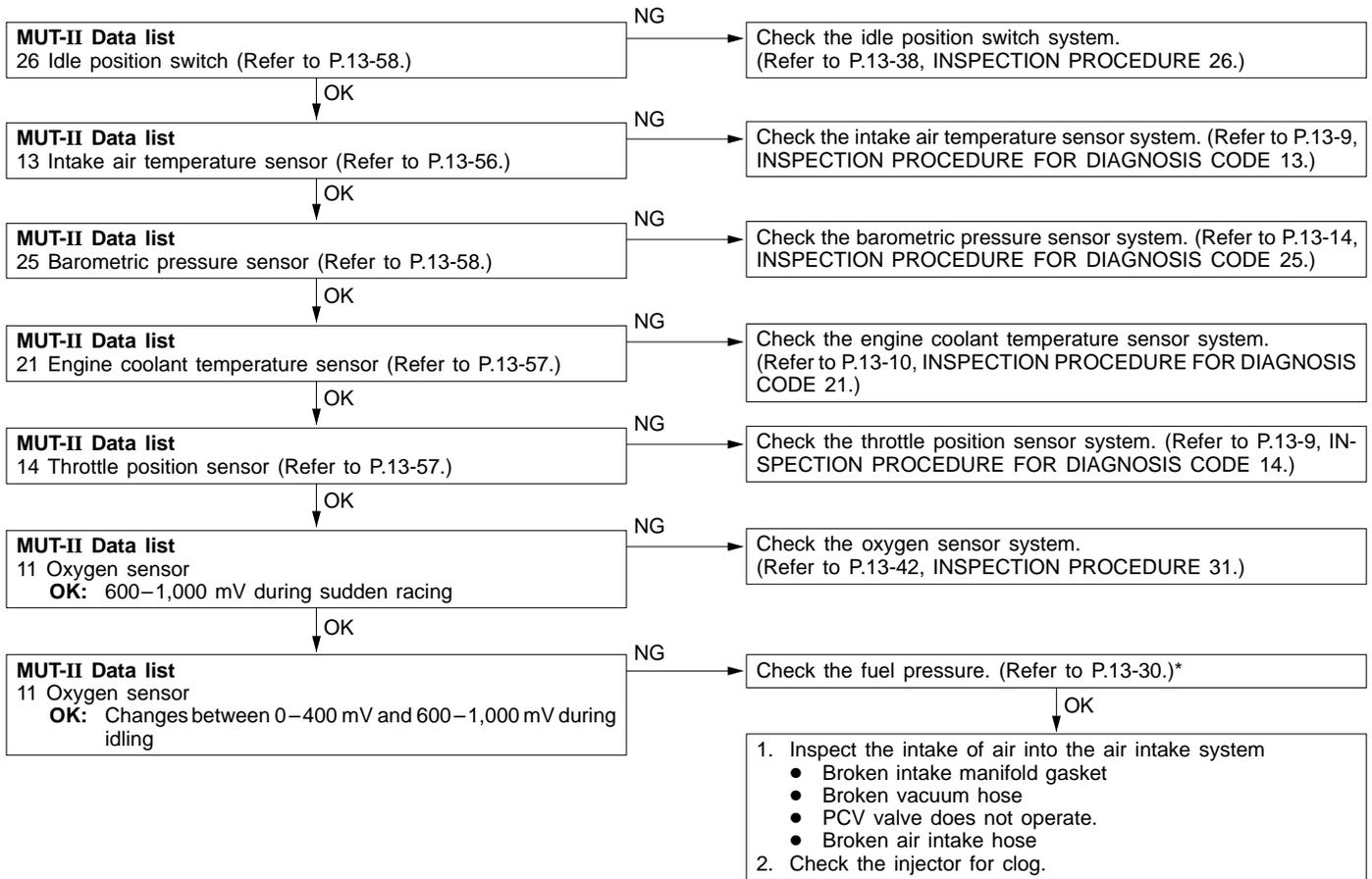


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

INSPECTION PROCEDURE 44

MUT-II: Check if surge occurs.

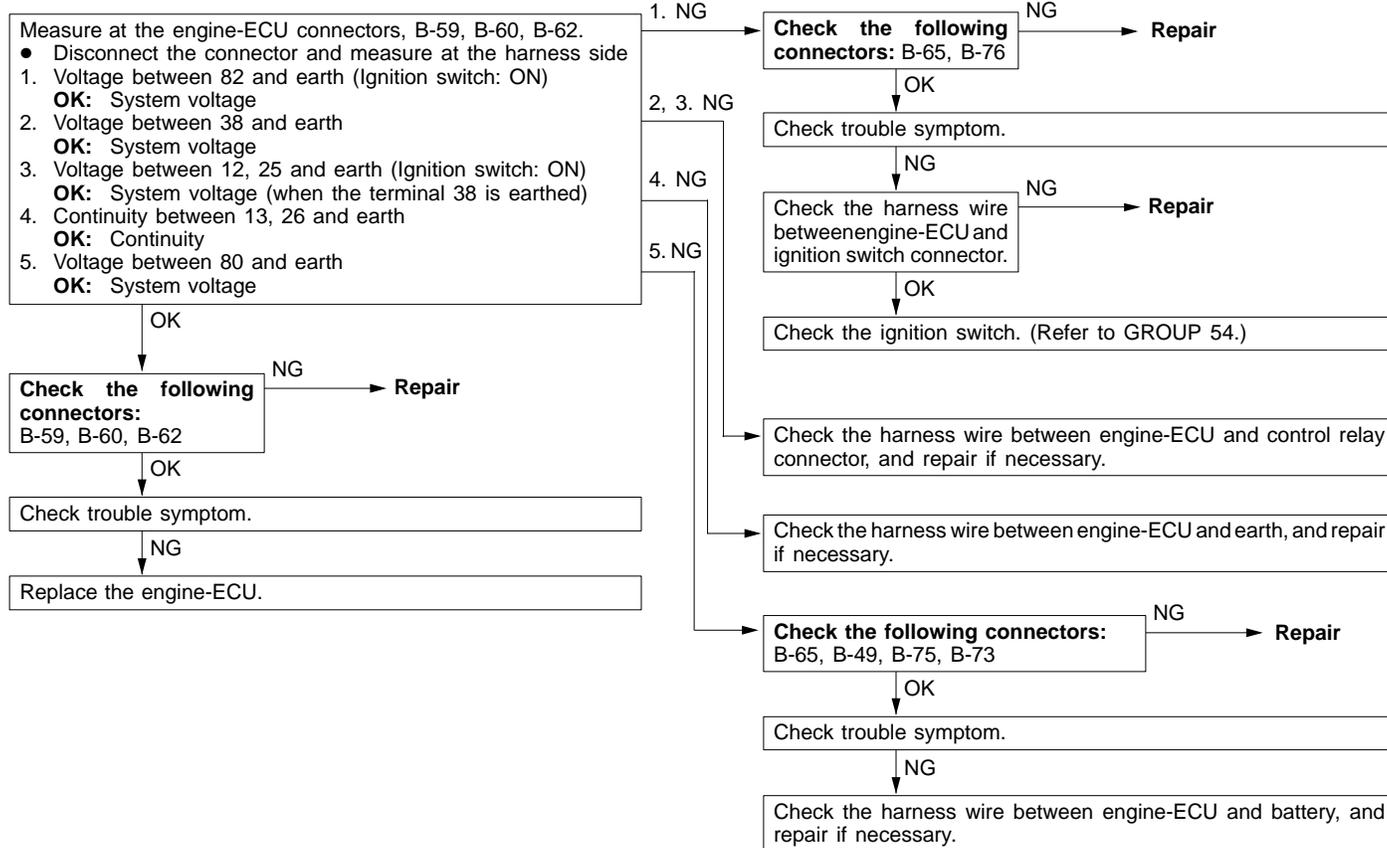


NOTE

*: Refer to Workshop Manual for LANCER EVOLUTION-IV and EVOLUTION-V (Pub. No. S9806CNCP9).

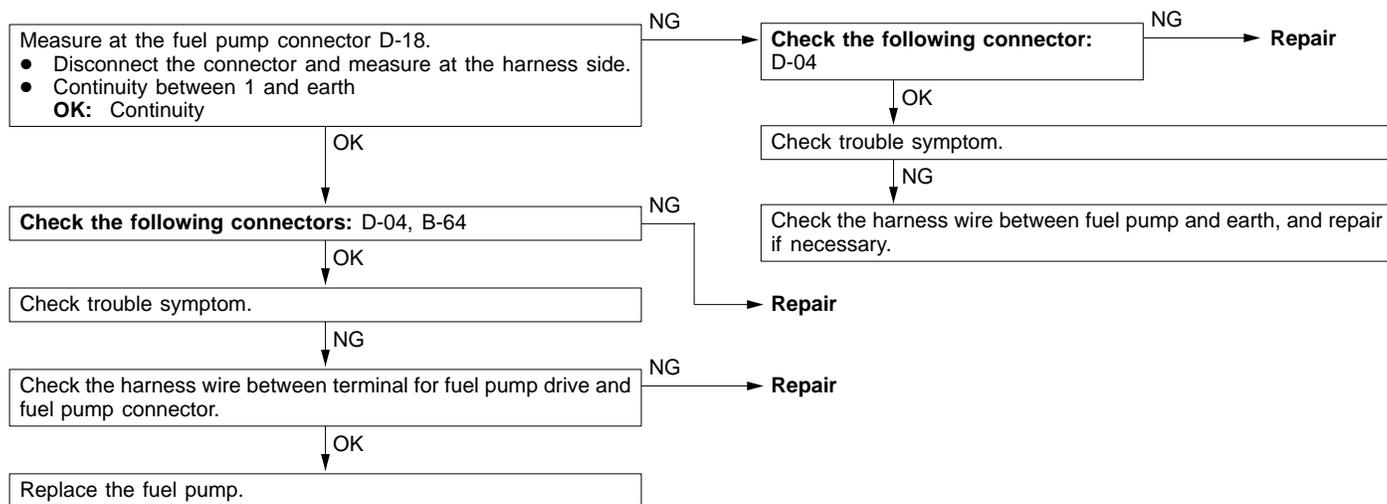
INSPECTION PROCEDURE 45

Check the engine-ECU power supply and earth circuit.



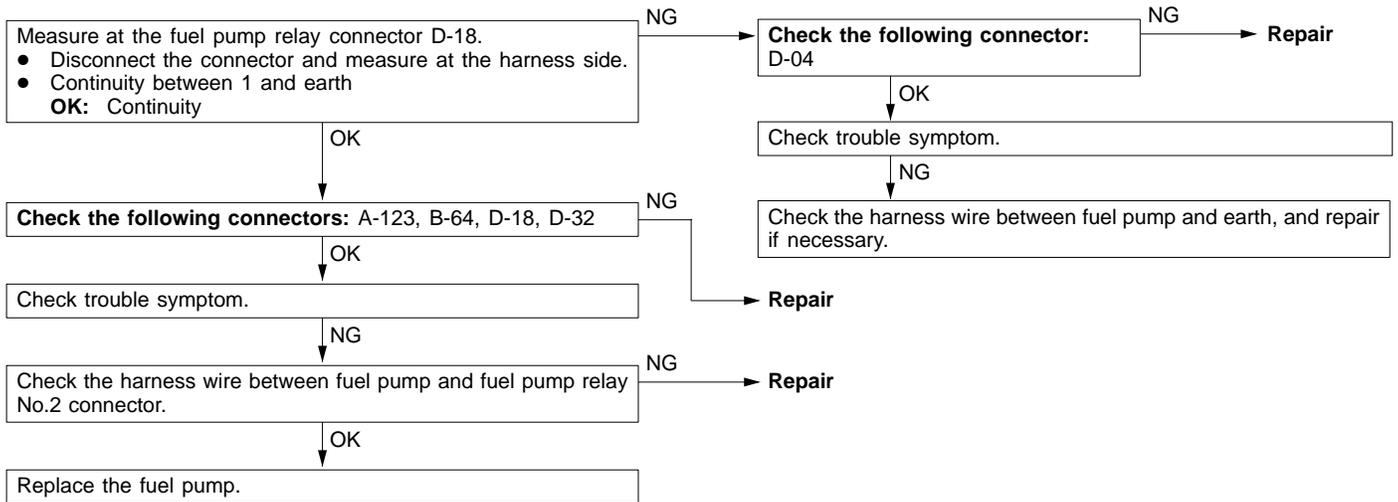
INSPECTION PROCEDURE 46 <EVOLUTION-IV, EVOLUTION-V>

Check fuel pump circuit.



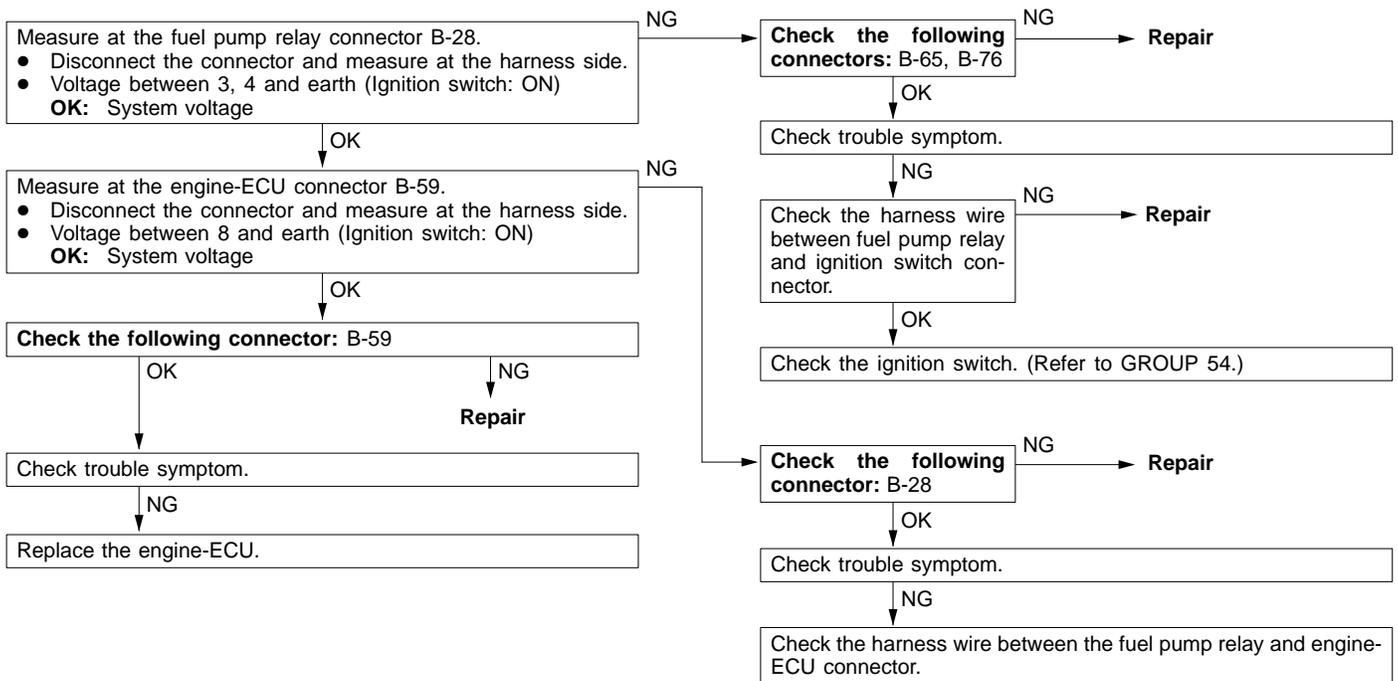
INSPECTION PROCEDURE 46 <EVOLUTION-VI>

Check fuel pump circuit.



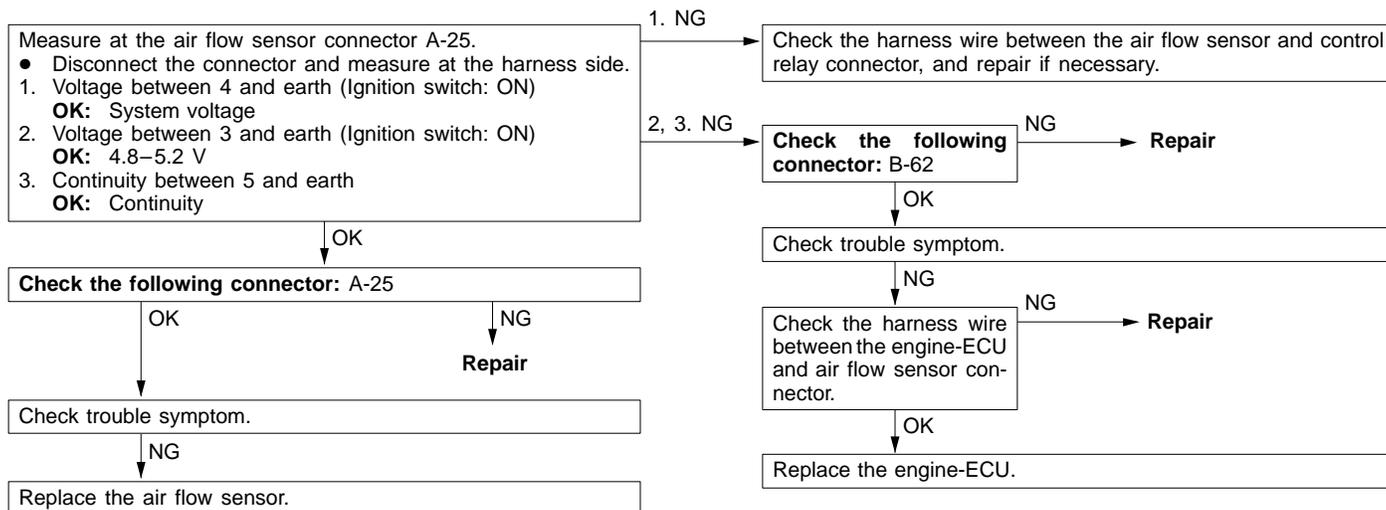
INSPECTION PROCEDURE 47

Check the fuel pump drive control circuit.



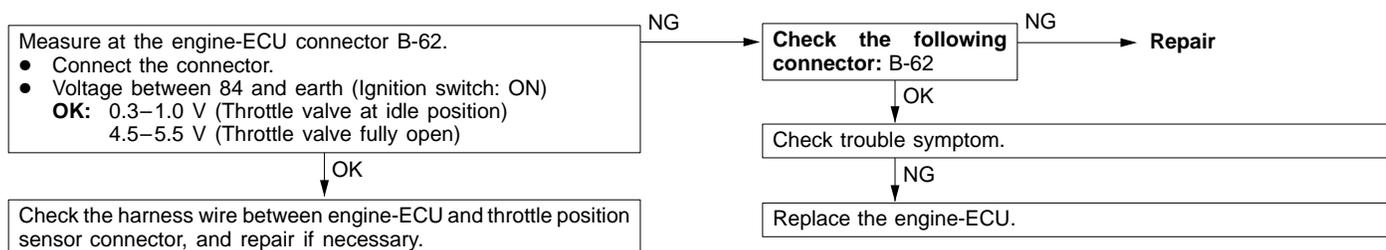
INSPECTION PROCEDURE 48

Check air flow sensor control circuit.



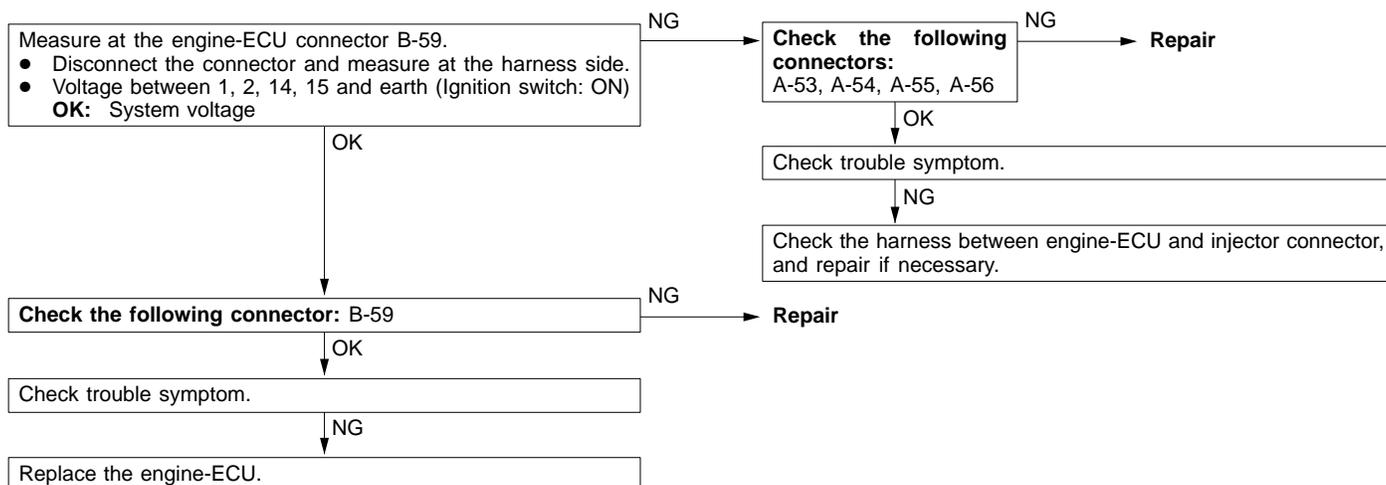
INSPECTION PROCEDURE 49

Check throttle position sensor output circuit.



INSPECTION PROCEDURE 50

Check injector control circuit.



DATA LIST REFERENCE TABLE

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
11	Oxygen sensor	Engine:After having warmed up Air/fuel mixture is made leaner when decelerating, and is made richer when racing.	When at 4,000 r/min, engine is suddenly decelerated	200 mV or less	Procedure No. 31	13-42
			When engine is suddenly raced	600 – 1,000 mV		
		Engine:After having warmed up The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECU.	Engine is idling	400 mV or less (Changes)		
			2,500 r/min	600 – 1,000 mV		
12	Air flow sensor* <EVOLUTION-IV>	<ul style="list-style-type: none"> • Engine coolant temperature: 80 – 95°C • Lamps, electric cooling fan and all accessories: OFF • Transmission: Neutral (A/T: P range) 	Engine is idling	17 – 43 Hz	–	–
			2,500 r/min	46 – 86 Hz		
			Engine is raced	Frequency increases in response to racing		
12	Air flow sensor* <EVOLUTION-V, VI>	<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	12 – 38 Hz	–	–
			2,500 r/min	36 – 76 Hz		
			Engine is raced	Frequency increases in response to racing		
13	Intake air temperature sensor	Ignition switch: ON or with engine running	When intake air temperature is –20°C	–20°C	Code No. 13	13-9
			When intake air temperature is 0°C	0°C		
			When intake air temperature is 20°C	20°C		
			When intake air temperature is 40°C	40°C		
			When intake air temperature is 80°C	80°C		

NOTE

*: In a new vehicle [driven approximately 500 km or less], the air flow sensor output frequency is sometimes 10% higher than the standard frequency.

Item No.	Inspection item	Inspection contents	Normal condition	Inspection procedure No.	Reference page	
14	Throttle position sensor	Ignition switch: ON	Set to idle position	300 – 1,000 mV	Code No. 14	13-9
			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	13-35	
18	Cranking signal (ignition switch-ST)	Ignition switch: ON	Engine: Stopped	OFF	Procedure No. 27	13-38
			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	13-10
			When engine coolant temperature is 0°C	0°C		
			When engine coolant temperature is 20°C	20°C		
			When engine coolant temperature is 40°C	40°C		
			When engine coolant temperature is 80°C	80°C		

Item No.	Inspection item	Inspection contents	Normal condition	Inspection procedure No.	Reference page	
22	Crank angle sensor	<ul style="list-style-type: none"> ● Engine: Cranking ● Tachometer: Connected 	Compare the engine speed readings on the tachometer and the MUT-II.	Accord	–	–
		<ul style="list-style-type: none"> ● Engine: Idling ● Idle position switch: ON 	When engine coolant temperature is –20°C	1,300 – 1,500 rpm		
			When engine coolant temperature is 0°C	1,300 – 1,500 rpm		
			When engine coolant temperature is 20°C	1,300 – 1,500 rpm		
			When engine coolant temperature is 40°C	1,150 – 1,350 rpm		
When engine coolant temperature is 80°C	750 – 950 rpm					
25	Barometric pressure sensor	Ignition switch: ON	At altitude of 0 m	101 kPa	Code No. 25	13-14
			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	13-38
			Throttle valve: Slightly open	OFF*		
27	Power steering fluid pressure switch	Engine: Idling	Steering wheel stationary	OFF	Procedure No. 28	13-39
			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	13-39
			A/C switch: ON	ON		

NOTE

*: 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 valve has opened, the idle position switch and the throttle position sensor need to be adjusted.

Item No.	Inspection item	Inspection contents	Normal condition	Inspection procedure No.	Reference page	
41	Injectors* ¹ <EVOLUTION-IV>	Engine: Cranking	When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously)	27 – 41 ms	–	–
			When engine coolant temperature is 20°C	14 – 22 ms		
			When engine coolant temperature is 80°C	3.9 – 5.9 ms		
	Injectors* ² <EVOLUTION-IV>	<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	1.2 – 2.4 ms		
			2,500 r/min	1.0 – 2.2 ms		
			When engine is suddenly raced	Increases		
41	Injectors* ¹ <EVOLUTION-V, VI>	Engine: Cranking	When engine coolant temperature is 0°C	27 – 40 ms	–	–
			When engine coolant temperature is 20°C	14.5 – 21.7 ms		
			When engine coolant temperature is 80°C	3.8 – 5.6 ms		
	Injectors* ² <EVOLUTION-V, VI>	<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	0.9 – 2.1 ms		
			2,500 r/min	0.7 – 1.9 ms		
			When engine is suddenly raced	Increases		

NOTE

*1: 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.

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

Item No.	Inspection item	Inspection contents	Normal condition	Inspection procedure No.	Reference page	
44	Ignition coils and power transistors <EVOLUTION-IV>	<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	3°ATDC – 13°BTDC	–	–
			2,500 r/min	24 – 44°BTDC		
44	Ignition coils and power transistors <EVOLUTION-V, VI>	<ul style="list-style-type: none"> Engine: After having warmed up Timing lamp is set. 	Engine is idling	0 – 13°BTDC	–	–
			2,500 r/min	24 – 44°BTDC		
45	ISC (stepper) motor position *	<ul style="list-style-type: none"> Engine coolant temperature: 80 – 90°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 steps	–	–
			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	13-39
			A/C switch: ON	ON (Compressor clutch is operating)		

NOTE

*: In a new vehicle [driven approximately 500 km or less], the stepper motor has sometimes 30 steps greater than the standard value.

Caution

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

8. ACTUATOR TEST REFERENCE TABLE

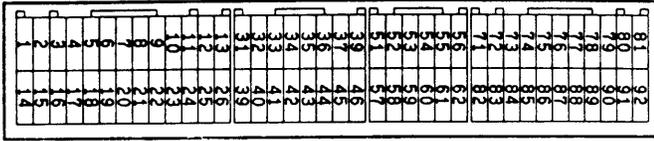
Item No.	Inspection item	Drive contents	Inspection contents	Normal condition	Inspection procedure No.	Reference page	
01	Injectors	Cut fuel to No. 1 injector	Engine: After having warmed up/Engine is idling (Cut the fuel supply to each injector in turn and check cylinders which don't affect idling.)	Idling condition becomes different (becomes unstable, resulting in engine stall).	Code No. 41	13-15	
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	13-36
				Listen near the fuel tank for the sound of fuel pump operation.			
09	Fuel pressure control valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON	Sound of operation can be heard when solenoid valve is driven.	Procedure No. 34	13-45	
12	Waste gate solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON	Sound of operation can be heard when solenoid valve is driven.	Procedure No. 35	13-45	
13	Fuel pump relay No.2	Turn fuel pump relay No.2 from OFF to ON.	<ul style="list-style-type: none"> • Ignition switch: ON • Listen to pump operation sound near fuel tank. 	Sound of operation can be heard.	Procedure No. 25	13-36	
17	Basic ignition timing	Set to ignition timing adjustment mode	<ul style="list-style-type: none"> • Engine: Idling • Timing light is set 	5° BTDC	—	—	

Item No.	Inspection item	Drive contents	Inspection contents	Normal condition	Inspection procedure No.	Reference page
20	Radiator fan (HIGH), condenser fan (HIGH)*1	Drive the fan motors (for radiator and condenser*1)	<ul style="list-style-type: none"> ● Ignition switch: ON ● A/C switch: ON*1 	Fan motors operate at high speed.	Procedure No. 30	13-40
21	Radiator fan (LOW), condenser fan (LOW)*1	Drive the fan motors (for radiator and condenser*1)	<ul style="list-style-type: none"> ● Ignition switch: ON ● A/C switch: ON*1 	Fan motors operate at low speed.		
36*2	Secondary air control solenoid valve	Turn solenoid valve from OFF to ON.	Ignition switch: ON	Sound of operation can be heard when solenoid valve is driven.	Procedure No. 36	13-46
37*2	A/C condenser fan (HIGH)	Drive A/C condenser fan motor	Ignition switch: ON	A/C condenser fan motor operates at high speed.	Procedure No. 30	13-41
38*2	A/C condenser fan (LOW)	Drive A/C condenser fan motor	Ignition switch: ON	A/C condenser fan motor operates at low speed.		

NOTE

*1: EVOLUTION-IV and EVOLUTION-V

*2: EVOLUTION-VI

ENGINE-ECU INSPECTION**TERMINAL VOLTAGES****Engine ECU connector**

9FU0393

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
1	No.1 injector	While engine is idling after having been warmed up, suddenly depress the accelerator pedal.	Momentarily drops slightly from 11 – 14 V.
14	No.2 injector		
2	No.3 injector		
15	No.4 injector		
3	Fuel pressure control valve	Ignition switch: ON	System voltage
		Engine: Cranking to idling (within about two minutes)	0 – 3 V to system voltage
4	Stepper motor coil (A1)	Engine: Immediately after engine has been started for warming up	Changes repeatedly from system voltage to 0 – 6 V and from 0 – 6 V to system voltage.
17	Stepper motor coil (A2)		
5	Stepper motor coil (B1)		
18	Stepper motor coil (B2)		
6	Secondary air control solenoid valve	Ignition switch: ON	System voltage
8	Fuel pump relay	Ignition switch: ON	System voltage
		Engine: Idling	0 – 3 V
10	Power transistor unit (A)	Engine speed: 3,000 r/min	0.3 – 3.0 V
23	Power transistor unit (B)		
11	Wastegate solenoid valve	Ignition switch: ON	System voltage
		Engine: At idle after having been warmed up (when premium gasoline is used)	0 – 3 V
12	Power supply	Ignition switch: ON	System voltage
25			
19	Air flow sensor reset signal	Engine: Idling	0 – 1 V
		Engine speed: 3,000 r/min	6 – 9 V
20	Fan motor relay (HI) <EVOLUTION-IV, V>	Fan not operating (coolant temperature: 90°C or below)	System voltage
		Fan at high speed (coolant temperature: 105°C or above)	0 – 3 V

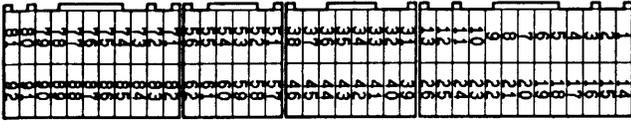
Terminal No.	Check item	Check condition (Engine condition)	Normal condition	
20	Radiator fan motor relay (HI) <EVOLUTION-VI>	Radiator fan not operating (coolant temperature: 95°C or below)	System voltage	
		Radiator fan at high speed (coolant temperature: 105°C or above)	0 – 3 V	
21	Fan motor relay (LOW) <EVOLUTION-IV, V>	Fan not operating (coolant temperature: 95°C or below)	System voltage	
		Fan at low speed (coolant temperature: 95 – 100°C)	0 – 3 V	
21	Radiator fan motor relay (LOW) <EVOLUTION-VI>	Radiator fan not operating (coolant temperature: 95°C or below)	System voltage	
		Radiator fan at low speed (coolant temperature: 95 – 105°C)	0 – 3 V	
22	A/C relay	<ul style="list-style-type: none"> ● Engine: Idling ● A/C switch: OFF to ON (Compressor is being driven.) 	System voltage, or 6 V or more instantaneously to 0 – 3 V	
32	A/C condenser fan motor relay (HI) <EVOLUTION-VI>	A/C condenser fan not operating (A/C switch: ON, coolant temperature: 105°C or below)	System voltage	
		A/C condenser fan at high speed (A/C switch: ON, coolant temperature: 105°C or above)	0 – 3 V	
33	Alternator G terminal	<ul style="list-style-type: none"> ● Engine: Warm, idle (radiator fan: OFF) ● Headlamp: OFF to ON ● Brake lamp: OFF to ON ● Rear defogger switch: OFF to ON 	Voltage rises by 0.2 – 3.5 V.	
34	A/C condenser fan motor relay (LOW) <EVOLUTION-VI>	A/C condenser fan not operating (A/C switch: OFF, coolant temperature: 105°C or below)	System voltage	
		A/C condenser fan at low speed (A/C switch: OFF, coolant temperature: 105°C or above)	0 – 3 V	
36	Engine warning lamp	Ignition switch: OFF → ON	0 – 3 V → System voltage (After several seconds have elapsed)	
37	Power steering fluid pressure switch	Engine: Idling after warming up	When steering wheel is stationary	System voltage
			When steering wheel is turned	0 – 3 V
38	Control relay	Ignition switch: OFF	System voltage	
		Ignition switch: ON	0 – 3 V	
39	Fuel pump relay No.2	While engine is idling, suddenly depress the accelerator pedal.	Momentarily rises slightly from 0 to 3 V.	
40	Exhaust temperature warning lamp	Ignition switch: OFF to ON	0 – 3 V to system voltage (After several seconds have elapsed)	

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
41	Alternator FR terminal	<ul style="list-style-type: none"> ● Engine: Warm, idle (radiator fan: OFF) ● Headlamp: OFF to ON ● Brake lamp: OFF to ON ● Rear defogger switch: OFF to ON 		Voltage drops by 0.2 – 3.5 V.
45	A/C switch	Engine: Idle speed	Turn the A/C switch OFF	0 – 3 V
			Turn the A/C switch ON (A/C compressor is operating)	System voltage
60	Oxygen sensor heater <EVOLUTION-V, VI>	Engine: Idling		0 – 3 V
		Engine speed: 5,000 r/min		System voltage
71	Ignition switch-ST	Engine: Cranking		8 V or more
72	Intake air temperature sensor	Ignition switch: ON	When intake air temperature is 0°C	3.2 – 3.8 V
			When intake air temperature is 20°C	2.3 – 2.9 V
			When intake air temperature is 40°C	1.5 – 2.1 V
			When intake air temperature is 80°C	0.4 – 1.0 V
76	Oxygen sensor	Engine: Running at 2,000 r/min after having been warmed up (Check using a digital type voltmeter)		0 ↔ 0.8 V (Changes repeatedly)
80	Backup power supply	Ignition switch: OFF		System voltage
81	Sensor impressed voltage	Ignition switch: ON		4.5 – 5.5 V
82	Ignition switch-IG	Ignition switch: ON		System voltage
83	Engine coolant temperature sensor	Ignition switch: ON	When engine coolant temperature is 0°C	3.2 – 3.8 V
			When engine coolant temperature is 20°C	2.3 – 2.9 V
			When engine coolant temperature is 40°C	1.3 – 1.9 V
			When engine coolant temperature is 80°C	0.3 – 0.9 V
84	Throttle position sensor	Ignition switch: ON	Set throttle valve to idle position	0.3 – 1.0 V
			Fully open throttle valve	4.5 – 5.5 V
85	Barometric pressure sensor	Ignition switch: ON	When altitude is 0 m	3.7 – 4.3 V
			When altitude is 1,200 m	3.2 – 3.8 V
86	Vehicle speed sensor	<ul style="list-style-type: none"> ● Ignition switch: ON ● Move the vehicle slowly forward 		0 ↔ 5 V (Changes repeatedly)

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
87	Idle position switch	Ignition switch: ON	Set throttle valve to idle position	0 – 1 V
			Slightly open throttle valve	4 V or more
88	Camshaft position sensor	Engine: Cranking		0.4 – 3.0 V
		Engine: Idle speed		0.5 – 2.0 V
89	Crank angle sensor	Engine: Cranking		0.4 – 4.0 V
		Engine: Idle speed		1.5 – 2.5 V
90	Air flow sensor	Engine: Idle speed		2.2 – 3.2 V
		Engine speed: 2,000 r/min		

RESISTANCE AND CONTINUITY BETWEEN HARNESS SIDE CONNECTORS AND TERMINALS

Engine-ECU Harness Side Connector Terminal Arrangement



9FU0392

Terminal No.	Inspection item	Normal condition (Check condition)
1 – 12	No.1 injector	2 – 3 Ω (At 20°C)
14 – 12	No.2 injector	
2 – 12	No.3 injector	
15 – 12	No.4 injector	
3 – 12	Fuel pressure control valve	28 – 36 Ω (At 20°C)
4 – 12	Stepper motor coil (A1)	28 – 33 Ω (At 20°C)
17 – 12	Stepper motor coil (A2)	
5 – 12	Stepper motor coil (B1)	
18 – 12	Stepper motor coil (B2)	
6 – 12	Secondary air control solenoid valve	28 – 36 Ω (At 20°C)
11 – 12	Wastegate solenoid valve	62 – 74 Ω (At 20°C)
60 – 12	Oxygen sensor heater <EVOLUTION-V, VI>	11 – 18 Ω (at 20°C)
13 – Body earth	Engine-ECU earth	Continuity established (0 Ω)
26 – Body earth		
72 – 92	Intake air temperature sensor	5.3 – 6.7 k Ω (When intake air temperature is 0°C)
		2.3 – 3.0 k Ω (When intake air temperature is 20°C)
		1.0 – 1.5 k Ω (When intake air temperature is 40°C)
		0.30 – 0.42 k Ω (When intake air temperature is 80°C)
74 – 77	High temperature sensor	3 Ω or less
83 – 92	Engine coolant temperature sensor	5.1 – 6.5 k Ω (When coolant temperature is 0°C)
		2.1 – 2.7 k Ω (When coolant temperature is 20°C)
		0.9 – 1.3 k Ω (When coolant temperature is 40°C)
		0.26 – 0.36 k Ω (When coolant temperature is 80°C)
87 – 92	Idle position switch	Continuity established (when throttle valve is at idle position)
		No continuity (when throttle valve is slightly open)
91 – Body earth	–	Continuity established

ON-VEHICLE SERVICE

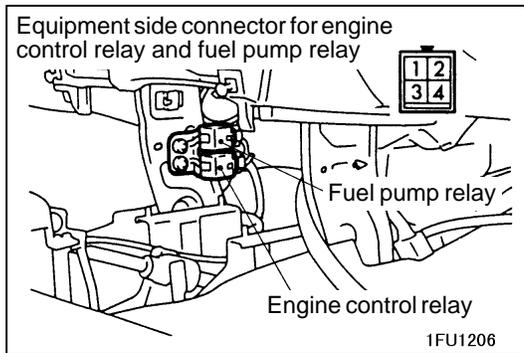
FUEL PUMP RESISTOR CHECK <EVOLUTION-VI>

Standard value: 0.45 – 0.65 Ω

The inspection procedures are the same as for the preceding year-models.

FUEL PUMP RELAY No.2 CONTINUITY CHECK <EVOLUTION-VI>

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



ENGINE CONTROL RELAY AND FUEL PUMP RELAY CONTINUITY CHECK

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

FUEL SUPPLY

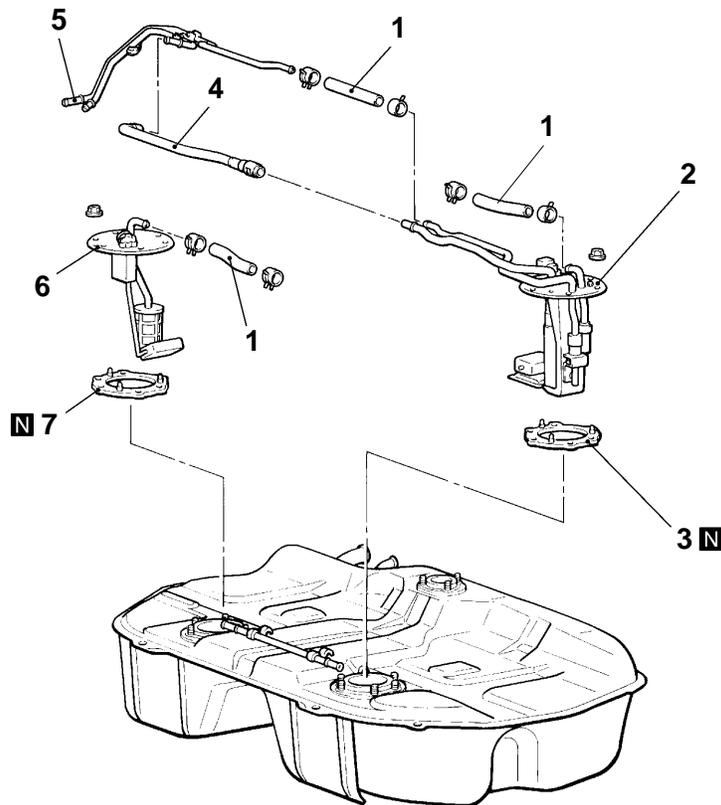
GENERAL

OUTLINE OF CHANGE

The service procedures have been revised as shown below because of change in the fuel pump & gauge assembly and the fuel gauge unit. <EVOLUTION-VI>

FUEL TANK <EVOLUTION-VI>

REMOVAL AND INSTALLATION



03M0080

Removal steps

- 1. Fuel hose
- 2. Fuel pump & gauge assembly
- 3. Packing
- ▶A◀ 4. High-pressure fuel hose

- 5. Fuel pipe assembly
- 6. Fuel gauge unit
- 7. Packing

NOTE

The service procedures other than those mentioned above remain unchanged.

INSTALLATION SERVICE POINT

▶A◀ HIGH-PRESSURE FUEL HOSE INSTALLATION

Caution

After connecting the quick-release joint of the high-pressure fuel hose, pull it gently in the direction of removal to check that the hose is firmly connected with a play of about 3 mm.

NOTES