

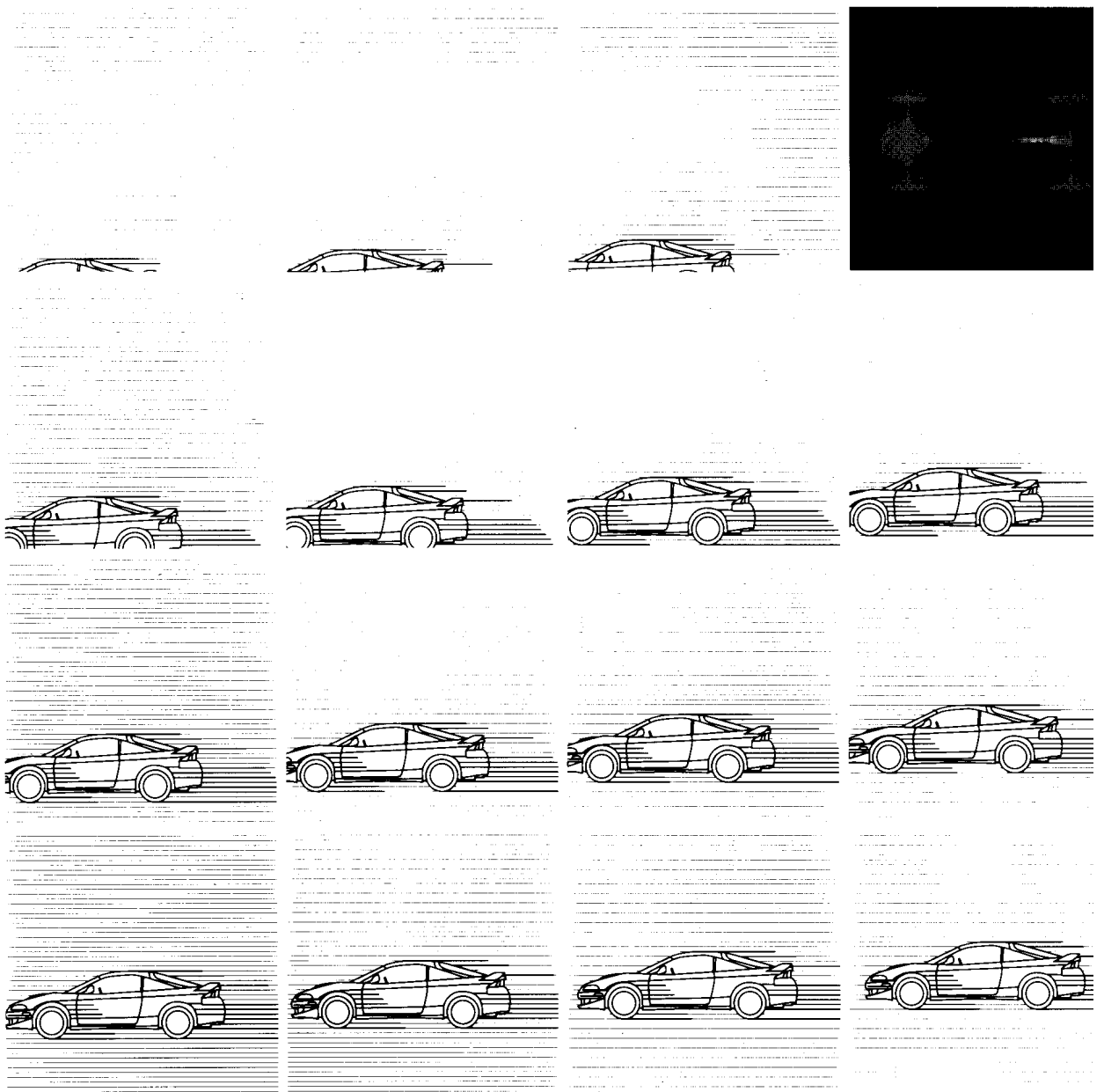


Workshop Manual

chassis

SUPPLEMENT

ECLIPSE'97



ECLIPSE

WORKSHOP MANUAL

SUPPLEMENT

FOREWORD

This manual outlines changes in servicing procedures related to the chassis including vehicle inspections, adjustments and improvements in the newly equipped models. Use the following manuals in combination with this manual as required.

TECHNICAL INFORMATION MANUAL
WORKSHOP MANUAL

ENGINE GROUP

PWEE□□□□

(Looseleaf edition)

ELECTRICAL WIRING

BODY REPAIR MANUAL

PARTS CATALOGUE

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All information, illustrations and product descriptions contained in this manual are current as at the time of publication. We, however, reserve the right to make changes at any time without prior notice or obligation.

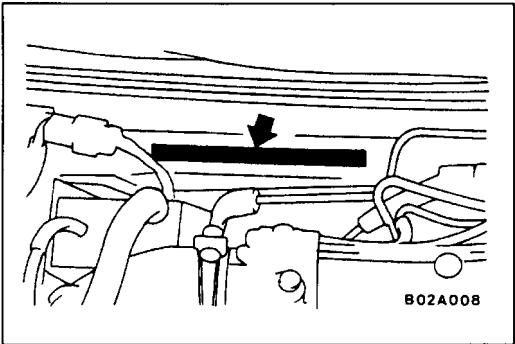
 **MITSUBISHI MOTOR SALES**
Europe B.V.

GROUP 00
GENERAL

VEHICLE IDENTIFICATION

MODEL

Model code	Engine model	Transmission model	Fuel supply system
D32AMNHSLF6	4G63 (1,997 ml)	F5M31 (2WD-5M/T)	MPI



CHASSIS NUMBER

The chassis number is stamped on the toeboard inside the engine compartment.

4	M	B	M	N	D32	A	V	E	000001
1	2	3	4	5	6	7	8		

No.	Items		Contents
1	Mitsubishi Motor Manufacturing of America, Inc.	–	–
2	Body style	M	2-door hatchback
3	Transmission type	N	5-speed manual
4	Development order	D32	1,997 ml petrol (DOHC, 2WD)
5	Sort	A	Passenger car

No.	Items		Contents
6	Model year	V	1997
7	Plant	E	Mitsubishi Motor Manufacturing of America, Inc.
8	Serial number	—	—

GROUP 11A

ENGINE <4G6>

GENERAL

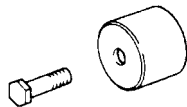
OUTLINE OF CHANGES

- The service procedures of camshaft and camshaft oil seal have been changed to correspond to the change of the camshaft position sensor.

SEALANTS

Items	Specified sealant	Remarks
Rocker cover and cylinder head Semi-circular packing	3M ATD Part No. 8660 or equivalent	Semi-drying sealant
Camshaft position sensor support	MITSUBISHI GENUINE PART MD970389 or equivalent	

SPECIAL TOOL

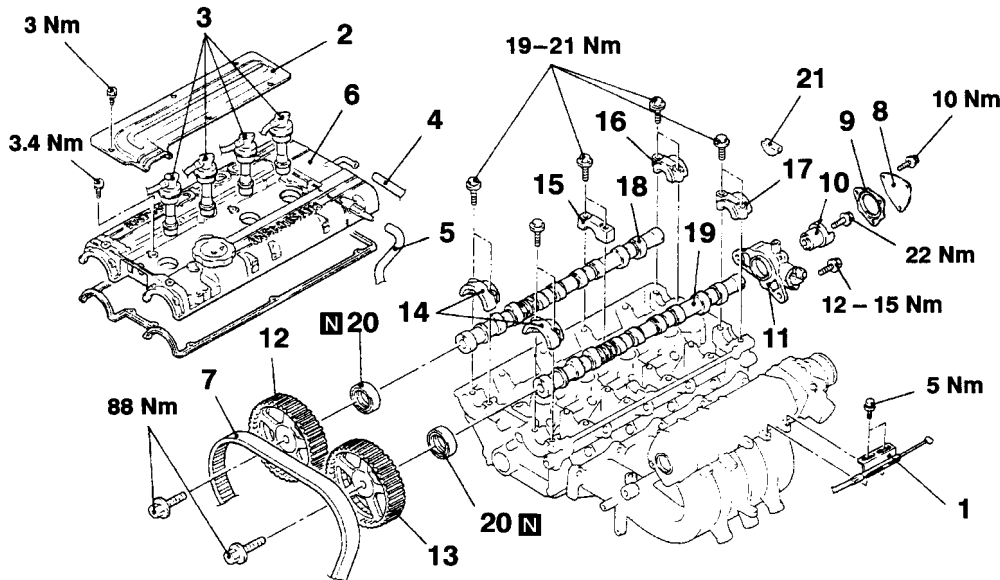
Tool	Number	Name	Use
	MD998713	Camshaft oil seal installer	Pressing-in camshaft oil seal

CAMSHAFT AND CAMSHAFT OIL SEAL**REMOVAL AND INSTALLATION****Pre-removal Operation**

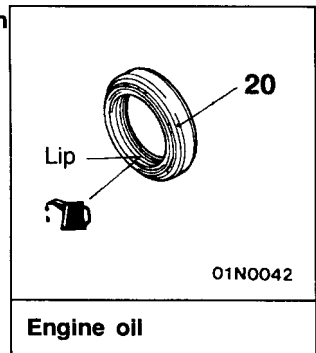
- Timing Belt Front Upper Cover Removal

Post-installation Operation

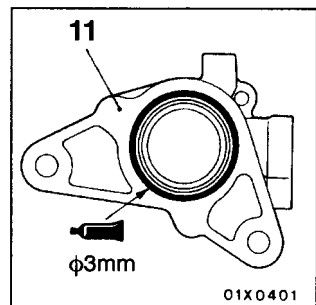
- Timing Belt Front Upper Cover Installation



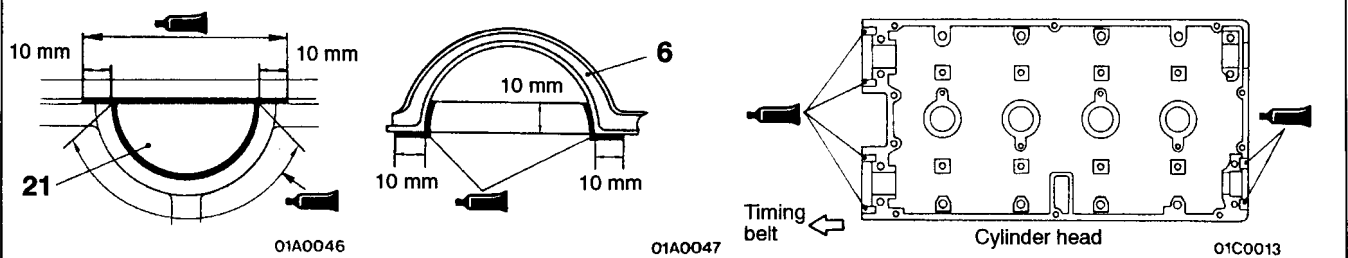
01X0407
00005321



Engine oil



Specified sealant:
MITSUBISHI GENUINE
PART MD970389 or
equivalent



Specified sealant: 3M ATD Part No. 8660 or equivalent

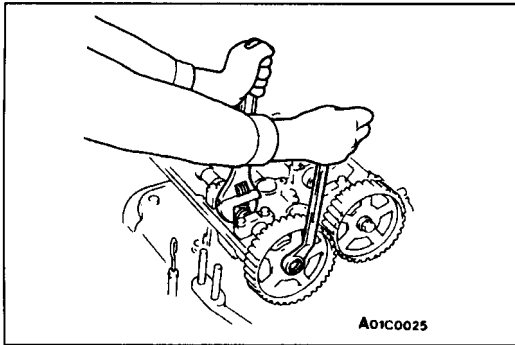
Removal steps

1. Accelerator cable connection
2. Center cover
3. Spark plug cable
4. Breather hose
5. PCV hose
6. Rocker cover
7. Timing belt (Refer to Basic Manual.)
8. Cover
9. Gasket
10. Camshaft position sensing cylinder
11. Camshaft position sensor support
12. Exhaust camshaft sprocket
13. Intake camshaft sprocket
14. Front camshaft bearing cap
15. Camshaft bearing cap
16. Rear camshaft bearing cap (R.H.)
17. Rear camshaft bearing cap (L.H.)
18. Exhaust camshaft
19. Intake camshaft
20. Camshaft oil seal
21. Semi-circular packing

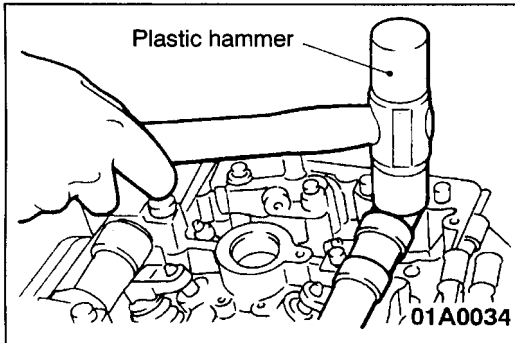
**Installation steps**

19. Intake camshaft
18. Exhaust camshaft
17. Rear camshaft bearing cap (L.H.)
16. Rear camshaft bearing cap (R.H.)
15. Camshaft bearing cap
14. Front camshaft bearing cap
20. Camshaft oil seal
13. Intake camshaft sprocket
12. Exhaust camshaft sprocket
11. Camshaft position sensor support
10. Camshaft position sensing cylinder
9. Gasket
8. Cover
7. Timing belt (Refer to Basic Manual.)
21. Semi-circular packing
6. Rocker cover
5. PCV hose
4. Breather hose
3. Spark plug cable
2. Center cover
1. Accelerator cable connection
(Refer to Basic Manual.)



**REMOVAL SERVICE POINTS****◀A▶ EXHAUST CAMSHAFT SPROCKET/INTAKE CAMSHAFT SPROCKET REMOVAL**

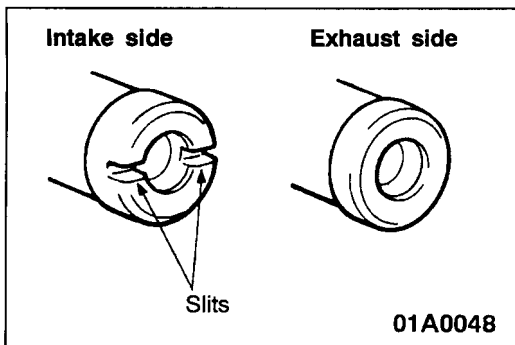
- (1) Use a wrench at the hexagonal part of the camshaft (to prevent the crankshaft from turning) to loosen the camshaft sprocket bolt.
- (2) Remove the camshaft sprockets.

**◀B▶ FRONT CAMSHAFT BEARING CAP/CAMSHAFT BEARING CAP/REAR CAMSHAFT BEARING CAP (R.H.) REAR CAMSHAFT BEARING CAP (L.H.) REMOVAL**

- (1) Loosen the bearing cap installation bolts in two or three steps.
- (2) Remove the bearing cap.

NOTE

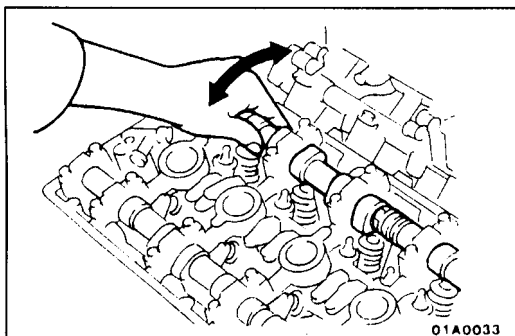
If the bearing cap is difficult to remove, use a plastic hammer to gently tap the rear part of the camshaft, and then remove.

**INSTALLATION SERVICE POINTS****▶A◀ INTAKE CAMSHAFT/EXHAUST CAMSHAFT INSTALLATION**

- (1) Install the camshafts on the cylinder head.

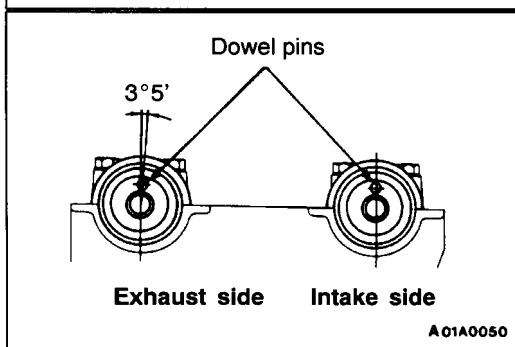
Caution

Do not confuse the intake side and the exhaust side.

**NOTE**

Install new camshafts using the following procedure.

- (1) Remove the rocker arms.
- (2) Lay the camshafts on the cylinder head and install the bearing caps.
- (3) Check that the camshaft can be easily turned by hand.
- (4) After checking, remove the bearing caps and the camshafts, and install the rocker arms.



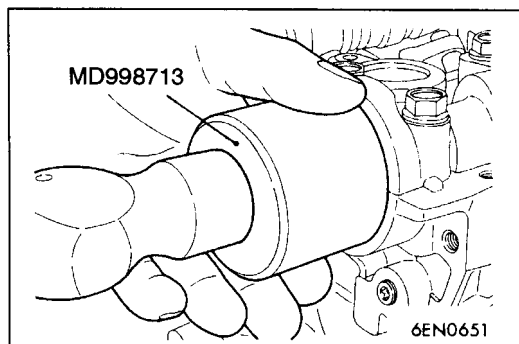
- (2) The camshaft's dowel pins should be at the positions shown in the figure.

►B◄ REAR CAMSHAFT BEARING CAP (R.H.)/REAR CAMSHAFT BEARING CAP (L.H.)/CAMSHAFT BEARING CAP/FROM CAMSHAFT BEARING CAP INSTALLATION

Tighten the bearing cap installation bolts to the specified torque in two or three steps.

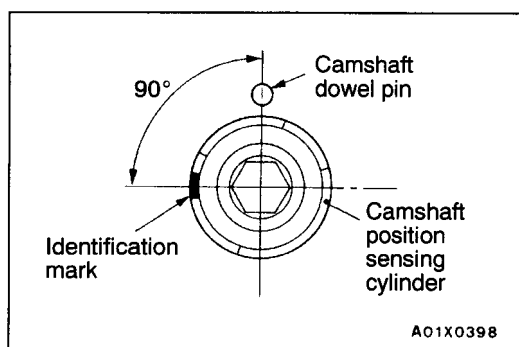
Caution

Tighten uniformly, otherwise the rocker arms will not be straight.



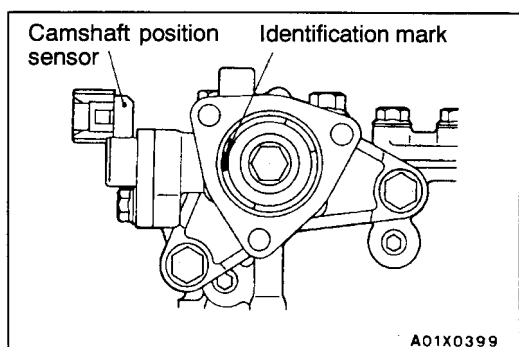
►C◄ CAMSHAFT OIL SEAL INSTALLATION

Use the special tool to drive the camshaft oil seal into position carefully.



►D◄ CAMSHAFT POSITION SENSING CYLINDER/CAMSHAFT POSITION SENSOR SUPPORT INSTALLATION

- (1) Install the camshaft position sensing cylinder to the end of the camshaft as shown in the illustration.



- (2) Install the camshaft position sensor support.
- (3) Check that the identification mark on the camshaft position sensing cylinder is pointing in the same direction as the camshaft position sensor installation direction when the camshaft is at the No.1 compression TDC position.

MULTIPOINT FUEL INJECTION (MPI)

CONTENTS

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Outline of changes	2	Oxygen Sensor Check	58
TROUBLESHOOTING	2		

GENERAL

OUTLINE OF CHANGES

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

TROUBLESHOOTING

FAIL-SAFE FUNCTION REFERENCE TABLE

Oxygen sensor (rear)	Performs the feedback control (closed loop control) of the air/fuel ratio by using only the signal of the oxygen sensor (front) installed on the front of the catalytic converter.
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INSPECTION CHART FOR DIAGNOSIS CODES

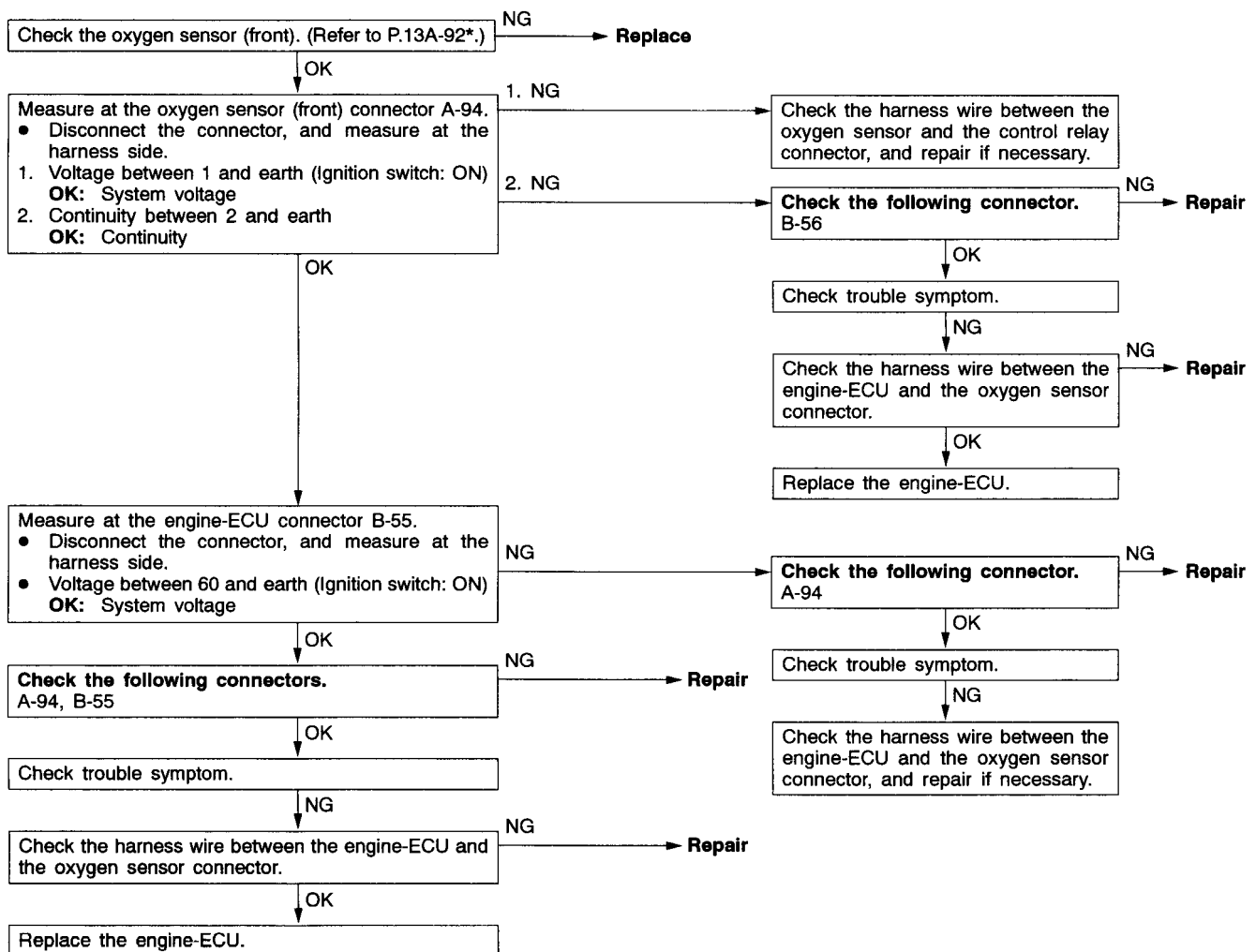
Code No.	Diagnosis item	Reference page
11	Oxygen sensor (front) system	13A-3
12	Air flow sensor system	13A-4
13	Intake air temperature sensor system	13A-4
14	Throttle position sensor system	13A-5
21	Engine coolant temperature sensor system	13A-6
22	Crank angle sensor system	13A-7
23	Camshaft position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

NOTE

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

INSPECTION PROCEDURE FOR DIAGNOSIS CODES

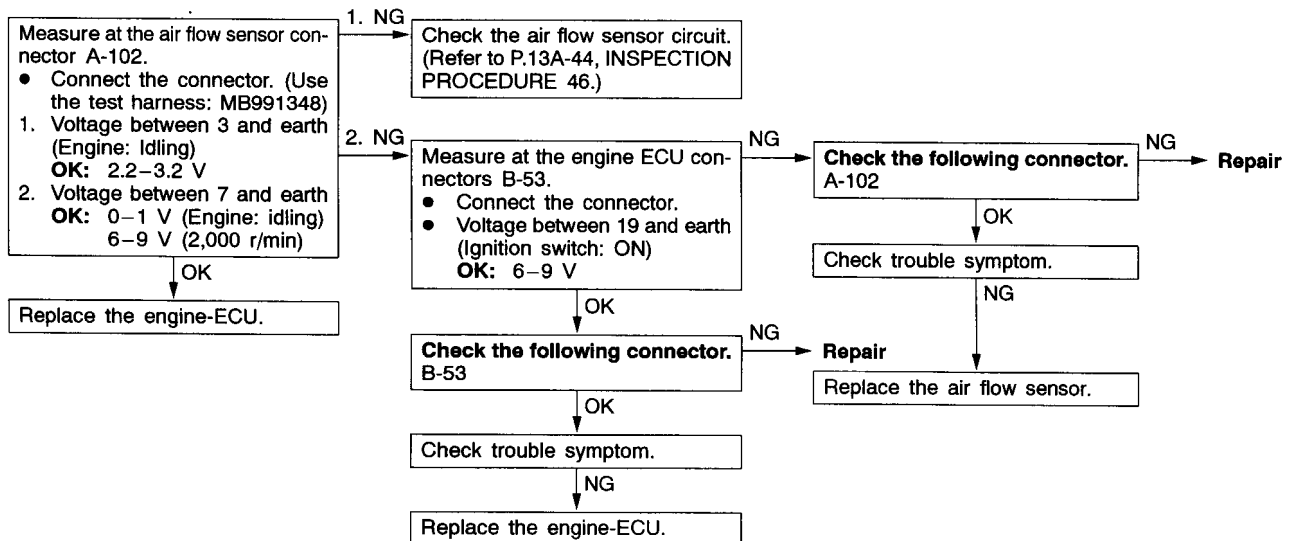
Code No. 11 Oxygen sensor (Front) system	Probable cause
Range of Check 3 minutes have passed after engine was started. - Engine coolant temperature is approx. 80°C or more. - Intake air temperature is 20–50°C. - Engine speed is approx. 2,000–3,000 r/min - Vehicle is moving at constant speed on a flat,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



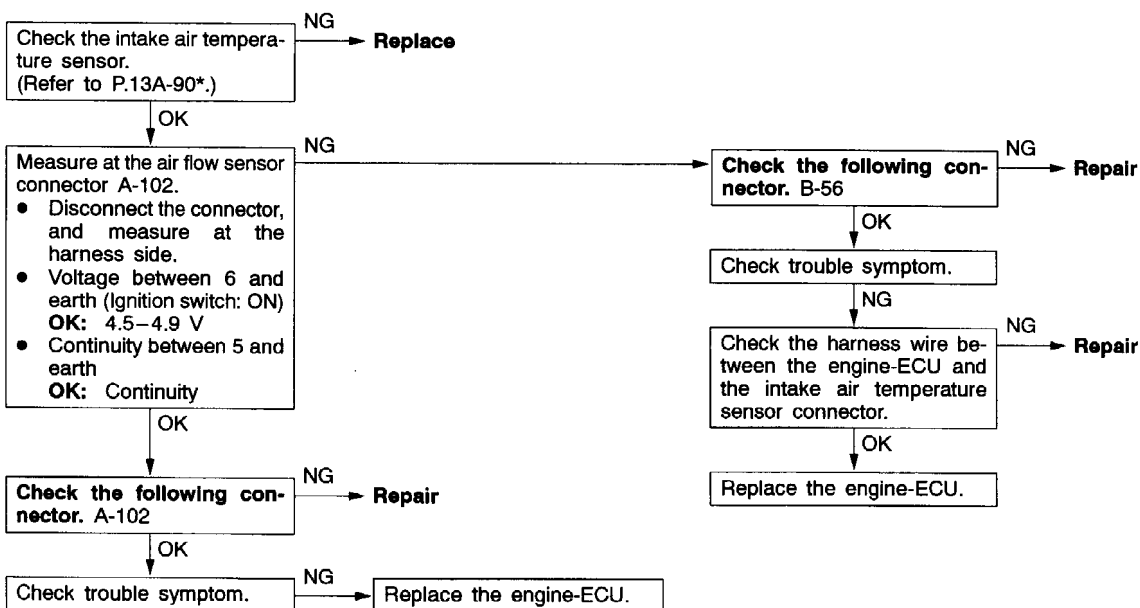
NOTE

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

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



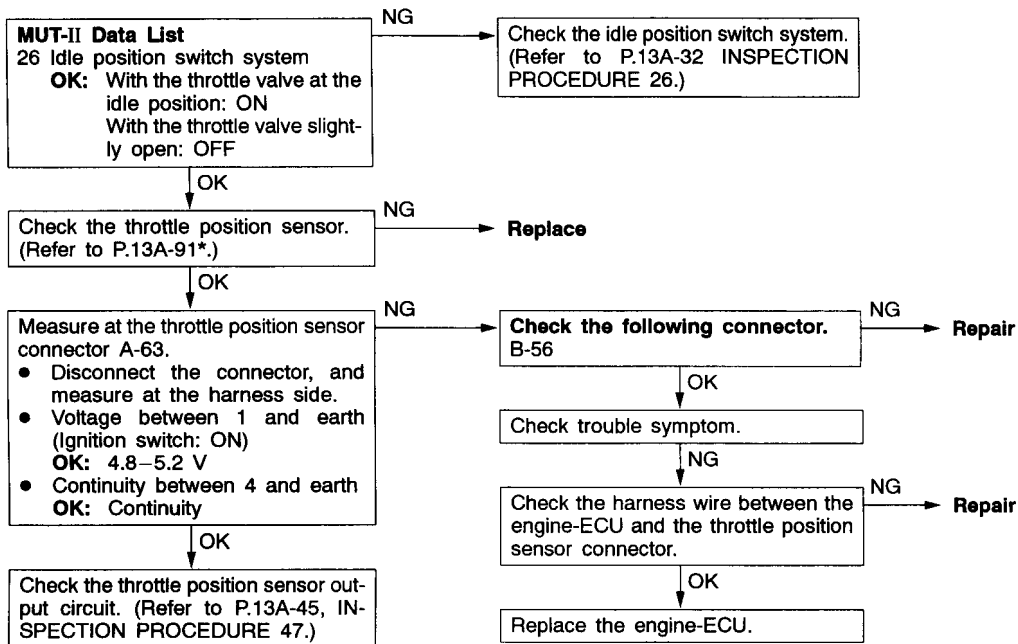
Code No. 13 Intake air temperature sensor system	Probable cause
Range of Check • Ignition switch: ON • Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions • Sensor output voltage is 4.6 V or more (corresponding to an intake air temperature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



NOTE

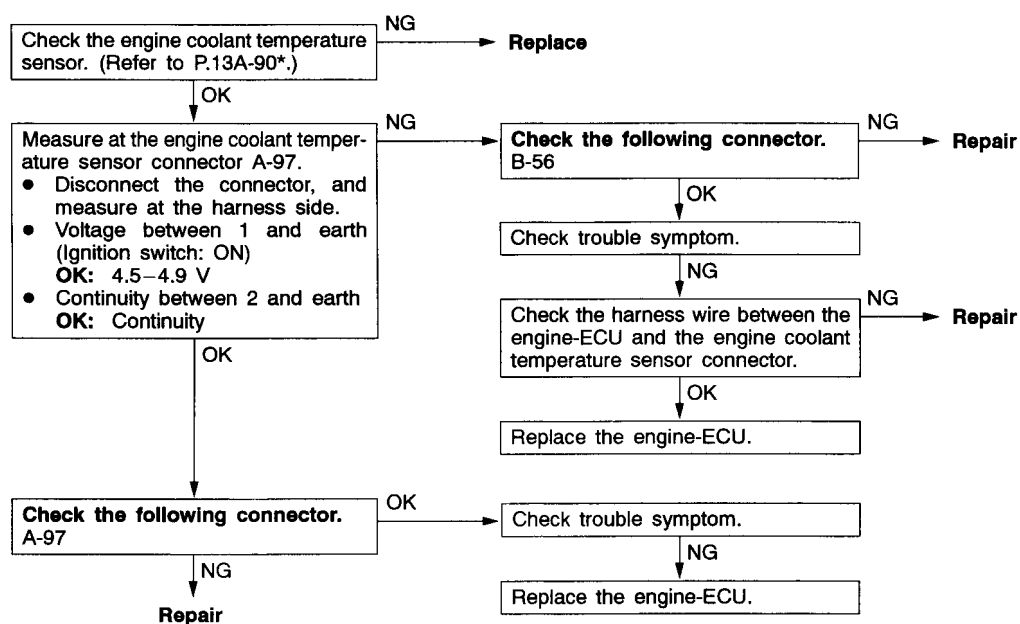
*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

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

**NOTE**

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

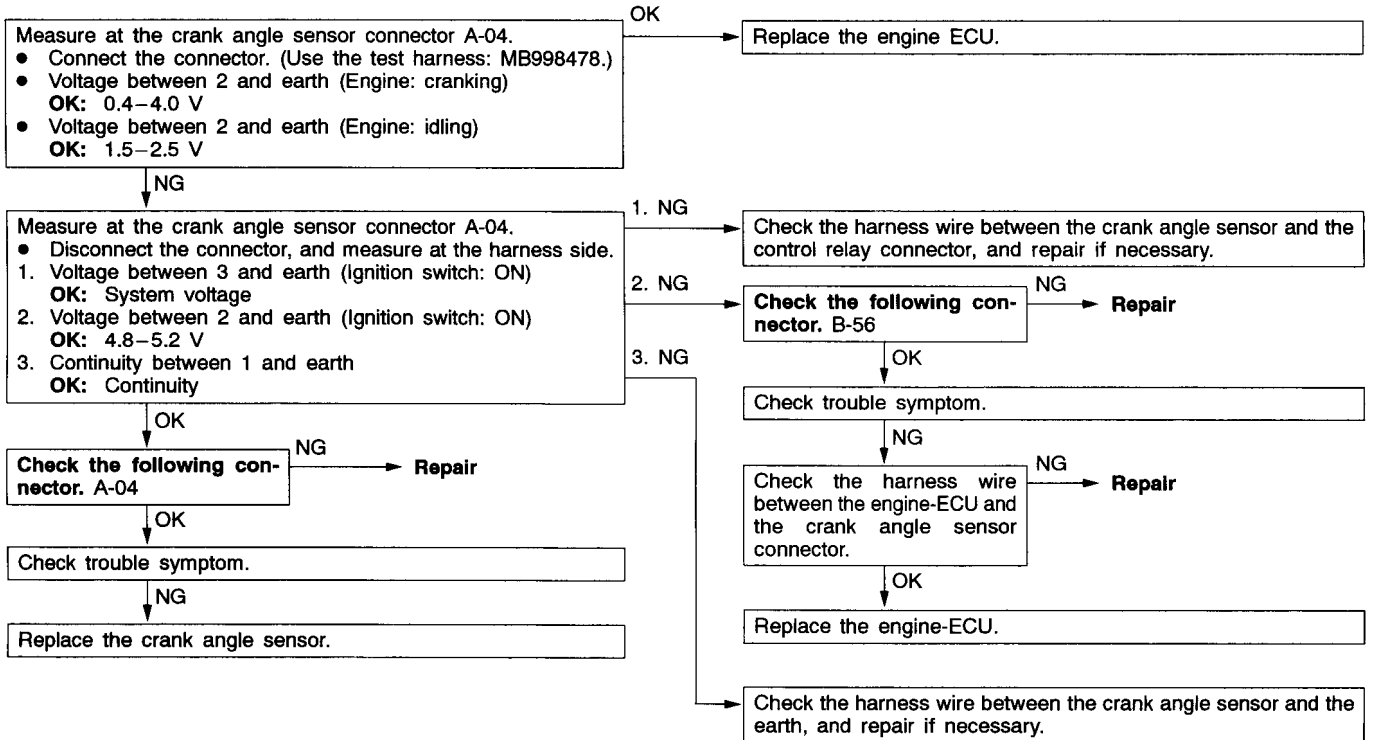
Code No. 21 Engine coolant temperature sensor system	Probable cause
Range of Check - Ignition switch: ON - Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. Set conditions - Sensor output voltage is 4.6 V or more (corresponding to an engine coolant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



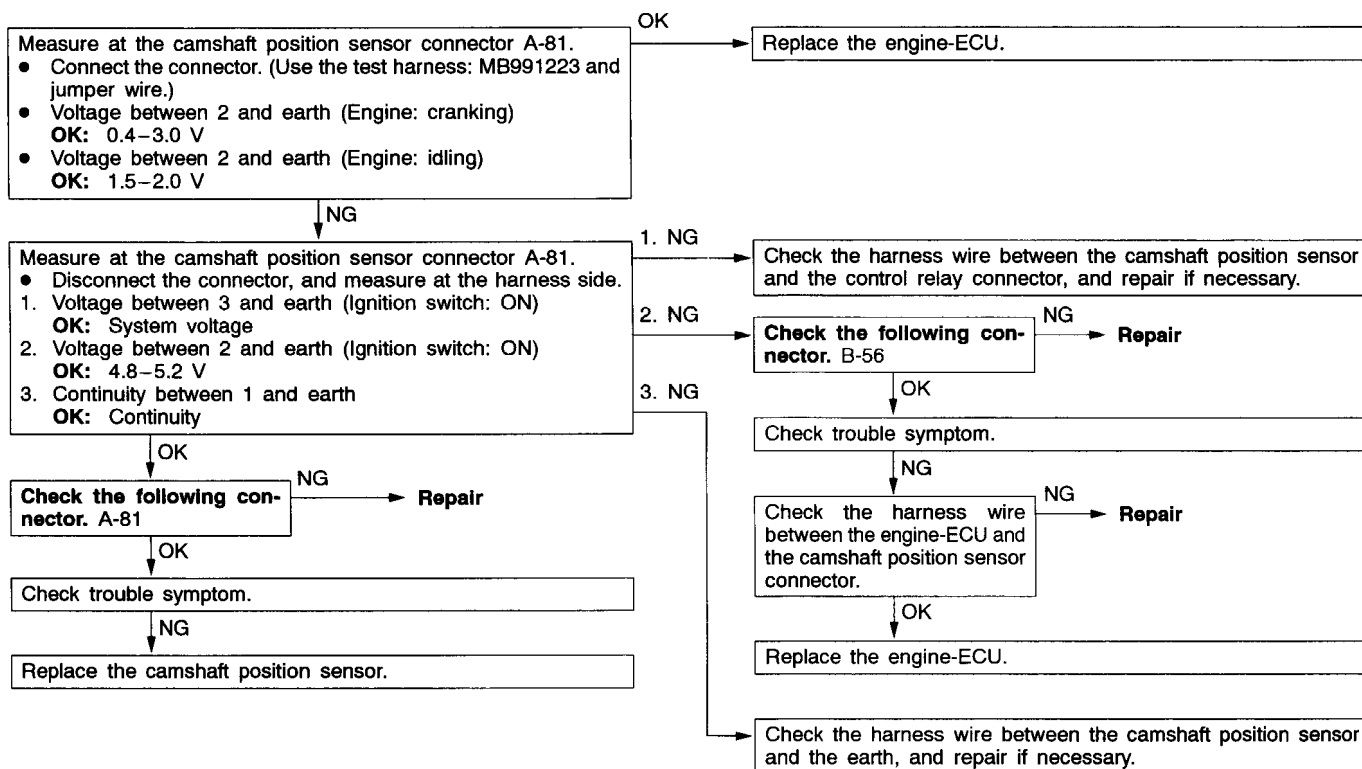
NOTE

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

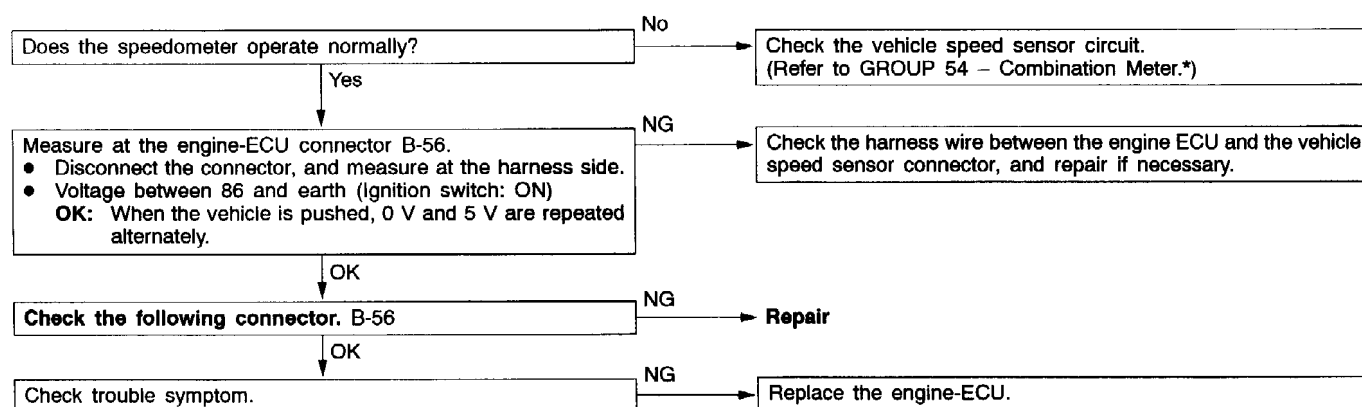
Code No. 22 Crank angle sensor system	Probable cause
Range of Check • Engine is cranking. Set conditions • Sensor output voltage does not change for 4 seconds (no pulse signal input.)	• Malfunction of the crank angle sensor • Improper connector contact, open circuit or short-circuited harness wire of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



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



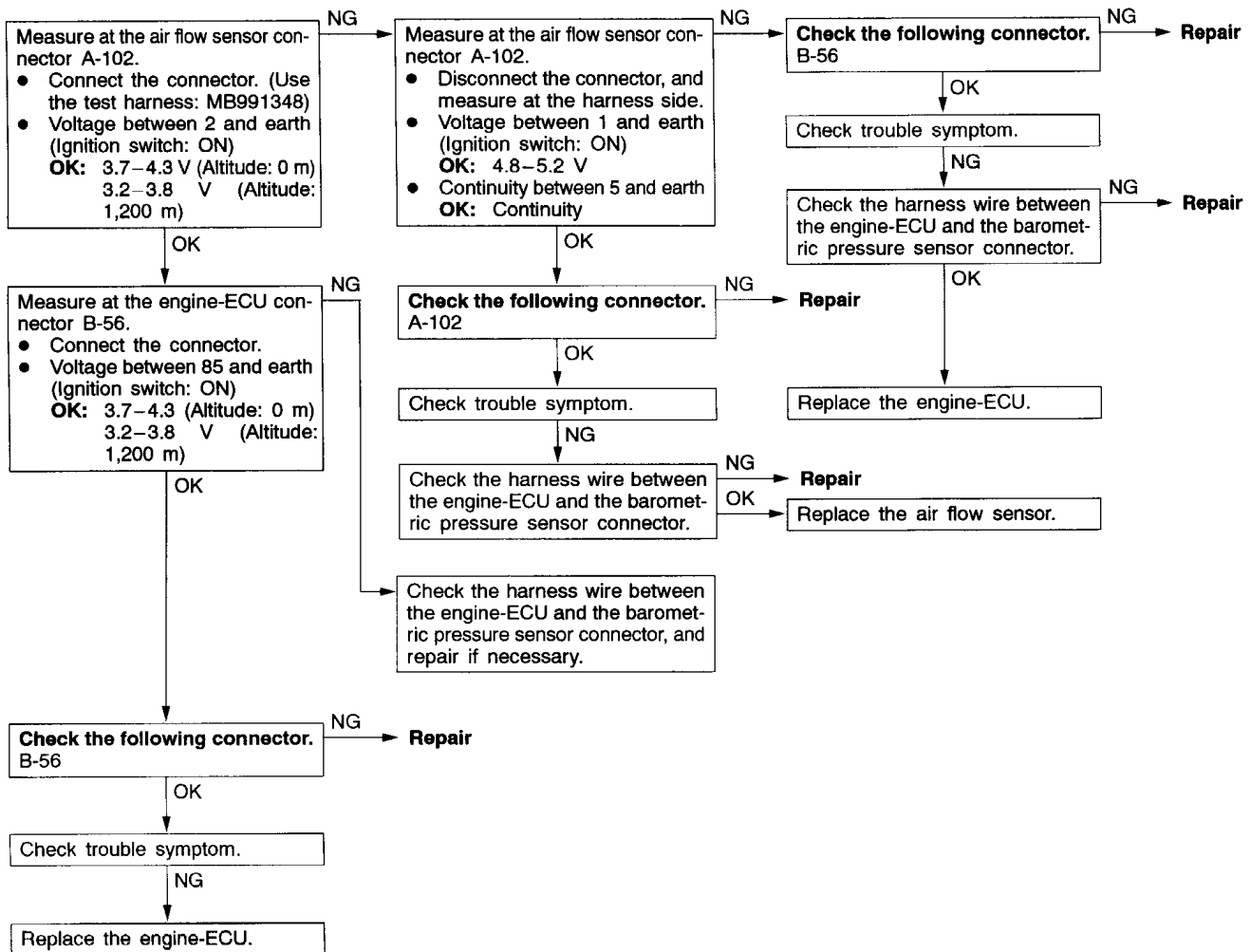
Code No. 24 Vehicles speed sensor system	Probable cause
Range of check - Ignition switch: ON - Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. - Idle position switch: OFF - Engine speed is 3,000 r/min or more. - Driving under high engine load conditions.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



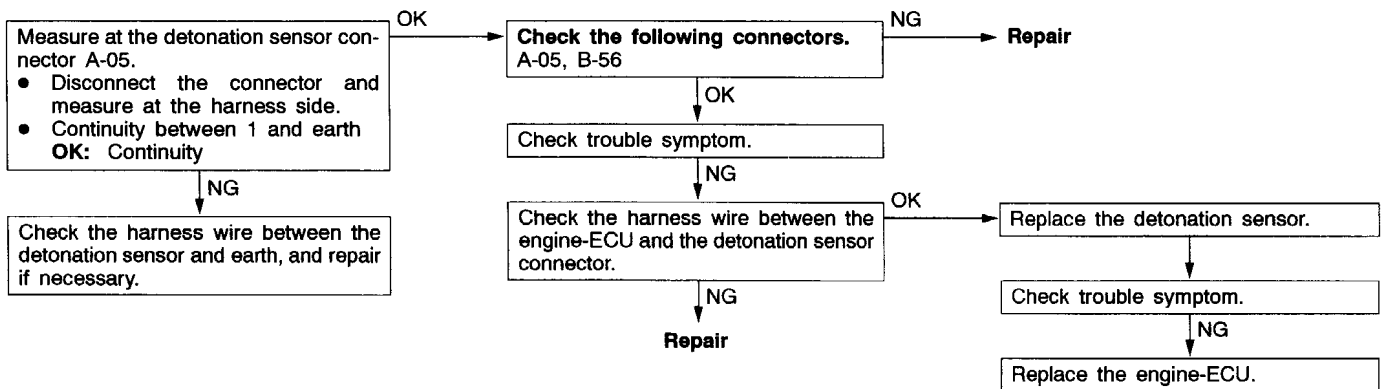
NOTE

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

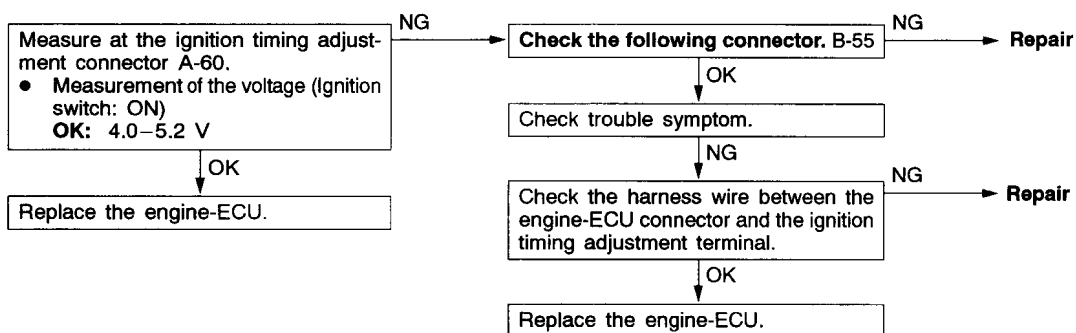
Code No. 25 Barometric pressure sensor system	Probable cause
Range of Check - Ignition switch: ON - Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. - Battery voltage is 8 V or more. Set conditions - Sensor output voltage is 4.5 V or more (corresponding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



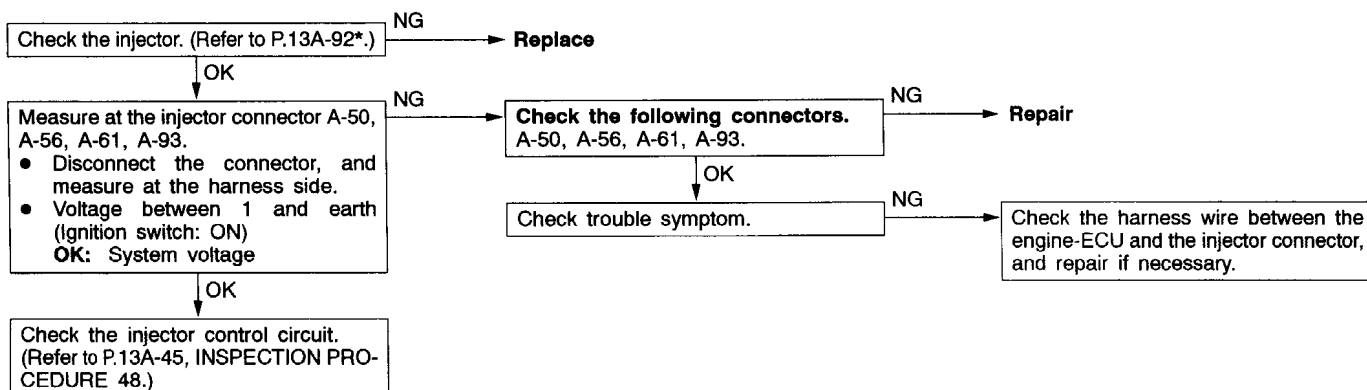
Code No. 31 Detonation sensor system	Probable cause
Range of Check - Ignition switch: ON - Excluding 60 seconds after the ignition switch is turned to ON or immediately after the engine starts. - Engine speed is approx. 5,000 r/min or more Set conditions The change in the detonation sensor output voltage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



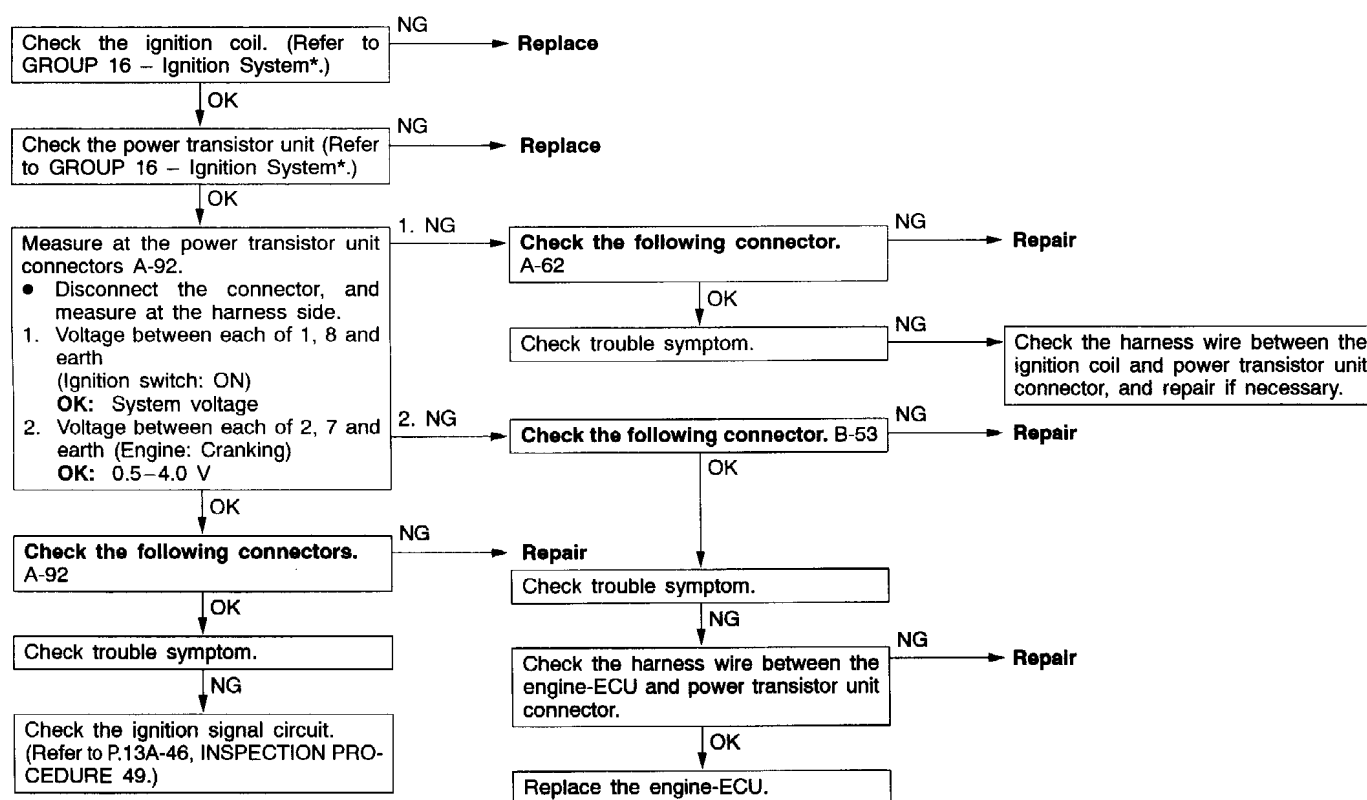
Code No. 36 Ignition timing adjustment signal system	Probable cause
Range of Check - Ignition switch: ON Set conditions - The ignition timing adjusting signal wire is shorted to the earth.	- Short circuit to earth of the ignition timing adjustment signal line - Malfunction of the engine-ECU



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



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



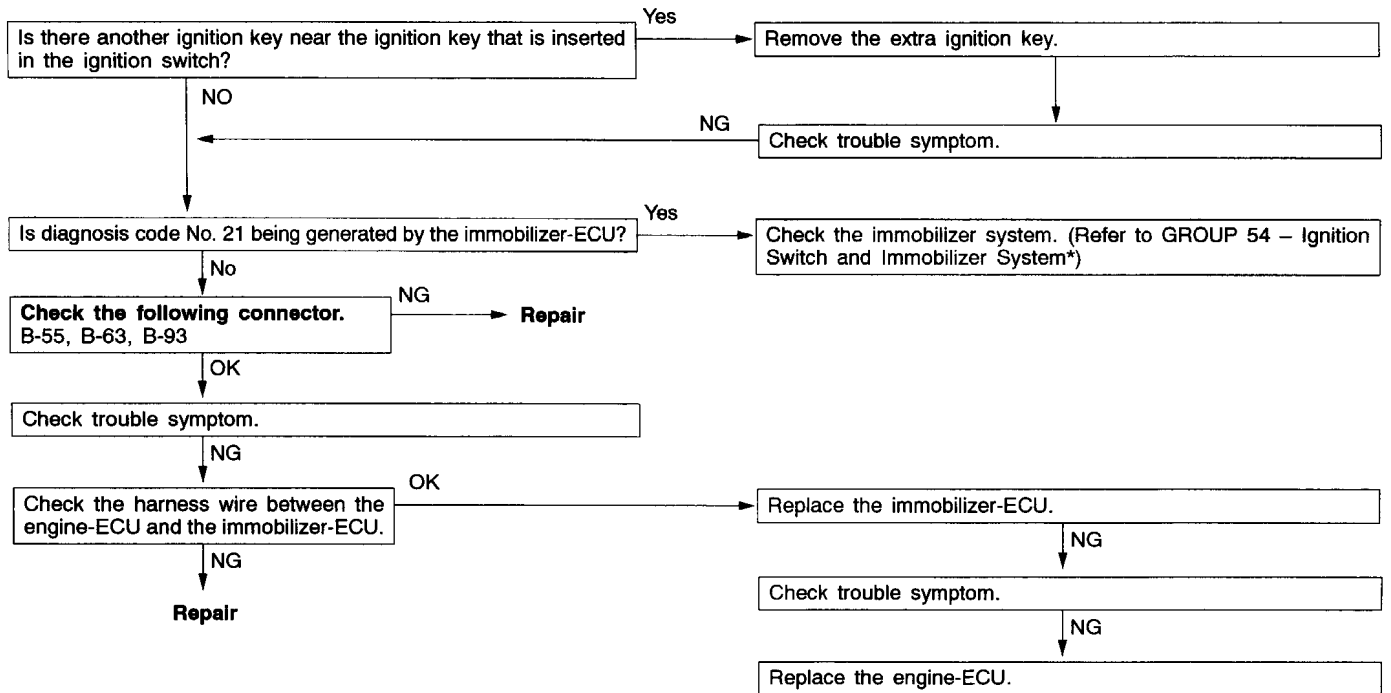
NOTE

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

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

NOTE

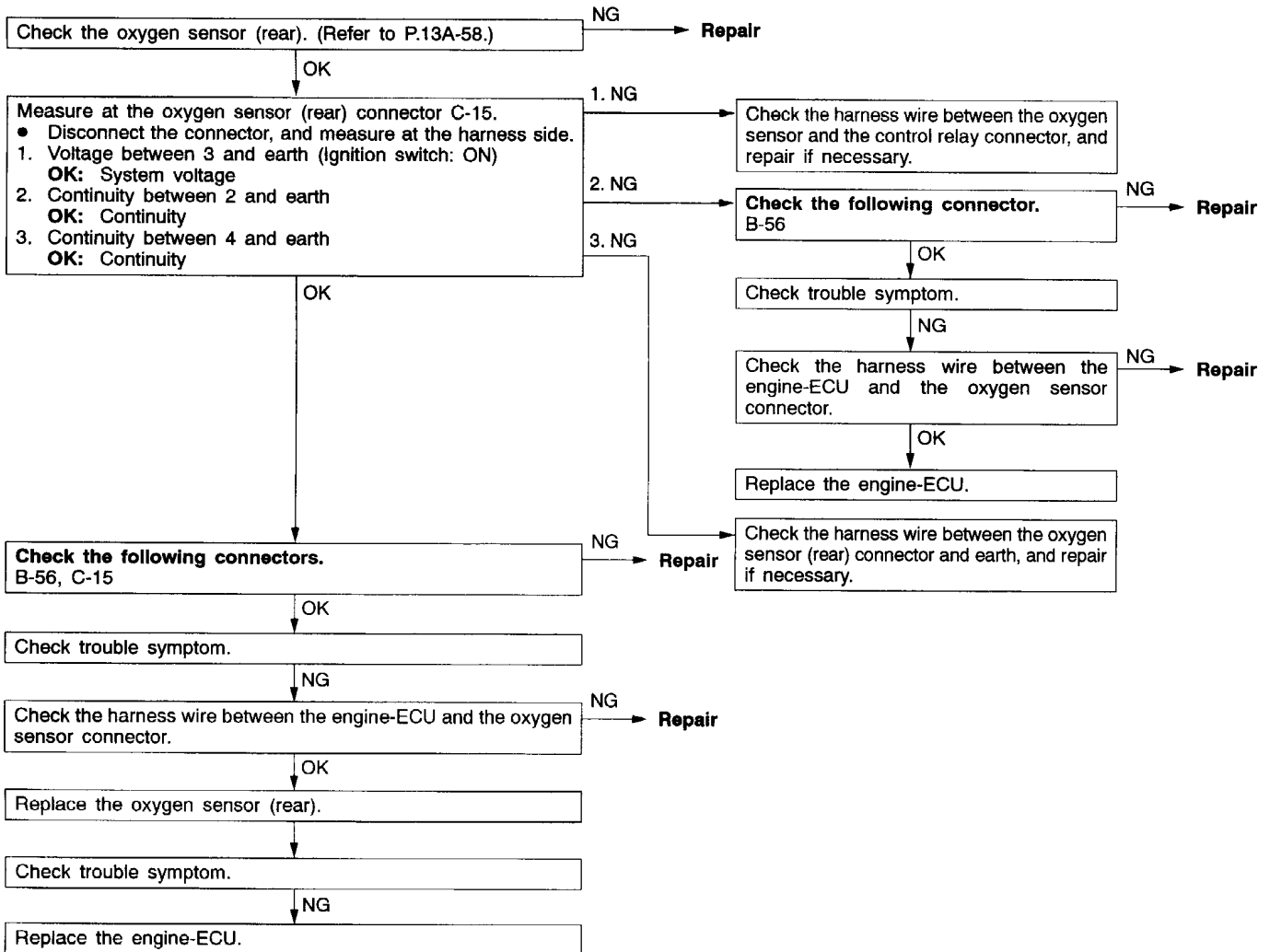
- When starting the engine, one ignition key's ID code interferes with another ignition key's code.
- This diagnosis code may be displayed when an ID-code is registered.



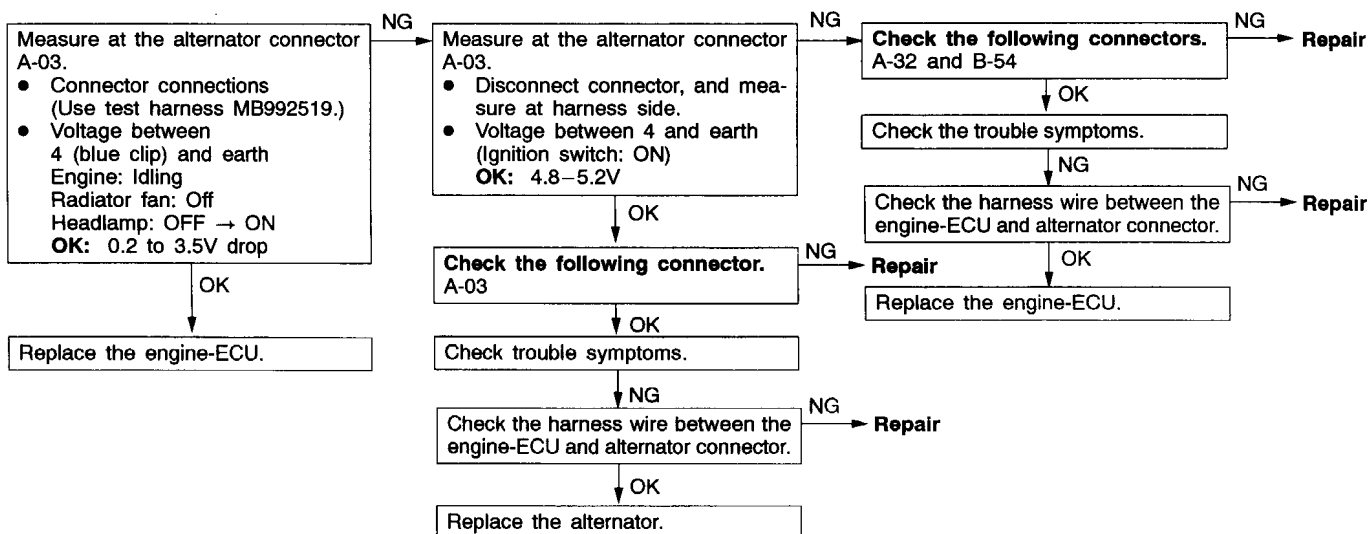
NOTE

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

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



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



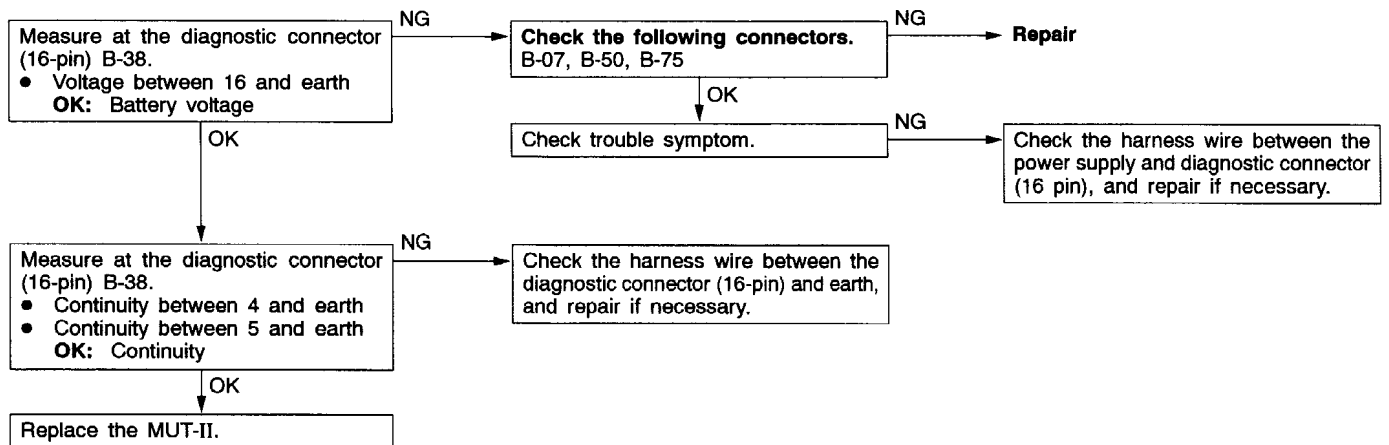
INSPECTION CHART FOR TROUBLE SYMPTOMS

Trouble symptom		Inspection procedure No.	Reference page
Communication with MUT-II is impossible.	Communication with all systems is not possible.	1	13A-16
	Communication with engine-ECU only is not possible.	2	13A-17
Engine warning lamp and related parts	The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position.	3	13A-18
	The engine warning lamp remains illuminating and never goes out.	4	13A-18
Starting	No initial combustion (starting impossible)	5	13A-19
	Initial combustion but no complete combustion (starting impossible)	6	13A-20
	It take too long time to start (improper starting)	7	13A-21
Idling stability (Improper idling)	Unstable idling (Rough idling, hunting)	8	13A-22
	Idling speed is high. (Improper idling speed)	9	13A-23
	Idling speed is low. (Improper idling speed)	10	13A-23
Idling stability (Engine stalls)	When the engine is cold, it stalls at idling. (Die out)	11	13A-24
	When the engine becomes hot, it stalls at idling. (Die out)	12	13A-25
	The engine stalls when the vehicle starts. (Pass out)	13	13A-26
	The engine stalls when decelerating.	14	13A-26
Driving	Hesitation, sag or stumble	15	13A-27
	The feeling of impact or vibration when accelerating	16	13A-27
	The feeling of impact or vibration when decelerating	17	13A-28
	Poor acceleration	18	13A-28
	Surge	19	13A-29
	Knocking	20	13A-29
Dieseling		21	13A-29
Too high CO and HC concentration when idling		22	13A-30
Low alternator output voltage (approx. 12.3V)		23	13A-31

INSPECTION PROCEDURE FOR TROUBLE SYMPTOMS

INSPECTION PROCEDURE 1

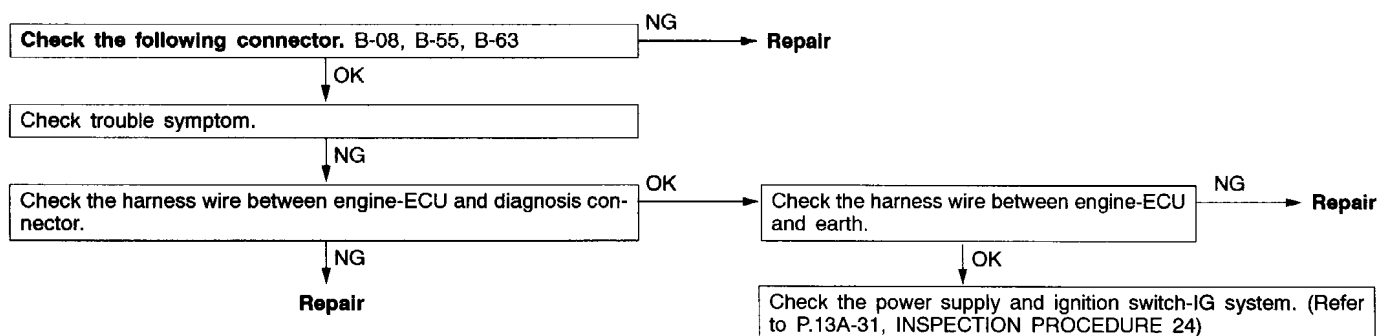
Communication with MUT-II is not possible. (Communication with all systems is not possible.)	Probable cause
The cause is probably a defect in the power supply system (including earth) for the diagnosis line.	• Malfunction of the connector • Malfunction of the harness wire



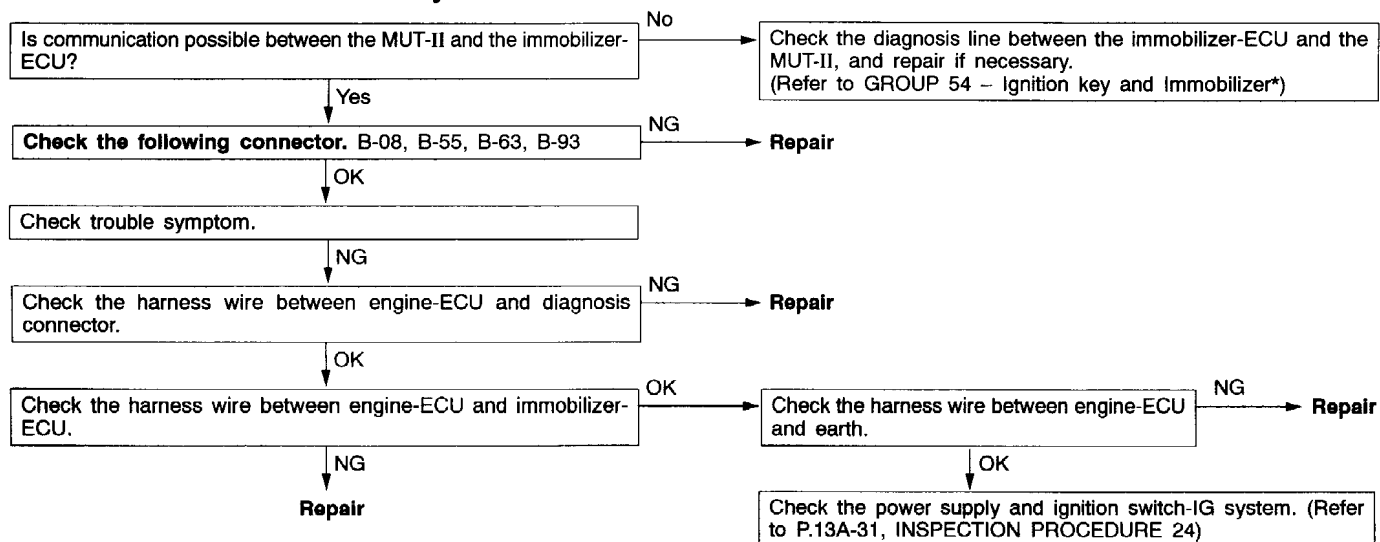
INSPECTION PROCEDURE 2

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

<Vehicles without immobilizer system>



<Vehicles with immobilizer system>



NOTE

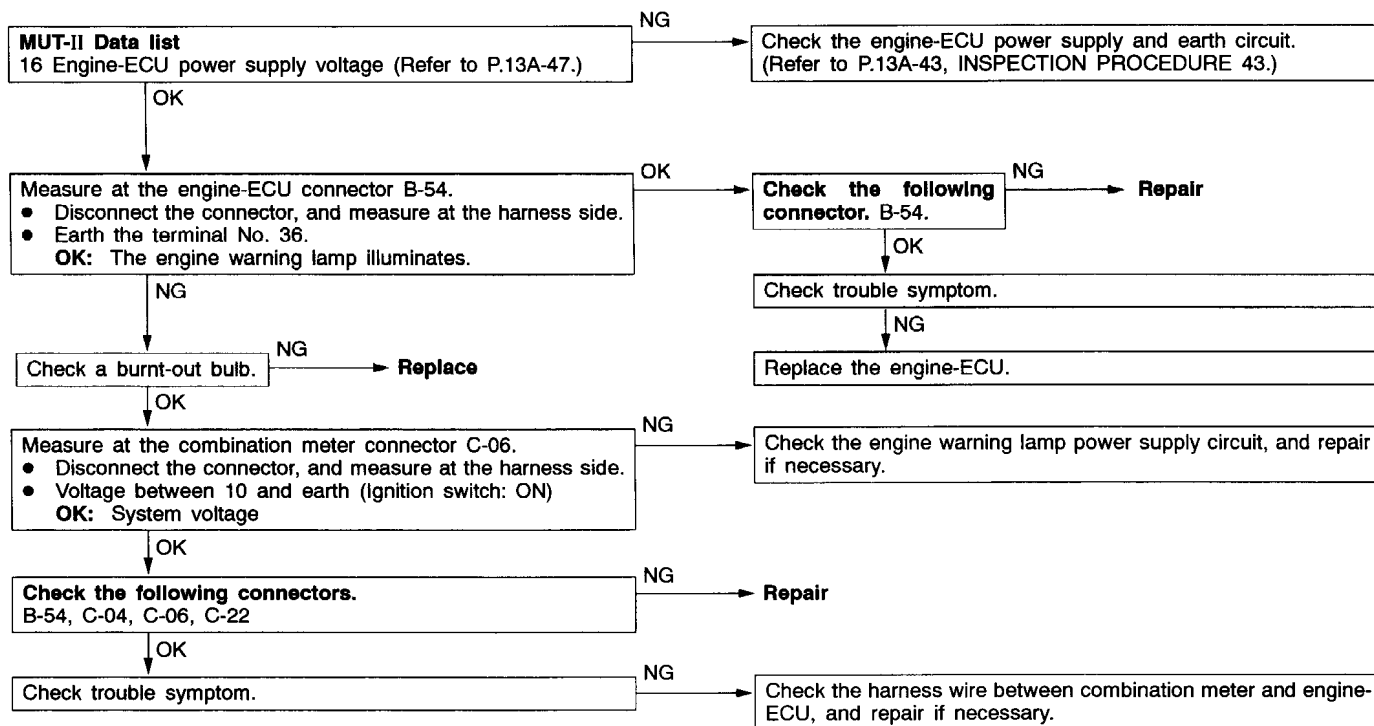
*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 3

The engine warning lamp does not illuminate right after the ignition switch is turned to the ON position. Probable cause

Because there is a burnt-out bulb, the engine ECU causes the engine warning lamp to illuminate for five seconds immediately after the ignition switch is turned to ON. If the engine warning lamp does not illuminate immediately after the ignition switch is turned to ON, one of the malfunctions listed at right has probably occurred.

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

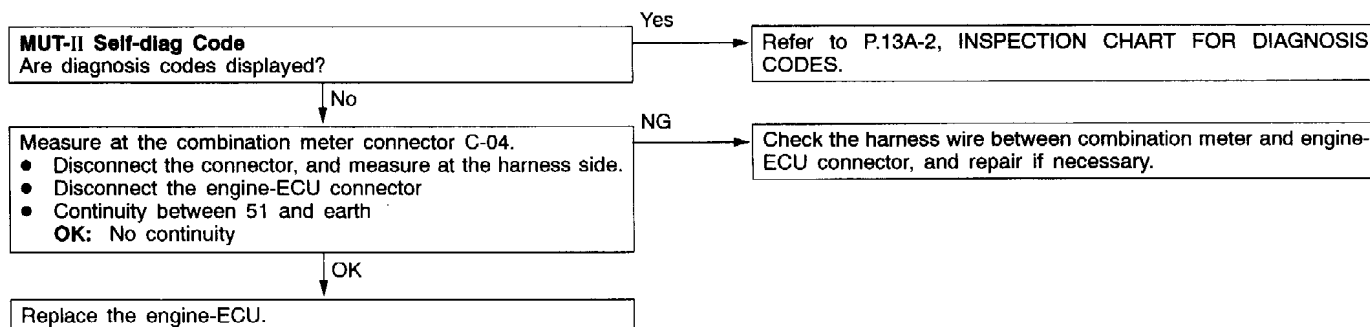


INSPECTION PROCEDURE 4

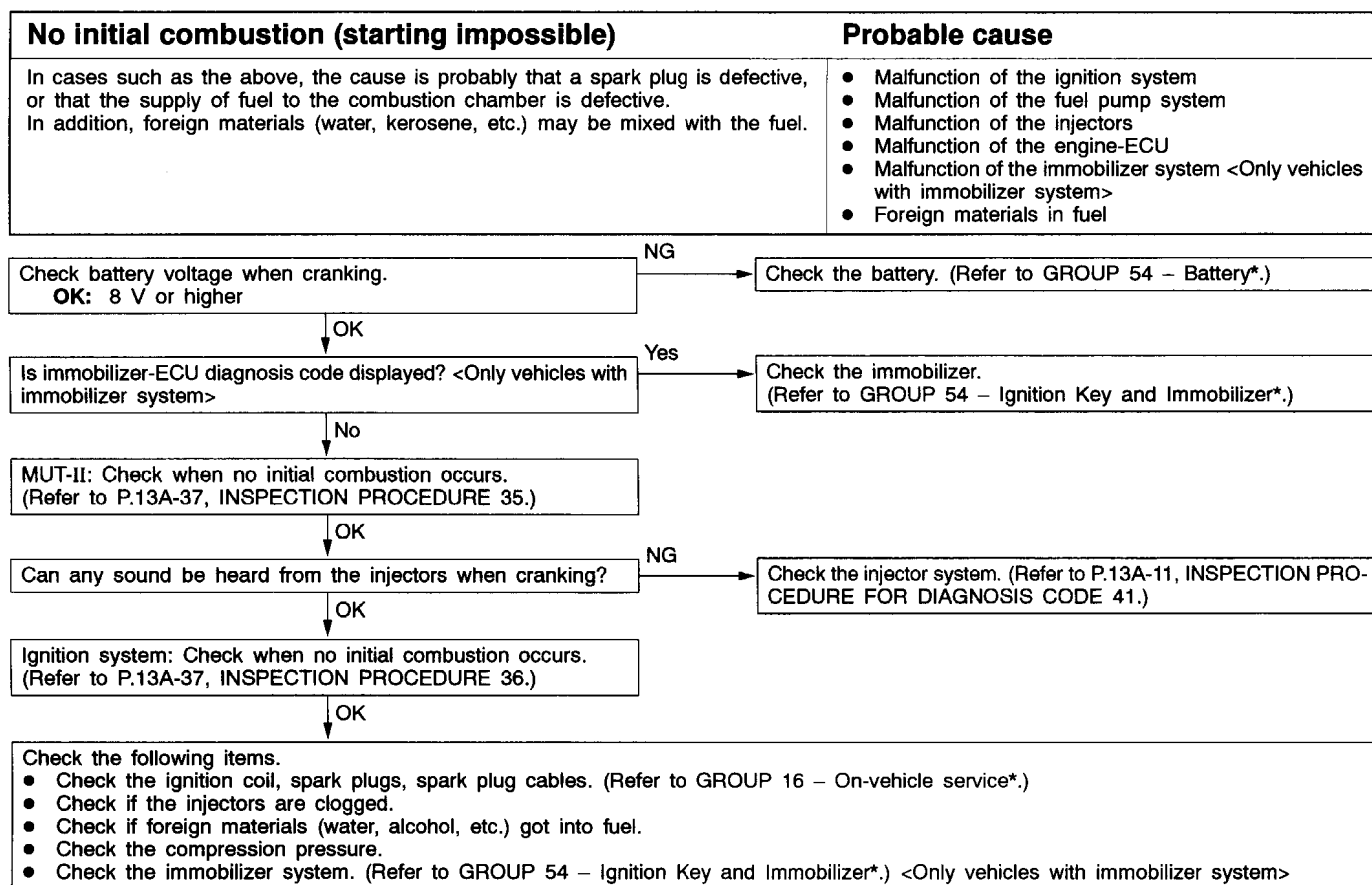
The engine warning lamp remains illuminating and never goes out. Probable cause

In cases such as the above, the cause is probably that the engine-ECU is detecting a problem in a sensor or actuator, or that one of the malfunctions listed at right has occurred.

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



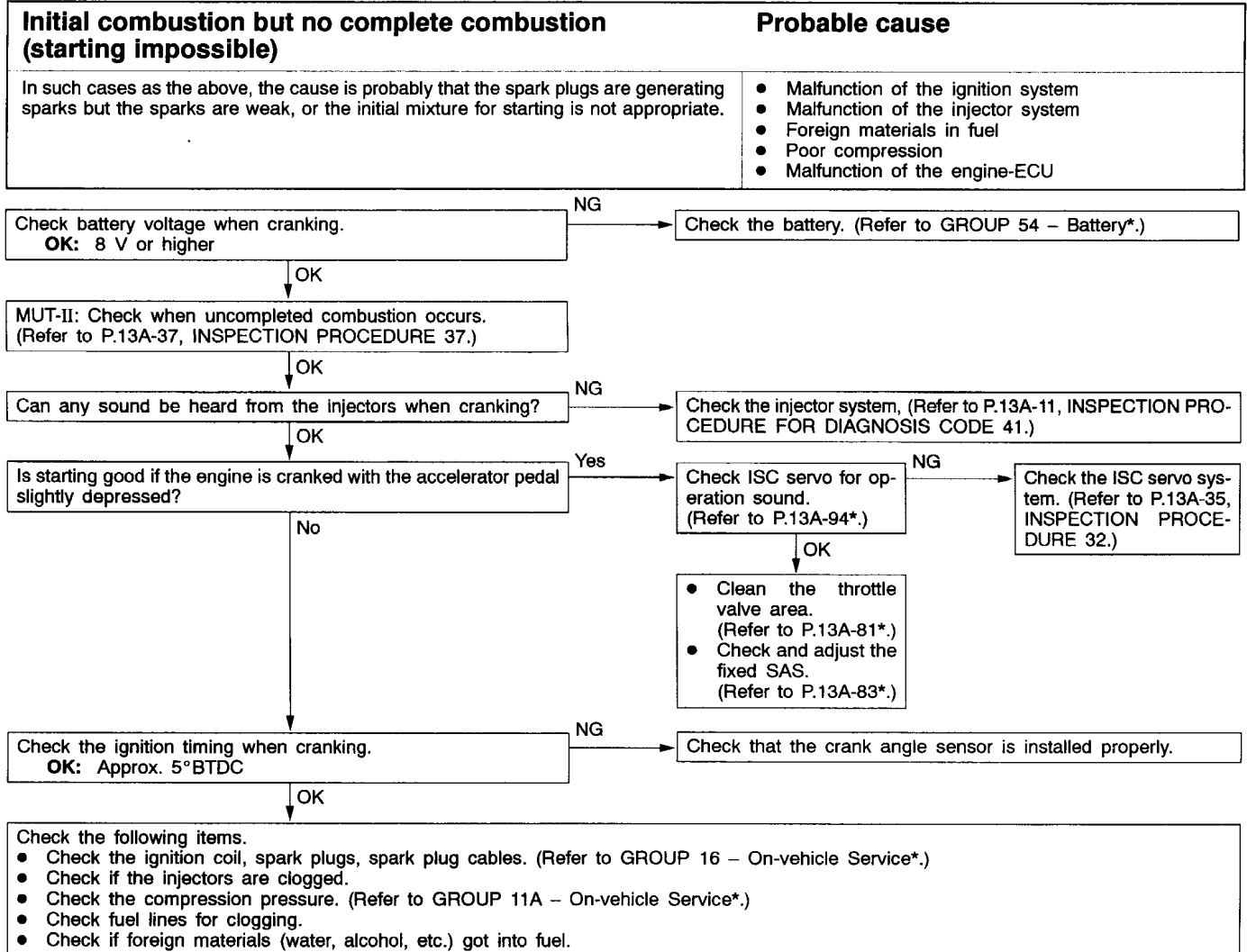
INSPECTION PROCEDURE 5



NOTE

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

INSPECTION PROCEDURE 6

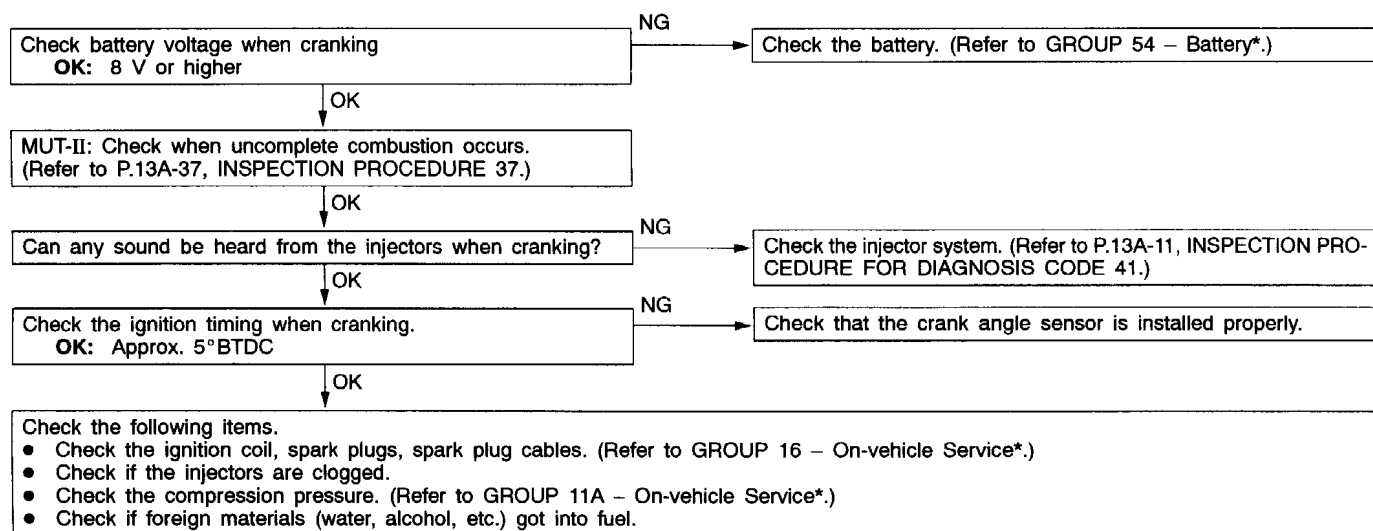


NOTE

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

INSPECTION PROCEDURE 7

It takes too long time to start. (Incorrect starting)	Probable cause
In cases such as the above, the cause is probably that the spark is weak and ignition is difficult, the initial mixture for starting is not appropriate, or sufficient compression pressure is not being obtained.	● Malfunction of the ignition system ● Malfunction of the injector system ● Inappropriate gasoline use ● Poor compression

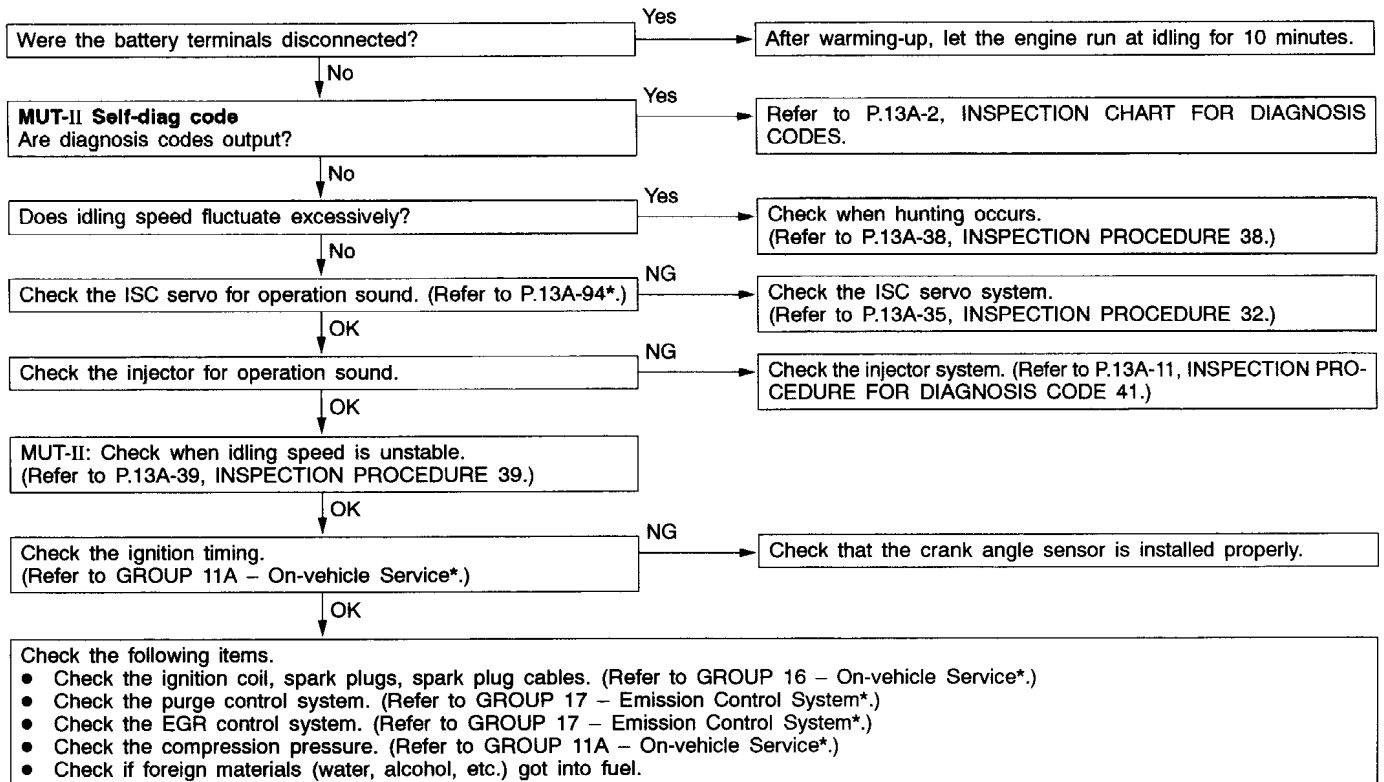


NOTE

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

INSPECTION PROCEDURE 8

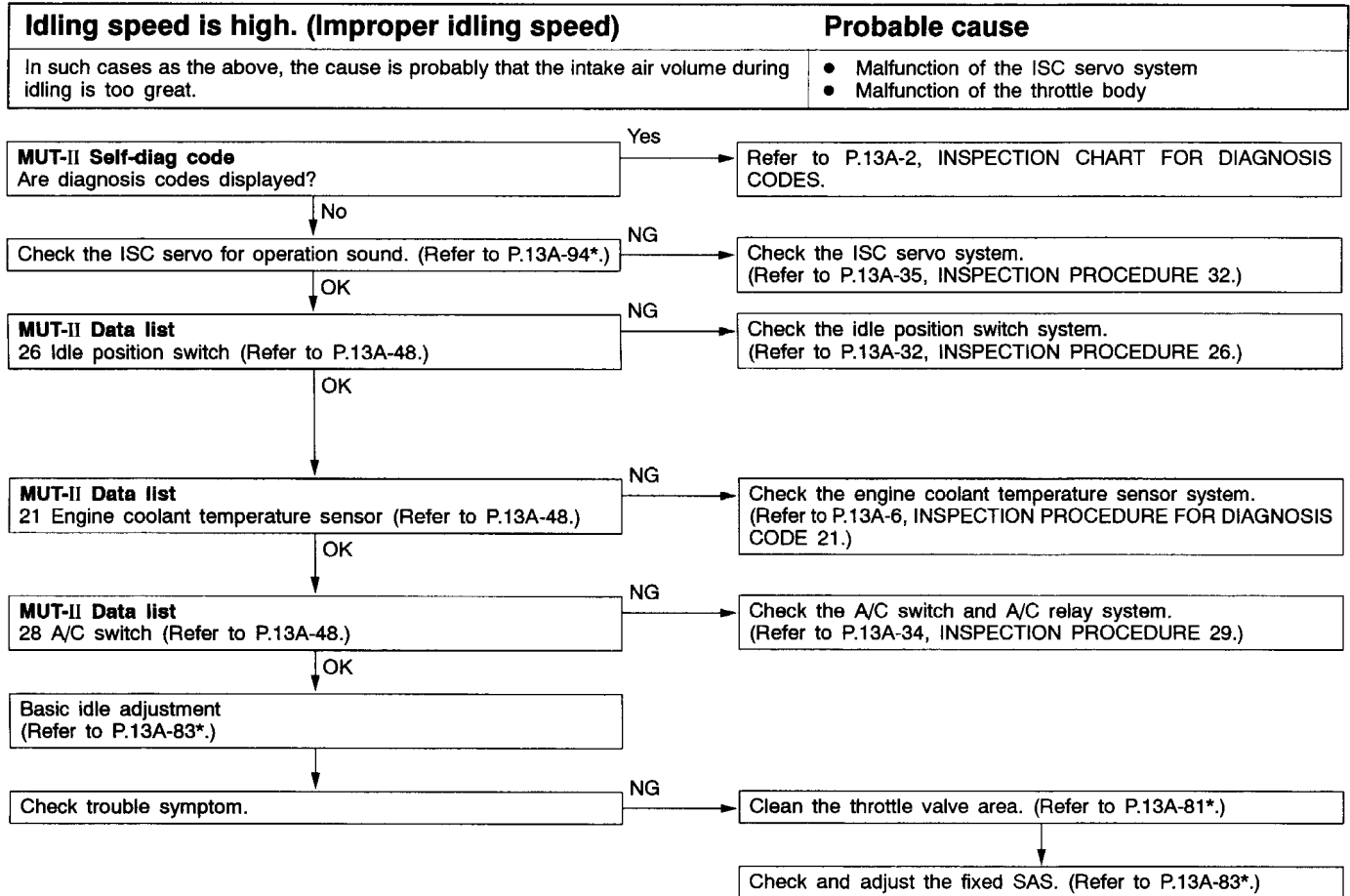
Idling is unstable (Rough idling, hunting)	Probable cause
In cases as the above, the cause is probably that the ignition system, air/fuel mixture, idle speed control (ISC) or compression pressure is defective. Because the range of possible causes is broad, inspection is narrowed down to simple items.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



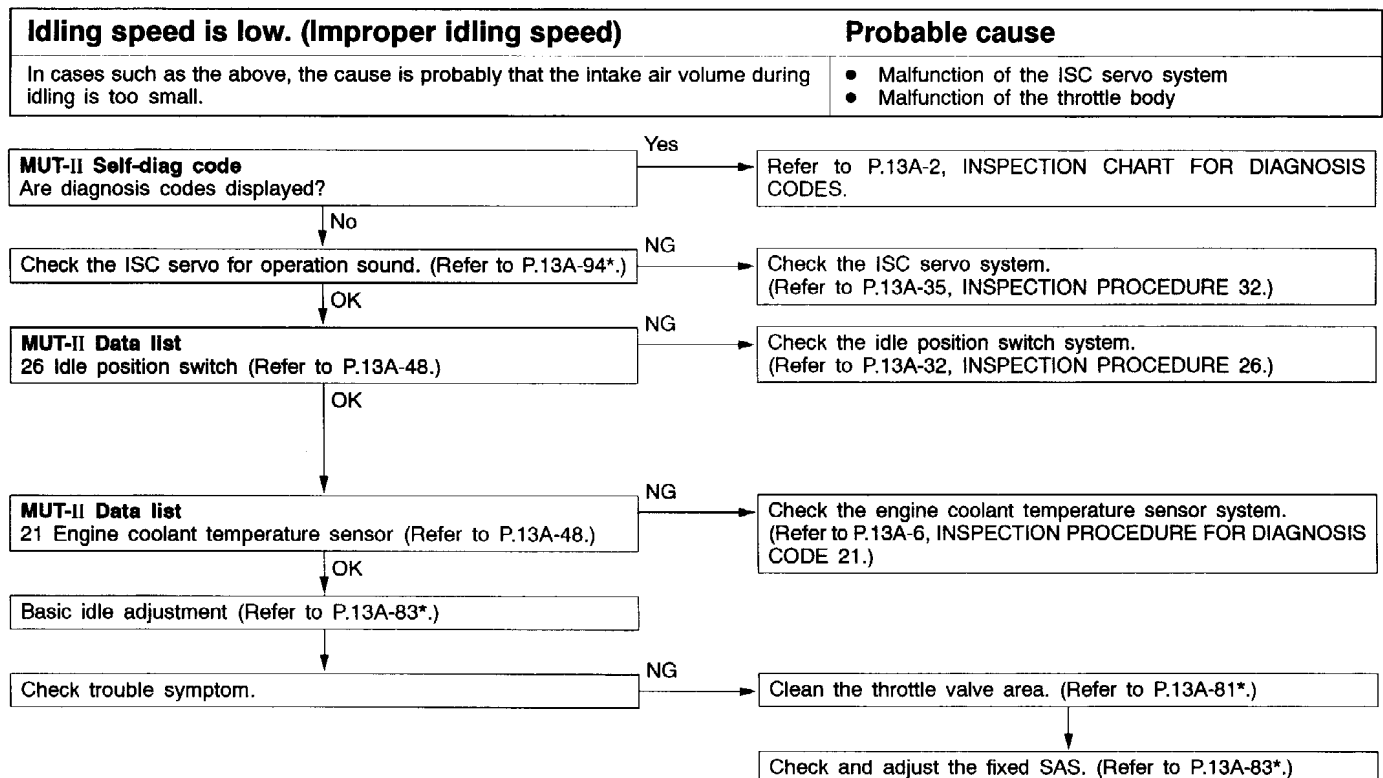
NOTE

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

INSPECTION PROCEDURE 9



INSPECTION PROCEDURE 10

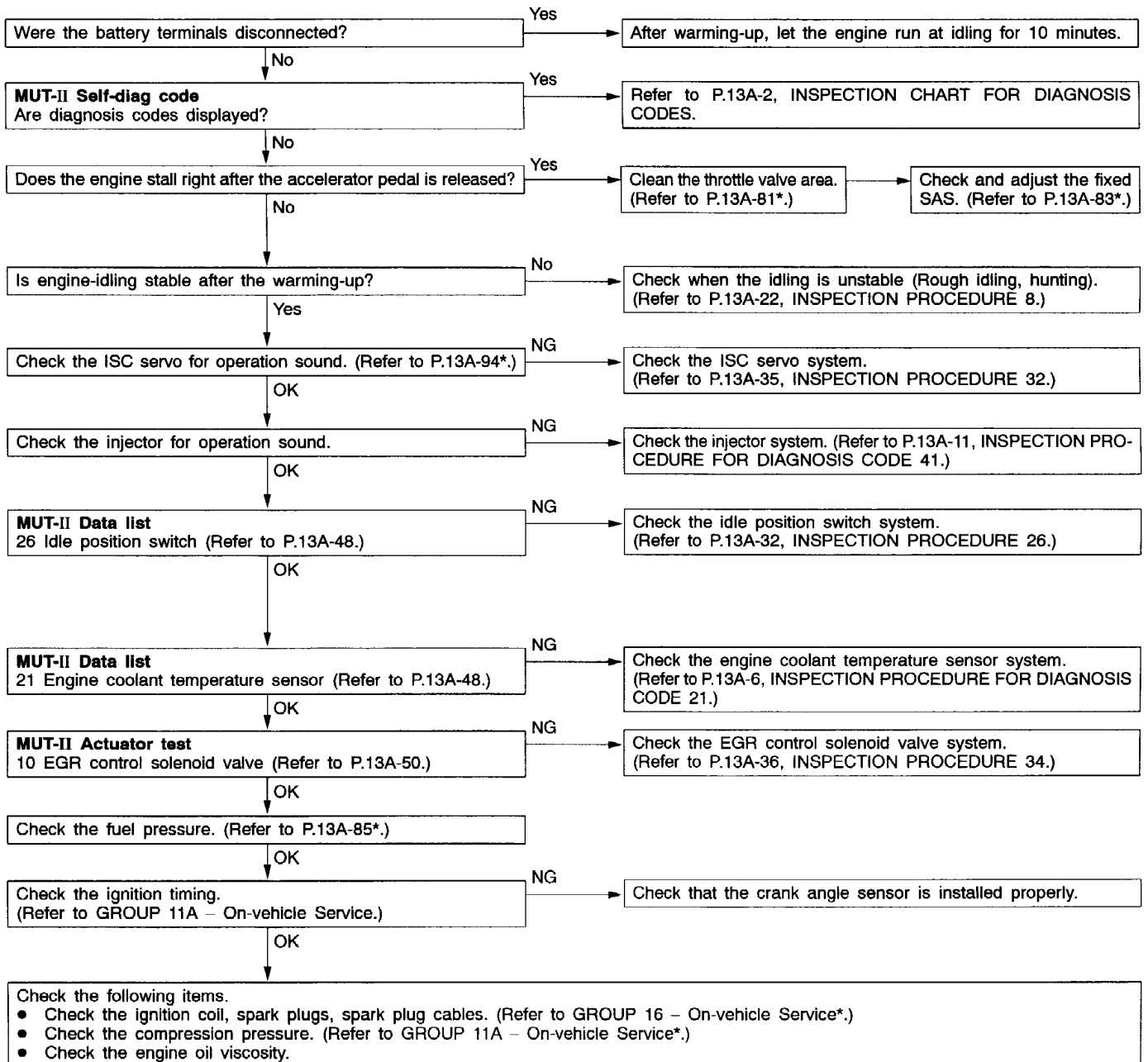


NOTE

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

INSPECTION PROCEDURE 11

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



NOTE

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

INSPECTION PROCEDURE 12

When the engine is hot, it stalls at idling. (Die out)	Probable cause
In such cases as the above, the cause is probably that ignition system, air/fuel mixture, idle speed control (ISC) or compression pressure is defective. In addition, if the engine suddenly stalls, the cause may also be a defective connector contact.	● Malfunction of the ignition system ● Malfunction of air-fuel ratio control system ● Malfunction of the ISC system ● Drawing air into intake system ● Improper connector contact

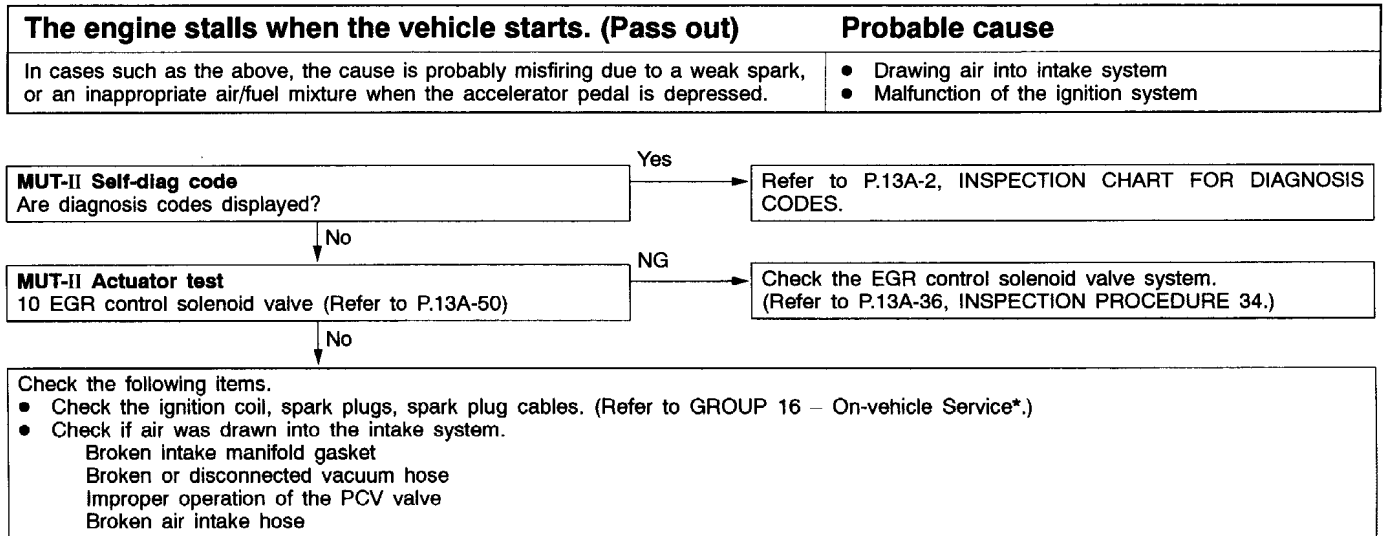

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graph TD
    Q1[Were the battery terminals disconnected?] -- Yes --> A1[After warming-up, let the engine run at idling for 10 minutes.]
    Q1 -- No --> Q2[MUT-II Self-diag code  
Are diagnosis codes displayed?]
    Q2 -- Yes --> A2[Refer to P.13A-2, INSPECTION CHART FOR DIAGNOSIS CODES.]
    Q2 -- No --> Q3[Check the ISC servo for operation sound. (Refer to P.13A-94*)]
    Q3 -- NG --> A3[Check the ISC servo system.  
(Refer to P.13A-35, INSPECTION PROCEDURE 32.)]
    Q3 -- OK --> Q4[Check the injector for operation sound.]
    Q4 -- NG --> A4[Check the injector system. (Refer to P.13A-11, INSPECTION PROCEDURE FOR DIAGNOSIS CODE 41.)]
    Q4 -- OK --> Q5[Does the engine stall right after the accelerator pedal is released?]
    Q5 -- Yes --> A5[Clean the throttle valve area. (Refer to P.13A-81*)]
    A5 --> A6[Check and adjust the fixed SAS. (Refer to P.13A-83*)]
    Q5 -- No --> Q6[Does the engine stall easily again?]
    Q6 -- No --> A7[While carrying out an intermittent malfunction simulation test (Refer to GROUP 00 – Points to Note for Intermittent Malfunctions.), check for sudden changes in the signals shown below.  
● Crank angle sensor signal ● Primary and secondary ignition signal  
● Air flow sensor signal ● Fuel pump drive signal  
● Injector drive signal ● Engine ECU power supply voltage]
    Q6 -- Yes --> Q7[MUT-II: Check when engine stalls when the engine is warm and idling. (Refer to P.13A-40, INSPECTION PROCEDURE 40.)]
    Q7 --> Q8[Check the Ignition timing. (Refer to GROUP 11A – On-vehicle Service*)]
    Q8 -- NG --> A8[Check that the crank angle sensor is installed properly.]
    Q8 -- OK --> A9[Check the following items.  
● Check the ignition coil, spark plugs, spark plug cables. (Refer to GROUP 16 – On-vehicle Service*)  
● Check if the injectors are clogged.  
● Check the compression pressure. (Refer to GROUP 11A – On-vehicle Service*)  
● Check if foreign materials (water, alcohol, etc.) got into fuel.]
  
```

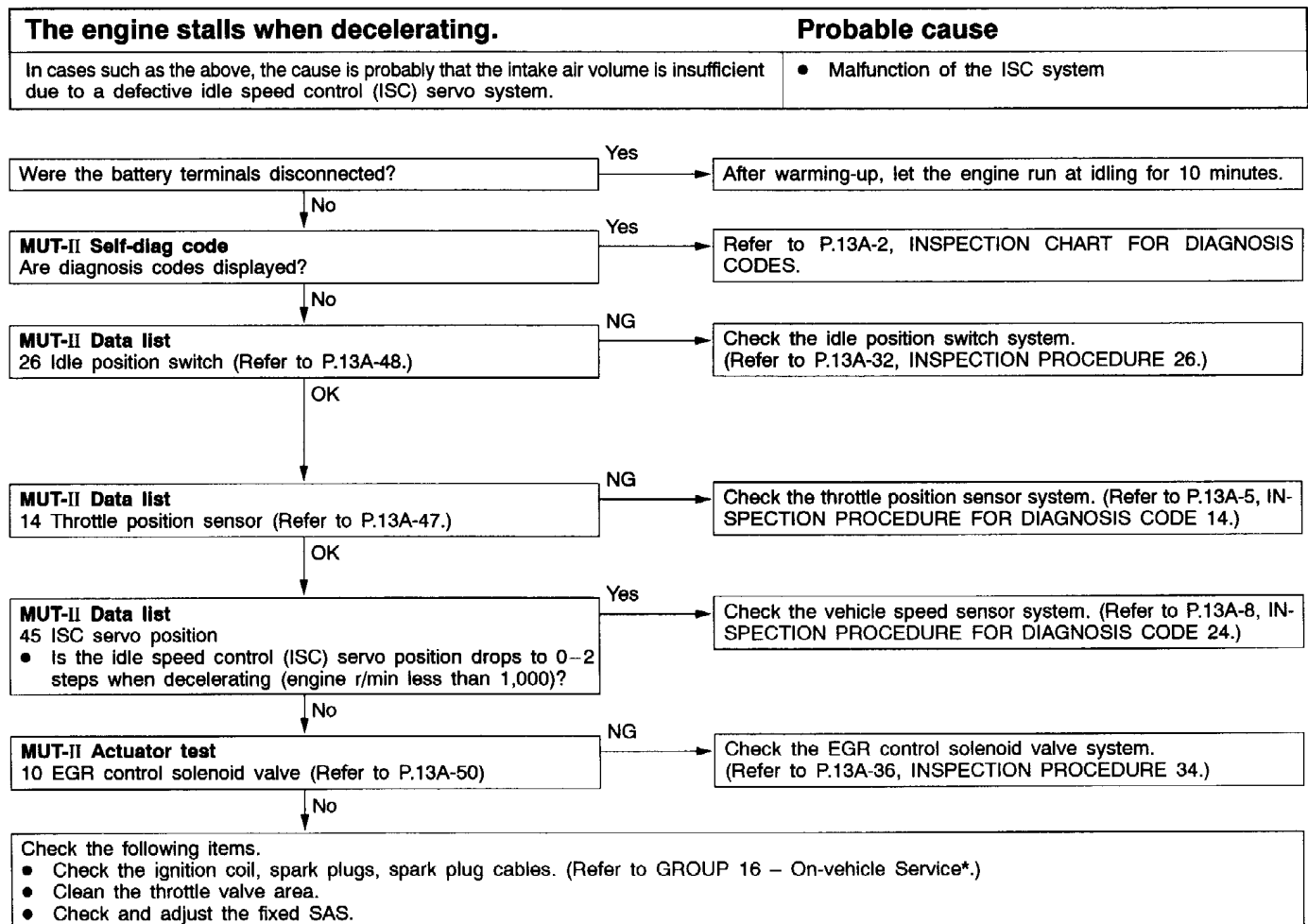
NOTE

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

INSPECTION PROCEDURE 13



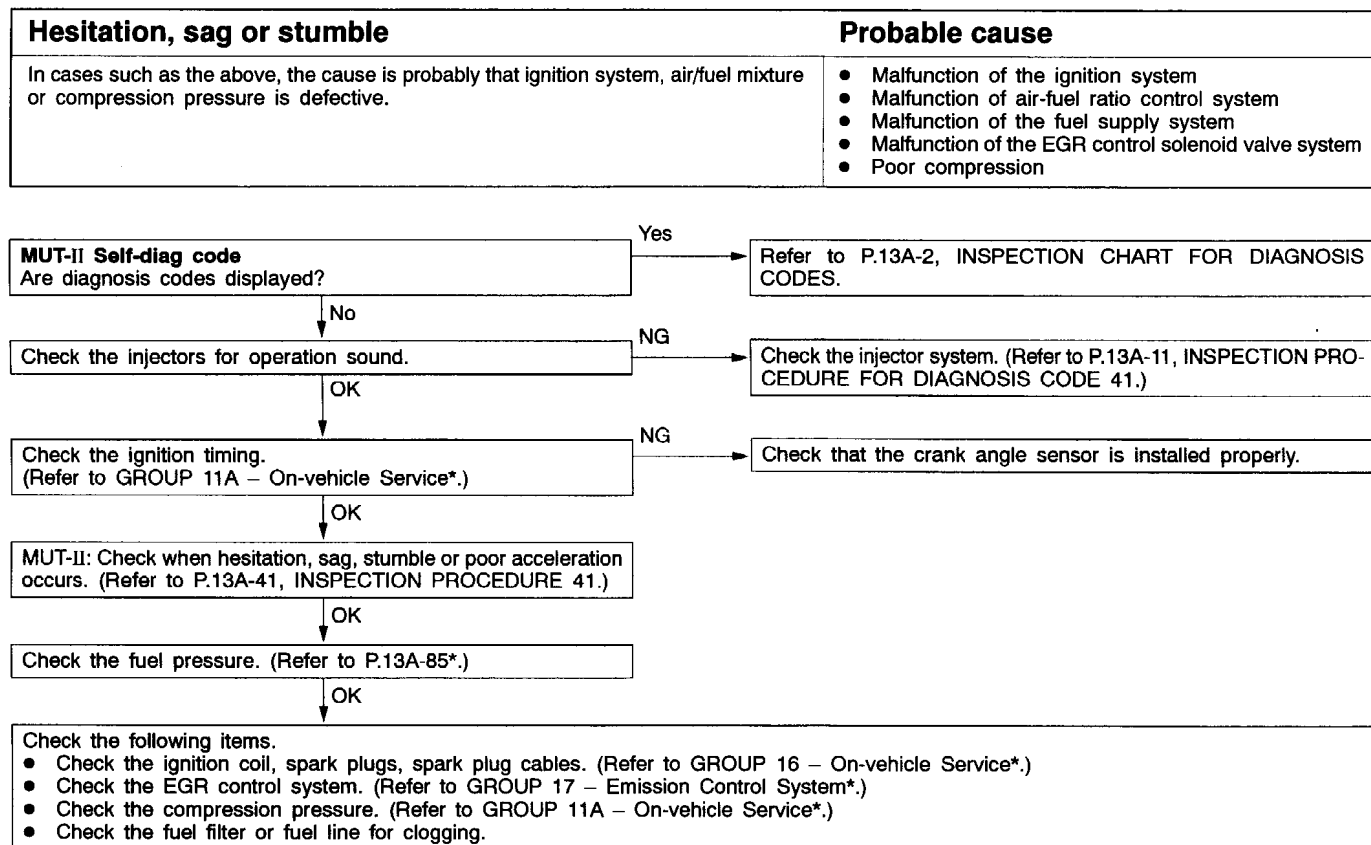
INSPECTION PROCEDURE 14



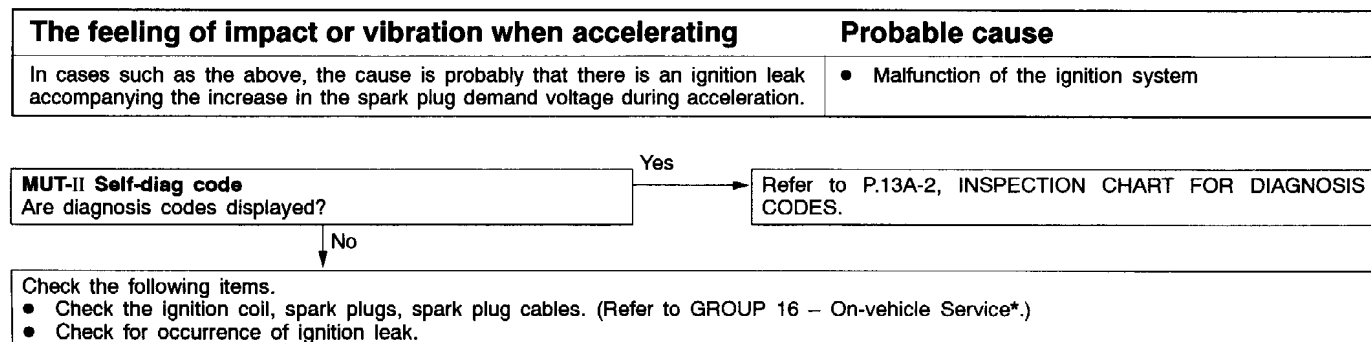
NOTE

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

INSPECTION PROCEDURE 15



INSPECTION PROCEDURE 16

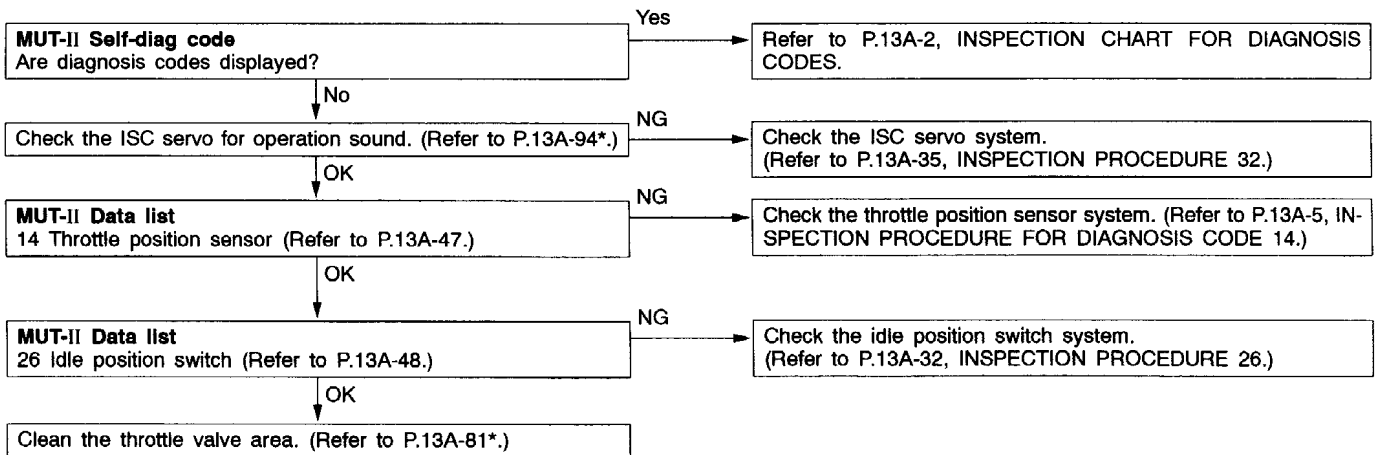


NOTE

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

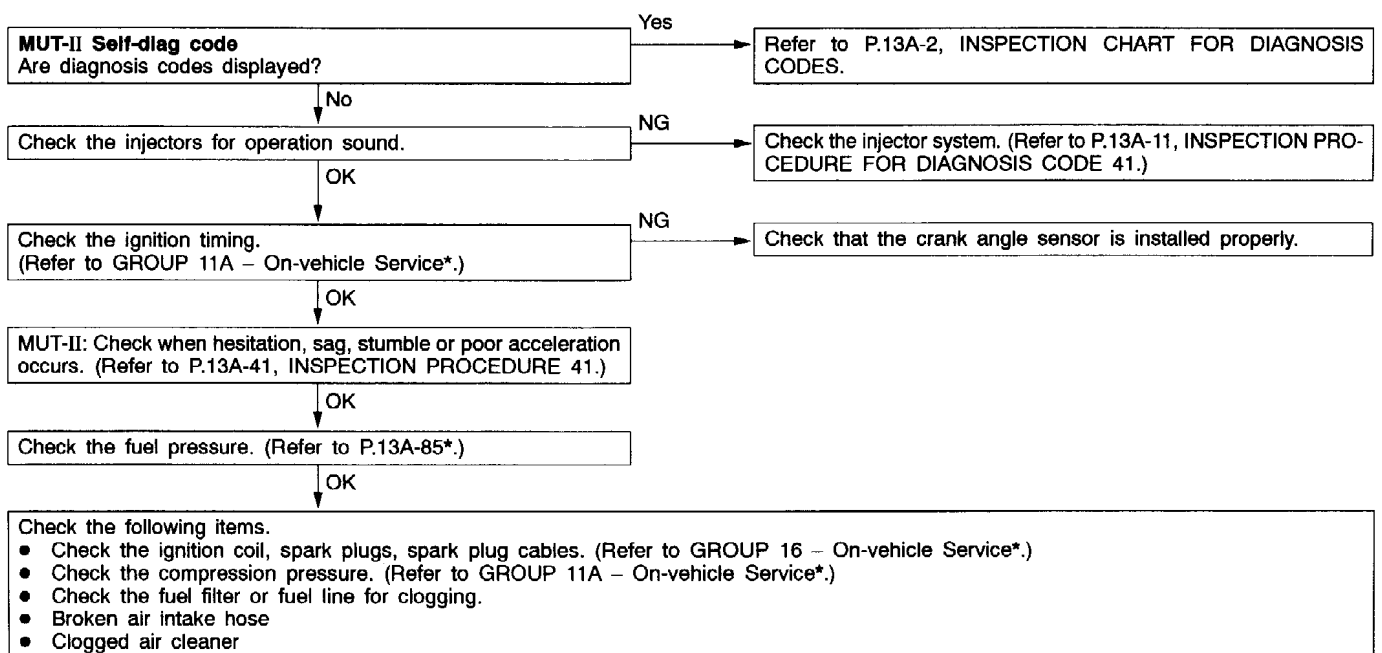
INSPECTION PROCEDURE 17

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



INSPECTION PROCEDURE 18

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

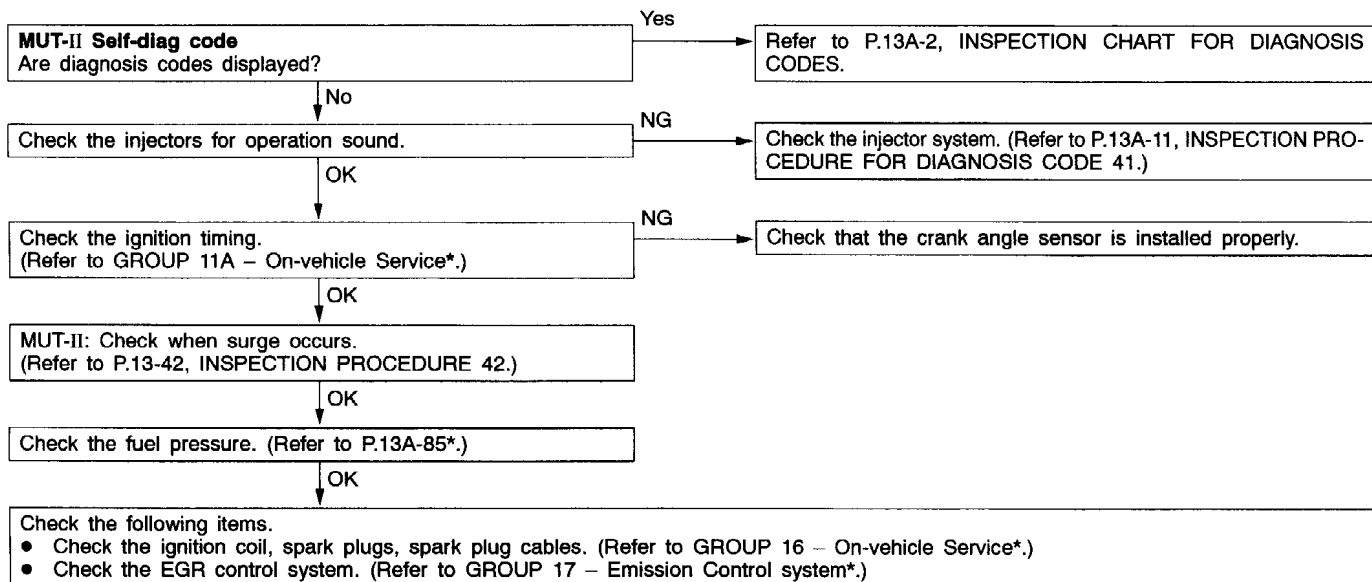


NOTE

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

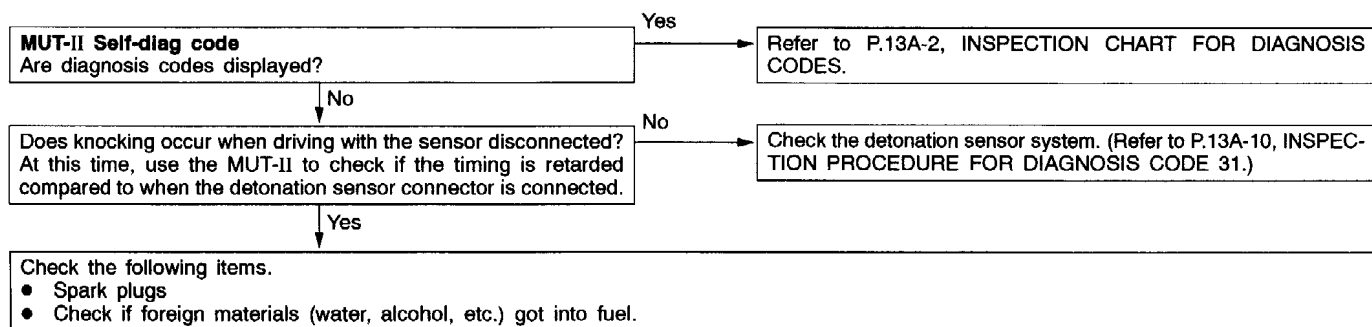
INSPECTION PROCEDURE 19

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



INSPECTION PROCEDURE 20

Knocking	Probable cause
In cases as the above, the cause is probably that the detonation control is defective or the heat value of the spark plug is inappropriate.	• Defective detonation sensor • Inappropriate heat value of the spark plug



INSPECTION PROCEDURE 21

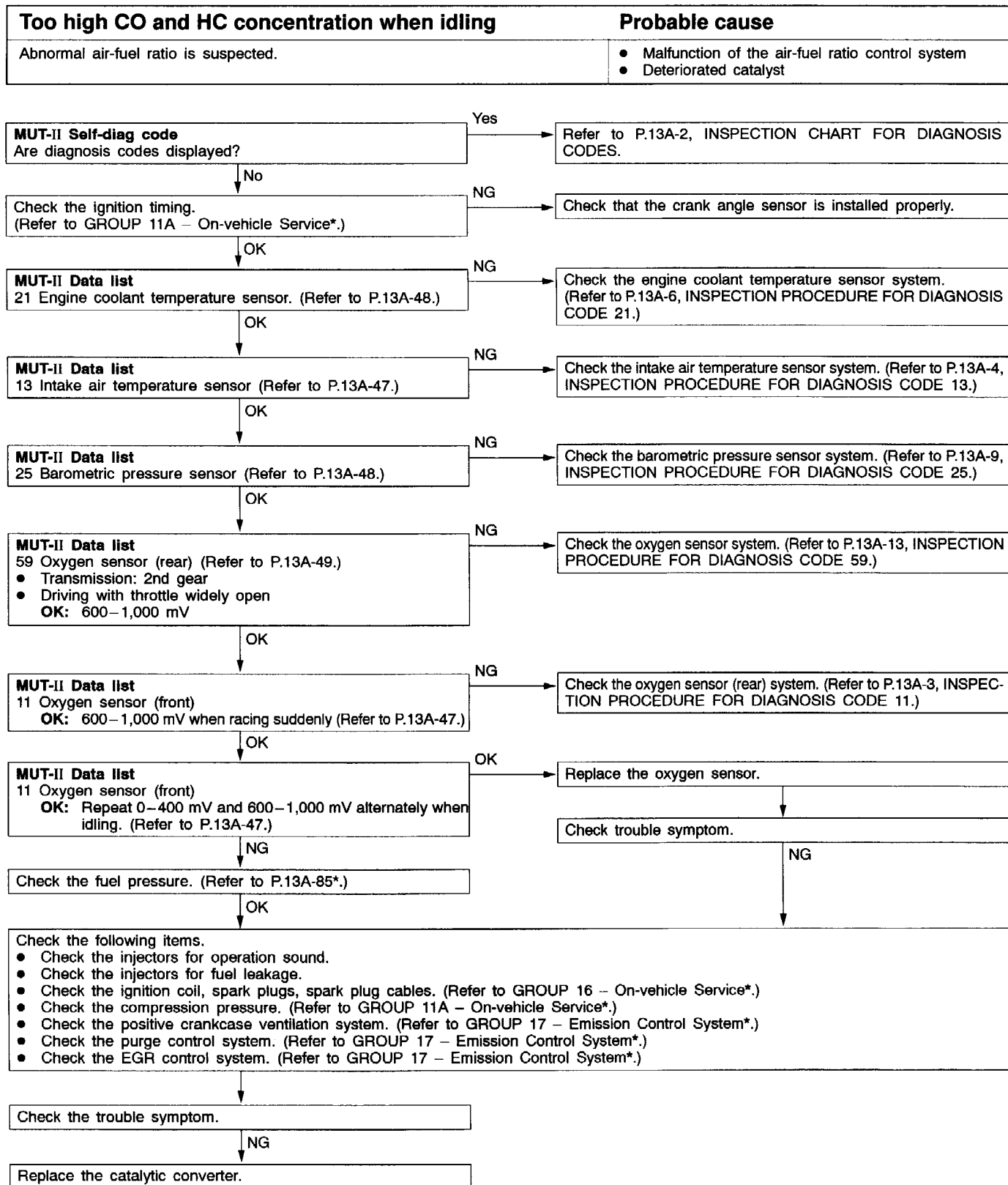
Dieseling	Probable cause
Fuel leakage from injectors is suspected.	• Fuel leakage from injectors

Check the injectors for fuel leakage.

NOTE

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

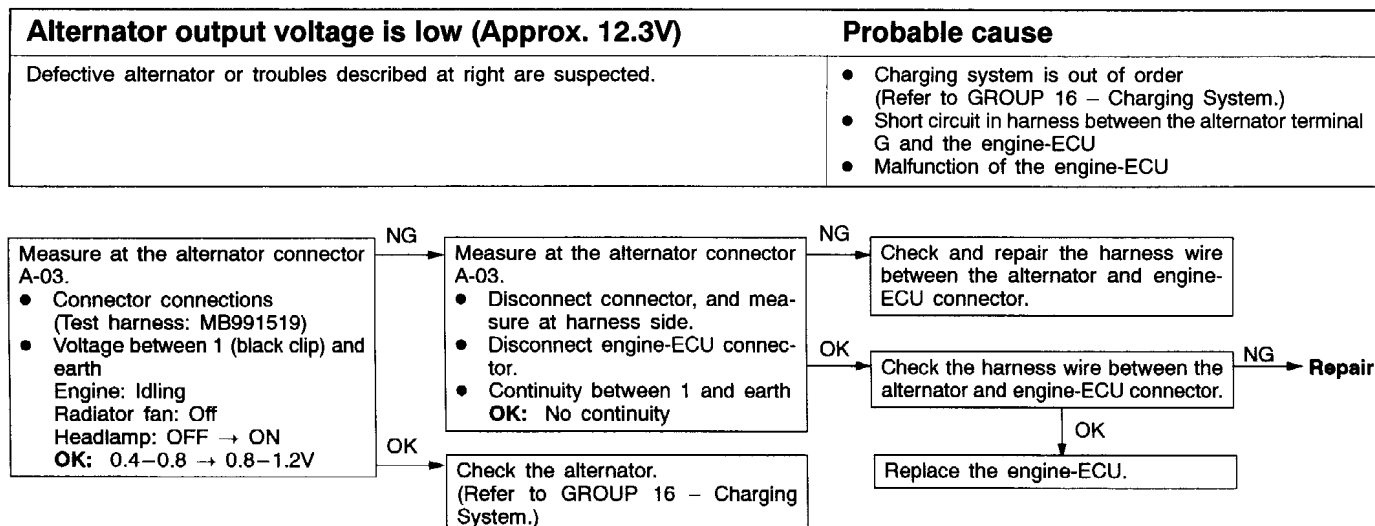
INSPECTION PROCEDURE 22



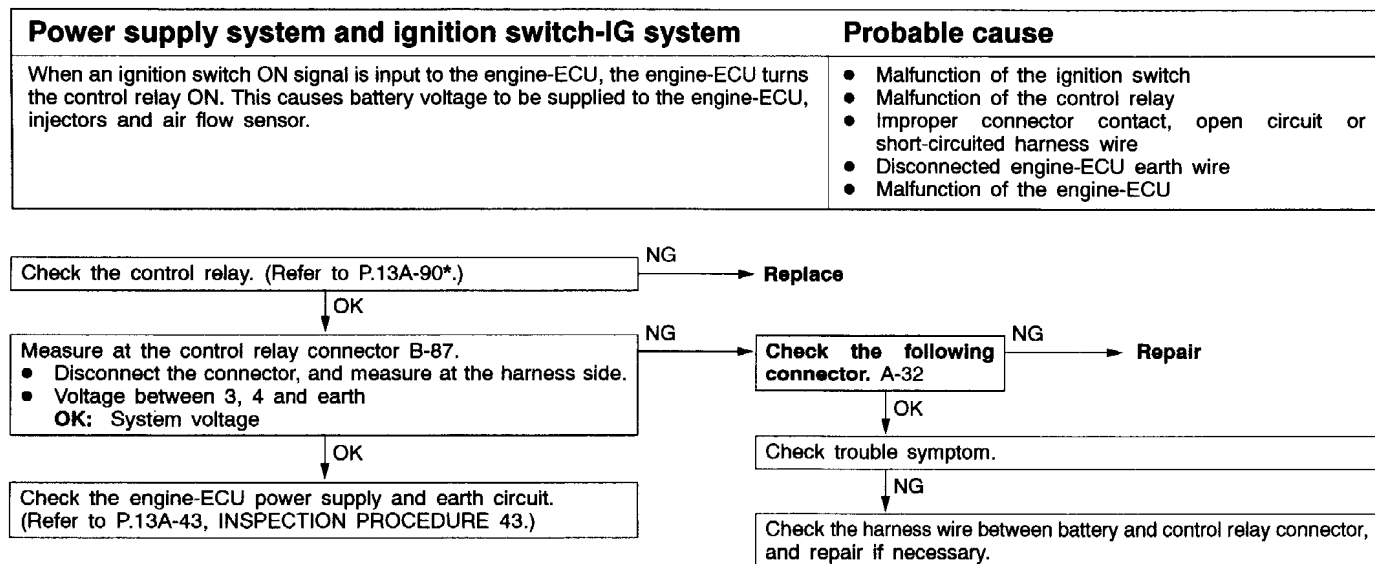
NOTE

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

INSPECTION PROCEDURE 23



INSPECTION PROCEDURE 24

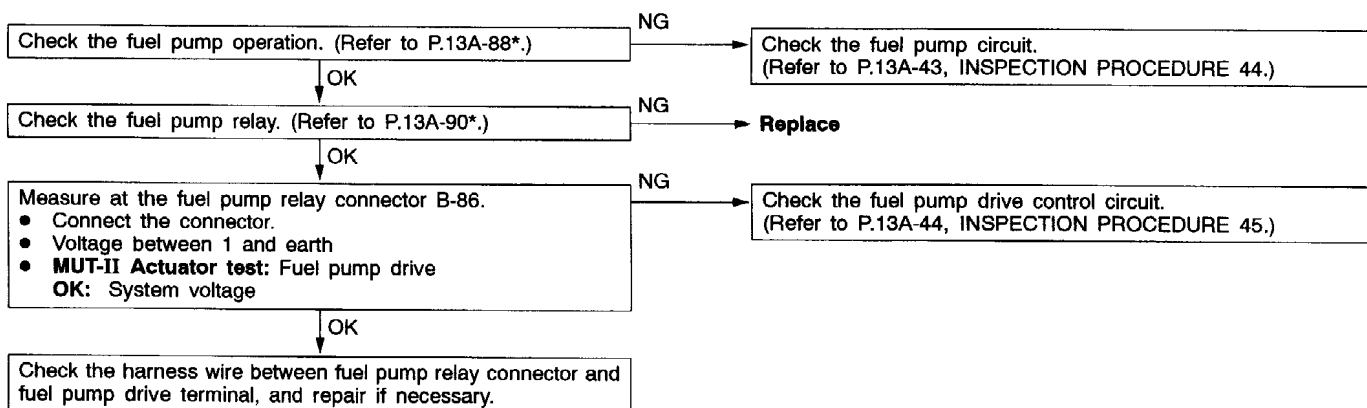


NOTE

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

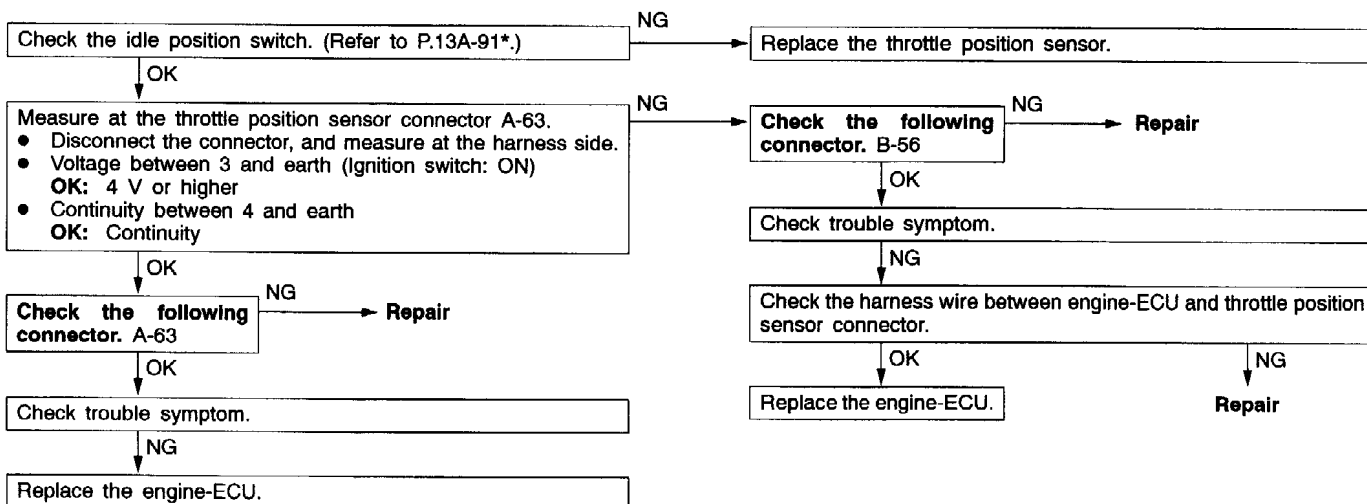
INSPECTION PROCEDURE 25

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



INSPECTION PROCEDURE 26

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

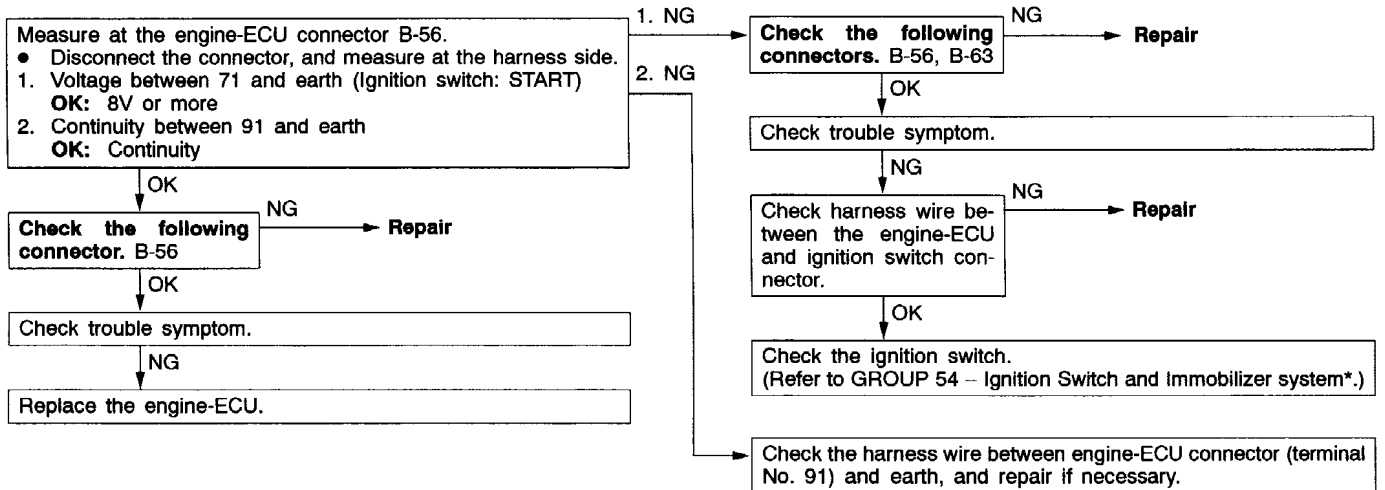


NOTE

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

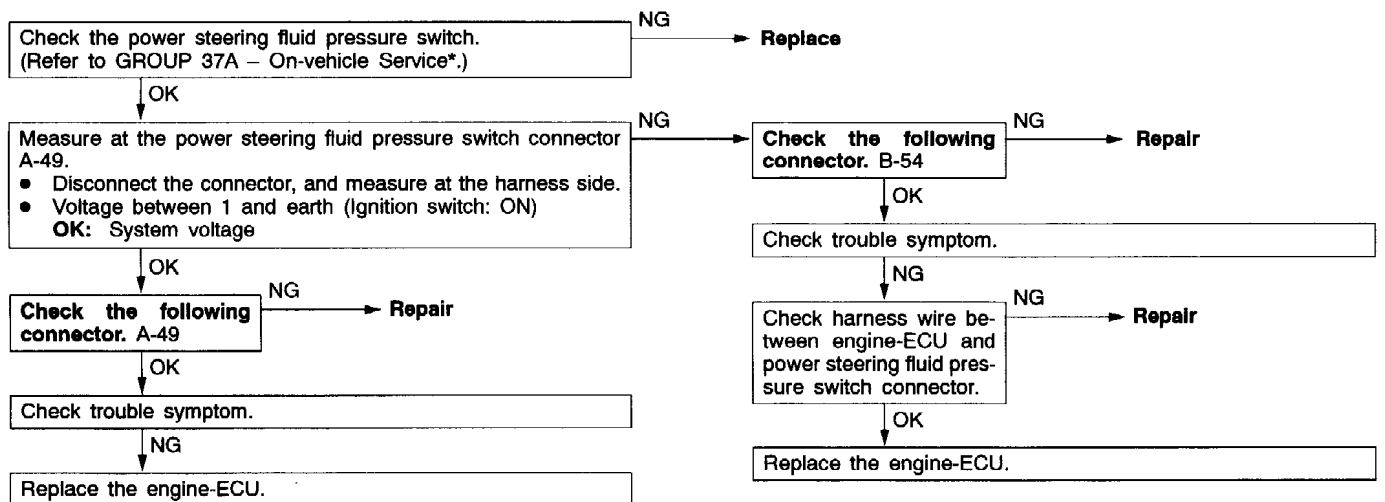
INSPECTION PROCEDURE 27

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



INSPECTION PROCEDURE 28

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

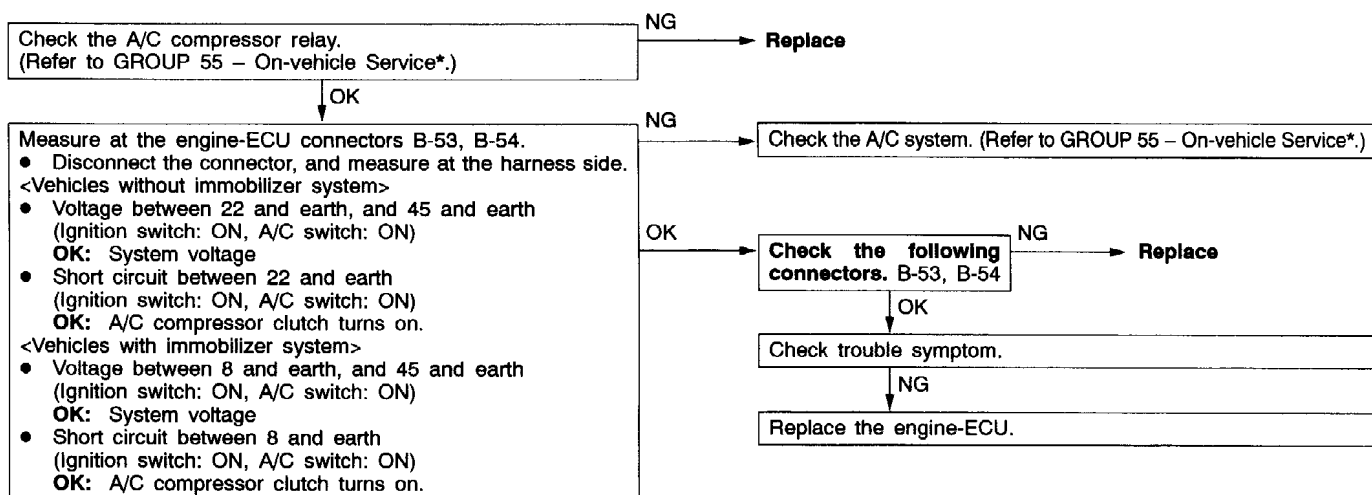


NOTE

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

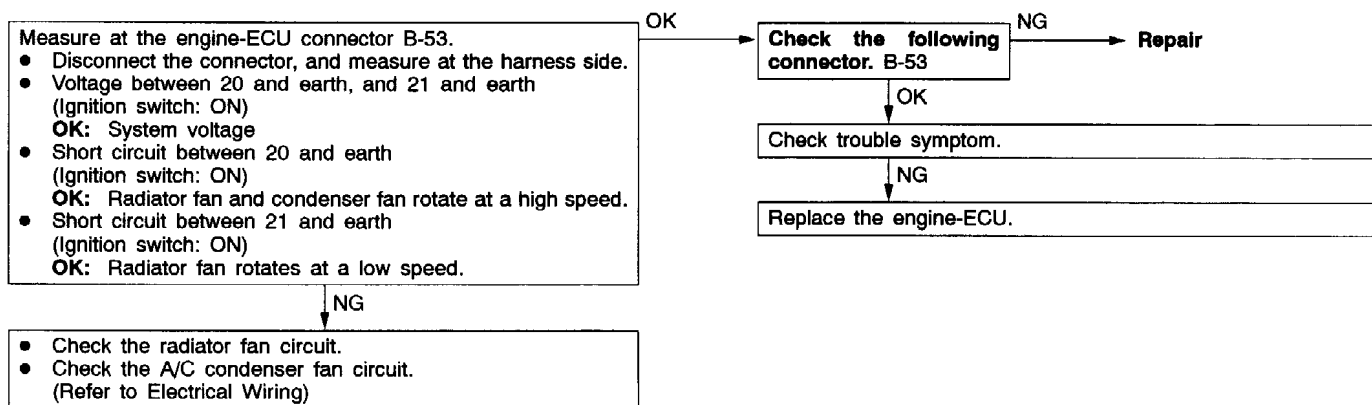
INSPECTION PROCEDURE 29

A/C switch and A/C relay system	Probable cause
When an A/C ON signal is input to the engine-ECU, the engine-ECU carries out control of the idle speed control (ISC) servo, and also operates the A/C compressor magnetic clutch.	• Malfunction of A/C control system • Malfunction of A/C switch • Improper connector contact, open circuit or short-circuited harness wire • Malfunction of the engine-ECU



INSPECTION PROCEDURE 30

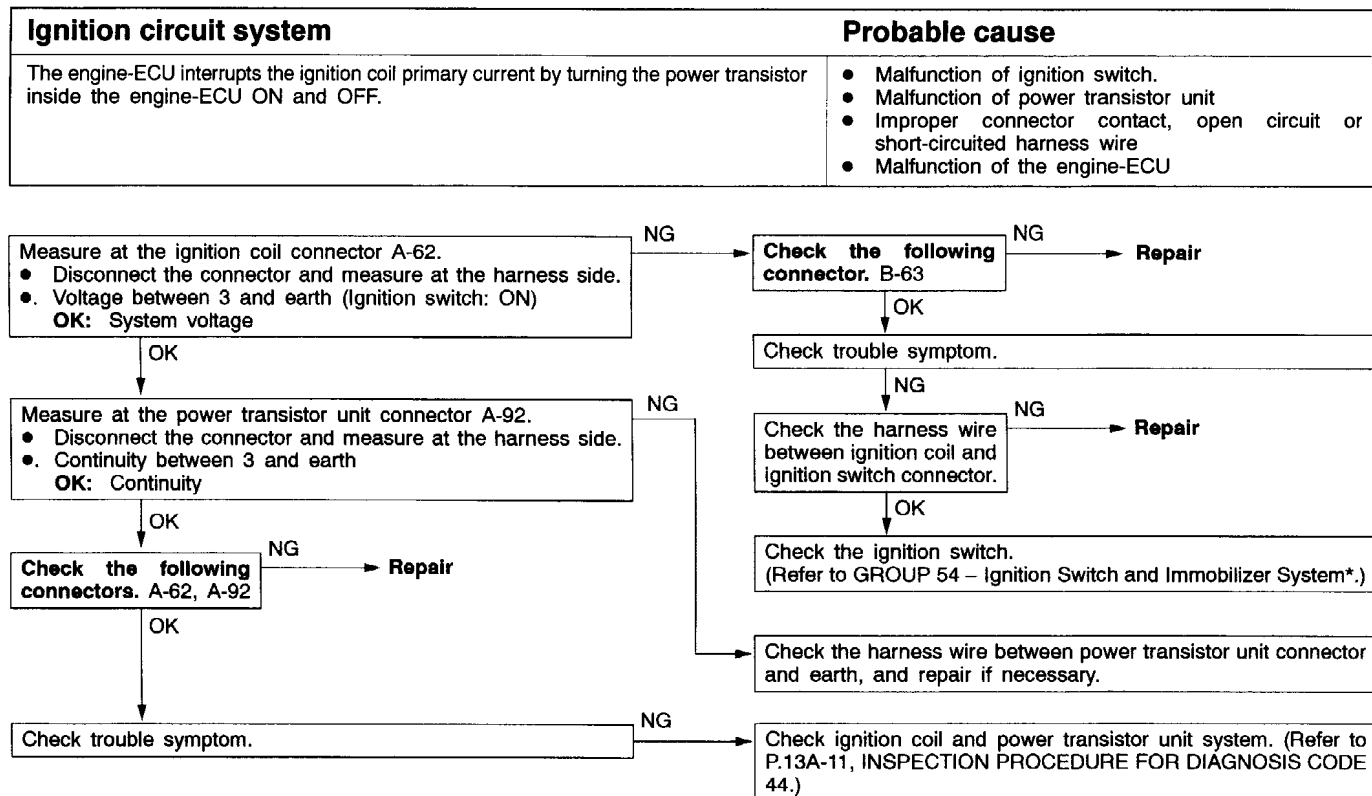
Fan motor relay system (Radiator fan, A/C condenser fan)	Probable cause
The fan motor relay is controlled by the power transistor inside the engine-ECU turning ON and OFF.	• Malfunction of fan motor relay • Malfunction of fan motor • Improper connector contact, open circuit or short-circuited harness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



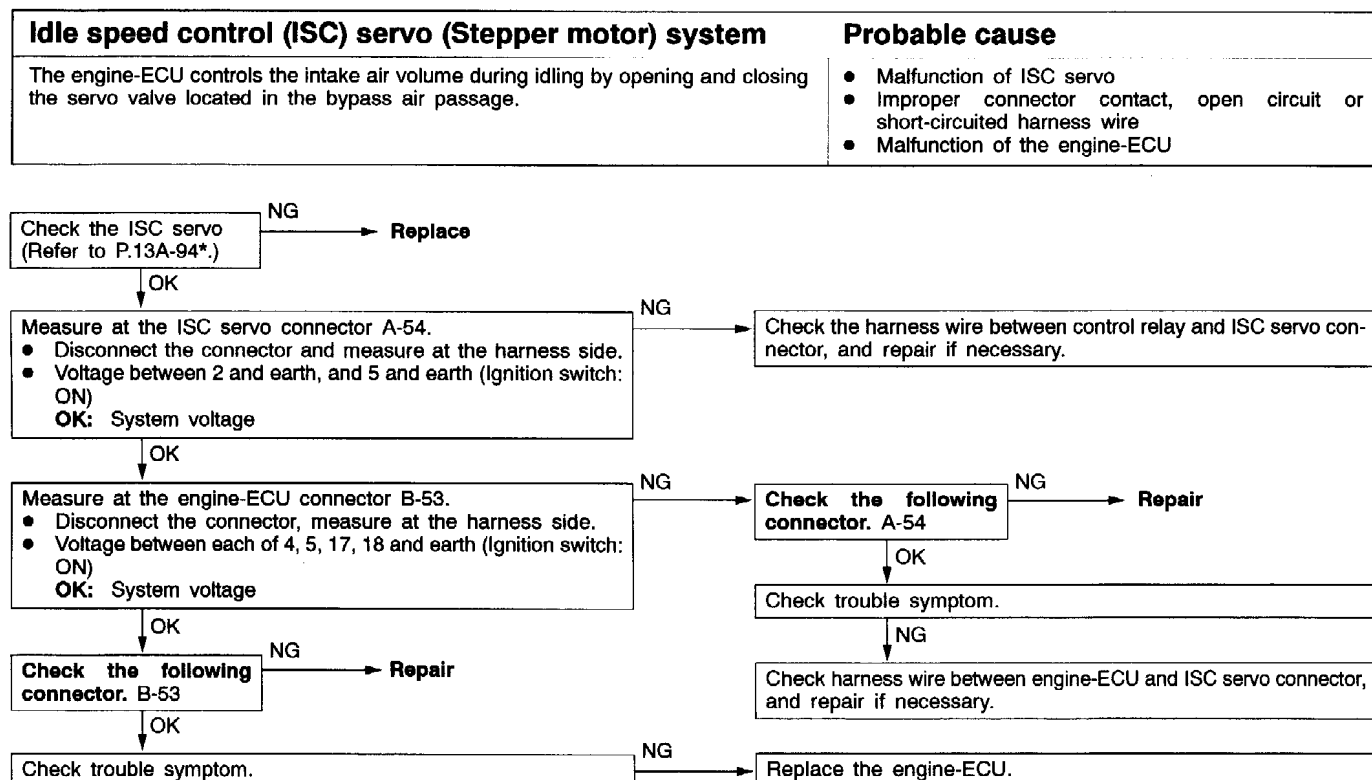
NOTE

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

INSPECTION PROCEDURE 31



INSPECTION PROCEDURE 32

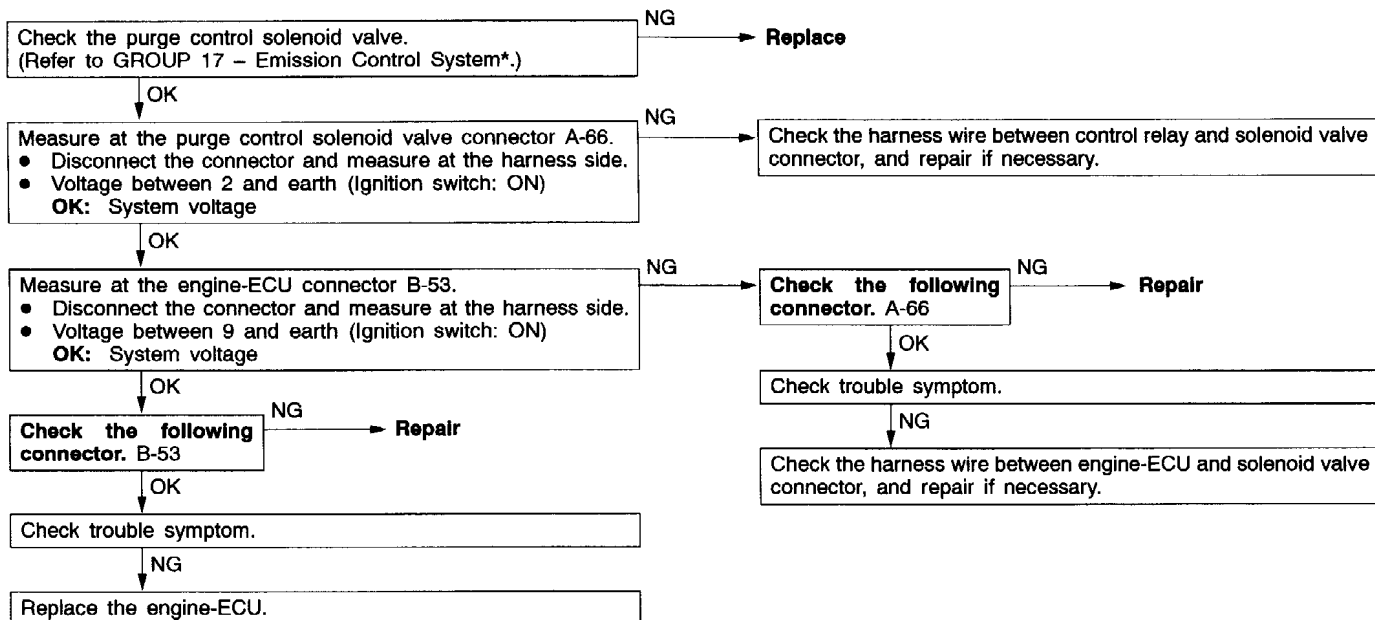


NOTE

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

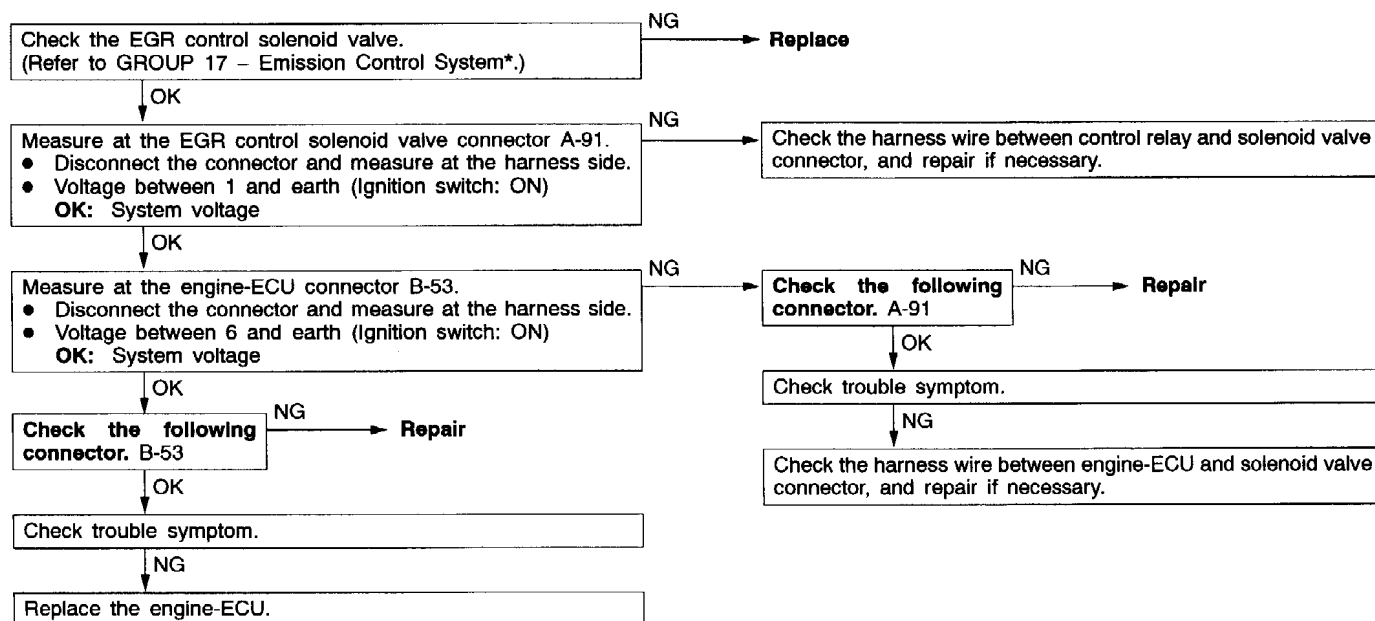
INSPECTION PROCEDURE 33

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



INSPECTION PROCEDURE 34

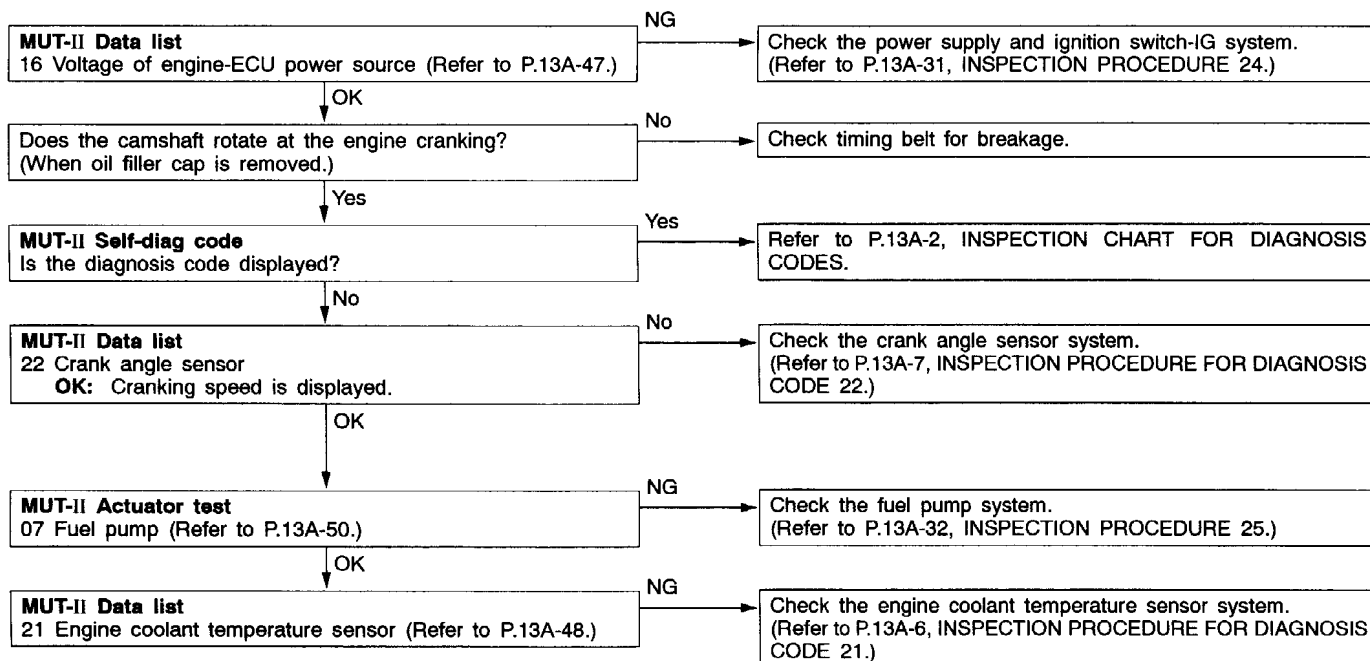
EGR control solenoid valve system	Probable cause
The EGR control solenoid valve is controlled by the negative pressure resulting from EGR operation leaking to port "A" of the throttle body.	• Malfunction of solenoid valve • Improper connector contact, open circuit or short-circuited harness wire. • Malfunction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



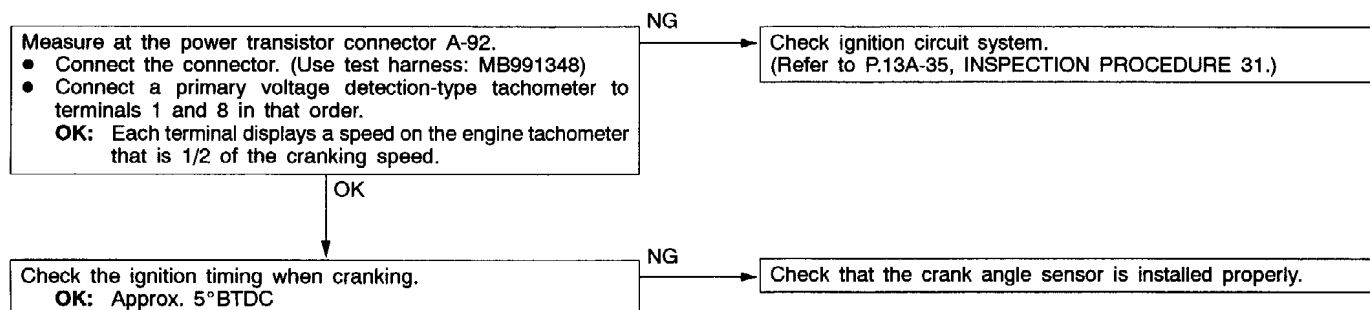
NOTE

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

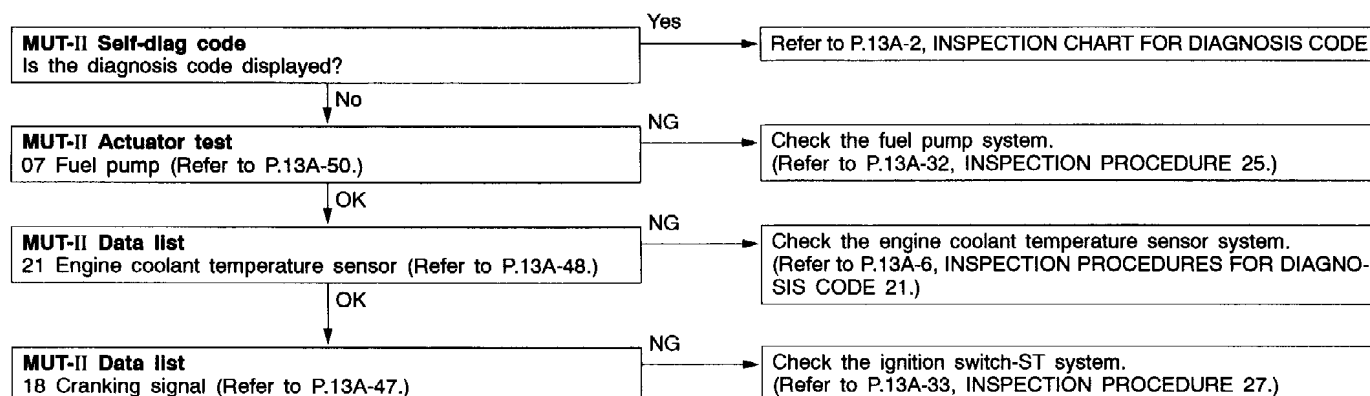
INSPECTION PROCEDURE 35

MUT-II: Check when no initial combustion occurs.

INSPECTION PROCEDURE 36

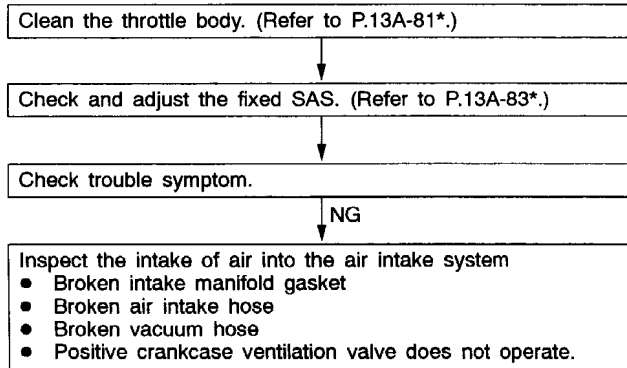
Ignition system: Check when no initial combustion occurs.

INSPECTION PROCEDURE 37

MUT-II: Check when incomplete combustion occurs.

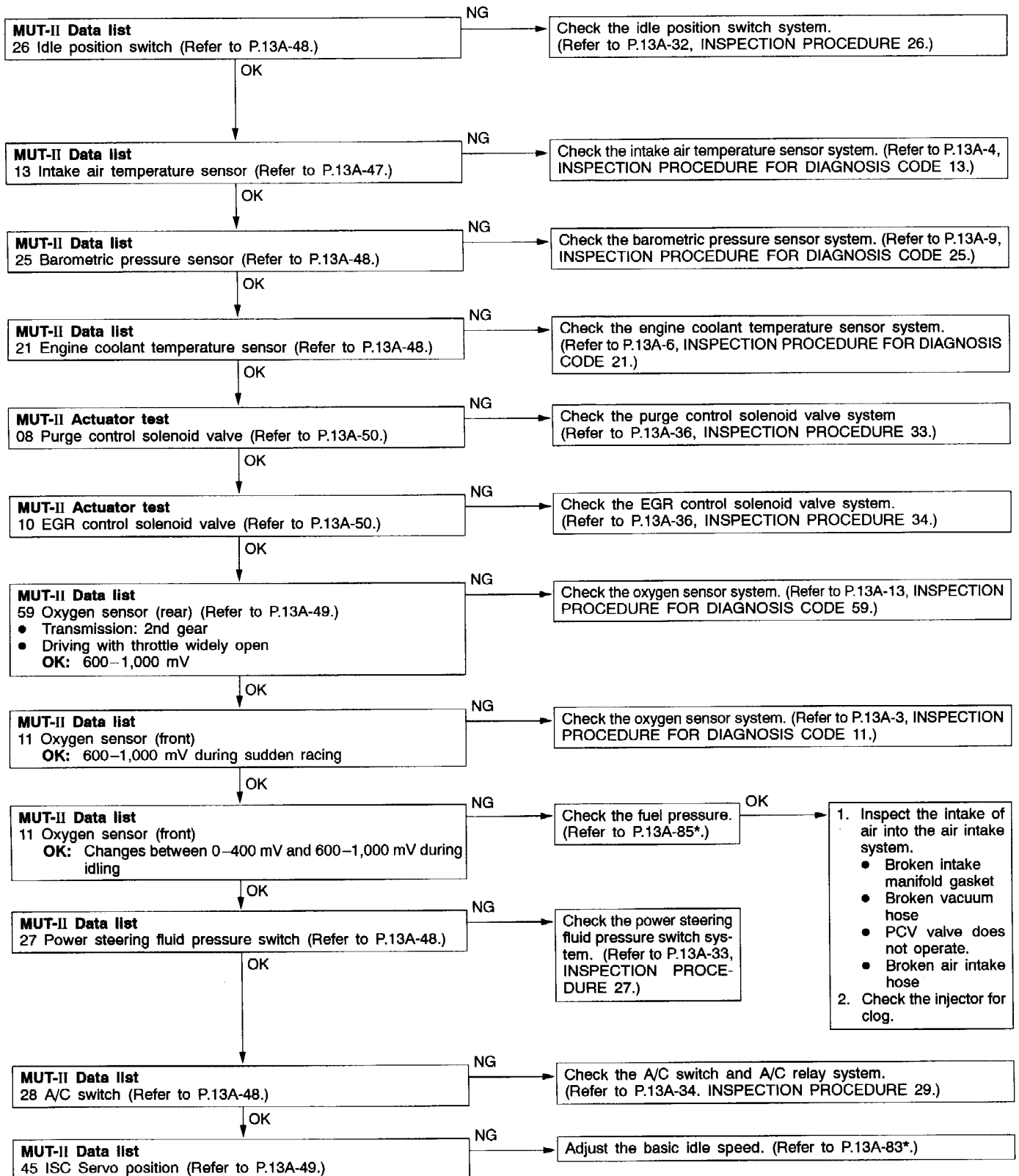
INSPECTION PROCEDURE 38

Check when hunting occurs.

**NOTE**

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

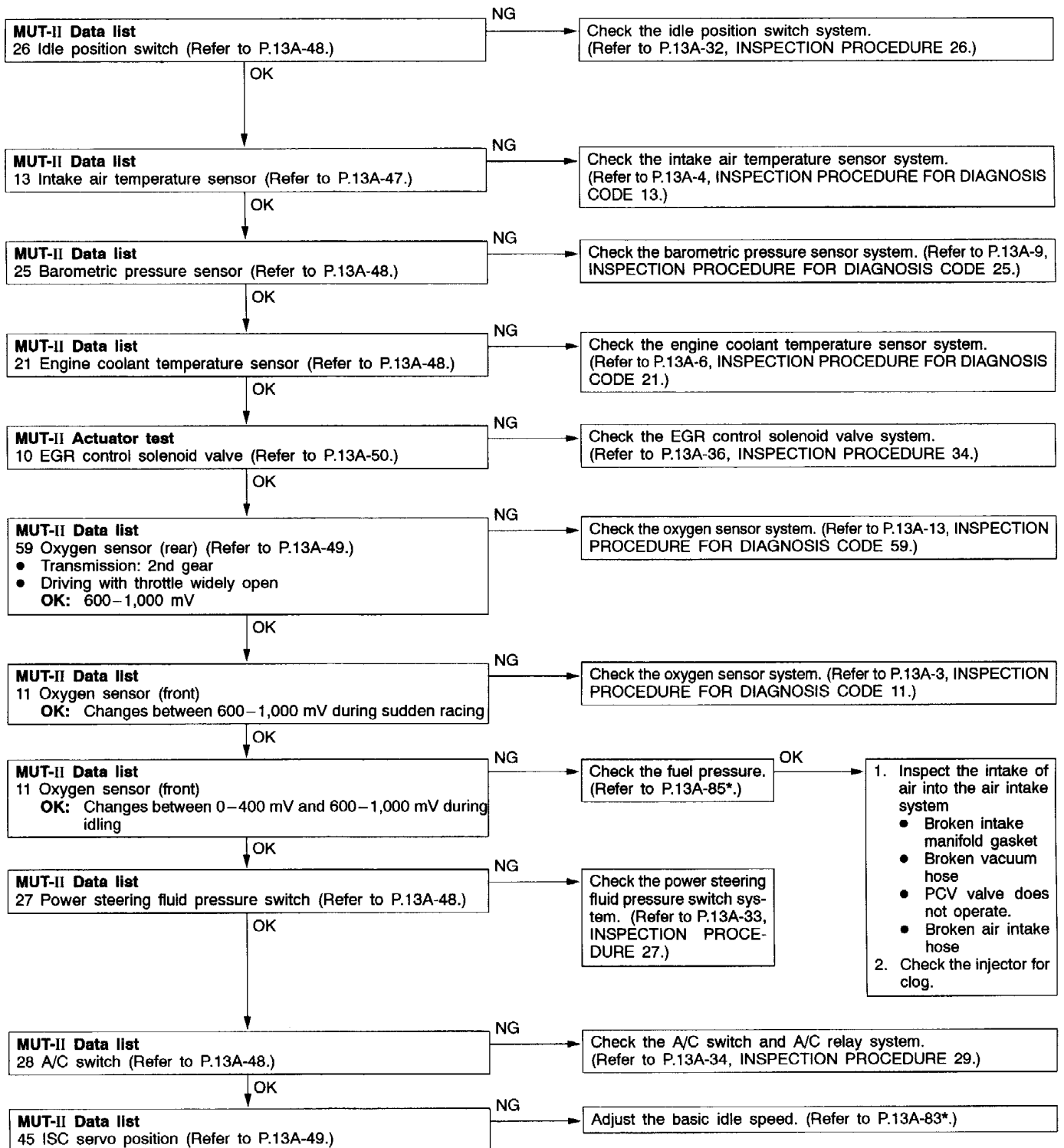
INSPECTION PROCEDURE 39

MUT-II: Check when idling speed is unstable.

NOTE

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

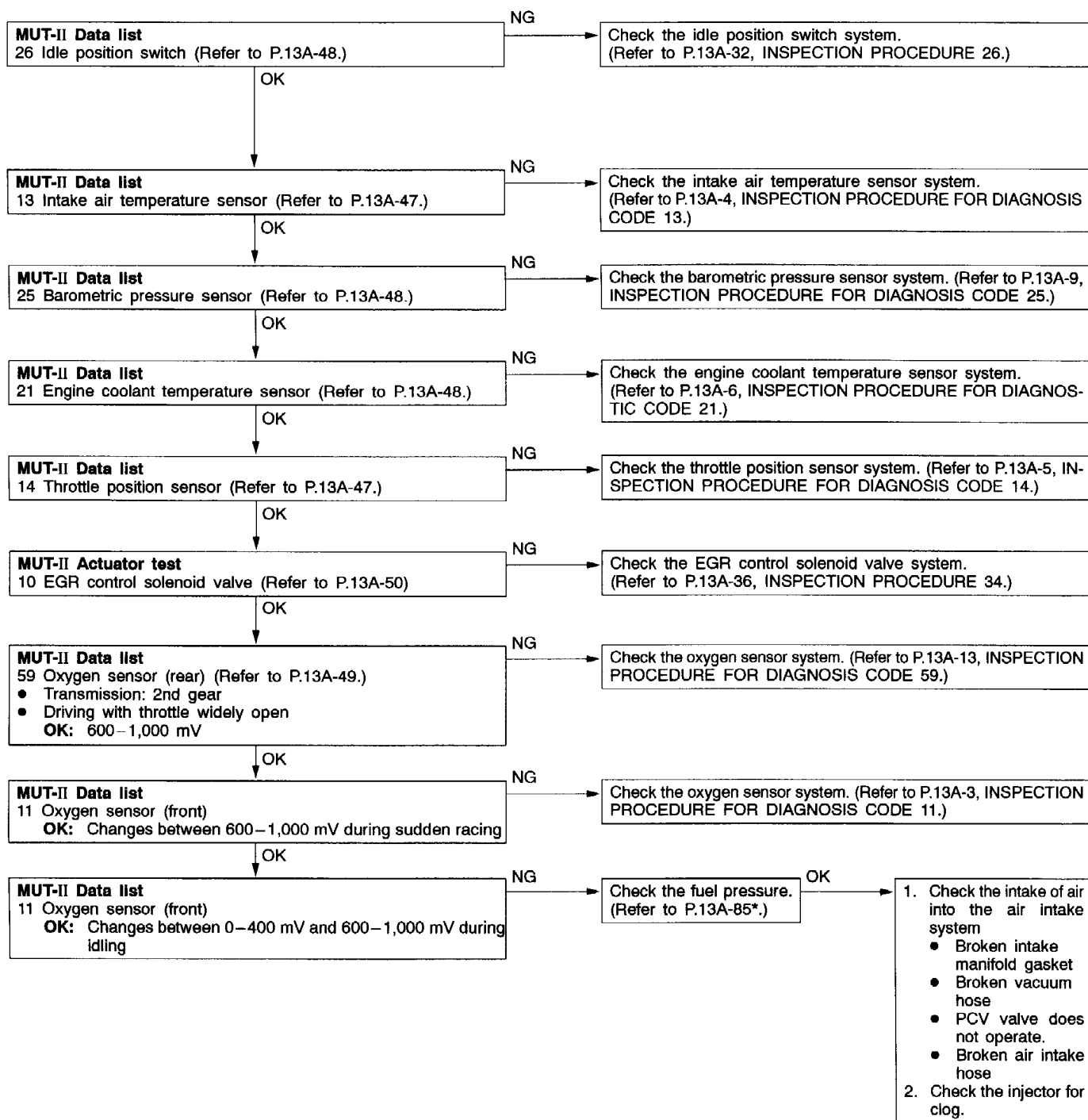
INSPECTION PROCEDURE 40

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

NOTE

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

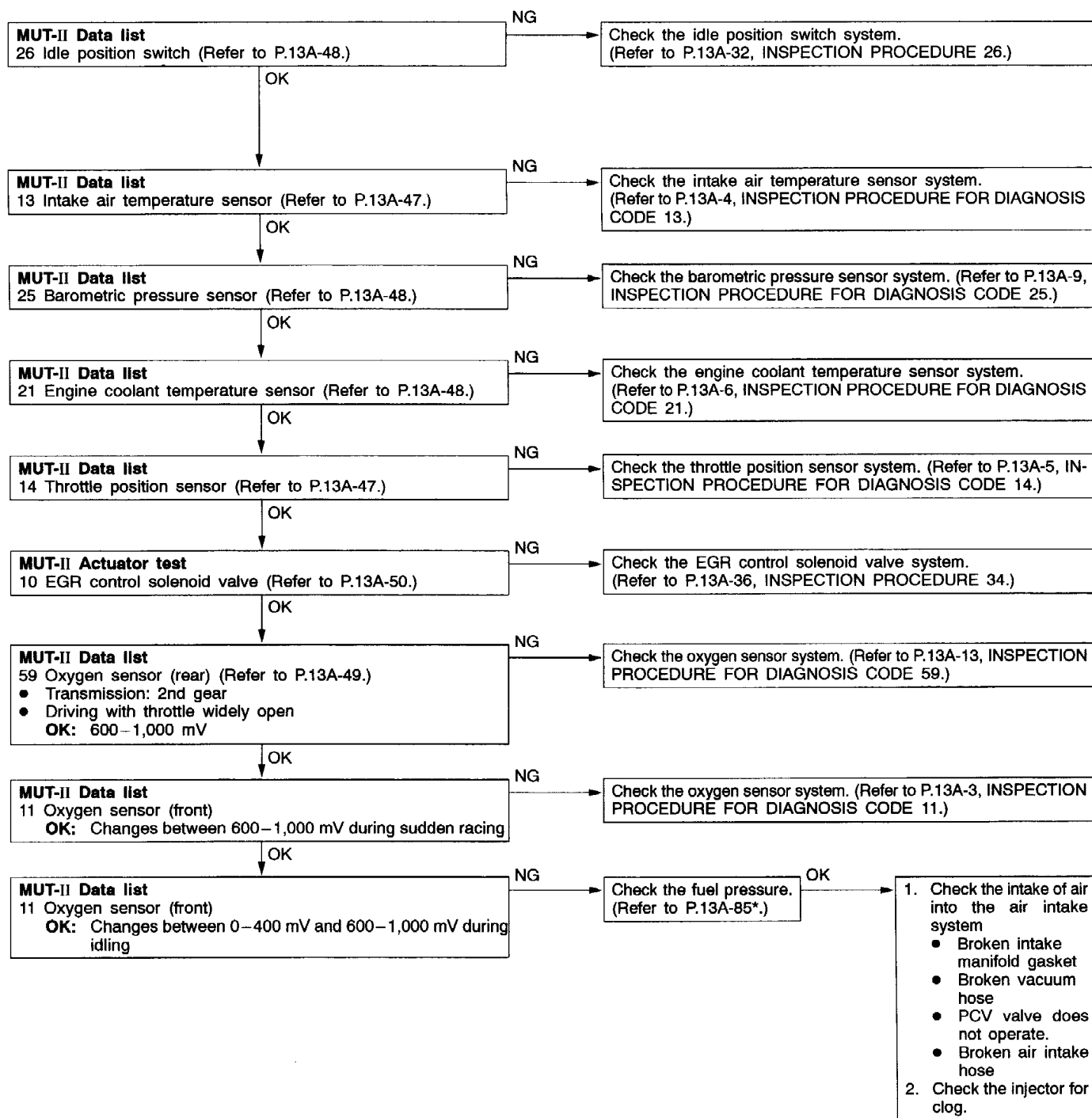
INSPECTION PROCEDURE 41

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

NOTE

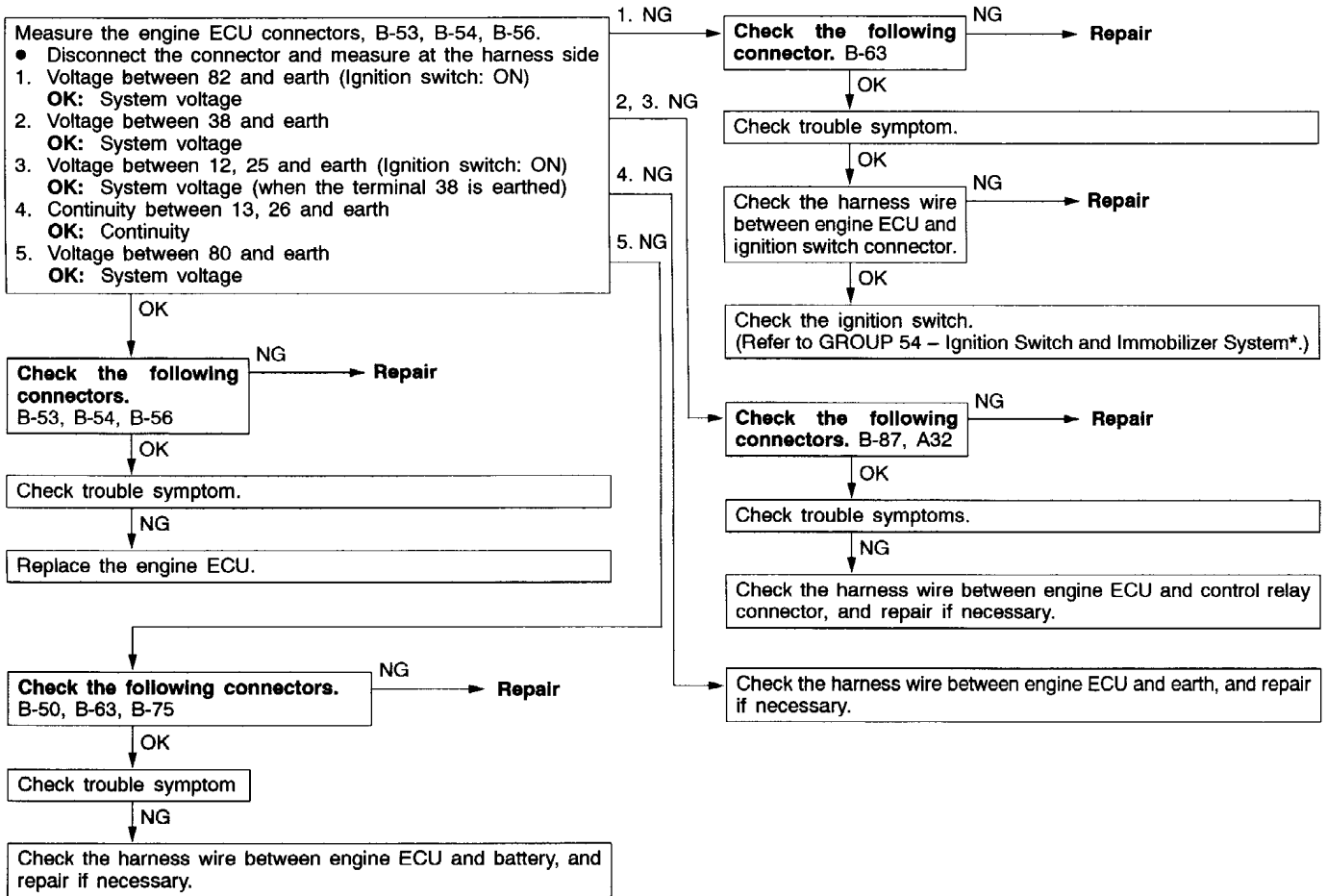
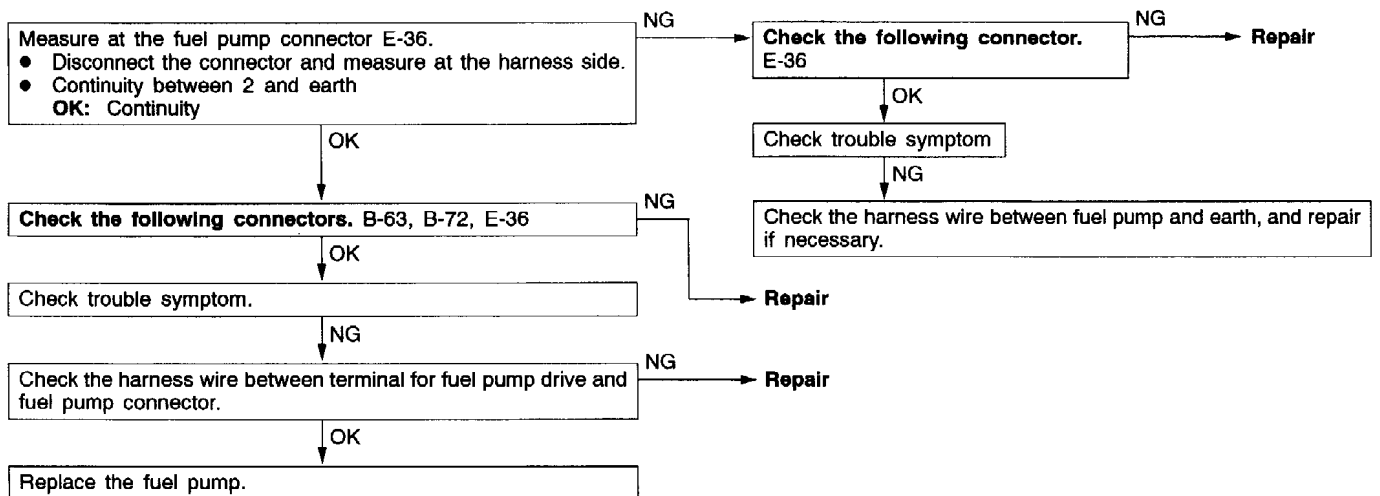
*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 42

MUT-II Check when surge occurs.

NOTE

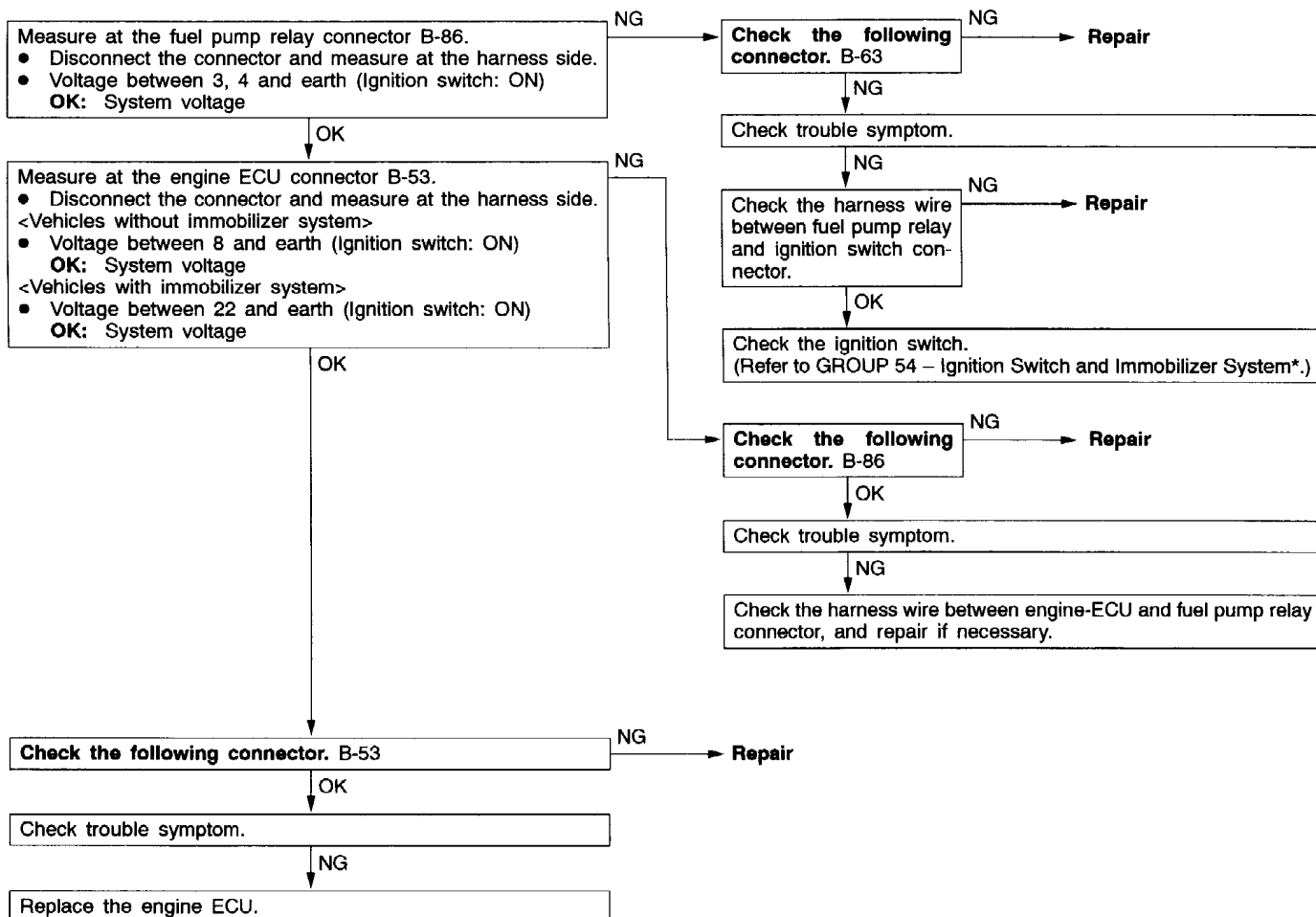
*: Refer to the '96 ECLIPSE Workshop Manual (Pub No. PWUE95E1).

INSPECTION PROCEDURE 43**Check the engine ECU power supply and earth circuit.****INSPECTION PROCEDURE 44****Check the fuel pump circuit.****NOTE**

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

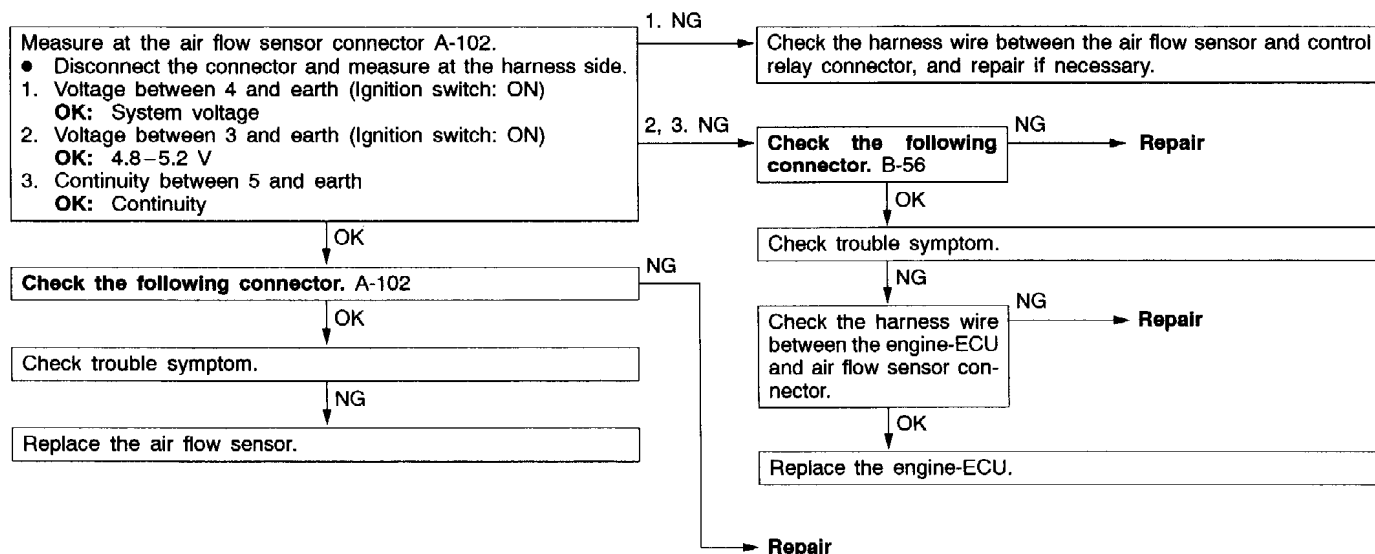
INSPECTION PROCEDURE 45

Check the fuel pump drive control circuit.



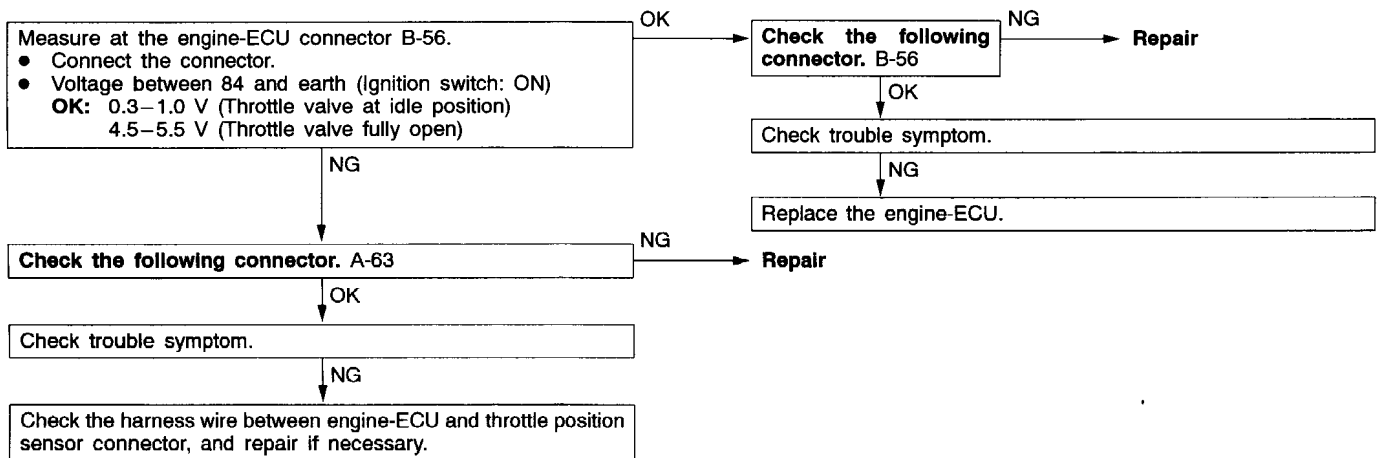
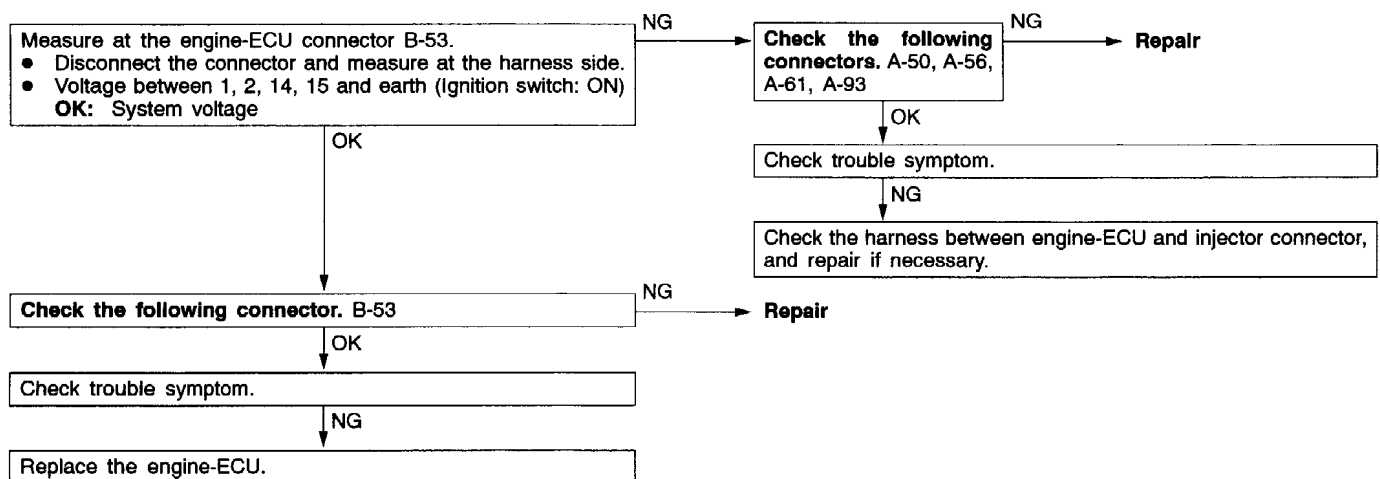
INSPECTION PROCEDURE 46

Check air flow sensor (AFS) control circuit.



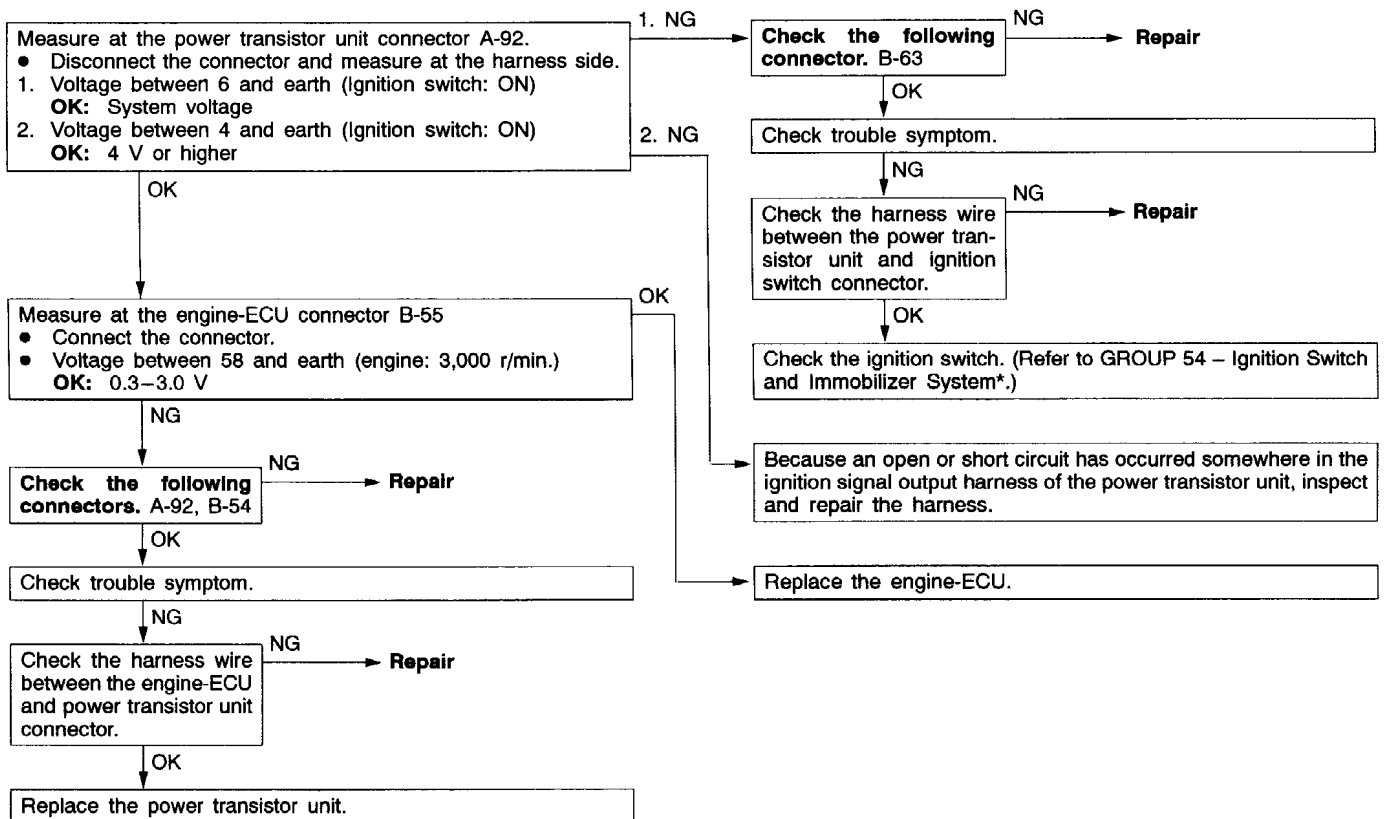
NOTE

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

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

INSPECTION PROCEDURE 49

Check the ignition signal circuit.



NOTE

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

DATA LIST REFERENCE TABLE

Caution

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

NOTE

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

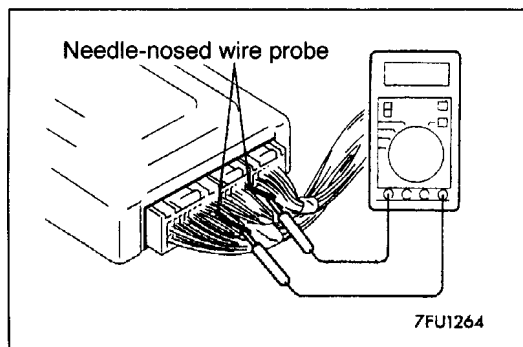
Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
11	Oxygen sensor (front)	Engine:After having warmed up Air/fuel mixture is made leaner when decelerating, and is made richer when racing.	When at 4,000 r/min, engine is suddenly decelerated	200 mV or less	Code No. 11	13A-3
			When engine is suddenly raced	600–1,000 mV		
		Engine:After having warmed up The oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECU.	Engine is idling	400 mV or less (Changes)		
			2,500 r/min	600–1,000 mV		
12	Air flow sensor*1	- Engine coolant temperature: 80–95°C - Lamps and all accessories: OFF - Transmission: Neutral	Engine is idling	25–51 Hz	—	—
			2,500 r/min	49–89		
			Engine is raced	Frequency increases in response to racing		
13	Intake air temperature sensor	Ignition switch: ON or with engine running	When intake air temperature is –20°C	–20°C	Code No. 13	13A-4
			When intake air temperature is 0°C	0°C		
			When intake air temperature is 20°C	20°C		
			When intake air temperature is 40°C	40°C		
			When intake air temperature is 80°C	80°C		
14	Throttle position sensor	Ignition switch: ON	Set to idle position	300–1,000 mV	Code No. 14	13A-5
			Gradually open	Increases in proportion to throttle opening angle		
			Open fully	4,500–5,500 mV		
16	Power supply voltage	Ignition switch: ON		System voltage	Procedure No. 24	13A-31
18	Cranking signal (ignition switch-ST)	Ignition switch: ON	Engine: Stopped	OFF	Procedure No. 27	13A-33
			Engine: Cranking	ON		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
21	Engine coolant temperature sensor	Ignition switch: ON or with engine running	When engine coolant temperature is -20°C	-20°C	Code No. 21	13A-6
			When engine coolant temperature is 0°C	0°C		
			When engine coolant temperature is 20°C	20°C		
			When engine coolant temperature is 40°C	40°C		
			When engine coolant temperature is 80°C	80°C		
22	Crank angle sensor	- Engine: Cranking - Tachometer: Connected	Compare the engine speed readings on the tachometer and the MUT-II.	Accord	Code No. 22	13A-7
		- Engine: Idling - Idle position switch: ON	When engine coolant temperature is -20°C	1,300–1,500 rpm		
			When engine coolant temperature is 0°C	1,200–1,400 rpm		
			When engine coolant temperature is 20°C	1,100–1,300 rpm		
			When engine coolant temperature is 40°C	950–1,150 rpm		
25	Barometric pressure sensor	Ignition switch: ON	At altitude of 0 m	101 kPa	Code No. 25	13A-9
			At altitude of 600 m	95 kPa		
			At altitude of 1,200 m	88 kPa		
			At altitude of 1,800 m	81 kPa		
26	Idle position switch	Ignition switch: ON Check by operating accelerator pedal repeatedly	Throttle valve: Set to idle position	ON	Procedure No. 26	13A-32
			Throttle valve: Slightly open	OFF*5		
27	Power steering fluid pressure switch	Engine: Idling	Steering wheel stationary	OFF	Procedure No. 28	13A-33
			Steering wheel turning	ON		
28	A/C switch	Engine: Idling (when A/C switch is ON, A/C compressor should be operating.)	A/C switch: OFF	OFF	Procedure No. 29	13A-34
			A/C switch: ON	ON		

Item No.	Inspection item	Inspection contents		Normal condition	Inspection procedure No.	Reference page
41	Injectors *2	Engine: Cranking	When engine coolant temperature is 0°C (injection is carried out for all cylinders simultaneously)	15–23 ms	–	–
			When engine coolant temperature is 20°C	32–47 ms		
			When engine coolant temperature is 80°C	7.4–11.0 ms		
	Injectors*3	- Engine coolant temperature: 80–95°C - Lamps and all accessories: OFF - Transmission: Neutral	Engine is idling	2.2–3.4 ms		
			2,500 r/min	1.7–2.9 ms		
			When engine is suddenly raced	Increases		
44	Ignition coils and power transistors	- Engine: After having warmed up - Timing lamp is set. (The timing lamp is set in order to check actual ignition timing.)	Engine is idling	0–13 °BTDC		
			2,500 r/min	23–43 °BTDC		
45	ISC (stepper) motor position *4	- Engine coolant temperature: 80–95°C - Lamps and all accessories: OFF - Transmission: Neutral - Idle position switch: ON - Engine: Idling - When A/C switch is ON, A/C compressor should be operating	A/C switch: OFF	2–25 STEP	–	–
			A/C switch: OFF → ON	Increases by 10–70 steps		
49	A/C relay	Engine: After having warmed up/Engine is idling	A/C switch: OFF	OFF (Compressor clutch is not operating)	Procedure No. 29	13A-34
			A/C switch: ON	ON (Compressor clutch is operating)		
59	Oxygen sensor (rear)	- Transmission: 2nd gear - Drive with throttle widely open	3,500 r/min	600–1,000 mV	Code No. 59	13A-13

ACTUATOR TEST REFERENCE TABLE

Item No.	Inspection item	Drive contents	Inspection contents		Normal condition	Inspection procedure No.	Reference page
01	Injectors	Cut fuel to No. 1 injector	Engine: After having warmed up/Engine is idling (Cut the fuel supply to each injector in turn and check cylinders which don't affect idling.)		Idling condition becomes different (becomes unstable).	Code No. 41	13A-11
02		Cut fuel to No. 2 injector					
03		Cut fuel to No. 3 injector					
04		Cut fuel to No. 4 injector					
07	Fuel pump	Fuel pump operates and fuel is recirculated.	- Engine: Cranking - Fuel pump: Forced driving according to both the above conditions.	Pinch the return hose with fingers to feel the pulse of the fuel being recirculated.	Pulse is felt.	Procedure No. 25	13A-32
				Listen near the fuel tank for the sound of fuel pump operation.	Sound of operation is heard.		
08	Purge control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Sound of operation can be heard when solenoid valve is driven.	Procedure No. 33	13A-36
10	EGR control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: ON		Sound of operation can be heard when solenoid valve is driven.	Procedure No. 34	13A-36
20	Radiator fan (Hi) Condenser fan (Hi)	Drive the fan motors (radiator and condenser).	Ignition switch: ON A/C switch: ON		Fan motor operates at high speed	Procedure No. 30	13A-34
21	Radiator fan (Lo)	Drive the radiator fan motor	Ignition switch: ON A/C switch: ON		Fan motor operates at low speed.	Procedure No. 30	13A-34

**CHECK AT THE ENGINE ECU TERMINALS****TERMINAL VOLTAGE CHECK CHART**

1. Connect a needle-nosed wire probe (test harness: MB991223 or paper clip) to a voltmeter probe.
2. Insert the needle-nosed wire probe into each of the engine ECU connector terminals from the wire side, and measure the voltage while referring to the check chart.

NOTE

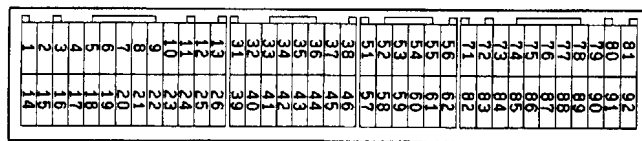
1. Make the voltage measurement with the engine ECU connectors connected.
2. You may find it convenient to pull out the engine ECU to make it easier to reach the connector terminals.
3. The checks can be carried out off the order given in the chart.

Caution

Short-circuiting the positive (+) probe between a connector terminal and earth could damage the vehicle wiring, the sensor, engine ECU or all of them. Be careful to prevent this!

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

Engine-ECU Connector Terminal Arrangement



9FU0393

NOTE

*: Vehicles with immobilizer system

Terminal No.	Check item	Check condition (Engine condition)	Normal condition
1	No. 1 injector	While engine is idling after having warmed up, suddenly depress the accelerator pedal.	From 11–14 V, momentarily drops slightly
14	No. 2 injector		
2	No. 3 injector		
15	No. 4 injector		
4	Stepper motor coil <A1>	Engine: Soon after the warmed up engine is started	System voltage ↔ 0 V (Changes repeatedly)
17	Stepper motor coil <A2>		
5	Stepper motor coil <B1>		
18	Stepper motor coil <B2>		
6	EGR control solenoid valve	Ignition switch: ON	System Voltage
		While engine is idling, suddenly depress the accelerator pedal.	From system voltage, momentarily drops
8 or 22*	Fuel pump relay	Ignition switch: ON	System voltage
		Engine: Idle speed	0–3V
9	Purge control solenoid valve	Ignition switch: ON	System voltage
		Running at 3,000r/min while engine is warming up after having been started.	0–3V
10	Power transistor unit A	Engine r/min: 3,000 r/min	0.3–3.0V
23	Power transistor unit B		
12	Power supply	Ignition switch: ON	System voltage
25			
19	Air flow sensor reset signal	Engine: Idle speed	0–1V
		Engine r/min: 3,000 r/min	6–9V

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

Terminal No.	Check item	Check condition (Engine condition)		Normal condition
71	Ignition switch – ST	Engine: Cranking		8V or more
72	Intake air temperature sensor	Ignition switch: ON	When intake air temperature is 0°C	3.2–3.8V
			When intake air temperature is 20°C	2.3–2.9V
			When intake air temperature is 40°C	1.5–2.1V
			When intake air temperature is 80°C	0.4–1.0V
75	Oxygen sensor (rear)	• Transmission: 2nd gear <M/T>, L range <A/T> • Engine r/min: 3,500 r/min or more • Driving with the throttle valve widely open		0.6–1.0V
76	Oxygen sensor (front)	Engine: Running at 2,500 r/min after warmed up (Check using a digital type voltmeter)		0 ↔ 0.8V (Changes repeatedly)
80	Backup power supply	Ignition switch: OFF		System voltage
81	Sensor impressed voltage	Ignition switch: ON		4.5–5.5V
82	Ignition switch – IG	Ignition switch: ON		System voltage
83	Engine coolant temperature sensor	Ignition switch: ON	When engine coolant temperature is 0°C	3.2–3.8V
			When engine coolant temperature is 20°C	2.3–2.9V
			When engine coolant temperature is 40°C	1.3–1.9V
			When engine coolant temperature is 80°C	0.3–0.9V
84	Throttle position sensor	Ignition switch: ON	Set throttle valve to idle position	0.3–1.0V
			Fully open throttle valve	4.5–5.5V
85	Barometric pressure sensor	Ignition switch: ON	When altitude is 0m	3.7–4.3V
			When altitude is 1,200m	3.2–3.8V
86	Vehicle speed sensor	• Ignition switch: ON • Move the vehicle slowly forward		0 ↔ 5V (Changes repeatedly)
87	Idle position switch	Ignition switch: ON	Set throttle valve to idle position	0–1V
			Slightly open throttle valve	4V or more

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

CHECK CHART FOR RESISTANCE AND CONTINUITY BETWEEN TERMINALS

1. Turn the ignition switch to OFF.
2. Disconnect the engine-ECU connector.
3. Measure the resistance and check for continuity between the terminals of the engine-ECU harness-side connector while referring to the check chart.

NOTE

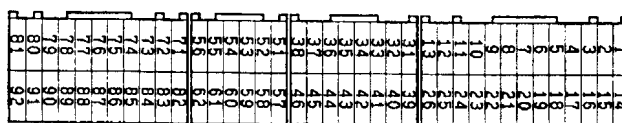
1. When measuring resistance and checking continuity, a harness for checking contact pin pressure should be used instead of inserting a test probe.
2. Checking need not be carried out in the order given in the chart.

Caution

If the terminals that should be checked are mistaken, or if connector terminals are not correctly shorted to earth, damage may be caused to the vehicle wiring, sensors, engine-ECU and/or ohmmeter. Be careful to prevent this!

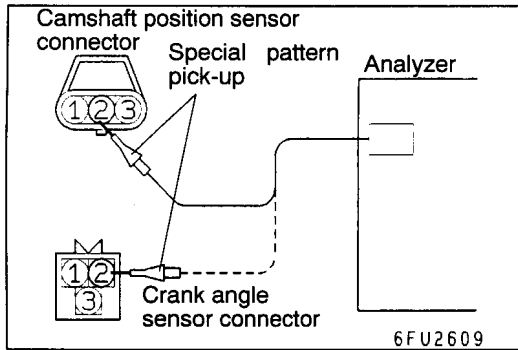
4. If the ohmmeter shows any deviation from the standard value, check the corresponding sensor, actuator and related electrical wiring, and then repair or replace.
5. After repair or replacement, recheck with the ohmmeter to confirm that the repair or replacement has corrected the problem.

Engine-ECU Harness Side Connector Terminal Arrangement



9FU0392

Terminal No.	Inspection item	Normal condition (Check condition)
1–12	No. 1 injector	13–16 Ω (At 20°C)
14–12	No. 2 injector	
2–12	No. 3 injector	
15–12	No. 4 injector	
4–12	Stepper motor coil (A1)	28–33 Ω (At 20°C)
17–12	Stepper motor coil (A2)	
5–12	Stepper motor coil (B1)	
18–12	Stepper motor coil (B2)	
6–12	EGR control solenoid valve	36–44 Ω (At 20°C)
9–12	Purge control solenoid valve	36–44 Ω (At 20°C)
13–Body earth	Engine-ECU earth	Continuity (0 Ω)
26–Body earth	Engine-ECU earth	
60–12	Oxygen sensor heater	7–40 Ω (At 20°C)
72–92	Intake air temperature sensor	5.3–6.7 k Ω (When intake air temperature is 0°C)
		2.3–3.0 k Ω (When intake air temperature is 20°C)
		1.0–1.5 k Ω (When intake air temperature is 40°C)
		0.30–0.42 k Ω (When intake air temperature is 80°C)
83–92	Engine coolant temperature sensor	5.1–6.5 k Ω (When coolant temperature is 0°C)
		2.1–2.7 k Ω (When coolant temperature is 20°C)
		0.9–1.3 k Ω (When coolant temperature is 40°C)
		0.26–0.36 k Ω (When coolant temperature is 80°C)
87–92	Idle position switch	Continuity (when throttle valve is at idle position)
		No continuity (when throttle valve is slightly open)



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

Measurement Method

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

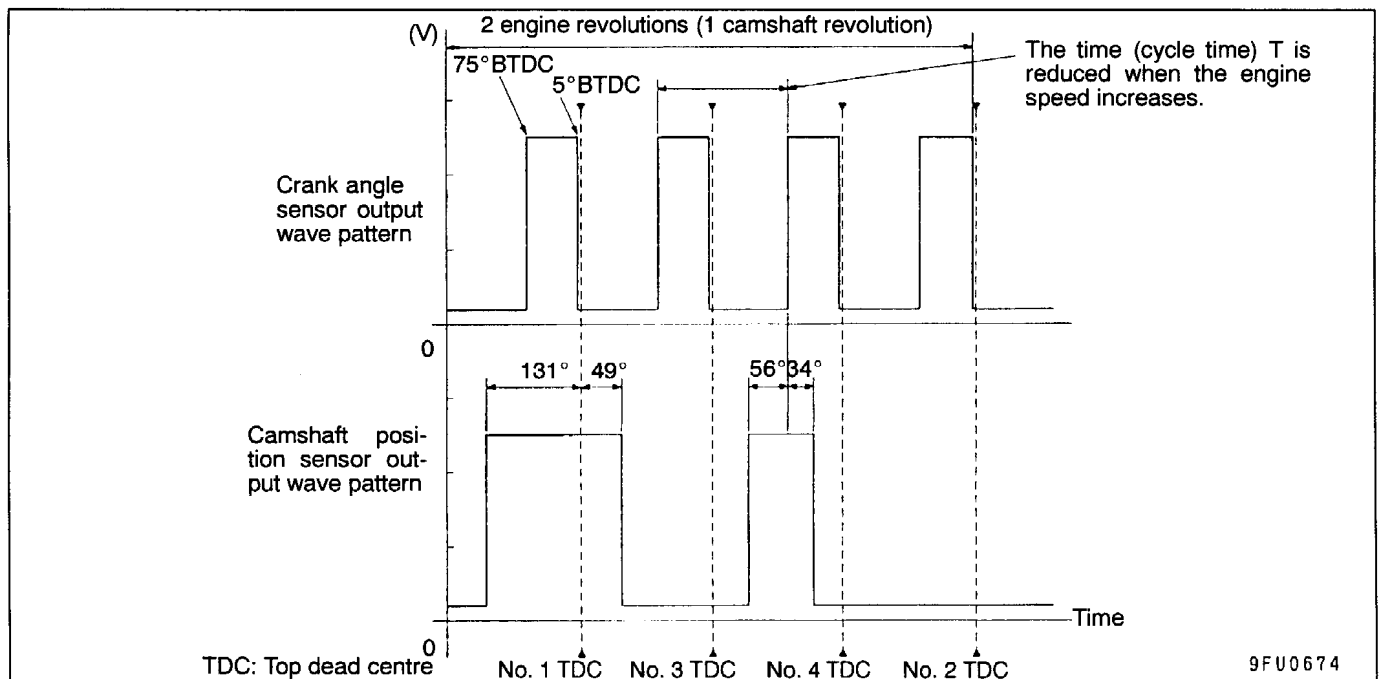
Alternate Method (Test harness not available)

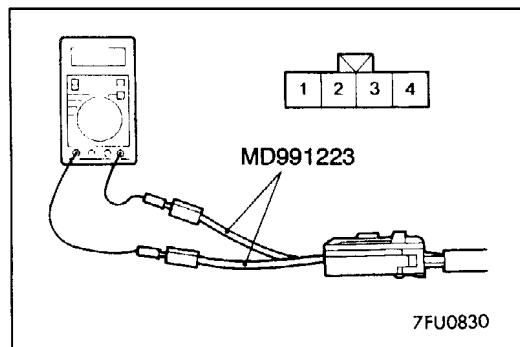
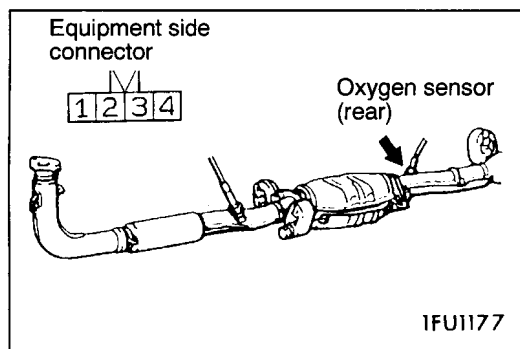
1. Connect the analyzer special pattern pickup to engine-ECU terminal 88. (When checking the camshaft position sensor signal wave pattern.)
2. Connect the analyzer special pattern pickup to engine-ECU terminal 89. (When checking the crank angle sensor signal wave pattern.)

Standard Wave Pattern Observation conditions

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

Standard wave pattern





ON-VEHICLE SERVICE

OXYGEN SENSOR CHECK

<Oxygen sensor (rear)>

1. Disconnect the oxygen sensor connector and connect the special tool (test harness set) to the connector on the oxygen sensor side.
2. Make sure that there is continuity ($7-40\ \Omega$ at 20°C) between terminal 3 and terminal 4 on the oxygen sensor connector.
3. If there is no continuity, replace the oxygen sensor.

NOTE

1. If the MUT-II does not display the standard value although no abnormality is found by the above mentioned continuity test and harness check, replace the oxygen sensor (rear).
2. For removal and installation of the oxygen sensor, refer to GROUP 15 – Exhaust Pipe and Main Muffler.

GROUP 15

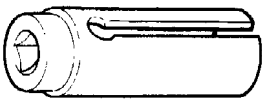
INTAKE AND EXHAUST

GENERAL

OUTLINE OF CHANGES

- The service procedures of exhaust pipe have been changed to correspond to the addition of the oxygen sensor <rear>.

SPECIAL TOOL

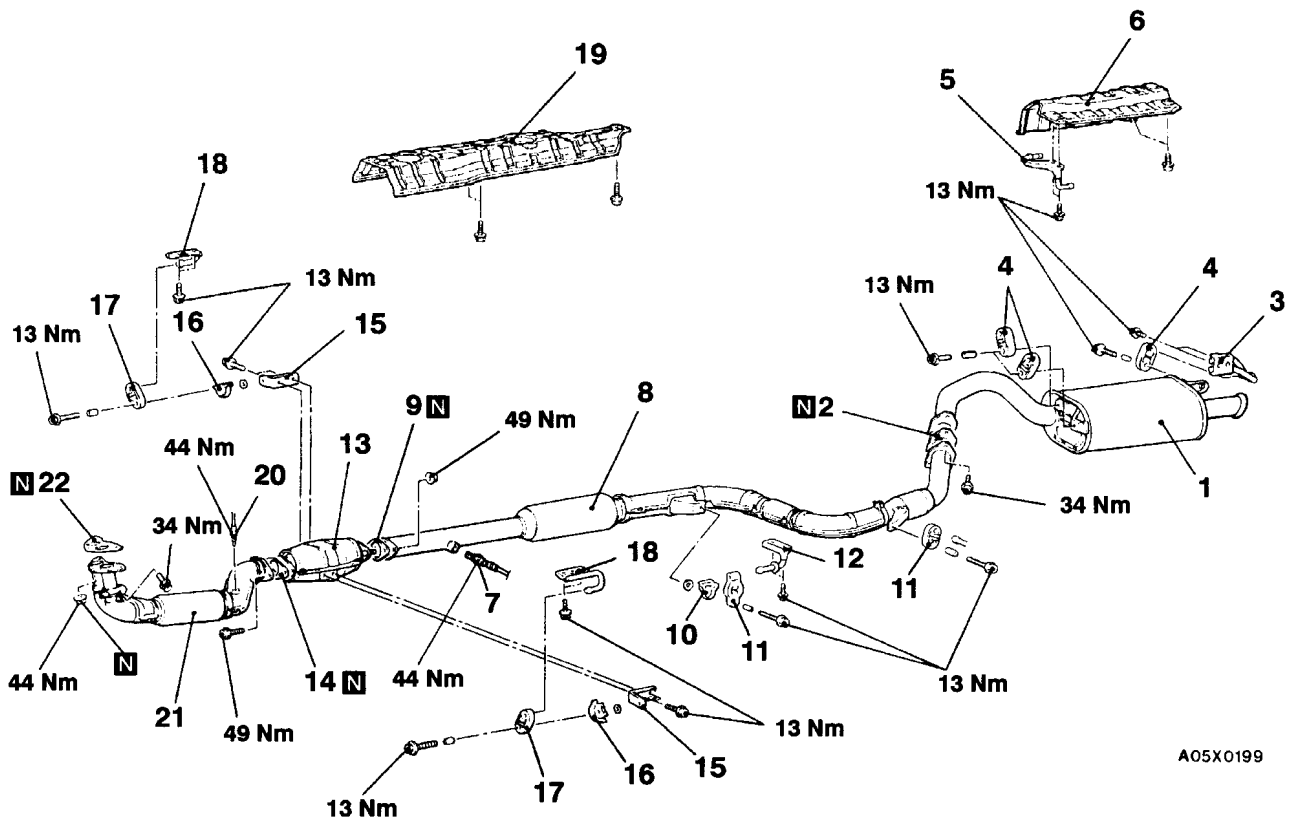
Tool	Number	Name	Use
	MD998770	Oxygen sensor wrench	Removal/Installation of oxygen sensor

EXHAUST PIPE AND MAIN MUFFLER

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Under Cover Removal and Installation



A05X0199

Main muffler removal steps

1. Main muffler assembly
2. Gasket
3. Hanger
4. Hanger
5. Rear hanger
6. Rear floor heat protector panel

Catalytic converter removal steps

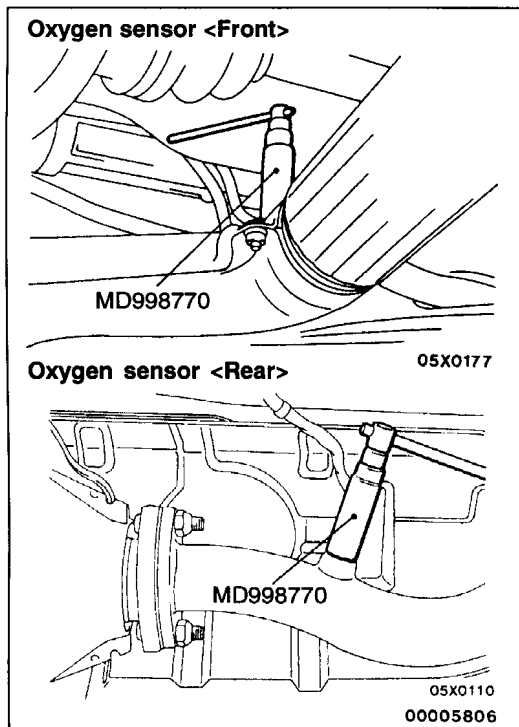
13. Catalytic converter
14. Gasket
15. Catalytic converter bracket
16. Hanger protector
17. Hanger
18. Front hanger
19. Front floor heat protector panel

Center exhaust pipe removal steps

- ◀A▶ ▶A▶
7. Oxygen sensor <rear>
 8. Centre exhaust pipe
 9. Gasket
 10. Hanger protector
 11. Hanger
 12. Center hanger

Front exhaust pipe removal steps

- ◀A▶ ▶A▶
20. Oxygen sensor <front>
 21. Front exhaust pipe
 22. Gasket



REMOVAL SERVICE POINT

◀A▶ OXYGEN SENSOR <REAR>/OXYGEN SENSOR <FRONT> REMOVAL

INSTALLATION SERVICE POINT

▶A◀ OXYGEN SENSOR <FRONT>/OXYGEN SENSOR <REAR> INSTALLATION

GROUP 16

ENGINE ELECTRICAL

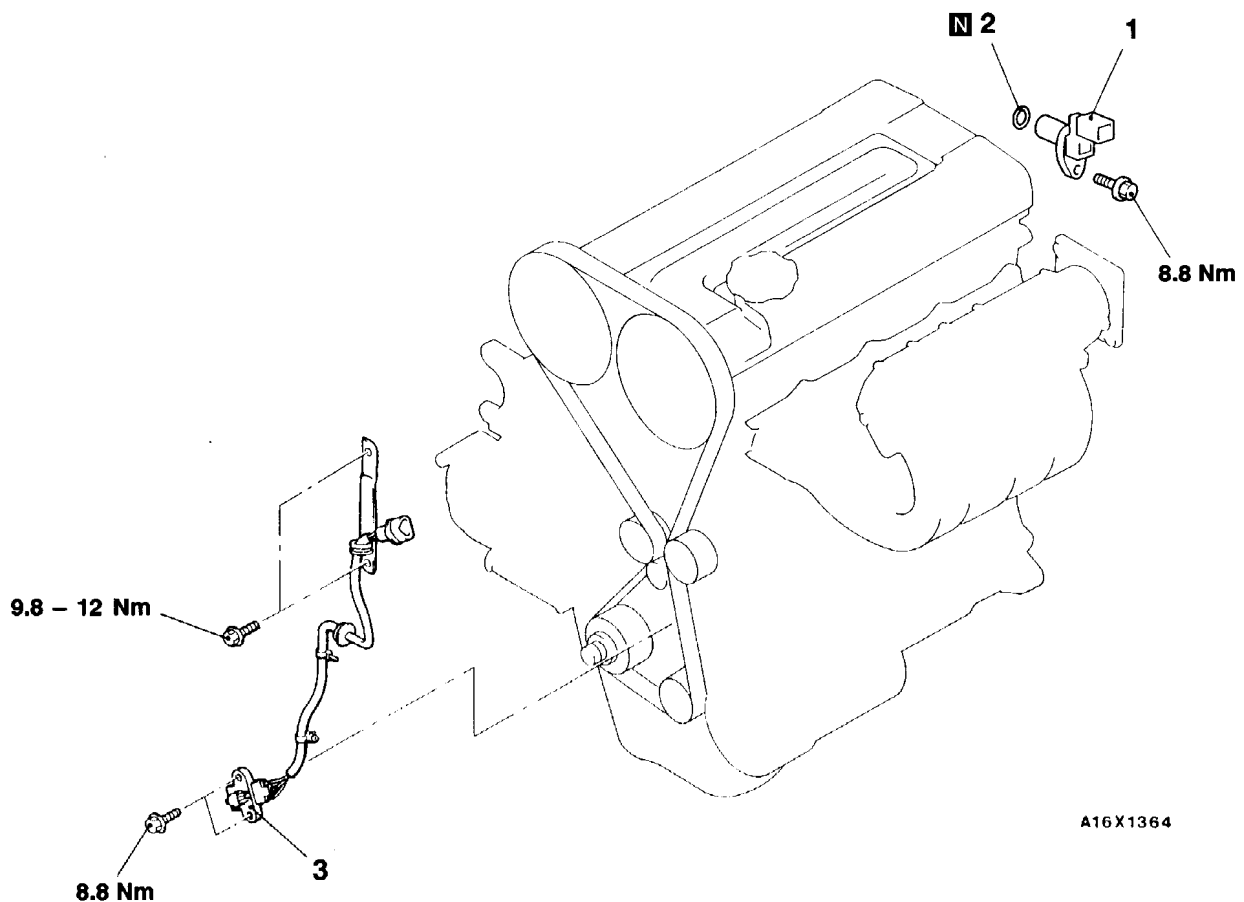
GENERAL

OUTLINE OF CHANGES

- The following service procedures have been changed to correspond to the change of the camshaft position sensor
 1. Camshaft position sensor
 2. Crankshaft position sensor

CAMSHAFT POSITION SENSOR AND CRANKSHAFT POSITION SENSOR

REMOVAL AND INSTALLATION



Removal steps

1. Camshaft position sensor
2. O-ring
 - Timing belt
3. Crankshaft position sensor

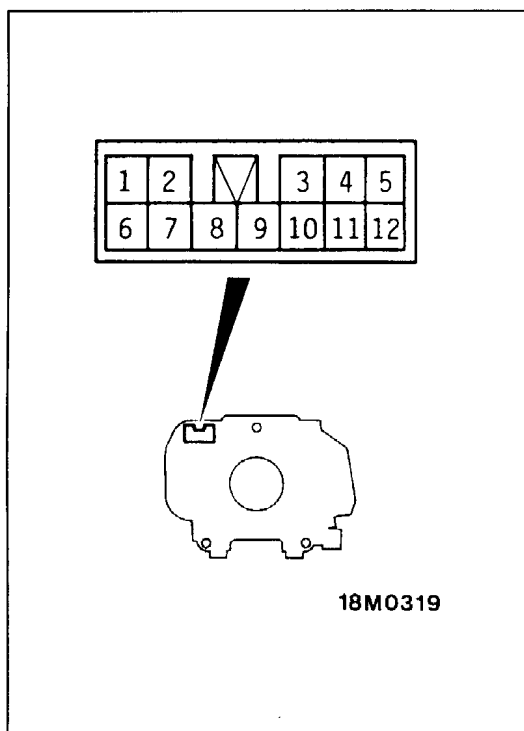
GROUP 51

EXTERIOR

GENERAL

OUTLINE OF CHANGES

- The inspections of wiper and washer switch and headlamp washer switch have been changed to correspond to the change of the column switch.



WINDSHIELD WIPER AND WASHER

INSPECTION

COLUMN SWITCH

Wiper and Washer Switch Continuity Check

Switch position		Terminal No.				
		6	7	8	9	10
Wiper switch	OFF		○—○			
	INT		○—○			
	1 (LO)			○—○		
	2 (HI)				○—○	
Washer switch	ON	○				○

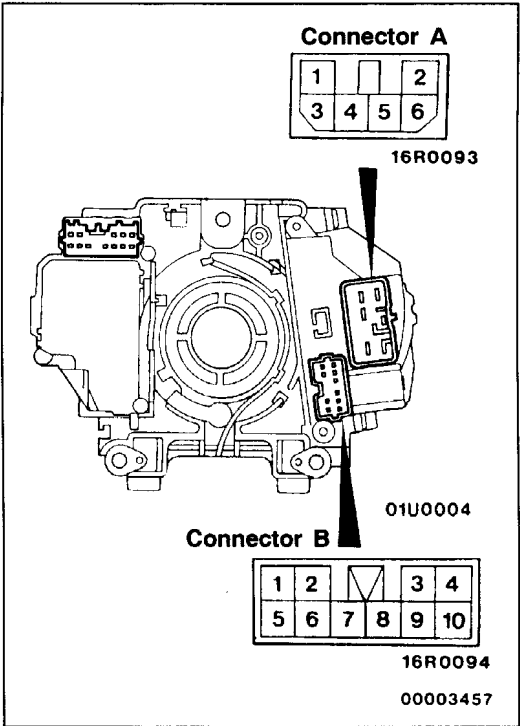
Intermittent Wiper Relay (Intermittent Operation Inspection)

- Connect the column switch connector.
- Turn the ignition switch to ACC.
- Check the intermittent operation time when the wiper switch is turned to INT.

Variable intermittent control

FAST: Approx. 2 seconds

SLOW: Approx. 15 seconds



HEADLAMP WASHER

INSPECTION

HEADLAMP WASHER SWITCH CHECK

Switch position		Connector A Terminal No.1	Connector B Terminal No.2
Washer switch	OFF		
	ON		

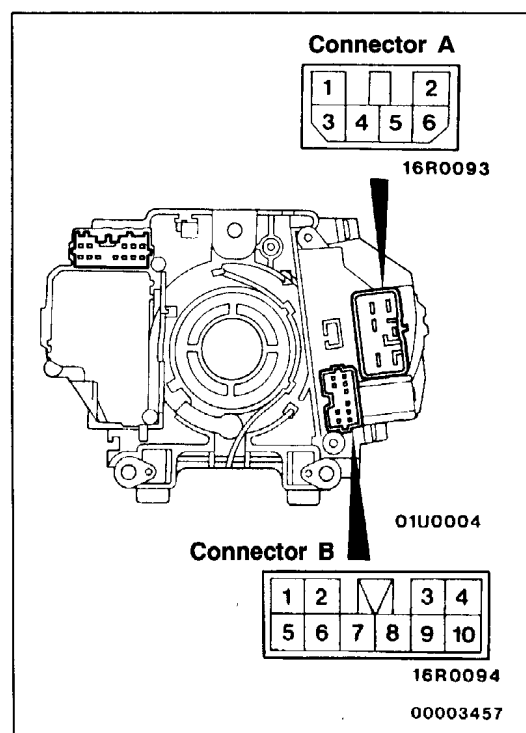
GROUP 54

CHASSIS ELECTRICAL

GENERAL

OUTLINE OF CHANGES

- The inspections of lighting switch, dimmer/passing switch and turn-signal lamp switch have been changed to correspond to the change of the column switch.
- The removal and installation procedures have been established to correspond to the addition of the clock to the vehicle without radio.



HEADLAMP AND FRONT TURN-SIGNAL LAMP ASSEMBLY

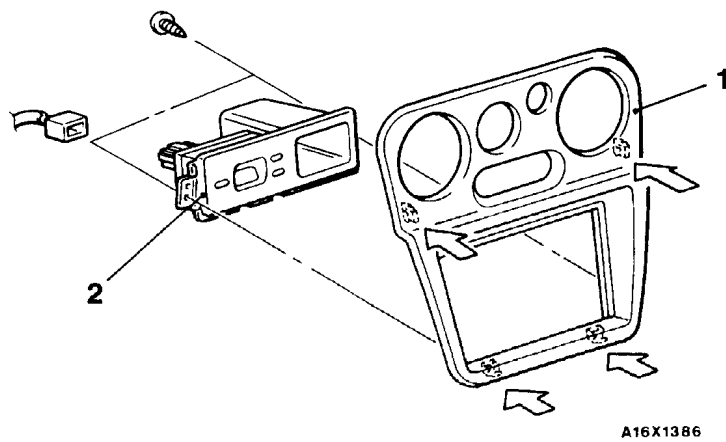
INSPECTION

COLUMN SWITCH CONTINUITY CHECK

Switch position		Connector A-terminal No.					Connector B-terminal No.					
		1	2	3	4	6	3	5	6	7	8	9
LIGHTING SWITCH	OFF											
	TAIL							○	—	○		
	HEAD	○	—					○	—	○		
DIMMER/ PASSING SWITCH	LOWER			○	○							
	UPPER				○	○						
	PASSING	○	○	○	*1	○						
				○	*2	○						
TURN-SIGNAL LAMP SWITCH	RH										○	○
	OFF											
	LH							○	—	—	○	

NOTE

1. *1 indicates continuity when the dimmer switch is in the lower position.
2. *2 indicates continuity when the dimmer switch is in the upper position.

CLOCK**REMOVAL AND INSTALLATION****NOTE**

↔ :Metal clip position

Removal steps

1. Center console panel
2. Clock